

Brunswick County Public Utilities - NC

PO Box 249
Bolivia, NC 28422-0249

Northwest Water Plant

Leland, N.C.

Samples Received: 3/16/2023

Analytical Report 0323-769

PFAS by Isotope Dilution PFAS

Report Issue Date: 4/6/2023

I certify that to the best of my knowledge all analytical data presented in this report have been checked for completeness, accuracy, errors and legibility in addition to having 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 21 pages. This report shall not be reproduced except in full without approval of the laboratory. This will provide assurance that parts of the report are not taken out of context.

Signature:



Laura Boivin, QA Associate II

Amendments:



Enthalpy Analytical, LLC – Ultratrace
Mark Hager, Project Manager
O: 910-876-6894 / F: 910-212-6886
mark.hager@enthalpy.com / www.enthalpy.com
2714 Exchange Drive, Wilmington, NC 28405

Summary of Results

Enthalpy Analytical

Job No.: 0323-769-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Client Project: N/A Site: Northwest Water Plant Leland, N.C.

Summary

	Compound	CAS	031623-SO1 ng/L	031623-EO1 ng/L
Acids	PFBA	375-22-4	3.16	3.76
	PFPeA	2706-90-3	5.02	6.82
	PFHxA	307-24-4	5.80	6.63
	PFHpA	375-85-9	2.86	3.59
	PFOA	335-67-1	5.58	6.40
	PFNA	375-95-1	0.714	0.617
	PFDA	335-76-2	0.452 J	0.323 J
	PFUnDA	2058-94-8	ND U	ND U
	PFDoDA	307-55-1	0.0180 L	ND U
	PFTTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U
	Sulfonates	PFBS	375-73-5	3.67
PFPeS		2706-91-4	0.620	0.663
PFHxS		355-46-4	4.35	4.06
PFHpS		375-92-8	0.365 J	0.251 L
PFOS		1763-23-1	11.5	9.70
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	0.0686 L	0.0663 L
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	ND U
	N-EtFOSAA	2991-50-6	ND U	ND U
	HFPO-DA	13252-13-6	3.00	3.68
	PFMOAA	674-13-5	15.0	16.4
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	3.52	4.24
	PFO3OA	39492-89-2	ND U	ND U
	PFO4DA	39492-90-5	ND U	ND U
	ADONA	919005-14-4	ND U	ND U
	9Cl-PF3ONS	756426-58-1	ND U	ND U
	11Cl-PF3OUdS	763051-92-9	ND U	ND U
	10:2 FTS	120226-60-0	ND U	ND U
	EVE Acid	69087-46-3	ND U	ND U
	FBSA	30334-69-1	0.0934 L	0.135 L
	Hydro-EVE Acid	773804-62-9	0.135 L	0.171 L
	Hydrolyzed PSDA	2416366-19-1	2.60	3.68
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND U	ND U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	0.134 L	0.318 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	1.26	ND U
	PEPA	267239-61-2	1.29	1.56
	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	6.20	5.98
R-EVE	2416366-22-6	7.37	12.7	
R-PSDA	2416366-18-0	5.04	7.79	
R-PSDCA	241636-21-5	ND U	ND U	

Detailed Results

Enthalpy Analytical

Job No.: 0323-769-1 PFAS by Isotope Dilution (non-potable water)
 Brunswick County Public Utilities - NC Client Project: N/A Site: Northwest Water Plant Leland, N.C.

