County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Plant

Leland, NC
Samples Received: 2-1-19

Analytical Report
(0219-701)

Isotope Dilution

PFAS

Enthalpy Analytical, LLC – Ultratrace

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

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 10 pages.

Juanica L. Thomas

QA Review Performed by: Juanica L. Thomas

Report Issued Date: 02/28/19

ENTHALPY ANALYTICAL

Summary of Results: PFAS

Enthalpy Ultratrace Batch # 10206

PFAS

Analyte	Method Blank ng/L	020119-S01 ng/L	020119-E01 ng/L
Acids			
PFBA	2.55	4.61 B	3.66 B
PFPeA	0.938 J	6.32 B	6.32 B
PFHxA	3.83	8.46 B	8.68 B
PFHpA	1.50 J	6.68 B	6.50 B
PFOA	1.21 J	6.77 B	6.55 B
PFNA	<0.509 U	0.850 J	1.12 J
PFDA	<1.25 U	<0.948 U	1.10 J
PFUnA	<0.481 U	<0.365 U	<0.339 U
PFDoA	<0.475 U	<0.360 U	<0.335 U
PFTrA	<0.745 U	<0.565 U	<0.526 U
PFTA	<0.830 U	<0.630 U	<0.586 U
Sulfonates			
L-PFBS	<0.830 U	2.41	1.86
PFPeS	<0.990 U	<0.751 U	<0.699 U
PFHxS	<0.827 U	3.41	2.35
PFHpS	<0.779 U	<0.591 U	<0.550 U
PFOS	<0.471 U	11.2	10.3
PFNS	<0.654 U	<0.496 U	<0.461 U
PFDS	<1.35 U	<1.02 U	<0.953 U
4:2 FTS	<0.646 U	<0.490 U	<0.456 U
6:2 FTS	<0.723 U	<0.548 U	0.535 J
8:2 FTS	<0.569 U	<0.432 U	<0.401 U
Other			
PFOSA	<3.65 U	<2.77 U	<2.58 U
N-MeFOSAA	<0.544 U	<0.413 U	<0.384 U
N-EtFOSAA	<0.651 U	<0.494 U	<0.459 U
HFPO-DA (Gen-X)	<33.3 U	<25.3 U	<23.5 U
Lab Sample ID	MB_10206_PFC	0219-701_10206_001	0219-701_10206_002

Enthalpy Analytical Narrative Summary

Company	County of Brunswick	**Client #**	n/a
Analyst	H. Allen	**Job #**	0219-701
Parameters	PFAS	**# Samples**	2

Custody

Enthalpy Analytical Wilmington received the samples (via client courier) by Laura Boivin on 2/1/2019. The samples were received at on ice at 3.1°C in good condition.

Prior to, during, and after analysis, the samples were stored in the laboratory with access only by authorized personnel of Enthalpy Analytical, LLC.

Analysis

The samples were analyzed by isotope dilution method for PFAS via LC/MS/MS. The analysis was completed using the following instrumentation: Waters Acquity UPLC equipped with Xevo TQ MS (Kili).

The sample is spiked with ES, mixed well and centrifuged. An aliquot of supernatant is added to a measured volume of water and extracted via SPE. The elute is condensed, reconstituted with IS and analyzed.

Calibration

The analytes and labeled standards in the initial calibration exhibited RSDs less than 50%. All analytes passed the R^2 coefficient correlation criteria.

The ICV and continuing calibration met the ±30% criteria for native analytes and ±50% criteria for labeled analytes.

QC Notes

The LCS injection met the ±50% criteria for ES recoveries with the exception of M2-4:2 FTS, M2-6:2 FTS and M2-8:2 FTS, which fell outside the upper limit. The analytes MPFBA, M2PFOA, and MPFOS for the JS Standard Area fell outside the lower limits of the ±50% criteria.

The following analytes were detected in the method blank (MB) above 1/10 of the sample concentration. These analyte values, notated with a B flag, should be considered biased low estimates. The MB met the ±50% criteria for ES recoveries with the exception of analytes M3PFBS, M2-4:2 FTS, M2-6:2 FTS, and M2-8:2 FTS, which fell outside the upper limit. The analytes MPFOS for the JS Standard Area fell outside the lower limits of the ±50% criteria.

M8FOSA fell outside the lower ES recovery limit for both the LCS and the Method Blank.

The samples were extracted within the 14-day from collection holding time. Extracts were analyzed within the 28-days from extraction to analysis holding time required by the method.

