

Brunswick County Public Utilities - NC

PO Box 249
Bolivia, NC 28422-0249

Leland, N.C.

Client Project# Northwest Water Plant
Samples Received: 4/26/2024

Analytical Report 0424-883

PFAS by Isotope Dilution (non-potable water)

Custom List

Report Issue Date: 5/23/2024

I certify that to the best of my knowledge all analytical data presented in this report have been checked for completeness, accuracy, errors and legibility in addition to having 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 24 pages. This report shall not be reproduced except in full without approval of the laboratory. This will provide assurance that parts of the report are not taken out of context.

Amendment(s):

Signature:



Laura Boivin, QA Associate II



Enthalpy Analytical, LLC – Ultratrace
Christina Kurnath, Project Manager
chkurnath@montrose-env.com / www.enthalpy.com
O: 910-876-6895
2714 Exchange Drive, Wilmington, NC 28405

Summary of Results

Enthalpy Analytical

Job No.: 0424-883-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Northwest Water Plant Leland, N.C.

Summary

	Compound	CAS	042624-SO1 ng/L	042624-EO1 ng/L
Acids	PFPrA	422-64-0	11.0	10.1
	PFBA	375-22-4	2.67	ND U
	PFPeA	2706-90-3	4.25	4.10
	PFHxA	307-24-4	4.67	4.82
	PFHpA	375-85-9	1.85	1.92
	PFOA	335-67-1	4.11	4.50
	PFNA	375-95-1	0.483 J	0.472 J
	PFDA	335-76-2	0.275 J	0.188 J
	PFUnDA	2058-94-8	ND U	ND U
	PFDoDA	307-55-1	ND U	ND U
	PFTTrDA	72629-94-8	ND U	ND U
	PFTeDA	376-06-7	ND U	ND U
	PFHxDA	67905-19-5	ND U	ND U
	Sulfonates	PFBS	375-73-5	3.30
PFPeS		2706-91-4	0.428 J	0.520
PFHxS		355-46-4	3.25	3.14
PFHpS		375-92-8	0.0409 L	0.0464 L
PFOS		1763-23-1	9.23	9.02
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	ND U	0.101 L
8:2 FTS		39108-34-4	ND U	ND U
10:2 FTS	120226-60-0	ND U	ND U	
Sulfonamidos	FBSA	30334-69-1	0.409 J	0.163 L
	N-EtFOSA	4151-50-2	ND U	ND U
	N-EtFOSAA	2991-50-6	ND U	ND U
	N-EtFOSE	1691-99-2	ND U	ND U
	N-MeFOSA	31506-32-8	ND U	ND U
	N-MeFOSAA	2355-31-9	ND U	ND U
	N-MeFOSE	24448-09-7	ND U	ND U
	PFOSA	754-91-6	ND U	ND U
PFECAs	ADONA	919005-14-4	ND U	ND U
	EVE Acid	69087-46-3	ND U	ND U
	HFPO-DA	13252-13-6	4.50	4.19
	Hydro-EVE Acid	773804-62-9	0.114 L	0.0802 L
	NFDHA	151772-58-6	ND U	ND U
	PEPA	267239-61-2	1.55	1.65
	PFECA-G	801212-59-9	ND U	ND U
	PFMOAA	674-13-5	12.0	10.7
	PFMOBA	863090-89-5	ND U	ND U
	PFMOPrA	377-73-1	ND U	ND U
	PFO2HxA	39492-88-1	6.91	6.55
	PFO3OA	39492-89-2	ND U	ND U
	PFO4DA	39492-90-5	ND U	ND U
	PFO5DA	39492-91-6	ND U	ND U
	PMPA	13140-29-9	6.09	6.54
	R-EVE	2416366-22-6	6.52	6.43
	PFESAs	11Cl-PF3OUdS	763051-92-9	ND U
9Cl-PF3ONS		756426-58-1	ND U	ND U
Hydrolyzed PSDA		2416366-19-1	2.36	2.23
Nafion Byproduct 1 (PS Acid)		29311-67-9	ND U	ND U
Nafion Byproduct 2 (Hydro-PS Acid)		749836-20-2	0.491 J	0.385 L
NVHOS		1132933-86-8	ND U	ND U
PFEESA		113507-82-7	ND U	ND U
R-PSDA		2416366-18-0	2.69	2.16 L
R-PSDCA		241636-21-5	ND U	ND U

Detailed Results

Enthalpy Analytical

Job No.: 0424-883-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Northwest Water Plant Leland, N.C.

