County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 01/06/22

Analytical Report
0122-713

Isotope Dilution Method

PFAS

Enthalpy Analytical, LLC – Ultratrace

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I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains __21__ pages.

QA Review Performed by: Laura K. Boivin

Report Issued Date: 1/27/2022

ENTHALPY ANALYTICAL

Summary of Results

Enthalpy Analytical

Job No.: 0122-713-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: Northwest Water Plant, Leland, NC

Summary

	Compound	CAS	01062022S01 ng/L	01062022E01 ng/L
Acids	PFBA	375-22-4	4.58	3.50
	PFPeA	2706-90-3	8.29	8.71
	PFHxA	307-24-4	6.05	6.71
	PFHpA	375-85-9	2.87	3.23
	PFOA	335-67-1	4.59	4.52
	PFNA	375-95-1	0.763	0.610
	PFDA	335-76-2	0.566 B	0.391 B
	PFUnDA	2058-94-8	0.169 JB	0.0488 LB
	PFDoDA	307-55-1	0.0669 LB	0.0295 LB
	PFTrDA	72629-94-8	0.0147 LB	ND U
	PFTeDA	376-06-7	0.0151 LB	ND U
Sulfonates	PFBS	375-73-5	4.66	4.58
	PFPeS	2706-91-4	0.528	0.705
	PFHxS	355-46-4	4.48	4.14
	PFHpS	375-92-8	0.0942 L	0.00847 L
	PFOS	1763-23-1	10.7	9.17
	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	0.217 J	0.0971 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	0.0844 LB	0.103 LB
	N-EtFOSAA	2991-50-6	ND U	0.00404 L
	HFPO-DA	13252-13-6	3.92	10.9
	PFMOAA	674-13-5	13.5	50.7
	PFMOPrA	377-73-1	ND U	0.00939 L
	PFO2HxA	39492-88-1	2.49	7.26
	PFO3OA	39492-89-2	1.00 L	3.16
	PFO4DA	39492-90-5	0.147 L	0.277 L
	Nafion Byproduct 1	29311-67-9	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	0.388	0.542
	Hydro-EVE Acid	773804-62-9	0.221 LB	0.618 L
	Hydrolyzed PSDA	2416366-19-1	3.60 B	10.6
	Nafion Byproduct 2	749836-20-2	0.219 L	0.317
	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	5.52	4.73
	PEPA	267239-61-2	ND U	3.75
	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	1.55	8.56
	R-EVE	2416366-22-6	3.40	16.2
	R-PSDA	2416366-18-0	21.3	32.7
	R-PSDCA	2416366-21-5	0.0335 LB	0.0635 LB

