

County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 06/18/21

Analytical Report 0621-773

Isotope Dilution Method PFAS



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 _____ pages.

....."Report Issued Date: _____



Summary of Results

Enthalpy Analytical

Job No.: 0621-773-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Northwest Water Plant Leland, NC

Summary

	Compound	CAS	061821-SO1 ng/L	061821-EO1 ng/L
Acids	PFBA	375-22-4	4.36	6.30
	PFPeA	2706-90-3	6.82	6.97
	PFHxA	307-24-4	5.80	6.90
	PFHpA	375-85-9	3.15	3.91
	PFOA	335-67-1	6.09	6.52
	PFNA	375-95-1	0.992	0.936
	PFDA	335-76-2	0.566	0.578
	PFUnDA	2058-94-8	0.103 L	0.172 J
	PFDODA	307-55-1	0.0188 L	0.0140 L
	PFTTrDA	72629-94-8	ND U	0.0843 L
	PFTeDA	376-06-7	ND U	ND U
Sulfonates	PFBS	375-73-5	5.80	6.37
	PFPeS	2706-91-4	0.842	0.833
	PFHxS	355-46-4	3.92	4.50
	PFHpS	375-92-8	0.232 J	0.223 J
	PFOS	1763-23-1	12.7	12.2
	PFNS	68259-12-1	ND U	ND U
	PFDS	335-77-3	ND U	ND U
	4:2 FTS	757124-72-4	ND U	ND U
	6:2 FTS	27619-97-2	0.105 J	0.267
8:2 FTS	39108-34-4	ND U	ND U	
other	PFOSA	754-91-6	ND U	ND U
	N-MeFOSAA	2355-31-9	ND U	0.0908 L
	N-EtFOSAA	2991-50-6	ND U	0.0271 L
	HFPO-DA	13252-13-6	5.58	5.48
	PFMOAA	674-13-5	40.6	34.5
	PFMOPra	377-73-1	ND U	0.165 L
	PFO2HxA	39492-88-1	4.05	6.23
	PFO3OA	39492-89-2	3.60	3.16
	PFO4DA	39492-90-5	0.809 L	ND U
	Nafion Byproduct 1	29311-67-9	ND U	ND U
	ADONA	919005-14-4	ND U	ND U
	9Cl-PF3ONS	756426-58-1	ND U	ND U
	11Cl-PF3OUdS	763051-92-9	ND U	ND U
	10:2 FTS	120226-60-0	ND U	ND U
	EVE Acid	69087-46-3	ND U	ND U
	FBSA	30334-69-1	0.819	0.699
	Hydro-EVE Acid	773804-62-9	0.315 L	0.285 L
	Hydrolyzed PSDA	2416366-19-1	5.42	8.91
	Nafion Byproduct 2	749836-20-2	0.290	0.445
	N-EtFOSA	4151-50-2	ND U	ND U
	N-EtFOSE	1691-99-2	ND U	ND U
	NFDHA	151772-58-6	ND U	ND U
	N-MeFOSA	31506-32-8	ND U	ND U
	N-MeFOSE	24448-09-7	ND U	ND U
	NVHOS	1132933-86-8	ND U	ND U
	PEPA	267239-61-2	8.37	4.82
	PFECA-G	801212-59-9	ND U	ND U
	PFEESA	113507-82-7	ND U	ND U
	PFHxDA	67905-19-5	ND U	ND U
	PFMOBA	863090-89-5	ND U	ND U
	PFO5DA	39492-91-6	ND U	ND U
PMPA	13140-29-9	4.98	8.72	
R-EVE Acid	2416366-22-6	5.83	5.12	
R-PSDA	2416366-18-0	11.9	ND U	
R-PSDCA	2416366-21-5	0.0380 L	0.0296 L	

Detailed Results

Enthalpy Analytical

Job No.: 0621-773-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Northwest Water Plant Leland, NC

