Brunswick County Public Utilities - NC

PO Box 249
Bolivia, NC 28422-0249

Northwest Water Plant - Leland, N.C.

Samples Received: 3/10/2023

Analytical Report
0323-739

PFAS by Isotope Dilution (non-potable water)
Brunswick PFAS List

Report Issue Date: 3/31/2023

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:

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Summary of Results

ENTHALPY
ANALYTICAL

Enthalpy Analytical

Job No.: 0323-739-1 PFAS by Isotope Dilution (non-potable water)

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

Summary

	Compound	CAS	03102023S01 ng/L	03102023E01 ng/L
Acids	PFBA	375-22-4	3.53	3.91
	PFPeA	2706-90-3	5.31	5.54
	PFHxA	307-24-4	3.98	6.20
	PFHpA	375-85-9	2.28 J	2.43
	PFOA	335-67-1	4.62	5.29
	PFNA	375-95-1	ND U	0.614
	PFDA	335-76-2	ND U	0.209 J
	PFUnDA	2058-94-8	ND U	ND U
	PFDoDA	307-55-1	ND U	ND U
	PFTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U
Sulfonates	PFBS	375-73-5	2.86 J	3.85
	PFPeS	2706-91-4	ND U	0.409 J
	PFHxS	355-46-4	3.49	3.35
	PFHpS	375-92-8	ND U	0.182 L
	PFOS	1763-23-1	7.95	10.4
	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	ND U	0.00607 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	1.14 J	1.59
	PFMOAA	674-13-5	4.02	9.98
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	0.725 L	1.89
	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	ND U	0.488 J
	Hydro-EVE Acid	773804-62-9	ND U	ND U
	Hydrolyzed PSDA	2416366-19-1	ND U	1.14
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND U	ND U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	ND U	0.107 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	1.46
	PEPA	267239-61-2	ND U	0.817
	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	1.81 J	2.74
	R-EVE	2416366-22-6	ND U	1.29
	R-PSDA	2416366-18-0	ND U	2.43 L
	R-PSDCA	241636-21-5	ND U	ND U

