

County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 04/13/22

Analytical Report 0422-804

Isotope Dilution Method PFAS



Enthalpy Analytical, LLC – Ultratrace

Mark Hager

O: 910-876-6894/ F: 910-212-6886

mark.hager@enthalpy.com / www.enthalpy.com

2714 Exchange Drive, Wilmington, NC 28405

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.: 0422-804-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Client Project: NA Site: Northwest Water Plant Leland

Summary

	Compound	CAS	041322S01 ng/L	041322E01 ng/L
Acids	PFBA	375-22-4	3.94	2.59
	PFPeA	2706-90-3	4.36	5.20
	PFHxA	307-24-4	3.84	4.17
	PFHpA	375-85-9	1.97	2.17
	PFOA	335-67-1	3.59	3.80
	PFNA	375-95-1	0.786 B	0.623 B
	PFDA	335-76-2	0.402 B	0.321 B
	PFUnDA	2058-94-8	0.239 JB	0.120 LB
	PFDoDA	307-55-1	ND U	0.0115 LB
	PFTTrDA	72629-94-8	ND U	0.0768 L
	PFTeDA	376-06-7	ND U	ND U
Sulfonates	PFBS	375-73-5	2.89	2.98
	PFPeS	2706-91-4	0.717	0.637
	PFHxS	355-46-4	2.59	2.77
	PFHpS	375-92-8	0.194 J	ND U
	PFOS	1763-23-1	9.15	7.68
	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	0.175 J	0.0633 LB
8:2 FTS	39108-34-4	0.0263 L	ND U	
Other	PFOSA	754-91-6	0.0617 LB	0.0392 LB
	N-MeFOSAA	2355-31-9	ND U	0.123 LB
	N-EtFOSAA	2991-50-6	ND U	0.0917 L
	HFPO-DA	13252-13-6	2.17	1.85
	PFMOAA	674-13-5	22.1	19.9
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	3.17	2.32
	PFO3OA	39492-89-2	0.479 L	0.694 L
	PFO4DA	39492-90-5	ND U	ND U
	Nafion Byproduct 1	29311-67-9	ND U	ND U
	ADONA	919005-14-4	ND U	ND U
	9Cl-PF3ONS	756426-58-1	0.000103 LB	ND U
	11Cl-PF3OUdS	763051-92-9	ND U	ND U
	10:2 FTS	120226-60-0	ND U	ND U
	EVE Acid	69087-46-3	0.0476 LB	0.0321 LB
	FBSA	30334-69-1	0.520	0.382
	Hydro-EVE Acid	773804-62-9	0.169 LB	0.195 LB
	Hydrolyzed PSDA	2416366-19-1	2.35	2.72
	Nafion Byproduct 2	749836-20-2	ND U	ND U
	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	1.82	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	ND U
	R-EVE	2416366-22-6	4.51	4.95
R-PSDA	2416366-18-0	ND U	ND U	
R-PSDCA	2416366-21-5	0.0703 LB	0.0649 LB	

Detailed Results

Enthalpy Analytical

Job No.: 0422-804-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Client Project: NA Site: Northwest Water Plant Leland

