

# County of Brunswick

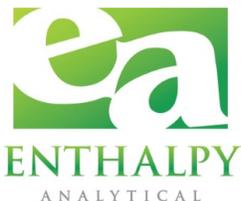
3954 Clearwell Dr NE  
Leland, NC 28451

## Northwest Water Plant

Leland, NC  
Samples Received: 02/17/22

### Analytical Report 0222-780

#### *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.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick N/A Northwest Water Plant

### Summary

	Compound	CAS	021722-SO1 ng/L	021722-EO1 ng/L
Acids	PFBA	375-22-4	2.99	2.98
	PFPeA	2706-90-3	5.13	5.91
	PFHxA	307-24-4	5.25	5.60
	PFHpA	375-85-9	2.75	2.85
	PFOA	335-67-1	5.26	5.46
	PFNA	375-95-1	0.815	0.657
	PFDA	335-76-2	0.456	0.325
	PFUnDA	2058-94-8	0.120 L	0.0643 L
	PFDoDA	307-55-1	0.0110 LB	0.00749 LB
	PFTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U
Sulfonates	PFBS	375-73-5	3.99	3.90
	PFPeS	2706-91-4	0.607	0.595
	PFHxS	355-46-4	2.68	3.43
	PFHpS	375-92-8	0.221 J	0.160 J
	PFOS	1763-23-1	9.48	7.48
	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	0.531	0.336
8:2 FTS	39108-34-4	ND U	ND U	
other	PFOSA	754-91-6	0.0551 L	ND U
	N-MeFOSAA	2355-31-9	0.103 L	0.0513 L
	N-EtFOSAA	2991-50-6	ND U	ND U
	HFPO-DA	13252-13-6	4.06	3.72
	PFMOAA	674-13-5	30.6	22.6
	PFMOPrA	377-73-1	ND U	0.0351 L
	PFO2HxA	39492-88-1	2.28	2.36
	PFO3OA	39492-89-2	0.954 L	0.997 L
	PFO4DA	39492-90-5	ND U	ND U
	Nafion Byproduct 1	29311-67-9	ND U	ND U
	ADONA	919005-14-4	ND U	ND U
	9Cl-PF3ONS	756426-58-1	ND U	ND U
	11Cl-PF3OUdS	763051-92-9	ND U	ND U
	10:2 FTS	120226-60-0	ND U	ND U
	EVE Acid	69087-46-3	ND U	ND U
	FBSA	30334-69-1	0.404	0.449
	Hydro-EVE Acid	773804-62-9	0.194 L	0.233 L
	Hydrolyzed PSDA	2416366-19-1	2.03 B	1.91 B
	Nafion Byproduct 2	749836-20-2	0.324	0.185 L
	N-EtFOSA	4151-50-2	ND U	ND U
	N-EtFOSE	1691-99-2	ND U	ND U
	NFDHA	151772-58-6	ND U	ND U
	N-MeFOSA	31506-32-8	ND U	ND U
	N-MeFOSE	24448-09-7	ND U	ND U
	NVHOS	1132933-86-8	2.00	2.03
	PEPA	267239-61-2	ND U	ND U
	PFECA-G	801212-59-9	ND U	ND U
	PFEESA	113507-82-7	ND U	ND U
	PFHxDA	67905-19-5	ND U	ND U
	PFMOBA	863090-89-5	ND U	ND U
PFO5DA	39492-91-6	ND U	ND U	
PMPA	13140-29-9	ND U	ND U	
R-EVE	2416366-22-6	7.15	7.27	
R-PSDA	2416366-18-0	ND U	ND U	
R-PSDCA	2416366-21-5	0.0140 LB	0.0132 LB	

# Detailed Results

**Enthalpy Analytical**

Job No.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)  
 County of Brunswick N/A Northwest Water Plant

