FINAL REPORT

Evaluation of Indirect Thermal Desorption Coupled with Thermal Oxidation Technology to Treat Solid PFAS-Impacted Investigation-Derived Waste

SERDP Project ER18-1572

FEBRUARY 2020

Frank Barranco
Paul Caprio
George Hay
EA Engineering, Science, and Technology, Inc., PBC

SERDP
DOD ▪ EPA ▪ DOE

Page Intentionally Left Blank

Page Intentionally Left Blank

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
02-28-2020	SERDP Final Report	November 2018-February 2020

4. TITLE AND SUBTITLE
Final Demonstration Test Report Testing of Indirect Thermal Desorption Coupled with Thermal Oxidation Technology to Treat Solid PFAS-Impacted Investigation-Derived Waste

5a. CONTRACT NUMBER
W912HQ18C0035

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Barranco, Frank

Caprio, Paul

Hay, George

5d. PROJECT NUMBER
W74RDV80194256

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

EA Engineering, Science, and
Technology, Inc., PBC
225 Schilling Circle, Suite 400
Hunt Valley, MD 21031-1124

8. PERFORMING ORGANIZATION REPORT NUMBER
6330901

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

USACE Humphreys ENGR CTR SPT
ATTN: CECT-HC
7701 Telegraph Road
Alexandria, VA 22315-3860

SERDP Program Office
Program Manager
4800 Mark Center Drive
Suite 17D08
Alexandria, VA 22350-3600

10. SPONSOR/MONITOR'S ACRONYM(S)
SERDP

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
ER18-1572

12. DISTRIBUTION / AVAILABILITY STATEMENT

13. SUPPLEMENTARY NOTES

14. ABSTRACT
Previous studies have shown that thermal technology can reduce levels of per- and polyfluoroalkyl substances (PFAS) in soil, combust PFAS contained in commercial products, or mineralize PFAS-based industrial chemicals. However, uncertainties remain regarding ITD parameterization for application to treatment of specific PFAS-impacted waste as well as the destruction and removal efficiency (DRE) that can be achieved through off-gas treatment by thermal oxidation (TO). The overall objective of this study was to advance the current understanding of ITD/TO's effectiveness for the treatment of soil containing a typical suite of PFAS found in, but not limited to, aqueous film forming foam (AFFF) formulations manufactured and heavily utilized prior to 2002.

A series of ten tests were conducted on sand spiked with PFAS at concentrations ranging from approximately 6,000 to 19,000 micrograms per kilogram (µg/kg). Spiked feed soil samples and thermally treated soil samples were collected for each test run. Soil samples were collected in duplicate for each condition. Over 60 soil samples were collected. All soil samples were analyzed for PFAS using U.S. Environmental Protection Agency (EPA) Method 537 Liquid Chromatography/Tandem Mass Spectrometry. For the test runs spiked with AFFF, soil samples were also analyzed for Total Oxidizable Precursor Assay.

15. SUBJECT TERMS
Thermal Treatment, Indirect Thermal Desorption (ITD), Thermal Oxidation (TO), Polyfluorinated alkyl substances (PFAS),Investigative Derived Waste (IDW)

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Ivy Harvey
U	U	U	UU	669	**19b. TELEPHONE NUMBER** *(include area code)* 410-584-7000

This page intentionally left blank

ABSTRACT

Previous studies have shown that thermal technology can reduce levels of per- and polyfluoroalkyl substances (PFAS) in soil, combust PFAS contained in commercial products, or mineralize PFAS-based industrial chemicals. However, uncertainties remain regarding ITD parameterization for application to treatment of specific PFAS-impacted waste as well as the destruction and removal efficiency (DRE) that can be achieved through off-gas treatment by thermal oxidation (TO). **The overall objective of this study was to advance the current understanding of ITD/TO's effectiveness for the treatment of soil containing a typical suite of PFAS found in, but not limited to, aqueous film forming foam (AFFF) formulations manufactured and heavily utilized prior to 2002.**

A series of ten tests were conducted on sand spiked with PFAS at concentrations ranging from approximately 6,000 to 19,000 micrograms per kilogram (µg/kg). Spiked feed soil samples and thermally treated soil samples were collected for each test run. Soil samples were collected in duplicate for each condition. Over 60 soil samples were collected. All soil samples were analyzed for PFAS using U.S. Environmental Protection Agency (EPA) Method 537 Liquid Chromatography/Tandem Mass Spectrometry. For the test runs spiked with AFFF, soil samples were also analyzed for Total Oxidizable Precursor Assay.

On four of the ten tests, the off gas from the thermal desorption unit was passed through a TO, and air samples were collected from the exhaust gas. The TO was operated at 1,000 degrees Celsius (°C) with a nominal residence time of 2.0 seconds for the DRE demonstration test runs. Four comparative test runs were conducted with two test runs analyzing the TO exhaust gas for PFAS via EPA Method 0010/Method 537 (to evaluate removal and destruction) and two test runs analyzing the exhaust gas for hydrogen fluoride via EPA Method 26A (to assess mass balance of Fluorine).

The demonstration tests show conclusively that at 650°C the ITD technology will remediate (i.e., removal by desorption) PFAS in soil to a concentration of less than 1-10 µg/kg, and that a TO can achieve a DRE of greater than 99.9997% for off-gas emissions from ITD-treated PFAS feed material. Test results also demonstrated that ITD technology effectively desorbs PFAS precursors when treating soils that were recently spiked with AFFF. The knowledge of how PFAS behaves in combustion or thermal processes is scarce. One of the more important aspects of this study was to advance the understanding of ITD/TO's (at the temperatures tested) capability to achieve "irreversible destruction" of PFAS-containing materials (including impacted soils, spent Granular Activated Carbon (GAC), and investigation-derived waste) and if other unintentional PFAS degradation products may have been formed during the process. During the tests where the TO was employed and the exhaust gas was analyzed separately for PFAS and HF, a mass balance was performed on fluorine to confirm the destruction of PFAS. Within the treated exhaust, the absence of PFAS (under extremely low detection limits at part per trillion levels) coupled with the recovery of the molar equivalent of fluorine (and associated mass balance) spiked within the feed material provided complimentary lines of evidence for PFAS removal and destruction..

Full-scale treatment of PFAS-impacted soil and spent sorbents from groundwater cleanup is currently limited to costly measures including: 1) transport to/disposal at a permitted landfill, 2) transport to/destruction at an incineration facility, and 3) high-temperature regenerative methods of sorbent media. Anticipating that future demand will only increase for PFAS-impacted soil and spent sorbent media, this study has direct benefits on advancing the state-of-the-industry by employing a mature technology (ITD/TO) to provide for "novel" and cost efficient treatment of a class of emerging contaminants. As an ancillary benefit to this study, significant improvements were made relating to laboratory methodology with sample extraction and recovery procedures for

analytical EPA Method 0010/EPA Method 537. These improvements will ensure in the future PFAS can be adequately extracted and recovered from an air sampling train for TO exhaust with Method 0010, thereby improving DRE estimates.

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (Continued)

ACRONYMS AND ABBREVIATIONS

°F	Degrees Fahrenheit
°C	Degrees Celsius
%	Percent
O_2	Oxygen
µg/kg	Microgram per kilogram
AFFF	Aqueous film forming foam
ASTM	American Society for Testing Materials
DoD	Department of Defense
DRE	Destruction and removal efficiency
DT	Demonstration test
EA	EA Engineering, Science, and Technology, Inc., PBC
EPA	United States Environmental Protection Agency
ESTCP	Environmental Security Technology Certification Program
FEED	Feed soil
HF	Hydrogen fluoride
ITD	Indirect Thermal Desorption
kg	Kilogram(s)
LC/MS/MS	Liquid Chromatography/Tandem Mass Spectrometry
mg/kg	Milligrams per kilogram
ng/L	Nanogram per liter
PFAA	Perfluoroalkyl acids
PFAS	Per- and polyfluoroalkyl substances
PFBS	Perfluorbutane sulfonate
PFC	Perfluorinated compound
PFCA	Perfluoroalkyl carboxylic acids
PFHxS	Perfluorohexane sulfonate
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFPeA	Perfluoropentanoic acid
PFSA	Perfluoroalkyl sulfonic acids
POHC	Principal organic hazardous constituent

ACRONYMS AND ABBREVIATIONS (CONTINUED)

ppb	Parts per billion
PROD	Treated soil
SCFM	Standard cubic feet per minute
SERDP	Strategic Environmental Research and Development Program
SI	Site Investigation
SVOC	Semi-volatile organic compound(s)
TO	Thermal oxidizer
TOP	Total Oxidizable Precursor Assay
USET	U.S. Ecology of Texas

KEYWORDS

Aqueous film forming foam (AFFF), Polyfluorinated alkyl substances (PFAS), Indirect Thermal Desorption (ITD), Thermal Oxidation (TO), destruction, Investigated Derived Waste (IDW), SERDP, destruction and removal efficiency (DRE), mass balance, off-gas, exhaust gas, EPA Method 0010, EPA Method 26A, Hydrogen Fluoride, EPA Method 537, precursors, TOP Assay, Fluorine.

ACKNOWLEDGEMENTS

EA would like to acknowledge the contributions of TestAmerica and TD*X Associates. Collaboration with TestAmerica was key in ensuring usable and defensible data were obtained in the exhaust gas during execution of the DT Program. TestAmerica completed this laboratory method development and validation, demonstrating that the six PFAS evaluated in the DT Program could be adequately recovered from the Method 0010 sampling train media (i.e., XAD-2 sorbent resin, condensate impingers, and a second XAD-2 resin trap) following analyses by EPA Method 537. TD*X Associates was vital in development and operation of the Demonstration Test pilot system used to execute this project and provided extensive knowledge and expertise on the implementation of thermal technologies.

ES. EXECUTIVE SUMMARY

Introduction—In May 2017, participants of a Strategic Environmental Research And Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) workshop identified a critical priority to demonstrate the effectiveness and sustainability of thermal destruction technologies for per- and polyfluoroalkyl substances (PFAS) waste streams (e.g., soils, spent granulated activated carbon, and resins). This report presents the results a pilot-scale demonstration test (DT) program to assess the performance of an Indirect Thermal Desorption (ITD) system and the destruction and removal efficiency (DRE) of a Thermal Oxidizer (TO) when treating PFAS-spiked soil and aqueous film forming foam (AFFF) (that includes PFOS-based pre 2002 formulations)-spiked soil. The activities in this contract include the development and government approval of a detailed test plan to evaluate the performance of the system; provisioning of the equipment, materials and trained personnel to perform the tests; execution of the tests in the test plan; and the generation of a report that documents the findings and conclusions of the tests.

Objectives—Previous studies have shown that thermal technologies (including ITD) can reduce PFAS levels in soil, combust PFAS contained in commercial products, and thermally mineralize PFAS-based industrial chemicals. However, uncertainties remain regarding ITD parameterization for application to treatment of specific PFAS-impacted waste as well as information regarding the Destruction Removal Efficiency (DRE) that can be achieved through off-gas treatment by TO. **The overall objective of this study was to advance the current understanding of ITD/TO's effectiveness for the treatment of soil containing a typical suite of PFAS found in, but not limited to, AFFF formulations manufactured and heavily utilized prior to 2002.**

A hypothesis-driven, two-phase pilot-scale treatment regime (referred to as DT Program) was conducted on PFAS-spiked and AFFF-spiked soils at two different thermal desorption temperatures (500 degrees Celsius [°C] and 650°C) with off-gas TO treatment at 1,000°C for a subset of test runs that included a quantitative fluorine mass balance. The DT Program was designed to answer the following four technical questions:

1. Is thermal desorption capable of treating a selected suite of PFAS to low parts per billion (ppb) levels in soil that would potentially allow for unrestricted reuse, discharge, or disposal of treated soil?
2. Does thermal desorption treatment effectively remove/treat/destroy potential precursors within soil?
3. During thermal desorption treatment, can TO achieve a DRE of 99.99 percent (%) for the selected suite of PFAS for the range of temperatures tested?
4. Can onsite ITD/TO treatment be a cost-effective alternative to current offsite disposal methods?

This study addresses ITD/TO treatment effectiveness, optimized operating parameters, air permitting requirements, and other practical considerations and attempts to validate the destruction pathway through calculation of DRE for residual PFAS as well as a fluorine mass balance.

Technical Approach—The subject demonstration tests were performed in Robstown, Texas using a pilot-scale thermal desorption system owned and operated by TD*X Associates under contract to EA Engineering, Science, and Technology, Inc., PBC (EA). Tests were initially planned to be conducted by treating soil spiked with the six PFAS included in the third Unregulated Contaminant Monitoring Rule and pre-2002 formulation AFFF solution diluted in water. However, due to a discrepancy when ordering, perfluoropentanoic acid (PFPeA) was received and ultimately used instead of perfluorononanoic (PFHpA) during the DT Program. PFPeA, like PFHpA is a perfluoalkyl carboxylic acid (PFCA), but a shorter 5 versus 7 chain PFCA. Use of this analyte as an alternate did not affect the overall project. The six PFAS used in these tests included: perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), PFPeA, and perfluorbutane sulfonate (PFBS). Tests were conducted in strict accordance with a sampling and analysis plan that specified samples per test run to be collected and analyzed (including quality control [QC] sampling), laboratory analytical methods and procedures, and data quality requirements.

The ITD/TO treatability testing was performed in two phases. During the first phase, a pilot-scale thermal desorber was used to treat PFAS-spiked and AFFF-spiked soils at two different temperatures (500°C and 650°C The first phase evaluated the performance of ITD technology to remediate AFFF-contaminated soils to low ppb levels and to determine if thermal desorption of AFFF-contaminated soils will desorb (i.e., remove) PFAS and potential PFAS precursors. The second phase of testing designed to demonstrate that an ITD unit (operating at temperature and residence time conditions optimal for PFAS removal from soil) combined with a TO for off-gas emissions control can achieve a DRE of 99.9997% for the PFAS-contaminant mass desorbed from the PFAS-spiked soil.

A series of ten tests were conducted on sand spiked with PFAS at concentrations ranging from approximately 6 to 19 milligrams per kilogram (mg/kg). Pre-treated spiked feed soil samples as well as thermally treated soil samples were collected for each test run. Over 60 pre-and post-treatment soil samples were collected and analyzed. PFAS analyses of pre- and post-treatment soil samples were conducted utilizing United States Environmental Protection Agency (EPA) Method 537 Liquid Chromatography/ Tandem Mass Spectrometry. Total Oxidizable Precursor (TOP) Assay analyses of pre- and post-treatment AFFF-spiked samples were also conducted. Two samples were collected and analyzed for TOP Assay with each test run.

The TO was operated at a nominal temperature of 1,000^{o}C for the DRE demonstration test runs. Four comparative test runs were conducted with two runs analyzing the TO exhaust gas for PFAS via EPA Method 0010/Method 537 and two runs analyzing the exhaust gas for Hydrogen Fluoride (HF) via EPA Method 26A. Figure ES-1 schematically illustrates the DT Program, how data was collected, synthesized, and used.

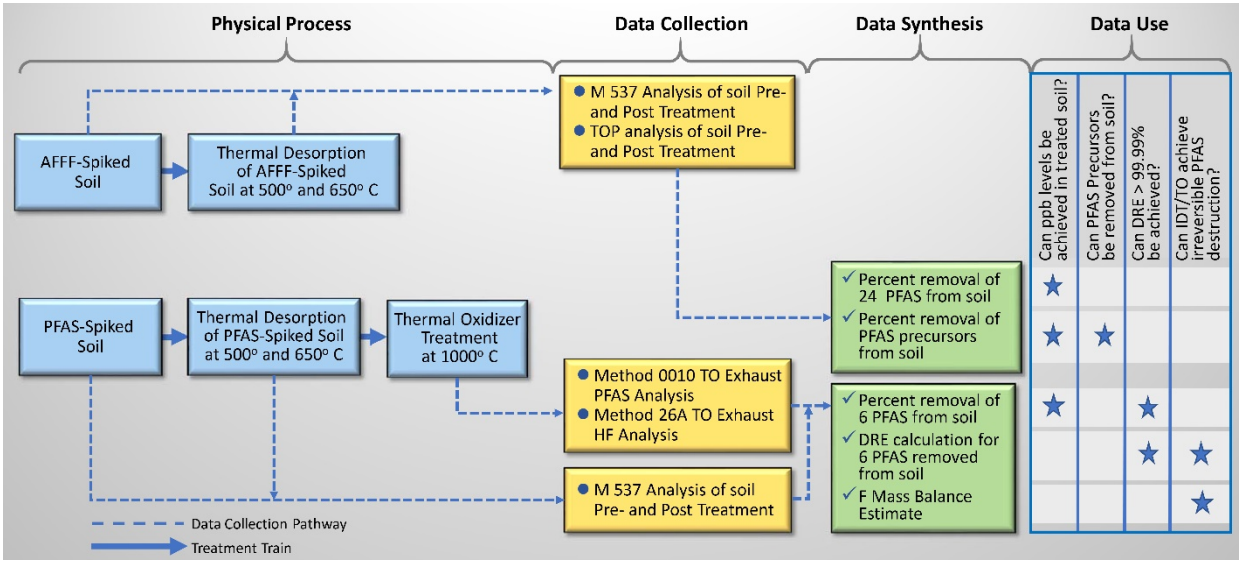


Figure ES-1. Summary of Demonstration Test Program

Results and Discussion— Based on the arithmetic average of the compilation of all AFFF-spiked soils tested at 500°C, PFAS removal exceeded 97% for the total of 24 quantifiable PFAS. The percent reduction for perfluoroalkyl sulfonic acids (PFSA), perfluoroalkyl carboxylic acids (PFCA) and fluorotelomer substances (FTS) subgroups are shown below in Figure ES-2.

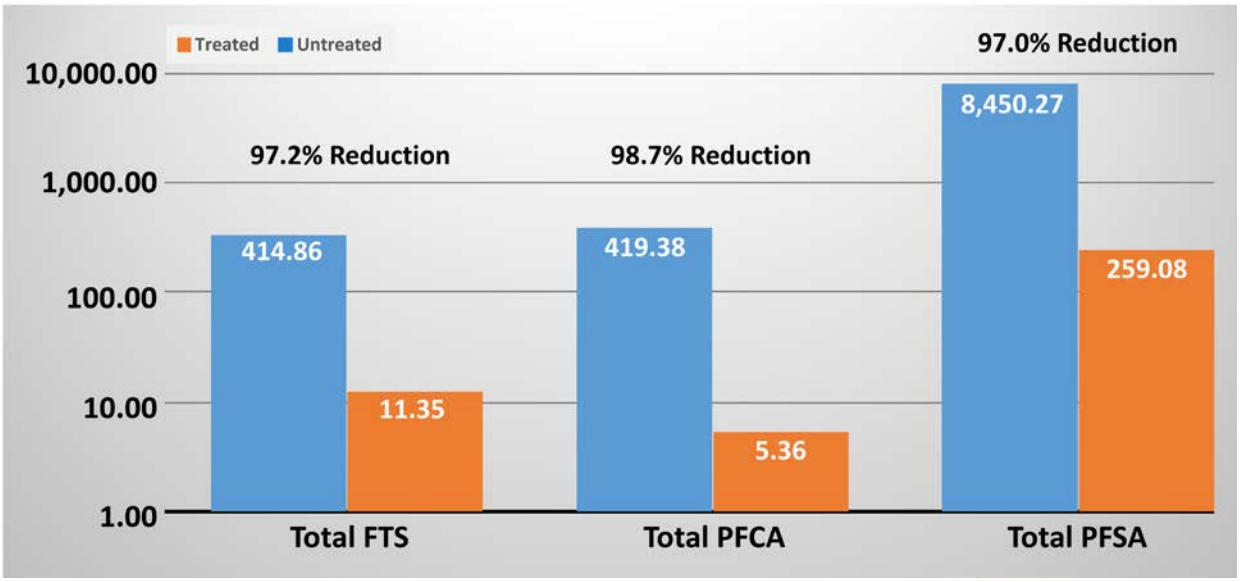


Figure ES-2. Thermal Desorption Treatment Results of AFFF in Soil (500° C)

Based on the arithmetic average of the compilation of all AFFF-spiked soils tested at 650°C, the PFAS removal exceeded 99.7% for all 24 of the total quantifiable PFAS. The percent reduction for PFSA, PFCA, and FTS subgroups are shown below in Figure ES-3.

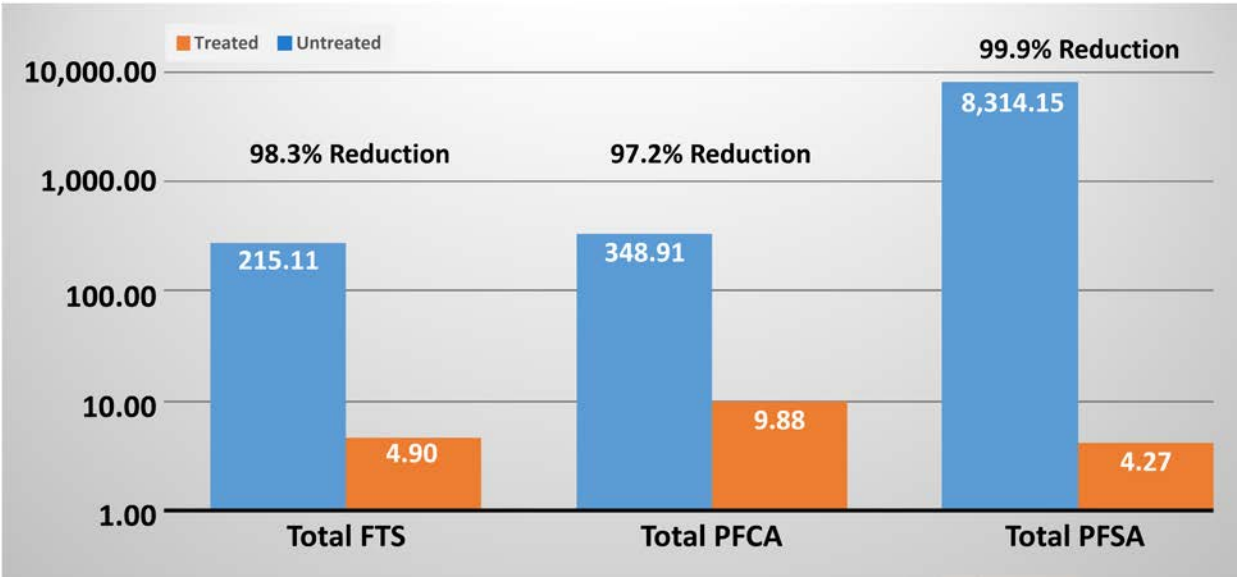


Figure ES-3. Thermal Desorption Treatment Results of AFFF-Spiked Soil (650°C)

TOP analyses was conducted on AFFF-spiked soils prior to and after thermal treatment at 500 and 650°C. The purpose was to evaluate if any precursors present in feed soil would be removed, and to what degree, by thermal treatment. As expected with the TOP procedure, pre-treated feed samples were oxidized, whereby the total PFCA mass increased in untreated samples by more than an order of magnitude (an indication of the significant presence of precursors in AFFF soil tested). However, after IDT treatment TOP analyses of oxidized samples compared to non-oxidized samples show insignificant increases in PFCA and overall reduction of PFCA precursors by at least 99% and 99.9 % respectively at 500°C and 650°C for treated samples. Figure ES-4 illustrates the arithmetically averaged PFCA levels prior to and after TOP, illustrating the presence of precursors in feed soil compared to pre- and post-oxidation results of process (treated) soil for tests operated at the ITD temperature of 650°C. These findings indicate that although AFFF

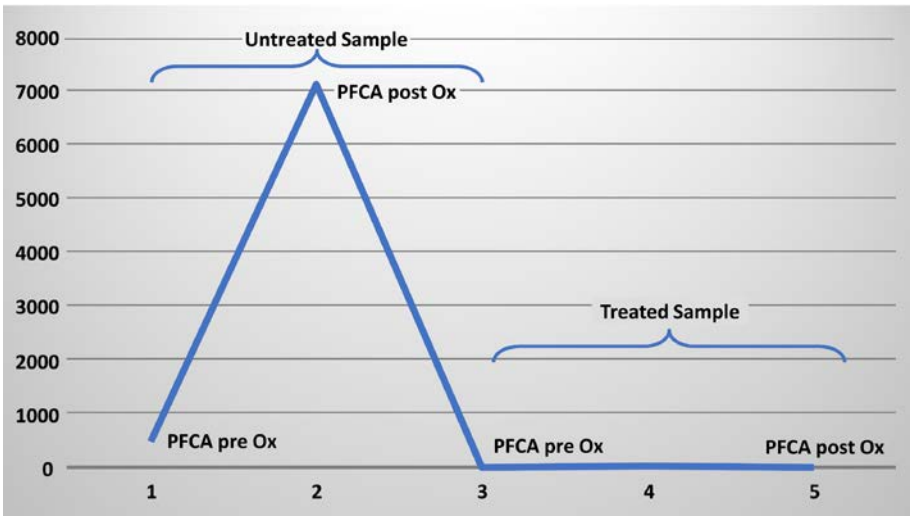


Figure ES-4 Total PFCA (ug/kg) for AFFF-Spiked Soil Treated at 650°C

contains a significant precursor burden that is subject to transformation, thermal removal efficiencies of greater that 99% were achieved, leaving little to no additional precursors remaining within the treated soil.

In addition to treatment of AFFF-spiked soil, six PFAS were spiked at known quantities to soils that were then treated at 500°C (Figure ES-5) and 650°C (Figure ES-6). These experiments were performed to assess, under highly controlled conditions, PFAS reduction in soils and TO exhaust gas when combining thermal desorption and thermal oxidation in the treatment train. Thermal oxidizer exhaust gas was analyzed for the six PFAS as well as HF, respectively, to calculate DRE and to complete a mass balance on fluorine. Based on the arithmetic average of PFAS-spiked soils (i.e., 3 PFCA and 3 PFSA) tested at 500°C, total PFAS removal exceeded 94%. The PFCA removal exceeded 99.8% while the PFSA removal was approximately 89%. With an approximate initial feed concentration of 45 ppm for the total of the 6 spiked PFAS (i.e., individual PFAS feed levels in the 6 to 9 ppm range) treated levels ranged from less than 20 ppb for PFCAs and between 500 and to approximately 1000 ppb for select PFSAs.

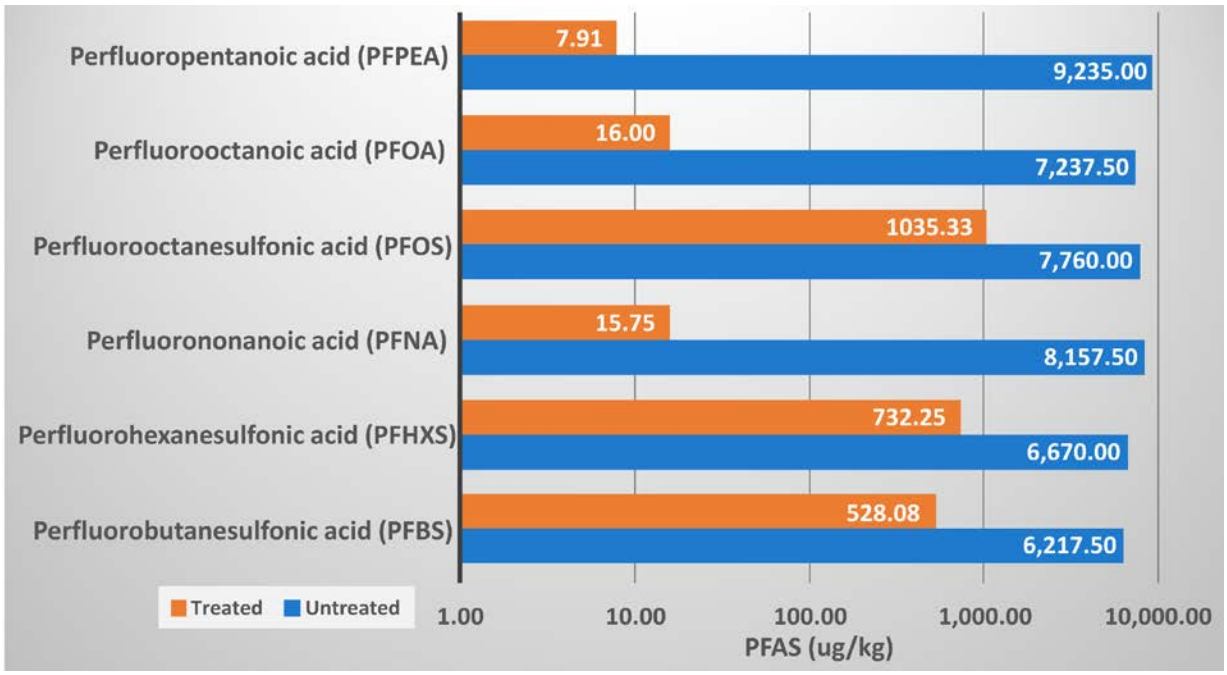


Figure ES-5. Thermal Desorption Treatment Results of 6 PFAS-Spiked Soil (500°C)

Based on the arithmetic average of all 6 PFAS-spiked soil (i.e., 3 PFCA and 3 PFSA) tested at 650°C, the PFAS removal exceeded 99% for PFAS, as well as the 3 PFCA and 3 PFSA. With an approximate initial feed concentration of 86 ppm for the total of 6 PFAS (i.e., individual PFAS feed levels in the 13 to 17 ppm) treated levels ranged from less than 2 ppb all PFAS.

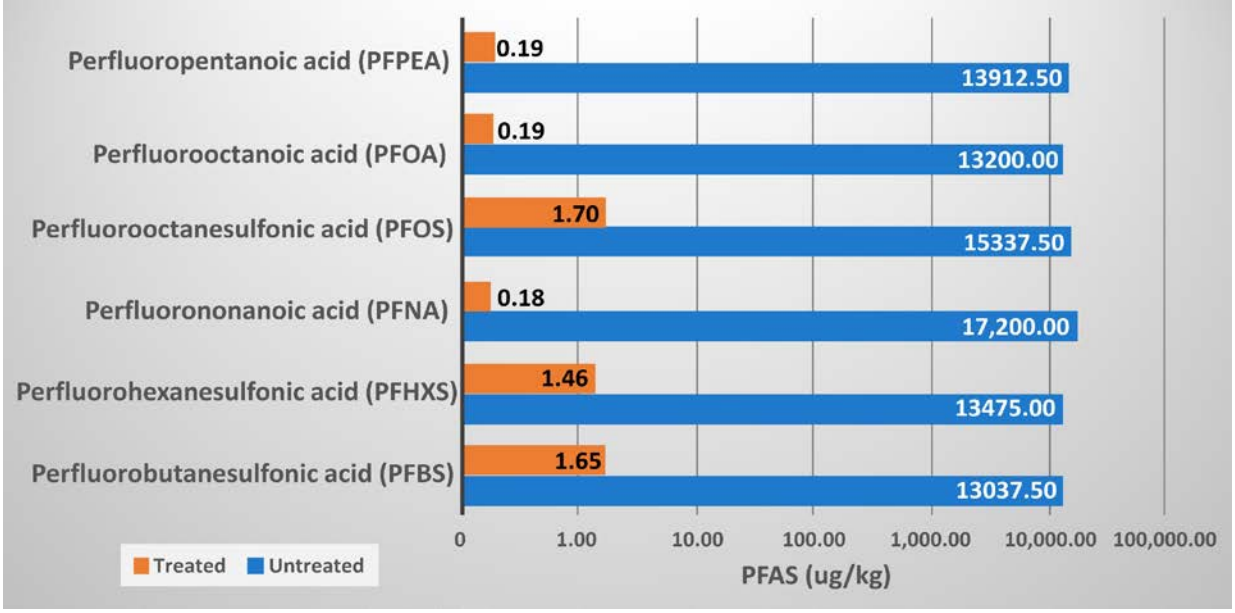
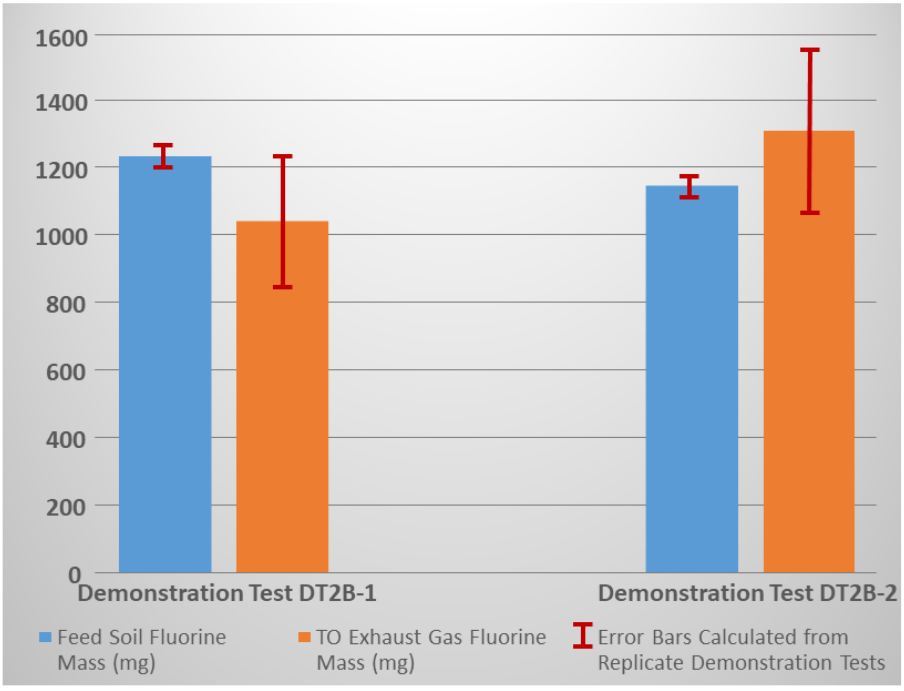


Figure ES-6. Thermal Desorption Treatment Results of 6 PFAS-Spiked Soil (650ºC)

The DRE was calculated for PFAS captured from TO exhaust by a modified EPA Method 0010. The findings indicate a DRE of 99.9997%. When performing EPA Method 26A to capture HF from TO exhaust gas, findings indicate fluorine mass recovered from TO exhaust is closely comparable to total fluorine mass added (as calculated molecular mass to PFAS) to feed soils. Mass balance calculations yield fluorine mass recovery of 84% and 114%, respectively, for the two trial tests conducted with 6 PFAS-spiked soil runs combining ITD and TO (Figure ES-7).

The demonstration tests show conclusively that for 650°C, the ITD technology will effectively remediate PFAS in soil to a concentration of less than 1-10



Note: Cumulative PFAS in exhaust gas was detected at less that 60 ng/sample in Demonstration Tests DT2A-1 and DT2A-2; therefore, all fluorine in exhaust gas was attributed to HF.

Figure ES-7. Fluorine Mass Balance Results

µg/kg. Furthermore, ITD combined with TO can achieve a DRE of greater than 99.9997% for off-gas emissions from ITD-treated PFAS feed material. Moreover, findings of this DT Program have demonstrated that ITD technology effectively desorbs PFAS precursors when treating soils that were recently spiked with AFFF. Prior to this study, the knowledge of how PFAS behaves in combustion or thermal processes was scarce. One of the more important aspects of this study was to advance the understanding of the capability of ITD/TOs (at the temperatures tested) to achieve "irreversible destruction" of PFAS-containing materials (including investigation-derived waste) and if other unintentional and unwanted degradation products will potentially be formed during the ITD/TO process. During the tests where TO was utilized and exhaust gas was analyzed separately for PFAS and HF, the mass balance performed on fluorine effectively demonstrates and confirms the destruction of the PFAS without the creation of unwanted byproducts. The extremely low detection of PFAS in the treated exhaust at (part per trillion levels) and recovery of the molar equivalent of F added to feed material during the mass balance provide complimentary lines of evidence for complete and irreversible PFAS thermal mineralization.

Implications for Future Research and Benefits—Full-scale treatment of PFAS-impacted soil and spent sorbents from groundwater cleanup is currently limited to costly measures including transport to/disposal at a permitted landfill, transport to/destruction at an incineration facility, and high-temperature regenerative methods of spent treatment sorbents. Anticipating that future demand will only increase for treatment of PFAS-impacted media, this study has direct benefits on advancing the state-of-the-industry by employing a mature technology (ITD/TO) to provide "innovative" treatment of an emerging contaminant. Based on these preliminary results of this study, which are very promising, additional scale-up study is warranted on ITD/TO technology for PFAS treatment to better define the routine application of this technology with respect to PFAS destruction and more completely assess the costs associated with full-scale implementation of this technology for PFAS treatment.

Transportable indirect thermal desorption systems intended for on-site soil treatment can be designed over a wide range of throughput capacity, from small batch units with a treatment capacity of approximately 0.5 ton/hr to large continuous-feed units with a 15 ton/hr capacity. Equipment selection and sizing is generally based on the quantity of soil requiring treatment at a given site, for example higher capacity units are generally more cost-effective at sites with large quantities of soil and vice versa. Unit treatment costs are inversely proportion to soil quantity and can range from $600/ton for sites containing, 1,000 cubic yards of soil, to less than $300/ton for a 100,000 cubic yard site. Direct-fired units have higher throughput capacity compared to indirect units, given similar capital and operating costs, and are therefore more cost-effective. Throughput capacity of direct fired units generally range from 5 ton/hr to in excess of 30 ton/hr. A highly engineered feasibility study coupled with a more extensive onsite full-scale, onsite demonstration pilot is recommended.

1. DEMONSTRATION TEST PROGRAM

1.1 OBJECTIVE

In May 2017, participants of a Strategic Environmental Research And Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) workshop identified a critical priority to demonstrate the effectiveness and sustainability of thermal destruction technologies for per- and polyfluoroalkyl substances (PFAS) waste streams (e.g., soils, spent granulated activated carbon, and resins). Previous studies have shown that thermal technology (including Indirect Thermal Desorption [ITD]) can reduce PFAS levels in soil, combust PFAS contained in commercial products, or mineralize PFAS-based industrial chemicals. However, uncertainties remain regarding ITD parameterization for application to treatment of specific PFAS-impacted waste as well as the destruction and removal efficiency (DRE) that can be achieved through off-gas treatment by thermal oxidation (TO). **The overall objective of this study was to advance the current understanding of ITD/TO's effectiveness for the treatment of soil containing a typical suite of PFAS found in, but not limited to, aqueous film forming foam (AFFF) formulations manufactured and heavily utilized prior to 2002.**

A hypothesis-driven, two-phase pilot-scale treatment regime (referred to as Demonstration Test [DT] Program) was conducted on PFAS-spiked soil and AFFF-spiked soil at two thermal desorption temperatures (500 degrees Celsius [°C] and 650°C) with off-gas TO treatment at 1,000°C for a subset of test runs that included a quantitative fluorine mass balance. The DT Program was designed to answer the following four technical questions:

1. Is thermal desorption capable of treating a selected suite of PFAS to low parts per billion (ppb) levels in soil that would potentially allow for unrestricted reuse, discharge, or disposal of treated soil?
2. Does thermal desorption treatment effectively remove/treat/destroy potential precursors within soil?
3. During thermal desorption treatment, can TO achieve a DRE of 99.99 percent (%) for the selected suite of PFAS for the range of temperatures tested?
4. Can onsite ITD/TO treatment be a cost-effective alternative to current offsite disposal methods?

This study addresses ITD/TO treatment effectiveness, operational parameterization and validates the PFAS destruction pathway through calculation of DRE and Fluorine mass balance. In answering these preliminary questions, this study has generated critical data needed to optimize thermal desorption to treat (i.e., remove) PFAS from soil, spent sorbents, and IDW as well as to assess the capability of TO destroy PFAS, supporting other practical considerations for full-scale implementation such as cost, scalability, air emissions treatment, and permitting requirements. This limited scope project is the initial step in determining if ITD/TO treatment is a viable method to remediate PFAS waste streams (e.g., soils, spent GAC and resins, and IDW) that merits more extensive field-scale evaluation.

1.2 SUMMARY OF DEMONSTRATION TEST PROGRAM

Testing was conducted at the U.S. Ecology of Texas (USET) Resource Conservation and Recovery Act permitted Treatment Storage and Disposal Facility located in Robstown, Texas. The facility includes multiple operating hazardous waste treatment units including a commercial-scale ITD unit, a landfill, various storage areas, two waste stabilization units, and an underground injection (deep-well) unit.

The DT was conducted using a pilot-scale unit owned and operated by TD*X Associates. The pilot-scale apparatus consists of two stages: (1) a thermal separation unit (desorber) and (2) a TO. The TO was specifically fabricated for the SERDP DT Program. The following procedure was sequentially applied for the tests conducted. Contaminated solids were heated in the thermal separation unit, which is a totally enclosed indirect heated dryer. The dryer was heated by propane-fired burners. The products of combustion of the fuel do not mix with either the waste or the volatilized materials. The contaminated soil sample was fed into the sealed dryer cylinder through an airlock where it was heated by conduction and radiation from the heated steel cylinder. Internal paddles were rotated to mix the solids and desorb their chemical constituents as vapors, where they were transported to a TO with an inert carrier gas (nitrogen). Thermocouples were used to monitor and record soil temperatures and TO temperature during the test period. When the soil reached the desired treatment temperature, the dryer furnace burners were shut down and the drum assembly was removed for cool-down. Treated soils were then removed from the dryer drum and transferred to a stainless-steel container for subsequent sample collection. The dryer has a soil treatment capacity of approximately 20-40 kilograms (kg) per test and a maximum operating shell temperature of 750°C, with a treated media temperature of up to 700°C. An overall summary of the DT Program is provided in Figure 1-1.

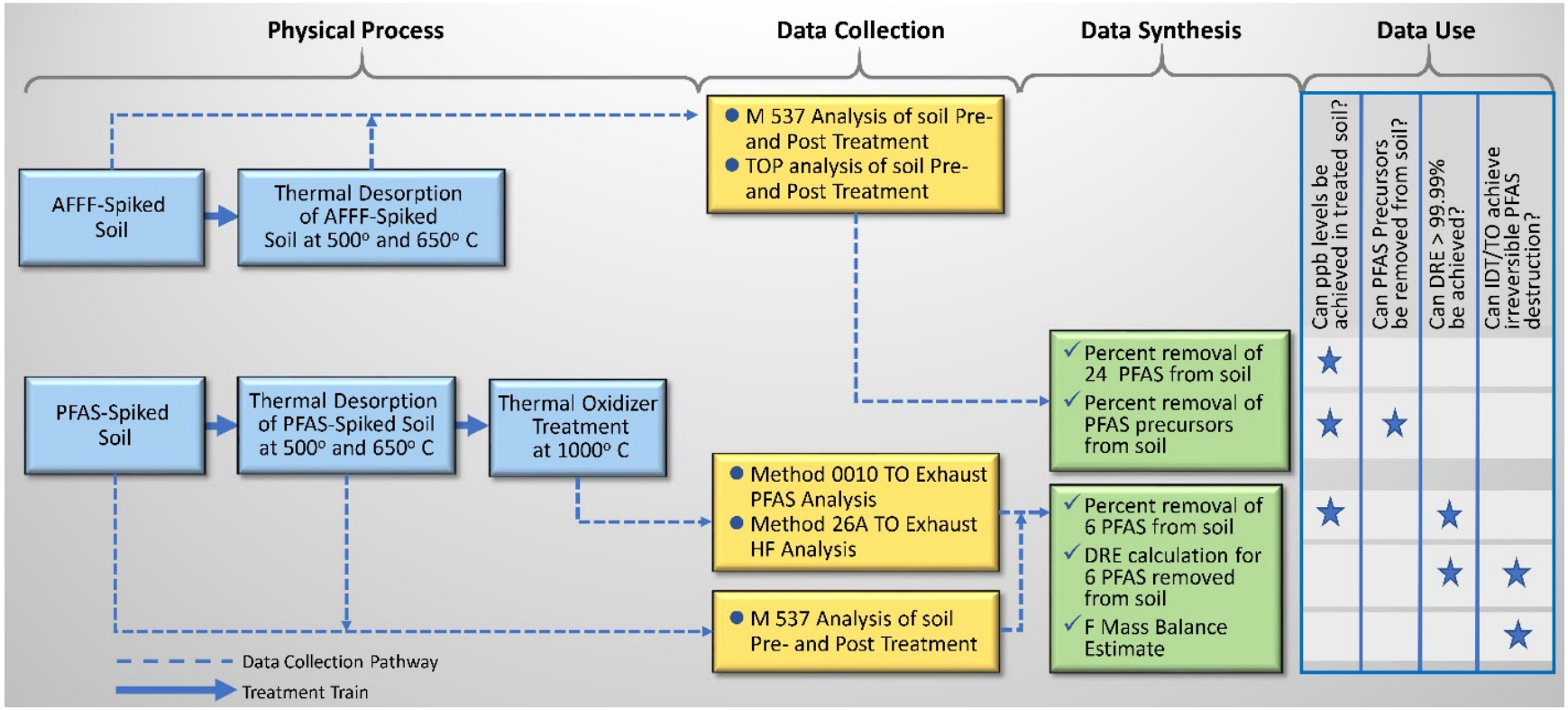


Figure 1-1. Summary of Demonstration Test Program

2. BACKGROUND

United States Environmental Protection Agency (EPA) published a lifetime Health Advisory for individual or combined perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) in drinking water of 70 nanograms per liter (ng/L) or parts per trillion. Roughly 20 states have also proposed, published, or promulgated media-specific criteria for PFOS, PFOA, and other selected PFAS for drinking water, groundwater, and/or soil. In response to EPA and state regulatory concerns that PFOS and other PFAS (e.g., PFOA) may present a human health risk when present in drinking water, the Department of Defense (DoD) has inventoried and identified more than 1,700 areas of potential concern (e.g., runways, crash sites, firefighting training and equipment calibration sites, hangars) at active and reserve military installations nationwide (United States Air Force Civil Engineer Center 2016, Air Force Public Affairs 2016, Anderson et al. 2016). DoD is currently completing initial site investigation (SI) at numerous facilities to assess if releases of AFFF have resulted in the spread of PFOS and other PFAS of potential concern in groundwater, soil, sediment, or surface water. To date, SI findings indicate that PFOS and other PFAS have migrated into the environment in the majority of the areas investigated. Some of these confirmed releases have contributed to PFAS contamination of drinking water supplies at multiple military installations and adjacent residential communities, nationwide. DOD. DoD has focused on eliminating PFAS exposure pathways to affected military personnel and adjacent communities by providing water treatment or alternate water supplies. In the absence of federally promulgated PFAS soil cleanup criteria, DoD has not focused on remediation of PFAS sources (e.g., soil); however, investigation-derived waste from SIs and PFAS-impacted soil encountered during military construction or demolitions projects has resulted in a significant amount of accumulated soil requiring disposal or treatment. Proven soil treatment technologies are limited. Full-scale treatment of PFAS-impacted soil, IDW, and spent adsorbents from drinking water mitigation is currently limited to costly measures including transport to and disposal at permitted landfills, transport to and destruction at incineration facilities, and high-temperature regenerative methods of spent sorbents. However, some landfills do not accept PFAS waste, and PFAS waste cannot be manifested as hazardous characteristic waste in most states. Although various types of pozzolans, activated carbon, or minerals could potentially be used to stabilize/solidify PFAS-impacted soil before disposal within landfills, very few commercially available sorbents have been developed to specifically immobilize PFAS in soil. In addition, stabilization/solidification does not destroy PFAS, nor will placing it below a cap or cover to isolate and contain contaminants.

Although there are ongoing efforts to investigate and scale-up newer soil treatment technologies, most technologies remain in the bench- or pilot- scale stages. There has been a limited number of bench and pilot studies conducted to evaluate PFAS removal in soil or other media by various types of thermal technologies. By design, these studies have focused on a small subset of PFAS in soil, discrete manufactured industrial chemicals, or commercial products treated with PFAS-containing material. A few of the more relevant studies are summarized below.

- A bench-scale test conducted by Environmental Endpoint Consulting in 2016 (Endpoint Consulting 2016) evaluated whether thermal treatment of soil to temperatures between 1,000 degrees Fahrenheit (°F) and 2,000°F was sufficient to remove ten PFAS from AFFF-spiked soils to levels below typical laboratory reporting limits. Results indicated

16% removal of total PFAS at 900°F for 15 minutes, 61% removal of total PFAS at 1,100°F for 15 minutes, and greater than 99% total PFAS removal at 1,750°F for 30 minutes. The study did not determine the optimal treatment conditions (temperature and duration), but concluded that greater than 99% removal of the ten PFAS from soil is likely to occur somewhere between 1,100°F and 1,750°F for a duration ranging from 15 to 30 minutes, and likely closer to the lower end of this range.

- Enviropacific achieved greater than 99.9% reduction in PFOS (from 172 to 0.004 milligrams per kilogram [mg/kg]), and PFOA (from 2.73 to less than 0.0005 mg/kg) at approximately 850°F (Enviropacific 2017).
- A study of the thermokinetics of destruction of ammonium perfluorooctanoate (APFO, the ammonium salt of PFOA) determined that greater than 99% decomposition occurred at 572-662°F in a matter of minutes proceeded by first order kinetics (Krusic and Roe 2004, 2005).
- Results of laboratory studies (EPA 2003a, b) showed PFAS to be more than 99% removed at approximately 1,112°F through direct fire incineration.
- A pilot-scale study (Lemieux et al. 2007) evaluated heating of carpet treated with stain-resistant coatings containing perfluorinated compounds (such PFOA, fluorotelomer alcohols and fluoropolymers) using a 0.73 kilowatt rotary kiln simulator to qualitatively and, where possible, quantitatively assess the potential for emissions of fluorinated compounds from combustion devices. A limited number of perfluorinated compounds (PFCs) were found in trace levels in the stack during combustion, and the concentrations were relatively independent of kiln feed, suggesting that PFCs are effectively destroyed even under mild combustion conditions.
- A study (Yamada et al. 2005) found a fluorotelomer-based acrylic polymer to be more than 99% destroyed at 1,742°F as a free polymer, and at 1,292°F when coated on a fabric.

The studies described above provide evidence that some of the more common, environmentally prevalent PFAS can be removed from solid media over a temperature range of approximately 500 to 1,750°F. However, there has been no concerted effort by researchers to coalesce multiple lines of evidence to quantify parameters for optimal treatment or to establish technology based DREs. Both ITD and TO are mature technologies that are used commercially for full-sale treatment of other regulated organic contaminants and waste. Due to the unique chemical/physical nature exhibited by PFAS that characteristically contain strong Carbon-Fluorine chemical bonds (e.g., resistance to breakdown at treatment temperatures that have been proven effective for other organics [e.g., petroleum or chlorinated constituents]; recalcitrance to biologically-mediated decomposition; intermedia partitioning behavior due to hydrophobicity and ionic exchange; and other physical characteristics such as surfactant behavior that may manifest at higher concentrations), treatment of PFAS-impacted media at elevated temperatures may be one of the few technologies that offer an assured permanent and irreversible process. Because IDT/TO is a mature technology, many of the scientific and technical challenges common to all organic pollutants have already been quantified and addressed. The innovation lies in the use of thermal technologies to remediate PFAS and the potential to scale-up treatment using existing or purpose-built systems in a comparatively expedited fashion compared to other

technologies that have not advanced beyond proof-of-concept or have not demonstrated the potential to achieve complete and irreversible PFAS destruction at full-scale, higher capacity throughput rates.

As previously described, this DT Program was designed to evaluate the performance of thermal treatment of soils impacted with PFAS. The analytical regimen included quantifying PFAS in study soils treated by ITD and exhaust gas emissions from a TO. However, the analytical procedures for exhaust gas testing of PFAS within an air emission stream have not been fully developed in a standardized EPA methodology for the environmental industry, and current analytical experience is limited to specific compounds at considerably higher detection limits for PFAS than expected in this DT. Therefore, as part of this DT Program, additional effort was required to define and tailor laboratory procedures for PFAS capture and analyses by Method 0010/ Method 537 from the TO exhaust gas. Preliminary analytical PFAS extraction method development and validation were required in advance of executing the DT Program to ensure usable and defensible exhaust gas results were obtained during execution of the DT Program. TestAmerica completed this laboratory method development and validation, demonstrating that the six PFAS evaluated in the DT Program could be adequately recovered from the Method 0010 sampling train media (i.e., XAD-2 sorbent resin, condensate impingers, and a second XAD-2 resin trap) following analyses by EPA Method 537. The complete analytical package and report specifying an adequate level of certainty for quantifiable PFAS extracted from air sampling media is included in Appendix A.

One of the more important aspects of the DT Program was to advance the understanding of ITD/TO's (at the temperatures tested) capability to achieve "irreversible destruction" of PFAS containing materials (including IDW) and if other unintentional or unwanted degradation products may be formed during thermal processes. Ideally, complete combustion of PFAS would result in the breaking of the strong Carbon-Fluorine bonds during thermal treatment into CO_2, H_2O and HF. However, there is limited scientific data on PFAS combustion by-products and the effects that other waste constituents (e.g., hydrocarbons) or other reactive chemicals or mineral additives would have on the composition of treatment emissions. In reviewing the available literature on PFAS combustion, and the associated thermal treatment by-products, during the planning for this study, it was noted that there was a general scientific-community consensus that HF formation was likely (Lemieux et al. 2007). Additionally, tetrafluoromethane (i.e., carbon tetrafluoride, CF_4) a potent greenhouse gas may also be formed (Koch 2002, Wang, 2011). CF_4 is a by-product when carbon or carbon compound is burned in an atmosphere where fluorine is present. Furthermore, thermal decomposition or combustion of CF_4 produces toxic gases (carbonyl fluoride and carbon monoxide) and in the presence of water will also yield HF (Greenwood, 1997).

The knowledge of how PFAS behaves in combustion or thermal processes is scarce, but there is consensus in limited scientific literature that degradation of PFAS occurs above a nominal temperature above 500°C. Various analytical methods have been used to identify or quantify a subset of specific PFAS (e.g., PFOS) combustion-degradation products. A summary of previous findings germane to this study is presented below.

- A study to combust PFOS and associated precursors conducted for 3M identified degradation products CF_4 CHF_3 and C_2F_6 (Taylor et al 2003). Though, the 3M study did

attempt a sulfur mass balance, the calculation was based on the assumption that combustion of PFOS and related precursors would result in all of the sulfur oxidized to SO_2, SOF_2 or SO_2F_2 under oxidative conditions established at elevated temperatures (i.e., 600 to 900°C). Based on in-line and off- line GC/MS analyses of sulfur components, no SOF_2 or SO_2F_2 was detected with the primary sulfur sink being SO_2.

- Another study indicated that thermally treated PFOS-contaminated sludge with addition of $Ca(OH)_2$ (Wang et al 2011; Wang et al. 2013) had reduced the emissions of CF_4 and C_2F_6 in favor of, for example CF_3H, but above all, promoting formation of solid CaF_2 and $Ca_5(PO_4)_3F$.

Neither of these studies carried out an elemental fluorine analysis for combusted PFAS exhaust or pre-versus post-treated Fluorine mass balance, leaving a critical data gap unresolved. To address these data gaps, two objectives were addressed: 1) PFAS analyses were performed on the exhaust gas via Method 0010/Method 537, and 2) hydrogen fluoride (HF) was measure in the exhaust gas using EPA Method 26A to assess the mass of Fluorine recovered. The results of these two activities evaluated in tandem provided separate, but complimentary lines of evidence to assess PFAS destruction pathways of this study.

3. MATERIALS AND METHODS

3.1 PFAS AND AFFF SPIKED SOIL PREPARATION

3.1.1 Selection of Principal Organic Hazardous Constituents

The principal organic hazardous constituents (POHCs) for these tests include six select PFAS and an AFFF solution. PFAS are commonly found in cleaners, textiles, leather, paper, paints, fire-fighting foams (AFFF), surfactants, and wire insulation. PFAS are generally carbon chains of varying length and can include varying amounts of oxygen, hydrogen, and fluorine.

Whether a compound is considered a "per" or a "poly" depends upon the following:

- Per FAS: All the carbons in the chain are bonded with fluorine
- Poly FAS: Not all carbons in the chain are bonded with fluorine.

The two most common PFAS of interest, referred to as long chain, contain eight carbon atoms and are PFOA and PFOS. Chemical properties common to PFAS are:

- High water solubility
- Low volatility.

The chemical and physical properties of PFOA and PFOS are presented in Table 3-1.

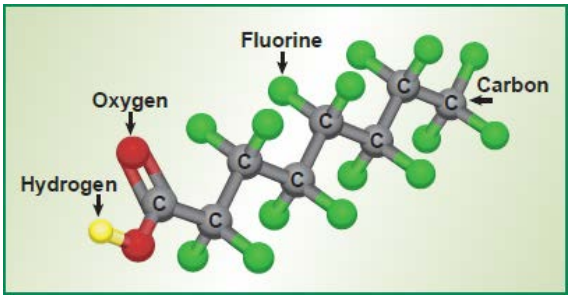


Photo Credit: NIEHS

Table 3-1 Chemical/Physical Properties of PFOA and PFOS

Property	PFOA	PFOS
Chemical Formula	$C_8HF_{15}O_2$	$C_8HF_{17}O_3S$
Molecular Weight (g/mol)	414.09	500.13
Boiling Point (°C)	192.4	259
Vapor Pressure (mm Hg at 25 °C)	0.525	~0.002
Solubility in Water (mg/L)	~9,500	680

Note: g/mol = Gram per mole.
°C = Degrees Celsius.
mm Hg = Millimeters of mercury.
mg/L = Milligram per liter.

3.1.2 Test Methodology for PFAS/AFFF - SPIKED SOIL

Demonstration tests were initially planned to be conducted by treating soil spiked with the six PFAS included in the third Unregulated Contaminant Monitoring Rule and pre-2002 formulation AFFF solution diluted in water. However, due to a discrepancy when ordering, perfluoropentanoic acid (PFPeA) was received and ultimately used instead of perfluorononanoic (PFHpA) during the DT Program. PFPeA, like PFHpA is a perfluoalkyl carboxylic acid (PFCA), but a shorter 5 versus 7 chain PFCA. Use of this analyte as an alternate did not affect

the overall project. The six PFAS used in these tests included: perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), PFPeA, and perfluorbutane sulfonate (PFBS). Liquid spikes were prepared from technical-grade PFAS. The manufacturer's assay for the PFAS is provided in Table 3-2.

Table 3-2 PFAS Spike Chemicals Used in the Study

PFAS	Formula	Assay
Sodium perfluorooctanoate (PFOA)	$C_8F_{15}O_2Na$	97%
Heptadecafluorooctanesulfonic acid potassium (PFOS)	$CF_3(CF_2)_7SO_3K$	98%
Perfluorononanoic acid (PFNA)	$CF_3(CF_2)_7COOH$	97%
Tridecafluorohexane-1-sulfonic acid potassium salt (PFHxS)	$C_6F_{13}KO_3S$	98%
Perfluoropentanoic acid (PFPeA)	$CF_3(CF_2)_3COOH$	97%
Potassium nonafluoro-1-butanesulfonate (PFBS)	$CF_3(CF_2)_3SO_3K$	98%

The AFFF solution procured for use in this DT Program was sampled and analyzed for individual PFAS using EPA Method 537. A summary of these results is presented in Table 3-3.

Table 3-3 PFAS Concentrations in the AFFF Solution

Analyte	DT3-AFFF Solution(ng/L)	DT4-AFFF Solution(ng/L)
4:2 FTS	< 2500000 U	< 2500000 U
6:2 FTS	304000 J	< 2500000 U
8:2 FTS	< 2500000 U	< 2500000 U
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	< 2500000 U	< 2500000 U
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	< 2500000 U	< 2500000 U
Perfluorobutanesulfonic acid (PFBS)	1570000	1450000
Perfluorobutanoic acid (PFBA)	209000 JB	190000 JB
Perfluorodecanesulfonic acid (PFDS)	155000 J	140000 J
Perfluorodecanoic acid (PFDA)	< 250000 U	< 250000 U
Perfluorododecanoic acid (PFDoA)	< 250000 U	< 250000 U
Perfluoroheptanesulfonic Acid (PFHpS)	1240000	1300000
Perfluoroheptanoic acid (PFHpA)	296000	268000
Perfluorohexanesulfonic acid (PFHxS)	7610000 B	7180000 B
Perfluorohexanoic acid (PFHxA)	1320000	1260000
Perfluorononanesulfonic acid (PFNS)	62400 J	61600 J
Perfluorononanoic acid (PFNA)	45000 J	< 250000 U
Perfluorooctanesulfonamide (FOSA)	< 250000 U	< 250000 U
Perfluorooctanesulfonic acid (PFOS)	76100000	79900000
Perfluorooctanoic acid (PFOA)	1170000	1070000
Perfluoropentanesulfonic acid (PFPeS)	1660000	1500000
Perfluoropentanoic acid (PFPeA)	268000	288000
Perfluorotetradecanoic acid (PFTeA)	< 250000 U	< 250000 U
Perfluorotridecanoic acid (PFTriA)	< 250000 U	< 250000 U
Perfluoroundecanoic acid (PFUnA)	< 250000 U	< 250000 U

Note: ng/L = Nanogram per liter.
B = Compound was found in the blank and sample.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

3.1.3 Selection of Soil

Testing was conducted using clean, homogeneous, well sorted store-bought play sand as the test soil medium. Contaminants desorb relatively easily from granular, free-flowing materials such as sands and sandy-silt. These types of materials have low surface to volume ratios, which enhance heat transfer. Conversely, clay soils that are tightly aggregated or exhibit plastic characteristics can be difficult to treat because of the tendency to stick to process equipment and to aggregate into large clumps that can inhibit heat transfer in the thermal desorber. Materials with a high clay content and an elevated moisture content also exhibit cohesion characteristics that can impair desorption of contaminants bound in consolidated fines. Since this study was designed to evaluate the effect of temperature only, sand was used to eliminate any desorption kinetics that are unrelated to soil temperature.

3.1.4 Spiked Soil Preparation

For each PFAS test condition, the soil was spiked with the six different PFAS, as presented in Table 3-2, to obtain a nominal feed soil concentration of 10-20 mg/kg each. The PFAS were weighed on a laboratory balance and dissolved in 5.5 liters of water. The spiked soil was prepared in discrete batches of approximately 100 kg each. A quantity of two 50-pound bags of dry sand was loaded into a 3.0 cubic foot portable electric cement mixer for each batch. Subsequently, the aqueous solution (e.g., deionized [DI] water) spiked with the six PFAS (5.5 liters) was added to the mixer and homogenized with the sand until a uniform soil moisture content was achieved based on visually apparent wet versus dry observations. The blended sand was then transferred into two new 5-gallon plastic pails and sealed with air-tight plastic lids. A single 5-gallon pail of PFAS-spiked soil was used for each test run.

The targeted and actual spiked soil concentrations for each of the DTs are summarized in Table 3-4.

Table 3-4 PFAS/AFFF Spiked Soil Concentrations for Demonstration Tests

Test Run	Soil Type	Spike Constituent(s)	Target PFAS Concentration (mg/kg, each)	Actual PFAS Concentration (mg/kg, each)	Soil Treatment Temperature (°C)
DT1-1	Sand	(6) PFAS	10	6.0 - 10.1	500
DT1-2	Sand	(6) PFAS	10	5.9 - 9.4	500
DT2A-1[1]	Sand	(6) PFAS	20	11.6 - 15.6	650
DT2A-2[1]	Sand	(6) PFAS	20	13.4 - 18.7	650
DT2B-1[1]	Sand	(6) PFAS	20	11.4 - 19.0	650
DT2B-2[1]	Sand	(6) PFAS	20	11.5 - 17.7	650
DT3-1	Sand	AFFF	10[2]	8.4 - 9.2[3]	500
DT3-2	Sand	AFFF	10[2]	8.9[3]	500
DT4-1	Sand	AFFF	10[2]	8.3 - 9.4[3]	650
DT4-2	Sand	AFFF	10[2]	8.1 - 9.2[3]	650

1. During DT2A sampling of the TO exhaust was performed for PFAS. During DT2B sampling of the TO exhaust gas was performed for HF.
2. As PFOS, estimated.
3. Total PFAS.

3.2 SOIL TREATMENT DEMONSTRATION TEST SUMMARY

ITD technology has been used to treat soil contaminated with semi-volatile organic compounds (SVOCs) since the mid-1980s. The typical soil treatment temperature range for this technology is 500 600ºC-°, with a practical maximum temperature limit of about 700ºC°. Hence, two target soil treatment temperatures were selected for this study, 500ºC° and 650ºC°. Actual spiked feed soil weights for each of the DTs are presented in Table 3-5.

Table 3-5 Feed Soil Weights for the Demonstration Test Runs (kg)

Test Run Number									
DT1-1	**DT1-2**	**DT2A-1**	**DT2A-2**	**DT2B-1**	**DT2B-2**	**DT3-1**	**DT3-2**	**DT4-1**	**DT4-2**
21.22	25.49	23.40	22.31	23.85	23.49	23.22	22.68	21.95	20.68
Note: kg = Kilogram.									

PFAS analyses of pre and post treatment soil samples were conducted using EPA Method 537 Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS). Total Oxidizable Precursor Assay (TOP) analyses of pre- and post-treatment AFFF-spiked samples were also conducted. Two test runs were conducted for each test condition and two samples were collected and analyzed for each test run. A summary of the soil sampling and analyses for the test runs is provided in Table 3-6.

Table 3-6 Soil Sampling and Analysis for each Demonstration Test Run

Test Run	Sample	Sampling Method	Sample Type	Number of Samples	Analytical Method
DT1-1 DT1-2	**Feed Soil** PFAS	ASTM E-300-86	Soil Composite	4	LC/MS/MS 537
	Treated Soil PFAS	ASTM E-300-86	Soil Composite	4	LC/MS/MS 537
DT2A-1 DT2A-2 DT2B-1 DT2B-2	**Treated Soil** Moisture content PFAS	ASTM E-300-86 ASTM E-300-86	Soil Composite Soil Composite	8 8	ASTM D22 16-05 LC/MS/MS 537
	Treated Soil Moisture Content PFAS	ASTM E-300-86 ASTM E-300-86	Soil Composite Soil Composite	8 8	ASTM D22 16-05 LC/MS/MS 537
DT3-1 DT3-2 DT4-1 DT4-2	**Feed Soil** AFFF AFFF	ASTM E-300-86 ASTM E-300-86	Soil Composite Soil Composite	8 8	LC/MS/MS 537 TOP Assay
	Treated Soil AFFF AFFF	ASTM E-300-86 ASTM E-300-86	Soil Composite Soil Composite	8 8	LC/MS/MS 537 TOP Assay
Note: AFFF = Aqueous film forming foam ASTM = American Society for Testing Materials. LC/MS/MS =					

3.3 THERMAL OXIDIZER DEMONSTRATION TEST SUMMARY

The objective of this task was to demonstrate that an ITD unit using a TO for gaseous emissions control can achieve a DRE of 99.9997% for the PFAS contaminant mass removed from treated feed material. The destruction efficiency of PFAS constituents is dominated by the temperature, time, turbulence (PFAS/air mixing), and PFAS/air stoichiometry (excess air) experienced in the high temperature zones of a TO. It was envisioned, thus planned, that PFAS could be effectively destroyed at very high efficiencies in a well-designed TO operating in the range of 900-1,000°C° at a nominal residence time of 2.0 seconds.

The destruction and removal efficiency were calculated from the mass of the PFAS constituent fed to the TO and the mass of the same constituent present in the exhaust emissions from the TO. Tests were conducted at one TO operating temperature (1,000°C°). For each test condition, the soil was spiked with six different PFAS at a nominal concentration of 20 mg/kg each. These compounds were diluted with water to improve spiking uniformity in the test soil matrix. Four comparative test runs were conducted, with two runs analyzing exhaust gas for PFAS via EPA Method 0010/Method 537 and two runs analyzing the exhaust gas for HF via EPA Method 26A as shown in Table 3-7.

Table 3-7 Sampling and Analysis of the TO for DRE Demonstration Test Runs

Test Run	Sample	Sampling Method	Sample Type	Number of Samples	Analytical Method
DT2A-1 DT2A-2	TO Exhaust Gas PFAS	EPA Method 0010	Particulate Filter, XAD-2 resin, impinger condensate	2	LC/MS/MS (537)
DT2B-1 DT2B-2	TO Exhaust Gas HF	EPA Method 26A	Impinger with H_2SO_4/NaOH/Silica Gel Reagents	2	Ion Chromatography (26A)

In order to quantify thermally induced PFAS mineralization, the test was structured to eliminate any source of Fluorine other than the known spiked mass of 6 PFAS in a clean medium sand thus eliminating ancillary waste constituents (e.g., hydrocarbons) and clay minerals that could complicate thermally induced byproduct formation. The TO exhaust was sampled by two methods that collectively were used to assess DRE, destruction pathways and verification of PFAS mineralization.

1. Collection and analysis of thermal exhaust via EPA Method 0010/Method 537 was used to assess if PFAS were present in the TO exhaust due to incomplete PFAS thermal treatment
2. Collection and analysis of thermal exhaust via EPA Method 26A was used to collect Fluorine from halogen compounds (HF) to conduct a Fluorine mass balance.

Considering that fluorine in the Carbon-Fluorine PFAS backbone makes up a considerable portion of the molecular mass, an assay of total Fluorine captured in the treatment exhaust compared to the original Fluorine mass in untreated feedstock was considered a viable method not only to verify thermal mineralization, but also as a secondary validation that a lack of PFAS recovered and measured by Method 00010/537 was not a result of PFAS pass-through.

In order to eliminate uncertainty in the origin of Fluorine and avoid introduction of other constituents in the feedstock that could affect byproduct formation, the "purity" of the sample was preserved by spiking the clean medium sand (feedstock) with 6 PFAS of known concentration.

EPA Method 0010 was modified to facilitate low-level PFAS recovery and detection in air samples. References to EPA Method 0010 throughout this report are specific to the modified analysis. EPA Method 0010 sampling train uses sampling modules containing a particulate filter, a water-cooled condenser coil and a sorbent trap containing approximately 40 grams of XAD-2 sorbent resin, condensate impingers, and a second XAD-2 resin trap for capture of gaseous phase constituents. (Later in the laboratory, the Method 0010 sample media were extracted by sonication with methanol followed by a direct determination using LC/MS/MS.) EPA Method 0010 sampling of the TO exhaust commenced at the start of each soil sample heating cycle and ended when the soil reached the desired treatment temperature and the test was terminated.

EPA Method 26A sample train equipment and configuration for TO air emission testing for HF is similar to EPA Method 0010. However, the sampling train solely consisted of impingers containing alkaline reagent for HF capture. The analysis of HF was conducted, based on the premise that CO_2 and HF were the primary decomposition by-products during TO treatment. Capturing and quantifying Fluorine, as a surrogate for mineralization of known organic Fluorine originating from the 6 PFAS spiked to soil, was utilized in tandem with Method 0010 PFAS results to assess complete or incomplete combustion of PFAS.

3.4 ITD/TO PROCESS DESCRIPTION AND OPERATION

The ITD is a dryer designed to separate oils and other organic contaminants from solid matrices at moderate temperatures. The system requires a 120-volt, single-phase power-source, and a nitrogen and fuel supply. The pilot-scale apparatus consists of two stages: (1) a thermal separation unit (desorber) and (2) a TO. Contaminated solids are heated in the thermal separation unit, which is a totally enclosed indirect heated dryer. The dryer is heated by propane-fired burners. The products of combustion of the fuel do not mix with either the waste or the volatilized materials. The contaminated soil sample is loaded into the sealed dryer cylinder through an airlock where it is heated by conduction and radiation from the heated steel cylinder. Internal paddles are rotated to mix the solids and desorb their chemical constituents as vapors, where they are transported to a TO with an inert carrier gas (nitrogen). Thermocouples are used to monitor and record the soil temperatures and TO temperature during the test period. When the soil reaches the desired treatment temperature, the dryer furnace burners are shut down and the drum assembly is removed for cool-down. Treated soils are then removed from the dryer drum and transferred to a stainless-steel container for subsequent sample collection. The dryer has a soil treatment capacity of approximately 20-40 kg per test and a maximum operating shell temperature of 750°C, with a treatment temperature of up to 700°C.

The TO is a vertical chamber with rectangular cross section provided with a propane fuel-fired auxiliary burner. It is insulated by fiber refractory and capable of operating at internal temperatures as high as 1,100°C. The volume of the combustion chamber is sized to provide approximately 2.0 seconds residence time at the maximum dryer purge vent gas flow rate.

3.5 PROCESS MONITORING PARAMETERS

This section provides a discussion of the key process monitoring parameters that were recorded during the DT Program. Table 3-8 is included here as a summary of the monitoring plan parameters and corresponds with Figure 3-1, with each tag number showing the monitoring locations on the process.

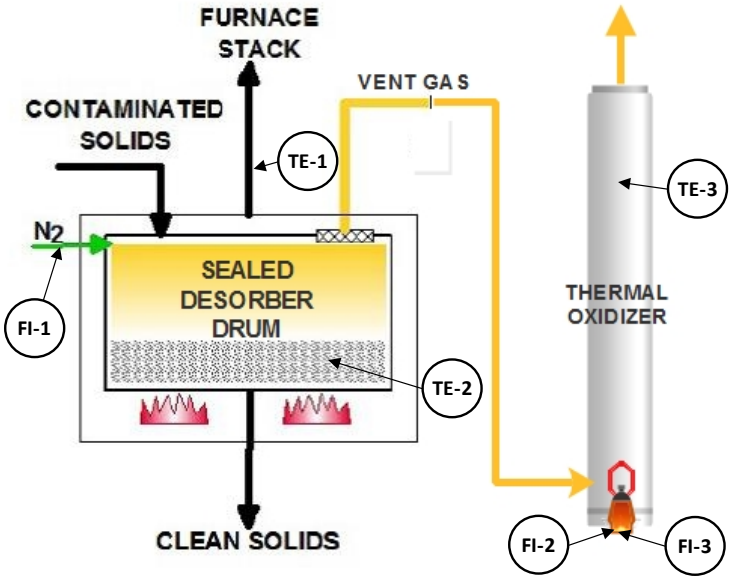


Figure 3-1 ITD/TO Unit Block Flow Diagram

Table 3-8 Summary of Monitoring Plan for TD*X Thermal Desorption Unit

Tag	Parameter	Monitor Device	Frequency	Location	CAL Range
FI-1	Nitrogen supply flow rate	Rotameter	30 minutes	Nitrogen feed line	0–20 scfh
NA	Feed soil mass	Platform scale	Run	Exclusion Zone	0-250 lb
TE-1	Dryer furnace temperature	Thermocouple	Continuous	Dryer furnace	0–2,300°F
TE-2	Dryer solids product temperature	Thermocouple	Continuous	Dryer shell	0–2,300°F
TE-3	Thermal oxidizer temperature	Thermocouple	Continuous	Dryer outlet	0–2,300°F
FI-2	TO propane supply flow rate	Rotameter	30 minutes	Propane feed line	0–20 lpm
FI-3	TO combustion air flow rate	Rotameter	30 minutes	Combustion air line	0–50 scfm

Notes: °F = Degrees Fahrenheit.
scfm = Standard cubic feet per minute.
lb = Pound(s).
lpm = Liters per minute.

Temperature data were electronically logged to a data file every minute. All other data were manually recorded by the plant operators on data sheets.

Table 3-9 Treated Product Temperatures for the Demonstration Test Runs (ºC)

Test Run Number									
DT1-1	DT1-2	DT2A-1	DT2A-2	DT2B-1	DT2B-2	DT3-1	DT3-2	DT4-1	DT4-2
514	507	653	653	655	652	524	501	662	654

Note: °C = Degrees Celsius.

Table 3-10 Nominal TO Temperatures for the Demonstration Test Runs (ºC)

Test Run Number									
DT1-1	**DT1-2**	**DT2A-1**	**DT2A-2**	**DT2B-1**	**DT2B-2**	**DT3-1**	**DT3-2**	**DT4-1**	**DT4-2**
N/A	N/A	1000	1000	1000	1000	N/A	N/A	N/A	N/A

Note: °C = Degrees Celsius.
N/A = Not available/applicable.

Data logs for the soil temperature, dryer shell temperature, and TO temperature for the test runs are plotted in Figures 3-2 through 3-11. Operator log sheets and other field documentation is provided in Appendix C.

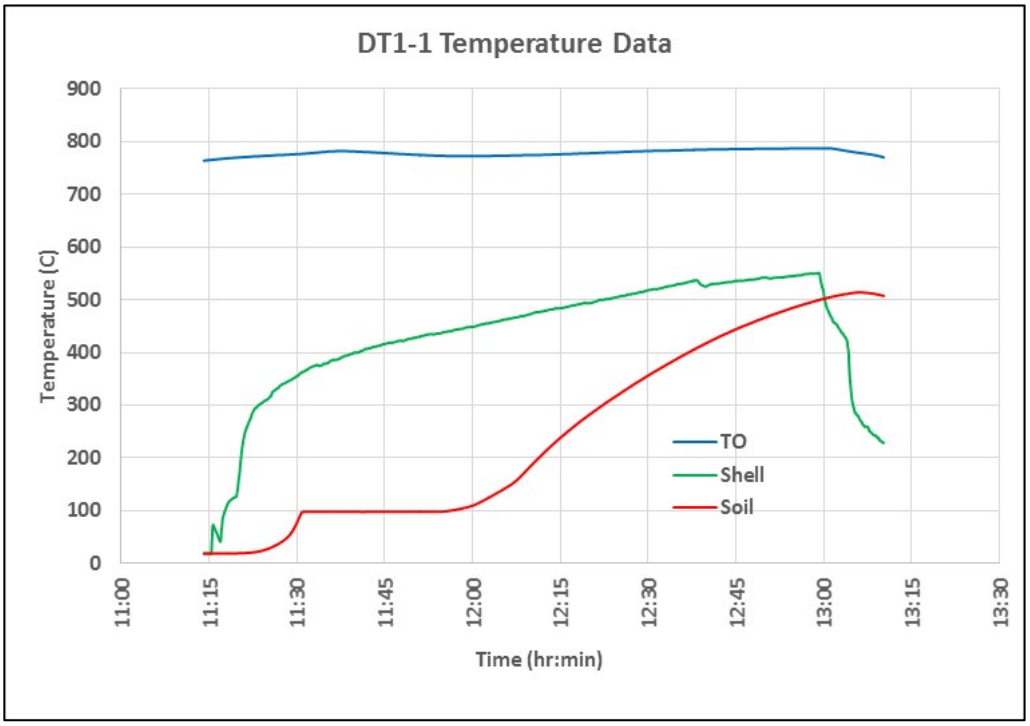


Figure 3-2. Temperature Log for Test Run DT1-1

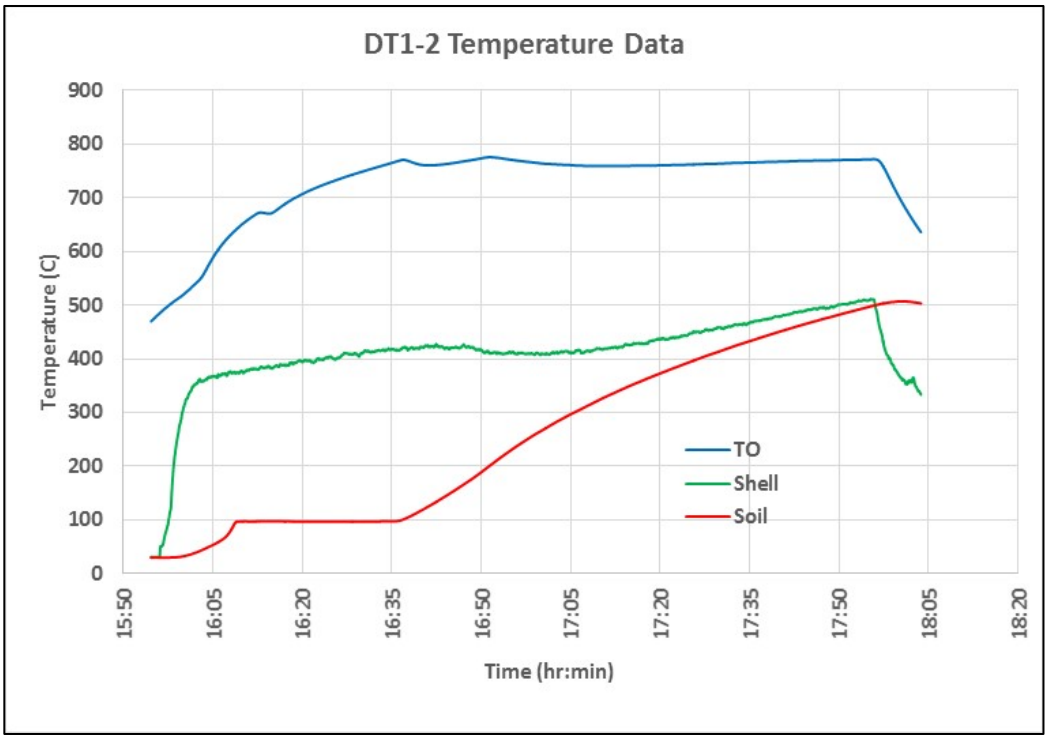


Figure 3-3. Temperature Log for Test Run DT1-2

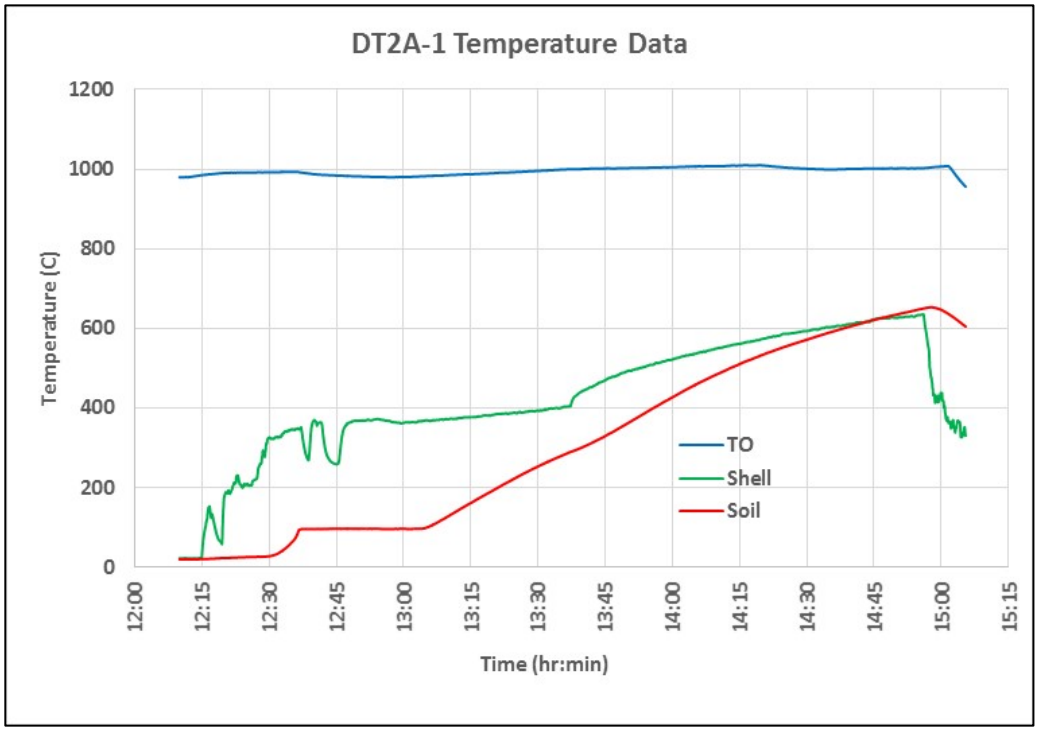


Figure 3-4. Temperature Log for Test Run DT2A-1

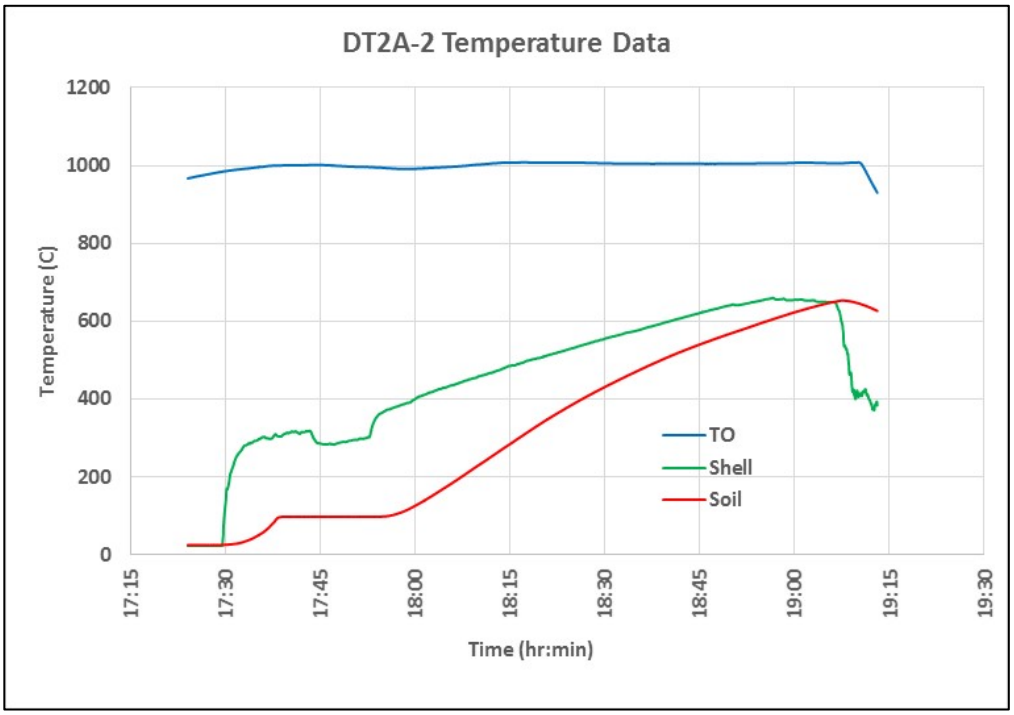


Figure 3-5. Temperature Log for Test Run DT2A-2

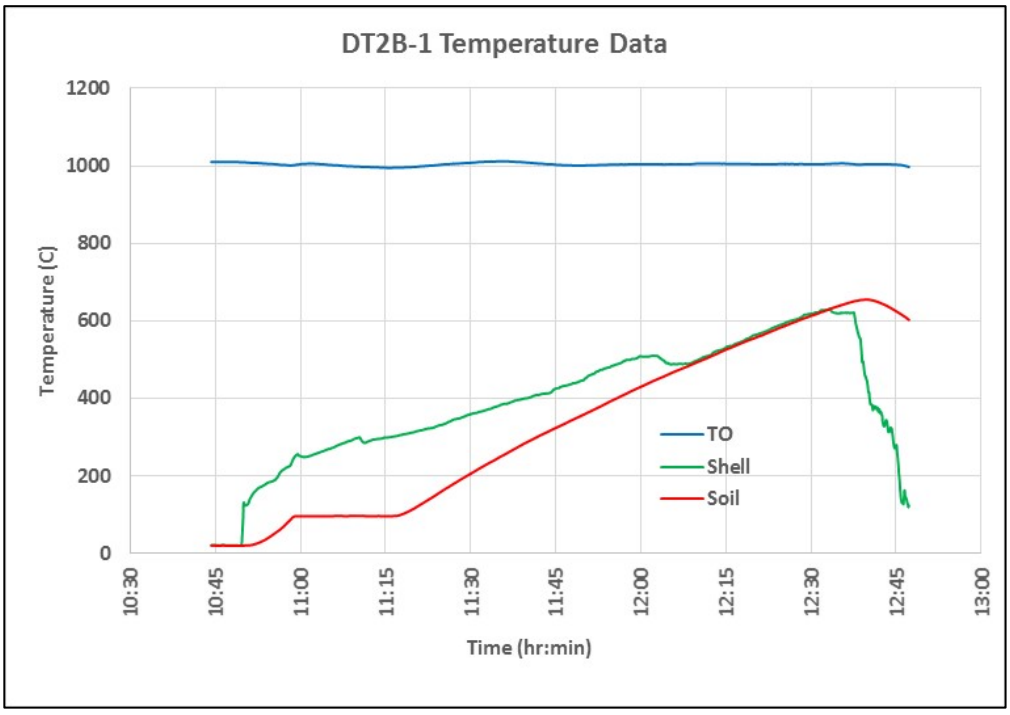


Figure 3-6. Temperature Log for Test Run DT2B-1

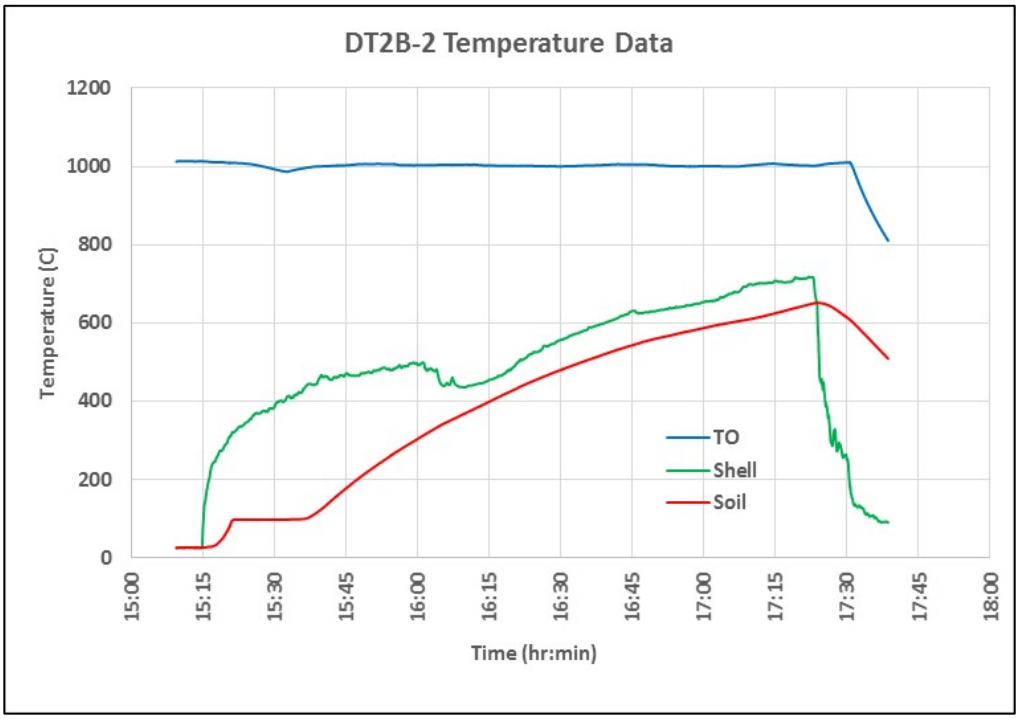


Figure 3-7. Temperature Log for Test Run DT2B-2

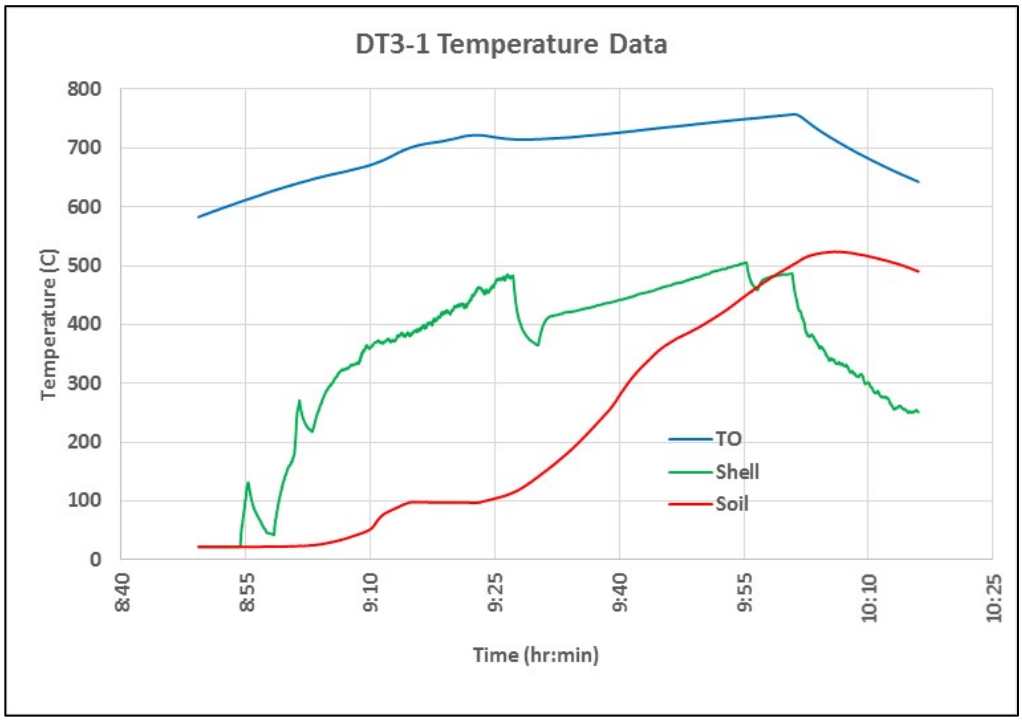


Figure 3-8. Temperature Log for Test Run DT3-1

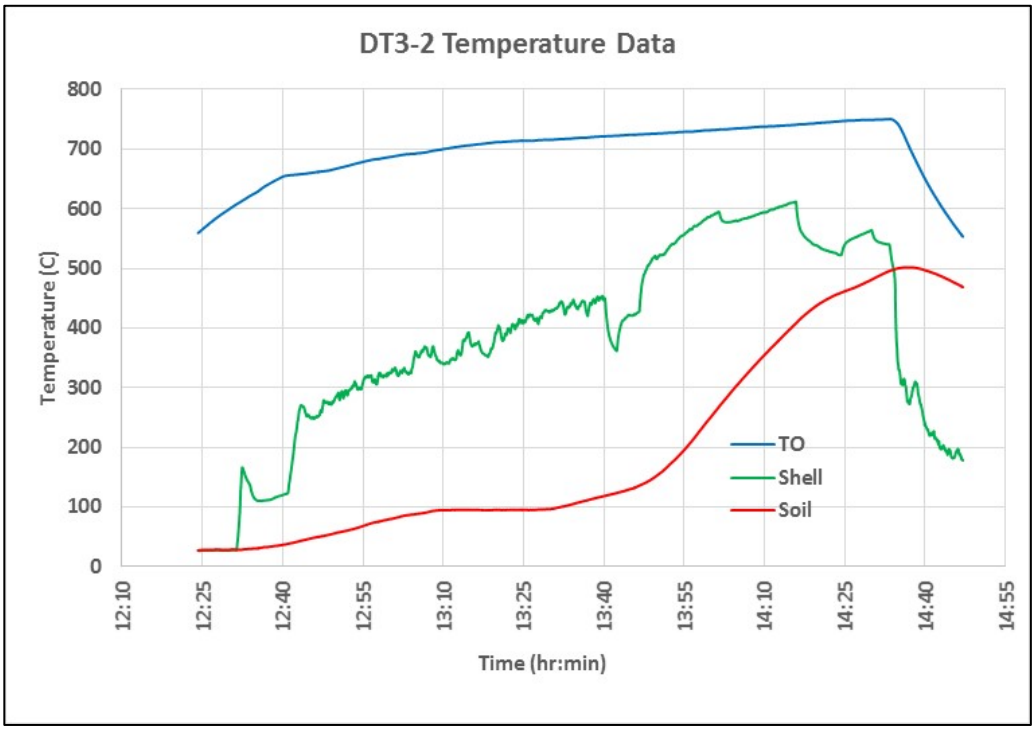


Figure 3-9. Temperature Log for Test Run DT3-2

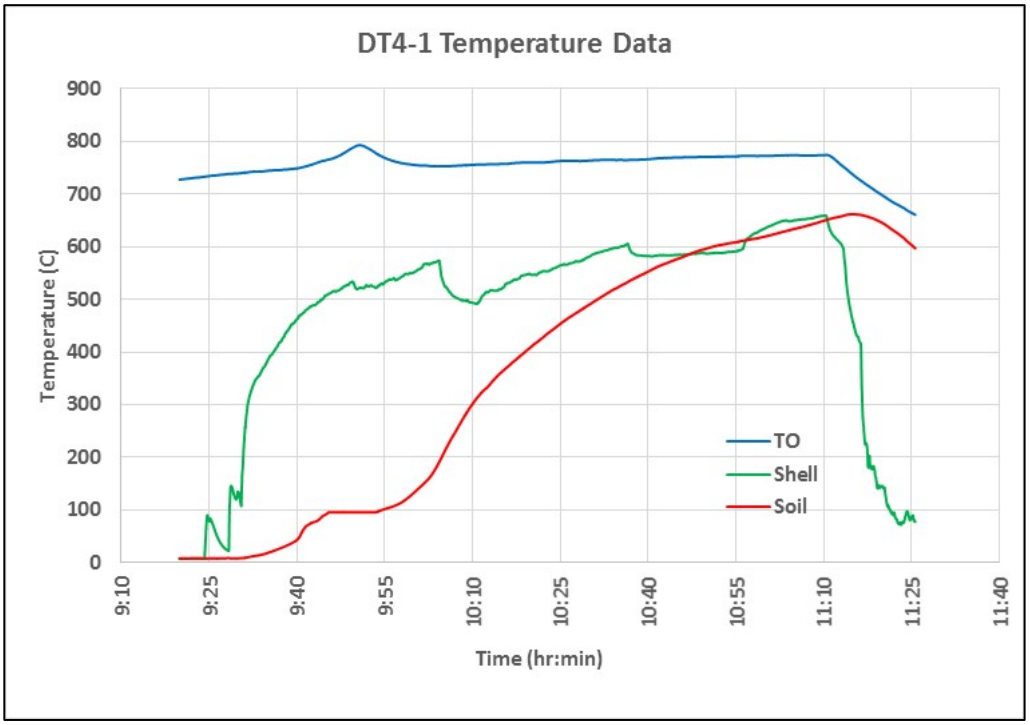


Figure 3-10. Temperature Log for Test Run DT4-1

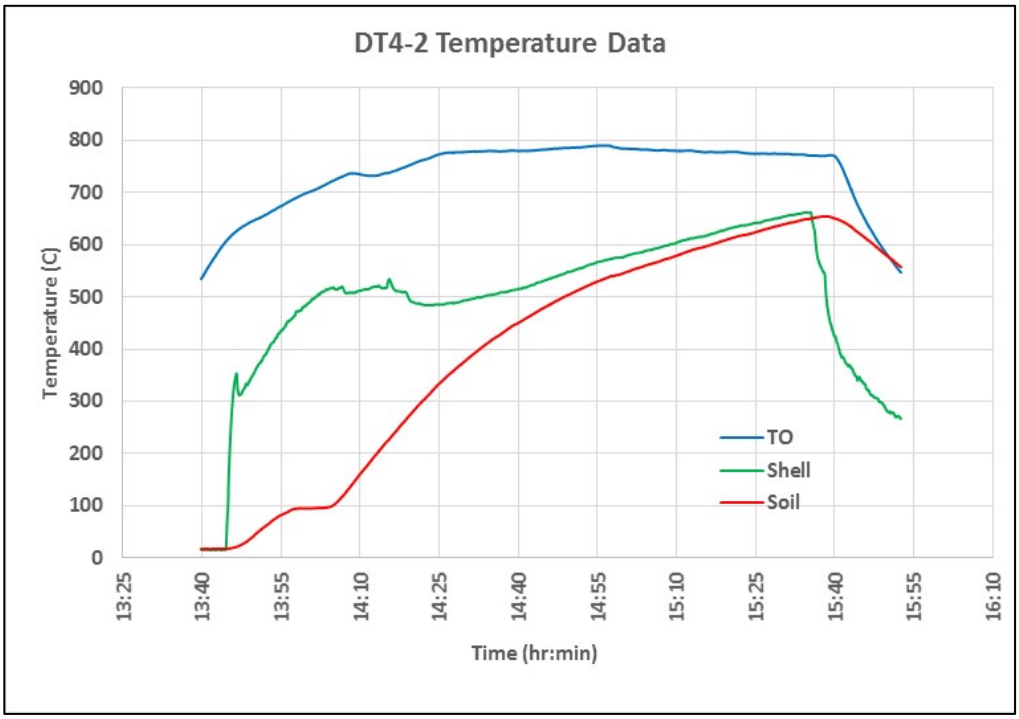


Figure 3-11. Temperature Log for Test Run DT4-2

3.6 SOIL SAMPLING AND ANALYSES

Samples of the spiked feed soil (provided with the prefix FEED) and post treatment soil (assigned with the prefix PROD) were collected for each test run. Two feed samples were collected prior to the start of each test run as the soil was loaded into the ITD dryer. At the conclusion of each test run, when the soil reached the desired treatment temperature, the dryer furnace burners were shut down and the drum assembly was removed for cool-down. Once the treated soils had cooled down, two post treatment soil samples were collected directly from the drum.

