Meritech – Durham

5926 NC Highway 55 East
Durham, NC 27713

Durham County TWWTP

Durham, NC
Samples Received: 09/10/2019

Analytical Report
0919-717

Isotope Dilution Method

PFAS – DEQ List

Enthalpy Analytical, LLC – Ultratrace

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I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains __33__ pages.

QA Review Performed by: Bryan A. Vining

Report Issued Date: 30 SEP 19

ENTHALPY ANALYTICAL

Summary of Results

ENTHALPY ANALYTICAL

Summary of Results: PFAS

Enthalpy Ultratrace Batch # 10463

PFAS

Analyte	Method Blank ng/L	INF 090919171 ng/L
Acids		
PFBA	ND U	44.8
PFPeA	ND U	ND U
PFHxA	ND U	5.73
PFHpA	ND U	1.99
PFOA	ND U	5.92
PFNA	ND U	0.728 J
PFDA	ND U	ND U
PFUnA	ND U	ND U
PFDoA	ND U	ND U
PFTrA	ND U	ND U
PFTA	0.594 J	ND U
Sulfonates		
L-PFBS	ND U	ND U
PFPeS	ND U	ND U
PFHxS	ND U	ND U
PFHpS	ND U	ND U
PFOS	ND U	6.89
PFNS	ND U	ND U
PFDS	ND U	ND U
Other		
PFOSA	ND U	ND U
N-MeFOSAA	ND U	ND U
N-EtFOSAA	ND U	ND U
Lab Sample ID	MB_10463	0919-717_10463_001R

Detailed Results

ENTHALPY ANALYTICAL

INF 090919171						Detailed Results - PFAS
Client Details						
Client Sample ID:	INF 090919171		**Client Name:**	**Durham County TWWTP**		
Client Project ID:	TWWTP		**Sample Collection Date:**	**09-Sep-19**		
Lab/Sample Details						
Lab Job #:	**0919-717**	**Matrix:**	**Aqueous**	**Date Received:**	**10-Sep-19**	
Lab Sample ID:	**0919-717_10463_001R**	**Wt./Vol.**	**31.9**	**Date Extracted:**	**21-Sep-19**	
QC Batch #:	**10463**			**Date Analyzed:**	**24-Sep-19**	
Final Volume (mL)	**0.4**			**Time Analyzed:**	**19:23:41**	

Analyte	CAS Number	Conc. (ng/L)		MDL (ng/L)	RL (ng/L)	Qualifiers	Standard	ES Recoveries (%)	Qualifiers
Acids							MPFBA	72.2	
PFBA	375-22-4	44.8		1.23	1.89		M5PFPeA	141	
PFPeA	2706-90-3	ND		0.703	1.89	U	M3PFBS	106	
PFHxA	307-24-4	5.73		1.23	1.89		M2-4:2 FTS	173	Q
PFHpA	375-85-9	1.99		0.544	1.89		M5PFHxA	81.4	
PFOA	335-67-1	5.92		0.622	1.89		M3HFPO-DA	186	Q
PFNA	375-95-1	0.728		0.399	1.89	J	M4PFHpA	92.7	
PFDA	335-76-2	ND		0.979	1.89	U	M3PFHxS	106	
PFUnA	2058-94-8	ND		0.377	1.89	U	M2-6:2 FTS	178	Q
PFDoDA	307-55-1	ND		0.372	1.89	U	M8PFOA	88.9	
PFTrDA	72629-94-8	ND		0.583	1.89	U	M9PFNA	74.0	
PFTeDA	376-06-7	ND		0.650	1.89	U	M8PFOS	83.3	
							M2-8:2 FTS	155	Q
Sulfonates							M8FOSA	37.6	Q
L-PFBS	375-73-5	ND		0.650	1.89	U	M6PFDA	83.8	
PFPeS	2706-91-4	ND		0.775	1.89	U	d3-N-MeFOSAA	38.4	Q
PFHxS	355-46-4	ND		0.648	1.89	U	d5-N-EtFOSAA	61.6	
PFHpS	375-92-8	ND		0.610	1.89	U	M7PFUdA	110	
PFOS	1763-23-1	6.89		0.369	1.89		MPFDoA	77.2	
PFNS	68259-12-1	ND		0.512	1.89	U	M2PFTeDA	155	Q
PFDS	335-77-3	ND		1.06	1.89	U			
Other									
PFOSA	754-91-6	ND		2.86	2.86	U			
N-MeFOSAA	2355-31-9	ND		0.426	1.89	U			
N-EtFOSAA	2991-50-6	ND		0.510	1.89	U			

QC Data

Continuing Calibration PFAS

Concentration (ng/L)	**4620**
Standard ID	**AH34**
Acquisition Date	**24-Sep-19**
Acquisition Time	**8:21:23**

