

Brunswick County Public Utilities - NC

PO Box 249
Bolivia, NC 28422-0249

Northwest Water Plant

Leland, N.C

Samples Received: 3/24/2023

Analytical Report 0323-803

PFAS by Isotope Dilution PFAS

Report Issue Date: 4/12/2023

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 20 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:



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Summary of Results

Enthalpy Analytical

Job No.: 0323-803-1 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	032423-SO1 ng/L	032423-EO1 ng/L
Acids	PFBA	375-22-4	4.45	3.55
	PFPeA	2706-90-3	5.88	6.38
	PFHxA	307-24-4	5.98	6.90
	PFHpA	375-85-9	3.40	3.40
	PFOA	335-67-1	5.43	6.40
	PFNA	375-95-1	0.564 J	0.648
	PFDA	335-76-2	0.298 J	0.335 J
	PFUnDA	2058-94-8	ND U	ND U
	PFDoDA	307-55-1	ND U	ND U
	PFTTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U
Sulfonates	PFBS	375-73-5	3.75	4.24
	PFPeS	2706-91-4	0.462 J	0.542
	PFHxS	355-46-4	4.16	4.12
	PFHpS	375-92-8	0.107 L	0.0544 L
	PFOS	1763-23-1	11.1	12.0
	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	0.199 LB	0.195 LB
8:2 FTS	39108-34-4	ND U	ND U	
Other	PFOSA	754-91-6	0.125 J	ND U
	N-MeFOSAA	2355-31-9	ND U	0.0407 L
	N-EtFOSAA	2991-50-6	ND U	ND U
	HFPO-DA	13252-13-6	2.60	3.20
	PFMOAA	674-13-5	10.7	11.1
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	3.11	2.98
	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	0.142 L	0.717
	Hydro-EVE Acid	773804-62-9	0.0497 L	0.0613 L
	Hydrolyzed PSDA	2416366-19-1	1.20	1.58
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND U	ND U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	0.131 L	0.330 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	ND U	ND U
	PEPA	267239-61-2	1.43	1.24
	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	5.17	5.71
	R-EVE	2416366-22-6	2.06	2.75
R-PSDA	2416366-18-0	1.77 L	3.40	
R-PSDCA	241636-21-5	ND U	ND U	