Enthalpy ID	0222-780-001-1	Prep Batch	EU13033	Sample Vol (mL)	291.58
Sample Name	021722-SO1	Prep Date	2022-02-18 09:44	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-02-22 12:51	Split Factor	N/A
Sampling Date	20220217 00:00	Analyst	brneff	Method Code	WM-026
Received Date	2022-02-17 13:30	Instrument	Fili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFPeA	2706-90-3	3738.49	5.13	5.13	0.146	0.261			
	PFHxA	307-24-4	3828.22	5.25	5.25	0.165	0.261			
	PFHpA	375-85-9	2005.99	2.75	2.75	0.105	0.261			
	PFOA	335-67-1	3834.35	5.26	5.26	0.152	0.261			
	PFNA	375-95-1	594.14	0.815	0.815	0.0652	0.261			
	PFDA	335-76-2	332.76	0.456	0.456	0.0724	0.261			
	PFUnDA	2058-94-8	87.31	0.120	0.120	0.159	0.261			L
	PFDoDA	307-55-1	8.03	0.0110	0.0110	0.173	0.261			LB
	PFTrDA	72629-94-8	ND	ND	ND	0.129	0.261			U
	PFTeDA	376-06-7	ND	ND	ND	0.187	0.261			U
Sulfonates	PFBS	375-73-5	2908.09	3.99	3.99	0.304	0.304			
	PFPeS	2706-91-4	442.46	0.607	0.607	0.177	0.246			
	PFHxS	355-46-4	1957.17	2.68	2.68	0.164	0.239			
	PFHpS	375-92-8	161.12	0.221	0.221	0.116	0.248			J
	PFOS	1763-23-1	6909.70	9.48	9.48	0.137	0.241			
	PFNS	68259-12-1	ND	ND	ND	0.0741	0.251			U
	PFDS	335-77-3	ND	ND	ND	0.165	0.251			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.101	0.244			U
other	6:2 FTS	27619-97-2	387.41	0.531	0.531	0.0995	0.248			
	8:2 FTS	39108-34-4	ND	ND	ND	0.147	0.250			U
	PFOSA	754-91-6	40.20	0.0551	0.0551	0.111	0.261			L
	N-MeFOSAA	2355-31-9	75.09	0.103	0.103	0.123	0.261			L
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0935	0.261			U
	HFPO-DA	13252-13-6	2960.41	4.06	4.06	0.195	0.261			
	PFMOAA	674-13-5	22271.91	30.6	30.6	1.23	1.23			
	PFMOPrA	377-73-1	ND	ND	ND	0.206	0.261			U
	PFO2HxA	39492-88-1	1662.08	2.28	2.28	1.23	1.23			
	PFO3OA	39492-89-2	695.44	0.954	0.954	1.23	1.23			L
	PF04DA	39492-90-5	ND	ND	ND	1.30	1.30			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.261	0.261			U
	ADONA	919005-14-4	ND	ND	ND	0.103	0.247			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.103	0.243			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.103	0.246			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.206	0.261			U
	EVE Acid	69087-46-3	ND	ND	ND	1.23	1.23			U
	FBSA	30334-69-1	294.67	0.404	0.404	0.206	0.261			
	Hydro-EVE Acid	773804-62-9	141.37	0.194	0.194	1.23	1.23			L
	Hydrolyzed PSDA	2416366-19-1	1481.84	2.03	2.03	1.23	1.23			B
	Nafion Byproduct 2	749836-20-2	236.05	0.324	0.324	0.261	0.261			U
	N-EtFOA	4151-50-2	ND	ND	ND	0.206	0.261			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.17	6.17			U
	NFDHA	151772-58-6	ND	ND	ND	0.206	0.261			U
	N-MeFOA	31506-32-8	ND	ND	ND	0.206	0.261			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.17	6.17			U
	NVHOS	1132933-86-8	1460.67	2.00	2.00	1.23	1.23			
	PEPA	267239-61-2	ND	ND	ND	1.23	1.23			U
PFECA-G	801212-59-9	ND	ND	ND	0.261	1.23			U	
PFEESA	113507-82-7	ND	ND	ND	0.206	0.261			U	
PFHxDA	67905-19-5	ND	ND	ND	1.23	1.23			U	
PFMOBA	863090-89-5	ND	ND	ND	1.23	1.23			U	
PF05DA	39492-91-6	ND	ND	ND	1.30	1.30			U	
PMPA	13140-29-9	ND	ND	ND	1.23	1.23			U	
R-EVE	2416366-22-6	5209.73	7.15	7.15	1.23	1.23			U	
R-PSDA	2416366-18-0	ND	ND	ND	1.23	1.23			U	
R-PSDCA	2416366-21-5	10.22	0.0140	0.0140	1.23	1.23			LB	
ES	M5PFPeA		7114.49	9.76				20-150%	142.3%	
	M3PFBS		10340.65	14.2				20-150%	206.8%	Q
	M2-4:2 FTS		8524.81	11.7				20-150%	170.5%	Q
	M5PFHxA		3126.60	4.29				20-150%	62.5%	
	M3HFPO-DA		2241.22	3.07				20-150%	44.8%	
	M4PFHpA		3500.25	4.80				20-150%	70.0%	
	M3PFHxS		4278.28	5.87				20-150%	85.6%	
	M2-6:2 FTS		4130.61	5.67				20-150%	82.6%	
	M8PFOA		3484.67	4.78				20-150%	69.7%	
	M9PFNA		3214.92	4.41				20-150%	64.3%	
	M8PFOS		3518.99	4.83				20-150%	70.4%	
	M2-8:2 FTS		3325.16	4.56				20-150%	66.5%	
	M8FOSA-I		2749.72	3.77				20-150%	55.0%	
	M6PFDA		3246.73	4.45				20-150%	64.9%	
	d3-N-MeFOSAA		3287.18	4.51				20-150%	65.7%	
	d5-N-EtFOSAA		3306.24	4.54				20-150%	66.1%	
	M7PFUDa		3532.77	4.85				20-150%	70.7%	
	MPPFOa		3139.06	4.31				20-150%	62.8%	
M2PFTeDA		2516.42	3.45				20-150%	50.3%		

## Enthalpy Analytical

Job No.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick N/A Northwest Water Plant