Enthalpy ID	0621-773-001-1	Prep Batch	EU11931	Sample Vol (mL)	294.66
Sample Name	061821-SO1	Prep Date	2021-06-23 17:10	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-06-24 13:20	Dilution Factor	1
Sampling Date	20210618 00:00	Analyst	rappelle	Method Code	WM-026
Received Date	2021-06-18 01:17	Instrument	Kili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery
Acids	PFBA	375-22-4	3212.95	4.36	4.36	0.130	0.258	0.130			
	PFPeA	2706-90-3	5025.80	6.82	6.82	0.144	0.258	0.144			
	PFHxA	307-24-4	4271.42	5.80	5.80	0.164	0.258	0.164			
	PFHpA	375-85-9	2317.61	3.15	3.15	0.104	0.258	0.104			
	PFOA	335-67-1	4486.05	6.09	6.09	0.150	0.258	0.150			
	PFNA	375-95-1	730.50	0.992	0.992	0.0646	0.258	0.0646			
	PFDA	335-76-2	417.08	0.566	0.566	0.0717	0.258	0.0717			
	PFUnDA	2058-94-8	75.92	0.103	0.103	0.157	0.258	0.157			
	PFDOxDA	307-55-1	13.82	0.0188	0.0188	0.171	0.258	0.171			
	PFTriDA	72629-94-8	ND	ND	ND	0.128	0.258	0.128			
PFTeDA	376-06-7	ND	ND	ND	0.185	0.258	0.185				
Sulfonates	PFBS	375-73-5	4270.43	5.80	5.80	0.301	0.301	0.301			
	PFPeS	2706-91-4	619.98	0.842	0.842	0.175	0.243	0.175			
	PFHxS	355-46-4	2884.25	3.92	3.92	0.162	0.236	0.162			
	PFHpS	375-92-8	170.63	0.232	0.232	0.115	0.246	0.115			
	PFOS	1763-23-1	9352.79	12.7	12.7	0.136	0.239	0.136			
	PFNS	68259-12-1	ND	ND	ND	0.0733	0.248	0.0733			
	PFDS	335-77-3	ND	ND	ND	0.163	0.248	0.163			
	4:2 FTS	757124-72-4	ND	ND	ND	0.100	0.242	0.100			
	6:2 FTS	27619-97-2	77.32	0.105	0.105	0.0984	0.246	0.0984			
	8:2 FTS	39108-34-4	ND	ND	ND	0.145	0.247	0.145			
other	PFOSA	754-91-6	ND	ND	ND	0.110	0.258	0.110			
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.122	0.258	0.122			
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0925	0.258	0.0925			
	HFPO-DA	13252-13-6	4111.72	5.58	5.58	0.193	0.258	0.193			
	PFMOAA	674-13-5	29905.97	40.6	40.6	1.22	1.22	1.22			
	PFMOPrA	377-73-1	ND	ND	ND	0.204	0.258	0.204			
	PFO2HxA	39492-88-1	2983.33	4.05	4.05	1.22	1.22	1.22			
	PFO3OA	39492-89-2	2649.97	3.60	3.60	1.22	1.22	1.22			
	PFO4DA	39492-90-5	596.06	0.809	0.809	1.22	2.55	1.22			
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.258	0.258	0.258			
	ADONA	919005-14-4	ND	ND	ND	0.102	0.244	0.102			
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.102	0.240	0.102			
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.102	0.243	0.102			
	10:2 FTS	120226-60-0	ND	ND	ND	0.204	0.258	0.204			
	EVE Acid	69087-46-3	ND	ND	ND	1.22	1.22	1.22			
	FBSA	30334-69-1	603.22	0.819	0.819	0.204	0.258	0.204			
	Hydro-EVE Acid	773804-62-9	232.14	0.315	0.315	1.22	1.22	1.22			
	Hydrolyzed PSDA	2416366-19-1	3995.43	5.42	5.42	1.22	1.22	1.22			
	Nafion Byproduct 2	749836-20-2	213.58	0.290	0.290	0.258	0.258	0.258			
	N-EtFOSA	4151-50-2	ND	ND	ND	0.204	0.258	0.204			
	N-EtFOSE	1691-99-2	ND	ND	ND	6.11	6.11	6.11			
	NFDHA	151772-58-6	ND	ND	ND	0.204	0.258	0.204			
	N-MeFOSA	31506-32-8	ND	ND	ND	0.204	0.258	0.204			
	N-MeFOSE	24448-09-7	ND	ND	ND	6.11	6.11	6.11			
	PFHxDA	67905-19-5	ND	ND	ND	1.22	1.22	1.22			
	PFMOBA	863090-89-5	ND	ND	ND	1.22	1.22	1.22			
	PFOSDA	39492-91-6	ND	ND	ND	2.55	2.55	2.55			
	PMPA	13140-29-9	3665.38	4.98	4.98	1.22	1.22	1.22			
R-EVE Acid	2416366-22-6	4294.65	5.83	5.83	1.22	1.22	1.22				
R-PSDA	2416366-18-0	8766.75	11.9	11.9	1.22	1.22	1.22				
R-PSDCA	2416366-21-5	28.01	0.0380	0.0380	1.22	1.22	1.22				
ES	MPFBA		5061.58	6.87					2.00	20-150%	101.2%
	M5PFPeA		13829.93	18.8					2.00	20-150%	276.6%
	M3PFBS		22493.12	30.5					2.00	20-150%	449.9%
	M2-4:2 FTS		11070.02	15.0					2.00	20-150%	221.4%
	M5PFHxA		4981.22	6.76					2.00	20-150%	99.6%
	M3HFPO-DA		5845.33	7.94					2.00	20-150%	116.9%
	M4PFHpA		5350.54	7.26					2.00	20-150%	107.0%
	M3PFHxS		4899.40	6.65					2.00	20-150%	98.0%
	M2-6:2 FTS		6396.73	8.68					2.00	20-150%	127.9%
	M8PFOA		5037.33	6.84					2.00	20-150%	100.7%
	M9PFNA		5823.42	7.91					2.00	20-150%	116.5%
	M8PFOS		5125.59	6.96					2.00	20-150%	102.5%
	M2-8:2 FTS		3931.53	5.34					2.00	20-150%	78.6%
	M8FOSA-I		4100.80	5.57					2.00	20-150%	82.0%
	M6PFDA		4838.55	6.57					2.00	20-150%	96.8%
	d3-N-MeFOSAA		4038.89	5.48					2.00	20-150%	80.8%
	d5-N-EtFOSAA		3910.29	5.31					2.00	20-150%	78.2%
	M7PFUDa		4894.67	6.84					2.00	20-150%	97.9%
	MPFDoA		4006.86	5.44					2.00	20-150%	80.1%
	M2PFTeDA		1332.26	1.81					2.00	20-150%	26.6%

