County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 12/30/20

Analytical Report
1220-765

Isotope Dilution Method

PFAS

Enthalpy Analytical, LLC – Ultratrace

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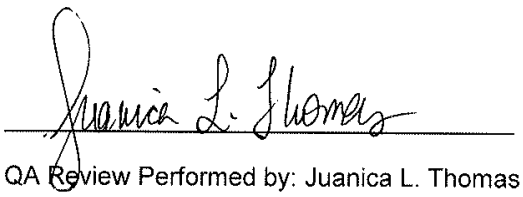
I certify that to the best of my knowledge all analytical data presented in this report:

- 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 __20__ pages.



QA Review Performed by: Juanica L. Thomas

Report Issued Date: 01/14/21

ENTHALPY ANALYTICAL

Summary of Results

Enthalpy Analytical

Job No.: 1220-765-1 PFAS by Isotope Dilution (non-potable water)

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

Summary

	Compound	CAS	123020-SO1 ng/L	123020-EO1 ng/L
Acids	PFBA	375-22-4	ND U	ND U
	PFPeA	2706-90-3	ND U	ND U
	PFHxA	307-24-4	2.89	2.77
	PFHpA	375-85-9	1.79	1.55
	PFOA	335-67-1	4.24	3.60
	PFNA	375-95-1	0.598	0.571
	PFDA	335-76-2	0.252 J	0.258 J
	PFUnDA	2058-94-8	ND U	0.132 J
	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	2.70	2.00
	PFPeS	2706-91-4	0.423	0.477
	PFHxS	355-46-4	2.28	1.85
	PFHpS	375-92-8	0.276	ND U
	PFOS	1763-23-1	7.40	6.58
	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	0.172 J	0.252 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	3.03	2.44
	PFMOAA	674-13-5	17.7	8.86
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	1.6	0.812
	PFO3OA	39492-89-2	ND U	ND U
	PFO4DA	39492-90-5	ND U	ND U
	Nafion Byproduct 1	29311-67-9	0.0509 L	0.0793 L
	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
	FBSA	30334-69-1	0.169 L	0.158 L
	N-EtFOSA	4151-50-2	ND U	ND U
	N-EtFOSE	1691-99-2	ND U	ND U
	N-MeFOSA	31506-32-8	ND U	ND U
	N-MeFOSE	24448-09-7	ND U	ND U
	Nafion Byproduct 2	749836-20-2	0.251 L	ND U
	NFDHA	151772-58-6	ND U	ND U
	PEPA		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

Detailed Results

Enthalpy Analytical

Job No.: 1220-765-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	1220-765-001-1	Prep Batch	EU11404	Sample Vol (mL)	275.7
Sample Name	123020-SO1	Prep Date	2020-12-31 16:09	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-01-01 00:00	Dilution Factor	1
Sampling Date	20201230 00:00				