Detailed Results

Enthalpy Analytical

Job No.: 0122-713-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID	0122-713-001-1	Prep Batch	EU12819	Sample Vol (mL)	279.05
Sample Name	01062022S01	Prep Date	2022-01-07 14:00	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-01-11 11:39	Dilution Factor	1
Sampling Date	20220106 00:00	Analyst	rappelle	Method Code	WM-026
Received Date	2022-01-06 13:00	Instrument	Kili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
	PFBA	375-22-4	3198.11	4.58	4.58	0.137	0.272			
	PFPeA	2706-90-3	5785.62	8.29	8.29	0.152	0.272			
	PFHxA	307-24-4	4222.60	6.05	6.05	0.173	0.272			
	PFHpA	375-85-9	2003.51	2.87	2.87	0.109	0.272			
	PFOA	335-67-1	3204.93	4.59	4.59	0.159	0.272			
Acids	PFNA	375-95-1	532.33	0.763	0.763	0.0682	0.272			
	PFDA	335-76-2	394.98	0.566	0.566	0.0757	0.272			B
	PFUnDA	2058-94-8	117.69	0.169	0.169	0.166	0.272			JB
	PFDoDA	307-55-1	46.68	0.0669	0.0669	0.181	0.272			LB
	PFTrDA	72629-94-8	10.23	0.0147	0.0147	0.135	0.272			LB
	PFTeDA	376-06-7	10.51	0.0151	0.0151	0.195	0.272			LB
	PFBS	375-73-5	3251.15	4.66	4.66	0.318	0.318			
	PFPeS	2706-91-4	368.09	0.528	0.528	0.185	0.257			
	PFHxS	355-46-4	3126.84	4.48	4.48	0.171	0.249			
	PFHpS	375-92-8	65.73	0.0942	0.0942	0.121	0.259			L
	PFOS	1763-23-1	7499.30	10.7	10.7	0.143	0.252			
Sulfonates	PFNS	68259-12-1	ND	ND	ND	0.0774	0.262			U
	PFDS	335-77-3	ND	ND	ND	0.172	0.262			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.106	0.255			U
	6:2 FTS	27619-97-2	151.35	0.217	0.217	0.104	0.259			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.153	0.261			U
	PFOSA	754-91-6	ND	ND	ND	0.116	0.272			U
	N-MeFOSAA	2355-31-9	58.89	0.0844	0.0844	0.129	0.272			LB
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0977	0.272			U
	HFPO-DA	13252-13-6	2734.17	3.92	3.92	0.204	0.272			
	PFMOAA	674-13-5	9439.24	13.5	13.5	1.29	1.29			
	PFMOPrA	377-73-1	ND	ND	ND	0.215	0.272			U
	PFO2HxA	39492-88-1	1737.95	2.49	2.49	1.29	1.29			
	PFO3OA	39492-89-2	700.81	1.00	1.00	1.29	1.29			L
	PFO4DA	39492-90-5	102.64	0.147	0.147	1.36	1.36			L
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.272	0.272			U
	ADONA	919005-14-4	ND	ND	ND	0.108	0.258			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.108	0.254			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.108	0.257			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.215	0.272			U
	EVE Acid	69087-46-3	ND	ND	ND	1.29	1.29			U
	FBSA	30334-69-1	270.37	0.388	0.388	0.215	0.272			
	Hydro-EVE Acid	773804-62-9	154.52	0.221	0.221	1.29	1.29			LB
other	Hydrolyzed PSDA	2416366-19-1	2513.30	3.60	3.60	1.29	1.29			B
	Nafion Byproduct 2	749836-20-2	152.79	0.219	0.219	0.272	0.272			L
	N-EtFOSA	4151-50-2	ND	ND	ND	0.215	0.272			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.45	6.45			U
	NFDHA	151772-58-6	ND	ND	ND	0.215	0.272			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.215	0.272			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.45	6.45			U
	NVHOS	1132933-86-8	3853.17	5.52	5.52	1.29	1.29			
	PEPA	267239-61-2	ND	ND	ND	1.29	1.29			U
	PFECA-G	801212-59-9	ND	ND	ND	0.272	1.29			U
	PFEESA	113507-82-7	ND	ND	ND	0.215	0.272			U
	PFHxDA	67905-19-5	ND	ND	ND	1.29	1.29			U
	PFMOBA	863090-89-5	ND	ND	ND	1.29	1.29			U
	PFO5DA	39492-91-6	ND	ND	ND	1.36	1.36			U
	PMPA	13140-29-9	1078.00	1.55	1.55	1.29	1.29			
	R-EVE	2416366-22-6	2373.22	3.40	3.40	1.29	1.29			
	R-PSDA	2416366-18-0	14848.05	21.3	21.3	1.29	1.29			
	R-PSDCA	2416366-21-5	23.36	0.0335	0.0335	1.29	1.29			LB
	MPFBA		5246.86	7.52				20-150%	104.9%	
	M5PFPeA		11908.72	17.1				20-150%	238.2%	Q
	M3PFBS		21276.32	30.5				20-150%	425.5%	Q
	M2-4:2 FTS		14629.59	21.0				20-150%	292.6%	Q
	M5PFHxA		4429.18	6.35				20-150%	88.6%	
	M3HFPO-DA		3238.09	4.64				20-150%	64.8%	
	M4PFHpA		5079.30	7.28				20-150%	101.6%	
	M3PFHxS		5504.00	7.89				20-150%	110.1%	
	M2-6:2 FTS		8138.67	11.7				20-150%	162.8%	Q
	M8PFOA		5145.63	7.38				20-150%	102.9%	
ES	M9PFNA		4847.04	6.95				20-150%	96.9%	
	M8PFOS		5159.73	7.40				20-150%	103.2%	
	M2-8:2 FTS		6179.73	8.86				20-150%	123.6%	
	M8FOSA-I		2631.46	3.77				20-150%	52.6%	
	M6PFDA		4811.44	6.90				20-150%	96.2%	
	d3-N-MeFOSAA		5116.65	7.33				20-150%	102.3%	
	d5-N-EtFOSAA		4331.80	6.21				20-150%	86.6%	
	M7PFUdA		4165.65	5.97				20-150%	83.3%	
	MPFDoA		3519.13	5.04				20-150%	70.4%	
	M2PFTeDA		1352.60	1.94				20-150%	27.1%	

