

County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Water Plant

Leland, NC
Samples Received: 01/22/21

Analytical Report 0121-754

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 _____ pages.

Report Issued Date: _____



Summary of Results

Enthalpy Analytical

Job No.: 0121-754-1 PFAS by Isotope Dilution (non-potable water)

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

Summary

	Compound	CAS	012221-SO1 ng/L	012221-EO1 ng/L
Acids	PFBA	375-22-4	3.18	ND U
	PFPeA	2706-90-3	ND U	ND U
	PFHxA	307-24-4	2.59	2.43
	PFHpA	375-85-9	1.41	1.26
	PFOA	335-67-1	3.39	2.77
	PFNA	375-95-1	0.394	0.413
	PFDA	335-76-2	0.148 J	0.111 J
	PFUnDA	2058-94-8	0.0230 L	0.0295 L
	PFDoDA	307-55-1	ND U	ND U
	PFTTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U
Sulfonates	PFBS	375-73-5	2.16	1.49
	PFPeS	2706-91-4	0.412	0.399
	PFHxS	355-46-4	1.94	1.89
	PFHpS	375-92-8	0.0581 L	0.203 J
	PFOS	1763-23-1	5.81	5.32
	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
other	6:2 FTS	27619-97-2	0.207 J	0.323
	8:2 FTS	39108-34-4	ND U	ND U
	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	8.76	6.38
	PFMOAA	674-13-5	41.1	34.5
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	2.13	2.30
	PFO3OA	39492-89-2	1.36	1.85
	PFO4DA	39492-90-5	ND U	3.50
	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
	FBSA	30334-69-1	0.208 J	0.176 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	0.352 L	0.438 L
	NFDHA	151772-58-6	ND U	ND U
	PEPA		14.8	12.9
	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	10.1	9.48

Detailed Results

Enthalpy Analytical

Job No.: 0121-754-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID 0121-754-001-1