Enthalpy Analytical

Job No.: 0621-773-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Northwest Water Plant Leland, NC

Enthalpy ID	0621-773-002-1	Prep Batch	EU11931	Sample Vol (mL)	293.11
Sample Name	061821-E01	Prep Date	2021-06-23 17:10	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-06-24 13:43	Dilution Factor	1
Sampling Date	20210618 00:00	Analyst	rappelle	Method Code	WM-026
Received Date	2021-06-18 01:17	Instrument	Kili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery
Acids	PFBA	375-22-4	4614.83	6.30	6.30	0.131	0.259	0.131			
	PFPeA	2706-90-3	5104.98	6.97	6.97	0.145	0.259	0.145			
	PFHxA	307-24-4	5054.11	6.90	6.90	0.165	0.259	0.165			
	PFHpA	375-85-9	2866.07	3.91	3.91	0.104	0.259	0.104			
	PFOA	335-67-1	4781.08	6.52	6.52	0.151	0.259	0.151			
	PFNA	375-95-1	685.83	0.936	0.936	0.0649	0.259	0.0649			
	PFDA	335-76-2	423.51	0.578	0.578	0.0721	0.259	0.0721			
	PFUnDA	2058-94-8	126.01	0.172	0.172	0.158	0.259	0.158			
	PFDoDA	307-55-1	10.28	0.0140	0.0140	0.172	0.259	0.172			
	PFTrDA	72629-94-8	61.81	0.0843	0.0843	0.129	0.259	0.129			
Sulfonates	PFTeDA	376-06-7	ND	ND	ND	0.186	0.259	0.186			
	PFBS	375-73-5	4665.16	6.37	6.37	0.303	0.303	0.303			
	PFPeS	2706-91-4	610.34	0.833	0.833	0.176	0.244	0.176			
	PFHxS	355-46-4	3299.70	4.50	4.50	0.163	0.237	0.163			
	PFHpS	375-92-8	163.55	0.223	0.223	0.115	0.247	0.115			
	PFOS	1763-23-1	8968.86	12.2	12.2	0.136	0.240	0.136			
	PFNS	68259-12-1	ND	ND	ND	0.0737	0.250	0.0737			
	PFDS	335-77-3	ND	ND	ND	0.164	0.250	0.164			
	4:2 FTS	757124-72-4	ND	ND	ND	0.101	0.243	0.101			
	6:2 FTS	27619-97-2	195.55	0.267	0.267	0.0989	0.247	0.0989			
Other	8:2 FTS	39108-34-4	ND	ND	ND	0.146	0.248	0.146			
	PFOSA	754-91-6	ND	ND	ND	0.111	0.259	0.111			
	N-MeFOSAA	2355-31-9	66.53	0.0908	0.0908	0.123	0.259	0.123			
	N-EtFOSAA	2991-50-6	19.83	0.0271	0.0271	0.0930	0.259	0.0930			
	HFPO-DA	13252-13-6	4019.16	5.48	5.48	0.194	0.259	0.194			
	PFMOAA	674-13-5	25286.35	34.5	34.5	1.23	1.23	1.23			
	PFMOPrA	377-73-1	121.00	0.165	0.165	0.205	0.259	0.205			
	PFO2HxA	39492-88-1	4562.81	6.23	6.23	1.23	1.23	1.23			
	PFO3OA	39492-89-2	2312.11	3.16	3.16	1.23	1.23	1.23			
	PFO4DA	39492-90-5	ND	ND	ND	1.23	2.57	1.23			
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.259	0.259	0.259			
	ADONA	919005-14-4	ND	ND	ND	0.102	0.246	0.102			
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.102	0.242	0.102			
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.102	0.244	0.102			
	10:2 FTS	120226-60-0	ND	ND	ND	0.205	0.259	0.205			
	EVE Acid	69087-46-3	ND	ND	ND	1.23	1.23	1.23			
	FBSA	30334-69-1	512.03	0.699	0.699	0.205	0.259	0.205			
	Hydro-EVE Acid	773804-62-9	208.84	0.285	0.285	1.23	1.23	1.23			
	Hydrolyzed PSDA	2416366-19-1	6525.82	8.91	8.91	1.23	1.23	1.23			
	Nafion Byproduct 2	749836-20-2	326.22	0.445	0.445	0.259	0.259	0.259			
ES	N-EtFOSA	4151-50-2	ND	ND	ND	0.205	0.259	0.205			
	N-EtFOSE	1691-99-2	ND	ND	ND	6.14	6.14	6.14			
	NFDHA	151772-58-6	ND	ND	ND	0.205	0.259	0.205			
	N-MeFOSA	31506-32-8	ND	ND	ND	0.205	0.259	0.205			
	N-MeFOSE	24448-09-7	ND	ND	ND	6.14	6.14	6.14			
	PFHxDA	67905-19-5	ND	ND	ND	1.23	1.23	1.23			
	PFMOBA	863090-89-5	ND	ND	ND	1.23	1.23	1.23			
	PFOSDA	39492-91-6	ND	ND	ND	2.57	2.57	2.57			
	PMPA	13140-29-9	6389.73	8.72	8.72	1.23	1.23	1.23			
	R-EVE Acid	2416366-22-6	3752.63	5.12	5.12	1.23	1.23	1.23			
	R-PSDA	2416366-18-0	ND	ND	ND	1.23	1.23	1.23			
	R-PSDCA	2416366-21-5	21.67	0.0296	0.0296	1.23	1.23	1.23			
	MPFBA		4110.94	5.61					2.00	20-150%	82.2%
	M5PFPeA		11364.02	15.5					2.00	20-150%	227.3%
	M3PFBS		13528.63	18.5					2.00	20-150%	270.6%
M2-4:2 FTS		7768.99	10.6					2.00	20-150%	155.4%	
M5PFHxA		4965.80	6.78					2.00	20-150%	99.3%	
M3HFPO-DA		5722.31	7.81					2.00	20-150%	114.4%	
M4PFHpA		5160.83	7.04					2.00	20-150%	103.2%	
M3PFHxS		4960.88	6.77					2.00	20-150%	99.2%	
M2-6:2 FTS		4048.45	5.52					2.00	20-150%	81.0%	
M8PFOA		5101.66	6.96					2.00	20-150%	102.0%	
M9PFNA		5518.13	7.53					2.00	20-150%	110.4%	
M8PFOS		4561.84	6.23					2.00	20-150%	91.2%	
M2-8:2 FTS		4268.88	5.83					2.00	20-150%	85.4%	
M8FOSA-I		4206.04	5.74					2.00	20-150%	84.1%	
M6PFDA		4821.85	6.58					2.00	20-150%	96.4%	
d3-N-MeFOSAA		3999.18	5.46					2.00	20-150%	80.0%	
d5-N-EtFOSAA		3857.08	5.26					2.00	20-150%	77.1%	
M7PFUDa		4679.71	6.39					2.00	20-150%	93.6%	
MPFDoA		4814.58	6.57					2.00	20-150%	96.3%	
M2PFTeDA		3934.45	5.37					2.00	20-150%	78.7%	