Enthalpy ID	0422-804-001-1	Prep Batch	EU13298	Sample Vol (mL)	268.93
Sample Name	041322S01	Prep Date	2022-04-14 13:00	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-04-16 10:04	Split Factor	N/A
Sampling Date	20220413 00:00	Analyst	brneff/ITB	Method Code	WM-026
Received Date	2022-04-13 15:04	Instrument	Kili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	2647.48	3.94	3.94	0.142	0.283			
	PFPeA	2706-90-3	2928.83	4.36	4.36	0.158	0.283			
	PFHxA	307-24-4	2582.99	3.84	3.84	0.179	0.283			
	PFHpA	375-85-9	1324.04	1.97	1.97	0.113	0.283			
	PFOA	335-67-1	2413.28	3.59	3.59	0.165	0.283			
	PFNA	375-95-1	528.38	0.786	0.786	0.0707	0.283			B
	PFDA	335-76-2	270.38	0.402	0.402	0.0785	0.283			B
	PFUnDA	2058-94-8	160.75	0.239	0.239	0.172	0.283			JB
	PFDODA	307-55-1	ND	ND	ND	0.188	0.283			U
	PFTrDA	72629-94-8	ND	ND	ND	0.140	0.283			U
PFTeDA	376-06-7	ND	ND	ND	0.203	0.283			U	
Sulfonates	PFBS	375-73-5	1939.69	2.89	2.89	0.330	0.330			
	PFPeS	2706-91-4	481.87	0.717	0.717	0.191	0.266			
	PFHxS	355-46-4	1738.69	2.59	2.59	0.178	0.259			
	PFHpS	375-92-8	130.44	0.194	0.194	0.126	0.269			J
	PFOS	1763-23-1	6154.91	9.15	9.15	0.149	0.262			
	PFNS	68259-12-1	ND	ND	ND	0.0803	0.272			U
	PFDS	335-77-3	ND	ND	ND	0.178	0.272			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.110	0.265			U
	6:2 FTS	27619-97-2	117.86	0.175	0.175	0.108	0.269			J
	8:2 FTS	39108-34-4	17.71	0.0263	0.0263	0.159	0.271			L
Other	PFOSA	754-91-6	41.48	0.0617	0.0617	0.121	0.283			LB
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.134	0.283			U
	N-EiFOSAA	2991-50-6	ND	ND	ND	0.101	0.283			U
	HFPO-DA	13252-13-6	1461.13	2.17	2.17	0.212	0.283			
	PFMOAA	674-13-5	14841.06	22.1	22.1	1.34	1.34			
	PFMOPrA	377-73-1	ND	ND	ND	0.223	0.283			U
	PFO2HxA	39492-88-1	2133.97	3.17	3.17	1.34	1.34			
	PFO3OA	39492-89-2	322.07	0.479	0.479	1.34	1.34			L
	PFO4DA	39492-90-5	ND	ND	ND	1.41	1.41			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.283	0.283			U
	ADONA	919005-14-4	ND	ND	ND	0.112	0.268			U
	9Cl-PF3ONS	756426-58-1	0.07	0.000103	0.000103	0.112	0.263			LB
