

County of Brunswick

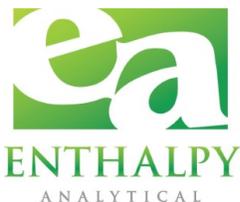
3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 02/18/21

Analytical Report 0221-737

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.: 0221-737-1 PFAS by Isotope Dilution (non-potable water)

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

Summary

	Compound	CAS	021821-SO1 ng/L	021821-EO1 ng/L
Acids	PFBA	375-22-4	ND U	ND U
	PFPeA	2706-90-3	ND U	ND U
	PFHxA	307-24-4	1.94	2.21
	PFHpA	375-85-9	1.35	1.48
	PFOA	335-67-1	2.82	2.82
	PFNA	375-95-1	0.384	0.452
	PFDA	335-76-2	0.227 J	0.167 J
	PFUnDA	2058-94-8	0.0809 LB	0.0717 LB
	PFDoDA	307-55-1	0.0294 L	0.0365 L
	PFTTrDA	72629-94-8	0.0788 L	ND U
PFTeDA	376-06-7	0.0106 L	ND U	
Sulfonates	PFBS	375-73-5	ND U	ND U
	PFPeS	2706-91-4	0.177 L	0.184 J
	PFHxS	355-46-4	1.71	1.32
	PFHpS	375-92-8	0.0102 L	0.0603 L
	PFOS	1763-23-1	4.40	4.21
	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	0.162 J	0.289	
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	0.0591 L
	N-EtFOSAA	2991-50-6	ND U	ND U
	HFPO-DA	13252-13-6	2.42	2.51
	PFMOAA	674-13-5	12.3	11.7
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	2.44	2.28
	PFO3OA	39492-89-2	ND U	0.788 L
	PFO4DA	39492-90-5	ND U	ND U
	Nafion Byproduct 1	29311-67-9	0.0775 LB	0.0810 LB
	ADONA	919005-14-4	ND U	ND U
	9Cl-PF3ONS	756426-58-1	ND U	ND U
	11Cl-PF3OUdS	763051-92-9	ND U	0.0113 L
	10:2 FTS	120226-60-0	ND U	ND U
	R-PSDA	2416366-18-0	ND U	ND U
	Hydrolyzed PSDA	2416366-19-1	2.37	2.36
	R-PSDCA	2416366-21-5	ND U	ND U
	EVE Acid	69087-46-3	0.0616 L	0.0988 L
	FBSA	30334-69-1	0.147 L	0.135 L
	Hydro-EVE Acid	773804-62-9	0.130 L	0.118 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	0.150 L	0.173 L
	NFDHA	151772-58-6	ND U	ND U
	NVHOS	1132933-86-8	ND U	ND U
	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	ND U	4.39	
R-EVE Acid	2416366-22-6	ND U	ND U	