Enthalpy ID	0424-883-001-1	Prep Batch	EU17332	Sample Vol (mL)	286.33
Sample Name	042624-SO1	Prep Date	2024-04-29 10:19	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2024-04-29 15:07	Split Factor	N/A
Sampling Date	2024-04-26 10:35	Analyst	jacksullivan	Method Code	EU-047-NPW
Received Date	2024-04-26	Instrument	Sauron	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFPPrA	422-64-0	F300424009	11.0	0.489	1.07			
	PFBA	375-22-4	S290424014	2.67	0.222	0.559			
	PFPeA	2706-90-3	S290424014	4.25	0.160	0.559			
	PFHxA	307-24-4	S290424014	4.67	0.187	0.559			
	PFHpA	375-85-9	S290424014	1.85	0.196	0.559			
	PFOA	335-67-1	S290424014	4.11	0.128	0.559			
	PFNA	375-95-1	S290424014	0.483	0.126	0.559			J
	PFDA	335-76-2	S290424014	0.275	0.160	0.559			J
	PFUnDA	2058-94-8	S290424014	ND	0.126	0.559			U
	PFDODA	307-55-1	S290424014	ND	0.227	0.559			U
	PFTTrDA	72629-94-8	S290424014	ND	0.185	0.559			U
	PFTeDA	376-06-7	S290424014	ND	0.213	0.559			U
	PFHxDA	67905-19-5	S290424014	ND	0.297	0.559			U
Sulfonates	PFBS	375-73-5	S290424014	3.30	0.297	0.559			
	PFPeS	2706-91-4	S290424014	0.428	0.115	0.526			J
	PFHxS	355-46-4	S290424014	3.25	0.431	0.512			
	PFHpS	375-92-8	S290424014	0.0409	0.271	0.532			L
	PFOS	1763-23-1	S290424014	9.23	0.295	0.518			
	PFNS	68259-12-1	S290424014	ND	0.173	0.538			U
	PFDS	335-77-3	S290424014	ND	0.293	0.538			U
	4:2 FTS	757124-72-4	S290424014	ND	0.0725	0.524			U
	6:2 FTS	27619-97-2	S290424014	ND	0.264	0.532			U
	8:2 FTS	39108-34-4	S290424014	ND	0.125	0.535			U
10:2 FTS	120226-60-0	S290424014	ND	0.428	0.559			U	
Sulfonamidos	FBSA	30334-69-1	S290424014	0.409	0.265	0.559			J
	N-EtFOSA	4151-50-2	S290424014	ND	0.346	0.559			U
	N-EtFOSAA	2991-50-6	S290424014	ND	0.227	0.559			U
	N-EtFOSE	1691-99-2	S290424014	ND	0.856	2.51			U
	N-MeFOSA	31506-32-8	S290424014	ND	0.231	0.559			U
	N-MeFOSAA	2355-31-9	S290424014	ND	0.157	0.559			U
	N-MeFOSE	24448-09-7	S290424014	ND	0.531	2.51			U
	PFOSA	754-91-6	S290424014	ND	0.0784	0.559			U
PFECAs	ADONA	919005-14-4	S290424014	ND	0.151	0.529			U
	EVE Acid	69087-46-3	S290424014	ND	0.178	1.26			U
	HFPO-DA	13252-13-6	S290424014	4.50	0.0592	0.559			
	Hydro-EVE Acid	773804-62-9	S290424014	0.114	0.183	0.559			L
	NFDHA	151772-58-6	S290424014	ND	0.118	0.559			U
	PEPA	267239-61-2	S290424014	1.55	0.105	0.559			
	PFECA-G	801212-59-9	S290424014	ND	0.0746	0.559			U
	PFMOAA	674-13-5	S290424014	12.0	0.283	0.559			
	PFMOBA	863090-89-5	S290424014	ND	0.938	1.26			U
	PFMOPrA	377-73-1	S290424014	ND	0.199	0.559			U

Enthalpy Analytical

Job No.: 0424-883-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Northwest Water Plant Leland, N.C.