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.112	0.266			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.223	0.283			U
	EVE Acid	69087-46-3	31.97	0.0476	0.0476	1.34	1.34			LB
	FBSA	30334-69-1	349.60	0.520	0.520	0.223	0.283			
	Hydro-EVE Acid	773804-62-9	113.93	0.169	0.169	1.34	1.34			LB
	Hydrolyzed PSDA	2416366-19-1	1582.51	2.35	2.35	1.34	1.34			
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	0.283	0.283			U
	N-EiFOSA	4151-50-2	ND	ND	ND	0.223	0.283			U
	N-EiFOSE	1691-99-2	ND	ND	ND	6.69	6.69			U
	NFDHA	151772-58-6	ND	ND	ND	0.223	0.283			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.223	0.283			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.69	6.69			U
	NVHOS	1132933-86-8	1220.80	1.82	1.82	1.34	1.34			
	PEPA	267239-61-2	ND	ND	ND	1.34	1.34			U
	PFECA-G	801212-59-9	ND	ND	ND	0.283	1.34			U
	PFEESA	113507-82-7	ND	ND	ND	0.223	0.283			U
	PFHxDA	67905-19-5	ND	ND	ND	1.34	1.34			U
	PFMOBA	863090-89-5	ND	ND	ND	1.34	1.34			U
PFO5DA	39492-91-6	ND	ND	ND	1.41	1.41			U	
PMPA	13140-29-9	ND	ND	ND	1.34	1.34			U	
R-EVE	2416366-22-6	3029.33	4.51	4.51	1.34	1.34				
R-PSDA	2416366-18-0	ND	ND	ND	1.34	1.34			U	
R-PSDCA	2416366-21-5	47.24	0.0703	0.0703	1.34	1.34			LB	
ES	MPFBA		4403.20	6.55				20-150%	88.1%	
	M5PFPeA		8369.09	12.4				20-150%	167.4%	Q
	M3PFBS		9310.07	13.8				20-150%	186.2%	Q
	M2-4:2 FTS		7296.20	10.9				20-150%	145.9%	
	M5PFHxA		4424.41	6.58				20-150%	88.5%	
	M3HFPO-DA		3978.81	5.92				20-150%	79.6%	
	M4PFHpA		4351.86	6.47				20-150%	87.0%	
	M3PFHxS		4517.20	6.72				20-150%	90.3%	
	M2-6:2 FTS		4829.82	7.18				20-150%	96.6%	
	M8PFOA		4235.73	6.30				20-150%	84.7%	
	M9PFNA		3873.50	5.76				20-150%	77.5%	
	M8PFOS		3814.08	5.67				20-150%	76.3%	
	M2-8:2 FTS		3409.20	5.07				20-150%	68.2%	
	M8FOSA-I		2868.60	4.27				20-150%	57.4%	
	M6PFDA		3668.94	5.46				20-150%	73.4%	
	d3-N-MeFOSAA		3162.27	4.70				20-150%	63.2%	
	d5-N-EiFOSAA		2917.80	4.34				20-150%	58.4%	
	M7PFUDa		2960.85	4.40				20-150%	59.2%	
MPFDaA		1990.66	2.96				20-150%	39.8%		
M2PFTeDA		534.10	0.794				20-150%	10.7%	Q	