Detailed Results

Enthalpy Analytical

Job No.: 0221-737-1 PFAS by Isotope Dilution (non-potable water)
 County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID 0221-737-001-1 Prep Batch EU11543 Sample Vol (mL) 289.51
 Sample Name 021821-SO1 Prep Date 2021-02-22 14:32 Extract Vol (mL) 0.4
 Matrix Aqueous Analysis Date 2021-02-23 09:21 Dilution Factor 1
 Sampling Date 20210218 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	0.132	0.254			U
	PFPeA	2706-90-3	ND	ND	ND	0.147	0.254			U
	PFHxA	307-24-4	1403.94	1.94	1.94	0.167	0.254			
	PFHpA	375-85-9	979.43	1.35	1.35	0.105	0.254			
	PFOA	335-67-1	2039.68	2.82	2.82	0.153	0.254			
	PFNA	375-95-1	277.91	0.384	0.384	0.0657	0.254			
	PFDA	335-76-2	164.47	0.227	0.227	0.0730	0.254			J
	PFUnDA	2058-94-8	58.56	0.0809	0.0809	0.160	0.254			LB
	PFDoDA	307-55-1	21.31	0.0294	0.0294	0.174	0.254			L
	PFTDA	72629-94-8	57.03	0.0788	0.0788	0.130	0.254			L
	PFTeDA	376-06-7	7.64	0.0106	0.0106	0.188	0.254			L
	PFBS	375-73-5	ND	ND	ND	0.307	0.307			U
	PFPeS	2706-91-4	128.30	0.177	0.177	0.178	0.239			L
	PFHxS	355-46-4	1238.78	1.71	1.71	0.165	0.232			
PFHpS	375-92-8	7.36	0.0102	0.0102	0.117	0.242			L	
Sulfonates	PFOS	1763-23-1	3183.96	4.40	4.40	0.138	0.236			
	PFNS	68259-12-1	ND	ND	ND	0.0746	0.245			U
	PFDS	335-77-3	ND	ND	ND	0.166	0.246			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.102	0.238			U
	6:2 FTS	27619-97-2	116.97	0.162	0.162	0.100	0.242			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.148	0.245			U
	PFOSA	754-91-6	ND	ND	ND	0.112	0.316			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.124	0.254			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0941	0.254			U
	HFPO-DA	13252-13-6	1754.97	2.42	2.42	0.197	0.254			
other	PFMOAA	674-13-5	8923.81	12.3	12.3	1.28	1.28			
	PFMOPrA	377-73-1	ND	ND	ND	0.207	0.254			U
	PFO2HxA	39492-88-1	1769.30	2.44	2.44	1.28	1.28			
	PFO3OA	39492-89-2	ND	ND	ND	1.28	1.28			U
	PFO4DA	39492-90-5	ND	ND	ND	1.28	2.60			U
	Nafion Byproduct 1	29311-67-9	56.13	0.0775	0.0775	0.207	0.254			LB
	ADONA	919005-14-4	ND	ND	ND	0.104	0.240			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.104	0.238			U
	11Cl-PF3OUds	763051-92-9	ND	ND	ND	0.104	0.240			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.207	0.254			U
	R-PSDA	2416366-18-0	ND	ND	ND	1.28	1.28			U
	Hydrolyzed PSDA	2416366-19-1	1713.53	2.37	2.37	1.28	1.28			
	R-PSDCA	2416366-21-5	ND	ND	ND	1.28	1.28			U
	EVE Acid	69087-46-3	44.58	0.0616	0.0616	1.28	1.28			L
	FBSA	30334-69-1	106.42	0.147	0.147	0.207	0.254			L
	Hydro-EVE Acid	773804-62-9	94.35	0.130	0.130	1.28	1.28			L
	N-EtFOA	4151-50-2	ND	ND	ND	0.207	0.254			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.22	6.22			U
	N-MeFOA	31506-32-8	ND	ND	ND	0.207	0.254			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.22	6.22			U
	Nafion Byproduct 2	749836-20-2	108.46	0.150	0.150	1.28	1.28			L
	NFDHA	151772-58-6	ND	ND	ND	0.207	0.254			U
	NVHOS	1132933-86-8	ND	ND	ND	1.28	1.28			U
	PEPA	267239-61-2	ND	ND	ND	1.28	1.28			U
	PFECA-G	801212-59-9	ND	ND	ND	1.28	1.28			U
	PFEESA	113507-82-7	ND	ND	ND	0.207	0.254			U
	PFHxDA	67905-19-5	ND	ND	ND	1.28	1.28			U
	PFMOBA	863090-89-5	ND	ND	ND	1.28	1.28			U
	PFO5DA	39492-91-6	ND	ND	ND	2.60	2.60			U
	PMPA	13140-29-9	ND	ND	ND	1.28	1.28			U
R-EVE Acid	2416366-22-6	ND	ND	ND	1.28	1.28			U	
ES	MPFBA		5048.84	6.98				20-150%	101.0%	
	M5PFPeA		12116.61	16.7				20-150%	242.3%	Q
	M3PFBS		19631.26	27.1				20-150%	392.6%	Q
	M2-4:2 FTS		10076.36	13.9				20-150%	201.5%	Q
	M5PFHxA		4262.27	5.89				20-150%	85.2%	
	M3HFPO-DA		5085.77	7.03				20-150%	101.7%	
	M4PFHpA		4341.63	6.00				20-150%	86.8%	
	M3PFHxS		4411.98	6.10				20-150%	88.2%	
	M2-6:2 FTS		5782.03	7.99				20-150%	115.6%	
	M8PFOA		4648.64	6.42				20-150%	93.0%	
	M9PFNA		4602.03	6.36				20-150%	92.0%	
	M8PFOS		4831.68	6.68				20-150%	96.6%	
	M2-8:2 FTS		4240.78	5.86				20-150%	84.8%	
	M8FOSA-I		2523.30	3.49				20-150%	50.5%	
	M6PFDA		4771.63	6.59				20-150%	95.4%	
	d3-N-MeFOSAA		4104.07	5.67				20-150%	82.1%	
	d5-N-EtFOSAA		3536.55	4.89				20-150%	70.7%	
	M7PFUDa		4188.78	5.79				20-150%	83.8%	
	MPFDoA		3474.68	4.80				20-150%	69.5%	
	M2PFTeDA		1258.91	1.74				20-150%	25.2%	