Detailed Results

Enthalpy Analytical

Job No.: 0323-803-1 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	0323-803-001-1	Prep Batch	EU14940	Sample Vol (mL)	280.71
Sample Name	032423-SO1	Prep Date	2023-03-24 15:40	Extract Vol (mL)	0.4
Matrix	AQ	Analysis Date	2023-03-28 14:46	Split Factor	N/A
Sampling Date	2023-03-24 08:25	Analyst	relanier	Method Code	WM-026
Received Date	2023-03-24 11:15	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	3123.65	4.45	4.45	0.226	0.570				
	PFPeA	2706-90-3	4129.81	5.88	5.88	0.163	0.570				
	PFHxA	307-24-4	4199.45	5.98	5.98	0.191	0.570				
	PFHpA	375-85-9	2389.53	3.40	3.40	0.199	0.570				
	PFOA	335-67-1	3813.71	5.43	5.43	0.130	0.570				
	PFNA	375-95-1	396.06	0.564	0.564	0.129	0.570			J	
	PFDA	335-76-2	209.05	0.298	0.298	0.163	0.570			J	
	PFUnDA	2058-94-8	ND	ND	ND	0.129	0.570			U	
	PFDoDA	307-55-1	ND	ND	ND	0.232	0.570			U	
	PFTtDA	72629-94-8	ND	ND	ND	0.189	0.570			U	
	PFTeDA	376-06-7	ND	ND	ND	0.217	0.570			U	
	Sulfonates	PFBs	375-73-5	2631.75	3.75	3.75	0.303	0.570			
		PFPeS	2706-91-4	323.96	0.462	0.462	0.117	0.537			J
PFHxS		355-46-4	2918.77	4.16	4.16	0.440	0.522				
PFHpS		375-92-8	75.00	0.107	0.107	0.276	0.543			L	
PFOS		1763-23-1	7759.72	11.1	11.1	0.301	0.528				
PFNS		68259-12-1	ND	ND	ND	0.177	0.549			U	
PFDS		335-77-3	ND	ND	ND	0.299	0.549			U	
4:2 FTS		757124-72-4	ND	ND	ND	0.0739	0.534			U	
6:2 FTS		27619-97-2	139.77	0.199	0.199	0.269	0.543			LB	
8:2 FTS		39108-34-4	ND	ND	ND	0.128	0.546			U	
PFOSA		754-91-6	87.50	0.125	0.125	0.0800	0.570			J	
N-MeFOSAA		2355-31-9	ND	ND	ND	0.160	0.570			U	
N-EFOSAA		2991-50-6	ND	ND	ND	0.232	0.570			U	
Other	HFPO-DA	13252-13-6	1823.88	2.60	2.60	0.0604	0.570				
	PFMOA	674-13-5	7490.35	10.7	10.7	0.289	0.570				
	PFMOPrA	377-73-1	ND	ND	ND	0.203	0.570			U	
	PF02HxA	39492-88-1	2184.12	3.11	3.11	0.183	0.570				
	PF03OA	39492-89-2	ND	ND	ND	0.262	0.570			U	
	PF04DA	39492-90-5	ND	ND	ND	0.451	2.85			U	
	ADONA	919005-14-4	ND	ND	ND	0.154	0.540			U	
	9CI-PF3ONS	756426-58-1	ND	ND	ND	0.365	0.531			U	
	11CI-PF3OUdS	763051-92-9	ND	ND	ND	0.269	0.537			U	
	10:2 FTS	120226-60-0	ND	ND	ND	0.436	0.570			U	
	EVE Acid	69087-46-3	ND	ND	ND	0.182	1.28			U	
