

County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

NW Plant

Leland, NC
Samples Received: 07/09/20

Analytical Report 0720-730

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.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Summary

	Compound	CAS	7920 S01 ng/L	7920 E01 ng/L
Acids	PFBA	375-22-4	4.91	7.84
	PFPeA	2706-90-3	8.08	8.10
	PFHxA	307-24-4	5.90	6.00
	PFHpA	375-85-9	3.15	3.39
	PFOA	335-67-1	5.29	6.68
	PFNA	375-95-1	0.798 J	0.811 J
	PFDA	335-76-2	0.401 J	0.425 J
	PFUnDA	2058-94-8	0.124 J	ND U
	PFDoDA	307-55-1	0.0718 J	0.0105 L
	PFTTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U
Sulfonates	PFBS	375-73-5	ND U	ND U
	PFPeS	2706-91-4	0.701 J	0.633 J
	PFHxS	355-46-4	4.92	5.06
	PFHpS	375-92-8	0.109 J	0.162 J
	PFOS	1763-23-1	10.9	10.5
	PFNS	68259-12-1	ND U	ND U
	PFDS	335-77-3	ND U	ND U
	4:2 FTS	757124-72-4	ND U	ND U
	6:2 FTS	27619-97-2	0.220 J	0.297 J
other	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	0.211 J	0.0879 J
	HFPO-DA	13252-13-6	15.3	15.7
	PFMOAA	674-13-5	116	113
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	7.62	7.31
	PFO3OA	39492-89-2	15.8	20.5
	PFO4DA	39492-90-5	ND U	ND U
	Nafion Byproduct 1	29311-67-9	ND U	ND U
other	ADONA	919005-14-4	ND U	ND U
	9CI-PF3ONS	756426-58-1	ND U	ND U
	11CI-PF3OUdS	763051-92-9	ND U	ND U
	10:2 FTS	120226-60-0	ND U	ND U
	FBSA	30334-69-1	0.219 J	0.260 J
	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	1.04 L	1.21 L
	NFDHA	151772-58-6	ND U	ND U
	PEPA		18.8	22.7
	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	2.27 L
	PMPA	13140-29-9	16.9	19.4

Detailed Results

Enthalpy Analytical

Job No.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Enthalpy ID 0720-730-001-1

