

Evaluation of Ionia Wastewater
Treatment Plant (WWTP) Biosolids
Land Application
Sites 08N06W02-RW01, RW02 &
RW03

Ionia County, Michigan

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1. Introduction

This technical memorandum summarizes and reports the findings of site investigations conducted at land application Sites 08N06W02-RW01 (Site RW01), 08N06W02-RW02 (Site RW02) and 08N06W02-RW03 (Site RW03) (**Figure 1**). The purpose of the investigation was to determine the impact, if any, from the land application of Per- and Polyfluoroalkyl Substances (PFAS)-impacted biosolids from the Ionia Wastewater Treatment Plant (WWTP) in the neighboring residential wells.

The field investigation activities were designed to characterize groundwater conditions and collect data to evaluate the risk to human health and the environment from land applying potential PFAS-impacted biosolids. A review of existing data was used to guide the scope of this investigation. Field investigation activities at the Sites included residential well sampling activities.

2. Background

Site RW01 is a 62-acre field southeast of Cedar Lake Road and W S County Line Road in Fenwick, Michigan, approximately 10 miles northeast of the Ionia WWTP. The Prairie Creek flows along the eastern edge of Site RW01 from north to south. Site RW02 is a 72-acre field directly west of Site RW01, on the southwest corner of Cedar Lake Road and W S County Line Road. Sites RW01 and RW02 are approximately a quarter mile north of Palo, Michigan and Site RW03. Site RW03 is a 26-acre field south of Van Vleck Road, directly east of the town of Palo, Michigan. The Prairie Creek also flows along the eastern edge of Site RW03.

Application to apply biosolids from the Ionia WWTP to Site RW01 was first received by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division (WRD) in 2003. Records indicate Site RW01 received 1773 dry tons (dT) of biosolids from nine (9) applications by the Ionia WWTP from 2003 through 2017. Applications were mostly consistent across a majority of the entire acreage of the Site and were relatively moderate or heavy, ranging from 64.68 to 298.22 dT and application rates of 1.55 to 5.78 dT per acre. The average application rate was 4.0 dT per acre. The application of biosolids to Site RW01 is attached in **Table 1a**.

Application to apply biosolids from the Ionia WWTP to Site RW02 was first received by the EGLE WRD in 2004. Records indicate Site RW02 received 943.4 dT of biosolids from seven (7) applications by the Ionia WWTP from 2004 through 2011. Applications did not cover the entire acreage of the Site and were relatively moderate, ranging from 60.2 to 202.53 dT and application rates of 2.15 to 6.08 dT per acre. The average application rate was 4.15 dT per acre. The application of biosolids to Site RW02 is attached in **Table 1b**.

Application to apply biosolids from the Ionia WWTP to Site RW03 was first received by the EGLE WRD in 2008. Records indicate Site RW03 received 312.790 dT of biosolids from three (3) applications by the Ionia WWTP from 2009 through 2015. Applications mostly covered the entire acreage of the Site and were relatively moderate, ranging from 34.97 to 147.26 dT and application rates of 3.18 to 5.66 dT per acre. The average application rate was 4.62 dT per acre. The application of biosolids to Site RW03 is attached in **Table 1c**.

The investigation conducted by AECOM on behalf of EGLE was performed in accordance with applicable AECOM, EGLE, and US Environmental Protection Agency (USEPA) guidance

documents, including the Scope of Work and the Quality Assurance Project Plan (QAPP), previously developed in 2018.

The USEPA has classified PFAS as emerging contaminants that are regulated by EGLE under Part 201, Environmental Remediation, and Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, Act 451 of 1994, as amended and their respective administrative rules, specifically Rule 299.44-299.50 (Generic Cleanup Criteria) and Rule 323.1057 (Rule 57) (Toxic Substances) of the Michigan Administrative Code. PFAS are a complex family of more than 4,750 human-made fluorinated organic chemicals. Due to their unique chemical properties, PFAS have been used in many industries and consumer products since the late 1950s. The Interstate Technology Regulatory Council (ITRC) has identified four (4) primary sources of PFAS: fire training/fire response sites, industrial sites, landfills, and wastewater treatment plants/biosolids.

AECOM initially sampled the Ionia WWTP on October 31, 2018. The Ionia WWTP has an approved Industrial Pretreatment Program (IPP) and authorization to discharge treated municipal wastewater under NPDES permit number MI0021041. The influent, effluent, and biosolids were analyzed for EGLE's recommended minimum analyte list of 24 PFAS compounds, using an isotope dilution method. The influent and effluent samples collected during the AECOM October 2018 event exceeded Rule 57 Water Quality Standards (WQS) for Perfluorooctane Sulfonic Acid (PFOS) (12 ng/L); however, the samples did not exceed Rule 57 WQS for Perfluorooctanoic Acid (PFOA) (12,000 ng/L) (**Section 8**). The Ionia WWTP has frequently sampled its effluent since October 2018 for PFAS. The results from the Ionia WWTP sampling events are summarized below, listed as the range of values detected by year.

Sample Location	Sample Year	PFOA¹ (detection range)	PFOS¹ (detection range)
Influent	2018	< 1.53 – < 2.00	213 – 499.36
Influent	2019	< 15.17	< 15.17
Effluent	2018	< 1.6 – 2.5	185 – 635
Effluent	2019	< 2.00 – 10.25	< 2.00 – 217.43
Effluent	2020	< 3.87 – 6.45	< 3.87 – 25.48
Biosolids	2018	< 9.7 – 1.45	1000 – 1220

¹Units for aqueous samples are in nanograms per liter (ng/L) or parts per trillion (ppt) and the solids are in micrograms per kilogram (µg/Kg) or parts per billion (ppb).

The Ionia WWTP has been approved to apply biosolids to the neighboring farmland since 2003, which provided Sites RW01, RW02 and RW03 for the study of biosolids from an IPP WWTP in the soil, surface water, and groundwater. The analytical results from sampling the influent, effluent, and biosolids at the Ionia WWTP represents only the conditions at the time of sampling. There is not enough historic information to accurately estimate the concentrations of PFOA and PFOS within the Ionia WWTP in the past, including the biosolids. It is documented that PFOA and PFOS were much more widely used in the past. As a result, concentrations in all environmental matrices found in agricultural fields where Ionia WWTP biosolids were land applied in the past may not be closely correlated to current concentrations found within the WWTP. However, biosolids associated with IPP WWTPs are expected to have higher PFAS concentrations than those from non-IPP WWTPs. The Ionia WWTP and agricultural fields RW01, RW02 and RW03, were selected to compare with other WWTPs and agricultural fields that participate in the IPP that had lower PFAS concentrations in their biosolids and non-IPP WWTPs and agricultural fields.

EGLE conducted an initial, limited investigation in September 2019 through July 2020 at the Ionia WWTP Sites RW01, RW02, and RW03 that included the collection of 37 nearby residential well samples. EGLE sampled nearby residential wells for protection of public health in the absence of being able to directly sample the soil, surface water, and groundwater at Sites RW01, RW02, and RW03 (**Figure 2**).

3. Hydrogeology/Geology

The geology and topography of Sites RW01, RW02, and RW03 are the result of glacial activity. The glacial aquifers consist of sand and gravel that are part of a thick sequence of Pleistocene glacial deposits. The area is composed of end moraines and outwash plains that are predominately composed of a sandy outwash and loamy till. **Appendix A** provides the primary surface soil types identified on each field by the USDA Natural Resources Conservation Service Web Soil Survey. No soil borings were installed during this investigation. Only residential well samples were collected adjacent to the Sites.

Regional groundwater flow is expected to generally be towards surface water bodies such as ponds and streams. The general groundwater elevation map based on EGLE-provided shallow groundwater elevation data indicates groundwater flows to the east at Sites RW01, RW02 and RW03 (**Figure 2**). The figure also shows that the primary groundwater discharge point is the Prairie Creek, located east of the Ionia Sites, which flows from north to south.

4. Scope of Work

A total of 37 residential well samples were collected adjacent to the agricultural fields and in the nearby town of Palo, Michigan to evaluate the potential PFAS impact from the Ionia WWTP biosolids. The first 31 residential samples collected from August 2019 to March 2020 were submitted to Vista Analytical Laboratories and analyzed for USEPA Method 537 Rev 1.1 which had an analyte list of 14 PFAS. In July 2020 the last six (6) residential samples were collected and analyzed by Vista Analytical Laboratories using USEPA Method 537.1 which had an analyte list of 18 PFAS. The full list of 18 PFAS analytes is provided below with the final four (4) compounds on the list being the additional analytes that were later added for analysis.

PFAS Name	Carbon Chain length (C#)	Acronym	CAS #
Perfluorohexanoic Acid ¹	C6	PFHxA	307-24-4
Perfluoroheptanoic Acid ¹	C7	PFHpA	375-85-9
Perfluorooctanoic Acid ¹	C8	PFOA	335-67-1
Perfluorononanoic Acid ¹	C9	PFNA	375-95-1
Perfluorodecanoic Acid ¹	C10	PFDA	335-76-2
Perfluoroundecanoic Acid ¹	C11	PFUnDA	2058-94-8
Perfluorododecanoic Acid ¹	C12	PFDoDA	307-55-1
Perfluorotridecanoic Acid ¹	C13	PFTTrDA	72629-94-8
Perfluorotetradecanoic Acid ¹	C14	PFTeDA	376-06-7
Perfluorobutane Sulfonic Acid ²	C4	PFBS	375-73-5
Perfluorohexane Sulfonic Acid ²	C6	PFHxS	355-46-4

PFAS Name	Carbon Chain length (C#)	Acronym	CAS #
Perfluorooctane Sulfonic Acid ²	C8	PFOS	1763-23-1
N-Ethyl Perfluorooctane Sulfonamidoacetic Acid ³	C8	EtFOSAA	2991-50-6
N-Methyl Perfluorooctane Sulfonamidoacetic Acid ⁴	C8	MeFOSAA	2355-31-9
Perfluoro (2-methyl-3-oxahexanoic) Acid ⁵	C6	HFPO-DA (Gen-X)	13252-13-6
4,8-Dioxa-3H-perfluorononanoic Acid ⁵	C10	ADONA	919005-14-4
9-chlorohexadecafluoro-3-oxanone-1-sulfonic Acid ⁵	C8	F-53B Minor	756426-58-1
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic Acid ⁵	C10	F-53B Major	763051-92-9

¹Perfluoroalkyl Carboxylic Acids (PFCAs) Family is composed of the following PFAS: PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnDA, PFDoDA, PFTeDA, PFTeDA

²Perfluoroalkane Sulfonic Acids (PFSA) Family is composed of the following PFAS: PFBS, PFHxS, PFOS

³N-Ethyl Perfluoroalkane Sulfonamidoacetic Acids (EtFASAA) Family is composed of the following PFAS: EtFOSAA

⁴N-Methyl Perfluoroalkane Sulfonamidoacetic Acids (MeFASAA) Family is composed of the following PFAS: MeFOSAA

⁵Recent PFAS developed as replacement chemistry

5. Residential Well Sampling

A total of 37 residential well samples were collected from households adjacent to Sites RW01, RW02, and RW03 and in the nearby town of Palo, Michigan (**Figure 2**). Prior to collection of the residential well samples, field staff inquired details of the well (e.g., depth of well, age of well, treatment to well if applicable, etc.) and determined the best sample port nearest to the source of groundwater. The groundwater was purged and allowed to flush for approximately five (5) minutes. The analytical data are summarized in the table below and attached in **Table 2** and **Figure 2**.

Residential Sample ID	Sample Date	Well Depth ²	Total PFAS ¹	PFHxA ¹	PFOA ¹	PFNA ¹	PFBS ¹	PFHxS ¹	PFOS ¹
WT1907100910ST	7/10/2019	42	ND	< 2	< 2	< 2	< 2	< 2	< 2
WR1907100930ST	7/10/2019	31	308	75	33	< 2	140	5	2.0
WT1907100950ST	7/10/2019	127	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT1907101005ST	7/10/2019	64	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT1907101015ST	7/10/2019	60	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT1907101035ST	7/10/2019	59	36	5	9	< 2	3	3	13.0
WT1907101045ST	7/10/2019	30	15	< 2	4	< 2	3	4	4.0
WR1909240900KER	9/24/2019	30	ND	< 2	< 2	< 2	< 2	< 2	< 2
WR1909240920KER	9/24/2019	86	ND	< 2	< 2	< 2	< 2	< 2	< 2
WR1909240930KER	9/24/2019	75	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT1909240950KER	9/24/2019	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT1909241000KER	9/24/2019	100	ND	< 2	< 2	< 2	< 2	< 2	< 2

Residential Sample ID	Sample Date	Well Depth ²	Total PFAS ¹	PFHxA ¹	PFOA ¹	PFNA ¹	PFBS ¹	PFHxS ¹	PFOS ¹
WT1909241020KER	9/24/2019	140	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT1909241030KER	9/24/2019	N/A	34	4	6	< 2	17	2	3
WR1909241040KER	9/24/2019	50	74	12	31	< 2	11	3	6.0
WT1909241050KER	9/24/2019	40	5	< 2	2	< 2	3	< 2	< 2
WT1909241110KER	9/24/2019	N/A	26	5	10	< 2	4	3	< 2
WT1909241120KER	9/24/2019	117	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT1909241145KER	9/24/2019	39	ND	< 2	< 2	< 2	< 2	< 2	< 2
WSFT2003180950ST	3/18/2020	128	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT2003181015ST	3/18/2020	118	ND	< 2	< 2	< 2	< 2	< 2	< 2
WR2003181030ST	3/18/2020	67	ND	< 2	< 2	< 2	< 2	< 2	< 2
WSFT2003181120ST	3/18/2020	36	3	< 2	< 2	< 2	3	< 2	< 2
WT2003181250ST	3/18/2020	140	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT2003181340ST	3/18/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT2003181350ST	3/18/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT2003181400ST	3/18/2020	45	ND	< 2	< 2	< 2	< 2	< 2	< 2
WR2003181420ST	3/18/2020	N/A	125	13	26	3	10	7	58
WT2003181430ST	3/18/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT2003181515ST	3/18/2020	N/A	23	5	10	< 2	< 2	< 2	4
WR2003181530ST	3/18/2020	52	ND	< 2	< 2	< 2	< 2	< 2	< 2
WR2007161320GGA	7/16/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT2007161330GGA	7/16/2020	38	3	< 2	< 2	< 2	3	< 2	< 2
WT2007161400GGA	7/16/2020	N/A	9	4	3	< 2	< 2	< 2	2.0
WT2007161415GGA	7/16/2020	62	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT2007161500GGA	7/16/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 2
WT2007161530GGA	7/16/2020	54	ND	< 2	< 2	< 2	< 2	< 2	< 2

¹Units are in nanograms per liter (ng/L) or parts per trillion (ppt). ²Units are in feet below ground surface (ft bgs). N/A indicates unknown well depths. ND = Non-Detect with typical detection limits between 2 to 4 ng/L.

All samples taken from the 37 residential wells did not exceed Part 201 Residential and Nonresidential Drinking Water Criteria (DWC) for PFNA, PFHxS, PFHxA, and PFBS of 6, 51, 400,000, and 420 ng/L, respectively (**Table 2**). The following six (6) residential well samples exceeded Part 201 DWC for PFOA of 8 ng/L: WR1907100930ST, WT1907101035ST, WR1909241040KER, WT1909241110KER, WR2003181420ST and WT2003181515ST. Sample WR2003181420ST also exceeded Part 201 DWC for PFOS of 16 ng/L.

Per the Michigan Department of Health and Human Services (MDHHS) Site-Specific Public Health Action Plan for Private Drinking Water Wells, PFAS results were screened against the EGLE PFAS Health Based Values (i.e. the Part 201 DWC) since those values are lower than the MDHHS PFAS Public Health Drinking Water Screening Levels (SL), except for PFOS. The Part 201 DWC for PFOS is 16 ng/L, while the MDHHS (SL) is 8 ng/L. Samples WR2003181420ST (58 ng/L PFOS) and WT1907101035ST (13 ng/L PFOS) exceeded the MDHHS SL for PFOS.

Five (5) of the six (6) residential well samples that exceeded the Part 201 DWC for PFOA are located adjacent to the western edge of Site RW03, while the sixth residential well sample is located along the northern edge of Site RW01 (**Figure 3**). The depth of all six (6) residential

wells are relatively shallow, ranging from 31 to 59 feet below ground surface (bgs) or the depth is unknown. The single residential well sample that also exceeded the Part 201 DWC for PFOS is also located adjacent to the western edge of Site RW03 (**Figure 4**). The Ionia County Health Department in coordination with the MDHHS offered point-of-use (POU) filters as an interim response action to all households with detections of PFAS in their residential well, except for two (2) homes which only had detections of PFBS of 3 ng/L, which is significantly lower than the Part 201 DWC of 420 ng/L.

6. QA/QC Results

Laboratory reports 1902059, 1903280, 2000597, 2000598, 2000599, 2000600, 2000601, 2000602, 2000603, 2000604, 2000605, 2000606, 2000607, 2000608, 2001528 (Residential Wells) and 1803583 (Ionia WWTP) from Vista Analytical Laboratories were subjected to data quality review (**Appendix B**). The reports were evaluated for data completeness, holding times and sample preservation, method and field blanks, ongoing precision and recovery (OPR), field duplicate precision, extracted internal standard recoveries, and reporting issues.

The initial calibration and continuing calibration verifications met the method acceptance criteria. A method blank and ORP sample was extracted and analyzed with each preparation batch. No analytes were detected in the method blank above half (1/2) the Limit of Quantification (LOQ). The OPR recoveries were within the method acceptance criteria. No quality issues were identified for any of the samples, and all of the results were considered usable.

7. Investigation-Derived Waste (IDW)

Investigation-derived waste (IDW) generated during the investigation included the following:

- Disposable material such as:
 - Personal protective equipment (PPE)
 - Paper towels
 - Rags
 - Sampling waste (label backings, empty field blank bottles)
 - Buckets

Minimally contaminated disposable sampling materials and PPE were containerized and disposed of as ordinary solid waste.

8. Pathway and Receptors Evaluation

An exposure pathway includes five (5) components: the source of contamination, environmental media and transport mechanism, the point of exposure, route of exposure, and receptor population. A pathway is considered potentially complete if all five components are present, and one or more hazardous substances are detected. The human health risk associated with a potentially complete exposure pathway is acceptable if concentrations do not exceed the applicable criteria and background concentrations (Rule 299.1013(3)). Ecological risks are acceptable if concentrations do not exceed water quality values or soil screening values.

Potentially complete groundwater exposure pathways associated with Sites RW01, RW02 and RW03 and corresponding Part 201 cleanup criteria are:

- Part 201 Residential and Nonresidential Drinking Water Criteria (DWC):
 - PFOA = 8 ng/L
 - PFOS = 16 ng/L
 - Perfluorononanoic acid (PFNA) = 6 ng/L
 - Perfluorohexane sulfonic acid (PFHxS) = 51 ng/L
 - Perfluorohexanoic acid (PFHxA) = 400,000 ng/L
 - Perfluorobutane sulfonic acid (PFBS) = 420 ng/L
 - Hexafluoropropylene oxide dimer acid (HFPO-DA) 370 ng/L
- Groundwater-Surface Water Interface (GSI) Criteria: PFOA = 12,000 ng/L and PFOS = 12 ng/L

Additionally, EGLE only regulates PFOA and PFOS in the surface water. Criteria under the Michigan Rule 57 WQS were developed to protect humans, wildlife, and aquatic life. Potentially complete surface water exposure pathways associated with all Sites and corresponding Rule 57 WQS are:

PFAS	Human Noncancer Value (nondrinking water source)	Human Noncancer Value (drinking water source)	Final Chronic Value	Final Acute Value	Aquatic Maximum Value
PFOS ¹	12	11	140,000	1,600,000	780,000
PFOA ¹	12,000	420	880,000	15,000,000	7,700,000

¹Units are in nanograms per liter (ng/L) or parts per trillion (ppt). These units are considered equivalent.

Potentially complete soil exposure pathways associated with all Sites and corresponding Part 201 cleanup criteria (if available) are:

- Direct Contact Criteria (DCC; criteria not available)
- Human exposure by consuming impacted vegetation (gardening, farming; screening levels not available)

Potential receptors associated with groundwater are:

- People who use impacted groundwater for drinking water

Potential receptors associated with surface water are:

- People using the drains and streams and other impacted surface waters for recreation and fishing.
- Fish and other aquatic life.

Potential receptors associated with soil are:

- Residents living at or near impacted soil areas.
- Non-residential use of impacted soil areas, such as farming and commercial use

8.1 Residential Wells - Groundwater Evaluation

The EGLE Wellogic database was used to identify residential wells located near Sites RW01, RW02, RW03, and in the nearby town of Palo, Michigan. The EGLE Wellogic database does not include all of the well records; however, a review of additional scanned well logs was also performed. EGLE and AECOM contacted numerous households for residential well sampling based on their proximity to Sites RW01, RW02, and RW03, 37 of which provided access to sample their wells. Based on the results of this initial investigation, there is an unacceptable risk based on Part 201 DWC. Groundwater may also be used for agricultural irrigation, however; no irrigation wells are located on Sites RW01, RW02 or RW03.

9. Summary and Discussion

AECOM conducted a field investigation to determine the impact, if any, from the land application of biosolids containing high levels of PFAS concentrations from the Ionia WWTP in the residential wells near Sites RW01, RW02 and RW03. Land application field investigations will help guide the understanding of fate and transport of PFAS in environmental matrices and supplement fate and transport modeling analysis being conducted on this topic.

The residential well sampling results indicate varying PFAS concentrations and are summarized in **Table 2**. PFAS were detected in 12 of the 37 residential well samples, with total PFAS concentrations ranging from 3 to 308 ng/L (**Table 2** and **Figure 2**). The laboratory reports are included in **Appendix B**.

PFAS such as PFBA, PFPeA, PFHxA, PFHpA, PFBS, and PFPeS have a shorter carbon chain length and are referred to as short-chain PFAS. While PFAS such as PFHxS, PFOA, and PFOS have longer fluorinated carbon chain lengths referred to as long-chain PFAS. The carbon chain length for PFBA and PFBS is four (4), and eight (8) for PFOA and PFOS. The shorter the carbon chain length for PFAS, the more mobile they are in the environment. As a result, long-chain PFAS are expected to concentrate and be present in the biosolids and soils at higher concentrations, while short-chain PFAS to be more frequently detected in the aqueous phases such as groundwater. The detection limits for the solid phase (i.e., biosolids and soil) are in micrograms per kilogram ($\mu\text{g/Kg}$) or parts per billion (ppb). For the aqueous phase (i.e. groundwater), the detection limits are in nanograms per liter (ng/L) or parts per trillion (ppt). As a result, PFAS that are non-detect in the solid phase may still be present at very low concentrations below the detection limit and may be detected in the aqueous phases.

PFAS properties, including fate and transport in the environment, are still being studied and are currently not fully understood. Equations developed to estimate leachability and migration of PFAS have not been empirically verified at this time. EGLE is currently evaluating additional agricultural fields and performing subsurface modeling to better understand the fate and transport of PFOA and PFOS in the environment.

9.1 Residential Wells - Groundwater

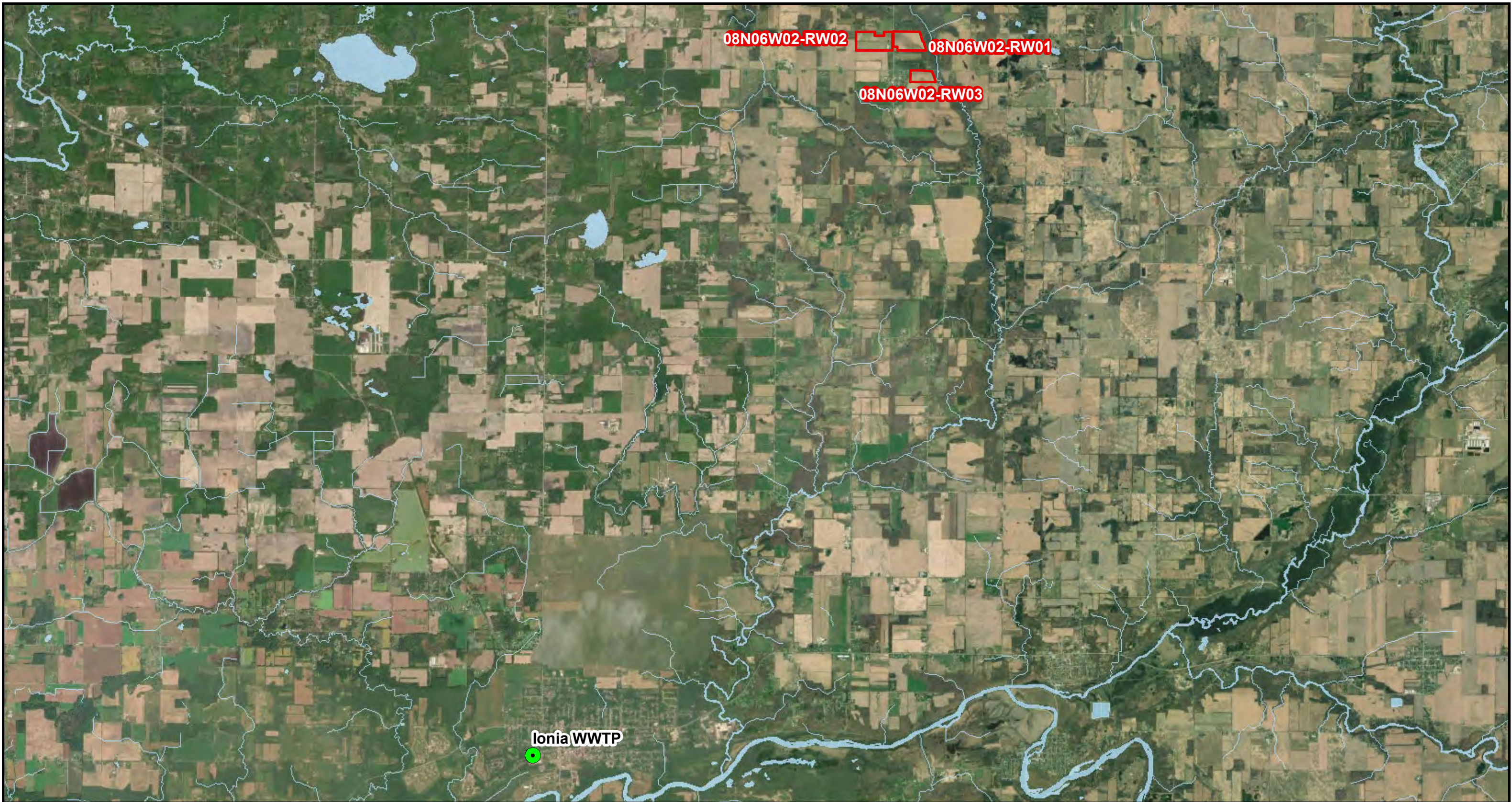
A total of 37 residential well samples were collected from neighboring household wells adjacent to Sites RW01, RW02, RW03 and in the nearby town of Palo, Michigan (**Figure 2**). Of the 37 residential samples, 25 reported total PFAS concentrations under detectable limits, while 12 of

the 37 residential samples reported total PFAS values ranging from 3 to 308 ng/L. Of the 18 PFAS analyzed, the following seven (7) compounds were detected: PFHxA, PFHpA, PFOA, PFNA, PFBS, PFHxS, and PFOS. The following six (6) residential well samples exceeded Part 201 DWC for PFOA of 8 ng/L: WR1907100930ST, WT1907101035ST, WR1909241040KER, WT1909241110KER, WR2003181420ST and WT2003181515ST. Only sample WR2003181420ST exceeded Part 201 DWC for PFOS of 16 ng/L. Note, samples WR2003181420ST (58 ng/L PFOS) and WT1907101035ST (13 ng/L PFOS) also exceeded the MDHHS SL for PFOS of 8 ng/L.