Prep Batch EU11469

Sample Vol (mL) 290.47

Sample Name 012221-SO1

Prep Date 2021-01-25 15:56

Extract Vol (mL) 0.4

Matrix Aqueous

Analysis Date 2021-01-27 09:05

Dilution Factor 1

Sampling Date 20210122 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	2308.51	3.18	3.18	0.132	0.253			
	PFPeA	2706-90-3	ND	ND	ND	0.146	0.253			U
	PFHxA	307-24-4	1880.20	2.59	2.59	0.166	0.253			
	PFHpA	375-85-9	1027.09	1.41	1.41	0.105	0.253			
	PFOA	335-67-1	2458.44	3.39	3.39	0.152	0.253			
	PFNA	375-95-1	285.81	0.394	0.394	0.0655	0.253			
	PFDA	335-76-2	107.62	0.148	0.148	0.0727	0.253			J
	PFUnDA	2058-94-8	16.72	0.0230	0.0230	0.159	0.253			L
	PFDODA	307-55-1	ND	ND	ND	0.174	0.253			U
	PFTDA	72629-94-8	ND	ND	ND	0.130	0.253			U
Sulfonates	PFTeDA	376-06-7	ND	ND	ND	0.188	0.253			U
	PFBS	375-73-5	1571.53	2.16	2.16	0.306	0.306			
	PFPeS	2706-91-4	299.26	0.412	0.412	0.177	0.238			
	PFHxS	355-46-4	1410.20	1.94	1.94	0.164	0.231			
	PFHpS	375-92-8	42.18	0.0581	0.0581	0.116	0.241			L
	PFOS	1763-23-1	4219.82	5.81	5.81	0.138	0.235			
	PFNS	68259-12-1	ND	ND	ND	0.0744	0.244			U
	PFDS	335-77-3	ND	ND	ND	0.165	0.245			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.102	0.237			U
	6:2 FTS	27619-97-2	149.96	0.207	0.207	0.0998	0.241			J
other	8:2 FTS	39108-34-4	ND	ND	ND	0.147	0.244			U
	PFOSA	754-91-6	ND	ND	ND	0.112	0.315			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.124	0.253			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0938	0.253			U
	HFPO-DA	13252-13-6	6359.32	8.76	8.76	0.196	0.253			
	PFMOAA	674-13-5	29818.60	41.1	41.1	1.27	1.27			
	PFMOPrA	377-73-1	ND	ND	ND	0.207	0.253			U
	PFO2HxA	39492-88-1	1545.01	2.13	2.13	1.27	1.27			U
	PFO3OA	39492-89-2	986.69	1.36	1.36	1.27	1.27			
	PFO4DA	39492-90-5	ND	ND	ND	1.27	2.59			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.207	0.253			U
	ADONA	919005-14-4	ND	ND	ND	0.103	0.240			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.103	0.237			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.103	0.240			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.207	0.253			U
	FBSA	30334-69-1	151.35	0.208	0.208	0.207	0.253			J
	N-EtFOSA	4151-50-2	ND	ND	ND	0.207	0.253			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.20	6.20			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.207	0.253			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.20	6.20			U
	Nafion Byproduct 2	749836-20-2	255.38	0.352	0.352	1.27	1.27			L
	NFDHA	151772-58-6	ND	ND	ND	0.207	0.253			U
	PEPA		10745.08	14.8	14.8	1.27	1.27			
	PFECA-G	801212-59-9	ND	ND	ND	1.27	1.27			U
	PFEESA	113507-82-7	ND	ND	ND	0.207	0.253			U
	PFHxDA	67905-19-5	ND	ND	ND	1.27	1.27			U
	PFMOBA	863090-89-5	ND	ND	ND	1.27	1.27			U
	PFO5DA	39492-91-6	ND	ND	ND	2.59	2.59			U
	PMPA	13140-29-9	7347.59	10.1	10.1	1.27	1.27			
ES	MPFBA		4425.65	6.09				20-150%	88.5%	
	M5PFPeA		12533.45	17.3				20-150%	250.7%	Q
	M3PFBS		23841.00	32.8				20-150%	476.8%	Q
	M2-4:2 FTS		56309.96	77.5				20-150%	1126.2%	Q
	M5PFHxA		4066.72	5.60				20-150%	81.3%	
	M3HFPO-DA		3793.93	5.22				20-150%	75.9%	
	M4PFHpA		4698.84	6.47				20-150%	94.0%	
	M3PFHxS		4428.15	6.10				20-150%	88.6%	
	M2-6:2 FTS		25382.65	35.0				20-150%	507.7%	Q
	M8PFOA		4333.45	5.97				20-150%	86.7%	
	M9PFNA		3296.10	4.54				20-150%	65.9%	
	M8PFOS		3084.36	4.25				20-150%	61.7%	
	M2-8:2 FTS		2110.18	2.91				20-150%	42.2%	
	M8FOSA-I		1978.46	2.72				20-150%	39.6%	
	M6PFDA		2988.58	4.12				20-150%	59.8%	
	d3-N-MeFOSAA		2139.12	2.95				20-150%	42.8%	
	d5-N-EtFOSAA		1742.62	2.40				20-150%	34.9%	
	M7PFUDa		2110.99	2.91				20-150%	42.2%	
	MPFDOa		1465.07	2.02				20-150%	29.3%	
	M2PFTeDA		784.99	1.08				20-150%	15.7%	Q

Enthalpy Analytical

Job No.: 0121-754-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID 0121-754-002-1