Each soil sample consisted of a composite of four soil samples that were collected and mixed in stainless steel sample bowls. The soil samples were homogenized, and representative composite feed and post treatment soil samples were transferred to plastic jars for subsequent submittal to TestAmerica for analyses. All sample jars were 250-milliliter polypropylene bottles with polypropylene screw caps. Refer to Table 3-6 for a summary of the soil analyses completed for each DT.

Between soil sample collection, the stainless-steel bowls and spoons used for sampling were washed with Alconox, rinsed in laboratory-grade deionized water, rinsed with methanol, then rinsed again thoroughly with laboratory-grade DI water prior to use for sampling.

Field quality control for PFAS included two field blanks, two equipment rinse blanks, a post treatment wipe test, and five field duplicates.

3.7 THERMAL OXIDIZER EXHAUST GAS SAMPLING AND ANALYSIS

Testing of the thermal oxidizer PFAS emissions was conducted as part of this DT program to determine the PFAS DRE in the TO.

The following EPA test methods were used to conduct the testing:

- Method 2: Determination of Stack Gas Velocity and Volumetric Flow Rate (S-Type Pitot)
- Method 3: Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources
- Method 4: Determination of Moisture Content in Stack Gases
- Method 0010: Determination of SVOCs in Stack Gases (modified for PFAS)
- Method 26A: Determination of HF in Stack Gases.

EPA Method 0010 (modified) was used to collect PFAS in the TO exhaust gas. This method is applicable to the determination of DRE of semi volatile POHCs, including PFAS, from incineration systems. Gaseous and particulate pollutants are withdrawn from an emission source at an isokinetic sampling rate and are collected in a multicomponent sampling train. Principal components of the train include a high-efficiency glass- or quartz-fiber filter and a packed bed of porous polymeric adsorbent resin. The filter is used to collect organic-laden particulate materials and the porous polymeric resin to adsorb semi volatile organic species. Comprehensive chemical analyses of the collected sample were conducted to determine the concentration and identity of the organic materials.

Sampling was performed for a total run time of approximately 100-150 minutes per test, coincident with the entire heating cycle and thermal treatment of spiked soils in the ITD dryer. Readings were manually recorded every 5 minutes (refer to Appendix E). The samples are extracted through probes constructed of quartz glass with an integrated nozzle. The entire probe is shrouded in Inconel and has a heated glass-lined probe. The sample collection train includes a heated glass mat filter, a water-cooled condenser coil, and a sorbent trap containing approximately 40 grams of XAD-2 sorbent resin, condensate impingers, and a second XAD-2 resin trap for capture of gaseous phase constituents. Samples collected from the exhaust gas were shipped to TestAmerica for analysis.

A schematic of the modified EPA Method 0010 sampling train is shown in Figure 3-12.

EPA Method 26A was used to collect HF in the TO exhaust gas. This method is applicable for determining emissions of hydrogen halides (HX) (HCl, HBr, and HF) and halogens (X2) (Cl_2 and Br_2) from a stationary source. This method collects the emission sample isokinetically and is, therefore, particularly suited for sampling wet sources such as those controlled by wet scrubbers or stacks emitting acid particulate matter (e.g., hydrogen halides dissolved in water droplets).

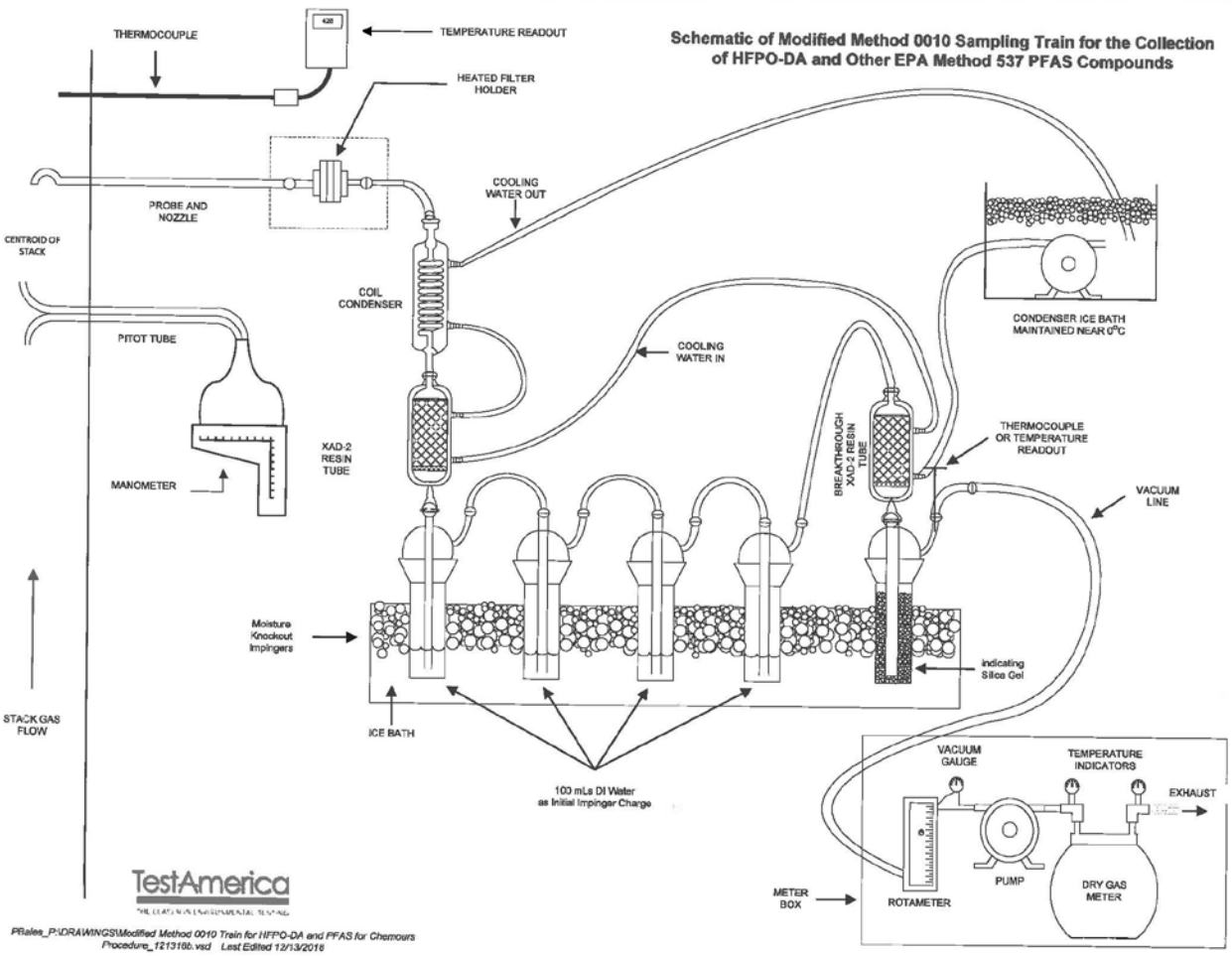


Figure 3-12 Modified EPA Method 0010 Sampling Train

Sampling was performed for a total run time of approximately 100-150 minutes per test, coincident with the entire heating cycle and thermal treatment of spiked soils in the ITD dryer. Readings were manually recorded every 5 minutes (refer to Appendix E).

The samples were extracted through probes constructed of quartz glass with an integrated nozzle. Gaseous and particulate pollutants were withdrawn isokinetically from the source and collected on a filter and in absorbing solutions. The filter collects particulate matter including halide salts but is not routinely recovered or analyzed. Acidic and alkaline absorbing solutions collect the gaseous hydrogen halides and halogens, respectively. The hydrogen halides are solubilized in the acidic solution and form chloride (Cl^-), bromide (Br^-), and fluoride (F^-) ions. The halogens have a very low solubility in the acidic solution and pass through to the alkaline solution where they are hydrolyzed to form a proton (H^+), the halide ion, and the hypohalous acid (HClO or HBrO). Sodium thiosulfate was added to the alkaline solution to assure reaction with the hypohalous acid to form a second halide ion such that two halide ions are formed for each molecule of halogen gas. Samples from the exhaust gas were shipped to TestAmerica for analysis.

A schematic of the sampling train for EPA Method 26A is shown in Figure 3-13.

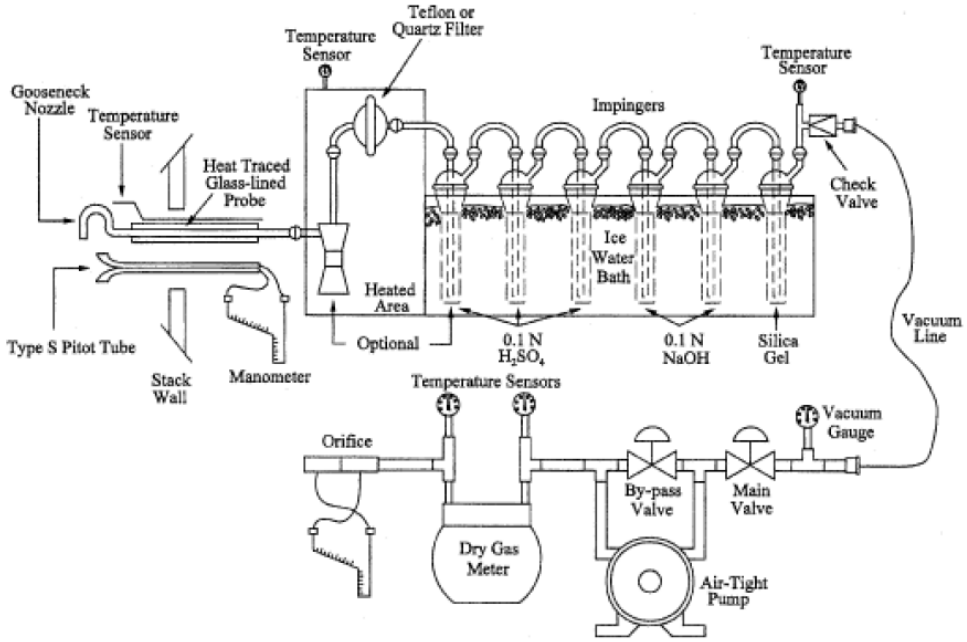


Figure 3-13 EPA Method 26A Sampling Train

Refer to Table 3-7 for a summary of the exhaust samples collected and analyses completed for each DT to evaluate DRE. The exhaust gas sampling report prepared by LCH Consulting Associates is provided in Appendix E.

4. RESULTS AND DISCUSSION

4.1 OVERVIEW OF DEMONSTRATION TEST PROGRAM RESULTS

The DT program was conducted during the period of 12-16 April 2019 at the U.S. Ecology Facility located in Robstown, Texas. Soil and exhaust gas samples were packaged shipped on ice to TestAmerica. Summaries of the PFAS- and AFFF-spiked soil test results are provided in Tables 4-1 and 4-2.

Table 4-1 PFAS Demonstration Test Program Summary

Parameter	DT1-1	DT1-2	DT2A-1	DT2A-2	DT2B-1	DT2B-2
Process Data						
Date	4/12/19	4/12/19	4/15/19	4/15/19	4/16/19	4/16/19
Start Time	1118	1556	1214	1730	1050	1515
End Time	1300	1755	1500	1910	1240	1730
Feed Weight (kg)	21.22	25.49	23.40	22.31	23.85	23.49
Soil Temperature (ºC)	514	507	653	653	655	652
TO Temperature (ºC)	N/A	N/A	1000	1000	1000	1000
TO PFAS DRE						
M0010 PFAS DRE (%)			99.9997%	99.9997%		
M26A Organic Fluorine DRE (%)					84%	114%

Note: kg = Kilogram.
°C = Degrees Celsius.

Table 4-2 AFFF Demonstration Test Program Summary

Parameter	DT3-1	DT3-2	DT4-1	DT4-2
Process Data				
Date	4/13/19	4/13/19	4/14/19	4/14/19
Start Time	0855	1232	0930	1345
End Time	1002	1434	1110	1535
Feed Weight (kg)	23.22	22.68	21.95	20.68
Soil Temperature (ºC)	524	501	662	654

Note: kg = Kilogram.
°C = Degrees Celsius.

4.2 SOIL RESULTS

PFAS analysis of pre- and post-treatment soil samples was conducted using EPA Method 537 LC/MS/MS. TOP analysis of pre and post treatment AFFF-spiked samples was also conducted. Two pre-treatment samples (FEED) and two post-treatment (PROD) samples were collected and analyzed for each test run. Test results are presented in the following sections.

4.2.2 PFAS Testing Soil Analysis

Soil analysis for the PFAS test runs are presented in Tables 4-3 through 4-8. Feed and treated soil analyses for each run are presented together for ready comparison. Based on the average of

PFAS-spiked soil (i.e., 3 PFCAs and 3 PFSAs) tested at 500°C, the PFAS removal exceeded 94% for total PFAS. The 3 PFCAs removal exceeded 99.8% while the 3 PFSAs removal was approximately 89%. With an approximate initial feed concentration of 45 ppm for the total 6 PFAS (individual PFAS-feed levels of approximately 6 to 9 ppm range) treated levels ranged from less than 20 ppb for PFCAs and between 500 and to approximately 1000 ppb for PFSAs. Based on the average of PFAS-spiked soil (i.e., 3 PFCAs and 3 PFSAs) tested at 650°C, the PFAS removal exceeded 99% for total PFAS, as well as the 3 PFCAs and 3 PFSAs. With an approximate initial feed concentration of 86 ppm for the total 6 PFAS (individual PFAS feed levels in the 13 to 17 ppm) treated levels ranged from less than 2 ppb all 6 PFAS.

Table 4-1 DT1-3 Soil Treatment Test Results (500ºC)

Analyte	PFAS Soil Concentration (µug/kg)				
	FEED DT1-1-1	FEED DT1-1-2	PROD DT1-1-1	PROD DT1-1-1-DUP	PROD DT1-1-2
Perfluorobutanesulfonic acid (PFBS)	6010	6530	451	241	171
Perfluorohexanesulfonic acid (PFHxS)	6500	6690	388	459	362
Perfluorononanoic acid (PFNA)	9290	7570	3.73	5.67	0.662
Perfluorooctanesulfonic acid (PFOS)	8680	7180	440	783	489
Perfluorooctanoic acid (PFOA)	7450	7250	4.13	6.51	1.95
Perfluoropentanoic acid (PFPeA)	8750	10100	1.91	1.46	0.723

Note: µug/kg = microgram = microgram per kilogram.

Table 4-2 DT1-4 Soil Treatment Test Results (500ºC)

Analyte	PFAS Soil Concentration (µug/kg)			
	FEED DT1-2-1	FEED DT1-2-2	PROD DT1-2-1	PROD DT1-2-2
Perfluorobutanesulfonic acid (PFBS)	6430	5900	1240	297
Perfluorohexanesulfonic acid (PFHxS)	7280	6210	1180	943
Perfluorononanoic acid (PFNA)	7400	8370	28.4	27.9
Perfluorooctanesulfonic acid (PFOS)	7170	8010	1310	1690
Perfluorooctanoic acid (PFOA)	7310	6940	28.9	26.7
Perfluoropentanoic acid (PFPeA)	9450	8640	23.6	5.3

Note: µg/kg = Microgram per kilogram. Note: ug/kg = microgram per kilogram

Table 4-5 DT2A-1 Soil Treatment Test Results (650ºC)

Analyte	PFAS Soil Concentration (µg/kg)				
	FEED DT2A-1-1	FEED DT2A-1-2	PROD DT2A-1-1	PROD DT2A-1-2	PROD DT2A-1-DUP
Perfluorobutanesulfonic acid (PFBS)	14400	12900	7.31	6.36	4.9
Perfluorohexanesulfonic acid (PFHxS)	14600	11600	6.95	4.95	4.15
Perfluorononanoic acid (PFNA)	15400	15200	< 0.194 U	< 0.198 U	0.0374 JI
Perfluorooctanesulfonic acid (PFOS)	14400	13900	7.04	4.78	4.41
Perfluorooctanoic acid (PFOA)	14200	12000	0.115 J	< 0.198 U	< 0.196 U
Perfluoropentanoic acid (PFPeA)	15600	13300	< 0.194 U	< 0.198 U	< 0.196 U

Note: µg/kg = Microgram per kilogram.
I = Value is the estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-6 DT2A-2 Soil Treatment Test Results (650ºC)

Analyte	PFAS Soil Concentration (µg/kg)			
	FEED DT2A-2-1	FEED DT2A-2-2	PROD DT2A-2-1	PROD DT2A-2-2
Perfluorobutanesulfonic acid (PFBS)	14100	13700	< 0.193 U	0.025 J
Perfluorohexanesulfonic acid (PFHxS)	14400	13500	< 0.193 U	0.058 J
Perfluorononanoic acid (PFNA)	17300	18700	< 0.193 U	< 0.193 U
Perfluorooctanesulfonic acid (PFOS)	15700	16700	< 0.484 U	< 0.483 U
Perfluorooctanoic acid (PFOA)	13400	14100	< 0.193 U	< 0.193 U
Perfluoropentanoic acid (PFPeA)	15000	14500	< 0.193 U	< 0.193 U

Note: µg/kg = Microgram per kilogram.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-7 DT2B-1 Soil Treatment Test Results (650ºC)

Analyte	PFAS Soil Concentration (µg/kg)				
	FEED DT2B-1-1	FEED DT2B-1-2	PROD DT2B-1-1	PROD DT2B-1-2	PROD DT2B-1-DUP
Perfluorobutanesulfonic acid (PFBS)	13900	11400	0.0702 J	0.0455 J	< 0.199 U
Perfluorohexanesulfonic acid (PFHxS)	15000	12600	0.153 J	0.113 J	< 0.199 U
Perfluorononanoic acid (PFNA)	19000	17200	< 0.196 U	< 0.193 U	< 0.199 U
Perfluorooctanesulfonic acid (PFOS)	16500	15600	< 0.49 U	0.225 J	< 0.497 U
Perfluorooctanoic acid (PFOA)	14300	12700	< 0.196 U	< 0.193 U	< 0.199 U
Perfluoropentanoic acid (PFPeA)	14600	12600	< 0.196 U	< 0.193 U	< 0.199 U

Note: µg/kg = Microgram per kilogram.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-8 DT2B-2 Soil Treatment Test Results (650ºC)

Analyte	PFAS Soil Concentration (µg/kg)			
	FEED-DT2B-2-1	FEED-DT2B-2-2	PROD DT2B-2-1	PROD DT2B-2-2
Perfluorobutanesulfonic acid (PFBS)	12400	11500	< 0.195 U	< 0.194 U
Perfluorohexanesulfonic acid (PFHxS)	13200	12900	< 0.195 U	< 0.194 U
Perfluorononanoic acid (PFNA)	17700	17100	< 0.195 U	< 0.194 U
Perfluorooctanesulfonic acid (PFOS)	15200	14700	< 0.486 U	< 0.484 U
Perfluorooctanoic acid (PFOA)	12500	12400	< 0.195 U	< 0.194 U
Perfluoropentanoic acid (PFPeA)	13000	12700	< 0.195 U	< 0.194 U

Note: µg/kg = Microgram per kilogram.
U = Not detected at the reporting limit.

The percent reduction of PFAS concentrations in soils treated at 500°C and 650°C are presented graphically in Figures 4-1 and 4-2, respectively. Based on the arithmetic average of PFAS-spiked soils (i.e., 3 PFCA and 3 PFSA) tested at 500°C, total PFAS removal exceeded 94%. The PFCA removal exceeded 99.8% while the PFSA removal was approximately 89%. With an approximate initial feed concentration of 45 ppm for the total of the 6 spiked PFAS (i.e.,

individual PFAS feed levels in the 6 to 9 ppm range) treated levels ranged from less than 20 ppb for PFCAs and between 500 and to approximately 1000 ppb for select PFSAs.

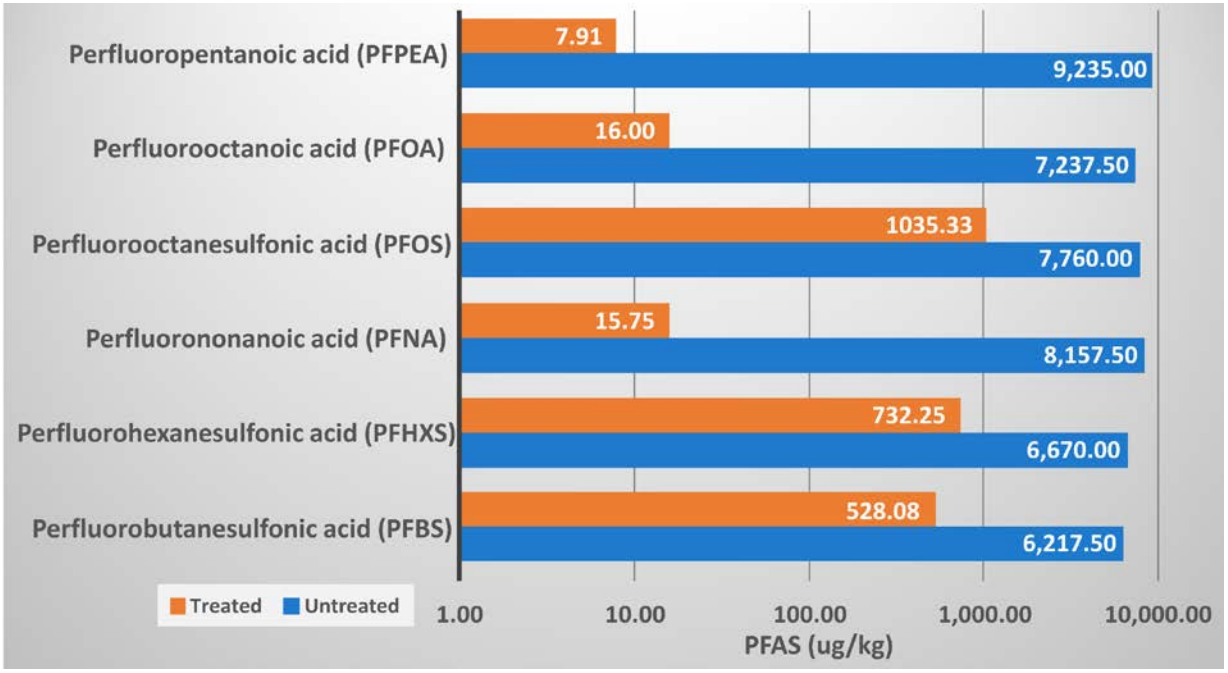


Figure 4-1. Thermal Desorption Treatment Results of 6 PFAS-Spiked Soil (500ºC)

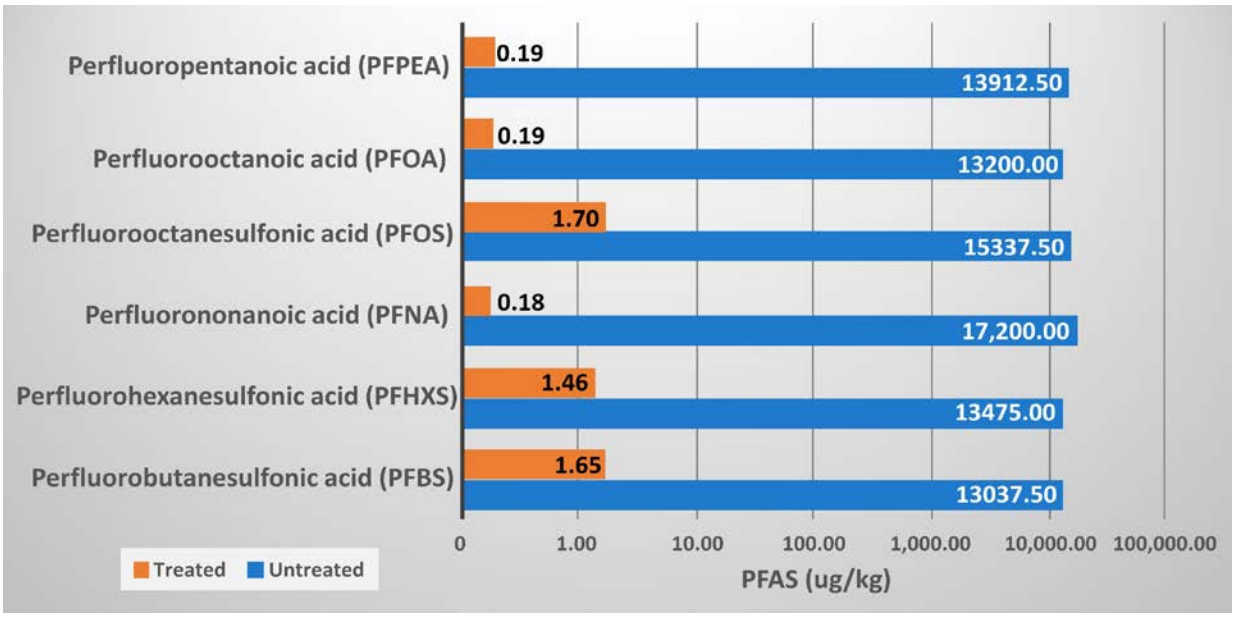
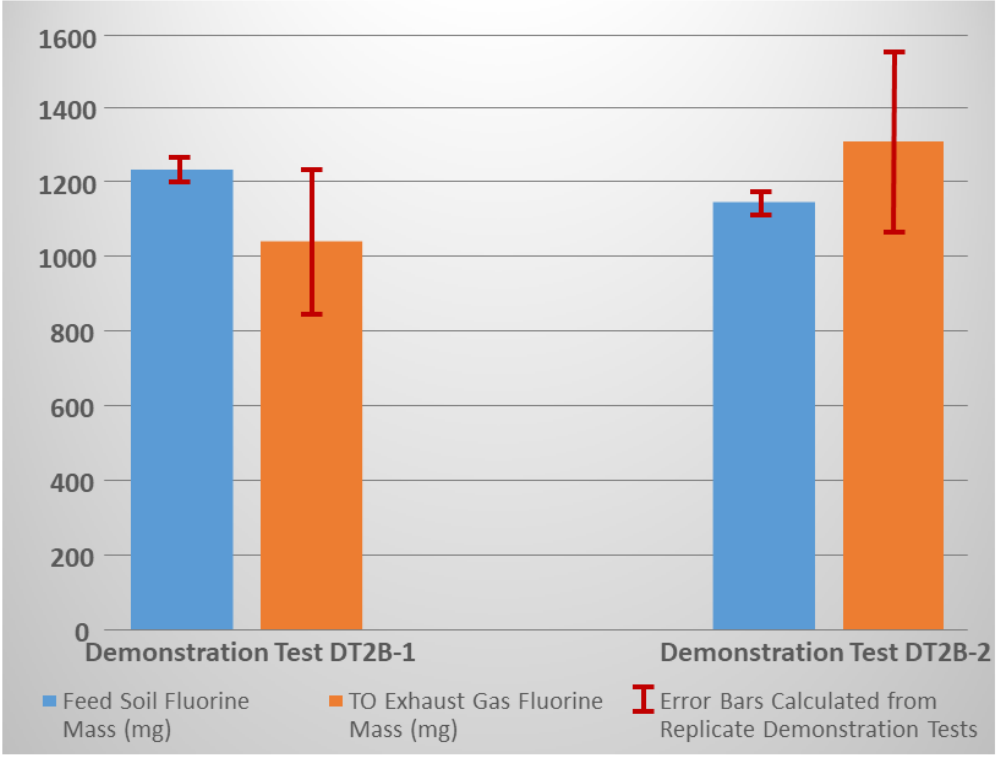


Figure 4-2. Thermal Desorption Treatment Results of 6 PFAS-Spiked Soil (650ºC)

Based on the arithmetic average of all 6 PFAS-spiked soil (i.e., 3 PFCA and 3 PFSA) tested at 650°C, the PFAS removal exceeded 99% for PFAS, as well as the 3 PFCA and 3 PFSA. With an

approximate initial feed concentration of 86 ppm for the total of 6 PFAS (i.e., individual PFAS feed levels in the 13 to 17 ppm) treated levels ranged from less than 2 ppb all PFAS.

The findings indicate a DRE of 99.9997%. When performing EPA Method 26A to capture HF from TO exhaust gas, findings indicate fluorine mass recovered from TO exhaust is closely comparable to total fluorine mass added (as calculated molecular mass to PFAS) to feed soils. Mass balance calculations yield fluorine mass recovery of 84% and 114%, respectively, for the two trial tests conducted with 6 PFAS-spiked soil runs combining ITD and TO (Figure 4-3).



Note: Cumulative PFAS in exhaust gas was detected at less that 60 ng/sample in Demonstration Tests DT2A-1 and DT2A-2; therefore, all fluorine in exhaust gas was attributed to HF.

Figure 4-3. Fluorine Mass Balance Results

4.2.3 AFFF Testing Soil Analysis

Based on the average of all AFFF-spiked soil tested at 500°C, the PFAS removal exceeded 97% for total of 24 quantifiable PFAS. With an approximate initial feed concentration of 10 ppm for total quantifiable PFAS (individual PFAS-spiked levels ranged from ~ 10 ppb to 7 ppm (i.e., PFOS), individual PFAS were removed to levels, in general, below 10 ppb, except for PFOS and PFHxS (i.e., post treatment levels of 215 and 25 pb, respectively). Based on the average of all AFFF-spiked soil tested at 650°C, the PFAS removal exceeded 99.7% for all 24 of the total quantifiable PFAS. With an approximate initial feed concentration of 9 ppm for total quantifiable PFAS (individual PFAS-spiked levels ranged from~ 1 ppb to 7 ppm [i.e., PFOS]), individual PFAS were removed to levels below 2 ppb, including PFOS and PFHxS.

Soil analysis for the AFFF test runs are presented in Tables 4-9 through 4-12. Feed and treated soil analyses for each run are presented together for ready comparison. Chemical analysis of the AFFF solution procured for the study is also presented in Table 4-13.

Table 4-9 DT3-1 Soil Treatment Test Results (500ºC)

Analyte	PFAS Soil Concentration (µg/kg)				
	FEED DT3-1-1	FEED DT3-1-2	PROD DT3-1-1	PROD DT3-1-2	PROD DT3-1-DUP
4:2 FTS	1.84 J	< 192 U	< 1.93 U	< 1.99 U	< 1.97 U
6:2 FTS	117 J	156 J	3.53	4.47	4.35
8:2 FTS	169 J	175 J	7.27	12.6	12.5
N-ethylperfluorooctanesulfonamidoacetic acid	< 1.92 U	< 192 U	< 1.93 U	< 1.99 U	< 1.97 U
N-methylperfluorooctanesulfonamidoacetic acid	< 1.92 U	< 192 U	< 1.93 U	< 1.99 U	< 1.97 U
Perfluorobutanesulfonic acid (PFBS)	142	208	13.7	7.06	8.97
Perfluorobutanoic acid (PFBA)	10.2 B	16.1 JB	1.01 B	0.787 B	0.9 B
Perfluorodecanesulfonic acid (PFDS)	18.6 J	19.9	2.53	1.08	2.24
Perfluorodecanoic acid (PFDA)	< 19.2 U	< 19.2 U	0.0572 J	0.0522 J	0.0717 J
Perfluorododecanoic acid (PFDoA)	0.163 J	< 19.2 U	< 0.193 U	< 0.199 U	< 0.197 U
Perfluoroheptanesulfonic Acid (PFHpS)	145	173	13.4	8.4	16.1
Perfluoroheptanoic acid (PFHpA)	22.6	38	0.519	0.42	0.541
Perfluorohexanesulfonic acid (PFHxS)	746	952	66.4	51	32.7
Perfluorohexanoic acid (PFHxA)	107	153	3.32	3.32	4.14
Perfluorononanesulfonic acid (PFNS)	14.9	8.38 J	1.26	0.483	0.931
Perfluorononanoic acid (PFNA)	12.5	14.6 J	0.226	0.334	0.188 J
Perfluorooctanesulfonamide (FOSA)	3.32	< 19.2 U	< 0.193 U	< 0.199 U	< 0.197 U
Perfluorooctanesulfonic acid (PFOS)	6880	7290	548	458	287
Perfluorooctanoic acid (PFOA)	112	143	1.57	1.51	1.99
Perfluoropentanesulfonic acid (PFPeS)	142	221	12.8	7.26	10.2
Perfluoropentanoic acid (PFPeA)	25	39.7	0.887	1.01	0.975
Perfluorotetradecanoic acid (PFTeA)	0.0684 J	< 19.2 U	< 0.193 U	< 0.199 U	< 0.197 U
Perfluorotridecanoic acid (PFTriA)	<0.192 U	< 19.2 U	< 0.193 U	< 0.199 U	< 0.197 U
Perfluoroundecanoic acid (PFUnA)	0.176 J	< 19.2 U	< 0.193 U	< 0.199 U	< 0.197 U

Note: µg/kg = Microgram per kilogram.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-10 DT3-2 Soil Treatment Test Results (500ºC)

Analyte	PFAS Soil Concentration (µg/kg)			
	FEED DT3-2-1	FEED DT3-2-2	PROD DT3-2-1	PROD DT3-2-2
4:2 FTS	< 195 U	1.59 J	< 1.94 U	< 1.94 U
6:2 FTS	160 J	127 J	< 1.94 U	< 1.94 U
8:2 FTS	148 J	217	< 1.94 U	< 1.94 U
N-ethylperfluorooctanesulfonamidoacetic acid	< 195 U	< 1.95 U	< 1.94 U	< 1.94 U
N-methylperfluorooctanesulfonamidoacetic acid	< 195 U	< 1.95 U	< 1.94 U	< 1.94 U
Perfluorobutanesulfonic acid (PFBS)	223	148	< 0.194 U	< 0.194 U
Perfluorobutanoic acid (PFBA)	18 JB	11 B	0.0616 JB	0.0592 JB
Perfluorodecanesulfonic acid (PFDS)	16.5 J	15.4 J	< 0.194 U	< 0.194 U
Perfluorodecanoic acid (PFDA)	< 19.5 U	< 19.5 U	< 0.194 U	< 0.194 U
Perfluorododecanoic acid (PFDoA)	< 19.5 U	0.178 J	< 0.194 U	< 0.194 U
Perfluoroheptanesulfonic Acid (PFHpS)	148	134	< 0.194 U	< 0.194 U
Perfluoroheptanoic acid (PFHpA)	37.5	22.1	< 0.194 U	< 0.194 U
Perfluorohexanesulfonic acid (PFHxS)	941	721	< 0.194 U	< 0.194 U
Perfluorohexanoic acid (PFHxA)	194	112	< 0.194 U	< 0.194 U
Perfluorononanesulfonic acid (PFNS)	7.7 J	13.7	< 0.194 U	< 0.194 U
Perfluorononanoic acid (PFNA)	13.3 J	12.1	< 0.194 U	< 0.194 U
Perfluorooctanesulfonamide (FOSA)	< 19.5 U	3.25	< 0.194 U	< 0.194 U
Perfluorooctanesulfonic acid (PFOS)	6890	7210	< 0.485 U	< 0.485 U
Perfluorooctanoic acid (PFOA)	162	100	< 0.194 U	< 0.194 U
Perfluoropentanesulfonic acid (PFPeS)	223	149	< 0.194 U	< 0.194 U
Perfluoropentanoic acid (PFPeA)	41.3	27.1	< 0.194 U	< 0.194 U
Perfluorotetradecanoic acid (PFTeA)	< 19.5 U	0.0642 J	< 0.194 U	< 0.194 U
Perfluorotridecanoic acid (PFTriA)	< 19.5 U	< 0.195 U	< 0.194 U	< 0.194 U
Perfluoroundecanoic acid (PFUnA)	< 19.5 U	0.175 J	< 0.194 U	< 0.194 U

Note: µg/kg = Microgram per kilogram.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-11 DT4-1 Soil Treatment Test Results (650ºC)

Analyte	PFAS Soil Concentration (µg/kg)				
	FEED DT4-1-1	FEED DT4-1-2	PROD DT4-1-1	PROD DT4-1-2	PROD DT4-1-DUP
4:2 FTS	0.529 J	0.801 J	< 1.97 U	< 1.96 U	< 1.95 U
6:2 FTS	82.4 J	116 J	< 1.97 U	0.387 J	< 1.95 U
8:2 FTS	218	198	< 1.97 U	0.344 J	< 1.95 U
N-ethylperfluorooctanesulfonamidoacetic acid	< 1.98 U	< 1.96 U	< 1.97 U	< 1.96 U	< 1.95 U
N-methylperfluorooctanesulfonamidoacetic acid	< 1.98 U	< 1.96 U	< 1.97 U	< 1.96 U	< 1.95 U
Perfluorobutanesulfonic acid (PFBS)	124	196	< 0.197 U	0.232	< 0.195 U
Perfluorobutanoic acid (PFBA)	9.54 B	14.5 JB	0.0634 JB	0.0698 JB	0.059 JB
Perfluorodecanesulfonic acid (PFDS)	16.6 J	19 J	< 0.197 U	< 0.196 U	< 0.195 U
Perfluorodecanoic acid (PFDA)	< 19.8 U	< 19.6 U	< 0.197 U	< 0.196 U	< 0.195 U
Perfluorododecanoic acid (PFDoA)	0.221	< 19.6 U	< 0.197 U	< 0.196 U	< 0.195 U
Perfluoroheptanesulfonic Acid (PFHpS)	132	165	< 0.197 U	< 0.196 U	< 0.195 U
Perfluoroheptanoic acid (PFHpA)	23.9	35.2	< 0.197 U	< 0.196 U	< 0.195 U
Perfluorohexanesulfonic acid (PFHxS)	607	880	< 0.197 U	0.431	< 0.195 U
Perfluorohexanoic acid (PFHxA)	98.7	146	< 0.197 U	0.119 J	< 0.195 U
Perfluorononanesulfonic acid (PFNS)	16	13.3	< 0.197 U	< 0.196 U	< 0.195 U
Perfluorononanoic acid (PFNA)	1.81	1.63	< 0.197 U	0.068 J	< 0.195 U
Perfluorooctanesulfonamide (FOSA)	3.63	3.48	< 0.197 U	< 0.196 U	< 0.195 U
Perfluorooctanesulfonic acid (PFOS)	6850	7440	< 0.492 U	0.437 J	< 0.488 U
Perfluorooctanoic acid (PFOA)	103	125	< 0.197 U	0.0922 J	< 0.195 U
Perfluoropentanesulfonic acid (PFPeS)	132	199	< 0.197 U	0.117 J	< 0.195 U
Perfluoropentanoic acid (PFPeA)	19.8	29	< 0.197 U	0.176 J	< 0.195 U
Perfluorotetradecanoic acid (PFTeA)	0.0682 J	0.0691 J	< 0.197 U	< 0.196 U	< 0.195 U
Perfluorotridecanoic acid (PFTriA)	< 0.198 U	< 0.196 U	< 0.197 U	< 0.196 U	< 0.195 U
Perfluoroundecanoic acid (PFUnA)	0.162 JI	0.146 J	< 0.197 U	< 0.196 U	< 0.195 U

Note: µg/kg = Microgram per kilogram.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-12 DT4-2 Soil Treatment Test Results (650ºC)

Analyte	PFAS Soil Concentration (µg/kg)			
	FEED DT4-2-1	FEED DT4-2-2	PROD DT4-2-1	PROD DT4-2-2
4:2 FTS	0.828 J	< 48.4 U	< 1.96 U	< 1.95 U
6:2 FTS	107 J	99.5	< 1.96 U	0.183 J
8:2 FTS	179 J	130	< 1.96 U	< 1.95 U
N-ethylperfluorooctanesulfonamidoacetic acid	< 1.96 U	< 48.4 U	< 1.96 U	< 1.95 U
N-methylperfluorooctanesulfonamidoacetic acid	< 1.96 U	< 48.4 U	< 1.96 U	< 1.95 U
Perfluorobutanesulfonic acid (PFBS)	205	152	0.0353 J	0.036 J
Perfluorobutanoic acid (PFBA)	16 JB	12 B	0.0612 JB	0.0523 JB
Perfluorodecanesulfonic acid (PFDS)	18.2 J	20.6	< 0.196 U	< 0.195 U
Perfluorodecanoic acid (PFDA)	< 19.6 U	< 4.84 U	< 0.196 U	< 0.195 U
Perfluorododecanoic acid (PFDoA)	0.212	< 4.84 U	< 0.196 U	< 0.195 U
Perfluoroheptanesulfonic Acid (PFHpS)	169	195	< 0.196 U	< 0.195 U
Perfluoroheptanoic acid (PFHpA)	39.1	28.1	< 0.196 U	< 0.195 U
Perfluorohexanesulfonic acid (PFHxS)	928	683	0.133 J	0.0791 J
Perfluorohexanoic acid (PFHxA)	153	129	< 0.196 U	< 0.195 U
Perfluorononanesulfonic acid (PFNS)	15.1	7.79	< 0.196 U	< 0.195 U
Perfluorononanoic acid (PFNA)	1.74	1.55 J	< 0.196 U	< 0.195 U
Perfluorooctanesulfonamide (FOSA)	3.58	3.12 J	< 0.196 U	< 0.195 U
Perfluorooctanesulfonic acid (PFOS)	7290	6400	1.1	< 0.486 U
Perfluorooctanoic acid (PFOA)	139	101	< 0.196 U	< 0.195 U
Perfluoropentanesulfonic acid (PFPeS)	211	172	0.0266 J	0.02 J
Perfluoropentanoic acid (PFPeA)	34.3	28.3	< 0.196 U	< 0.195 U
Perfluorotetradecanoic acid (PFTeA)	0.0708 J	< 4.84 U	< 0.196 U	< 0.195 U
Perfluorotridecanoic acid (PFTriA)	< 0.196 U	< 4.84 U	< 0.196 U	< 0.195 U
Perfluoroundecanoic acid (PFUnA)	0.13 JI	< 4.84 U	< 0.196 U	< 0.195 U

Note: µg/kg = Microgram per kilogram.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-13 PFAS Analysis of the AFFF Solution

Analyte	DT3-AFFF Solution (ng/L)	DT4-AFFF Solution (ng/L)
4:2 FTS	< 2500000 U	< 2500000 U
6:2 FTS	304000 J	< 2500000 U
8:2 FTS	< 2500000 U	< 2500000 U
N-ethylperfluorooctanesulfonamidoacetic acid	< 2500000 U	< 2500000 U
N-methylperfluorooctanesulfonamidoacetic acid	< 2500000 U	< 2500000 U
Perfluorobutanesulfonic acid (PFBS)	1570000	1450000
Perfluorobutanoic acid (PFBA)	209000 JB	190000 JB
Perfluorodecanesulfonic acid (PFDS)	155000 J	140000 J
Perfluorodecanoic acid (PFDA)	< 250000 U	< 250000 U
Perfluorododecanoic acid (PFDoA)	< 250000 U	< 250000 U
Perfluoroheptanesulfonic Acid (PFHpS)	1240000	1300000
Perfluoroheptanoic acid (PFHpA)	296000	268000
Perfluorohexanesulfonic acid (PFHxS)	7610000 B	7180000 B
Perfluorohexanoic acid (PFHxA)	1320000	1260000
Perfluorononanesulfonic acid (PFNS)	62400 J	61600 J
Perfluorononanoic acid (PFNA)	45000 J	< 250000 U
Perfluorooctanesulfonamide (FOSA)	< 250000 U	< 250000 U
Perfluorooctanesulfonic acid (PFOS)	76100000	79900000
Perfluorooctanoic acid (PFOA)	1170000	1070000
Perfluoropentanesulfonic acid (PFPeS)	1660000	1500000
Perfluoropentanoic acid (PFPeA)	268000	288000
Perfluorotetradecanoic acid (PFTeA)	< 250000 U	< 250000 U
Perfluorotridecanoic acid (PFTriA)	< 250000 U	< 250000 U
Perfluoroundecanoic acid (PFUnA)	< 250000 U	< 250000 U

Note: ng/L = Nanogram per liter.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Based on the arithmetic average of the compilation of all AFFF-spiked soils tested at 500°C, PFAS removal exceeded 97% for the total of 24 quantifiable PFAS. The percent reduction for perfluoroalkyl sulfonic acids (PFSA), perfluoroalkyl carboxylic acids (PFCA) and fluorotelomer substances (FTS) subgroups are shown below in Figure 4-4.

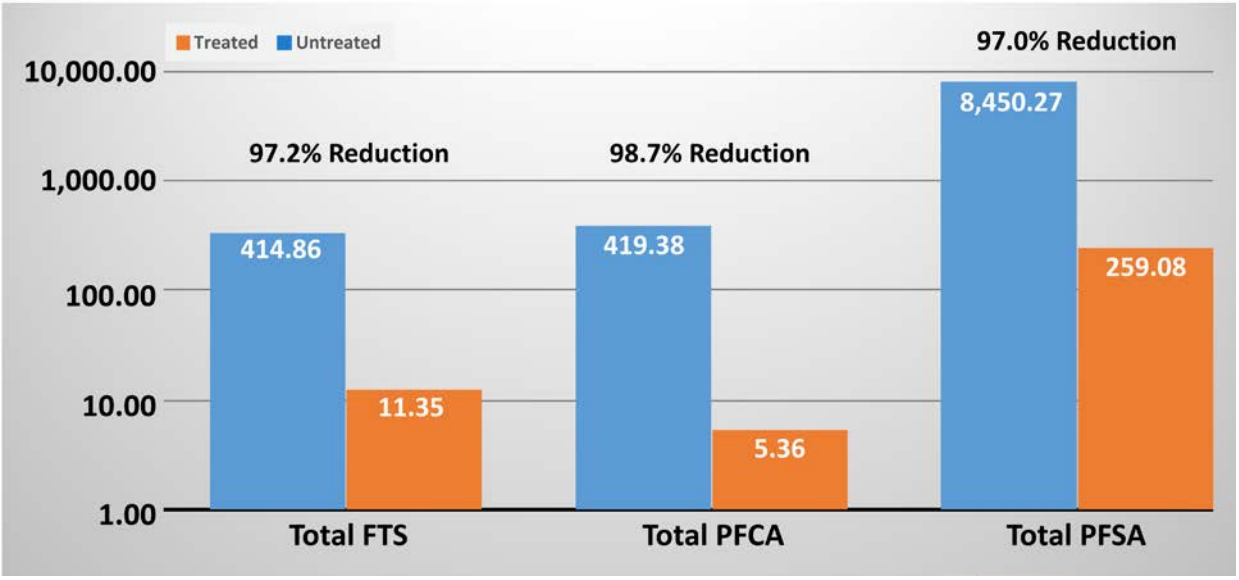


Figure 4-4. Thermal Desorption Treatment Results of AFFF in Soil (500º C)

Based on the arithmetic average of the compilation of all AFFF-spiked soils tested at 650°C, the PFAS removal exceeded 99.7% for all 24 of the total quantifiable PFAS. The percent reduction for PFSA, PFCA, and FTS subgroups are shown below in Figure 4-5.

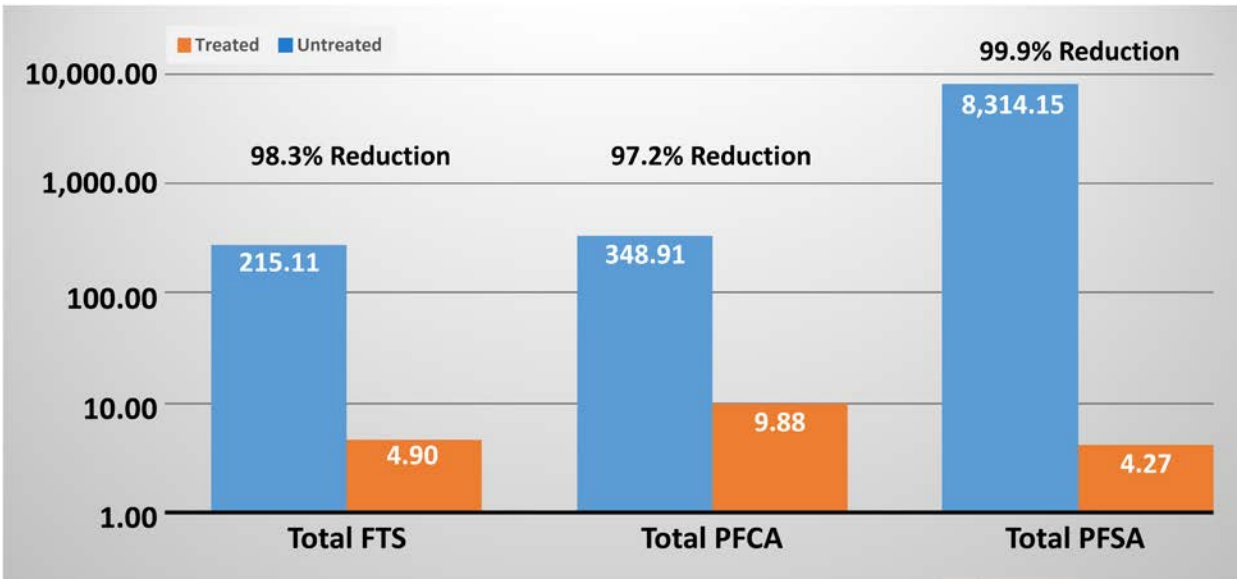


Figure 4-5. Thermal Desorption Treatment Results of AFFF-Spiked Soil (650°C)

4.2.4 AFFF Testing - Total Oxidizable Precursor Assay

Current methodologies for the analyses of PFAS are designed to measure a discrete list of 14 to 30 compounds. There are many additional PFAS that are not determined as discrete compounds by existing analytical methods, including EPA Method 537. The TOP assay can help measure the concentration of non-discrete and difficult to measure PFAS that are not determined by conventional analytical methods.

PFCs are often referred to as "precursors" to the perfluoroalkyl acids (PFAAs), as they bio transform to PFAAs as dead end environmental products. An example of these environmental biotransformation processes is often seen in biological wastewater treatment plants, where significantly more PFOA and PFOS are measured at the outflow than the inflow. The increase is explained by the fact that many PFAS enter the sewage treatment plant uncharacterized and are bio transformed to PFAAs of various chain lengths with PFOS and PFOA often being the only analytes assessed.

The TOP assay rapidly converts polyfluorinated PFAA precursors into PFAAs, including PFOA, using a hydroxyl radical-based chemical oxidation method. The TOP assay replicates what micro-organisms in the environment would achieve after many years. The end result is to provide a range of PFAAs that are detectable by LC/MS/MS. The TOP assay quantifies the sum of PFAS that could be converted to PFAAs in the environment. The TOP methodology has revealed that, for AFFF-impacted sites, the existing analytical LC/MS/MS methods are only detecting an estimated 30 to 50% of the total PFAA mass present as PFAA precursors.

To perform the TOP assay, as-received samples are analyzed by EPA Method 537 (LC/MS/MS) prior to chemical oxidation ("Pre-Treatment"). Samples are again analyzed after undergoing chemical oxidation ("Post-Treatment") and the difference is used to determine the total PFAA mass present as PFAA precursors in the sample. Tables 4-14 through 4-17 present the results of the TOP assay of total PFAA mass present in both untreated (FEED) and IDT treated (Processed) AFFF soil test runs at 500°C and 650°C. Each table shows PFAA analysis of non-oxidized and oxidized TOP sample both untreated and IDT treated AFFF soil. As illustrated in the tables after oxidation total PFAA mass increased in untreated samples by more than an order of magnitude an indication of a significant precursor presence in AFFF soil tested. However, after IDT treatment TOP analysis of oxidized samples compared to non-oxidized samples show insignificant increases in PFAA and overall reduction of PFAA precursors by at least 99% and 99.9 % respectively at 500 and 650°C in treated samples. The indication is that although AFFF contains a significant precursor burden that is subject to transformation, removal efficiencies of greater that 99% were achieved, leaving little to no additional precursors remaining in treated soil.

Table 4-14 TOP Analysis AFFF-Spiked Soil (Treatment at 500°C)- Test DT3-1

	Feed DT3-1				Processed DT3-1			
	Non-Oxidized		Oxidized		Non-Oxidized		Oxidized	
Analyte	**DT3-1-1**	**DT3-1-2**	**DT3-1-1**	**DT3-1-2**	**DT3-1-1**	**DT3-1-2**	**DT3-1-1**	**DT3-1-2**
PFBA	74	< 49 U	1200 *B	870 *B	1.2	1.5	13 *B	6.4 B*
PFHpA	< 44 U	< 49 U	780 *	500 *	0.63	< 0.49 U	11 *	4.7 *
PFHxA	160	120	2600 *	1800 *	3.5	3.1	21 *	8.6
PFNA	< 44 U	< 49 U	140	49	0.95	< 0.49 U	1.8	0.61
PFOA	130	89	710 *	410 *	2.9	1	8 *	3.3 *
PFPA	< 44 U	< 49 U	1900 *	1500 *	1	0.75	18 *	6.5
Total PFCA	**360**	**210**	**7300**	**5100**	**10**	**6.4**	**73**	**30**

Note: * = Isotope Dilution analyte is outside acceptance limits.
ng/L = Nanogram per liter.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-15 TOP Analysis AFFF-Spiked Soil (Treatment at 500°C)- Test DT3-2

	Feed DT3-2				Processed DT3-2			
	Non-Oxidized		Oxidized		Non-Oxidized		Oxidized	
Analyte	**DT3-2-1**	**DT3-2-2**	**DT3-2-1**	**DT3-2-2**	**DT3-2-1**	**DT3-2-2**	**DT3-2-1**	**DT3-2-2**
PFBA	< 37 U	53	960 *B	1100 *B	< 0.5 U	< 0.49 U	1.3 B*	1.2 B*
PFHpA	< 37 U	37	650 *	680 *	< 0.5 U	< 0.49 U	< 0.49 U*	< 0.5 U*
PFHxA	120	150	1900 *	2300 *	< 0.5 U	< 0.49 U	1.1	1.3
PFNA	< 37 U	< 34 U	58	59	< 0.5 U	< 0.49 U	< 0.49 U	< 0.5 U
PFOA	90	130	410 *	510 *	< 0.5 U	< 0.49 U	< 0.49 U*	< 0.5 U*
PFPA	< 37 U	37	1600 *	2200 *	< 0.5 U	< 0.49 U	0.56	0.67
Total PFCA	**210**	**410**	**5600**	**6800**	**0**	**0**	**3**	**3.2**

Note: * = Isotope Dilution analyte is outside acceptance limits.
ng/L = Nanogram per liter.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-16 TOP Analysis AFFF-Spiked Soil (Treatment at 650°C)- Test DT4-1

	Feed DT4-1				Processed DT4-1			
	Non-Oxidized		Oxidized		Non-Oxidized		Oxidized	
Analyte	DT4-1-1	DT4-1-2	DT4-1-1	DT4-1-2	DT4-1-1	DT4-1-2	DT4-1-1	DT4-1-2
PFBA	67	49	1300 *B	1200 *B	< 0.49 U	< 0.49 U	3.4 B*	1.3 B*
PFHpA	< 34 U	< 43 U	810 *	850 *	< 0.49 U	< 0.49 U	< 0.5 U*	< 0.5 U*
PFHxA	120	140	2400 *	2200 *	0.84	< 0.49 U	7.8	1.2 I
PFNA	< 34 U	< 43 U	84	67	< 0.49 U	< 0.49 U	< 0.5 U	< 0.5 U
PFOA	110	120	590 *	570 *	< 0.49 U	< 0.49 U	0.58 *	< 0.5 U*
PFPA	< 34 U	< 43 U	2200 *	2200 *	< 0.49 U	< 0.49 U	3.9	0.6
Total PFCA	**300**	**310**	**7400**	**7100**	**0.84**	**0**	**16**	**3.1**

Note: * = Isotope Dilution analyte is outside acceptance limits.
ng/L = Nanogram per liter.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

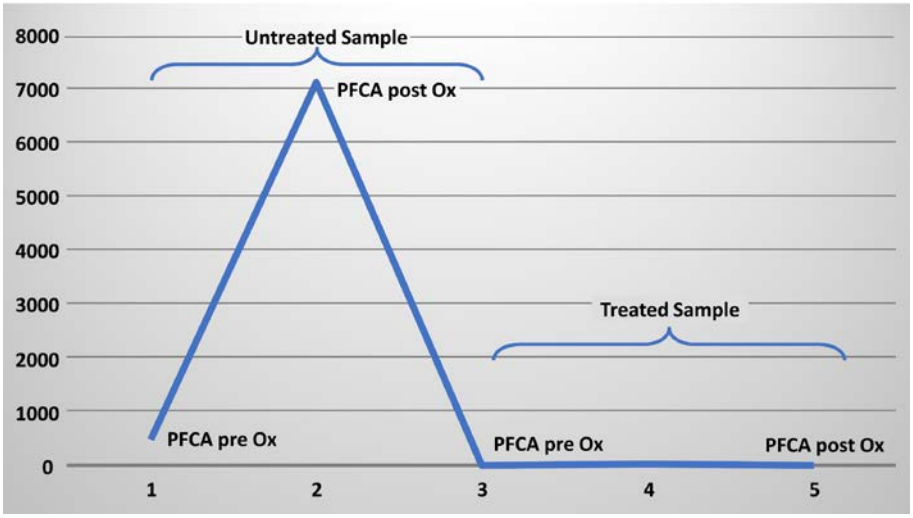
Table 4-17 TOP Analysis AFFF-Spiked Soil (Treatment at 650°C)- Test DT4-2

	Feed DT4-2				Processed DT4-2			
	Non-Oxidized		Oxidized		Non-Oxidized		Oxidized	
Analyte	DT4-2-1	DT4-2-2	DT4-2-1	DT4-2-2	DT4-2-1	DT4-2-2	DT4-2-1	DT4-2-2
PFBA	< 44 U	38	1400 *B	940 *B	< 0.5 U	< 0.5 U	1.1 B*	1 B*
PFDA	< 44 U	< 4.5 U	< 46 U	16	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
PFDoA	< 44 U	< 4.5 U	< 46 U	5.7	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
PFHpA	< 44 U	30	920 *	590 *	< 0.5 U	< 0.5 U	< 0.5 U*	< 0.5 U*
PFHxA	110	130	2500 *	2000 *	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
PFNA	< 44 U	< 4.5 U	82	56	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
PFOA	92	100	610 *	360 *	< 0.5 U	< 0.5 U	< 0.5 U*	< 0.5 U*
PFPA	< 44 U	32	2600 *	1600 *	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
PFUnA	< 44 U	< 4.5 U	< 46 U	7.2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Total PFCA	**200**	**330**	**8100**	**5500**	**0**	**0**	**1.1**	**1**

Note: * = Isotope Dilution analyte is outside acceptance limits.
ng/L = Nanogram per liter.
B = Compound was found in the blank and sample.
I = Value is an estimated maximum possible concentration.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

As expected with the TOP procedure, pre-treated feed samples were oxidized, whereby the total PFCA mass increased in untreated samples by more than an order of magnitude (an indication of the significant presence of precursors in AFFF soil tested). However, after IDT treatment TOP analyses of oxidized samples compared to non-oxidized samples show insignificant increases in PFCA and overall reduction of PFCA precursors by at least 99% and 99.9 % respectively at 500°C and 650°C for treated samples. Figure 4-6 illustrates the arithmetically averaged PFCA levels prior to and after TOP, illustrating the presence of precursors in feed soil compared to pre- and post-oxidation results of process (treated) soil for tests operated at the ITD temperature of 650°C. These findings indicate that although AFFF contains a significant precursor burden that is subject to transformation, thermal removal efficiencies of greater that 99% were achieved, leaving little to no additional precursors remaining within the treated soil.

Figure 4-6 Total PFCA (ug/kg) for AFFF-Spiked Soil Treated at 650°C



4.3 FIELD BLANK AND RINSE WATER RESULTS

Analytical test results for the soil sampling field blanks and decontamination rinse water are provided in Table 4-18. Wipe test results of the dryer shell following run DT3-1 are presented in Table 4-19. These results show that the sampling methodologies and decontamination procedures used in the DT Program were successful and that sample cross-contamination was not observed.

Table 4-18 Soil Sampling Field Blanks and Rinse Water

Analyte	FB-1-1 (ng/L)	FB-3-1 (ng/L)	RINSE-1-1 (ng/L)	RINSE-3-1 (ng/L)
4:2 FTS	< 20.6 U	< 21.4 U	< 21 U	< 18.5 U
6:2 FTS	< 20.6 U	< 21.4 U	< 21 U	< 18.5 U
8:2 FTS	< 20.6 U	< 21.4 U	< 21 U	< 18.5 U
N-ethylperfluorooctanesulfonamidoacetic acid	< 20.6 U	< 21.4 U	< 21 U	< 18.5 U
N-methylperfluorooctanesulfonamidoacetic acid	< 20.6 U	< 21.4 U	< 21 U	< 18.5 U
Perfluorobutanesulfonic acid (PFBS)	< 2.06 U	< 2.14 U	4.55	< 1.85 U
Perfluorobutanoic acid (PFBA)	0.605 JB	0.595 JB	0.638 JB	0.427 JB
Perfluorodecanesulfonic acid (PFDS)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U
Perfluorodecanoic acid (PFDA)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U
Perfluorododecanoic acid (PFDoA)	< 2.06 U	< 2.14 U	0.995 JB	< 1.85 U
Perfluoroheptanesulfonic Acid (PFHpS)	< 2.06 U	< 2.14 U	0.454 J	0.224 J
Perfluoroheptanoic acid (PFHpA)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U
Perfluorohexanesulfonic acid (PFHxS)	0.281 JB	0.361 JB	12.6 B	1.31 JB
Perfluorohexanoic acid (PFHxA)	< 2.06 U	< 2.14 U	< 2.1 U	0.647 J
Perfluorononanesulfonic acid (PFNS)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U
Perfluorononanoic acid (PFNA)	< 2.06 U	< 2.14 U	304	< 1.85 U
Perfluorooctanesulfonamide (FOSA)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U
Perfluorooctanesulfonic acid (PFOS)	< 2.06 U	< 2.14 U	77.4	12.4
Perfluorooctanoic acid (PFOA)	< 2.06 U	< 2.14 U	94.7	0.911 J
Perfluoropentanesulfonic acid (PFPeS)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U
Perfluoropentanoic acid (PFPeA)	< 2.06 U	< 2.14 U	12.3	< 1.85 U
Perfluorotetradecanoic acid (PFTeA)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U
Perfluorotridecanoic acid (PFTriA)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U
Perfluoroundecanoic acid (PFUnA)	< 2.06 U	< 2.14 U	< 2.1 U	< 1.85 U

Note: ng/L = Nanogram per liter.
B = Compound was found in the blank and sample.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-19 Dryer Shell Wipe Test

Analyte	Post DT3-1 Wipe Test (ng/L)
4:2 FTS	< 18.5 U
6:2 FTS	< 18.5 U
8:2 FTS	< 18.5 U
N-ethylperfluorooctanesulfonamidoacetic acid	< 18.5 U
N-methylperfluorooctanesulfonamidoacetic acid	< 18.5 U
Perfluorobutanesulfonic acid (PFBS)	< 1.85 U
Perfluorobutanoic acid (PFBA)	0.427 JB
Perfluorodecanesulfonic acid (PFDS)	< 1.85 U
Perfluorodecanoic acid (PFDA)	< 1.85 U
Perfluorododecanoic acid (PFDoA)	< 1.85 U
Perfluoroheptanesulfonic Acid (PFHpS)	0.224 J
Perfluoroheptanoic acid (PFHpA)	< 1.85 U
Perfluorohexanesulfonic acid (PFHxS)	1.31 JB
Perfluorohexanoic acid (PFHxA)	0.647 J
Perfluorononanesulfonic acid (PFNS)	< 1.85 U
Perfluorononanoic acid (PFNA)	< 1.85 U
Perfluorooctanesulfonamide (FOSA)	< 1.85 U
Perfluorooctanesulfonic acid (PFOS)	12.4
Perfluorooctanoic acid (PFOA)	0.911 J
Perfluoropentanesulfonic acid (PFPeS)	< 1.85 U
Perfluoropentanoic acid (PFPeA)	< 1.85 U
Perfluorotetradecanoic acid (PFTeA)	< 1.85 U
Perfluorotridecanoic acid (PFTriA)	< 1.85 U
Perfluoroundecanoic acid (PFUnA)	< 1.85 U

Note: ng/L = Nanogram per liter.
B = Compound was found in the blank and sample.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

4.3.1 Thermal Oxidizer Exhaust Gas Results

EPA Method 0010 samples were sent to TestAmerica for analysis. The EPA Method 0010 samples were extracted by sonication with methanol followed by a direct determination using LC/MS/MS. Analytical results for the two test runs are provided in Tables 4-20 and 4-21.

Table 4-20 DT2A-1 Feed and TO M0010 PFAS Analytical Data

Analyte	FEED DT2A-1-1 (µg/kg)	FEED DT2A-1-2 (µg/kg)	TO2A-1-1 BH (ng)	TO2A-1-1 B-T XAD (ng)	TO2A-1-1 FH (ng)	TO2A-1-1 IMP COND (ng)
Perfluorobutanesulfonic acid (PFBS)	14400	12900	8.6 B	8.33 B	< 0.495 U	< 0.5 U
Perfluorohexanesulfonic acid (PFHxS)	14600	11600	0.634	0.497 J	< 0.495 U	< 0.5 U
Perfluorononanoic acid (PFNA)	15400	15200	< 0.5 U	< 0.5 U	< 0.495 U	< 0.5 U
Perfluorooctanesulfonic acid (PFOS)	14400	13900	1.22 B	1.21 B	< 0.495 U	< 0.5 U
Perfluorooctanoic acid (PFOA)	14200	12000	13.5 B	11.6 B	< 0.495 U	1.13
Perfluoropentanoic acid (PFPeA)	15600	13300	4.03 B	2.43 B	0.783	0.761

Note: µg/kg = Microgram per kilogram.
ng = Nanogram.
B = Compound was found in the blank and sample.
J = Result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value.
U = Not detected at the reporting limit.

Table 4-21 DT2A-2 Feed and TO M0010 PFAS Analytical Data

Analyte	FEED DT2A-2-1 (µg/kg)	FEED DT2A-2-2 (µg/kg)	TO2A-1-2 BH (ng)	TO2A-1-2 B-T XAD (ng)	TO2A-1-2 FH (ng)	TO2A-1-2 IMP COND (ng)
Perfluorobutanesulfonic acid (PFBS)	14100	13700	10.3 B	9.62 B	< 0.496 U	< 0.5 U
Perfluorohexanesulfonic acid (PFHxS)	14400	13500	0.7	0.595	< 0.496 U	< 0.5 U
Perfluorononanoic acid (PFNA)	17300	18700	< 0.5 U	< 0.5 U	< 0.496 U	< 0.5 U
Perfluorooctanesulfonic acid (PFOS)	15700	16700	1.2 B	1.25 B	< 0.496 U	< 0.5 U
Perfluorooctanoic acid (PFOA)	13400	14100	13.6 B	12.9 B	< 0.496 U	0.538
Perfluoropentanoic acid (PFPeA)	15000	14500	3.68 B	3.06 B	0.525	< 0.5 U

Note: µg/kg = Microgram per kilogram.
ng = Nanogram.
B = Compound was found in the blank and sample.
U = Not detected at the reporting limit.

An EPA Method 0010 field blank was also submitted to the laboratory for analysis. These results are provided in Table 4-22.

Table 4-22 DT2A-1 M0010 Field Blank Analytical Data

Analyte	TO2A-1-1-QC BH PB (ng)	TO2A-1-1-QC B-T XAD PB (ng)	TO2A-1-1-QC DI WATER RB (ng)	TO2A-1-1-QC FH PB (ng)
Perfluorobutanesulfonic acid (PFBS)	9.61 B	9.44 B	< 0.5 U	< 0.5 U
Perfluorohexanesulfonic acid (PFHxS)	0.749	0.555	< 0.5 U	< 0.5 U
Perfluorononanoic acid (PFNA)	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Perfluorooctanesulfonic acid (PFOS)	1.27 B	1.21 B	< 0.5 U	< 0.5 U
Perfluorooctanoic acid (PFOA)	12.9 B	12.7 B	< 0.5 U	< 0.5 U
Perfluoropentanoic acid (PFPeA)	3.12 B	3.48 B	< 0.5 U	< 0.5 U

Note: ng = Nanogram.

It should be noted that negligibly low PFAS concentrations were detected in the EPA Method 0010 field blank. PFAS concentrations detected in the field blank were nearly equivalent to the actual test sample results. The relative percent difference between the sample concentrations and blank concentrations for analytes detected in the blank samples was only 5%. [1] This suggests that the low concentration of PFAS detected in the exhaust gas samples were attributed to background and may not represent PFAS mass associated with feed material. The data were not blank corrected when calculating the DRE, and the uncorrected reported values were used as shown in Tables 4-23 and 4-24.

Table 4-23 DT2A-1 Feed and TO M0010 PFAS Data used for DRE Determination

Analyte	FEED DT2A-1-1 (µg/kg)	FEED DT2A-1-2 (µg/kg)	TO2A-1-1 BH (ng)	TO2A-1-1 B-T XAD (ng)	TO2A-1-1 FH (ng)	TO2A-1-1 IMP COND (ng)
Perfluorobutanesulfonic acid (PFBS)	14400	12900	8.6	8.33	0.495	0.5
Perfluorohexanesulfonic acid (PFHxS)	14600	11600	0.634	0.497	0.495	0.5
Perfluorononanoic acid (PFNA)	15400	15200	0.5	0.5	0.495	0.5
Perfluorooctanesulfonic acid (PFOS)	14400	13900	1.22	1.21	0.495	0.5
Perfluorooctanoic acid (PFOA)	14200	12000	13.5	11.6	0.495	1.13
Perfluoropentanoic acid (PFPeA)	15600	13300	4.03	2.43	0.783	0.761

Note: µg/kg = Microgram per kilogram.
ng = Nanogram.

Table 4-24 DT2A-2 Feed and TO M0010 PFAS Data used for DRE Determination

Analyte	FEED DT2A-2-1 (µg/kg)	FEED DT2A-2-2 (µg/kg)	TO2A-1-2 BH (ng)	TO2A-1-2 B-T XAD (ng)	TO2A-1-2 FH (ng)	TO2A-1-2 IMP COND (ng)
Perfluorobutanesulfonic acid (PFBS)	14100	13700	10.3	9.62	0.496	0.5
Perfluorohexanesulfonic acid (PFHxS)	14400	13500	0.7	0.595	0.496	0.5

[1] Other research data suggests Supelco XAD resins, which were used in this demonstration test, may be impacted with trace amounts of PFAS compounds as a result of manufacturing, based on recent communications with Jeff Ryan. This would explain the low level PFAS detections in the XAD resin samples as well as the blanks.

Perfluorononanoic acid (PFNA)	17300	18700	0.5	0.5	0.496	0.5
Perfluorooctanesulfonic acid (PFOS)	15700	16700	1.2	1.25	0.496	0.5
Perfluorooctanoic acid (PFOA)	13400	14100	13.6	12.9	0.496	0.538
Perfluoropentanoic acid (PFPeA)	15000	14500	3.68	3.06	0.525	0.5

Note: µg/kg = Microgram per kilogram.
ng = Nanogram.

4.3.2 Thermal Oxidizer PFAS DRE Calculation

PFAS DRE was calculated from the mass of the PFAS constituent fed to the TO and the mass of the same constituent present in the exhaust emissions from the TO:

$$\text{PFAS DRE (\%)} = [1- (PFAS_{EG}/(PFAS_{FS} - PFAS_{TS})] \times 100$$

where, $PFAS_{EG}$ = mass of PFAS in TO exhaust gas
$PFAS_{FS}$ = mass of PFAS in feed soil
$PFAS_{TS}$ = mass of PFAS in treated soil.

PFAS data from the feed soil, treated soil, and corresponding EPA Method 0010 sample along with the sample and TO exhaust gas volumes measured by the various EPA test methods are used to calculate the DRE as shown in Table 4-25

Table 4-25 DT2A EPA Method 0010 PFAS DRE

Parameter	DT2A-1	DT2A-2
Soil Feed Parameter		
Feed Weight, wet (kg)	23.4	22.31
Feed Moisture Content (% wt.)	9.5%	9.9%
Feed Weight, dry (kg)	21.18	20.11
PFAS Feed Concentration (ug/kg, dry)	84216	91117
PFAS Feed Mass (ug)	1783436	1832586
TO Exhaust Gas Parameter		
M0010 Sample PFAS Catch (ng)	<60.2	<63.9
M0010 Sample Volume (dscm)	2.59	1.59
TO Exhaust Gas PFAS Concentration (ng/dscm)	23	40
TO Exhaust Gas Flow Rate (dscm/min)	1.47	1.47
Sample Duration (min)	165	100
TO Exhaust Volume (dscm)	243.0	147.3
TO Exhaust Gas PFAS Mass (ng)	5659	5921
PFAS DRE (%)	>99.9997%	>99.9997%

Note: µg/kg = Microgram per kilogram.
% wt. = Percent weight.
dscm = Dry standard cubic meter.
ng/dscm = Nanogram per dry standard cubic meter.
dscm/min = Dry standard cubic meter per minute.
kg = Kilogram.
ng = Nanogram.
DRE = Destruction and removal efficiency.

The inherent margin of error between Method 0010/Method 537 analytical reporting limits (approximately 3% field and laboratory variability observed with analyses of replicate test runs) and actual reported air-emission PFAS concentration adjusted for total TO flow (up to +/- 30% based on air sampling variability historically observed with the air sampling train via Method 5), is extremely low overall. This is because the exhaust gas PFAS concentration, which may experience up to +/- 30% air sampling variability (i.e., due to air traversing the TO emission stack with a 1/2" diameter sampling nozzle largely leads too this variability), is not significant in comparison to the initial feed PFAS concentration. This relationship of low exhaust gas PFAS concentration to high feed soil PFAS concentration thus only marginally affects the margin of error of the DRE calculation, which as shown in Table 4-25 for samples from DT2A-1 and DT2A-2 calculated at 99.9997%.

4.3.3 Thermal Oxidizer HF Emissions Analysis

EPA Method 26A samples were sent to TestAmerica for HF analysis by ion chromatography as shown in Table 4-26.

Table 4-26 DT2B EPA Method 26A Hydrogen Fluoride Test Results

Parameter	TO2B-1-1	TO2B-1-2	TO2B-1-1-QC / DI WATER	TO2B-1-1-QC / NOAH
Hydrogen Fluoride (µg)	11800	14100	< 21.1 U	< 21.1 U

Note: µg = Microgram.
U = Not detected at the reporting limit.

4.3.4 Thermal Oxidizer Fluorine Mass Balance Calculation

Organic Fluorine DRE is calculated from the mass of organic fluorine fed to the TO and the mass of inorganic fluorine present in the exhaust emissions from the TO:

$$\text{Organic Fluorine DRE (\%)} = [F^-_{EG}/(F^-_{FS} - F^-_{TS})] \times 100$$

where, F^-_{EG} = mass of inorganic fluorine in TO exhaust gas
F^-_{FS} = mass of organic fluorine in feed soil
F^-_{TS} = mass of organic fluorine in treated soil.

Fluorine data from the feed soil, treated soil and corresponding EPA Method 26A sample along with the sample and TO exhaust gas volumes measured by the various EPA test methods are used to calculate the DRE as shown in Table 4-27 through 4-29

Table 4-27 DT2B-1 Feed Soil Fluorine Concentration

Analyte	Chemical Formula	FEED DT2B-1-1 (ug/kg)	FEED DT2B-1-2 (ug/kg)	Fluorine Content (% wt.)	Fluorine Content (ug/kg)
Perfluorobutanesulfonic acid (PFBS)	$C_4HF_9O_3S$	13900	11400	57.0%	7208
Perfluorohexanesulfonic acid (PFHxS)	$C_6HF_{13}O_3S$	15000	12600	61.7%	8519

Perfluorononanoic acid (PFNA)	$C_9HF_{17}O_2$	19000	17200	69.6%	12598
Perfluorooctanesulfonic acid (PFOS)	$C_8HF_{17}O_3S$	16500	15600	64.6%	10366
Perfluorooctanoic acid (PFOA)	$C_8HF_{15}O_2$	14300	12700	68.8%	9292
Perfluoropentanoic acid (PFPeA)	$C_5HF_9O_2$	14600	12600	64.8%	8807
Total Fluorine in Feed Soil (ug/kg)					56790
Note: µg/kg = Microgram per kilogram.					

Table 4-28 DT2B-2 Feed Soil Fluorine Concentration

Analyte	Chemical Formula	FEED DT2B-2-1 (ug/kg)	FEED DT2B-2-2 (ug/kg)	Fluorine Content (% wt.)	Fluorine Content (ug/kg)
Perfluorobutanesulfonic acid (PFBS)	$C_4HF_9O_3S$	12400	11500	57.0%	6809
Perfluorohexanesulfonic acid (PFHxS)	$C_6HF_{13}O_3S$	13200	12900	61.7%	8056
Perfluorononanoic acid (PFNA)	$C_9HF_{17}O_2$	17700	17100	69.6%	12110
Perfluorooctanesulfonic acid (PFOS)	$C_8HF_{17}O_3S$	15200	14700	64.6%	9655
Perfluorooctanoic acid (PFOA)	$C_8HF_{15}O_2$	12500	12400	68.8%	8569
Perfluoropentanoic acid (PFPeA)	$C_5HF_9O_2$	13000	12700	64.8%	8322
Total Fluorine in Feed Soil (ug/kg)					53522
Note: µg/kg = Microgram per kilogram.					

Table 4-29 DT2B EPA Method 26A Fluorine Mass Balance / DRE

Parameter	DT2B-1	DT2B-2
Soil Feed Parameter		
Feed Weight, wet (kg)	23.85	23.49
Feed Moisture Content (% wt.)	9.2%	9.0%
Feed Weight, dry (kg)	21.67	21.38
Fluorine Feed Concentration (ug/kg, dry)	56790	53522
Fluorine Feed Mass (ug)	1230510	1144081
TO Exhaust Gas Parameter		
M26A Sample Hydrogen Fluoride Catch (ug)	11800	14100
M26A Sample Fluorine Catch (ug)	11206	13390
M26A Sample Volume (dscm)	1.76	2.04
TO Exhaust Gas Fluorine Concentration (ug/dscm)	6367	6562
TO Exhaust Gas Flow Rate (dscm/min)	1.42	1.47
Sample Duration (min)	115	135
TO Exhaust Volume (dscm)	162.8	198.8
TO Exhaust Gas Fluorine Mass (ug)	1036815	1304559
PFAS DRE from Fluorine Mass Balance (%)	84%	114%

Note: µg/kg = Microgram per kilogram.
% wt. = Percent weight.
dscm = Dry standard cubic meter.
µg/dscm = Microgram per dry standard cubic meter.
kg = Kilogram.
DRE = Destruction and removal efficiency.

The inherent margin of error between Method 26A analytical reporting limits (approximately 19.5% field and laboratory variability, with 3% variability attributed to laboratory alone based on matrix spike/matrix spike duplicates) and actual reported air-emission HF concentration adjusted for total TO flow (approximately +/- 30% based on air sampling variability shown with the air sampling train via Method 5), approximates Method 5 variability. This is because the exhaust gas HF concentration, which experiences +/- 30% air sampling variability (i.e., air traversing the TO emission stack with a 1/2" diameter sampling nozzle), is significant relative to the initial mass of organic fluorine in feed soil minus the mass of organic fluorine in treated soil. This relationship of elevated exhaust gas HF concentration relative to a similar magnitude of organic fluorine in feed soil results in a wider range of variability for the organic Fluorine DRE (84% to 114%) as well as the inorganic Fluorine mass identified in test runs (19.5% expressed as relative percent difference between replicate runs).

While the emissions of HF are not specifically regulated from hazardous waste combustors, emissions of hydrogen chloride (HCl) are regulated. The HCl limit can be viewed as a surrogate for all acid gas emissions from the TO. EPA performance specifications for a Hazardous Waste Combustor per 40 CFR 63 Subpart EEE limit the emissions of hydrogen chloride to less than 21 ppmV, dry basis, corrected to 7% oxygen in the exhaust stack. During the demonstration tests measured HF concentrations suggest HCl emissions were well under this regulatory limit and depending on the concentration of PFAS in the feed material it is possible a scrubber would not be required. However, transportable hazardous waste thermal treatment units are generally equipped with an acid gas scrubber as standard equipment. The incremental capital and operating cost associated with the scrubber is only a fraction of the overall soil treatment cost (i.e., less than $10-$20/ton).

4.4 GENERAL UNDERSTANDING OF CURRENT DISPOSAL COSTS

Final disposition of solid PFAS contaminated media (i.e., IDW, spent carbon, contaminated soils, etc.) is currently limited to transport and disposal within landfills permitted for hazardous waste or incineration. However, many landfills and incinerators are not accepting PFAS contaminated media as these facilities are waiting for regulatory agencies to clarify whether it is acceptable to receive and/or process PFAS contaminated media and to establish the parameters and regulatory limits under which they must operate. Although costs vary widely, transport and disposal costs for PFAS contaminated media can range from $300 to $1,000 per ton. Based on the design and implementation of similar ITD/TO units, it is estimated without having performed a highly engineered feasibility study, for sites with significant quantities of soil requiring treatment (i.e., greater than 100,000 cubic yards of soil), ITD/TO technology could be performed onsite for approximately $300 per ton to treat PFAS contaminated soils. For sites, with lesser quantities of PFAS contaminated soils the costs would increase. Additional, study is warranted to better define the costs associated with the ITD/TO technology for a wider range of soil quantities.

5. CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

A preliminary evaluation of the ITD/TO Technology to treat solid PFAS-Impact Waste was performed using the five priorities identified under SERDP Project ER18-1633, *Lines of evidence to assess the effectiveness of per- and PFAS remedial technologies*. The premise of this SERDP Project was to prioritize the top five lines of evidence that may be used to assess the effectiveness of PFAS remedial technologies to help guide future investments and improve the return on investment in PFAS treatment technologies. An evaluation of these priorities, within the context of this Demonstration Test, is presented in Table 5-1.

Table 5-1. Preliminary Evaluation of the Effectiveness of ITD/TO Technology

Priority/Line of Evidence	Evaluated (Y/N)	Comments
Priority 1: Decrease in target PFAS concentrations	Y	Treated highly contaminated soils to low ppb concentrations.
Priority 2: Treatment kinetics and mechanism identified or appear plausible	Y	Thermal desorption and thermal oxidation are mature technologies with processes well understood.
Priority 3: Treatment transformation products identified and quantified	Y	PFAS and precursors not identified in treated soils. Fluorine mass balance indicates complete destruction of PFAS. HF identified in TO exhaust gas, which can be mitigated using traditional scrubbers.
Priority 4: Study design employs best practices	Y	Demonstration tests were performed in duplicate, employing EPA methodologies, and improving on less established analytical protocols.
Priority 5: Evaluation of factors that may decrease PFAS treatment effectiveness	Y	Evaluated a range of thermal desorption temperatures. Additional studies warranted for factors relating to potential PFAS destruction caused during ITD phase.

5.1 CONCLUSIONS

The DT Program results show conclusively that a successful proof of concept was achieved; where by ITD technology will remediate PFAS in soil to a concentration of less than 1-10 µg/kg, and, furthermore, that a nominal TO operating under the conditions of this study can achieve a DRE of greater than 99.9997% for off-gas emissions[2] from ITD-treated PFAS feed material. More specifically, at 650°C the ITD technology will desorb PFAS in soil to a concentration of less than 1-10 µg/kg, and that TO operating in the range of 900-1,000ºC° at a nominal residence time of 2.0 seconds can achieve a DRE of greater than 99.9997% for exhaust gas emissions from ITD- treated PFAS material. At 500°C and ITD for the six PFAS, the removal efficiencies for Perfluoroalkyyl carboxylic acids (PFCAs) were observed to be higher than for Perfluoroalkane

[2] Particulate Matter (PM) 10 and PM 2.5 analyses were not performed as part of the TO stack testing.

sulfonic acids (PFSAs) (99.84% relative to 88.88%). However, at 650°C and ITD for the six PFAS, the removal efficiencies for both PFCAs and PFSAs were optimally greater (99.99% or higher). Higher removal efficiencies were observed for the AFFF-spiked soils at 500°C ITD. This may be attributed to the lower overall concentrations of PFAS in the feed soils spiked with AFFF.

Although there were significant PFAS reductions in soil achieved by ITD at both 500° C and 650° C, treatment efficiencies and absolute post-treatment levels of PFSAs (e.g., PFOS and PFHxS) attained at the lower temperature of 500°C may not always be sufficient to meet future soil-to-groundwater cleanup standards. At 650° C, findings of this study indicate that future soil-to-groundwater cleanup standards would likely be met.

The proof-of-concept DT Program results also demonstrated that ITD technology effectively desorbs PFAS precursors at 650°C when treating soils that were recently spiked with AFFF (Fluorotelomer removal efficiencies greater than 98%), and ITD does not create additional PFAS precursors at both 500°C and 650°C. During the tests where TO was used and the exhaust gas was analyzed for both PFAS and HF, a mass balance was performed on fluorine to demonstrate/confirm the destruction of PFAS. The mass balance confirmed that 84% and 114% (for an arithmetic mean of the replicate runs of 99%) of the spiked organic Fluorine was recovered as HF (or inorganic Fluorine) for the two demonstration tests, results both of which were well within the anticipated air sampling uncertainty of plus or minus 30%. Test results are summarized in Tables 4-1 and 4-2.

5.2 IMPLICATIONS FOR FUTURE RESEARCH

Full-scale treatment of PFAS-impacted soil and spent sorbents from groundwater cleanup is currently limited to costly measures including transport to/disposal at a permitted landfill, transport to/destruction at an incineration facility, and high-temperature regenerative methods of spent treatment sorbents. Anticipating that future demand will only increase for treatment of PFAS-impacted media, this study has direct benefits on advancing the state-of-the-industry by employing a mature technology (ITD/TO) to provide “innovative” treatment of an emerging contaminant. Based on these preliminary results of this study, which are very promising, additional scale-up study is warranted on ITD/TO technology for PFAS treatment to better define the routine application of this technology with respect to PFAS destruction and more completely assess the costs associated with full-scale implementation of this technology for PFAS treatment.

Transportable indirect thermal desorption systems intended for on-site soil treatment can be designed over a wide range of throughput capacity, from small batch units with a treatment capacity of approximately 0.5 ton/hr to large continuous-feed units with a 15 ton/hr capacity. Equipment selection and sizing is generally based on the quantity of soil requiring treatment at a given site, for example higher capacity units are generally more cost-effective at sites with large quantities of soil and vice versa. Unit treatment costs are inversely proportion to soil quantity and can range from $600/ton for sites containing, 1,000 cubic yards of soil, to less than $300/ton for a 100,000 cubic yard site. Direct-fired units have higher throughput capacity compared to indirect units, given similar capital and operating costs, and are therefore more cost-effective. Throughput capacity of direct fired units generally range from 5 ton/hr to in excess of 30 ton/hr.

A highly engineered feasibility study coupled with a more extensive onsite full-scale, onsite demonstration pilot is recommended to answer the following:

- What are the most cost-effective ways (e.g., fuel source) to implement operation of the ITD/TO on a full-scale?
- At what PFAS feed concentrations does an HF scrubber need to be considered for the exhaust treatment train?
- Is ITD/TO effective on the full suite of PFAS currently identified under EPA Method 537 (i.e., beyond the six PFAS compounds tested)?
- Does EPA Method 0010 coupled with EPA Method 537 adequately capture PFAS in exhaust gas to satisfy EPA/regulatory concerns?
- Can ITD/TO treated material be used as site backfill? Would this gain public and regulatory acceptance?
- Will this technology be accepted by the public as a regulatory approved treatment method?
- What are the scalable ranges of unit costs associated with ITD/TO treatment? At what point is ITD/TO cost competitive (i.e., volume of waste requiring treatment)?

A rough outline of potential next steps for future work include the following. First, we propose to add to the project team a representative of the EPA to provide regulatory perspective and guidance as to what additional data would be most influential in prompting regulatory acceptance of the ITD/TO technology to treat PFAS contaminated media. Second, a community out-reach element would be included with future funding that would be used to survey and better understand if the ITD/TO technology could gain public acceptance and be permitted locally on or adjacent to DoD. sites. The research team has identified several viable candidate DoD Sites with stockpiled PFAS-contaminated soils for further study. DoD and/or Government affiliated interest (equating to future sponsorship) currently exists for Eielson AFB, Fairchild AFB, and DFSP Newington. PFAS- and AFFF impacted soil at these Sites would be subjected to treatment under similar operating conditions to this Study to evaluate to evaluate DRE performance and Fluorine mass balance under actual rather than controlled conditions.

6. LITURATURE CITED

SERDP and ESTCP Workshop on Research and Demonstration Needs for Management of AFFF-Impacted Sites, September 2017.

Houtz, E.F., C.P. Higgins, J.A. Field and D.L. Sedlak. 2013. Persistence of Perfluoroalkyl acid precursors in AFFF-impacted groundwater and soil. Environmental Science and Technology 47: 8187 – 8195.

TCEQ, March 2017, TRRP Tier 1 protective concentration levels (PCLs) are the default cleanup standards in the Texas Risk Reduction Program; www.tceq.texas.gov/remediation/trrp/trrppcls.html.

Alaska Department of Environmental Conservation (ADEC). 2017. 18 AAC 75, Oil and Other Hazardous Substances Pollution Control. As amended through March 23, 2017.

United States Air Force Civil Engineer Center. 2016. PFC Program Review Presentation, Daniel Medina, Steve TerMaath. September.

Air Force Public Affairs, Assessing Potential Perfluorinated Compounds (PFCs) Contamination at Air Force Installations, March 2016.

Anderson, H.R., G.C. Long, R.C. Porter and J.K. Anderson. 2016. Occurrence of select perfluoroalkyl substances at U.S. Air Force aqueous film-forming foam release sites other than fire-training areas: Field-validation of critical fate and transport properties. Chemosphere 150: 678 – 685.

Endpoint Consulting, 2016. Bench-Scale VEG Research & Development Study: Implementation Memorandum for Ex-Situ Thermal Desorption of Perfluoroalkyl Compounds (PFCs) in Soils. http://www.endpoint-inc.com/wp-content/uploads/2016/05/VEG-Bench-Scale-PFCs-Soil.pdf.

Enviropacific, 2017. “Treatment of PFAS in Soils, Sediments and Water”. http://www.enviropacific.com.au/wp-content/uploads/2016/09/Enviropacific_Treatment-of-PFAS.pdf

Krusic P J, and Roe D C. (2004). Gas-phase NMR technique for studying the thermolysis of materials: Thermal decomposition of ammonium perfluorooctanoate. Analytical Chemistry, 76(13): 3800–3803.

Krusic P J, Marchione A. and Roe D C. (2005). Gas-phase NMR studies of, the thermolysis of perfluorooctanoic acid. Journal of Fluorine Chemistry, 126(11-12): 1510–1516.

U.S. Environmental Protection Agency, Office of Pollution Prevention & Toxics (2003a). Laboratory-Scale Thermal Degradation of Perfluorooctanyl Sulfonate and Related Substances. Washington DC:, Docket AR226-1366.

U.S. Environmental Protection Agency, Office of Pollution Prevention & Toxics (2003b) Final Report: Laboratory-Scale Thermal Degradation of PerfluoroOctanyl Sulfonate and Related Substances. Washington DC Docket AR226-1367.

Lemieux, P. M., et al., EMISSIONS OF FLUORINATED COMPOUNDS FROM THE COMBUSTION OF CARPETING. In Proceedings, 2007 International Conference on Incineration and Thermal Treatment Technologies, Phoenix, AZ, May 14 - 18, 2007.

Yamada, et al., 2005, Thermal degradation of fluorotelomer treated articles and related materials, Chemoshere, 61(7), pp. 974-984.

Appendix A

PFAS Spike Test Analytical Report

ANALYTICAL REPORT

Job Number: 140-13780-1

Job Description: PFAS Pilot Study - Spike Tests

For:
EA Engineering, Science, and Technology
225 Schilling Circle
Suite 400
Hunt Valley, MD 21031

Attention: Ms. Ivy Harvey

Approved for release.
Courtney M Adkins
Project Manager I
1/25/2019 9:01 AM

Courtney M Adkins, Project Manager I
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
01/25/2019

Table of Contents

Table of Contents

Qualifiers

LCMS

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.

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	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
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 (Radiochemistry)
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)

Method Summary

Client: EA Engineering, Science, and Technology
Project/Site: PFAS Pilot Study - Spike Tests

TestAmerica Job ID: 140-13780-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
None	Leaching Procedure	TAL SOP	TAL SAC
None	Leaching Procedure for Condensate	TAL SOP	TAL SAC
None	Leaching Procedure for XAD	TAL SOP	TAL SAC
Preparation	Dilution	None	TAL SAC
Split	Source Air Split	None	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

None = None

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: EA Engineering, Science, and Technology
Project/Site: PFAS Pilot Study - Spike Tests

TestAmerica Job ID: 140-13780-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
140-13780-1	D-2082 R1 Quartz Filter #1	Air	12/20/18 08:00	12/26/18 09:56
140-13780-2	D-2083 R2 Quartz Filter #2	Air	12/20/18 08:00	12/26/18 09:56
140-13780-3	D-2084 R3 Quartz Filter #3	Air	12/20/18 08:00	12/26/18 09:56
140-13780-4	D-2085 R1 XAD-2 Resin #1	Air	12/20/18 08:00	12/26/18 09:56
140-13780-5	D-2086 R2 XAD-2 Resin #2	Air	12/20/18 08:00	12/26/18 09:56
140-13780-6	D-2087 R3 XAD-2 Resin #3	Air	12/20/18 08:00	12/26/18 09:56
140-13780-7	D-2088 R1 DI Water #1	Air	12/20/18 08:00	12/26/18 09:56
140-13780-8	D-2089 R2 DI Water #2	Air	12/20/18 08:00	12/26/18 09:56
140-13780-9	D-2090 R2 DI Water #3	Air	12/20/18 08:00	12/26/18 09:56

Job Narrative
140-13780-1

Method 0010/Method 3542 Spike Test Preparation

The spike test samples were prepared by spiking each train fraction with 1.0mL of IDA solution and 1.0mL of native spike solution of the six (6) PFAS target analytes. The Front-half and Back-half fractions were then extracted with a methanol / 5% ammonium hydroxide reagent in the Knoxville laboratory. These samples were concentrated to a final volume of 2mL and forwarded to the Sacramento laboratory for analysis. The condensate samples were prepared by spiking 1.0mL of IDA solution and 1.0mL of native spike solution prior to an SPE extraction in the Sacramento laboratory.

