

County of Brunswick

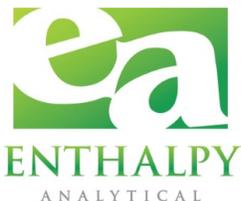
3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 03/18/22

Analytical Report 0322-782

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.

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Summary of Results



Enthalpy Analytical

Job No.: 0322-782-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County PULic Utilities - NC N/A Northwest Water Plant, Leland

Summary

	Compound	CAS	031822-SO1 ng/L	031822-EO1 ng/L
Acids	PFBA	375-22-4	2.82	3.66
	PFPeA	2706-90-3	4.03	4.35
	PFHxA	307-24-4	4.32	4.72
	PFHpA	375-85-9	2.21	2.48
	PFOA	335-67-1	5.46	5.23
	PFNA	375-95-1	0.859	0.780
	PFDA	335-76-2	0.424	0.394
	PFUnDA	2058-94-8	0.115 L	0.108 L
	PFDoDA	307-55-1	0.0201 LB	0.0490 LB
	PFTriDA	72629-94-8	0.0290 LB	0.0363 LB
	PFTeDA	376-06-7	ND U	0.00294 L
Sulfonates	PFBS	375-73-5	2.12	2.43
	PFPeS	2706-91-4	0.576	0.653
	PFHxS	355-46-4	3.11	3.25
	PFHpS	375-92-8	0.214 J	0.173 J
	PFOS	1763-23-1	10.2	8.62
	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	0.218 J	0.198 J	
8:2 FTS	39108-34-4	ND U	ND U	
other	PFOSA	754-91-6	0.00821 L	ND U
	N-MeFOSAA	2355-31-9	0.0316 L	0.0230 L
	N-EtFOSAA	2991-50-6	0.0126 LB	0.0281 LB
	HFPO-DA	13252-13-6	2.34	2.21
	PFMOAA	674-13-5	16.2	13.6
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	1.41	1.91
	PFO3OA	39492-89-2	0.871 L	0.811 L
	PFO4DA	39492-90-5	0.697 L	ND U
	Nafion Byproduct 1	29311-67-9	ND U	ND U
	ADONA	919005-14-4	ND U	0.0151 L
	9Cl-PF3ONS	756426-58-1	ND U	ND U
	11Cl-PF3OUdS	763051-92-9	ND U	0.0195 LB
	10:2 FTS	120226-60-0	ND U	0.117 LB
	EVE Acid	69087-46-3	ND U	0.00377 LB
	FBSA	30334-69-1	0.252 J	0.328
	Hydro-EVE Acid	773804-62-9	0.131 LB	0.131 LB
	Hydrolyzed PSDA	2416366-19-1	1.98 B	1.91 B
	Nafion Byproduct 2	749836-20-2	0.185 L	0.129 L
	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	0.731 L	0.865 L
	PEPA	267239-61-2	ND U	ND U
	PFECA-G	801212-59-9	ND U	0.0258 L
	PFEEESA	113507-82-7	0.000797 L	0.00817 L
	PFHxDA	67905-19-5	0.0254 LB	0.0178 LB
	PFMOBA	863090-89-5	ND U	ND U
	PFO5DA	39492-91-6	0.398 L	ND U
PMPA	13140-29-9	ND U	ND U	
R-EVE	2416366-22-6	3.65	4.62	
R-PSDA	2416366-18-0	3.95	3.75	
R-PSDCA	2416366-21-5	0.0149 LB	0.0109 LB	

Detailed Results



Enthalpy Analytical

Job No.: 0322-782-1 PFAS by Isotope Dilution (non-potable water)
 Brunswick County Public Utilities - NC N/A Northwest Water Plant, Leland

