County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 01/28/21

Analytical Report
0121-771

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.

Juanica L. Thomas

QA Review Performed by: Juanica L. Thomas

Report Issued Date: 2/11/21

ENTHALPY ANALYTICAL

Summary of Results

Enthalpy Analytical

Job No.: 0121-771-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: Northwest Water Plant, Leland,NC

Summary

	Compound	CAS	012821-SO1 ng/L	012821-EO1 ng/L
Acids	PFBA	375-22-4	ND U	ND U
	PFPeA	2706-90-3	ND U	ND U
	PFHxA	307-24-4	3.68	3.58
	PFHpA	375-85-9	2.24	2.28
	PFOA	335-67-1	4.81	4.51
	PFNA	375-95-1	0.543	0.527
	PFDA	335-76-2	0.212 J	0.177 J
	PFUnDA	2058-94-8	0.0368 L	0.0393 L
	PFDoDA	307-55-1	0.00237 L	ND U
	PFTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	0.0311 L	ND U
Sulfonates	PFBS	375-73-5	3.94	3.08
	PFPeS	2706-91-4	0.545	0.556
	PFHxS	355-46-4	3.66	3.07
	PFHpS	375-92-8	0.122 J	0.167 J
	PFOS	1763-23-1	8.24	8.34
	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	0.183 J	0.311
	8:2 FTS	39108-34-4	ND U	ND U
other	PFOSA	754-91-6	ND U	ND U
	N-MeFOSAA	2355-31-9	0.0383 LB	0.0366 LB
	N-EtFOSAA	2991-50-6	0.0932 J	ND U
	HFPO-DA	13252-13-6	11.9	10.9
	PFMOAA	674-13-5	66.3	50.2
	PFMOPrA	377-73-1	0.0391 L	ND U
	PFO2HxA	39492-88-1	3.04	2.56
	PFO3OA	39492-89-2	4.35	3.31
	PFO4DA	39492-90-5	2.94	2.11 J
	Nafion Byproduct 1	29311-67-9	0.0564 L	0.00199 L
	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
	Byproduct 4		31.7	31.7
	Byproduct 5		25.0	24.9
	Byproduct 6		0.0651 L	0.0489 L
	EVE Acid	69087-46-3	0.0881 L	0.0880 L
	FBSA	30334-69-1	0.295	0.352
	Hydro-EVE Acid	773804-62-9	0.747 L	0.704 L
	N-EtFOSA	4151-50-2	ND U	ND U
	N-EtFOSE	1691-99-2	ND U	ND U
	N-MeFOSA	31506-32-8	ND U	ND U
	N-MeFOSE	24448-09-7	ND U	ND U
	Nafion Byproduct 2	749836-20-2	0.689 L	0.699 L
	NFDHA	151772-58-6	ND U	ND U
	NVHOS	1132933-86-8	4.04	3.50
	PEPA		18.5	11.6
	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	10.8	12.6
	R-EVE Acid		7.35	12.3

Detailed Results

Enthalpy Analytical

Job No.: 0121-771-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland,NC

Enthalpy ID	0121-771-001-1	Prep Batch	EU11495	Sample Vol (mL)	293.48
Sample Name	012821-SO1	Prep Date	2021-02-02 15:41	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-02-03 10:44	Dilution Factor	1
Sampling Date	20210128 00:00				