Prep Batch EU11002

Sample Vol (mL) 282.4

Sample Name 7920 S01

Prep Date 2020-07-13

Extract Vol (mL) 0.4

Matrix AQ

Analysis Date 2020-07-28

Dilution Factor 1

Sampling Date 20200709 08:00

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery	Flags
Acids	PFPeA	2706-90-3	5707.16	8.08	8.08	0.0795	1.03		
	PFHxA	307-24-4	4167.26	5.90	5.90	0.140	1.03		
	PFHpA	375-85-9	2221.42	3.15	3.15	0.0615	1.03		
	PFNA	375-95-1	563.33	0.798	0.798	0.0451	1.03		J
	PFDA	335-76-2	283.12	0.401	0.401	0.111	1.03		J
	PFUnDA	2058-94-8	87.73	0.124	0.124	0.0426	1.03		J
	PFDODA	307-55-1	50.70	0.0718	0.0718	0.0421	1.03		J
	PFTrDA	72629-94-8	ND	ND	ND	0.0660	1.03		U
	PFTeDA	376-06-7	ND	ND	ND	0.0735	1.03		U
	PFBS	375-73-5	ND	ND	ND	0.0735	1.03		U
Sulfonates	PFPeS	2706-91-4	494.86	0.701	0.701	0.0876	1.03		J
	PFHxS	355-46-4	3471.94	4.92	4.92	0.0732	1.03		
	PFNS	68259-12-1	ND	ND	ND	0.0579	1.03		U
	PFDS	335-77-3	ND	ND	ND	0.120	1.03		U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0572	1.03		U
	8:2 FTS	39108-34-4	ND	ND	ND	0.0504	1.03		U
	PFOSA	754-91-6	ND	ND	ND	0.323	1.03		U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.0482	1.03		U
other	HFPO-DA	13252-13-6	10826.20	15.3	15.3	0.0842	1.03		
	PFMOAA	674-13-5	82093.69	116	116	1.31	1.77		
	PFMOPrA	377-73-1	ND	ND	ND	0.212	1.12		U
	PFO2HxA	39492-88-1	5382.05	7.62	7.62	1.31	1.31		
	PFO3OA	39492-89-2	11146.33	15.8	15.8	1.31	1.31		
	PFO4DA	39492-90-5	ND	ND	ND	1.31	1.31		U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.212	1.12		U
	ADONA	919005-14-4	ND	ND	ND	0.106	1.12		U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.106	1.12		U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.106	1.12		U
	10:2 FTS	120226-60-0	ND	ND	ND	0.212	1.12		U
	FBSA	30334-69-1	154.76	0.219	0.219	0.212	1.12		J
	N-EtFOSA	4151-50-2	ND	ND	ND	0.212	1.12		U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.37	6.37		U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.212	1.12		U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.37	6.37		U
	Nafion Byproduct 2	749836-20-2	736.21	1.04	1.04	1.31	1.31		L
	NFDHA	151772-58-6	ND	ND	ND	0.212	1.12		U
	PEPA		13283.05	18.8	18.8	1.31	1.31		
	PFECA-G	801212-59-9	ND	ND	ND	1.31	1.31		U
	PFEESA	113507-82-7	ND	ND	ND	0.212	1.12		U
	PFHxDA	67905-19-5	ND	ND	ND	1.31	1.31		U
	PFMOBA	863090-89-5	ND	ND	ND	1.31	1.31		U
	PFO5DA	39492-91-6	ND	ND	ND	2.66	2.66		U
	PMPA	13140-29-9	11904.52	16.9	16.9	1.31	1.31		
ES	MPFBA		4551.68	6.45				23.9%	
	M5PFPeA		11168.97	15.8				55.8%	
	M3PFBS		20107.28	28.5				99.5%	
	M2-4:2 FTS		49437.28	70.0				253.8%	Q
	M5PFHxA		4031.61	5.71				93.3%	
	M3HFPO-DA		4068.89	5.76				92.2%	
	M4PFHpA		4364.79	6.18				98.4%	
	M3PFHxS		4573.87	6.48				96.8%	
	M8PFOA		4578.53	6.49				101.8%	
	M9PFNA		4267.36	6.04				95.2%	
	M2-8:2 FTS		6229.18	8.82				142.2%	
	M8FOSA-I		2803.82	3.97				58.9%	
	M6PFDA		4006.06	5.67				97.7%	
	d3-N-MeFOSAA		4442.43	6.29				95.6%	
	d5-N-EtFOSAA		4007.03	5.68				83.7%	
	M7PFUDa		3561.36	5.04				90.2%	
	MPFDoA		3087.79	4.37				83.1%	
	M2PFTeDA		1240.28	1.76				34.0%	

Enthalpy Analytical

Job No.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Enthalpy ID	0720-730-001-2	Prep Batch	EU11054	Sample Vol (mL)	279.18
Sample Name	7920 S01	Prep Date	2020-08-01	Extract Vol (mL)	0.4
Matrix	AQ	Analysis Date	2020-08-01	Dilution Factor	1
Sampling Date	20200709 08:00				

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery	Flags
Acids	PFBA	375-22-4	3429.15	4.91	4.91	0.141	1.04		
	PFOA	335-67-1	3689.21	5.29	5.29	0.0712	1.04		
Sulfonates	PFHpS	375-92-8	75.84	0.109	0.109	0.0698	1.04		J
	PFOS	1763-23-1	7574.45	10.9	10.9	0.0422	1.04		
	6:2 FTS	27619-97-2	153.73	0.220	0.220	0.0647	1.04		J
Other	N-EtFOSAA	2991-50-6	147.03	0.211	0.211	0.0583	1.04		J
ES	MPFBA		4988.03	7.15				21.3%	
	M2-6:2 FTS		31869.73	45.7				138.2%	
	M8PFOA		5160.82	7.39				97.5%	
	M8PFOS		4655.50	6.67				88.8%	
	d5-N-EtFOSAA		3900.25	5.59				74.4%	

Enthalpy Analytical

Job No.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Enthalpy ID 0720-730-002-1