Enthalpy ID	0322-782-001-1	Prep Batch	EU13166	Sample Vol (mL)	292.57
Sample Name	031822-SO1	Prep Date	2022-03-18 15:15	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-04-06 23:20	Split Factor	N/A
Sampling Date	20220318 00:00	Analyst	avheadrick	Method Code	WM-026
Received Date	2022-03-18 14:00	Instrument	Killi	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	2062.02	2.82	2.82	0.131	0.260			
	PFPeA	2706-90-3	2950.12	4.03	4.03	0.145	0.260			
	PFHxA	307-24-4	3156.46	4.32	4.32	0.165	0.260			
	PFHpA	375-85-9	1612.85	2.21	2.21	0.104	0.260			
	PFOA	335-67-1	3994.79	5.46	5.46	0.151	0.260			
	PFNA	375-95-1	628.19	0.859	0.859	0.0650	0.260			
	PFDA	335-76-2	310.35	0.424	0.424	0.0722	0.260			
	PFUnDA	2058-94-8	84.36	0.115	0.115	0.158	0.260			L
	PFDaDA	307-55-1	14.74	0.0201	0.0201	0.173	0.260			LB
	PFTrDA	72629-94-8	21.22	0.0290	0.0290	0.129	0.260			LB
PFTeDA	376-06-7	ND	ND	ND	0.186	0.260			U	
Sulfonates	PFBS	375-73-5	1553.11	2.12	2.12	0.303	0.303			
	PFPeS	2706-91-4	421.44	0.576	0.576	0.176	0.245			
	PFHsS	355-46-4	2274.89	3.11	3.11	0.163	0.238			
	PFHpS	375-92-8	156.74	0.214	0.214	0.115	0.247			J
	PFOS	1763-23-1	7473.01	10.2	10.2	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	159.30	0.218	0.218	0.0991	0.247			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.146	0.249			U
other	PFOSA	754-91-6	6.01	0.00821	0.00821	0.111	0.260			L
	N-MeFOSAA	2355-31-9	23.09	0.0316	0.0316	0.123	0.260			L
	N-EiFOSAA	2991-50-6	9.23	0.0126	0.0126	0.0931	0.260			LB
	HFPO-DA	13252-13-6	1710.03	2.34	2.34	0.195	0.260			
	PFMOAA	674-13-5	11830.28	16.2	16.2	1.23	1.23			
	PFMOPrA	377-73-1	ND	ND	ND	0.205	0.260			U
	PFO2HxA	39492-88-1	1034.62	1.41	1.41	1.23	1.23			
	PFO3OA	39492-89-2	637.34	0.871	0.871	1.23	1.23			L
	PFO4DA	39492-90-5	509.64	0.697	0.697	1.30	1.30			L
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.260	0.260			U
	ADONA	919005-14-4	ND	ND	ND	0.103	0.246			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.103	0.242			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.103	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	184.53	0.252	0.252	0.205	0.260			J
	Hydro-EVE Acid	773804-62-9	95.52	0.131	0.131	1.23	1.23			LB
	Hydrolyzed PSDA	2416366-19-1	1445.57	1.98	1.98	1.23	1.23			B
	Nafion Byproduct 2	749836-20-2	135.14	0.185	0.185	0.260	0.260			L
	N-EiFOSA	4151-50-2	ND	ND	ND	0.205	0.260			U
	N-EiFOSE	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	534.93	0.731	0.731	1.23	1.23			L
	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	0.58	0.000797	0.000797	0.205	0.260			L
	PFHxDA	67905-19-5	18.56	0.0254	0.0254	1.23	1.23			LB
	PFMObA	863090-89-5	ND	ND	ND	1.23	1.23			U
PFO5DA	39492-91-6	291.04	0.398	0.398	1.30	1.30			L	
PMPA	13140-29-9	ND	ND	ND	1.23	1.23			U	
R-EVE	2416366-22-6	2666.52	3.65	3.65	1.23	1.23				
R-PSDA	2416366-18-0	2887.67	3.95	3.95	1.23	1.23				
R-PSDCA	2416366-21-5	10.91	0.0149	0.0149	1.23	1.23			LB	
ES	MPFBA		4548.75	6.22				20-150%	91.0%	
	M5PFPeA		10468.24	14.3				20-150%	209.4%	Q
	M3PFBS		16234.83	22.2				20-150%	324.7%	Q
	M2-4:2 FTS		9658.48	13.2				20-150%	193.2%	Q
	M5PFPHxA		4116.74	5.63				20-150%	82.3%	
	M3HFPO-DA		3290.42	4.50				20-150%	65.8%	
	M4PFPHxA		4667.08	6.38				20-150%	93.3%	
	M3PFPHxS		4787.52	6.55				20-150%	95.8%	
	M2-6:2 FTS		5484.46	7.50				20-150%	109.7%	
	M8PFOA		4418.80	6.04				20-150%	88.4%	
	M9PFNA		3691.94	5.05				20-150%	73.8%	
	M8PFOS		4413.25	6.03				20-150%	88.3%	
	M2-8:2 FTS		6558.37	8.97				20-150%	131.2%	
	M8FOSA-I		3757.97	5.14				20-150%	75.2%	
	M6PFDA		4691.97	6.41				20-150%	93.8%	
	d3-N-MeFOSAA		4575.19	6.26				20-150%	91.5%	
	d5-N-EiFOSAA		4094.27	5.60				20-150%	81.9%	
	M7PFOA		3898.12	5.33				20-150%	78.0%	
MPFDaA		3275.88	4.48				20-150%	65.5%		
M2PFTeDA		1186.24	1.62				20-150%	23.7%		