Detailed Results

ENTHALPY
ANALYTICAL

Enthalpy Analytical

Job No.: 0323-739-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	0323-739-001-1	Prep Batch	EU14849	Sample Vol (mL)	50
Sample Name	03102023S01	Prep Date	2023-03-13 11:00	Extract Vol (mL)	0.4
Matrix	AQ	Analysis Date	2023-03-14 05:27	Split Factor	N/A
Sampling Date	2023-03-10 13:10	Analyst	bmay	Method Code	WM-026
Received Date	2023-03-10 13:44	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	440.92	3.53	3.53	1.27	3.20			
	PFPeA	2706-90-3	663.78	5.31	5.31	0.915	3.20			
	PFHxA	307-24-4	497.05	3.98	3.98	1.07	3.20			
	PFHpA	375-85-9	285.03	2.28	2.28	1.12	3.20			J
	PFOA	335-67-1	577.83	4.62	4.62	0.732	3.20			
	PFNA	375-95-1	ND	ND	ND	0.723	3.20			U
	PFDA	335-76-2	ND	ND	ND	0.915	3.20			U
	PFUnDA	2058-94-8	ND	ND	ND	0.723	3.20			U
	PFDoDA	307-55-1	ND	ND	ND	1.30	3.20			U
	PFTrDA	72629-94-8	ND	ND	ND	1.06	3.20			U
	PFTeDA	376-06-7	ND	ND	ND	1.22	3.20			U
Sulfonates	PFBS	375-73-5	357.64	2.86	2.86	1.70	3.20			J
	PFPeS	2706-91-4	ND	ND	ND	0.657	3.01			U
	PFHxS	355-46-4	435.91	3.49	3.49	2.47	2.93			
	PFHpS	375-92-8	ND	ND	ND	1.55	3.05			U
	PFOS	1763-23-1	994.15	7.95	7.95	1.69	2.96			
	PFNS	68259-12-1	ND	ND	ND	0.993	3.08			U
	PFDS	335-77-3	ND	ND	ND	1.68	3.08			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.415	3.00			U
	6:2 FTS	27619-97-2	ND	ND	ND	1.51	3.05			U
	8:2 FTS	39108-34-4	ND	ND	ND	0.717	3.07			U
Other	PFOSA	754-91-6	ND	ND	ND	0.449	3.20			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.899	3.20			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	1.30	3.20			U
	HFPO-DA	13252-13-6	142.36	1.14	1.14	0.339	3.20			J
	PFMOAA	674-13-5	502.65	4.02	4.02	1.62	3.20			
	PFMOPrA	377-73-1	ND	ND	ND	1.14	3.20			U
	PFO2HxA	39492-88-1	90.65	0.725	0.725	1.03	3.20			L
	PFO3OA	39492-89-2	ND	ND	ND	1.47	3.20			U
	PFO4DA	39492-90-5	ND	ND	ND	2.53	16.0			U
	ADONA	919005-14-4	ND	ND	ND	0.867	3.03			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	2.05	2.98			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	1.51	3.01			U
	10:2 FTS	120226-60-0	ND	ND	ND	2.45	3.20			U
	EVE Acid	69087-46-3	ND	ND	ND	1.02	7.20			U
	FBSA	30334-69-1	ND	ND	ND	1.52	3.20			U
	Hydro-EVE Acid	773804-62-9	ND	ND	ND	1.05	3.20			U
	Hydrolyzed PSDA	2416366-19-1	ND	ND	ND	2.13	3.20			U
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND	ND	ND	1.71	3.20			U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	ND	ND	ND	2.65	3.20			U
	N-EtFOSA	4151-50-2	ND	ND	ND	1.98	3.20			U
	N-EtFOSE	1691-99-2	ND	ND	ND	4.90	14.4			U
	NFDHA	151772-58-6	ND	ND	ND	0.673	3.20			U
	N-MeFOSA	31506-32-8	ND	ND	ND	1.32	3.20			U
	N-MeFOSE	24448-09-7	ND	ND	ND	3.04	14.4			U
	NVHOS	1132933-86-8	ND	ND	ND	0.493	3.20			U
	PEPA	267239-61-2	ND	ND	ND	0.600	3.20			U
	PFECA-G	801212-59-9	ND	ND	ND	0.427	3.20			U
	PFEESA	113507-82-7	ND	ND	ND	0.962	3.20			U
	PFHxDA	67905-19-5	ND	ND	ND	1.70	3.20			U
	PFMOBA	863090-89-5	ND	ND	ND	5.37	7.20			U
	PFO5DA	39492-91-6	ND	ND	ND	2.56	16.0			U
	PMPA	13140-29-9	225.78	1.81	1.81	0.754	3.20			J
	R-EVE	2416366-22-6	ND	ND	ND	5.31	7.20			U
	R-PSDA	2416366-18-0	ND	ND	ND	14.1	14.1			U
	R-PSDCA	241636-21-5	ND	ND	ND	1.35	3.20			U
ES	MPFBA		4694.53	37.6				20-150%	93.9%	
	M5PFPeA		4218.51	33.7				20-150%	84.4%	
	M3PFBS		4325.41	34.6				20-150%	86.5%	
	M2-4:2 FTS		5588.81	44.7				20-150%	111.8%	
	M5PFHxA		4493.03	35.9				20-150%	89.9%	
	M3HFPO-DA		4688.30	37.5				20-150%	93.8%	
	M4PFHpA		4653.90	37.2				20-150%	93.1%	
	M3PFHxS		5454.39	43.6				20-150%	109.1%	
	M2-6:2 FTS		6704.06	53.6				20-150%	134.1%	
	M8PFOA		4623.19	37.0				20-150%	92.5%	
	M9PFNA		4631.69	37.1				20-150%	92.6%	
	M8PFOS		4804.83	38.4				20-150%	96.1%	
	M2-8:2 FTS		7376.26	59.0				20-150%	147.5%	
	M8FOSA-I		4663.40	37.3				20-150%	93.3%	
	M6PFDA		4475.45	35.8				20-150%	89.5%	
	d3-N-MeFOSAA		2835.67	22.7				20-150%	56.7%	
	d5-N-EtFOSAA		2407.60	19.3				20-150%	48.2%	
	M7PFUdA		4261.51	34.1				20-150%	85.2%	
	MPFDoA		4261.79	34.1				20-150%	85.2%	
	M2PFTeDA		3426.50	27.4				20-150%	68.5%	
	d3-N-MeFOSA		5144.19	41.2				10-200%	51.4%	
	d5-N-EtFOSA		3836.86	30.7				10-200%	38.4%	
	d7-N-MeFOSE		7417.58	59.3				10-200%	74.2%	
	d9-N-EtFOSE		6194.03	49.6				10-200%	61.9%	