Enthalpy Analytical

Job No.: 0422-804-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Client Project: NA Site: Northwest Water Plant Leland

Enthalpy ID	0422-804-002-1	Prep Batch	EU13298	Sample Vol (mL)	275.29
Sample Name	041322E01	Prep Date	2022-04-14 13:00	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-04-16 10:28	Split Factor	N/A
Sampling Date	20220413 00:00	Analyst	brneff/ITB	Method Code	WM-026
Received Date	2022-04-13 15:04	Instrument	Kili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	1779.83	2.59	2.59	0.139	0.276			
	PFPeA	2706-90-3	3576.96	5.20	5.20	0.154	0.276			
	PFFhxA	307-24-4	2870.10	4.17	4.17	0.175	0.276			
	PFFHpA	375-85-9	1490.02	2.17	2.17	0.111	0.276			
	PFOA	335-67-1	2614.52	3.80	3.80	0.161	0.276			
	PFNA	375-95-1	428.77	0.623	0.623	0.0691	0.276			B
	PFDA	335-76-2	220.96	0.321	0.321	0.0767	0.276			B
	PFUnDA	2058-94-8	82.46	0.120	0.120	0.168	0.276			LB
	PFDoDA	307-55-1	7.90	0.0115	0.0115	0.183	0.276			LB
	PFTTrDA	72629-94-8	52.88	0.0768	0.0768	0.137	0.276			L
PFTeDA	376-06-7	ND	ND	ND	0.198	0.276			U	
Sulfonates	PFBs	375-73-5	2047.85	2.98	2.98	0.322	0.322			
	PFPeS	2706-91-4	438.10	0.637	0.637	0.187	0.260			
	PFFhXS	355-46-4	1903.14	2.77	2.77	0.173	0.253			
	PFFHpS	375-92-8	ND	ND	ND	0.123	0.263			U
	PFOS	1763-23-1	5288.77	7.68	7.68	0.145	0.256			
	PFNS	68259-12-1	ND	ND	ND	0.0785	0.266			U
	PFDS	335-77-3	ND	ND	ND	0.174	0.266			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.107	0.259			U
	6:2 FTS	27619-97-2	43.56	0.0633	0.0633	0.105	0.263			LB
	8:2 FTS	39108-34-4	ND	ND	ND	0.155	0.264			U
Other	PFOSA	754-91-6	26.95	0.0392	0.0392	0.118	0.276			LB
	N-MeFOSAA	2355-31-9	84.99	0.123	0.123	0.131	0.276			LB
	N-EiFOSAA	2991-50-6	63.08	0.0917	0.0917	0.0990	0.276			L
	HFPO-DA	13252-13-6	1276.42	1.85	1.85	0.207	0.276			
	PFMOAA	674-13-5	13680.47	19.9	19.9	1.31	1.31			
	PFMOPrA	377-73-1	ND	ND	ND	0.218	0.276			U
	PFO2HxA	39492-88-1	1594.70	2.32	2.32	1.31	1.31			
	PFO3OA	39492-89-2	477.86	0.694	0.694	1.31	1.31			L
	PFO4DA	39492-90-5	ND	ND	ND	1.38	1.38			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.276	0.276			U
