County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

North West Water Plant

Leland, NC
Samples Received: 06/24/2021

Analytical Report
0621-790

PFAS by Isotope Dilution

Brunswick PFAS List

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 __20__ pages.

Valgena Respass

QA Review Performed by – Valgena Respass

Report Issued Date: 12-Jul-21

ENTHALPY ANALYTICAL

Summary of Results

Enthalpy Analytical

Job No.: 0621-790-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick NW Water Plant, Leland N.C.

Summary

	Compound	CAS	062421-SO1 ng/L	062421-EO1 ng/L
Acids	PFBA	375-22-4	5.71	ND U
	PFPeA	2706-90-3	7.71	7.93
	PFHxA	307-24-4	7.10	7.00
	PFHpA	375-85-9	4.00	3.73
	PFOA	335-67-1	6.89	6.58
	PFNA	375-95-1	1.07	0.967
	PFDA	335-76-2	0.647	0.415
	PFUnDA	2058-94-8	0.179 J	0.0968 L
	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	6.67	5.00
	PFPeS	2706-91-4	0.868	0.545
	PFHxS	355-46-4	3.39	3.44
	PFHpS	375-92-8	0.314	ND U
	PFOS	1763-23-1	12.2	10.1
	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	0.236 J	0.193 J
	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	4.80	5.54
	PFMOAA	674-13-5	39.3	29.9
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	3.18	4.22
	PFO3OA	39492-89-2	ND U	4.49
	PFO4DA	39492-90-5	ND U	ND U
	Nafion Byproduct 1	29311-67-9	ND U	ND U
	ADONA	919005-14-4	ND U	ND U
	9Cl-PF3ONS	756426-58-1	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	1.03	0.806
	Hydro-EVE Acid	773804-62-9	0.358 L	0.299 L
	Hydrolyzed PSDA	2416366-19-1	3.07	3.83
	Nafion Byproduct 2	749836-20-2	0.378	ND U
	N-EtFOSA	4151-50-2	ND U	ND U
	N-EtFOSE	1691-99-2	ND U	ND U
	NFDHA	151772-58-6	ND U	ND U
	N-MeFOSA	31506-32-8	ND U	ND U
	N-MeFOSE	24448-09-7	ND U	ND U
	NVHOS	1132933-86-8	3.12	2.16
	PEPA	267239-61-2	ND U	ND U
	PFECA-G	801212-59-9	ND U	ND U
	PFEESA	113507-82-7	ND U	ND U
	PFHxDA	67905-19-5	ND U	ND U
	PFMOBA	863090-89-5	ND U	ND U
	PFO5DA	39492-91-6	ND U	ND U
	PMPA	13140-29-9	ND U	ND U
	R-EVE Acid	2416366-22-6	5.27	4.92
	R-PSDA	2416366-18-0	11.5	9.02
	R-PSDCA	2416366-21-5	ND U	0.0255 L

Detailed Results

Enthalpy Analytical

Job No.: 0621-790-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick NW Water Plant, Leland N.C.