QC Data

Enthalpy Analytical

Job No.: 0621-773-1 PFAS by Isotope Dilution (non-potable water)
 County of Brunswick Northwest Water Plant Leland, NC

Enthalpy ID MB-11931-PFAS Prep Batch EU11931 Sample Vol (mL) 250
 Sample Name MB-11931-PFAS Prep Date 2021-06-23 17:10 Extract Vol (mL) 0.4
 Matrix Aqueous Analysis Date 2021-06-24 11:47 Dilution Factor 1
 Sampling Date Analyst rappelle Method Code WM-026
 Received Date 2021-06-23 17:10 Instrument Kili Sample Type Blank

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery
Acids	PFBA	375-22-4	ND	ND	ND	0.153	0.304	0.153			
	PFPeA	2706-90-3	ND	ND	ND	0.170	0.304	0.170			
	PFHxA	307-24-4	0.95	0.00152	0.00152	0.193	0.304	0.193			
	PFHpA	375-85-9	ND	ND	ND	0.122	0.304	0.122			
	PFOA	335-67-1	11.84	0.0189	0.0189	0.177	0.304	0.177			
	PFNA	375-95-1	ND	ND	ND	0.0761	0.304	0.0761			
	PFDA	335-76-2	ND	ND	ND	0.0845	0.304	0.0845			
	PFUnDA	2058-94-8	ND	ND	ND	0.185	0.304	0.185			
	PFDoDA	307-55-1	ND	ND	ND	0.202	0.304	0.202			
	PFTTrDA	72629-94-8	ND	ND	ND	0.151	0.304	0.151			
	PFTeDA	376-06-7	ND	ND	ND	0.218	0.304	0.218			
	PFBS	375-73-5	ND	ND	ND	0.355	0.355	0.355			
Sulfonates	PFPeS	2706-91-4	ND	ND	ND	0.206	0.286	0.206			
	PFHxS	355-46-4	ND	ND	ND	0.191	0.278	0.191			
	PFHpS	375-92-8	ND	ND	ND	0.135	0.290	0.135			
	PFOS	1763-23-1	ND	ND	ND	0.160	0.282	0.160			
	PFNS	68259-12-1	ND	ND	ND	0.0864	0.293	0.0864			
	PFDS	335-77-3	ND	ND	ND	0.192	0.293	0.192			
	4:2 FTS	757124-72-4	ND	ND	ND	0.118	0.285	0.118			
	6:2 FTS	27619-97-2	ND	ND	ND	0.116	0.290	0.116			
8:2 FTS	39108-34-4	ND	ND	ND	0.171	0.291	0.171				
other	PFOSA	754-91-6	ND	ND	ND	0.130	0.304	0.130			
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.144	0.304	0.144			
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.109	0.304	0.109			
	HFPO-DA	13252-13-6	ND	ND	ND	0.228	0.304	0.228			
	PFMOAA	674-13-5	ND	ND	ND	1.44	1.44	1.44			
	PFMOPrA	377-73-1	ND	ND	ND	0.240	0.304	0.240			
	PFO2HxA	39492-88-1	ND	ND	ND	1.44	1.44	1.44			
	PFO3OA	39492-89-2	ND	ND	ND	1.44	1.44	1.44			
	PFO4DA	39492-90-5	ND	ND	ND	1.44	3.01	1.44			
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.304	0.304	0.304			
	ADONA	919005-14-4	ND	ND	ND	0.120	0.288	0.120			
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.120	0.283	0.120			
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.120	0.286	0.120			