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
	PFBA	375-22-4	ND	ND	ND	0.130	0.251			U
	PFPeA	2706-90-3	ND	ND	ND	0.145	0.251			U
	PFHxA	307-24-4	2703.59	3.68	3.68	0.164	0.251			
	PFHpA	375-85-9	1640.53	2.24	2.24	0.104	0.251			
	PFOA	335-67-1	3526.80	4.81	4.81	0.151	0.251			
Acids	PFNA	375-95-1	398.55	0.543	0.543	0.0648	0.251			
	PFDA	335-76-2	155.86	0.212	0.212	0.0720	0.251			J
	PFUnDA	2058-94-8	26.99	0.0368	0.0368	0.158	0.251			L
	PFDoDA	307-55-1	1.74	0.00237	0.00237	0.172	0.251			L
	PFTrDA	72629-94-8	ND	ND	ND	0.129	0.251			U
	PFTeDA	376-06-7	22.82	0.0311	0.0311	0.186	0.251			L
	PFBS	375-73-5	2889.53	3.94	3.94	0.302	0.302			
	PFPeS	2706-91-4	399.81	0.545	0.545	0.175	0.236			
	PFHxS	355-46-4	2681.94	3.66	3.66	0.163	0.229			
	PFHpS	375-92-8	89.71	0.122	0.122	0.115	0.239			J
Sulfonates	PFOS	1763-23-1	6044.79	8.24	8.24	0.136	0.233			
	PFNS	68259-12-1	ND	ND	ND	0.0736	0.241			U
	PFDS	335-77-3	ND	ND	ND	0.164	0.243			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.101	0.234			U
	6:2 FTS	27619-97-2	134.09	0.183	0.183	0.0988	0.239			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.146	0.241			U
	PFOSA	754-91-6	ND	ND	ND	0.111	0.312			U
	N-MeFOSAA	2355-31-9	28.08	0.0383	0.0383	0.123	0.251			LB
	N-EtFOSAA	2991-50-6	68.40	0.0932	0.0932	0.0929	0.251			J
	HFPO-DA	13252-13-6	8707.85	11.9	11.9	0.194	0.251			
	PFMOAA	674-13-5	48611.66	66.3	66.3	1.26	1.26			
	PFMOPrA	377-73-1	28.67	0.0391	0.0391	0.204	0.251			L
	PFO2HxA	39492-88-1	2230.72	3.04	3.04	1.26	1.26			
	PFO3OA	39492-89-2	3190.53	4.35	4.35	1.26	1.26			
	PFO4DA	39492-90-5	2155.78	2.94	2.94	1.26	2.56			
	Nafion Byproduct 1	29311-67-9	41.41	0.0564	0.0564	0.204	0.251			L
	ADONA	919005-14-4	ND	ND	ND	0.102	0.237			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.102	0.234			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.102	0.237			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.204	0.251			U
	Byproduct 4		23283.63	31.7	31.7	1.26	1.26			
	Byproduct 5		18373.00	25.0	25.0	1.26	1.26			
	Byproduct 6		47.75	0.0651	0.0651	1.26	1.26			L
other	EVE Acid	69087-46-3	64.66	0.0881	0.0881	1.26	1.26			L
	FBSA	30334-69-1	216.34	0.295	0.295	0.204	0.251			
	Hydro-EVE Acid	773804-62-9	548.34	0.747	0.747	1.26	1.26			L
	N-EtFOSA	4151-50-2	ND	ND	ND	0.204	0.251			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.13	6.13			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.204	0.251			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.13	6.13			U
	Nafion Byproduct 2	749836-20-2	505.42	0.689	0.689	1.26	1.26			L
	NFDHA	151772-58-6	ND	ND	ND	0.204	0.251			U
	NVHOS	1132933-86-8	2966.75	4.04	4.04	1.26	1.26			
	PEPA		13605.73	18.5	18.5	1.26	1.26			
	PFECA-G	801212-59-9	ND	ND	ND	1.26	1.26			U
	PFEESA	113507-82-7	ND	ND	ND	0.204	0.251			U
	PFHxDA	67905-19-5	ND	ND	ND	1.26	1.26			U
	PFMOBA	863090-89-5	ND	ND	ND	1.26	1.26			U
	PFO5DA	39492-91-6	ND	ND	ND	2.56	2.56			U
	PMPA	13140-29-9	7938.77	10.8	10.8	1.26	1.26			
	R-EVE Acid		5392.00	7.35	7.35	1.26	1.26			
	MPFBA		3867.69	5.27				20-150%	77.4%	
	M5PFPeA		12389.96	16.9				20-150%	247.8%	Q
	M3PFBS		21269.33	29.0				20-150%	425.4%	Q
	M2-4:2 FTS		56178.21	76.6				20-150%	1123.6%	Q
	M5PFHxA		3333.61	4.54				20-150%	66.7%	
	M3HFPO-DA		4270.87	5.82				20-150%	85.4%	
	M4PFHpA		4006.31	5.46				20-150%	80.1%	
	M3PFHxS		3856.69	5.26				20-150%	77.1%	
	M2-6:2 FTS		31107.54	42.4				20-150%	622.2%	Q
ES	M8PFOA		3828.21	5.22				20-150%	76.6%	
	M9PFNA		3374.65	4.60				20-150%	67.5%	
	M8PFOS		3668.78	5.00				20-150%	73.4%	
	M2-8:2 FTS		4012.90	5.47				20-150%	80.3%	
	M8FOSA-I		2466.27	3.36				20-150%	49.3%	
	M6PFDA		3758.91	5.12				20-150%	75.2%	
	d3-N-MeFOSAA		4045.03	5.51				20-150%	80.9%	
	d5-N-EtFOSAA		3261.03	4.44				20-150%	65.2%	
	M7PFUdA		3459.81	4.72				20-150%	69.2%	
	MPFDoA		2558.18	3.49				20-150%	51.2%	
	M2PFTeDA		1150.52	1.57				20-150%	23.0%	

