NAVFAC
Naval Facilities Engineering Command

# Off-Base Drinking Water Sample Results, Combined Level 2 and Level 4 Laboratory Report, Electronic Data Deliverable, Data Validation Report, and the Sample Location Figure, SDG 320-18555-1

*Naval Weapons Station Earle*
*Colts Neck, New Jersey*

July 2019

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

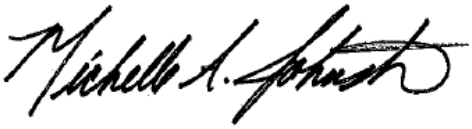
# ANALYTICAL REPORT

Job Number: 320-18555-1

Job Description: Ensafe-NWS-Earle, NJ PFCs Potable Water

For:
Earth Toxics, Inc
PO BOX 3382
Logan, UT 84321

Attention: Mike Dryden



Approved for release.
Michelle A Johnston
Project Manager II
5/12/2016 11:52 AM

Michelle A Johnston, Project Manager II
4955 Yarrow Street, Arvada, CO, 80002
(303)736-0110
michelle.johnston@testamericainc.com
05/12/2016

cc: Ms. Tina Cantwell
Ms. Nicole Loos
Ms. Jennifer O'Keefe

The test results in this report relate only to the samples in this report and meet all requirements of NELAC, with any exceptions noted. Pursuant to NELAP, this report shall not be reproduced except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Denver Project Manager.

The Lab Certification ID# is 4025.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

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# Table of Contents

## Qualifiers

### LCMS

| Qualifier | Qualifier Description |
|---|---|
| U | Undetected at the Limit of Detection. |
| J | Estimated: The analyte was positively identified; the quantitation is an estimation |
| M | Manual integrated compound. |
| Q | One or more quality control criteria failed. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

# CASE NARRATIVE
# Client: Earth Toxics, Inc.
# Project: Ensafe-NWS-Earle, NJ PFCs Potable Water
# Report Number: 320-18555-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

**Sample Receipt**

The samples were received on 4/28/2016 9:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.8º C. No anomalies were encountered during sample receipt.

**Perfluorinated Hydrocarbons (PFCs)**

Samples DW16 (320-18555-1) and DW16FB (320-18555-2) were analyzed for Perfluorinated Hydrocarbons (PFC) in accordance with WS-LC-0025. The samples were prepared on 05/03/2016 and analyzed on 05/07/2016.

Reporting limits and method detection limits have been adjusted accordingly for the initial volumes extracted.

Surrogate 13C8 PFOS was recovered above the QC limits in sample DW16FB (320-18555-2). This is an indicator that data may be biased high. As the sample does not contain any detectable concentration for constituents associated with this surrogate, corrective action is deemed unnecessary. The associated data has been flagged “Q” in accordance with the DOD QSM.

MS/MSD analyses for prep batch 320-108614 were not requested.

The level 1 standard from the ICAL is used to evaluate the tune criteria. The instrument mass windows are set at +/-0.5 amu. Detection of the analyte serves as verification that the assigned mass is within +/-0.5 amu of the true value, which meets the DOD tune criterion.

No other analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Detection Summary

Client: Earth Toxics, Inc
Project/Site: Ensafe-NWS-Earle, NJ PFCs Potable Water

TestAmerica Job ID: 320-18555-1

## Client Sample ID: DW16 — Lab Sample ID: 320-18555-1

| Analyte | Result | Qualifier | LOQ | LOD | DL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|---|
| Perfluoroheptanoic acid (PFHpA) | 1.0 | J | 2.4 | 1.9 | 0.78 | ng/L | 1 | | WS-LC-0025 | Total/NA |
| Perfluorooctanesulfonic acid (PFOS) | 1.3 | J M | 3.9 | 2.9 | 1.2 | ng/L | 1 | | WS-LC-0025 | Total/NA |
| Perfluorooctanoic acid (PFOA) | 1.3 | J | 2.4 | 1.9 | 0.72 | ng/L | 1 | | WS-LC-0025 | Total/NA |

## Client Sample ID: DW16FB — Lab Sample ID: 320-18555-2

No Detections.

This Detection Summary does not include radiochemical test results.

## Client Sample ID: DW16
**Lab Sample ID: 320-18555-1**

**Date Collected: 04/27/16 12:36**
**Matrix: Water**

**Date Received: 04/28/16 09:15**

### Method: WS-LC-0025 - Perfluorinated Hydrocarbons

| Analyte | Result | Qualifier | LOQ | LOD | DL | Unit | D | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Perfluorobutanesulfonic acid (PFBS) | 1.9 | U | 2.4 | 1.9 | 0.89 | ng/L | | 05/07/16 19:11 | 1 |
| **Perfluoroheptanoic acid (PFHpA)** | **1.0** | **J** | 2.4 | 1.9 | 0.78 | ng/L | | 05/07/16 19:11 | 1 |
| Perfluorohexanesulfonic acid (PFHxS) | 1.9 | U | 2.4 | 1.9 | 0.84 | ng/L | | 05/07/16 19:11 | 1 |
| Perfluorononanoic acid (PFNA) | 1.9 | U | 2.4 | 1.9 | 0.63 | ng/L | | 05/07/16 19:11 | 1 |
| **Perfluorooctanesulfonic acid (PFOS)** | **1.3** | **J M** | 3.9 | 2.9 | 1.2 | ng/L | | 05/07/16 19:11 | 1 |
| **Perfluorooctanoic acid (PFOA)** | **1.3** | **J** | 2.4 | 1.9 | 0.72 | ng/L | | 05/07/16 19:11 | 1 |

| *Isotope Dilution* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C2 PFHxA* | *109* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:11* | *1* |
| *13C4 PFOA* | *95* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:11* | *1* |
| *13C4 PFOS* | *149* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:11* | *1* |
| *13C4-PFHpA* | *105* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:11* | *1* |
| *13C5 PFNA* | *54* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:11* | *1* |
| *18O2 PFHxS* | *138* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:11* | *1* |

## Client Sample ID: DW16FB
**Lab Sample ID: 320-18555-2**

**Date Collected: 04/27/16 12:40**
**Matrix: Water**

**Date Received: 04/28/16 09:15**

### Method: WS-LC-0025 - Perfluorinated Hydrocarbons

| Analyte | Result | Qualifier | LOQ | LOD | DL | Unit | D | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Perfluorobutanesulfonic acid (PFBS) | 1.8 | U | 2.3 | 1.8 | 0.83 | ng/L | | 05/07/16 19:33 | 1 |
| Perfluoroheptanoic acid (PFHpA) | 1.8 | U | 2.3 | 1.8 | 0.73 | ng/L | | 05/07/16 19:33 | 1 |
| Perfluorohexanesulfonic acid (PFHxS) | 1.8 | U | 2.3 | 1.8 | 0.79 | ng/L | | 05/07/16 19:33 | 1 |
| Perfluorononanoic acid (PFNA) | 1.8 | U | 2.3 | 1.8 | 0.59 | ng/L | | 05/07/16 19:33 | 1 |
| Perfluorooctanesulfonic acid (PFOS) | 2.7 | U | 3.6 | 2.7 | 1.2 | ng/L | | 05/07/16 19:33 | 1 |
| Perfluorooctanoic acid (PFOA) | 1.8 | U | 2.3 | 1.8 | 0.68 | ng/L | | 05/07/16 19:33 | 1 |

| *Isotope Dilution* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C2 PFHxA* | *125* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:33* | *1* |
| *13C4 PFOA* | *132* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:33* | *1* |
| *13C4 PFOS* | *189* | *Q* | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:33* | *1* |
| *13C4-PFHpA* | *127* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:33* | *1* |
| *13C5 PFNA* | *120* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:33* | *1* |
| *18O2 PFHxS* | *143* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 19:33* | *1* |

# Default Detection Limits

Client: Earth Toxics, Inc
Project/Site: Ensafe-NWS-Earle, NJ PFCs Potable Water

TestAmerica Job ID: 320-18555-1

## Method: WS-LC-0025 - Perfluorinated Hydrocarbons

| Analyte | LOQ | DL | Units | Method |
|---|---|---|---|---|
| Perfluorobutanesulfonic acid (PFBS) | 2.5 | 0.92 | ng/L | WS-LC-0025 |
| Perfluoroheptanoic acid (PFHpA) | 2.5 | 0.80 | ng/L | WS-LC-0025 |
| Perfluorohexanesulfonic acid (PFHxS) | 2.5 | 0.87 | ng/L | WS-LC-0025 |
| Perfluorononanoic acid (PFNA) | 2.5 | 0.65 | ng/L | WS-LC-0025 |
| Perfluorooctanesulfonic acid (PFOS) | 4.0 | 1.3 | ng/L | WS-LC-0025 |
| Perfluorooctanoic acid (PFOA) | 2.5 | 0.75 | ng/L | WS-LC-0025 |

# Isotope Dilution Summary

Client: Earth Toxics, Inc
Project/Site: Ensafe-NWS-Earle, NJ PFCs Potable Water

TestAmerica Job ID: 320-18555-1

## Method: WS-LC-0025 - Perfluorinated Hydrocarbons

**Matrix: Water** **Prep Type: Total/NA**

| | | Percent Isotope Dilution Recovery (Acceptance Limits) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | Client Sample ID | 3C2 PFHx (25-150) | 3C4 PFO/ (25-150) | 3C4 PFOS (25-150) | 3C4-PFHp (25-150) | 3C5 PFN/ (25-150) | 3O2 PFHx (25-150) | | |
| 320-18555-1 | DW16 | 109 | 95 | 149 | 105 | 54 | 138 | | |
| 320-18555-2 | DW16FB | 125 | 132 | 189 Q | 127 | 120 | 143 | | |
| LCS 320-108614/2-A | Lab Control Sample | 122 | 121 | 116 | 123 | 119 | 123 | | |
| LCSD 320-108614/3-A | Lab Control Sample Dup | 121 | 126 | 101 | 121 | 121 | 123 | | |
| MB 320-108614/1-A | Method Blank | 124 | 136 | 127 | 124 | 128 | 129 | | |

**Surrogate Legend**

13C2 PFHxA = 13C2 PFHxA
13C4 PFOA = 13C4 PFOA
13C4 PFOS = 13C4 PFOS
13C4-PFHpA = 13C4-PFHpA
13C5 PFNA = 13C5 PFNA
18O2 PFHxS = 18O2 PFHxS

## Method: WS-LC-0025 - Perfluorinated Hydrocarbons

**Lab Sample ID: MB 320-108614/1-A** — **Client Sample ID: Method Blank**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 109262** — **Prep Batch: 108614**

| Analyte | MB Result | MB Qualifier | LOQ | LOD | DL | Unit | D | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Perfluorobutanesulfonic acid (PFBS) | 2.0 | U | 2.5 | 2.0 | 0.92 | ng/L | | 05/07/16 18:08 | 1 |
| Perfluoroheptanoic acid (PFHpA) | 2.0 | U | 2.5 | 2.0 | 0.80 | ng/L | | 05/07/16 18:08 | 1 |
| Perfluorohexanesulfonic acid (PFHxS) | 2.0 | U | 2.5 | 2.0 | 0.87 | ng/L | | 05/07/16 18:08 | 1 |
| Perfluorononanoic acid (PFNA) | 2.0 | U M | 2.5 | 2.0 | 0.65 | ng/L | | 05/07/16 18:08 | 1 |
| Perfluorooctanesulfonic acid (PFOS) | 3.0 | U | 4.0 | 3.0 | 1.3 | ng/L | | 05/07/16 18:08 | 1 |
| Perfluorooctanoic acid (PFOA) | 2.0 | U | 2.5 | 2.0 | 0.75 | ng/L | | 05/07/16 18:08 | 1 |

| *Isotope Dilution* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C2 PFHxA* | *124* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 18:08* | *1* |
| *13C4 PFOA* | *136* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 18:08* | *1* |
| *13C4 PFOS* | *127* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 18:08* | *1* |
| *13C4-PFHpA* | *124* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 18:08* | *1* |
| *13C5 PFNA* | *128* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 18:08* | *1* |
| *18O2 PFHxS* | *129* | | *25 - 150* | *05/03/16 12:39* | *05/07/16 18:08* | *1* |

**Lab Sample ID: LCS 320-108614/2-A** — **Client Sample ID: Lab Control Sample**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 109262** — **Prep Batch: 108614**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Perfluorobutanesulfonic acid (PFBS) | 35.4 | 27.7 | | ng/L | | 78 | 50 - 150 |
| Perfluoroheptanoic acid (PFHpA) | 40.0 | 30.2 | | ng/L | | 75 | 60 - 140 |
| Perfluorohexanesulfonic acid (PFHxS) | 36.4 | 31.0 | M | ng/L | | 85 | 60 - 140 |
| Perfluorononanoic acid (PFNA) | 40.0 | 31.6 | | ng/L | | 79 | 60 - 140 |
| Perfluorooctanesulfonic acid (PFOS) | 37.1 | 37.0 | M | ng/L | | 100 | 60 - 140 |
| Perfluorooctanoic acid (PFOA) | 40.0 | 33.4 | | ng/L | | 84 | 60 - 140 |

| *Isotope Dilution* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *13C2 PFHxA* | *122* | | *25 - 150* |
| *13C4 PFOA* | *121* | | *25 - 150* |
| *13C4 PFOS* | *116* | | *25 - 150* |
| *13C4-PFHpA* | *123* | | *25 - 150* |
| *13C5 PFNA* | *119* | | *25 - 150* |
| *18O2 PFHxS* | *123* | | *25 - 150* |

**Lab Sample ID: LCSD 320-108614/3-A** — **Client Sample ID: Lab Control Sample Dup**
**Matrix: Water** — **Prep Type: Total/NA**
**Analysis Batch: 109262** — **Prep Batch: 108614**

| Analyte | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|
| Perfluorobutanesulfonic acid (PFBS) | 35.4 | 27.4 | | ng/L | | 78 | 50 - 150 | 1 | 30 |
| Perfluoroheptanoic acid (PFHpA) | 40.0 | 29.4 | | ng/L | | 74 | 60 - 140 | 3 | 30 |
| Perfluorohexanesulfonic acid (PFHxS) | 36.4 | 30.4 | M | ng/L | | 83 | 60 - 140 | 2 | 30 |
| Perfluorononanoic acid (PFNA) | 40.0 | 32.0 | | ng/L | | 80 | 60 - 140 | 1 | 30 |

## Method: WS-LC-0025 - Perfluorinated Hydrocarbons (Continued)

**Lab Sample ID: LCSD 320-108614/3-A**
**Matrix: Water**
**Analysis Batch: 109262**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**
**Prep Batch: 108614**

| Analyte | | | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Perfluorooctanesulfonic acid (PFOS) | | | 37.1 | 42.4 | M | ng/L | | 114 | 60 - 140 | 14 | 30 |
| Perfluorooctanoic acid (PFOA) | | | 40.0 | 31.4 | | ng/L | | 79 | 60 - 140 | 6 | 30 |

| *Isotope Dilution* | *LCSD %Recovery* | *LCSD Qualifier* | *Limits* |
|---|---|---|---|
| *13C2 PFHxA* | *121* | | *25 - 150* |
| *13C4 PFOA* | *126* | | *25 - 150* |
| *13C4 PFOS* | *101* | | *25 - 150* |
| *13C4-PFHpA* | *121* | | *25 - 150* |
| *13C5 PFNA* | *121* | | *25 - 150* |
| *18O2 PFHxS* | *123* | | *25 - 150* |

## LCMS

### Prep Batch: 108614

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 320-18555-1 | DW16 | Total/NA | Water | 3535 | |
| 320-18555-2 | DW16FB | Total/NA | Water | 3535 | |
| LCS 320-108614/2-A | Lab Control Sample | Total/NA | Water | 3535 | |
| LCSD 320-108614/3-A | Lab Control Sample Dup | Total/NA | Water | 3535 | |
| MB 320-108614/1-A | Method Blank | Total/NA | Water | 3535 | |

### Analysis Batch: 109262

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 320-18555-1 | DW16 | Total/NA | Water | WS-LC-0025 | 108614 |
| 320-18555-2 | DW16FB | Total/NA | Water | WS-LC-0025 | 108614 |
| LCS 320-108614/2-A | Lab Control Sample | Total/NA | Water | WS-LC-0025 | 108614 |
| LCSD 320-108614/3-A | Lab Control Sample Dup | Total/NA | Water | WS-LC-0025 | 108614 |
| MB 320-108614/1-A | Method Blank | Total/NA | Water | WS-LC-0025 | 108614 |

# Lab Chronicle

Client: Earth Toxics, Inc
Project/Site: Ensafe-NWS-Earle, NJ PFCs Potable Water

TestAmerica Job ID: 320-18555-1

## Client Sample ID: DW16

**Lab Sample ID: 320-18555-1**

**Date Collected: 04/27/16 12:36**

**Matrix: Water**

**Date Received: 04/28/16 09:15**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 3535 | | | 517.1 mL | 1.0 mL | 108614 | 05/03/16 12:39 | VPM | TAL SAC |
| Total/NA | Analysis | WS-LC-0025 | | 1 | 517.1 mL | 1.0 mL | 109262 | 05/07/16 19:11 | JRB | TAL SAC |
| | Instrument ID: A4 | | | | | | | | | |

## Client Sample ID: DW16FB

**Lab Sample ID: 320-18555-2**

**Date Collected: 04/27/16 12:40**

**Matrix: Water**

**Date Received: 04/28/16 09:15**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 3535 | | | 550.7 mL | 1.0 mL | 108614 | 05/03/16 12:39 | VPM | TAL SAC |
| Total/NA | Analysis | WS-LC-0025 | | 1 | 550.7 mL | 1.0 mL | 109262 | 05/07/16 19:33 | JRB | TAL SAC |
| | Instrument ID: A4 | | | | | | | | | |

**Laboratory References:**

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

# Certification Summary

Client: Earth Toxics, Inc
TestAmerica Job ID: 320-18555-1
Project/Site: Ensafe-NWS-Earle, NJ PFCs Potable Water

## Laboratory: TestAmerica Sacramento

The certifications listed below are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| A2LA | DoD ELAP | | 2928-01 | 01-31-17 |
| New Jersey | NELAP | 2 | CA005 | 06-30-16 |

## Laboratory: TestAmerica Denver

The certifications listed below are applicable to this report.

| Authority | Program | EPA Region | Certification ID | Expiration Date |
|---|---|---|---|---|
| A2LA | DoD ELAP | | 2907.01 | 10-31-17 |
| New Jersey | NELAP | 2 | CO004 | 06-30-16 |

# Method Summary

Client: Earth Toxics, Inc
Project/Site: Ensafe-NWS-Earle, NJ PFCs Potable Water

TestAmerica Job ID: 320-18555-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| WS-LC-0025 | Perfluorinated Hydrocarbons | TAL SOP | TAL SAC |

**Protocol References:**

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

**Laboratory References:**

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

# Sample Summary

Client: Earth Toxics, Inc
Project/Site: Ensafe-NWS-Earle, NJ PFCs Potable Water

TestAmerica Job ID: 320-18555-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 320-18555-1 | DW16 | Water | 04/27/16 12:36 | 04/28/16 09:15 |
| 320-18555-2 | DW16FB | Water | 04/27/16 12:40 | 04/28/16 09:15 |

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

Instrument ID: A4 Analysis Batch Number: 109262

Lab Sample ID: MB 320-108614/1-A Client Sample ID:

Date Analyzed: 05/07/16 18:08 Lab File ID: 07MAY2016B4A_015.d GC Column: Acquity ID: 2.1(mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|---|---|---|---|---|
| | | REASON | ANALYST | DATE |
| Perfluorononanoic acid (PFNA) | 11.49 | Baseline | barnettj | 05/09/16 14:33 |

Lab Sample ID: LCS 320-108614/2-A Client Sample ID:

Date Analyzed: 05/07/16 18:29 Lab File ID: 07MAY2016B4A_016.d GC Column: Acquity ID: 2.1(mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|---|---|---|---|---|
| | | REASON | ANALYST | DATE |
| Perfluorohexanesulfonic acid (PFHxS) | 9.43 | Isomers | barnettj | 05/09/16 14:43 |
| Perfluorooctanesulfonic acid (PFOS) | 11.46 | Isomers | barnettj | 05/09/16 14:34 |

Lab Sample ID: LCSD 320-108614/3-A Client Sample ID:

Date Analyzed: 05/07/16 18:50 Lab File ID: 07MAY2016B4A_017.d GC Column: Acquity ID: 2.1(mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|---|---|---|---|---|
| | | REASON | ANALYST | DATE |
| Perfluorohexanesulfonic acid (PFHxS) | 9.42 | Isomers | barnettj | 05/09/16 14:43 |
| Perfluorooctanesulfonic acid (PFOS) | 11.46 | Isomers | barnettj | 05/09/16 14:36 |

Lab Sample ID: 320-18555-1 Client Sample ID: DW16

Date Analyzed: 05/07/16 19:11 Lab File ID: 07MAY2016B4A_018.d GC Column: Acquity ID: 2.1(mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|---|---|---|---|---|
| | | REASON | ANALYST | DATE |
| Perfluorooctanesulfonic acid (PFOS) | 11.46 | Isomers | barnettj | 05/09/16 14:30 |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| **LCMPFCSU_00036** | 10/07/16 | 04/07/16 | Methanol, Lot Baker 115935 | 10000 uL | LCM2PFHxDA_00004 | 200 uL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00004 | 200 uL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00004 | 200 uL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00005 | 200 uL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00008 | 200 uL | 13C8 FOSA | 1 ug/mL |
| | | | | | LCMPFBA_00005 | 200 uL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00007 | 200 uL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00005 | 200 uL | 13C2 PFDoA | 1 ug/mL |
| | | | | | LCMPFHxA_00008 | 200 uL | 13C2 PFHxA | 1 ug/mL |
| | | | | | LCMPFHxS_00005 | 200 uL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00005 | 200 uL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00009 | 200 uL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00012 | 200 uL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00006 | 200 uL | 13C2 PFUnA | 1 ug/mL |
| .LCM2PFHxDA_00004 | 01/07/21 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| .LCM2PFTeDA_00004 | 12/07/20 | Wellington Laboratories, Lot M2PFTeDA1115 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| .LCM4PFHPA_00004 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| .LCM5PFPEA_00005 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| .LCM8FOSA_00008 | 12/22/17 | Wellington Laboratories, Lot M8FOSA1215I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| .LCMPFBA_00005 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| .LCMPFDA_00007 | 08/19/20 | Wellington Laboratories, Lot MPFDA0815 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| .LCMPFDoA_00005 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| .LCMPFHxA_00008 | 04/09/20 | Wellington Laboratories, Lot MPFHxA0415 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |
| .LCMPFHxS_00005 | 08/23/20 | Wellington Laboratories, Lot MPFHxS1015 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| .LCMPFNA_00005 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| .LCMPFOA_00009 | 01/22/21 | Wellington Laboratories, Lot MPFOA0116 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| .LCMPFOS_00012 | 01/22/21 | Wellington Laboratories, Lot MPFOS0116 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| .LCMPFUdA_00006 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |
| **LCPFC-L1_00018** | 06/29/16 | 12/30/15 | MeOH/H2O, Lot 90285 | 5 mL | LCMPFCSU_00024 | 250 uL | 13C2-PFHxDA | 50 ng/mL |
| | | | | | | | 13C2-PFTeDA | 50 ng/mL |
| | | | | | | | 13C4-PFHpA | 50 ng/mL |
| | | | | | | | 13C5-PFPeA | 50 ng/mL |
| | | | | | | | 13C8 FOSA | 50 ng/mL |
| | | | | | | | 13C4 PFBA | 50 ng/mL |
| | | | | | | | 13C2 PFDA | 50 ng/mL |
| | | | | | | | 13C2 PFDoA | 50 ng/mL |
| | | | | | | | 13C2 PFHxA | 50 ng/mL |
| | | | | | | | 18O2 PFHxS | 47.3 ng/mL |
| | | | | | | | 13C5 PFNA | 50 ng/mL |
| | | | | | | | 13C4 PFOA | 50 ng/mL |
| | | | | | | | 13C4 PFOS | 47.8 ng/mL |
| | | | | | | | 13C2 PFUnA | 50 ng/mL |
| | | | | | LCPFCSP_00040 | 25 uL | Perfluorobutyric acid | 0.5 ng/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 0.442 ng/mL |
| | | | | | | | Perfluorodecanoic acid | 0.5 ng/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | | | Perfluorododecanoic acid | 0.5 ng/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 0.482 ng/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 0.5 ng/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 0.476 ng/mL |
| | | | | | | | Perfluorohexanoic acid | 0.5 ng/mL |
| | | | | | | | Perfluorohexadecanoic acid | 0.5 ng/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 0.473 ng/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 0.5 ng/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 0.5 ng/mL |
| | | | | | | | Perfluorooctandecanoic acid | 0.5 ng/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 0.478 ng/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 0.5 ng/mL |
| | | | | | | | Perfluoropentanoic acid | 0.5 ng/mL |
| | | | | | | | Perfluorotetradecanoic acid | 0.5 ng/mL |
| | | | | | | | Perfluorotridecanoic acid | 0.5 ng/mL |
| | | | | | | | Perfluoroundecanoic acid | 0.5 ng/mL |
| .LCMPFCSU_00024 | 06/29/16 | 12/29/15 | Methanol, Lot Baker 115491 | 10 mL | LCM2PFHxDA_00003 | 0.2 mL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00003 | 0.2 mL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00003 | 0.2 mL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00004 | 0.2 mL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00006 | 0.2 mL | 13C8 FOSA | 1 ug/mL |
| | | | | | LCMPFBA_00004 | 0.2 mL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00004 | 0.2 mL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00004 | 0.2 mL | 13C2 PFDoA | 1 ug/mL |
| | | | | | LCMPFHxA_00005 | 0.2 mL | 13C2 PFHxA | 1 ug/mL |
| | | | | | LCMPFHxS_00004 | 0.2 mL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00003 | 0.2 mL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00007 | 0.2 mL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00009 | 0.2 mL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00005 | 0.2 mL | 13C2 PFUnA | 1 ug/mL |
| ..LCM2PFHxDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| ..LCM2PFTeDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFTeDA1112 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| ..LCM4PFHPA_00003 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| ..LCM5PFPEA_00004 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| ..LCM8FOSA_00006 | 12/15/16 | Wellington Laboratories, Lot M8FOSA1214I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| ..LCMPFBA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| ..LCMPFDA_00004 | 04/13/19 | Wellington Laboratories, Lot MPFDA0414 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| ..LCMPFDoA_00004 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| ..LCMPFHxA_00005 | 04/13/19 | Wellington Laboratories, Lot MPFHxA0414 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |
| ..LCMPFHxS_00004 | 07/25/18 | Wellington Laboratories, Lot MPFHxS0713 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| ..LCMPFNA_00003 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| ..LCMPFOA_00007 | 04/10/20 | Wellington Laboratories, Lot MPFOA0415 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| ..LCMPFOS_00009 | 05/15/20 | Wellington Laboratories, Lot MPFOS0515 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| ..LCMPFUdA_00005 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| .LCPFCSP_00040 | 06/30/16 | 12/30/15 | Methanol, Lot 090285 | 5 mL | LCPFCSP_00039 | 0.5 mL | Perfluorobutyric acid | 0.1 ug/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 0.0884 ug/mL |
| | | | | | | | Perfluorodecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorododecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 0.0964 ug/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 0.1 ug/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 0.0952 ug/mL |
| | | | | | | | Perfluorohexanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorohexadecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 0.0946 ug/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 0.1 ug/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 0.1 ug/mL |
| | | | | | | | Perfluorooctandecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 0.0956 ug/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 0.1 ug/mL |
| | | | | | | | Perfluoropentanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorotetradecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorotridecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluoroundecanoic acid | 0.1 ug/mL |
| ..LCPFCSP_00039 | 06/30/16 | 12/30/15 | Methanol, Lot 090285 | 5 mL | LCPFBA_00003 | 0.1 mL | Perfluorobutyric acid | 1 ug/mL |
| | | | | | LCPFBSA_00001 | 0.1 mL | Perfluorobutanesulfonic acid (PFBS) | 0.884 ug/mL |
| | | | | | LCPFDA_00003 | 0.1 mL | Perfluorodecanoic acid | 1 ug/mL |
| | | | | | LCPFDoA_00003 | 0.1 mL | Perfluorododecanoic acid | 1 ug/mL |
| | | | | | LCPFDSA_00001 | 0.1 mL | Perfluorodecane Sulfonic acid | 0.964 ug/mL |
| | | | | | LCPFHpA_00004 | 0.1 mL | Perfluoroheptanoic acid (PFHpA) | 1 ug/mL |
| | | | | | LCPFHpSA_00001 | 0.1 mL | Perfluoroheptanesulfonic Acid | 0.952 ug/mL |
| | | | | | LCPFHxA_00003 | 0.1 mL | Perfluorohexanoic acid | 1 ug/mL |
| | | | | | LCPFHxDA_00004 | 0.1 mL | Perfluorohexadecanoic acid | 1 ug/mL |
| | | | | | LCPFHxSA_00001 | 0.1 mL | Perfluorohexanesulfonic acid (PFHxS) | 0.946 ug/mL |
| | | | | | LCPFNA_00004 | 0.1 mL | Perfluorononanoic acid (PFNA) | 1 ug/mL |
| | | | | | LCPFOA_00004 | 0.1 mL | Perfluorooctanoic acid (PFOA) | 1 ug/mL |
| | | | | | LCPFODA_00004 | 0.1 mL | Perfluorooctandecanoic acid | 1 ug/mL |
| | | | | | LCPFOS_00004 | 0.1 mL | Perfluorooctanesulfonic acid (PFOS) | 0.956 ug/mL |
| | | | | | LCPFOSA_00005 | 0.1 mL | Perfluorooctane Sulfonamide | 1 ug/mL |
| | | | | | LCPFPeA_00003 | 0.1 mL | Perfluoropentanoic acid | 1 ug/mL |
| | | | | | LCPFTeDA_00003 | 0.1 mL | Perfluorotetradecanoic acid | 1 ug/mL |
| | | | | | LCPFTrDA_00003 | 0.1 mL | Perfluorotridecanoic acid | 1 ug/mL |
| | | | | | LCPFUdA_00003 | 0.1 mL | Perfluoroundecanoic acid | 1 ug/mL |
| ...LCPFBA_00003 | 03/05/18 | Wellington Laboratories, Lot PFBA0313 | | | (Purchased Reagent) | | Perfluorobutyric acid | 50 ug/mL |
| ...LCPFBSA_00001 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| ...LCPFDA_00003 | 06/18/18 | Wellington Laboratories, Lot PFDA0613 | | | (Purchased Reagent) | | Perfluorodecanoic acid | 50 ug/mL |
| ...LCPFDoA_00003 | 01/03/18 | Wellington Laboratories, Lot PFDoA0113 | | | (Purchased Reagent) | | Perfluorododecanoic acid | 50 ug/mL |
| ...LCPFDSA_00001 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonic acid | 48.2 ug/mL |
| ...LCPFHpA_00004 | 05/09/19 | Wellington Laboratories, Lot PFHpA0514 | | | (Purchased Reagent) | | Perfluoroheptanoic acid (PFHpA) | 50 ug/mL |
| ...LCPFHpSA_00001 | 11/21/17 | Wellington Laboratories, Lot LPFHpS1112 | | | (Purchased Reagent) | | Perfluoroheptanesulfonic Acid | 47.6 ug/mL |
| ...LCPFHxA_00003 | 05/09/19 | Wellington Laboratories, Lot PFHxA0514 | | | (Purchased Reagent) | | Perfluorohexanoic acid | 50 ug/mL |
| ...LCPFHxDA_00004 | 11/28/17 | Wellington Laboratories, Lot PFHxDA0707 | | | (Purchased Reagent) | | Perfluorohexadecanoic acid | 50 ug/mL |
| ...LCPFHxSA_00001 | 05/09/19 | Wellington Laboratories, Lot LPFHxS0514 | | | (Purchased Reagent) | | Perfluorohexanesulfonic acid (PFHxS) | 47.3 ug/mL |
| ...LCPFNA_00004 | 05/09/19 | Wellington Laboratories, Lot PFNA0514 | | | (Purchased Reagent) | | Perfluorononanoic acid (PFNA) | 50 ug/mL |
| ...LCPFOA_00004 | 10/11/18 | Wellington Laboratories, Lot PFOA1013 | | | (Purchased Reagent) | | Perfluorooctanoic acid (PFOA) | 50 ug/mL |
| ...LCPFODA_00004 | 04/25/17 | Wellington Laboratories, Lot PFODA0807 | | | (Purchased Reagent) | | Perfluorooctandecanoic acid | 50 ug/mL |
| ...LCPFOS_00004 | 06/20/19 | Wellington Laboratories, Lot LPFOS0614 | | | (Purchased Reagent) | | Perfluorooctanesulfonic acid (PFOS) | 47.8 ug/mL |
| ...LCPFOSA_00005 | 07/31/18 | Wellington Laboratories, Lot FOSA0714I | | | (Purchased Reagent) | | Perfluorooctane Sulfonamide | 50 ug/mL |
| ...LCPFPeA_00003 | 01/03/18 | Wellington Laboratories, Lot PFPeA0113 | | | (Purchased Reagent) | | Perfluoropentanoic acid | 50 ug/mL |
| ...LCPFTeDA_00003 | 06/19/18 | Wellington Laboratories, Lot PFTeDA0613 | | | (Purchased Reagent) | | Perfluorotetradecanoic acid | 50 ug/mL |
| ...LCPFTrDA_00003 | 12/10/18 | Wellington Laboratories, Lot PFTrDA1213 | | | (Purchased Reagent) | | Perfluorotridecanoic acid | 50 ug/mL |
| ...LCPFUdA_00003 | 06/19/18 | Wellington Laboratories, Lot PFUdA0613 | | | (Purchased Reagent) | | Perfluoroundecanoic acid | 50 ug/mL |
| **LCPFC-L2_00018** | 06/29/16 | 12/30/15 | MeOH/H2O, Lot 090285 | 5 mL | LCMPFCSU_00024 | 250 uL | 13C2-PFHxDA | 50 ng/mL |
| | | | | | | | 13C2-PFTeDA | 50 ng/mL |
| | | | | | | | 13C4-PFHpA | 50 ng/mL |
| | | | | | | | 13C5-PFPeA | 50 ng/mL |
| | | | | | | | 13C8 FOSA | 50 ng/mL |
| | | | | | | | 13C4 PFBA | 50 ng/mL |
| | | | | | | | 13C2 PFDA | 50 ng/mL |
| | | | | | | | 13C2 PFDoA | 50 ng/mL |
| | | | | | | | 13C2 PFHxA | 50 ng/mL |
| | | | | | | | 18O2 PFHxS | 47.3 ng/mL |
| | | | | | | | 13C5 PFNA | 50 ng/mL |
| | | | | | | | 13C4 PFOA | 50 ng/mL |
| | | | | | | | 13C4 PFOS | 47.8 ng/mL |
| | | | | | | | 13C2 PFUnA | 50 ng/mL |
| | | | | | LCPFCSP_00040 | 50 uL | Perfluorobutyric acid | 1 ng/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 0.884 ng/mL |
| | | | | | | | Perfluorodecanoic acid | 1 ng/mL |
| | | | | | | | Perfluorododecanoic acid | 1 ng/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 0.964 ng/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 1 ng/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 0.952 ng/mL |
| | | | | | | | Perfluorohexanoic acid | 1 ng/mL |
| | | | | | | | Perfluorohexadecanoic acid | 1 ng/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 0.946 ng/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 1 ng/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 1 ng/mL |
| | | | | | | | Perfluorooctandecanoic acid | 1 ng/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 0.956 ng/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 1 ng/mL |
| | | | | | | | Perfluoropentanoic acid | 1 ng/mL |
| | | | | | | | Perfluorotetradecanoic acid | 1 ng/mL |
| | | | | | | | Perfluorotridecanoic acid | 1 ng/mL |
| | | | | | | | Perfluoroundecanoic acid | 1 ng/mL |
| .LCMPFCSU_00024 | 06/29/16 | 12/29/15 | Methanol, Lot Baker 115491 | 10 mL | LCM2PFHxDA_00003 | 0.2 mL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00003 | 0.2 mL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00003 | 0.2 mL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00004 | 0.2 mL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00006 | 0.2 mL | 13C8 FOSA | 1 ug/mL |
| | | | | | LCMPFBA_00004 | 0.2 mL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00004 | 0.2 mL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00004 | 0.2 mL | 13C2 PFDoA | 1 ug/mL |
| | | | | | LCMPFHxA_00005 | 0.2 mL | 13C2 PFHxA | 1 ug/mL |
| | | | | | LCMPFHxS_00004 | 0.2 mL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00003 | 0.2 mL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00007 | 0.2 mL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00009 | 0.2 mL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00005 | 0.2 mL | 13C2 PFUnA | 1 ug/mL |
| ..LCM2PFHxDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| ..LCM2PFTeDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFTeDA1112 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| ..LCM4PFHPA_00003 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| ..LCM5PFPEA_00004 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| ..LCM8FOSA_00006 | 12/15/16 | Wellington Laboratories, Lot M8FOSA1214I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| ..LCMPFBA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| ..LCMPFDA_00004 | 04/13/19 | Wellington Laboratories, Lot MPFDA0414 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| ..LCMPFDoA_00004 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| ..LCMPFHxA_00005 | 04/13/19 | Wellington Laboratories, Lot MPFHxA0414 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |
| ..LCMPFHxS_00004 | 07/25/18 | Wellington Laboratories, Lot MPFHxS0713 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| ..LCMPFNA_00003 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| ..LCMPFOA_00007 | 04/10/20 | Wellington Laboratories, Lot MPFOA0415 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| ..LCMPFOS_00009 | 05/15/20 | Wellington Laboratories, Lot MPFOS0515 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| ..LCMPFUdA_00005 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |
| .LCPFCSP_00040 | 06/30/16 | 12/30/15 | Methanol, Lot 090285 | 5 mL | LCPFCSP_00039 | 0.5 mL | Perfluorobutyric acid | 0.1 ug/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 0.0884 ug/mL |
| | | | | | | | Perfluorodecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorododecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 0.0964 ug/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 0.1 ug/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 0.0952 ug/mL |
| | | | | | | | Perfluorohexanoic acid | 0.1 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | | | Perfluorohexadecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 0.0946 ug/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 0.1 ug/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 0.1 ug/mL |
| | | | | | | | Perfluorooctandecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 0.0956 ug/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 0.1 ug/mL |
| | | | | | | | Perfluoropentanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorotetradecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorotridecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluoroundecanoic acid | 0.1 ug/mL |
| ..LCPFCSP_00039 | 06/30/16 | 12/30/15 | Methanol, Lot 090285 | 5 mL | LCPFBA_00003 | 0.1 mL | Perfluorobutyric acid | 1 ug/mL |
| | | | | | LCPFBSA_00001 | 0.1 mL | Perfluorobutanesulfonic acid (PFBS) | 0.884 ug/mL |
| | | | | | LCPFDA_00003 | 0.1 mL | Perfluorodecanoic acid | 1 ug/mL |
| | | | | | LCPFDoA_00003 | 0.1 mL | Perfluorododecanoic acid | 1 ug/mL |
| | | | | | LCPFDSA_00001 | 0.1 mL | Perfluorodecane Sulfonic acid | 0.964 ug/mL |
| | | | | | LCPFHpA_00004 | 0.1 mL | Perfluoroheptanoic acid (PFHpA) | 1 ug/mL |
| | | | | | LCPFHpSA_00001 | 0.1 mL | Perfluoroheptanesulfonic Acid | 0.952 ug/mL |
| | | | | | LCPFHxA_00003 | 0.1 mL | Perfluorohexanoic acid | 1 ug/mL |
| | | | | | LCPFHxDA_00004 | 0.1 mL | Perfluorohexadecanoic acid | 1 ug/mL |
| | | | | | LCPFHxSA_00001 | 0.1 mL | Perfluorohexanesulfonic acid (PFHxS) | 0.946 ug/mL |
| | | | | | LCPFNA_00004 | 0.1 mL | Perfluorononanoic acid (PFNA) | 1 ug/mL |
| | | | | | LCPFOA_00004 | 0.1 mL | Perfluorooctanoic acid (PFOA) | 1 ug/mL |
| | | | | | LCPFODA_00004 | 0.1 mL | Perfluorooctandecanoic acid | 1 ug/mL |
| | | | | | LCPFOS_00004 | 0.1 mL | Perfluorooctanesulfonic acid (PFOS) | 0.956 ug/mL |
| | | | | | LCPFOSA_00005 | 0.1 mL | Perfluorooctane Sulfonamide | 1 ug/mL |
| | | | | | LCPFPeA_00003 | 0.1 mL | Perfluoropentanoic acid | 1 ug/mL |
| | | | | | LCPFTeDA_00003 | 0.1 mL | Perfluorotetradecanoic acid | 1 ug/mL |
| | | | | | LCPFTrDA_00003 | 0.1 mL | Perfluorotridecanoic acid | 1 ug/mL |
| | | | | | LCPFUdA_00003 | 0.1 mL | Perfluoroundecanoic acid | 1 ug/mL |
| ...LCPFBA_00003 | 03/05/18 | Wellington Laboratories, Lot PFBA0313 | | | (Purchased Reagent) | | Perfluorobutyric acid | 50 ug/mL |
| ...LCPFBSA_00001 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ug/mL |
| ...LCPFDA_00003 | 06/18/18 | Wellington Laboratories, Lot PFDA0613 | | | (Purchased Reagent) | | Perfluorodecanoic acid | 50 ug/mL |
| ...LCPFDoA_00003 | 01/03/18 | Wellington Laboratories, Lot PFDoA0113 | | | (Purchased Reagent) | | Perfluorododecanoic acid | 50 ug/mL |
| ...LCPFDSA_00001 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonic acid | 48.2 ug/mL |
| ...LCPFHpA_00004 | 05/09/19 | Wellington Laboratories, Lot PFHpA0514 | | | (Purchased Reagent) | | Perfluoroheptanoic acid (PFHpA) | 50 ug/mL |
| ...LCPFHpSA_00001 | 11/21/17 | Wellington Laboratories, Lot LPFHpS1112 | | | (Purchased Reagent) | | Perfluoroheptanesulfonic Acid | 47.6 ug/mL |
| ...LCPFHxA_00003 | 05/09/19 | Wellington Laboratories, Lot PFHxA0514 | | | (Purchased Reagent) | | Perfluorohexanoic acid | 50 ug/mL |
| ...LCPFHxDA_00004 | 11/28/17 | Wellington Laboratories, Lot PFHxDA0707 | | | (Purchased Reagent) | | Perfluorohexadecanoic acid | 50 ug/mL |
| ...LCPFHxSA_00001 | 05/09/19 | Wellington Laboratories, Lot LPFHxS0514 | | | (Purchased Reagent) | | Perfluorohexanesulfonic acid (PFHxS) | 47.3 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| ...LCPFNA_00004 | 05/09/19 | Wellington Laboratories, Lot PFNA0514 | | | (Purchased Reagent) | | Perfluorononanoic acid (PFNA) | 50 ug/mL |
| ...LCPFOA_00004 | 10/11/18 | Wellington Laboratories, Lot PFOA1013 | | | (Purchased Reagent) | | Perfluorooctanoic acid (PFOA) | 50 ug/mL |
| ...LCPFODA_00004 | 04/25/17 | Wellington Laboratories, Lot PFODA0807 | | | (Purchased Reagent) | | Perfluorooctandecanoic acid | 50 ug/mL |
| ...LCPFOS_00004 | 06/20/19 | Wellington Laboratories, Lot LPFOS0614 | | | (Purchased Reagent) | | Perfluorooctanesulfonic acid (PFOS) | 47.8 ug/mL |
| ...LCPFOSA_00005 | 07/31/18 | Wellington Laboratories, Lot FOSA0714I | | | (Purchased Reagent) | | Perfluorooctane Sulfonamide | 50 ug/mL |
| ...LCPFPeA_00003 | 01/03/18 | Wellington Laboratories, Lot PFPeA0113 | | | (Purchased Reagent) | | Perfluoropentanoic acid | 50 ug/mL |
| ...LCPFTeDA_00003 | 06/19/18 | Wellington Laboratories, Lot PFTeDA0613 | | | (Purchased Reagent) | | Perfluorotetradecanoic acid | 50 ug/mL |
| ...LCPFTrDA_00003 | 12/10/18 | Wellington Laboratories, Lot PFTrDA1213 | | | (Purchased Reagent) | | Perfluorotridecanoic acid | 50 ug/mL |
| ...LCPFUdA_00003 | 06/19/18 | Wellington Laboratories, Lot PFUdA0613 | | | (Purchased Reagent) | | Perfluoroundecanoic acid | 50 ug/mL |
| **LCPFC-L3_00016** | 06/29/16 | 12/30/15 | MeOH/H2O, Lot 090285 | 5 mL | LCMPFCSU_00024 | 250 uL | 13C2-PFHxDA | 50 ng/mL |
| | | | | | | | 13C2-PFTeDA | 50 ng/mL |
| | | | | | | | 13C4-PFHpA | 50 ng/mL |
| | | | | | | | 13C5-PFPeA | 50 ng/mL |
| | | | | | | | 13C8 FOSA | 50 ng/mL |
| | | | | | | | 13C4 PFBA | 50 ng/mL |
| | | | | | | | 13C2 PFDA | 50 ng/mL |
| | | | | | | | 13C2 PFDoA | 50 ng/mL |
| | | | | | | | 13C2 PFHxA | 50 ng/mL |
| | | | | | | | 18O2 PFHxS | 47.3 ng/mL |
| | | | | | | | 13C5 PFNA | 50 ng/mL |
| | | | | | | | 13C4 PFOA | 50 ng/mL |
| | | | | | | | 13C4 PFOS | 47.8 ng/mL |
| | | | | | | | 13C2 PFUnA | 50 ng/mL |
| | | | | | LCPFCSP_00040 | 250 uL | Perfluorobutyric acid | 5 ng/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 4.42 ng/mL |
| | | | | | | | Perfluorodecanoic acid | 5 ng/mL |
| | | | | | | | Perfluorododecanoic acid | 5 ng/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 4.82 ng/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 5 ng/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 4.76 ng/mL |
| | | | | | | | Perfluorohexanoic acid | 5 ng/mL |
| | | | | | | | Perfluorohexadecanoic acid | 5 ng/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 4.73 ng/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 5 ng/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 5 ng/mL |
| | | | | | | | Perfluorooctandecanoic acid | 5 ng/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 4.78 ng/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 5 ng/mL |
| | | | | | | | Perfluoropentanoic acid | 5 ng/mL |
| | | | | | | | Perfluorotetradecanoic acid | 5 ng/mL |
| | | | | | | | Perfluorotridecanoic acid | 5 ng/mL |
| | | | | | | | Perfluoroundecanoic acid | 5 ng/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| .LCMPFCSU_00024 | 06/29/16 | 12/29/15 | Methanol, Lot Baker 115491 | 10 mL | LCM2PFHxDA_00003 | 0.2 mL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00003 | 0.2 mL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00003 | 0.2 mL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00004 | 0.2 mL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00006 | 0.2 mL | 13C8 FOSA | 1 ug/mL |
| | | | | | LCMPFBA_00004 | 0.2 mL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00004 | 0.2 mL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00004 | 0.2 mL | 13C2 PFDoA | 1 ug/mL |
| | | | | | LCMPFHxA_00005 | 0.2 mL | 13C2 PFHxA | 1 ug/mL |
| | | | | | LCMPFHxS_00004 | 0.2 mL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00003 | 0.2 mL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00007 | 0.2 mL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00009 | 0.2 mL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00005 | 0.2 mL | 13C2 PFUnA | 1 ug/mL |
| ..LCM2PFHxDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| ..LCM2PFTeDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFTeDA1112 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| ..LCM4PFHPA_00003 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| ..LCM5PFPEA_00004 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| ..LCM8FOSA_00006 | 12/15/16 | Wellington Laboratories, Lot M8FOSA1214I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| ..LCMPFBA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| ..LCMPFDA_00004 | 04/13/19 | Wellington Laboratories, Lot MPFDA0414 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| ..LCMPFDoA_00004 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| ..LCMPFHxA_00005 | 04/13/19 | Wellington Laboratories, Lot MPFHxA0414 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |
| ..LCMPFHxS_00004 | 07/25/18 | Wellington Laboratories, Lot MPFHxS0713 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| ..LCMPFNA_00003 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| ..LCMPFOA_00007 | 04/10/20 | Wellington Laboratories, Lot MPFOA0415 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| ..LCMPFOS_00009 | 05/15/20 | Wellington Laboratories, Lot MPFOS0515 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| ..LCMPFUdA_00005 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |
| .LCPFCSP_00040 | 06/30/16 | 12/30/15 | Methanol, Lot 090285 | 5 mL | LCPFCSP_00039 | 0.5 mL | Perfluorobutyric acid | 0.1 ug/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 0.0884 ug/mL |
| | | | | | | | Perfluorodecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorododecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 0.0964 ug/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 0.1 ug/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 0.0952 ug/mL |
| | | | | | | | Perfluorohexanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorohexadecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 0.0946 ug/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 0.1 ug/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 0.1 ug/mL |
| | | | | | | | Perfluorooctandecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 0.0956 ug/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 0.1 ug/mL |

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | | | Perfluoropentanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorotetradecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluorotridecanoic acid | 0.1 ug/mL |
| | | | | | | | Perfluoroundecanoic acid | 0.1 ug/mL |
| ..LCPFCSP_00039 | 06/30/16 | 12/30/15 | Methanol, Lot 090285 | 5 mL | LCPFBA_00003 | 0.1 mL | Perfluorobutyric acid | 1 ug/mL |
| | | | | | LCPFBSA_00001 | 0.1 mL | Perfluorobutanesulfonic acid (PFBS) | 0.884 ug/mL |
| | | | | | LCPFDA_00003 | 0.1 mL | Perfluorodecanoic acid | 1 ug/mL |
| | | | | | LCPFDoA_00003 | 0.1 mL | Perfluorododecanoic acid | 1 ug/mL |
| | | | | | LCPFDSA_00001 | 0.1 mL | Perfluorodecane Sulfonic acid | 0.964 ug/mL |
| | | | | | LCPFHpA_00004 | 0.1 mL | Perfluoroheptanoic acid (PFHpA) | 1 ug/mL |
| | | | | | LCPFHpSA_00001 | 0.1 mL | Perfluoroheptanesulfonic Acid | 0.952 ug/mL |
| | | | | | LCPFHxA_00003 | 0.1 mL | Perfluorohexanoic acid | 1 ug/mL |
| | | | | | LCPFHxDA_00004 | 0.1 mL | Perfluorohexadecanoic acid | 1 ug/mL |
| | | | | | LCPFHxSA_00001 | 0.1 mL | Perfluorohexanesulfonic acid (PFHxS) | 0.946 ug/mL |
| | | | | | LCPFNA_00004 | 0.1 mL | Perfluorononanoic acid (PFNA) | 1 ug/mL |
| | | | | | LCPFOA_00004 | 0.1 mL | Perfluorooctanoic acid (PFOA) | 1 ug/mL |
| | | | | | LCPFODA_00004 | 0.1 mL | Perfluorooctandecanoic acid | 1 ug/mL |
| | | | | | LCPFOS_00004 | 0.1 mL | Perfluorooctanesulfonic acid (PFOS) | 0.956 ug/mL |
| | | | | | LCPFOSA_00005 | 0.1 mL | Perfluorooctane Sulfonamide | 1 ug/mL |
| | | | | | LCPFPeA_00003 | 0.1 mL | Perfluoropentanoic acid | 1 ug/mL |
| | | | | | LCPFTeDA_00003 | 0.1 mL | Perfluorotetradecanoic acid | 1 ug/mL |
| | | | | | LCPFTrDA_00003 | 0.1 mL | Perfluorotridecanoic acid | 1 ug/mL |
| | | | | | LCPFUdA_00003 | 0.1 mL | Perfluoroundecanoic acid | 1 ug/mL |
| ...LCPFBA_00003 | 03/05/18 | Wellington Laboratories, Lot PFBA0313 | | | (Purchased Reagent) | | Perfluorobutyric acid | 50 ug/mL |
| ...LCPFBSA_00001 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ug/mL |
| ...LCPFDA_00003 | 06/18/18 | Wellington Laboratories, Lot PFDA0613 | | | (Purchased Reagent) | | Perfluorodecanoic acid | 50 ug/mL |
| ...LCPFDoA_00003 | 01/03/18 | Wellington Laboratories, Lot PFDoA0113 | | | (Purchased Reagent) | | Perfluorododecanoic acid | 50 ug/mL |
| ...LCPFDSA_00001 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonic acid | 48.2 ug/mL |
| ...LCPFHpA_00004 | 05/09/19 | Wellington Laboratories, Lot PFHpA0514 | | | (Purchased Reagent) | | Perfluoroheptanoic acid (PFHpA) | 50 ug/mL |
| ...LCPFHpSA_00001 | 11/21/17 | Wellington Laboratories, Lot LPFHpS1112 | | | (Purchased Reagent) | | Perfluoroheptanesulfonic Acid | 47.6 ug/mL |
| ...LCPFHxA_00003 | 05/09/19 | Wellington Laboratories, Lot PFHxA0514 | | | (Purchased Reagent) | | Perfluorohexanoic acid | 50 ug/mL |
| ...LCPFHxDA_00004 | 11/28/17 | Wellington Laboratories, Lot PFHxDA0707 | | | (Purchased Reagent) | | Perfluorohexadecanoic acid | 50 ug/mL |
| ...LCPFHxSA_00001 | 05/09/19 | Wellington Laboratories, Lot LPFHxS0514 | | | (Purchased Reagent) | | Perfluorohexanesulfonic acid (PFHxS) | 47.3 ug/mL |
| ...LCPFNA_00004 | 05/09/19 | Wellington Laboratories, Lot PFNA0514 | | | (Purchased Reagent) | | Perfluorononanoic acid (PFNA) | 50 ug/mL |
| ...LCPFOA_00004 | 10/11/18 | Wellington Laboratories, Lot PFOA1013 | | | (Purchased Reagent) | | Perfluorooctanoic acid (PFOA) | 50 ug/mL |
| ...LCPFODA_00004 | 04/25/17 | Wellington Laboratories, Lot PFODA0807 | | | (Purchased Reagent) | | Perfluorooctandecanoic acid | 50 ug/mL |
| ...LCPFOS_00004 | 06/20/19 | Wellington Laboratories, Lot LPFOS0614 | | | (Purchased Reagent) | | Perfluorooctanesulfonic acid (PFOS) | 47.8 ug/mL |
| ...LCPFOSA_00005 | 07/31/18 | Wellington Laboratories, Lot FOSA0714I | | | (Purchased Reagent) | | Perfluorooctane Sulfonamide | 50 ug/mL |
| ...LCPFPeA_00003 | 01/03/18 | Wellington Laboratories, Lot PFPeA0113 | | | (Purchased Reagent) | | Perfluoropentanoic acid | 50 ug/mL |
| ...LCPFTeDA_00003 | 06/19/18 | Wellington Laboratories, Lot PFTeDA0613 | | | (Purchased Reagent) | | Perfluorotetradecanoic acid | 50 ug/mL |
| ...LCPFTrDA_00003 | 12/10/18 | Wellington Laboratories, Lot PFTrDA1213 | | | (Purchased Reagent) | | Perfluorotridecanoic acid | 50 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| ...LCPFUdA_00003 | 06/19/18 | Wellington Laboratories, Lot PFUdA0613 | | | (Purchased Reagent) | | Perfluoroundecanoic acid | 50 ug/mL |
| **LCPFC-L4_00018** | 08/11/16 | 03/02/16 | MeOH/H2O, Lot 090285 | 5 mL | LCMPFCSU_00029 | 250 uL | 13C2-PFHxDA | 50 ng/mL |
| | | | | | | | 13C2-PFTeDA | 50 ng/mL |
| | | | | | | | 13C4-PFHpA | 50 ng/mL |
| | | | | | | | 13C5-PFPeA | 50 ng/mL |
| | | | | | | | 13C8 FOSA | 50 ng/mL |
| | | | | | | | 13C4 PFBA | 50 ng/mL |
| | | | | | | | 13C2 PFDA | 50 ng/mL |
| | | | | | | | 13C2 PFDoA | 50 ng/mL |
| | | | | | | | 13C2 PFHxA | 50 ng/mL |
| | | | | | | | 18O2 PFHxS | 47.3 ng/mL |
| | | | | | | | 13C5 PFNA | 50 ng/mL |
| | | | | | | | 13C4 PFOA | 50 ng/mL |
| | | | | | | | 13C4 PFOS | 47.8 ng/mL |
| | | | | | | | 13C2 PFUnA | 50 ng/mL |
| | | | | | LCPFCSP_00041 | 100 uL | Perfluorobutyric acid | 20 ng/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 17.68 ng/mL |
| | | | | | | | Perfluorodecanoic acid | 20 ng/mL |
| | | | | | | | Perfluorododecanoic acid | 20 ng/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 19.28 ng/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 20 ng/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 19.04 ng/mL |
| | | | | | | | Perfluorohexanoic acid | 20 ng/mL |
| | | | | | | | Perfluorohexadecanoic acid | 20 ng/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 18.92 ng/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 20 ng/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 20 ng/mL |
| | | | | | | | Perfluorooctandecanoic acid | 20 ng/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 19.12 ng/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 20 ng/mL |
| | | | | | | | Perfluoropentanoic acid | 20 ng/mL |
| | | | | | | | Perfluorotetradecanoic acid | 20 ng/mL |
| | | | | | | | Perfluorotridecanoic acid | 20 ng/mL |
| | | | | | | | Perfluoroundecanoic acid | 20 ng/mL |
| .LCMPFCSU_00029 | 08/29/16 | 02/29/16 | Methanol, Lot Baker 115491 | 10000 uL | LCM2PFHxDA_00003 | 200 uL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00003 | 200 uL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00003 | 200 uL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00004 | 200 uL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00007 | 200 uL | 13C8 FOSA | 1 ug/mL |
| | | | | | LCMPFBA_00004 | 200 uL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00006 | 200 uL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00004 | 200 uL | 13C2 PFDoA | 1 ug/mL |
| | | | | | LCMPFHxA_00007 | 200 uL | 13C2 PFHxA | 1 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | LCMPFHxS_00004 | 200 uL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00004 | 200 uL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00008 | 200 uL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00010 | 200 uL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00005 | 200 uL | 13C2 PFUnA | 1 ug/mL |
| ..LCM2PFHxDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| ..LCM2PFTeDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFTeDA1112 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| ..LCM4PFHPA_00003 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| ..LCM5PFPEA_00004 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| ..LCM8FOSA_00007 | 12/15/16 | Wellington Laboratories, Lot M8FOSA1214I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| ..LCMPFBA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| ..LCMPFDA_00006 | 08/19/20 | Wellington Laboratories, Lot MPFDA0815 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| ..LCMPFDoA_00004 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| ..LCMPFHxA_00007 | 04/09/20 | Wellington Laboratories, Lot MPFHxA0415 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |
| ..LCMPFHxS_00004 | 07/25/18 | Wellington Laboratories, Lot MPFHxS0713 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| ..LCMPFNA_00004 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| ..LCMPFOA_00008 | 04/10/20 | Wellington Laboratories, Lot MPFOA0415 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| ..LCMPFOS_00010 | 05/15/20 | Wellington Laboratories, Lot MPFOS0515 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| ..LCMPFUdA_00005 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |
| .LCPFCSP_00041 | 08/11/16 | 02/11/16 | Methanol, Lot 090285 | 5 mL | LCPFBA_00003 | 0.1 mL | Perfluorobutyric acid | 1 ug/mL |
| | | | | | LCPFBSA_00001 | 0.1 mL | Perfluorobutanesulfonic acid (PFBS) | 0.884 ug/mL |
| | | | | | LCPFDA_00003 | 0.1 mL | Perfluorodecanoic acid | 1 ug/mL |
| | | | | | LCPFDoA_00003 | 0.1 mL | Perfluorododecanoic acid | 1 ug/mL |
| | | | | | LCPFDSA_00001 | 0.1 mL | Perfluorodecane Sulfonic acid | 0.964 ug/mL |
| | | | | | LCPFHpA_00004 | 0.1 mL | Perfluoroheptanoic acid (PFHpA) | 1 ug/mL |
| | | | | | LCPFHpSA_00001 | 0.1 mL | Perfluoroheptanesulfonic Acid | 0.952 ug/mL |
| | | | | | LCPFHxA_00003 | 0.1 mL | Perfluorohexanoic acid | 1 ug/mL |
| | | | | | LCPFHxDA_00004 | 0.1 mL | Perfluorohexadecanoic acid | 1 ug/mL |
| | | | | | LCPFHxSA_00001 | 0.1 mL | Perfluorohexanesulfonic acid (PFHxS) | 0.946 ug/mL |
| | | | | | LCPFNA_00004 | 0.1 mL | Perfluorononanoic acid (PFNA) | 1 ug/mL |
| | | | | | LCPFOA_00004 | 0.1 mL | Perfluorooctanoic acid (PFOA) | 1 ug/mL |
| | | | | | LCPFODA_00004 | 0.1 mL | Perfluorooctandecanoic acid | 1 ug/mL |
| | | | | | LCPFOS_00004 | 0.1 mL | Perfluorooctanesulfonic acid (PFOS) | 0.956 ug/mL |
| | | | | | LCPFOSA_00005 | 0.1 mL | Perfluorooctane Sulfonamide | 1 ug/mL |
| | | | | | LCPFPeA_00003 | 0.1 mL | Perfluoropentanoic acid | 1 ug/mL |
| | | | | | LCPFTeDA_00003 | 0.1 mL | Perfluorotetradecanoic acid | 1 ug/mL |
| | | | | | LCPFTrDA_00003 | 0.1 mL | Perfluorotridecanoic acid | 1 ug/mL |
| | | | | | LCPFUdA_00003 | 0.1 mL | Perfluoroundecanoic acid | 1 ug/mL |
| ..LCPFBA_00003 | 03/05/18 | Wellington Laboratories, Lot PFBA0313 | | | (Purchased Reagent) | | Perfluorobutyric acid | 50 ug/mL |
| ..LCPFBSA_00001 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ug/mL |
| ..LCPFDA_00003 | 06/18/18 | Wellington Laboratories, Lot PFDA0613 | | | (Purchased Reagent) | | Perfluorodecanoic acid | 50 ug/mL |
| ..LCPFDoA_00003 | 01/03/18 | Wellington Laboratories, Lot PFDoA0113 | | | (Purchased Reagent) | | Perfluorododecanoic acid | 50 ug/mL |
| ..LCPFDSA_00001 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonic acid | 48.2 ug/mL |

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| ..LCPFHpA_00004 | 05/09/19 | Wellington Laboratories, Lot PFHpA0514 | | | (Purchased Reagent) | | Perfluoroheptanoic acid (PFHpA) | 50 ug/mL |
| ..LCPFHpSA_00001 | 11/21/17 | Wellington Laboratories, Lot LPFHpS1112 | | | (Purchased Reagent) | | Perfluoroheptanesulfonic Acid | 47.6 ug/mL |
| ..LCPFHxA_00003 | 05/09/19 | Wellington Laboratories, Lot PFHxA0514 | | | (Purchased Reagent) | | Perfluorohexanoic acid | 50 ug/mL |
| ..LCPFHxDA_00004 | 11/28/17 | Wellington Laboratories, Lot PFHxDA0707 | | | (Purchased Reagent) | | Perfluorohexadecanoic acid | 50 ug/mL |
| ..LCPFHxSA_00001 | 05/09/19 | Wellington Laboratories, Lot LPFHxS0514 | | | (Purchased Reagent) | | Perfluorohexanesulfonic acid (PFHxS) | 47.3 ug/mL |
| ..LCPFNA_00004 | 05/09/19 | Wellington Laboratories, Lot PFNA0514 | | | (Purchased Reagent) | | Perfluorononanoic acid (PFNA) | 50 ug/mL |
| ..LCPFOA_00004 | 10/11/18 | Wellington Laboratories, Lot PFOA1013 | | | (Purchased Reagent) | | Perfluorooctanoic acid (PFOA) | 50 ug/mL |
| ..LCPFODA_00004 | 04/25/17 | Wellington Laboratories, Lot PFODA0807 | | | (Purchased Reagent) | | Perfluorooctandecanoic acid | 50 ug/mL |
| ..LCPFOS_00004 | 06/20/19 | Wellington Laboratories, Lot LPFOS0614 | | | (Purchased Reagent) | | Perfluorooctanesulfonic acid (PFOS) | 47.8 ug/mL |
| ..LCPFOSA_00005 | 07/31/18 | Wellington Laboratories, Lot FOSA0714I | | | (Purchased Reagent) | | Perfluorooctane Sulfonamide | 50 ug/mL |
| ..LCPFPeA_00003 | 01/03/18 | Wellington Laboratories, Lot PFPeA0113 | | | (Purchased Reagent) | | Perfluoropentanoic acid | 50 ug/mL |
| ..LCPFTeDA_00003 | 06/19/18 | Wellington Laboratories, Lot PFTeDA0613 | | | (Purchased Reagent) | | Perfluorotetradecanoic acid | 50 ug/mL |
| ..LCPFTrDA_00003 | 12/10/18 | Wellington Laboratories, Lot PFTrDA1213 | | | (Purchased Reagent) | | Perfluorotridecanoic acid | 50 ug/mL |
| ..LCPFUdA_00003 | 06/19/18 | Wellington Laboratories, Lot PFUdA0613 | | | (Purchased Reagent) | | Perfluoroundecanoic acid | 50 ug/mL |
| **LCPFC-L5_00017** | 08/11/16 | 03/02/16 | MeOH/H2O, Lot 090285 | 5 mL | LCMPFCSU_00029 | 250 uL | 13C2-PFHxDA | 50 ng/mL |
| | | | | | | | 13C2-PFTeDA | 50 ng/mL |
| | | | | | | | 13C4-PFHpA | 50 ng/mL |
| | | | | | | | 13C5-PFPeA | 50 ng/mL |
| | | | | | | | 13C8 FOSA | 50 ng/mL |
| | | | | | | | 13C4 PFBA | 50 ng/mL |
| | | | | | | | 13C2 PFDA | 50 ng/mL |
| | | | | | | | 13C2 PFDoA | 50 ng/mL |
| | | | | | | | 13C2 PFHxA | 50 ng/mL |
| | | | | | | | 18O2 PFHxS | 47.3 ng/mL |
| | | | | | | | 13C5 PFNA | 50 ng/mL |
| | | | | | | | 13C4 PFOA | 50 ng/mL |
| | | | | | | | 13C4 PFOS | 47.8 ng/mL |
| | | | | | | | 13C2 PFUnA | 50 ng/mL |
| | | | | | LCPFCSP_00041 | 250 uL | Perfluorobutyric acid | 50 ng/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ng/mL |
| | | | | | | | Perfluorodecanoic acid | 50 ng/mL |
| | | | | | | | Perfluorododecanoic acid | 50 ng/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 48.2 ng/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 50 ng/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 47.6 ng/mL |
| | | | | | | | Perfluorohexanoic acid | 50 ng/mL |
| | | | | | | | Perfluorohexadecanoic acid | 50 ng/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 47.3 ng/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 50 ng/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 50 ng/mL |
| | | | | | | | Perfluorooctandecanoic acid | 50 ng/mL |

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 47.8 ng/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 50 ng/mL |
| | | | | | | | Perfluoropentanoic acid | 50 ng/mL |
| | | | | | | | Perfluorotetradecanoic acid | 50 ng/mL |
| | | | | | | | Perfluorotridecanoic acid | 50 ng/mL |
| | | | | | | | Perfluoroundecanoic acid | 50 ng/mL |
| .LCMPFCSU_00029 | 08/29/16 | 02/29/16 | Methanol, Lot Baker 115491 | 10000 uL | LCM2PFHxDA_00003 | 200 uL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00003 | 200 uL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00003 | 200 uL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00004 | 200 uL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00007 | 200 uL | 13C8 FOSA | 1 ug/mL |
| | | | | | LCMPFBA_00004 | 200 uL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00006 | 200 uL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00004 | 200 uL | 13C2 PFDoA | 1 ug/mL |
| | | | | | LCMPFHxA_00007 | 200 uL | 13C2 PFHxA | 1 ug/mL |
| | | | | | LCMPFHxS_00004 | 200 uL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00004 | 200 uL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00008 | 200 uL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00010 | 200 uL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00005 | 200 uL | 13C2 PFUnA | 1 ug/mL |
| ..LCM2PFHxDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| ..LCM2PFTeDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFTeDA1112 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| ..LCM4PFHPA_00003 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| ..LCM5PFPEA_00004 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| ..LCM8FOSA_00007 | 12/15/16 | Wellington Laboratories, Lot M8FOSA1214I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| ..LCMPFBA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| ..LCMPFDA_00006 | 08/19/20 | Wellington Laboratories, Lot MPFDA0815 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| ..LCMPFDoA_00004 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| ..LCMPFHxA_00007 | 04/09/20 | Wellington Laboratories, Lot MPFHxA0415 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |
| ..LCMPFHxS_00004 | 07/25/18 | Wellington Laboratories, Lot MPFHxS0713 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| ..LCMPFNA_00004 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| ..LCMPFOA_00008 | 04/10/20 | Wellington Laboratories, Lot MPFOA0415 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| ..LCMPFOS_00010 | 05/15/20 | Wellington Laboratories, Lot MPFOS0515 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| ..LCMPFUdA_00005 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |
| .LCPFCSP_00041 | 08/11/16 | 02/11/16 | Methanol, Lot 090285 | 5 mL | LCPFBA_00003 | 0.1 mL | Perfluorobutyric acid | 1 ug/mL |
| | | | | | LCPFBSA_00001 | 0.1 mL | Perfluorobutanesulfonic acid (PFBS) | 0.884 ug/mL |
| | | | | | LCPFDA_00003 | 0.1 mL | Perfluorodecanoic acid | 1 ug/mL |
| | | | | | LCPFDoA_00003 | 0.1 mL | Perfluorododecanoic acid | 1 ug/mL |
| | | | | | LCPFDSA_00001 | 0.1 mL | Perfluorodecane Sulfonic acid | 0.964 ug/mL |
| | | | | | LCPFHpA_00004 | 0.1 mL | Perfluoroheptanoic acid (PFHpA) | 1 ug/mL |
| | | | | | LCPFHpSA_00001 | 0.1 mL | Perfluoroheptanesulfonic Acid | 0.952 ug/mL |
| | | | | | LCPFHxA_00003 | 0.1 mL | Perfluorohexanoic acid | 1 ug/mL |
| | | | | | LCPFHxDA_00004 | 0.1 mL | Perfluorohexadecanoic acid | 1 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | LCPFHxSA_00001 | 0.1 mL | Perfluorohexanesulfonic acid (PFHxS) | 0.946 ug/mL |
| | | | | | LCPFNA_00004 | 0.1 mL | Perfluorononanoic acid (PFNA) | 1 ug/mL |
| | | | | | LCPFOA_00004 | 0.1 mL | Perfluorooctanoic acid (PFOA) | 1 ug/mL |
| | | | | | LCPFODA_00004 | 0.1 mL | Perfluorooctandecanoic acid | 1 ug/mL |
| | | | | | LCPFOS_00004 | 0.1 mL | Perfluorooctanesulfonic acid (PFOS) | 0.956 ug/mL |
| | | | | | LCPFOSA_00005 | 0.1 mL | Perfluorooctane Sulfonamide | 1 ug/mL |
| | | | | | LCPFPeA_00003 | 0.1 mL | Perfluoropentanoic acid | 1 ug/mL |
| | | | | | LCPFTeDA_00003 | 0.1 mL | Perfluorotetradecanoic acid | 1 ug/mL |
| | | | | | LCPFTrDA_00003 | 0.1 mL | Perfluorotridecanoic acid | 1 ug/mL |
| | | | | | LCPFUdA_00003 | 0.1 mL | Perfluoroundecanoic acid | 1 ug/mL |
| ..LCPFBA_00003 | 03/05/18 | Wellington Laboratories, Lot PFBA0313 | | | (Purchased Reagent) | | Perfluorobutyric acid | 50 ug/mL |
| ..LCPFBSA_00001 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ug/mL |
| ..LCPFDA_00003 | 06/18/18 | Wellington Laboratories, Lot PFDA0613 | | | (Purchased Reagent) | | Perfluorodecanoic acid | 50 ug/mL |
| ..LCPFDoA_00003 | 01/03/18 | Wellington Laboratories, Lot PFDoA0113 | | | (Purchased Reagent) | | Perfluorododecanoic acid | 50 ug/mL |
| ..LCPFDSA_00001 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonic acid | 48.2 ug/mL |
| ..LCPFHpA_00004 | 05/09/19 | Wellington Laboratories, Lot PFHpA0514 | | | (Purchased Reagent) | | Perfluoroheptanoic acid (PFHpA) | 50 ug/mL |
| ..LCPFHpSA_00001 | 11/21/17 | Wellington Laboratories, Lot LPFHpS1112 | | | (Purchased Reagent) | | Perfluoroheptanesulfonic Acid | 47.6 ug/mL |
| ..LCPFHxA_00003 | 05/09/19 | Wellington Laboratories, Lot PFHxA0514 | | | (Purchased Reagent) | | Perfluorohexanoic acid | 50 ug/mL |
| ..LCPFHxDA_00004 | 11/28/17 | Wellington Laboratories, Lot PFHxDA0707 | | | (Purchased Reagent) | | Perfluorohexadecanoic acid | 50 ug/mL |
| ..LCPFHxSA_00001 | 05/09/19 | Wellington Laboratories, Lot LPFHxS0514 | | | (Purchased Reagent) | | Perfluorohexanesulfonic acid (PFHxS) | 47.3 ug/mL |
| ..LCPFNA_00004 | 05/09/19 | Wellington Laboratories, Lot PFNA0514 | | | (Purchased Reagent) | | Perfluorononanoic acid (PFNA) | 50 ug/mL |
| ..LCPFOA_00004 | 10/11/18 | Wellington Laboratories, Lot PFOA1013 | | | (Purchased Reagent) | | Perfluorooctanoic acid (PFOA) | 50 ug/mL |
| ..LCPFODA_00004 | 04/25/17 | Wellington Laboratories, Lot PFODA0807 | | | (Purchased Reagent) | | Perfluorooctandecanoic acid | 50 ug/mL |
| ..LCPFOS_00004 | 06/20/19 | Wellington Laboratories, Lot LPFOS0614 | | | (Purchased Reagent) | | Perfluorooctanesulfonic acid (PFOS) | 47.8 ug/mL |
| ..LCPFOSA_00005 | 07/31/18 | Wellington Laboratories, Lot FOSA0714I | | | (Purchased Reagent) | | Perfluorooctane Sulfonamide | 50 ug/mL |
| ..LCPFPeA_00003 | 01/03/18 | Wellington Laboratories, Lot PFPeA0113 | | | (Purchased Reagent) | | Perfluoropentanoic acid | 50 ug/mL |
| ..LCPFTeDA_00003 | 06/19/18 | Wellington Laboratories, Lot PFTeDA0613 | | | (Purchased Reagent) | | Perfluorotetradecanoic acid | 50 ug/mL |
| ..LCPFTrDA_00003 | 12/10/18 | Wellington Laboratories, Lot PFTrDA1213 | | | (Purchased Reagent) | | Perfluorotridecanoic acid | 50 ug/mL |
| ..LCPFUdA_00003 | 06/19/18 | Wellington Laboratories, Lot PFUdA0613 | | | (Purchased Reagent) | | Perfluoroundecanoic acid | 50 ug/mL |
| **LCPFC-L6_00015** | 06/29/16 | 12/30/15 | MeOH/H2O, Lot 090285 | 2 mL | LCMPFCSU_00024 | 100 uL | 13C2-PFHxDA | 50 ng/mL |
| | | | | | | | 13C2-PFTeDA | 50 ng/mL |
| | | | | | | | 13C4-PFHpA | 50 ng/mL |
| | | | | | | | 13C5-PFPeA | 50 ng/mL |
| | | | | | | | 13C8 FOSA | 50 ng/mL |
| | | | | | | | 13C4 PFBA | 50 ng/mL |
| | | | | | | | 13C2 PFDA | 50 ng/mL |
| | | | | | | | 13C2 PFDoA | 50 ng/mL |
| | | | | | | | 13C2 PFHxA | 50 ng/mL |
| | | | | | | | 18O2 PFHxS | 47.3 ng/mL |
| | | | | | | | 13C5 PFNA | 50 ng/mL |
| | | | | | | | 13C4 PFOA | 50 ng/mL |
| | | | | | | | 13C4 PFOS | 47.8 ng/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | | | 13C2 PFUnA | 50 ng/mL |
| | | | | | LCPFCSP_00039 | 400 uL | Perfluorobutyric acid | 200 ng/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 176.8 ng/mL |
| | | | | | | | Perfluorodecanoic acid | 200 ng/mL |
| | | | | | | | Perfluorododecanoic acid | 200 ng/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 192.8 ng/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 200 ng/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 190.4 ng/mL |
| | | | | | | | Perfluorohexanoic acid | 200 ng/mL |
| | | | | | | | Perfluorohexadecanoic acid | 200 ng/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 189.2 ng/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 200 ng/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 200 ng/mL |
| | | | | | | | Perfluorooctandecanoic acid | 200 ng/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 191.2 ng/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 200 ng/mL |
| | | | | | | | Perfluoropentanoic acid | 200 ng/mL |
| | | | | | | | Perfluorotetradecanoic acid | 200 ng/mL |
| | | | | | | | Perfluorotridecanoic acid | 200 ng/mL |
| | | | | | | | Perfluoroundecanoic acid | 200 ng/mL |
| .LCMPFCSU_00024 | 06/29/16 | 12/29/15 | Methanol, Lot Baker 115491 | 10 mL | LCM2PFHxDA_00003 | 0.2 mL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00003 | 0.2 mL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00003 | 0.2 mL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00004 | 0.2 mL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00006 | 0.2 mL | 13C8 FOSA | 1 ug/mL |
| | | | | | LCMPFBA_00004 | 0.2 mL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00004 | 0.2 mL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00004 | 0.2 mL | 13C2 PFDoA | 1 ug/mL |
| | | | | | LCMPFHxA_00005 | 0.2 mL | 13C2 PFHxA | 1 ug/mL |
| | | | | | LCMPFHxS_00004 | 0.2 mL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00003 | 0.2 mL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00007 | 0.2 mL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00009 | 0.2 mL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00005 | 0.2 mL | 13C2 PFUnA | 1 ug/mL |
| ..LCM2PFHxDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| ..LCM2PFTeDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFTeDA1112 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| ..LCM4PFHPA_00003 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| ..LCM5PFPEA_00004 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| ..LCM8FOSA_00006 | 12/15/16 | Wellington Laboratories, Lot M8FOSA1214I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| ..LCMPFBA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| ..LCMPFDA_00004 | 04/13/19 | Wellington Laboratories, Lot MPFDA0414 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| ..LCMPFDoA_00004 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| ..LCMPFHxA_00005 | 04/13/19 | Wellington Laboratories, Lot MPFHxA0414 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| ..LCMPFHxS_00004 | 07/25/18 | Wellington Laboratories, Lot MPFHxS0713 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| ..LCMPFNA_00003 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| ..LCMPFOA_00007 | 04/10/20 | Wellington Laboratories, Lot MPFOA0415 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| ..LCMPFOS_00009 | 05/15/20 | Wellington Laboratories, Lot MPFOS0515 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| ..LCMPFUdA_00005 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |
| .LCPFCSP_00039 | 06/30/16 | 12/30/15 | Methanol, Lot 090285 | 5 mL | LCPFBA_00003 | 0.1 mL | Perfluorobutyric acid | 1 ug/mL |
| | | | | | LCPFBSA_00001 | 0.1 mL | Perfluorobutanesulfonic acid (PFBS) | 0.884 ug/mL |
| | | | | | LCPFDA_00003 | 0.1 mL | Perfluorodecanoic acid | 1 ug/mL |
| | | | | | LCPFDoA_00003 | 0.1 mL | Perfluorododecanoic acid | 1 ug/mL |
| | | | | | LCPFDSA_00001 | 0.1 mL | Perfluorodecane Sulfonic acid | 0.964 ug/mL |
| | | | | | LCPFHpA_00004 | 0.1 mL | Perfluoroheptanoic acid (PFHpA) | 1 ug/mL |
| | | | | | LCPFHpSA_00001 | 0.1 mL | Perfluoroheptanesulfonic Acid | 0.952 ug/mL |
| | | | | | LCPFHxA_00003 | 0.1 mL | Perfluorohexanoic acid | 1 ug/mL |
| | | | | | LCPFHxDA_00004 | 0.1 mL | Perfluorohexadecanoic acid | 1 ug/mL |
| | | | | | LCPFHxSA_00001 | 0.1 mL | Perfluorohexanesulfonic acid (PFHxS) | 0.946 ug/mL |
| | | | | | LCPFNA_00004 | 0.1 mL | Perfluorononanoic acid (PFNA) | 1 ug/mL |
| | | | | | LCPFOA_00004 | 0.1 mL | Perfluorooctanoic acid (PFOA) | 1 ug/mL |
| | | | | | LCPFODA_00004 | 0.1 mL | Perfluorooctandecanoic acid | 1 ug/mL |
| | | | | | LCPFOS_00004 | 0.1 mL | Perfluorooctanesulfonic acid (PFOS) | 0.956 ug/mL |
| | | | | | LCPFOSA_00005 | 0.1 mL | Perfluorooctane Sulfonamide | 1 ug/mL |
| | | | | | LCPFPeA_00003 | 0.1 mL | Perfluoropentanoic acid | 1 ug/mL |
| | | | | | LCPFTeDA_00003 | 0.1 mL | Perfluorotetradecanoic acid | 1 ug/mL |
| | | | | | LCPFTrDA_00003 | 0.1 mL | Perfluorotridecanoic acid | 1 ug/mL |
| | | | | | LCPFUdA_00003 | 0.1 mL | Perfluoroundecanoic acid | 1 ug/mL |
| ..LCPFBA_00003 | 03/05/18 | Wellington Laboratories, Lot PFBA0313 | | | (Purchased Reagent) | | Perfluorobutyric acid | 50 ug/mL |
| ..LCPFBSA_00001 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ug/mL |
| ..LCPFDA_00003 | 06/18/18 | Wellington Laboratories, Lot PFDA0613 | | | (Purchased Reagent) | | Perfluorodecanoic acid | 50 ug/mL |
| ..LCPFDoA_00003 | 01/03/18 | Wellington Laboratories, Lot PFDoA0113 | | | (Purchased Reagent) | | Perfluorododecanoic acid | 50 ug/mL |
| ..LCPFDSA_00001 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonic acid | 48.2 ug/mL |
| ..LCPFHpA_00004 | 05/09/19 | Wellington Laboratories, Lot PFHpA0514 | | | (Purchased Reagent) | | Perfluoroheptanoic acid (PFHpA) | 50 ug/mL |
| ..LCPFHpSA_00001 | 11/21/17 | Wellington Laboratories, Lot LPFHpS1112 | | | (Purchased Reagent) | | Perfluoroheptanesulfonic Acid | 47.6 ug/mL |
| ..LCPFHxA_00003 | 05/09/19 | Wellington Laboratories, Lot PFHxA0514 | | | (Purchased Reagent) | | Perfluorohexanoic acid | 50 ug/mL |
| ..LCPFHxDA_00004 | 11/28/17 | Wellington Laboratories, Lot PFHxDA0707 | | | (Purchased Reagent) | | Perfluorohexadecanoic acid | 50 ug/mL |
| ..LCPFHxSA_00001 | 05/09/19 | Wellington Laboratories, Lot LPFHxS0514 | | | (Purchased Reagent) | | Perfluorohexanesulfonic acid (PFHxS) | 47.3 ug/mL |
| ..LCPFNA_00004 | 05/09/19 | Wellington Laboratories, Lot PFNA0514 | | | (Purchased Reagent) | | Perfluorononanoic acid (PFNA) | 50 ug/mL |
| ..LCPFOA_00004 | 10/11/18 | Wellington Laboratories, Lot PFOA1013 | | | (Purchased Reagent) | | Perfluorooctanoic acid (PFOA) | 50 ug/mL |
| ..LCPFODA_00004 | 04/25/17 | Wellington Laboratories, Lot PFODA0807 | | | (Purchased Reagent) | | Perfluorooctandecanoic acid | 50 ug/mL |
| ..LCPFOS_00004 | 06/20/19 | Wellington Laboratories, Lot LPFOS0614 | | | (Purchased Reagent) | | Perfluorooctanesulfonic acid (PFOS) | 47.8 ug/mL |
| ..LCPFOSA_00005 | 07/31/18 | Wellington Laboratories, Lot FOSA0714I | | | (Purchased Reagent) | | Perfluorooctane Sulfonamide | 50 ug/mL |
| ..LCPFPeA_00003 | 01/03/18 | Wellington Laboratories, Lot PFPeA0113 | | | (Purchased Reagent) | | Perfluoropentanoic acid | 50 ug/mL |
| ..LCPFTeDA_00003 | 06/19/18 | Wellington Laboratories, Lot PFTeDA0613 | | | (Purchased Reagent) | | Perfluorotetradecanoic acid | 50 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| ..LCPFTrDA_00003 | 12/10/18 | Wellington Laboratories, Lot PFTrDA1213 | | | (Purchased Reagent) | | Perfluorotridecanoic acid | 50 ug/mL |
| ..LCPFUdA_00003 | 06/19/18 | Wellington Laboratories, Lot PFUdA0613 | | | (Purchased Reagent) | | Perfluoroundecanoic acid | 50 ug/mL |
| **LCPFC-L7_00015** | 06/29/16 | 12/30/15 | MeOH/H2O, Lot 090285 | 2 mL | LCMPFCSU_00024 | 100 uL | 13C2-PFHxDA | 50 ng/mL |
| | | | | | | | 13C2-PFTeDA | 50 ng/mL |
| | | | | | | | 13C4-PFHpA | 50 ng/mL |
| | | | | | | | 13C5-PFPeA | 50 ng/mL |
| | | | | | | | 13C8 FOSA | 50 ng/mL |
| | | | | | | | 13C4 PFBA | 50 ng/mL |
| | | | | | | | 13C2 PFDA | 50 ng/mL |
| | | | | | | | 13C2 PFDoA | 50 ng/mL |
| | | | | | | | 13C2 PFHxA | 50 ng/mL |
| | | | | | | | 18O2 PFHxS | 47.3 ng/mL |
| | | | | | | | 13C5 PFNA | 50 ng/mL |
| | | | | | | | 13C4 PFOA | 50 ng/mL |
| | | | | | | | 13C4 PFOS | 47.8 ng/mL |
| | | | | | | | 13C2 PFUnA | 50 ng/mL |
| | | | | | LCPFCSP_00039 | 800 uL | Perfluorobutyric acid | 400 ng/mL |
| | | | | | | | Perfluorobutanesulfonic acid (PFBS) | 353.6 ng/mL |
| | | | | | | | Perfluorodecanoic acid | 400 ng/mL |
| | | | | | | | Perfluorododecanoic acid | 400 ng/mL |
| | | | | | | | Perfluorodecane Sulfonic acid | 385.6 ng/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 400 ng/mL |
| | | | | | | | Perfluoroheptanesulfonic Acid | 380.8 ng/mL |
| | | | | | | | Perfluorohexanoic acid | 400 ng/mL |
| | | | | | | | Perfluorohexadecanoic acid | 400 ng/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 378.4 ng/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 400 ng/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 400 ng/mL |
| | | | | | | | Perfluorooctandecanoic acid | 400 ng/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 382.4 ng/mL |
| | | | | | | | Perfluorooctane Sulfonamide | 400 ng/mL |
| | | | | | | | Perfluoropentanoic acid | 400 ng/mL |
| | | | | | | | Perfluorotetradecanoic acid | 400 ng/mL |
| | | | | | | | Perfluorotridecanoic acid | 400 ng/mL |
| | | | | | | | Perfluoroundecanoic acid | 400 ng/mL |
| .LCMPFCSU_00024 | 06/29/16 | 12/29/15 | Methanol, Lot Baker 115491 | 10 mL | LCM2PFHxDA_00003 | 0.2 mL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00003 | 0.2 mL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00003 | 0.2 mL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00004 | 0.2 mL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00006 | 0.2 mL | 13C8 FOSA | 1 ug/mL |
| | | | | | LCMPFBA_00004 | 0.2 mL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00004 | 0.2 mL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00004 | 0.2 mL | 13C2 PFDoA | 1 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | LCMPFHxA_00005 | 0.2 mL | 13C2 PFHxA | 1 ug/mL |
| | | | | | LCMPFHxS_00004 | 0.2 mL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00003 | 0.2 mL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00007 | 0.2 mL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00009 | 0.2 mL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00005 | 0.2 mL | 13C2 PFUnA | 1 ug/mL |
| ..LCM2PFHxDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| ..LCM2PFTeDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFTeDA1112 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| ..LCM4PFHPA_00003 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| ..LCM5PFPEA_00004 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| ..LCM8FOSA_00006 | 12/15/16 | Wellington Laboratories, Lot M8FOSA1214I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| ..LCMPFBA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| ..LCMPFDA_00004 | 04/13/19 | Wellington Laboratories, Lot MPFDA0414 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| ..LCMPFDoA_00004 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| ..LCMPFHxA_00005 | 04/13/19 | Wellington Laboratories, Lot MPFHxA0414 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |
| ..LCMPFHxS_00004 | 07/25/18 | Wellington Laboratories, Lot MPFHxS0713 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| ..LCMPFNA_00003 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| ..LCMPFOA_00007 | 04/10/20 | Wellington Laboratories, Lot MPFOA0415 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| ..LCMPFOS_00009 | 05/15/20 | Wellington Laboratories, Lot MPFOS0515 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| ..LCMPFUdA_00005 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |
| .LCPFCSP_00039 | 06/30/16 | 12/30/15 | Methanol, Lot 090285 | 5 mL | LCPFBA_00003 | 0.1 mL | Perfluorobutyric acid | 1 ug/mL |
| | | | | | LCPFBSA_00001 | 0.1 mL | Perfluorobutanesulfonic acid (PFBS) | 0.884 ug/mL |
| | | | | | LCPFDA_00003 | 0.1 mL | Perfluorodecanoic acid | 1 ug/mL |
| | | | | | LCPFDoA_00003 | 0.1 mL | Perfluorododecanoic acid | 1 ug/mL |
| | | | | | LCPFDSA_00001 | 0.1 mL | Perfluorodecane Sulfonic acid | 0.964 ug/mL |
| | | | | | LCPFHpA_00004 | 0.1 mL | Perfluoroheptanoic acid (PFHpA) | 1 ug/mL |
| | | | | | LCPFHpSA_00001 | 0.1 mL | Perfluoroheptanesulfonic Acid | 0.952 ug/mL |
| | | | | | LCPFHxA_00003 | 0.1 mL | Perfluorohexanoic acid | 1 ug/mL |
| | | | | | LCPFHxDA_00004 | 0.1 mL | Perfluorohexadecanoic acid | 1 ug/mL |
| | | | | | LCPFHxSA_00001 | 0.1 mL | Perfluorohexanesulfonic acid (PFHxS) | 0.946 ug/mL |
| | | | | | LCPFNA_00004 | 0.1 mL | Perfluorononanoic acid (PFNA) | 1 ug/mL |
| | | | | | LCPFOA_00004 | 0.1 mL | Perfluorooctanoic acid (PFOA) | 1 ug/mL |
| | | | | | LCPFODA_00004 | 0.1 mL | Perfluorooctandecanoic acid | 1 ug/mL |
| | | | | | LCPFOS_00004 | 0.1 mL | Perfluorooctanesulfonic acid (PFOS) | 0.956 ug/mL |
| | | | | | LCPFOSA_00005 | 0.1 mL | Perfluorooctane Sulfonamide | 1 ug/mL |
| | | | | | LCPFPeA_00003 | 0.1 mL | Perfluoropentanoic acid | 1 ug/mL |
| | | | | | LCPFTeDA_00003 | 0.1 mL | Perfluorotetradecanoic acid | 1 ug/mL |
| | | | | | LCPFTrDA_00003 | 0.1 mL | Perfluorotridecanoic acid | 1 ug/mL |
| | | | | | LCPFUdA_00003 | 0.1 mL | Perfluoroundecanoic acid | 1 ug/mL |
| ..LCPFBA_00003 | 03/05/18 | Wellington Laboratories, Lot PFBA0313 | | | (Purchased Reagent) | | Perfluorobutyric acid | 50 ug/mL |
| ..LCPFBSA_00001 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ug/mL |
| ..LCPFDA_00003 | 06/18/18 | Wellington Laboratories, Lot PFDA0613 | | | (Purchased Reagent) | | Perfluorodecanoic acid | 50 ug/mL |
| ..LCPFDoA_00003 | 01/03/18 | Wellington Laboratories, Lot PFDoA0113 | | | (Purchased Reagent) | | Perfluorododecanoic acid | 50 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| ..LCPFDSA_00001 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonic acid | 48.2 ug/mL |
| ..LCPFHpA_00004 | 05/09/19 | Wellington Laboratories, Lot PFHpA0514 | | | (Purchased Reagent) | | Perfluoroheptanoic acid (PFHpA) | 50 ug/mL |
| ..LCPFHpSA_00001 | 11/21/17 | Wellington Laboratories, Lot LPFHpS1112 | | | (Purchased Reagent) | | Perfluoroheptanesulfonic Acid | 47.6 ug/mL |
| ..LCPFHxA_00003 | 05/09/19 | Wellington Laboratories, Lot PFHxA0514 | | | (Purchased Reagent) | | Perfluorohexanoic acid | 50 ug/mL |
| ..LCPFHxDA_00004 | 11/28/17 | Wellington Laboratories, Lot PFHxDA0707 | | | (Purchased Reagent) | | Perfluorohexadecanoic acid | 50 ug/mL |
| ..LCPFHxSA_00001 | 05/09/19 | Wellington Laboratories, Lot LPFHxS0514 | | | (Purchased Reagent) | | Perfluorohexanesulfonic acid (PFHxS) | 47.3 ug/mL |
| ..LCPFNA_00004 | 05/09/19 | Wellington Laboratories, Lot PFNA0514 | | | (Purchased Reagent) | | Perfluorononanoic acid (PFNA) | 50 ug/mL |
| ..LCPFOA_00004 | 10/11/18 | Wellington Laboratories, Lot PFOA1013 | | | (Purchased Reagent) | | Perfluorooctanoic acid (PFOA) | 50 ug/mL |
| ..LCPFODA_00004 | 04/25/17 | Wellington Laboratories, Lot PFODA0807 | | | (Purchased Reagent) | | Perfluorooctandecanoic acid | 50 ug/mL |
| ..LCPFOS_00004 | 06/20/19 | Wellington Laboratories, Lot LPFOS0614 | | | (Purchased Reagent) | | Perfluorooctanesulfonic acid (PFOS) | 47.8 ug/mL |
| ..LCPFOSA_00005 | 07/31/18 | Wellington Laboratories, Lot FOSA0714I | | | (Purchased Reagent) | | Perfluorooctane Sulfonamide | 50 ug/mL |
| ..LCPFPeA_00003 | 01/03/18 | Wellington Laboratories, Lot PFPeA0113 | | | (Purchased Reagent) | | Perfluoropentanoic acid | 50 ug/mL |
| ..LCPFTeDA_00003 | 06/19/18 | Wellington Laboratories, Lot PFTeDA0613 | | | (Purchased Reagent) | | Perfluorotetradecanoic acid | 50 ug/mL |
| ..LCPFTrDA_00003 | 12/10/18 | Wellington Laboratories, Lot PFTrDA1213 | | | (Purchased Reagent) | | Perfluorotridecanoic acid | 50 ug/mL |
| ..LCPFUdA_00003 | 06/19/18 | Wellington Laboratories, Lot PFUdA0613 | | | (Purchased Reagent) | | Perfluoroundecanoic acid | 50 ug/mL |
| **LCPFCIC_00016** | 06/16/16 | 12/22/15 | MeOH/H2O, Lot 09285 | 5 mL | LCMPFCSU_00023 | 250 uL | 13C2-PFHxDA | 50 ng/mL |
| | | | | | | | 13C2-PFTeDA | 50 ng/mL |
| | | | | | | | 13C4-PFHpA | 50 ng/mL |
| | | | | | | | 13C5-PFPeA | 50 ng/mL |
| | | | | | | | 13C8 FOSA | 50 ng/mL |
| | | | | | | | 13C4 PFBA | 50 ng/mL |
| | | | | | | | 13C2 PFDA | 50 ng/mL |
| | | | | | | | 13C2 PFDoA | 50 ng/mL |
| | | | | | | | 13C2 PFHxA | 50 ng/mL |
| | | | | | | | 18O2 PFHxS | 47.3 ng/mL |
| | | | | | | | 13C5 PFNA | 50 ng/mL |
| | | | | | | | 13C4 PFOA | 50 ng/mL |
| | | | | | | | 13C4 PFOS | 47.8 ng/mL |
| | | | | | | | 13C2 PFUnA | 50 ng/mL |
| | | | | | LCPFACMXB_00008 | 125 uL | Perfluorobutanesulfonic acid (PFBS) | 44.25 ng/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 50 ng/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 47.25 ng/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 50 ng/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 47.75 ng/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 50 ng/mL |
| .LCMPFCSU_00023 | 06/21/16 | 12/21/15 | Methanol, Lot Baker 115491 | 5 mL | LCM2PFHxDA_00002 | 0.1 mL | 13C2-PFHxDA | 1 ug/mL |
| | | | | | LCM2PFTeDA_00003 | 0.1 mL | 13C2-PFTeDA | 1 ug/mL |
| | | | | | LCM4PFHPA_00003 | 0.1 mL | 13C4-PFHpA | 1 ug/mL |
| | | | | | LCM5PFPEA_00004 | 0.1 mL | 13C5-PFPeA | 1 ug/mL |
| | | | | | LCM8FOSA_00006 | 0.1 mL | 13C8 FOSA | 1 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | LCMPFBA_00004 | 0.1 mL | 13C4 PFBA | 1 ug/mL |
| | | | | | LCMPFDA_00005 | 0.1 mL | 13C2 PFDA | 1 ug/mL |
| | | | | | LCMPFDoA_00003 | 0.1 mL | 13C2 PFDoA | 1 ug/mL |
| | | | | | LCMPFHxA_00006 | 0.1 mL | 13C2 PFHxA | 1 ug/mL |
| | | | | | LCMPFHxS_00004 | 0.1 mL | 18O2 PFHxS | 0.946 ug/mL |
| | | | | | LCMPFNA_00003 | 0.1 mL | 13C5 PFNA | 1 ug/mL |
| | | | | | LCMPFOA_00007 | 0.1 mL | 13C4 PFOA | 1 ug/mL |
| | | | | | LCMPFOS_00009 | 0.1 mL | 13C4 PFOS | 0.956 ug/mL |
| | | | | | LCMPFUdA_00004 | 0.1 mL | 13C2 PFUnA | 1 ug/mL |
| ..LCM2PFHxDA_00002 | 11/29/17 | Wellington Laboratories, Lot M2PFHxDA1112 | | | (Purchased Reagent) | | 13C2-PFHxDA | 50 ug/mL |
| ..LCM2PFTeDA_00003 | 11/29/17 | Wellington Laboratories, Lot M2PFTeDA1112 | | | (Purchased Reagent) | | 13C2-PFTeDA | 50 ug/mL |
| ..LCM4PFHPA_00003 | 05/22/20 | Wellington Laboratories, Lot M4PFHpA0515 | | | (Purchased Reagent) | | 13C4-PFHpA | 50 ug/mL |
| ..LCM5PFPEA_00004 | 05/22/20 | Wellington Laboratories, Lot M5PFPeA0515 | | | (Purchased Reagent) | | 13C5-PFPeA | 50 ug/mL |
| ..LCM8FOSA_00006 | 12/15/16 | Wellington Laboratories, Lot M8FOSA1214I | | | (Purchased Reagent) | | 13C8 FOSA | 50 ug/mL |
| ..LCMPFBA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFBA1014 | | | (Purchased Reagent) | | 13C4 PFBA | 50 ug/mL |
| ..LCMPFDA_00005 | 04/13/19 | Wellington Laboratories, Lot MPFDA0414 | | | (Purchased Reagent) | | 13C2 PFDA | 50 ug/mL |
| ..LCMPFDoA_00003 | 07/17/19 | Wellington Laboratories, Lot MPFDoA0714 | | | (Purchased Reagent) | | 13C2 PFDoA | 50 ug/mL |
| ..LCMPFHxA_00006 | 04/13/19 | Wellington Laboratories, Lot MPFHxA0414 | | | (Purchased Reagent) | | 13C2 PFHxA | 50 ug/mL |
| ..LCMPFHxS_00004 | 07/25/18 | Wellington Laboratories, Lot MPFHxS0713 | | | (Purchased Reagent) | | 18O2 PFHxS | 47.3 ug/mL |
| ..LCMPFNA_00003 | 04/13/19 | Wellington Laboratories, Lot MPFNA0414 | | | (Purchased Reagent) | | 13C5 PFNA | 50 ug/mL |
| ..LCMPFOA_00007 | 04/10/20 | Wellington Laboratories, Lot MPFOA0415 | | | (Purchased Reagent) | | 13C4 PFOA | 50 ug/mL |
| ..LCMPFOS_00009 | 05/15/20 | Wellington Laboratories, Lot MPFOS0515 | | | (Purchased Reagent) | | 13C4 PFOS | 47.8 ug/mL |
| ..LCMPFUdA_00004 | 10/31/19 | Wellington Laboratories, Lot MPFUdA1014 | | | (Purchased Reagent) | | 13C2 PFUnA | 50 ug/mL |
| .LCPFACMXB_00008 | 06/20/19 | Wellington Laboratories, Lot PFACMXB0614 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 1.77 ug/mL |
| | | | | | | | Perfluoroheptanoic acid (PFHpA) | 2 ug/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 1.89 ug/mL |
| | | | | | | | Perfluorononanoic acid (PFNA) | 2 ug/mL |
| | | | | | | | Perfluorooctanesulfonic acid (PFOS) | 1.91 ug/mL |
| | | | | | | | Perfluorooctanoic acid (PFOA) | 2 ug/mL |
| **LCPFCSP_00047** | 09/08/16 | 04/26/16 | Methanol, Lot 090285 | 5000 uL | LCPFBA_00004 | 100 uL | Perfluorobutyric acid | 1 ug/mL |
| | | | | | LCPFBS_00003 | 100 uL | Perfluorobutane Sulfonate | 0.884 ug/mL |
| | | | | | LCPFBSA_00001 | 100 uL | Perfluorobutanesulfonic acid (PFBS) | 0.884 ug/mL |
| | | | | | LCPFDA_00004 | 100 uL | Perfluorodecanoic acid | 1 ug/mL |
| | | | | | LCPFDoA_00004 | 100 uL | Perfluorododecanoic acid | 1 ug/mL |
| | | | | | LCPFDoS_00003 | 100 uL | PFDoS (Perflouro-1-dodecanesulfonate) | 0.968 ug/mL |
| | | | | | LCPFDS_00003 | 100 uL | Perfluorodecane Sulfonate | 0.964 ug/mL |
| | | | | | LCPFDSA_00001 | 100 uL | Perfluorodecane Sulfonic acid | 0.964 ug/mL |
| | | | | | LCPFHpA_00004 | 100 uL | Perfluoroheptanoic acid (PFHpA) | 1 ug/mL |
| | | | | | LCPFHpS_00005 | 100 uL | Perfluoroheptane Sulfonate | 0.952 ug/mL |
| | | | | | LCPFHpSA_00001 | 100 uL | Perfluoroheptanesulfonic Acid | 0.952 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| | | | | | LCPFHxA_00003 | 100 uL | Perfluorohexanoic acid | 1 ug/mL |
| | | | | | LCPFHxDA_00004 | 100 uL | Perfluorohexadecanoic acid | 1 ug/mL |
| | | | | | LCPFHxS-br_00001 | 100 uL | Perfluorohexane Sulfonate | 0.91 ug/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 0.91 ug/mL |
| | | | | | LCPFNA_00004 | 100 uL | Perfluorononanoic acid (PFNA) | 1 ug/mL |
| | | | | | LCPFNS_00002 | 100 uL | PFNS (Perflouro-1-nonanesulfonate) | 0.96 ug/mL |
| | | | | | LCPFOA_00005 | 100 uL | Perfluorooctanoic acid (PFOA) | 1 ug/mL |
| | | | | | LCPFODA_00004 | 100 uL | Perfluorooctandecanoic acid | 1 ug/mL |
| | | | | | LCPFOS-br_00001 | 100 uL | Perfluorooctanesulfonic acid (PFOS) | 0.928 ug/mL |
| | | | | | LCPFOSA_00006 | 100 uL | Perfluorooctane Sulfonamide | 1 ug/mL |
| | | | | | LCPFPeA_00004 | 100 uL | Perfluoropentanoic acid | 1 ug/mL |
| | | | | | LCPFPeS_00002 | 100 uL | PFPeS (Perflouro-1-pentanesulfonate) | 0.938 ug/mL |
| | | | | | LCPFTeDA_00003 | 100 uL | Perfluorotetradecanoic acid | 1 ug/mL |
| | | | | | LCPFTrDA_00003 | 100 uL | Perfluorotridecanoic acid | 1 ug/mL |
| | | | | | LCPFUdA_00003 | 100 uL | Perfluoroundecanoic acid | 1 ug/mL |
| .LCPFBA_00004 | 01/30/20 | Wellington Laboratories, Lot PFBA0115 | | | (Purchased Reagent) | | Perfluorobutyric acid | 50 ug/mL |
| .LCPFBS_00003 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutane Sulfonate | 44.2 ug/mL |
| .LCPFBSA_00001 | 10/09/19 | Wellington Laboratories, Lot LPFBS1014 | | | (Purchased Reagent) | | Perfluorobutanesulfonic acid (PFBS) | 44.2 ug/mL |
| .LCPFDA_00004 | 07/02/20 | Wellington Laboratories, Lot PFDA0615 | | | (Purchased Reagent) | | Perfluorodecanoic acid | 50 ug/mL |
| .LCPFDoA_00004 | 01/30/20 | Wellington Laboratories, Lot PFDoA0115 | | | (Purchased Reagent) | | Perfluorododecanoic acid | 50 ug/mL |
| .LCPFDoS_00003 | 10/06/16 | Wellington Laboratories, Lot LPFDoS1011 | | | (Purchased Reagent) | | PFDoS (Perflouro-1-dodecanesulfonate) | 48.4 ug/mL |
| .LCPFDS_00003 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonate | 48.2 ug/mL |
| .LCPFDSA_00001 | 09/13/18 | Wellington Laboratories, Lot LPFDS0913 | | | (Purchased Reagent) | | Perfluorodecane Sulfonic acid | 48.2 ug/mL |
| .LCPFHpA_00004 | 05/09/19 | Wellington Laboratories, Lot PFHpA0514 | | | (Purchased Reagent) | | Perfluoroheptanoic acid (PFHpA) | 50 ug/mL |
| .LCPFHpS_00005 | 01/28/19 | Wellington Laboratories, Lot LPFHpS0114 | | | (Purchased Reagent) | | Perfluoroheptane Sulfonate | 47.6 ug/mL |
| .LCPFHpSA_00001 | 11/21/17 | Wellington Laboratories, Lot LPFHpS1112 | | | (Purchased Reagent) | | Perfluoroheptanesulfonic Acid | 47.6 ug/mL |
| .LCPFHxA_00003 | 05/09/19 | Wellington Laboratories, Lot PFHxA0514 | | | (Purchased Reagent) | | Perfluorohexanoic acid | 50 ug/mL |
| .LCPFHxDA_00004 | 11/28/17 | Wellington Laboratories, Lot PFHxDA0707 | | | (Purchased Reagent) | | Perfluorohexadecanoic acid | 50 ug/mL |
| .LCPFHxS-br_00001 | 07/03/20 | Wellington Laboratories, Lot brPFHxSK0615 | | | (Purchased Reagent) | | Perfluorohexane Sulfonate | 45.5 ug/mL |
| | | | | | | | Perfluorohexanesulfonic acid (PFHxS) | 45.5 ug/mL |
| .LCPFNA_00004 | 05/09/19 | Wellington Laboratories, Lot PFNA0514 | | | (Purchased Reagent) | | Perfluorononanoic acid (PFNA) | 50 ug/mL |
| .LCPFNS_00002 | 07/04/17 | Wellington Laboratories, Lot LPFNS0712 | | | (Purchased Reagent) | | PFNS (Perflouro-1-nonanesulfonate) | 48 ug/mL |
| .LCPFOA_00005 | 11/06/20 | Wellington Laboratories, Lot PFOA1115 | | | (Purchased Reagent) | | Perfluorooctanoic acid (PFOA) | 50 ug/mL |
| .LCPFODA_00004 | 04/25/17 | Wellington Laboratories, Lot PFODA0807 | | | (Purchased Reagent) | | Perfluorooctandecanoic acid | 50 ug/mL |
| .LCPFOS-br_00001 | 10/14/20 | Wellington Laboratories, Lot brPFOSK1015 | | | (Purchased Reagent) | | Perfluorooctanesulfonic acid (PFOS) | 46.4 ug/mL |
| .LCPFOSA_00006 | 09/02/17 | Wellington Laboratories, Lot FOSA0815I | | | (Purchased Reagent) | | Perfluorooctane Sulfonamide | 50 ug/mL |
| .LCPFPeA_00004 | 01/30/20 | Wellington Laboratories, Lot PFPeA0115 | | | (Purchased Reagent) | | Perfluoropentanoic acid | 50 ug/mL |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| .LCPFPeS_00002 | 07/04/17 | Wellington Laboratories, Lot LPFPeS0712 | | | (Purchased Reagent) | | PFPeS (Perflouro-1-pentanesulfonate) | 46.9 ug/mL |
| .LCPFTeDA_00003 | 06/19/18 | Wellington Laboratories, Lot PFTeDA0613 | | | (Purchased Reagent) | | Perfluorotetradecanoic acid | 50 ug/mL |
| .LCPFTrDA_00003 | 12/10/18 | Wellington Laboratories, Lot PFTrDA1213 | | | (Purchased Reagent) | | Perfluorotridecanoic acid | 50 ug/mL |
| .LCPFUdA_00003 | 06/19/18 | Wellington Laboratories, Lot PFUdA0613 | | | (Purchased Reagent) | | Perfluoroundecanoic acid | 50 ug/mL |

# Reagent

# LCM2PFHxDA_00002

Rec: 8/14/14 SKV

Scanned: 8/18/14 STV

318141
ID: LCM2PFHxDA_00002
Exp: 11/29/17 Prpd: SKV
13C2-PFHxDA at 50ug/mL

# WELLINGTON LABORATORIES

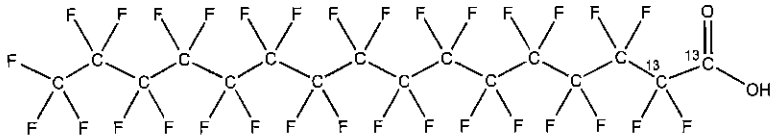
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** M2PFHxDA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]hexadecanoic acid

**LOT NUMBER:** M2PFHxDA1112

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_{14}HF_{31}O_2$ | **MOLECULAR WEIGHT:** | 816.11 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 11/29/2012 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 11/29/2017 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.3% of native perfluoro-n-hexadecanoic acid.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 01/10/2013 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

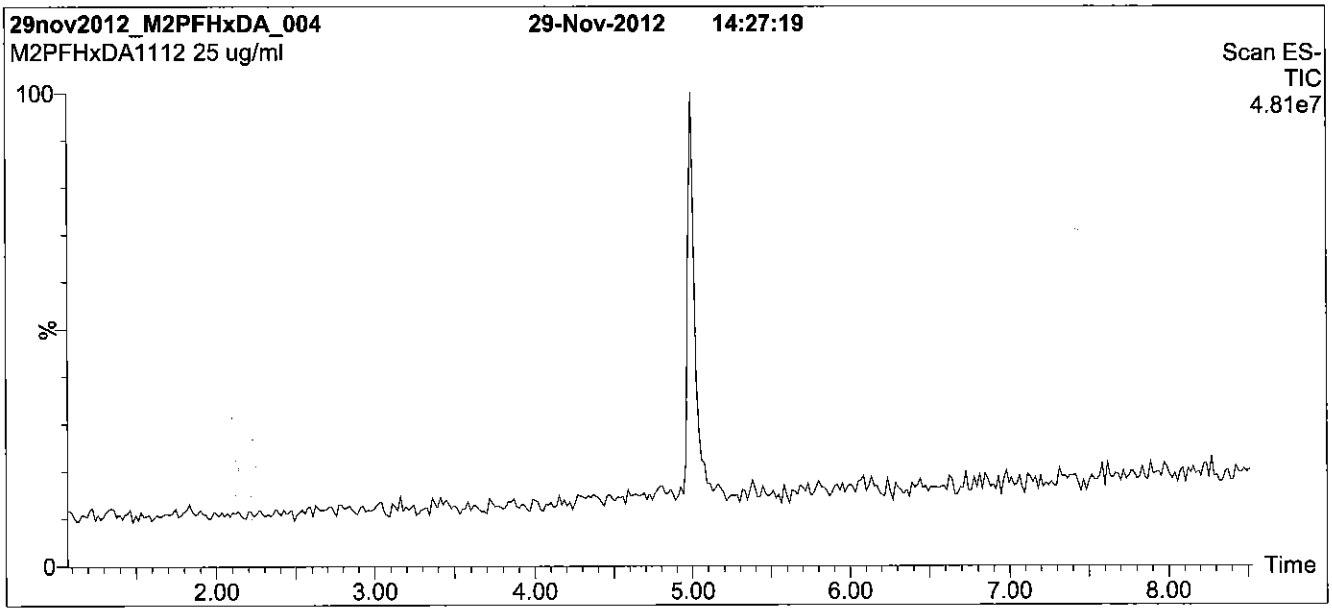
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

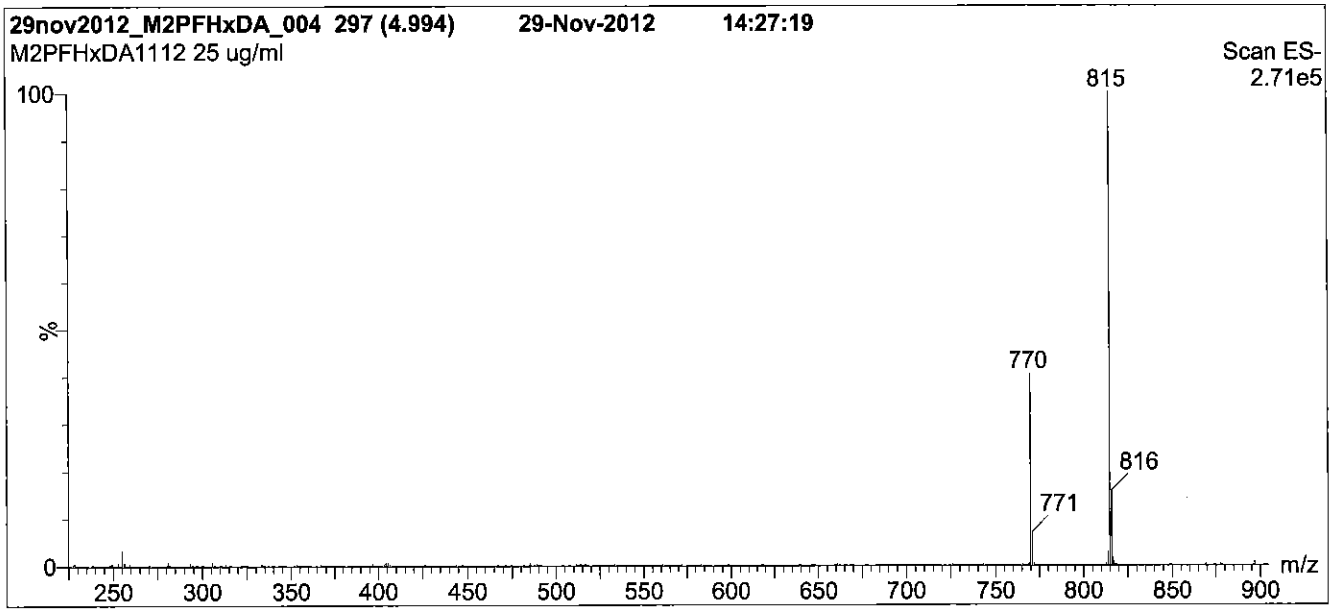
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **M2PFHxDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 100% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

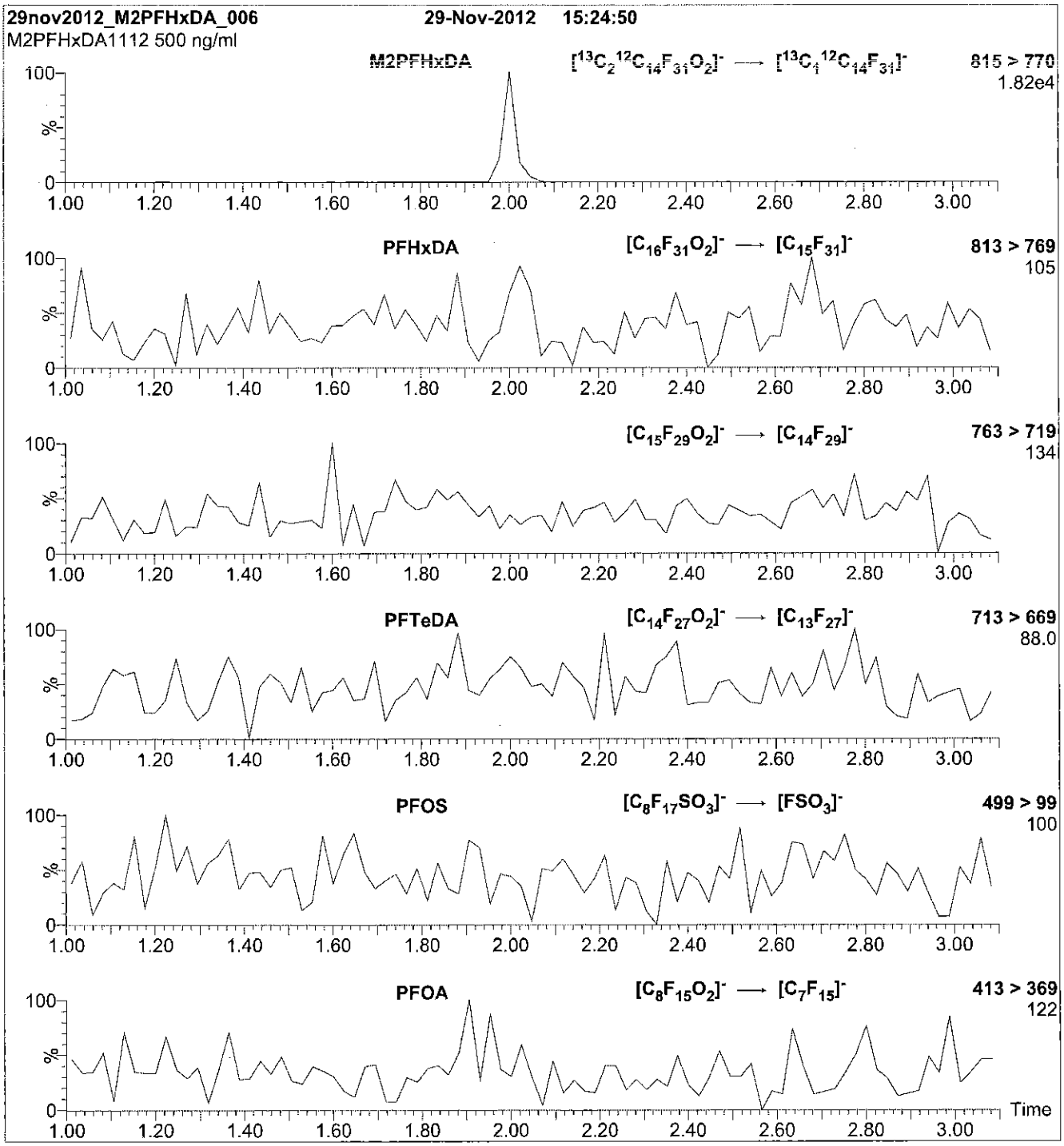
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 1200 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M2PFHxDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml M2PFHxDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 15

# Reagent

# LCM2PFHxDA_00003

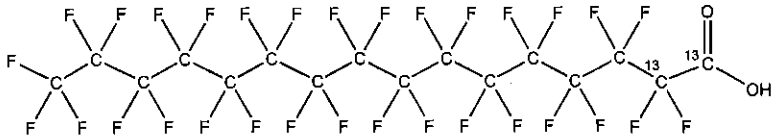
r: 12/9/15 SW

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** M2PFHxDA
**LOT NUMBER:** M2PFHxDA1112
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]hexadecanoic acid

**STRUCTURE:**
**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_2{}^{12}C_{14}HF_{31}O_2$
**MOLECULAR WEIGHT:** 816.11
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)
**CHEMICAL PURITY:** >98%
**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$)
**LAST TESTED:** (mm/dd/yyyy) 11/29/2012
**EXPIRY DATE:** (mm/dd/yyyy) 11/29/2017
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.3% of native perfluoro-n-hexadecanoic acid.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/01/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

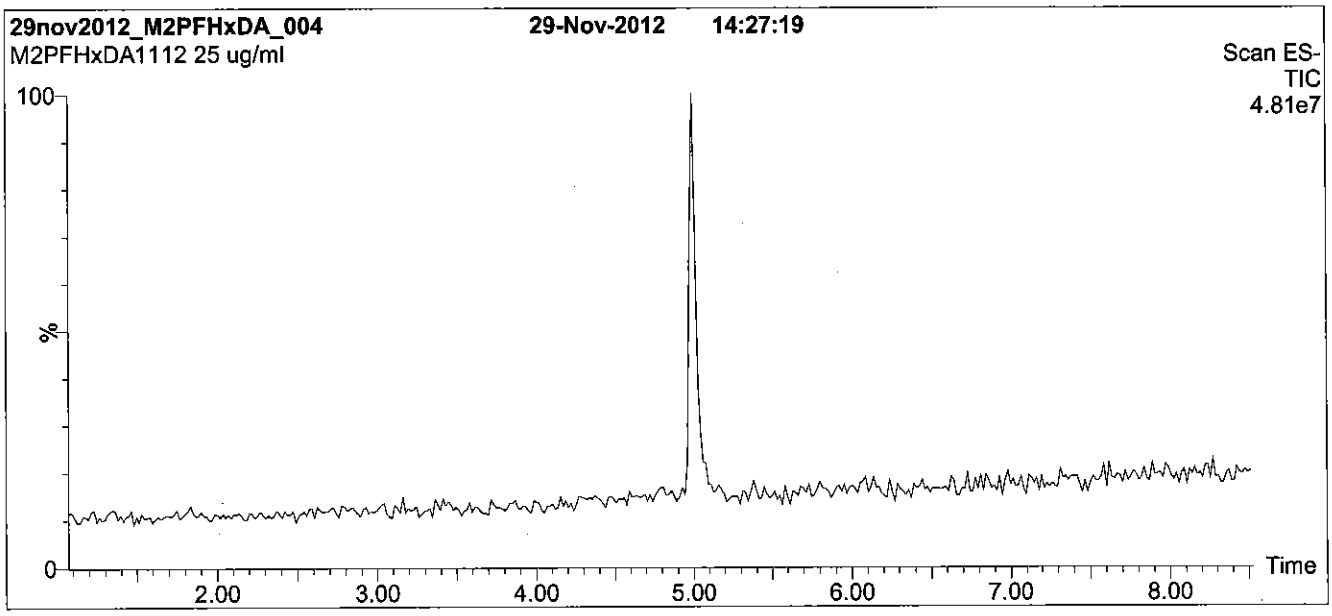
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

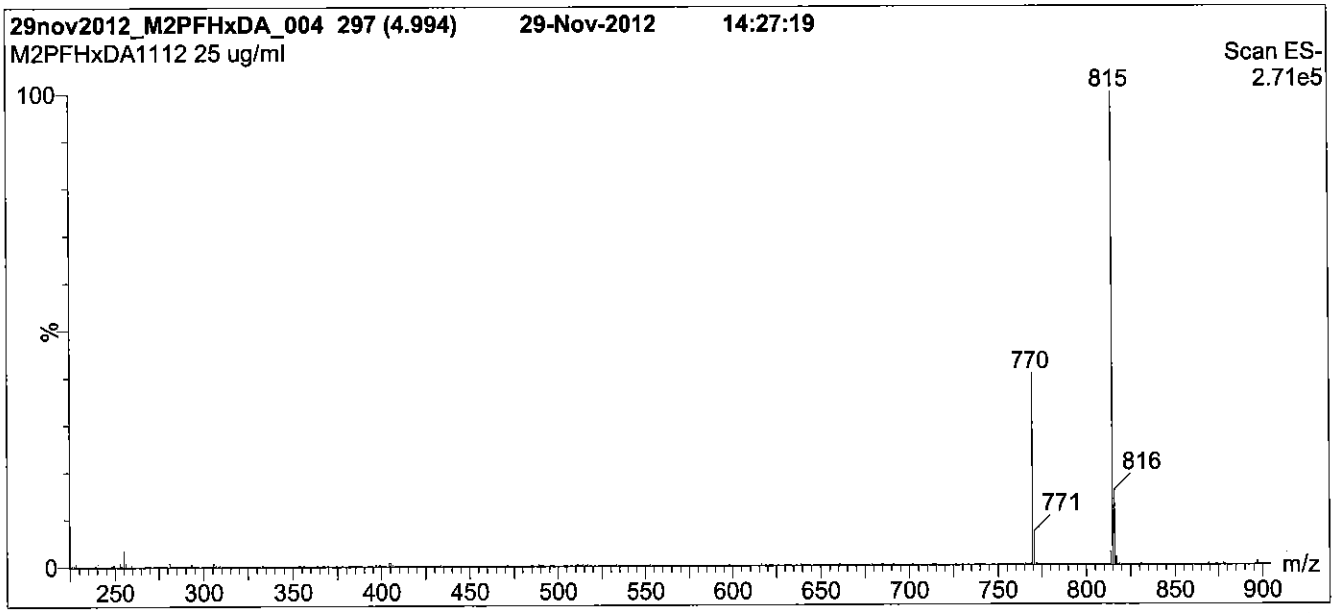
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **M2PFHxDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 100% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

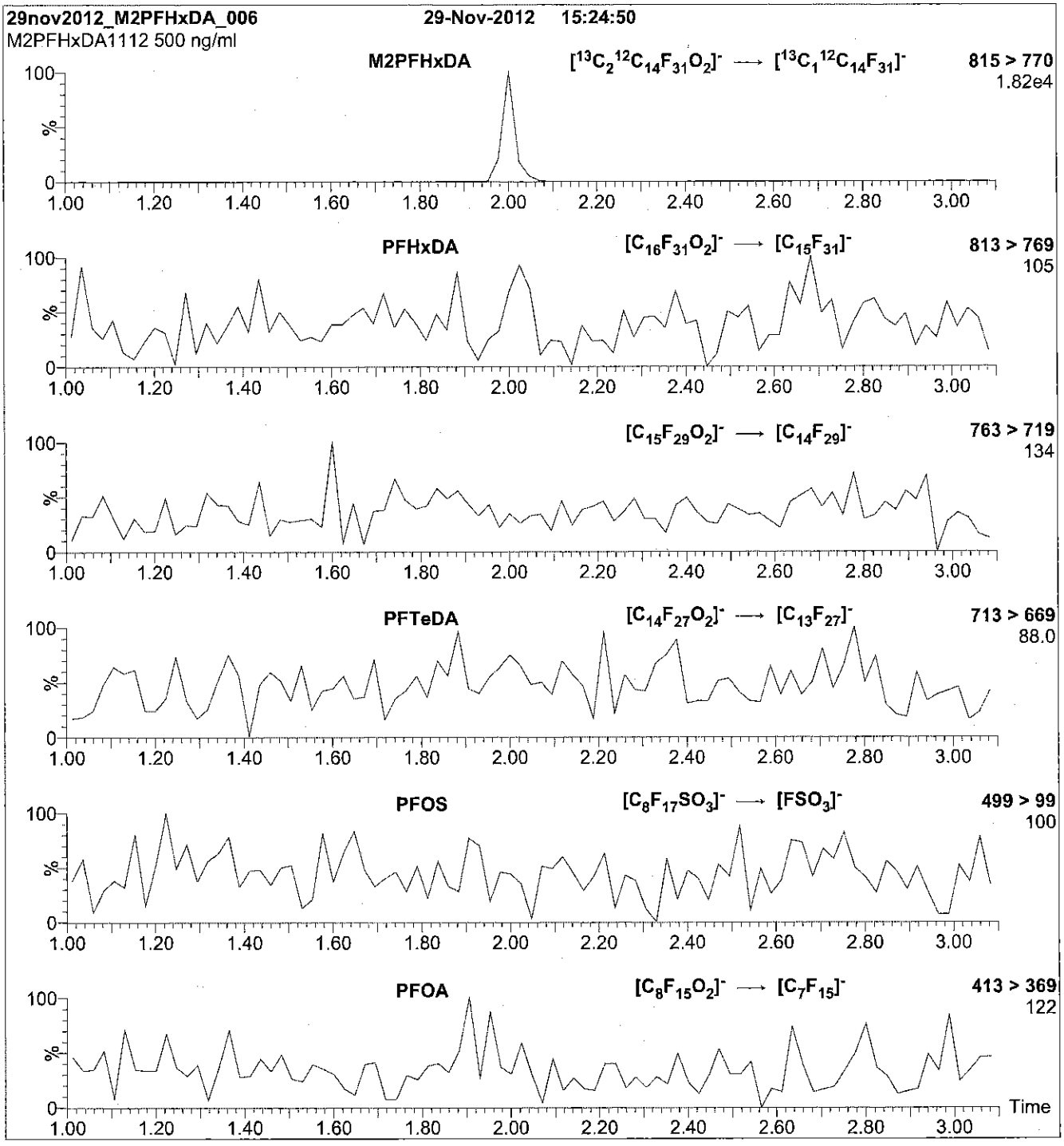
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 1200 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M2PFHxDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml M2PFHxDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 15

# Reagent

# LCM2PFHxDA_00004

591157
ID: LCM2PFHxDA_00004
Exp: 01/07/21 Prpd: CBW
13C2-PFHxDA at 50ug/mL

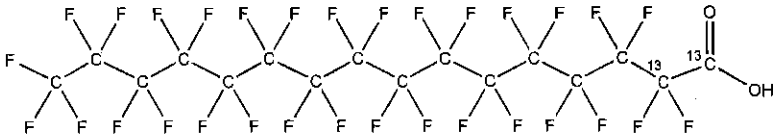
R: 3/3/16 CBW

# WELLINGTON LABORATORIES

# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** M2PFHxDA
**LOT NUMBER:** M2PFHxDA1112
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]hexadecanoic acid

**STRUCTURE:**
**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_{14}HF_{31}O_2$ | **MOLECULAR WEIGHT:** | 816.11 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 01/07/2016 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 01/07/2021 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.3% of native perfluoro-n-hexadecanoic acid.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 01/11/2016 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

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where x is expressed as a relative standard uncertainty of the individual parameter.

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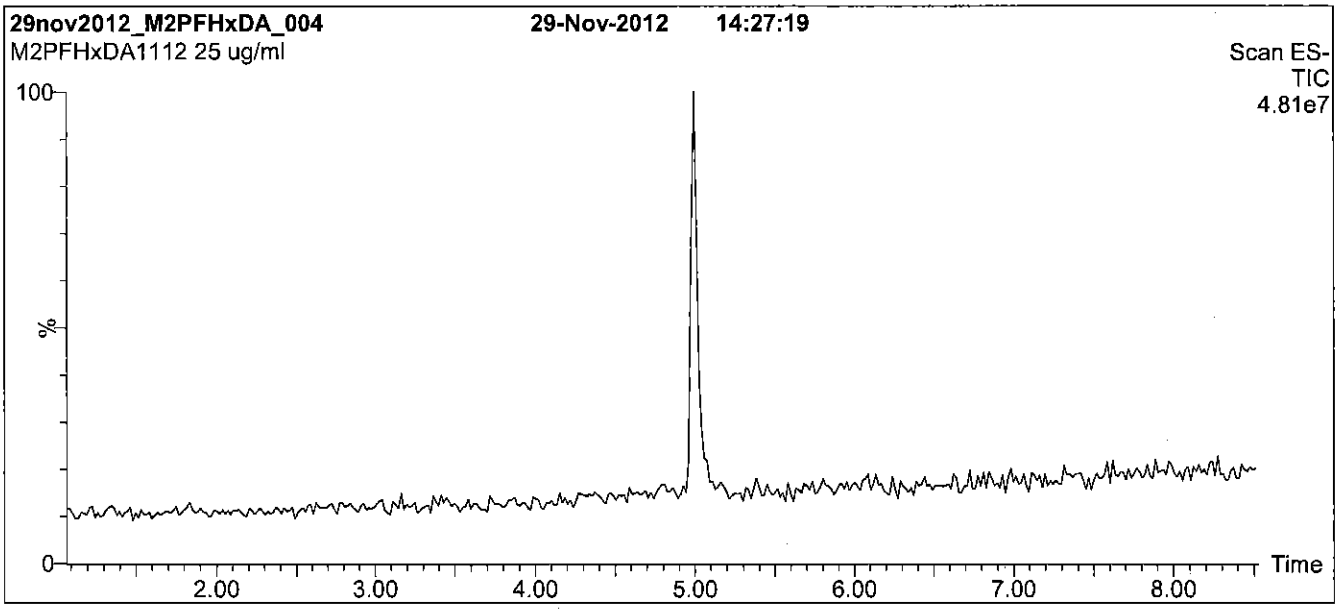
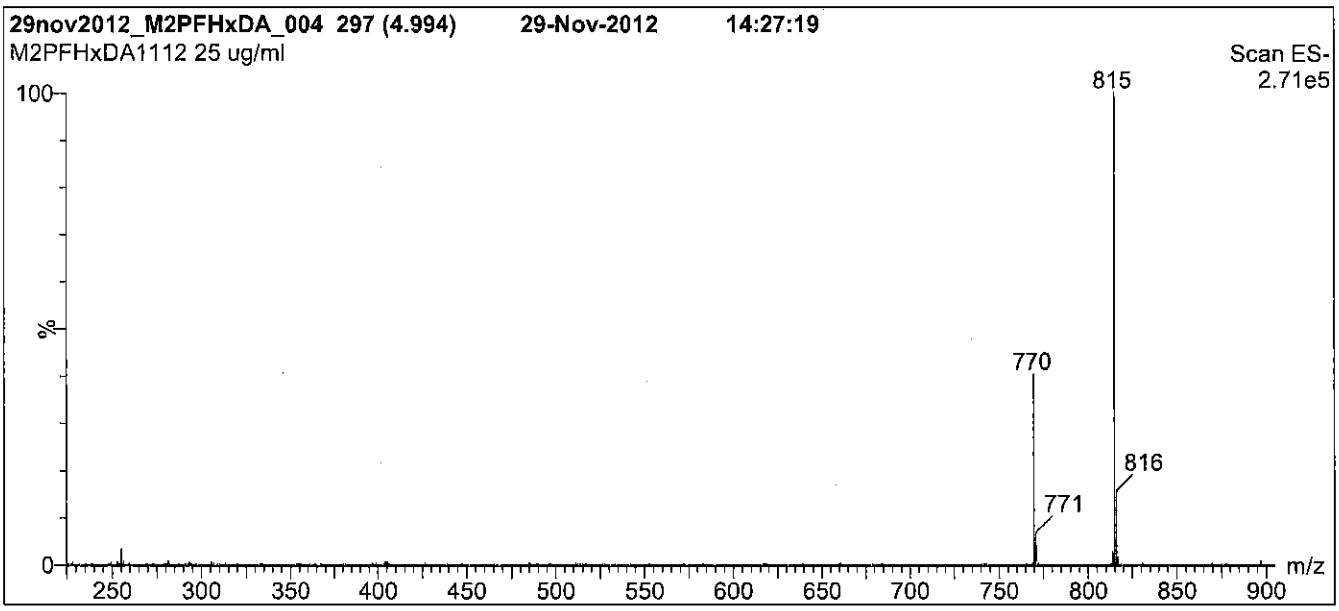
**Figure 1:** **M2PFHxDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 100% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

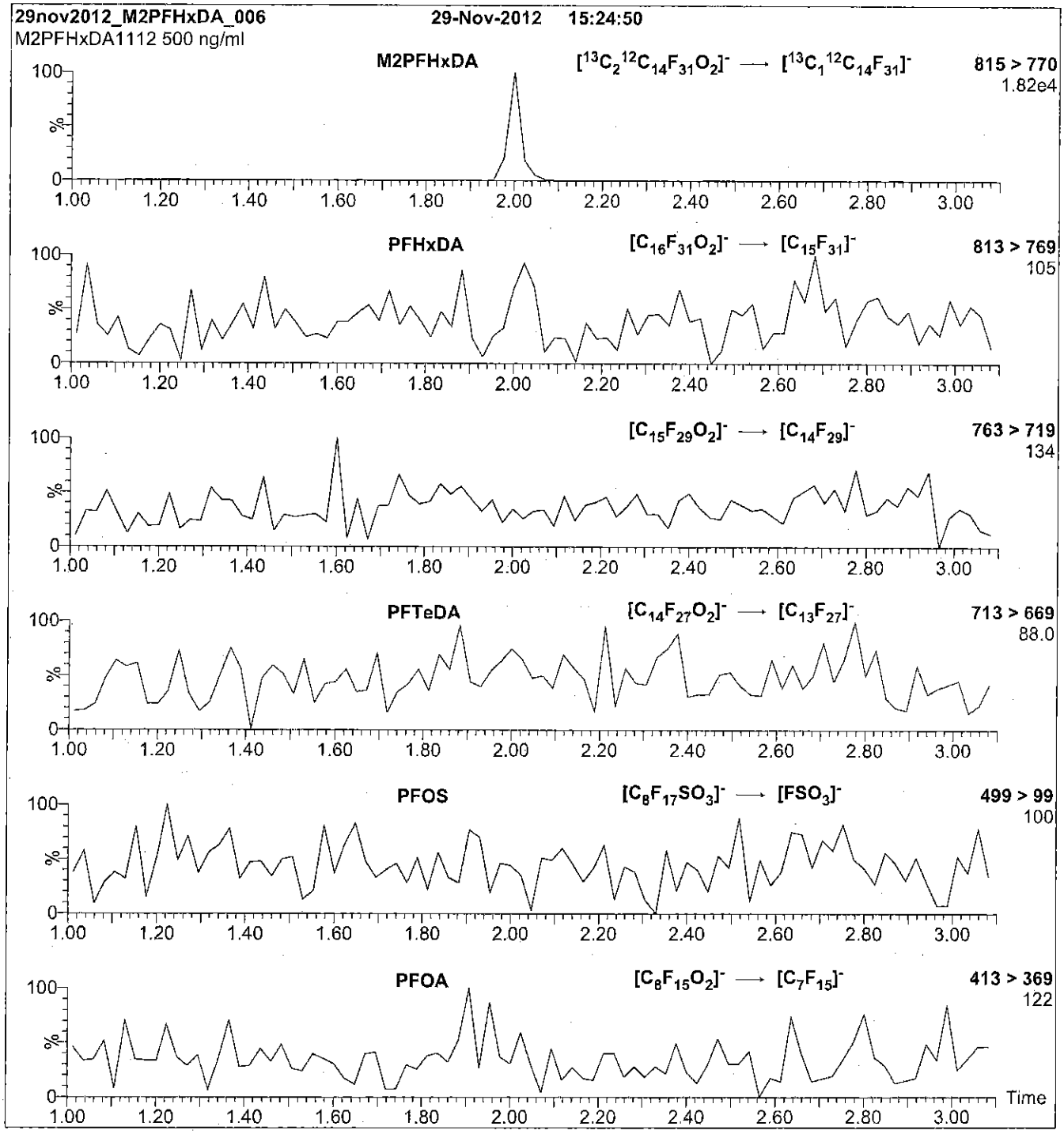
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 1200 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M2PFHxDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml M2PFHxDA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 15

# Reagent

# LCM2PFTeDA_00003

# WELLINGTON LABORATORIES

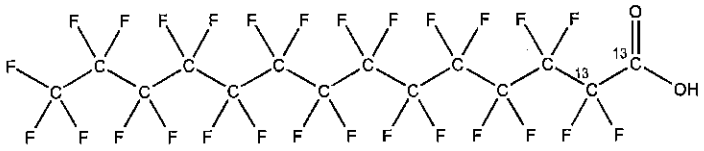
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** M2PFTeDA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]tetradecanoic acid

**LOT NUMBER:** M2PFTeDA1112

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_{12}HF_{27}O_2$ | **MOLECULAR WEIGHT:** | 716.10 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 11/29/2012 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 11/29/2017 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/01/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

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## HAZARDS:

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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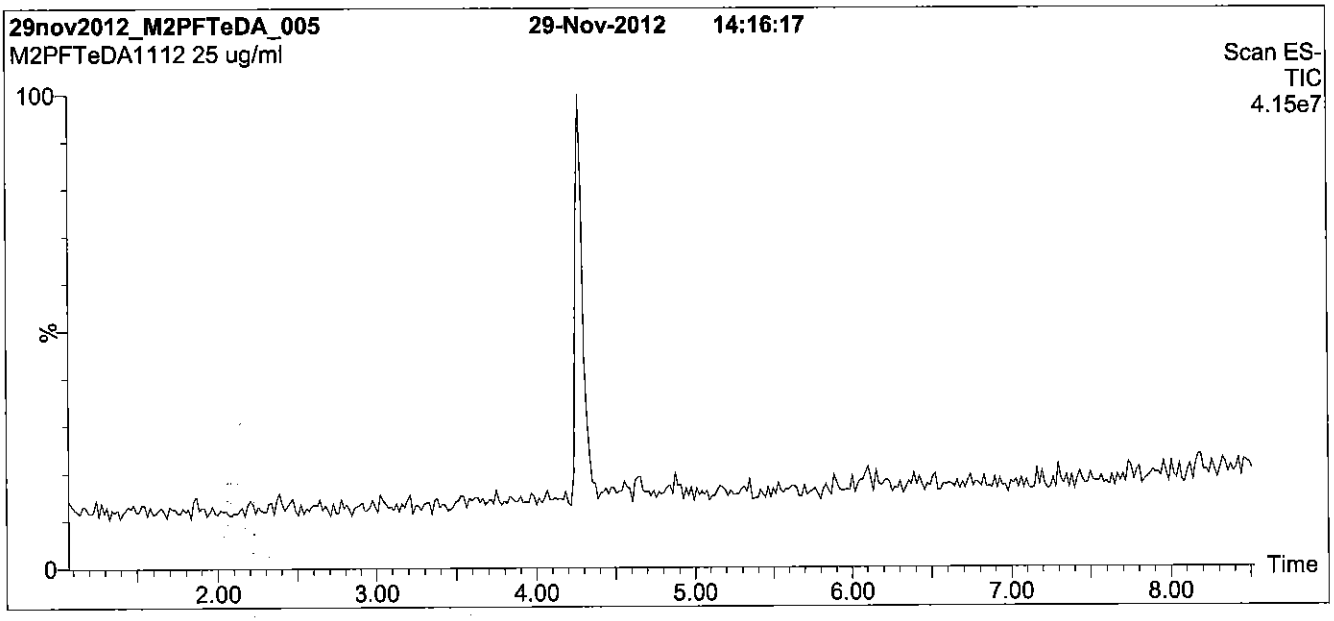
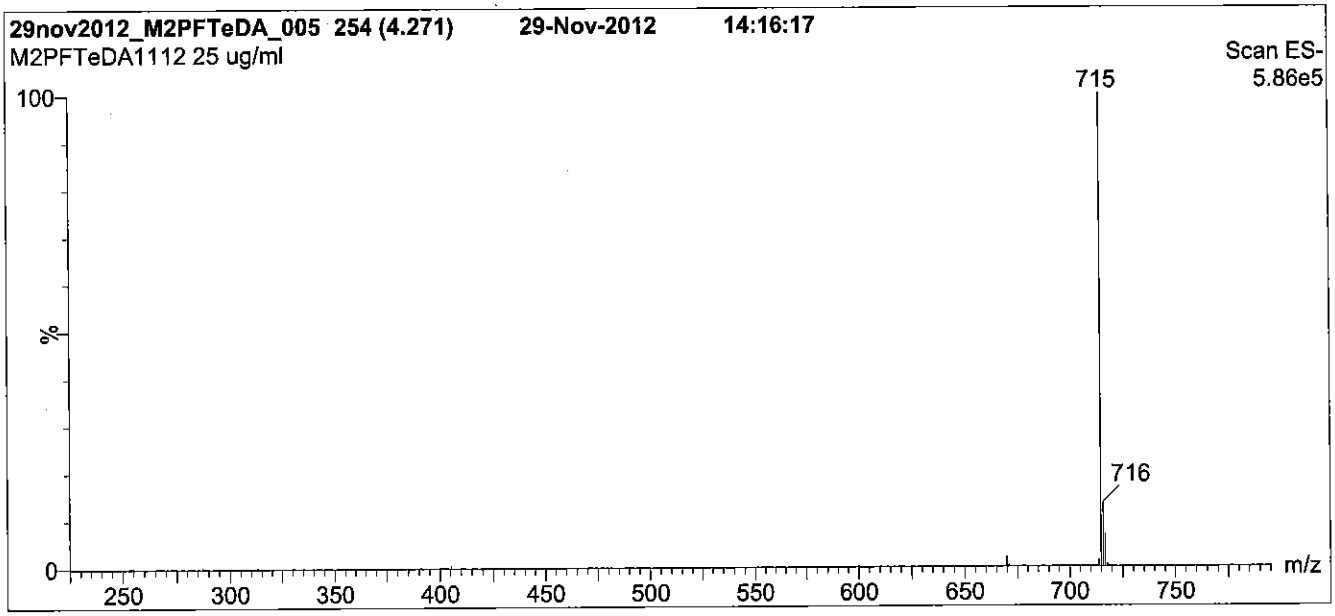
**Figure 1:** **M2PFTeDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 100% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

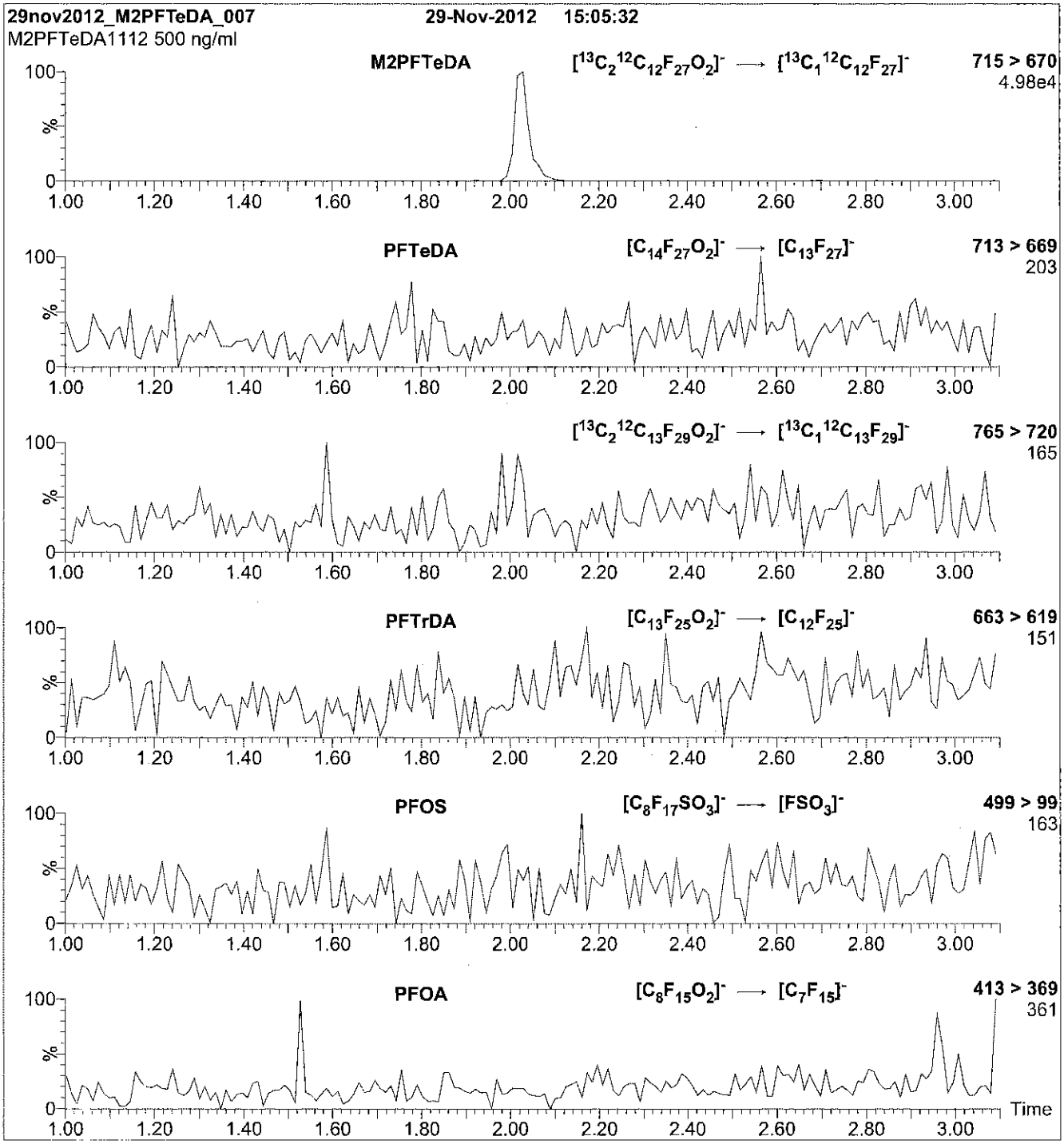
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 1200 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M2PFTeDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml M2PFTeDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.66e-3
Collision Energy (eV) = 14

# Reagent

# LCM2PFTeDA_00004

591158
ID: LCM2PFTeDA_00004
Exp: 12/07/20 Prpd: CBW
13C2-PFTeDA at 50ug/mL

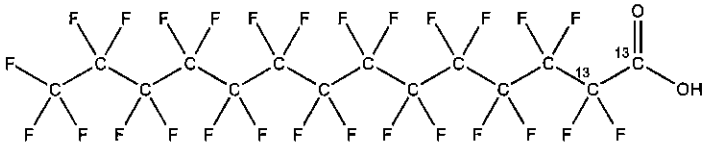
R: 3/3/16 CBW

# WELLINGTON LABORATORIES

# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** M2PFTeDA
**LOT NUMBER:** M2PFTeDA1115
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]tetradecanoic acid

**STRUCTURE:**
**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_2{}^{12}C_{12}HF_{27}O_2$
**MOLECULAR WEIGHT:** 716.10
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)
**CHEMICAL PURITY:** >98%
**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$)
**LAST TESTED:** (mm/dd/yyyy) 12/07/2015
**EXPIRY DATE:** (mm/dd/yyyy) 12/07/2020
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 12/08/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
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The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1$, $x_2$,...$x_n$ on which it depends is:

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where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCTION

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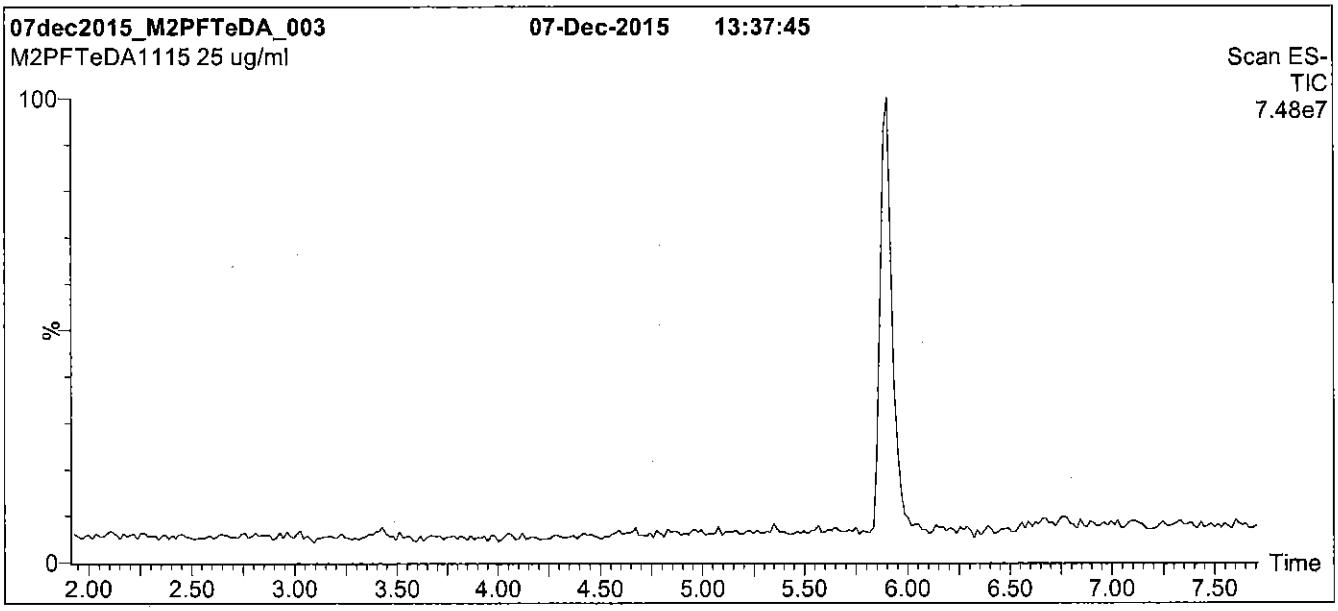
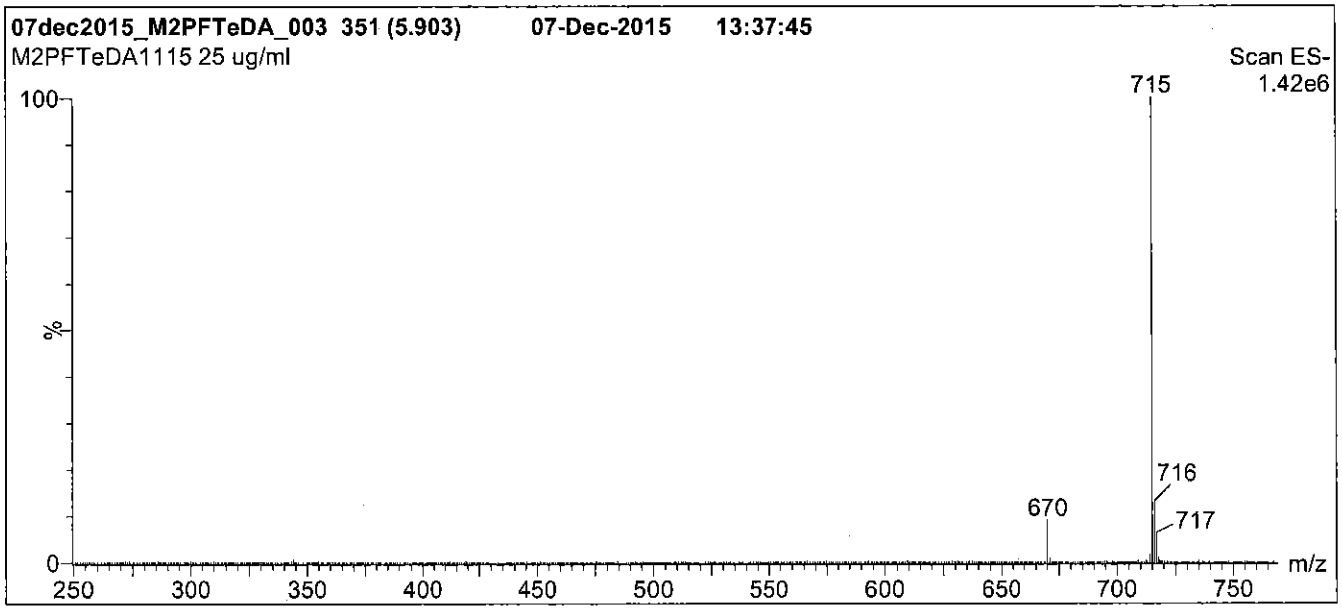
**Figure 1:** **M2PFTeDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

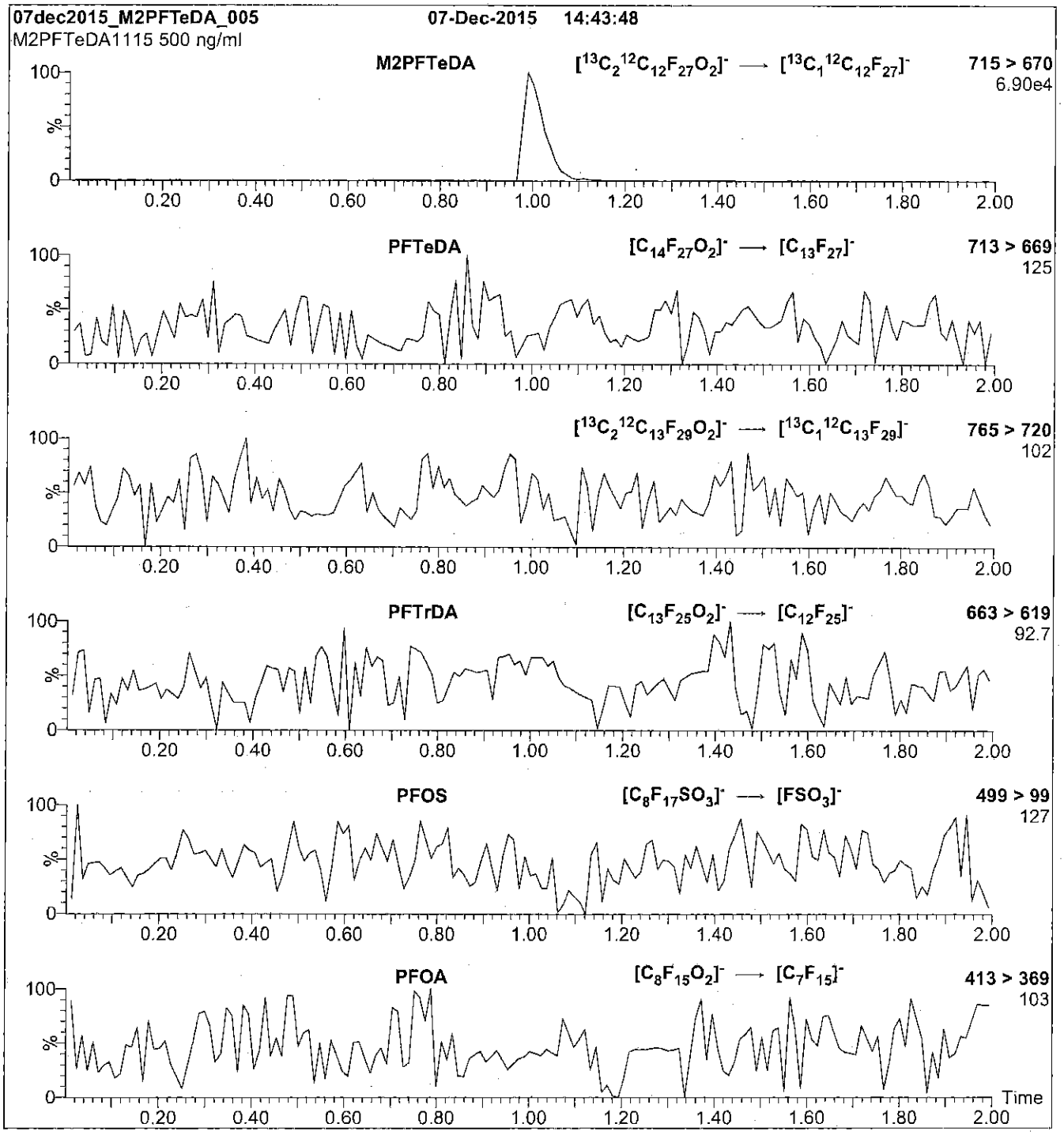
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 1250 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M2PFTeDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml M2PFTeDA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 14

# Reagent

# LCM4PFHPA_00003

r: 11/10/15 SEV

# WELLINGTON LABORATORIES

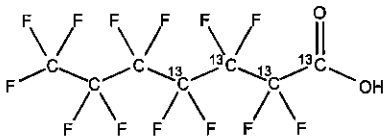
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** M4PFHpA
**COMPOUND:** Perfluoro-n-[1,2,3,4-$^{13}C_4$]heptanoic acid

**LOT NUMBER:** M4PFHpA0515

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4{}^{12}C_3HF_{13}O_2$ | **MOLECULAR WEIGHT:** | 368.03 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$<br>(1,2,3,4-$^{13}C_4$) |
| **LAST TESTED:** (mm/dd/yyyy) | 05/22/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 05/22/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** _____ **Date:** 05/25/2015 (mm/dd/yyyy)
B.G. Chittim

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED Reference Material Producer

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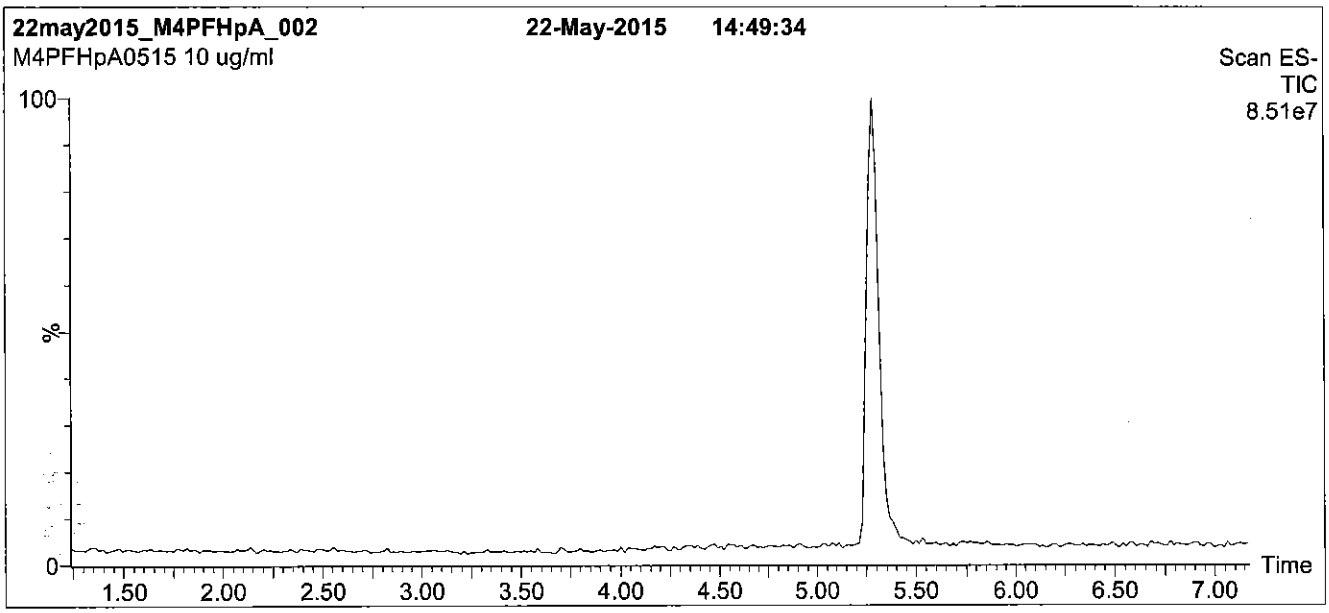
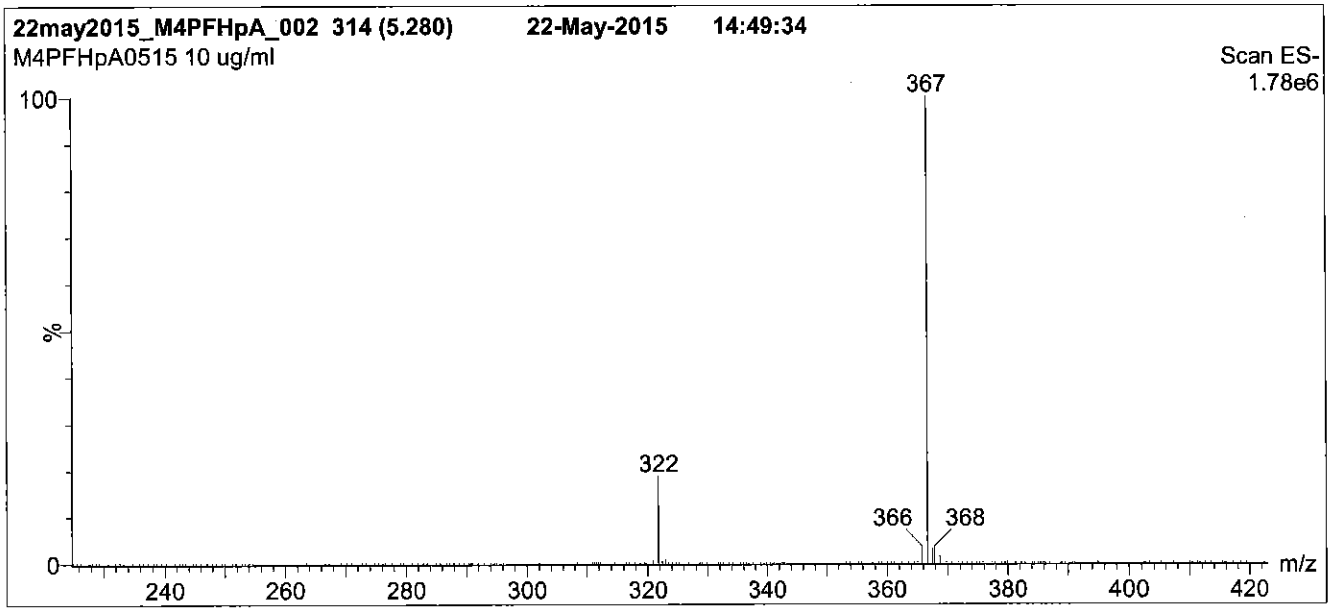
**Figure 1:** **M4PFHpA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

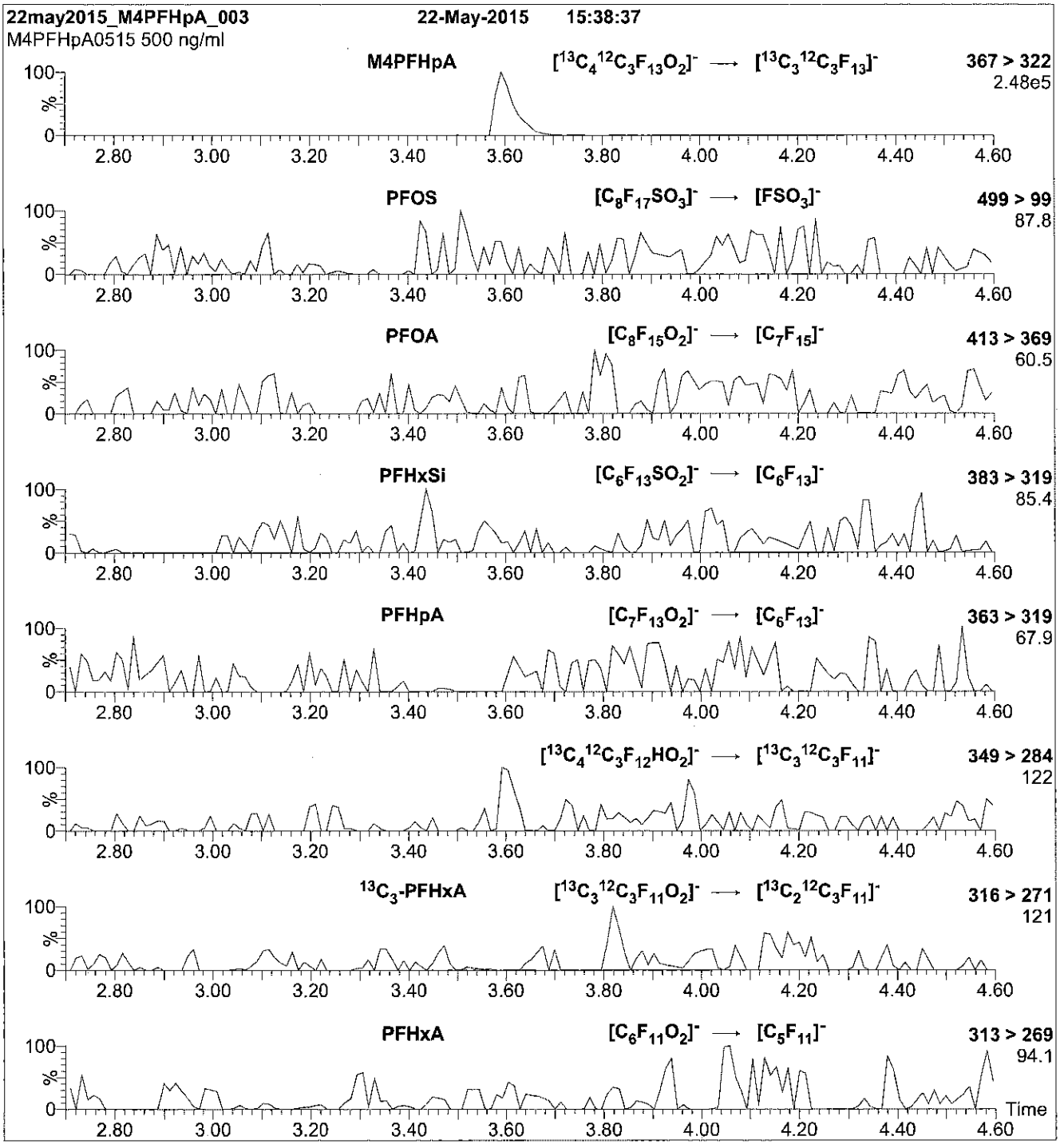
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M4PFHpA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml M4PFHpA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 11

# Reagent

# LCM4PFHPA_00004

R:3/3/16 CBW

591159
ID: LCM4PFHPA_00004
Exp: 05/22/20 Prpd: CBW
13C4-Perfluoroheptanoic a

# WELLINGTON LABORATORIES

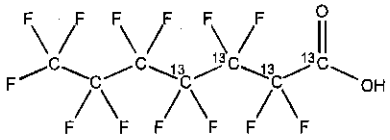
# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** M4PFHpA
**COMPOUND:** Perfluoro-n-[1,2,3,4-$^{13}C_4$]heptanoic acid

**LOT NUMBER:** M4PFHpA0515

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4{}^{12}C_3HF_{13}O_2$ | **MOLECULAR WEIGHT:** | 368.03 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99%$^{13}C$<br>(1,2,3,4-$^{13}C_4$) |
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**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
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**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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**Certified By:** _____ **Date:** 05/25/2015 (mm/dd/yyyy)
B.G. Chittim

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
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CALA Testing Accreditation Inc. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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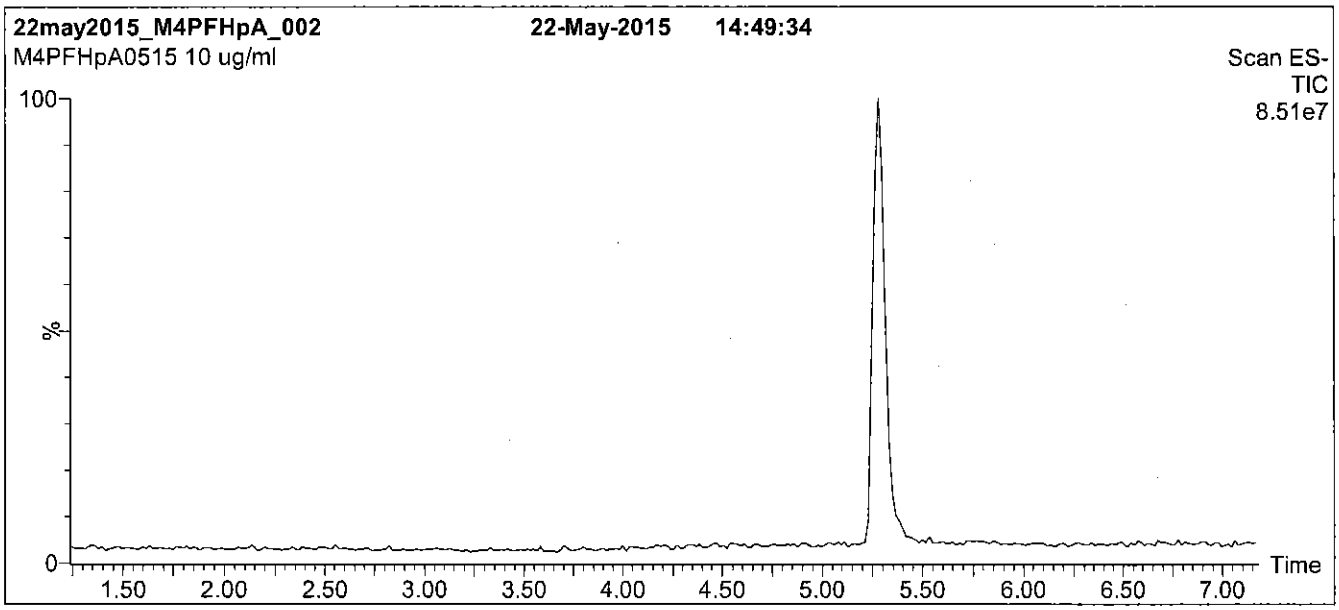
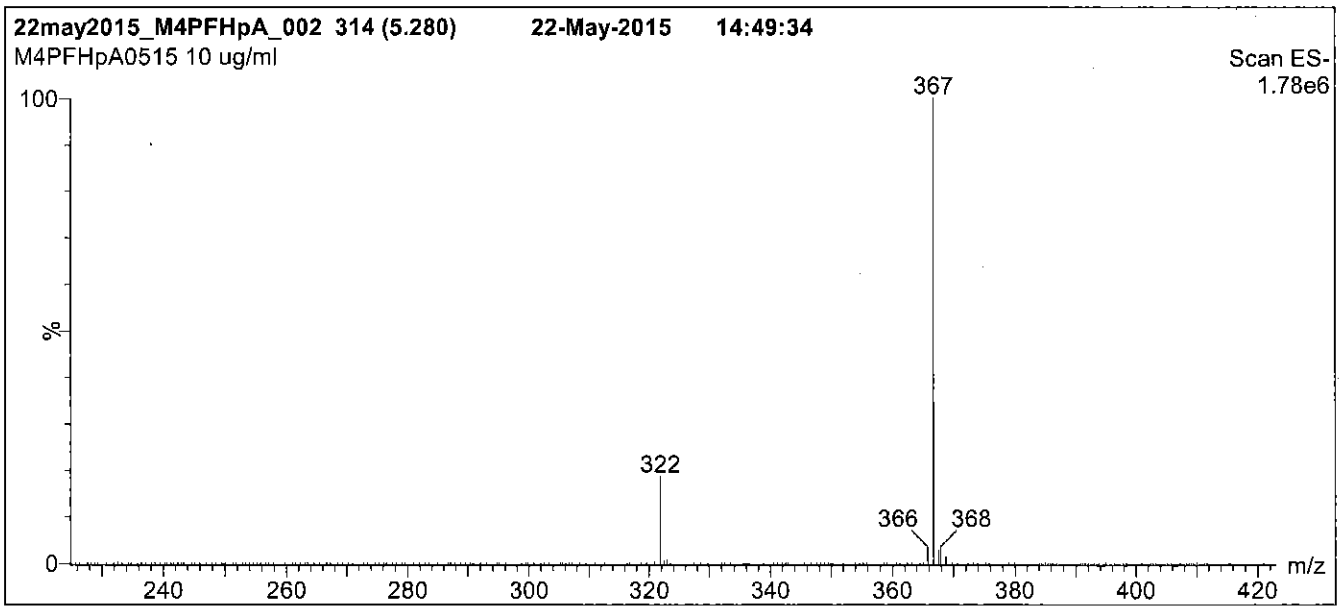



**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

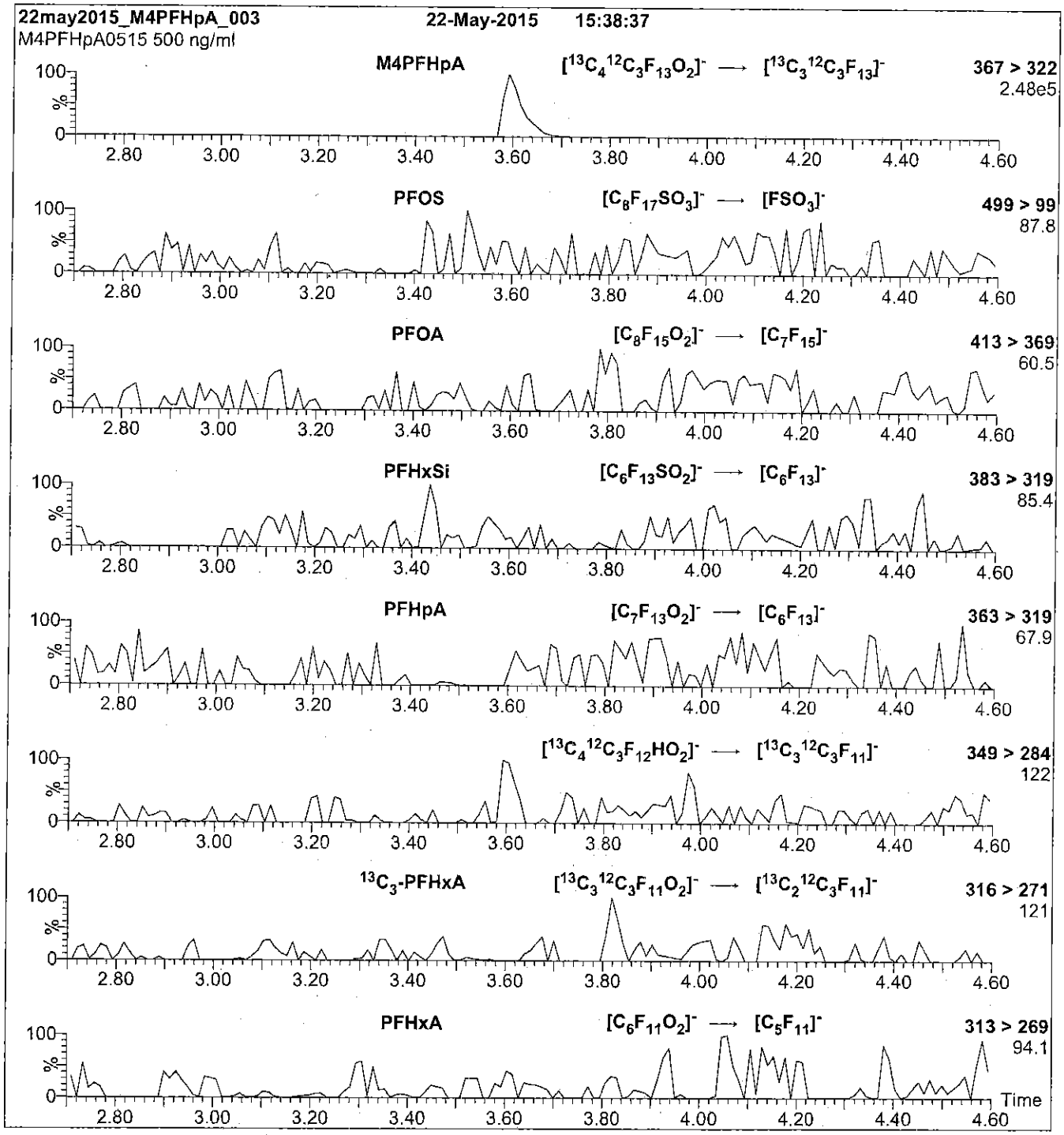
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M4PFHpA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml M4PFHpA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 11

# Reagent

---

# LCM5PFPEA_00004

V1 11/10/15 SRA

# WELLINGTON LABORATORIES

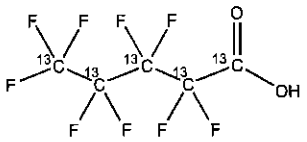
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** M5PFPeA
**COMPOUND:** Perfluoro-n-[$^{13}C_5$]pentanoic acid

**LOT NUMBER:** M5PFPeA0515

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_5HF_9O_2$ | **MOLECULAR WEIGHT:** | 269.01 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($^{13}C_5$) |
| **LAST TESTED:** (mm/dd/yyyy) | 05/22/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 05/22/2020 | | |
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Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains < 0.1% of perfluoro-n-pentanoic acid.

