



June 28, 2018

Vista Work Order No. 1801198

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 June 08, 2018. This sample set was analyzed on a standard turn-around time, under your Project Name 'MDEQ North Kent PFAS-Thornapple'.

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. 1801198

Case Narrative

Sample Condition on Receipt:

Two aqueous 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:

PFAS Isotope Dilution Method

The samples contained particulate and were centrifuged prior to extraction.

The samples were extracted and analyzed for a selected list of PFAS using the PFAS Isotope Dilution Method (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.

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 Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The recovery of PFDS was greater than 130% in the OPR. This analyte was not detected in the samples. The recoveries of all other analytes were within the method acceptance criteria.

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

QC Anomalies

LabNumber	SampleName	Analysis	Analyte	Flag	%Rec
B8F0097-BLK1	B8F0097-BLK1	PFAS Isotope Dilution Method	13C2-PFUnA	H	54.8

H = Recovery was outside laboratory acceptance criteria.

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Sample Inventory Report

Vista Sample ID	Client Sample ID	Sampled	Received	Components/Containers
1801198-01	FM1806061700NR	06-Jun-18 17:00	08-Jun-18 09:27	HDPE Bottle, 250 mL
1801198-02	SW1806061705NR	06-Jun-18 17:05	08-Jun-18 09:27	HDPE Bottle, 250 mL HDPE Bottle, 250 mL

ANALYTICAL RESULTS

Sample ID: Method Blank
PFAS Isotope Dilution Method

Client Data					Laboratory Data							
Name:	Merit Laboratories, Inc.	Matrix:	Aqueous		Lab Sample:	B8F0097-BLK1	Column:	BEH C18				
Project:	MDEQ North Kent PFAS-Thornapple											

Analyte	CAS Number	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	ND	0.365	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFPeA	2706-90-3	ND	0.640	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFBS	375-73-5	ND	0.895	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
4:2 FTS	757124-72-4	ND	0.695	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFHxA	307-24-4	ND	1.09	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFPeS	2706-91-4	ND	1.21	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFHpA	375-85-9	ND	0.296	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFHxS	355-46-4	ND	0.474	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
6:2 FTS	27619-97-2	ND	1.00	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFOA	335-67-1	ND	0.580	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFHpS	375-92-8	ND	0.469	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFNA	375-95-1	ND	0.405	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFOSA	754-91-6	ND	0.885	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFOS	1763-23-1	ND	0.404	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFDA	335-76-2	ND	0.745	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
8:2 FTS	39108-34-4	ND	1.03	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFNS	68259-12-1	ND	1.94	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
MeFOSAA	2355-31-9	ND	0.825	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
EtFOSAA	2991-50-6	ND	0.685	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFUnA	2058-94-8	ND	0.525	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFDS	335-77-3	ND	0.615	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFDoA	307-55-1	ND	0.396	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFTTrDA	72629-94-8	ND	0.247	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
PFTeDA	376-06-7	ND	0.378	2.50	4.00		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	95.3	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C3-PFPeA	IS	101	60 - 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C3-PFBS	IS	106	60 - 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C2-PFHxA	IS	98.0	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C4-PFHpA	IS	101	60 - 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
18O2-PFHxS	IS	96.5	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C2-6:2 FTS	IS	97.5	40 - 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C2-PFOA	IS	84.1	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C5-PFNA	IS	76.8	50 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C8-PFOSA	IS	41.2	20 - 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1

Sample ID: Method Blank **PFAS Isotope Dilution Method**

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Aqueous	Lab Sample:	B8F0097-BLK1	Column:	BEH C18
Project:	MDEQ North Kent PFAS-Thornapple						

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C8-PFOS	IS	93.1	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C2-PFDA	IS	70.1	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
d3-MeFOSAA	IS	67.9	50 - 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
d5-EtFOSAA	IS	71.6	50 - 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C2-PFUnA	IS	54.8	60 - 130	H	B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C2-PFDoA	IS	64.8	30 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	1
13C2-PFTeDA	IS	69.9	20 - 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:49	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:	B8F0097-BS1	Column:	BEH C18			
Project:	MDEQ North Kent PFAS-Thornapple										

