County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 12/18/20

Analytical Report
1220-743

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.

Juanica L. Thomas

QA Review Performed by: Juanica L. Thomas

Report Issued Date: 01/07/21

ENTHALPY ANALYTICAL

Summary of Results

Enthalpy Analytical

Job No.: 1220-743-1 PFAS by Isotope Dilution (non-potable water)

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

Summary

	Compound	CAS	121820-S01 ng/L	121820-E01 ng/L
Acids	PFBA	375-22-4	ND U	ND U
	PFPeA	2706-90-3	ND U	ND U
	PFHxA	307-24-4	4.75	4.53
	PFHpA	375-85-9	3.01	2.92
	PFOA	335-67-1	5.76	5.24
	PFNA	375-95-1	0.690	0.700
	PFDA	335-76-2	0.358	0.340
	PFUnDA	2058-94-8	0.125 J	0.138 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	ND U	ND U
	PFPeS	2706-91-4	0.571	0.684
	PFHxS	355-46-4	3.89	3.60
	PFHpS	375-92-8	0.397	0.328
	PFOS	1763-23-1	11.0	10.5
	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	0.537	0.368
	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	9.13	8.59
	PFMOAA	674-13-5	36.1	38.5
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	3.37	5.08
	PFO3OA	39492-89-2	3.49	3.41
	PFO4DA	39492-90-5	ND U	ND U
	Nafion Byproduct 1	29311-67-9	0.399	0.377
	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	0.435	0.330
	N-EtFOSE	1691-99-2	ND U	ND U
	N-MeFOSA	31506-32-8	ND U	ND U
	N-EtFOSA	4151-50-2	ND U	ND U
	N-MeFOSE	24448-09-7	ND U	ND U
	Nafion Byproduct 2	749836-20-2	0.387 L	0.538 L
	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
	PFO5DA	39492-91-6	ND U	ND U
	PFMOBA	863090-89-5	ND U	ND U
	PMPA	13140-29-9	ND U	ND U