Enthalpy ID	0621-790-001-1	Prep Batch	EU11975	Sample Vol (mL)	285.75
Sample Name	062421-SO1	Prep Date	2021-07-01 15:34	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-07-02 19:23	Dilution Factor	1
Sampling Date	20210624 00:00	Analyst	hallen	Method Code	WM-026
Received Date	2021-06-24 13:25	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	4080.48	5.71	5.71	0.134	0.266			
	PFPeA	2706-90-3	5504.91	7.71	7.71	0.149	0.266			
	PFHxA	307-24-4	5071.52	7.10	7.10	0.169	0.266			
	PFHpA	375-85-9	2860.68	4.00	4.00	0.107	0.266			
	PFOA	335-67-1	4920.47	6.89	6.89	0.155	0.266			
Acids	PFNA	375-95-1	762.92	1.07	1.07	0.0666	0.266			
	PFDA	335-76-2	461.92	0.647	0.647	0.0739	0.266			
	PFUnDA	2058-94-8	127.97	0.179	0.179	0.162	0.266			J
	PFDoDA	307-55-1	ND	ND	ND	0.177	0.266			U
	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	4761.68	6.67	6.67	0.311	0.311			
	PFPeS	2706-91-4	619.85	0.868	0.868	0.180	0.251			
	PFHxS	355-46-4	2422.59	3.39	3.39	0.167	0.244			
	PFHpS	375-92-8	224.24	0.314	0.314	0.118	0.253			
	PFOS	1763-23-1	8690.44	12.2	12.2	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	168.55	0.236	0.236	0.101	0.253			J
	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	ND	ND	ND	0.126	0.266			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0954	0.266			U
	HFPO-DA	13252-13-6	3432.09	4.80	4.80	0.199	0.266			
	PFMOAA	674-13-5	28083.70	39.3	39.3	1.26	1.26			
	PFMOPrA	377-73-1	ND	ND	ND	0.210	0.266			U
	PFO2HxA	39492-88-1	2274.10	3.18	3.18	1.26	1.26			
	PFO3OA	39492-89-2	ND	ND	ND	1.26	1.26			U
	PFO4DA	39492-90-5	ND	ND	ND	1.26	2.63			U
	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	736.65	1.03	1.03	0.210	0.266			
	Hydro-EVE Acid	773804-62-9	256.02	0.358	0.358	1.26	1.26			L
other	Hydrolyzed PSDA	2416366-19-1	2189.56	3.07	3.07	1.26	1.26			
	Nafion Byproduct 2	749836-20-2	270.05	0.378	0.378	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	2228.04	3.12	3.12	1.26	1.26			
	PEPA	267239-61-2	ND	ND	ND	1.26	1.26			U
	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	2.63	2.63			U
	PMPA	13140-29-9	ND	ND	ND	1.26	1.26			U
	R-EVE Acid	2416366-22-6	3763.82	5.27	5.27	1.26	1.26			
	R-PSDA	2416366-18-0	8249.15	11.5	11.5	1.26	1.26			
	R-PSDCA	2416366-21-5	ND	ND	ND	1.26	1.26			U
	MPFBA		5570.06	7.80				20-150%	111.4%	
	M5PFPeA		15289.06	21.4				20-150%	305.8%	Q
	M3PFBS		26388.82	36.9				20-150%	527.8%	Q
	M2-4:2 FTS		11042.79	15.5				20-150%	220.9%	Q
	M5PFHxA		4541.35	6.36				20-150%	90.8%	
	M3HFPO-DA		4061.41	5.69				20-150%	81.2%	
	M4PFHpA		4862.19	6.81				20-150%	97.2%	
	M3PFHxS		5967.23	8.35				20-150%	119.3%	
	M2-6:2 FTS		5617.25	7.86				20-150%	112.3%	
	M8PFOA		4864.31	6.81				20-150%	97.3%	
ES	M9PFNA		5247.97	7.35				20-150%	105.0%	
	M8PFOS		5100.03	7.14				20-150%	102.0%	
	M2-8:2 FTS		4431.00	6.20				20-150%	88.6%	
	M8FOSA-I		3005.38	4.21				20-150%	60.1%	
	M6PFDA		5109.17	7.15				20-150%	102.2%	
	d3-N-MeFOSAA		3538.53	4.95				20-150%	70.8%	
	d5-N-EtFOSAA		3534.05	4.95				20-150%	70.7%	
	M7PFUdA		4645.73	6.50				20-150%	92.9%	
	MPFDoA		3833.63	5.37				20-150%	76.7%	
	M2PFTeDA		1394.01	1.95				20-150%	27.9%	

Enthalpy Analytical

Job No.: 0621-790-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick NW Water Plant, Leland N.C.