Analyte	Concentration (ng/L)	PD (v. ICAL)	Limit	Acceptable
Acids				
PFBA	4704.3710	1.8	±30	Yes
PFPeA	4720.1666	2.2	±30	Yes
PFHxA	4647.0094	0.6	±30	Yes
PFHpA	4767.4752	3.2	±30	Yes
PFOA	4842.1741	4.8	±30	Yes
PFNA	4797.0047	3.8	±30	Yes
PFDA	4787.6756	3.6	±30	Yes
PFUnA	4868.1359	5.4	±30	Yes
PFDoDA	5444.0861	17.8	±30	Yes
PFTrDA	4972.1112	7.6	±30	Yes
PFTeDA	4597.1396	-0.5	±30	Yes
Sulfonates				
L-PFBS	4305.3123	5.3	±30	Yes
PFPeS	4544.7478	4.7	±30	Yes
PFHxS	4258.0047	1.1	±30	Yes
PFHpS	3989.1186	-9.1	±30	Yes
PFOS	4058.5655	-5.1	±30	Yes
PFNS	4549.1120	2.6	±30	Yes
PFDS	4336.1951	-2.7	±30	Yes
4:2 FTS	4139.4222	-4.2	±30	Yes
6:2 FTS	4443.8164	1.2	±30	Yes
8:2 FTS	4505.6191	1.6	±30	Yes
Other				
PFOSA	4627.2801	0.2	±30	Yes
N-MeFOSAA	4715.1445	2.1	±30	Yes
N-EtFOSAA	5358.6825	16.0	±30	Yes
HFPO-DA (Gen-X)	141193.3441	-12.7	±30	Yes

Continuing Calibration PFAS

Concentration (ng/L)	5000
Acquisition Date	24-Sep-19
Acquisition Time	8:21:23

Analyte	Concentration (ng/g)	Recovery (%)	Limit (%)	Acceptable	
MPFBA	5088	102	±50	Yes	
M5PFPeA	5185	104	±50	Yes	
M3PFBS	5316	106	±50	Yes	
M2-4:2 FTS	10167	203	±50	No	
M5PFHxA	5316	106	±50	Yes	
M3HFPO-DA	65541	125	±50	Yes	
M4PFHpA	5746	115	±50	Yes	
M3PFHxS	5223	104	±50	Yes	
M2-6:2 FTS	6649	133	±50	Yes	
M8PFOA	5014	100	±50	Yes	
M9PFNA	5258	105	±50	Yes	
M8PFOS	5183	104	±50	Yes	
M2-8:2 FTS	7654	153	±50	No	
M8FOSA	5313	106	±50	Yes	
M6PFDA	4997	99.9	±50	Yes	
d3-N-MeFOSAA	5862	117	±50	Yes	
d5-N-EtFOSAA	7207	144	±50	Yes	
M7PFUdA	6318	126	±50	Yes	
MPFDoA	4387	87.7	±50	Yes	
M2PFTeDA	2883	57.7	±50	Yes	
Injection Standards	Area	Recovery (%)			
MPFBA	45300	97.0			
M2PFOA	52400	93.7			
MPFDA	42500	110			
MPFOS	21000	101			

Continuing Calibration PFAS

Concentration (ng/L)	**1925**
Standard ID	**AH35**
Acquisition Date	**24-Sep-19**
Acquisition Time	**12:58:38**

Analyte	Concentration (ng/L)	PD (v. ICAL)	Limit	Acceptable
Acids				
PFBA	2021.0251	5.0	±30	Yes
PFPeA	2033.0592	5.6	±30	Yes
PFHxA	1936.2876	0.6	±30	Yes
PFHpA	2109.9110	9.6	±30	Yes
PFOA	1980.9073	2.9	±30	Yes
PFNA	2060.1147	7.0	±30	Yes
PFDA	2101.3249	9.2	±30	Yes
PFUnA	2051.2104	6.6	±30	Yes
PFDoDA	1868.8464	-2.9	±30	Yes
PFTrDA	2027.0981	5.3	±30	Yes
PFTeDA	1802.5266	-6.4	±30	Yes
Sulfonates				
L-PFBS	1735.9013	1.9	±30	Yes
PFPeS	2060.9672	13.9	±30	Yes
PFHxS	1741.6526	-0.8	±30	Yes
PFHpS	1642.0269	-10.2	±30	Yes
PFOS	1698.4617	-4.7	±30	Yes
PFNS	1929.1668	4.4	±30	Yes
PFDS	1662.7943	-10.5	±30	Yes
4:2 FTS	1833.4259	1.9	±30	Yes
6:2 FTS	1818.4823	-0.6	±30	Yes
8:2 FTS	2060.5301	11.5	±30	Yes
Other				
PFOSA	1942.0084	0.9	±30	Yes
N-MeFOSAA	1884.2721	-2.1	±30	Yes
N-EtFOSAA	1951.2942	1.4	±30	Yes
HFPO-DA (Gen-X)	67010.1785	-0.5	±30	Yes

Continuing Calibration PFAS

Concentration (ng/L)	5000
Acquisition Date	24-Sep-19
Acquisition Time	12:58:38

Analyte	Concentration (ng/g)	Recovery (%)	Limit (%)	Acceptable	
MPFBA	4885	97.7	±50	Yes	
M5PFPeA	6738	135	±50	Yes	
M3PFBS	4094	81.9	±50	Yes	
M2-4:2 FTS	4246	84.9	±50	Yes	
M5PFHxA	4462	89.2	±50	Yes	
M3HFPO-DA	61508	117	±50	Yes	
M4PFHpA	4782	95.6	±50	Yes	
M3PFHxS	4728	94.6	±50	Yes	
M2-6:2 FTS	4439	88.8	±50	Yes	
M8PFOA	5066	101	±50	Yes	
M9PFNA	5491	110	±50	Yes	
M8PFOS	4924	98.5	±50	Yes	
M2-8:2 FTS	4242	84.8	±50	Yes	
M8FOSA	5813	116	±50	Yes	
M6PFDA	4821	96.4	±50	Yes	
d3-N-MeFOSAA	5010	100	±50	Yes	
d5-N-EtFOSAA	5787	116	±50	Yes	
M7PFUdA	5254	105	±50	Yes	
MPFDoA	4913	98.3	±50	Yes	
M2PFTeDA	4374	87.5	±50	Yes	
Injection Standards	Area	Recovery (%)			
MPFBA	26200	56.2			
M2PFOA	51900	92.9			
MPFDA	42900	111			
MPFOS	20700	99.3			