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	0.304	0.240			
	EVE Acid	69087-46-3	ND	ND	ND	1.44	1.44	1.44			
	FBSA	30334-69-1	ND	ND	ND	0.240	0.304	0.240			
	Hydro-EVE Acid	773804-62-9	ND	ND	ND	1.44	1.44	1.44			
	Hydrolyzed PSDA	2416366-19-1	ND	ND	ND	1.44	1.44	1.44			
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	0.304	0.304	0.304			
	N-EtFOSA	4151-50-2	ND	ND	ND	0.240	0.304	0.240			
	N-EtFOSE	1691-99-2	ND	ND	ND	7.20	7.20	7.20			
	NFDHA	151772-58-6	ND	ND	ND	0.240	0.304	0.240			
	N-MeFOSA	31506-32-8	ND	ND	ND	0.240	0.304	0.240			
	N-MeFOSE	24448-09-7	ND	ND	ND	7.20	7.20	7.20			
	PFHxDA	67905-19-5	ND	ND	ND	1.44	1.44	1.44			
	PFMOBA	863090-89-5	ND	ND	ND	1.44	1.44	1.44			
	PFOSDA	39492-91-6	ND	ND	ND	3.01	3.01	3.01			
	PMPA	13140-29-9	ND	ND	ND	1.44	1.44	1.44			
R-EVE Acid	2416366-22-6	ND	ND	ND	1.44	1.44	1.44				
R-PSDA	2416366-18-0	ND	ND	ND	1.44	1.44	1.44				
R-PSDCA	2416366-21-5	ND	ND	ND	1.44	1.44	1.44				
ES	MPFBA		5364.12	8.58					2.00	20-150%	107.3%
	M5PFPeA		5843.60	9.35					2.00	20-150%	116.9%
	M3PFBS		5146.95	8.24					2.00	20-150%	102.9%
	M2-4:2 FTS		3532.55	5.65					2.00	20-150%	70.7%
	M5PFHxA		4719.91	7.55					2.00	20-150%	94.4%
	M3HFPO-DA		5390.27	8.62					2.00	20-150%	107.8%
	M4PFHpA		4848.57	7.76					2.00	20-150%	97.0%
	M3PFHxS		4660.38	7.46					2.00	20-150%	93.2%
	M2-6:2 FTS		4544.33	7.27					2.00	20-150%	90.9%
	M8PFOA		4610.06	7.38					2.00	20-150%	92.2%
	M9PFNA		5570.84	8.91					2.00	20-150%	111.4%
	M8PFOS		4506.32	7.21					2.00	20-150%	90.1%
	M2-8:2 FTS		4279.32	6.85					2.00	20-150%	85.6%
	M8FOSA-I		4004.51	6.41					2.00	20-150%	80.1%
	M6PFDA		4859.27	7.77					2.00	20-150%	97.2%
	d3-N-MeFOSAA		3468.90	5.55					2.00	20-150%	69.4%
	d5-N-EtFOSAA		3496.40	5.59					2.00	20-150%	69.9%
	M7PFUdA		4831.65	7.73					2.00	20-150%	96.6%
	MPFDoA		4395.47	7.03					2.00	20-150%	87.9%
	M2PFTeDA		3003.92	4.81					2.00	20-150%	60.1%

Enthalpy Analytical

Job No.: 0621-773-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Northwest Water Plant Leland, NC

Enthalpy ID	OPR-11931-PFAS	Prep Batch	EU11931	Sample Vol (mL)	250
Sample Name	OPR-11931-PFAS	Prep Date	2021-06-23 17:10	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-06-24 12:10	Dilution Factor	1
Sampling Date		Analyst	rappelle	Method Code	WM-026
Received Date	2021-06-23 17:10	Instrument	Kili	Sample Type	Control