Enthalpy Analytical

Job No.: 0122-713-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID	0122-713-002-1	Prep Batch	EU12819	Sample Vol (mL)	285.82
Sample Name	01062022E01	Prep Date	2022-01-07 14:00	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-01-11 12:03	Dilution Factor	1
Sampling Date	20220106 00:00	Analyst	rappelle	Method Code	WM-026
Received Date	2022-01-06 13:00	Instrument	Kili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
	PFBA	375-22-4	2498.58	3.50	3.50	0.134	0.266			
	PFPeA	2706-90-3	6221.36	8.71	8.71	0.149	0.266			
	PFHxA	307-24-4	4797.47	6.71	6.71	0.169	0.266			
	PFHpA	375-85-9	2307.65	3.23	3.23	0.107	0.266			
	PFOA	335-67-1	3232.13	4.52	4.52	0.155	0.266			
Acids	PFNA	375-95-1	435.93	0.610	0.610	0.0666	0.266			
	PFDA	335-76-2	279.72	0.391	0.391	0.0739	0.266			B
	PFUnDA	2058-94-8	34.87	0.0488	0.0488	0.162	0.266			LB
	PFDoDA	307-55-1	21.07	0.0295	0.0295	0.177	0.266			LB
	PFTrDA	72629-94-8	ND	ND	ND	0.132	0.266			U
	PFTeDA	376-06-7	ND	ND	ND	0.191	0.266			U
	PFBS	375-73-5	3269.78	4.58	4.58	0.311	0.311			
	PFPeS	2706-91-4	503.98	0.705	0.705	0.180	0.251			
	PFHxS	355-46-4	2955.30	4.14	4.14	0.167	0.244			
	PFHpS	375-92-8	6.05	0.00847	0.00847	0.118	0.253			L
	PFOS	1763-23-1	6554.40	9.17	9.17	0.140	0.246			
Sulfonates	PFNS	68259-12-1	ND	ND	ND	0.0756	0.256			U
	PFDS	335-77-3	ND	ND	ND	0.168	0.256			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.103	0.249			U
	6:2 FTS	27619-97-2	69.36	0.0971	0.0971	0.101	0.253			L
	8:2 FTS	39108-34-4	ND	ND	ND	0.150	0.255			U
	PFOSA	754-91-6	ND	ND	ND	0.114	0.266			U
	N-MeFOSAA	2355-31-9	73.94	0.103	0.103	0.126	0.266			LB
	N-EtFOSAA	2991-50-6	2.88	0.00404	0.00404	0.0953	0.266			L
	HFPO-DA	13252-13-6	7757.48	10.9	10.9	0.199	0.266			
	PFMOAA	674-13-5	36203.88	50.7	50.7	1.26	1.26			
	PFMOPrA	377-73-1	6.71	0.00939	0.00939	0.210	0.266			L
	PFO2HxA	39492-88-1	5187.72	7.26	7.26	1.26	1.26			
	PFO3OA	39492-89-2	2258.03	3.16	3.16	1.26	1.26			
	PFO4DA	39492-90-5	198.18	0.277	0.277	1.33	1.33			L
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.266	0.266			U
	ADONA	919005-14-4	ND	ND	ND	0.105	0.252			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.105	0.248			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.105	0.251			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.210	0.266			U
	EVE Acid	69087-46-3	ND	ND	ND	1.26	1.26			U
	FBSA	30334-69-1	387.50	0.542	0.542	0.210	0.266			
	Hydro-EVE Acid	773804-62-9	441.45	0.618	0.618	1.26	1.26			L
other	Hydrolyzed PSDA	2416366-19-1	7564.47	10.6	10.6	1.26	1.26			
	Nafion Byproduct 2	749836-20-2	226.34	0.317	0.317	0.266	0.266			
	N-EtFOSA	4151-50-2	ND	ND	ND	0.210	0.266			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.30	6.30			U
	NFDHA	151772-58-6	ND	ND	ND	0.210	0.266			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.210	0.266			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.30	6.30			U
	NVHOS	1132933-86-8	3380.41	4.73	4.73	1.26	1.26			
	PEPA	267239-61-2	2682.74	3.75	3.75	1.26	1.26			
	PFECA-G	801212-59-9	ND	ND	ND	0.266	1.26			U
	PFEESA	113507-82-7	ND	ND	ND	0.210	0.266			U
	PFHxDA	67905-19-5	ND	ND	ND	1.26	1.26			U
	PFMOBA	863090-89-5	ND	ND	ND	1.26	1.26			U
	PFO5DA	39492-91-6	ND	ND	ND	1.33	1.33			U
	PMPA	13140-29-9	6118.41	8.56	8.56	1.26	1.26			
	R-EVE	2416366-22-6	11607.38	16.2	16.2	1.26	1.26			
	R-PSDA	2416366-18-0	23390.18	32.7	32.7	1.26	1.26			
	R-PSDCA	2416366-21-5	45.38	0.0635	0.0635	1.26	1.26			LB
	MPFBA		5212.11	7.29				20-150%	104.2%	
	M5PFPeA		9920.96	13.9				20-150%	198.4%	Q
	M3PFBS		14552.55	20.4				20-150%	291.1%	Q
	M2-4:2 FTS		9858.27	13.8				20-150%	197.2%	Q
	M5PFHxA		4698.13	6.57				20-150%	94.0%	
	M3HFPO-DA		3909.84	5.47				20-150%	78.2%	
	M4PFHpA		4756.92	6.66				20-150%	95.1%	
	M3PFHxS		5079.61	7.11				20-150%	101.6%	
	M2-6:2 FTS		5019.32	7.02				20-150%	100.4%	
	M8PFOA		4857.49	6.80				20-150%	97.1%	
ES	M9PFNA		4811.60	6.73				20-150%	96.2%	
	M8PFOS		4266.42	5.97				20-150%	85.3%	
	M2-8:2 FTS		5883.79	8.23				20-150%	117.7%	
	M8FOSA-I		2678.56	3.75				20-150%	53.6%	
	M6PFDA		4535.62	6.35				20-150%	90.7%	
	d3-N-MeFOSAA		4001.34	5.60				20-150%	80.0%	
	d5-N-EtFOSAA		4054.73	5.67				20-150%	81.1%	
	M7PFUdA		3874.56	5.42				20-150%	77.5%	
	MPFDoA		3947.52	5.52				20-150%	79.0%	
	M2PFTeDA		2366.03	3.31				20-150%	47.3%	