	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	0.143	0.267			U
	PFPeA	2706-90-3	ND	ND	ND	0.0814	0.267			U
	PFHxA	307-24-4	1990.98	2.89	2.89	0.143	0.267			
	PFHpA	375-85-9	1231.28	1.79	1.79	0.0630	0.267			
	PFOA	335-67-1	2920.43	4.24	4.24	0.0721	0.267			
	PFNA	375-95-1	411.98	0.598	0.598	0.0462	0.267			
	PFDA	335-76-2	173.39	0.252	0.252	0.113	0.267			J
	PFUnDA	2058-94-8	ND	ND	ND	0.0436	0.267			U
	PFDoDA	307-55-1	ND	ND	ND	0.0431	0.267			U
	PFTrDA	72629-94-8	ND	ND	ND	0.0676	0.267			U
	PFTeDA	376-06-7	ND	ND	ND	0.0753	0.267			U
Sulfonates	PFBS	375-73-5	1861.92	2.70	2.70	0.0753	0.236			
	PFPeS	2706-91-4	291.68	0.423	0.423	0.0898	0.251			
	PFHxS	355-46-4	1570.90	2.28	2.28	0.0750	0.244			
	PFHpS	375-92-8	190.04	0.276	0.276	0.0706	0.254			
	PFOS	1763-23-1	5101.85	7.40	7.40	0.0427	0.248			
	PFNS	68259-12-1	ND	ND	ND	0.0593	0.257			U
	PFDS	335-77-3	ND	ND	ND	0.122	0.258			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0586	0.250			U
	6:2 FTS	27619-97-2	118.33	0.172	0.172	0.0656	0.254			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.0516	0.257			U
other	PFOSA	754-91-6	ND	ND	ND	0.331	0.332			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.0493	0.267			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0590	0.267			U
	HFPO-DA	13252-13-6	2088.05	3.03	3.03	0.0863	0.267			
	PFMOAA	674-13-5	12218.45	17.7	17.7	1.34	1.34			
	PFMOPrA	377-73-1	ND	ND	ND	0.218	0.267			U
	PFO2HxA	39492-88-1	1104.03	1.6	1.6	1.34	1.34			U
	PFO3OA	39492-89-2	ND	ND	ND	1.34	1.34			U
	PFO4DA	39492-90-5	ND	ND	ND	2.73	2.73			U
	Nafion Byproduct 1	29311-67-9	35.09	0.0509	0.0509	0.218	0.267			L
	ADONA	919005-14-4	ND	ND	ND	0.109	0.252			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.109	0.250			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.109	0.252			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.218	0.267			U
	FBSA	30334-69-1	116.55	0.169	0.169	0.218	0.267			L
	N-EtFOSA	4151-50-2	ND	ND	ND	0.218	0.267			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.53	6.53			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.218	0.267			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.53	6.53			U
	Nafion Byproduct 2	749836-20-2	173.28	0.251	0.251	1.34	1.34			L
	NFDHA	151772-58-6	ND	ND	ND	0.218	0.267			U
	PEPA		ND	ND	ND	1.34	1.34			U
	PFECA-G	801212-59-9	ND	ND	ND	1.34	1.34			U
	PFEESA	113507-82-7	ND	ND	ND	0.218	0.267			U
	PFHxDA	67905-19-5	ND	ND	ND	1.34	1.34			U
	PFMOBA	863090-89-5	ND	ND	ND	1.34	1.34			U
	PFO5DA	39492-91-6	ND	ND	ND	2.73	2.73			U
	PMPA	13140-29-9	ND	ND	ND	1.34	1.34			U
ES	MPFBA		4243.76	6.16				20-150%	84.9%	
	M5PFPeA		12955.57	18.8				20-150%	259.1%	Q
	M3PFBS		21466.33	31.1				20-150%	429.3%	Q
	M2-4:2 FTS		49637.84	72.0				20-150%	992.8%	Q
	M5PFHxA		3588.36	5.21				20-150%	71.8%	
	M3HFPO-DA		2885.22	4.19				20-150%	57.7%	
	M4PFHpA		4129.47	5.99				20-150%	82.6%	
	M3PFHxS		4715.30	6.84				20-150%	94.3%	
	M2-6:2 FTS		40013.36	58.1				20-150%	800.3%	Q
	M8PFOA		4330.99	6.28				20-150%	86.6%	
	M9PFNA		3967.82	5.76				20-150%	79.4%	
	M8PFOS		4195.18	6.09				20-150%	83.9%	
	M2-8:2 FTS		7103.48	10.3				20-150%	142.1%	
	M8FOSA-I		2070.04	3.00				20-150%	41.4%	
	M6PFDA		4234.47	6.14				20-150%	84.7%	
	d3-N-MeFOSAA		4599.30	6.67				20-150%	92.0%	
	d5-N-EtFOSAA		4451.06	6.46				20-150%	89.0%	
	M7PFUdA		3730.62	5.41				20-150%	74.6%	
	MPFDoA		2713.32	3.94				20-150%	54.3%	
	M2PFTeDA		1143.99	1.66				20-150%	22.9%	

Enthalpy Analytical

Job No.: 1220-765-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	1220-765-002-1	Prep Batch	EU11404	Sample Vol (mL)	275.92
Sample Name	123020-EO1	Prep Date	2020-12-31 16:09	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-01-01 00:23	Dilution Factor	1
Sampling Date	20201230 00:00				