Prep Batch EU11002

Sample Vol (mL) 276.76

Sample Name 7920 E01

Prep Date 2020-07-13

Extract Vol (mL) 0.4

Matrix AQ

Analysis Date 2020-07-28

Dilution Factor 1

Sampling Date 20200709 08:00

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery	Flags
Acids	PFPeA	2706-90-3	5603.03	8.10	8.10	0.0811	1.05		
	PFHxA	307-24-4	4151.80	6.00	6.00	0.142	1.05		
	PFHpA	375-85-9	2344.74	3.39	3.39	0.0628	1.05		
	PFNA	375-95-1	560.94	0.811	0.811	0.0460	1.05		J
	PFDA	335-76-2	294.02	0.425	0.425	0.113	1.05		J
	PFUnDA	2058-94-8	ND	ND	ND	0.0434	1.05		U
	PFDaDA	307-55-1	7.28	0.0105	0.0105	0.0429	1.05		L
	PFTriDA	72629-94-8	ND	ND	ND	0.0673	1.05		U
	PFTeDA	376-06-7	ND	ND	ND	0.0750	1.05		U
	PFBS	375-73-5	ND	ND	ND	0.0750	1.05		U
Sulfonates	PFPeS	2706-91-4	437.72	0.633	0.633	0.0894	1.05		J
	PFHxS	355-46-4	3503.26	5.06	5.06	0.0747	1.05		
	PFNS	68259-12-1	ND	ND	ND	0.0591	1.05		U
	PFDS	335-77-3	ND	ND	ND	0.122	1.05		U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0584	1.05		U
	8:2 FTS	39108-34-4	ND	ND	ND	0.0514	1.05		U
	PFOSA	754-91-6	ND	ND	ND	0.330	1.05		U
	N-MeFOSAA	2355-31-9	ND	ND	ND	0.0491	1.05		U
other	HFPO-DA	13252-13-6	10854.38	15.7	15.7	0.0859	1.05		
	PFMOAA	674-13-5	78391.07	113	113	1.34	1.81		
	PFMOPrA	377-73-1	ND	ND	ND	0.217	1.14		U
	PFO2HxA	39492-88-1	5063.92	7.31	7.31	1.34	1.34		
	PFO3OA	39492-89-2	14183.50	20.5	20.5	1.34	1.34		
	PFO4DA	39492-90-5	ND	ND	ND	1.34	1.34		U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.217	1.14		U
	ADONA	919005-14-4	ND	ND	ND	0.108	1.14		U
	9Cl-PF3ONS	756426-58-1	ND	ND	ND	0.108	1.14		U
	11Cl-PF3OUdS	763051-92-9	ND	ND	ND	0.108	1.14		U
	10:2 FTS	120226-60-0	ND	ND	ND	0.217	1.14		U
	FBSA	30334-69-1	180.22	0.260	0.260	0.217	1.14		J
	N-EtFOSA	4151-50-2	ND	ND	ND	0.217	1.14		U
	N-EtFOSE	1691-99-2	ND	ND	ND	6.50	6.50		U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.217	1.14		U
	N-MeFOSE	24448-09-7	ND	ND	ND	6.50	6.50		U
	Nafion Byproduct 2	749836-20-2	834.94	1.21	1.21	1.34	1.34		L
	NFDHA	151772-58-6	ND	ND	ND	0.217	1.14		U
	PEPA		15729.23	22.7	22.7	1.34	1.34		
	PFECA-G	801212-59-9	ND	ND	ND	1.34	1.34		U
	PFEESA	113507-82-7	ND	ND	ND	0.217	1.14		U
	PFHxDA	67905-19-5	ND	ND	ND	1.34	1.34		U
	PFMOBA	863090-89-5	ND	ND	ND	1.34	1.34		U
	PFO5DA	39492-91-6	1570.91	2.27	2.27	2.72	2.72		L
	PMPA	13140-29-9	13415.37	19.4	19.4	1.34	1.34		
ES	MPFBA		4069.00	5.88				30.2%	
	M5PFPeA		10565.59	15.3				74.5%	
	M3PFBS		20104.39	29.1				140.4%	
	M2-4:2 FTS		52801.08	76.3				382.5%	Q
	M5PFHxA		3860.99	5.58				130.4%	
	M3HFPO-DA		4140.46	5.98				136.9%	
	M4PFHpA		4236.70	6.12				139.4%	
	M3PFHxS		4559.58	6.59				140.9%	
	M8PFOA		4284.27	6.19				139.0%	
	M9PFNA		4376.20	6.32				142.5%	
	M2-8:2 FTS		5785.46	8.36				192.8%	Q
	M8FOSA-I		2050.26	2.96				62.9%	
	M6PFDA		4086.11	5.91				143.1%	
	d3-N-MeFOSAA		4326.70	6.25				136.0%	
	d5-N-EtFOSAA		4399.78	6.36				134.3%	
	M7PFUDa		3876.13	5.60				141.1%	
	MPFDaA		3428.45	4.96				132.5%	
	M2PFTeDA		2846.58	4.11				112.2%	