Prep Batch EU11469

Sample Vol (mL) 286.74

Sample Name 012221-EO1

Prep Date 2021-01-25 15:56

Extract Vol (mL) 0.4

Matrix Aqueous

Analysis Date 2021-01-27 09:28

Dilution Factor 1

Sampling Date 20210122 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	0.133	0.257			U
	PFPeA	2706-90-3	ND	ND	ND	0.148	0.257			U
	PFHxA	307-24-4	1744.32	2.43	2.43	0.168	0.257			
	PFFHpA	375-85-9	901.01	1.26	1.26	0.106	0.257			
	PFOA	335-67-1	1985.34	2.77	2.77	0.154	0.257			
	PFNA	375-95-1	295.85	0.413	0.413	0.0663	0.257			
	PFDA	335-76-2	79.75	0.111	0.111	0.0737	0.257			J
	PFUnDA	2058-94-8	21.12	0.0295	0.0295	0.161	0.257			L
	PFDODA	307-55-1	ND	ND	ND	0.176	0.257			U
	PFTDA	72629-94-8	ND	ND	ND	0.132	0.257			U
Sulfonates	PFTeDA	376-06-7	ND	ND	ND	0.190	0.257			U
	PFBS	375-73-5	1070.76	1.49	1.49	0.310	0.310			
	PFPeS	2706-91-4	286.33	0.399	0.399	0.180	0.241			
	PFHxS	355-46-4	1357.83	1.89	1.89	0.167	0.234			
	PFFHpS	375-92-8	145.77	0.203	0.203	0.118	0.244			J
	PFOS	1763-23-1	3812.37	5.32	5.32	0.139	0.239			
	PFNS	68259-12-1	ND	ND	ND	0.0753	0.247			U
	PFDS	335-77-3	ND	ND	ND	0.167	0.248			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.103	0.240			U
	6:2 FTS	27619-97-2	231.49	0.323	0.323	0.101	0.244			
other	8:2 FTS	39108-34-4	ND	ND	ND	0.149	0.247			U
	PFOSA	754-91-6	ND	ND	ND	0.113	0.319			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.126	0.257			U
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0950	0.257			U
	HFPO-DA	13252-13-6	4574.81	6.38	6.38	0.199	0.257			
	PFMOA	674-13-5	24746.23	34.5	34.5	1.29	1.29			
	PFMOPrA	377-73-1	ND	ND	ND	0.209	0.257			U
	PFO2HxA	39492-88-1	1647.88	2.3	2.3	1.29	1.29			U
	PFO3OA	39492-89-2	1326.03	1.85	1.85	1.29	1.29			
	PFO4DA	39492-90-5	2507.11	3.50	3.50	1.29	2.62			
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.209	0.257			U
	ADONA	919005-14-4	ND	ND	ND	0.105	0.243			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.105	0.240			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.105	0.243			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.209	0.257			U
	FBSA	30334-69-1	126.06	0.176	0.176	0.209	0.257			L
	N-EtFOSA	4151-50-2	ND	ND	ND	0.209	0.257			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.28	6.28			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.209	0.257			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.28	6.28			U
	Nafion Byproduct 2	749836-20-2	314.30	0.438	0.438	1.29	1.29			L
	NFDHA	151772-58-6	ND	ND	ND	0.209	0.257			U
	PEPA		9223.60	12.9	12.9	1.29	1.29			
	PFECA-G	801212-59-9	ND	ND	ND	1.29	1.29			U
	PFEESA	113507-82-7	ND	ND	ND	0.209	0.257			U
	PFHxDA	67905-19-5	ND	ND	ND	1.29	1.29			U
	PFMObA	863090-89-5	ND	ND	ND	1.29	1.29			U
	PFO5DA	39492-91-6	ND	ND	ND	2.62	2.62			U
	PMPA	13140-29-9	6792.92	9.48	9.48	1.29	1.29			
ES	MPFBA		4287.38	5.98				20-150%	85.7%	
	M5PFPeA		10531.28	14.7				20-150%	210.6%	Q
	M3PFBS		17419.12	24.3				20-150%	348.4%	Q
	M2-4:2 FTS		34415.57	48.0				20-150%	688.3%	Q
	M5PFFHxA		4330.71	6.04				20-150%	86.6%	
	M3HFPO-DA		4878.22	6.81				20-150%	97.6%	
	M4PFFHpA		4333.39	6.05				20-150%	86.7%	
	M3PFFHxS		5089.09	7.10				20-150%	101.8%	
	M2-6:2 FTS		14549.66	20.3				20-150%	291.0%	Q
	M8PFOA		4390.10	6.12				20-150%	87.8%	
	M9PFNA		3650.46	5.09				20-150%	73.0%	
	M8PFOS		3956.40	5.52				20-150%	79.1%	
	M2-8:2 FTS		2481.15	3.46				20-150%	49.6%	
	M8FOSA-I		2022.65	2.82				20-150%	40.5%	
	M6PFDA		3555.76	4.96				20-150%	71.1%	
	d3-N-MeFOSAA		2732.87	3.81				20-150%	54.7%	
	d5-N-EtFOSAA		2846.47	3.97				20-150%	56.9%	
	M7PFUDa		3253.12	4.54				20-150%	65.1%	
	MPFDOa		2754.20	3.84				20-150%	55.1%	
	M2PFTeDA		2706.22	3.78				20-150%	54.1%	