Enthalpy Analytical

Job No.: 0322-782-1 PFAS by Isotope Dilution (non-potable water)
 Brunswick County Public Utilities - NC N/A Northwest Water Plant, Leland

Enthalpy ID	0322-782-002-1	Prep Batch	EU13166	Sample Vol (mL)	296.08
Sample Name	031822-E01	Prep Date	2022-03-18 15:15	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-04-06 23:44	Split Factor	N/A
Sampling Date	20220318 00:00	Analyst	avheadrick	Method Code	WM-026
Received Date	2022-03-18 14:00	Instrument	Killi	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	2709.79	3.66	3.66	0.129	0.257			
	PFPeA	2706-90-3	3217.26	4.35	4.35	0.144	0.257			
	PFHxA	307-24-4	3490.98	4.72	4.72	0.163	0.257			
	PFFhA	375-85-9	1838.00	2.48	2.48	0.103	0.257			
	PFOA	335-67-1	3874.42	5.23	5.23	0.149	0.257			
	PFNA	375-95-1	577.32	0.780	0.780	0.0643	0.257			
	PFDA	335-76-2	291.89	0.394	0.394	0.0713	0.257			
	PFUnDA	2058-94-8	79.96	0.108	0.108	0.156	0.257			L
	PFDaDA	307-55-1	36.31	0.0490	0.0490	0.171	0.257			LB
	PFTrDA	72629-94-8	26.90	0.0363	0.0363	0.128	0.257			LB
PFTeDA	376-06-7	2.18	0.00294	0.00294	0.184	0.257			L	
Sulfonates	PFBS	375-73-5	1795.88	2.43	2.43	0.300	0.300			
	PFPeS	2706-91-4	483.07	0.653	0.653	0.174	0.242			
	PFHsS	355-46-4	2406.53	3.25	3.25	0.161	0.235			
	PFFhS	375-92-8	127.84	0.173	0.173	0.114	0.245			J
	PFOS	1763-23-1	6377.35	8.62	8.62	0.135	0.238			
	PFNS	68259-12-1	ND	ND	ND	0.0730	0.247			U
	PFDS	335-77-3	ND	ND	ND	0.162	0.247			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0996	0.240			U
	6:2 FTS	27619-97-2	146.59	0.198	0.198	0.0979	0.245			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.144	0.246			U
other	PFOSA	754-91-6	ND	ND	ND	0.110	0.257			U
	N-MeFOSAA	2355-31-9	17.03	0.0230	0.0230	0.122	0.257			L
	N-EiFOSAA	2991-50-6	20.78	0.0281	0.0281	0.0920	0.257			LB
	HFPO-DA	13252-13-6	1635.10	2.21	2.21	0.193	0.257			
	PFMOAA	674-13-5	10098.70	13.6	13.6	1.22	1.22			
	PFMOPrA	377-73-1	ND	ND	ND	0.203	0.257			U
	PFO2HxA	39492-88-1	1415.14	1.91	1.91	1.22	1.22			
	PFO3OA	39492-89-2	600.12	0.811	0.811	1.22	1.22			L
	PFO4DA	39492-90-5	ND	ND	ND	1.28	1.28			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.257	0.257			U
	ADONA	919005-14-4	11.19	0.0151	0.0151	0.101	0.243			L
	9Cl-PF3OUds	756426-58-1	ND	ND	ND	0.101	0.239			U