	ADONA	919005-14-4	ND	ND	ND	0.109	0.262			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.109	0.257			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.109	0.260			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.218	0.276			U
	EVE Acid	69087-46-3	22.06	0.0321	0.0321	1.31	1.31			LB
	FBSA	30334-69-1	262.97	0.382	0.382	0.218	0.276			
	Hydro-EVE Acid	773804-62-9	134.16	0.195	0.195	1.31	1.31			LB
	Hydrolyzed PSDA	2416366-19-1	1873.71	2.72	2.72	1.31	1.31			
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	0.276	0.276			U
	N-EiFOSA	4151-50-2	ND	ND	ND	0.218	0.276			U
	N-EiFOSE	1691-99-2	ND	ND	ND	6.54	6.54			U
	NFDHA	151772-58-6	ND	ND	ND	0.218	0.276			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.218	0.276			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.54	6.54			U
	NVHOS	1132933-86-8	ND	ND	ND	1.31	1.31			U
PEPA	267239-61-2	ND	ND	ND	1.31	1.31			U	
PFECA-G	801212-59-9	ND	ND	ND	0.276	1.31			U	
PFEEsA	113507-82-7	ND	ND	ND	0.218	0.276			U	
PFFhDA	67905-19-5	ND	ND	ND	1.31	1.31			U	
PFMOBA	863090-89-5	ND	ND	ND	1.31	1.31			U	
PFO5DA	39492-91-6	ND	ND	ND	1.38	1.38			U	
PMPA	13140-29-9	ND	ND	ND	1.31	1.31			U	
R-EVE	2416366-22-6	3409.41	4.95	4.95	1.31	1.31				
R-PSDA	2416366-18-0	ND	ND	ND	1.31	1.31			U	
R-PSDCA	2416366-21-5	44.64	0.0649	0.0649	1.31	1.31			LB	
ES	MPFBA		5021.37	7.30				20-150%	100.4%	
	M5PFPeA		8717.54	12.7				20-150%	174.4%	Q
	M3PFBs		11064.66	16.1				20-150%	221.3%	Q
	M2-4:2 FTS		8950.38	13.0				20-150%	179.0%	Q
	M5PFFhxA		4364.10	6.34				20-150%	87.3%	
	M3HFPO-DA		4438.37	6.45				20-150%	88.8%	
	M4PFFHpA		4449.05	6.46				20-150%	89.0%	
	M3PFFHXS		5094.51	7.40				20-150%	101.9%	
	M2-6:2 FTS		7933.05	11.5				20-150%	158.7%	Q
	M8PFOA		4468.56	6.49				20-150%	89.4%	
	M9PFNA		4733.06	6.88				20-150%	94.7%	
	M8PFOS		4440.12	6.45				20-150%	88.8%	
	M2-8:2 FTS		5663.15	8.23				20-150%	113.3%	
	M8FOSA-I		3905.29	5.67				20-150%	78.1%	
	M6PFDA		4700.93	6.83				20-150%	94.0%	
	d3-N-MeFOSAA		3952.81	5.74				20-150%	79.1%	
	d5-N-EiFOSAA		3952.78	5.74				20-150%	79.1%	
	M7PFUdA		3930.46	5.71				20-150%	78.6%	
MPFDaA		2694.43	3.92				20-150%	53.9%		
M2PFTeDA		892.30	1.30				20-150%	17.8%	Q	

QC Data



Enthalpy Analytical

Job No.: 0422-804-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Client Project: NA Site: Northwest Water Plant Leland