	FBSA	30334-69-1	99.82	0.142	0.142	0.271	0.570			L	
	Hydro-EVE Acid	773804-62-9	34.86	0.0497	0.0497	0.187	0.570			L	
	Hydrolyzed PSDA	2416366-19-1	843.08	1.20	1.20	0.379	0.570				
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND	ND	ND	0.305	0.570			U	
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	91.71	0.131	0.131	0.472	0.570			L	
	N-EFOSA	4151-50-2	ND	ND	ND	0.353	0.570			U	
	N-EFOSE	1691-99-2	ND	ND	ND	0.873	2.56			U	
	NFDHA	151772-58-6	ND	ND	ND	0.120	0.570			U	
	N-MeFOSA	31506-32-8	ND	ND	ND	0.235	0.570			U	
	N-MeFOSE	24448-09-7	ND	ND	ND	0.541	2.56			U	
	NVHOS	1132933-86-8	ND	ND	ND	0.0878	0.570			U	
	PEPA	267239-61-2	1005.05	1.43	1.43	0.107	0.570				
	PFECA-G	801212-59-9	ND	ND	ND	0.0761	0.570			U	
	PFEESA	113507-82-7	ND	ND	ND	0.171	0.570			U	
	PFHxDA	67905-19-5	ND	ND	ND	0.303	0.570			U	
	PFMOBA	863090-89-5	ND	ND	ND	0.957	1.28			U	
	PFOSDA	39492-91-6	ND	ND	ND	0.456	2.85			U	
	PMMPA	13140-29-9	3627.37	5.17	5.17	0.134	0.570				
	R-EVE	2416366-22-6	1443.44	2.06	2.06	0.946	1.28				
	R-PSDA	2416366-18-0	1242.63	1.77	1.77	2.51	2.51			L	
	R-PSDCA	241636-21-5	ND	ND	ND	0.240	0.570			U	
	ES	MFPBA		3719.95	5.30				20-150%	74.4%	
M5PFPeA			4369.47	6.23				20-150%	87.4%		
M3PFBS			5057.25	7.21				20-150%	101.1%		
M2-4:2 FTS			5470.47	7.80				20-150%	109.4%		
M5PFHxA			4010.72	5.72				20-150%	80.2%		
M3HFPO-DA			3816.42	5.44				20-150%	76.3%		
M4PFHpA			4192.32	5.97				20-150%	83.8%		
M3PFHxS			4138.83	5.90				20-150%	82.8%		
M2-6:2 FTS			4211.54	6.00				20-150%	84.2%		
M8PFOA			4377.83	6.24				20-150%	87.6%		
M9PFNA			4083.57	5.82				20-150%	81.7%		
M8PFOS			3746.52	5.34				20-150%	74.9%		
M2-8:2 FTS			4153.75	5.92				20-150%	83.1%		
M8FOSA-I			4193.03	5.97				20-150%	83.9%		
M6PFDA			3970.47	5.66				20-150%	79.4%		
d3-N-MeFOSAA			3581.22	5.10				20-150%	71.6%		
d5-N-EFOSAA			3499.73	4.99				20-150%	70.0%		
M7PFUnDA			3574.09	5.09				20-150%	71.5%		
MPFDoA			3387.84	4.83				20-150%	67.8%		
M2PFTeDA			2112.10	3.01				20-150%	42.2%		
d3-N-MeFOSA			4017.75	5.73				10-200%	40.2%		
d5-N-EFOSA		3743.66	5.33				10-200%	37.4%			
d7-N-MeFOSE		4930.37	7.03				10-200%	49.3%			
d9-N-EFOSE		3959.29	5.64				10-200%	39.6%			