Enthalpy ID	0323-769-001-1	Prep Batch	EU14879	Sample Vol (mL)	274.92
Sample Name	031623-SO1	Prep Date	2023-03-17 14:30	Extract Vol (mL)	0.4
Matrix	AQ	Analysis Date	2023-03-20 23:54	Split Factor	N/A
Sampling Date	2023-03-16 13:00	Analyst	bmay	Method Code	WM-026
Received Date	2023-03-16 13:33	Instrument	Sauron	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	2174.26	3.16	3.16	0.231	0.582				
	PFPeA	2706-90-3	3449.13	5.02	5.02	0.166	0.582				
	PFHxA	307-24-4	3984.34	5.80	5.80	0.195	0.582				
	PFHpA	375-85-9	1968.04	2.86	2.86	0.204	0.582				
	PFOA	335-67-1	3835.39	5.58	5.58	0.133	0.582				
	PFNA	375-95-1	490.53	0.714	0.714	0.131	0.582				
	PFDA	335-76-2	310.54	0.452	0.452	0.166	0.582			J	
	PFUnDA	2058-94-8	ND	ND	ND	0.131	0.582			U	
	PFDODA	307-55-1	12.35	0.0180	0.0180	0.236	0.582			L	
	PFTeDA	72629-94-8	ND	ND	ND	0.193	0.582			U	
	PFTODA	376-06-7	ND	ND	ND	0.222	0.582			U	
	Sulfonates	PFBS	375-73-5	2520.11	3.67	3.67	0.309	0.582			
PFPeS		2706-91-4	426.30	0.620	0.620	0.119	0.548				
PFHxS		355-46-4	2990.58	4.35	4.35	0.449	0.533				
PFHpS		375-92-8	251.07	0.365	0.365	0.282	0.554			J	
PFOS		1763-23-1	7928.02	11.5	11.5	0.307	0.539				
PFNS		68259-12-1	ND	ND	ND	0.181	0.561			U	
PFDS		335-77-3	ND	ND	ND	0.306	0.561			U	
4:2 FTS		757124-72-4	ND	ND	ND	0.0755	0.545			U	
6:2 FTS		27619-97-2	47.16	0.0686	0.0686	0.275	0.554			L	
8:2 FTS		39108-34-4	ND	ND	ND	0.130	0.557			U	
Other		PFOSA	754-91-6	ND	ND	ND	0.0817	0.582			U
		N-MeFOSAA	2355-31-9	ND	ND	ND	0.164	0.582			U
	N-EiFOSAA	2991-50-6	ND	ND	ND	0.236	0.582			U	
	HFPO-DA	13252-13-6	2063.50	3.00	3.00	0.0617	0.582				
	PFMOAA	674-13-5	10325.06	15.0	15.0	0.295	0.582				
	PFMOPiA	377-73-1	ND	ND	ND	0.207	0.582			U	
	PFO2HxA	39492-88-1	2417.91	3.52	3.52	0.187	0.582				
	PFO3OA	39492-89-2	ND	ND	ND	0.267	0.582			U	
	PFO4DA	39492-90-5	ND	ND	ND	0.460	2.91			U	
	ADONA	919005-14-4	ND	ND	ND	0.158	0.551			U	
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.373	0.542			U	
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.275	0.548			U	
	10:2 FTS	120226-60-0	ND	ND	ND	0.446	0.582			U	
	EVE Acid	69087-46-3	ND	ND	ND	0.186	1.31			U	
	FBSA	30334-69-1	64.22	0.0934	0.0934	0.276	0.582			L	