Analyte	CAS Number	Amt Found (ng/L)	Spike Amt	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	37.1	40.0	92.7	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFPeA	2706-90-3	37.1	40.0	92.7	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFBS	375-73-5	37.6	40.0	93.9	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
4:2 FTS	757124-72-4	34.2	40.0	85.4	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFHxA	307-24-4	35.0	40.0	87.5	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFPeS	2706-91-4	41.0	40.0	103	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFHpA	375-85-9	34.9	40.0	87.3	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFHxS	355-46-4	32.6	40.0	81.4	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
6:2 FTS	27619-97-2	37.6	40.0	94.1	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFOA	335-67-1	35.4	40.0	88.4	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFHpS	375-92-8	39.9	40.0	99.6	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFNA	375-95-1	37.7	40.0	94.2	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFOSA	754-91-6	37.3	40.0	93.2	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFOS	1763-23-1	35.3	40.0	88.2	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFDA	335-76-2	33.7	40.0	84.3	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
8:2 FTS	39108-34-4	35.1	40.0	87.8	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFNS	68259-12-1	35.8	40.0	89.5	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
MeFOSAA	2355-31-9	34.6	40.0	86.5	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
EtFOSAA	2991-50-6	36.3	40.0	90.8	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFUnA	2058-94-8	37.5	40.0	93.8	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFDS	335-77-3	54.2	40.0	135	60 - 130	H	B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFDoA	307-55-1	39.2	40.0	98.1	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFTTrDA	72629-94-8	43.1	40.0	108	60 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
PFTeDA	376-06-7	40.0	40.0	100	70 - 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	99.1	60- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C3-PFPeA	IS	93.5	60- 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C3-PFBS	IS	103	60- 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C2-PFHxA	IS	98.2	70- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C4-PFHpA	IS	101	60- 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
18O2-PFHxS	IS	115	60- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C2-6:2 FTS	IS	94.4	40- 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C2-PFOA	IS	88.9	60- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C5-PFNA	IS	82.0	50- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C8-PFOSA	IS	49.4	20- 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1

Sample ID: OPR **PFAS Isotope Dilution Method**

Client Data				Laboratory Data					
Name:	Merit Laboratories, Inc.	Matrix:	Aqueous	Lab Sample:	B8F0097-BS1	Column:	BEH C18		
Project:	MDEQ North Kent PFAS-Thornapple								

Labeled Standards	Type	% Rec	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C8-PFOS	IS	103	60- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C2-PFDA	IS	73.7	60- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
d3-MeFOSAA	IS	78.5	50- 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
d5-EtFOSAA	IS	82.8	50- 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C2-PFUnA	IS	66.4	60- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C2-PFDoA	IS	67.0	30- 130		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1
13C2-PFTeDA	IS	82.9	20- 150		B8F0097	14-Jun-18	0.250 L	15-Jun-18 23:28	1

Sample ID: FM1806061700NR

PFAS Isotope Dilution Method

Client Data					Laboratory Data						
Name:	Merit Laboratories, Inc.		Matrix:	Aqueous	Lab Sample:	1801198-01	Column:	BEH C18			
Project:	MDEQ North Kent PFAS-Thornapple		Date Collected:	06-Jun-18 17:00	Date Received:	08-Jun-18 09:27					
Location:	THORNAPPLE-CASCADE										

Analyte	CAS Number	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	2.66	1.43	9.80	15.7	J	B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFPeA	2706-90-3	ND	2.51	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFBS	375-73-5	ND	3.51	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
4:2 FTS	757124-72-4	ND	2.72	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFHxA	307-24-4	ND	4.27	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFPeS	2706-91-4	ND	4.74	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFHpA	375-85-9	ND	1.16	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFHxS	355-46-4	ND	1.85	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
6:2 FTS	27619-97-2	ND	3.92	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFOA	335-67-1	2.41	2.27	9.80	15.7	J	B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFHpS	375-92-8	ND	1.84	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFNA	375-95-1	9.23	1.59	9.80	15.7	J	B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFOSA	754-91-6	ND	3.47	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFOS	1763-23-1	197	1.58	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFDA	335-76-2	57.4	2.92	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
8:2 FTS	39108-34-4	6.67	4.03	9.80	15.7	J	B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFNS	68259-12-1	ND	7.58	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
MeFOSAA	2355-31-9	ND	3.23	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
EtFOSAA	2991-50-6	21.1	2.68	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFUnA	2058-94-8	20.5	2.06	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFDS	335-77-3	ND	2.41	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFDoA	307-55-1	ND	1.55	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFTriDA	72629-94-8	ND	0.968	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
PFTeDA	376-06-7	ND	1.48	9.80	15.7		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	97.2	60 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C3-PFPeA	IS	94.5	60 - 150		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C3-PFBS	IS	110	60 - 150		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C2-PFHxA	IS	93.3	70 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C4-PFHpA	IS	93.9	60 - 150		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
18O2-PFHxS	IS	97.5	60 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C2-6:2 FTS	IS	94.0	40 - 150		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C2-PFOA	IS	96.6	60 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1