	11Cl-PF3OUds	763051-92-9	14.47	0.0195	0.0195	0.101	0.242			LB
	10:2 FTS	120226-60-0	86.68	0.117	0.117	0.203	0.257			LB
	EVE Acid	69087-46-3	2.79	0.00377	0.00377	1.22	1.22			LB
	FBSA	30334-69-1	242.72	0.328	0.328	0.203	0.257			
	Hydro-EVE Acid	773804-62-9	96.67	0.131	0.131	1.22	1.22			LB
	Hydrolyzed PSDA	2416366-19-1	1414.92	1.91	1.91	1.22	1.22			B
	Nafion Byproduct 2	749836-20-2	95.25	0.129	0.129	0.257	0.257			L
	N-EiFOSA	4151-50-2	ND	ND	ND	0.203	0.257			U
	N-EiFOSE	1691-99-2	ND	ND	ND	6.08	6.08			U
	NFDHA	151772-58-6	ND	ND	ND	0.203	0.257			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.203	0.257			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.08	6.08			U
	NVHOS	1132933-86-8	640.25	0.865	0.865	1.22	1.22			L
	PEPA	267239-61-2	ND	ND	ND	1.22	1.22			U
	PFECA-G	801212-59-9	19.09	0.0258	0.0258	0.257	1.22			L
	PFEESA	113507-82-7	6.05	0.00817	0.00817	0.203	0.257			L
	PFFhDA	67905-19-5	13.16	0.0178	0.0178	1.22	1.22			LB
	PFFMOBA	863090-89-5	ND	ND	ND	1.22	1.22			U
PFO5DA	39492-91-6	ND	ND	ND	1.28	1.28			U	
PMPA	13140-29-9	ND	ND	ND	1.22	1.22			U	
R-EVE	2416366-22-6	3420.13	4.62	4.62	1.22	1.22				
R-PSDA	2416366-18-0	2779.44	3.75	3.75	1.22	1.22				
R-PSDCA	2416366-21-5	8.04	0.0109	0.0109	1.22	1.22			LB	
ES	MPFBA		4171.25	5.64				20-150%	83.4%	
	M5PFPeA		8159.69	11.0				20-150%	163.2%	Q
	M3PFBS		10018.41	13.5				20-150%	200.4%	Q
	M2-4:2 FTS		7475.66	10.1				20-150%	149.5%	
	M5PFFhxA		4259.49	5.75				20-150%	85.2%	
	M3HFPO-DA		3543.37	4.79				20-150%	70.9%	
	M4PFFhA		4290.60	5.80				20-150%	85.8%	
	M3PFFhS		4273.74	5.77				20-150%	85.5%	
	M2-6:2 FTS		4467.48	6.04				20-150%	89.3%	
	M8PFOA		4180.96	5.65				20-150%	83.6%	
	M9PFNA		3647.35	4.93				20-150%	72.9%	
	M8PFOS		4142.18	5.60				20-150%	82.8%	
	M2-8:2 FTS		5102.45	6.89				20-150%	102.0%	
	M8FOSA-I		3650.20	4.93				20-150%	73.0%	
	M6PFDA		4287.27	5.79				20-150%	85.7%	
	d3-N-MeFOSAA		4355.21	5.88				20-150%	87.1%	
	d5-N-EiFOSAA		4098.58	5.54				20-150%	82.0%	
	M7PFUdA		4102.92	5.54				20-150%	82.1%	
MPFDcA		3758.32	5.08				20-150%	75.2%		
M2PFTeDA		2334.70	3.15				20-150%	46.7%		

QC Data



Enthalpy Analytical

Job No.: 0322-782-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC N/A Northwest Water Plant, Leland