Of the 12 residential well samples that reported PFAS detections, six (6) of the wells are set at relatively shallow depths, between 30 to 59 ft bgs. EGLE and AECOM were unable to determine the well depth for the remaining five (5) residential well sample locations that reported PFAS detections. Additionally, five (5) of the six (6) residential wells that exceeded the Part 201 DWC for PFOS and PFOA are all located closely together in the town of Palo, west of Site RW03. Well logs from the surrounding residential wells, including those in Palo, show they are predominantly placed in the upper drift sediments. The wells to the west of Site RW03 showed an upper clay layer ranging from 11 to 46 ft thick, with deeper layers of sands, clays, and gravels.

The groundwater from residential wells neighboring Sites RW01, RW02 and RW03 showed impact of short and long-chain PFAS, with PFOA and PFOS Part 201 DWC exceedances and detections of PFHxA, PFHpA, and PFBS. Based on these findings, there does appear to be a potential risk to the surrounding drinking water wells. Since EGLE and AECOM did not directly sample the soil, surface water, and groundwater at Sites RW01, RW02, and RW03, it is unclear if the land application of biosolids from the Ionia WWTP is the source of PFAS contamination in this area. Further investigations are needed to identify the source and determine the extent of PFAS in this area.

Figures



AECOM



Drawn: SJE Date: 1/21/2021

Approved: DB Date: 1/21/2021

Project #:



Legend

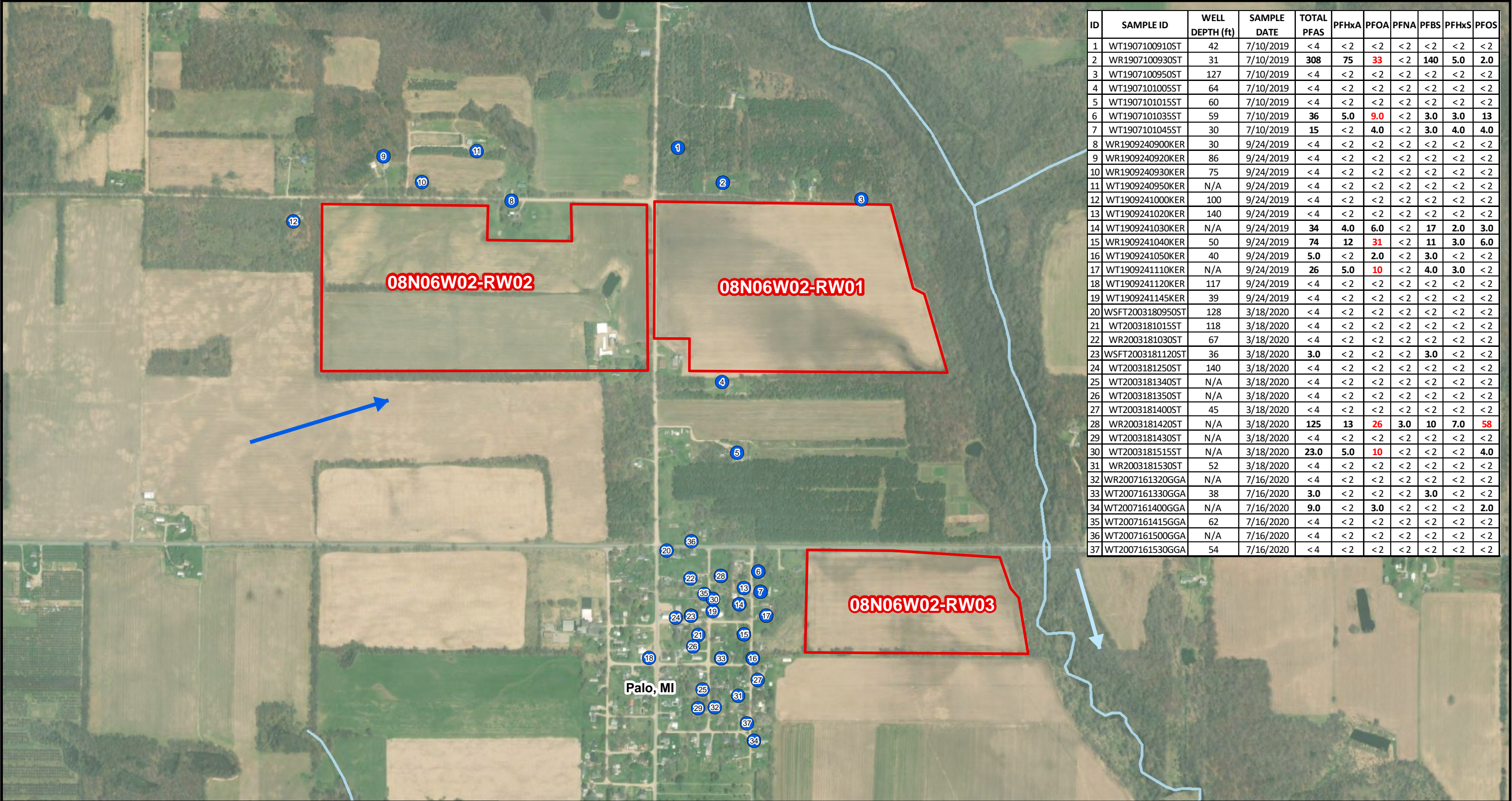
-  Waste Water Treatment
-  Biosolids Application



0 2 4 Miles

FIGURE 1
IONIA BIOSOLIDS
APPLICATION FIELDS OVERVIEW

IONIA, MI



ID	SAMPLE ID	WELL DEPTH (ft)	SAMPLE DATE	TOTAL PFAS	PFHxA	PFOA	PFNA	PFBS	PFHxS	PFOS
1	WT1907100910ST	42	7/10/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
2	WR1907100930ST	31	7/10/2019	308	75	33	< 2	140	5.0	2.0
3	WT1907100950ST	127	7/10/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
4	WT1907101005ST	64	7/10/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
5	WT1907101015ST	60	7/10/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
6	WT1907101035ST	59	7/10/2019	36	5.0	9.0	< 2	3.0	3.0	13
7	WT1907101045ST	30	7/10/2019	15	< 2	4.0	< 2	3.0	4.0	4.0
8	WR1909240900KER	30	9/24/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
9	WR1909240920KER	86	9/24/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
10	WR1909240930KER	75	9/24/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
11	WT1909240950KER	N/A	9/24/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
12	WT1909241000KER	100	9/24/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
13	WT1909241020KER	140	9/24/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
14	WT1909241030KER	N/A	9/24/2019	34	4.0	6.0	< 2	17	2.0	3.0
15	WR1909241040KER	50	9/24/2019	74	12	31	< 2	11	3.0	6.0
16	WT1909241050KER	40	9/24/2019	5.0	< 2	2.0	< 2	3.0	< 2	< 2
17	WT1909241110KER	N/A	9/24/2019	26	5.0	10	< 2	4.0	3.0	< 2
18	WT1909241120KER	117	9/24/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
19	WT1909241145KER	39	9/24/2019	< 4	< 2	< 2	< 2	< 2	< 2	< 2
20	WSFT2003180950ST	128	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
21	WT2003181015ST	118	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
22	WR2003181030ST	67	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
23	WSFT2003181120ST	36	3/18/2020	3.0	< 2	< 2	< 2	3.0	< 2	< 2
24	WT2003181250ST	140	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
25	WT2003181340ST	N/A	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
26	WT2003181350ST	N/A	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
27	WT2003181400ST	45	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
28	WR2003181420ST	N/A	3/18/2020	125	13	26	< 2	3.0	10	7.0
29	WT2003181430ST	N/A	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
30	WT2003181515ST	N/A	3/18/2020	23.0	5.0	10	< 2	< 2	< 2	4.0
31	WR2003181530ST	52	3/18/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
32	WR2007161320GGA	N/A	7/16/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
33	WT2007161330GGA	38	7/16/2020	3.0	< 2	< 2	< 2	3.0	< 2	< 2
34	WT2007161400GGA	N/A	7/16/2020	9.0	< 2	3.0	< 2	< 2	< 2	2.0
35	WT2007161415GGA	62	7/16/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
36	WT2007161500GGA	N/A	7/16/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2
37	WT2007161530GGA	54	7/16/2020	< 4	< 2	< 2	< 2	< 2	< 2	< 2

AECOM

Drawn: JS Date: 2/1/2021

Approved: LM Date: 2/1/2021

Project #:

●

Residential Sample Location

+

Biosolids Application Field

→

Surface Water Flow Direction

→

Approximate GW Flow Direction

Michigan Part 201 Residential & Nonresidential Drinking Water Criteria (DWC), ng/L
PFHxA = 400,000 PFBS = 420
PFOA = 8 PFHxS = 51
PFNA = 6 PFOS = 16
Red text indicates exceedance of Part 201 DWC
All sample results are in ng/L

00.250.5

Miles

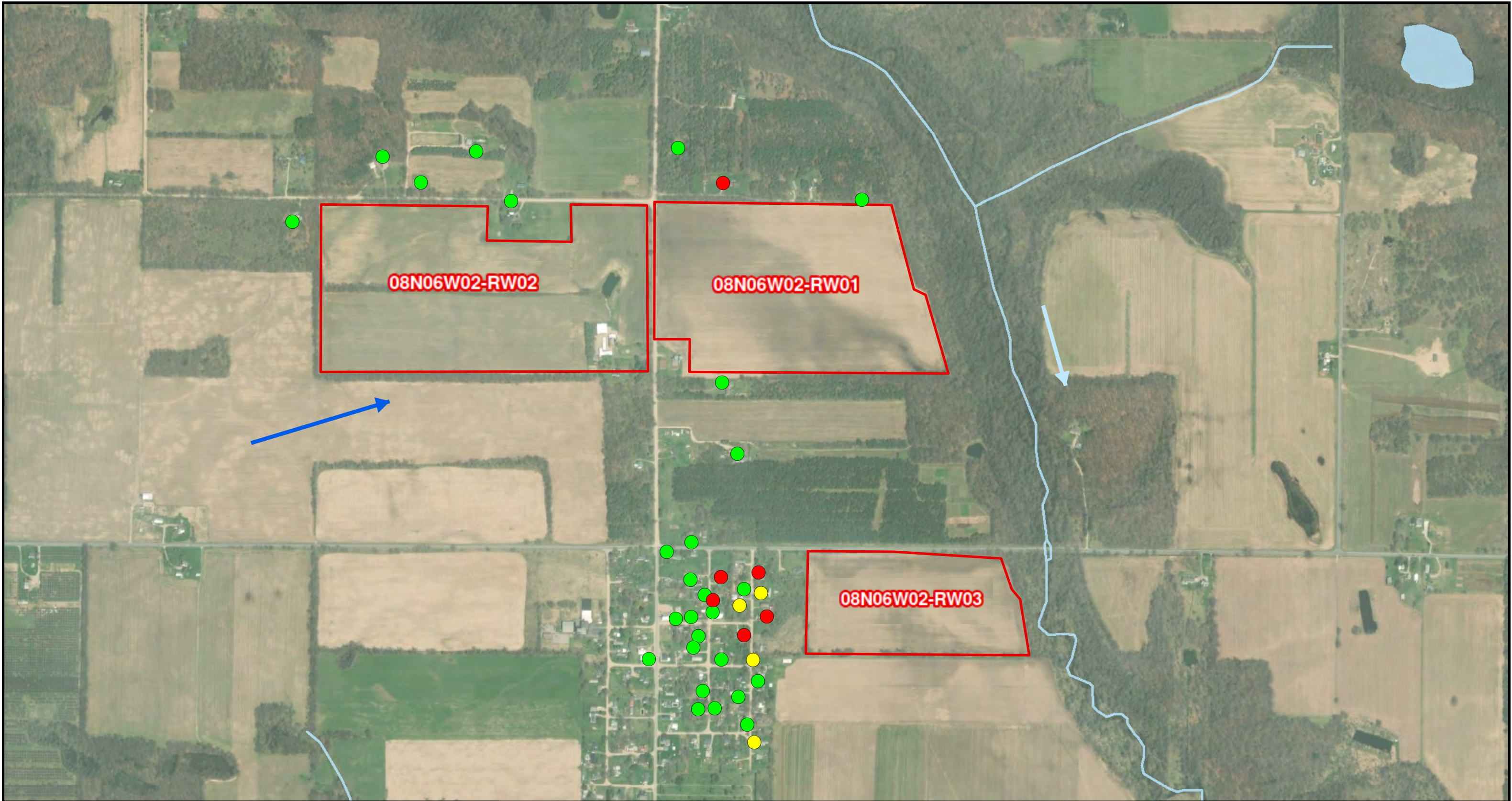
N

FIGURE 2

RESIDENTIAL PFAS SAMPLING RESULTS

IONIA, MI

Document Path: L:\DCS\GIS\ArcMap_GeoDB_Projects\ENV\GIS_Data\GIS\Biosolids_MDEQ\MXD\Ionia\Figure2_Ionia_Residential_Sampling_TotalPFAS.mxd



AECOM

Drawn: JS Date: 1/19/2021

Approved: LM Date: 1/19/2021

Project #:



Legend

Residential Samples

PFOA (ng/L)

● Below Detection Limit (DL)

● >DL - ≤Part 201 DWC

● >Part 201 DWC

Michigan Part 201 Residential and Nonresidential
Drinking Water Criteria (DWC)
PFOA=8 ng/L



Biosolids Application Field



Surface Water Flow Direction



Approximate GW Flow Direction



0

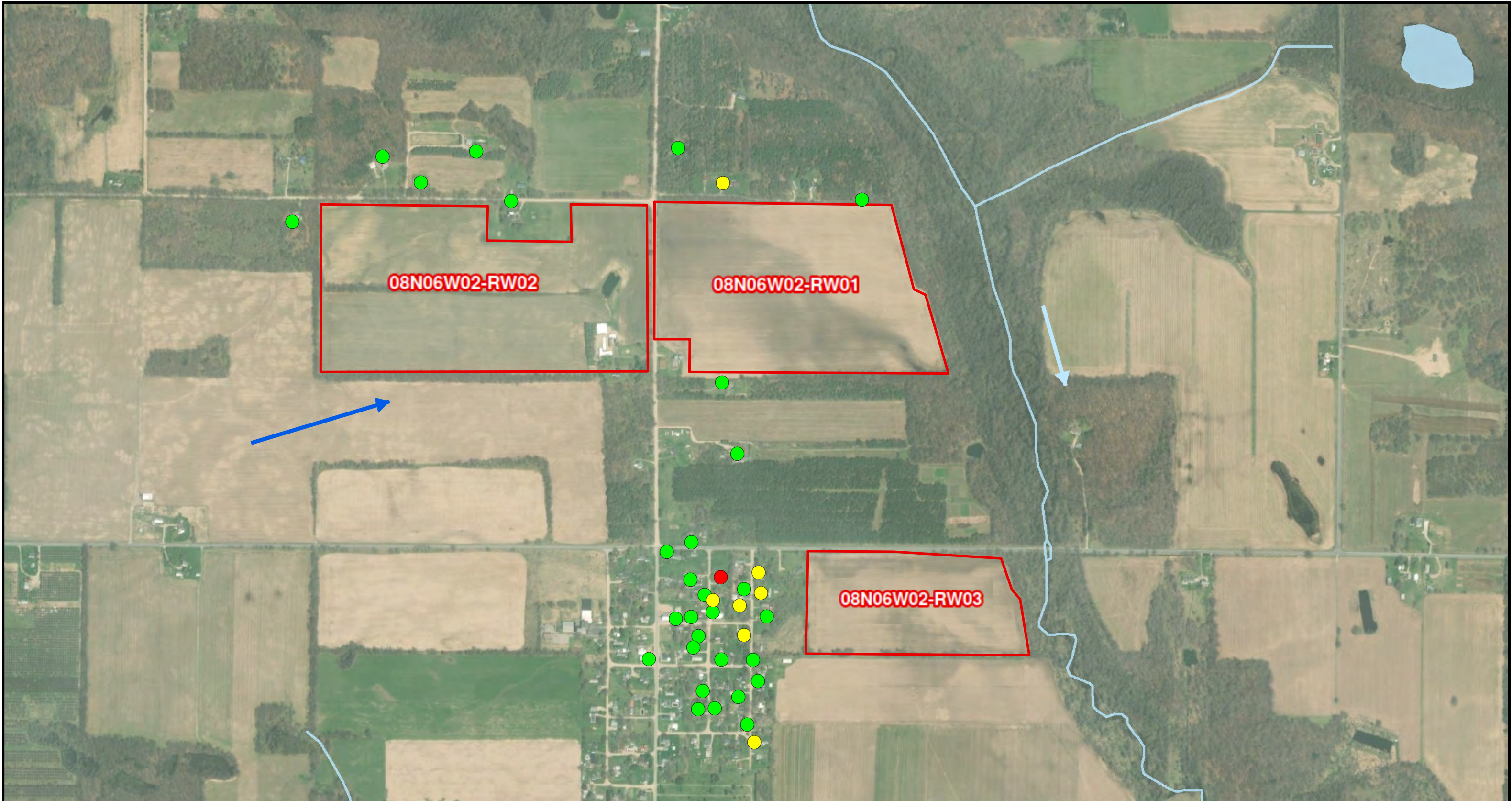
0.25

0.5

Miles

FIGURE 3
RESIDENTIAL SAMPLING
RESULTS PFOA HEAT MAP
PART 201 DWC EXCEEDENCES

IONIA, MI



AECOM

Drawn: JS Date: 1/19/2021

Approved: LM Date: 1/19/2021

Project #:



Legend

Residential Samples

PFOS (ng/L)

● Below Detection Limit (DL)

● >DL - ≤Part 201 DWC

● >Part 201 DWC

Michigan Part 201 Residential and Nonresidential
Drinking Water Criteria (DWC)
PFOS=16 ng/L



Biosolids Application Field



Surface Water Flow Direction



Approximate GW Flow Direction

0

0.25

0.5

Miles



FIGURE 4
RESIDENTIAL SAMPLING
RESULTS PFOS HEAT MAP
PART 201 DWC EXCEEDENCES

IONIA, MI

Tables

Table 1a
Parcel ID: 08N06W02-RW01
Biosolids Application Data

Year	Site ID	Dry Ton (dT) Land Applied	Acres Used	Acres Approved	Dry Tons (dT) / Acre	Dates/Additional Information
2017	08N06W02-RW01	209.38	62	62	3.38	N/A
2015	08N06W02-RW01	170.46	55	62	3.1	N/A
2012	08N06W02-RW01	274.33	62	62	4.42	N/A
2010	08N06W02-RW01	225.24	39	62	5.78	N/A
2008	08N06W02-RW01	253.73	58	62	4.37	N/A
2007	08N06W02-RW01	93	60	62	1.55	N/A
2006	08N06W02-RW01	64.68	12	62	5.39	N/A
2005	08N06W02-RW01	184.14	62	62	2.97	N/A
2003	08N06W02-RW01	298.22	62	62	4.81	N/A
Total dry tons:		1773	Average application rate (dry tons/acre):		4.0	

dT = dry tons

N/A = Not Applicable / Not Provided

Table 1b
Parcel ID: 08N06W02-RW02
Biosolids Application Data

Year	Site ID	Dry Ton (dT) Land Applied	Acres Used	Acres Approved	Dry Tons (dT) / Acre	Dates
2011	08N06W02-RW02	194.33	38	72	5.11	N/A
2009	08N06W02-RW02	152.06	25	72	6.08	N/A
2008	08N06W02-RW02	79.37	20	72	3.97	N/A
2007	08N06W02-RW02	60.2	28	72	2.15	N/A
2006	08N06W02-RW02	202.53	43	72	4.71	N/A
2005	08N06W02-RW02	65.4	20	72	3.27	N/A
2004	08N06W02-RW02	189.5	50	72	3.79	N/A
Total dry tons:		943.4	Average application rate (dry tons/acre):		4.15	

dT = dry tons

N/A = Not Applicable / Not Provided

Table 1c
Parcel ID: 08N06W02-RW03
Biosolids Application Data

Year	Site ID	Dry Ton (dT) Land Applied	Acres Used	Acres Approved	Dry Tons (dT) / Acre	Dates
2015	08N06W02-RW03	34.97	11	26	3.18	N/A
2011	08N06W02-RW03	130.56	26	26	5.02	N/A
2009	08N06W02-RW03	147.26	26	26	5.66	N/A
Total dry tons:		312.79	Average application rate (dry tons/acre):		4.62	

dT = dry tons

N/A = Not Applicable / Not Provided

Table 2

Parcel ID: 08N06W02-RW01, RW02 RW03
Residential Wells PFAS Analytical Results Summary

Residential Sample ID	Sample Date	Well Depth (ft)	Total PFAS	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFUnDA	PFDoDA	PFTTrDA	PFTeDA	PFBS	PFHxS	PFOS	EtFOSAA	MeFOSAA	HFPO-DA (Gen-X)	ADONA	F-53B Minor	F-53B Major
WT1907100910ST	7/10/2019	42	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WR1907100930ST	7/10/2019	31	308	75	53	33	< 2	< 2	< 4	< 4	< 4	< 4	140	5	2.0	< 4	< 4	--	--	--	--
WT1907100950ST	7/10/2019	127	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT1907101005ST	7/10/2019	64	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT1907101015ST	7/10/2019	60	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT1907101035ST	7/10/2019	59	36	5	3	9	< 2	< 2	< 4	< 4	< 4	< 4	3	3	13.0	< 4	< 4	--	--	--	--
WT1907101045ST	7/10/2019	30	15	< 2	< 2	4	< 2	< 2	< 4	< 4	< 4	< 4	3	4	4.0	< 4	< 4	--	--	--	--
WR1909240900KER	9/24/2019	30	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WR1909240920KER	9/24/2019	86	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WR1909240930KER	9/24/2019	75	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT1909240950KER	9/24/2019	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT1909241000KER	9/24/2019	100	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT1909241020KER	9/24/2019	140	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT1909241030KER	9/24/2019	N/A	34	4	2	6	< 2	< 2	< 4	< 4	< 4	< 4	17	2	3	< 4	< 4	--	--	--	--
WR1909241040KER	9/24/2019	50	74	12	11	31	< 2	< 2	< 4	< 4	< 4	< 4	11	3	6.0	< 4	< 4	--	--	--	--
WT1909241050KER	9/24/2019	40	5	< 2	< 2	2	< 2	< 2	< 4	< 4	< 4	< 4	3	< 2	< 2	< 4	< 4	--	--	--	--
WT1909241110KER	9/24/2019	N/A	26	5	4	10	< 2	< 2	< 4	< 4	< 4	< 4	4	3	< 2	< 4	< 4	--	--	--	--
WT1909241120KER	9/24/2019	117	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT1909241145KER	9/24/2019	39	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WSFT2003180950ST	3/18/2020	128	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT2003181015ST	3/18/2020	118	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WR2003181030ST	3/18/2020	67	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WSFT2003181120ST	3/18/2020	36	3	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	3	< 2	< 2	< 4	< 4	--	--	--	--
WT2003181250ST	3/18/2020	140	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT2003181340ST	3/18/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT2003181350ST	3/18/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT2003181400ST	3/18/2020	45	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WR2003181420ST	3/18/2020	N/A	125	13	8	26	3	< 2	< 4	< 4	< 4	< 4	10	7	58	< 4	< 4	--	--	--	--
WT2003181430ST	3/18/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WT2003181515ST	3/18/2020	N/A	23	5	4	10	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	4	< 4	< 4	--	--	--	--
WR2003181530ST	3/18/2020	52	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	--	--	--	--
WR2007161320GGA	7/16/2020	N/A	ND	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 4	< 4
WT2007161330GGA	7/16/2020	38	3	< 2	< 2	< 2	< 2	< 2	< 4	< 4	< 4	< 4	3	< 2	< 2	< 4	< 4	< 4	< 4	< 4	< 4
WT2007161400GGA	7/16/2020	N/A	9	4	< 2	3	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	2.0	< 4	< 4	< 4	< 4	< 4	< 4
WT2007161415GGA	7/16/2020	62	ND	< 2	< 3	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 4	< 4
WT2007161500GGA	7/16/2020	N/A	ND	< 2	< 4	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 4	< 4
WT2007161530GGA	7/16/2020	54	ND	< 2	< 5	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 2	< 2	< 2	< 4	< 4	< 4	< 4	< 4	< 4

All values are in nanograms per liter (ng/L) or parts per trillion (ppt)
" < " = Values Below Detection Limit (DL)
ND = Non-Detect (All Values Below DL)
N/A = Not Applicable / Not Provided
"--" = Not Analyzed
Bolded values indicate detection

EGLE Part 201 Drinking Water Criteria (DWC) (ng/L)
PFOA = 8; PFOS = 16; PFNA =6; PFHxS=51
PFHxA = 400,000; PFBS = 420

	Perfluoroalkyl Carboxylic Acids (PFCAs)
	Perfluoroalkane Sulfonic Acids (PFSAs)
	N-Ethyl Perfluoroalkane Sulfonamidoacetic Acids (EtFASAA s)
	N-Methyl Perfluoroalkane Sulfonamidoacetic Acids (MeFASAA s)
	Per- and Polyfluoroalkyl Ether Carboxylic Acids
	Additional Substances