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**Certified By:** B.G. Chittim **Date:** 05/25/2015 (mm/dd/yyyy)

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$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

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CALA Testing Accreditation No.: A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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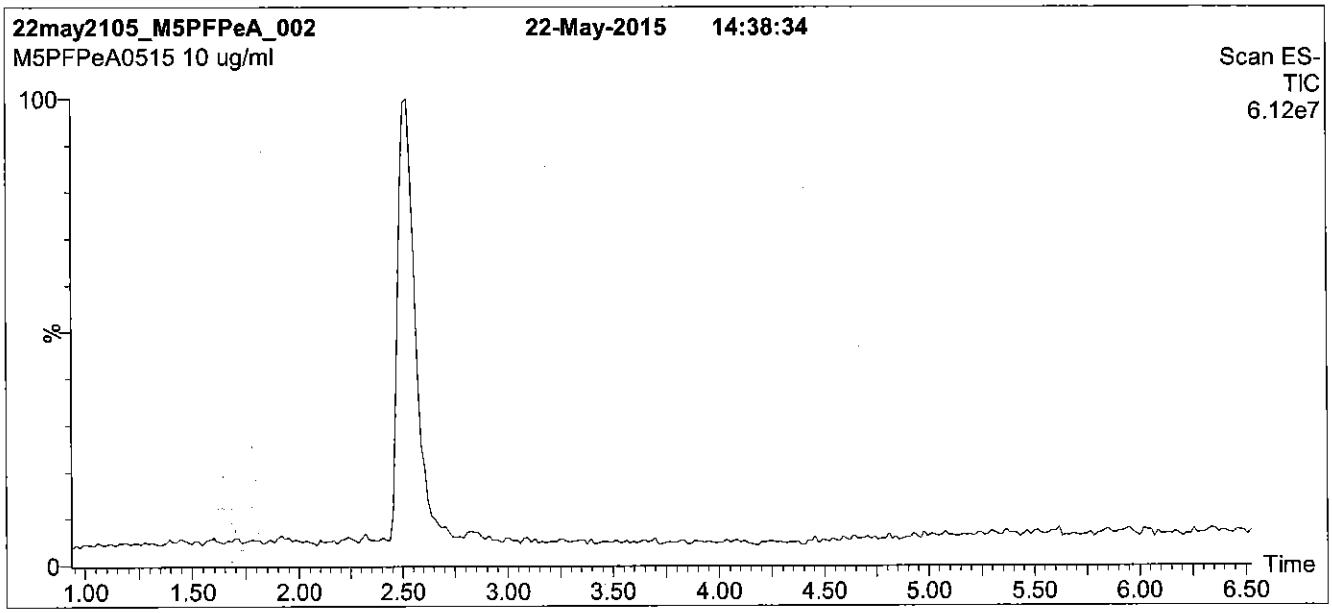
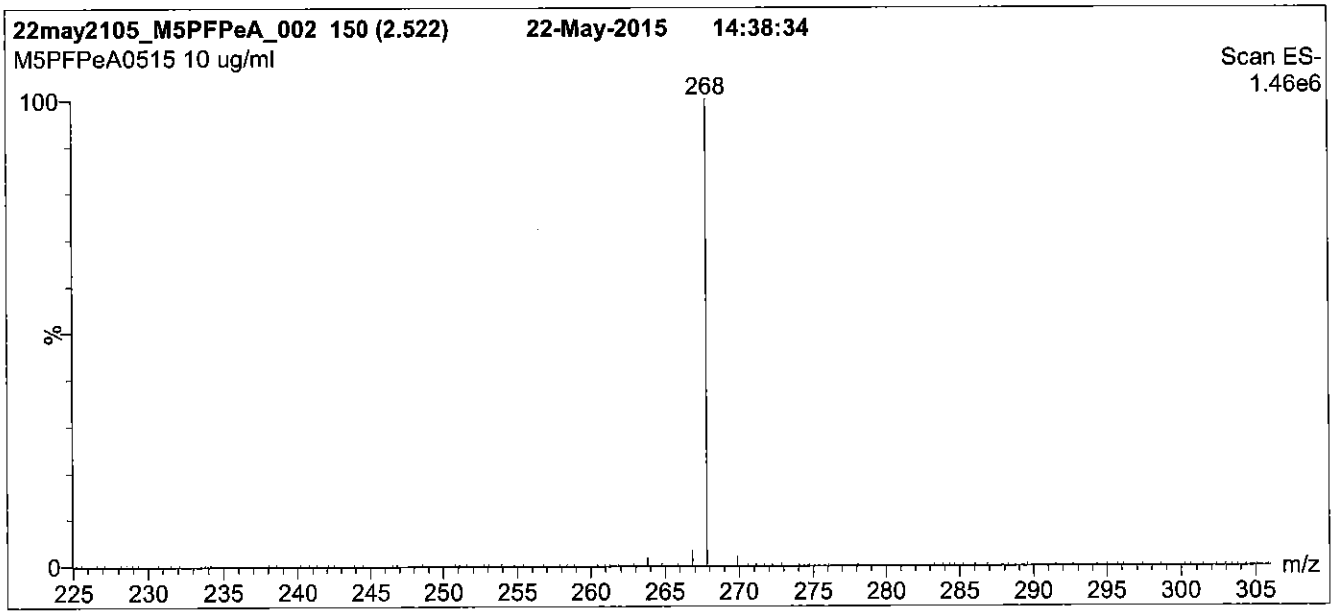
**Figure 1:** **M5PFPeA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

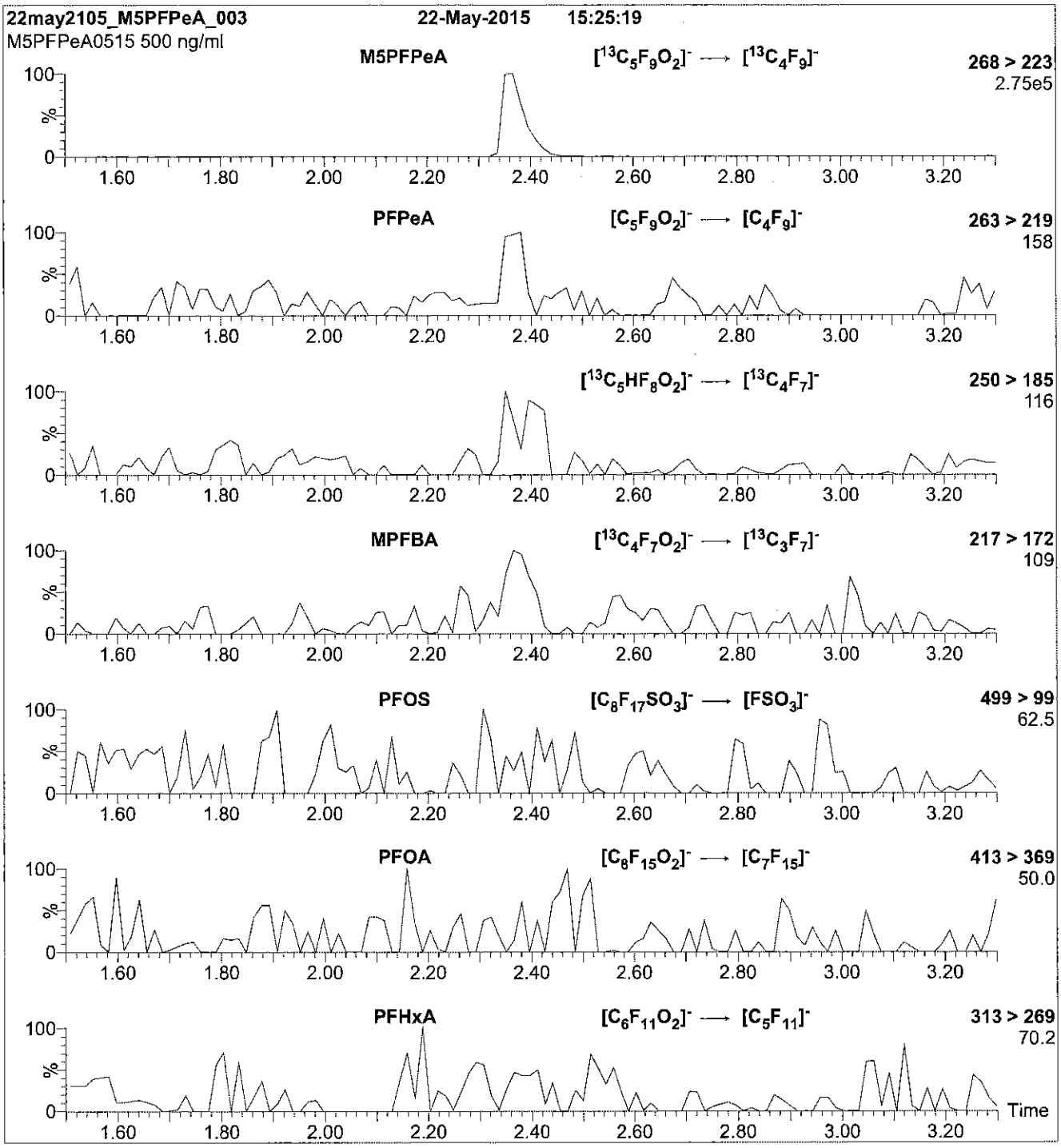
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M5PFPeA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml M5PFPeA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 9

# Reagent

# LCM5PFPEA_00005

R: 3/3/16 cbw

# WELLINGTON LABORATORIES

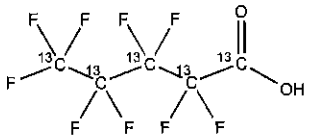
# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** M5PFPeA
**COMPOUND:** Perfluoro-n-[$^{13}C_5$]pentanoic acid

**LOT NUMBER:** M5PFPeA0515

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_5HF_9O_2$ | **MOLECULAR WEIGHT:** | 269.01 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($^{13}C_5$) |
| **LAST TESTED:** (mm/dd/yyyy) | 05/22/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 05/22/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains < 0.1% of perfluoro-n-pentanoic acid.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 05/25/2015 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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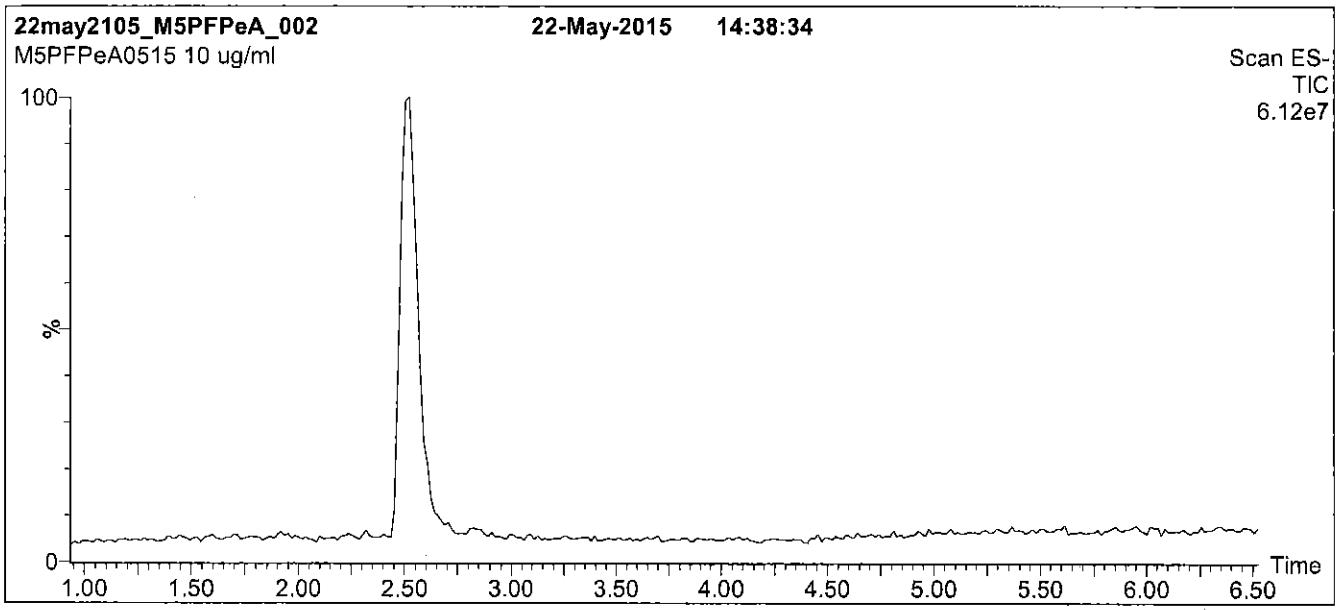
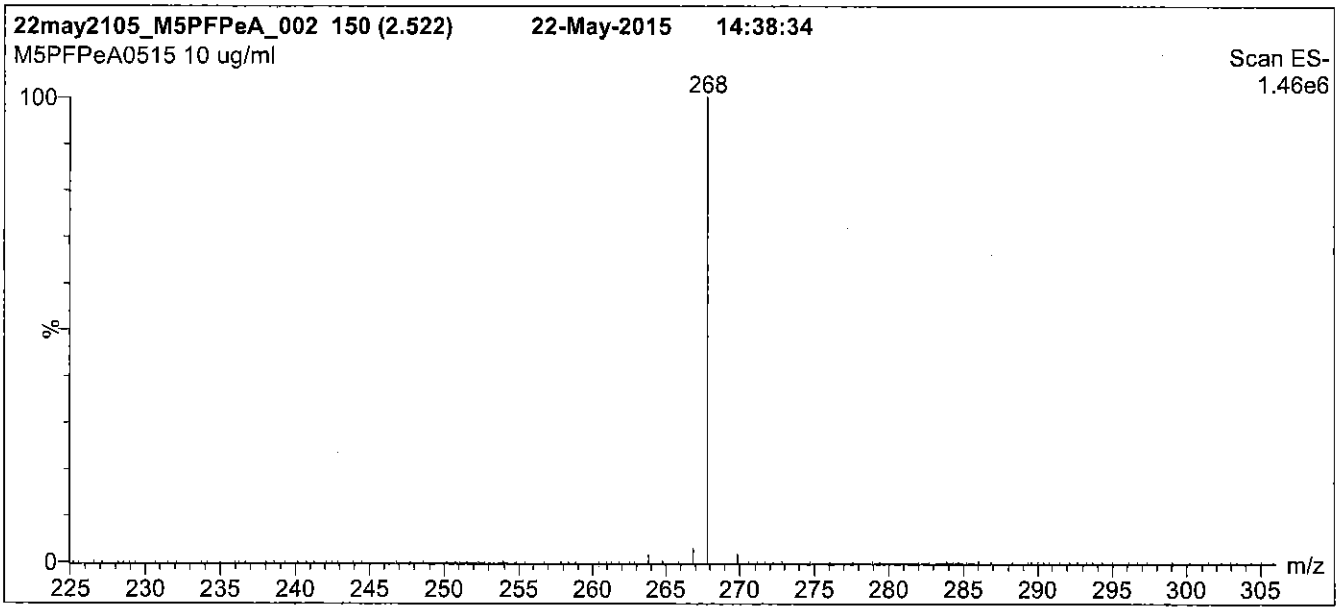



**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

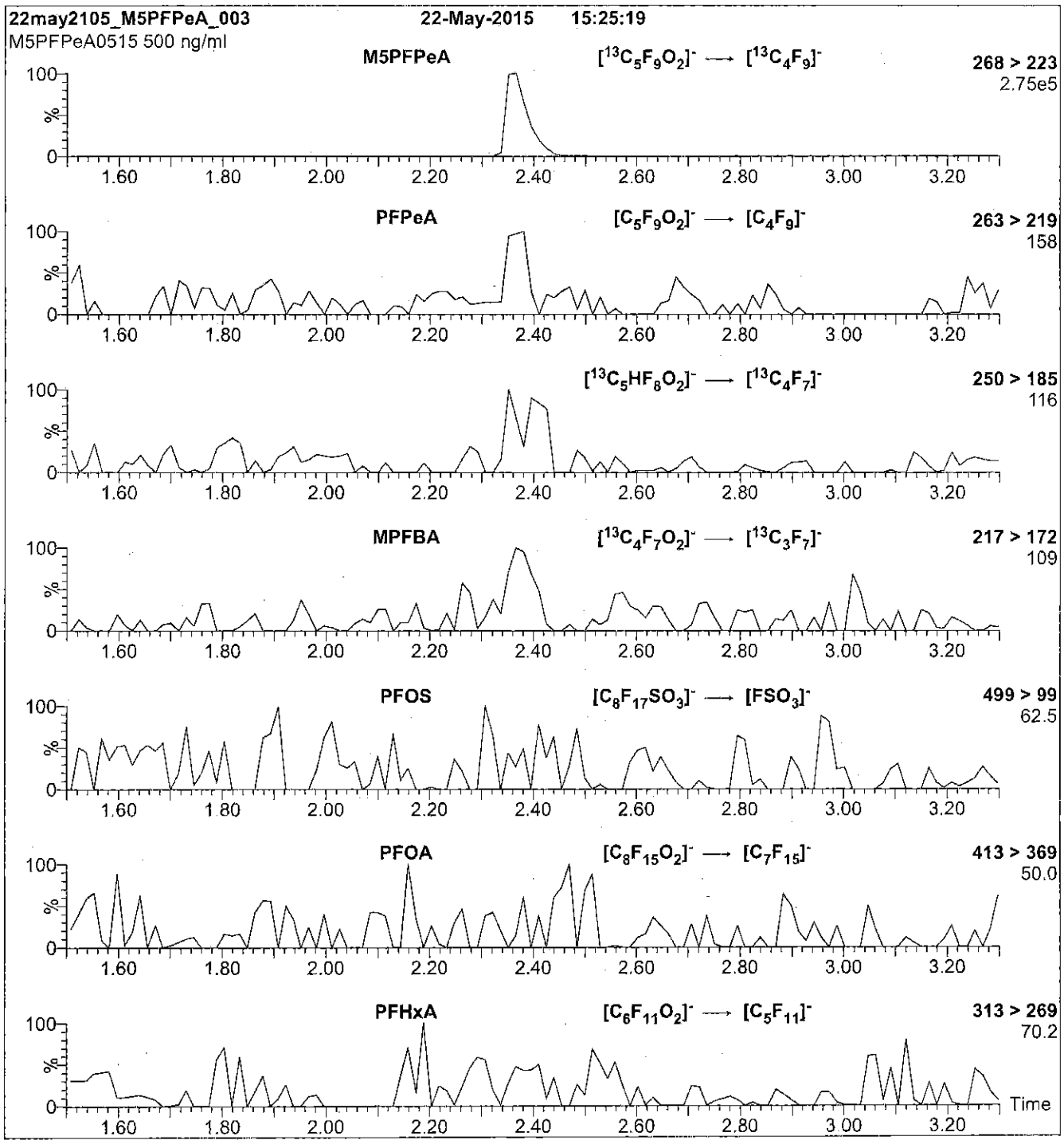
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M5PFPeA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml M5PFPeA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 9

# Reagent

# LCM8FOSA_00006

Rec: 9/15/15 SV

# WELLINGTON LABORATORIES

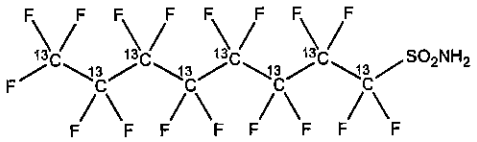
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** M8FOSA-I
**COMPOUND:** Perfluoro-1-[$^{13}C_8$]octanesulfonamide

**LOT NUMBER:** M8FOSA1214I

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_8H_2F_{17}NO_2S$ | **MOLECULAR WEIGHT:** | 507.09 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Isopropanol |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($^{13}C_8$) |
| **LAST TESTED:** (mm/dd/yyyy) | 12/15/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 12/15/2016 | | |
| **RECOMMENDED STORAGE:** | Refrigerate ampoule | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

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**Certified By:** B.G. Chittim **Date:** 04/01/2015 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***



*Form#:27, Issued 2004-11-10*
*Revision#:3, Revised 2015-03-24*

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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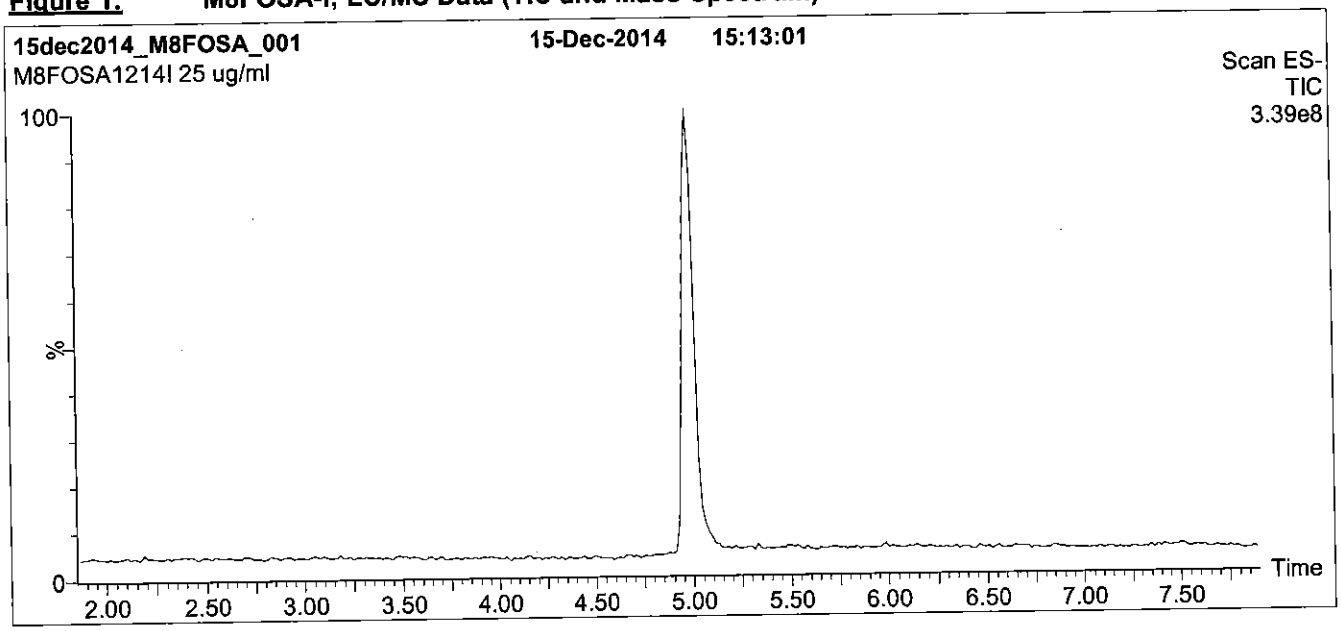
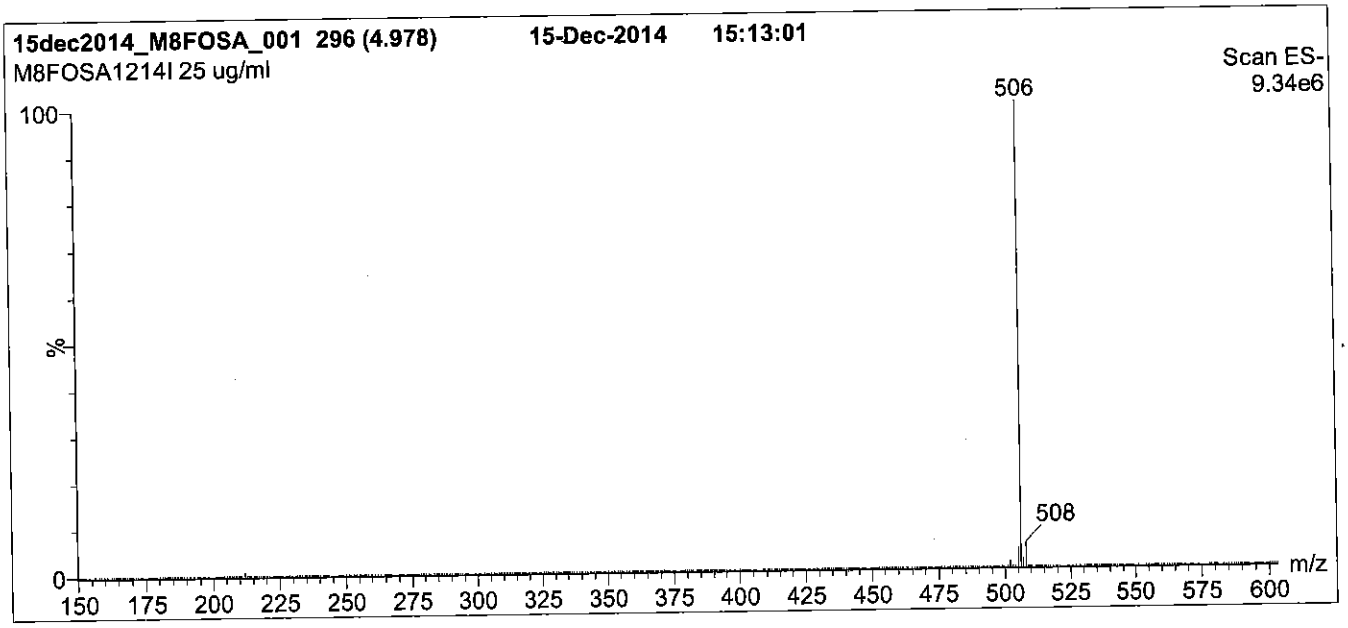
**Figure 1:** **M8FOSA-I; LC/MS Data (TIC and Mass Spectrum)**




**Condltions for Figure 1:**

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1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7.5 min and hold for 1 min
before returning to initial conditions in 0.5 min.
Time: 10 min

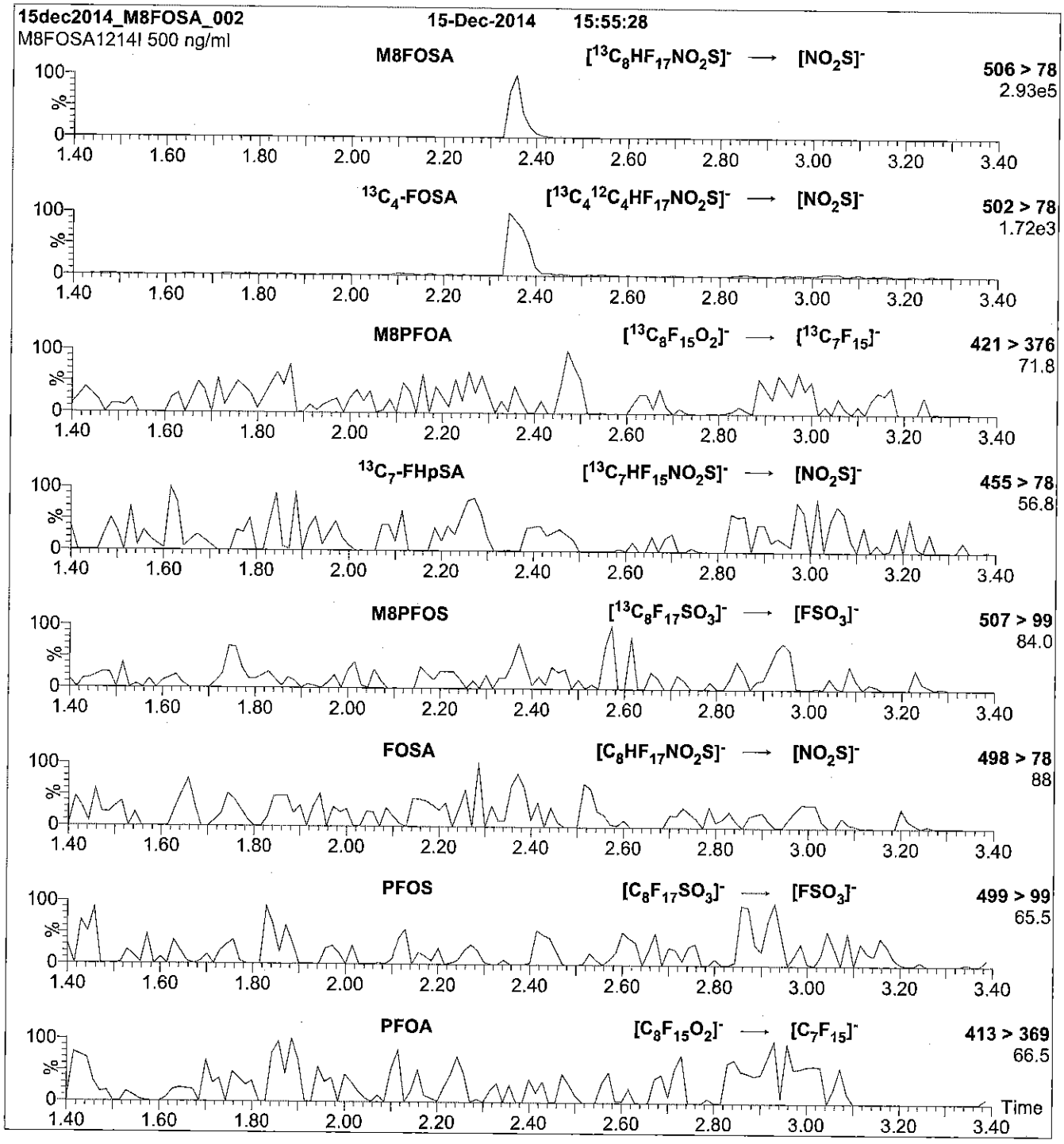
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M8FOSA-I; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml M8FOSA-I) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 30

# Reagent

# LCM8FOSA_00007

572887
ID: LCM8FOSA_00007
Exp. 12/15/16 Prpd: CBW
13C8-Perfluorooctanesulfo

R: 1/25/16
S:

# WELLINGTON LABORATORIES

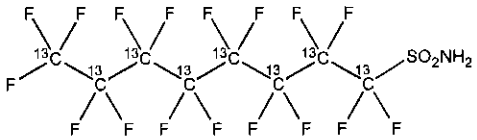
## CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** M8FOSA-I
**COMPOUND:** Perfluoro-1-[$^{13}C_8$]octanesulfonamide

**LOT NUMBER:** M8FOSA1214I

**STRUCTURE:**

**CAS #:** Not available



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$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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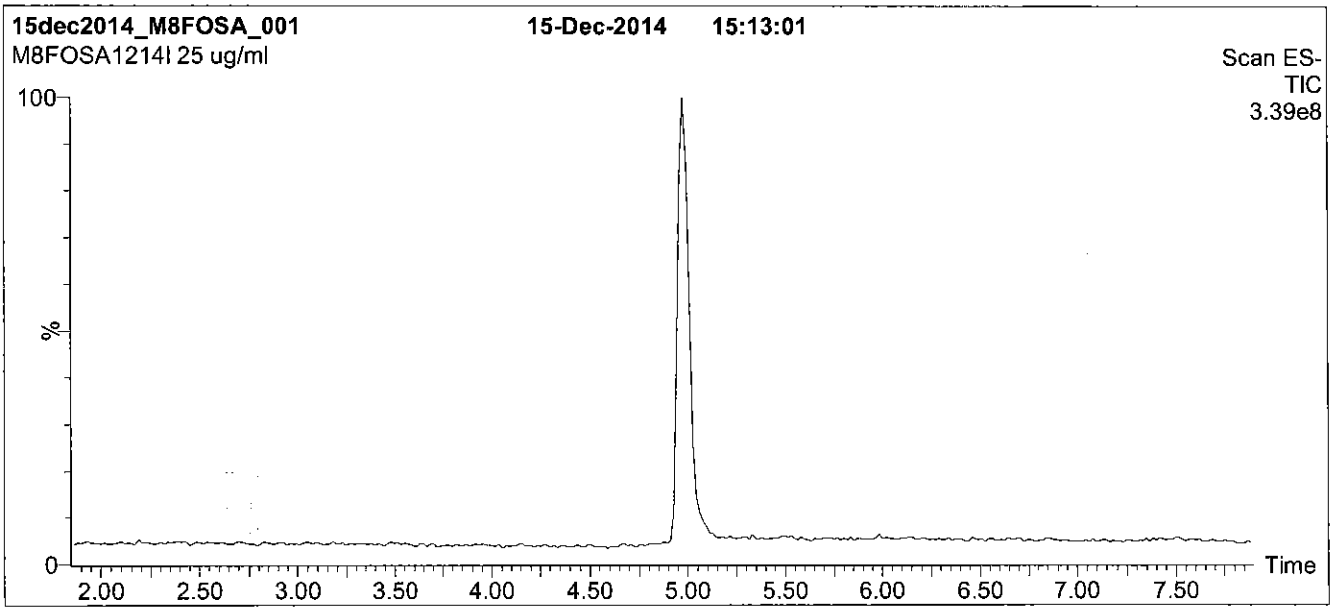
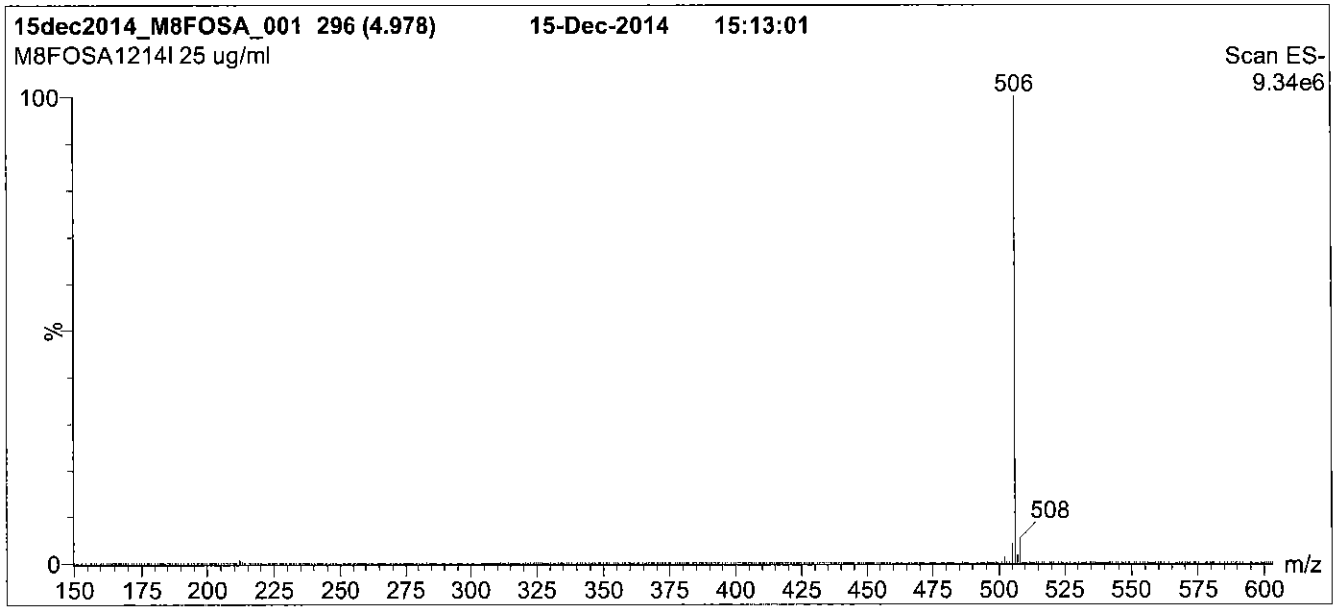
**Figure 1:** **M8FOSA-I; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7.5 min and hold for 1 min
before returning to initial conditions in 0.5 min.
Time: 10 min

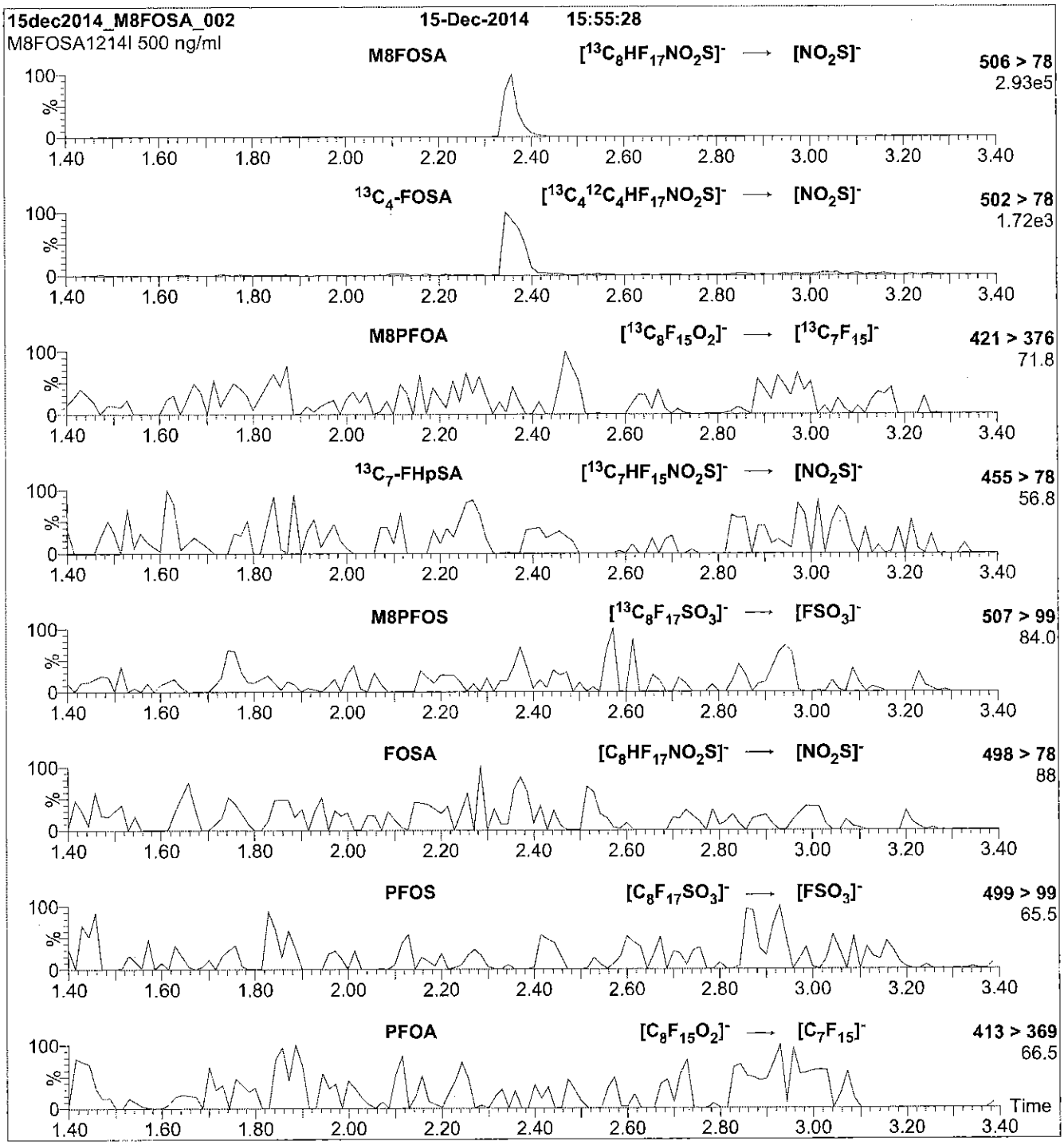
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M8FOSA-I; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml M8FOSA-I)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 30

# Reagent

# LCM8FOSA_00008

R: 3/3/16 CBJ

591143
ID: LCM8FOSA_00008
Exp: 12/22/17 Prpd: CBW
13C8-Perfluorooctanesulfo

# WELLINGTON LABORATORIES

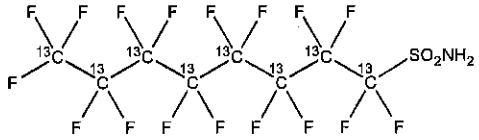
# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** M8FOSA-I
**COMPOUND:** Perfluoro-1-[$^{13}C_8$]octanesulfonamide

**LOT NUMBER:** M8FOSA1215I

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_6H_2F_{17}NO_2S$ | **MOLECULAR WEIGHT:** | 507.09 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Isopropanol |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($^{13}C_8$) |
| **LAST TESTED:** (mm/dd/yyyy) | 12/22/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 12/22/2017 | | |
| **RECOMMENDED STORAGE:** | Refrigerate ampoule | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** _____ **Date:** 01/14/2016 (mm/dd/yyyy)
B.G. Chittim

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

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CALA (testing) Accreditation No. A 1226

ANAB ACCREDITED ISO 17025 ISO 17034 REFERENCE MATERIAL PRODUCER

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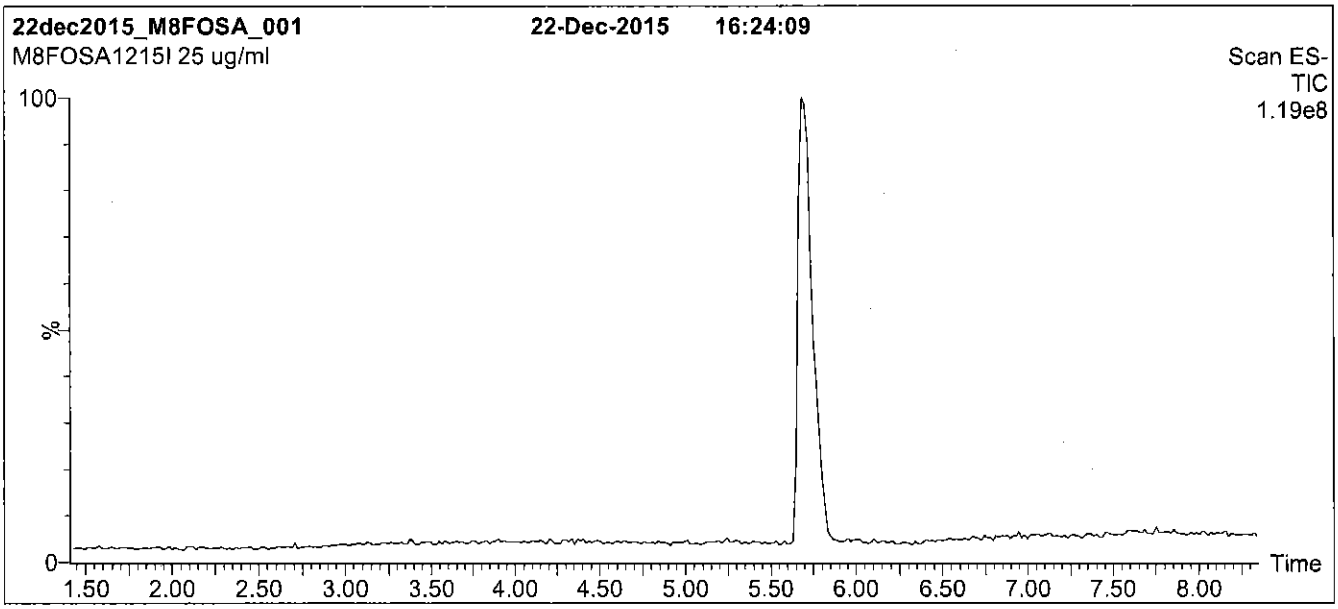


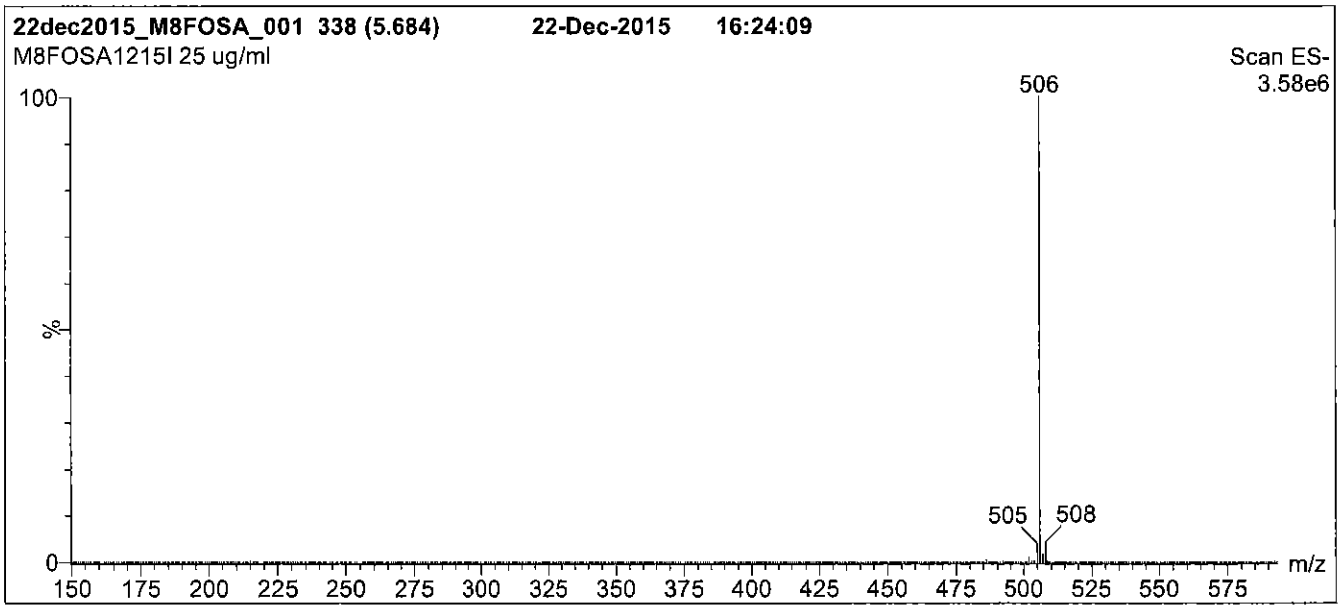


**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
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Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

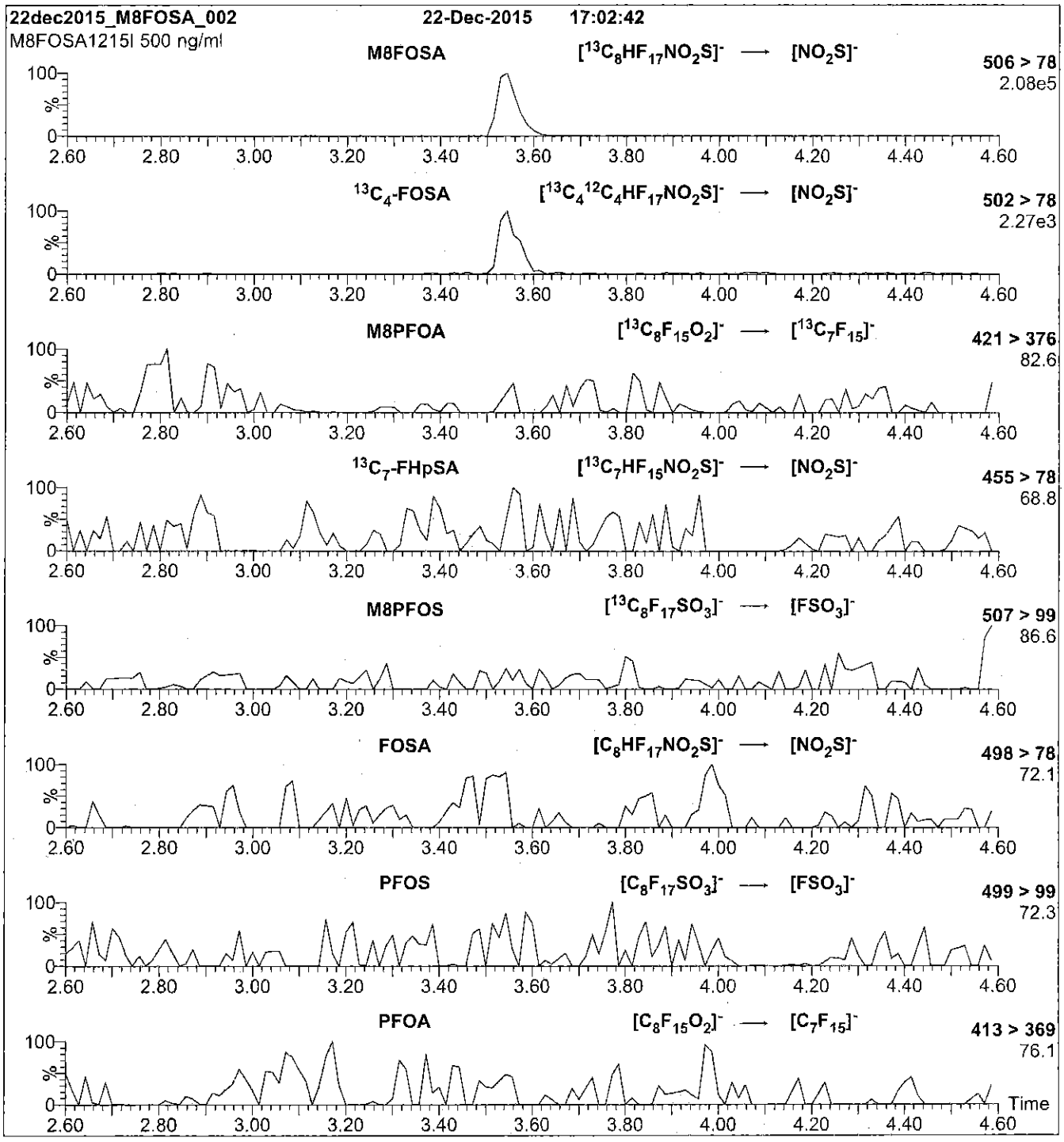
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **M8FOSA-I; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml M8FOSA-I)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 30

# Reagent

# LCMPFBA_00004

R: 12/9/15 SEJ

# WELLINGTON LABORATORIES

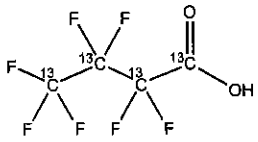
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFBA
**COMPOUND:** Perfluoro-n-[1,2,3,4-$^{13}C_4$]butanoic acid

**LOT NUMBER:** MPFBA1014

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4HF_7O_2$ | **MOLECULAR WEIGHT:** | 218.01 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$<br>(1,2,3,4-$^{13}C_4$) |
| **LAST TESTED:** (mm/dd/yyyy) | 10/31/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 10/31/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** _____ **Date:** 03/31/2015 (mm/dd/yyyy)
B.G. Chittim

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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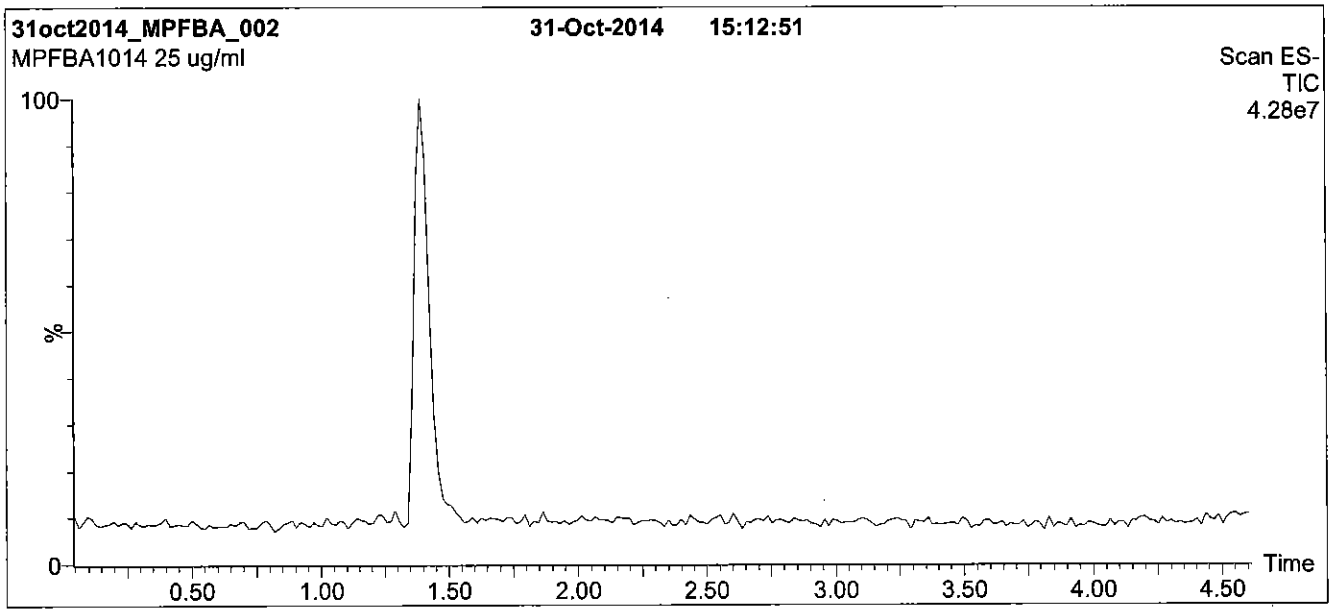
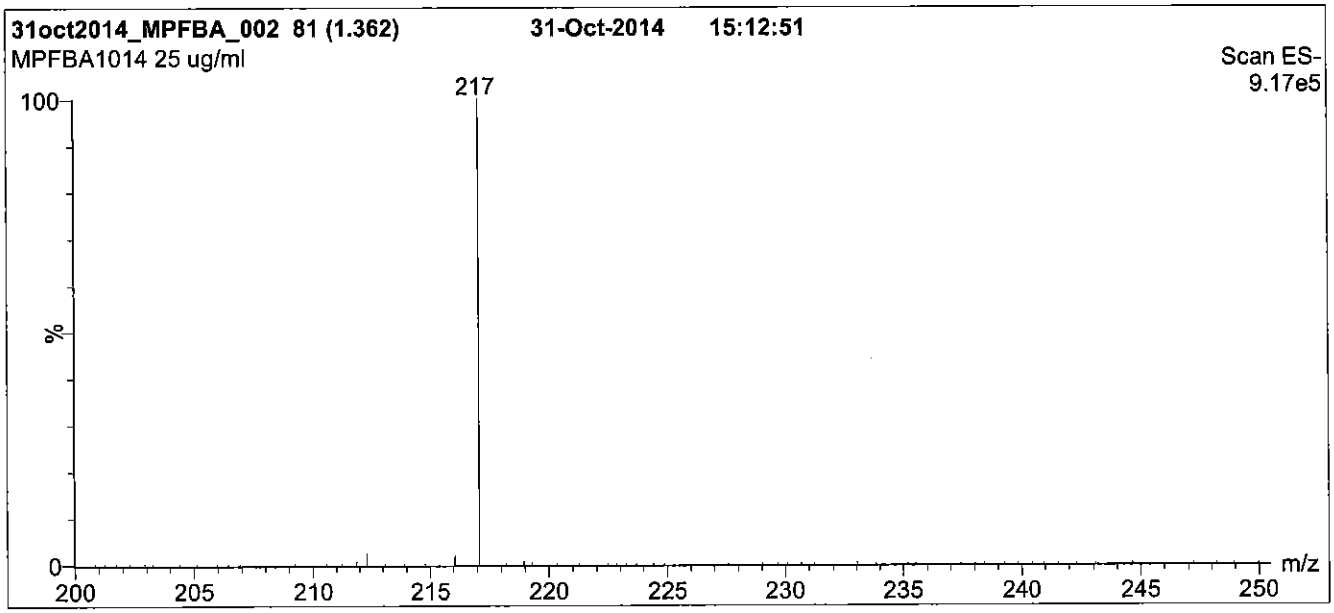
**Figure 1:** **MPFBA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

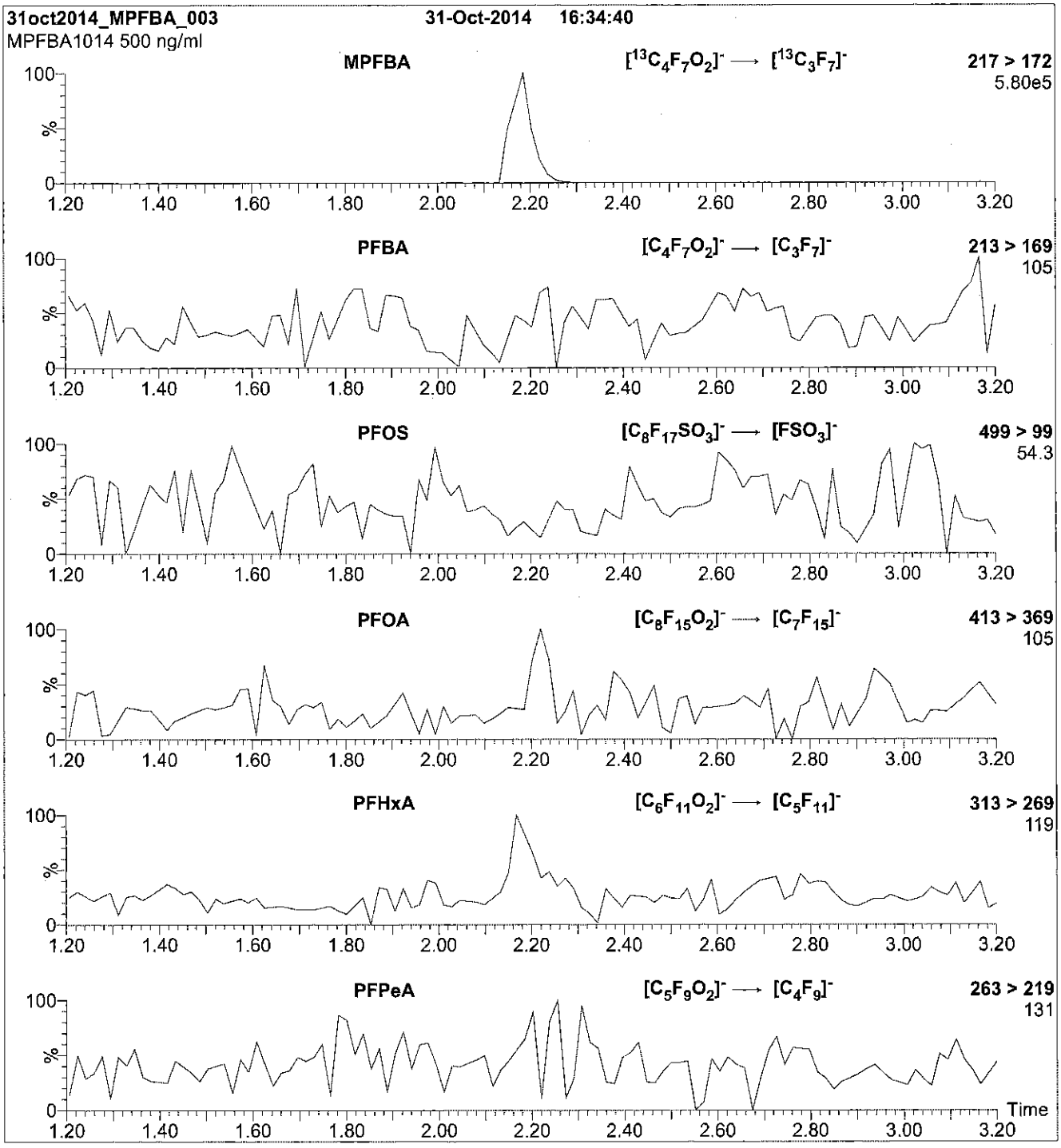
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 8.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFBA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFBA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 10

# Reagent

# LCMPFBA_00005

591161
ID: LCMPFBA_00005
Exp: 10/31/19 Prpd: CBW
13C4-Perfluorobutanoic ac

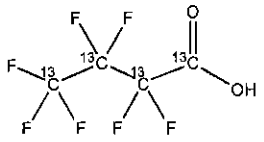
R: 3/3/16 CBW

# WELLINGTON LABORATORIES

# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFBA
**LOT NUMBER:** MPFBA1014
**COMPOUND:** Perfluoro-n-[1,2,3,4-$^{13}C_4$]butanoic acid

**STRUCTURE:**
**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4HF_7O_2$ | **MOLECULAR WEIGHT:** | 218.01 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$<br>(1,2,3,4-$^{13}C_4$) |
| **LAST TESTED:** (mm/dd/yyyy) | 10/31/2014 | | |
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Figure 1: LC/MS Data (TIC and Mass Spectrum)
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**Certified By:** B.G. Chittim **Date:** 03/31/2015 (mm/dd/yyyy)

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All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

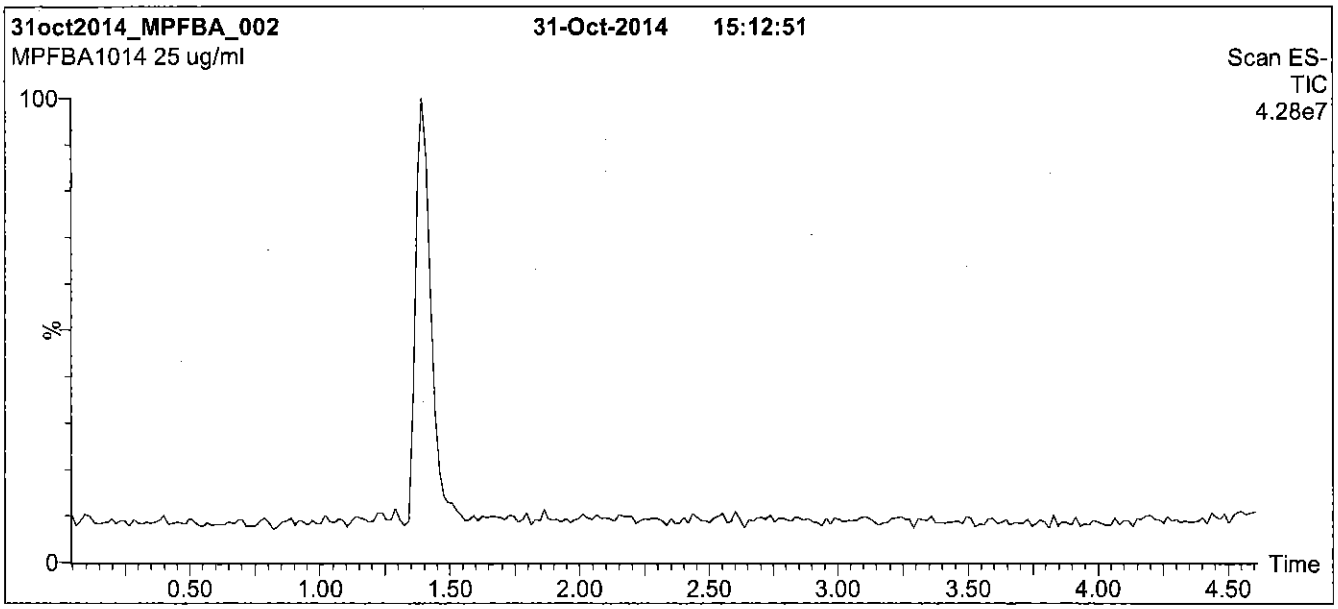
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

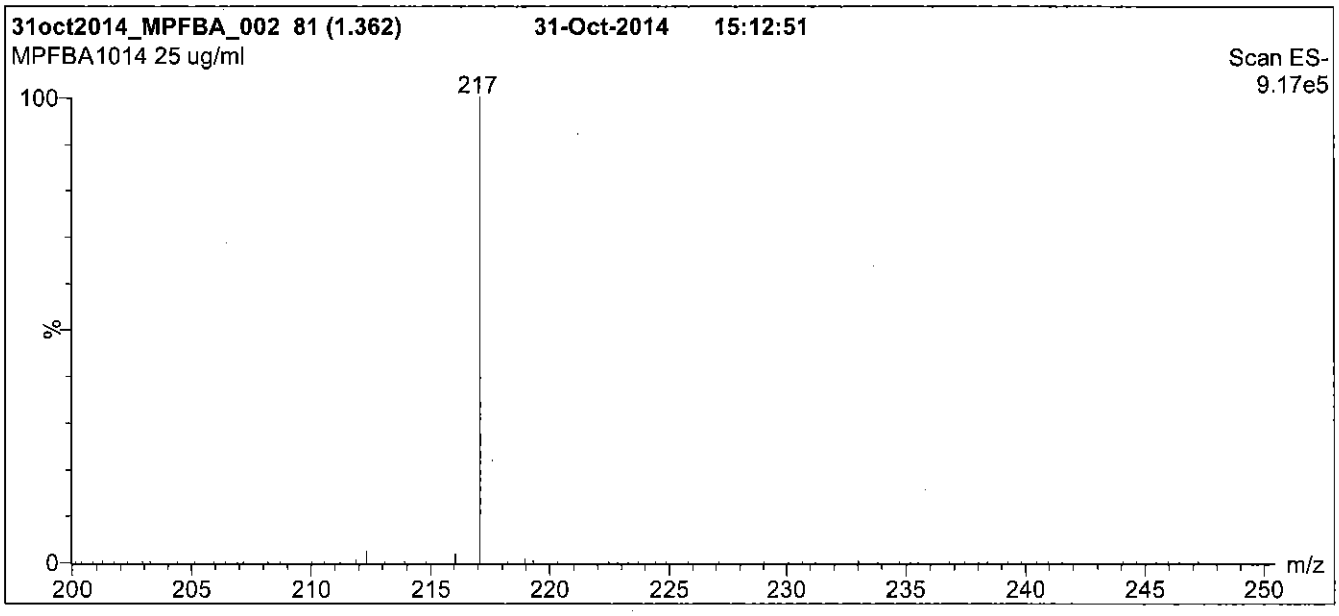
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **MPFBA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

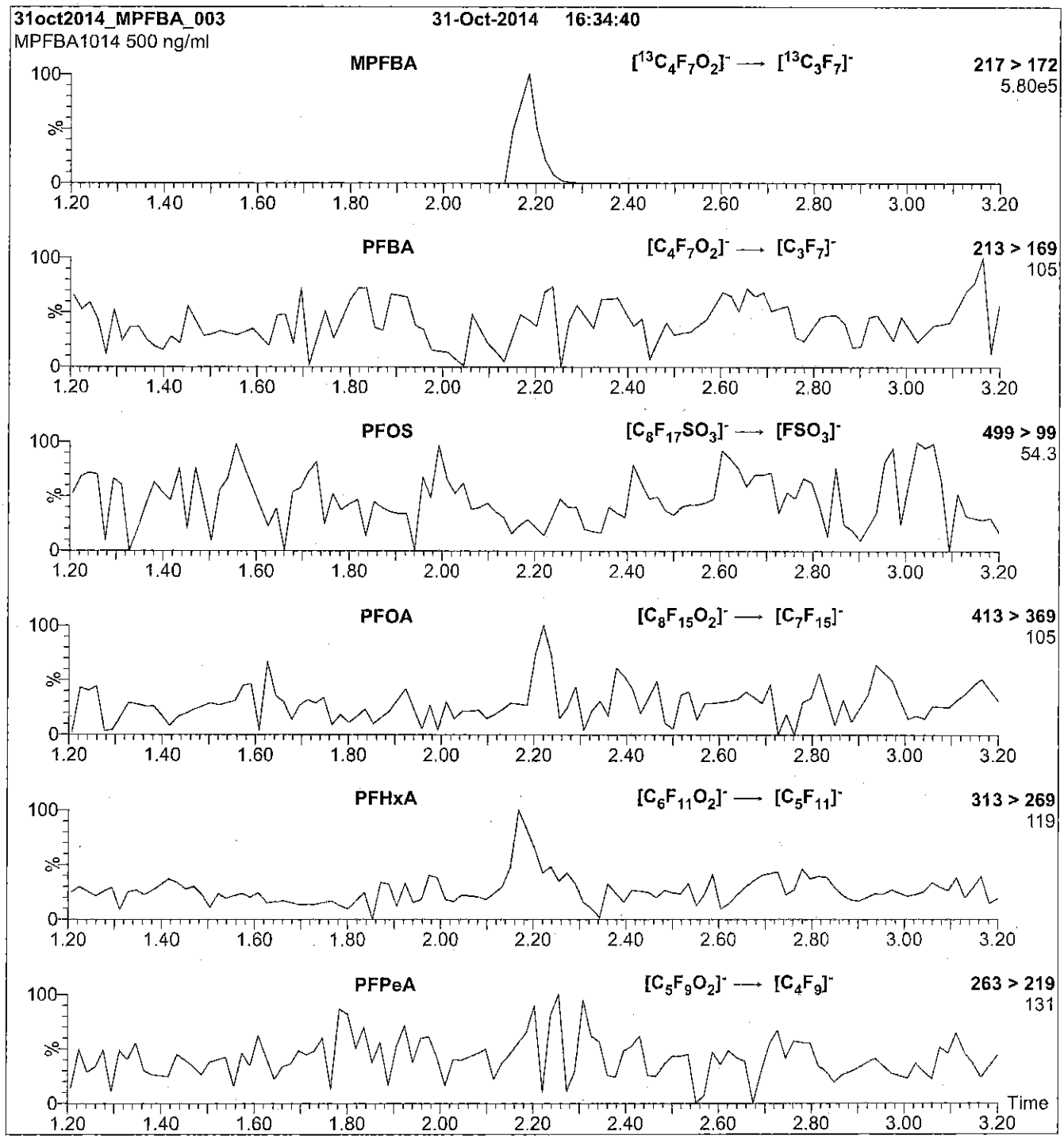
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 8.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFBA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFBA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 10

# Reagent

# LCMPFDA_00004

R: 10-20-2011 (was 2012)

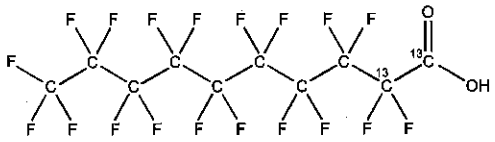
Rec. 10-20-2011

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

12LCMS0262
LCMPFDA_00001

| | | | |
|---|---|---|---|
| **PRODUCT CODE:** | MPFDA | **LOT NUMBER:** | MPFDA0411 |
| **COMPOUND:** | Perfluoro-n-[1,2-$^{13}C_2$]decanoic acid | | |
| **STRUCTURE:** | | **CAS #** | Not available |



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_8HF_{19}O_2$ | **MOLECULAR WEIGHT:** | 516.07 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$<br>(1,2-$^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 04/07/2011 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 04/07/2014 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of $^{13}C_1$-PFNA.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/19/2011 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

**INTENDED USE:**

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

**HAZARDS:**

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

**SYNTHESIS / CHARACTERIZATION:**

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

**HOMOGENEITY:**

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

**UNCERTAINTY:**

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1$, $x_2$,...$x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

**TRACEABILITY:**

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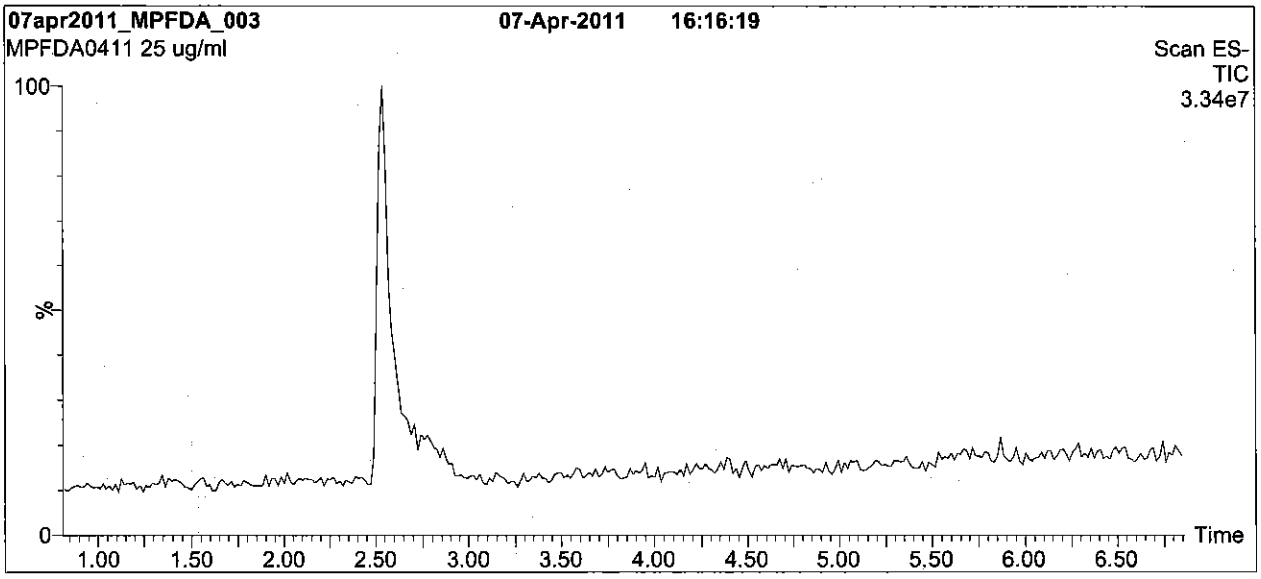
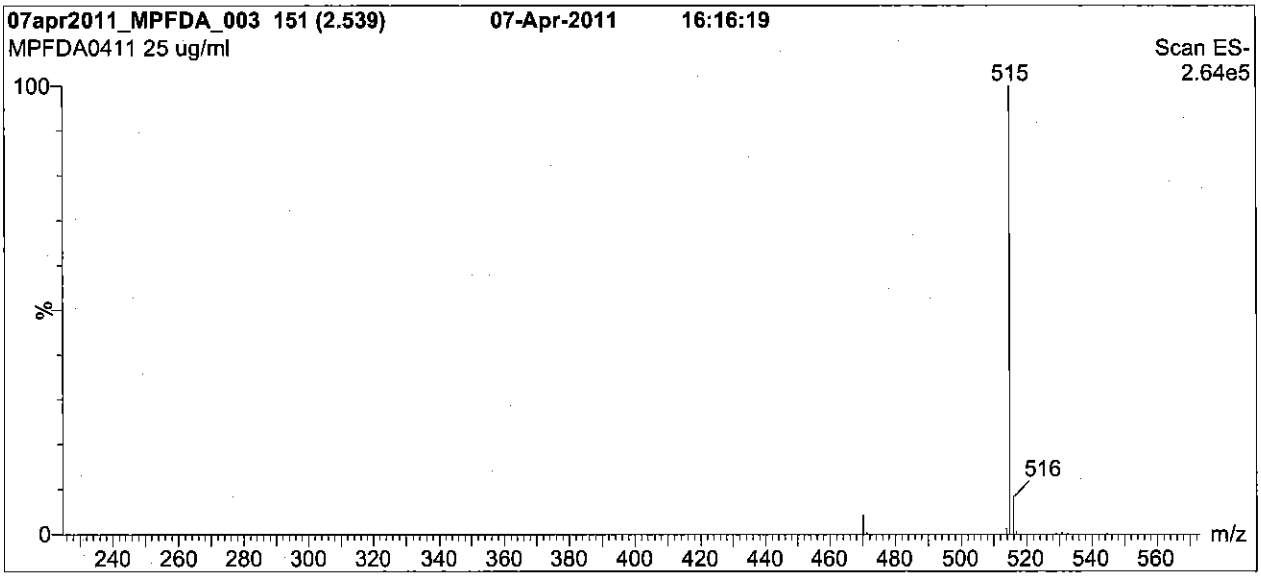



**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

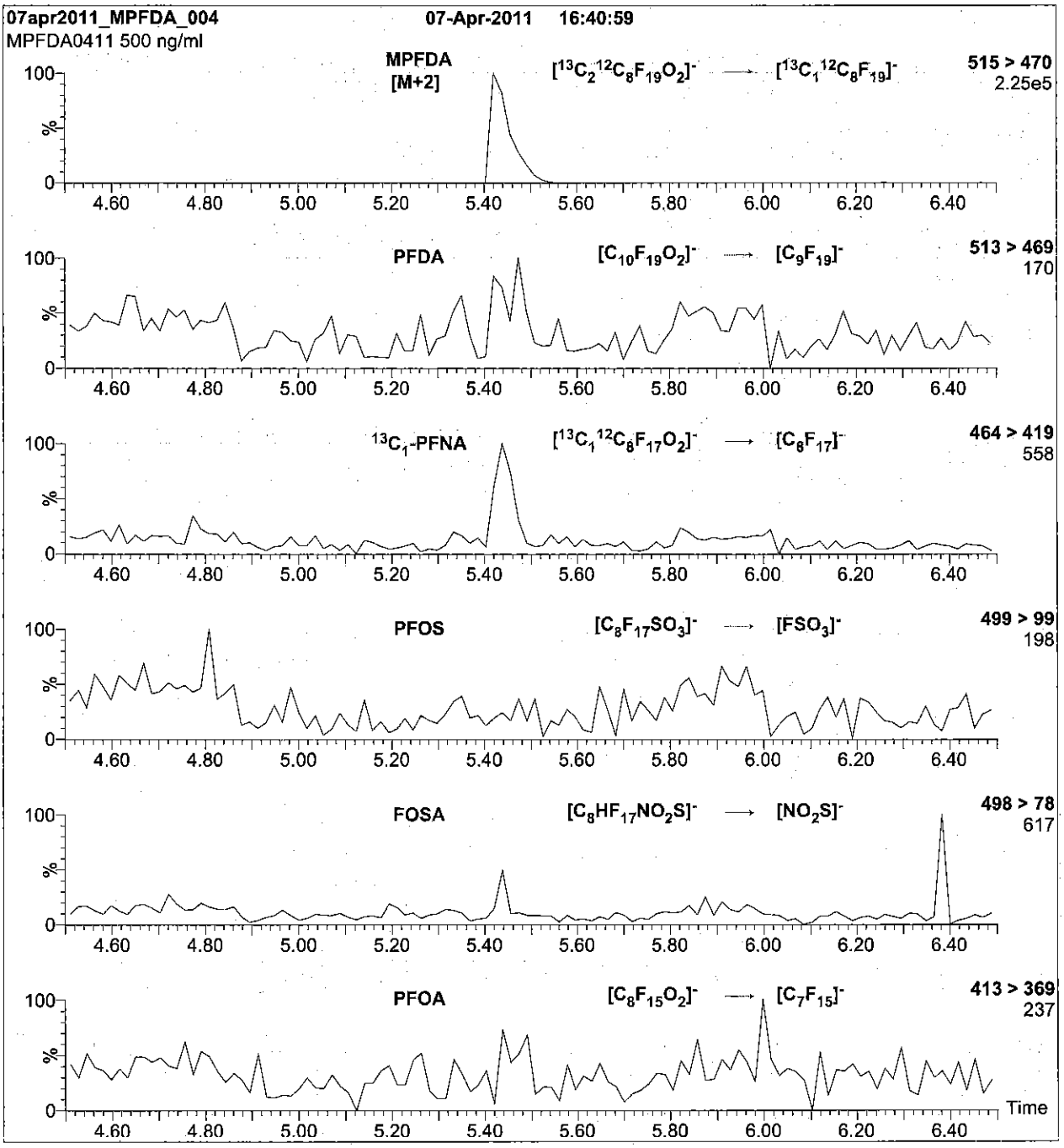
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml MPFDA) |
| Mobile phase: | Isocratic 70% (80:20 MeOH:ACN) / 30% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 13

# Reagent

# LCMPFDA_00005

RL 4/15/15 SKV

# WELLINGTON LABORATORIES

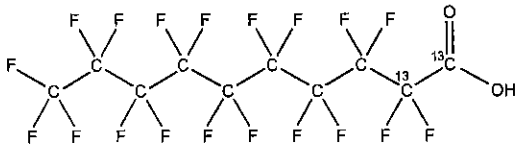
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFDA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]decanoic acid

**LOT NUMBER:** MPFDA0414

**STRUCTURE:**

**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_2{}^{12}C_8HF_{19}O_2$
**CONCENTRATION:** 50 ± 2.5 µg/ml

**MOLECULAR WEIGHT:** 516.07
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 04/13/2014
**EXPIRY DATE:** (mm/dd/yyyy) 04/13/2019
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$)

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of $^{13}C_1$-PFNA.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** _____ **Date:** 04/15/2014 (mm/dd/yyyy)
B.G. Chittim

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

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CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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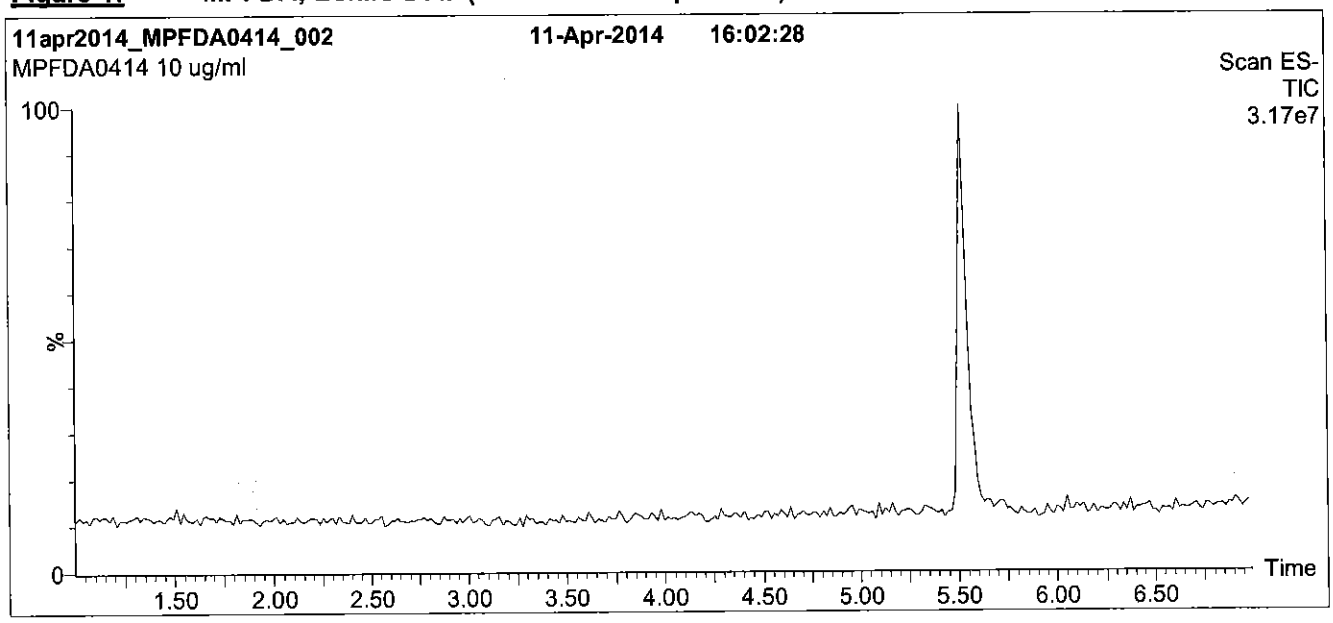
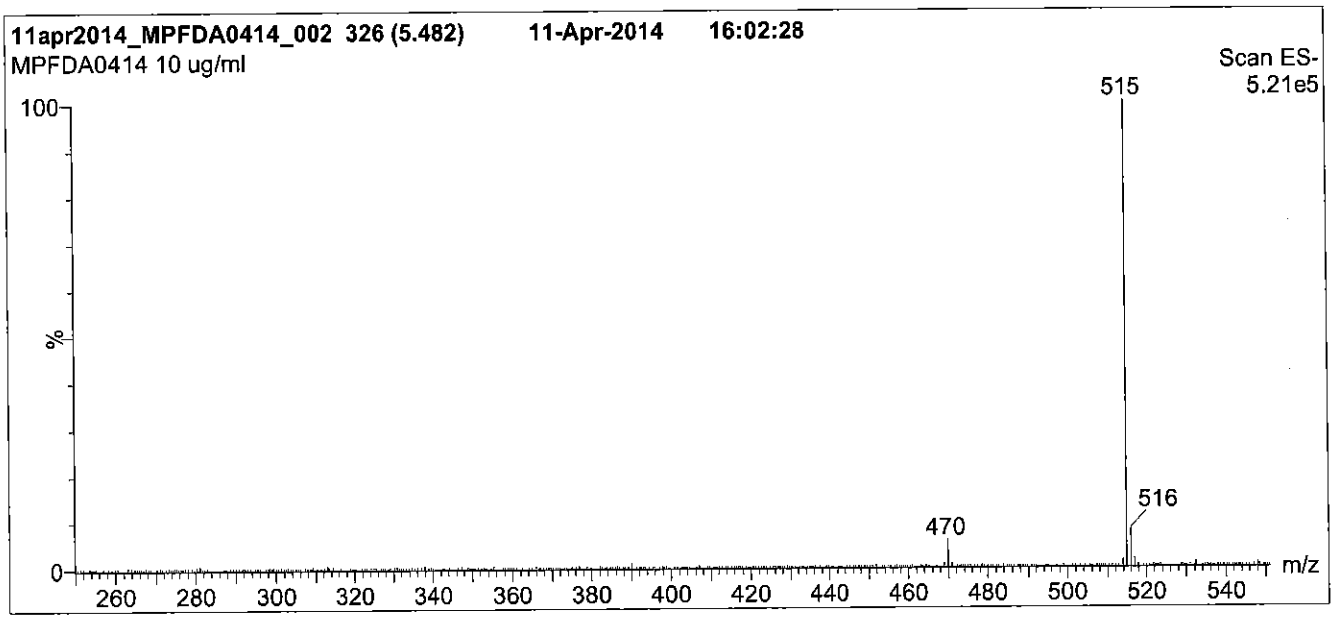



**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

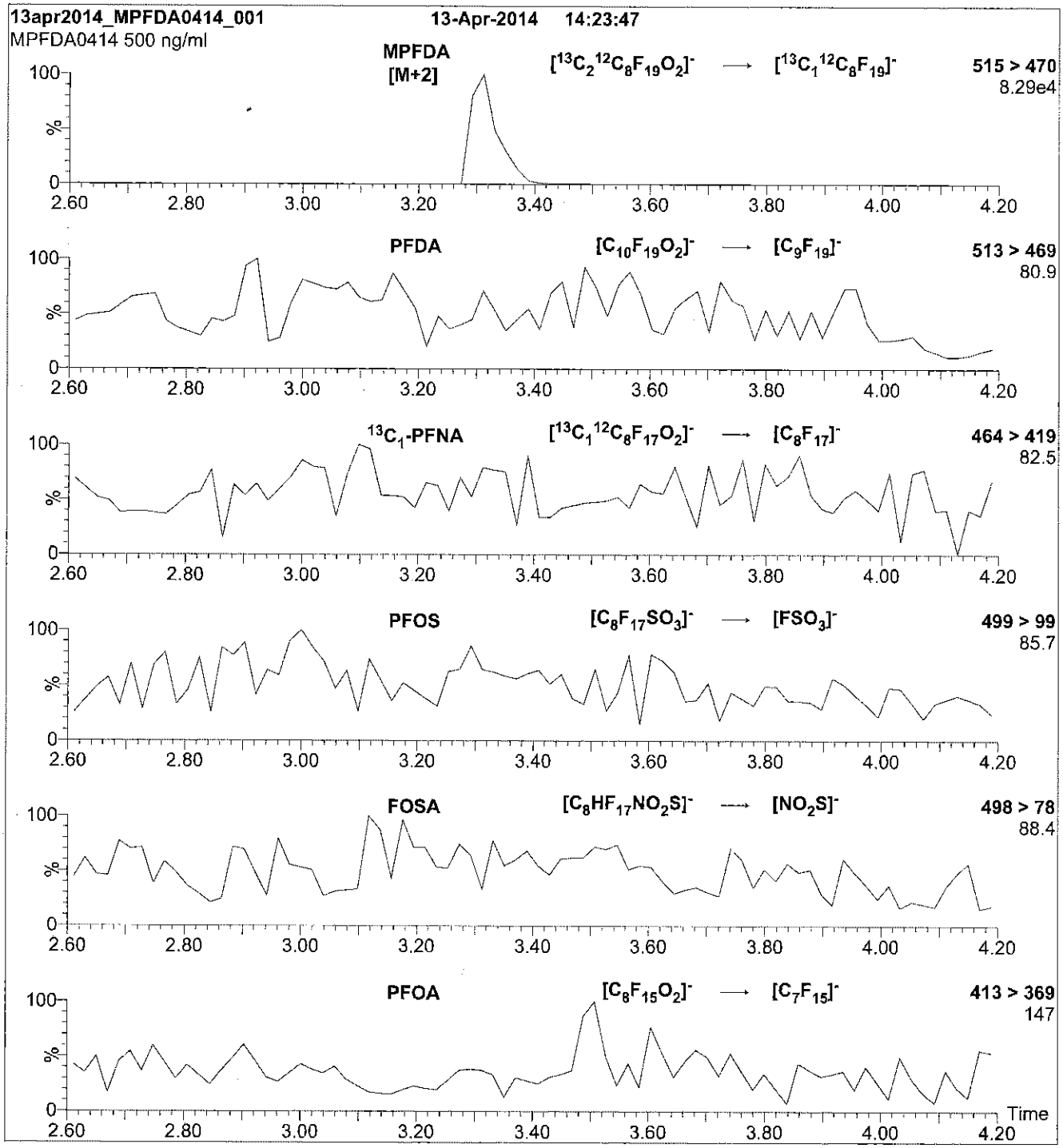
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml MPFDA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 13

# Reagent

# LCMPFDA_00006

R: 2/25/16 CBW

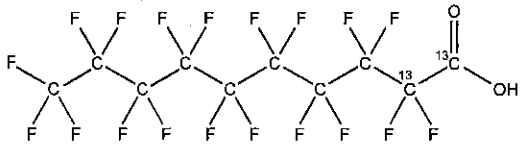
587892
ID: LCMPFDA_00006
Exp:08/19/20 Prpd:CBW Opn:02/25/16
13C2-Perfluorinodecanoic a

# WELLINGTON LABORATORIES

# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFDA
**LOT NUMBER:** MPFDA0815
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]decanoic acid

**STRUCTURE:**
**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_2{}^{12}C_8HF_{19}O_2$
**MOLECULAR WEIGHT:** 516.07
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)
**CHEMICAL PURITY:** >98%
**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$)
**LAST TESTED:** (mm/dd/yyyy) 08/19/2015
**EXPIRY DATE:** (mm/dd/yyyy) 08/19/2020
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains < 0.1% of $^{13}C_1$-PFNA.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 08/21/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

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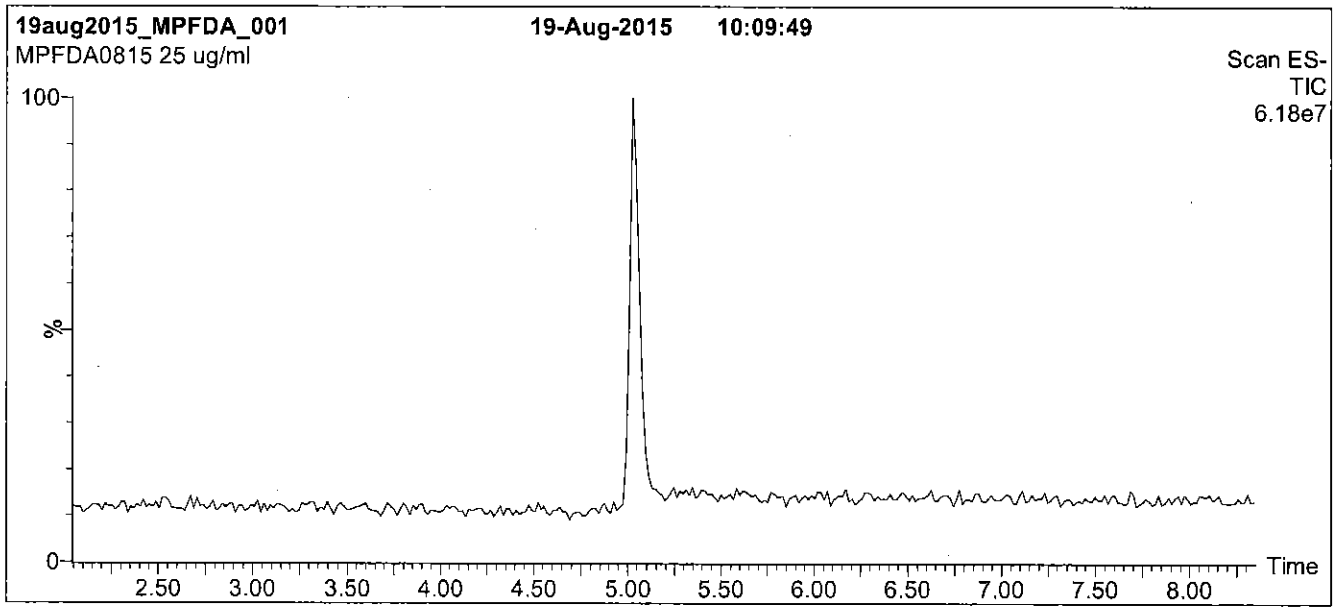
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

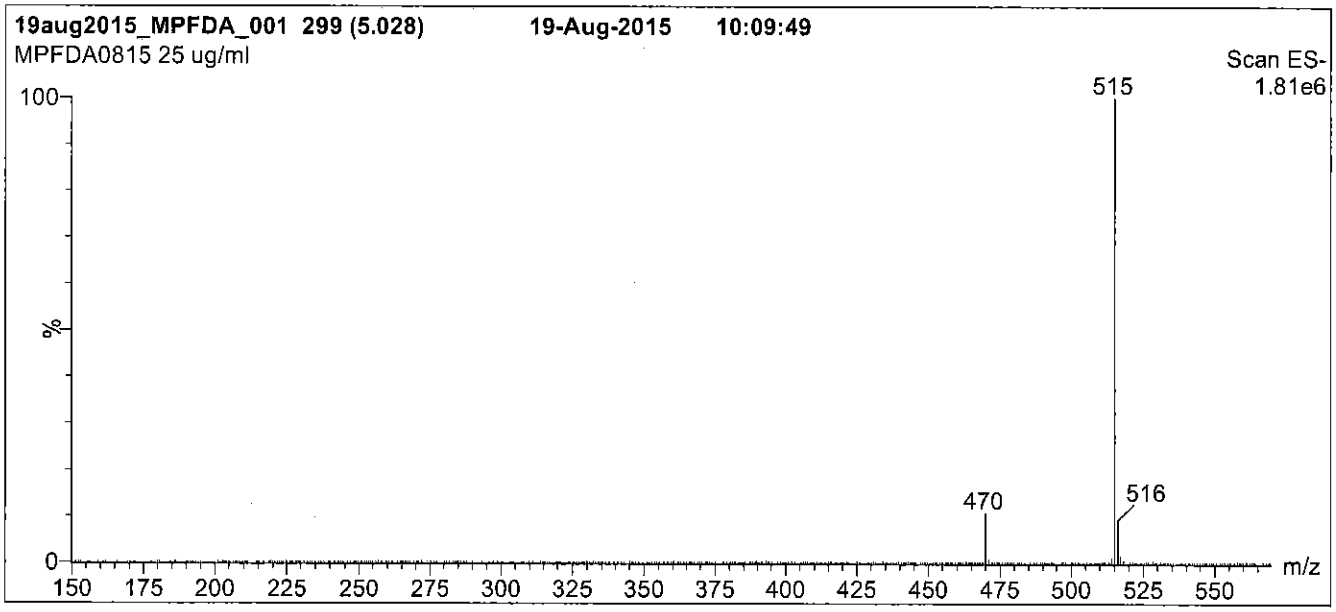
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **MPFDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions in 0.5 min.
Time: 10 min

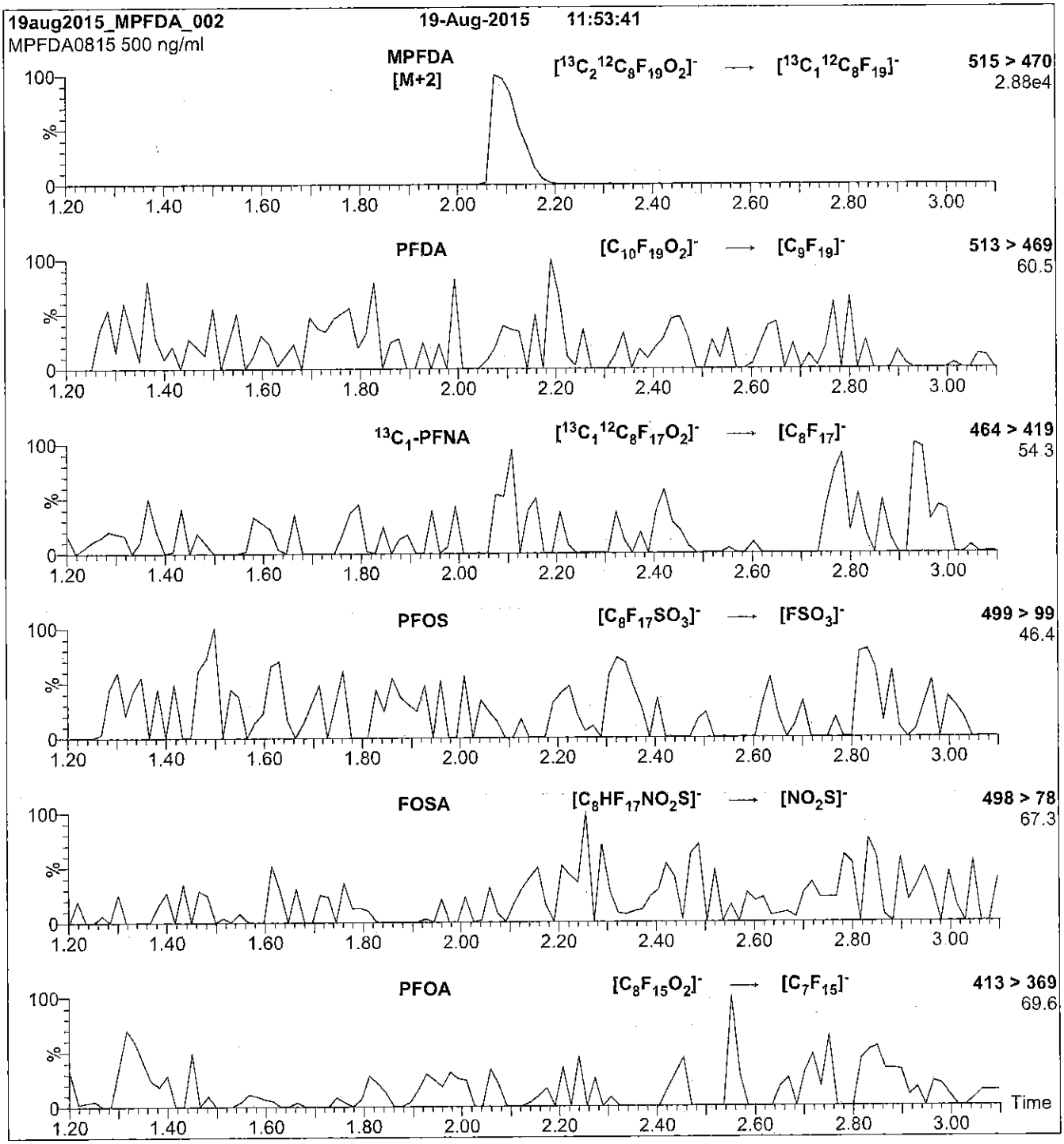
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 13

# Reagent

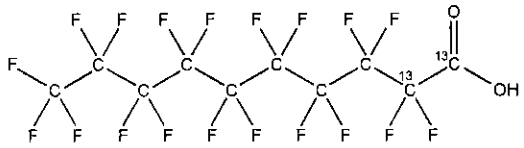
# LCMPFDA_00007

Rec. 3/29/16 JRB ✓

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** MPFDA
**LOT NUMBER:** MPFDA0815
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]decanoic acid
**STRUCTURE:**
**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_8HF_{19}O_2$ | **MOLECULAR WEIGHT:** | 516.07 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 08/19/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 08/19/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains < 0.1% of $^{13}C_1$-PFNA.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 08/21/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1$, $x_2$,...$x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17025 ISO 17034 REFERENCE MATERIAL PRODUCER

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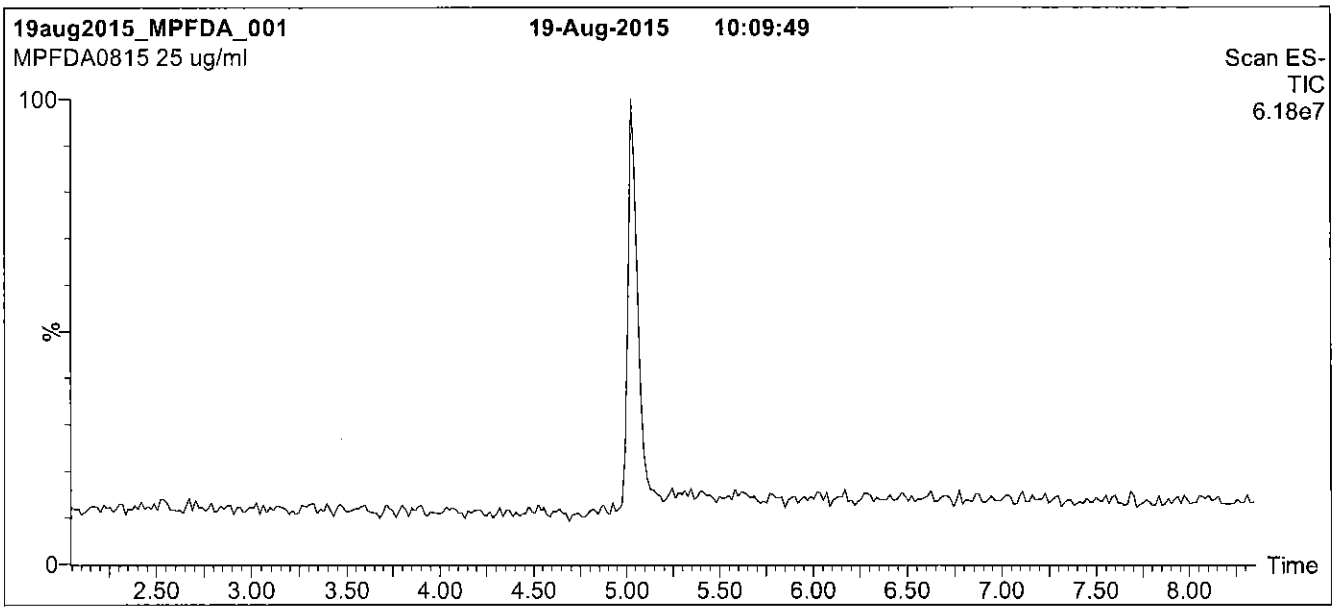
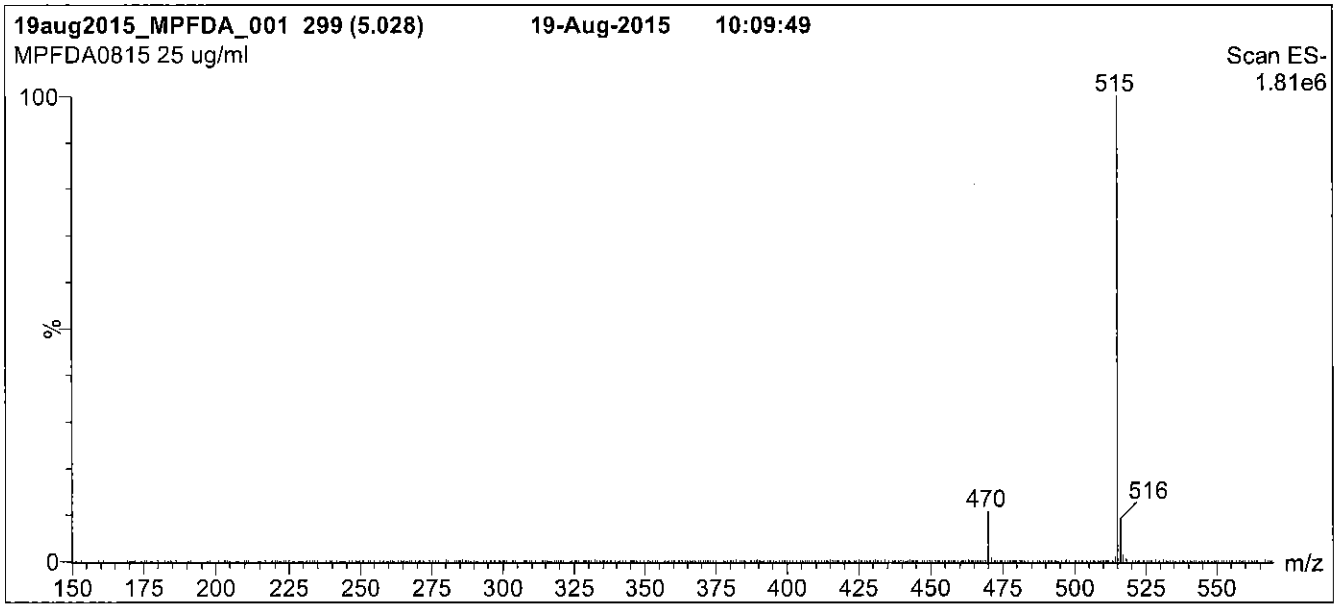



**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

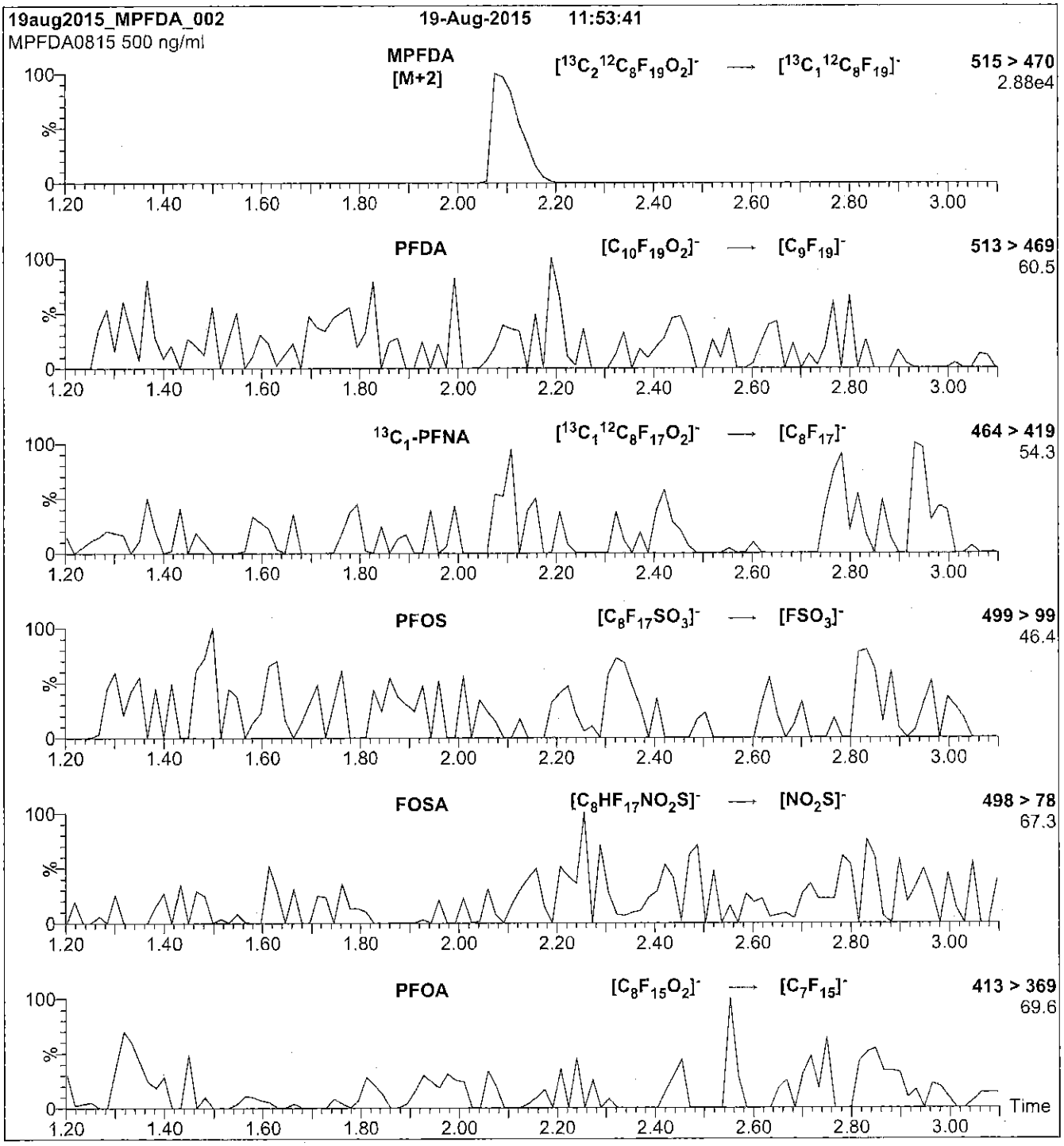
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 13

# Reagent

# LCMPFDoA_00003

P. 2/11/15 SRV

# WELLINGTON LABORATORIES

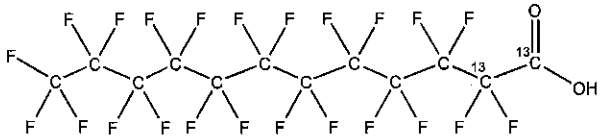
## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** MPFDoA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]dodecanoic acid

**LOT NUMBER:** MPFDoA0714

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_{10}HF_{23}O_2$ | **MOLECULAR WEIGHT:** | 616.08 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 07/17/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 07/17/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** _____ **Date:** 07/21/2014 (mm/dd/yyyy)
B.G. Chittim

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

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## HAZARDS:

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## SYNTHESIS / CHARACTERIZATION:

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## HOMOGENEITY:

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where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

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## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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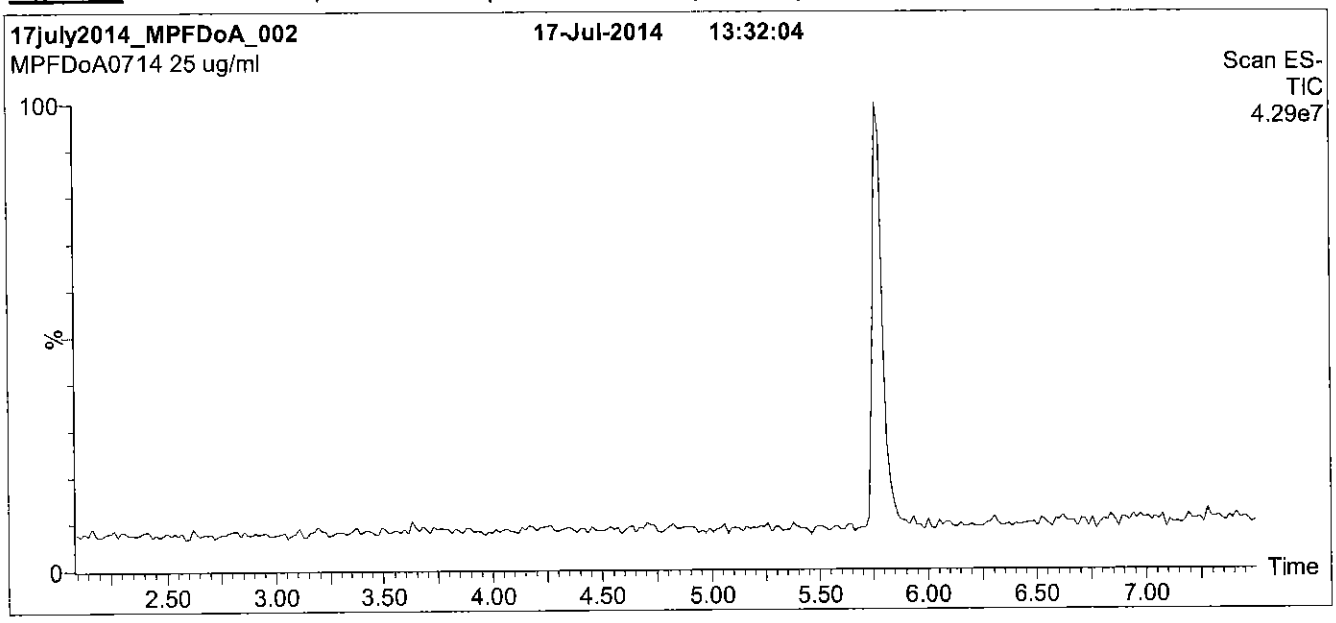
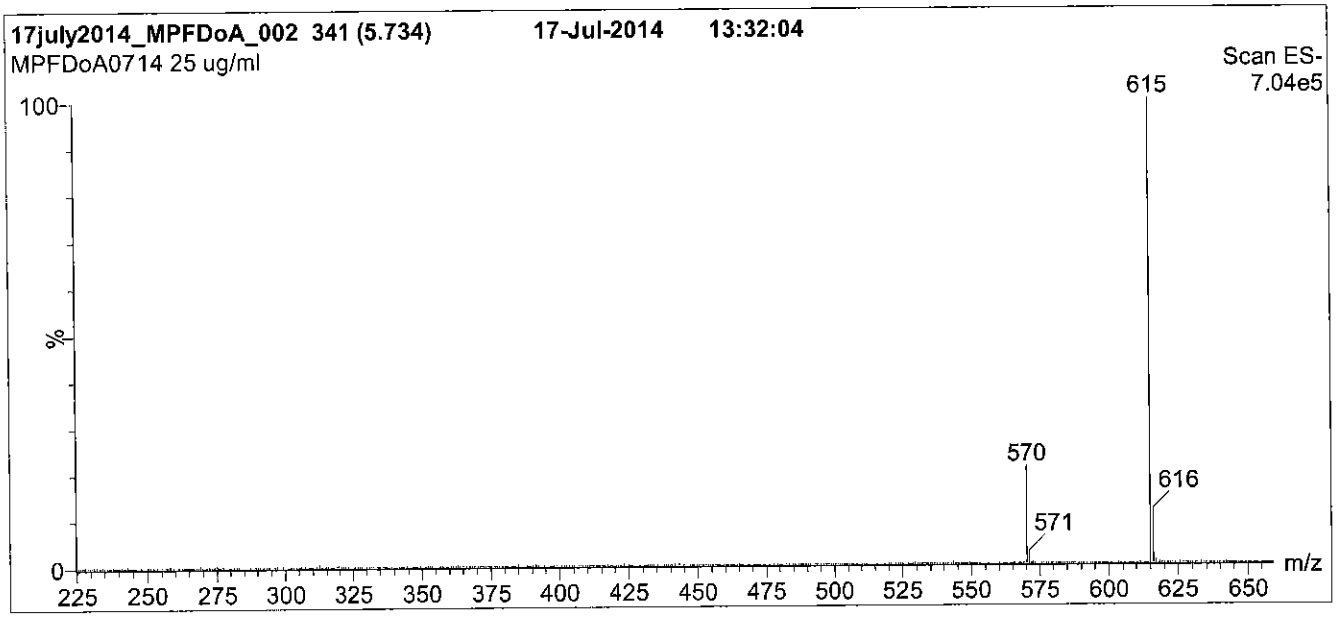
**Figure 1:** **MPFDoA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

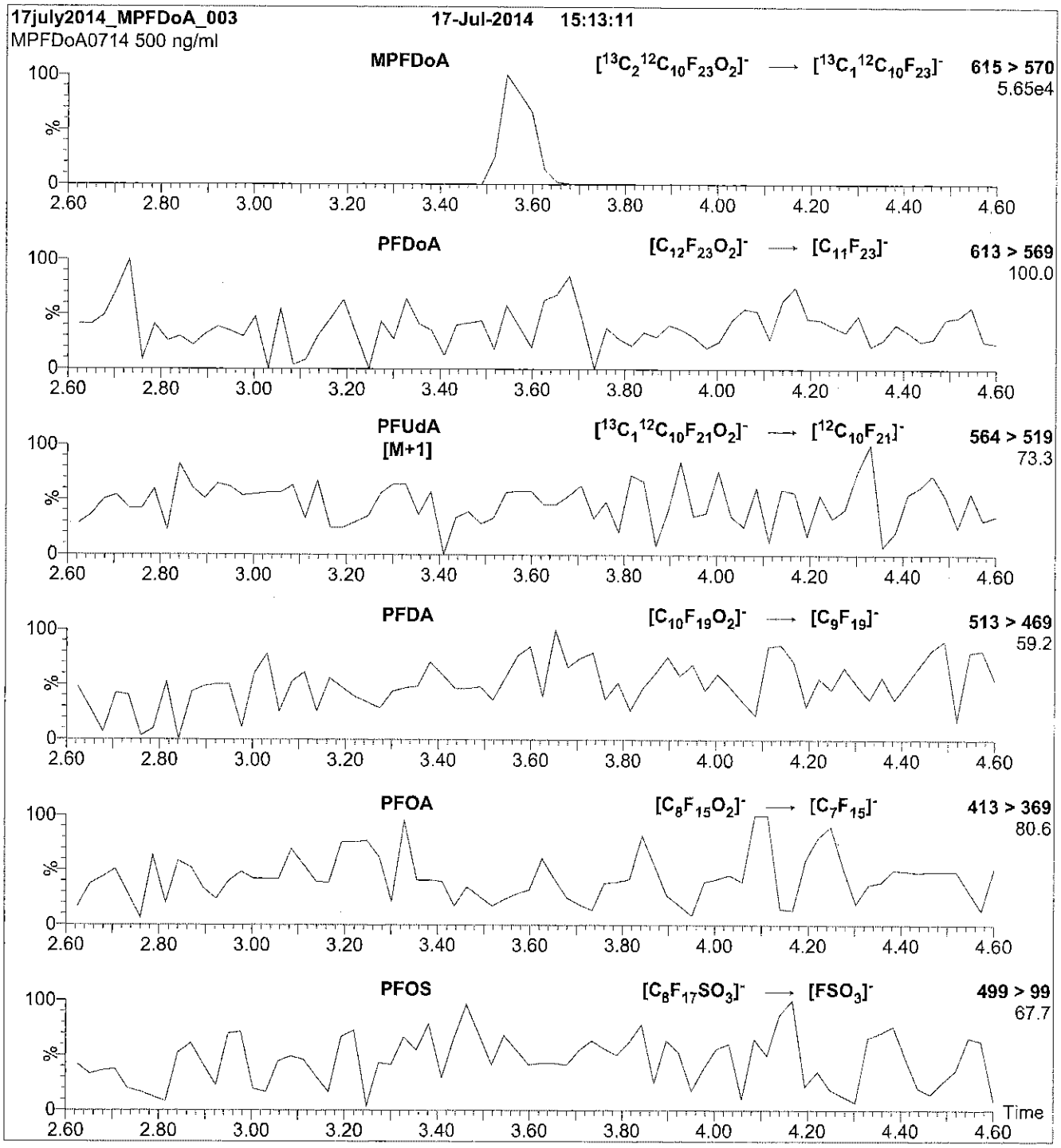
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 20.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFDoA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml MPFDoA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 13

# Reagent

# LCMPFDoA_00004

V : 14/10/15 JKV

# WELLINGTON LABORATORIES

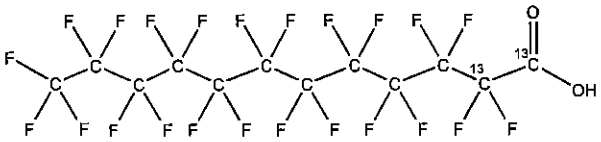
# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFDoA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]dodecanoic acid

**LOT NUMBER:** MPFDoA0714

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_{10}HF_{23}O_2$ | **MOLECULAR WEIGHT:** | 616.08 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 07/17/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 07/17/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/01/2015 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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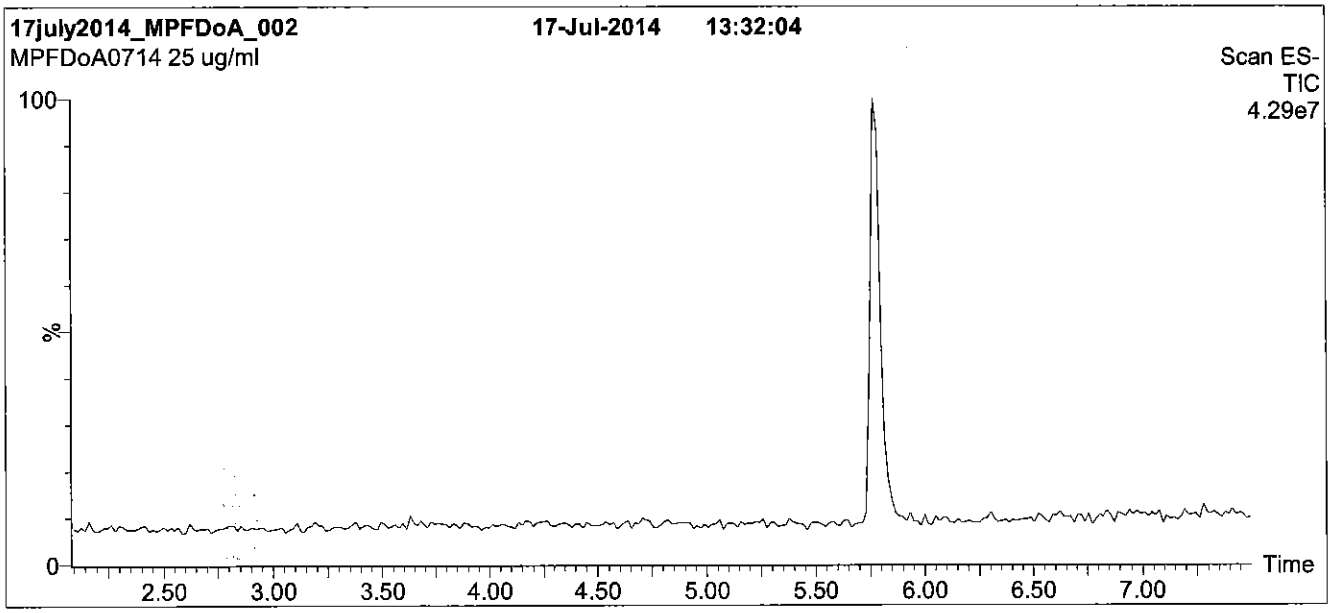
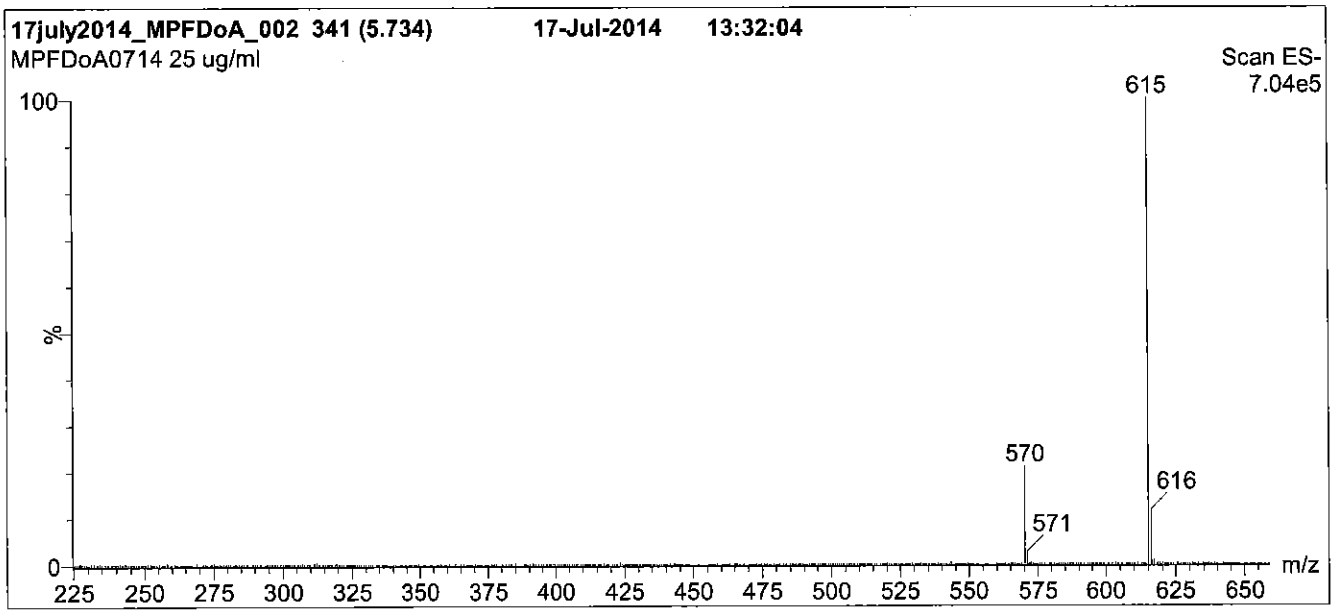
**Figure 1:** **MPFDoA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

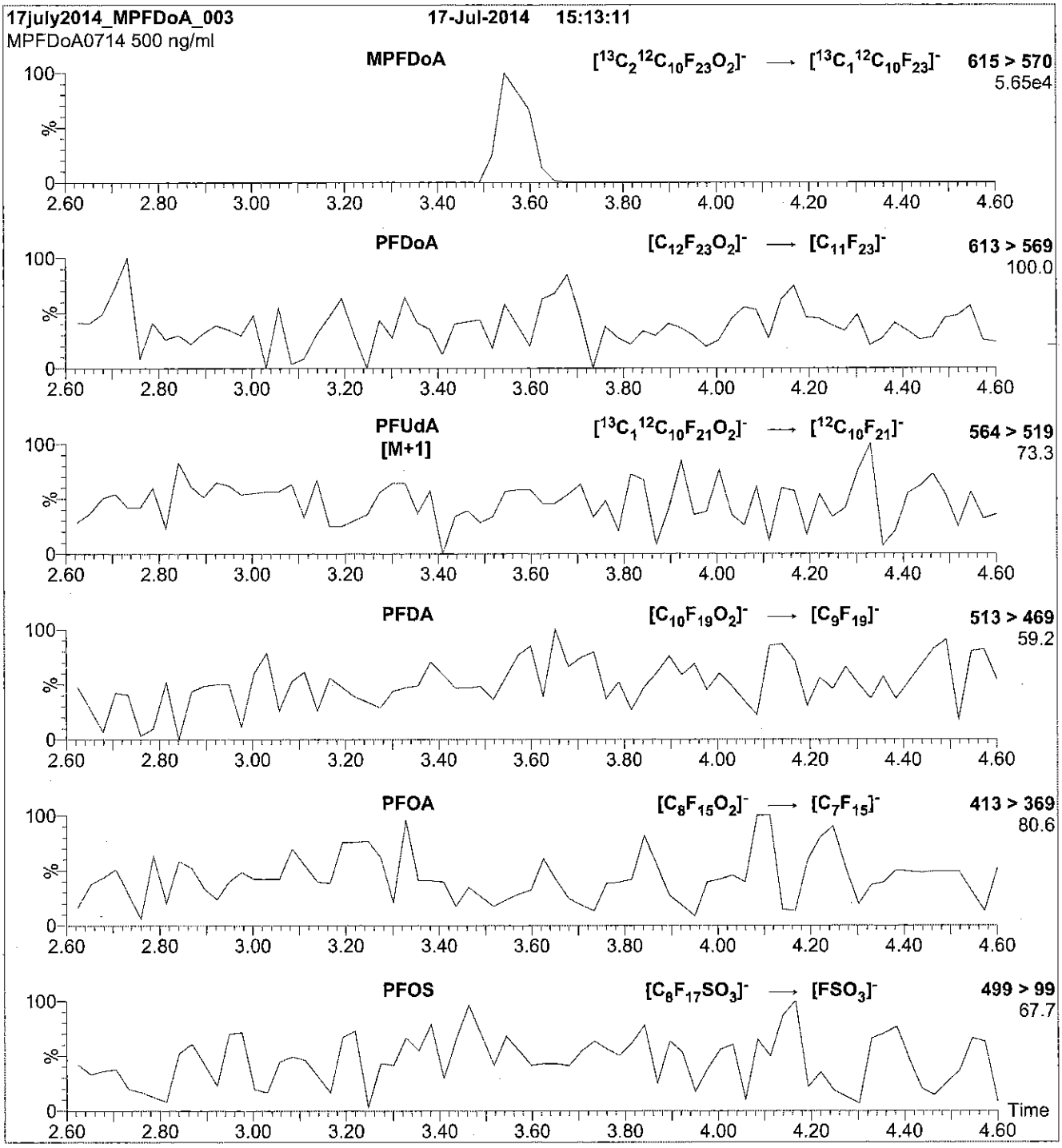
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 20.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFDoA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFDoA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 13

# Reagent

# LCMPFDoA_00005

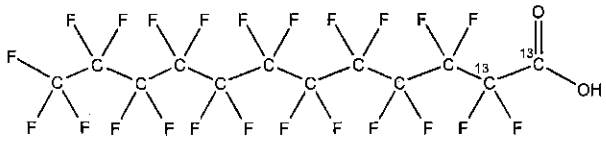
R:3/3/16 CBW

591162
ID: LCMPFDoA_00005
Exp: 07/17/19 Prpd: CBW
13C2-Perfluorododecanoic

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFDoA
**LOT NUMBER:** MPFDoA0714
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]dodecanoic acid
**STRUCTURE:**
**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_2{}^{12}C_{10}HF_{23}O_2$
**MOLECULAR WEIGHT:** 616.08
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)
**CHEMICAL PURITY:** >98%
**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$)
**LAST TESTED:** (mm/dd/yyyy) 07/17/2014
**EXPIRY DATE:** (mm/dd/yyyy) 07/17/2019
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/01/2015 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

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CALA Testing

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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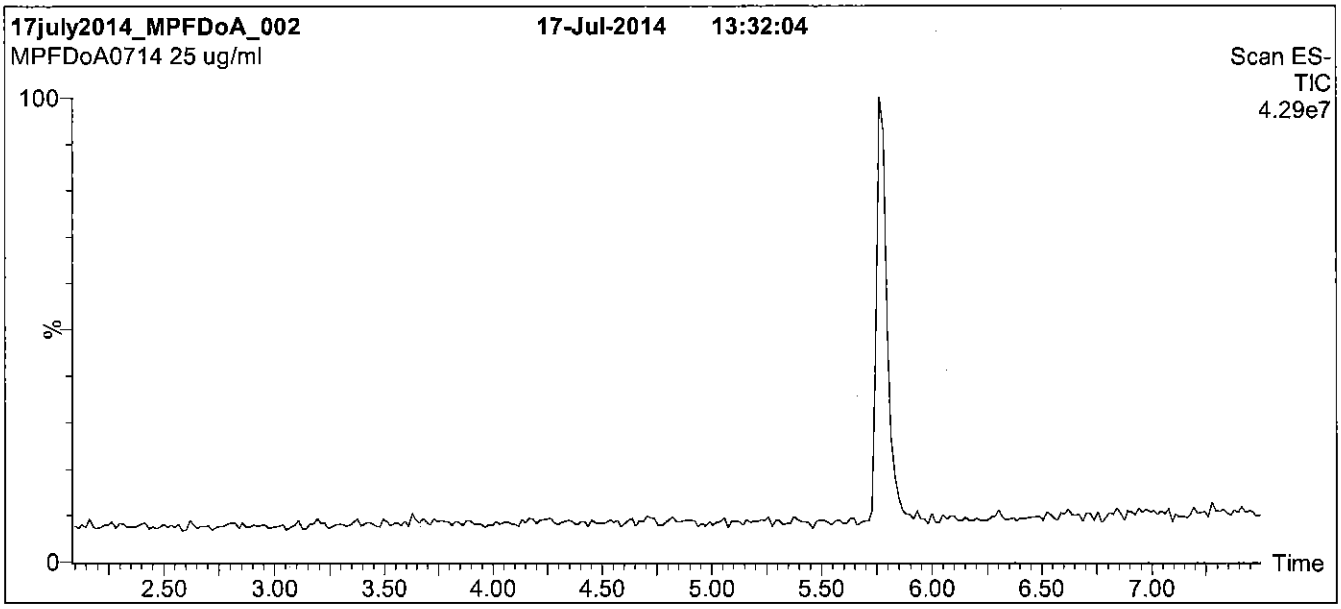


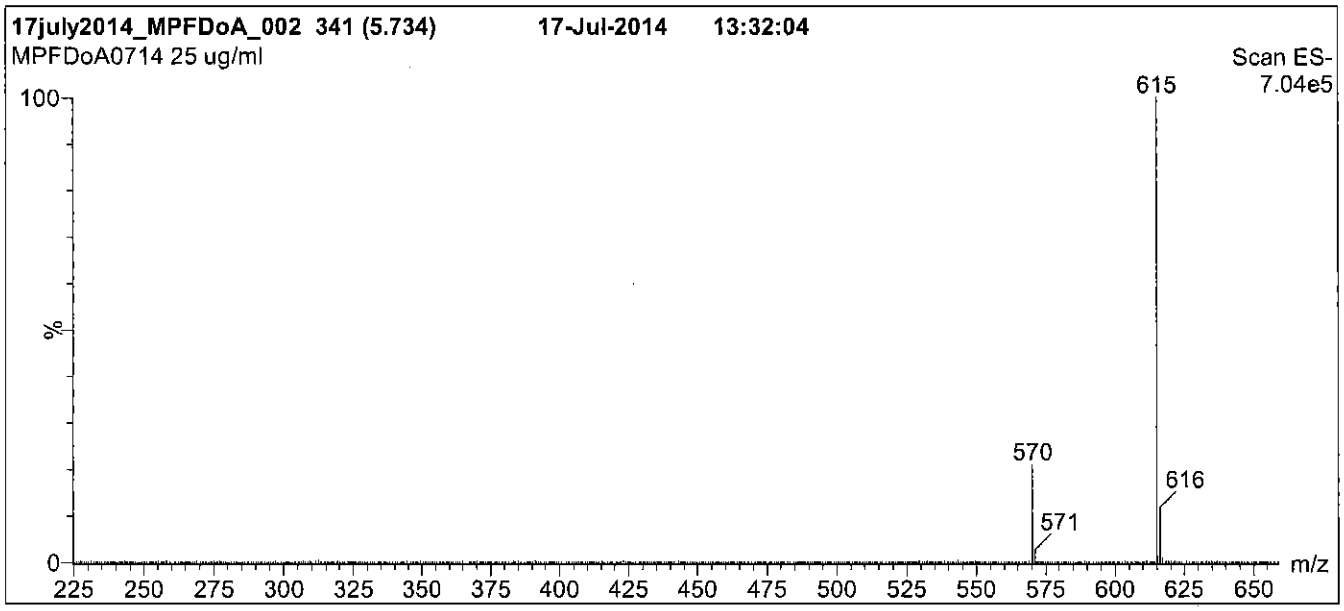


**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
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Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

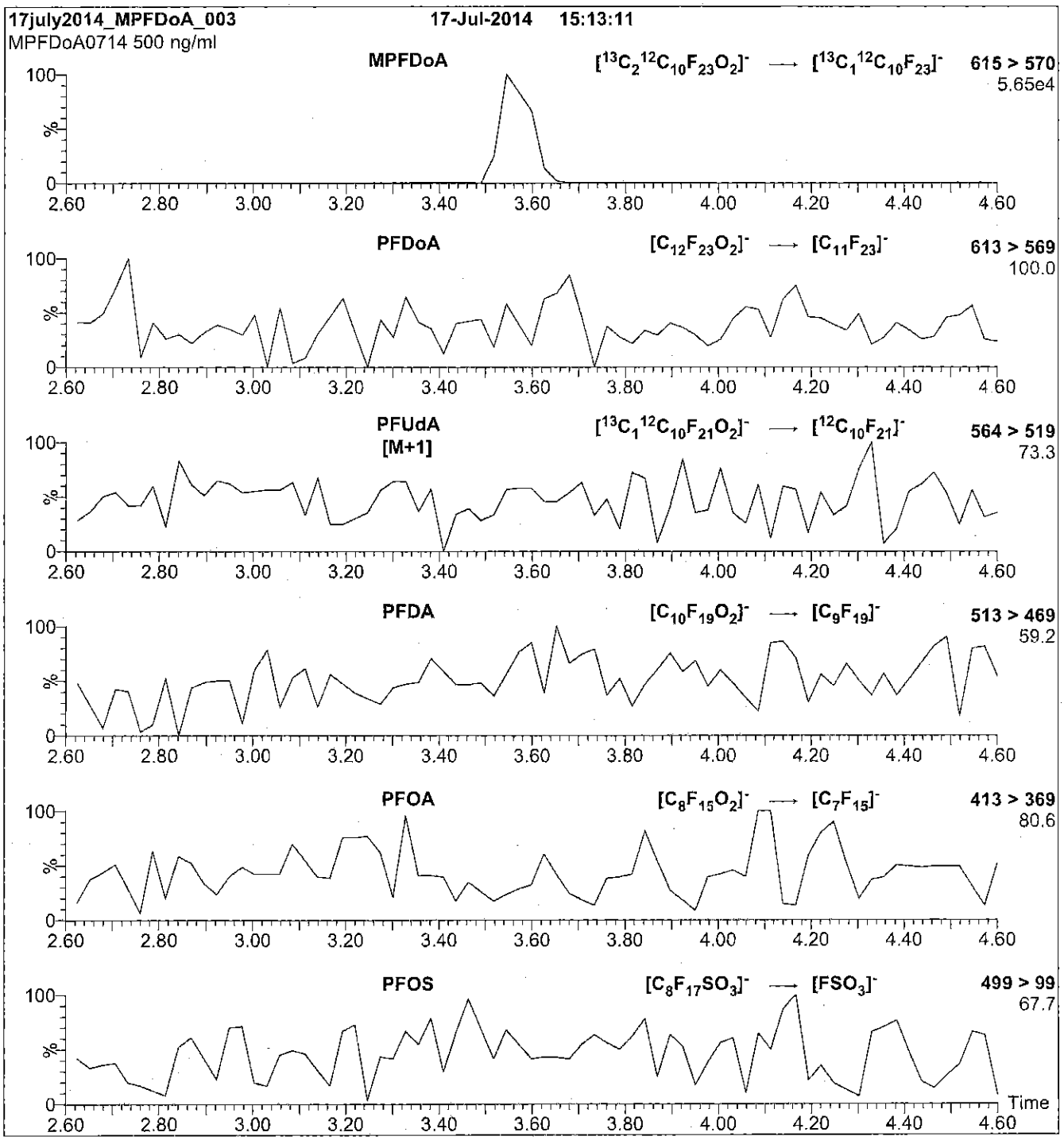
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 20.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFDoA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFDoA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 13