	PFO2HxA	39492-88-1	S290424014	6.91	0.180	0.559			
	PFO3OA	39492-89-2	S290424014	ND	0.257	0.559			U
	PFO4DA	39492-90-5	S290424014	ND	0.442	2.79			U
	PFO5DA	39492-91-6	S290424014	ND	0.447	2.79			U
	PMPA	13140-29-9	S290424014	6.09	0.132	0.559			
	R-EVE	2416366-22-6	S290424014	6.52	0.927	1.26			
PFESAs	11CI-PF3OUdS	763051-92-9	S290424014	ND	0.264	0.526			U
	9CI-PF3ONS	756426-58-1	S290424014	ND	0.358	0.521			U
	Hydrolyzed PSDA	2416366-19-1	S290424014	2.36	0.372	0.559			
	Nafion Byproduct 1 (PS Acid)	29311-67-9	S290424014	ND	0.299	0.559			U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	S290424014	0.491	0.463	0.559			J
	NVHOS	1132933-86-8	S290424014	ND	0.0861	0.559			U
	PFEESA	113507-82-7	S290424014	ND	0.168	0.559			U
	R-PSDA	2416366-18-0	S290424014	2.69	2.46	2.46			
	R-PSDCA	241636-21-5	S290424014	ND	0.236	0.559			U
ES	MPFBA		S290424014				20-150%	217.2%	Q
	M5PFPeA		S290424014				20-150%	246.6%	Q
	M3PFBS		S290424014				20-150%	227.3%	Q
	M2-4:2 FTS		S290424014				20-150%	285.0%	Q
	M5PFHxA		S290424014				20-150%	194.5%	Q
	M3HFPO-DA		S290424014				20-150%	207.3%	Q
	M4PFHpA		S290424014				20-150%	212.2%	Q
	M3PFHxS		S290424014				20-150%	230.0%	Q
	M2-6:2 FTS		S290424014				20-150%	213.2%	Q
	M8PFOA		S290424014				20-150%	218.2%	Q
	M9PFNA		S290424014				20-150%	198.5%	Q
	M8PFOS		S290424014				20-150%	192.0%	Q
	M2-8:2 FTS		S290424014				20-150%	182.9%	Q
	M8FOSA-I		S290424014				20-150%	173.5%	Q
	M6PFDA		S290424014				20-150%	211.4%	Q
	d3-N-MeFOSAA		S290424014				20-150%	252.6%	Q
	d5-N-EtFOSAA		S290424014				20-150%	239.5%	Q
	M7PFUdA		S290424014				20-150%	188.2%	Q
	MPFDoA		S290424014				20-150%	164.2%	Q
	M2PFTeDA		S290424014				20-150%	129.3%	
	d3-N-MeFOSA		S290424014				10-200%	33.0%	
	d5-N-EtFOSA		S290424014				10-200%	35.4%	
	d7-N-MeFOSE		S290424014				10-200%	130.1%	
d9-N-EtFOSE		S290424014				10-200%	98.6%		
13C3-PFPrA		F300424009				20-150%	21.1%		

Enthalpy Analytical

Job No.: 0424-883-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Northwest Water Plant Leland, N.C.

Enthalpy ID	0424-883-002-1	Prep Batch	EU17332	Sample Vol (mL)	292.17
Sample Name	042624-EO1	Prep Date	2024-04-29 10:19	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2024-04-29 15:30	Split Factor	N/A
Sampling Date	2024-04-26 10:35	Analyst	jacksullivan	Method Code	EU-047-NPW
Received Date	2024-04-26	Instrument	Sauron	Sample Type	Sample
		Bottle ID	A		