	Hydro-EVE Acid	773804-62-9	92.63	0.135	0.135	0.191	0.582			L	
	Hydrolyzed PSDA	2416366-19-1	1787.74	2.60	2.60	0.387	0.582				
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND	ND	ND	0.311	0.582			L	
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	92.17	0.134	0.134	0.482	0.582			U	
	N-EiFOSA	4151-50-2	ND	ND	ND	0.360	0.582			U	
	N-EiFOSE	1691-99-2	ND	ND	ND	0.891	2.62			U	
	NFDHA	151772-58-6	ND	ND	ND	0.122	0.582			U	
	N-MeFOSA	31506-32-8	ND	ND	ND	0.240	0.582			U	
	N-MeFOSE	24448-09-7	ND	ND	ND	0.553	2.62			U	
	NVHOS	1132933-86-8	865.73	1.26	1.26	0.0897	0.582				
	PEPA	267239-61-2	888.91	1.29	1.29	0.109	0.582				
	PFECA-G	801212-59-9	ND	ND	ND	0.0777	0.582			U	
	PFEESA	113507-82-7	ND	ND	ND	0.175	0.582			U	
	PFHxDA	67905-19-5	ND	ND	ND	0.309	0.582			U	
	PFMOBA	863090-89-5	ND	ND	ND	0.977	1.31			U	
	PFOSDA	39492-91-6	ND	ND	ND	0.466	2.91			U	
	PMPA	13140-29-9	4259.95	6.20	6.20	0.137	0.582				
	R-EVE	2416366-22-6	5062.04	7.37	7.37	0.966	1.31				
	R-PSDA	2416366-18-0	3463.97	5.04	5.04	2.56	2.56				
	R-PSDCA	2416366-21-5	ND	ND	ND	0.246	0.582			U	
	ES	MPFBA		3816.79	5.55				20-150%	76.3%	
M5PFPeA			5170.91	7.52				20-150%	103.4%		
M3PFBS			6614.97	9.62				20-150%	132.3%		
M2-4:2 FTS			10065.39	14.6				20-150%	201.3%	Q	
M5PFHxA			3420.33	4.98				20-150%	68.4%		
M3HFPO-DA			3159.53	4.60				20-150%	63.2%		
M4PFHpA			3912.00	5.69				20-150%	78.2%		
M3PFHxS			4328.63	6.30				20-150%	86.6%		
M2-6:2 FTS			6865.24	9.99				20-150%	137.3%		
M8PFOA			3831.95	5.58				20-150%	76.6%		
M9PFNA			4535.54	6.60				20-150%	90.7%		
M8PFOS			4978.47	7.24				20-150%	99.6%		
M2-8:2 FTS			6040.76	8.79				20-150%	120.8%		
M8FOSA-I			4209.71	6.13				20-150%	84.2%		
M6PFDA			4214.63	6.13				20-150%	84.3%		
d3-N-MeFOSAA			5031.52	7.32				20-150%	100.6%		
d5-N-EiFOSAA			5286.46	7.69				20-150%	105.7%		
M7PFUdA			3784.20	5.51				20-150%	75.7%		
MPFDoA			2976.31	4.33				20-150%	59.5%		
M2PFTeDA			2124.88	3.09				20-150%	42.5%		
d3-N-MeFOSA			3322.60	4.83				10-200%	33.2%		
d5-N-EiFOSA		3137.19	4.56				10-200%	31.4%			
d7-N-MeFOSE		6207.91	9.03				10-200%	62.1%			
d9-N-EiFOSE		5170.57	7.52				10-200%	51.7%			