Each of the PFAS target analytes were spiked at a mass of 20ng into each of the three train fractions.

Reporting Limits (RLs) and Method Detection Limits (MDLs) for PFAS analytes used for this specialty application were derived from the Sacramento Laboratory's reference data for reporting soil and water matrices. Method 0010 sampling train matrix specific RLs and MDLs have not been established for PFAS analytes. The soil and water limits are expected to be reasonable approximations of the actual matrix specific limits, under these conditions.

LCMS

Method 537 (modified): The method blank for preparation batch 320-267852, 320-267854 and 320-267856 and analytical batch 320-269672 contained concentrations of several target analytes above the reporting limit (RL). Re-analysis was performed with reoccurring results; therefore the concentration levels reported may represent background target analyte levels under these conditions.

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

Field Sample No.	Spike Test	Sample Coding ID	RFA/ COC No.	Sample Description	Analytical Parameter*	Sample Container	TestAmerica Laboratory	Lab & Field QC Samples
D- 2082	1	D- 2082 R1 Quartz Filter #1 (Front Half)	001	90 mm Quartz Fiber Particulate Filter #1 Spiked with Native & IDS PFAS	PFAS Target Analyte List	Petri Dish	Knoxville (Extraction) Sacramento (Analysis)	
D- 2083	2	D- 2083 R2 Quartz Filter #2 (Front Half)	001	90 mm Quartz Fiber Particulate Filter #2 Spiked with Native & IDS PFAS	PFAS Target Analyte List	Petri Dish	Knoxville (Extraction) Sacramento (Analysis)	
D- 2084	3	D- 2084 R3 Quartz Filter #3 (Front Half)	001	90 mm Quartz Fiber Particulate Filter #3 Spiked with Native & IDS PFAS	PFAS Target Analyte List	Petri Dish	Knoxville (Extraction) Sacramento (Analysis)	
D- 2085	1	D- 2085 R1 XAD-2 Resin #1 (Back Half)	002	XAD-2 Resin #1 Spiked with Native & IDS PFAS	PFAS Target Analyte List	XAD-2 Resin Tube	Knoxville (Extraction) Sacramento (Analysis)	
D- 2086	2	D- 2086 R2 XAD-2 Resin #2 (Back Half)	002	XAD-2 Resin #2 Spiked with Native & IDS PFAS	PFAS Target Analyte List	XAD-2 Resin Tube	Knoxville (Extraction) Sacramento (Analysis)	
D- 2087	3	D- 2087 R3 XAD-2 Resin #3 (Back Half)	002	XAD-2 Resin #3 Spiked with Native & IDS PFAS	PFAS Target Analyte List	XAD-2 Resin Tube	Knoxville (Extraction) Sacramento (Analysis)	
D- 2088	1	D- 2088 R1 DI Water #1 (Condensate)	003	500 mL Deionized (DI) Water/Condensate #1 with Native & IDS PFAS	PFAS Target Analyte List	500 mL HDPE Wide-Mouth Bottle	Knoxville (Extraction) Sacramento (Analysis)	
D- 2089	2	D- 2089 R2 DI Water #2 (Condensate)	003	500 mL Deionized (DI) Water/Condensate #2 with Native & IDS PFAS	PFAS Target Analyte List	500 mL HDPE Wide-Mouth Bottle	Knoxville (Extraction) Sacramento (Analysis)	
D- 2090	3	D- 2090 R3 DI Water #3 (Condensate)	003	500 mL Deionized (DI) Water/Condensate #3 with Native & IDS PFAS	PFAS Target Analyte List	500 mL HDPE Wide-Mouth Bottle	Knoxville (Extraction) Sacramento (Analysis)	

***Spike tests are performed for the following PFAS compounds:**

Perfluorooctanoic Acid (PFOA)
Perfluoroheptanoic acid (PFHpA)
Perfluorononanoic Acid (PFNA)
Perfluorooctane Sulfonate (PFOS)
Perfluorohexane Sulfonate (PFHxS)
Perfluorobutane Sulfonate (PFBS)

LCMS

Prep Batch: 267851

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-1	D-2082 R1 Quartz Filter #1	Total/NA	Air	None	
140-13780-2	D-2083 R2 Quartz Filter #2	Total/NA	Air	None	
140-13780-3	D-2084 R3 Quartz Filter #3	Total/NA	Air	None	
MB 320-267851/1-C	Method Blank	Total/NA	Air	None	

Prep Batch: 267852

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-4	D-2085 R1 XAD-2 Resin #1	Total/NA	Air	None	
140-13780-5	D-2086 R2 XAD-2 Resin #2	Total/NA	Air	None	
140-13780-6	D-2087 R3 XAD-2 Resin #3	Total/NA	Air	None	
MB 320-267852/1-C	Method Blank	Total/NA	Air	None	

Cleanup Batch: 267853

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-1	D-2082 R1 Quartz Filter #1	Total/NA	Air	Split	267851
140-13780-2	D-2083 R2 Quartz Filter #2	Total/NA	Air	Split	267851
140-13780-3	D-2084 R3 Quartz Filter #3	Total/NA	Air	Split	267851
MB 320-267851/1-C	Method Blank	Total/NA	Air	Split	267851

Cleanup Batch: 267854

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-4	D-2085 R1 XAD-2 Resin #1	Total/NA	Air	Split	267852
140-13780-5	D-2086 R2 XAD-2 Resin #2	Total/NA	Air	Split	267852
140-13780-6	D-2087 R3 XAD-2 Resin #3	Total/NA	Air	Split	267852
MB 320-267852/1-C	Method Blank	Total/NA	Air	Split	267852

Cleanup Batch: 267855

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-1	D-2082 R1 Quartz Filter #1	Total/NA	Air	Preparation	267853
140-13780-2	D-2083 R2 Quartz Filter #2	Total/NA	Air	Preparation	267853
140-13780-3	D-2084 R3 Quartz Filter #3	Total/NA	Air	Preparation	267853
MB 320-267851/1-C	Method Blank	Total/NA	Air	Preparation	267853

Cleanup Batch: 267856

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-4	D-2085 R1 XAD-2 Resin #1	Total/NA	Air	Preparation	267854
140-13780-5	D-2086 R2 XAD-2 Resin #2	Total/NA	Air	Preparation	267854
140-13780-6	D-2087 R3 XAD-2 Resin #3	Total/NA	Air	Preparation	267854
MB 320-267852/1-C	Method Blank	Total/NA	Air	Preparation	267854

Prep Batch: 267857

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-7	D-2088 R1 DI Water #1	Total/NA	Air	None	
140-13780-8	D-2089 R2 DI Water #2	Total/NA	Air	None	
140-13780-9	D-2090 R2 DI Water #3	Total/NA	Air	None	
MB 320-267857/1-B	Method Blank	Total/NA	Air	None	

Cleanup Batch: 267869

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-7	D-2088 R1 DI Water #1	Total/NA	Air	Preparation	267857
140-13780-8	D-2089 R2 DI Water #2	Total/NA	Air	Preparation	267857

LCMS (Continued)

Cleanup Batch: 267869 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-9	D-2090 R2 DI Water #3	Total/NA	Air	Preparation	267857
MB 320-267857/1-B	Method Blank	Total/NA	Air	Preparation	267857

Analysis Batch: 269672

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-13780-1	D-2082 R1 Quartz Filter #1	Total/NA	Air	537 (modified)	267855
140-13780-2	D-2083 R2 Quartz Filter #2	Total/NA	Air	537 (modified)	267855
140-13780-3	D-2084 R3 Quartz Filter #3	Total/NA	Air	537 (modified)	267855
140-13780-4	D-2085 R1 XAD-2 Resin #1	Total/NA	Air	537 (modified)	267856
140-13780-5	D-2086 R2 XAD-2 Resin #2	Total/NA	Air	537 (modified)	267856
140-13780-6	D-2087 R3 XAD-2 Resin #3	Total/NA	Air	537 (modified)	267856
140-13780-7	D-2088 R1 DI Water #1	Total/NA	Air	537 (modified)	267869
140-13780-8	D-2089 R2 DI Water #2	Total/NA	Air	537 (modified)	267869
140-13780-9	D-2090 R2 DI Water #3	Total/NA	Air	537 (modified)	267869
MB 320-267852/1-C	Method Blank	Total/NA	Air	537 (modified)	267856
MB 320-267857/1-B	Method Blank	Total/NA	Air	537 (modified)	267869

Analysis Batch: 270021

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 320-267851/1-C	Method Blank	Total/NA	Air	537 (modified)	267855

Client Sample ID: D-2082 R1 Quartz Filter #1

Lab Sample ID: 140-13780-1

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	17.2		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:48	1
Perfluoroheptanoic acid (PFHpA)	19.1		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:48	1
Perfluorohexanesulfonic acid (PFHxS)	17.2		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:48	1
Perfluorononanoic acid (PFNA)	19.2		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:48	1
Perfluorooctanesulfonic acid (PFOS)	17.0		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:48	1
Perfluorooctanoic acid (PFOA)	20.6		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*87*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:48*	*1*
13C4 PFHpA	*67*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:48*	*1*
13C5 PFNA	*77*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:48*	*1*
13C4 PFOA	*73*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:48*	*1*
13C4 PFOS	*92*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:48*	*1*
18O2 PFHxS	*86*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:48*	*1*

Client Sample ID: D-2083 R2 Quartz Filter #2

Lab Sample ID: 140-13780-2

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	18.2		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:56	1
Perfluoroheptanoic acid (PFHpA)	18.8		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:56	1
Perfluorohexanesulfonic acid (PFHxS)	17.0		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:56	1
Perfluorononanoic acid (PFNA)	19.6		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:56	1
Perfluorooctanesulfonic acid (PFOS)	18.1		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:56	1
Perfluorooctanoic acid (PFOA)	21.8		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 22:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*84*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:56*	*1*
13C4 PFHpA	*77*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:56*	*1*
13C5 PFNA	*86*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:56*	*1*
13C4 PFOA	*81*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:56*	*1*
13C4 PFOS	*88*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:56*	*1*
18O2 PFHxS	*85*		*25 - 150*	*12/28/18 01:41*	*01/08/19 22:56*	*1*

Client Sample ID: D-2084 R3 Quartz Filter #3

Lab Sample ID: 140-13780-3

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	17.8		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 23:03	1

Client Sample ID: D-2084 R3 Quartz Filter #3
Lab Sample ID: 140-13780-3

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	19.4		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 23:03	1
Perfluorohexanesulfonic acid (PFHxS)	17.6		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 23:03	1
Perfluorononanoic acid (PFNA)	19.4		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 23:03	1
Perfluorooctanesulfonic acid (PFOS)	17.6		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 23:03	1
Perfluorooctanoic acid (PFOA)	21.2		0.500	0.490	ng/Sample		12/28/18 01:41	01/08/19 23:03	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*92*		*25 - 150*	*12/28/18 01:41*	*01/08/19 23:03*	*1*
13C4 PFHpA	*70*		*25 - 150*	*12/28/18 01:41*	*01/08/19 23:03*	*1*
13C5 PFNA	*84*		*25 - 150*	*12/28/18 01:41*	*01/08/19 23:03*	*1*
13C4 PFOA	*74*		*25 - 150*	*12/28/18 01:41*	*01/08/19 23:03*	*1*
13C4 PFOS	*96*		*25 - 150*	*12/28/18 01:41*	*01/08/19 23:03*	*1*
18O2 PFHxS	*88*		*25 - 150*	*12/28/18 01:41*	*01/08/19 23:03*	*1*

Client Sample ID: D-2085 R1 XAD-2 Resin #1
Lab Sample ID: 140-13780-4

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	31.1	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:26	1
Perfluoroheptanoic acid (PFHpA)	18.9	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:26	1
Perfluorohexanesulfonic acid (PFHxS)	18.2	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:26	1
Perfluorononanoic acid (PFNA)	19.1		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:26	1
Perfluorooctanesulfonic acid (PFOS)	18.4	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:26	1
Perfluorooctanoic acid (PFOA)	20.8		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:26	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*56*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:26*	*1*
13C4 PFHpA	*77*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:26*	*1*
13C5 PFNA	*100*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:26*	*1*
13C4 PFOA	*94*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:26*	*1*
13C4 PFOS	*105*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:26*	*1*
18O2 PFHxS	*89*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:26*	*1*

Client Sample ID: D-2086 R2 XAD-2 Resin #2
Lab Sample ID: 140-13780-5

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	42.7	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:34	1
Perfluoroheptanoic acid (PFHpA)	20.2	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:34	1

Client Sample ID: D-2086 R2 XAD-2 Resin #2
Lab Sample ID: 140-13780-5

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	19.0	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:34	1
Perfluorononanoic acid (PFNA)	19.5		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:34	1
Perfluorooctanesulfonic acid (PFOS)	19.3	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:34	1
Perfluorooctanoic acid (PFOA)	19.5		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*49*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:34*	*1*
13C4 PFHpA	*75*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:34*	*1*
13C5 PFNA	*103*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:34*	*1*
13C4 PFOA	*98*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:34*	*1*
13C4 PFOS	*108*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:34*	*1*
18O2 PFHxS	*81*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:34*	*1*

Client Sample ID: D-2087 R3 XAD-2 Resin #3
Lab Sample ID: 140-13780-6

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	37.8	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:41	1
Perfluoroheptanoic acid (PFHpA)	20.8	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:41	1
Perfluorohexanesulfonic acid (PFHxS)	18.9	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:41	1
Perfluorononanoic acid (PFNA)	19.8		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:41	1
Perfluorooctanesulfonic acid (PFOS)	19.8	B	0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:41	1
Perfluorooctanoic acid (PFOA)	20.2		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*49*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:41*	*1*
13C4 PFHpA	*75*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:41*	*1*
13C5 PFNA	*100*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:41*	*1*
13C4 PFOA	*95*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:41*	*1*
13C4 PFOS	*104*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:41*	*1*
18O2 PFHxS	*81*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:41*	*1*

Client Sample ID: D-2088 R1 DI Water #1
Lab Sample ID: 140-13780-7

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	17.6		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:04	1
Perfluoroheptanoic acid (PFHpA)	19.9		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:04	1
Perfluorohexanesulfonic acid (PFHxS)	17.3		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:04	1

Client Sample ID: D-2088 R1 DI Water #1
Lab Sample ID: 140-13780-7

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorononanoic acid (PFNA)	19.7		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:04	1
Perfluorooctanesulfonic acid (PFOS)	17.4		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:04	1
Perfluorooctanoic acid (PFOA)	21.5		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:04	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*96*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:04*	*1*
13C4 PFHpA	*98*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:04*	*1*
13C5 PFNA	*98*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:04*	*1*
13C4 PFOA	*96*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:04*	*1*
13C4 PFOS	*101*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:04*	*1*
18O2 PFHxS	*96*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:04*	*1*

Client Sample ID: D-2089 R2 DI Water #2
Lab Sample ID: 140-13780-8

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	17.8		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:11	1
Perfluoroheptanoic acid (PFHpA)	19.4		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:11	1
Perfluorohexanesulfonic acid (PFHxS)	17.5		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:11	1
Perfluorononanoic acid (PFNA)	19.1		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:11	1
Perfluorooctanesulfonic acid (PFOS)	17.6		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:11	1
Perfluorooctanoic acid (PFOA)	21.2		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:11	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*92*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:11*	*1*
13C4 PFHpA	*93*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:11*	*1*
13C5 PFNA	*96*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:11*	*1*
13C4 PFOA	*93*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:11*	*1*
13C4 PFOS	*97*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:11*	*1*
18O2 PFHxS	*89*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:11*	*1*

Client Sample ID: D-2090 R2 DI Water #3
Lab Sample ID: 140-13780-9

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56
Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	17.9		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:19	1
Perfluoroheptanoic acid (PFHpA)	20.1		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:19	1
Perfluorohexanesulfonic acid (PFHxS)	17.1		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:19	1
Perfluorononanoic acid (PFNA)	18.6		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:19	1

Client Sample ID: D-2090 R2 DI Water #3

Lab Sample ID: 140-13780-9

Date Collected: 12/20/18 08:00

Matrix: Air

Date Received: 12/26/18 09:56

Sample Container: Plastic 250ml - unpreserved

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	17.7		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:19	1
Perfluorooctanoic acid (PFOA)	22.0		0.500	0.490	ng/Sample		12/28/18 03:39	01/09/19 00:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*94*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:19*	*1*
13C4 PFHpA	*97*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:19*	*1*
13C5 PFNA	*101*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:19*	*1*
13C4 PFOA	*96*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:19*	*1*
13C4 PFOS	*100*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:19*	*1*
18O2 PFHxS	*97*		*25 - 150*	*12/28/18 03:39*	*01/09/19 00:19*	*1*

Default Detection Limits

Client: EA Engineering, Science, and Technology
Project/Site: PFAS Pilot Study - Spike Tests

TestAmerica Job ID: 140-13780-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: None

Analyte	RL	MDL	Units	Method
Perfluorobutanesulfonic acid (PFBS)	0.500	0.490	ng/Sample	537 (modified)
Perfluoroheptanoic acid (PFHpA)	0.500	0.490	ng/Sample	537 (modified)
Perfluorohexanesulfonic acid (PFHxS)	0.500	0.490	ng/Sample	537 (modified)
Perfluorononanoic acid (PFNA)	0.500	0.490	ng/Sample	537 (modified)
Perfluorooctanesulfonic acid (PFOS)	0.500	0.490	ng/Sample	537 (modified)
Perfluorooctanoic acid (PFOA)	0.500	0.490	ng/Sample	537 (modified)

Isotope Dilution Summary

Client: EA Engineering, Science, and Technology
Project/Site: PFAS Pilot Study - Spike Tests

TestAmerica Job ID: 140-13780-1

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	3C3-PFBS (25-150)	PFHpA (25-150)	PFNA (25-150)	PFOA (25-150)	PFOS (25-150)	PFHxS (25-150)		
140-13780-1	D-2082 R1 Quartz Filter #1	87	67	77	73	92	86		
140-13780-2	D-2083 R2 Quartz Filter #2	84	77	86	81	88	85		
140-13780-3	D-2084 R3 Quartz Filter #3	92	70	84	74	96	88		
140-13780-4	D-2085 R1 XAD-2 Resin #1	56	77	100	94	105	89		
140-13780-5	D-2086 R2 XAD-2 Resin #2	49	75	103	98	108	81		
140-13780-6	D-2087 R3 XAD-2 Resin #3	49	75	100	95	104	81		
140-13780-7	D-2088 R1 DI Water #1	96	98	98	96	101	96		
140-13780-8	D-2089 R2 DI Water #2	92	93	96	93	97	89		
140-13780-9	D-2090 R2 DI Water #3	94	97	101	96	100	97		
MB 320-267851/1-C	Method Blank	85	80	90	89	91	83		
MB 320-267852/1-C	Method Blank	58	80	93	93	97	86		
MB 320-267857/1-B	Method Blank	90	95	98	95	101	90		

Surrogate Legend

13C3-PFBS = 13C3 PFBS
PFHpA = 13C4 PFHpA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFHxS = 18O2 PFHxS

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-267851/1-C
Matrix: Air
Analysis Batch: 270021

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 267851

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		0.500	0.490	ng/Sample		12/28/18 01:41	01/10/19 14:00	1
Perfluoroheptanoic acid (PFHpA)	ND		0.500	0.490	ng/Sample		12/28/18 01:41	01/10/19 14:00	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.500	0.490	ng/Sample		12/28/18 01:41	01/10/19 14:00	1
Perfluorononanoic acid (PFNA)	ND		0.500	0.490	ng/Sample		12/28/18 01:41	01/10/19 14:00	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.500	0.490	ng/Sample		12/28/18 01:41	01/10/19 14:00	1
Perfluorooctanoic acid (PFOA)	ND		0.500	0.490	ng/Sample		12/28/18 01:41	01/10/19 14:00	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*85*		*25 - 150*	*12/28/18 01:41*	*01/10/19 14:00*	*1*
13C4 PFHpA	*80*		*25 - 150*	*12/28/18 01:41*	*01/10/19 14:00*	*1*
13C5 PFNA	*90*		*25 - 150*	*12/28/18 01:41*	*01/10/19 14:00*	*1*
13C4 PFOA	*89*		*25 - 150*	*12/28/18 01:41*	*01/10/19 14:00*	*1*
13C4 PFOS	*91*		*25 - 150*	*12/28/18 01:41*	*01/10/19 14:00*	*1*
18O2 PFHxS	*83*		*25 - 150*	*12/28/18 01:41*	*01/10/19 14:00*	*1*

Lab Sample ID: MB 320-267852/1-C
Matrix: Air
Analysis Batch: 269672

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 267852

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	11.89		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:19	1
Perfluoroheptanoic acid (PFHpA)	0.7172		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:19	1
Perfluorohexanesulfonic acid (PFHxS)	0.7087		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:19	1
Perfluorononanoic acid (PFNA)	ND		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:19	1
Perfluorooctanesulfonic acid (PFOS)	0.8044		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:19	1
Perfluorooctanoic acid (PFOA)	ND		0.500	0.490	ng/Sample		12/20/18 12:25	01/08/19 23:19	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 PFBS	*58*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:19*	*1*
13C4 PFHpA	*80*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:19*	*1*
13C5 PFNA	*93*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:19*	*1*
13C4 PFOA	*93*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:19*	*1*
13C4 PFOS	*97*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:19*	*1*
18O2 PFHxS	*86*		*25 - 150*	*12/20/18 12:25*	*01/08/19 23:19*	*1*

Lab Sample ID: MB 320-267857/1-B
Matrix: Air
Analysis Batch: 269672

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 267857

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	ND		0.500	0.490	ng/Sample		12/28/18 03:39	01/08/19 23:56	1
Perfluoroheptanoic acid (PFHpA)	ND		0.500	0.490	ng/Sample		12/28/18 03:39	01/08/19 23:56	1
Perfluorohexanesulfonic acid (PFHxS)	ND		0.500	0.490	ng/Sample		12/28/18 03:39	01/08/19 23:56	1
Perfluorononanoic acid (PFNA)	ND		0.500	0.490	ng/Sample		12/28/18 03:39	01/08/19 23:56	1
Perfluorooctanesulfonic acid (PFOS)	ND		0.500	0.490	ng/Sample		12/28/18 03:39	01/08/19 23:56	1
Perfluorooctanoic acid (PFOA)	ND		0.500	0.490	ng/Sample		12/28/18 03:39	01/08/19 23:56	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3 PFBS	90		25 - 150	12/28/18 03:39	01/08/19 23:56	1
13C4 PFHpA	95		25 - 150	12/28/18 03:39	01/08/19 23:56	1
13C5 PFNA	98		25 - 150	12/28/18 03:39	01/08/19 23:56	1
13C4 PFOA	95		25 - 150	12/28/18 03:39	01/08/19 23:56	1
13C4 PFOS	101		25 - 150	12/28/18 03:39	01/08/19 23:56	1
18O2 PFHxS	90		25 - 150	12/28/18 03:39	01/08/19 23:56	1

Client Sample ID: D-2082 R1 Quartz Filter #1

Lab Sample ID: 140-13780-1

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	267851	12/28/18 01:41		TAL SAC
Total/NA	Cleanup	Split			25 mL	2 mL	267853	12/28/18 01:53		TAL SAC
Total/NA	Cleanup	Preparation			2 mL	10.00 mL	267855	12/28/18 03:36		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/08/19 22:48	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: D-2083 R2 Quartz Filter #2

Lab Sample ID: 140-13780-2

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	267851	12/28/18 01:41		TAL SAC
Total/NA	Cleanup	Split			25 mL	2 mL	267853	12/28/18 01:53		TAL SAC
Total/NA	Cleanup	Preparation			2 mL	10.00 mL	267855	12/28/18 03:36		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/08/19 22:56	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: D-2084 R3 Quartz Filter #3

Lab Sample ID: 140-13780-3

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	267851	12/28/18 01:41		TAL SAC
Total/NA	Cleanup	Split			25 mL	2 mL	267853	12/28/18 01:53		TAL SAC
Total/NA	Cleanup	Preparation			2 mL	10.00 mL	267855	12/28/18 03:36		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/08/19 23:03	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: D-2085 R1 XAD-2 Resin #1

Lab Sample ID: 140-13780-4

Date Collected: 12/20/18 08:00
Matrix: Air
Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	360 mL	267852	12/20/18 12:25		TAL SAC
Total/NA	Cleanup	Split			180 mL	2 mL	267854	12/28/18 01:56		TAL SAC
Total/NA	Cleanup	Preparation			2 mL	10.00 mL	267856	12/29/18 06:38		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/08/19 23:26	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: D-2086 R2 XAD-2 Resin #2

Lab Sample ID: 140-13780-5

Date Collected: 12/20/18 08:00

Matrix: Air

Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	360 mL	267852	12/20/18 12:25		TAL SAC
Total/NA	Cleanup	Split			180 mL	2 mL	267854	12/28/18 01:56		TAL SAC
Total/NA	Cleanup	Preparation			2 mL	10.00 mL	267856	12/29/18 06:38		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/08/19 23:34	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: D-2087 R3 XAD-2 Resin #3

Lab Sample ID: 140-13780-6

Date Collected: 12/20/18 08:00

Matrix: Air

Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	360 mL	267852	12/20/18 12:25		TAL SAC
Total/NA	Cleanup	Split			180 mL	2 mL	267854	12/28/18 01:56		TAL SAC
Total/NA	Cleanup	Preparation			2 mL	10.00 mL	267856	12/29/18 06:38		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/08/19 23:41	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: D-2088 R1 DI Water #1

Lab Sample ID: 140-13780-7

Date Collected: 12/20/18 08:00

Matrix: Air

Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	500 mL	267857	12/28/18 03:39		TAL SAC
Total/NA	Cleanup	Preparation			250 mL	10.00 mL	267869	12/28/18 06:24		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/09/19 00:04	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: D-2089 R2 DI Water #2

Lab Sample ID: 140-13780-8

Date Collected: 12/20/18 08:00

Matrix: Air

Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	500 mL	267857	12/28/18 03:39		TAL SAC
Total/NA	Cleanup	Preparation			250 mL	10.00 mL	267869	12/28/18 06:24		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/09/19 00:11	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: D-2090 R2 DI Water #3

Lab Sample ID: 140-13780-9

Date Collected: 12/20/18 08:00

Matrix: Air

Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	500 mL	267857	12/28/18 03:39		TAL SAC
Total/NA	Cleanup	Preparation			250 mL	10.00 mL	267869	12/28/18 06:24		TAL SAC

Client Sample ID: D-2090 R2 DI Water #3

Lab Sample ID: 140-13780-9

Date Collected: 12/20/18 08:00

Matrix: Air

Date Received: 12/26/18 09:56

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	537 (modified)		1			269672	01/09/19 00:19	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: Method Blank

Lab Sample ID: MB 320-267851/1-C

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	50 mL	267851	12/28/18 01:41		TAL SAC
Total/NA	Cleanup	Split			25 mL	2 mL	267853	12/28/18 01:53		TAL SAC
Total/NA	Cleanup	Preparation			2 mL	10.00 mL	267855	12/28/18 03:36		TAL SAC
Total/NA	Analysis	537 (modified)		1			270021	01/10/19 14:00	S1M	TAL SAC
	Instrument ID: A9									

Client Sample ID: Method Blank

Lab Sample ID: MB 320-267852/1-C

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	360 mL	267852	12/20/18 12:25		TAL SAC
Total/NA	Cleanup	Split			180 mL	2 mL	267854	12/28/18 01:56		TAL SAC
Total/NA	Cleanup	Preparation			2 mL	10.00 mL	267856	12/29/18 06:38		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/08/19 23:19	CBW	TAL SAC
	Instrument ID: A9									

Client Sample ID: Method Blank

Lab Sample ID: MB 320-267857/1-B

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	500 mL	267857	12/28/18 03:39		TAL SAC
Total/NA	Cleanup	Preparation			250 mL	10.00 mL	267869	12/28/18 06:24		TAL SAC
Total/NA	Analysis	537 (modified)		1			269672	01/08/19 23:56	CBW	TAL SAC
	Instrument ID: A9									

Laboratory References:

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

Accreditation/Certification Summary

Client: EA Engineering, Science, and Technology
TestAmerica Job ID: 140-13780-1
Project/Site: PFAS Pilot Study - Spike Tests

Laboratory: TestAmerica Knoxville

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
	AFCEE		N/A	
ANAB	DoD ELAP		L2311	02-13-19
Arkansas DEQ	State Program	6	88-0688	06-16-19
California	State Program	9	2423	06-30-19
Colorado	State Program	8	TN00009	02-28-19
Connecticut	State Program	1	PH-0223	09-30-19
Florida	NELAP	4	E87177	06-30-19
Georgia	State Program	4	906	04-13-20
Hawaii	State Program	9	N/A	04-13-19
Kansas	NELAP	7	E-10349	10-31-19
Kentucky (DW)	State Program	4	90101	12-31-18 *
Louisiana	NELAP	6	83979	06-30-19
Louisiana (DW)	NELAP	6	LA160005	12-31-19
Maryland	State Program	3	277	03-31-19
Michigan	State Program	5	9933	04-13-20
Nevada	State Program	9	TN00009	07-31-19
New Hampshire	NELAP	1	2999	01-17-20
New Jersey	NELAP	2	TN001	06-30-19
New York	NELAP	2	10781	03-31-19
North Carolina (DW)	State Program	4	21705	07-31-19
North Carolina (WW/SW)	State Program	4	64	12-31-19
Ohio VAP	State Program	5	CL0059	08-28-20
Oklahoma	State Program	6	9415	08-31-19
Oregon	NELAP	10	TNI0189	06-30-19
Pennsylvania	NELAP	3	68-00576	12-31-19
Tennessee	State Program	4	2014	04-13-20
Texas	NELAP	6	T104704380-16-9	08-31-19
US Fish & Wildlife	Federal		LE-058448-0	07-31-19
USDA	Federal		P330-16-00262	08-20-19
Utah	NELAP	8	TN00009	07-31-19
Virginia	NELAP	3	460176	09-14-19
Washington	State Program	10	C593	01-19-20
West Virginia (DW)	State Program	3	9955C	12-31-18 *
West Virginia DEP	State Program	3	345	04-30-19
Wisconsin	State Program	5	998044300	08-31-19

Laboratory: TestAmerica Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19 *
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19 *
Hawaii	State Program	9	N/A	01-29-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Accreditation/Certification Summary

Client: EA Engineering, Science, and Technology
TestAmerica Job ID: 140-13780-1
Project/Site: PFAS Pilot Study - Spike Tests

Laboratory: TestAmerica Sacramento (Continued)

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-19
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19 *
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	12-31-20
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18 *
Wyoming	State Program	8	8TMS-L	01-28-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 269628

Lab Sample ID: IC 320-269628/2 Client Sample ID:

Date Analyzed: 01/08/19 17:41 Lab File ID: 2019.01.08ICALAA._002.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanesulfonic acid (PFHxS)	2.80	Baseline	roycea	01/09/19 07:58
Perfluorooctanoic acid (PFOA)	3.20	Baseline	roycea	01/09/19 07:58
Perfluorooctanesulfonic acid (PFOS)	3.58	Baseline	roycea	01/09/19 07:58
Perfluorononanoic acid (PFNA)	3.59	Baseline	roycea	01/09/19 07:59
N-ethylperfluorooctanesulfonamido acetic acid (NEtFOSAA)	4.29	Isomers	roycea	01/09/19 07:59
Perfluoro-n-octadecanoic acid (PFODA)	6.06	Baseline	roycea	01/09/19 07:59

Lab Sample ID: IC 320-269628/3 Client Sample ID:

Date Analyzed: 01/08/19 17:48 Lab File ID: 2019.01.08ICALAA._003.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluoropentanoic acid (PFPeA)	2.03	Baseline	roycea	01/09/19 08:01
Perfluorohexanesulfonic acid (PFHxS)	2.80	Baseline	roycea	01/09/19 08:02
Perfluorooctanoic acid (PFOA)	3.20	Baseline	roycea	01/09/19 08:01
Perfluorooctanesulfonic acid (PFOS)	3.57	Baseline	roycea	01/09/19 08:02
Perfluorononanoic acid (PFNA)	3.59	Baseline	roycea	01/09/19 08:02

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 269628

Lab Sample ID: ICB 320-269628/9 Client Sample ID:

Date Analyzed: 01/08/19 18:33 Lab File ID: 2019.01.08ICALAA._009.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorooctanoic acid (PFOA)	3.20	Baseline	roycea	01/09/19 08:21
Perfluorononanoic acid (PFNA)	3.59	Baseline	roycea	01/09/19 08:19
N-methylperfluorooctanesulfonamidoacetic acid	4.12	Assign Peak	roycea	01/09/19 08:20
Perfluorodecanoic acid		Invalid Compound ID	roycea	01/09/19 08:19
Perfluoropentanoic acid		Invalid Compound ID	roycea	01/09/19 08:19
Perfluoroundecanoic acid		Invalid Compound ID	roycea	01/09/19 08:20

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 269668

Lab Sample ID: CCB 320-269668/1 Client Sample ID:

Date Analyzed: 01/08/19 19:18 Lab File ID: 2019.01.08LLAAXX_004.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorooctanoic acid (PFOA)	3.20	Baseline	ruangyotsakuld	01/10/19 09:32
Perfluorooctanesulfonic acid (PFOS)	3.57	Assign Peak	ruangyotsakuld	01/10/19 09:32

Lab Sample ID: CCVL 320-269668/2 Client Sample ID:

Date Analyzed: 01/08/19 19:26 Lab File ID: 2019.01.08LLAAXX_005.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorononanoic acid (PFNA)	3.58	Baseline	ruangyotsakuld	01/10/19 09:35

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 269672

Lab Sample ID: CCV 320-269672/1 Client Sample ID:

Date Analyzed: 01/08/19 22:33 Lab File ID: 2019.01.08LLAAXX_030.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
F-53B Minor	4.39	Peak assignment corrected	westendorfc	01/09/19 11:41

Lab Sample ID: 140-13780-1 Client Sample ID: D-2082 R1 Quartz Filter #1

Date Analyzed: 01/08/19 22:48 Lab File ID: 2019.01.08LLAAXX_032.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	2.05	Incomplete Integration	westendorfc	01/09/19 11:43
13C4 PFHpA	2.78	Incomplete Integration	westendorfc	01/09/19 11:43
Perfluoroheptanoic acid (PFHpA)	2.78	Incomplete Integration	westendorfc	01/09/19 11:43

Lab Sample ID: 140-13780-2 Client Sample ID: D-2083 R2 Quartz Filter #2

Date Analyzed: 01/08/19 22:56 Lab File ID: 2019.01.08LLAAXX_033.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluoroheptanoic acid (PFHpA)	2.79	Incomplete Integration	westendorfc	01/09/19 11:44

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 269672

Lab Sample ID: MB 320-267852/1-C Client Sample ID:

Date Analyzed: 01/08/19 23:19 Lab File ID: 2019.01.08LLAAXX_036.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	2.07	Baseline	westendorfc	01/09/19 11:47
13C4 PFHpA	2.79	Incomplete Integration	westendorfc	01/09/19 11:46
18O2 PFHxS	2.79	Incomplete Integration	westendorfc	01/09/19 11:46
Perfluoroheptanoic acid (PFHpA)	2.79	Incomplete Integration	westendorfc	01/09/19 11:47
Perfluorohexanesulfonic acid (PFHxS)	2.79	Baseline	westendorfc	01/09/19 11:47
Perfluorooctanesulfonic acid (PFOS)	3.56	Baseline	westendorfc	01/09/19 11:48
Perfluorononanoic acid (PFNA)		Invalid Compound ID	westendorfc	01/09/19 11:48
Perfluorooctanoic acid (PFOA)		Invalid Compound ID	westendorfc	01/09/19 11:48

Lab Sample ID: 140-13780-4 Client Sample ID: D-2085 R1 XAD-2 Resin #1

Date Analyzed: 01/08/19 23:26 Lab File ID: 2019.01.08LLAAXX_037.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	2.06	Incomplete Integration	westendorfc	01/09/19 11:50
13C4 PFHpA	2.78	Incomplete Integration	westendorfc	01/09/19 11:50
18O2 PFHxS	2.79	Incomplete Integration	westendorfc	01/09/19 11:50
Perfluoroheptanoic acid (PFHpA)	2.79	Incomplete Integration	westendorfc	01/09/19 11:51
Perfluorohexanesulfonic acid (PFHxS)	2.79	Baseline	westendorfc	01/09/19 11:51

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 269672

Lab Sample ID: 140-13780-5 Client Sample ID: D-2086 R2 XAD-2 Resin #2

Date Analyzed: 01/08/19 23:34 Lab File ID: 2019.01.08LLAAXX_038.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
13C3 PFBS	2.05	Incomplete Integration	westendorfc	01/09/19 11:52
Perfluorobutanesulfonic acid (PFBS)	2.05	Incomplete Integration	westendorfc	01/09/19 11:53
13C4 PFHpA	2.78	Incomplete Integration	westendorfc	01/09/19 11:52
18O2 PFHxS	2.79	Incomplete Integration	westendorfc	01/09/19 11:52
Perfluoroheptanoic acid (PFHpA)	2.79	Incomplete Integration	westendorfc	01/09/19 11:53
Perfluorohexanesulfonic acid (PFHxS)	2.79	Baseline	westendorfc	01/09/19 11:53
Perfluorooctanoic acid (PFOA)	3.19	Baseline	westendorfc	01/09/19 11:53

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 269672

Lab Sample ID: 140-13780-6 Client Sample ID: D-2087 R3 XAD-2 Resin #3

Date Analyzed: 01/08/19 23:41 Lab File ID: 2019.01.08LLAAXX_039.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
13C3 PFBS	2.05	Baseline	westendorfc	01/09/19 11:54
Perfluorobutanesulfonic acid (PFBS)	2.05	Incomplete Integration	westendorfc	01/09/19 11:54
13C4 PFHpA	2.78	Incomplete Integration	westendorfc	01/09/19 11:54
18O2 PFHxS	2.79	Incomplete Integration	westendorfc	01/09/19 11:54
Perfluoroheptanoic acid (PFHpA)	2.79	Incomplete Integration	westendorfc	01/09/19 11:55
Perfluorohexanesulfonic acid (PFHxS)	2.79	Baseline	westendorfc	01/09/19 11:55
Perfluorooctanoic acid (PFOA)	3.19	Baseline	westendorfc	01/09/19 11:55

Lab Sample ID: MB 320-267857/1-B Client Sample ID:

Date Analyzed: 01/08/19 23:56 Lab File ID: 2019.01.08LLAAXX_041.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorooctanoic acid (PFOA)	3.19	Baseline	westendorfc	01/09/19 12:32
Perfluorobutanesulfonic acid (PFBS)		Invalid Compound ID	westendorfc	01/09/19 12:32
Perfluoroheptanoic acid (PFHpA)		Invalid Compound ID	westendorfc	01/09/19 12:32
Perfluorononanoic acid (PFNA)		Invalid Compound ID	westendorfc	01/09/19 12:32
Perfluorooctanesulfonic acid (PFOS)		Invalid Compound ID	westendorfc	01/09/19 12:32

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 270021

Lab Sample ID: CCB 320-270021/1 Client Sample ID:

Date Analyzed: 01/10/19 13:37 Lab File ID: 2019.01.10LLA_004.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanesulfonic acid (PFHxS)	2.77	Baseline	mongkols	01/11/19 09:26
Perfluorooctanoic acid (PFOA)	3.17	Baseline	mongkols	01/11/19 09:26
Perfluorobutanoic acid		Invalid Compound ID	mongkols	01/11/19 09:26
Perfluorodecanoic acid		Invalid Compound ID	mongkols	01/11/19 09:26
Perfluorododecanoic acid		Invalid Compound ID	mongkols	01/11/19 09:26
Perfluoroheptanesulfonic acid		Invalid Compound ID	mongkols	01/11/19 09:26
Perfluorononanoic acid (PFNA)		Invalid Compound ID	mongkols	01/11/19 09:26
Perfluoropentanoic acid		Invalid Compound ID	mongkols	01/11/19 09:26
Perfluorotridecanoic acid		Invalid Compound ID	mongkols	01/11/19 09:26
Perfluoroundecanoic acid		Invalid Compound ID	mongkols	01/11/19 09:26

Lab Sample ID: CCVL 320-270021/2 Client Sample ID:

Date Analyzed: 01/10/19 13:45 Lab File ID: 2019.01.10LLA_005.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanesulfonic acid (PFHxS)	2.78	Baseline	mongkols	01/11/19 09:31
Perfluorooctanoic acid (PFOA)	3.17	Baseline	mongkols	01/11/19 09:31
Perfluorooctanesulfonic acid (PFOS)	3.54	Baseline	mongkols	01/11/19 09:31
N-ethylperfluorooctanesulfonamido acetic acid	4.24	Baseline	mongkols	01/11/19 09:32

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Analysis Batch Number: 270021

Lab Sample ID: MB 320-267851/1-C Client Sample ID:

Date Analyzed: 01/10/19 14:00 Lab File ID: 2019.01.10LLA_032.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanesulfonic acid (PFHxS)	2.77	Baseline	westendorfc	01/11/19 08:42
Perfluorobutanesulfonic acid (PFBS)		Invalid Compound ID	westendorfc	01/11/19 08:42
Perfluoroheptanoic acid (PFHpA)		Invalid Compound ID	westendorfc	01/11/19 08:42
Perfluorononanoic acid (PFNA)		Invalid Compound ID	westendorfc	01/11/19 08:43
Perfluorooctanesulfonic acid (PFOS)		Invalid Compound ID	westendorfc	01/11/19 08:43
Perfluorooctanoic acid (PFOA)		Invalid Compound ID	westendorfc	01/11/19 08:43

Method PFC IDA

Fluorinated Hydrocarbons by Method PFAS IDA

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Matrix: Air Level: Low

GC Column (1): Acquity ID: 2.1 (mm)

Client Sample ID	Lab Sample ID	PFBS #	PFHpA #	PFHxS #	PFOA #	PFOS #	PFNA #
D-2082 R1 Quartz Filter #1	140-13780-1	87	67	86	73	92	77
D-2083 R2 Quartz Filter #2	140-13780-2	84	77	85	81	88	86
D-2084 R3 Quartz Filter #3	140-13780-3	92	70	88	74	96	84
D-2085 R1 XAD-2 Resin #1	140-13780-4	56	77	89	94	105	100
D-2086 R2 XAD-2 Resin #2	140-13780-5	49	75	81	98	108	103
D-2087 R3 XAD-2 Resin #3	140-13780-6	49	75	81	95	104	100
D-2088 R1 DI Water #1	140-13780-7	96	98	96	96	101	98
D-2089 R2 DI Water #2	140-13780-8	92	93	89	93	97	96
D-2090 R2 DI Water #3	140-13780-9	94	97	97	96	100	101
	MB 320-267851/1-C	85	80	83	89	91	90
	MB 320-267852/1-C	58	80	86	93	97	93
	MB 320-267857/1-B	90	95	90	95	101	98

	QC LIMITS
PFBS = 13C3 PFBS	25-150
PFHpA = 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 537 (modified)

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab File ID: 2019.01.08LLAAXX_036.d Lab Sample ID: MB 320-267852/1-C

Matrix: Air Date Extracted: 12/20/2018 12:25

Instrument ID: A9 Date Analyzed: 01/08/2019 23:19

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
D-2085 R1 XAD-2 Resin #1	140-13780-4	2019.01.08L LAAXX_037.d	01/08/2019 23:26
D-2086 R2 XAD-2 Resin #2	140-13780-5	2019.01.08L LAAXX_038.d	01/08/2019 23:34
D-2087 R3 XAD-2 Resin #3	140-13780-6	2019.01.08L LAAXX_039.d	01/08/2019 23:41

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab File ID: 2019.01.10LLA_032.d Lab Sample ID: MB 320-267851/1-C

Matrix: Air Date Extracted: 12/28/2018 01:41

Instrument ID: A9 Date Analyzed: 01/10/2019 14:00

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
D-2082 R1 Quartz Filter #1	140-13780-1	2019.01.08L LAAXX_032.d	01/08/2019 22:48
D-2083 R2 Quartz Filter #2	140-13780-2	2019.01.08L LAAXX_033.d	01/08/2019 22:56
D-2084 R3 Quartz Filter #3	140-13780-3	2019.01.08L LAAXX_034.d	01/08/2019 23:03

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab File ID: 2019.01.08LLAAXX_041.d Lab Sample ID: MB 320-267857/1-B

Matrix: Air Date Extracted: 12/28/2018 03:39

Instrument ID: A9 Date Analyzed: 01/08/2019 23:56

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
D-2088 R1 DI Water #1	140-13780-7	2019.01.08LLAAXX_042.d	01/09/2019 00:04
D-2089 R2 DI Water #2	140-13780-8	2019.01.08LLAAXX_043.d	01/09/2019 00:11
D-2090 R2 DI Water #3	140-13780-9	2019.01.08LLAAXX_044.d	01/09/2019 00:19

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Sample No.: IC 320-269628/5 Date Analyzed: 01/08/2019 18:03

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm)

Lab File ID (Standard): 2019.01.08ICALAA._0 Heated Purge: (Y/N) N

Calibration ID: 43086

		13PFOA					
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MID-POINT		7071404	3.19				
UPPER LIMIT		10607106	3.39				
LOWER LIMIT		3535702	2.99				
LAB SAMPLE ID	CLIENT SAMPLE ID						
ICB 320-269628/9		7403106	3.19				
ICV 320-269628/10		5413310	3.20				
CCV 320-269668/3 CCVIS		7064205	3.18				
CCV 320-270021/3 CCVIS		6908427	3.17				

13PFOA = 13C2 PFOA

Area Limit = 50%-150% of internal standard area
RT Limit = ± 0.2 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537 (MODIFIED)

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Sample No.: CCV 320-269668/3 Date Analyzed: 01/08/2019 19:33

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm)

Lab File ID (Standard): 2019.01.08LLAAXX_00 Heated Purge: (Y/N) N

Calibration ID: 43086

		13PFOA					
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		7064205	3.18				
UPPER LIMIT		10596308	3.38				
LOWER LIMIT		3532103	2.98				
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCB 320-269668/1		7516388	3.20				
CCVL 320-269668/2		7309378	3.19				
CCV 320-269672/1		6986478	3.19				
140-13780-1	D-2082 R1 Quartz Filter #1	7858433	3.18				
140-13780-2	D-2083 R2 Quartz Filter #2	8025475	3.18				
140-13780-3	D-2084 R3 Quartz Filter #3	7595558	3.19				
MB 320-267852/1-C		7327335	3.19				
140-13780-4	D-2085 R1 XAD-2 Resin #1	7018247	3.18				
140-13780-5	D-2086 R2 XAD-2 Resin #2	6410717	3.19				
140-13780-6	D-2087 R3 XAD-2 Resin #3	6756184	3.19				
CCV 320-269672/11		6852489	3.18				
MB 320-267857/1-B		7425179	3.19				
140-13780-7	D-2088 R1 DI Water #1	7363002	3.18				
140-13780-8	D-2089 R2 DI Water #2	7759064	3.19				
140-13780-9	D-2090 R2 DI Water #3	7328341	3.18				
CCV 320-269672/16		6749752	3.18				

13PFOA = 13C2 PFOA

Area Limit = 50%-150% of internal standard area
RT Limit = ± 0.2 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537 (MODIFIED)

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Sample No.: CCV 320-270021/3 Date Analyzed: 01/10/2019 13:52

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm)

Lab File ID (Standard): 2019.01.10LLA_006.d Heated Purge: (Y/N) N

Calibration ID: 43086

		13PFOA					
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		6908427	3.17				
UPPER LIMIT		10362641	3.37				
LOWER LIMIT		3454214	2.97				
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCB 320-270021/1		7457853	3.17				
CCVL 320-270021/2		7068234	3.17				
MB 320-267851/1-C		8270494	3.16				
CCV 320-270021/9		5676216	3.17				

13PFOA = 13C2 PFOA

Area Limit = 50%-150% of internal standard area
RT Limit = ± 0.2 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537 (MODIFIED)

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2082 R1 Quartz Filter #1 Lab Sample ID: 140-13780-1

Matrix: Air Lab File ID: 2019.01.08LLAAXX_032.d

Analysis Method: 537 (modified) Date Collected: 12/20/2018 08:00

Extraction Method: None Date Extracted: 12/28/2018 01:41

Sample wt/vol: 1(Sample) Date Analyzed: 01/08/2019 22:48

Con. Extract Vol.: 50(mL) Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	17.2		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	19.1		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	17.2		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	19.2		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	17.0		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	20.6		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	87		25-150
STL01892	13C4 PFHpA	67		25-150
STL00995	13C5 PFNA	77		25-150
STL00990	13C4 PFOA	73		25-150
STL00991	13C4 PFOS	92		25-150
STL00994	18O2 PFHxS	86		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_032.d
Lims ID: 140-13780-A-1-C
Client ID: D-2082 R1 Quartz Filter #1
Sample Type: Client
Inject. Date: 08-Jan-2019 22:48:57 ALS Bottle#: 21 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-1-c
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:43:59
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										M
217.00 > 172.00	1.684	1.679	0.005	0.530	5003600	1.67		66.7	6201	M
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.684	1.679	0.005	1.000	1873801	1.01			93.6	M
4 Perfluoropentanoic acid										
262.90 > 219.00	2.019	2.014	0.005	1.000	1680041	0.9743			66.3	
D 3 13C5 PFPeA										M
267.90 > 223.00	2.019	2.022	-0.003	0.635	4310200	1.64		65.7	2291	M
D 5 13C3 PFBS										
301.90 > 80.00	2.051	2.054	-0.003	0.645	8712022	2.02		86.9	242358	
6 Perfluorobutanesulfonic acid										M
298.90 > 80.00	2.051	2.056	-0.005	1.000	3113447	0.8611	Target=2.70		1353	M
298.90 > 99.00	2.051	2.056	-0.005	1.000	1141237		2.73(1.35-4.05)		708	M
D 9 13C2 PFHxA										
315.00 > 270.00	2.392	2.383	0.009	0.752	4960768	1.70		68.0	2502	
10 Perfluorohexanoic acid										M
313.00 > 269.00	2.392	2.384	0.008	1.000	1686974	0.9816	Target=13.92		357	
313.00 > 119.00	2.392	2.384	0.008	1.000	120431		14.01(6.96-20.87)		218	M
D 16 13C4 PFHpA										M
367.00 > 322.00	2.781	2.782	-0.001	0.875	6024567	1.68		67.2	1894	M
D 17 18O2 PFHxS										
403.00 > 84.00	2.790	2.782	0.008	0.877	5182870	2.04		86.4	2565	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.790	2.782	0.008	1.000	2336613	0.8618	Target=3.80		1552	
399.00 > 99.00	2.790	2.782	0.008	1.000	627582		3.72(1.90-5.70)		292	
15 Perfluoroheptanoic acid										M
363.00 > 319.00	2.781	2.782	-0.001	1.000	2392493	0.9542	Target=4.34		400	
363.00 > 169.00	2.781	2.782	-0.001	1.000	512422		4.67(2.17-6.52)		762	M

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.164	3.165	-0.001	1.000	724446	0.8928			510	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.164	3.165	-0.001	0.995	912702	2.58		109	1117	
* 24 13C2 PFOA										
415.00 > 370.00	3.180	3.180	0.0		7858433	2.50			3267	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.180	3.180	0.0	0.895	2268799	0.9013	Target=3.69		1560	
449.00 > 99.00	3.180	3.180	0.0	0.895	543111		4.18(1.84-5.53)		1242	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.180	3.180	0.0	1.000	2418492	1.03	Target=2.72		296	
413.00 > 169.00	3.180	3.180	0.0	1.000	861928		2.81(1.36-4.08)		734	
D 25 13C4 PFOA										
417.00 > 372.00	3.180	3.180	0.0	1.000	5664045	1.82		72.8	2394	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.552	3.552	0.0	1.000	2139995	0.8511	Target=4.08		1178	
499.00 > 99.00	3.552	3.552	0.0	1.000	506204		4.23(2.04-6.12)		1312	
D 28 13C4 PFOS										
503.00 > 80.00	3.552	3.552	0.0	1.117	5701940	2.20		92.2	2910	
30 Perfluorononanoic acid										
463.00 > 419.00	3.567	3.567	0.0	1.000	2051326	0.9592	Target=5.35		240	
463.00 > 169.00	3.567	3.567	0.0	1.000	377424		5.44(2.68-8.03)		596	
D 31 13C5 PFNA										
468.00 > 423.00	3.567	3.567	0.0	1.122	5370473	1.92		76.7	2892	
D 33 13C8 FOSA										
506.00 > 78.00	3.884	3.885	-0.001	1.222	2562052	1.50		60.1	1955	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.892	3.885	0.007	1.002	3371574	1.13			2241	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.935	3.927	0.008	1.238	92545	2.28		95.2	368	
D 36 13C2 PFDA										
515.00 > 470.00	3.926	3.927	-0.001	1.235	5184286	1.89		75.6	3210	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.926	3.927	-0.001	0.998	549140	1.00			1321	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.926	3.927	-0.001	1.000	2438795	1.02	Target=14.23		799	
513.00 > 169.00	3.926	3.927	-0.001	1.000	164030		14.87(7.12-21.35)		275	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.082	4.093	-0.011	1.284	1346246	1.87		75.0	1508	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.092	4.093	-0.001	1.002	428055	0.9174			133	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.224	4.225	-0.001	1.189	2046093	0.9806	Target=4.28		1923	
599.00 > 99.00	4.224	4.225	-0.001	1.189	401982		5.09(2.14-6.43)		1050	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.250	4.250	0.0	1.336	1152844	1.93		77.0	1155	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.250	4.250	0.0	1.336	4359763	2.02		80.9	6169	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.000	1386493	0.9535	Target=10.48		350	
563.00 > 169.00	4.250	4.250	0.0	1.000	142006		9.76(5.24-15.72)		479	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.258	4.259	-0.001	1.002	387077	1.01			2606	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.541	4.534	0.007	1.000	1987009	0.9333	Target=9.37		543	
613.00 > 169.00	4.541	4.534	0.007	1.000	229249		8.67(4.68-14.05)		627	
D 49 13C2 PFDoA										
615.00 > 570.00	4.541	4.541	0.0	1.428	5542278	2.12		84.8	3512	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.810	4.803	0.007	1.059	1701373	1.01	Target=6.18		528	
663.00 > 169.00	4.803	4.803	0.0	1.058	278935		6.10(3.09-9.27)		962	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.049	5.049	0.0	1.588	4080119	2.25		90.1	2456	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.057	5.050	0.007	1.002	239361	0.8982	Target=1.39		824	
713.00 > 219.00	5.049	5.050	-0.001	1.000	174953		1.37(0.70-2.09)		747	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:44 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_032.d

Injection Date: 08-Jan-2019 22:48:57 Instrument ID: A9

Lims ID: 140-13780-A-1-C Lab Sample ID: 320-13780-1

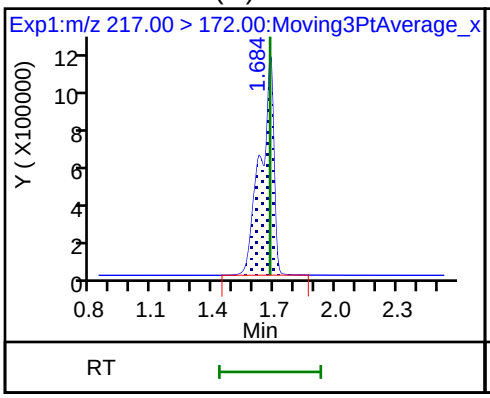
Client ID: D-2082 R1 Quartz Filter #1

Operator ID: A9\Administrator ALS Bottle#: 21 Worklist Smp#: 3

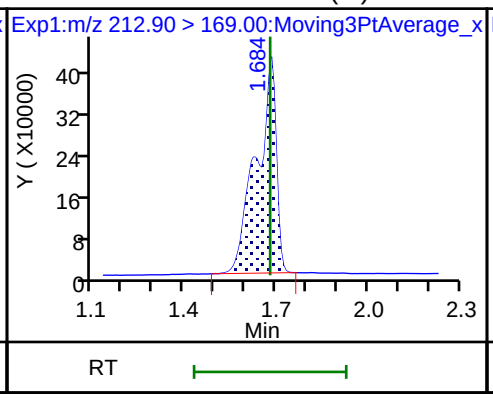
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

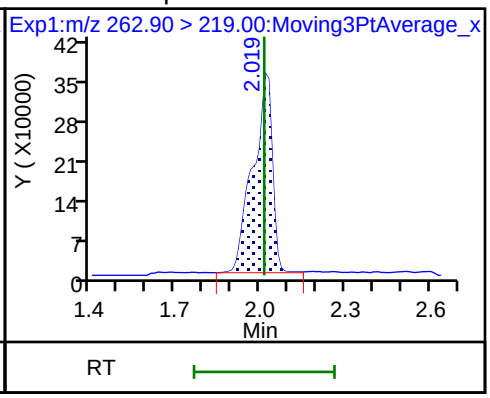
D 1 13C4 PFBA (M)



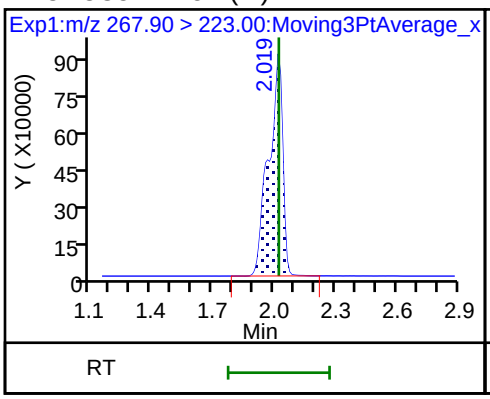
2 Perfluorobutanoic acid (M)



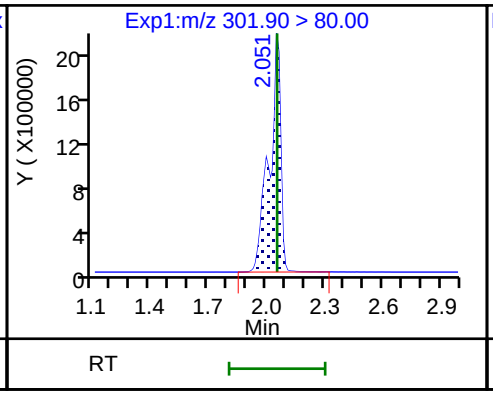
4 Perfluoropentanoic acid



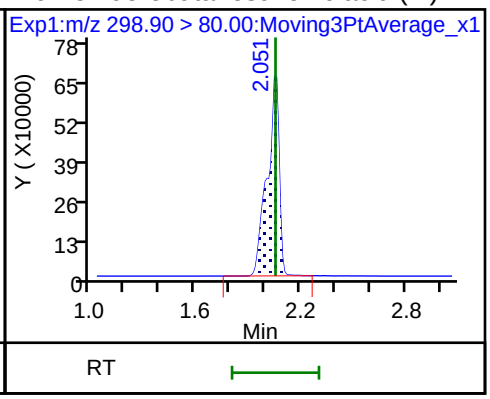
D 3 13C5 PFPeA (M)



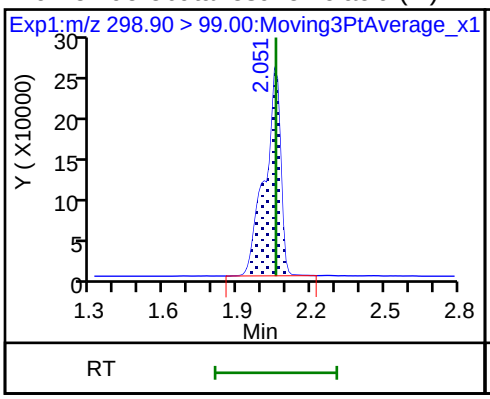
D 5 13C3 PFBS



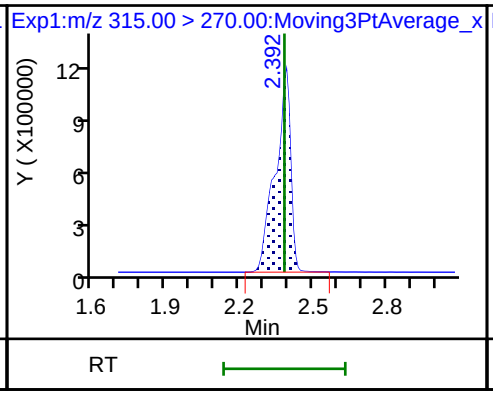
6 Perfluorobutanesulfonic acid (M)



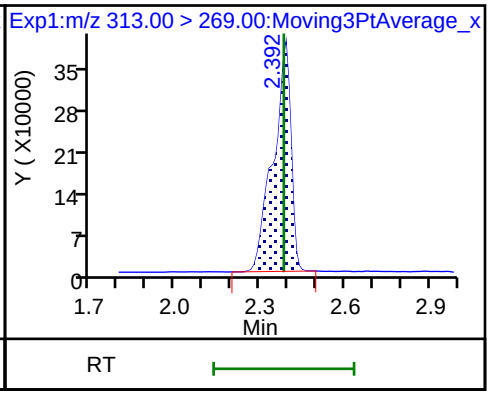
6 Perfluorobutanesulfonic acid (M)



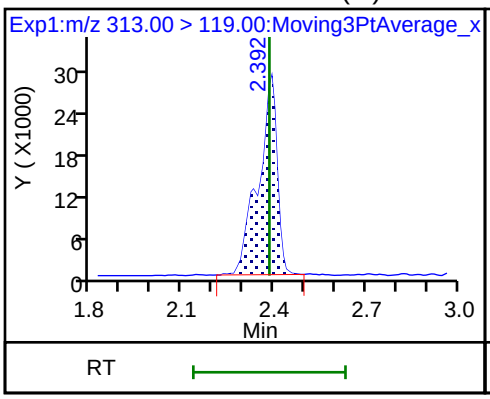
D 9 13C2 PFHxA



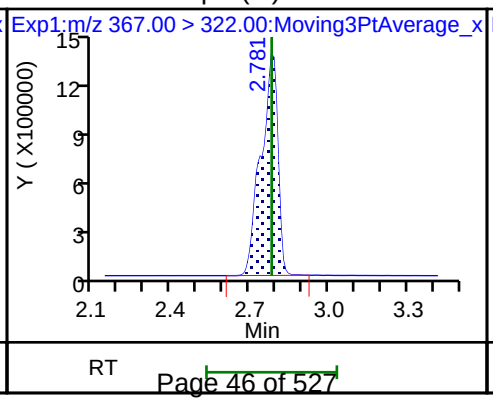
10 Perfluorohexanoic acid



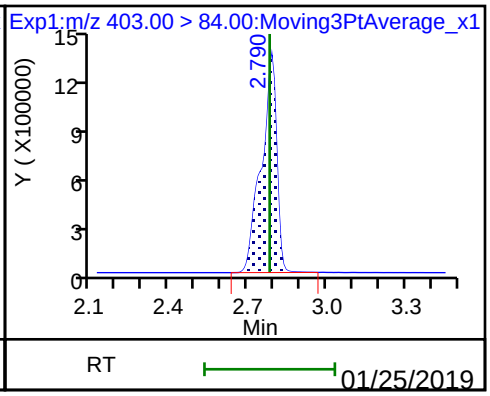
10 Perfluorohexanoic acid (M)



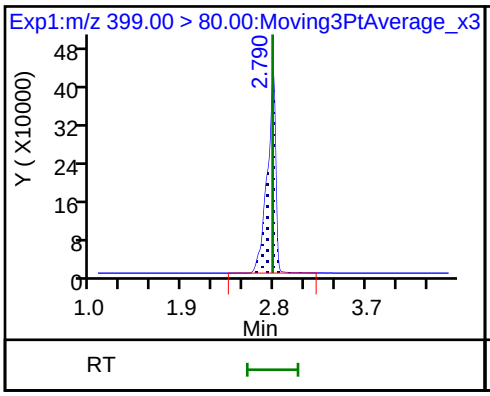
D 16 13C4 PFHpA (M)



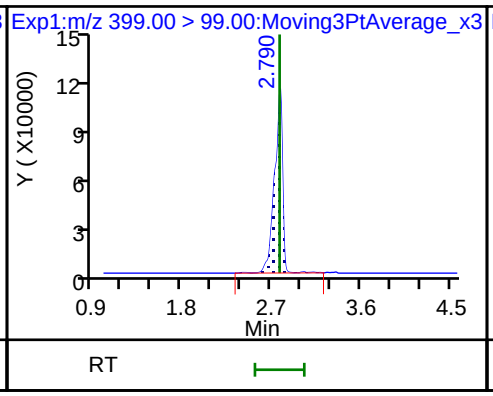
D 17 18O2 PFHxS



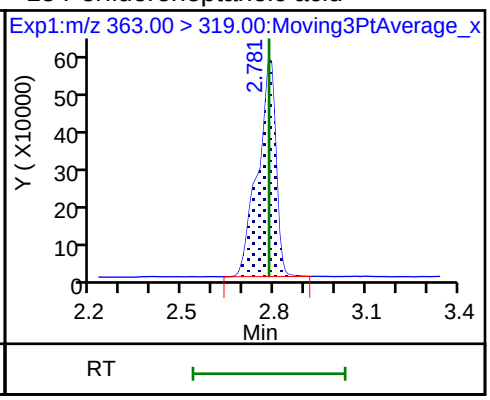
18 Perfluorohexanesulfonic acid



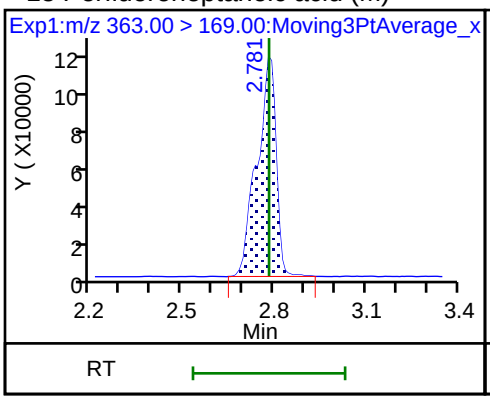
18 Perfluorohexanesulfonic acid



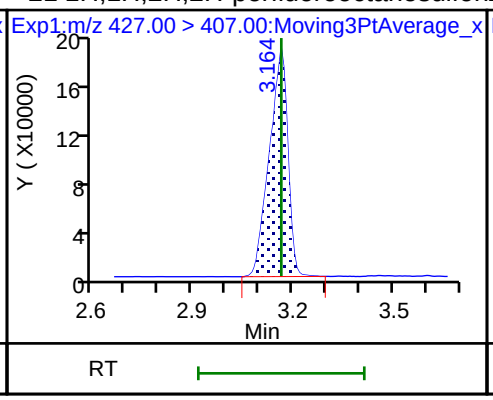
15 Perfluoroheptanoic acid



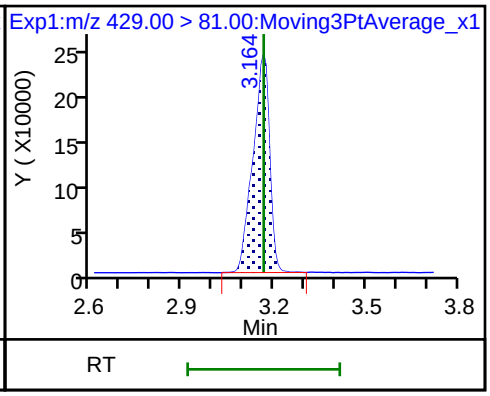
15 Perfluoroheptanoic acid (M)



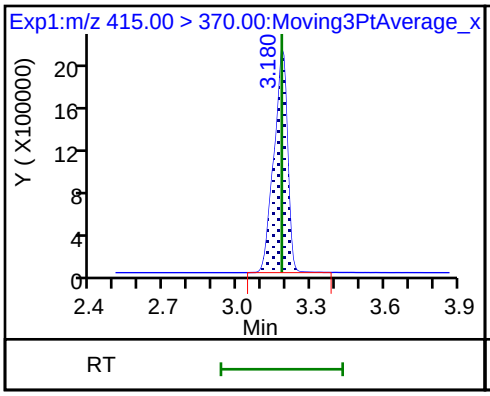
21 1H,1H,2H,2H-perfluorooctanesulfon



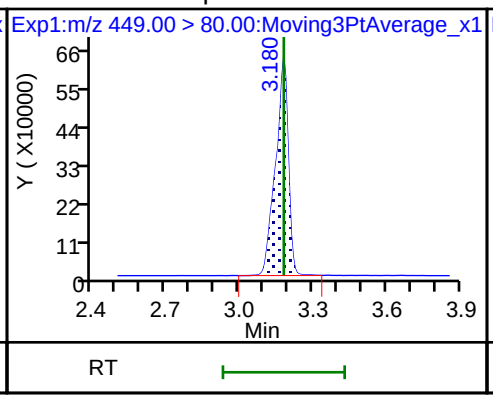
D 20 M2-6:2 FTS



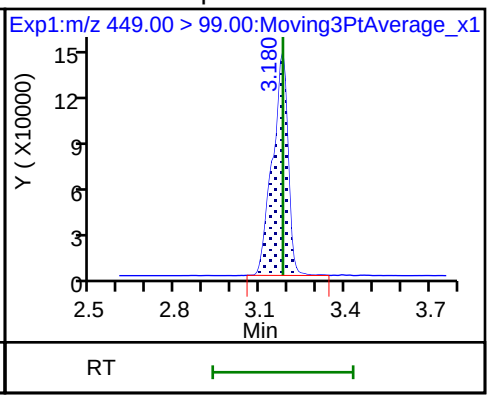
* 24 13C2 PFOA



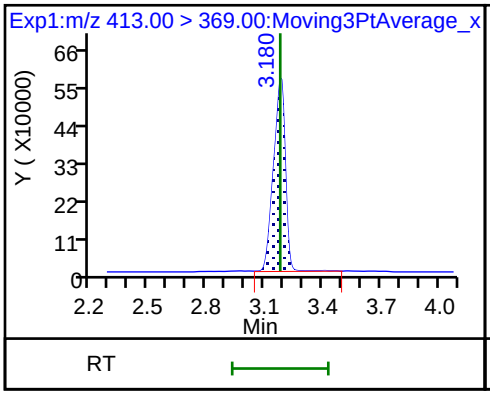
23 Perfluoroheptanesulfonic acid



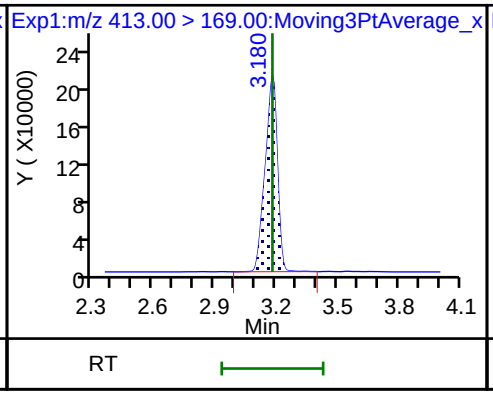
23 Perfluoroheptanesulfonic acid



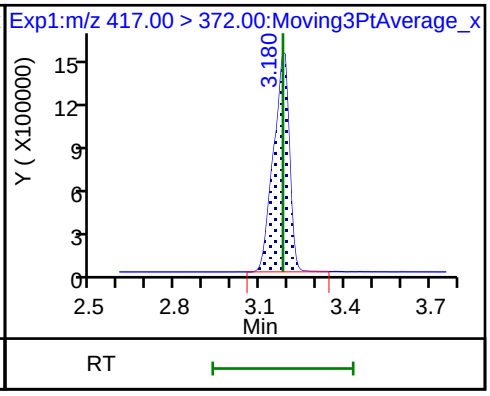
26 Perfluorooctanoic acid



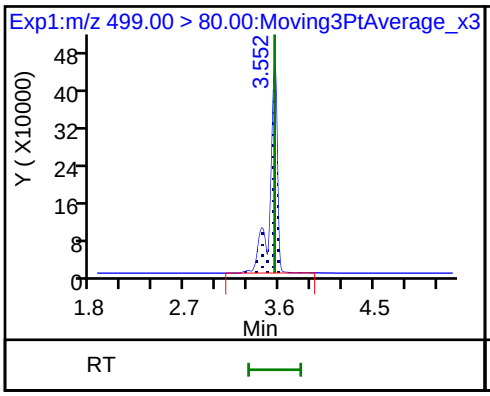
26 Perfluorooctanoic acid



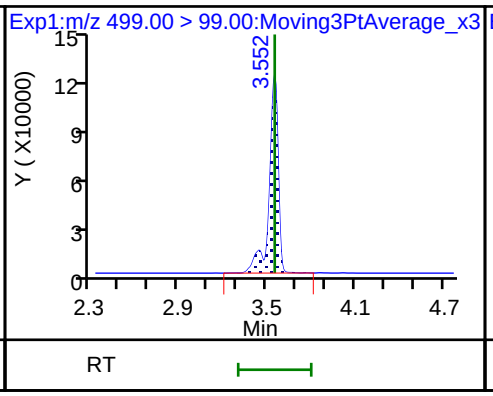
D 25 13C4 PFOA



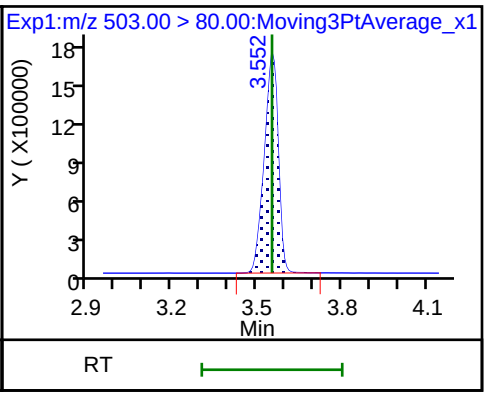
29 Perfluorooctanesulfonic acid



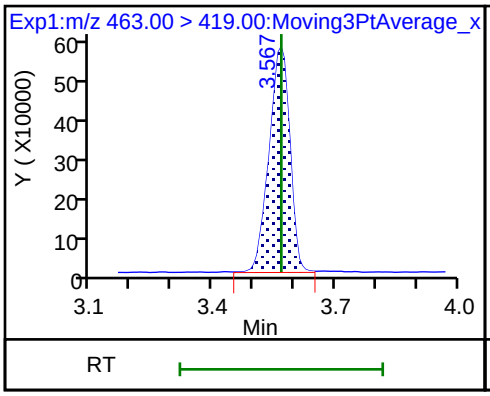
29 Perfluorooctanesulfonic acid



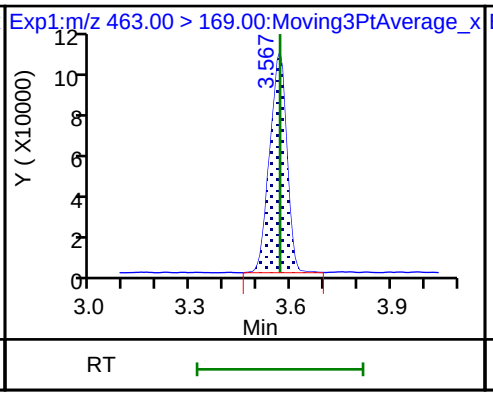
D 28 13C4 PFOS



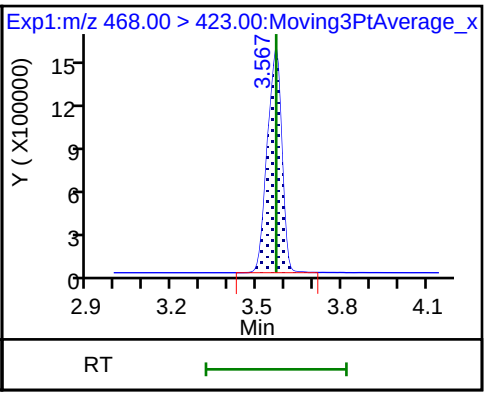
30 Perfluorononanoic acid



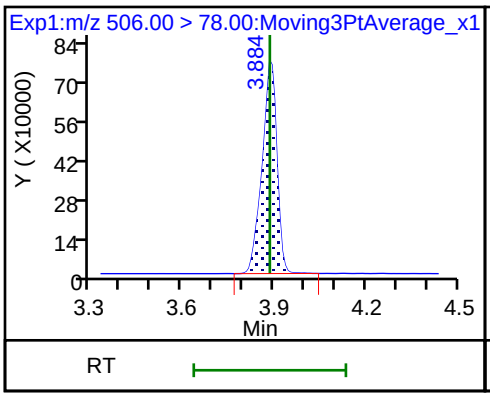
30 Perfluorononanoic acid



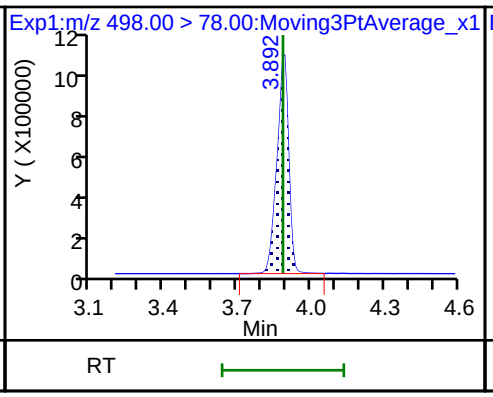
D 31 13C5 PFNA



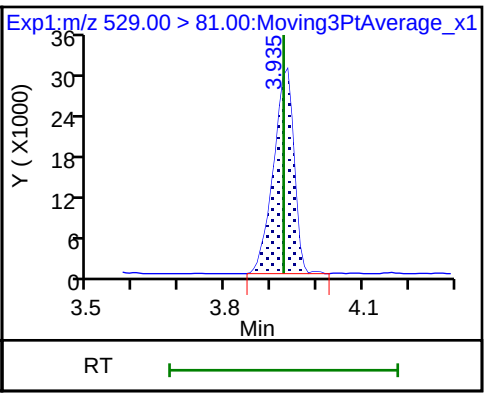
D 33 13C8 FOSA



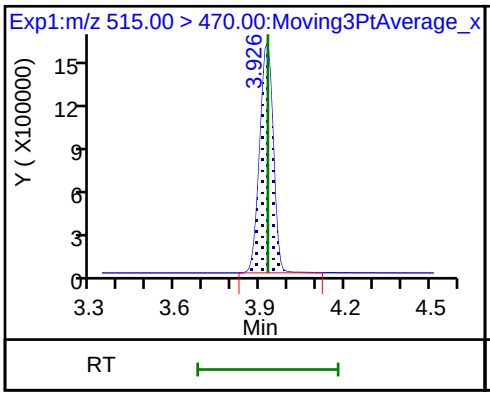
34 Perfluorooctanesulfonamide



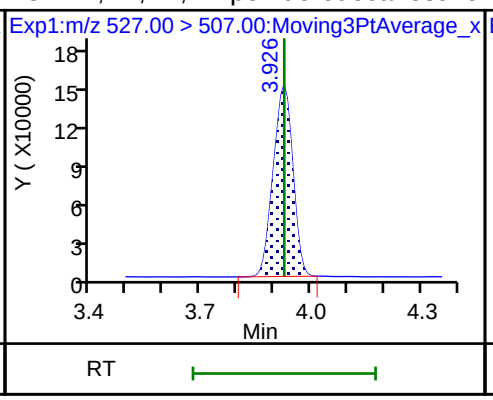
D 39 M2-8:2 FTS



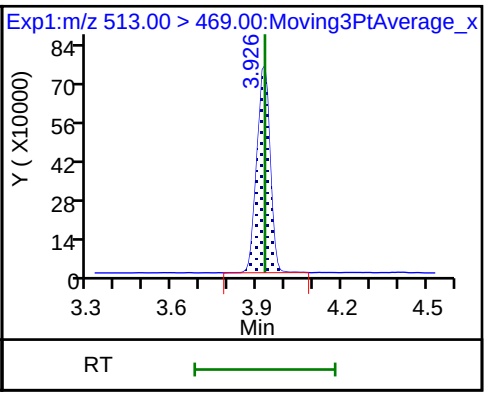
D 36 13C2 PFDA



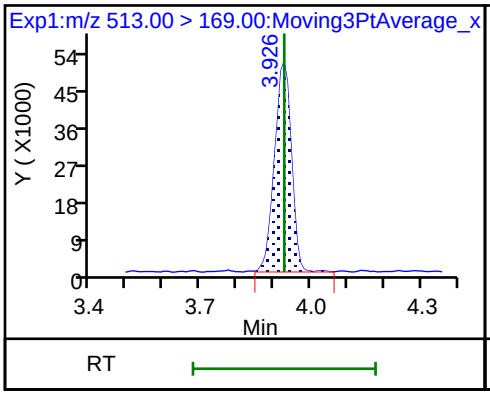
37 1H,1H,2H,2H-perfluorodecanesulfoni



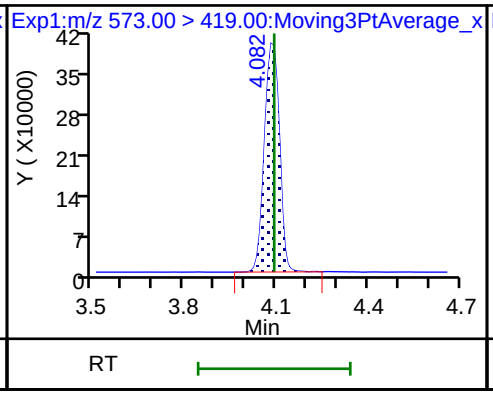
38 Perfluorodecanoic acid



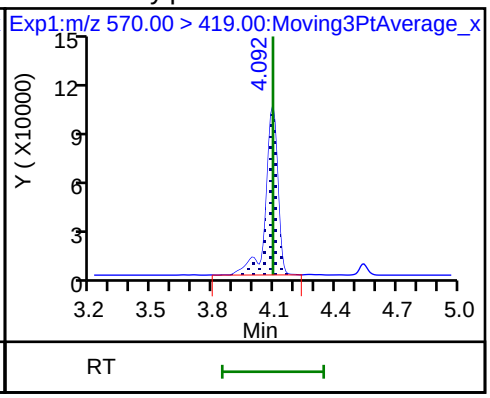
38 Perfluorodecanoic acid



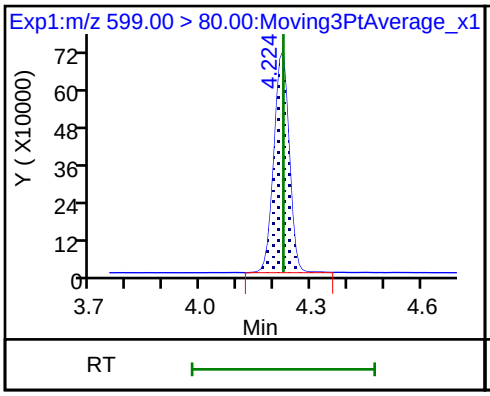
D 40 d3-NMeFOSAA



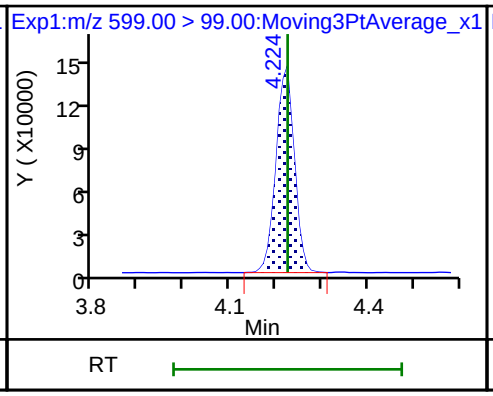
41 N-methylperfluorooctanesulfonamido



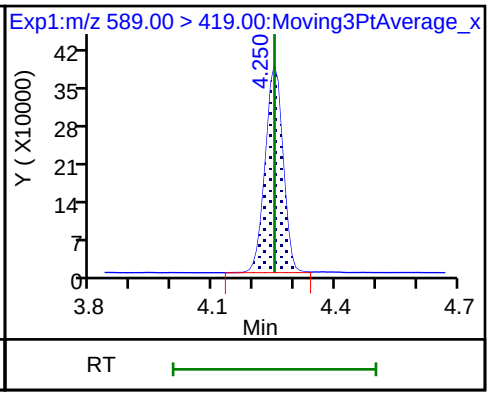
42 Perfluorodecanesulfonic acid



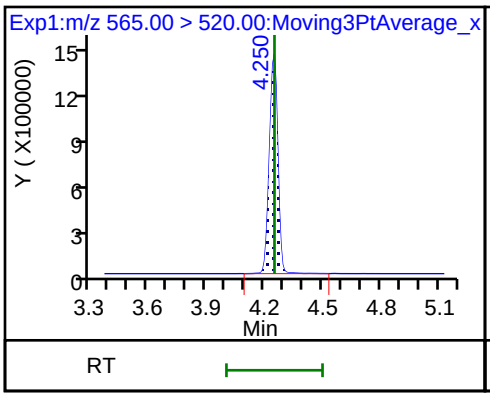
42 Perfluorodecanesulfonic acid



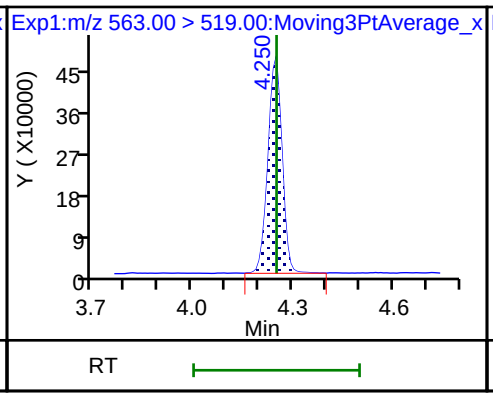
D 45 d5-NEtFOSAA



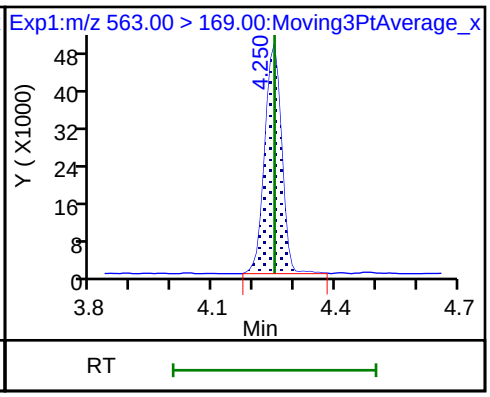
D 44 13C2 PFUnA



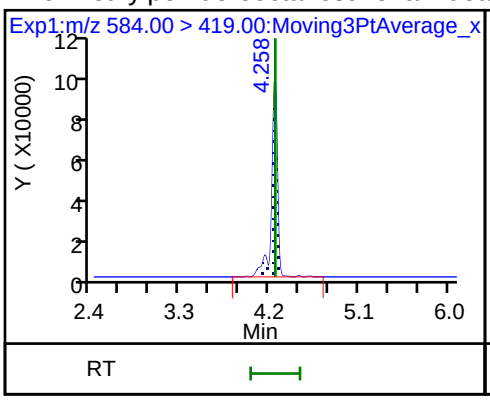
43 Perfluoroundecanoic acid



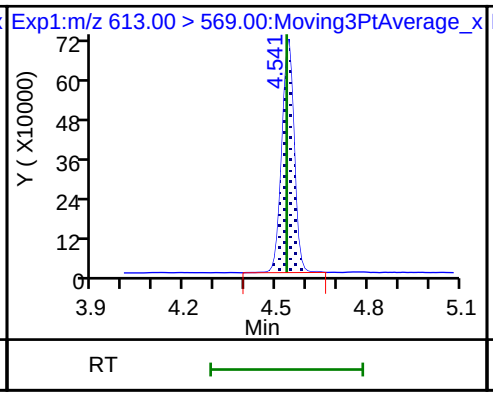
43 Perfluoroundecanoic acid



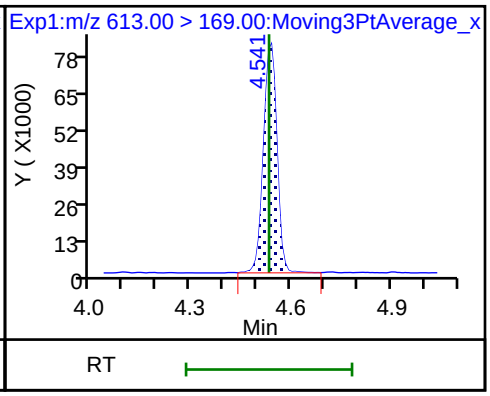
46 N-ethylperfluorooctanesulfonamidoa



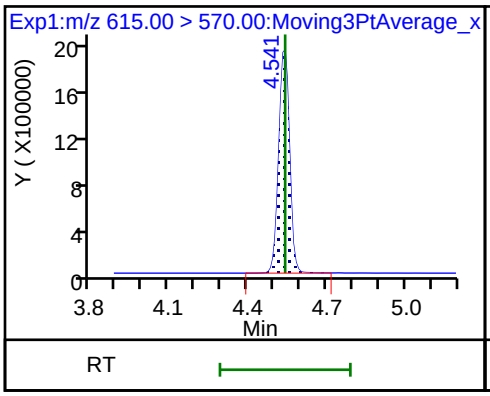
50 Perfluorododecanoic acid



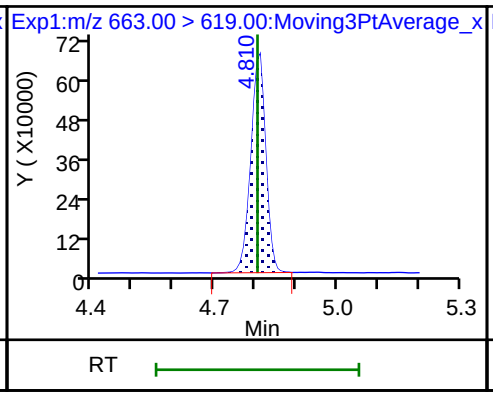
50 Perfluorododecanoic acid



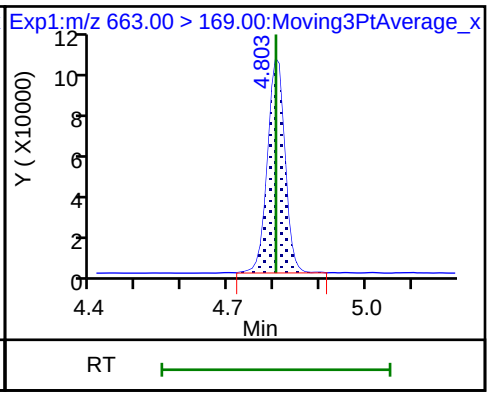
D 49 13C2 PFDoA



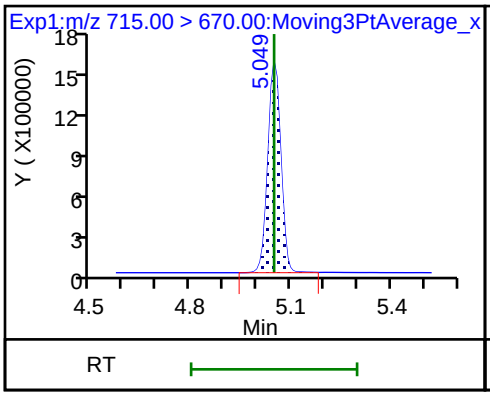
54 Perfluorotridecanoic acid



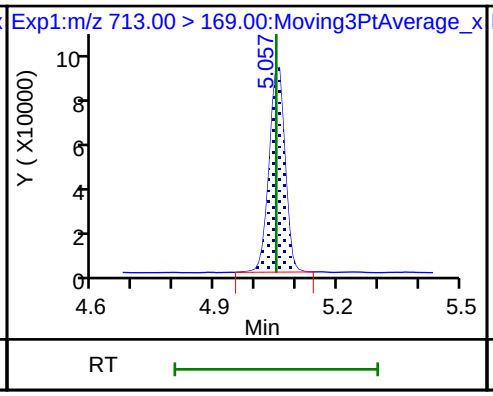
54 Perfluorotridecanoic acid



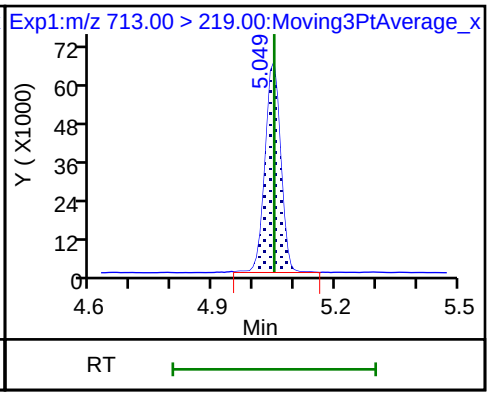
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

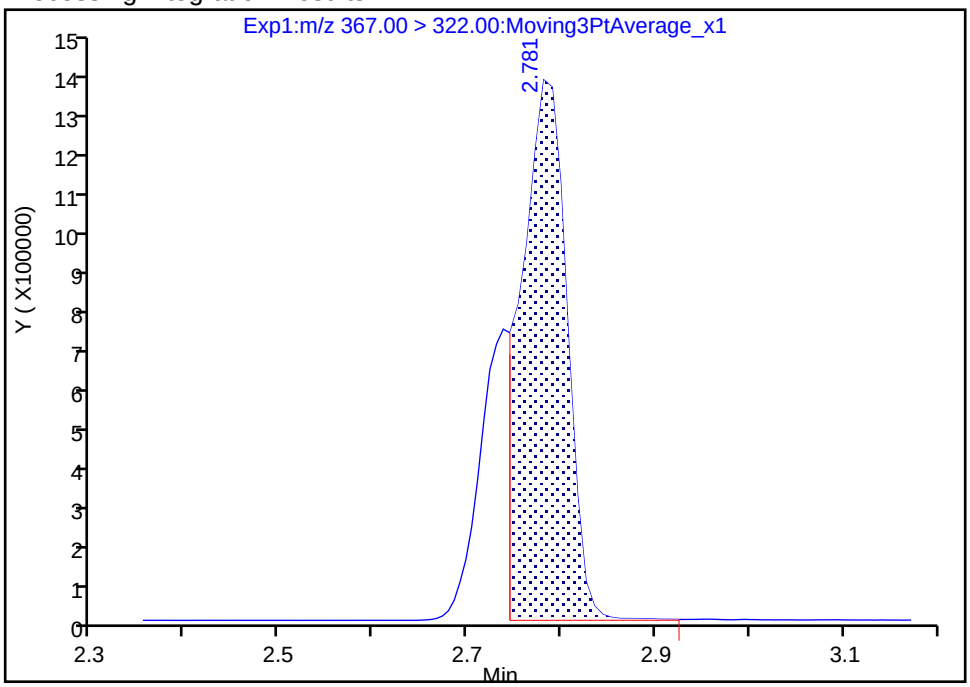
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_032.d				
Injection Date:	08-Jan-2019 22:48:57	Instrument ID:	A9		
Lims ID:	140-13780-A-1-C	Lab Sample ID:	320-13780-1		
Client ID:	D-2082 R1 Quartz Filter #1				
Operator ID:	A9\Administrator	ALS Bottle#:	21	Worklist Smp#:	3
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 16 13C4 PFHpA, CAS: STL01892

Signal: 1

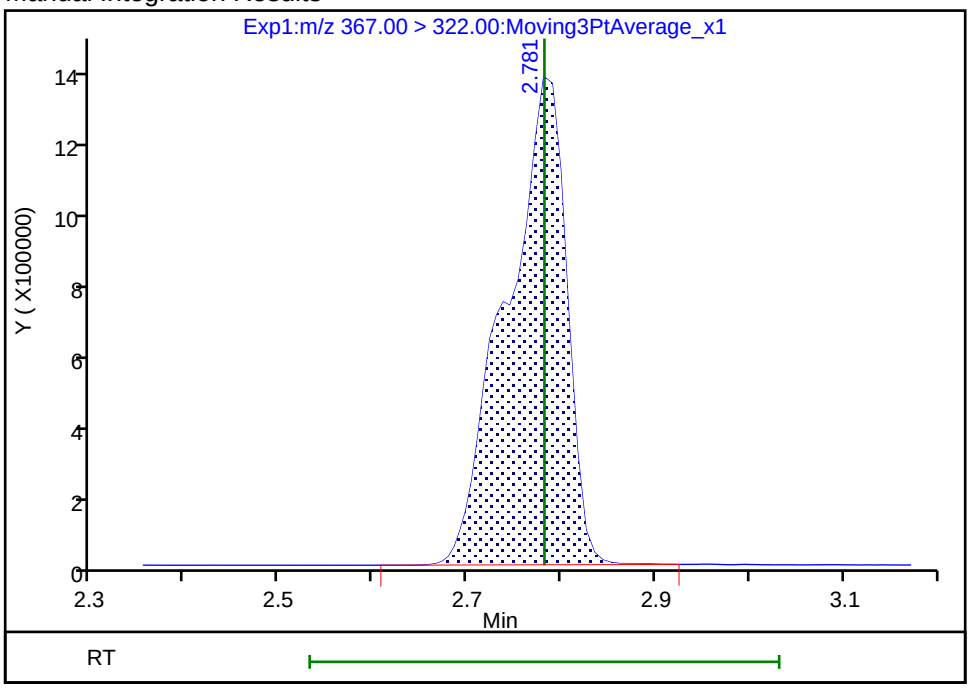
Processing Integration Results

RT: 2.78
Area: 4449630
Amount: 1.240281
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 6024567
Amount: 1.679276
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:43:20