QC Data

ENTHALPY
ANALYTICAL

Enthalpy Analytical

Job No.: 0122-713-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID	MB-12819-PFAS	Prep Batch	EU12819	Sample Vol (mL)	250
Sample Name	MB-12819-PFAS	Prep Date	2022-01-07 14:00	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-01-11 08:34	Dilution Factor	1
Sampling Date		Analyst	rappelle	Method Code	WM-026
Received Date	2022-01-07 14:00	Instrument	Kili	Sample Type	Blank

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	ND	ND	ND	0.153	0.304			U
	PFPeA	2706-90-3	20.37	0.0326	0.0326	0.170	0.304			L
	PFHxA	307-24-4	ND	ND	ND	0.193	0.304			U
	PFHpA	375-85-9	42.06	0.0673	0.0673	0.122	0.304			L
	PFOA	335-67-1	3.39	0.00542	0.00542	0.177	0.304			L
	PFNA	375-95-1	15.39	0.0246	0.0246	0.0761	0.304			L
	PFDA	335-76-2	49.43	0.0791	0.0791	0.0845	0.304			L
	PFUnDA	2058-94-8	38.63	0.0618	0.0618	0.185	0.304			L
	PFDoDA	307-55-1	73.69	0.118	0.118	0.202	0.304			L
	PFTrDA	72629-94-8	66.10	0.106	0.106	0.151	0.304			L
	PFTeDA	376-06-7	126.53	0.202	0.202	0.218	0.304			L
Sulfonates	PFBS	375-73-5	ND	ND	ND	0.355	0.355			U
	PFPeS	2706-91-4	ND	ND	ND	0.206	0.286			U
	PFHxS	355-46-4	ND	ND	ND	0.191	0.278			U
	PFHpS	375-92-8	ND	ND	ND	0.135	0.290			U
	PFOS	1763-23-1	ND	ND	ND	0.160	0.282			U
	PFNS	68259-12-1	ND	ND	ND	0.0864	0.293			U
	PFDS	335-77-3	ND	ND	ND	0.192	0.293			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.118	0.285			U
	6:2 FTS	27619-97-2	ND	ND	ND	0.116	0.290			U
	8:2 FTS	39108-34-4	ND	ND	ND	0.171	0.291			U
other	PFOSA	754-91-6	ND	ND	ND	0.130	0.304			U
	N-MeFOSAA	2355-31-9	85.26	0.136	0.136	0.144	0.304			L
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.109	0.304			U
	HFPO-DA	13252-13-6	ND	ND	ND	0.228	0.304			U
	PFMOAA	674-13-5	ND	ND	ND	1.44	1.44			U
	PFMOPrA	377-73-1	ND	ND	ND	0.240	0.304			U
	PFO2HxA	39492-88-1	ND	ND	ND	1.44	1.44			U
	PFO3OA	39492-89-2	ND	ND	ND	1.44	1.44			U
	PFO4DA	39492-90-5	ND	ND	ND	1.52	1.52			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.304	0.304			U
	ADONA	919005-14-4	ND	ND	ND	0.120	0.288			U