# Reagent

---

# LCMPFHxA_00006

P: 4/15/15 SKV

# WELLINGTON LABORATORIES

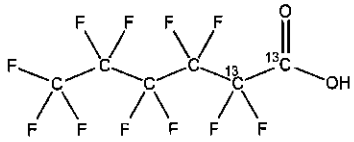
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFHxA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]hexanoic acid

**LOT NUMBER:** MPFHxA0414

**STRUCTURE:**

**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_2{}^{12}C_4HF_{11}O_2$
**CONCENTRATION:** 50 ± 2.5 µg/ml

**MOLECULAR WEIGHT:** 316.04
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 04/13/2014
**EXPIRY DATE:** (mm/dd/yyyy) 04/13/2019
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$)

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains < 0.1% of perfluoro-n-hexanoic acid and ~ 0.3% of perfluoro-n-octanoic acid.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/15/2014 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

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## TRACEABILITY:

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## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

CALA Testing Accreditation No. A 0226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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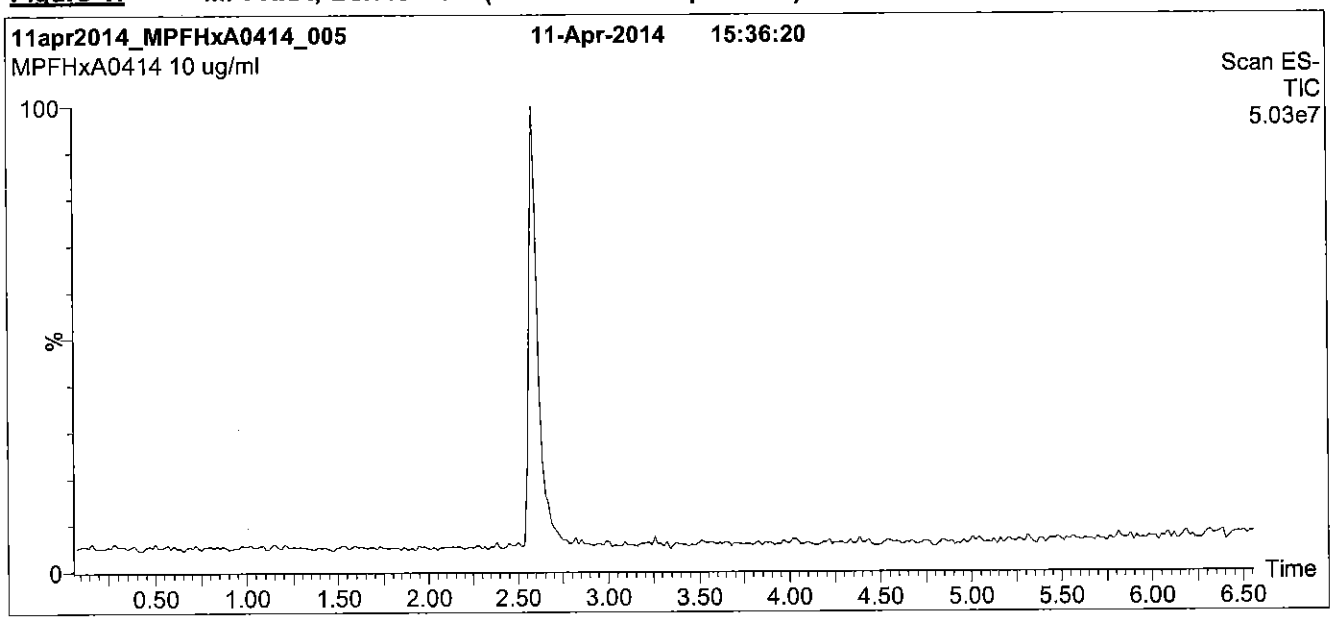
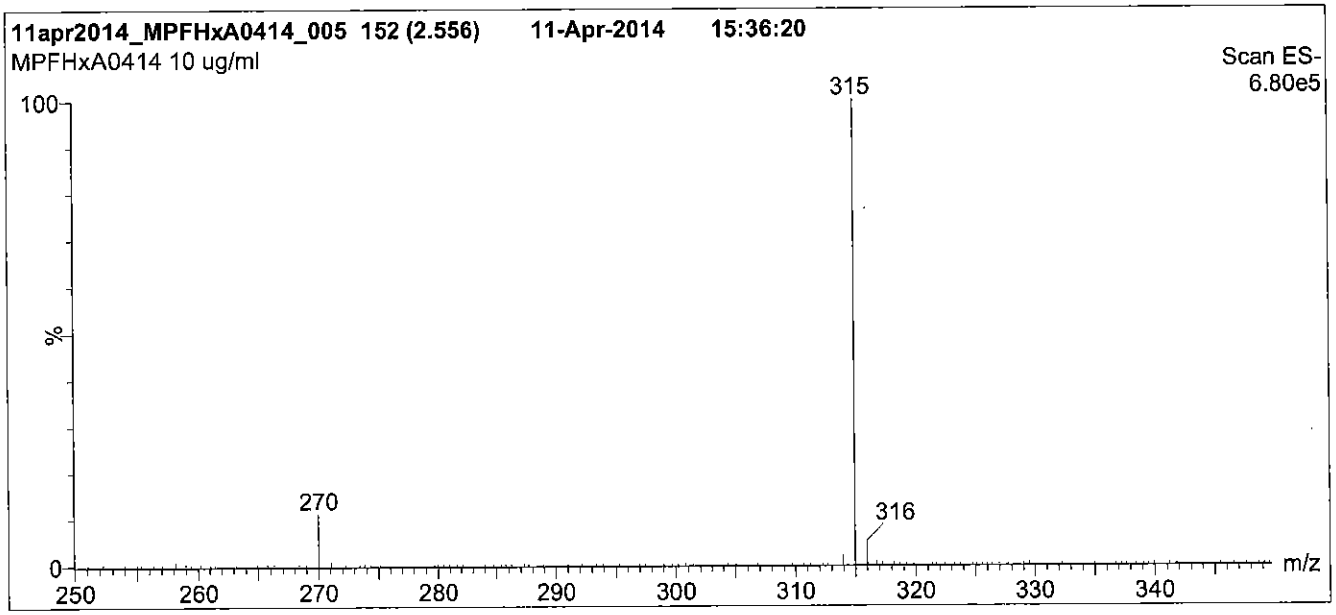
**Figure 1:** **MPFHxA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

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**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions over 0.5 min.
Time: 10 min

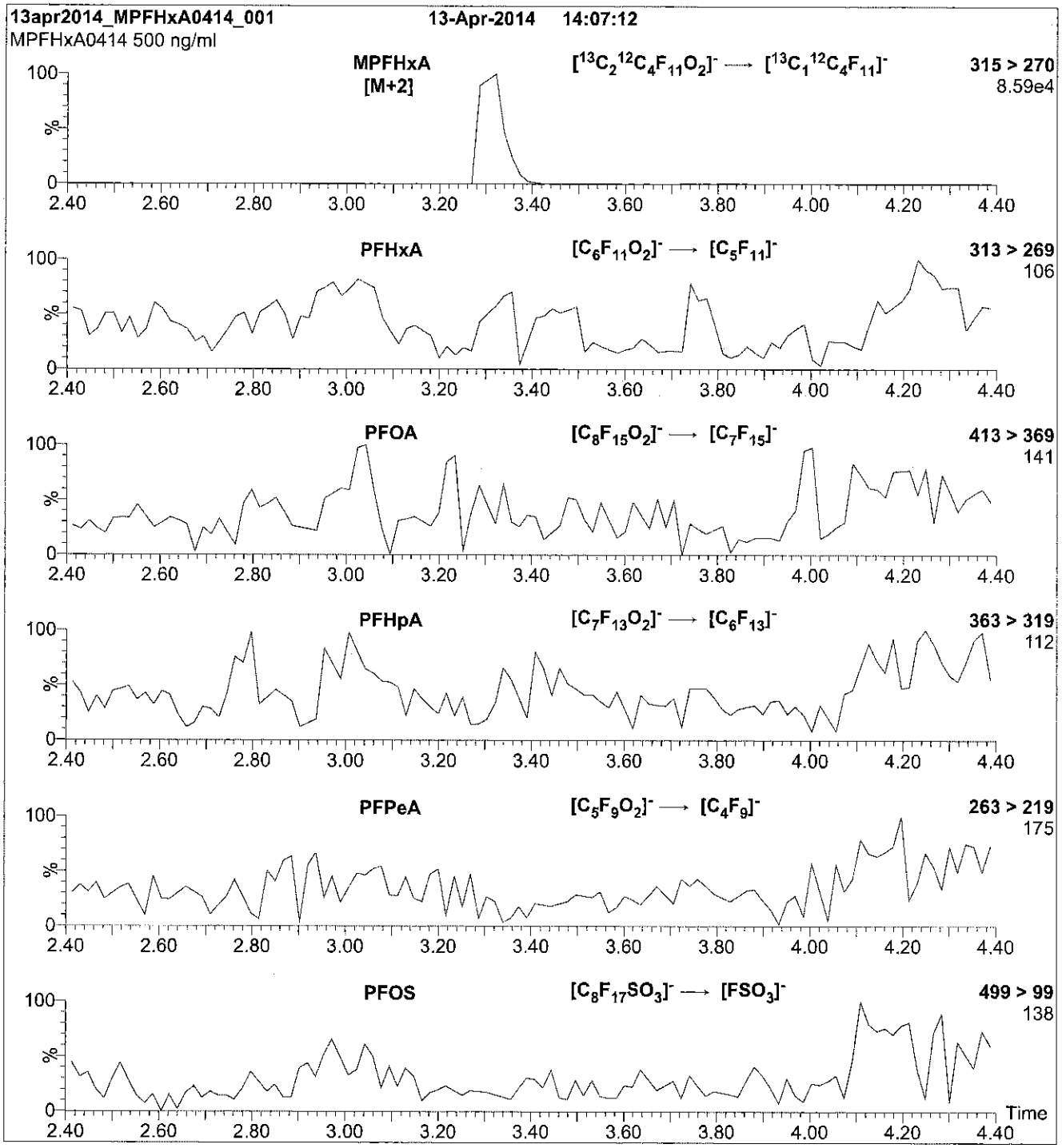
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFHxA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFHxA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 10

# Reagent

---

# LCMPFHxA_00007

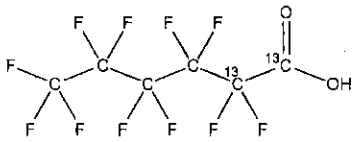
R: 2/25/16 CBW

587893
ID: LCMPFHxA_00007
Exp:04/09/20 Prpd:CBW Opn:02/25/16
13C2-Perfluorohexanoic ac

# WELLINGTON LABORATORIES

# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFHxA
**LOT NUMBER:** MPFHxA0415
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]hexanoic acid
**STRUCTURE:**
**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_2{}^{12}C_4HF_{11}O_2$
**MOLECULAR WEIGHT:** 316.04
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)
**CHEMICAL PURITY:** >98%
**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$)
**LAST TESTED:** (mm/dd/yyyy) 04/09/2015
**EXPIRY DATE:** (mm/dd/yyyy) 04/09/2020
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
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**Certified By:** B.G. Chittim **Date:** 04/14/2015 (mm/dd/yyyy)

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CALA

ANAB ACCREDITED

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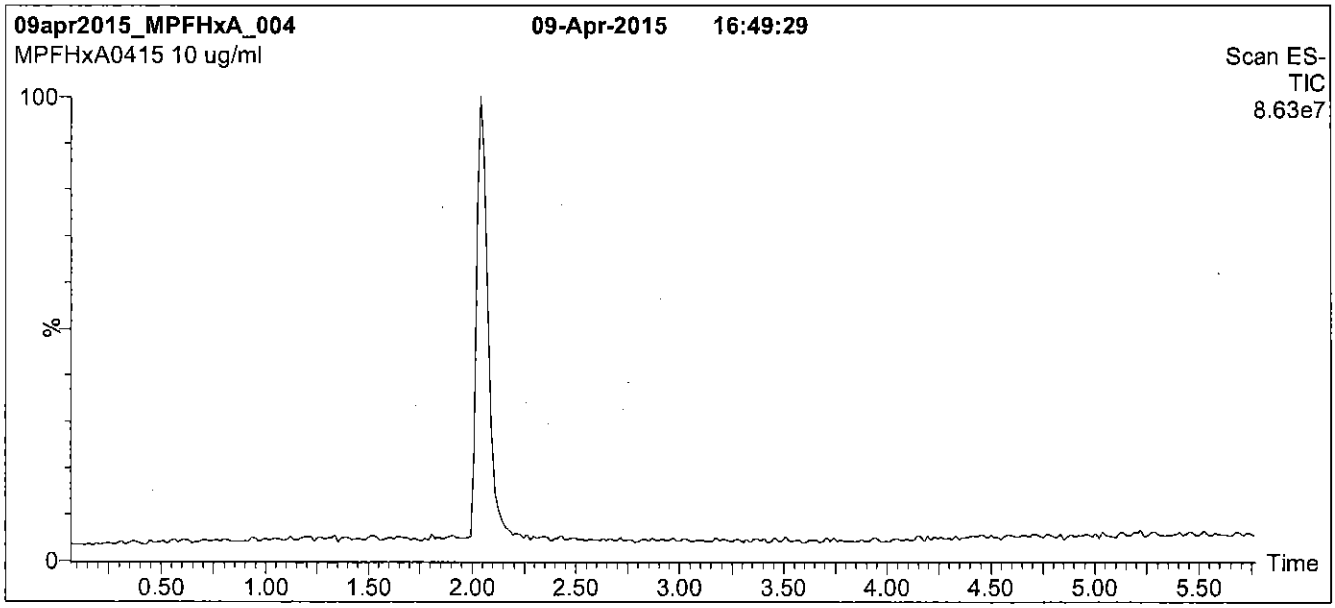
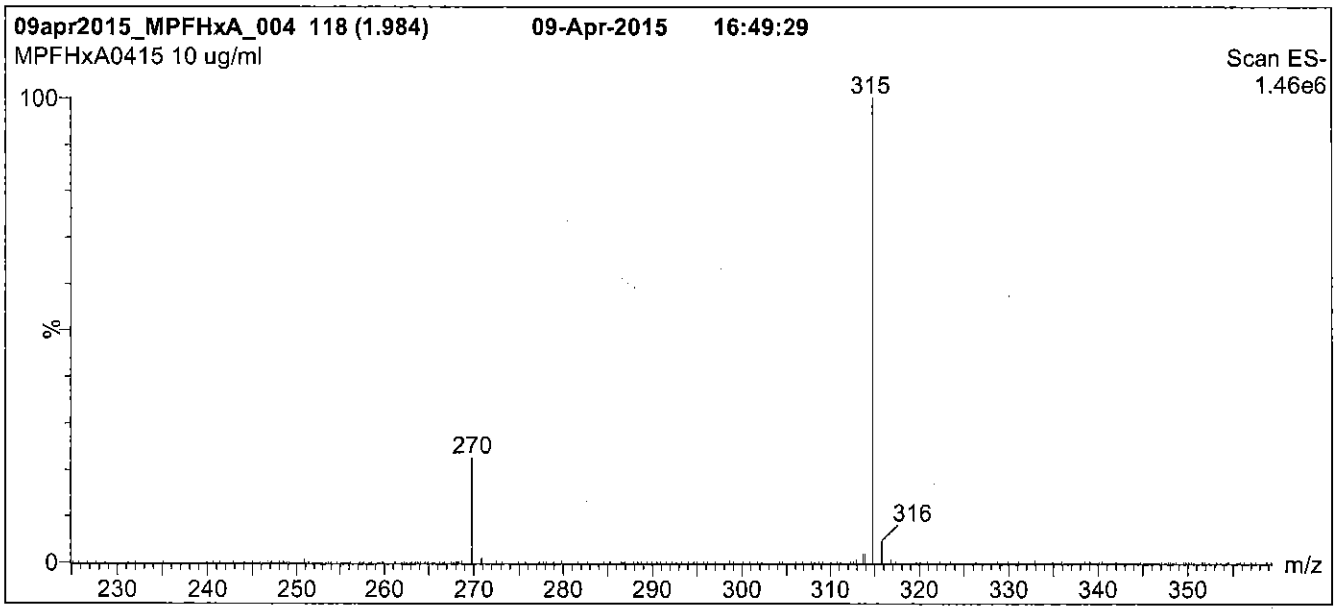
**Figure 1:** **MPFHxA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions over 0.5 min.
Time: 10 min

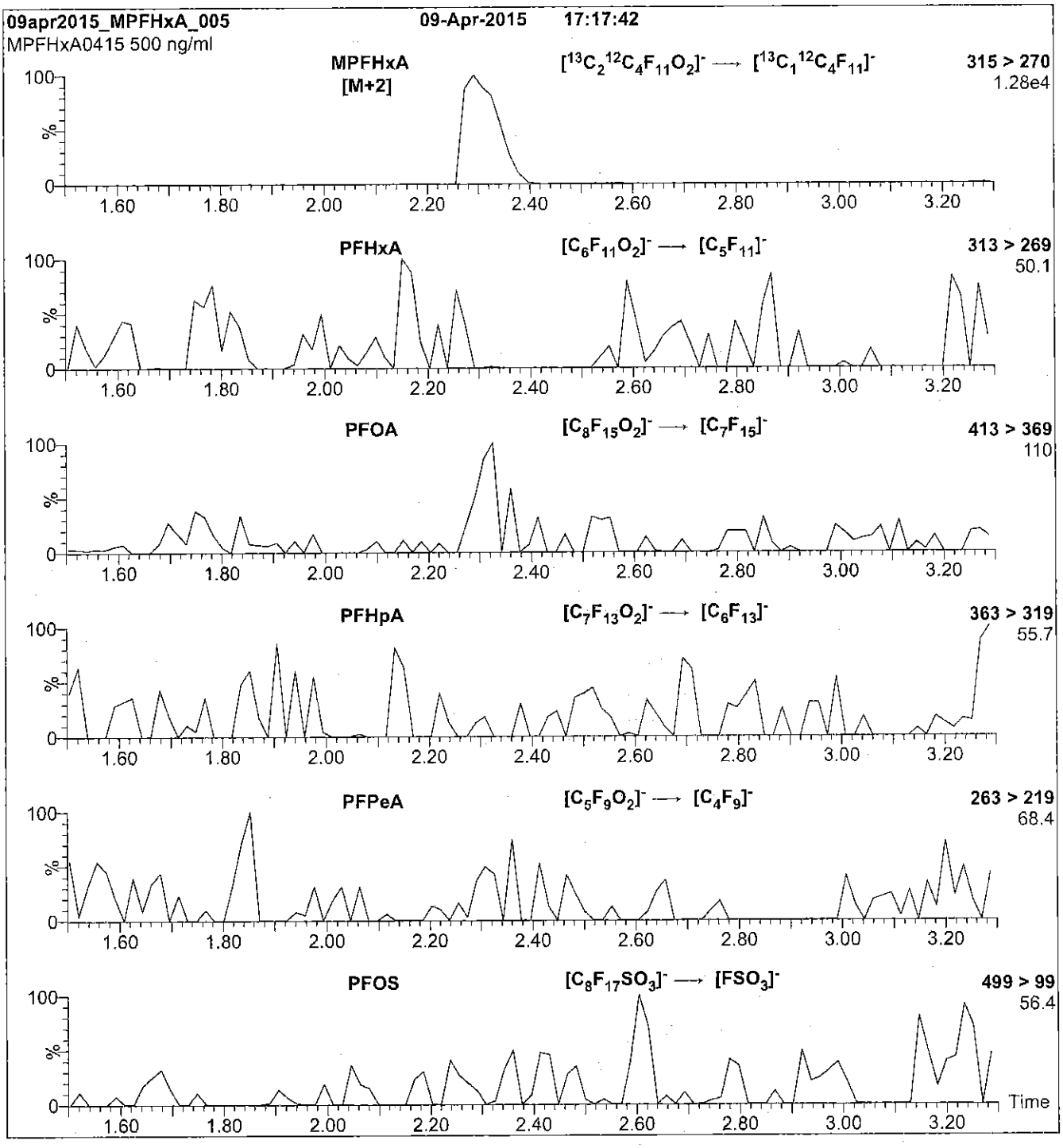
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFHxA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFHxA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.20e-3
Collision Energy (eV) = 10

# Reagent

---

# LCMPFHxA_00008

605233
ID: LCMPFHxA_00008
Exp: 04/09/20 Prpd: CBW
13C2-Perfluorohexanoic ac

Rec. 3/29/16 JRB ✓

# WELLINGTON LABORATORIES

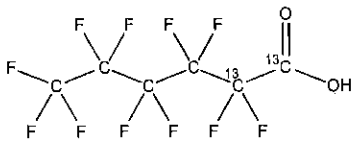
# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFHxA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]hexanoic acid

**LOT NUMBER:** MPFHxA0415

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_4HF_{11}O_2$ | **MOLECULAR WEIGHT:** | 316.04 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 04/09/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 04/09/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains < 0.1% of perfluoro-n-hexanoic acid and ~ 0.3% of perfluoro-n-octanoic acid.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/14/2015 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

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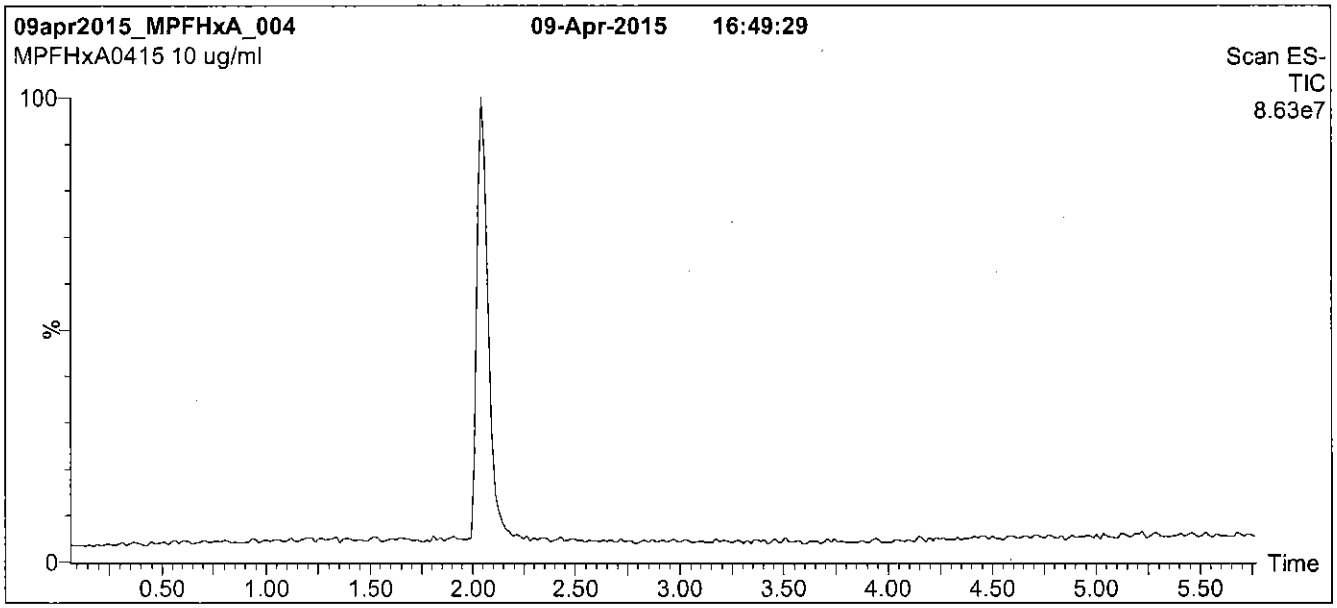
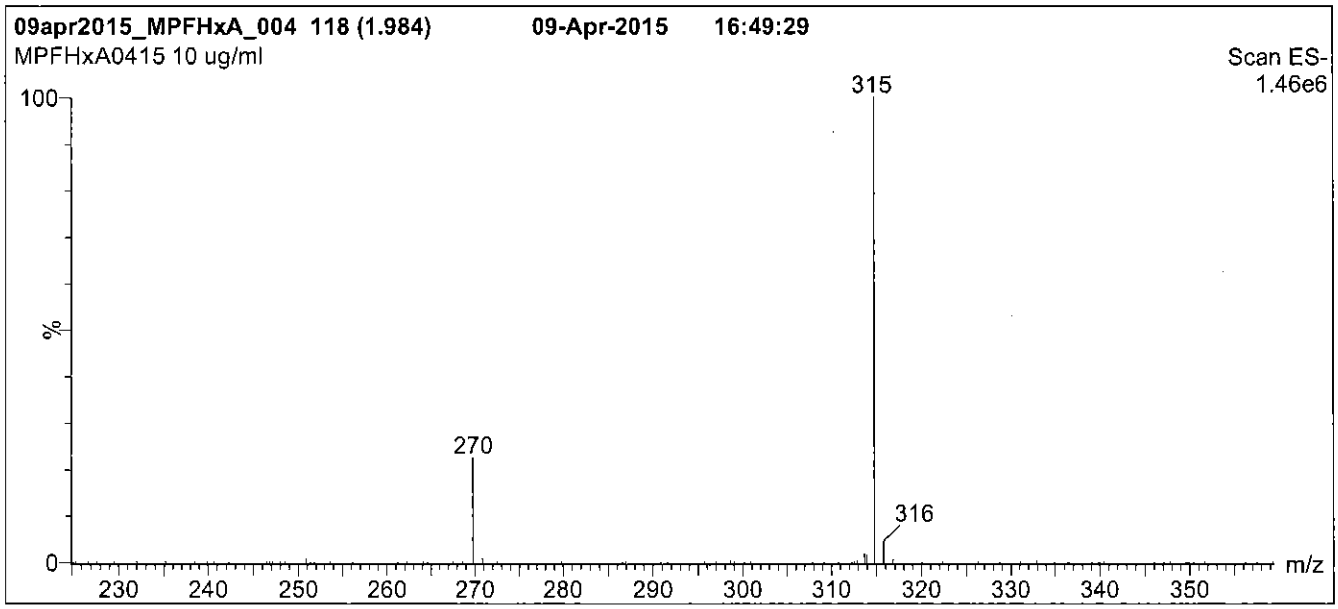
CALA Testing Accredited Test: A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **MPFHxA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions over 0.5 min.
Time: 10 min

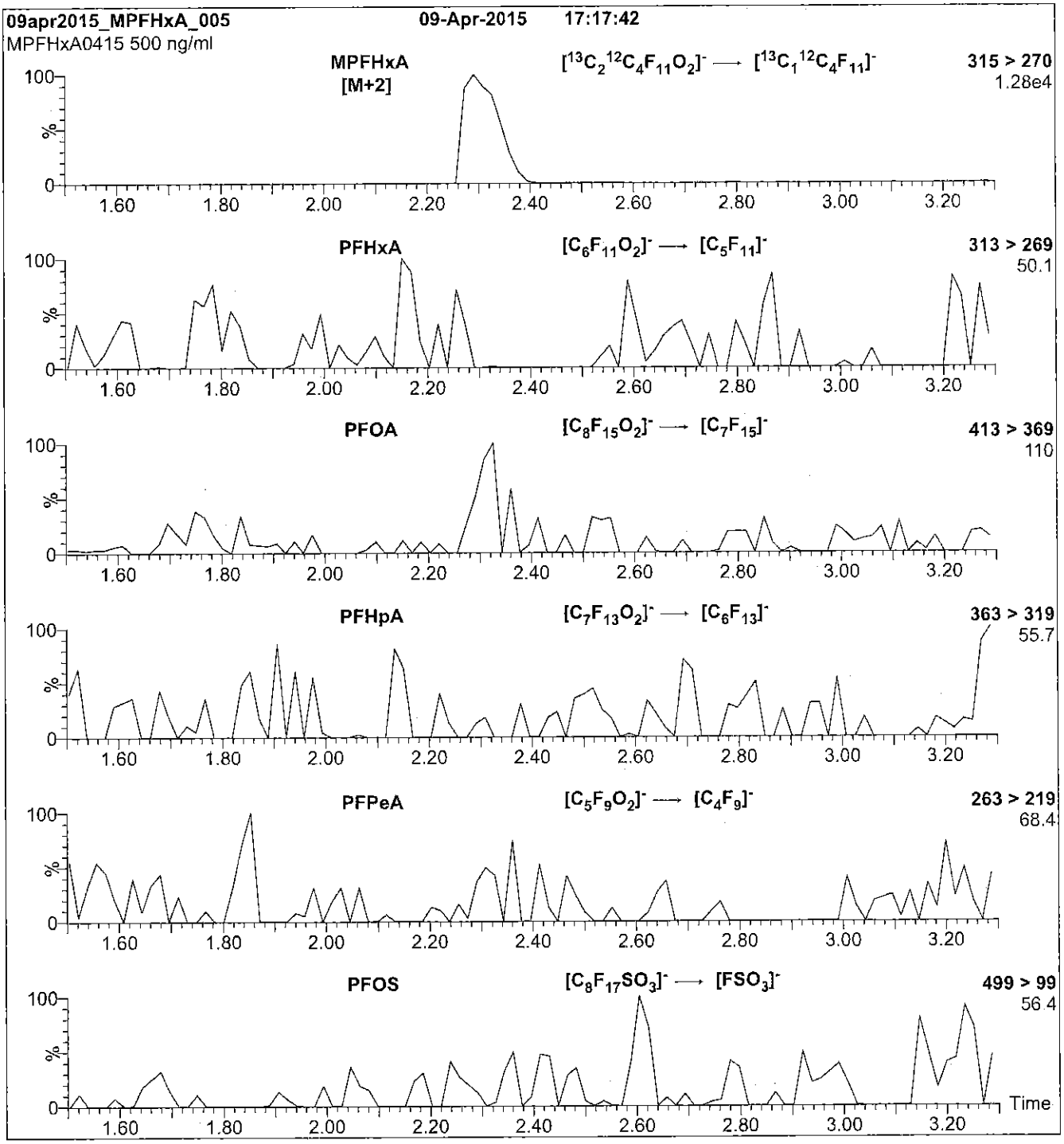
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFHxA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFHxA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.20e-3
Collision Energy (eV) = 10

# Reagent

---

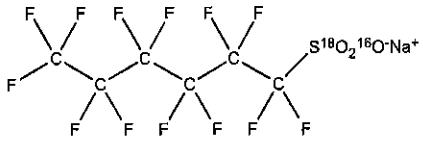
# LCMPFHxS_00004

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFHxS
**COMPOUND:** Sodium perfluoro-1-hexane[$^{18}O_2$]sulfonate
**LOT NUMBER:** MPFHxS0713

**STRUCTURE:**
**CAS #:** Not available




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_6F_{13}S^{18}O_2{}^{16}ONa$ | **MOLECULAR WEIGHT:** | 426.10 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>47.3 ± 2.4 µg/ml (MPFHxS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | >94% ($^{18}O_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 07/25/2013 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 07/25/2018 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- The response factor for MPFHxS ($C_6F_{13}S^{18}O_2{}^{16}O^-$) has been observed to be up to 10% lower than for PFHxS ($C_6F_{13}S^{16}O_3^-$) when both compounds are injected together. This difference may vary between instruments.
- Due to the isotopic purity of the starting material ($^{18}O_2$ >94%), MPFHxS contains ~ 0.3% of PFHxS. This value agrees with the theoretical percent relative abundance that is expected based on the stated isotopic purity.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 03/30/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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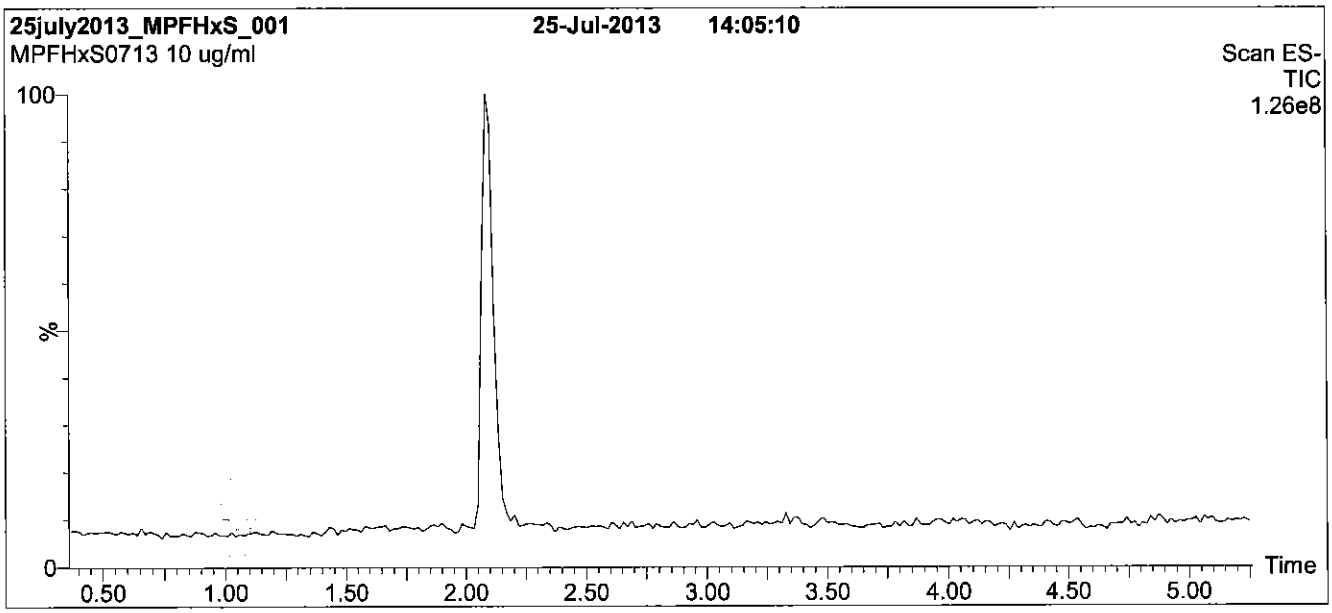
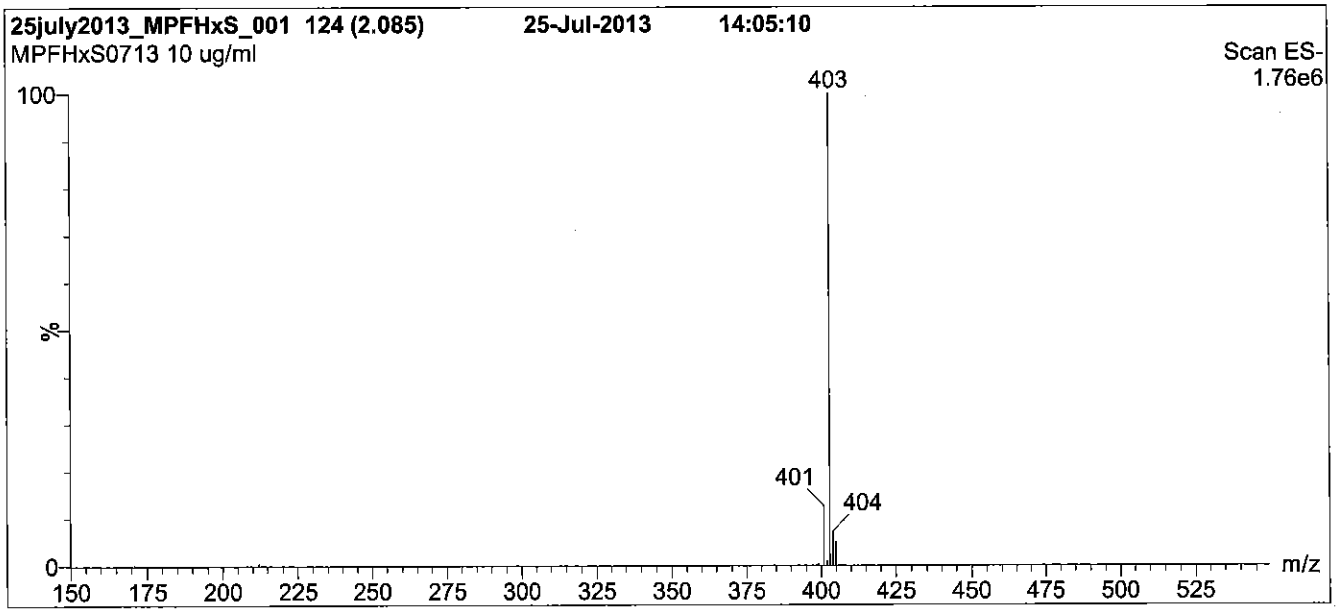
**Figure 1:** **MPFHxS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

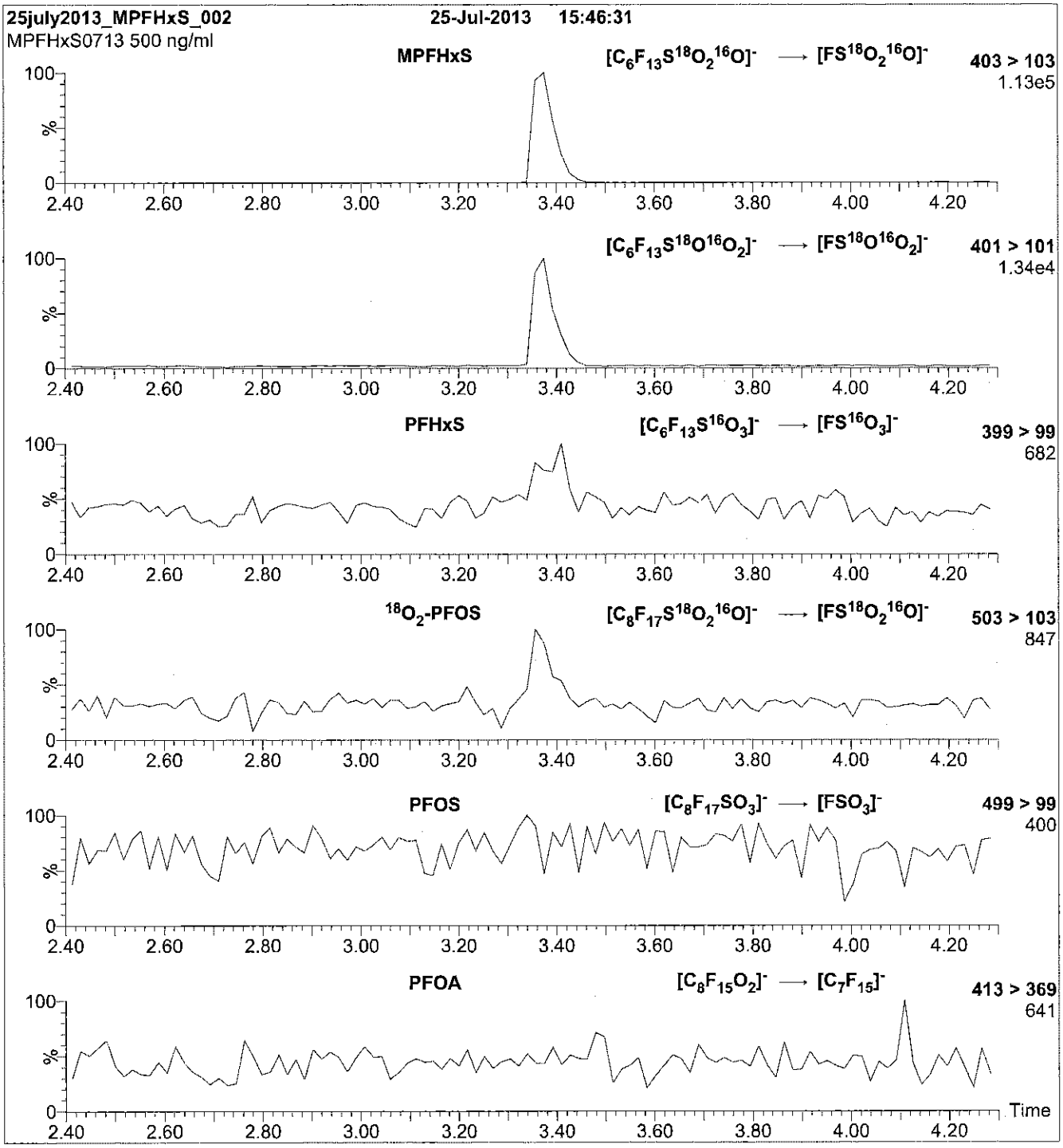
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 50.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFHxS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFHxS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.58e-3
Collision Energy (eV) = 30

# Reagent

---

# LCMPFHxS_00005

591163
ID: LCMPFHxS_00005
Exp: 08/23/20 Prpd: CBW
18O2-Perfluorohexanesulfo

R: 3/3/16 CBW

# WELLINGTON LABORATORIES

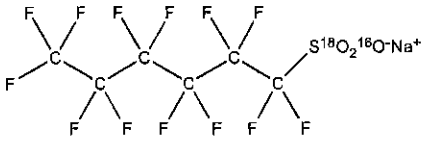
# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFHxS
**COMPOUND:** Sodium perfluoro-1-hexane[$^{18}O_2$]sulfonate

**LOT NUMBER:** MPFHxS1015

**STRUCTURE:**

**CAS #:** Not available




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_6F_{13}S^{18}O_2{}^{16}ONa$ | **MOLECULAR WEIGHT:** | 426.10 |
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| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | >94% ($^{18}O_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 10/23/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 10/23/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
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**ADDITIONAL INFORMATION:**

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**Certified By:** B.G. Chittim **Date:** 10/28/2015 (mm/dd/yyyy)


***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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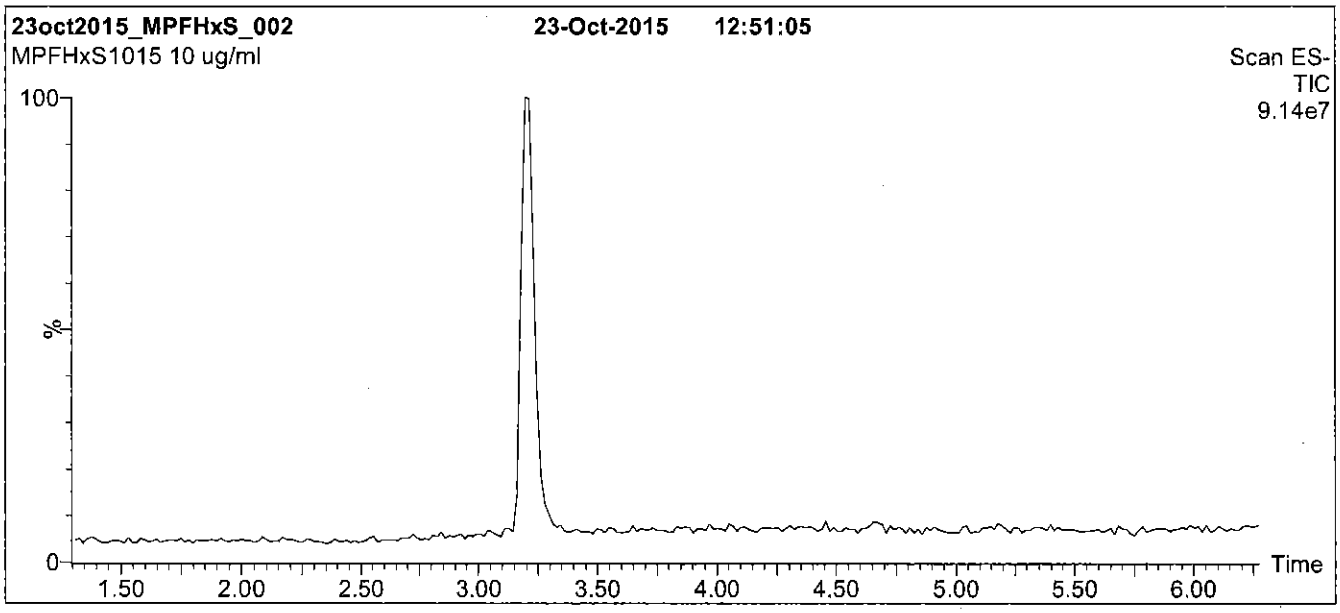
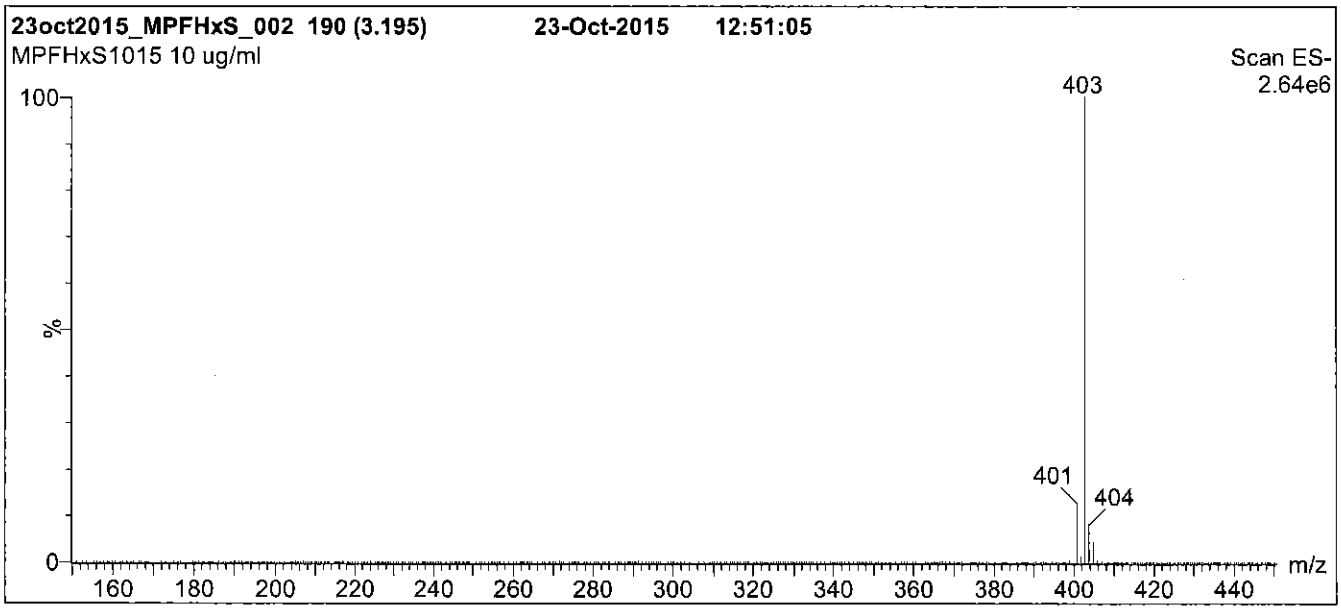
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17025 & ISO 34 REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **MPFHxS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions in 0.5 min.
Time: 10 min

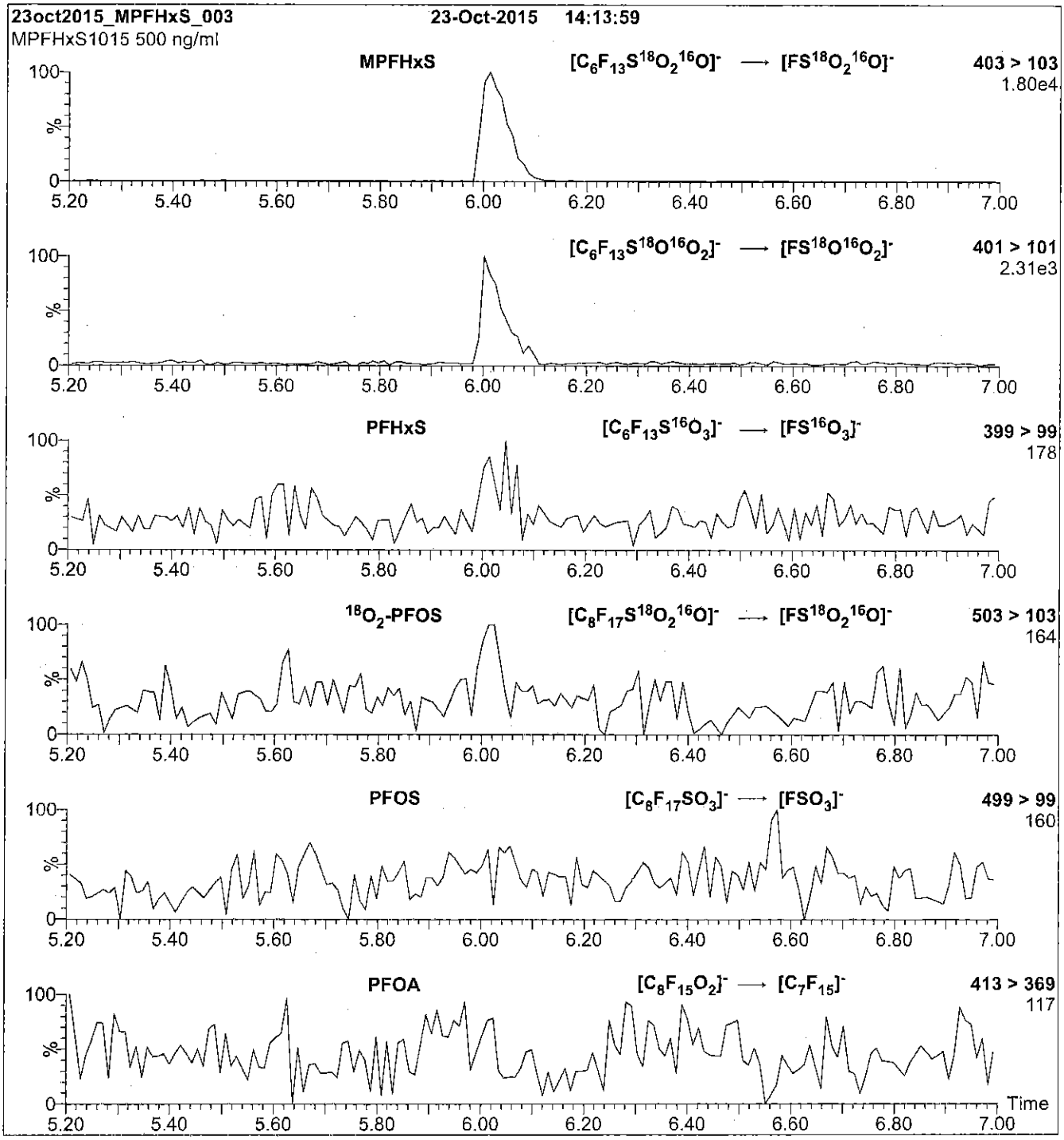
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 50.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFHxS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFHxS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 30

# Reagent

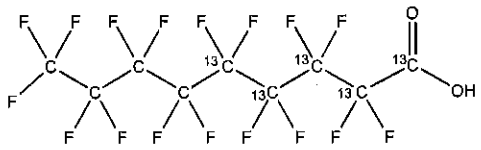
# LCMPFNA_00003

V- 2/11/15 SV

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

| | | | |
|---|---|---|---|
| **PRODUCT CODE:** | MPFNA | **LOT NUMBER:** | MPFNA0414 |
| **COMPOUND:** | Perfluoro-n-[1,2,3,4,5-$^{13}C_5$]nonanoic acid | | |
| **STRUCTURE:** | | **CAS #:** | Not available |



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_5{}^{12}C_4HF_{17}O_2$ | **MOLECULAR WEIGHT:** | 469.04 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$<br>(1,2,3,4,5-$^{13}C_5$) |
| **LAST TESTED:** (mm/dd/yyyy) | 04/13/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 04/13/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/13/2014 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

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where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

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## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

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This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

CALA Testing Accreditation No: A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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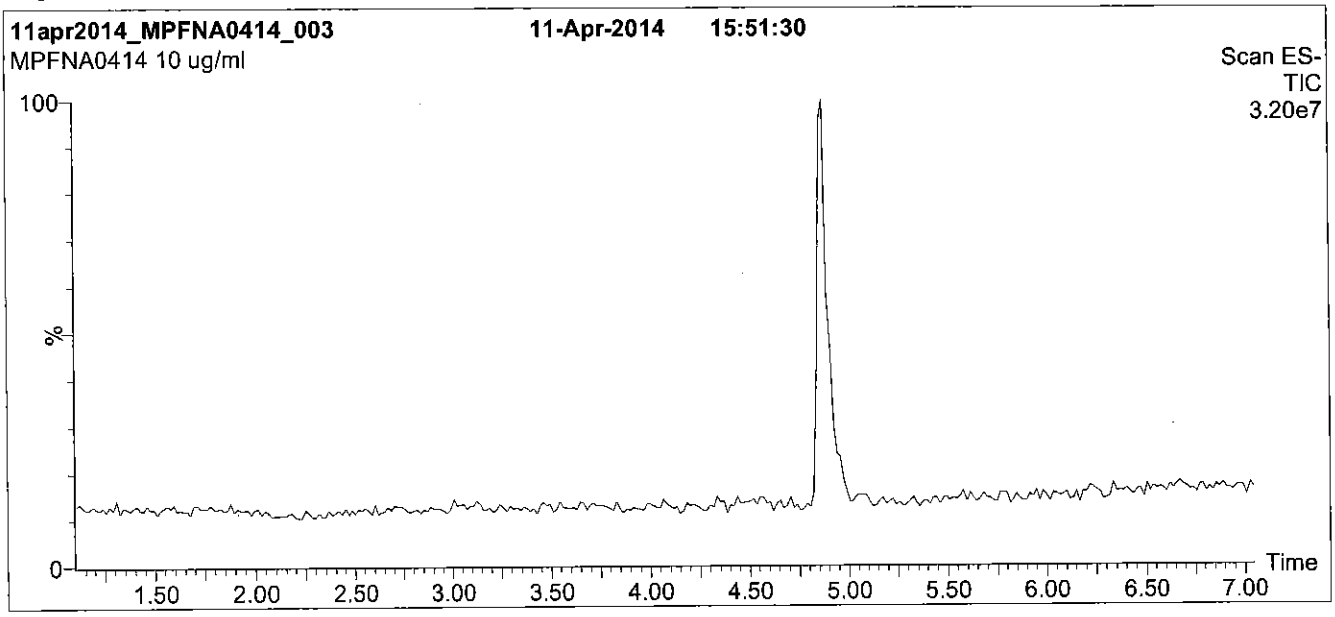


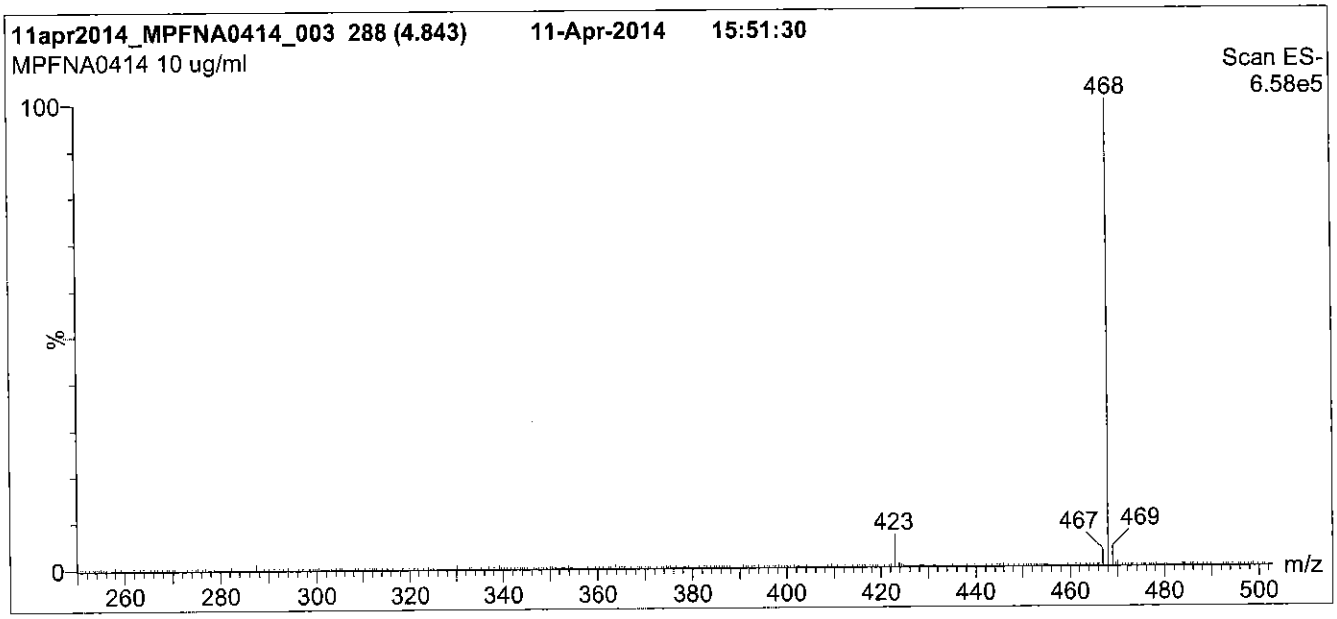


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Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
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Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
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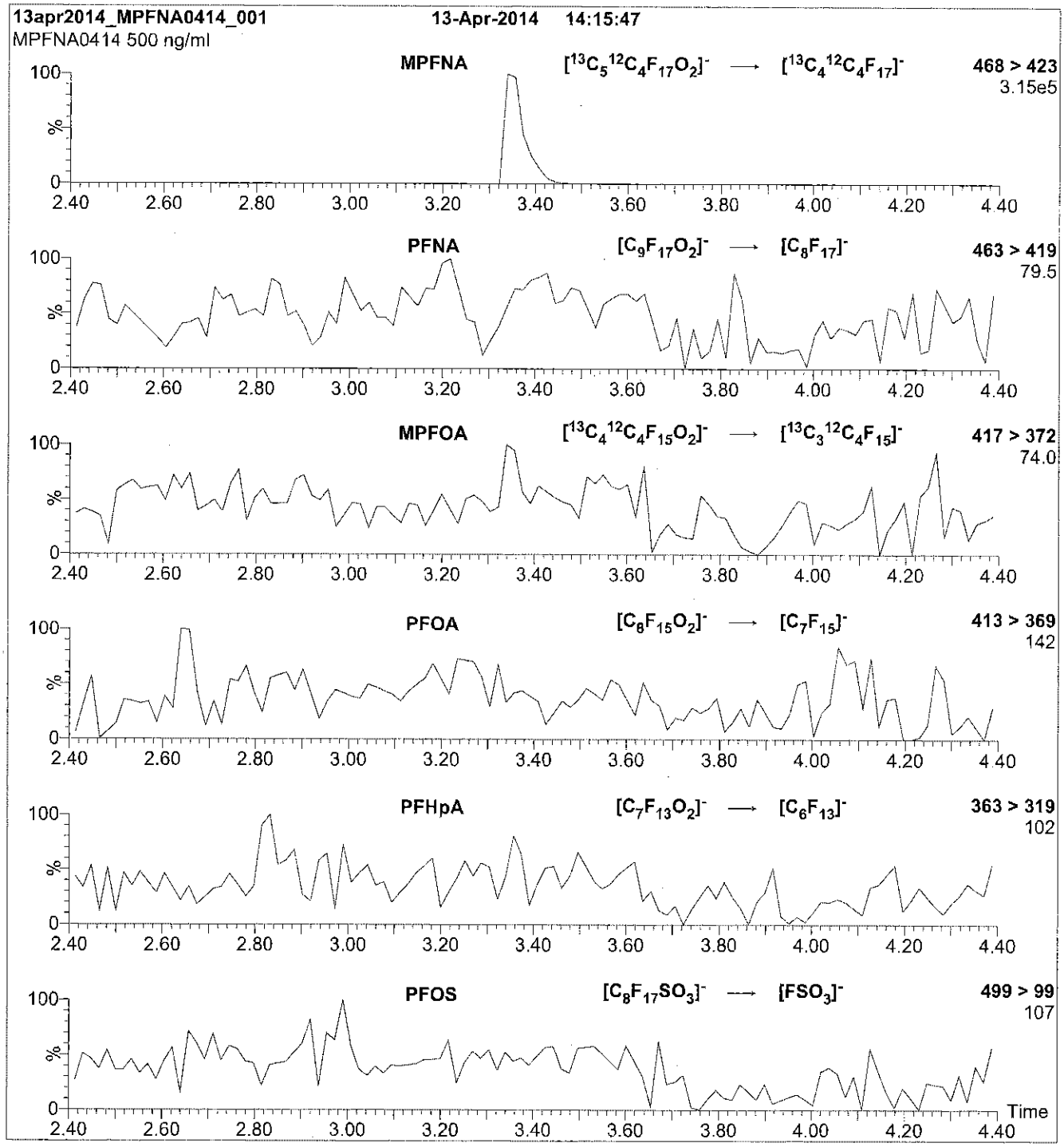
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFNA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml MPFNA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 11

# Reagent

# LCMPFNA_00004

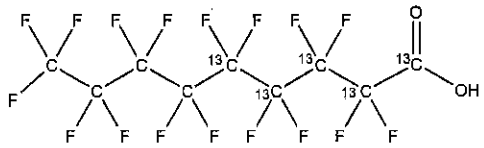
R: 2/25/16 CBW

587894
ID: LCMPFNA_00004
Exp:04/13/19 Prpd:CBW Opn:02/25/15
13C5-Perfluornonanoic aci

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFNA
**LOT NUMBER:** MPFNA0414
**COMPOUND:** Perfluoro-n-[1,2,3,4,5-$^{13}C_5$]nonanoic acid
**STRUCTURE:**
**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_5{}^{12}C_4HF_{17}O_2$
**MOLECULAR WEIGHT:** 469.04
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)
**CHEMICAL PURITY:** >98%
**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2,3,4,5\text{-}^{13}C_5$)
**LAST TESTED:** (mm/dd/yyyy) 04/13/2014
**EXPIRY DATE:** (mm/dd/yyyy) 04/13/2019
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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**Certified By:** B.G. Chittim **Date:** 04/01/2015 (mm/dd/yyyy)

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***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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CALA

ANAB ACCREDITED

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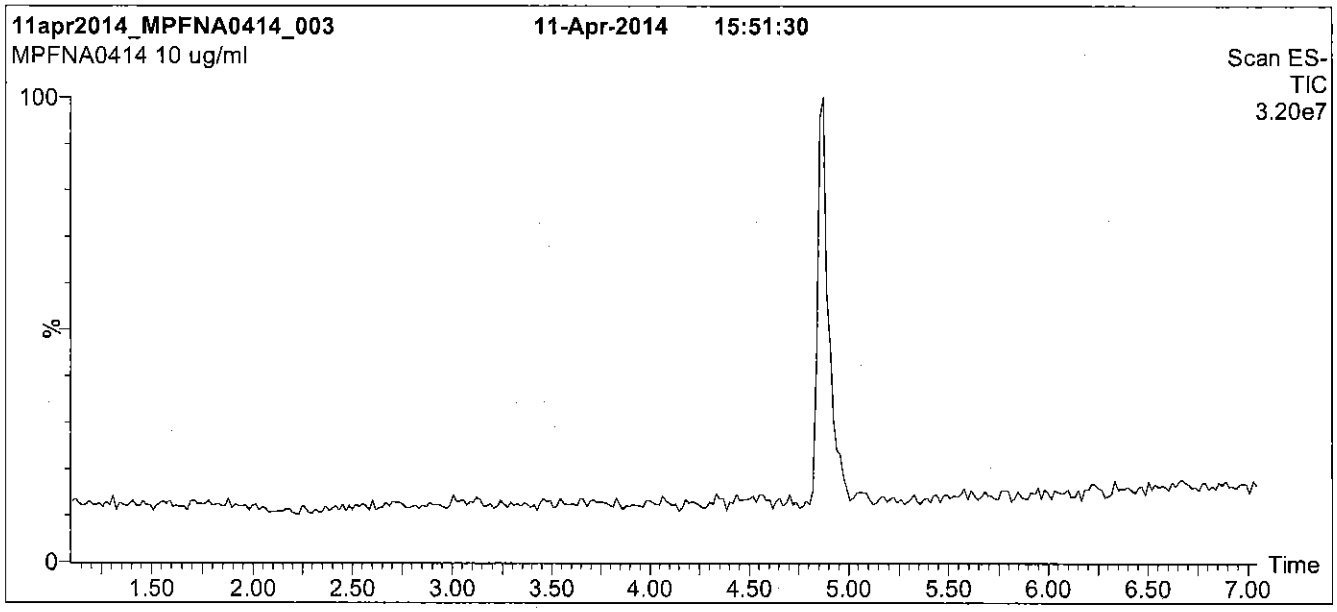


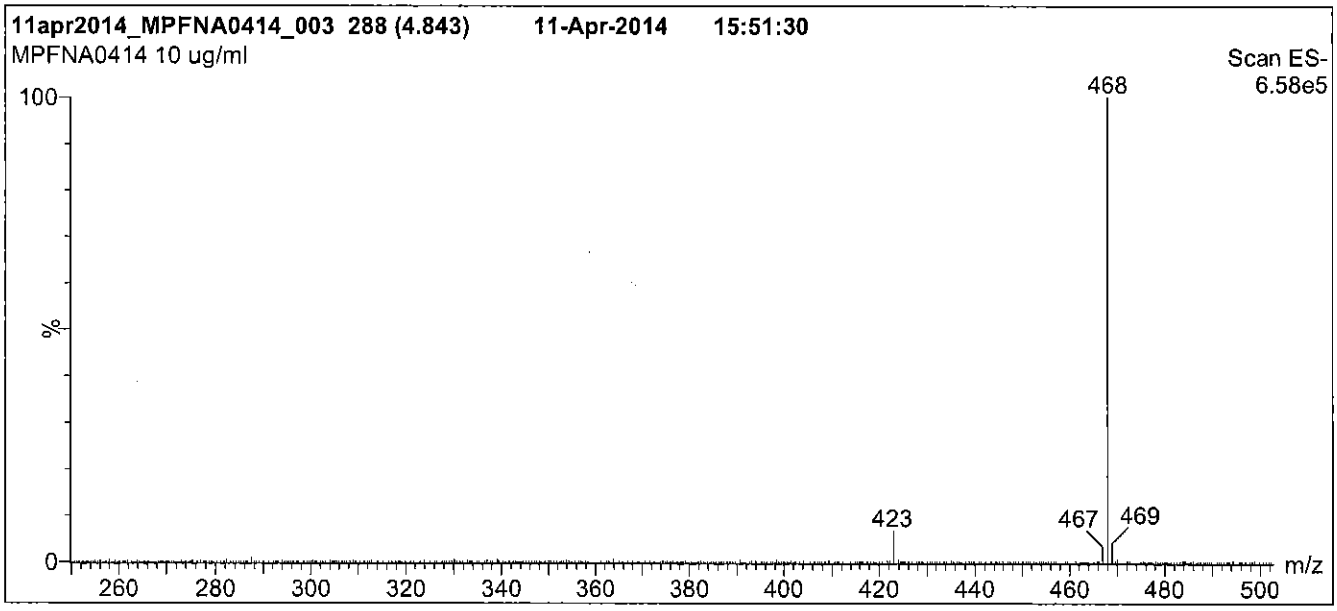


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**MS:** **Micromass Quattro *micro* API MS**

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Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 850 amu)

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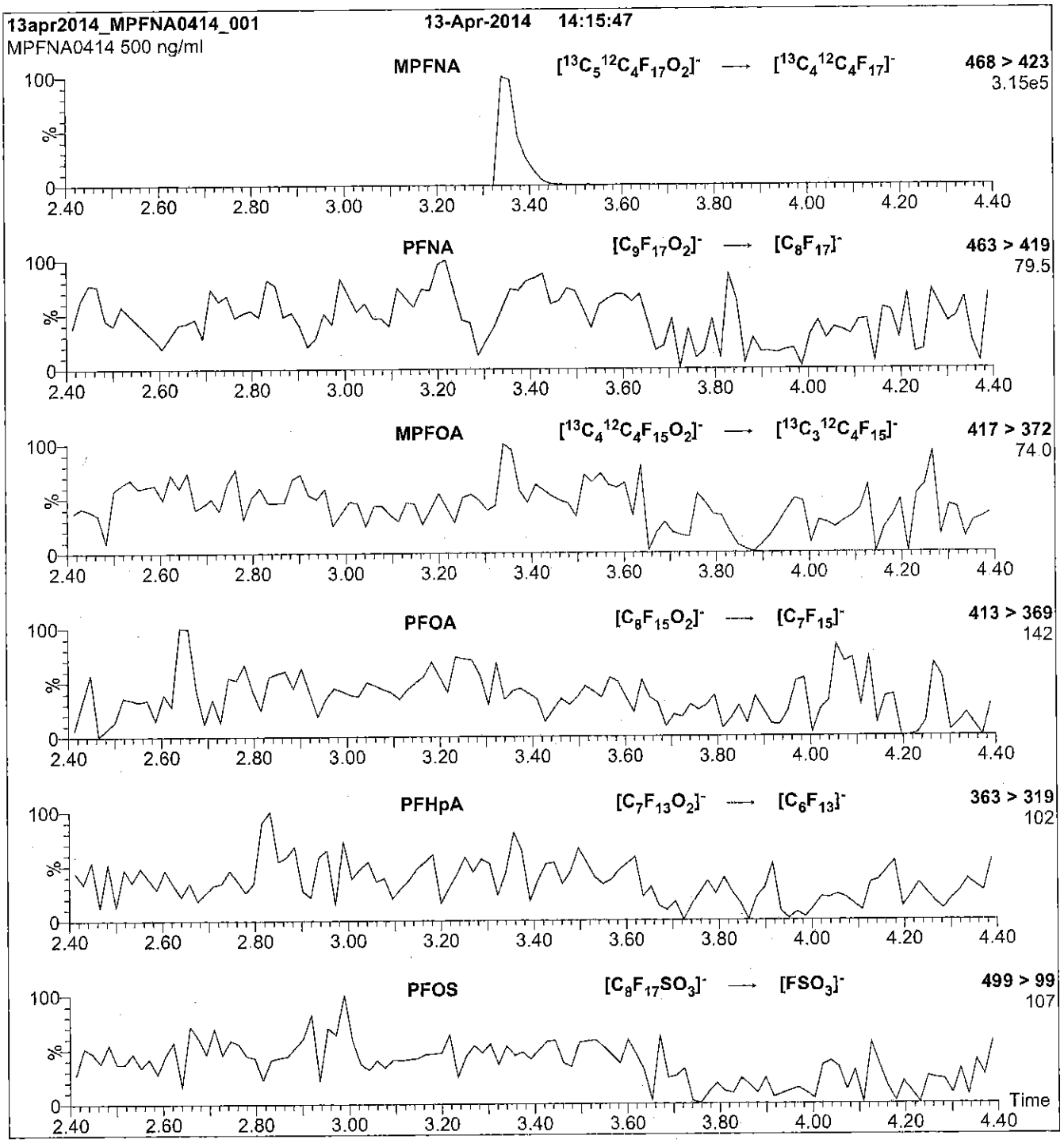
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFNA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFNA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 11

# Reagent

# LCMPFNA_00005

Rec. 3/24/16 JEB V

# WELLINGTON LABORATORIES

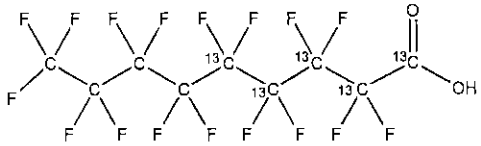
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFNA
**COMPOUND:** Perfluoro-n-[1,2,3,4,5-$^{13}C_5$]nonanoic acid

**LOT NUMBER:** MPFNA0414

**STRUCTURE:**

**CAS #:** Not available



| | | | |
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CALA Testing Accreditation No. A1226

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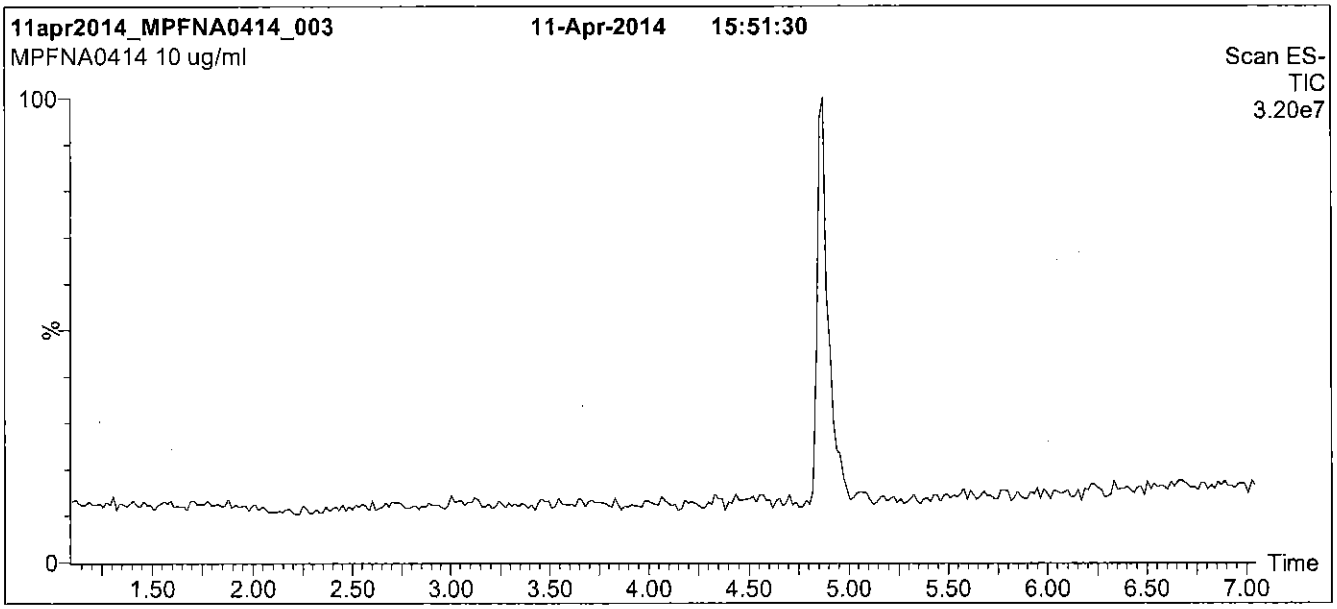
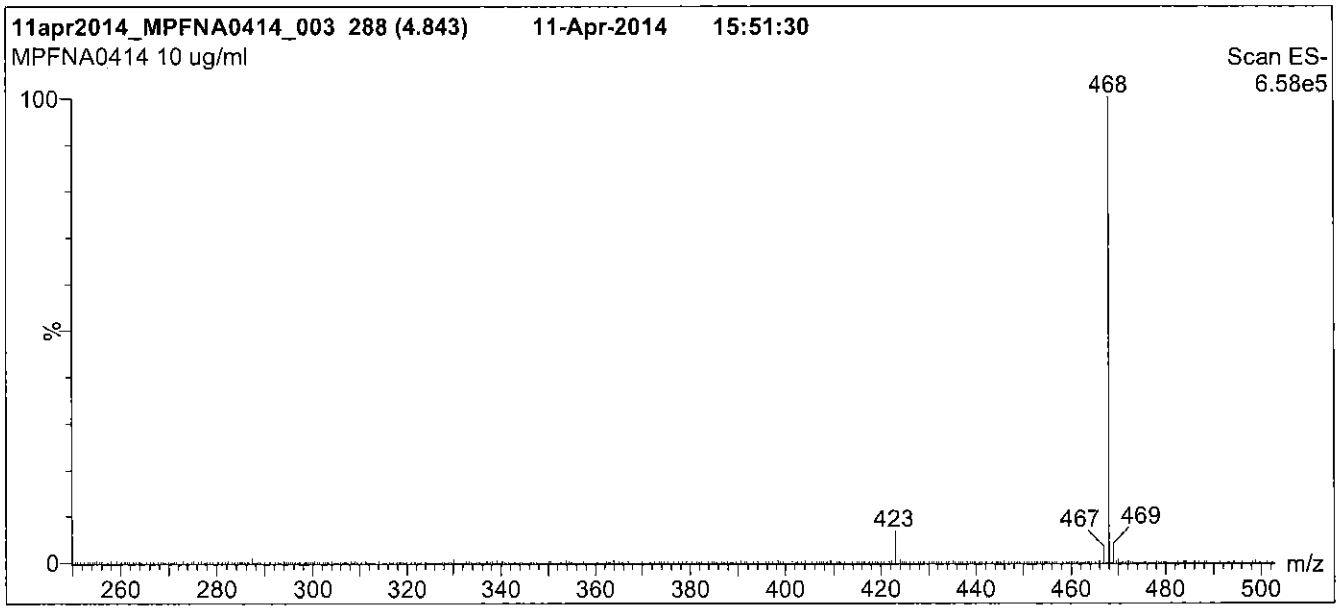
**Figure 1:** **MPFNA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions in 0.5 min.
Time: 10 min

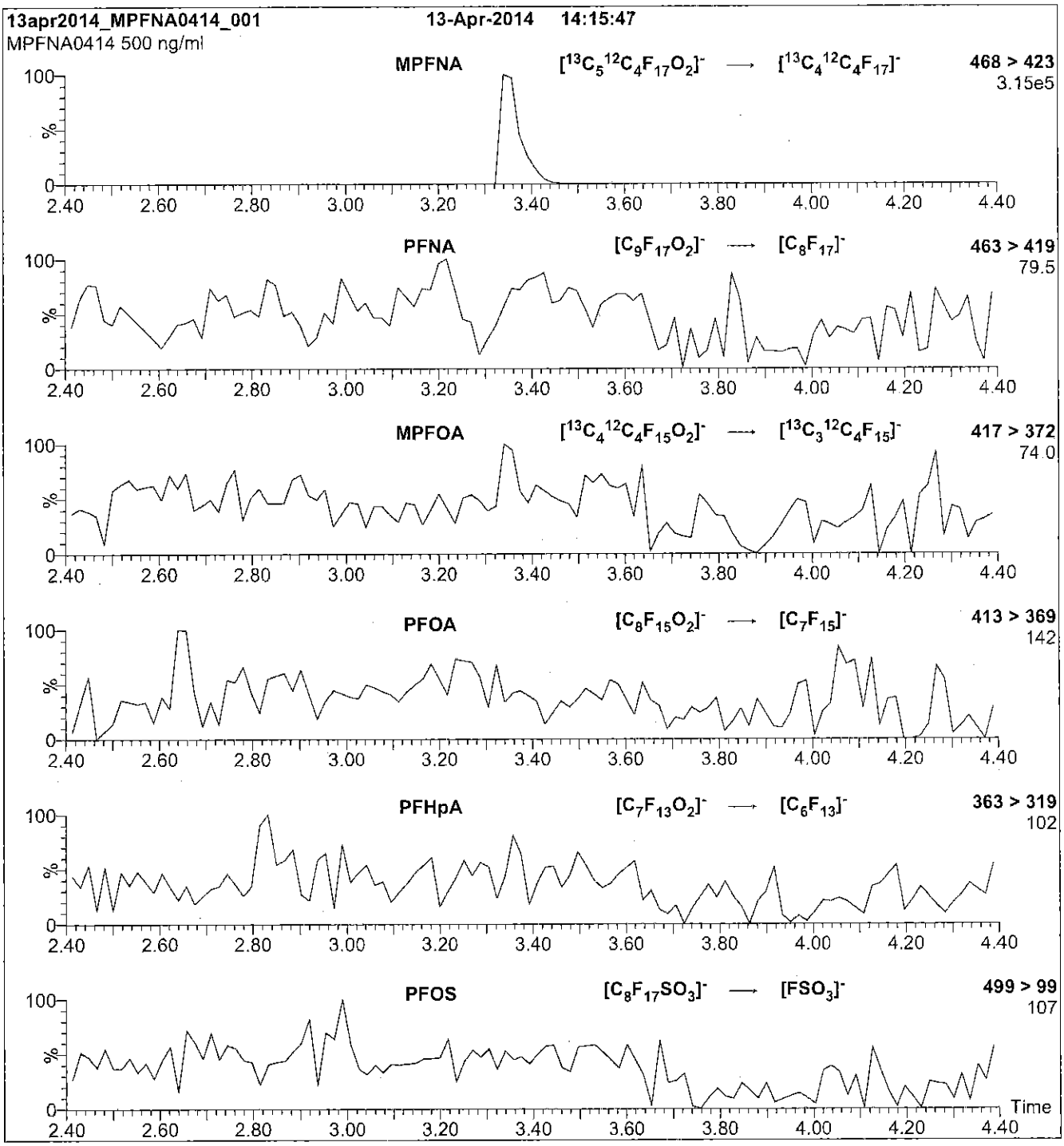
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFNA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFNA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 11

# Reagent

# LCMPFOA_00007

V: 9/15/15 BV

# WELLINGTON LABORATORIES

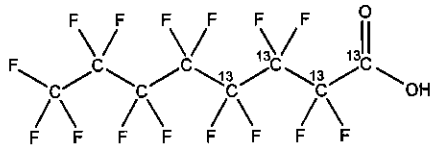
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFOA
**COMPOUND:** Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanoic acid

**LOT NUMBER:** MPFOA0415

**STRUCTURE:**

**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_4{}^{12}C_4HF_{15}O_2$
**CONCENTRATION:** 50 ± 2.5 µg/ml

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 04/10/2015
**EXPIRY DATE:** (mm/dd/yyyy) 04/10/2020
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**MOLECULAR WEIGHT:** 418.04
**SOLVENT(S):** Methanol
Water (<1%)

**ISOTOPIC PURITY:** ≥99% $^{13}C$ (1,2,3,4-$^{13}C_4$)

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of native perfluoro-n-octanoic acid (PFOA).

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/10/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

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The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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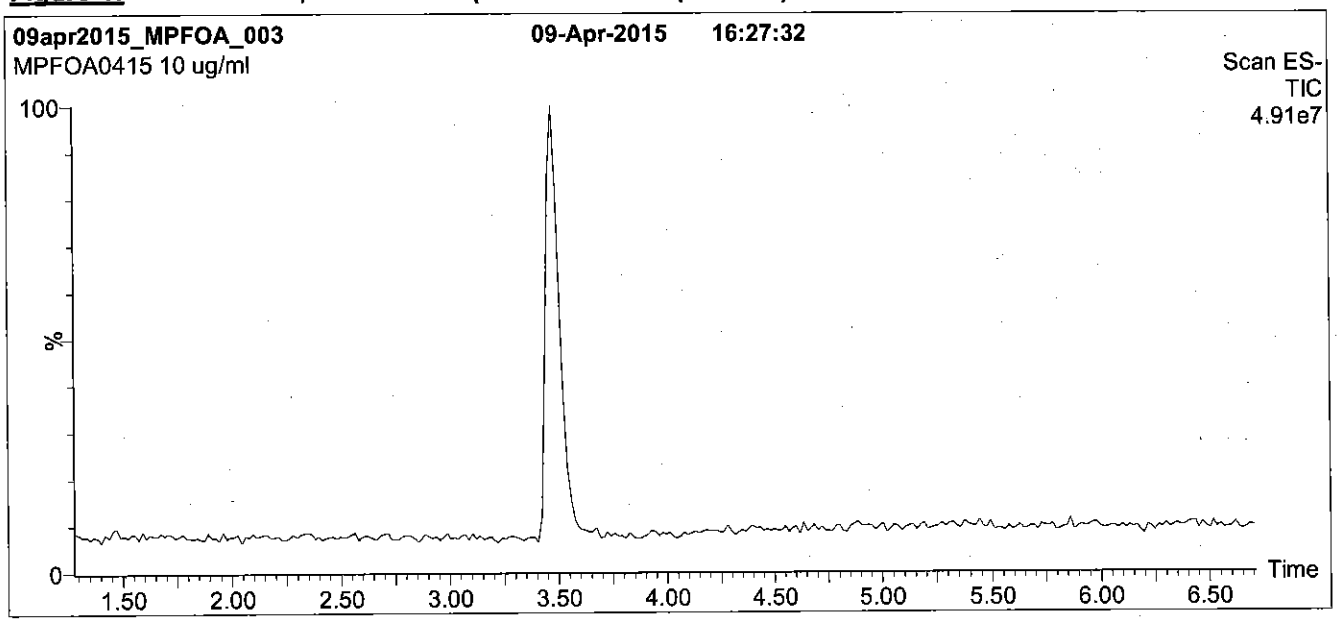


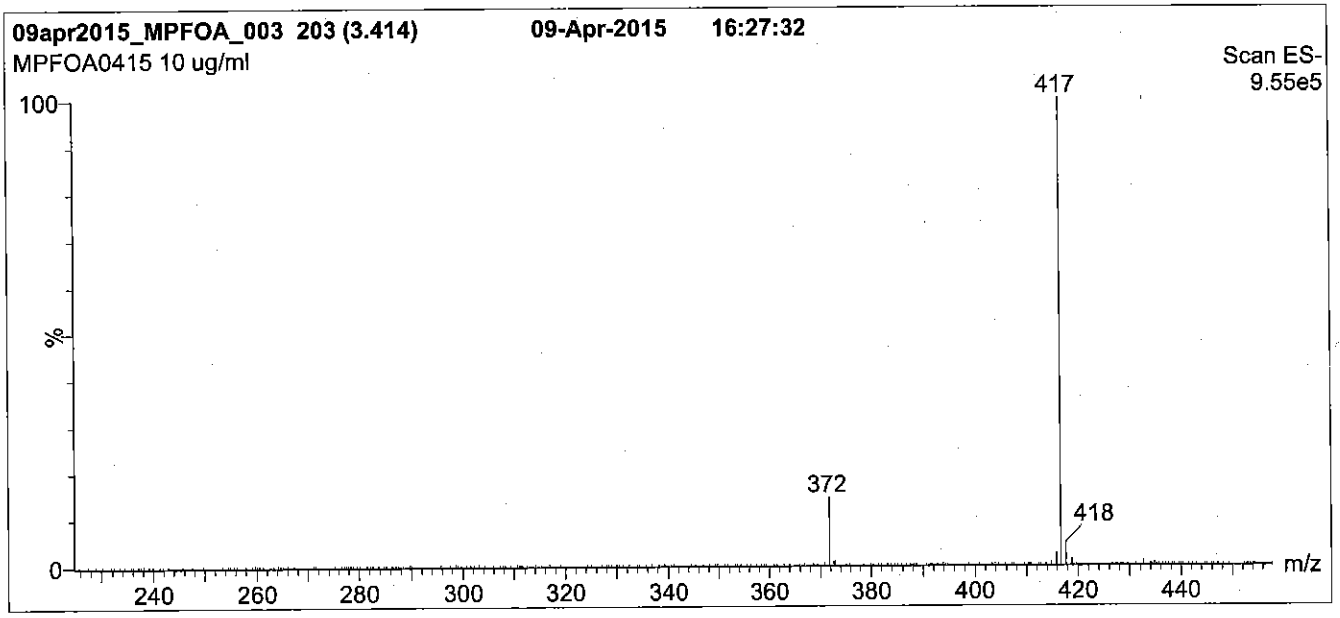


**Conditions for Figure 1:**

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**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
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Ramp to 90% organic over 7 min and hold for 2 min
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Time: 10 min

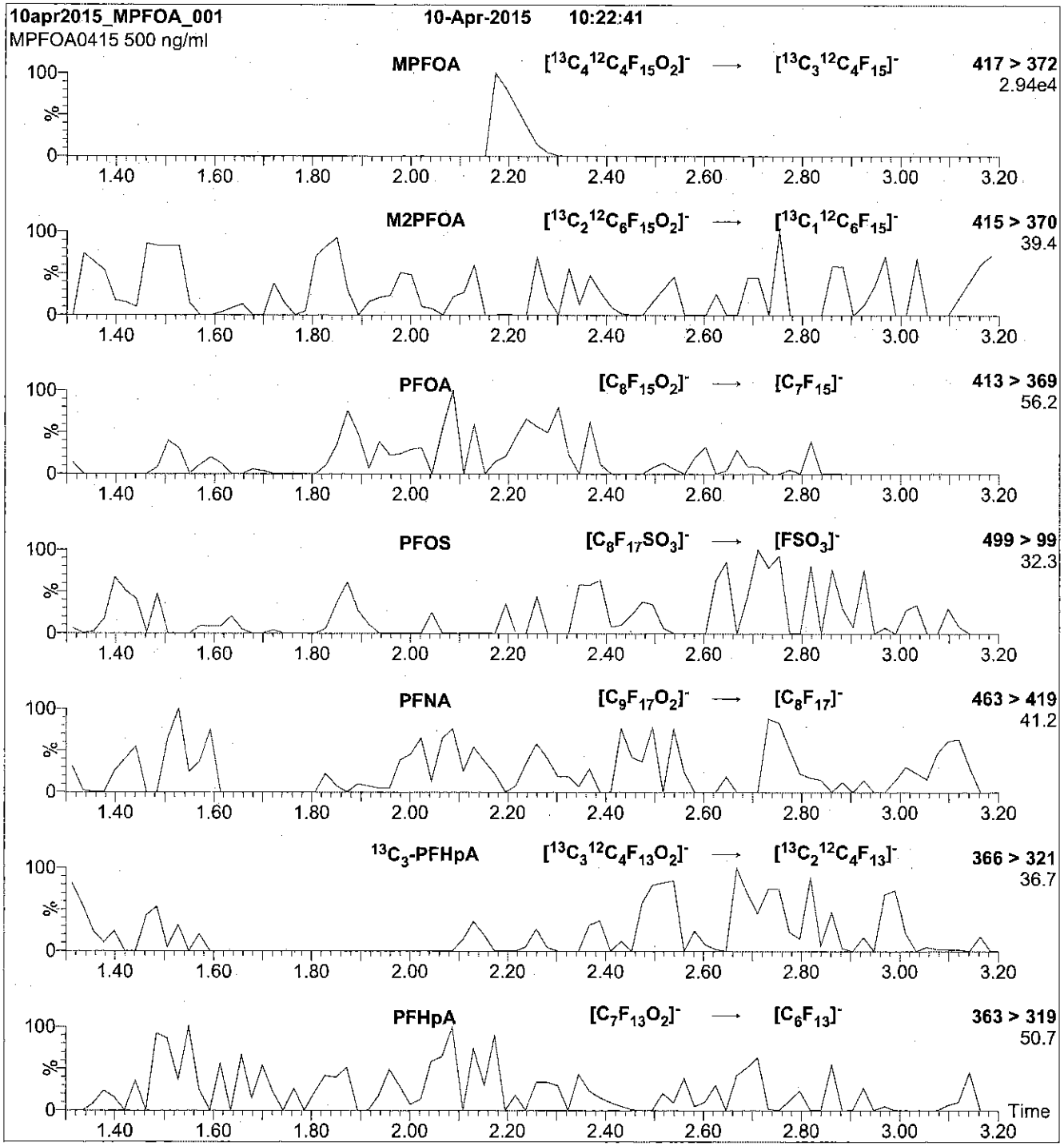
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFOA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFOA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.24e-3
Collision Energy (eV) = 11

# Reagent

# LCMPFOA_00008

572885
ID: LCMPFOA_00008
Exp 04/10/20 Prpd: CBW
13C4-Perfluorooctanoic ac

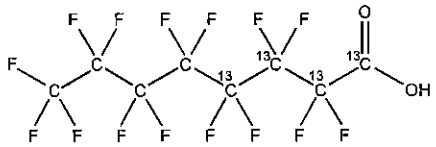
R: 1/25/16
S:

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFOA
**LOT NUMBER:** MPFOA0415
**COMPOUND:** Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanoic acid

**STRUCTURE:**
**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4{}^{12}C_4HF_{15}O_2$ | **MOLECULAR WEIGHT:** | 418.04 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$<br>(1,2,3,4-$^{13}C_4$) |
| **LAST TESTED:** (mm/dd/yyyy) | 04/10/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 04/10/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of native perfluoro-n-octanoic acid (PFOA).

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**Certified By:** B.G. Chittim **Date:** 04/10/2015 (mm/dd/yyyy)

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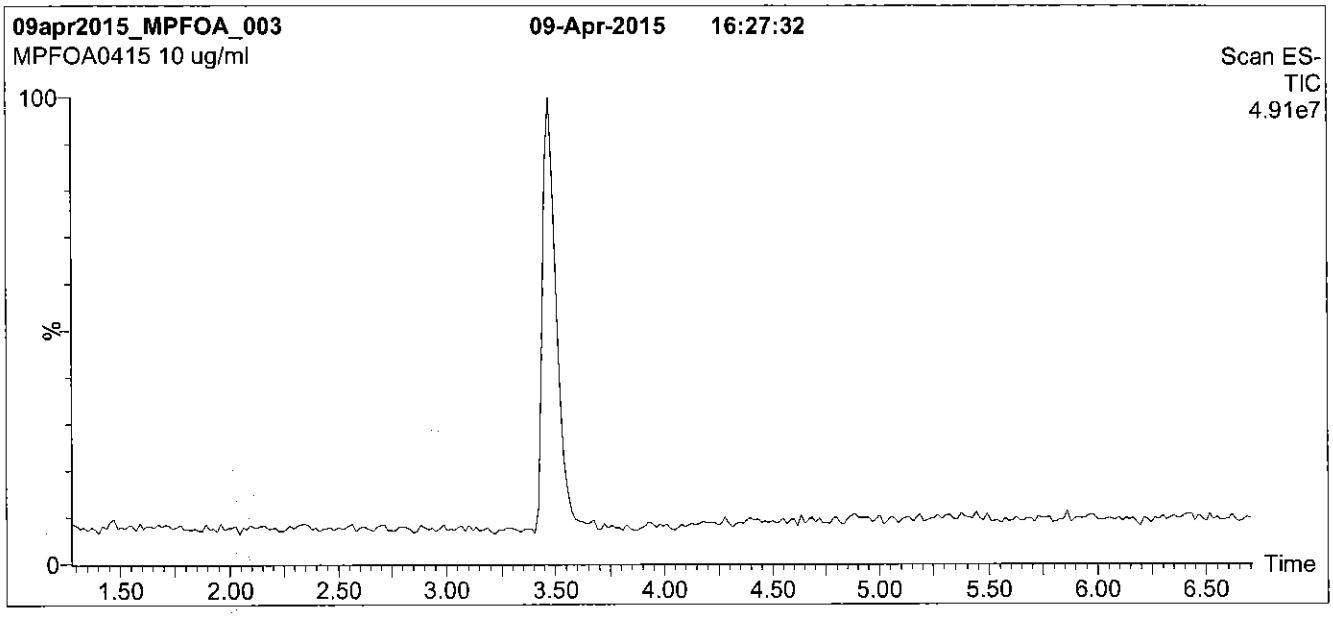
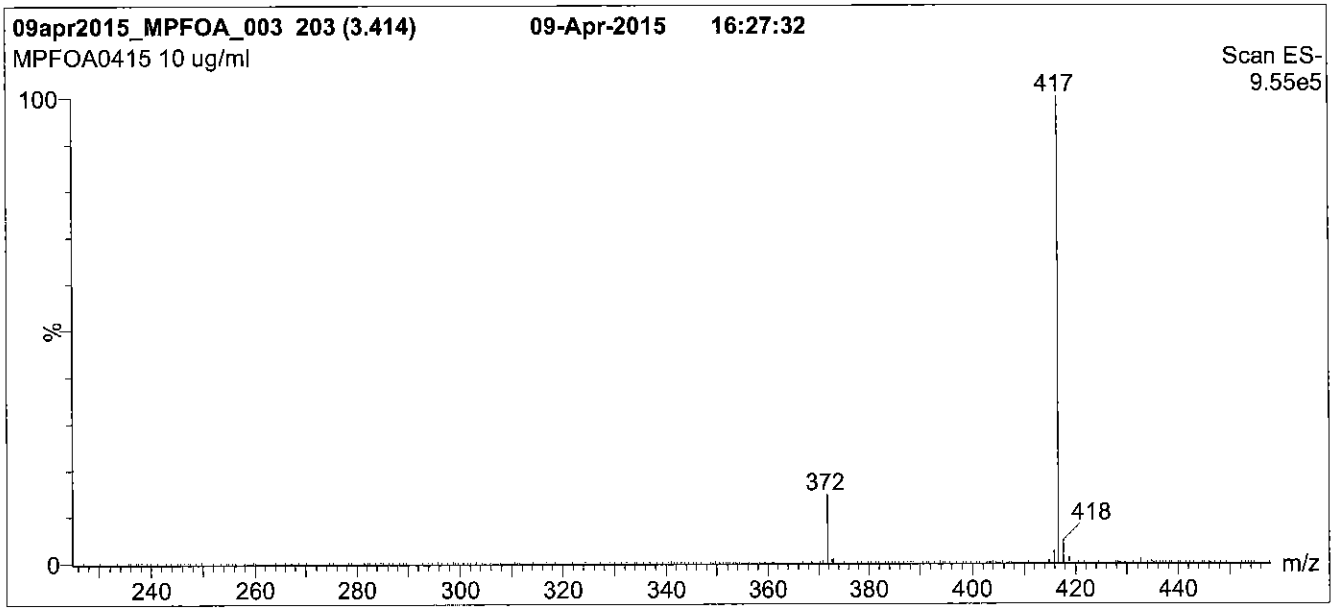



**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

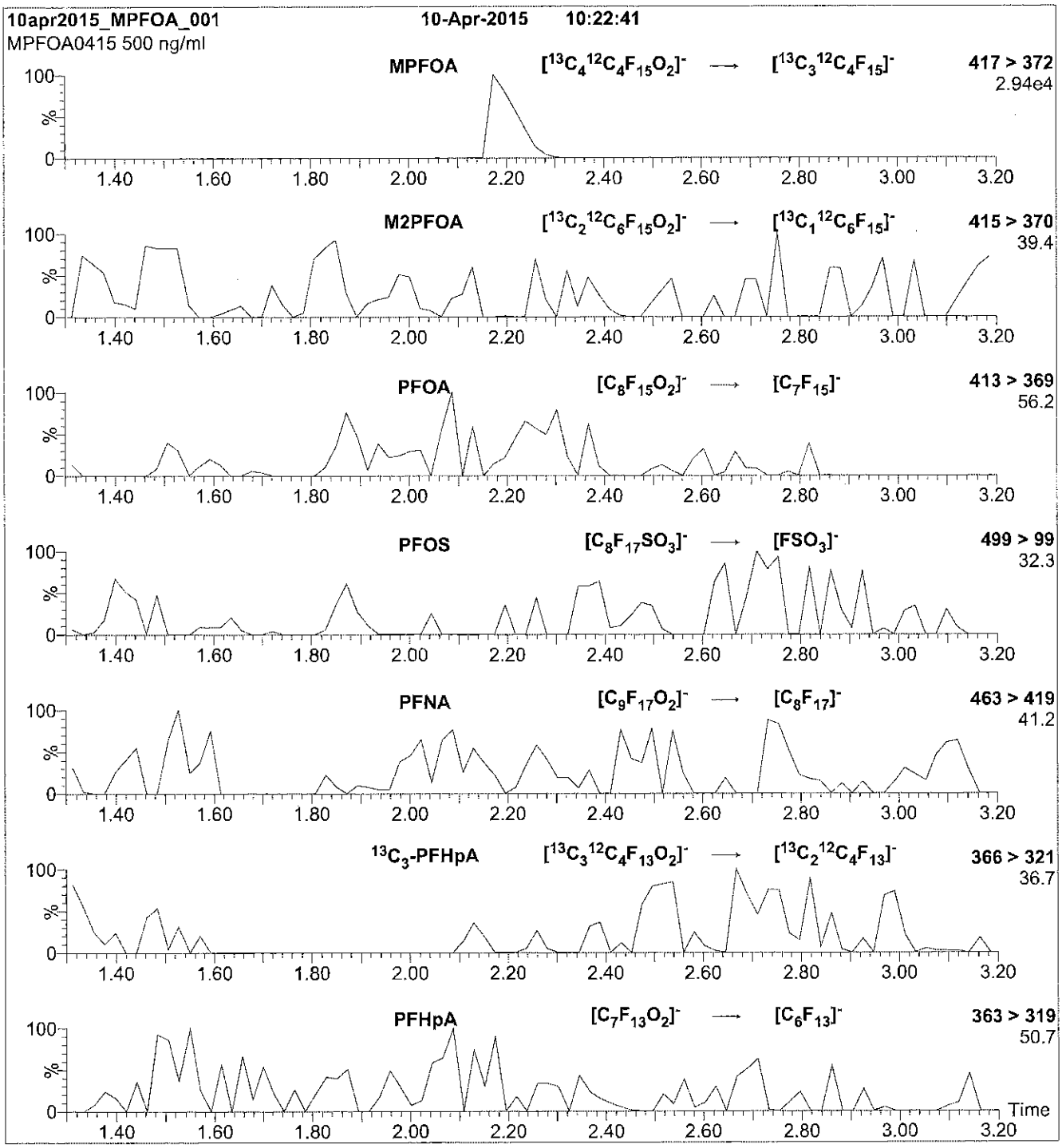
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFOA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFOA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.24e-3
Collision Energy (eV) = 11

# Reagent

# LCMPFOA_00009

591145
ID: LCMPFOA_00009
Exp: 01/22/21 Prpd: CBW
13C4-Perfluorooctanoic ac

R: 3/3/16 CBW

# WELLINGTON LABORATORIES

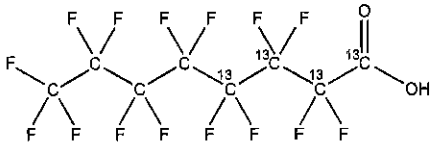
# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFOA
**COMPOUND:** Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanoic acid

**LOT NUMBER:** MPFOA0116

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4{}^{12}C_4HF_{15}O_2$ | **MOLECULAR WEIGHT:** | 418.04 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2,3,4$-$^{13}C_4$) |
| **LAST TESTED:** (mm/dd/yyyy) | 01/22/2016 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 01/22/2021 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

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Figure 1: LC/MS Data (TIC and Mass Spectrum)
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**ADDITIONAL INFORMATION:**

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- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
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**Certified By:** B.G. Chittim **Date:** 02/01/2016 (mm/dd/yyyy)

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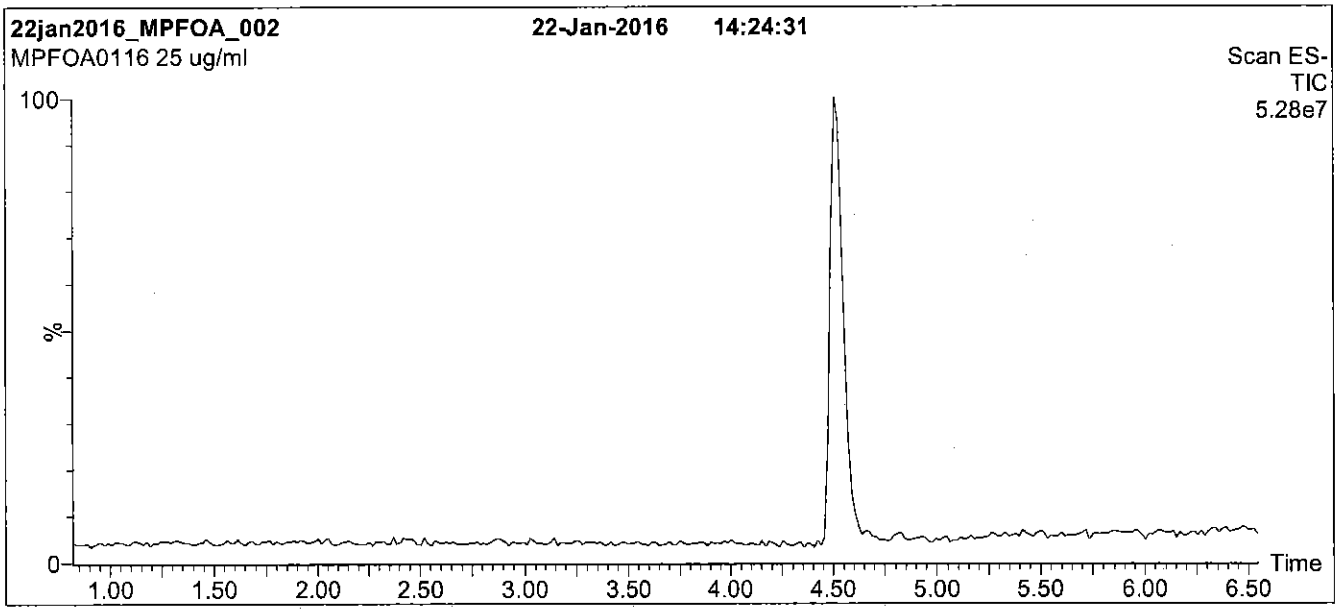
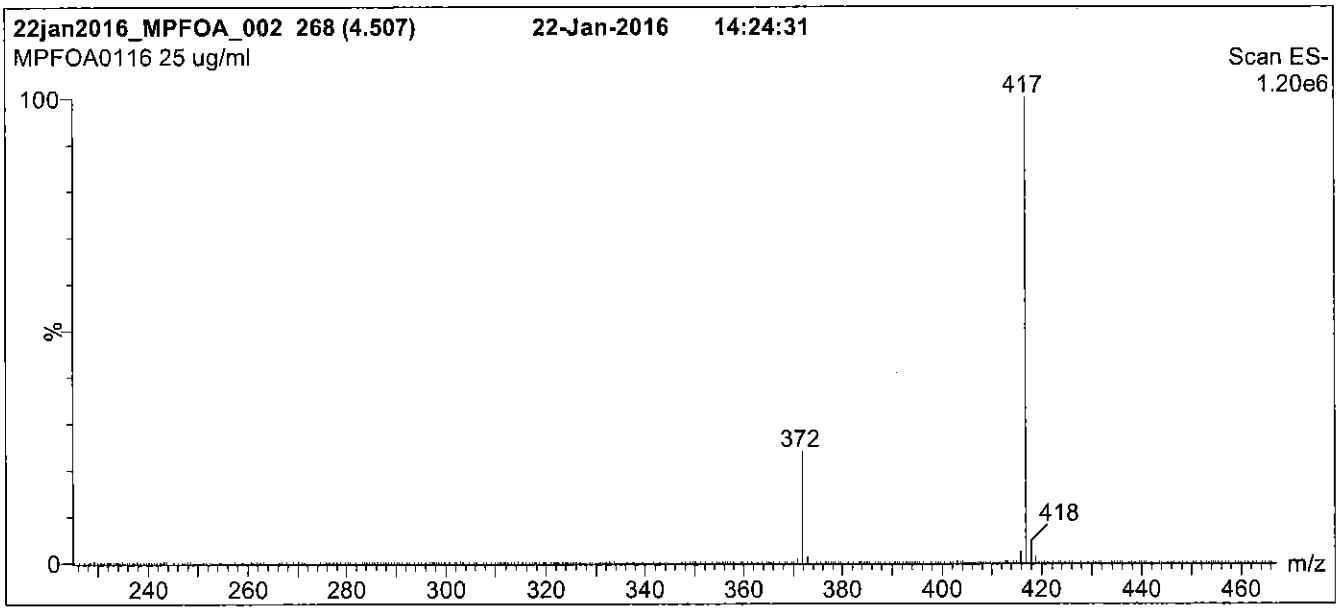
**Figure 1:** **MPFOA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

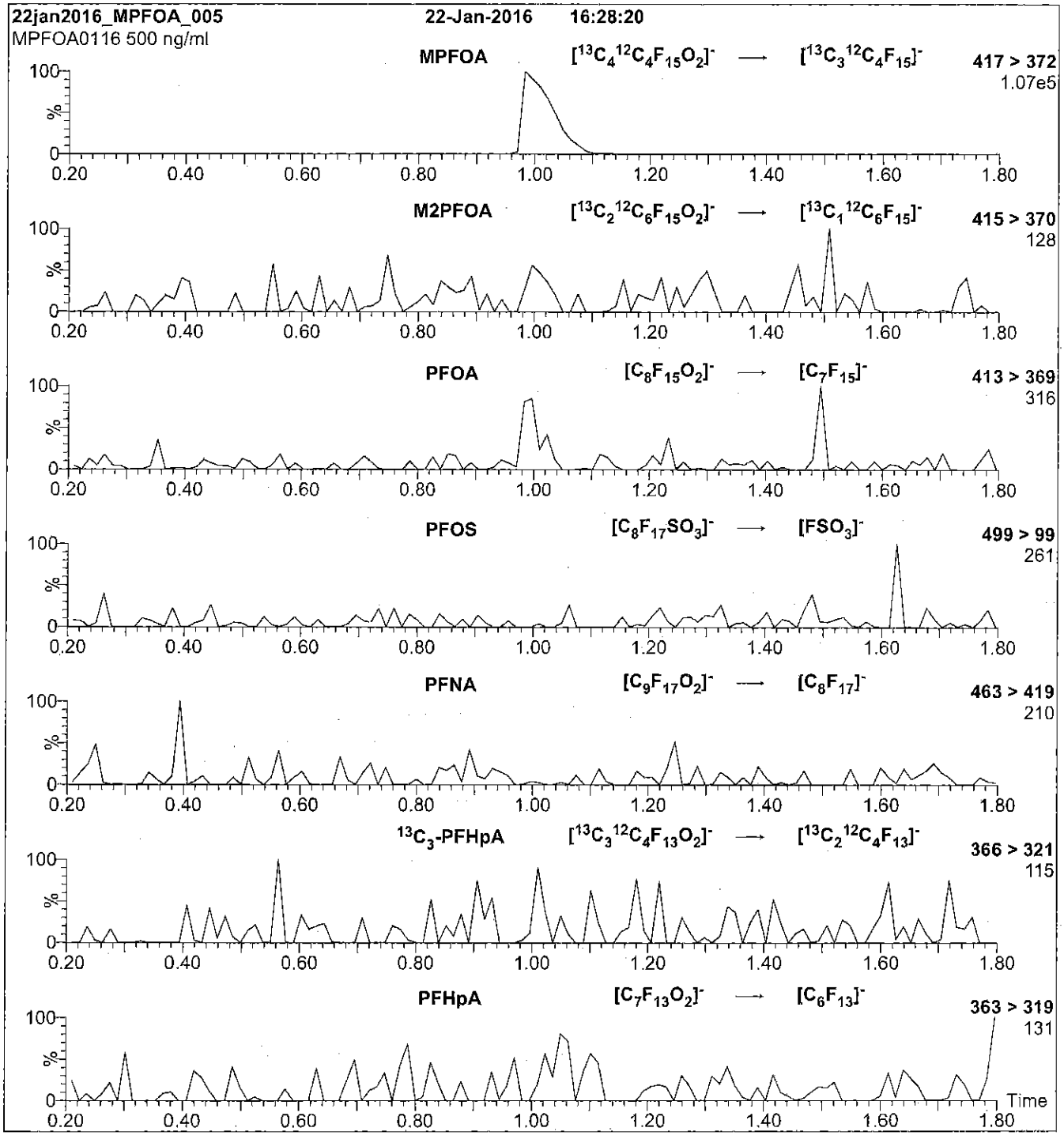
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFOA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml MPFOA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.58e-3
Collision Energy (eV) = 10

# Reagent

# LCMPFOS_00009

V: 9/15/15 GV

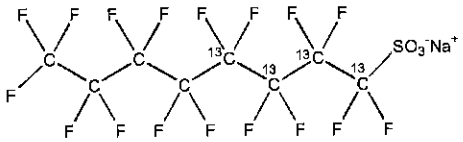
# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFOS **LOT NUMBER:** MPFOS0515

**COMPOUND:** Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

**STRUCTURE:** **CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4{}^{12}C_4F_{17}SO_3Na$ | **MOLECULAR WEIGHT:** | 526.08 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>47.8 ± 2.4 µg/ml (MPFOS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2,3,4$-$^{13}C_4$) |
| **LAST TESTED:** (mm/dd/yyyy) | 05/15/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 05/15/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 05/28/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*



*Form#:27, Issued 2004-11-10*
*Revision#:3, Revised 2015-03-24*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

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CALA Testing Accreditation No.: A 1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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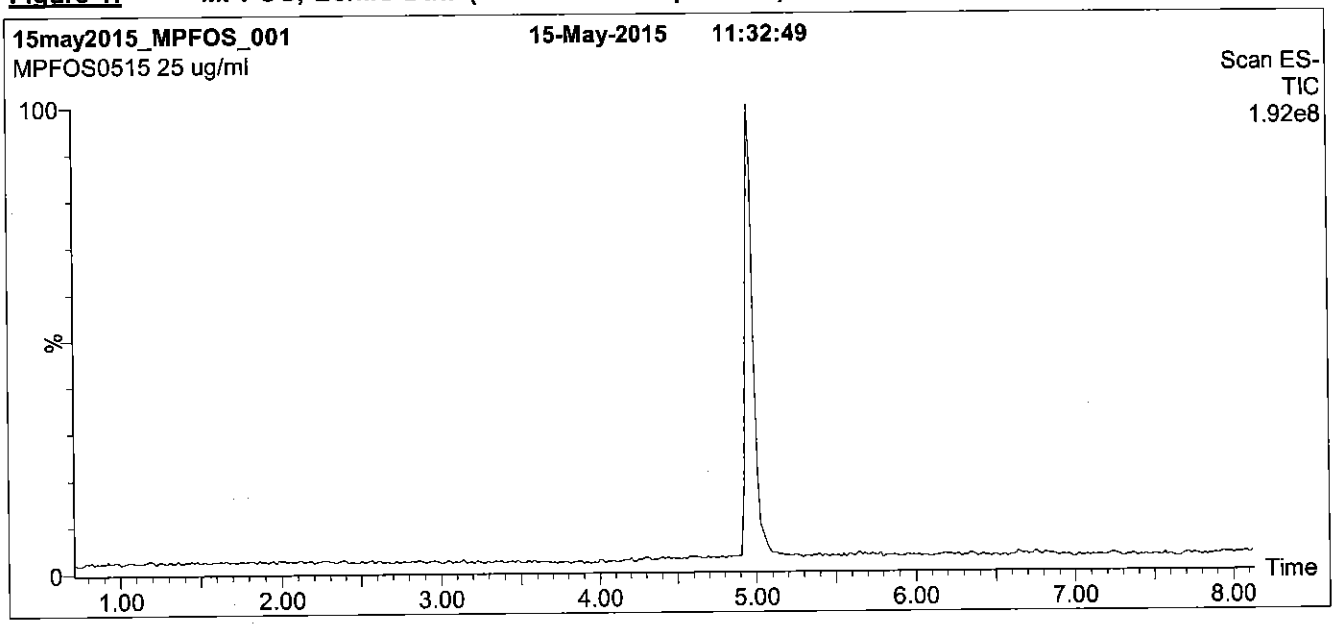
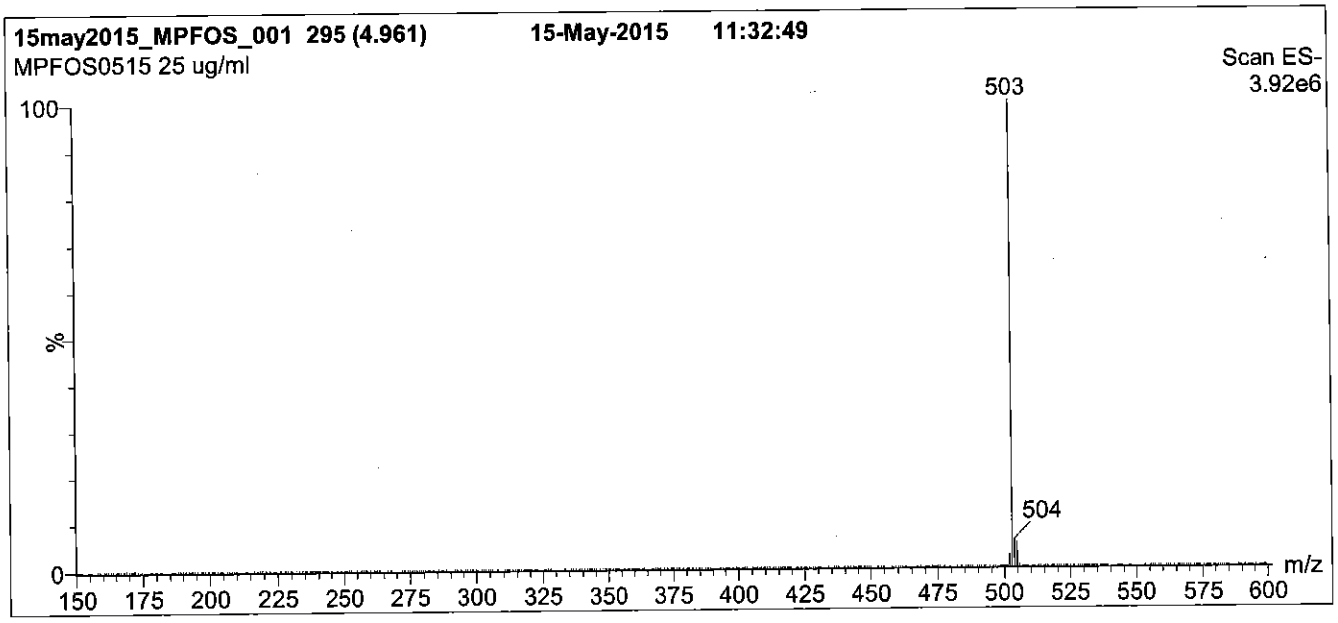
**Figure 1:** **MPFOS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

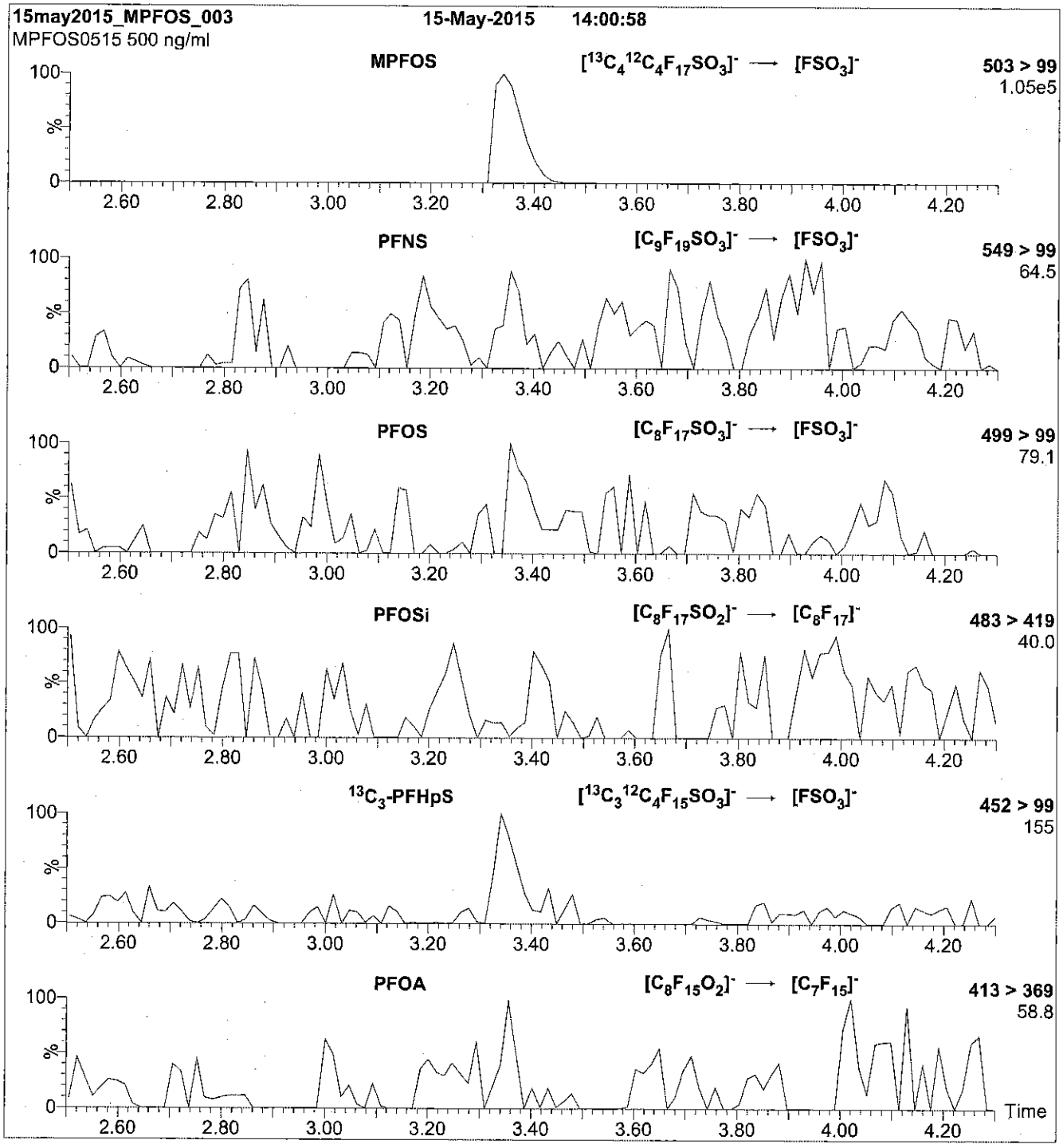
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFOS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml MPFOS) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 40

# Reagent

# LCMPFOS_00010

572886
ID: LCMPFOS_00010
Exp: 05/15/20 Prpd: CBW
13C4-Perfluorooctanesulfo

R: 1/25/16
S:

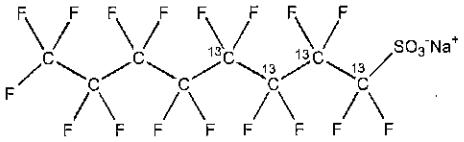
# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFOS **LOT NUMBER:** MPFOS0515

**COMPOUND:** Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

**STRUCTURE:** **CAS #:** Not available




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4{}^{12}C_4F_{17}SO_3Na$ | **MOLECULAR WEIGHT:** | 526.08 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>47.8 ± 2.4 µg/ml (MPFOS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2,3,4$-$^{13}C_4$) |
| **LAST TESTED:** (mm/dd/yyyy) | 05/15/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 05/15/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 05/28/2015 (mm/dd/yyyy)


***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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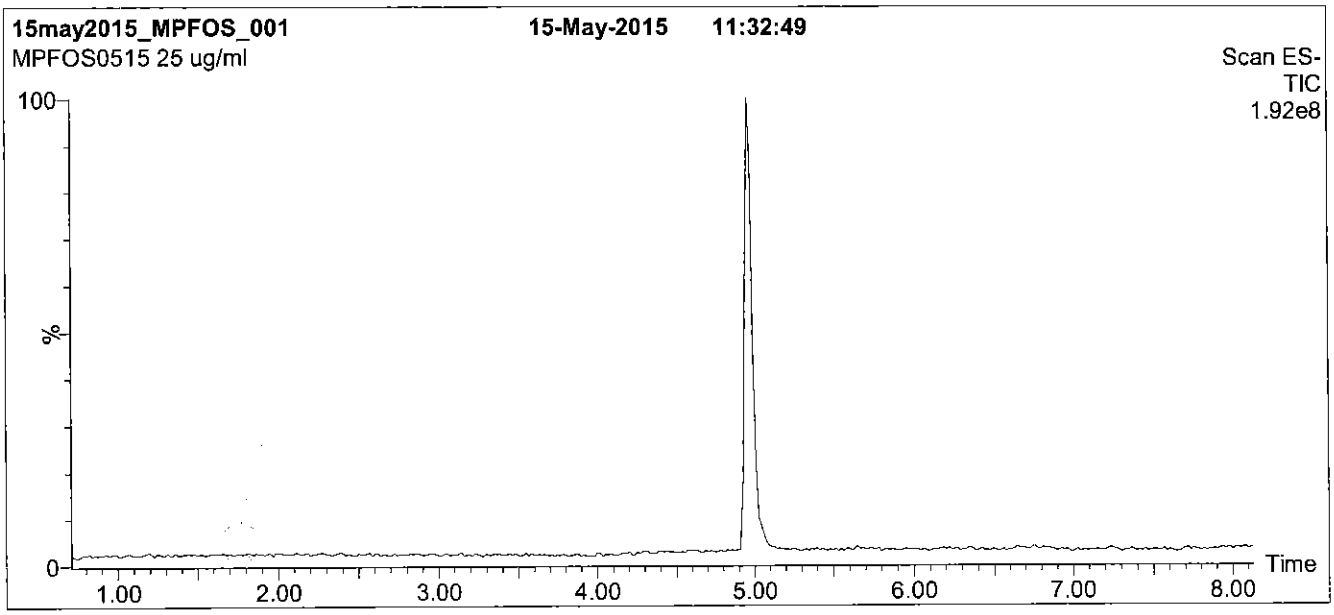
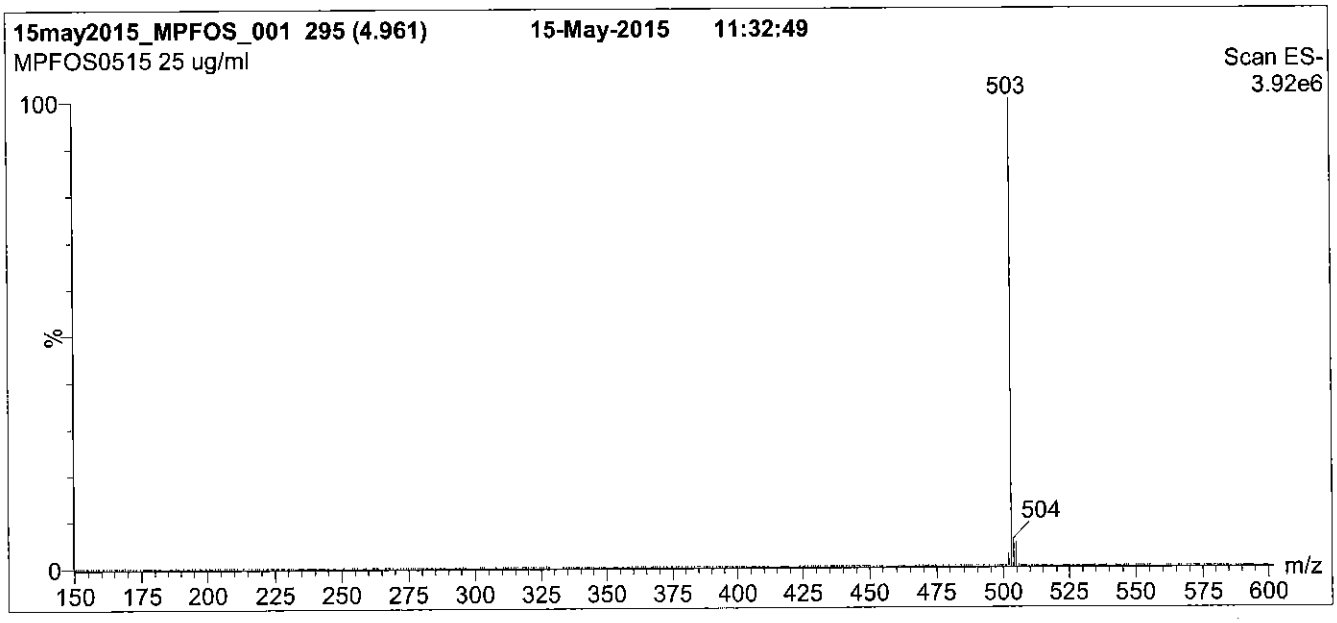
**Figure 1:** **MPFOS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

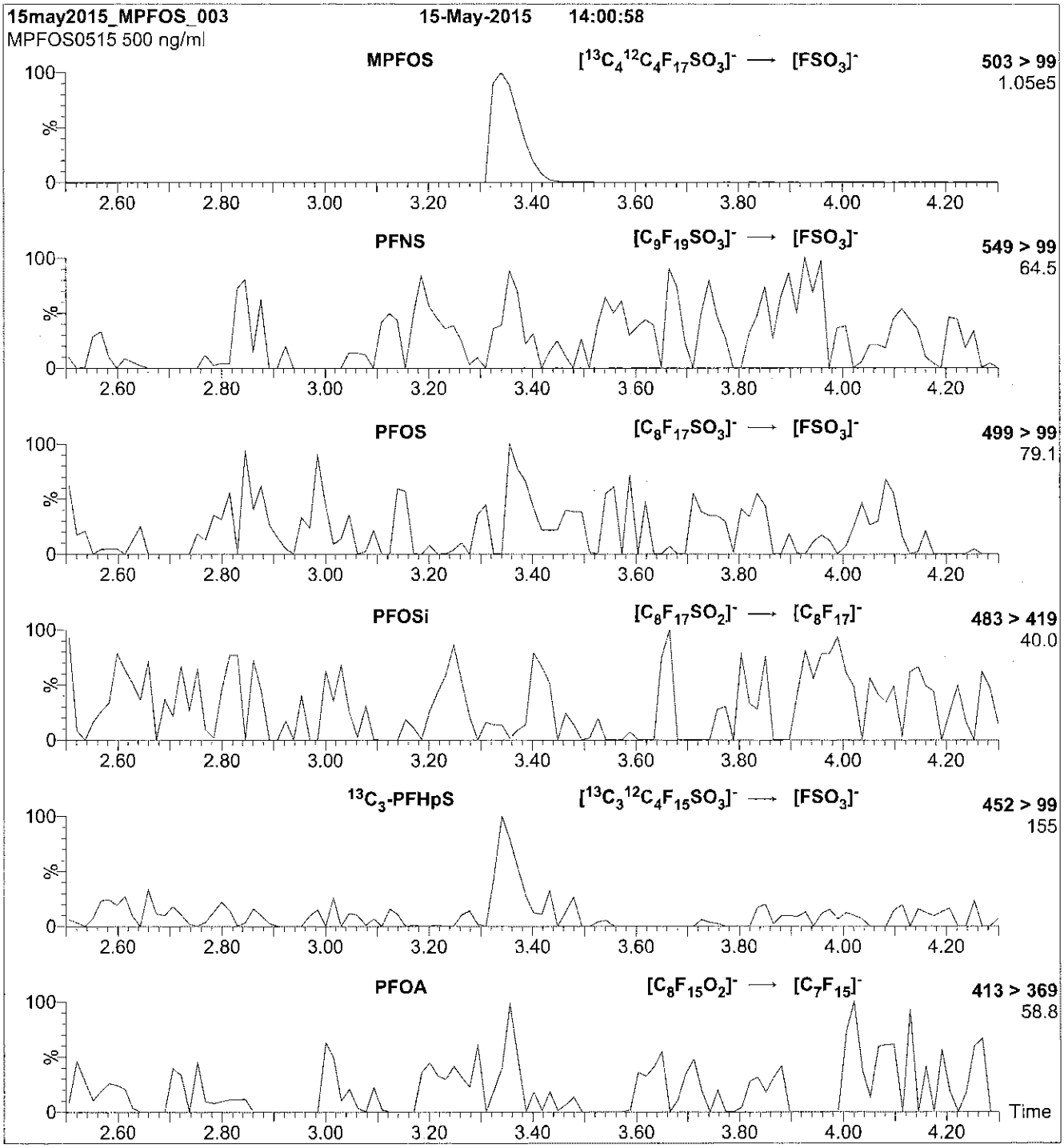
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFOS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFOS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 40

# Reagent

# LCMPFOS_00012

605227
ID: LCMPFOS_00012
Exp: 01/22/21 Prpd: CBW
13C4-Perfluorooctanesulfo

Rec. 3/29/16 JRB ✓

606228
ID: LCMPFOS_00013
Exp: 01/22/21 Prpd: CBW
13C4-Perfluorooctanesulfo

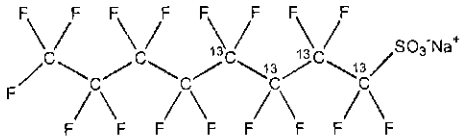
# WELLINGTON LABORATORIES

# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFOS **LOT NUMBER:** MPFOS0116

**COMPOUND:** Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

**STRUCTURE:** **CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_4{}^{12}C_4F_{17}SO_3Na$ | **MOLECULAR WEIGHT:** | 526.08 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>47.8 ± 2.4 µg/ml (MPFOS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2,3,4\text{-}^{13}C_4$) |
| **LAST TESTED:** (mm/dd/yyyy) | 01/22/2016 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 01/22/2021 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 02/01/2016 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
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CALA

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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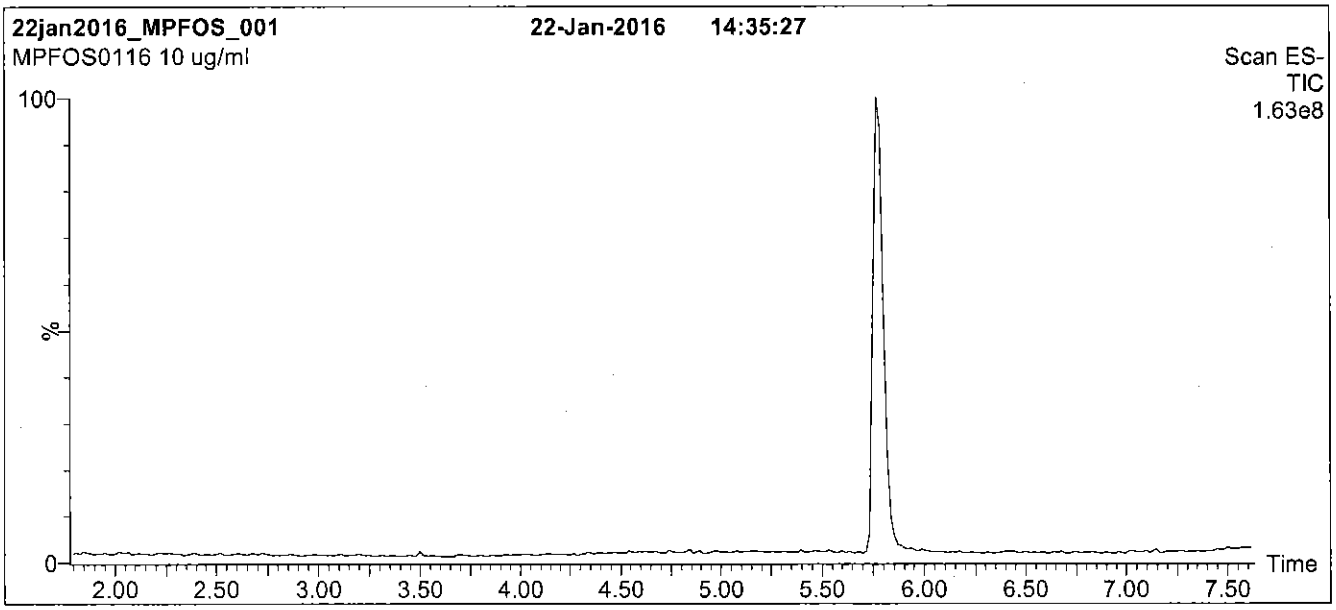
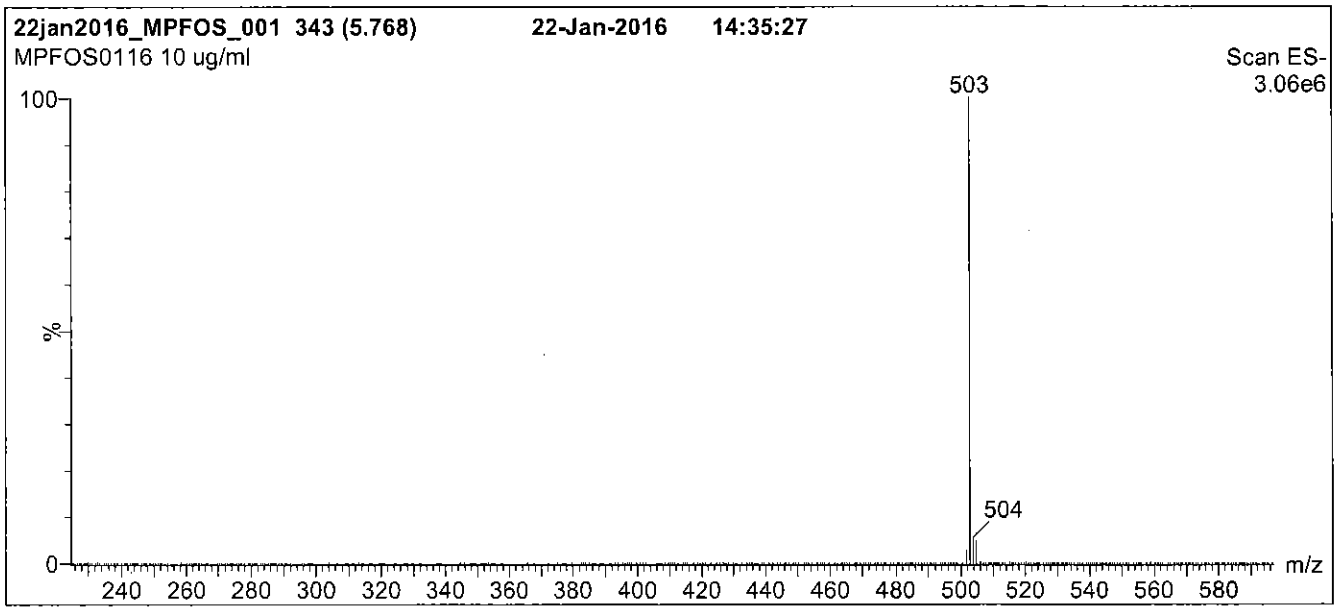
**Figure 1:** **MPFOS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

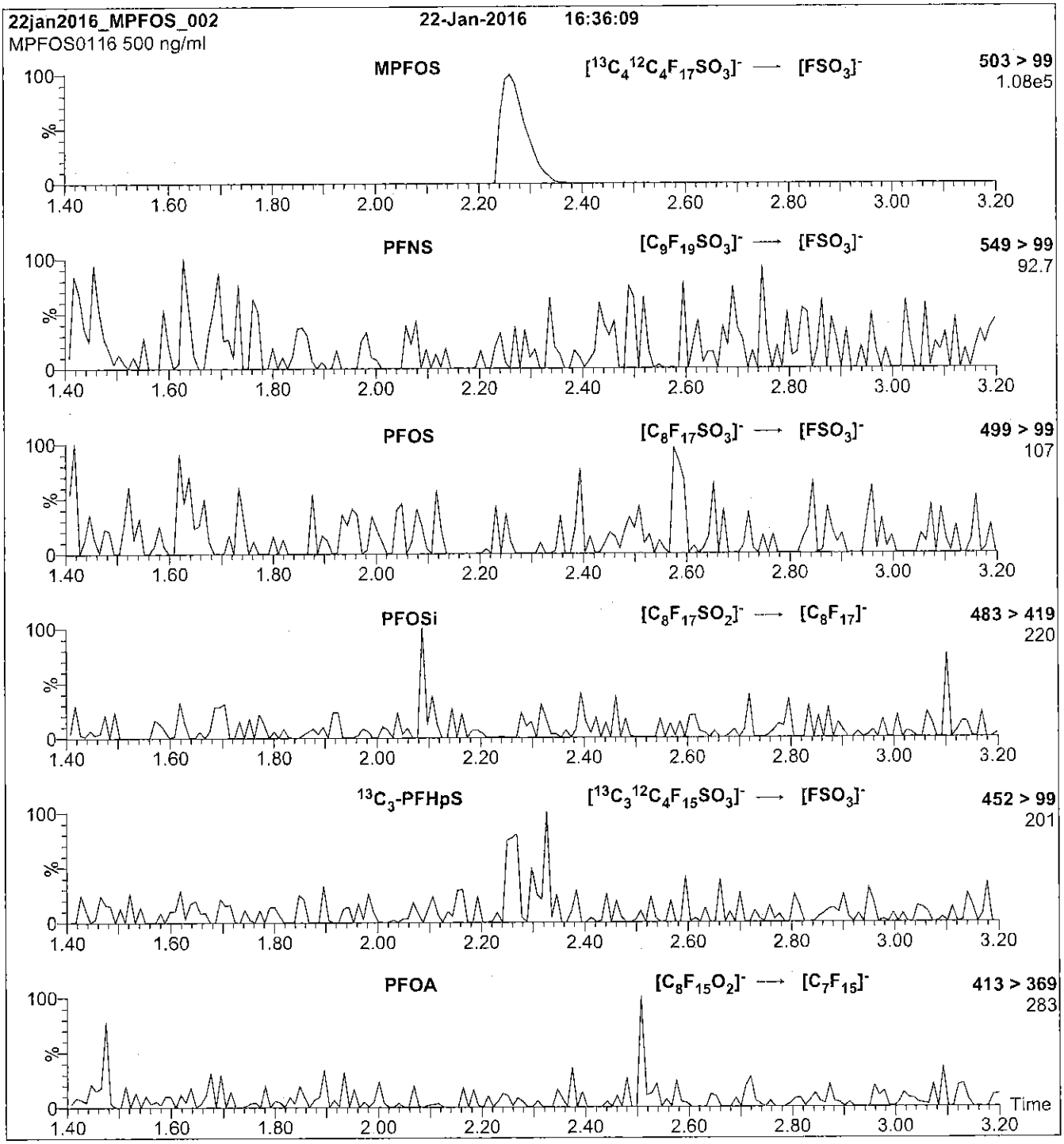
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFOS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFOS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.70e-3
Collision Energy (eV) = 40

# Reagent

# LCMPFUdA_00004

r: 4/15/15 SKU

# WELLINGTON LABORATORIES

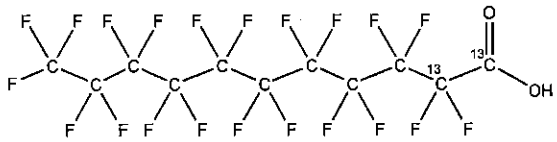
## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** MPFUdA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]undecanoic acid

**LOT NUMBER:** MPFUdA1014

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_9HF_{21}O_2$ | **MOLECULAR WEIGHT:** | 566.08 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$<br>(1,2-$^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 10/31/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 10/31/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Presence of 1-$^{13}C_1$-PFUdA (~1%; see Figure 2), 2-$^{13}C_1$-PFUdA (~1%), and PFUdA (~0.2%; see Figure 2) are due to the isotopic purity of the $^{13}C$-precursor.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 11/03/2014 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

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## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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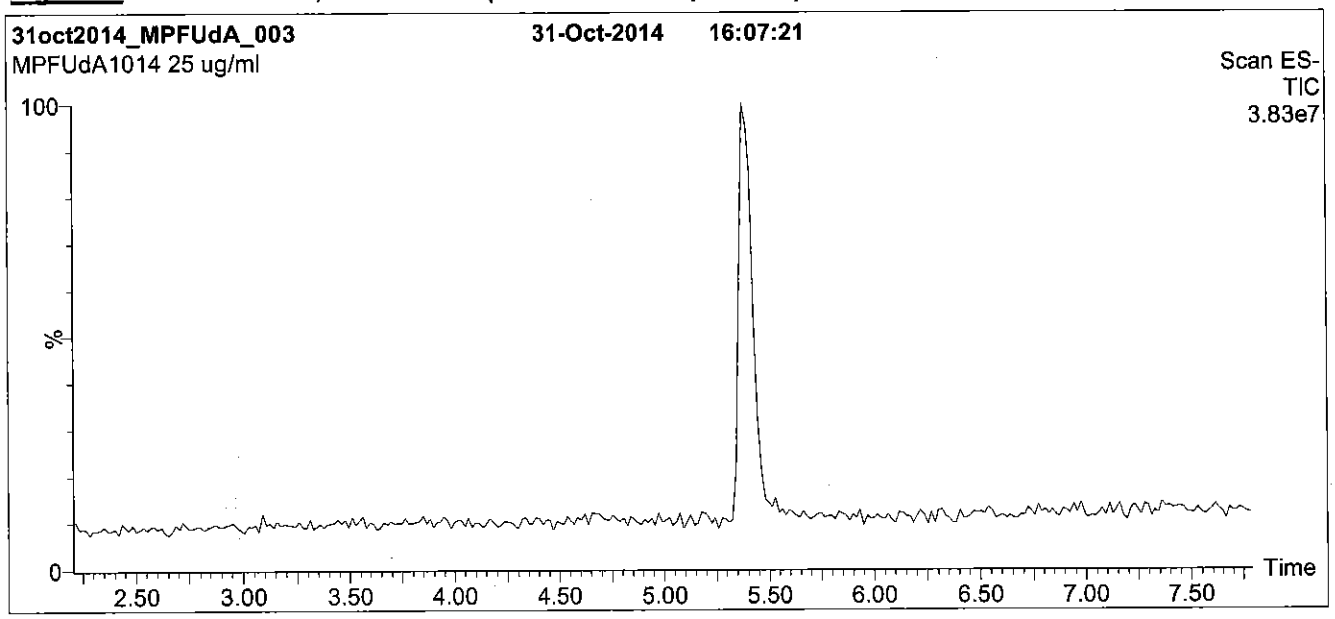
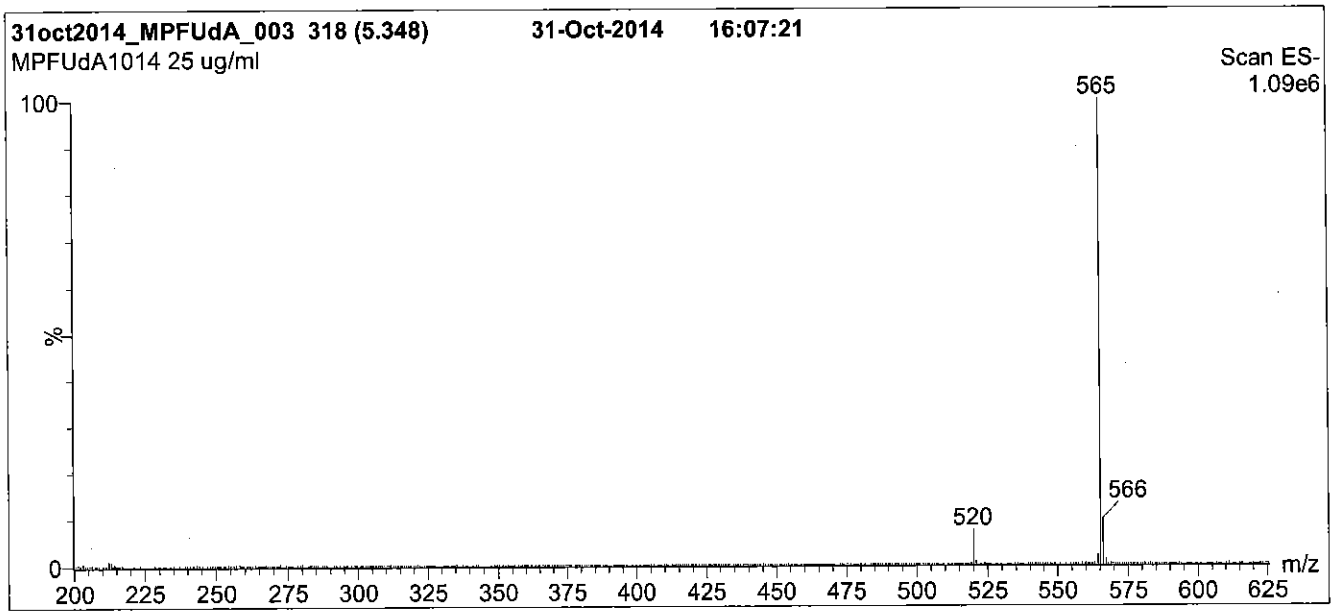



**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

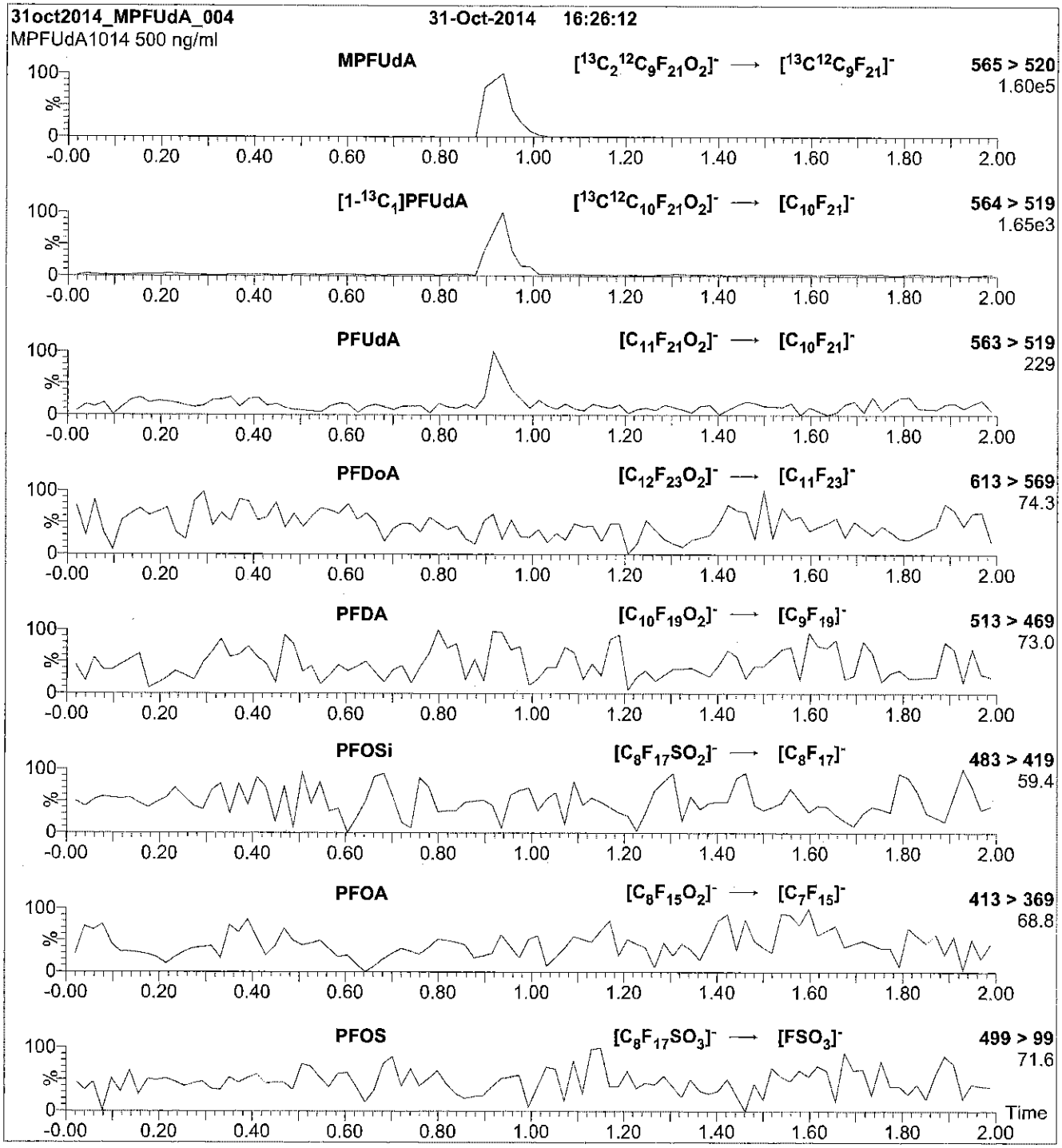
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFUdA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFUdA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

# Reagent

# LCMPFUdA_00005

V: 12/9/15 SEV

# WELLINGTON LABORATORIES

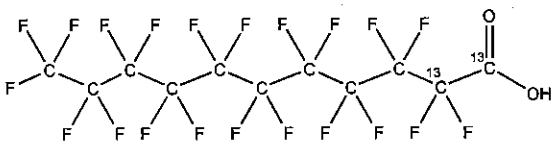
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** MPFUdA
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]undecanoic acid

**LOT NUMBER:** MPFUdA1014

**STRUCTURE:**

**CAS #:** Not available



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $^{13}C_2{}^{12}C_9HF_{21}O_2$ | **MOLECULAR WEIGHT:** | 566.08 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | **ISOTOPIC PURITY:** | ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$) |
| **LAST TESTED:** (mm/dd/yyyy) | 10/31/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 10/31/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

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Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
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**Certified By:** B.G. Chittim **Date:** 04/01/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

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CALA Testing Accreditation No. A 1226

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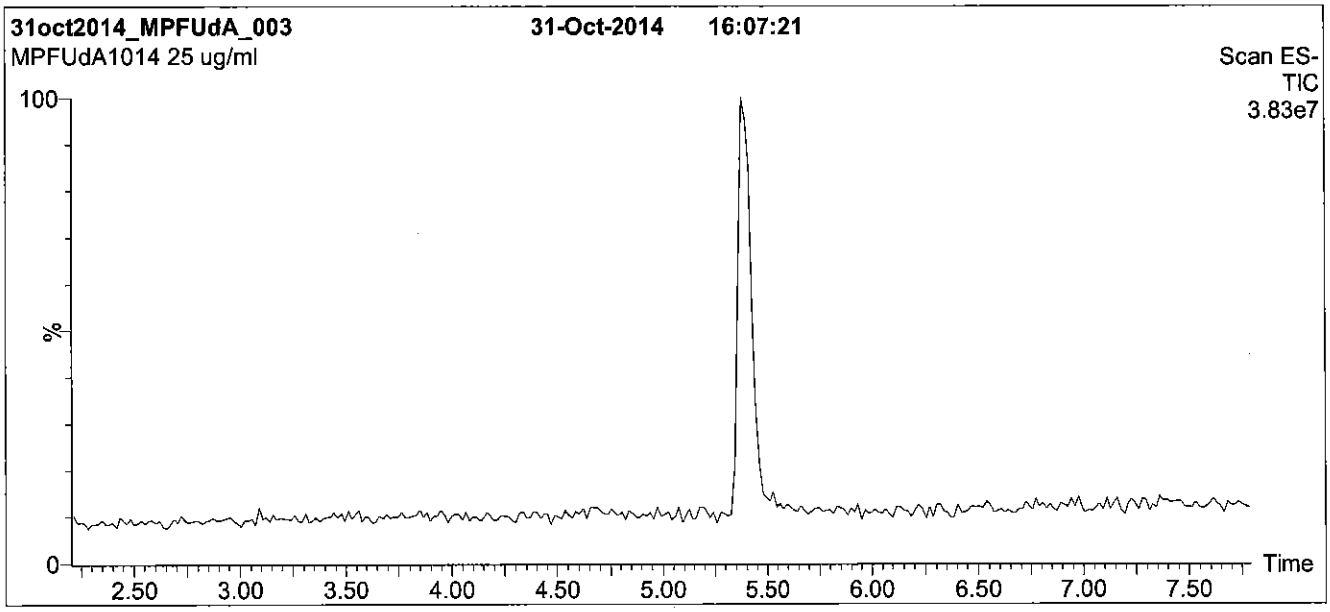
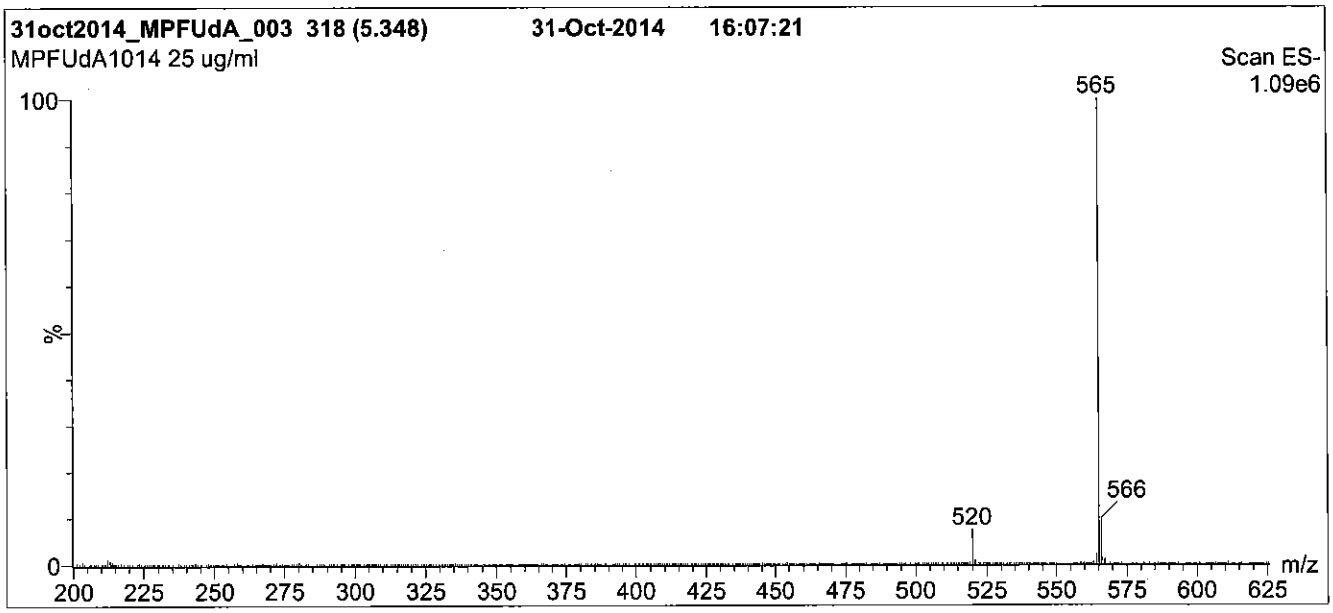



