

# County of Brunswick

3954 Clearwell Dr NE  
Leland, NC 28451

## Northwest Water Plant

Leland, NC  
Samples Received: 02/04/21

### Analytical Report 0221-711

#### *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.: 0221-711-1 PFAS by Isotope Dilution (non-potable water)

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

### Summary

	Compound	CAS	020421-SO1 ng/L	020421-EO1 ng/L
Acids	PFBA	375-22-4	ND U	ND U
	PFPeA	2706-90-3	ND U	ND U
	PFHxA	307-24-4	3.02	3.74
	PFHpA	375-85-9	2.02	2.12
	PFOA	335-67-1	3.45	4.20
	PFNA	375-95-1	0.506	0.540
	PFDA	335-76-2	0.272	0.220 J
	PFUnDA	2058-94-8	0.0780 L	0.00869 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	2.12	2.56
	PFPeS	2706-91-4	0.377	0.448
	PFHxS	355-46-4	1.61	2.02
	PFHpS	375-92-8	0.0748 L	0.0997 L
	PFOS	1763-23-1	5.63	6.53
	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	0.181 J	0.275
	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	2.28	1.54
	PFMOAA	674-13-5	9.33	7.50
	PFMOPrA	377-73-1	0.0282 L	ND U
	PFO2HxA	39492-88-1	1.51	0.46
	PFO3OA	39492-89-2	ND U	ND U
	PFO4DA	39492-90-5	ND U	ND U
	Nafion Byproduct 1	29311-67-9	ND U	0.0275 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
	Byproduct 4		ND U	ND U
	Byproduct 5		3.10	4.73
	Byproduct 6		ND U	ND U
	EVE Acid	69087-46-3	0.0441 L	0.0852 L
	FBSA	30334-69-1	0.187 L	0.271
	Hydro-EVE Acid	773804-62-9	0.0946 LB	0.140 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	0.211 L	ND U
	NFDHA	151772-58-6	0.000586 L	ND U
	NVHOS	1132933-86-8	ND U	ND U
	PEPA		ND U	ND U
	PFECA-G	801212-59-9	ND U	ND U
	PFEEESA	113507-82-7	ND U	ND U
PFHxDA	67905-19-5	ND U	ND U	
PFMOBA	863090-89-5	ND U	ND U	
PFOSDA	39492-91-6	ND U	ND U	
PMPA	13140-29-9	ND U	ND U	
R-EVE Acid		ND U	ND U	