QC Data

Enthalpy Analytical

Job No.: 0121-754-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	MB-11469-PFAS	Prep Batch	EU11469	Sample Vol (mL)	250
Sample Name	MB-11469-PFAS	Prep Date	2021-01-25 15:56	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-01-27 02:08	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	0.153	0.294			U
	PFPeA	2706-90-3	ND	ND	ND	0.170	0.294			U
	PFHxA	307-24-4	14.29	0.0229	0.0229	0.193	0.294			L
	PFHpA	375-85-9	ND	ND	ND	0.122	0.294			U
	PFOA	335-67-1	1.05	0.00168	0.00168	0.177	0.294			L
	PFNA	375-95-1	ND	ND	ND	0.0761	0.294			U
	PFDA	335-76-2	ND	ND	ND	0.0845	0.294			U
	PFUnDA	2058-94-8	ND	ND	ND	0.185	0.294			U
	PFDoDA	307-55-1	ND	ND	ND	0.202	0.294			U
	PFTrDA	72629-94-8	ND	ND	ND	0.151	0.294			U
Sulfonates	PFTeDA	376-06-7	1.88	0.00300	0.00300	0.218	0.294			L
	PFBS	375-73-5	ND	ND	ND	0.355	0.355			U
	PFPeS	2706-91-4	ND	ND	ND	0.206	0.277			U
	PFHxS	355-46-4	ND	ND	ND	0.191	0.269			U
	PFHpS	375-92-8	ND	ND	ND	0.135	0.280			U
	PFOS	1763-23-1	ND	ND	ND	0.160	0.274			U
	PFNS	68259-12-1	ND	ND	ND	0.0864	0.283			U
	PFDS	335-77-3	ND	ND	ND	0.192	0.285			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.118	0.275			U
	6:2 FTS	27619-97-2	ND	ND	ND	0.116	0.280			U
other	8:2 FTS	39108-34-4	ND	ND	ND	0.171	0.283			U
	PFOSA	754-91-6	ND	ND	ND	0.130	0.366			U
	N-MeFOSAA	2355-31-9	45.92	0.0735	0.0735	0.144	0.294			L
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.109	0.294			U
	HFPO-DA	13252-13-6	ND	ND	ND	0.228	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	1.48	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-EtFOSA	4151-50-2	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-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
	PFMOBA	863090-89-5	ND	ND	ND	1.48	1.48			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
ES	MPFBA		4553.03	7.28				20-150%	91.1%	
	M5PFPeA		4688.11	7.50				20-150%	93.8%	
	M3PFBS		5070.44	8.11				20-150%	101.4%	
	M2-4:2 FTS		3991.05	6.39				20-150%	79.8%	
	M5PFHxA		4379.15	7.01				20-150%	87.6%	
	M3HFPO-DA		5467.94	8.75				20-150%	109.4%	
	M4PFHpA		4464.51	7.14				20-150%	89.3%	
	M3PFHxS		3977.00	6.36				20-150%	79.5%	
	M2-6:2 FTS		3246.54	5.19				20-150%	64.9%	
	M8PFOA		4131.45	6.61				20-150%	82.6%	
	M9PFNA		4094.44	6.55				20-150%	81.9%	
	M8PFOS		3929.77	6.29				20-150%	78.6%	
	M2-8:2 FTS		3088.19	4.94				20-150%	61.8%	
	M8FOSA-I		2621.39	4.19				20-150%	52.4%	
	M6PFDA		4296.03	6.87				20-150%	85.9%	
	d3-N-MeFOSAA		2938.77	4.70				20-150%	58.8%	
	d5-N-EtFOSAA		2862.19	4.58				20-150%	57.2%	
	M7PFUDa		3859.32	6.17				20-150%	77.2%	
	MPFDoA		3459.14	5.53				20-150%	69.2%	
	M2PFTeDA		2613.34	4.18				20-150%	52.3%	