Enthalpy ID	0222-780-001-2	Prep Batch	EU13098	Sample Vol (mL)	285.26
Sample Name	021722-SO1	Prep Date	2022-03-04 15:35	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-03-12 16:48	Split Factor	N/A
Sampling Date	20220217 00:00	Analyst	avheadrick	Method Code	WM-026
Received Date	2022-02-17 13:30	Instrument	Kili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	2129.31	2.99	2.99	0.134	0.266			
ES	MPFBA		4810.28	6.75				20-150%	96.2%	

## Enthalpy Analytical

Job No.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)  
 County of Brunswick N/A Northwest Water Plant

Enthalpy ID	0222-780-002-1	Prep Batch	EU13033	Sample Vol (mL)	295.39
Sample Name	021722-E01	Prep Date	2022-02-18 09:44	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-02-22 13:14	Split Factor	N/A
Sampling Date	20220217 00:00	Analyst	brneff	Method Code	WM-026
Received Date	2022-02-17 13:30	Instrument	Fili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFPeA	2706-90-3	4361.46	5.91	5.91	0.144	0.257			
	PFHxA	307-24-4	4135.24	5.60	5.60	0.163	0.257			
	PFHpA	375-85-9	2107.93	2.85	2.85	0.103	0.257			
	PFOA	335-67-1	4031.88	5.46	5.46	0.150	0.257			
	PFNA	375-95-1	485.33	0.657	0.657	0.0644	0.257			
	PFDA	335-76-2	240.09	0.325	0.325	0.0715	0.257			
	PFUnDA	2058-94-8	47.50	0.0643	0.0643	0.157	0.257			L
	PFDoDA	307-55-1	5.53	0.00749	0.00749	0.171	0.257			LB
	PFTrDA	72629-94-8	ND	ND	ND	0.128	0.257			U
	PFTeDA	376-06-7	ND	ND	ND	0.185	0.257			U
Sulfonates	PFBS	375-73-5	2883.40	3.90	3.90	0.300	0.300			
	PFPeS	2706-91-4	439.65	0.595	0.595	0.174	0.242			
	PFHxS	355-46-4	2531.25	3.43	3.43	0.162	0.236			
	PFHpS	375-92-8	118.46	0.160	0.160	0.114	0.245			J
	PFOS	1763-23-1	5521.59	7.48	7.48	0.135	0.238			
	PFNS	68259-12-1	ND	ND	ND	0.0731	0.248			U
	PFDS	335-77-3	ND	ND	ND	0.162	0.248			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0999	0.241			U
	6:2 FTS	27619-97-2	247.76	0.336	0.336	0.0982	0.245			
	8:2 FTS	39108-34-4	ND	ND	ND	0.145	0.246			U
other	PFOSA	754-91-6	ND	ND	ND	0.110	0.257			U
	N-MeFOSAA	2355-31-9	37.90	0.0513	0.0513	0.122	0.257			L
	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0923	0.257			U
	HFPO-DA	13252-13-6	2744.84	3.72	3.72	0.193	0.257			
	PFMOAA	674-13-5	16706.05	22.6	22.6	1.22	1.22			
	PFMOPrA	377-73-1	25.92	0.0351	0.0351	0.203	0.257			L
	PFO2HxA	39492-88-1	1745.38	2.36	2.36	1.22	1.22			
	PFO3OA	39492-89-2	736.33	0.997	0.997	1.22	1.22			L
	PF04DA	39492-90-5	ND	ND	ND	1.29	1.29			U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.257	0.257			U
	ADONA	919005-14-4	ND	ND	ND	0.102	0.244			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.102	0.240			U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.102	0.242			U
	10:2 FTS	120226-60-0	ND	ND	ND	0.203	0.257			U
	EVE Acid	69087-46-3	ND	ND	ND	1.22	1.22			U
	FBSA	30334-69-1	331.33	0.449	0.449	0.203	0.257			
	Hydro-EVE Acid	773804-62-9	171.94	0.233	0.233	1.22	1.22			L
	Hydrolyzed PSDA	2416366-19-1	1413.15	1.91	1.91	1.22	1.22			B
	Nafion Byproduct 2	749836-20-2	136.93	0.185	0.185	0.257	0.257			L
	N-EtFOA	4151-50-2	ND	ND	ND	0.203	0.257			U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.09	6.09			U
	NFDHA	151772-58-6	ND	ND	ND	0.203	0.257			U
	N-MeFOA	31506-32-8	ND	ND	ND	0.203	0.257			U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.09	6.09			U
	NVHOS	1132933-86-8	1501.95	2.03	2.03	1.22	1.22			
	PEPA	267239-61-2	ND	ND	ND	1.22	1.22			U
	PFECA-G	801212-59-9	ND	ND	ND	0.257	1.22			U
	PFEESA	113507-82-7	ND	ND	ND	0.203	0.257			U
	PFHxDA	67905-19-5	ND	ND	ND	1.22	1.22			U
	PFMOBA	863090-89-5	ND	ND	ND	1.22	1.22			U
PF05DA	39492-91-6	ND	ND	ND	1.29	1.29			U	
PMPA	13140-29-9	ND	ND	ND	1.22	1.22			U	
R-EVE	2416366-22-6	5367.23	7.27	7.27	1.22	1.22			U	
R-PSDA	2416366-18-0	ND	ND	ND	1.22	1.22			U	
R-PSDCA	2416366-21-5	9.71	0.0132	0.0132	1.22	1.22			LB	
ES	M5PFPeA		11016.45	14.9				20-150%	220.3%	Q
	M3PFBS		15850.34	21.5				20-150%	317.0%	Q
	M2-4:2 FTS		10273.46	13.9				20-150%	205.5%	Q
	M5PFHxA		4751.43	6.43				20-150%	95.0%	
	M3HFPO-DA		4236.10	5.74				20-150%	84.7%	
	M4PFHpA		4670.10	6.32				20-150%	93.4%	
	M3PFHxS		4926.51	6.67				20-150%	98.5%	
	M2-6:2 FTS		5215.80	7.06				20-150%	104.3%	
	M8PFOA		4602.50	6.23				20-150%	92.1%	
	M9PFNA		4483.42	6.07				20-150%	89.7%	
	M8PFOS		4638.66	6.28				20-150%	92.8%	
	M2-8:2 FTS		3935.76	5.33				20-150%	78.7%	
	M8FOSA-I		3402.92	4.61				20-150%	68.1%	
	M6PFDA		4446.12	6.02				20-150%	88.9%	
	d3-N-MeFOSAA		3912.77	5.30				20-150%	78.3%	
	d5-N-EtFOSAA		4050.22	5.48				20-150%	81.0%	
	M7PFUDa		4124.66	5.59				20-150%	82.5%	
	MPPDoA		3869.35	5.24				20-150%	77.4%	
M2PFTeDA		3159.06	4.28				20-150%	63.2%		