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

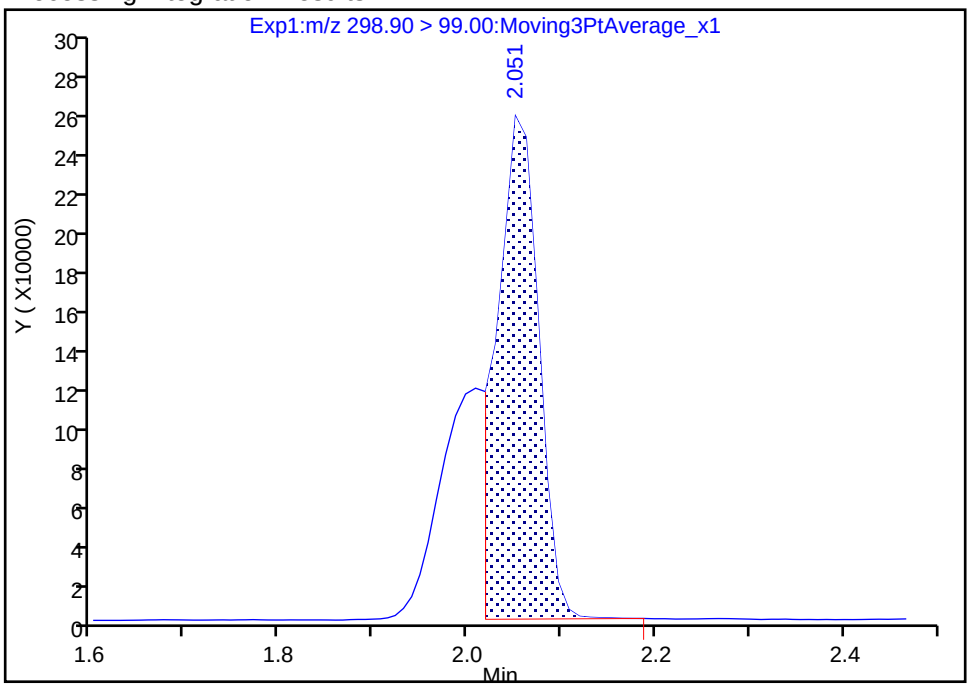
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_032.d				
Injection Date:	08-Jan-2019 22:48:57	Instrument ID:	A9		
Lims ID:	140-13780-A-1-C	Lab Sample ID:	320-13780-1		
Client ID:	D-2082 R1 Quartz Filter #1				
Operator ID:	A9\Administrator	ALS Bottle#:	21	Worklist Smp#:	3
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

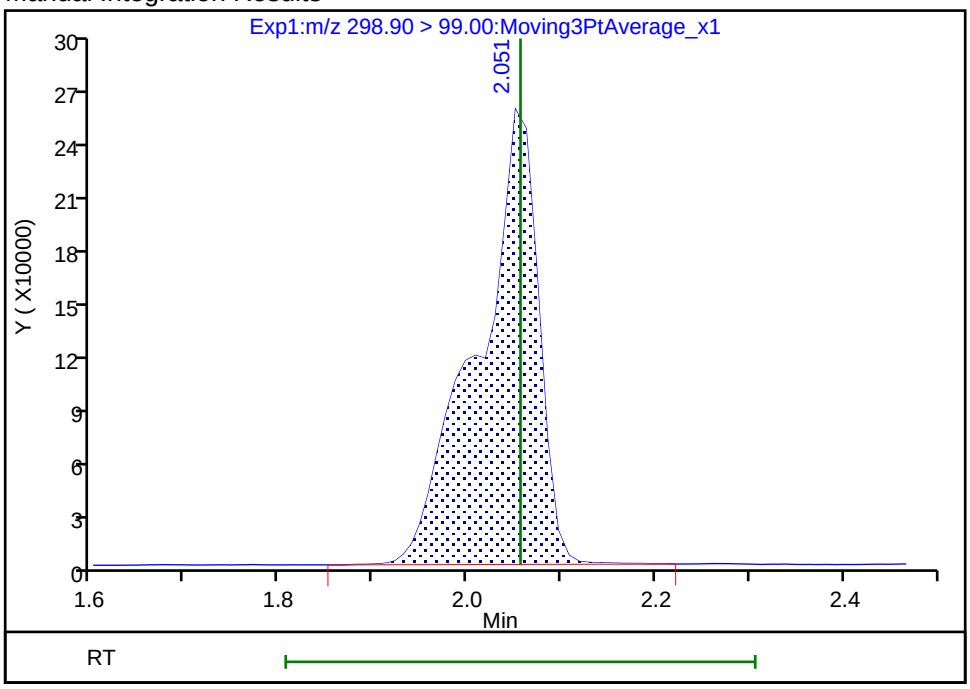
Processing Integration Results

RT: 2.05
Area: 760075
Amount: 0.046203
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 1141237
Amount: 0.861133
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:43:36

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

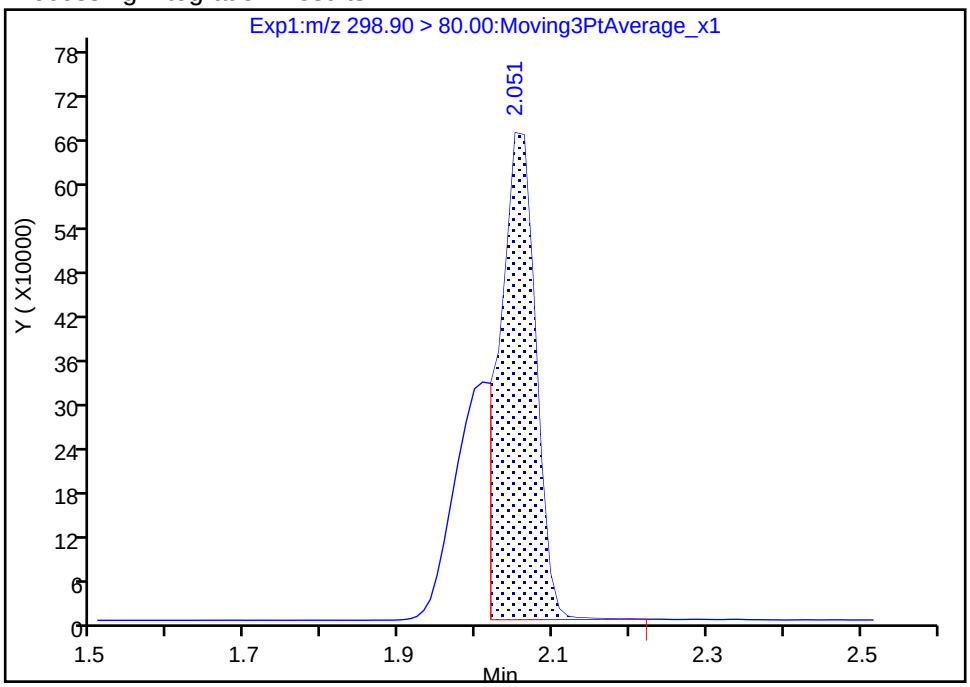
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_032.d				
Injection Date:	08-Jan-2019 22:48:57	Instrument ID:	A9		
Lims ID:	140-13780-A-1-C	Lab Sample ID:	320-13780-1		
Client ID:	D-2082 R1 Quartz Filter #1				
Operator ID:	A9\Administrator	ALS Bottle#:	21	Worklist Smp#:	3
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

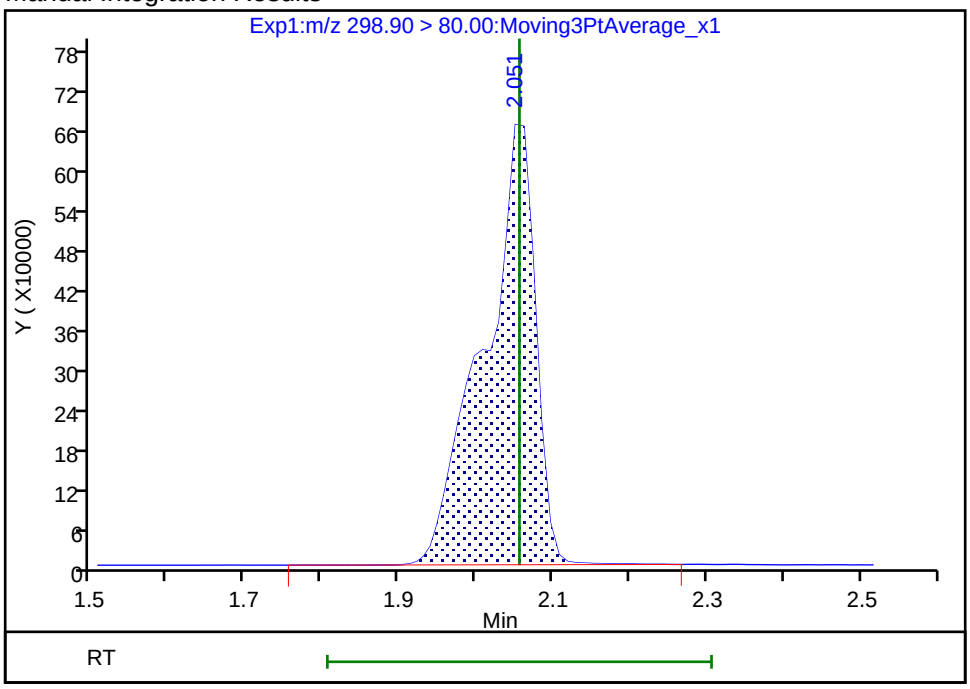
Processing Integration Results

RT: 2.05
Area: 2088079
Amount: 0.046203
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 3113447
Amount: 0.861133
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:43:38
Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

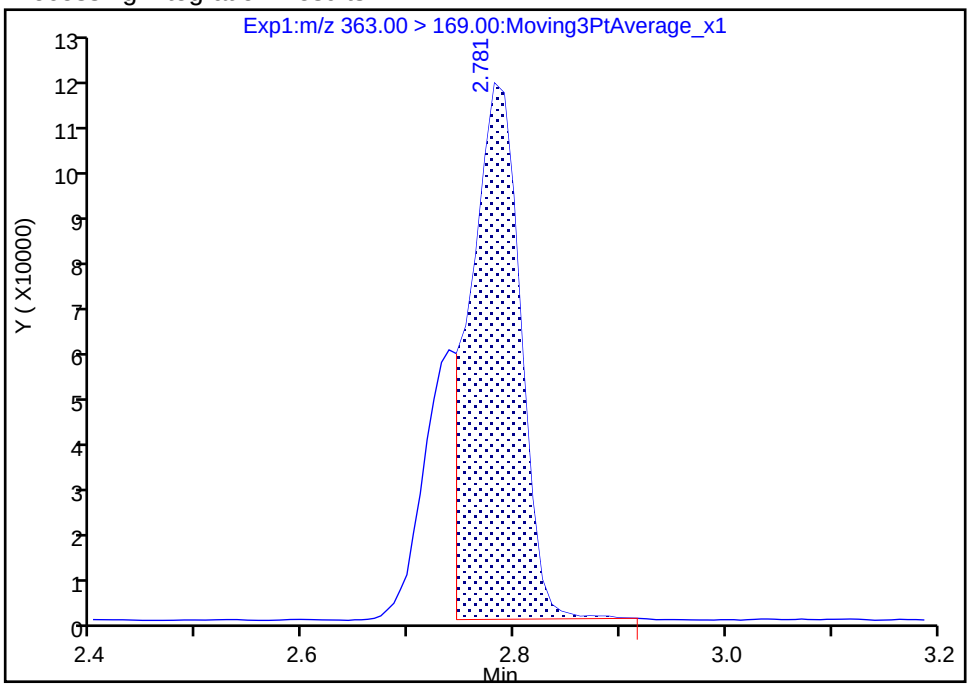
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_032.d				
Injection Date:	08-Jan-2019 22:48:57	Instrument ID:	A9		
Lims ID:	140-13780-A-1-C	Lab Sample ID:	320-13780-1		
Client ID:	D-2082 R1 Quartz Filter #1				
Operator ID:	A9\Administrator	ALS Bottle#:	21	Worklist Smp#:	3
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 2

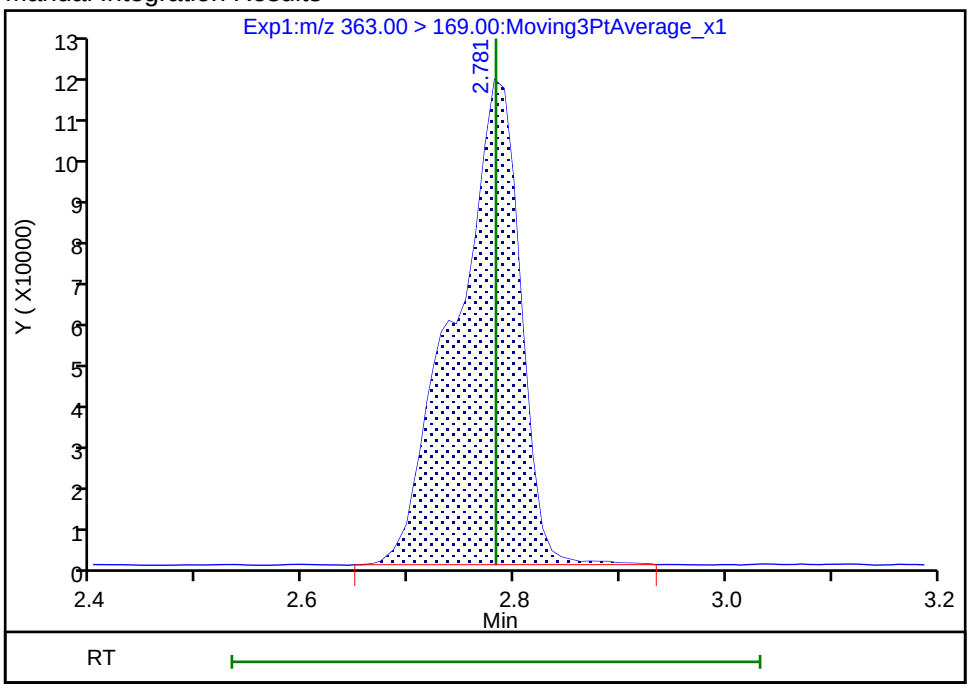
Processing Integration Results

RT: 2.78
Area: 383111
Amount: 0.076339
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 512422
Amount: 0.954238
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:43:46

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2083 R2 Quartz Filter #2 Lab Sample ID: 140-13780-2

Matrix: Air Lab File ID: 2019.01.08LLAAXX_033.d

Analysis Method: 537 (modified) Date Collected: 12/20/2018 08:00

Extraction Method: None Date Extracted: 12/28/2018 01:41

Sample wt/vol: 1(Sample) Date Analyzed: 01/08/2019 22:56

Con. Extract Vol.: 50(mL) Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	18.2		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	18.8		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	17.0		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	19.6		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	18.1		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	21.8		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	84		25-150
STL01892	13C4 PFHpA	77		25-150
STL00995	13C5 PFNA	86		25-150
STL00990	13C4 PFOA	81		25-150
STL00991	13C4 PFOS	88		25-150
STL00994	18O2 PFHxS	85		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_033.d
Lims ID: 140-13780-A-2-C
Client ID: D-2083 R2 Quartz Filter #2
Sample Type: Client
Inject. Date: 08-Jan-2019 22:56:27 ALS Bottle#: 22 Worklist Smp#: 4
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-2-c
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:44:53
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										M
217.00 > 172.00	1.680	1.679	0.001	0.528	5784182	1.89		75.5	7292	M
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.688	1.679	0.009	1.005	2133000	1.00			107	M
4 Perfluoropentanoic acid										
262.90 > 219.00	2.025	2.014	0.011	1.000	2042614	1.03			92.4	
D 3 13C5 PFPeA										
267.90 > 223.00	2.025	2.022	0.003	0.636	4968574	1.85		74.1	3478	
D 5 13C3 PFBS										
301.90 > 80.00	2.057	2.054	0.003	0.647	8547611	1.94		83.5	1083478	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.057	2.056	0.001	1.000	3235973	0.9122	Target=2.70		1974	
298.90 > 99.00	2.057	2.056	0.001	1.000	1112248		2.91(1.35-4.05)		625	
D 9 13C2 PFHxA										
315.00 > 270.00	2.393	2.383	0.010	0.752	5825181	1.96		78.2	2928	
10 Perfluorohexanoic acid										M
313.00 > 269.00	2.393	2.384	0.009	1.000	1924504	0.9536	Target=13.92		413	
313.00 > 119.00	2.393	2.384	0.009	1.000	145935		13.19(6.96-20.87)		276	M
D 16 13C4 PFHpA										
367.00 > 322.00	2.783	2.782	0.001	0.875	7040454	1.92		76.9	2353	
D 17 18O2 PFHxS										
403.00 > 84.00	2.792	2.782	0.010	0.878	5200296	2.01		84.9	2411	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.792	2.782	0.010	1.000	2307975	0.8484	Target=3.80		2252	
399.00 > 99.00	2.792	2.782	0.010	1.000	654443		3.53(1.90-5.70)		295	
15 Perfluoroheptanoic acid										M
363.00 > 319.00	2.792	2.782	0.010	1.003	2756503	0.9408	Target=4.34		419	
363.00 > 169.00	2.792	2.782	0.010	1.003	596182		4.62(2.17-6.52)		589	M

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.165	3.165	0.0	0.998	770430	0.9361			593	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.173	3.165	0.008	0.998	925666	2.56		108	993	
* 24 13C2 PFOA										
415.00 > 370.00	3.181	3.180	0.001		8025475	2.50			2800	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.181	3.180	0.001	0.893	2352015	0.9628	Target=3.69		1624	
449.00 > 99.00	3.181	3.180	0.001	0.893	556375		4.23(1.84-5.53)		912	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.189	3.180	0.009	1.002	2911129	1.09	Target=2.72		305	
413.00 > 169.00	3.189	3.180	0.009	1.002	1029942		2.83(1.36-4.08)		1022	
D 25 13C4 PFOA										
417.00 > 372.00	3.181	3.180	0.001	1.000	6449893	2.03		81.2	2324	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.553	3.552	0.001	0.998	2206345	0.9043	Target=4.08		1109	
499.00 > 99.00	3.561	3.552	0.009	1.000	509868		4.33(2.04-6.12)		1150	
D 28 13C4 PFOS										
503.00 > 80.00	3.561	3.552	0.009	1.119	5533240	2.09		87.6	3102	
30 Perfluorononanoic acid										
463.00 > 419.00	3.568	3.567	0.001	1.000	2396421	0.9807	Target=5.35		306	
463.00 > 169.00	3.568	3.567	0.001	1.000	412032		5.82(2.68-8.03)		758	
D 31 13C5 PFNA										
468.00 > 423.00	3.568	3.567	0.001	1.122	6136449	2.14		85.8	5005	
D 33 13C8 FOSA										
506.00 > 78.00	3.893	3.885	0.008	1.224	2755571	1.58		63.3	1750	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.893	3.885	0.008	1.000	3649461	1.14			2565	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.927	3.927	0.0	1.235	95074	2.29		95.7	351	
D 36 13C2 PFDA										
515.00 > 470.00	3.927	3.927	0.0	1.235	6016961	2.15		86.0	2592	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.927	3.927	0.0	1.000	568812	1.01			1530	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.927	3.927	0.0	1.000	2807922	1.02	Target=14.23		924	
513.00 > 169.00	3.927	3.927	0.0	1.000	183121		15.33(7.12-21.35)		337	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.094	4.093	0.0	1.287	1455586	1.98		79.4	2181	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.094	4.093	0.0	1.000	501058	0.99			117	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.225	4.225	0.0	1.187	1902181	0.9395	Target=4.28		1934	
599.00 > 99.00	4.225	4.225	0.0	1.187	403568		4.71(2.14-6.43)		1217	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.260	4.250	0.010	1.339	1310308	2.14		85.7	1339	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.251	4.250	0.001	1.336	4757994	2.16		86.4	3863	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.251	4.250	0.001	1.000	1571449	0.99	Target=10.48		341	
563.00 > 169.00	4.251	4.250	0.001	1.000	152777		10.29(5.24-15.72)		655	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.260	4.259	0.001	1.000	422107	0.9728			1063	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.542	4.534	0.008	1.000	2254796	1.02	Target=9.37		653	
613.00 > 169.00	4.542	4.534	0.008	1.000	234080		9.63(4.68-14.05)		680	
D 49 13C2 PFDoA										
615.00 > 570.00	4.542	4.541	0.001	1.428	5742739	2.15		86.1	3487	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.811	4.803	0.008	1.059	1730357	0.99	Target=6.18		600	
663.00 > 169.00	4.811	4.803	0.008	1.059	304540		5.68(3.09-9.27)		1401	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.058	5.049	0.009	1.590	4447974	2.40		96.2	4715	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.058	5.050	0.008	1.000	273352	0.9409	Target=1.39		1083	
713.00 > 219.00	5.050	5.050	0.0	0.998	180908		1.51(0.70-2.09)		822	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:46 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_033.d

Injection Date: 08-Jan-2019 22:56:27 Instrument ID: A9

Lims ID: 140-13780-A-2-C Lab Sample ID: 320-13780-2

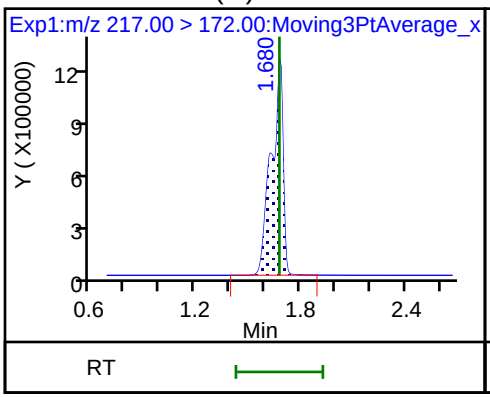
Client ID: D-2083 R2 Quartz Filter #2

Operator ID: A9\Administrator ALS Bottle#: 22 Worklist Smp#: 4

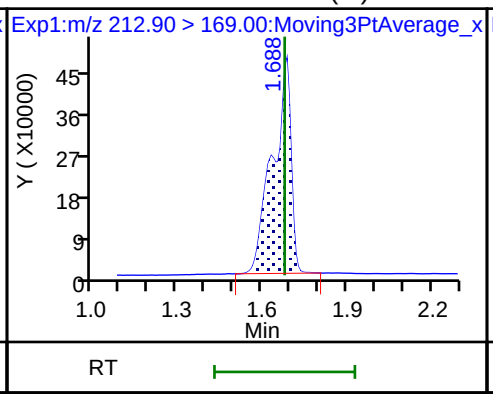
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

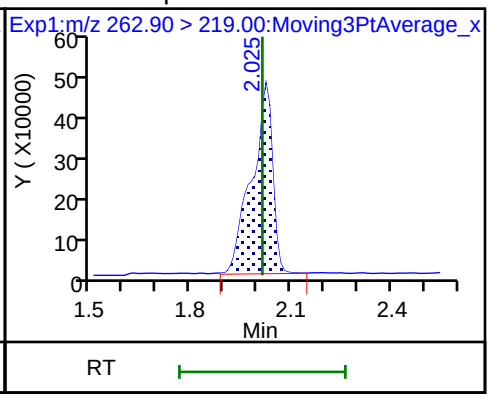
D 1 13C4 PFBA (M)



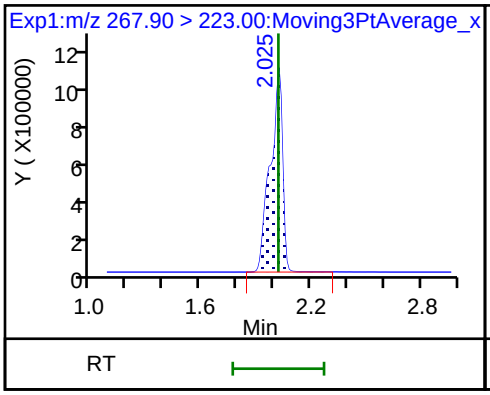
2 Perfluorobutanoic acid (M)



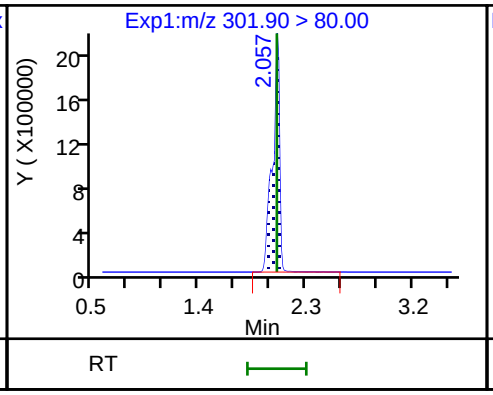
4 Perfluoropentanoic acid



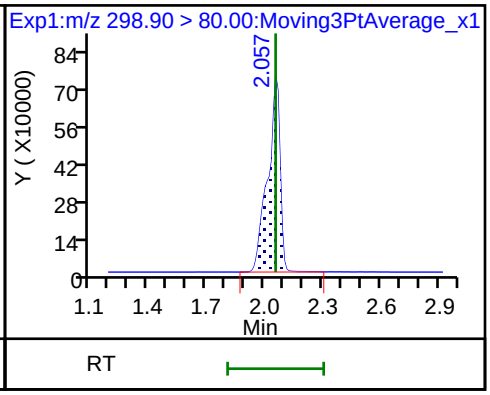
D 3 13C5 PFPeA



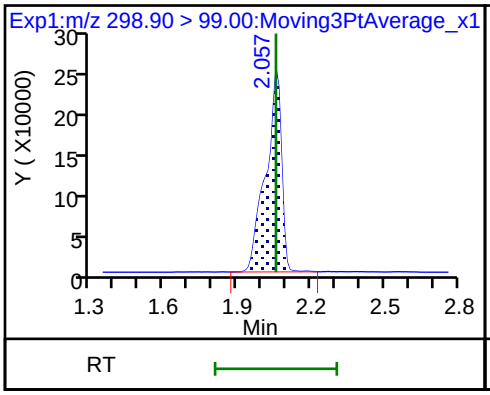
D 5 13C3 PFBS



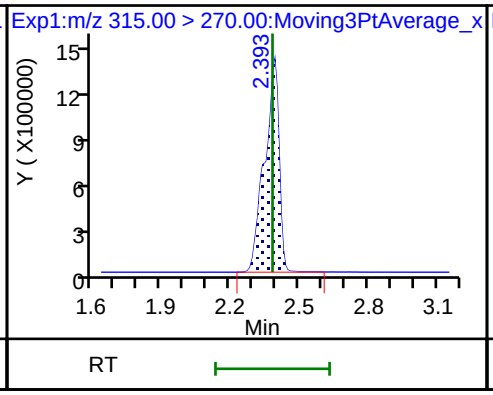
6 Perfluorobutanesulfonic acid



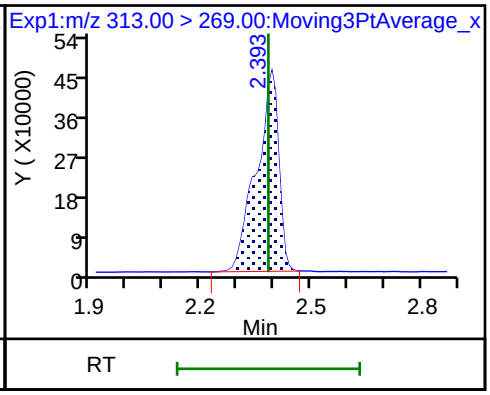
6 Perfluorobutanesulfonic acid



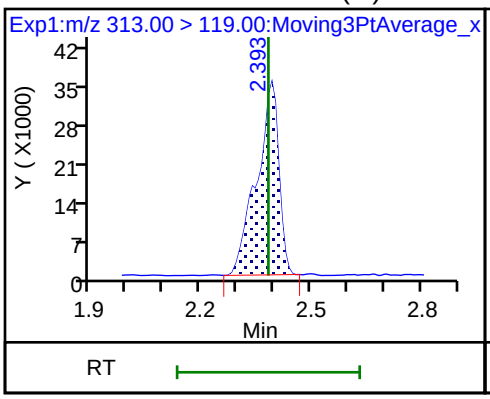
D 9 13C2 PFHxA



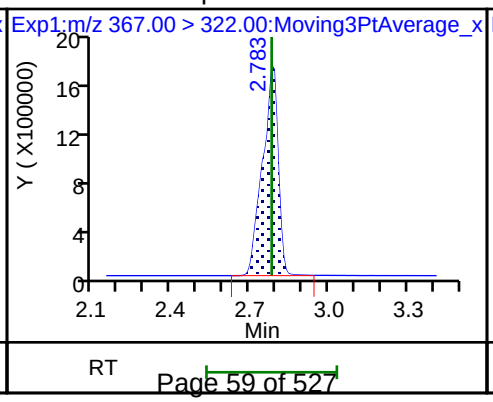
10 Perfluorohexanoic acid



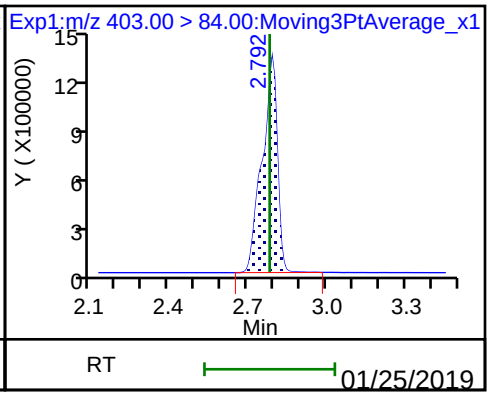
10 Perfluorohexanoic acid (M)



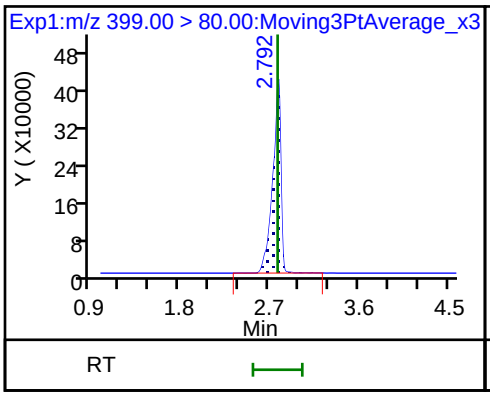
D 16 13C4 PFHpA



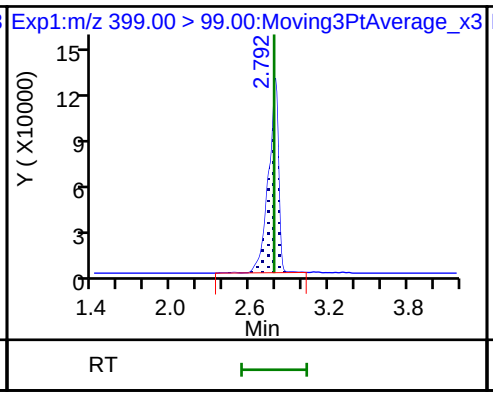
D 17 18O2 PFHxS



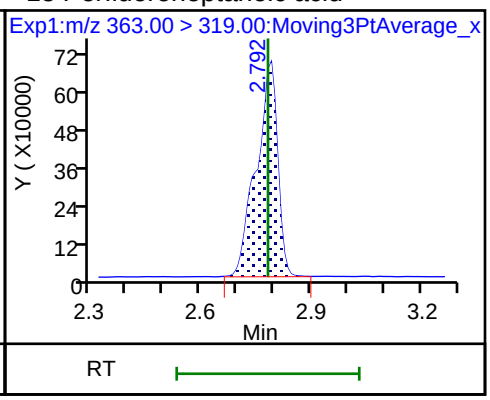
18 Perfluorohexanesulfonic acid



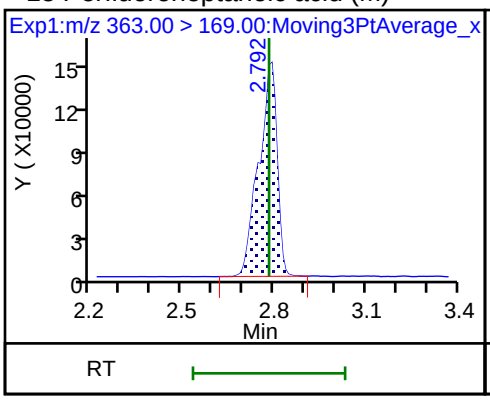
18 Perfluorohexanesulfonic acid



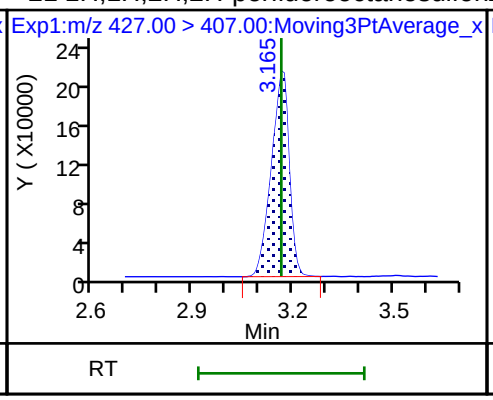
15 Perfluoroheptanoic acid



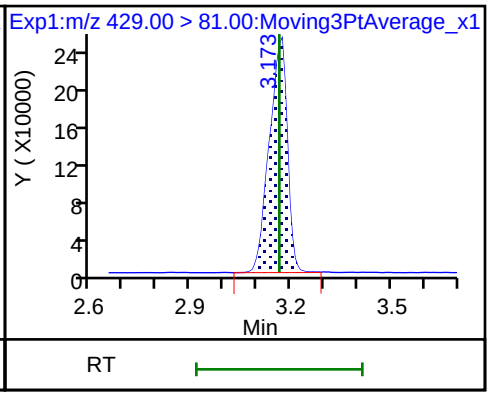
15 Perfluoroheptanoic acid (M)



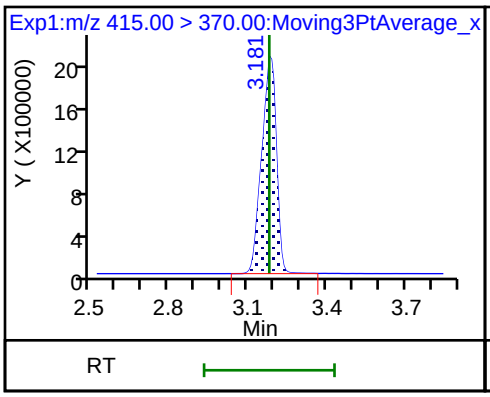
21 1H,1H,2H,2H-perfluorooctanesulfon



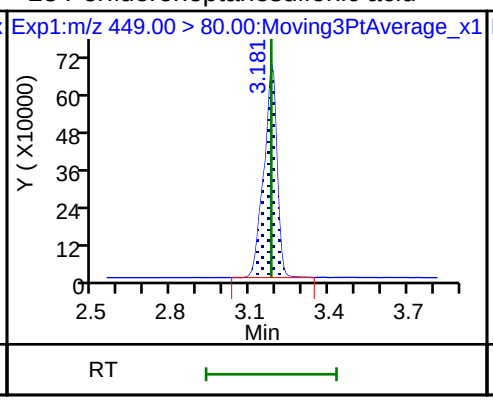
D 20 M2-6:2 FTS



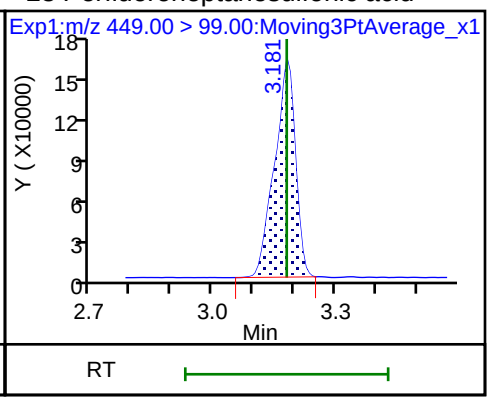
* 24 13C2 PFOA



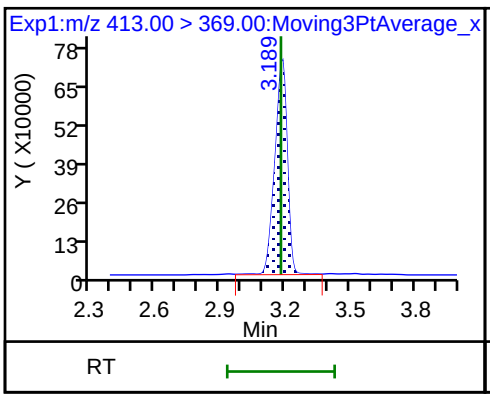
23 Perfluoroheptanesulfonic acid



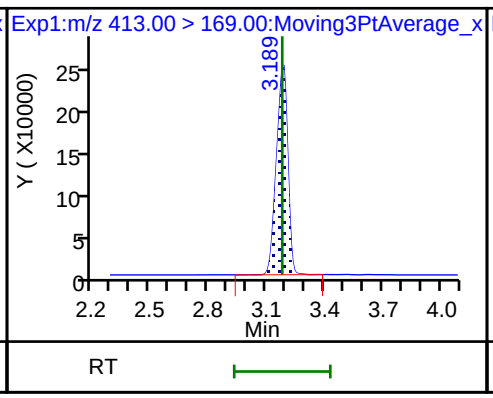
23 Perfluoroheptanesulfonic acid



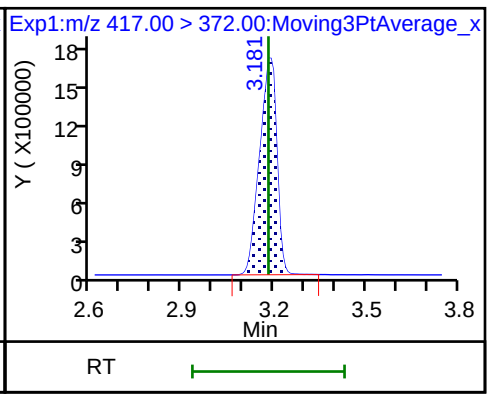
26 Perfluorooctanoic acid



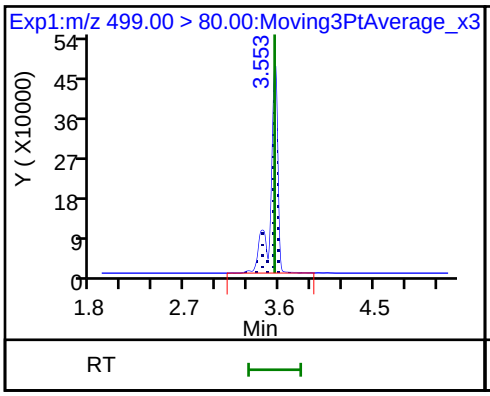
26 Perfluorooctanoic acid



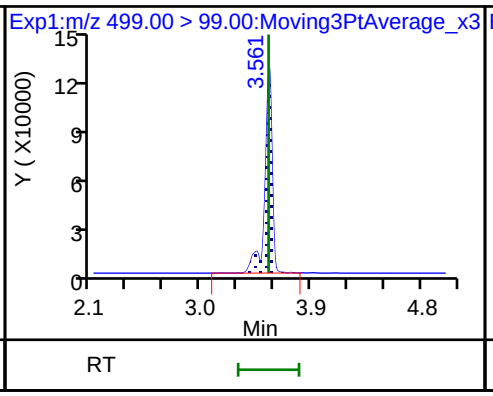
D 25 13C4 PFOA



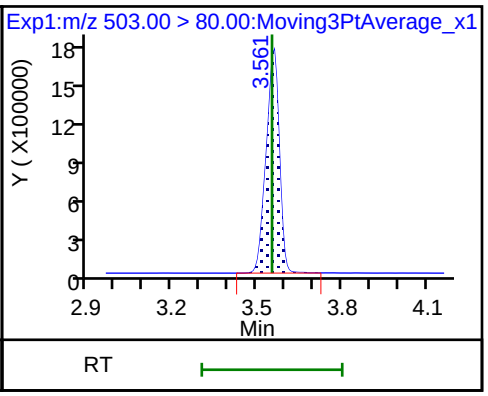
29 Perfluorooctanesulfonic acid



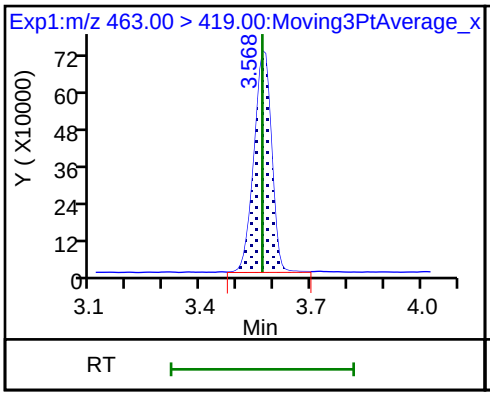
29 Perfluorooctanesulfonic acid



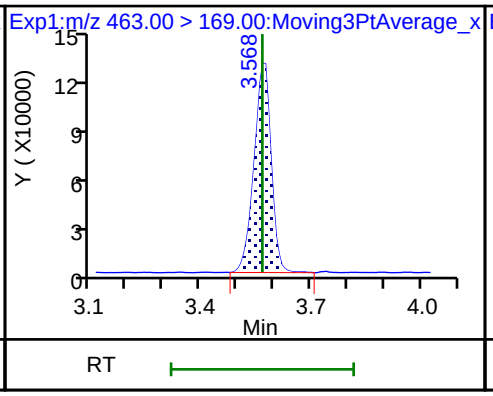
D 28 13C4 PFOS



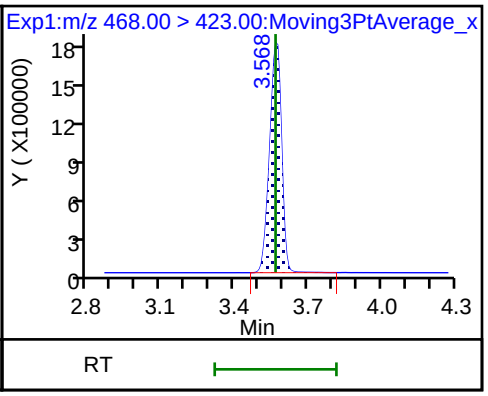
30 Perfluorononanoic acid



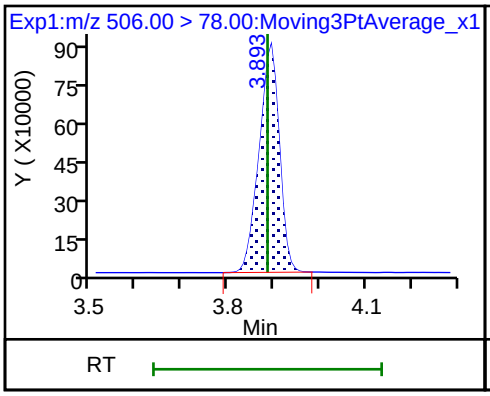
30 Perfluorononanoic acid



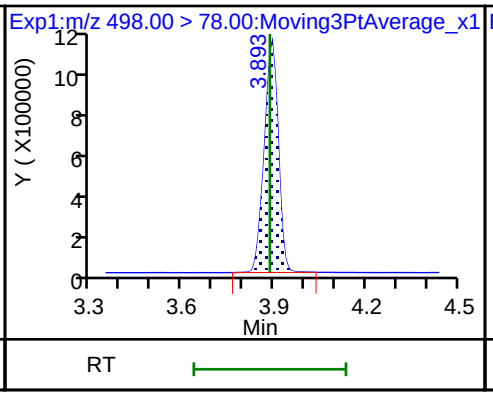
D 31 13C5 PFNA



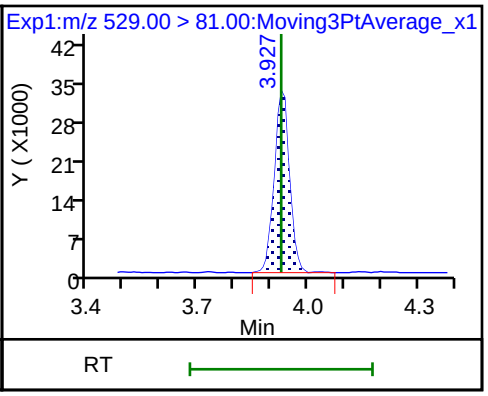
D 33 13C8 FOSA



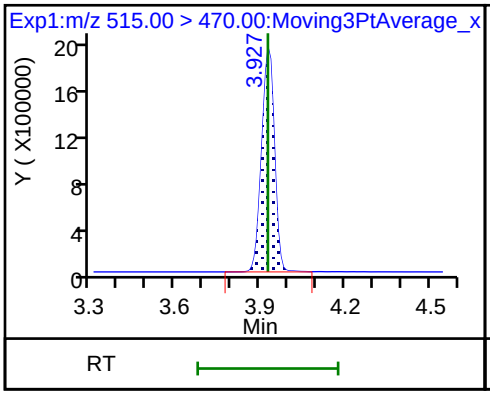
34 Perfluorooctanesulfonamide



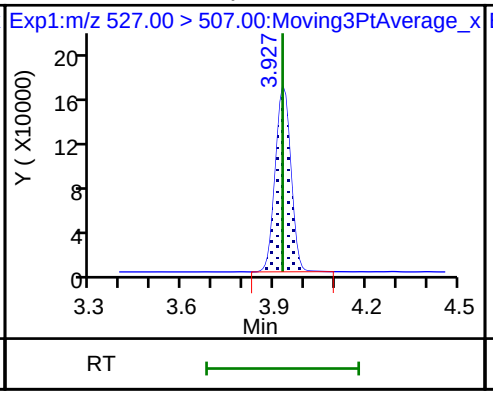
D 39 M2-8:2 FTS



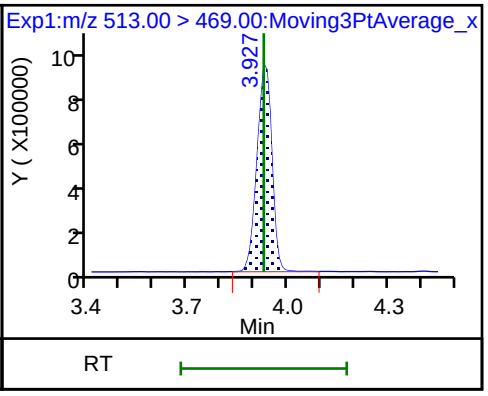
D 36 13C2 PFDA



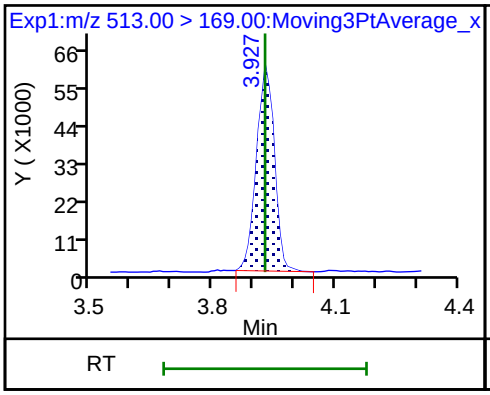
37 1H,1H,2H,2H-perfluorodecanesulfoni



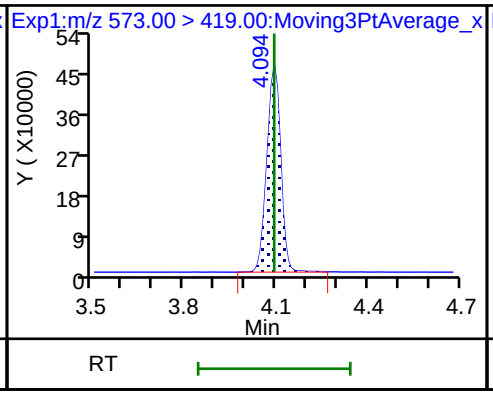
38 Perfluorodecanoic acid



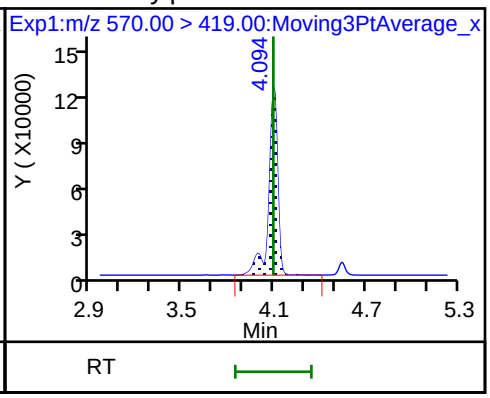
38 Perfluorodecanoic acid



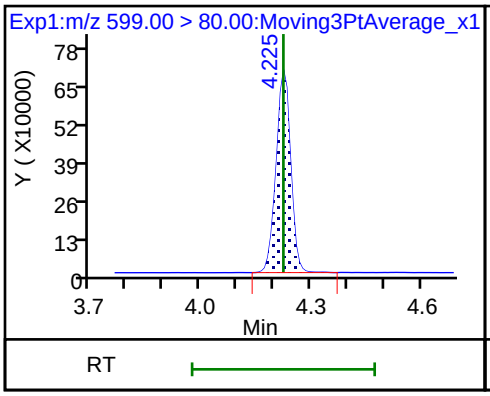
D 40 d3-NMeFOSAA



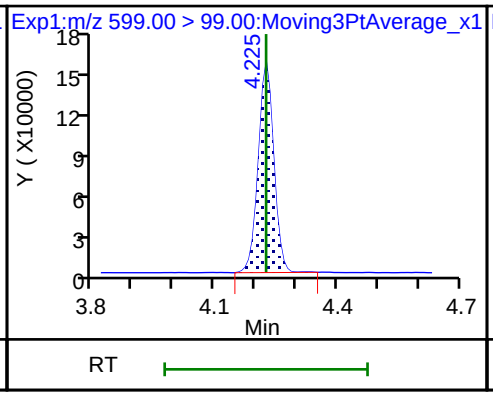
41 N-methylperfluorooctanesulfonamido



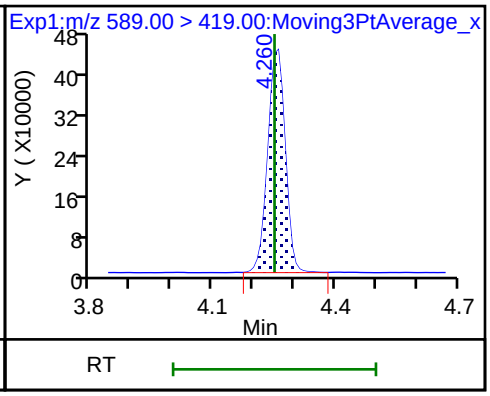
42 Perfluorodecanesulfonic acid



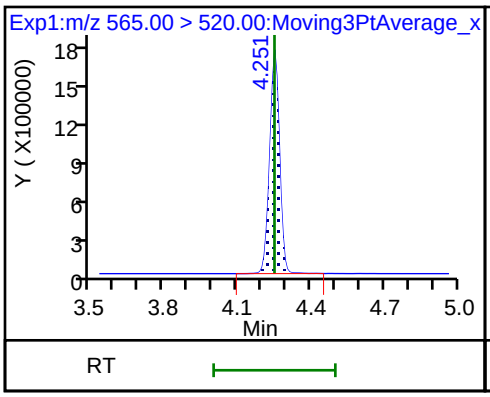
42 Perfluorodecanesulfonic acid



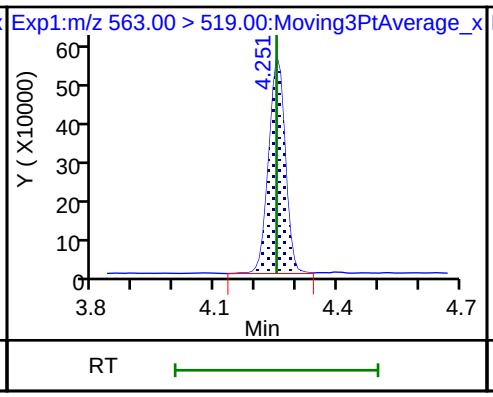
D 45 d5-NEtFOSAA



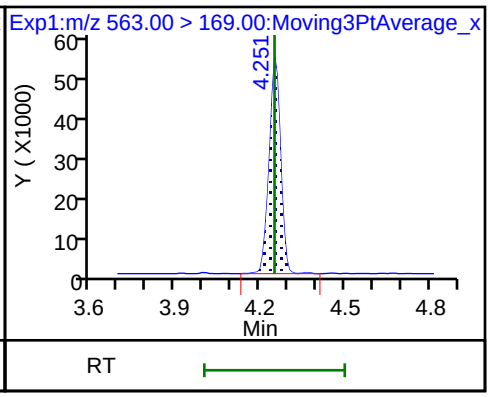
D 44 13C2 PFUnA



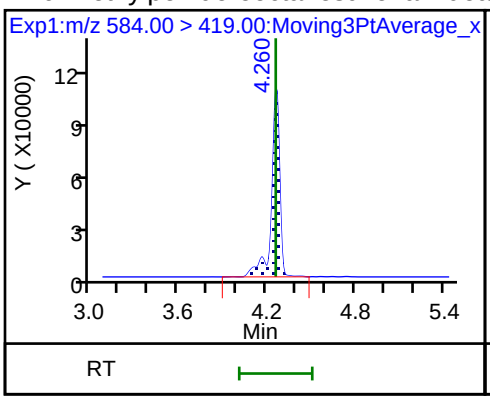
43 Perfluoroundecanoic acid



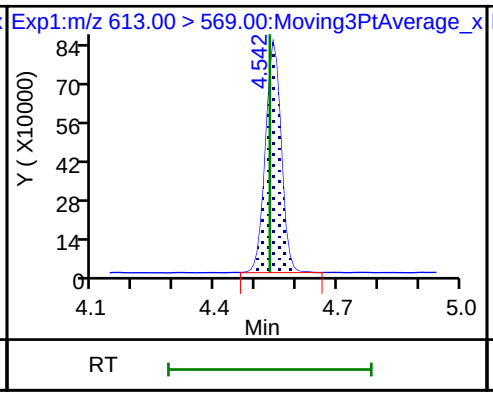
43 Perfluoroundecanoic acid



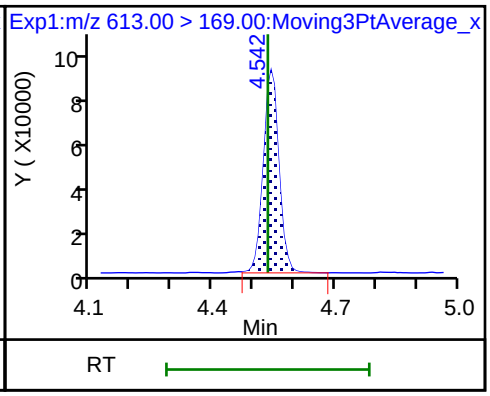
46 N-ethylperfluorooctanesulfonamidoa



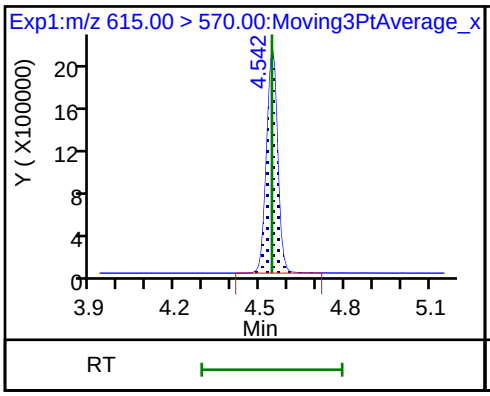
50 Perfluorododecanoic acid



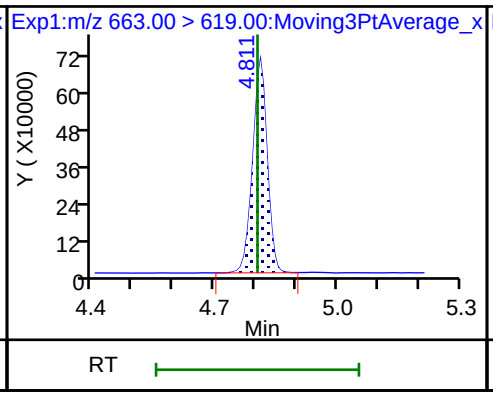
50 Perfluorododecanoic acid



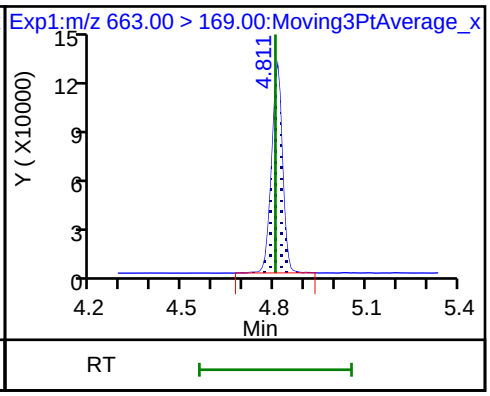
D 49 13C2 PFDoA



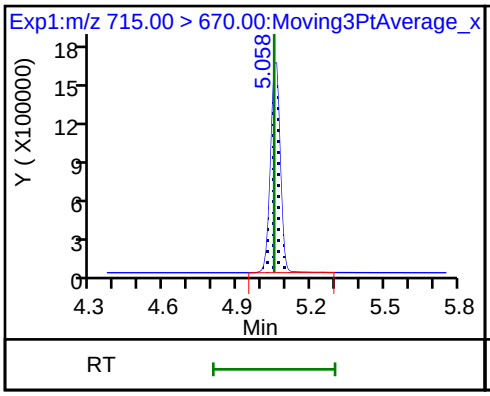
54 Perfluorotridecanoic acid



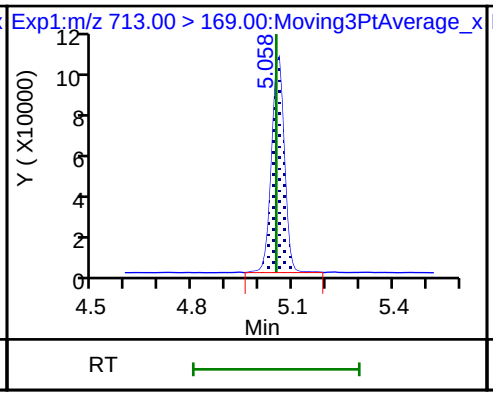
54 Perfluorotridecanoic acid



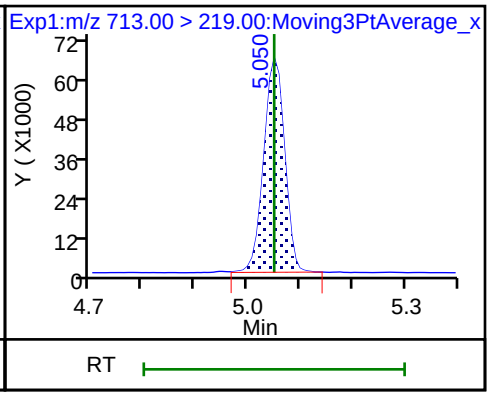
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

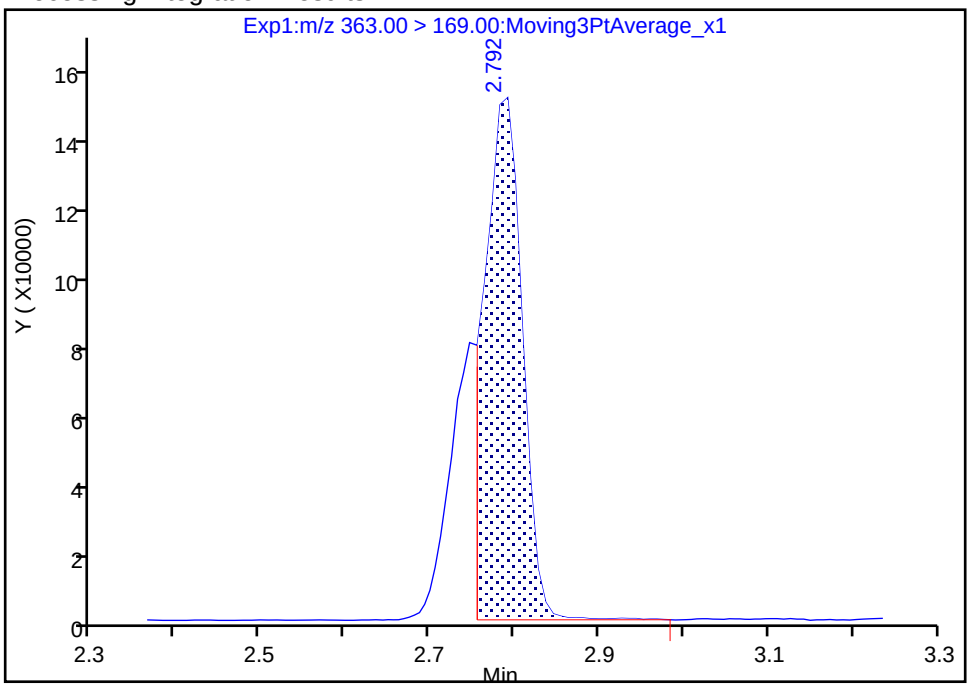
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_033.d				
Injection Date:	08-Jan-2019 22:56:27	Instrument ID:	A9		
Lims ID:	140-13780-A-2-C	Lab Sample ID:	320-13780-2		
Client ID:	D-2083 R2 Quartz Filter #2				
Operator ID:	A9\Administrator	ALS Bottle#:	22	Worklist Smp#:	4
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 2

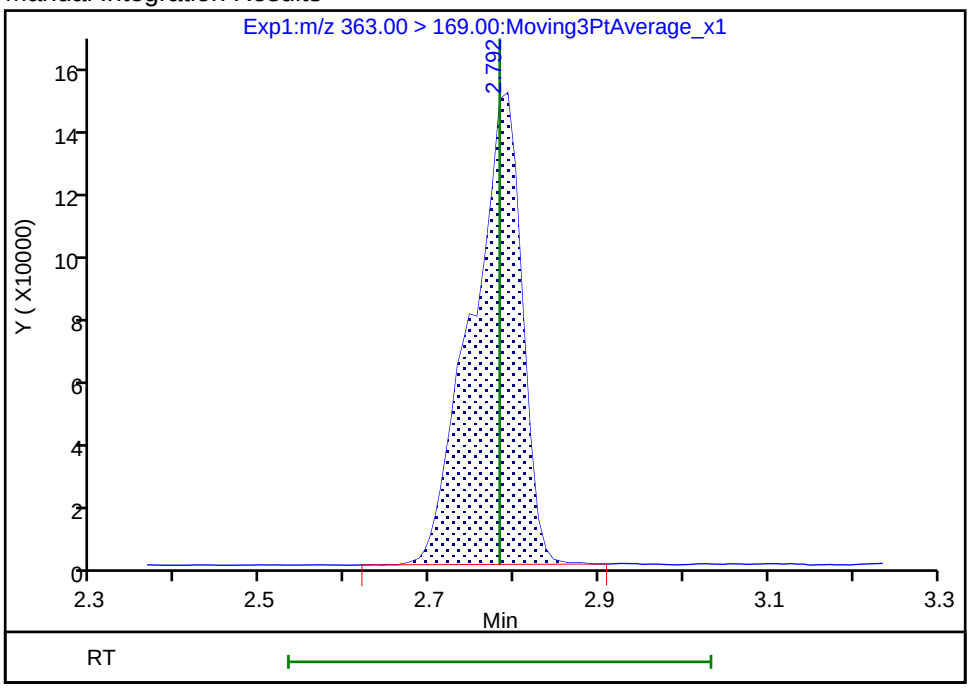
Processing Integration Results

RT: 2.79
Area: 432900
Amount: 0.075263
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 596182
Amount: 0.940784
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:44:42

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2084 R3 Quartz Filter #3 Lab Sample ID: 140-13780-3

Matrix: Air Lab File ID: 2019.01.08LLAAXX_034.d

Analysis Method: 537 (modified) Date Collected: 12/20/2018 08:00

Extraction Method: None Date Extracted: 12/28/2018 01:41

Sample wt/vol: 1(Sample) Date Analyzed: 01/08/2019 23:03

Con. Extract Vol.: 50(mL) Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	17.8		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	19.4		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	17.6		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	19.4		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	17.6		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	21.2		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	92		25-150
STL01892	13C4 PFHpA	70		25-150
STL00995	13C5 PFNA	84		25-150
STL00990	13C4 PFOA	74		25-150
STL00991	13C4 PFOS	96		25-150
STL00994	18O2 PFHxS	88		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_034.d
Lims ID: 140-13780-A-3-C
Client ID: D-2084 R3 Quartz Filter #3
Sample Type: Client
Inject. Date: 08-Jan-2019 23:03:59 ALS Bottle#: 23 Worklist Smp#: 5
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-3-c
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:45:24
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.679	1.679	0.0	0.527	5351558	1.85		73.8	8031	
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.679	1.679	0.0	1.000	1952924	0.9855			108	M
4 Perfluoropentanoic acid										
262.90 > 219.00	2.024	2.014	0.010	1.000	1859422	1.00			87.0	
D 3 13C5 PFPeA										
267.90 > 223.00	2.024	2.022	0.002	0.635	4653830	1.83		73.4	2877	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.054	0.002	0.645	8864831	2.13		91.5	803778	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.056	2.056	0.0	1.000	3282722	0.8923	Target=2.70		1950	
298.90 > 99.00	2.056	2.056	0.0	1.000	1139306		2.88(1.35-4.05)		789	
D 9 13C2 PFHxA										
315.00 > 270.00	2.393	2.383	0.010	0.750	5213303	1.85		74.0	3272	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.393	2.384	0.009	1.000	1736890	0.9617	Target=13.92		421	
313.00 > 119.00	2.393	2.384	0.009	1.000	129307		13.43(6.96-20.87)		268	
D 16 13C4 PFHpA										
367.00 > 322.00	2.791	2.782	0.009	0.875	6109433	1.76		70.5	3182	
D 17 18O2 PFHxS										
403.00 > 84.00	2.791	2.782	0.009	0.875	5128646	2.09		88.5	2785	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.791	2.782	0.009	1.000	2366262	0.8820	Target=3.80		1928	
399.00 > 99.00	2.791	2.782	0.009	1.000	646335		3.66(1.90-5.70)		289	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.791	2.782	0.009	1.000	2466903	0.9702	Target=4.34		470	
363.00 > 169.00	2.791	2.782	0.009	1.000	520570		4.74(2.17-6.52)		649	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.165	3.165	0.0	1.000	691542	0.99			597	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.165	3.165	0.0	0.993	783756	2.29		96.6	1153	
* 24 13C2 PFOA										
415.00 > 370.00	3.189	3.180	0.009		7595558	2.50			3073	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.181	3.180	0.001	0.893	2266346	0.8938	Target=3.69		1719	
449.00 > 99.00	3.181	3.180	0.001	0.893	554058		4.09(1.84-5.53)		1124	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.189	3.180	0.009	1.000	2466064	1.06	Target=2.72		336	
413.00 > 169.00	3.189	3.180	0.009	1.000	853203		2.89(1.36-4.08)		1477	
D 25 13C4 PFOA										
417.00 > 372.00	3.189	3.180	0.009	1.000	5597848	1.86		74.5	3304	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.560	3.552	0.008	1.000	2234327	0.8823	Target=4.08		1996	
499.00 > 99.00	3.560	3.552	0.008	1.000	528040		4.23(2.04-6.12)		1211	
D 28 13C4 PFOS										
503.00 > 80.00	3.560	3.552	0.008	1.117	5743200	2.30		96.0	2928	
30 Perfluorononanoic acid										
463.00 > 419.00	3.575	3.567	0.008	1.000	2195203	0.9705	Target=5.35		303	
463.00 > 169.00	3.575	3.567	0.008	1.000	409816		5.36(2.68-8.03)		743	
D 31 13C5 PFNA										
468.00 > 423.00	3.575	3.567	0.008	1.121	5680589	2.10		83.9	3401	
D 33 13C8 FOSA										
506.00 > 78.00	3.894	3.885	0.009	1.221	2979414	1.81		72.4	2656	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.894	3.885	0.009	1.000	3627277	1.05			3107	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.937	3.927	0.010	1.235	96840	2.47		103	304	
D 36 13C2 PFDA										
515.00 > 470.00	3.928	3.927	0.001	1.232	5675316	2.14		85.7	2677	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.937	3.927	0.010	1.000	551156	0.9601			1366	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.928	3.927	0.001	1.000	2719173	1.04	Target=14.23		811	
513.00 > 169.00	3.937	3.927	0.010	1.002	176960		15.37(7.12-21.35)		317	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.094	4.093	0.001	1.284	1343300	1.94		77.4	1571	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.094	4.093	0.001	1.000	456478	0.9805			136	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.226	4.225	0.001	1.187	2025838	0.9640	Target=4.28		1601	
599.00 > 99.00	4.226	4.225	0.001	1.187	443717		4.57(2.14-6.43)		914	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.260	4.250	0.010	1.336	1204525	2.08		83.3	1389	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.251	4.250	0.001	1.333	4514432	2.17		86.7	4506	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.251	4.250	0.001	1.000	1529508	1.02	Target=10.48		447	
563.00 > 169.00	4.251	4.250	0.001	1.000	154163		9.92(5.24-15.72)		482	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.260	4.259	0.001	1.000	387631	0.9718			1817	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.542	4.534	0.008	1.000	2119449	1.00	Target=9.37		570	
613.00 > 169.00	4.550	4.534	0.016	1.002	225181		9.41(4.68-14.05)		836	
D 49 13C2 PFDoA										
615.00 > 570.00	4.542	4.541	0.001	1.425	5521022	2.19		87.4	4282	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.811	4.803	0.008	1.059	1718688	1.03	Target=6.18		616	
663.00 > 169.00	4.811	4.803	0.008	1.059	287574		5.98(3.09-9.27)		1014	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.059	5.049	0.010	1.586	3994376	2.28		91.3	2476	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.059	5.050	0.009	1.000	245476	0.9409	Target=1.39		987	
713.00 > 219.00	5.050	5.050	0.0	0.998	177086		1.39(0.70-2.09)		736	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:48 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_034.d

Injection Date: 08-Jan-2019 23:03:59 Instrument ID: A9

Lims ID: 140-13780-A-3-C Lab Sample ID: 320-13780-3

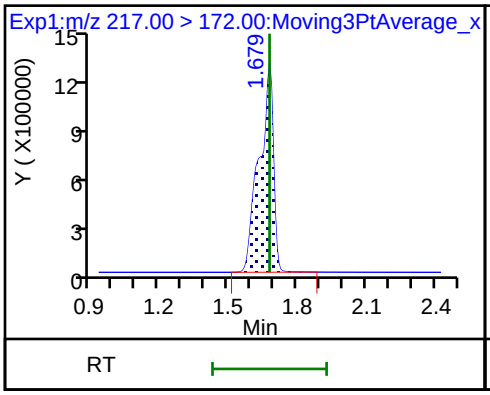
Client ID: D-2084 R3 Quartz Filter #3

Operator ID: A9\Administrator ALS Bottle#: 23 Worklist Smp#: 5

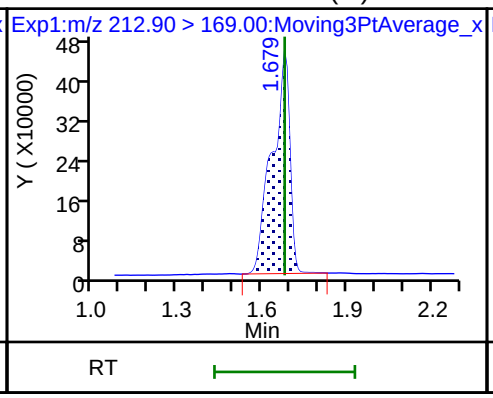
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

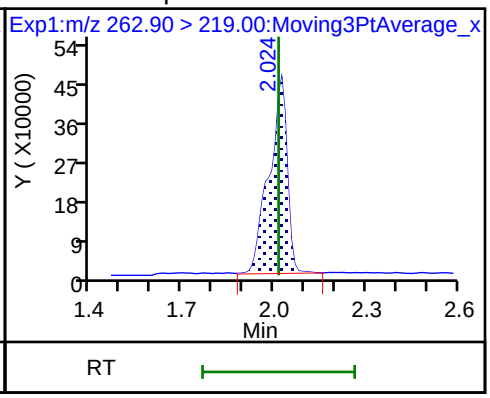
D 1 13C4 PFBA



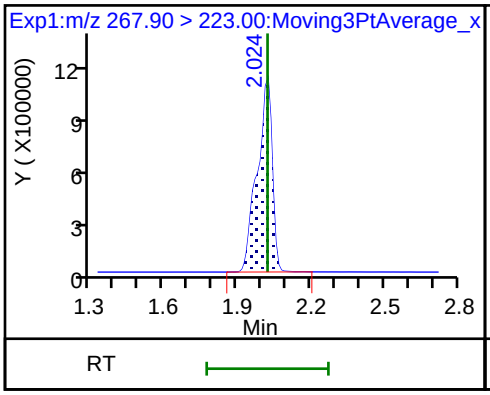
2 Perfluorobutanoic acid (M)



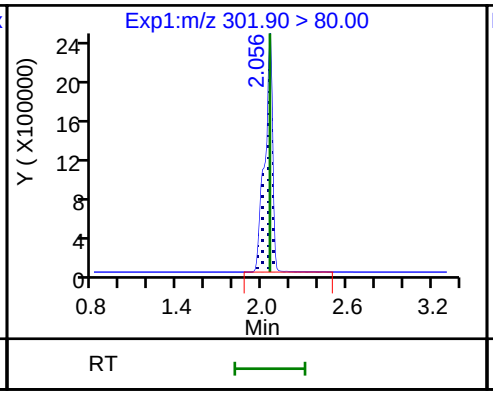
4 Perfluoropentanoic acid



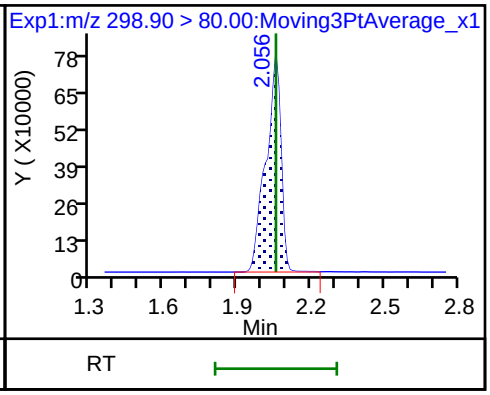
D 3 13C5 PFPeA



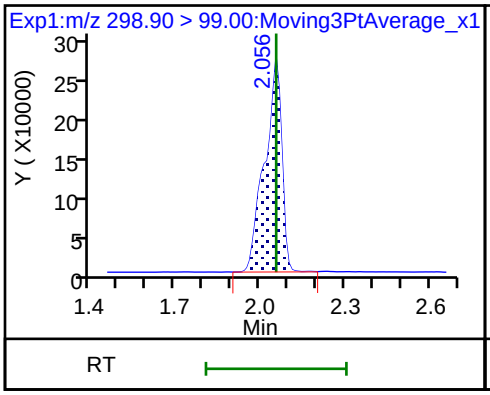
D 5 13C3 PFBS



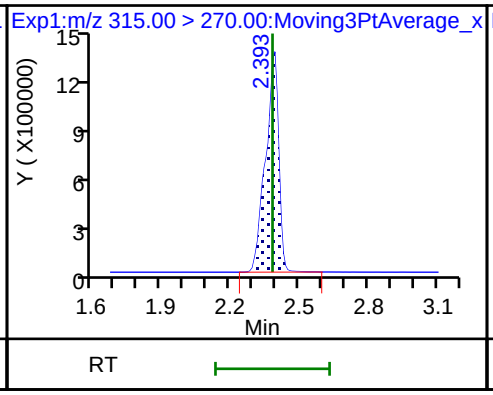
6 Perfluorobutanesulfonic acid



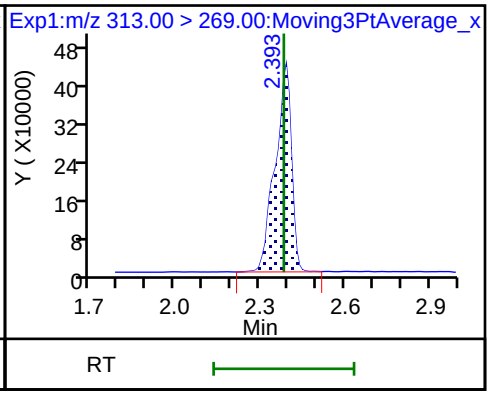
6 Perfluorobutanesulfonic acid



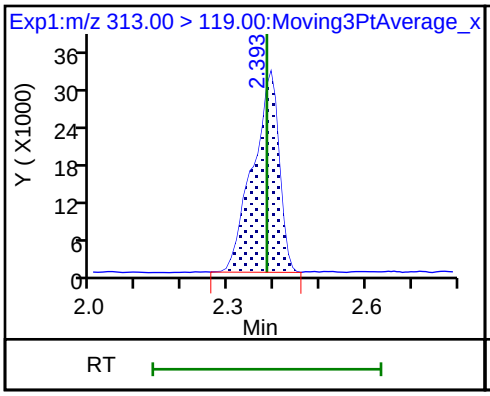
D 9 13C2 PFHxA



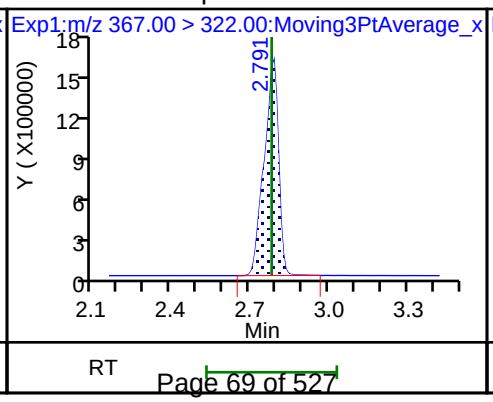
10 Perfluorohexanoic acid



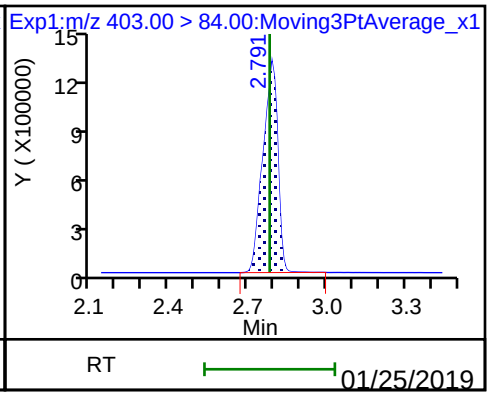
10 Perfluorohexanoic acid



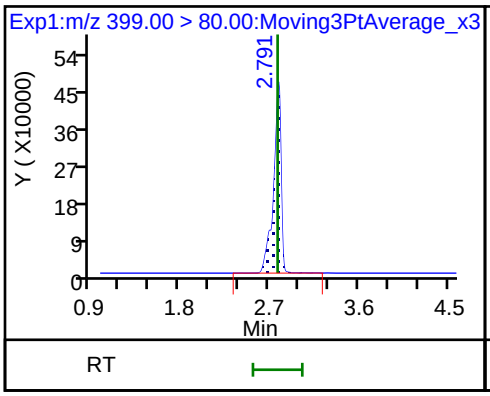
D 16 13C4 PFHpA



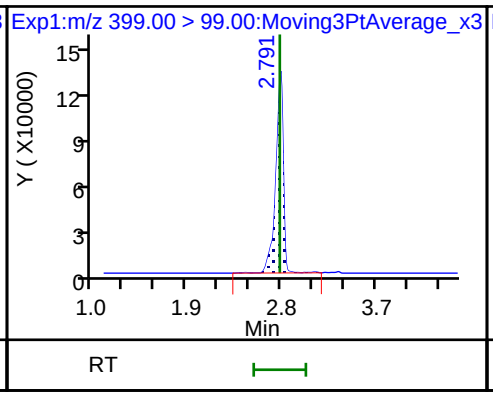
D 17 18O2 PFHxS



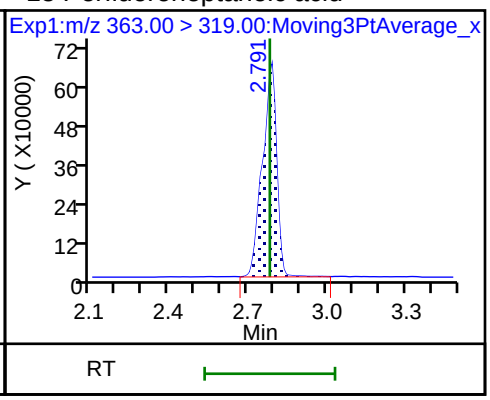
18 Perfluorohexanesulfonic acid



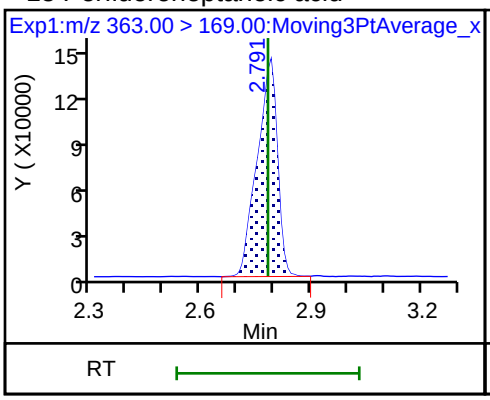
18 Perfluorohexanesulfonic acid



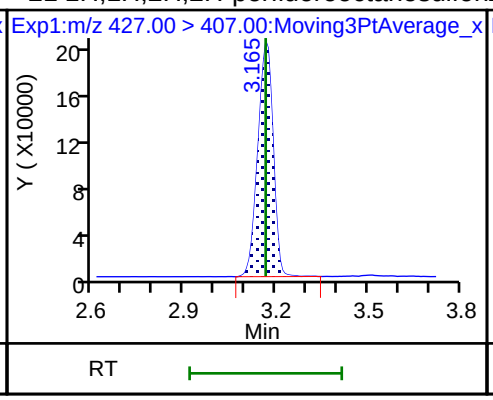
15 Perfluoroheptanoic acid



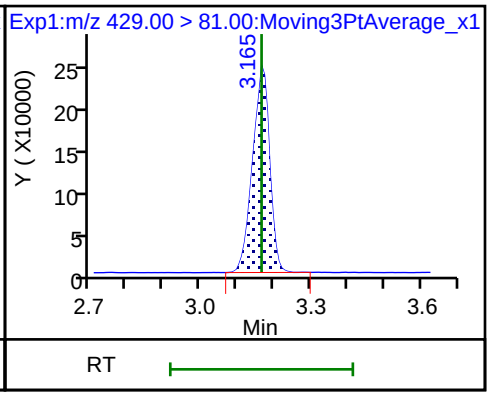
15 Perfluoroheptanoic acid



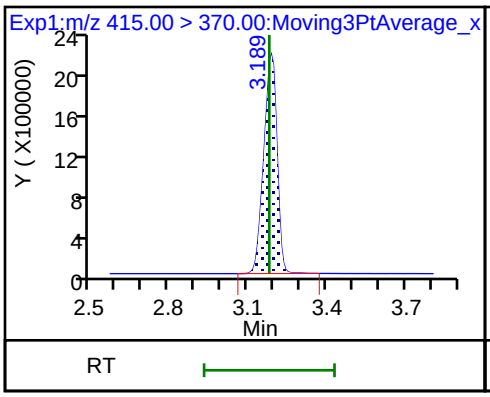
21 1H,1H,2H,2H-perfluorooctanesulfon



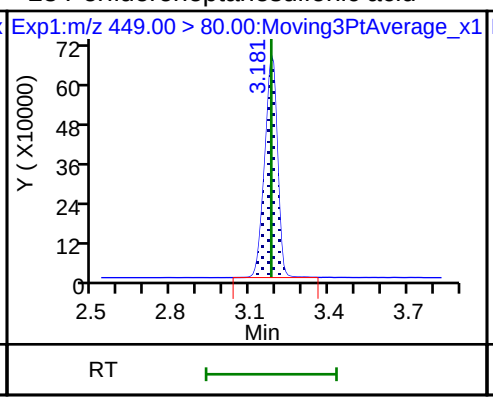
D 20 M2-6:2 FTS



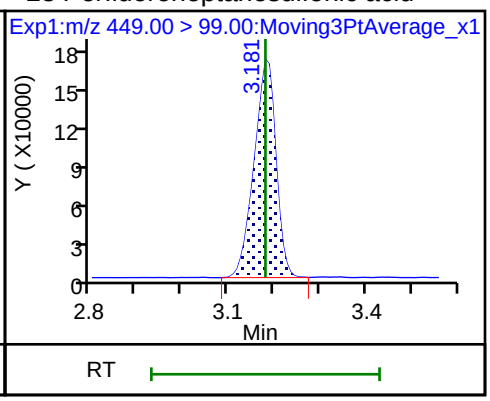
* 24 13C2 PFOA



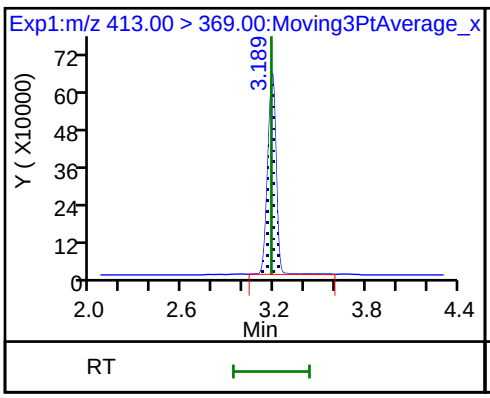
23 Perfluoroheptanesulfonic acid



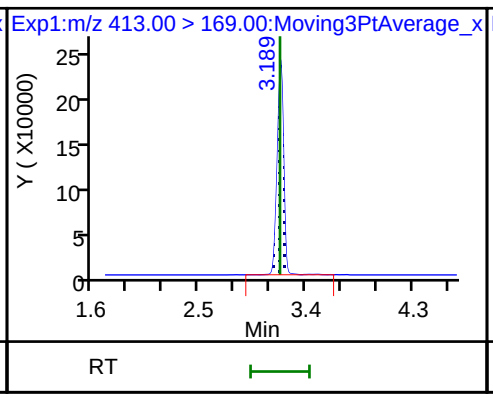
23 Perfluoroheptanesulfonic acid



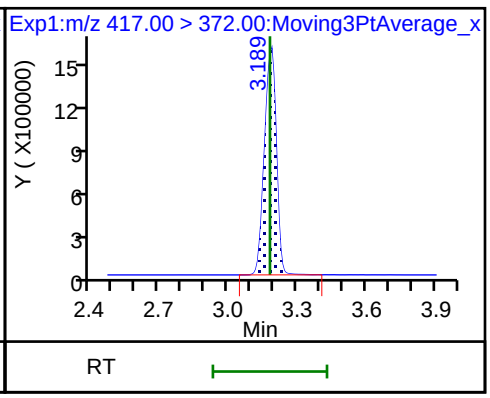
26 Perfluorooctanoic acid



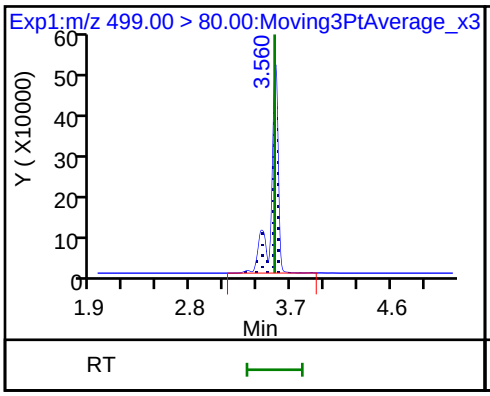
26 Perfluorooctanoic acid



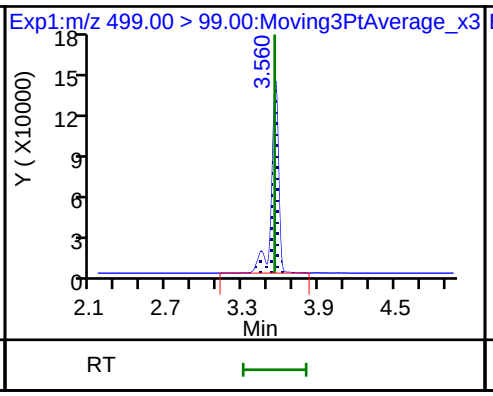
D 25 13C4 PFOA



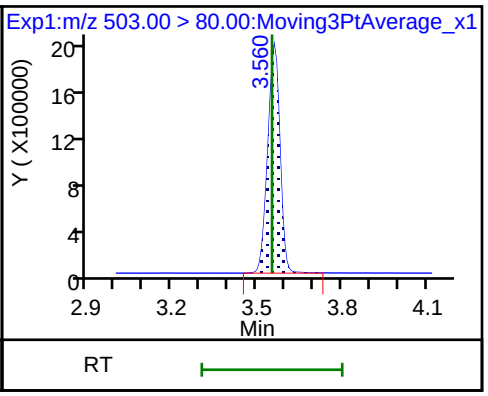
29 Perfluorooctanesulfonic acid



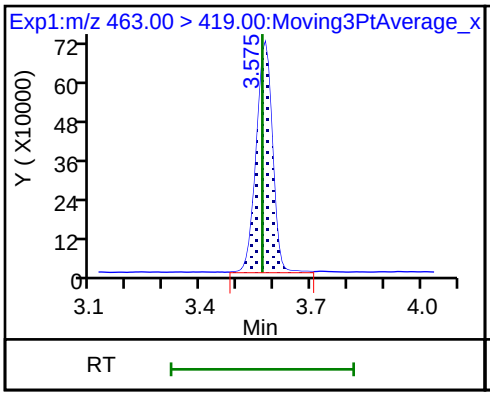
29 Perfluorooctanesulfonic acid



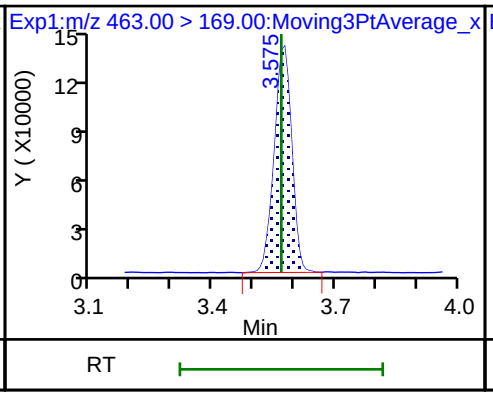
D 28 13C4 PFOS



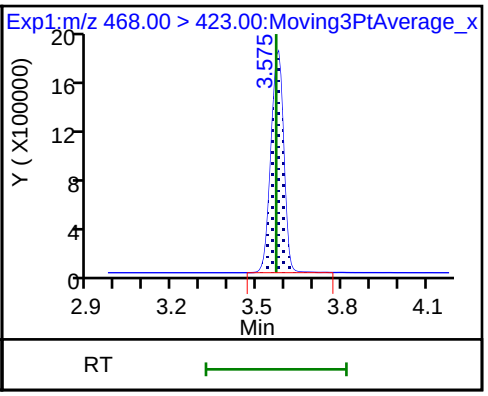
30 Perfluorononanoic acid



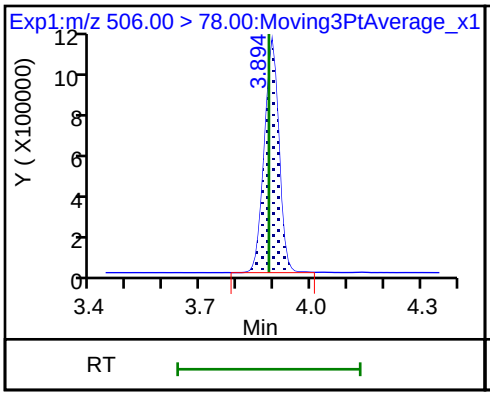
30 Perfluorononanoic acid



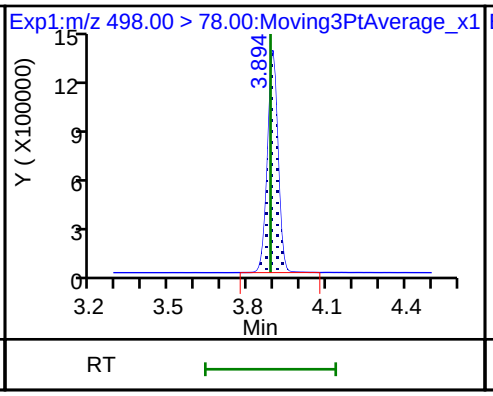
D 31 13C5 PFNA



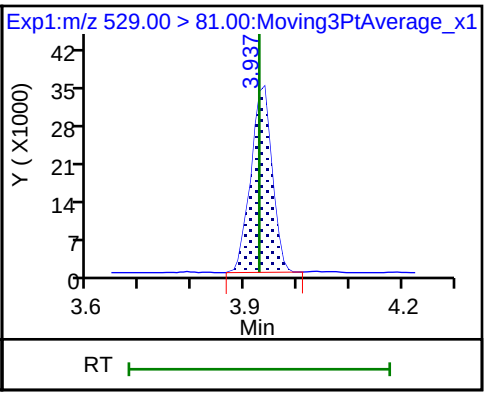
D 33 13C8 FOSA



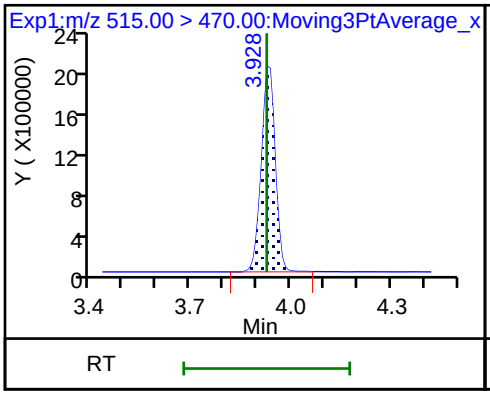
34 Perfluorooctanesulfonamide



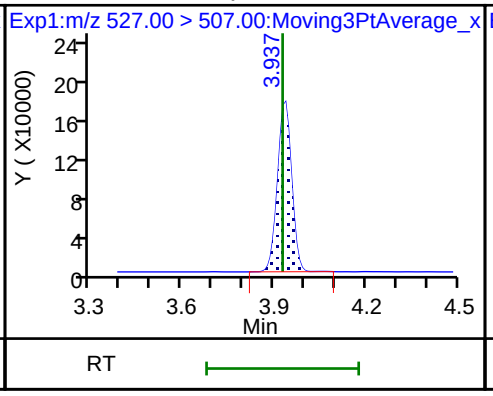
D 39 M2-8:2 FTS



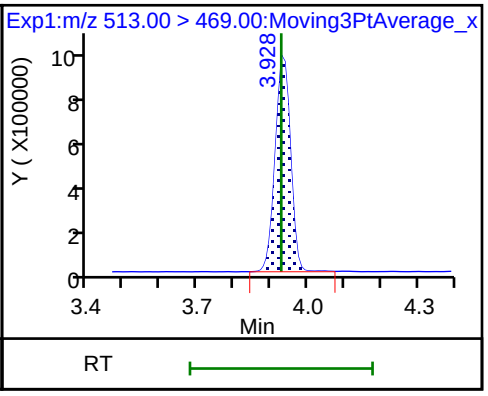
D 36 13C2 PFDA



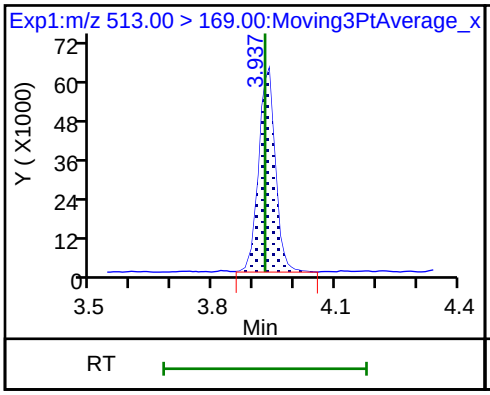
37 1H,1H,2H,2H-perfluorodecanesulfoni



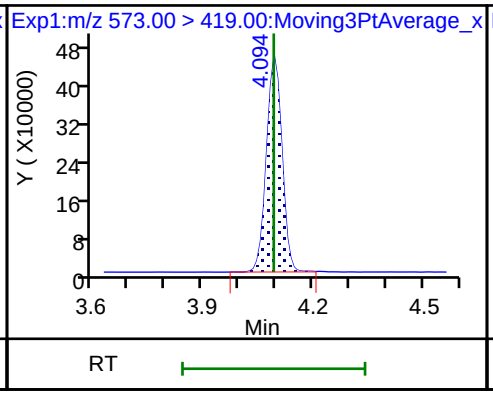
38 Perfluorodecanoic acid



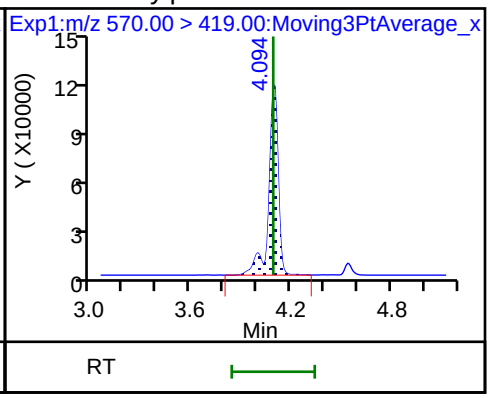
38 Perfluorodecanoic acid



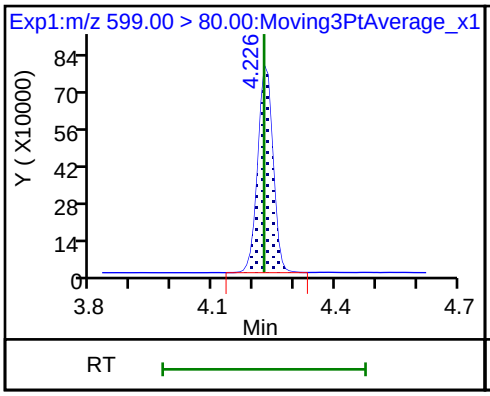
D 40 d3-NMeFOSAA



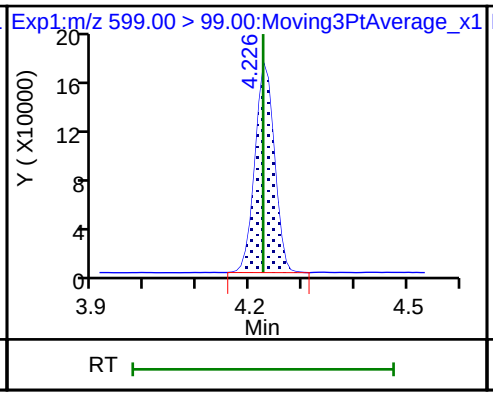
41 N-methylperfluorooctanesulfonamido



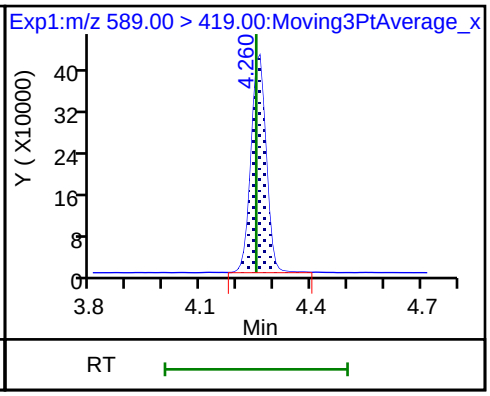
42 Perfluorodecanesulfonic acid



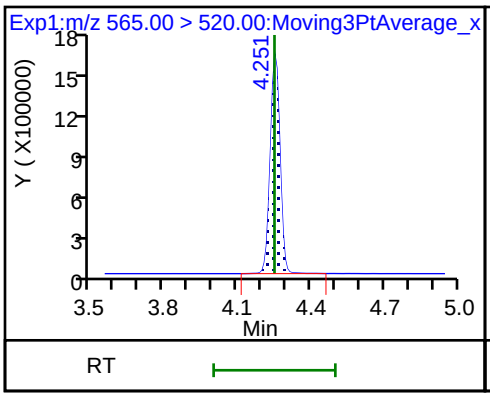
42 Perfluorodecanesulfonic acid



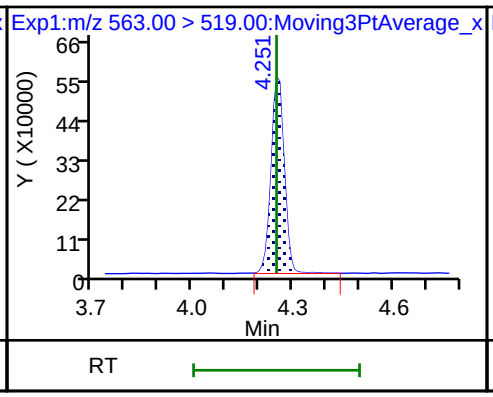
D 45 d5-NEtFOSAA



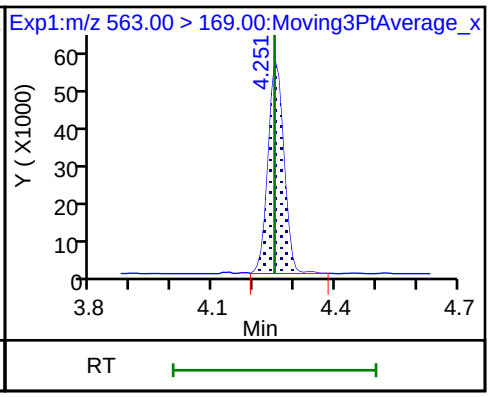
D 44 13C2 PFUnA



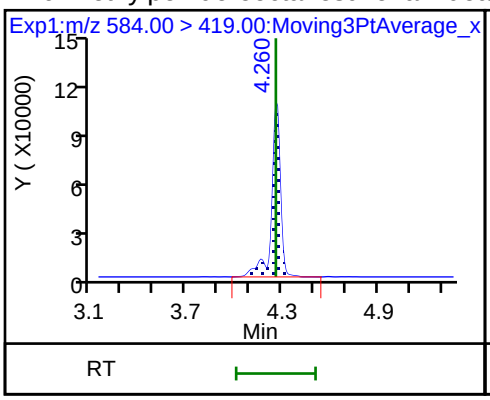
43 Perfluoroundecanoic acid



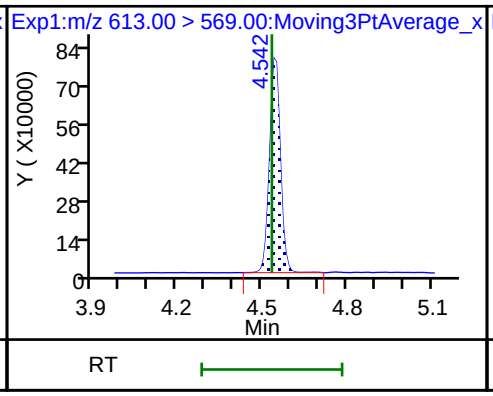
43 Perfluoroundecanoic acid



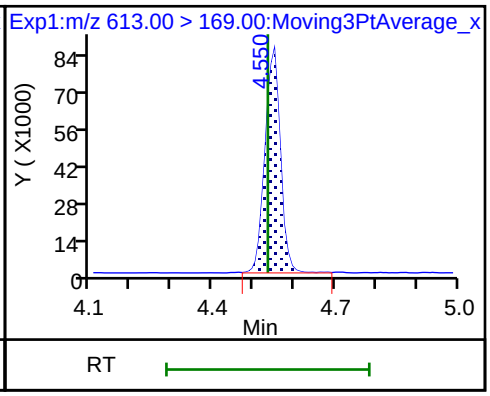
46 N-ethylperfluorooctanesulfonamidoa



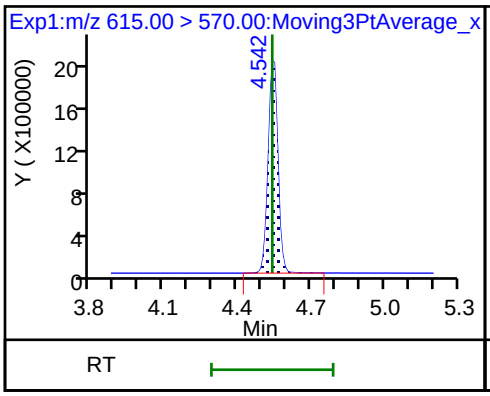
50 Perfluorododecanoic acid



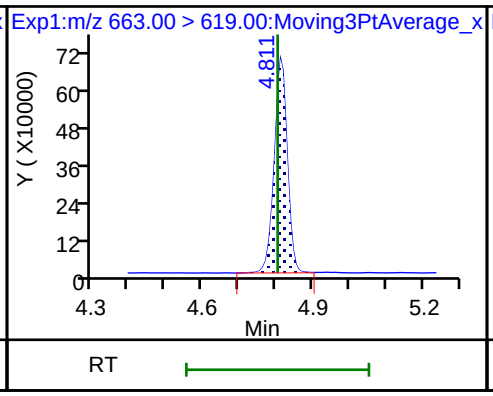
50 Perfluorododecanoic acid



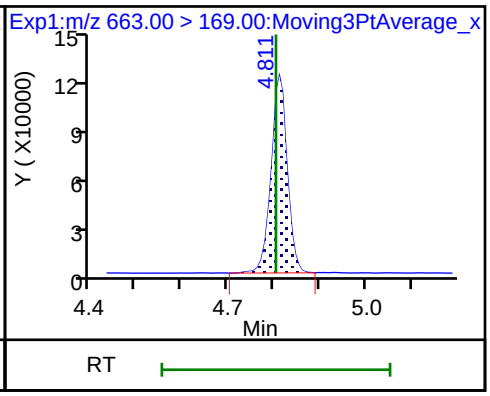
D 49 13C2 PFDoA



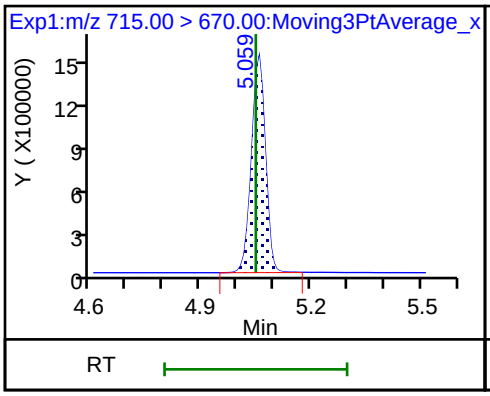
54 Perfluorotridecanoic acid



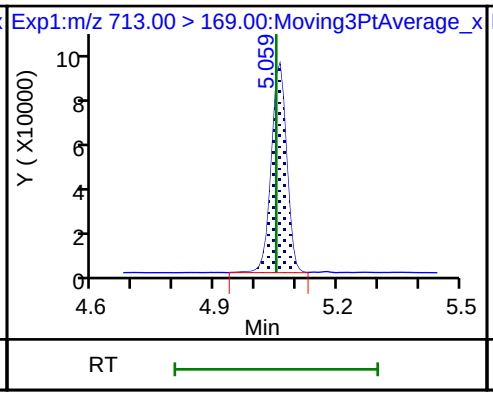
54 Perfluorotridecanoic acid



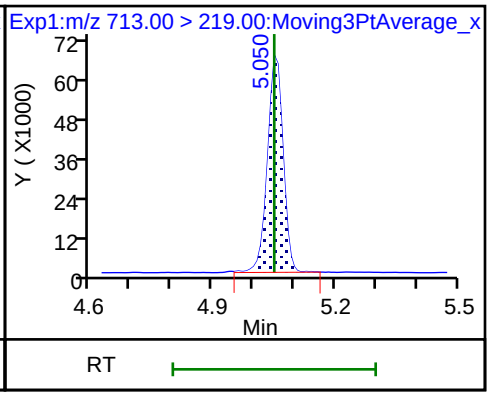
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2085 R1 XAD-2 Resin #1 Lab Sample ID: 140-13780-4

