County of Brunswick

3954 Clearwell Dr NE
Leland, NC 28451

Northwest Plant

Leland, NC
Samples Received: 3-14-19

Analytical Report
(0319-715)

Isotope Dilution

PFAS

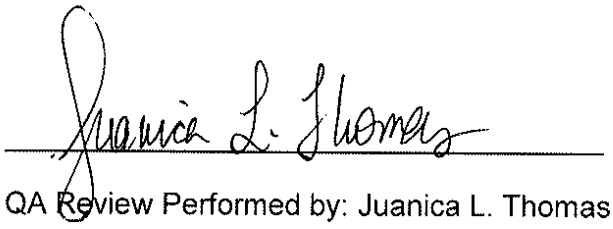
Enthalpy Analytical, LLC – Ultratrace

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 __13__ pages.



QA Review Performed by: Juanica L. Thomas

Report Issued Date: 03/27/19

ENTHALPY ANALYTICAL

Summary of Results

Summary of Results: PFAS

Enthalpy Ultratrace Batch # 10244

PFAS

Analyte	Method Blank ng/L	031419-SO1 ng/L	031419-EO1 ng/L
Acids			
PFBA	2.13	3.50 B	2.65 B
PFPeA	1.58 J	5.15 B	4.84 B
PFHxA	3.87	6.02 B	5.94 B
PFHpA	ND U	3.52	2.87
PFOA	0.407 J	6.20	5.96
PFNA	ND U	0.696 J	0.598 J
PFDA	0.0456 L	0.864 L	0.396 L
PFUnA	ND U	ND U	ND U
PFDoA	ND U	ND U	ND U
PFTrA	ND U	ND U	ND U
PFTA	ND U	0.340 J	ND U
Sulfonates			
L-PFBS	ND U	1.72	2.72
PFPeS	ND U	ND U	ND U
PFHxS	ND U	1.90	2.73
PFHpS	ND U	ND U	ND U
PFOS	ND U	13.8	14.5
PFNS	ND U	ND U	ND U
PFDS	ND U	ND U	ND U
4:2 FTS	ND U	ND U	ND U
6:2 FTS	0.104 L	0.340 L	0.523 JB
8:2 FTS	ND U	ND U	ND U
Other			
PFOSA	ND U	0.0317 L	ND U
N-MeFOSAA	ND U	ND U	ND U
N-EtFOSAA	ND U	ND U	ND U
HFPO-DA (Gen-X)	ND U	ND U	ND U
Lab Sample ID	MB_10244	0319-715_10244_001	0319-715_10244_002

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	County of Brunswick
Job#	0319-715 PFAS
Client Project #	n/a

Custody

Hunter Allen of Enthalpy Analytical Wilmington received the samples (via client courier) on 03/14/19 on ice at 2.8°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 using Waters Acquity UPLC equipped with Xevo TQ MS (LC/MS/MS "Fili").

For aqueous samples, 35mL aliquot (or less due to sample amount) was weighed 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 200 µL of Injection Standard (IS), prior to analysis.

Calibration

The analytes and labeled standards of interest in the initial calibration exhibited RSDs less than 50%. All analytes passed the R^2 coefficient correlation criteria. The continuing calibration met the ±30% criteria for native analytes of interest, ±50% criteria for ES recoveries and JS area count values.

QC Notes

The LCS met the ±50% criteria for ES recoveries with the exception of M3PFHxS which fell out the upper limit and M8FOSA which fell outside the lower limit. The JS Standard Area met the ±50% criteria with the exception of MPFOS which fell outside the lower limit.

A few analytes were detected in the method blank at values more than 1/10 the sample amount. The analytes detected in the samples are notated with a B qualifier. ES recoveries met the ±50% criteria with the exception of M8FOSA which fell outside the lower limit. JS Standard Area met criteria with the exception of MPFOS which fell outside the lower limit.

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

The isotopically labeled standard PFBA was observed in the method blank as well as all samples. It was determined to be found in the standard provided the manufacturer used in preparation of the IS.

Reporting Notes (continued)	The ES compounds M8FOSA and M3HFPO-DA fell outside the QC limits for both samples. The LCS exhibited some ES recoveries outside the QC limits, as well, but all native analytes in the LCS were recovered well within acceptance criteria. Based on the native results in the LCS, we conclude that the out-of-range ES recoveries have no impact on the accuracy of the target analyte (native) compounds, and, therefore, the data are considered acceptable. 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 results presented in this report are representative of the samples as provided to the laboratory. 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.

Sample Custody

Job 0319-715 report due Thursday Mar 28 2019

ENTHALPY ANALYTICAL

To	Glenn Walker	From	Lindsay Boone
Company	County of Brunswick	Customer PO	
Site	N.W. Leland Plant	Sales Order	SO1036291
Customer Phone	910-612-5618	Date Due QA	Tuesday, March 26, 2019
Customer Email	glenn.walker@brunswickcountync.gov	Results Due	Thursday, March 28, 2019
Customer Project		Report Due	Thursday, March 28, 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	Level 1 Report	Sampled Received ReceivedTemp StorageTemp StorageLocation	03-14-19 10:45 (local time) 03-14-19 11:45 2.8 4 R1

0319-715

ENTHALPY analytical

Chain of Custody Record

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	# of Bottles	# of Jars	# of Bags	# Other			Method 1613	Method 8290	Method 1668A/B/C PCB	PFAS by LC/MS/MS	PAHs by HRGC/HRMS	Sample on Hold	EPA 537 Gen X		Notes:
031419-S01	3/14/19	10 45 AM	30 mL	G	NW	2												✓		
031419-E01	3/14/19	10 45 AM	30 mL	B	DW	2												✓		

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Temperature Upon Receipt:
[signature]	3/14/19	[signature]	3/14/19	11:45 AM	☑ Iced ☐ Ambient °C 2.8 TS
					☐ Iced ☐ Ambient °C______
					☐ Iced ☐ Ambient °C______

by client courier on ice 1 cooler good condit. no seal HA 3/14/

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