# Detailed Results

## Enthalpy Analytical

Job No.: 0221-711-1 PFAS by Isotope Dilution (non-potable water)  
 County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID 0221-711-001-1 Prep Batch EU11509 Sample Vol (mL) 291.83  
 Sample Name 020421-S01 Prep Date 2021-02-05 15:22 Extract Vol (mL) 0.4  
 Matrix Aqueous Analysis Date 2021-02-05 18:13 Dilution Factor 1  
 Sampling Date 20210204 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	0.131	0.252			U
	PFPeA	2706-90-3	ND	ND	ND	0.146	0.252			U
	PFHxA	307-24-4	2201.95	3.02	3.02	0.165	0.252			
	PFHpA	375-85-9	1475.56	2.02	2.02	0.105	0.252			
	PFOA	335-67-1	2520.07	3.45	3.45	0.152	0.252			
	PFNA	375-95-1	369.51	0.506	0.506	0.0652	0.252			
	PFDA	335-76-2	198.42	0.272	0.272	0.0724	0.252			
	PFUnDA	2058-94-8	56.92	0.0780	0.0780	0.158	0.252			L
	PFDoDA	307-55-1	ND	ND	ND	0.173	0.252			U
	PFTDA	72629-94-8	ND	ND	ND	0.129	0.252			U
PFTeDA	376-06-7	ND	ND	ND	0.187	0.252			U	
Sulfonates	PFBS	375-73-5	1545.13	2.12	2.12	0.304	0.304			
	PFPeS	2706-91-4	274.69	0.377	0.377	0.176	0.237			
	PFHxS	355-46-4	1171.71	1.61	1.61	0.164	0.230			
	PFHpS	375-92-8	54.57	0.0748	0.0748	0.116	0.240			L
	PFOS	1763-23-1	4109.34	5.63	5.63	0.137	0.234			
	PFNS	68259-12-1	ND	ND	ND	0.0740	0.243			U
	PFDS	335-77-3	ND	ND	ND	0.164	0.244			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.101	0.236			U
	6:2 FTS	27619-97-2	131.82	0.181	0.181	0.0994	0.240			J
	8:2 FTS	39108-34-4	ND	ND	ND	0.146	0.243			U
other	PFOSA	754-91-6	ND	ND	ND	0.111	0.314			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.123	0.252			U
	N-EiFOSAA	2991-50-6	ND	ND	ND	0.0934	0.252			U
	HFPO-DA	13252-13-6	1666.43	2.28	2.28	0.195	0.252			
	PFMOAA	674-13-5	6807.83	9.33	9.33	1.27	1.27			
	PFMOPrA	377-73-1	20.54	0.0282	0.0282	0.206	0.252			L
	PFO2HxA	39492-88-1	1098.85	1.51	1.51	1.27	1.27			
	PFO3OA	39492-89-2	ND	ND	ND	1.27	1.27			U
	PFO4DA	39492-90-5	ND	ND	ND	1.27	2.58			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.206	0.252			U
	ADONA	919005-14-4	ND	ND	ND	0.103	0.238			U
	9Cl-PF3OUdS	756426-58-1	ND	ND	ND	0.103	0.236			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.103	0.238			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.206	0.252			U
	Byproduct 4		ND	ND	ND	1.27	1.27			U
	Byproduct 5		2259.81	3.10	3.10	1.27	1.27			
	Byproduct 6		ND	ND	ND	1.27	1.27			U
	EVE Acid	69087-46-3	32.19	0.0441	0.0441	1.27	1.27			L
	FBSA	30334-69-1	136.77	0.187	0.187	0.206	0.252			L
	Hydro-EVE Acid	773804-62-9	69.05	0.0946	0.0946	1.27	1.27			LB
	N-EiFOSA	4151-50-2	ND	ND	ND	0.206	0.252			U
	N-EiFOSE	1691-99-2	ND	ND	ND	6.17	6.17			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.206	0.252			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.17	6.17			U
	Nafion Byproduct 2	749836-20-2	154.06	0.211	0.211	1.27	1.27			L
	NFDHA	151772-58-6	0.43	0.000586	0.000586	0.206	0.252			L
	NVHOS	1132933-86-8	ND	ND	ND	1.27	1.27			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	0.206	0.252			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	2.58	2.58			U	
PMPA	13140-29-9	ND	ND	ND	1.27	1.27			U	
R-EVE Acid		ND	ND	ND	1.27	1.27			U	
ES	MPFBA		4422.11	6.06				20-150%	88.4%	
	M5PFPeA		10679.16	14.6				20-150%	213.6%	Q
	M3PFBS		21030.09	28.8				20-150%	420.6%	Q
	M2-4:2 FTS		51631.09	70.8				20-150%	1032.6%	Q
	M5PFHxA		4151.75	5.69				20-150%	83.0%	
	M3HFPO-DA		4170.49	5.72				20-150%	83.4%	
	M4PFHpA		4751.50	6.51				20-150%	95.0%	
	M3PFHxS		4988.05	6.84				20-150%	99.8%	
	M2-6:2 FTS		27525.90	37.7				20-150%	550.5%	Q
	M8PFOA		4840.45	6.63				20-150%	96.8%	
	M9PFNA		3852.84	5.28				20-150%	77.1%	
	M8PFOS		4389.38	6.02				20-150%	87.8%	
	M2-8:2 FTS		4703.07	6.45				20-150%	94.1%	
	M8FOSA-I		3071.06	4.21				20-150%	61.4%	
	M6PFDA		4084.46	5.60				20-150%	81.7%	
	d3-N-MeFOSAA		4203.97	5.76				20-150%	84.1%	
	d5-N-EiFOSAA		3446.09	4.72				20-150%	68.9%	
	M7PFUdA		4037.09	5.53				20-150%	80.7%	
	MPFDcA		2842.63	3.90				20-150%	56.9%	
	M2PFTeDA		1213.51	1.66				20-150%	24.3%	

