County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 07/29/21

Analytical Report
0721-831

Isotope Dilution Method

PFAS

Enthalpy Analytical, LLC – Ultratrace

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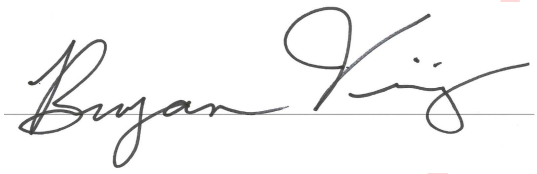
I certify that to the best of my knowledge all analytical data presented in this report:

- 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 __20__ pages.



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Date: 2021.08.19 17:19:40 -04'00'

Report Issued Date: 19AUG21

Summary of Results

Enthalpy Analytical

Job No.: 0721-831-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: Northwest Water Plant, Leland NC

Summary

	Compound	CAS	072921-SO1 ng/L	072921-EO1 ng/L
Acids	PFBA	375-22-4	6.67	5.47
	PFPeA	2706-90-3	8.87	8.88
	PFHxA	307-24-4	8.15	7.86
	PFHpA	375-85-9	3.46	3.58
	PFOA	335-67-1	7.21	5.61
	PFNA	375-95-1	1.15	0.914
	PFDA	335-76-2	0.598	0.628
	PFUnDA	2058-94-8	0.168 J	0.153 L
	PFDoDA	307-55-1	ND U	ND U
	PFTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U
Sulfonates	PFBS	375-73-5	5.93	5.31
	PFPeS	2706-91-4	0.862	0.679
	PFHxS	355-46-4	3.69	3.36
	PFHpS	375-92-8	0.359	0.335
	PFOS	1763-23-1	15.2	11.7
	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	0.0114 L	0.148 J
	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	0.0859 LB
	N-EtFOSAA	2991-50-6	ND U	ND U
	HFPO-DA	13252-13-6	5.01	3.34
	PFMOAA	674-13-5	35.6	22.9
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	3.35	3.69
	PFO3OA	39492-89-2	2.15	1.69
	PFO4DA	39492-90-5	ND U	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	0.733	0.630
	Hydro-EVE Acid	773804-62-9	0.293 L	0.234 L
	Hydrolyzed PSDA	2416366-19-1	3.60	6.20
	Nafion Byproduct 2	749836-20-2	0.549	0.610
	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	2.22
	PEPA	267239-61-2	ND U	ND U
	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	10.4	12.6
	R-EVE Acid	2416366-22-6	5.44	7.16
	R-PSDA	2416366-18-0	ND U	ND U
	R-PSDCA	2416366-21-5	ND U	ND U