Enthalpy ID	MB-13166-PFAS	Prep Batch	EU13166	Sample Vol (mL)	250
Sample Name	MB-13166-PFAS	Prep Date	2022-03-18 15:15	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2022-04-06 22:34	Split Factor	N/A
Sampling Date		Analyst	avheadrick	Method Code	WM-026
Received Date		Instrument	Killi	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	ND	ND	ND	0.193	0.304			U
	PFFHpA	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	0.25	0.000402	0.000402	0.185	0.304			L
	PFDoDA	307-55-1	22.87	0.0366	0.0366	0.202	0.304			L
	PFTriDA	72629-94-8	31.49	0.0504	0.0504	0.151	0.304			L
	PFTeDA	376-06-7	ND	ND	ND	0.218	0.304			U
	PFBS	375-73-5	40.83	0.0653	0.0653	0.355	0.355			L
	PFPeS	2706-91-4	ND	ND	ND	0.206	0.286			U
	PFHxS	355-46-4	ND	ND	ND	0.191	0.278			U
Sulfonates	PFFHpS	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
	PFOSA	754-91-6	ND	ND	ND	0.130	0.304			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.144	0.304			U
	N-EiFOSAA	2991-50-6	20.20	0.0323	0.0323	0.109	0.304			L
	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
Other	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	31.72	0.0508	0.0508	0.120	0.286			L
	10:2 FTS	120226-60-0	73.96	0.118	0.118	0.240	0.304			L
	EVE Acid	69087-46-3	30.32	0.0485	0.0485	1.44	1.44			L
	FBSA	30334-69-1	ND	ND	ND	0.240	0.304			U
	Hydro-EVE Acid	773804-62-9	28.07	0.0449	0.0449	1.44	1.44			L
	Hydrolyzed PSDA	2416366-19-1	239.56	0.383	0.383	1.44	1.44			L
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	0.304	0.304			U
	N-EiFOSA	4151-50-2	ND	ND	ND	0.240	0.304			U
	N-EiFOSE	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
	PFEEA	113507-82-7	ND	ND	ND	0.240	0.304			U
	PFFhDA	67905-19-5	73.41	0.117	0.117	1.44	1.44			L
	PFFMOBA	863090-89-5	ND	ND	ND	1.44	1.44			U
	PFOSDA	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	2416366-22-6	155.67	0.249	0.249	1.44	1.44			L
	R-PSDA	2416366-18-0	198.69	0.318	0.318	1.44	1.44			L
	R-PSDCA	2416366-21-5	39.73	0.0636	0.0636	1.44	1.44			L
ES	MFPBA		4258.35	6.81				20-150%	85.2%	
	M5FPPeA		4171.84	6.67				20-150%	83.4%	
	M3PFBS		3958.84	6.33				20-150%	79.2%	
	M2-4:2 FTS		4461.76	7.14				20-150%	89.2%	
	M5PFFhxA		4396.25	7.03				20-150%	87.9%	
	M3HFPO-DA		4354.00	6.97				20-150%	87.1%	
	M4PFFHpA		4577.33	7.32				20-150%	91.5%	
	M3PFFHxS		4502.11	7.20				20-150%	90.0%	
	M2-6:2 FTS		4223.28	6.76				20-150%	84.5%	
	M8PFOA		4589.18	7.34				20-150%	91.8%	
	M9PFNA		3902.29	6.24				20-150%	78.0%	
	M8PFOS		4194.29	6.71				20-150%	83.9%	
	M2-8:2 FTS		6038.36	9.66				20-150%	120.8%	
	M8FOSA-I		4370.27	6.99				20-150%	87.4%	
	M8PFDA		4996.39	7.99				20-150%	99.9%	
	d3-N-MeFOSAA		4537.48	7.26				20-150%	90.7%	
	d5-N-EiFOSAA		3820.79	6.11				20-150%	76.4%	
	M7PFUdA		4583.63	7.33				20-150%	91.7%	
MPFDcA		4273.37	6.84				20-150%	85.5%		
M2PFTeDA		2983.09	4.77				20-150%	59.7%		

Enthalpy Analytical

Job No.: 0322-782-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC N/A Northwest Water Plant, Leland

Enthalpy ID	OPR-13166-PFAS	Prep Batch	EU13166	Sample Vol (mL)	250
Sample Name	OPR-13166-PFAS	Prep Date	2022-03-18 15:15	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2022-04-06 22:57	Split Factor	N/A
Sampling Date		Analyst	avheadrick	Method Code	WM-026
Received Date		Instrument	Kili	Sample Type	Control