	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	0.143	0.267			U
	PFPeA	2706-90-3	ND	ND	ND	0.0813	0.267			U
	PFHxA	307-24-4	1911.90	2.77	2.77	0.143	0.267			
	PFHpA	375-85-9	1067.91	1.55	1.55	0.0630	0.267			
	PFOA	335-67-1	2483.26	3.60	3.60	0.0720	0.267			
	PFNA	375-95-1	394.01	0.571	0.571	0.0461	0.267			
	PFDA	335-76-2	178.18	0.258	0.258	0.113	0.267			J
	PFUnDA	2058-94-8	91.05	0.132	0.132	0.0436	0.267			J
	PFDoDA	307-55-1	ND	ND	ND	0.0430	0.267			U
	PFTrDA	72629-94-8	ND	ND	ND	0.0675	0.267			U
	PFTeDA	376-06-7	ND	ND	ND	0.0752	0.267			U
Sulfonates	PFBS	375-73-5	1379.71	2.00	2.00	0.0752	0.236			
	PFPeS	2706-91-4	328.84	0.477	0.477	0.0897	0.251			
	PFHxS	355-46-4	1274.81	1.85	1.85	0.0749	0.244			
	PFHpS	375-92-8	ND	ND	ND	0.0706	0.254			U
	PFOS	1763-23-1	4536.28	6.58	6.58	0.0427	0.248			
	PFNS	68259-12-1	ND	ND	ND	0.0593	0.257			U
	PFDS	335-77-3	ND	ND	ND	0.122	0.258			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0585	0.249			U
	6:2 FTS	27619-97-2	173.78	0.252	0.252	0.0655	0.254			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.0516	0.257			U
other	PFOSA	754-91-6	ND	ND	ND	0.331	0.332			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.0493	0.267			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0590	0.267			U
	HFPO-DA	13252-13-6	1682.39	2.44	2.44	0.0862	0.267			
	PFMOAA	674-13-5	6114.07	8.86	8.86	1.34	1.34			
	PFMOPrA	377-73-1	ND	ND	ND	0.217	0.267			U
	PFO2HxA	39492-88-1	559.93	0.812	0.812	1.34	1.34			U
	PFO3OA	39492-89-2	ND	ND	ND	1.34	1.34			U
	PFO4DA	39492-90-5	ND	ND	ND	2.73	2.73			U
	Nafion Byproduct 1	29311-67-9	54.70	0.0793	0.0793	0.217	0.267			L
	ADONA	919005-14-4	ND	ND	ND	0.109	0.252			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.109	0.249			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.109	0.252			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.217	0.267			U
	FBSA	30334-69-1	109.20	0.158	0.158	0.217	0.267			L
	N-EtFOSA	4151-50-2	ND	ND	ND	0.217	0.267			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.52	6.52			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.217	0.267			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.52	6.52			U
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	1.34	1.34			U
	NFDHA	151772-58-6	ND	ND	ND	0.217	0.267			U
	PEPA		ND	ND	ND	1.34	1.34			U
	PFECA-G	801212-59-9	ND	ND	ND	1.34	1.34			U
	PFEESA	113507-82-7	ND	ND	ND	0.217	0.267			U
	PFHxDA	67905-19-5	ND	ND	ND	1.34	1.34			U
	PFMOBA	863090-89-5	ND	ND	ND	1.34	1.34			U
	PFO5DA	39492-91-6	ND	ND	ND	2.73	2.73			U
	PMPA	13140-29-9	ND	ND	ND	1.34	1.34			U
ES	MPFBA		4243.98	6.15				20-150%	84.9%	
	M5PFPeA		11599.54	16.8				20-150%	232.0%	Q
	M3PFBS		17232.60	25.0				20-150%	344.7%	Q
	M2-4:2 FTS		43593.96	63.2				20-150%	871.9%	Q
	M5PFHxA		3684.87	5.34				20-150%	73.7%	
	M3HFPO-DA		2963.22	4.30				20-150%	59.3%	
	M4PFHpA		4311.42	6.25				20-150%	86.2%	
	M3PFHxS		4711.92	6.83				20-150%	94.2%	
	M2-6:2 FTS		30709.57	44.5				20-150%	614.2%	Q
	M8PFOA		4483.79	6.50				20-150%	89.7%	
	M9PFNA		3929.00	5.70				20-150%	78.6%	
	M8PFOS		4436.41	6.43				20-150%	88.7%	
	M2-8:2 FTS		6627.85	9.61				20-150%	132.6%	
	M8FOSA-I		3552.71	5.15				20-150%	71.1%	
	M6PFDA		4285.21	6.21				20-150%	85.7%	
	d3-N-MeFOSAA		4860.62	7.05				20-150%	97.2%	
	d5-N-EtFOSAA		5134.14	7.44				20-150%	102.7%	
	M7PFUdA		4094.01	5.94				20-150%	81.9%	
	MPFDoA		3217.88	4.66				20-150%	64.4%	
	M2PFTeDA		2599.32	3.77				20-150%	52.0%	