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	DL ng/L	Spike Amt. (ng)	Recovery Limits	Recovery
Acids	PFBA	375-22-4	12880.71	20.6	20.6	0.153	0.304	0.153	7.50	73-129%	103.0%
	PFPeA	2706-90-3	12440.56	19.9	19.9	0.170	0.304	0.170	7.50	72-129%	99.5%
	PFHxA	307-24-4	13618.50	21.8	21.8	0.193	0.304	0.193	7.50	72-129%	108.9%
	PFHpA	375-85-9	13612.36	21.8	21.8	0.122	0.304	0.122	7.50	72-130%	108.9%
	PFOA	335-67-1	13735.38	22.0	22.0	0.177	0.304	0.177	7.50	71-133%	109.9%
	PFNA	375-95-1	12913.11	20.7	20.7	0.0761	0.304	0.0761	7.50	69-130%	103.3%
	PFDA	335-76-2	13947.47	22.3	22.3	0.0845	0.304	0.0845	7.50	71-129%	111.6%
	PFUnDA	2058-94-8	13853.62	22.2	22.2	0.185	0.304	0.185	7.50	69-133%	110.8%
	PFDoDA	307-55-1	12712.73	20.3	20.3	0.202	0.304	0.202	7.50	72-134%	101.7%
	PFTriDA	72629-94-8	16042.11	25.7	25.7	0.151	0.304	0.151	7.50	65-144%	128.3%
	PFTeDA	376-06-7	14002.33	22.4	22.4	0.218	0.304	0.218	7.50	71-132%	112.0%
Sulfonates	PFBS	375-73-5	12724.86	20.4	20.4	0.355	0.355	0.355	7.50	72-134%	114.8%
	PFPeS	2706-91-4	13087.29	20.9	20.9	0.206	0.286	0.206	7.50	71-127%	111.3%
	PFHxS	355-46-4	12078.97	19.3	19.3	0.191	0.278	0.191	7.50	68-131%	105.7%
	PFHpS	375-92-8	13945.51	22.3	22.3	0.135	0.290	0.135	7.50	69-134%	117.1%
	PFOS	1763-23-1	12898.55	20.6	20.6	0.160	0.282	0.160	7.50	65-140%	111.2%
	PFNS	68259-12-1	13834.40	22.1	22.1	0.0864	0.293	0.0864	7.50	69-127%	115.0%
	PFDS	335-77-3	13679.90	21.9	21.9	0.192	0.293	0.192	7.50	53-142%	113.4%
	4:2 FTS	757124-72-4	13278.77	21.2	21.2	0.118	0.285	0.118	7.50	63-143%	113.4%
6:2 FTS	27619-97-2	13128.88	21.0	21.0	0.116	0.290	0.116	7.50	64-140%	110.4%	
8:2 FTS	39108-34-4	15658.50	25.1	25.1	0.171	0.291	0.171	7.50	67-138%	130.5%	
Other	PFOSA	754-91-6	12752.80	20.4	20.4	0.130	0.304	0.130	7.50	67-137%	102.0%
	N-MeFOSAA	2355-31-9	13559.06	21.7	21.7	0.144	0.304	0.144	7.50	65-136%	108.5%
	N-EtFOSAA	2991-50-6	14113.26	22.6	22.6	0.109	0.304	0.109	7.50	61-135%	112.9%
	HFPO-DA	13252-13-6	11926.88	19.1	19.1	0.228	0.304	0.228	7.50	70-130%	95.4%
ES	MPFBA		5084.57	8.14					2.00	20-150%	101.7%
	M5PFPeA		5575.76	8.92					2.00	20-150%	111.5%
	M3PFBS		4778.69	7.65					2.00	20-150%	95.6%
	M2-4:2 FTS		3909.62	6.26					2.00	20-150%	78.2%
	M5PFHxA		4798.65	7.68					2.00	20-150%	96.0%
	M3HFPO-DA		5527.74	8.84					2.00	20-150%	110.6%
	M4PFHpA		4839.18	7.74					2.00	20-150%	96.8%
	M3PFHxS		4860.44	7.78					2.00	20-150%	97.2%
	M2-6:2 FTS		4280.66	6.85					2.00	20-150%	85.6%
	M8PFOA		4732.32	7.57					2.00	20-150%	94.6%
	M9PFNA		5388.89	8.62					2.00	20-150%	107.8%
	M8PFOS		4481.63	7.17					2.00	20-150%	89.6%
	M2-8:2 FTS		3636.19	5.82					2.00	20-150%	72.7%
	M8FOSA-I		3816.73	6.11					2.00	20-150%	76.3%
	M6PFDA		4774.61	7.64					2.00	20-150%	95.5%
	d3-N-MeFOSAA		3499.18	5.60					2.00	20-150%	70.0%
	d5-N-EtFOSAA		3408.96	5.45					2.00	20-150%	68.2%
	M7PFUdA		4774.09	7.64					2.00	20-150%	95.5%
	MPFDoA		5015.53	8.02					2.00	20-150%	100.3%
M2PFTeDA		3951.59	6.32					2.00	20-150%	79.0%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0621-773-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant Leland, NC

1. Custody

Lois Walton received the samples on June 18, 2021 at 14.6 °C after being relinquished by County of Brunswick. The samples were received in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, LLC

Table 1 - Sample Inventory

EU Lab Sample ID	Client Sample ID	Matrix
0621-773-001-1	061821-SO1	Aqueous
0621-773-002-1	061821-EO1	Aqueous

2. Methods and Analytes

A list of analytes of interest and corresponding methods of analysis is shown in Table 3. Abbreviations are defined in the listed Appendices.

Table 3 - Methods and Analytes

EU Method	Analytes	Cleanup Method
EU-047	Brunswick PFAS list	ENVI-Carb

3. Analysis

The samples were analyzed using Waters Acquity UPLC equipped with Xevo TQ MS (LC/MS/MS "Kili").