Detailed Results

Enthalpy Analytical

Job No.: 1220-743-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	1220-743-001-1	Prep Batch	EU11385	Sample Vol (mL)	292.49
Sample Name	121820-S01	Prep Date	2020-12-22 18:40	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2020-12-23 00:30	Dilution Factor	1
Sampling Date	20201218 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	0.135	0.252			U
	PFPeA	2706-90-3	ND	ND	ND	0.0767	0.252			U
	PFHxA	307-24-4	3471.90	4.75	4.75	0.135	0.252			
	PFHpA	375-85-9	2202.52	3.01	3.01	0.0594	0.252			
	PFOA	335-67-1	4214.03	5.76	5.76	0.0679	0.252			
	PFNA	375-95-1	504.23	0.690	0.690	0.0435	0.252			
	PFDA	335-76-2	262.14	0.358	0.358	0.107	0.252			
	PFUnDA	2058-94-8	91.09	0.125	0.125	0.0411	0.252			J
	PFDoDA	307-55-1	ND	ND	ND	0.0406	0.252			U
	PFTrDA	72629-94-8	ND	ND	ND	0.0637	0.252			U
	PFTeDA	376-06-7	ND	ND	ND	0.0709	0.252			U
Sulfonates	PFBS	375-73-5	ND	ND	ND	0.0709	0.223			U
	PFPeS	2706-91-4	417.72	0.571	0.571	0.0846	0.237			
	PFHxS	355-46-4	2844.36	3.89	3.89	0.0707	0.230			
	PFHpS	375-92-8	290.44	0.397	0.397	0.0666	0.239			
	PFOS	1763-23-1	8029.89	11.0	11.0	0.0403	0.234			
	PFNS	68259-12-1	ND	ND	ND	0.0559	0.242			U
	PFDS	335-77-3	ND	ND	ND	0.115	0.243			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0552	0.235			U
	6:2 FTS	27619-97-2	392.45	0.537	0.537	0.0618	0.239			
	8:2 FTS	39108-34-4	ND	ND	ND	0.0486	0.242			U
other	PFOSA	754-91-6	ND	ND	ND	0.312	0.313			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.0465	0.252			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0556	0.252			U
	HFPO-DA	13252-13-6	6679.22	9.13	9.13	0.0813	0.252			
	PFMOAA	674-13-5	26395.41	36.1	36.1	1.27	1.27			
	PFMOPrA	377-73-1	ND	ND	ND	0.205	0.252			U
	PFO2HxA	39492-88-1	2463.41	3.37	3.37	1.27	1.27			
	PFO3OA	39492-89-2	2553.79	3.49	3.49	1.27	1.27			
	PFO4DA	39492-90-5	ND	ND	ND	2.57	2.57			U
	Nafion Byproduct 1	29311-67-9	291.67	0.399	0.399	0.205	0.252			
	ADONA	919005-14-4	ND	ND	ND	0.103	0.238			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.103	0.235			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.103	0.238			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.205	0.252			U
	FBSA	30334-69-1	318.10	0.435	0.435	0.205	0.252			
	N-EtFOSE	1691-99-2	ND	ND	ND	6.15	6.15			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.205	0.252			U
	N-EtFOSA	4151-50-2	ND	ND	ND	0.205	0.252			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.15	6.15			U
	Nafion Byproduct 2	749836-20-2	283.16	0.387	0.387	1.27	1.27			L
	NFDHA	151772-58-6	ND	ND	ND	0.205	0.252			U
	PEPA		ND	ND	ND	1.27	1.27			U
	PFECA-G	801212-59-9	ND	ND	ND	1.27	1.27			U
	PFEESA	113507-82-7	ND	ND	ND	0.205	0.252			U
	PFHxDA	67905-19-5	ND	ND	ND	1.27	1.27			U
	PFO5DA	39492-91-6	ND	ND	ND	2.57	2.57			U
	PFMOBA	863090-89-5	ND	ND	ND	1.27	1.27			U
	PMPA	13140-29-9	ND	ND	ND	1.27	1.27			U
ES	MPFBA		3932.56	5.38				20-150%	78.7%	
	M5PFPeA		10566.40	14.5				20-150%	211.3%	Q
	M3PFBS		15705.91	21.5				20-150%	314.1%	Q
	M2-4:2 FTS		41609.56	56.9				20-150%	832.2%	Q
	M5PFHxA		3711.85	5.08				20-150%	74.2%	
	M3HFPO-DA		3098.18	4.24				20-150%	62.0%	
	M4PFHpA		3905.85	5.34				20-150%	78.1%	
	M3PFHxS		4544.62	6.22				20-150%	90.9%	
	M2-6:2 FTS		20793.30	28.4				20-150%	415.9%	Q
	M8PFOA		3828.85	5.24				20-150%	76.6%	
	M9PFNA		4000.22	5.47				20-150%	80.0%	
	M8PFOS		3751.95	5.13				20-150%	75.0%	
	M2-8:2 FTS		3978.20	5.44				20-150%	79.6%	
	M8FOSA-I		3435.26	4.70				20-150%	68.7%	
	M6PFDA		3841.61	5.25				20-150%	76.8%	
	d3-N-MeFOSAA		4447.92	6.08				20-150%	89.0%	
	d5-N-EtFOSAA		4466.97	6.11				20-150%	89.3%	
	M7PFUdA		3613.86	4.94				20-150%	72.3%	
	MPFDoA		2521.62	3.45				20-150%	50.4%	
	M2PFTeDA		1570.58	2.15				20-150%	31.4%	