Enthalpy Analytical

Job No.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Enthalpy ID	0720-730-002-2	Prep Batch	EU11054	Sample Vol (mL)	276.75
Sample Name	7920 E01	Prep Date	2020-08-01	Extract Vol (mL)	0.4
Matrix	AQ	Analysis Date	2020-08-01	Dilution Factor	1
Sampling Date	20200709 08:00				

	Compound	CAS	Extract Concentration ng/L	Sample Concentration ng/L	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery	Flags
Acids	PFBA	375-22-4	5425.82	7.84	7.84	0.142	1.05		
	PFOA	335-67-1	4621.26	6.68	6.68	0.0718	1.05		
Sulfonates	PFHpS	375-92-8	112.18	0.162	0.162	0.0704	1.05		J
	PFOS	1763-23-1	7240.76	10.5	10.5	0.0425	1.05		
	6:2 FTS	27619-97-2	205.28	0.297	0.297	0.0653	1.05		J
Other	N-EtFOSAA	2991-50-6	60.83	0.0879	0.0879	0.0588	1.05		J
ES	MPFBA		4443.94	6.42				24.5%	
	M2-6:2 FTS		21078.73	30.5				117.9%	
	M8PFOA		5018.53	7.25				90.8%	
	M8PFOS		5292.41	7.65				98.6%	
	d5-N-EtFOSAA		5131.07	7.42				95.7%	

QC Data

Enthalpy Analytical

Job No.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Enthalpy ID MB-11002-PFAS

Prep Batch EU11002

Sample Vol (mL) 250

Sample Name MB-11002-PFAS

Prep Date 2020-07-13

Extract Vol (mL) 0.4

Matrix

Analysis Date 2020-07-28

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	Flags
Acids	PFPeA	2706-90-3	ND	ND	ND	0.0898	1.16		U
	PFHxA	307-24-4	ND	ND	ND	0.158	1.16		U
	PFHpA	375-85-9	ND	ND	ND	0.0695	1.16		U
	PFNA	375-95-1	ND	ND	ND	0.0509	1.16		U
	PFDA	335-76-2	ND	ND	ND	0.125	1.16		U
	PFUnDA	2058-94-8	ND	ND	ND	0.0481	1.16		U
	PFDODA	307-55-1	ND	ND	ND	0.0475	1.16		U
	PFTrDA	72629-94-8	ND	ND	ND	0.0745	1.16		U
	PFTeDA	376-06-7	ND	ND	ND	0.0830	1.16		U
	PFBS	375-73-5	ND	ND	ND	0.0830	1.16		U
Sulfonates	PFPeS	2706-91-4	ND	ND	ND	0.0990	1.16		U
	PFHxS	355-46-4	ND	ND	ND	0.0827	1.16		U
	PFNS	68259-12-1	ND	ND	ND	0.0654	1.16		U
	PFDS	335-77-3	ND	ND	ND	0.135	1.16		U
	4:2 FTS	757124-72-4	ND	ND	ND	0.0646	1.16		U
	8:2 FTS	39108-34-4	ND	ND	ND	0.0569	1.16		U
	PFOSA	754-91-6	ND	ND	ND	0.365	1.16		U
other	N-MeFOSAA	2355-31-9	ND	ND	ND	0.0544	1.16		U
	HFPO-DA	13252-13-6	ND	ND	ND	0.0951	1.16		U
	PFMOAA	674-13-5	ND	ND	ND	1.48	2.00		U
	PFMOPrA	377-73-1	36.77	0.0588	0.0588	0.240	1.27		L
	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	1.48		U
	Nafion Byproduct 1	29311-67-9	ND	ND	ND	0.240	1.27		U
	ADONA	919005-14-4	ND	ND	ND	0.120	1.27		U
	9CI-PF3ONS	756426-58-1	ND	ND	ND	0.120	1.27		U
	11CI-PF3OUdS	763051-92-9	ND	ND	ND	0.120	1.27		U
	10:2 FTS	120226-60-0	ND	ND	ND	0.240	1.27		U
	FBSA	30334-69-1	ND	ND	ND	0.240	1.27		U
	N-EtFOSA	4151-50-2	ND	ND	ND	0.240	1.27		U
	N-EtFOSE	1691-99-2	ND	ND	ND	7.20	7.20		U
	N-MeFOSA	31506-32-8	ND	ND	ND	0.240	1.27		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	1.27		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	1.27		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		4571.43	7.31				101.3%	
	M5PFPeA		4738.34	7.58				99.6%	
	M3PFBS		4377.94	7.00				91.2%	
	M2-4:2 FTS		4585.84	7.34				99.1%	
	M5PFHxA		4887.28	7.82				101.4%	
	M3HFPO-DA		5879.31	9.41				119.4%	
	M4PFHpA		4799.20	7.68				97.0%	
	M3PFHxS		4358.33	6.97				87.5%	
	M8PFOA		4714.00	7.54				94.0%	
	M9PFNA		4688.16	7.50				93.8%	
	M2-8:2 FTS		5691.00	9.11				123.3%	
	M8FOSA-I		3468.26	5.55				69.1%	
	M6PFDA		4338.40	6.94				98.0%	
	d3-N-MeFOSAA		4395.51	7.03				89.8%	
	d5-N-EtFOSAA		4495.26	7.19				89.2%	
	M7PFUDa		4032.51	6.45				94.6%	
	MPFDaA		3204.36	5.13				79.8%	
	M2PFTeDA		2491.19	3.99				63.3%	