Matrix: Air Lab File ID: 2019.01.08LLAAXX_037.d

Analysis Method: 537 (modified) Date Collected: 12/20/2018 08:00

Extraction Method: None Date Extracted: 12/20/2018 12:25

Sample wt/vol: 1(Sample) Date Analyzed: 01/08/2019 23:26

Con. Extract Vol.: 360(mL) Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	31.1	B	0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	18.9	B	0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	18.2	B	0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	19.1		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	18.4	B	0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	20.8		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	56		25-150
STL01892	13C4 PFHpA	77		25-150
STL00995	13C5 PFNA	100		25-150
STL00990	13C4 PFOA	94		25-150
STL00991	13C4 PFOS	105		25-150
STL00994	18O2 PFHxS	89		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d
Lims ID: 140-13780-A-4-C
Client ID: D-2085 R1 XAD-2 Resin #1
Sample Type: Client
Inject. Date: 08-Jan-2019 23:26:31 ALS Bottle#: 25 Worklist Smp#: 8
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-4-c
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:49:25
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.676	1.679	-0.003	0.527	2393130	0.8930		35.7	398	
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.684	1.679	0.005	1.005	666667	0.7523			8.3	M
4 Perfluoropentanoic acid										M
262.90 > 219.00	2.019	2.014	0.005	1.000	1108078	0.9456			32.4	M
D 3 13C5 PFPeA										M
267.90 > 223.00	2.019	2.022	-0.003	0.635	2929249	1.25		50.0	753	M
D 5 13C3 PFBS										
301.90 > 80.00	2.051	2.054	-0.003	0.645	5051139	1.31		56.4	77426	
6 Perfluorobutanesulfonic acid										M
298.90 > 80.00	2.062	2.056	0.006	1.006	3255792	1.55	Target=2.70		214	M
298.90 > 99.00	2.051	2.056	-0.005	1.000	1143225		2.85(1.35-4.05)		118	M
D 9 13C2 PFHxA										M
315.00 > 270.00	2.392	2.383	0.009	0.752	4503518	1.73		69.1	2138	M
10 Perfluorohexanoic acid										M
313.00 > 269.00	2.392	2.384	0.008	1.000	1741163	1.12	Target=13.92		117	M
313.00 > 119.00	2.392	2.384	0.008	1.000	127854		13.62(6.96-20.87)		53.3	M
D 16 13C4 PFHpA										M
367.00 > 322.00	2.781	2.782	-0.001	0.875	6172360	1.93		77.1	2110	M
D 17 18O2 PFHxS										M
403.00 > 84.00	2.790	2.782	0.008	0.877	4740780	2.09		88.5	2988	M
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.790	2.782	0.008	1.000	2262788	0.9124	Target=3.80		41.4	
399.00 > 99.00	2.790	2.782	0.008	1.000	591119		3.83(1.90-5.70)		96.6	M
15 Perfluoroheptanoic acid										M
363.00 > 319.00	2.790	2.782	0.008	1.003	2433773	0.9475	Target=4.34		120	M
363.00 > 169.00	2.781	2.782	-0.001	1.000	533459		4.56(2.17-6.52)		242	M

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.164	3.165	-0.001	1.000	907132	0.9208			791	
D 20 M2-6:2 FTS										M
429.00 > 81.00	3.164	3.165	-0.001	0.995	1108035	3.51		148	615	M
* 24 13C2 PFOA										
415.00 > 370.00	3.180	3.180	0.0		7018247	2.50			2682	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.180	3.180	0.0	0.893	2331608	0.9091	Target=3.69		454	
449.00 > 99.00	3.180	3.180	0.0	0.893	569703		4.09(1.84-5.53)		647	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.180	3.180	0.0	1.000	2814965	1.04	Target=2.72		174	
413.00 > 169.00	3.180	3.180	0.0	1.000	993069		2.83(1.36-4.08)		782	
D 25 13C4 PFOA										
417.00 > 372.00	3.180	3.180	0.0	1.000	6513137	2.34		93.8	2381	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.551	3.552	-0.001	0.998	2359622	0.9211	Target=4.08		683	
499.00 > 99.00	3.551	3.552	-0.001	0.998	567518		4.16(2.04-6.12)		592	
D 28 13C4 PFOS										
503.00 > 80.00	3.559	3.552	0.007	1.119	5809518	2.51		105	2684	
30 Perfluorononanoic acid										
463.00 > 419.00	3.566	3.567	-0.001	1.000	2362467	0.9525	Target=5.35		156	
463.00 > 169.00	3.566	3.567	-0.001	1.000	439130		5.38(2.68-8.03)		435	
D 31 13C5 PFNA										
468.00 > 423.00	3.566	3.567	-0.001	1.122	6228684	2.49		99.5	2746	
D 33 13C8 FOSA										
506.00 > 78.00	3.884	3.885	-0.001	1.222	3360240	2.21		88.3	2790	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.884	3.885	-0.001	1.000	4091099	1.05			927	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.918	3.927	-0.009	1.232	100604	2.77		116	308	
D 36 13C2 PFDA										
515.00 > 470.00	3.926	3.927	-0.001	1.235	5966013	2.44		97.5	3090	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.926	3.927	-0.001	1.002	603504	1.01			1418	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.926	3.927	-0.001	1.000	2824852	1.03	Target=14.23		457	
513.00 > 169.00	3.926	3.927	-0.001	1.000	173594		16.27(7.12-21.35)		210	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.082	4.093	-0.011	1.284	1579616	2.46		98.5	1481	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.092	4.093	-0.001	1.002	501975	0.9169			91.6	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.224	4.225	-0.001	1.187	2091819	0.9840	Target=4.28		1163	
599.00 > 99.00	4.215	4.225	-0.010	1.184	430959		4.85(2.14-6.43)		739	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.250	4.250	0.0	1.336	1533602	2.87		115	1854	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.250	4.250	0.0	1.336	5007375	2.60		104	2244	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.000	1608389	0.9631	Target=10.48		337	
563.00 > 169.00	4.241	4.250	-0.009	0.998	162490		9.90(5.24-15.72)		321	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.258	4.259	-0.001	1.002	498989	0.9825			853	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.541	4.534	0.007	1.000	2433924	0.99	Target=9.37		477	
613.00 > 169.00	4.541	4.534	0.007	1.000	250753		9.71(4.68-14.05)		607	
D 49 13C2 PFDoA										
615.00 > 570.00	4.541	4.541	0.0	1.428	6375329	2.73		109	2727	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.803	4.803	0.0	1.058	2229171	1.15	Target=6.18		902	
663.00 > 169.00	4.803	4.803	0.0	1.058	363862		6.13(3.09-9.27)		1127	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.049	5.049	0.0	1.588	4598771	2.84		114	4636	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.049	5.050	-0.001	1.000	276807	0.9216	Target=1.39		1160	
713.00 > 219.00	5.049	5.050	-0.001	1.000	194364		1.42(0.70-2.09)		625	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:34 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d

Injection Date: 08-Jan-2019 23:26:31 Instrument ID: A9

Lims ID: 140-13780-A-4-C Lab Sample ID: 320-13780-4

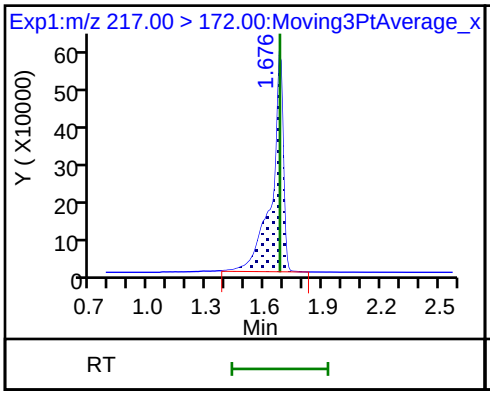
Client ID: D-2085 R1 XAD-2 Resin #1

Operator ID: A9\Administrator ALS Bottle#: 25 Worklist Smp#: 8

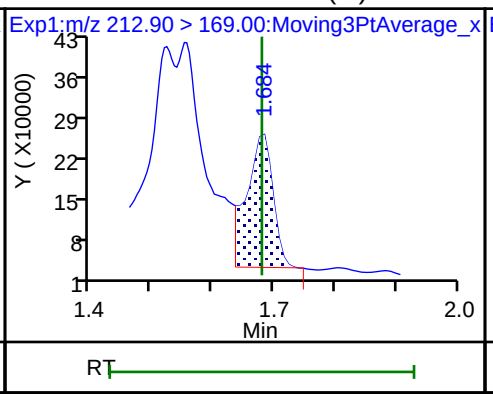
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

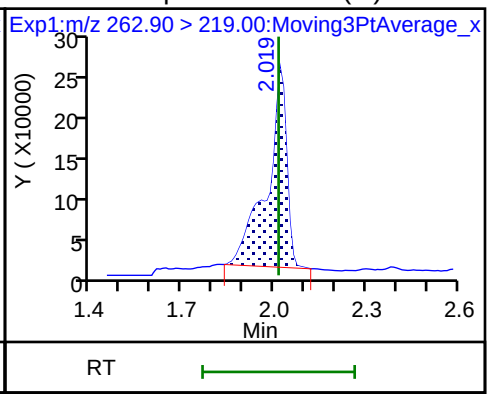
D 1 13C4 PFBA



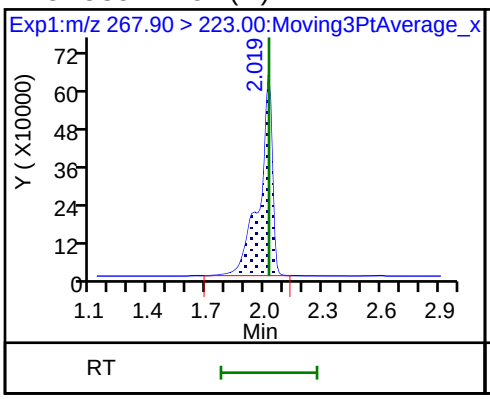
2 Perfluorobutanoic acid (M)



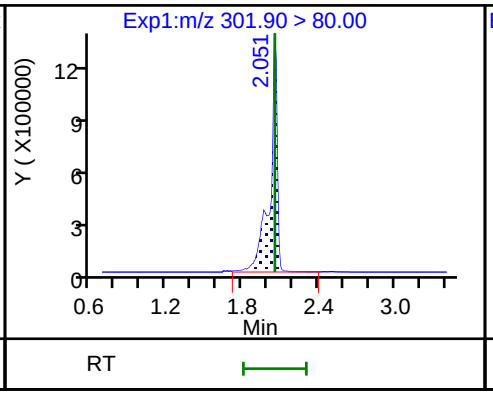
4 Perfluoropentanoic acid (M)



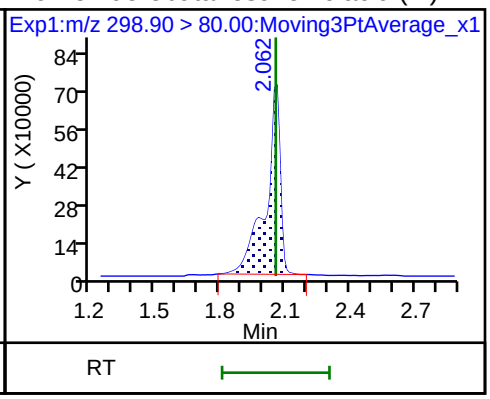
D 3 13C5 PFPeA (M)



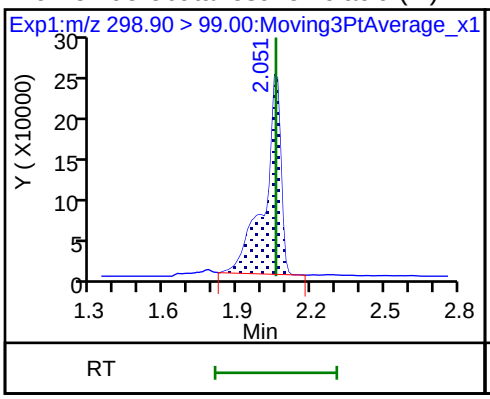
D 5 13C3 PFBS



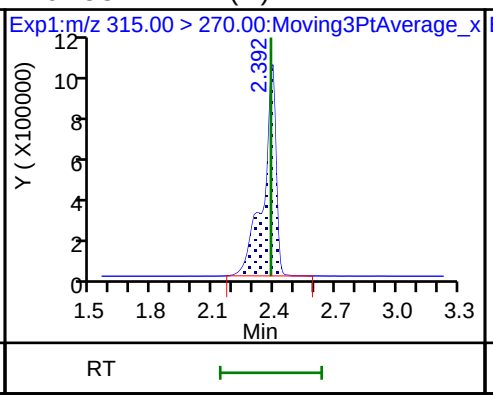
6 Perfluorobutanesulfonic acid (M)



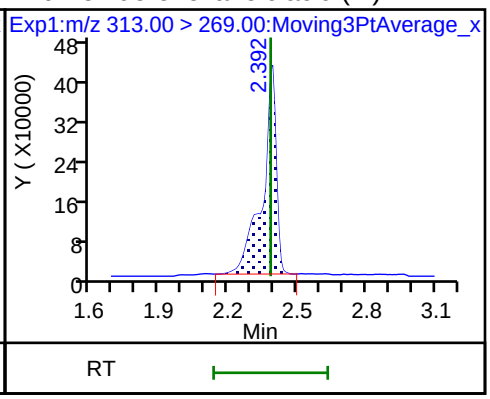
6 Perfluorobutanesulfonic acid (M)



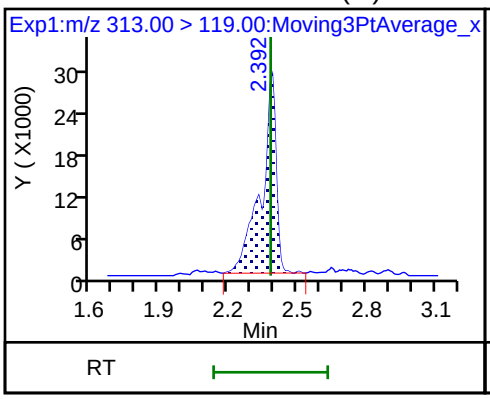
D 9 13C2 PFHxA (M)



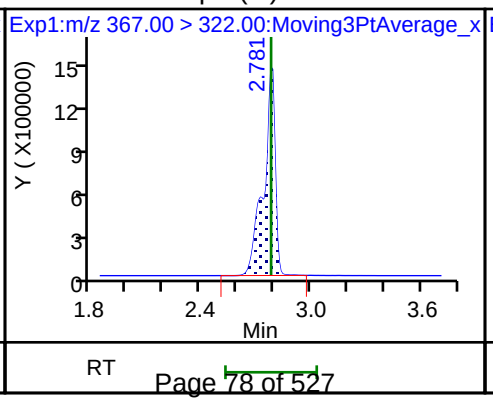
10 Perfluorohexanoic acid (M)



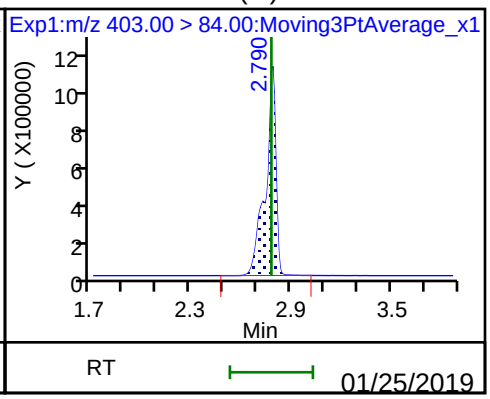
10 Perfluorohexanoic acid (M)



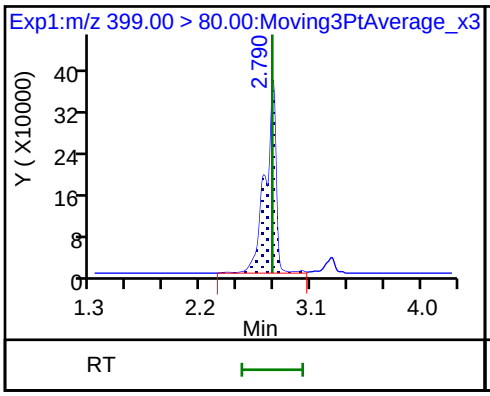
D 16 13C4 PFHpA (M)



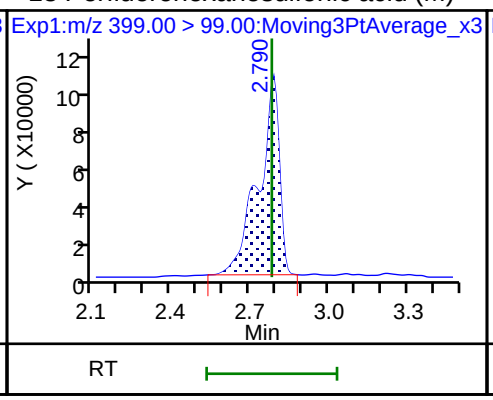
D 17 18O2 PFHxS (M)



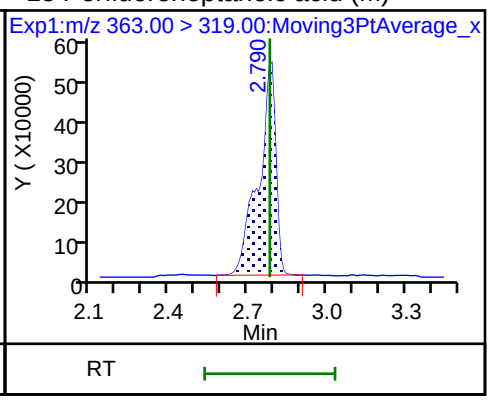
18 Perfluorohexanesulfonic acid



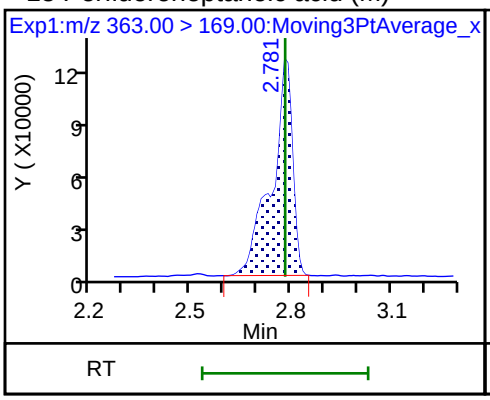
18 Perfluorohexanesulfonic acid (M)



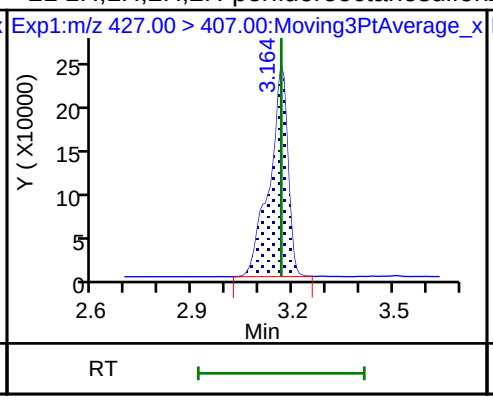
15 Perfluoroheptanoic acid (M)



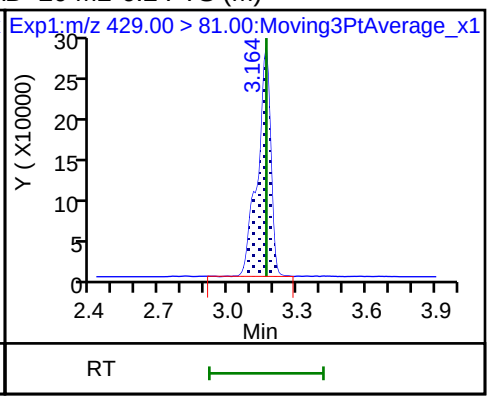
15 Perfluoroheptanoic acid (M)



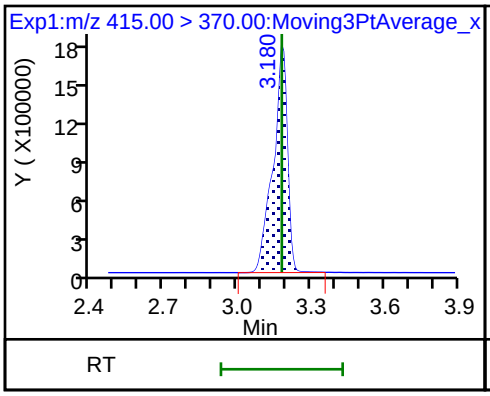
21 1H,1H,2H,2H-perfluorooctanesulfon



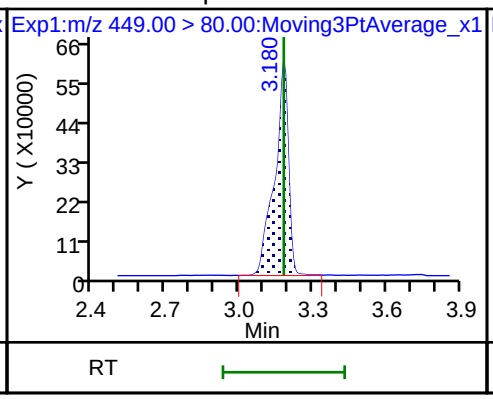
D 20 M2-6:2 FTS (M)



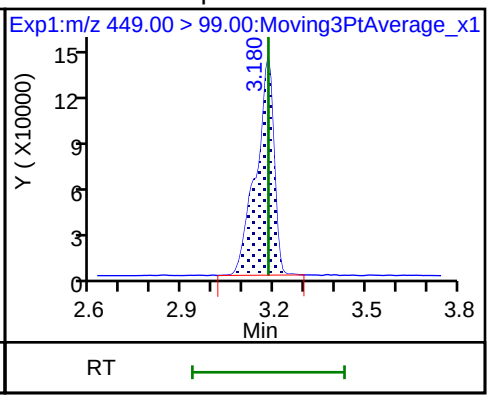
* 24 13C2 PFOA



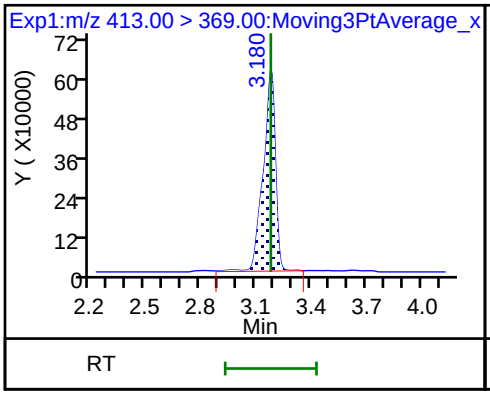
23 Perfluoroheptanesulfonic acid



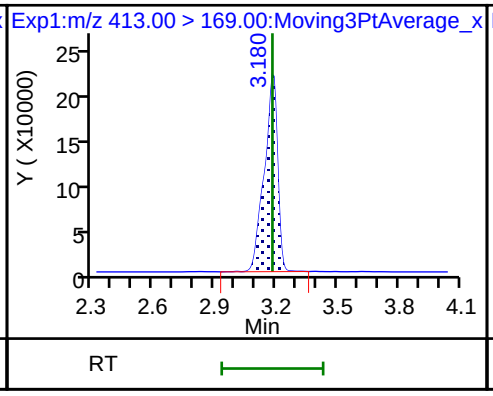
23 Perfluoroheptanesulfonic acid



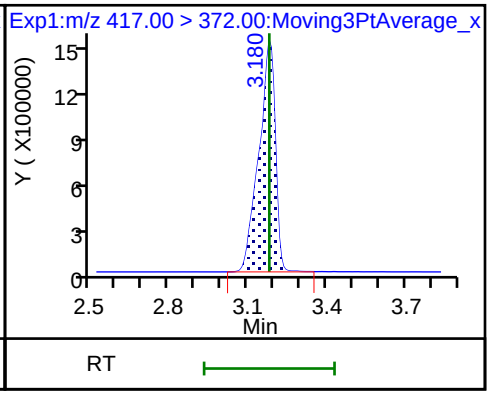
26 Perfluorooctanoic acid



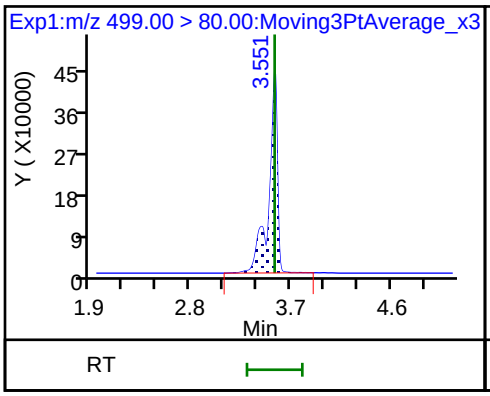
26 Perfluorooctanoic acid



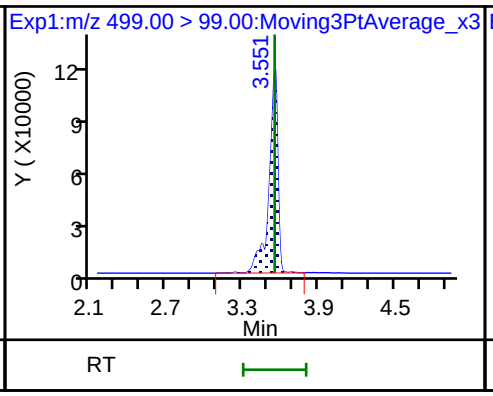
D 25 13C4 PFOA



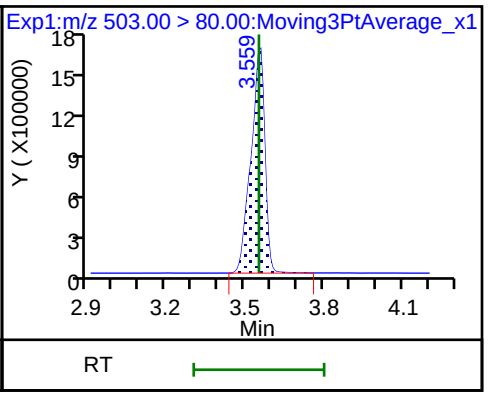
29 Perfluorooctanesulfonic acid



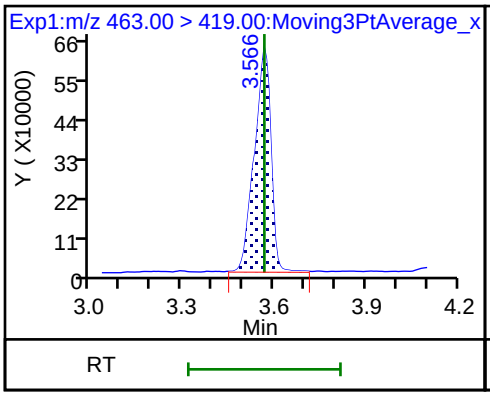
29 Perfluorooctanesulfonic acid



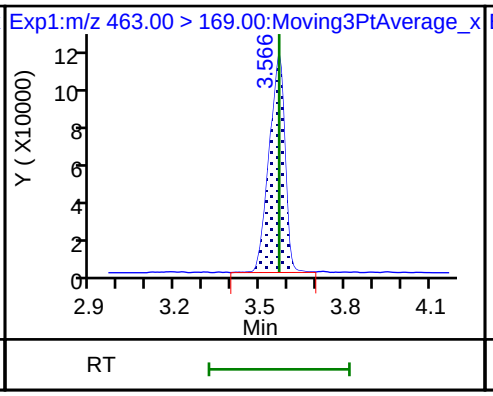
D 28 13C4 PFOS



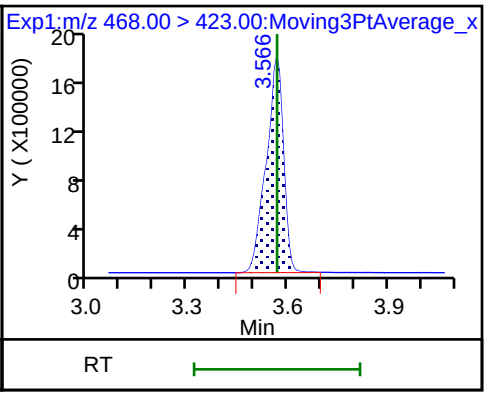
30 Perfluorononanoic acid



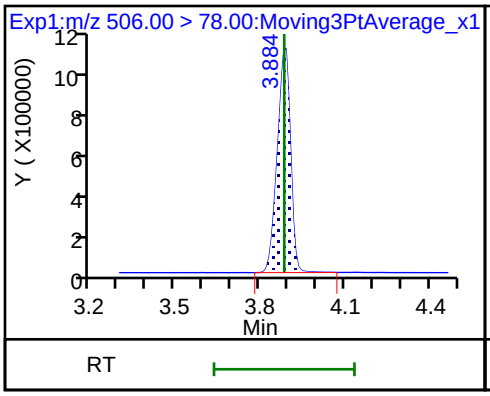
30 Perfluorononanoic acid



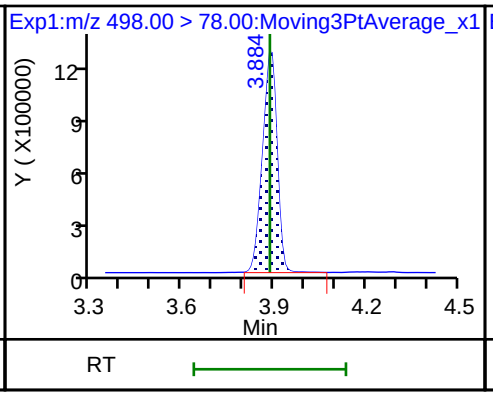
D 31 13C5 PFNA



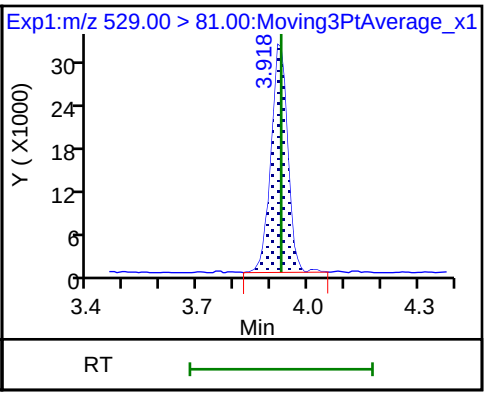
D 33 13C8 FOSA



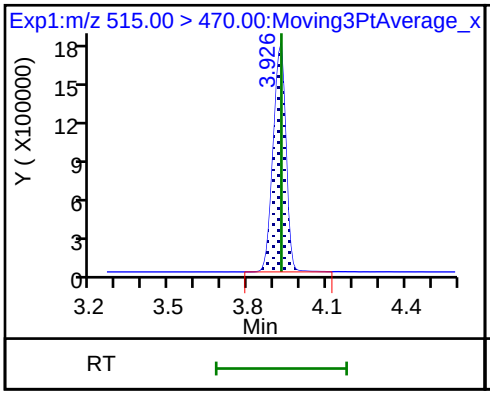
34 Perfluorooctanesulfonamide



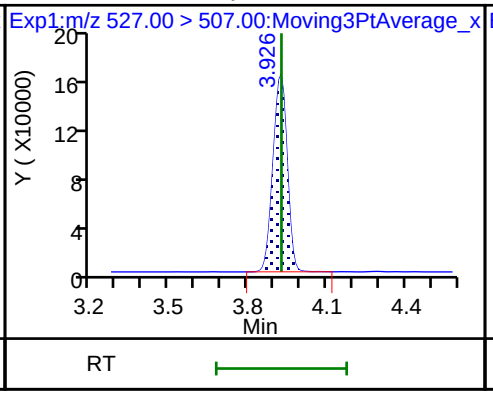
D 39 M2-8:2 FTS



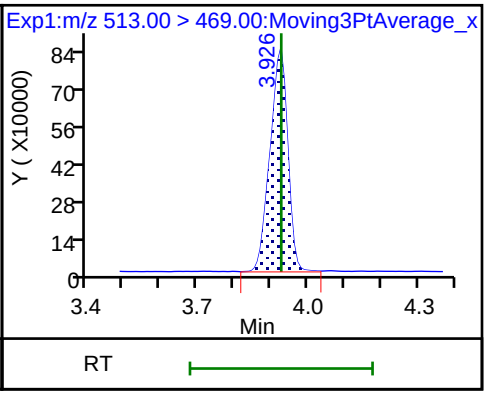
D 36 13C2 PFDA



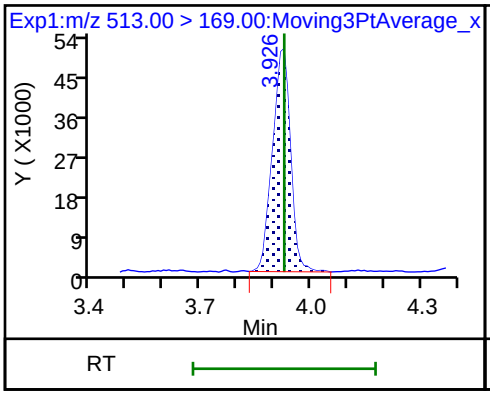
37 1H,1H,2H,2H-perfluorodecanesulfoni



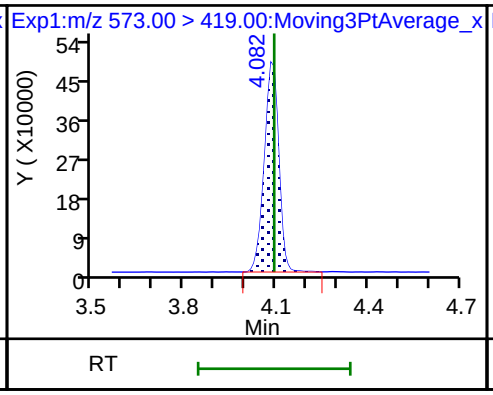
38 Perfluorodecanoic acid



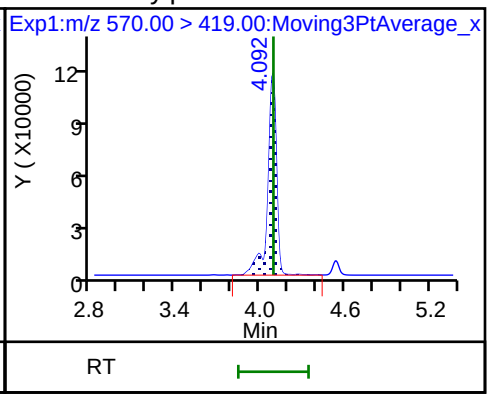
38 Perfluorodecanoic acid



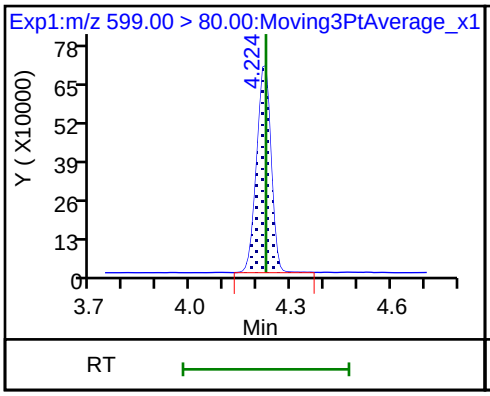
D 40 d3-NMeFOSAA



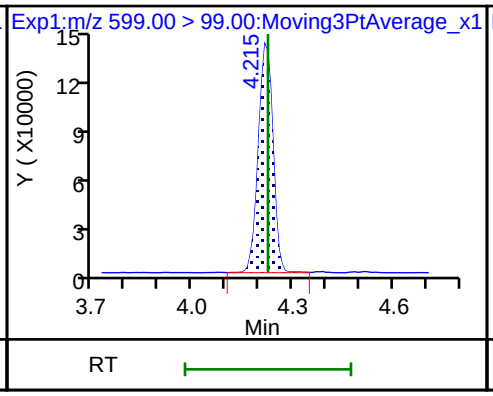
41 N-methylperfluorooctanesulfonamido



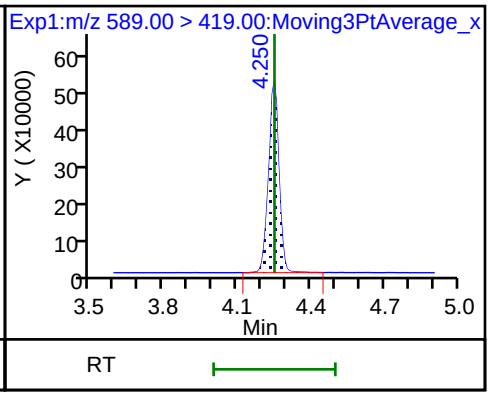
42 Perfluorodecanesulfonic acid



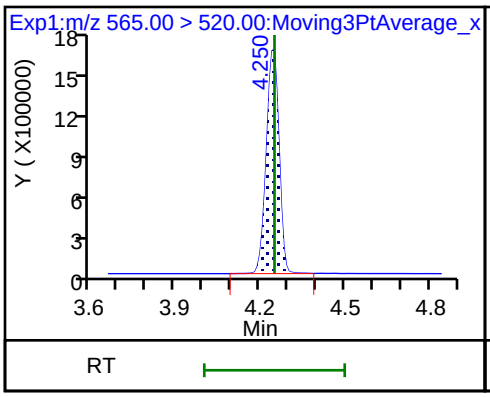
42 Perfluorodecanesulfonic acid



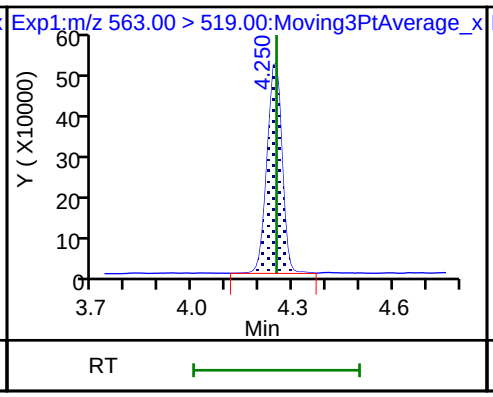
D 45 d5-NEtFOSAA



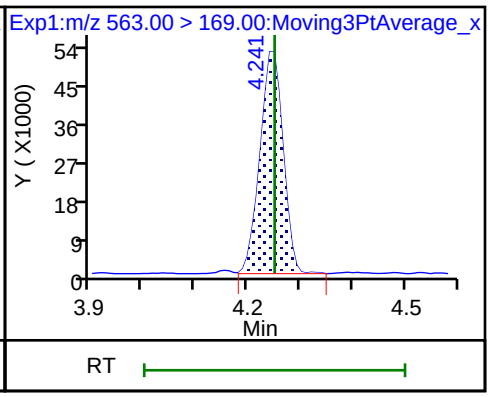
D 44 13C2 PFUnA



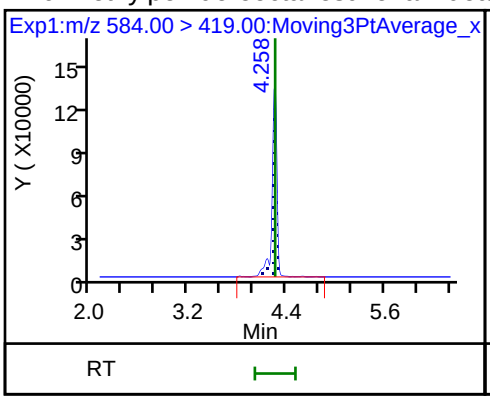
43 Perfluoroundecanoic acid



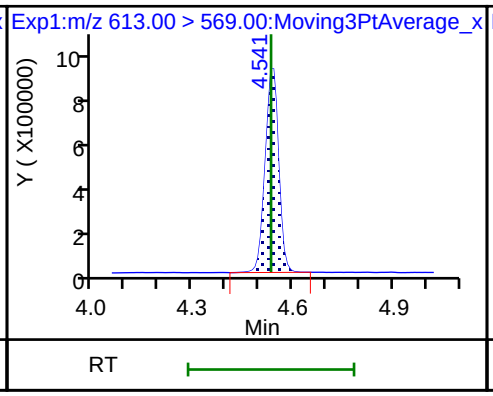
43 Perfluoroundecanoic acid



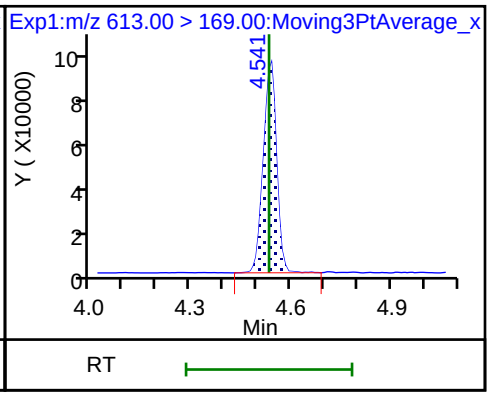
46 N-ethylperfluorooctanesulfonamidoa



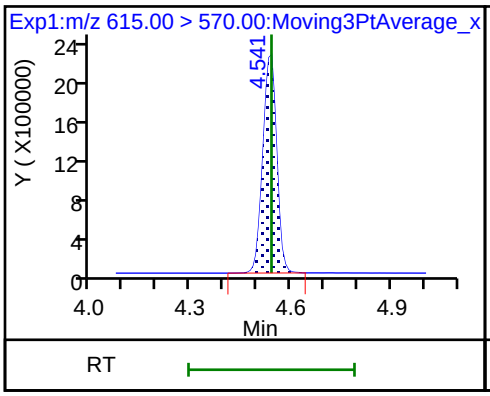
50 Perfluorododecanoic acid



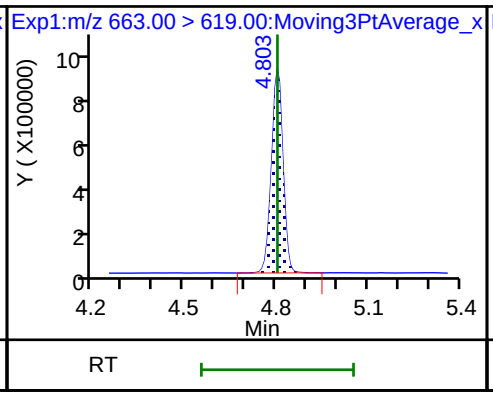
50 Perfluorododecanoic acid



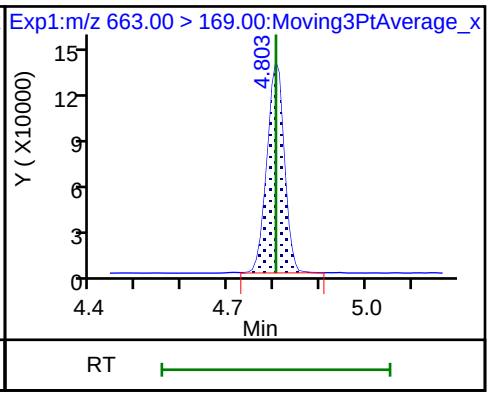
D 49 13C2 PFDoA



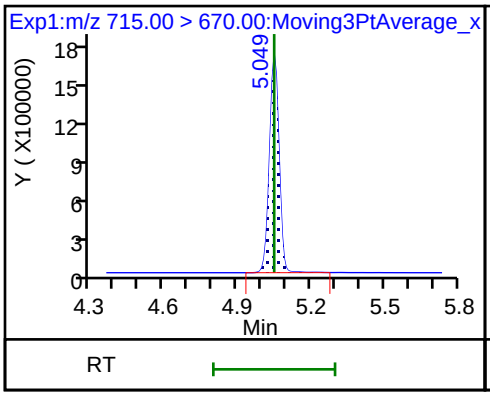
54 Perfluorotridecanoic acid



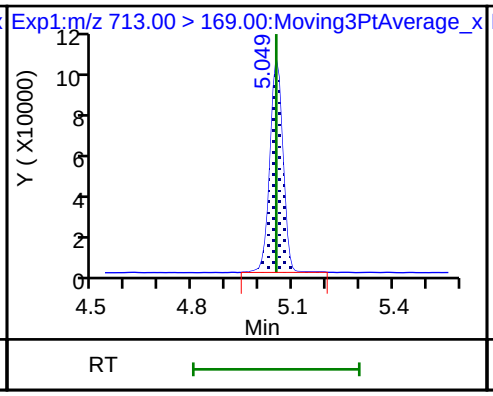
54 Perfluorotridecanoic acid



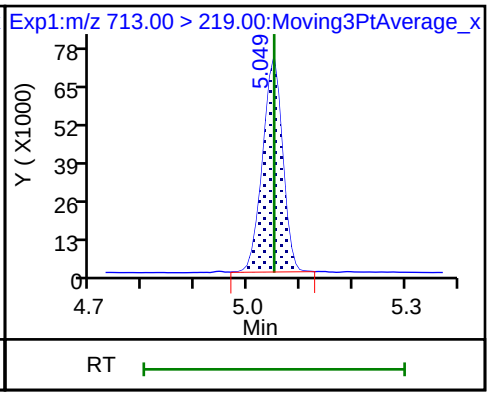
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

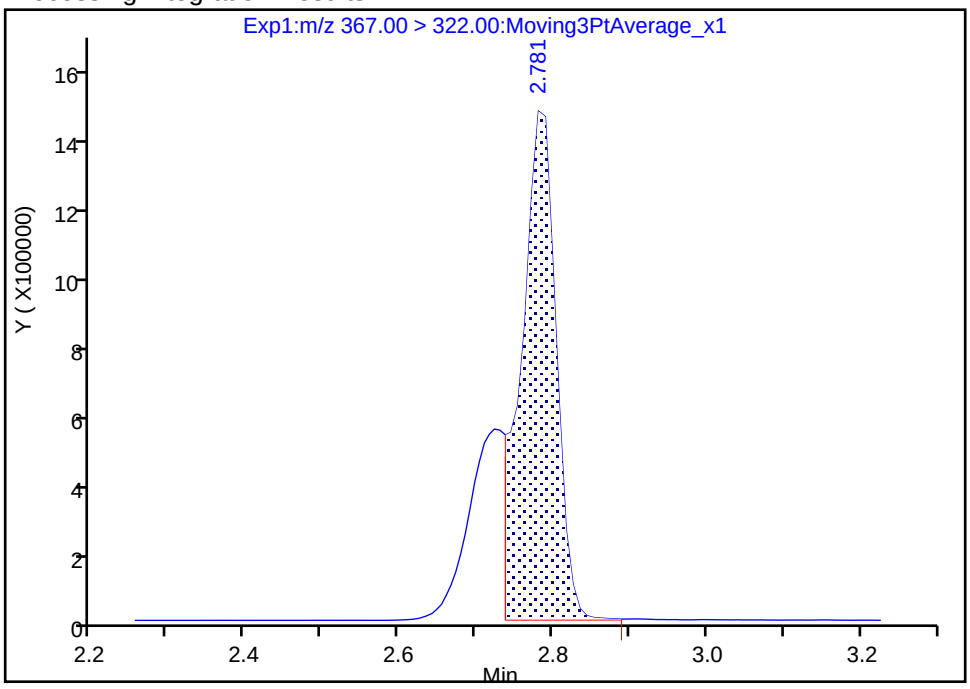
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d				
Injection Date:	08-Jan-2019 23:26:31	Instrument ID:	A9		
Lims ID:	140-13780-A-4-C	Lab Sample ID:	320-13780-4		
Client ID:	D-2085 R1 XAD-2 Resin #1				
Operator ID:	A9\Administrator	ALS Bottle#:	25	Worklist Smp#:	8
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 16 13C4 PFHpA, CAS: STL01892

Signal: 1

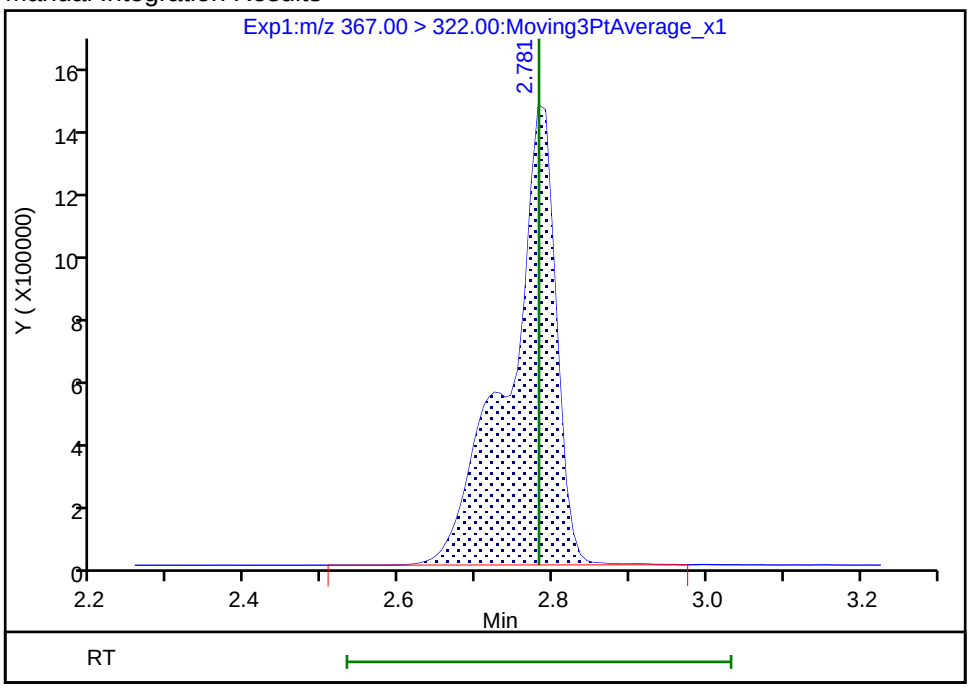
Processing Integration Results

RT: 2.78
Area: 4459729
Amount: 1.391913
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 6172360
Amount: 1.926437
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:50:28

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

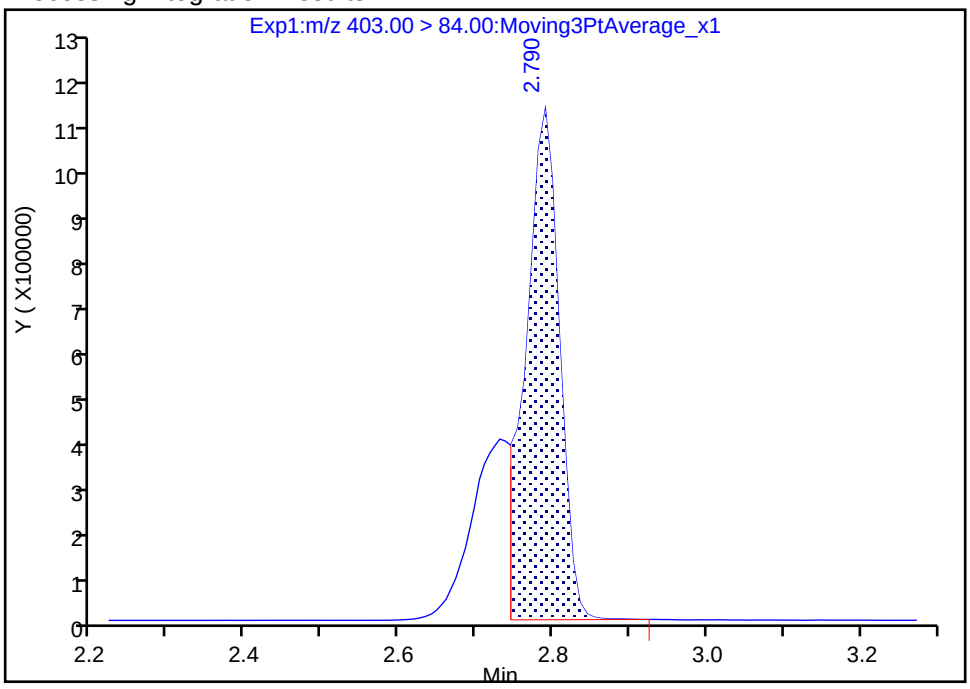
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d				
Injection Date:	08-Jan-2019 23:26:31	Instrument ID:	A9		
Lims ID:	140-13780-A-4-C	Lab Sample ID:	320-13780-4		
Client ID:	D-2085 R1 XAD-2 Resin #1				
Operator ID:	A9\Administrator	ALS Bottle#:	25	Worklist Smp#:	8
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 17 18O2 PFHxS, CAS: STL00994

Signal: 1

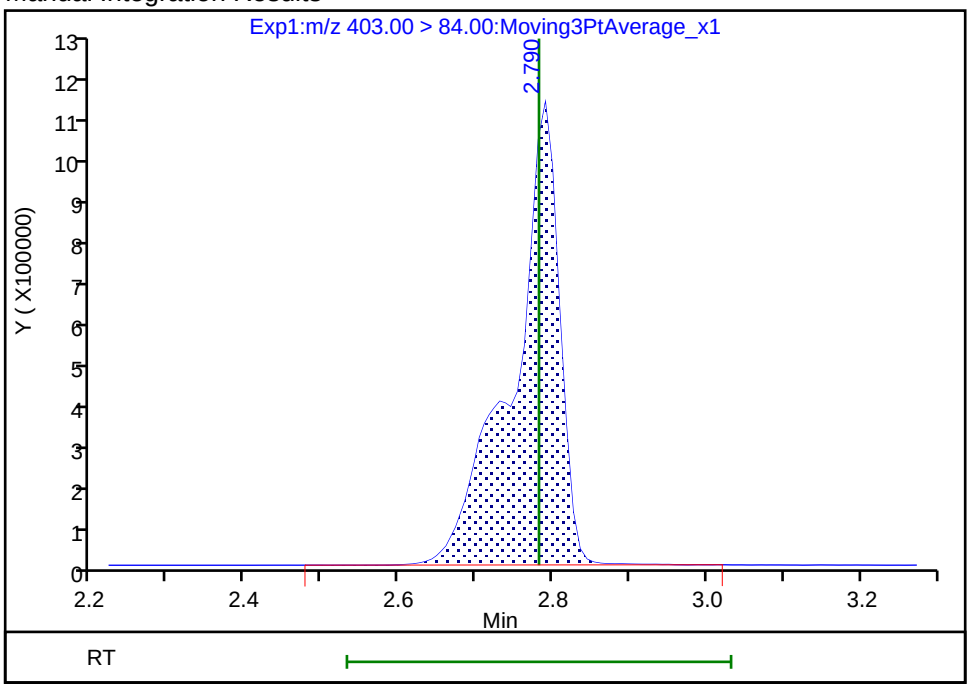
Processing Integration Results

RT: 2.79
Area: 3362584
Amount: 1.484568
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 4740780
Amount: 2.093036
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:50:24

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

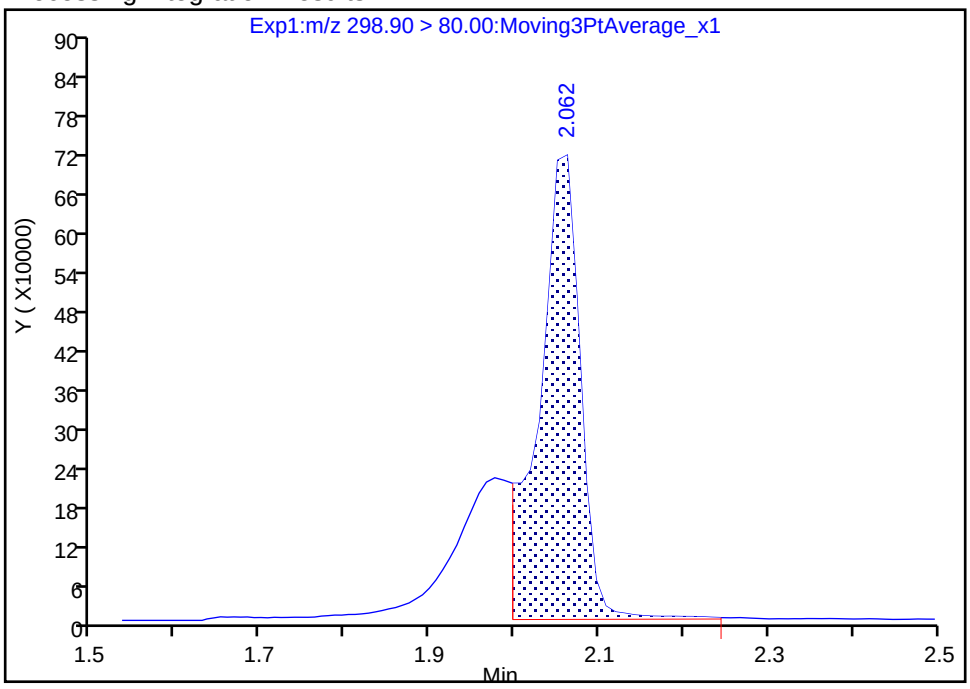
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d				
Injection Date:	08-Jan-2019 23:26:31	Instrument ID:	A9		
Lims ID:	140-13780-A-4-C	Lab Sample ID:	320-13780-4		
Client ID:	D-2085 R1 XAD-2 Resin #1				
Operator ID:	A9\Administrator	ALS Bottle#:	25	Worklist Smp#:	8
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

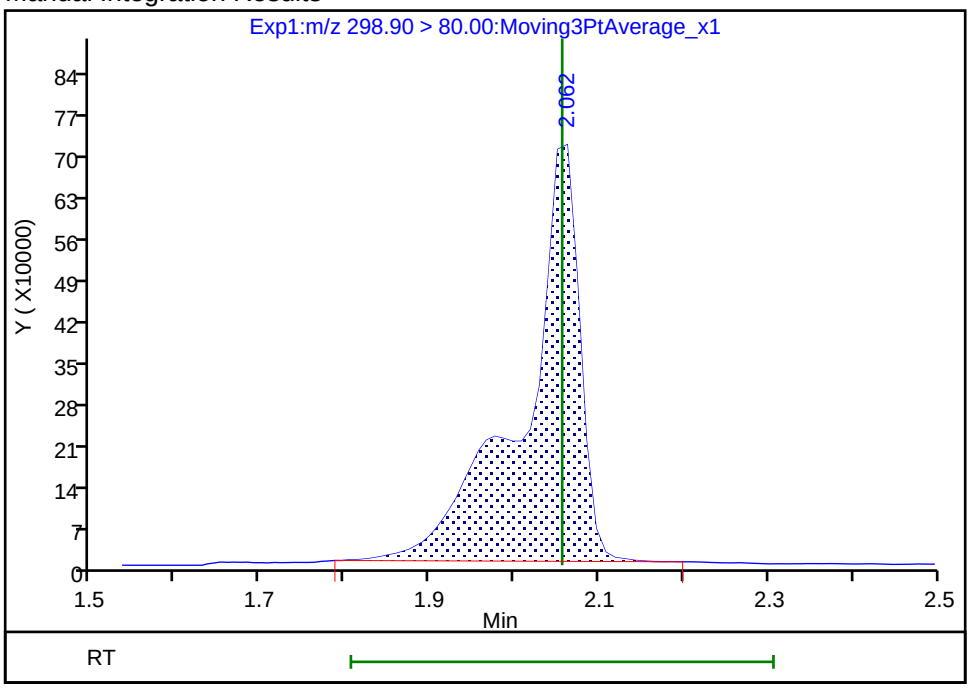
Processing Integration Results

RT: 2.06
Area: 2382422
Amount: 0.012628
Amount Units: ng/ml



Manual Integration Results

RT: 2.06
Area: 3255792
Amount: 1.553156
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:50:50

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

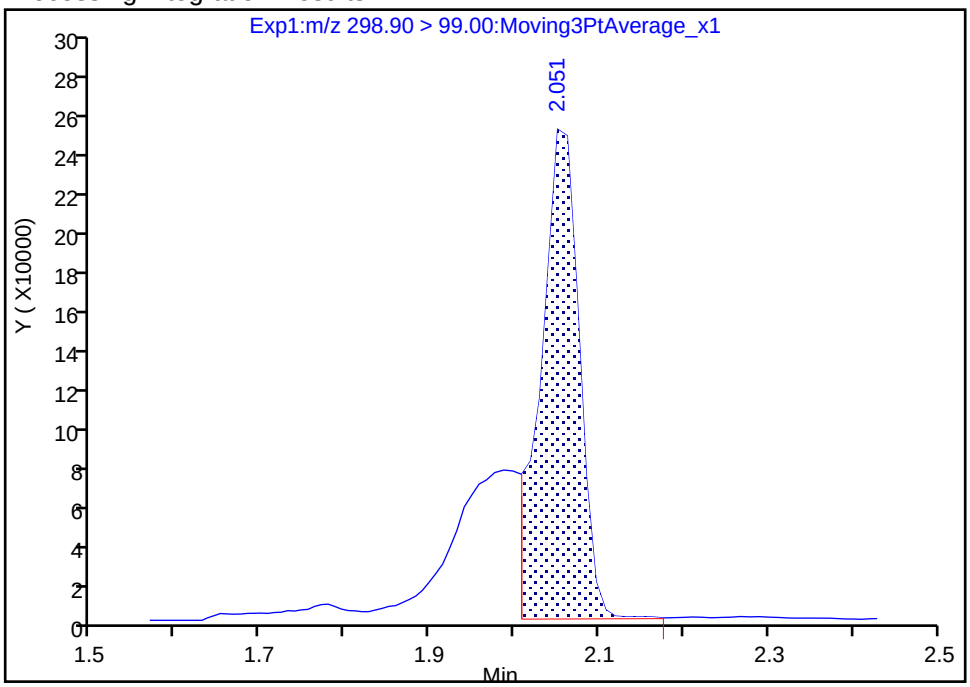
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d				
Injection Date:	08-Jan-2019 23:26:31	Instrument ID:	A9		
Lims ID:	140-13780-A-4-C	Lab Sample ID:	320-13780-4		
Client ID:	D-2085 R1 XAD-2 Resin #1				
Operator ID:	A9\Administrator	ALS Bottle#:	25	Worklist Smp#:	8
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

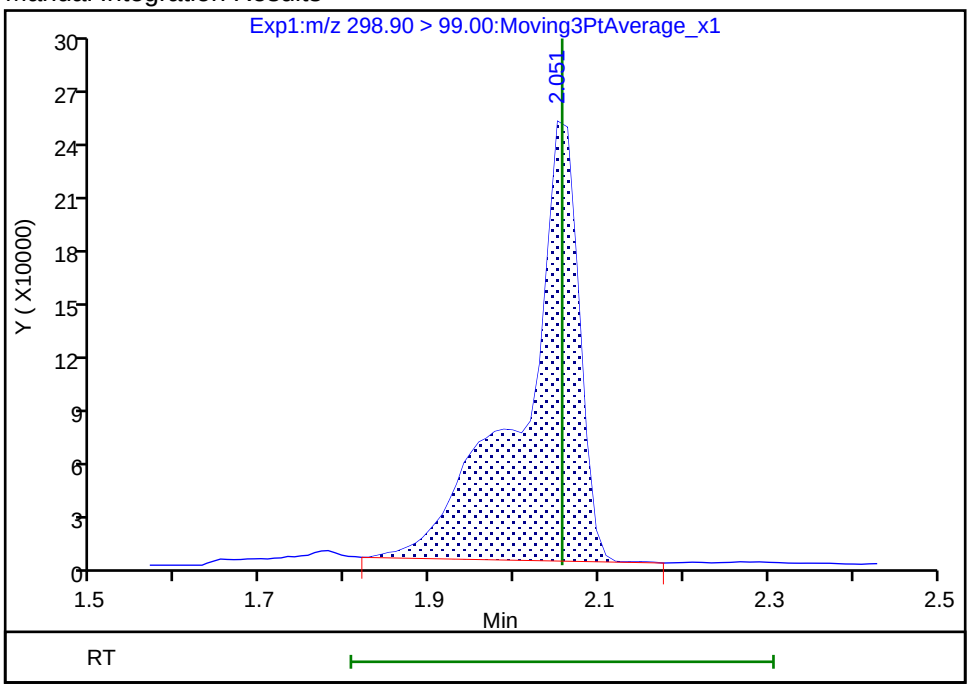
Processing Integration Results

RT: 2.05
Area: 775301
Amount: 0.012628
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 1143225
Amount: 1.553156
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:50:52
Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

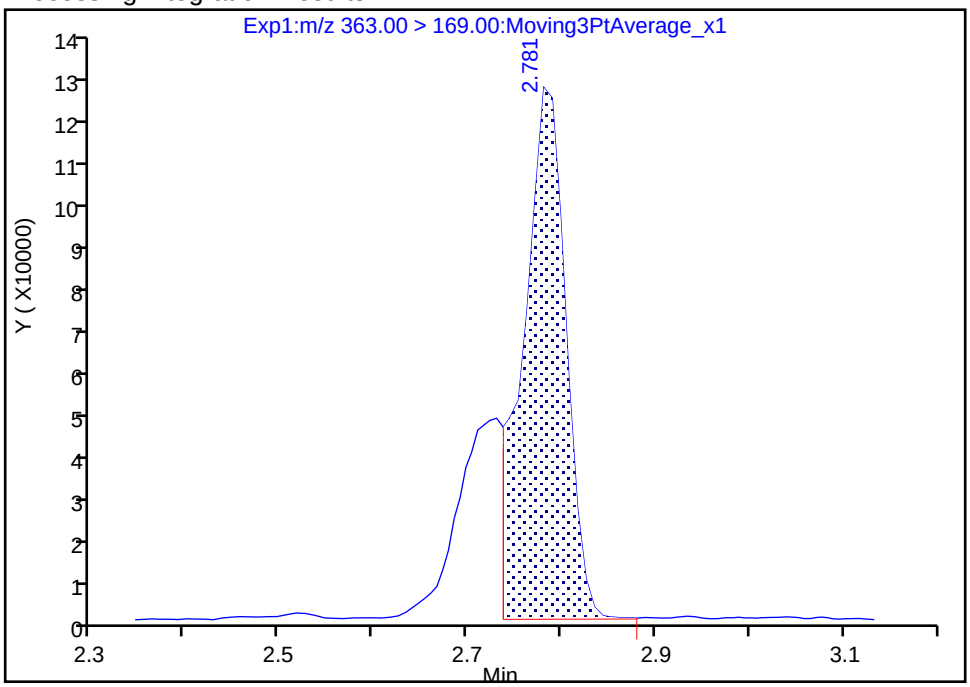
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d				
Injection Date:	08-Jan-2019 23:26:31	Instrument ID:	A9		
Lims ID:	140-13780-A-4-C	Lab Sample ID:	320-13780-4		
Client ID:	D-2085 R1 XAD-2 Resin #1				
Operator ID:	A9\Administrator	ALS Bottle#:	25	Worklist Smp#:	8
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 2

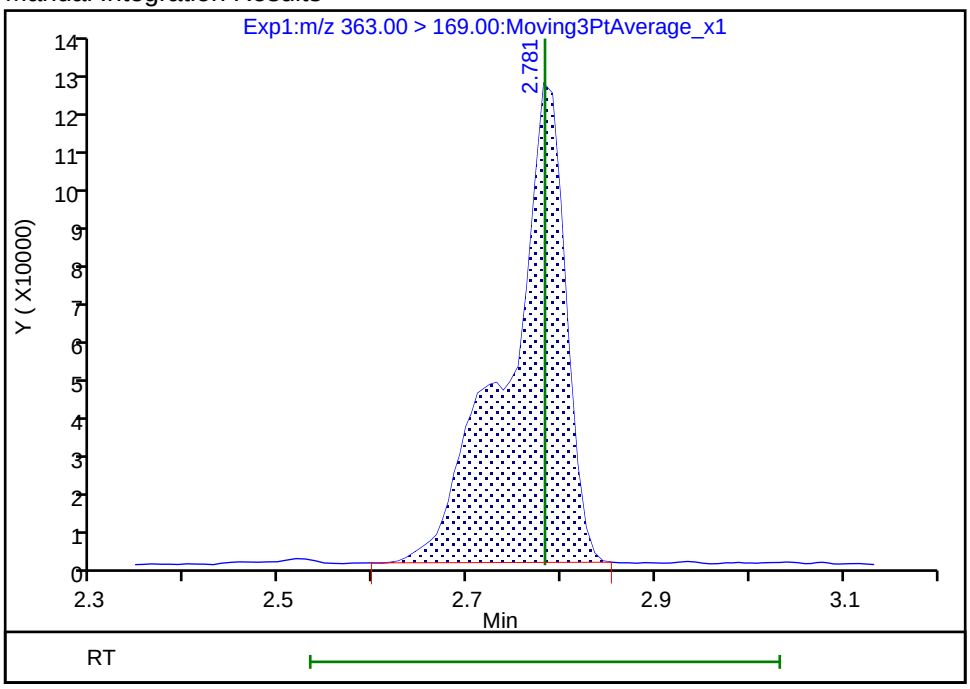
Processing Integration Results

RT: 2.78
Area: 388015
Amount: 0.008568
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 533459
Amount: 0.947460
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:51:18

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

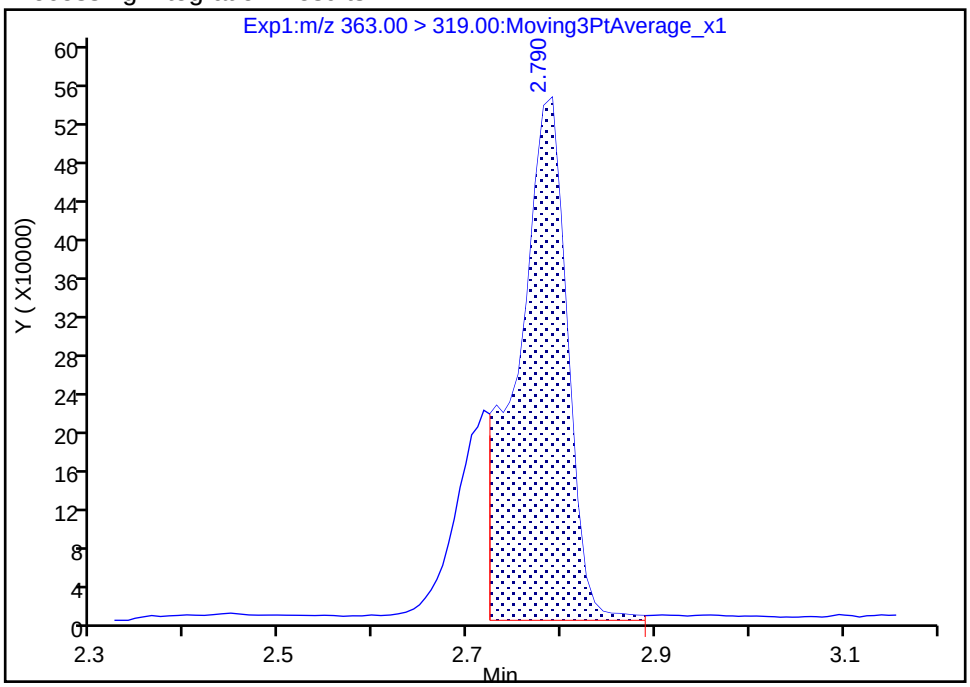
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d				
Injection Date:	08-Jan-2019 23:26:31	Instrument ID:	A9		
Lims ID:	140-13780-A-4-C	Lab Sample ID:	320-13780-4		
Client ID:	D-2085 R1 XAD-2 Resin #1				
Operator ID:	A9\Administrator	ALS Bottle#:	25	Worklist Smp#:	8
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

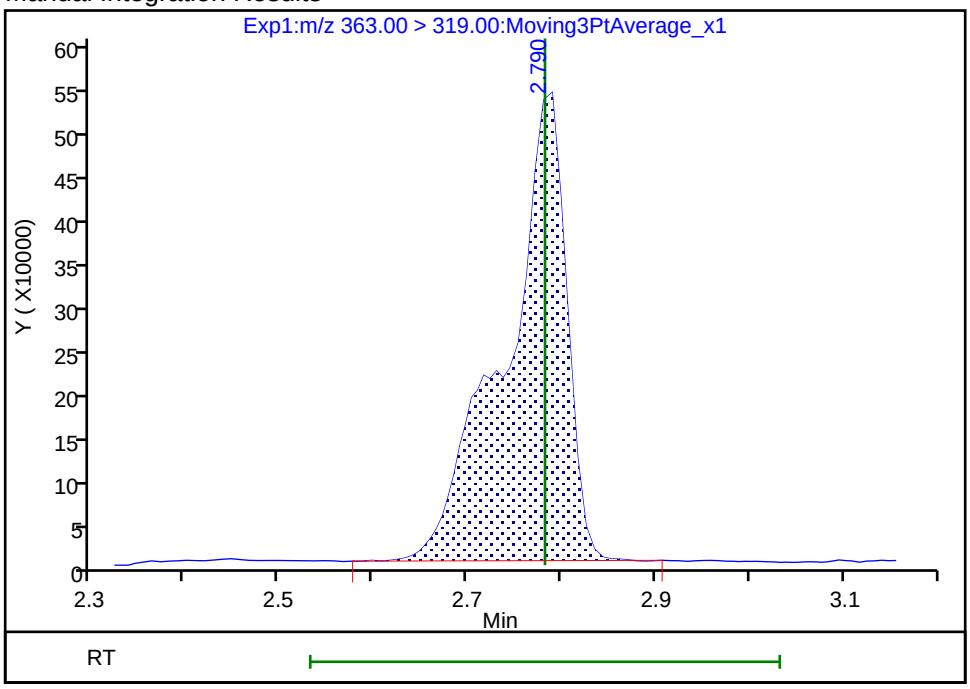
Processing Integration Results

RT: 2.79
Area: 1980908
Amount: 0.008568
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 2433773
Amount: 0.947460
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:51:20

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

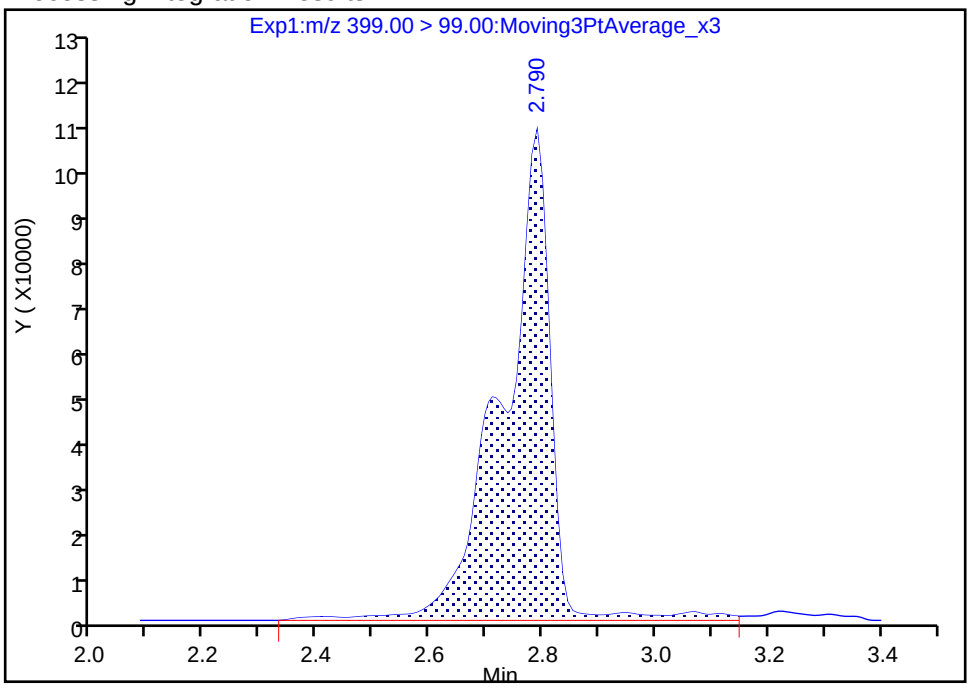
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_037.d				
Injection Date:	08-Jan-2019 23:26:31	Instrument ID:	A9		
Lims ID:	140-13780-A-4-C	Lab Sample ID:	320-13780-4		
Client ID:	D-2085 R1 XAD-2 Resin #1				
Operator ID:	A9\Administrator	ALS Bottle#:	25	Worklist Smp#:	8
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 2

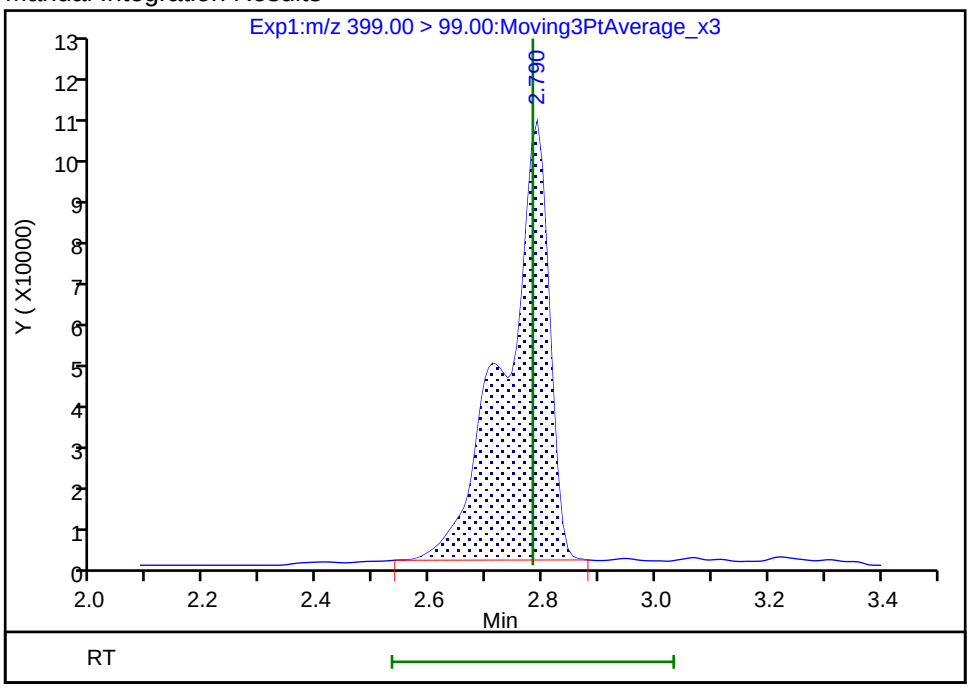
Processing Integration Results

RT: 2.79
Area: 647290
Amount: 0.010138
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 591119
Amount: 0.912405
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:51:27

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2086 R2 XAD-2 Resin #2 Lab Sample ID: 140-13780-5

Matrix: Air Lab File ID: 2019.01.08LLAAXX_038.d

Analysis Method: 537 (modified) Date Collected: 12/20/2018 08:00

Extraction Method: None Date Extracted: 12/20/2018 12:25

Sample wt/vol: 1(Sample) Date Analyzed: 01/08/2019 23:34

Con. Extract Vol.: 360(mL) Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	42.7	B	0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	20.2	B	0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	19.0	B	0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	19.5		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	19.3	B	0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	19.5		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	49		25-150
STL01892	13C4 PFHpA	75		25-150
STL00995	13C5 PFNA	103		25-150
STL00990	13C4 PFOA	98		25-150
STL00991	13C4 PFOS	108		25-150
STL00994	18O2 PFHxS	81		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d
Lims ID: 140-13780-A-5-C
Client ID: D-2086 R2 XAD-2 Resin #2
Sample Type: Client
Inject. Date: 08-Jan-2019 23:34:01 ALS Bottle#: 26 Worklist Smp#: 9
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-5-c
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:53:42
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.675	1.679	-0.004	0.526	1756285	0.7175		28.7	201	
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.675	1.679	-0.004	1.000	552454	0.8495			5.2	M
4 Perfluoropentanoic acid										M
262.90 > 219.00	2.019	2.014	0.005	1.000	868879	0.9283			24.8	M
D 3 13C5 PFPeA										M
267.90 > 223.00	2.019	2.022	-0.003	0.634	2339523	1.09		43.7	420	M
D 5 13C3 PFBS										M
301.90 > 80.00	2.050	2.054	-0.004	0.644	3984306	1.13		48.7	37233	M
6 Perfluorobutanesulfonic acid										M
298.90 > 80.00	2.050	2.056	-0.006	1.000	3527920	2.13	Target=2.70		160	M
298.90 > 99.00	2.050	2.056	-0.006	1.000	1198401		2.94(1.35-4.05)		92.6	M
D 9 13C2 PFHxA										M
315.00 > 270.00	2.390	2.383	0.007	0.751	3684757	1.55		61.9	1565	M
10 Perfluorohexanoic acid										M
313.00 > 269.00	2.390	2.384	0.006	1.000	1545432	1.21	Target=13.92		71.3	M
313.00 > 119.00	2.390	2.384	0.006	1.000	117899		13.11(6.96-20.87)		35.0	M
D 16 13C4 PFHpA										M
367.00 > 322.00	2.780	2.782	-0.002	0.873	5507942	1.88		75.3	1901	M
D 17 18O2 PFHxS										M
403.00 > 84.00	2.789	2.782	0.007	0.876	3946662	1.91		80.7	1852	M
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.789	2.782	0.007	1.000	1957057	0.9479	Target=3.80		29.3	
399.00 > 99.00	2.789	2.782	0.007	1.000	503532		3.89(1.90-5.70)		68.5	M
15 Perfluoroheptanoic acid										M
363.00 > 319.00	2.789	2.782	0.007	1.003	2314106	1.01	Target=4.34		91.6	M
363.00 > 169.00	2.780	2.782	-0.002	1.000	504218		4.59(2.17-6.52)		201	M

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.169	3.165	0.004	1.002	926457	0.9125			673	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.161	3.165	-0.004	0.993	1141986	3.96		167	523	
* 24 13C2 PFOA										
415.00 > 370.00	3.185	3.180	0.005		6410717	2.50			2323	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.177	3.180	-0.003	0.893	2125532	0.8859	Target=3.69		370	
449.00 > 99.00	3.177	3.180	-0.003	0.893	514680		4.13(1.84-5.53)		467	
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.185	3.180	0.005	1.000	2517308	0.9774	Target=2.72		133	M
413.00 > 169.00	3.185	3.180	0.005	1.000	900569		2.80(1.36-4.08)		672	
D 25 13C4 PFOA										
417.00 > 372.00	3.185	3.180	0.005	1.000	6211108	2.45		97.9	1833	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.557	3.552	0.005	1.000	2316845	0.9668	Target=4.08		466	
499.00 > 99.00	3.557	3.552	0.005	1.000	552711		4.19(2.04-6.12)		420	
D 28 13C4 PFOS										
503.00 > 80.00	3.557	3.552	0.005	1.117	5434506	2.57		108	2026	
30 Perfluorononanoic acid										
463.00 > 419.00	3.572	3.567	0.005	1.002	2283698	0.9763	Target=5.35		141	
463.00 > 169.00	3.564	3.567	-0.003	1.000	414616		5.51(2.68-8.03)		325	
D 31 13C5 PFNA										
468.00 > 423.00	3.564	3.567	-0.003	1.119	5874519	2.57		103	3946	
D 33 13C8 FOSA										
506.00 > 78.00	3.891	3.885	0.006	1.222	3166540	2.28		91.1	2613	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.891	3.885	0.006	1.000	3922174	1.07			960	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.925	3.927	-0.002	1.232	106984	3.23		135	339	
D 36 13C2 PFDA										
515.00 > 470.00	3.925	3.927	-0.002	1.232	5878241	2.63		105	3587	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.925	3.927	-0.002	1.000	582143	0.9179			1676	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.925	3.927	-0.002	1.000	2769000	1.03	Target=14.23		386	
513.00 > 169.00	3.916	3.927	-0.011	0.998	183469		15.09(7.12-21.35)		181	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.081	4.093	-0.012	1.281	1592399	2.72		109	1590	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.091	4.093	-0.002	1.002	498439	0.9031			86.0	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.222	4.225	-0.003	1.187	1931833	0.9715	Target=4.28		1066	
599.00 > 99.00	4.213	4.225	-0.012	1.185	402215		4.80(2.14-6.43)		707	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.248	4.250	-0.002	1.334	1345864	2.76		110	1386	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.239	4.250	-0.011	1.331	4669193	2.66		106	2562	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.239	4.250	-0.011	1.000	1599144	1.03	Target=10.48		334	
563.00 > 169.00	4.248	4.250	-0.002	1.002	148773		10.75(5.24-15.72)		376	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.257	4.259	-0.003	1.002	438073	0.9829			558	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.539	4.534	0.005	1.002	2227626	1.01	Target=9.37		431	
613.00 > 169.00	4.531	4.534	-0.003	1.000	231519		9.62(4.68-14.05)		841	
D 49 13C2 PFDoA										
615.00 > 570.00	4.531	4.541	-0.010	1.423	5754724	2.70		108	4235	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.800	4.803	-0.003	1.059	1963066	1.12	Target=6.18		734	
663.00 > 169.00	4.800	4.803	-0.003	1.059	325282		6.03(3.09-9.27)		1253	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.044	5.049	-0.005	1.584	4074117	2.76		110	2445	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.044	5.050	-0.006	1.000	249681	0.9383	Target=1.39		661	
713.00 > 219.00	5.044	5.050	-0.006	1.000	175639		1.42(0.70-2.09)		924	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:37 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d

Injection Date: 08-Jan-2019 23:34:01 Instrument ID: A9

Lims ID: 140-13780-A-5-C Lab Sample ID: 320-13780-5

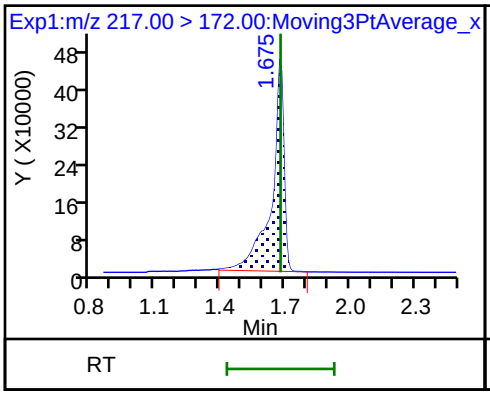
Client ID: D-2086 R2 XAD-2 Resin #2

Operator ID: A9\Administrator ALS Bottle#: 26 Worklist Smp#: 9

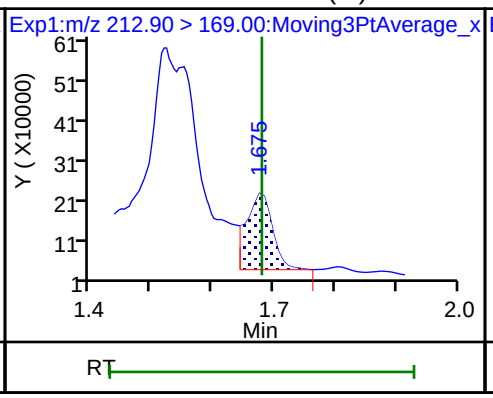
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

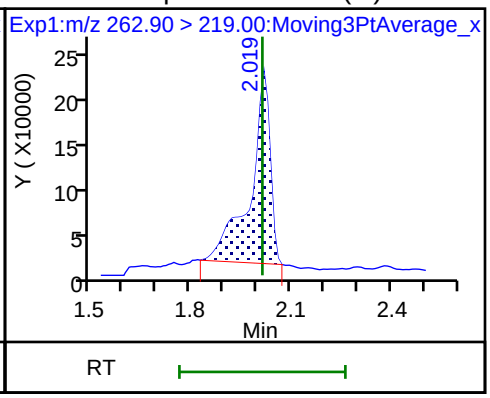
D 1 13C4 PFBA



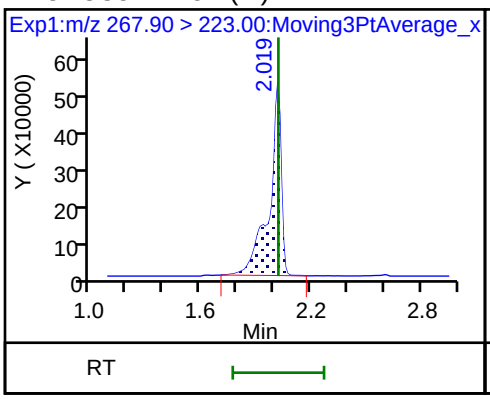
2 Perfluorobutanoic acid (M)