Continuing Calibration PFAS

Concentration (ng/L)	**901**
Standard ID	**AH36**
Acquisition Date	**24-Sep-19**
Acquisition Time	**18:39:18**

Analyte	Concentration (ng/L)	PD (v. ICAL)	Limit	Acceptable
Acids				
PFBA	954.3862	5.9	±30	Yes
PFPeA	963.2494	6.9	±30	Yes
PFHxA	986.4835	9.5	±30	Yes
PFHpA	955.8770	6.1	±30	Yes
PFOA	958.1947	6.3	±30	Yes
PFNA	959.4512	6.5	±30	Yes
PFDA	983.4262	9.1	±30	Yes
PFUnA	967.6638	7.4	±30	Yes
PFDoDA	923.0174	2.4	±30	Yes
PFTrDA	916.1026	1.7	±30	Yes
PFTeDA	800.2108	-11.2	±30	Yes
Sulfonates				
L-PFBS	916.2491	14.9	±30	Yes
PFPeS	1035.3884	22.3	±30	Yes
PFHxS	866.8228	5.5	±30	Yes
PFHpS	811.0588	-5.2	±30	Yes
PFOS	832.1329	-0.2	±30	Yes
PFNS	881.7335	1.9	±30	Yes
PFDS	852.2990	-2.0	±30	Yes
4:2 FTS	885.5004	5.1	±30	Yes
6:2 FTS	868.0699	1.4	±30	Yes
8:2 FTS	918.9691	6.2	±30	Yes
Other				
PFOSA	913.6025	1.4	±30	Yes
N-MeFOSAA	946.5272	5.1	±30	Yes
N-EtFOSAA	804.3480	-10.7	±30	Yes
HFPO-DA (Gen-X)	38016.9955	20.6	±30	Yes

Continuing Calibration PFAS

Concentration (ng/L)	5000
Acquisition Date	24-Sep-19
Acquisition Time	18:39:18

Analyte	Concentration (ng/g)	Recovery (%)	Limit (%)	Acceptable
MPFBA	5071	101	±50	Yes
M5PFPeA	5788	116	±50	Yes
M3PFBS	4499	90.0	±50	Yes
M2-4:2 FTS	4160	83.2	±50	Yes
M5PFHxA	4705	94.1	±50	Yes
M3HFPO-DA	70345	134	±50	Yes
M4PFHpA	5090	102	±50	Yes
M3PFHxS	4792	95.8	±50	Yes
M2-6:2 FTS	4406	88.1	±50	Yes
M8PFOA	5056	101	±50	Yes
M9PFNA	5472	109	±50	Yes
M8PFOS	5074	102	±50	Yes
M2-8:2 FTS	4309	86.2	±50	Yes
M8FOSA	5931	119	±50	Yes
M6PFDA	4989	99.8	±50	Yes
d3-N-MeFOSAA	4776	95.5	±50	Yes
d5-N-EtFOSAA	5921	118	±50	Yes
M7PFUdA	5546	111	±50	Yes
MPFDoA	5104	102	±50	Yes
M2PFTeDA	5227	104	±50	Yes

Injection Standards	Area	Recovery (%)
MPFBA	28400	60.8
M2PFOA	42500	76.1
MPFDA	33600	86.6
MPFOS	17300	82.8

Continuing Calibration PFAS

Concentration (ng/L)	**4620**
Standard ID	**AH34**
Acquisition Date	**24-Sep-19**
Acquisition Time	**21:03:55**

Analyte	Concentration (ng/L)	PD (v. ICAL)	Limit	Acceptable
Acids				
PFBA	4952.8315	7.2	±30	Yes
PFPeA	4838.9379	4.7	±30	Yes
PFHxA	4558.2911	-1.3	±30	Yes
PFHpA	4772.2550	3.3	±30	Yes
PFOA	4626.7902	0.1	±30	Yes
PFNA	4804.3201	4.0	±30	Yes
PFDA	4698.1838	1.7	±30	Yes
PFUnA	4801.1567	3.9	±30	Yes
PFDoDA	4487.7071	-2.9	±30	Yes
PFTrDA	4590.6569	-0.6	±30	Yes
PFTeDA	4113.2046	-11.0	±30	Yes
Sulfonates				
L-PFBS	4131.0103	1.0	±30	Yes
PFPeS	4379.3037	0.8	±30	Yes
PFHxS	3993.1493	-5.2	±30	Yes
PFHpS	3740.1222	-14.8	±30	Yes
PFOS	4000.6042	-6.4	±30	Yes
PFNS	4373.0609	-1.4	±30	Yes
PFDS	4204.7915	-5.7	±30	Yes
4:2 FTS	4351.7771	0.7	±30	Yes
6:2 FTS	4460.2458	1.6	±30	Yes
8:2 FTS	4140.3135	-6.6	±30	Yes
Other				
PFOSA	4698.7525	1.7	±30	Yes
N-MeFOSAA	4752.7673	2.9	±30	Yes
N-EtFOSAA	5059.7812	9.5	±30	Yes
HFPO-DA (Gen-X)	184953.7542	14.4	±30	Yes