Enthalpy ID	0621-790-002-1	Prep Batch	EU11975	Sample Vol (mL)	297.11
Sample Name	062421-EO1	Prep Date	2021-07-01 15:34	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-07-02 19:46	Dilution Factor	1
Sampling Date	20210624 00:00	Analyst	hallen	Method Code	WM-026
Received Date	2021-06-24 13:25	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	ND	ND	ND	0.129	0.256			U
	PFPeA	2706-90-3	5886.56	7.93	7.93	0.143	0.256			
	PFHxA	307-24-4	5200.94	7.00	7.00	0.162	0.256			
	PFHpA	375-85-9	2774.16	3.73	3.73	0.103	0.256			
	PFOA	335-67-1	4887.34	6.58	6.58	0.149	0.256			
Acids	PFNA	375-95-1	718.05	0.967	0.967	0.0640	0.256			
	PFDA	335-76-2	308.35	0.415	0.415	0.0711	0.256			
	PFUnDA	2058-94-8	71.91	0.0968	0.0968	0.156	0.256			L
	PFDoDA	307-55-1	ND	ND	ND	0.170	0.256			U
	PFTrDA	72629-94-8	ND	ND	ND	0.127	0.256			U
	PFTeDA	376-06-7	ND	ND	ND	0.183	0.256			U
	PFBS	375-73-5	3714.57	5.00	5.00	0.299	0.299			
	PFPeS	2706-91-4	404.82	0.545	0.545	0.173	0.241			
	PFHxS	355-46-4	2556.88	3.44	3.44	0.161	0.234			
	PFHpS	375-92-8	ND	ND	ND	0.114	0.244			U
	PFOS	1763-23-1	7481.16	10.1	10.1	0.135	0.237			
Sulfonates	PFNS	68259-12-1	ND	ND	ND	0.0727	0.246			U
	PFDS	335-77-3	ND	ND	ND	0.162	0.246			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0993	0.240			U
	6:2 FTS	27619-97-2	143.49	0.193	0.193	0.0976	0.244			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.144	0.245			U
	PFOSA	754-91-6	ND	ND	ND	0.109	0.256			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.121	0.256			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0917	0.256			U
	HFPO-DA	13252-13-6	4112.74	5.54	5.54	0.192	0.256			
	PFMOAA	674-13-5	22197.27	29.9	29.9	1.21	1.21			
	PFMOPrA	377-73-1	ND	ND	ND	0.202	0.256			U
	PFO2HxA	39492-88-1	3132.63	4.22	4.22	1.21	1.21			
	PFO3OA	39492-89-2	3336.06	4.49	4.49	1.21	1.21			
	PFO4DA	39492-90-5	ND	ND	ND	1.21	2.53			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.256	0.256			U
	ADONA	919005-14-4	ND	ND	ND	0.101	0.242			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.101	0.238			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.101	0.241			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.202	0.256			U
	EVE Acid	69087-46-3	ND	ND	ND	1.21	1.21			U
	FBSA	30334-69-1	598.43	0.806	0.806	0.202	0.256			
	Hydro-EVE Acid	773804-62-9	222.18	0.299	0.299	1.21	1.21			L
other	Hydrolyzed PSDA	2416366-19-1	2844.36	3.83	3.83	1.21	1.21			
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	0.256	0.256			U
	N-EtFOSA	4151-50-2	ND	ND	ND	0.202	0.256			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.06	6.06			U
	NFDHA	151772-58-6	ND	ND	ND	0.202	0.256			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.202	0.256			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.06	6.06			U
	NVHOS	1132933-86-8	1602.78	2.16	2.16	1.21	1.21			
	PEPA	267239-61-2	ND	ND	ND	1.21	1.21			U
	PFECA-G	801212-59-9	ND	ND	ND	0.256	1.21			U
	PFEESA	113507-82-7	ND	ND	ND	0.202	0.256			U
	PFHxDA	67905-19-5	ND	ND	ND	1.21	1.21			U
	PFMOBA	863090-89-5	ND	ND	ND	1.21	1.21			U
	PFO5DA	39492-91-6	ND	ND	ND	2.53	2.53			U
	PMPA	13140-29-9	ND	ND	ND	1.21	1.21			U
	R-EVE Acid	2416366-22-6	3656.03	4.92	4.92	1.21	1.21			
	R-PSDA	2416366-18-0	6700.90	9.02	9.02	1.21	1.21			
	R-PSDCA	2416366-21-5	18.94	0.0255	0.0255	1.21	1.21			L
	MPFBA		4803.64	6.47				20-150%	96.1%	
	M5PFPeA		10367.56	14.0				20-150%	207.4%	Q
	M3PFBS		21059.29	28.4				20-150%	421.2%	Q
	M2-4:2 FTS		9752.36	13.1				20-150%	195.0%	Q
	M5PFHxA		4518.44	6.08				20-150%	90.4%	
	M3HFPO-DA		4349.50	5.86				20-150%	87.0%	
	M4PFHpA		4729.43	6.37				20-150%	94.6%	
	M3PFHxS		4723.98	6.36				20-150%	94.5%	
	M2-6:2 FTS		6028.47	8.12				20-150%	120.6%	
	M8PFOA		4497.35	6.05				20-150%	89.9%	
ES	M9PFNA		4878.51	6.57				20-150%	97.6%	
	M8PFOS		4842.87	6.52				20-150%	96.9%	
	M2-8:2 FTS		3433.83	4.62				20-150%	68.7%	
	M8FOSA-I		2648.27	3.57				20-150%	53.0%	
	M6PFDA		5200.38	7.00				20-150%	104.0%	
	d3-N-MeFOSAA		3553.56	4.78				20-150%	71.1%	
	d5-N-EtFOSAA		3255.09	4.38				20-150%	65.1%	
	M7PFUdA		4583.31	6.17				20-150%	91.7%	
	MPFDoA		4350.15	5.86				20-150%	87.0%	
	M2PFTeDA		3187.07	4.29				20-150%	63.7%	