Enthalpy Analytical

Job No.: 0121-771-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland,NC

Enthalpy ID	0121-771-002-1	Prep Batch	EU11495	Sample Vol (mL)	286.85
Sample Name	012821-EO1	Prep Date	2021-02-02 15:41	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-02-03 11:07	Dilution Factor	1
Sampling Date	20210128 00:00				

	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	0.133	0.257			U
	PFPeA	2706-90-3	ND	ND	ND	0.148	0.257			U
	PFHxA	307-24-4	2564.04	3.58	3.58	0.168	0.257			
	PFHpA	375-85-9	1632.82	2.28	2.28	0.106	0.257			
	PFOA	335-67-1	3230.93	4.51	4.51	0.154	0.257			
	PFNA	375-95-1	378.10	0.527	0.527	0.0663	0.257			
	PFDA	335-76-2	126.75	0.177	0.177	0.0736	0.257			J
	PFUnDA	2058-94-8	28.16	0.0393	0.0393	0.161	0.257			L
	PFDoDA	307-55-1	ND	ND	ND	0.176	0.257			U
	PFTrDA	72629-94-8	ND	ND	ND	0.132	0.257			U
	PFTeDA	376-06-7	ND	ND	ND	0.190	0.257			U
Sulfonates	PFBS	375-73-5	2206.30	3.08	3.08	0.309	0.309			
	PFPeS	2706-91-4	398.89	0.556	0.556	0.180	0.241			
	PFHxS	355-46-4	2200.98	3.07	3.07	0.166	0.234			
	PFHpS	375-92-8	119.79	0.167	0.167	0.118	0.244			J
	PFOS	1763-23-1	5983.01	8.34	8.34	0.139	0.238			
	PFNS	68259-12-1	ND	ND	ND	0.0753	0.247			U
	PFDS	335-77-3	ND	ND	ND	0.167	0.248			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.103	0.240			U
	6:2 FTS	27619-97-2	223.19	0.311	0.311	0.101	0.244			
	8:2 FTS	39108-34-4	ND	ND	ND	0.149	0.247			U
other	PFOSA	754-91-6	ND	ND	ND	0.113	0.319			U
	N-MeFOSAA	2355-31-9	26.22	0.0366	0.0366	0.126	0.257			LB
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0950	0.257			U
	HFPO-DA	13252-13-6	7813.97	10.9	10.9	0.199	0.257			
	PFMOAA	674-13-5	35996.31	50.2	50.2	1.29	1.29			
	PFMOPrA	377-73-1	ND	ND	ND	0.209	0.257			U
	PFO2HxA	39492-88-1	1834.98	2.56	2.56	1.29	1.29			
	PFO3OA	39492-89-2	2375.17	3.31	3.31	1.29	1.29			
	PFO4DA	39492-90-5	1509.60	2.11	2.11	1.29	2.62			J
	Nafion Byproduct 1	29311-67-9	1.42	0.00199	0.00199	0.209	0.257			L
	ADONA	919005-14-4	ND	ND	ND	0.105	0.243			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.105	0.240			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.105	0.243			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.209	0.257			U
	Byproduct 4		22747.21	31.7	31.7	1.29	1.29			