Continuing Calibration PFAS

Concentration (ng/L)	5000
Acquisition Date	24-Sep-19
Acquisition Time	21:03:55

Analyte	Concentration (ng/g)	Recovery (%)	Limit (%)	Acceptable
MPFBA	4973	99.5	±50	Yes
M5PFPeA	6204	124	±50	Yes
M3PFBS	3998	80.0	±50	Yes
M2-4:2 FTS	4878	97.6	±50	Yes
M5PFHxA	4665	93.3	±50	Yes
M3HFPO-DA	54460	104	±50	Yes
M4PFHpA	4829	96.6	±50	Yes
M3PFHxS	4569	91.4	±50	Yes
M2-6:2 FTS	4476	89.5	±50	Yes
M8PFOA	5252	105	±50	Yes
M9PFNA	5381	108	±50	Yes
M8PFOS	5046	101	±50	Yes
M2-8:2 FTS	5295	106	±50	Yes
M8FOSA	5483	110	±50	Yes
M6PFDA	5139	103	±50	Yes
d3-N-MeFOSAA	4894	97.9	±50	Yes
d5-N-EtFOSAA	5504	110	±50	Yes
M7PFUdA	5633	113	±50	Yes
MPFDoA	5716	114	±50	Yes
M2PFTeDA	5800	116	±50	Yes

Injection Standards	Area	Recovery (%)
MPFBA	20900	44.7
M2PFOA	36300	65.1
MPFDA	29400	75.7
MPFOS	16700	80.1

Continuing Calibration PFAS

Concentration (ng/L)	**901**
Standard ID	**AH36**
Acquisition Date	**25-Sep-19**
Acquisition Time	**9:45:21**

Analyte	Concentration (ng/L)	PD (v. ICAL)	Limit	Acceptable
Acids				
PFBA	929.9144	3.2	±30	Yes
PFPeA	969.5193	7.6	±30	Yes
PFHxA	969.5879	7.6	±30	Yes
PFHpA	892.2611	-1.0	±30	Yes
PFOA	995.1939	10.5	±30	Yes
PFNA	954.2529	5.9	±30	Yes
PFDA	1036.4900	15.0	±30	Yes
PFUnA	1043.0293	15.8	±30	Yes
PFDoDA	812.9137	-9.8	±30	Yes
PFTrDA	898.4559	-0.3	±30	Yes
PFTeDA	780.5030	-13.4	±30	Yes
Sulfonates				
L-PFBS	916.8777	15.0	±30	Yes
PFPeS	1032.1449	21.9	±30	Yes
PFHxS	828.6564	0.8	±30	Yes
PFHpS	754.6174	-11.8	±30	Yes
PFOS	864.1835	3.6	±30	Yes
PFNS	972.3493	12.4	±30	Yes
PFDS	913.9843	5.1	±30	Yes
4:2 FTS	821.8465	-2.4	±30	Yes
6:2 FTS	921.8520	7.7	±30	Yes
8:2 FTS	879.3141	1.7	±30	Yes
Other				
PFOSA	983.3819	9.1	±30	Yes
N-MeFOSAA	902.9198	0.2	±30	Yes
N-EtFOSAA	924.0222	2.6	±30	Yes
HFPO-DA (Gen-X)	55698.4569	76.6	±30	No

Continuing Calibration

PFAS

Concentration (ng/L)	**5000**
Acquisition Date	**25-Sep-19**
Acquisition Time	**9:45:21**

Analyte	Concentration (ng/g)	Recovery (%)	Limit (%)	Acceptable
MPFBA	4990	99.8	±50	Yes
M5PFPeA	6577	132	±50	Yes
M3PFBS	3703	74.1	±50	Yes
M2-4:2 FTS	4482	89.6	±50	Yes
M5PFHxA	4512	90.2	±50	Yes
M3HFPO-DA	57229	109	±50	Yes
M4PFHpA	5168	103	±50	Yes
M3PFHxS	4432	88.6	±50	Yes
M2-6:2 FTS	3973	79.5	±50	Yes
M8PFOA	5080	102	±50	Yes
M9PFNA	5453	109	±50	Yes
M8PFOS	5034	101	±50	Yes
M2-8:2 FTS	5391	108	±50	Yes
M8FOSA	5841	117	±50	Yes
M6PFDA	4821	96.4	±50	Yes
d3-N-MeFOSAA	4687	93.7	±50	Yes
d5-N-EtFOSAA	5736	115	±50	Yes
M7PFUdA	5610	112	±50	Yes
MPFDoA	6253	125	±50	Yes
M2PFTeDA	6773	136	±50	Yes

Injection Standards	Area	Recovery (%)
MPFBA	13200	28.2
M2PFOA	24700	44.2
MPFDA	21300	54.8
MPFOS	12300	58.8

Continuing Calibration — PFAS

Concentration (ng/L)	**11510**
Standard ID	**AH33**
Acquisition Date	**25-Sep-19**
Acquisition Time	**10:18:46**

Analyte	Concentration (ng/L)	PD (v. ICAL)	Limit	Acceptable
Acids				
PFBA	11469.8360	-0.3	±30	Yes
PFPeA	11624.5998	1.0	±30	Yes
PFHxA	11421.0031	-0.8	±30	Yes
PFHpA	11201.8472	-2.7	±30	Yes
PFOA	11698.6437	1.6	±30	Yes
PFNA	11746.2207	2.1	±30	Yes
PFDA	11008.0547	-4.4	±30	Yes
PFUnA	11267.0699	-2.1	±30	Yes
PFDoDA	10743.0124	-6.7	±30	Yes
PFTrDA	10783.3530	-6.3	±30	Yes
PFTeDA	10296.1961	-10.5	±30	Yes
Sulfonates				
L-PFBS	10491.0162	3.0	±30	Yes
PFPeS	10281.5542	-5.0	±30	Yes
PFHxS	10260.1429	-2.3	±30	Yes
PFHpS	9653.3586	-11.7	±30	Yes
PFOS	9632.4618	-9.6	±30	Yes
PFNS	11629.6423	5.2	±30	Yes
PFDS	10734.5748	-3.4	±30	Yes
4:2 FTS	9873.8184	-8.3	±30	Yes
6:2 FTS	10688.1504	-2.3	±30	Yes
8:2 FTS	9387.2868	-15.0	±30	Yes
Other				
PFOSA	11112.1845	-3.5	±30	Yes
N-MeFOSAA	11481.6158	-0.2	±30	Yes
N-EtFOSAA	11810.7140	2.6	±30	Yes
HFPO-DA (Gen-X)	493559.6501	22.5	±30	Yes