	9Cl-PF3ONS	756426-58-1	15.91	0.0255	0.0255	0.120	0.283			L
	11Cl-PF3OUdS	763051-92-9	26.83	0.0429	0.0429	0.120	0.286			L
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	0.304			U
	EVE Acid	69087-46-3	15.74	0.0252	0.0252	1.44	1.44			L
	FBSA	30334-69-1	ND	ND	ND	0.240	0.304			U
	Hydro-EVE Acid	773804-62-9	27.85	0.0446	0.0446	1.44	1.44			L
	Hydrolyzed PSDA	2416366-19-1	408.04	0.653	0.653	1.44	1.44			L
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	0.304	0.304			U
	N-EtFOSA	4151-50-2	ND	ND	ND	0.240	0.304			U
	N-EtFOSE	1691-99-2	ND	ND	ND	7.20	7.20			U
	NFDHA	151772-58-6	ND	ND	ND	0.240	0.304			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.240	0.304			U
	N-MeFOSE	24448-09-7	ND	ND	ND	7.20	7.20			U
	NVHOS	1132933-86-8	ND	ND	ND	1.44	1.44			U
	PEPA	267239-61-2	ND	ND	ND	1.44	1.44			U
	PFECA-G	801212-59-9	ND	ND	ND	0.304	1.44			U
	PFEESA	113507-82-7	ND	ND	ND	0.240	0.304			U
	PFHxDA	67905-19-5	ND	ND	ND	1.44	1.44			U
	PFMOBA	863090-89-5	ND	ND	ND	1.44	1.44			U
	PFO5DA	39492-91-6	ND	ND	ND	1.52	1.52			U
	PMPA	13140-29-9	ND	ND	ND	1.44	1.44			U
	R-EVE	2416366-22-6	115.66	0.185	0.185	1.44	1.44			L
	R-PSDA	2416366-18-0	ND	ND	ND	1.44	1.44			U
	R-PSDCA	2416366-21-5	54.78	0.0876	0.0876	1.44	1.44			L
ES	MPFBA		4254.84	6.81				20-150%	85.1%	
	M5PFPeA		4081.00	6.53				20-150%	81.6%	
	M3PFBS		4473.02	7.16				20-150%	89.5%	
	M2-4:2 FTS		2931.35	4.69				20-150%	58.6%	
	M5PFHxA		3718.64	5.95				20-150%	74.4%	
	M3HFPO-DA		3303.06	5.28				20-150%	66.1%	
	M4PFHpA		3776.01	6.04				20-150%	75.5%	
	M3PFHxS		3494.02	5.59				20-150%	69.9%	
	M2-6:2 FTS		3582.61	5.73				20-150%	71.7%	
	M8PFOA		3891.89	6.23				20-150%	77.8%	
	M9PFNA		3599.11	5.76				20-150%	72.0%	
	M8PFOS		4045.96	6.47				20-150%	80.9%	
	M2-8:2 FTS		3764.69	6.02				20-150%	75.3%	
	M8FOSA-I		2679.98	4.29				20-150%	53.6%	
	M6PFDA		3456.10	5.53				20-150%	69.1%	
	d3-N-MeFOSAA		3186.50	5.10				20-150%	63.7%	
	d5-N-EtFOSAA		2715.78	4.35				20-150%	54.3%	
	M7PFUdA		3113.50	4.98				20-150%	62.3%	
	MPFDoA		3114.82	4.98				20-150%	62.3%	
	M2PFTeDA		1709.11	2.73				20-150%	34.2%	