## Enthalpy Analytical

Job No.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick N/A Northwest Water Plant

Enthalpy ID	0222-780-002-2	Prep Batch	EU13098	Sample Vol (mL)	283.14
Sample Name	021722-EO1	Prep Date	2022-03-04 15:35	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-03-12 17:11	Split Factor	N/A
Sampling Date	20220217 00:00	Analyst	avheadrick	Method Code	WM-026
Received Date	2022-02-17 13:30	Instrument	Kili	Sample Type	Sample

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	2110.20	2.98	2.98	0.135	0.268			
ES	MPFBA		4785.30	6.76				20-150%	95.7%	

# QC Data



**Enthalpy Analytical**

Job No.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)  
 County of Brunswick NA Northwest Water Plant

Enthalpy ID MB-13033-PFAS Prep Batch EU13033 Sample Vol (mL) 250  
 Sample Name MB-13033-PFAS Prep Date 2022-02-18 09:44 Extract Vol (mL) 0.4  
 Matrix Aqueous Analysis Date 2022-02-22 10:55 Split Factor N/A  
 Sampling Date Analyst brneff Method Code WM-026  
 Received Date Instrument Filii Sample Type Blank

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	501.96	0.803	0.803	0.153	0.304			
	PFPeA	2706-90-3	ND	ND	ND	0.170	0.304			U
	PFHxA	307-24-4	10.65	0.0170	0.0170	0.193	0.304			L
	PFFpA	375-85-9	ND	ND	ND	0.122	0.304			U
	PFOA	335-67-1	ND	ND	ND	0.177	0.304			U
	PFNA	375-95-1	ND	ND	ND	0.0761	0.304			U
	PFDA	335-76-2	ND	ND	ND	0.0845	0.304			U
	PFUnDA	2058-94-8	1.11	0.00177	0.00177	0.185	0.304			L
	PFDoDA	307-55-1	19.34	0.0309	0.0309	0.202	0.304			L
	PFTdA	72629-94-8	48.19	0.0771	0.0771	0.151	0.304			L
PFTeDA	376-06-7	46.54	0.0745	0.0745	0.218	0.304			L	
Sulfonates	PFBs	375-73-5	ND	ND	ND	0.355	0.355			U
	PFPeS	2706-91-4	ND	ND	ND	0.206	0.286			U
	PFFhS	355-46-4	ND	ND	ND	0.191	0.278			U
	PFFpS	375-92-8	ND	ND	ND	0.135	0.290			U
	PFOS	1763-23-1	ND	ND	ND	0.160	0.282			U
	PFNS	68259-12-1	ND	ND	ND	0.0864	0.293			U
	PFDS	335-77-3	ND	ND	ND	0.192	0.293			U
	4:2 FTS	757124-72-4	ND	ND	ND	0.118	0.285			U
	6:2 FTS	27619-97-2	ND	ND	ND	0.116	0.290			U
	8:2 FTS	39108-34-4	ND	ND	ND	0.171	0.291			U
other	PFOSA	754-91-6	ND	ND	ND	0.130	0.304			U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.144	0.304			U
	N-EiFOSAA	2991-50-6	41.25	0.0660	0.0660	0.109	0.304			L
	HFPO-DA	13252-13-6	ND	ND	ND	0.228	0.304			U
	PFMOA	674-13-5	ND	ND	ND	1.44	1.44			U
	PFMOPrA	377-73-1	ND	ND	ND	0.240	0.304			U
	PFO2HA	39492-88-1	ND	ND	ND	1.44	1.44			U
	PFO3OA	39492-89-2	ND	ND	ND	1.44	1.44			U
	PFO4DA	39492-90-5	ND	ND	ND	1.52	1.52			U
	Nation Byproduct 1	29311-67-9	ND	ND	ND	0.304	0.304			U
	ADONA	919005-14-4	ND	ND	ND	0.120	0.288			U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.120	0.283			U
	11Cl-PF3OUdS	763051-92-9	5.45	0.00872	0.00872	0.120	0.286			L
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	0.304			U
	EVE Acid	69087-46-3	17.37	0.0278	0.0278	1.44	1.44			L
	FBSA	30334-69-1	ND	ND	ND	0.240	0.304			U