Detailed Results

Enthalpy Analytical

Job No.: 0721-831-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland NC

Enthalpy ID	0721-831-001-2	Prep Batch	EU12096	Sample Vol (mL)	292.7
Sample Name	072921-SO1	Prep Date	2021-08-03 16:53	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-08-04 07:20	Dilution Factor	1
Sampling Date	20210729 00:00	Analyst	hallen	Method Code	WM-026
Received Date	2021-07-29 02:57	Instrument	Flli	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	4880.29	6.67	6.67	0.131	0.260			
	PFPeA	2706-90-3	6492.27	8.87	8.87	0.145	0.260			
	PFHxA	307-24-4	5964.93	8.15	8.15	0.165	0.260			
	PFHpA	375-85-9	2533.18	3.46	3.46	0.104	0.260			
	PFOA	335-67-1	5278.00	7.21	7.21	0.151	0.260			
	PFNA	375-95-1	839.25	1.15	1.15	0.0650	0.260			
	PFDA	335-76-2	437.77	0.598	0.598	0.0722	0.260			
	PFUnDA	2058-94-8	122.68	0.168	0.168	0.158	0.260			J
	PFDoDA	307-55-1	ND	ND	ND	0.173	0.260			U
	PFTrDA	72629-94-8	ND	ND	ND	0.129	0.260			U
	PFTeDA	376-06-7	ND	ND	ND	0.186	0.260			U
Sulfonates	PFBS	375-73-5	4340.57	5.93	5.93	0.303	0.303			
	PFPeS	2706-91-4	630.65	0.862	0.862	0.176	0.245			
	PFHxS	355-46-4	2699.05	3.69	3.69	0.163	0.238			
	PFHpS	375-92-8	262.60	0.359	0.359	0.115	0.247			
	PFOS	1763-23-1	11100.32	15.2	15.2	0.137	0.241			
	PFNS	68259-12-1	ND	ND	ND	0.0738	0.250			U
	PFDS	335-77-3	ND	ND	ND	0.164	0.250			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.101	0.243			U
	6:2 FTS	27619-97-2	8.31	0.0114	0.0114	0.0991	0.247			L
	8:2 FTS	39108-34-4	ND	ND	ND	0.146	0.249			U
other	PFOSA	754-91-6	ND	ND	ND	0.111	0.260			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.123	0.260			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0931	0.260			U
	HFPO-DA	13252-13-6	3663.16	5.01	5.01	0.195	0.260			
	PFMOAA	674-13-5	26020.91	35.6	35.6	1.23	1.23			
	PFMOPrA	377-73-1	ND	ND	ND	0.205	0.260			U
	PFO2HxA	39492-88-1	2449.39	3.35	3.35	1.23	1.23			
	PFO3OA	39492-89-2	1572.27	2.15	2.15	1.23	1.23			
	PFO4DA	39492-90-5	ND	ND	ND	1.30	1.30			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.260	0.260			U
	ADONA	919005-14-4	ND	ND	ND	0.102	0.246			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.102	0.242			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.102	0.245			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.205	0.260			U
	EVE Acid	69087-46-3	ND	ND	ND	1.23	1.23			U
	FBSA	30334-69-1	536.56	0.733	0.733	0.205	0.260			
	Hydro-EVE Acid	773804-62-9	214.75	0.293	0.293	1.23	1.23			L
	Hydrolyzed PSDA	2416366-19-1	2631.77	3.60	3.60	1.23	1.23			
	Nafion Byproduct 2	749836-20-2	401.48	0.549	0.549	0.260	0.260			
	N-EtFOSA	4151-50-2	ND	ND	ND	0.205	0.260			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.15	6.15			U
	NFDHA	151772-58-6	ND	ND	ND	0.205	0.260			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.205	0.260			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.15	6.15			U
	NVHOS	1132933-86-8	ND	ND	ND	1.23	1.23			U
	PEPA	267239-61-2	ND	ND	ND	1.23	1.23			U
	PFECA-G	801212-59-9	ND	ND	ND	0.260	1.23			U
	PFEESA	113507-82-7	ND	ND	ND	0.205	0.260			U
	PFHxDA	67905-19-5	ND	ND	ND	1.23	1.23			U
	PFMOBA	863090-89-5	ND	ND	ND	1.23	1.23			U
	PFO5DA	39492-91-6	ND	ND	ND	1.30	1.30			U
	PMPA	13140-29-9	7580.71	10.4	10.4	1.23	1.23			
	R-EVE Acid	2416366-22-6	3979.36	5.44	5.44	1.23	1.23			
	R-PSDA	2416366-18-0	ND	ND	ND	1.23	1.23			U
	R-PSDCA	2416366-21-5	ND	ND	ND	1.23	1.23			U
ES	MPFBA		4162.02	5.69				20-150%	83.2%	
	M5PFPeA		12968.89	17.7				20-150%	259.4%	Q
	M3PFBS		20695.13	28.3				20-150%	413.9%	Q
	M2-4:2 FTS		8214.37	11.2				20-150%	164.3%	Q
	M5PFHxA		3324.40	4.54				20-150%	66.5%	
	M3HFPO-DA		4242.76	5.80				20-150%	84.9%	
	M4PFHpA		4135.37	5.65				20-150%	82.7%	
	M3PFHxS		4673.61	6.39				20-150%	93.5%	
	M2-6:2 FTS		10351.66	14.1				20-150%	207.0%	Q
	M8PFOA		3975.09	5.43				20-150%	79.5%	
	M9PFNA		4180.56	5.71				20-150%	83.6%	
	M8PFOS		3928.36	5.37				20-150%	78.6%	
	M2-8:2 FTS		6132.07	8.38				20-150%	122.6%	
	M8FOSA-I		3261.36	4.46				20-150%	65.2%	
	M6PFDA		4441.53	6.07				20-150%	88.8%	
	d3-N-MeFOSAA		6065.48	8.29				20-150%	121.3%	
	d5-N-EtFOSAA		6205.13	8.48				20-150%	124.1%	
	M7PFUdA		3842.68	5.25				20-150%	76.9%	
	MPFDoA		2723.84	3.72				20-150%	54.5%	
	M2PFTeDA		987.95	1.35				20-150%	19.8%	Q