Enthalpy Analytical

Job No.: 0122-713-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID	OPR-12819-PFAS	Prep Batch	EU12819	Sample Vol (mL)	250
Sample Name	OPR-12819-PFAS	Prep Date	2022-01-07 14:00	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-01-11 08:57	Dilution Factor	1
Sampling Date		Analyst	rappelle	Method Code	WM-026
Received Date	2022-01-07 14:00	Instrument	Kili	Sample Type	Control

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	13882.77	22.2	22.2	0.153	0.304	73-129%	111.1%	
	PFPeA	2706-90-3	14838.84	23.7	23.7	0.170	0.304	72-129%	118.7%	
	PFHxA	307-24-4	13937.36	22.3	22.3	0.193	0.304	72-129%	111.5%	
	PFHpA	375-85-9	15796.44	25.3	25.3	0.122	0.304	72-130%	126.4%	
	PFOA	335-67-1	13309.33	21.3	21.3	0.177	0.304	71-133%	106.5%	
	PFNA	375-95-1	13871.88	22.2	22.2	0.0761	0.304	69-130%	111.0%	
	PFDA	335-76-2	15306.55	24.5	24.5	0.0845	0.304	71-129%	122.5%	
	PFUnDA	2058-94-8	15687.99	25.1	25.1	0.185	0.304	69-133%	125.5%	
	PFDoDA	307-55-1	13488.13	21.6	21.6	0.202	0.304	72-134%	107.9%	
	PFTrDA	72629-94-8	19743.45	31.6	31.6	0.151	0.304	65-144%	157.9%	Q
	PFTeDA	376-06-7	14620.30	23.4	23.4	0.218	0.304	71-132%	117.0%	
Sulfonates	PFBS	375-73-5	12832.15	20.5	20.5	0.355	0.355	72-134%	115.7%	
	PFPeS	2706-91-4	13801.10	22.1	22.1	0.206	0.286	71-127%	117.3%	
	PFHxS	355-46-4	13854.69	22.2	22.2	0.191	0.278	68-131%	121.3%	
	PFHpS	375-92-8	13063.04	20.9	20.9	0.135	0.290	69-134%	109.7%	
	PFOS	1763-23-1	12856.90	20.6	20.6	0.160	0.282	65-140%	110.8%	
	PFNS	68259-12-1	13058.52	20.9	20.9	0.0864	0.293	69-127%	108.6%	
	PFDS	335-77-3	12021.60	19.2	19.2	0.192	0.293	53-142%	99.7%	
	4:2 FTS	757124-72-4	14484.36	23.2	23.2	0.118	0.285	63-143%	123.7%	
	6:2 FTS	27619-97-2	12532.76	20.1	20.1	0.116	0.290	64-140%	105.4%	
	8:2 FTS	39108-34-4	12258.68	19.6	19.6	0.171	0.291	67-138%	102.2%	
Other	PFOSA	754-91-6	16176.51	25.9	25.9	0.130	0.304	67-137%	129.4%	
	N-MeFOSAA	2355-31-9	14977.40	24.0	24.0	0.144	0.304	65-136%	119.8%	
	N-EtFOSAA	2991-50-6	15680.91	25.1	25.1	0.109	0.304	61-135%	125.4%	
	HFPO-DA	13252-13-6	15488.74	24.8	24.8	0.228	0.304	70-130%	123.9%	
ES	MPFBA		3801.28	6.08				20-150%	76.0%	
	M5PFPeA		3840.05	6.14				20-150%	76.8%	
	M3PFBS		3910.68	6.26				20-150%	78.2%	
	M2-4:2 FTS		3401.20	5.44				20-150%	68.0%	
	M5PFHxA		3809.21	6.09				20-150%	76.2%	
	M3HFPO-DA		3382.90	5.41				20-150%	67.7%	
	M4PFHpA		3648.61	5.84				20-150%	73.0%	
	M3PFHxS		3268.13	5.23				20-150%	65.4%	
	M2-6:2 FTS		4715.69	7.55				20-150%	94.3%	
	M8PFOA		3933.05	6.29				20-150%	78.7%	
	M9PFNA		3755.83	6.01				20-150%	75.1%	
	M8PFOS		3629.71	5.81				20-150%	72.6%	
	M2-8:2 FTS		5180.00	8.29				20-150%	103.6%	
	M8FOSA-I		2482.48	3.97				20-150%	49.6%	
	M6PFDA		3562.59	5.70				20-150%	71.3%	
	d3-N-MeFOSAA		2991.55	4.79				20-150%	59.8%	
	d5-N-EtFOSAA		2697.56	4.32				20-150%	54.0%	
	M7PFUdA		3216.92	5.15				20-150%	64.3%	
	MPFDoA		3197.10	5.12				20-150%	63.9%	
	M2PFTeDA		1840.20	2.94				20-150%	36.8%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0122-713-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant, Leland, NC