QC Data

ENTHALPY ANALYTICAL

Enthalpy Analytical

Job No.: 1220-765-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	MB-11404-PFAS	Prep Batch	EU11404	Sample Vol (mL)	250
Sample Name	MB-11404-PFAS	Prep Date	2020-12-31 16:09	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2020-12-31 20:32	Dilution Factor	1
Sampling Date					

	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	0.157	0.294			U
	PFPeA	2706-90-3	ND	ND	ND	0.0898	0.294			U
	PFHxA	307-24-4	ND	ND	ND	0.158	0.294			U
	PFHpA	375-85-9	ND	ND	ND	0.0695	0.294			U
	PFOA	335-67-1	ND	ND	ND	0.0795	0.294			U
	PFNA	375-95-1	2.63	0.00420	0.00420	0.0509	0.294			L
	PFDA	335-76-2	ND	ND	ND	0.125	0.294			U
	PFUnDA	2058-94-8	ND	ND	ND	0.0481	0.294			U
	PFDoDA	307-55-1	ND	ND	ND	0.0475	0.294			U
	PFTrDA	72629-94-8	ND	ND	ND	0.0745	0.294			U
	PFTeDA	376-06-7	ND	ND	ND	0.0830	0.294			U
Sulfonates	PFBS	375-73-5	ND	ND	ND	0.0830	0.261			U
	PFPeS	2706-91-4	ND	ND	ND	0.0990	0.277			U
	PFHxS	355-46-4	ND	ND	ND	0.0827	0.269			U
	PFHpS	375-92-8	ND	ND	ND	0.0779	0.280			U
	PFOS	1763-23-1	ND	ND	ND	0.0471	0.274			U
	PFNS	68259-12-1	ND	ND	ND	0.0654	0.283			U
	PFDS	335-77-3	ND	ND	ND	0.135	0.285			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0646	0.275			U
	6:2 FTS	27619-97-2	ND	ND	ND	0.0723	0.280			U
	8:2 FTS	39108-34-4	ND	ND	ND	0.0569	0.283			U
other	PFOSA	754-91-6	ND	ND	ND	0.365	0.366			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.0544	0.294			U
	N-EtFOSAA	2991-50-6	36.53	0.0584	0.0584	0.0651	0.294			L
	HFPO-DA	13252-13-6	ND	ND	ND	0.0951	0.294			U
	PFMOAA	674-13-5	ND	ND	ND	1.48	1.48			U
	PFMOPrA	377-73-1	ND	ND	ND	0.240	0.294			U
	PFO2HxA	39492-88-1	ND	ND	ND	1.48	1.48			U
	PFO3OA	39492-89-2	ND	ND	ND	1.48	1.48			U
	PFO4DA	39492-90-5	ND	ND	ND	3.01	3.01			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.240	0.294			U
	ADONA	919005-14-4	ND	ND	ND	0.120	0.278			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.120	0.275			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.120	0.278			U
	PFO5DA	39492-91-6	ND	ND	ND	3.01	3.01			U
	PMPA	13140-29-9	ND	ND	ND	1.48	1.48			U
	PFMOBA	863090-89-5	ND	ND	ND	1.48	1.48			U
	PFEESA	113507-82-7	ND	ND	ND	0.240	0.294			U
	PFHxDA	67905-19-5	ND	ND	ND	1.48	1.48			U
	PEPA		ND	ND	ND	1.48	1.48			U
	PFECA-G	801212-59-9	ND	ND	ND	1.48	1.48			U
	N-MeFOSE	24448-09-7	ND	ND	ND	7.20	7.20			U
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	1.48	1.48			U
	NFDHA	151772-58-6	ND	ND	ND	0.240	0.294			U
	N-EtFOSE	1691-99-2	ND	ND	ND	7.20	7.20			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.240	0.294			U
	FBSA	30334-69-1	ND	ND	ND	0.240	0.294			U
	N-EtFOSA	4151-50-2	ND	ND	ND	0.240	0.294			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	0.294			U
ES	MPFBA		5061.24	8.10				20-150%	101.2%	
	M5PFPeA		4435.96	7.10				20-150%	88.7%	
	M3PFBS		3422.58	5.48				20-150%	68.5%	
	M2-4:2 FTS		3220.26	5.15				20-150%	64.4%	
	M5PFHxA		3824.77	6.12				20-150%	76.5%	
	M3HFPO-DA		3560.26	5.70				20-150%	71.2%	
	M4PFHpA		4037.03	6.46				20-150%	80.7%	
	M3PFHxS		4590.63	7.35				20-150%	91.8%	
	M2-6:2 FTS		6461.92	10.3				20-150%	129.2%	
	M8PFOA		5102.19	8.16				20-150%	102.0%	
	M9PFNA		4986.51	7.98				20-150%	99.7%	
	M8PFOS		5021.53	8.03				20-150%	100.4%	
	M2-8:2 FTS		6074.72	9.72				20-150%	121.5%	
	M8FOSA-I		3166.38	5.07				20-150%	63.3%	
	M6PFDA		4738.53	7.58				20-150%	94.8%	
	d3-N-MeFOSAA		5157.27	8.25				20-150%	103.1%	
	d5-N-EtFOSAA		5495.27	8.79				20-150%	109.9%	
	M7PFUdA		4446.15	7.11				20-150%	88.9%	
	MPFDoA		3813.99	6.10				20-150%	76.3%	
	M2PFTeDA		2869.65	4.59				20-150%	57.4%	