Sample ID: FM1806061700NR **PFAS Isotope Dilution Method**

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Aqueous	Lab Sample:	1801198-01	Column:	BEH C18
Project:	MDEQ North Kent PFAS-Thornapple	Date Collected:	06-Jun-18 17:00	Date Received:	08-Jun-18 09:27		
Location:	THORNAPPLE-CASCADE						

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C5-PFNA	IS	86.1	50 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C8-PFOSA	IS	73.6	20 - 150		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C8-PFOS	IS	102	60 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C2-PFDA	IS	94.9	60 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
d3-MeFOSAA	IS	81.2	50 - 150		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
d5-EtFOSAA	IS	88.3	50 - 150		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C2-PFUnA	IS	87.1	60 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C2-PFDoA	IS	83.8	30 - 130		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	1
13C2-PFTeDA	IS	76.5	20 - 150		B8F0097	14-Jun-18	0.0638 L	19-Jun-18 04:29	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: SW1806061705NR
PFAS Isotope Dilution Method

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Aqueous	Lab Sample:	1801198-02	Column:	BEH C18
Project:	MDEQ North Kent PFAS-Thornapple	Date Collected:	06-Jun-18 17:05	Date Received:	08-Jun-18 09:27		
Location:	THORNAPPLE-CASCADE						

Analyte	CAS Number	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
PFBA	375-22-4	2.39	0.361	2.47	3.96	J	B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFPeA	2706-90-3	0.861	0.633	2.47	3.96	J	B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFBS	375-73-5	1.06	0.886	2.47	3.96	J	B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
4:2 FTS	757124-72-4	ND	0.688	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFHxA	307-24-4	ND	1.08	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFPeS	2706-91-4	ND	1.20	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFHpA	375-85-9	0.617	0.292	2.47	3.96	J	B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFHxS	355-46-4	0.832	0.469	2.47	3.96	J	B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
6:2 FTS	27619-97-2	1.95	0.990	2.47	3.96	J	B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFOA	335-67-1	1.33	0.574	2.47	3.96	J	B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFHpS	375-92-8	ND	0.464	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFNA	375-95-1	0.785	0.401	2.47	3.96	J	B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFOSA	754-91-6	ND	0.876	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFOS	1763-23-1	8.27	0.399	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFDA	335-76-2	ND	0.737	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
8:2 FTS	39108-34-4	ND	1.02	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFNS	68259-12-1	ND	1.91	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
MeFOSAA	2355-31-9	ND	0.816	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
EtFOSAA	2991-50-6	ND	0.678	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFUnA	2058-94-8	ND	0.519	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFDS	335-77-3	ND	0.609	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFDoA	307-55-1	ND	0.392	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFTriDA	72629-94-8	ND	0.244	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
PFTeDA	376-06-7	ND	0.374	2.47	3.96		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C3-PFBA	IS	88.5	60 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C3-PFPeA	IS	87.0	60 - 150		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C3-PFBS	IS	96.2	60 - 150		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C2-PFHxA	IS	90.8	70 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C4-PFHpA	IS	89.4	60 - 150		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
18O2-PFHxS	IS	89.7	60 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C2-6:2 FTS	IS	84.7	40 - 150		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C2-PFOA	IS	83.0	60 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1

Sample ID: SW1806061705NR **PFAS Isotope Dilution Method**

Client Data				Laboratory Data			
Name:	Merit Laboratories, Inc.	Matrix:	Aqueous	Lab Sample:	1801198-02	Column:	BEH C18
Project:	MDEQ North Kent PFAS-Thornapple	Date Collected:	06-Jun-18 17:05	Date Received:	08-Jun-18 09:27		
Location:	THORNAPPLE-CASCADE						