## Enthalpy Analytical

Job No.: 0221-711-1 PFAS by Isotope Dilution (non-potable water)  
 County of Brunswick Site: Northwest Water Plant, Leland, NC

Enthalpy ID 0221-711-002-1 Prep Batch EU11509 Sample Vol (mL) 288.8  
 Sample Name 020421-EO1 Prep Date 2021-02-05 15:22 Extract Vol (mL) 0.4  
 Matrix Aqueous Analysis Date 2021-02-05 18:36 Dilution Factor 1  
 Sampling Date 20210204 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	0.132	0.255			U
	PFPeA	2706-90-3	ND	ND	ND	0.147	0.255			U
	PFHxA	307-24-4	2697.44	3.74	3.74	0.167	0.255			
	PFHpA	375-85-9	1533.12	2.12	2.12	0.106	0.255			
	PFOA	335-67-1	3029.36	4.20	4.20	0.153	0.255			
	PFNA	375-95-1	389.87	0.540	0.540	0.0659	0.255			
	PFDA	335-76-2	159.18	0.220	0.220	0.0731	0.255			J
	PFUnDA	2058-94-8	6.28	0.00869	0.00869	0.160	0.255			L
	PFDoDA	307-55-1	ND	ND	ND	0.175	0.255			U
	PFTDA	72629-94-8	ND	ND	ND	0.131	0.255			U
PFTeDA	376-06-7	ND	ND	ND	0.189	0.255			U	
Sulfonates	PFBS	375-73-5	1851.01	2.56	2.56	0.307	0.307			
	PFPeS	2706-91-4	323.13	0.448	0.448	0.178	0.240			
	PFHxS	355-46-4	1457.47	2.02	2.02	0.165	0.233			
	PFHpS	375-92-8	72.02	0.0997	0.0997	0.117	0.242			L
	PFOS	1763-23-1	4711.33	6.53	6.53	0.139	0.237			
	PFNS	68259-12-1	ND	ND	ND	0.0748	0.245			U
	PFDS	335-77-3	ND	ND	ND	0.166	0.247			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.102	0.238			U
	6:2 FTS	27619-97-2	198.65	0.275	0.275	0.100	0.242			
	8:2 FTS	39108-34-4	ND	ND	ND	0.148	0.245			U
other	PFOSA	754-91-6	ND	ND	ND	0.113	0.317			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.125	0.255			U
	N-EiFOSAA	2991-50-6	ND	ND	ND	0.0944	0.255			U
	HFPO-DA	13252-13-6	1108.52	1.54	1.54	0.197	0.255			
	PFMOAA	674-13-5	5414.83	7.50	7.50	1.28	1.28			
	PFMOPrA	377-73-1	ND	ND	ND	0.208	0.255			U
	PFO2HxA	39492-88-1	328.71	0.46	0.46	1.28	1.28			
	PFO3OA	39492-89-2	ND	ND	ND	1.28	1.28			U
	PFO4DA	39492-90-5	ND	ND	ND	1.28	2.60			U
	Nafion Byproduct 1	29311-67-9	19.83	0.0275	0.0275	0.208	0.255			L