Enthalpy Analytical

Job No.: 0323-769-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Client Project: N/A Site: Northwest Water Plant Leland, N.C.

Enthalpy ID	0323-769-002-1	Prep Batch	EU14879	Sample Vol (mL)	286.43
Sample Name	031623-EO1	Prep Date	2023-03-17 14:30	Extract Vol (mL)	0.4
Matrix	AQ	Analysis Date	2023-03-21 00:16	Split Factor	N/A
Sampling Date	2023-03-16 13:00	Analyst	bmay	Method Code	WM-026
Received Date	2023-03-16 13:33	Instrument	Sauron	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	2690.28	3.76	3.76	0.222	0.559			
	PFPeA	2706-90-3	4886.15	6.82	6.82	0.160	0.559			
	PFHxA	307-24-4	4744.91	6.63	6.63	0.187	0.559			
	PFHpA	375-85-9	2573.87	3.59	3.59	0.196	0.559			
	PFOA	335-67-1	4585.11	6.40	6.40	0.128	0.559			
	PFNA	375-95-1	441.96	0.617	0.617	0.126	0.559			
	PFDA	335-76-2	231.36	0.323	0.323	0.160	0.559			J
	PFUnDA	2058-94-8	ND	ND	ND	0.126	0.559			U
	PFDODA	307-55-1	ND	ND	ND	0.227	0.559			U
	PFTeDA	72629-94-8	ND	ND	ND	0.185	0.559			U
	PFTeDA	376-06-7	ND	ND	ND	0.213	0.559			U
	Sulfonates	PFBS	375-73-5	3771.61	5.27	5.27	0.297	0.559		
PFPeS		2706-91-4	474.91	0.663	0.663	0.115	0.526			
PFHxS		355-46-4	2906.73	4.06	4.06	0.431	0.512			
PFHpS		375-92-8	179.68	0.251	0.251	0.271	0.532			L
PFOS		1763-23-1	6946.38	9.70	9.70	0.295	0.517			
PFNS		68259-12-1	ND	ND	ND	0.173	0.538			U
PFDS		335-77-3	ND	ND	ND	0.293	0.538			U
4:2 FTS		757124-72-4	ND	ND	ND	0.0724	0.523			U
6:2 FTS		27619-97-2	47.51	0.0663	0.0663	0.264	0.532			L
8:2 FTS		39108-34-4	ND	ND	ND	0.125	0.535			U
PFOSA		754-91-6	ND	ND	ND	0.0784	0.559			U
N-MeFOSAA		2355-31-9	ND	ND	ND	0.157	0.559			U
N-EiFOSAA		2991-50-6	ND	ND	ND	0.227	0.559			U
HFPO-DA		13252-13-6	2636.02	3.68	3.68	0.0592	0.559			
Other	PFMOAA	674-13-5	11770.07	16.4	16.4	0.283	0.559			
	PFMOPiA	377-73-1	ND	ND	ND	0.199	0.559			U
	PFO2HxA	39492-88-1	3035.09	4.24	4.24	0.180	0.559			
	PFO3OA	39492-89-2	ND	ND	ND	0.257	0.559			U
	PFO4DA	39492-90-5	ND	ND	ND	0.442	2.79			U
	ADONA	919005-14-4	ND	ND	ND	0.151	0.529			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.358	0.520			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.264	0.526			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.428	0.559			U
	EVE Acid	69087-46-3	ND	ND	ND	0.178	1.26			U
	FBSA	30334-69-1	96.78	0.135	0.135	0.265	0.559			L
	Hydro-EVE Acid	773804-62-9	122.12	0.171	0.171	0.183	0.559			L
	Hydrolyzed PSDA	2416366-19-1	2635.67	3.68	3.68	0.372	0.559			
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND	ND	ND	0.299	0.559			U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	227.82	0.318	0.318	0.463	0.559			L
	N-EiFOSA	4151-50-2	ND	ND	ND	0.346	0.559			U
	N-EiFOSE	1691-99-2	ND	ND	ND	0.855	2.51			U
	NFDHA	151772-58-6	ND	ND	ND	0.117	0.559			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.230	0.559			U
	N-MeFOSE	24448-09-7	ND	ND	ND	0.531	2.51			U
	NVHOS	1132933-86-8	ND	ND	ND	0.0861	0.559			U
	PEPA	267239-61-2	1114.27	1.56	1.56	0.105	0.559			
	PFECA-G	801212-59-9	ND	ND	ND	0.0745	0.559			U
	PFEESA	113507-82-7	ND	ND	ND	0.168	0.559			U
	PFHxDA	67905-19-5	ND	ND	ND	0.297	0.559			U
	PFMOBA	863090-89-5	ND	ND	ND	0.937	1.26			U
	PFOSDA	39492-91-6	ND	ND	ND	0.447	2.79			U
	PMPA	13140-29-9	4280.70	5.98	5.98	0.132	0.559			
	R-EVE	2416366-22-6	9087.29	12.7	12.7	0.927	1.26			
	R-PSDA	2416366-18-0	5576.05	7.79	7.79	2.46	2.46			
	R-PSDCA	241636-21-5	ND	ND	ND	0.236	0.559			U
	ES	MPFBA		4205.10	5.87				20-150%	84.1%
M5PFPeA			5106.73	7.13				20-150%	102.1%	
M3PFBS			6383.67	8.91				20-150%	127.7%	
M2-4:2 FTS			11026.53	15.4				20-150%	220.5%	Q
M5PFHxA			3339.15	4.66				20-150%	66.8%	
M3HFPO-DA			3109.64	4.34				20-150%	62.2%	
M4PFHpA			3722.43	5.20				20-150%	74.4%	
M3PFHxS			4025.10	5.62				20-150%	80.5%	
M2-6:2 FTS			8108.11	11.3				20-150%	162.2%	Q
M8PFOA			4001.08	5.59				20-150%	80.0%	
M9PFNA			4424.98	6.18				20-150%	88.5%	
M8PFOS			4592.13	6.41				20-150%	91.8%	
M2-8:2 FTS			6102.84	8.52				20-150%	122.1%	
M8FOSA-I			3735.92	5.22				20-150%	74.7%	
M6PFDA			4165.43	5.82				20-150%	83.3%	
d3-N-MeFOSAA			4878.78	6.81				20-150%	97.6%	
d5-N-EiFOSAA			5091.51	7.11				20-150%	101.8%	
M7PFUdA			3536.42	4.94				20-150%	70.7%	
MPFDoA			2709.83	3.78				20-150%	54.2%	
M2PFTeDA			2430.79	3.39				20-150%	48.6%	
d3-N-MeFOSA			3950.60	5.52				10-200%	39.5%	
d5-N-EiFOSA			4129.82	5.77				10-200%	41.3%	
d7-N-MeFOSE			6863.18	9.58				10-200%	68.6%	
d9-N-EiFOSE		6340.76	8.85				10-200%	63.4%		