PFHxA = Perfluorohexanoic acid
PFHpA = Perfluoroheptanoic acid
PFOA = Perfluorooctanoic acid
PFNA = Perfluorononanoic acid
PFDA = Perfluorodecanoic acid
PFUnDA = Perfluoroundecanoic acid

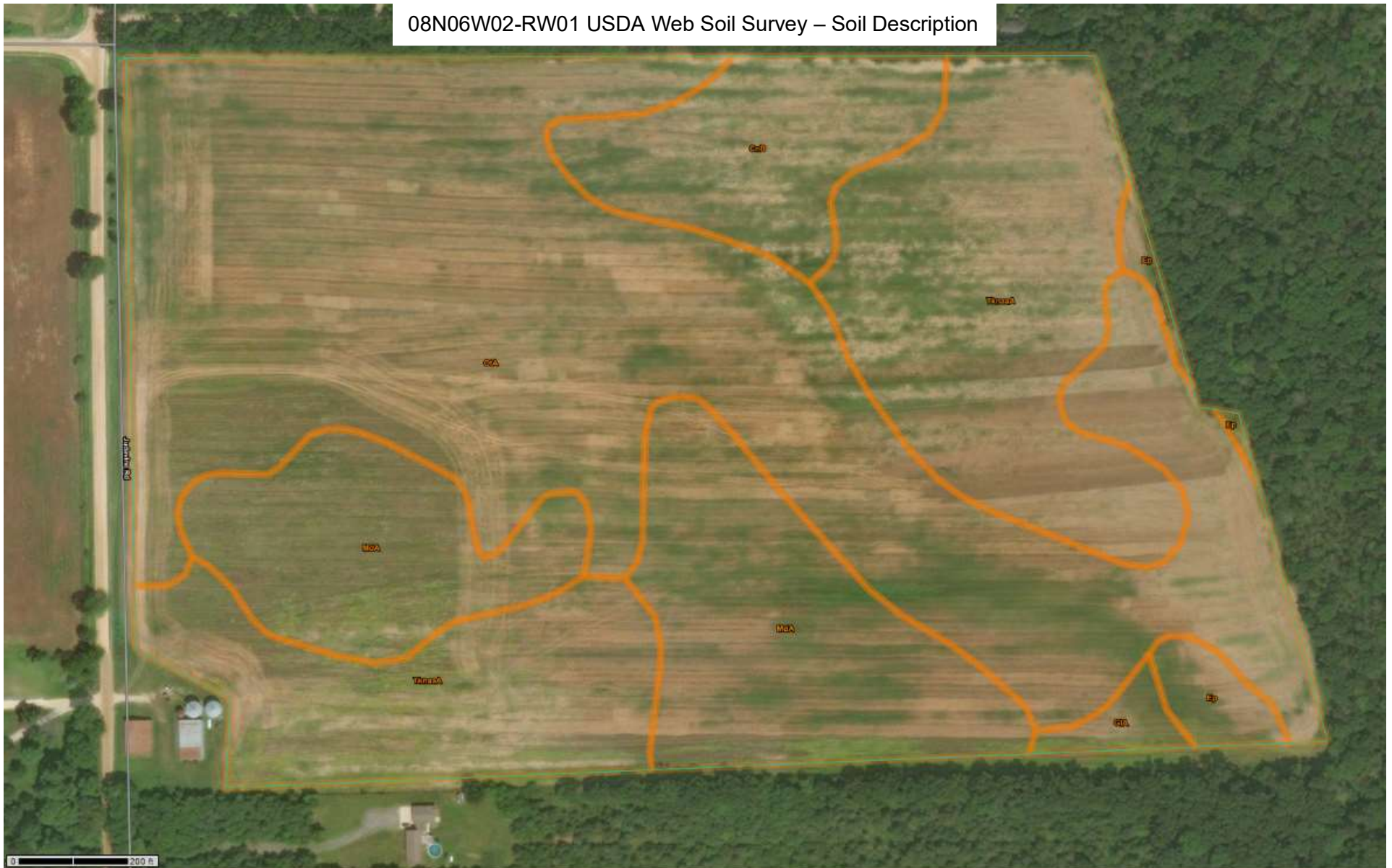
PFDoDA = Perfluorododecanoic acid
PFTTrDA = Perfluorotridecanoic acid
PFTeDA = Perfluorotetradecanoic acid
PFBS = Perfluorobutane sulfonic acid
PFHxS = Perfluorohexane sulfonic acid
PFOS = Perfluorooctane sulfonic acid

EtFOSAA = N-Ethyl perfluorooctane sulfonamidoacetic acid
MeFOSAA = N-Methyl perfluorooctane sulfonamidoacetic acid
HFPO-DA (Gen-X) = Perfluoro-2-methyl-3-oxahexanoicacid
ADONA = 4,8-Dioxa-3H-perfluorononanoicacid
F-53B Minor = 9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid
F-53B Major = 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid

Concentration exceeds DWC criteria

Appendix A

08N06W02-RW01 USDA Web Soil Survey – Soil Description



CnB – Coloma loamy sand, *Landform*: outwash plains, moraines, *Parent material*: sandy outwash

Ep – Epoufette sandy loam, *Landform*: depressions, outwash plains, *Parent material*: sandy outwash

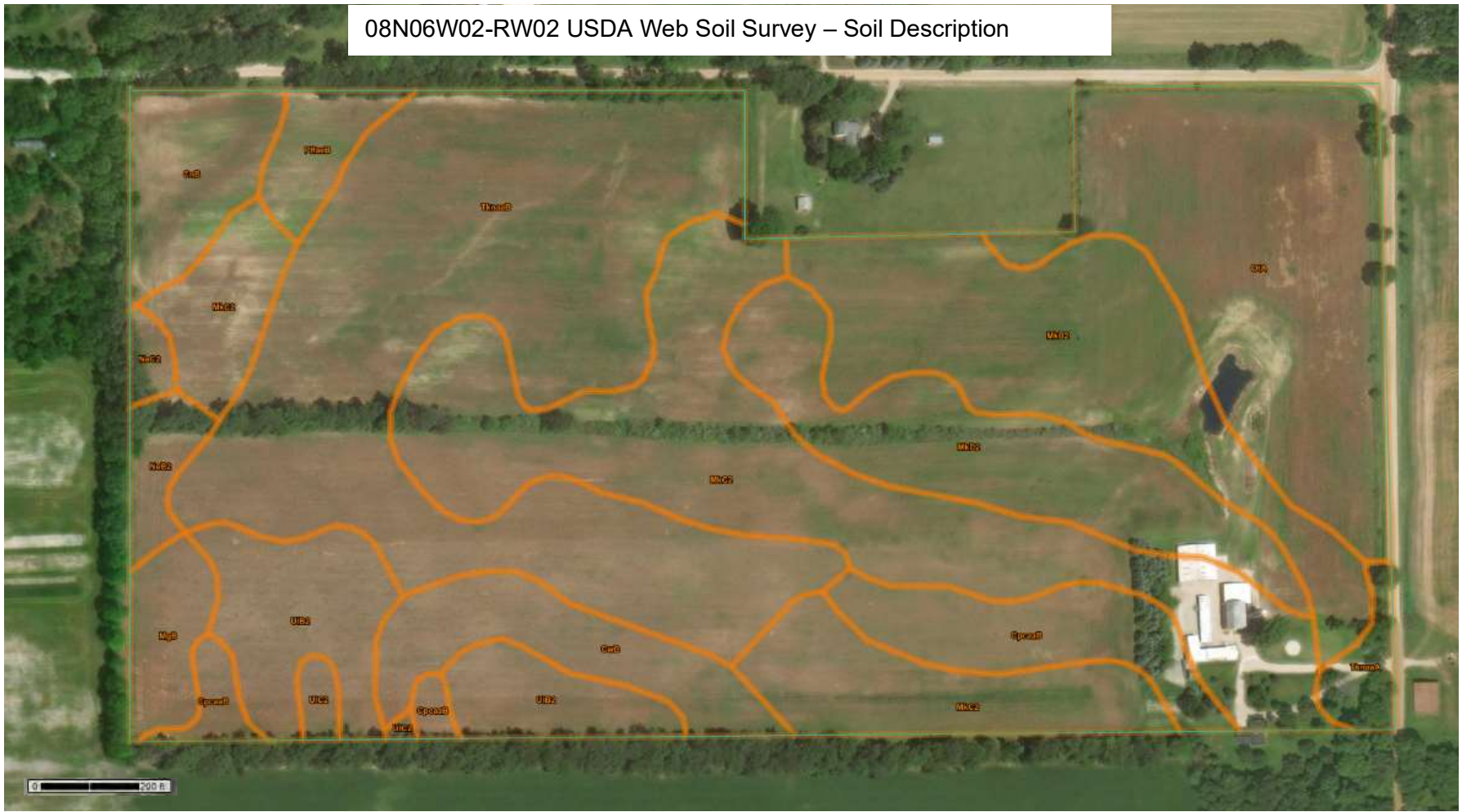
GfA – Gladwin sandy loam, *Landform*: outwash plains, *Parent material*: sandy glaciofluvial deposits

MdA – Mancelona-Chelsea loamy sands, *Landform*: outwash plains, and flats, till plains, *Parent material*: sandy and gravelly outwash, and sandy eolian sands

OtA – Otisco sandy loam, *Landform*: till plains, *Parent material*: sandy till

TknaaA – Tekenink-Elmdale loamy sands (0-2% slopes), *Landform*: recessional moraines and moraines, *Parent material*: coarse-loamy till

08N06W02-RW02 USDA Web Soil Survey – Soil Description



CnB – Coloma loamy sand, *Landform*: outwash plains, moraines, *Parent material*: sandy outwash

CpcaaB – Capac loam, *Landform*: end moraines, ground moraines, *Parent material*: loamy till

CwB – Coral sandy loam, *Landform*: moraines, *Parent material*: loamy till

MgB – Marlette loam, *Landform*: moraines, till plains, *Parent material*: loamy till

Mkb2 – Marlette sandy loam (2-6% slopes), *Landform*: end moraines, *Parent material*: loamy till

Mkc2 – Marlette sandy loam (6-12% slopes), *Landform*: end moraines, *Parent material*: loamy till

Mkd2 – Marlette sandy loam (12-18% slopes), *Landform*: end moraines, *Parent material*: loamy till

NeB2 – Nester loam (2-6% slopes), *Landform*: till plains, *Parent material*: loamy till

Nec2 – Nester loam (6-12% slopes), *Landform*: till plains, *Parent material*: loamy till

OtA – Otisco sandy loam, *Landform*: till plains, *Parent material*: sandy till

PlfaeB – Plainfield-Spinks sands, *Landform*: moraines, outwash plains, *Parent material*: sandy drift

TknaaB – Tekenink-Elmdale loamy sands (0-6% slopes), *Landform*: recessional moraines and moraines, *Parent material*: coarse-loamy till

UIB2 – Ubly sandy loam (2-6% slopes), *Landform*: till plains, *Parent material*: loamy till

08N06W02-RW03 USDA Web Soil Survey – Soil Description



CnB – Coloma loamy sand, *Landform*: outwash plains, moraines, *Parent material*: sandy outwash

GhA – Gladwin loamy sand, *Landform*: outwash plains, *Parent material*: sandy glaciofluvial deposits

GIA – Gladwin sandy loam, *Landform*: outwash plains, *Parent material*: sandy glaciofluvial deposits

OtA – Otisco sandy loam, *Landform*: till plains, *Parent material*: sandy till

Sd – Sebawa loam, *Landform*: drainageways on outwash plains and drainageways on moraines, *Parent material*: loamy drift over sandy and gravelly outwash

TknAA – Tekenink-Elmdale loamy sands (2-6% slopes), *Landform*: recessional moraines and moraines, *Parent material*: coarse-loamy till

WeA – Wasepi sandy loam, *Landform*: outwash plains, *Parent material*: loamy over sandy and gravelly glaciofluvial deposits

Appendix B



January 14, 2019

Vista Work Order No. 1803583

Ms. Maya Murshak
Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Dear Ms. Murshak,

Enclosed are the amended results for the sample set received at Vista Analytical Laboratory on November 09, 2018 under your Project Name 'Statewide WWTP Biosolids PFAS Evaluation'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1803583

Case Narrative

Sample Condition on Receipt:

Two wastewater samples and one biosolid sample were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. A revised CoC was received by email on November 26, 2018. This report was amended to include additional analyses for sample "BS1810310830GC". In addition, the results for 6:2 FTS in samples "WW1810310815GC" and "BS1810310830GC" were reprocessed to reference 13C2-PFOA, due to the interference affecting 13C2-6:2 FTS.

Analytical Notes:

As requested, the sample mass in the second container of sample "BS1810310830GC" was centrifuged. The aqueous and solid phases were extracted and analyzed separately. The results for the aqueous phase have been reported as "BS1810310830GC-A" and the results for the solid phase have been reported as "BS1810310830GC-S".

PFAS Isotope Dilution Method

The wastewater samples, as well as "BS1810310830GC-A", were extracted and analyzed for a selected list of PFAS using Vista's PFAS Isotope Dilution Method. This method is listed on Vista's NELAP certificate as Modified EPA Method 537. The results for PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Results for all other analytes include the linear isomers only.

The wastewater samples contained particulate and were centrifuged prior to extraction.

Holding Times

The samples were originally extracted and analyzed within the method hold times. The wastewater samples required re-extractions, which were performed outside of the hold time.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with each preparation batch. No analytes were detected in the Method Blanks above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria.

The results for 6:2 FTS in sample "WW1810310800GC" and "BS1810310830GC-A" were reported using 13C2-PFOA as the internal standard.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

VAL-PFAS

The biosolid sample, as well as "BS1810310830GC-S", were extracted and analyzed for a selected list of PFAS using VAL Method PFAS. The results for PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Results for all other analytes include the linear isomers only.

Holding Times

The samples were extracted and analyzed within the hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with each preparation batch. No analytes were detected in the Method Blanks above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria.

The results for 6:2 FTS in sample "BS1810310830GC" were reported using 13C2-PFOA as the internal standard.

The labeled standard recoveries outside the acceptance criteria are listed in the table below.

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
1803583-02	WW1810310800GC	PFAS Isotope Dilution Method	13C2-PFUnA	H	51.6
1803583-03	BS1810310830GC	VAL - PFAS	13C3-PFBA	H	4.50
1803583-03	BS1810310830GC	VAL - PFAS	13C3-PFPeA	H	24.8
1803583-03	BS1810310830GC	VAL - PFAS	13C2-PFHxA	H	69.5
1803583-03	BS1810310830GC	VAL - PFAS	13C2-8:2 FTS	H	221
1803583-03	BS1810310830GC	VAL - PFAS	d3-MeFOSAA	H	46.8
1803583-03	BS1810310830GC	VAL - PFAS	13C2-PFDoA	H	25.4
1803583-03	BS1810310830GC	VAL - PFAS	13C2-PFTeDA	H	8.70
1803583-04	BS1810310830GC-S	VAL - PFAS	13C2-8:2 FTS	H	169
1803583-04	BS1810310830GC-S	VAL - PFAS	13C2-PFDoA	H	23.7
1803583-05	BS1810310830GC-A	PFAS Isotope Dilution Method	13C2-PFUnA	H	59.9
B8K0155-BLK1	B8K0155-BLK1	VAL - PFAS	13C2-PFHxA	H	69.6
B8K0155-BLK1	B8K0155-BLK1	VAL - PFAS	13C2-PFDA	H	55.5
B8K0155-BLK1	B8K0155-BLK1	VAL - PFAS	d3-MeFOSAA	H	44.7
B8K0155-BLK1	B8K0155-BLK1	VAL - PFAS	d5-EtFOSAA	H	49.8
B8K0155-BLK1	B8K0155-BLK1	VAL - PFAS	13C2-PFUnA	H	56.6
B8K0155-BS1	B8K0155-BS1	VAL - PFAS	13C2-PFDA	H	55.3
B8K0155-BS1	B8K0155-BS1	VAL - PFAS	d3-MeFOSAA	H	45.1
B8K0155-BS1	B8K0155-BS1	VAL - PFAS	13C2-PFUnA	H	56.1
B8K0194-BS1	B8K0194-BS1	PFAS Isotope Dilution Method	13C2-PFDA	H	57.8
B8K0194-BS1	B8K0194-BS1	PFAS Isotope Dilution Method	13C2-PFUnA	H	59.1

H = Recovery was outside laboratory acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1803583-01	WW1810310815GC	31-Oct-18 08:15	09-Nov-18 09:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
1803583-02	WW1810310800GC	31-Oct-18 08:00	09-Nov-18 09:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
1803583-03	BS1810310830GC	31-Oct-18 08:30	09-Nov-18 09:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
1803583-04	BS1810310830GC-S	31-Oct-18 08:30	09-Nov-18 09:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
1803583-05	BS1810310830GC-A	31-Oct-18 08:30	09-Nov-18 09:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: Method Blank						PFAS Isotope Dilution Method					
Client Data Name: Merit Laboratories, Inc. Matrix: Aqueous Project: Statewide WWTP Biosolids PFAS Evaluation						Laboratory Data Lab Sample: B8K0194-BLK1 Column: BEH C18					
Analyte	CAS Number	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFPeA	2706-90-3	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFBS	375-73-5	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
4:2 FTS	757124-72-4	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFHxA	307-24-4	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFPeS	2706-91-4	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFHpA	375-85-9	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFHxS	355-46-4	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
6:2 FTS	27619-97-2	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFOA	335-67-1	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFHpS	375-92-8	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFNA	375-95-1	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFOSA	754-91-6	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFOS	1763-23-1	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFDA	335-76-2	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
8:2 FTS	39108-34-4	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFNS	68259-12-1	ND	1.94	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
MeFOSAA	2355-31-9	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
EtFOSAA	2991-50-6	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFUnA	2058-94-8	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFDS	335-77-3	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFDoA	307-55-1	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFTTrDA	72629-94-8	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
PFTeDA	376-06-7	ND	1.37	2.00	4.00		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
Labeled Standards	Type	% Recovery	Limits		Qualifiers		Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	100	60 - 130				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C3-PFPeA	IS	101	60 - 150				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C3-PFBS	IS	103	60 - 150				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C2-4:2 FTS	IS	104	40 - 150				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C2-PFHxA	IS	99.9	70 - 130				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C4-PFHpA	IS	96.9	60 - 150				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
18O2-PFHxS	IS	100	60 - 130				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C2-6:2 FTS	IS	90.5	40 - 150				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C2-PFOA	IS	78.9	60 - 130				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C5-PFNA	IS	68.2	50 - 130				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C8-PFOSA	IS	32.0	20 - 150				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C8-PFOS	IS	78.8	60 - 130				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1
13C2-PFDA	IS	67.5	60 - 130				B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1

Sample ID: Method Blank					PFAS Isotope Dilution Method					
Client Data Name: Merit Laboratories, Inc. Matrix: Aqueous Project: Statewide WWTP Biosolids PFAS Evaluation					Laboratory Data Lab Sample: B8K0194-BLK1 Column: BEH C18					
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
13C2-8:2 FTS	IS	70.0	40 - 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1	
d3-MeFOSAA	IS	63.6	50 - 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1	
d5-EtFOSAA	IS	71.9	50 - 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1	
13C2-PFUnA	IS	65.2	60 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1	
13C2-PFDoA	IS	72.0	30 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1	
13C2-PFTeDA	IS	62.5	20 - 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:22	1	

DL - Detection Limit
LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: OPR						PFAS Isotope Dilution Method					
Client Data						Laboratory Data					
Name:	Merit Laboratories, Inc.		Matrix:	Aqueous		Lab Sample:	B8K0194-BS1		Column:	BEH C18	
Project:	Statewide WWTP Biosolids PFAS Evaluation										
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	42.6	40.0	107	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFPeA	2706-90-3	43.5	40.0	109	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFBS	375-73-5	44.1	40.0	110	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
4:2 FTS	757124-72-4	42.2	40.0	105	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFHxA	307-24-4	43.4	40.0	109	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFPeS	2706-91-4	42.2	40.0	105	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFHpA	375-85-9	42.4	40.0	106	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFHxS	355-46-4	42.0	40.0	105	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
6:2 FTS	27619-97-2	44.9	40.0	112	60 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFOA	335-67-1	45.8	40.0	114	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFHpS	375-92-8	44.3	40.0	111	60 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFNA	375-95-1	40.7	40.0	102	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFOSA	754-91-6	40.2	40.0	101	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFOS	1763-23-1	39.7	40.0	99.2	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFDA	335-76-2	41.6	40.0	104	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
8:2 FTS	39108-34-4	45.6	40.0	114	60 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFNS	68259-12-1	39.3	40.0	98.1	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
MeFOSAA	2355-31-9	40.8	40.0	102	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
EtFOSAA	2991-50-6	38.7	40.0	96.8	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFUnA	2058-94-8	44.9	40.0	112	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFDS	335-77-3	37.0	40.0	92.5	60 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFDaA	307-55-1	49.3	40.0	123	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFTTrDA	72629-94-8	47.5	40.0	119	60 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
PFTeDA	376-06-7	45.3	40.0	113	70 - 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
Labeled Standards		Type		% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA		IS		87.1	60- 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C3-PFPeA		IS		90.8	60- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C3-PFBS		IS		81.6	60- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-4:2 FTS		IS		85.1	40- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-PFHxA		IS		86.5	70- 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C4-PFHpA		IS		82.2	60- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
18O2-PFHxS		IS		85.5	60- 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-6:2 FTS		IS		74.2	40- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-PFOA		IS		70.6	60- 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C5-PFNA		IS		61.5	50- 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1

Sample ID: OPR					PFAS Isotope Dilution Method				
Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation					Laboratory Data Lab Sample: B8K0194-BS1 Column: BEH C18				
Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C8-PFOA	IS	30.7	20- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C8-PFOS	IS	67.3	60- 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-PFDA	IS	57.8	60- 130	H	B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-8:2 FTS	IS	63.0	40- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
d3-MeFOSAA	IS	51.5	50- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
d5-EtFOSAA	IS	53.7	50- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-PFUnA	IS	59.1	60- 130	H	B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-PFDoA	IS	60.8	30- 130		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1
13C2-PFTeDA	IS	53.9	20- 150		B8K0194	28-Nov-18	0.250 L	30-Nov-18 00:11	1

Sample ID: Method Blank						PFAS Isotope Dilution Method					
Client Data Name: Merit Laboratories, Inc. Matrix: Aqueous Project: Statewide WWTP Biosolids PFAS Evaluation						Laboratory Data Lab Sample: B8L0090-BLK1 Column: BEH C18					
Analyte	CAS Number	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFPeA	2706-90-3	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFBS	375-73-5	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
4:2 FTS	757124-72-4	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFHxA	307-24-4	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFPeS	2706-91-4	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFHpA	375-85-9	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFHxS	355-46-4	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
6:2 FTS	27619-97-2	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFOA	335-67-1	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFHpS	375-92-8	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFNA	375-95-1	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFOSA	754-91-6	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFOS	1763-23-1	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFDA	335-76-2	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
8:2 FTS	39108-34-4	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFNS	68259-12-1	ND	1.94	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
MeFOSAA	2355-31-9	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
EtFOSAA	2991-50-6	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFUnA	2058-94-8	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFDS	335-77-3	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFDoA	307-55-1	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFTTrDA	72629-94-8	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
PFTeDA	376-06-7	ND	1.37	2.00	4.00		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
Labeled Standards	Type	% Recovery		Limits		Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	101		60 - 130			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C3-PFPeA	IS	98.0		60 - 150			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C3-PFBS	IS	101		60 - 150			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C2-4:2 FTS	IS	85.9		40 - 150			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C2-PFHxA	IS	100		70 - 130			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C4-PFHpA	IS	105		60 - 150			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
18O2-PFHxS	IS	110		60 - 130			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C2-6:2 FTS	IS	98.2		40 - 150			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C2-PFOA	IS	89.5		60 - 130			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C5-PFNA	IS	92.2		50 - 130			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C8-PFOSA	IS	42.6		20 - 150			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C8-PFOS	IS	101		60 - 130			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1
13C2-PFDA	IS	87.5		60 - 130			B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1

Sample ID: Method Blank					PFAS Isotope Dilution Method					
Client Data Name: Merit Laboratories, Inc. Matrix: Aqueous Project: Statewide WWTP Biosolids PFAS Evaluation					Laboratory Data Lab Sample: B8L0090-BLK1 Column: BEH C18					
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
13C2-8:2 FTS	IS	74.9	40 - 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1	
d3-MeFOSAA	IS	82.3	50 - 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1	
d5-EtFOSAA	IS	93.7	50 - 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1	
13C2-PFUnA	IS	76.5	60 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1	
13C2-PFDoA	IS	77.5	30 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1	
13C2-PFTeDA	IS	67.3	20 - 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 23:06	1	

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: OPR						PFAS Isotope Dilution Method					
Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation						Laboratory Data Lab Sample: B8L0090-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	40.1	40.0	100	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFPeA	2706-90-3	38.0	40.0	95.1	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFBS	375-73-5	41.6	40.0	104	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
4:2 FTS	757124-72-4	40.1	40.0	100	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFHxA	307-24-4	38.3	40.0	95.8	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFPeS	2706-91-4	39.4	40.0	98.6	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFHpA	375-85-9	39.3	40.0	98.3	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFHxS	355-46-4	39.5	40.0	98.8	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
6:2 FTS	27619-97-2	38.2	40.0	95.5	60 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFOA	335-67-1	42.3	40.0	106	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFHpS	375-92-8	40.2	40.0	101	60 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFNA	375-95-1	35.9	40.0	89.8	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFOSA	754-91-6	33.9	40.0	84.7	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFOS	1763-23-1	37.9	40.0	94.7	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFDA	335-76-2	37.9	40.0	94.8	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
8:2 FTS	39108-34-4	43.4	40.0	108	60 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFNS	68259-12-1	37.0	40.0	92.4	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
MeFOSAA	2355-31-9	33.6	40.0	84.1	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
EtFOSAA	2991-50-6	38.2	40.0	95.4	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFUnA	2058-94-8	39.8	40.0	99.4	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFDS	335-77-3	31.3	40.0	78.2	60 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFDaA	307-55-1	43.9	40.0	110	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFTTrDA	72629-94-8	39.5	40.0	98.9	60 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
PFTeDA	376-06-7	41.7	40.0	104	70 - 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
Labeled Standards	Type			% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS			94.9	60- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C3-PFPeA	IS			99.1	60- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C3-PFBS	IS			102	60- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-4:2 FTS	IS			87.4	40- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-PFHxA	IS			97.0	70- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C4-PFHpA	IS			94.5	60- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
18O2-PFHxS	IS			111	60- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-6:2 FTS	IS			89.8	40- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-PFOA	IS			85.9	60- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C5-PFNA	IS			85.2	50- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1