	Compound	CAS	InjFileName	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFPrA	422-64-0	F300424010	10.1	0.479	1.04			
	PFBA	375-22-4	S290424015	ND	0.217	0.548			U
	PFPeA	2706-90-3	S290424015	4.10	0.157	0.548			
	PFHxA	307-24-4	S290424015	4.82	0.183	0.548			
	PFHpA	375-85-9	S290424015	1.92	0.192	0.548			
	PFOA	335-67-1	S290424015	4.50	0.125	0.548			
	PFNA	375-95-1	S290424015	0.472	0.124	0.548			J
	PFDA	335-76-2	S290424015	0.188	0.157	0.548			J
	PFUnDA	2058-94-8	S290424015	ND	0.124	0.548			U
	PFDoDA	307-55-1	S290424015	ND	0.222	0.548			U
	PFTTrDA	72629-94-8	S290424015	ND	0.181	0.548			U
	PFTeDA	376-06-7	S290424015	ND	0.209	0.548			U
	PFHxDA	67905-19-5	S290424015	ND	0.291	0.548			U
Sulfonates	PFBS	375-73-5	S290424015	2.96	0.291	0.548			
	PFPeS	2706-91-4	S290424015	0.520	0.112	0.516			
	PFHxS	355-46-4	S290424015	3.14	0.423	0.502			
	PFHpS	375-92-8	S290424015	0.0464	0.265	0.522			L
	PFOS	1763-23-1	S290424015	9.02	0.289	0.507			
	PFNS	68259-12-1	S290424015	ND	0.170	0.527			U
	PFDS	335-77-3	S290424015	ND	0.288	0.527			U
	4:2 FTS	757124-72-4	S290424015	ND	0.0710	0.513			U
	6:2 FTS	27619-97-2	S290424015	0.101	0.258	0.522			L
	8:2 FTS	39108-34-4	S290424015	ND	0.123	0.525			U
10:2 FTS	120226-60-0	S290424015	ND	0.419	0.548			U	
Sulfonamidos	FBSA	30334-69-1	S290424015	0.163	0.260	0.548			L
	N-EtFOSA	4151-50-2	S290424015	ND	0.339	0.548			U
	N-EtFOSAA	2991-50-6	S290424015	ND	0.222	0.548			U
	N-EtFOSE	1691-99-2	S290424015	ND	0.839	2.46			U
	N-MeFOSA	31506-32-8	S290424015	ND	0.226	0.548			U
	N-MeFOSAA	2355-31-9	S290424015	ND	0.154	0.548			U
	N-MeFOSE	24448-09-7	S290424015	ND	0.520	2.46			U
	PFOSA	754-91-6	S290424015	ND	0.0768	0.548			U
PFECAs	ADONA	919005-14-4	S290424015	ND	0.148	0.519			U
	EVE Acid	69087-46-3	S290424015	ND	0.175	1.23			U
	HFPO-DA	13252-13-6	S290424015	4.19	0.0580	0.548			
	Hydro-EVE Acid	773804-62-9	S290424015	0.0802	0.180	0.548			L
	NFDHA	151772-58-6	S290424015	ND	0.115	0.548			U
	PEPA	267239-61-2	S290424015	1.65	0.103	0.548			
	PFECA-G	801212-59-9	S290424015	ND	0.0731	0.548			U
	PFMOAA	674-13-5	S290424015	10.7	0.277	0.548			
	PFMOBA	863090-89-5	S290424015	ND	0.919	1.23			U
	PFMOPrA	377-73-1	S290424015	ND	0.195	0.548			U

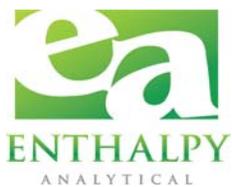
Enthalpy Analytical

Job No.: 0424-883-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Northwest Water Plant Leland, N.C.

	PFO2HxA	39492-88-1	S290424015	6.55	0.176	0.548			
	PFO3OA	39492-89-2	S290424015	ND	0.252	0.548			U
	PFO4DA	39492-90-5	S290424015	ND	0.433	2.74			U
	PFO5DA	39492-91-6	S290424015	ND	0.438	2.74			U
	PMPA	13140-29-9	S290424015	6.54	0.129	0.548			
	R-EVE	2416366-22-6	S290424015	6.43	0.909	1.23			
PFESAs	11CI-PF3OUdS	763051-92-9	S290424015	ND	0.258	0.516			U
	9CI-PF3ONS	756426-58-1	S290424015	ND	0.351	0.510			U
	Hydrolyzed PSDA	2416366-19-1	S290424015	2.23	0.365	0.548			
	Nafion Byproduct 1 (PS Acid)	29311-67-9	S290424015	ND	0.293	0.548			U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	S290424015	0.385	0.454	0.548			L
	NVHOS	1132933-86-8	S290424015	ND	0.0844	0.548			U
	PFEESA	113507-82-7	S290424015	ND	0.165	0.548			U
	R-PSDA	2416366-18-0	S290424015	2.16	2.41	2.41			L
	R-PSDCA	241636-21-5	S290424015	ND	0.231	0.548			U
ES	MPFBA		S290424015				20-150%	188.5%	Q
	M5PFPeA		S290424015				20-150%	223.1%	Q
	M3PFBS		S290424015				20-150%	203.6%	Q
	M2-4:2 FTS		S290424015				20-150%	268.0%	Q
	M5PFHxA		S290424015				20-150%	180.5%	Q
	M3HFPO-DA		S290424015				20-150%	196.7%	Q
	M4PFHpA		S290424015				20-150%	196.6%	Q
	M3PFHxS		S290424015				20-150%	236.9%	Q
	M2-6:2 FTS		S290424015				20-150%	202.4%	Q
	M8PFOA		S290424015				20-150%	195.8%	Q
	M9PFNA		S290424015				20-150%	180.4%	Q
	M8PFOS		S290424015				20-150%	192.5%	Q
	M2-8:2 FTS		S290424015				20-150%	174.4%	Q
	M8FOSA-I		S290424015				20-150%	163.7%	Q
	M6PFDA		S290424015				20-150%	218.1%	Q
	d3-N-MeFOSAA		S290424015				20-150%	253.2%	Q
	d5-N-EtFOSAA		S290424015				20-150%	249.0%	Q
	M7PFUdA		S290424015				20-150%	192.6%	Q
	MPFDoA		S290424015				20-150%	165.9%	Q
	M2PFTeDA		S290424015				20-150%	146.2%	
	d3-N-MeFOSA		S290424015				10-200%	74.1%	
	d5-N-EtFOSA		S290424015				10-200%	80.2%	
	d7-N-MeFOSE		S290424015				10-200%	145.7%	
	d9-N-EtFOSE		S290424015				10-200%	109.5%	
	13C3-PFPrA		F300424010				20-150%	17.1%	Q