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	13468.04	21.5	21.5	0.153	0.304	73-129%	107.7%	
	PFPeA	2706-90-3	13059.30	20.9	20.9	0.170	0.304	72-129%	104.5%	
	PFHxA	307-24-4	13058.57	20.9	20.9	0.193	0.304	72-129%	104.5%	
	PFHpA	375-85-9	12253.66	19.6	19.6	0.122	0.304	72-130%	98.0%	
	PFOA	335-67-1	13655.42	21.8	21.8	0.177	0.304	71-133%	109.2%	
	PFNA	375-95-1	13547.10	21.7	21.7	0.0761	0.304	69-130%	108.4%	
	PFDA	335-76-2	12745.78	20.4	20.4	0.0845	0.304	71-129%	102.0%	
	PFUnDA	2058-94-8	12683.17	20.3	20.3	0.185	0.304	69-133%	101.5%	
	PFDODA	307-55-1	14291.98	22.9	22.9	0.202	0.304	72-134%	114.3%	
	PFTrDA	72629-94-8	14962.94	23.9	23.9	0.151	0.304	65-144%	119.7%	
PFTeDA	376-06-7	13393.04	21.4	21.4	0.218	0.304	71-132%	107.1%		
Sulfonates	PFBS	375-73-5	10918.95	17.5	17.5	0.355	0.355	72-134%	98.5%	
	PFPeS	2706-91-4	13211.81	21.1	21.1	0.206	0.286	71-127%	112.3%	
	PFHxS	355-46-4	12520.23	20.0	20.0	0.191	0.278	68-131%	109.6%	
	PFHpS	375-92-8	14612.10	23.4	23.4	0.135	0.290	69-134%	122.7%	
	PFOS	1763-23-1	13102.24	21.0	21.0	0.160	0.282	65-140%	113.0%	
	PFNS	68259-12-1	13734.12	22.0	22.0	0.0864	0.293	69-127%	114.2%	
	PFDS	335-77-3	12892.01	20.6	20.6	0.192	0.293	53-142%	106.9%	
	4:2 FTS	757124-72-4	12597.20	20.2	20.2	0.118	0.285	63-143%	107.6%	
6:2 FTS	27619-97-2	11759.95	18.8	18.8	0.116	0.290	64-140%	98.9%		
8:2 FTS	39108-34-4	10166.49	16.3	16.3	0.171	0.291	67-138%	84.7%		
Other	PFOSA	754-91-6	12725.62	20.4	20.4	0.130	0.304	67-137%	101.8%	
	N-MeFOSAA	2355-31-9	13334.77	21.3	21.3	0.144	0.304	65-136%	106.7%	
	N-EtFOSAA	2991-50-6	13667.60	21.9	21.9	0.109	0.304	61-135%	109.3%	
	HFPO-DA	13252-13-6	15267.20	24.4	24.4	0.228	0.304	70-130%	122.1%	
ES	MPFBA		4508.67	7.21				20-150%	90.2%	
	M5PFPeA		4506.11	7.21				20-150%	90.1%	
	M3PFBS		4269.54	6.83				20-150%	85.4%	
	M2-4:2 FTS		4463.87	7.14				20-150%	89.3%	
	M5PFHxA		4421.83	7.07				20-150%	88.4%	
	M3HFPO-DA		4132.77	6.61				20-150%	82.7%	
	M4PFHpA		4512.64	7.22				20-150%	90.3%	
	M3PFHxS		4516.21	7.23				20-150%	90.3%	
	M2-6:2 FTS		4719.52	7.55				20-150%	94.4%	
	M8PFOA		4439.00	7.10				20-150%	88.8%	
	M9PFNA		3868.96	6.19				20-150%	77.4%	
	M8PFOS		4288.32	6.86				20-150%	85.8%	
	M2-8:2 FTS		6865.93	11.0				20-150%	137.3%	
	M8FOSA-I		3672.46	5.88				20-150%	73.4%	
	M6PFDA		4646.14	7.43				20-150%	92.9%	
	d3-N-MeFOSAA		4725.64	7.56				20-150%	94.5%	
	d5-N-EtFOSAA		4322.56	6.92				20-150%	86.5%	
	M7PFUDa		4299.81	6.88				20-150%	86.0%	
	MPFDoA		4137.47	6.62				20-150%	82.7%	
	M2PFTeDA		3132.12	5.01				20-150%	62.6%	

Narrative Summary



Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0322-782-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant, Leland

1. Custody

Megan Holden received the samples on March 18, 2022 at 2.8 °C after being relinquished by Brunswick County Public Utilities - NC. 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
0322-782-001-1	031822-SO1	Aqueous
0322-782-002-1	031822-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.

Due to acquisition requirements for analytes requested, the sample was analyzed in more than one sequence.