Enthalpy Analytical

Job No.: 1220-743-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	1220-743-002-1	Prep Batch	EU11385	Sample Vol (mL)	289.25
Sample Name	121820-E01	Prep Date	2020-12-22 18:40	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2020-12-23 00:53	Dilution Factor	1
Sampling Date	20201218 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	0.136	0.254			U
	PFPeA	2706-90-3	ND	ND	ND	0.0776	0.254			U
	PFHxA	307-24-4	3278.29	4.53	4.53	0.136	0.254			
	PFHpA	375-85-9	2111.62	2.92	2.92	0.0601	0.254			
	PFOA	335-67-1	3791.76	5.24	5.24	0.0687	0.254			
	PFNA	375-95-1	506.11	0.700	0.700	0.0440	0.254			
	PFDA	335-76-2	245.81	0.340	0.340	0.108	0.254			
	PFUnDA	2058-94-8	99.57	0.138	0.138	0.0416	0.254			J
	PFDoDA	307-55-1	ND	ND	ND	0.0411	0.254			U
	PFTrDA	72629-94-8	ND	ND	ND	0.0644	0.254			U
	PFTeDA	376-06-7	ND	ND	ND	0.0717	0.254			U
Sulfonates	PFBS	375-73-5	ND	ND	ND	0.0717	0.225			U
	PFPeS	2706-91-4	494.92	0.684	0.684	0.0856	0.239			
	PFHxS	355-46-4	2600.79	3.60	3.60	0.0715	0.232			
	PFHpS	375-92-8	236.94	0.328	0.328	0.0673	0.242			
	PFOS	1763-23-1	7567.43	10.5	10.5	0.0407	0.236			
	PFNS	68259-12-1	ND	ND	ND	0.0565	0.245			U
	PFDS	335-77-3	ND	ND	ND	0.117	0.246			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0558	0.238			U
	6:2 FTS	27619-97-2	266.05	0.368	0.368	0.0625	0.242			
	8:2 FTS	39108-34-4	ND	ND	ND	0.0492	0.245			U
other	PFOSA	754-91-6	ND	ND	ND	0.315	0.317			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.0470	0.254			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0563	0.254			U
	HFPO-DA	13252-13-6	6210.74	8.59	8.59	0.0822	0.254			
	PFMOAA	674-13-5	27869.96	38.5	38.5	1.28	1.28			
	PFMOPrA	377-73-1	ND	ND	ND	0.207	0.254			U
	PFO2HxA	39492-88-1	2672.27	5.08	5.08	1.28	1.28			
	PFO3OA	39492-89-2	2466.65	3.41	3.41	1.28	1.28			
	PFO4DA	39492-90-5	ND	ND	ND	2.60	2.60			U
	Nafion Byproduct 1	29311-67-9	272.82	0.377	0.377	0.207	0.254			
	ADONA	919005-14-4	ND	ND	ND	0.104	0.241			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.104	0.238			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.104	0.241			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.207	0.254			U
	FBSA	30334-69-1	238.74	0.330	0.330	0.207	0.254			
	N-EtFOSE	1691-99-2	ND	ND	ND	6.22	6.22			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.207	0.254			U
	N-EtFOSA	4151-50-2	ND	ND	ND	0.207	0.254			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.22	6.22			U
	Nafion Byproduct 2	749836-20-2	389.12	0.538	0.538	1.28	1.28			L
	NFDHA	151772-58-6	ND	ND	ND	0.207	0.254			U
	PEPA		ND	ND	ND	1.28	1.28			U
	PFECA-G	801212-59-9	ND	ND	ND	1.28	1.28			U
	PFEESA	113507-82-7	ND	ND	ND	0.207	0.254			U
	PFHxDA	67905-19-5	ND	ND	ND	1.28	1.28			U
	PFO5DA	39492-91-6	ND	ND	ND	2.60	2.60			U
	PFMOBA	863090-89-5	ND	ND	ND	1.28	1.28			U
	PMPA	13140-29-9	ND	ND	ND	1.28	1.28			U
ES	MPFBA		3698.46	5.11				20-150%	74.0%	
	M5PFPeA		9711.84	13.4				20-150%	194.2%	Q
	M3PFBS		15665.43	21.7				20-150%	313.3%	Q
	M2-4:2 FTS		43133.56	59.6				20-150%	862.7%	Q
	M5PFHxA		3639.07	5.03				20-150%	72.8%	
	M3HFPO-DA		2875.60	3.98				20-150%	57.5%	
	M4PFHpA		3785.97	5.24				20-150%	75.7%	
	M3PFHxS		4207.79	5.82				20-150%	84.2%	
	M2-6:2 FTS		19510.93	27.0				20-150%	390.2%	Q
	M8PFOA		3811.19	5.27				20-150%	76.2%	
	M9PFNA		3443.71	4.76				20-150%	68.9%	
	M8PFOS		3266.80	4.52				20-150%	65.3%	
	M2-8:2 FTS		2400.71	3.32				20-150%	48.0%	
	M8FOSA-I		2248.95	3.11				20-150%	45.0%	
	M6PFDA		3392.02	4.69				20-150%	67.8%	
	d3-N-MeFOSAA		3501.38	4.84				20-150%	70.0%	
	d5-N-EtFOSAA		3530.59	4.88				20-150%	70.6%	
	M7PFUdA		3366.72	4.66				20-150%	67.3%	
	MPFDoA		2819.80	3.90				20-150%	56.4%	
	M2PFTeDA		3305.21	4.57				20-150%	66.1%	