Enthalpy ID	MB-13298-PFAS	Prep Batch	EU13298	Sample Vol (mL)	250
Sample Name	MB-13298-PFAS	Prep Date	2022-04-14 13:00	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-04-16 06:59	Split Factor	N/A
Sampling Date		Analyst	brneff/ITB	Method Code	WM-026
Received Date		Instrument	Kili	Sample Type	Blank

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	ND	ND	ND	0.153	0.304			U
	PFPeA	2706-90-3	79.68	0.127	0.127	0.170	0.304			L
	PFHxA	307-24-4	39.98	0.0640	0.0640	0.193	0.304			L
	PFHpA	375-85-9	76.36	0.122	0.122	0.177	0.304			J
	PFOA	335-67-1	ND	ND	ND	0.177	0.304			U
	PFNA	375-95-1	58.81	0.0941	0.0941	0.0761	0.304			J
	PFDA	335-76-2	39.52	0.0632	0.0632	0.0845	0.304			L
	PFUnDA	2058-94-8	51.33	0.0821	0.0821	0.185	0.304			L
	PFDoDA	307-55-1	15.51	0.0248	0.0248	0.202	0.304			L
	PFTrDA	72629-94-8	ND	ND	ND	0.151	0.304			U
	PFTeDA	376-06-7	ND	ND	ND	0.218	0.304			U
	PFBS	375-73-5	ND	ND	ND	0.355	0.355			U
	PFPeS	2706-91-4	ND	ND	ND	0.206	0.286			U
	PFHxS	355-46-4	ND	ND	ND	0.191	0.278			U
PFHpS	375-92-8	ND	ND	ND	0.135	0.290			U	
Sulfonates	PFOS	1763-23-1	61.89	0.0990	0.0990	0.160	0.282			L
	PFNS	68259-12-1	10.11	0.0162	0.0162	0.0864	0.293			L
	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	9.81	0.0157	0.0157	0.116	0.290			L
	8:2 FTS	39108-34-4	ND	ND	ND	0.171	0.291			U
	PFOSA	754-91-6	40.69	0.0651	0.0651	0.130	0.304			L
	N-MeFOSAA	2355-31-9	94.47	0.151	0.151	0.144	0.304			J
Other	N-EiFOSAA	2991-50-6	ND	ND	ND	0.109	0.304			U
	HFPO-DA	13252-13-6	ND	ND	ND	0.228	0.304			U
	PFMOAA	674-13-5	64.01	0.102	0.102	1.44	1.44			L
	PFMOPrA	377-73-1	1.07	0.00171	0.00171	0.240	0.304			L
	PFO2HxA	39492-88-1	ND	ND	ND	1.44	1.44			U
	PFO3OA	39492-89-2	ND	ND	ND	1.44	1.44			U
	PFO4DA	39492-90-5	ND	ND	ND	1.52	1.52			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.304	0.304			U
	ADONA	919005-14-4	22.32	0.0357	0.0357	0.120	0.288			L
	9Cl-PF3ONS	756426-58-1	7.86	0.0126	0.0126	0.120	0.283			L
	11Cl-PF3OUdS	763051-92-9	9.05	0.0145	0.0145	0.120	0.286			L
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	0.304			U
	EVE Acid	69087-46-3	34.25	0.0548	0.0548	1.44	1.44			L
	FBSA	30334-69-1	22.61	0.0362	0.0362	0.240	0.304			L
	Hydro-EVE Acid	773804-62-9	30.93	0.0495	0.0495	1.44	1.44			L
	Hydrolyzed PSDA	2416366-19-1	49.81	0.0797	0.0797	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	68.09	0.109	0.109	0.240	0.304			L
	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
	PFCECA-G	801212-59-9	44.47	0.0711	0.0711	0.304	1.44			L
	PFEEESA	113507-82-7	57.03	0.0912	0.0912	0.240	0.304			L
	PFHxDA	67905-19-5	ND	ND	ND	1.44	1.44			U
	PFMOBA	863090-89-5	ND	ND	ND	1.44	1.44			U
PFOSDA	39492-91-6	300.64	0.481	0.481	1.52	1.52			L	
PMPA	13140-29-9	ND	ND	ND	1.44	1.44			U	
R-EVE	2416366-22-6	ND	ND	ND	1.44	1.44			U	
R-PSDA	2416366-18-0	ND	ND	ND	1.44	1.44			U	
R-PSDCA	2416366-21-5	39.48	0.0632	0.0632	1.44	1.44			L	
ES	MPFBA		5429.46	8.69				20-150%	108.6%	
	M5PFPeA		5555.71	8.89				20-150%	111.1%	
	M3PFBS		5517.83	8.83				20-150%	110.4%	
	M2-4:2 FTS		5604.86	8.97				20-150%	112.1%	
	M5PFHxA		5320.51	8.51				20-150%	106.4%	
	M3HFPO-DA		5384.52	8.62				20-150%	107.7%	
	M4PFHpA		5023.21	8.04				20-150%	100.5%	
	M3PFHxS		5125.28	8.20				20-150%	102.5%	
	M2-6:2 FTS		5467.55	8.75				20-150%	109.4%	
	M8PFOA		4802.29	7.68				20-150%	96.0%	
	M9PFNA		3993.75	6.39				20-150%	79.9%	
	M8PFOS		3836.51	6.14				20-150%	76.7%	
	M2-8:2 FTS		3587.05	5.74				20-150%	71.7%	
	M8FOSA-I		2516.08	4.03				20-150%	50.3%	
	M6PFDA		3763.56	6.02				20-150%	75.3%	
	d3-N-MeFOSAA		3114.63	4.98				20-150%	62.3%	
	d5-N-EiFOSAA		3038.60	4.86				20-150%	60.8%	
	M7PFUdA		2935.86	4.70				20-150%	58.7%	
MPFDaA		2214.34	3.54				20-150%	44.3%		
M2PFTeDA		713.96	1.14				20-150%	14.3%	Q	