Enthalpy Analytical

Job No.: 0721-831-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland NC

Enthalpy ID	0721-831-002-2	Prep Batch	EU12096	Sample Vol (mL)	288.76
Sample Name	072921-EO1	Prep Date	2021-08-03 16:53	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-08-04 07:43	Dilution Factor	1
Sampling Date	20210729 00:00	Analyst	hallen	Method Code	WM-026
Received Date	2021-07-29 02:57	Instrument	Flli	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	3950.03	5.47	5.47	0.132	0.263			
	PFPeA	2706-90-3	6412.89	8.88	8.88	0.147	0.263			
	PFHxA	307-24-4	5676.10	7.86	7.86	0.167	0.263			
	PFHpA	375-85-9	2580.93	3.58	3.58	0.106	0.263			
	PFOA	335-67-1	4047.27	5.61	5.61	0.153	0.263			
	PFNA	375-95-1	659.65	0.914	0.914	0.0659	0.263			
	PFDA	335-76-2	453.01	0.628	0.628	0.0732	0.263			
	PFUnDA	2058-94-8	110.31	0.153	0.153	0.160	0.263			L
	PFDoDA	307-55-1	ND	ND	ND	0.175	0.263			U
	PFTrDA	72629-94-8	ND	ND	ND	0.131	0.263			U
	PFTeDA	376-06-7	ND	ND	ND	0.189	0.263			U
Sulfonates	PFBS	375-73-5	3830.03	5.31	5.31	0.307	0.307			
	PFPeS	2706-91-4	490.44	0.679	0.679	0.178	0.248			
	PFHxS	355-46-4	2422.71	3.36	3.36	0.165	0.241			
	PFHpS	375-92-8	241.57	0.335	0.335	0.117	0.251			
	PFOS	1763-23-1	8453.84	11.7	11.7	0.139	0.244			
	PFNS	68259-12-1	ND	ND	ND	0.0748	0.253			U
	PFDS	335-77-3	ND	ND	ND	0.166	0.253			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.102	0.247			U
	6:2 FTS	27619-97-2	107.12	0.148	0.148	0.100	0.251			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.148	0.252			U
other	PFOSA	754-91-6	ND	ND	ND	0.113	0.263			U
	N-MeFOSAA	2355-31-9	62.04	0.0859	0.0859	0.125	0.263			LB
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0944	0.263			U
	HFPO-DA	13252-13-6	2412.51	3.34	3.34	0.197	0.263			
	PFMOAA	674-13-5	16504.20	22.9	22.9	1.25	1.25			
	PFMOPrA	377-73-1	ND	ND	ND	0.208	0.263			U
	PFO2HxA	39492-88-1	2662.25	3.69	3.69	1.25	1.25			
	PFO3OA	39492-89-2	1219.94	1.69	1.69	1.25	1.25			
	PFO4DA	39492-90-5	ND	ND	ND	1.32	1.32			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.263	0.263			U
	ADONA	919005-14-4	ND	ND	ND	0.104	0.249			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.104	0.245			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.104	0.248			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.208	0.263			U
	EVE Acid	69087-46-3	ND	ND	ND	1.25	1.25			U
	FBSA	30334-69-1	454.92	0.630	0.630	0.208	0.263			
	Hydro-EVE Acid	773804-62-9	169.27	0.234	0.234	1.25	1.25			L
	Hydrolyzed PSDA	2416366-19-1	4474.66	6.20	6.20	1.25	1.25			
	Nafion Byproduct 2	749836-20-2	440.13	0.610	0.610	0.263	0.263			
	N-EtFOSA	4151-50-2	ND	ND	ND	0.208	0.263			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.23	6.23			U
	NFDHA	151772-58-6	ND	ND	ND	0.208	0.263			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.208	0.263			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.23	6.23			U
	NVHOS	1132933-86-8	1604.03	2.22	2.22	1.25	1.25			
	PEPA	267239-61-2	ND	ND	ND	1.25	1.25			U
	PFECA-G	801212-59-9	ND	ND	ND	0.263	1.25			U
	PFEESA	113507-82-7	ND	ND	ND	0.208	0.263			U
	PFHxDA	67905-19-5	ND	ND	ND	1.25	1.25			U
	PFMOBA	863090-89-5	ND	ND	ND	1.25	1.25			U
	PFO5DA	39492-91-6	ND	ND	ND	1.32	1.32			U
	PMPA	13140-29-9	9106.00	12.6	12.6	1.25	1.25			
	R-EVE Acid	2416366-22-6	5168.28	7.16	7.16	1.25	1.25			
	R-PSDA	2416366-18-0	ND	ND	ND	1.25	1.25			U
	R-PSDCA	2416366-21-5	ND	ND	ND	1.25	1.25			U
ES	MPFBA		4322.71	5.99				20-150%	86.5%	
	M5PFPeA		11644.29	16.1				20-150%	232.9%	Q
	M3PFBS		18335.96	25.4				20-150%	366.7%	Q
	M2-4:2 FTS		7557.98	10.5				20-150%	151.2%	Q
	M5PFHxA		3570.48	4.95				20-150%	71.4%	
	M3HFPO-DA		7055.85	9.77				20-150%	141.1%	
	M4PFHpA		4246.74	5.88				20-150%	84.9%	
	M3PFHxS		4552.27	6.31				20-150%	91.0%	
	M2-6:2 FTS		9582.85	13.3				20-150%	191.7%	Q
	M8PFOA		4798.32	6.65				20-150%	96.0%	
	M9PFNA		4719.85	6.54				20-150%	94.4%	
	M8PFOS		4263.08	5.91				20-150%	85.3%	
	M2-8:2 FTS		5476.15	7.59				20-150%	109.5%	
	M8FOSA-I		3383.44	4.69				20-150%	67.7%	
	M6PFDA		3943.58	5.46				20-150%	78.9%	
	d3-N-MeFOSAA		5639.12	7.81				20-150%	112.8%	
	d5-N-EtFOSAA		5920.04	8.20				20-150%	118.4%	
	M7PFUdA		3710.55	5.14				20-150%	74.2%	
	MPFDoA		2481.33	3.44				20-150%	49.6%	
	M2PFTeDA		1270.73	1.76				20-150%	25.4%	