Sample ID: OPR					PFAS Isotope Dilution Method				
Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation					Laboratory Data Lab Sample: B8L0090-BS1 Column: BEH C18				
Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C8-PFOSA	IS	53.5	20- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C8-PFOS	IS	86.3	60- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-PFDA	IS	80.9	60- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-8:2 FTS	IS	69.6	40- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
d3-MeFOSAA	IS	74.3	50- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
d5-EtFOSAA	IS	75.6	50- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-PFUnA	IS	75.0	60- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-PFDoA	IS	73.2	30- 130		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1
13C2-PFTeDA	IS	67.6	20- 150		B8L0090	14-Dec-18	0.250 L	23-Dec-18 22:55	1

Sample ID: WW1810310815GC
PFAS Isotope Dilution Method

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Wastewater	Lab Sample:	1803583-01	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	31-Oct-18 08:15	Date Received:	09-Nov-18 09:41		
Location:	IONA-MI0021041-EFPT1						

Analyte	CAS Number	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	34.9	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFPeA	2706-90-3	31.3	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFBS	375-73-5	2.43	1.47	2.15	4.30	J	B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
4:2 FTS	757124-72-4	154	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFHxA	307-24-4	66.0	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFPeS	2706-91-4	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFHpA	375-85-9	34.0	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFHxS	355-46-4	2.05	1.47	2.15	4.30	J	B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
6:2 FTS	27619-97-2	142000	294	430	860	D	B8K0194	28-Nov-18	0.233 L	07-Dec-18 21:36	200
PFOA	335-67-1	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFHpS	375-92-8	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFNA	375-95-1	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFOSA	754-91-6	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFOS	1763-23-1	635	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFDA	335-76-2	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
8:2 FTS	39108-34-4	400	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFNS	68259-12-1	ND	2.08	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
MeFOSAA	2355-31-9	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
EtFOSAA	2991-50-6	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFUnA	2058-94-8	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFDS	335-77-3	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFDoA	307-55-1	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFTTrDA	72629-94-8	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
PFTeDA	376-06-7	ND	1.47	2.15	4.30		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	97.3	60 - 130		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C3-PFPeA	IS	98.2	60 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C3-PFBS	IS	102	60 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C2-4:2 FTS	IS	97.4	40 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C2-PFHxA	IS	96.0	70 - 130		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C4-PFHpA	IS	99.9	60 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
18O2-PFHxS	IS	103	60 - 130		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C2-6:2 FTS	IS	12600	40 - 150	D, H	B8K0194	28-Nov-18	0.233 L	07-Dec-18 21:36	200
13C2-PFOA	IS	83.1	60 - 130	D	B8K0194	28-Nov-18	0.233 L	07-Dec-18 21:36	200
13C5-PFNA	IS	78.8	50 - 130		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C8-PFOSA	IS	66.3	20 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C8-PFOS	IS	90.4	60 - 130		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1
13C2-PFDA	IS	74.1	60 - 130		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1

Sample ID: WW1810310815GC					PFAS Isotope Dilution Method					
Client Data					Laboratory Data					
Name:	Merit Laboratories, Inc.		Matrix:	Wastewater	Lab Sample:	1803583-01		Column:	BEH C18	
Project:	Statewide WWTP Biosolids PFAS Evaluation		Date Collected:	31-Oct-18 08:15	Date Received:	09-Nov-18 09:41				
Location:	IONA-MI0021041-EFPT1									
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
13C2-8:2 FTS	IS	112	40 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1	
d3-MeFOSAA	IS	60.0	50 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1	
d5-EtFOSAA	IS	63.1	50 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1	
13C2-PFUnA	IS	63.1	60 - 130		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1	
13C2-PFDoA	IS	53.3	30 - 130		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1	
13C2-PFTeDA	IS	38.2	20 - 150		B8K0194	28-Nov-18	0.233 L	30-Nov-18 00:32	1	

DL - Detection Limit
LOD - Limit of Detection
Results reported to the DL.

LOQ - Limit of quantitation
When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WW1810310800GC
PFAS Isotope Dilution Method

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Wastewater	Lab Sample:	1803583-02	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	31-Oct-18 08:00	Date Received:	09-Nov-18 09:41		
Location:	IONA-MI0021041-IFPT1						

Analyte	CAS Number	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	5.09	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFPeA	2706-90-3	4.27	1.53	2.23	4.46	J	B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFBS	375-73-5	2.03	1.53	2.23	4.46	J	B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
4:2 FTS	757124-72-4	42.2	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFHxA	307-24-4	5.16	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFPeS	2706-91-4	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFHpA	375-85-9	6.34	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFHxS	355-46-4	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
6:2 FTS	27619-97-2	8280	15.3	22.3	44.6	D	B8K0194	28-Nov-18	0.224 L	16-Dec-18 21:00	10
PFOA	335-67-1	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFHpS	375-92-8	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFNA	375-95-1	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFOSA	754-91-6	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFOS	1763-23-1	213	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFDA	335-76-2	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
8:2 FTS	39108-34-4	109	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFNS	68259-12-1	ND	2.16	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
MeFOSAA	2355-31-9	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
EtFOSAA	2991-50-6	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFUnA	2058-94-8	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFDS	335-77-3	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFDoA	307-55-1	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFTTrDA	72629-94-8	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
PFTeDA	376-06-7	ND	1.53	2.23	4.46		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	94.7	60 - 130		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C3-PFPeA	IS	94.1	60 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C3-PFBS	IS	95.9	60 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C2-4:2 FTS	IS	86.0	40 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C2-PFHxA	IS	95.0	70 - 130		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C4-PFHpA	IS	89.3	60 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
18O2-PFHxS	IS	106	60 - 130		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C2-6:2 FTS	IS	85.9	40 - 150	D	B8K0194	28-Nov-18	0.224 L	16-Dec-18 21:00	10
13C2-PFOA	IS	88.9	60 - 130		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C5-PFNA	IS	79.2	50 - 130		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C8-PFOSA	IS	54.1	20 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C8-PFOS	IS	73.1	60 - 130		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1
13C2-PFDA	IS	66.8	60 - 130		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1

Sample ID: WW1810310800GC					PFAS Isotope Dilution Method					
Client Data					Laboratory Data					
Name:	Merit Laboratories, Inc.		Matrix:	Wastewater	Lab Sample:	1803583-02		Column:	BEH C18	
Project:	Statewide WWTP Biosolids PFAS Evaluation		Date Collected:	31-Oct-18 08:00	Date Received:	09-Nov-18 09:41				
Location:	IONA-MI0021041-IFPT1									
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
13C2-8:2 FTS	IS	74.8	40 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1	
d3-MeFOSAA	IS	50.7	50 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1	
d5-EtFOSAA	IS	51.3	50 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1	
13C2-PFUnA	IS	51.6	60 - 130	H	B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1	
13C2-PFDoA	IS	39.0	30 - 130		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1	
13C2-PFTeDA	IS	26.7	20 - 150		B8K0194	28-Nov-18	0.224 L	30-Nov-18 01:04	1	

DL - Detection Limit

LOD - Limit of Detection

LOQ - Limit of quantitation

Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: BS1810310830GC-A
PFAS Isotope Dilution Method

Client Data					Laboratory Data				
Name:	Merit Laboratories, Inc.	Matrix:	Aqueous		Lab Sample:	1803583-05	Column:	BEH C18	
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	31-Oct-18 08:30		Date Received:	09-Nov-18 09:41			
Location:	IONA-MI0021041-STAND								

Analyte	CAS Number	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	87.8	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFPeA	2706-90-3	89.9	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFBS	375-73-5	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
4:2 FTS	757124-72-4	116	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFHxA	307-24-4	251	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFPeS	2706-91-4	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFHpA	375-85-9	34.7	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFHxS	355-46-4	3.91	2.83	4.13	8.27	J	B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
6:2 FTS	27619-97-2	154000	142	207	414	D	B8L0090	14-Dec-18	0.121 L	01-Jan-19 06:23	50
PFOA	335-67-1	10.1	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFHpS	375-92-8	10.6	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFNA	375-95-1	3.66	2.83	4.13	8.27	J	B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFOSA	754-91-6	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFOS	1763-23-1	2920	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFDA	335-76-2	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
8:2 FTS	39108-34-4	605	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFNS	68259-12-1	ND	4.00	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
MeFOSAA	2355-31-9	4.54	2.83	4.13	8.27	J	B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
EtFOSAA	2991-50-6	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFUnA	2058-94-8	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFDS	335-77-3	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFDoA	307-55-1	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFTTrDA	72629-94-8	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
PFTeDA	376-06-7	ND	2.83	4.13	8.27		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	99.9	60 - 130		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C3-PFPeA	IS	106	60 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C3-PFBS	IS	106	60 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C2-4:2 FTS	IS	90.1	40 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C2-PFHxA	IS	99.9	70 - 130		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C4-PFHpA	IS	105	60 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
18O2-PFHxS	IS	118	60 - 130		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C2-6:2 FTS	IS	534	40 - 150	D, H	B8L0090	14-Dec-18	0.121 L	01-Jan-19 06:23	50
13C2-PFOA	IS	108	60 - 130	D	B8L0090	14-Dec-18	0.121 L	01-Jan-19 06:23	50
13C5-PFNA	IS	82.5	50 - 130		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C8-PFOSA	IS	58.9	20 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C8-PFOS	IS	67.1	60 - 130		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1
13C2-PFDA	IS	70.2	60 - 130		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1

Sample ID: BS1810310830GC-A					PFAS Isotope Dilution Method					
Client Data					Laboratory Data					
Name:	Merit Laboratories, Inc.		Matrix:	Aqueous	Lab Sample:	1803583-05		Column:	BEH C18	
Project:	Statewide WWTP Biosolids PFAS Evaluation		Date Collected:	31-Oct-18 08:30	Date Received:	09-Nov-18 09:41				
Location:	IONA-MI0021041-STAND									
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
13C2-8:2 FTS	IS	85.7	40 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1	
d3-MeFOSAA	IS	65.6	50 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1	
d5-EtFOSAA	IS	85.0	50 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1	
13C2-PFUnA	IS	59.9	60 - 130	H	B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1	
13C2-PFDoA	IS	57.1	30 - 130		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1	
13C2-PFTeDA	IS	58.6	20 - 150		B8L0090	14-Dec-18	0.121 L	23-Dec-18 23:17	1	

DL - Detection Limit

LOD - Limit of Detection

LOQ - Limit of quantitation

Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: Method Blank											VAL - PFAS
Client Data Name: Merit Laboratories, Inc. Matrix: Solid Project: Statewide WWTP Biosolids PFAS Evaluation						Laboratory Data Lab Sample: B8K0155-BLK1 Column: BEH C18					
Analyte	CAS Number	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFPeA	2706-90-3	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFBS	375-73-5	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
4:2 FTS	757124-72-4	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFHxA	307-24-4	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFPeS	2706-91-4	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFHpA	375-85-9	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFHxS	355-46-4	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
6:2 FTS	27619-97-2	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFOA	335-67-1	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFHpS	375-92-8	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFNA	375-95-1	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFOSA	754-91-6	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFOS	1763-23-1	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFDA	335-76-2	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
8:2 FTS	39108-34-4	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFNS	68259-12-1	ND	1.43	1.50	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
MeFOSAA	2355-31-9	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
EtFOSAA	2991-50-6	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFUnA	2058-94-8	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFDS	335-77-3	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFDoA	307-55-1	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFTTrDA	72629-94-8	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
PFTeDA	376-06-7	ND	0.845	1.00	2.00		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
Labeled Standards	Type	% Recovery		Limits		Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	65.0		60 - 130			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C3-PFPeA	IS	66.4		60 - 150			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C3-PFBS	IS	68.0		60 - 150			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C2-4:2 FTS	IS	50.4		40 - 150			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C2-PFHxA	IS	69.6		70 - 130		H	B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C4-PFHpA	IS	62.8		60 - 150			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
18O2-PFHxS	IS	71.5		60 - 130			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C2-6:2 FTS	IS	50.5		40 - 150			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C2-PFOA	IS	68.2		60 - 130			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C5-PFNA	IS	63.9		50 - 130			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C8-PFOSA	IS	50.1		20 - 150			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C8-PFOS	IS	75.5		60 - 130			B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1
13C2-PFDA	IS	55.5		60 - 130		H	B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1

Sample ID: Method Blank					VAL - PFAS						
Client Data				Laboratory Data							
Name:	Merit Laboratories, Inc.		Matrix:	Solid		Lab Sample:	B8K0155-BLK1		Column:	BEH C18	
Project:	Statewide WWTP Biosolids PFAS Evaluation										
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution		
13C2-8:2 FTS	IS	57.4	40 - 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1		
d3-MeFOSAA	IS	44.7	50 - 150	H	B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1		
d5-EtFOSAA	IS	49.8	50 - 150	H	B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1		
13C2-PFUnA	IS	56.6	60 - 130	H	B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1		
13C2-PFDoA	IS	56.6	30 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1		
13C2-PFTeDA	IS	58.0	20 - 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 03:08	1		

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: OPR						VAL - PFAS					
Client Data						Laboratory Data					
Name:	Merit Laboratories, Inc.	Matrix:	Solid			Lab Sample:	B8K0155-BS1	Column:	BEH C18		
Project:	Statewide WWTP Biosolids PFAS Evaluation										
Analyte	CAS Number	Amt Found (ng/g)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	10.5	10.0	105	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFPeA	2706-90-3	10.3	10.0	103	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFBS	375-73-5	9.85	10.0	98.5	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
4:2 FTS	757124-72-4	11.2	10.0	112	60 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFHxA	307-24-4	10.7	10.0	107	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFPeS	2706-91-4	10.2	10.0	102	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFHpA	375-85-9	10.1	10.0	101	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFHxS	355-46-4	9.84	10.0	98.4	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
6:2 FTS	27619-97-2	10.4	10.0	104	60 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFOA	335-67-1	9.98	10.0	99.8	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFHpS	375-92-8	9.81	10.0	98.1	60 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFNA	375-95-1	10.7	10.0	107	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFOSA	754-91-6	11.0	10.0	110	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFOS	1763-23-1	9.64	10.0	96.4	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFDA	335-76-2	10.9	10.0	109	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
8:2 FTS	39108-34-4	9.87	10.0	98.7	60 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFNS	68259-12-1	9.53	10.0	95.3	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
MeFOSAA	2355-31-9	10.4	10.0	104	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
EtFOSAA	2991-50-6	10.4	10.0	104	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFUnA	2058-94-8	10.6	10.0	106	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFDS	335-77-3	8.32	10.0	83.2	60 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFDoA	307-55-1	9.90	10.0	99.0	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFTTrDA	72629-94-8	10.6	10.0	106	60 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
PFTeDA	376-06-7	9.71	10.0	97.1	70 - 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
Labeled Standards		Type		% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA		IS		66.8	60- 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C3-PFPeA		IS		69.0	60- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C3-PFBS		IS		72.6	60- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-4:2 FTS		IS		59.2	40- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-PFHxA		IS		70.7	70- 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C4-PFHpA		IS		65.7	60- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
18O2-PFHxS		IS		75.5	60- 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-6:2 FTS		IS		56.3	40- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-PFOA		IS		73.9	60- 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C5-PFNA		IS		65.5	50- 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1

Sample ID: OPR					VAL - PFAS				
Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation					Laboratory Data Lab Sample: B8K0155-BS1 Column: BEH C18				
Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C8-PFOSA	IS	47.3	20- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C8-PFOS	IS	79.3	60- 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-PFDA	IS	55.3	60- 130	H	B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-8:2 FTS	IS	58.5	40- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
d3-MeFOSAA	IS	45.1	50- 150	H	B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
d5-EtFOSAA	IS	50.2	50- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-PFUnA	IS	56.1	60- 130	H	B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-PFDoA	IS	58.4	30- 130		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1
13C2-PFTeDA	IS	63.0	20- 150		B8K0155	25-Nov-18	1.00 g	29-Nov-18 02:57	1

Sample ID: Method Blank
VAL - PFAS

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Solid	Lab Sample:	B8L0089-BLK1	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation						

Analyte	CAS Number	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFPeA	2706-90-3	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFBS	375-73-5	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
4:2 FTS	757124-72-4	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFHxA	307-24-4	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFPeS	2706-91-4	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFHpA	375-85-9	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFHxS	355-46-4	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
6:2 FTS	27619-97-2	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFOA	335-67-1	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFHpS	375-92-8	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFNA	375-95-1	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFOSA	754-91-6	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFOS	1763-23-1	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFDA	335-76-2	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
8:2 FTS	39108-34-4	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFNS	68259-12-1	ND	1.43	1.50	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
MeFOSAA	2355-31-9	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
EtFOSAA	2991-50-6	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFUnA	2058-94-8	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFDS	335-77-3	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFDoA	307-55-1	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFTTrDA	72629-94-8	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
PFTeDA	376-06-7	ND	0.845	1.00	2.00		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	104	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C3-PFPeA	IS	101	60 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C3-PFBS	IS	104	60 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C2-4:2 FTS	IS	92.2	40 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C2-PFHxA	IS	98.1	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C4-PFHpA	IS	99.5	60 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
18O2-PFHxS	IS	97.2	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C2-6:2 FTS	IS	103	40 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C2-PFOA	IS	91.5	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C5-PFNA	IS	82.9	50 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C8-PFOSA	IS	59.2	20 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C8-PFOS	IS	92.2	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1
13C2-PFDA	IS	89.4	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1

Sample ID: Method Blank					VAL - PFAS					
Client Data Name: Merit Laboratories, Inc. Matrix: Solid Project: Statewide WWTP Biosolids PFAS Evaluation					Laboratory Data Lab Sample: B8L0089-BLK1 Column: BEH C18					
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
13C2-8:2 FTS	IS	77.1	40 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1	
d3-MeFOSAA	IS	78.4	50 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1	
d5-EtFOSAA	IS	74.1	50 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1	
13C2-PFUnA	IS	69.6	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1	
13C2-PFDoA	IS	66.6	30 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1	
13C2-PFTeDA	IS	69.1	20 - 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:16	1	

DL - Detection Limit	LOD - Limit of Detection LOQ - Limit of quantitation	The results are reported in dry weight. The sample size is reported in wet weight. Results reported to the DL.	When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.
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Sample ID: OPR						VAL - PFAS					
Client Data						Laboratory Data					
Name: Merit Laboratories, Inc.		Matrix: Solid				Lab Sample: B8L0089-BS1		Column: BEH C18			
Project: Statewide WWTP Biosolids PFAS Evaluation											
Analyte	CAS Number	Amt Found (ng/g)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	10.1	10.0	101	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFPeA	2706-90-3	10.0	10.0	100	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFBS	375-73-5	9.52	10.0	95.2	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
4:2 FTS	757124-72-4	10.4	10.0	104	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFHxA	307-24-4	9.76	10.0	97.6	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFPeS	2706-91-4	9.30	10.0	93.0	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFHpA	375-85-9	9.90	10.0	99.0	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFHxS	355-46-4	10.5	10.0	105	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
6:2 FTS	27619-97-2	9.75	10.0	97.5	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFOA	335-67-1	11.2	10.0	112	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFHpS	375-92-8	9.70	10.0	97.0	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFNA	375-95-1	10.1	10.0	101	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFOSA	754-91-6	8.91	10.0	89.1	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFOS	1763-23-1	9.72	10.0	97.2	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFDA	335-76-2	9.50	10.0	95.0	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
8:2 FTS	39108-34-4	10.9	10.0	109	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFNS	68259-12-1	9.00	10.0	90.0	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
MeFOSAA	2355-31-9	8.49	10.0	84.9	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
EtFOSAA	2991-50-6	9.13	10.0	91.3	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFUnA	2058-94-8	9.74	10.0	97.4	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFDS	335-77-3	9.21	10.0	92.1	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFDoA	307-55-1	11.7	10.0	117	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFTrDA	72629-94-8	11.0	10.0	110	60 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
PFTeDA	376-06-7	11.6	10.0	116	70 - 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
Labeled Standards		Type		% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA		IS		108	60- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C3-PFPeA		IS		102	60- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C3-PFBS		IS		108	60- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-4:2 FTS		IS		95.2	40- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-PFHxA		IS		101	70- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C4-PFHpA		IS		103	60- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
18O2-PFHxS		IS		104	60- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-6:2 FTS		IS		100	40- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-PFOA		IS		89.4	60- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C5-PFNA		IS		83.0	50- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1

Sample ID: OPR					VAL - PFAS				
Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation					Laboratory Data Lab Sample: B8L0089-BS1 Column: BEH C18				
Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C8-PFOA	IS	64.4	20- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C8-PFOS	IS	100	60- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-PFDA	IS	84.1	60- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-8:2 FTS	IS	78.9	40- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
d3-MeFOSAA	IS	91.6	50- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
d5-EtFOSAA	IS	86.7	50- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-PFUnA	IS	76.4	60- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-PFDoA	IS	69.7	30- 130		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1
13C2-PFTeDA	IS	76.8	20- 150		B8L0089	12-Dec-18	1.00 g	15-Dec-18 02:05	1

Sample ID: BS1810310830GC
VAL - PFAS

Client Data						Laboratory Data					
Name:	Merit Laboratories, Inc.			Matrix:	Biosolid		Lab Sample:	1803583-03		Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation			Date Collected:	31-Oct-18 08:30		Date Received:	09-Nov-18 09:41			
Location:	IONA-MI0021041-STAND							% Solids:	0.793		

Analyte	CAS Number	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	10.8	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFPeA	2706-90-3	11.7	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFBS	375-73-5	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
4:2 FTS	757124-72-4	16.8	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFHxA	307-24-4	37.5	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFPeS	2706-91-4	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFHpA	375-85-9	5.28	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFHxS	355-46-4	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
6:2 FTS	27619-97-2	23200	41.9	49.6	99.1	I, D	B8K0155	25-Nov-18	127 g	30-Nov-18 13:27	50
PFOA	335-67-1	1.45	0.837	0.991	1.98	J	B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFHpS	375-92-8	2.07	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFNA	375-95-1	0.881	0.837	0.991	1.98	J	B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFOSA	754-91-6	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFOS	1763-23-1	1220	4.19	4.96	9.91	D	B8K0155	25-Nov-18	127 g	30-Nov-18 10:54	5
PFDA	335-76-2	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
8:2 FTS	39108-34-4	55.4	4.19	4.96	9.91	D	B8K0155	25-Nov-18	127 g	30-Nov-18 10:54	5
PFNS	68259-12-1	ND	1.42	1.49	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
MeFOSAA	2355-31-9	9.95	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
EtFOSAA	2991-50-6	5.23	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFUnA	2058-94-8	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFDS	335-77-3	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFDoA	307-55-1	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFTTrDA	72629-94-8	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
PFTeDA	376-06-7	ND	0.837	0.991	1.98		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	4.50	60 - 130	H	B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C3-PFPeA	IS	24.8	60 - 150	H	B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C3-PFBS	IS	73.3	60 - 150		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C2-4:2 FTS	IS	50.5	40 - 150		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C2-PFHxA	IS	69.5	70 - 130	H	B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C4-PFHpA	IS	73.1	60 - 150		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
18O2-PFHxS	IS	89.7	60 - 130		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C2-6:2 FTS	IS	8590	40 - 150	D, H	B8K0155	25-Nov-18	127 g	30-Nov-18 13:27	50
13C2-PFOA	IS	83.5	60 - 130	D	B8K0155	25-Nov-18	127 g	30-Nov-18 13:27	50
13C5-PFNA	IS	84.6	50 - 130		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C8-PFOSA	IS	87.4	20 - 150		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C8-PFOS	IS	88.5	60 - 130	D	B8K0155	25-Nov-18	127 g	30-Nov-18 10:54	5
13C2-PFDA	IS	76.3	60 - 130		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1

Sample ID: BS1810310830GC	VAL - PFAS
----------------------------------	-------------------

Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation Location: IONA-MI0021041-STAND	Laboratory Data Matrix: Biosolid Date Collected: 31-Oct-18 08:30 Lab Sample: 1803583-03 Date Received: 09-Nov-18 09:41 Column: BEH C18 % Solids: 0.793
---	---

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-8:2 FTS	IS	221	40 - 150	D, H	B8K0155	25-Nov-18	127 g	30-Nov-18 10:54	5
d3-MeFOSAA	IS	46.8	50 - 150	H	B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
d5-EtFOSAA	IS	60.3	50 - 150		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C2-PFUnA	IS	65.5	60 - 130		B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C2-PFDoA	IS	25.4	30 - 130	H	B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1
13C2-PFTeDA	IS	8.70	20 - 150	H	B8K0155	25-Nov-18	127 g	29-Nov-18 03:18	1

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: BS1810310830GC-S
VAL - PFAS

Client Data						Laboratory Data					
Name:	Merit Laboratories, Inc.			Matrix:	Biosolid		Lab Sample:	1803583-04		Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation			Date Collected:	31-Oct-18 08:30		Date Received:	09-Nov-18 09:41			
Location:	IONA-MI0021041-STAND							% Solids:	0.794		

Analyte	CAS Number	Conc. (ng/g)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFPeA	2706-90-3	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFBS	375-73-5	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
4:2 FTS	757124-72-4	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFHxA	307-24-4	4.36	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFPeS	2706-91-4	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFHpA	375-85-9	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFHxS	355-46-4	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
6:2 FTS	27619-97-2	2050	4.18	4.95	9.90	D	B8L0089	12-Dec-18	127 g	16-Dec-18 19:14	5
PFOA	335-67-1	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFHpS	375-92-8	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFNA	375-95-1	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFOSA	754-91-6	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFOS	1763-23-1	983	4.18	4.95	9.90	D	B8L0089	12-Dec-18	127 g	16-Dec-18 19:14	5
PFDA	335-76-2	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
8:2 FTS	39108-34-4	136	4.18	4.95	9.90	D	B8L0089	12-Dec-18	127 g	16-Dec-18 19:14	5
PFNS	68259-12-1	ND	1.42	1.49	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
MeFOSAA	2355-31-9	7.07	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
EtFOSAA	2991-50-6	4.44	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFUnA	2058-94-8	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFDS	335-77-3	6.91	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFDoA	307-55-1	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFTTrDA	72629-94-8	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
PFTeDA	376-06-7	ND	0.837	0.990	1.98		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	97.6	60 - 130		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C3-PFPeA	IS	97.6	60 - 150		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C3-PFBS	IS	88.6	60 - 150		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C2-4:2 FTS	IS	66.7	40 - 150		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C2-PFHxA	IS	93.9	70 - 130		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C4-PFHpA	IS	96.3	60 - 150		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
18O2-PFHxS	IS	93.5	60 - 130		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C2-6:2 FTS	IS	106	40 - 150	D	B8L0089	12-Dec-18	127 g	16-Dec-18 19:14	5
13C2-PFOA	IS	84.3	60 - 130		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C5-PFNA	IS	80.8	50 - 130		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C8-PFOSA	IS	71.6	20 - 150		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C8-PFOS	IS	81.4	60 - 130	D	B8L0089	12-Dec-18	127 g	16-Dec-18 19:14	5
13C2-PFDA	IS	85.0	60 - 130		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1