For aqueous samples, the sample volume was measured gravimetrically by the laboratory, and spiked with Extraction Standard (ES). The sample was then mixed well and centrifuged, if needed. The samples were then extracted via SPE, and the extracts were cleaned up using ENVI-Carb.

Each final sample extract was transferred to an autosampler vial, spiked with Injection Standard (IS), and brought to a final volume of 400µL prior to analysis.

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0621-773-1 PFAS by Isotope Dilution (non-potable water)
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4. Calibration

Except where noted below, in the initial calibration, the reported analytes exhibited R^2 of ≥ 0.99 . The reported analytes in the calibration standards, continuing calibration (concal) and Initial Calibration Verification (ICV) met the 30% accuracy criterion for native analytes.

PFO4DA was high in the opening concal, but but this compound was not detected in one sample, and it was less than LOD in the other, so the data were accepted. .

PFHxDA was low in the closing concal, but this compound was not detected in any samples, so the data were accepted..

N-EtFOSE was high in the opening concal, but this compound was not detected in any samples, so the data were accepted.

5. QC Notes

The QC sample analyses passed all method criteria.

The samples were extracted within the 28-day from collection holding time and analyzed within the 28-day from extraction to analysis holding time required by the method.

6. Reporting Notes

Some labeled standards in the samples fell outside the limits for ES recoveries. The target analytes are quantified based on their ratio to the labeled standards, therefore, undergo the same losses as the labeled standards. As a result, low or high recoveries do not cause any change to ratios or contribute any additional error in the measurement of the target analytes. Therefore, the data are considered acceptable.

The results presented in this report are representative of the samples as provided to the laboratory.

These analyses met the requirements of the TNI Standard. , , 10:2 FTS, EVE Acid, FBSA, Gen-X, Hydro-EVE Acid, and R-PSDCA are not accredited under TNI. Any deviations from the requirements of the reference method or TNI Standard have been stated above.

Enthalpy Analytical, LLC in Wilmington NC is accredited by the Louisiana Department of Environmental Quality to the 2009 TNI Standard under certificate number 05075.

PFAS Compound Acronym List

Acronym	Compound Name	CAS #
Target Analytes		
PFBA	Perfluorobutanoic Acid	375-22-4
PFPeA	Perfluoropentanoic Acid	2706-90-3
PFHxA	Perfluorohexanoic Acid	307-24-4
PFHpA	Perfluoroheptanoic Acid	375-85-9
PFOA	Perfluorooctanoic Acid	335-67-1
PFNA	Perfluorononanoic Acid	375-95-1
PFDA	Perfluorodecanoic acid	335-76-2
PFUnA (PFUnDA)	Perfluoroundecanoic acid	2058-94-8
PFDoA (PFDoDA)	Perfluorododecanoic acid	307-55-1
PFTrDA (PFTriA)	Perfluorotridecanoic acid	72629-94-8
PFTeDA (PFTA)	Perfluorotetradecanoic acid	376-06-7
PFBS	Perfluorobutane sulfonic acid	375-73-5
PFPeS	Perfluoropentane sulfonic acid	2706-91-4
PFHxS	Perfluorohexane sulfonic acid	355-46-4
PFHpS	Perfluoroheptane sulfonic acid	375-92-8
PFOS	Perfluorooctane sulfonic acid	1763-23-1
PFNS	Perfluorononane sulfonic acid	68259-12-1
PFDS	Perfluorodecane sulfonic acid	757124-72-4
4:2 FTS	4:2 fluorotelomer sulfonic acid	27619-97-2
6:2 FTS	6:2 fluorotelomer sulfonic acid	39108-34-4
8:2 FTS	8:2 fluorotelomer sulfonic acid	13252-13-6
PFOSA (FOSA)	Perfluorooctane sulfonamide	754-91-6
N-MeFOSAA	N-methyl perfluorooctane sulfonamido acetic acid	2355-31-9
N-EtFOSAA	N-ethyl perfluorooctane sulfonamido acetic acid	2991-50-6
HFPO-DA	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (Gen-X)	13252-13-6
11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	763051-92-9
9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	756426-58-1
ADONA	4,8-dioxa-3H-perfluorononanoic acid	919005-14-4
* PFMOAA	Perfluoro-2-methoxyacetic acid	674-13-5
PFMOPrA (PFMPA)	Perfluoro-3-methoxypropanoic acid	377-73-1
* PFO2HxA	Perfluoro (3,5-dioxahexanoic) acid	39492-88-1
* PFO3OA	Perfluoro (3,5,7-trioxaoctanoic) acid	39492-89-2
* PFO4DA	Perfluoro (3,5,7,9-tetraoxadecanoic) acid	39492-90-5
* PFO5DA	Perfluoro(3,5,7,9,11-pentaoxidodecanoic) acid	39492-91-6
* Nafion Byproduct 1	Nafion Byproduct 1	29311-67-9
* Nafion Byproduct 2	Nafion Byproduct 2	749836-20-2
PFEESA	Perfluoro(2-ethoxyethane)sulphonic acid	113507-82-7
PFMOBA (PFMBA)	Perfluoro-4-methoxybutanic acid	863090-89-5
NFDHA	Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6
* PEPA	Perfluoro-2-ethoxypropanoic acid	267239-61-2
* PMPA	Perfluoro-2-methoxypropanoic acid	13140-29-9
* 10:2 FTS	Fluorotelomer sulfonate 10:2	120226-60-0
* N-EtFOSA	N-ethylperfluoro-1-octanesulfonamide	4151-50-2
* N-EtFOSE	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol	1691-99-2
* N-MeFOSA	N-methylperfluoro-1-octanesulfonamide	31506-32-8
* N-MeFOSE	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol	24448-09-7
* PFECA-G	4-(Heptafluoroisopropoxy)hexafluorobutanoic acid	801212-59-9
* PFHxDA	Perfluorohexadecanoic acid	67905-19-5
* R-PSDA	Perfluoro-4-(2-sulfoethoxy)pentanoic acid	2416366-18-0