Enthalpy Analytical

Job No.: 0323-803-1 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	0323-803-002-1	Prep Batch	EU14940	Sample Vol (mL)	289.73
Sample Name	032423-EO1	Prep Date	2023-03-24 15:40	Extract Vol (mL)	0.4
Matrix	AQ	Analysis Date	2023-03-28 15:09	Split Factor	N/A
Sampling Date	2023-03-24 08:25	Analyst	relanier	Method Code	WM-026
Received Date	2023-03-24 11:15	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	2571.52	3.55	3.55	0.219	0.552				
	PFPeA	2706-90-3	4620.56	6.38	6.38	0.158	0.552				
	PFHxA	307-24-4	4999.65	6.90	6.90	0.185	0.552				
	PFHpA	375-85-9	2461.35	3.40	3.40	0.193	0.552				
	PFOA	335-67-1	4637.25	6.40	6.40	0.126	0.552				
	PFNA	375-95-1	469.18	0.648	0.648	0.125	0.552				
	PFDA	335-76-2	242.31	0.335	0.335	0.158	0.552				
	PFUnDA	2058-94-8	ND	ND	ND	0.125	0.552			J	
	PFDoDA	307-55-1	ND	ND	ND	0.224	0.552			U	
	PFTtDA	72629-94-8	ND	ND	ND	0.183	0.552			U	
	PFTeDA	376-06-7	ND	ND	ND	0.211	0.552			U	
	Sulfonates	PFBS	375-73-5	3069.07	4.24	4.24	0.293	0.552			
		PFPeS	2706-91-4	392.40	0.542	0.542	0.113	0.520			
PFHxS		355-46-4	2980.81	4.12	4.12	0.426	0.506				
PFHpS		375-92-8	39.39	0.0544	0.0544	0.267	0.526			L	
PFOS		1763-23-1	8661.15	12.0	12.0	0.292	0.512				
PFNS		68259-12-1	ND	ND	ND	0.171	0.532			U	
PFDS		335-77-3	ND	ND	ND	0.290	0.532			U	
4:2 FTS		757124-72-4	ND	ND	ND	0.0716	0.517			U	
6:2 FTS		27619-97-2	141.34	0.195	0.195	0.261	0.526			LB	
8:2 FTS		39108-34-4	ND	ND	ND	0.124	0.529			U	
Other		PFOSA	754-91-6	ND	ND	ND	0.0775	0.552			U
		N-MeFOSAA	2355-31-9	29.45	0.0407	0.0407	0.155	0.552			L
		N-EFOSAA	2991-50-6	ND	ND	ND	0.224	0.552			U
	HFPO-DA	13252-13-6	2318.35	3.20	3.20	0.0585	0.552				
	PFMOAA	674-13-5	8035.46	11.1	11.1	0.280	0.552				
	PFMOPrA	377-73-1	ND	ND	ND	0.197	0.552			U	
	PFO2HxA	39492-88-1	2158.35	2.98	2.98	0.178	0.552				
	PFO3OA	39492-89-2	ND	ND	ND	0.254	0.552			U	
	PFO4DA	39492-90-5	ND	ND	ND	0.437	2.76			U	
	ADONA	919005-14-4	ND	ND	ND	0.150	0.523			U	
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.354	0.514			U	
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.261	0.520			U	
	10:2 FTS	120226-60-0	ND	ND	ND	0.423	0.552			U	
	EVE Acid	69087-46-3	ND	ND	ND	0.176	1.24			U	
	FBSA	30334-69-1	519.25	0.717	0.717	0.262	0.552			U	
	Hydro-EVE Acid	773804-62-9	44.41	0.0613	0.0613	0.181	0.552			L	
	Hydrolyzed PSDA	2416366-19-1	1142.55	1.58	1.58	0.368	0.552				
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND	ND	ND	0.295	0.552			U	
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	239.27	0.330	0.330	0.457	0.552			L	
	N-EFOSA	4151-50-2	ND	ND	ND	0.342	0.552			U	
	N-EFOSE	1691-99-2	ND	ND	ND	0.846	2.49			U	
	NFDHA	151772-58-6	ND	ND	ND	0.116	0.552			U	
	N-MeFOSA	31506-32-8	ND	ND	ND	0.228	0.552			U	
	N-MeFOSE	24448-09-7	ND	ND	ND	0.525	2.49			U	
	NVHOS	1132933-86-8	ND	ND	ND	0.0851	0.552			U	
	PEPA	267239-61-2	900.58	1.24	1.24	0.104	0.552				
	PFECA-G	801212-59-9	ND	ND	ND	0.0737	0.552			U	
	PFEEA	113507-82-7	ND	ND	ND	0.166	0.552			U	
	PFHxDA	67905-19-5	ND	ND	ND	0.293	0.552			U	
	PFMOBA	863090-89-5	ND	ND	ND	0.927	1.24			U	
	PFOSDA	39492-91-6	ND	ND	ND	0.442	2.76			U	
	PMPA	13140-29-9	4134.79	5.71	5.71	0.130	0.552				
	R-EVE	2416366-22-6	1992.09	2.75	2.75	0.916	1.24				
R-PSDA	2416366-18-0	2459.89	3.40	3.40	2.43	2.43					
R-PSDCA	241636-21-5	ND	ND	ND	0.233	0.552			U		
ES	MPPBA		4761.03	6.57				20-150%	95.2%		
	M5PFPeA		5475.22	7.56				20-150%	109.5%		
	M3PFBS		5762.14	7.96				20-150%	115.2%		
	M2-4:2 FTS		7000.64	9.67				20-150%	140.0%		
	M5PFHxA		3944.70	5.45				20-150%	78.9%		
	M3HFPO-DA		4078.94	5.63				20-150%	81.6%		
	M4PFHpA		4659.88	6.43				20-150%	93.2%		
	M3PFHxS		4568.18	6.31				20-150%	91.4%		
	M2-6:2 FTS		5357.82	7.40				20-150%	107.2%		
	M8PFOA		4569.43	6.31				20-150%	91.4%		
	M9PFNA		4253.14	5.87				20-150%	85.1%		
	M6PFOS		3903.03	5.39				20-150%	78.1%		
	M2-8:2 FTS		4191.30	5.79				20-150%	83.8%		
	M8FOSA-I		4380.48	6.05				20-150%	87.6%		
	M6PFDA		4561.32	6.30				20-150%	91.2%		
	d3-N-MeFOSAA		3985.15	5.50				20-150%	79.7%		
	d5-N-EFOSAA		3682.38	5.08				20-150%	73.6%		
	M7PFUdA		4103.05	5.66				20-150%	82.1%		
	MPPFDoA		3824.72	5.28				20-150%	76.5%		
	M2PFTeDA		2770.78	3.83				20-150%	55.4%		
	d3-N-MeFOSA		4370.19	6.03				10-200%	43.7%		
d5-N-EFOSA		4376.53	6.04				10-200%	43.8%			
d7-N-MeFOSE		6853.25	9.46				10-200%	68.5%			
d9-N-EFOSE		6852.04	9.46				10-200%	68.5%			