QC Data



Enthalpy Analytical

Job No.: 0424-883-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Northwest Water Plant Leland, N.C.

Enthalpy ID	MB_17332_PFAS	Prep Batch	EU17332	Sample Vol (mL)	250
Sample Name	MB_17332_PFAS	Prep Date	2024-04-29 10:19	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2024-04-29 14:00	Split Factor	N/A
Sampling Date		Analyst	jacksullivan	Method Code	EU-047-NPW
Received Date		Instrument	Sauron	Sample Type	Blank
		Bottle ID	-		

	Compound	CAS	InjFileName	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFPPrA	422-64-0	F300424007	ND	0.560	1.22			U
	PFBA	375-22-4	S290424011	ND	0.254	0.640			U
	PFPeA	2706-90-3	S290424011	ND	0.183	0.640			U
	PFHxA	307-24-4	S290424011	ND	0.214	0.640			U
	PFHpA	375-85-9	S290424011	ND	0.224	0.640			U
	PFOA	335-67-1	S290424011	ND	0.146	0.640			U
	PFNA	375-95-1	S290424011	ND	0.145	0.640			U
	PFDA	335-76-2	S290424011	ND	0.183	0.640			U
	PFUnDA	2058-94-8	S290424011	ND	0.145	0.640			U
	PFDODA	307-55-1	S290424011	ND	0.260	0.640			U
	PFTTrDA	72629-94-8	S290424011	ND	0.212	0.640			U
	PFTeDA	376-06-7	S290424011	ND	0.244	0.640			U
	PFHxDA	67905-19-5	S290424011	ND	0.340	0.640			U
Sulfonates	PFBS	375-73-5	S290424011	ND	0.340	0.640			U
	PFPeS	2706-91-4	S290424011	ND	0.131	0.603			U
	PFHxS	355-46-4	S290424011	ND	0.494	0.586			U
	PFHpS	375-92-8	S290424011	ND	0.310	0.610			U
	PFOS	1763-23-1	S290424011	ND	0.338	0.593			U
	PFNS	68259-12-1	S290424011	ND	0.199	0.616			U
	PFDS	335-77-3	S290424011	ND	0.336	0.616			U
	4:2 FTS	757124-72-4	S290424011	ND	0.0830	0.600			U
	6:2 FTS	27619-97-2	S290424011	ND	0.302	0.610			U
	8:2 FTS	39108-34-4	S290424011	ND	0.143	0.613			U
10:2 FTS	120226-60-0	S290424011	ND	0.490	0.640			U	
Sulfonamidos	FBSA	30334-69-1	S290424011	ND	0.304	0.640			U
	N-EtFOSA	4151-50-2	S290424011	ND	0.396	0.640			U
	N-EtFOSAA	2991-50-6	S290424011	ND	0.260	0.640			U
	N-EtFOSE	1691-99-2	S290424011	ND	0.980	2.88			U
	N-MeFOSA	31506-32-8	S290424011	ND	0.264	0.640			U
	N-MeFOSAA	2355-31-9	S290424011	ND	0.180	0.640			U
	N-MeFOSE	24448-09-7	S290424011	ND	0.608	2.88			U
	PFOSA	754-91-6	S290424011	ND	0.0898	0.640			U
PFECAs	ADONA	919005-14-4	S290424011	ND	0.173	0.606			U
	EVE Acid	69087-46-3	S290424011	ND	0.204	1.44			U
	HFPO-DA	13252-13-6	S290424011	ND	0.0678	0.640			U
	Hydro-EVE Acid	773804-62-9	S290424011	ND	0.210	0.640			U
	NFDHA	151772-58-6	S290424011	ND	0.135	0.640			U
	PEPA	267239-61-2	S290424011	ND	0.120	0.640			U
	PFECA-G	801212-59-9	S290424011	ND	0.0854	0.640			U
	PFMOAA	674-13-5	S290424011	ND	0.324	0.640			U
	PFMOBA	863090-89-5	S290424011	ND	1.07	1.44			U
	PFMOPrA	377-73-1	S290424011	ND	0.228	0.640			U

Enthalpy Analytical

Job No.: 0424-883-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Northwest Water Plant Leland, N.C.