Sample ID: BS1810310830GC-S	VAL - PFAS
------------------------------------	-------------------

Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation Location: IONA-MI0021041-STAND	Laboratory Data Matrix: Biosolid Date Collected: 31-Oct-18 08:30 Lab Sample: 1803583-04 Date Received: 09-Nov-18 09:41 Column: BEH C18 % Solids: 0.794
---	---

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-8:2 FTS	IS	169	40 - 150	D, H	B8L0089	12-Dec-18	127 g	16-Dec-18 19:14	5
d3-MeFOSAA	IS	50.5	50 - 150		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
d5-EtFOSAA	IS	56.5	50 - 150		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C2-PFUnA	IS	71.9	60 - 130		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C2-PFDoA	IS	23.7	30 - 130	H	B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1
13C2-PFTeDA	IS	44.6	20 - 150		B8L0089	12-Dec-18	127 g	15-Dec-18 02:37	1

DL - Detection Limit

LOD - Limit of Detection
LOQ - Limit of quantitation

The results are reported in dry weight.
The sample size is reported in wet weight.
Results reported to the DL.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limits of Detection
LOQ	Limits of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	Ion ratio outside of 70-130% of Standard Ratio. (DOD PFAS projects only)
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	18-008-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1322288
New Hampshire Environmental Accreditation Program	207718
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-009
Pennsylvania Department of Environmental Protection	015
Texas Commission on Environmental Quality	T104704189-18-9
Virginia Department of General Services	9618
Washington Department of Ecology	C584-18
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Revised COC - rec'd via client email 11/26/18 *(JW)*



CHAIN OF CUSTODY

For Laboratory Use Only

Work Order #: **1803583** Temp: _____ °C
Storage ID: _____ Storage Secured: Yes ☐ No ☐

Project ID: **Statewide WWTP Biosolids PFAS Evaluation** PO#: **60588767.01** Sampler: **Garth Cousineau**
(name)

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify: _____

Invoice to: Name **Stephanie Kammer** Company **MDEQ** Address **525 W. Allegan Street** City **Lansing** State **MI** Ph# **517-897-1597** Fax# **517-241-3571**

Relinquished by (printed name and signature) **Dorin Bogdan** *Dorin Bogdan* Date **11/20/2018** Time **17:00** Received by (printed name and signature) _____ Date _____ Time _____

Relinquished by (printed name and signature) _____ Date _____ Time _____ Received by (printed name and signature) _____ Date _____ Time _____

SHIP TO: Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 Ph: (916) 673-1520; Fax: (916) 673-0106				Method of Shipment: _____		Add Analysis(es) Requested										PFAS Isotope Dilution		USEPA Method 537		Comments
ATTN: <u>Jennifer Miller</u>				Tracking No.: _____		Container(s)														
Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	List of 21	List of 21 willsoners	List of 24	List of 24 willsoners	List of 28	Other: Please List Below	PFCA/PFOA	UCMR3 PFAS List 6	PFAS List 14					
WW1810310815GC	10/31/18	0815	IONA-MI0021041-EFPT1	2	P	WW		X								Effluent				
WW1810310800GC	10/31/18	0800	IONA-MI0021041-IFPT1	2	P	WW		X								Influent				
BS1810310830GC	10/31/18	0830	IONA-MI0021041-STAND	2	P	BS		X								Stabilized Anaerobic				

Special Instructions/Comments: **Send Results and Acknowledgements to the list provided**

SEND DOCUMENTATION AND RESULTS TO:

Name: **Stephanie Kammer**
Company: **MDEQ**
Address: **525 W. Allegan Street, Constitution Hall, 1st South West**
City: **Lansing** State: **MI** Zip: **30242**
Phone: **517-897-1597** Fax: **517-241-3571**
Email: **dorin.bogdan@aecom.com**

Container Types: P= HDPE, PJ= HDPE Jar
O = Other: _____

Bottle Preservation Type: T = Thiosulfate,
TZ = Trizma: _____

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment,
SL = Sludge, BS=Biosolids, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____

Sample Log-In Checklist

Page # 1 of 1
TAT std

Vista Work Order #: 1803583

Samples Arrival:	Date/Time <u>11/09/18 0941</u>	Initials: <u>BSB</u>	Location: <u>WR-2</u>
Logged In:	Date/Time <u>11/09/18 1519</u>	Initials: <u>BSB</u>	Location: <u>WR-2</u> Shelf/Rack: <u>A3/F3</u>
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GSO	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
Temp °C: <u>0.6</u> (uncorrected)	Probe used: Y <input checked="" type="radio"/> N <input type="radio"/>		Thermometer ID: <u>IR-4</u>
Temp °C: <u>0.5</u> (corrected)			

	YES	NO	NA
Adequate Sample Volume Received?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?			<input checked="" type="checkbox"/>
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Airbill	<input checked="" type="checkbox"/>		
Trk # <u>4377 0528 7350</u>	<input checked="" type="checkbox"/>		
Sample Container Intact?	<input checked="" type="checkbox"/>		
Sample Custody Seals Intact?			<input checked="" type="checkbox"/>
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
COC Anomaly/Sample Acceptance Form completed?		<input checked="" type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			<input checked="" type="checkbox"/>
Preservation Documented:	Yes	No	NA <input checked="" type="checkbox"/>
Shipping Container	Vista	Client <input checked="" type="checkbox"/>	Retain
			Return <input checked="" type="checkbox"/>
			Dispose

Comments:



July 31, 2019

Vista Work Order No. 1902059

Ms. Maya Murshak
Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Dear Ms. Murshak,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on July 11, 2019 under your Project Name 'Statewide WWTP Biosolids PFAS Evaluation'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1902059

Case Narrative

Sample Condition on Receipt:

Seven drinking water samples and one aqueous sample were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. A sample ID discrepancy was noted: the sample listed as "WR1907101005ST" on the sample container label has been reported as "WT1907101005ST", as it was listed on the CoC.

Analytical Notes:

EPA Method 537, Rev. 1.1

The samples were extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

Two Laboratory Fortified Blanks (LFB/LFBD) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB/LFBD recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1902059-01	WT1907100910ST	10-Jul-19 09:10	11-Jul-19 09:00	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1902059-02	WR1907100930ST	10-Jul-19 09:30	11-Jul-19 09:00	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1902059-03	WT1907100950ST	10-Jul-19 09:50	11-Jul-19 09:00	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1902059-04	FB1907100955ST	10-Jul-19 09:55	11-Jul-19 09:00	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1902059-05	WT1907101005ST	10-Jul-19 10:05	11-Jul-19 09:00	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1902059-06	WT1907101015ST	10-Jul-19 10:15	11-Jul-19 09:00	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1902059-07	WT1907101035ST	10-Jul-19 10:35	11-Jul-19 09:00	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1902059-08	WT1907101045ST	10-Jul-19 10:45	11-Jul-19 09:00	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB					EPA Method 537				
Client Data Name: Merit Laboratories, Inc. Matrix: Aqueous Project: Statewide WWTP Biosolids PFAS Evaluation				Laboratory Data Lab Sample: B9G0132-BLK1 Column: BEH C18					
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFHxA	307-24-4	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFHpA	375-85-9	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFHxS	355-46-4	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFOA	335-67-1	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFOS	1763-23-1	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFUnA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFDaA	307-55-1	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	90	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
13C2-PFDA	SURR	92	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1
d5-EtFOSAA	SURR	85	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 04:06	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFBD

EPA Method 537

Name:	Merit Laboratories, Inc.	Lab Sample:	B9G0132-BS1/B9G0132-BSD1	Date Extracted:	15-Jul-19
Project:	Statewide WWTP Biosolids PFAS Evaluation	QC Batch:	B9G0132	Column:	BEH C18
Matrix:	Aqueous	Samp Size:	0.25/0.25 L		

Analyte	CAS Number	LFB (ng/L)	LFB Spike	LFB % Rec	LFB Quals	LFBD (ng/L)	LFBD Spike	LFBD % Rec	RPD	LFBD Quals	%Rec Limits	RPD Limits	LFB Analyzed	LFB Dil	LFBD Analyzed	LFBD Dil
PFBS	375-73-5	65	71	92		74	71	104	12		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFHxA	307-24-4	74	80	93		84	80	105	12		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFHpA	375-85-9	77	80	97		88	80	110	13		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFHxS	355-46-4	69	73	94		78	73	107	13		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFOA	335-67-1	80	80	100		85	80	107	6		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFNA	375-95-1	75	80	94		84	80	106	12		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFOS	1763-23-1	74	74	100		81	74	109	8		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFDA	335-76-2	70	80	88		85	80	106	18		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
MeFOSAA	2355-31-9	80	80	100		87	80	109	9		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
EtFOSAA	2991-50-6	68	80	85		81	80	102	19		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFUnA	2058-94-8	78	80	98		83	80	104	6		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFDaA	307-55-1	77	80	96		87	80	108	12		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFTTrDA	72629-94-8	82	80	102		91	80	114	11		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
PFTeDA	376-06-7	76	80	95		87	80	109	14		70-130	30	18-Jul-19 04:17	1	18-Jul-19 04:28	1
Labeled Standards	Type			LFB % Rec	LFB Quals			LFBD % Rec		LFBD Quals	Limits		LFB Analyzed	LFB Dil	LFBD Analyzed	LFBD Dil
13C2-PFHxA	SURR			93				108			70-130		18-Jul-19 04:17	1	18-Jul-19 04:28	1
13C2-PFDA	SURR			96				111			70-130		18-Jul-19 04:17	1	18-Jul-19 04:28	1
d5-EtFOSAA	SURR			88				103			70-130		18-Jul-19 04:17	1	18-Jul-19 04:28	1

Reporting convention specified by MI DEQ.

Sample ID: WT1907100910ST						EPA Method 537					
Client Data				Laboratory Data							
Name:	Merit Laboratories, Inc.		Matrix:	Drinking Water		Lab Sample:	1902059-01		Column:	BEH C18	
Project:	Statewide WWTP Biosolids PFAS Evaluation		Date Collected:	10-Jul-19 09:10		Date Received:	11-Jul-19 09:00				
Location:	11937 CEDAR LAKE										
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution		
PFBS	375-73-5	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFHxA	307-24-4	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFHpA	375-85-9	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFHxS	355-46-4	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFOA	335-67-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFOS	1763-23-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFUnA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFDaA	307-55-1	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution		
13C2-PFHxA	SURR	96	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
13C2-PFDA	SURR	96	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		
d5-EtFOSAA	SURR	85	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 06:39	1		

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WR1907100930ST					EPA Method 537				
Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation Location: 11965 CEDAR LAKE Matrix: Drinking Water Date Collected: 10-Jul-19 09:30				Laboratory Data Lab Sample: 1902059-02 Date Received: 11-Jul-19 09:00 Column: BEH C18					
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	140	2		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFHxA	307-24-4	75	2		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFHpA	375-85-9	53	2		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFHxS	355-46-4	5	2		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFOA	335-67-1	33	2		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFOS	1763-23-1	2	2		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFUnA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFDaA	307-55-1	ND	4		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
13C2-PFDA	SURR	95	70 - 130		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1
d5-EtFOSAA	SURR	91	70 - 130		B9G0132	15-Jul-19	0.23 L	18-Jul-19 06:50	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1907100950ST	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation Location: 11977 CEDAR LAKE	Laboratory Data Lab Sample: 1902059-03 Date Received: 11-Jul-19 09:00 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFHxA	307-24-4	ND	2		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFHpA	375-85-9	ND	2		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFHxS	355-46-4	ND	2		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFOA	335-67-1	ND	2		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFOS	1763-23-1	ND	2		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFOA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFDoA	307-55-1	ND	4		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	115	70 - 130		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
13C2-PFDA	SURR	95	70 - 130		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1
d5-EtFOSAA	SURR	75	70 - 130		B9G0132	15-Jul-19	0.23 L	22-Jul-19 16:54	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: FB1907100955ST **EPA Method 537**

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Aqueous	Lab Sample:	1902059-04	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	10-Jul-19 09:55	Date Received:	11-Jul-19 09:00		

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFHxA	307-24-4	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFHpA	375-85-9	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFHxS	355-46-4	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFOA	335-67-1	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFOS	1763-23-1	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFUnA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFDaA	307-55-1	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	99	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
13C2-PFDA	SURR	101	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1
d5-EtFOSAA	SURR	90	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:11	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1907101005ST	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation Location: 8722 JUDEVINE RD	Laboratory Data Matrix: Drinking Water Date Collected: 10-Jul-19 10:05 Lab Sample: 1902059-05 Date Received: 11-Jul-19 09:00 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFHxA	307-24-4	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFHpA	375-85-9	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFHxS	355-46-4	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFOA	335-67-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFOS	1763-23-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFUnA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFDaA	307-55-1	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	91	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
13C2-PFDA	SURR	95	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1
d5-EtFOSAA	SURR	89	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:22	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1907101015ST	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation Location: 8674 JUDEVINE RD	Laboratory Data Matrix: Drinking Water Date Collected: 10-Jul-19 10:15 Lab Sample: 1902059-06 Date Received: 11-Jul-19 09:00 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFHxA	307-24-4	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFHpA	375-85-9	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFHxS	355-46-4	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFOA	335-67-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFOS	1763-23-1	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFUnA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFDaA	307-55-1	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	92	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
13C2-PFDA	SURR	94	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1
d5-EtFOSAA	SURR	88	70 - 130		B9G0132	15-Jul-19	0.24 L	18-Jul-19 07:33	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1907101035ST						EPA Method 537			
Client Data Name: Merit Laboratories, Inc. Matrix: Drinking Water Project: Statewide WWTP Biosolids PFAS Evaluation Date Collected: 10-Jul-19 10:35 Location: 8478 FRONT ST				Laboratory Data Lab Sample: 1902059-07 Column: BEH C18 Date Received: 11-Jul-19 09:00					
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	3	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFHxA	307-24-4	5	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFHpA	375-85-9	3	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFHxS	355-46-4	3	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFOA	335-67-1	9	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFOS	1763-23-1	13	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFUnA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFDaA	307-55-1	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	94	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
13C2-PFDA	SURR	93	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1
d5-EtFOSAA	SURR	90	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:44	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1907101045ST						EPA Method 537			
Client Data Name: Merit Laboratories, Inc. Project: Statewide WWTP Biosolids PFAS Evaluation Location: 8450 FRONT ST				Laboratory Data Lab Sample: 1902059-08 Date Received: 11-Jul-19 09:00 Column: BEH C18					
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	3	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFHxA	307-24-4	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFHpA	375-85-9	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFHxS	355-46-4	4	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFOA	335-67-1	4	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFNA	375-95-1	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFOS	1763-23-1	4	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFDA	335-76-2	ND	2		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
MeFOSAA	2355-31-9	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
EtFOSAA	2991-50-6	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFOA	2058-94-8	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFDoA	307-55-1	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFTTrDA	72629-94-8	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
PFTeDA	376-06-7	ND	4		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	93	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
13C2-PFDA	SURR	96	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1
d5-EtFOSAA	SURR	92	70 - 130		B9G0132	15-Jul-19	0.25 L	18-Jul-19 07:55	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limits of Detection
LOQ	Limits of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-21
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A



CHAIN OF CUSTODY

For Laboratory Use Only

Work Order #: 1902059 Temp: 0.9 °C
Storage ID: R-13 / WP-2 Storage Secured: Yes ☒ No ☐

Project ID: Statewide WWTP Biosolids PFAS Evaluation PO#: 60588767.01 Sampler: Sara Thurkettle
(name)

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify: _____

Invoice to: Name Company Address City State Ph# Fax#
Stephanie Kammer MDEQ 525 W. Allegan Street Lansing MI 517-897-1597 517-241-3571

Relinquished by (printed name and signature) Date Time Received by (printed name and signature) Date Time
Kaitlyn Eicholtz 7/10/2019 1700 Ashley Mason 07/11/19 0900
Relinquished by (printed name and signature) Date Time Received by (printed name and signature) Date Time

SHIP TO: Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 Ph: (916) 673-1520; Fax: (916) 673-0106				Method of Shipment:		Add Analysis(es) Requested										Comments	
ATTN: <u>Jennifer Miller</u>				Tracking No.:		<div style="display: flex; justify-content: space-between;"> <div> PFAS Isotope Dilution </div> <div> USEPA Method 537 </div> </div>											
Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	List of 21	List of 21 w/ Isomers	List of 24	List of 24 w/ Isomers	List of 28	Other, Please List Below	PFOS PFOS	UCMR3 PFAS List 6	PFAS List: 14		
WT1907100910ST	7/10/19	0910	11937 CEDAR LAKE	2	P	DW									X	TZ; KITCHEN SINK; NO TREATMENT	
WR1907100930ST	7/10/19	0930	11965 CEDAR LAKE	2	P	DW									X	TZ; OUTSIDE SPIGOT; BYPASSED SOFTENER	
WT1907100950ST	7/10/19	0950	11977 CEDAR LAKE	2	P	DW									X	TZ; OUTSIDE SPIGOT; TREATMENT UNKOWN	
FB1907100955ST	7/10/19	0955		2	P	AQ									X	TZ; FIELD BLANK	
WT1907101005ST	7/10/19	1005	8722 JUDEVINE RD	2	P	DW									X	TZ; OUTSIDE SPIGOT; TREATMENT UNKOWN	
WT1907101015ST	7/10/19	1015	8674 JUDEVINE RD	2	P	DW									X	TZ; OUTSIDE SPIGOT; TREATMENT UNKOWN	
WT1907101035ST	7/10/19	1035	8478 FRONT ST	2	P	DW									X	TZ; KITCHEN SINK; NO TREATMENT	
WT1907101045ST	7/10/19	1045	8450 FRONT ST	2	P	DW									X	TZ; KITCHEN SINK; NO TREATMENT	

Special Instructions/Comments: Send Results and Acknowledgements to the list provided

SEND DOCUMENTATION AND RESULTS TO:

Name: Stephanie Kammer
Company: MDEQ
Address: 525 W. Allegan Street, Constitution Hall, 1st South West
City: Lansing State: MI Zip: 30242
Phone: 517-897-1597 Fax: 517-241-3571
Email: dorin.bogdan@aeom.com

Container Types: P= HDPE, PJ= HDPE Jar
O = Other: _____

Bottle Preservation Type: T = Thiosulfate,
TZ = Trizma: _____

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment,
SL = Sludge, BS=Biosolids, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____



Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #:

1902059

TAT Std

Samples Arrival:	Date/Time <u>07/11/19 0900</u>	Initials: <u>ajm</u>	Location: <u>WR-2</u>
			Shelf/Rack: <u>N/A</u>
Logged In:	Date/Time <u>07/11/19 1437</u>	Initials: <u>ajm</u>	Location: <u>R-13 /WR-2</u>
			Shelf/Rack: <u>A-1/A-3</u>
Delivered By:	<input checked="" type="checkbox"/> FedEx	<input type="checkbox"/> UPS	<input type="checkbox"/> On Trac
	<input type="checkbox"/> GSO	<input type="checkbox"/> DHL	<input type="checkbox"/> Hand Delivered
	<input type="checkbox"/> Other		
Preservation:	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice	<input type="checkbox"/> Dry Ice
	<input type="checkbox"/> None		
Temp °C: <u>0.9</u> (uncorrected)	Probe used: Y / <input checked="" type="checkbox"/> N		Thermometer ID: <u>IR-3</u>
Temp °C: <u>0.9</u> (corrected)			

	YES	NO	NA
Adequate Sample Volume Received?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Airbill <u> </u> Trk # <u>4894 6696 0949</u>	<input checked="" type="checkbox"/>		
Sample Container Intact?	<input checked="" type="checkbox"/>		
Sample Custody Seals Intact?			<input checked="" type="checkbox"/>
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
COC Anomaly/Sample Acceptance Form completed?	<input checked="" type="checkbox"/>		
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>		
Preservation Documented:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA
	<input type="checkbox"/> Na ₂ S ₂ O ₃	<input checked="" type="checkbox"/> Trizma	<input type="checkbox"/> None
	<input type="checkbox"/> Other		
Shipping Container	<input checked="" type="checkbox"/> Vista	<input type="checkbox"/> Client	<input checked="" type="checkbox"/> Retain
		<input type="checkbox"/> Return	<input type="checkbox"/> Dispose

Comments:

COC Sample ID :

"WT1907101005ST"

Bottle label ID :

"WR1907101005ST"

ajm 07/11/19

Chain of Custody Anomaly/Sample Acceptance Form



Client: Merit Laboratories, Inc.
 Contact: Maya Murshak
 Email: mayamurshak@meritlabs.com
 Phone: (517) 827-2744

Workorder Number: 1902059
 Date Received: 11-Jul-19 09:00
 Documented by/date: Ashley Mason 07-11-19

Please review the following information and complete the Client Authorization section. To comply with NELAC regulations, we must receive authorization before proceeding with sample analysis.

- ☐ Sample Collection Date and/or Time not provided
- ☐ Temperature outside Method Requirement (WI-PHT)
- Temperature _____ °C Ice Present? Yes No Melted
- ☒ Sample ID Not Reconcilable
- ☐ Sample Holding Time Missed
- ☐ Insufficient Sample Size
- ☐ All Sample Container(s) Broken
- ☐ Drinking Water Incorrect Container Type
- ☐ Chain-of-Custody not received, illegible or destroyed
- ☐ Other: _____

Comments/Samples Affected:

<u>COC ID</u>	<u>Sample Label ID</u>
WT1907101005ST	WR1907101005ST

Client Authorization

Proceed with Analysis: ☒ YES NO

Signature and Date

[Signature] 07/30/19

Client Comments/Instructions Client notified via email on 07/12/19.

Reporting CoC ID.



October 22, 2019

Vista Work Order No. 1903280

Ms. Maya Murshak
Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Dear Ms. Murshak,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on September 25, 2019 under your Project Name 'Statewide Biosolids'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1903280**Case Narrative****Sample Condition on Receipt:**

Twelve drinking water samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The samples were extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

Two Laboratory Fortified Blanks (LFB/LFBD) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB/LFBD recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1903280-01	WR1909240900KER	24-Sep-19 09:00	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-02	WR1909240920KER	24-Sep-19 09:20	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-03	WR1909240930KER	24-Sep-19 09:30	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-04	WT1909240950KER	24-Sep-19 09:50	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-05	WT1909241000KER	24-Sep-19 10:00	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-06	WT1909241020KER	24-Sep-19 10:20	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-07	WT1909241030KER	24-Sep-19 10:30	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-08	WR1909241040KER	24-Sep-19 10:40	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-09	WT1909241050KER	24-Sep-19 10:50	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-10	WT1909241110KER	24-Sep-19 11:10	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-11	WT1909241120KER	24-Sep-19 11:20	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL
1903280-12	WT1909241145KER	24-Sep-19 11:45	25-Sep-19 10:14	HDPE Bottle, 250 mL
				HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB					EPA Method 537				
<div>Client Data</div> <div>Name: Merit Laboratories, Inc. Project: Statewide Biosolids</div> <div>Matrix: Aqueous</div>				<div>Laboratory Data</div> <div>Lab Sample: B9I0265-BLK1 Column: BEH C18</div>					
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFDaA	307-55-1	ND	4		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFTeDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	95	70 - 130		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
13C2-PFDA	SURR	91	70 - 130		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1
d5-EtFOSAA	SURR	90	70 - 130		B9I0265	08-Oct-19	0.25 L	09-Oct-19 23:09	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFBD

EPA Method 537

Name:	Merit Laboratories, Inc.	Lab Sample:	B9I0265-BS1/B9I0265-BSD1	Date Extracted:	08-Oct-19
Project:	Statewide Biosolids	QC Batch:	B9I0265	Column:	BEH C18
Matrix:	Aqueous	Samp Size:	0.25/0.25 L		

Analyte	CAS Number	LFB (ng/L)	LFB Spike	LFB % Rec	LFB Quals	LFBD (ng/L)	LFBD Spike	LFBD % Rec	RPD	LFBD Quals	%Rec Limits	RPD Limits	LFB Analyzed	LFB Dil	LFBD Analyzed	LFBD Dil
PFBS	375-73-5	69	71	98		62	71	88	11		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFHxA	307-24-4	71	80	89		68	80	85	4		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFHpA	375-85-9	69	80	87		67	80	84	3		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFHxS	355-46-4	75	73	103		65	73	90	13		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFOA	335-67-1	73	80	91		71	80	88	3		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFNA	375-95-1	72	80	91		70	80	88	3		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFOS	1763-23-1	74	74	100		67	74	90	10		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFDA	335-76-2	72	80	90		62	80	77	15		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
MeFOSAA	2355-31-9	79	80	98		75	80	93	5		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
EtFOSAA	2991-50-6	81	80	101		73	80	92	10		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFUnA	2058-94-8	72	80	90		66	80	83	8		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFDoA	307-55-1	65	80	81		63	80	79	3		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFTTrDA	72629-94-8	63	80	79		58	80	73	8		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1
PFTeDA	376-06-7	66	80	82		59	80	74	11		70-130	30	09-Oct-19 23:20	1	09-Oct-19 23:31	1

Labeled Standards	Type	LFB % Rec	LFB Quals	LFBD % Rec	LFBD Quals	Limits	LFB Analyzed	LFB Dil	LFBD Analyzed	LFBD Dil
13C2-PFHxA	SURR	91		87		70-130	09-Oct-19 23:20	1	09-Oct-19 23:31	1
13C2-PFDA	SURR	95		80		70-130	09-Oct-19 23:20	1	09-Oct-19 23:31	1
d5-EtFOSAA	SURR	91		83		70-130	09-Oct-19 23:20	1	09-Oct-19 23:31	1

Reporting convention specified by MI DEQ.