Enthalpy Analytical

Job No.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Enthalpy ID	MB-11054-PFAS	Prep Batch	EU11054	Sample Vol (mL)	250
Sample Name	MB-11054-PFAS	Prep Date	2020-08-01	Extract Vol (mL)	0.4
Matrix		Analysis Date	2020-08-01	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	Flags
Acids	PFBA	375-22-4	ND	ND	ND	0.157	1.16		U
	PFOA	335-67-1	91.13	0.146	0.146	0.0795	1.16		J
Sulfonates	PFHpS	375-92-8	ND	ND	ND	0.0779	1.16		U
	PFOS	1763-23-1	ND	ND	ND	0.0471	1.16		U
	6:2 FTS	27619-97-2	70.43	0.113	0.113	0.0723	1.16		J
Other	N-EtFOSAA	2991-50-6	ND	ND	ND	0.0651	1.16		U
ES	MPFBA		4952.34	7.92				95.4%	
	M2-6:2 FTS		4584.13	7.33				89.6%	
	M8PFOA		5020.29	8.03				88.8%	
	M8PFOS		5003.36	8.01				82.2%	
	d5-N-EtFOSAA		4769.95	7.63				78.4%	

Enthalpy Analytical

Job No.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Enthalpy ID	OPR-11002-PFAS	Prep Batch	EU11002	Sample Vol (mL)	250
Sample Name	OPR-11002-PFAS	Prep Date	2020-07-13	Extract Vol (mL)	0.4
Matrix		Analysis Date	2020-07-28	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	Flags
Acids	PFPeA	2706-90-3	12251.50	19.6	19.6	0.0898	1.16	98.0%	
	PFHxA	307-24-4	12198.31	19.5	19.5	0.158	1.16	97.6%	
	PFHpA	375-85-9	13064.52	20.9	20.9	0.0695	1.16	104.5%	
	PFNA	375-95-1	12153.92	19.4	19.4	0.0509	1.16	97.2%	
	PFDA	335-76-2	11961.24	19.1	19.1	0.125	1.16	95.7%	
	PFUnDA	2058-94-8	12045.21	19.3	19.3	0.0481	1.16	96.4%	
	PFDODA	307-55-1	12765.60	20.4	20.4	0.0475	1.16	102.1%	
	PFTTrDA	72629-94-8	11805.17	18.9	18.9	0.0745	1.16	94.4%	
	PFTeDA	376-06-7	12712.58	20.3	20.3	0.0830	1.16	101.7%	
Sulfonates	PFBS	375-73-5	11489.14	18.4	18.4	0.0830	1.16	103.6%	
	PFPeS	2706-91-4	11461.02	18.3	18.3	0.0990	1.16	97.4%	
	PFHxS	355-46-4	11284.90	18.1	18.1	0.0827	1.16	98.8%	
	PFNS	68259-12-1	11097.68	17.8	17.8	0.0654	1.16	92.3%	
	PFDS	335-77-3	12800.72	20.5	20.5	0.135	1.16	106.1%	
	4:2 FTS	757124-72-4	10822.48	17.3	17.3	0.0646	1.16	92.4%	
	8:2 FTS	39108-34-4	12278.15	19.6	19.6	0.0569	1.16	102.3%	
Other	PFOSA	754-91-6	11865.77	19.0	19.0	0.365	1.16	94.9%	
	N-MeFOSAA	2355-31-9	13068.90	20.9	20.9	0.0544	1.16	104.6%	
	HFPO-DA	13252-13-6	12082.16	19.3	19.3	0.0951	1.16	96.7%	
	11CI-PF3OUdS	763051-92-9	10013.16	16.0	16.0	0.120	1.27	84.9%	
ES	MPFBA		4426.00	7.08				123.6%	
	M5PFPeA		4393.75	7.03				116.5%	
	M3PFBS		3929.64	6.29				103.2%	
	M2-4:2 FTS		4401.01	7.04				120.0%	
	M5PFHxA		4409.17	7.05				117.4%	
	M3HFPO-DA		5140.41	8.22				134.0%	
	M4PFHpA		4274.16	6.84				110.9%	