	PFO2HxA	39492-88-1	S290424011	ND	0.206	0.640			U
	PFO3OA	39492-89-2	S290424011	ND	0.294	0.640			U
	PFO4DA	39492-90-5	S290424011	ND	0.506	3.20			U
	PFO5DA	39492-91-6	S290424011	ND	0.512	3.20			U
	PMPA	13140-29-9	S290424011	ND	0.151	0.640			U
	R-EVE	2416366-22-6	S290424011	ND	1.06	1.44			U
PFESAs	11CI-PF3OUdS	763051-92-9	S290424011	ND	0.302	0.603			U
	9CI-PF3ONS	756426-58-1	S290424011	ND	0.410	0.596			U
	Hydrolyzed PSDA	2416366-19-1	S290424011	ND	0.426	0.640			U
	Nafion Byproduct 1 (PS Acid)	29311-67-9	S290424011	ND	0.342	0.640			U
	Nafion Byproduct 2 (Hydro-PS Acid)	749836-20-2	S290424011	ND	0.530	0.640			U
	NVHOS	1132933-86-8	S290424011	ND	0.0986	0.640			U
	PFEESA	113507-82-7	S290424011	ND	0.192	0.640			U
	R-PSDA	2416366-18-0	S290424011	ND	2.82	2.82			U
	R-PSDCA	241636-21-5	S290424011	ND	0.270	0.640			U
ES	MPFBA		S290424011				20-150%	198.9%	Q
	M5PFPeA		S290424011				20-150%	220.7%	Q
	M3PFBS		S290424011				20-150%	174.6%	Q
	M2-4:2 FTS		S290424011				20-150%	269.4%	Q
	M5PFHxA		S290424011				20-150%	203.6%	Q
	M3HFPO-DA		S290424011				20-150%	220.5%	Q
	M4PFHpA		S290424011				20-150%	205.6%	Q
	M3PFHxS		S290424011				20-150%	246.9%	Q
	M2-6:2 FTS		S290424011				20-150%	206.9%	Q
	M8PFOA		S290424011				20-150%	211.9%	Q
	M9PFNA		S290424011				20-150%	189.4%	Q
	M8PFOS		S290424011				20-150%	192.9%	Q
	M2-8:2 FTS		S290424011				20-150%	191.9%	Q
	M8FOSA-I		S290424011				20-150%	180.0%	Q
	M6PFDA		S290424011				20-150%	208.7%	Q
	d3-N-MeFOSAA		S290424011				20-150%	246.0%	Q
	d5-N-EtFOSAA		S290424011				20-150%	237.9%	Q
	M7PFUdA		S290424011				20-150%	187.3%	Q
	MPFDoA		S290424011				20-150%	176.6%	Q
	M2PFTeDA		S290424011				20-150%	158.8%	Q
	d3-N-MeFOSA		S290424011				10-200%	62.1%	
	d5-N-EtFOSA		S290424011				10-200%	67.7%	
	d7-N-MeFOSE		S290424011				10-200%	153.9%	
d9-N-EtFOSE		S290424011				10-200%	125.1%		
13C3-PFPrA		F300424007				20-150%	29.3%		

Enthalpy Analytical

Job No.: 0424-883-1 PFAS by Isotope Dilution (non-potable water)

Brunswick County Public Utilities - NC Northwest Water Plant Leland, N.C.