QC Data

Enthalpy Analytical

Job No.: 0621-790-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick NW Water Plant, Leland N.C.

Enthalpy ID	MB-11975-PFAS	Prep Batch	EU11975	Sample Vol (mL)	250
Sample Name	MB-11975-PFAS	Prep Date	2021-07-01 15:34	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-07-02 18:13	Dilution Factor	1
Sampling Date		Analyst	hallen	Method Code	WM-026
Received Date	2021-07-01 15:34	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
	PFBA	375-22-4	ND	ND	ND	0.153	0.304			U
	PFPeA	2706-90-3	ND	ND	ND	0.170	0.304			U
	PFHxA	307-24-4	ND	ND	ND	0.193	0.304			U
	PFHpA	375-85-9	ND	ND	ND	0.122	0.304			U
	PFOA	335-67-1	ND	ND	ND	0.177	0.304			U
Acids	PFNA	375-95-1	ND	ND	ND	0.0761	0.304			U
	PFDA	335-76-2	ND	ND	ND	0.0845	0.304			U
	PFUnDA	2058-94-8	ND	ND	ND	0.185	0.304			U
	PFDoDA	307-55-1	ND	ND	ND	0.202	0.304			U
	PFTrDA	72629-94-8	ND	ND	ND	0.151	0.304			U
	PFTeDA	376-06-7	ND	ND	ND	0.218	0.304			U
	PFBS	375-73-5	ND	ND	ND	0.355	0.355			U
	PFPeS	2706-91-4	ND	ND	ND	0.206	0.286			U
	PFHxS	355-46-4	ND	ND	ND	0.191	0.278			U
	PFHpS	375-92-8	ND	ND	ND	0.135	0.290			U
	PFOS	1763-23-1	ND	ND	ND	0.160	0.282			U
Sulfonates	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
	PFOSA	754-91-6	ND	ND	ND	0.130	0.304			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.144	0.304			U
	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	1.44	3.01			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	ND	ND	ND	0.120	0.283			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.120	0.286			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	0.304			U
	EVE Acid	69087-46-3	ND	ND	ND	1.44	1.44			U
	FBSA	30334-69-1	ND	ND	ND	0.240	0.304			U
	Hydro-EVE Acid	773804-62-9	ND	ND	ND	1.44	1.44			U
other	Hydrolyzed PSDA	2416366-19-1	ND	ND	ND	1.44	1.44			U
	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	3.01	3.01			U
	PMPA	13140-29-9	ND	ND	ND	1.44	1.44			U
	R-EVE Acid	2416366-22-6	ND	ND	ND	1.44	1.44			U
	R-PSDA	2416366-18-0	ND	ND	ND	1.44	1.44			U
	R-PSDCA	2416366-21-5	ND	ND	ND	1.44	1.44			U
	MPFBA		4680.23	7.49				20-150%	93.6%	
	M5PFPeA		4668.15	7.47				20-150%	93.4%	
	M3PFBS		5087.91	8.14				20-150%	101.8%	
	M2-4:2 FTS		5536.24	8.86				20-150%	110.7%	
	M5PFHxA		5012.75	8.02				20-150%	100.3%	
	M3HFPO-DA		4824.67	7.72				20-150%	96.5%	
	M4PFHpA		4930.27	7.89				20-150%	98.6%	
	M3PFHxS		5038.42	8.06				20-150%	100.8%	
	M2-6:2 FTS		4180.52	6.69				20-150%	83.6%	
ES	M8PFOA		4539.01	7.26				20-150%	90.8%	
	M9PFNA		4681.84	7.49				20-150%	93.6%	
	M8PFOS		4704.06	7.53				20-150%	94.1%	
	M2-8:2 FTS		3807.49	6.09				20-150%	76.1%	
	M8FOSA-I		2515.08	4.02				20-150%	50.3%	
	M6PFDA		4585.60	7.34				20-150%	91.7%	
	d3-N-MeFOSAA		2881.99	4.61				20-150%	57.6%	
	d5-N-EtFOSAA		2965.30	4.74				20-150%	59.3%	
	M7PFUdA		4017.38	6.43				20-150%	80.3%	
	MPFDoA		3710.26	5.94				20-150%	74.2%	
	M2PFTeDA		2897.18	4.64				20-150%	57.9%	