Enthalpy Analytical

Job No.: 0221-737-1 PFAS by Isotope Dilution (non-potable water)
 County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID 0221-737-002-1 Prep Batch EU11543 Sample Vol (mL) 287.67
 Sample Name 021821-E01 Prep Date 2021-02-22 14:32 Extract Vol (mL) 0.4
 Matrix Aqueous Analysis Date 2021-02-23 09:44 Dilution Factor 1
 Sampling Date 20210218 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	0.256			U
	PFPeA	2706-90-3	ND	ND	ND	0.148	0.256			U
	PFHxA	307-24-4	1592.03	2.21	2.21	0.168	0.256			
	PFHpA	375-85-9	1067.54	1.48	1.48	0.106	0.256			
	PFOA	335-67-1	2024.61	2.82	2.82	0.154	0.256			
	PFNA	375-95-1	324.73	0.452	0.452	0.0661	0.256			
	PFDA	335-76-2	120.20	0.167	0.167	0.0734	0.256			J
	PFUnDA	2058-94-8	51.56	0.0717	0.0717	0.161	0.256			LB
	PFDoDA	307-55-1	26.24	0.0365	0.0365	0.176	0.256			L
	PFTDA	72629-94-8	ND	ND	ND	0.131	0.256			U
	PFTeDA	376-06-7	ND	ND	ND	0.189	0.256			U
	PFBS	375-73-5	ND	ND	ND	0.309	0.309			U
	PFPeS	2706-91-4	132.58	0.184	0.184	0.179	0.241			J
	PFHxS	355-46-4	946.13	1.32	1.32	0.166	0.234			
	PFHpS	375-92-8	43.38	0.0603	0.0603	0.117	0.243			L
Sulfonates	PFOS	1763-23-1	3028.81	4.21	4.21	0.139	0.238			
	PFNS	68259-12-1	ND	ND	ND	0.0751	0.246			U
	PFDS	335-77-3	ND	ND	ND	0.167	0.248			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.103	0.239			U
	6:2 FTS	27619-97-2	208.16	0.289	0.289	0.101	0.243			
	8:2 FTS	39108-34-4	ND	ND	ND	0.149	0.246			U
	PFOSA	754-91-6	ND	ND	ND	0.113	0.318			U
	N-MeFOSAA	2355-31-9	42.48	0.0591	0.0591	0.125	0.256			L
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0947	0.256			U
	HFPO-DA	13252-13-6	1806.11	2.51	2.51	0.198	0.256			
other	PFMOAA	674-13-5	8413.33	11.7	11.7	1.29	1.29			
	PFMOPrA	377-73-1	ND	ND	ND	0.209	0.256			U
	PFO2HxA	39492-88-1	1641.13	2.28	2.28	1.29	1.29			
	PFO3OA	39492-89-2	566.70	0.788	0.788	1.29	1.29			L
	PFO4DA	39492-90-5	ND	ND	ND	1.29	2.61			
	Nafion Byproduct 1	29311-67-9	58.27	0.0810	0.0810	0.209	0.256			LB
	ADONA	919005-14-4	ND	ND	ND	0.104	0.242			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.104	0.239			