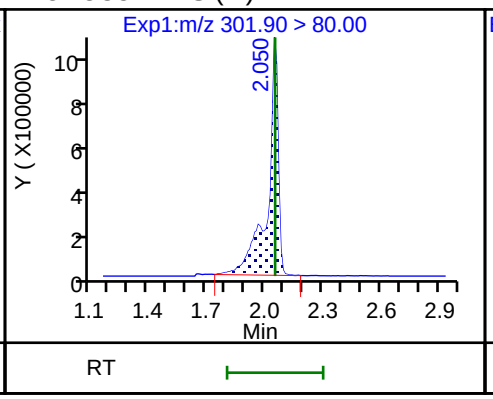
4 Perfluoropentanoic acid (M)



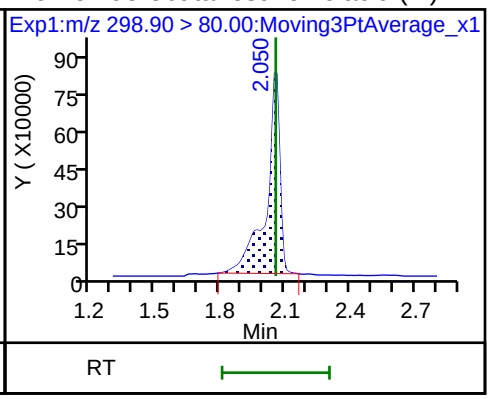
D 3 13C5 PFPeA (M)



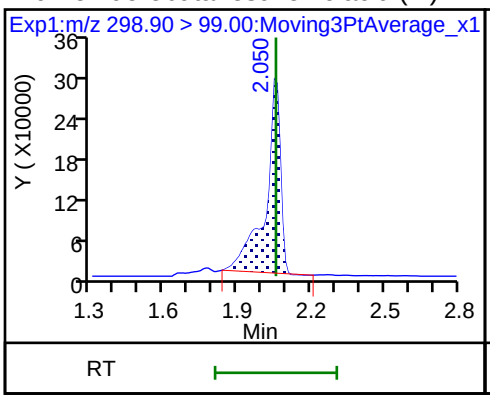
D 5 13C3 PFBS (M)



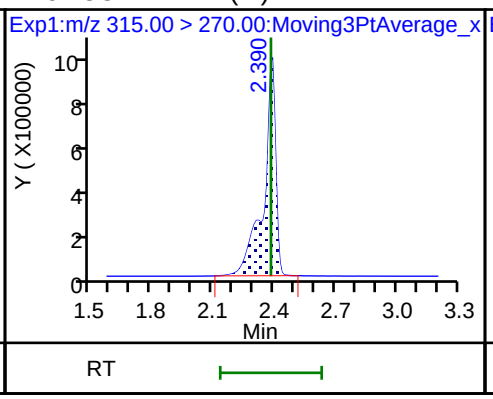
6 Perfluorobutanesulfonic acid (M)



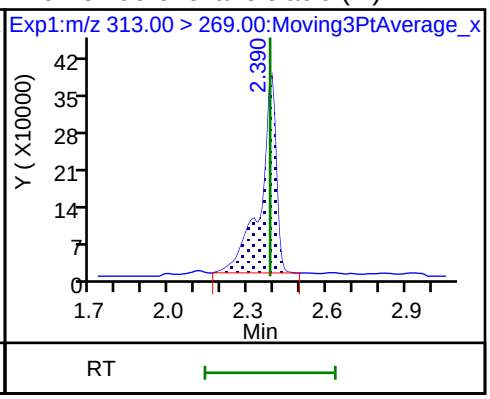
6 Perfluorobutanesulfonic acid (M)



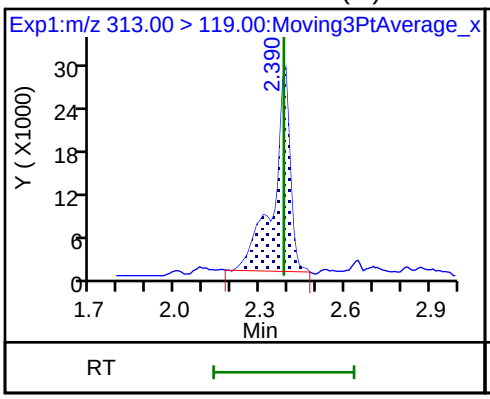
D 9 13C2 PFHxA (M)



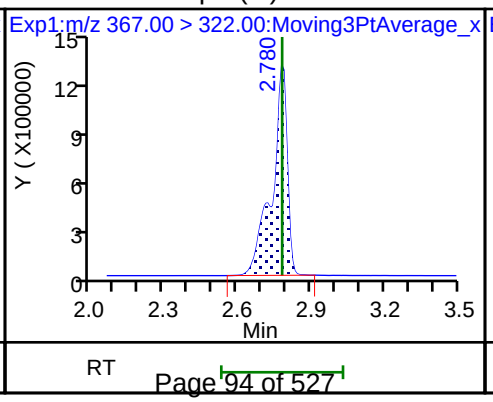
10 Perfluorohexanoic acid (M)



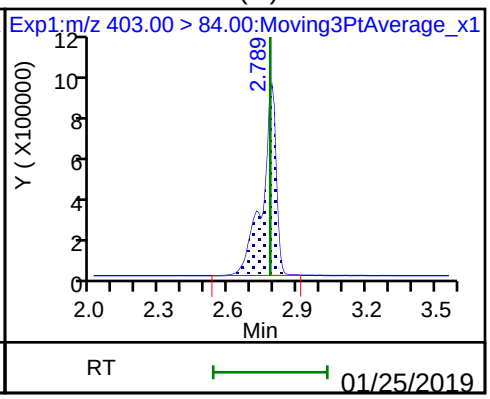
10 Perfluorohexanoic acid (M)



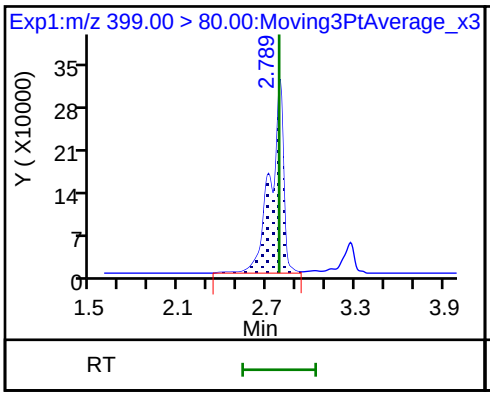
D 16 13C4 PFHpA (M)



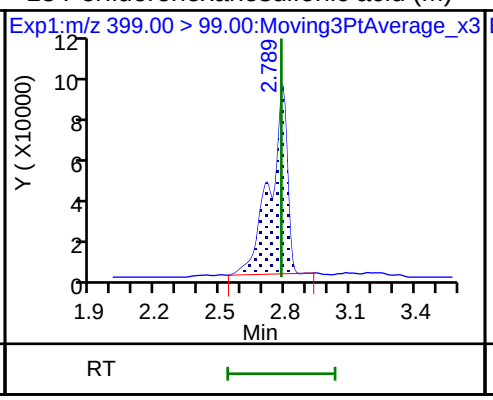
D 17 18O2 PFHxS (M)



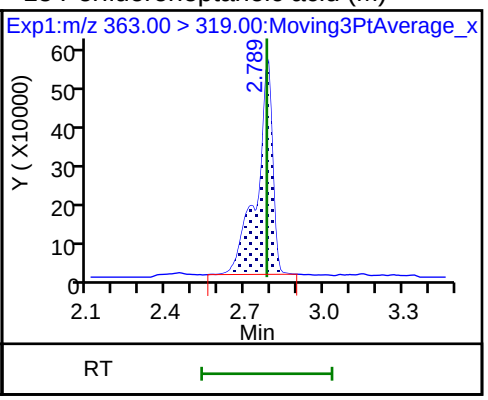
18 Perfluorohexanesulfonic acid



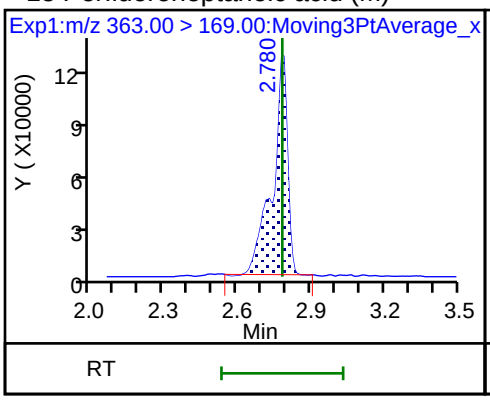
18 Perfluorohexanesulfonic acid (M)



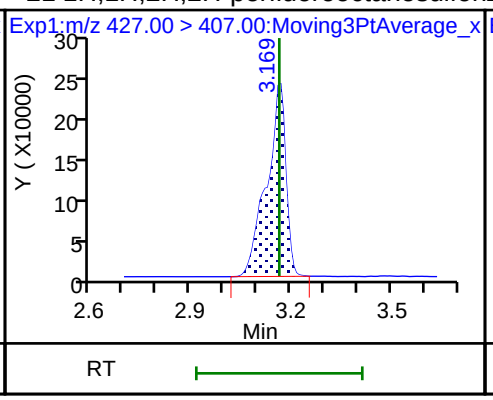
15 Perfluoroheptanoic acid (M)



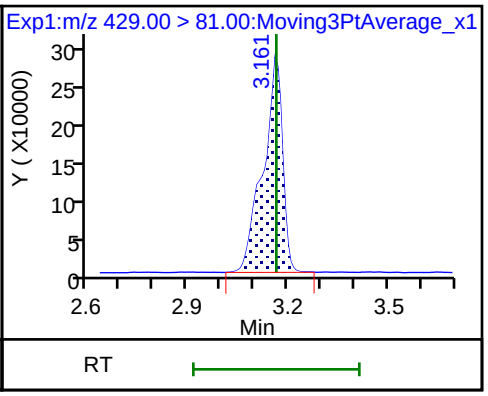
15 Perfluoroheptanoic acid (M)



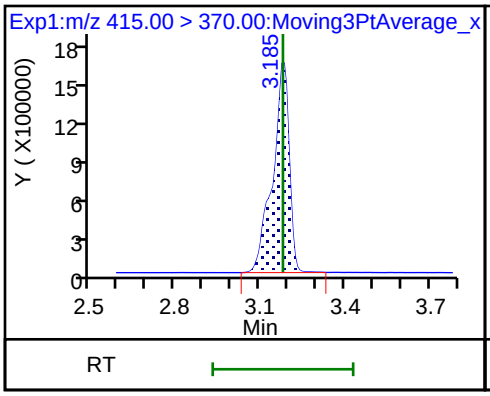
21 1H,1H,2H,2H-perfluorooctanesulfon



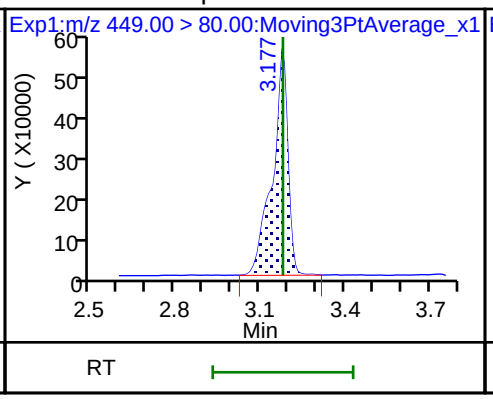
D 20 M2-6:2 FTS



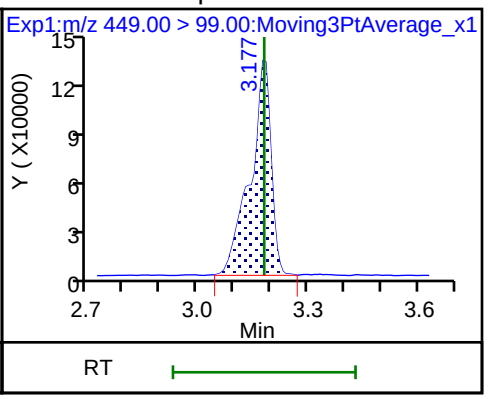
* 24 13C2 PFOA



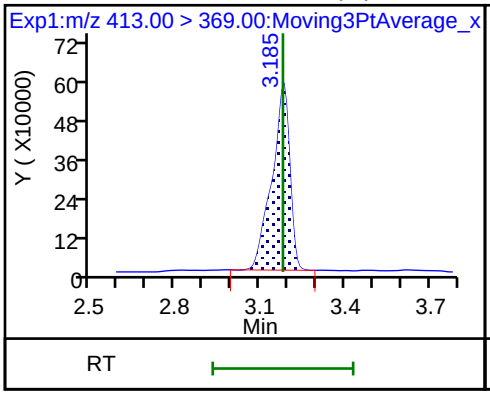
23 Perfluoroheptanesulfonic acid



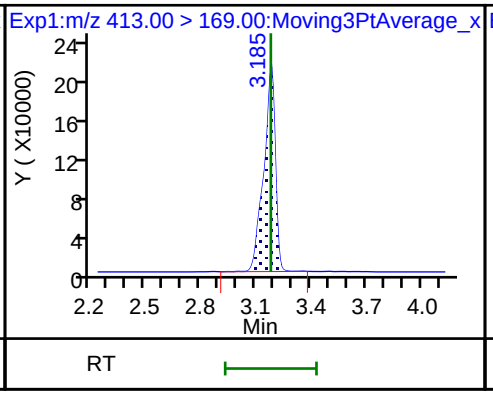
23 Perfluoroheptanesulfonic acid



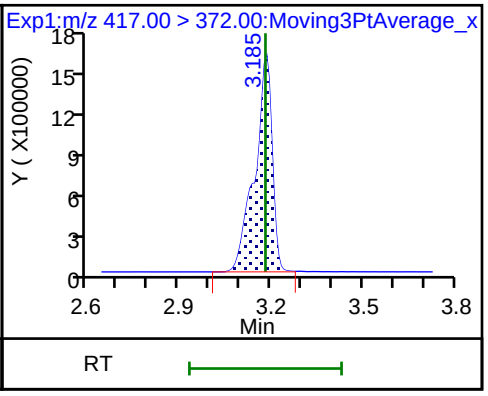
26 Perfluorooctanoic acid (M)



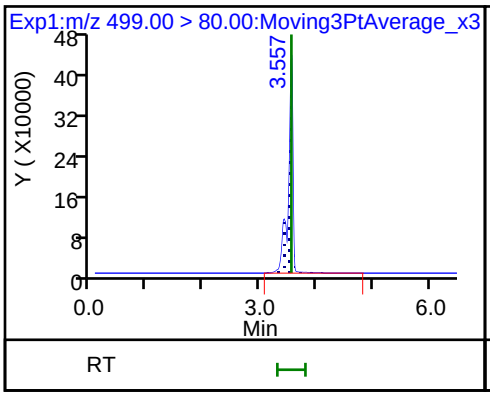
26 Perfluorooctanoic acid



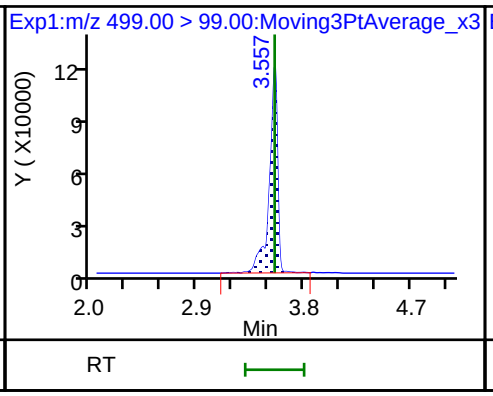
D 25 13C4 PFOA



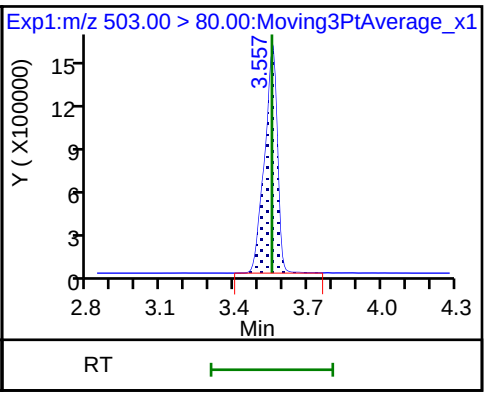
29 Perfluorooctanesulfonic acid



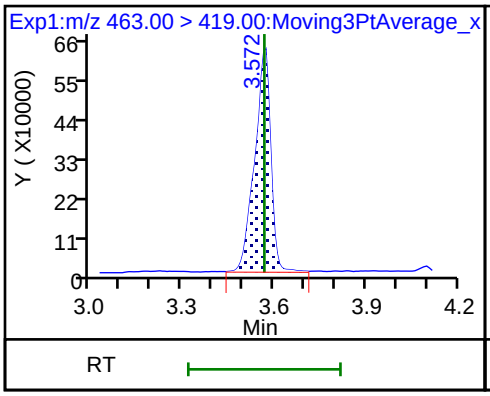
29 Perfluorooctanesulfonic acid



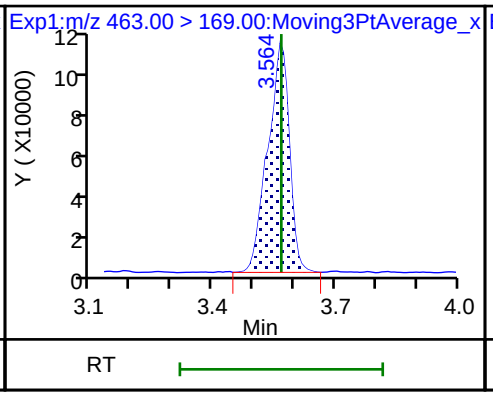
D 28 13C4 PFOS



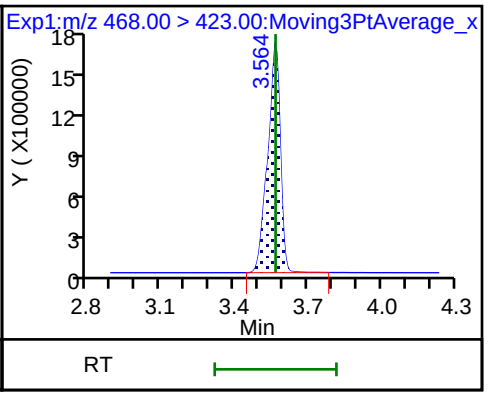
30 Perfluorononanoic acid



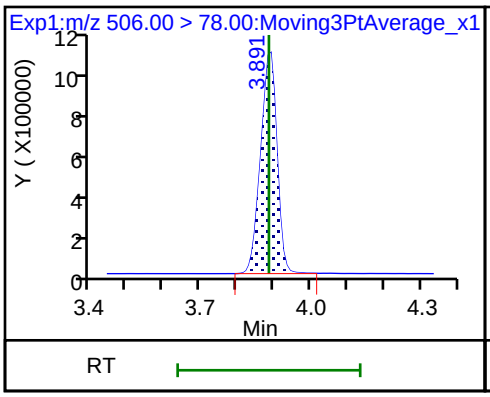
30 Perfluorononanoic acid



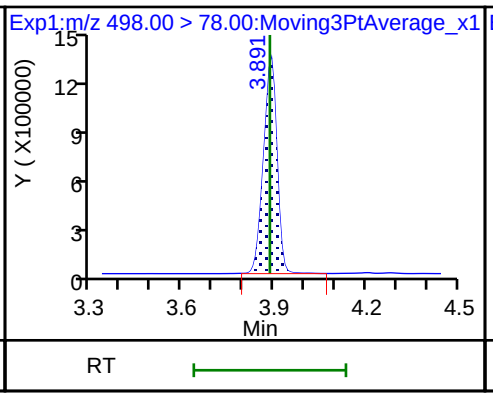
D 31 13C5 PFNA



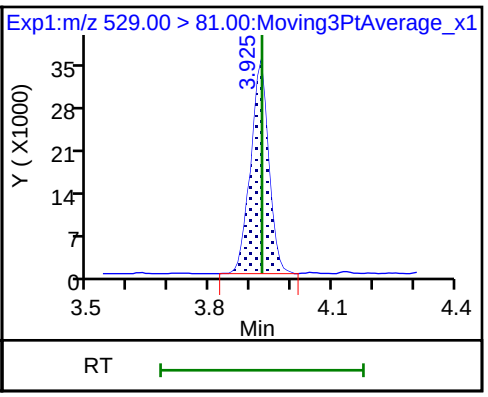
D 33 13C8 FOSA



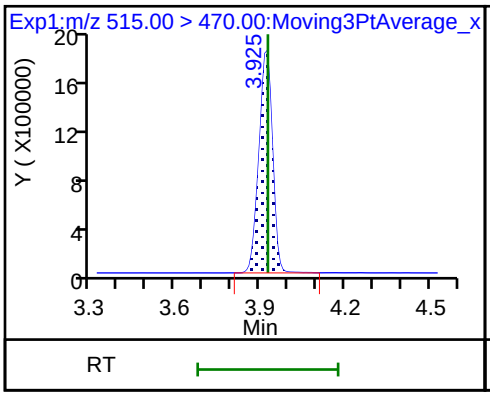
34 Perfluorooctanesulfonamide



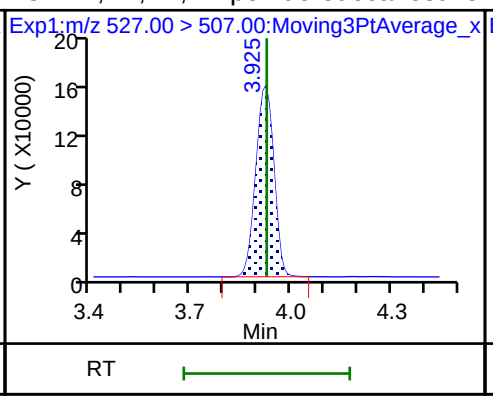
D 39 M2-8:2 FTS



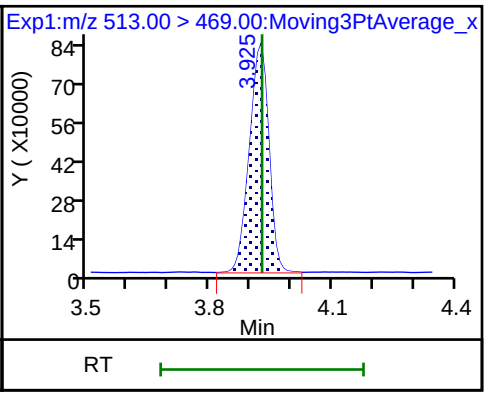
D 36 13C2 PFDA



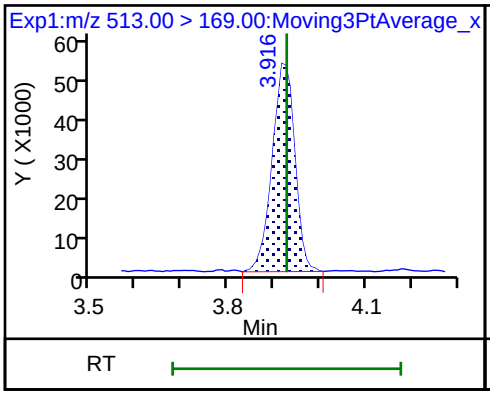
37 1H,1H,2H,2H-perfluorodecanesulfoni



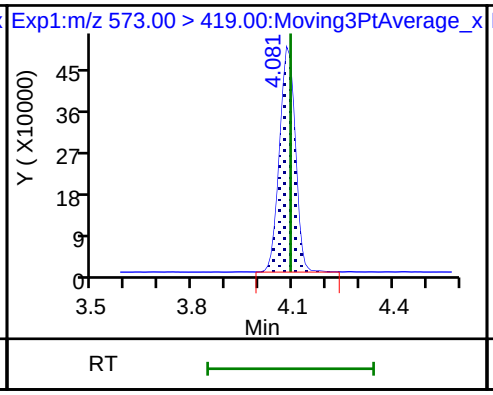
38 Perfluorodecanoic acid



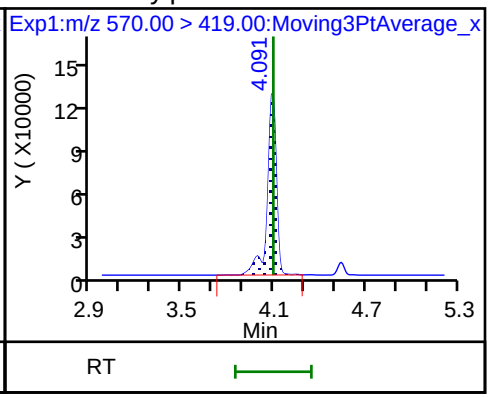
38 Perfluorodecanoic acid



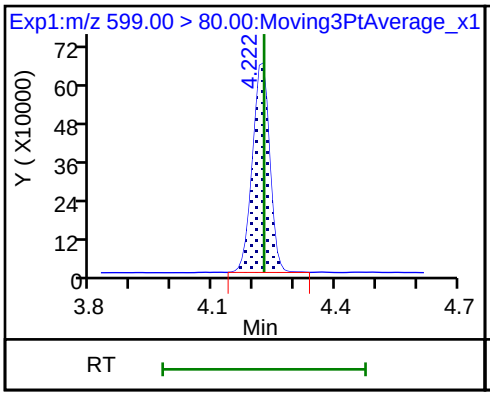
D 40 d3-NMeFOSAA



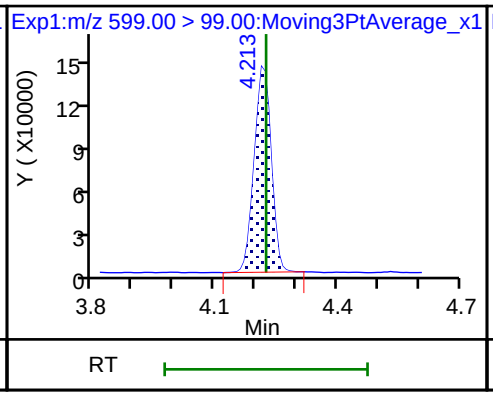
41 N-methylperfluorooctanesulfonamido



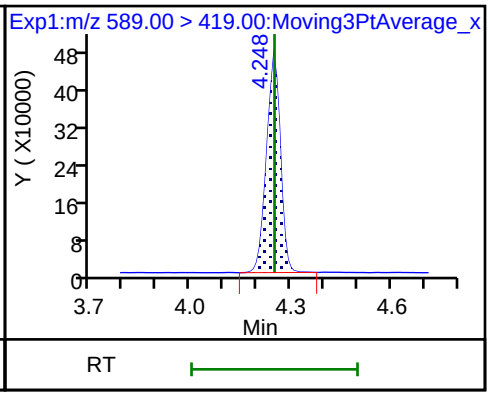
42 Perfluorodecanesulfonic acid



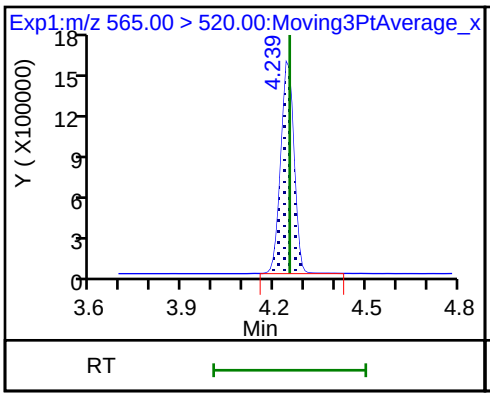
42 Perfluorodecanesulfonic acid



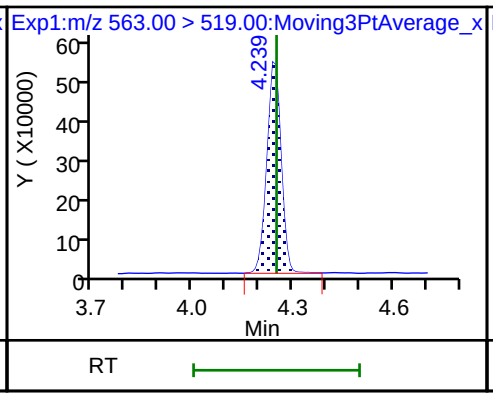
D 45 d5-NEtFOSAA



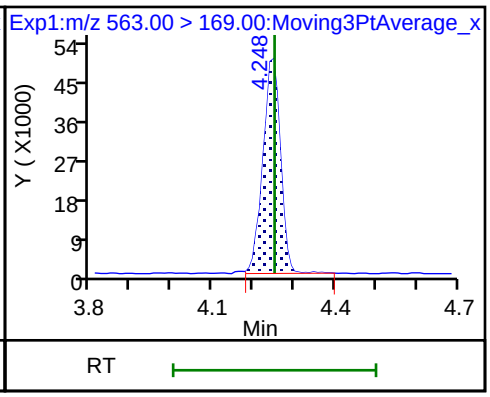
D 44 13C2 PFUnA



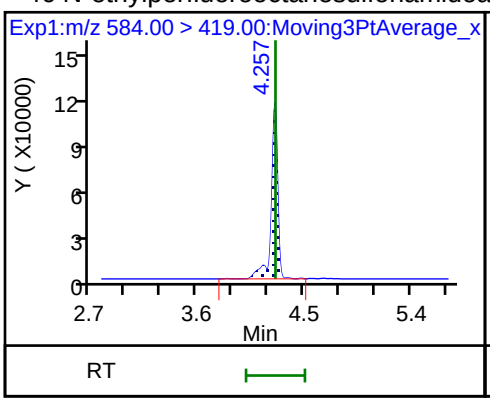
43 Perfluoroundecanoic acid



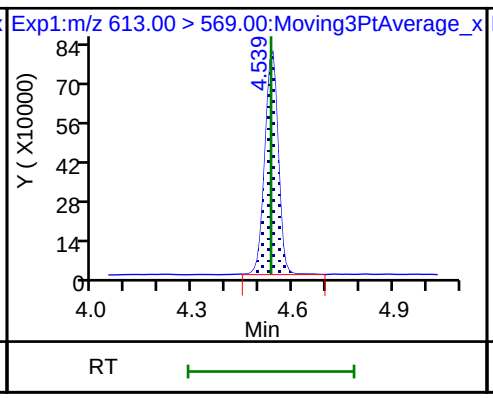
43 Perfluoroundecanoic acid



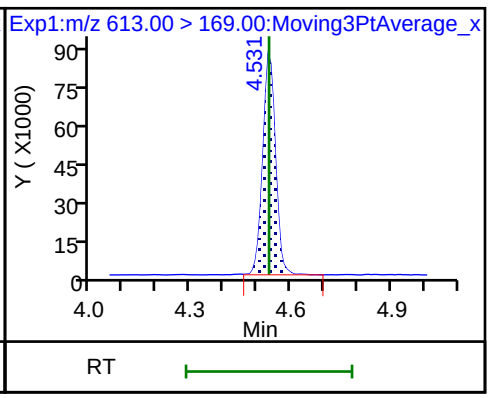
46 N-ethylperfluorooctanesulfonamidoa



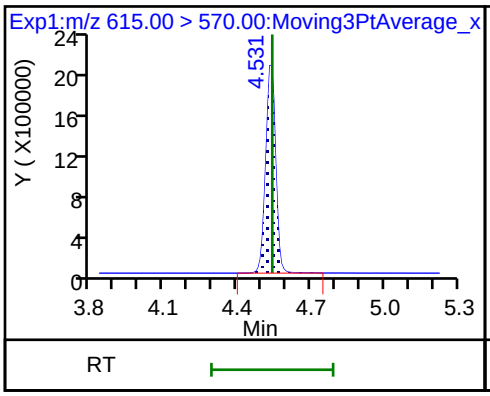
50 Perfluorododecanoic acid



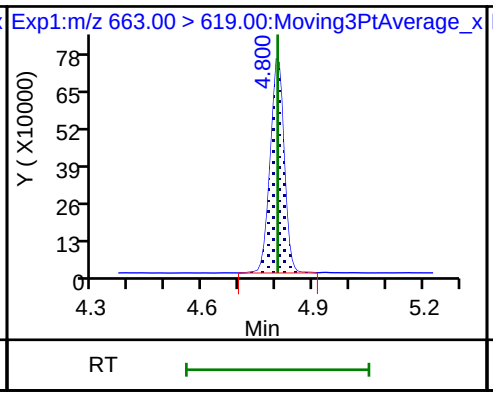
50 Perfluorododecanoic acid



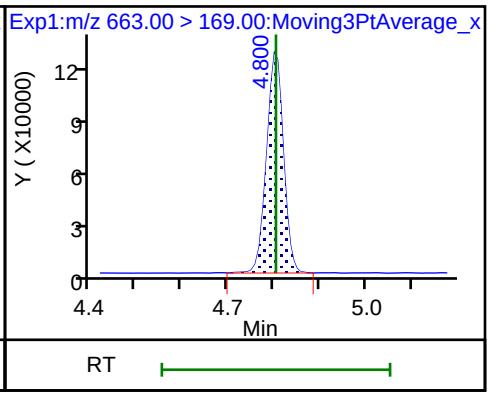
D 49 13C2 PFDoA



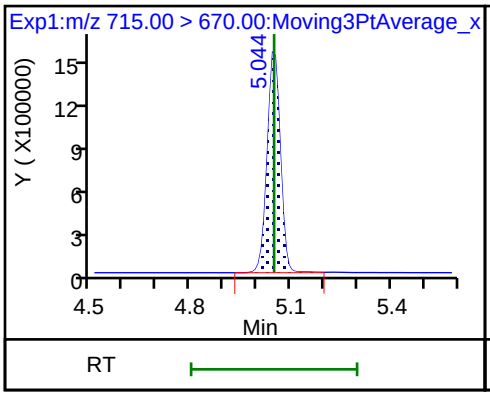
54 Perfluorotridecanoic acid



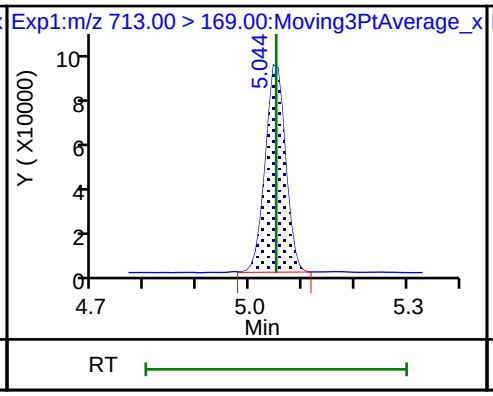
54 Perfluorotridecanoic acid



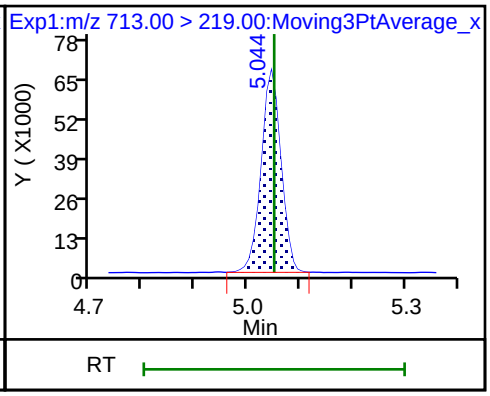
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

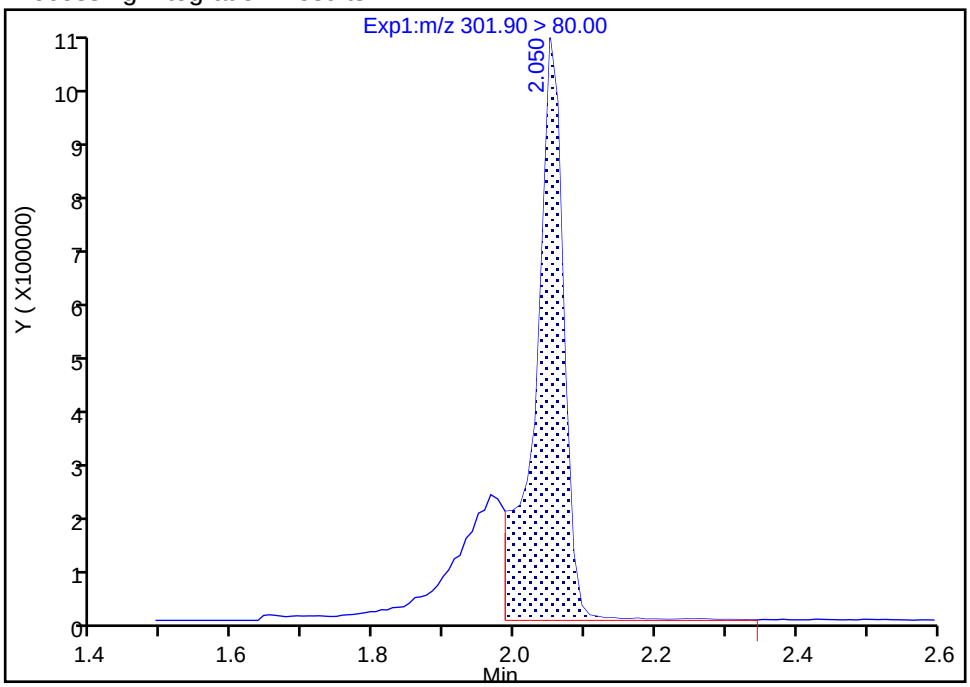
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 5 13C3 PFBS, CAS: STL02337

Signal: 1

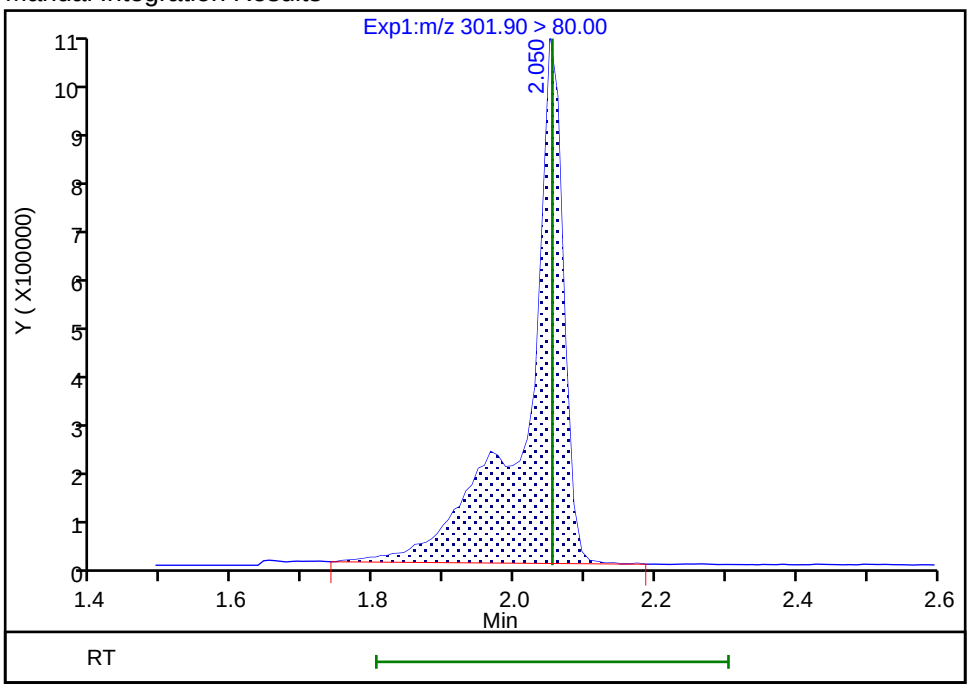
Processing Integration Results

RT: 2.05
Area: 2976866
Amount: 0.846501
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 3984306
Amount: 1.132976
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:52:09

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

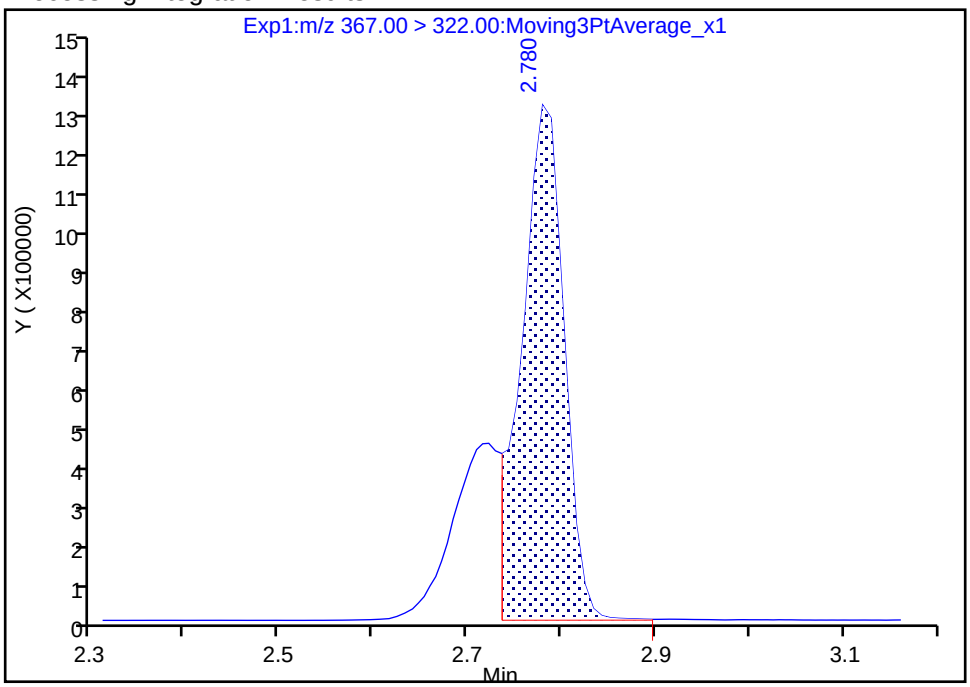
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 16 13C4 PFHpA, CAS: STL01892

Signal: 1

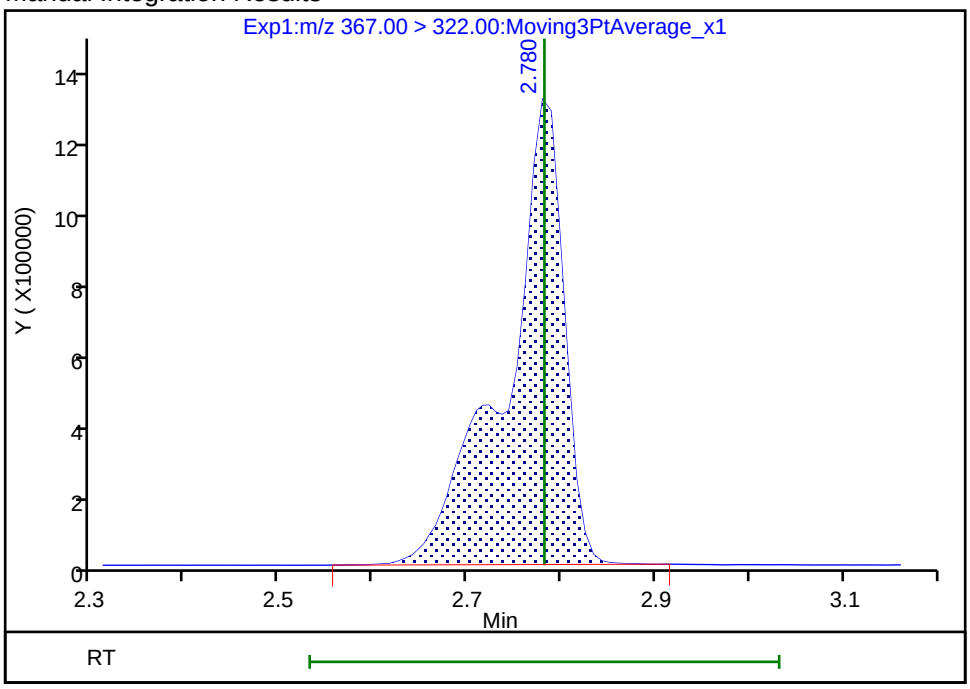
Processing Integration Results

RT: 2.78
Area: 3997075
Amount: 1.365740
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 5507942
Amount: 1.881980
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:52:22

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

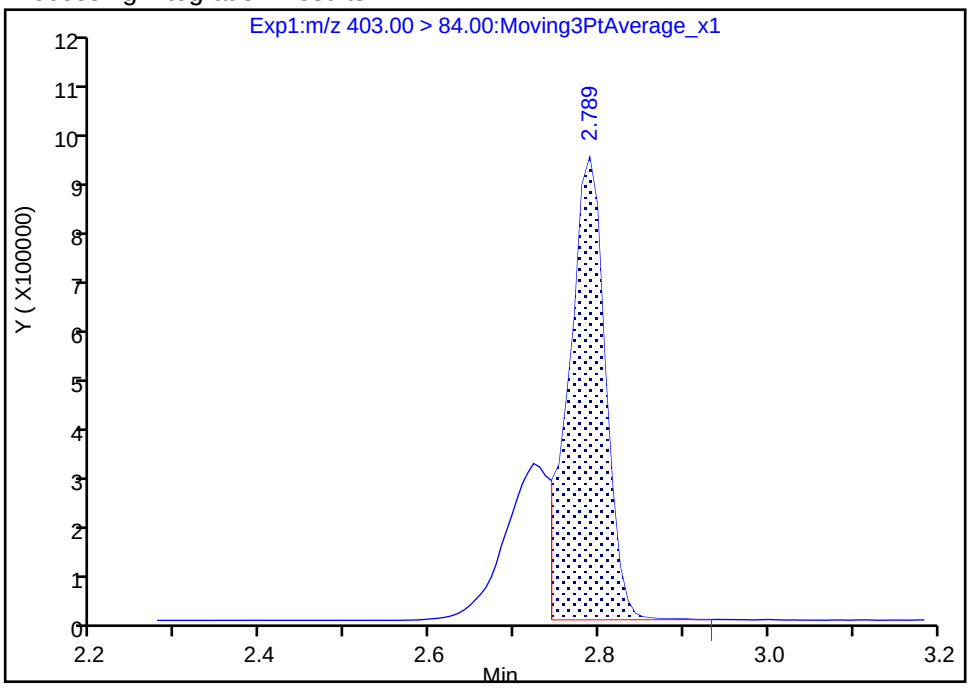
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 17 18O2 PFHxS, CAS: STL00994

Signal: 1

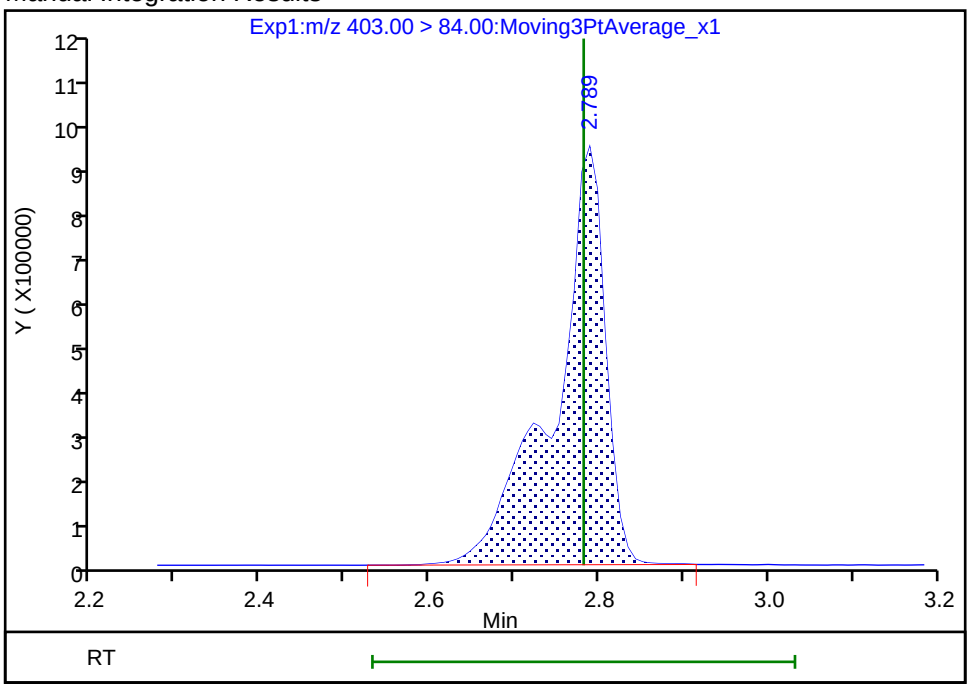
Processing Integration Results

RT: 2.79
Area: 2794255
Amount: 1.350563
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 3946662
Amount: 1.907563
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:52:18

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

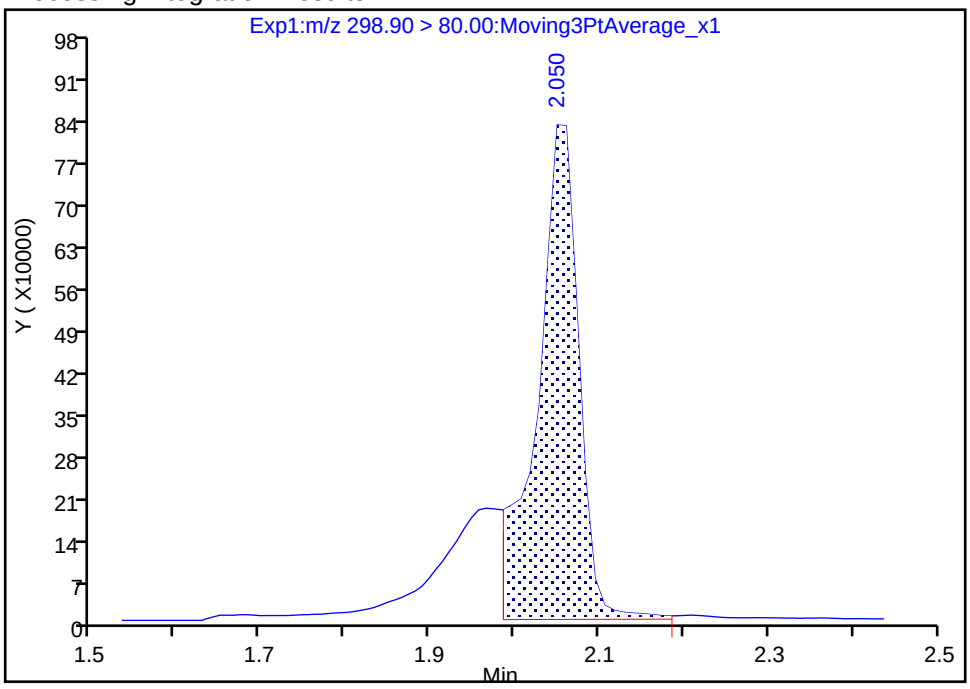
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

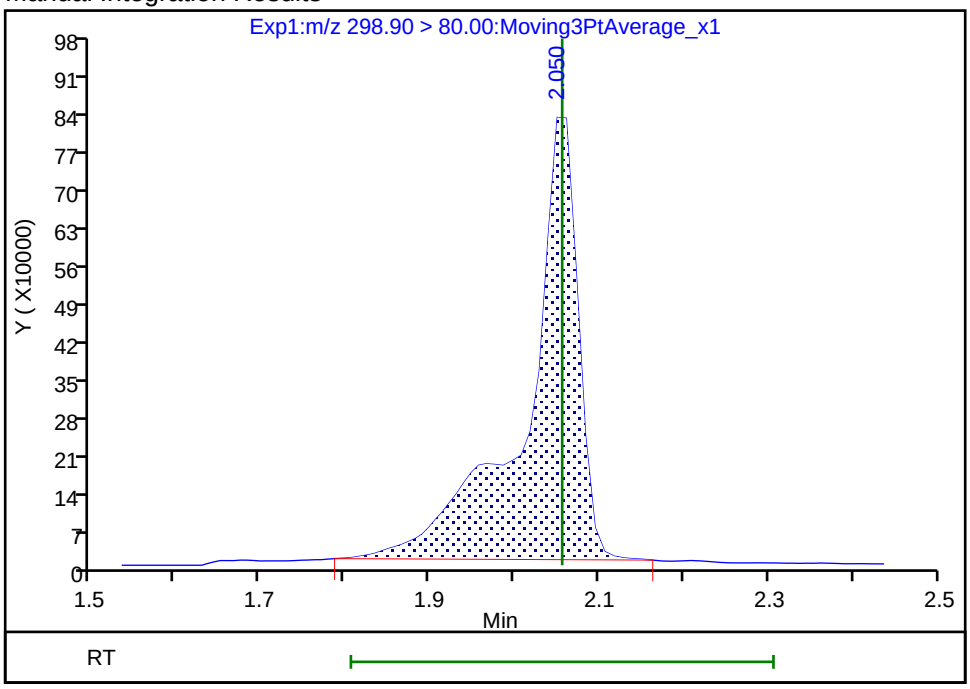
Processing Integration Results

RT: 2.05
Area: 2790372
Amount: 0.018751
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 3527920
Amount: 2.133603
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:53:00

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

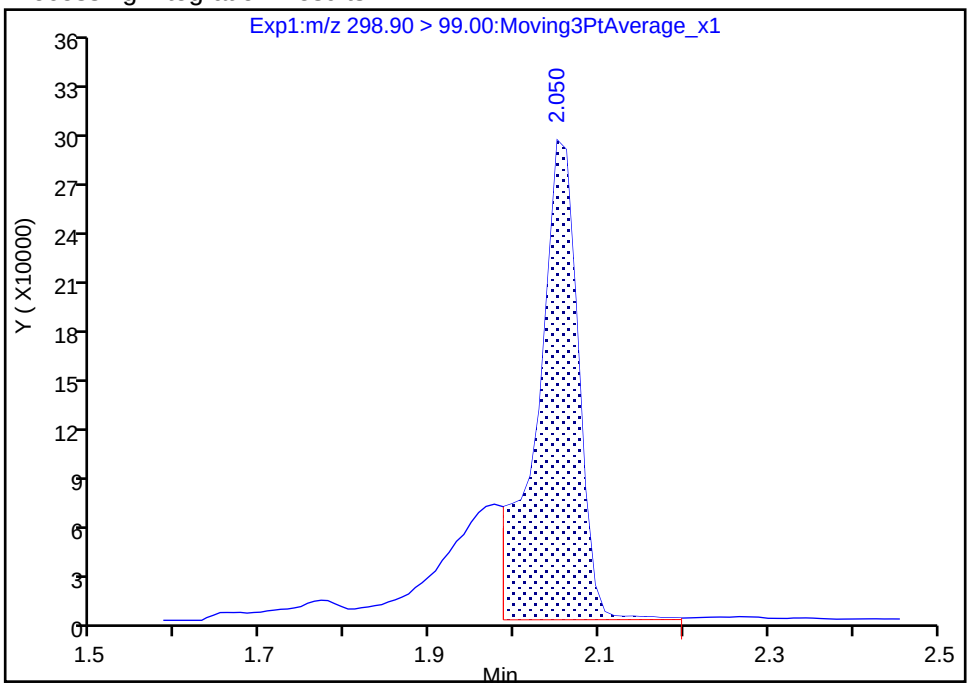
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

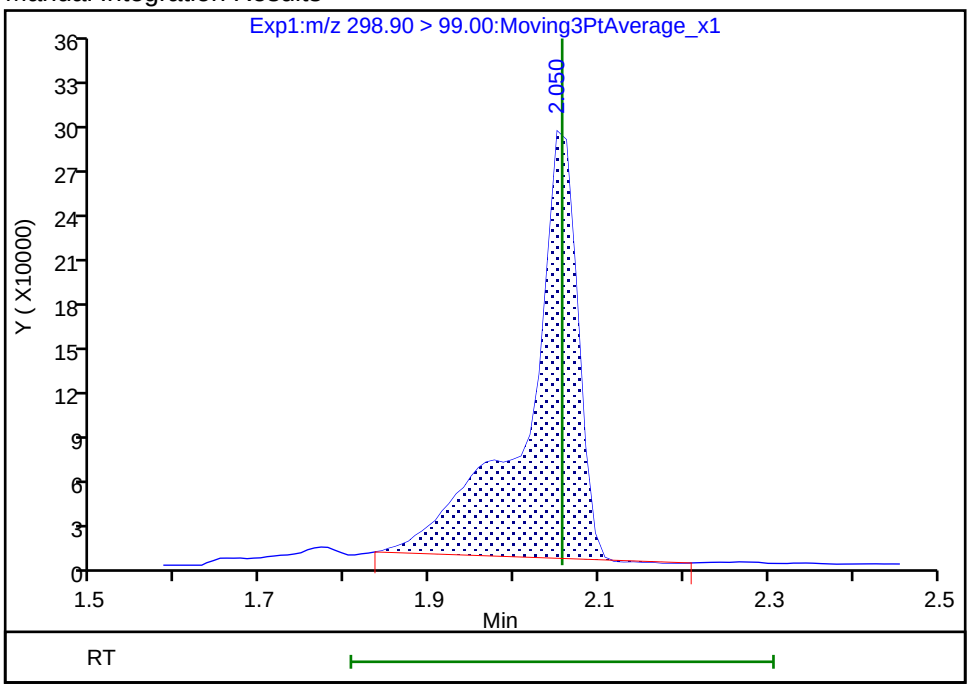
Processing Integration Results

RT: 2.05
Area: 969949
Amount: 0.018751
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 1198401
Amount: 2.133603
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:53:02

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

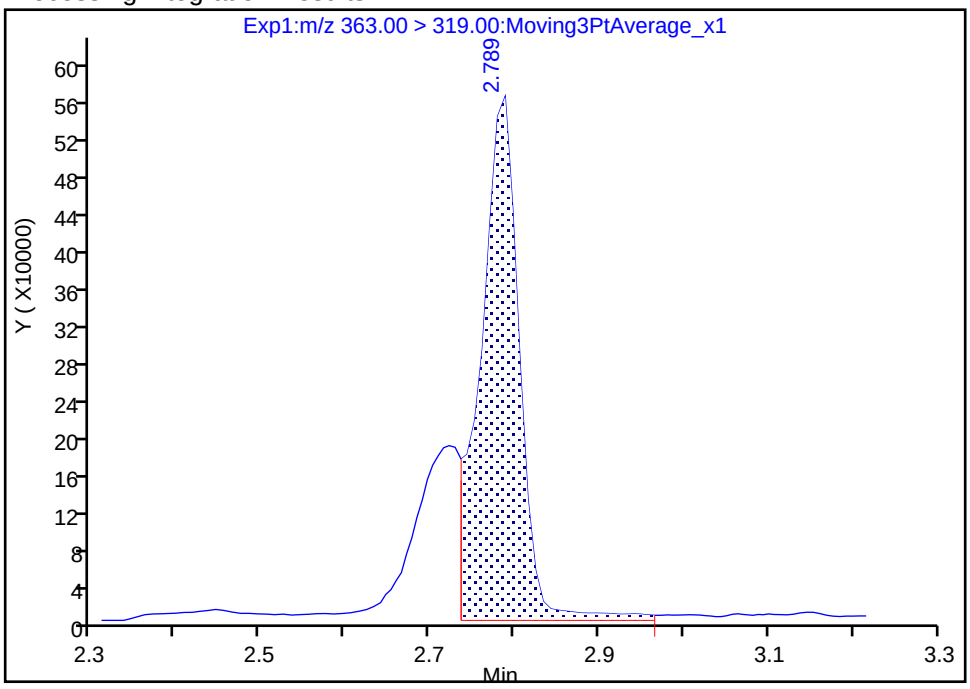
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

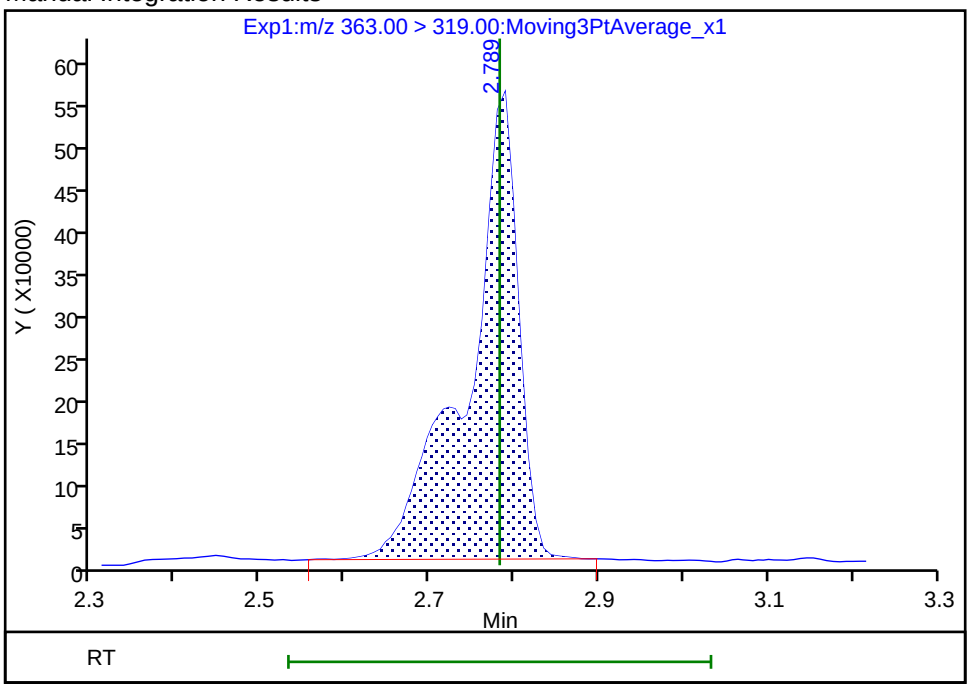
Processing Integration Results

RT: 2.79
Area: 1778233
Amount: 0.008620
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 2314106
Amount: 1.009546
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:53:16

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

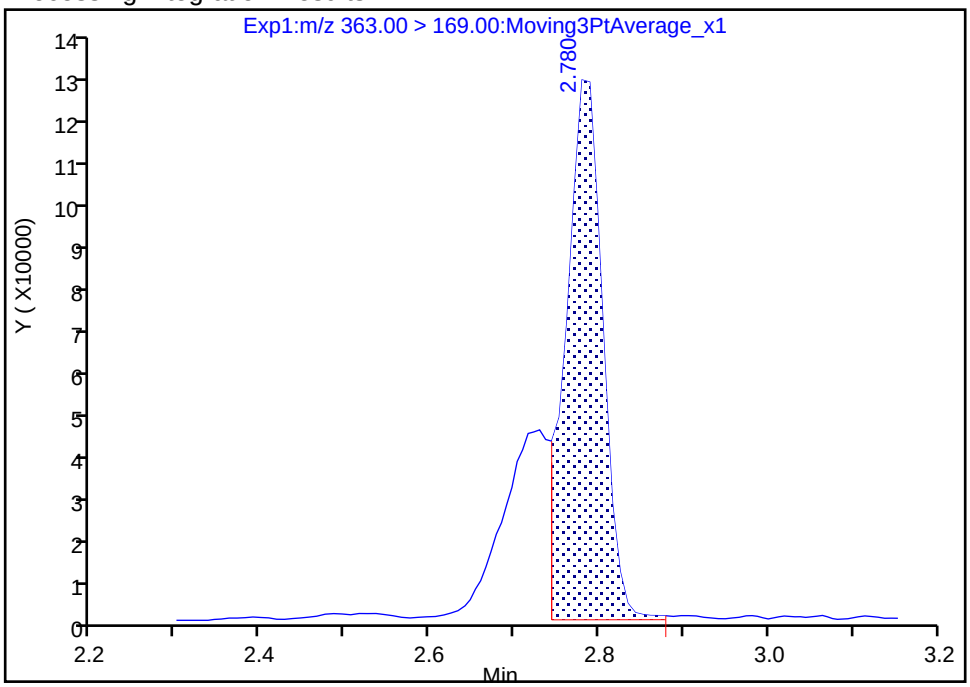
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 2

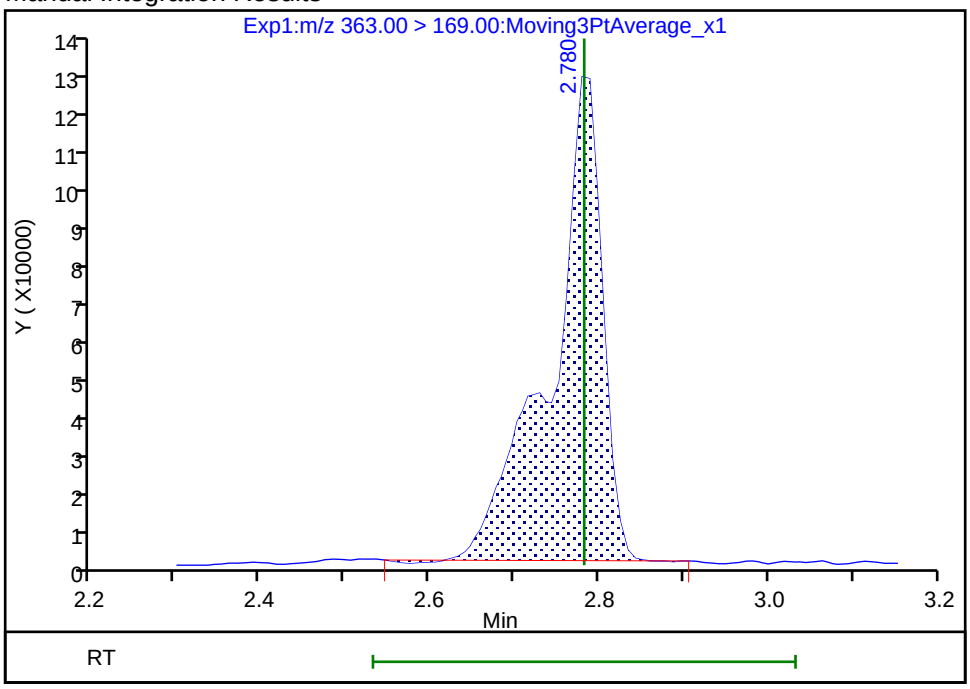
Processing Integration Results

RT: 2.78
Area: 358846
Amount: 0.008620
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 504218
Amount: 1.009546
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:53:17

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

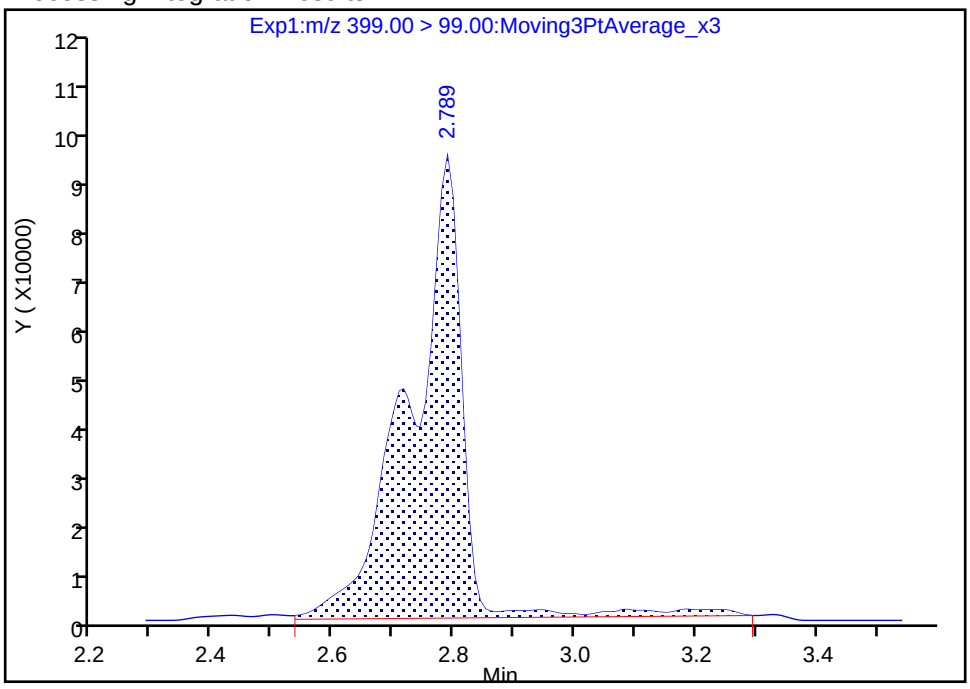
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 2

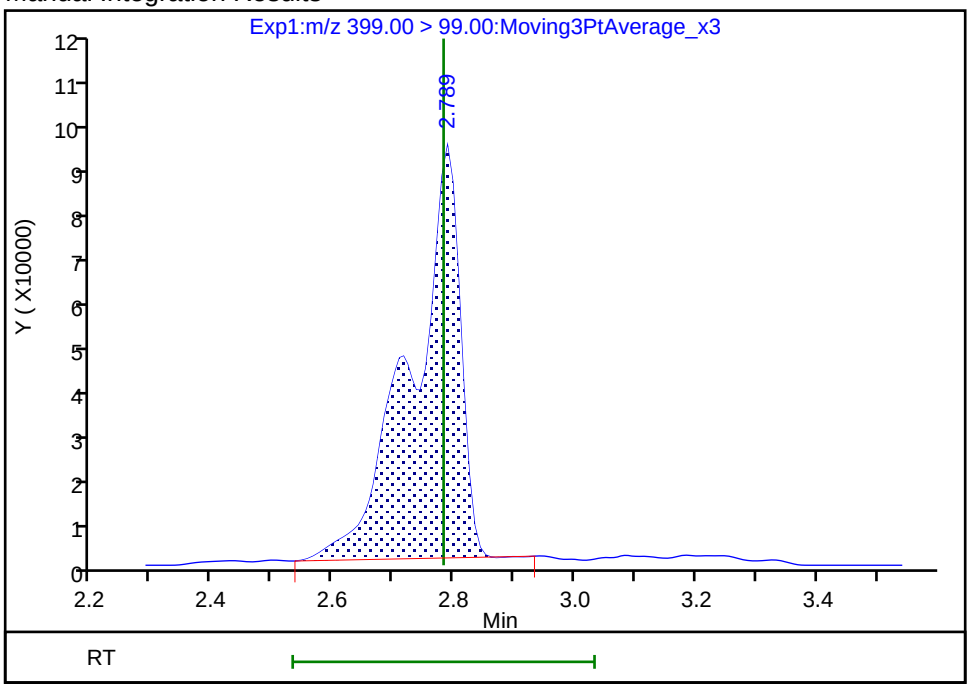
Processing Integration Results

RT: 2.79
Area: 549000
Amount: 0.010532
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 503532
Amount: 0.947910
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:53:23

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

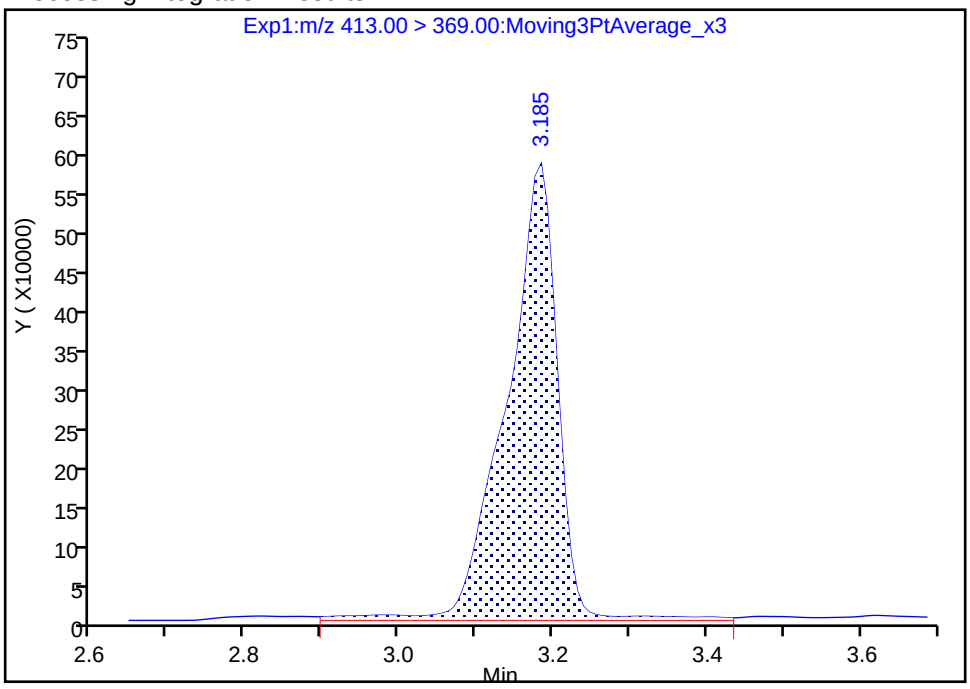
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_038.d				
Injection Date:	08-Jan-2019 23:34:01	Instrument ID:	A9		
Lims ID:	140-13780-A-5-C	Lab Sample ID:	320-13780-5		
Client ID:	D-2086 R2 XAD-2 Resin #2				
Operator ID:	A9\Administrator	ALS Bottle#:	26	Worklist Smp#:	9
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

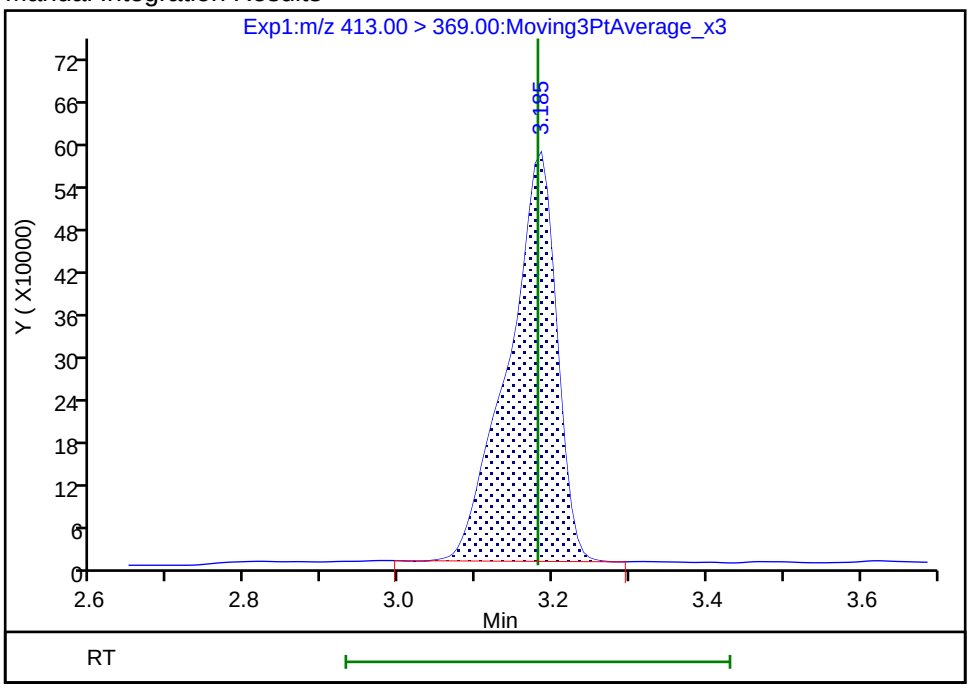
Processing Integration Results

RT: 3.18
Area: 2690547
Amount: 0.011608
Amount Units: ng/ml



Manual Integration Results

RT: 3.18
Area: 2517308
Amount: 0.977439
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:53:30

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2087 R3 XAD-2 Resin #3 Lab Sample ID: 140-13780-6

Matrix: Air Lab File ID: 2019.01.08LLAAXX_039.d

Analysis Method: 537 (modified) Date Collected: 12/20/2018 08:00

Extraction Method: None Date Extracted: 12/20/2018 12:25

Sample wt/vol: 1(Sample) Date Analyzed: 01/08/2019 23:41

Con. Extract Vol.: 360(mL) Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	37.8	B	0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	20.8	B	0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	18.9	B	0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	19.8		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	19.8	B	0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	20.2		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	49		25-150
STL01892	13C4 PFHpA	75		25-150
STL00995	13C5 PFNA	100		25-150
STL00990	13C4 PFOA	95		25-150
STL00991	13C4 PFOS	104		25-150
STL00994	18O2 PFHxS	81		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d
Lims ID: 140-13780-A-6-C
Client ID: D-2087 R3 XAD-2 Resin #3
Sample Type: Client
Inject. Date: 08-Jan-2019 23:41:30 ALS Bottle#: 27 Worklist Smp#: 10
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-6-c
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:55:37
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.676	1.679	-0.003	0.526	1970399	0.7638		30.6	210	
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.676	1.679	-0.003	1.000	569331	0.7803			6.1	M
4 Perfluoropentanoic acid										M
262.90 > 219.00	2.019	2.014	0.005	1.000	941356	0.9295			25.8	M
D 3 13C5 PFPeA										M
267.90 > 223.00	2.019	2.022	-0.003	0.634	2531478	1.12		44.9	435	M
D 5 13C3 PFBS										M
301.90 > 80.00	2.051	2.054	-0.003	0.644	4252681	1.15		49.4	33052	M
6 Perfluorobutanesulfonic acid										M
298.90 > 80.00	2.051	2.056	-0.005	1.000	3332992	1.89	Target=2.70		160	M
298.90 > 99.00	2.051	2.056	-0.005	1.000	1155368		2.88(1.35-4.05)		97.6	M
D 9 13C2 PFHxA										M
315.00 > 270.00	2.391	2.383	0.008	0.751	4022291	1.60		64.2	1815	M
10 Perfluorohexanoic acid										M
313.00 > 269.00	2.391	2.384	0.007	1.000	1598066	1.15	Target=13.92		75.9	M
313.00 > 119.00	2.391	2.384	0.007	1.000	119598		13.36(6.96-20.87)		39.9	M
D 16 13C4 PFHpA										M
367.00 > 322.00	2.780	2.782	-0.002	0.873	5802289	1.88		75.2	6322	M
D 17 18O2 PFHxS										M
403.00 > 84.00	2.789	2.782	0.007	0.876	4193793	1.92		81.3	4990	M
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.789	2.782	0.007	1.000	2068817	0.9430	Target=3.80		36.1	
399.00 > 99.00	2.789	2.782	0.007	1.000	541189		3.82(1.90-5.70)		74.0	M
15 Perfluoroheptanoic acid										M
363.00 > 319.00	2.789	2.782	0.007	1.003	2513519	1.04	Target=4.34		114	M
363.00 > 169.00	2.789	2.782	0.007	1.003	520547		4.83(2.17-6.52)		204	M

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.169	3.165	0.004	1.002	931186	0.9149			682	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.162	3.165	-0.003	0.993	1144773	3.77		159	631	
* 24 13C2 PFOA										
415.00 > 370.00	3.185	3.180	0.005		6756184	2.50			2397	
23 Perfluoroheptanesulfonic acid										M
449.00 > 80.00	3.177	3.180	-0.003	0.893	2200450	0.9024	Target=3.69		368	
449.00 > 99.00	3.177	3.180	-0.003	0.893	550018		4.00(1.84-5.53)		475	M
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.185	3.180	0.005	1.000	2675747	1.01	Target=2.72		147	M
413.00 > 169.00	3.185	3.180	0.005	1.000	961571		2.78(1.36-4.08)		668	
D 25 13C4 PFOA										
417.00 > 372.00	3.185	3.180	0.005	1.000	6380957	2.39		95.4	1955	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.557	3.552	0.005	1.000	2411773	0.99	Target=4.08		435	
499.00 > 99.00	3.557	3.552	0.005	1.000	575168		4.19(2.04-6.12)			
D 28 13C4 PFOS										
503.00 > 80.00	3.557	3.552	0.005	1.117	5523678	2.48		104	1892	
30 Perfluorononanoic acid										
463.00 > 419.00	3.572	3.567	0.005	1.002	2380380	0.9892	Target=5.35		152	
463.00 > 169.00	3.565	3.567	-0.002	1.000	429268		5.55(2.68-8.03)		355	
D 31 13C5 PFNA										
468.00 > 423.00	3.565	3.567	-0.002	1.119	6043376	2.51		100	3678	
D 33 13C8 FOSA										
506.00 > 78.00	3.891	3.885	0.006	1.222	3240331	2.21		88.5	2388	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.891	3.885	0.006	1.000	4049836	1.07			998	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.933	3.927	0.006	1.235	102051	2.92		122	268	
D 36 13C2 PFDA										
515.00 > 470.00	3.924	3.927	-0.003	1.232	5895604	2.50		100	2783	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.924	3.927	-0.003	0.998	603608	1.00			1494	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.924	3.927	-0.003	1.000	2854216	1.05	Target=14.23		422	
513.00 > 169.00	3.924	3.927	-0.003	1.000	192751		14.81(7.12-21.35)		235	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.089	4.093	-0.004	1.284	1591298	2.58		103	1978	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.089	4.093	-0.004	1.000	542531	0.9837			137	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.222	4.225	-0.003	1.187	2145947	1.06	Target=4.28		1147	
599.00 > 99.00	4.222	4.225	-0.003	1.187	446909		4.80(2.14-6.43)		792	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.248	4.250	-0.002	1.334	1443848	2.81		112	1841	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.239	4.250	-0.011	1.331	5008787	2.70		108	2907	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.248	4.250	-0.002	1.002	1658980	0.99	Target=10.48		360	
563.00 > 169.00	4.248	4.250	-0.002	1.002	161334		10.28(5.24-15.72)		422	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.257	4.259	-0.002	1.002	460540	0.9632			614	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.539	4.534	0.005	1.000	2389755	1.02	Target=9.37		469	
613.00 > 169.00	4.539	4.534	0.005	1.000	261651		9.13(4.68-14.05)		700	
D 49 13C2 PFDoA										
615.00 > 570.00	4.539	4.541	-0.002	1.425	6086558	2.71		108	3276	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.800	4.803	-0.003	1.057	2120576	1.15	Target=6.18		834	
663.00 > 169.00	4.800	4.803	-0.003	1.057	358918		5.91(3.09-9.27)		1092	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.044	5.049	-0.005	1.584	4410678	2.83		113	2349	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.053	5.050	0.003	1.002	265776	0.9226	Target=1.39		696	
713.00 > 219.00	5.044	5.050	-0.006	1.000	196194		1.35(0.70-2.09)		642	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:39 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d

Injection Date: 08-Jan-2019 23:41:30 Instrument ID: A9

Lims ID: 140-13780-A-6-C Lab Sample ID: 320-13780-6

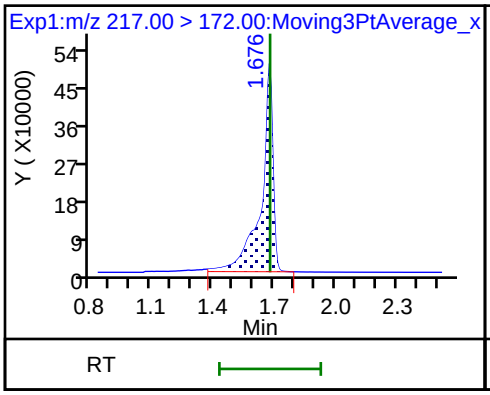
Client ID: D-2087 R3 XAD-2 Resin #3

Operator ID: A9\Administrator ALS Bottle#: 27 Worklist Smp#: 10

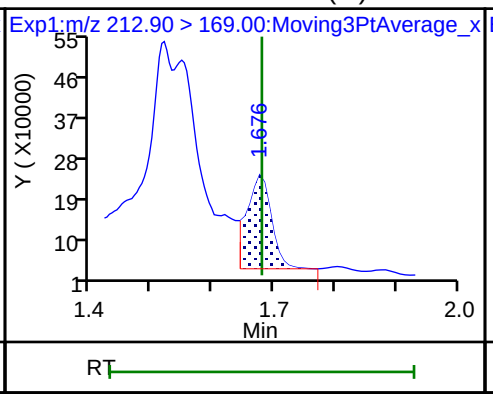
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

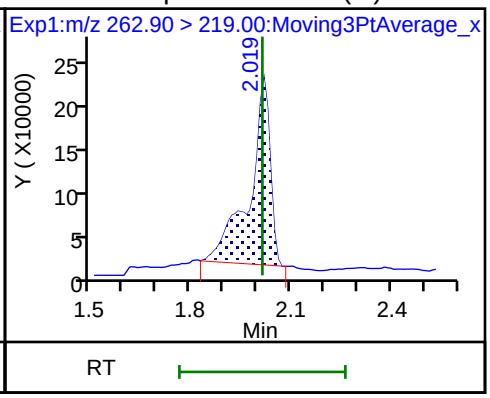
D 1 13C4 PFBA



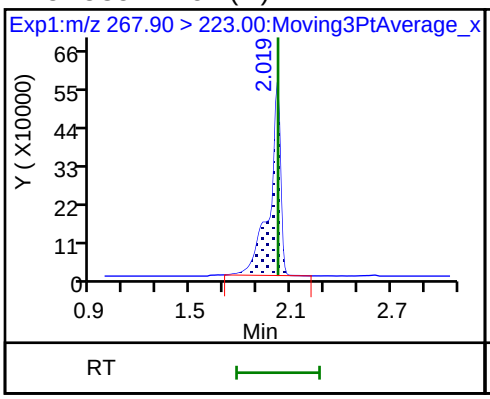
2 Perfluorobutanoic acid (M)



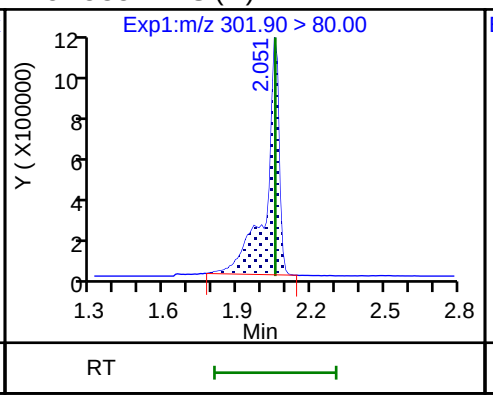
4 Perfluoropentanoic acid (M)



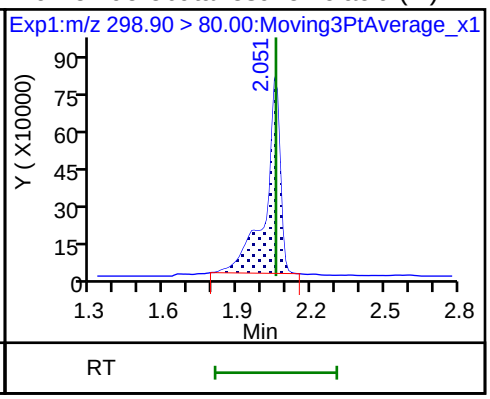
D 3 13C5 PFPeA (M)



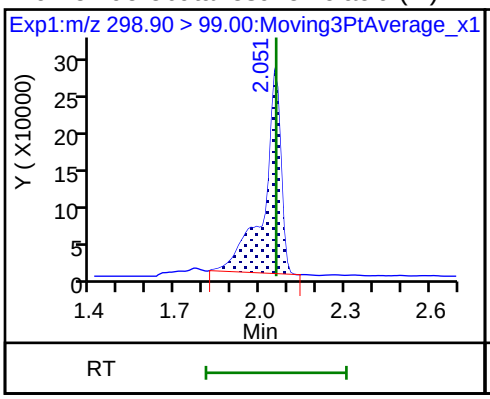
D 5 13C3 PFBS (M)



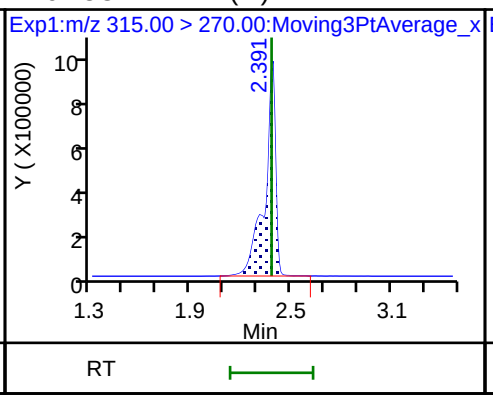
6 Perfluorobutanesulfonic acid (M)



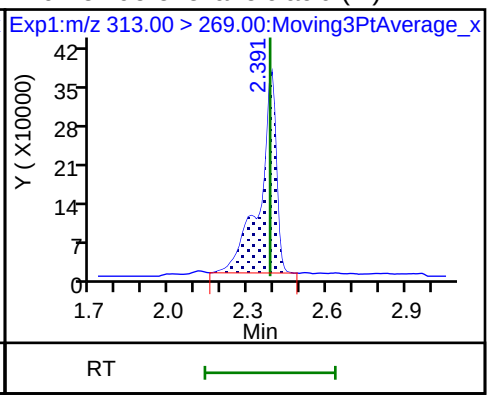
6 Perfluorobutanesulfonic acid (M)



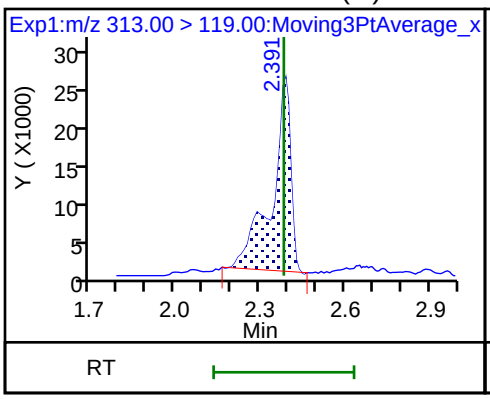
D 9 13C2 PFHxA (M)



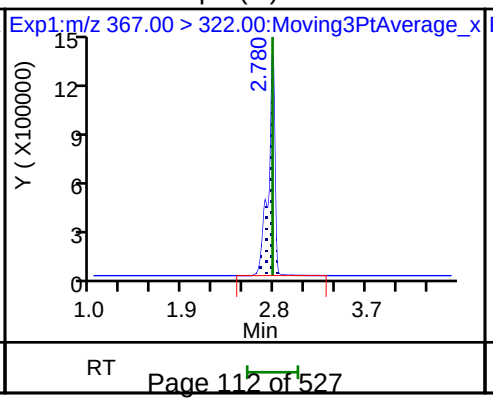
10 Perfluorohexanoic acid (M)



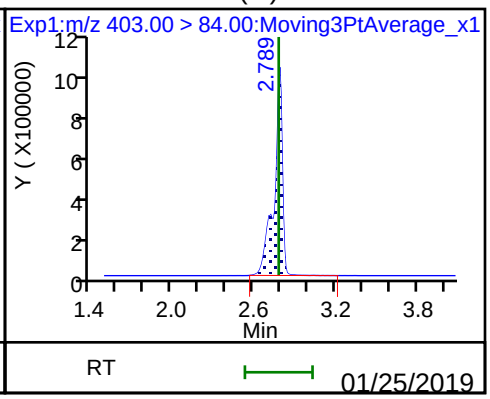
10 Perfluorohexanoic acid (M)



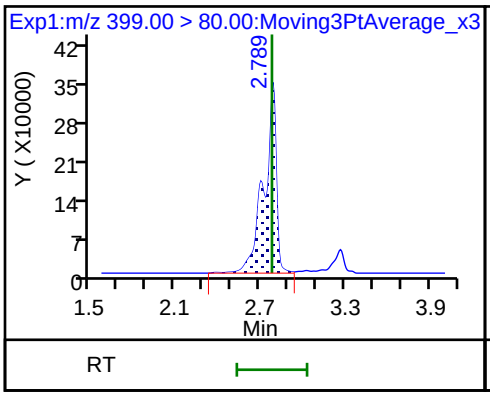
D 16 13C4 PFHpA (M)



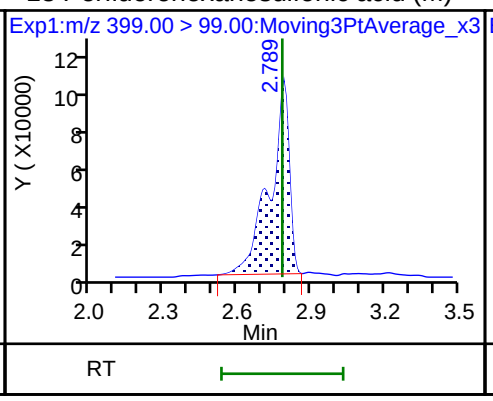
D 17 18O2 PFHxS (M)



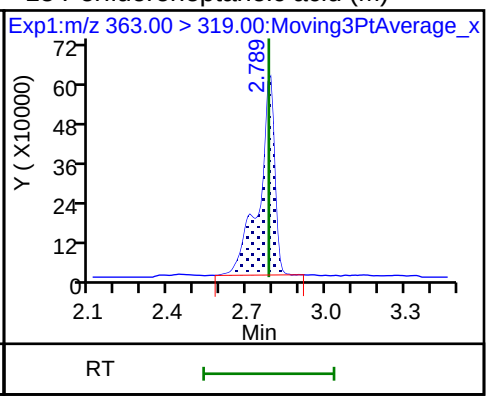
18 Perfluorohexanesulfonic acid



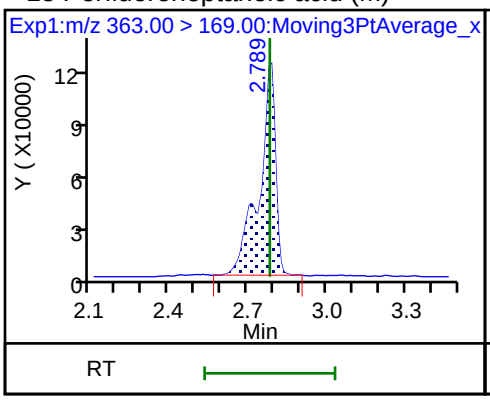
18 Perfluorohexanesulfonic acid (M)



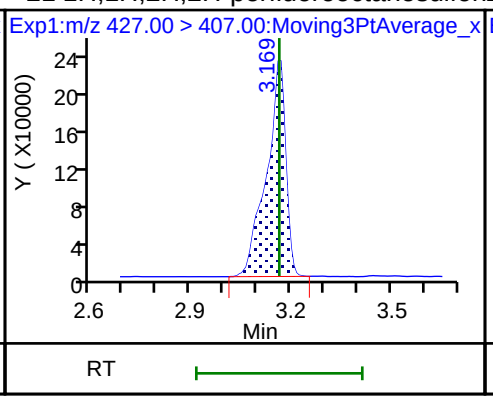
15 Perfluoroheptanoic acid (M)



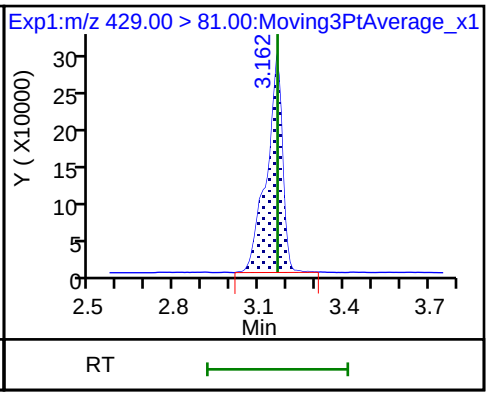
15 Perfluoroheptanoic acid (M)



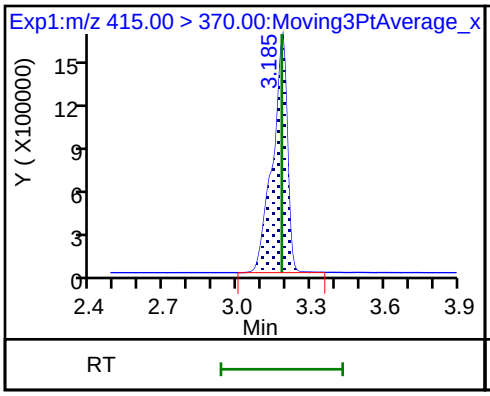
21 1H,1H,2H,2H-perfluorooctanesulfon



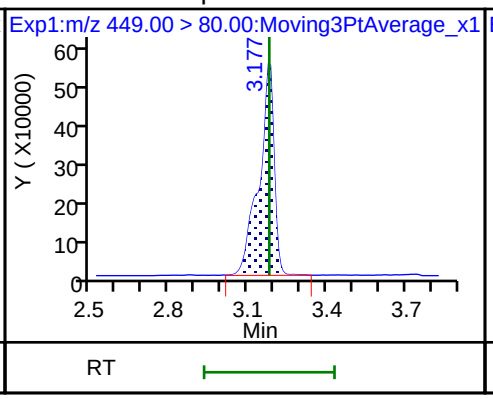
D 20 M2-6:2 FTS



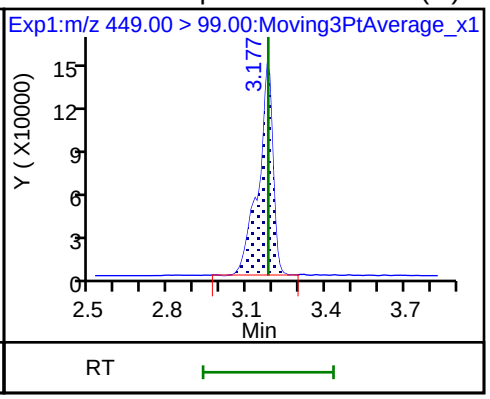
* 24 13C2 PFOA



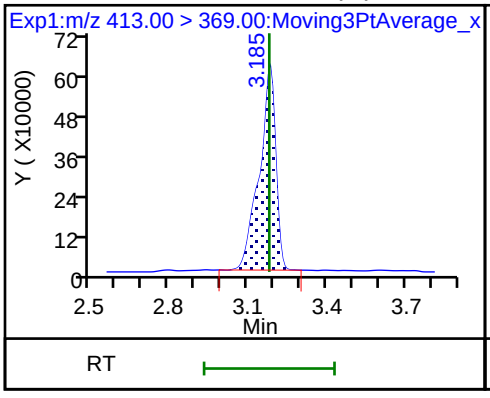
23 Perfluoroheptanesulfonic acid



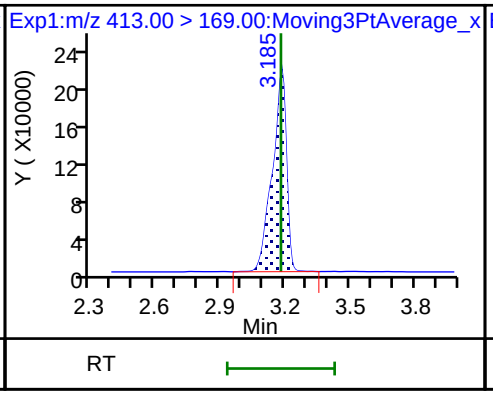
23 Perfluoroheptanesulfonic acid (M)