1. Custody

Dallas King received the samples on January 06, 2022 at 1.8 °C after being relinquished by County of Brunswick. 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
0122-713-001-1	01062022S01	Aqueous
0122-713-002-1	01062022E01	Aqueous

2. Methods and Analytes

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

Table 3 - Methods and Analytes

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

3. Analysis

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

For aqueous samples, the sample volume was measured gravimetrically by the laboratory, and spiked with Extraction Standard (ES). The sample was then mixed well and centrifuged, if needed. The samples were then extracted via SPE, and the extracts were cleaned up using ENVI-Carb.

Each final sample extract was transferred to an autosampler vial, spiked with Injection Standard (IS), and brought to a final volume of 400µL prior to analysis.

Samples that run in more than one sequence in order to analyze all analytes of interest and to be in compliance with method criteria.

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.

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0122-713-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant, Leland, NC

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-12819-PFAS PFTrDA fell above method criteria. This analyte was detected below LOD in sample 001 (01062022S01) and was not-detected in sample 002 (01062022E01). The data is reported with no adverse impact.

Method Blank (MB)-12819-PFAS PFTeDA was detected in the MB above 1/2 LOQ. This analyte was detected below LOD in sample 001 (01062022S01) and noted with a 'B' qualifier. PFTrDA was not-detected in sample 002 (01062022E01). The data is reported with no adverse impact.

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

6. Reporting Notes

Analyte(s) were detected in the method blank (MB) below 1/2 LOQ. Any analytes detected in the samples with less than 10 times the amount detected in MB were notated with a B qualifier

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

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

These analyses met the requirements of the TNI Standard. Any deviations from the requirements of the reference method or TNI Standard have been stated above.

Enthalpy Analytical, LLC in Wilmington NC is accredited by the Louisiana Department of Environmental Quality to the 2009 TNI Standard under certificate number 05075.

General Reporting Notes – Data Qualifiers

The following are general reporting notes that are applicable to all Enthalpy Analytical, LLC - Wilmington, NC data reports, unless specifically noted otherwise.

General Data Qualifiers

- B – The analyte was found in the method blank, at a concentration that was at least 10% of the amount in the sample.
- Cxx – Two or more congeners co-elute. In EDDs, C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group ('xx') are shown with the number of the lowest IUPAC co-eluter.
- E – The reported concentration exceeds the calibration range (upper point of the calibration curve). For HRMS data, this condition does not imply additional measurement uncertainty. For LC-MS/MS data, these values should be considered as having measurement uncertainty higher than values within the calibration range.
- EDL – Estimated Detection Level: The EDL is unique to isotope dilution methods and reflects the conditions of analysis at the time of analysis, including the equipment used. Where the MDL is a static value, the EDL is a dynamic value.
- EMPC – Estimated Maximum Possible Concentration: EMPC is specific to Dioxin/Furan tests to indicate the determined ion-abundance ratio was outside the allowed theoretical range (usually due to being near the detection limit, although it can very rarely be caused by a co-eluting interference). The EMPC concentration is adjusted to reflect the value at the theoretical ion-abundance ratio.
- IR – The ion ratio between the primary and secondary ions was observed to be outside the method criteria. The analyte concentration may be inaccurate due to interference.
- J – The analyte has a concentration below the minimum calibration level (LOQ value) but greater than the LOD. These values should be considered as having measurement uncertainty higher than values within the calibration range
- L - Indicates that an analyte has a concentration below the Minimum Detection Limit (MDL). The reported concentration is not recommended for regulatory use as the analyte signal may have a signal-to-noise ratio less than the criteria deemed necessary to be considered a detected analyte.
- LOD – Limit of Detection: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOD. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the minimum detection limit (MDL). The LOD is adjusted for sample weight or volume.
- LOQ – Limit of Quantitation: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOQ. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the reporting limit (RL). The LOQ is adjusted for sample weight or volume.