	Hydro-EVE Acid	773804-62-9	ND	ND	ND	1.44	1.44			U
	Hydrolyzed PSDA	2416366-19-1	263.82	0.422	0.422	1.44	1.44			L
	Nation Byproduct 2	749836-20-2	ND	ND	ND	0.304	0.304			U
	N-EiFOSA	4151-50-2	ND	ND	ND	0.240	0.304			U
	N-EiFOSE	1691-99-2	ND	ND	ND	7.20	7.20			U
	NFDHA	151772-58-6	ND	ND	ND	0.240	0.304			U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.240	0.304			U
	N-MeFOSE	24448-09-7	ND	ND	ND	7.20	7.20			U
	PEPA	267239-61-2	ND	ND	ND	1.44	1.44			U
	PFECA-G	801212-59-9	ND	ND	ND	0.304	1.44			U
	PFEESA	113507-82-7	ND	ND	ND	0.240	0.304			U
	PFFhDA	67905-19-5	237.73	0.380	0.380	1.44	1.44			L
	PFFMOBA	863090-89-5	ND	ND	ND	1.44	1.44			U
	PFO5DA	39492-91-6	ND	ND	ND	1.52	1.52			U
PMPA	13140-29-9	ND	ND	ND	1.44	1.44			U	
R-EVE	2416366-22-6	122.17	0.195	0.195	1.44	1.44			L	
R-PSDA	2416366-18-0	ND	ND	ND	1.44	1.44			U	
R-PSDCA	2416366-21-5	18.67	0.0299	0.0299	1.44	1.44			L	
ES	MPFBA		4994.98	7.99				20-150%	99.9%	
	MSPFPeA		5441.68	8.71				20-150%	108.8%	
	M3PFBS		5444.57	8.71				20-150%	108.9%	
	M2-4:2 FTS		5536.64	8.86				20-150%	110.7%	
	MSPFHxA		4964.14	7.94				20-150%	99.3%	
	M3HFPO-DA		5279.59	8.45				20-150%	105.6%	
	M4PFHpA		5288.92	8.46				20-150%	105.8%	
	M3PFHhS		5267.74	8.43				20-150%	105.4%	
	M2-6:2 FTS		4880.71	7.81				20-150%	97.6%	
	M8PFOA		5236.27	8.38				20-150%	104.7%	
	M8PFNA		5016.40	8.03				20-150%	100.3%	
	M8PFOS		5185.72	8.30				20-150%	103.7%	
	M2-8:2 FTS		4638.43	7.42				20-150%	92.8%	
	M8FOSA-I		3456.17	5.53				20-150%	69.1%	
	M8PFDA		4683.30	7.49				20-150%	93.7%	
	d3-N-MeFOSAA		4459.89	7.14				20-150%	89.2%	
	d5-N-EiFOSAA		4448.98	7.12				20-150%	89.0%	
	M7PFUdA		4751.92	7.60				20-150%	95.0%	
MPFDoA		4374.69	7.00				20-150%	87.5%		
M2PFTeDA		3070.17	4.91				20-150%	61.4%		
JS	M3PFBA		2962.37	4.72			50-150%			
	M2PFOA		3131.44	5.01			50-150%			
	MPFDA		3289.44	5.26			50-150%			
	MPFOS		3018.10	4.83			50-150%			

## Enthalpy Analytical

Job No.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick N/A Northwest Water Plant

Enthalpy ID	MB-13098-PFAS	Prep Batch	EU13098	Sample Vol (mL)	250
Sample Name	MB-13098-PFAS	Prep Date	2022-03-04 15:35	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-03-12 11:01	Split Factor	N/A
Sampling Date		Analyst	avheadrick	Method Code	WM-026
Received Date		Instrument	Kili	Sample Type	Blank

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	ND	ND	ND	0.153	0.304			
ES	MPFBA		4316.09	6.91				20-150%	86.3%	U

# Enthalpy Analytical

Job No.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick N/A Northwest Water Plant

Enthalpy ID	OPR-13033-PFAS	Prep Batch	EU13033	Sample Vol (mL)	250
Sample Name	OPR-13033-PFAS	Prep Date	2022-02-18 09:44	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-02-22 11:18	Split Factor	N/A
Sampling Date		Analyst	brneff	Method Code	WM-026
Received Date		Instrument	Fii	Sample Type	Control