**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

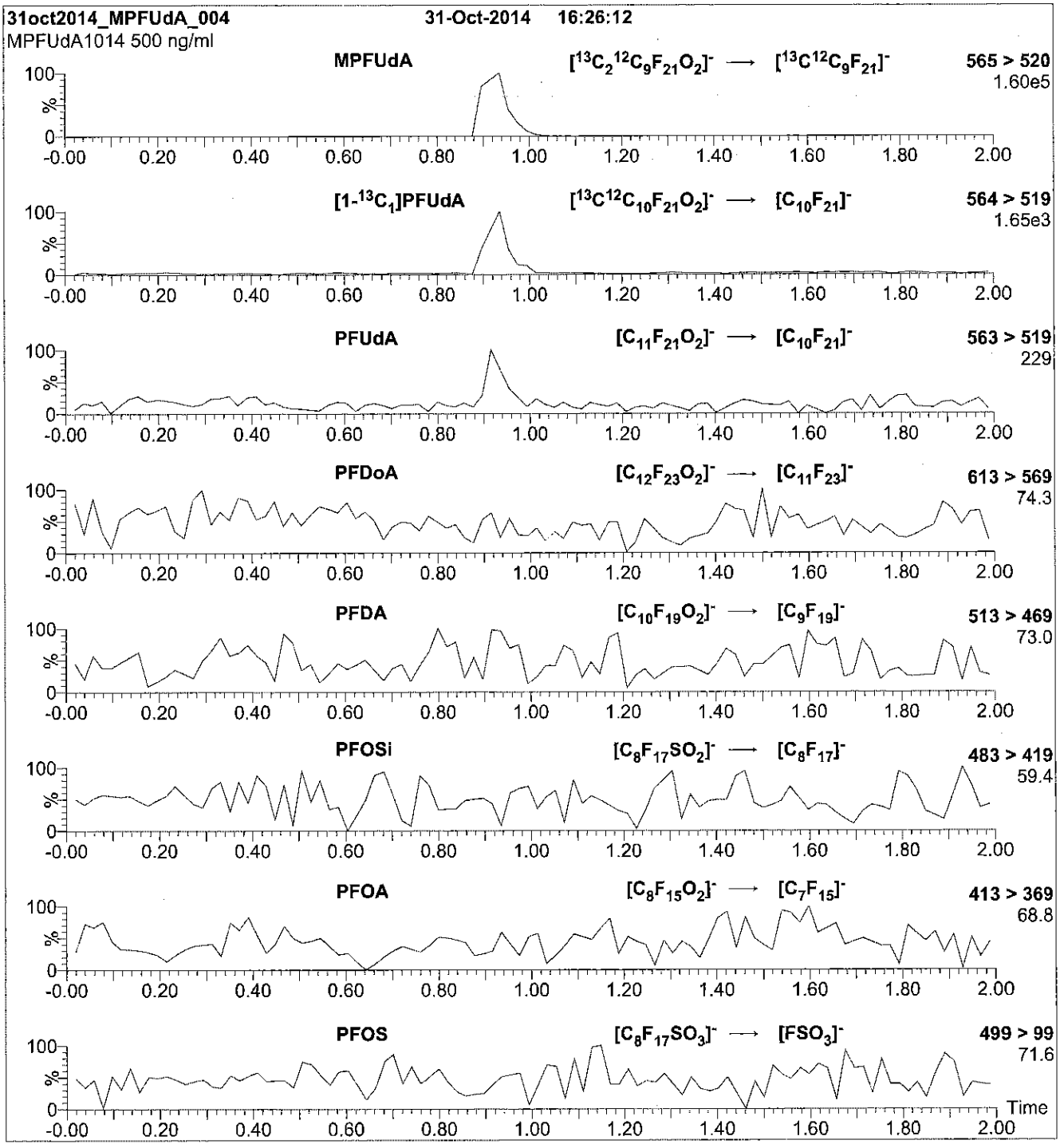
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFUdA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml MPFUdA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

# Reagent

# LCMPFUdA_00006

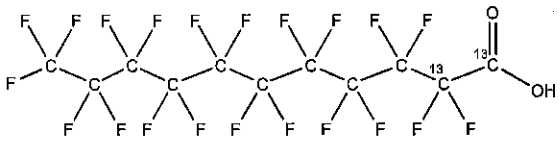
591165
ID: LCMPFUdA_00006
Exp: 10/31/19 Prpd: CBW
13C2-Perfluoroundecanoic

R: 3/3/16 CBW

# WELLINGTON LABORATORIES

# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** MPFUdA
**LOT NUMBER:** MPFUdA1014
**COMPOUND:** Perfluoro-n-[1,2-$^{13}C_2$]undecanoic acid
**STRUCTURE:**
**CAS #:** Not available



**MOLECULAR FORMULA:** $^{13}C_2{}^{12}C_9HF_{21}O_2$
**MOLECULAR WEIGHT:** 566.08
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)
**CHEMICAL PURITY:** >98%
**ISOTOPIC PURITY:** ≥99% $^{13}C$ ($1,2\text{-}^{13}C_2$)
**LAST TESTED:** (mm/dd/yyyy) 10/31/2014
**EXPIRY DATE:** (mm/dd/yyyy) 10/31/2019
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

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CALA Testing Accreditation No. A 1226

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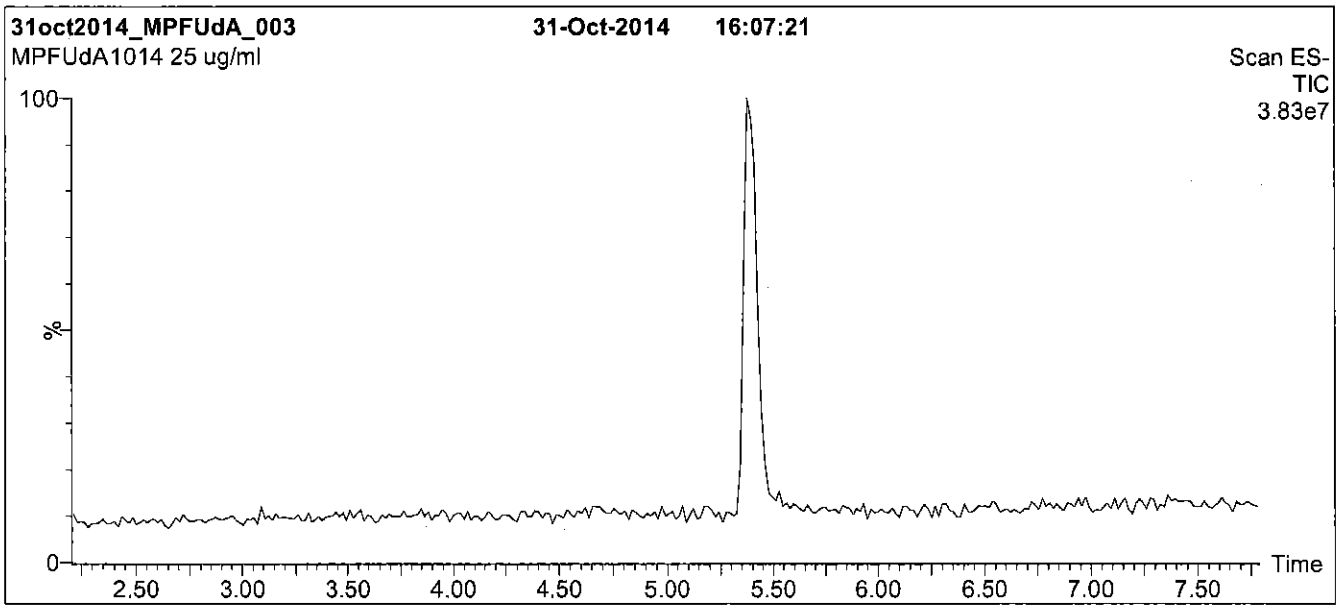
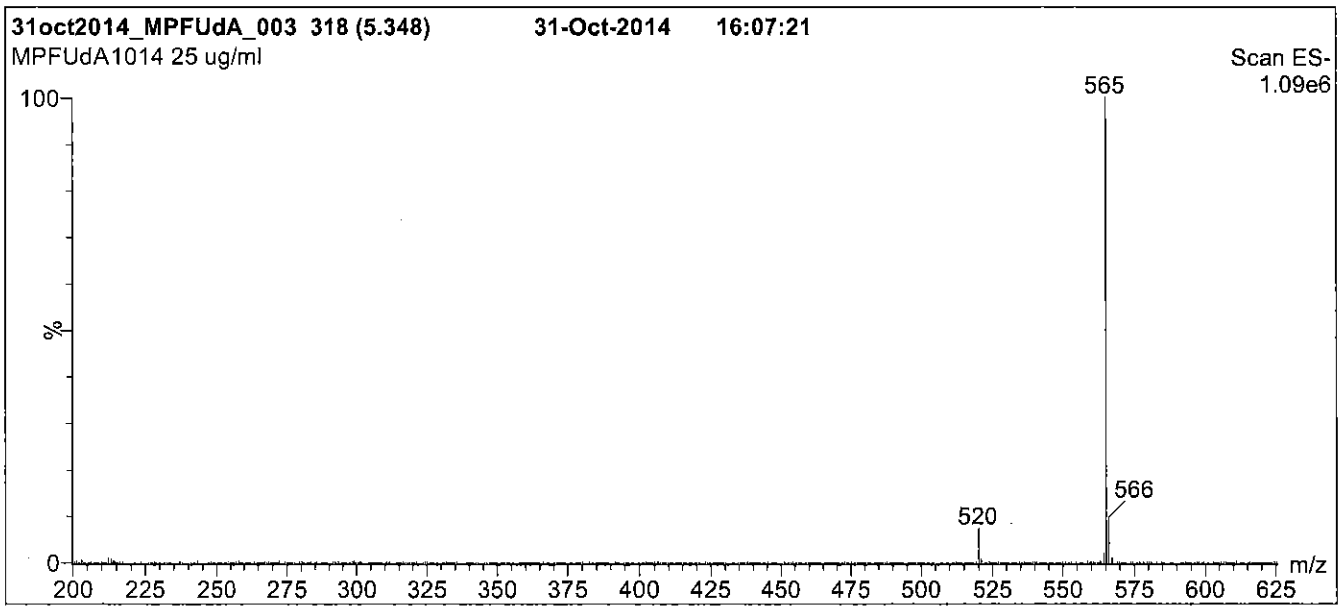
**Figure 1:** **MPFUdA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

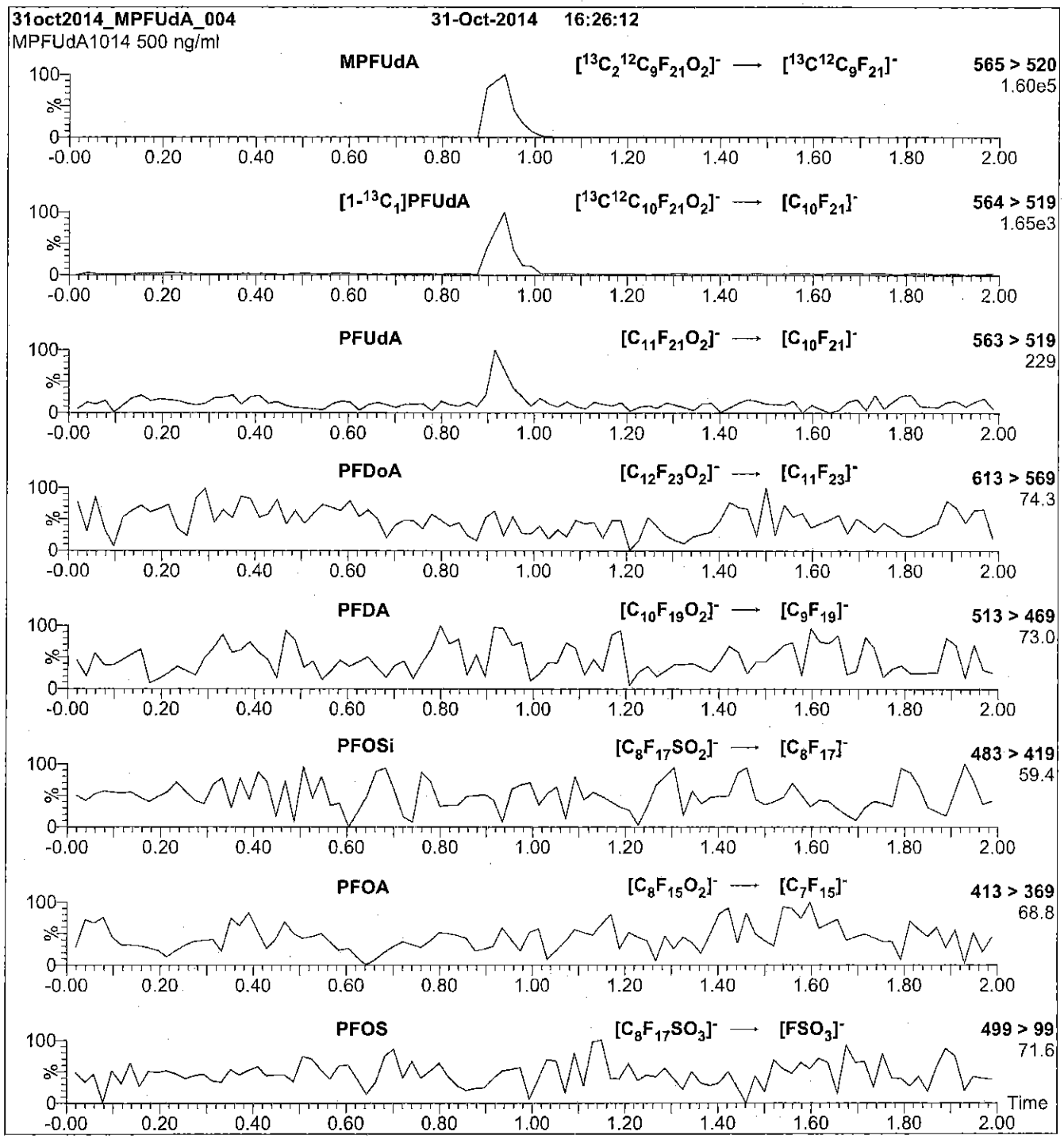
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **MPFUdA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml MPFUdA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

# Reagent

# LCPFBA_00003

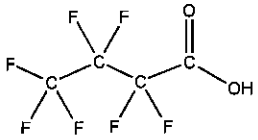
rec 7/15/14

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFBA
**COMPOUND:** Perfluoro-n-butanoic acid
**LOT NUMBER:** PFBA0313

**STRUCTURE:**
**CAS #:** 375-22-4



**MOLECULAR FORMULA:** $C_4HF_7O_2$
**MOLECULAR WEIGHT:** 214.04
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 03/05/2013
**EXPIRY DATE:** (mm/dd/yyyy) 03/05/2018
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 03/06/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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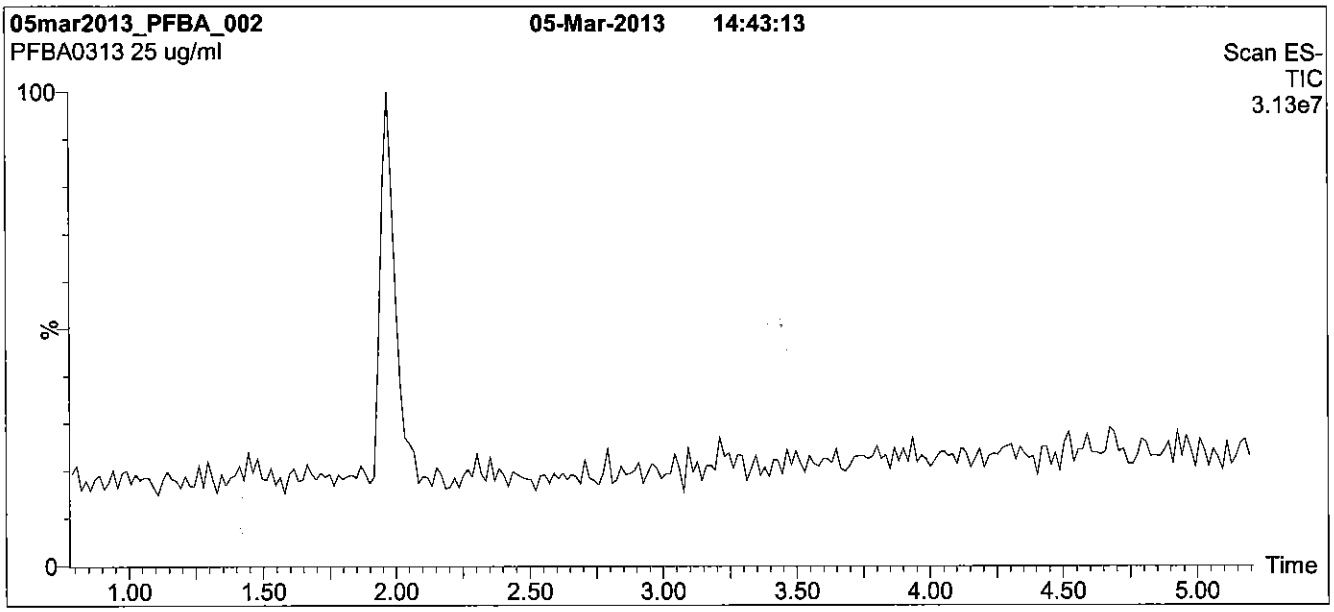
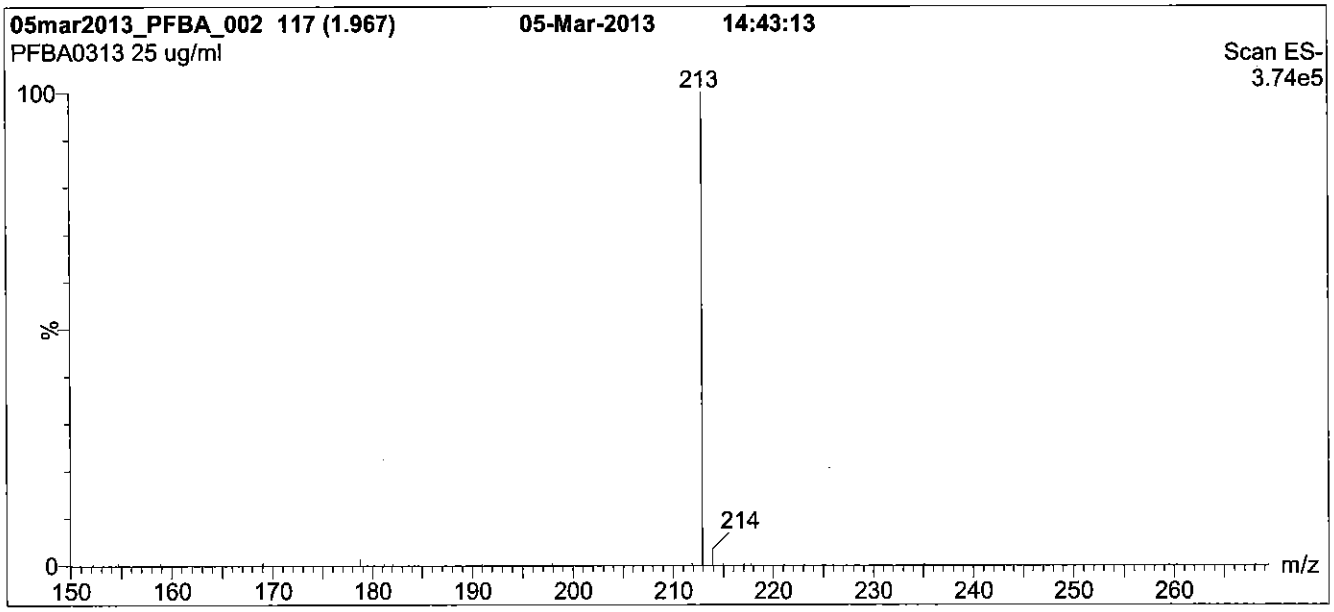
**Figure 1:** **PFBA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 25% (80:20 MeOH:ACN) / 75% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

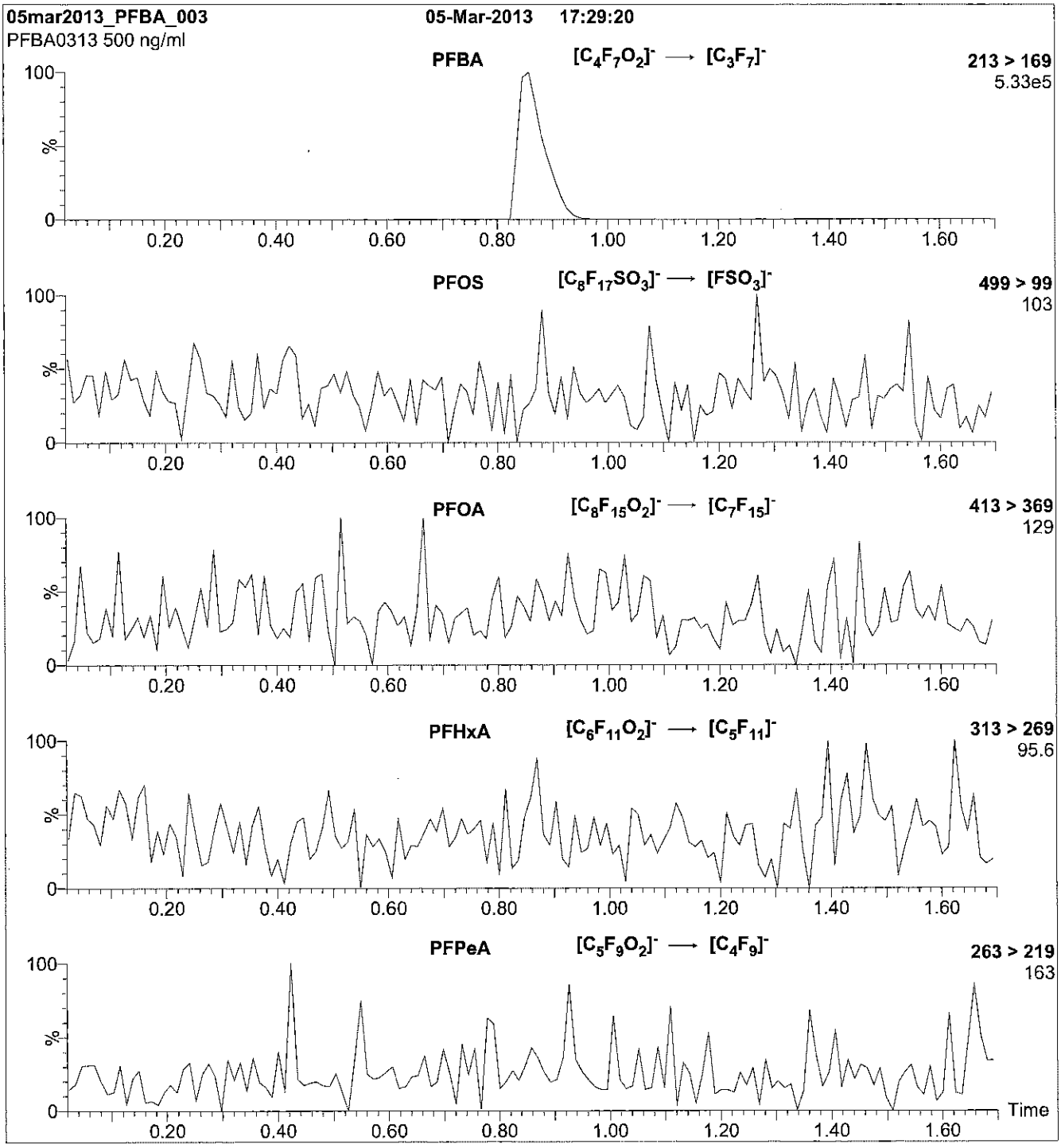
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 8.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFBA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFBA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.70e-3
Collision Energy (eV) = 10

# Reagent

# LCPFBA_00004

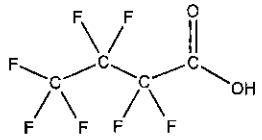
R: 2/25/16 CBW

587895
ID: LCPFBA_00004
Exp: 01/30/20 Prpd: CBW
PF-n-butanoic acid

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

| | | | |
|---|---|---|---|
| **PRODUCT CODE:** | PFBA | **LOT NUMBER:** | PFBA0115 |
| **COMPOUND:** | Perfluoro-n-butanoic acid | | |
| **STRUCTURE:** | | **CAS #:** | 375-22-4 |




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_4HF_7O_2$ | **MOLECULAR WEIGHT:** | 214.04 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Methanol<br>Water (<1%) |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 01/30/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 01/30/2020 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** _____ B.G. Chittim **Date:** 03/25/2015 (mm/dd/yyyy)


***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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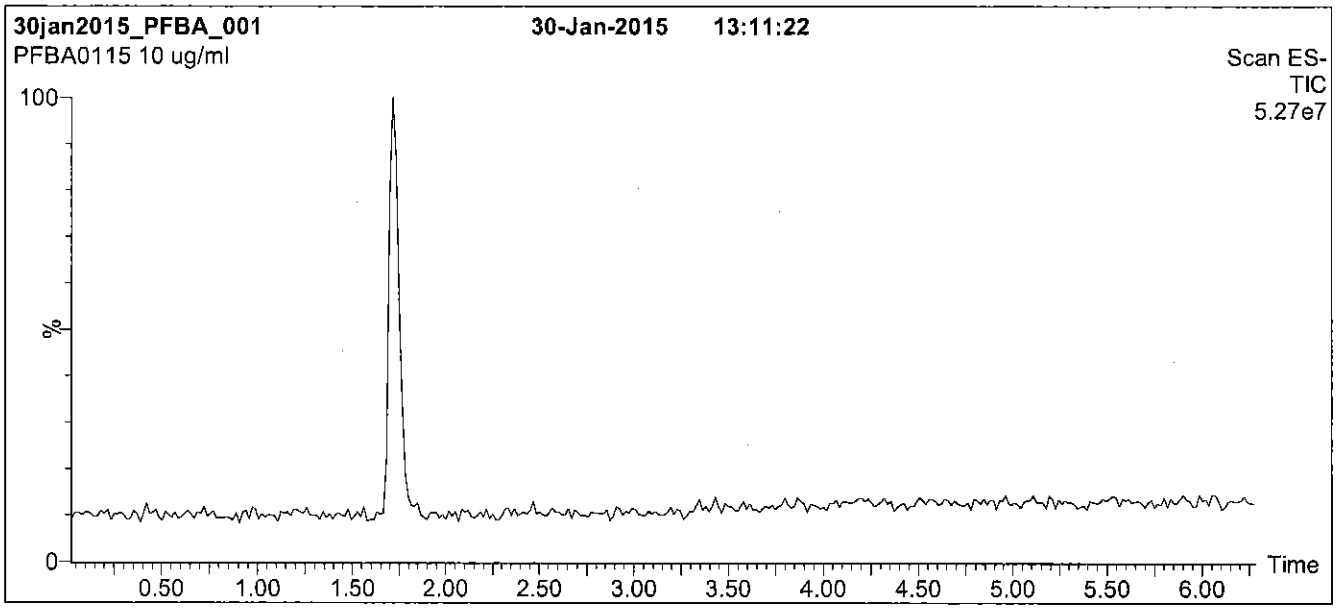
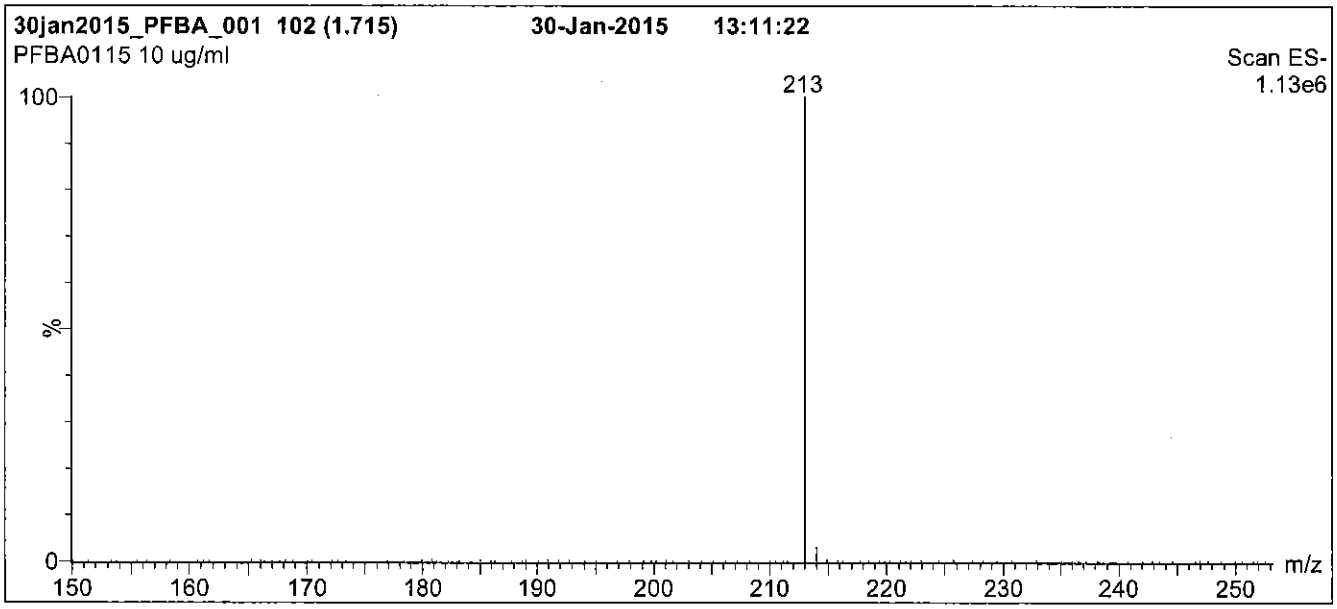
**Figure 1:** **PFBA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7.5 min and hold for 1 min
before returning to initial conditions in 0.5 min.
Time: 10 min

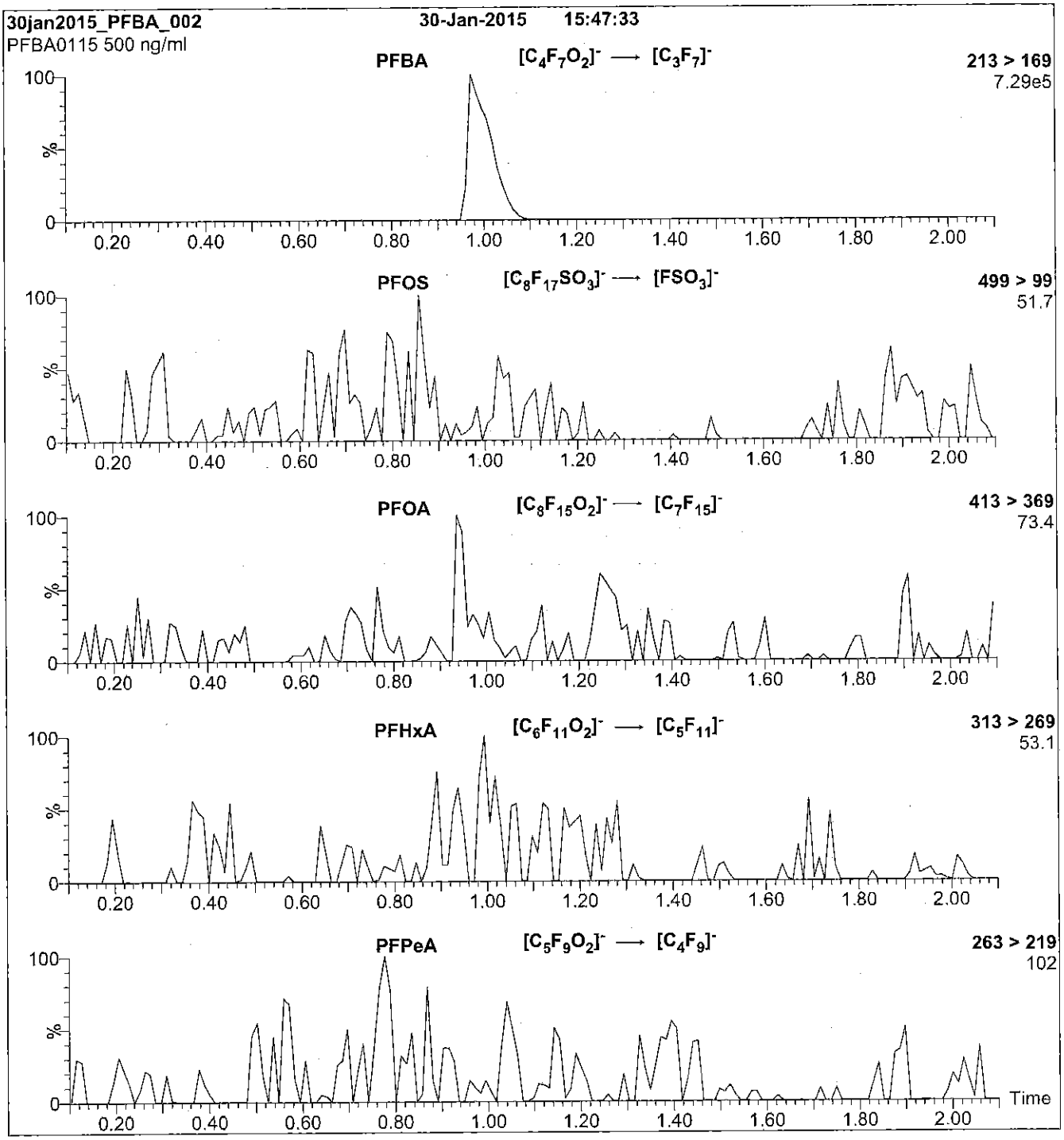
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 8.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFBA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFBA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 10

# Reagent

# LCPFBS_00003

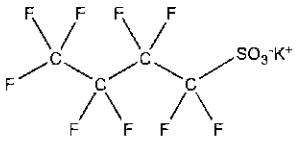
r. 2/11/15

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** L-PFBS
**COMPOUND:** Potassium perfluoro-1-butanesulfonate
**LOT NUMBER:** LPFBS1014

**STRUCTURE:**
**CAS #:** 29420-49-3




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_4F_9SO_3K$ | **MOLECULAR WEIGHT:** | 338.19 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (K salt)<br>44.2 ± 2.2 µg/ml (PFBS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 10/09/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 10/09/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 10/17/2014 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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CALA Testing Accreditation No: A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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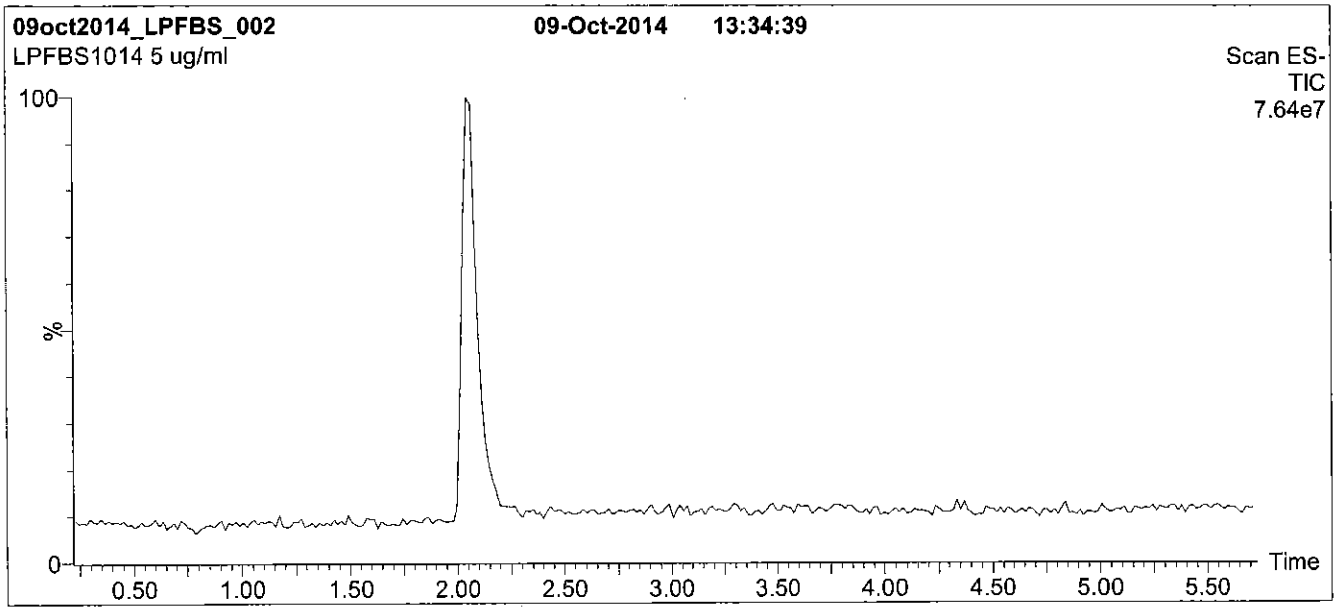
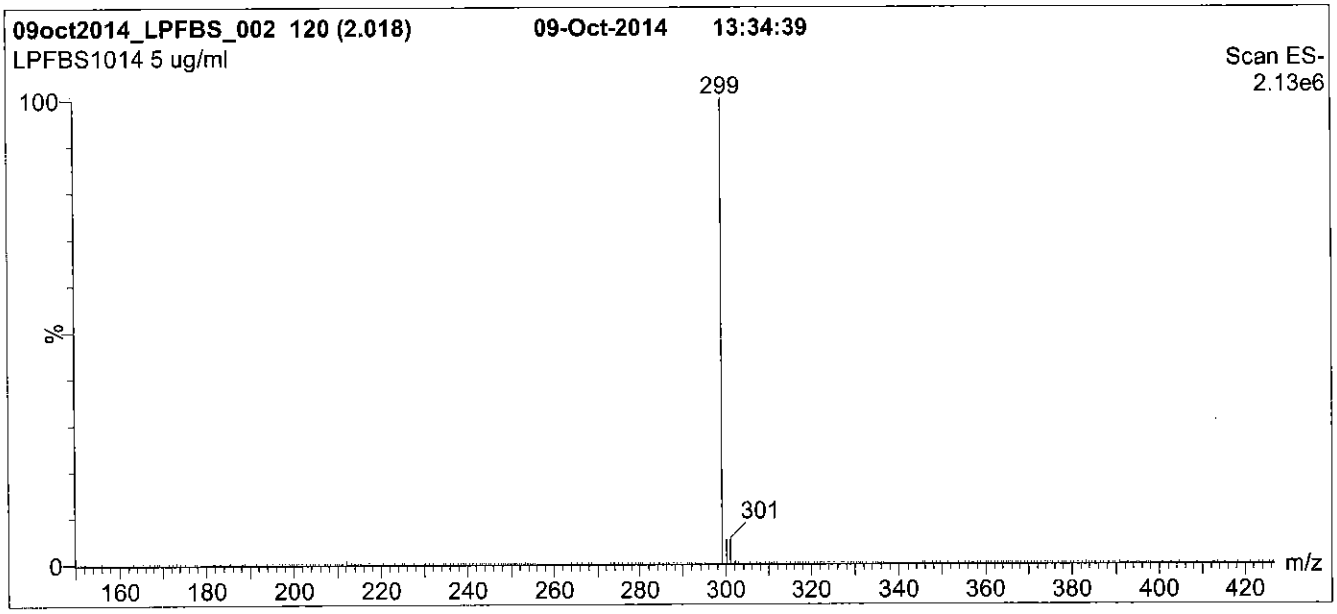
**Figure 1:** **L-PFBS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

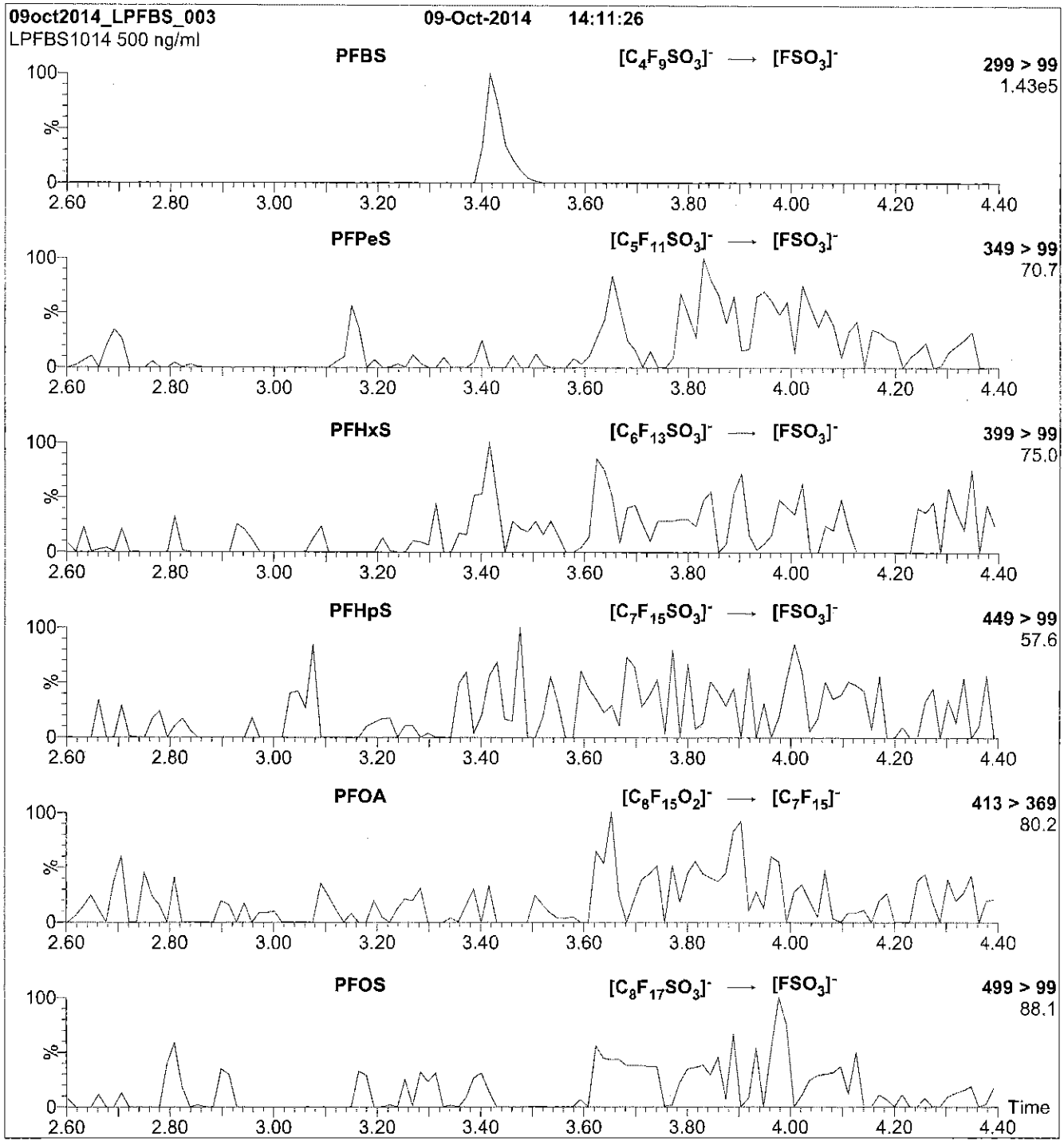
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **L-PFBS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml L-PFBS) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 25

# Reagent

# LCPFDA_00003

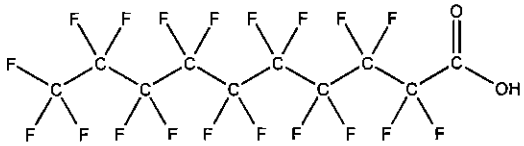
rec 7/16/14

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFDA
**COMPOUND:** Perfluoro-n-decanoic acid
**LOT NUMBER:** PFDA0613

**STRUCTURE:**
**CAS #:** 335-76-2



**MOLECULAR FORMULA:** $C_{10}HF_{19}O_2$
**MOLECULAR WEIGHT:** 514.08
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 06/19/2013
**EXPIRY DATE:** (mm/dd/yyyy) 06/19/2018
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.4% PFNA and ~ 0.1% PFOA.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 07/03/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1$, $x_2$,...$x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

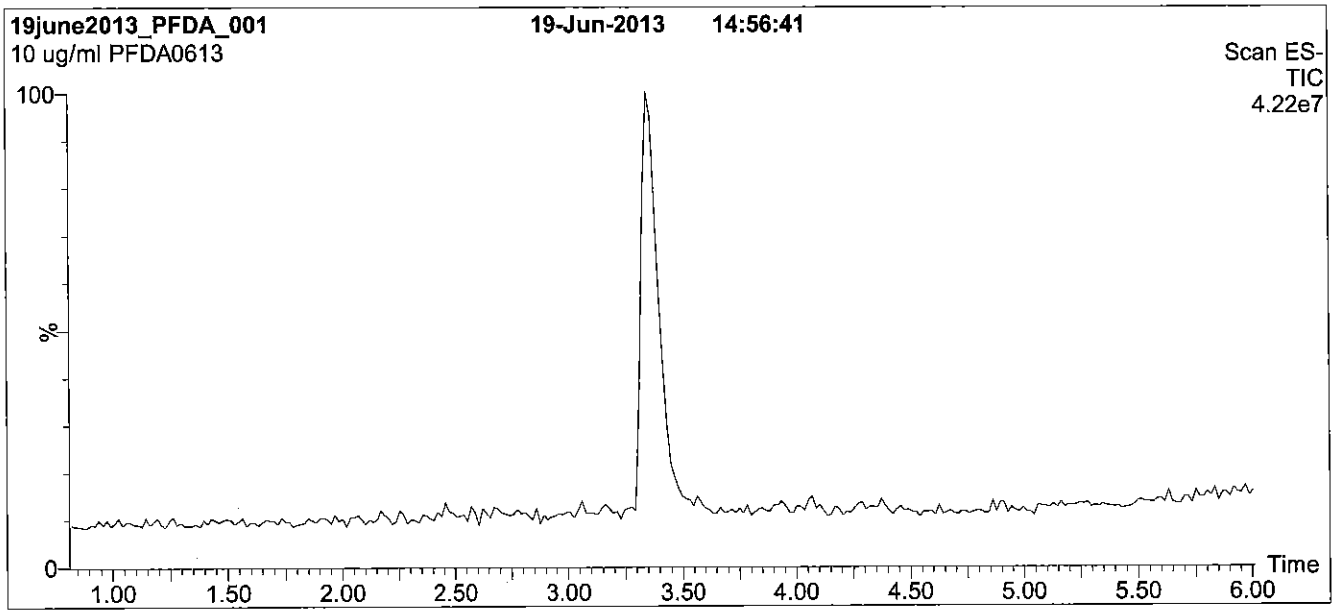
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

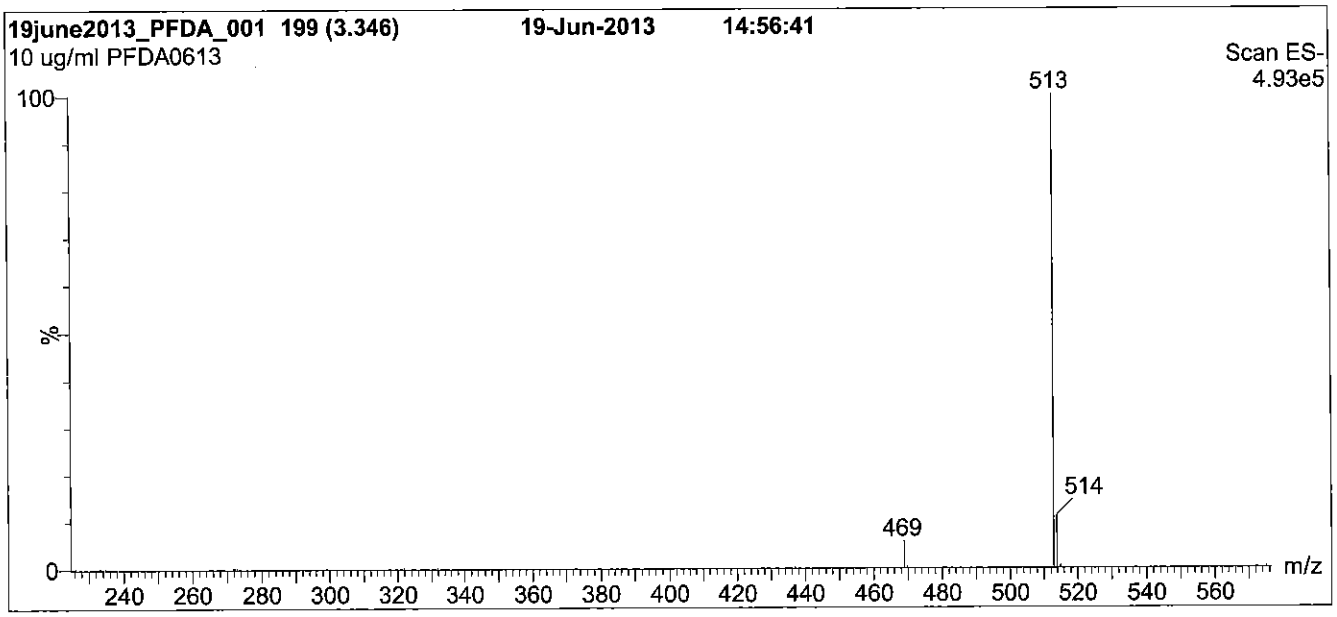
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **PFDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

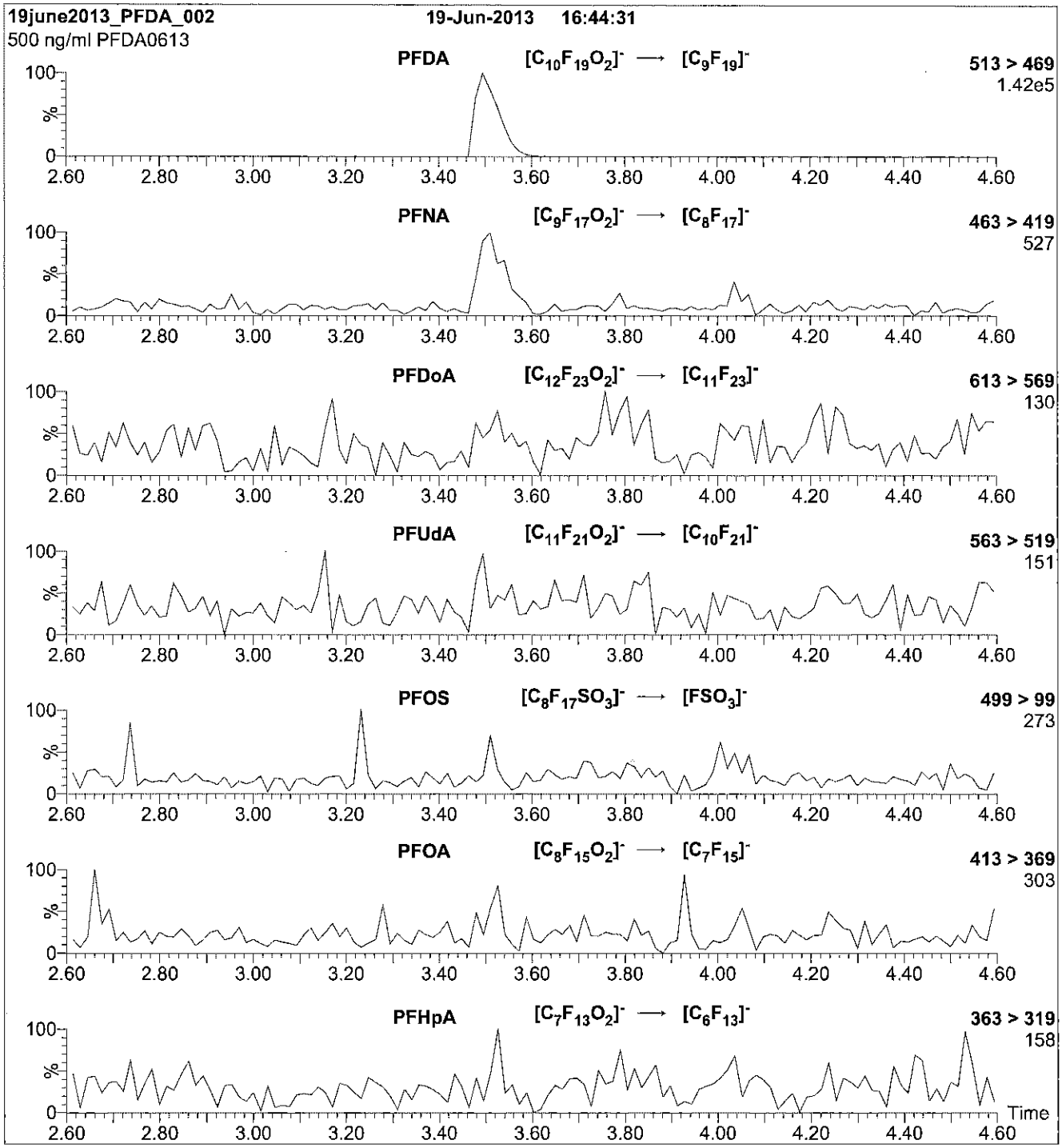
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.58e-3
Collision Energy (eV) = 13

# Reagent

# LCPFDA_00004

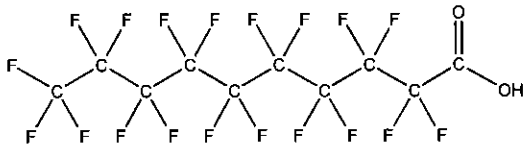
rec: 8/20/15 cw

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFDA
**COMPOUND:** Perfluoro-n-decanoic acid
**LOT NUMBER:** PFDA0615

**STRUCTURE:**
**CAS #:** 335-76-2



**MOLECULAR FORMULA:** $C_{10}HF_{19}O_2$
**MOLECULAR WEIGHT:** 514.08
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 07/02/2015
**EXPIRY DATE:** (mm/dd/yyyy) 07/02/2020
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.6% PFNA and ~ 0.3% PFOA.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 07/24/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

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$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

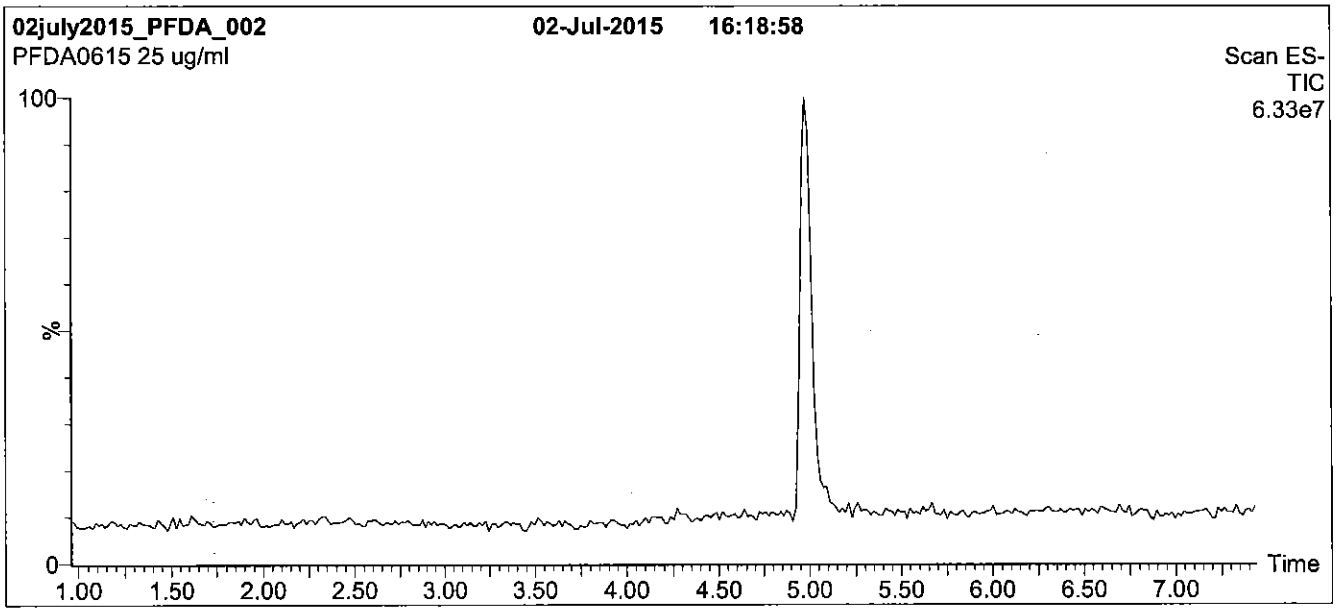
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

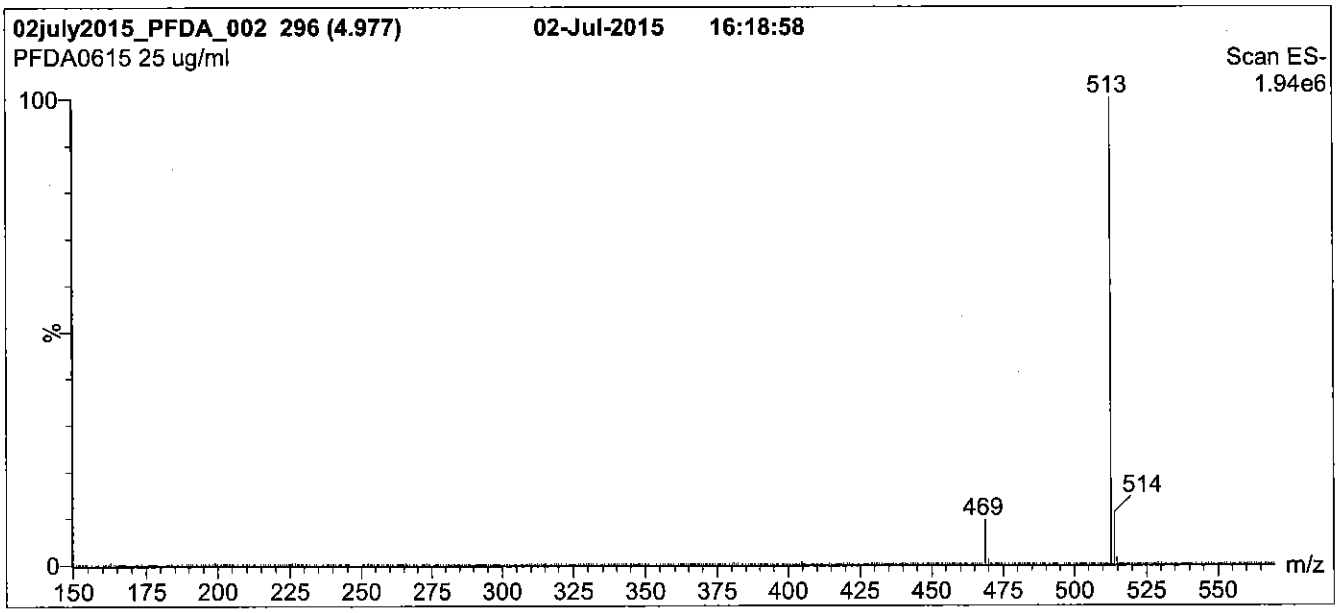
CALA

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **PFDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

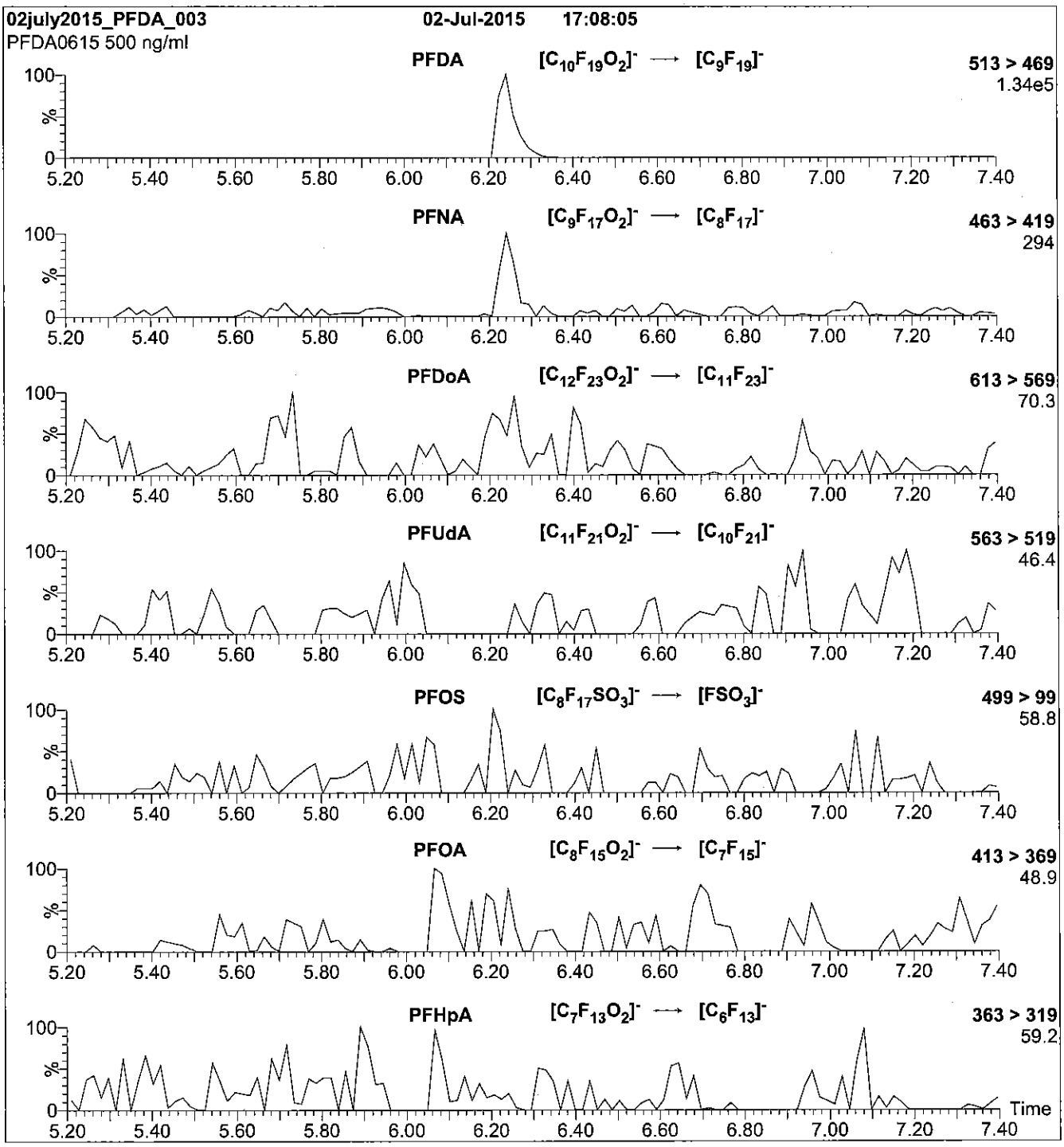
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.62e-3
Collision Energy (eV) = 13

# Reagent

# LCPFDoA_00003

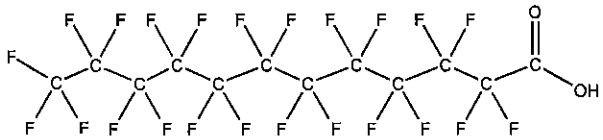
Rec 7/14/15

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFDoA
**COMPOUND:** Perfluoro-n-dodecanoic acid
**LOT NUMBER:** PFDoA0113

**STRUCTURE:**
**CAS #:** 307-55-1



**MOLECULAR FORMULA:** $C_{12}HF_{23}O_2$
**MOLECULAR WEIGHT:** 614.10
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 01/03/2013
**EXPIRY DATE:** (mm/dd/yyyy) 01/03/2018
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

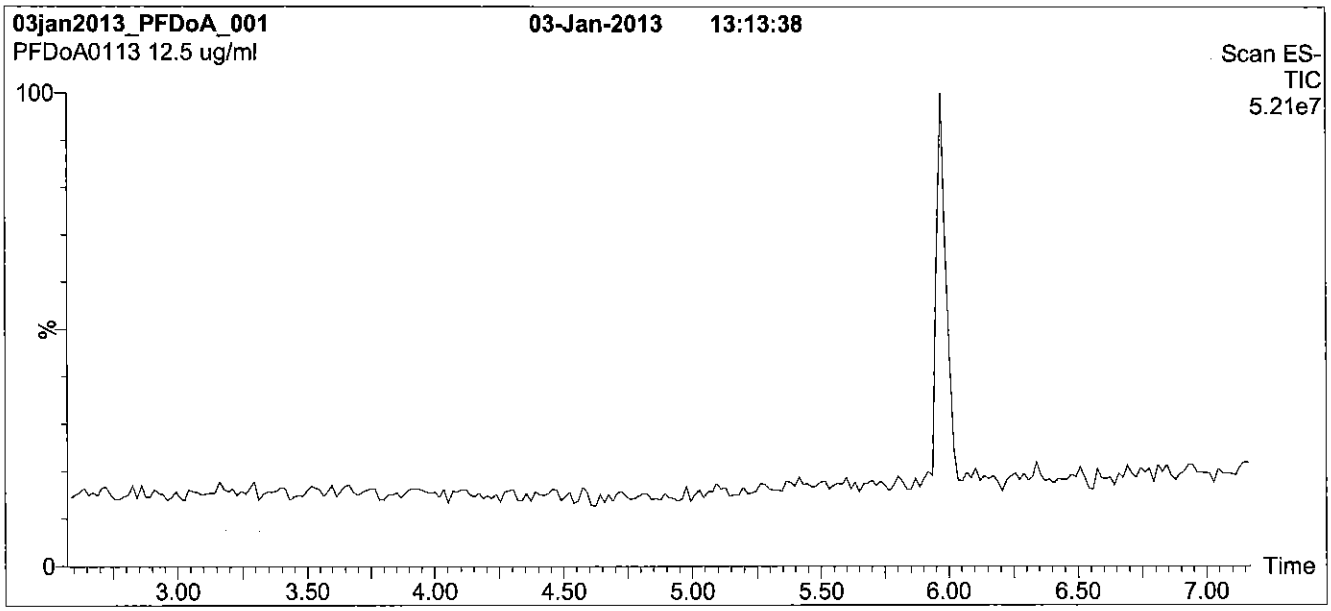
- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

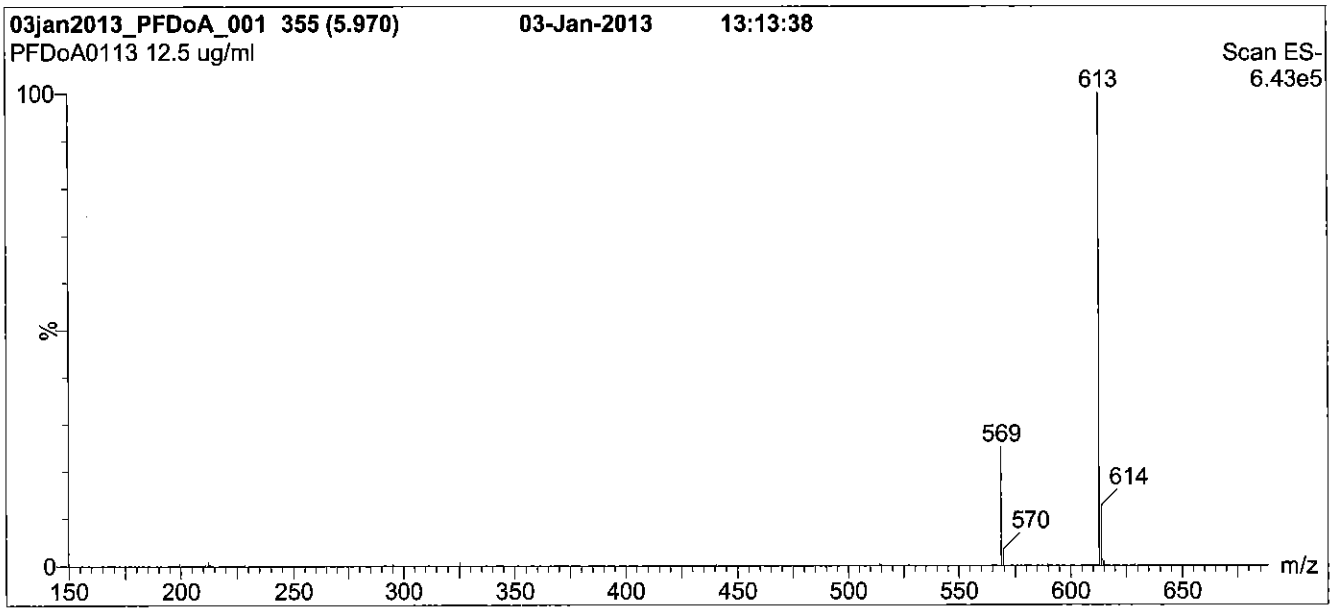
***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 02/01/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

**Figure 1:** **PFDoA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min.
Return to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 20.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

# Reagent

# LCPFDoA_00004

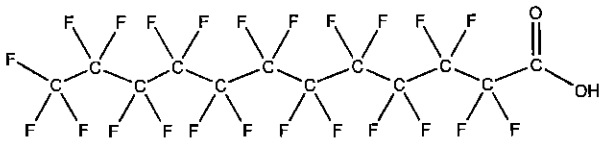
Rec: 12/30/15 cw

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFDoA
**COMPOUND:** Perfluoro-n-dodecanoic acid
**LOT NUMBER:** PFDoA0115

**STRUCTURE:**
**CAS #:** 307-55-1



**MOLECULAR FORMULA:** $C_{12}HF_{23}O_2$
**MOLECULAR WEIGHT:** 614.10
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 01/30/2015
**EXPIRY DATE:** (mm/dd/yyyy) 01/30/2020
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 03/25/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

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## HAZARDS:

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## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

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$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accredited No. A1226

ANAB ACCREDITED ISO 17025 / 17034 REFERENCE MATERIAL PRODUCER

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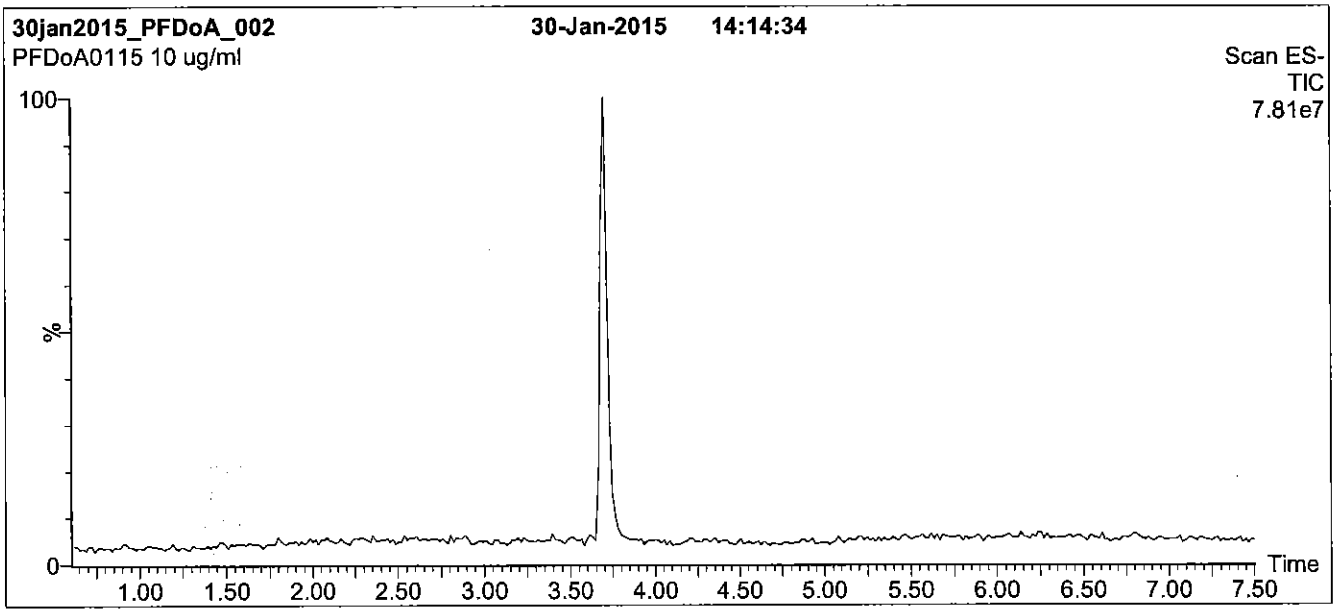
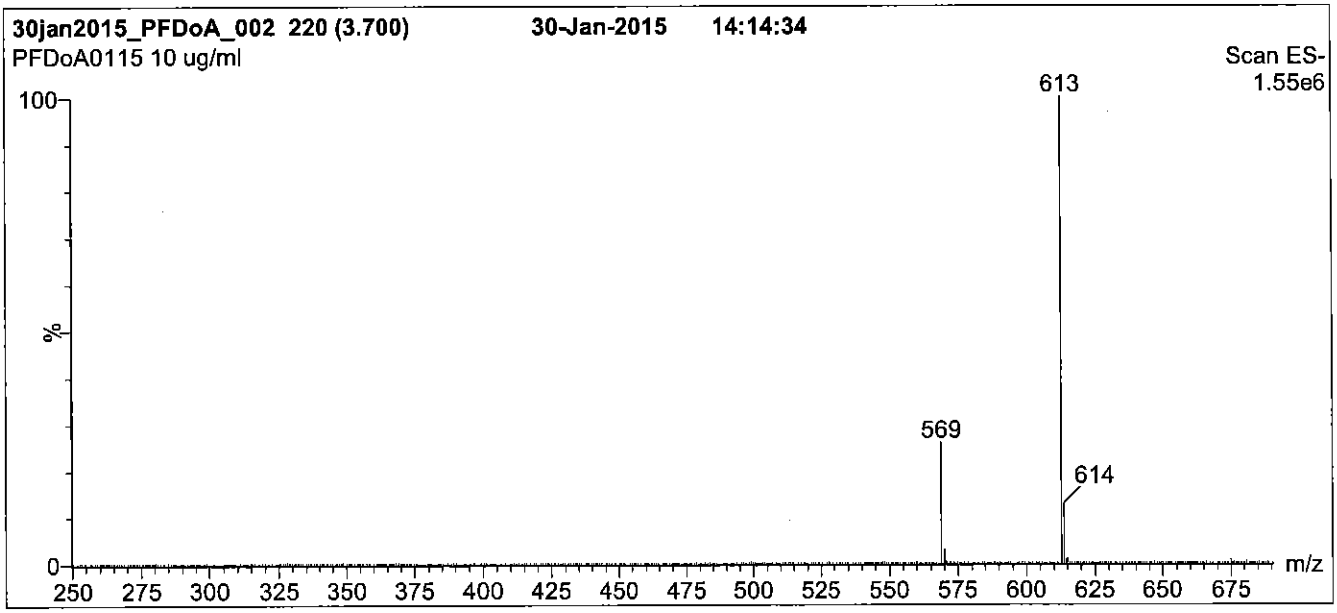
**Figure 1:** **PFDoA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

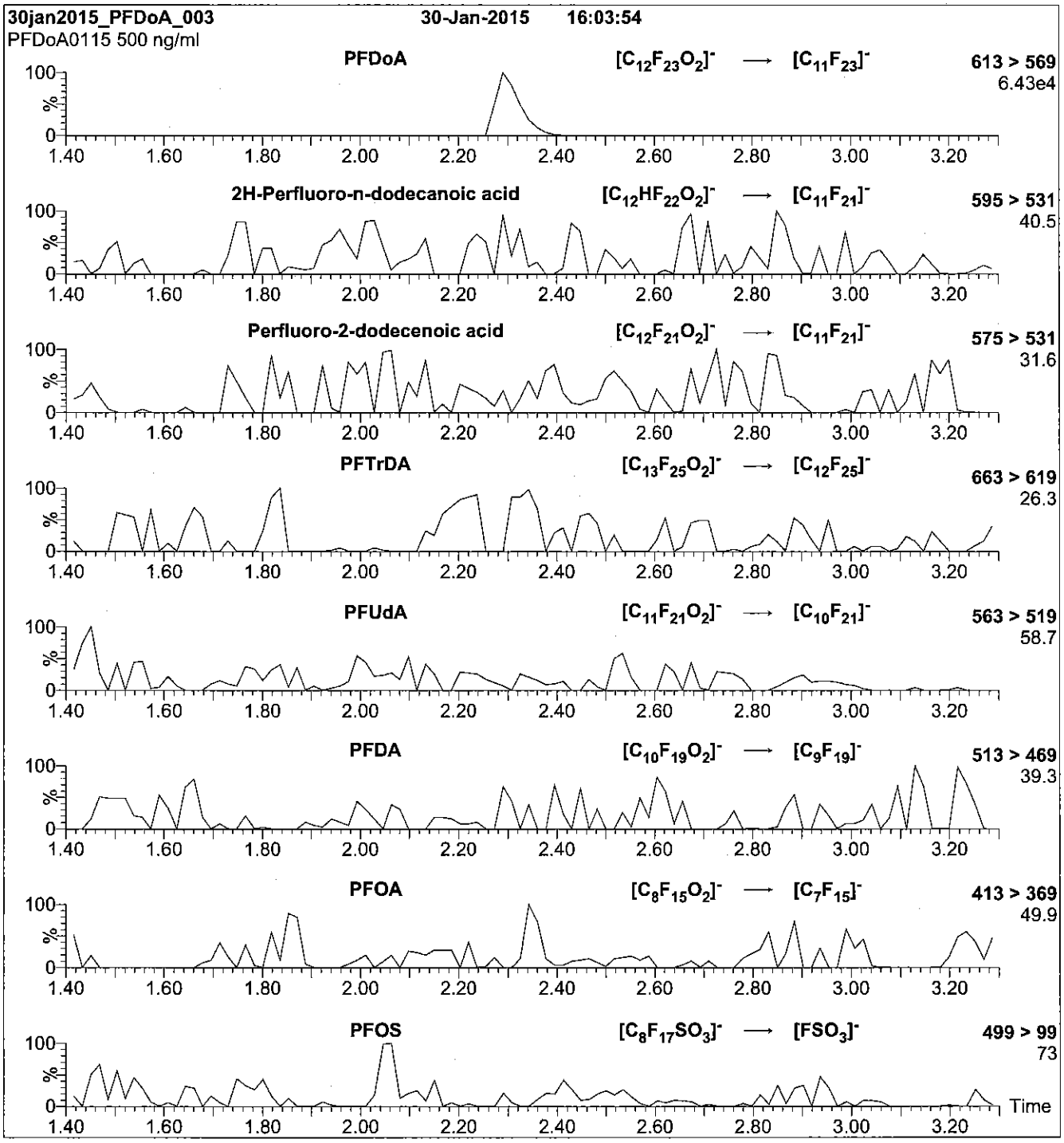
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 1000 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 20.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFDoA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFDoA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 13

# Reagent

# LCPFDoS_00003

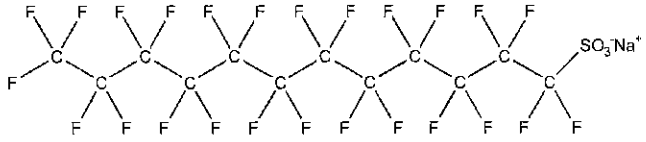
P. 2/11/15 BV

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** L-PFDoS
**LOT NUMBER:** LPFDoS1011
**COMPOUND:** Sodium perfluoro-1-dodecanesulfonate

**STRUCTURE:**
**CAS #:** Not available




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_{12}F_{25}SO_3Na$ | **MOLECULAR WEIGHT:** | 722.14 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt) | **SOLVENT(S):** | Methanol |
| | 48.4 ± 2.4 µg/ml (PFDoS anion) | | |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 10/06/2011 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 10/06/2016 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains ~ 0.3% of sodium perfluoro-1-tetradecanesulfonate and ~ 0.8% of perfluoro-n-dodecanoic acid (PFDoA).

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 01/15/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

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## HOMOGENEITY:

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## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

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CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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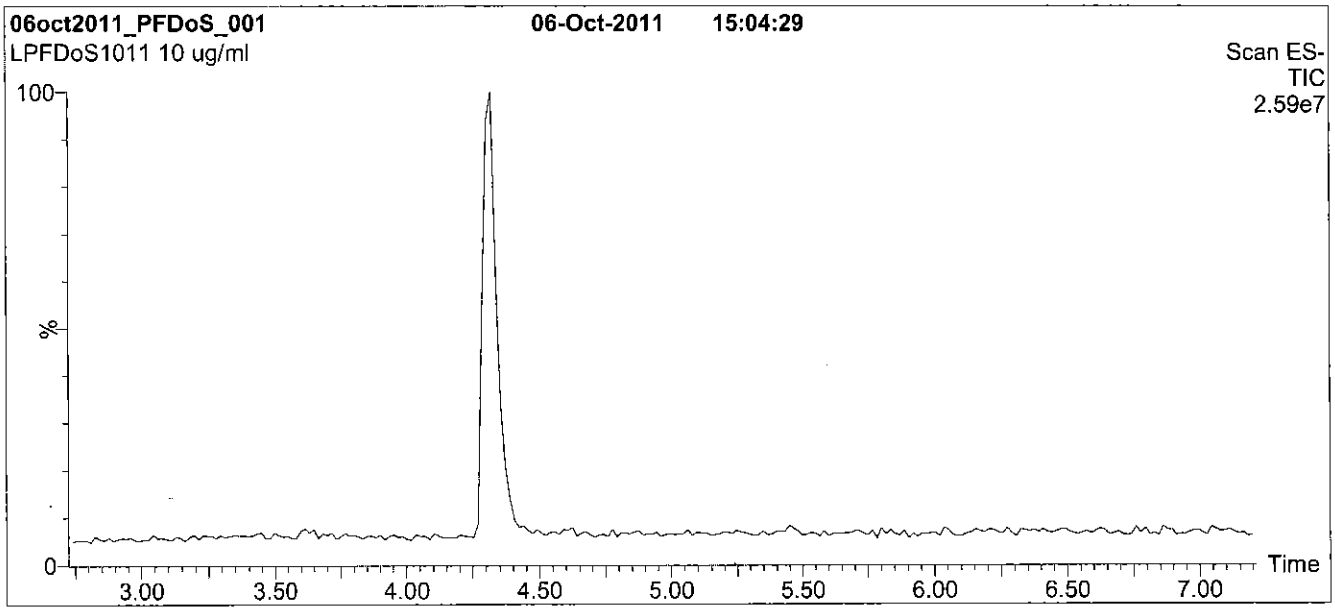
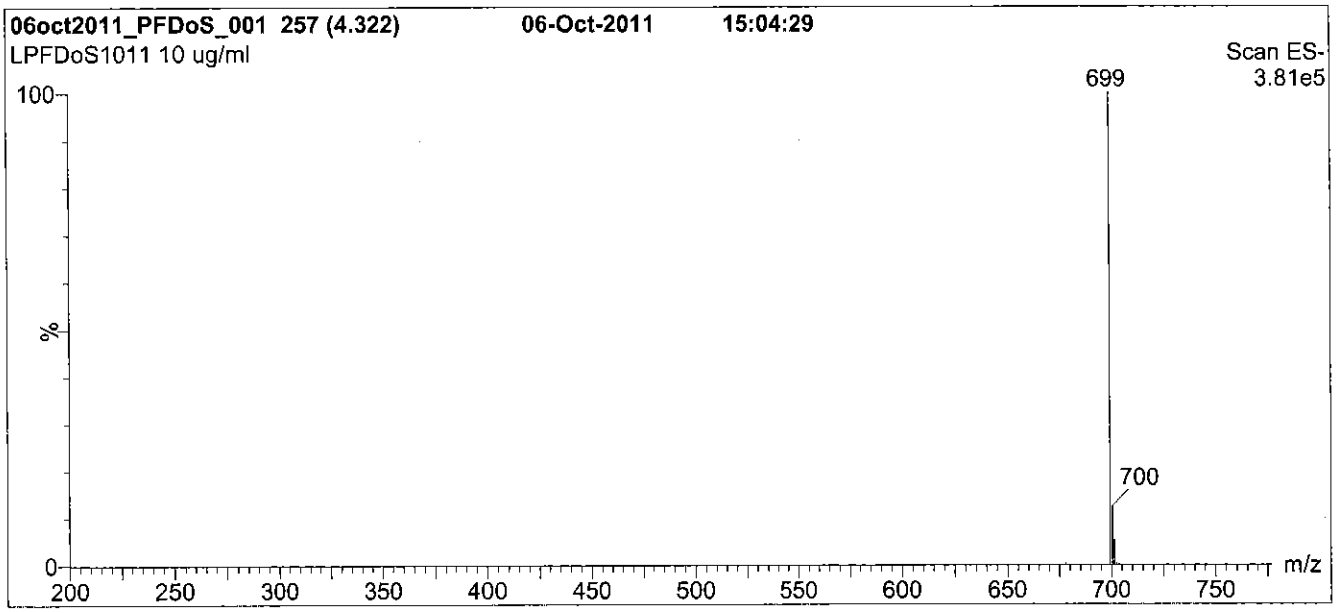
**Figure 1:** **L-PFDoS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

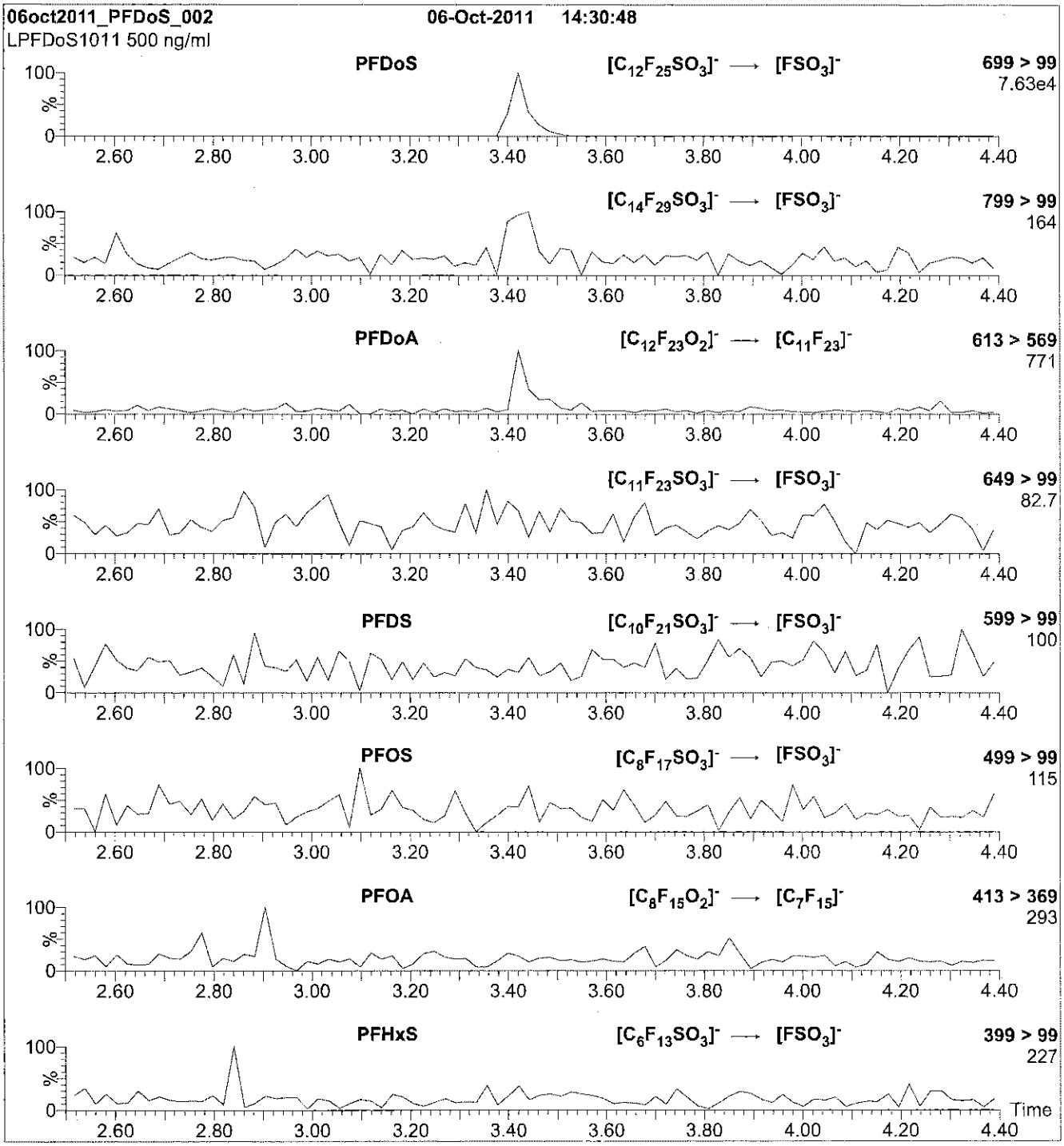
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 80.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **L-PFDoS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml L-PFDoS)

Mobile phase: Isocratic 65% (80:20 MeOH:ACN) / 35% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 50

# Reagent

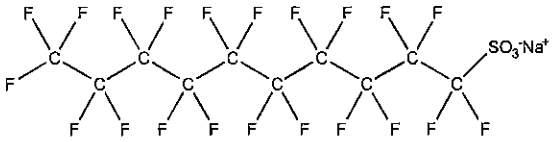
# LCPFDS_00003

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** L-PFDS
**LOT NUMBER:** LPFDS0913
**COMPOUND:** Sodium perfluoro-1-decanesulfonate

**STRUCTURE:**




**CAS #:** Not available

| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_{10}F_{21}SO_3Na$ | **MOLECULAR WEIGHT:** | 622.13 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>48.2 ± 2.4 µg/ml (PFDS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 09/13/2013 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 09/13/2018 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 09/23/2013 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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CALA Testing Accreditation No. A 1226

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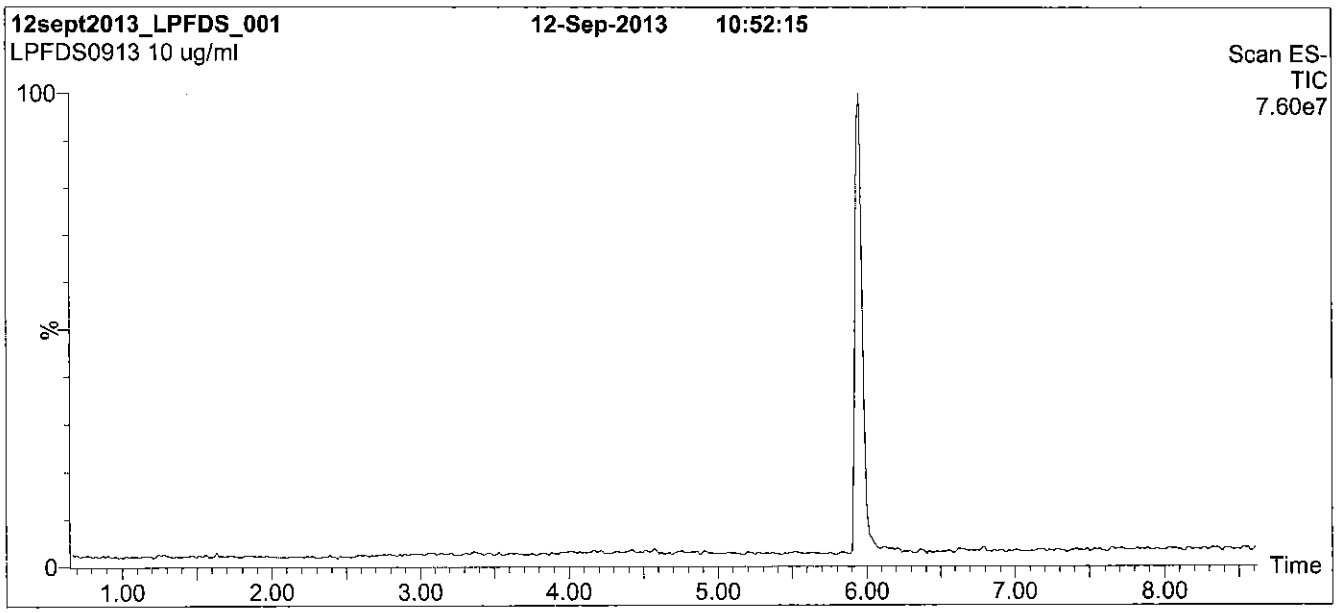
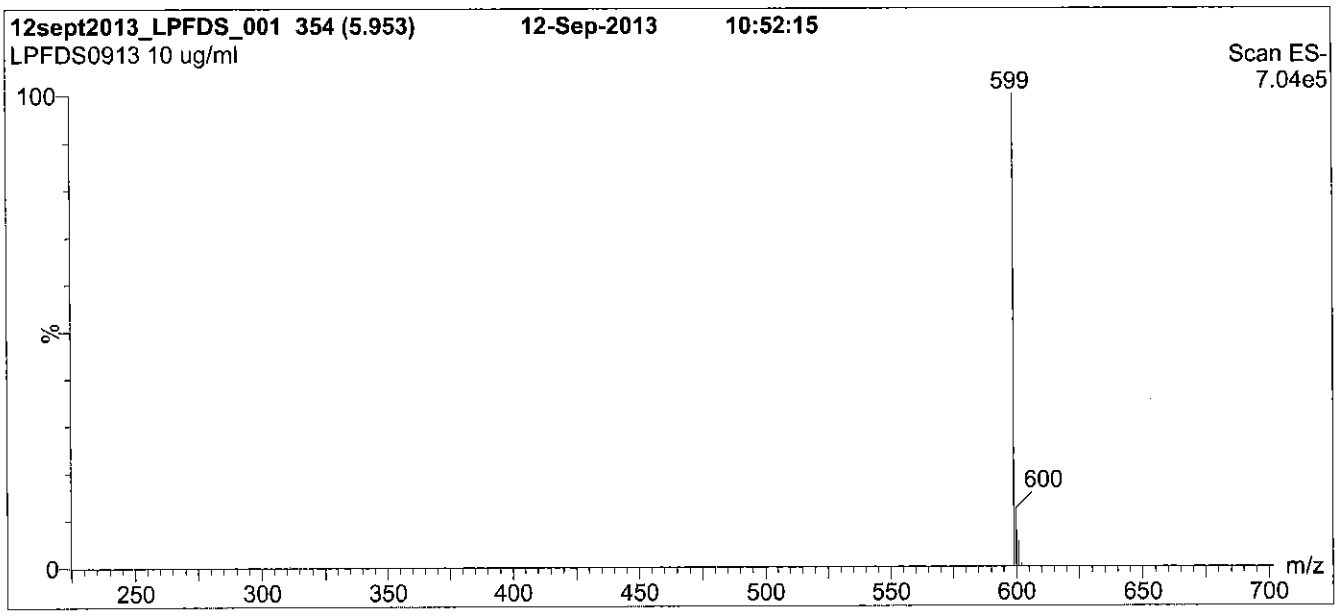
**Figure 1:** **L-PFDS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 11 min

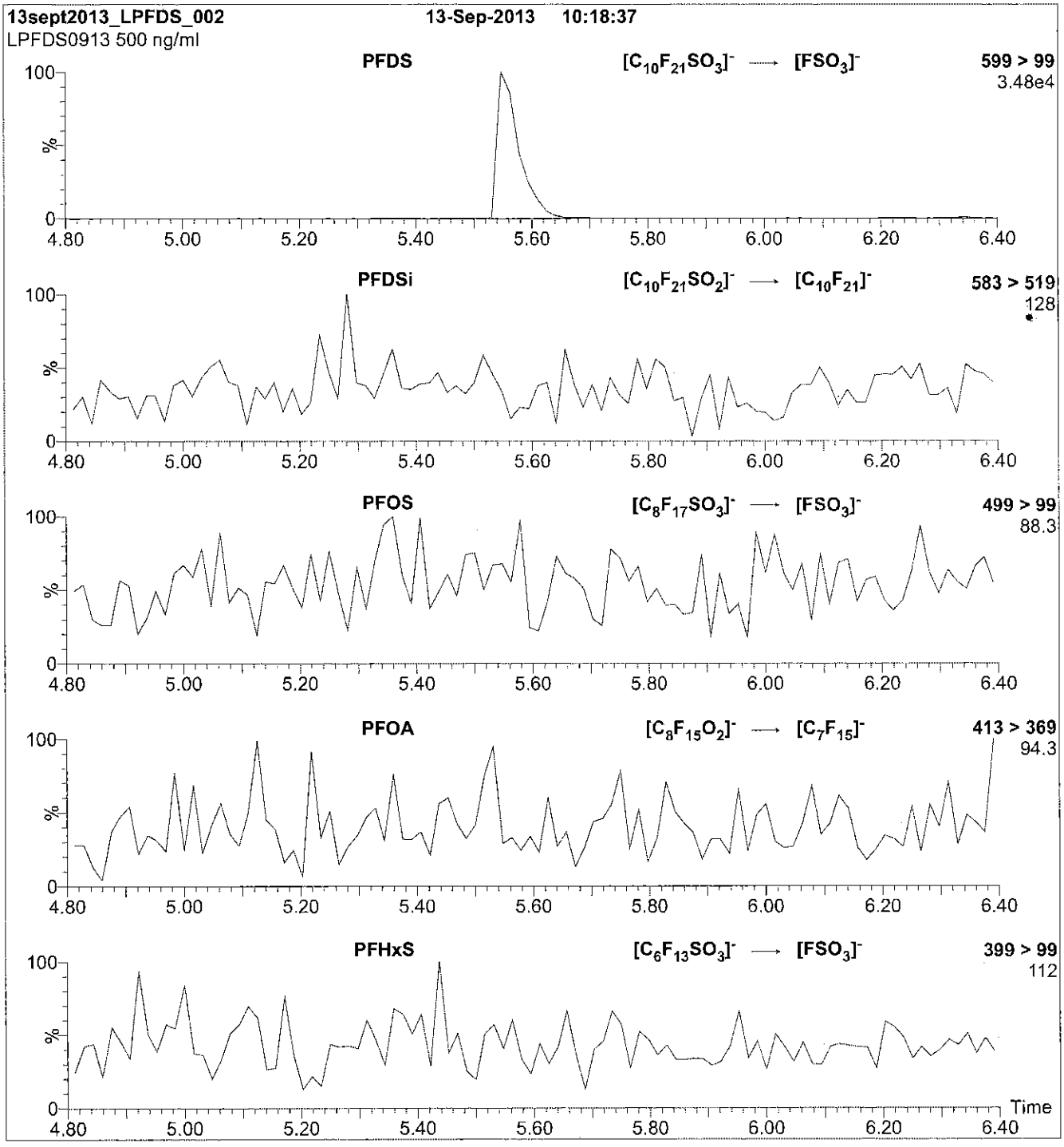
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 70.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 650

**Figure 2:** **L-PFDS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml L-PFDS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.78e-3
Collision Energy (eV) = 50

# Reagent

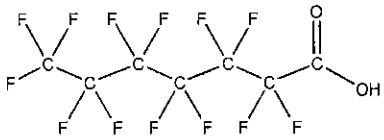
# LCPFHpA_00004

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFHpA
**COMPOUND:** Perfluoro-n-heptanoic acid
**LOT NUMBER:** PFHpA0514

**STRUCTURE:**
**CAS #:** 375-85-9



**MOLECULAR FORMULA:** $C_7HF_{13}O_2$
**MOLECULAR WEIGHT:** 364.06
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 05/09/2014
**EXPIRY DATE:** (mm/dd/yyyy) 05/09/2019
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 05/22/2014 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
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where x is expressed as a relative standard uncertainty of the individual parameter.

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CALA Testing Accreditation No. A1226

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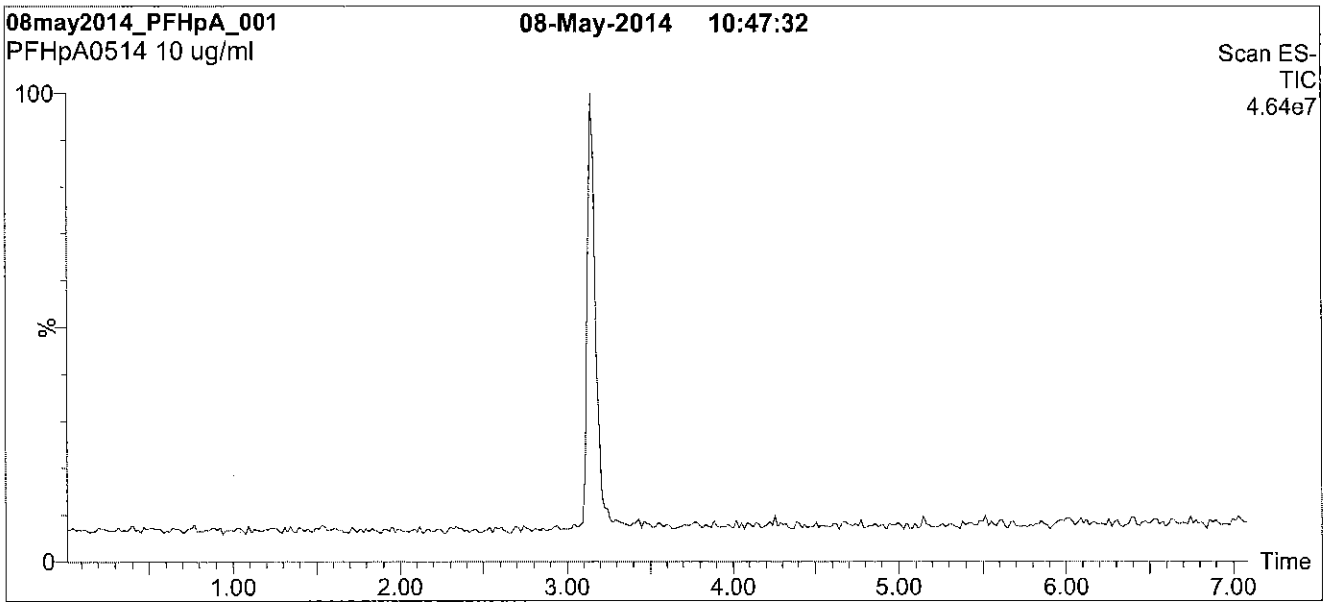
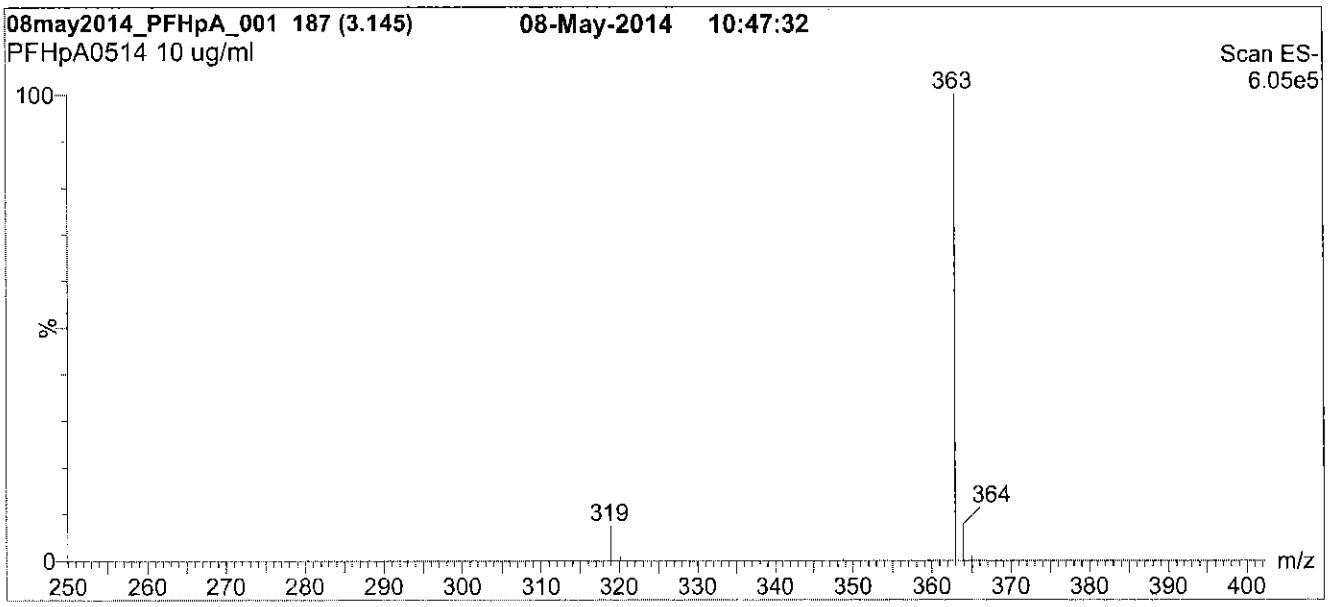
**Figure 1:** **PFHpA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH $C_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

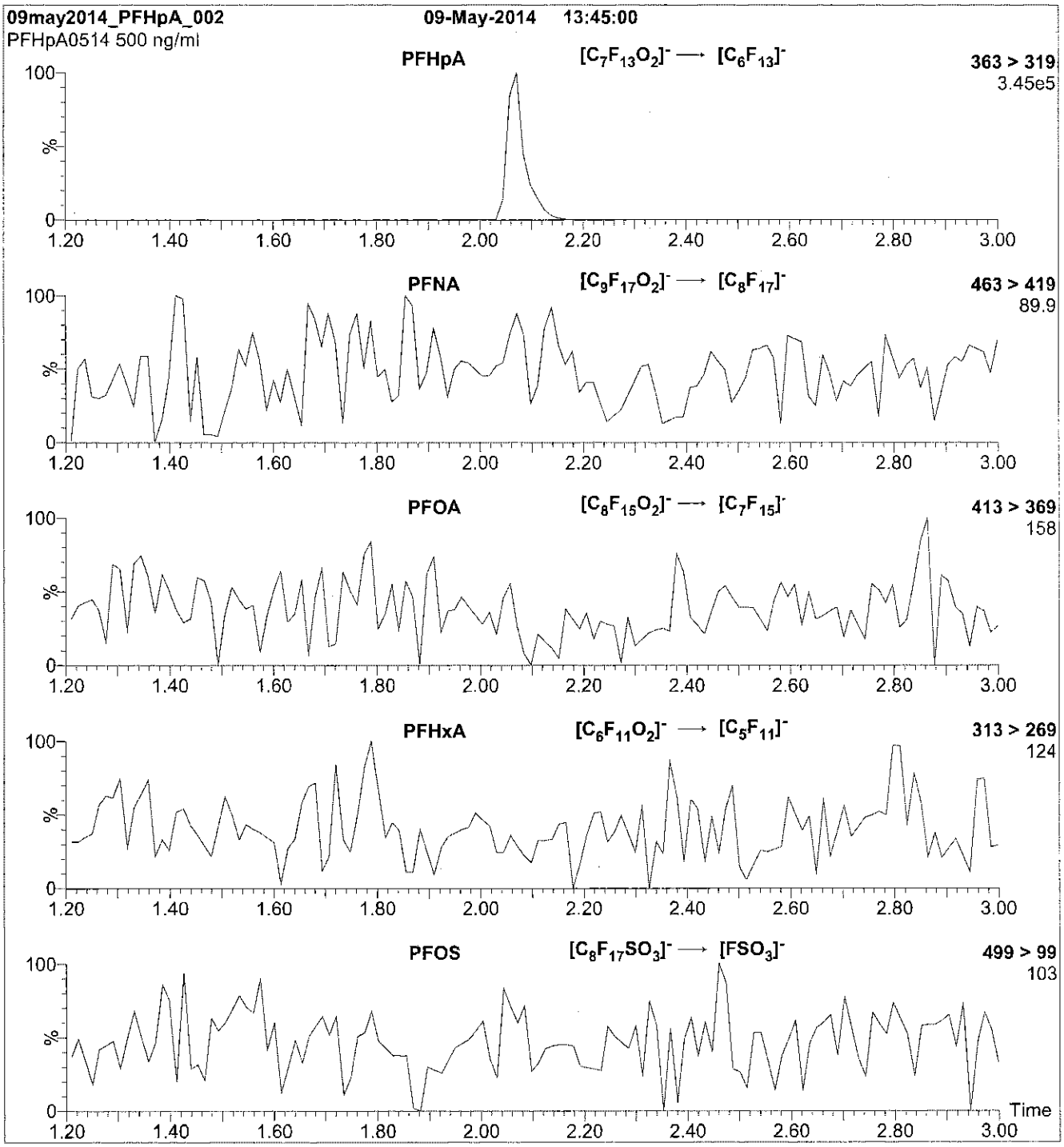
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFHpA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFHpA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.24e-3
Collision Energy (eV) = 11

# Reagent

# LCPFHpS_00005

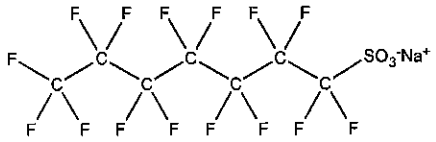
R: 4/15/15 SK

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** L-PFHpS
**COMPOUND:** Sodium perfluoro-1-heptanesulfonate
**LOT NUMBER:** LPFHpS0114

**STRUCTURE:**
**CAS #:** Not available




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_7F_{15}SO_3Na$ | **MOLECULAR WEIGHT:** | 472.10 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>47.6 ± 2.4 µg/ml (PFHpS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 01/28/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 01/28/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains ~ 0.1% of L-PFHxS ($C_6F_{13}SO_3Na$) and ~ 0.2% of L-PFOS ($C_8F_{17}SO_3Na$).

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 03/27/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ACCREDITED Reference Material Producer

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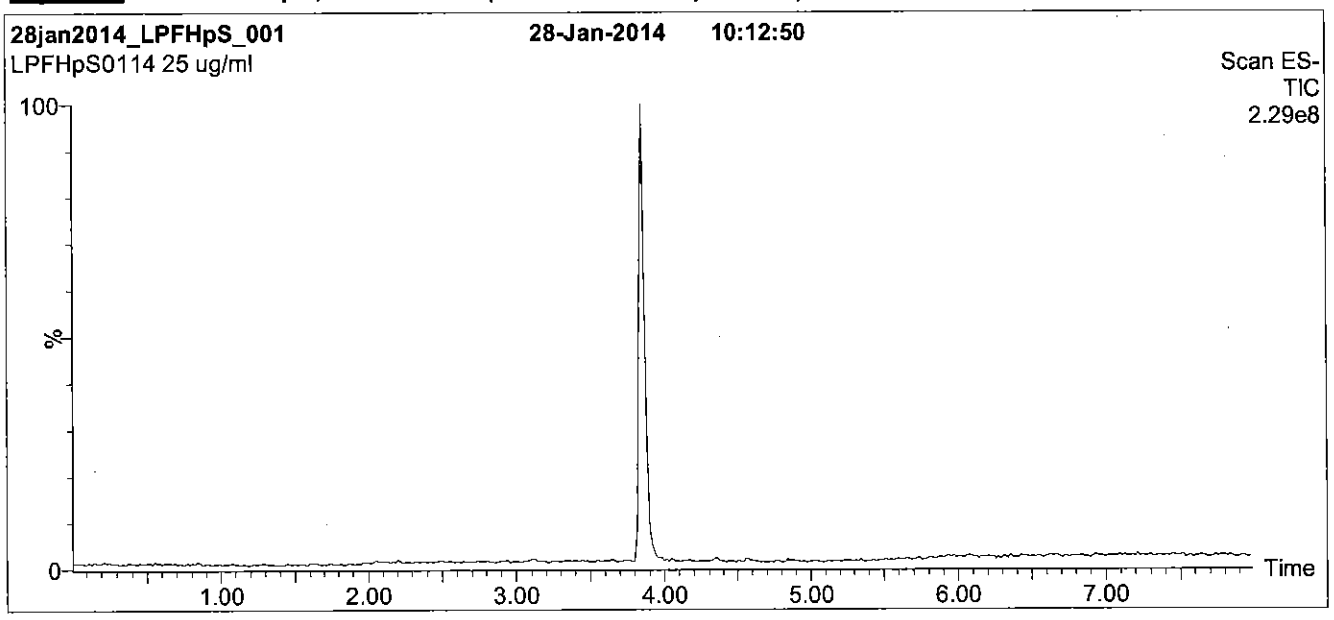
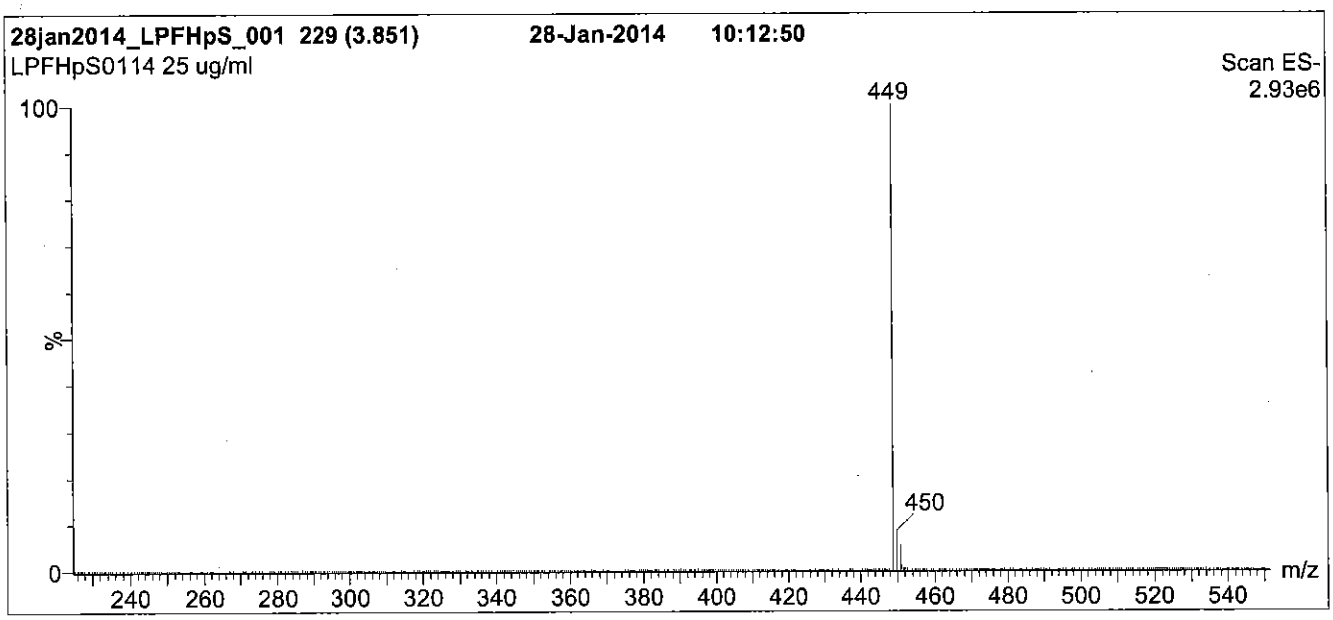
**Figure 1:** **L-PFHpS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

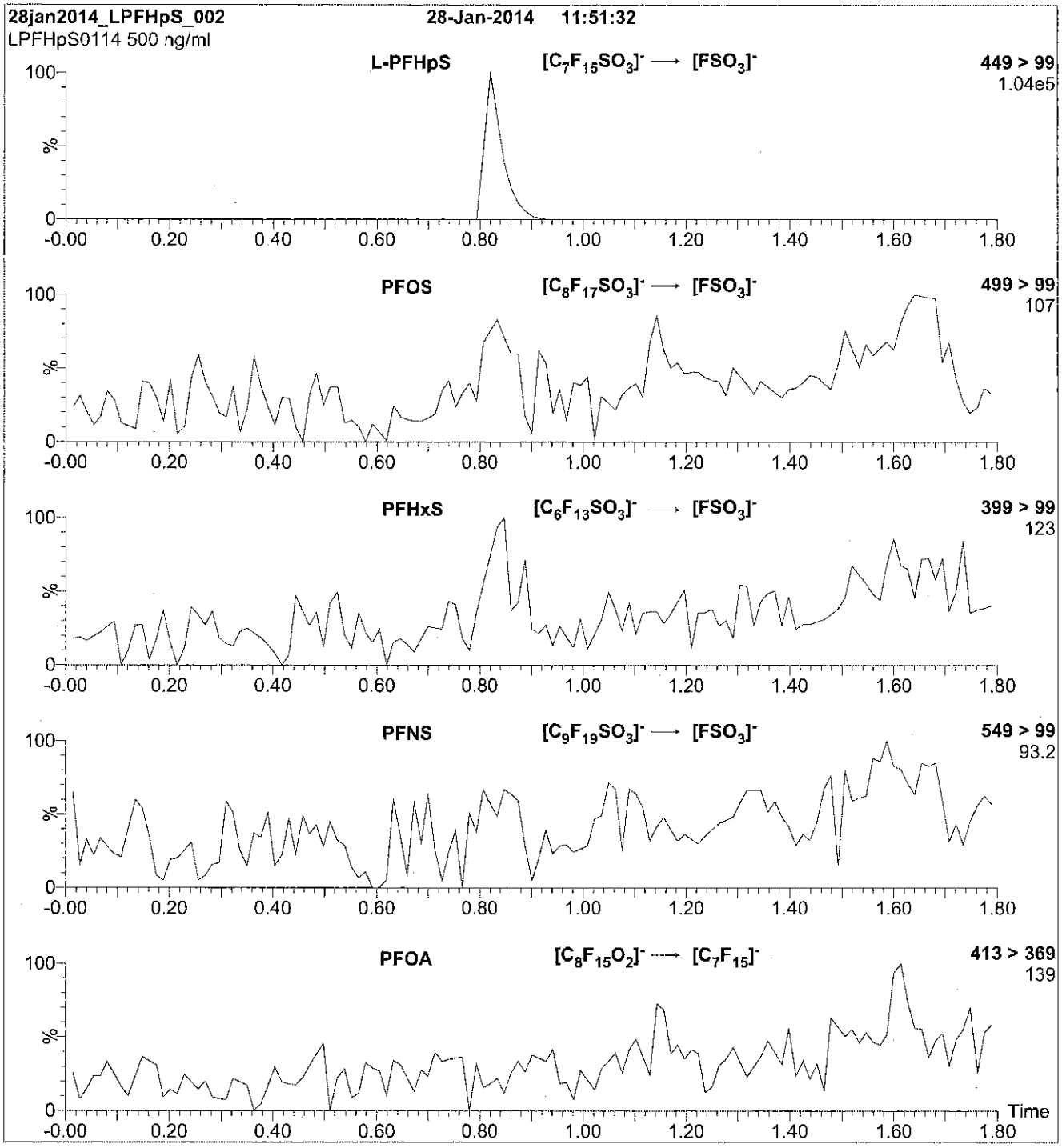
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **L-PFHpS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml L-PFHpS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.66e-3
Collision Energy (eV) = 35

# Reagent

# LCPFHxA_00003

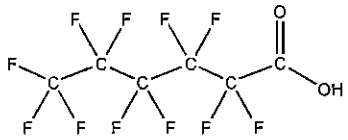
V: 2/11/15 SW

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** PFHxA
**COMPOUND:** Perfluoro-n-hexanoic acid
**LOT NUMBER:** PFHxA0514

**STRUCTURE:**
**CAS #:** 307-24-4



**MOLECULAR FORMULA:** $C_6HF_{11}O_2$
**MOLECULAR WEIGHT:** 314.05
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 05/09/2014
**EXPIRY DATE:** (mm/dd/yyyy) 05/09/2019
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 05/22/2014 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

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The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1$, $x_2$,...$x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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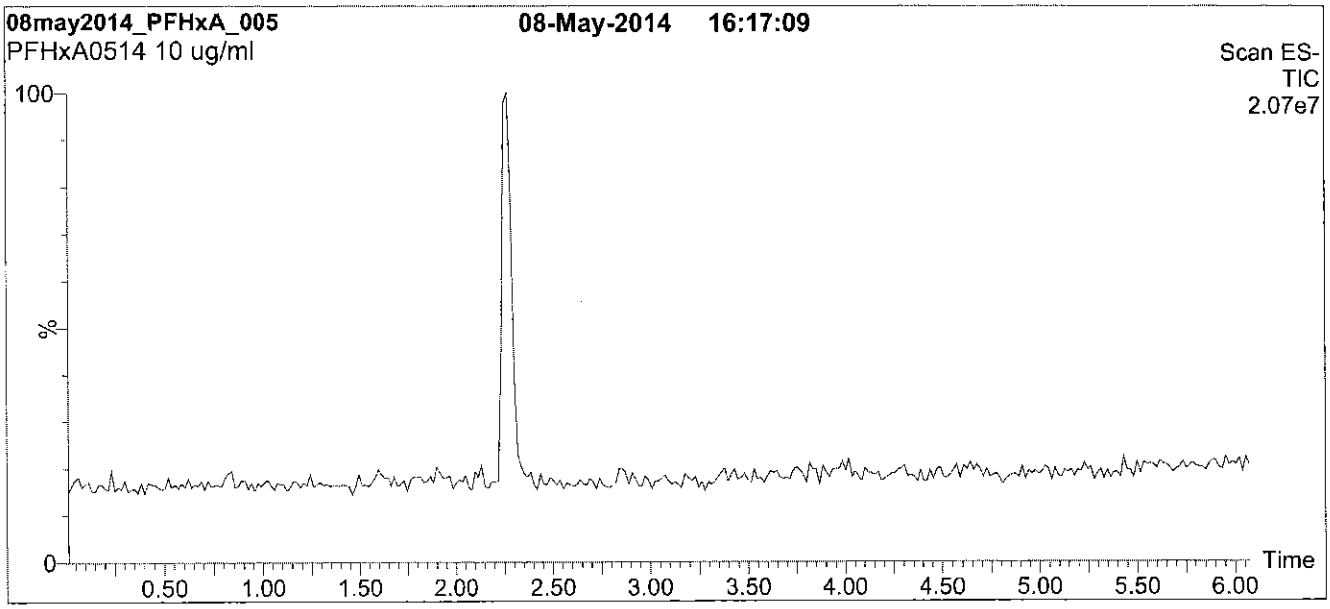
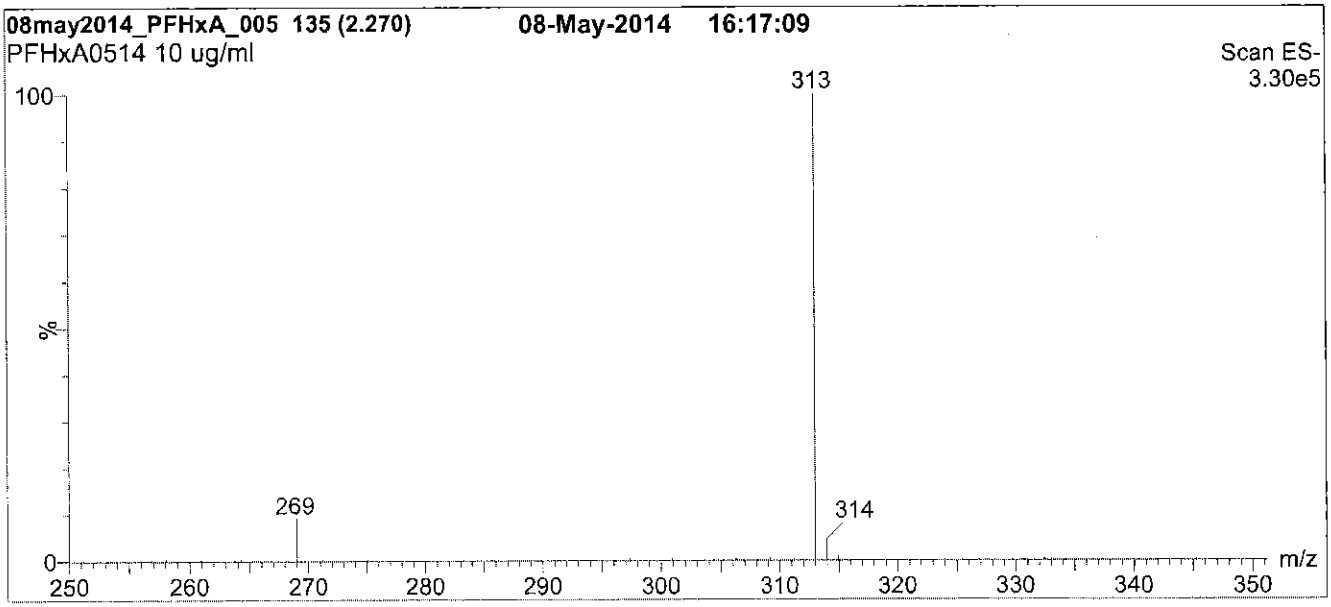
**Figure 1:** **PFHxA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH $C_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

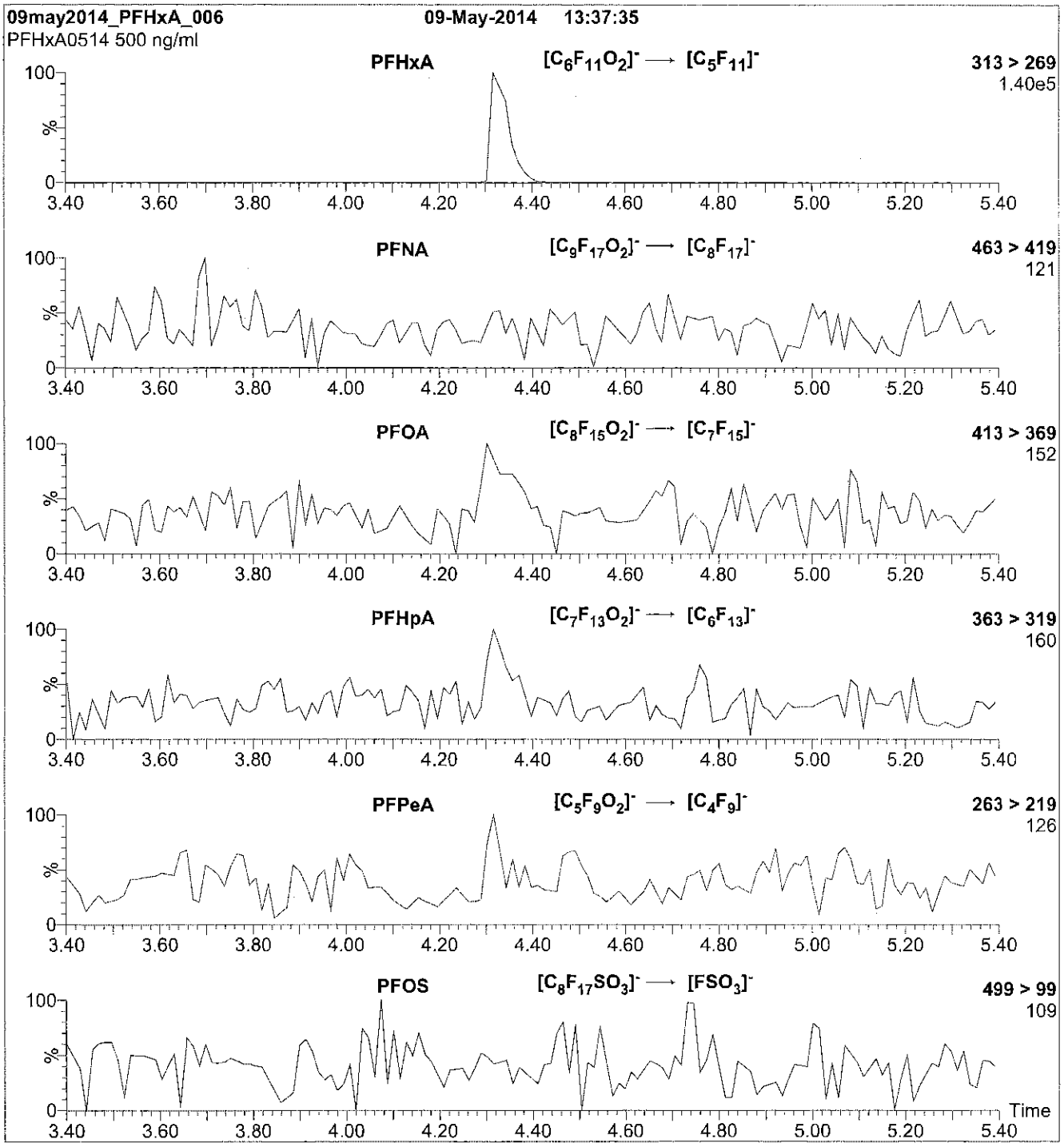
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFHxA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFHxA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.24e-3
Collision Energy (eV) = 10

# Reagent

# LCPFHxS-br_00001

P: 12/9/15 SW

WELLINGTON LABORATORIES

# CERTIFICATE OF ANALYSIS DOCUMENTATION

## br-PFHxSK

**Potassium Perfluorohexanesulfonate Solution/Mixture of Linear and Branched Isomers**

| | |
|---|---|
| **PRODUCT CODE:** | br-PFHxSK |
| **LOT NUMBER:** | brPFHxSK0615 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (total potassium salt) |
| | 45.5 ± 2.3 µg/ml (total PFHxS anion) |
| **SOLVENT(S):** | Methanol |
| **DATE PREPARED:** (mm/dd/yyyy) | 06/29/2015 |
| **LAST TESTED:** (mm/dd/yyyy) | 07/03/2015 |
| **EXPIRY DATE:** (mm/dd/yyyy) | 07/03/2020 |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place |

**DESCRIPTION:**

The chemical purity has been determined to be ≥98% perfluorohexanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the identified isomeric components are given in Table A.

**DOCUMENTATION/ DATA ATTACHED:**

Table A: Isomeric Components and Percent Composition by $^{19}$F-NMR
Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains ~ 0.5% of perfluoro-1-pentanesulfonate and ~ 0.2% of perfluoro-1-octanesulfonate.
- CAS#: 3871-99-6 (for linear isomer; potassium salt).

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*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

## HAZARDS:

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## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

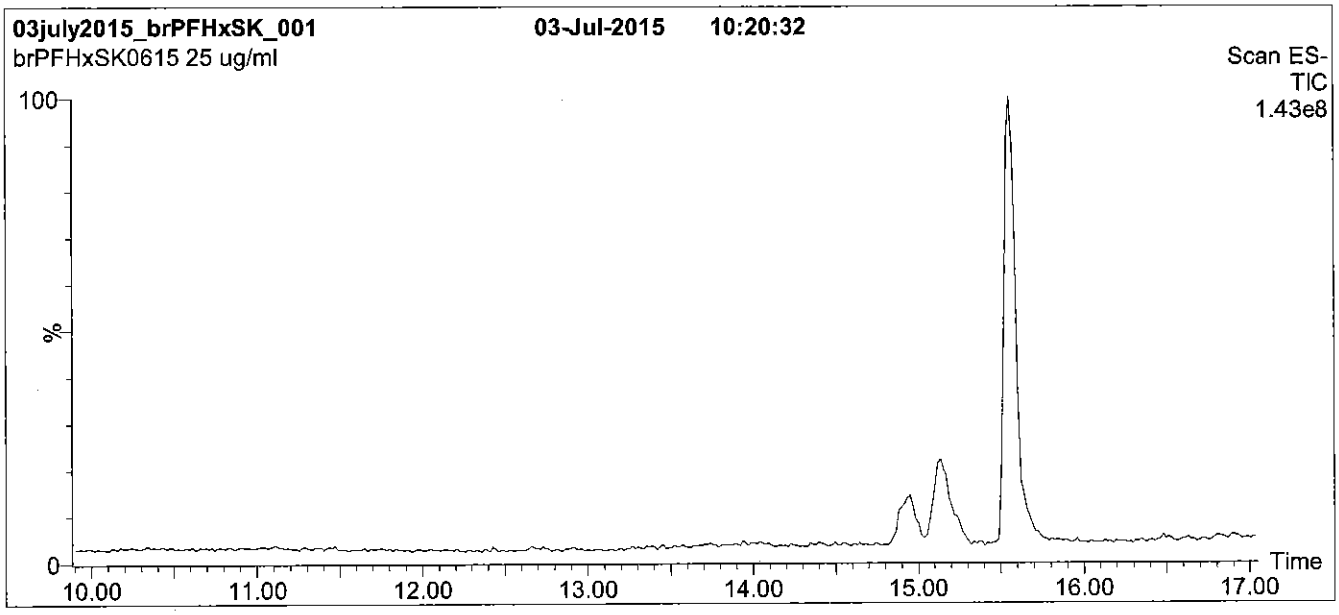
**Table A:** **br-PFHxSK; Isomeric Components and Percent Composition (by $^{19}$F-NMR)***

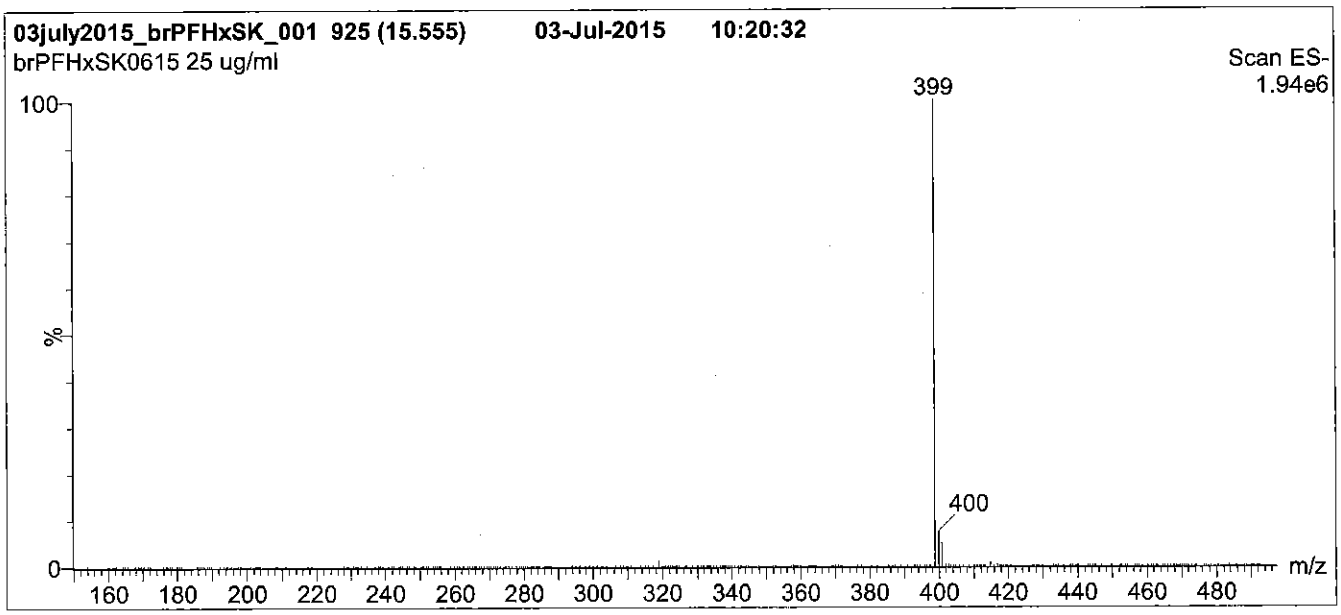
| Isomer | Name | Structure | Percent Composition by $^{19}$F-NMR |
|---|---|---|---|
| 1 | Potassium perfluoro-1-hexanesulfonate | $CF_3CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$ | 81.1 |
| 2 | Potassium 1-trifluoromethylperfluoropentanesulfonate** | $CF_3CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$ | 2.9 |
| 3 | Potassium 2-trifluoromethylperfluoropentanesulfonate | $CF_3CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$ | 1.4 |
| 4 | Potassium 3-trifluoromethylperfluoropentanesulfonate | $CF_3CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$ | 5.0 |
| 5 | Potassium 4-trifluoromethylperfluoropentanesulfonate | $CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$ | 8.9 |
| 6 | Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate | $CF_3C(CF_3)CF_2CF_2SO_3^-K^+$ | 0.2 |
| 7 | Other Unidentified Isomers | | 0.5 |

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

**Certified By:** _____ **Date:** 07/15/2015
B.G. Chittim (mm/dd/yyyy)

**Figure 1:** **br-PFHxSK; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 20% (80:20 MeOH:ACN) / 80% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 50% organic over 14 min. Ramp to
90% organic over 3 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 20 min

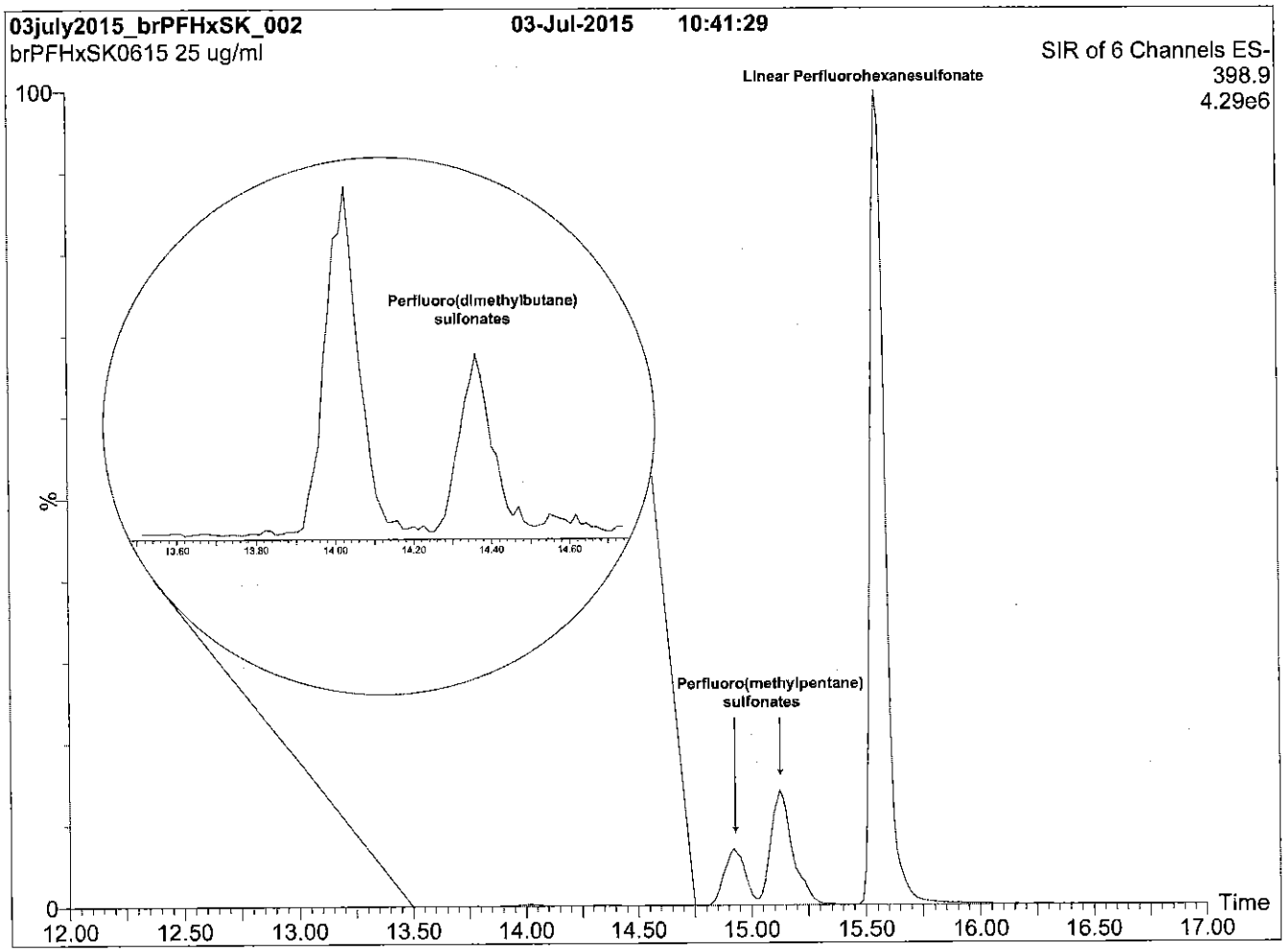
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 50.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **br-PFHxSK; LC/MS Data**




**Conditions for Figure 2:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 20% (80:20 MeOH:ACN) / 80% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 50% organic over 14 min. Ramp to
90% organic over 3 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 20 min

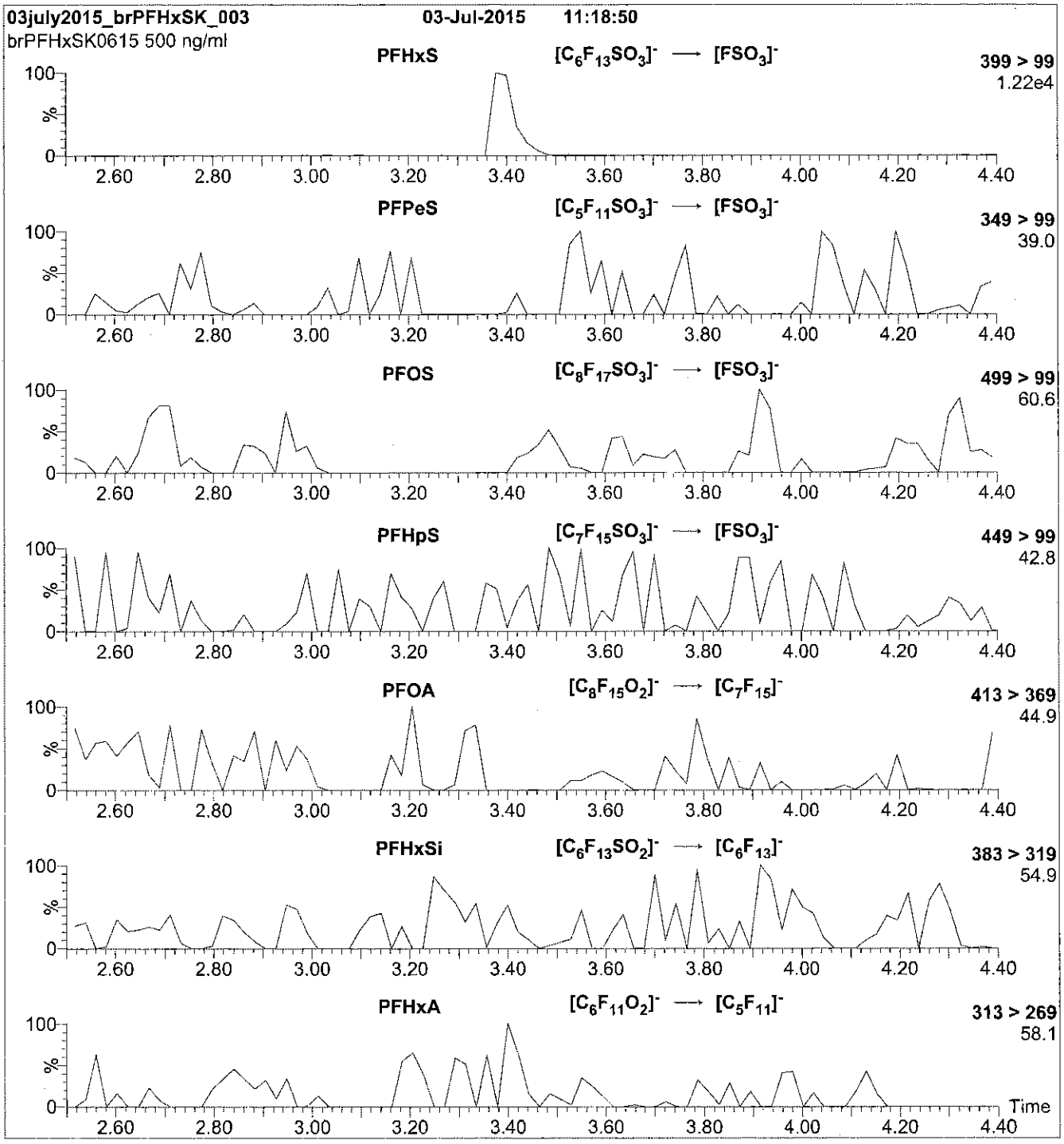
Flow: 300 µl/min

**MS Parameters**

Experiment: SIR (6 channels)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 50.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 3:** **br-PFHxSK; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 3:**

Injection: Direct loop injection
10 µl (500 ng/ml br-PFHxSK)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 30

# Reagent

# LCPFNA_00004

P: 3/27/15 sv

S:

# WELLINGTON LABORATORIES

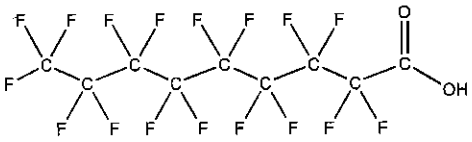
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFNA
**COMPOUND:** Perfluoro-n-nonanoic acid

**LOT NUMBER:** PFNA0514

**STRUCTURE:**

**CAS #:** 375-95-1



**MOLECULAR FORMULA:** $C_9HF_{17}O_2$
**CONCENTRATION:** 50 ± 2.5 µg/ml

**MOLECULAR WEIGHT:** 464.08
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 05/09/2014
**EXPIRY DATE:** (mm/dd/yyyy) 05/09/2019
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of perfluoro-n-octanoic acid (PFOA) and < 0.1% of perfluoro-n-heptanoic acid (PFHpA).