QC Data

Enthalpy Analytical

Job No.: 0721-831-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland NC

Enthalpy ID	MB-12096-PFAS	Prep Batch	EU12096	Sample Vol (mL)	250
Sample Name	MB-12096-PFAS	Prep Date	2021-08-03 16:53	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-08-04 06:10	Dilution Factor	1
Sampling Date		Analyst	hallen	Method Code	WM-026
Received Date	2021-08-03 16:53	Instrument	Flli	Sample Type	Blank

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	ND	ND	ND	0.153	0.304			U
	PFPeA	2706-90-3	ND	ND	ND	0.170	0.304			U
	PFHxA	307-24-4	51.99	0.0832	0.0832	0.193	0.304			L
	PFHpA	375-85-9	ND	ND	ND	0.122	0.304			U
	PFOA	335-67-1	ND	ND	ND	0.177	0.304			U
	PFNA	375-95-1	ND	ND	ND	0.0761	0.304			U
	PFDA	335-76-2	ND	ND	ND	0.0845	0.304			U
	PFUnDA	2058-94-8	ND	ND	ND	0.185	0.304			U
	PFDoDA	307-55-1	45.43	0.0727	0.0727	0.202	0.304			L
	PFTrDA	72629-94-8	25.76	0.0412	0.0412	0.151	0.304			L
	PFTeDA	376-06-7	52.23	0.0836	0.0836	0.218	0.304			L
Sulfonates	PFBS	375-73-5	ND	ND	ND	0.355	0.355			U
	PFPeS	2706-91-4	ND	ND	ND	0.206	0.286			U
	PFHxS	355-46-4	ND	ND	ND	0.191	0.278			U
	PFHpS	375-92-8	ND	ND	ND	0.135	0.290			U
	PFOS	1763-23-1	ND	ND	ND	0.160	0.282			U
	PFNS	68259-12-1	ND	ND	ND	0.0864	0.293			U
	PFDS	335-77-3	ND	ND	ND	0.192	0.293			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.118	0.285			U
	6:2 FTS	27619-97-2	ND	ND	ND	0.116	0.290			U
	8:2 FTS	39108-34-4	ND	ND	ND	0.171	0.291			U
other	PFOSA	754-91-6	ND	ND	ND	0.130	0.304			U
	N-MeFOSAA	2355-31-9	32.00	0.0512	0.0512	0.144	0.304			L
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.109	0.304			U
	HFPO-DA	13252-13-6	ND	ND	ND	0.228	0.304			U
	PFMOAA	674-13-5	ND	ND	ND	1.44	1.44			U
	PFMOPrA	377-73-1	ND	ND	ND	0.240	0.304			U
	PFO2HxA	39492-88-1	ND	ND	ND	1.44	1.44			U
	PFO3OA	39492-89-2	ND	ND	ND	1.44	1.44			U
	PFO4DA	39492-90-5	ND	ND	ND	1.52	1.52			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.304	0.304			U