QC Data

Enthalpy Analytical

Job No.: 0323-769-1 PFAS by Isotope Dilution (non-potable water)
 Brunswick County Public Utilities - NC Client Project: N/A Site: Northwest Water Plant Leland, N.C.

Enthalpy ID	MB-14879-PFAS	Prep Batch	EU14879	Sample Vol (mL)	250
Sample Name	MB-14879-PFAS	Prep Date	2023-03-17 14:30	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2023-03-20 21:15	Split Factor	N/A
Sampling Date		Analyst	bmay	Method Code	WM-026
Received Date		Instrument	Sauron	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	0.254	0.640			U	
	PFPeA	2706-90-3	ND	ND	ND	0.183	0.640			U	
	PFHxA	307-24-4	ND	ND	ND	0.214	0.640			U	
	PFHpA	375-85-9	ND	ND	ND	0.224	0.640			U	
	PFOA	335-67-1	ND	ND	ND	0.146	0.640			U	
	PFNA	375-95-1	ND	ND	ND	0.145	0.640			U	
	PFDA	335-76-2	ND	ND	ND	0.183	0.640			U	
	PFUnDA	2058-94-8	ND	ND	ND	0.145	0.640			U	
	PFDaDA	307-55-1	ND	ND	ND	0.260	0.640			U	
	PFTeDA	72629-94-8	ND	ND	ND	0.212	0.640			U	
	PFTeDA	376-06-7	ND	ND	ND	0.244	0.640			U	
	Sulfonates	PFBs	375-73-5	ND	ND	ND	0.340	0.640			U
		PFPeS	2706-91-4	ND	ND	ND	0.131	0.603			U
		PFHxS	355-46-4	ND	ND	ND	0.494	0.586			U
PFHpS		375-92-8	ND	ND	ND	0.310	0.610			U	
PFOS		1763-23-1	ND	ND	ND	0.338	0.593			U	
PFNS		68259-12-1	ND	ND	ND	0.199	0.616			U	
PFDS		335-77-3	ND	ND	ND	0.336	0.616			U	
4:2 FTS		757124-72-4	ND	ND	ND	0.0830	0.600			U	
6:2 FTS		27619-97-2	ND	ND	ND	0.302	0.610			U	
8:2 FTS		39108-34-4	ND	ND	ND	0.143	0.613			U	
PFOSA		754-91-6	ND	ND	ND	0.0898	0.640			U	
N-MeFOSAA		2355-31-9	ND	ND	ND	0.180	0.640			U	
N-EiFOSAA		2991-50-6	ND	ND	ND	0.260	0.640			U	
HFPO-DA		13252-13-6	ND	ND	ND	0.0678	0.640			U	
Other	PFOAA	674-13-5	ND	ND	ND	0.324	0.640			U	
	PFMOPiA	377-73-1	ND	ND	ND	0.228	0.640			U	
	PFO2HxA	39492-88-1	ND	ND	ND	0.206	0.640			U	
	PFO3OA	39492-89-2	ND	ND	ND	0.294	0.640			U	
	PFO4DA	39492-90-5	ND	ND	ND	0.506	3.20			U	
	ADONA	919005-14-4	ND	ND	ND	0.173	0.606			U	
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.410	0.596			U	
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.302	0.603			U	
	10:2 FTS	120226-60-0	ND	ND	ND	0.490	0.640			U	
	EVE Acid	69087-46-3	ND	ND	ND	0.204	1.44			U	