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** _____ **Date:** 05/22/2014 (mm/dd/yyyy)
B.G. Chittim

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

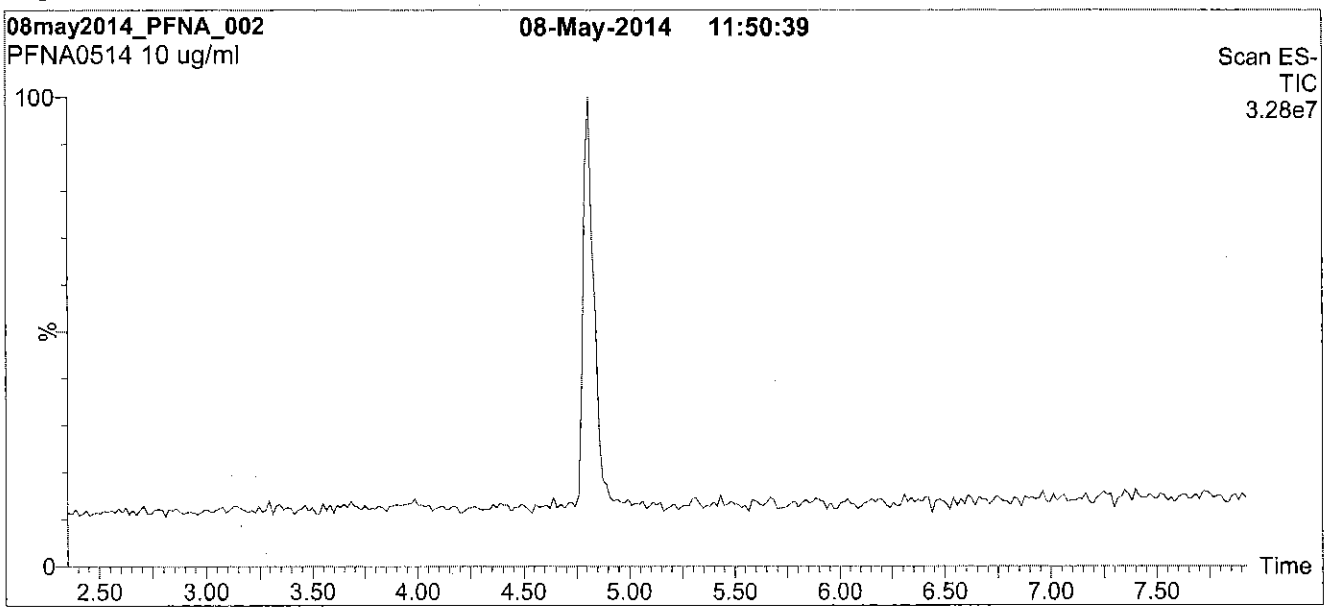
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

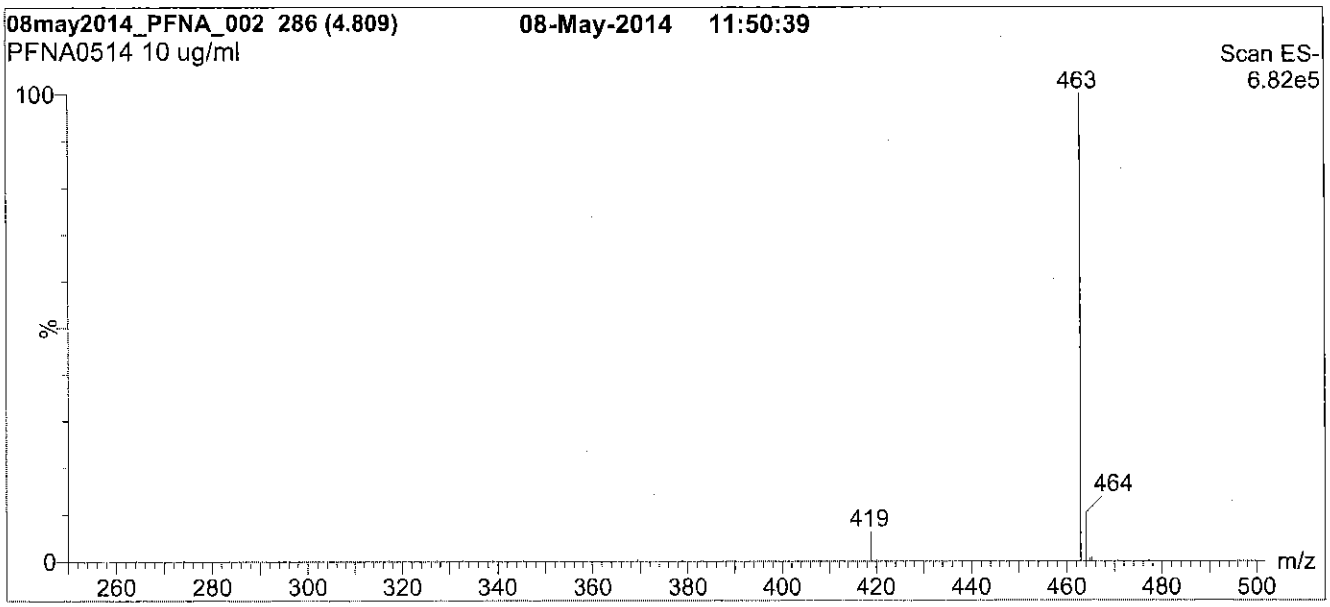
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **PFNA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH $C_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

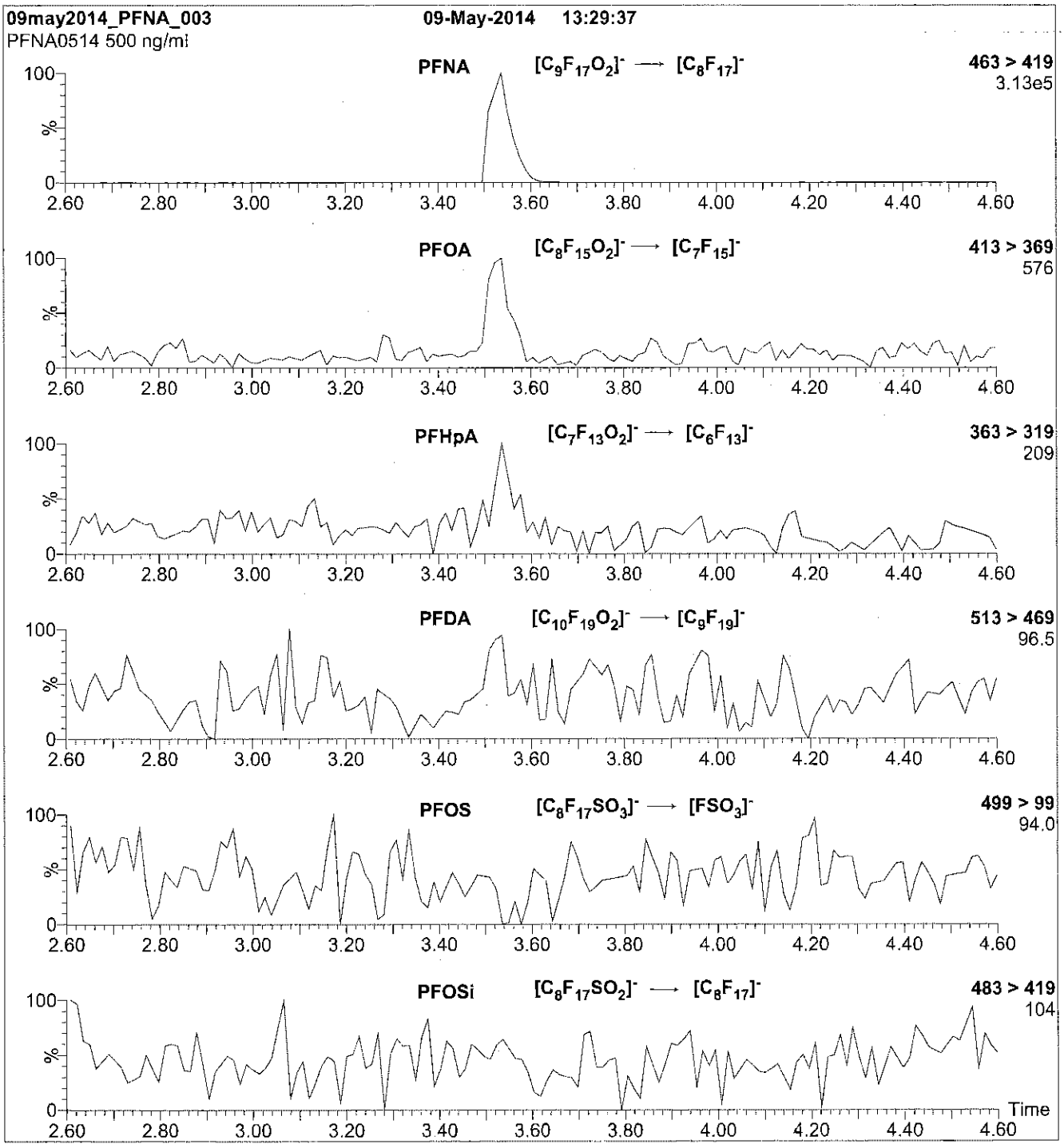
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFNA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFNA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.17e-3
Collision Energy (eV) = 11

# Reagent

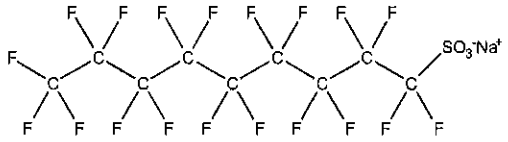
# LCPFNS_00002

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** L-PFNS
**COMPOUND:** Sodium perfluoro-1-nonanesulfonate
**LOT NUMBER:** LPFNS0712
**CAS #:** 98789-57-2

**STRUCTURE:**




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_9F_{19}SO_3Na$ | **MOLECULAR WEIGHT:** | 572.12 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>48.0 ± 2.4 µg/ml (PFNS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 07/04/2012 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 07/04/2017 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 01/15/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

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## HOMOGENEITY:

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$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

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## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

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CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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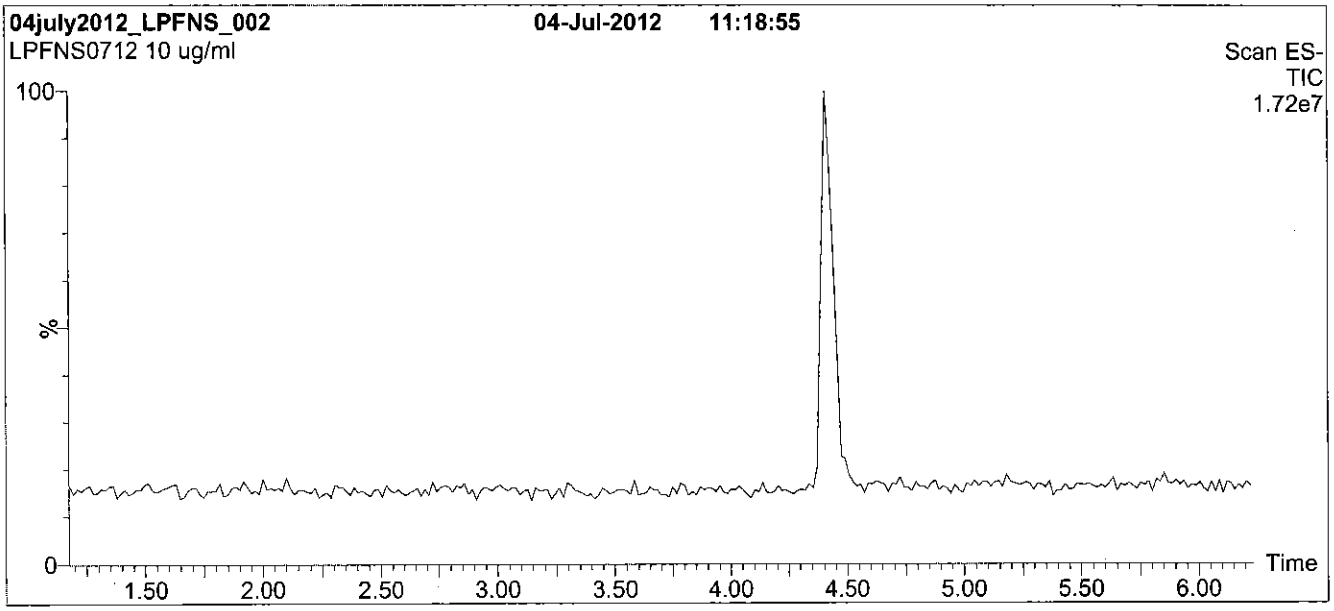
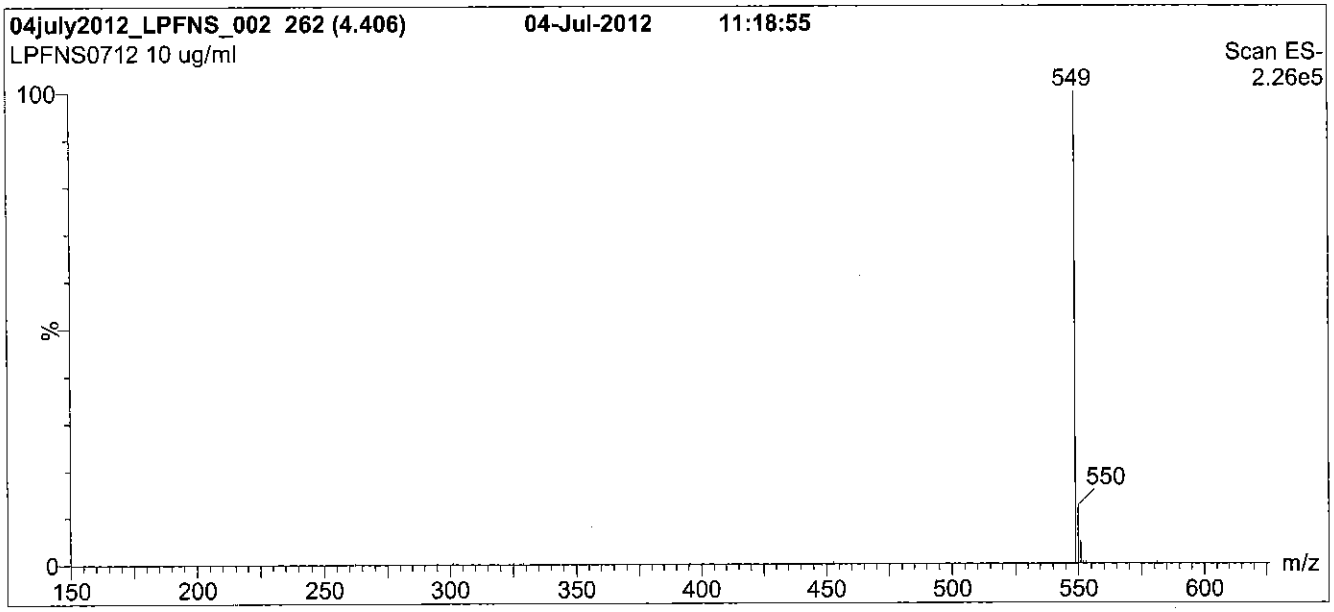
**Figure 1:** **L-PFNS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

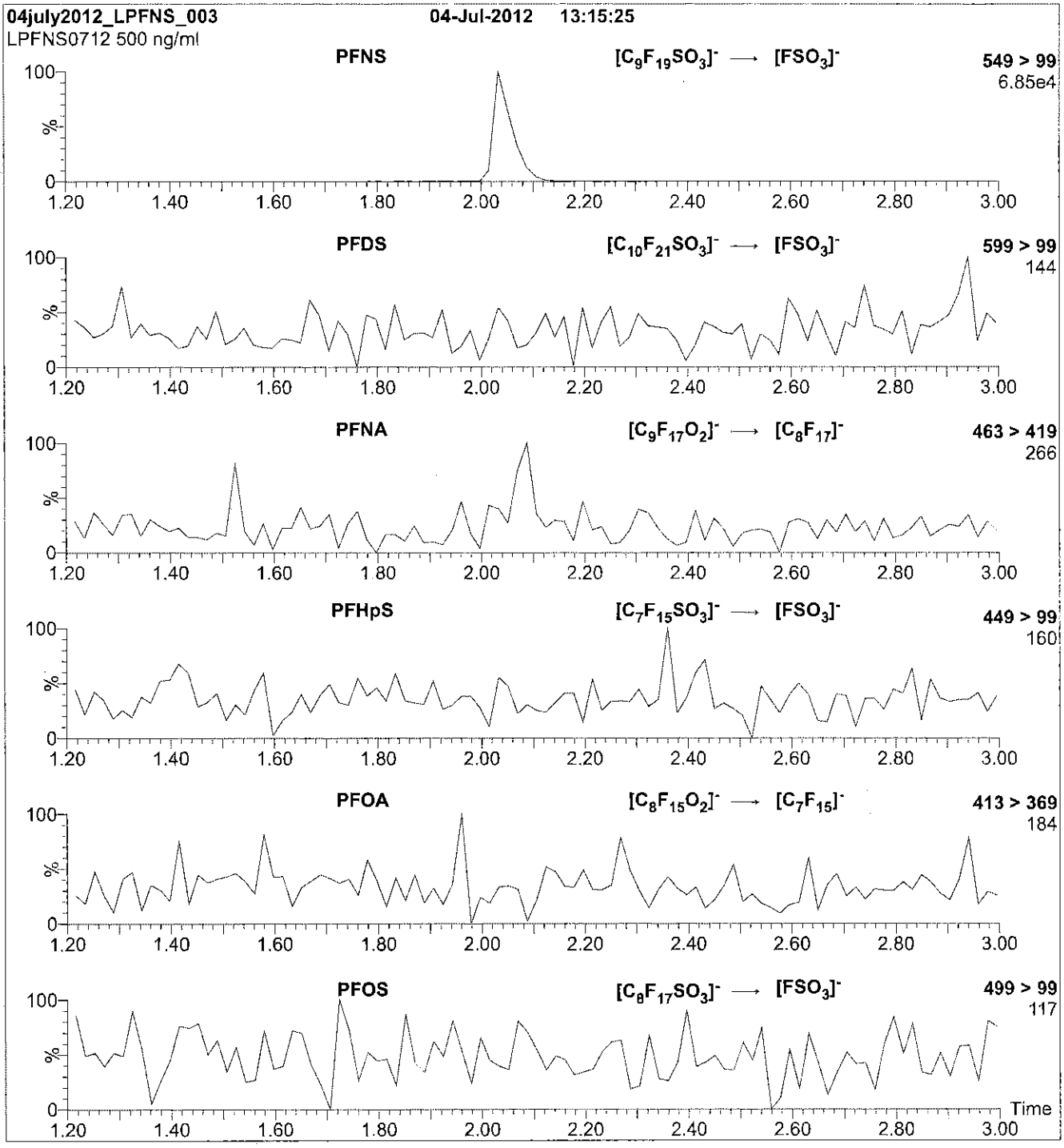
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 65.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **L-PFNS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml L-PFNS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 45

# Reagent

# LCPFOA_00004

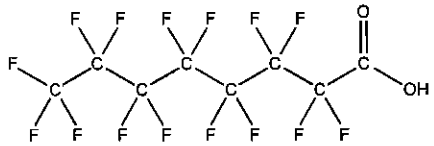
Rec 7/15/14

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFOA
**COMPOUND:** Perfluoro-n-octanoic acid
**LOT NUMBER:** PFOA1013

**STRUCTURE:**
**CAS #:** 335-67-1



**MOLECULAR FORMULA:** $C_8HF_{15}O_2$
**MOLECULAR WEIGHT:** 414.07
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 10/11/2013
**EXPIRY DATE:** (mm/dd/yyyy) 10/11/2018
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 10/18/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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## EXPIRY DATE / PERIOD OF VALIDITY:

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CALA Testing Accreditation No. A 1226

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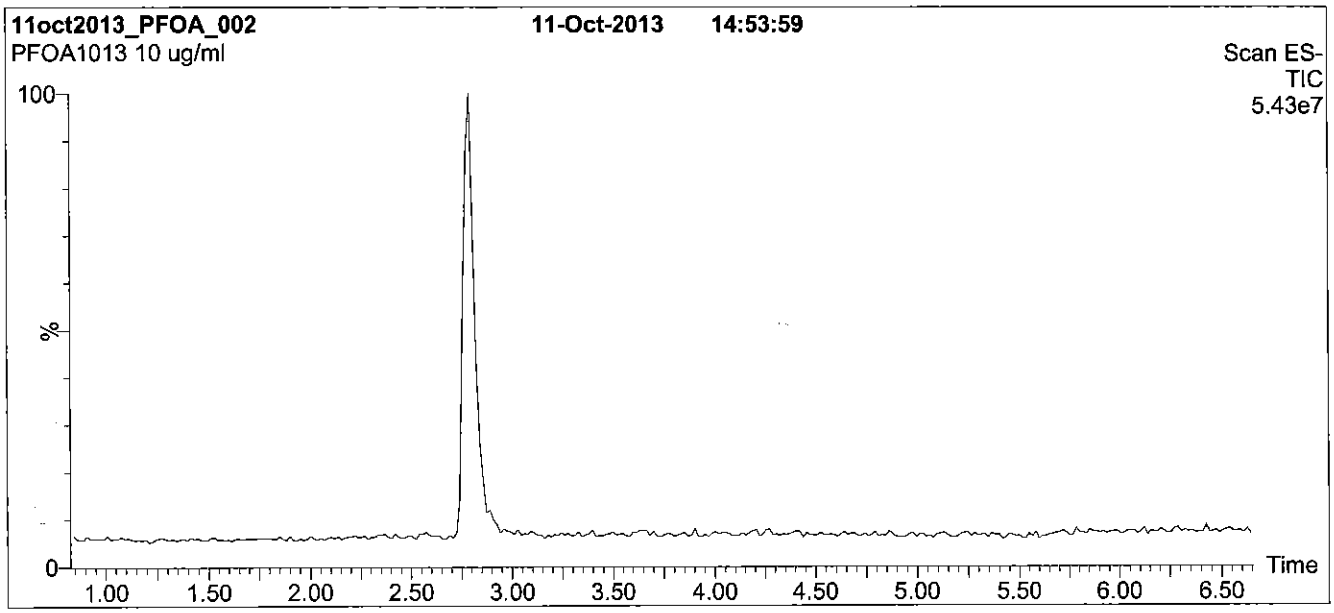
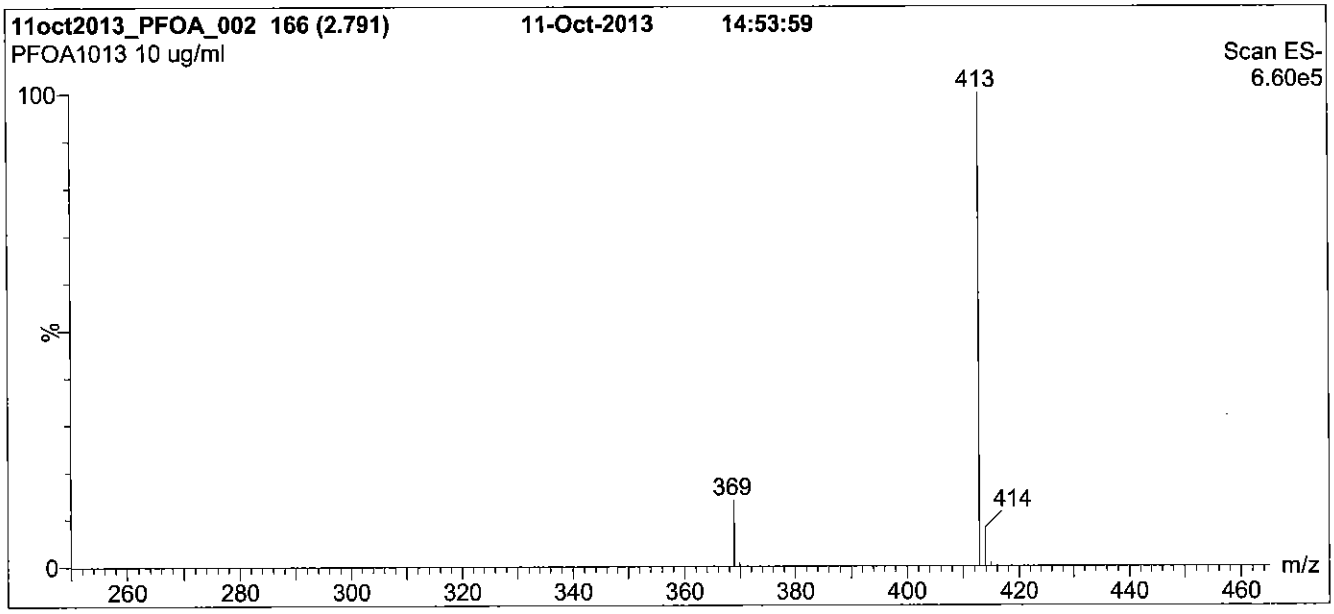
**Figure 1:** **PFOA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7.5 min and hold for
1 min before returning to initial conditions in 0.5 min.
Time: 10 min

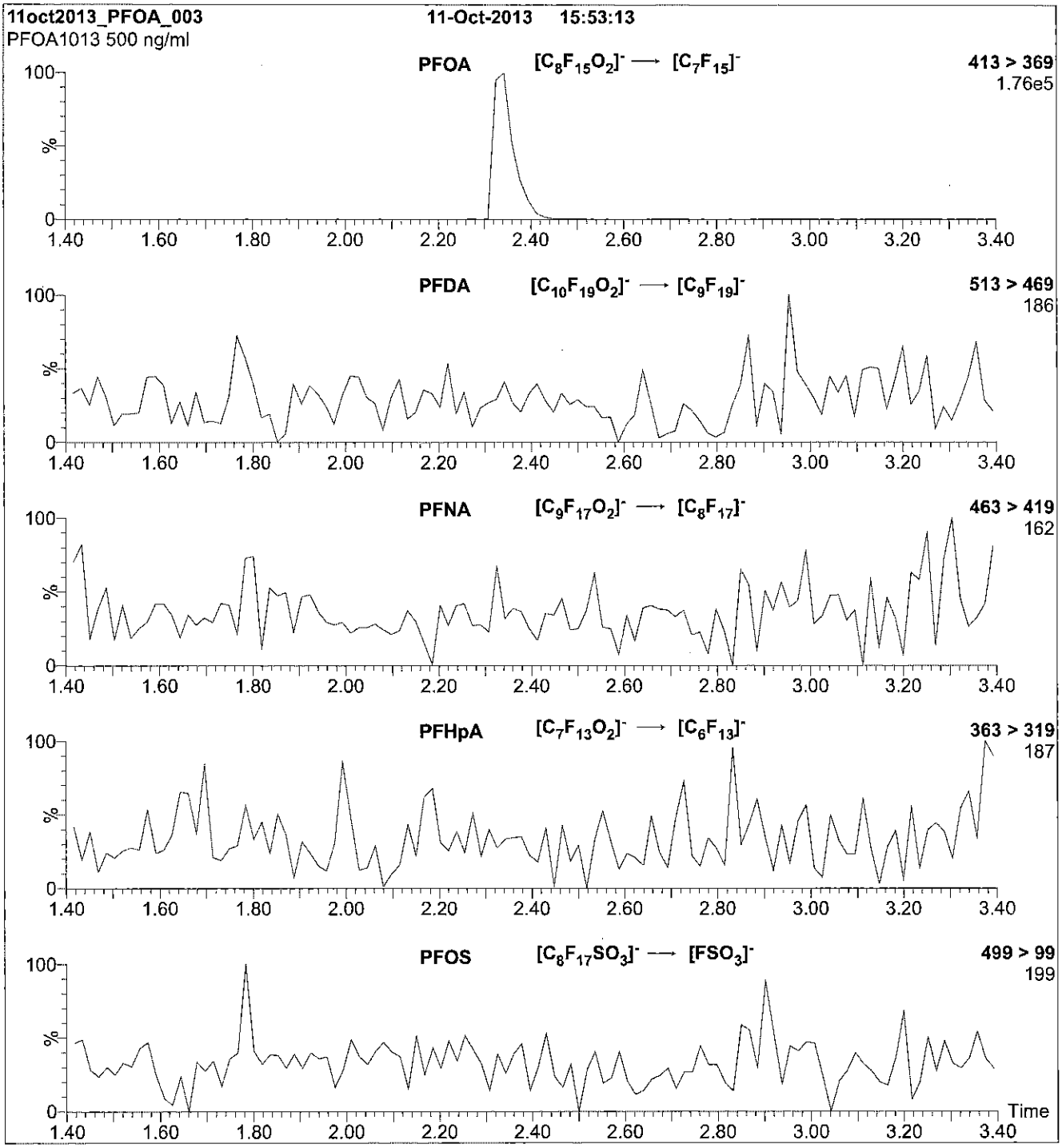
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFOA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml PFOA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 11

# Reagent

# LCPFOA_00005

Rec 4/30/15 CW

# WELLINGTON LABORATORIES

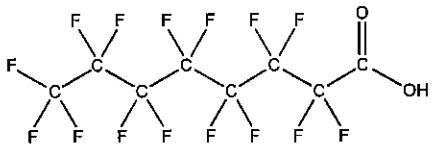
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFOA
**COMPOUND:** Perfluoro-n-octanoic acid

**LOT NUMBER:** PFOA1115

**STRUCTURE:**

**CAS #:** 335-67-1



**MOLECULAR FORMULA:** $C_8HF_{15}O_2$
**CONCENTRATION:** 50 ± 2.5 µg/ml

**MOLECULAR WEIGHT:** 414.07
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 11/06/2015
**EXPIRY DATE:** (mm/dd/yyyy) 11/06/2020
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 11/11/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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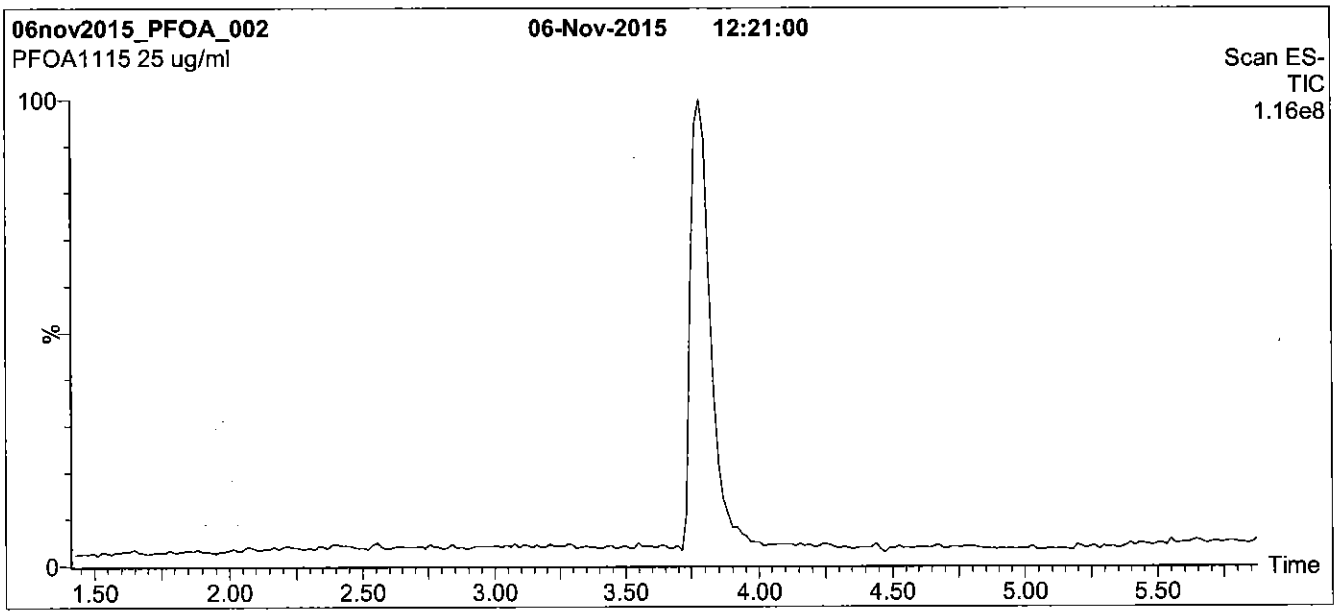
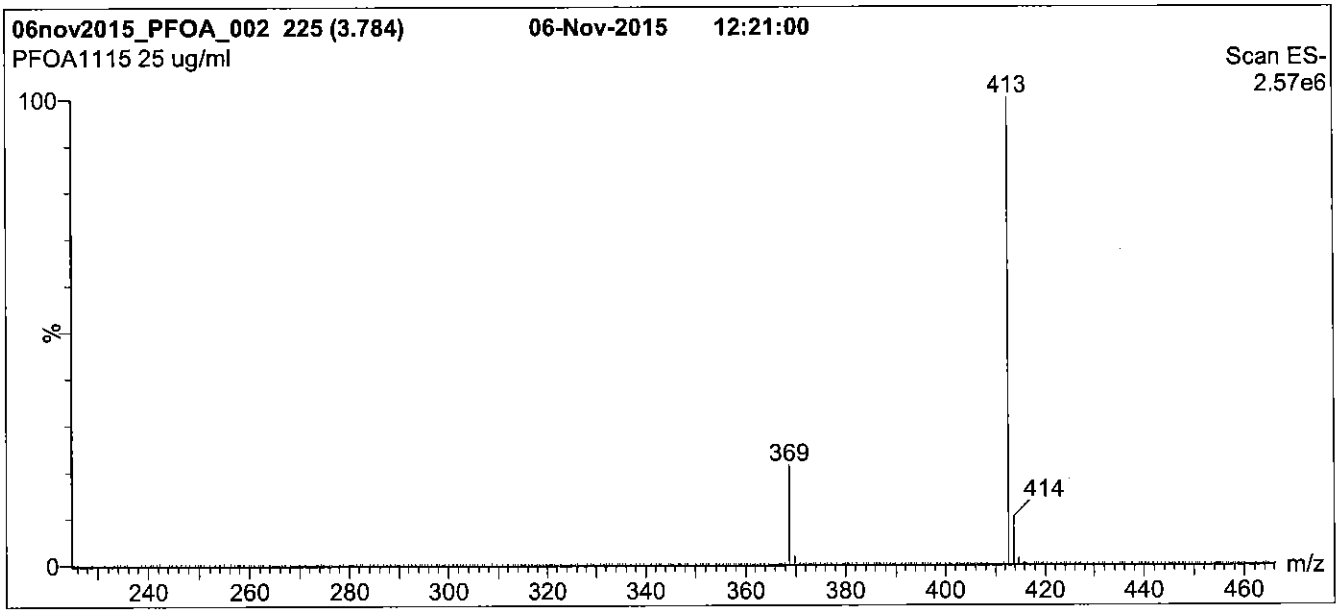
**Figure 1:** **PFOA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

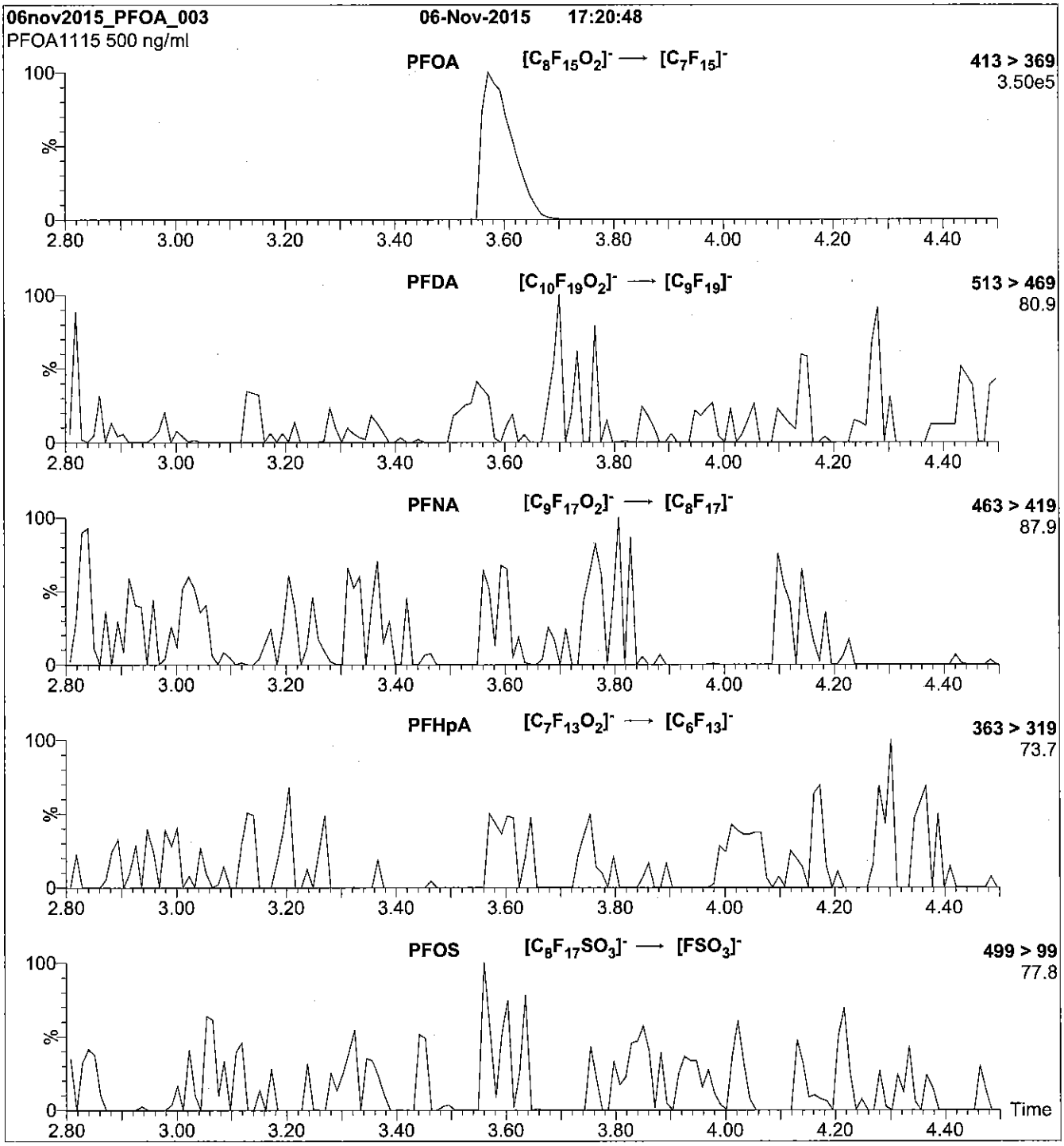
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFOA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

| | |
|---|---|
| Injection: | Direct loop injection<br>10 µl (500 ng/ml PFOA) |
| Mobile phase: | Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$<br>(both with 10 mM $NH_4OAc$ buffer) |
| Flow: | 300 µl/min |

**MS Parameters**

Collision Gas (mbar) = 3.17e-3
Collision Energy (eV) = 10

# Reagent

# LCPFODA_00004

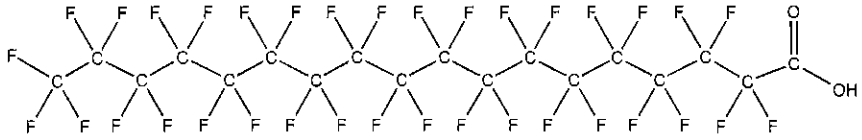
P: 24/15 RJ

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** PFODA
**LOT NUMBER:** PFODA0807
**COMPOUND:** Perfluoro-n-octadecanoic acid

**STRUCTURE:**
**CAS #:** 16517-11-6



**MOLECULAR FORMULA:** $C_{18}HF_{35}O_2$
**MOLECULAR WEIGHT:** 914.15
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (4%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 04/25/2014
**EXPIRY DATE:** (mm/dd/yyyy) 04/25/2017
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 04/28/2014 (mm/dd/yyyy)

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## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

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## HOMOGENEITY:

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where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

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## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

CALA Testing Accredited Méthodes No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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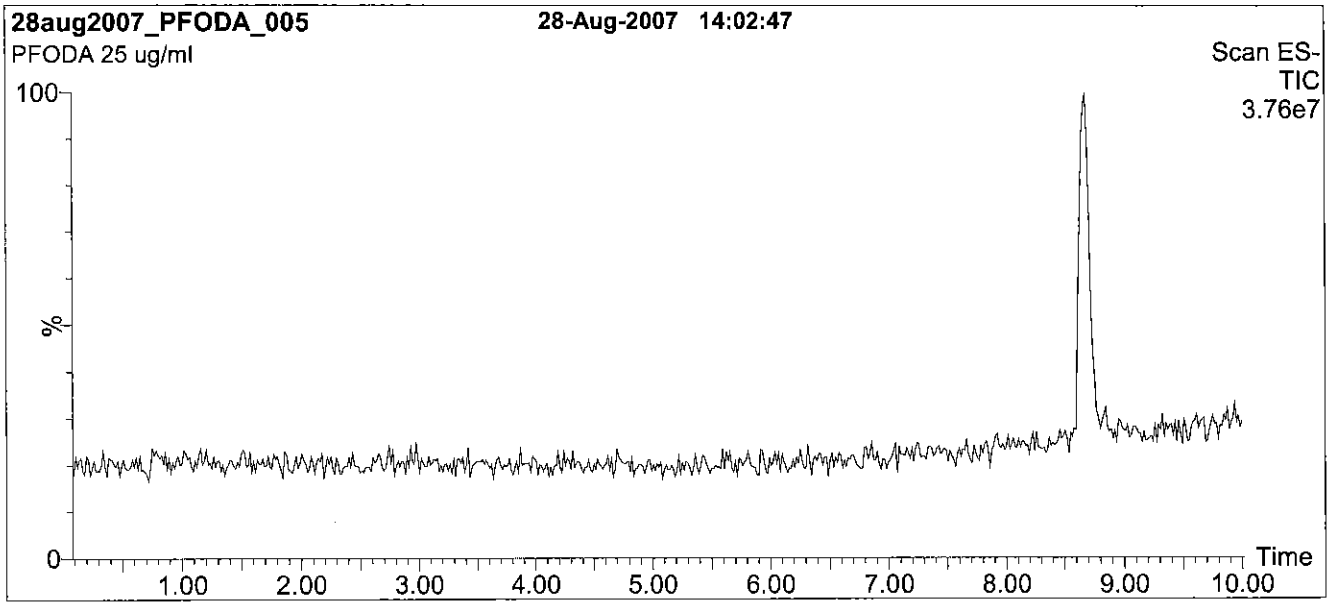
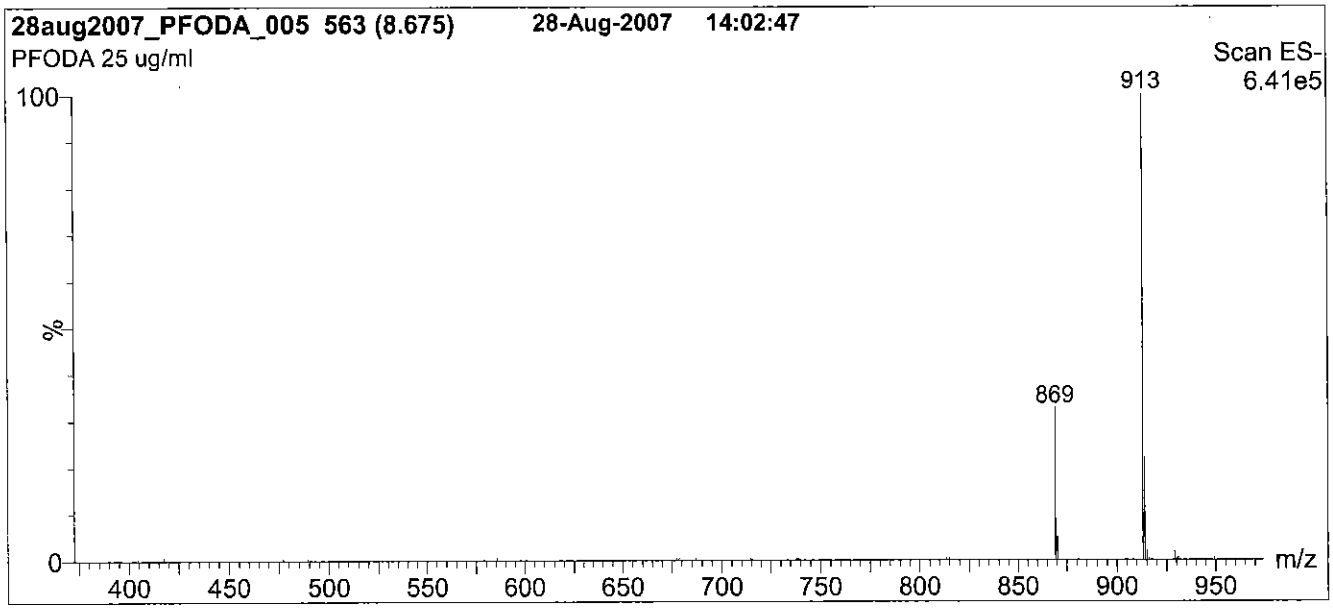
**Figure 1:** **PFODA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 75% (80:20 MeOH:ACN) / 25% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Hold 5 min. Ramp to 100% organic over 6 min.
Hold 3 min before returning to initial conditions.
Time: 16 min

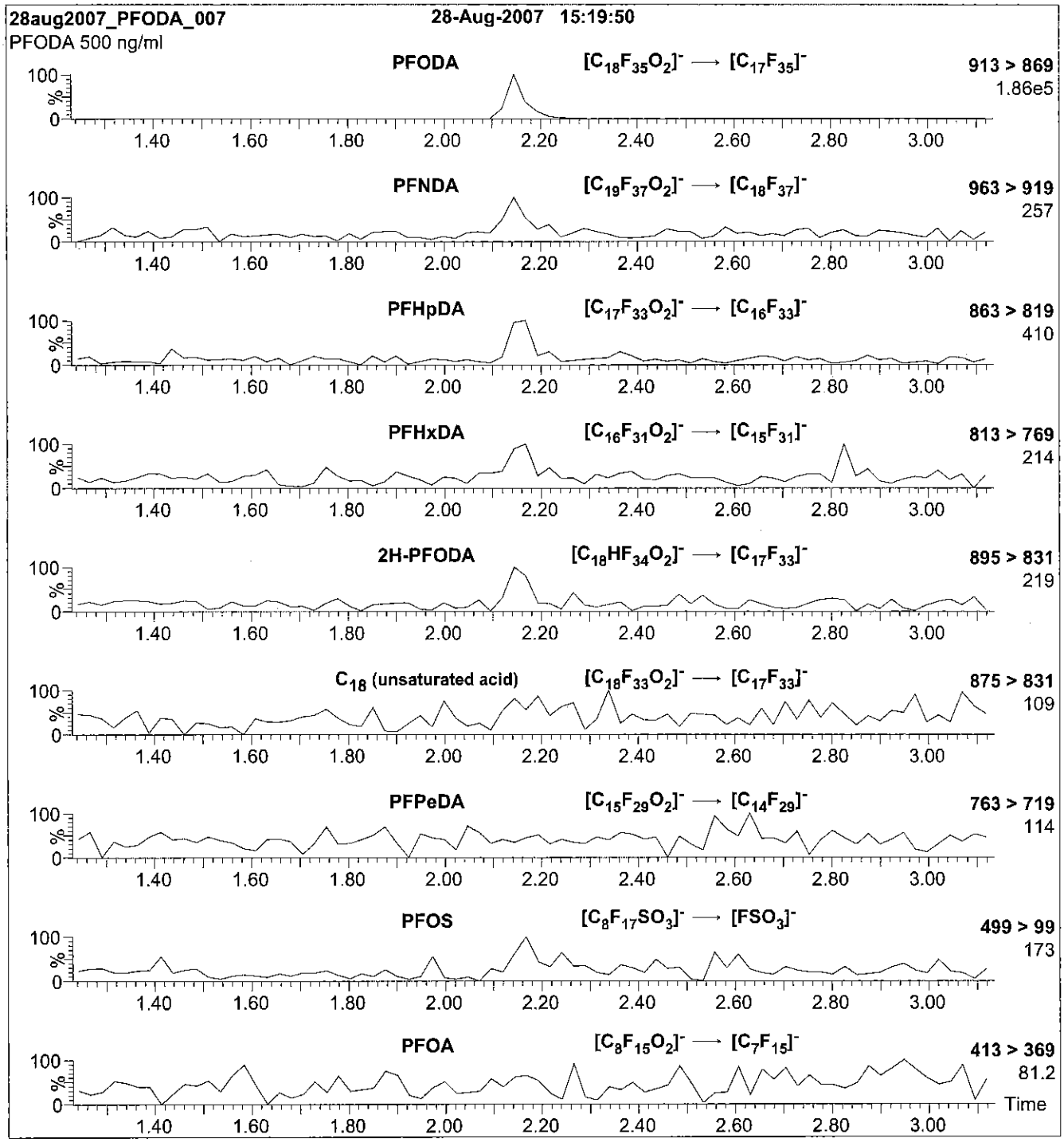
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 1100 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 650

**Figure 2:** **PFODA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFODA)

Mobile phase: Isocratic 75% (80:20 MeOH:ACN) / 25% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.58e-3
Collision Energy (eV) = 15

# Reagent

# LCPFOS-br_00001

566008
ID: LCPFOS-br_00001
Exp: 10/14/20 Pipd: CBW
Potassium Perfluorooctane

P: 12/9/15 SW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

# br-PFOSK

**Potassium Perfluorooctanesulfonate Solution/Mixture of Linear and Branched Isomers**

| | |
|---|---|
| **PRODUCT CODE:** | br-PFOSK |
| **LOT NUMBER:** | brPFOSK1015 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml (total potassium salt) |
| | 46.4 ± 2.3 µg/ml (total PFOS anion) |
| **SOLVENT(S):** | Methanol |
| **DATE PREPARED:** (mm/dd/yyyy) | 10/13/2015 |
| **LAST TESTED:** (mm/dd/yyyy) | 10/14/2015 |
| **EXPIRY DATE:** (mm/dd/yyyy) | 10/14/2020 |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place |

**DESCRIPTION:**

The chemical purity has been determined to be ≥98% perfluorooctanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the isomeric components are given in Table A.

**DOCUMENTATION/ DATA ATTACHED:**

Table A: Isomeric Components and Percent Composition by $^{19}$F-NMR
Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data (SIR)
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- A 5-point calibration curve was generated using linear PFOS (potassium salt) and mass-labelled PFOS as an internal standard to enable quantitation of br-PFOSK using isotopic dilution.
- CAS#: 2795-39-3 (for linear isomer; potassium salt).

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***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

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## HAZARDS:

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## HOMOGENEITY:

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## UNCERTAINTY:

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$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

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## EXPIRY DATE / PERIOD OF VALIDITY:

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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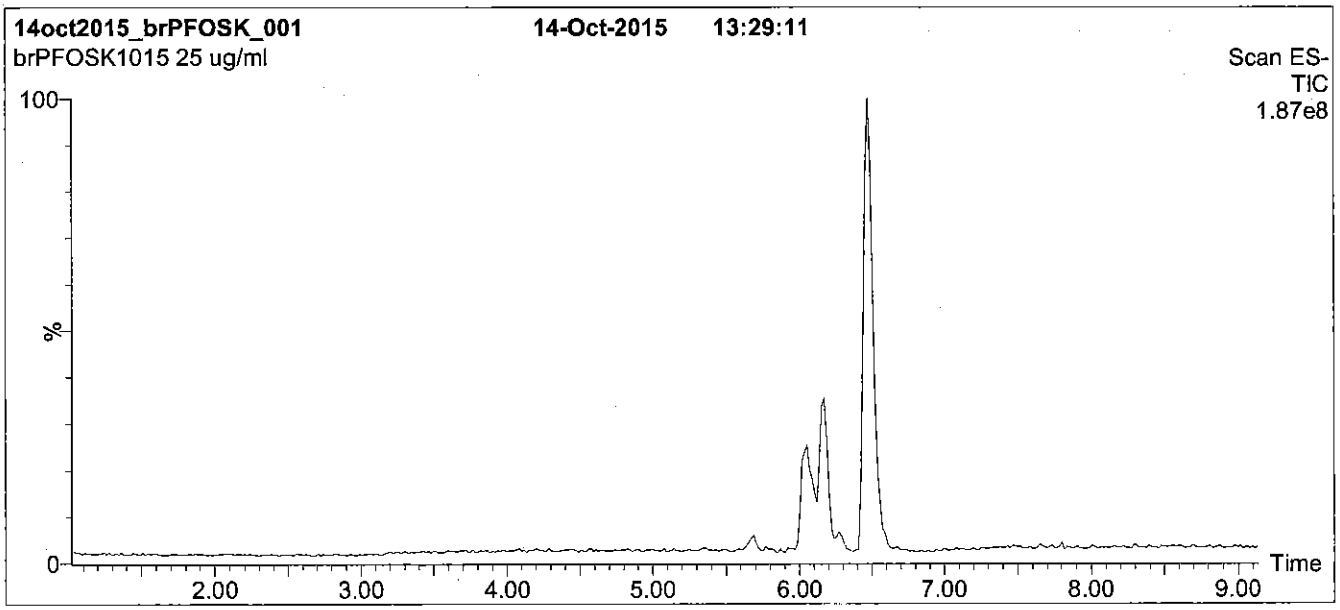
**Table A:** **br-PFOSK; Isomeric Components and Percent Composition (by $^{19}$F-NMR)***

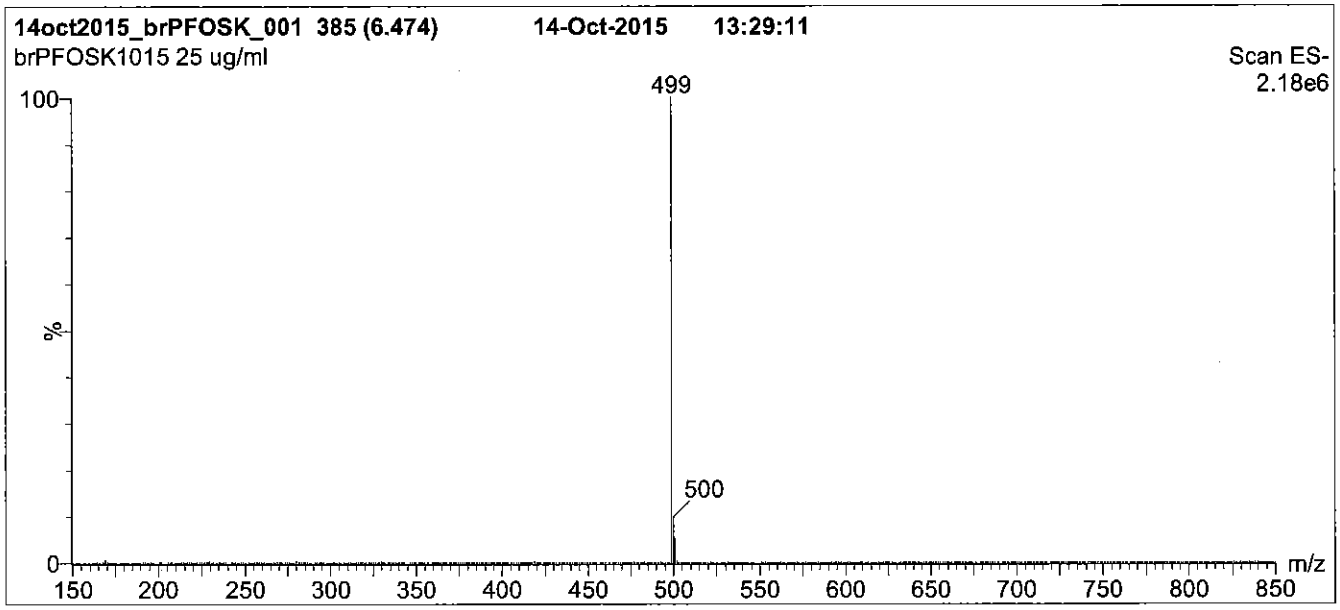
| Isomer | Name | Structure | Percent Composition by $^{19}$F-NMR |
|---|---|---|---|
| 1 | Potassium perfluoro-1-octanesulfonate | $CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$ | 78.8 |
| 2 | Potassium 1-trifluoromethylperfluoroheptanesulfonate** | $CF_3CF_2CF_2CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$ | 1.2 |
| 3 | Potassium 2-trifluoromethylperfluoroheptanesulfonate | $CF_3CF_2CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$ | 0.6 |
| 4 | Potassium 3-trifluoromethylperfluoroheptanesulfonate | $CF_3CF_2CF_2CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$ | 1.9 |
| 5 | Potassium 4-trifluoromethylperfluoroheptanesulfonate | $CF_3CF_2CF_2CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$ | 2.2 |
| 6 | Potassium 5-trifluoromethylperfluoroheptanesulfonate | $CF_3CF_2CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$ | 4.5 |
| 7 | Potassium 6-trifluoromethylperfluoroheptanesulfonate | $CF_3CF(CF_3)CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$ | 10.0 |
| 8 | Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate | $CF_3-C(CF_3)_2CF_2CF_2CF_2SO_3^-K^+$ | 0.2 |
| 9 | Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate | $CF_3CF_2-C(CF_3)_2-CF_2CF_2SO_3^-K^+$ | 0.03 |
| 10 | Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate | $CF_3-CF(CF_3)-CF(CF_3)-CF_2CF_2CF_2SO_3^-K^+$ | 0.4 |
| 11 | Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate | $CF_3-CF(CF_3)-CF_2-CF(CF_3)-CF_2CF_2SO_3^-K^+$ | 0.07 |

* Percent of total perfluorooctanesulfonate isomers only. Isomers are labelled in Figure 2.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

**Certified By:** _____ **Date:** 10/15/2015
(mm/dd/yyyy)
B.G. Chittim

**Figure 1:** **br-PFOSK; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 12 min and hold for 2 min.
Return to initial conditions over 0.5 min.
Time: 16 min

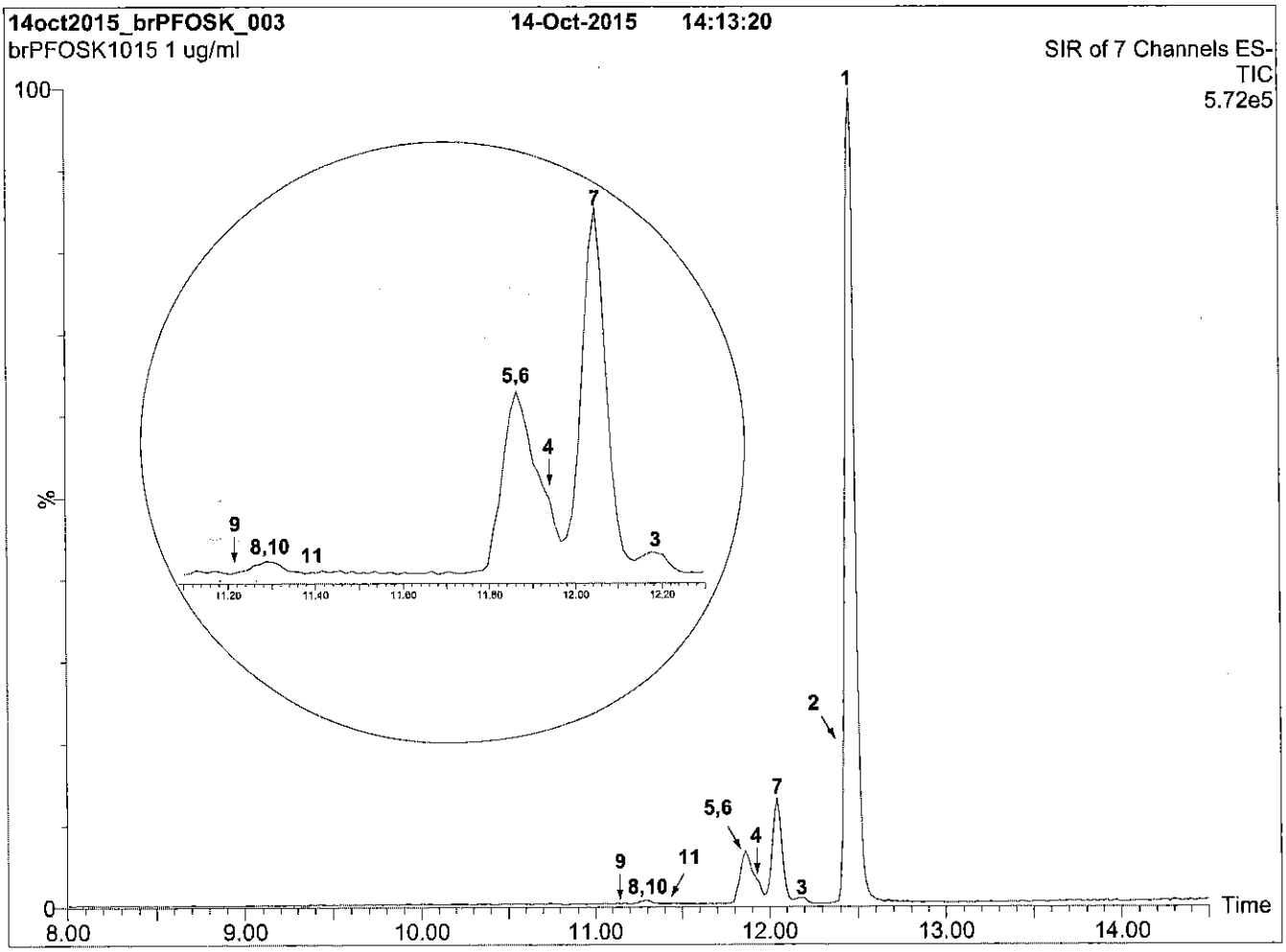
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **br-PFOSK; LC/MS Data (SIR)**




**Conditions for Figure 2:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions:**

Column: Acquity UPLC BEH Shield $RP_{18}$ (1.7 µm, 2.1 x 100 mm)

Injection: 1.0 µg/ml of br-PFOSK

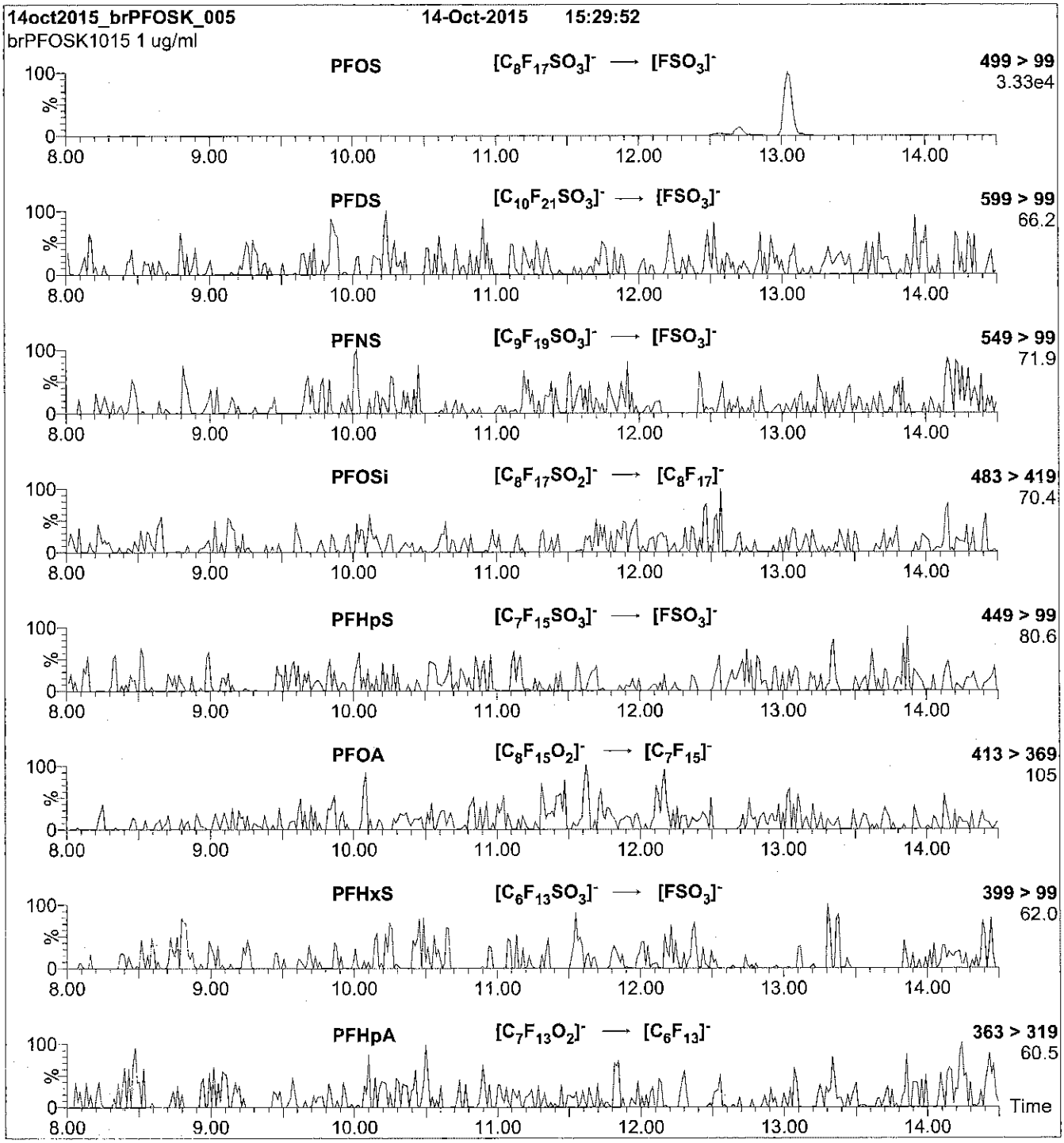
Mobile Phase: Gradient
45% (80:20 MeOH:ACN) / 55% $H_2O$ (both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 15 min and hold for 3 min.
Return to initial conditions over 1 min.
Time: 20 min

Flow: 300 µl/min

**MS Conditions:**

SIR ($ES^-$)
Source = 110 °C
Desolvation = 325 °C
Cone Voltage = 60V

**Figure 3:** **br-PFOSK; LC/MS/MS Data (Selected MRM Transitions)**




**Condltions for Figure 3:**

Injection: On-column

Mobile phase: Same as Figure 2

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.06e-3
Collision Energy (eV) = 11-50 (variable)

# Reagent

# LCPFOS_00004

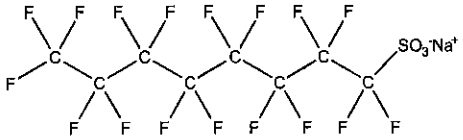
C 3/17/15 SV

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** L-PFOS
**LOT NUMBER:** LPFOS0614
**COMPOUND:** Sodium perfluoro-1-octanesulfonate

**STRUCTURE:**




**CAS #:** 4021-47-0

| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_8F_{17}SO_3Na$ | **MOLECULAR WEIGHT:** | 522.11 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>47.8 ± 2.4 µg/ml (PFOS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 06/20/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 06/20/2019 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** _____ **Date:** 10/27/2014 (mm/dd/yyyy)
B.G. Chittim

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1$, $x_2$,...$x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

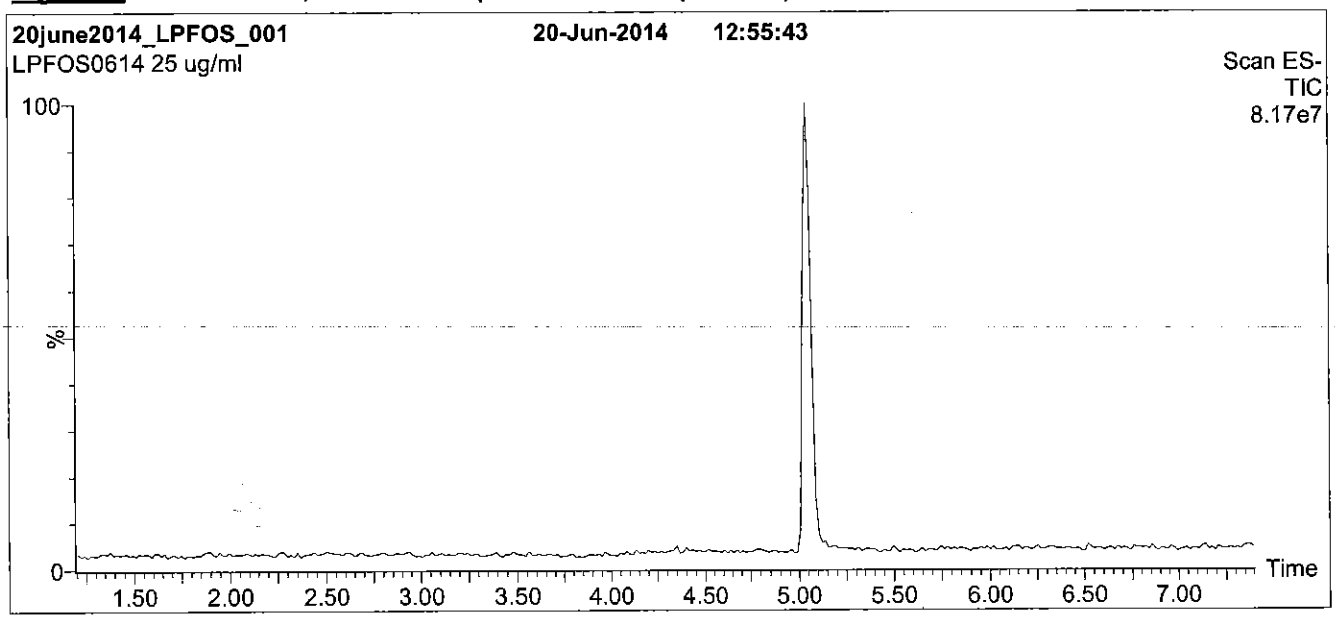
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

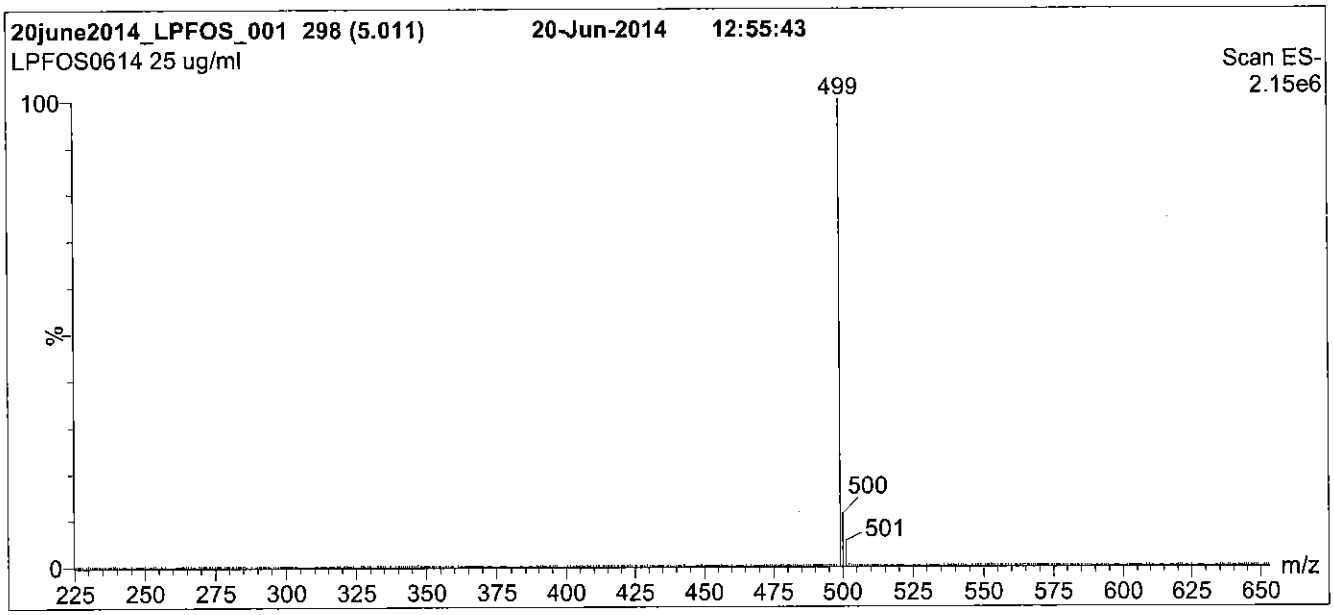
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **L-PFOS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

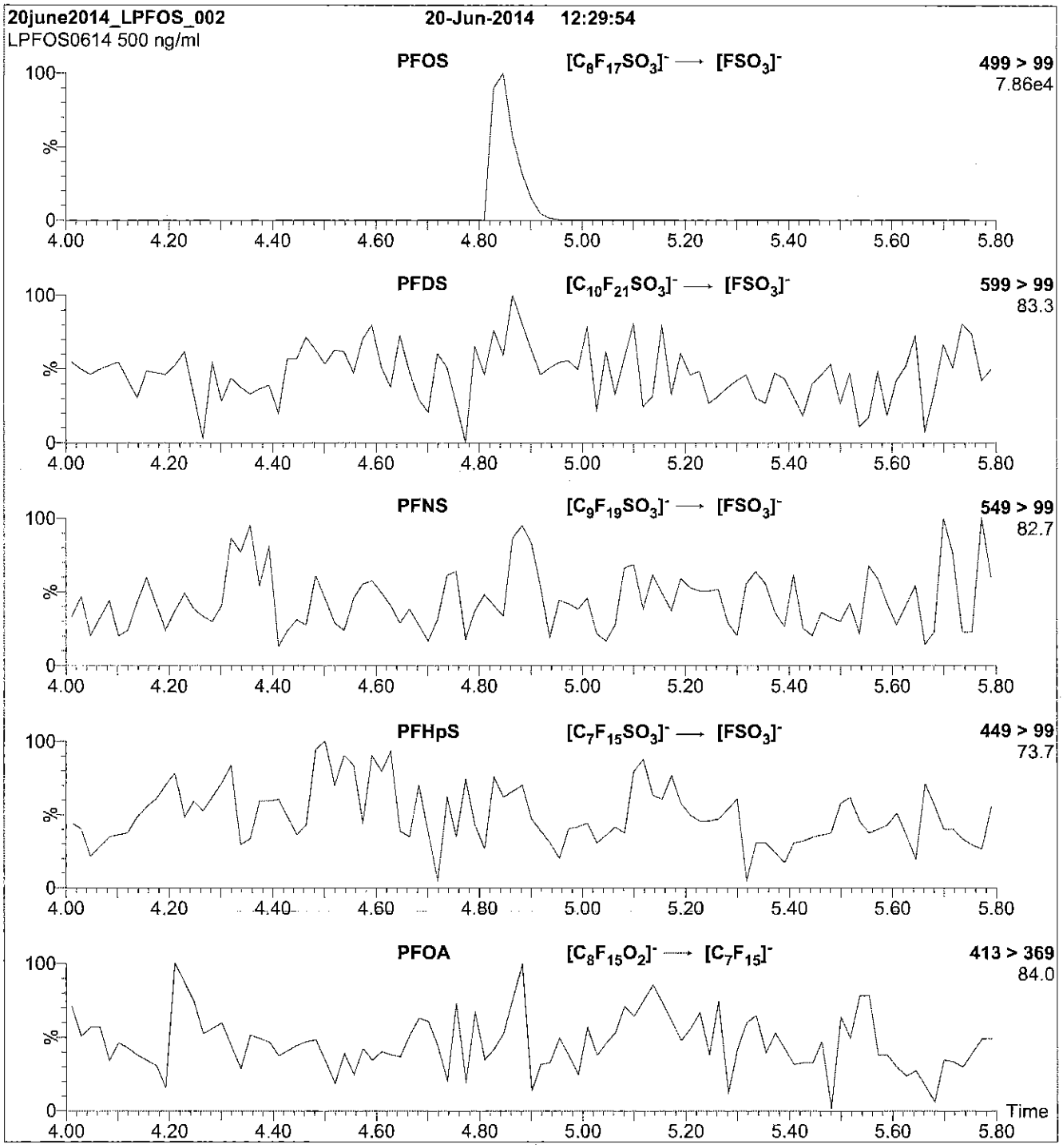
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **L-PFOS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml L-PFOS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 40

# Reagent

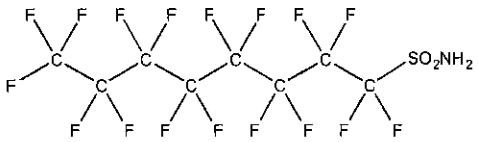
# LCPFOSA_00005

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** FOSA-I
**COMPOUND:** Perfluoro-1-octanesulfonamide
**LOT NUMBER:** FOSA0714I

**STRUCTURE:**
**CAS #:** 754-91-6




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_8H_2F_{17}NO_2S$ | **MOLECULAR WEIGHT:** | 499.14 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Isopropanol |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 07/31/2014 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | Stability studies ongoing | | |
| **RECOMMENDED STORAGE:** | Refrigerate ampoule | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 08/05/2014 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1$, $x_2$,...$x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

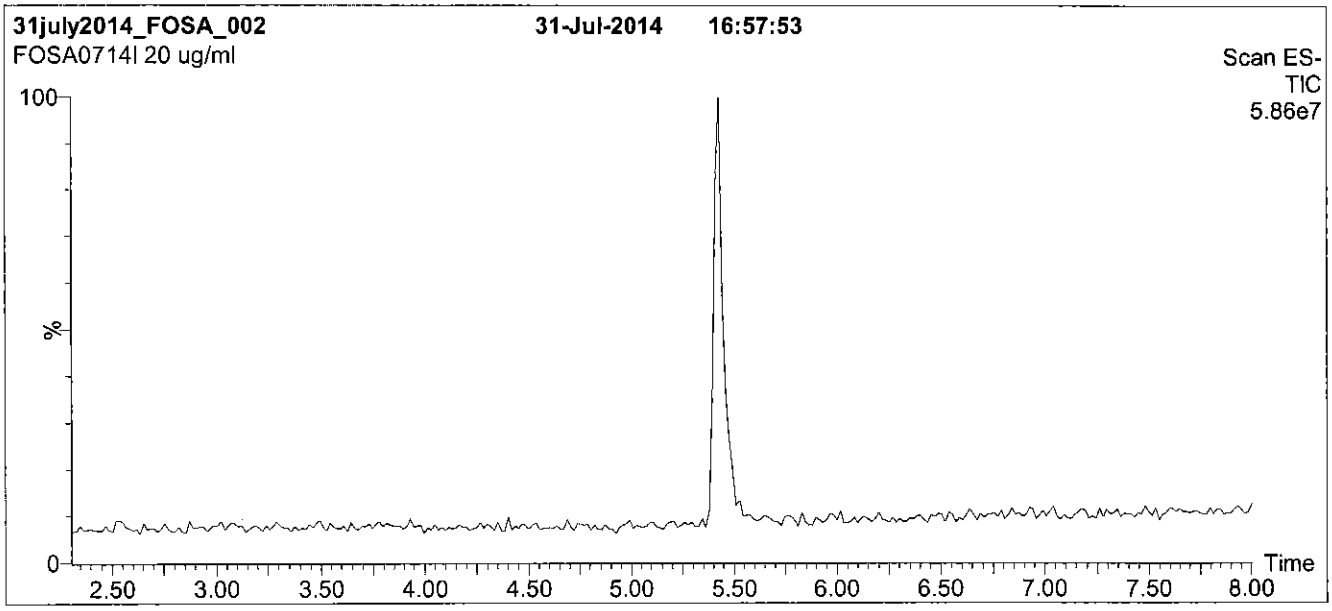
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

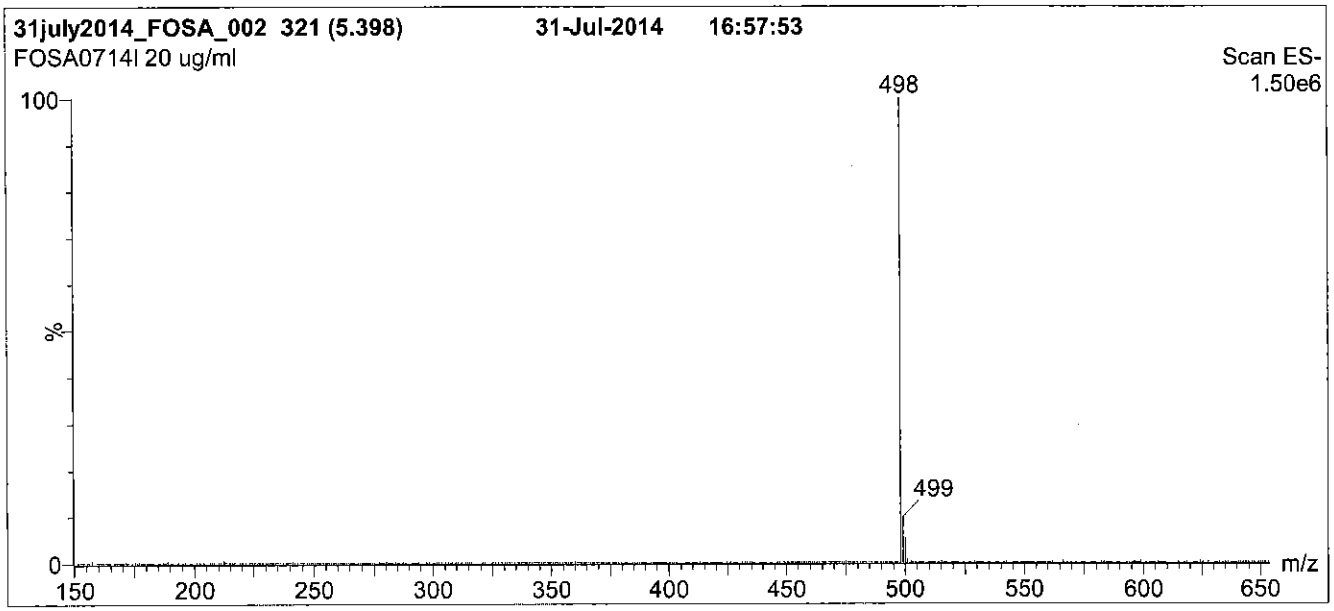
CALA

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **FOSA-I; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH $C_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

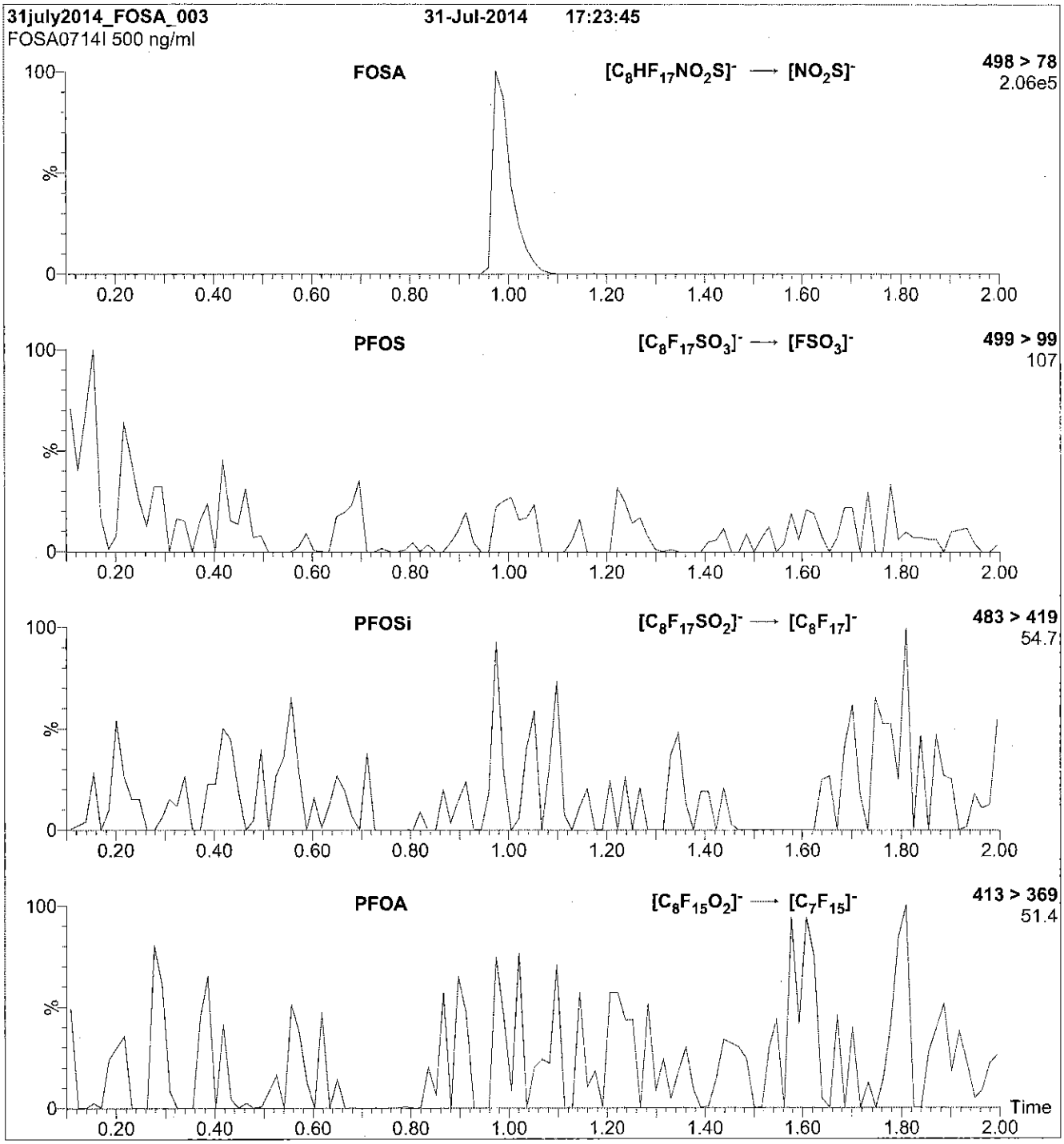
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **FOSA-I; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml FOSA-I)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.58e-3
Collision Energy (eV) = 30

# Reagent

# LCPFOSA_00006

Rec 12/30/15 CW

# WELLINGTON LABORATORIES

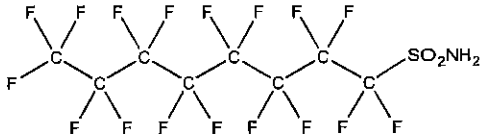
# CERTIFICATE OF ANALYSIS
## DOCUMENTATION

**PRODUCT CODE:** FOSA-I
**COMPOUND:** Perfluoro-1-octanesulfonamide

**LOT NUMBER:** FOSA0815I

**STRUCTURE:**

**CAS #:** 754-91-6



| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_8H_2F_{17}NO_2S$ | **MOLECULAR WEIGHT:** | 499.14 |
| **CONCENTRATION:** | 50 ± 2.5 µg/ml | **SOLVENT(S):** | Isopropanol |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 09/02/2015 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 09/02/2017 | | |
| **RECOMMENDED STORAGE:** | Refrigerate ampoule | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 09/11/2015 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

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## HOMOGENEITY:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

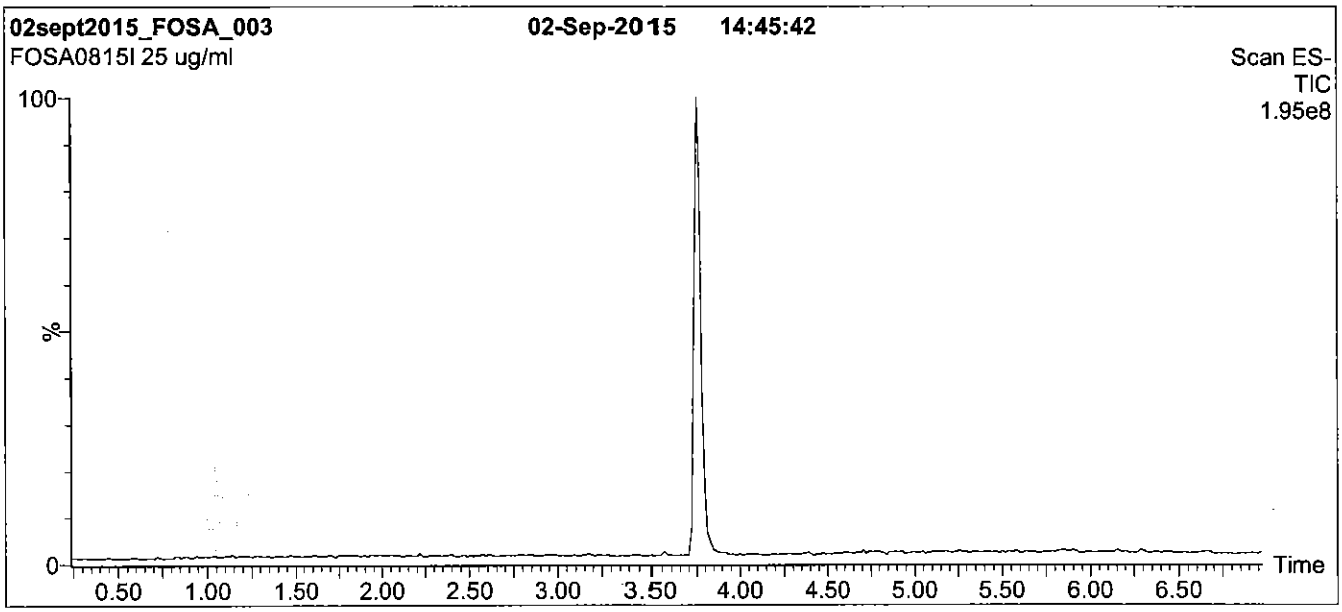
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

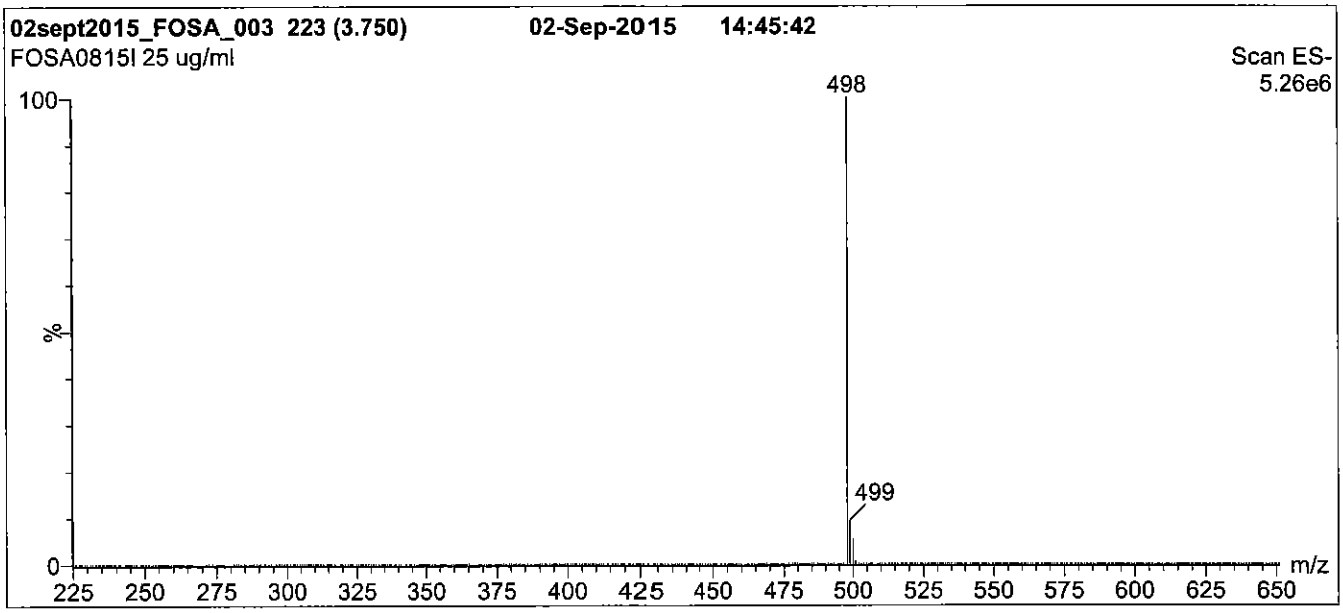
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17025 AR REFERENCE MATERIAL PRODUCER

**For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

**Figure 1:** **FOSA-I; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

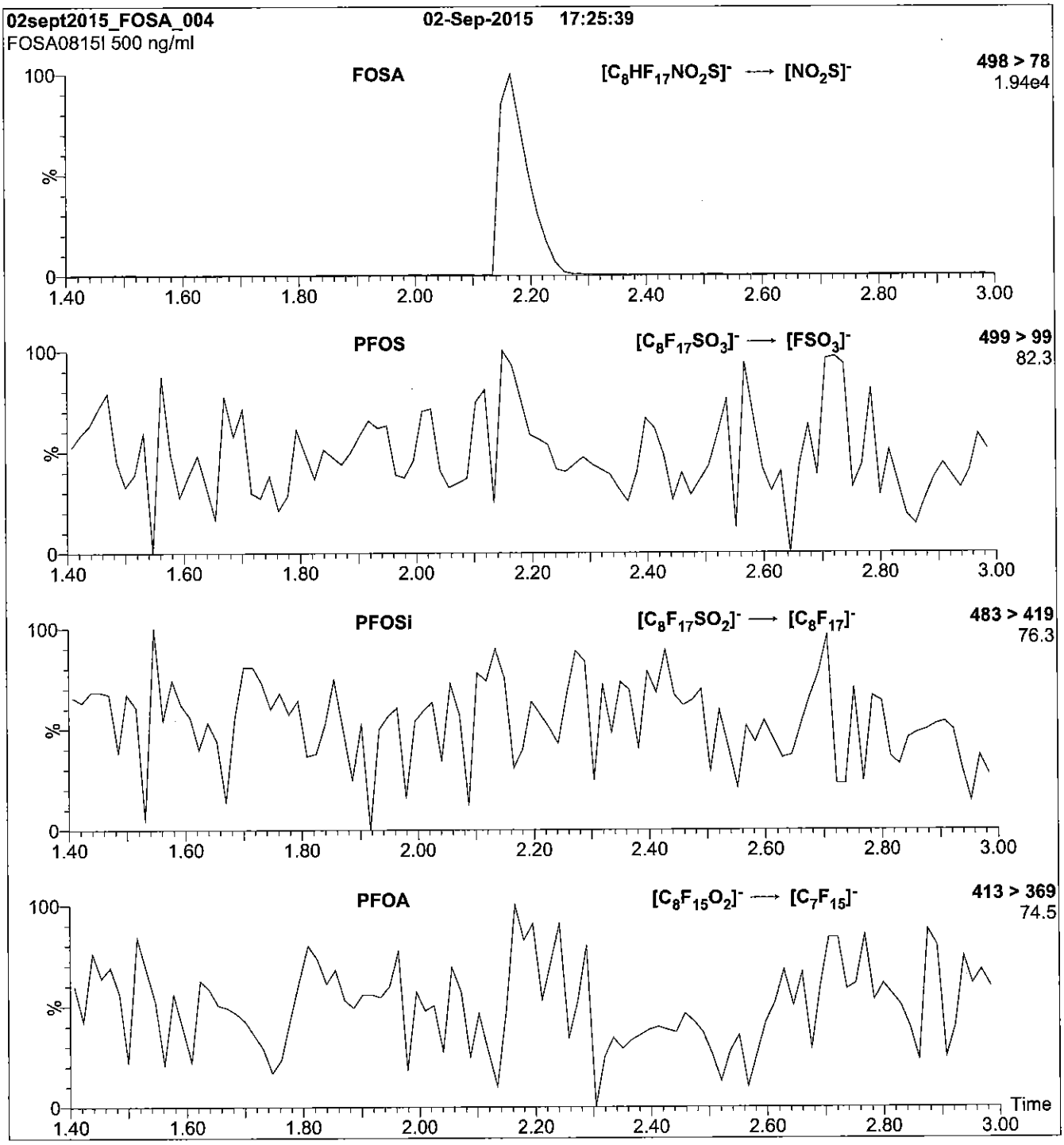
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **FOSA-I; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml FOSA-I)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 30

# Reagent

# LCPFPeA_00003

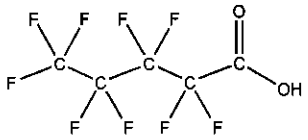
Rec 7/15/14

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFPeA
**COMPOUND:** Perfluoro-n-pentanoic acid
**LOT NUMBER:** PFPeA0113

**STRUCTURE:**
**CAS #:** 2706-90-3



**MOLECULAR FORMULA:** $C_5HF_9O_2$
**MOLECULAR WEIGHT:** 264.05
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 01/03/2013
**EXPIRY DATE:** (mm/dd/yyyy) 01/03/2018
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.3% of Perfluoro-n-heptanoic acid (PFHpA) and ~ 0.2% of $C_5H_2F_8O_2$ (hydrido - derivative) as measured by $^{19}F$ NMR.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 01/14/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1$, $x_2$,...$x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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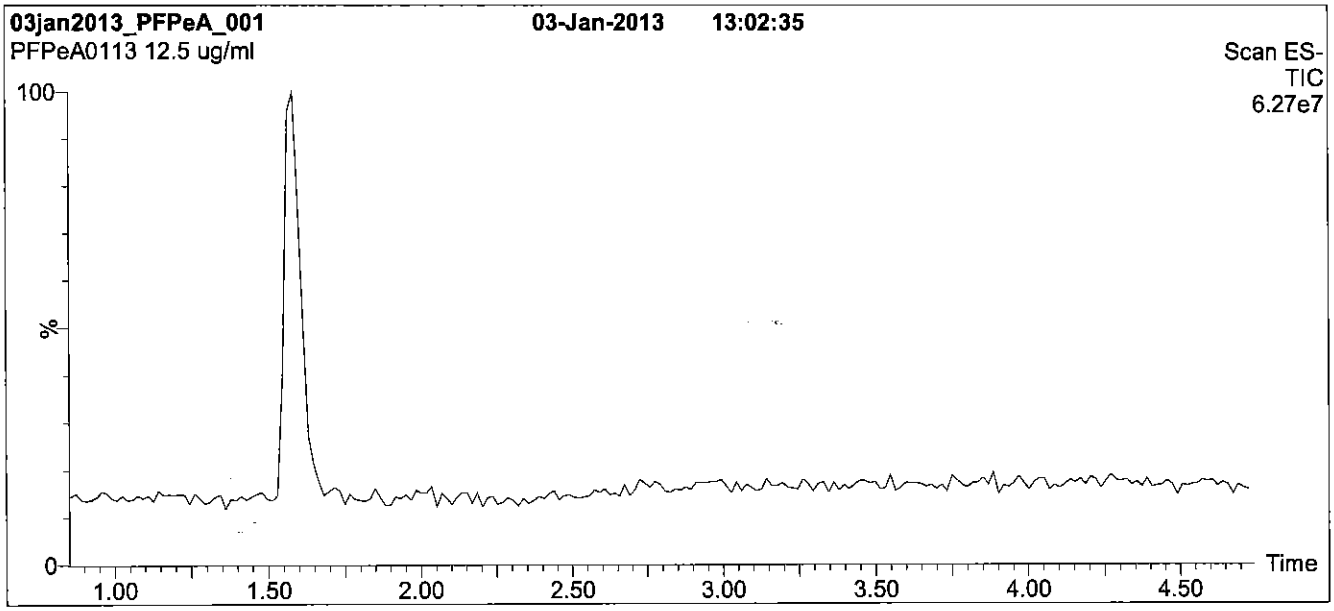
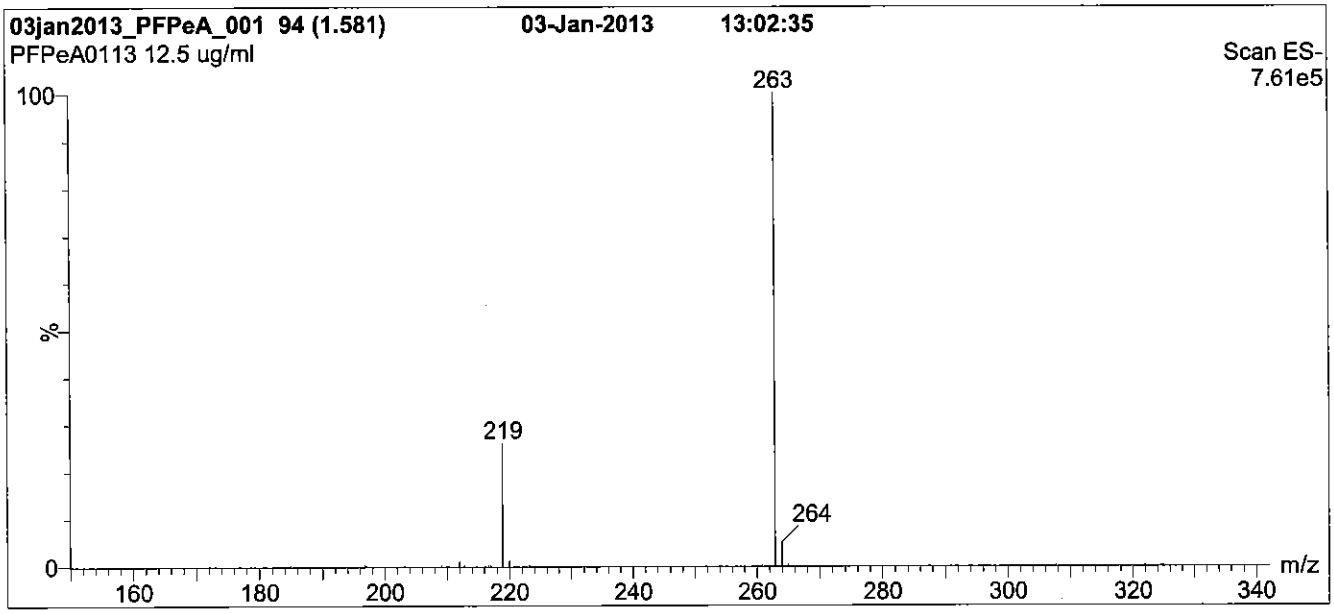
**Figure 1:** **PFPeA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions in 0.5 min.
Time: 10 min

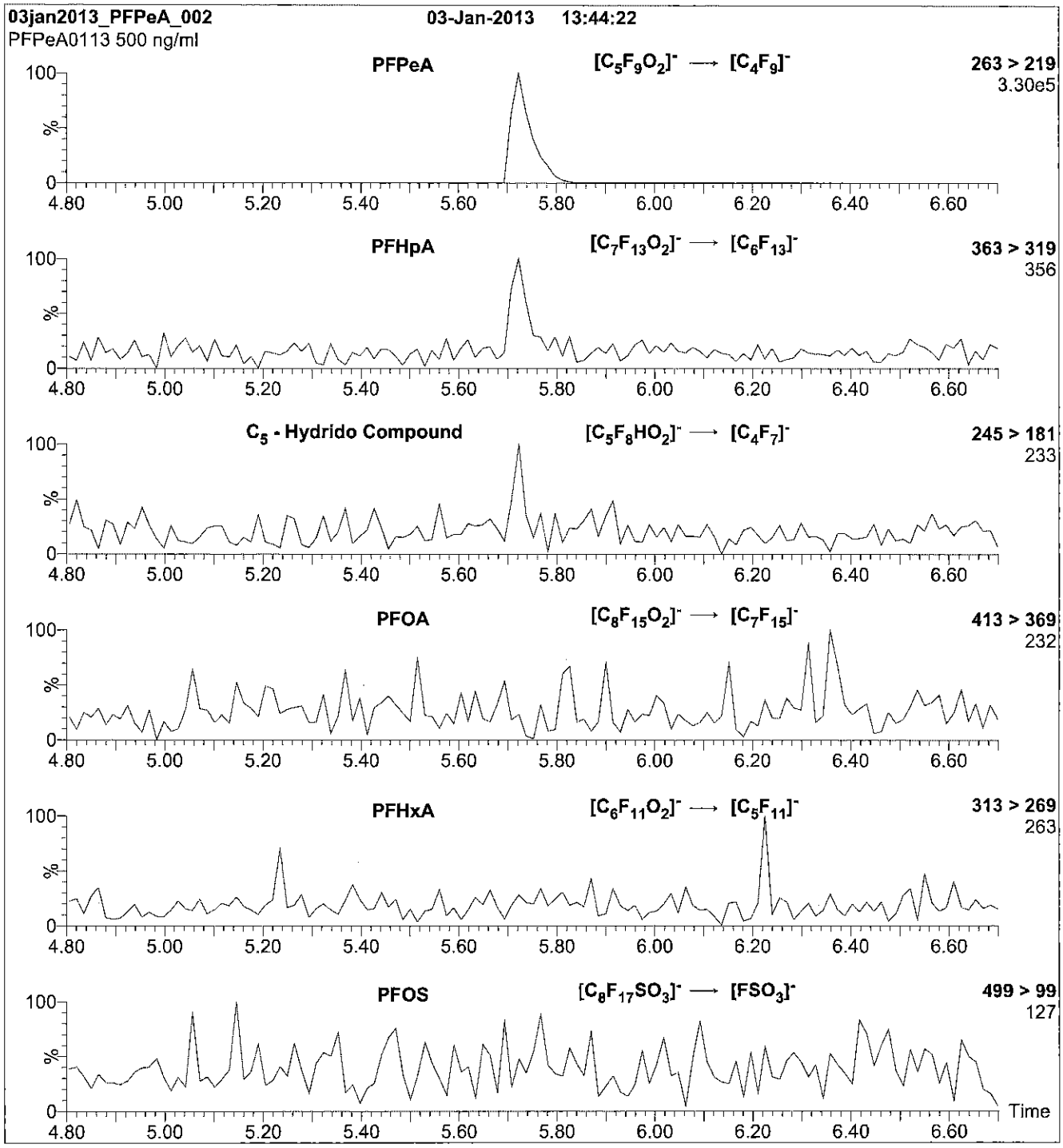
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFPeA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFPeA)

Mobile phase: Isocratic 70% (80:20 MeOH:ACN) / 30% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 9

# Reagent

# LCPFPeA_00004

Rec: 12/30/15 aw

# WELLINGTON LABORATORIES

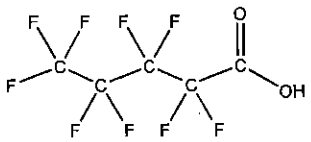
## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFPeA
**COMPOUND:** Perfluoro-n-pentanoic acid

**LOT NUMBER:** PFPeA0115

**STRUCTURE:**

**CAS #:** 2706-90-3



**MOLECULAR FORMULA:** $C_5HF_9O_2$
**CONCENTRATION:** 50 ± 2.5 µg/ml

**MOLECULAR WEIGHT:** 264.05
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 01/30/2015
**EXPIRY DATE:** (mm/dd/yyyy) 01/30/2020
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.3% of Perfluoro-n-heptanoic acid (PFHpA) and ~ 0.2% of $C_5H_2F_8O_2$ (hydrido - derivative) as measured by $^{19}F$ NMR.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 03/26/2015 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

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## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

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CALA Testing Accreditation No. 1226

ANAB ACCREDITED ISO 17025 REFERENCE MATERIAL PRODUCER

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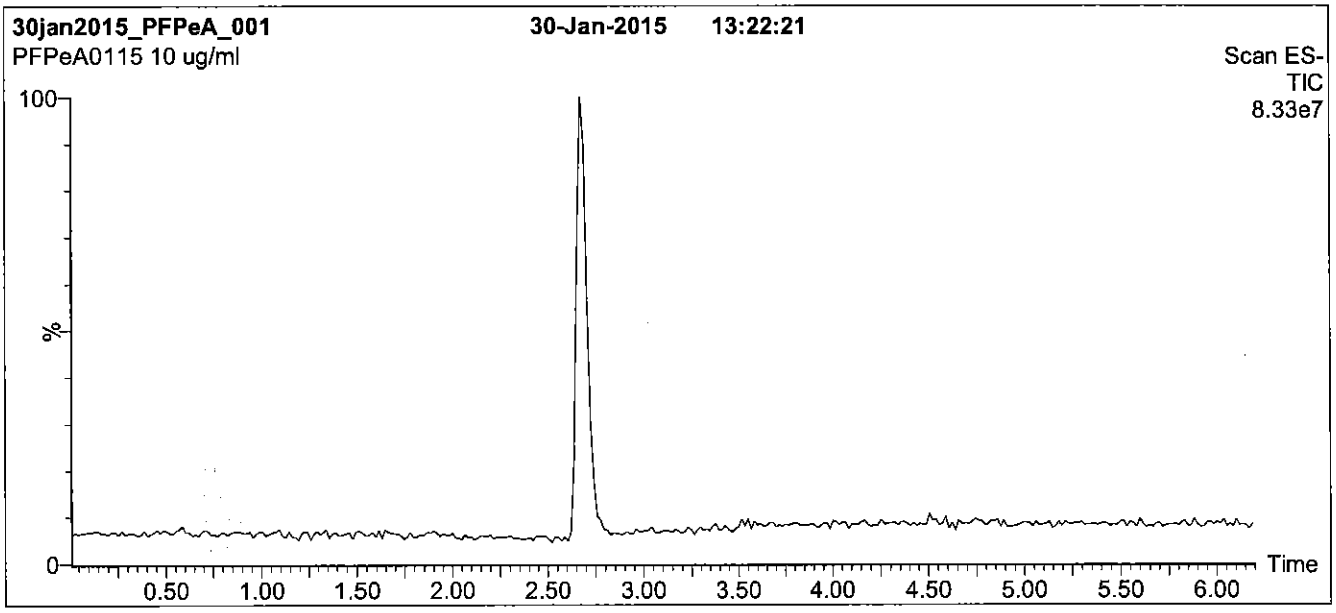
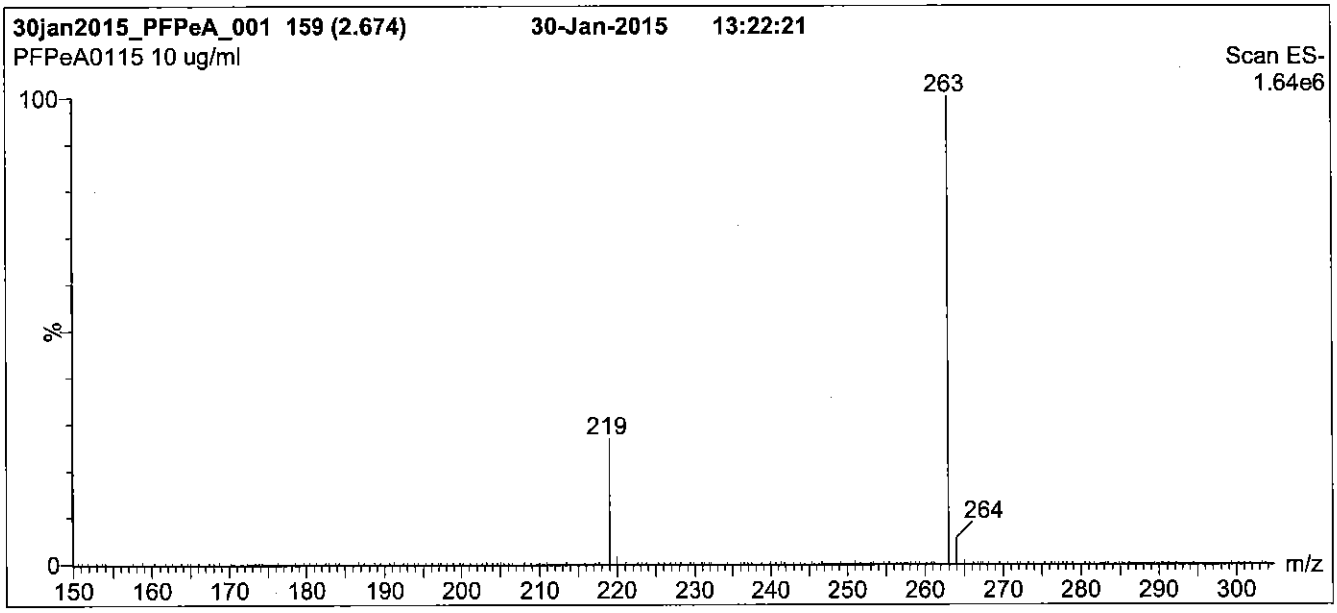
**Figure 1:** **PFPeA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

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**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7.5 min and hold for 1 min before returning to initial conditions in 0.5 min.
Time: 10 min

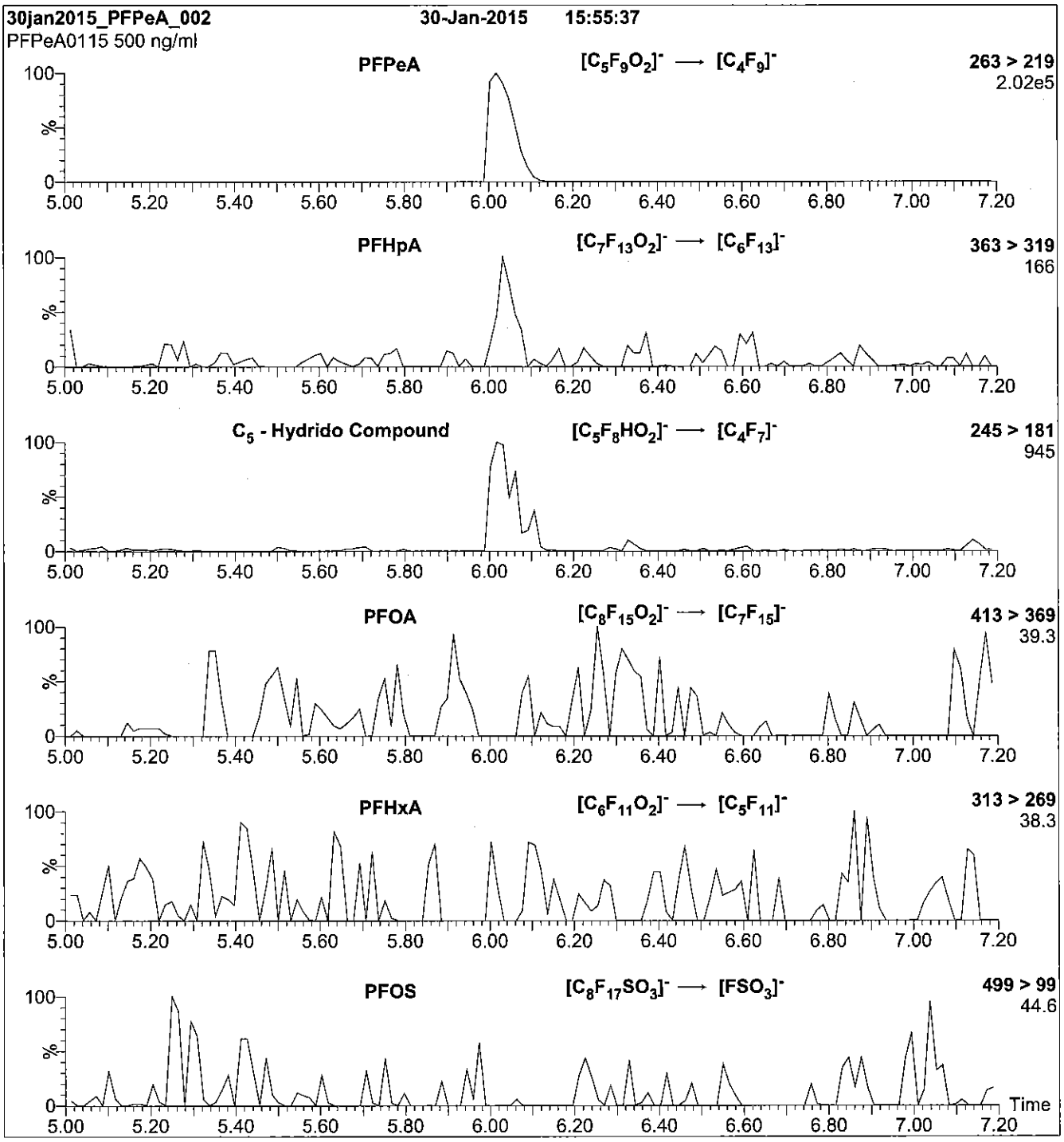
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFPeA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFPeA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 9

# Reagent

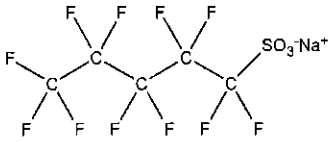
# LCPFPeS_00002

R 24hrs ow

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS DOCUMENTATION

**PRODUCT CODE:** L-PFPeS
**LOT NUMBER:** LPFPeS0712
**COMPOUND:** Sodium perfluoro-1-pentanesulfonate
**STRUCTURE:**
**CAS #:** Not available




| | | | |
|---|---|---|---|
| **MOLECULAR FORMULA:** | $C_5F_{11}SO_3Na$ | **MOLECULAR WEIGHT:** | 372.09 |
| **CONCENTRATION:** | 50.0 ± 2.5 µg/ml (Na salt)<br>46.9 ± 2.3 µg/ml (PFPeS anion) | **SOLVENT(S):** | Methanol |
| **CHEMICAL PURITY:** | >98% | | |
| **LAST TESTED:** (mm/dd/yyyy) | 07/04/2012 | | |
| **EXPIRY DATE:** (mm/dd/yyyy) | 07/04/2017 | | |
| **RECOMMENDED STORAGE:** | Store ampoule in a cool, dark place | | |

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 01/15/2013 (mm/dd/yyyy)

***Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA***
***519-822-2436 • Fax: 519-822-2849 • info@well-labs.com***

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CALA Testing Accreditation No. A 1226

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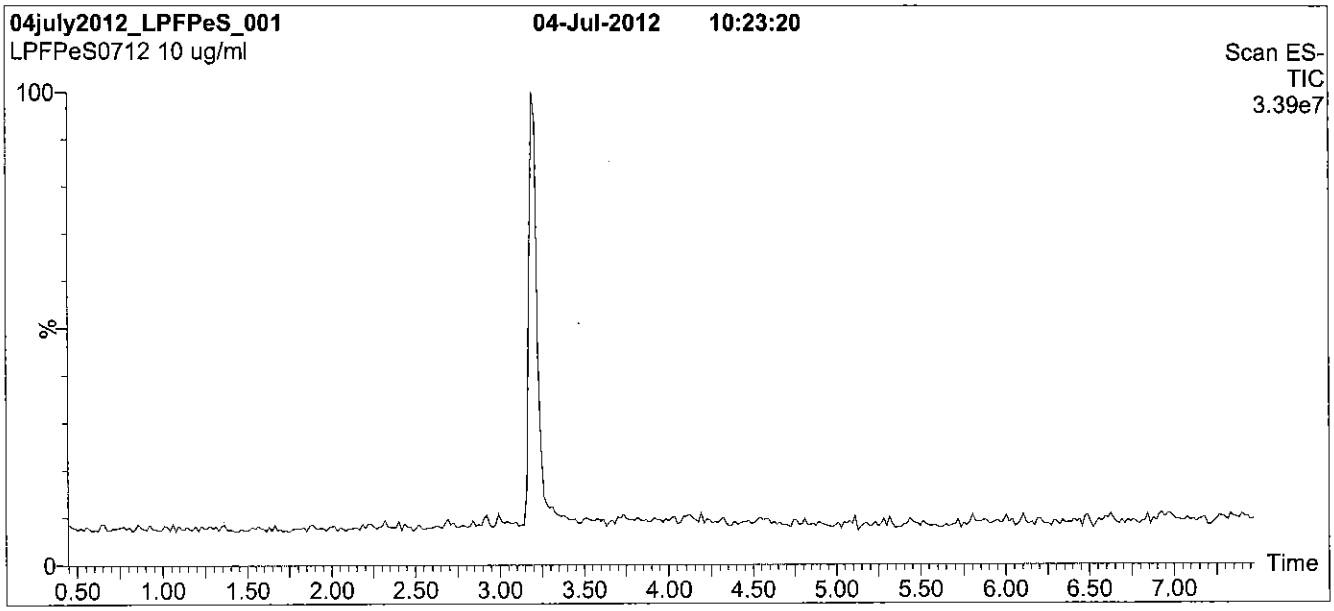
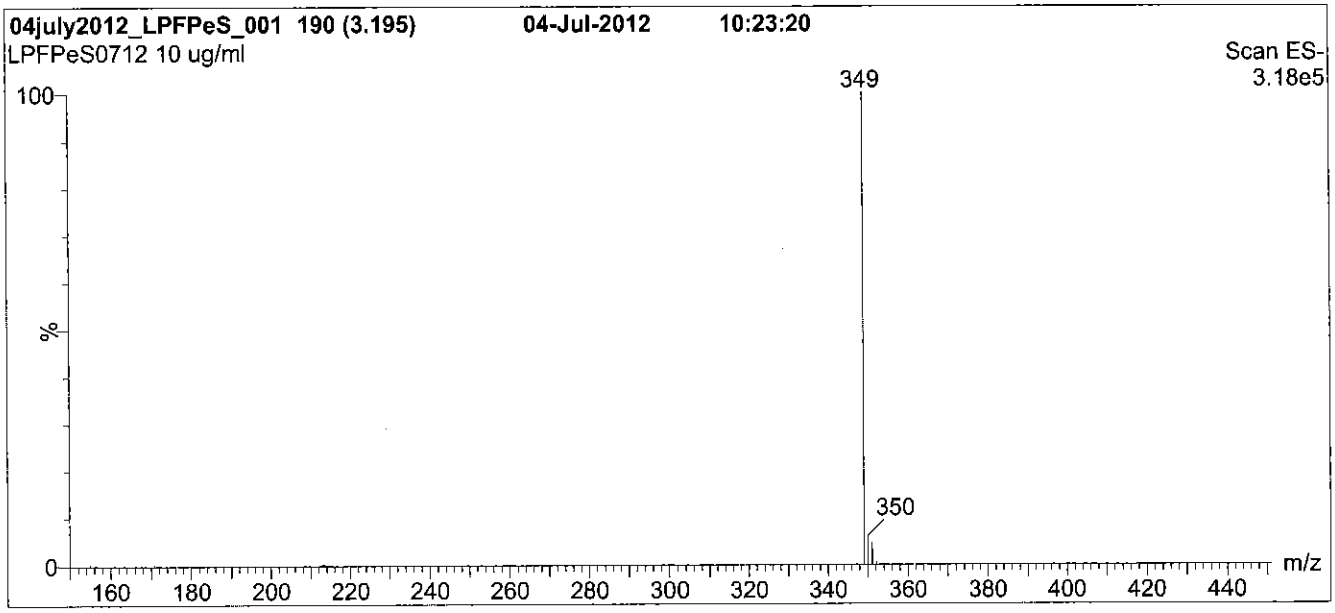
**Figure 1:** **L-PFPeS; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions over 0.5 min.
Time: 10 min

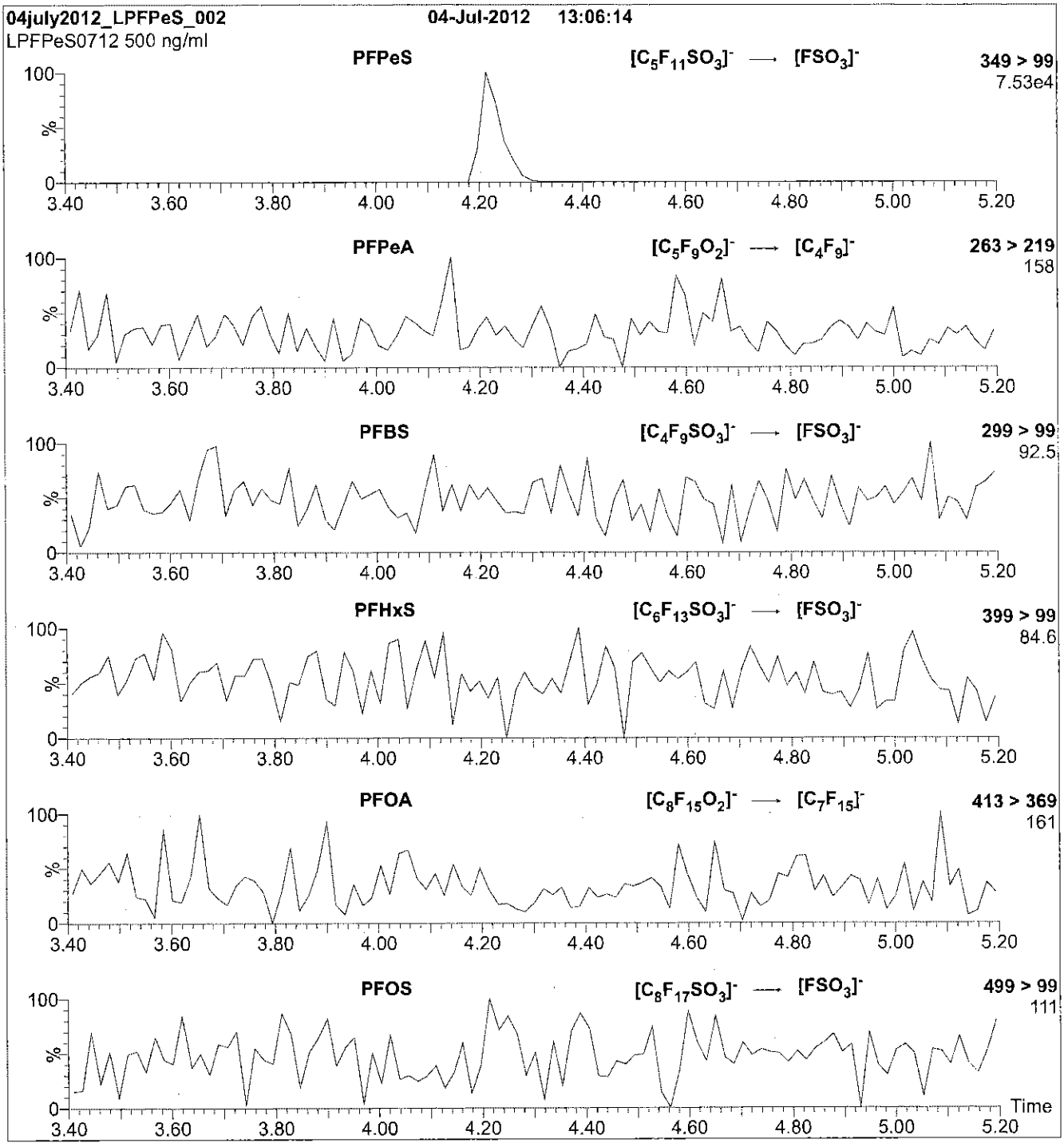
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 50.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **L-PFPeS; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml L-PFPeS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.66e-3
Collision Energy (eV) = 30

# Reagent

# LCPFTeDA_00003

V: 2/11/15 SRV

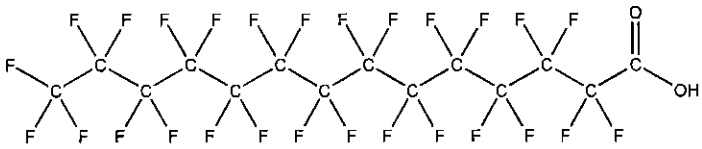
# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFTeDA
**LOT NUMBER:** PFTeDA0613
**COMPOUND:** Perfluoro-n-tetradecanoic acid

**STRUCTURE:**

**CAS #:** 376-06-7



**MOLECULAR FORMULA:** $C_{14}HF_{27}O_2$
**MOLECULAR WEIGHT:** 714.11
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 06/19/2013
**EXPIRY DATE:** (mm/dd/yyyy) 06/19/2018
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.2% of PFDoA ($C_{12}HF_{23}O_2$) and ~ 0.2% of PFPeDA ($C_{15}HF_{29}O_2$).

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 07/17/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

## UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value $y$ and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

## TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

## QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

CALA Testing Accredited Laboratory No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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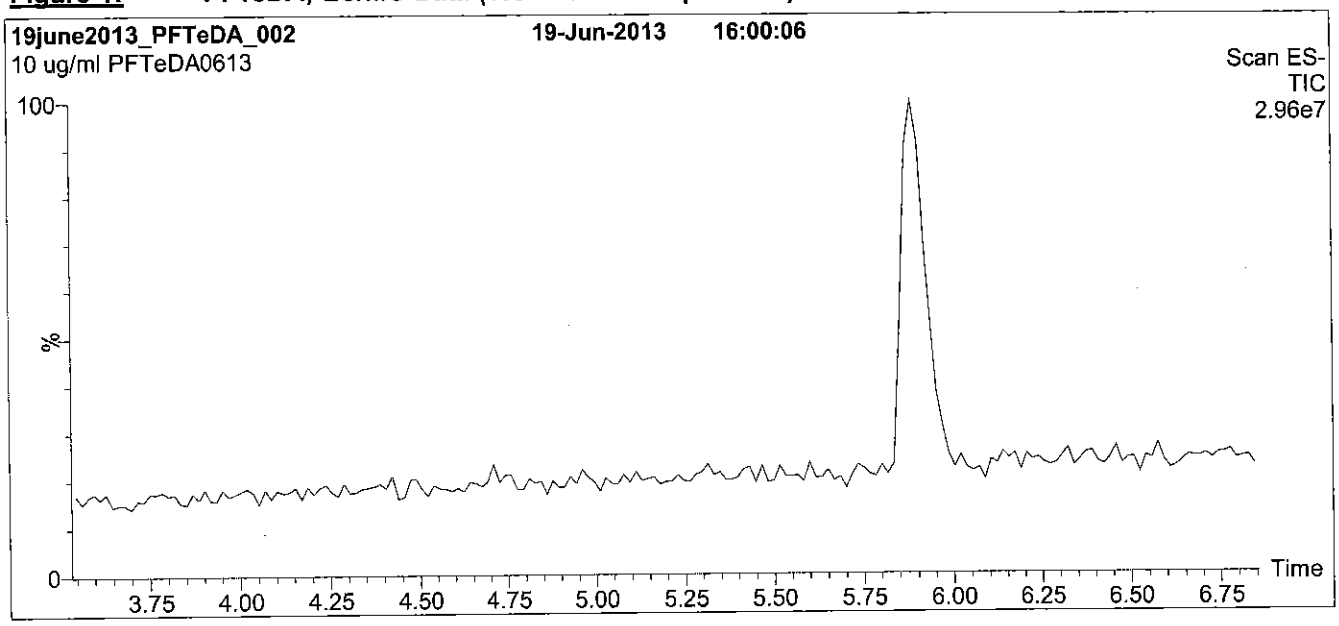
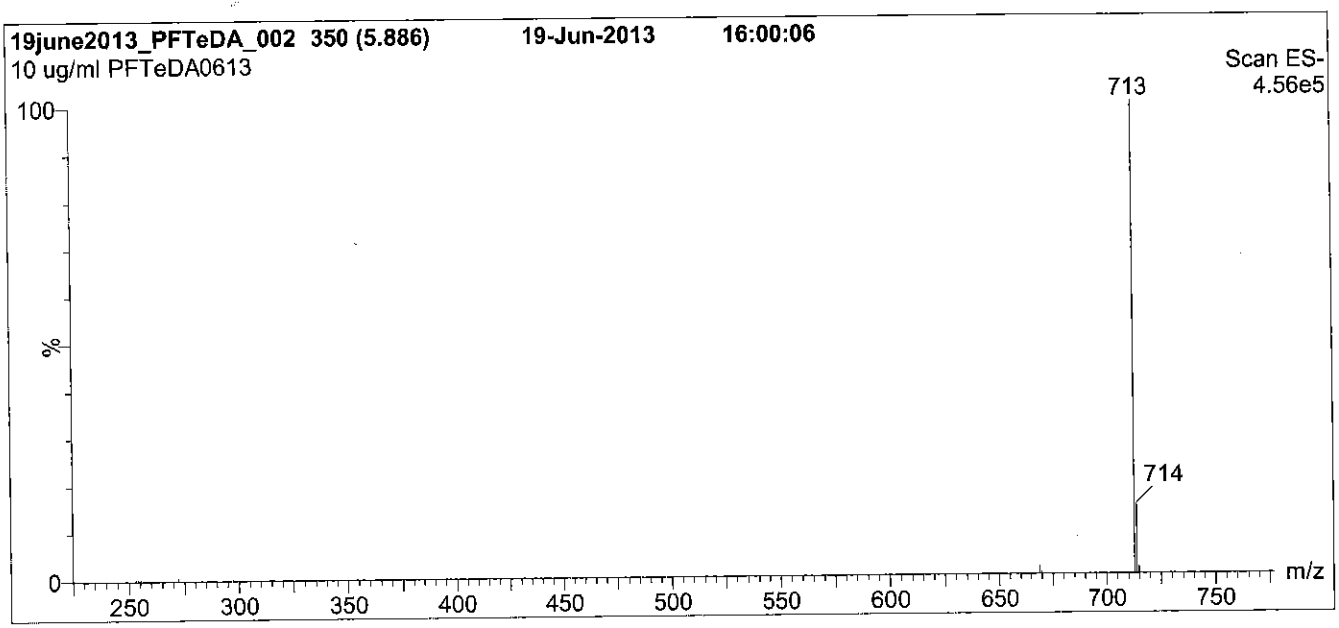
**Figure 1:** **PFTeDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.50 min.
Time: 10 min

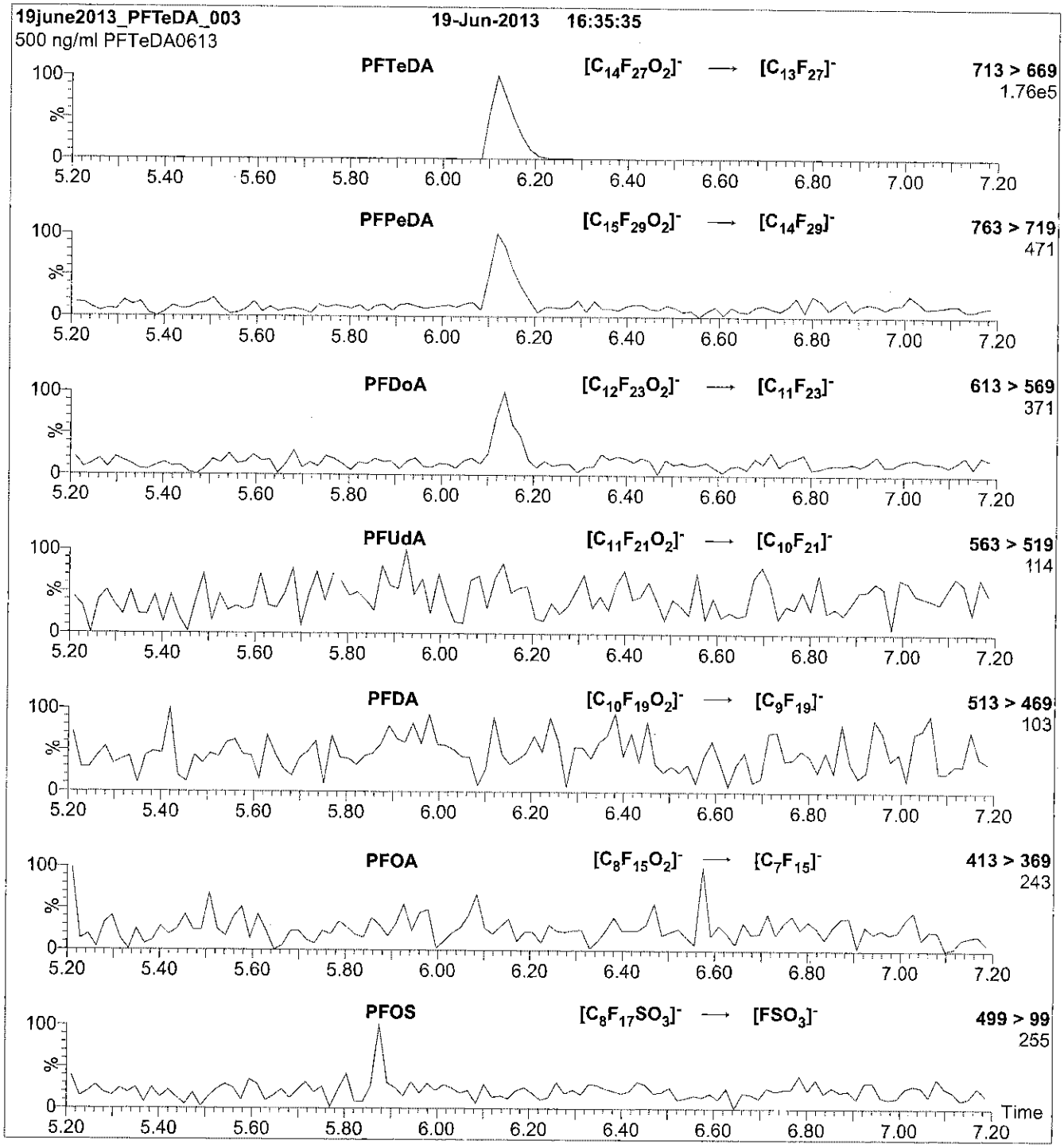
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFTeDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFTeDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 14

# Reagent

# LCPFTrDA_00003

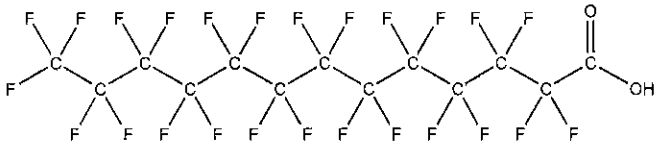
V. 2/11/15 CTN

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFTrDA
**LOT NUMBER:** PFTrDA1213
**COMPOUND:** Perfluoro-n-tridecanoic acid

**STRUCTURE:**
**CAS #:** 72629-94-8



**MOLECULAR FORMULA:** $C_{13}HF_{25}O_2$
**MOLECULAR WEIGHT:** 664.11
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 12/10/2013
**EXPIRY DATE:** (mm/dd/yyyy) 12/10/2018
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of PFUdA ($C_{11}HF_{21}O_2$), ~ 0.4% of PFDoA ($C_{12}HF_{23}O_2$), and ~ 0.1% of PFTeDA ($C_{14}HF_{27}O_2$).

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 12/11/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

## INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

## HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

## SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

## HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

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The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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## TRACEABILITY:

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## EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

## LIMITED WARRANTY:

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## QUALITY MANAGEMENT:

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CALA Testing

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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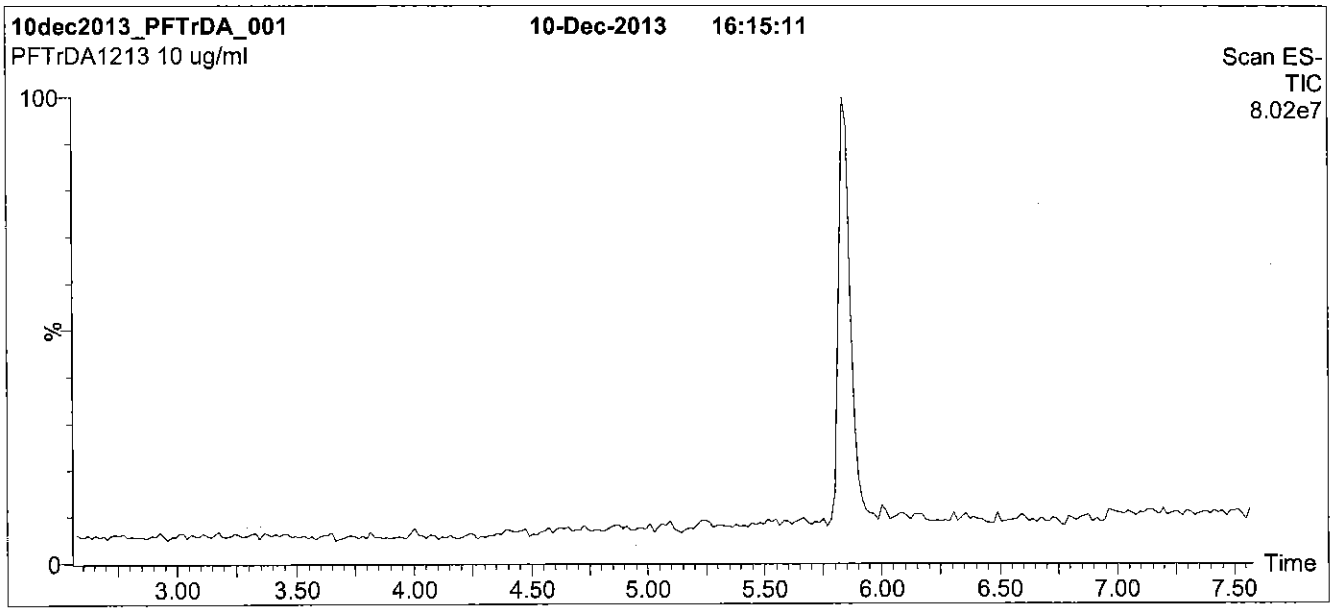
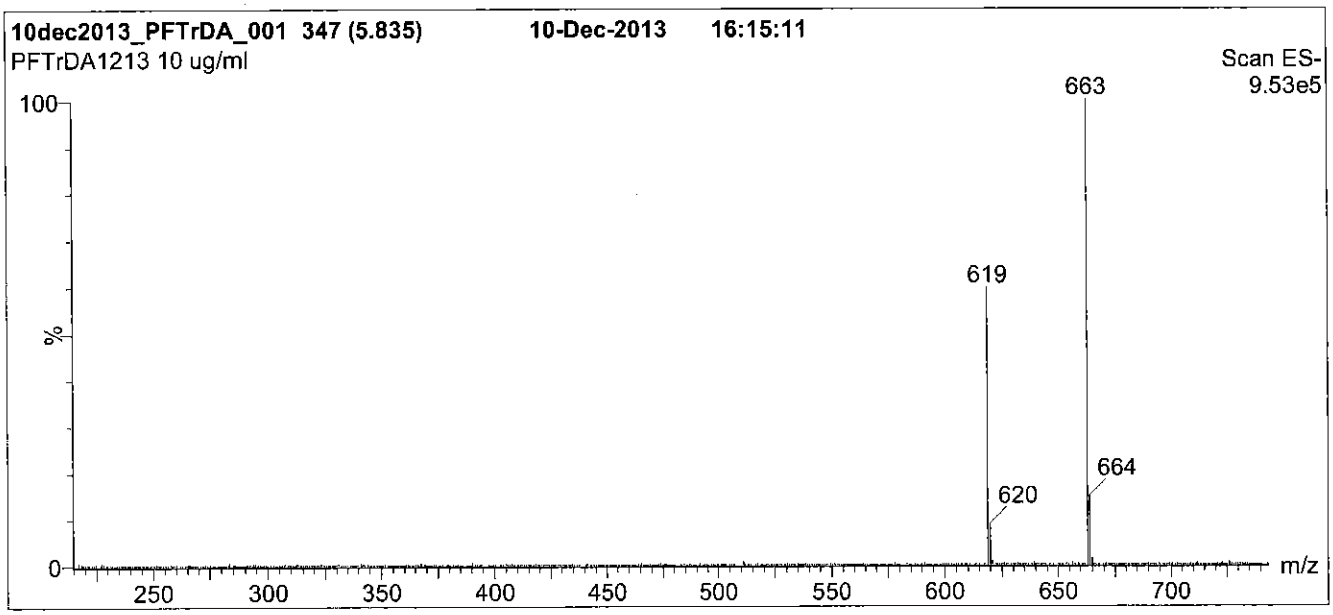
**Figure 1:** **PFTrDA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

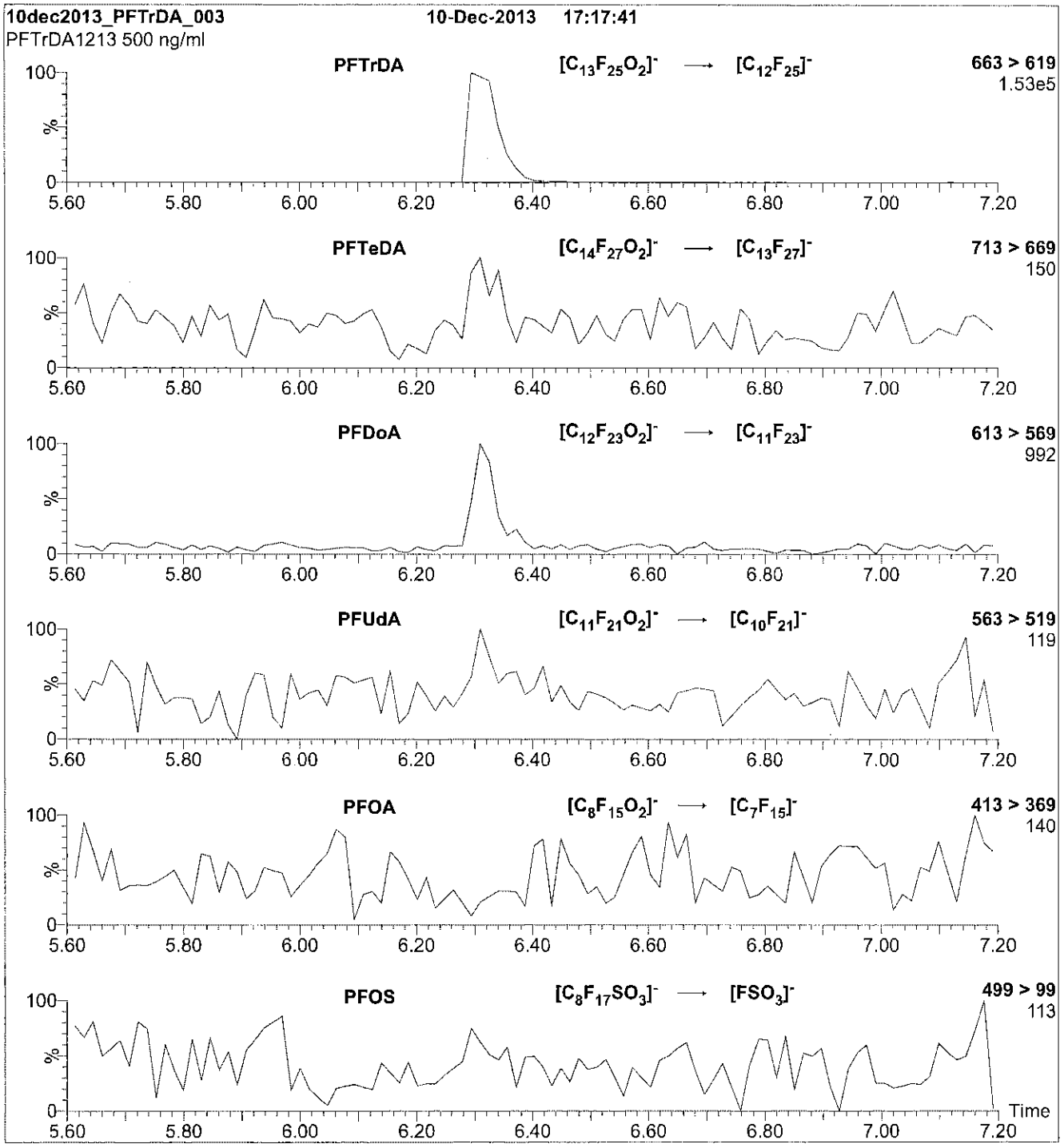
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (215 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 22.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 650

**Figure 2:** **PFTrDA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFTrDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 15

# Reagent

---

# LCPFUdA_00003

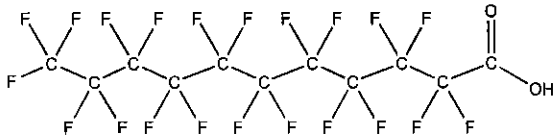
R 2/11/15 SFV

# WELLINGTON LABORATORIES

## CERTIFICATE OF ANALYSIS
DOCUMENTATION

**PRODUCT CODE:** PFUdA
**COMPOUND:** Perfluoro-n-undecanoic acid
**LOT NUMBER:** PFUdA0613

**STRUCTURE:**
**CAS #:** 2058-94-8



**MOLECULAR FORMULA:** $C_{11}HF_{21}O_2$
**MOLECULAR WEIGHT:** 564.09
**CONCENTRATION:** 50 ± 2.5 µg/ml
**SOLVENT(S):** Methanol
Water (<1%)

**CHEMICAL PURITY:** >98%
**LAST TESTED:** (mm/dd/yyyy) 06/19/2013
**EXPIRY DATE:** (mm/dd/yyyy) 06/19/2018
**RECOMMENDED STORAGE:** Store ampoule in a cool, dark place

**DOCUMENTATION/ DATA ATTACHED:**

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

**ADDITIONAL INFORMATION:**

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

***FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE***

**Certified By:** B.G. Chittim **Date:** 07/03/2013 (mm/dd/yyyy)

*Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA*
*519-822-2436 • Fax: 519-822-2849 • info@well-labs.com*

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CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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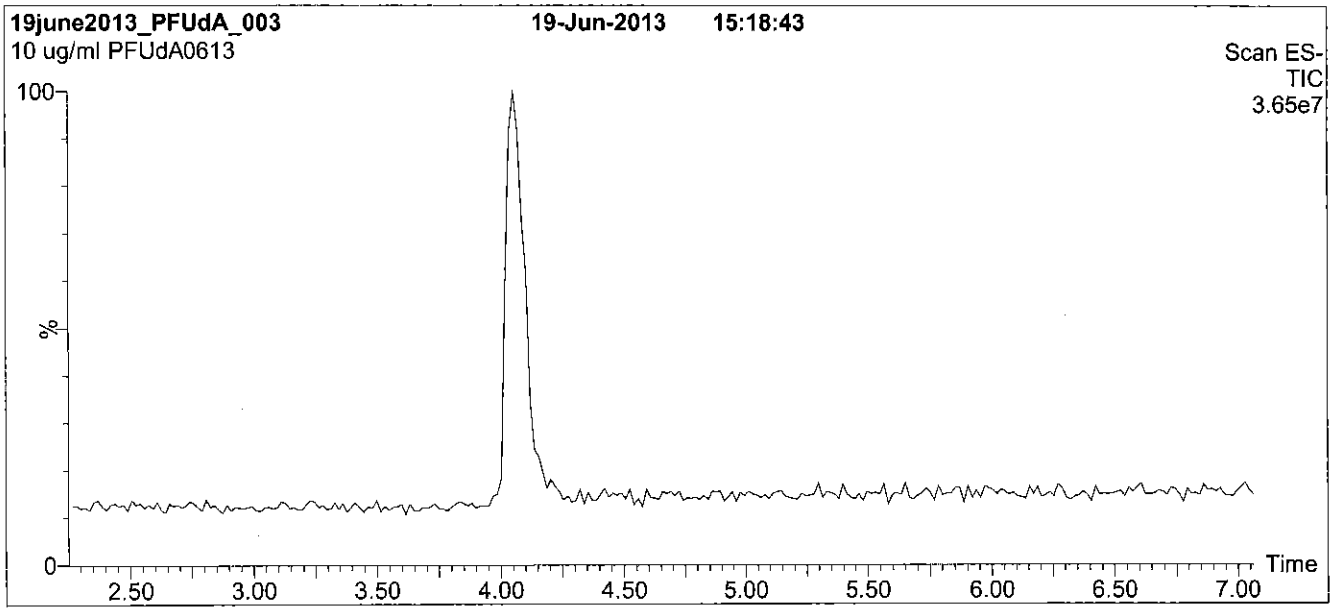
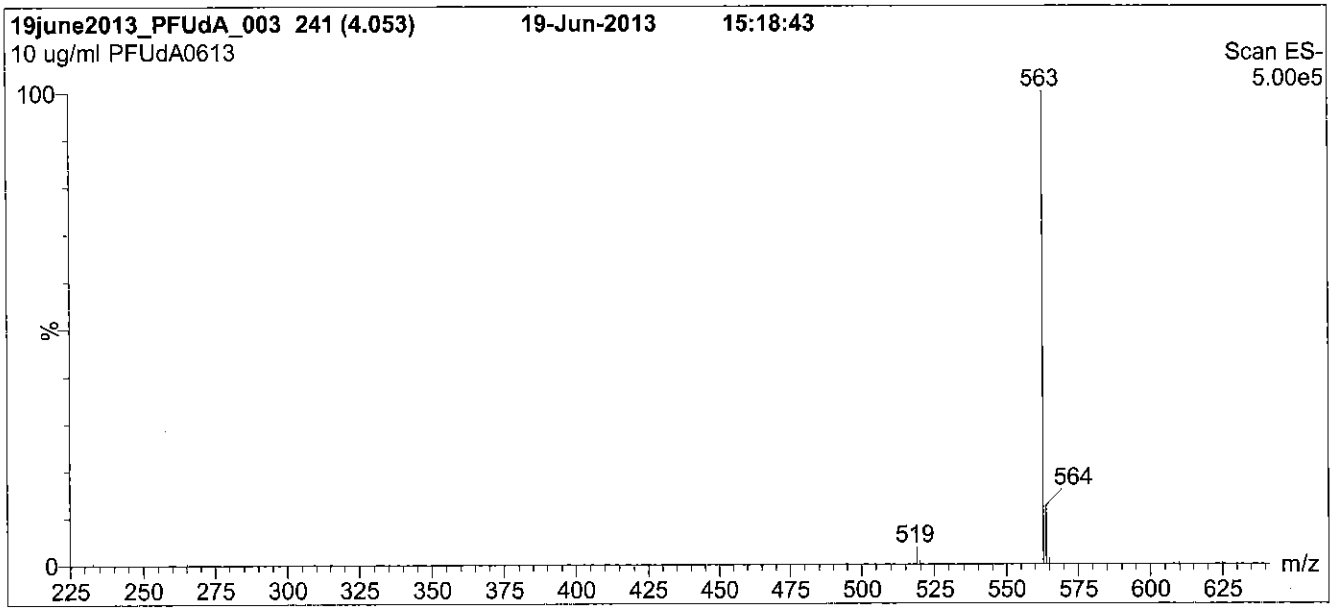
**Figure 1:** **PFUdA; LC/MS Data (TIC and Mass Spectrum)**




**Conditions for Figure 1:**

**LC:** **Waters Acquity Ultra Performance LC**
**MS:** **Micromass Quattro *micro* API MS**

**Chromatographic Conditions**

Column: Acquity UPLC BEH Shield $RP_{18}$
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

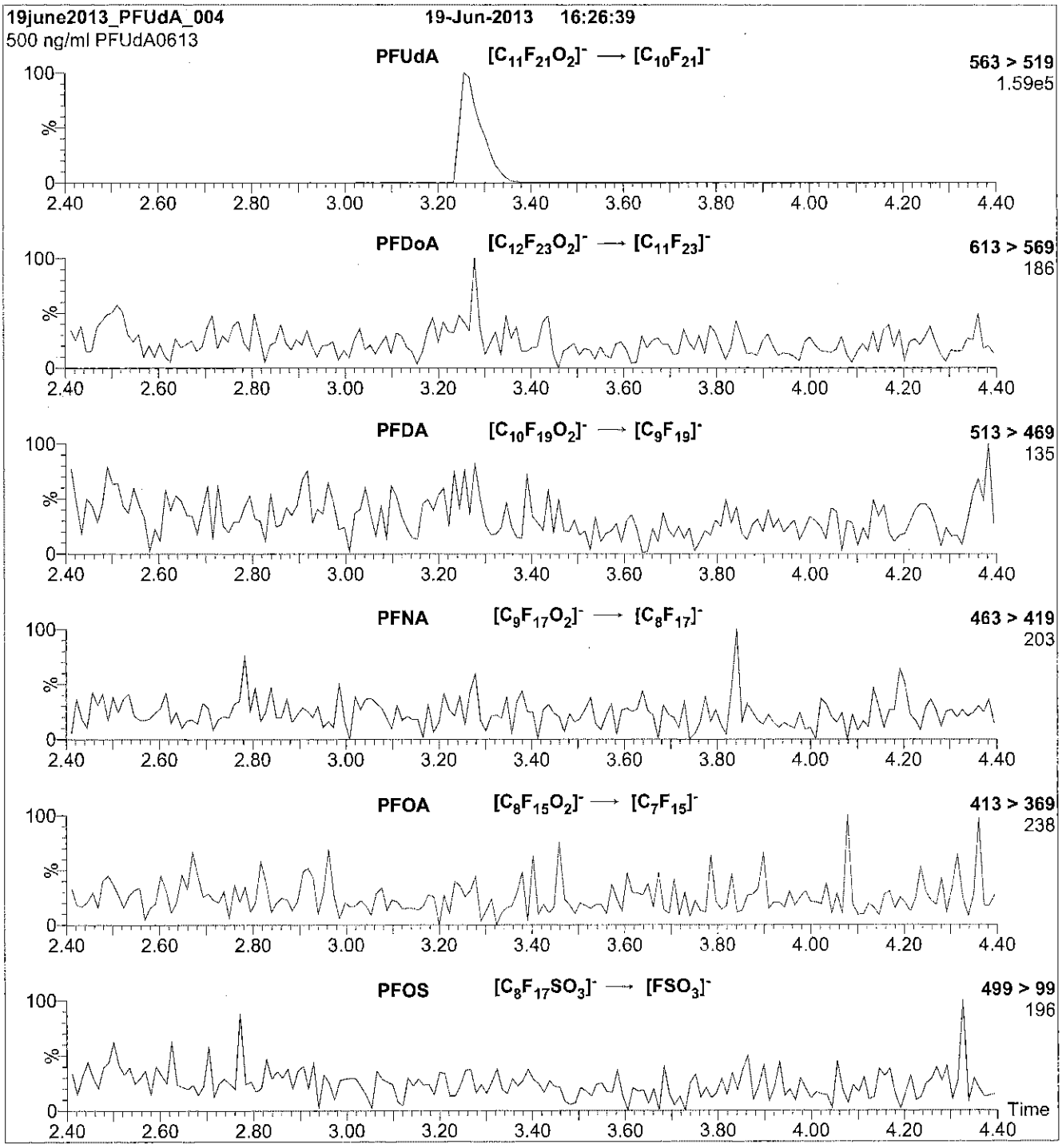
Flow: 300 µl/min

**MS Parameters**

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

**Figure 2:** **PFUdA; LC/MS/MS Data (Selected MRM Transitions)**




**Conditions for Figure 2:**

Injection: Direct loop injection
10 µl (500 ng/ml PFUdA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $H_2O$
(both with 10 mM $NH_4OAc$ buffer)

Flow: 300 µl/min

**MS Parameters**

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

# Method PFC DOD

## Perfluronated Hydrocarbons (LC/MS) by Method PFC_DOD

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): Acquity ID: 2.1 (mm)

| Client Sample ID | Lab Sample ID | PFHxA # | 13CHpA # | PFHxS # | PFOA # | PFOS # | PFNA # |
|---|---|---|---|---|---|---|---|
| DW16 | 320-18555-1 | 109 | 105 | 138 | 95 | 149 | 54 |
| DW16FB | 320-18555-2 | 125 | 127 | 143 | 132 | 189 Q | 120 |
| | MB 320-108614/1-A | 124 | 124 | 129 | 136 | 127 | 128 |
| | LCS 320-108614/2-A | 122 | 123 | 123 | 121 | 116 | 119 |
| | LCSD 320-108614/3-A | 121 | 121 | 123 | 126 | 101 | 121 |

| | QC LIMITS |
|---|---|
| PFHxA = 13C2 PFHxA | 25-150 |
| 13CHpA = 13C4-PFHpA | 25-150 |
| PFHxS = 18O2 PFHxS | 25-150 |
| PFOA = 13C4 PFOA | 25-150 |
| PFOS = 13C4 PFOS | 25-150 |
| PFNA = 13C5 PFNA | 25-150 |

# Column to be used to flag recovery values

FORM II WS-LC-0025

FORM III
LCMS LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 07MAY2016B4A_016.d

Lab ID: LCS 320-108614/2-A Client ID:

| COMPOUND | SPIKE ADDED (ng/L) | LCS CONCENTRATION (ng/L) | LCS % REC | QC LIMITS REC | # |
|---|---|---|---|---|---|
| 13C2 PFHxA | 100 | 122 | 122 | 25-150 | |
| 13C4 PFOA | 100 | 121 | 121 | 25-150 | |
| 13C4 PFOS | 95.6 | 111 | 116 | 25-150 | |
| 13C4-PFHpA | 100 | 123 | 123 | 25-150 | |
| 13C5 PFNA | 100 | 119 | 119 | 25-150 | |
| 18O2 PFHxS | 94.6 | 116 | 123 | 25-150 | |
| Perfluorobutanesulfonic acid (PFBS) | 35.4 | 27.7 | 78 | 50-150 | |
| Perfluoroheptanoic acid (PFHpA) | 40.0 | 30.2 | 75 | 60-140 | |
| Perfluorohexanesulfonic acid (PFHxS) | 36.4 | 31.0 | 85 | 60-140 | M |
| Perfluorononanoic acid (PFNA) | 40.0 | 31.6 | 79 | 60-140 | |
| Perfluorooctanesulfonic acid (PFOS) | 37.1 | 37.0 | 100 | 60-140 | M |
| Perfluorooctanoic acid (PFOA) | 40.0 | 33.4 | 84 | 60-140 | |

# Column to be used to flag recovery and RPD values

FORM III WS-LC-0025

FORM III
LCMS LAB CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 07MAY2016B4A_017.d

Lab ID: LCSD 320-108614/3-A Client ID:

| COMPOUND | SPIKE ADDED (ng/L) | LCSD CONCENTRATION (ng/L) | LCSD % REC | % RPD | QC LIMITS RPD | QC LIMITS REC | # |
|---|---|---|---|---|---|---|---|
| 13C2 PFHxA | 100 | 121 | 121 | | | 25-150 | |
| 13C4 PFOA | 100 | 126 | 126 | | | 25-150 | |
| 13C4 PFOS | 95.6 | 96.8 | 101 | | | 25-150 | |
| 13C4-PFHpA | 100 | 121 | 121 | | | 25-150 | |
| 13C5 PFNA | 100 | 121 | 121 | | | 25-150 | |
| 18O2 PFHxS | 94.6 | 116 | 123 | | | 25-150 | |
| Perfluorobutanesulfonic acid (PFBS) | 35.4 | 27.4 | 78 | 1 | 30 | 50-150 | |
| Perfluoroheptanoic acid (PFHpA) | 40.0 | 29.4 | 74 | 3 | 30 | 60-140 | |
| Perfluorohexanesulfonic acid (PFHxS) | 36.4 | 30.4 | 83 | 2 | 30 | 60-140 | M |
| Perfluorononanoic acid (PFNA) | 40.0 | 32.0 | 80 | 1 | 30 | 60-140 | |
| Perfluorooctanesulfonic acid (PFOS) | 37.1 | 42.4 | 114 | 14 | 30 | 60-140 | M |
| Perfluorooctanoic acid (PFOA) | 40.0 | 31.4 | 79 | 6 | 30 | 60-140 | |

# Column to be used to flag recovery and RPD values

FORM III WS-LC-0025

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento  Job No.: 320-18555-1

SDG No.:

Lab File ID: 07MAY2016B4A_015.d  Lab Sample ID: MB 320-108614/1-A

Matrix: Water  Date Extracted: 05/03/2016 12:39

Instrument ID: A4  Date Analyzed: 05/07/2016 18:08

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

| CLIENT SAMPLE ID | LAB SAMPLE ID | LAB FILE ID | DATE ANALYZED |
|---|---|---|---|
| | LCS 320-108614/2-A | 07MAY2016B4A_016.d | 05/07/2016 18:29 |
| | LCSD 320-108614/3-A | 07MAY2016B4A_017.d | 05/07/2016 18:50 |
| DW16 | 320-18555-1 | 07MAY2016B4A_018.d | 05/07/2016 19:11 |
| DW16FB | 320-18555-2 | 07MAY2016B4A_019.d | 05/07/2016 19:33 |

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18555-1

SDG No.:

Client Sample ID: DW16 | Lab Sample ID: 320-18555-1

Matrix: Water | Lab File ID: 07MAY2016B4A_018.d

Analysis Method: WS-LC-0025 | Date Collected: 04/27/2016 12:36

Extraction Method: 3535 | Date Extracted: 05/03/2016 12:39

Sample wt/vol: 517.1(mL) | Date Analyzed: 05/07/2016 19:11

Con. Extract Vol.: 1.0(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 109262 | Units: ng/L

| CAS NO. | COMPOUND NAME | RESULT | Q | LOQ | LOD | DL |
|---|---|---|---|---|---|---|
| 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | 1.9 | U | 2.4 | 1.9 | 0.89 |
| 375-85-9 | Perfluoroheptanoic acid (PFHpA) | 1.0 | J | 2.4 | 1.9 | 0.78 |
| 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | 1.9 | U | 2.4 | 1.9 | 0.84 |
| 375-95-1 | Perfluorononanoic acid (PFNA) | 1.9 | U | 2.4 | 1.9 | 0.63 |
| 1763-23-1 | Perfluorooctanesulfonic acid (PFOS) | 1.3 | J M | 3.9 | 2.9 | 1.2 |
| 335-67-1 | Perfluorooctanoic acid (PFOA) | 1.3 | J | 2.4 | 1.9 | 0.72 |

| CAS NO. | ISOTOPE DILUTION | %REC | Q | LIMITS |
|---|---|---|---|---|
| STL00993 | 13C2 PFHxA | 109 | | 25-150 |
| STL00990 | 13C4 PFOA | 95 | | 25-150 |
| STL00991 | 13C4 PFOS | 149 | | 25-150 |
| STL01892 | 13C4-PFHpA | 105 | | 25-150 |
| STL00995 | 13C5 PFNA | 54 | | 25-150 |
| STL00994 | 18O2 PFHxS | 138 | | 25-150 |

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_018.d
Lims ID: 320-18555-B-1-A
Client ID: DW16
Sample Type: Client
Inject. Date: 07-May-2016 19:11:53 ALS Bottle#: 28 Worklist Smp#: 18
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: 320-18555-b-1-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:55 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 14:30:40

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 9941 | 0.4563 | | | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 3782354 | 54.6 | | 109 | 12873 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.388 | 9.396 | -0.008 | | 3070431 | 52.3 | | 105 | 5628 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.380 | 9.396 | -0.016 | 1.000 | 17432 | 0.5186 | | | 14.7 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.419 | 9.430 | -0.011 | | 1637380 | 65.2 | | 138 | 3578 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 16485 | 0.3267 | | | | |
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.500 | 10.511 | -0.011 | | 3117782 | 47.4 | | 94.9 | 6761 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.500 | 10.512 | -0.012 | 1.000 | 17604 | 0.6909 | | | 20.8 | |
| 412.8 > 168.7 | 10.500 | 10.512 | -0.012 | 1.000 | 4086 | | 4.31(0.00-0.00) | | 14.2 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.459 | 11.467 | -0.008 | | 315108 | 71.0 | | 149 | 687 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | M |
| 498.3 > 79.2 | 11.459 | 11.470 | -0.011 | 1.000 | 61877 | 0.6940 | | | 97.7 | M |
| 498.3 > 98.2 | 11.459 | 11.470 | -0.011 | 1.000 | 33242 | | 1.86(0.00-0.00) | | 76.7 | M |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.488 | 11.489 | -0.001 | | 1576076 | 27.1 | | 54.3 | 3680 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.497 | 11.490 | 0.007 | 1.000 | 1717 | 0.0639 | | | 2.4 | |

## QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 09-May-2016 15:30:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_018.d

Injection Date: 07-May-2016 19:11:53 Instrument ID: A4

Lims ID: 320-18555-B-1-A Lab Sample ID: 320-18555-1

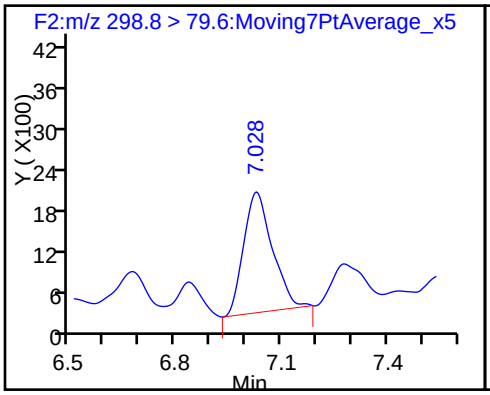
Client ID: DW16

Operator ID: JRB ALS Bottle#: 28 Worklist Smp#: 18

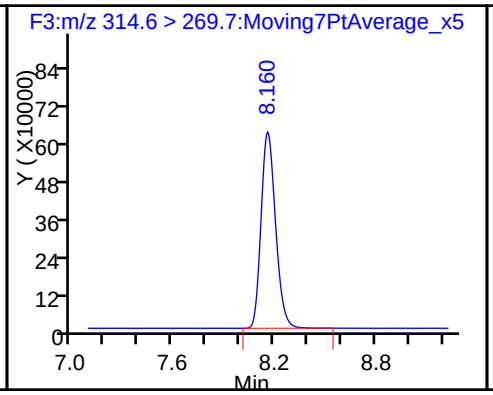
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