QC Data

Enthalpy Analytical

Job No.: 0323-803-1 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-14940-PFAS	Prep Batch	EU14940	Sample Vol (mL)	250
Sample Name	MB-14940-PFAS	Prep Date	2023-03-24 15:40	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2023-03-28 13:56	Split Factor	N/A
Sampling Date		Analyst	relanier	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	
	PFFeA	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	
	PFDoDA	307-55-1	ND	ND	ND	0.260	0.640			U	
	PFTfDA	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
		PFFeS	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	3605.83	5.77	5.77	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-EFOSAA		2991-50-6	ND	ND	ND	0.260	0.640			U	
HFPO-DA		13252-13-6	ND	ND	ND	0.0678	0.640			U	
PFMOA	674-13-5	ND	ND	ND	0.324	0.640			U		
PFMOPrA	377-73-1	ND	ND	ND	0.228	0.640			U		
PFQ2HxA	39492-88-1	ND	ND	ND	0.206	0.640			U		
PFO3OA	39492-89-2	ND	ND	ND	0.294	0.640			U		
PFQ4DA	39492-90-5	ND	ND	ND	0.506	3.20			U		
ADONA	919005-14-4	ND	ND	ND	0.173	0.606			U		
9CI-PF3ONS	756426-58-1	ND	ND	ND	0.410	0.596			U		
11CI-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-EtFOA	4151-50-2	ND	ND	ND	0.396	0.640			U		
N-EtFOSE	1691-99-2	ND	ND	ND	0.980	2.88			U		
NFDHA	151772-58-6	ND	ND	ND	0.135	0.640			U		
N-MeFOA	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	241636-21-5	ND	ND	ND	0.270	0.640			U		
ES	MFPBA		5222.13	8.36				20-150%	104.4%		
	M5PFFeA		5526.87	8.84				20-150%	110.5%		
	M3PFBS		4434.14	7.09				20-150%	88.7%		
	M2-4:2 FTS		5573.21	8.92				20-150%	111.5%		
	M5PFHxA		4872.42	7.80				20-150%	97.4%		
	M3HFPO-DA		4490.90	7.19				20-150%	89.8%		
	M4PFHpA		4816.50	7.71				20-150%	96.3%		
	M3PFHxS		4735.25	7.58				20-150%	94.7%		
	M2-6:2 FTS		4496.49	7.19				20-150%	89.9%		
	M8PFOA		4743.75	7.59				20-150%	94.9%		
	M9PFNA		4579.67	7.33				20-150%	91.6%		
	M8PFOS		4721.30	7.55				20-150%	94.4%		
	M2-8:2 FTS		4659.08	7.45				20-150%	93.2%		
	M8FOSA-1		4148.60	6.64				20-150%	83.0%		
	M6PFDA		4748.72	7.60				20-150%	95.0%		
	d3-N-MeFOSAA		4281.69	6.85				20-150%	85.6%		
	d5-N-EtFOSAA		4061.55	6.50				20-150%	81.2%		
	M7PFUdA		4345.73	6.95				20-150%	86.9%		
	MFPDoA		3655.67	5.85				20-150%	73.1%		
	M2PFTeDA		2026.14	3.24				20-150%	40.5%		
	d3-N-MeFOA		3315.90	5.31				10-200%	33.2%		
d5-N-EtFOA		3054.95	4.89				10-200%	30.5%			
d7-N-MeFOSE		5739.09	9.18				10-200%	57.4%			
d9-N-EtFOSE		4477.38	7.16				10-200%	44.8%			