Enthalpy ID	OPR_17332_PFAS	Prep Batch	EU17332	Sample Vol (mL)	250
Sample Name	OPR_17332_PFAS	Prep Date	2024-04-29 10:19	Extract Vol (mL)	0.4
Matrix	aqueous	Analysis Date	2024-04-29 14:22	Split Factor	N/A
Sampling Date		Analyst	jacksullivan	Method Code	EU-047-NPW
Received Date		Instrument	Sauron	Sample Type	Control
		Bottle ID	-		

	Compound	CAS	InjFileName	Formatted Result ng/L	LOD ng/L	LOQ ng/L	Recovery Limits	Recovery	Flags
Acids	PFBA	375-22-4	S290424012	18.1	0.254	0.640	69.1-122%	90.5%	
	PFPeA	2706-90-3	S290424012	18.9	0.183	0.640	68.5-121%	94.4%	
	PFHxA	307-24-4	S290424012	20.2	0.214	0.640	68.3-121%	100.8%	
	PFHpA	375-85-9	S290424012	19.8	0.224	0.640	62.4-128%	98.9%	
	PFOA	335-67-1	S290424012	20.3	0.146	0.640	66.3-124%	101.4%	
	PFNA	375-95-1	S290424012	20.0	0.145	0.640	70.5-120%	99.9%	
	PFDA	335-76-2	S290424012	19.4	0.183	0.640	68.9-117%	96.9%	
	PFUnDA	2058-94-8	S290424012	20.4	0.145	0.640	58.1-132%	102.0%	
	PFDoDA	307-55-1	S290424012	20.9	0.260	0.640	52.1-140%	104.3%	
	PFTTrDA	72629-94-8	S290424012	22.9	0.212	0.640	65-144%	114.4%	
	PFTeDA	376-06-7	S290424012	20.6	0.244	0.640	36.1-161%	103.2%	
Sulfonates	PFBS	375-73-5	S290424012	18.4	0.340	0.640	67.5-111.6%	103.9%	
	PFPeS	2706-91-4	S290424012	19.0	0.131	0.603	51.8-142%	101.0%	
	PFHxS	355-46-4	S290424012	16.0	0.494	0.586	59.6-128%	87.4%	
	PFHpS	375-92-8	S290424012	21.0	0.310	0.610	46.9-157%	110.0%	
	PFOS	1763-23-1	S290424012	18.6	0.338	0.593	59.2-132%	100.5%	
	PFNS	68259-12-1	S290424012	18.3	0.199	0.616	53.9-133%	95.2%	
	PFDS	335-77-3	S290424012	17.7	0.336	0.616	38.1-142%	91.9%	
	4:2 FTS	757124-72-4	S290424012	19.4	0.0830	0.600	61.9-131%	103.3%	
	6:2 FTS	27619-97-2	S290424012	19.7	0.302	0.610	62.3-129%	103.8%	
8:2 FTS	39108-34-4	S290424012	20.7	0.143	0.613	37.5-159%	108.0%		
Sulfonamidos	N-EtFOSAA	2991-50-6	S290424012	20.4	0.260	0.640	61.5-133%	101.8%	
	N-MeFOSAA	2355-31-9	S290424012	20.4	0.180	0.640	57.3-138%	101.8%	
	PFOSA	754-91-6	S290424012	19.3	0.0898	0.640	49.1-143%	96.6%	
PFECAs	HFPO-DA	13252-13-6	S290424012	19.2	0.0678	0.640	57.2-130%	95.8%	
ES	MPFBA		S290424012				20-150%	203.9%	Q
	M5PFPeA		S290424012				20-150%	213.1%	Q
	M3PFBS		S290424012				20-150%	167.1%	Q
	M2-4:2 FTS		S290424012				20-150%	248.3%	Q
	M5PFHxA		S290424012				20-150%	191.8%	Q
	M3HFPO-DA		S290424012				20-150%	215.0%	Q
	M4PFHpA		S290424012				20-150%	201.3%	Q
	M3PFHxS		S290424012				20-150%	243.4%	Q
	M2-6:2 FTS		S290424012				20-150%	207.1%	Q
	M8PFOA		S290424012				20-150%	203.0%	Q
	M9PFNA		S290424012				20-150%	182.4%	Q
	M8PFOS		S290424012				20-150%	186.6%	Q
	M2-8:2 FTS		S290424012				20-150%	176.9%	Q
	M8FOSA-I		S290424012				20-150%	178.7%	Q
	M6PFDA		S290424012				20-150%	201.5%	Q
	d3-N-MeFOSAA		S290424012				20-150%	250.8%	Q
	d5-N-EtFOSAA		S290424012				20-150%	228.6%	Q
M7PFUdA		S290424012				20-150%	180.4%	Q	
MPFDoA		S290424012				20-150%	165.8%	Q	
M2PFTeDA		S290424012				20-150%	142.0%		

Narrative Summary



Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0424-883-1
Client ID.	Northwest Water Plant Site: Leland, N.C.

1. Custody

Cherith McCullagh received the samples on ice at 12.6 °C after being relinquished by Brunswick County Public Utilities - NC.