	FBSA	30334-69-1	ND	ND	ND	0.304	0.640			U	
	Hydro-EVE Acid	773804-62-9	ND	ND	ND	0.210	0.640			U	
	Hydrolyzed PSDA	2416366-19-1	ND	ND	ND	0.426	0.640			U	
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND	ND	ND	0.342	0.640			U	
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	ND	ND	ND	0.530	0.640			U	
	N-EiFOSA	4151-50-2	ND	ND	ND	0.396	0.640			U	
	N-EiFOSE	1691-99-2	ND	ND	ND	0.980	2.88			U	
	NFDHA	151772-58-6	ND	ND	ND	0.135	0.640			U	
	N-MeFOSA	31506-32-8	ND	ND	ND	0.264	0.640			U	
	N-MeFOSE	24448-09-7	ND	ND	ND	0.608	2.88			U	
	NVHOS	1132933-86-8	ND	ND	ND	0.0986	0.640			U	
	PEPA	267239-61-2	ND	ND	ND	0.120	0.640			U	
	PFECA-G	801212-59-9	ND	ND	ND	0.0854	0.640			U	
	PFEESA	113507-82-7	ND	ND	ND	0.192	0.640			U	
	PFHxDA	67905-19-5	ND	ND	ND	0.340	0.640			U	
	PFMOBA	863090-89-5	ND	ND	ND	1.07	1.44			U	
	PFOSDA	39492-91-6	ND	ND	ND	0.512	3.20			U	
	PMPA	13140-29-9	ND	ND	ND	0.151	0.640			U	
	R-EVE	2416366-22-6	ND	ND	ND	1.06	1.44			U	
	R-PSDA	2416366-18-0	ND	ND	ND	2.82	2.82			U	
	R-PSDCA	2416366-21-5	ND	ND	ND	0.270	0.640			U	
	ES	MPFBA		4273.06	6.84				20-150%	85.5%	
		M5PFPeA		3978.53	6.37				20-150%	79.6%	
		M3PFBS		4423.19	7.08				20-150%	88.5%	
		M2-4:2 FTS		8842.01	14.1				20-150%	176.8%	Q
		M5PFHxA		4197.01	6.72				20-150%	83.9%	
		M3HFPO-DA		3910.60	6.26				20-150%	78.2%	
		M4PFHpA		4346.12	6.95				20-150%	86.9%	
M3PFHxS			4524.05	7.24				20-150%	90.5%		
M2-6:2 FTS			6437.61	10.3				20-150%	128.8%		
M8PFOA			4081.24	6.53				20-150%	81.6%		
M9PFNA			4558.10	7.29				20-150%	91.2%		
M8PFOS			4329.81	6.93				20-150%	86.6%		
M2-8:2 FTS			5298.60	8.48				20-150%	106.0%		
M8FOSA-I			3438.20	5.50				20-150%	68.8%		
M6PFDA			3980.08	6.37				20-150%	79.6%		
d3-N-MeFOSAA			4665.12	7.46				20-150%	93.3%		
d5-N-EiFOSAA			4030.38	6.45				20-150%	80.6%		
M7PFUdA			3252.03	5.20				20-150%	65.0%		
MPFDaA			2108.18	3.37				20-150%	42.2%		
M2PFTeDA			1789.49	2.86				20-150%	35.8%		
d3-N-MeFOSA			3087.08	4.94				10-200%	30.9%		
d5-N-EiFOSA		2898.44	4.64				10-200%	29.0%			
d7-N-MeFOSE		6028.78	9.65				10-200%	60.3%			
d9-N-EiFOSE		4988.93	7.98				10-200%	49.9%			