	11Cl-PF3OUds	763051-92-9	8.11	0.0113	0.0113	0.104	0.242			L
	10:2 FTS	120226-60-0	ND	ND	ND	0.209	0.256			U
	R-PSDA	2416366-18-0	ND	ND	ND	1.29	1.29			U
	Hydrolyzed PSDA	2416366-19-1	1693.93	2.36	2.36	1.29	1.29			
	R-PSDCA	2416366-21-5	ND	ND	ND	1.29	1.29			U
	EVE Acid	69087-46-3	71.06	0.0988	0.0988	1.29	1.29			L
	FBSA	30334-69-1	97.22	0.135	0.135	0.209	0.256			L
	Hydro-EVE Acid	773804-62-9	84.83	0.118	0.118	1.29	1.29			L
	N-EtFOA	4151-50-2	ND	ND	ND	0.209	0.256			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.26	6.26			U
	N-MeFOA	31506-32-8	ND	ND	ND	0.209	0.256			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.26	6.26			U
	Nafion Byproduct 2	749836-20-2	124.54	0.173	0.173	1.29	1.29			L
	NFDHA	151772-58-6	ND	ND	ND	0.209	0.256			U
	NVHOS	1132933-86-8	ND	ND	ND	1.29	1.29			U
	PEPA	267239-61-2	ND	ND	ND	1.29	1.29			U
	PFECA-G	801212-59-9	ND	ND	ND	1.29	1.29			U
PFEESA	113507-82-7	ND	ND	ND	0.209	0.256			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	
PFOSDA	39492-91-6	ND	ND	ND	2.61	2.61			U	
PMPA	13140-29-9	3156.11	4.39	4.39	1.29	1.29				
R-EVE Acid	2416366-22-6	ND	ND	ND	1.29	1.29			U	
ES	MPFBA		4924.32	6.85				20-150%	98.5%	
	M5PFPeA		11545.67	16.1				20-150%	230.9%	Q
	M3PFBS		17888.84	24.9				20-150%	357.8%	Q
	M2-4:2 FTS		8660.19	12.0				20-150%	173.2%	Q
	M5PFHxA		4233.85	5.89				20-150%	84.7%	
	M3HFPO-DA		5592.51	7.78				20-150%	111.9%	
	M4PFHpA		4433.56	6.16				20-150%	88.7%	
	M3PFHxS		5237.33	7.28				20-150%	104.7%	
	M2-6:2 FTS		5673.52	7.89				20-150%	113.5%	
	M8PFOA		4894.73	6.81				20-150%	97.9%	
	M9PFNA		4621.05	6.43				20-150%	92.4%	
	M8PFOS		4954.73	6.89				20-150%	99.1%	
	M2-8:2 FTS		3968.53	5.52				20-150%	79.4%	
	M8FOSA-I		3430.41	4.77				20-150%	68.6%	
	M6PFDA		4814.68	6.69				20-150%	96.3%	
	d3-N-MeFOSAA		4302.00	5.98				20-150%	86.0%	
	d5-N-EtFOSAA		3803.97	5.29				20-150%	76.1%	
	M7PFUdA		4497.93	6.25				20-150%	90.0%	
	MPFDoA		3827.59	5.32				20-150%	76.6%	
	M2PFTeDA		3313.24	4.61				20-150%	66.3%	