Enthalpy Analytical

Job No.: 0323-739-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	0323-739-002-1	Prep Batch	EU14849	Sample Vol (mL)	279.19
Sample Name	03102023E01	Prep Date	2023-03-13 11:00	Extract Vol (mL)	0.4
Matrix	AQ	Analysis Date	2023-03-14 05:50	Split Factor	N/A
Sampling Date	2023-03-10 13:10	Analyst	bmay	Method Code	WM-026
Received Date	2023-03-10 13:44	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	2725.69	3.91	3.91	0.227	0.573			
	PFPeA	2706-90-3	3866.42	5.54	5.54	0.164	0.573			
	PFHxA	307-24-4	4330.34	6.20	6.20	0.192	0.573			
	PFHpA	375-85-9	1696.98	2.43	2.43	0.201	0.573			
	PFOA	335-67-1	3693.51	5.29	5.29	0.131	0.573			
	PFNA	375-95-1	428.77	0.614	0.614	0.129	0.573			
	PFDA	335-76-2	145.98	0.209	0.209	0.164	0.573			J
	PFUnDA	2058-94-8	ND	ND	ND	0.129	0.573			U
	PFDoDA	307-55-1	ND	ND	ND	0.233	0.573			U
	PFTrDA	72629-94-8	ND	ND	ND	0.190	0.573			U
	PFTeDA	376-06-7	ND	ND	ND	0.218	0.573			U
Sulfonates	PFBS	375-73-5	2684.00	3.85	3.85	0.304	0.573			
	PFPeS	2706-91-4	285.40	0.409	0.409	0.118	0.540			J
	PFHxS	355-46-4	2338.00	3.35	3.35	0.442	0.525			
	PFHpS	375-92-8	127.16	0.182	0.182	0.278	0.546			L
	PFOS	1763-23-1	7229.87	10.4	10.4	0.303	0.531			
	PFNS	68259-12-1	ND	ND	ND	0.178	0.552			U
	PFDS	335-77-3	ND	ND	ND	0.301	0.552			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0743	0.537			U
	6:2 FTS	27619-97-2	4.24	0.00607	0.00607	0.270	0.546			L
	8:2 FTS	39108-34-4	ND	ND	ND	0.128	0.549			U
Other	PFOSA	754-91-6	ND	ND	ND	0.0804	0.573			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.161	0.573			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.233	0.573			U
	HFPO-DA	13252-13-6	1109.20	1.59	1.59	0.0607	0.573			
	PFMOAA	674-13-5	6966.91	9.98	9.98	0.290	0.573			
	PFMOPrA	377-73-1	ND	ND	ND	0.204	0.573			U
	PFO2HxA	39492-88-1	1321.58	1.89	1.89	0.184	0.573			
	PFO3OA	39492-89-2	ND	ND	ND	0.263	0.573			U
	PFO4DA	39492-90-5	ND	ND	ND	0.453	2.87			U
	ADONA	919005-14-4	ND	ND	ND	0.155	0.543			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.367	0.534			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.270	0.540			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.439	0.573			U
	EVE Acid	69087-46-3	ND	ND	ND	0.183	1.29			U
	FBSA	30334-69-1	340.33	0.488	0.488	0.272	0.573			J
	Hydro-EVE Acid	773804-62-9	ND	ND	ND	0.188	0.573			U
	Hydrolyzed PSDA	2416366-19-1	794.74	1.14	1.14	0.381	0.573			
	Nafion Byproduct 1 (PS Acid)	29311-67-9	ND	ND	ND	0.306	0.573			U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	74.44	0.107	0.107	0.475	0.573			L
	N-EtFOSA	4151-50-2	ND	ND	ND	0.355	0.573			U
	N-EtFOSE	1691-99-2	ND	ND	ND	0.878	2.58			U
	NFDHA	151772-58-6	ND	ND	ND	0.121	0.573			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.236	0.573			U
	N-MeFOSE	24448-09-7	ND	ND	ND	0.544	2.58			U
	NVHOS	1132933-86-8	1016.46	1.46	1.46	0.0883	0.573			
	PEPA	267239-61-2	570.12	0.817	0.817	0.107	0.573			
	PFECA-G	801212-59-9	ND	ND	ND	0.0765	0.573			U
	PFEESA	113507-82-7	ND	ND	ND	0.172	0.573			U
	PFHxDA	67905-19-5	ND	ND	ND	0.304	0.573			U
	PFMOBA	863090-89-5	ND	ND	ND	0.962	1.29			U
	PFO5DA	39492-91-6	ND	ND	ND	0.458	2.87			U
	PMPA	13140-29-9	1912.12	2.74	2.74	0.135	0.573			
	R-EVE	2416366-22-6	903.33	1.29	1.29	0.951	1.29			
	R-PSDA	2416366-18-0	1699.11	2.43	2.43	2.53	2.53			L
	R-PSDCA	241636-21-5	ND	ND	ND	0.242	0.573			U
ES	MPFBA		3980.41	5.70				20-150%	79.6%	
	M5PFPeA		5696.50	8.16				20-150%	113.9%	
	M3PFBS		7127.49	10.2				20-150%	142.5%	
	M2-4:2 FTS		6401.37	9.17				20-150%	128.0%	
	M5PFHxA		4315.68	6.18				20-150%	86.3%	
	M3HFPO-DA		4312.99	6.18				20-150%	86.3%	
	M4PFHpA		4551.37	6.52				20-150%	91.0%	
	M3PFHxS		4668.19	6.69				20-150%	93.4%	
	M2-6:2 FTS		6790.22	9.73				20-150%	135.8%	
	M8PFOA		4407.30	6.31				20-150%	88.1%	
	M9PFNA		4225.52	6.05				20-150%	84.5%	
	M8PFOS		4438.66	6.36				20-150%	88.8%	
	M2-8:2 FTS		7262.16	10.4				20-150%	145.2%	
	M8FOSA-I		4372.53	6.26				20-150%	87.5%	
	M6PFDA		4595.10	6.58				20-150%	91.9%	
	d3-N-MeFOSAA		2427.85	3.48				20-150%	48.6%	
	d5-N-EtFOSAA		2159.16	3.09				20-150%	43.2%	
	M7PFUdA		4037.65	5.78				20-150%	80.8%	
	MPFDoA		3969.01	5.69				20-150%	79.4%	
	M2PFTeDA		3039.05	4.35				20-150%	60.8%	
	d3-N-MeFOSA		3853.53	5.52				10-200%	38.5%	
	d5-N-EtFOSA		3050.46	4.37				10-200%	30.5%	
	d7-N-MeFOSE		6301.94	9.03				10-200%	63.0%	
	d9-N-EtFOSE		5545.74	7.95				10-200%	55.5%	