Enthalpy Analytical

Job No.: 0323-769-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Client Project: N/A Site: Northwest Water Plant Leland, N.C.

Enthalpy ID	OPR-14879-PFAS	Prep Batch	EU14879	Sample Vol (mL)	250
Sample Name	OPR-14879-PFAS	Prep Date	2023-03-17 14:30	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2023-03-20 21:38	Split Factor	N/A
Sampling Date		Analyst	bmay	Method Code	WM-026
Received Date		Instrument	Sauron	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	12886.48	20.6	20.6	0.254	0.640	73-129%	103.1%	
	PFPeA	2706-90-3	11673.15	18.7	18.7	0.183	0.640	72-129%	93.4%	
	PFHxA	307-24-4	12648.02	20.2	20.2	0.214	0.640	72-129%	101.2%	
	PFHpA	375-85-9	13512.05	21.6	21.6	0.224	0.640	72-130%	108.1%	
	PFOA	335-67-1	11512.39	18.4	18.4	0.146	0.640	71-133%	92.1%	
	PFNA	375-95-1	12062.31	19.3	19.3	0.145	0.640	69-130%	96.5%	
	PFDA	335-76-2	13165.64	21.1	21.1	0.183	0.640	71-129%	105.3%	
	PFUnDA	2058-94-8	13582.04	21.7	21.7	0.145	0.640	69-133%	108.7%	
	PFDODA	307-55-1	13190.58	21.1	21.1	0.260	0.640	72-134%	105.5%	
	PFTeDA	72629-94-8	31805.20	50.9	50.9	0.212	0.640	65-144%	254.4%	Q
Sulfonates	PFBS	375-73-5	11916.59	19.1	19.1	0.340	0.640	72-134%	107.5%	
	PFPeS	2706-91-4	9515.30	15.2	15.2	0.131	0.603	71-127%	80.9%	
	PFHxS	355-46-4	11461.00	18.3	18.3	0.494	0.586	68-131%	100.3%	
	PFHpS	375-92-8	12726.73	20.4	20.4	0.310	0.610	69-134%	106.8%	
	PFOS	1763-23-1	10855.22	17.4	17.4	0.338	0.593	65-140%	93.6%	
	PFNS	68259-12-1	11105.70	17.8	17.8	0.199	0.616	69-127%	92.4%	
	PFDS	335-77-3	9962.83	15.9	15.9	0.336	0.616	53-142%	82.6%	
	4:2 FTS	757124-72-4	12317.95	19.7	19.7	0.0830	0.600	63-143%	105.2%	
	6:2 FTS	27619-97-2	10562.98	16.9	16.9	0.302	0.610	64-140%	88.9%	
	8:2 FTS	39108-34-4	12051.58	19.3	19.3	0.143	0.613	67-138%	100.4%	
Other	PFOSA	754-91-6	14586.37	23.3	23.3	0.0898	0.640	67-137%	116.7%	
	N-MeFOSAA	2355-31-9	13244.82	21.2	21.2	0.180	0.640	65-136%	106.0%	
	N-EtFOSAA	2991-50-6	11559.01	18.5	18.5	0.260	0.640	61-135%	92.5%	
	HFPO-DA	13252-13-6	12246.22	19.6	19.6	0.0678	0.640	70-130%	98.0%	
ES	MPFBA		3796.31	6.07				20-150%	75.9%	
	M5PFPeA		3600.51	5.76				20-150%	72.0%	
	M3PFBS		4279.24	6.85				20-150%	85.6%	
	M2-4:2 FTS		7480.40	12.0				20-150%	149.6%	
	M5PFHxA		3653.51	5.85				20-150%	73.1%	
	M3HFPO-DA		3389.29	5.42				20-150%	67.8%	
	M4PFHpA		3788.97	6.06				20-150%	75.8%	
	M3PFHxS		3585.58	5.74				20-150%	71.7%	
	M2-6:2 FTS		5747.89	9.20				20-150%	115.0%	
	M8PFOA		3954.01	6.33				20-150%	79.1%	
	M9PFNA		4117.94	6.59				20-150%	82.4%	
	M8PFOS		3777.70	6.04				20-150%	75.6%	
	M2-8:2 FTS		4843.30	7.75				20-150%	96.9%	
	M8FOSA-I		2912.15	4.66				20-150%	58.2%	
	M6PFDA		3750.98	6.00				20-150%	75.0%	
	d3-N-MeFOSAA		4165.70	6.67				20-150%	83.3%	
	d5-N-EtFOSAA		3977.93	6.36				20-150%	79.6%	
	M7PFUDa		3247.95	5.20				20-150%	65.0%	
	MPFDoA		2257.35	3.61				20-150%	45.1%	
	M2PFTeDA		762.03	1.22				20-150%	15.2%	Q