	ADONA	919005-14-4	ND	ND	ND	0.104	0.241			U
	9Cl-PF3OUdS	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	0.208	0.255			U
	Byproduct 4		ND	ND	ND	1.28	1.28			U
	Byproduct 5		3418.62	4.73	4.73	1.28	1.28			
	Byproduct 6		ND	ND	ND	1.28	1.28			U
	EVE Acid	69087-46-3	61.52	0.0852	0.0852	1.28	1.28			L
	FBSA	30334-69-1	195.74	0.271	0.271	0.208	0.255			
	Hydro-EVE Acid	773804-62-9	101.16	0.140	0.140	1.28	1.28			L
	N-EiFOSA	4151-50-2	ND	ND	ND	0.208	0.255			U
	N-EiFOSE	1691-99-2	ND	ND	ND	6.23	6.23			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.208	0.255			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.23	6.23			U
	Nafion Byproduct 2	749836-20-2	ND	ND	ND	1.28	1.28			U
	NFDHA	151772-58-6	ND	ND	ND	0.208	0.255			U
	NVHOS	1132933-86-8	ND	ND	ND	1.28	1.28			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	0.208	0.255			U
PFHxDA	67905-19-5	ND	ND	ND	1.28	1.28			U	
PFMOBA	863090-89-5	ND	ND	ND	1.28	1.28			U	
PFO5DA	39492-91-6	ND	ND	ND	2.60	2.60			U	
PMPA	13140-29-9	ND	ND	ND	1.28	1.28			U	
R-EVE Acid		ND	ND	ND	1.28	1.28			U	
ES	MPFBA		4409.09	6.11				20-150%	88.2%	
	M5PFPeA		8534.76	11.8				20-150%	170.7%	Q
	M3PFBS		20123.33	27.9				20-150%	402.5%	Q
	M2-4:2 FTS		57806.39	80.1				20-150%	1156.1%	Q
	M5PFHxA		3613.59	5.00				20-150%	72.3%	
	M3HFPO-DA		3915.67	5.42				20-150%	78.3%	
	M4PFHpA		4549.30	6.30				20-150%	91.0%	
	M3PFHxS		4960.02	6.87				20-150%	99.2%	
	M2-6:2 FTS		58675.32	81.3				20-150%	1173.5%	Q
	M8PFOA		4868.18	6.74				20-150%	97.4%	
	M9PFNA		3911.99	5.42				20-150%	78.2%	
	M8PFOS		4857.92	6.73				20-150%	97.2%	
	M2-8:2 FTS		10032.12	13.9				20-150%	200.6%	Q
	M8FOSA-I		3667.86	5.08				20-150%	73.4%	
	M6PFDA		4925.53	6.82				20-150%	98.5%	
	d3-N-MeFOSAA		5076.70	7.03				20-150%	101.5%	
	d5-N-EiFOSAA		5074.11	7.03				20-150%	101.5%	
	M7PFUdA		4657.89	6.45				20-150%	93.2%	
	MPFDcA		4291.36	5.94				20-150%	85.8%	
	M2PFTeDA		3927.92	5.44				20-150%	78.6%	