	M3PFHxS		4527.86	7.24				105.9%	
	M8PFOA		4262.80	6.82				109.1%	
	M9PFNA		4308.16	6.89				110.6%	
	M2-8:2 FTS		5176.13	8.28				130.6%	
	M8FOSA-I		3723.89	5.96				86.4%	
	M6PFDA		4123.77	6.60				107.2%	
	d3-N-MeFOSAA		4365.03	6.98				103.8%	
	d5-N-EtFOSAA		4115.86	6.59				95.0%	
	M7PFUdA		3719.47	5.95				100.5%	
	MPFDoA		3347.11	5.36				96.0%	
	M2PFTeDA		2594.01	4.15				75.9%	

Enthalpy Analytical

Job No.: 0720-730 PFAS by Isotope Dilution (non-potable water)

County of Brunswick Site: NW Plant Lab, Leland

Enthalpy ID	OP-11054-PFAS	Prep Batch	EU11054	Sample Vol (mL)	250
Sample Name	OP-11054-PFAS	Prep Date	2020-08-01	Extract Vol (mL)	0.4
Matrix		Analysis Date	2020-08-01	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	Flags
Acids	PFBA	375-22-4	12346.41	19.8	19.8	0.157	1.16	98.8%	
	PFOA	335-67-1	12769.28	20.4	20.4	0.0795	1.16	102.2%	
Sulfonates	PFHpS	375-92-8	11471.23	18.4	18.4	0.0779	1.16	96.3%	
	PFOS	1763-23-1	10311.19	16.5	16.5	0.0471	1.16	88.9%	
	6:2 FTS	27619-97-2	10961.32	17.5	17.5	0.0723	1.16	92.2%	
Other	N-EtFOSAA	2991-50-6	11070.66	17.7	17.7	0.0651	1.16	88.6%	
ES	MPFBA		5603.25	8.97				103.4%	
	M2-6:2 FTS		5124.58	8.20				96.0%	
	M8PFOA		4793.61	7.67				85.3%	
	M8PFOS		5205.68	8.33				93.2%	
	d5-N-EtFOSAA		5045.85	8.07				90.4%	

Narrative Summary

1. Custody

Naomi Harka received the samples on 07/09/20 at 6.6°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
0720-730-002-1, 0720-730-002-2	7920 E01	AQ
0720-730-001-1, 0720-730-001-2	7920 S01	AQ

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	Full PFAS List (49)	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.

Cleanup procedures were performed on the supernatant and then extracted via SPE. Each final sample extract was transferred to an autosampler vial and spiked with 80µL of Injection Standard (IS), prior to analysis.

4. Calibration

In the initial calibration, the analytes exhibited R^2 of ≥ 0.99 and labeled standards RSDs $\geq 20\%$. The calibration standard analytes, continuing calibration (concal) and Initial Calibration Verification (ICV) met the 30% criterion for native analytes.

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

The samples were initially extracted in batch 11002, which exhibited unacceptable method blank contamination. The samples were then re-extracted and re-analyzed for the affected analytes only in batch 11054. The results reported here use the concentrations obtained in the first valid analysis.

