

# County of Brunswick

3954 Clearwell Dr NE  
Leland, NC 28451

## Northwest Plant Lab

Leland, NC  
Samples Received: 10/24/19

## Analytical Report 1019-737

### *Isotope Dilution Method*

PFAS – Legacy 24, Gen-X, PFMOAA



### **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

**Summary of Results: PFAS**
**Enthalpy Ultratrace Batch #**
**10522**
**PFAS**

| Analyte           | Method Blank<br>ng/L | 102419 - S01<br>ng/L | 102419 - E01<br>ng/L |
|-------------------|----------------------|----------------------|----------------------|
| <b>Acids</b>      |                      |                      |                      |
| PFBA              | ND U                 | 9.15                 | 9.73                 |
| PFPeA             | ND U                 | 24.6                 | 24.9                 |
| PFHxA             | ND U                 | 24.0                 | 25.4                 |
| PFHpA             | ND U                 | 14.5                 | 14.5                 |
| PFOA              | 0.00510 J L          | 6.79                 | 6.92                 |
| PFNA              | ND U                 | 0.957 J              | 0.932 J              |
| PFDA              | ND U                 | 0.741 J              | 0.597 J              |
| PFUnA             | ND U                 | 0.133 J              | ND U                 |
| PFDoA             | ND U                 | 0.0309 J L           | ND U                 |
| PFTrA             | ND U                 | ND U                 | ND U                 |
| PFTA              | ND U                 | ND U                 | ND U                 |
| <b>Sulfonates</b> |                      |                      |                      |
| L-PFBS            | ND U                 | ND U                 | ND U                 |
| PFPeS             | ND U                 | 1.50                 | 1.06 J               |
| PFHxS             | ND U                 | 5.83                 | 5.74                 |
| PFHpS             | ND U                 | 0.255 J              | 0.281 J              |
| PFOS              | ND U                 | 10.5                 | 11.3                 |
| 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           | ND U                 | 0.119 J              | 0.208 J              |
| 8:2 FTS           | ND U                 | ND U                 | ND U                 |
| <b>Other</b>      |                      |                      |                      |
| PFOSA             | ND U                 | ND U                 | ND U                 |
| N-MeFOSAA         | ND U                 | ND U                 | ND U                 |
| N-EtFOSAA         | ND U                 | ND U                 | ND U                 |
| HFPO-DA (Gen-X)   | ND U                 | 13.7 J               | 15.7 J               |
| PFMOAA            | ND U                 | 160                  | 172                  |
| Lab Sample ID     | MB-10522-PFAS        | 1019-737-001-1       | 1019-737-002-1       |

# Narrative Summary

# Enthalpy Analytical Narrative Summary

|                         |                                          |
|-------------------------|------------------------------------------|
| <b>Company</b>          | County of Brunswick                      |
| <b>Job#</b>             | 1019-737 PFAS – Legacy 24, Gen X, PFMOAA |
| <b>Client Project #</b> | N/A                                      |

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Custody</b>         | <p>Braidy May of Enthalpy Analytical Wilmington received the samples (via courier) on 10/24/19 on ice at 5.4°C in good condition.</p> <p>Prior to, during, and after analysis, the samples were stored in the laboratory with access only by authorized personnel of Enthalpy Analytical, LLC.</p>                                                                                                                                                                                                                                             |
| <b>Analysis</b>        | <p>The samples were analyzed by isotope dilution method for PFAS using Waters Acquity UPLC equipped with Xevo TQ MS (LC/MS/MS “Kili”).</p> <p>For aqueous samples, 250mL aliquot was weighed and spiked with Extraction Standard (ES). The sample was then mixed well and centrifuged.</p> <p>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 400 µL of Injection Standard (IS), prior to analysis.</p>                      |
| <b>Calibration</b>     | <p>The analytes and labeled standards in the initial calibration exhibited RSDs less than 50%. All analytes passed the <math>R^2</math> coefficient correlation criterion. The internal calibration verification (ICV) met the <math>\pm 30\%</math> criteria for native analytes and <math>\pm 50\%</math> criteria for ES recoveries. The continuing calibrations (concal) met the <math>\pm 30\%</math> criteria for native analytes and <math>\pm 50\%</math> criteria for ES recoveries.</p>                                              |
| <b>QC Notes</b>        | <p>The QC injection (OPR) met the <math>\pm 30\%</math> criteria for % Recovery and 20%-150% criteria for ES recoveries for all analytes.</p> <p>No analytes were detected in the method blank above the MDL and met the 20%-150% criteria for ES recoveries for all analytes.</p> <p>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.</p>                                                                |
| <b>Reporting Notes</b> | <p>Some labeled standards in the samples fell outside the limits for ES recoveries. Because the target analytes are quantified based on their ratio to the labeled standards and undergo the same losses as the labeled standards, low or high recoveries do not cause any change to those ratios or result in any additional error in the measurement of the target analytes. Therefore, the data are considered acceptable.</p> <p>The results presented in this report are representative of the samples as provided to the laboratory.</p> |

## Enthalpy Analytical Narrative Summary

(continued)

### Reporting Notes (cont.)

These analyses met the requirements of the TNI Standard. Gen-X and PFMOAA are not accredited analytes under TNI. 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, 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.
- 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) and is considered an estimate.
- 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. Indicates that a peak is identified but did not meet the method specified ion-abundance ratio.
- J – Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve). The value is less than the minimum calibration level but greater than the Reporting Limit (RL) or Estimated Detection Limit (EDL).
- 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 value may have a S/N less than 3.
- ND – Indicates a non-detect.
- NR – Indicates a value that is not reportable due to issues observed in sample preparation or analysis.
- 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 Minimum Detection Limit (MDL) or Estimated Detection Limit (EDL) may be reported for this analyte.
- V – The labeled standard recovery is not within method control limits.