Continuing Calibration PFAS

Concentration (ng/L)	**5000**
Acquisition Date	**25-Sep-19**
Acquisition Time	**10:18:46**

Analyte	Concentration (ng/g)	Recovery (%)	Limit (%)	Acceptable
MPFBA	5028	101	±50	Yes
M5PFPeA	6527	130	±50	Yes
M3PFBS	3953	79.1	±50	Yes
M2-4:2 FTS	5786	116	±50	Yes
M5PFHxA	4640	92.8	±50	Yes
M3HFPO-DA	46728	89.0	±50	Yes
M4PFHpA	5094	102	±50	Yes
M3PFHxS	4550	91.0	±50	Yes
M2-6:2 FTS	4499	90.0	±50	Yes
M8PFOA	5162	103	±50	Yes
M9PFNA	5366	107	±50	Yes
M8PFOS	5155	103	±50	Yes
M2-8:2 FTS	5917	118	±50	Yes
M8FOSA	5589	112	±50	Yes
M6PFDA	5079	102	±50	Yes
d3-N-MeFOSAA	5290	106	±50	Yes
d5-N-EtFOSAA	5570	111	±50	Yes
M7PFUdA	5317	106	±50	Yes
MPFDoA	6231	125	±50	Yes
M2PFTeDA	6594	132	±50	Yes

Injection Standards	Area	Recovery (%)
MPFBA	15800	33.8
M2PFOA	26800	47.9
MPFDA	22500	58.0
MPFOS	13700	65.5

OPR Evaluation

Batch ID#: 10463

Analyte	Conc. (ng/g)	Recovery (%)	Lower Limit	Upper Limit	Acceptable?
Acids					
PFBA	383	91.9%	73	129	Y
PFPeA	405	97.2%	72	129	Y
PFHxA	415	99.5%	72	129	Y
PFHpA	417	100%	72	130	Y
PFOA	415	99.5%	71	133	Y
PFNA	389	93.4%	69	130	Y
PFDA	426	102%	71	129	Y
PFUnA	398	95.5%	69	133	Y
PFDoDA	425	102%	72	134	Y
PFTrDA	443	106%	65	144	Y
PFTeDA	402	96.6%	71	132	Y
Sulfonates					
L-PFBS	327	88.6%	72	130	Y
PFPeS	405	103%	71	127	Y
PFHxS	338	88.9%	68	131	Y
PFHpS	350	88.4%	69	134	Y
PFOS	350	90.7%	65	140	Y
PFNS	352	88.0%	69	127	Y
PFDS	413	103%	53	142	Y
4:2 FTS	342	87.7%	63	143	Y
6:2 FTS	360	91.0%	64	140	Y
8:2 FTS	361	90.3%	67	138	Y
Other					
PFOSA	336	80.6%	68	141	Y
N-MeFOSAA	381	91.5%	65	136	Y
N-EtFOSAA	399	95.7%	61	135	Y
HFPO-DA (Gen-X)	15700	107%	70	130	Y

ENTHALPY ANALYTICAL

OPR						Detailed Results - PFAS

Lab/Sample Details

		Matrix:	Aqueous	Date Received:	N/A
Lab Sample ID:	OPR_10463	Wt./Vol.	60	Date Extracted:	21-Sep-19
QC Batch #:	10463			Date Analyzed:	24-Sep-19
Final Volume (mL)	0.4			Time Analyzed:	19:01:31

Analyte	CAS Number	Conc. (ng/L)		MDL (ng/L)	RL (ng/L)	Qualifiers	Standard	ES Recoveries	Qualifiers
Acids							MPFBA	94.4	
PFBA	375-22-4	383		0.656	1.01		M5PFPeA	132	
PFPeA	2706-90-3	405		0.374	1.01		M3PFBS	74.6	
PFHxA	307-24-4	415		0.657	1.01		M2-4:2 FTS	169	Q
PFHpA	375-85-9	417		0.290	1.01		M5PFHxA	66.4	
PFOA	335-67-1	415		0.331	1.01		M3HFPO-DA	91.8	
PFNA	375-95-1	389		0.212	1.01		M4PFHpA	85.2	
PFDA	335-76-2	426		0.521	1.01		M3PFHxS	90.2	
PFUnA	2058-94-8	398		0.200	1.01		M2-6:2 FTS	164	Q
PFDoDA	307-55-1	425		0.198	1.01		M8PFOA	88.1	
PFTrDA	72629-94-8	443		0.310	1.01		M9PFNA	87.7	
PFTeDA	376-06-7	402		0.346	1.01		M8PFOS	86.9	
							M2-8:2 FTS	172	Q
Sulfonates							M8FOSA	73.6	
L-PFBS	375-73-5	327		0.346	1.01		M6PFDA	85.5	
PFPeS	2706-91-4	405		0.412	1.01		d3-N-MeFOSAA	133	
PFHxS	355-46-4	338		0.345	1.01		d5-N-EtFOSAA	103	
PFHpS	375-92-8	350		0.325	1.01		M7PFUdA	94.2	
PFOS	1763-23-1	350		0.196	1.01		MPFDoA	97.7	
PFNS	68259-12-1	352		0.272	1.01		M2PFTeDA	100	
PFDS	335-77-3	413		0.562	1.01				
Other									
PFOSA	754-91-6	336		1.52	1.52				
N-MeFOSAA	2355-31-9	381		0.227	1.01				
N-EtFOSAA	2991-50-6	399		0.271	1.01				