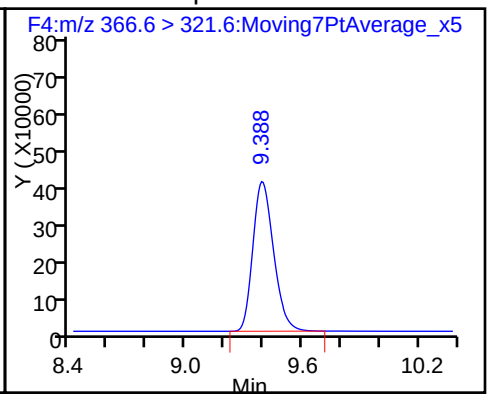
51 Perfluorobutanesulfonic acid



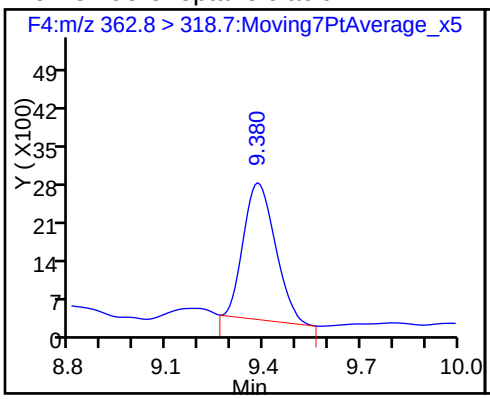

D 6 13C2 PFHxA



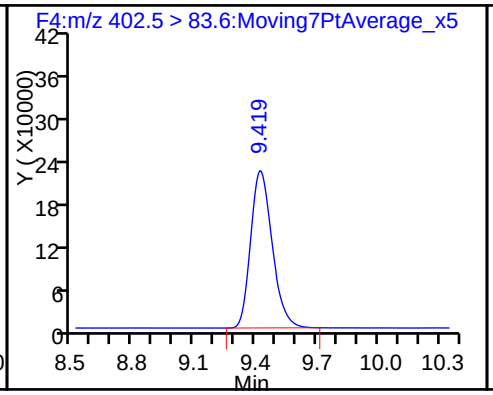

D 8 13C4-PFHpA



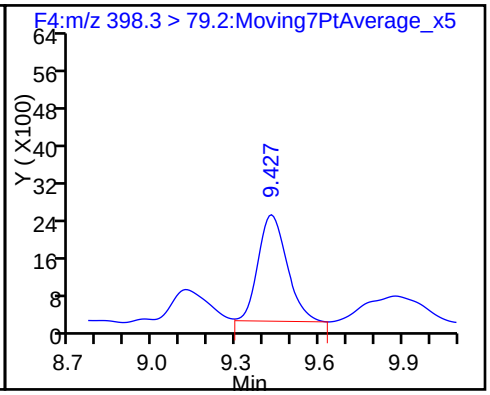

9 Perfluoroheptanoic acid



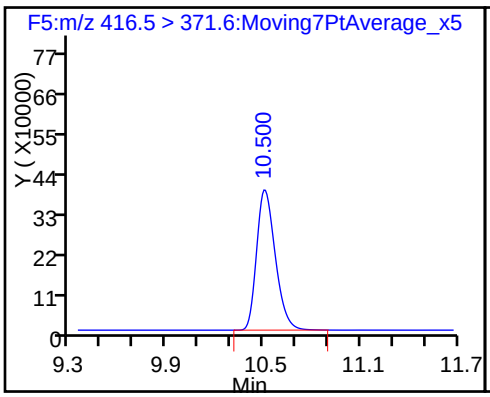

D 11 18O2 PFHxS



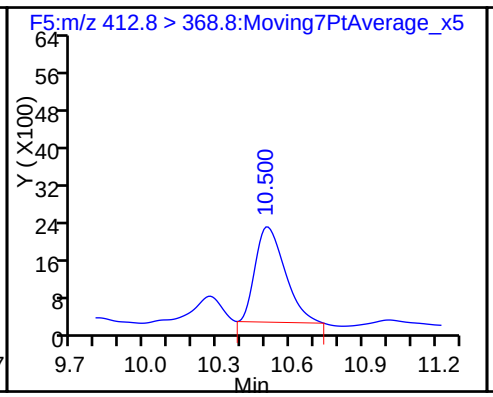

58 Perfluorohexanesulfonic acid



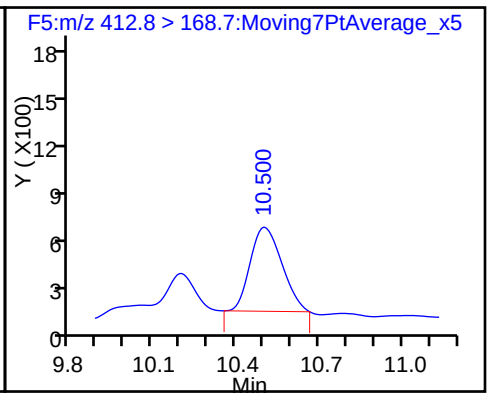

D 12 13C4 PFOA



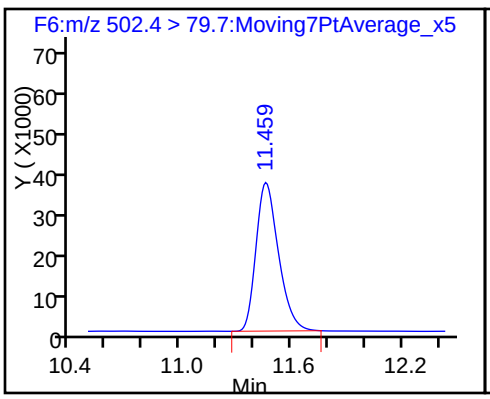

13 Perfluorooctanoic acid



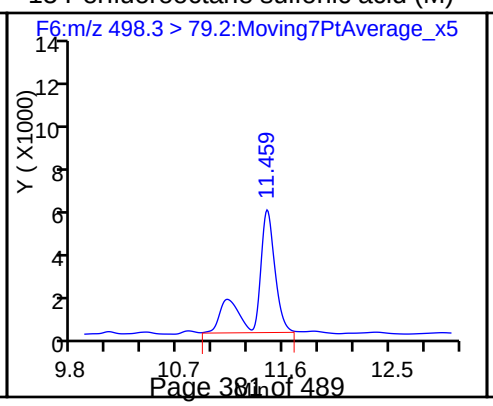

13 Perfluorooctanoic acid



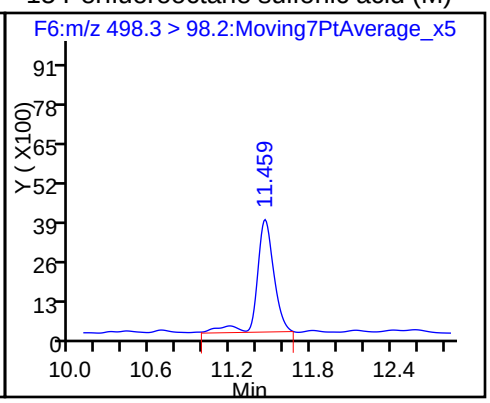

D 16 13C4 PFOS



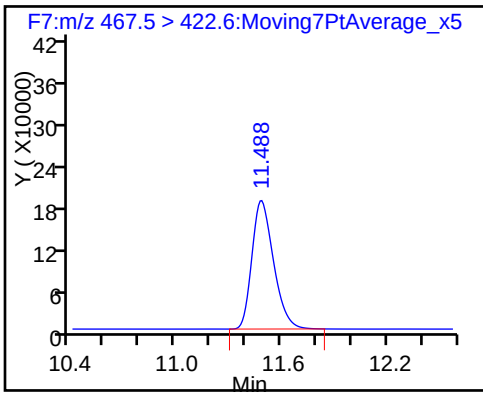

15 Perfluorooctane sulfonic acid (M)



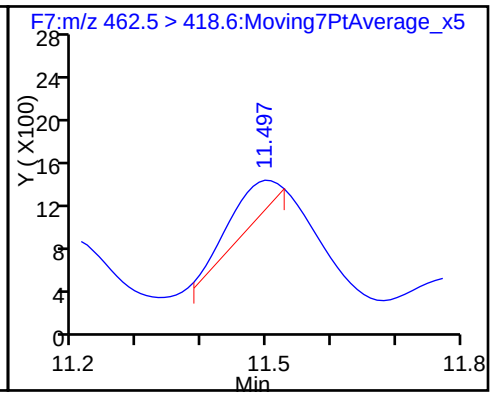

15 Perfluorooctane sulfonic acid (M)



D 17 13C5 PFNA




18 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

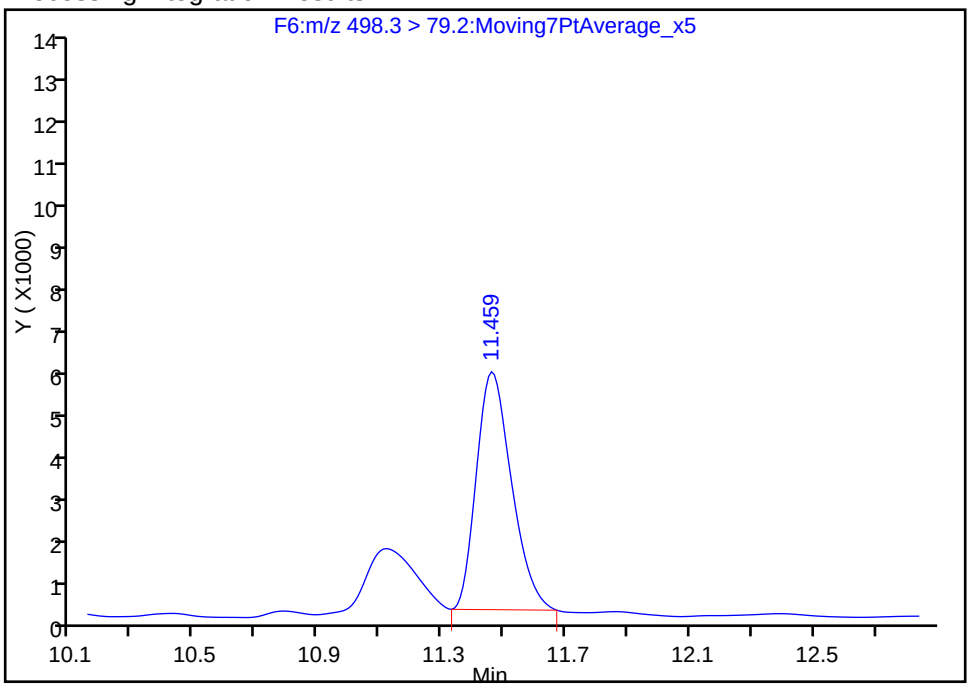
| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_018.d | | | | |
| Injection Date: | 07-May-2016 19:11:53 | Instrument ID: | A4 | | |
| Lims ID: | 320-18555-B-1-A | Lab Sample ID: | 320-18555-1 | | |
| Client ID: | DW16 | | | | |
| Operator ID: | JRB | ALS Bottle#: | 28 | Worklist Smp#: | 18 |
| Injection Vol: | 15.0 ul | Dil. Factor: | 1.0000 | | |
| Method: | PFAC_A4 | Limit Group: | LC PFC_DOD ICAL | | |
| Column: | | Detector | F6:MRM | | |

## 15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

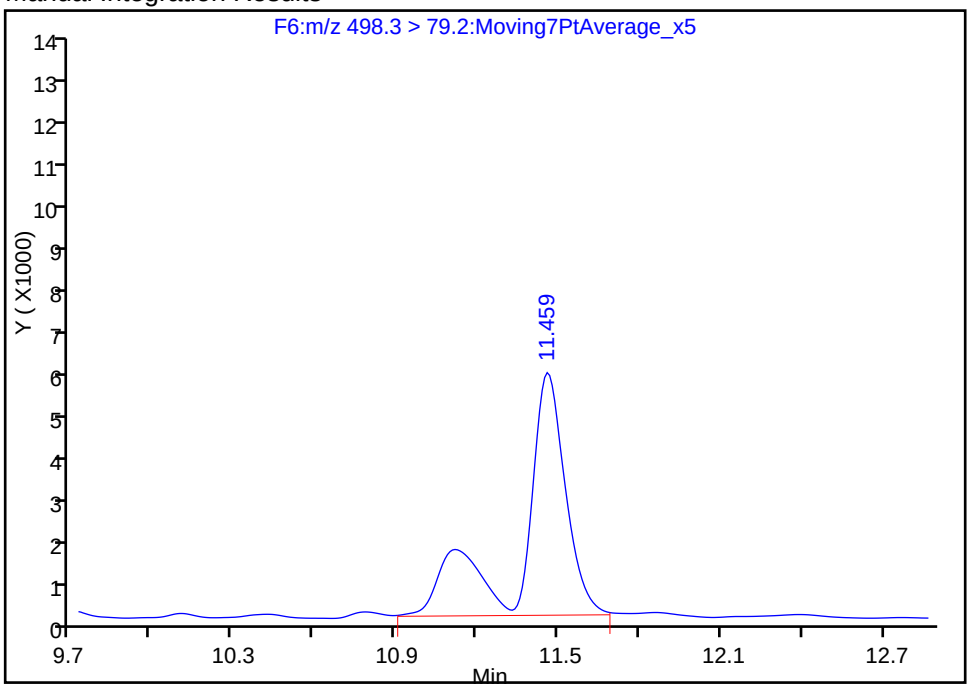
Processing Integration Results

RT: 11.46
Area: 42415
Amount: 0.409782
Amount Units: ng/ml




Manual Integration Results

RT: 11.46
Area: 61877
Amount: 0.694037
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:30:40

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_018.d

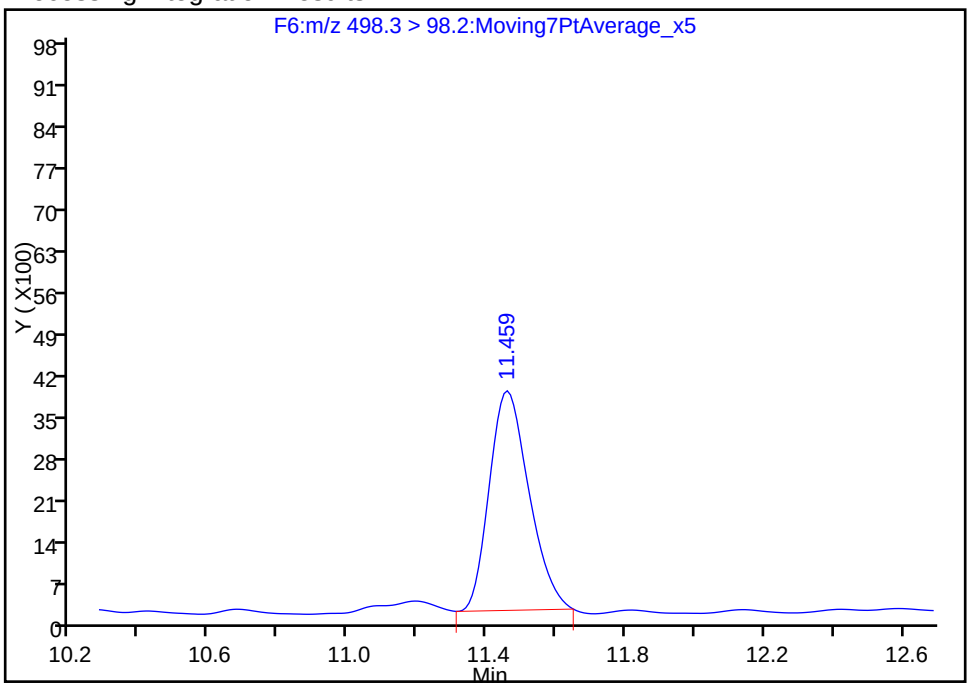
| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 07-May-2016 19:11:53 | Instrument ID: | A4 | | |
| Lims ID: | 320-18555-B-1-A | Lab Sample ID: | 320-18555-1 | | |
| Client ID: | DW16 | | | | |
| Operator ID: | JRB | ALS Bottle#: | 28 | Worklist Smp#: | 18 |
| Injection Vol: | 15.0 ul | Dil. Factor: | 1.0000 | | |
| Method: | PFAC_A4 | Limit Group: | LC PFC_DOD ICAL | | |
| Column: | | Detector | F6:MRM | | |

## 15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

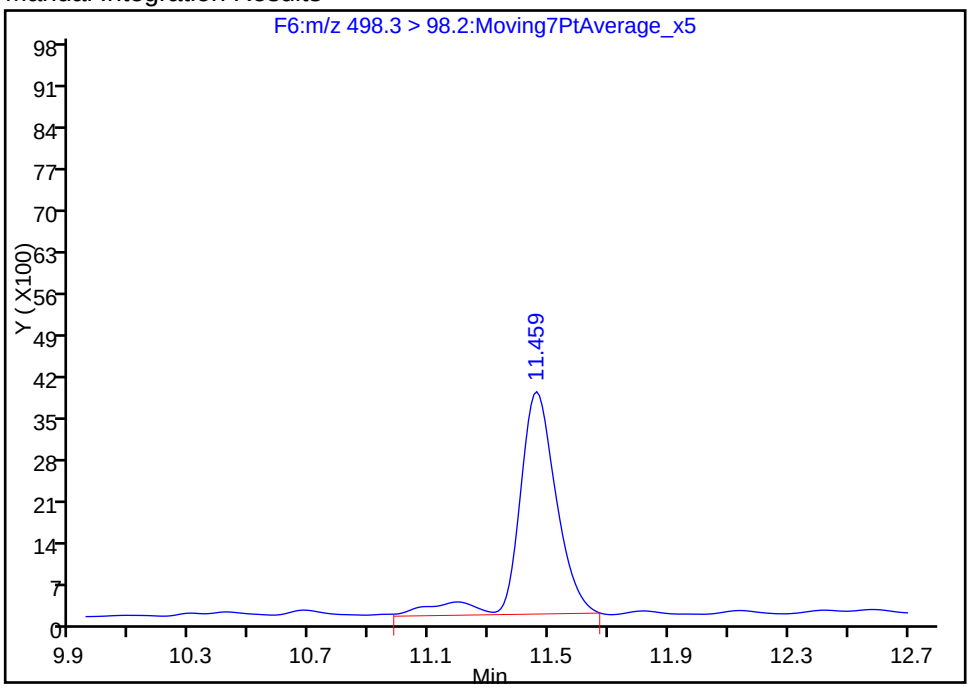
Processing Integration Results

RT: 11.46
Area: 29516
Amount: 0.409782
Amount Units: ng/ml




Manual Integration Results

RT: 11.46
Area: 33242
Amount: 0.694037
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:30:40

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18555-1

SDG No.:

Client Sample ID: DW16FB | Lab Sample ID: 320-18555-2

Matrix: Water | Lab File ID: 07MAY2016B4A_019.d

Analysis Method: WS-LC-0025 | Date Collected: 04/27/2016 12:40

Extraction Method: 3535 | Date Extracted: 05/03/2016 12:39

Sample wt/vol: 550.7(mL) | Date Analyzed: 05/07/2016 19:33

Con. Extract Vol.: 1.0(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 109262 | Units: ng/L

| CAS NO. | COMPOUND NAME | RESULT | Q | LOQ | LOD | DL |
|---|---|---|---|---|---|---|
| 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | 1.8 | U | 2.3 | 1.8 | 0.83 |
| 375-85-9 | Perfluoroheptanoic acid (PFHpA) | 1.8 | U | 2.3 | 1.8 | 0.73 |
| 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | 1.8 | U | 2.3 | 1.8 | 0.79 |
| 375-95-1 | Perfluorononanoic acid (PFNA) | 1.8 | U | 2.3 | 1.8 | 0.59 |
| 1763-23-1 | Perfluorooctanesulfonic acid (PFOS) | 2.7 | U | 3.6 | 2.7 | 1.2 |
| 335-67-1 | Perfluorooctanoic acid (PFOA) | 1.8 | U | 2.3 | 1.8 | 0.68 |

| CAS NO. | ISOTOPE DILUTION | %REC | Q | LIMITS |
|---|---|---|---|---|
| STL00993 | 13C2 PFHxA | 125 | | 25-150 |
| STL00990 | 13C4 PFOA | 132 | | 25-150 |
| STL00991 | 13C4 PFOS | 189 | Q | 25-150 |
| STL01892 | 13C4-PFHpA | 127 | | 25-150 |
| STL00995 | 13C5 PFNA | 120 | | 25-150 |
| STL00994 | 18O2 PFHxS | 143 | | 25-150 |

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_019.d
Lims ID: 320-18555-A-2-A
Client ID: DW16FB
Sample Type: Client
Inject. Date: 07-May-2016 19:33:04 ALS Bottle#: 29 Worklist Smp#: 19
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: 320-18555-a-2-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:55 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 14:31:06

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 4326712 | 62.4 | | 125 | 6537 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.388 | 9.396 | -0.008 | | 3723723 | 63.4 | | 127 | 7417 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.419 | 9.430 | -0.011 | | 1702976 | 67.8 | | 143 | 5227 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 8748 | 0.1667 | | | | |
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.509 | 10.511 | -0.002 | | 4328819 | 65.9 | | 132 | 7356 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.459 | 11.467 | -0.008 | | 401804 | 90.5 | | 189 | 1160 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.479 | 11.489 | -0.010 | | 3495076 | 60.2 | | 120 | 8134 | |

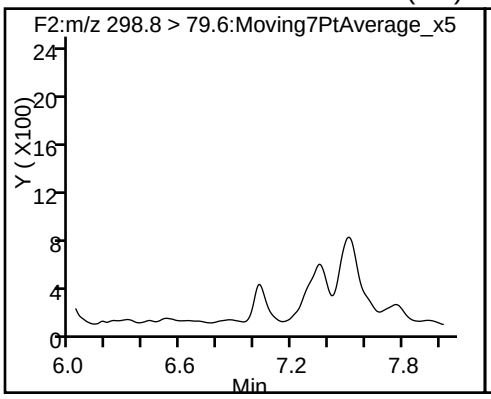
Report Date: 09-May-2016 15:30:03 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

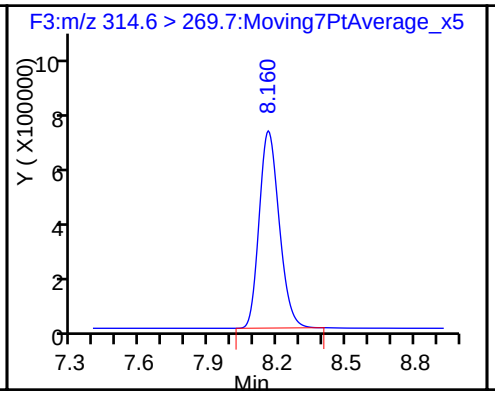
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_019.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 07-May-2016 19:33:04 | Instrument ID: | A4 | | |
| Lims ID: | 320-18555-A-2-A | Lab Sample ID: | 320-18555-2 | | |
| Client ID: | DW16FB | | | | |
| Operator ID: | JRB | ALS Bottle#: | 29 | Worklist Smp#: | 19 |
| Injection Vol: | 15.0 ul | Dil. Factor: | 1.0000 | | |
| Method: | PFAC_A4 | Limit Group: | LC PFC_DOD ICAL | | |

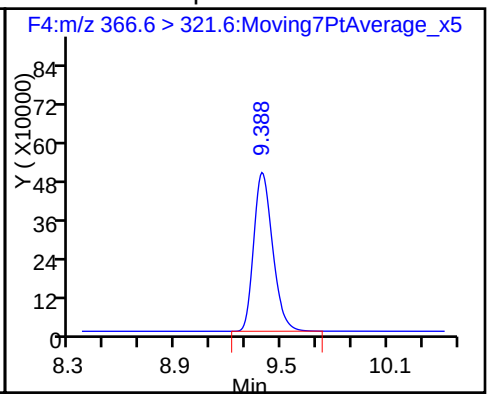
51 Perfluorobutanesulfonic acid (ND)



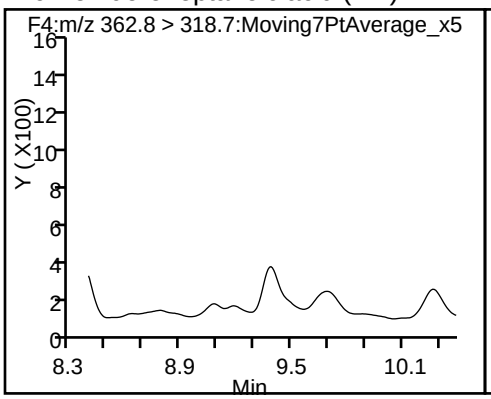

D 6 13C2 PFHxA



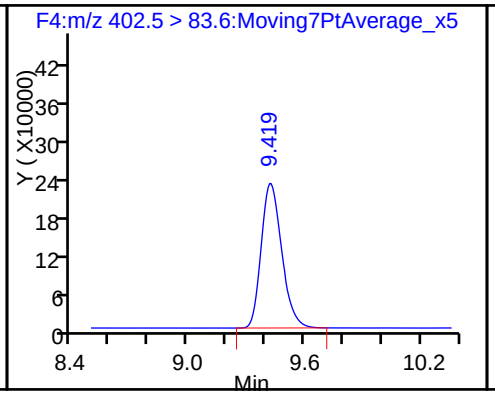

D 8 13C4-PFHpA



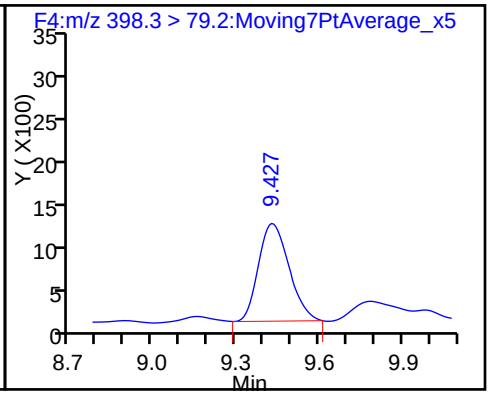

9 Perfluoroheptanoic acid (ND)



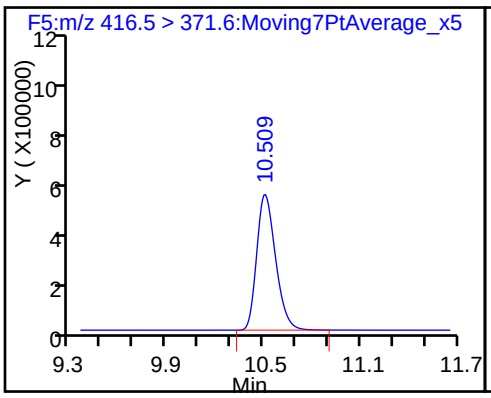

D 11 18O2 PFHxS



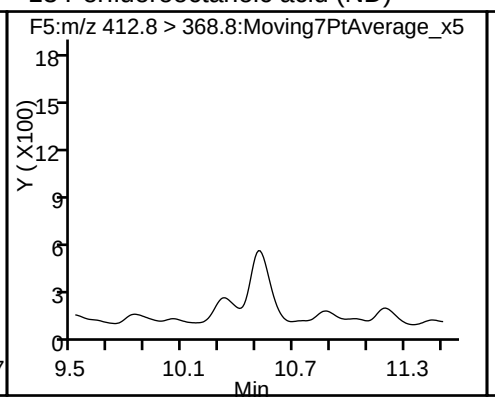

58 Perfluorohexanesulfonic acid



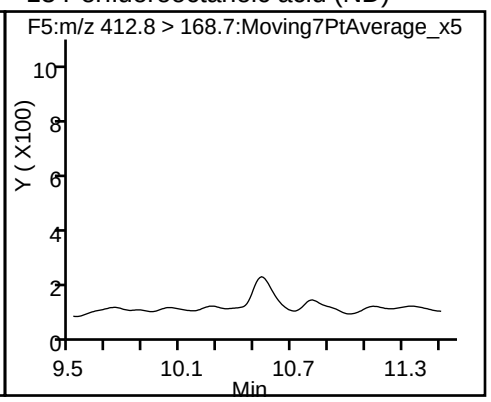

D 12 13C4 PFOA



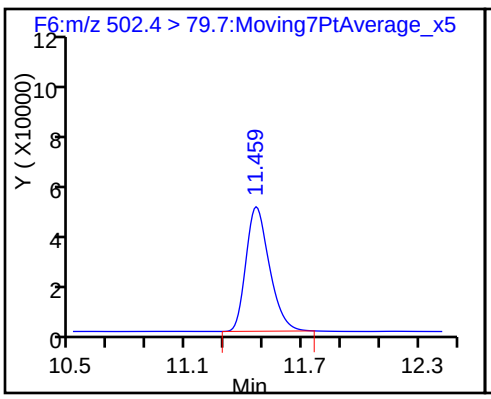

13 Perfluorooctanoic acid (ND)



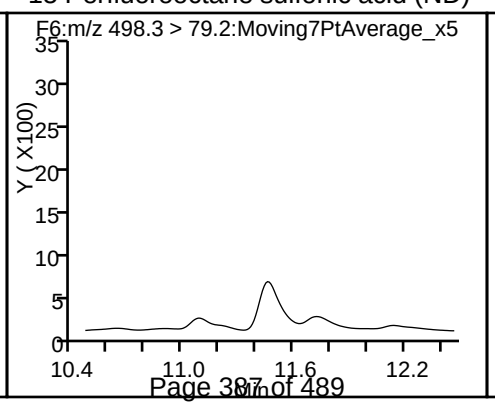

13 Perfluorooctanoic acid (ND)



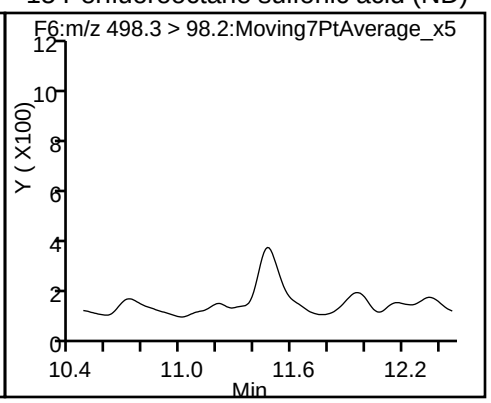

D 16 13C4 PFOS



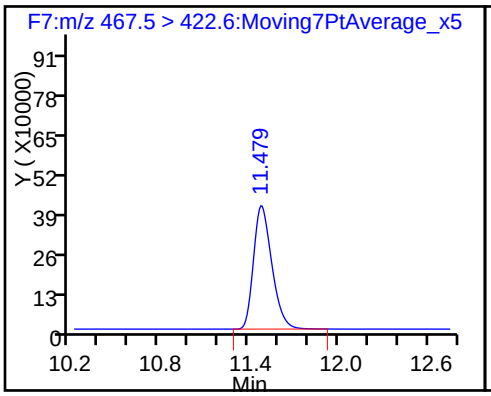

15 Perfluorooctane sulfonic acid (ND)



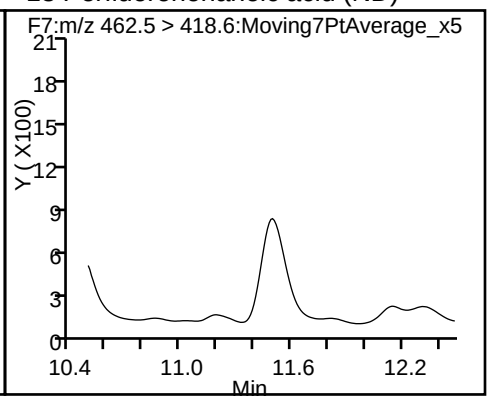

15 Perfluorooctane sulfonic acid (ND)



D 17 13C5 PFNA




18 Perfluorononanoic acid (ND)



FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1 Analy Batch No.: 109262

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/07/2016 14:36 Calibration End Date: 05/07/2016 16:43 Calibration ID: 21044

Calibration Files:

| LEVEL: | LAB SAMPLE ID: | LAB FILE ID: |
|---|---|---|
| Level 1 | STD 320-109262/5 | 07MAY2016B4A_005.d |
| Level 2 | STD 320-109262/6 | 07MAY2016B4A_006.d |
| Level 3 | STD 320-109262/7 | 07MAY2016B4A_007.d |
| Level 4 | STD 320-109262/8 | 07MAY2016B4A_008.d |
| Level 5 | STD 320-109262/9 | 07MAY2016B4A_009.d |
| Level 6 | STD 320-109262/10 | 07MAY2016B4A_010.d |
| Level 7 | STD 320-109262/11 | 07MAY2016B4A_011.d |

| ANALYTE | LVL 1 | LVL 2 | LVL 3 | LVL 4 | LVL 5 | LVL 6 | LVL 7 | | | | RT WINDOW | AVG RT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Perfluorobutanoic acid (PFBA) | 5.803 | 5.794 | 5.803 | 5.800 | 5.797 | 5.800 | 5.797 | | | | 5.549 - 6.049 | 5.799 |
| Perfluoropentanoic acid (PFPeA) | 6.904 | 6.909 | 6.913 | 6.913 | 6.913 | 6.909 | 6.913 | | | | 6.661 - 7.161 | 6.911 |
| Perfluorobutanesulfonic acid (PFBS) | +++++ | 7.028 | 7.024 | 7.024 | 7.024 | 7.028 | +++++ | | | | 6.776 - 7.276 | 7.026 |
| Perfluorohexanoic acid (PFHxA) | 8.166 | 8.160 | 8.166 | 8.160 | 8.160 | 8.160 | 8.160 | | | | 7.912 - 8.412 | 8.162 |
| Perfluoroheptanoic acid (PFHpA) | 9.396 | 9.396 | 9.396 | 9.396 | 9.396 | 9.396 | 9.396 | | | | 9.146 - 9.646 | 9.396 |
| Perfluorohexanesulfonic acid (PFHxS) | +++++ | 9.435 | 9.427 | 9.427 | 9.427 | 9.435 | +++++ | | | | 9.181 - 9.681 | 9.430 |
| Perfluorooctanoic acid (PFOA) | 10.520 | 10.511 | 10.509 | 10.511 | 10.511 | 10.511 | 10.511 | | | | 10.262 - 10.762 | 10.512 |
| Perfluoroheptanesulfonic Acid (PFHpS) | 10.511 | 10.511 | 10.518 | 10.511 | 10.511 | 10.520 | 10.520 | | | | 10.265 - 10.765 | 10.515 |
| Perfluorooctanesulfonic acid (PFOS) | +++++ | 11.470 | 11.467 | 11.470 | 11.470 | 11.470 | +++++ | | | | 11.220 - 11.720 | 11.469 |
| Perfluorononanoic acid (PFNA) | 11.489 | 11.489 | 11.496 | 11.489 | 11.489 | 11.489 | 11.489 | | | | 11.240 - 11.740 | 11.490 |
| Perfluorodecanoic acid (PFDA) | 12.328 | 12.327 | 12.324 | 12.327 | 12.327 | 12.327 | 12.328 | | | | 12.077 - 12.577 | 12.327 |
| Perfluorooctane Sulfonamide (FOSA) | 12.888 | 12.888 | 12.896 | 12.887 | 12.888 | 12.900 | 12.900 | | | | 12.642 - 13.142 | 12.892 |
| Perfluorodecanesulfonic acid (PFDS) | 12.991 | 12.991 | 12.999 | 12.991 | 12.991 | 13.003 | 12.991 | | | | 12.744 - 13.244 | 12.994 |
| Perfluoroundecanoic acid (PFUnA) | 13.034 | 13.034 | 13.041 | 13.044 | 13.044 | 13.045 | 13.045 | | | | 12.791 - 13.291 | 13.041 |
| Perfluorododecanoic acid (PFDoA) | 13.644 | 13.644 | 13.638 | 13.644 | 13.644 | 13.644 | 13.644 | | | | 13.393 - 13.893 | 13.643 |
| Perfluorotridecanoic Acid (PFTriA) | +++++ | 14.154 | 14.160 | 14.154 | 14.154 | 14.165 | 14.165 | | | | 13.910 - 14.410 | 14.159 |
| Perfluorotetradecanoic acid (PFTeA) | 14.593 | 14.593 | 14.598 | 14.592 | 14.592 | 14.593 | 14.593 | | | | 14.343 - 14.843 | 14.593 |
| Perfluoro-n-hexadecanoic acid (PFHxDA) | 15.245 | 15.245 | 15.242 | 15.245 | 15.245 | 15.245 | 15.245 | | | | 14.994 - 15.494 | 15.245 |
| Perfluoro-n-octandecanoic acid (PFODA) | 15.578 | 15.578 | 15.581 | 15.578 | 15.578 | 15.584 | 15.584 | | | | 15.330 - 15.830 | 15.580 |
| 13C4 PFBA | 5.797 | 5.797 | 5.800 | 5.794 | 5.797 | 5.800 | 5.797 | | | | 5.547 - 6.047 | 5.797 |
| 13C5-PFPeA | 6.909 | 6.909 | 6.913 | 6.909 | 6.909 | 6.909 | 6.909 | | | | 6.659 - 7.159 | 6.910 |
| 13C2 PFHxA | 8.166 | 8.160 | 8.166 | 8.160 | 8.160 | 8.160 | 8.160 | | | | 7.912 - 8.412 | 8.162 |
| 13C4-PFHpA | 9.396 | 9.396 | 9.396 | 9.396 | 9.396 | 9.396 | 9.396 | | | | 9.146 - 9.646 | 9.396 |
| 18O2 PFHxS | 9.427 | 9.427 | 9.427 | 9.427 | 9.427 | 9.435 | 9.435 | | | | 9.180 - 9.680 | 9.429 |
| 13C4 PFOA | 10.511 | 10.511 | 10.509 | 10.511 | 10.511 | 10.511 | 10.511 | | | | 10.261 - 10.761 | 10.511 |
| 13C4 PFOS | 11.470 | 11.461 | 11.467 | 11.470 | 11.461 | 11.470 | 11.470 | | | | 11.217 - 11.717 | 11.467 |
| 13C5 PFNA | 11.489 | 11.489 | 11.487 | 11.489 | 11.489 | 11.489 | 11.489 | | | | 11.239 - 11.739 | 11.489 |
| 13C2 PFDA | 12.328 | 12.327 | 12.324 | 12.327 | 12.327 | 12.327 | 12.328 | | | | 12.077 - 12.577 | 12.327 |
| 13C8 FOSA | 12.888 | 12.888 | 12.896 | 12.887 | 12.888 | 12.900 | 12.900 | | | | 12.642 - 13.142 | 12.892 |
| 13C2 PFUnA | 13.045 | 13.045 | 13.041 | 13.044 | 13.044 | 13.045 | 13.045 | | | | 12.794 - 13.294 | 13.044 |
| 13C2 PFDoA | 13.644 | 13.644 | 13.638 | 13.644 | 13.644 | 13.644 | 13.644 | | | | 13.393 - 13.893 | 13.643 |
| 13C2-PFTeDA | 14.593 | 14.593 | 14.598 | 14.592 | 14.592 | 14.593 | 14.593 | | | | 14.343 - 14.843 | 14.593 |
| 13C2-PFHxDA | 15.245 | 15.245 | 15.242 | 15.245 | 15.245 | 15.245 | 15.245 | | | | 14.994 - 15.494 | 15.245 |

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1 Analy Batch No.: 109262

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/07/2016 14:36 Calibration End Date: 05/07/2016 16:43 Calibration ID: 21044

Calibration Files:

| LEVEL: | LAB SAMPLE ID: | LAB FILE ID: |
|---|---|---|
| Level 1 | STD 320-109262/5 | 07MAY2016B4A_005.d |
| Level 2 | STD 320-109262/6 | 07MAY2016B4A_006.d |
| Level 3 | STD 320-109262/7 | 07MAY2016B4A_007.d |
| Level 4 | STD 320-109262/8 | 07MAY2016B4A_008.d |
| Level 5 | STD 320-109262/9 | 07MAY2016B4A_009.d |
| Level 6 | STD 320-109262/10 | 07MAY2016B4A_010.d |
| Level 7 | STD 320-109262/11 | 07MAY2016B4A_011.d |

| ANALYTE | CF | | | | CURVE TYPE | COEFFICIENT | | | # | MIN CF | %RSD | # | MAX %RSD | R^2 OR COD | # | MIN R^2 OR COD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LVL 1<br>LVL 5 | LVL 2<br>LVL 6 | LVL 3<br>LVL 7 | LVL 4 | | B | M1 | M2 | | | | | | | | |
| 13C4 PFBA | 79656<br>73227 | 83359<br>60125 | 81233<br>48455 | 77565 | Ave | | 71945.8486 | | | | 18.0 | | 50.0 | | | |
| 13C5-PFPeA | 52933<br>52285 | 57310<br>40715 | 57946<br>33384 | 56736 | Ave | | 50186.8514 | | | | 18.9 | | 50.0 | | | |
| 13C2 PFHxA | 76645<br>71126 | 82211<br>54168 | 81691<br>42818 | 76476 | Ave | | 69305.0200 | | | | 21.7 | | 50.0 | | | |
| 13C4-PFHpA | 66539<br>58571 | 70818<br>45421 | 68019<br>36427 | 65432 | Ave | | 58746.8486 | | | | 22.1 | | 50.0 | | | |
| 18O2 PFHxS | 27355<br>25770 | 28990<br>18130 | 31630<br>13578 | 30242 | Ave | | 25099.4322 | | | | 26.8 | | 50.0 | | | |
| 13C4 PFOA | 76074<br>63144 | 81896<br>46129 | 78537<br>38436 | 75744 | Ave | | 65708.3829 | | | | 26.1 | | 50.0 | | | |
| 13C4 PFOS | 3392.2<br>4627.7 | 5108.4<br>2549.9 | 6602.8<br>1945.4 | 6842.4 | Ave | | 4438.39809 | | | | 43.0 | | 50.0 | | | |
| 13C5 PFNA | 62463<br>60588 | 70490<br>43746 | 69445<br>37578 | 62103 | Ave | | 58059.0886 | | | | 21.7 | | 50.0 | | | |
| 13C2 PFDA | 86385<br>74332 | 94140<br>55473 | 95139<br>49057 | 84977 | Ave | | 77071.9486 | | | | 23.8 | | 50.0 | | | |
| 13C8 FOSA | 79249<br>74900 | 89230<br>58460 | 92464<br>53166 | 88234 | Ave | | 76529.0686 | | | | 20.2 | | 50.0 | | | |
| 13C2 PFUnA | 93200<br>77978 | 98187<br>60215 | 95478<br>52347 | 89682 | Ave | | 81012.3800 | | | | 22.5 | | 50.0 | | | |
| 13C2 PFDoA | 92674<br>84240 | 94999<br>65506 | 98143<br>56547 | 96366 | Ave | | 84067.9400 | | | | 19.7 | | 50.0 | | | |
| 13C2-PFTeDA | 54563<br>53484 | 61237<br>46755 | 61071<br>40178 | 59889 | Ave | | 53882.4514 | | | | 14.8 | | 50.0 | | | |
| 13C2-PFHxDA | 15649<br>19982 | 20359<br>17092 | 20685<br>15014 | 22340 | Ave | | 18731.5371 | | | | 15.0 | | 50.0 | | | |

Note: The m1 coefficient is the same as Ave CF for an Ave curve type.

FORM VI

CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1 Analy Batch No.: 109262

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/07/2016 14:36 Calibration End Date: 05/07/2016 16:43 Calibration ID: 21044

| ANALYTE | RRF | | | | | CURVE TYPE | COEFFICIENT | | | # | MIN RRF | %RSD | # | MAX %RSD | R^2 OR COD | # | MIN R^2 OR COD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3 | LVL 4 | LVL 5 | | B | M1 | M2 | | | | | | | | |
| Perfluorobutanoic acid (PFBA) | 46404<br>40115 | 53987<br>33405 | 56733 | 48320 | 49094 | AveID | | 0.6541 | | | | 6.2 | | 35.0 | | | |
| Perfluoropentanoic acid (PFPeA) | 29718<br>17582 | 24797<br>13936 | 27963 | 23999 | 24170 | AveID | | 0.4587 | | | | 11.1 | | 35.0 | | | |
| Perfluorobutanesulfonic acid (PFBS) | +++++<br>11845 | 20805<br>+++++ | 17950 | 16536 | 17052 | AveID | | 0.6294 | | | | 11.3 | | 50.0 | | | |
| Perfluorohexanoic acid (PFHxA) | 54714<br>22299 | 39930<br>17797 | 33417 | 32865 | 30283 | AveID | | 0.4702 | | | | 23.5 | | 35.0 | | | |
| Perfluoroheptanoic acid (PFHpA) | 34834<br>22392 | 40832<br>18405 | 36197 | 30675 | 30549 | L2ID | 0.0206 | 0.5076 | | | | | | | 0.9960 | | 0.9900 |
| Perfluorohexanesulfonic acid (PFHxS) | +++++<br>28706 | 46434<br>+++++ | 44722 | 36873 | 37897 | AveID | | 1.4578 | | | | 10.6 | | 35.0 | | | |
| Perfluorooctanoic acid (PFOA) | 22978<br>20207 | 30351<br>16752 | 35221 | 31088 | 28733 | AveID | | 0.4086 | | | | 13.5 | | 35.0 | | | |
| Perfluoroheptanesulfonic Acid (PFHpS) | 50088<br>27568 | 44855<br>21056 | 48714 | 42004 | 38286 | AveID | | 9.5673 | | | | 29.9 | | 50.0 | | | |
| Perfluorooctanesulfonic acid (PFOS) | +++++<br>47257 | 68397<br>+++++ | 80724 | 65989 | 64000 | AveID | | 13.524 | | | | 23.9 | | 35.0 | | | |
| Perfluorononanoic acid (PFNA) | 79896<br>59159 | 84121<br>48540 | 91986 | 76668 | 80354 | L2ID | -0.029 | 1.2993 | | | | | | | 0.9980 | | 0.9900 |
| Perfluorodecanoic acid (PFDA) | 108336<br>66890 | 117709<br>57495 | 104569 | 89042 | 88315 | AveID | | 1.1739 | | | | 6.5 | | 35.0 | | | |
| Perfluorooctane Sulfonamide (FOSA) | 87510<br>64643 | 82609<br>55412 | 98847 | 86760 | 83499 | AveID | | 1.0493 | | | | 6.8 | | 35.0 | | | |
| Perfluorodecanesulfonic acid (PFDS) | 29923<br>11461 | 29550<br>9328.5 | 25377 | 20961 | 18200 | AveID | | 4.9622 | | | | 38.4 | | 50.0 | | | |
| Perfluoroundecanoic acid (PFUnA) | 132468<br>70896 | 126447<br>59233 | 121774 | 96562 | 93588 | AveID | | 1.2243 | | | | 9.4 | | 35.0 | | | |
| Perfluorododecanoic acid (PFDoA) | 83186<br>62211 | 91905<br>52781 | 92589 | 76749 | 79159 | AveID | | 0.9182 | | | | 6.3 | | 35.0 | | | |
| Perfluorotridecanoic Acid (PFTriA) | +++++<br>46891 | 83470<br>39878 | 80487 | 66764 | 64002 | AveID | | 1.1646 | | | | 13.4 | | 50.0 | | | |
| Perfluorotetradecanoic acid (PFTeA) | 58064<br>21554 | 39010<br>19030 | 30670 | 26383 | 26809 | AveID | | 0.5828 | | | | 38.0 | | 50.0 | | | |
| Perfluoro-n-hexadecanoic acid (PFHxDA) | 144318<br>49443 | 119054<br>42201 | 71222 | 56322 | 57766 | AveID | | 4.2326 | | | | 58.4 | * | 50.0 | | | |
| Perfluoro-n-octandecanoic acid (PFODA) | 39842<br>36754 | 41184<br>32484 | 45202 | 40031 | 42430 | AveID | | 2.1405 | | | | 10.5 | | 50.0 | | | |

Note: The m1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1 Analy Batch No.: 109262

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/07/2016 14:36 Calibration End Date: 05/07/2016 16:43 Calibration ID: 21044

Calibration Files:

| LEVEL: | LAB SAMPLE ID: | LAB FILE ID: |
|---|---|---|
| Level 1 | STD 320-109262/5 | 07MAY2016B4A_005.d |
| Level 2 | STD 320-109262/6 | 07MAY2016B4A_006.d |
| Level 3 | STD 320-109262/7 | 07MAY2016B4A_007.d |
| Level 4 | STD 320-109262/8 | 07MAY2016B4A_008.d |
| Level 5 | STD 320-109262/9 | 07MAY2016B4A_009.d |
| Level 6 | STD 320-109262/10 | 07MAY2016B4A_010.d |
| Level 7 | STD 320-109262/11 | 07MAY2016B4A_011.d |

| ANALYTE | CURVE TYPE | RESPONSE | | | | | CONCENTRATION (NG/ML) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3 | LVL 4 | LVL 5 | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3 | LVL 4 | LVL 5 |
| 13C4 PFBA | Ave | 3982789<br>3006261 | 4167965<br>2422770 | 4061625 | 3878267 | 3661370 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C5-PFPeA | Ave | 2646648<br>2035735 | 2865489<br>1669202 | 2897281 | 2836800 | 2614243 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C2 PFHxA | Ave | 3832257<br>2708397 | 4110569<br>2140879 | 4084525 | 3823824 | 3556306 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C4-PFHpA | Ave | 3326968<br>2271067 | 3540907<br>1821368 | 3400960 | 3271575 | 2928552 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 18O2 PFHxS | Ave | 1293900<br>857567 | 1371209<br>642257 | 1496092 | 1430465 | 1218932 | 47.3<br>47.3 | 47.3<br>47.3 | 47.3 | 47.3 | 47.3 |
| 13C4 PFOA | Ave | 3803682<br>2306438 | 4094798<br>1921778 | 3926833 | 3787199 | 3157206 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C4 PFOS | Ave | 162148<br>121887 | 244181<br>92991 | 315612 | 327067 | 221202 | 47.8<br>47.8 | 47.8<br>47.8 | 47.8 | 47.8 | 47.8 |
| 13C5 PFNA | Ave | 3123163<br>2187306 | 3524508<br>1878882 | 3472269 | 3105174 | 3029379 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C2 PFDA | Ave | 4319255<br>2773674 | 4706997<br>2452843 | 4756961 | 4248863 | 3716589 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C8 FOSA | Ave | 3962434<br>2922997 | 4461510<br>2658316 | 4623178 | 4411716 | 3745023 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C2 PFUnA | Ave | 4660004<br>3010737 | 4909342<br>2617358 | 4773887 | 4484117 | 3898888 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C2 PFDoA | Ave | 4633718<br>3275300 | 4749959<br>2827360 | 4907172 | 4818283 | 4211987 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C2-PFTeDA | Ave | 2728142<br>2337751 | 3061843<br>2008897 | 3053568 | 2994446 | 2674211 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |
| 13C2-PFHxDA | Ave | 782466<br>854590 | 1017962<br>750704 | 1034238 | 1116993 | 999085 | 50.0<br>50.0 | 50.0<br>50.0 | 50.0 | 50.0 | 50.0 |

Curve Type Legend:
Ave = Average

FORM VI

RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1 Analy Batch No.: 109262

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/07/2016 14:36 Calibration End Date: 05/07/2016 16:43 Calibration ID: 21044

Calibration Files:

| LEVEL: | LAB SAMPLE ID: | LAB FILE ID: |
|---|---|---|
| Level 1 | STD 320-109262/5 | 07MAY2016B4A_005.d |
| Level 2 | STD 320-109262/6 | 07MAY2016B4A_006.d |
| Level 3 | STD 320-109262/7 | 07MAY2016B4A_007.d |
| Level 4 | STD 320-109262/8 | 07MAY2016B4A_008.d |
| Level 5 | STD 320-109262/9 | 07MAY2016B4A_009.d |
| Level 6 | STD 320-109262/10 | 07MAY2016B4A_010.d |
| Level 7 | STD 320-109262/11 | 07MAY2016B4A_011.d |

| ANALYTE | IS REF | CURVE TYPE | RESPONSE | | | | | CONCENTRATION (NG/ML) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3 | LVL 4 | LVL 5 | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3 | LVL 4 | LVL 5 |
| Perfluorobutanoic acid (PFBA) | | AveID | 23202<br>8022980 | 53987<br>13361889 | 283663 | 966407 | 2454691 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluoropentanoic acid (PFPeA) | | AveID | 14859<br>3516497 | 24797<br>5574481 | 139814 | 479972 | 1208503 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluorobutanesulfonic acid (PFBS) | | AveID | +++++<br>2094175 | 18392<br>+++++ | 79337 | 292351 | 753720 | +++++<br>177 | 0.884<br>+++++ | 4.42 | 17.7 | 44.2 |
| Perfluorohexanoic acid (PFHxA) | | AveID | 27357<br>4459810 | 39930<br>7118891 | 167084 | 657304 | 1514167 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluoroheptanoic acid (PFHpA) | | L2ID | 17417<br>4478320 | 40832<br>7362160 | 180983 | 613507 | 1527432 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluorohexanesulfonic acid (PFHxS) | | AveID | +++++<br>5431196 | 43927<br>+++++ | 211535 | 697633 | 1792512 | +++++<br>189 | 0.946<br>+++++ | 4.73 | 18.9 | 47.3 |
| Perfluorooctanoic acid (PFOA) | | AveID | 11489<br>4041400 | 30351<br>6700717 | 176105 | 621766 | 1436665 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluoroheptanesulfonic Acid (PFHpS) | | AveID | 23842<br>5249023 | 42702<br>8018135 | 231881 | 799753 | 1822433 | 0.476<br>190 | 0.952<br>381 | 4.76 | 19.0 | 47.6 |
| Perfluorooctanesulfonic acid (PFOS) | | AveID | +++++<br>9035448 | 65388<br>+++++ | 385863 | 1261703 | 3059219 | +++++<br>191 | 0.956<br>+++++ | 4.78 | 19.1 | 47.8 |
| Perfluorononanoic acid (PFNA) | | L2ID | 39948<br>11831745 | 84121<br>19415885 | 459929 | 1533359 | 4017693 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluorodecanoic acid (PFDA) | | AveID | 54168<br>13377984 | 117709<br>22997987 | 522846 | 1780843 | 4415759 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluorooctane Sulfonamide (FOSA) | | AveID | 43755<br>12928661 | 82609<br>22164769 | 494236 | 1735199 | 4174969 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluorodecanesulfonic acid (PFDS) | | AveID | 14423<br>2209724 | 28486<br>3597082 | 122317 | 404135 | 877246 | 0.482<br>193 | 0.964<br>386 | 4.82 | 19.3 | 48.2 |
| Perfluoroundecanoic acid (PFUnA) | | AveID | 66234<br>14179140 | 126447<br>23693236 | 608872 | 1931235 | 4679381 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluorododecanoic acid (PFDoA) | | AveID | 41593<br>12442195 | 91905<br>21112590 | 462946 | 1534982 | 3957939 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |

FORM VI

RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1 Analy Batch No.: 109262

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/07/2016 14:36 Calibration End Date: 05/07/2016 16:43 Calibration ID: 21044

| ANALYTE | IS REF | CURVE TYPE | RESPONSE | | | | | CONCENTRATION (NG/ML) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3 | LVL 4 | LVL 5 | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3 | LVL 4 | LVL 5 |
| Perfluorotridecanoic Acid (PFTriA) | | AveID | +++++<br>9378259 | 83470<br>15951099 | 402437 | 1335287 | 3200077 | +++++<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluorotetradecanoic acid (PFTeA) | | AveID | 29032<br>4310813 | 39010<br>7612184 | 153352 | 527653 | 1340427 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluoro-n-hexadecanoic acid (PFHxDA) | | AveID | 72159<br>9888554 | 119054<br>16880346 | 356111 | 1126435 | 2888299 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |
| Perfluoro-n-octandecanoic acid (PFODA) | | AveID | 19921<br>7350840 | 41184<br>12993450 | 226008 | 800611 | 2121522 | 0.500<br>200 | 1.00<br>400 | 5.00 | 20.0 | 50.0 |

Curve Type Legend:

AveID = Average isotope dilution
L2ID = Linear 1/conc^2 IsoDil

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_005.d
Lims ID: Std L1
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 07-May-2016 14:36:33 ALS Bottle#: 10 Worklist Smp#: 5
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L1
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:53:29 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 14:21:28

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.797 | 5.797 | 0.0 | | 3982789 | 55.4 | | 111 | 15015 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.803 | 5.799 | 0.004 | 1.000 | 23202 | 0.4453 | | 89.1 | 152 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 2646648 | 52.7 | | 105 | 7897 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.904 | 6.911 | -0.007 | 1.000 | 14859 | 0.6119 | | 122 | 11.8 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 8366 | NC | | | 33.5 | |
| 298.8 > 98.6 | 7.028 | 7.026 | 0.002 | 1.001 | 5453 | | 1.53(0.00-0.00) | | 18.9 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 8366 | 0.4859 | | 110 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.166 | 8.162 | 0.004 | | 3832257 | 55.3 | | 111 | 14100 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.166 | 8.162 | 0.004 | 1.000 | 27357 | 0.7591 | | 152 | 126 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.396 | 9.396 | 0.0 | | 3326968 | 56.6 | | 113 | 6270 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.396 | 9.396 | 0.0 | 1.000 | 17417 | 0.4751 | | 95.0 | 69.3 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.427 | 9.430 | -0.003 | | 1293900 | 51.6 | | 109 | 6485 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 23580 | NC | | | 54.1 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 23580 | 0.5913 | | 125 | | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.511 | 10.511 | 0.0 | | 3803682 | 57.9 | | 116 | 7235 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.520 | 10.512 | 0.008 | 1.000 | 11489 | 0.3696 | | 73.9 | 30.8 | |
| 412.8 > 168.7 | 10.511 | 10.512 | -0.001 | 0.999 | 5821 | | 1.97(0.00-0.00) | 73.9 | 34.2 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.511 | 10.515 | -0.004 | 1.000 | 23842 | 0.7346 | | 154 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.511 | 10.515 | -0.004 | 1.000 | 23842 | NC | | | 106 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.470 | 11.467 | 0.003 | | 162148 | 36.5 | | 76.4 | 539 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.470 | 11.470 | 0.0 | 1.000 | 38296 | 0.8347 | | 175 | 131 | |
| 498.3 > 98.2 | 11.470 | 11.470 | 0.0 | 1.000 | 22340 | | 1.71(0.00-0.00) | 175 | 119 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.489 | 11.489 | 0.0 | | 3123163 | 53.8 | | 108 | 5701 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.489 | 11.490 | -0.001 | 1.000 | 39948 | 0.5142 | | 103 | 79.9 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.328 | 12.327 | 0.001 | | 4319255 | 56.0 | | 112 | 8470 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.328 | 12.327 | 0.001 | 1.000 | 54168 | 0.5342 | | 107 | 177 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.888 | 12.892 | -0.004 | | 3962434 | 51.8 | | 104 | 5658 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.888 | 12.892 | -0.004 | 1.000 | 43755 | 0.5262 | | 105 | 158 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 14423 | NC | | | 59.3 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 14423 | 0.8568 | | 178 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.034 | 13.041 | -0.007 | 1.000 | 66234 | 0.5804 | | 116 | 192 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.045 | 13.044 | 0.001 | | 4660004 | 57.5 | | 115 | 5803 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.644 | 13.643 | 0.001 | | 4633718 | 55.1 | | 110 | 4160 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.644 | 13.643 | 0.001 | 1.000 | 41593 | 0.4888 | | 97.8 | 20.4 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.165 | 14.160 | 0.005 | 1.000 | 40850 | 0.6428 | | 129 | 33.3 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.593 | 14.593 | 0.0 | 1.000 | 29032 | 0.9129 | | 183 | 23.7 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.593 | 14.593 | 0.0 | | 2728142 | 50.6 | | 101 | 4293 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.245 | 15.244 | 0.001 | | 782466 | 41.8 | | 83.5 | 2277 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.245 | 15.244 | 0.001 | 1.000 | 72159 | 1.09 | | 218 | 18.0 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.578 | 15.580 | -0.002 | 1.000 | 19921 | 0.5947 | | 119 | 39.0 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFC-L1_00018 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:53:30 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_005.d

Injection Date: 07-May-2016 14:36:33 Instrument ID: A4

Lims ID: Std L1

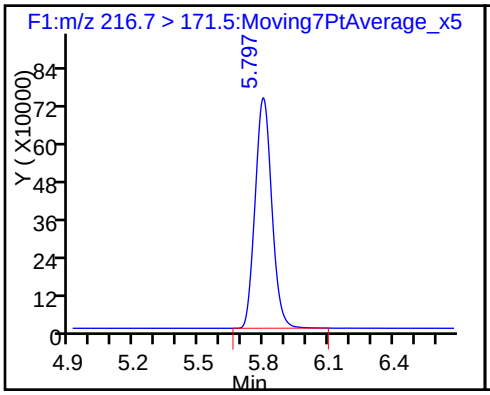
Client ID:

Operator ID: JRB ALS Bottle#: 10 Worklist Smp#: 5

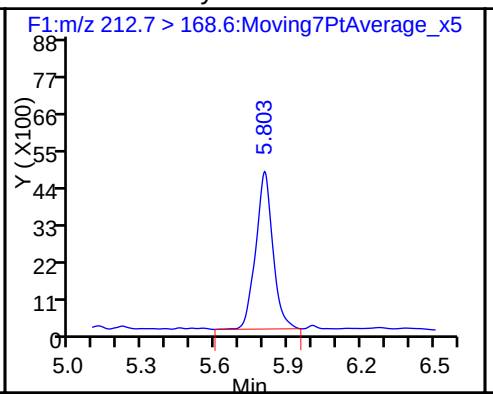
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

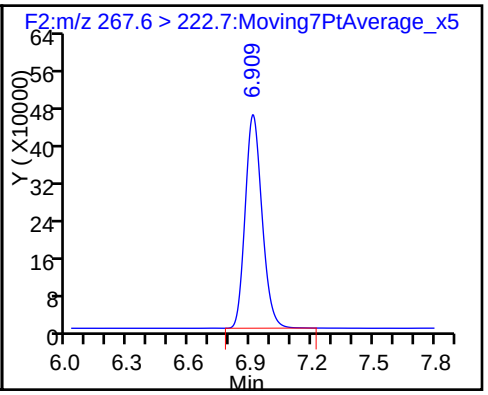
D 1 13C4 PFBA



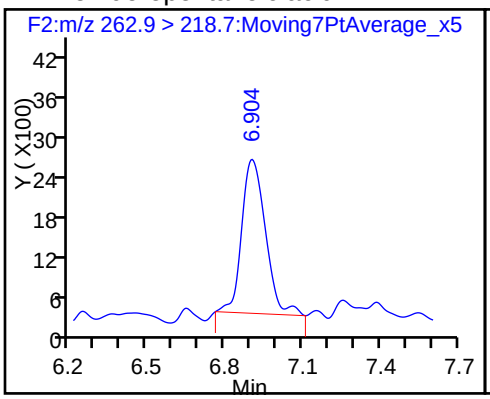

2 Perfluorobutyric acid



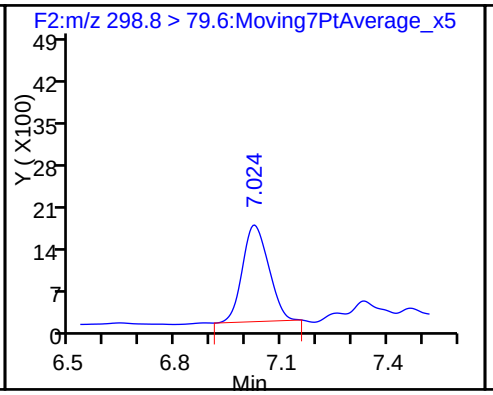

D 3 13C5-PFPeA



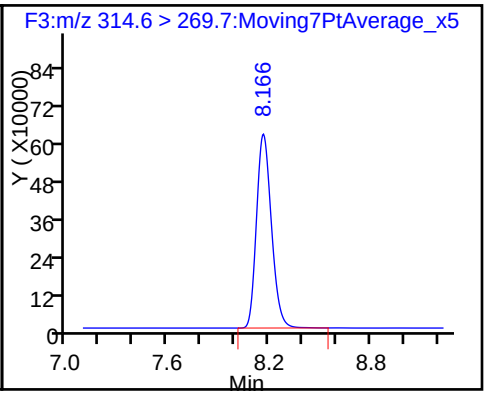

4 Perfluoropentanoic acid



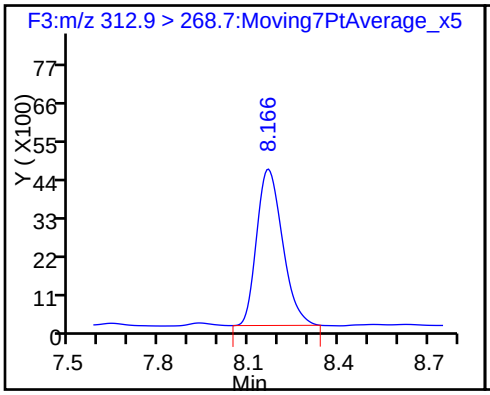

51 Perfluorobutanesulfonic acid



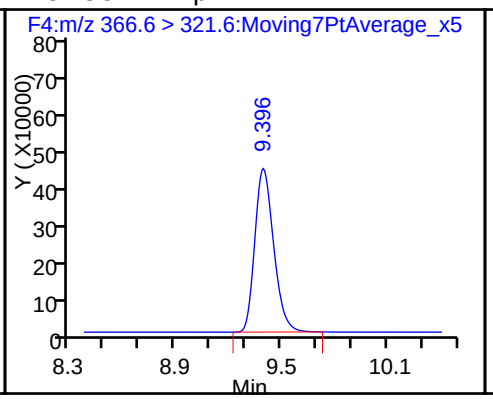

D 6 13C2 PFHxA



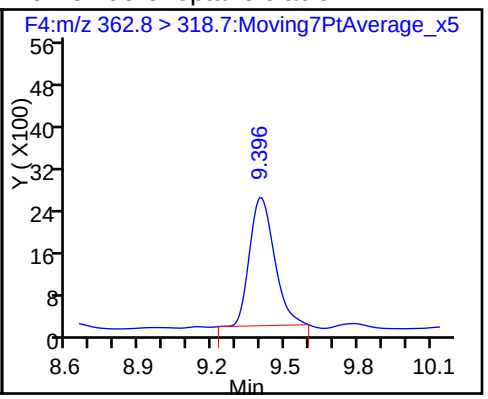

7 Perfluorohexanoic acid



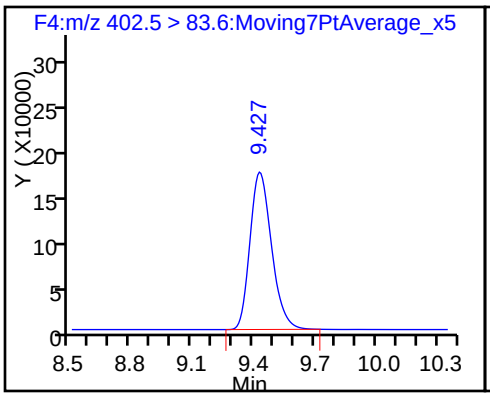

D 8 13C4-PFHpA



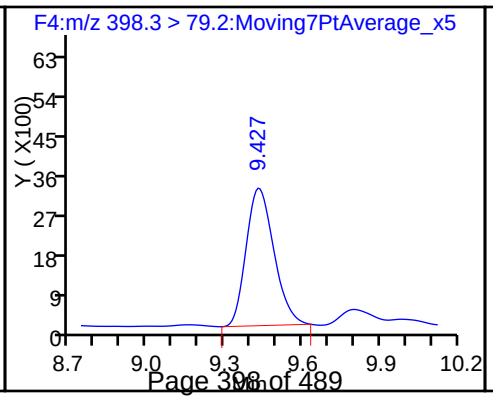

9 Perfluoroheptanoic acid



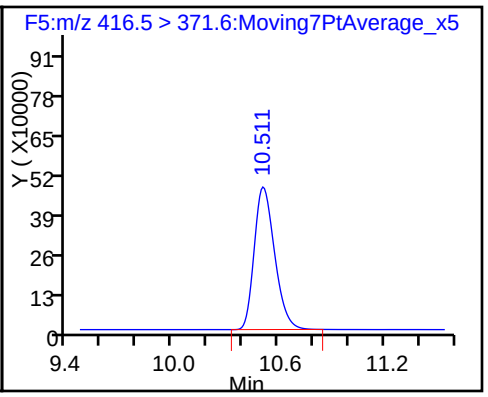

D 11 18O2 PFHxS



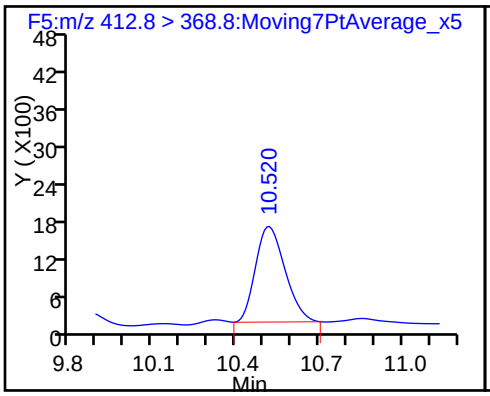

58 Perfluorohexanesulfonic acid



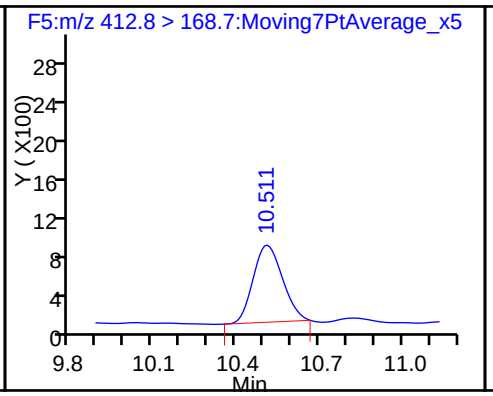

D 12 13C4 PFOA



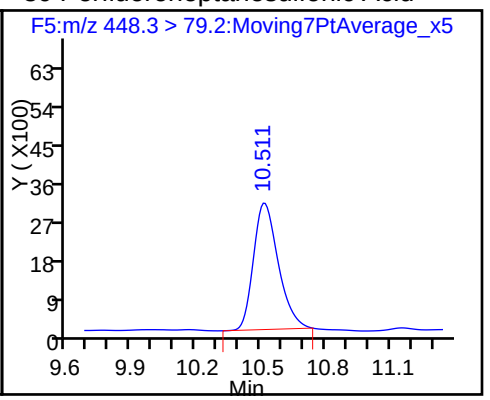
13 Perfluorooctanoic acid



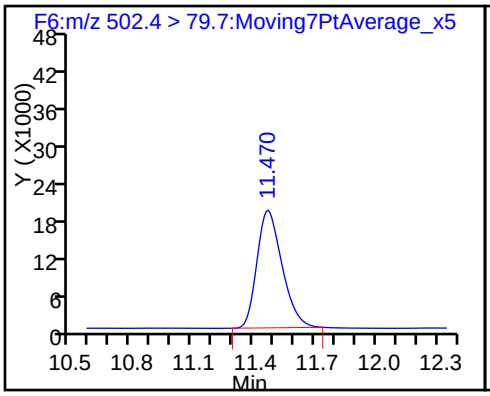

13 Perfluorooctanoic acid



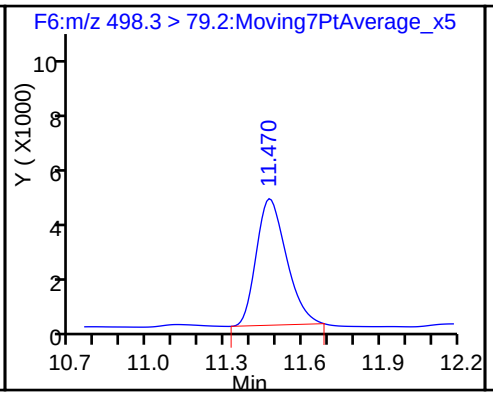

39 Perfluoroheptanesulfonic Acid



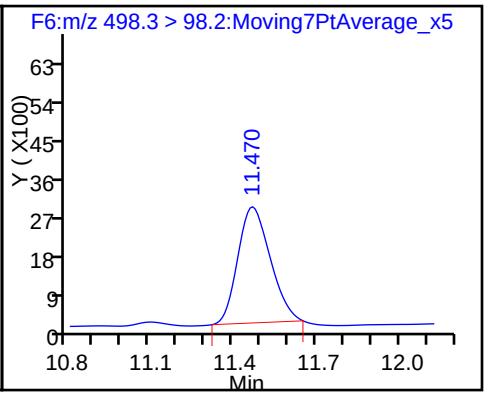

D 16 13C4 PFOS



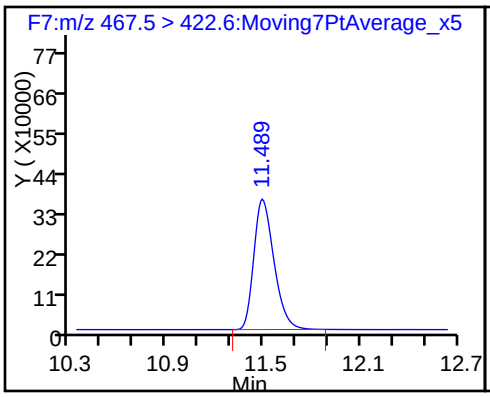

15 Perfluorooctane sulfonic acid



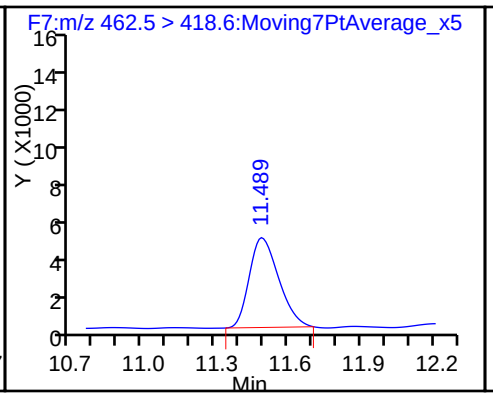

15 Perfluorooctane sulfonic acid



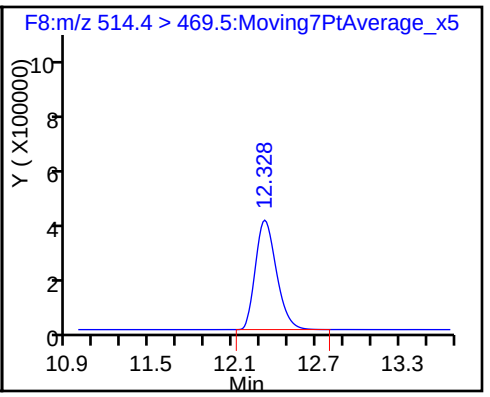

D 17 13C5 PFNA



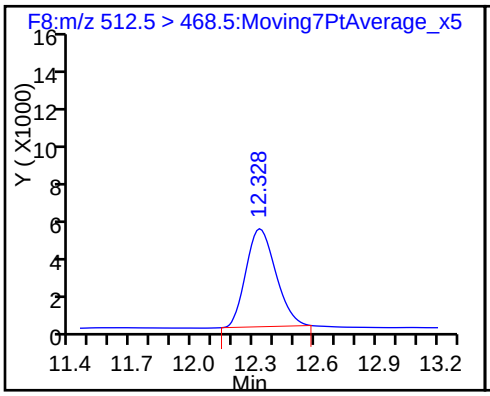

18 Perfluorononanoic acid



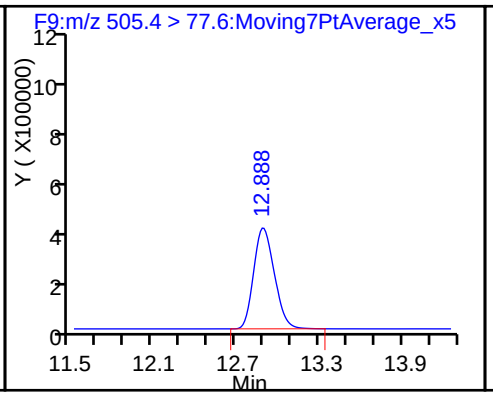

D 19 13C2 PFDA



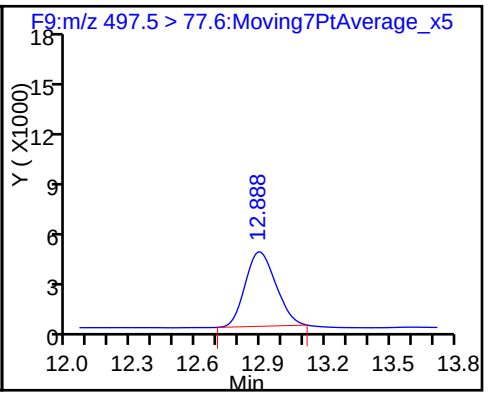

20 Perfluorodecanoic acid



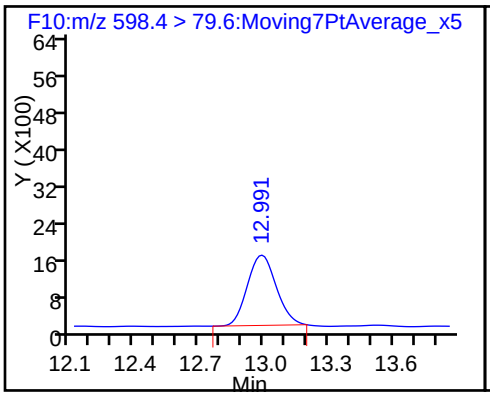

D 23 13C8 FOSA



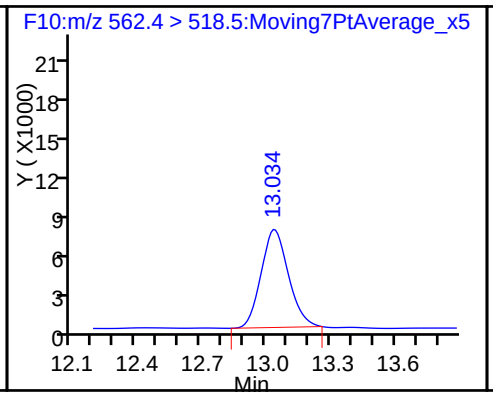

24 Perfluorooctane Sulfonamide



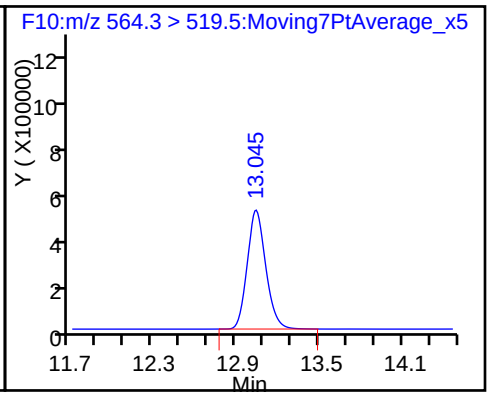
49 Perfluorodecane Sulfonic acid



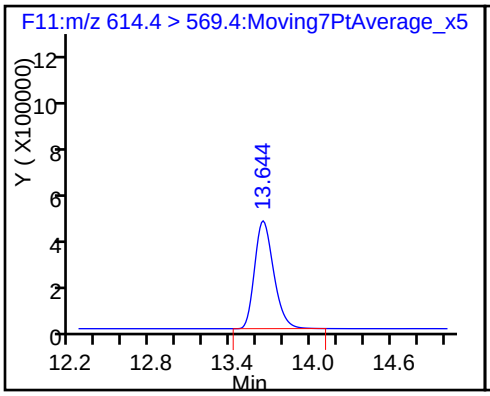

27 Perfluoroundecanoic acid



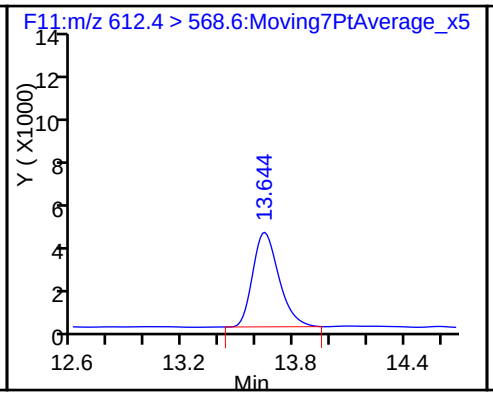

D 26 13C2 PFUnA



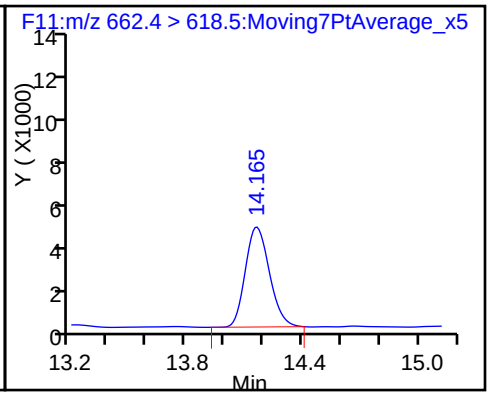

D 28 13C2 PFDoA



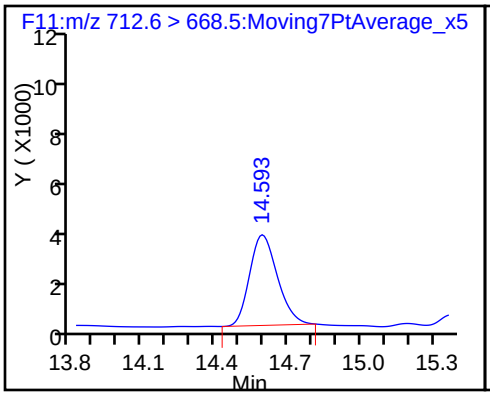

29 Perfluorododecanoic acid



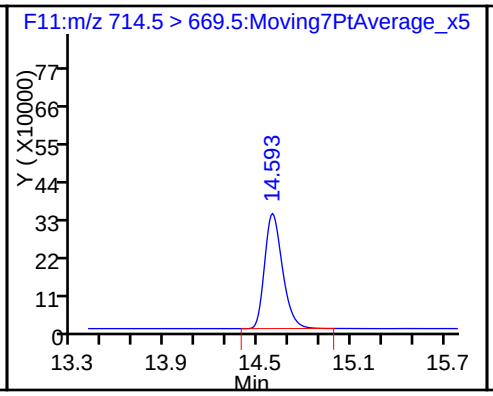

30 Perfluorotridecanoic acid



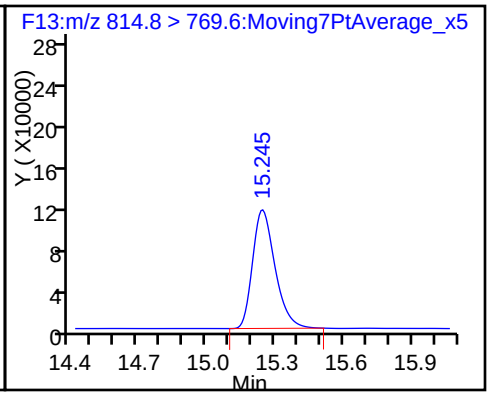

32 Perfluorotetradecanoic acid



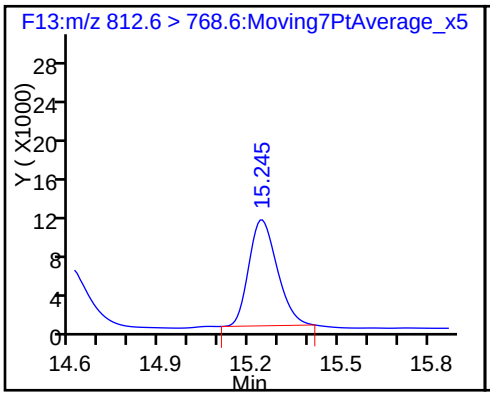

D 33 13C2-PFTeDA



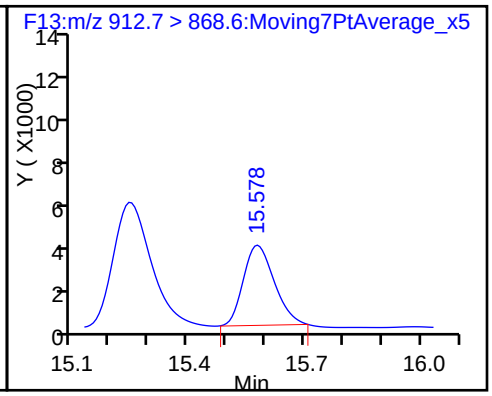

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_006.d
Lims ID: Std L2
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 07-May-2016 14:57:44 ALS Bottle#: 11 Worklist Smp#: 6
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L2
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:42 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 14:27:57

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.797 | 5.797 | 0.0 | | 4167965 | 57.9 | | 116 | 15624 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.794 | 5.799 | -0.005 | 1.000 | 53987 | 0.99 | | 99.0 | 247 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 2865489 | 57.1 | | 114 | 9235 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.909 | 6.911 | -0.002 | 1.000 | 24797 | 0.9432 | | 94.3 | 20.9 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 18392 | NC | | | 57.5 | |
| 298.8 > 98.6 | 7.019 | 7.026 | -0.007 | 0.999 | 14097 | | 1.30(0.00-0.00) | | 46.6 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 18392 | 1.01 | | 114 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 4110569 | 59.3 | | 119 | 8480 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 39930 | 1.03 | | 103 | 226 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.396 | 9.396 | 0.0 | | 3540907 | 60.3 | | 121 | 7204 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.396 | 9.396 | 0.0 | 1.000 | 40832 | 1.10 | | 110 | 214 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.427 | 9.430 | -0.003 | | 1371209 | 54.6 | | 115 | 4953 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.435 | 9.431 | 0.004 | 1.000 | 43927 | NC | | | 126 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.435 | 9.431 | 0.004 | 1.000 | 43927 | 1.04 | | 110 | | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.511 | 10.511 | 0.0 | | 4094798 | 62.3 | | 125 | 6790 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.511 | 10.512 | -0.001 | 1.000 | 30351 | 0.9069 | | 90.7 | 94.4 | |
| 412.8 > 168.7 | 10.520 | 10.512 | 0.008 | 1.001 | 13029 | | 2.33(0.00-0.00) | 90.7 | 44.6 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.511 | 10.515 | -0.004 | 1.000 | 42702 | 0.8737 | | 91.8 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.511 | 10.515 | -0.004 | 1.000 | 42702 | NC | | | 313 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.461 | 11.467 | -0.006 | | 244181 | 55.0 | | 115 | 1067 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.470 | 11.470 | 0.0 | 1.000 | 65388 | 0.9465 | | 99.0 | 207 | |
| 498.3 > 98.2 | 11.470 | 11.470 | 0.0 | 1.000 | 44358 | | 1.47(0.00-0.00) | 99.0 | 148 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.489 | 11.489 | 0.0 | | 3524508 | 60.7 | | 121 | 7136 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.489 | 11.490 | -0.001 | 1.000 | 84121 | 0.9404 | | 94.0 | 211 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.327 | 12.327 | 0.0 | | 4706997 | 61.1 | | 122 | 9848 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.327 | 12.327 | 0.0 | 1.000 | 117709 | 1.07 | | 107 | 340 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.888 | 12.892 | -0.004 | | 4461510 | 58.3 | | 117 | 4309 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.888 | 12.892 | -0.004 | 1.000 | 82609 | 0.8823 | | 88.2 | 322 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 28486 | NC | | | 145 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 28486 | 1.12 | | 117 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.034 | 13.041 | -0.007 | 1.000 | 126447 | 1.05 | | 105 | 295 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.045 | 13.044 | 0.001 | | 4909342 | 60.6 | | 121 | 8920 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.644 | 13.643 | 0.001 | | 4749959 | 56.5 | | 113 | 4766 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.644 | 13.643 | 0.001 | 1.000 | 91905 | 1.05 | | 105 | 48.1 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.154 | 14.160 | -0.006 | 1.000 | 83470 | 1.17 | | 117 | 53.4 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.593 | 14.593 | 0.0 | 1.000 | 39010 | 1.09 | | 109 | 32.5 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.593 | 14.593 | 0.0 | | 3061843 | 56.8 | | 114 | 4668 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.245 | 15.244 | 0.001 | | 1017962 | 54.3 | | 109 | 2833 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.245 | 15.244 | 0.001 | 1.000 | 119054 | 1.38 | | 138 | 27.7 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.578 | 15.580 | -0.002 | 1.000 | 41184 | 0.9451 | | 94.5 | 74.7 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFC-L2_00018 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:29:43 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_006.d

Injection Date: 07-May-2016 14:57:44 Instrument ID: A4

Lims ID: Std L2

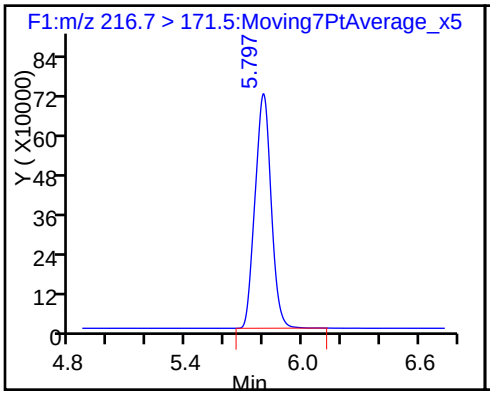
Client ID:

Operator ID: JRB ALS Bottle#: 11 Worklist Smp#: 6

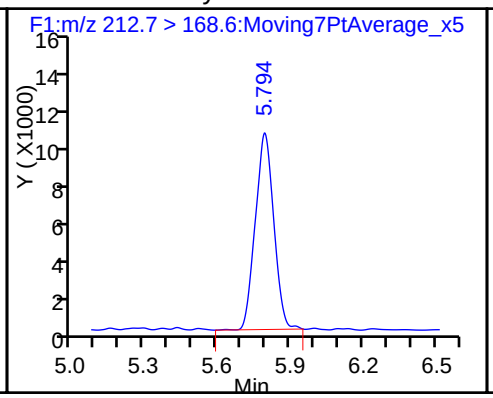
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

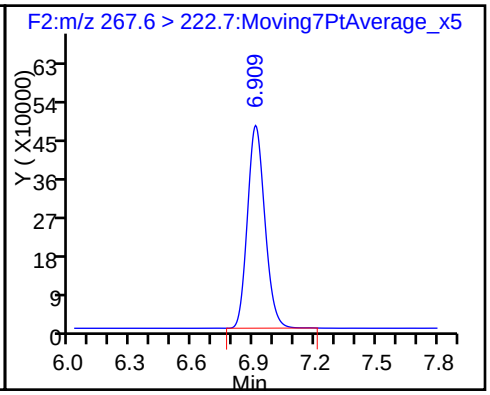
D 1 13C4 PFBA



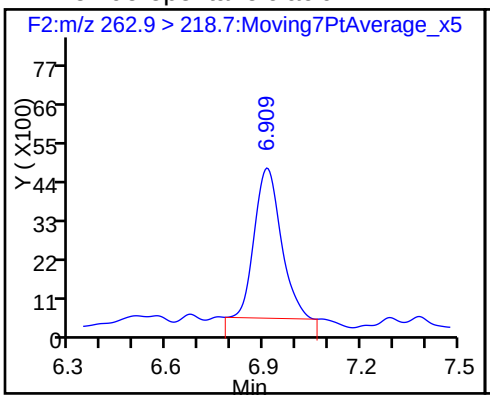

2 Perfluorobutyric acid



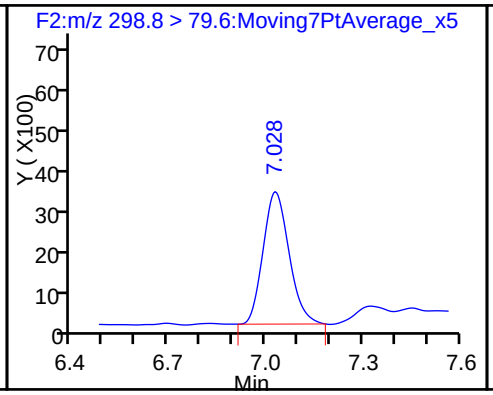

D 3 13C5-PFPeA



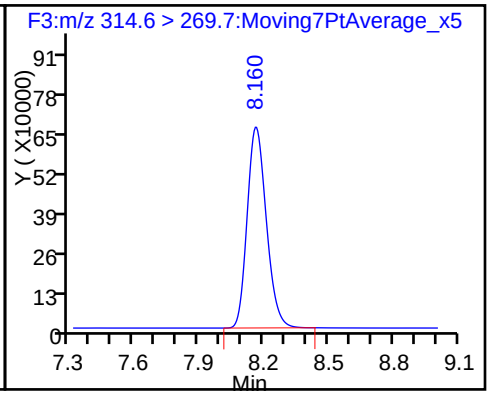

4 Perfluoropentanoic acid



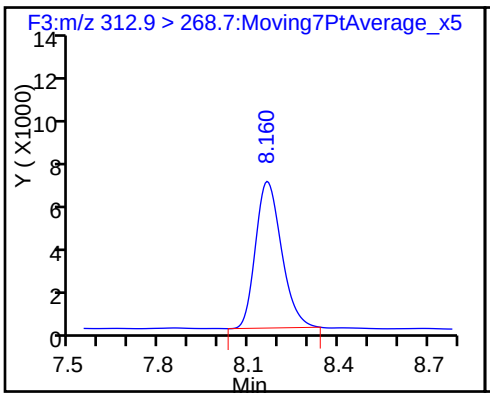

51 Perfluorobutanesulfonic acid



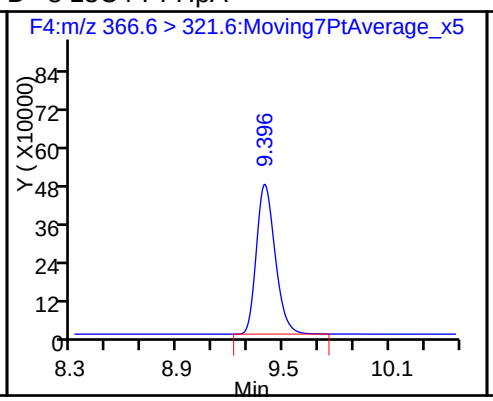

D 6 13C2 PFHxA



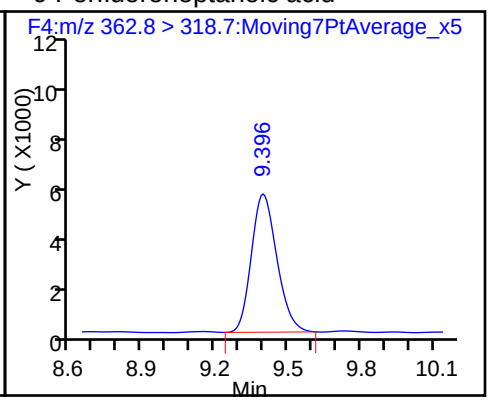

7 Perfluorohexanoic acid



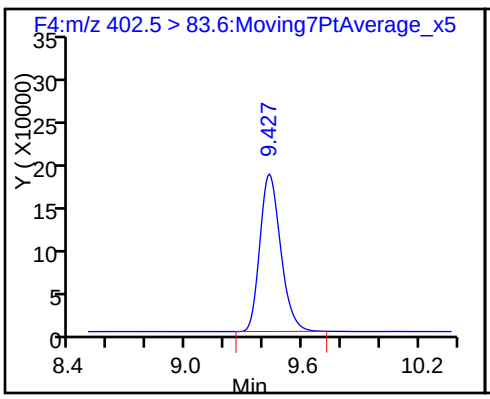

D 8 13C4-PFHpA



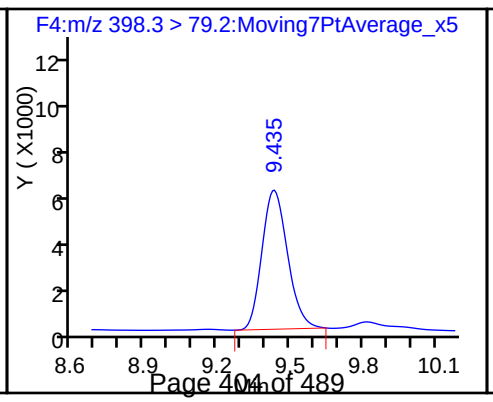

9 Perfluoroheptanoic acid



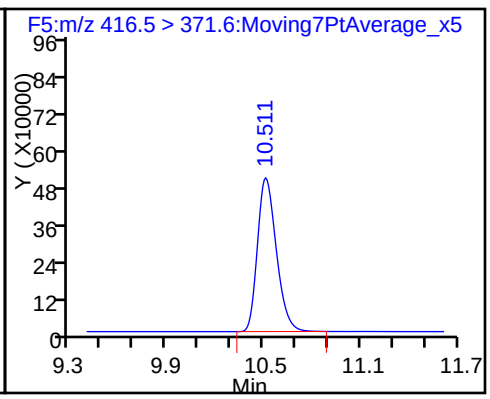

D 11 18O2 PFHxS



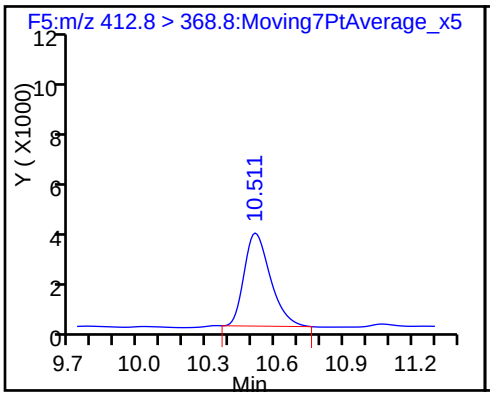

58 Perfluorohexanesulfonic acid



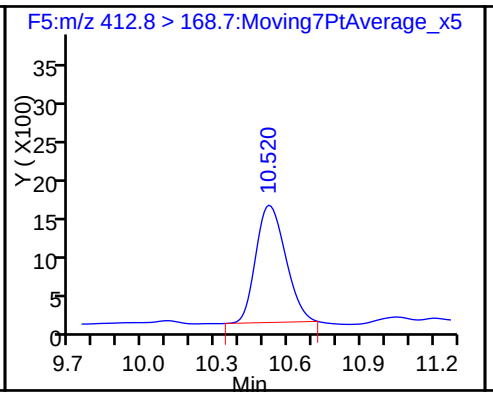

D 12 13C4 PFOA



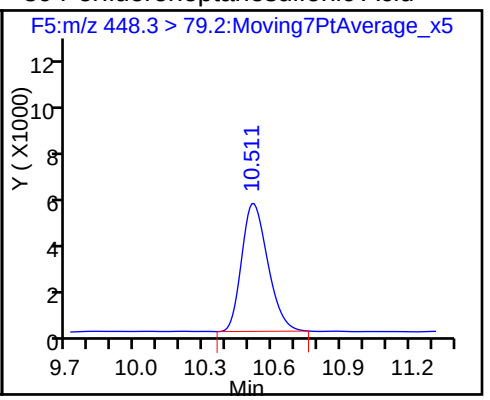
13 Perfluorooctanoic acid



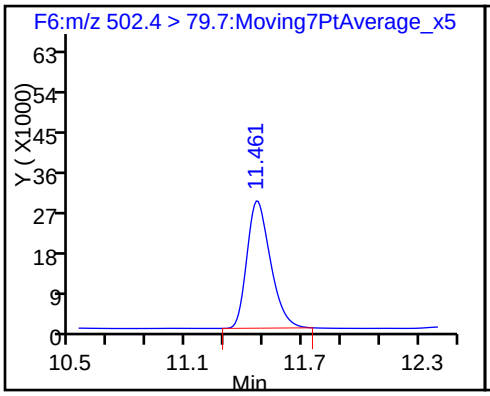

13 Perfluorooctanoic acid



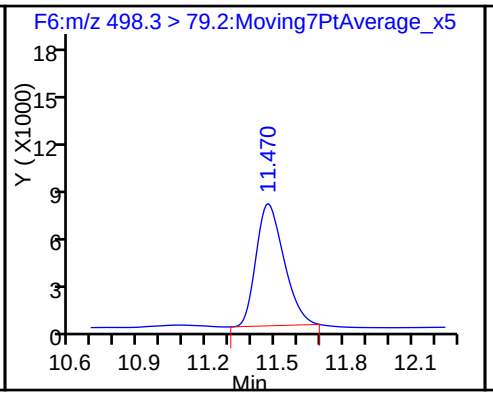

39 Perfluoroheptanesulfonic Acid



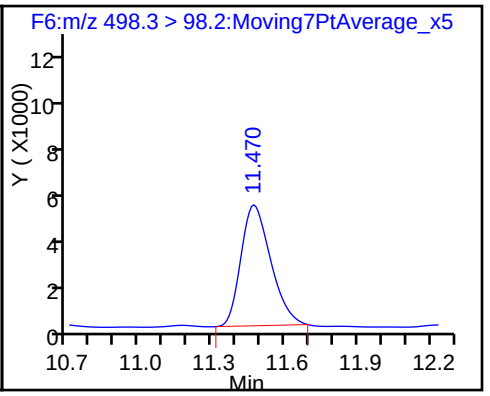

D 16 13C4 PFOS



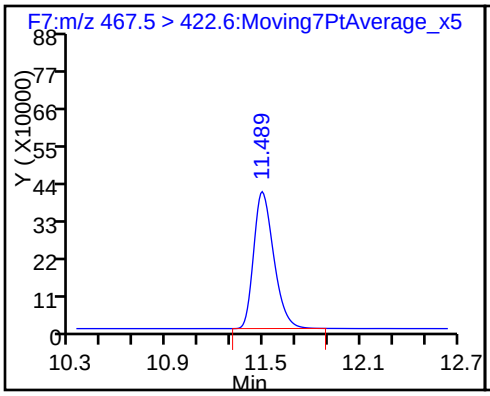

15 Perfluorooctane sulfonic acid



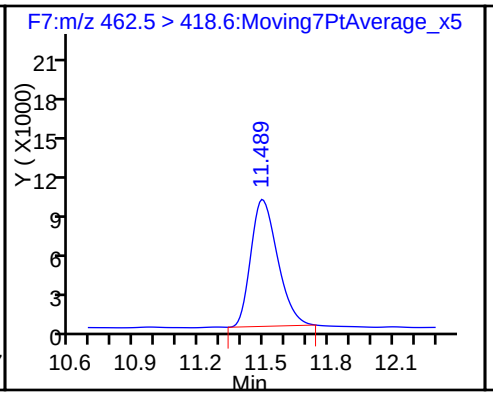

15 Perfluorooctane sulfonic acid



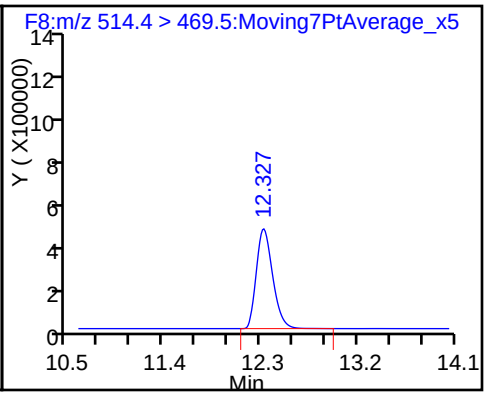

D 17 13C5 PFNA



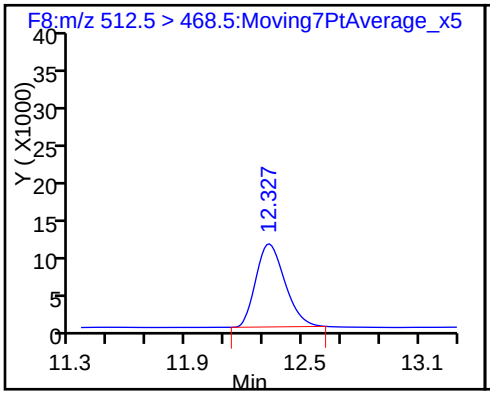

18 Perfluorononanoic acid



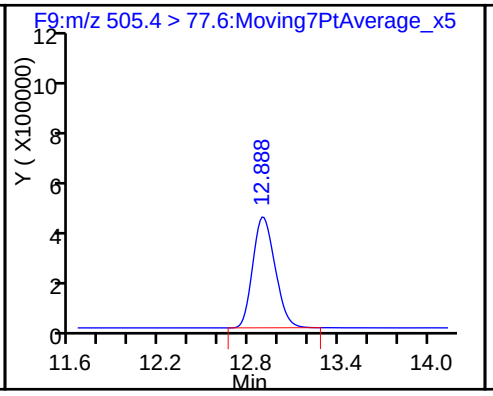

D 19 13C2 PFDA



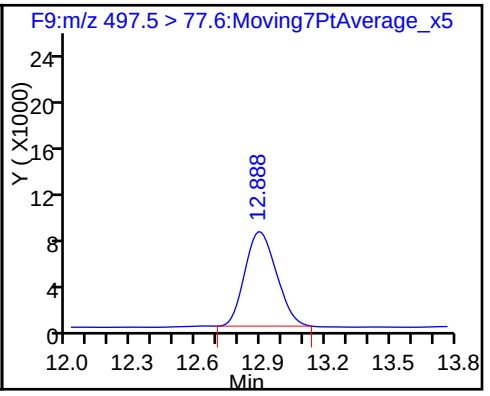

20 Perfluorodecanoic acid



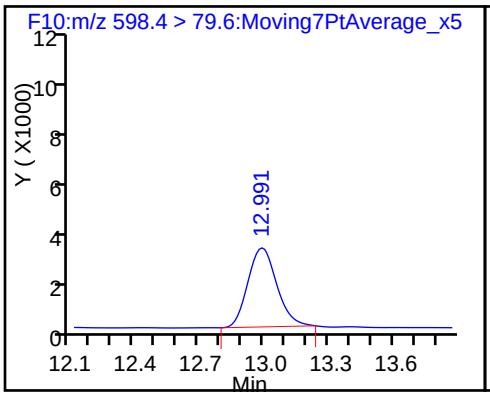

D 23 13C8 FOSA



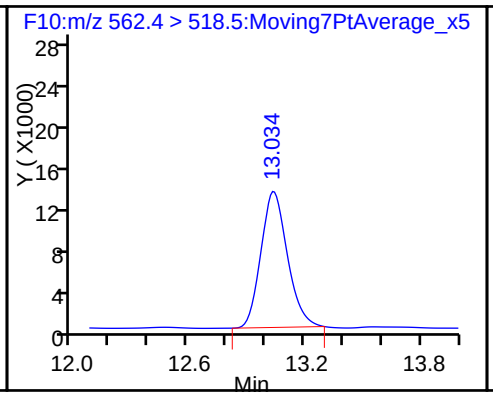

24 Perfluorooctane Sulfonamide



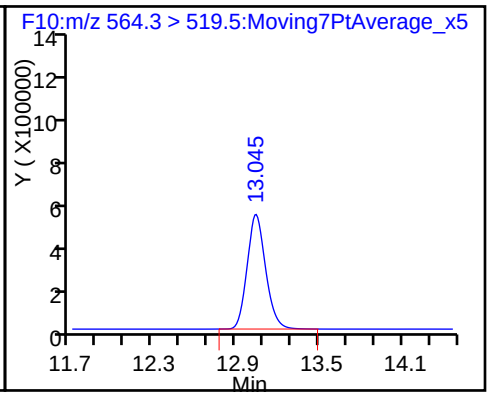
49 Perfluorodecane Sulfonic acid



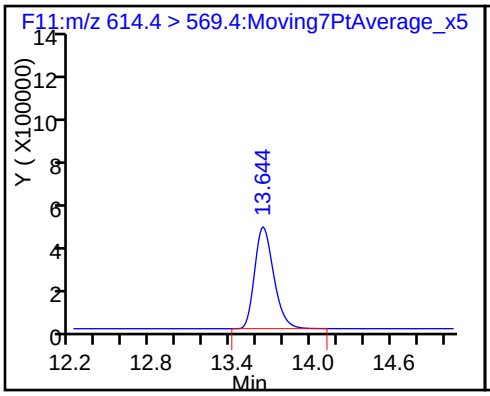

27 Perfluoroundecanoic acid



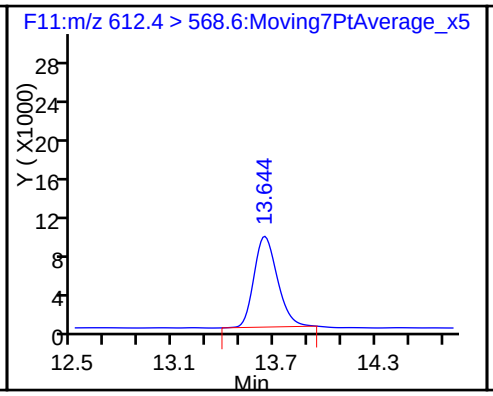

D 26 13C2 PFUnA



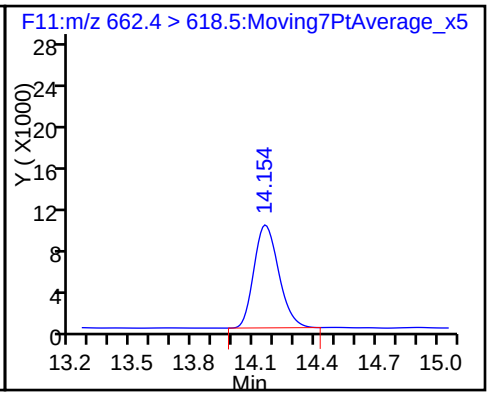

D 28 13C2 PFDoA



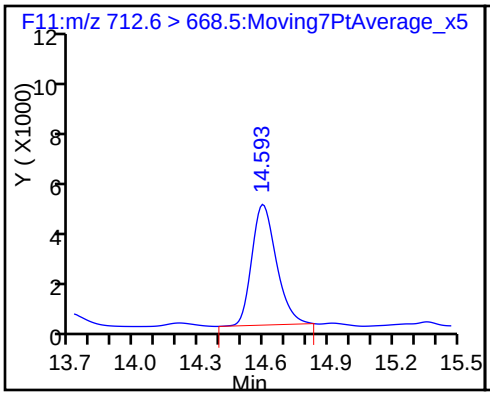

29 Perfluorododecanoic acid



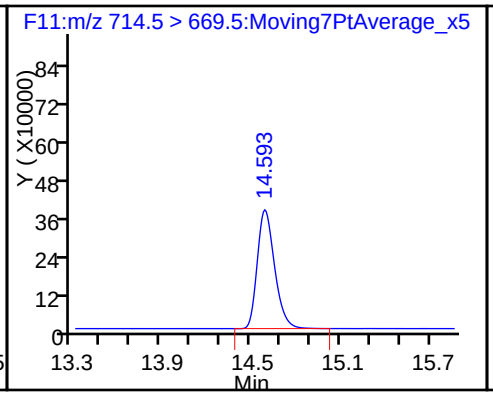

30 Perfluorotridecanoic acid



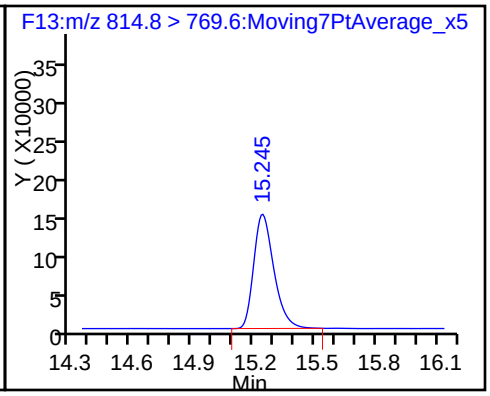

32 Perfluorotetradecanoic acid



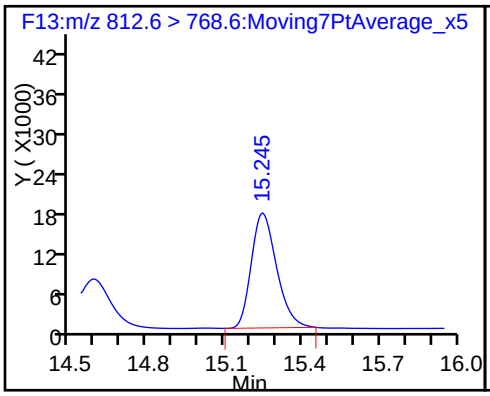

D 33 13C2-PFTeDA



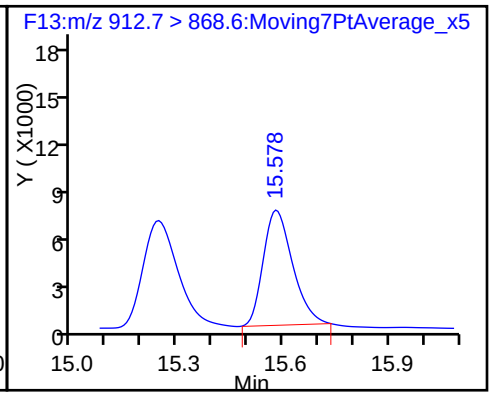

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_007.d
Lims ID: Std L3
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 07-May-2016 15:18:54 ALS Bottle#: 12 Worklist Smp#: 7
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L3
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:44 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.800 | 5.797 | 0.003 | | 4061625 | 56.5 | | 113 | 13701 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.803 | 5.799 | 0.004 | 1.000 | 283663 | 5.34 | | 107 | 1475 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.913 | 6.909 | 0.004 | | 2897281 | 57.7 | | 115 | 9866 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.913 | 6.911 | 0.002 | 1.000 | 139814 | 5.26 | | 105 | 82.5 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 79337 | NC | | | 219 | |
| 298.8 > 98.6 | 7.024 | 7.026 | -0.002 | 1.000 | 58730 | | 1.35(0.00-0.00) | | 170 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 79337 | 3.99 | | 90.2 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.166 | 8.162 | 0.004 | | 4084525 | 58.9 | | 118 | 11852 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.166 | 8.162 | 0.004 | 1.000 | 167084 | 4.35 | | 87.0 | 889 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.396 | 9.396 | 0.0 | | 3400960 | 57.9 | | 116 | 7715 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.396 | 9.396 | 0.0 | 1.000 | 180983 | 5.20 | | 104 | 741 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.427 | 9.430 | -0.003 | | 1496092 | 59.6 | | 126 | 5004 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 211535 | NC | | | 672 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 211535 | 4.59 | | 97.0 | | |
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.509 | 10.511 | -0.002 | | 3926833 | 59.8 | | 120 | 6587 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.509 | 10.512 | -0.003 | 1.000 | 176105 | 5.49 | | 110 | 524 | |
| 412.8 > 168.7 | 10.518 | 10.512 | 0.006 | 1.001 | 50489 | | 3.49(0.00-0.00) | 110 | 180 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.518 | 10.515 | 0.003 | 1.000 | 231881 | 3.67 | | 77.1 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.518 | 10.515 | 0.003 | 1.000 | 231881 | NC | | | 991 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.467 | 11.467 | 0.0 | | 315612 | 71.1 | | 149 | 1074 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.467 | 11.470 | -0.003 | 1.000 | 385863 | 4.32 | | 90.4 | 1097 | |
| 498.3 > 98.2 | 11.467 | 11.470 | -0.003 | 1.000 | 244524 | | 1.58(0.00-0.00) | 90.4 | 647 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.487 | 11.489 | -0.002 | | 3472269 | 59.8 | | 120 | 7034 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.496 | 11.490 | 0.006 | 1.000 | 459929 | 5.12 | | 102 | 1286 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.324 | 12.327 | -0.003 | | 4756961 | 61.7 | | 123 | 9472 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.324 | 12.327 | -0.003 | 1.000 | 522846 | 4.68 | | 93.6 | 1041 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.896 | 12.892 | 0.004 | | 4623178 | 60.4 | | 121 | 3855 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.896 | 12.892 | 0.004 | 1.000 | 494236 | 5.09 | | 102 | 1320 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.999 | 12.994 | 0.005 | 1.000 | 122317 | NC | | | 550 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.999 | 12.994 | 0.005 | 1.000 | 122317 | 3.73 | | 77.5 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.041 | 13.041 | 0.0 | 1.000 | 608872 | 5.21 | | 104 | 1316 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.041 | 13.044 | -0.003 | | 4773887 | 58.9 | | 118 | 6203 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.638 | 13.643 | -0.005 | | 4907172 | 58.4 | | 117 | 4969 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.638 | 13.643 | -0.005 | 1.000 | 462946 | 5.14 | | 103 | 217 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.160 | 14.160 | 0.0 | 1.000 | 402437 | 5.66 | | 113 | 228 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.598 | 14.593 | 0.005 | 1.000 | 153352 | 4.31 | | 86.2 | 125 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.598 | 14.593 | 0.005 | | 3053568 | 56.7 | | 113 | 4088 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.242 | 15.244 | -0.002 | | 1034238 | 55.2 | | 110 | 2810 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.242 | 15.244 | -0.002 | 1.000 | 356111 | 4.07 | | 81.3 | 79.5 | |
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.581 | 15.580 | 0.001 | 1.000 | 226008 | 5.10 | | 102 | 395 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFC-L3_00016 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:29:45 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_007.d

Injection Date: 07-May-2016 15:18:54 Instrument ID: A4

Lims ID: Std L3

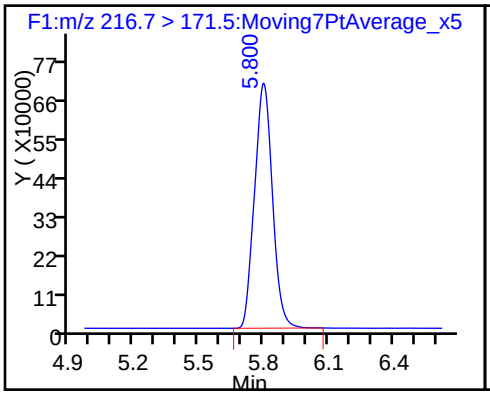
Client ID:

Operator ID: JRB ALS Bottle#: 12 Worklist Smp#: 7

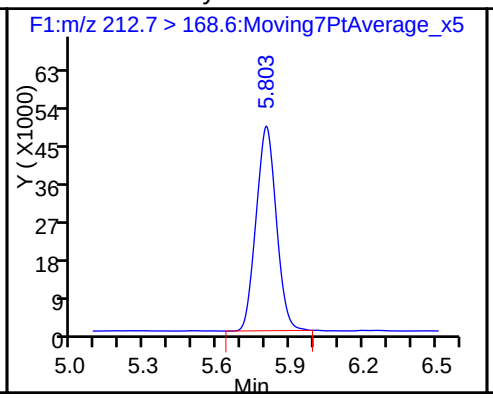
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

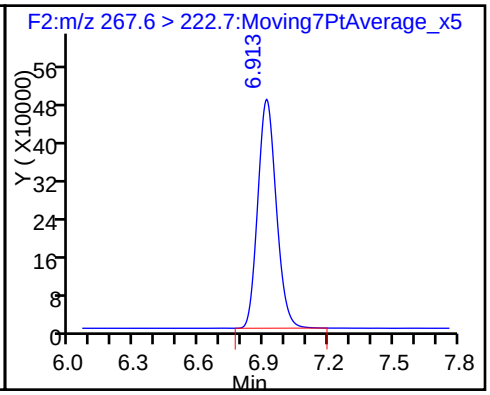
D 1 13C4 PFBA



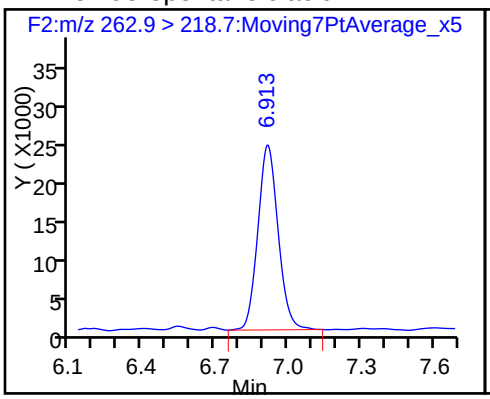

2 Perfluorobutyric acid



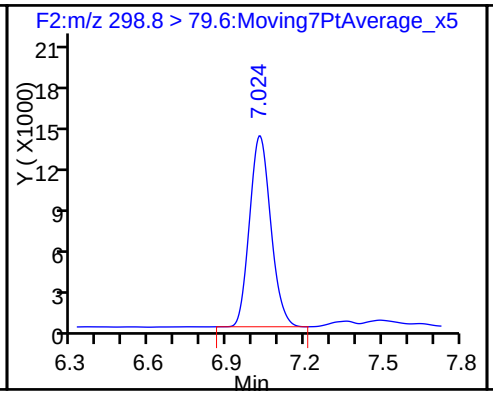

D 3 13C5-PFPeA



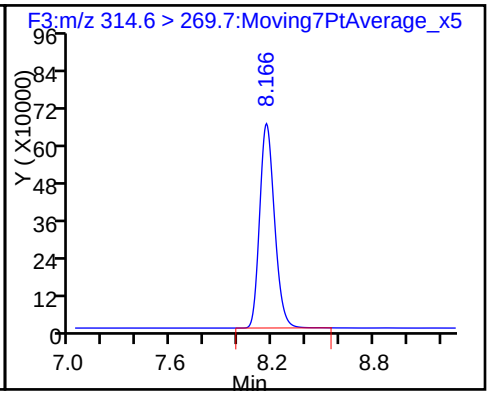

4 Perfluoropentanoic acid



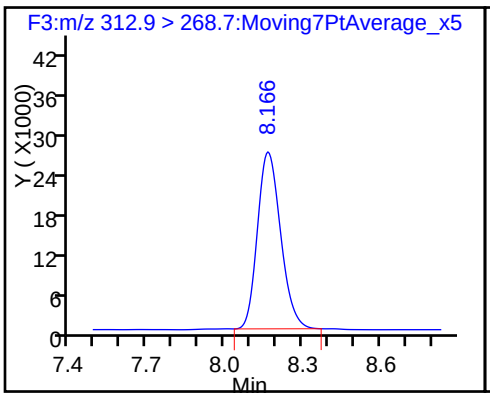

51 Perfluorobutanesulfonic acid



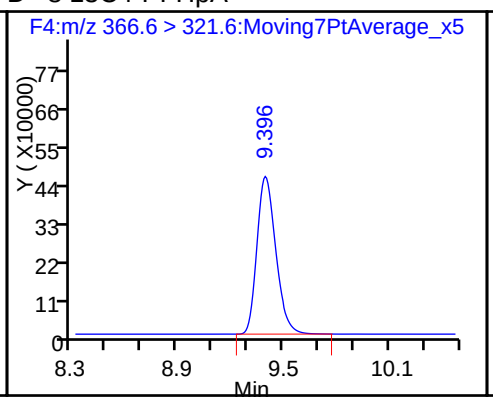

D 6 13C2 PFHxA



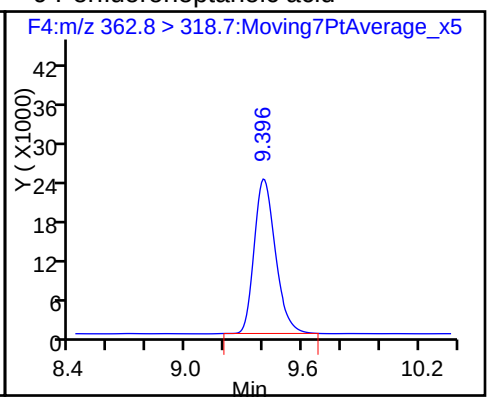

7 Perfluorohexanoic acid



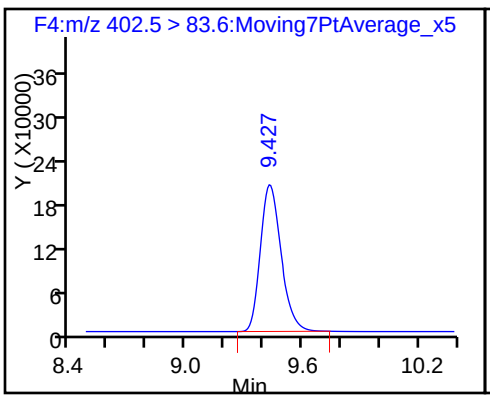

D 8 13C4-PFHpA



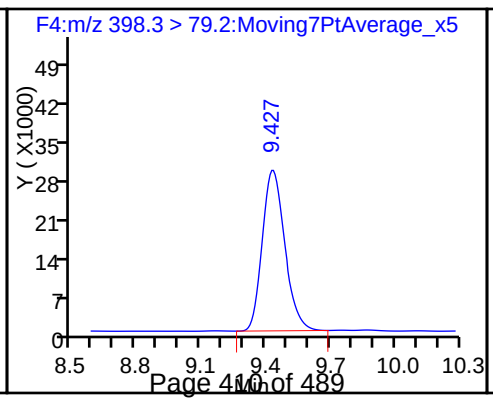

9 Perfluoroheptanoic acid



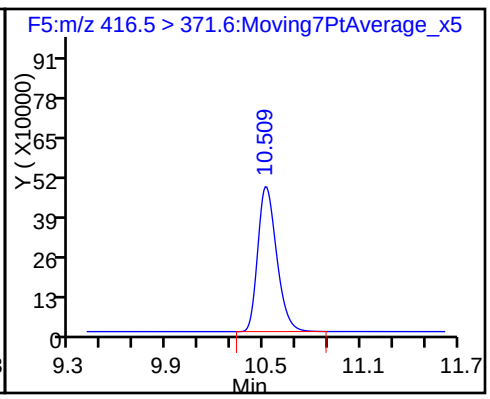

D 11 18O2 PFHxS



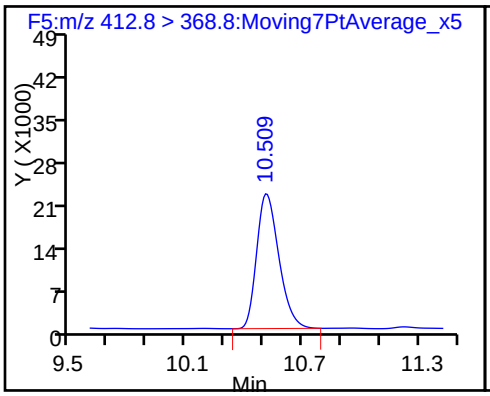

58 Perfluorohexanesulfonic acid



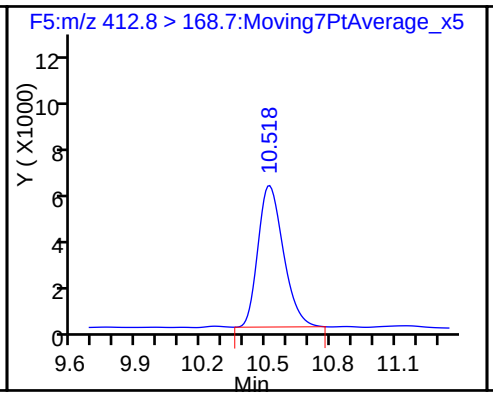

D 12 13C4 PFOA



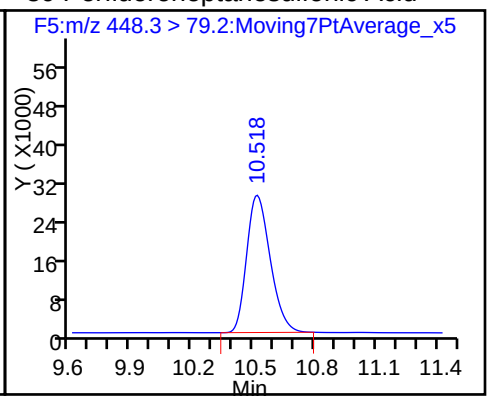
13 Perfluorooctanoic acid



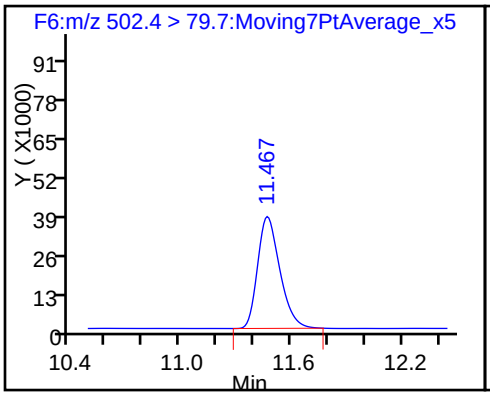

13 Perfluorooctanoic acid



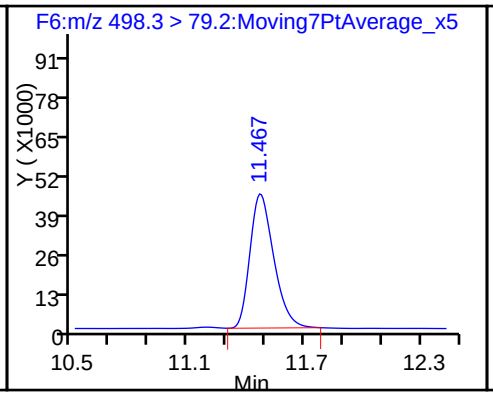

39 Perfluoroheptanesulfonic Acid



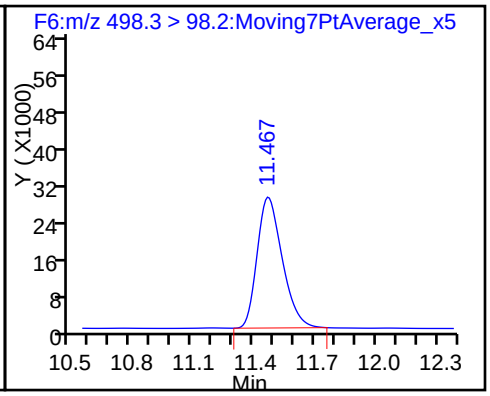

D 16 13C4 PFOS



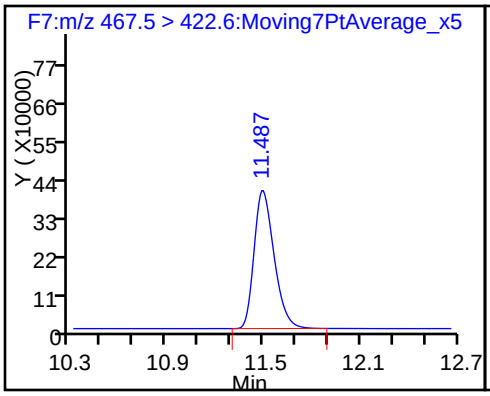

15 Perfluorooctane sulfonic acid



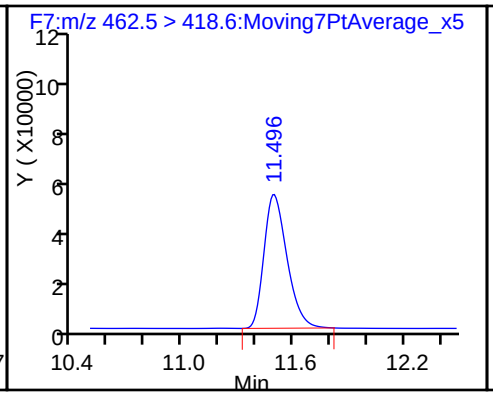

15 Perfluorooctane sulfonic acid



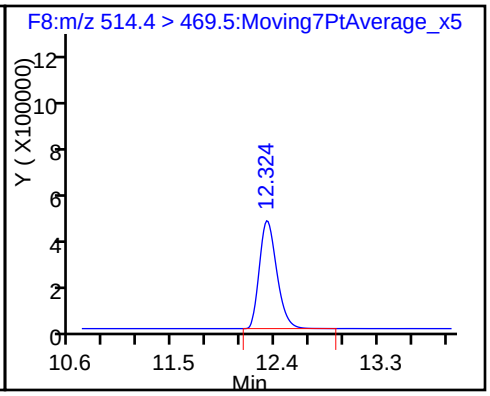

D 17 13C5 PFNA



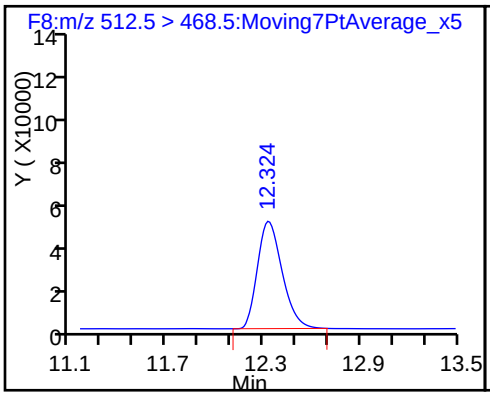

18 Perfluorononanoic acid



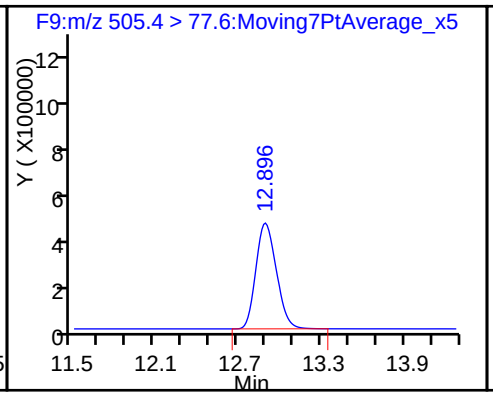

D 19 13C2 PFDA



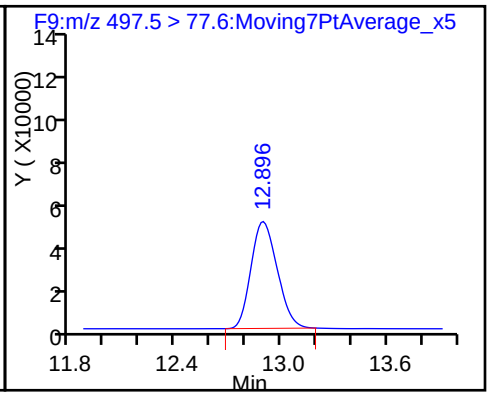

20 Perfluorodecanoic acid



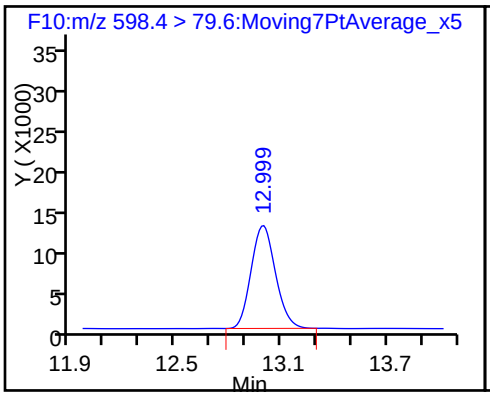

D 23 13C8 FOSA



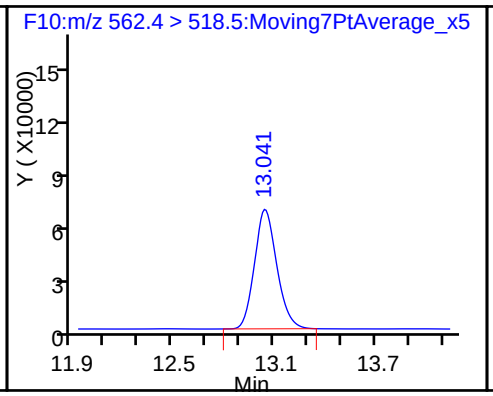

24 Perfluorooctane Sulfonamide



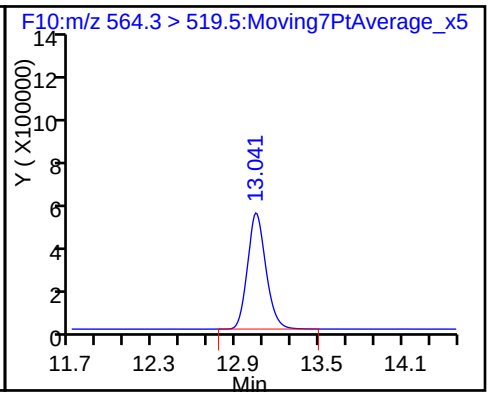
49 Perfluorodecane Sulfonic acid



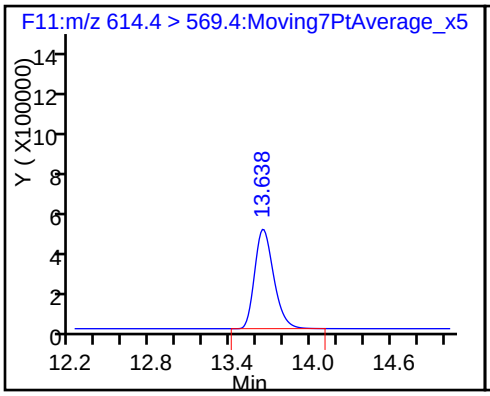

27 Perfluoroundecanoic acid



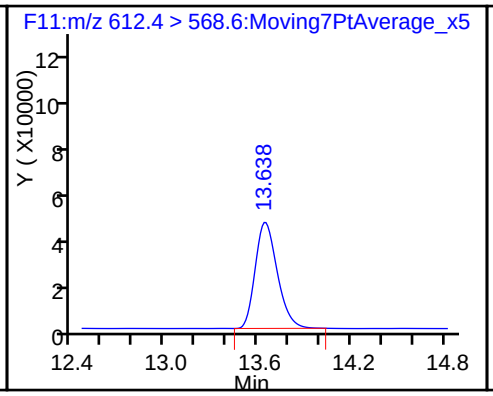

D 26 13C2 PFUnA



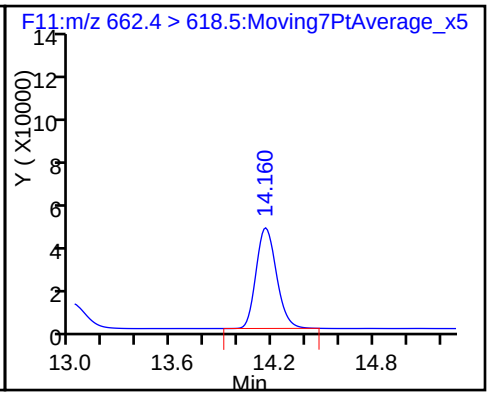

D 28 13C2 PFDoA



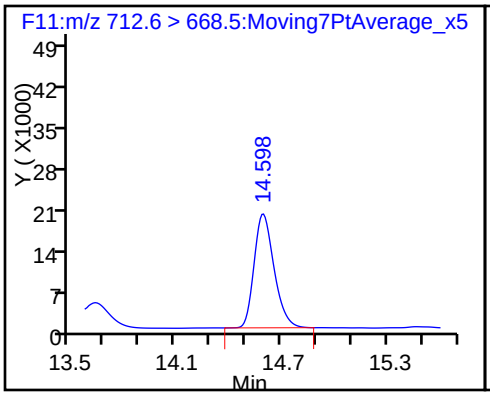

29 Perfluorododecanoic acid



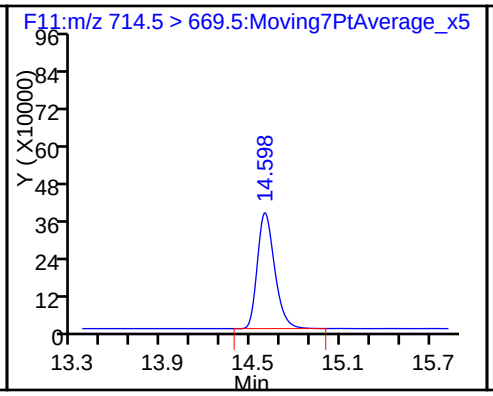

30 Perfluorotridecanoic acid



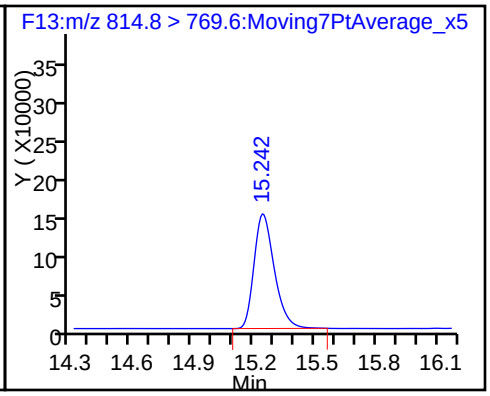

32 Perfluorotetradecanoic acid



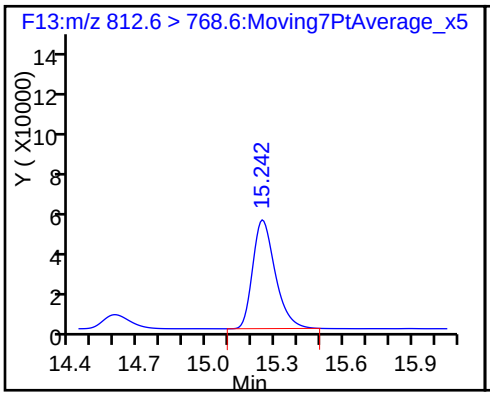

D 33 13C2-PFTeDA



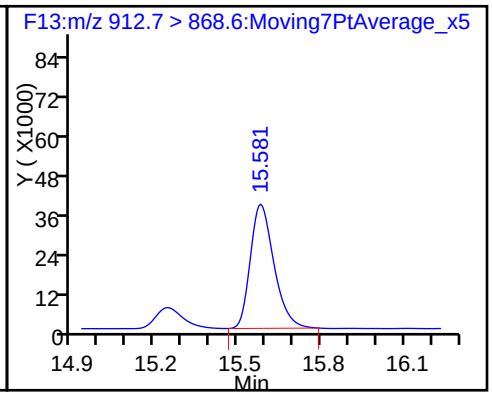

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_008.d
Lims ID: Std L4
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 07-May-2016 15:40:06 ALS Bottle#: 13 Worklist Smp#: 8
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L4
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:46 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 15:23:17

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.794 | 5.797 | -0.003 | | 3878267 | 53.9 | | 108 | 14357 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.800 | 5.799 | 0.001 | 1.000 | 966407 | 19.0 | | 95.2 | 3793 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 2836800 | 56.5 | | 113 | 8182 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.913 | 6.911 | 0.002 | 1.000 | 479972 | 18.4 | | 92.2 | 364 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 292351 | NC | | | 658 | |
| 298.8 > 98.6 | 7.024 | 7.026 | -0.002 | 1.000 | 212650 | | 1.37(0.00-0.00) | | 604 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 292351 | 15.4 | | 86.9 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 3823824 | 55.2 | | 110 | 8034 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 657304 | 18.3 | | 91.4 | 2183 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.396 | 9.396 | 0.0 | | 3271575 | 55.7 | | 111 | 5711 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.396 | 9.396 | 0.0 | 1.000 | 613507 | 18.4 | | 92.2 | 1775 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.427 | 9.430 | -0.003 | | 1430465 | 57.0 | | 120 | 3364 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 697633 | NC | | | 1851 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 697633 | 15.8 | | 83.6 | | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.511 | 10.511 | 0.0 | | 3787199 | 57.6 | | 115 | 8618 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.511 | 10.512 | -0.001 | 1.000 | 621766 | 20.1 | | 100 | 1789 | |
| 412.8 > 168.7 | 10.511 | 10.512 | -0.001 | 1.000 | 201776 | | 3.08(0.00-0.00) | 100 | 888 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.511 | 10.515 | -0.004 | 1.000 | 799753 | 12.2 | | 64.2 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.511 | 10.515 | -0.004 | 1.000 | 799753 | NC | | | 2825 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.470 | 11.467 | 0.003 | | 327067 | 73.7 | | 154 | 1632 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.470 | 11.470 | 0.0 | 1.000 | 1261703 | 13.6 | | 71.3 | 2963 | |
| 498.3 > 98.2 | 11.470 | 11.470 | 0.0 | 1.000 | 741413 | | 1.70(0.00-0.00) | 71.3 | 1615 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.489 | 11.489 | 0.0 | | 3105174 | 53.5 | | 107 | 5365 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.489 | 11.490 | -0.001 | 1.000 | 1533359 | 19.0 | | 95.1 | 2632 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.327 | 12.327 | 0.0 | | 4248863 | 55.1 | | 110 | 6741 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.327 | 12.327 | 0.0 | 1.000 | 1780843 | 17.9 | | 89.3 | 4088 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.887 | 12.892 | -0.005 | | 4411716 | 57.6 | | 115 | 4283 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.887 | 12.892 | -0.005 | 1.000 | 1735199 | 18.7 | | 93.7 | 2754 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 404135 | NC | | | 1267 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 404135 | 11.9 | | 61.7 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.044 | 13.041 | 0.003 | 1.000 | 1931235 | 17.6 | | 87.9 | 2112 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.044 | 13.044 | 0.0 | | 4484117 | 55.4 | | 111 | 5119 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.644 | 13.643 | 0.001 | | 4818283 | 57.3 | | 115 | 4362 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.644 | 13.643 | 0.001 | 1.000 | 1534982 | 17.3 | | 86.7 | 844 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.154 | 14.160 | -0.006 | 1.000 | 1335287 | 19.1 | | 95.7 | 864 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.592 | 14.593 | -0.001 | 1.000 | 527653 | 15.1 | | 75.6 | 382 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.592 | 14.593 | -0.001 | | 2994446 | 55.6 | | 111 | 3695 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.245 | 15.244 | 0.001 | | 1116993 | 59.6 | | 119 | 2760 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.245 | 15.244 | 0.001 | 1.000 | 1126435 | 11.9 | | 59.6 | 241 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.578 | 15.580 | -0.002 | 1.000 | 800611 | 16.7 | | 83.7 | 1137 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFC-L4_00018 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:29:46 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_008.d

Injection Date: 07-May-2016 15:40:06 Instrument ID: A4

Lims ID: Std L4

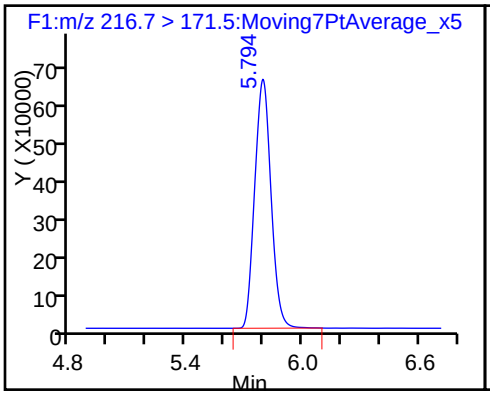
Client ID:

Operator ID: JRB ALS Bottle#: 13 Worklist Smp#: 8

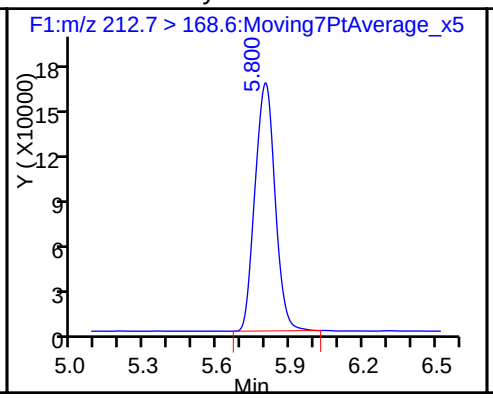
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

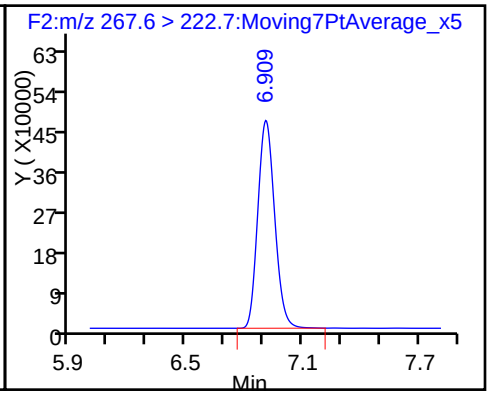
D 1 13C4 PFBA



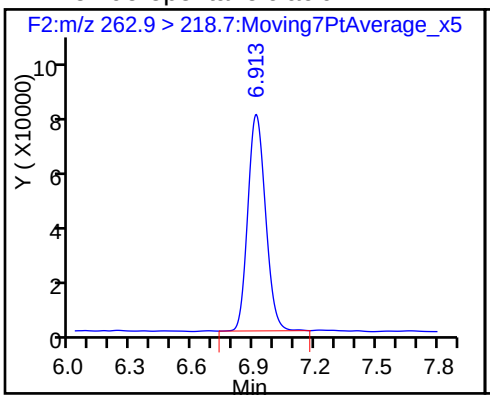

2 Perfluorobutyric acid



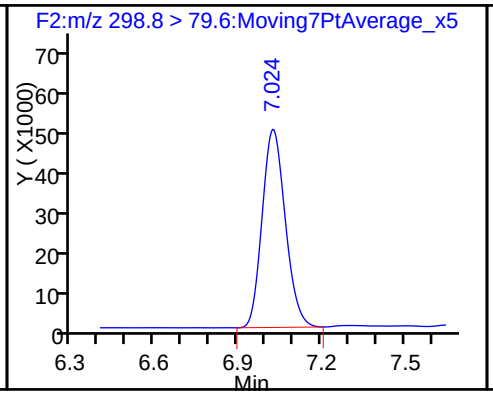

D 3 13C5-PFPeA



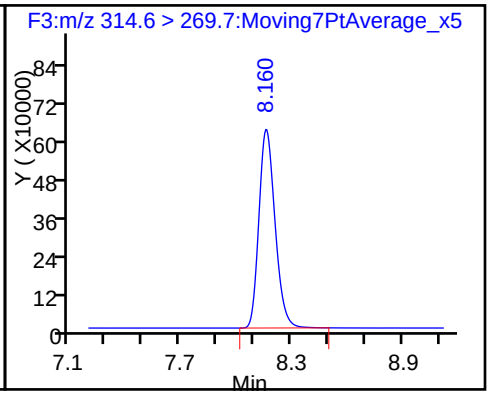

4 Perfluoropentanoic acid



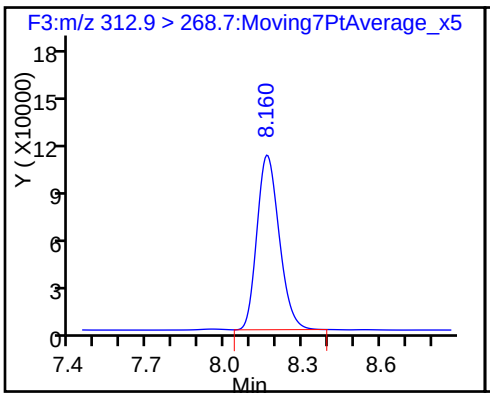

51 Perfluorobutanesulfonic acid



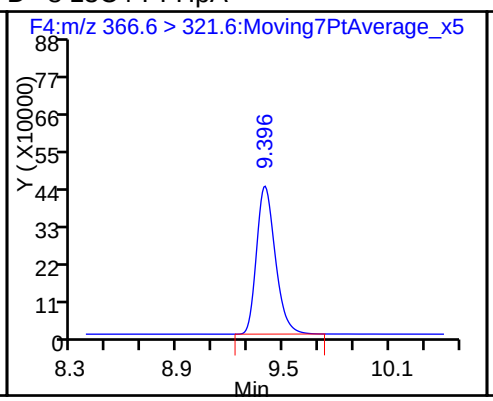

D 6 13C2 PFHxA



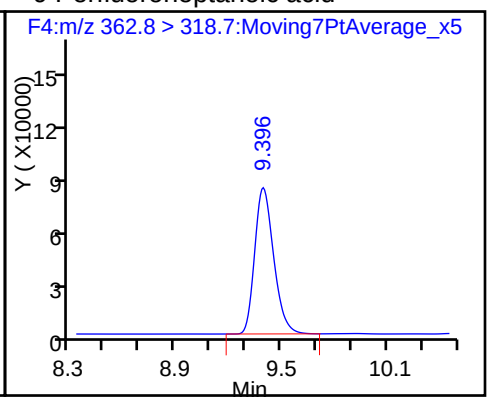

7 Perfluorohexanoic acid



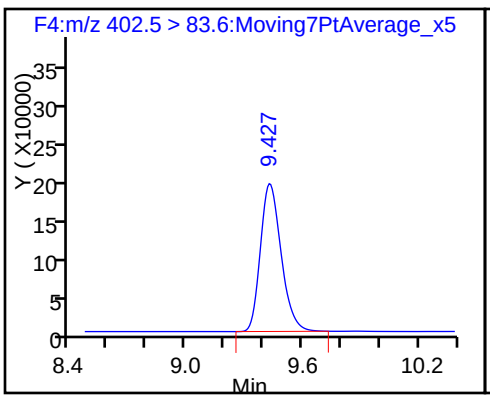

D 8 13C4-PFHpA



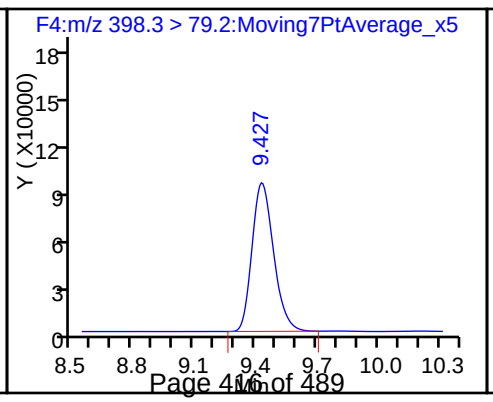

9 Perfluoroheptanoic acid



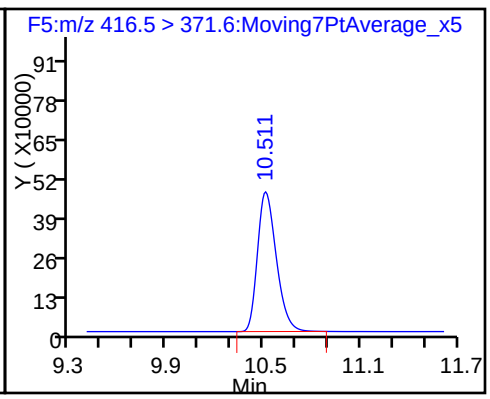

D 11 18O2 PFHxS



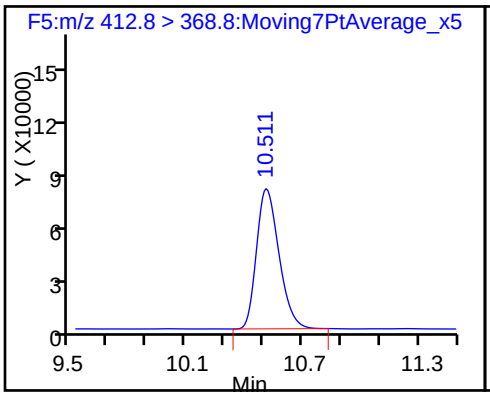

58 Perfluorohexanesulfonic acid



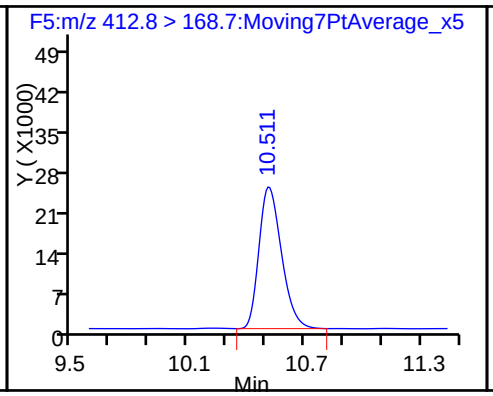

D 12 13C4 PFOA



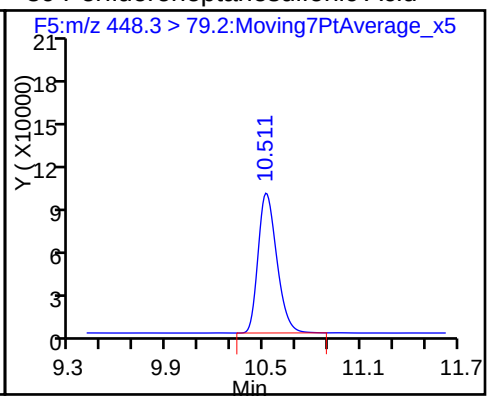
13 Perfluorooctanoic acid



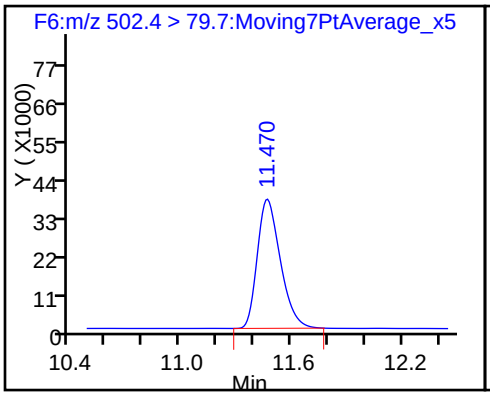

13 Perfluorooctanoic acid



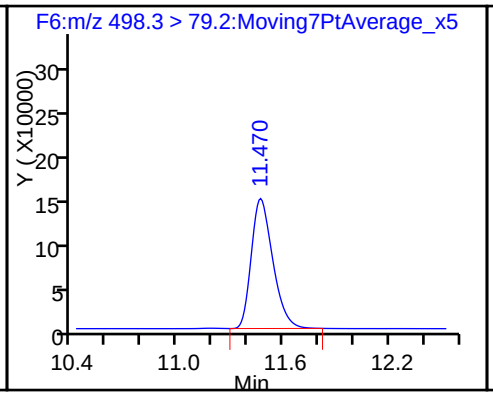

39 Perfluoroheptanesulfonic Acid



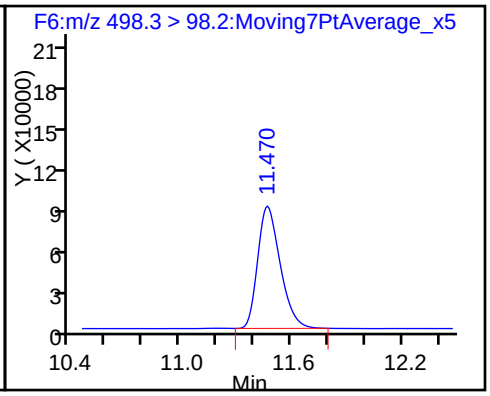

D 16 13C4 PFOS



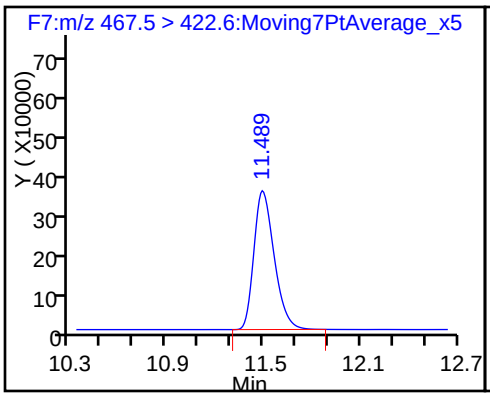

15 Perfluorooctane sulfonic acid



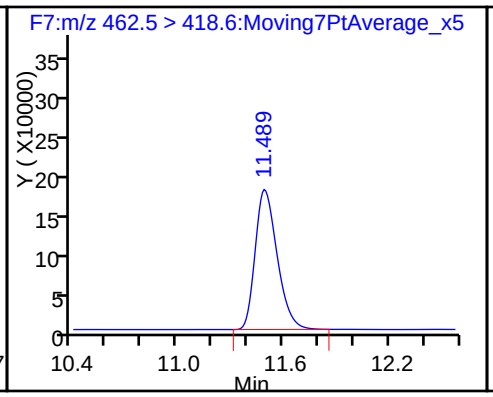

15 Perfluorooctane sulfonic acid



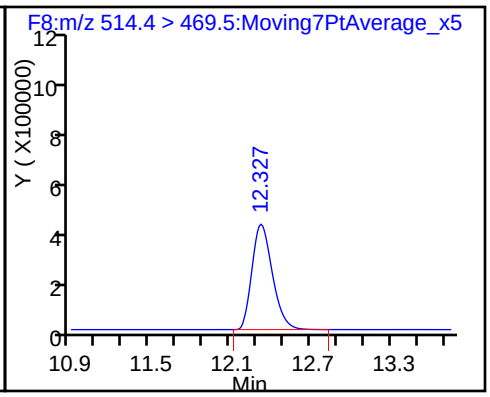

D 17 13C5 PFNA



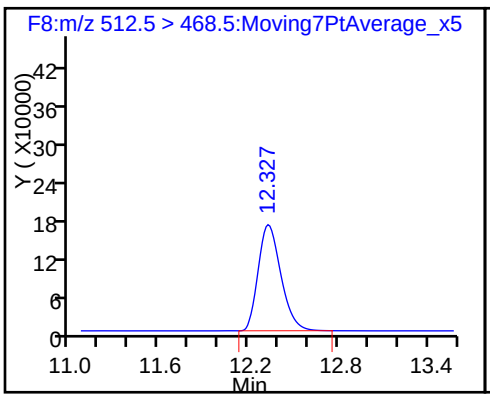

18 Perfluorononanoic acid



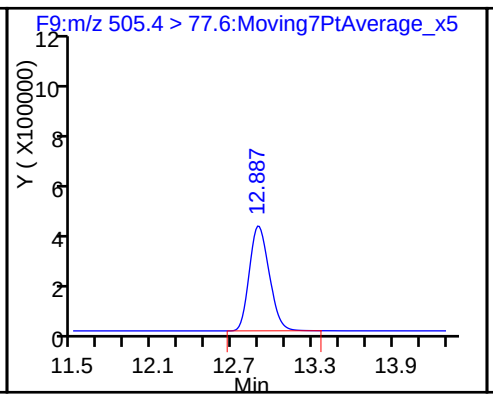

D 19 13C2 PFDA



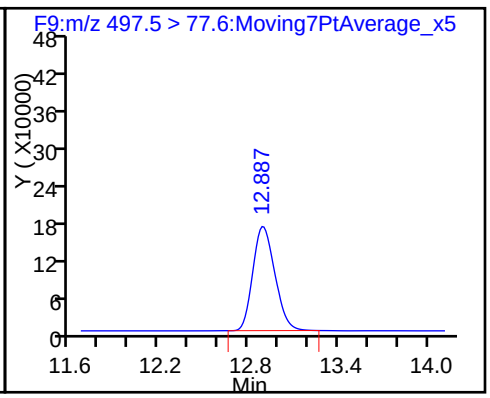

20 Perfluorodecanoic acid



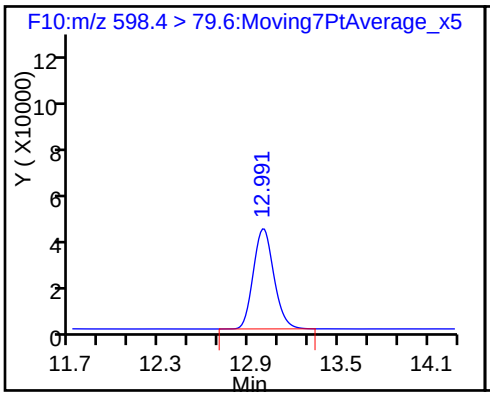

D 23 13C8 FOSA



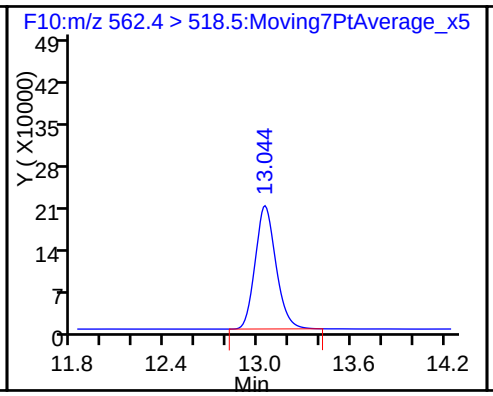

24 Perfluorooctane Sulfonamide



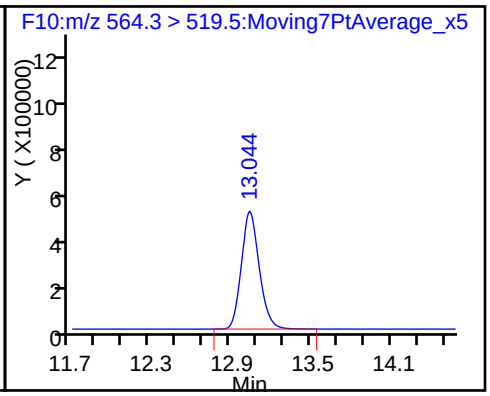
49 Perfluorodecane Sulfonic acid



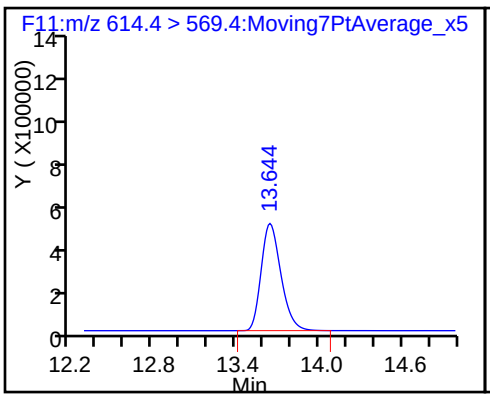

27 Perfluoroundecanoic acid



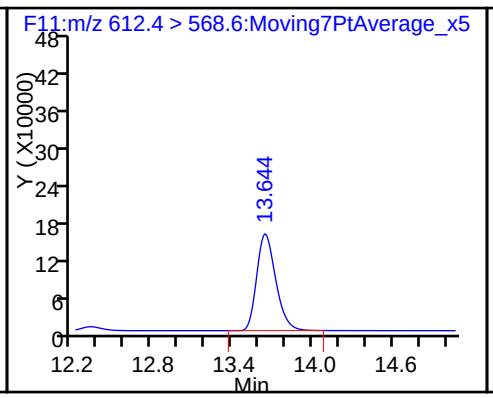

D 26 13C2 PFUnA



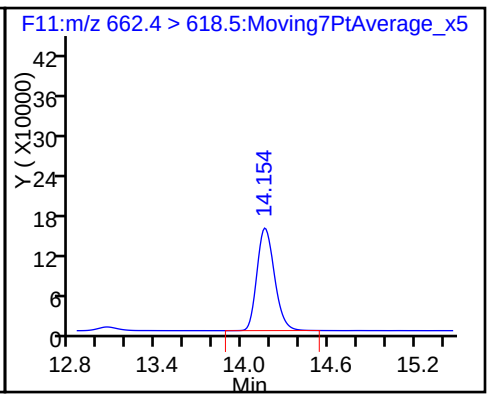

D 28 13C2 PFDoA



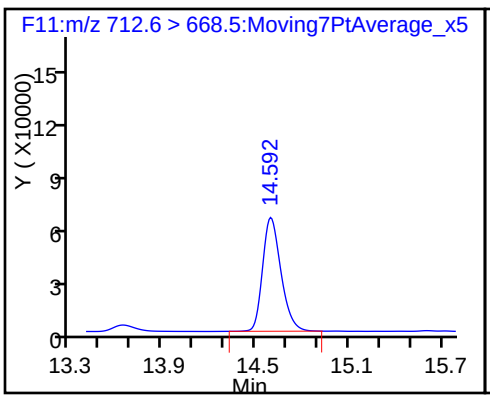

29 Perfluorododecanoic acid



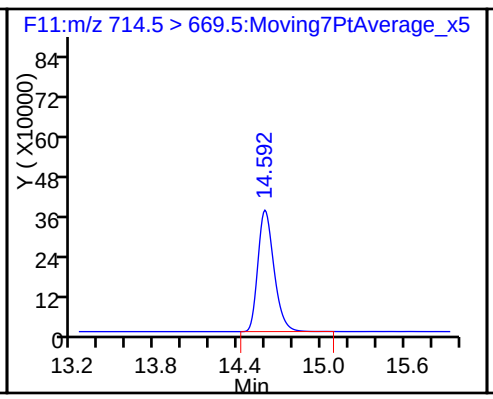

30 Perfluorotridecanoic acid



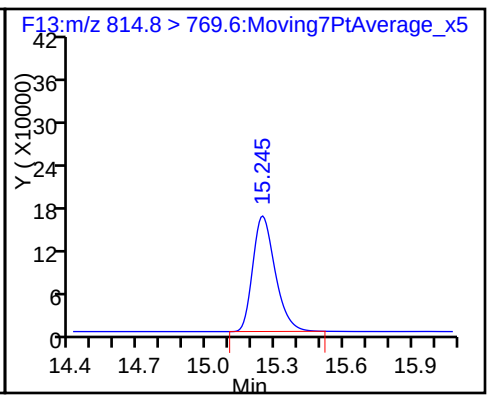

32 Perfluorotetradecanoic acid



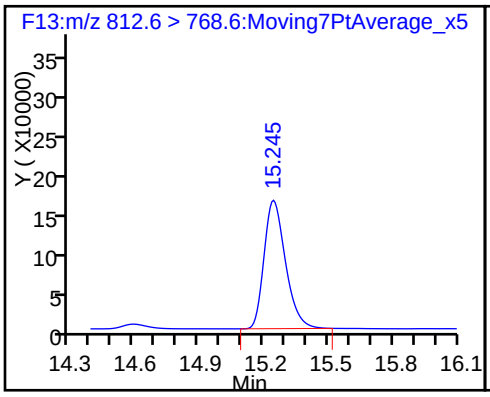

D 33 13C2-PFTeDA



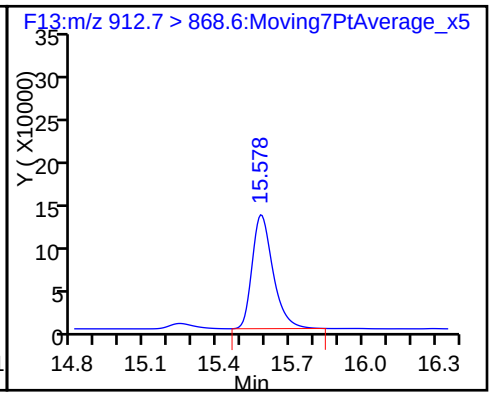

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_009.d
Lims ID: Std L5
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 07-May-2016 16:01:16 ALS Bottle#: 14 Worklist Smp#: 9
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L5
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:47 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 15:22:08