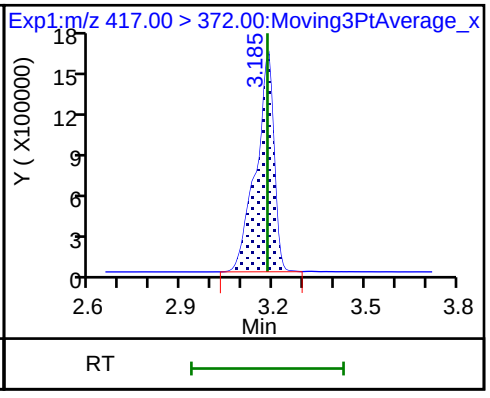
26 Perfluorooctanoic acid (M)



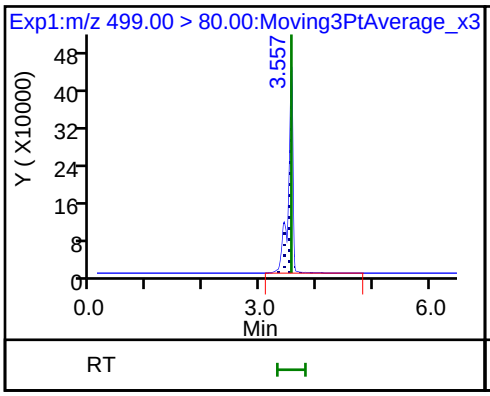
26 Perfluorooctanoic acid



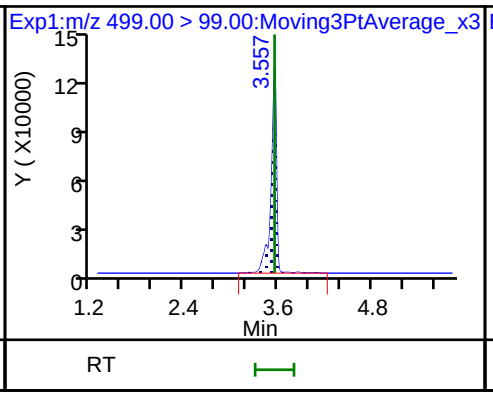
D 25 13C4 PFOA



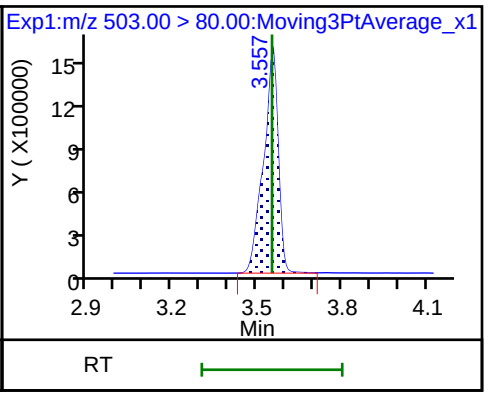
29 Perfluorooctanesulfonic acid



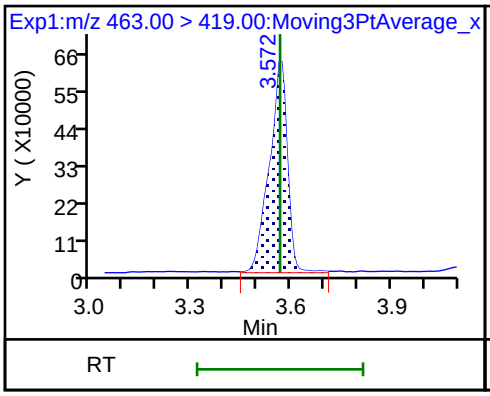
29 Perfluorooctanesulfonic acid



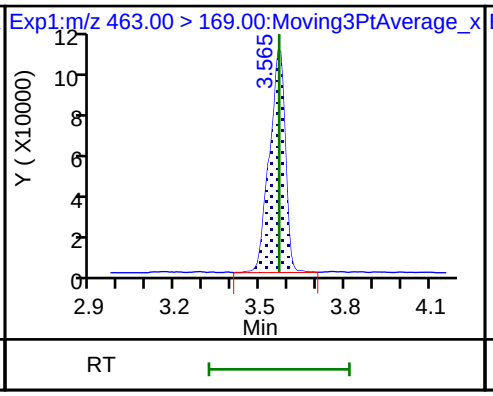
D 28 13C4 PFOS



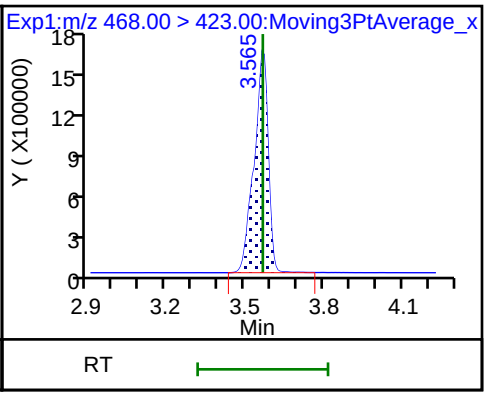
30 Perfluorononanoic acid



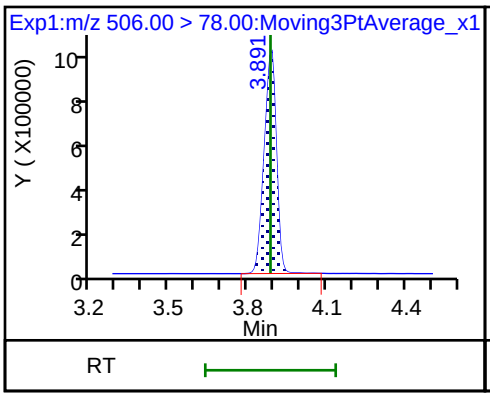
30 Perfluorononanoic acid



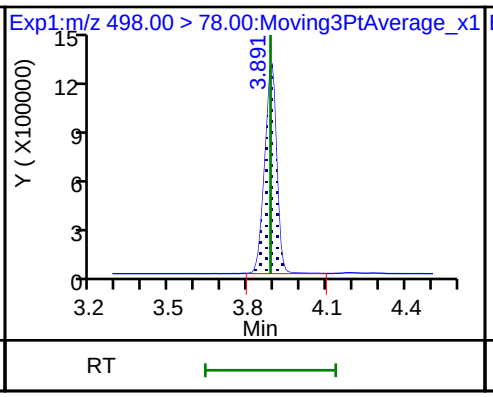
D 31 13C5 PFNA



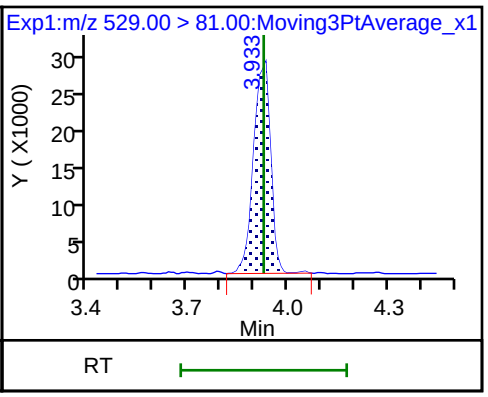
D 33 13C8 FOSA



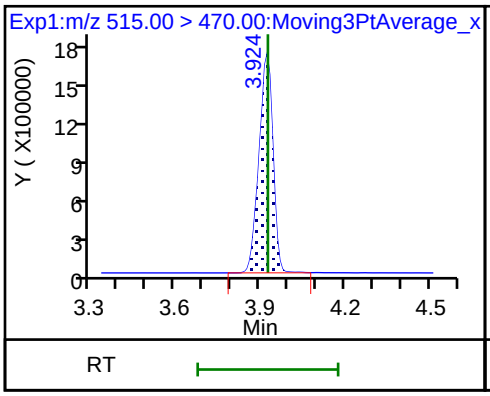
34 Perfluorooctanesulfonamide



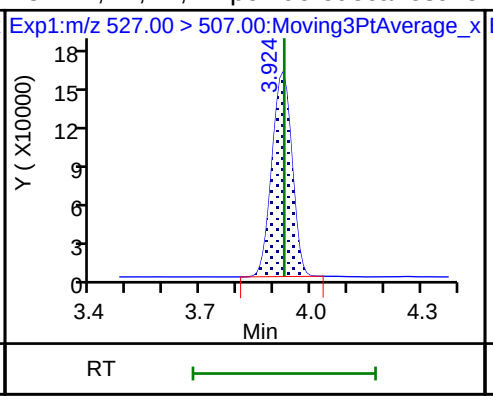
D 39 M2-8:2 FTS



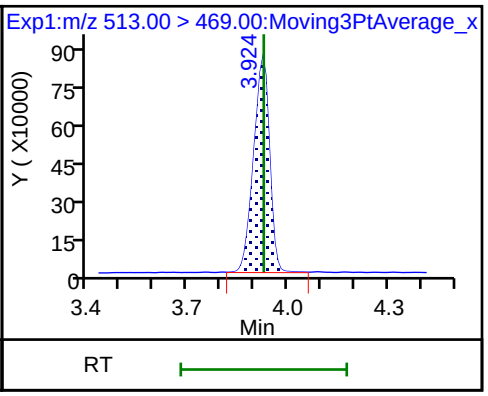
D 36 13C2 PFDA



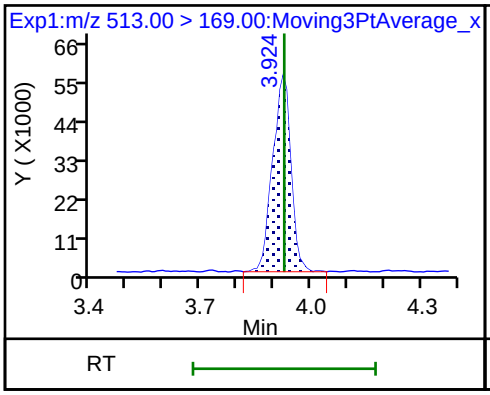
37 1H,1H,2H,2H-perfluorodecanesulfoni



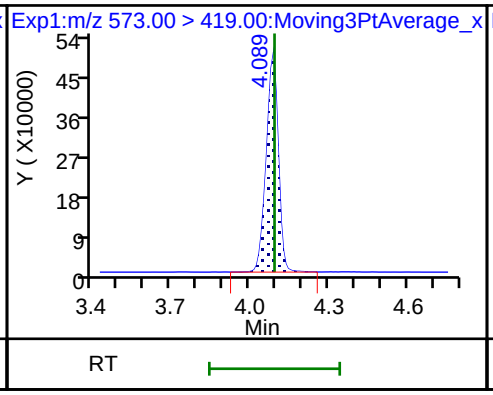
38 Perfluorodecanoic acid



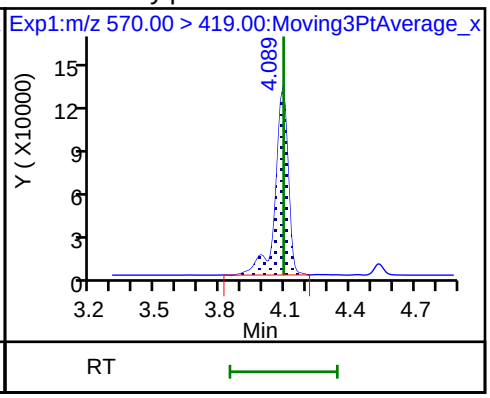
38 Perfluorodecanoic acid



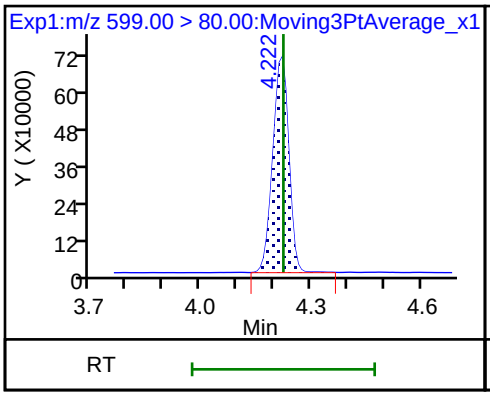
D 40 d3-NMeFOSAA



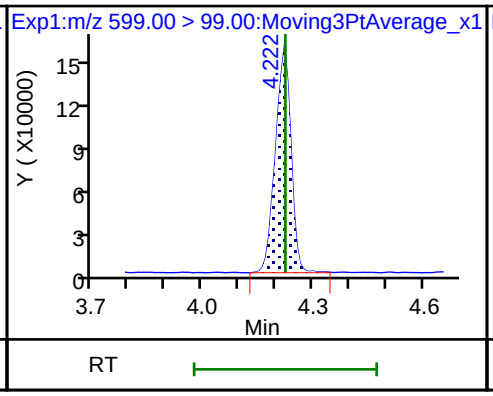
41 N-methylperfluorooctanesulfonamido



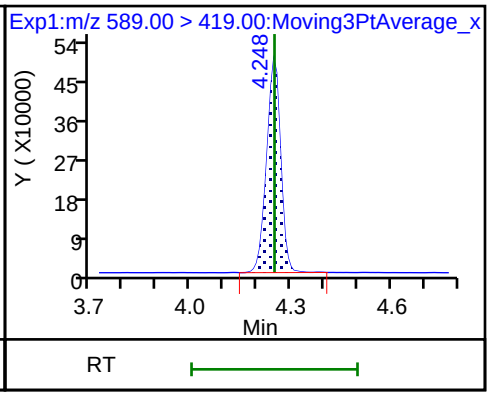
42 Perfluorodecanesulfonic acid



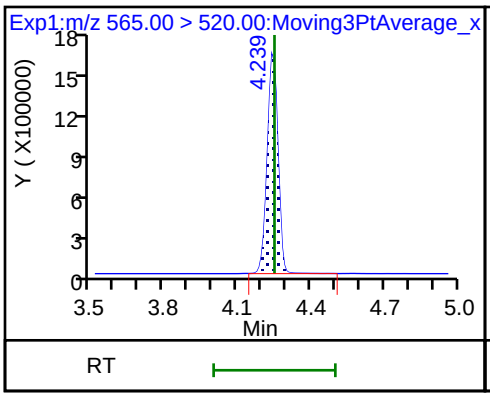
42 Perfluorodecanesulfonic acid



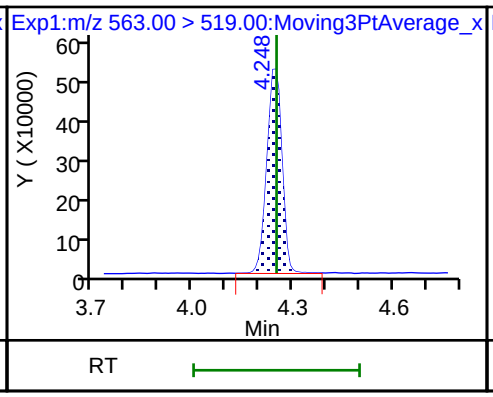
D 45 d5-NEtFOSAA



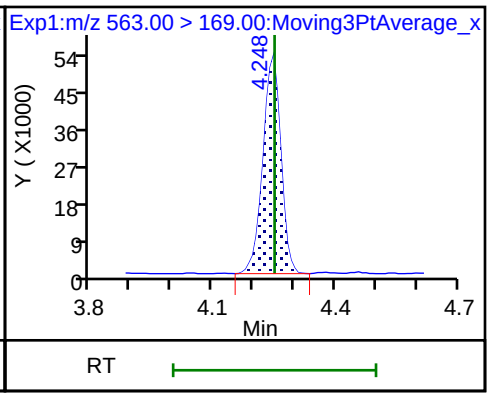
D 44 13C2 PFUnA



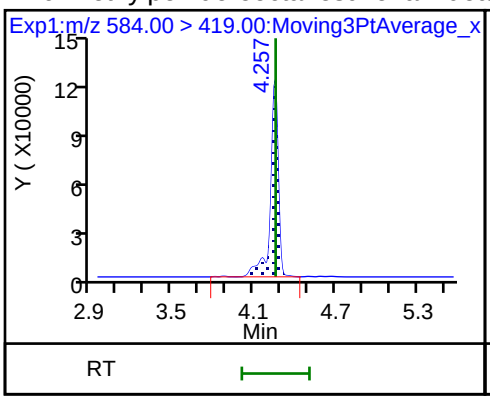
43 Perfluoroundecanoic acid



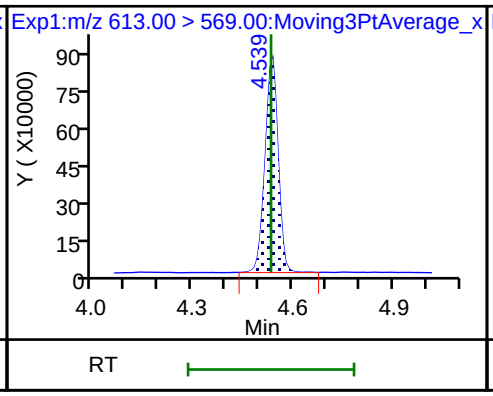
43 Perfluoroundecanoic acid



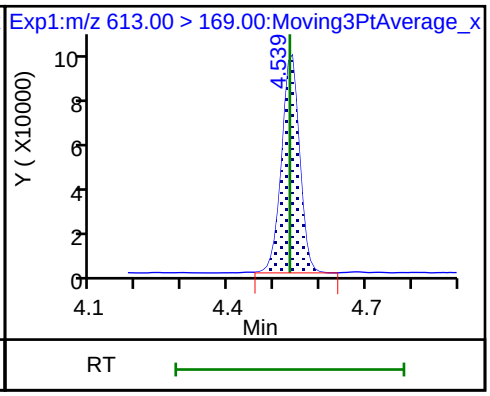
46 N-ethylperfluorooctanesulfonamidoa



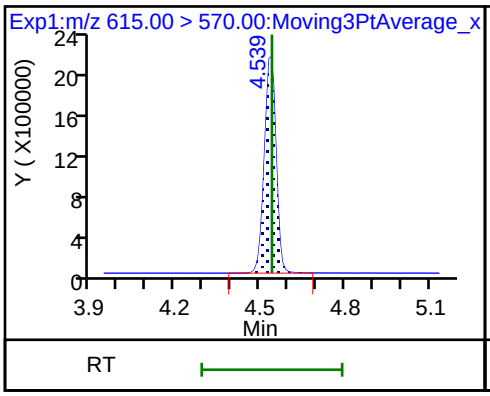
50 Perfluorododecanoic acid



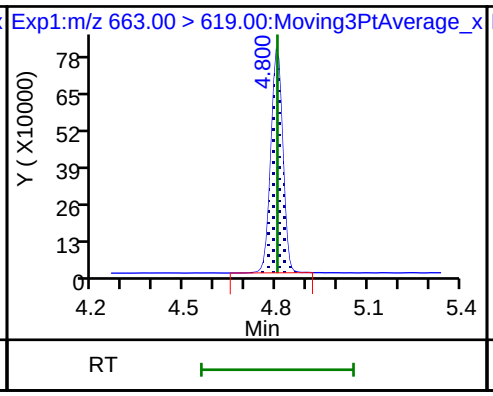
50 Perfluorododecanoic acid



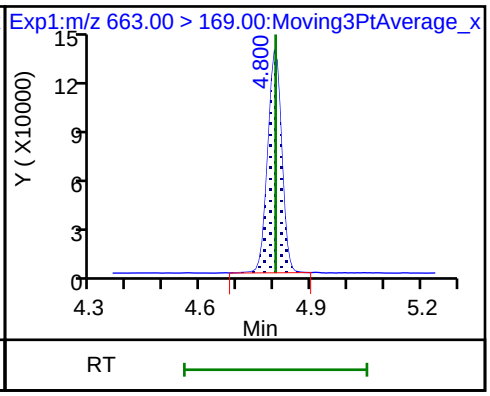
D 49 13C2 PFDoA



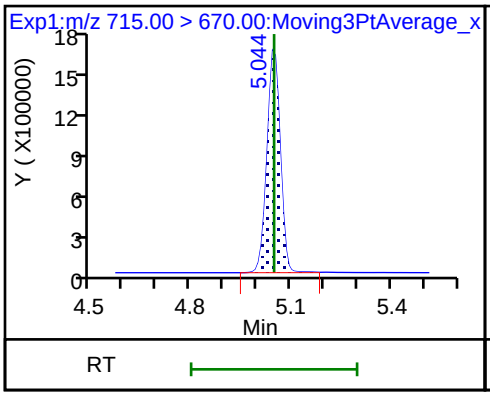
54 Perfluorotridecanoic acid



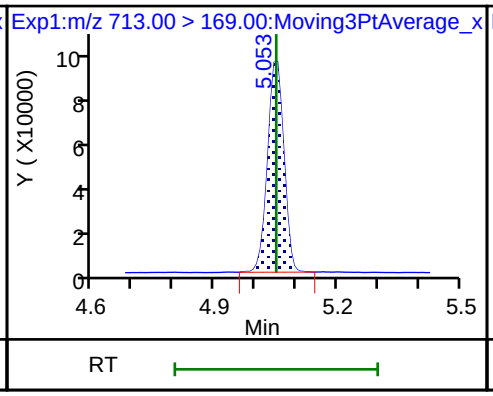
54 Perfluorotridecanoic acid



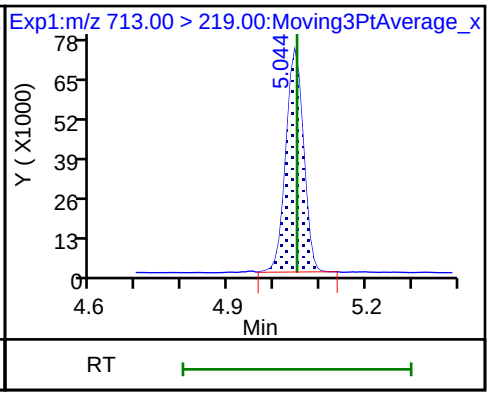
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

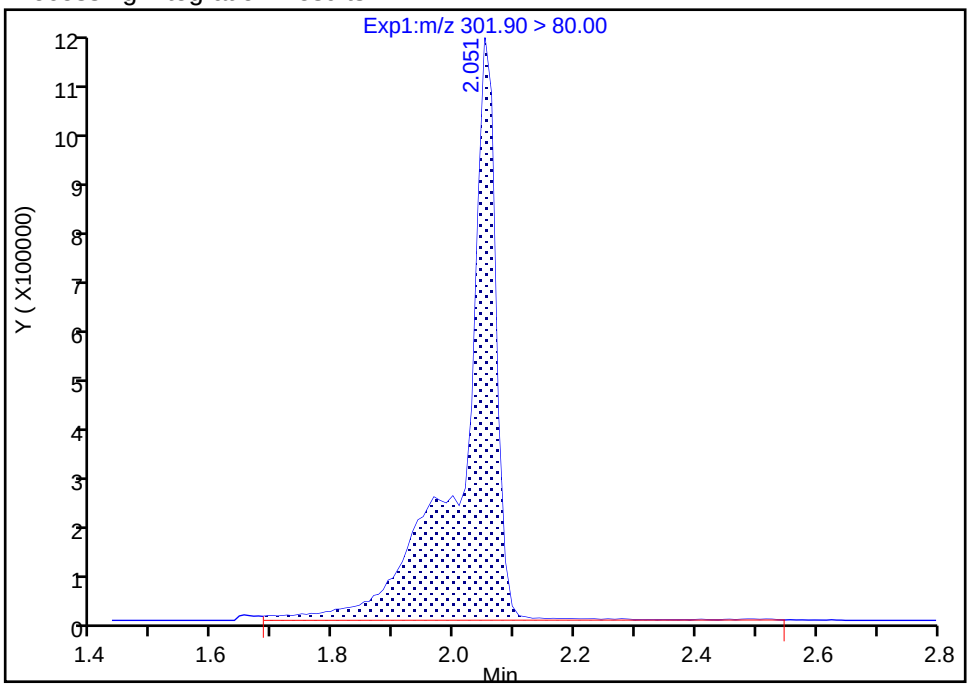
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 5 13C3 PFBS, CAS: STL02337

Signal: 1

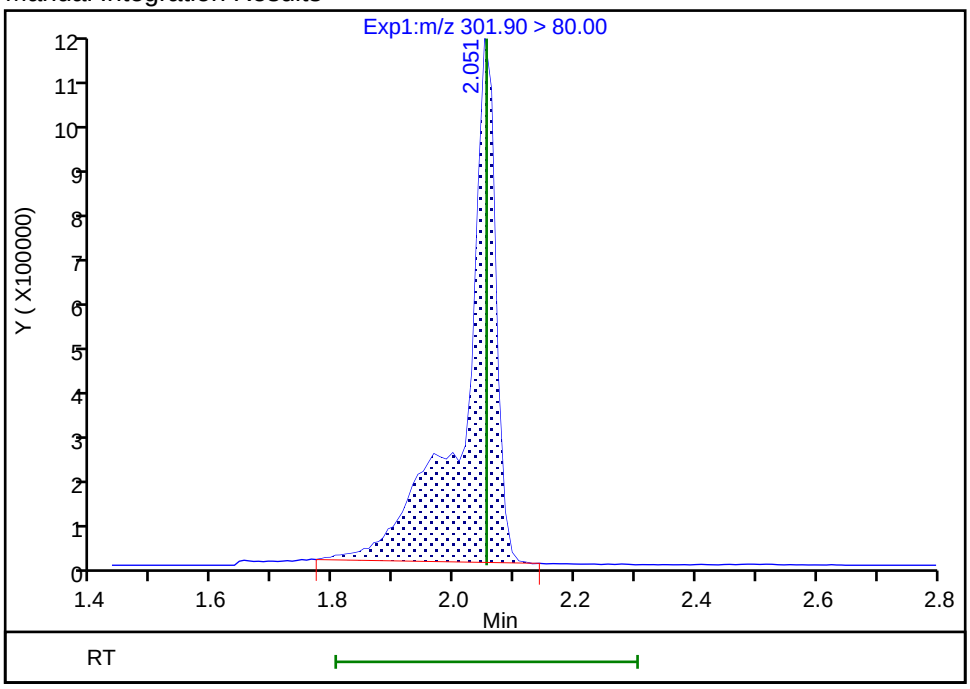
Processing Integration Results

RT: 2.05
Area: 4518120
Amount: 1.219077
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 4252681
Amount: 1.147456
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:54:10

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

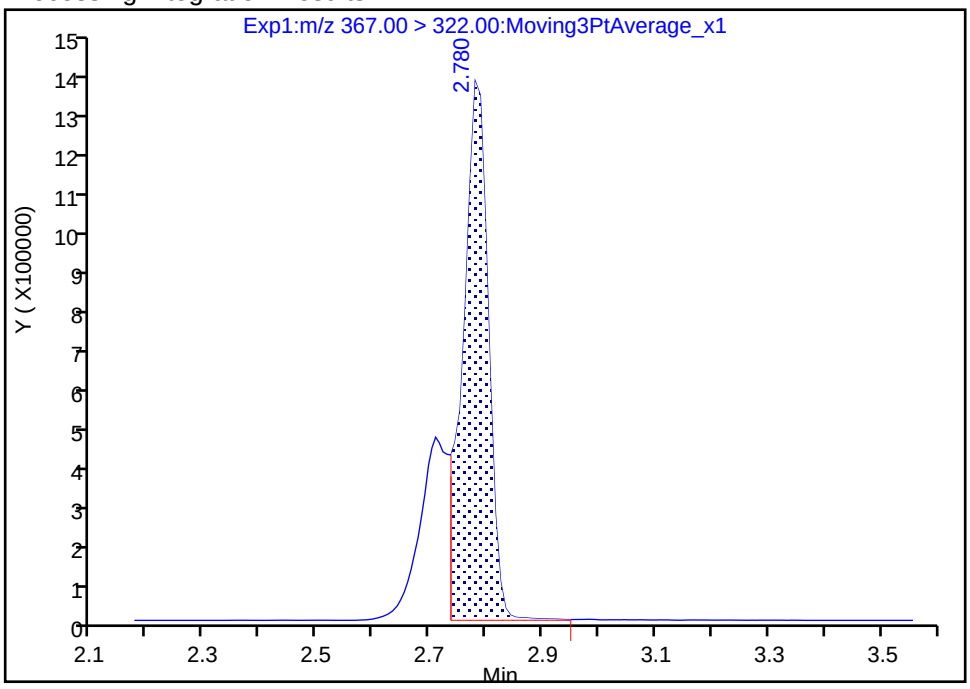
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 16 13C4 PFHpA, CAS: STL01892

Signal: 1

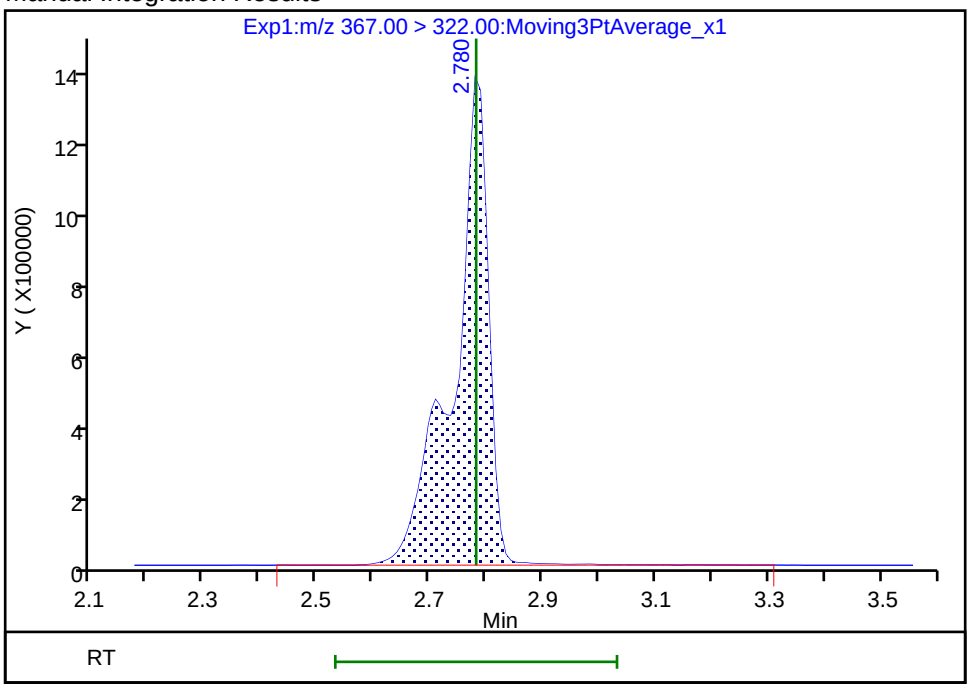
Processing Integration Results

RT: 2.78
Area: 4161714
Amount: 1.349283
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 5802289
Amount: 1.881179
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:54:23

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

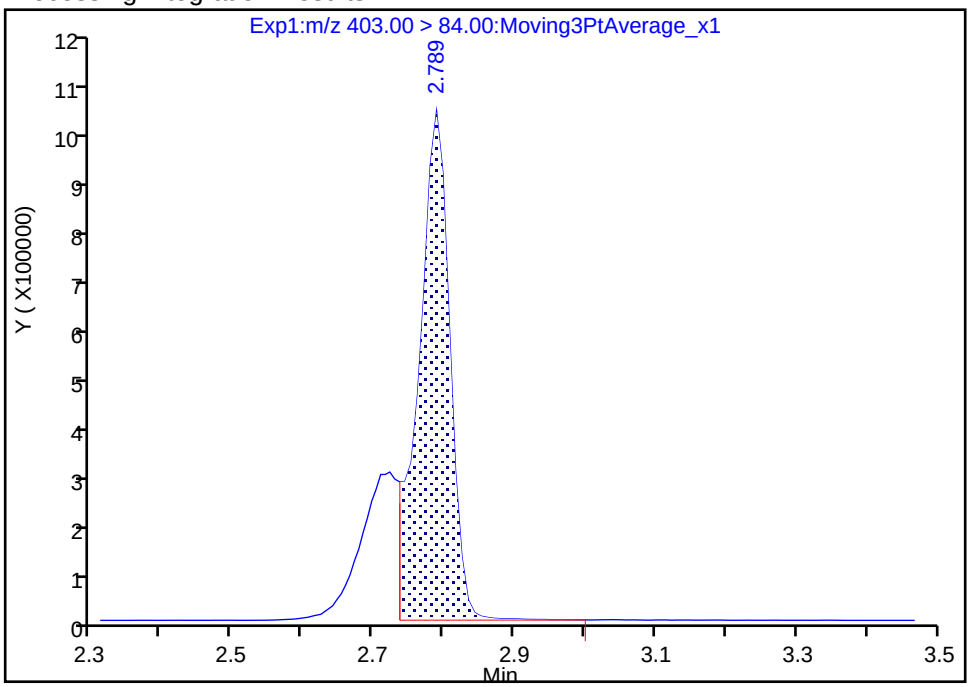
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

D 17 18O2 PFHxS, CAS: STL00994

Signal: 1

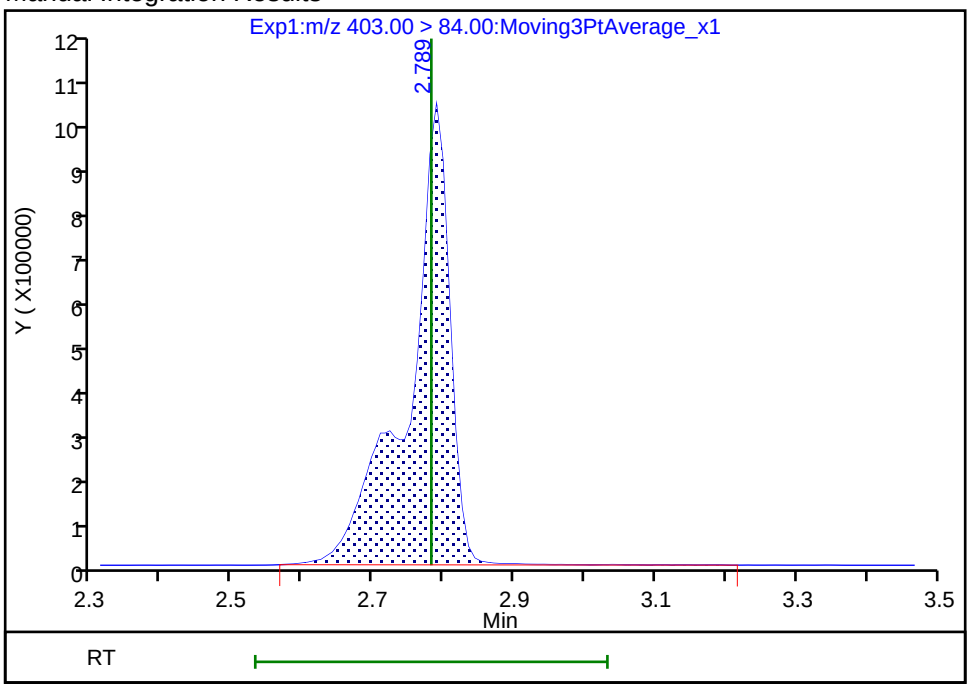
Processing Integration Results

RT: 2.79
Area: 3104543
Amount: 1.423809
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 4193793
Amount: 1.923362
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:54:20

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

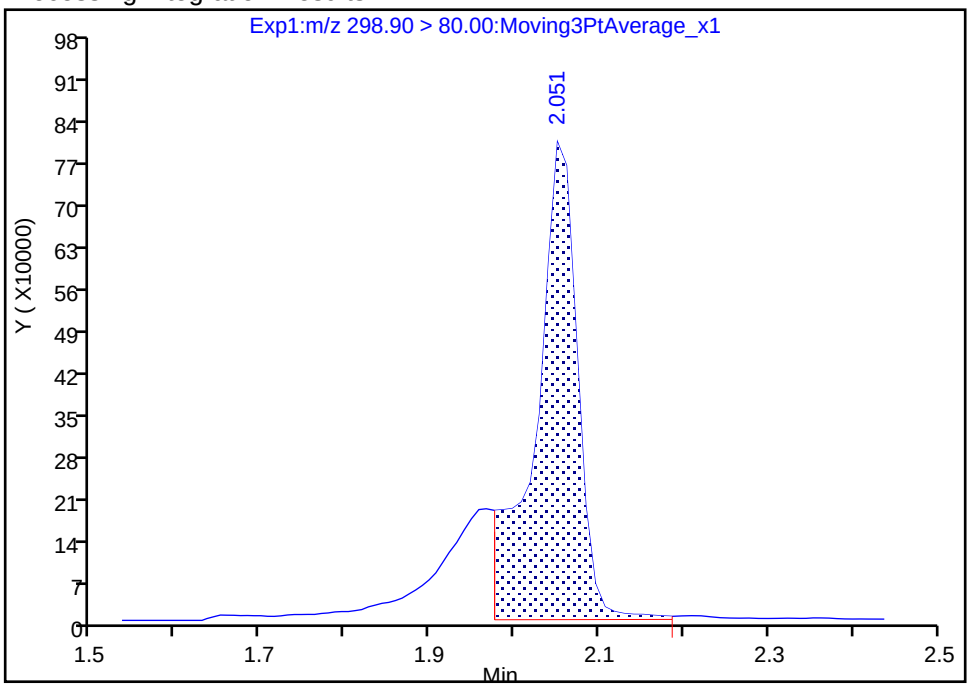
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

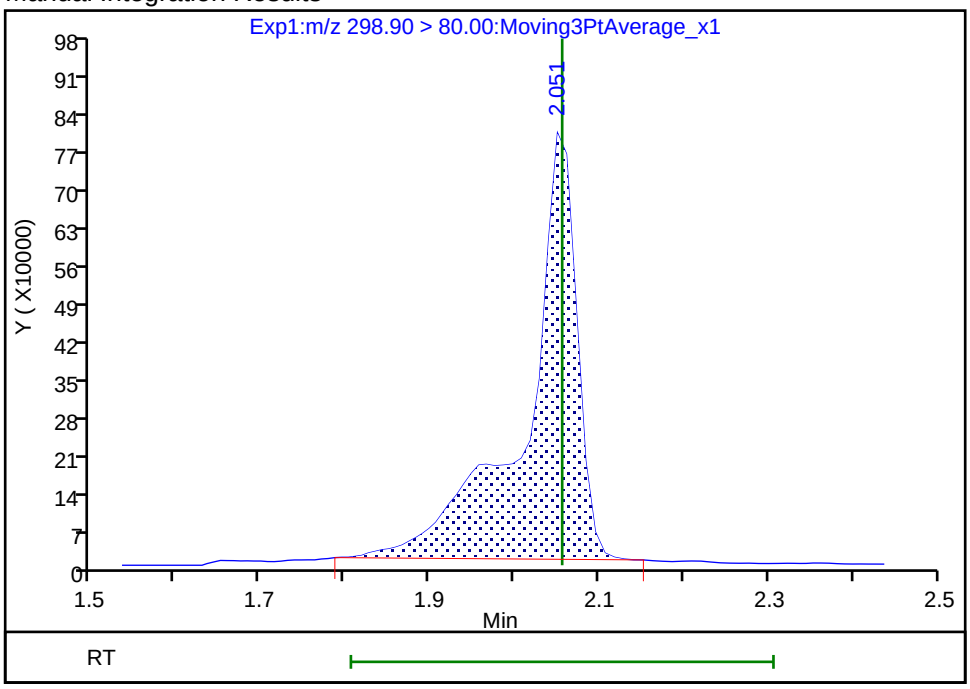
Processing Integration Results

RT: 2.05
Area: 2733557
Amount: 0.017210
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 3332992
Amount: 1.888509
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:54:53

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

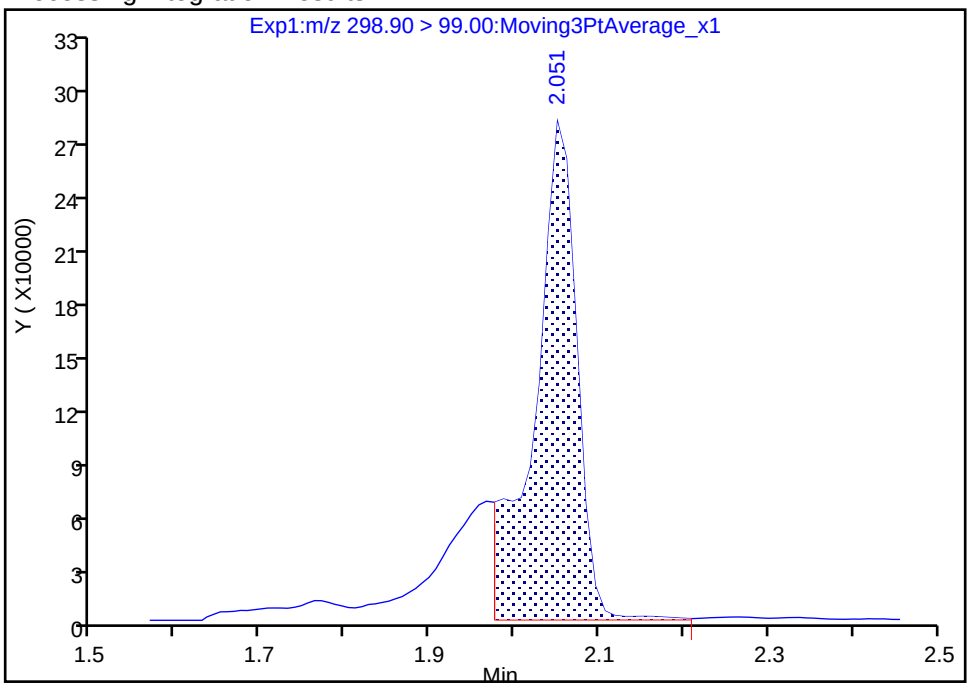
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

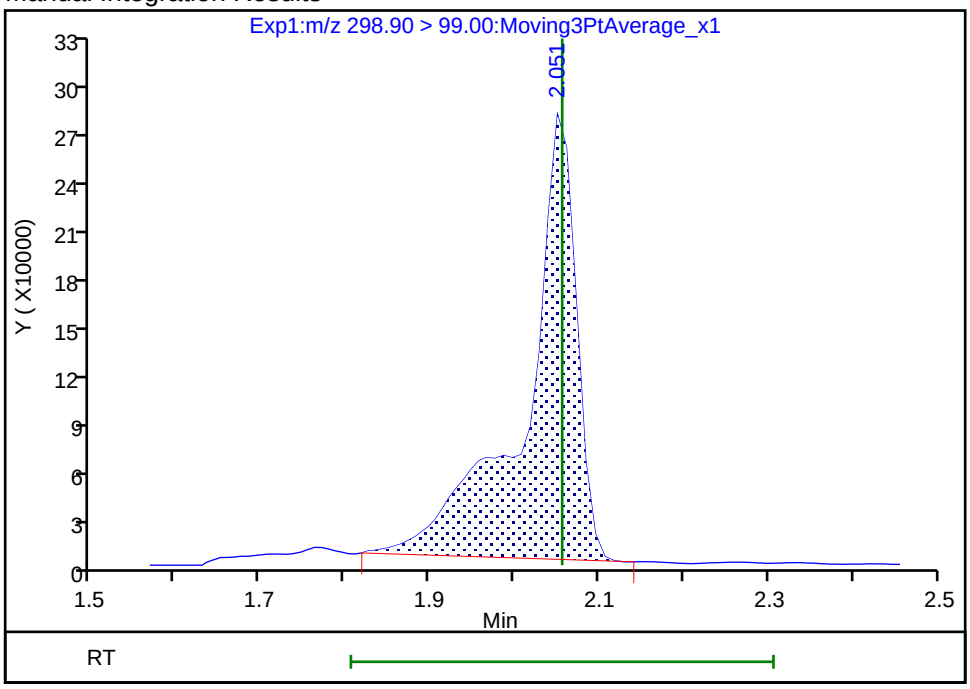
Processing Integration Results

RT: 2.05
Area: 956525
Amount: 0.017210
Amount Units: ng/ml



Manual Integration Results

RT: 2.05
Area: 1155368
Amount: 1.888509
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:54:54
Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

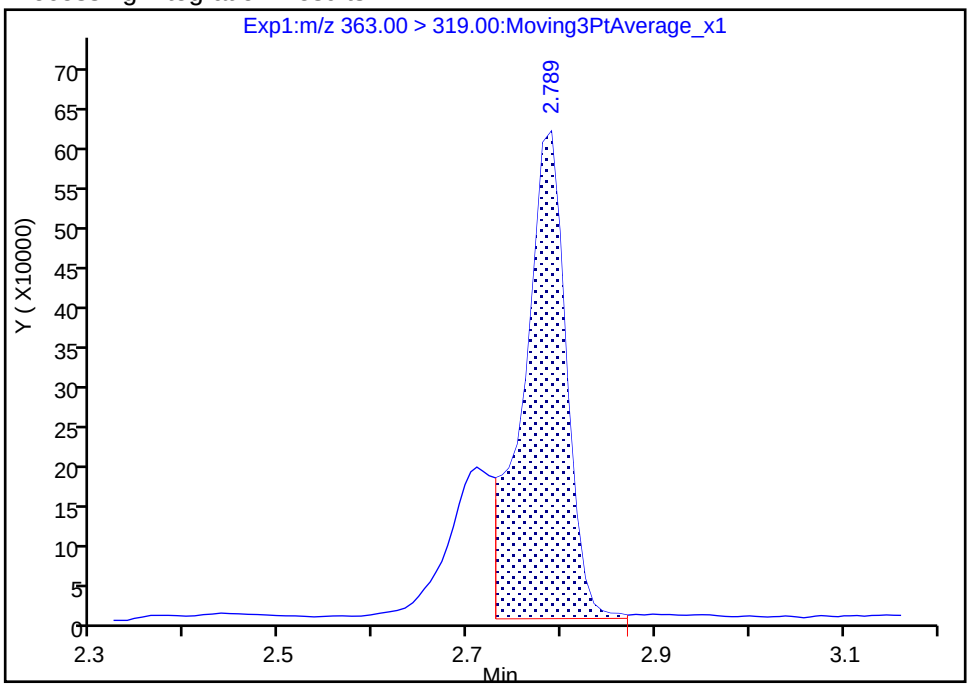
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

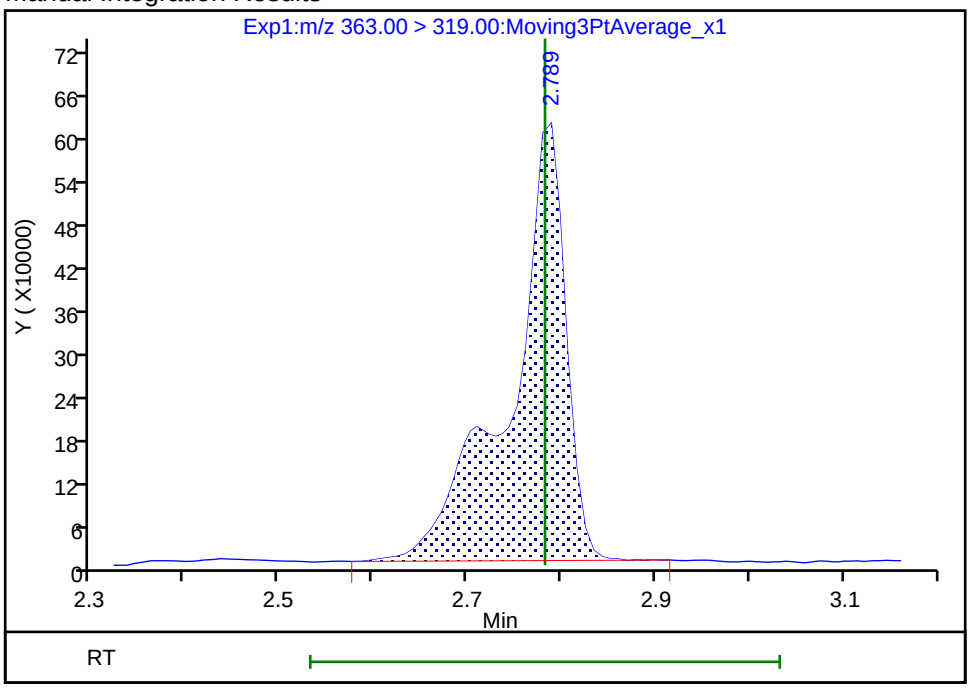
Processing Integration Results

RT: 2.79
Area: 1934047
Amount: 0.008899
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 2513519
Amount: 1.040914
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:55:04

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

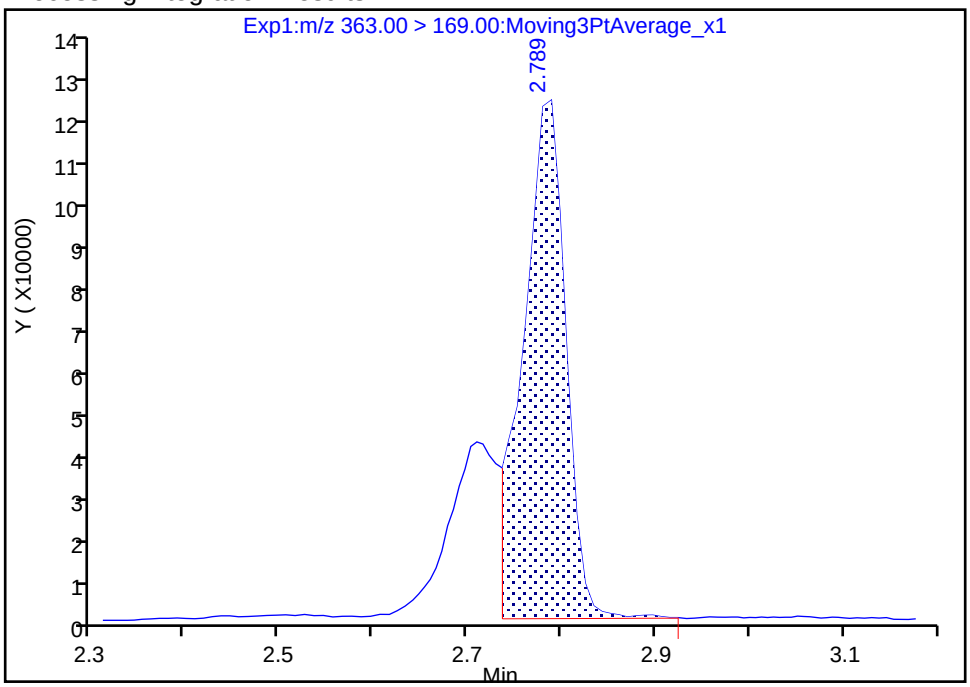
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 2

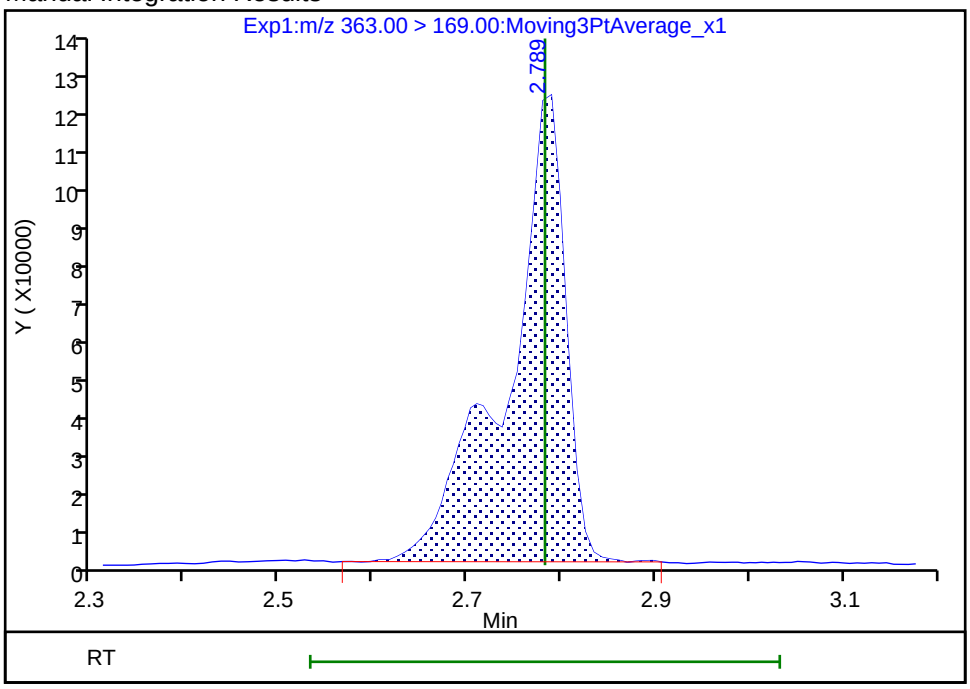
Processing Integration Results

RT: 2.79
Area: 377890
Amount: 0.008899
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 520547
Amount: 1.040914
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:55:05

Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

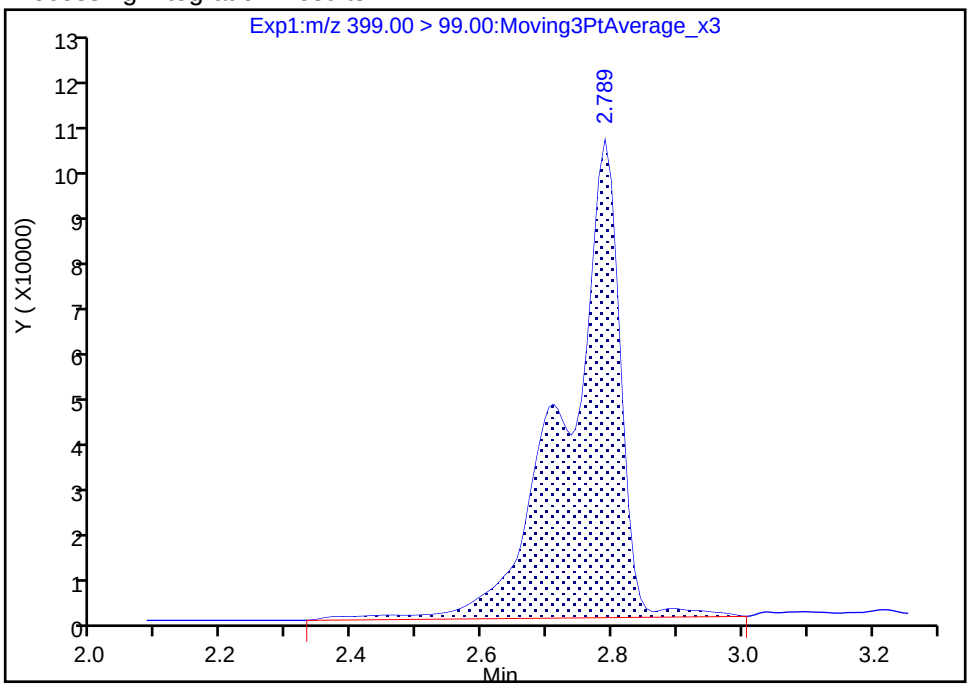
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 2

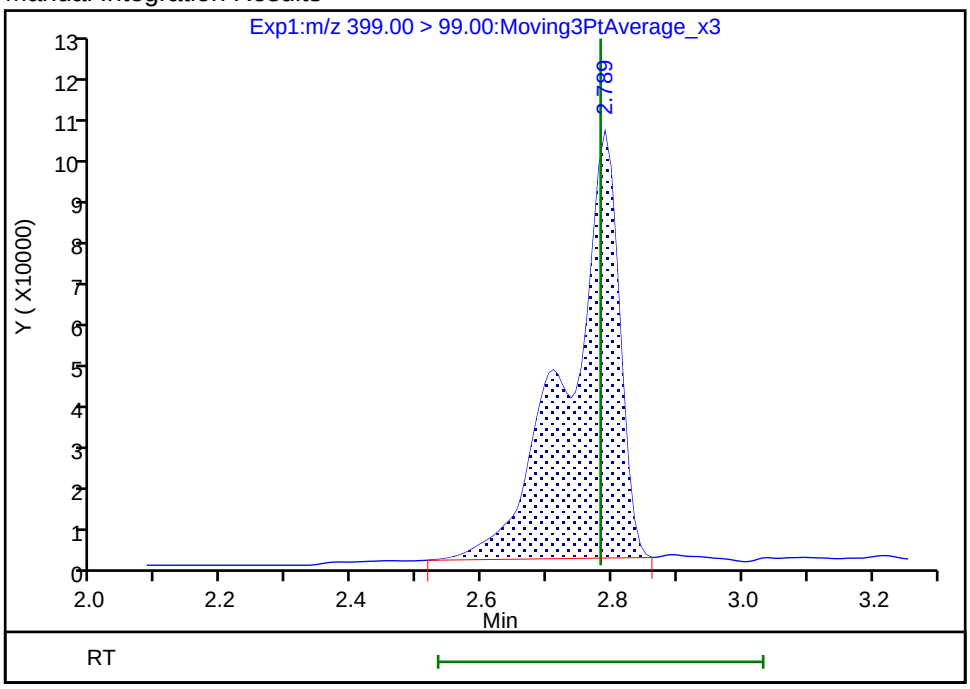
Processing Integration Results

RT: 2.79
Area: 579038
Amount: 0.010478
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 541189
Amount: 0.942993
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:55:14

Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento

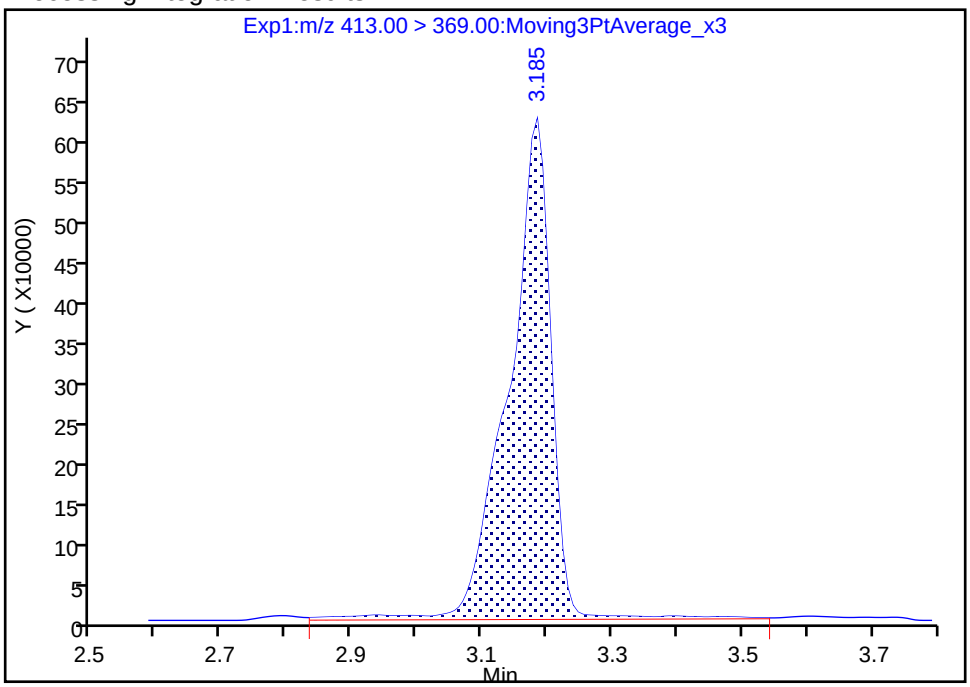
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_039.d				
Injection Date:	08-Jan-2019 23:41:30	Instrument ID:	A9		
Lims ID:	140-13780-A-6-C	Lab Sample ID:	320-13780-6		
Client ID:	D-2087 R3 XAD-2 Resin #3				
Operator ID:	A9\Administrator	ALS Bottle#:	27	Worklist Smp#:	10
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

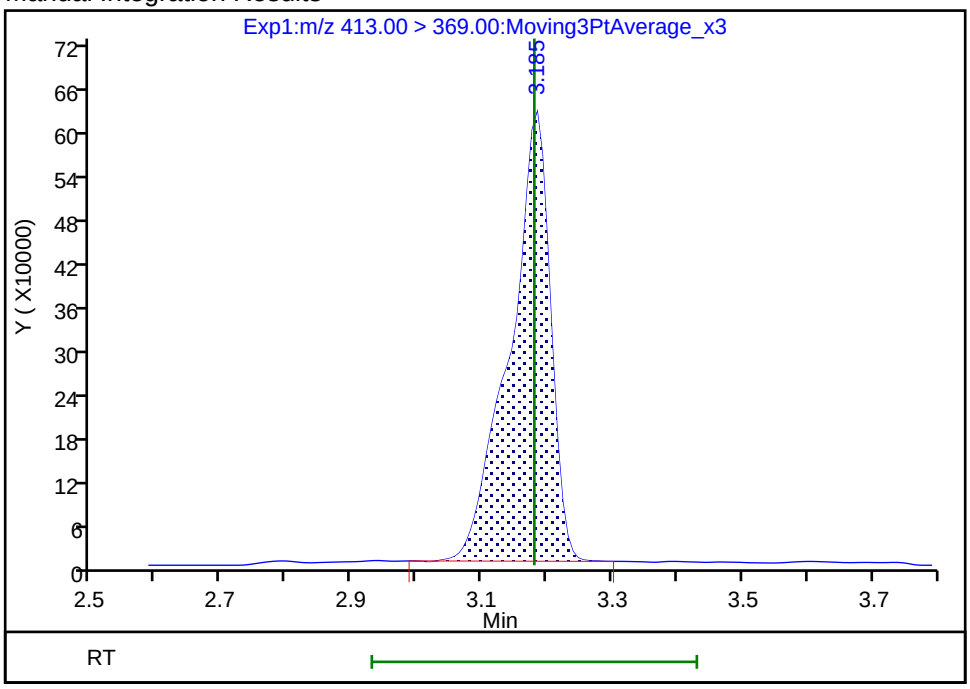
Processing Integration Results

RT: 3.18
Area: 2844077
Amount: 0.011944
Amount Units: ng/ml



Manual Integration Results

RT: 3.18
Area: 2675747
Amount: 1.011304
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:55:26
Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2088 R1 DI Water #1 Lab Sample ID: 140-13780-7

Matrix: Air Lab File ID: 2019.01.08LLAAXX_042.d

Analysis Method: 537 (modified) Date Collected: 12/20/2018 08:00

Extraction Method: None Date Extracted: 12/28/2018 03:39

Sample wt/vol: 1(Sample) Date Analyzed: 01/09/2019 00:04

Con. Extract Vol.: 500(mL) Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	17.6		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	19.9		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	17.3		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	19.7		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	17.4		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	21.5		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	96		25-150
STL01892	13C4 PFHpA	98		25-150
STL00995	13C5 PFNA	98		25-150
STL00990	13C4 PFOA	96		25-150
STL00991	13C4 PFOS	101		25-150
STL00994	18O2 PFHxS	96		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_042.d
Lims ID: 140-13780-A-7-B
Client ID: D-2088 R1 DI Water #1
Sample Type: Client
Inject. Date: 09-Jan-2019 00:04:01 ALS Bottle#: 29 Worklist Smp#: 13
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-7-b
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 12:34:28
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										M
217.00 > 172.00	1.679	1.679	0.0	0.528	6992160	2.49		99.5	4415	M
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.679	1.679	0.0	1.000	2565619	0.99			172	M
4 Perfluoropentanoic acid										
262.90 > 219.00	2.023	2.014	0.009	1.000	2327009	1.01			114	
D 3 13C5 PFPeA										
267.90 > 223.00	2.023	2.022	0.001	0.636	5742234	2.33		93.4	3386	
D 5 13C3 PFBS										
301.90 > 80.00	2.055	2.054	0.001	0.646	9014645	2.23		96.0	2674065	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.055	2.056	-0.001	1.000	3294807	0.8807	Target=2.70		2275	
298.90 > 99.00	2.055	2.056	-0.001	1.000	1177562		2.80(1.35-4.05)		1066	
D 9 13C2 PFHxA										
315.00 > 270.00	2.391	2.383	0.008	0.752	6955032	2.54		102	4709	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.391	2.384	0.007	1.000	2189851	0.9088	Target=13.92		590	
313.00 > 119.00	2.391	2.384	0.007	1.000	165649		13.22(6.96-20.87)		317	
D 16 13C4 PFHpA										
367.00 > 322.00	2.781	2.782	-0.001	0.875	8232210	2.45		98.0	3256	
D 17 18O2 PFHxS										
403.00 > 84.00	2.790	2.782	0.008	0.877	5422389	2.28		96.5	2652	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.790	2.782	0.008	1.000	2447054	0.8627	Target=3.80		2031	
399.00 > 99.00	2.790	2.782	0.008	1.000	670847		3.65(1.90-5.70)		253	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.781	2.782	-0.001	1.000	3409331	1.00	Target=4.34		780	
363.00 > 169.00	2.781	2.782	-0.001	1.000	729034		4.68(2.17-6.52)		1026	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.164	3.165	-0.001	1.000	727511	1.00			822	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.164	3.165	-0.001	0.995	822046	2.48		104	1373	
* 24 13C2 PFOA										
415.00 > 370.00	3.180	3.180	0.0		7363002	2.50			3039	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.180	3.180	0.0	0.893	2497570	0.9664	Target=3.69		2318	
449.00 > 99.00	3.180	3.180	0.0	0.893	595165		4.20(1.84-5.53)		1462	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.180	3.180	0.0	1.000	3117821	1.08	Target=2.72		499	
413.00 > 169.00	3.180	3.180	0.0	1.000	1062797		2.93(1.36-4.08)		1194	
D 25 13C4 PFOA										
417.00 > 372.00	3.180	3.180	0.0	1.000	6988580	2.40		95.9	3503	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.559	3.552	0.007	1.000	2248874	0.8712	Target=4.08		1582	
499.00 > 99.00	3.559	3.552	0.007	1.000	536955		4.19(2.04-6.12)		1940	
D 28 13C4 PFOS										
503.00 > 80.00	3.559	3.552	0.007	1.119	5854159	2.41		101	2392	
30 Perfluorononanoic acid										
463.00 > 419.00	3.566	3.567	-0.001	1.000	2523237	0.9858	Target=5.35		414	
463.00 > 169.00	3.566	3.567	-0.001	1.000	460237		5.48(2.68-8.03)		918	
D 31 13C5 PFNA										
468.00 > 423.00	3.566	3.567	-0.001	1.122	6427787	2.45		97.9	3057	
D 33 13C8 FOSA										
506.00 > 78.00	3.892	3.885	0.007	1.224	3696322	2.31		92.6	2978	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.892	3.885	0.007	1.000	4525629	1.05			2921	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.926	3.927	-0.001	1.235	93051	2.45		102	278	
D 36 13C2 PFDA										
515.00 > 470.00	3.926	3.927	-0.001	1.235	6323446	2.46		98.5	4673	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.926	3.927	-0.001	1.000	517996	0.9391			1505	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.926	3.927	-0.001	1.000	3210746	1.11	Target=14.23		1736	
513.00 > 169.00	3.926	3.927	-0.001	1.000	189917		16.91(7.12-21.35)		270	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.092	4.093	-0.001	1.287	1801909	2.68		107	2359	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.092	4.093	-0.001	1.000	571997	0.9159			161	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.224	4.225	-0.001	1.187	2053127	0.9584	Target=4.28		2515	
599.00 > 99.00	4.224	4.225	-0.001	1.187	411617		4.99(2.14-6.43)		1158	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.250	4.250	0.0	1.336	1400953	2.50		99.9	1720	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.250	4.250	0.0	1.336	4788492	2.37		94.8	3158	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.000	1523721	0.9541	Target=10.48		352	
563.00 > 169.00	4.250	4.250	0.0	1.000	154779		9.84(5.24-15.72)		661	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.258	4.259	-0.001	1.002	439957	0.9483			6823	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.541	4.534	0.007	1.000	2260195	1.02	Target=9.37		825	
613.00 > 169.00	4.541	4.534	0.007	1.000	231536		9.76(4.68-14.05)		768	
D 49 13C2 PFDoA										
615.00 > 570.00	4.541	4.541	0.0	1.428	5774910	2.36		94.4	4383	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.803	4.803	0.0	1.058	1732818	0.9882	Target=6.18		800	
663.00 > 169.00	4.803	4.803	0.0	1.058	294642		5.88(3.09-9.27)		996	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.049	5.049	0.0	1.588	4255918	2.51		100	4792	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.049	5.050	-0.001	1.000	250558	0.9014	Target=1.39		1177	
713.00 > 219.00	5.041	5.050	-0.009	0.998	174126		1.44(0.70-2.09)		761	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:25 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_042.d

Injection Date: 09-Jan-2019 00:04:01 Instrument ID: A9

Lims ID: 140-13780-A-7-B Lab Sample ID: 320-13780-7

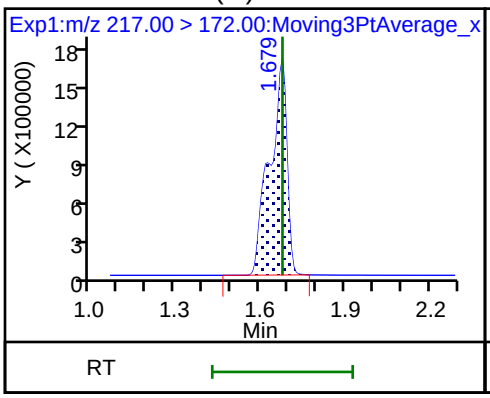
Client ID: D-2088 R1 DI Water #1

Operator ID: A9\Administrator ALS Bottle#: 29 Worklist Smp#: 13

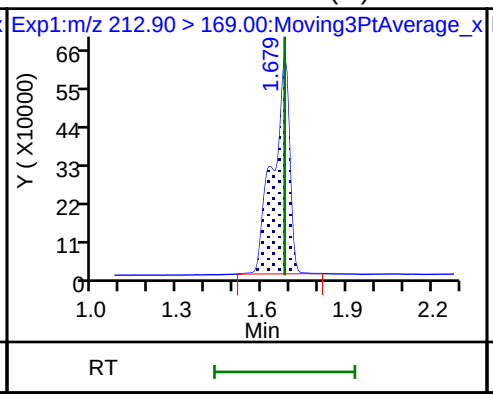
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

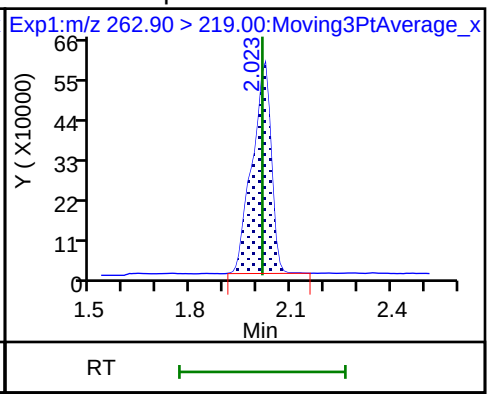
D 1 13C4 PFBA (M)



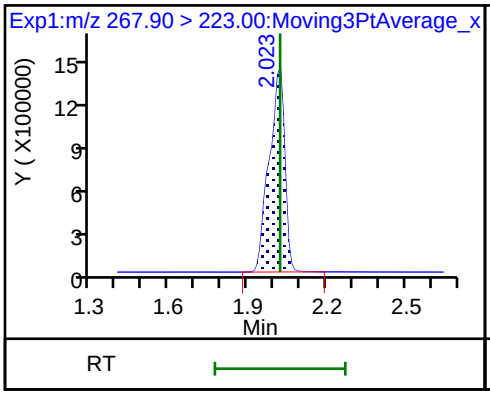
2 Perfluorobutanoic acid (M)



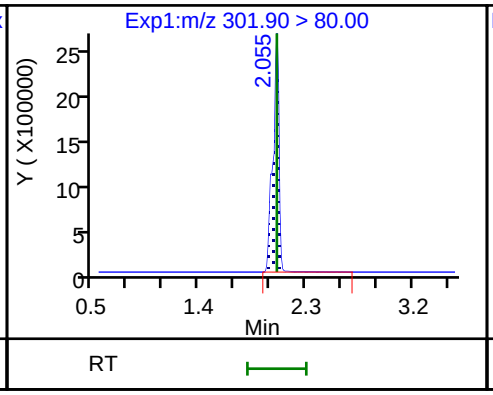
4 Perfluoropentanoic acid



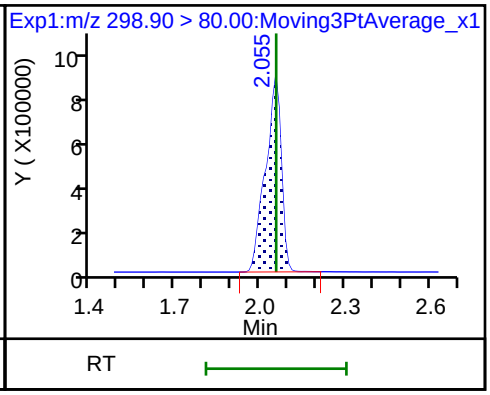
D 3 13C5 PFPeA



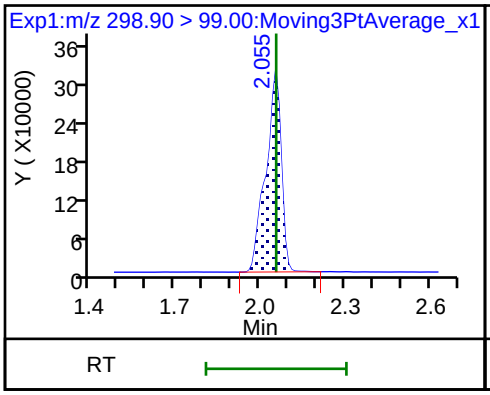
D 5 13C3 PFBS



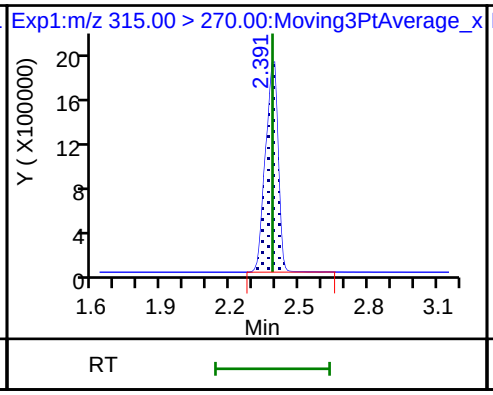
6 Perfluorobutanesulfonic acid



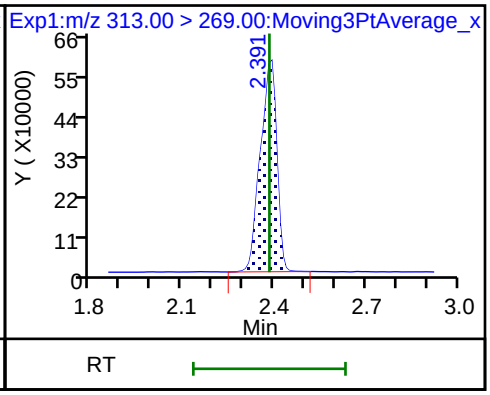
6 Perfluorobutanesulfonic acid



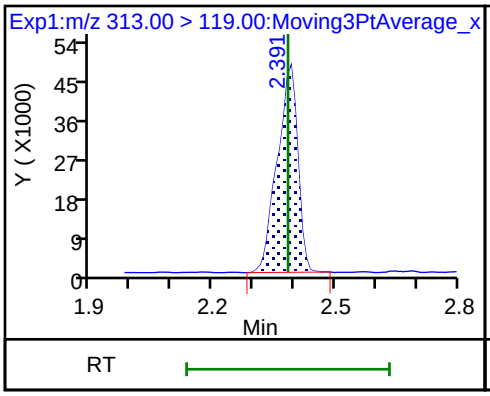
D 9 13C2 PFHxA



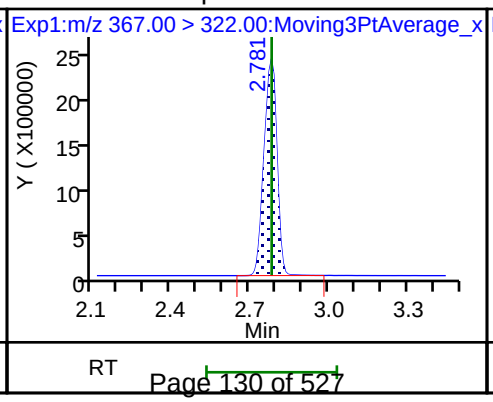
10 Perfluorohexanoic acid



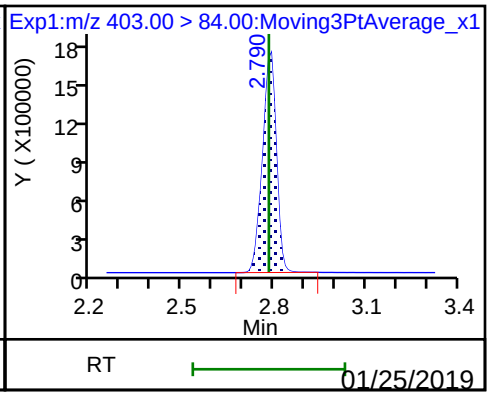
10 Perfluorohexanoic acid



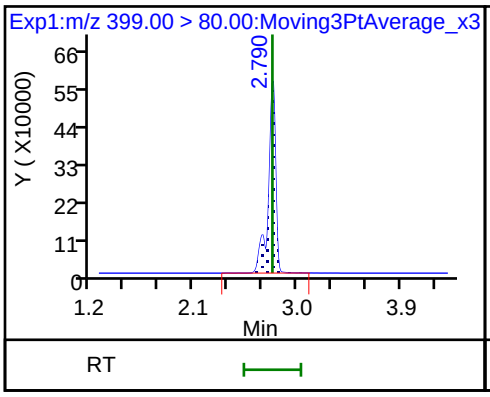
D 16 13C4 PFHpA



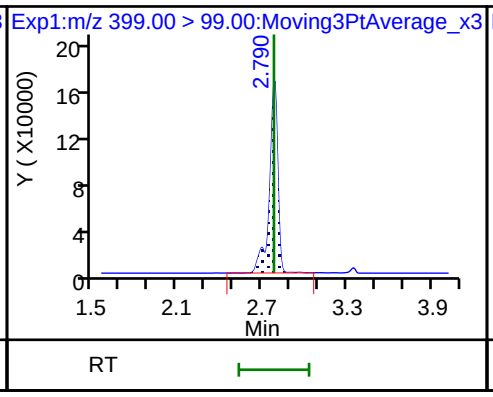
D 17 18O2 PFHxS



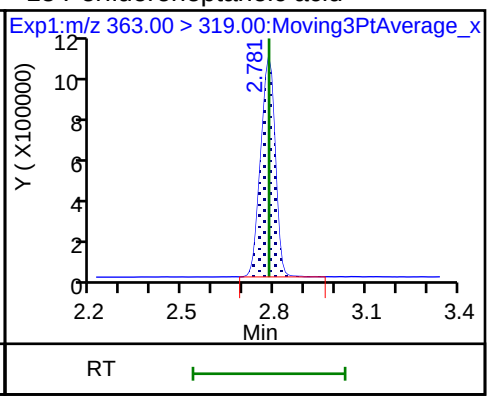
18 Perfluorohexanesulfonic acid



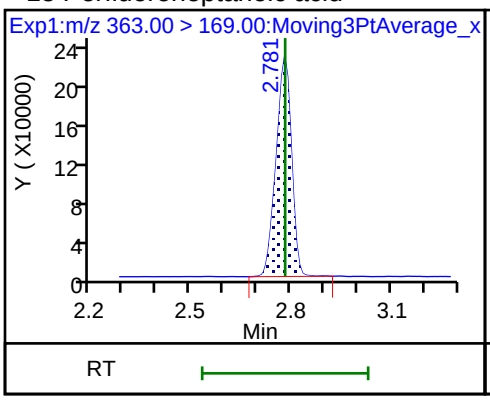
18 Perfluorohexanesulfonic acid



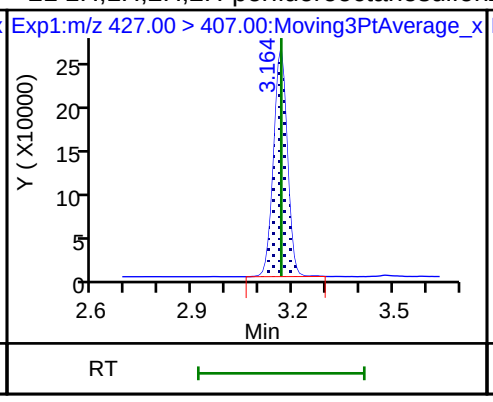
15 Perfluoroheptanoic acid



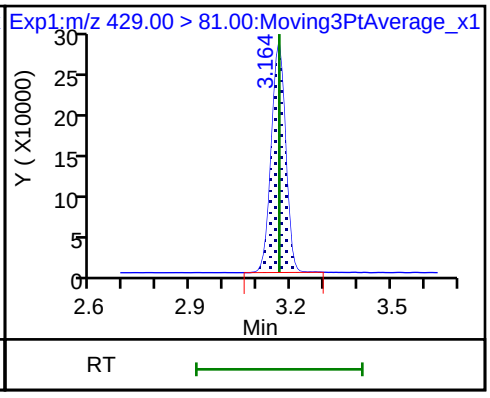
15 Perfluoroheptanoic acid



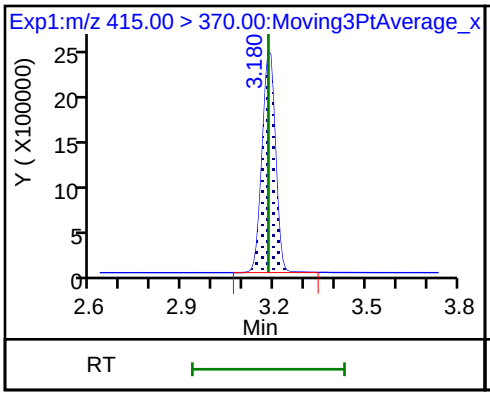
21 1H,1H,2H,2H-perfluorooctanesulfon



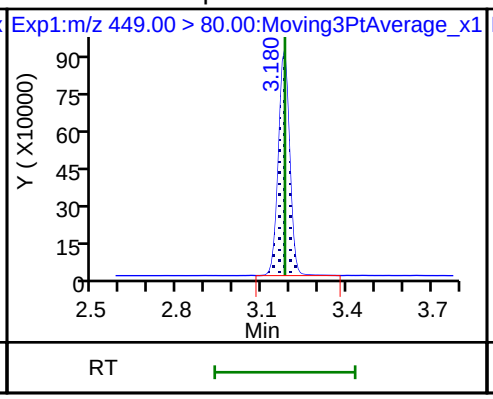
D 20 M2-6:2 FTS



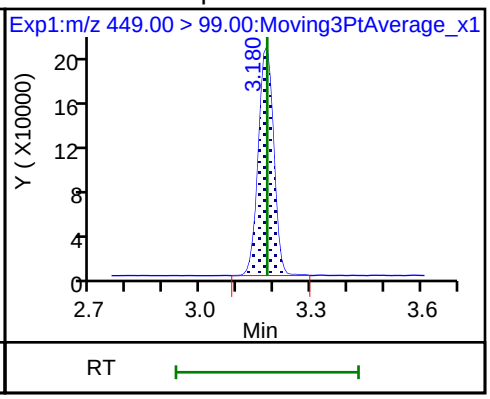
* 24 13C2 PFOA



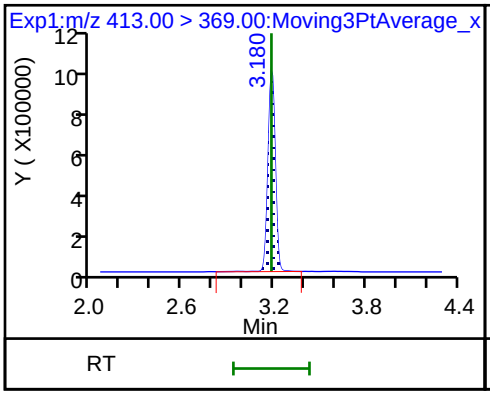
23 Perfluoroheptanesulfonic acid



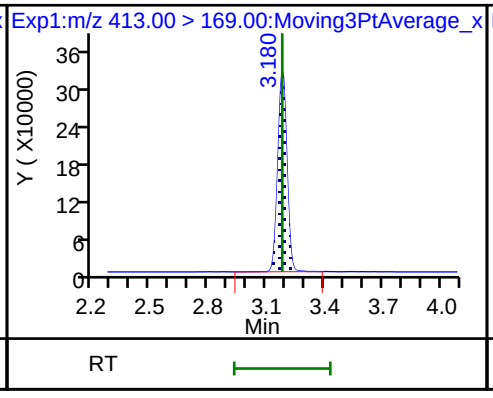
23 Perfluoroheptanesulfonic acid



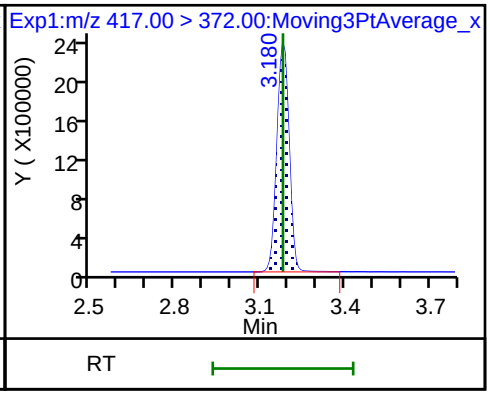
26 Perfluorooctanoic acid



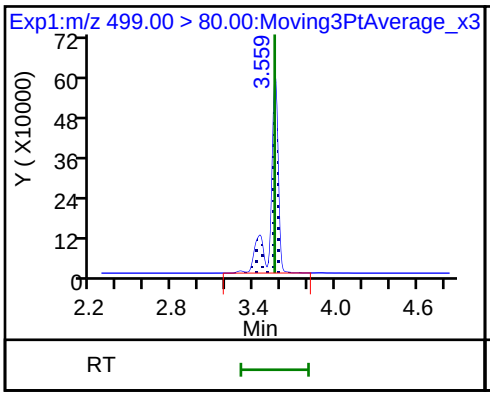
26 Perfluorooctanoic acid



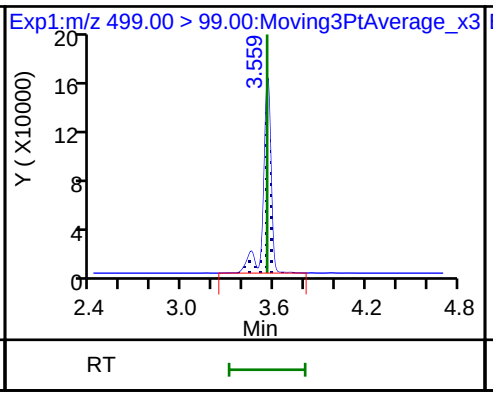
D 25 13C4 PFOA



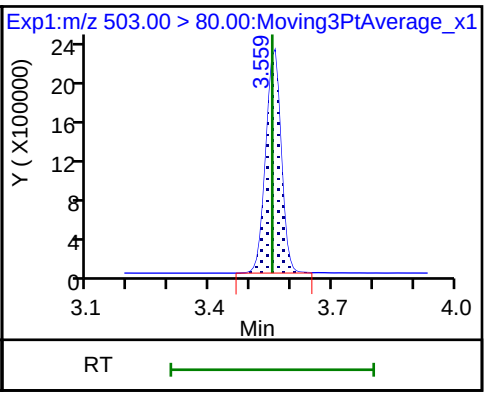
29 Perfluorooctanesulfonic acid



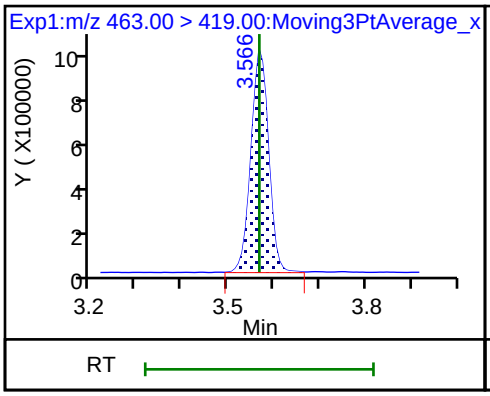
29 Perfluorooctanesulfonic acid



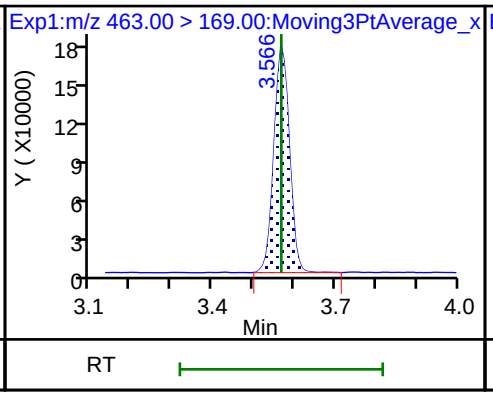
D 28 13C4 PFOS



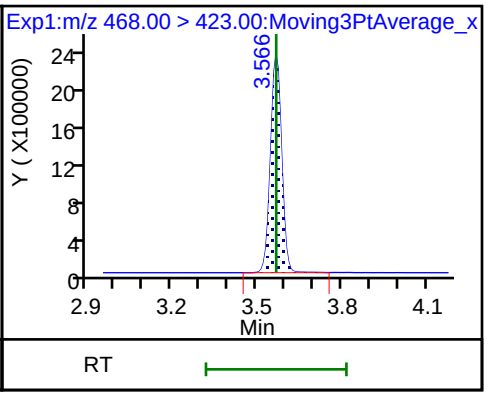
30 Perfluorononanoic acid



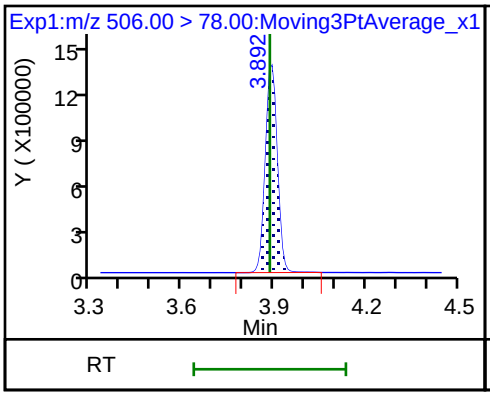
30 Perfluorononanoic acid



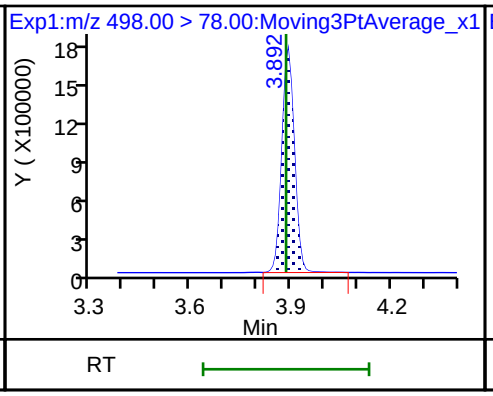
D 31 13C5 PFNA



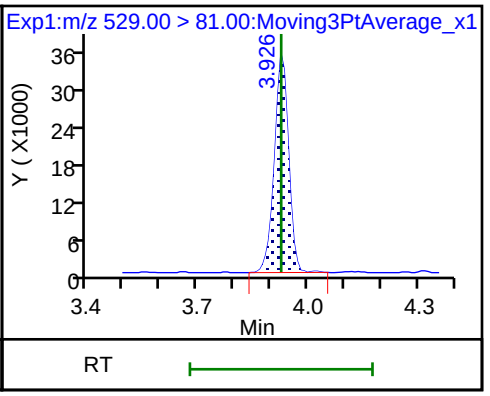
D 33 13C8 FOSA



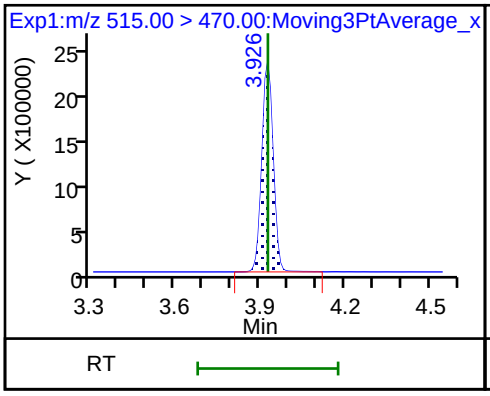
34 Perfluorooctanesulfonamide



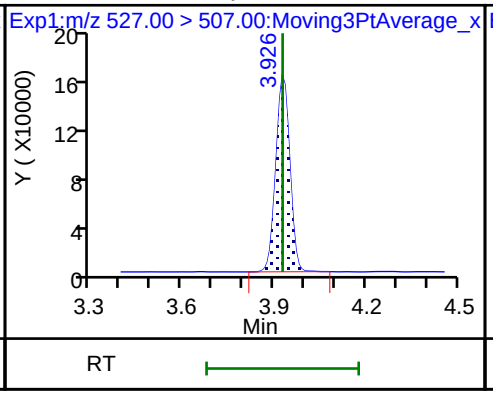
D 39 M2-8:2 FTS



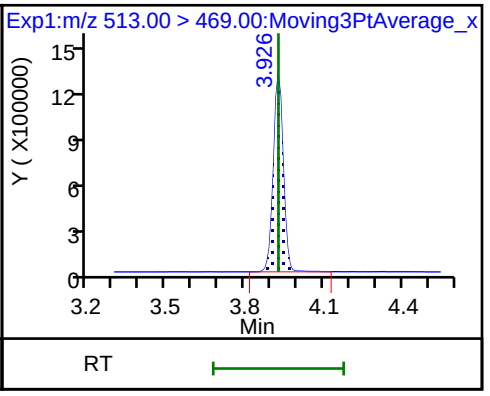
D 36 13C2 PFDA



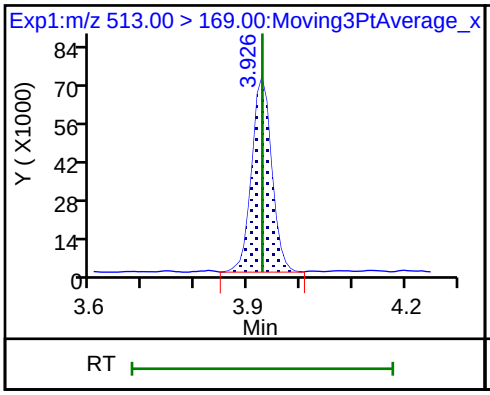
37 1H,1H,2H,2H-perfluorodecanesulfoni



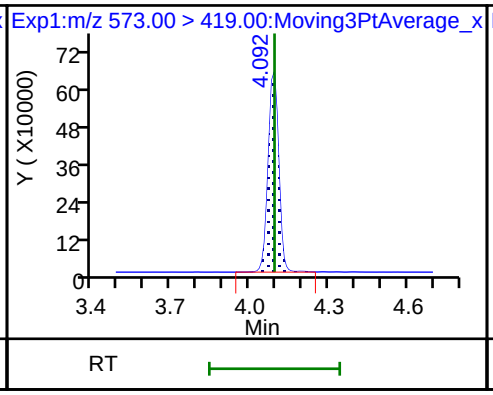
38 Perfluorodecanoic acid



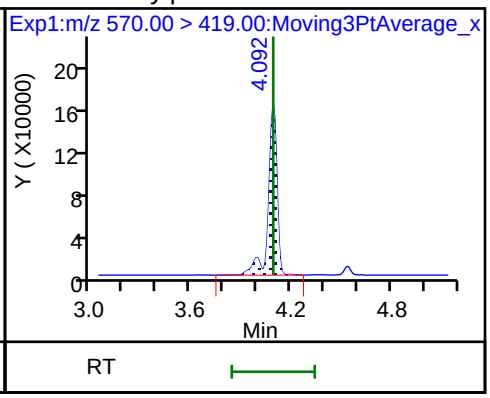
38 Perfluorodecanoic acid



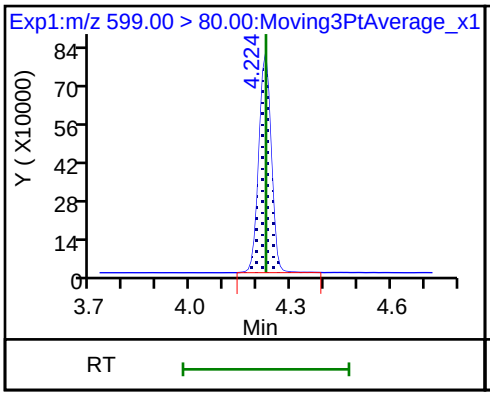
D 40 d3-NMeFOSAA



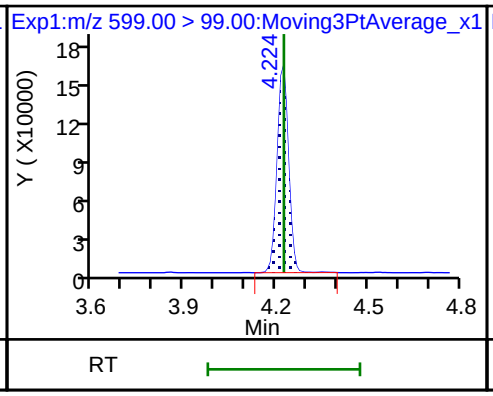
41 N-methylperfluorooctanesulfonamido



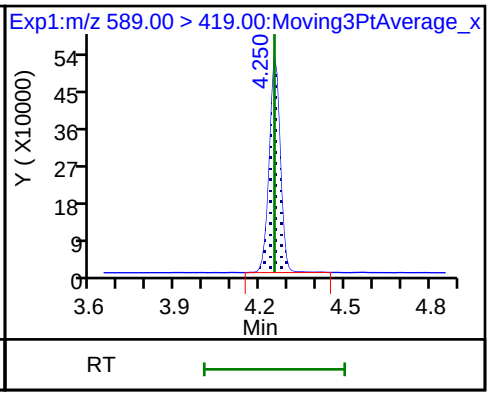
42 Perfluorodecanesulfonic acid



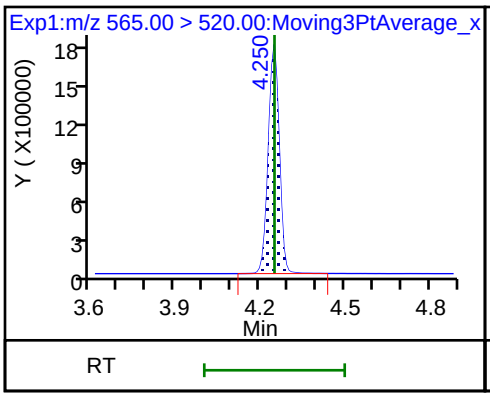
42 Perfluorodecanesulfonic acid



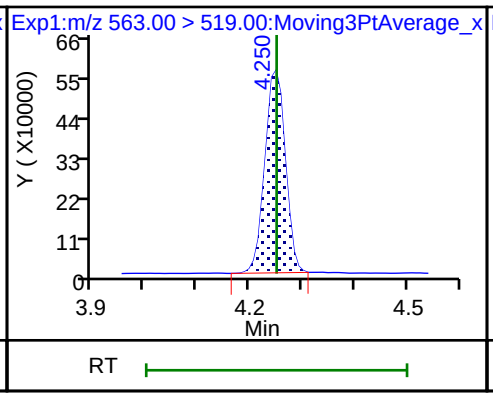
D 45 d5-NEtFOSAA



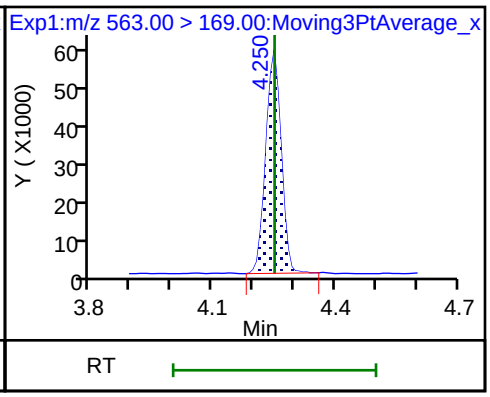
D 44 13C2 PFUnA



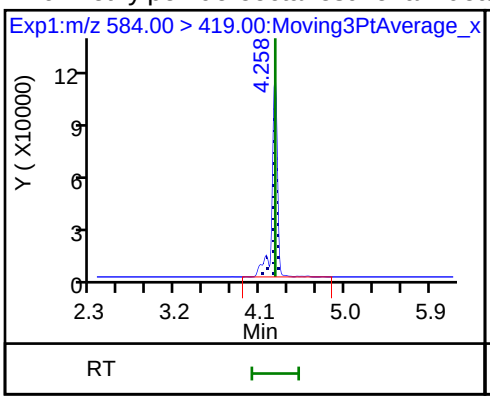
43 Perfluoroundecanoic acid



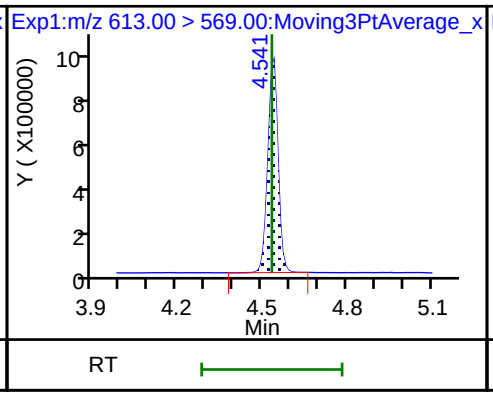
43 Perfluoroundecanoic acid



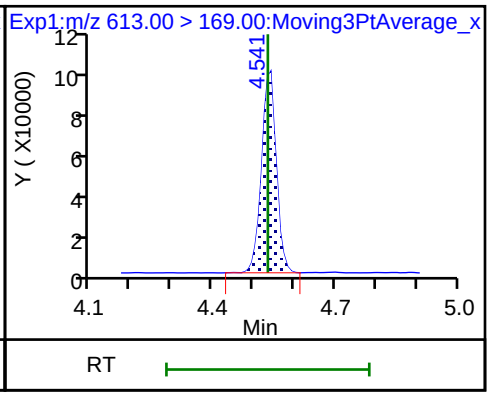
46 N-ethylperfluorooctanesulfonamidoa



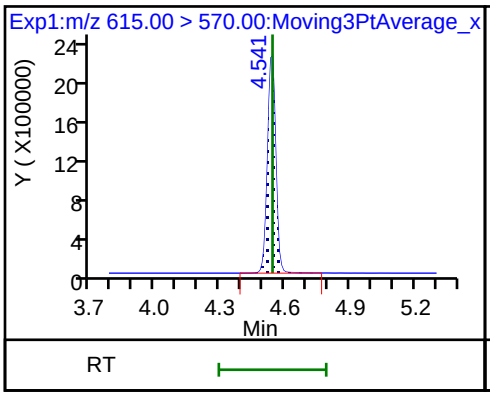
50 Perfluorododecanoic acid



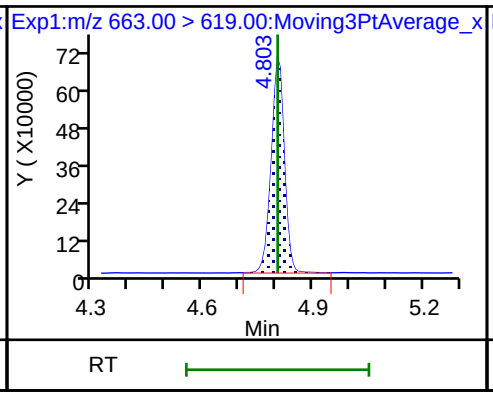
50 Perfluorododecanoic acid



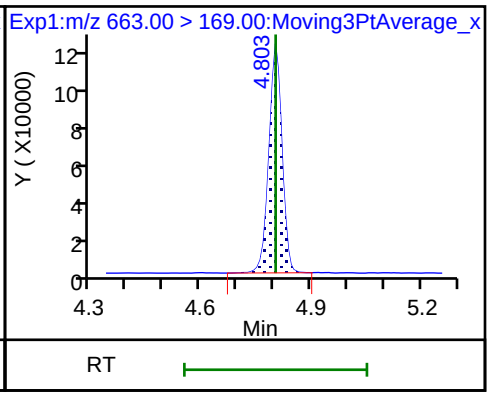
D 49 13C2 PFDoA



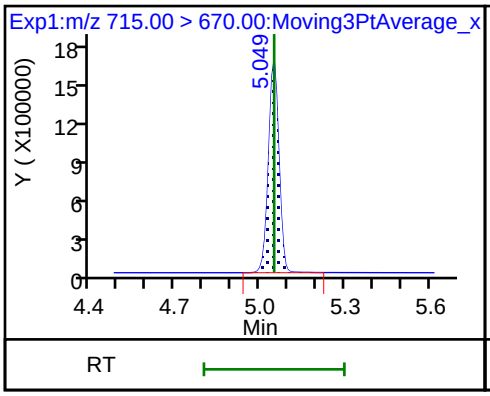
54 Perfluorotridecanoic acid



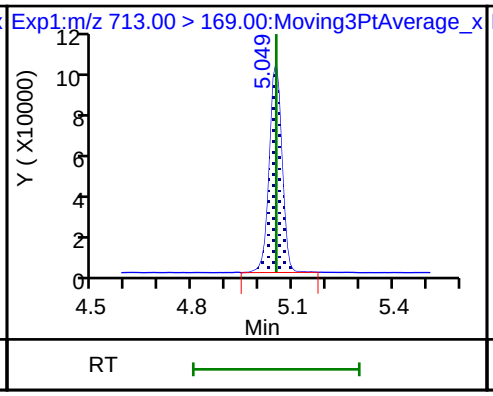
54 Perfluorotridecanoic acid



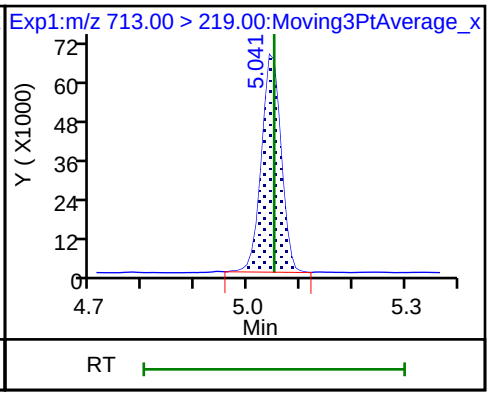
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2089 R2 DI Water #2 | Lab Sample ID: 140-13780-8