Enthalpy Analytical

Job No.: 0621-790-1 PFAS by Isotope Dilution (non-potable water)
County of Brunswick NW Water Plant, Leland N.C.

Enthalpy ID	OPR-11975-PFAS	Prep Batch	EU11975	Sample Vol (mL)	250
Sample Name	OPR-11975-PFAS	Prep Date	2021-07-01 15:34	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-07-02 18:37	Dilution Factor	1
Sampling Date		Analyst	hallen	Method Code	WM-026
Received Date	2021-07-01 15:34	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	10836.73	17.3	17.3	0.153	0.304	73-129%	86.7%	
	PFPeA	2706-90-3	11519.64	18.4	18.4	0.170	0.304	72-129%	92.2%	
	PFHxA	307-24-4	11270.11	18.0	18.0	0.193	0.304	72-129%	90.2%	
	PFHpA	375-85-9	11779.80	18.8	18.8	0.122	0.304	72-130%	94.2%	
	PFOA	335-67-1	12330.16	19.7	19.7	0.177	0.304	71-133%	98.6%	
	PFNA	375-95-1	11206.42	17.9	17.9	0.0761	0.304	69-130%	89.7%	
	PFDA	335-76-2	10818.72	17.3	17.3	0.0845	0.304	71-129%	86.5%	
	PFUnDA	2058-94-8	10397.31	16.6	16.6	0.185	0.304	69-133%	83.2%	
	PFDoDA	307-55-1	11333.13	18.1	18.1	0.202	0.304	72-134%	90.7%	
	PFTrDA	72629-94-8	12525.62	20.0	20.0	0.151	0.304	65-144%	100.2%	
	PFTeDA	376-06-7	11172.71	17.9	17.9	0.218	0.304	71-132%	89.4%	
Sulfonates	PFBS	375-73-5	8508.75	13.6	13.6	0.355	0.355	72-134%	76.7%	
	PFPeS	2706-91-4	11431.58	18.3	18.3	0.206	0.286	71-127%	97.2%	
	PFHxS	355-46-4	10663.24	17.1	17.1	0.191	0.278	68-131%	93.3%	
	PFHpS	375-92-8	10217.76	16.3	16.3	0.135	0.290	69-134%	85.8%	
	PFOS	1763-23-1	9199.13	14.7	14.7	0.160	0.282	65-140%	79.3%	
	PFNS	68259-12-1	9612.96	15.4	15.4	0.0864	0.293	69-127%	79.9%	
	PFDS	335-77-3	8348.95	13.4	13.4	0.192	0.293	53-142%	69.2%	
	4:2 FTS	757124-72-4	10745.40	17.2	17.2	0.118	0.285	63-143%	91.7%	
	6:2 FTS	27619-97-2	10798.98	17.3	17.3	0.116	0.290	64-140%	90.8%	
	8:2 FTS	39108-34-4	14751.50	23.6	23.6	0.171	0.291	67-138%	122.9%	
Other	PFOSA	754-91-6	11245.41	18.0	18.0	0.130	0.304	67-137%	90.0%	
	N-MeFOSAA	2355-31-9	12432.00	19.9	19.9	0.144	0.304	65-136%	99.5%	
	N-EtFOSAA	2991-50-6	11457.09	18.3	18.3	0.109	0.304	61-135%	91.7%	
	HFPO-DA	13252-13-6	9563.89	15.3	15.3	0.228	0.304	70-130%	76.5%	
ES	MPFBA		5366.28	8.59				20-150%	107.3%	
	M5PFPeA		5153.80	8.25				20-150%	103.1%	
	M3PFBS		5211.72	8.34				20-150%	104.2%	
	M2-4:2 FTS		4835.11	7.74				20-150%	96.7%	
	M5PFHxA		5303.24	8.49				20-150%	106.1%	
	M3HFPO-DA		5309.66	8.50				20-150%	106.2%	
	M4PFHpA		5247.89	8.40				20-150%	105.0%	
	M3PFHxS		4639.77	7.42				20-150%	92.8%	
	M2-6:2 FTS		4146.89	6.64				20-150%	82.9%	
	M8PFOA		4905.08	7.85				20-150%	98.1%	
	M9PFNA		5194.22	8.31				20-150%	103.9%	
	M8PFOS		4718.81	7.55				20-150%	94.4%	
	M2-8:2 FTS		2930.42	4.69				20-150%	58.6%	
	M8FOSA-I		3093.84	4.95				20-150%	61.9%	
	M6PFDA		4854.77	7.77				20-150%	97.1%	
	d3-N-MeFOSAA		3048.96	4.88				20-150%	61.0%	
	d5-N-EtFOSAA		3155.94	5.05				20-150%	63.1%	
	M7PFUdA		4477.61	7.16				20-150%	89.6%	
	MPFDoA		3304.00	5.29				20-150%	66.1%	