QC Data

Enthalpy Analytical

Job No.: 0221-737-1 PFAS by Isotope Dilution (non-potable water)
 County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID MB-11543-PFAS Prep Batch EU11543 Sample Vol (mL) 250
 Sample Name MB-11543-PFAS Prep Date 2021-02-22 14:32 Extract Vol (mL) 0.4
 Matrix Aqueous Analysis Date 2021-02-23 08:34 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	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	6.76	0.0108	0.0108	0.177	0.294			L
	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	9.20	0.0147	0.0147	0.185	0.294			L
	PFDoDA	307-55-1	ND	ND	ND	0.202	0.294			U
	PFTDA	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	
Sulfonates	PFOS	1763-23-1	17.59	0.0281	0.0281	0.160	0.274			L
	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	ND	ND	ND	0.116	0.280			U
	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	26.25	0.0420	0.0420	0.144	0.294			L
	N-EiFOSAA	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	78.10	0.125	0.125	0.240	0.294			L	
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	
R-PSDA	2416366-18-0	ND	ND	ND	1.48	1.48			U	
Hydrolyzed PSDA	2416366-19-1	ND	ND	ND	1.48	1.48			U	
R-PSDCA	2416366-21-5	12.23	0.0196	0.0196	1.48	1.48			L	
other	EVE Acid	69087-48-3	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	8.26	0.0132	0.0132	1.48	1.48			L
	N-EiFOA	4151-50-2	ND	ND	ND	0.240	0.294			U
	N-EiFOSE	1691-99-2	ND	ND	ND	7.20	7.20			U
	N-MeFOA	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	267239-61-2	ND	ND	ND	1.48	1.48			U
	PFECA-G	801212-59-9	32.08	0.0513	0.0513	1.48	1.48			L
	PFEESA	113507-82-7	35.26	0.0564	0.0564	0.240	0.294			L
	PFHxDA	67905-19-5	ND	ND	ND	1.48	1.48			U
PFMOBA	863090-89-5	ND	ND	ND	1.48	1.48			U	
PFOSDA	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	2416366-22-6	ND	ND	ND	1.48	1.48			U	
ES	MPFBA		5176.78	8.28				20-150%	103.5%	
	M5PFPeA		5366.30	8.59				20-150%	107.3%	
	M3PFBS		4952.79	7.92				20-150%	99.1%	
	M2-4:2 FTS		3488.06	5.58				20-150%	69.8%	
	M5PFHxA		4720.06	7.55				20-150%	94.4%	
	M3HFPO-DA		6746.36	10.8				20-150%	134.9%	
	M4PFHpA		4536.75	7.26				20-150%	90.7%	
	M3PFHxS		4371.51	6.99				20-150%	87.4%	
	M2-6:2 FTS		4992.85	7.99				20-150%	99.9%	
	M8PFOA		5003.96	8.01				20-150%	100.1%	
	M9PFNA		4894.61	7.83				20-150%	97.9%	
	M8PFOS		4818.29	7.71				20-150%	96.4%	
	M2-8:2 FTS		3674.42	5.88				20-150%	73.5%	
	M8FOSA-I		3356.31	5.37				20-150%	67.1%	
	M6PFDA		4908.51	7.85				20-150%	98.2%	
	d3-N-MeFOSAA		3913.05	6.26				20-150%	78.3%	
	d5-N-EiFOSAA		3384.98	5.42				20-150%	67.7%	
	M7PFUDa		4516.36	7.23				20-150%	90.3%	
	MPFDoA		3554.12	5.69				20-150%	71.1%	
	M2PFTeDA		2115.34	3.38				20-150%	42.3%	