Enthalpy Analytical

Job No.: 0422-804-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Client Project: NA Site: Northwest Water Plant Leland

Enthalpy ID	OPR-13298-PFAS	Prep Batch	EU13298	Sample Vol (mL)	250
Sample Name	OPR-13298-PFAS	Prep Date	2022-04-14 13:00	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-04-16 07:22	Split Factor	N/A
Sampling Date		Analyst	brneff/ITB	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	12560.22	20.1	20.1	0.153	0.304	73-129%	100.5%	
	PFPeA	2706-90-3	11909.54	19.1	19.1	0.170	0.304	72-129%	95.3%	
	PFHxA	307-24-4	12699.38	20.3	20.3	0.193	0.304	72-129%	101.6%	
	PFHpA	375-85-9	12692.01	20.3	20.3	0.122	0.304	72-130%	101.5%	
	PFOA	335-67-1	12793.03	20.5	20.5	0.177	0.304	71-133%	102.3%	
	PFNA	375-95-1	12258.07	19.6	19.6	0.0761	0.304	69-130%	98.1%	
	PFDA	335-76-2	12546.03	20.1	20.1	0.0845	0.304	71-129%	100.4%	
	PFUnDA	2058-94-8	13008.19	20.8	20.8	0.185	0.304	69-133%	104.1%	
	PFDoDA	307-55-1	12519.66	20.0	20.0	0.202	0.304	72-134%	100.2%	
	PFTTrDA	72629-94-8	24971.09	40.0	40.0	0.151	0.304	65-144%	199.8%	Q
PFTeDA	376-06-7	12084.00	19.3	19.3	0.218	0.304	71-132%	96.7%		
Sulfonates	PFBS	375-73-5	10568.04	16.9	16.9	0.355	0.355	72-134%	95.3%	
	PFPeS	2706-91-4	10937.69	17.5	17.5	0.206	0.286	71-127%	93.0%	
	PFHxS	355-46-4	11547.36	18.5	18.5	0.191	0.278	68-131%	101.1%	
	PFHpS	375-92-8	14390.09	23.0	23.0	0.135	0.290	69-134%	120.8%	
	PFOS	1763-23-1	11293.15	18.1	18.1	0.160	0.282	65-140%	97.4%	
	PFNS	68259-12-1	9015.19	14.4	14.4	0.0864	0.293	69-127%	75.0%	
	PFDS	335-77-3	6674.31	10.7	10.7	0.192	0.293	53-142%	55.3%	
	4:2 FTS	757124-72-4	12228.11	19.6	19.6	0.118	0.285	63-143%	104.4%	
6:2 FTS	27619-97-2	11932.32	19.1	19.1	0.116	0.290	64-140%	100.4%		
8:2 FTS	39108-34-4	13970.75	22.4	22.4	0.171	0.291	67-138%	116.4%		
Other	PFOSA	754-91-6	12442.02	19.9	19.9	0.130	0.304	67-137%	99.5%	
	N-MeFOSAA	2355-31-9	12459.68	19.9	19.9	0.144	0.304	65-136%	99.7%	
	N-EtFOSAA	2991-50-6	11943.48	19.1	19.1	0.109	0.304	61-135%	95.5%	
	HFPO-DA	13252-13-6	11283.69	18.1	18.1	0.228	0.304	70-130%	90.3%	
ES	MPFBA		4634.54	7.42				20-150%	92.7%	
	M5PFPeA		4981.94	7.97				20-150%	99.6%	
	M3PFBS		4945.37	7.91				20-150%	98.9%	
	M2-4:2 FTS		4866.63	7.79				20-150%	97.3%	
	M5PFHxA		4450.98	7.12				20-150%	89.0%	
	M3HFPO-DA		5031.12	8.05				20-150%	100.6%	
	M4PFHpA		4305.26	6.89				20-150%	86.1%	
	M3PFHxS		4288.65	6.86				20-150%	85.8%	
	M2-6:2 FTS		4463.24	7.14				20-150%	89.3%	
	M8PFOA		4087.48	6.54				20-150%	81.7%	
	M9PFNA		3741.42	5.99				20-150%	74.8%	
	M8PFOS		3571.45	5.71				20-150%	71.4%	
	M2-8:2 FTS		2345.03	3.75				20-150%	46.9%	
	M8FOSA-I		2308.73	3.69				20-150%	46.2%	
	M6PFDA		3411.64	5.46				20-150%	68.2%	
	d3-N-MeFOSAA		2721.36	4.35				20-150%	54.4%	
	d5-N-EtFOSAA		2500.75	4.00				20-150%	50.0%	
	M7PFUDa		2377.01	3.80				20-150%	47.5%	
	MPFDoA		1740.00	2.78				20-150%	34.8%	
	M2PFTeDA		550.20	0.880				20-150%	11.0%	Q

Narrative Summary



Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0422-804-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	NA Site: Northwest Water Plant Leland

1. Custody

Megan Holden received the samples on April 13, 2022 at 4.2 °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
0422-804-001-1	041322S01	Aqueous
0422-804-002-1	041322E01	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

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.

The supplemental analysis used a single point calibrator forced through zero.

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0422-804-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	NA Site: Northwest Water Plant Leland

4. Calibration, continued

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

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

QC samples that did not meet method acceptance criteria were:

PFAS PFTrDA fell above method criteria in OPR-13298-PFAS. This analyte was not detected in the samples; therefore, the data is reportable with no adverse impact.

PFAS M2PFTeDA was detected in MB-13298-PFAS above 1/2 LOQ. This analyte was not detected above LOD in samples and the data is reported without 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

This report provides all results including detections below LOD following client instruction.

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.

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0422-804-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	NA Site: Northwest Water Plant Leland

4. Calibration, continued

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

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

QC samples that did not meet method acceptance criteria were:

PFAS PFTrDA fell above method criteria in OPR-13298-PFAS. This analyte was not detected in the samples; therefore, the data is reportable with no adverse impact.

PFAS M2PFTeDA was detected in MB-13298-PFAS above 1/2 LOQ. This analyte was not detected above LOD in samples and the data is reported without 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

This report provides all results including detections below LOD following client instruction.

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)
11CI-PF3OUdS	763051-92-9	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
9CI-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-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



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