	M2PFTeDA		2794.49	4.47				20-150%	55.9%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0621-790-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: NW Water Plant, Leland N.C.

1. Custody

Lois Walton received the samples on June 24, 2021 at 18.8 °C after being relinquished by County of Brunswick. The samples were received in good condition. The sample IDs and sampling dates on the sample containers differed from those on the chain of custody. The sample IDs and sampling dates on the containers were used in processing and reporting the samples

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
0621-790-001-1	062421-SO1	Aqueous
0621-790-002-1	062421-EO1	Aqueous

2. Methods and Analytes

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

Table 3 - Methods and Analytes

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

3. Analysis

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

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

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

Samples that were run in more than one sequence to included all of the analytes of interest.

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0621-790-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: NW Water Plant, Leland N.C.

4. Calibration

Except where noted below, in the initial calibration, the analytes of interest exhibited R^2 values of ≥ 0.99. The analytes of interest in the calibration, Continuing Calibration Verification (CCV) and Initial Calibration Verification (ICV) standards met the 30% accuracy criterion for native analytes.

The analyte recovery for PFO4DA was greater than 30% in both the opening and closing CCV standards. The analyte recovery for N-EtFOSE, NFDH, and PFO5DA were greater than 30% in the closing CCV standard. Neither of these analytese were detected any the samples.

5. QC Notes

The QC sample analyses passed all method criteria.

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

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 concentration 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. Specific to Dioxin/Furan tests and equivalent to MDL
- EMPC – Estimated Maximum Possible Concentration Specific to Dioxin/Furan tests to indicate the signal/noise ratio wass not sufficient for peak identification (the determined ion-abundance ratio was outside the allowed theoretical range), or where there was a co-eluting interference. Indicates that a peak was identified but did not meet the method specified ion-abundance ratio.
- IR – The ion ratio between the primary and secondary ions was observed to be outside the method criteria therefore the actual analyte concentration cannot be accurately determined as defined by DoD QSM Table B-15.
- 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 Quantiation: 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 LOD is adjusted for sample weight or volume.
- <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.