QC Data

Enthalpy Analytical

Job No.: 1220-743-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	MB-11385-PFAS	Prep Batch	EU11385	Sample Vol (mL)	250
Sample Name	MB-11385-PFAS	Prep Date	2020-12-22 18:40	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2020-12-22 23:43	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	ND	ND	ND	0.0509	0.294			U
	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	82.62	0.132	0.132	0.0471	0.274			J
	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	ND	ND	ND	0.0651	0.294			U
	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
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	0.294			U
	FBSA	30334-69-1	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
	N-EtFOSA	4151-50-2	ND	ND	ND	0.240	0.294			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
	PEPA		ND	ND	ND	1.48	1.48			U
	PFECA-G	801212-59-9	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
	PFO5DA	39492-91-6	ND	ND	ND	3.01	3.01			U
	PFMOBA	863090-89-5	ND	ND	ND	1.48	1.48			U
	PMPA	13140-29-9	ND	ND	ND	1.48	1.48			U
ES	MPFBA		4463.97	7.14				20-150%	89.3%	
	M5PFPeA		4903.36	7.85				20-150%	98.1%	
	M3PFBS		4231.66	6.77				20-150%	84.6%	
	M2-4:2 FTS		4372.98	7.00				20-150%	87.5%	
	M5PFHxA		4209.73	6.74				20-150%	84.2%	
	M3HFPO-DA		4010.13	6.42				20-150%	80.2%	
	M4PFHpA		4238.20	6.78				20-150%	84.8%	
	M3PFHxS		4661.28	7.46				20-150%	93.2%	
	M2-6:2 FTS		4897.17	7.84				20-150%	97.9%	
	M8PFOA		4698.12	7.52				20-150%	94.0%	
	M9PFNA		5074.35	8.12				20-150%	101.5%	
	M8PFOS		4485.76	7.18				20-150%	89.7%	
	M2-8:2 FTS		4753.65	7.61				20-150%	95.1%	
	M8FOSA-I		3879.09	6.21				20-150%	77.6%	
	M6PFDA		4298.08	6.88				20-150%	86.0%	
	d3-N-MeFOSAA		4844.39	7.75				20-150%	96.9%	
	d5-N-EtFOSAA		5085.11	8.14				20-150%	101.7%	
	M7PFUdA		4284.72	6.86				20-150%	85.7%	
	MPFDoA		3657.05	5.85				20-150%	73.1%	
	M2PFTeDA		4143.49	6.63				20-150%	82.9%	