## General Reporting Notes – Data Qualifiers

- Q – 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 5.3 Table B-15.

### **DRBC/TMDL Specific Data Qualifiers / Data Attributes**

- D – Dilution Data. Result was obtained from the analysis of a dilution. The number that follows the “D” indicates the dilution factor.
- X – Results from re-injection/repeat/second-column analysis.

### **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.
- 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.

| PFAS Compound Acronym List |                                                                                 |
|----------------------------|---------------------------------------------------------------------------------|
| Acronym                    | Compound Name                                                                   |
| Target Analytes            |                                                                                 |
| PFBA                       | Perfluorobutanoic Acid                                                          |
| PFPeA                      | Perfluoropentanoic Acid                                                         |
| PFHxA                      | Perfluorohexanoic Acid                                                          |
| PFHpA                      | Perfluoroheptanoic Acid                                                         |
| PFOA                       | Perfluorooctanoic Acid                                                          |
| PFNA                       | Perfluorononanoic Acid                                                          |
| PFDA                       | Perfluorodecanoic acid                                                          |
| PFUnA (PFUnDA)             | Perfluoroundecanoic acid                                                        |
| PFDoA (PFDoDA)             | Perfluorododecanoic acid                                                        |
| PFTriDA (PFTriA)           | Perfluorotridecanoic acid                                                       |
| PFTeDA (PFTA)              | Perfluorotetradecanoic acid                                                     |
| PFBS                       | Perfluorobutane sulfonic acid                                                   |
| PFPeS                      | Perfluoropentane sulfonic acid                                                  |
| PFHxS                      | Perfluorohexane sulfonic acid                                                   |
| PFHpS                      | Perfluoroheptane sulfonic acid                                                  |
| PFOS                       | Perfluorooctane sulfonic acid                                                   |
| PFNS                       | Perfluorononane sulfonic acid                                                   |
| PFDS                       | Perfluorodecane sulfonic acid                                                   |
| 4:2 FTS                    | 4:2 fluorotelomer sulfonic acid                                                 |
| 6:2 FTS                    | 6:2 fluorotelomer sulfonic acid                                                 |
| 8:2 FTS                    | 8:2 fluorotelomer sulfonic acid                                                 |
| PFOSA (FOSA)               | Perfluorooctane sulfonamide                                                     |
| N-MeFOSAA                  | N-methyl perfluorooctane sulfonamido acetic acid                                |
| N-EtFOSAA                  | N-ethyl perfluorooctane sulfonamido acetic acid                                 |
| HFPO-DA                    | 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (Gen-X) |
| Extraction Standards       |                                                                                 |
| MPFBA                      | Perfluoro-n-[13C4]butanoic acid                                                 |
| M5PFPeA                    | Perfluoro-n-[13C5]pentanoic acid                                                |
| M3PFBS                     | Sodium perfluoro-1-[2,3,4-13C3]-butanesulfonic acid                             |
| M2-4:2 FTS                 | Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-hexane sulfonic acid                  |
| M5PFHxA                    | Perfluoro-n-[1,2,3,4,6-13C5]hexanoic acid                                       |
| M3HFPO-DA                  | 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-13C3-propanoic acid    |
| M4PFHpA                    | Perfluoro-n-[1,2,3,4-13C4]heptanoic acid                                        |
| M3PFHxS                    | Sodium perfluoro-1-[1,2,3-13C3]-hexanesulfonic acid                             |
| M2-6:2 FTS                 | Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-octane sulfonic acid                  |
| M8PFOA                     | Perfluoro-n-[13C8]octanoic acid                                                 |
| M9PFNA                     | Perfluoro-n-[13C9]nonanoic acid                                                 |
| M8PFOS                     | Sodium perfluoro-1-[13C8]-octanesulfonic acid                                   |
| M2-8:2 FTS                 | Sodium 1H,1H,2H,2H-perfluoro-1-[1,2-13C2]-decane sulfonic acid                  |
| M8FOSA                     | Perfluoro-1-[13C8]octanesulfonamide                                             |
| M6PFDA                     | Perfluoro-n-[1,2,3,4,5,6-13C6]decanoic acid                                     |
| d3-N-MeFOSAA               | N-methyl-d3-perfluoro-1-octanesulfonamide                                       |
| d5-N-EtFOSAA               | N-ethyl-d5-perfluoro-1-octanesulfonamide                                        |
| M7PFUnDA (M7PFUdA)         | Perfluoro-n-[1,2,3,4,5,6,7-13C7]undecanoic acid                                 |
| MPFDoA                     | Perfluoro-n-[1,2-13C2]dodecanoic acid                                           |
| M2PFTeDA                   | Perfluoro-n-[1,2-13C2]tetradecanoic acid                                        |

| Injection Standards |                                                       |
|---------------------|-------------------------------------------------------|
| M3PFBA              | Perfluoro-n-[2,3,4-13C3]butanoic acid                 |
| M2PFOA              | Perfluoro-n-[1,2-13C2]octanoic acid                   |
| MPFDA               | Perfluoro-n-[1,2-13C2]decanoic acid                   |
| MPFOS               | Sodium perfluoro-1-[1,2,3,4-13C4]-octanesulfonic acid |

# 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.

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](mailto:Cindy.James@enthalpy.com).

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

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Courier, on ice, cooler, no seal, EU # 1019-733-1306194, Bu 10/24/19

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Of This Report.**