	Byproduct 5		17878.85	24.9	24.9	1.29	1.29			
	Byproduct 6		35.06	0.0489	0.0489	1.29	1.29			L
	EVE Acid	69087-46-3	63.12	0.0880	0.0880	1.29	1.29			L
	FBSA	30334-69-1	252.69	0.352	0.352	0.209	0.257			
	Hydro-EVE Acid	773804-62-9	504.61	0.704	0.704	1.29	1.29			L
	N-EtFOSA	4151-50-2	ND	ND	ND	0.209	0.257			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.28	6.28			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.209	0.257			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.28	6.28			U
	Nafion Byproduct 2	749836-20-2	501.56	0.699	0.699	1.29	1.29			L
	NFDHA	151772-58-6	ND	ND	ND	0.209	0.257			U
	NVHOS	1132933-86-8	2507.51	3.50	3.50	1.29	1.29			
	PEPA		8332.87	11.6	11.6	1.29	1.29			
	PFECA-G	801212-59-9	ND	ND	ND	1.29	1.29			U
	PFEESA	113507-82-7	ND	ND	ND	0.209	0.257			U
	PFHxDA	67905-19-5	ND	ND	ND	1.29	1.29			U
	PFMOBA	863090-89-5	ND	ND	ND	1.29	1.29			U
	PFO5DA	39492-91-6	ND	ND	ND	2.62	2.62			U
	PMPA	13140-29-9	9059.72	12.6	12.6	1.29	1.29			
	R-EVE Acid		8792.48	12.3	12.3	1.29	1.29			
ES	MPFBA		4535.13	6.32				20-150%	90.7%	
	M5PFPeA		11264.09	15.7				20-150%	225.3%	Q
	M3PFBS		19488.02	27.2				20-150%	389.8%	Q
	M2-4:2 FTS		44269.03	61.7				20-150%	885.4%	Q
	M5PFHxA		3663.96	5.11				20-150%	73.3%	
	M3HFPO-DA		4145.54	5.78				20-150%	82.9%	
	M4PFHpA		4162.61	5.80				20-150%	83.3%	
	M3PFHxS		4272.91	5.96				20-150%	85.5%	
	M2-6:2 FTS		23562.18	32.9				20-150%	471.2%	Q
	M8PFOA		4288.17	5.98				20-150%	85.8%	
	M9PFNA		3686.08	5.14				20-150%	73.7%	
	M8PFOS		3511.61	4.90				20-150%	70.2%	
	M2-8:2 FTS		4120.59	5.75				20-150%	82.4%	
	M8FOSA-I		2542.02	3.54				20-150%	50.8%	
	M6PFDA		3941.90	5.50				20-150%	78.8%	
	d3-N-MeFOSAA		4349.25	6.06				20-150%	87.0%	
	d5-N-EtFOSAA		3781.23	5.27				20-150%	75.6%	
	M7PFUdA		3929.10	5.48				20-150%	78.6%	
	MPFDoA		3524.63	4.91				20-150%	70.5%	
	M2PFTeDA		3119.69	4.35				20-150%	62.4%	

QC Data

Enthalpy Analytical

Job No.: 0121-771-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland,NC

Enthalpy ID	MB-11495-PFAS	Prep Batch	EU11495	Sample Vol (mL)	250
Sample Name	MB-11495-PFAS	Prep Date	2021-02-02 15:41	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-02-03 07:58	Dilution Factor	1
Sampling Date					