QC Data

ENTHALPY
ANALYTICAL

Enthalpy Analytical

Job No.: 0323-739-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	MB-14849-PFAS	Prep Batch	EU14849	Sample Vol (mL)	250
Sample Name	MB-14849-PFAS	Prep Date	2023-03-13 11:00	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2023-03-14 00:32	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
	PFDoDA	307-55-1	ND	ND	ND	0.260	0.640			U
	PFTrDA	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
Other	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-EtFOSAA	2991-50-6	ND	ND	ND	0.260	0.640			U
	HFPO-DA	13252-13-6	ND	ND	ND	0.0678	0.640			U
	PFMOAA	674-13-5	ND	ND	ND	0.324	0.640			U
	PFMOPrA	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-EtFOSA	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-MeFOSA	31506-32-8	31.07	0.0497	0.0497	0.264	0.640			L
	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
	PFO5DA	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	MPFBA		4322.23	6.92				20-150%	86.4%	
	M5PFPeA		4549.44	7.28				20-150%	91.0%	
	M3PFBS		4342.69	6.95				20-150%	86.9%	
	M2-4:2 FTS		4572.43	7.32				20-150%	91.4%	
	M5PFHxA		3633.36	5.81				20-150%	72.7%	
	M3HFPO-DA		4190.71	6.71				20-150%	83.8%	
	M4PFHpA		3939.09	6.30				20-150%	78.8%	
	M3PFHxS		5323.08	8.52				20-150%	106.5%	
	M2-6:2 FTS		6342.68	10.1				20-150%	126.9%	
	M8PFOA		4321.93	6.92				20-150%	86.4%	
	M9PFNA		4020.41	6.43				20-150%	80.4%	
	M8PFOS		4721.61	7.55				20-150%	94.4%	
	M2-8:2 FTS		6889.15	11.0				20-150%	137.8%	
	M8FOSA-I		4305.15	6.89				20-150%	86.1%	
	M6PFDA		4883.31	7.81				20-150%	97.7%	
	d3-N-MeFOSAA		2394.32	3.83				20-150%	47.9%	
	d5-N-EtFOSAA		1968.76	3.15				20-150%	39.4%	
	M7PFUdA		4834.29	7.73				20-150%	96.7%	
	MPFDoA		4322.95	6.92				20-150%	86.5%	
	M2PFTeDA		3342.96	5.35				20-150%	66.9%	
	d3-N-MeFOSA		5356.95	8.57				10-200%	53.6%	
	d5-N-EtFOSA		4741.36	7.59				10-200%	47.4%	
	d7-N-MeFOSE		6872.87	11.0				10-200%	68.7%	
	d9-N-EtFOSE		4775.85	7.64				10-200%	47.8%	