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	11426.11	18.3	18.3	0.153	0.304	73-129%	91.4%	
	PFPeA	2706-90-3	11557.44	18.5	18.5	0.170	0.304	72-129%	92.5%	
	PFHxA	307-24-4	10931.64	17.5	17.5	0.193	0.304	72-129%	87.5%	
	PFHpA	375-85-9	10576.41	16.9	16.9	0.122	0.304	72-130%	84.6%	
	PFOA	335-67-1	12181.56	19.5	19.5	0.177	0.304	71-133%	97.5%	
	PFNA	375-95-1	12598.49	20.2	20.2	0.0761	0.304	69-130%	100.8%	
	PFDA	335-76-2	11533.00	18.5	18.5	0.0845	0.304	71-129%	92.3%	
	PFUnDA	2058-94-8	11363.47	18.2	18.2	0.185	0.304	69-133%	90.9%	
	PFDoDA	307-55-1	11142.67	17.8	17.8	0.202	0.304	72-134%	89.1%	
	PFTriDA	72629-94-8	16999.47	27.2	27.2	0.151	0.304	65-144%	136.0%	
Sulfonates	PFTeDA	376-06-7	12107.09	19.4	19.4	0.218	0.304	71-132%	96.9%	
	PFBS	375-73-5	9588.31	15.3	15.3	0.355	0.355	72-134%	86.5%	
	PFPeS	2706-91-4	10435.72	16.7	16.7	0.206	0.286	71-127%	88.7%	
	PFHxS	355-46-4	10457.68	16.7	16.7	0.191	0.278	68-131%	91.5%	
	PFHpS	375-92-8	12495.46	20.0	20.0	0.135	0.290	69-134%	104.9%	
	PFOS	1763-23-1	11000.14	17.6	17.6	0.160	0.282	65-140%	94.8%	
	PFNS	68259-12-1	11690.27	18.7	18.7	0.0864	0.293	69-127%	97.2%	
	PFDS	335-77-3	10372.10	16.6	16.6	0.192	0.293	53-142%	86.0%	
	4:2 FTS	757124-72-4	11424.73	18.3	18.3	0.118	0.285	63-143%	97.5%	
	6:2 FTS	27619-97-2	12606.55	20.2	20.2	0.116	0.290	64-140%	106.0%	
other	8:2 FTS	39108-34-4	11128.43	17.8	17.8	0.171	0.291	67-138%	92.7%	
	PFOSA	754-91-6	10948.62	17.5	17.5	0.130	0.304	67-137%	87.6%	
	N-MeFOSAA	2355-31-9	12330.70	19.7	19.7	0.144	0.304	65-136%	98.6%	
	N-EtFOSAA	2991-50-6	11669.86	18.7	18.7	0.109	0.304	61-135%	93.4%	
	HFPO-DA	13252-13-6	13465.20	21.5	21.5	0.228	0.304	70-130%	107.7%	
	FBSA	30334-69-1	10210.01	16.3	16.3	0.240	0.304	20-150%	81.7%	
	PEPA	267239-61-2	10416.51	16.7	16.7	1.44	1.44	20-150%	83.3%	
ES	MPFBA		5348.84	8.56				20-150%	107.0%	
	M5PFPeA		5699.00	9.12				20-150%	114.0%	
	M3PFBS		5976.65	9.56				20-150%	119.5%	
	M2-4:2 FTS		5417.21	8.67				20-150%	108.3%	
	M5PFHxA		5187.87	8.30				20-150%	103.8%	
	M3HFPO-DA		4501.02	7.20				20-150%	90.0%	
	M4PFHpA		5301.31	8.48				20-150%	106.0%	
	M3PFHxS		5814.77	9.30				20-150%	116.3%	
	M2-6:2 FTS		5378.82	8.61				20-150%	107.6%	
	M8PFOA		5223.16	8.36				20-150%	104.5%	
	M9PFNA		4551.22	7.28				20-150%	91.0%	
	M8PFOS		5382.25	8.61				20-150%	107.6%	
	M2-8:2 FTS		5315.60	8.50				20-150%	106.3%	
	M8FOSA-I		4386.74	7.02				20-150%	87.7%	
	M6PFDA		4966.75	7.95				20-150%	99.3%	
	d3-N-MeFOSAA		4591.01	7.35				20-150%	91.8%	
	d5-N-EtFOSAA		4674.07	7.48				20-150%	93.5%	
	M7PFUdA		4959.21	7.93				20-150%	99.2%	
	MPFDoA		4539.11	7.26				20-150%	90.8%	
	M2PFTeDA		2699.33	4.32				20-150%	54.0%	

## Enthalpy Analytical

Job No.: 0222-780-1 PFAS by Isotope Dilution (non-potable water)

County of Brunswick N/A Northwest Water Plant

Enthalpy ID	OPR-13098-PFAS	Prep Batch	EU13098	Sample Vol (mL)	250
Sample Name	OPR-13098-PFAS	Prep Date	2022-03-04 15:35	Extract Vol (mL)	0.4
Matrix	Aqueous	Analysis Date	2022-03-12 11:24	Split Factor	N/A
Sampling Date		Analyst	avheadrick	Method Code	WM-026
Received Date		Instrument	Kili	Sample Type	Control

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	12594.16	20.2	20.2	0.153	0.304	73-129%	100.8%	
ES	MPFBA		4656.92	7.45				20-150%	93.1%	

# Narrative Summary



# Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0222-780-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant

## 1. Custody

Dallas King received the samples on February 17, 2022 at 0.6 °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
0222-780-001-1	021722-SO1	Aqueous
0222-780-001-2		
0222-780-002-1	021722-EO1	Aqueous
0222-780-002-2		

## 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 "Fili" and "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.