	ADONA	919005-14-4	ND	ND	ND	0.120	0.288			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.120	0.283			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.120	0.286			U
	10:2 FTS	120226-60-0	1.09	0.00174	0.00174	0.240	0.304			L
	EVE Acid	69087-46-3	ND	ND	ND	1.44	1.44			U
	FBSA	30334-69-1	ND	ND	ND	0.240	0.304			U
	Hydro-EVE Acid	773804-62-9	ND	ND	ND	1.44	1.44			U
	Hydrolyzed PSDA	2416366-19-1	ND	ND	ND	1.44	1.44			U
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	0.304	0.304			U
	N-EtFOSA	4151-50-2	ND	ND	ND	0.240	0.304			U
	N-EtFOSE	1691-99-2	ND	ND	ND	7.20	7.20			U
	NFDHA	151772-58-6	ND	ND	ND	0.240	0.304			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.240	0.304			U
	N-MeFOSE	24448-09-7	ND	ND	ND	7.20	7.20			U
	NVHOS	1132933-86-8	ND	ND	ND	1.44	1.44			U
	PEPA	267239-61-2	ND	ND	ND	1.44	1.44			U
	PFECA-G	801212-59-9	ND	ND	ND	0.304	1.44			U
	PFEESA	113507-82-7	ND	ND	ND	0.240	0.304			U
	PFHxDA	67905-19-5	ND	ND	ND	1.44	1.44			U
	PFMOBA	863090-89-5	ND	ND	ND	1.44	1.44			U
	PFO5DA	39492-91-6	ND	ND	ND	1.52	1.52			U
	PMPA	13140-29-9	ND	ND	ND	1.44	1.44			U
	R-EVE Acid	2416366-22-6	ND	ND	ND	1.44	1.44			U
	R-PSDA	2416366-18-0	ND	ND	ND	1.44	1.44			U
	R-PSDCA	2416366-21-5	5.43	0.00868	0.00868	1.44	1.44			L
ES	MPFBA		5205.38	8.33				20-150%	104.1%	
	M5PFPeA		5968.38	9.55				20-150%	119.4%	
	M3PFBS		5091.55	8.15				20-150%	101.8%	
	M2-4:2 FTS		4864.28	7.78				20-150%	97.3%	
	M5PFHxA		4607.00	7.37				20-150%	92.1%	
	M3HFPO-DA		7299.06	11.7				20-150%	146.0%	
	M4PFHpA		5260.72	8.42				20-150%	105.2%	
	M3PFHxS		5472.37	8.76				20-150%	109.4%	
	M2-6:2 FTS		8164.64	13.1				20-150%	163.3%	Q
	M8PFOA		5511.98	8.82				20-150%	110.2%	
	M9PFNA		5442.90	8.71				20-150%	108.9%	
	M8PFOS		4750.11	7.60				20-150%	95.0%	
	M2-8:2 FTS		6519.04	10.4				20-150%	130.4%	
	M8FOSA-I		3818.32	6.11				20-150%	76.4%	
	M6PFDA		5235.44	8.38				20-150%	104.7%	
	d3-N-MeFOSAA		6469.37	10.4				20-150%	129.4%	
	d5-N-EtFOSAA		7047.08	11.3				20-150%	140.9%	
	M7PFUdA		4556.98	7.29				20-150%	91.1%	
	MPFDoA		3294.26	5.27				20-150%	65.9%	
	M2PFTeDA		2675.76	4.28				20-150%	53.5%	