4. Calibration

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

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0322-782-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant, Leland

4. Calibration, continued

The Standards that did not were:

SID AQ04 10:2 FTS fell high in the closing concal. This analyte was not detected in sample 031822-SO1 and detected below LOD in sample 031822-EO1. The data is reportable with no adverse impact.

Supplemental compounds were run using a single point calibration forced through zero.

The Technical Director extended the method criteria for certain non-legacy analytes that do not have their own internal standard and exhibit observed variability during calibration.

5. QC Notes

The QC sample analyses passed all method criteria.

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

6. Reporting Notes

This report provides results below LOD. Analyte(s) were detected in the method blank (MB) at less than 1/2 LOQ that may also be less than LOD. Any analyte(s) detected in the samples with less than 10 times the amount detected in MB were notated with a B qualifier and are reported with no adverse impact.

Some labeled extraction standards in the sample analyses fell outside the control limits for ES recovery, as denoted by the "Q" qualifier. The target analytes are quantified based on their ratio to their labeled standard analogs. As a result, low or high labeled standard recovery do not cause any change to ratios or contribute any additional error in the measurement of the target analytes. The data have been accepted and reported with no further actions.

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 amount 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: The EDL is unique to isotope dilution methods and reflects the conditions of analysis at the time of analysis, including the equipment used. Where the MDL is a static value, the EDL is a dynamic value.
- EMPC – Estimated Maximum Possible Concentration: EMPC is specific to Dioxin/Furan tests to indicate the determined ion-abundance ratio was outside the allowed theoretical range (usually due to being near the detection limit, although it can very rarely be caused by a co-eluting interference). The EMPC concentration is adjusted to reflect the value at the theoretical ion-abundance ratio.
- IR – The ion ratio between the primary and secondary ions was observed to be outside the method criteria. The analyte concentration may be inaccurate due to interference.
- 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 Quantitation: 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 LOQ is adjusted for sample weight or volume.



General Reporting Notes – Data Qualifiers

- <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.
- <LOQ() – Analyte was not found at a concentration high enough to be reported as above the QSM-defined LOQ or TNI defined Reporting Limit. It is reported as less than the LOQ, and the LOQ 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 / Q – The labeled standard recovery is not within method control limits.
- X – Indicates the result is 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.
- R – Indicates a re-extraction of the sample.
- RJ – Indicates a reinjection of the sample extract.



General Reporting Notes – Data Qualifiers

- S – Indicates a sample split. The number that follows the “S” indicates the split factor.
- SAT – Indicates an analyte saturated the detector.