Labeled Standards	Type	% Recovery	Limits	Qualifiers	Batch	Extracted	Samp Size	Analyzed	Dilution
13C5-PFNA	IS	83.5	50 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C8-PFOA	IS	61.7	20 - 150		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C8-PFOS	IS	96.7	60 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C2-PFDA	IS	82.8	60 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
d3-MeFOSAA	IS	78.7	50 - 150		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
d5-EtFOSAA	IS	82.5	50 - 150		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C2-PFUnA	IS	79.8	60 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C2-PFDoA	IS	65.8	30 - 130		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	1
13C2-PFTeDA	IS	71.2	20 - 150		B8F0097	14-Jun-18	0.253 L	19-Jun-18 04:40	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.

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
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.

CERTIFICATIONS

Accrediting Authority	Certificate Number
Alaska Department of Environmental Conservation	17-013
Arkansas Department of Environmental Quality	17-015-0
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777-18
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2016026
Minnesota Department of Health	1322288
New Hampshire Environmental Accreditation Program	207717
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-008
Pennsylvania Department of Environmental Protection	014
Texas Commission on Environmental Quality	T104704189-17-8
Virginia Department of General Services	9077
Washington Department of Ecology	C584
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.



PAGE 1 OF 1

CHAIN OF CUSTODY

For Laboratory Use Only
 Work Order #: 1001198 Temp: 6.8 °C
 Storage ID: WR-2 Storage Secured: Yes No

Project ID: MDEQ North Kent PFAS - Thornapple PO#: 60556961 Sampler: Nic Ropotos
 (name)

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

Invoice to: Name Abigail Hendershott Company MDEQ Address 350 Ottawa Ave NW City Grand Rapids State MI Ph# 616-888-0528 Fax# _____

Relinquished by (printed name and signature) Jim Buzzell Date 6/7/2018 Time 17:30 Received by (printed name and signature) Sydney Roughton Date 6/8/18 Time 0952

SHIP TO: Vista Analytical Laboratory
 1104 Windfield Way
 El Dorado Hills, CA 95762
 (916) 673-1520 * Fax (916) 673-0106
 Method of Shipment: _____
 Tracking No.: _____
 ATTN: Jennifer Miller

Quantity	Type	Matrix	Add Analysis(es) Requested						Branch and Linear	EPA Method 537 (DW only)			Comments
			PFOS/PFOA	UCMR3 PFAS List 6	537 List: 14	PFAS List of 24	Other: Please List Below	PFOS/PFOA		UCMR3 PFAS List 6	PFAS List: 14		

Sample ID	Date	Time	Location/Sample Description	Quantity	Type	Matrix	PFOS/PFOA	UCMR3 PFAS List 6	537 List: 14	PFAS List of 24	Other: Please List Below	Branch and Linear	PFOS/PFOA	UCMR3 PFAS List 6	PFAS List: 14	Comments
FM1806061700NR	6/6/18	17:00	THORNAPPLE-CASCADE	1	P	AQ				X						~60mL condensed Foam Sample
SW1806061705NR	6/6/18	17:05	THORNAPPLE-CASCADE	2	P	AQ				X						

Special Instructions/Comments: **Send Results and Acknowledgements to:**
 _____ VorceK@michigan.gov
 _____ Dorin.Bogdan@aecom.com
 _____ Robert.Kennedy@aecom.com
 _____ James.Buzzell@aecom.com

SEND DOCUMENTATION AND RESULTS TO:

Name: Abigail Hendershott
 Company: MDEQ
 Address: 350 Ottawa Ave NW
 City: Grand Rapids State: MI Zip: 49503
 Phone: 616-888-0528 Fax: _____
 Email: hendershotta@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: _____ TZ = Trizma: _____ None SL = Sludge, SO = Soil, WW = Wastewater, B = Blood/Serum, O = Other: _____

Sample Log-in Checklist

 Vista Work Order #: 1801198 TAT Std

Samples Arrival:	Date/Time 06/08/18 0927	Initials: SRK	Location: WR-2
			Shelf/Rack: N/A
Logged In:	Date/Time 06/09/18 1200	Initials: JBB	Location: WR-2
			Shelf/Rack: F5
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: 6.9 (uncorrected)	Time: 0937		Thermometer ID: IR-4
Temp °C: 6.8 (corrected)	Probe used: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		