Reporting Notes	Sample 020119-S01 (0219-701-001) ES Recoveries fell outside the upper limits for analytes M5PFPeA, M3HFPO-DA, and M2-6:2 FTS. The analyte MPFBA for the JS Standard Area fell outside the lower limit of the ±50% criteria. Sample 020119-E01 (0219-701-002) ES Recoveries fell outside the upper limits for analytes M5PFPeA, M2-4:2 FTS, M3HFPO-DA, and M2-6:2 FTS. Both samples exhibited ES Recoveries outside the lower limits for M8FOSA. 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. The samples, calibrations and standards for the data presented in this report were analyzed at 2714 Exchange Drive, Wilmington, NC 28405.

General Reporting Notes – Data Qualifiers

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

General Data Qualifiers / Data Attributes

- B – The analyte was found in the method blank, at a concentration that was at least 10% of the concentration in the sample.
- C – 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 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).
- EMPC – Represents an estimated maximum possible concentration. EMPCs arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
- J – Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve).
- ND – Indicates a non-detect.
- NR – Indicates a value that is not reportable.
- PR – Due to interference, the associated congener is poorly resolved.
- DI – Indicates the presence of a quantitative interference.
- 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. The Estimated Detection Limit (EDL) may be reported for this analyte.
- V – The labeled standard recovery was found to be outside of the method control limits.

DRBC/TMDL Specific Data Qualifiers / Data Attributes

- J – The reported result is an estimate. The value is less than the minimum calibration level but greater than the Estimated Detection Limit (EDL).
- U – The analyte was not detected in the sample at the Estimated Detection Limit (EDL).
- E – The reported concentration is an estimate. The value exceeds the upper calibration range (upper point of the calibration curve).

- D – Dilution Data. Result was obtained from the analysis of a dilution.
- B – Analyte found in the sample and associated method blank.
- Cxx – Co-elutes with the indicated congener, data is reported under the lowest IUPAC congener. 'xx' denotes the IUPAC number with the lowest numerical designated congener.
- NR – Analyte is not reportable because of problems in sample preparation or analysis.
- V – Labeled standard recovery is not within method control limits.
- X – Results from re-injection/repeat/second-column analysis.
- EMPC – Estimated Maximum Possible Concentration. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.

Lab Identifiers

- 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 – Indicates a dilution of the sample extract. 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.

Job 0219-701 report due Friday Feb 15 2019

ENTHALPY ANALYTICAL

To	Glenn Walker	From	Lindsay Boone
Company	Brunswick County Water	Customer PO	
Site		Sales Order	SO1034282
Customer Phone	910-371-3490	Date Due QA	Wednesday, February 13, 2019
Customer Email	glenn.walker@brunswickcountync.org	Results Due	Friday, February 15, 2019
Customer Project		Report Due	Friday, February 15, 2019

Line	Method	Analytes	Quant	Dept	Objective	Status	
1	WM-026 PFAS by Isotope Dilution (non-potable water) report:	Legacy 24 plus Gen X	2	Wilmington		Sampled Received ReceivedTemp StorageTemp StorageLocation	02-01-19 10:20 (local time) 02-01-19 11:28 3.1 4.0 R1

0218 0219-701
(CE) 2/26/19

Chain of Custody Record

ENTHALPY analytical

Enthalpy Ultratrace Job#: _____ COC Page_____of_____

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: BRUNSWICK COUNTY WATER
Project Manager: GLENN WALKER
Report To: GLENN WALKER

Project Number:
Site Name: N.W. PLANT LAB
Location: LELAND

PO#:
Telephone#: 910-371-3490
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

Sample ID	Date	Time	Sample Volume	Type	Matrix	Sample Containers: # of Bottles	# of Jars	# of Bags	# Other				Analyses: Method 1613	Method 8290	Method 1668A/B/C PCB	PFAS by LC/MS/MS	PAHs by HRGC/HRMS	Sample on Hold	EPA 537 (Rev 2		Notes:
02019 - SO1	2-1-19	1030 AM	30mL	G	NW	2															
02019 - EO1	2-1-19	1030 AM	30 m	G	DW	2															

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
BILLY BENTON	2-1-19	Laura Boivin	2/1/19	11:28 AM	☑ Iced ☐ Ambient °C 3.1
					☐ Iced ☐ Ambient °C_____
					☐ Iced ☐ Ambient °C_____

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

Brunswick courier, One cooler, Temp. → 3.1°C, Therm. # ⇒ T5, On Ice, condition: Good, no seal, BW 2/1/19

This Is The Last Page Of This Report.

ENTHALPY ANALYTICAL