Enthalpy Analytical

Job No.: 1220-765-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	OPR-11404-PFAS	Prep Batch	EU11404	Sample Vol (mL)	250
Sample Name	OPR-11404-PFAS	Prep Date	2020-12-31 16:09	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2020-12-31 20:55	Dilution Factor	1
Sampling Date					

	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	12968.47	20.7	20.7	0.157	0.294		103.7%	
	PFPeA	2706-90-3	12333.80	19.7	19.7	0.0898	0.294		98.7%	
	PFHxA	307-24-4	12822.09	20.5	20.5	0.158	0.294		102.6%	
	PFHpA	375-85-9	11796.84	18.9	18.9	0.0695	0.294		94.4%	
	PFOA	335-67-1	12154.63	19.4	19.4	0.0795	0.294		97.2%	
	PFNA	375-95-1	12352.46	19.8	19.8	0.0509	0.294		98.8%	
	PFDA	335-76-2	12419.27	19.9	19.9	0.125	0.294		99.4%	
	PFUnDA	2058-94-8	12621.85	20.2	20.2	0.0481	0.294		101.0%	
	PFDoDA	307-55-1	12793.43	20.5	20.5	0.0475	0.294		102.3%	
	PFTrDA	72629-94-8	16193.90	25.9	25.9	0.0745	0.294		129.6%	
	PFTeDA	376-06-7	12034.63	19.3	19.3	0.0830	0.294		96.3%	
Sulfonates	PFBS	375-73-5	11537.18	18.5	18.5	0.0830	0.261		104.1%	
	PFPeS	2706-91-4	12549.54	20.1	20.1	0.0990	0.277		106.7%	
	PFHxS	355-46-4	12169.20	19.5	19.5	0.0827	0.269		106.5%	
	PFHpS	375-92-8	11898.33	19.0	19.0	0.0779	0.280		99.9%	
	PFOS	1763-23-1	11723.70	18.8	18.8	0.0471	0.274		101.1%	
	PFNS	68259-12-1	11615.63	18.6	18.6	0.0654	0.283		96.6%	
	PFDS	335-77-3	13543.96	21.7	21.7	0.135	0.285		112.3%	
	4:2 FTS	757124-72-4	10359.40	16.6	16.6	0.0646	0.275		88.4%	
	6:2 FTS	27619-97-2	10735.08	17.2	17.2	0.0723	0.280		90.3%	
	8:2 FTS	39108-34-4	10903.11	17.4	17.4	0.0569	0.283		90.9%	
Other	PFOSA	754-91-6	13399.07	21.4	21.4	0.365	0.366		107.2%	
	N-MeFOSAA	2355-31-9	11777.88	18.8	18.8	0.0544	0.294		94.2%	
	N-EtFOSAA	2991-50-6	12181.08	19.5	19.5	0.0651	0.294		97.4%	
	HFPO-DA	13252-13-6	11531.00	18.4	18.4	0.0951	0.294		92.2%	
ES	MPFBA		4182.97	6.69				20-150%	83.7%	
	M5PFPeA		4695.93	7.51				20-150%	93.9%	
	M3PFBS		4302.40	6.88				20-150%	86.0%	
	M2-4:2 FTS		4413.58	7.06				20-150%	88.3%	
	M5PFHxA		3703.86	5.93				20-150%	74.1%	
	M3HFPO-DA		3649.40	5.84				20-150%	73.0%	
	M4PFHpA		3985.02	6.38				20-150%	79.7%	
	M3PFHxS		4187.59	6.70				20-150%	83.8%	
	M2-6:2 FTS		6878.62	11.0				20-150%	137.6%	
	M8PFOA		4248.42	6.80				20-150%	85.0%	
	M9PFNA		4143.95	6.63				20-150%	82.9%	
	M8PFOS		4077.37	6.52				20-150%	81.5%	
	M2-8:2 FTS		6163.95	9.86				20-150%	123.3%	
	M8FOSA-I		3182.52	5.09				20-150%	63.7%	
	M6PFDA		4361.78	6.98				20-150%	87.2%	
	d3-N-MeFOSAA		4411.25	7.06				20-150%	88.2%	