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

## 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.

Supplemental compounds were run using a single point calibration forced through zero.

# Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job No.	0222-780-1 PFAS by Isotope Dilution (non-potable water)
Client ID.	N/A Site: Northwest Water Plant

The Technical Director extended the method criteria for certain non-legacy analytes that do not have their own internal standard and exhibit observed variability during calibration.

## 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

This report provides all results including detections below LOD following client instruction.

PFAS PFBA was detected above LOQ in the initial extraction batch analysis. Samples were re-extracted for this analyte and reported successfully.

Analyte(s) were detected in the method blank (MB) at less than 1/2 LOQ. Any analyte(s) detected in the samples with less than 10 times the amount detected in MB were notated with a B qualifier and are reported with no adverse impact.

Some labeled extraction standards in the sample analyses fell outside the control limits for ES recovery, as denoted by the "Q" qualifier. The target analytes are quantified based on their ratio to their labeled standard analogs. As a result, low or high labeled standard recovery do not cause any change to ratios or contribute any additional error in the measurement of the target analytes. The data have been accepted and reported with no further actions.

The results presented in this report are representative of the samples as provided to the laboratory.

These analyses met the requirements of the TNI Standard. Any deviations from the requirements of the reference method or TNI Standard have been stated above.

Enthalpy Analytical, LLC in Wilmington NC is accredited by the Louisiana Department of Environmental Quality to the 2009 TNI Standard under certificate number 05075.



## General Reporting Notes – Data Qualifiers

The following are general reporting notes that are applicable to all Enthalpy Analytical, LLC - Wilmington, NC data reports, unless specifically noted otherwise.

### General Data Qualifiers

- B – The analyte was found in the method blank, at a concentration that was at least 10% of the amount 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: The EDL is unique to isotope dilution methods and reflects the conditions of analysis at the time of analysis, including the equipment used. Where the MDL is a static value, the EDL is a dynamic value.
- EMPC – Estimated Maximum Possible Concentration: EMPC is specific to Dioxin/Furan tests to indicate the determined ion-abundance ratio was outside the allowed theoretical range (usually due to being near the detection limit, although it can very rarely be caused by a co-eluting interference). The EMPC concentration is adjusted to reflect the value at the theoretical ion-abundance ratio.
- IR – The ion ratio between the primary and secondary ions was observed to be outside the method criteria. The analyte concentration may be inaccurate due to interference.
- 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 LOQ is adjusted for sample weight or volume.

## General Reporting Notes – Data Qualifiers

- <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.
- <LOQ() – Analyte was not found at a concentration high enough to be reported as above the QSM-defined LOQ or TNI defined Reporting Limit. It is reported as less than the LOQ, and the LOQ 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 / Q – The labeled standard recovery is not within method control limits.
- X – Indicates the result is 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.
- R – Indicates a re-extraction of the sample.
- RJ – Indicates a reinjection of the sample extract.



## General Reporting Notes – Data Qualifiers

- S – Indicates a sample split. The number that follows the “S” indicates the split factor.
- SAT – Indicates an analyte saturated the detector.