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0323-769-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Northwest Water Plant Site: Leland, N.C.

1. Custody

Summer Banning received the samples on March 16, 2023 at 7.7 °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
0323-769-001-1	031623-SO1	AQ
0323-769-002-1	031623-EO1	AQ

2. Methods and Analytes

A list of analytes of interest and corresponding methods of analysis is shown in Table 3. Abbreviations are defined in the listed Appendices.

Table 3 - Methods and Analytes

EU Method	Analytes	Cleanup Method
EU-047	PFAS List - Brunswick List	ENVI-Carb

3. Analysis

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

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:

031623-SO1, 031623-EO1

The samples were analyzed on more than one instrument sequence in order to meet method acceptance criteria.

4. Calibration

In the initial calibration, the reported analytes exhibited R² of ≥ 0.99.

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0323-769-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Northwest Water Plant Site: Leland, N.C.

The reported analytes in the calibration standards, continuing calibration (concal) and Initial Calibration Verification (ICV) met the 30% accuracy criterion for native analytes, except where noted below.

PFTrDA, 11CI-PF3OUdS, 10:2 FTS, and PFHxDA fell outside method control limits in one or more concals. These analytes were not detected in the samples; therefore, the data is reportable without adverse impact.

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:

OPR-14879-PFAS PFTrDA fell above method recovery criteria. This analyte was not detected in the samples. The data is reported with no further action.

MB-14879-PFAS M2-4:2 FTS, OPR-14879-PFAS M2PFTeDA

Labeled standards in the QC samples that fell outside the control limits for ES recovery are 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 does not cause any change to ratios or contribute any additional error in the measurement of the target analyte(s). The data has been accepted and reported with no further actions.

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.

Samples received above 6 °C, client notified in order acknowledgement documentation.

6. Reporting Notes

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

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.

Manual integrations were performed on analytes in the ICAL, controls, and samples to correct baseline-to-baseline integration as well as integrate all isomers for compounds that have both linear and branched isomers.

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0323-769-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Northwest Water Plant Site: Leland, N.C.

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 for SOP EU047 # Method 537.1 Accredited ^ Method 533 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
# PFTrDA (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 for SOP EU047 # Method 537.1 Accredited ^ Method 533 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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