ENTHALPY ANALYTICAL

Method Blank

Detailed Results - PFAS

Lab/Sample Details

		Matrix:	Aqueous	Date Received:	N/A
Lab Sample ID:	MB_10463	Wt./Vol.	60.0	Date Extracted:	21-Sep-19
QC Batch #:	10463			Date Analyzed:	24-Sep-19
Final Volume (mL)	0.4			Time Analyzed:	18:50:24

Analyte	CAS Number	Conc. (ng/L)		MDL (ng/L)	RL (ng/L)	Qualifiers	Standard	ES Recoveries (%)	Qualifiers
Acids							MPFBA	83.3	
PFBA	375-22-4	ND		0.656	1.01	U	M5PFPeA	140	
PFPeA	2706-90-3	ND		0.374	1.01	U	M3PFBS	63.2	
PFHxA	307-24-4	ND		0.657	1.01	U	M2-4:2 FTS	66.7	
PFHpA	375-85-9	ND		0.290	1.01	U	M5PFHxA	67.4	
PFOA	335-67-1	ND		0.331	1.01	U	M3HFPO-DA	123	
PFNA	375-95-1	ND		0.212	1.01	U	M4PFHpA	87.1	
PFDA	335-76-2	ND		0.521	1.01	U	M3PFHxS	79.5	
PFUnA	2058-94-8	ND		0.200	1.01	U	M2-6:2 FTS	77.7	
PFDoDA	307-55-1	ND		0.198	1.01	U	M8PFOA	88.4	
PFTrDA	72629-94-8	ND		0.310	1.01	U	M9PFNA	96.3	
PFTeDA	376-06-7	ND		0.346	1.01	U	M8PFOS	86.8	
							M2-8:2 FTS	83.0	
Sulfonates							M8FOSA	90.2	
L-PFBS	375-73-5	ND		0.346	1.01	U	M6PFDA	84.7	
PFPeS	2706-91-4	ND		0.412	1.01	U	d3-N-MeFOSAA	77.0	
PFHxS	355-46-4	ND		0.345	1.01	U	d5-N-EtFOSAA	95.5	
PFHpS	375-92-8	ND		0.325	1.01	U	M7PFUdA	93.8	
PFOS	1763-23-1	ND		0.196	1.01	U	MPFDoA	94.8	
PFNS	68259-12-1	ND		0.272	1.01	U	M2PFTeDA	93.8	
PFDS	335-77-3	ND		0.562	1.01	U			
Other									
PFOSA	754-91-6	ND		1.52	1.52	U			
N-MeFOSAA	2355-31-9	ND		0.227	1.01	U			
N-EtFOSAA	2991-50-6	ND		0.271	1.01	U			

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Meritech – Durham County WWTP
Job#	0919-717 PFAS - DEQ list
Client Project #	n/a

Custody

Bryan Vining of Enthalpy Analytical Wilmington received the sample from an Enthalpy courier on 09/10/19 on ice at 4.0°C in good condition.

Prior to, during, and after analysis, the sample(s) was stored in the laboratory with access only by authorized personnel of Enthalpy Analytical, LLC.

Analysis

The sample(s) was analyzed by isotope dilution method for PFAS using Waters Acquity UPLC equipped with Xevo TQ MS (LC/MS/MS "Kili").

For aqueous samples, a 30mL aliquot (or less due to sample amount) was weighed and spiked with Extraction Standard (ES). The sample was then mixed well and centrifuged.

Cleanup procedures were performed on the supernatant and then extracted via SPE. Each final sample extract was transferred to an autosampler vial and spiked with 400 µL of Injection Standard (IS), prior to analysis.

Calibration

The analytes and labeled standards in the initial calibration (ICAL) exhibited RSDs less than 20%, with the exception of M8FOSA; however, all calibration points for this compound back-calculated to within 30% of nominal, so the data were deemed acceptable. All analytes passed the R^2 coefficient correlation criteria. Per DoD QSM 5.3 Table B-15, the ICAL is acceptable for all analytes since R^2 met criteria. All analytes will be reported. The continuing calibration met the ±30% criteria for native analytes and ±50% criteria for ES recoveries.

QC Notes

The QC injection met the ±50% criteria for ES recoveries. All target analytes met exhibited acceptable recovery of target concentration.

The samples were initially extracted on 16 SEP 19. The QC samples associated with that extraction exhibited ES recoveries outside the acceptance limits, requiring re-extraction and re-analysis of the samples in the extraction batch. The samples were re-extracted on 21 SEP 19.

The samples were initially extracted within the 14-day from collection holding time. The re-extraction took place outside the 14-day from collection holding time. No error is expected to be introduced by the extraction outside holding time, as there is evidence of stability for up to 70 days in refrigerate samples. Extracts were analyzed within the 28-days from extraction to analysis holding time required by the method..