	YES	NO	NA
Adequate Sample Volume Received?	JBB		
Holding Time Acceptable?	SR		
Shipping Container(s) Intact?	SR		
Shipping Custody Seals Intact?			SR
Shipping Documentation Present?	SR		
Airbill <u>292</u> Trk # <u>4377 0528 2830</u>	SR		
Sample Container Intact?	JBB		
Sample Custody Seals Intact?			JBB
Chain of Custody / Sample Documentation Present?	SR		
COC Anomaly/Sample Acceptance Form completed?	JBB		
If Chlorinated or Drinking Water Samples, Acceptable Preservation?	JBB		JBB
Preservation Documented:	Na ₂ S ₂ O ₃	<input checked="" type="checkbox"/> Trizma	<input checked="" type="checkbox"/> None
		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Shipping Container	Vista	<input checked="" type="checkbox"/> Client	<input type="checkbox"/> Retain
		<input checked="" type="checkbox"/> Return	<input type="checkbox"/> Dispose

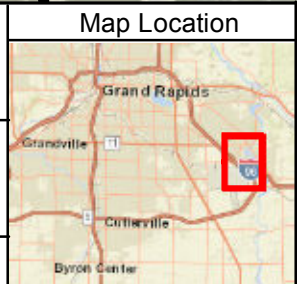
Comments:



DE

AECOM

Prepared: 6/29/2018



Legend

- Surface Water Sample
- Foam Sample
- ▭ Gerald R. Ford International Airport

Sample Name - Date (Total PFAS | PFOA + PFOS)

0 0.25 0.5 Miles

THORNAPPLE RIVER
FOAM AND
SURFACE WATER SAMPLING

CASCADE TOWNSHIP
KENT COUNTY, MI

Thornapple River PFAS Detection Summary

Sample ID	Location ID	Sample Type	Sample Date	Report #	Total PFAS	PFOA + PFOS	PFBA	PFPeA	PFHxA	PFPeS	PFHpA	PFOA	PFNA	PFDA	PFNS	PFUnDA	PFDoDA	PFTTrDA	PFTeDA	PFBS	PFHxS	PFHpS	PFOS	PFDS	4:2 FTS	6:2 FTS	8:2 FTS	FOSA	MeFOSAA	EtFOSAA	
FM1806061700NR	THORNAPPLE-CASCADE	Foam	6/6/2018	1801198	316.97	199.41	2.66	ND	ND	ND	ND	2.41	9.230	57.40	ND	20.50	ND	ND	ND	ND	ND	ND	197.00	ND	ND	ND	6.67	ND	ND	21.10	
SW1806061705NR	THORNAPPLE-CASCADE	Surface water	6/6/2018	1801198	18.10	9.60	2.39	0.86	ND	ND	0.62	1.33	0.79	ND	ND	ND	ND	ND	ND	1.06	0.83	ND	8.27	ND	ND	1.95	ND	ND	ND	ND	

ND = Non Detect
Concentrations are reported as ng/L or ppt
FB = Field Blank

Contaminant exceeds DWC

PFBA = Perfluorobutanoic acid
PFPeA = Perfluoropentanoic acid
PFHxA = Perfluorohexanoic acid

PFHpA = Perfluoroheptanoic acid
PFOA = Perfluorooctanoic acid
PFNA = Perfluorononanoic acid

PFDA = Perfluorodecanoic acid
PFUnDA = Perfluoroundecanoic acid
PFDoDA = Perfluorododecanoic acid

4:2 FTSA = 4:2 Fluorotelomer sulfonic acid
6:2 FTSA = 6:2 Fluorotelomer sulfonic acid
8:2 FTSA = 8:2 Fluorotelomer sulfonic acid

PFTTrDA = Perfluorotridecanoic acid
PFTeDA = Perfluorotetradecanoic acid
PFBS = Perfluorobutane sulfonic acid
PFHxS = Perfluorohexane sulfonic acid

PFHpS = Perfluoroheptane sulfonic acid
PFOS = Perfluorooctane sulfonic acid
PFDS = Perfluorodecane sulfonic acid
FOSA = Perfluorooctane sulfonamide

N-MeFOSAA = N-Methyl Perfluorooctane sulfonamide
EtFOSAA = N-Ethyl Perfluorooctane sulfonamidoacetic acid
PFNS = Perfluorononane sulfonic acid
PFPeS = Perfluoropentane sulfonic acid