- 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 – The labeled standard recovery is not within method control limits.
- X – Results 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.
- RJ – Indicates a reinjection of the sample extract.
- S – Indicates a sample split. The number that follows the "S" indicates the split factor.
- R – Indicates a re-extraction of the sample.

	PFAS Compound Acronym List		
	Acronym	Compound Name	CAS #
	Target Analytes		
	PFBA	Perfluorobutanoic Acid	375-22-4
	PFPeA	Perfluoropentanoic Acid	2706-90-3
	PFHxA	Perfluorohexanoic Acid	307-24-4
	PFHpA	Perfluoroheptanoic Acid	375-85-9
	PFOA	Perfluorooctanoic Acid	335-67-1
	PFNA	Perfluorononanoic Acid	375-95-1
	PFDA	Perfluorodecanoic acid	335-76-2
	PFUnA (PFUnDA)	Perfluoroundecanoic acid	2058-94-8
	PFDoA (PFDoDA)	Perfluorododecanoic acid	307-55-1
	PFTrDA (PFTriA)	Perfluorotridecanoic acid	72629-94-8
	PFTeDA (PFTA)	Perfluorotetradecanoic acid	376-06-7
	PFBS	Perfluorobutane sulfonic acid	375-73-5
	PFPeS	Perfluoropentane sulfonic acid	2706-91-4
	PFHxS	Perfluorohexane sulfonic acid	355-46-4
	PFHpS	Perfluoroheptane sulfonic acid	375-92-8
	PFOS	Perfluorooctane sulfonic acid	1763-23-1
	PFNS	Perfluorononane sulfonic acid	68259-12-1
	PFDS	Perfluorodecane sulfonic acid	757124-72-4
	4:2 FTS	4:2 fluorotelomer sulfonic acid	27619-97-2
	6:2 FTS	6:2 fluorotelomer sulfonic acid	39108-34-4
	8:2 FTS	8:2 fluorotelomer sulfonic acid	13252-13-6
	PFOSA (FOSA)	Perfluorooctane sulfonamide	754-91-6
	N-MeFOSAA	N-methyl perfluorooctane sulfonamido acetic acid	2355-31-9
	N-EtFOSAA	N-ethyl perfluorooctane sulfonamido acetic acid	2991-50-6
	HFPO-DA	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (Gen-X)	13252-13-6
	11Cl-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	763051-92-9
	9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	756426-58-1
	ADONA	4,8-dioxa-3H-perfluorononanoic acid	919005-14-4
*	PFMOAA	Perfluoro-2-methoxyacetic acid	674-13-5
	PFMOPrA (PFMPA)	Perfluoro-3-methoxypropanoic acid	377-73-1
*	PFO2HxA	Perfluoro (3,5-dioxahexanoic) acid	39492-88-1
*	PFO3OA	Perfluoro (3,5,7-trioxaoctanoic) acid	39492-89-2
*	PFO4DA	Perfluoro (3,5,7,9-tetraoxadecanoic) acid	39492-90-5
*	PFO5DA	Perfluoro(3,5,7,9,11-pentaoxadodecanoic) acid	39492-91-6
*	Nafion Byproduct 1	Nafion Byproduct 1	29311-67-9
*	Nafion Byproduct 2	Nafion Byproduct 2	749836-20-2
	PFEESA	Perfluoro(2-ethoxyethane)sulphonic acid	113507-82-7
	PFMOBA (PFMBA)	Perfluoro-4-methoxybutanic acid	863090-89-5
	NFDHA	Nonafluoro-3,6-dioxaheptanoic acid	151772-58-6
*	PEPA	Perfluoro-2-ethoxypropanoic acid	267239-61-2
*	PMPA	Perfluoro-2-methoxypropanoic acid	13140-29-9
*	10:2 FTS	Fluorotelomer sulfonate 10:2	120226-60-0
*	N-EtFOSA	N-ethylperfluoro-1-octanesulfonamide	4151-50-2
*	N-EtFOSE	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol	1691-99-2
*	N-MeFOSA	N-methylperfluoro-1-octanesulfonamide	31506-32-8
*	N-MeFOSE	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol	24448-09-7
*	PFECA-G	4-(Heptafluoroisopropoxy)hexafluorobutanoic acid	801212-59-9
*	PFHxDA	Perfluorohexadecanoic acid	67905-19-5
*	R-PSDA	Perfluoro-4-(2-sulfoethoxy)pentanoic acid	2416366-18-0