# QC Data

## Enthalpy Analytical

Job No.: 0221-711-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	MB-11509-PFAS	Prep Batch	EU11509	Sample Vol (mL)	250
Sample Name	MB-11509-PFAS	Prep Date	2021-02-05 15:22	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-02-05 17:04	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	ND	ND	ND	0.193	0.294			U	
	PFHpA	375-85-9	ND	ND	ND	0.122	0.294			U	
	PFOA	335-67-1	ND	ND	ND	0.177	0.294			U	
	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	
	PFTriDA	72629-94-8	ND	ND	ND	0.151	0.294			U	
	PFTeDA	376-06-7	ND	ND	ND	0.218	0.294			U	
	Sulfonates	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	8.50	0.0136	0.0136	0.116	0.280			L	
8:2 FTS		39108-34-4	ND	ND	ND	0.171	0.283			U	
other	PFOSA	754-91-6	ND	ND	ND	0.130	0.366			U	
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.144	0.294			U	
	N-EiFOSAA	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	
	Byproduct 4		ND	ND	ND	1.48	1.48			U	
	Byproduct 5		ND	ND	ND	1.48	1.48			U	
	Byproduct 6		ND	ND	ND	1.48	1.48			U	
	EVE Acid	69087-46-3	ND	ND	ND	1.48	1.48			U	
	FBSA	30334-69-1	ND	ND	ND	0.240	0.294			U	
	Hydro-EVE Acid	773804-62-9	7.05	0.0113	0.0113	1.48	1.48			L	
	N-EiFOSA	4151-50-2	ND	ND	ND	0.240	0.294			U	
	N-EiFOSE	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	
	NVHOS	1132933-86-8	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	
	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		
R-EVE Acid		ND	ND	ND	1.48	1.48			U		
ES	MPFBA		4833.59	7.73				20-150%	96.7%		
	M5PFPeA		4740.57	7.58				20-150%	94.8%		
	M3PFBS		5267.46	8.43				20-150%	105.3%		
	M2-4:2 FTS		4620.76	7.39				20-150%	92.4%		
	M5PFHxA		5230.22	8.37				20-150%	104.6%		
	M3HFPO-DA		5350.90	8.56				20-150%	107.0%		
	M4PFHpA		4821.77	7.71				20-150%	96.4%		
	M3PFHxS		4626.05	7.40				20-150%	92.5%		
	M2-6:2 FTS		4426.48	7.08				20-150%	88.5%		
	M8PFOA		4629.13	7.73				20-150%	96.6%		
	M9PFNA		4692.36	7.51				20-150%	93.8%		
	M8PFOS		4371.55	6.99				20-150%	87.4%		
	M2-8:2 FTS		3266.83	5.23				20-150%	65.3%		
	M8FOSA-I		3139.73	5.02				20-150%	62.8%		
	M6PFDA		4698.08	7.52				20-150%	94.0%		
	d3-N-MeFOSAA		3948.04	6.32				20-150%	79.0%		
	d5-N-EiFOSAA		3764.17	6.02				20-150%	75.3%		
	M7PFUdA		4713.08	7.54				20-150%	94.3%		
	MPFDaA		4135.07	6.62				20-150%	82.7%		
	M2PFTeDA		3890.81	6.23				20-150%	77.8%		

# Enthalpy Analytical

Job No.: 0221-711-1 PFAS by Isotope Dilution (non-potable water)