	d5-N-EtFOSAA		4453.06	7.12				20-150%	89.1%	
	M7PFUdA		3899.22	6.24				20-150%	78.0%	
	MPFDoA		3240.69	5.19				20-150%	64.8%	
	M2PFTeDA		2420.40	3.87				20-150%	48.4%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	1220-765-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland, NC

1. Custody

Anthony Stokes received the samples on December 30, 2020 at 2.8 °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
1220-765-001-1	123020-SO1	Aqueous
1220-765-002-1	123020-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	PFAS - Full 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.

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.	1220-765-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland, NC

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 standards in the samples fell outside the limits for ES recoveries, noted by a Q qualifier. The target analytes are quantified based on their ratio to the labeled standards, therefore, undergo the same losses as the labeled standards. As a result, low or high recoveries do not cause any change to ratios or contribute any additional error in the measurement of the target analytes. Therefore, the data are considered acceptable.

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	674-13-5
*	9Cl-PF3ONS	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	919005-14-4
*	ADONA	4,8-dioxa-3H-perfluorononanoic acid	756426-58-1
*	PFMOAA	Perfluoro-2-methoxyacetic acid	763051-92-9
*	PFMOPrA	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	Perfluoro-4-methoxybutanic acid	863090-89-5
*	PEPA	Perfluoro-2-ethoxypropanoic acid	N/A
*	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

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 Standard. Accreditation pending.

Sample Custody

1220-765

ENTHALPY analytical

Chain of Custody Record

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	# of Bottles	# of Jars	# of Bags	# Other				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:
123020-SO1	12/30/2020	1030	250 ml	G	NW	2														X	
123020-EO1	12/30/2020	1030	250 ml	G	DW	2														X	

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
Jeff Robinson	12/30/2020	[signature]	12/31/20	2:00pm	☑ Iced ☐ Ambient °C 2.8
					☐ Iced ☐ Ambient °C______
					☐ Iced ☐ Ambient °C______

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This Is The Last Page Of This Report.

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