PFAS Compound Acronym List		
Acronym	CAS #	Compound Name
<b>Target Analytes</b>		
<b>* Analyte is not accredited</b>		
PFBA	375-22-4	Perfluorobutanoic Acid
PFPeA	2706-90-3	Perfluoropentanoic Acid
PFHxA	307-24-4	Perfluorohexanoic Acid
PFHpA	375-85-9	Perfluoroheptanoic Acid
PFOA	335-67-1	Perfluorooctanoic Acid
PFNA	375-95-1	Perfluorononanoic Acid
PFDA	335-76-2	Perfluorodecanoic acid
PFUnA (PFUnDA)	2058-94-8	Perfluoroundecanoic acid
PFDoA (PFDoDA)	307-55-1	Perfluorododecanoic acid
PFTriA (PFTriA)	72629-94-8	Perfluorotridecanoic acid
PFTeDA (PFTA)	376-06-7	Perfluorotetradecanoic acid
PFBS	375-73-5	Perfluorobutane sulfonic acid
PFPeS	2706-91-4	Perfluoropentane sulfonic acid
PFHxS	355-46-4	Perfluorohexane sulfonic acid
PFHpS	375-92-8	Perfluoroheptane sulfonic acid
PFOS	1763-23-1	Perfluorooctane sulfonic acid
PFNS	68259-12-1	Perfluorononane sulfonic acid
PFDS	335-77-3	Perfluorodecane sulfonic acid
4:2 FTS	757124-72-4	4:2 fluorotelomer sulfonic acid
6:2 FTS	27619-97-2	6:2 fluorotelomer sulfonic acid
8:2 FTS	39108-34-4	8:2 fluorotelomer sulfonic acid
PFOSA (FOSA)	754-91-6	Perfluorooctane sulfonamide
N-MeFOSAA	2355-31-9	N-methyl perfluorooctane sulfonamido acetic acid
N-EtFOSAA	2991-50-6	N-ethyl perfluorooctane sulfonamido acetic acid
HFPO-DA	13252-13-6	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (Gen-X)
11Cl-PF3OUdS	763051-92-9	11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid
9Cl-PF3ONS	756426-58-1	9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid
ADONA	919005-14-4	4,8-dioxa-3H-perfluorononanoic acid
PFEESA	113507-82-7	Perfluoro(2-ethoxyethane)sulphonic acid
PFMOBA (PFMBA)	863090-89-5	Perfluoro-4-methoxybutanic acid
NFDHA	151772-58-6	Nonafluoro-3,6-dioxaheptanoic acid
PFMOPra (PFMPA)	377-73-1	Perfluoro-3-methoxypropanoic acid
* PFMOAA	674-13-5	Perfluoro-2-methoxyacetic acid
* PFO2HxA	39492-88-1	Perfluoro (3,5-dioxaheptanoic) acid
* PFO3OA	39492-89-2	Perfluoro (3,5,7-trioxaoctanoic) acid
* PFO4DA	39492-90-5	Perfluoro (3,5,7,9-tetraoxadecanoic) acid
* PFO5DA	39492-91-6	Perfluoro(3,5,7,9,11-pentaoxadodecanoic) acid
* Nafion Byproduct 1	29311-67-9	Nafion Byproduct 1
* Nafion Byproduct 2	749836-20-2	Nafion Byproduct 2
* PEPA	267239-61-2	Perfluoro-2-ethoxypropanoic acid
* PMPA	13140-29-9	Perfluoro-2-methoxypropanoic acid
* 10:2 FTS	120226-60-0	Fluorotelomer sulfonate 10:2
* N-EtFOSA	4151-50-2	N-ethylperfluoro-1-octanesulfonamide
* N-EtFOSE	1691-99-2	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol
* N-MeFOSA	31506-32-8	N-methylperfluoro-1-octanesulfonamide
* N-MeFOSE	24448-09-7	2-(N-methylperfluoro-1-octanesulfonamido)-ethanol
* PFECA-G	801212-59-9	4-(Heptafluoroisopropoxy)hexafluorobutanoic acid
* PFHxDA	67905-19-5	Perfluorohexadecanoic acid
R-PSDA (Nafion Byproduct * 4)	2416366-18-0	Perfluoro-4-(2-sulfoethoxy)pentanoic acid

PFAS Compound Acronym List		
Acronym	CAS #	Compound Name
<b>Target Analytes</b>		
<b>* Analyte is not accredited</b>		
* Hydrolyzed PSDA (Nafion Byproduct 5)	2416366-19-1	2-fluoro-2-[1,1,2,3,3,3-hexafluoro-2-(1,1,2,2-tetrafluoro-2-sulfoethoxy)propoxy]-acetic acid
* R-PSDCA (Nafion Byproduct 6)	2416366-21-5	1,1,2,2-tetrafluoro-2-[1,2,2,3,3-pentafluoro-1-(trifluoromethyl)propoxy] ethanesulfonic acid
* EVE Acid	69087-46-3	2,2,3,3-tetrafluoro-3-({1,1,1,2,3,3-hexafluoro-3-[(1,2,2-trifluoroethenyl)oxy]propan-2-yl}oxy)propionic acid
* FBSA	30334-69-1	Perfluorobutylsulfonamide
* Hydro-EVE Acid	773804-62-9	2,2,3,3-Tetrafluoro-3-({1,1,1,2,3,3-hexafluoro-3-(1,2,2,2-tetrafluoroethoxy)propan-2-yl}oxy)propanoic acid
* R-EVE Acid	2416366-22-6	4-(2-carboxy-1,1,2,2-tetrafluoroethoxy)-2,2,3,3,4,5,5,5-octafluoro-pentanoic acid
* NVHOS	1132933-86-8	Perfluoroethoxysulfonic acid
* PFDoS	79780-39-5	Perfluorododecane sulfonic acid
* PFOA	16517-11-6	Perfluorooctadecanoic acid
* 3:3 FTCA	356-02-5	2H,2H,3H,3H-Perfluorohexanoic acid
* 5:3 FTCA	914637-49-3	2H,2H,3H,3H-Perfluorooctanoic acid
* 7:3 FTCA	812-70-4	2H,2H,3H,3H-Perfluorodecanoic acid
* N-AP-FHxSA	50598-28-2	N-(3-(Dimethylamino)propyl)tridecafluoro-1-hexanesulfonamide
* N-CMAmP-6:2 FOSA	34455-29-3	N-(Carboxymethyl)-N,N-dimethyl-3-(((3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl)amino)1-propanaminium

# Sample Custody





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