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
	PFBA	375-22-4	ND	ND	ND	0.153	0.294			U
	PFPeA	2706-90-3	ND	ND	ND	0.170	0.294			U
	PFHxA	307-24-4	ND	ND	ND	0.193	0.294			U
	PFHpA	375-85-9	ND	ND	ND	0.122	0.294			U
	PFOA	335-67-1	ND	ND	ND	0.177	0.294			U
Acids	PFNA	375-95-1	ND	ND	ND	0.0761	0.294			U
	PFDA	335-76-2	ND	ND	ND	0.0845	0.294			U
	PFUnDA	2058-94-8	ND	ND	ND	0.185	0.294			U
	PFDoDA	307-55-1	ND	ND	ND	0.202	0.294			U
	PFTrDA	72629-94-8	ND	ND	ND	0.151	0.294			U
	PFTeDA	376-06-7	ND	ND	ND	0.218	0.294			U
	PFBS	375-73-5	ND	ND	ND	0.355	0.355			U
	PFPeS	2706-91-4	ND	ND	ND	0.206	0.277			U
	PFHxS	355-46-4	ND	ND	ND	0.191	0.269			U
	PFHpS	375-92-8	ND	ND	ND	0.135	0.280			U
	PFOS	1763-23-1	ND	ND	ND	0.160	0.274			U
Sulfonates	PFNS	68259-12-1	ND	ND	ND	0.0864	0.283			U
	PFDS	335-77-3	ND	ND	ND	0.192	0.285			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.118	0.275			U
	6:2 FTS	27619-97-2	7.88	0.0126	0.0126	0.116	0.280			L
	8:2 FTS	39108-34-4	ND	ND	ND	0.171	0.283			U
	PFOSA	754-91-6	ND	ND	ND	0.130	0.366			U
	N-MeFOSAA	2355-31-9	26.20	0.0419	0.0419	0.144	0.294			L
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.109	0.294			U
	HFPO-DA	13252-13-6	ND	ND	ND	0.228	0.294			U
	PFMOAA	674-13-5	ND	ND	ND	1.48	1.48			U
	PFMOPrA	377-73-1	ND	ND	ND	0.240	0.294			U
	PFO2HxA	39492-88-1	ND	ND	ND	1.48	1.48			U
	PFO3OA	39492-89-2	ND	ND	ND	1.48	1.48			U
	PFO4DA	39492-90-5	ND	ND	ND	1.48	3.01			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.240	0.294			U
	ADONA	919005-14-4	ND	ND	ND	0.120	0.278			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.120	0.275			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.120	0.278			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	0.294			U
	Byproduct 4		ND	ND	ND	1.48	1.48			U
	Byproduct 5		ND	ND	ND	1.48	1.48			U
	Byproduct 6		10.33	0.0165	0.0165	1.48	1.48			L
other	EVE Acid	69087-46-3	ND	ND	ND	1.48	1.48			U
	FBSA	30334-69-1	ND	ND	ND	0.240	0.294			U
	Hydro-EVE Acid	773804-62-9	ND	ND	ND	1.48	1.48			U
	N-EtFOSA	4151-50-2	14.33	0.0229	0.0229	0.240	0.294			L
	N-EtFOSE	1691-99-2	ND	ND	ND	7.20	7.20			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.240	0.294			U
	N-MeFOSE	24448-09-7	ND	ND	ND	7.20	7.20			U
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	1.48	1.48			U
	NFDHA	151772-58-6	ND	ND	ND	0.240	0.294			U
	NVHOS	1132933-86-8	ND	ND	ND	1.48	1.48			U
	PEPA		ND	ND	ND	1.48	1.48			U
	PFECA-G	801212-59-9	ND	ND	ND	1.48	1.48			U
	PFEESA	113507-82-7	ND	ND	ND	0.240	0.294			U
	PFHxDA	67905-19-5	ND	ND	ND	1.48	1.48			U
	PFMOBA	863090-89-5	ND	ND	ND	1.48	1.48			U
	PFO5DA	39492-91-6	ND	ND	ND	3.01	3.01			U
	PMPA	13140-29-9	ND	ND	ND	1.48	1.48			U
	R-EVE Acid		ND	ND	ND	1.48	1.48			U
	MPFBA		4553.19	7.29				20-150%	91.1%	
	M5PFPeA		4979.97	7.97				20-150%	99.6%	
	M3PFBS		4820.47	7.71				20-150%	96.4%	
	M2-4:2 FTS		4302.08	6.88				20-150%	86.0%	
	M5PFHxA		4336.34	6.94				20-150%	86.7%	
	M3HFPO-DA		5460.51	8.74				20-150%	109.2%	
	M4PFHpA		4350.22	6.96				20-150%	87.0%	
	M3PFHxS		4917.41	7.87				20-150%	98.3%	
	M2-6:2 FTS		4421.06	7.07				20-150%	88.4%	
ES	M8PFOA		4654.55	7.45				20-150%	93.1%	
	M9PFNA		4145.16	6.63				20-150%	82.9%	
	M8PFOS		4437.14	7.10				20-150%	88.7%	
	M2-8:2 FTS		4390.88	7.03				20-150%	87.8%	
	M8FOSA-I		3629.89	5.81				20-150%	72.6%	
	M6PFDA		4503.36	7.21				20-150%	90.1%	
	d3-N-MeFOSAA		5408.82	8.65				20-150%	108.2%	
	d5-N-EtFOSAA		4646.42	7.43				20-150%	92.9%	
	M7PFUdA		4232.93	6.77				20-150%	84.7%	
	MPFDoA		4213.99	6.74				20-150%	84.3%	
	M2PFTeDA		3415.95	5.47				20-150%	68.3%	