* Hydrolyzed PSDA	2-fluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2-tetrafluoro-2-sulfoethoxy)propoxy]-acetic acid	2416366-19-1
* R-PSDCA	1,1,2,2-tetrafluoro-2-[1,2,2,3,3-pentafluoro-1-(trifluoromethyl)propoxy] ethanesulfonic acid	2416366-21-5
* EVE Acid	2,2,3,3-tetrafluoro-3-({1,1,1,2,3,3,3-hexafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propan-2-yl}oxy)propionic acid	69087-46-3
* FBSA	Perfluorobutylsulfonamide	30334-69-1
* Hydro-EVE Acid	2,2,3,3-Tetrafluoro-3-[[1,1,1,2,3,3,3-hexafluoro-3-(1,2,2,2-tetrafluoroethoxy)propan-2-yl]oxy]propanoic acid	773804-62-9
* R-EVE Acid	4-(2-carboxy-1,1,2,2-tetrafluoroethoxy)-2,2,3,3,4,5,5,5-octafluoro-pentanoic acid	2416366-22-6
Extraction Standards		
MPFBA	Perfluoro-n-[13C4]butanoic acid	
M5PFPeA	Perfluoro-n-[13C5]pentanoic acid	
M3PFBS	Sodium perfluoro-1-[2,3,4-13C3]-butanesulfonic acid	
M2-4:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-hexane sulfonic acid	
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]-hexanesulfonic acid	
M2-6:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-octane sulfonic acid	
M8PFOA	Perfluoro-n-[13C8]octanoic acid	
M9PFNA	Perfluoro-n-[13C9]nonanoic acid	
M8PFOS	Sodium perfluoro-1-[13C8]-octanesulfonic acid	
M2-8:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-decane sulfonic acid	
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		
M3PFBA	Perfluoro-n-[2,3,4-13C3]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]-octanesulfonic acid	

* Analytes are currently not accredited under TNI Scope - Accreditation pending.

General Reporting Notes – Data Qualifiers

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

General Data Qualifiers

- B – The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
- Cxx – 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 ('xx') 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). For HRMS data, this condition does not imply additional measurement uncertainty. For LC-MS/MS data, these values should be considered as having measurement uncertainty higher than values within the calibration range.
- EDL – Estimated Detection Level. Specific to Dioxin/Furan tests and equivalent to MDL
- EMPC – Estimated Maximum Possible Concentration Specific to Dioxin/Furan tests to indicate the signal/noise ratio was not sufficient for peak identification (the determined ion-abundance ratio was outside the allowed theoretical range), or where there was a co-eluting interference. Indicates that a peak was identified but did not meet the method specified ion-abundance ratio.
- IR – The ion ratio between the primary and secondary ions was observed to be outside the method criteria therefore the actual analyte concentration cannot be accurately determined as defined by DoD QSM Table B-15.
- J – The analyte has a concentration below the minimum calibration level (LOQ value) but greater than the LOD. These values should be considered as having measurement uncertainty higher than values within the calibration range
- 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 analyte signal may have a signal-to-noise ratio less than the criteria deemed necessary to be considered a detected analyte.
- LOD – Limit of Detection: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOD. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the minimum detection limit (MDL). The LOD is adjusted for sample weight or volume.
- LOQ – Limit of Quantiation: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOQ. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the reporting limit (RL). The LOD is adjusted for sample weight or volume.
- <LOD() – Analyte was not found at a concentration high enough to be reported as detected. It is reported as less than the LOD, and the LOD is given in the parentheses.



General Reporting Notes – Data Qualifiers

- ND – Indicates a non-detect.
- NR – Indicates a value that is not reportable due to issues observed in sample preparation or analysis.
- PR – The associated congener(s) is(are) poorly resolved.
- QI – Indicates the presence of a quantitative interference.
- RL – Reporting Limit. Lowest reportable value. The level is higher than the MDL.
- 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.
- V / Q – The labeled standard recovery is not within method control limits.
- X – Results from re-injection/repeat/second-column analysis.

Lab Identifiers/ Data Attributes

- 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 – Dilution Data. Result was obtained from the analysis of a dilution. 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.
- R – Indicates a re-extraction of the sample.

Sample Custody

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