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.797 | 5.797 | 0.0 | | 3661370 | 50.9 | | 102 | 13083 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.797 | 5.799 | -0.002 | 1.000 | 2454691 | 51.2 | | 102 | 7043 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 2614243 | 52.1 | | 104 | 5190 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.913 | 6.911 | 0.002 | 1.000 | 1208503 | 50.4 | | 101 | 864 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 753720 | NC | | | 1583 | |
| 298.8 > 98.6 | 7.024 | 7.026 | -0.002 | 1.000 | 504967 | | 1.49(0.00-0.00) | | 1288 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 753720 | 46.5 | | 105 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 3556306 | 51.3 | | 103 | 8432 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 1514167 | 45.3 | | 90.5 | 2183 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.396 | 9.396 | 0.0 | | 2928552 | 49.9 | | 99.7 | 6891 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.396 | 9.396 | 0.0 | 1.000 | 1527432 | 51.3 | | 103 | 2931 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.427 | 9.430 | -0.003 | | 1218932 | 48.6 | | 103 | 4101 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 1792512 | NC | | | 2906 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 1792512 | 47.7 | | 101 | | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.511 | 10.511 | 0.0 | | 3157206 | 48.0 | | 96.1 | 5622 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.511 | 10.512 | -0.001 | 1.000 | 1436665 | 55.7 | | 111 | 2382 | |
| 412.8 > 168.7 | 10.511 | 10.512 | -0.001 | 1.000 | 453722 | | 3.17(0.00-0.00) | 111 | 1275 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.511 | 10.515 | -0.004 | 1.000 | 1822433 | 41.2 | | 86.5 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.511 | 10.515 | -0.004 | 1.000 | 1822433 | NC | | | 4809 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.461 | 11.467 | -0.006 | | 221202 | 49.8 | | 104 | 1046 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.470 | 11.470 | 0.0 | 1.000 | 3059219 | 48.9 | | 102 | 3832 | |
| 498.3 > 98.2 | 11.470 | 11.470 | 0.0 | 1.000 | 1912980 | | 1.60(0.00-0.00) | 102 | 3178 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.489 | 11.489 | 0.0 | | 3029379 | 52.2 | | 104 | 6203 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.489 | 11.490 | -0.001 | 1.000 | 4017693 | 51.1 | | 102 | 4706 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.327 | 12.327 | 0.0 | | 3716589 | 48.2 | | 96.4 | 6579 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.327 | 12.327 | 0.0 | 1.000 | 4415759 | 50.6 | | 101 | 5832 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.888 | 12.892 | -0.004 | | 3745023 | 48.9 | | 97.9 | 4237 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.888 | 12.892 | -0.004 | 1.000 | 4174969 | 53.1 | | 106 | 3133 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 877246 | NC | | | 2720 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 877246 | 38.2 | | 79.3 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.044 | 13.041 | 0.003 | 1.000 | 4679381 | 49.0 | | 98.0 | 4897 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.044 | 13.044 | 0.0 | | 3898888 | 48.1 | | 96.3 | 5017 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.644 | 13.643 | 0.001 | | 4211987 | 50.1 | | 100 | 4392 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.644 | 13.643 | 0.001 | 1.000 | 3957939 | 51.2 | | 102 | 2040 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.154 | 14.160 | -0.006 | 1.000 | 3200077 | 51.4 | | 103 | 1981 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.592 | 14.593 | -0.001 | 1.000 | 1340427 | 43.0 | | 86.0 | 836 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.592 | 14.593 | -0.001 | | 2674211 | 49.6 | | 99.3 | 4076 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.245 | 15.244 | 0.001 | | 999085 | 53.3 | | 107 | 2443 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.245 | 15.244 | 0.001 | 1.000 | 2888299 | 34.2 | | 68.3 | 620 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.578 | 15.580 | -0.002 | 1.000 | 2121522 | 49.6 | | 99.2 | 2370 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:29:48 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_009.d

Injection Date: 07-May-2016 16:01:16 Instrument ID: A4

Lims ID: Std L5

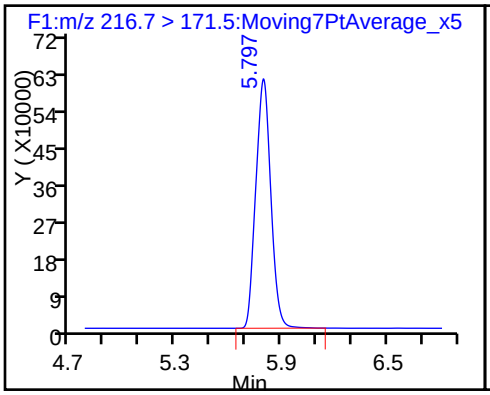
Client ID:

Operator ID: JRB ALS Bottle#: 14 Worklist Smp#: 9

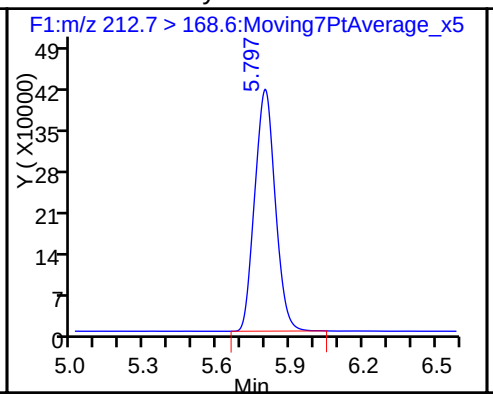
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

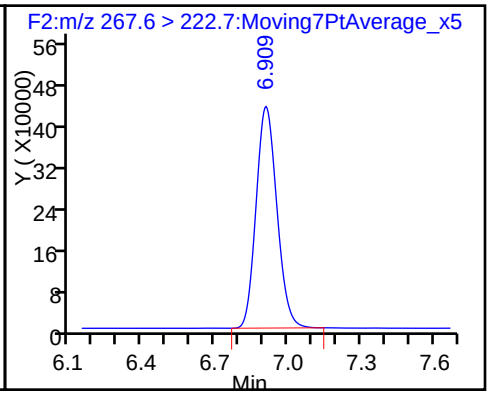
D 1 13C4 PFBA



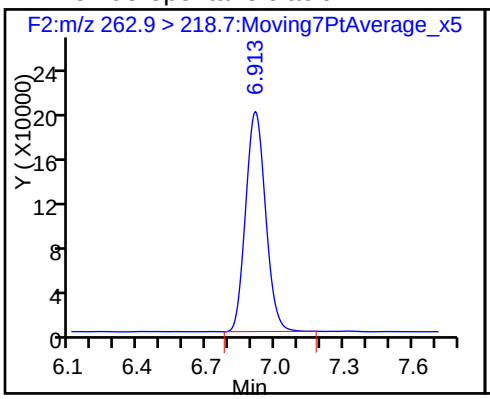

2 Perfluorobutyric acid



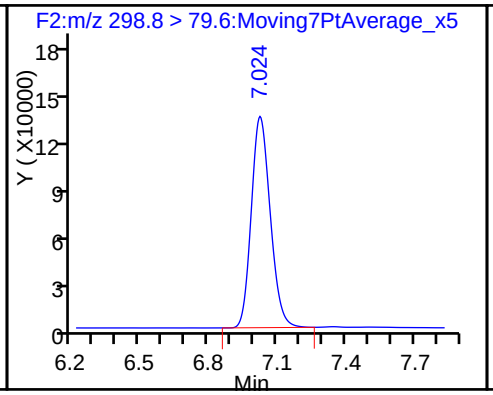

D 3 13C5-PFPeA



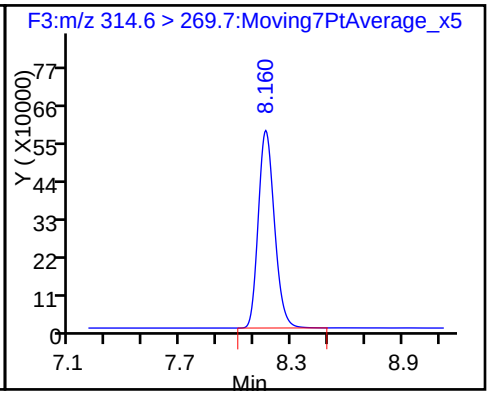

4 Perfluoropentanoic acid



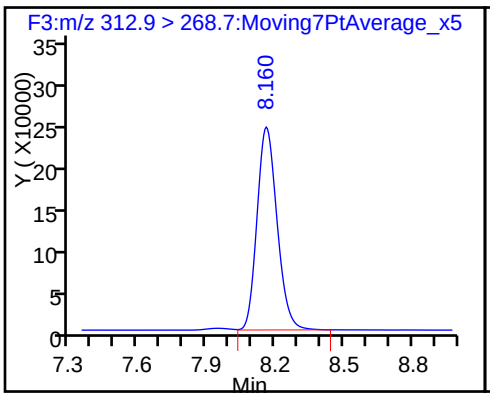

51 Perfluorobutanesulfonic acid



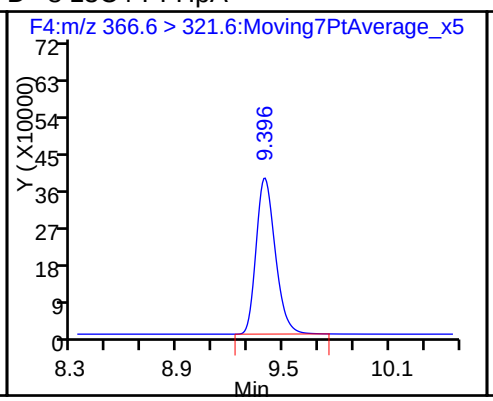

D 6 13C2 PFHxA



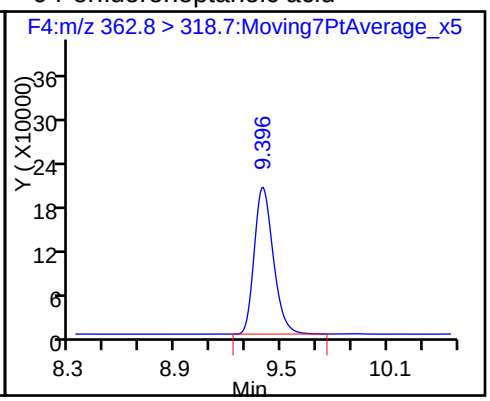

7 Perfluorohexanoic acid



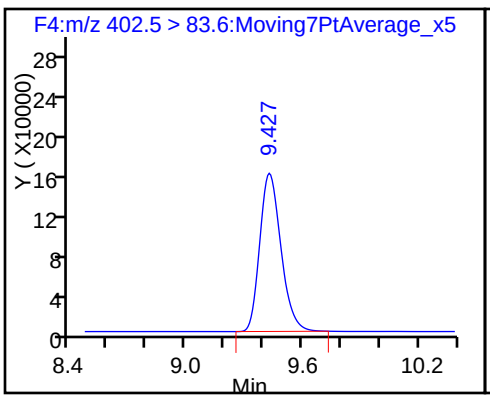

D 8 13C4-PFHpA



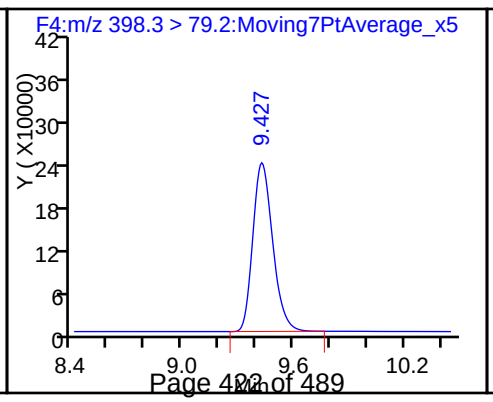

9 Perfluoroheptanoic acid



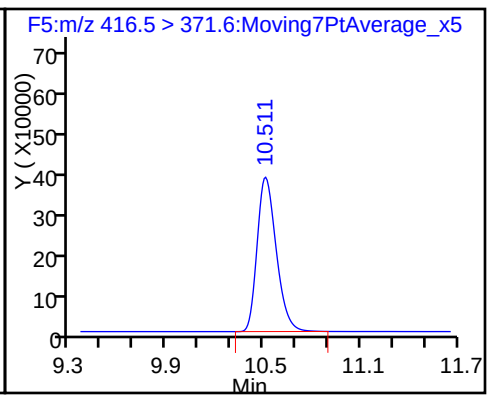

D 11 18O2 PFHxS



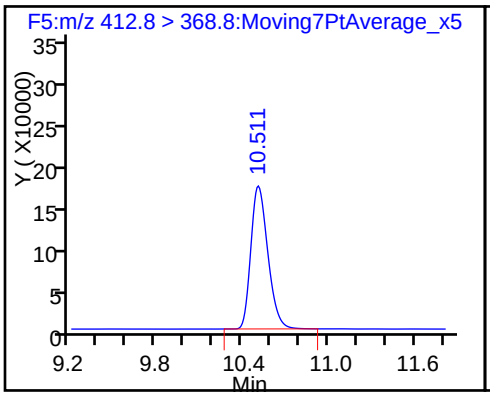

58 Perfluorohexanesulfonic acid



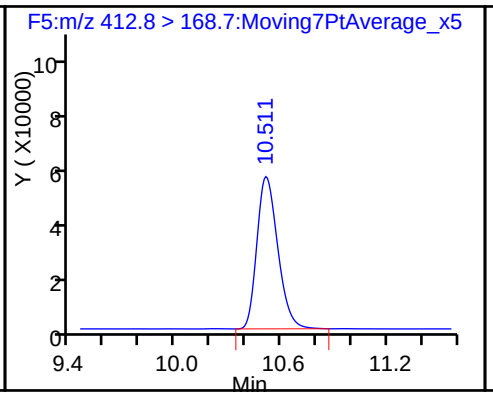

D 12 13C4 PFOA



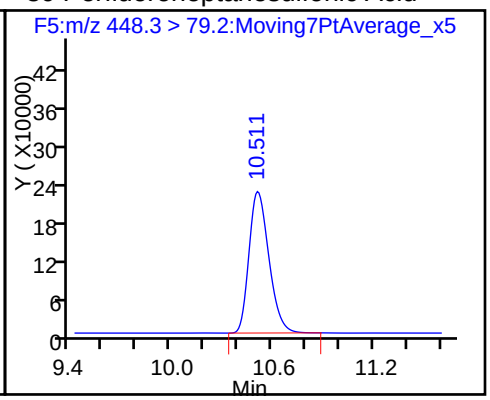
13 Perfluorooctanoic acid



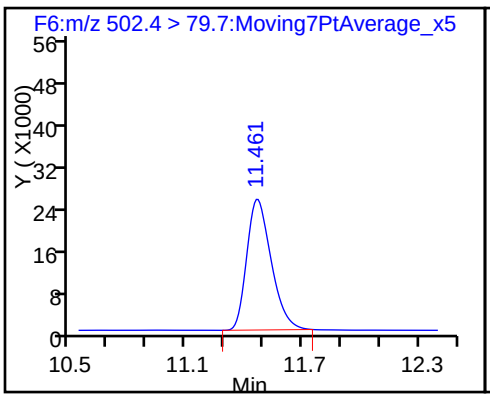

13 Perfluorooctanoic acid



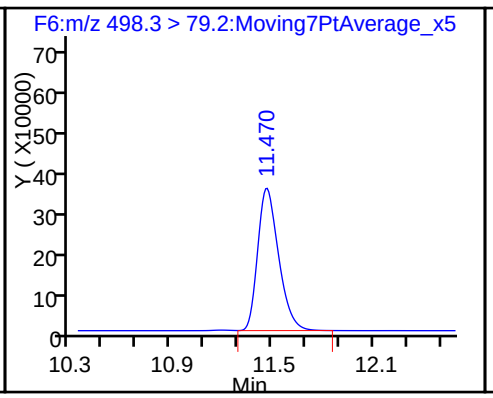

39 Perfluoroheptanesulfonic Acid



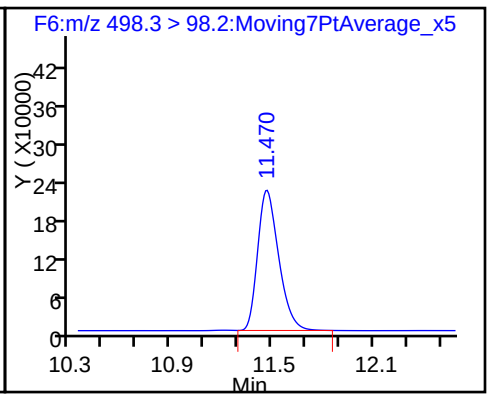

D 16 13C4 PFOS



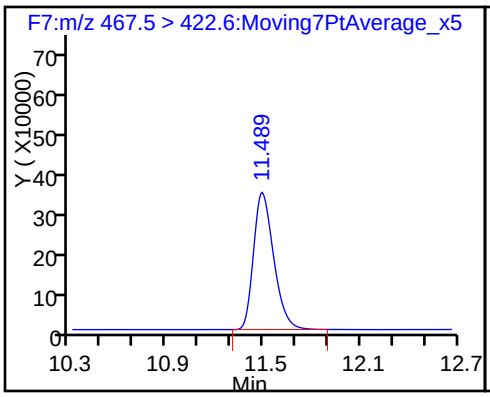

15 Perfluorooctane sulfonic acid



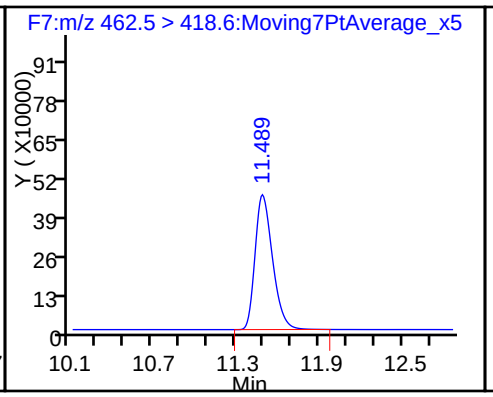

15 Perfluorooctane sulfonic acid



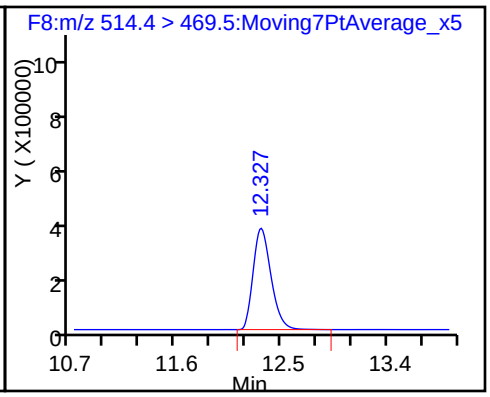

D 17 13C5 PFNA



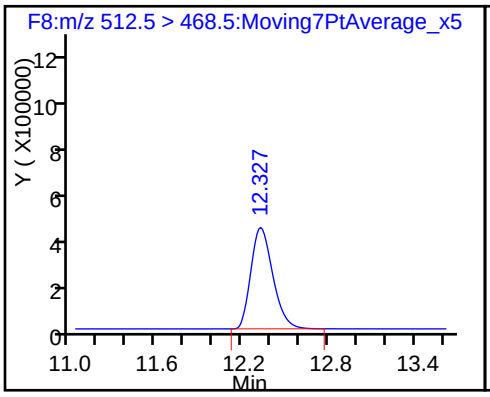

18 Perfluorononanoic acid



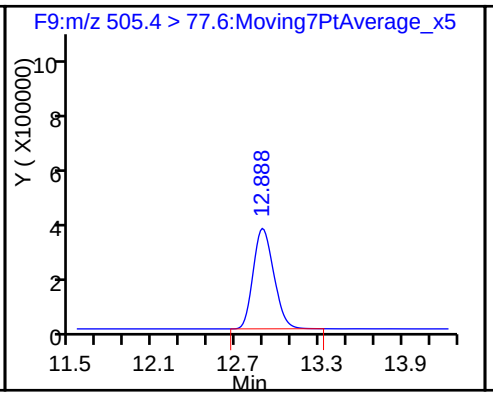

D 19 13C2 PFDA



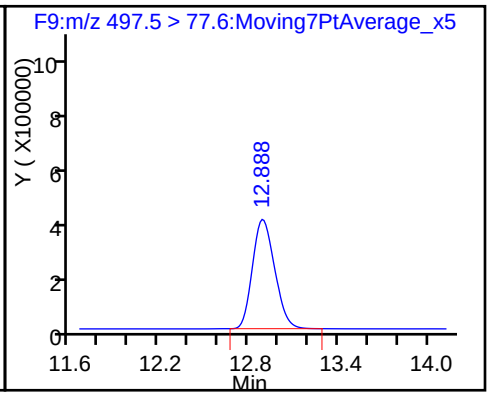

20 Perfluorodecanoic acid



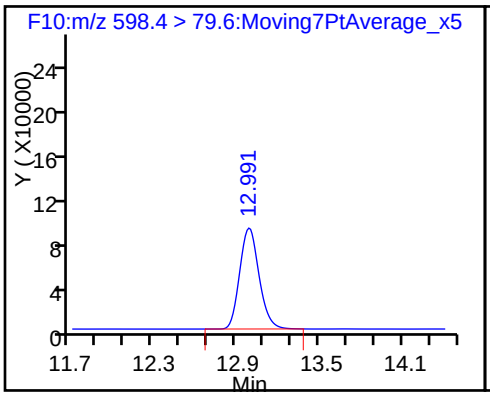

D 23 13C8 FOSA



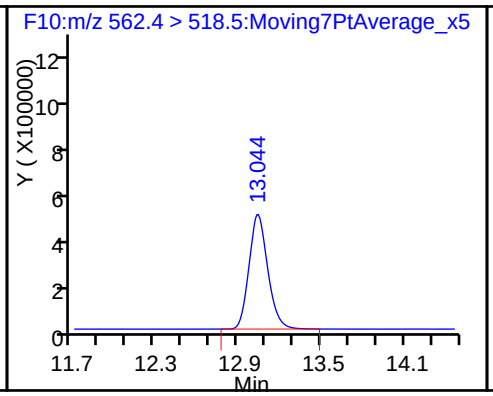

24 Perfluorooctane Sulfonamide



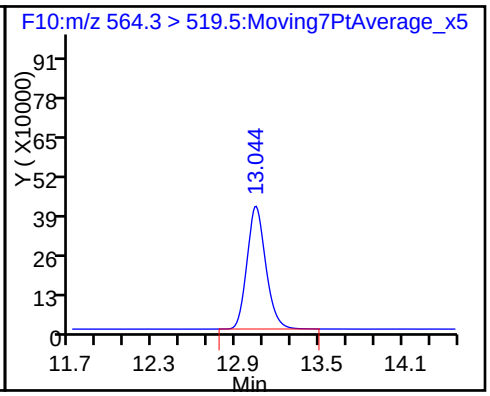
49 Perfluorodecane Sulfonic acid



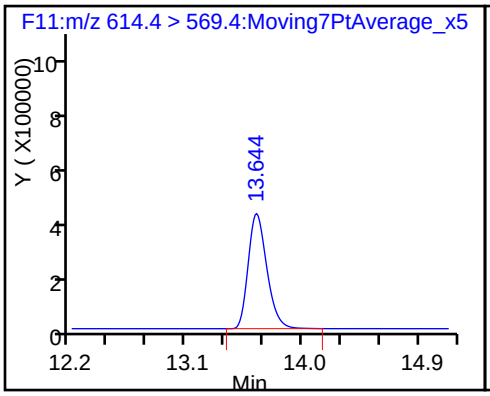

27 Perfluoroundecanoic acid



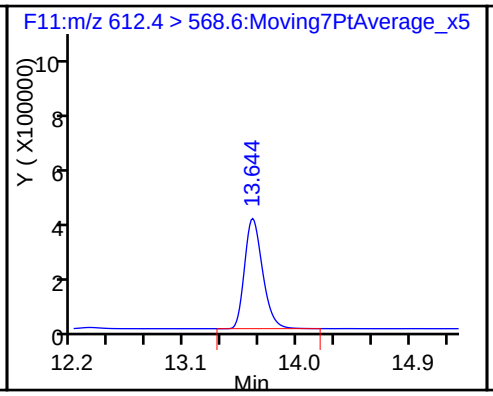

D 26 13C2 PFUnA



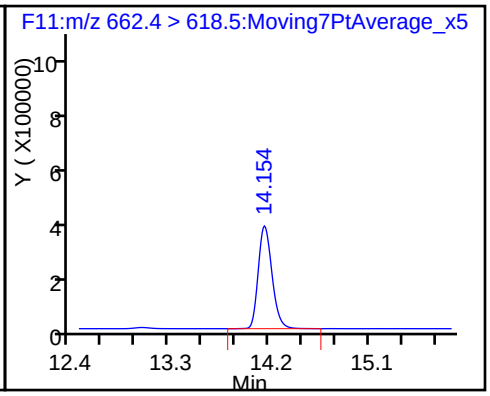

D 28 13C2 PFDoA



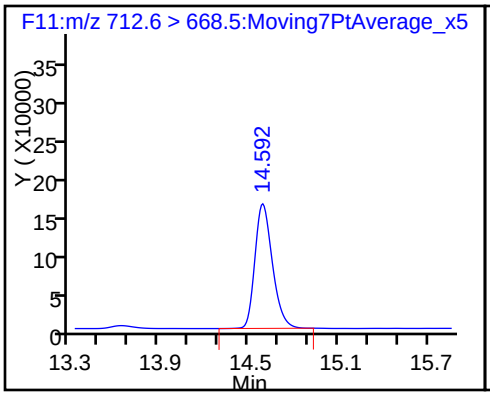

29 Perfluorododecanoic acid



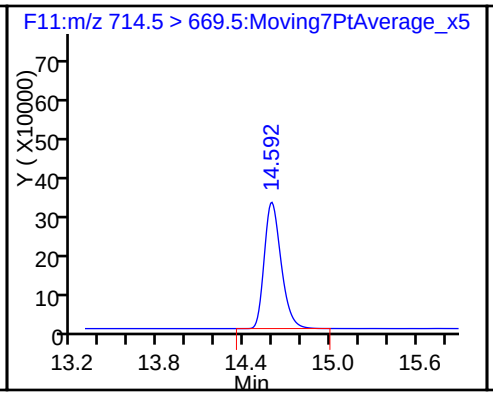

30 Perfluorotridecanoic acid



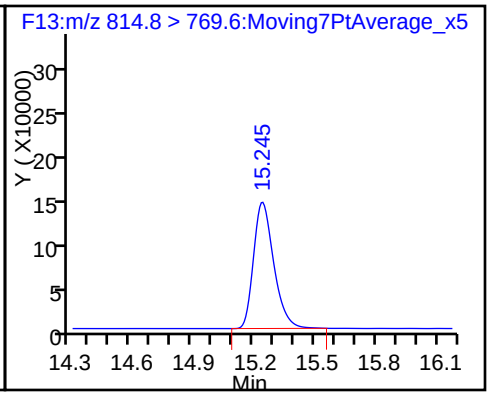

32 Perfluorotetradecanoic acid



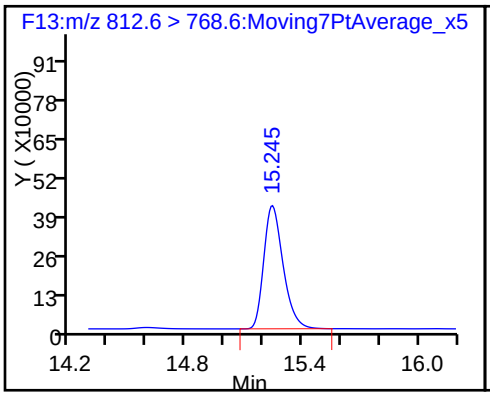

D 33 13C2-PFTeDA



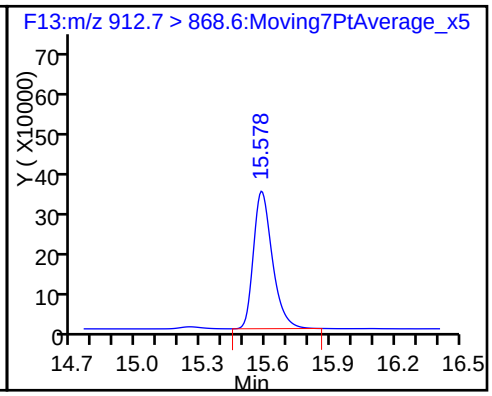

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_010.d
Lims ID: Std L6
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 07-May-2016 16:22:27 ALS Bottle#: 15 Worklist Smp#: 10
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L6
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:51:24 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 15:51:23

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.800 | 5.797 | 0.003 | | 3006261 | 41.8 | | 83.6 | 9443 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.800 | 5.799 | 0.001 | 1.000 | 8022980 | 204.0 | | 102 | 15719 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 2035735 | 40.6 | | 81.1 | 5904 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.909 | 6.911 | -0.002 | 1.000 | 3516497 | 188.3 | | 94.1 | 2260 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 2094175 | NC | | | 4551 | |
| 298.8 > 98.6 | 7.028 | 7.026 | 0.002 | 1.000 | 1434942 | | 1.46(0.00-0.00) | | 3394 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 2094175 | 183.5 | | 104 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 2708397 | 39.1 | | 78.2 | 8576 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 4459810 | 175.1 | | 87.5 | 2464 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.396 | 9.396 | 0.0 | | 2271067 | 38.7 | | 77.3 | 4689 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.396 | 9.396 | 0.0 | 1.000 | 4478320 | 194.2 | | 97.1 | 6685 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.435 | 9.430 | 0.005 | | 857567 | 34.2 | | 72.2 | 2498 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.435 | 9.431 | 0.004 | 1.000 | 5431196 | NC | | | 5713 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.435 | 9.431 | 0.004 | 1.000 | 5431196 | 205.5 | | 109 | | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.511 | 10.511 | 0.0 | | 2306438 | 35.1 | | 70.2 | 4094 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.511 | 10.512 | -0.001 | 1.000 | 4041400 | 214.4 | | 107 | 4989 | |
| 412.8 > 168.7 | 10.511 | 10.512 | -0.001 | 1.000 | 1228575 | | 3.29(0.00-0.00) | 107 | 3088 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.520 | 10.515 | 0.005 | 1.000 | 5249023 | 215.2 | | 113 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.520 | 10.515 | 0.005 | 1.000 | 5249023 | NC | | | 5721 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.470 | 11.467 | 0.003 | | 121887 | 27.5 | | 57.5 | 469 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.470 | 11.470 | 0.0 | 1.000 | 9035448 | 262.0 | | 137 | 2805 | |
| 498.3 > 98.2 | 11.470 | 11.470 | 0.0 | 1.000 | 5448091 | | 1.66(0.00-0.00) | 137 | 3114 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.489 | 11.489 | 0.0 | | 2187306 | 37.7 | | 75.3 | 4165 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.489 | 11.490 | -0.001 | 1.000 | 11831745 | 208.2 | | 104 | 7740 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.327 | 12.327 | 0.0 | | 2773674 | 36.0 | | 72.0 | 3503 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.327 | 12.327 | 0.0 | 1.000 | 13377984 | 205.4 | | 103 | 5437 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.900 | 12.892 | 0.008 | | 2922997 | 38.2 | | 76.4 | 3065 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.900 | 12.892 | 0.008 | 1.000 | 12928661 | 210.8 | | 105 | 3796 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 13.003 | 12.994 | 0.009 | 1.000 | 2209724 | NC | | | 5099 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 13.003 | 12.994 | 0.009 | 1.000 | 2209724 | 174.6 | | 90.6 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.045 | 13.041 | 0.004 | 1.000 | 14179140 | 192.3 | | 96.2 | 5752 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.045 | 13.044 | 0.001 | | 3010737 | 37.2 | | 74.3 | 4151 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.644 | 13.643 | 0.001 | | 3275300 | 39.0 | | 77.9 | 3296 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.644 | 13.643 | 0.001 | 1.000 | 12442195 | 206.9 | | 103 | 3183 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.165 | 14.160 | 0.005 | 1.000 | 9378259 | 172.2 | | 86.1 | 2884 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.593 | 14.593 | 0.0 | 1.000 | 4310813 | 158.2 | | 79.1 | 2150 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.593 | 14.593 | 0.0 | | 2337751 | 43.4 | | 86.8 | 3283 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.245 | 15.244 | 0.001 | | 854590 | 45.6 | | 91.2 | 2376 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.245 | 15.244 | 0.001 | 1.000 | 9888554 | 136.7 | | 68.3 | 1546 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.584 | 15.580 | 0.004 | 1.000 | 7350840 | 200.9 | | 100 | 4090 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFC-L6_00015 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:51:26 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_010.d

Injection Date: 07-May-2016 16:22:27 Instrument ID: A4

Lims ID: Std L6

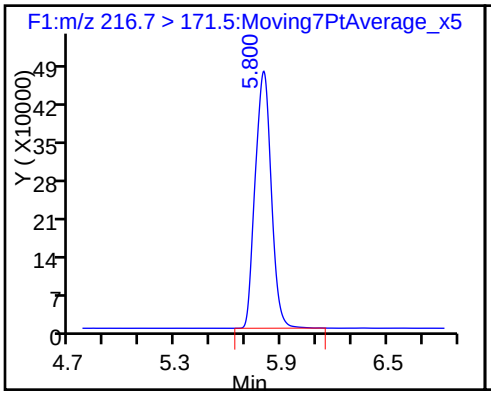
Client ID:

Operator ID: JRB ALS Bottle#: 15 Worklist Smp#: 10

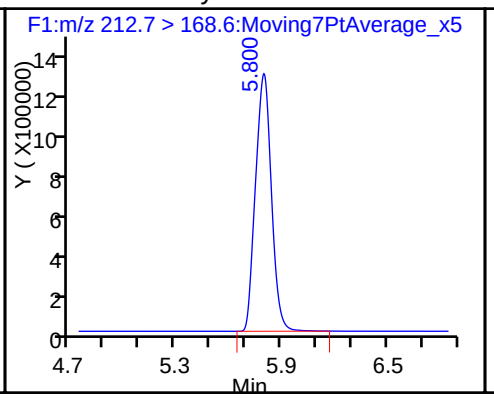
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

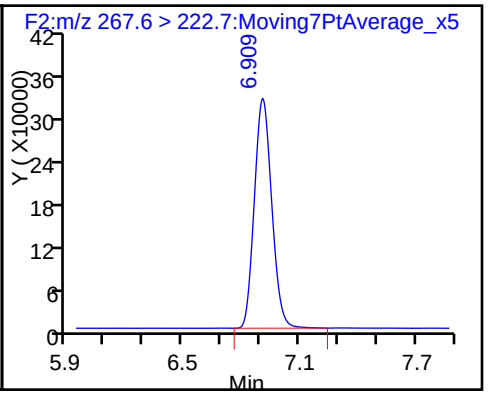
D 1 13C4 PFBA



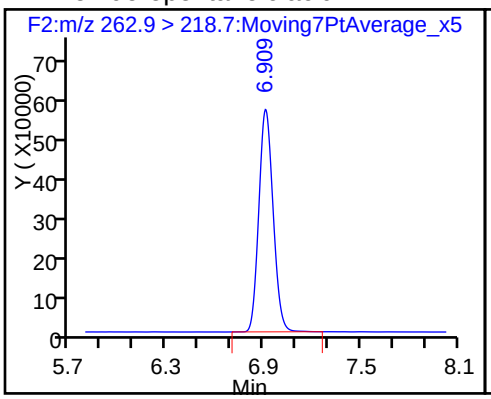

2 Perfluorobutyric acid



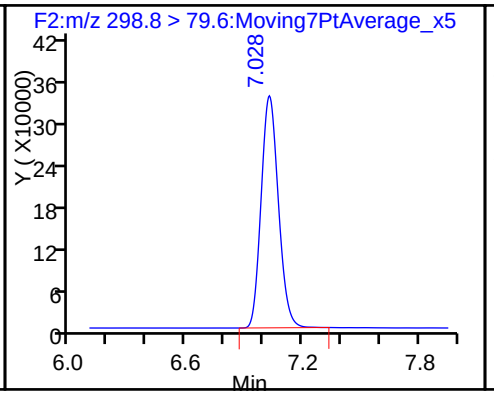

D 3 13C5-PFPeA



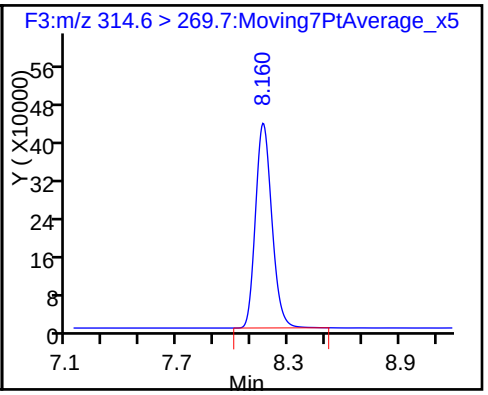

4 Perfluoropentanoic acid



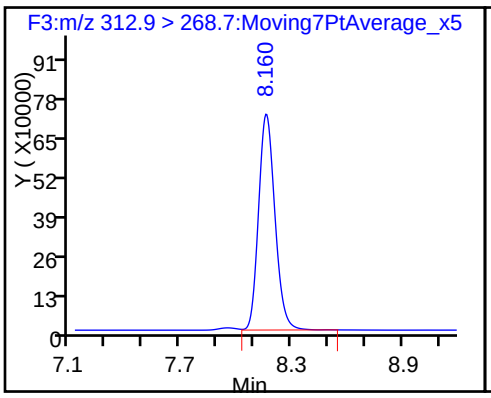

51 Perfluorobutanesulfonic acid



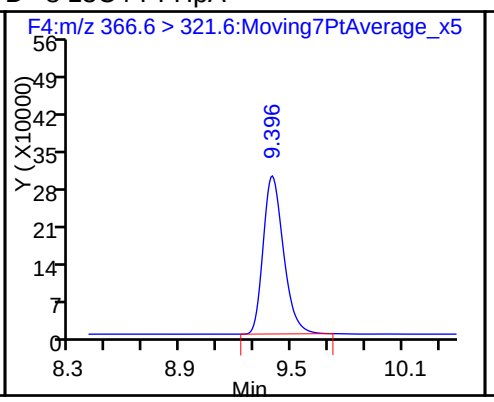

D 6 13C2 PFHxA



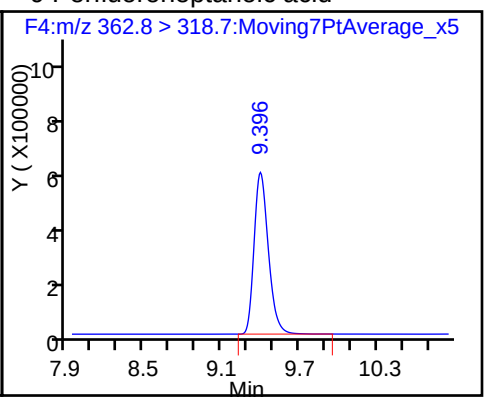

7 Perfluorohexanoic acid



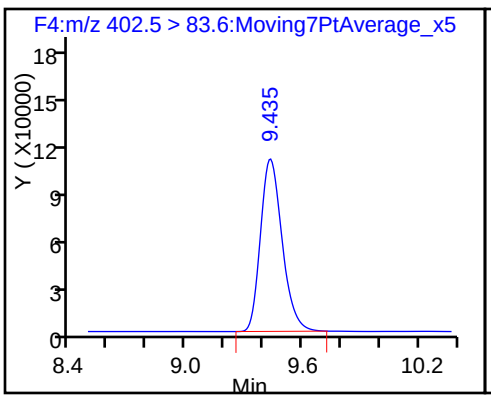

D 8 13C4-PFHpA



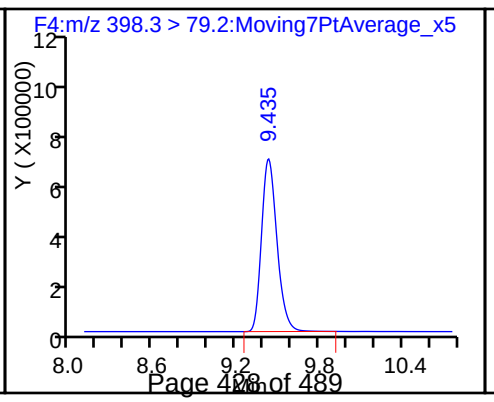

9 Perfluoroheptanoic acid



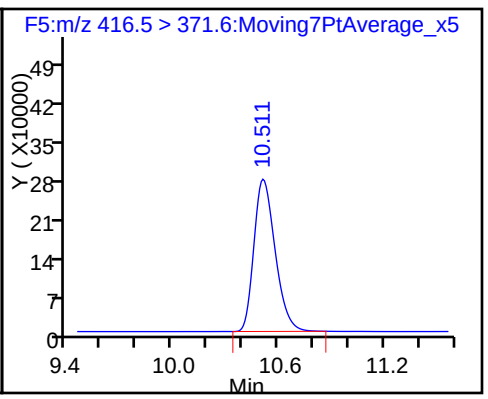

D 11 18O2 PFHxS



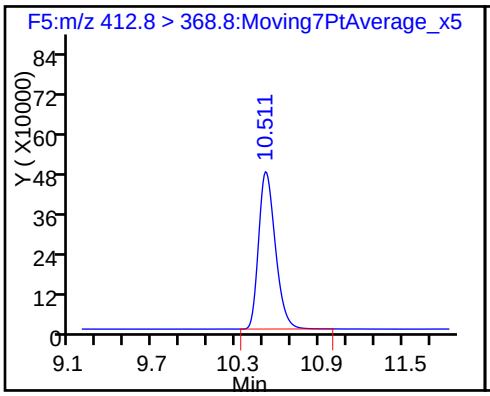

58 Perfluorohexanesulfonic acid



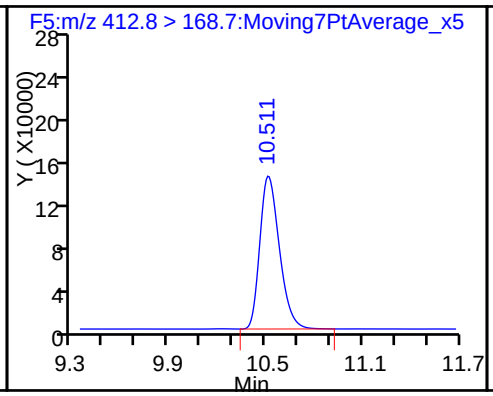

D 12 13C4 PFOA



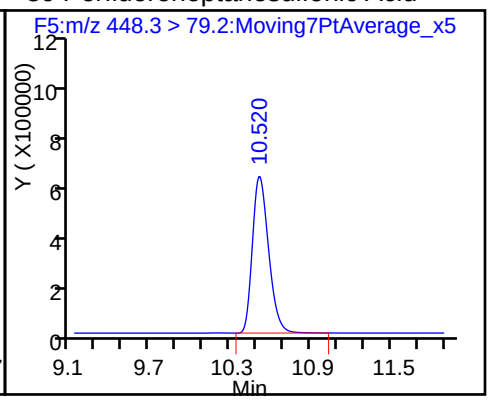
13 Perfluorooctanoic acid



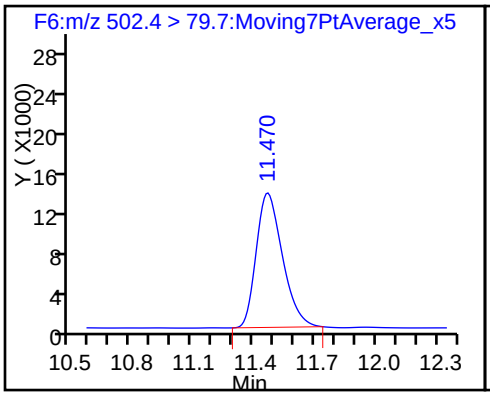

13 Perfluorooctanoic acid



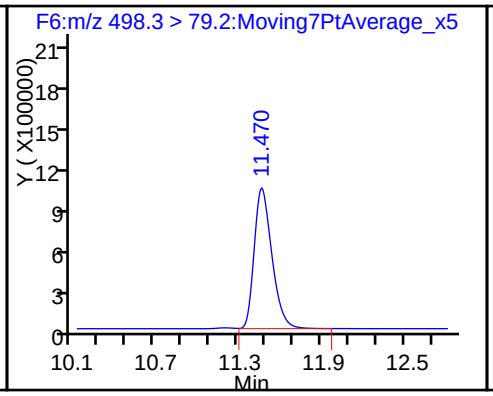

39 Perfluoroheptanesulfonic Acid



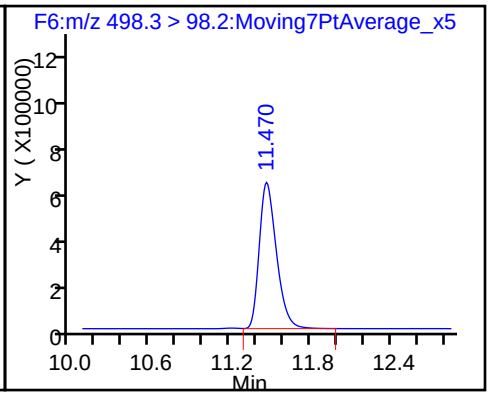

D 16 13C4 PFOS



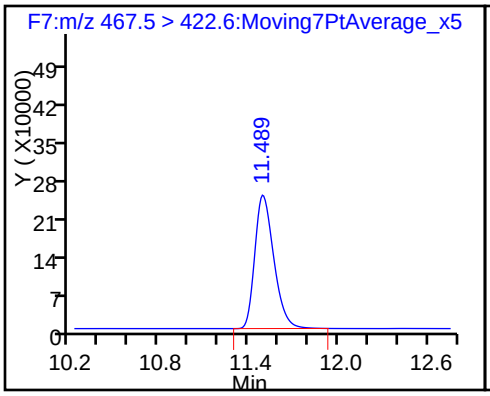

15 Perfluorooctane sulfonic acid



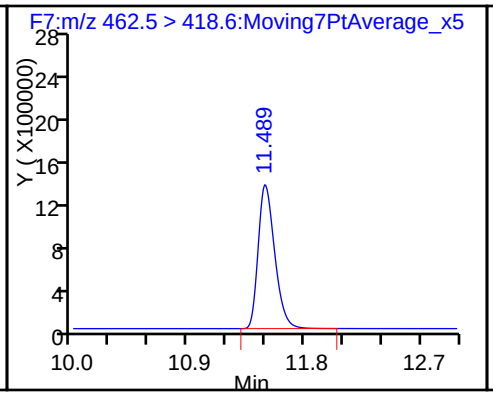

15 Perfluorooctane sulfonic acid



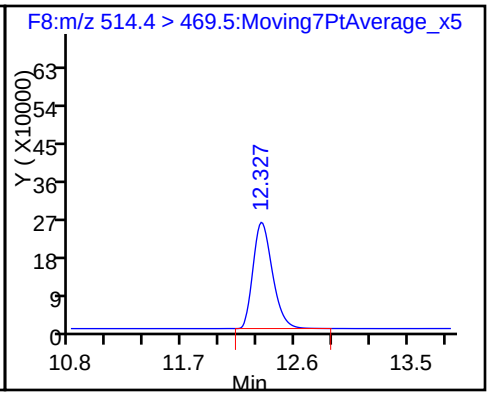

D 17 13C5 PFNA



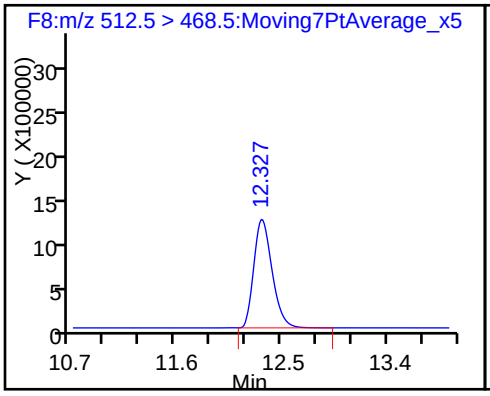

18 Perfluorononanoic acid



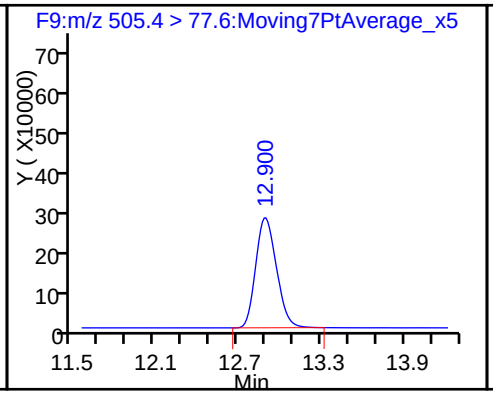

D 19 13C2 PFDA



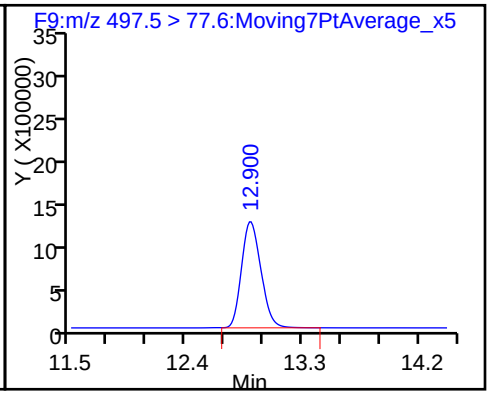

20 Perfluorodecanoic acid



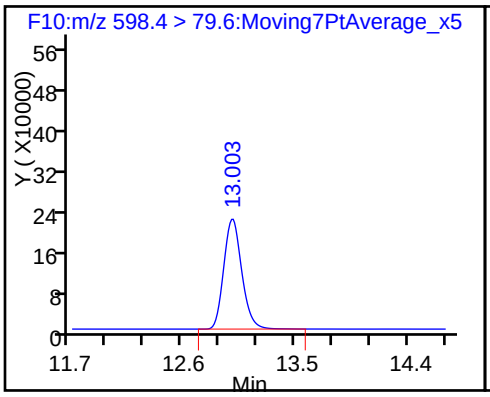

D 23 13C8 FOSA



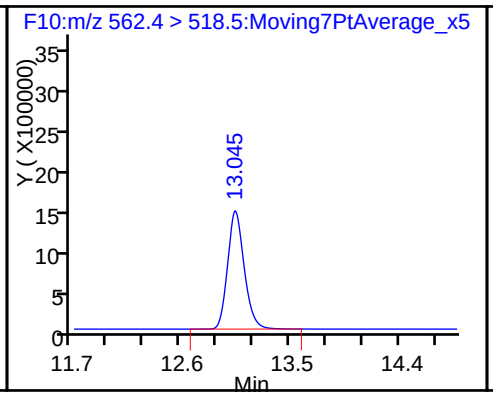

24 Perfluorooctane Sulfonamide



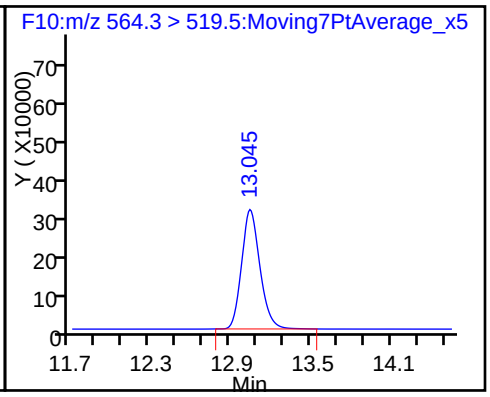
49 Perfluorodecane Sulfonic acid



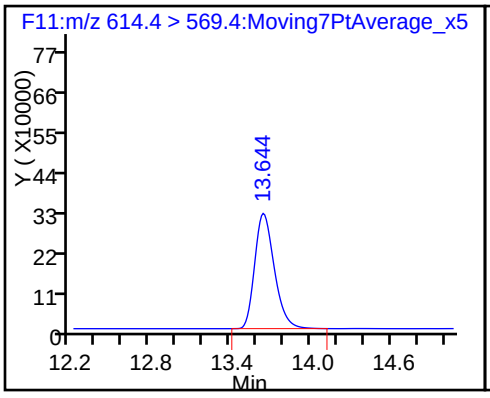

27 Perfluoroundecanoic acid



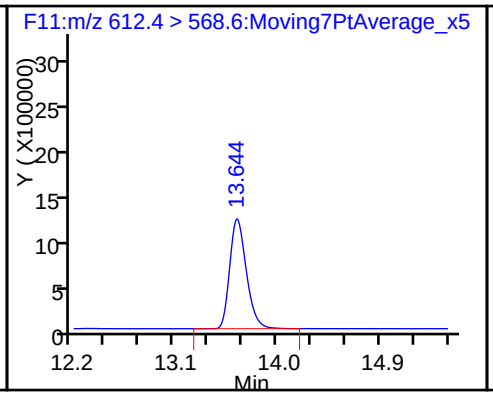

D 26 13C2 PFUnA



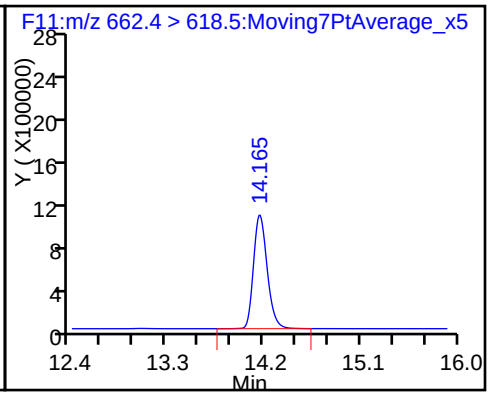

D 28 13C2 PFDoA



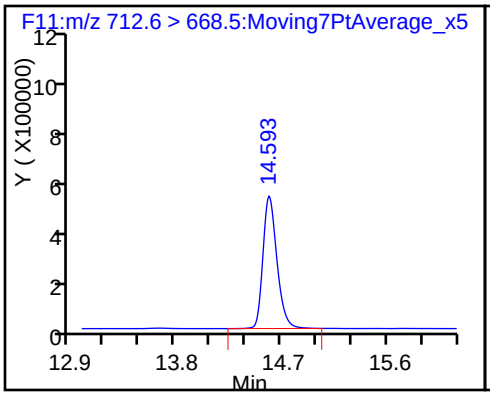

29 Perfluorododecanoic acid



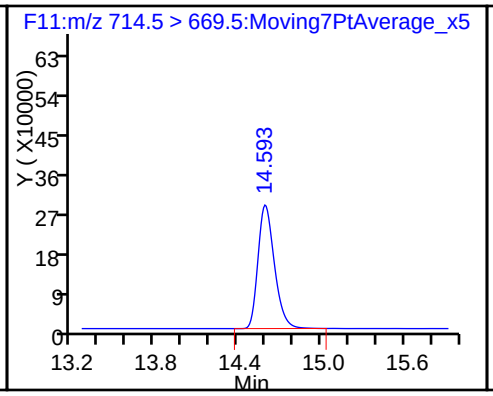

30 Perfluorotridecanoic acid



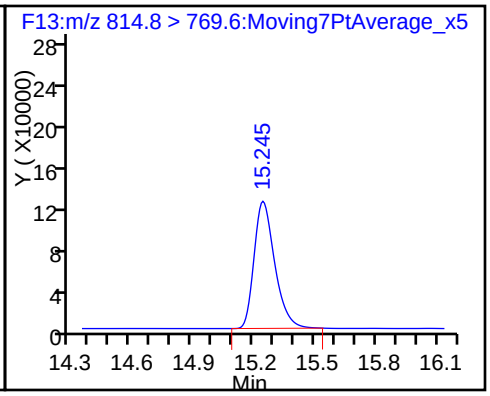

32 Perfluorotetradecanoic acid



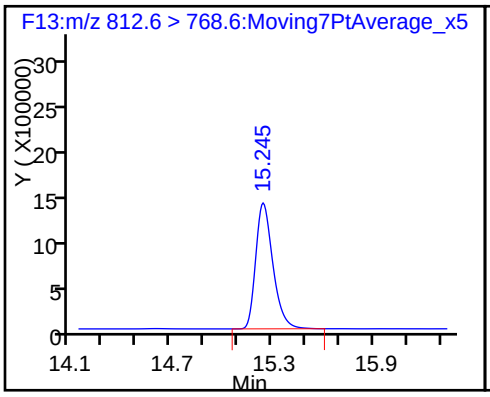

D 33 13C2-PFTeDA



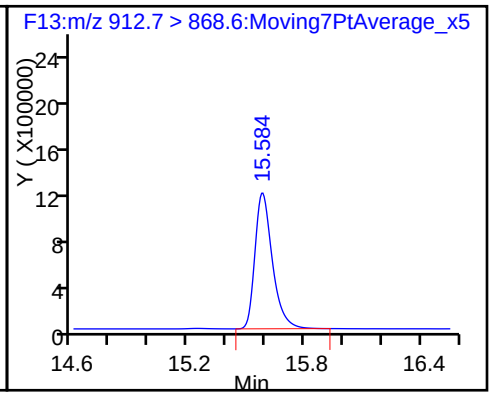

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d
Lims ID: Std L7
Client ID:
Sample Type: IC Calib Level: 7
Inject. Date: 07-May-2016 16:43:39 ALS Bottle#: 16 Worklist Smp#: 11
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L7
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:51 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.797 | 5.797 | 0.0 | | 2422770 | 33.7 | | 67.3 | 6829 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.797 | 5.799 | -0.002 | 1.000 | 13361889 | 421.6 | | 105 | 27625 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 1669202 | 33.3 | | 66.5 | 4015 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.913 | 6.911 | 0.002 | 1.000 | 5574481 | 364.0 | | 91.0 | 3348 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 3220184 | NC | | | 5589 | |
| 298.8 > 98.6 | 7.028 | 7.026 | 0.002 | 1.000 | 2161653 | | 1.49(0.00-0.00) | | 3442 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 3220184 | 376.8 | | 107 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 2140879 | 30.9 | | 61.8 | 3818 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 7118891 | 353.6 | | 88.4 | 1767 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.396 | 9.396 | 0.0 | | 1821368 | 31.0 | | 62.0 | 3580 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.396 | 9.396 | 0.0 | 1.000 | 7362160 | 398.1 | | 99.5 | 5821 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.435 | 9.430 | 0.005 | | 642257 | 25.6 | | 54.1 | 2263 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.435 | 9.431 | 0.004 | 1.000 | 8392855 | NC | | | 6863 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.435 | 9.431 | 0.004 | 1.000 | 8392855 | 424.0 | | 112 | | |
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.511 | 10.511 | 0.0 | | 1921778 | 29.2 | | 58.5 | 2967 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.511 | 10.512 | -0.001 | 1.000 | 6700717 | 426.6 | | 107 | 4931 | |
| 412.8 > 168.7 | 10.511 | 10.512 | -0.001 | 1.000 | 2084034 | | 3.22(0.00-0.00) | 107 | 2996 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.520 | 10.515 | 0.005 | 1.000 | 8018135 | 430.8 | | 113 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.520 | 10.515 | 0.005 | 1.000 | 8018135 | NC | | | 4516 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.470 | 11.467 | 0.003 | | 92991 | 21.0 | | 43.8 | 366 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.470 | 11.470 | 0.0 | 1.000 | 13888751 | 527.9 | | 138 | 2381 | |
| 498.3 > 98.2 | 11.470 | 11.470 | 0.0 | 1.000 | 8305046 | | 1.67(0.00-0.00) | 138 | 2555 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.489 | 11.489 | 0.0 | | 1878882 | 32.4 | | 64.7 | 3943 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.489 | 11.490 | -0.001 | 1.000 | 19415885 | 397.7 | | 99.4 | 6518 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.328 | 12.327 | 0.001 | | 2452843 | 31.8 | | 63.7 | 3498 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.328 | 12.327 | 0.001 | 1.000 | 22997987 | 399.4 | | 99.8 | 5244 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.900 | 12.892 | 0.008 | | 2658316 | 34.7 | | 69.5 | 2825 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.900 | 12.892 | 0.008 | 1.000 | 22164769 | 397.3 | | 99.3 | 3724 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 3597082 | NC | | | 3158 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.991 | 12.994 | -0.003 | 1.000 | 3597082 | 372.6 | | 96.6 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.045 | 13.041 | 0.004 | 1.000 | 23693236 | 369.7 | | 92.4 | 4980 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.045 | 13.044 | 0.001 | | 2617358 | 32.3 | | 64.6 | 3020 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.644 | 13.643 | 0.001 | | 2827360 | 33.6 | | 67.3 | 2416 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.644 | 13.643 | 0.001 | 1.000 | 21112590 | 406.6 | | 102 | 3276 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.165 | 14.160 | 0.005 | 1.000 | 15951099 | 340.9 | | 85.2 | 2960 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.593 | 14.593 | 0.0 | 1.000 | 7612184 | 325.1 | | 81.3 | 2828 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.593 | 14.593 | 0.0 | | 2008897 | 37.3 | | 74.6 | 2488 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.245 | 15.244 | 0.001 | | 750704 | 40.1 | | 80.2 | 1691 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.245 | 15.244 | 0.001 | 1.000 | 16880346 | 265.6 | | 66.4 | 2038 | |
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.584 | 15.580 | 0.004 | 1.000 | 12993450 | 404.3 | | 101 | 3490 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFC-L7_00015 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:29:52 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Injection Date: 07-May-2016 16:43:39 Instrument ID: A4

Lims ID: Std L7

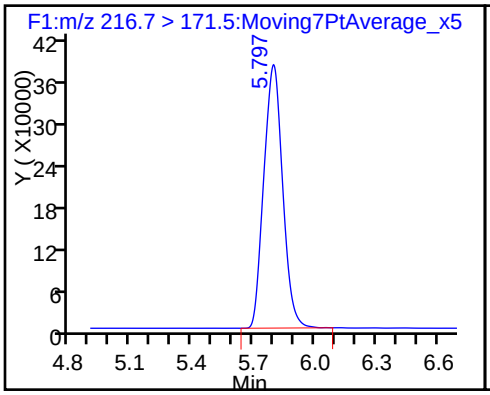
Client ID:

Operator ID: JRB ALS Bottle#: 16 Worklist Smp#: 11

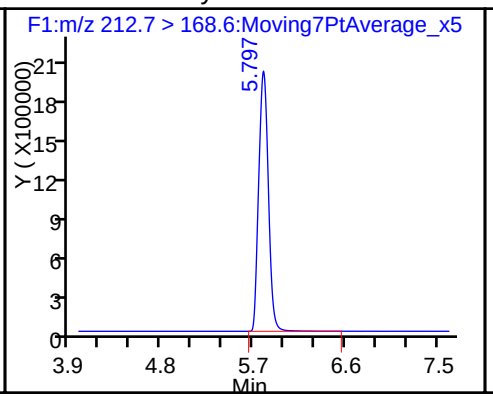
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

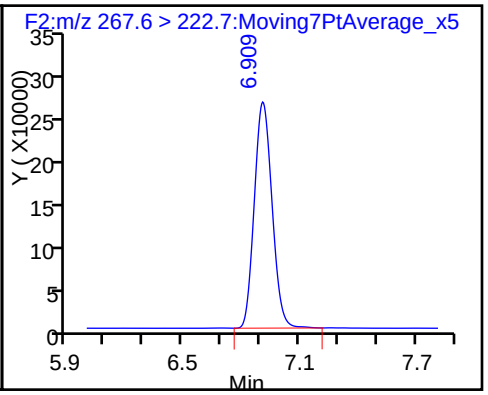
D 1 13C4 PFBA



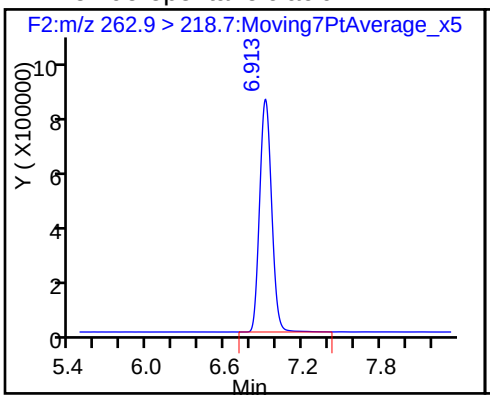

2 Perfluorobutyric acid



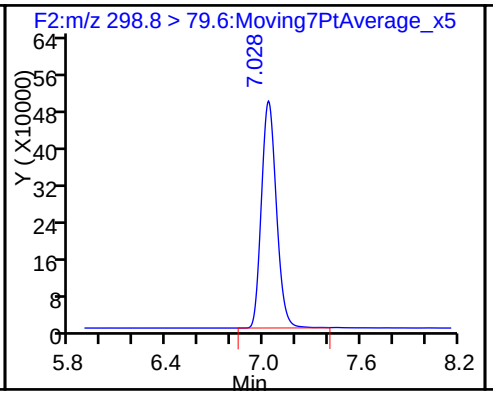

D 3 13C5-PFPeA



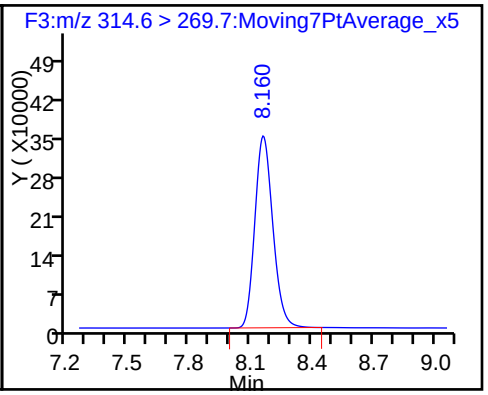

4 Perfluoropentanoic acid



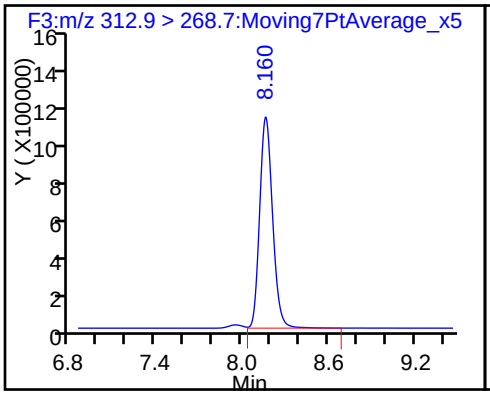

51 Perfluorobutanesulfonic acid



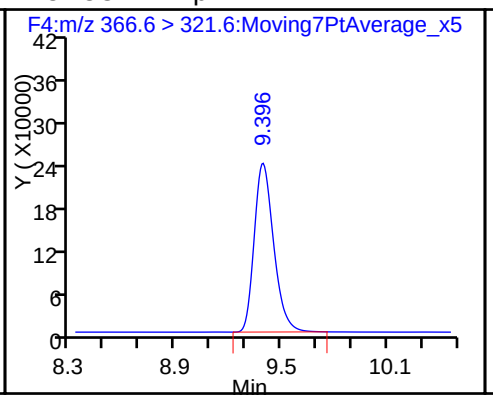

D 6 13C2 PFHxA



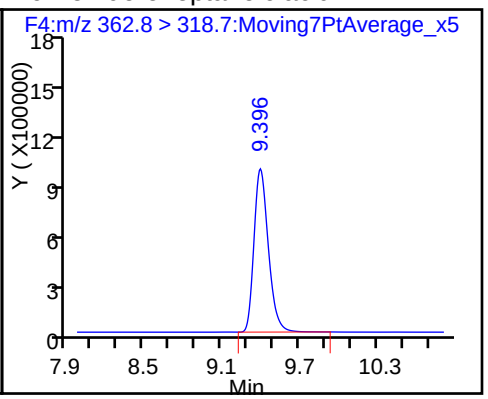

7 Perfluorohexanoic acid



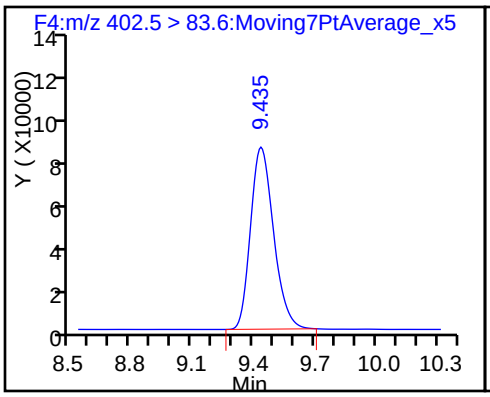

D 8 13C4-PFHpA



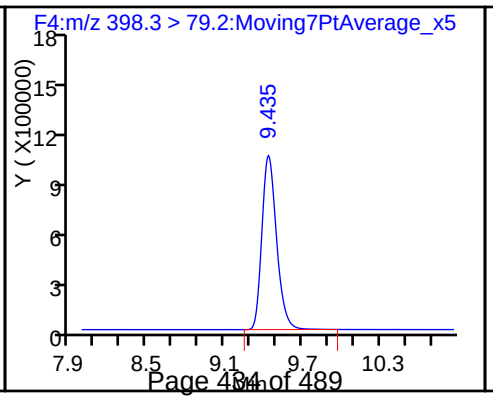

9 Perfluoroheptanoic acid



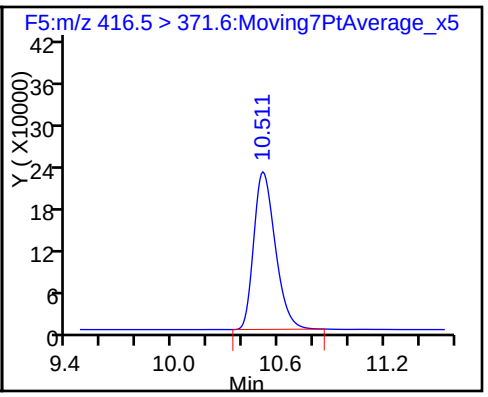

D 11 18O2 PFHxS



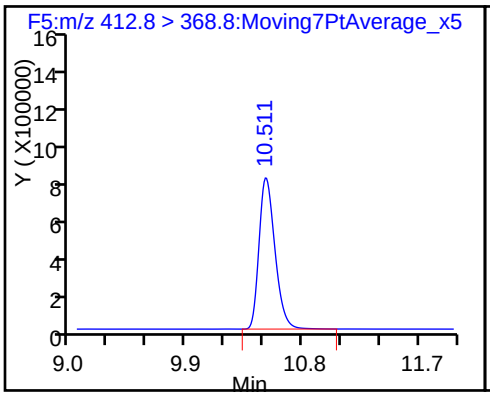

58 Perfluorohexanesulfonic acid



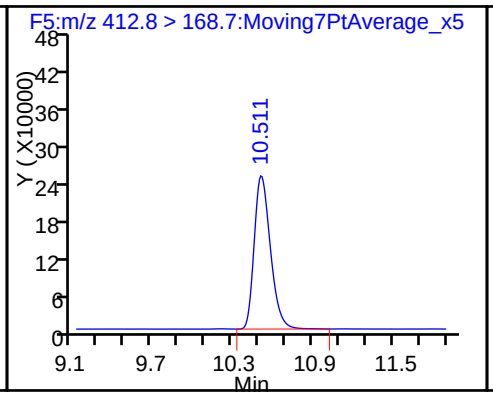

D 12 13C4 PFOA



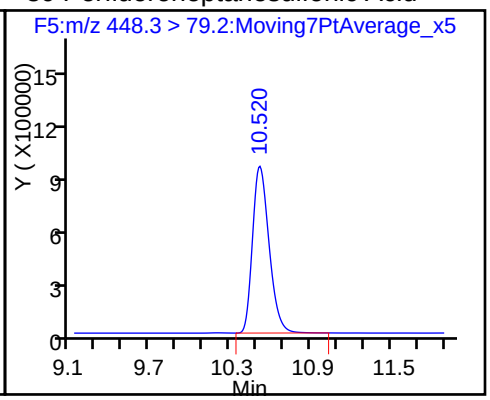
13 Perfluorooctanoic acid



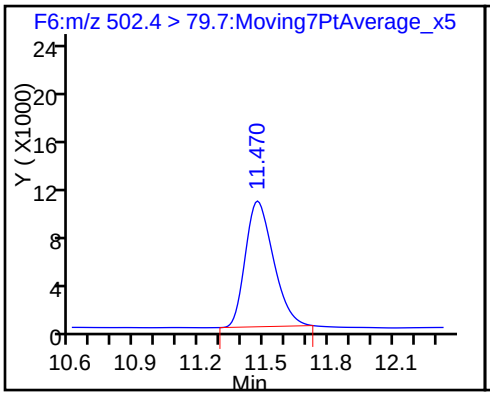

13 Perfluorooctanoic acid



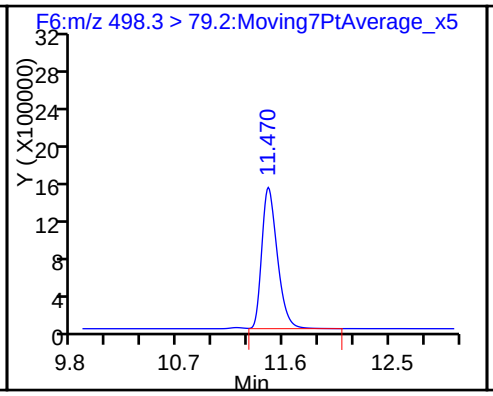

39 Perfluoroheptanesulfonic Acid



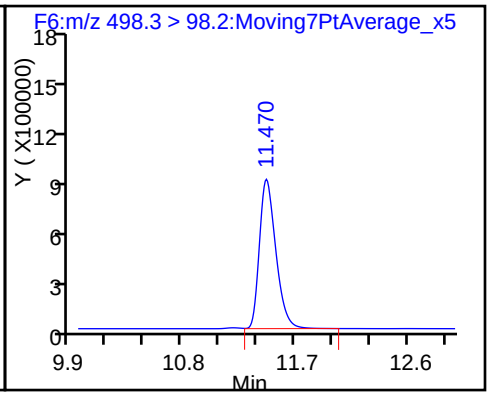

D 16 13C4 PFOS



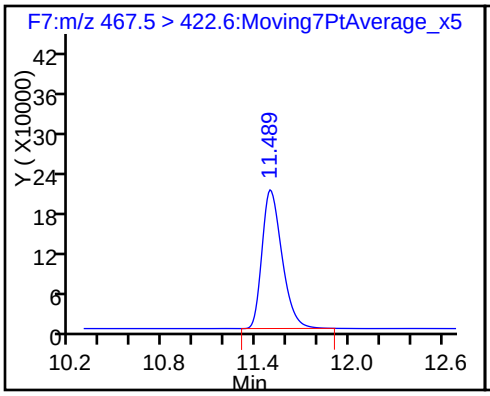

15 Perfluorooctane sulfonic acid



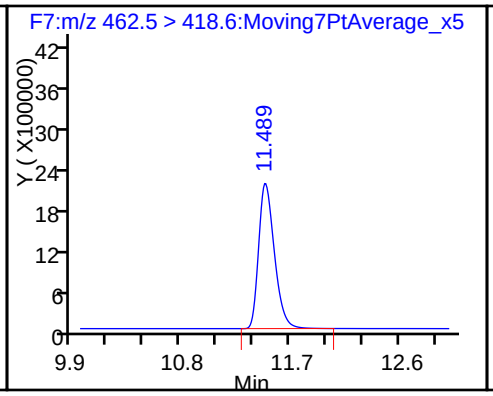

15 Perfluorooctane sulfonic acid



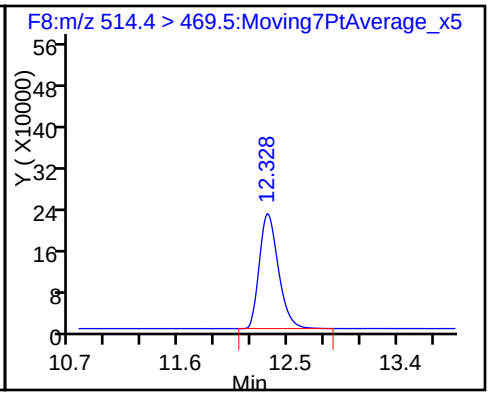

D 17 13C5 PFNA



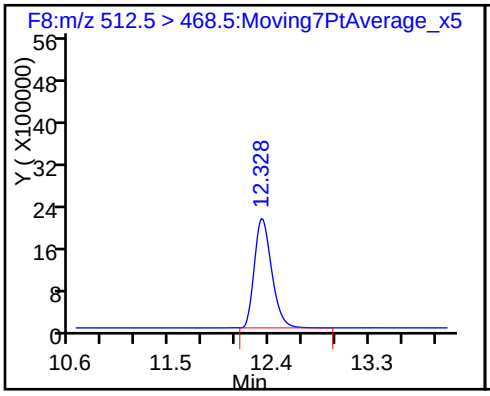

18 Perfluorononanoic acid



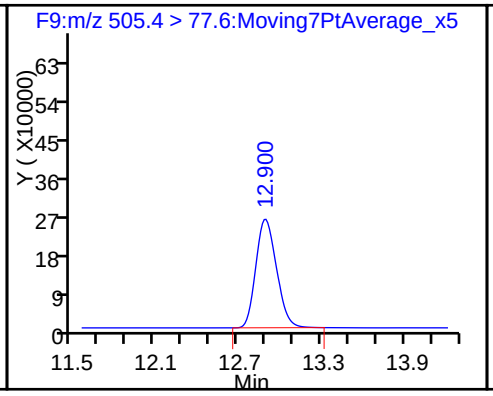

D 19 13C2 PFDA



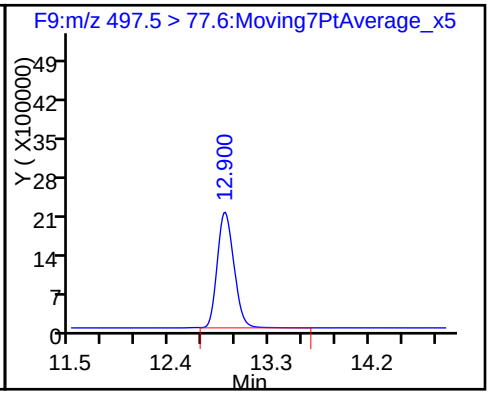

20 Perfluorodecanoic acid



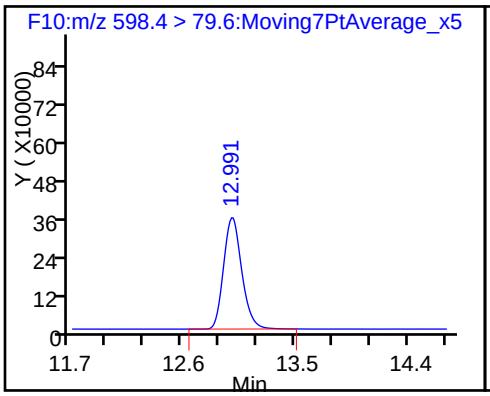

D 23 13C8 FOSA



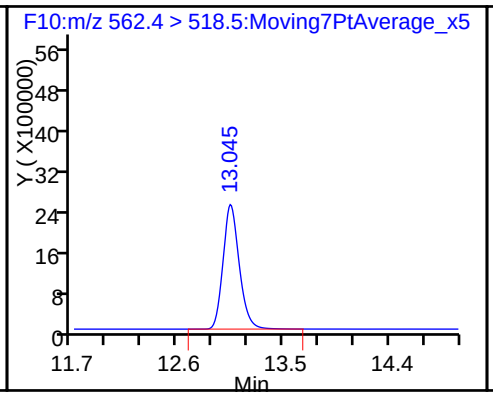

24 Perfluorooctane Sulfonamide



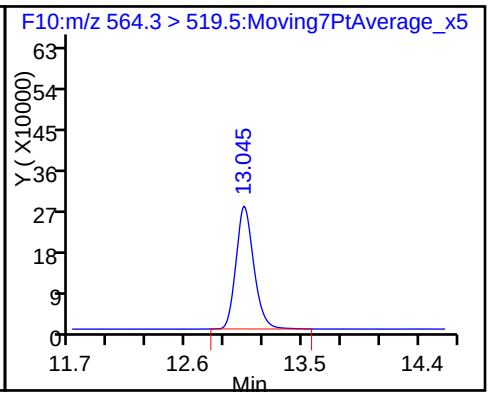
49 Perfluorodecane Sulfonic acid



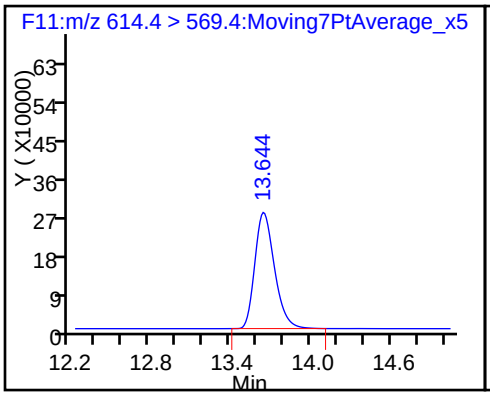

27 Perfluoroundecanoic acid



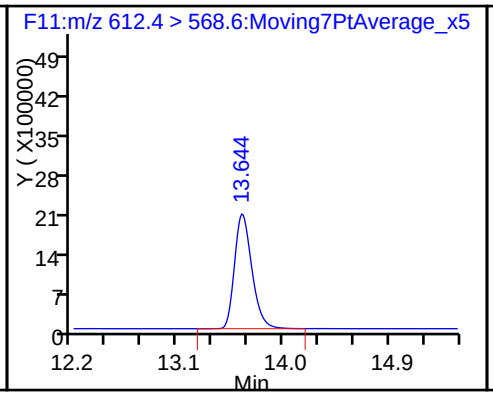

D 26 13C2 PFUnA



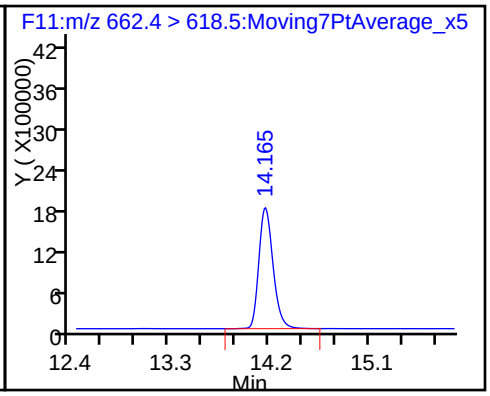

D 28 13C2 PFDoA



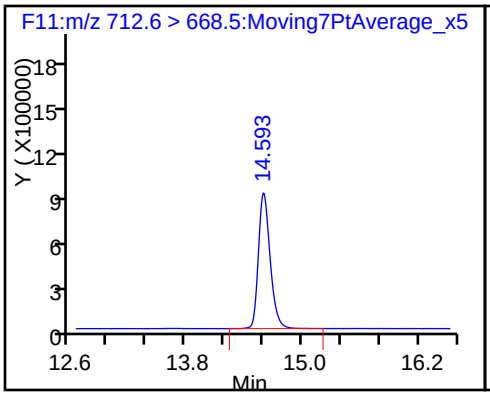

29 Perfluorododecanoic acid



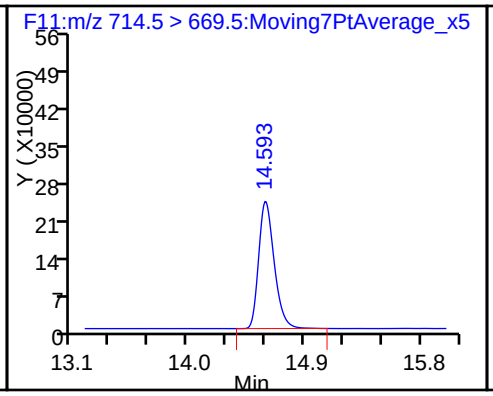

30 Perfluorotridecanoic acid



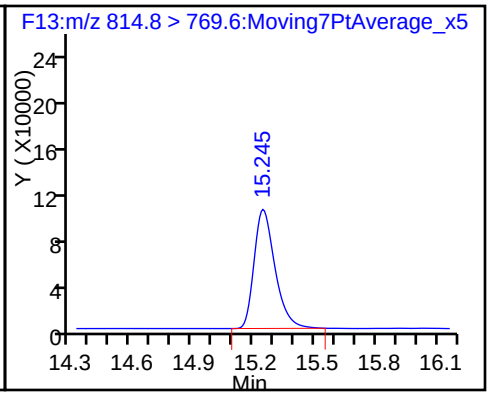

32 Perfluorotetradecanoic acid



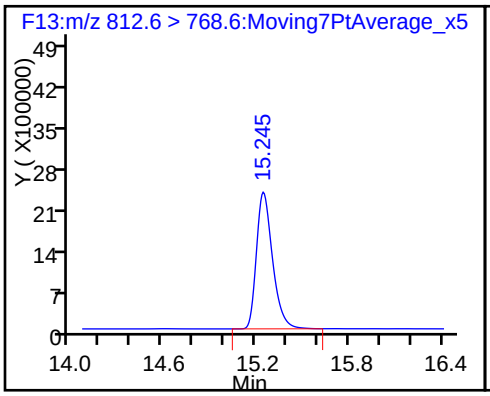

D 33 13C2-PFTeDA



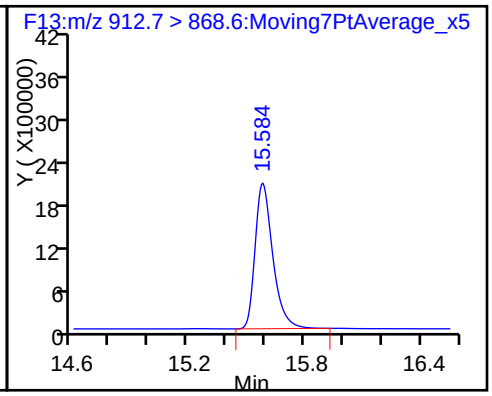

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento  Job No.: 320-18555-1

SDG No.:

Lab Sample ID: ICV 320-109262/13  Calibration Date: 05/07/2016 17:25

Instrument ID: A4  Calib Start Date: 05/07/2016 14:36

GC Column: Acquity  ID: 2.10(mm)  Calib End Date: 05/07/2016 16:43

Lab File ID: 07MAY2016B4A_013.d  Conc. Units: ng/mL

| ANALYTE | CURVE TYPE | AVE RRF | RRF | MIN RRF | CALC AMOUNT | SPIKE AMOUNT | %D | MAX %D |
|---|---|---|---|---|---|---|---|---|
| Perfluorobutanoic acid (PFBA) | AveID | 0.6541 | 0.5276 | | 40.3 | 50.0 | -19.3 | 25.0 |
| Perfluoropentanoic acid (PFPeA) | AveID | 0.4587 | 0.3366 | | 36.7 | 50.0 | -26.6* | 25.0 |
| Perfluorobutanesulfonic acid (PFBS) | AveID | 0.6294 | 0.4746 | | 33.4 | 44.3 | -24.6 | 25.0 |
| Perfluorohexanoic acid (PFHxA) | AveID | 0.4702 | 0.3270 | | 34.8 | 50.0 | -30.5* | 25.0 |
| Perfluoroheptanoic acid (PFHpA) | L2ID | | 0.4017 | | 39.5 | 50.0 | -20.9 | 25.0 |
| Perfluorohexanesulfonic acid (PFHxS) | AveID | 1.458 | 1.187 | | 38.5 | 47.3 | -18.6 | 25.0 |
| Perfluorooctanoic acid (PFOA) | AveID | 0.4086 | 0.3390 | | 41.5 | 50.0 | -17.0 | 25.0 |
| Perfluoroheptanesulfonic Acid (PFHpS) | AveID | 9.567 | 7.050 | | 35.1 | 47.6 | -26.3* | 25.0 |
| Perfluorooctanesulfonic acid (PFOS) | AveID | 13.52 | 11.39 | | 40.2 | 47.8 | -15.8 | 25.0 |
| Perfluorononanoic acid (PFNA) | L2ID | | 1.088 | | 41.9 | 50.0 | -16.2 | 25.0 |
| Perfluorodecanoic acid (PFDA) | AveID | 1.174 | 0.9278 | | 39.5 | 50.0 | -21.0 | 25.0 |
| Perfluorooctane Sulfonamide (FOSA) | AveID | 1.049 | 0.9258 | | 44.1 | 50.0 | -11.8 | 25.0 |
| Perfluorodecanesulfonic acid (PFDS) | AveID | 4.962 | 3.027 | | 29.4 | 48.3 | -39.0* | 25.0 |
| Perfluoroundecanoic acid (PFUnA) | AveID | 1.224 | 1.017 | | 41.5 | 50.0 | -16.9 | 25.0 |
| Perfluorododecanoic acid (PFDoA) | AveID | 0.9182 | 0.7547 | | 41.1 | 50.0 | -17.8 | 25.0 |
| Perfluorotridecanoic Acid (PFTriA) | AveID | 1.165 | 0.9389 | | 40.3 | 50.0 | -19.4 | 25.0 |
| Perfluorotetradecanoic acid (PFTeA) | AveID | 0.5828 | 0.3687 | | 31.6 | 50.0 | -36.7* | 25.0 |
| Perfluoro-n-hexadecanoic acid (PFHxDA) | AveID | 4.233 | 2.436 | | 28.8 | 50.0 | -42.4* | 25.0 |
| Perfluoro-n-octandecanoic acid (PFODA) | AveID | 2.140 | 1.693 | | 39.5 | 50.0 | -20.9 | 25.0 |

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_013.d
Lims ID: ICV
Client ID:
Sample Type: ICV
Inject. Date: 07-May-2016 17:25:59 ALS Bottle#: 9 Worklist Smp#: 13
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: ICV
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub6

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:55 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 15:17:11

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.800 | 5.797 | 0.003 | | 4061797 | 56.5 | | 113 | 10914 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.800 | 5.799 | 0.001 | 1.000 | 2142970 | 40.3 | | | 5807 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.904 | 6.909 | -0.005 | | 2898406 | 57.8 | | 116 | 7437 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.909 | 6.911 | -0.002 | 1.000 | 975483 | 36.7 | | | 705 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.019 | 7.026 | -0.007 | 1.000 | 591579 | NC | | | 1109 | |
| 298.8 > 98.6 | 7.019 | 7.026 | -0.007 | 1.000 | 419016 | | 1.41(0.00-0.00) | | 1095 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.019 | 7.026 | -0.007 | 1.000 | 591579 | 33.4 | | | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 3707069 | 53.5 | | 107 | 8917 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 1212029 | 34.8 | | | 2122 | |
| 22 PFPeS (Perflouro-1-pentanesulfonat | | | | | | | | | | |
| 348.7 > 79.5 | 8.236 | 8.231 | 0.005 | 0.874 | 1430099 | NC | | | 6389 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.388 | 9.396 | -0.008 | | 3276734 | 55.8 | | 112 | 5730 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.388 | 9.396 | -0.008 | 1.000 | 1316404 | 39.5 | | | 3892 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.427 | 9.430 | -0.003 | | 1332523 | 53.1 | | 112 | 3550 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.419 | 9.431 | -0.012 | 1.000 | 1579911 | NC | | | 2492 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.419 | 9.431 | -0.012 | 1.000 | 1579911 | 38.5 | | | | |
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.500 | 10.511 | -0.011 | | 3555800 | 54.1 | | 108 | 5097 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.500 | 10.512 | -0.012 | 1.000 | 1205525 | 41.5 | | | 2434 | |
| 412.8 > 168.7 | 10.509 | 10.512 | -0.003 | 1.001 | 384892 | | 3.13(0.00-0.00) | | 1722 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.509 | 10.515 | -0.006 | 1.000 | 1698177 | 35.1 | | | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.509 | 10.515 | -0.006 | 1.000 | 1698177 | NC | | | 4526 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.459 | 11.467 | -0.008 | | 241899 | 54.5 | | 114 | 1141 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.459 | 11.470 | -0.011 | 1.000 | 2753141 | 40.2 | | | 4098 | |
| 498.3 > 98.2 | 11.459 | 11.470 | -0.011 | 1.000 | 1540943 | | 1.79(0.00-0.00) | | 2204 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.479 | 11.489 | -0.010 | | 3047739 | 52.5 | | 105 | 4938 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.488 | 11.490 | -0.002 | 1.000 | 3315865 | 41.9 | | | 4574 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.325 | 12.327 | -0.002 | | 4050126 | 52.5 | | 105 | 4855 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.325 | 12.327 | -0.002 | 1.000 | 3757786 | 39.5 | | | 5301 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.885 | 12.892 | -0.007 | | 4187814 | 54.7 | | 109 | 3874 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.885 | 12.892 | -0.007 | 1.000 | 3877198 | 44.1 | | | 2801 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.988 | 12.994 | -0.006 | 1.000 | 739058 | NC | | | 2153 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.988 | 12.994 | -0.006 | 1.000 | 739058 | 29.4 | | | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.031 | 13.041 | -0.010 | 1.000 | 4110453 | 41.5 | | | 4017 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.031 | 13.044 | -0.013 | | 4041436 | 49.9 | | 99.8 | 5326 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.639 | 13.643 | -0.004 | | 4586095 | 54.6 | | 109 | 3794 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.639 | 13.643 | -0.004 | 1.000 | 3461244 | 41.1 | | | 1936 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.151 | 14.160 | -0.009 | 1.000 | 2816223 | 40.3 | | | 1557 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.580 | 14.593 | -0.013 | 1.000 | 1105812 | 31.6 | | | 809 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.580 | 14.593 | -0.013 | | 2999651 | 55.7 | | 111 | 3553 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.235 | 15.244 | -0.009 | | 1016404 | 54.3 | | 109 | 2747 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.235 | 15.244 | -0.009 | 1.000 | 2476440 | 28.8 | | | 650 | |
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.576 | 15.580 | -0.004 | 1.000 | 1720883 | 39.5 | | | 1914 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFCIC_00016 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:29:55 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_013.d

Injection Date: 07-May-2016 17:25:59 Instrument ID: A4

Lims ID: ICV

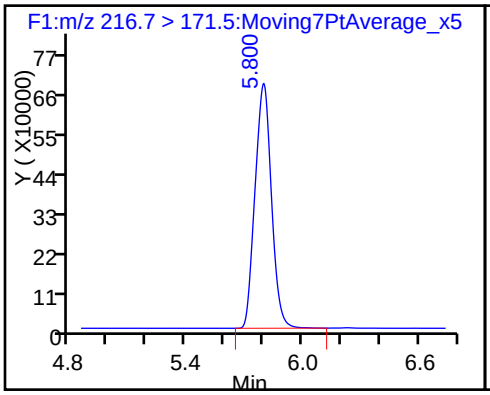
Client ID:

Operator ID: JRB ALS Bottle#: 9 Worklist Smp#: 13

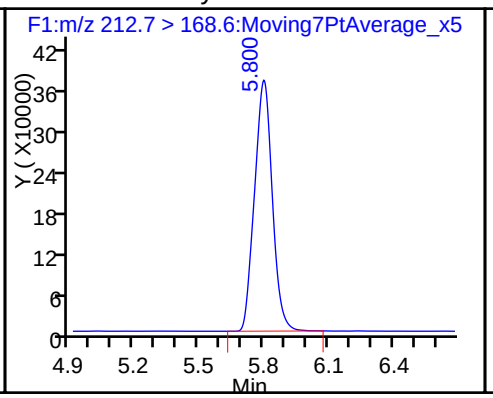
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

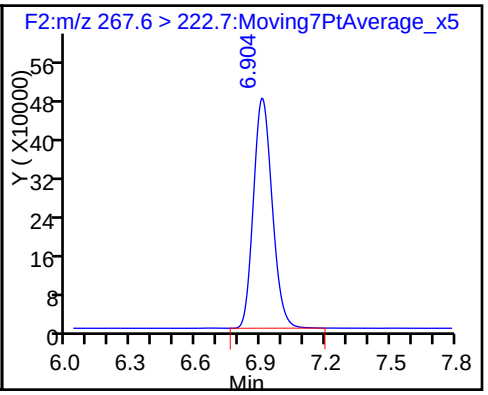
D 1 13C4 PFBA



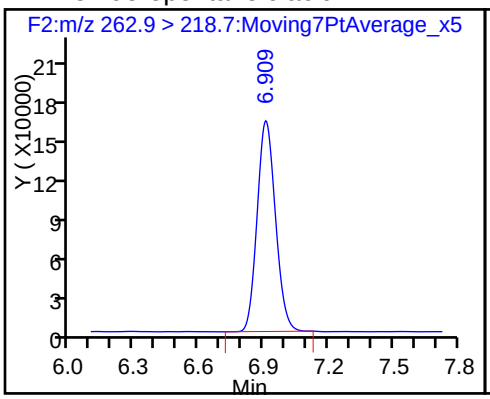

2 Perfluorobutyric acid



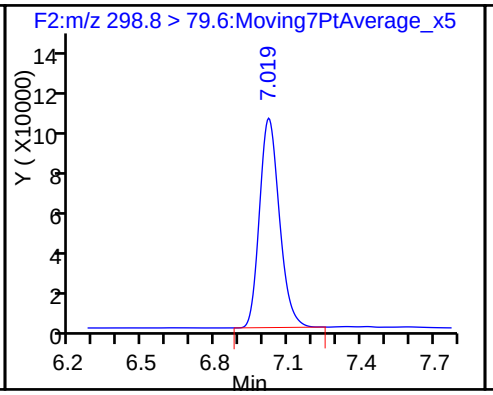

D 3 13C5-PFPeA



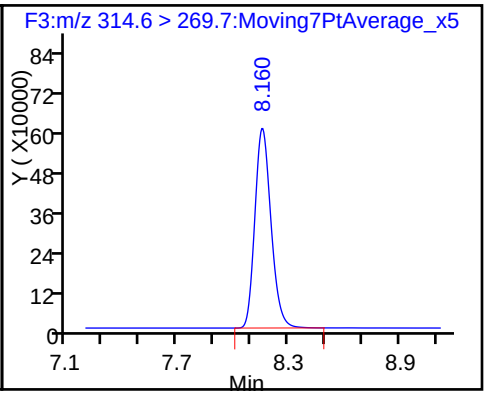

4 Perfluoropentanoic acid



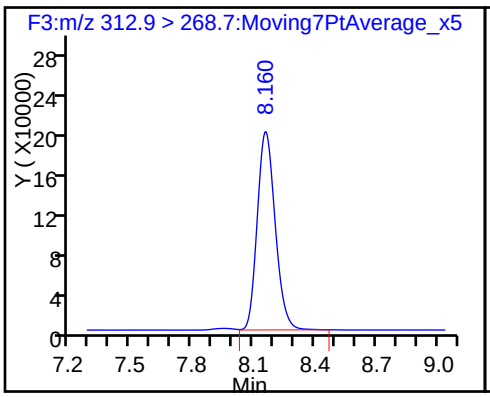

51 Perfluorobutanesulfonic acid



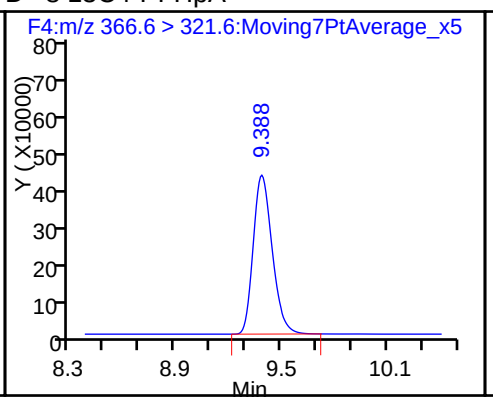

D 6 13C2 PFHxA



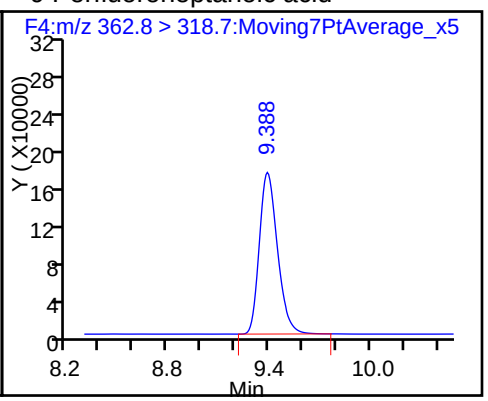

7 Perfluorohexanoic acid



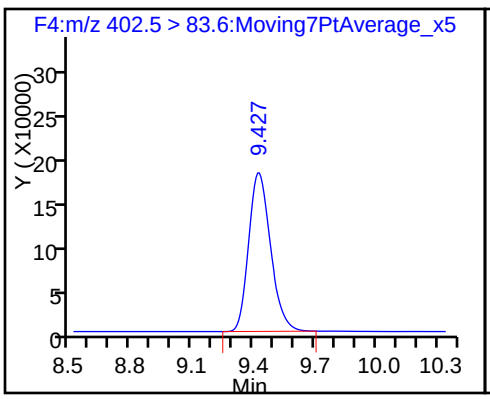

D 8 13C4-PFHpA



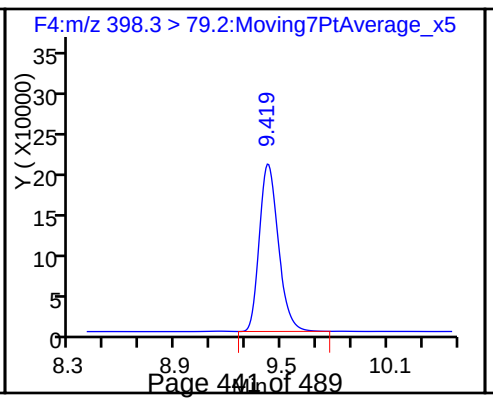

9 Perfluoroheptanoic acid



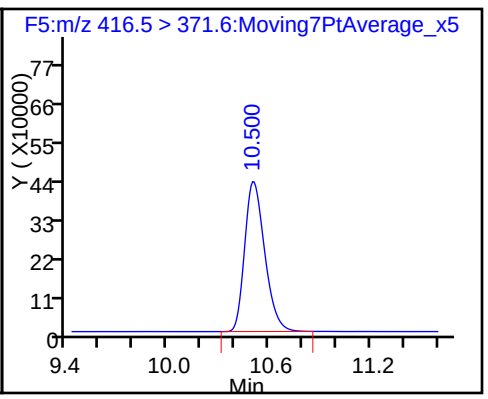

D 11 18O2 PFHxS



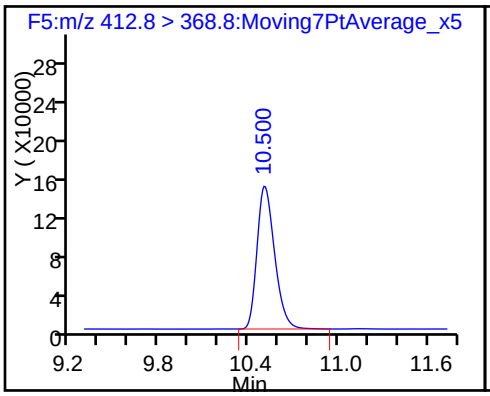

58 Perfluorohexanesulfonic acid



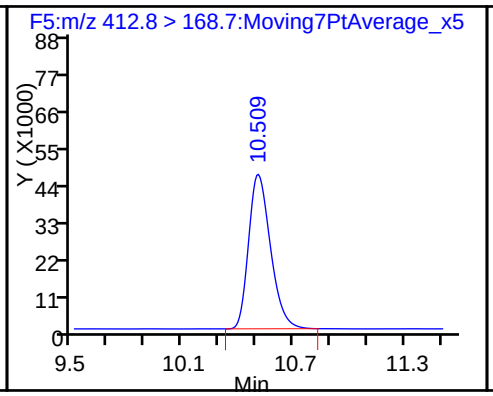

D 12 13C4 PFOA



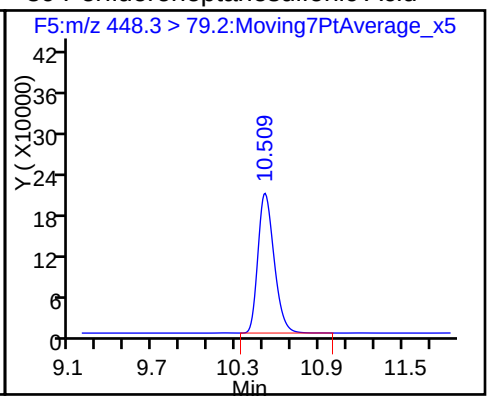
13 Perfluorooctanoic acid



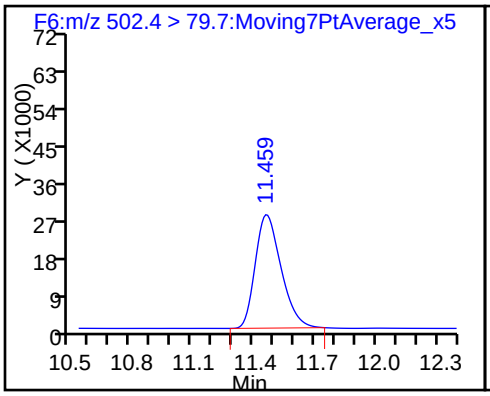

13 Perfluorooctanoic acid



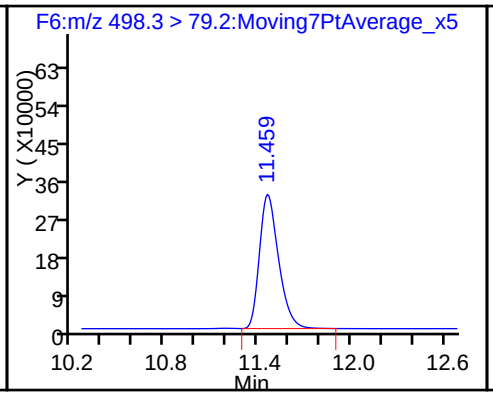

39 Perfluoroheptanesulfonic Acid



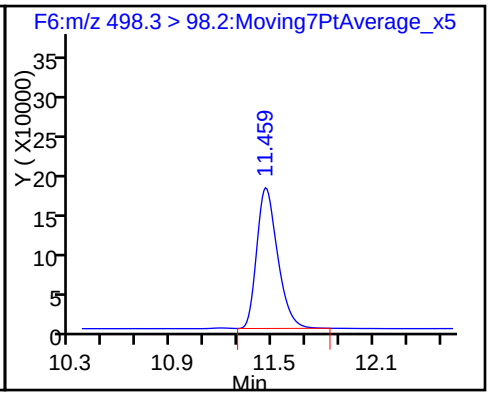

D 16 13C4 PFOS



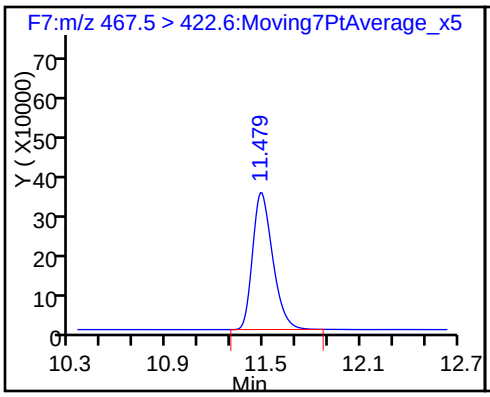

15 Perfluorooctane sulfonic acid



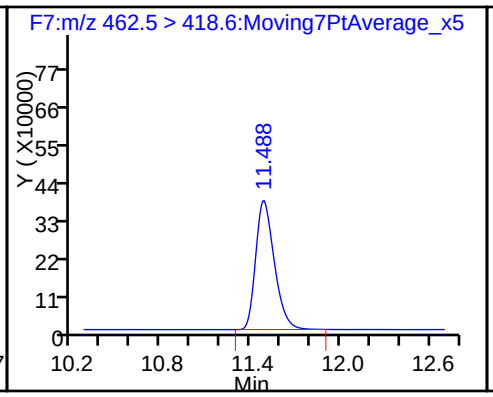

15 Perfluorooctane sulfonic acid



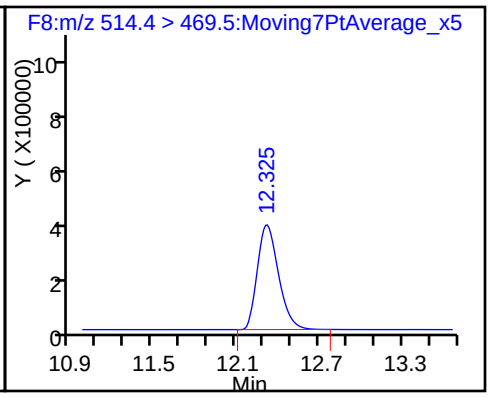

D 17 13C5 PFNA



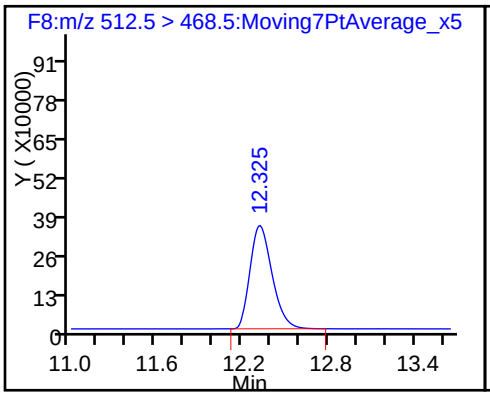

18 Perfluorononanoic acid



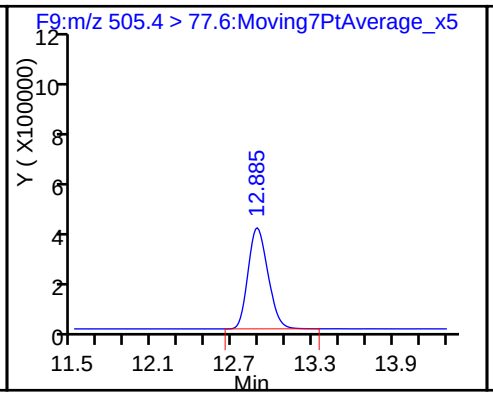

D 19 13C2 PFDA



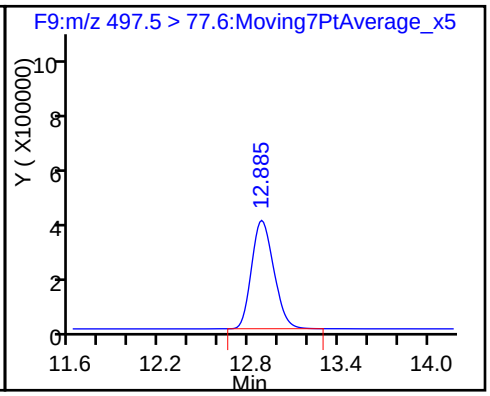

20 Perfluorodecanoic acid



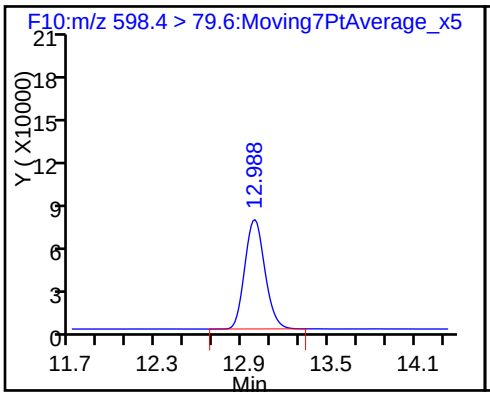

D 23 13C8 FOSA



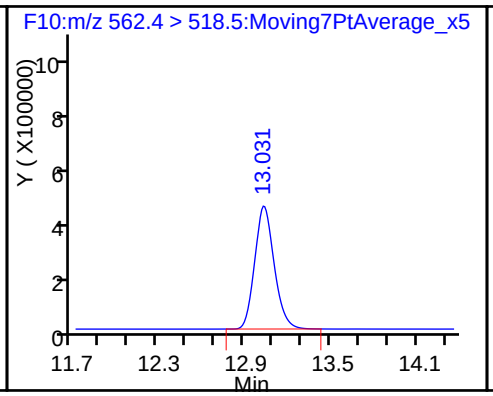

24 Perfluorooctane Sulfonamide



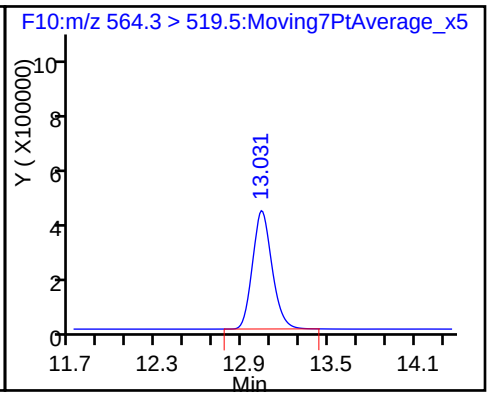
49 Perfluorodecane Sulfonic acid



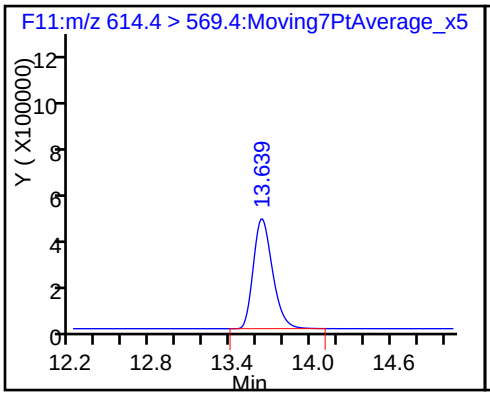

27 Perfluoroundecanoic acid



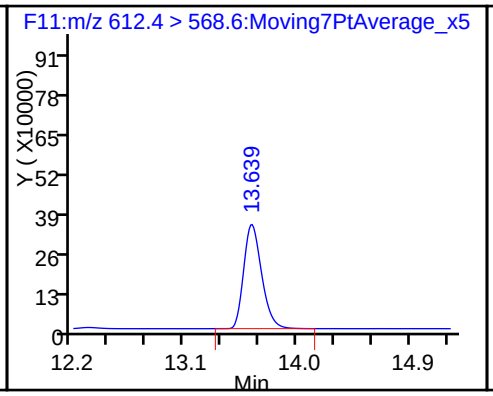

D 26 13C2 PFUnA



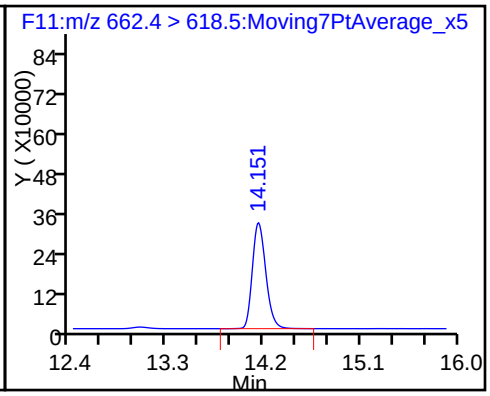

D 28 13C2 PFDoA



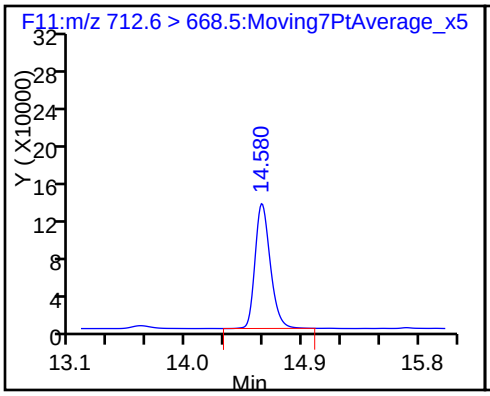

29 Perfluorododecanoic acid



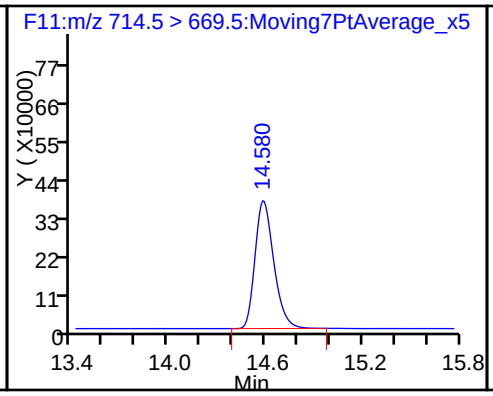

30 Perfluorotridecanoic acid



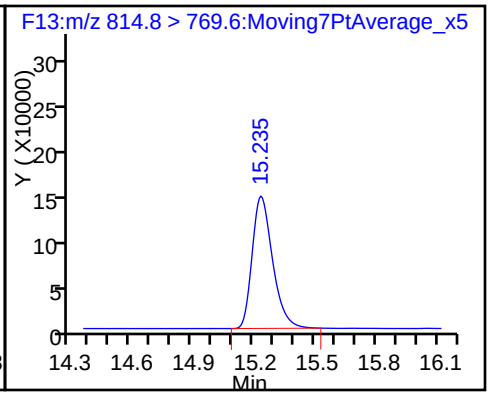

32 Perfluorotetradecanoic acid



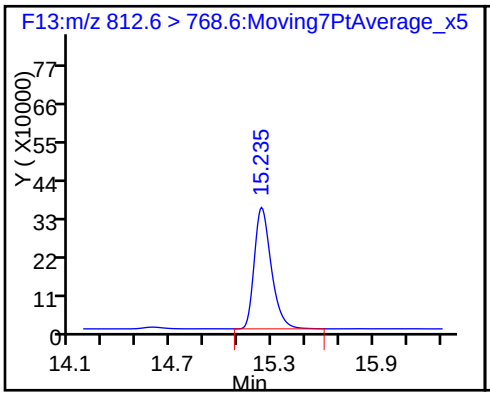

D 33 13C2-PFTeDA



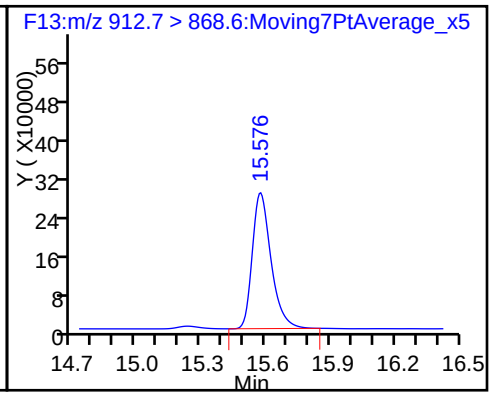

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento  Job No.: 320-18555-1

SDG No.:

Lab Sample ID: CCV 320-109262/25  Calibration Date: 05/07/2016 21:40

Instrument ID: A4  Calib Start Date: 05/07/2016 14:36

GC Column: Acquity  ID: 2.10(mm)  Calib End Date: 05/07/2016 16:43

Lab File ID: 07MAY2016B4A_025.d  Conc. Units: ng/mL

| ANALYTE | CURVE TYPE | AVE RRF | RRF | MIN RRF | CALC AMOUNT | SPIKE AMOUNT | %D | MAX %D |
|---|---|---|---|---|---|---|---|---|
| Perfluorobutanoic acid (PFBA) | AveID | 0.6541 | 0.6792 | | 51.9 | 50.0 | 3.8 | 25.0 |
| Perfluoropentanoic acid (PFPeA) | AveID | 0.4587 | 0.5036 | | 54.9 | 50.0 | 9.8 | 25.0 |
| Perfluorobutanesulfonic acid (PFBS) | AveID | 0.6294 | 0.6227 | | 43.7 | 44.2 | -1.1 | 25.0 |
| Perfluorohexanoic acid (PFHxA) | AveID | 0.4702 | 0.4705 | | 50.0 | 50.0 | 0.0 | 25.0 |
| Perfluoroheptanoic acid (PFHpA) | L2ID | | 0.5024 | | 49.4 | 50.0 | -1.1 | 25.0 |
| Perfluorohexanesulfonic acid (PFHxS) | AveID | 1.458 | 1.353 | | 43.9 | 47.3 | -7.2 | 25.0 |
| Perfluoroheptanesulfonic Acid (PFHpS) | AveID | 9.567 | 6.218 | | 30.9 | 47.6 | -35.0* | 25.0 |
| Perfluorooctanoic acid (PFOA) | AveID | 0.4086 | 0.4518 | | 55.3 | 50.0 | 10.6 | 25.0 |
| Perfluorooctanesulfonic acid (PFOS) | AveID | 13.52 | 10.96 | | 38.7 | 47.8 | -19.0 | 25.0 |
| Perfluorononanoic acid (PFNA) | L2ID | | 1.339 | | 51.6 | 50.0 | 3.1 | 25.0 |
| Perfluorodecanoic acid (PFDA) | AveID | 1.174 | 1.227 | | 52.3 | 50.0 | 4.5 | 25.0 |
| Perfluorooctane Sulfonamide (FOSA) | AveID | 1.049 | 1.046 | | 49.8 | 50.0 | -0.3 | 25.0 |
| Perfluorodecanesulfonic acid (PFDS) | AveID | 4.962 | 3.108 | | 30.2 | 48.2 | -37.4* | 25.0 |
| Perfluoroundecanoic acid (PFUnA) | AveID | 1.224 | 1.284 | | 52.4 | 50.0 | 4.9 | 25.0 |
| Perfluorododecanoic acid (PFDoA) | AveID | 0.9182 | 0.9862 | | 53.7 | 50.0 | 7.4 | 25.0 |
| Perfluorotridecanoic Acid (PFTriA) | AveID | 1.165 | 1.096 | | 47.1 | 50.0 | -5.9 | 25.0 |
| Perfluorotetradecanoic acid (PFTeA) | AveID | 0.5828 | 0.4923 | | 42.2 | 50.0 | -15.5 | 25.0 |
| Perfluoro-n-hexadecanoic acid (PFHxDA) | AveID | 4.233 | 2.764 | | 32.7 | 50.0 | -34.7* | 25.0 |
| Perfluoro-n-octandecanoic acid (PFODA) | AveID | 2.140 | 1.979 | | 46.2 | 50.0 | -7.5 | 25.0 |

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_025.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 07-May-2016 21:40:08 ALS Bottle#: 14 Worklist Smp#: 25
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:39 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 15:25:01

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.797 | 5.797 | 0.0 | | 3429073 | 47.7 | | 95.3 | 10696 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.800 | 5.799 | 0.001 | 1.000 | 2329058 | 51.9 | | 104 | 6021 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 2474469 | 49.3 | | 98.6 | 6816 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.909 | 6.911 | -0.002 | 1.000 | 1246176 | 54.9 | | 110 | 1239 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 688904 | NC | | | 1436 | |
| 298.8 > 98.6 | 7.024 | 7.026 | -0.002 | 0.999 | 481906 | | 1.43(0.00-0.00) | | 956 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.028 | 7.026 | 0.002 | 1.000 | 688904 | 43.7 | | 98.9 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 3153827 | 45.5 | | 91.0 | 9622 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 1483958 | 50.0 | | 100 | 2030 | |
| 22 PFPeS (Perflouro-1-pentanesulfonat | | | | | | | | | | |
| 348.7 > 79.5 | 8.236 | 8.231 | 0.005 | 0.874 | 1407496 | NC | | | 5159 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.388 | 9.396 | -0.008 | | 2802440 | 47.7 | | 95.4 | 6361 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.396 | 9.396 | 0.0 | 1.000 | 1407925 | 49.4 | | 98.9 | 3035 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.427 | 9.430 | -0.003 | | 1183861 | 47.2 | | 99.7 | 3324 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 1602039 | NC | | | 2536 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 1602039 | 43.9 | | 92.8 | | |
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.509 | 10.511 | -0.002 | | 3127171 | 47.6 | | 95.2 | 7082 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.509 | 10.512 | -0.003 | 1.000 | 1412917 | 55.3 | | 111 | 3103 | |
| 412.8 > 168.7 | 10.509 | 10.512 | -0.003 | 1.000 | 466929 | | 3.03(0.00-0.00) | | 1243 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.509 | 10.515 | -0.006 | 1.000 | 1623132 | 30.9 | | 65.0 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.509 | 10.515 | -0.006 | 1.000 | 1623132 | NC | | | 3685 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.458 | 11.467 | -0.009 | | 262118 | 59.1 | | 124 | 846 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.467 | 11.470 | -0.003 | 1.000 | 2872696 | 38.7 | | 81.0 | 3026 | |
| 498.3 > 98.2 | 11.458 | 11.470 | -0.012 | 0.999 | 1686957 | | 1.70(0.00-0.00) | | 3051 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.478 | 11.489 | -0.011 | | 2746725 | 47.3 | | 94.6 | 6394 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.487 | 11.490 | -0.003 | 1.000 | 3678403 | 51.6 | | 103 | 4690 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.324 | 12.327 | -0.003 | | 3324519 | 43.1 | | 86.3 | 4686 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.324 | 12.327 | -0.003 | 1.000 | 4080207 | 52.3 | | 105 | 4269 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.884 | 12.892 | -0.008 | | 3503067 | 45.8 | | 91.5 | 3268 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.884 | 12.892 | -0.008 | 1.000 | 3663830 | 49.8 | | 99.7 | 2926 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.987 | 12.994 | -0.007 | 1.000 | 821444 | NC | | | 2449 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.987 | 12.994 | -0.007 | 1.000 | 821444 | 30.2 | | 62.6 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.030 | 13.041 | -0.011 | 1.000 | 4429046 | 52.4 | | 105 | 5180 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.030 | 13.044 | -0.014 | | 3449996 | 42.6 | | 85.2 | 5324 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.638 | 13.643 | -0.005 | | 3522783 | 41.9 | | 83.8 | 3071 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.638 | 13.643 | -0.005 | 1.000 | 3474084 | 53.7 | | 107 | 1782 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.150 | 14.160 | -0.010 | 1.000 | 2796923 | 47.1 | | 94.1 | 1669 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.588 | 14.593 | -0.005 | 1.000 | 1256274 | 42.2 | | 84.5 | 830 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.579 | 14.593 | -0.014 | | 2551866 | 47.4 | | 94.7 | 4086 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.234 | 15.244 | -0.010 | | 1016573 | 54.3 | | 109 | 2764 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.234 | 15.244 | -0.010 | 1.000 | 2809866 | 32.7 | | 65.3 | 652 | |
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.575 | 15.580 | -0.005 | 1.000 | 2011892 | 46.2 | | 92.5 | 2454 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

## Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 09-May-2016 15:29:40 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_025.d

Injection Date: 07-May-2016 21:40:08 Instrument ID: A4

Lims ID: CCV L5

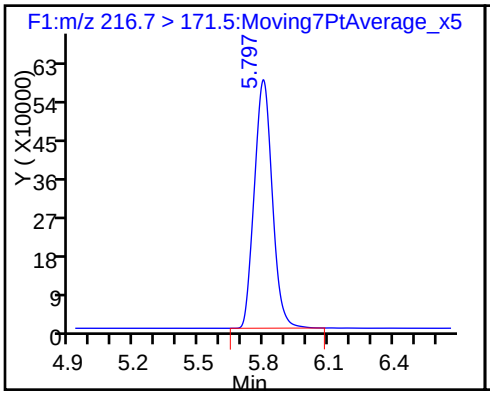
Client ID:

Operator ID: JRB ALS Bottle#: 14 Worklist Smp#: 25

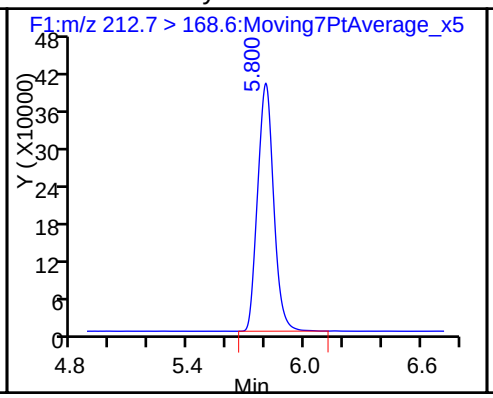
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

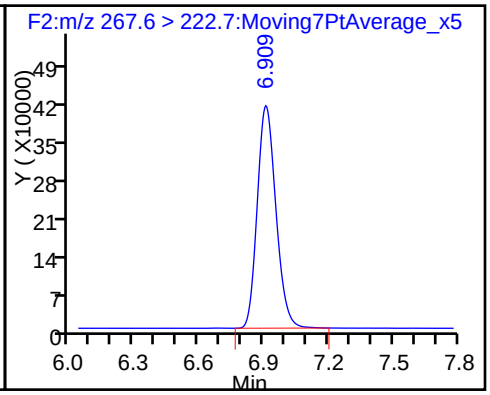
D 1 13C4 PFBA



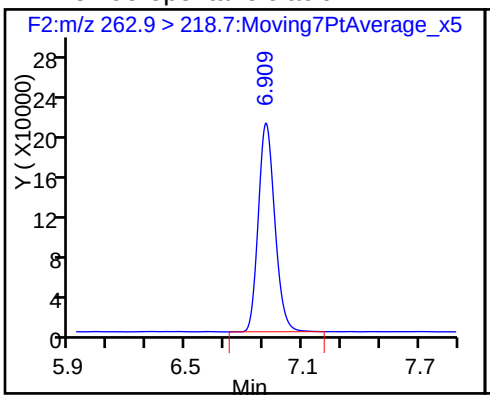

2 Perfluorobutyric acid



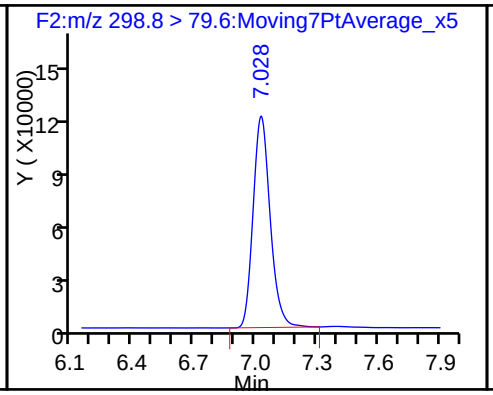

D 3 13C5-PFPeA



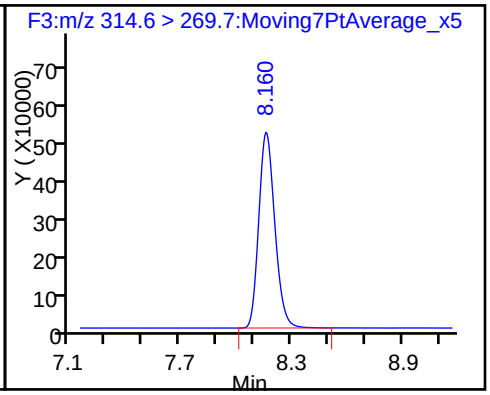

4 Perfluoropentanoic acid



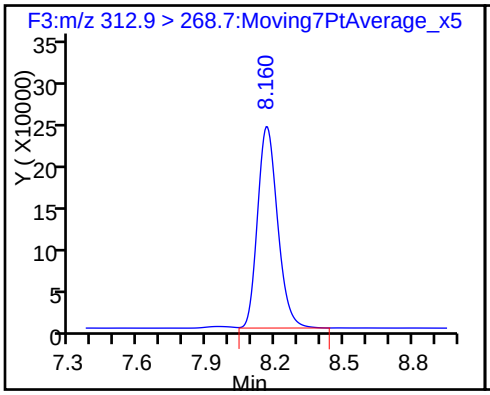

51 Perfluorobutanesulfonic acid



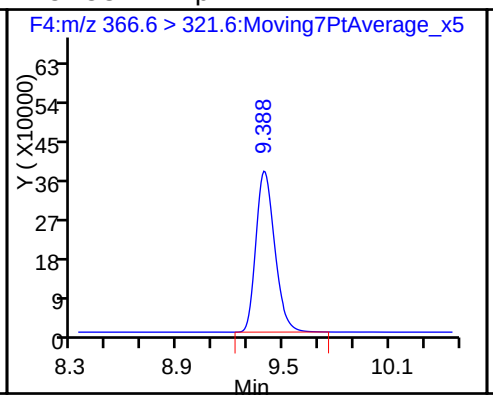

D 6 13C2 PFHxA



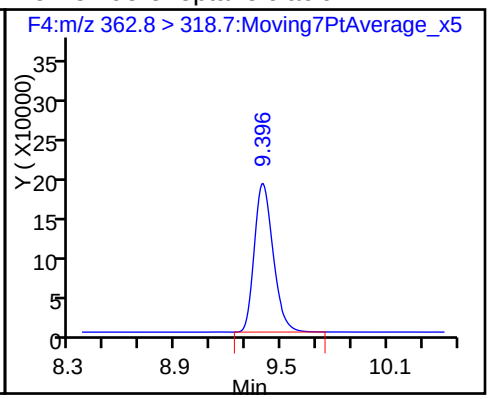

7 Perfluorohexanoic acid



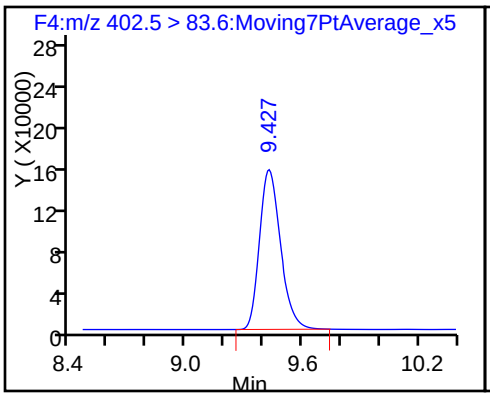

D 8 13C4-PFHpA



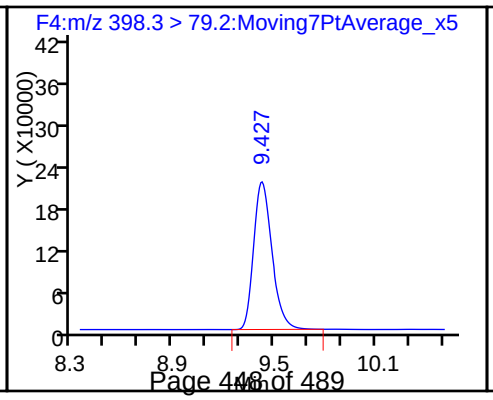

9 Perfluoroheptanoic acid



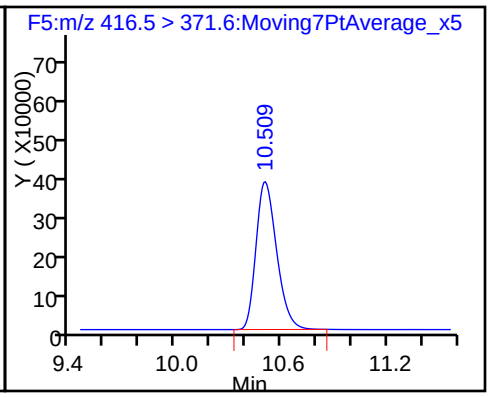

D 11 18O2 PFHxS



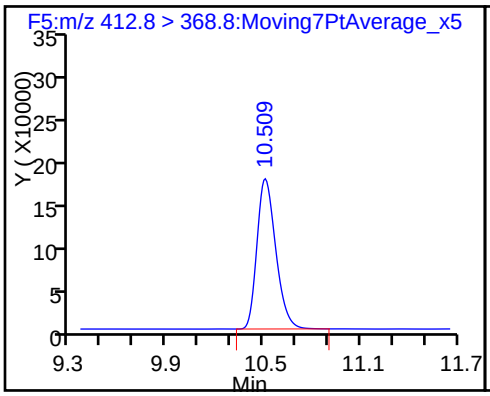

58 Perfluorohexanesulfonic acid



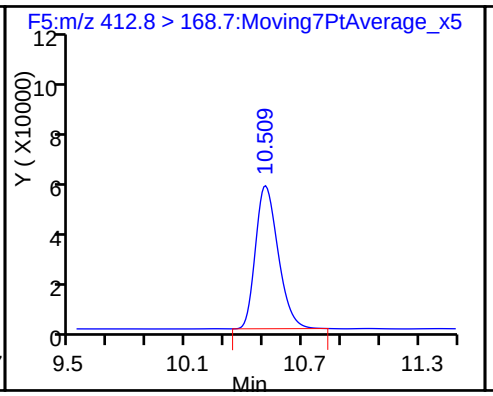

D 12 13C4 PFOA



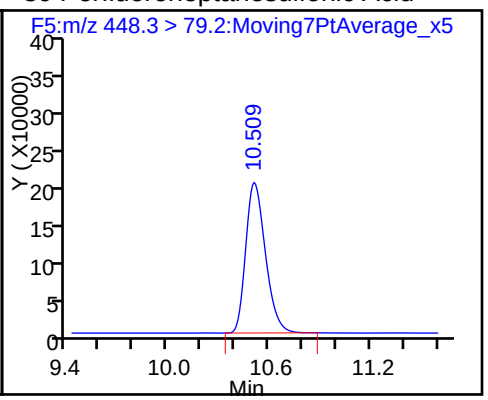
13 Perfluorooctanoic acid



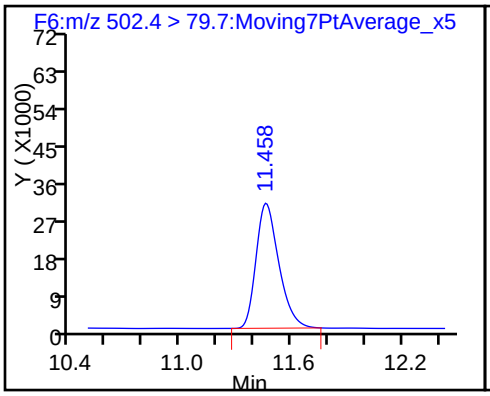

13 Perfluorooctanoic acid



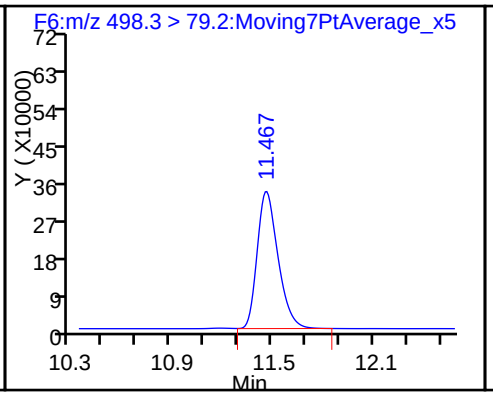

39 Perfluoroheptanesulfonic Acid



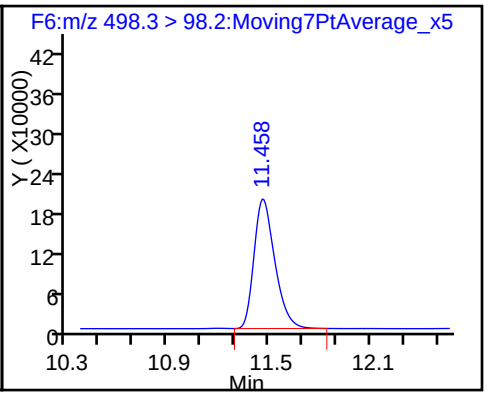

D 16 13C4 PFOS



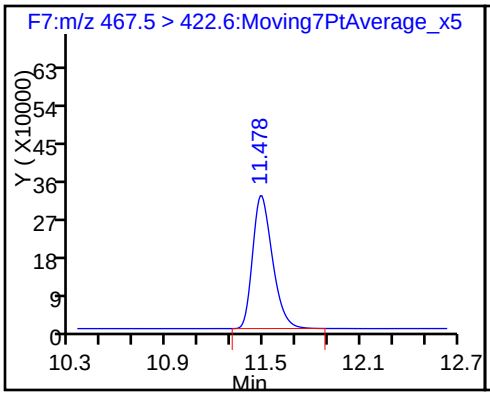

15 Perfluorooctane sulfonic acid



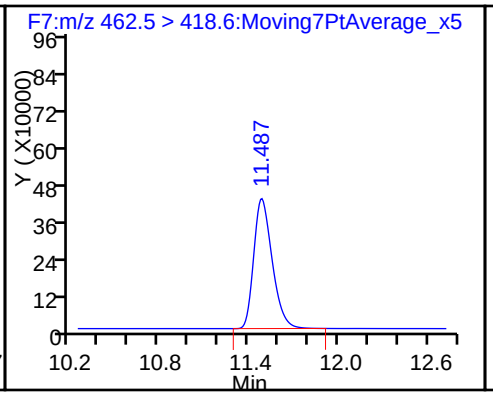

15 Perfluorooctane sulfonic acid



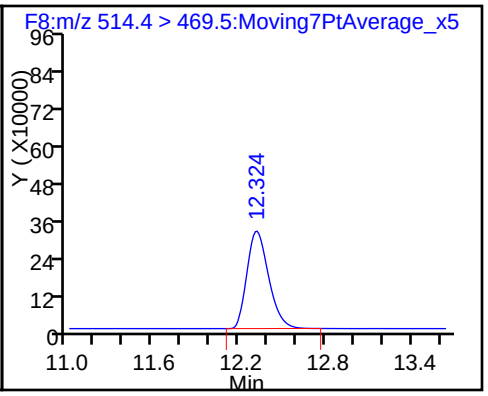

D 17 13C5 PFNA



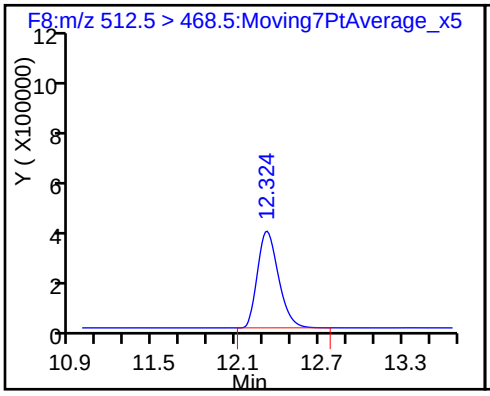

18 Perfluorononanoic acid



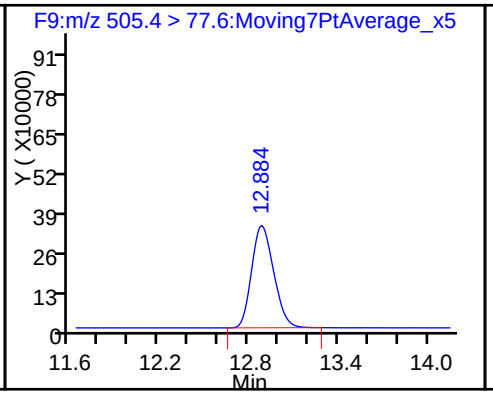

D 19 13C2 PFDA



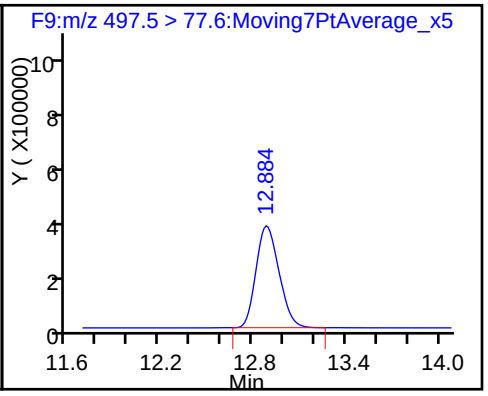

20 Perfluorodecanoic acid



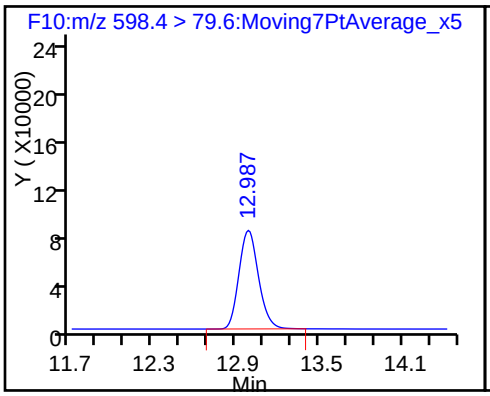

D 23 13C8 FOSA



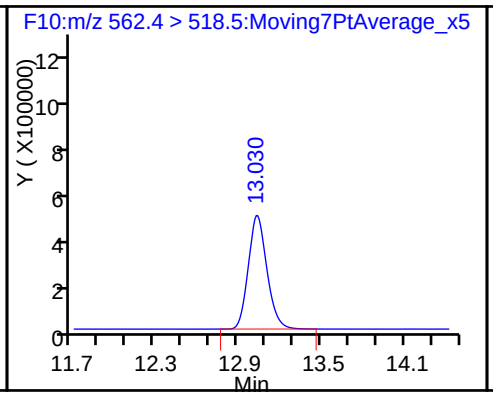

24 Perfluorooctane Sulfonamide



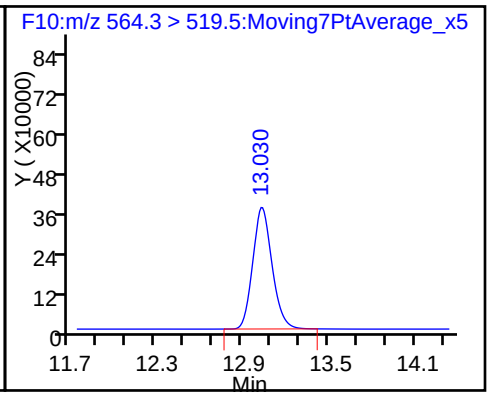
49 Perfluorodecane Sulfonic acid



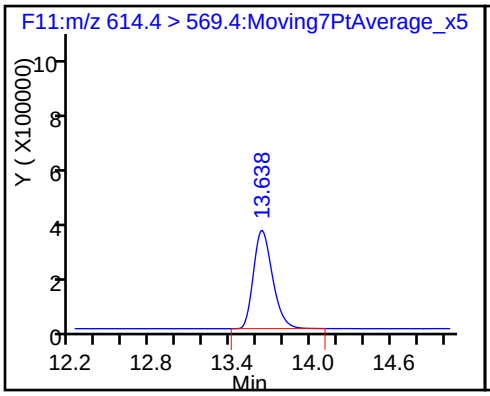

27 Perfluoroundecanoic acid



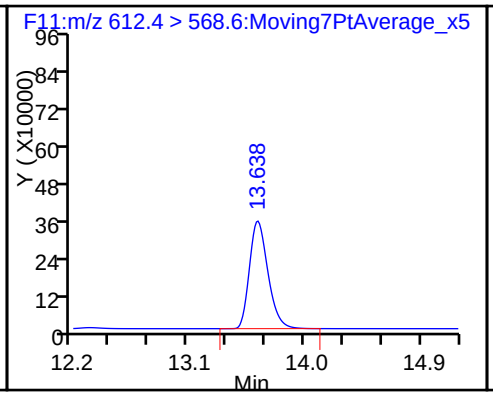

D 26 13C2 PFUnA



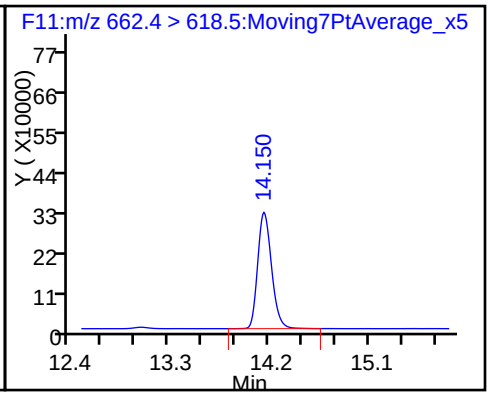

D 28 13C2 PFDoA



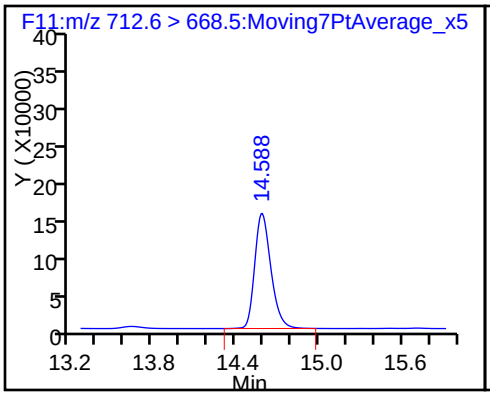

29 Perfluorododecanoic acid



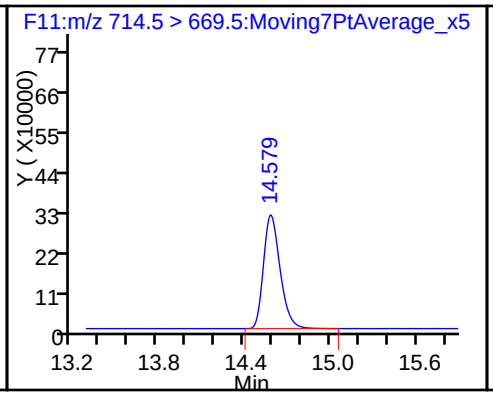

30 Perfluorotridecanoic acid



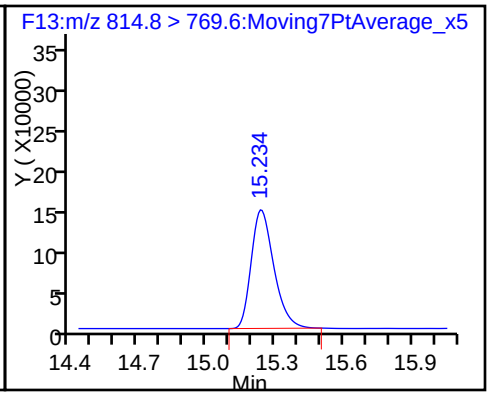

32 Perfluorotetradecanoic acid



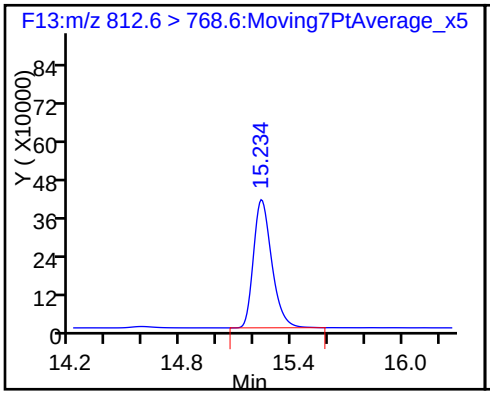

D 33 13C2-PFTeDA



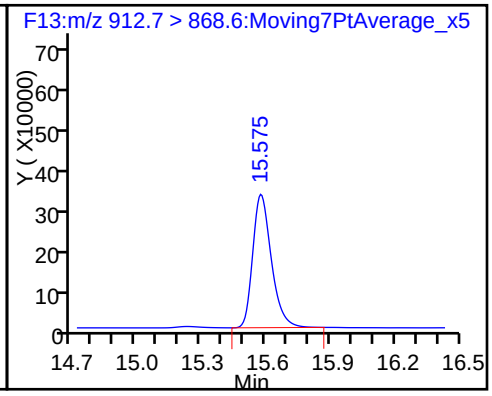

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18555-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-108614/1-A

Matrix: Water | Lab File ID: 07MAY2016B4A_015.d

Analysis Method: WS-LC-0025 | Date Collected:

Extraction Method: 3535 | Date Extracted: 05/03/2016 12:39

Sample wt/vol: 500(mL) | Date Analyzed: 05/07/2016 18:08

Con. Extract Vol.: 1.0(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 109262 | Units: ng/L

| CAS NO. | COMPOUND NAME | RESULT | Q | LOQ | LOD | DL |
|---|---|---|---|---|---|---|
| 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | 2.0 | U | 2.5 | 2.0 | 0.92 |
| 375-85-9 | Perfluoroheptanoic acid (PFHpA) | 2.0 | U | 2.5 | 2.0 | 0.80 |
| 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | 2.0 | U | 2.5 | 2.0 | 0.87 |
| 375-95-1 | Perfluorononanoic acid (PFNA) | 2.0 | U M | 2.5 | 2.0 | 0.65 |
| 1763-23-1 | Perfluorooctanesulfonic acid (PFOS) | 3.0 | U | 4.0 | 3.0 | 1.3 |
| 335-67-1 | Perfluorooctanoic acid (PFOA) | 2.0 | U | 2.5 | 2.0 | 0.75 |

| CAS NO. | ISOTOPE DILUTION | %REC | Q | LIMITS |
|---|---|---|---|---|
| STL00993 | 13C2 PFHxA | 124 | | 25-150 |
| STL00990 | 13C4 PFOA | 136 | | 25-150 |
| STL00991 | 13C4 PFOS | 127 | | 25-150 |
| STL01892 | 13C4-PFHpA | 124 | | 25-150 |
| STL00995 | 13C5 PFNA | 128 | | 25-150 |
| STL00994 | 18O2 PFHxS | 129 | | 25-150 |

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_015.d
Lims ID: MB 320-108614/1-A
Client ID:
Sample Type: MB
Inject. Date: 07-May-2016 18:08:20 ALS Bottle#: 25 Worklist Smp#: 15
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-108614/1-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:55 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 14:33:13