Enthalpy Analytical

Job No.: 0721-831-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: Northwest Water Plant, Leland NC

Enthalpy ID	OPR-12096-PFAS	Prep Batch	EU12096	Sample Vol (mL)	250
Sample Name	OPR-12096-PFAS	Prep Date	2021-08-03 16:53	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-08-04 06:33	Dilution Factor	1
Sampling Date		Analyst	hallen	Method Code	WM-026
Received Date	2021-08-03 16:53	Instrument	Fili	Sample Type	Control

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	13079.25	20.9	20.9	0.153	0.304	73-129%	104.6%	
	PFPeA	2706-90-3	13212.95	21.1	21.1	0.170	0.304	72-129%	105.7%	
	PFHxA	307-24-4	12111.40	19.4	19.4	0.193	0.304	72-129%	96.9%	
	PFHpA	375-85-9	12653.49	20.2	20.2	0.122	0.304	72-130%	101.2%	
	PFOA	335-67-1	12789.80	20.5	20.5	0.177	0.304	71-133%	102.3%	
	PFNA	375-95-1	13445.17	21.5	21.5	0.0761	0.304	69-130%	107.6%	
	PFDA	335-76-2	14596.33	23.4	23.4	0.0845	0.304	71-129%	116.8%	
	PFUnDA	2058-94-8	12822.83	20.5	20.5	0.185	0.304	69-133%	102.6%	
	PFDoDA	307-55-1	15162.15	24.3	24.3	0.202	0.304	72-134%	121.3%	
	PFTrDA	72629-94-8	15621.15	25.0	25.0	0.151	0.304	65-144%	125.0%	
	PFTeDA	376-06-7	13356.00	21.4	21.4	0.218	0.304	71-132%	106.8%	
Sulfonates	PFBS	375-73-5	10440.72	16.7	16.7	0.355	0.355	72-134%	94.2%	
	PFPeS	2706-91-4	12675.18	20.3	20.3	0.206	0.286	71-127%	107.8%	
	PFHxS	355-46-4	12046.16	19.3	19.3	0.191	0.278	68-131%	105.4%	
	PFHpS	375-92-8	13301.39	21.3	21.3	0.135	0.290	69-134%	111.7%	
	PFOS	1763-23-1	12012.40	19.2	19.2	0.160	0.282	65-140%	103.6%	
	PFNS	68259-12-1	13261.32	21.2	21.2	0.0864	0.293	69-127%	110.3%	
	PFDS	335-77-3	11609.50	18.6	18.6	0.192	0.293	53-142%	96.2%	
	4:2 FTS	757124-72-4	12613.41	20.2	20.2	0.118	0.285	63-143%	107.7%	
	6:2 FTS	27619-97-2	12318.68	19.7	19.7	0.116	0.290	64-140%	103.6%	
	8:2 FTS	39108-34-4	10585.52	16.9	16.9	0.171	0.291	67-138%	88.2%	
other	PFOSA	754-91-6	14084.43	22.5	22.5	0.130	0.304	67-137%	112.7%	
	N-MeFOSAA	2355-31-9	12751.18	20.4	20.4	0.144	0.304	65-136%	102.0%	
	N-EtFOSAA	2991-50-6	12398.54	19.8	19.8	0.109	0.304	61-135%	99.2%	
	HFPO-DA	13252-13-6	8957.10	14.3	14.3	0.228	0.304	70-130%	71.7%	
	ADONA	919005-14-4	11570.83	18.5	18.5	0.120	0.288	70-130%	98.0%	
	9Cl-PF3ONS	756426-58-1	11559.69	18.5	18.5	0.120	0.283	70-130%	99.1%	
	11Cl-PF3OUdS	763051-92-9	10272.83	16.4	16.4	0.120	0.286	70-130%	87.2%	
ES	MPFBA		4536.54	7.26				20-150%	90.7%	
	M5PFPeA		4664.84	7.46				20-150%	93.3%	
	M3PFBS		4374.62	7.00				20-150%	87.5%	
	M2-4:2 FTS		4100.65	6.56				20-150%	82.0%	
	M5PFHxA		4603.10	7.36				20-150%	92.1%	
	M3HFPO-DA		6944.65	11.1				20-150%	138.9%	
	M4PFHpA		4839.16	7.74				20-150%	96.8%	
	M3PFHxS		4744.03	7.59				20-150%	94.9%	
	M2-6:2 FTS		7236.65	11.6				20-150%	144.7%	
	M8PFOA		4750.98	7.60				20-150%	95.0%	
	M9PFNA		4944.88	7.91				20-150%	98.9%	
	M8PFOS		4573.08	7.32				20-150%	91.5%	
	M2-8:2 FTS		5939.87	9.50				20-150%	118.8%	
	M8FOSA-I		3686.32	5.90				20-150%	73.7%	
	M6PFDA		4343.55	6.95				20-150%	86.9%	
	d3-N-MeFOSAA		6119.48	9.79				20-150%	122.4%	
	d5-N-EtFOSAA		6583.90	10.5				20-150%	131.7%	
	M7PFUdA		5320.40	8.51				20-150%	106.4%	
	MPFDoA		4060.33	6.50				20-150%	81.2%	
	M2PFTeDA		3480.70	5.57				20-150%	69.6%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0721-831-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland NC