Enthalpy Analytical

Job No.: 0323-739-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	OPR-14849-PFAS	Prep Batch	EU14849	Sample Vol (mL)	250
Sample Name	OPR-14849-PFAS	Prep Date	2023-03-13 11:00	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2023-03-14 00:55	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	11690.15	18.7	18.7	0.254	0.640	73-129%	93.5%	
	PFPeA	2706-90-3	12244.55	19.6	19.6	0.183	0.640	72-129%	98.0%	
	PFHxA	307-24-4	12398.23	19.8	19.8	0.214	0.640	72-129%	99.2%	
	PFHpA	375-85-9	11508.48	18.4	18.4	0.224	0.640	72-130%	92.1%	
	PFOA	335-67-1	10936.32	17.5	17.5	0.146	0.640	71-133%	87.5%	
	PFNA	375-95-1	12763.91	20.4	20.4	0.145	0.640	69-130%	102.1%	
	PFDA	335-76-2	10761.45	17.2	17.2	0.183	0.640	71-129%	86.1%	
	PFUnDA	2058-94-8	11215.58	17.9	17.9	0.145	0.640	69-133%	89.7%	
	PFDoDA	307-55-1	9595.84	15.4	15.4	0.260	0.640	72-134%	76.8%	
	PFTrDA	72629-94-8	15788.88	25.3	25.3	0.212	0.640	65-144%	126.3%	
	PFTeDA	376-06-7	9710.26	15.5	15.5	0.244	0.640	71-132%	77.7%	
Sulfonates	PFBS	375-73-5	10780.91	17.2	17.2	0.340	0.640	72-134%	97.2%	
	PFPeS	2706-91-4	14554.66	23.3	23.3	0.131	0.603	71-127%	123.7%	
	PFHxS	355-46-4	9776.93	15.6	15.6	0.494	0.586	68-131%	85.6%	
	PFHpS	375-92-8	11745.24	18.8	18.8	0.310	0.610	69-134%	98.6%	
	PFOS	1763-23-1	10358.54	16.6	16.6	0.338	0.593	65-140%	89.3%	
	PFNS	68259-12-1	10526.47	16.8	16.8	0.199	0.616	69-127%	87.5%	
	PFDS	335-77-3	10246.39	16.4	16.4	0.336	0.616	53-142%	84.9%	
	4:2 FTS	757124-72-4	11997.73	19.2	19.2	0.0830	0.600	63-143%	102.4%	
	6:2 FTS	27619-97-2	10764.79	17.2	17.2	0.302	0.610	64-140%	90.6%	
	8:2 FTS	39108-34-4	10491.96	16.8	16.8	0.143	0.613	67-138%	87.4%	
Other	PFOSA	754-91-6	10499.28	16.8	16.8	0.0898	0.640	67-137%	84.0%	
	N-MeFOSAA	2355-31-9	11650.08	18.6	18.6	0.180	0.640	65-136%	93.2%	
	N-EtFOSAA	2991-50-6	14637.63	23.4	23.4	0.260	0.640	61-135%	117.1%	
	HFPO-DA	13252-13-6	12216.84	19.5	19.5	0.0678	0.640	70-130%	97.7%	
ES	MPFBA		4612.36	7.38				20-150%	92.2%	
	M5PFPeA		3875.72	6.20				20-150%	77.5%	
	M3PFBS		3705.54	5.93				20-150%	74.1%	
	M2-4:2 FTS		4863.81	7.78				20-150%	97.3%	
	M5PFHxA		3936.86	6.30				20-150%	78.7%	
	M3HFPO-DA		4527.63	7.24				20-150%	90.6%	
	M4PFHpA		4159.10	6.65				20-150%	83.2%	
	M3PFHxS		4798.16	7.68				20-150%	96.0%	
	M2-6:2 FTS		6235.90	9.98				20-150%	124.7%	
	M8PFOA		4556.98	7.29				20-150%	91.1%	
	M9PFNA		3883.83	6.21				20-150%	77.7%	
	M8PFOS		4698.87	7.52				20-150%	94.0%	
	M2-8:2 FTS		7549.92	12.1				20-150%	151.0%	Q
	M8FOSA-I		4367.20	6.99				20-150%	87.3%	
	M6PFDA		4336.25	6.94				20-150%	86.7%	
	d3-N-MeFOSAA		2374.76	3.80				20-150%	47.5%	
	d5-N-EtFOSAA		1893.10	3.03				20-150%	37.9%	
	M7PFUdA		4021.88	6.44				20-150%	80.4%	
	MPFDoA		4007.73	6.41				20-150%	80.2%	
	M2PFTeDA		2378.90	3.81				20-150%	47.6%	
	d3-N-MeFOSA		4407.55	7.05				10-200%	44.1%	
	d5-N-EtFOSA		3572.70	5.72				10-200%	35.7%	
	d7-N-MeFOSE		5124.44	8.20				10-200%	51.2%	
	d9-N-EtFOSE		3919.69	6.27				10-200%	39.2%	