Enthalpy Analytical

Job No.: 0121-771-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: Northwest Water Plant, Leland,NC

Enthalpy ID	OPR-11495-PFAS	Prep Batch	EU11495	Sample Vol (mL)	250
Sample Name	OPR-11495-PFAS	Prep Date	2021-02-02 15:41	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-02-03 08:22	Dilution Factor	1
Sampling Date					

	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	13719.63	22.0	22.0	0.153	0.294		109.8%	
	PFPeA	2706-90-3	12625.21	20.2	20.2	0.170	0.294		101.0%	
	PFHxA	307-24-4	12937.89	20.7	20.7	0.193	0.294		103.5%	
	PFHpA	375-85-9	13162.42	21.1	21.1	0.122	0.294		105.3%	
	PFOA	335-67-1	13111.83	21.0	21.0	0.177	0.294		104.9%	
	PFNA	375-95-1	12924.06	20.7	20.7	0.0761	0.294		103.4%	
	PFDA	335-76-2	12745.04	20.4	20.4	0.0845	0.294		102.0%	
	PFUnDA	2058-94-8	12948.37	20.7	20.7	0.185	0.294		103.6%	
	PFDoDA	307-55-1	12431.97	19.9	19.9	0.202	0.294		99.5%	
	PFTrDA	72629-94-8	17390.37	27.8	27.8	0.151	0.294		139.1%	
	PFTeDA	376-06-7	13739.49	22.0	22.0	0.218	0.294		109.9%	
Sulfonates	PFBS	375-73-5	11510.75	18.4	18.4	0.355	0.355		103.8%	
	PFPeS	2706-91-4	11180.19	17.9	17.9	0.206	0.277		95.0%	
	PFHxS	355-46-4	11895.29	19.0	19.0	0.191	0.269		104.1%	
	PFHpS	375-92-8	13244.37	21.2	21.2	0.135	0.280		111.2%	
	PFOS	1763-23-1	12117.59	19.4	19.4	0.160	0.274		104.5%	
	PFNS	68259-12-1	12667.90	20.3	20.3	0.0864	0.283		105.3%	
	PFDS	335-77-3	13765.26	22.0	22.0	0.192	0.285		114.1%	
	4:2 FTS	757124-72-4	12618.19	20.2	20.2	0.118	0.275		107.7%	
	6:2 FTS	27619-97-2	11361.70	18.2	18.2	0.116	0.280		95.6%	
	8:2 FTS	39108-34-4	14936.92	23.9	23.9	0.171	0.283		124.5%	
Other	PFOSA	754-91-6	12598.87	20.2	20.2	0.130	0.366		100.8%	
	N-MeFOSAA	2355-31-9	11769.61	18.8	18.8	0.144	0.294		94.2%	
	N-EtFOSAA	2991-50-6	12576.69	20.1	20.1	0.109	0.294		100.6%	
	HFPO-DA	13252-13-6	12798.59	20.5	20.5	0.228	0.294		102.4%	
ES	MPFBA		4227.43	6.76				20-150%	84.5%	
	M5PFPeA		4728.24	7.57				20-150%	94.6%	
	M3PFBS		4745.75	7.59				20-150%	94.9%	
	M2-4:2 FTS		4229.79	6.77				20-150%	84.6%	
	M5PFHxA		4449.50	7.12				20-150%	89.0%	
	M3HFPO-DA		5551.89	8.88				20-150%	111.0%	
	M4PFHpA		4488.72	7.18				20-150%	89.8%	
	M3PFHxS		4217.85	6.75				20-150%	84.4%	
	M2-6:2 FTS		4994.05	7.99				20-150%	99.9%	
	M8PFOA		4412.42	7.06				20-150%	88.2%	
	M9PFNA		4112.79	6.58				20-150%	82.3%	
	M8PFOS		3907.46	6.25				20-150%	78.1%	
	M2-8:2 FTS		3894.85	6.23				20-150%	77.9%	
	M8FOSA-I		3466.28	5.55				20-150%	69.3%	
	M6PFDA		4184.74	6.70				20-150%	83.7%	
	d3-N-MeFOSAA		4542.70	7.27				20-150%	90.9%	