General Reporting Notes – Data Qualifiers

- <LOD() – Analyte was not found at a concentration high enough to be reported as detected. It is reported as less than the LOD, and the LOD is given in the parentheses.
- <LOQ() – Analyte was not found at a concentration high enough to be reported as above the QSM-defined LOQ or TNI defined Reporting Limit. It is reported as less than the LOQ, and the LOQ is given in the parentheses.
- ND – Indicates a non-detect.
- NR – Indicates a value that is not reportable due to issues observed in sample preparation or analysis.
- PR – The associated congener(s) is(are) poorly resolved.
- QI – Indicates the presence of a quantitative interference.
- RL – Reporting Limit. Lowest reportable value. The level is higher than the MDL.
- SI – Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.
- U – The analyte was not detected.
- V / Q – The labeled standard recovery is not within method control limits.
- X – Indicates the result is from re-injection/repeat/second-column analysis.

Lab Identifiers/ Data Attributes

- AR – Indicates use of the archived portion of the sample extract.
- CU – Indicates a sample that required additional clean-up prior to HRMS injection/processing.
- D – Dilution Data. Result was obtained from the analysis of a dilution. The number that follows the "D" indicates the dilution factor.
- DE – Indicates a dilution performed with the addition of ES (Extraction Standard) solution.
- DUP – Designation for a duplicate sample.
- MS – Designation for a matrix spike.
- MSD – Designation for a matrix spike duplicate.
- R – Indicates a re-extraction of the sample.
- RJ – Indicates a reinjection of the sample extract.

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

PFAS Compound Acronym List			
	Acronym	CAS #	Compound Name
	Target Analytes		
	*** Analyte is not accredited**		
	PFBA	375-22-4	Perfluorobutanoic Acid
	PFPeA	2706-90-3	Perfluoropentanoic Acid
	PFHxA	307-24-4	Perfluorohexanoic Acid
	PFHpA	375-85-9	Perfluoroheptanoic Acid
	PFOA	335-67-1	Perfluorooctanoic Acid
	PFNA	375-95-1	Perfluorononanoic Acid
	PFDA	335-76-2	Perfluorodecanoic acid
	PFUnA (PFUnDA)	2058-94-8	Perfluoroundecanoic acid
	PFDoA (PFDoDA)	307-55-1	Perfluorododecanoic acid
	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
*	PFMOAA	674-13-5	Perfluoro-2-methoxyacetic acid
	PFMOPrA (PFMPA)	377-73-1	Perfluoro-3-methoxypropanoic 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
	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
*	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	2416366-18-0	Perfluoro-4-(2-sulfoethoxy)pentanoic acid

	PFAS Compound Acronym List		
	Acronym	CAS #	Compound Name
	Target Analytes		
	* Analyte is not accredited		
*	Hydrolyzed PSDA	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	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

Sample Custody

ENTHALPY
ANALYTICAL

(0122-713)

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:
01062022S01	1/6/2022	1000	250 ml	G	NW	2											X	
01062022E01	1/6/2022	1000	250 ml	G	DW	2											X	

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
Phil Mcculloch	1/6/2022	Dalley Kinsey	1.6.22	13:00	☑ Iced ☐ Ambient °C 1.8° T9
					☐ Iced ☐ Ambient °C_____
					☐ Iced ☐ Ambient °C_____

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Courier, cooler, on ice, no seals, good condition DK 1/6/22

This Is The Last Page Of This Report.

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