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	Received
0424-883-001-1	042624-SO1	aqueous	2024-04-26
0424-883-002-1	042624-EO1	aqueous	2024-04-26

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	Custom List	ENVI-Carb

3. Analysis

The samples were analyzed using Waters Acquity UPLC equipped with Xevo TQ MS (LC/MS/MS "Sauron").

The samples were analyzed in more than one analytical sequence in order to include all of the analytes of interest and to meet method acceptance criteria.

Extracts were treated to a dilution factor of five (D5) prior to injection for polar analyte(s).

4. Calibration

In the initial calibration, the analytes exhibited R² of ≥ 0.99 . The reported analytes in the calibration standards, continuing calibration (concal) and Initial Calibration Verification (ICV) met the accuracy criterion for native analytes.

Enthalpy Analytical Narrative Summary

Company	Brunswick County Public Utilities - NC
Job No.	0424-883-1
Client ID.	Northwest Water Plant Site: Leland, N.C.

5. QC Notes

Ongoing Precision Recovery (OPR) control limits have not been established for some analytes of interest.

Except where noted below, the QC sample analyses passed all method criteria.

Most ES compounds recovered above the upper acceptance limit. The results from the OPR indicate that this phenomenon is caused by an injection standard (JS) solution concentration lower than expected. The recovery of native analytes within normal acceptance ranges verifies that extraction standards were spiked correctly. The results of this analysis are; therefore, accurate for the target analytes.

PFAS by Isotope Dilution (non-potable water) samples were extracted within 28 days, and extracts analyzed within 28 days.

6. Reporting Notes

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

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

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.

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

- Ac - Alternate calculation flag indicates the es recovery was calculated using the opening concal when either of the following situations is encountered in the data processing software: the ES recovery is over 400% or the JS is not detected.
- 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.
- I/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 - For reports containing PFAS analytes only, this flag 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.

General Reporting Notes – Data Qualifiers

- 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.
- <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.



General Reporting Notes – Data Qualifiers

- R – Indicates a re-extraction of the sample.
- RJ – Indicates a reinjection of the sample extract.
- 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
Target Analytes		
* Analyte is not accredited for SOP EU047 # Method 537.1 Accredited ^ Method 533 Accredited		
^ 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
# PFTrDA (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
Target Analytes		
* Analyte is not accredited for SOP EU047 # Method 537.1 Accredited ^ Method 533 Accredited		
* 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



0424-883



Chain of Custody Record

Enthalpy Ultratrace Job#: _____ COC Page 1 of 1

Special Handling:

- Standard Turn Around Time
- Rush Turn Around Time -- Date Needed _____
- All Fast TATs Subject to Approval by Enthalpy Analytical, Inc.
- All Samples Disposed of After 6 months Unless Otherwise Instructed.

Enthalpy Analytical-Wilmington, NC has added enhancements to standard methods to improve accuracy, precision and permit an assessment of laboratory performance in the context of your specific data needs. For more information email Cindy.James@enthalpy.com.

Client Name: <u>BRUNSWICK COUNTY UTILITIES</u>	Project Number: _____	PO#: _____
Project Manager: <u>GLENN WALKER</u>	Site Name: <u>NORTHWEST WATER PLANT</u>	Telephone#: _____
Report To: <u>SAME</u>	Location: <u>LELAND N.C.</u>	Email: _____

This Chain of Custody is applicable to Non-Air samples. Standard TAT differ per analysis and are provided by request.

Client Special Instructions:						Sample Containers				Analyses:						Notes:			
Sample ID	Date	Time	Sample Volume	Type	Matrix	# of Bottles	# of Jars	# of Bags	# Other	Method 1613	Method 8290	Method 1668A/B/C/PCE	PFAS by LC/MS/MS	PAHs by HRGC/HRMS	Sample on Hold		Method 23	ALL PFAS	
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																			
042624-SO1	4/26/2024	1035AM	250 ml	G	NW	2												X	Please Add PFPrA and
042624-EO1	4/26/2024	1035AM	250 ml	G	DW	2												X	PFHpA To The Testing.
																			Mark Hager Knows About
																			This if you Have Questions

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
	4/26/2024		4-26-24	11:14	<input checked="" type="checkbox"/> Iced <input type="checkbox"/> Ambient °C <u>12.6</u>
					<input type="checkbox"/> Iced <input type="checkbox"/> Ambient °C _____
					<input type="checkbox"/> Iced <input type="checkbox"/> Ambient °C _____

2714 Exchange Drive • Wilmington, NC 28405 • (910) 212-5858 • www.enthalpy.com

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