	d5-N-EtFOSAA		4305.12	6.89				20-150%	86.1%	
	M7PFUdA		4376.85	7.00				20-150%	87.5%	
	MPFDoA		4336.75	6.94				20-150%	86.7%	
	M2PFTeDA		3288.95	5.26				20-150%	65.8%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0121-771-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland<NC

1. Custody

Ann Marie Baxter received the samples on January 28, 2021 at 3.9 °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
0121-771-001-1	012821-SO1	Aqueous
0121-771-002-1	012821-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	PFAS	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.

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

Certain analytes require analysis under different settings which requires a different sequence.

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. Due to concal issues for analyte PEPA, the samples were reinjected. Reinjection was successful.

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0121-771-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland<NC

5. QC Notes

QC sample analyses passed all method criteria. For % Recovery, OPR-11495-PFAS PFTrDA fell outside the upper limit but met marginal exceedance limits. Therefore, data is accepted with no adverse impact.

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 a Q qualifer. 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	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	674-13-5
*	9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	919005-14-4
*	ADONA	4,8-dioxa-3H-perfluorononanoic acid	756426-58-1
*	PFMOAA	Perfluoro-2-methoxyacetic acid	763051-92-9
*	PFMOPrA	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	Perfluoro-4-methoxybutanic acid	863090-89-5
*	PEPA	Perfluoro-2-ethoxypropanoic acid	N/A
*	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

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 Standard. Accreditation pending.

Sample Custody

0121-771

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 moreinformation 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:
012821-SO1	1/28/2021	1:05PM	250 ml	G	NW	2											X	
012821-EO1	1/28/2021	1:05PM	250 ml	G	DW	2											X	

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
[signature]	1/28/2021	Ann Marie Baxter	1/28/21	1:40	☑ Iced ☐ Ambient °C 3.9 T9
					☐ Iced ☐ Ambient °C_____
					☐ Iced ☐ Ambient °C_____

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courier, cooler, no seals, good condition

This Is The Last Page Of This Report.