*	Hydrolyzed PSDA	2-fluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2-tetrafluoro-2-sulfoethoxy)propoxy]-acetic acid	2416366-19-1
*	R-PSDCA	1,1,2,2-tetrafluoro-2-[1,2,2,3,3-pentafluoro-1-(trifluoromethyl)propoxy] ethanesulfonic acid	2416366-21-5
*	EVE Acid	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	69087-46-3
*	FBSA	Perfluorobutylsulfonamide	30334-69-1
*	Hydro-EVE Acid	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	773804-62-9
*	R-EVE Acid	4-(2-carboxy-1,1,2,2-tetrafluoroethoxy)-2,2,3,3,4,5,5,5-octafluoro-pentanoic acid	2416366-22-6
	Extraction Standards		
	MPFBA	Perfluoro-n-[13C4]butanoic acid	
	M5PFPeA	Perfluoro-n-[13C5]pentanoic acid	
	M3PFBS	Sodium perfluoro-1-[2,3,4-13C3]-butanesulfonic acid	
	M2-4:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-hexane sulfonic acid	
	M5PFHxA	Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid	
	M3HFPO-DA	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-13C3-propanoic acid	
	M4PFHpA	Perfluoro-n-[1,2,3,4-13C4]heptanoic acid	
	M3PFHxS	Sodium perfluoro-1-[1,2,3-13C3]-hexanesulfonic acid	
	M2-6:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-octane sulfonic acid	
	M8PFOA	Perfluoro-n-[13C8]octanoic acid	
	M9PFNA	Perfluoro-n-[13C9]nonanoic acid	
	M8PFOS	Sodium perfluoro-1-[13C8]-octanesulfonic acid	
	M2-8:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-decane sulfonic acid	
	M8FOSA	Perfluoro-1-[13C8]octanesulfonamide	
	M6PFDA	Perfluoro-n-[1,2,3,4,5,6-13C6]decanoic acid	
	d3-N-MeFOSAA	N-methyl-d3-perfluoro-1-octanesulfonamide	
	d5-N-EtFOSAA	N-ethyl-d5-perfluoro-1-octanesulfonamide	
	M7PFUnDA (M7PFUdA)	Perfluoro-n-[1,2,3,4,5,6,7-13C7]undecanoic acid	
	MPFDoA	Perfluoro-n-[1,2-13C2]dodecanoic acid	
	M2PFTeDA	Perfluoro-n-[1,2-13C2]tetradecanoic acid	
	Injection Standards		
	M3PFBA	Perfluoro-n-[2,3,4-13C3]butanoic acid	
	M2PFOA	Perfluoro-n-[1,2-13C2]octanoic acid	
	MPFDA	Perfluoro-n-[1,2-13C2]decanoic acid	
	MPFOS	Sodium perfluoro-1-[1,2,3,4-13C4]-octanesulfonic acid	

* Analytes are currently not accredited under TNI Scope - Accreditation pending.

Sample Custody

*Sample ID "062421" not "062321" on both samples CH 6/24/21

0621-790

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:
*	062321-S01	6/23/2021	1305	250 ml	G	NW	2														X	
*	062321-E01	6/23/2021	1305	250 ml	G	DW	2														X	

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
Phil Mcculloch	6/23/2021	Lois Watts	6/24/21	1:25	☑ Iced ☐ Ambient °C 18.8 T9
					☐ Iced ☐ Ambient °C_____
					☐ Iced ☐ Ambient °C_____

Courier, cooler, on ice, no seals, good condition WW 6/24

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