Enthalpy Analytical

Job No.: 0221-737-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	OPR-11543-PFAS	Prep Batch	EU11543	Sample Vol (mL)	250
Sample Name	OPR-11543-PFAS	Prep Date	2021-02-22 14:32	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-02-23 08:57	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	12704.93	20.3	20.3	0.153	0.294		101.6%	
	PFPeA	2706-90-3	12451.79	19.9	19.9	0.170	0.294		99.6%	
	PFHxA	307-24-4	12121.29	19.4	19.4	0.193	0.294		97.0%	
	PFHpA	375-85-9	12657.11	20.3	20.3	0.122	0.294		101.3%	
	PFOA	335-67-1	12568.58	20.1	20.1	0.177	0.294		100.5%	
	PFNA	375-95-1	12370.43	19.8	19.8	0.0761	0.294		99.0%	
	PFDA	335-76-2	11871.00	19.0	19.0	0.0845	0.294		95.0%	
	PFUnDA	2058-94-8	12356.98	19.8	19.8	0.185	0.294		98.9%	
	PFDoDA	307-55-1	12101.29	19.4	19.4	0.202	0.294		96.8%	
	PFTTrDA	72629-94-8	18785.98	30.1	30.1	0.151	0.294		150.3%	
PFTeDA	376-06-7	13167.52	21.1	21.1	0.218	0.294		105.3%		
Sulfonates	PFBS	375-73-5	9751.38	15.6	15.6	0.355	0.355		87.9%	
	PFPeS	2706-91-4	11286.67	18.1	18.1	0.206	0.277		96.0%	
	PFHxS	355-46-4	8605.48	13.8	13.8	0.191	0.269		75.3%	
	PFHpS	375-92-8	9519.37	15.2	15.2	0.135	0.280		79.9%	
	PFOS	1763-23-1	9669.39	15.5	15.5	0.160	0.274		83.4%	
	PFNS	68259-12-1	10510.03	16.8	16.8	0.0864	0.283		87.4%	
	PFDS	335-77-3	9721.10	15.6	15.6	0.192	0.285		80.6%	
	4:2 FTS	757124-72-4	11253.30	18.0	18.0	0.118	0.275		96.1%	
6:2 FTS	27619-97-2	12131.24	19.4	19.4	0.116	0.280		102.1%		
8:2 FTS	39108-34-4	11029.01	17.6	17.6	0.171	0.283		91.9%		
Other	PFOSA	754-91-6	11997.08	19.2	19.2	0.130	0.366		96.0%	
	N-MeFOSAA	2355-31-9	11269.44	18.0	18.0	0.144	0.294		90.2%	
	N-EtFOSAA	2991-50-6	12462.68	19.9	19.9	0.109	0.294		99.7%	
	HFPO-DA	13252-13-6	10434.08	16.7	16.7	0.228	0.294		83.5%	
ES	MPFBA		4685.18	7.50				20-150%	93.7%	
	M5PFPeA		4734.47	7.58				20-150%	94.7%	
	M3PFBS		4708.42	7.53				20-150%	94.2%	
	M2-4:2 FTS		3692.31	5.91				20-150%	73.8%	
	M5PFHxA		4202.38	6.72				20-150%	84.0%	
	M3HFPO-DA		5880.81	9.41				20-150%	117.6%	
	M4PFHpA		3815.13	6.10				20-150%	76.3%	
	M3PFHxS		4770.27	7.63				20-150%	95.4%	
	M2-6:2 FTS		3913.65	6.26				20-150%	78.3%	
	M8PFOA		4047.83	6.48				20-150%	81.0%	
	M9PFNA		4025.93	6.44				20-150%	80.5%	
	M8PFOS		4298.00	6.88				20-150%	86.0%	
	M2-8:2 FTS		3597.33	5.76				20-150%	71.9%	
	M8FOSA-I		2963.96	4.74				20-150%	59.3%	
	M6PFDA		4248.57	6.80				20-150%	85.0%	
	d3-N-MeFOSAA		3766.26	6.03				20-150%	75.3%	
	d5-N-EtFOSAA		3109.70	4.98				20-150%	62.2%	
M7PFUDa		3990.17	6.38				20-150%	79.8%		
MPFDoA		3486.59	5.58				20-150%	69.7%		
M2PFTeDA		2409.98	3.86				20-150%	48.2%		

Narrative Summary



Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0221-737-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland, NC

1. Custody

Ann Marie Baxter received the samples on February 18, 2021 at 4.3 °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
0221-737-001-1	021821-SO1	Aqueous
0221-737-002-1	021821-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.

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

021821-SO1, 021821-EO1 Due to acquisition requirements for analytes requested, the samples were analyzed in more than one 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.

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0221-737-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland, NC

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:

OPR-11543-PFAS PFTTrDA

HV#hfryhulv#ru#kh#leryh0p hqwrqhg#dqdwv#g#g#rwp# hhw# hwkrg#fulhud#krz hyhu#khu#lv
qr#dgyuh#p sdfw#r#g#dw#g#xh#w#k#l#dqdw#p hhw#gj#p hwkrg#fulhud#ru#(Uhfryhul#dv#h#dv#
vdp sdv#hlqj# QRG1

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 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 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 – 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
PFTriA (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-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	Perfluoro-4-methoxybutanic acid	863090-89-5
* 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

**This Is The Last Page
Of This Report.**