Narrative Summary

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Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0323-739-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site:Northwest Water Plant - Leland, N.C.

1. Custody

Summer Banning received the samples on March 10, 2023 at 10.9 °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
0323-739-001-1	03102023S01	AQ
0323-739-002-1	03102023E01	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	Brunswick PFAS 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), with the followine exception. A 50 mL aliquot of sample 03102023S01 was spiked the ES for analysis. 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 analytes of interest exhibited R^2 values of ≥ 0.99. The analytes of interest in the initial calibration, continuing calibration and Initial Calibration Verification (ICV) standards met the 30% accuracy criterion for native analytes, with the following exception. The analytes PFPeS and FBSA exhibited high recovery in the continuing calibration standard within the analytical sequence. However, the 30% accuracy criterion was met for all of the analytes of interest in the begining and ending continuing calibration standards for the analytical sequence.

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0323-739-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site:Northwest Water Plant - Leland, N.C.

5. QC Notes

The QC sample analyses passed all method criteria, except as follows. The laboratory control sample, OPR-14849-PFAS, was reported for the 25 analytes routinely spiked for PFAS reporting. The recovery of the ES, M2-8:2 FTS, exceeded the high control limit. The associated analyte recovery was acceptable. 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.

6. Reporting Notes

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 to perform PFAS analysis using its SOP EU047 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-dioxahexanoic) 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

ENTHALPY ANALYTICAL

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
*	PFODA	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

ENTHALPY ANALYTICAL

Sample Custody

ENTHALPY
ANALYTICAL

0323-739

Chain of Custody Record

ENTHALPY analytical

Enthalpy Ultratrace Job#: _____ **COC Page** 1 of 1

Special Handling:

X Standard Turn Around Time

☐ Rush Turn Around Time -- Date Needed_____

• All Fast TATs Subject to Approval by Enthalpy Analytical, Inc.

• All Samples Disposed of After 6 months Unless Otherwise Instructed.

Enthalpy Analytical-Wilmington, NC has added enhancements to standard methods to improve accuracy, precision and permit an assessment of laboratory performance in the context of your specific data needs. For more information email Cindy.James@enthalpy.com.

Client Name: BRUNSWICK COUNTY UTILITIES

Project Manager: GLENN WALKER

Report To: SAME

Project Number:

Site Name: NORTHWEST WATER PLANT

Location: LELAND N.C.

PO#:

Telephone#:

Email:

This Chain of Custody is applicable to Non-Air samples. Standard TAT differ per analysis and are provided by request.

Client Special Instructions:

Matrix: GW-Groundwater, WW-Wastewater, NW-Non-Potable Water, DW-Drinking Water, S-Soil, SL-Sludge, BT-Biological Tissue, O-Other

Type: G=Grab C=Composite Q=Quality Control

Sample ID	Date	Time	Sample Volume	Type	Matrix	Sample Containers: # of Bottles	# of Jars	# of Bags	# Other				Analyses: Method 1613	Method 8290	Method 1668A/B/C PCB	PFAS by LC/MS/MS	PAHs by HRGC/HRMS	Sample on Hold	Method 23	ALL PFAS	Notes:
03102023S01	3/10/2023	1310	250 ml	G	NW	2														X	
03102023E01	3/10/2023	1310	250 ml	G	DW	2														X	
cooler, cooler, on ice, no seals, good condition SB 3/10/23																					

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
Phillip Mcculloch	3/10/2023		3/10/23	13:44	☑ Iced ☐ Ambient °C 10.9 TM
					☐ Iced ☐ Ambient °C_____
					☐ Iced ☐ Ambient °C_____

This Is The Last Page Of This Report.

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