Enthalpy Analytical

Job No.: 0121-754-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	OPR-11469-PFAS	Prep Batch	EU11469	Sample Vol (mL)	250
Sample Name	OPR-11469-PFAS	Prep Date	2021-01-25 15:56	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-01-27 02:31	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	12150.72	19.4	19.4	0.153	0.294		97.2%	
	PFPeA	2706-90-3	11805.26	18.9	18.9	0.170	0.294		94.4%	
	PFHxA	307-24-4	12707.30	20.3	20.3	0.193	0.294		101.7%	
	PFHpA	375-85-9	10947.57	17.5	17.5	0.122	0.294		87.6%	
	PFOA	335-67-1	11899.50	19.0	19.0	0.177	0.294		95.2%	
	PFNA	375-95-1	12129.85	19.4	19.4	0.0761	0.294		97.0%	
	PFDA	335-76-2	11495.82	18.4	18.4	0.0845	0.294		92.0%	
	PFUnDA	2058-94-8	11622.32	18.6	18.6	0.185	0.294		93.0%	
	PFDoDA	307-55-1	12269.71	19.6	19.6	0.202	0.294		98.2%	
	PFTTrDA	72629-94-8	11710.19	18.7	18.7	0.151	0.294		93.7%	
Sulfonates	PFTeDA	376-06-7	11163.35	17.9	17.9	0.218	0.294		89.3%	
	PFBS	375-73-5	9158.32	14.7	14.7	0.355	0.355		82.6%	
	PFPeS	2706-91-4	10383.86	16.6	16.6	0.206	0.277		88.3%	
	PFHxS	355-46-4	11031.15	17.6	17.6	0.191	0.269		96.6%	
	PFHpS	375-92-8	10816.05	17.3	17.3	0.135	0.280		90.8%	
	PFOS	1763-23-1	10437.08	16.7	16.7	0.160	0.274		90.0%	
	PFNS	68259-12-1	11035.53	17.7	17.7	0.0864	0.283		91.8%	
	PFDS	335-77-3	15474.40	24.8	24.8	0.192	0.285		128.3%	
	4:2 FTS	757124-72-4	12114.57	19.4	19.4	0.118	0.275		103.4%	
Other	6:2 FTS	27619-97-2	14790.70	23.7	23.7	0.116	0.280		124.4%	
	8:2 FTS	39108-34-4	10224.61	16.4	16.4	0.171	0.283		85.2%	
	PFOSA	754-91-6	11885.05	19.0	19.0	0.130	0.366		95.1%	
	N-MeFOSAA	2355-31-9	11034.28	17.7	17.7	0.144	0.294		88.3%	
ES	N-EtFOSAA	2991-50-6	12160.35	19.5	19.5	0.109	0.294		97.3%	
	HFPO-DA	13252-13-6	12701.61	20.3	20.3	0.228	0.294		101.6%	
	MPFBA		4269.96	6.83				20-150%	85.4%	
	M5PFPeA		4312.05	6.90				20-150%	86.2%	
	M3PFBS		4325.52	6.92				20-150%	86.5%	
	M2-4:2 FTS		3316.28	5.31				20-150%	66.3%	
	M5PFHxA		4021.83	6.43				20-150%	80.4%	
	M3HFPO-DA		4228.23	6.77				20-150%	84.6%	
	M4PFHpA		4068.02	6.51				20-150%	81.4%	
	M3PFHxS		3683.27	5.89				20-150%	73.7%	
	M2-6:2 FTS		2463.43	3.94				20-150%	49.3%	
	M8PFOA		3655.84	5.85				20-150%	73.1%	
	M9PFNA		3228.51	5.17				20-150%	64.6%	
	M8PFOS		3396.27	5.43				20-150%	67.9%	
	M2-8:2 FTS		2584.96	4.14				20-150%	51.7%	
	M8FOSA-I		2230.37	3.57				20-150%	44.6%	
	M6PFDA		3532.33	5.65				20-150%	70.6%	
	d3-N-MeFOSAA		2677.04	4.28				20-150%	53.5%	
	d5-N-EtFOSAA		2634.13	4.21				20-150%	52.7%	
	M7PFUDa		3529.79	5.65				20-150%	70.6%	
	MPFDoA		3253.16	5.21				20-150%	65.1%	
	M2PFTeDA		3527.34	5.64				20-150%	70.5%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0121-754-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland, NC

1. Custody

Caity Hayes received the samples on January 22, 2021 at 5.4 °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
0121-754-001-1	012221-SO1	Aqueous
0121-754-002-1	012221-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.	0121-754-1 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 recoverie, as 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 was 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 Quantitation: For reports conforming to the DOD ELAP QSM, this is the QSM-defined LOQ. For reports conforming to TNI requirements (but not DOD ELAP QSM requirements), this value is the reporting limit (RL). The 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.

General Reporting Notes – Data Qualifiers

- 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
PFTriA (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
* 11CI-PF3OUdS	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	674-13-5
* 9CI-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



Enthalpy Ultratrace Job#: _____ COC Page 1 of 1

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 Number: _____

PO#:

Project Manager: **GLENN WALKER**

Site Name: **NORTHWEST WATER PLANT**

Telephone#:

Report To: **SAME**

Location: LELAND N.C.

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

[illegible]

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Carrier, No seals, cooler, on ice, good condition

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**This Is The Last Page
Of This Report.**