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.797 | 5.797 | 0.0 | | 4403881 | 61.2 | | 122 | 10189 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.797 | 5.799 | -0.002 | 1.000 | 7090 | 0.1231 | | | 26.8 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 3117587 | 62.1 | | 124 | 7025 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.909 | 6.911 | -0.002 | 1.000 | 7809 | 0.2730 | | | 6.0 | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 4309353 | 62.2 | | 124 | 11303 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.155 | 8.162 | -0.007 | 1.000 | 12914 | 0.3187 | | | 55.7 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.388 | 9.396 | -0.008 | | 3654382 | 62.2 | | 124 | 7212 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.419 | 9.430 | -0.011 | | 1532777 | 61.1 | | 129 | 4687 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 10287 | NC | | | 26.9 | |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 10287 | 0.2178 | | | | |
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.509 | 10.511 | -0.002 | | 4455145 | 67.8 | | 136 | 7771 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.509 | 10.515 | -0.006 | 1.000 | 3752 | 0.0697 | | | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.509 | 10.515 | -0.006 | 1.000 | 3752 | NC | | | 19.7 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.458 | 11.467 | -0.009 | | 268822 | 60.6 | | 127 | 953 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | |
| 498.3 > 79.2 | 11.467 | 11.470 | -0.003 | 1.000 | 10004 | 0.1315 | | | 59.2 | |
| 498.3 > 98.2 | 11.467 | 11.470 | -0.003 | 1.000 | 7598 | | 1.32(0.00-0.00) | | 24.4 | |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.487 | 11.489 | -0.002 | | 3728577 | 64.2 | | 128 | 7488 | |
| 18 Perfluorononanoic acid | | | | | | | | | | M |
| 462.5 > 418.6 | 11.487 | 11.490 | -0.003 | 1.000 | 9803 | 0.1231 | | | 22.9 | M |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.324 | 12.327 | -0.003 | | 5213896 | 67.6 | | 135 | 6119 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.324 | 12.327 | -0.003 | 1.000 | 17240 | 0.1408 | | | 80.6 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.884 | 12.892 | -0.008 | | 161537 | 2.11 | | 4.2 | 494 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.884 | 12.892 | -0.008 | 1.000 | 36175 | 10.7 | | | 102 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.987 | 12.994 | -0.007 | 1.000 | 5901 | NC | | | 19.4 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.987 | 12.994 | -0.007 | 1.000 | 5901 | 0.2115 | | | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.030 | 13.041 | -0.011 | 1.000 | 35052 | 0.2658 | | | 71.7 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.030 | 13.044 | -0.014 | | 5385072 | 66.5 | | 133 | 5335 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.638 | 13.643 | -0.005 | | 5416769 | 64.4 | | 129 | 4976 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.638 | 13.643 | -0.005 | 1.000 | 26718 | 0.2686 | | | 15.8 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.150 | 14.160 | -0.010 | 1.000 | 22812 | 0.3407 | | | 13.0 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.579 | 14.593 | -0.014 | 1.000 | 21126 | 0.6305 | | | 14.1 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.588 | 14.593 | -0.005 | | 2874683 | 53.4 | | 107 | 3738 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.234 | 15.244 | -0.010 | | 990397 | 52.9 | | 106 | 2760 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.234 | 15.244 | -0.010 | 1.000 | 85458 | 1.02 | | | 24.3 | |
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.575 | 15.580 | -0.005 | 1.000 | 53693 | 1.27 | | | 119 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 09-May-2016 15:29:58 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_015.d

Injection Date: 07-May-2016 18:08:20 Instrument ID: A4

Lims ID: MB 320-108614/1-A

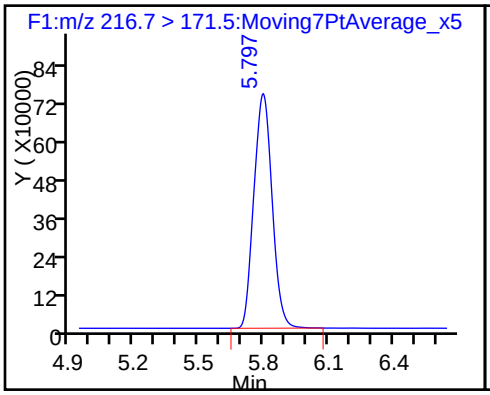
Client ID:

Operator ID: JRB ALS Bottle#: 25 Worklist Smp#: 15

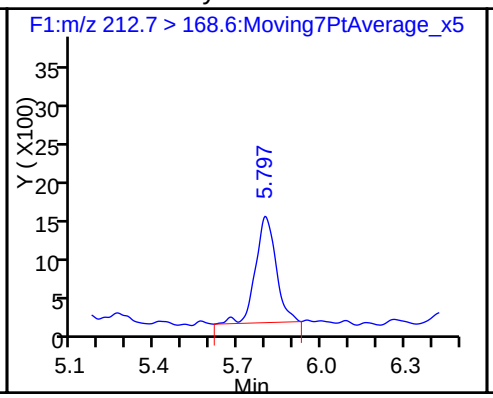
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

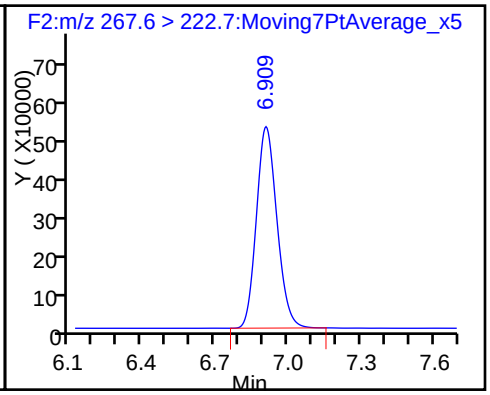
D 1 13C4 PFBA



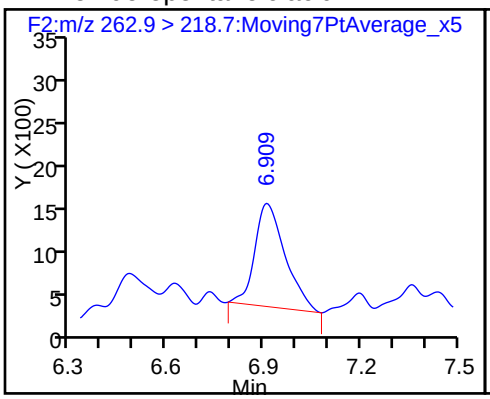

2 Perfluorobutyric acid



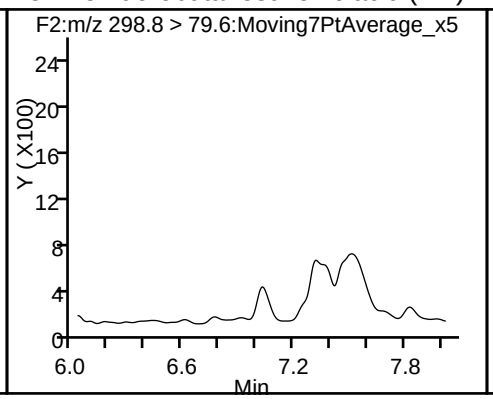

D 3 13C5-PFPeA



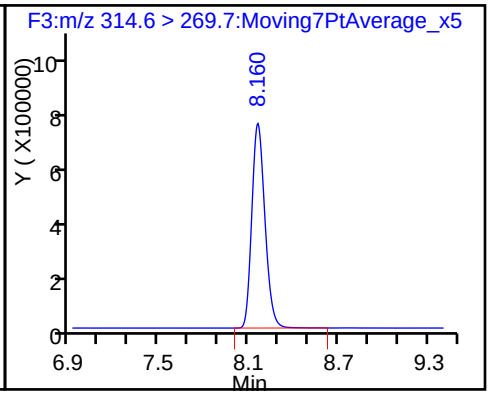

4 Perfluoropentanoic acid



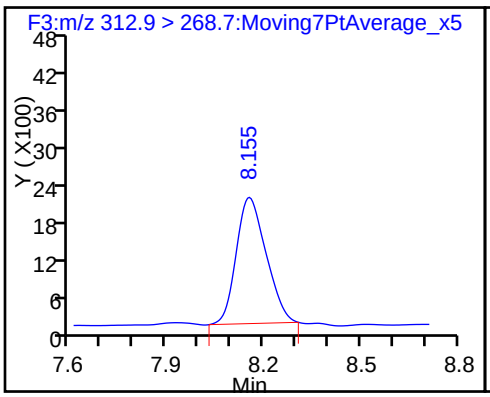

51 Perfluorobutanesulfonic acid (ND)



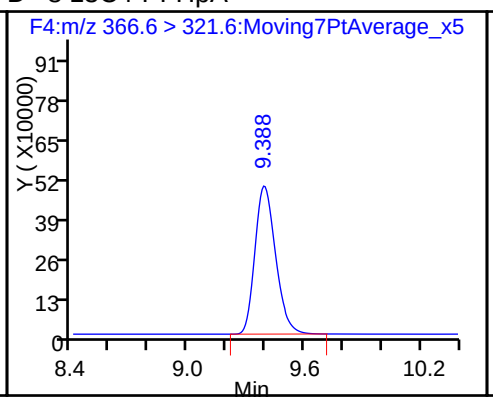

D 6 13C2 PFHxA



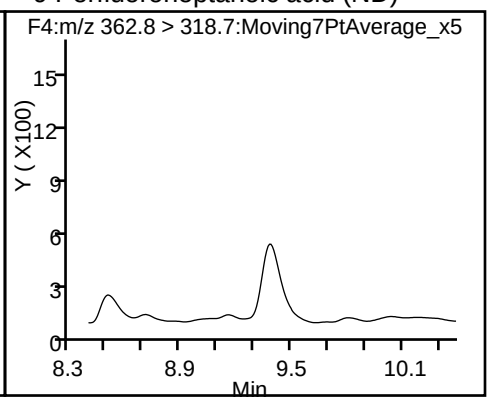

7 Perfluorohexanoic acid



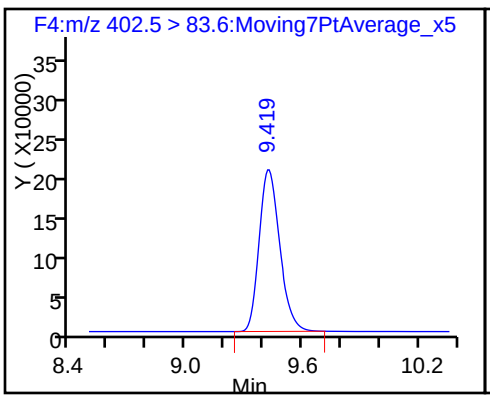

D 8 13C4-PFHpA



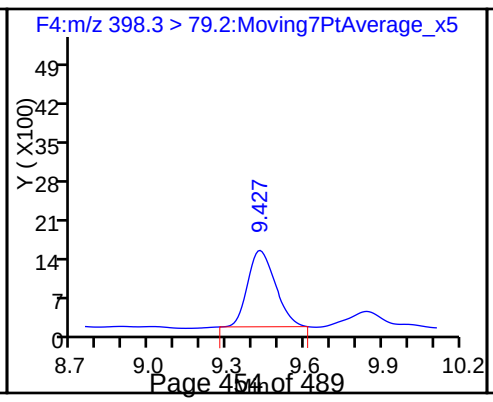

9 Perfluoroheptanoic acid (ND)



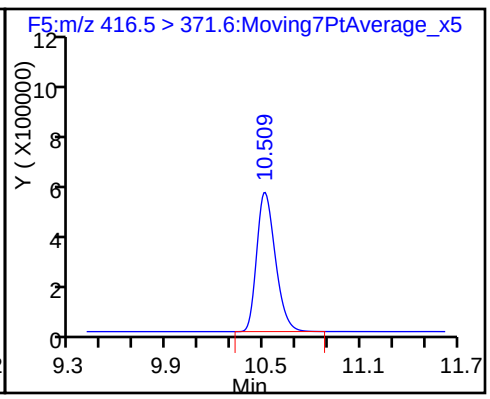

D 11 18O2 PFHxS



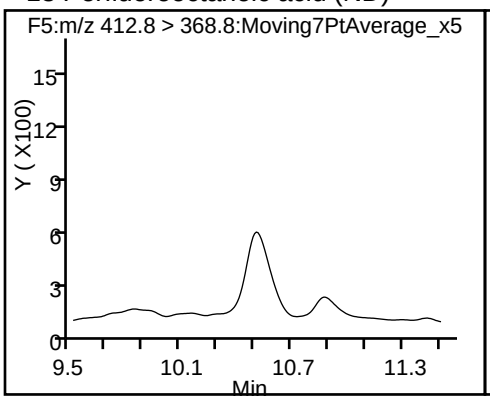

58 Perfluorohexanesulfonic acid



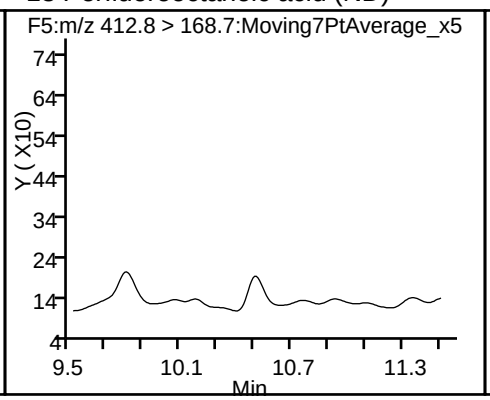

D 12 13C4 PFOA



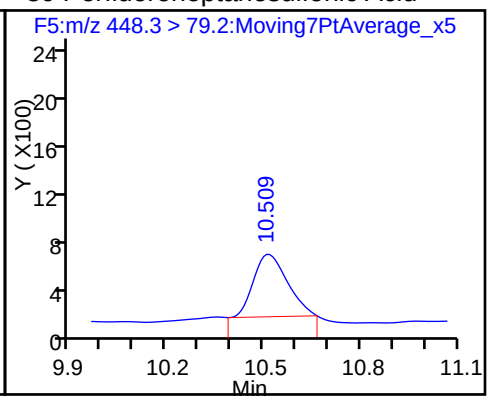
13 Perfluorooctanoic acid (ND)



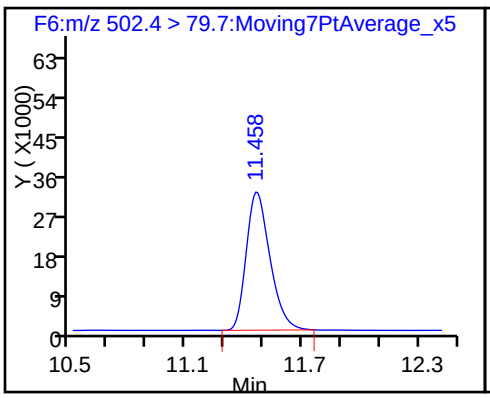

13 Perfluorooctanoic acid (ND)



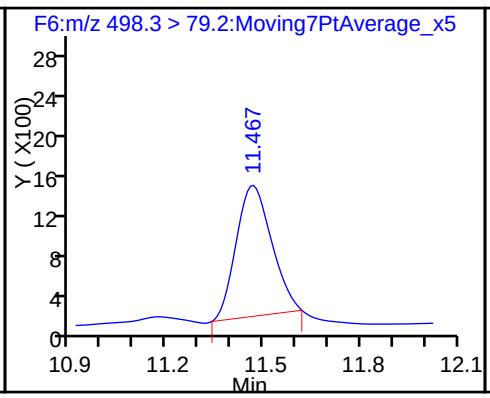

39 Perfluoroheptanesulfonic Acid



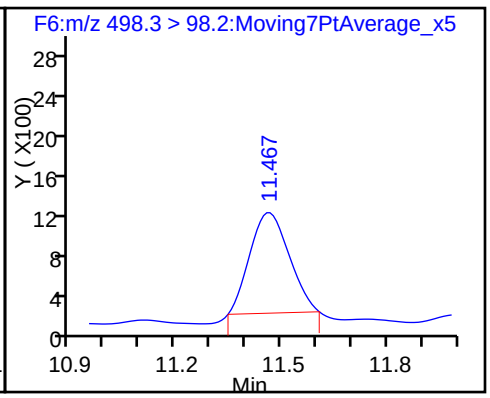

D 16 13C4 PFOS



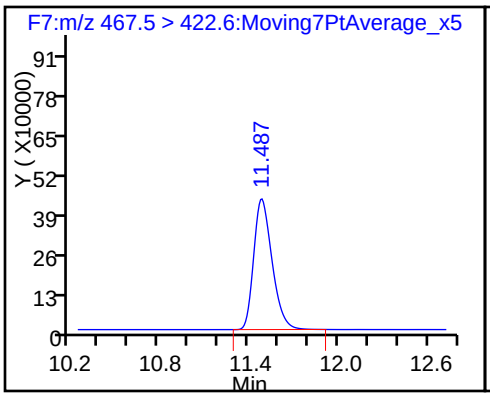

15 Perfluorooctane sulfonic acid



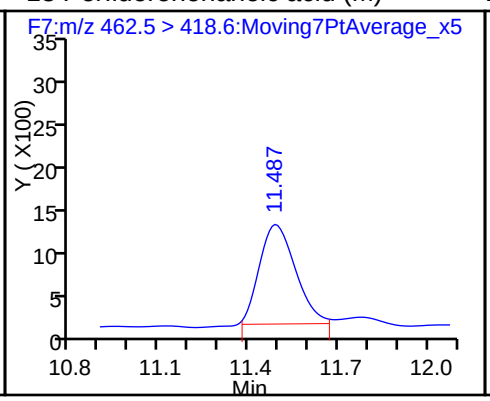

15 Perfluorooctane sulfonic acid



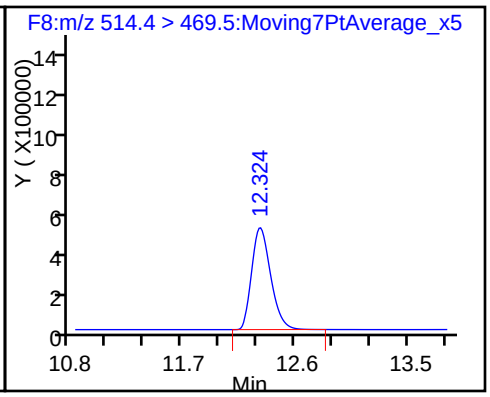

D 17 13C5 PFNA



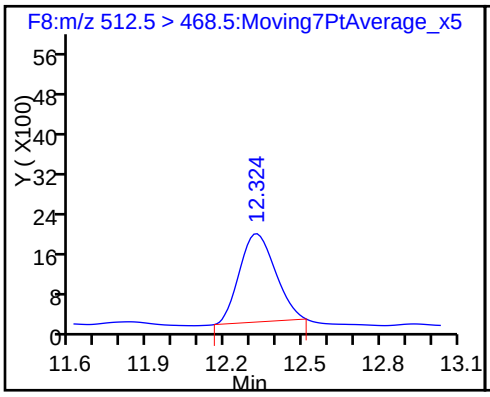

18 Perfluorononanoic acid (M)



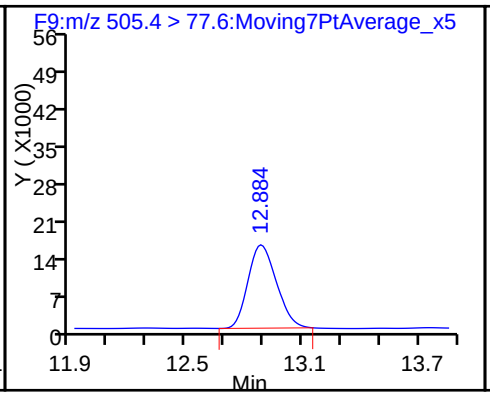

D 19 13C2 PFDA



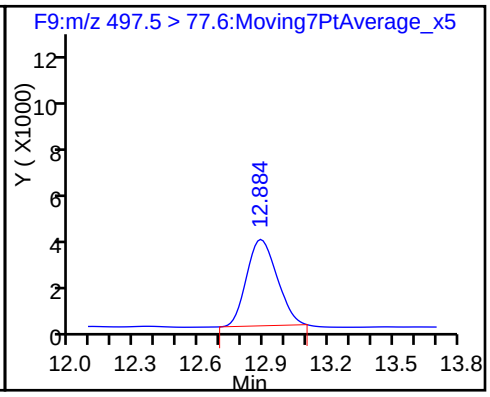

20 Perfluorodecanoic acid



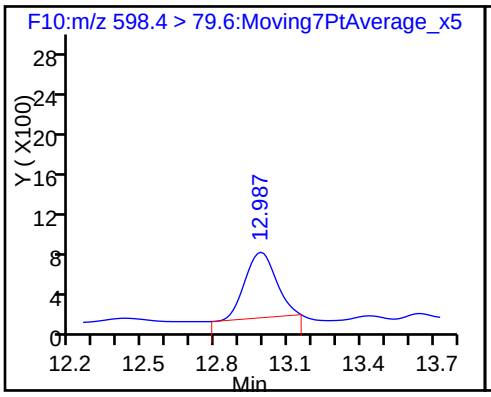

D 23 13C8 FOSA



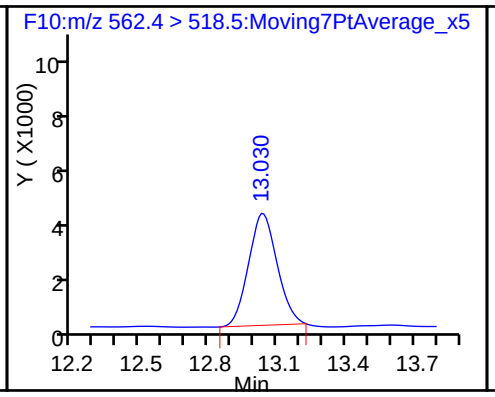

24 Perfluorooctane Sulfonamide



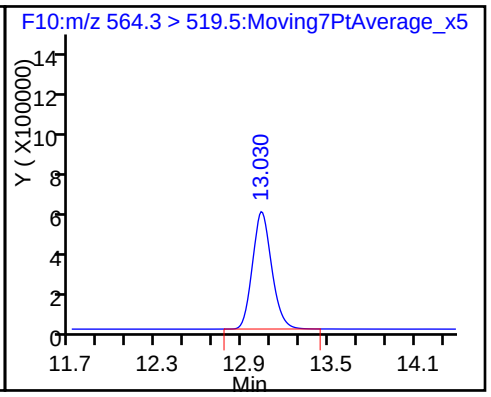
49 Perfluorodecane Sulfonic acid



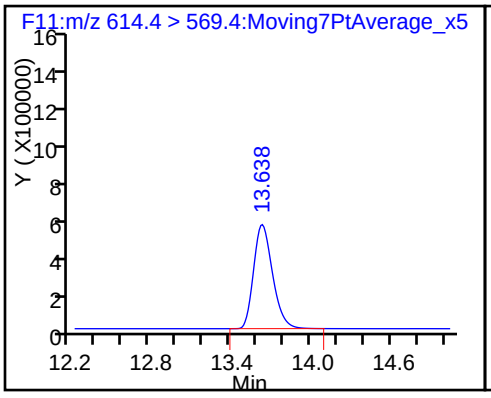

27 Perfluoroundecanoic acid



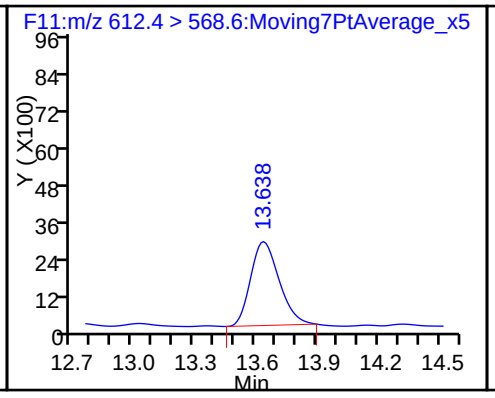

D 26 13C2 PFUnA



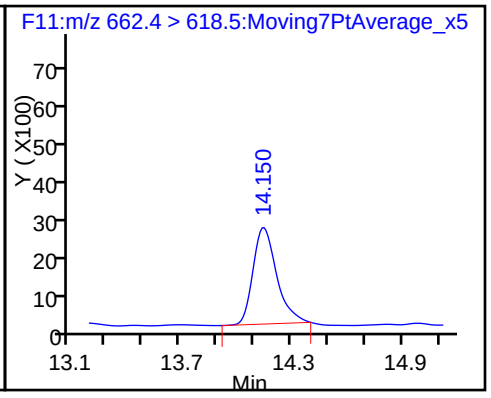

D 28 13C2 PFDoA



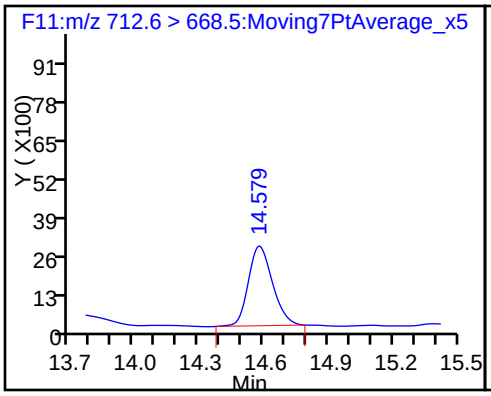

29 Perfluorododecanoic acid



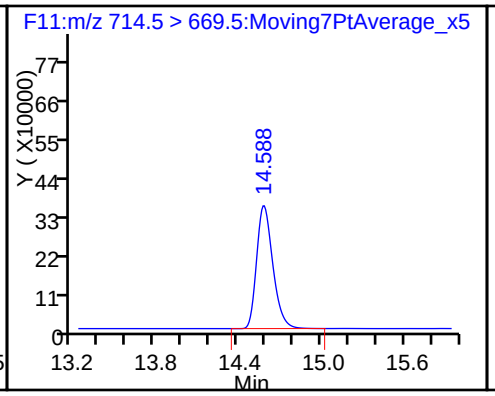

30 Perfluorotridecanoic acid



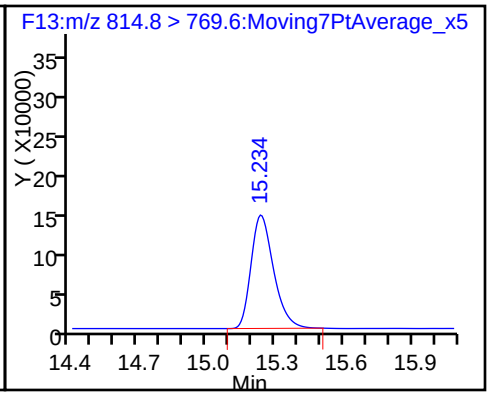

32 Perfluorotetradecanoic acid



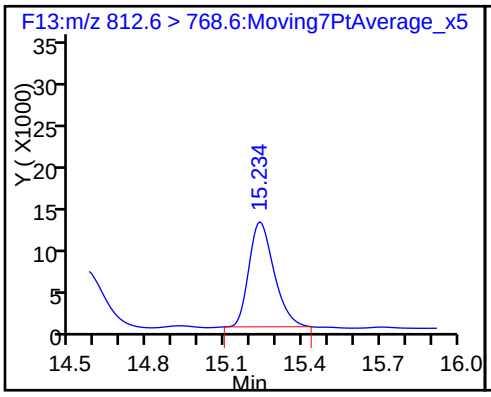

D 33 13C2-PFTeDA



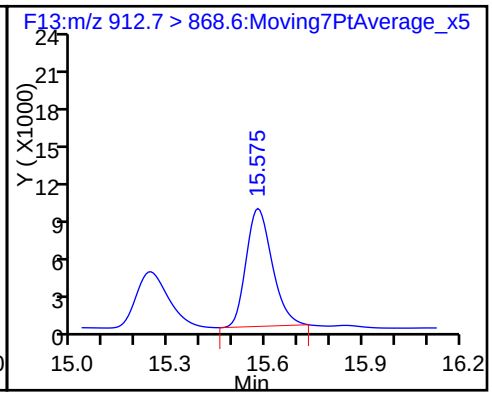

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

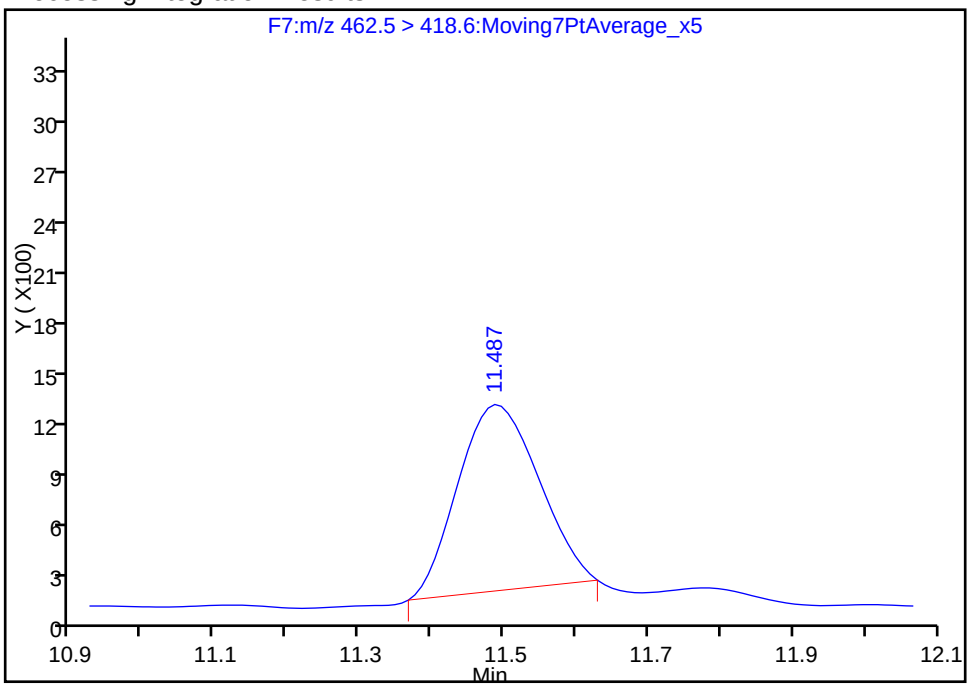
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_015.d
Injection Date: 07-May-2016 18:08:20 Instrument ID: A4
Lims ID: MB 320-108614/1-A
Client ID:
Operator ID: JRB ALS Bottle#: 25 Worklist Smp#: 15
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F7:MRM

## 18 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

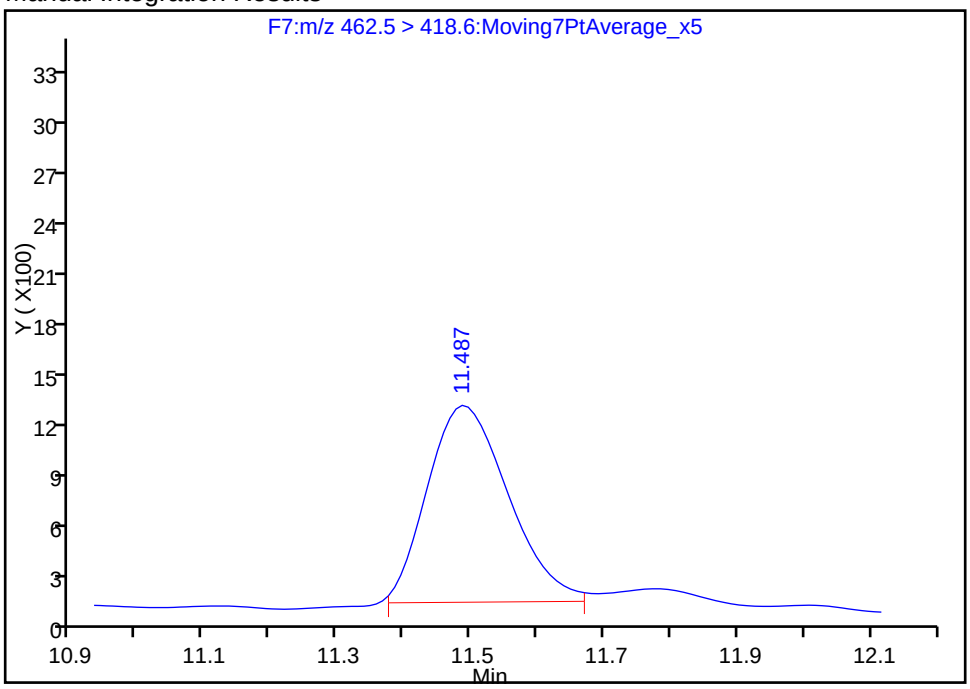
Processing Integration Results

RT: 11.49
Area: 8584
Amount: 0.110548
Amount Units: ng/ml




Manual Integration Results

RT: 11.49
Area: 9803
Amount: 0.123128
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:33:13
Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18555-1

SDG No.:

Client Sample ID: | Lab Sample ID: LCS 320-108614/2-A

Matrix: Water | Lab File ID: 07MAY2016B4A_016.d

Analysis Method: WS-LC-0025 | Date Collected:

Extraction Method: 3535 | Date Extracted: 05/03/2016 12:39

Sample wt/vol: 500(mL) | Date Analyzed: 05/07/2016 18:29

Con. Extract Vol.: 1.0(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 109262 | Units: ng/L

| CAS NO. | COMPOUND NAME | RESULT | Q | LOQ | LOD | DL |
|---|---|---|---|---|---|---|
| 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | 27.7 | | 2.5 | 2.0 | 0.92 |
| 375-85-9 | Perfluoroheptanoic acid (PFHpA) | 30.2 | | 2.5 | 2.0 | 0.80 |
| 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | 31.0 | M | 2.5 | 2.0 | 0.87 |
| 375-95-1 | Perfluorononanoic acid (PFNA) | 31.6 | | 2.5 | 2.0 | 0.65 |
| 1763-23-1 | Perfluorooctanesulfonic acid (PFOS) | 37.0 | M | 4.0 | 3.0 | 1.3 |
| 335-67-1 | Perfluorooctanoic acid (PFOA) | 33.4 | | 2.5 | 2.0 | 0.75 |

| CAS NO. | ISOTOPE DILUTION | %REC | Q | LIMITS |
|---|---|---|---|---|
| STL00993 | 13C2 PFHxA | 122 | | 25-150 |
| STL00990 | 13C4 PFOA | 121 | | 25-150 |
| STL00991 | 13C4 PFOS | 116 | | 25-150 |
| STL01892 | 13C4-PFHpA | 123 | | 25-150 |
| STL00995 | 13C5 PFNA | 119 | | 25-150 |
| STL00994 | 18O2 PFHxS | 123 | | 25-150 |

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_016.d
Lims ID: LCS 320-108614/2-A
Client ID:
Sample Type: LCS
Inject. Date: 07-May-2016 18:29:30 ALS Bottle#: 26 Worklist Smp#: 16
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: lcs 320-108614/2-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:55 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 14:43:18

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.800 | 5.797 | 0.003 | | 4293108 | 59.7 | | 119 | 12825 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.797 | 5.799 | -0.002 | 1.000 | 859490 | 15.3 | | 76.5 | 2885 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 3027765 | 60.3 | | 121 | 7008 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.909 | 6.911 | -0.002 | 1.000 | 414799 | 14.9 | | 74.7 | 302 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 268324 | NC | | | 812 | |
| 298.8 > 98.6 | 7.024 | 7.026 | -0.002 | 1.000 | 190778 | | 1.41(0.00-0.00) | | 531 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 268324 | 13.8 | | 78.3 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 4236968 | 61.1 | | 122 | 9452 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 561161 | 14.1 | | 70.4 | 1539 | |
| 22 PFPeS (Perflouro-1-pentanesulfonat | | | | | | | | | | |
| 348.7 > 79.5 | 8.231 | 8.231 | 0.0 | 0.873 | 6941 | NC | | | 57.0 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.388 | 9.396 | -0.008 | | 3611202 | 61.5 | | 123 | 7141 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.388 | 9.396 | -0.008 | 1.000 | 554975 | 15.1 | | 75.5 | 1847 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.427 | 9.430 | -0.003 | | 1456386 | 58.0 | | 123 | 4135 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | M |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 694919 | NC | | | 901 | M |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | M |
| 398.3 > 79.2 | 9.427 | 9.431 | -0.004 | 1.000 | 694919 | 15.5 | | 85.1 | | M |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.508 | 10.511 | -0.003 | | 3980727 | 60.6 | | 121 | 4855 | |
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.508 | 10.512 | -0.004 | 1.000 | 543366 | 16.7 | | 83.5 | 1508 | |
| 412.8 > 168.7 | 10.508 | 10.512 | -0.004 | 1.000 | 163654 | | 3.32(0.00-0.00) | | 666 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.508 | 10.515 | -0.007 | 1.000 | 735954 | 15.0 | | 78.5 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.508 | 10.515 | -0.007 | 1.000 | 735954 | NC | | | 2700 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.458 | 11.467 | -0.009 | | 245863 | 55.4 | | 116 | 817 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | M |
| 498.3 > 79.2 | 11.458 | 11.470 | -0.012 | 1.000 | 1285816 | 18.5 | | 99.6 | 1956 | M |
| 498.3 > 98.2 | 11.458 | 11.470 | -0.012 | 1.000 | 684086 | | 1.88(0.00-0.00) | | 1516 | M |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.487 | 11.489 | -0.002 | | 3452032 | 59.5 | | 119 | 6457 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.487 | 11.490 | -0.003 | 1.000 | 1417141 | 15.8 | | 79.1 | 2606 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.324 | 12.327 | -0.003 | | 4563984 | 59.2 | | 118 | 5791 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.311 | 12.327 | -0.016 | 1.000 | 1663555 | 15.5 | | 77.6 | 4015 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.884 | 12.892 | -0.008 | | 499165 | 6.52 | | 13.0 | 1391 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.884 | 12.892 | -0.008 | 1.000 | 216405 | 20.7 | | 103 | 594 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.987 | 12.994 | -0.007 | 1.000 | 372014 | NC | | | 1329 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.987 | 12.994 | -0.007 | 1.000 | 372014 | 14.6 | | 75.6 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.030 | 13.041 | -0.011 | 1.000 | 1760511 | 15.5 | | 77.5 | 2005 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.030 | 13.044 | -0.014 | | 4637241 | 57.2 | | 114 | 5568 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.638 | 13.643 | -0.005 | | 4893124 | 58.2 | | 116 | 5351 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.638 | 13.643 | -0.005 | 1.000 | 1426304 | 15.9 | | 79.4 | 772 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.150 | 14.160 | -0.010 | 1.000 | 1165194 | 18.1 | | 90.3 | 854 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.579 | 14.593 | -0.014 | 1.000 | 431451 | 13.4 | | 66.8 | 308 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.579 | 14.593 | -0.014 | | 2769430 | 51.4 | | 103 | 3738 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.234 | 15.244 | -0.010 | | 994189 | 53.1 | | 106 | 2625 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.234 | 15.244 | -0.010 | 1.000 | 991095 | 11.8 | | 58.9 | 281 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.575 | 15.580 | -0.005 | 1.000 | 742543 | 17.4 | | 87.2 | 1368 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 09-May-2016 15:29:59 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_016.d

Injection Date: 07-May-2016 18:29:30 Instrument ID: A4

Lims ID: LCS 320-108614/2-A

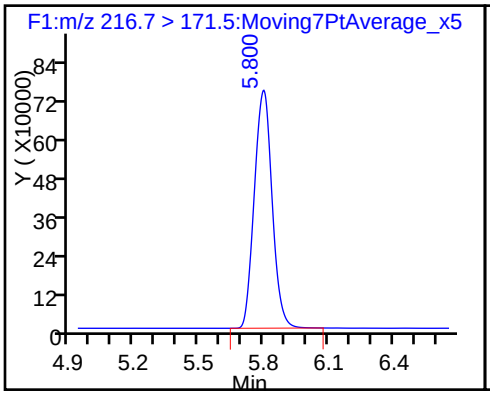
Client ID:

Operator ID: JRB ALS Bottle#: 26 Worklist Smp#: 16

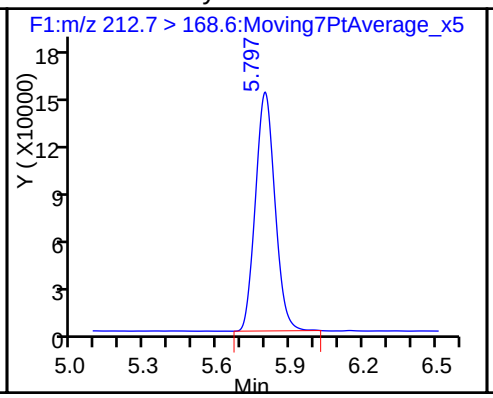
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

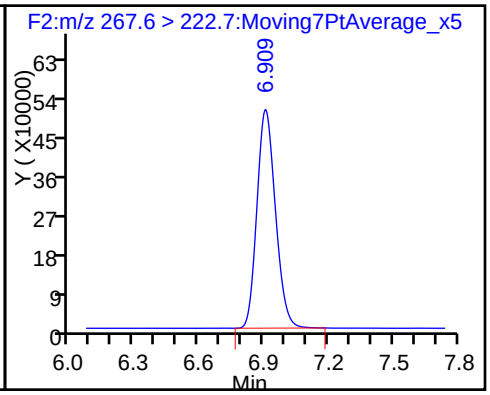
D 1 13C4 PFBA



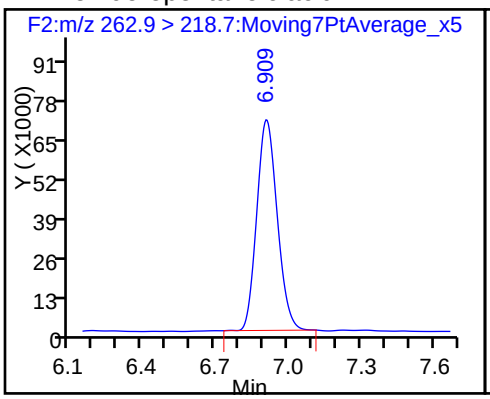

2 Perfluorobutyric acid



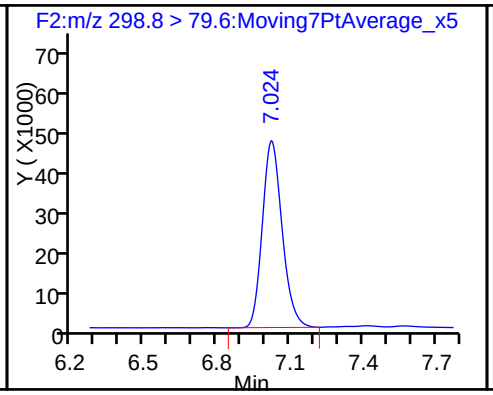

D 3 13C5-PFPeA



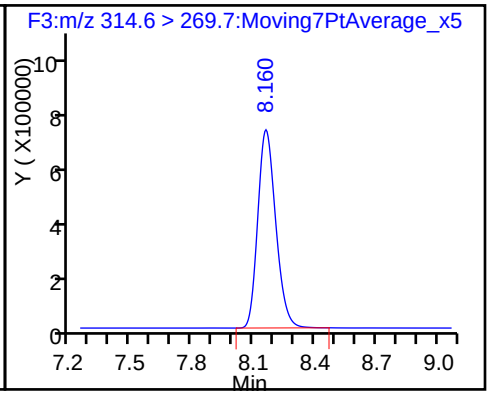

4 Perfluoropentanoic acid



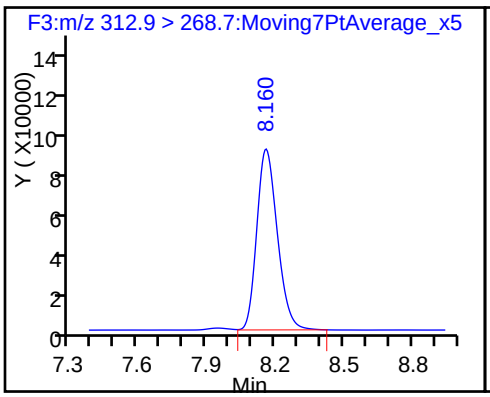

51 Perfluorobutanesulfonic acid



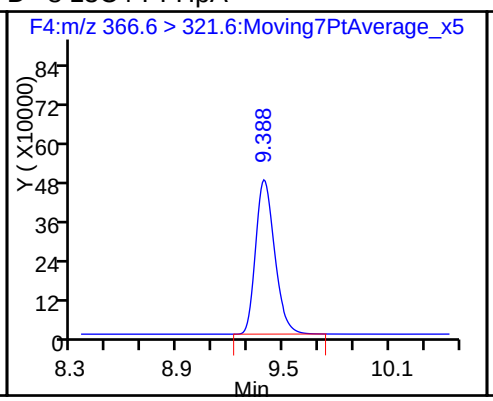

D 6 13C2 PFHxA



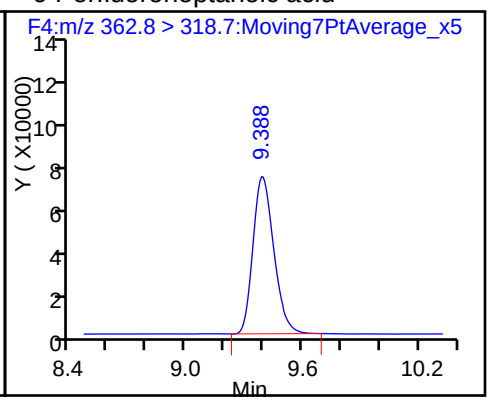

7 Perfluorohexanoic acid



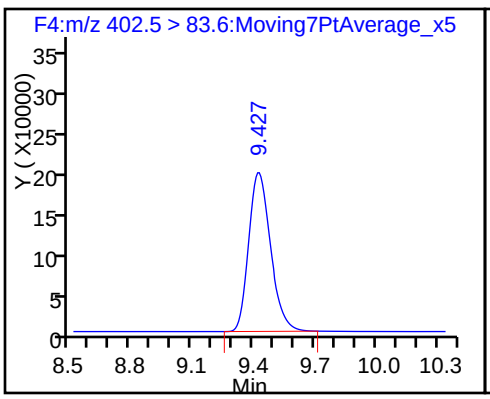

D 8 13C4-PFHpA



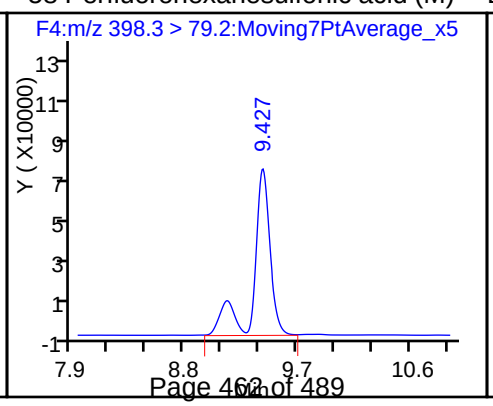

9 Perfluoroheptanoic acid



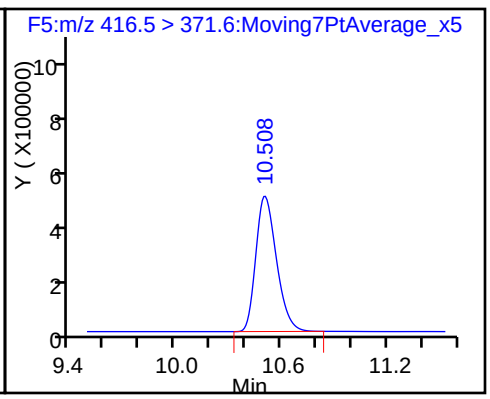

D 11 18O2 PFHxS



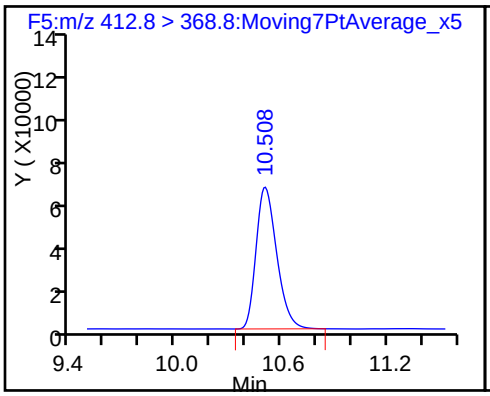

58 Perfluorohexanesulfonic acid (M)



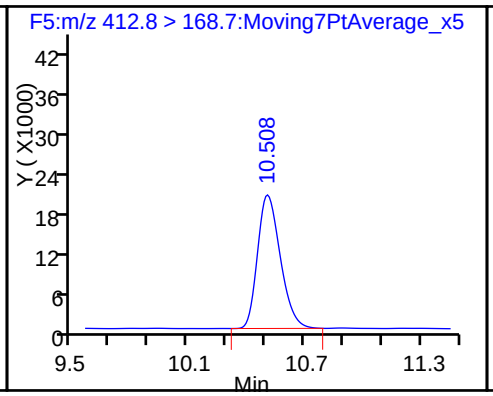

D 12 13C4 PFOA



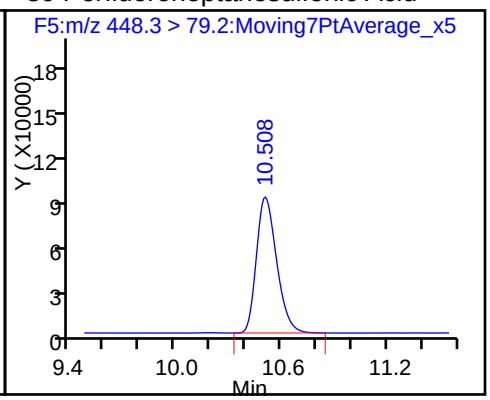
13 Perfluorooctanoic acid



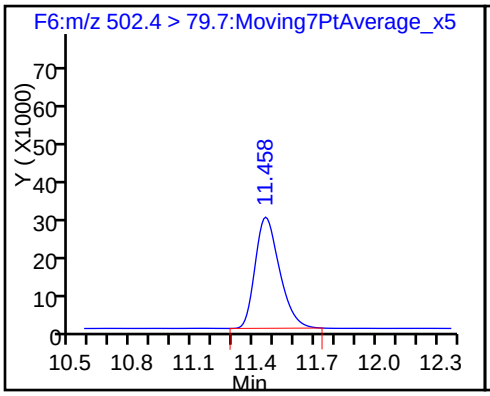

13 Perfluorooctanoic acid



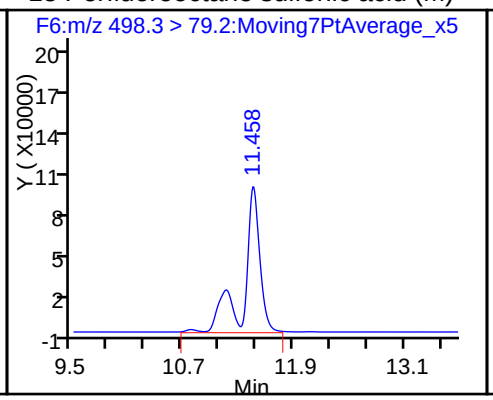

39 Perfluoroheptanesulfonic Acid



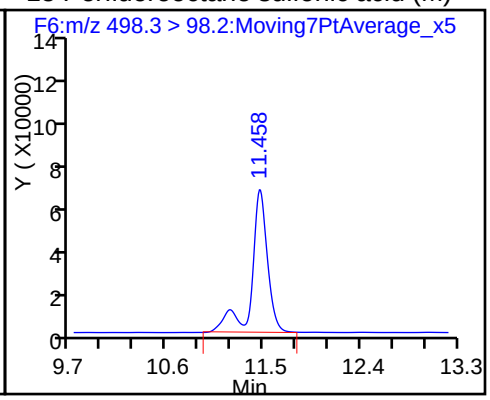

D 16 13C4 PFOS



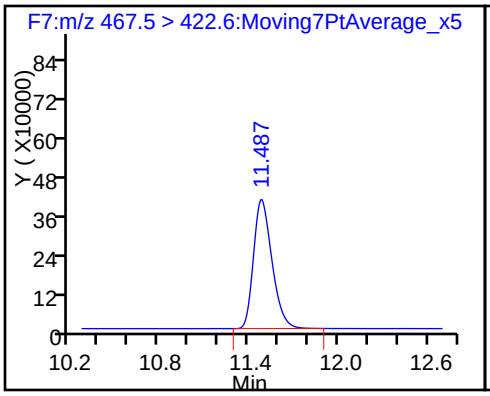

15 Perfluorooctane sulfonic acid (M)



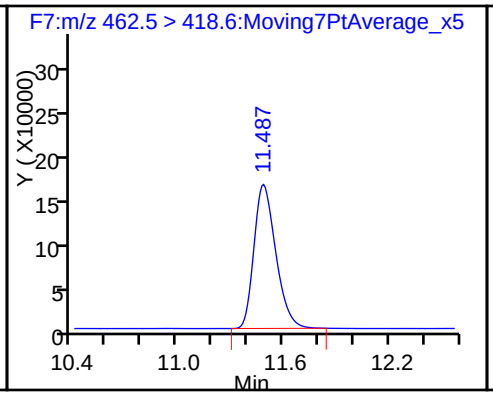

15 Perfluorooctane sulfonic acid (M)



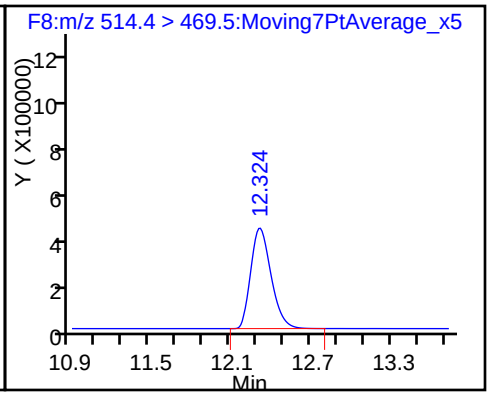

D 17 13C5 PFNA



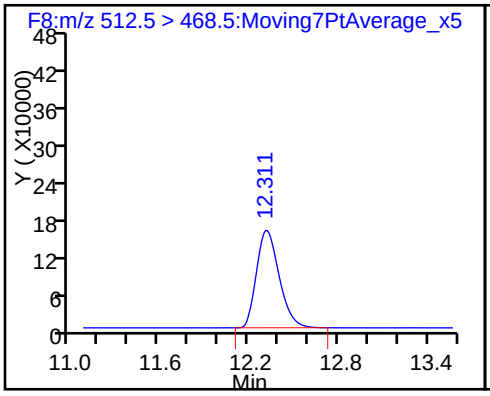

18 Perfluorononanoic acid



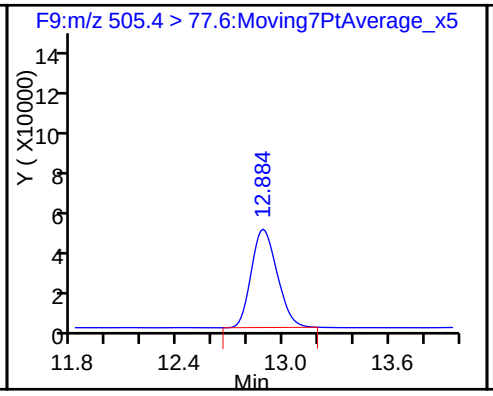

D 19 13C2 PFDA



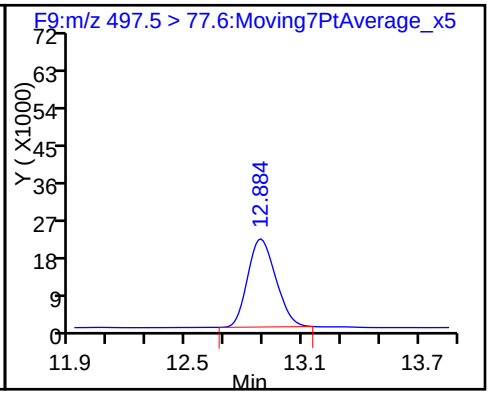

20 Perfluorodecanoic acid



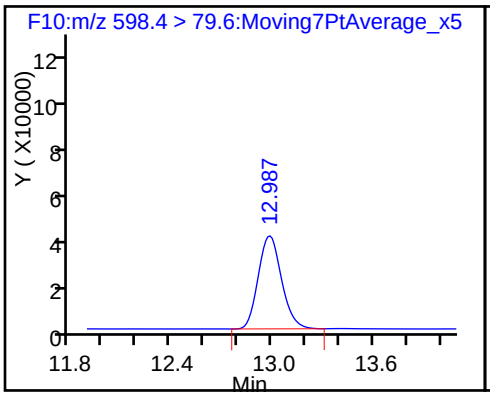

D 23 13C8 FOSA



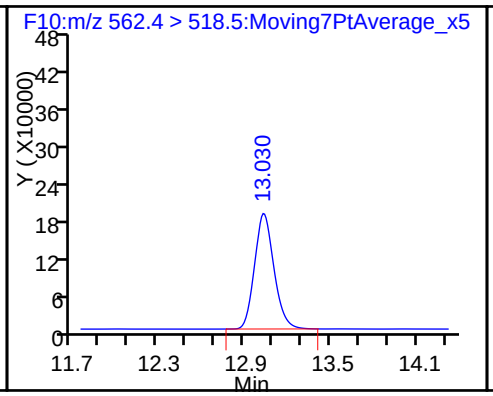

24 Perfluorooctane Sulfonamide



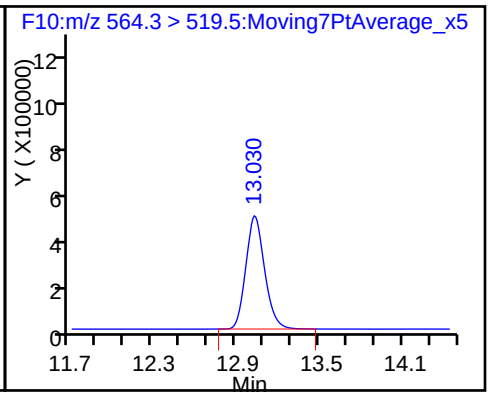
49 Perfluorodecane Sulfonic acid



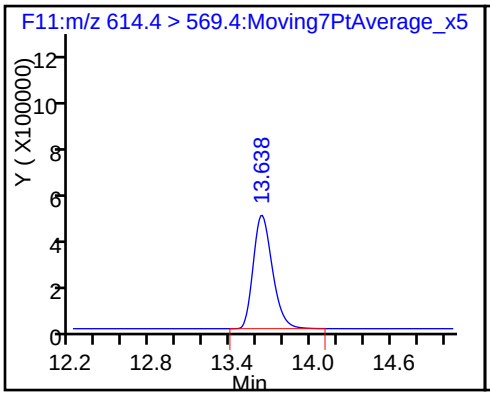

27 Perfluoroundecanoic acid



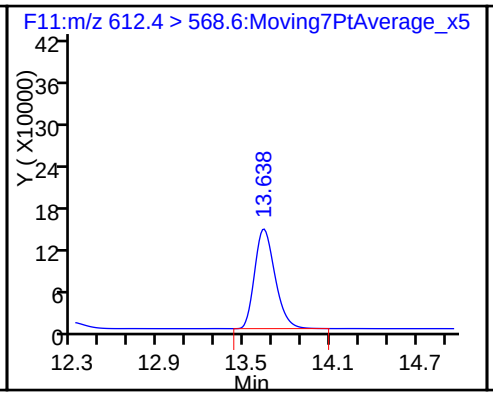

D 26 13C2 PFUnA



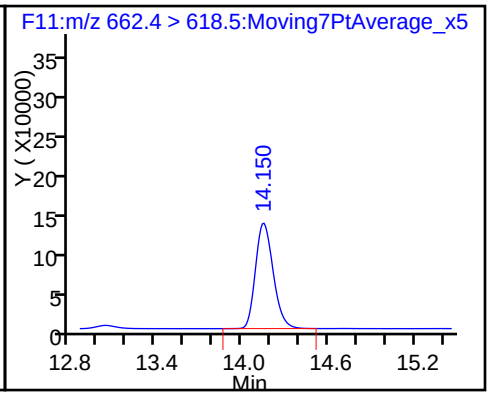

D 28 13C2 PFDoA



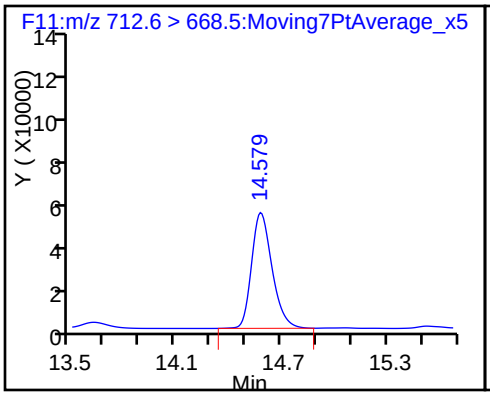

29 Perfluorododecanoic acid



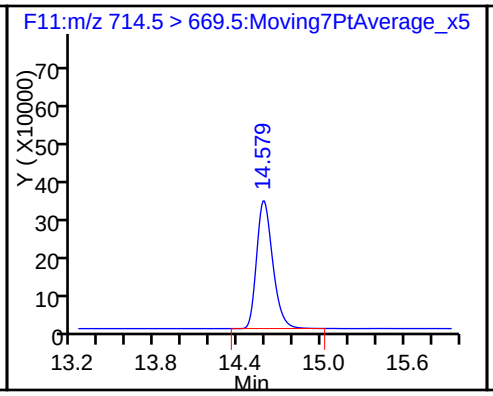

30 Perfluorotridecanoic acid



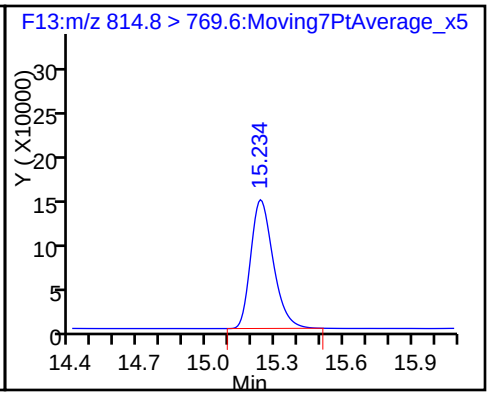

32 Perfluorotetradecanoic acid



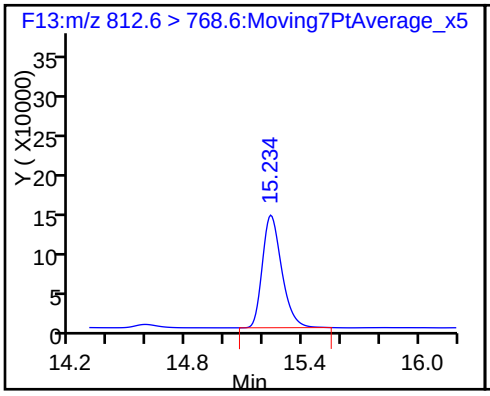

D 33 13C2-PFTeDA



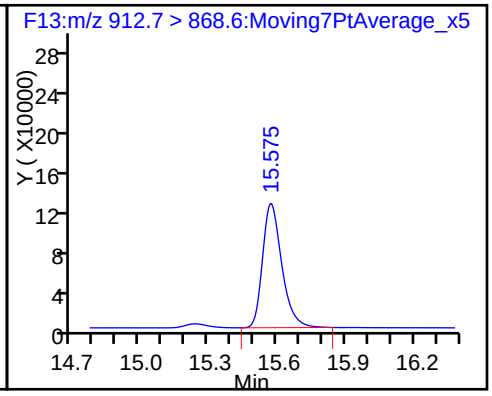

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

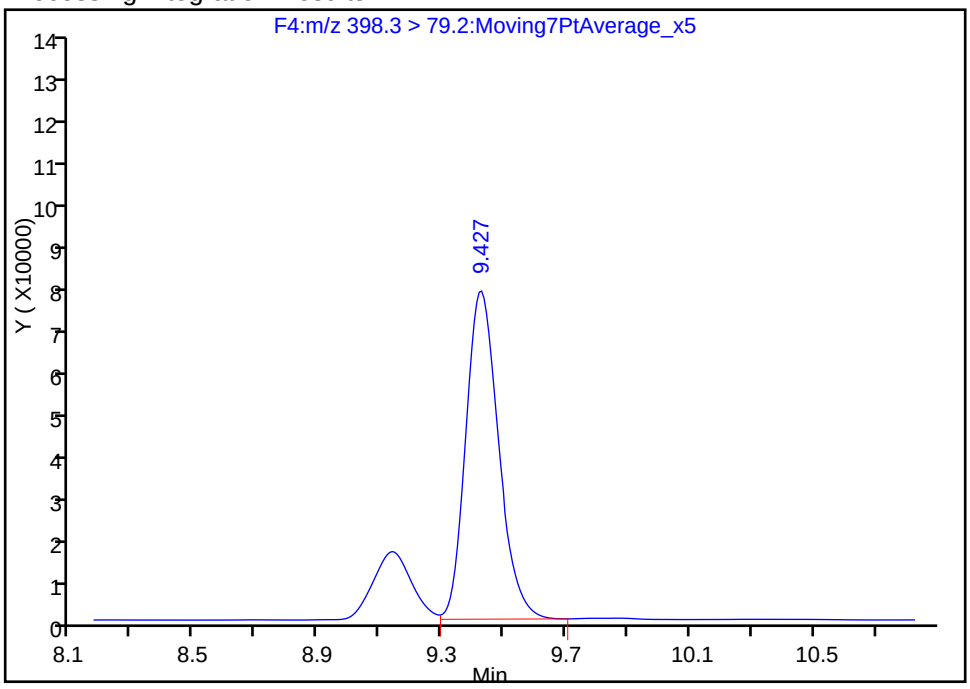
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_016.d
Injection Date: 07-May-2016 18:29:30 Instrument ID: A4
Lims ID: LCS 320-108614/2-A
Client ID:
Operator ID: JRB ALS Bottle#: 26 Worklist Smp#: 16
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F4:MRM

## 58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

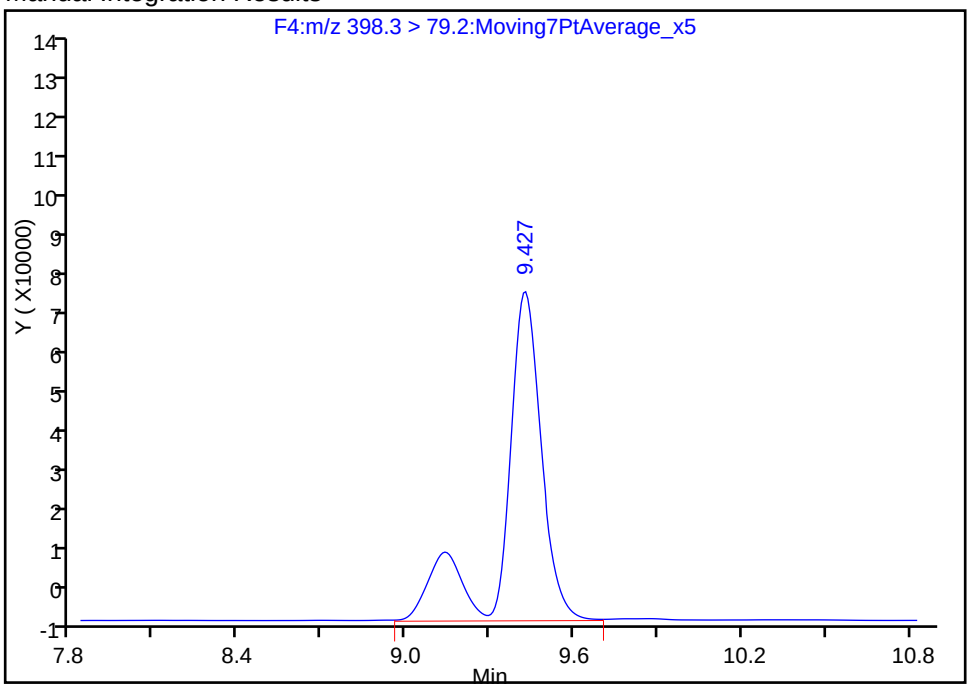
Processing Integration Results

RT: 9.43
Area: 550854
Amount: 11.655380
Amount Units: ng/ml




Manual Integration Results

RT: 9.43
Area: 694919
Amount: 15.482215
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:43:18
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

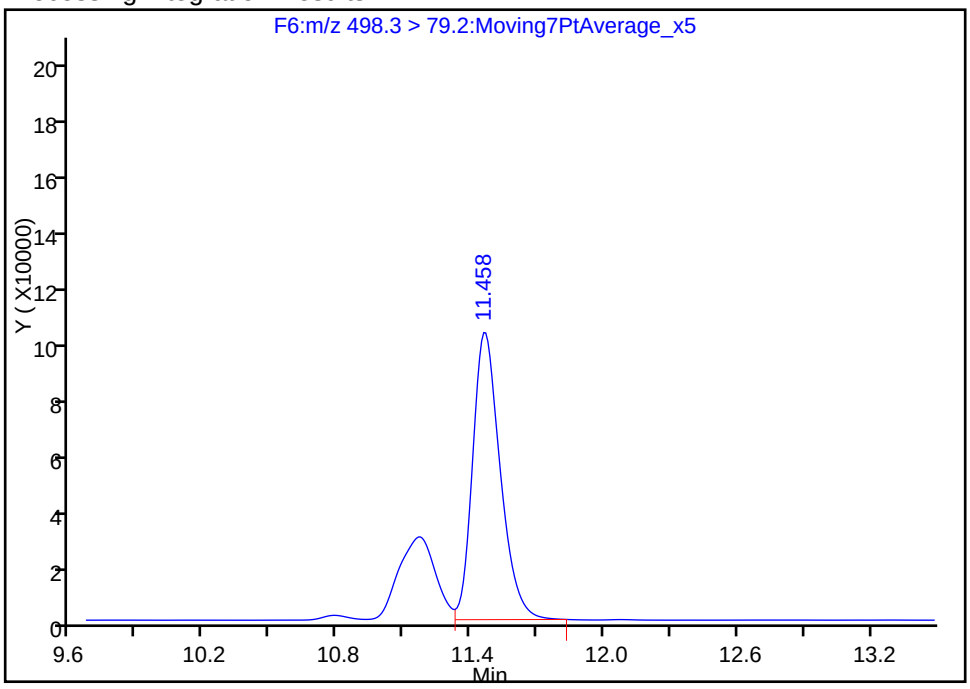
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_016.d
Injection Date: 07-May-2016 18:29:30 Instrument ID: A4
Lims ID: LCS 320-108614/2-A
Client ID:
Operator ID: JRB ALS Bottle#: 26 Worklist Smp#: 16
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

## 15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

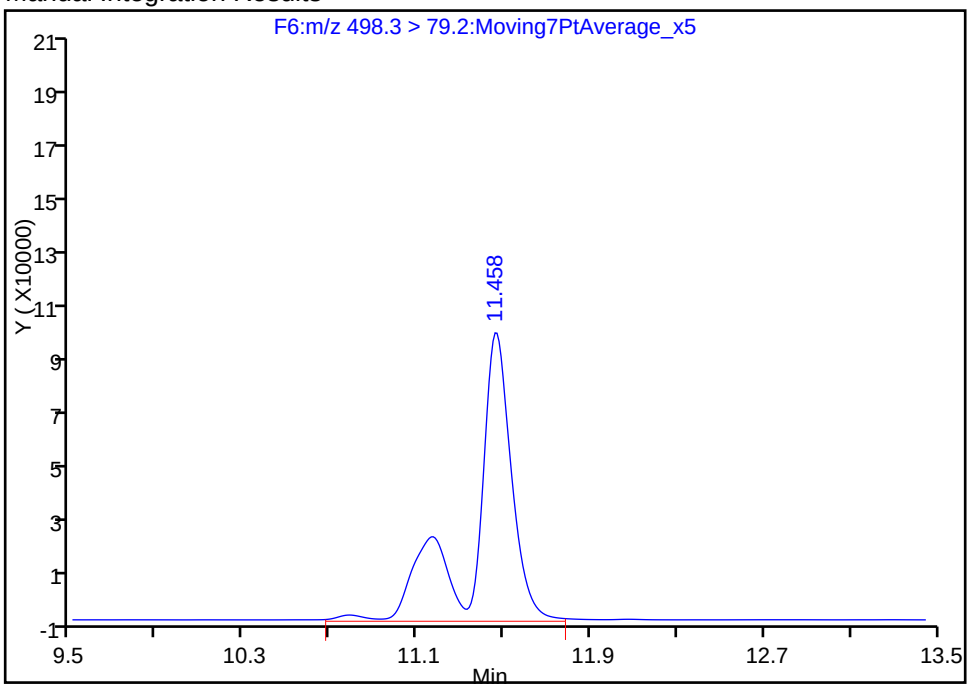
Processing Integration Results

RT: 11.46
Area: 890578
Amount: 11.027357
Amount Units: ng/ml




Manual Integration Results

RT: 11.46
Area: 1285816
Amount: 18.484094
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:34:30
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

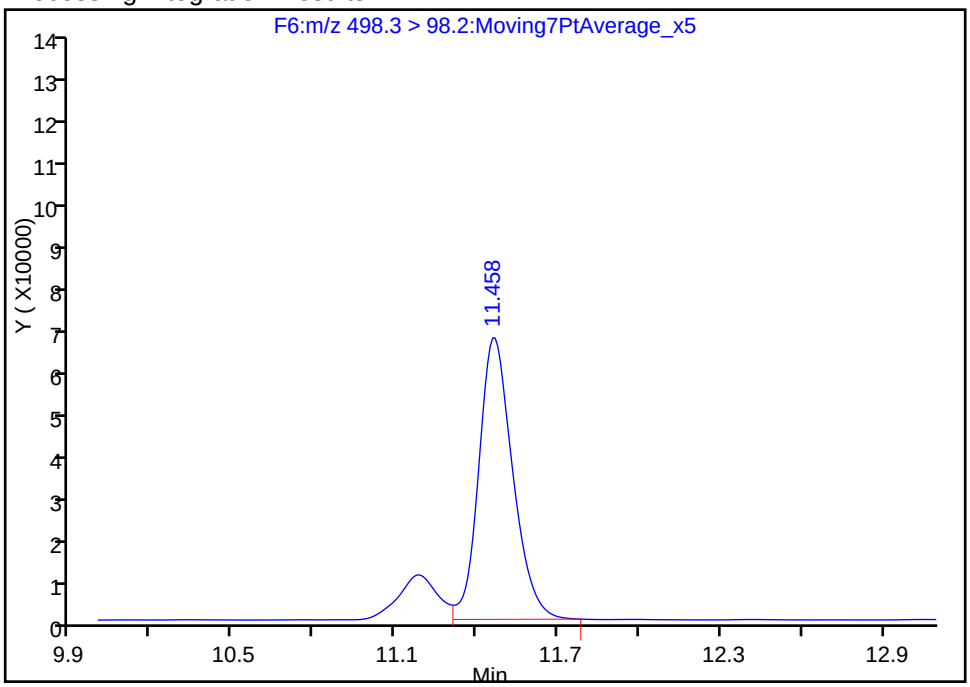
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_016.d
Injection Date: 07-May-2016 18:29:30 Instrument ID: A4
Lims ID: LCS 320-108614/2-A
Client ID:
Operator ID: JRB ALS Bottle#: 26 Worklist Smp#: 16
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

## 15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

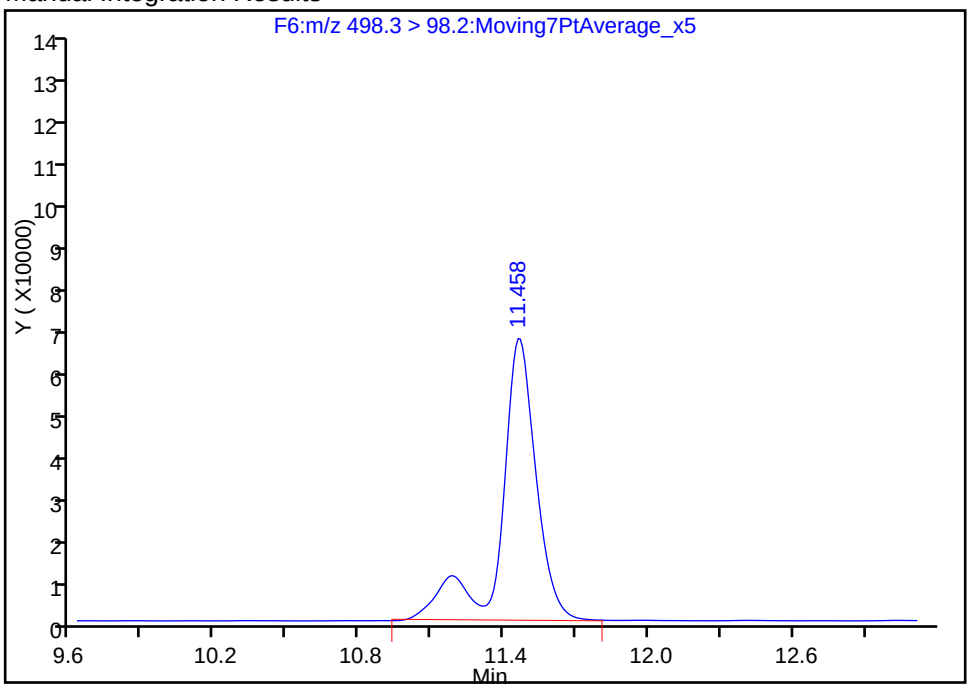
Processing Integration Results

RT: 11.46
Area: 581702
Amount: 11.027357
Amount Units: ng/ml




Manual Integration Results

RT: 11.46
Area: 684086
Amount: 18.484094
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:34:30
Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18555-1

SDG No.:

Client Sample ID: | Lab Sample ID: LCSD 320-108614/3-A

Matrix: Water | Lab File ID: 07MAY2016B4A_017.d

Analysis Method: WS-LC-0025 | Date Collected:

Extraction Method: 3535 | Date Extracted: 05/03/2016 12:39

Sample wt/vol: 500(mL) | Date Analyzed: 05/07/2016 18:50

Con. Extract Vol.: 1.0(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 109262 | Units: ng/L

| CAS NO. | COMPOUND NAME | RESULT | Q | LOQ | LOD | DL |
|---|---|---|---|---|---|---|
| 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | 27.4 | | 2.5 | 2.0 | 0.92 |
| 375-85-9 | Perfluoroheptanoic acid (PFHpA) | 29.4 | | 2.5 | 2.0 | 0.80 |
| 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | 30.4 | M | 2.5 | 2.0 | 0.87 |
| 375-95-1 | Perfluorononanoic acid (PFNA) | 32.0 | | 2.5 | 2.0 | 0.65 |
| 1763-23-1 | Perfluorooctanesulfonic acid (PFOS) | 42.4 | M | 4.0 | 3.0 | 1.3 |
| 335-67-1 | Perfluorooctanoic acid (PFOA) | 31.4 | | 2.5 | 2.0 | 0.75 |

| CAS NO. | ISOTOPE DILUTION | %REC | Q | LIMITS |
|---|---|---|---|---|
| STL00993 | 13C2 PFHxA | 121 | | 25-150 |
| STL00990 | 13C4 PFOA | 126 | | 25-150 |
| STL00991 | 13C4 PFOS | 101 | | 25-150 |
| STL01892 | 13C4-PFHpA | 121 | | 25-150 |
| STL00995 | 13C5 PFNA | 121 | | 25-150 |
| STL00994 | 18O2 PFHxS | 123 | | 25-150 |

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_017.d
Lims ID: LCSD 320-108614/3-A
Client ID:
Sample Type: LCSD
Inject. Date: 07-May-2016 18:50:41 ALS Bottle#: 27 Worklist Smp#: 17
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: lcsd 320-108614/3-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 09-May-2016 15:29:55 Calib Date: 07-May-2016 16:43:39
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK010

First Level Reviewer: barnettj Date: 09-May-2016 14:36:28

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| D 1 13C4 PFBA | | | | | | | | | | |
| 216.7 > 171.5 | 5.797 | 5.797 | 0.0 | | 4296172 | 59.7 | | 119 | 15386 | |
| 2 Perfluorobutyric acid | | | | | | | | | | |
| 212.7 > 168.6 | 5.800 | 5.799 | 0.001 | 1.000 | 830899 | 14.8 | | 73.9 | 2982 | |
| D 3 13C5-PFPeA | | | | | | | | | | |
| 267.6 > 222.7 | 6.909 | 6.909 | 0.0 | | 3118096 | 62.1 | | 124 | 9552 | |
| 4 Perfluoropentanoic acid | | | | | | | | | | |
| 262.9 > 218.7 | 6.909 | 6.911 | -0.002 | 1.000 | 399899 | 14.0 | | 69.9 | 254 | |
| 5 Perfluorobutane Sulfonate | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 266332 | NC | | | 697 | |
| 298.8 > 98.6 | 7.019 | 7.026 | -0.007 | 0.999 | 173117 | | 1.54(0.00-0.00) | | 566 | |
| 51 Perfluorobutanesulfonic acid | | | | | | | | | | |
| 298.8 > 79.6 | 7.024 | 7.026 | -0.002 | 1.000 | 266332 | 13.7 | | 77.6 | | |
| D 6 13C2 PFHxA | | | | | | | | | | |
| 314.6 > 269.7 | 8.160 | 8.162 | -0.002 | | 4176166 | 60.3 | | 121 | 8285 | |
| 7 Perfluorohexanoic acid | | | | | | | | | | |
| 312.9 > 268.7 | 8.160 | 8.162 | -0.002 | 1.000 | 530642 | 13.5 | | 67.6 | 1549 | |
| D 8 13C4-PFHpA | | | | | | | | | | |
| 366.6 > 321.6 | 9.388 | 9.396 | -0.008 | | 3556624 | 60.5 | | 121 | 9438 | |
| 9 Perfluoroheptanoic acid | | | | | | | | | | |
| 362.8 > 318.7 | 9.388 | 9.396 | -0.008 | 1.000 | 532728 | 14.7 | | 73.6 | 1776 | |
| D 11 18O2 PFHxS | | | | | | | | | | |
| 402.5 > 83.6 | 9.419 | 9.430 | -0.011 | | 1459376 | 58.1 | | 123 | 4512 | |
| 10 Perfluorohexane Sulfonate | | | | | | | | | | M |
| 398.3 > 79.2 | 9.431 | 9.431 | 0.0 | 1.000 | 0 | NC | | | 115 | M |
| 58 Perfluorohexanesulfonic acid | | | | | | | | | | M |
| 398.3 > 79.2 | 9.419 | 9.431 | -0.012 | 1.000 | 683037 | 15.2 | | 83.4 | | M |
| D 12 13C4 PFOA | | | | | | | | | | |
| 416.5 > 371.6 | 10.502 | 10.511 | -0.009 | | 4153210 | 63.2 | | 126 | 7318 | |

| Signal | RT | EXP RT | DLT RT | REL RT | Response | Amount ng/ml | Ratio(Limits) | %Rec | S/N | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 13 Perfluorooctanoic acid | | | | | | | | | | |
| 412.8 > 368.8 | 10.502 | 10.512 | -0.010 | 1.000 | 533256 | 15.7 | | 78.6 | 1308 | |
| 412.8 > 168.7 | 10.511 | 10.512 | -0.001 | 1.001 | 166330 | | 3.21(0.00-0.00) | | 819 | |
| 39 Perfluoroheptanesulfonic Acid | | | | | | | | | | |
| 448.3 > 79.2 | 10.502 | 10.515 | -0.013 | 1.000 | 733718 | 17.1 | | 89.6 | | |
| 14 Perfluoroheptane Sulfonate | | | | | | | | | | |
| 448.3 > 79.2 | 10.502 | 10.515 | -0.013 | 1.000 | 733718 | NC | | | 2327 | |
| D 16 13C4 PFOS | | | | | | | | | | |
| 502.4 > 79.7 | 11.461 | 11.467 | -0.006 | | 214917 | 48.4 | | 101 | 623 | |
| 15 Perfluorooctane sulfonic acid | | | | | | | | | | M |
| 498.3 > 79.2 | 11.461 | 11.470 | -0.009 | 1.000 | 1287976 | 21.2 | | 114 | 2147 | M |
| 498.3 > 98.2 | 11.461 | 11.470 | -0.009 | 1.000 | 664231 | | 1.94(0.00-0.00) | | 1369 | M |
| D 17 13C5 PFNA | | | | | | | | | | |
| 467.5 > 422.6 | 11.480 | 11.489 | -0.009 | | 3513544 | 60.5 | | 121 | 6839 | |
| 18 Perfluorononanoic acid | | | | | | | | | | |
| 462.5 > 418.6 | 11.480 | 11.490 | -0.010 | 1.000 | 1459355 | 16.0 | | 80.0 | 2504 | |
| D 19 13C2 PFDA | | | | | | | | | | |
| 514.4 > 469.5 | 12.315 | 12.327 | -0.012 | | 5038061 | 65.4 | | 131 | 6115 | |
| 20 Perfluorodecanoic acid | | | | | | | | | | |
| 512.5 > 468.5 | 12.315 | 12.327 | -0.012 | 1.000 | 1707395 | 14.4 | | 72.2 | 2782 | |
| D 23 13C8 FOSA | | | | | | | | | | |
| 505.4 > 77.6 | 12.888 | 12.892 | -0.004 | | 747443 | 9.77 | | 19.5 | 2275 | |
| 24 Perfluorooctane Sulfonamide | | | | | | | | | | |
| 497.5 > 77.6 | 12.888 | 12.892 | -0.004 | 1.000 | 270569 | 17.2 | | 86.2 | 627 | |
| 25 Perfluorodecane Sulfonate | | | | | | | | | | |
| 598.4 > 79.6 | 12.978 | 12.994 | -0.016 | 1.000 | 332610 | NC | | | 1009 | |
| 49 Perfluorodecane Sulfonic acid | | | | | | | | | | |
| 598.4 > 79.6 | 12.978 | 12.994 | -0.016 | 1.000 | 332610 | 14.9 | | 77.3 | | |
| 27 Perfluoroundecanoic acid | | | | | | | | | | |
| 562.4 > 518.5 | 13.034 | 13.041 | -0.007 | 1.000 | 1729258 | 14.8 | | 74.2 | 2714 | |
| D 26 13C2 PFUnA | | | | | | | | | | |
| 564.3 > 519.5 | 13.034 | 13.044 | -0.010 | | 4761087 | 58.8 | | 118 | 4544 | |
| D 28 13C2 PFDoA | | | | | | | | | | |
| 614.4 > 569.4 | 13.632 | 13.643 | -0.011 | | 4897835 | 58.3 | | 117 | 4236 | |
| 29 Perfluorododecanoic acid | | | | | | | | | | |
| 612.4 > 568.6 | 13.632 | 13.643 | -0.011 | 1.000 | 1334470 | 14.8 | | 74.2 | 667 | |
| 30 Perfluorotridecanoic acid | | | | | | | | | | |
| 662.4 > 618.5 | 14.144 | 14.160 | -0.016 | 1.000 | 1088293 | 16.5 | | 82.4 | 807 | |
| 32 Perfluorotetradecanoic acid | | | | | | | | | | |
| 712.6 > 668.5 | 14.583 | 14.593 | -0.010 | 1.000 | 420588 | 12.7 | | 63.7 | 271 | |
| D 33 13C2-PFTeDA | | | | | | | | | | |
| 714.5 > 669.5 | 14.583 | 14.593 | -0.010 | | 2834350 | 52.6 | | 105 | 3479 | |
| D 35 13C2-PFHxDA | | | | | | | | | | |
| 814.8 > 769.6 | 15.237 | 15.244 | -0.007 | | 1162132 | 62.0 | | 124 | 2970 | |
| 34 Perfluorohexadecanoic acid | | | | | | | | | | |
| 812.6 > 768.6 | 15.237 | 15.244 | -0.007 | 1.000 | 1007330 | 10.2 | | 51.2 | 261 | |
| 36 Perfluorooctandecanoic acid | | | | | | | | | | |
| 912.7 > 868.6 | 15.571 | 15.580 | -0.009 | 1.000 | 722324 | 14.5 | | 72.6 | 1133 | |

## QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 09-May-2016 15:30:00 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_017.d

Injection Date: 07-May-2016 18:50:41 Instrument ID: A4

Lims ID: LCSD 320-108614/3-A

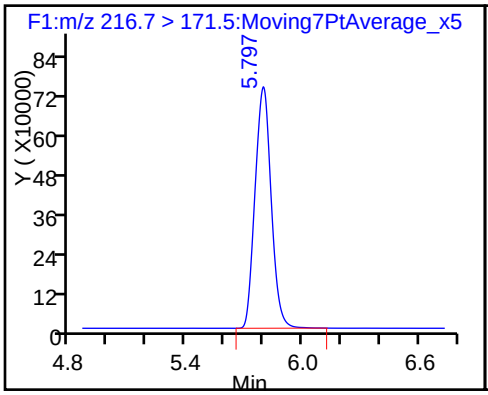
Client ID:

Operator ID: JRB ALS Bottle#: 27 Worklist Smp#: 17

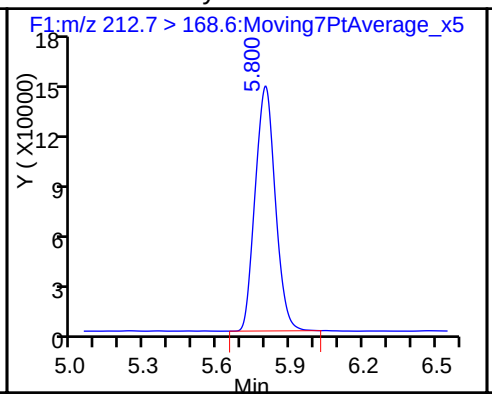
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

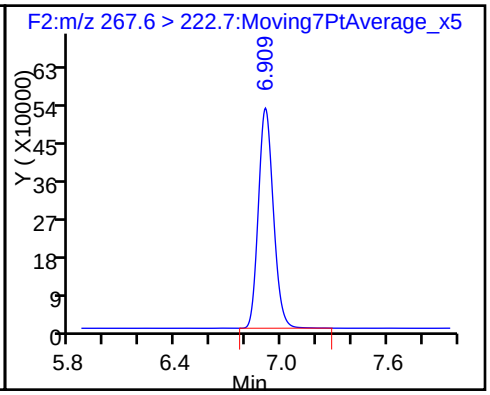
D 1 13C4 PFBA



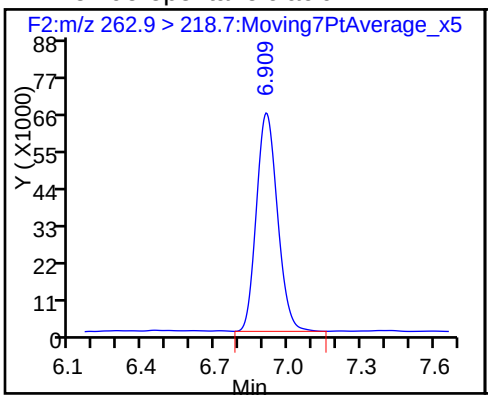

2 Perfluorobutyric acid



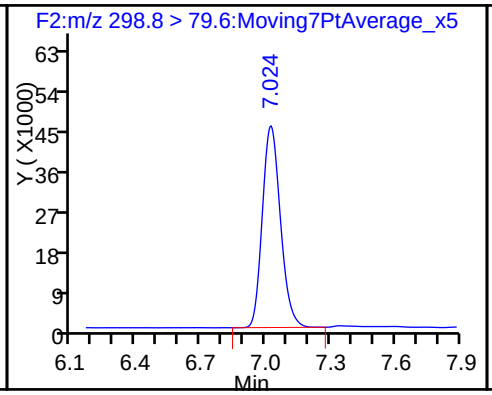

D 3 13C5-PFPeA



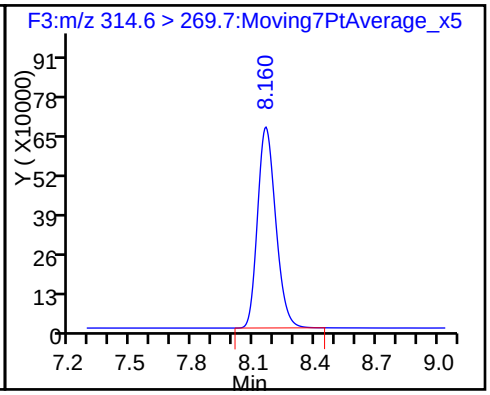

4 Perfluoropentanoic acid



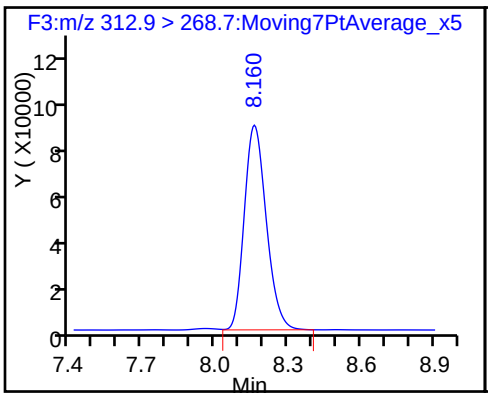

51 Perfluorobutanesulfonic acid



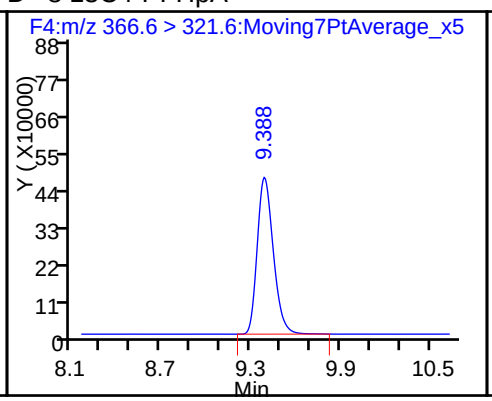

D 6 13C2 PFHxA



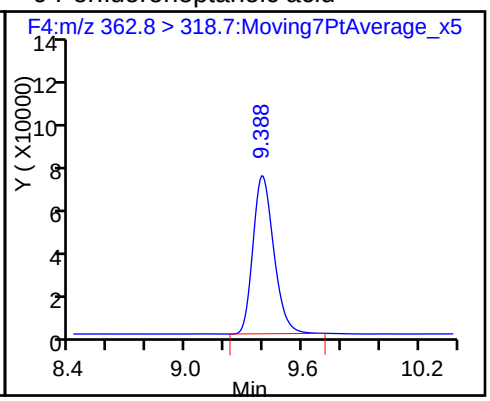

7 Perfluorohexanoic acid



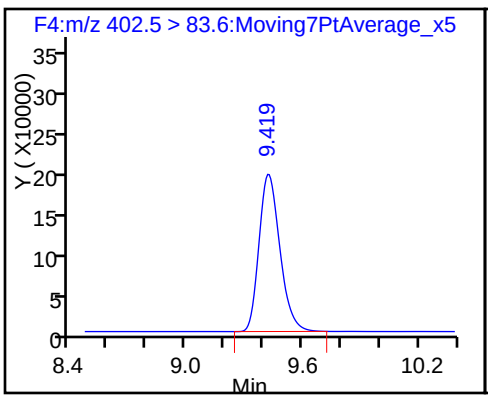

D 8 13C4-PFHpA



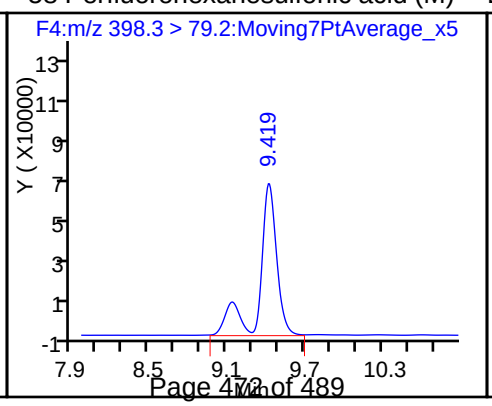

9 Perfluoroheptanoic acid



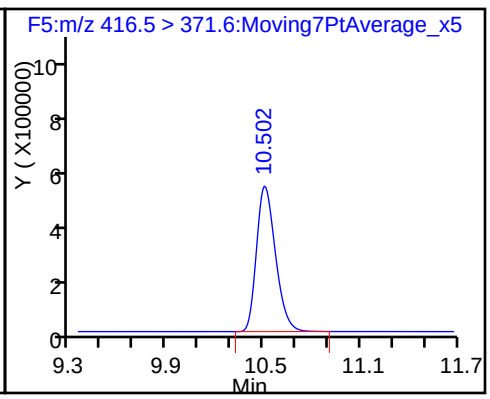

D 11 18O2 PFHxS



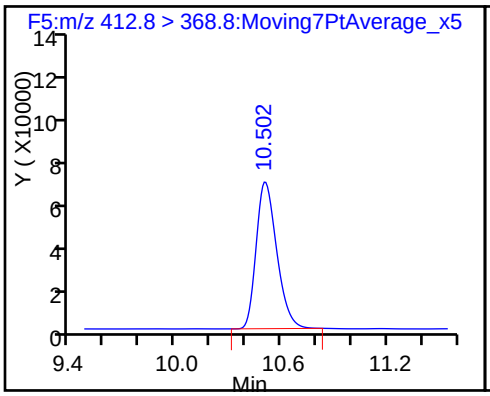

58 Perfluorohexanesulfonic acid (M)



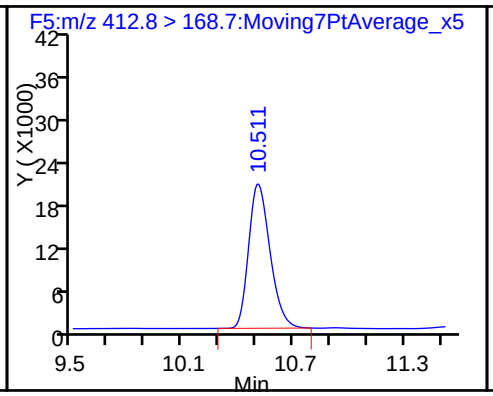

D 12 13C4 PFOA



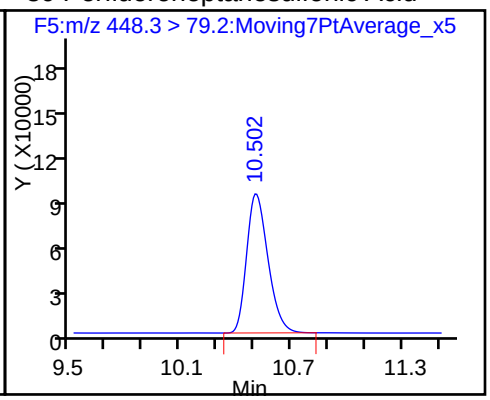
13 Perfluorooctanoic acid



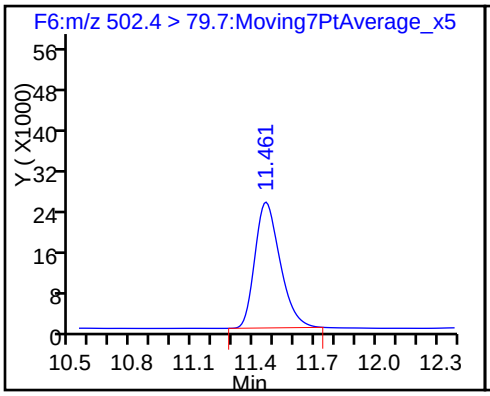

13 Perfluorooctanoic acid



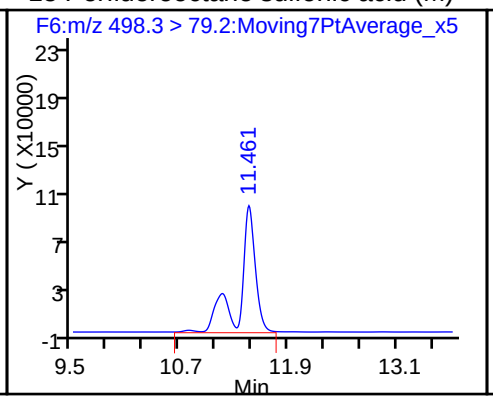

39 Perfluoroheptanesulfonic Acid



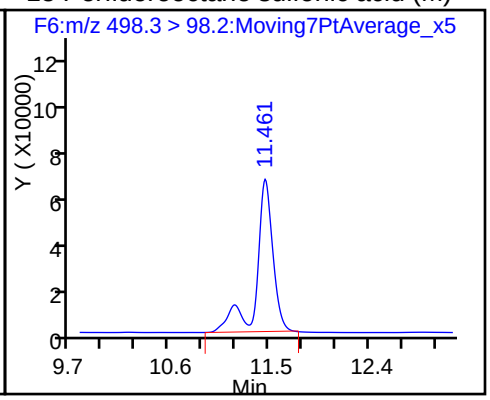

D 16 13C4 PFOS



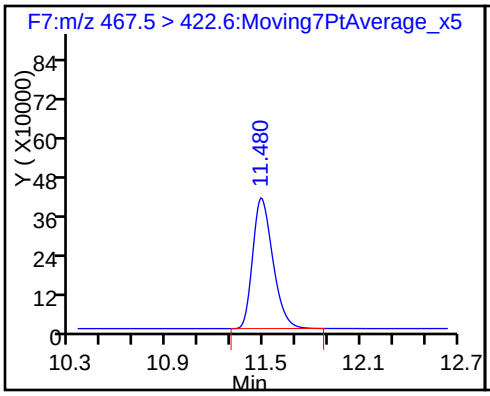

15 Perfluorooctane sulfonic acid (M)



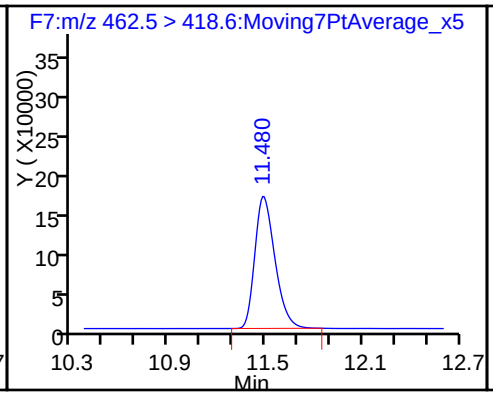

15 Perfluorooctane sulfonic acid (M)



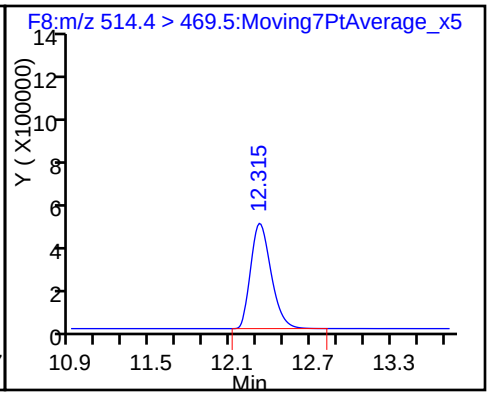

D 17 13C5 PFNA



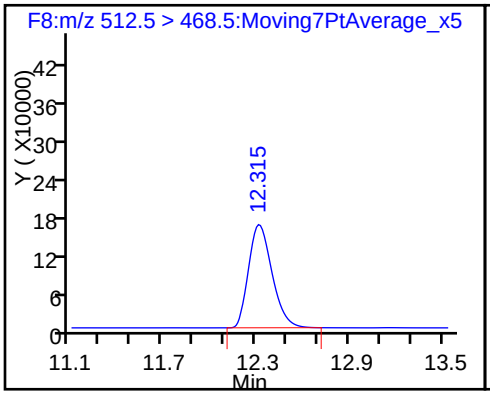

18 Perfluorononanoic acid



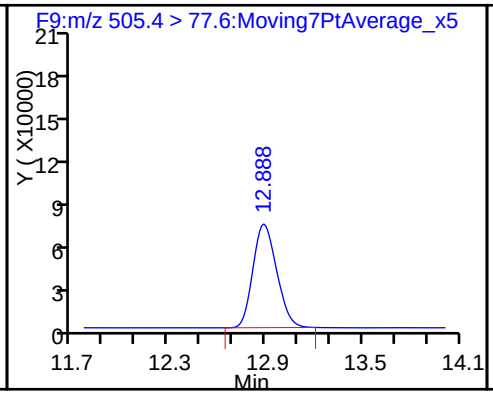

D 19 13C2 PFDA



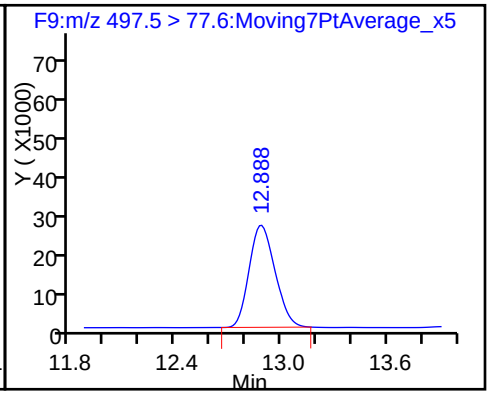

20 Perfluorodecanoic acid



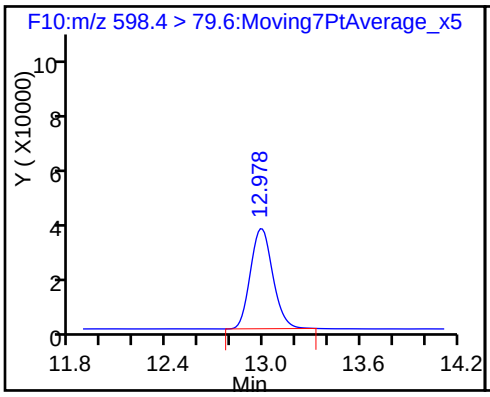

D 23 13C8 FOSA



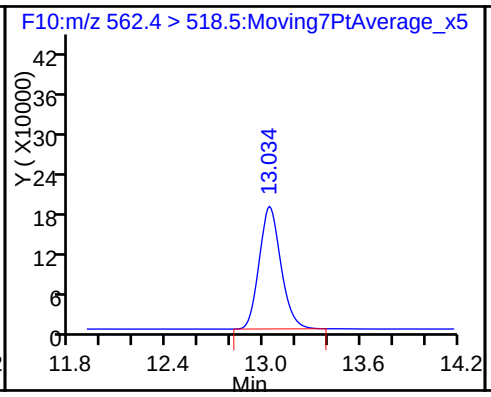

24 Perfluorooctane Sulfonamide



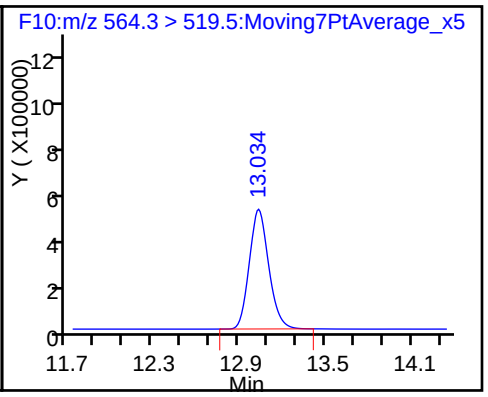
49 Perfluorodecane Sulfonic acid



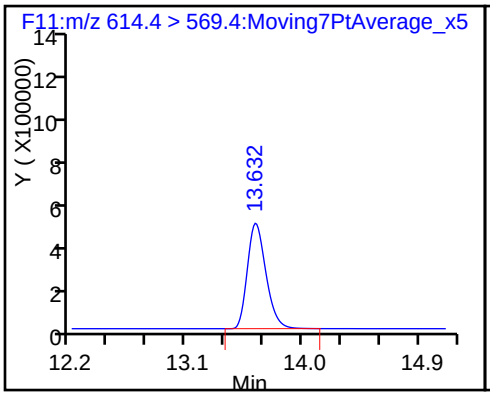

27 Perfluoroundecanoic acid



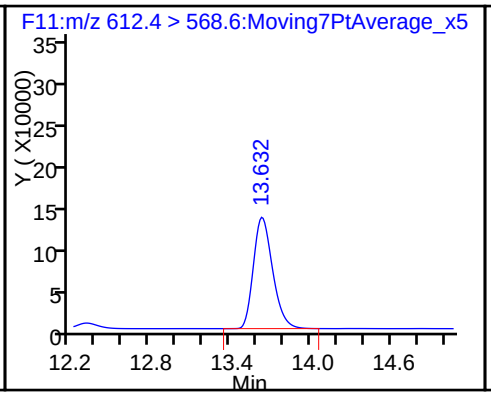

D 26 13C2 PFUnA



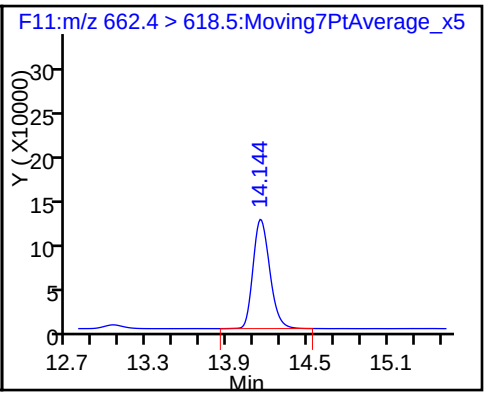

D 28 13C2 PFDoA



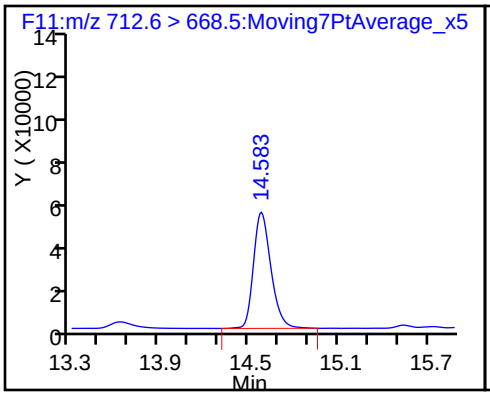

29 Perfluorododecanoic acid



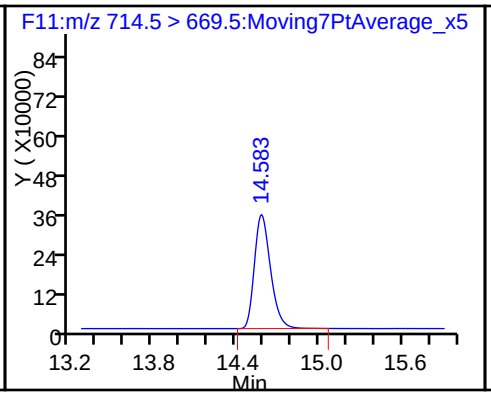

30 Perfluorotridecanoic acid



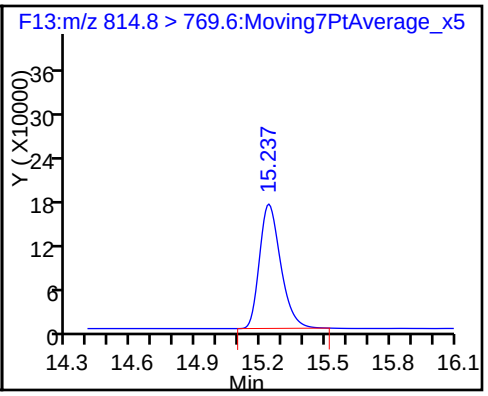

32 Perfluorotetradecanoic acid



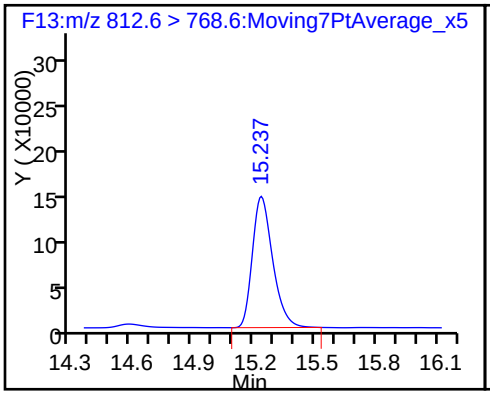

D 33 13C2-PFTeDA



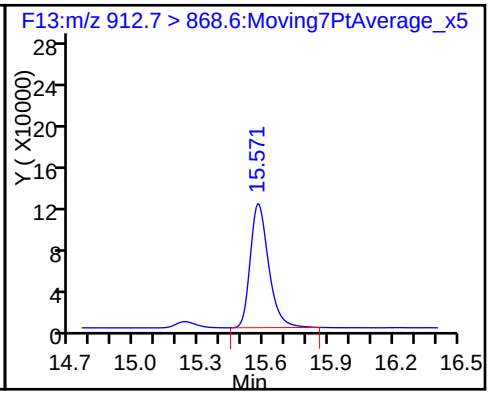

D 35 13C2-PFHxDA




34 Perfluorohexadecanoic acid




36 Perfluorooctandecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

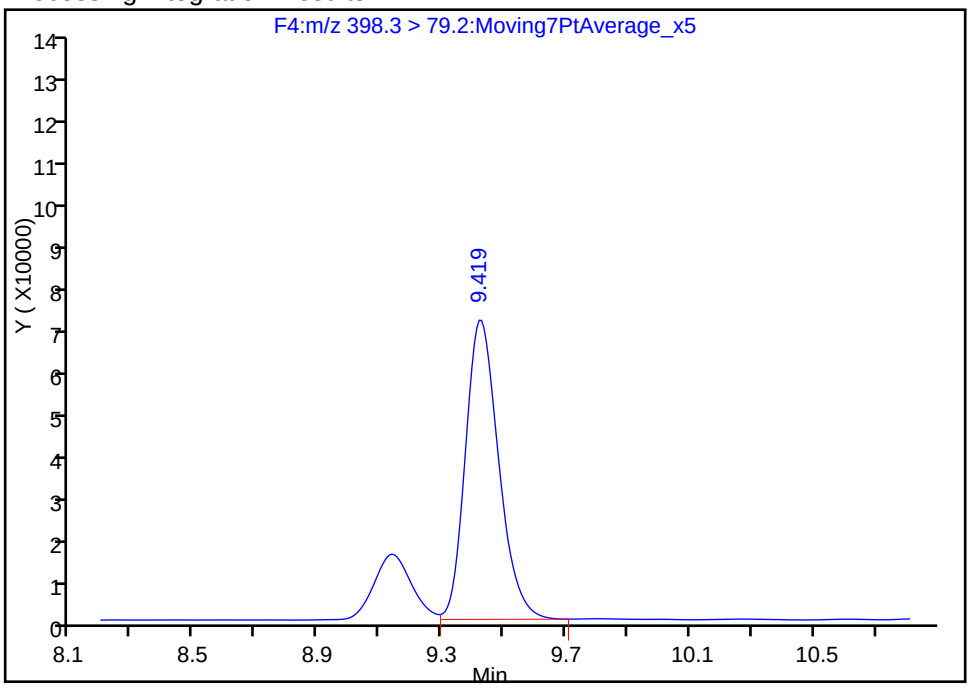
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_017.d
Injection Date: 07-May-2016 18:50:41 Instrument ID: A4
Lims ID: LCSD 320-108614/3-A
Client ID:
Operator ID: JRB ALS Bottle#: 27 Worklist Smp#: 17
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F4:MRM

## 58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

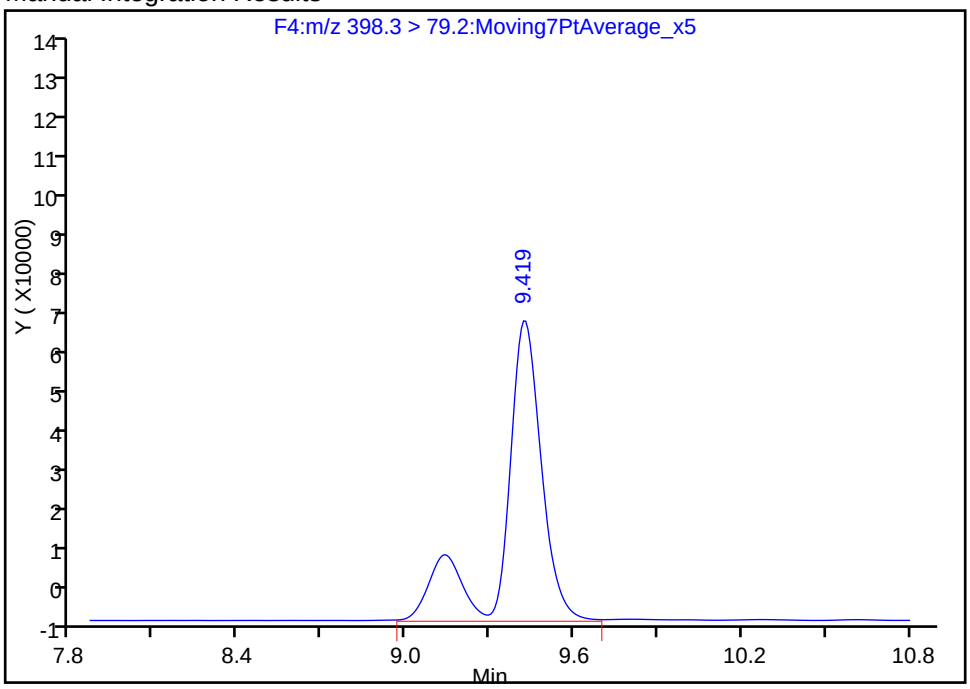
Processing Integration Results

RT: 9.42
Area: 537453
Amount: 11.348533
Amount Units: ng/ml




Manual Integration Results

RT: 9.42
Area: 683037
Amount: 15.186316
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:36:28
Audit Action: Assigned Compound ID Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

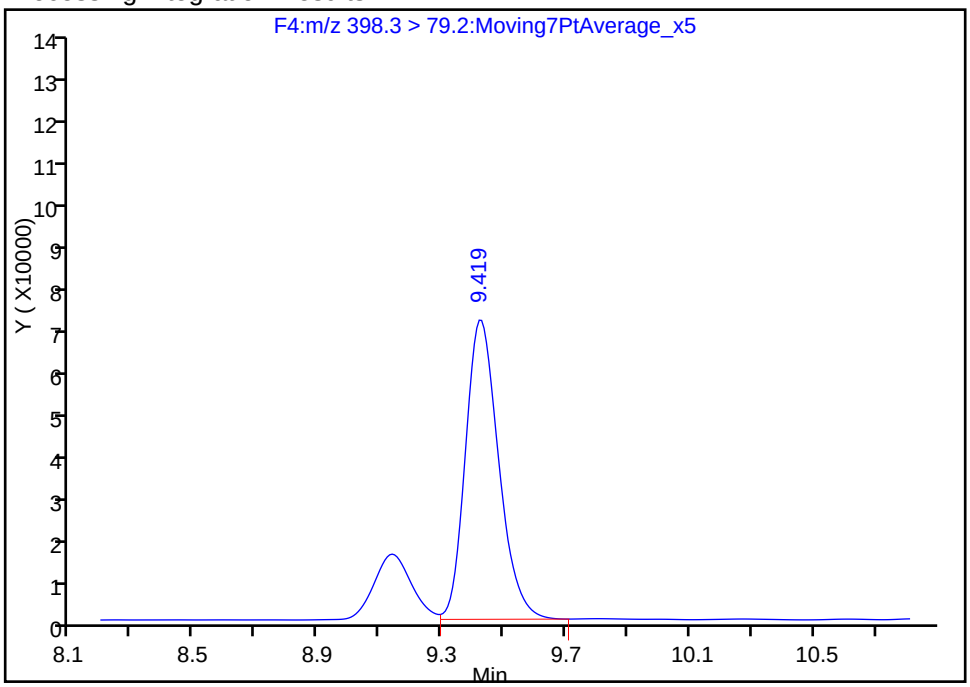
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_017.d
Injection Date: 07-May-2016 18:50:41 Instrument ID: A4
Lims ID: LCSD 320-108614/3-A
Client ID:
Operator ID: JRB ALS Bottle#: 27 Worklist Smp#: 17
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F4:MRM

## 58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

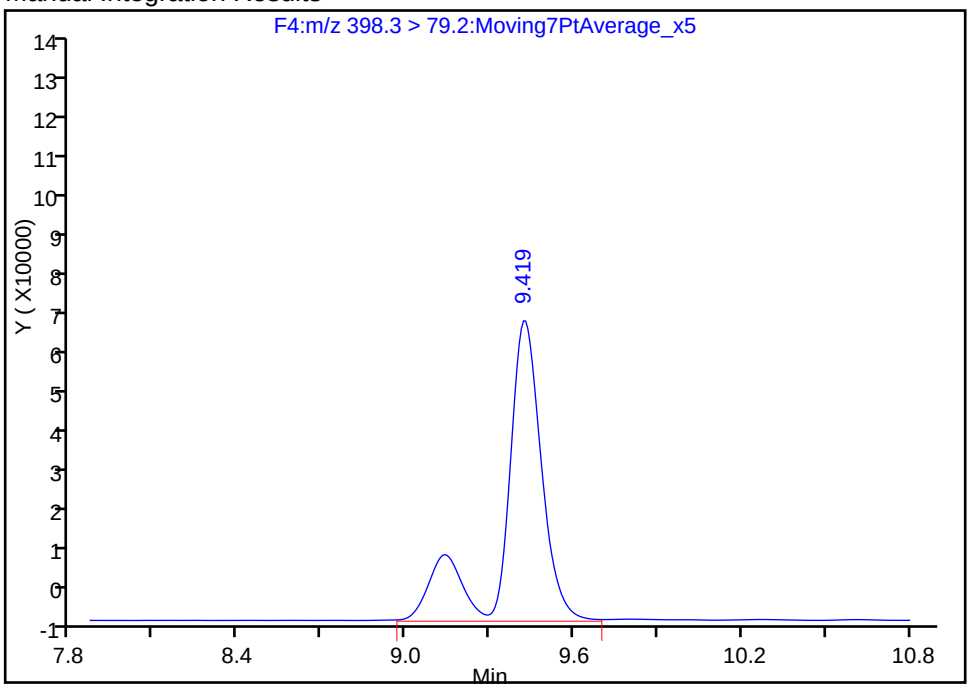
Processing Integration Results

RT: 9.42
Area: 537453
Amount: 11.348533
Amount Units: ng/ml




Manual Integration Results

RT: 9.42
Area: 683037
Amount: 15.186316
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:43:58
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

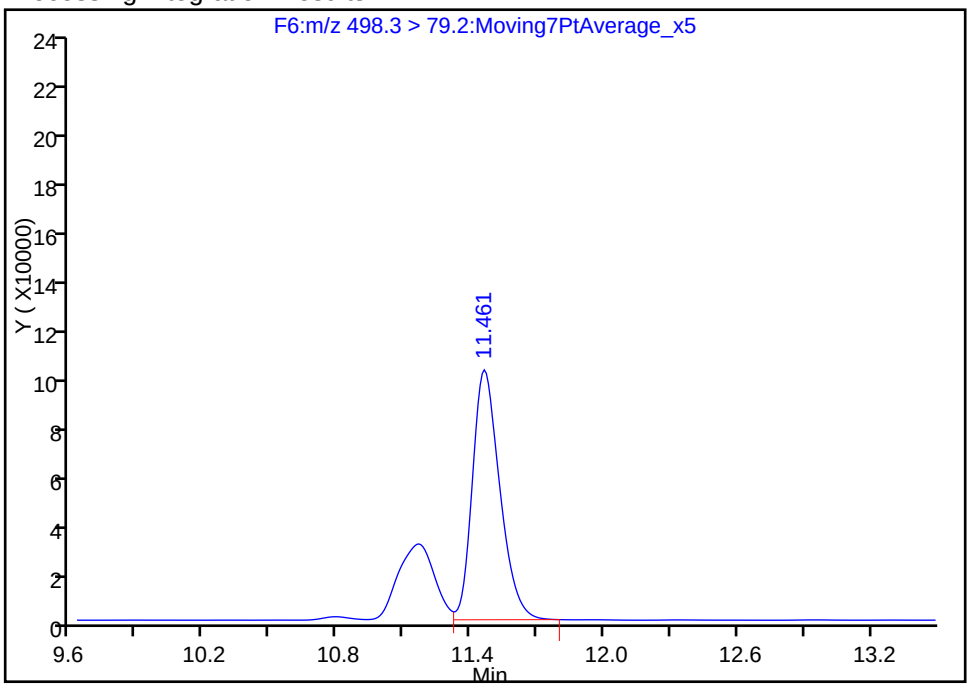
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_017.d
Injection Date: 07-May-2016 18:50:41 Instrument ID: A4
Lims ID: LCSD 320-108614/3-A
Client ID:
Operator ID: JRB ALS Bottle#: 27 Worklist Smp#: 17
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

## 15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

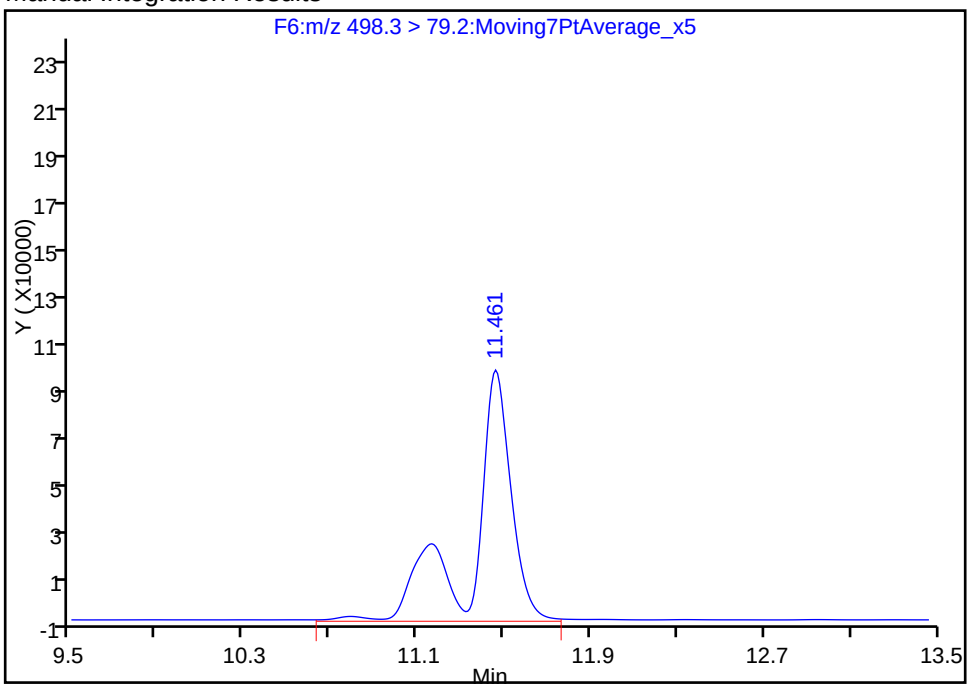
Processing Integration Results

RT: 11.46
Area: 878549
Amount: 12.444799
Amount Units: ng/ml




Manual Integration Results

RT: 11.46
Area: 1287976
Amount: 21.181149
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:36:28
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

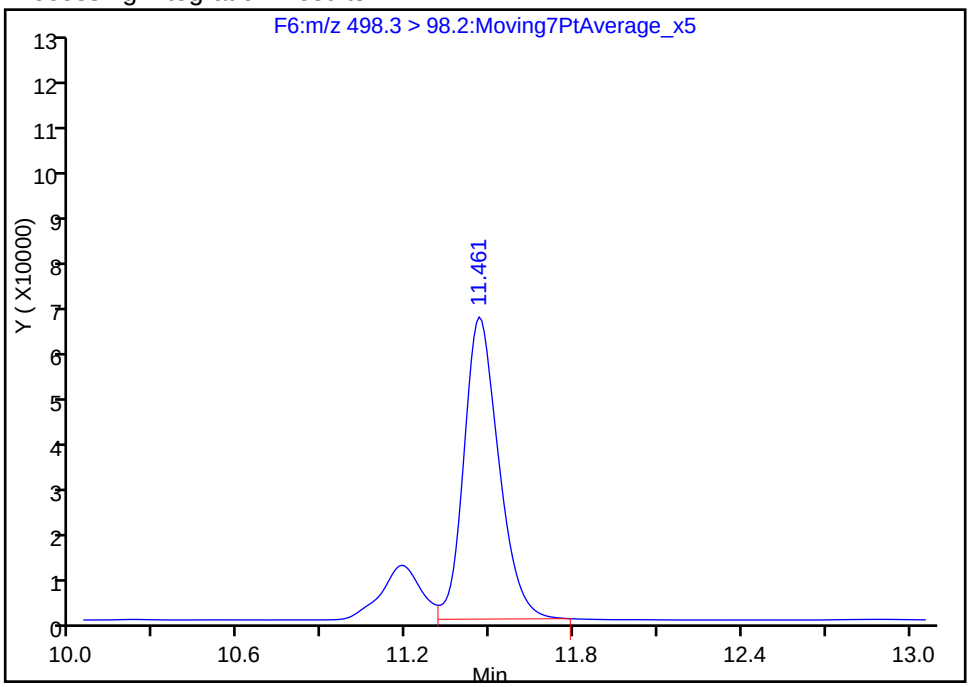
Data File: \\ChromNA\Sacramento\ChromData\A4\20160509-30565.b\07MAY2016B4A_017.d
Injection Date: 07-May-2016 18:50:41 Instrument ID: A4
Lims ID: LCSD 320-108614/3-A
Client ID:
Operator ID: JRB ALS Bottle#: 27 Worklist Smp#: 17
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

## 15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

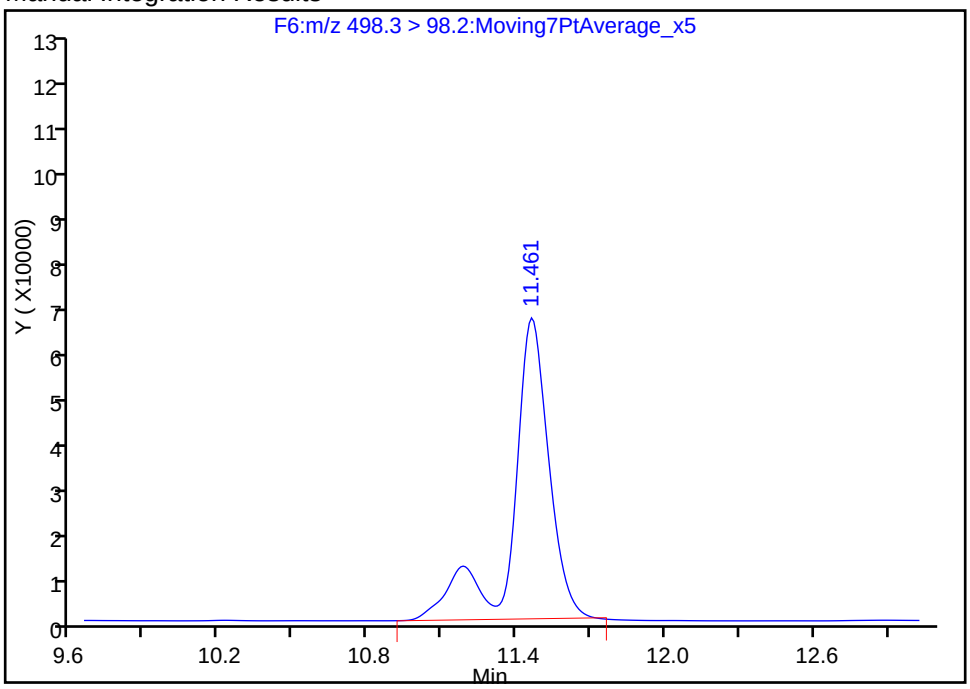
Processing Integration Results

RT: 11.46
Area: 559392
Amount: 12.444799
Amount Units: ng/ml




Manual Integration Results

RT: 11.46
Area: 664231
Amount: 21.181149
Amount Units: ng/ml




Reviewer: barnettj, 09-May-2016 14:36:28
Audit Action: Manually Integrated Audit Reason: Isomers

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-18555-1

SDG No.:

Instrument ID: A4 Start Date: 05/07/2016 14:36

Analysis Batch Number: 109262 End Date: 05/07/2016 21:40

| LAB SAMPLE ID | CLIENT SAMPLE ID | DATE ANALYZED | DILUTION FACTOR | LAB FILE ID | COLUMN ID |
|---|---|---|---|---|---|
| STD 320-109262/5 IC | | 05/07/2016 14:36 | 1 | 07MAY2016B4A_005.d | Acquity 2.1(mm) |
| STD 320-109262/6 IC | | 05/07/2016 14:57 | 1 | 07MAY2016B4A_006.d | Acquity 2.1(mm) |
| STD 320-109262/7 IC | | 05/07/2016 15:18 | 1 | 07MAY2016B4A_007.d | Acquity 2.1(mm) |
| STD 320-109262/8 IC | | 05/07/2016 15:40 | 1 | 07MAY2016B4A_008.d | Acquity 2.1(mm) |
| STD 320-109262/9 IC | | 05/07/2016 16:01 | 1 | 07MAY2016B4A_009.d | Acquity 2.1(mm) |
| STD 320-109262/10 IC | | 05/07/2016 16:22 | 1 | 07MAY2016B4A_010.d | Acquity 2.1(mm) |
| STD 320-109262/11 IC | | 05/07/2016 16:43 | 1 | 07MAY2016B4A_011.d | Acquity 2.1(mm) |
| ZZZZZ | | 05/07/2016 17:04 | 1 | | Acquity 2.1(mm) |
| ICV 320-109262/13 | | 05/07/2016 17:25 | 1 | 07MAY2016B4A_013.d | Acquity 2.1(mm) |
| MB 320-108614/1-A | | 05/07/2016 18:08 | 1 | 07MAY2016B4A_015.d | Acquity 2.1(mm) |
| LCS 320-108614/2-A | | 05/07/2016 18:29 | 1 | 07MAY2016B4A_016.d | Acquity 2.1(mm) |
| LCSD 320-108614/3-A | | 05/07/2016 18:50 | 1 | 07MAY2016B4A_017.d | Acquity 2.1(mm) |
| 320-18555-1 | | 05/07/2016 19:11 | 1 | 07MAY2016B4A_018.d | Acquity 2.1(mm) |
| 320-18555-2 | | 05/07/2016 19:33 | 1 | 07MAY2016B4A_019.d | Acquity 2.1(mm) |
| ZZZZZ | | 05/07/2016 21:18 | 1 | | Acquity 2.1(mm) |
| CCV 320-109262/25 | | 05/07/2016 21:40 | 1 | 07MAY2016B4A_025.d | Acquity 2.1(mm) |

# LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento  Job No.: 320-18555-1

SDG No.:

Batch Number: 108614  Batch Start Date: 05/03/16 12:39  Batch Analyst: Marchenko, Veronika P

Batch Method: 3535  Batch End Date: 05/04/16 16:24

| Lab Sample ID | Client Sample ID | Method Chain | Basis | GrossWeight | TareWeight | InitialAmount | FinalAmount | LCMPFCSU 00036 | LCPFCSP 00047 |
|---|---|---|---|---|---|---|---|---|---|
| MB 320-108614/1 | | 3535, WS-LC-0025 | | | | 500 mL | 1.0 mL | 50 uL | |
| LCS 320-108614/2 | | 3535, WS-LC-0025 | | | | 500 mL | 1.0 mL | 50 uL | 20 uL |
| LCSD 320-108614/3 | | 3535, WS-LC-0025 | | | | 500 mL | 1.0 mL | 50 uL | 20 uL |
| 320-18555-B-1 | DW16 | 3535, WS-LC-0025 | T | 556.26 g | 39.14 g | 517.1 mL | 1.0 mL | 50 uL | |
| 320-18555-A-2 | DW16FB | 3535, WS-LC-0025 | T | 590.52 g | 39.87 g | 550.7 mL | 1.0 mL | 50 uL | |

| Batch Notes | |
|---|---|
| Balance ID | QA-070 |
| Batch Comment | 0.1N NaOH/H2O: 607459; HEXANE: 0000125986; MeOH: 620223; Manifold 9 |
| H2O ID | 04-25-16 |
| Pipette ID | EC15219, EC15131 |
| Analyst ID - Reagent Drop | VPM |
| Analyst ID - SU Reagent Drop | VPM |
| Analyst ID - SU Reagent Drop Witness | HJA |
| Solvent Lot # | 622460 |
| Solvent Name | 0.3% NH4OH/MeOH |
| SOP Number | WS-LC-0025 |
| SPE Cartridge Type | WAX 500mg |
| Solid Phase Extraction Disk ID | 002636061A |

| Basis | Basis Description |
|---|---|
| T | Total/NA |

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

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West Sacramento

# HPLC/LCMS Data Review Checklist

Job Number(s): 18555 Work List ID(s): 30565

Extraction Batch: 108614 Analysis Batch(es): 109262

Delivery Rank 4 Due Date: 5/9/16

| A. Calibration/Instrument Run QC | 1st Level | 2nd Level | N/A |
|---|---|---|---|
| 1. ICAL locked in Chrom and TALS? ICAL Batch# | ✓ | ✓ | |
| 2. ICAL, CCV Frequency & Criteria met. | ✓ | ✓ | |
| • $RF_{average}$ criteria appropriate for the method. | ✓ | ✓ | |
| • Linear Regression criteria appropriate if required ($r \geq 0.995$). | ✓ | ✓ | |
| • Quadratic fit criteria appropriate if required ($r^2 \geq 0.990$). | | | ✓ |
| • For Linear Regression and Quadratic fit – Does the y-intercept support ½ the reporting limit as described in CA-Q-S-005? | ✓ | ✓ | |
| • All curve points show calculated concentrations. | ✓ | ✓ | |
| 3. Peaks correctly ID'd by data system. | ✓ | ✓ | |
| 5. Tune check frequency & criteria met and Tune check report attached. | | | ✓ |
| B. QA/QC | | | |
| 1. Are all QC samples properly linked in TALS? | ✓ | ✓ | |
| 2. Method blank, LCS/LCSD and MS/SD frequencies met. | ✓ | ✓ | |
| 3. LCS/LCSD and MB data are within control limits. If not, NCM is present. | ✓ | ✓ | |
| 4. Are MS/MSD recoveries and RPD within control limits? | | | ✓ |
| 5. Holding Times were met for prep and analytical. | ✓ | ✓ | |
| 6. IS/Surrogate recoveries meet criteria or properly noted. NCM | ✓ | ✓ | |
| C. Sample Analysis | | | |
| 1. Was correct analysis performed and were project instructions followed? | ✓ | ✓ | |
| 2. If required, are compounds within RT windows? | | | ✓ |
| 3. If required, are positive hits confirmed and >40% RPD flagged? | | | ✓ |
| 4. Manual-Integrations reviewed and appropriate. | ✓ | ✓ | |
| 5. All analytes correctly reported. (Primary, secondary, acceptable status) | ✓ | ✓ | |
| 6. Correct reporting limits used. (based on client request, prep factors, and dilutions) | ✓ | ✓ | |
| D. Documentation | | | |
| 1. Are all non-conformances documented/attached? NCM# 52185 | ✓ | ✓ | |
| 2. Do results make sense (e.g. dilutions, etc.)? | ✓ | ✓ | |
| 3. Have all flags been reviewed for appropriateness? | ✓ | ✓ | |
| 4. For level 3 and 4 reports, have forms and raw data been reviewed? | | ✓ | ✓ 5/9/2016 MKW |
| 5. Was QC Checker run for this job? | ✓ | ✓ | |

*Upon completion of this checklist, the reviewer must scan and attach the checklist to the TALS job.*

1st Level (Analyst): JRB Date: 5-9-16

2nd Level Reviewer: MKWolf Date: 5/9/2016

Box # 66

# Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-108614

Method Code: 320-3535_IVWT-320

Analyst: Marchenko, Veronika P

RUSH Due 5/9

Batch Open: 5/3/2016 12:39:16PM

Batch End: 5/4/16 16:24

## Solid-Phase Extraction (SPE)

| | Input Sample Lab ID (Analytical Method) | SDG (Job #) | GrossWt TareWt | InitAmnt FinAmnt | PHs Rcvd | PHs Adj1 | PHs Adj2 | Due Date | Analytical TAT | Dlv Rank | Comments | Output Sample Lab ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MB~320-108614/1 N/A | N/A | | 500 mL | | | | N/A | N/A | N/A | | MB 320-108614/1-A |
| | | | | 1.0 mL | | | | | | | | |
| 2 | LCS~320-108614/2 N/A | N/A | | 500 mL | | | | N/A | N/A | N/A | | LCS 320-108614/2-A |
| | | | | 1.0 mL | | | | | | | | |
| 3 | LCSD~320-108614/3 N/A | N/A | | 500 mL | | | | N/A | N/A | N/A | | LCSD 320-108614/3-A |
| | | | | 1.0 mL | | | | | | | | |
| 4 | 320-18555-B-1 (PFC_IDA_DOD5) | N/A (320-18555-1) | 556.26 g | 517.1 mL | | | | 5/5/16 | 5_Days | 4 | | 320-18555-B-1-A |
| | | | 39.14 g | 1.0 mL | | | | | | | | |
| 5 | 320-18555-A-2 (PFC_IDA_DOD5) | N/A (320-18555-1) | 590.52 g | 550.7 mL | | | | 5/5/16 | 5_Days | 4 | | 320-18555-A-2-A |
| | | | 39.87 g | 1.0 mL | | | | | | | | |

# Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-108614
Method Code: 320-3535_IVWT-320

Analyst: Marchenko, Veronika P

Batch Open: 5/3/2016 12:39:16PM
Batch End:

## Batch Notes

| | |
|---|---|
| First Start time | NA |
| First End time | NA |
| Balance ID | QA-070 |
| SPE Cartridge Type | WAX 500mg |
| Solid Phase Extraction Disk ID | 002636061A |
| H2O ID | 04-25-16 |
| Pipette ID | EC15219, EC15131 |
| Solvent Name | 0.3% NH4OH/MeOH |
| Solvent Lot # | 622460 |
| Analyst ID - Reagent Drop | VPM |
| Analyst ID - SU Reagent Drop | VPM |
| Analyst ID - SU Reagent Drop Witness | HJA |
| Acid Name | NA |
| Acid ID | NA |
| Reagent ID | NA |
| Reagent Lot Number | NA |
| NaCl ID | NA |
| SOP Number | WS-LC-0025 |
| Batch Comment | 0.1N NaOH/H2O: 607459; HEXANE: 0000125986; MeOH: 620223; Manifold 9 |

# Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-108614
Analyst: Marchenko, Veronika P
Batch Open: 5/3/2016 12:39:16PM

Method Code: 320-3535_IVWT-320
Batch End:

## Comments

320-18555-B-1
Method Comments: Q5Rev111213_StdVarApp_30day disposal

320-18555-A-2
Method Comments: Q5Rev111213_StdVarApp_30day disposal

# Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-108614 Analyst: Marchenko, Veronika P Batch Open: 5/3/2016 12:39:16PM

Method Code: 320-3535_IVWT-320 Batch End:

## Reagent Additions Worksheet

| Lab ID | Reagent Code | Amount Added | Final Amount | By | Witness |
|---|---|---|---|---|---|
| MB 320-108614/1 | LCMPFCSU_00036 | 50 uL | 1.0 mL | VPM 05-03-16 | NJA 5-3-16 |
| LCS 320-108614/2 | LCMPFCSU_00036 | 50 uL | 1.0 mL | | |
| LCS 320-108614/2 | LCPFCSP_00047 | 20 uL | 1.0 mL | | |
| LCSD 320-108614/3 | LCMPFCSU_00036 | 50 uL | 1.0 mL | | |
| LCSD 320-108614/3 | LCPFCSP_00047 | 20 uL | 1.0 mL | | |
| 320-18555-B-1 | LCMPFCSU_00036 | 50 uL | 1.0 mL | | |
| 320-18555-A-2 | LCMPFCSU_00036 | 50 uL | 1.0 mL | | |

### Other Reagents:

| Reagent | Amount/Units | Lot#: |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

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Sacramento
Preparation Data Review Checklist

Preparation Batch Number(s): 108614 Test: PFC_IDA_5000D5 VPM 5/9/16

Earliest Holding Time: 5-04-16

| Sample List Tab | 1st Level Reviewer | 2nd Level Reviewer |
|---|---|---|
| Samples identified to the correct method | ✓ | ✓ |
| All necessary NCMs filed (including holding time) | ✓ | ✓ |
| Method/sample/login/QAS checked and correct | ✓ | ✓ |
| **Worksheet Tab** | **1st Level Reviewer** | **2nd Level Reviewer** |
| All samples properly preserved | NA | NA |
| Weights in anticipated range and not targeted | ✓ | ✓ |
| All additional test requirements performed, documented, and uploaded to TALS correctly (e.g. final amount, initial amount, turbidity, and CI Check) | ✓ | ✓ |
| The pH is transcribed correctly in TALS | NA | NA |
| All additional information transcribed into TALS is correct and raw data is attached | ✓ | ✓ |
| Comments are transcribed correctly in TALS | ✓ | ✓ |
| **Reagents Tab** | **1st Level Reviewer** | **2nd Level Reviewer** |
| All necessary reagents not expired and entered into TALS | ✓ | ✓ |
| All spike amounts correct and added to necessary samples and QC | ✓ | ✓ |
| **Batch Information** | **1st Level Reviewer** | **2nd Level Reviewer** |
| Date and time accurate and entered into TALS correctly | ✓ | ✓ |
| All necessary 'batch information' complete and entered into TALS correctly | ✓ | ✓ |

1st Level Reviewer: VPM Date: 05-04-16

2nd Level Reviewer: SNE Date: 5/4/16

Comments:

# Shipping and Receiving Documents

**TestAmerica Denver**
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

# Chain of Custody Record

TestAmerica

| Client Information | Sampler: Tom Lesinski | Lab PM: Johnston, Michelle A | Carrier Tracking No(s): | COC No: 280-48902-18075 1 |
|---|---|---|---|---|
| Client Contact: Mike Dryden | Phone: | E-Mail: michelle.johnston@testamericainc.com | | Page: Page 1 of 1 |
| Company: Earth Toxics, Inc | | | | Job #: |
| Address: PO BOX 3382 | Due Date Requested: | | | |
| City: Logan | TAT Requested (days): 7 DAY | | | |
| State, Zip: UT, 84321 | | | | |
| Phone: | PO #: Purchase Order Requested | | | |
| Email: mdryden@earthtoxics.com | WO #: | | | |
| Project Name: Ensafe-NWS - Earle, NJ PFCs Potable Water | Project #: 28014493 | | | |
| Site: | SSOW#: | | | |

**Analysis Requested**

| Sample Identification | Sample Date | Sample Time | Sample Type (C=comp, G=grab) | Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air) | 537 MOD (PFOS, PFOA, PFNA, PFHxS, PFHpA & PFBS) Ship Direct to TA - Sacramento |
|---|---|---|---|---|---|
| DW16 | 4-27-16 | 1236 | G | W | X |
| DW16FB | 4-27-16 | 1240 | G | W | X |

**Preservation Codes:**

| | |
|---|---|
| A - HCL | M - Hexane |
| B - NaOH | N - None |
| C - Zn Acetate | O - AsNaO2 |
| D - Nitric Acid | P - Na2O4S |
| E - NaHSO4 | Q - Na2SO3 |
| F - MeOH | R - Na2S2SO3 |
| G - Amchlor | S - H2SO4 |
| H - Ascorbic Acid | T - TSP Dodecahydrate |
| I - Ice | U - Acetone |
| J - DI Water | V - MCAA |
| K - EDTA | W - ph 4-5 |
| L - EDA | Z - other (specify) |

Other:

Special Instructions/Note:

320-18555 Chain of Custody

**Possible Hazard Identification**
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

**Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)**
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Empty Kit Relinquished by: | | Date: | | Time: | | Method of Shipment: | |
| Relinquished by: | | Date/Time: 4-27-16 | 1410 | Company: TestAmerica | Received by: | Date/Time: 4/28/16 0915 | Company: TACDS |
| Relinquished by: | | Date/Time: | | Company: | Received by: | Date/Time: | Company: |
| Relinquished by: | | Date/Time: | | Company: | Received by: | Date/Time: | Company: |

| Custody Seals Intact: | Custody Seal No.: | Cooler Temperature(s)°C and Other Remarks |
|---|---|---|
| Δ Yes Δ No | | 0.8 |

# Login Sample Receipt Checklist

Client: Earth Toxics, Inc

Job Number: 320-18555-1

**Login Number: 18555**
**List Number: 1**
**Creator: Nelson, Kym D**

**List Source: TestAmerica Sacramento**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | True | |
| The cooler's custody seal, if present, is intact. | N/A | |
| Sample custody seals, if present, are intact. | N/A | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| Is the Field Sampler's name present on COC? | True | |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | N/A | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |

| Sample | Sample Name | Specific Method | CAS Number | Analyte | Result | Units | Qualifier | Limit | Reports To | Dilution | Result Basis | Batch | Sampled | Prepared | Analyzed | Analysis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 320-18555-1 | DW16 | PFC_IDA_DOD5 | 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | 1.9 | ng/L | U | 0.89 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:36 PM | 5/3/2016 12:39 PM | 5/7/2016 7:11 PM | Perfluorinated Hydrocarbons |
| 320-18555-1 | DW16 | PFC_IDA_DOD5 | 375-85-9 | Perfluoroheptanoic acid (PFHpA) | **1.0** | ng/L | J | 0.78 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:36 PM | 5/3/2016 12:39 PM | 5/7/2016 7:11 PM | Perfluorinated Hydrocarbons |
| 320-18555-1 | DW16 | PFC_IDA_DOD5 | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | 1.9 | ng/L | U | 0.84 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:36 PM | 5/3/2016 12:39 PM | 5/7/2016 7:11 PM | Perfluorinated Hydrocarbons |
| 320-18555-1 | DW16 | PFC_IDA_DOD5 | 375-95-1 | Perfluorononanoic acid (PFNA) | 1.9 | ng/L | U | 0.63 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:36 PM | 5/3/2016 12:39 PM | 5/7/2016 7:11 PM | Perfluorinated Hydrocarbons |
| 320-18555-1 | DW16 | PFC_IDA_DOD5 | 1763-23-1 | Perfluorooctanesulfonic acid (PFOS) | **1.3** | ng/L | J M | 1.2 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:36 PM | 5/3/2016 12:39 PM | 5/7/2016 7:11 PM | Perfluorinated Hydrocarbons |
| 320-18555-1 | DW16 | PFC_IDA_DOD5 | 335-67-1 | Perfluorooctanoic acid (PFOA) | **1.3** | ng/L | J | 0.72 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:36 PM | 5/3/2016 12:39 PM | 5/7/2016 7:11 PM | Perfluorinated Hydrocarbons |
| 320-18555-2 | DW16FB | PFC_IDA_DOD5 | 375-73-5 | Perfluorobutanesulfonic acid (PFBS) | 1.8 | ng/L | U | 0.83 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:40 PM | 5/3/2016 12:39 PM | 5/7/2016 7:33 PM | Perfluorinated Hydrocarbons |
| 320-18555-2 | DW16FB | PFC_IDA_DOD5 | 375-85-9 | Perfluoroheptanoic acid (PFHpA) | 1.8 | ng/L | U | 0.73 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:40 PM | 5/3/2016 12:39 PM | 5/7/2016 7:33 PM | Perfluorinated Hydrocarbons |
| 320-18555-2 | DW16FB | PFC_IDA_DOD5 | 355-46-4 | Perfluorohexanesulfonic acid (PFHxS) | 1.8 | ng/L | U | 0.79 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:40 PM | 5/3/2016 12:39 PM | 5/7/2016 7:33 PM | Perfluorinated Hydrocarbons |
| 320-18555-2 | DW16FB | PFC_IDA_DOD5 | 375-95-1 | Perfluorononanoic acid (PFNA) | 1.8 | ng/L | U | 0.59 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:40 PM | 5/3/2016 12:39 PM | 5/7/2016 7:33 PM | Perfluorinated Hydrocarbons |
| 320-18555-2 | DW16FB | PFC_IDA_DOD5 | 1763-23-1 | Perfluorooctanesulfonic acid (PFOS) | 2.7 | ng/L | U | 1.2 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:40 PM | 5/3/2016 12:39 PM | 5/7/2016 7:33 PM | Perfluorinated Hydrocarbons |
| 320-18555-2 | DW16FB | PFC_IDA_DOD5 | 335-67-1 | Perfluorooctanoic acid (PFOA) | 1.8 | ng/L | U | 0.68 | MDL | 1.0 | Total | 109262 | 4/27/2016 12:40 PM | 5/3/2016 12:39 PM | 5/7/2016 7:33 PM | Perfluorinated Hydrocarbons |

Naval Installation Restoration Information Solution (NIRIS)
Environmental Restoration Program (ERP) Records
Transmittal Form

## Purpose

Complete one copy of this form to accompany the paper and electronic versions of Environmental Restoration Program (ERP) records submitted for inclusion to NIRIS.

## Submitted By:

**Name:** Jennifer O'Keefe

**Organization:** Resolution Consultants

**Email:** jokeefe@ensafe.com **Phone:** 609-610-2721

## Record Information:

**Installation:** NWS Earle

**Program:** (●) ERN ( ) BRAC **Supporting:** [ ] MRP [ ] LUC [ ] RAD [ ] POL

**Document Title:** Data Validation Report

**AOC, SITE, SWMU, UST, UXO:** Site 46 Military Sealift Command Fire School

**Sample Delivery Groups (SDGs):** 320-18555-1

**Document Date:** June 2016 **Number of Pages:** 6

**Contract Number:** N62470-11-D-8013 **CTO/DO Number:** WE09

**Author/Affiliation:** Jennifer O'Keefe/Resolution Consultants

**Distribution/Availability Statement:** [■] A [ ] B [ ] C [ ] D [ ] E [ ] F

**Sensitive Content** ( ) Yes (●) No **Cite Pages:**

**Recommended File Type:** ( ) Administrative Record ( ) Post Decision (●) Site File

## Notes:

## DATA VALIDATION REPORT

| | |
|---|---|
| **Site Name**: | Naval Weapons Station Earle, Colts Neck, New Jersey, Site 46 — Military Sealift Command Firefighting School |
| **Laboratory**: | TestAmerica, Sacramento, California. |
| **Sample Delivery Groups**: | 320-18555-1 |
| **Matrix**: | Potable Water |
| **Data Quality Level**: | Stage 4, Electronic and Manual |
| **Analysis**: | Select perfluorinated compounds (PFCs) via Method 537 Modified |

This report summarizes data review findings for potable water samples collected in April 2016 using the following reference documents:

- *Internal Draft Perfluorinated Compound Groundwater Investigation Sampling and Analysis Plan, Site 46 Military Sealift Command, Naval Weapons Station Earle Newport, Colts Neck, New Jersey*, Resolution Consultants (December 2015).

- Laboratory standard operating procedure (SOP) *Perfluorinated Compounds (PFCs) in Water, Soils, Sediments, and Tissue [Method 37 Modified],* TestAmerica, Sacramento, California, WS-LC-0025, Revision 1.5, (November 2015).

- *Contract Laboratory Program National Functional Guidelines for Chlorinated Dioxin/Furan Data review,* United States Environmental Protection Agency*,* (September 2011).

- *Department of Defense Quality Systems Manual for Environmental Laboratories*, Version 5.0. (July 2013).

Validation was performed on one potable water sample (DW-16) and a field blank (DW-16FB) as summarized in Attachment A. Samples discussed in this validation report were analyzed and reported as definitive data. A full deliverable data packages, QC summaries and raw data, were submitted for data review.

The data were evaluated based on the following review elements:

* Data completeness
* Sample receipt and preservation
* Holding times
* Initial calibration
* Initial calibration verification
* Continuing calibration verification
* Laboratory control sample/laboratory control sample duplicate results
* Isotope dilution recoveries
* Laboratory method blanks
* Field and trip blanks
* Field duplicate precision
* Sample reporting issues
* Sample result transcriptions/recalculations

Acceptable data parameters for which all criteria were met, as indicated above with an asterisk (*), are not discussed further.

### Isotope Dilution Recoveries

The isotope dilution analytes consist of carbon-13 labeled analogs, oxygen-18 labeled analogs, or deuterated analogs of the compounds of interest, and they are spiked into every standard and sample at the time of extraction. This provides a correction for recovery of each corresponding native compound because the native compound and its labeled compound exhibit similar effects upon extraction, concentration, and analysis. By determining the ratio of these amounts, both the quantity and mass of the compound can be ascertained.

Sample DW-16FB had an isotope dilution percent recovery (%R) for $^{13}C_4$-PFOS of 189%, which was above the 25-150% control limit. However, no qualification was performed because isotope dilution recovery outliers are not anticipated to have adverse effects to data quality.

### Overall Assessment

The data from SDG 320-18555-1 were reviewed independently from the laboratory to assess data quality. The results were acceptable without qualification; therefore, the data are usable for their intended purpose, according to U.S. Environmental Protection Agency and Department of Defense guidelines. Attachment B provides final results after data review.

**Attachment A**
**Sample and Analysis Summary**

| Table A-1<br>Sample Summary | | | | |
|---|---|---|---|---|
| **Sample Delivery Group** | **Laboratory Identification** | **Sample Date** | **Sample Identification** | **Sample Type** |
| 320185551 | 320-18555-1 | 4/27/2016 | DW-16 | Potable Water |
| 320185551 | 320-18555-2 | 4/27/2016 | DW-16FB | Field Blank |

***Notes:***

All samples were analyzed via laboratory standard operating procedure *Perfluorinated Compounds (PFCs) in Water, Soils, Sediments, and Tissue [Method 37 Modified],* TestAmerica, Sacramento, California, WS-LC-0025, Revision 1.5, (November 2015) for the following select list of analytes: Perfluorobutanesulfonic Acid (PFBS), Perfluoroheptanoic Acid (PFHPA), Perfluorohexanesulfonic Acid (PFHXS), Perfluorononanoic Acid (PFNA), Perfluorooctane Sulfonic Acid (PFOS), and Perfluorooctanoic Acid (PFOA).

**Attachment B**

**Final Validated Results after Data Review**

**Table B-1**
**Perfluorinated Compound Results – April 2016**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **Sample Delivery Group** | 320185551 | | 320185551 | |
| | | **Lab Identification** | 320-18555-1 | | 320-18555-2 | |
| | | **Sample Identification** | DW-16 | | DW-16FB | |
| | | **Sample Date** | 4/27/2016 | | 4/27/2016 | |
| | | **Sample Type** | Potable Water | | Field Blank | |
| **Analyte** | **CAS No** | **Units** | Result | Qual | Result | Qual |
| Perfluorobutanesulfonic Acid (PFBS) | 375-73-5 | ng/L | 1.9 | U | 1.8 | U |
| Perfluoroheptanoic Acid (PFHPA) | 375-85-9 | ng/L | 1.0 | J | 1.8 | U |
| Perfluorohexanesulfonic Acid (PFHXS) | 355-46-4 | ng/L | 1.9 | U | 1.8 | U |
| Perfluorononanoic Acid (PFNA) | 375-95-1 | ng/L | 1.9 | U | 1.8 | U |
| Perfluorooctane Sulfonic Acid (PFOS) | 1763-23-1 | ng/L | 1.3 | J | 2.7 | U |
| Perfluorooctanoic Acid (PFOA) | 335-67-1 | ng/L | 1.3 | J | 1.8 | U |

***Notes:***
ng/L = Nanograms per liter
Qual = Final qualifier
U = ***Undetected*** — The parameter was analyzed but undetected.
J = ***Estimated Value*** — The analyte concentration was less than the limit of quantitation.

# Naval Weapons Station Earle


Approximate Existing Public Water Distribution System

Approximate Groundwater Flow

One Half Mile Area Designated for Drinking Water Sampling (Potable Well Source)

NWS Earle Property Boundary

0 450 900 Feet

NWS EARLE OFFBASE PFC INVESTIGATION
POTABLE WELL SAMPLE AREA
COLTS NECK, NEW JERSEY

NAVFAC Naval Facilities Engineering Command

RESOLUTION CONSULTANTS

| | |
|---|---|
| REQUESTED BY: J. O'KEEFE | DATE: 2/3/2016 |
| DRAWN BY: M. SENNE | TASK ORDER NUMBER: XXXXX |

X:\Navy\Earle\PotableInvestigationArea.mxd