Enthalpy Analytical

Job No.: 0323-803-1 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-14940-PFAS	Prep Batch	EU14940	Sample Vol (mL)	250
Sample Name	OPR-14940-PFAS	Prep Date	2023-03-24 15:40	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2023-03-28 14:23	Split Factor	N/A
Sampling Date		Analyst	relanier	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	14964.57	23.9	23.9	0.254	0.640	73-129%	119.7%	
	PFPeA	2706-90-3	13671.17	21.9	21.9	0.183	0.640	72-129%	109.4%	
	PFHxA	307-24-4	14307.14	22.9	22.9	0.214	0.640	72-129%	114.5%	
	PFHpA	375-85-9	14964.28	23.9	23.9	0.224	0.640	72-130%	119.7%	
	PFOA	335-67-1	14655.14	23.4	23.4	0.146	0.640	71-133%	117.2%	
	PFNA	375-95-1	13702.90	21.9	21.9	0.145	0.640	69-130%	109.6%	
	PFDA	335-76-2	14621.70	23.4	23.4	0.183	0.640	71-129%	117.0%	
	PFUnDA	2058-94-8	14160.39	22.7	22.7	0.145	0.640	69-133%	113.3%	
	PFDODA	307-55-1	19167.54	30.7	30.7	0.260	0.640	72-134%	153.3%	Q
	PFTrDA	72629-94-8	19823.84	31.7	31.7	0.212	0.640	65-144%	158.6%	Q
	PFTeDA	376-06-7	14286.06	22.9	22.9	0.244	0.640	71-132%	114.3%	
Sulfonates	PFBS	375-73-5	11645.52	18.6	18.6	0.340	0.640	72-134%	105.0%	
	PFPeS	2706-91-4	12461.26	19.9	19.9	0.131	0.603	71-127%	105.9%	
	PFHxS	355-46-4	11654.26	18.6	18.6	0.494	0.586	68-131%	102.0%	
	PFHpS	375-92-8	13024.70	20.8	20.8	0.310	0.610	69-134%	109.3%	
	PFOS	1763-23-1	11875.63	19.0	19.0	0.338	0.593	65-140%	102.4%	
	PFNS	68259-12-1	13705.12	21.9	21.9	0.199	0.616	69-127%	114.0%	
	PFDS	335-77-3	12602.16	20.2	20.2	0.336	0.616	53-142%	104.5%	
	4:2 FTS	757124-72-4	12373.37	19.8	19.8	0.0830	0.600	63-143%	105.6%	
	6:2 FTS	27619-97-2	12435.43	19.9	19.9	0.302	0.610	64-140%	104.6%	
8:2 FTS	39108-34-4	12492.00	20.0	20.0	0.143	0.613	67-138%	104.1%		
Other	PFOSA	754-91-6	16176.01	25.9	25.9	0.0898	0.640	67-137%	129.4%	
	N-MeFOSAA	2355-31-9	12474.46	20.0	20.0	0.180	0.640	65-136%	99.8%	
	N-EtFOSAA	2991-50-6	14501.74	23.2	23.2	0.260	0.640	61-135%	116.0%	
	HFPO-DA	13252-13-6	13495.11	21.6	21.6	0.0678	0.640	70-130%	108.0%	
ES	MPFBA		3763.51	6.02				20-150%	75.3%	
	M5PFPeA		3860.07	6.18				20-150%	77.2%	
	M3PFBS		3704.52	5.93				20-150%	74.1%	
	M2-4:2 FTS		4986.30	7.98				20-150%	99.7%	
	M5PFHxA		3925.30	6.28				20-150%	78.5%	
	M3HFPO-DA		3921.71	6.27				20-150%	78.4%	
	M4PFHpA		3959.59	6.34				20-150%	79.2%	
	M3PFHxS		4162.31	6.66				20-150%	83.2%	
	M2-6:2 FTS		4283.12	6.85				20-150%	85.7%	
	M8PFOA		3943.57	6.31				20-150%	78.9%	
	M9PFNA		3954.92	6.33				20-150%	79.1%	
	M8PFOS		3967.46	6.35				20-150%	79.3%	
	M2-8:2 FTS		4336.21	6.94				20-150%	86.7%	
	M8FOSA-I		3571.50	5.71				20-150%	71.4%	
	M6PFDA		3905.40	6.25				20-150%	78.1%	
	d3-N-MeFOSAA		3723.88	5.96				20-150%	74.5%	
	d5-N-EtFOSAA		3290.52	5.26				20-150%	65.8%	
	M7PFUDa		3561.18	5.70				20-150%	71.2%	
	MPFDoA		3146.38	5.03				20-150%	62.9%	
	M2PFTeDA		2418.11	3.87				20-150%	48.4%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0323-803-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant, Leland, N.C

1. Custody

Megan Holden received the samples on March 24, 2023 at 4.1 °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
0323-803-001-1	032423-SO1	AQ
0323-803-002-1	032423-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 - 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.

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, except as noted below.

PFDoDA fell above method control limits in the concals. This analyte was not detected above LOQ 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.

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0323-803-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant, Leland, N.C

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:

MB-14940-PFAS 6:2 FTS was detected above 1/2 LOQ. This analyte was not detected in the samples and the data is reported without adverse impact.

OPR-14940-PFAS PFDODA, OPR-14940-PFAS PFTrDA

These analytes were not detected in the samples above LOQ. The data is approved with no further action.

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.

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.

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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