Reporting Notes	Some analytes in the samples fell outside the limits for ES recoveries, notated with a "Q" qualifier. It is concluded to be due to matrix effects.
Reporting Notes (continued)	Based on the native results in the OPR meeting criteria, the out-of- range ES recoveries have no impact on the accuracy of the target analyte (native) compounds. Therefore, the data are considered acceptable. The results presented in this report are representative of the samples as provided to the laboratory. The samples, calibrations and standards for the data presented in this report were analyzed at 2714 Exchange Drive, Wilmington, NC 28405.

General Reporting Notes – Data Qualifiers

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc.-Wilmington, NC data reports, unless specifically noted otherwise.

General Data Qualifiers / Data Attributes

- B – The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
- C – Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter**.**
- E – The reported concentration exceeds the calibration range (upper point of the calibration curve).
- EMPC – Represents an estimated maximum possible concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
- J – Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve).
- L - Indicates that an analyte has a concentration below the Minimum Detection Limit (MDL). The reported concentration is not recommended for regulatory use as the value may have a S/N less than 3.
- ND – Indicates a non-detect.
- NR – Indicates a value that is not reportable.
- PR – Due to interference, the associated congener is poorly resolved.
- DI – Indicates the presence of a quantitative interference.
- SI – Denotes “Single Ion Mode” and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
- U – The analyte was not detected. The Estimated Detection Limit (EDL) may be reported for this analyte.
- V – The labeled standard recovery was found to be outside of the method control limits.

DRBC/TMDL Specific Data Qualifiers / Data Attributes

- J – The reported result is an estimate. The value is less than the minimum calibration level but greater than the Estimated Detection Limit (EDL).

General Reporting Notes – Data Qualifiers

- U – The analyte was not detected in the sample at the Estimated Detection Limit (EDL).
- E – The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).
- D – Dilution Data. Result was obtained from the analysis of a dilution.
- B – Analyte found in the sample and associated method blank.
- Cxx – Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. 'xx' denotes the IUPAC number with the lowest numerical designated congener.
- NR – Analyte is not reportable because of problems in sample preparation or analysis.
- V – Labeled standard recovery is not within method control limits.
- X – Results from re-injection/repeat/second-column analysis.
- EMPC – Estimated Maximum Possible Concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

Lab Identifiers

- AR – Indicates use of the archived portion of the sample extract.
- CU – Indicates a sample that required additional clean-up prior to HRMS injection/processing.
- D – Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor.
- DE – Indicates a dilution performed with the addition of ES (Extraction Standard) solution.
- DUP – Designation for a duplicate sample.
- MS – Designation for a matrix spike.
- MSD – Designation for a matrix spike duplicate.
- RJ – Indicates a reinjection of the sample extract.
- S – Indicates a sample split. The number that follows the "S" indicates the split factor.

PFAS Compound Acronym List	
Acronym	**Compound Name**
Target Analytes	
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 (PFTDoA)	Perfluorododecanoic acid
PFTrDA (PFTrA)	Perfluorotridecanoic acid
PFTeDA (PFTA)	Perfluorotetradecanoic acid
PFBS	Perfluorobutane sulfonate
PFPeS	Perfluoropentane sulfonate
PFHxS	Perfluorohexane sulfonate
PFHpS	Perfluoroheptane sulfonate
PFOS	Perfluorooctane sulfonate
PFNS	Perfluorononane sulfonate
PFDS	Perfluorodecane sulfonate
4:2 FTS	4:2 fluorotelomer sulfonic acid
6:2 FTS	6:2 fluorotelomer sulfonic acid
8:2 FTS	8:2 fluorotelomer sulfonic acid
PFOSA	Perfluorooctane sulfonamide
N-MeFOSAA	N-methyl perfluorooctane sulfonamido acetic acid
N-EtFOSAA	N-ethyl perfluorooctane sulfonamido acetic acid
HFPO-DA	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (Gen-X)
Extraction Standards	
M3PFBA	Perfluoro-n-[2,3,4-13C3]butanoic acid
M5PFPeA	Perfluoro-n-[13C5]pentanoic acid
M3PFBS	Sodium perfluoro-1-[2,3,4-13C3]-butanesulfonate
M2-4:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-hexane sulfonate
M5PFHxA	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid
M3HFPO-DA	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-13C3-propanoic acid
M4PFHpA	Perfluoro-n-[1,2,3,4-13C4]heptanoic acid
M3PFHxS	Sodium perfluoro-1-[1,2,3-13C3]-hexanesulfonate
M2-6:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-octane sulfonate
M8PFOA	Perfluoro-n-[13C8]octanoic acid
M9PFNA	Perfluoro-n-[13C9]nonanoic acid
M8PFOS	Sodium perfluoro-1-[13C8]-octanesulfonate
M2-8:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-decane sulfonate
M8FOSA	Perfluoro-1-[13C8]octanesulfonamide
M6PFDA	Perfluoro-n-[1,2,3,4,5,6-13C6]decanoic acid
d3-N-MeFOSAA	N-methyl-d3-perfluoro-1-octanesulfonamide
d5-N-EtFOSAA	N-ethyl-d5-perfluoro-1-octanesulfonamide
M7PFUnDA (M7PFUdA)	Perfluoro-n-[1,2,3,4,5,6,7-13C7]undecanoic acid
MPFDoA	Perfluoro-n-[1,2-13C2]dodecanoic acid
M2PFTeDA	Perfluoro-n-[1,2-13C2]tetradecanoic acid

Injection Standards	
MPFBA	Perfluoro-n-[13C4]butanoic acid
M2PFOA	Perfluoro-n-[1,2-13C2]octanoic acid
MPFDA	Perfluoro-n-[1,2-13C2]decanoic acid
MPFOS	Sodium perfluoro-1-[1,2,3,4-13C4]-octanesulfonate

Attachment B

To locate a lab capable of performing the PFAS analysis, please visit https://www.denix.osd.mil/edqw/accreditation/accreditedlabs/and search by method "PFAS by LCMSMS Compliant with Table B-15 of QSM 5.1 or Latest Version". Grab samples are required to avoid cross-contamination and ensure consistency.