1. Custody

Lois Walton received the samples on July 29, 2021 at 5.6 °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
0721-831-001-2	072921-SO1	Aqueous
0721-831-001-1		
0721-831-002-2	072921-EO1	Aqueous
0721-831-002-1		

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	PFAS Brunswick List	ENVI-Carb

3. Analysis

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

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.

Samples that were run in more than one sequence and their comments are as follows:

072921-SO1, 072921-EO1

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0721-831-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland NC

4. Calibration

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, except as noted below.

NFDHA had a high recovery for the OPR and the middle concal, however samples were ND.

PFDoDA had a high recovery in the opening concal, however all samples were ND as well.

5. QC Notes

Except where noted below, the QC sample analyses passed all method criteria.

QC samples that did not meet method acceptance criteria were:

In MB-12096-PFAS M2-6:2 FTS was recovered above the upper recovery limit. However, as it was recovered high, and the corresponding native analyte was not detected, the data were accepted.

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, as noted by the Q qualifier. 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. 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.

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 wass 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.

- 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 – 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.

	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	335-77-3
	4:2 FTS	4:2 fluorotelomer sulfonic acid	757124-72-4
	6:2 FTS	6:2 fluorotelomer sulfonic acid	27619-97-2
	8:2 FTS	8:2 fluorotelomer sulfonic acid	39108-34-4
	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-pentaoxadodecanoic) 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-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-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.

Sample Custody

0721-831

Chain of Custody Record

ENTHALPY analytical

Enthalpy Ultratrace Job#: _____ COC Page__1__of__1__

Special Handling:

X 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:__BRUNSWICK COUNTY UTILITIES_____

Project Manager:_GLENN WALKER_____

Report To:__SAME_____

Project Number:_____

Site Name:_NORTHWEST WATER PLANT_____

Location:_LELAND N.C._____

PO#:_____

Telephone#:_____

Email:_____

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	Sample Containers: # of Bottles	# of Jars	# of Bags	# Other	Analyses: Method 1613	Method 8290	Method 1668A/B/C PCB	PFAS by LC/MS/MS	PAHs by HRGC/HRMS	Sample on Hold	Method 23	ALL PFAS	Notes:
072921-SO1	7/29/2021	1:10PM	250 ml	G	NW	2											X	
072921-EO1	7/29/2021	1:10PM	250 ml	G	DW	2											X	

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
[signature]	7/29/2021	[signature]	7/29/21	2:57	☑ Iced ☐ Ambient °C 5.6 T9
					☐ Iced ☐ Ambient °C_____
					☐ Iced ☐ Ambient °C_____

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

Courier, cooler, on ice, no seals, good condition (jw) 7/29/21

This Is The Last Page Of This Report.