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

Enthalpy ID	OPR-11509-PFAS	Prep Batch	EU11509	Sample Vol (mL)	250
Sample Name	OPR-11509-PFAS	Prep Date	2021-02-05 15:22	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2021-02-05 17:27	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	12949.81	20.7	20.7	0.153	0.294		103.6%	
	PFPeA	2706-90-3	12942.54	20.7	20.7	0.170	0.294		103.5%	
	PFHxA	307-24-4	13370.33	21.4	21.4	0.193	0.294		107.0%	
	PFHpA	375-85-9	12682.28	20.3	20.3	0.122	0.294		101.5%	
	PFOA	335-67-1	13739.84	22.0	22.0	0.177	0.294		109.9%	
	PFNA	375-95-1	13595.53	21.8	21.8	0.0761	0.294		108.8%	
	PFDA	335-76-2	14374.72	23.0	23.0	0.0845	0.294		115.0%	
	PFUnDA	2058-94-8	12198.45	19.5	19.5	0.185	0.294		97.6%	
	PFDoDA	307-55-1	13583.78	21.7	21.7	0.202	0.294		108.7%	
	PFTTrDA	72629-94-8	15527.97	24.8	24.8	0.151	0.294		124.2%	
PFTeDA	376-06-7	13666.62	21.9	21.9	0.218	0.294		109.3%		
Sulfonates	PFBS	375-73-5	9534.01	15.3	15.3	0.355	0.355		86.0%	
	PFPeS	2706-91-4	10643.91	17.0	17.0	0.206	0.277		90.5%	
	PFHxS	355-46-4	11839.41	18.9	18.9	0.191	0.269		103.6%	
	PFHpS	375-92-8	12796.15	20.5	20.5	0.135	0.280		107.4%	
	PFOS	1763-23-1	12005.29	19.2	19.2	0.160	0.274		103.5%	
	PFNS	68259-12-1	13418.52	21.5	21.5	0.0864	0.283		111.6%	
	PFDS	335-77-3	15943.39	25.5	25.5	0.192	0.285		132.2%	
	4:2 FTS	757124-72-4	13252.16	21.2	21.2	0.118	0.275		113.1%	
6:2 FTS	27619-97-2	12860.05	20.6	20.6	0.116	0.280		108.2%		
8:2 FTS	39108-34-4	14286.19	22.9	22.9	0.171	0.283		119.1%		
other	PFOSA	754-91-6	13442.25	21.5	21.5	0.130	0.366		107.5%	
	N-MeFOSAA	2355-31-9	11755.12	18.8	18.8	0.144	0.294		94.0%	
	N-EtFOSAA	2991-50-6	13068.30	20.9	20.9	0.109	0.294		104.5%	
	HFPO-DA	13252-13-6	13931.68	22.3	22.3	0.228	0.294		111.5%	
	FBSA	30334-69-1	8870.70	14.2	14.2	0.240	0.294		71.0%	
ES	MPFBA		4648.17	7.44				20-150%	93.0%	
	M5PFPeA		4674.32	7.48				20-150%	93.5%	
	M3PFBS		5267.97	8.43				20-150%	105.4%	
	M2-4:2 FTS		4522.65	7.24				20-150%	90.5%	
	M5PFHxA		5349.71	8.56				20-150%	107.0%	
	M3HFPO-DA		5530.49	8.85				20-150%	110.6%	
	M4PFHpA		5573.12	8.92				20-150%	111.5%	
	M3PFHxS		4625.77	7.40				20-150%	92.5%	
	M2-6:2 FTS		4374.93	7.00				20-150%	87.5%	
	M8PFOA		4663.45	7.46				20-150%	93.3%	
	M9PFNA		4821.63	7.71				20-150%	96.4%	
	M8PFOS		4392.70	7.03				20-150%	87.9%	
	M2-8:2 FTS		3888.87	6.22				20-150%	77.8%	
	M8FOSA-I		3259.11	5.21				20-150%	65.2%	
	M6PFDA		4465.58	7.14				20-150%	89.3%	
	d3-N-MeFOSAA		4374.45	7.00				20-150%	87.5%	
	d5-N-EtFOSAA		4080.11	6.53				20-150%	81.6%	
	M7PFUDa		5014.35	8.02				20-150%	100.3%	
MPFD0A		4207.50	6.73				20-150%	84.2%		
M2PFTeDA		3730.69	5.97				20-150%	74.6%		

# Narrative Summary



# Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0221-711-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland, NC

## 1. Custody

Ann Marie Baxter received the samples on February 04, 2021 at 4.1 °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
0221-711-001-1	020421-SO1	Aqueous
0221-711-002-1	020421-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 and their comments are as follows:

020421-SO1, 020421-EO1

Due to acquisition requirements for analytes requested, the samples were analyzed in more than one sequence.

# Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0221-711-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	Site: Northwest Water Plant, Leland, NC

## 4. Calibration

In the initial calibration, the reported analytes exhibited  $R^2$  of  $\geq 0.99$ . The reported analytes in the calibration standards, continuing calibration (concal) and Initial Calibration Verification (ICV) met the 30% accuracy criterion for native analytes.

## 5. QC Notes

The QC sample analyses passed all method criteria. For % Recovery, PFDS fell outside the method criteria but met DOD QSM 5.3 marginal exceedance limits. Therefore, data is accepted with no adverse impact.

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

## 6. Reporting Notes

Some labeled standards in the samples fell outside the limits for ES recoveries, 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 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.



## 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 #
<b>Target Analytes</b>		
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
* 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-pentaoxidodecanoic) 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





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