Some labeled standards in the samples fell outside the limits for ES recoveries as denoted by the Q flag. 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.

Brunswick County PFAS Analyte List

	PFAS Analyte	CAS #
*	Perfluoro(2-ethoxyethane)sulphonic acid (PFEESA)	113507-82-7
*	Hexafluoropropylene Oxide Dimer Acid (HFPOA-DA/Gen X)	13252-13-6(b)
*	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6
	Perfluorooctanesulfonate (PFOS)	1763-23-1
	Perfluoroundecanoic acid (PFUdA)	2058-94-8
	N-methylperfluoro-1-octanesulfonamidoacetic acid (N-MeFOSAA)	2355-31-9
	Perfluoropentanoic acid (PFPeA)	2706-90-3
	Perfluoropentanesulfonate (PFPeS)	2706-91-4
	Fluorotelomer sulfonate 6:2 (6:2 FTS)	27619-97-2
	Perfluorodecanesulfonate (PFDS)	2806-15-7
	Nafion Byproduct 1	29311-67-9
	N-ethylperfluoro-1-octanesulfonamidoacetic acid (N-EtFOSAA)	2991-50-6
	Perfluorohexanoic acid (PFHxA)	307-24-4
	Perfluorododecanoic acid (PFDoA)	307-55-1
	Perfluorooctanoic acid (PFOA)	335-67-1
	Perfluorodecanoic acid (PFDA)	335-76-2
	Perfluorohexanesulfonate (PFHxS)	355-46-4
	Perfluorobutyric acid (PFBA)	375-22-4
	Perfluorobutanesulfonate (PFBS)	375-73-5
	Perfluoroheptanoic acid (PFHpA)	375-85-9
	Perfluoroheptanesulfonate (PFHpS)	375-92-8
	Perfluorononanoic acid (PFNA)	375-95-1
	Perfluorotetradecanoic acid (PFTeDA)	376-06-7
*	Perfluoro-3-methoxypropanoic acid (PFMOPrA)	377-73-1
	Fluorotelomer sulfonate 8:2 (8:2 FTS)	39108-34-4
*	Perfluoro(3,5-dioxahexanoic) acid (PFO2HxA)	39492-88-1
*	Perfluoro(3,5,7-trioxaoctanoic) acid (PFO3OA)	39492-89-2
*	Perfluoro(3,5,7,9-tetraoxadecanoic) acid (PFO4DA)	39492-90-5
*	Perfluoro(3,5,7,9,11-pentaoxadodecanoic) acid (PFO5DA)	39492-91-6
	Perfluorononanesulfonate (PFNS)	474511-07-4
*	Perfluoro-2-methoxyacetic acid (PFMOAA)	674-13-5
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8
*	Nafion Byproduct 2	749836-20-2
	Perfluorooctanesulfonamide (PFOSA)	754-91-6
*	9-chlorohexadecafluoro-3-oxanonane-1-sulfonate (9Cl-PF3PONS)	756426-58-1 (d)
	Fluorotelomer sulfonate 4:2 (4:2 FTS)	757124-72-4
*	11-chloroeicosafluoro-3-oxaundecane-1-sulfonate (11Cl-PF3OUdS)	763051-92-9 (c)
*	Perfluoro-4-methoxybutanic acid (PFMOBA)	863090-89-5
	Sodium dodecafluoro-3H-4,8-dioxanonanoate (ADONA)	919005-14-4(e)
*	Perfluoro-2-ethoxypropanoic acid (PEPA)	N/A
*	Perfluoro-2-methoxypropanoic acid (PMPA)	13140-29-9

* Analytes are currently not accredited under TNI Standard for NPW. Accreditation pending.

Sample Custody



Enthalpy Ultratrace Job#: _____ COC Page _____ of _____

☐ 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.

Client Name: Brunswick County water
Project Manager: Glenn Walker
Report To: Same

Site Name: NW Plant Lab
Location: Ireland

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]

Relinquished By:

Date: _____

Received By:

Date:

Time:

Sample Temperature Upon Receipt:

Phillip McCulloch

7-9-20

Received By: Hono HARB

7/9/24

14:40

☒ Iced ☐ Ambient °C 6.6, 79☐ Iced ☐ Ambient °C☐ Iced ☐ Ambient °C

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Courier, iced, no seal, good condition NH 7/9/20

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Of This Report.**