PFAS Compound Acronym List		
Acronym	CAS #	Compound Name
Target Analytes		
* Analyte is not accredited		
PFBA	375-22-4	Perfluorobutanoic Acid
PFPeA	2706-90-3	Perfluoropentanoic Acid
PFHxA	307-24-4	Perfluorohexanoic Acid
PFHpA	375-85-9	Perfluoroheptanoic Acid
PFOA	335-67-1	Perfluorooctanoic Acid
PFNA	375-95-1	Perfluorononanoic Acid
PFDA	335-76-2	Perfluorodecanoic acid
PFUnA (PFUnDA)	2058-94-8	Perfluoroundecanoic acid
PFDoA (PFDoDA)	307-55-1	Perfluorododecanoic acid
PFTriA (PFTriA)	72629-94-8	Perfluorotridecanoic acid
PFTeDA (PFTA)	376-06-7	Perfluorotetradecanoic acid
PFBS	375-73-5	Perfluorobutane sulfonic acid
PFPeS	2706-91-4	Perfluoropentane sulfonic acid
PFHxS	355-46-4	Perfluorohexane sulfonic acid
PFHpS	375-92-8	Perfluoroheptane sulfonic acid
PFOS	1763-23-1	Perfluorooctane sulfonic acid
PFNS	68259-12-1	Perfluorononane sulfonic acid
PFDS	335-77-3	Perfluorodecane sulfonic acid
4:2 FTS	757124-72-4	4:2 fluorotelomer sulfonic acid
6:2 FTS	27619-97-2	6:2 fluorotelomer sulfonic acid
8:2 FTS	39108-34-4	8:2 fluorotelomer sulfonic acid
PFOSA (FOSA)	754-91-6	Perfluorooctane sulfonamide
N-MeFOSAA	2355-31-9	N-methyl perfluorooctane sulfonamido acetic acid
N-EtFOSAA	2991-50-6	N-ethyl perfluorooctane sulfonamido acetic acid
HFPO-DA	13252-13-6	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (Gen-X)
11Cl-PF3OUdS	763051-92-9	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
9Cl-PF3ONS	756426-58-1	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
ADONA	919005-14-4	4,8-dioxa-3H-perfluorononanoic acid
PFEESA	113507-82-7	Perfluoro(2-ethoxyethane)sulphonic acid
PFMOBA (PFMBA)	863090-89-5	Perfluoro-4-methoxybutanic acid
NFDHA	151772-58-6	Nonafluoro-3,6-dioxaheptanoic acid
PFMOPra (PFMPA)	377-73-1	Perfluoro-3-methoxypropanoic acid
* PFMOAA	674-13-5	Perfluoro-2-methoxyacetic acid
* PFO2HxA	39492-88-1	Perfluoro (3,5-dioxaheptanoic) acid
* PFO3OA	39492-89-2	Perfluoro (3,5,7-trioxaoctanoic) acid
* PFO4DA	39492-90-5	Perfluoro (3,5,7,9-tetraoxadecanoic) acid
* PFO5DA	39492-91-6	Perfluoro(3,5,7,9,11-pentaoxadodecanoic) acid
* Nafion Byproduct 1	29311-67-9	Nafion Byproduct 1
* Nafion Byproduct 2	749836-20-2	Nafion Byproduct 2
* PEPA	267239-61-2	Perfluoro-2-ethoxypropanoic acid
* PMPA	13140-29-9	Perfluoro-2-methoxypropanoic acid
* 10:2 FTS	120226-60-0	Fluorotelomer sulfonate 10:2
* N-EtFOSA	4151-50-2	N-ethylperfluoro-1-octanesulfonamide
* N-EtFOSE	1691-99-2	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol
* N-MeFOSA	31506-32-8	N-methylperfluoro-1-octanesulfonamide
* N-MeFOSE	24448-09-7	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol
* PFECA-G	801212-59-9	4-(Heptafluoroisopropoxy)hexafluorobutanoic acid
* PFHxDA	67905-19-5	Perfluorohexadecanoic acid
R-PSDA (Nafion Byproduct * 4)	2416366-18-0	Perfluoro-4-(2-sulfoethoxy)pentanoic acid

PFAS Compound Acronym List		
Acronym	CAS #	Compound Name
Target Analytes		
* Analyte is not accredited		
* Hydrolyzed PSDA (Nafion Byproduct 5)	2416366-19-1	2-fluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2-tetrafluoro-2-sulfoethoxy)propoxy]-acetic acid
* R-PSDCA (Nafion Byproduct 6)	2416366-21-5	1,1,2,2-tetrafluoro-2-[1,2,2,3,3-pentafluoro-1-(trifluoromethyl)propoxy] ethanesulfonic acid
* EVE Acid	69087-46-3	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
* FBSA	30334-69-1	Perfluorobutylsulfonamide
* Hydro-EVE Acid	773804-62-9	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
* R-EVE Acid	2416366-22-6	4-(2-carboxy-1,1,2,2-tetrafluoroethoxy)-2,2,3,3,4,5,5,5-octafluoro-pentanoic acid
* NVHOS	1132933-86-8	Perfluoroethoxysulfonic acid
* PFDoS	79780-39-5	Perfluorododecane sulfonic acid
* PFOA	16517-11-6	Perfluorooctadecanoic acid
* 3:3 FTCA	356-02-5	2H,2H,3H,3H-Perfluorohexanoic acid
* 5:3 FTCA	914637-49-3	2H,2H,3H,3H-Perfluorooctanoic acid
* 7:3 FTCA	812-70-4	2H,2H,3H,3H-Perfluorodecanoic acid
* N-AP-FHxSA	50598-28-2	N-(3-(Dimethylamino)propyl)tridecafluoro-1-hexanesulfonamide
* N-CMAmP-6:2 FOSA	34455-29-3	N-(Carboxymethyl)-N,N-dimethyl-3-(((3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl)amino)1-propanaminium

Sample Custody



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Of This Report.**