Sample ID: WR1909240900KER	EPA Method 537
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Client Data	Laboratory Data
Name: Merit Laboratories, Inc.	Lab Sample: 1903280-01
Project: Statewide Biosolids	Date Received: 25-Sep-19 10:14
Location: 4291 SE County Line	Column: BEH C18
Matrix: Drinking Water	
Date Collected: 24-Sep-19 09:00	

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFDaA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFTdA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	110	70 - 130		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
13C2-PFDA	SURR	104	70 - 130		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1
d5-EtFOSAA	SURR	102	70 - 130		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:41	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WR1909240920KER	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide Biosolids Location: 4091 SE County Line	Laboratory Data Matrix: Drinking Water Date Collected: 24-Sep-19 09:20 Lab Sample: 1903280-02 Date Received: 25-Sep-19 10:14 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFOA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFDoA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFTeDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
13C2-PFDA	SURR	93	70 - 130		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1
d5-EtFOSAA	SURR	89	70 - 130		B9I0265	08-Oct-19	0.24 L	09-Oct-19 23:52	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WR1909240930KER	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide Biosolids Location: 4169 SE County Line	Laboratory Data Lab Sample: 1903280-03 Date Received: 25-Sep-19 10:14 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFDoA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFTDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	94	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
13C2-PFDA	SURR	88	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1
d5-EtFOSAA	SURR	80	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:03	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1909240950KER					EPA Method 537				
Client Data				Laboratory Data					
Name:	Merit Laboratories, Inc.	Matrix:	Drinking Water	Lab Sample:	1903280-04	Column:	BEH C18		
Project:	Statewide Biosolids	Date Collected:	24-Sep-19 09:50	Date Received:	25-Sep-19 10:14				
Location:	4233 SE County Line								
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFDoA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFTrDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	92	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
13C2-PFDA	SURR	83	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1
d5-EtFOSAA	SURR	93	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:13	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1909241000KER **EPA Method 537**

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Drinking Water	Lab Sample:	1903280-05	Column:	BEH C18
Project:	Statewide Biosolids	Date Collected:	24-Sep-19 10:00	Date Received:	25-Sep-19 10:14		
Location:	3982 SE County Line						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFOA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFDoA	307-55-1	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFTTrDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	93	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
13C2-PFDA	SURR	84	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1
d5-EtFOSAA	SURR	87	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:24	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1909241020KER	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide Biosolids Location: 8463 Front Street	Laboratory Data Matrix: Drinking Water Date Collected: 24-Sep-19 10:20 Lab Sample: 1903280-06 Date Received: 25-Sep-19 10:14 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PfUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFDaA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFTDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	88	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
13C2-PFDA	SURR	84	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1
d5-EtFOSAA	SURR	77	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 00:34	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1909241030KER					EPA Method 537					
Client Data					Laboratory Data					
Name:	Merit Laboratories, Inc.		Matrix:	Drinking Water	Lab Sample:	1903280-07		Column:	BEH C18	
Project:	Statewide Biosolids		Date Collected:	24-Sep-19 10:30	Date Received:	25-Sep-19 10:14				
Location:	8421 Front Street									
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
PFBS	375-73-5	17	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFHxA	307-24-4	4	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFHpA	375-85-9	2	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFHxS	355-46-4	2	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFOA	335-67-1	6	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFOS	1763-23-1	3	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFDaA	307-55-1	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFTTrDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
13C2-PFHxA	SURR	97	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
13C2-PFDA	SURR	94	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	
d5-EtFOSAA	SURR	94	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:45	1	

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WR1909241040KER					EPA Method 537					
Client Data					Laboratory Data					
Name:	Merit Laboratories, Inc.		Matrix:	Drinking Water	Lab Sample:	1903280-08		Column:	BEH C18	
Project:	Statewide Biosolids		Date Collected:	24-Sep-19 10:40	Date Received:	25-Sep-19 10:14				
Location:	8341 Front Street									
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
PFBS	375-73-5	11	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFHxA	307-24-4	12	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFHpA	375-85-9	11	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFHxS	355-46-4	3	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFOA	335-67-1	31	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFOS	1763-23-1	6	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFDoA	307-55-1	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFTrDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution	
13C2-PFHxA	SURR	93	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
13C2-PFDA	SURR	95	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	
d5-EtFOSAA	SURR	92	70 - 130		B9I0265	08-Oct-19	0.25 L	10-Oct-19 00:56	1	

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1909241050KER						EPA Method 537					
Client Data				Laboratory Data							
Name:	Merit Laboratories, Inc.		Matrix:	Drinking Water		Lab Sample:	1903280-09		Column:	BEH C18	
Project:	Statewide Biosolids		Date Collected:	24-Sep-19 10:50		Date Received:	25-Sep-19 10:14				
Location:	8280 Front Street										
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution		
PFBS	375-73-5	3	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFOA	335-67-1	2	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFDoA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFTTrDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution		
13C2-PFHxA	SURR	115	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
13C2-PFDA	SURR	108	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		
d5-EtFOSAA	SURR	115	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:06	1		

RL - Reporting limit

Results reported to RL.

Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1909241110KER	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide Biosolids Location: 8410 Front Street	Laboratory Data Matrix: Drinking Water Date Collected: 24-Sep-19 11:10 Lab Sample: 1903280-10 Date Received: 25-Sep-19 10:14 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	4	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFHxA	307-24-4	5	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFHpA	375-85-9	4	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFHxS	355-46-4	3	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFOA	335-67-1	10	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFDoA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFTTrDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	90	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
13C2-PFDA	SURR	81	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1
d5-EtFOSAA	SURR	111	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 01:49	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1909241120KER	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide Biosolids Location: 8301 Judevine	Laboratory Data Lab Sample: 1903280-11 Date Received: 25-Sep-19 10:14 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFDaA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFTDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	93	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
13C2-PFDA	SURR	85	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1
d5-EtFOSAA	SURR	75	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:00	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT1909241145KER	EPA Method 537
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Client Data Name: Merit Laboratories, Inc. Project: Statewide Biosolids Location: Palo Methodist Church	Laboratory Data Matrix: Drinking Water Date Collected: 24-Sep-19 11:45 Lab Sample: 1903280-12 Date Received: 25-Sep-19 10:14 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFHxA	307-24-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFHpA	375-85-9	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFHxS	355-46-4	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFOA	335-67-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFNA	375-95-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFOS	1763-23-1	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFDA	335-76-2	ND	2		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
MeFOSAA	2355-31-9	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
EtFOSAA	2991-50-6	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFUnA	2058-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFDoA	307-55-1	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFTTrDA	72629-94-8	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
PFTeDA	376-06-7	ND	4		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	88	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
13C2-PFDA	SURR	78	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1
d5-EtFOSAA	SURR	85	70 - 130		B9I0265	08-Oct-19	0.24 L	10-Oct-19 02:10	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A



CHAIN OF CUSTODY

For Laboratory Use Only

Work Order #: 1903280 Temp: 1-9 °C
Storage ID: P-13, WR-2 Storage Secured: Yes ☒ No ☐

Project ID: Statewide Biosolids PO#: 60588767.01 Sampler: Kelly Richart
(name)

TAT (check one): Standard: ☒ 21 days
☐ 14 days ☐ 7 days Specify: _____
Rush (surcharge may apply)

Invoice to: Name Stephanie Kammer Company EGLE Address 525 W. Allegan Street City Lansing State MI Ph# 517-897-1597 Fax# 517-241-3571

Relinquished by (printed name and signature) George Austin Date 9/24/2019 Time 1700 Received by (printed name and signature) Kim Ewert Date 09/25/19 Time 1014
Relinquished by (printed name and signature) _____ Date _____ Time _____ Received by (printed name and signature) _____ Date _____ Time _____

SHIP TO: Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 Ph: (916) 673-1520; Fax: (916) 673-0106				Method of Shipment:		Tracking No.:		Add Analysis(es) Requested										Comments	
ATTN: <u>Jennifer Miller</u>				Container(s)		PFAS Isotope Dilution										USEPA Method 537			
						Quantity	Type	Matrix	List of 21	List of 21 w/Isomers	List of 24	List of 24 w/Isomers	List of 28	Other: Please List Below	PFCA/ PFOS	UCM/R3 PFAS List 14	PFAS List 14		
Sample ID	Date	Time	Location/Sample Description																
WR1909240900KER	9/24/19	0900	4291 SE County Line	2	P	DW										X	TZ		
WR1909240920KER	9/24/19	0920	4091 SE County Line	2	P	DW										X	TZ		
WR1909240930KER	9/24/19	0930	4169 SE County Line	2	P	DW										X	TZ		
WT1909240950KER	9/24/19	0950	4233 SE County Line	2	P	DW										X	TZ		
WT1909241000KER	9/24/19	1000	3982 SE County Line	2	P	DW										X	TZ		
WT1909241020KER	9/24/19	1020	8463 Front Street	2	P	DW										X	TZ		
WT1909241030KER	9/24/19	1030	8421 Front Street	2	P	DW										X	TZ		
WR1909241040KER	9/24/19	1040	8341 Front Street	2	P	DW										X	TZ		
WT1909241050KER	9/24/19	1050	8280 Front Street	2	P	DW										X	TZ		
WT1909241110KER	9/24/19	1110	8410 Front Street	2	P	DW										X	TZ		

Special Instructions/Comments: Send Results and Acknowledgements to the list provided

SEND
DOCUMENTATION
AND RESULTS TO:

Name: Stephanie Kammer
Company: EGLE
Address: 525 W. Allegan Street, Constitution Hall, 1st South West
City: Lansing State: MI Zip: 30242
Phone: 517-897-1597 Fax: 517-241-3571
Email: dorin.bogdan@aecom.com

Container Types: P= HDPE, PJ= HDPE Jar
O = Other: _____

Bottle Preservation Type: T = Thiosulfate,
TZ = Trizma: _____

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment,
SL = Sludge, BS=Biosolids, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____



CHAIN OF CUSTODY

For Laboratory Use Only *api 09/25/19*
 Work Order #: 19038 1903280 Temp: 1.9 °C
 Storage ID: R-13,WR-2 Storage Secured: Yes ☒ No ☐

Project ID: Statewide Biosolids PO#: 60588767.01 Sampler: Kelly Richart
 (name)

TAT Standard: ☒ 21 days
 (check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify: _____

Invoice to: Name Stephanie Kammer Company EGLE Address 525 W. Allegan Street City Lansing State MI Ph# 517-897-1597 Fax# 517-241-3571

Relinquished by (printed name and signature) George Austin *[Signature]* Date 9/24/2019 Time 1700 Received by (printed name and signature) Km Guez *[Signature]* Date 09/25/19 Time 1014

SHIP TO: Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 Ph: (916) 673-1520; Fax: (916) 673-0106				Method of Shipment:		Add Analysis(es) Requested										Comments		
ATTN: <u>Jennifer Miller</u>				Tracking No.:		Container(s)												
Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	List of 21	List of 21 w/Isomers	List of 24	List of 24 w/Isomers	List of 28	Other: Please List Below	PFOA/PFOs	UCMR3 PFAS List 8	PFAS List 14			
WT1909241120KER	9/24/19	1120	8301 Judevine	2	P	DW										X	TZ, Old Fire Station	
WT1909241145KER	9/24/19	1145	Palo Methodist Church	2	P	DW										X	TZ, Palo United Methodist Church	

Special Instructions/Comments: Send Results and Acknowledgements to the list provided

SEND DOCUMENTATION AND RESULTS TO:

Name: Stephanie Kammer
 Company: EGLE
 Address: 525 W. Allegan Street, Constitution Hall, 1st South West
 City: Lansing State: MI Zip: 30242
 Phone: 517-897-1597 Fax: 517-241-3571
 Email: dorin.bogdan@aecom.com

Container Types: P= HDPE, PJ= HDPE Jar
 O = Other: _____

Bottle Preservation Type: T = Thiosulfate,
 TZ = Trizma: _____

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment,
 SL = Sludge, BS=Biosolids, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____

Sample Log-In Checklist

 Page # 1 of 1

 Vista Work Order #: 1903280

 TAT Std

Samples Arrival:	Date/Time <u>09/25/19 1014</u>	Initials: <u>ke</u>	Location: <u>WR-2</u> Shelf/Rack: <u>NA</u>
Logged In:	Date/Time <u>09/25/19 1337</u>	Initials: <u>ajm</u>	Location: <u>R-13 / WR-2</u> Shelf/Rack: <u>A-1 / E-3</u>
Delivered By:	<u>FedEx</u> UPS On Trac GSO DHL Hand Delivered Other		
Preservation:	<u>Ice</u> Blue Ice Dry Ice None		
Temp °C: <u>1.9</u> (uncorrected)	Probe used: Y / <u>N</u>		Thermometer ID: <u>IR-3</u>
Temp °C: <u>1.9</u> (corrected)			

	YES	NO	NA
Adequate Sample Volume Received?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?			<input checked="" type="checkbox"/>
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Airbill <u>#2</u> Trk # <u>4894 6696 2562</u>	<input checked="" type="checkbox"/>		
Sample Container Intact?	<input checked="" type="checkbox"/>		
Sample Custody Seals Intact?			<input checked="" type="checkbox"/>
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
COC Anomaly/Sample Acceptance Form completed?		<input checked="" type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>		
Preservation Documented:	Na ₂ S ₂ O ₃ <u>Trizma</u> None Yes No NA		
Shipping Container	Vista <u>Client</u> Retain <u>Return</u> Dispose		

Comments:



April 09, 2020

Vista Work Order No. 2000608

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000608**Case Narrative****Sample Condition on Receipt:**

Two drinking water samples and one aqueous sample were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. A revised Chain-of-Custody (CoC) was received by email on March 19, 2020.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The samples were extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

A Laboratory Fortified Sample Matrix (LFSM) and Laboratory Fortified Sample Matrix Duplicate (LFSMD) were performed on sample "WSFT2003180950ST". The analyte recovery of PFBS in the MS was greater than 130%. All other analyte recoveries and RPDs were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000608-01	FB2003180940ST	18-Mar-20 09:40	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
2000608-02	WSFT2003180950ST	MS/MSD18-Mar-20 09:50	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL HDPE Bottle, 250 mL HDPE Bottle, 250 mL HDPE Bottle, 250 mL HDPE Bottle, 250 mL
2000608-03	WSFT2003180950ST-FD	18-Mar-20 09:50	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
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Client Data	Laboratory Data
Name: AECOM Project: MPART - Palo, Ionia County, MI	Matrix: Aqueous Lab Sample: B0C0257-BLK1 Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDa	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDoA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type		% Rec		Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR		110		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR		101		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR		90		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: FB2003180940ST **EPA Method 537 Rev 1.1**

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Aqueous	Lab Sample:	2000608-01	Column:	BEH C18
Project:	MPART - Palo, Ionia County, MI	Date Collected:	18-Mar-20 09:40	Date Received:	19-Mar-20 08:41		

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFDoA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFTTrDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
13C2-PFDA	SURR	95	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1
d5-EtFOSAA	SURR	95	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:17	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WSFT2003180950ST	EPA Method 537 Rev 1.1
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Client Data	Laboratory Data
Name: AECOM	Lab Sample: 2000608-02
Project: MPART - Palo, Ionia County, MI	Date Received: 19-Mar-20 08:41
Location: 8496 Judevine Rd	Column: BEH C18
Matrix: Drinking Water	Date Collected: 18-Mar-20 09:50

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	106	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
13C2-PFDA	SURR	95	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1
d5-EtFOSAA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:28	1

RL - Reporting limit	Results reported to RL. Reporting convention specified by MI DEQ..	When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.
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Sample ID: WSFT2003180950ST

EPA Method 537 Rev 1.1

Name:	AECOM	Lab Sample:	B0C0257-MS1/B0C0257-MSD1	Source Lab Sample:	2000608-02
Project:	MPART - Palo, Ionia County, MI	QC Batch:	B0C0257	Date Extracted:	31-Mar-20
Matrix:	Aqueous	Samp Size:	0.24/0.25 L	Column:	BEH C18

Analyte	CAS Number	Sample (ng/L)	LFSM (ng/L)	LFSM Spike	LFSM % Rec	LFSM Quals	LFSMD (ng/L)	LFSMD Spike	LFSM D	RPD	LFSMD Quals	%Rec Limits	RPD Limits	LFSM Analyzed	LFSM Dil	LFSMD Analyzed	LFS MD
PFBS	375-73-5	ND	49	37	131	H	43	36	121	8		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFHxA	307-24-4	ND	50	42	119		45	40	113	6		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFHpA	375-85-9	ND	53	42	125		47	40	116	8		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFHxS	355-46-4	ND	50	38	130		43	37	116	11		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFOA	335-67-1	ND	47	42	111		43	40	106	4		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFNA	375-95-1	ND	50	42	118		45	40	111	6		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFOS	1763-23-1	ND	44	39	112		38	37	102	10		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFDA	335-76-2	ND	47	42	112		41	40	102	10		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
MeFOSAA	2355-31-9	ND	46	42	109		39	40	96	13		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
EtFOSAA	2991-50-6	ND	44	42	106		38	40	95	11		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFUnA	2058-94-8	ND	44	42	106		39	40	97	9		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFDoA	307-55-1	ND	40	42	96		36	40	88	8		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFTTrDA	72629-94-8	ND	39	42	93		35	40	87	7		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
PFTeDA	376-06-7	ND	38	42	91		34	40	85	6		70-130	30	06-Apr-20 17:31	1	06-Apr-20 17:42	1
Labeled Standards		Type			LFSM % Rec	LFSM Quals			LFSMD % Rec		LFSMD Quals	Limits		LFSM Analyzed	LFSM Dil	LFSMD Analyzed	LFS MD
13C2-PFHxA		SURR			113				98			70-130		06-Apr-20 17:31	1	06-Apr-20 17:42	1
13C2-PFDA		SURR			104				90			70-130		06-Apr-20 17:31	1	06-Apr-20 17:42	1
d5-EtFOSAA		SURR			101				85			70-130		06-Apr-20 17:31	1	06-Apr-20 17:42	1

Reporting convention specified by MI DEQ.

Sample ID: WSFT2003180950ST-FD	EPA Method 537 Rev 1.1
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Client Data	Laboratory Data
Name: AECOM	Lab Sample: 2000608-03
Project: MPART - Palo, Ionia County, MI	Date Received: 19-Mar-20 08:41
Location: 8496 Judevine Rd	Column: BEH C18
Matrix: Drinking Water	Date Collected: 18-Mar-20 09:50

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	102	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
13C2-PFDA	SURR	97	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1
d5-EtFOSAA	SURR	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 20:39	1

RL - Reporting limit	Results reported to RL. Reporting convention specified by MI DEQ..	When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.
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DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A



— revised COC — received via email 03/19/20 1258 hrs 03/19/20

CHAIN OF CUSTODY

For Laboratory Use Only
Work Order #: 2000608 Temp: 3.3 °C
Storage ID: R-13, WR-2 Storage Secured: Yes ☒ No ☐

Project ID: MPART - Palo, Ionia County, MI PO#: 60560354.14 Sampler: Sara Thurkettle & Kaitlyn Eicholtz
(name)

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify: _____

Invoice to: Name Mike Jury Company EGLE Address Saginaw Bay District Office City Saginaw State MI Ph# 517-242-9578 Fax# _____

Relinquished by (printed name and signature) Kaitlyn Eicholtz [Signature] Date 3/8/2020 Time 17:00 Received by (printed name and signature) see original COC Date _____ Time _____

Relinquished by (printed name and signature) _____ Date _____ Time _____ Received by (printed name and signature) _____ Date _____ Time _____

SHIP TO: Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762				Add Analysis(es) Requested														Mod. EPA Method 537	EPA Method 537(DW only)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Special Instructions/Comments: Send Results and Acknowledgements to:
See email for distribution list.

SEND
DOCUMENTATION
AND RESULTS TO:

Name: Stephanie Kammer
Company: EGLE
Address: 525 W. Allegan Street, Constitution Hall, 1st South West
City: Lansing State: MI Zip: 30242
Phone: 517-897-1597 Fax: 517-241-3571
Email: KammerS@michigan.gov

Container Types: P = HDPE, PJ = HDPE Jar
O = Other: _____



Bottle Preservation Type: T = Thiosulfate,
TZ = Trizma: _____ TZ

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment,
SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____



Work Order #: 2000608 Temp: 3.3
Storage ID: R-13, WR-2 Storage Secured: Yes ☒ No ☐

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify:

Relinquished by (printed name and signature)	Date	Time	Received by (printed name and signature)	Date	Time
Kaitlyn Eicholtz 	3/8/2020	17:00	 William R. Wright	3/9/20	09:41
Relinquished by (printed name and signature)	Date	Time	Received by (printed name and signature)	Date	Time

Add Analysis(es) Requested		Mod. EPA Method 537
Container(s)		
Quantity		
Type		
Matrix		
PFOA/ PFOS		
UCMR3 PFAS List6		
537 List: 14		
Full List of 24		
Other: Please List Below		
Branch and Linear		

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment
SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other.

SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other.

Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #: 2000608

TAT std

Samples Arrival:	Date/Time <u>3/19/20 08:41</u>	Initials: <u>WRW</u>	Location:
	Shelf/Rack: <u>N/A</u>		
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
	<input type="radio"/> None		
Temp °C: <u>3.3</u> (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: <u>IR-3</u>
Temp °C: <u>3.3</u> (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill			
Trk # <u>1708 7183 6143</u>	<input checked="" type="checkbox"/>		
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="checkbox"/> Vista	<input type="checkbox"/> Client	<input type="checkbox"/> Retain
	<input type="checkbox"/> Return	<input type="checkbox"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Logged In:	Date/Time <u>03/19/20 1349</u>	Initials: <u>WWS</u>	Location: <u>R-13, WR-2</u> ↓ ↓ Shelf/Rack: <u>A-1, E-4</u>
COC Anomaly/Sample Acceptance Form completed?			
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

Comments:

CoC/Label Reconciliation Report WO# 2000608

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2000608-01	A FB2003180940ST		18-Mar-20 09:40	HDPE Bottle, 250 mL	Aqueous	
2000608-01	B FB2003180940ST		18-Mar-20 09:40	HDPE Bottle, 250 mL	Aqueous	
2000608-02	A WSFT2003180950ST	8496 Judevine Rd	18-Mar-20 09:50	HDPE Bottle, 250 mL	Aqueous	MS/MSD
2000608-02	B WSFT2003180950ST	8496 Judevine Rd	18-Mar-20 09:50	HDPE Bottle, 250 mL	Aqueous	MS/MSD
2000608-02	C WSFT2003180950ST	8496 Judevine Rd	18-Mar-20 09:50	HDPE Bottle, 250 mL	Aqueous	MS/MSD
2000608-02	D WSFT2003180950ST	8496 Judevine Rd	18-Mar-20 09:50	HDPE Bottle, 250 mL	Aqueous	MS/MSD
2000608-02	E WSFT2003180950ST	8496 Judevine Rd	18-Mar-20 09:50	HDPE Bottle, 250 mL	Aqueous	MS/MSD
2000608-02	F WSFT2003180950ST	8496 Judevine Rd	18-Mar-20 09:50	HDPE Bottle, 250 mL	Aqueous	MS/MSD
2000608-03	A WSFT2003180950ST-FD	8496 Judevine Rd	18-Mar-20 09:50	HDPE Bottle, 250 mL	Aqueous	
2000608-03	B WSFT2003180950ST-FD	8496 Judevine Rd	18-Mar-20 09:50	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.

Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	✓			
Sample Custody Seals Intact?			✓	
Adequate Sample Volume?	✓			
Container Type Appropriate for Analysis(es)	✓			
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	✓			
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	✓			

Verified by/Date: WWS 03/19/20



April 09, 2020

Vista Work Order No. 2000607

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000607**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000607-01	WT2003181015ST	18-Mar-20 10:15	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI	Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18
--	---

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDoA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTTrDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDoA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type		% Rec		Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR		110		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR		101		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR		90		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WT2003181015ST	EPA Method 537 Rev 1.1
----------------------------------	-------------------------------

Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI Location: 8337 Church St	Laboratory Data Lab Sample: 2000607-01 Date Received: 19-Mar-20 08:41 Column: BEH C18
--	---

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	100	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
13C2-PFDA	SURR	94	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1
d5-EtFOSAA	SURR	81	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 20:06	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Sample Log-In Checklist

 Page # 1 of 1

 Vista Work Order #: 2000607

 TAT std

Samples Arrival:	Date/Time 3/19/20 08:41	Initials: WRW	Location:
			Shelf/Rack: <u>N/A</u>
Delivered By:	<input checked="" type="radio"/> FedEx <input type="radio"/> UPS <input type="radio"/> On Trac <input type="radio"/> GLS <input type="radio"/> DHL <input type="radio"/> Hand Delivered <input type="radio"/> Other		
Preservation:	<input checked="" type="radio"/> Ice <input type="radio"/> Blue Ice <input type="radio"/> Dry Ice <input type="radio"/> None		
Temp °C: 3.3 (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: <u>IR-3</u>
Temp °C: 3.3 (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Airbill	Trk # <u>1708 7183 6143</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Shipping Documentation Present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Container	<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain
	<input type="radio"/> Return	<input type="radio"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Holding Time Acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Logged In:	Date/Time 03/19/20 1344	Initials: WWS	Location: R-13, WR-2 ↓ ↓ Shelf/Rack: <u>2-1, E-4</u>
COC Anomaly/Sample Acceptance Form completed?		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000607

LabNumber	CoC Sample ID		SampleAlias	Sample Date/Time		Container	BaseMatrix	Sample Comments
2000607-01	A WT2003181015ST	<input checked="" type="checkbox"/>	8337 Church St	18-Mar-20 10:15	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000607-01	B WT2003181015ST	<input checked="" type="checkbox"/>	8337 Church St	18-Mar-20 10:15	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.

Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Verified by/Date: WWS 03/19/20



April 09, 2020

Vista Work Order No. 2000606

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000606**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000606-01	WR2003181030ST	18-Mar-20 10:30	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI	Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18
--	---

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PfUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDaA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type		% Rec		Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR		110		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR		101		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR		90		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WR2003181030ST	EPA Method 537 Rev 1.1
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Client Data	Laboratory Data
Name: AECOM	Lab Sample: 2000606-01
Project: MPART - Palo, Ionia County, MI	Date Received: 19-Mar-20 08:41
Location: 8447 Church St	Column: BEH C18
Matrix: Drinking Water	Date Collected: 18-Mar-20 10:30

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
13C2-PFDA	SURR	90	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1
d5-EtFOSAA	SURR	86	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 19:55	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009



MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A



Work Order #: 2000666 Temp: 3.3
Storage ID: R-13, WR-2 Storage Secured: Yes ☒ No ☐

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify:

Relinquished by (printed name and signature)	Date	Time	Received by (printed name and signature)	Date	Time
Kaitlyn Eicholtz 	3/8/2020	17:00	William Wright 	3/19/20	08:41
Relinquished by (printed name and signature)	Date	Time	Received by (printed name and signature)	Date	Time

Mod. EPA
Method 537

SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other. Page 13 of 15

Sample Log-In Checklist

 Page # 1 of 1

Vista Work Order #:

2000606

 TAT std

Samples Arrival:	Date/Time 3/19/20 08:41	Initials: WRW	Location: Shelf/Rack: <u>N/A</u>
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
Temp °C: 3.3 (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: <u>IR-3</u>
Temp °C: 3.3 (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill	Trk # <u>1708 7183 6143</u>	<input checked="" type="checkbox"/>	
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain
	<input type="radio"/> Return	<input type="radio"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		

Logged In:	Date/Time 03/19/20 1337	Initials: WWS	Location: R-13, WR-2 ↓ ↓ Shelf/Rack: <u>2-1, E-4</u>
COC Anomaly/Sample Acceptance Form completed?			<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000606

LabNumber	CoC Sample ID		SampleAlias	Sample Date/Time		Container	BaseMatrix	Sample Comments
2000606-01	A WR2003181030ST	<input checked="" type="checkbox"/>	8447 Church St	18-Mar-20 10:30	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000606-01	B WR2003181030ST	<input checked="" type="checkbox"/>	8447 Church St	18-Mar-20 10:30	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Verified by/Date: WJS 03/19/20



April 09, 2020

Vista Work Order No. 2000605

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000605**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000605-01	WSFT2003181120ST	18-Mar-20 11:20	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB					EPA Method 537 Rev 1.1				
Client Data Name: AECOM Matrix: Aqueous Project: MPART - Palo, Ionia County, MI					Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18				
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PfUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDaA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type			% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR			110	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR			101	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR			90	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WSFT2003181120ST **EPA Method 537 Rev 1.1**

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Drinking Water	Lab Sample:	2000605-01	Column:	BEH C18
Project:	MPART - Palo, Ionia County, MI	Date Collected:	18-Mar-20 11:20	Date Received:	19-Mar-20 08:41		
Location:	4560 Division St						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	3	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFTeDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	105	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
13C2-PFDA	SURR	92	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1
d5-EtFOSAA	SURR	97	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 19:44	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

CHAIN OF CUSTODY

For Laboratory Use Only

Work Order #: 2000605 Temp: 33
Storage ID: R-13, WR-2 Storage Secured: Yes ☒ No

Project ID: MPART - Palo, Ionia County, MI PO#: 60560354.14 Sampler: Sara Thurkettle & Kaitlyn Eicholtz
(name)

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify: _____

Invoice to: Name Company Address City State Ph# Fax#
Mike Jury EGLE Saginaw Bay District Office Saginaw MI 517-242-9578

Relinquished by (printed name and signature) Date Time Received by (printed name and signature) Date Time
Kaitlyn Eicholtz 3/8/2020 17:00 William R. Wright 3/19/20 09:41
Relinquished by (printed name and signature) Date Time Received by (printed name and signature) Date Time

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 * Fax (916) 673-0106

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Container(s)

Mod. EPA
Method 537

EPA Method
537 (DW only)

Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	PFOA/PFOS	UCMR3 PFAS List 6	537 List: 14	Full List of 24	Other: Please List Below	Branch and Linear	PFOA/PFOS	UCMR3 PFAS List 6	PFAS List: 14	Comments
WSFT2003181120ST	3/18/20	11:20	4560 Division St	2	P	DW									X	

Special Instructions/Comments: Send Results and Acknowledgements to:

See email for distribution list.

**SEND
DOCUMENTATION
AND RESULTS TO:**

Name: Stephanie Kammer
Company: EGLE
Address: 525 W. Allegan Street, Constitution Hall, 1st South West
City: Lansing State: MI Zip: 30242
Phone: 517-897-1597 Fax: 517-241-3571
Email: KammerS@michigan.gov

Container Types: P = HDPE, PJ = HDPE Jar

Bottle Preservation Type: T = Thiosulfate,

TZ = Trizma: _____ TZ

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment

SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other:

Sample Log-In Checklist

 Page # 1 of 1

Vista Work Order #:

2000605

 TAT std

Samples Arrival:	Date/Time <u>3/19/20 08:41</u>	Initials: <u>WRW</u>	Location: Shelf/Rack: <u>N/A</u>
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
Temp °C: <u>3.3</u> (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: <u>IR-3</u>
Temp °C: <u>3.3</u> (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill	Trk # <u>1708 7183 6143</u>	<input checked="" type="checkbox"/>	
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain
	<input type="radio"/> Return	<input type="radio"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Logged In:	Date/Time <u>03/19/20 1331</u>	Initials: <u>WWS</u>	Location: <u>R-13, WR-2</u> ↓ ↓ Shelf/Rack: <u>A-1, E-4</u>
COC Anomaly/Sample Acceptance Form completed?		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000605

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2000605-01	A WSFT2003181120ST	4560 Division St	18-Mar-20 11:20	HDPE Bottle, 250 mL	Aqueous	
2000605-01	B WSFT2003181120ST	4560 Division St	18-Mar-20 11:20	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.

Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	✓			
Sample Custody Seals Intact?			✓	
Adequate Sample Volume?	✓			
Container Type Appropriate for Analysis(es)	✓			
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	✓			
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	✓			

Verified by/Date: WWS 03/19/20



April 09, 2020

Vista Work Order No. 2000604

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000604**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Certifications.....	10
Sample Receipt.....	13

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000604-01	WT2003181250ST	18-Mar-20 12:50	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
-----------------------	-------------------------------

Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI	Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18
--	---

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDoA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type			% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR			110	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR			101	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR			90	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WT2003181250ST	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI Location: 8406 Main St	Laboratory Data Matrix: Drinking Water Date Collected: 18-Mar-20 12:50 Lab Sample: 2000604-01 Date Received: 19-Mar-20 08:41 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PfUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	81	70 - 130		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
13C2-PFDA	SURR	100	70 - 130		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1
d5-EtFOSAA	SURR	85	70 - 130		B0C0257	31-Mar-20	0.24 L	07-Apr-20 16:05	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Sample Log-In Checklist

Page # 1 of 1

Vista Work Order #: 2000604

TAT std

Samples Arrival:	Date/Time <u>3/19/20 08:41</u>	Initials: <u>WRW</u>	Location: Shelf/Rack: <u>N/A</u>
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
Temp °C: <u>3.3</u> (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: <u>IR-3</u>
Temp °C: <u>3.3</u> (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill	Trk # <u>1708 7183 6143</u>	<input checked="" type="checkbox"/>	
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain
	<input type="radio"/> Return	<input type="radio"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		

Logged In:	Date/Time <u>03/19/20 1321</u>	Initials: <u>WWS</u>	Location: <u>R-13, WR-2</u> ↓ ↓ Shelf/Rack: <u>2-1, E-4</u>
COC Anomaly/Sample Acceptance Form completed?			<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000604

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2000604-01	A WT2003181250ST <input checked="" type="checkbox"/>	8406 Main St	18-Mar-20 12:50 <input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000604-01	B WT2003181250ST <input checked="" type="checkbox"/>	8406 Main St	18-Mar-20 12:50 <input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Verified by/Date: WWS 03/19/20



April 09, 2020

Vista Work Order No. 2000603

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000603**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000603-01	WT2003181340ST	18-Mar-20 13:40	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI	Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDaA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type			% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR			110	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR			101	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR			90	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WT2003181340ST	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI Location: 8267 Church St	Laboratory Data Lab Sample: 2000603-01 Date Received: 19-Mar-20 08:41 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFOA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFDoA	307-55-1	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFTeDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	100	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
13C2-PFDA	SURR	91	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1
d5-EtFOSAA	SURR	83	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:59	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Sample Log-In Checklist

 Page # 1 of 1

Vista Work Order #:

2000603

 TAT std

Samples Arrival:	Date/Time 3/19/20 08:41	Initials: WRW	Location: Shelf/Rack: N/A
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
Temp °C: 3.3 (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: IR-3
Temp °C: 3.3 (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill			
Trk # <u>1708 7183 6143</u>	<input checked="" type="checkbox"/>		
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="checkbox"/> Vista	<input type="checkbox"/> Client	<input type="checkbox"/> Retain
	<input type="checkbox"/> Return	<input type="checkbox"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Logged In:	Date/Time 03/19/20 1315	Initials: WWS	Location: R-13, WR-2 ↓ ↓ Shelf/Rack: 2-1, E-4
COC Anomaly/Sample Acceptance Form completed?		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000603

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2000603-01	A WT2003181340ST <input checked="" type="checkbox"/>	8267 Church St	18-Mar-20 13:40 <input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000603-01	B WT2003181340ST <input checked="" type="checkbox"/>	8267 Church St	18-Mar-20 13:40 <input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Verified by/Date: WWS 03/19/20



April 09, 2020

Vista Work Order No. 2000602

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000602**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000602-01	WT2003181350ST	18-Mar-20 13:50	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI	Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDoA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDoA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type		% Rec		Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR		110		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR		101		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR		90		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WT2003181350ST	EPA Method 537 Rev 1.1
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Client Data	Laboratory Data
Name: AECOM	Lab Sample: 2000602-01
Project: MPART - Palo, Ionia County, MI	Column: BEH C18
Location: 8335 Church St	Date Received: 19-Mar-20 08:41
Matrix: Drinking Water	Date Collected: 18-Mar-20 13:50

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	104	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1
d5-EtFOSAA	SURR	80	70 - 130		B0C0257	31-Mar-20	0.24 L	06-Apr-20 18:48	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

CHAIN OF CUSTODY

For Laboratory Use Only

Work Order #: 2000602 Temp: 3.3
Storage ID: R-13, WR-2 Storage Secured: Yes ☒ No

Project ID: MPART - Palo, Ionia County, MI PO#: 60560354.14 Sampler: Sara Therkettle & Kaitlyn Eicholtz
(name)

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify: _____

Invoice to: Name Company Address City State Ph# Fax#
Mike Jury EGLE Saginaw Bay District Office Saginaw MI 517-242-9578

Relinquished by (printed name and signature) Date Time Received by (printed name and signature) Date Time
Kaitlyn Eicholtz 3/8/2020 17:00 William R. Wright 3/19/20 08:41
Relinquished by (printed name and signature) Date Time Received by (printed name and signature) Date Time

SHIP TO: Vista Analytical Laboratory
1104 Windfield Way
El Dorado Hills, CA 95762
(916) 673-1520 * Fax (916) 673-0106

ATTN: _____

Method of Shipment: _____

Tracking No.: _____

Add Analysis(es) Requested

Container(s)

Mod. EPA
Method 537

EPA Method
537 (DW only)

Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	PFOA/PFOS	UCMR3 PFAS List 6	537 List: 14	Full List of 24	Other: Please List Below	Branch and Linear	PFOA/PFOS	UCMR3 PFAS List 6	PFAS List: 14	Comments
WT2003181350ST	3/18/20	13:50	8335 Church St	2	P	DW									X	

Special Instructions/Comments: Send Results and Acknowledgements to:
See email for distribution list.

SEND
DOCUMENTATION
AND RESULTS TO:

Name: Stephanie Kammer
Company: EGLE
Address: 525 W. Allegan Street, Constitution Hall, 1st South West
City: Lansing State: MI Zip: 30242
Phone: 517-897-1597 Fax: 517-241-3571
Email: KammerS@michigan.gov

Container Types: P= HDPE, PJ= HDPE Jar

Bottle Preservation Type: T = Thiosulfate,

TZ = Trizma: _____ TZ

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment

SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____

Sample Log-In Checklist

 Page # 1 of 1

 Vista Work Order #: 2000602

 TAT std

Samples Arrival:	Date/Time <u>3/19/20 08:41</u>		Initials: <u>WRW</u>		Location:		
					Shelf/Rack: <u>N/A</u>		
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered	<input type="radio"/> Other
Preservation:	<input checked="" type="radio"/> Ice		<input type="radio"/> Blue Ice		<input type="radio"/> Dry Ice		<input type="radio"/> None
Temp °C: <u>3.3</u> (uncorrected)	Probe used: Y <input checked="" type="radio"/> N <input type="radio"/>				Thermometer ID: <u>IR-3</u>		
Temp °C: <u>3.3</u> (corrected)							

				YES	NO	NA
Shipping Container(s) Intact?				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Custody Seals Intact?				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Airbill	Trk # <u>1708 7183 6143</u>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Documentation Present?				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Container	<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain	<input type="radio"/> Return	<input type="radio"/> Dispose	
Chain of Custody / Sample Documentation Present?				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chain of Custody / Sample Documentation Complete?				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Holding Time Acceptable?				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Logged In:	Date/Time <u>03/19/20 1300</u>	Initials: <u>WWS</u>	Location: <u>R-13, WR-2</u> ↓ ↓ Shelf/Rack: <u>2-1, E-4</u>			
COC Anomaly/Sample Acceptance Form completed?				<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000602

LabNumber	CoC Sample ID		SampleAlias	Sample Date/Time		Container	BaseMatrix	Sample Comments
2000602-01	A WT2003181350ST	<input checked="" type="checkbox"/>	8335 Church St	18-Mar-20 13:50	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000602-01	B WT2003181350ST	<input checked="" type="checkbox"/>	8335 Church St	18-Mar-20 13:50	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>			
Sample Custody Seals Intact?			<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>			
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>			
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>			
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>			

Verified by/Date: WJS 03/19/20



April 09, 2020

Vista Work Order No. 2000601

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000601**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Receipt.....	13

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000601-01	WT2003181400ST	18-Mar-20 14:00	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB					EPA Method 537 Rev 1.1				
Client Data Name: AECOM Matrix: Aqueous Project: MPART - Palo, Ionia County, MI					Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18				
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDoA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDaA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type			% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR			110	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR			101	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR			90	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WT2003181400ST	EPA Method 537 Rev 1.1
----------------------------------	-------------------------------

Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI Location: 8262 Front St	Laboratory Data Lab Sample: 2000601-01 Date Received: 19-Mar-20 08:41 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFOA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFDoA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFTeDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
13C2-PFDA	SURR	101	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:37	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

CHAIN OF CUSTODY

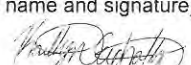
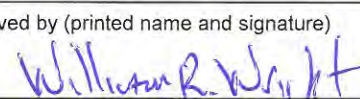

For Laboratory Use Only

Work Order #: 2000601 Temp: 3.3
Storage ID: R-13, WR-2 Storage Secured: Yes ☒ No ☐

Project ID: MPART - Palo, Ionia County, MI PO#: 60560354.14 Sampler: Sara Thurkettle & Kaitlyn Eicholtz
(name)

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify: _____

Invoice to: Name	Company	Address	City	State	Ph#	Fax#
Mike Jury	EGLE	Saginaw Bay District Office	Saginaw	MI	517-242-9578	

Relinquished by (printed name and signature)	Date	Time	Received by (printed name and signature)	Date	Time
Kaitlyn Eicholtz 	3/8/2020	17:00	William R. Wright  Will R. Rife 	3/19/20	09:41
Relinquished by (printed name and signature)	Date	Time	Received by (printed name and signature)	Date	Time

SHIP TO: Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 (916) 673-1520 * Fax (916) 673-0106 ATTN: _____ Method of Shipment: _____ Tracking No.: _____				Add Analysis(es) Requested										Mod. EPA Method 537			EPA Method 537(DW only)			Comments
				Container(s)																
Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	PFOA/PFOS	UCMR3 PFAS List 6	537 List: 14	Full List of 24	Other: Please List Below	Branch and Linear	PFOA/PFOS	UCMR3 PFAS List 6	PFAS List: 14					
WT2003181400ST	3/18/20	14:00	8262 Front St	2	P	DW										X				

Special Instructions/Comments: Send Results and Acknowledgements to:
See email for distribution list.

**SEND
DOCUMENTATION
AND RESULTS TO:**

Name: Stephanie Kammer
Company: EGLE
Address: 525 W. Allegan Street, Constitution Hall, 1st South West
City: Lansing State: MI Zip: 30242
Phone: 517-897-1597 Fax: 517-241-3571
Email: KammerS@michigan.gov

Container Types: P= HDPE, PJ= HDPE Jar

Bottle Preservation Type: T = Thiosulfate,

Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment

O = Other Work Order 2000601

TZ = Trizma: _____ TZ _____

SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: Page 13 of 15

Sample Log-In Checklist

 Page # 1 of 1

Vista Work Order #:

2000601

 TAT std

Samples Arrival:	Date/Time 3/19/20 08:41	Initials: WRW	Location: Shelf/Rack: <u>N/A</u>
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
Temp °C: <u>3.3</u> (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: <u>IR-3</u>
Temp °C: <u>3.3</u> (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill	Trk # <u>1708 7183 6143</u>	<input checked="" type="checkbox"/>	
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain
	<input type="radio"/> Return	<input type="radio"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Logged In:	Date/Time 03/19/20 1302	Initials: WWS	Location: <u>R-13, WR-2</u> ↓ ↓ Shelf/Rack: <u>2-1, E-4</u>
COC Anomaly/Sample Acceptance Form completed?		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000601

LabNumber	CoC Sample ID		SampleAlias	Sample Date/Time		Container	BaseMatrix	Sample Comments
2000601-01	A WT2003181400ST	<input checked="" type="checkbox"/>	8262 Front St	18-Mar-20 14:00	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000601-01	B WT2003181400ST	<input checked="" type="checkbox"/>	8262 Front St	18-Mar-20 14:00	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Verified by/Date: MWS 03/19/20



April 14, 2020

Vista Work Order No. 2000600

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000600**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000600-01	WR2003181420ST	18-Mar-20 14:20	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB					EPA Method 537 Rev 1.1				
Client Data Name: AECOM Matrix: Aqueous Project: MPART - Palo, Ionia County, MI					Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18				
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PfUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDaA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type		% Rec		Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR		110		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR		101		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR		90		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WR2003181420ST **EPA Method 537 Rev 1.1**

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Drinking Water	Lab Sample:	2000600-01	Column:	BEH C18
Project:	MPART - Palo, Ionia County, MI	Date Collected:	18-Mar-20 14:20	Date Received:	19-Mar-20 08:41		
Location:	8456 Church St						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	10	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFHxA	307-24-4	13	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFHpA	375-85-9	8	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFHxS	355-46-4	7	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFOA	335-67-1	26	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFNA	375-95-1	3	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFOS	1763-23-1	58	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFDoA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFTTrDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	109	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
13C2-PFDA	SURR	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1
d5-EtFOSAA	SURR	94	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:26	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Sample Log-In Checklist

 Page # 1 of 1

 Vista Work Order #: 2000600 TAT std

Samples Arrival:	Date/Time 3/19/20 08:41	Initials: WRW	Location: Shelf/Rack: N/A
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
	<input type="radio"/> None		
Temp °C: 3.3 (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: IR-3
Temp °C: 3.3 (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill	Trk # 1708 7183 6143	<input checked="" type="checkbox"/>	
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain
	<input type="radio"/> Return	<input type="radio"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Logged In:	Date/Time 03/19/20 1253	Initials: WWS	Location: R-13, WR-2 ↓ ↓ Shelf/Rack: 2-1, E-4
COC Anomaly/Sample Acceptance Form completed?		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000600

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2000600-01	A WR2003181420ST <input checked="" type="checkbox"/>	8456 Church St	18-Mar-20 14:20 <input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000600-01	B WR2003181420ST <input checked="" type="checkbox"/>	8456 Church St	18-Mar-20 14:20 <input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Verified by/Date: WWS 03/19/20



April 09, 2020

Vista Work Order No. 2000599

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000599**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Certifications.....	10
Sample Receipt.....	13

Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000599-01	WT2003181430ST	18-Mar-20 14:30	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
-----------------------	-------------------------------

Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI	Laboratory Data Lab Sample: B0C0257-BLK1 Column: BEH C18
--	---

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PfUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDaA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type		% Rec		Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR		110		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR		101		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR		90		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WT2003181430ST	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI Location: 8231 Church St	Laboratory Data Matrix: Drinking Water Date Collected: 18-Mar-20 14:30 Lab Sample: 2000599-01 Date Received: 19-Mar-20 08:41 Column: BEH C18
--	--

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PfUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	109	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
13C2-PFDA	SURR	102	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1
d5-EtFOSAA	SURR	102	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:15	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Sample Log-In Checklist

 Page # 1 of 1

Vista Work Order #:

2000599

 TAT std

Samples Arrival:	Date/Time <u>3/19/20 08:41</u>	Initials: <u>WRW</u>	Location: Shelf/Rack: <u>N/A</u>
Delivered By:	<input checked="" type="checkbox"/> FedEx	<input type="checkbox"/> UPS	<input type="checkbox"/> On Trac
	<input type="checkbox"/> GLS	<input type="checkbox"/> DHL	<input type="checkbox"/> Hand Delivered
Preservation:	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice	<input type="checkbox"/> Dry Ice
Temp °C: <u>3.3</u> (uncorrected)	Probe used: Y <input checked="" type="checkbox"/> N		Thermometer ID: <u>IR-3</u>
Temp °C: <u>3.3</u> (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill	Trk # <u>1709 7183 6143</u>	<input checked="" type="checkbox"/>	
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="checkbox"/> Vista	<input type="checkbox"/> Client	<input type="checkbox"/> Retain
	<input type="checkbox"/> Return	<input type="checkbox"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Logged In:	Date/Time <u>03/19/20 1233</u>	Initials: <u>WWS</u>	Location: <u>R-13, WR-2</u> ↓ ↓ Shelf/Rack: <u>2-1, E-4</u>
COC Anomaly/Sample Acceptance Form completed?		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000599

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2000599-01	A WT2003181430ST	8231 Church St	18-Mar-20 14:30	HDPE Bottle, 250 mL	Aqueous	
2000599-01	B WT2003181430ST	8231 Church St	18-Mar-20 14:30	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	✓			
Sample Custody Seals Intact?			✓	
Adequate Sample Volume?	✓			
Container Type Appropriate for Analysis(es)	✓			
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	✓			
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	✓			

Verified by/Date: WWS 03/19/20



April 09, 2020

Vista Work Order No. 2000598

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000598**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000598-01	WT2003181515ST	18-Mar-20 15:15	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
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Client Data	Laboratory Data
Name: AECOM Project: MPART - Palo, Ionia County, MI	Matrix: Aqueous Lab Sample: B0C0257-BLK1 Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDaA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type		% Rec		Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR		110		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR		101		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR		90		70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WT2003181515ST	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI Location: 8438 Church St	Laboratory Data Matrix: Drinking Water Date Collected: 18-Mar-20 15:15 Lab Sample: 2000598-01 Date Received: 19-Mar-20 08:41 Column: BEH C18
--	--

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFHxA	307-24-4	5	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFHpA	375-85-9	4	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFOA	335-67-1	10	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFOS	1763-23-1	4	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFUnA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFTeDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
13C2-PFDA	SURR	96	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1
d5-EtFOSAA	SURR	92	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 18:04	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Sample Log-In Checklist

 Page # 1 of 1

 Vista Work Order #: 2000598 TAT std

Samples Arrival:	Date/Time 3/19/20 08:41	Initials: WRW	Location: Shelf/Rack: N/A
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Dry Ice
	<input type="radio"/> None		
Temp °C: 3.3 (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: IR-3
Temp °C: 3.3 (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?	<input checked="" type="checkbox"/>		
Airbill	Trk # 1708 7183 6143	<input checked="" type="checkbox"/>	
Shipping Documentation Present?	<input checked="" type="checkbox"/>		
Shipping Container	<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain
	<input type="radio"/> Return	<input type="radio"/> Dispose	
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>		
Holding Time Acceptable?	<input checked="" type="checkbox"/>		
Logged In:	Date/Time 03/19/20 1222	Initials: WWS	Location: R-13, WR-2 ↓ ↓ Shelf/Rack: 2-1, E-4
COC Anomaly/Sample Acceptance Form completed?		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000598

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2000598-01	A WT2003181515ST <input checked="" type="checkbox"/>	8438 Church St	18-Mar-20 15:15 <input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000598-01	B WT2003181515ST <input checked="" type="checkbox"/>	8438 Church St	18-Mar-20 15:15 <input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Verified by/Date: WLS 03/19/20



April 09, 2020

Vista Work Order No. 2000597

Mr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Mr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on March 19, 2020 under your Project Name 'MPART - Palo, Ionia County, MI'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2000597**Case Narrative****Sample Condition on Receipt:**

One drinking water sample was received in good condition and within the method temperature requirements. The sample was received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537, Rev. 1.1**

The sample was extracted and analyzed for a selected list of 14 PFAS using EPA Method 537, Rev. 1.1. The results have been reported following the conventions specified by the Michigan Department of Environmental Quality.

Holding Times

The sample was extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Laboratory Fortified Blank (LFB) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2000597-01	WR2003181530ST	18-Mar-20 15:30	19-Mar-20 08:41	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB	EPA Method 537 Rev 1.1
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Client Data	Laboratory Data
Name: AECOM Project: MPART - Palo, Ionia County, MI	Matrix: Aqueous Lab Sample: B0C0257-BLK1 Column: BEH C18

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFOA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	98	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
13C2-PFDA	SURR	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1
d5-EtFOSAA	SURR	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:08	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB						EPA Method 537 Rev 1.1					
Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI						Laboratory Data Lab Sample: B0C0257-BS1 Column: BEH C18					
Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	43	35	123	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxA	307-24-4	46	40	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHpA	375-85-9	48	40	121	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFHxS	355-46-4	42	36	116	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOA	335-67-1	43	40	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFNA	375-95-1	45	40	114	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFOS	1763-23-1	40	37	108	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDA	335-76-2	42	40	104	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
MeFOSAA	2355-31-9	37	40	93	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
EtFOSAA	2991-50-6	36	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFUnA	2058-94-8	40	40	99	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFDaA	307-55-1	37	40	91	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTTrDA	72629-94-8	36	40	90	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
PFTeDA	376-06-7	35	40	87	70 - 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
Labeled Standards	Type			% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR			110	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
13C2-PFDA	SURR			101	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1
d5-EtFOSAA	SURR			90	70- 130		B0C0257	31-Mar-20	0.25 L	06-Apr-20 17:19	1

Data Reported per Michigan DEQ instructions.