Enthalpy Analytical

Job No.: 1220-743-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	OPR-11385-PFAS	Prep Batch	EU11385	Sample Vol (mL)	250
Sample Name	OPR-11385-PFAS	Prep Date	2020-12-22 18:40	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2020-12-23 00:06	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	12506.80	20.0	20.0	0.157	0.294		100.1%	
	PFPeA	2706-90-3	12612.69	20.2	20.2	0.0898	0.294		100.9%	
	PFHxA	307-24-4	12207.47	19.5	19.5	0.158	0.294		97.7%	
	PFHpA	375-85-9	12355.11	19.8	19.8	0.0695	0.294		98.8%	
	PFOA	335-67-1	11515.33	18.4	18.4	0.0795	0.294		92.1%	
	PFNA	375-95-1	11174.13	17.9	17.9	0.0509	0.294		89.4%	
	PFDA	335-76-2	11857.02	19.0	19.0	0.125	0.294		94.9%	
	PFUnDA	2058-94-8	11343.56	18.1	18.1	0.0481	0.294		90.7%	
	PFDoDA	307-55-1	12680.71	20.3	20.3	0.0475	0.294		101.4%	
	PFTrDA	72629-94-8	12419.68	19.9	19.9	0.0745	0.294		99.4%	
	PFTeDA	376-06-7	12496.18	20.0	20.0	0.0830	0.294		100.0%	
Sulfonates	PFBS	375-73-5	11033.05	17.7	17.7	0.0830	0.261		99.5%	
	PFPeS	2706-91-4	11901.51	19.0	19.0	0.0990	0.277		101.2%	
	PFHxS	355-46-4	11190.63	17.9	17.9	0.0827	0.269		97.9%	
	PFHpS	375-92-8	12585.68	20.1	20.1	0.0779	0.280		105.7%	
	PFOS	1763-23-1	12064.49	19.3	19.3	0.0471	0.274		104.0%	
	PFNS	68259-12-1	11048.09	17.7	17.7	0.0654	0.283		91.9%	
	PFDS	335-77-3	13575.43	21.7	21.7	0.135	0.285		112.5%	
	4:2 FTS	757124-72-4	11399.70	18.2	18.2	0.0646	0.275		97.3%	
	6:2 FTS	27619-97-2	9377.18	15.0	15.0	0.0723	0.280		78.9%	
	8:2 FTS	39108-34-4	12117.06	19.4	19.4	0.0569	0.283		101.0%	
Other	PFOSA	754-91-6	13775.78	22.0	22.0	0.365	0.366		110.2%	
	N-MeFOSAA	2355-31-9	11310.39	18.1	18.1	0.0544	0.294		90.5%	
	N-EtFOSAA	2991-50-6	11826.30	18.9	18.9	0.0651	0.294		94.6%	
	HFPO-DA	13252-13-6	12047.95	19.3	19.3	0.0951	0.294		96.4%	
ES	MPFBA		4137.68	6.62				20-150%	82.8%	
	M5PFPeA		4582.38	7.33				20-150%	91.6%	
	M3PFBS		4162.24	6.66				20-150%	83.2%	
	M2-4:2 FTS		3940.78	6.31				20-150%	78.8%	
	M5PFHxA		3974.05	6.36				20-150%	79.5%	
	M3HFPO-DA		3693.08	5.91				20-150%	73.9%	
	M4PFHpA		4186.59	6.70				20-150%	83.7%	
	M3PFHxS		4753.93	7.61				20-150%	95.1%	
	M2-6:2 FTS		5163.22	8.26				20-150%	103.3%	
	M8PFOA		4649.93	7.44				20-150%	93.0%	
	M9PFNA		4579.51	7.33				20-150%	91.6%	
	M8PFOS		4143.14	6.63				20-150%	82.9%	
	M2-8:2 FTS		4451.23	7.12				20-150%	89.0%	
	M8FOSA-I		2983.09	4.77				20-150%	59.7%	
	M6PFDA		4156.08	6.65				20-150%	83.1%	
	d3-N-MeFOSAA		4530.80	7.25				20-150%	90.6%	
	d5-N-EtFOSAA		4214.22	6.74				20-150%	84.3%	
	M7PFUdA		3791.80	6.07				20-150%	75.8%	
	MPFDoA		3124.41	5.00				20-150%	62.5%	
	M2PFTeDA		3381.09	5.41				20-150%	67.6%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	1220-743 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant, Leland, NC

1. Custody

Caity Hayes received the samples on December 18, 2020 at 4.8 °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
1220-743-001-1	121820-S01	Aqueous
1220-743-002-1	121820-E01	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, Initial Calibration Verification (ICV) and continuing calibration (concal) met the 30% accuracy criterion for native analytes with the exception of PFMOBA, 10:2 FTS, PFHxDA. The data was accepted due to the samples being ND for the analytes.

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	1220-743 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A 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, as notated 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

1220-743

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	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:
121820-SO1	12/18/2020	10:10 AM	250 ml	G	NW	2														X	
121820-EO1	12/18/2020	10:10 AM	250 ml	G	DW	2														X	

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
[signature]	12/18/2020	[signature]	12/18/20	14:28	☑ Iced ☐ Ambient °C 4.8° TS
					☐ Iced ☐ Ambient °C_____
					☐ Iced ☐ Ambient °C_____

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Courier. NO seals, on ice, cooler, good condition

CH 12/18/20

This Is The Last Page Of This Report.