It is the Division's understanding that this test method is capable of providing results for the listed PFAS compounds listed below. The Division recognizes that there may be variations from lab to lab. Each facility shall provide results for PFOA, PFOS, and shall include as many of the following PFAS compounds as possible:

Analyte Name	Acronym	Fluorinated Carbon Chain Length	Molecular Formula	CAS Number
Perfluorotetradecanoic acid	PFTeA	C_{14}	$C_{13}F_{27}COOH$	376-06-7
Perfluorotridecanoic acid	PFTriA	C_{13}	$C_{12}F_{25}COOH$	72629-94-8
Perfluorododecanoic acid	PFDoA	C_{12}	$C_{11}F_{23}COOH$	307-55-1
Perfluoroundecanoic acid	PFUnA	C_{11}	$C_{10}F_{21}COOH$	2058-94-8
Perfluorodecanoic acid	PFDA	C_{10}	$C_9F_{19}COOH$	335-76-2
Perfluorononanoic acid	PFNA	C_9	$C_8F_{17}COOH$	375-95-1
Perfluorooctanoic acid	PFOA	C_8	$C_7F_{15}COOH$	335-67-1
Perfluoroheptanoic acid	PFHpA	C_7	$C_6F_{13}COOH$	375-85-9
Perfluorohexanoic acid	PFHxA	C_6	$C_5F_{11}COOH$	307-24-4
Perfluoropentanoic acid	PFPeA	C_5	C_4F_9COOH	2706-90-3
Perfluorobutanoic acid	PFBA	C_4	C_3F_7COOH	375-22-4
Perfluorodecanesulfonic acid	PFDS	C_{10}	$C_{10}F_{21}SO_3H$	335-77-3
Perfluorononanesulfonic acid	PFNS	C_9	$C_9F_{19}SO_3H$	68259-12-1
Perfluorooctanesulfonic acid	PFOS	C_8	$C_8F_{17}SO_3H$	1763-23-1
Perfluoroheptanesulfonic acid	PFHpS	C_7	$C_7F_{15}SO_3H$	375-92-8
Perfluorohexanesulfonic acid	PFHxS	C_6	$C_6F_{13}SO_3H$	355-46-4
Perfluoropentanesulfonic acid	PFPeS	C_5	$C_5F_{11}SO_3H$	2706-91-4
Perfluorobutanesulfonic acid	PFBS	C_{4OMG}	$C_4F_9SO_3H$	375-73-5
Perfluorooctanesulfonamide	PFOSA	C_8	$C_8F_{17}SO_2NH_2$	754-91-6
2-(N-Ethylperfluorooctanesulfonamido) acetic acid	N-EtFOSAA	C_8	$C_8F_{17}SO_2N(C_2H_5)CH_2COOH$	2991-50-6
2-(N-Methylperfluorooctanesulfonamido) acetic acid	N-MeFOSAA	C_8	$C_8F_{17}SO_2N(CH_3)CHCOOH$	2355-31-9

Sample Custody

0919-717

ENTHALPY analytical

Chain of Custody Record

Enthalpy Ultratrace Job#: ____________ COC Page_____of_____

Special Handling:

☒ Standard Turn Around Time

☐ Rush Turn Around Time -- Date Needed______________

• All Fast TATs Subject to Approval by Enthalpy Analytical, Inc.

• All Samples Disposed of After 6 months Unless Otherwise Instructed.

Enthalpy Analytical-Wilmington, NC has added enhancements to standard methods to improve accuracy, precision and permit an assessment of laboratory performance in the context of your specific data needs. For more information email Cindy.James@enthalpy.com.

Client Name: Durham County TWWTP
Project Manager: Amy Moore
Report To: Amy Moore

Project Number:
Site Name: TWWTP
Location: Influent

PO#:
Telephone#: 919.560.9035
Email: ajmoore@dconc.gov

This Chain of Custody is applicable to Non-Air samples. Standard TAT differ per analysis and are provided by request.

Client Special Instructions:

Matrix: GW-Groundwater, WW-Wastewater, NW-Non-Potable Water, DW-Drinking Water, S-Soil, SL-Sludge, BT-Biological Tissue, O-Other

Type: G=Grab C=Composite Q=Quality Control

Sample ID	Date	Time	Sample Volume	Type	Matrix	# of Bottles	# of Jars	# of Bags	# Other				Method 1613	Method 8290	Method 1668A/B/C PCB	PFAS by LC/MS/MS	PAHs by HRGC/HRMS	Sample on Hold			Notes:
INF 090919171	9/9/19	0913	2x30mL	G	WW	2										X					Sampled by KK

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
[signature]	9/9/19	[signature]	9/9/19	1340	☐ Iced ☐ Ambient °C________
[signature]	9/9/19				☐ Iced ☐ Ambient °C________
[signature]	9-10-19	[signature]	9/10/19	8:59AM	☐ Iced ☐ Ambient °C 0.8°C Raytek5 DSM 9-10-19

2714 Exchange Drive • Wilmington, NC 28405 • (910) 212-5858 • www.enthalpy.com

Rel: [signature] 9-10-19

Rec'd 9/10/19 BAV Couriered from Durham 4.0°C on ice good condition Stored in R1 TS

This Is The Last Page Of This Report.