Sample ID: WR2003181530ST	EPA Method 537 Rev 1.1
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Client Data Name: AECOM Project: MPART - Palo, Ionia County, MI Location: 8253 Front St	Laboratory Data Matrix: Drinking Water Date Collected: 18-Mar-20 15:30 Lab Sample: 2000597-01 Date Received: 19-Mar-20 08:41 Column: BEH C18
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Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFHxA	307-24-4	ND	2		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFHpA	375-85-9	ND	2		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFHxS	355-46-4	ND	2		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFOA	335-67-1	ND	2		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFNA	375-95-1	ND	2		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFOS	1763-23-1	ND	2		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFDA	335-76-2	ND	2		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
MeFOSAA	2355-31-9	ND	4		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
EtFOSAA	2991-50-6	ND	4		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFA	2058-94-8	ND	4		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFDaA	307-55-1	ND	4		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFTDA	72629-94-8	ND	4		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
PFTeDA	376-06-7	ND	4		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	100	70 - 130		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
13C2-PFDA	SURR	89	70 - 130		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1
d5-EtFOSAA	SURR	88	70 - 130		B0C0257	31-Mar-20	0.26 L	06-Apr-20 17:53	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

Sample Log-In Checklist

 Page # 1 of 1

 Vista Work Order #: 2000597 TAT std

Samples Arrival:	Date/Time 3/19/20 08:41	Initials: WRW	Location: Shelf/Rack: N/A				
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered	<input type="radio"/> Other
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice		<input type="radio"/> Dry Ice		<input type="radio"/> None	
Temp °C: 3.3 (uncorrected)	Probe used: Y / <input checked="" type="radio"/> N				Thermometer ID: IR-3		
Temp °C: 3.3 (corrected)							

				YES	NO	NA
Shipping Container(s) Intact?				<input checked="" type="checkbox"/>		
Shipping Custody Seals Intact?				<input checked="" type="checkbox"/>		
Airbill	Trk # 1708 7183 6143			<input checked="" type="checkbox"/>		
Shipping Documentation Present?				<input checked="" type="checkbox"/>		
Shipping Container		<input checked="" type="radio"/> Vista	<input type="radio"/> Client	<input type="radio"/> Retain	<input type="radio"/> Return	<input type="radio"/> Dispose
Chain of Custody / Sample Documentation Present?				<input checked="" type="checkbox"/>		
Chain of Custody / Sample Documentation Complete?				<input checked="" type="checkbox"/>		
Holding Time Acceptable?				<input checked="" type="checkbox"/>		
Logged In:	Date/Time 03/19/20 12:14	Initials: WWS	Location: R-13, WR-2 ↓ ↓ Shelf/Rack: 2-1, E-4			
COC Anomaly/Sample Acceptance Form completed?					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

CoC/Label Reconciliation Report WO# 2000597

LabNumber	CoC Sample ID		SampleAlias	Sample Date/Time		Container	BaseMatrix	Sample Comments
2000597-01	A WR2003181530ST	<input checked="" type="checkbox"/>	8253 Front St	18-Mar-20 15:30	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	
2000597-01	B WR2003181530ST	<input checked="" type="checkbox"/>	8253 Front St	18-Mar-20 15:30	<input checked="" type="checkbox"/>	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA	Comments:
Sample Container Intact?	<input checked="" type="checkbox"/>			
Sample Custody Seals Intact?			<input checked="" type="checkbox"/>	
Adequate Sample Volume?	<input checked="" type="checkbox"/>			
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>			
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>			
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>			

Verified by/Date: WUS 03/19/20



August 03, 2020

Vista Work Order No. 2001528

Dr. Dorin Bogdan
AECOM
3950 Sparks Drive SE
Grand Rapids, MI 49546

Dear Dr. Bogdan,

Enclosed are the results for the sample set received at Vista Analytical Laboratory on July 21, 2020 under your Project Name 'Statewide WWTP Biosolids PFAS Evaluation'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at [mmaier@vista-analytical.com](mailto:mmmaier@vista-analytical.com).

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 2001528**Case Narrative****Sample Condition on Receipt:**

Six drinking water samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology.

Analytical Notes:**EPA Method 537.1**

The samples were extracted and analyzed for a list of 18 PFAS using EPA Method 537.1. The results have been reported following the conventions specified by the Michigan Department of Environment, Great Lakes, and Energy.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

Two Laboratory Fortified Blanks (LFB/LFBD) and a Laboratory Reagent Blank (LRB) were extracted and analyzed with the preparation batch. No analytes were detected in the Laboratory Reagent Blank. The LFB/LFBD recoveries were within the method acceptance criteria.

The surrogate recoveries for all QC and field samples were within the acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
2001528-01	WR2007161320GGA	16-Jul-20 13:20	21-Jul-20 10:22	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
2001528-02	WT2007161330GGA	16-Jul-20 13:30	21-Jul-20 10:22	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
2001528-03	WT2007161400GGA	16-Jul-20 14:00	21-Jul-20 10:22	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
2001528-04	WT2007161415GGA	16-Jul-20 14:15	21-Jul-20 10:22	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
2001528-05	WT2007161500GGA	16-Jul-20 15:00	21-Jul-20 10:22	HDPE Bottle, 250 mL HDPE Bottle, 250 mL
2001528-06	WT2007161530GGA	16-Jul-20 15:30	21-Jul-20 10:22	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: LRB					EPA Method 537.1				
Client Data				Laboratory Data					
Name:	AECOM	Matrix:	Aqueous	Lab Sample:	B0G0209-BLK1	Column:	BEH C18		
Project:	Statewide WWTP Biosolids PFAS Evaluation								
Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFHxA	307-24-4	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFHpA	375-85-9	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFHxS	355-46-4	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFOA	335-67-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFNA	375-95-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFOS	1763-23-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFDA	335-76-2	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
MeFOSAA	2355-31-9	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
EtFOSAA	2991-50-6	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFUnA	2058-94-8	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFDoA	307-55-1	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFTrDA	72629-94-8	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
PFTeDA	376-06-7	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
HFPO-DA	13252-13-6	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
ADONA	919005-14-4	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
9Cl-PF3ONS	756426-58-1	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
11Cl-PF3OUdS	763051-92-9	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	92	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
13C2-PFDA	SURR	100	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
d5-EtFOSAA	SURR	96	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1
13C3-HFPO-DA	SURR	95	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 08:51	1

RL - Reporting limit

Results reported to RL.
Reporting convention specified by MI DEQ.

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: LFB

EPA Method 537.1

Name:	AECOM	Lab Sample:	B0G0209-BS1/B0G0209-BSD1	Date Extracted:	24-Jul-20
Project:	Statewide WWTP Biosolids PFAS Evaluation	QC Batch:	B0G0209	Column:	BEH C18
Matrix:	Aqueous	Samp Size:	0.25/0.25 L		

Analyte	CAS Number	LFB (ng/L)	LFB Spike	LFB % Rec	LFB Quals	LFBD (ng/L)	LFBD Spike	LFBD % Rec	RPD	LFBD Quals	%Rec Limits	RPD Limits	LFB Analyzed	LFB Dil	LFBD Analyzed	LFBD Dil
PFBS	375-73-5	12	14	85		12	14	83	2		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFHxA	307-24-4	14	16	85		14	16	86	1		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFHpA	375-85-9	16	16	99		16	16	100	1		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFHxS	355-46-4	14	15	95		14	15	99	4		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFOA	335-67-1	16	16	97		15	16	95	2		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFNA	375-95-1	14	16	90		15	16	95	5		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFOS	1763-23-1	14	15	91		14	15	95	4		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFDA	335-76-2	15	16	92		15	16	94	2		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
MeFOSAA	2355-31-9	15	16	95		15	16	96	1		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
EtFOSAA	2991-50-6	14	16	89		14	16	86	3		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFUnA	2058-94-8	15	16	94		15	16	95	1		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFDoA	307-55-1	14	16	90		14	16	85	7		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFTTrDA	72629-94-8	14	16	88		15	16	92	4		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
PFTeDA	376-06-7	13	16	83		14	16	85	2		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
HFPO-DA	13252-13-6	14	16	88		14	16	89	1		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
ADONA	919005-14-4	16	15	109		17	15	113	4		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
9Cl-PF3ONS	756426-58-1	14	15	96		13	15	90	6		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1
11Cl-PF3OUdS	763051-92-9	14	15	94		14	15	91	3		50-150	50	27-Jul-20 09:02	1	27-Jul-20 09:13	1

Labeled Standards	Type	LFB % Rec	LFB Quals	LFBD % Rec	LFBD Quals	Limits	LFB Analyzed	LFB Dil	LFBD Analyzed	LFBD Dil
13C2-PFHxA	SURR	93		93		70-130	27-Jul-20 09:02	1	27-Jul-20 09:13	1
13C2-PFDA	SURR	101		101		70-130	27-Jul-20 09:02	1	27-Jul-20 09:13	1
d5-EtFOSAA	SURR	100		95		70-130	27-Jul-20 09:02	1	27-Jul-20 09:13	1
13C3-HFPO-DA	SURR	96		96		70-130	27-Jul-20 09:02	1	27-Jul-20 09:13	1

Reporting convention specified by MI DEQ.

Sample ID: WR2007161320GGA

EPA Method 537.1

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Drinking Water	Lab Sample:	2001528-01	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	16-Jul-20 13:20	Date Received:	21-Jul-20 10:22		
Location:	8238 CHURCH STREET						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFHxA	307-24-4	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFHpA	375-85-9	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFHxS	355-46-4	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFOA	335-67-1	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFNA	375-95-1	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFOS	1763-23-1	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFDA	335-76-2	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
MeFOSAA	2355-31-9	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
EtFOSAA	2991-50-6	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFUnA	2058-94-8	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFDoA	307-55-1	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFTriDA	72629-94-8	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
PFTeDA	376-06-7	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
HFPO-DA	13252-13-6	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
ADONA	919005-14-4	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
9Cl-PF3ONS	756426-58-1	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
11Cl-PF3OUdS	763051-92-9	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	96	70 - 130		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
13C2-PFDA	SURR	104	70 - 130		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
d5-EtFOSAA	SURR	85	70 - 130		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1
13C3-HFPO-DA	SURR	97	70 - 130		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:24	1

RL - Reporting limit

Results reported to RL.

Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT2007161330GGA

EPA Method 537.1

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Drinking Water	Lab Sample:	2001528-02	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	16-Jul-20 13:30	Date Received:	21-Jul-20 10:22		
Location:	4600 CENTER STREET						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	3	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFHxA	307-24-4	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFHpA	375-85-9	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFHxS	355-46-4	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFOA	335-67-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFNA	375-95-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFOS	1763-23-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFDA	335-76-2	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
MeFOSAA	2355-31-9	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
EtFOSAA	2991-50-6	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFUnA	2058-94-8	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFDoA	307-55-1	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFTriDA	72629-94-8	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
PFTeDA	376-06-7	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
HFPO-DA	13252-13-6	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
ADONA	919005-14-4	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
9Cl-PF3ONS	756426-58-1	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
11Cl-PF3OUdS	763051-92-9	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	94	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
13C2-PFDA	SURR	96	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
d5-EtFOSAA	SURR	84	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1
13C3-HFPO-DA	SURR	96	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:35	1

RL - Reporting limit

Results reported to RL.

Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT2007161400GGA

EPA Method 537.1

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Drinking Water	Lab Sample:	2001528-03	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	16-Jul-20 14:00	Date Received:	21-Jul-20 10:22		
Location:	8194 FRONT STREET						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFHxA	307-24-4	4	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFHpA	375-85-9	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFHxS	355-46-4	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFOA	335-67-1	3	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFNA	375-95-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFOS	1763-23-1	2	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFDA	335-76-2	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
MeFOSAA	2355-31-9	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
EtFOSAA	2991-50-6	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFUnA	2058-94-8	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFDaA	307-55-1	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFTeDA	72629-94-8	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
PFTeDA	376-06-7	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
HFPO-DA	13252-13-6	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
ADONA	919005-14-4	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
9Cl-PF3ONS	756426-58-1	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
11Cl-PF3OUdS	763051-92-9	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	97	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
13C2-PFDA	SURR	96	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
d5-EtFOSAA	SURR	97	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1
13C3-HFPO-DA	SURR	98	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 09:46	1

RL - Reporting limit

Results reported to RL.

Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT2007161415GGA
EPA Method 537.1

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Drinking Water	Lab Sample:	2001528-04	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	16-Jul-20 14:15	Date Received:	21-Jul-20 10:22		
Location:	8441 CHURCH STREET						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFHxA	307-24-4	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFHpA	375-85-9	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFHxS	355-46-4	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFOA	335-67-1	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFNA	375-95-1	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFOS	1763-23-1	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFDA	335-76-2	ND	2		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
MeFOSAA	2355-31-9	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
EtFOSAA	2991-50-6	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFUnA	2058-94-8	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFDoA	307-55-1	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFTriDA	72629-94-8	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
PFTeDA	376-06-7	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
HFPO-DA	13252-13-6	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
ADONA	919005-14-4	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
9Cl-PF3ONS	756426-58-1	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
11Cl-PF3OUdS	763051-92-9	ND	4		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	101	70 - 130		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
13C2-PFDA	SURR	109	70 - 130		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
d5-EtFOSAA	SURR	105	70 - 130		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1
13C3-HFPO-DA	SURR	103	70 - 130		B0G0209	24-Jul-20	0.24 L	27-Jul-20 09:57	1

RL - Reporting limit

Results reported to RL.

Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT2007161500GGA

EPA Method 537.1

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Drinking Water	Lab Sample:	2001528-05	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	16-Jul-20 15:00	Date Received:	21-Jul-20 10:22		
Location:	4543 VAN VLECK ROAD						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFHxA	307-24-4	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFHpA	375-85-9	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFHxS	355-46-4	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFOA	335-67-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFNA	375-95-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFOS	1763-23-1	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFDA	335-76-2	ND	2		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
MeFOSAA	2355-31-9	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
EtFOSAA	2991-50-6	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFUnA	2058-94-8	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFDoA	307-55-1	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFTriDA	72629-94-8	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
PFTeDA	376-06-7	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
HFPO-DA	13252-13-6	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
ADONA	919005-14-4	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
9Cl-PF3ONS	756426-58-1	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
11Cl-PF3OUdS	763051-92-9	ND	4		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	95	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
13C2-PFDA	SURR	103	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
d5-EtFOSAA	SURR	92	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1
13C3-HFPO-DA	SURR	94	70 - 130		B0G0209	24-Jul-20	0.25 L	27-Jul-20 10:08	1

RL - Reporting limit

Results reported to RL.

Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

Sample ID: WT2007161530GGA

EPA Method 537.1

Client Data				Laboratory Data			
Name:	AECOM	Matrix:	Drinking Water	Lab Sample:	2001528-06	Column:	BEH C18
Project:	Statewide WWTP Biosolids PFAS Evaluation	Date Collected:	16-Jul-20 15:30	Date Received:	21-Jul-20 10:22		
Location:	8215 FRONT STREET						

Analyte	CAS Number	Conc. (ng/L)	RL	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBS	375-73-5	ND	2		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFHxA	307-24-4	ND	2		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFHpA	375-85-9	ND	2		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFHxS	355-46-4	ND	2		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFOA	335-67-1	ND	2		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFNA	375-95-1	ND	2		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFOS	1763-23-1	ND	2		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFDA	335-76-2	ND	2		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
MeFOSAA	2355-31-9	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
EtFOSAA	2991-50-6	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFOA	2058-94-8	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFDoA	307-55-1	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFTeDA	72629-94-8	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
PFTeDA	376-06-7	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
HFPO-DA	13252-13-6	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
ADONA	919005-14-4	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
9Cl-PF3ONS	756426-58-1	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
11Cl-PF3OUdS	763051-92-9	ND	4		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C2-PFHxA	SURR	92	70 - 130		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
13C2-PFDA	SURR	96	70 - 130		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
d5-EtFOSAA	SURR	99	70 - 130		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1
13C3-HFPO-DA	SURR	95	70 - 130		B0G0209	24-Jul-20	0.22 L	27-Jul-20 10:19	1

RL - Reporting limit

Results reported to RL.

Reporting convention specified by MI DEQ..

When reported, PFHxS, PFOA, PFOS, MeFOSAA and EtFOSAA include both linear and branched isomers. Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank
Conc.	Concentration
CRS	Cleanup Recovery Standard
D	Dilution
DL	Detection Limit
E	The associated compound concentration exceeded the calibration range of the instrument
H	Recovery and/or RPD was outside laboratory acceptance limits
I	Chemical Interference
IS	Internal Standard
J	The amount detected is below the Reporting Limit/LOQ
LOD	Limit of Detection
LOQ	Limit of Quantitation
M	Estimated Maximum Possible Concentration (CA Region 2 projects only)
MDL	Method Detection Limit
NA	Not applicable
ND	Not Detected
OPR	Ongoing Precision and Recovery sample
P	The reported concentration may include contribution from chlorinated diphenyl ether(s).
Q	The ion transition ratio is outside of the acceptance criteria.
RL	Reporting Limit
TEQ	Toxic Equivalency
U	Not Detected (specific projects only)
*	See Cover Letter

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

Vista Analytical Laboratory Certifications

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	19-013-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-23
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2018017
Massachusetts Department of Environmental Protection	N/A
Michigan Department of Environmental Quality	9932
Minnesota Department of Health	1521520
New Hampshire Environmental Accreditation Program	207718-B
New Jersey Department of Environmental Protection	190001
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-010
Pennsylvania Department of Environmental Protection	016
Texas Commission on Environmental Quality	T104704189-19-10
Vermont Department of Health	VT-4042
Virginia Department of General Services	10272
Washington Department of Ecology	C584-19
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request.

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA TO-9A

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613/1613B
1,4-Dioxane (1,4-Diethyleneoxide) analysis by GC/HRMS	EPA 522
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	ISO 25101 2009

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A



CHAIN OF CUSTODY

For Laboratory Use Only

Work Order #: 2001528 Temp: 4.1 °C

Storage ID: R-13, WR-2 Storage Secured: Yes ☒ No ☐

Project ID: Statewide WWTP Biosolids PFAS Evaluation PO#: 60588767.01 Sampler: George Austin (name)

TAT Standard: ☒ 21 days
(check one): Rush (surcharge may apply)
☐ 14 days ☐ 7 days Specify: _____

Invoice to: Name Stephanie Kammer Company MDEQ Address 525 W. Allegan Street City Lansing State MI Ph# 517-897-1597 Fax# 517-241-3571

Relinquished by (printed name and signature) George Austin Date 7/20/20 Time 1400 Received by (printed name and signature) William Kierzyk Date 07/21/20 Time 10:22

SHIP TO: Vista Analytical Laboratory 1104 Windfield Way El Dorado Hills, CA 95762 Ph: (916) 673-1520; Fax: (916) 673-0106				Method of Shipment:		Add Analysis(es) Requested		PFAS Isotope Dilution		USEPA Method 537.1		Comments	
ATTN: <u>Jennifer Miller</u>				Tracking No.:		Container(s)		List of 21		List of 24			
Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	List of 21	List of 21 willomers	List of 24	List of 24 willomers	List of 28	Other: Please List Below	
WR2007161320GGA	7/16/20	1320	8238 CHURCH STREET	2	P	DW						X	TZ; KITCHEN FAUCET, NO TREATMENT
WT2007161330GGA	7/16/20	1330	4600 CENTER STREET	2	P	DW						X	TZ; OUTDOOR SPIGOT
WT2007161400GGA	7/16/20	1400	8194 FRONT STREET	2	P	DW						X	TZ; SAMPLED VIA HOSE FROM OUTDOOR SPIGOT
WT2007161415GGA	7/16/20	1415	8441 CHURCH STREET	2	P	DW						X	TZ; OUTDOOR SPIGOT
WT2007161500GGA	7/16/20	1500	4543 VAN VLECK ROAD	2	P	DW						X	TZ; PRESSURE TANK
WT2007161530GGA	7/16/20	1530	8215 FRONT STREET	2	P	DW						X	TZ; SAMPLED VIA HOSE FROM OUTDOOR SPIGOT

Special Instructions/Comments: Send Results and Acknowledgements to the list provided

SEND DOCUMENTATION AND RESULTS TO:

Name: Stephanie Kammer
Company: MDEQ
Address: 525 W. Allegan Street, Constitution Hall, 1st South West
City: Lansing State: MI Zip: 30242
Phone: 517-897-1597 Fax: 517-241-3571
Email: dorin.bogdan@aeom.com

Container Types: P= HDPE, PJ= HDPE Jar Bottle Preservation Type: T = Thiosulfate, Matrix Types: AQ = Aqueous, DW = Drinking Water, EF = Effluent, PP = Pulp/Paper, SD = Sediment, O = Other: _____ TZ = Trizma. SL = Sludge, BS=Biosolids, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____

Sample Log-In Checklist

 Page # 1 of 1

 Vista Work Order #: 2001528 TAT std

Samples Arrival:	Date/Time 07/21/20 10:22	Initials: WRS	Location: WE-2
Delivered By:	<input checked="" type="radio"/> FedEx	<input type="radio"/> UPS	<input type="radio"/> On Trac
	<input type="radio"/> GLS	<input type="radio"/> DHL	<input type="radio"/> Hand Delivered
Preservation:	<input checked="" type="radio"/> Ice	<input type="radio"/> Blue Ice	<input type="radio"/> Techni Ice
	<input type="radio"/> Dry Ice	<input type="radio"/> None	
Temp °C: 4.1 (uncorrected)	Probe used: Y <input checked="" type="radio"/> N		Thermometer ID: TR-3
Temp °C: 4.1 (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Airbill <u>-</u> Trk # <u>3949 7615 9820</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Documentation Present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Container	Vista	<input checked="" type="radio"/> Client	Retain
		<input checked="" type="radio"/> Return	Dispose
Chain of Custody / Sample Documentation Present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chain of Custody / Sample Documentation Complete?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Holding Time Acceptable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Logged In:	Date/Time 07/22/20 0828	Initials: WRS	Location: R-13, WR-2
			Shelf/Rack: 2-3, B-5
COC Anomaly/Sample Acceptance Form completed?			<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Comments:

Sample Log-In Checklist

 Page # 1 of 1

 Vista Work Order #: 2001528 TAT std

Samples Arrival:	Date/Time 07/21/20 10:22	Initials: WWS	Location: WR-2
			Shelf/Rack: NA
Delivered By:	<input checked="" type="checkbox"/> FedEx	<input type="checkbox"/> UPS	<input type="checkbox"/> On Trac
	<input type="checkbox"/> GLS	<input type="checkbox"/> DHL	<input type="checkbox"/> Hand Delivered
Preservation:	<input checked="" type="checkbox"/> Ice	<input type="checkbox"/> Blue Ice	<input type="checkbox"/> Techni Ice
	<input type="checkbox"/> Dry Ice	<input type="checkbox"/> None	
Temp °C: 4.1 (uncorrected)	Probe used: Y / <input checked="" type="checkbox"/> N		Thermometer ID: IR-3
Temp °C: 4.1 (corrected)			

	YES	NO	NA
Shipping Container(s) Intact?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Custody Seals Intact?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Airbill <input checked="" type="checkbox"/> Trk # 3949 7567 8432	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Documentation Present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shipping Container	Vista	<input checked="" type="checkbox"/> Client	Retain
		<input checked="" type="checkbox"/> Return	Dispose
Chain of Custody / Sample Documentation Present?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Chain of Custody / Sample Documentation Complete?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Holding Time Acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Logged In:	Date/Time 07/22/20 0828	Initials: WWS	Location: R-13, WR-2 ↓ Shelf/Rack: 2-3, B-5
COC Anomaly/Sample Acceptance Form completed?			<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

 2
 Comments:

CoC/Label Reconciliation Report WO# 2001528

LabNumber	CoC Sample ID	SampleAlias	Sample Date/Time	Container	BaseMatrix	Sample Comments
2001528-01	A WR2007161320GGA	8238 CHURCH STREET	16-Jul-20 13:20	HDPE Bottle, 250 mL	Aqueous	
2001528-01	B WR2007161320GGA	8238 CHURCH STREET	16-Jul-20 13:20	HDPE Bottle, 250 mL	Aqueous	
2001528-02	A WT2007161330GGA	4600 CENTER STREET	16-Jul-20 13:30	HDPE Bottle, 250 mL	Aqueous	
2001528-02	B WT2007161330GGA	4600 CENTER STREET	16-Jul-20 13:30	HDPE Bottle, 250 mL	Aqueous	
2001528-03	A WT2007161400GGA	8194 FRONT STREET	16-Jul-20 14:00	HDPE Bottle, 250 mL	Aqueous	
2001528-03	B WT2007161400GGA	8194 FRONT STREET	16-Jul-20 14:00	HDPE Bottle, 250 mL	Aqueous	
2001528-04	A WT2007161415GGA	8441 CHURCH STREET	16-Jul-20 14:15	HDPE Bottle, 250 mL	Aqueous	
2001528-04	B WT2007161415GGA	8441 CHURCH STREET	16-Jul-20 14:15	HDPE Bottle, 250 mL	Aqueous	
2001528-05	A WT2007161500GGA	4543 VAN VLECK ROAD	16-Jul-20 15:00	HDPE Bottle, 250 mL	Aqueous	
2001528-05	B WT2007161500GGA	4543 VAN VLECK ROAD	16-Jul-20 15:00	HDPE Bottle, 250 mL	Aqueous	
2001528-06	A WT2007161530GGA	8215 FRONT STREET	16-Jul-20 15:30	HDPE Bottle, 250 mL	Aqueous	
2001528-06	B WT2007161530GGA	8215 FRONT STREET	16-Jul-20 15:30	HDPE Bottle, 250 mL	Aqueous	

Checkmarks indicate that information on the COC reconciled with the sample label.
Any discrepancies are noted in the following columns.

	Yes	No	NA
Sample Container Intact?	<input checked="" type="checkbox"/>		
Sample Custody Seals Intact?			<input checked="" type="checkbox"/>
Adequate Sample Volume?	<input checked="" type="checkbox"/>		
Container Type Appropriate for Analysis(es)	<input checked="" type="checkbox"/>		
Preservation Documented: Na2S2O3 <u>Trizma</u> None Other	<input checked="" type="checkbox"/>		
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	<input checked="" type="checkbox"/>		

Comments: C1: Cooler 1 of 2
C2: Cooler 2 of 2

Verified by/Date: K2 07/20/20



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