Matrix: Air | Lab File ID: 2019.01.08LLAAXX_043.d

Analysis Method: 537 (modified) | Date Collected: 12/20/2018 08:00

Extraction Method: None | Date Extracted: 12/28/2018 03:39

Sample wt/vol: 1(Sample) | Date Analyzed: 01/09/2019 00:11

Con. Extract Vol.: 500(mL) | Dilution Factor: 1

Injection Volume: 20(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 | Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	17.8		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	19.4		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	17.5		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	19.1		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	17.6		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	21.2		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	92		25-150
STL01892	13C4 PFHpA	93		25-150
STL00995	13C5 PFNA	96		25-150
STL00990	13C4 PFOA	93		25-150
STL00991	13C4 PFOS	97		25-150
STL00994	18O2 PFHxS	89		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_043.d
Lims ID: 140-13780-A-8-B
Client ID: D-2089 R2 DI Water #2
Sample Type: Client
Inject. Date: 09-Jan-2019 00:11:31 ALS Bottle#: 30 Worklist Smp#: 14
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-8-b
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 12:35:10
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										M
217.00 > 172.00	1.679	1.679	0.0	0.527	7056775	2.38		95.3	6370	M
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.679	1.679	0.0	1.000	2610032	1.00			167	M
4 Perfluoropentanoic acid										
262.90 > 219.00	2.022	2.014	0.008	1.000	2340343	1.01			114	
D 3 13C5 PFPeA										
267.90 > 223.00	2.022	2.022	0.0	0.634	5811783	2.24		89.7	4173	
D 5 13C3 PFBS										
301.90 > 80.00	2.054	2.054	0.0	0.644	9080472	2.13		91.8	302773	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.054	2.056	-0.002	1.000	3347669	0.8883	Target=2.70		2244	
298.90 > 99.00	2.054	2.056	-0.002	1.000	1175466		2.85(1.35-4.05)		793	
D 9 13C2 PFHxA										
315.00 > 270.00	2.383	2.383	0.0	0.747	6781196	2.35		94.2	3163	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.383	2.384	-0.001	1.000	2349432	1.00	Target=13.92		608	
313.00 > 119.00	2.392	2.384	0.008	1.004	176490		13.31(6.96-20.87)		406	
D 16 13C4 PFHpA										
367.00 > 322.00	2.782	2.782	0.0	0.873	8243236	2.33		93.1	3249	
D 17 18O2 PFHxS										
403.00 > 84.00	2.791	2.782	0.009	0.875	5251944	2.10		88.7	3381	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.791	2.782	0.009	1.000	2401824	0.8742	Target=3.80		3035	
399.00 > 99.00	2.791	2.782	0.009	1.000	697905		3.44(1.90-5.70)		184	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.782	2.782	0.0	1.000	3330684	0.9709	Target=4.34		802	
363.00 > 169.00	2.782	2.782	0.0	1.000	720432		4.62(2.17-6.52)		1121	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.165	3.165	0.0	1.000	700987	0.9881			646	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.165	3.165	0.0	0.993	797952	2.29		96.3	1145	
* 24 13C2 PFOA										
415.00 > 370.00	3.188	3.180	0.008		7759064	2.50			3139	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.181	3.180	0.001	0.894	2474843	0.9424	Target=3.69		2589	
449.00 > 99.00	3.181	3.180	0.001	0.894	595483		4.16(1.84-5.53)		1628	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.181	3.180	0.001	0.998	3124514	1.06	Target=2.72		489	
413.00 > 169.00	3.181	3.180	0.001	0.998	1124228		2.78(1.36-4.08)		1121	
D 25 13C4 PFOA										
417.00 > 372.00	3.188	3.180	0.008	1.000	7112931	2.32		92.6	2454	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.560	3.552	0.008	1.000	2314055	0.8822	Target=4.08		1667	
499.00 > 99.00	3.552	3.552	0.0	0.998	566108		4.09(2.04-6.12)		1498	
D 28 13C4 PFOS										
503.00 > 80.00	3.560	3.552	0.008	1.116	5948642	2.33		97.4	5004	
30 Perfluorononanoic acid										
463.00 > 419.00	3.567	3.567	0.0	1.000	2535816	0.9544	Target=5.35		440	
463.00 > 169.00	3.567	3.567	0.0	1.000	461502		5.49(2.68-8.03)		1027	
D 31 13C5 PFNA										
468.00 > 423.00	3.567	3.567	0.0	1.119	6672254	2.41		96.4	3135	
D 33 13C8 FOSA										
506.00 > 78.00	3.893	3.885	0.008	1.221	3787943	2.25		90.0	3945	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.893	3.885	0.008	1.000	4548969	1.03			3043	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.927	3.927	0.0	1.232	99729	2.49		104	413	
D 36 13C2 PFDA										
515.00 > 470.00	3.927	3.927	0.0	1.232	6523963	2.41		96.4	3057	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.927	3.927	0.0	1.000	507596	0.8586			1601	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.927	3.927	0.0	1.000	3002281	1.00	Target=14.23		1346	
513.00 > 169.00	3.927	3.927	0.0	1.000	210386		14.27(7.12-21.35)		307	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.093	4.093	0.0	1.284	1827789	2.58		103	1774	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.093	4.093	0.0	1.000	552931	0.8728			145	
42 Perfluorodecanesulfonic acid										a
599.00 > 80.00	4.225	4.225	0.0	1.187	2081982	0.9565	Target=4.28		2511	
599.00 > 99.00	4.225	4.225	0.0	1.187	422754		4.92(2.14-6.43)		1103	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.250	4.250	0.0	1.333	1442877	2.44		97.6	1534	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.250	4.250	0.0	1.333	4762837	2.24		89.5	2624	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.000	1542673	0.9712	Target=10.48		437	
563.00 > 169.00	4.250	4.250	0.0	1.000	162399		9.50(5.24-15.72)		549	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.259	4.259	0.0	1.002	452716	0.9475			1135	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.541	4.534	0.007	1.000	2386018	1.05	Target=9.37		902	
613.00 > 169.00	4.541	4.534	0.007	1.000	248467		9.60(4.68-14.05)		873	
D 49 13C2 PFDoA										
615.00 > 570.00	4.541	4.541	0.0	1.424	5930028	2.30		91.9	3818	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.803	4.803	0.0	1.058	1824451	1.01	Target=6.18		857	
663.00 > 169.00	4.803	4.803	0.0	1.058	303534		6.01(3.09-9.27)		1043	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.049	5.049	0.0	1.584	4292089	2.40		96.0	4255	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.049	5.050	-0.001	1.000	259259	0.9248	Target=1.39		1091	
713.00 > 219.00	5.049	5.050	-0.001	1.000	181538		1.43(0.70-2.09)		928	

QC Flag Legend

Review Flags

M - Manually Integrated

a - User Assigned ID

Report Date: 10-Jan-2019 11:21:27 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_043.d

Injection Date: 09-Jan-2019 00:11:31 Instrument ID: A9

Lims ID: 140-13780-A-8-B Lab Sample ID: 320-13780-8

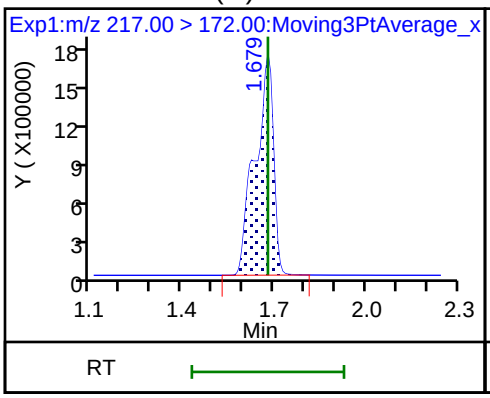
Client ID: D-2089 R2 DI Water #2

Operator ID: A9\Administrator ALS Bottle#: 30 Worklist Smp#: 14

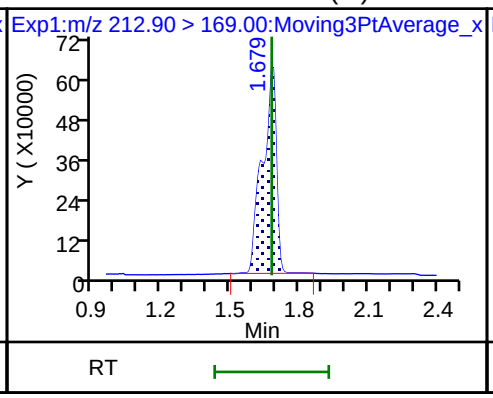
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

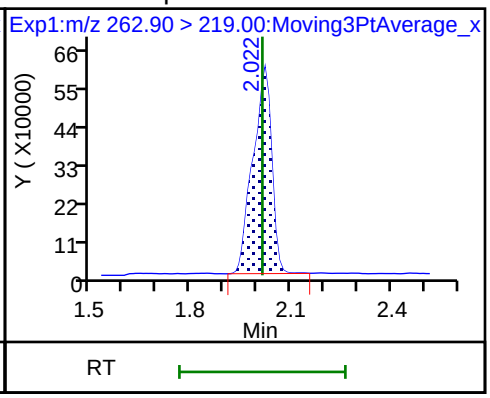
D 1 13C4 PFBA (M)



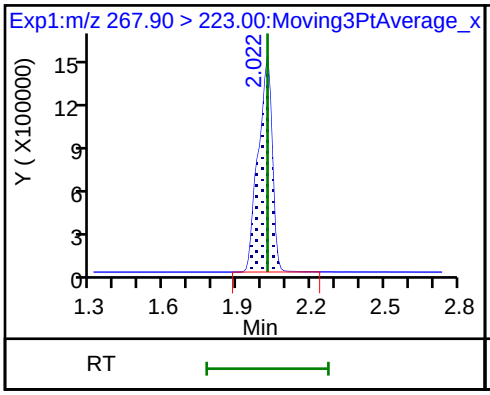
2 Perfluorobutanoic acid (M)



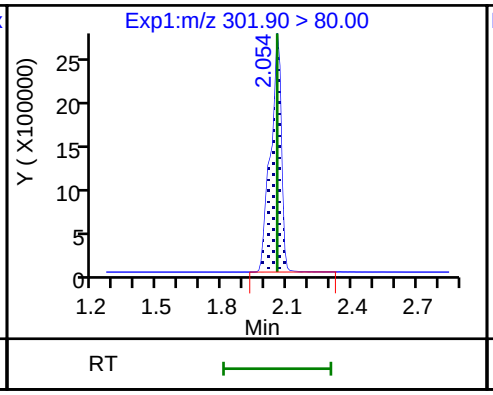
4 Perfluoropentanoic acid



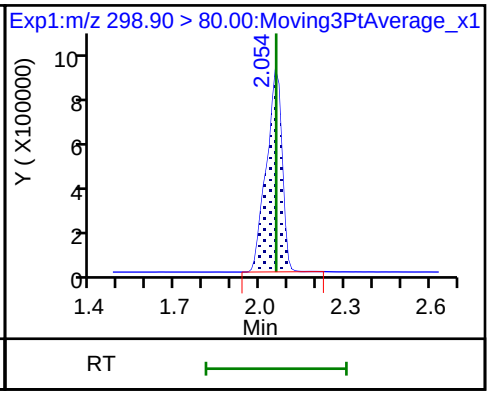
D 3 13C5 PFPeA



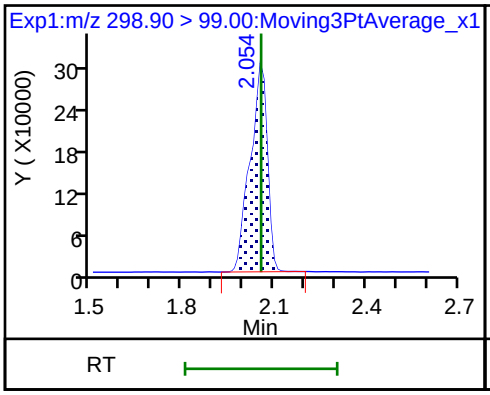
D 5 13C3 PFBS



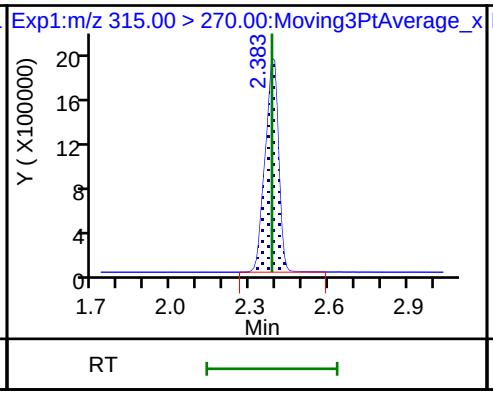
6 Perfluorobutanesulfonic acid



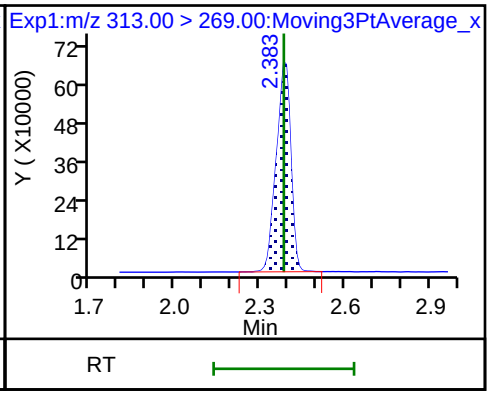
6 Perfluorobutanesulfonic acid



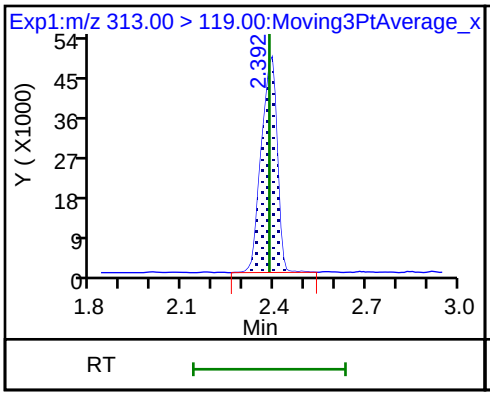
D 9 13C2 PFHxA



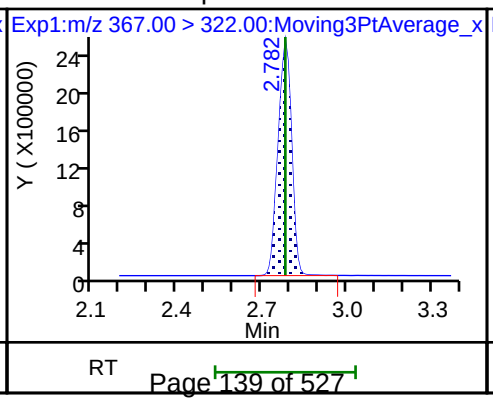
10 Perfluorohexanoic acid



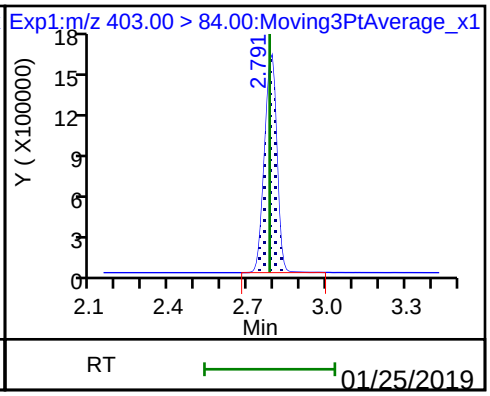
10 Perfluorohexanoic acid



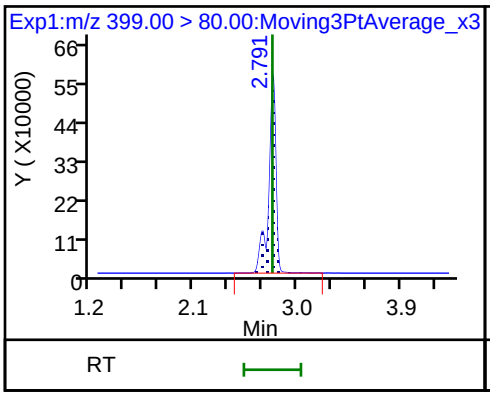
D 16 13C4 PFHpA



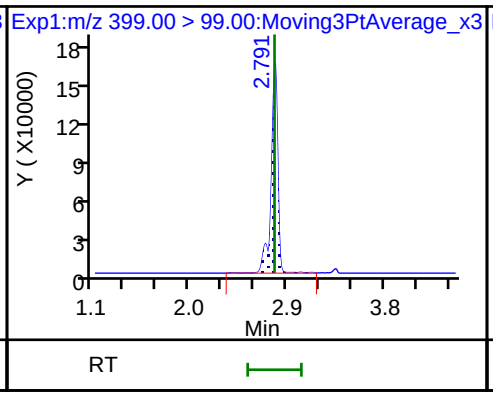
D 17 18O2 PFHxS



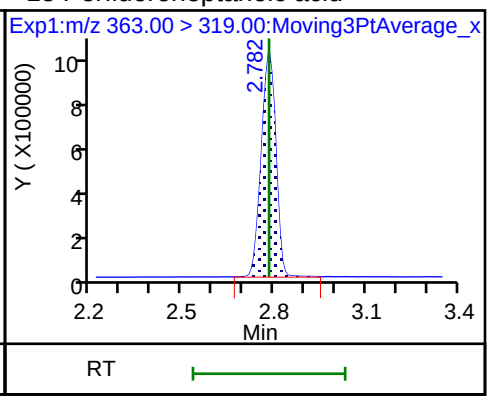
18 Perfluorohexanesulfonic acid



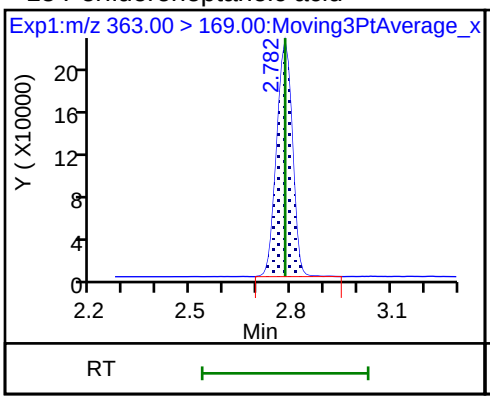
18 Perfluorohexanesulfonic acid



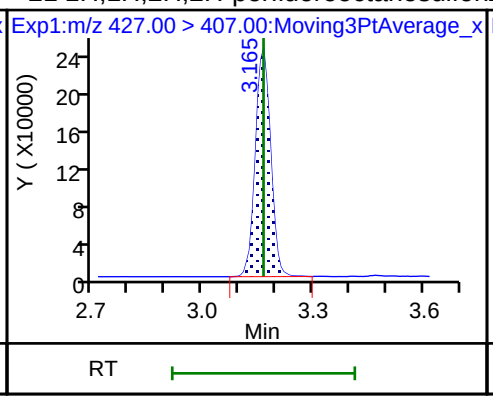
15 Perfluoroheptanoic acid



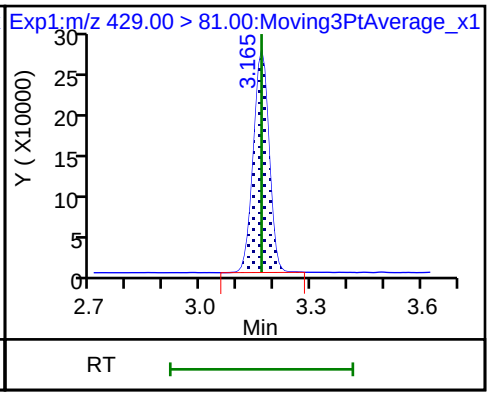
15 Perfluoroheptanoic acid



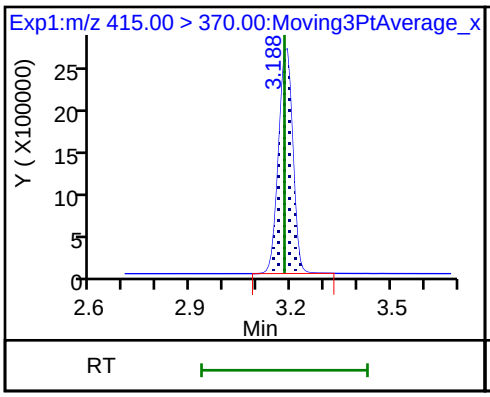
21 1H,1H,2H,2H-perfluorooctanesulfon



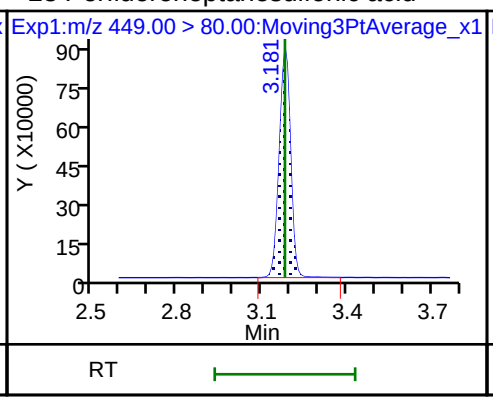
D 20 M2-6:2 FTS



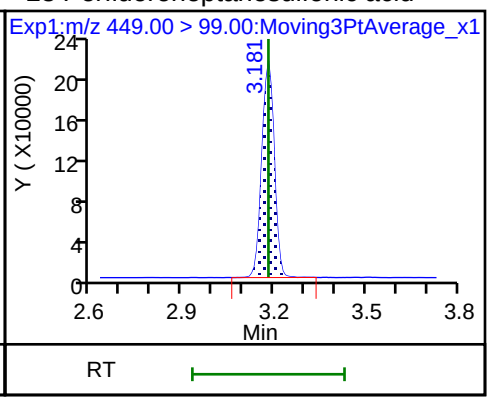
* 24 13C2 PFOA



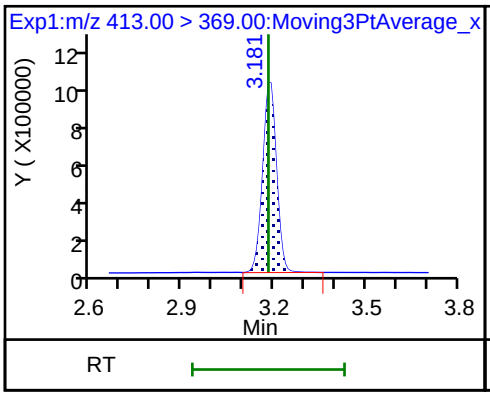
23 Perfluoroheptanesulfonic acid



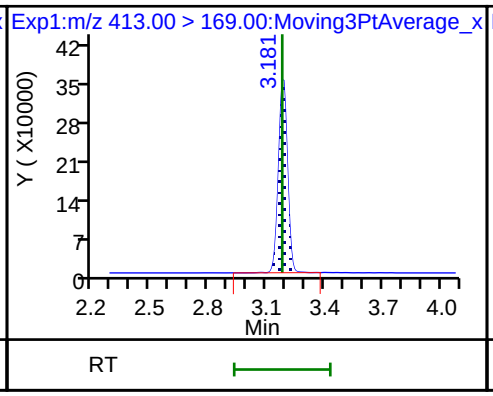
23 Perfluoroheptanesulfonic acid



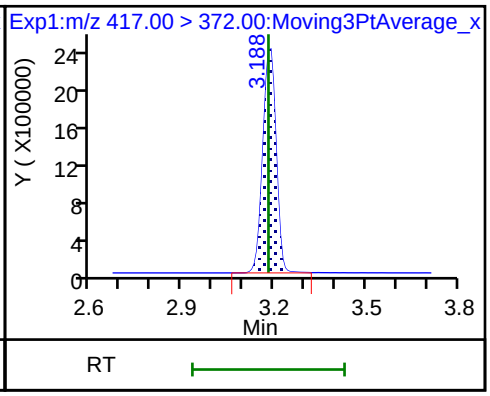
26 Perfluorooctanoic acid



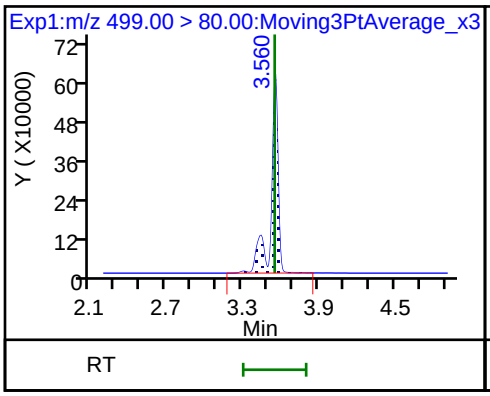
26 Perfluorooctanoic acid



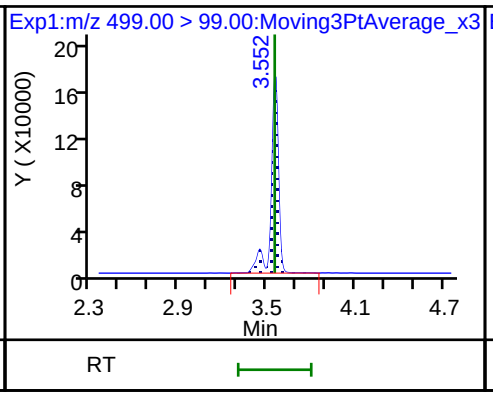
D 25 13C4 PFOA



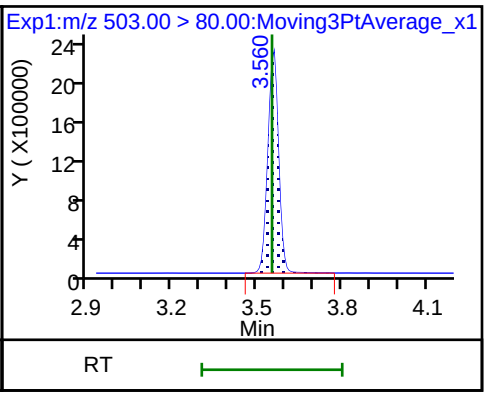
29 Perfluorooctanesulfonic acid



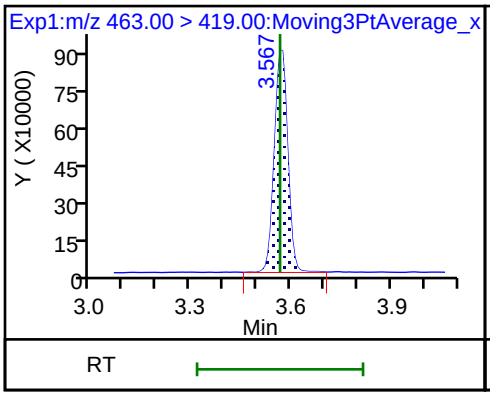
29 Perfluorooctanesulfonic acid



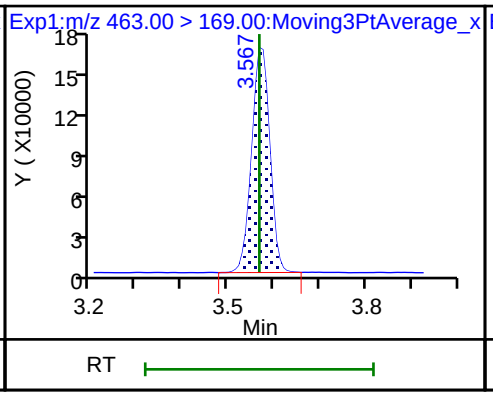
D 28 13C4 PFOS



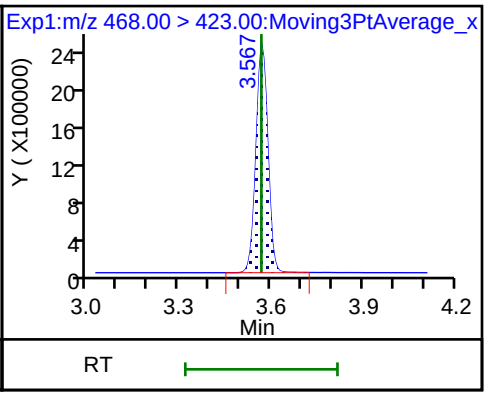
30 Perfluorononanoic acid



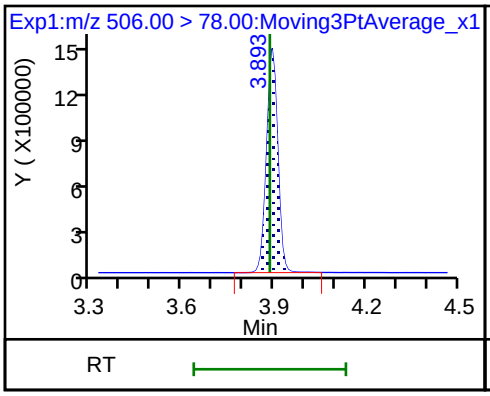
30 Perfluorononanoic acid



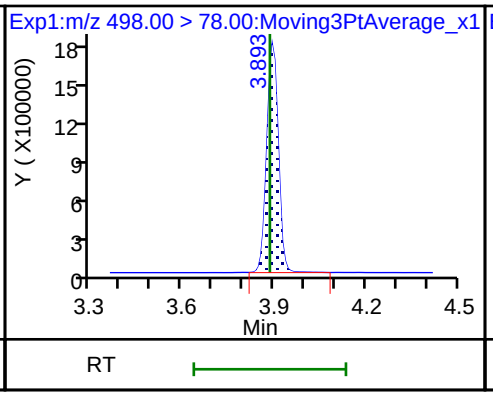
D 31 13C5 PFNA



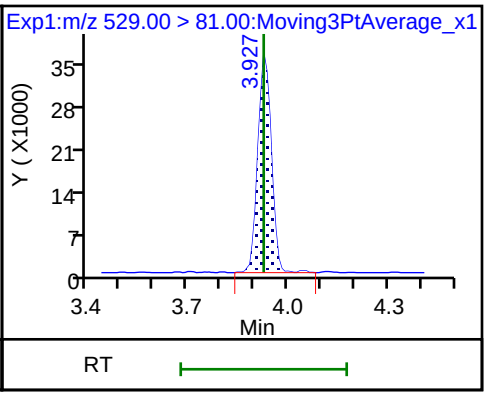
D 33 13C8 FOSA



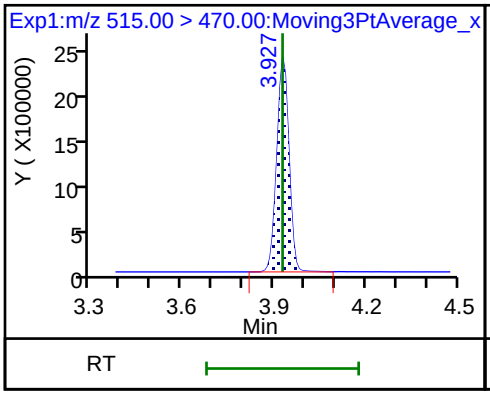
34 Perfluorooctanesulfonamide



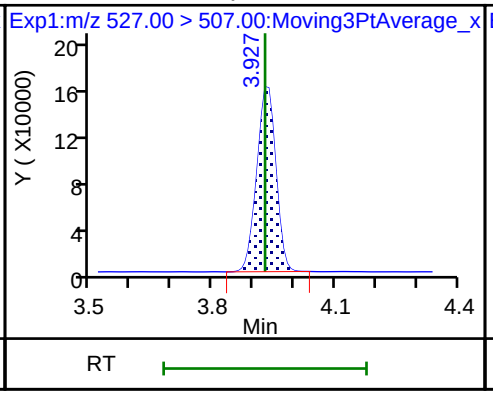
D 39 M2-8:2 FTS



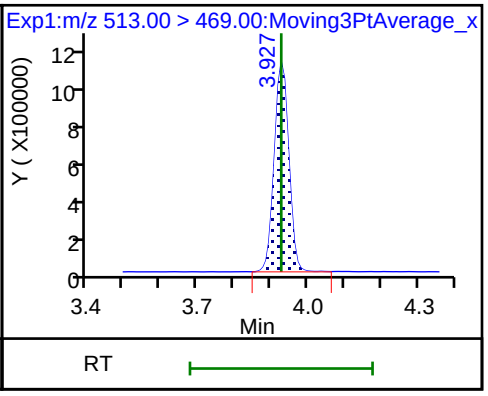
D 36 13C2 PFDA



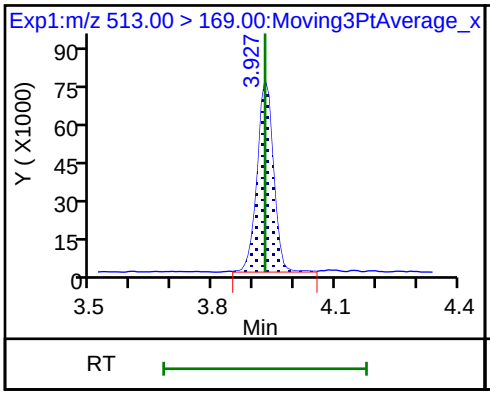
37 1H,1H,2H,2H-perfluorodecanesulfoni



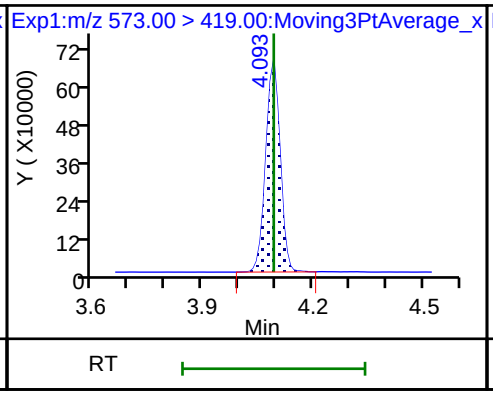
38 Perfluorodecanoic acid



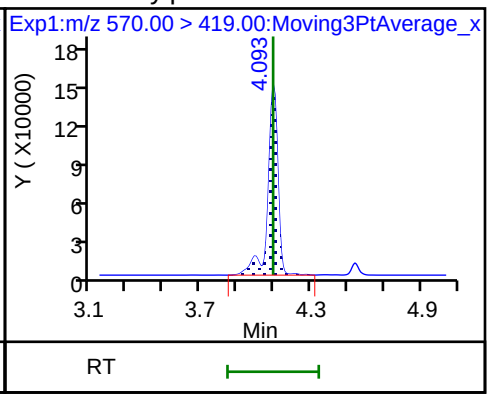
38 Perfluorodecanoic acid



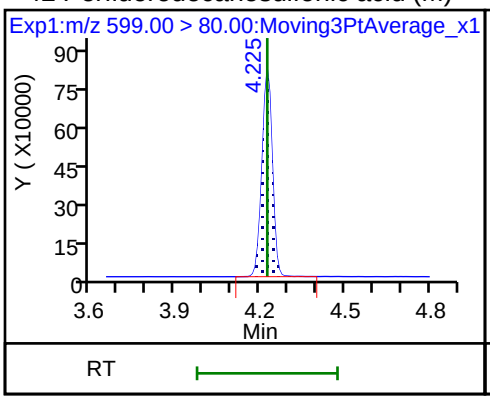
D 40 d3-NMeFOSAA



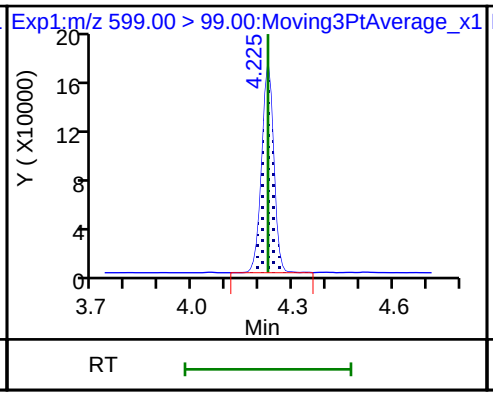
41 N-methylperfluorooctanesulfonamido



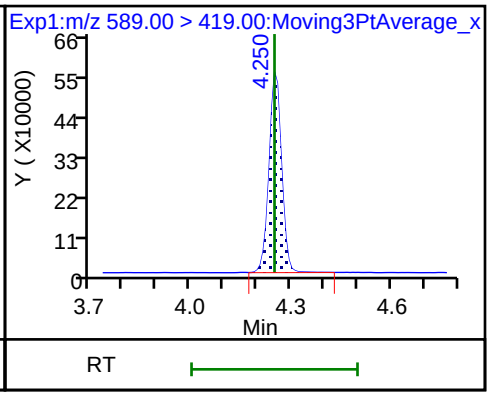
42 Perfluorodecanesulfonic acid (M)



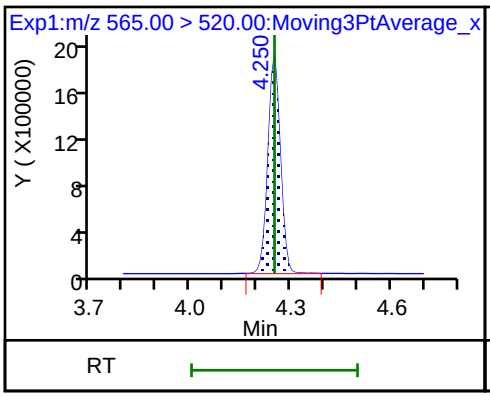
42 Perfluorodecanesulfonic acid



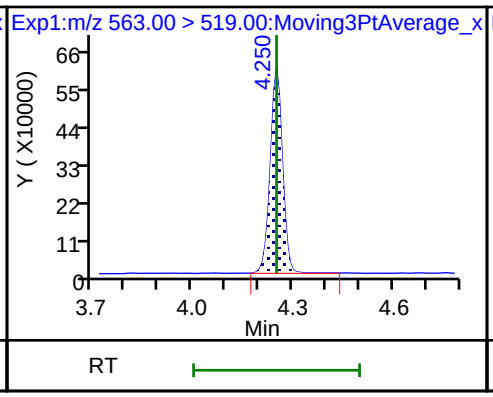
D 45 d5-NEtFOSAA



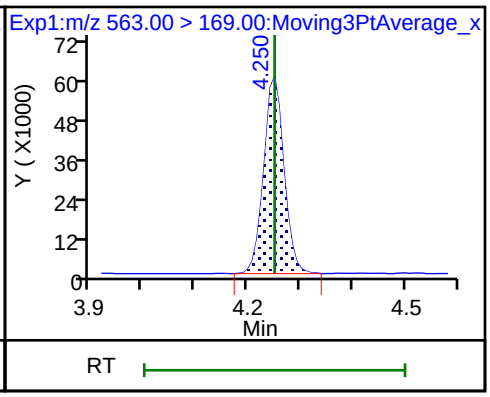
D 44 13C2 PFUnA



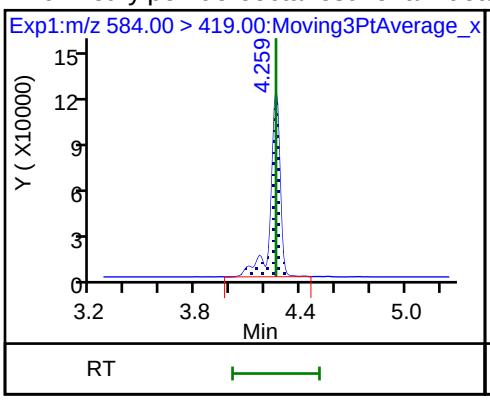
43 Perfluoroundecanoic acid



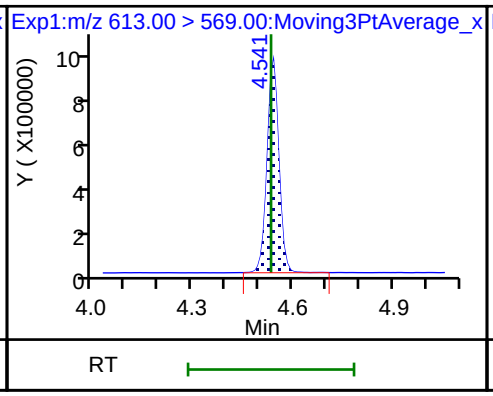
43 Perfluoroundecanoic acid



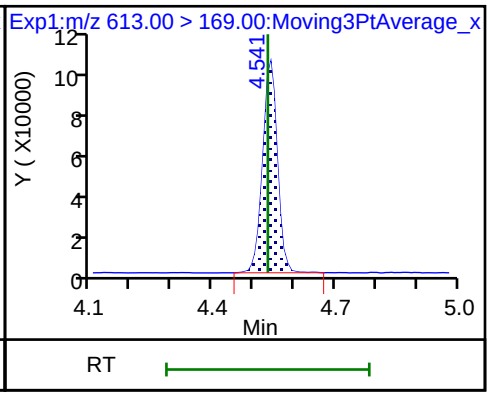
46 N-ethylperfluorooctanesulfonamidoa



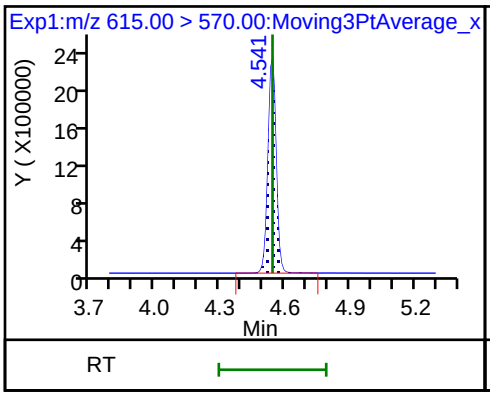
50 Perfluorododecanoic acid



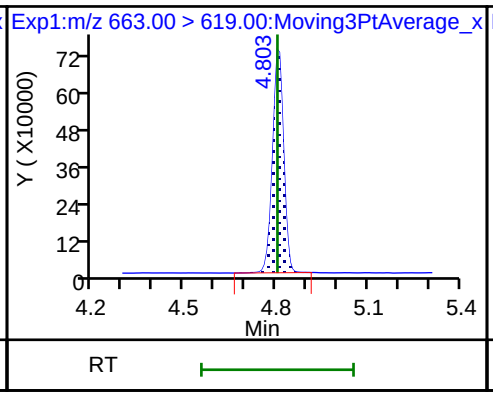
50 Perfluorododecanoic acid



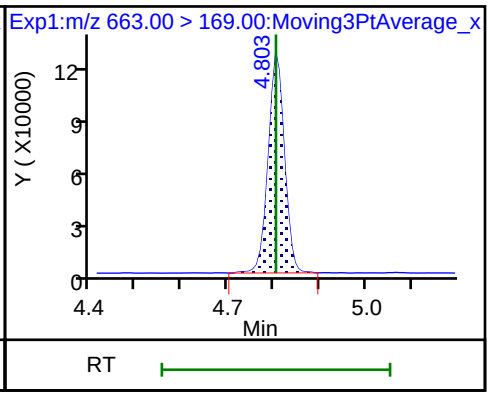
D 49 13C2 PFDoA



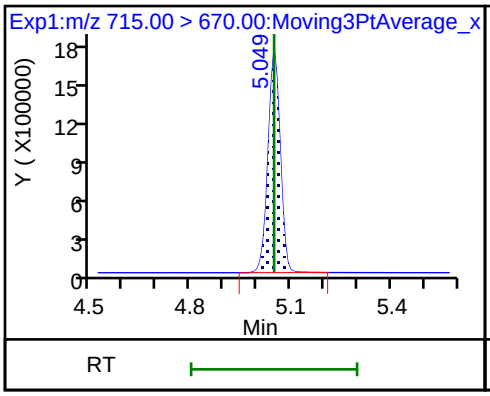
54 Perfluorotridecanoic acid



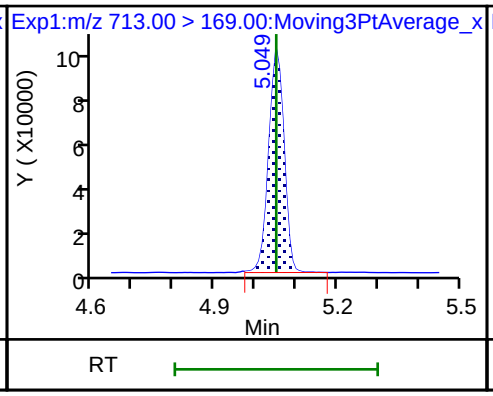
54 Perfluorotridecanoic acid



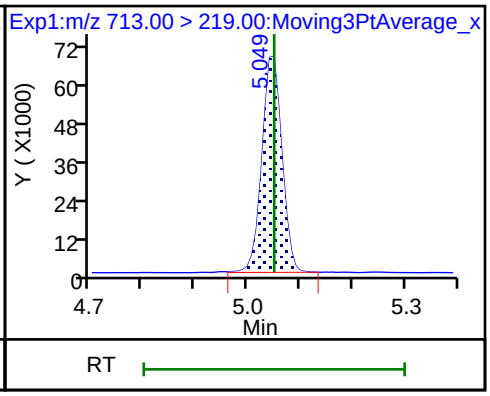
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: D-2090 R2 DI Water #3 Lab Sample ID: 140-13780-9

Matrix: Air Lab File ID: 2019.01.08LLAAXX_044.d

Analysis Method: 537 (modified) Date Collected: 12/20/2018 08:00

Extraction Method: None Date Extracted: 12/28/2018 03:39

Sample wt/vol: 1(Sample) Date Analyzed: 01/09/2019 00:19

Con. Extract Vol.: 500(mL) Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	17.9		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	20.1		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	17.1		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	18.6		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	17.7		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	22.0		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	94		25-150
STL01892	13C4 PFHpA	97		25-150
STL00995	13C5 PFNA	101		25-150
STL00990	13C4 PFOA	96		25-150
STL00991	13C4 PFOS	100		25-150
STL00994	18O2 PFHxS	97		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_044.d
Lims ID: 140-13780-A-9-B
Client ID: D-2090 R2 DI Water #3
Sample Type: Client
Inject. Date: 09-Jan-2019 00:19:01 ALS Bottle#: 31 Worklist Smp#: 15
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: 140-13780-a-9-b
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 12:35:42
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										M
217.00 > 172.00	1.676	1.679	-0.003	0.527	6966247	2.49		99.6	6258	M
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.676	1.679	-0.003	1.000	2653724	1.03			144	M
4 Perfluoropentanoic acid										
262.90 > 219.00	2.019	2.014	0.005	1.000	2408868	1.04			119	
D 3 13C5 PFPeA										
267.90 > 223.00	2.019	2.022	-0.003	0.635	5800134	2.37		94.8	3982	
D 5 13C3 PFBS										
301.90 > 80.00	2.063	2.054	0.009	0.649	8812464	2.19		94.3	831105	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.051	2.056	-0.005	0.994	3278669	0.8965	Target=2.70		2058	
298.90 > 99.00	2.051	2.056	-0.005	0.994	1163468		2.82(1.35-4.05)		716	
D 9 13C2 PFHxA										
315.00 > 270.00	2.382	2.383	-0.001	0.749	6680365	2.46		98.2	3385	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.382	2.384	-0.002	1.000	2237575	0.9668	Target=13.92		399	
313.00 > 119.00	2.392	2.384	0.008	1.004	173557		12.89(6.96-20.87)		358	
D 16 13C4 PFHpA										
367.00 > 322.00	2.781	2.782	-0.001	0.875	8121591	2.43		97.1	4571	
D 17 18O2 PFHxS										
403.00 > 84.00	2.781	2.782	-0.001	0.875	5417653	2.29		96.9	2442	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.781	2.782	-0.001	1.000	2418413	0.8533	Target=3.80		2242	
399.00 > 99.00	2.781	2.782	-0.001	1.000	699131		3.46(1.90-5.70)		323	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.781	2.782	-0.001	1.000	3396496	1.00	Target=4.34		617	
363.00 > 169.00	2.781	2.782	-0.001	1.000	693317		4.90(2.17-6.52)		794	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.157	3.165	-0.008	1.000	694867	0.9351			833	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.157	3.165	-0.008	0.993	835772	2.54		107	1404	
* 24 13C2 PFOA										
415.00 > 370.00	3.180	3.180	0.0		7328341	2.50			2495	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.172	3.180	-0.008	0.893	2469113	0.9649	Target=3.69		2463	
449.00 > 99.00	3.172	3.180	-0.008	0.893	611703		4.04(1.84-5.53)		1972	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.180	3.180	0.0	1.000	3160601	1.10	Target=2.72		503	
413.00 > 169.00	3.180	3.180	0.0	1.000	1104082		2.86(1.36-4.08)		1245	
D 25 13C4 PFOA										
417.00 > 372.00	3.180	3.180	0.0	1.000	6932352	2.39		95.6	3042	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.552	3.552	0.0	1.000	2264084	0.8859	Target=4.08		1181	
499.00 > 99.00	3.552	3.552	0.0	1.000	547388		4.14(2.04-6.12)		1682	
D 28 13C4 PFOS										
503.00 > 80.00	3.552	3.552	0.0	1.117	5796134	2.40		100	4416	
30 Perfluorononanoic acid										
463.00 > 419.00	3.567	3.567	0.0	1.000	2438042	0.9276	Target=5.35		405	
463.00 > 169.00	3.567	3.567	0.0	1.000	464480		5.25(2.68-8.03)		822	
D 31 13C5 PFNA										
468.00 > 423.00	3.567	3.567	0.0	1.122	6600710	2.53		101	3186	
D 33 13C8 FOSA										
506.00 > 78.00	3.885	3.885	0.0	1.222	3290572	2.07		82.8	2367	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.892	3.885	0.007	1.002	4103966	1.07			2876	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.927	3.927	0.0	1.235	93379	2.47		103	377	
D 36 13C2 PFDA										
515.00 > 470.00	3.927	3.927	0.0	1.235	6414084	2.51		100	3166	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.927	3.927	0.0	1.000	561695	1.01			1622	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.927	3.927	0.0	1.000	3078042	1.04	Target=14.23		1201	
513.00 > 169.00	3.927	3.927	0.0	1.000	193266		15.93(7.12-21.35)		345	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.083	4.093	-0.010	1.284	1606914	2.40		96.0	1582	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.092	4.093	-0.001	1.002	507313	0.9109			154	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.224	4.225	-0.001	1.189	1891628	0.8919	Target=4.28		2522	
599.00 > 99.00	4.224	4.225	-0.001	1.189	394415		4.80(2.14-6.43)		992	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.250	4.250	0.0	1.336	1159923	2.08		83.1	1254	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 44 13C2 PFUnA										
565.00 > 520.00	4.241	4.250	-0.009	1.334	4810600	2.39		95.7	2711	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.002	1539012	0.9592	Target=10.48		439	
563.00 > 169.00	4.250	4.250	0.0	1.002	153388		10.03(5.24-15.72)		478	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.259	4.259	0.0	1.002	394337	1.03			926	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.533	4.534	-0.001	1.000	1881059	1.01	Target=9.37		610	
613.00 > 169.00	4.541	4.534	0.007	1.002	200221		9.39(4.68-14.05)		594	
D 49 13C2 PFDoA										
615.00 > 570.00	4.533	4.541	-0.008	1.426	4861259	2.00		79.8	4760	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.803	4.803	0.0	1.059	1415362	0.9589	Target=6.18		710	
663.00 > 169.00	4.803	4.803	0.0	1.059	236829		5.98(3.09-9.27)		1084	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.049	5.049	0.0	1.588	3365297	1.99		79.7	5328	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.049	5.050	-0.001	1.000	196722	0.8950	Target=1.39		1037	
713.00 > 219.00	5.041	5.050	-0.009	0.998	149924		1.31(0.70-2.09)		1019	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:29 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_044.d

Injection Date: 09-Jan-2019 00:19:01 Instrument ID: A9

Lims ID: 140-13780-A-9-B Lab Sample ID: 320-13780-9

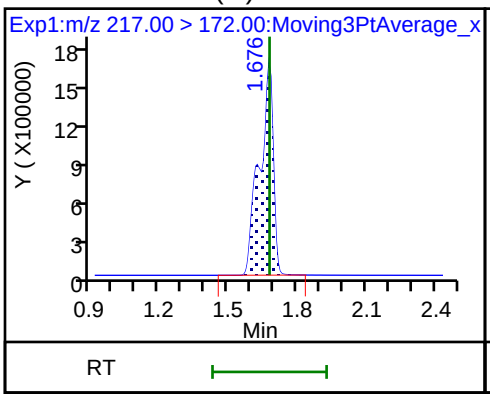
Client ID: D-2090 R2 DI Water #3

Operator ID: A9\Administrator ALS Bottle#: 31 Worklist Smp#: 15

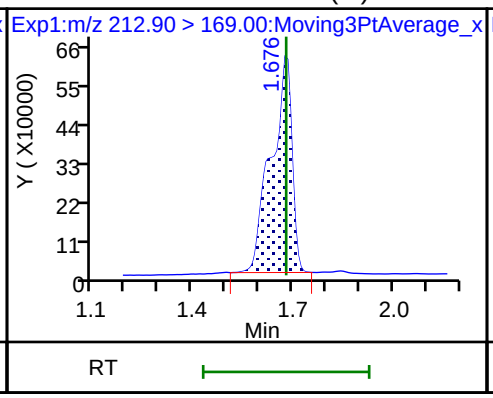
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

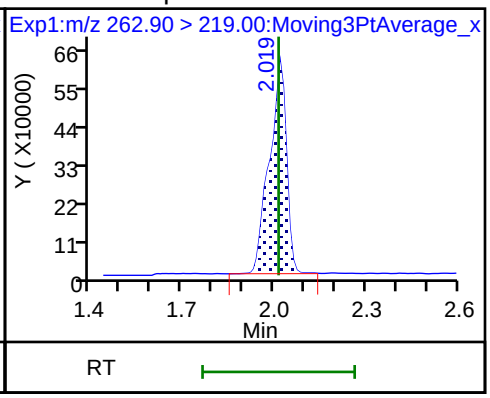
D 1 13C4 PFBA (M)



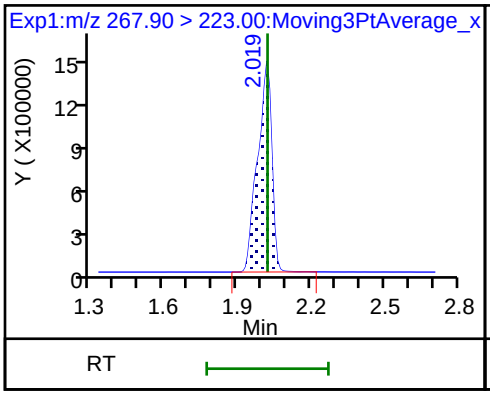
2 Perfluorobutanoic acid (M)



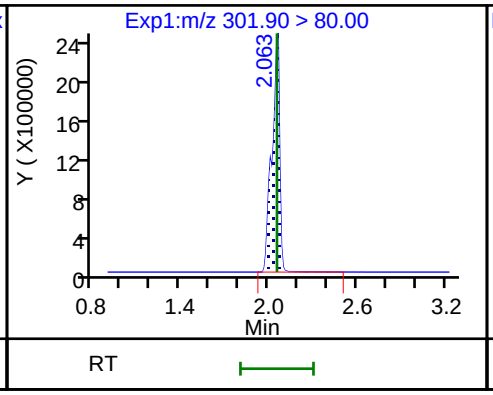
4 Perfluoropentanoic acid



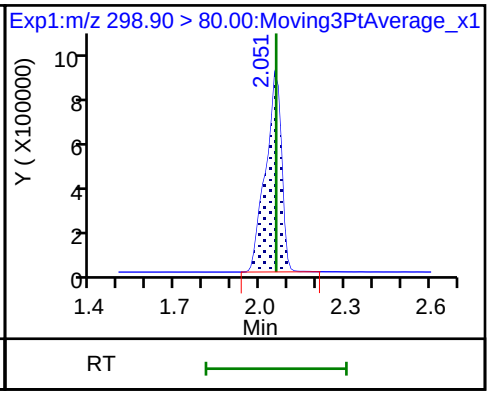
D 3 13C5 PFPeA



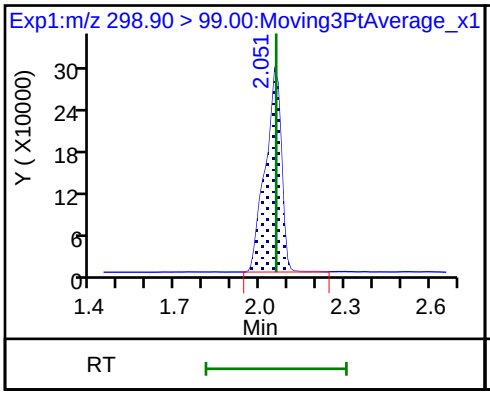
D 5 13C3 PFBS



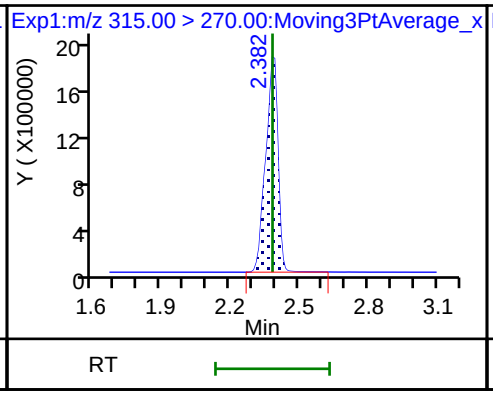
6 Perfluorobutanesulfonic acid



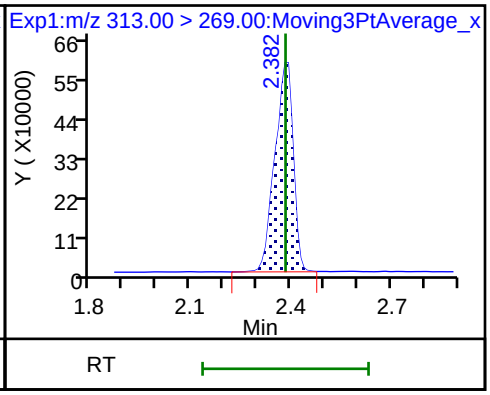
6 Perfluorobutanesulfonic acid



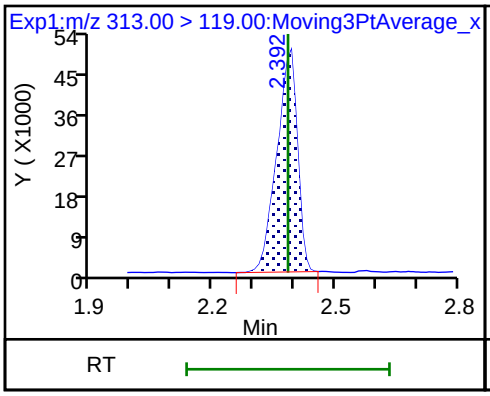
D 9 13C2 PFHxA



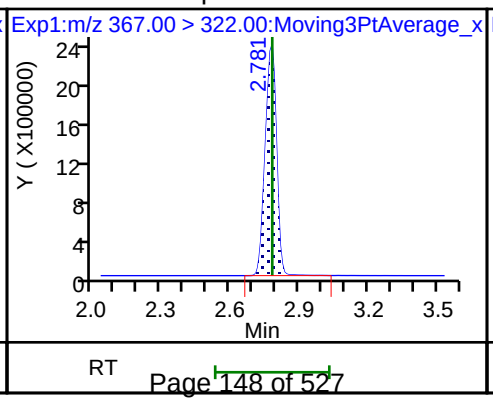
10 Perfluorohexanoic acid



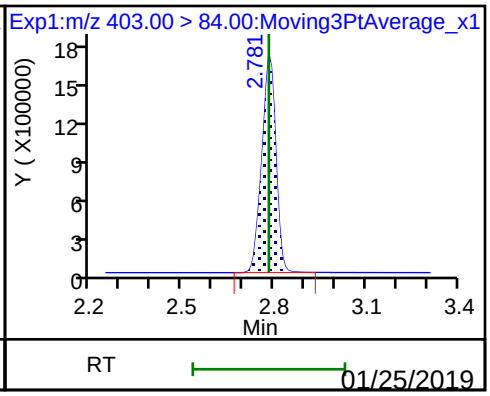
10 Perfluorohexanoic acid



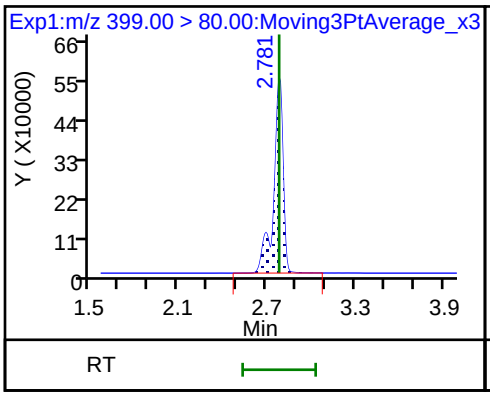
D 16 13C4 PFHpA



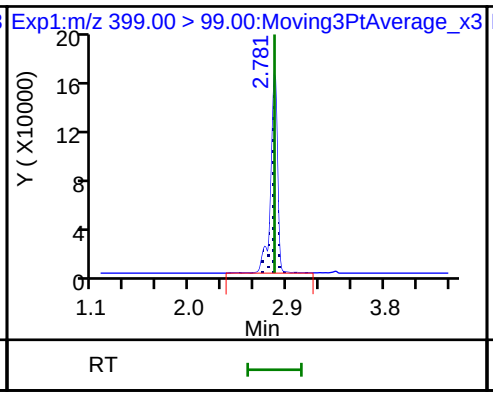
D 17 18O2 PFHxS



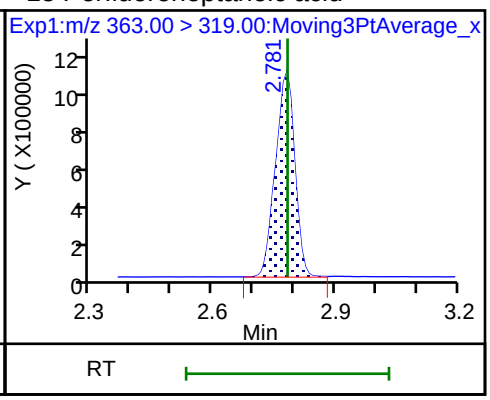
18 Perfluorohexanesulfonic acid



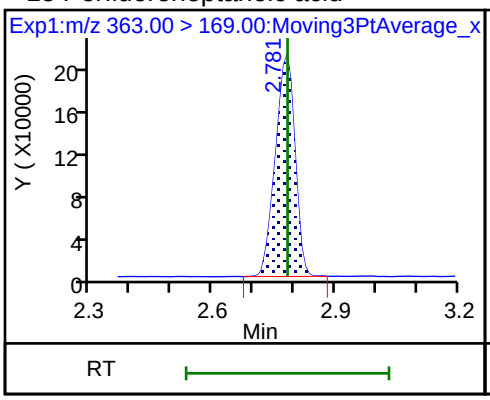
18 Perfluorohexanesulfonic acid



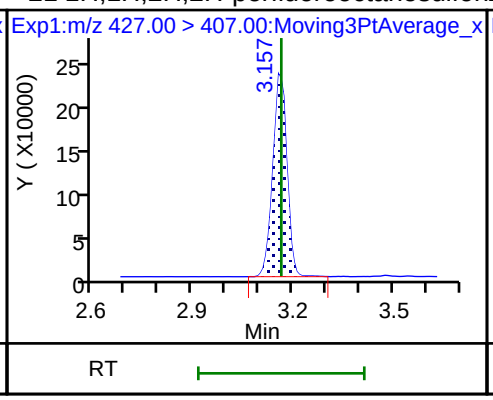
15 Perfluoroheptanoic acid



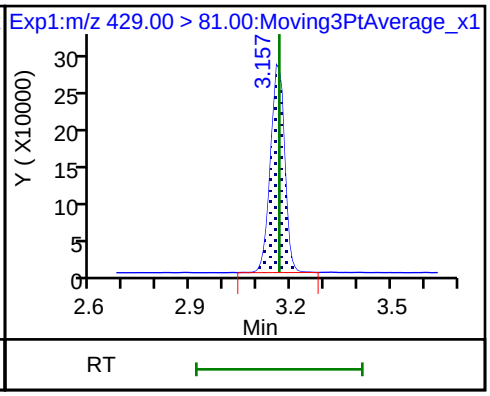
15 Perfluoroheptanoic acid



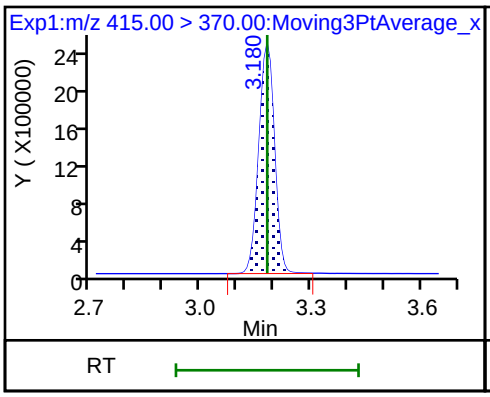
21 1H,1H,2H,2H-perfluorooctanesulfon



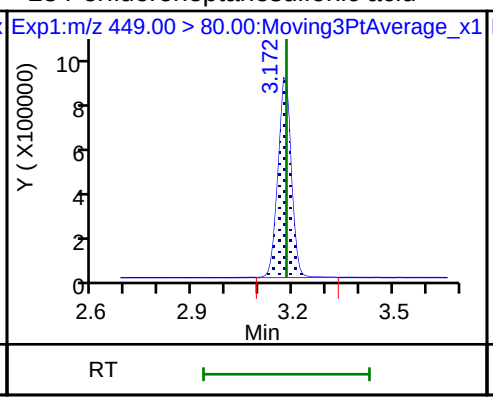
D 20 M2-6:2 FTS



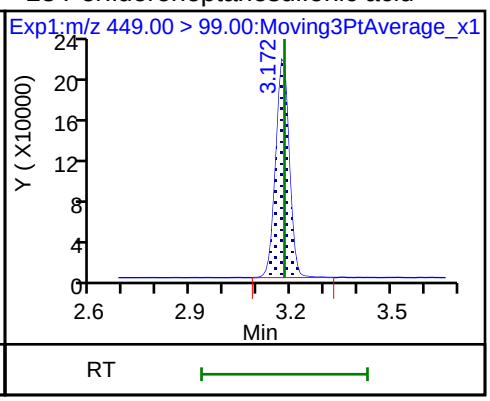
* 24 13C2 PFOA



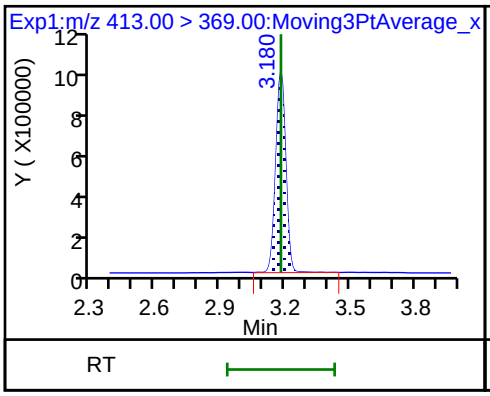
23 Perfluoroheptanesulfonic acid



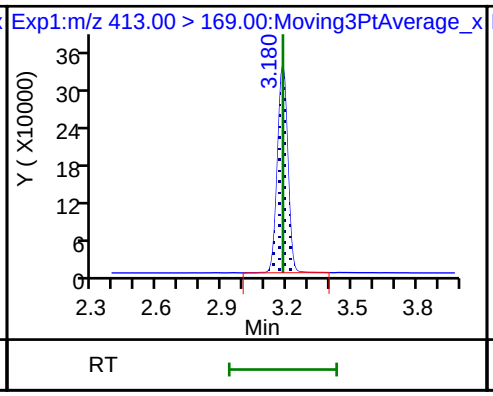
23 Perfluoroheptanesulfonic acid



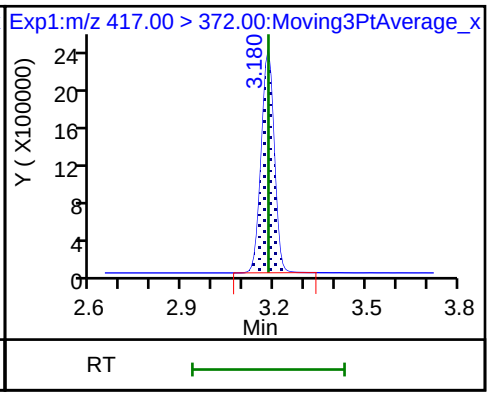
26 Perfluorooctanoic acid



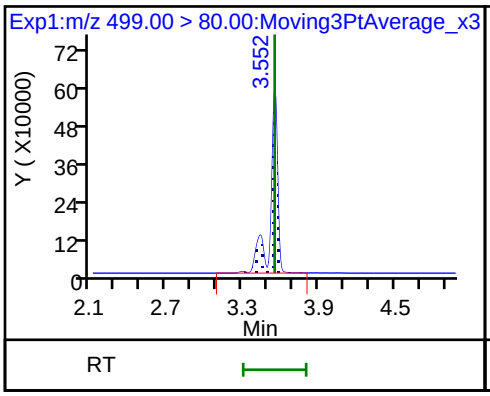
26 Perfluorooctanoic acid



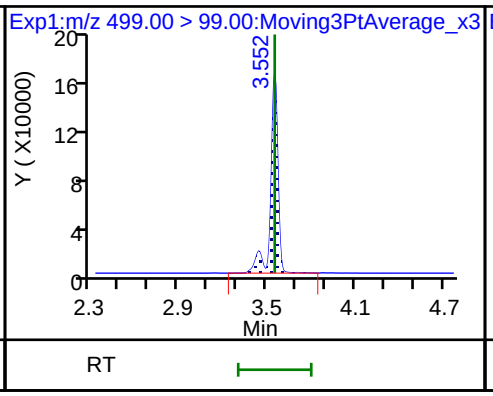
D 25 13C4 PFOA



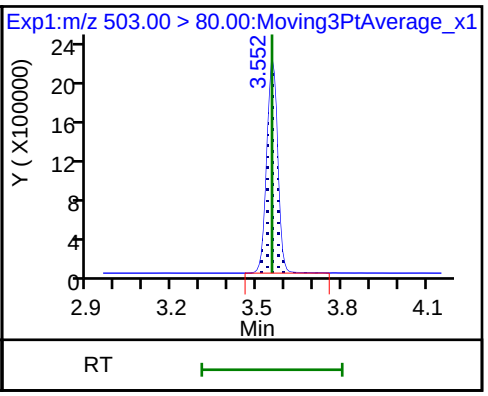
29 Perfluorooctanesulfonic acid



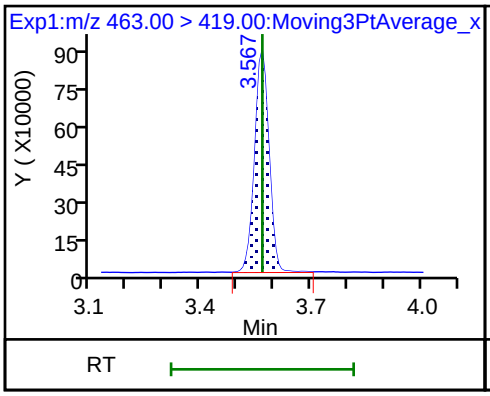
29 Perfluorooctanesulfonic acid



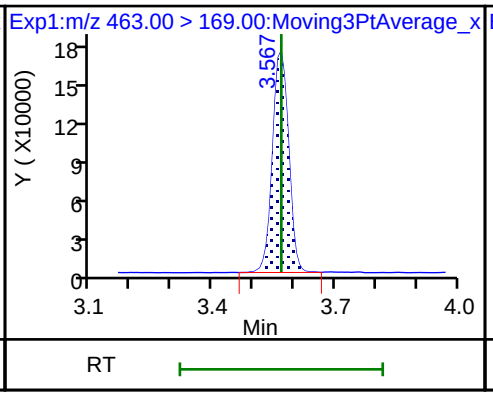
D 28 13C4 PFOS



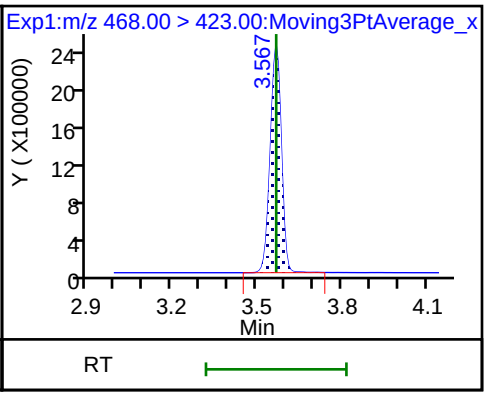
30 Perfluorononanoic acid



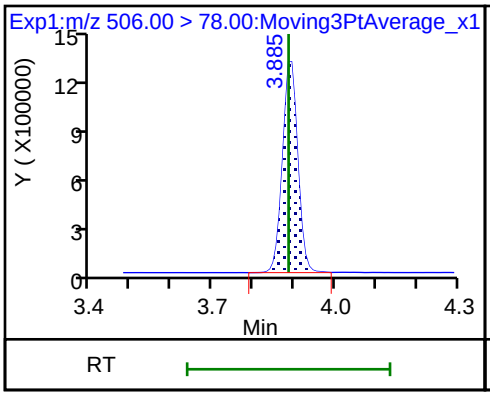
30 Perfluorononanoic acid



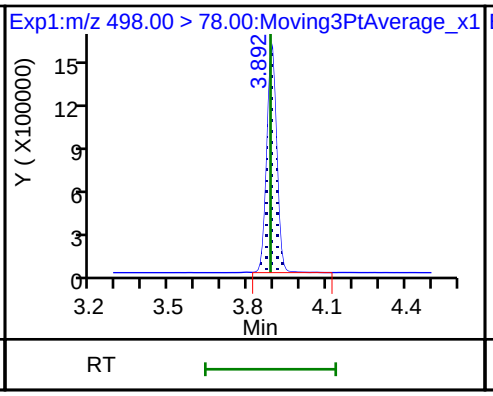
D 31 13C5 PFNA



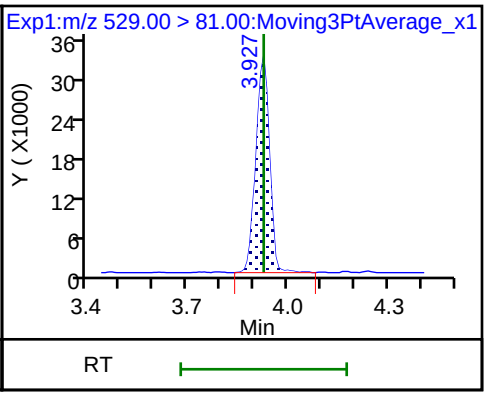
D 33 13C8 FOSA



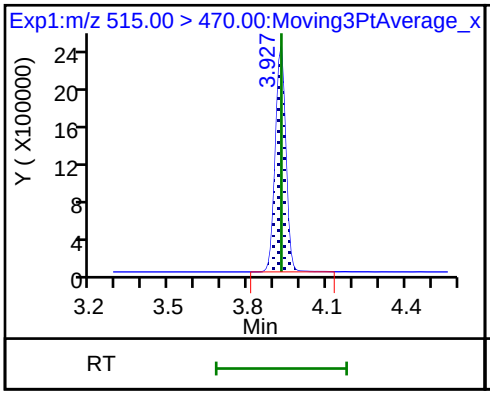
34 Perfluorooctanesulfonamide



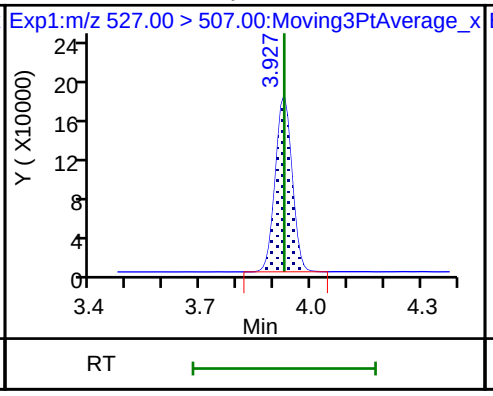
D 39 M2-8:2 FTS



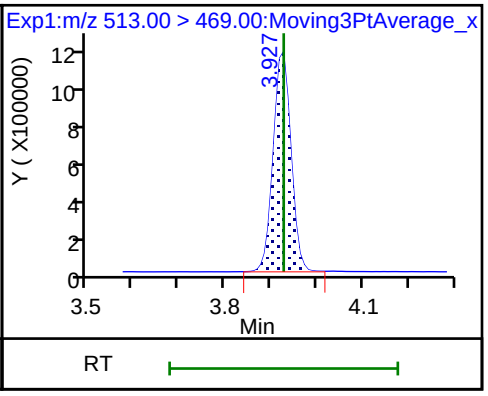
D 36 13C2 PFDA



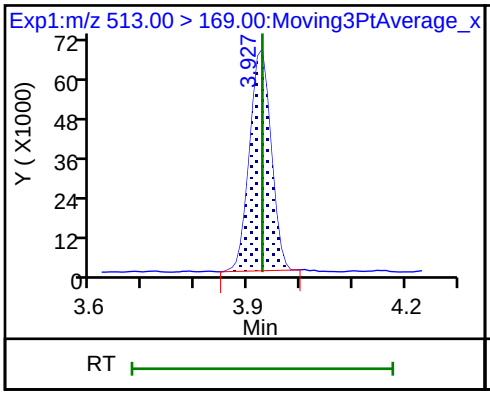
37 1H,1H,2H,2H-perfluorodecanesulfoni



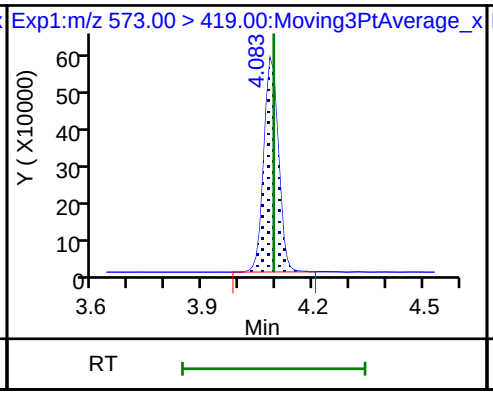
38 Perfluorodecanoic acid



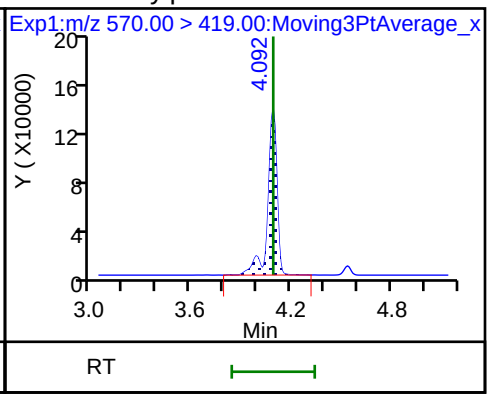
38 Perfluorodecanoic acid



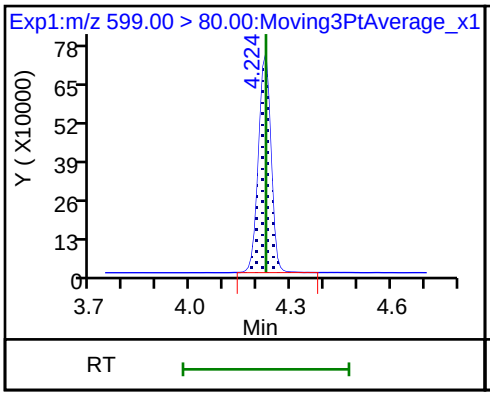
D 40 d3-NMeFOSAA



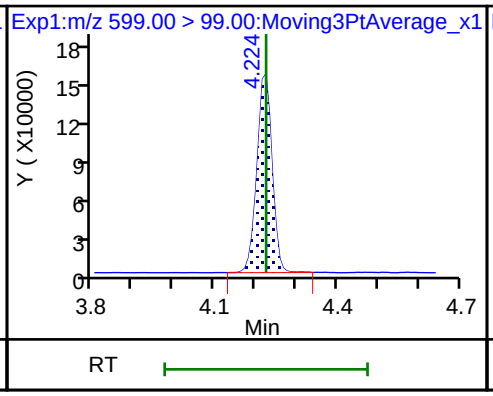
41 N-methylperfluorooctanesulfonamido



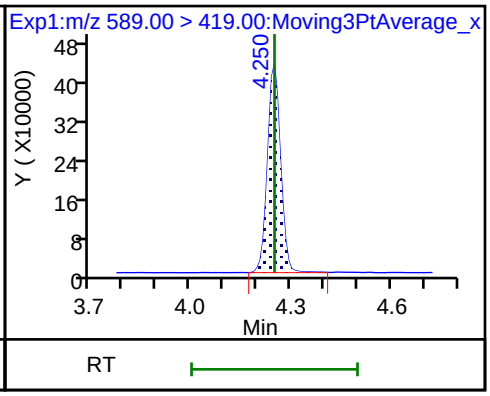
42 Perfluorodecanesulfonic acid



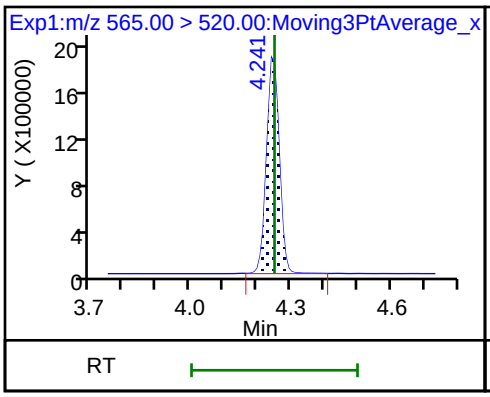
42 Perfluorodecanesulfonic acid



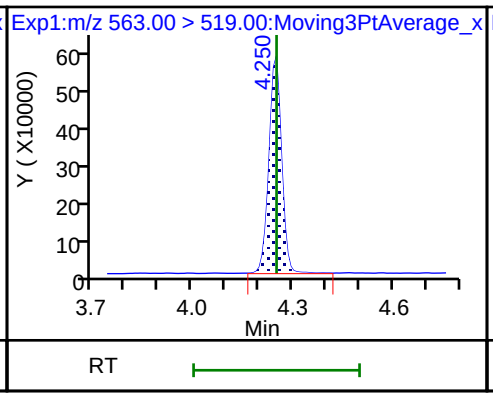
D 45 d5-NEtFOSAA



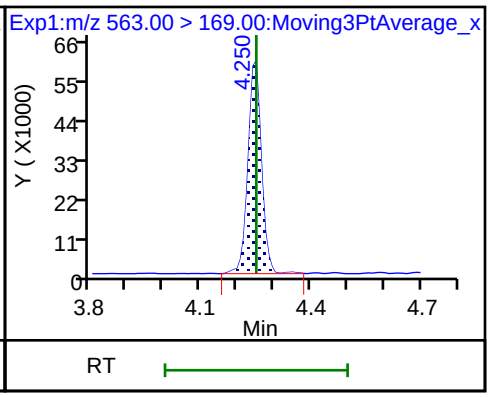
D 44 13C2 PFUnA



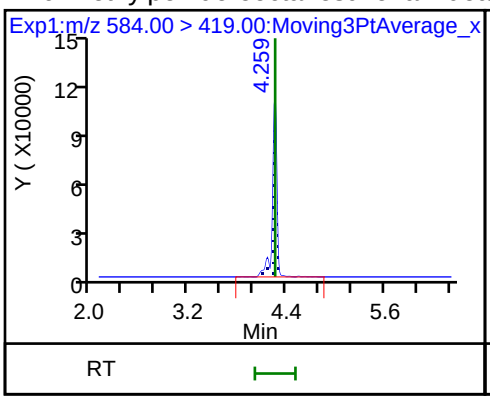
43 Perfluoroundecanoic acid



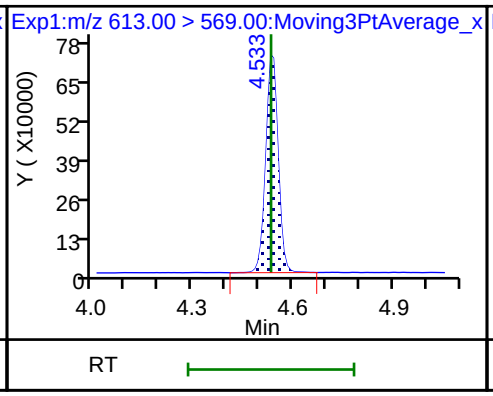
43 Perfluoroundecanoic acid



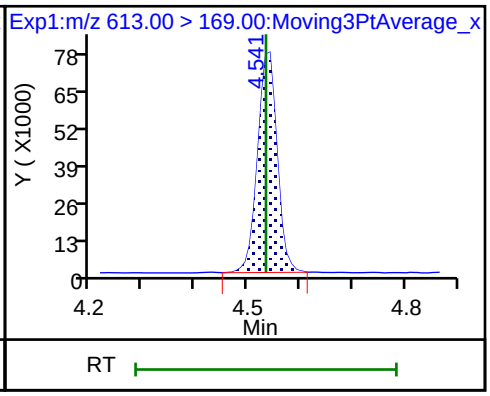
46 N-ethylperfluorooctanesulfonamidoa



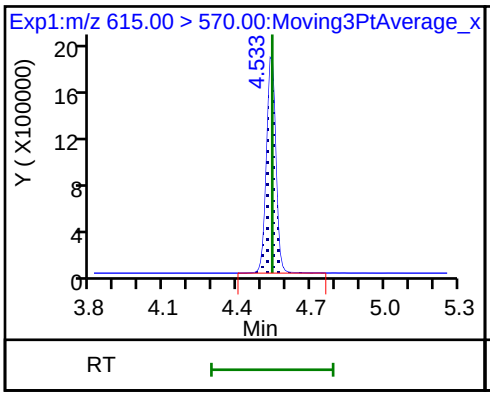
50 Perfluorododecanoic acid



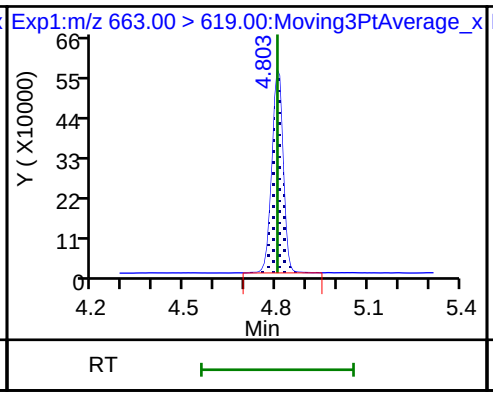
50 Perfluorododecanoic acid



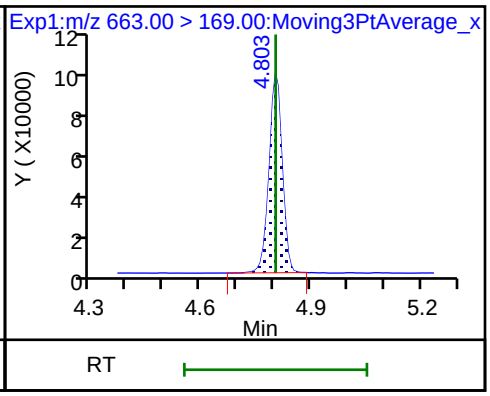
D 49 13C2 PFDoA



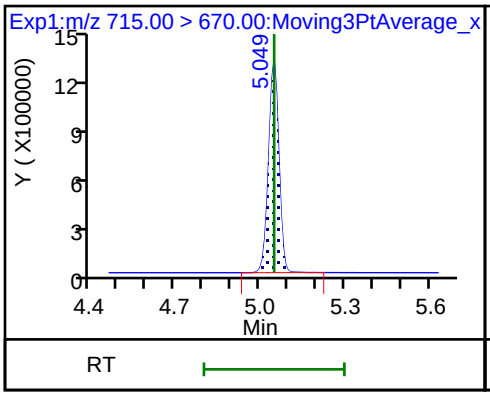
54 Perfluorotridecanoic acid



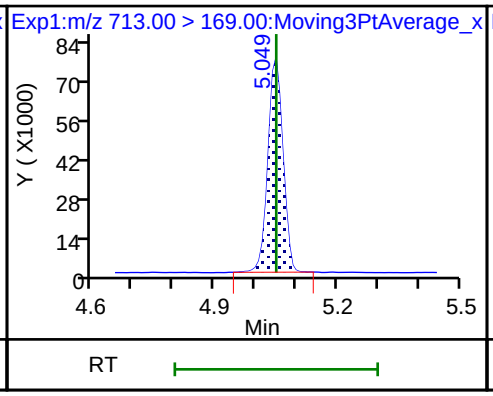
54 Perfluorotridecanoic acid



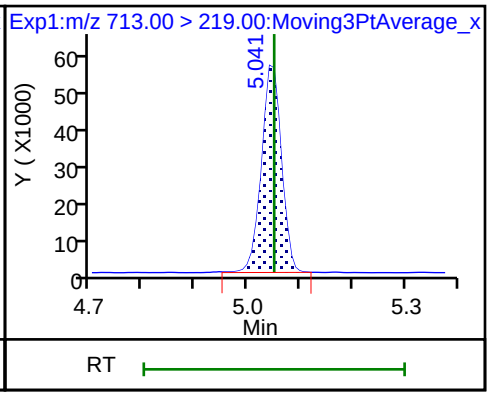
D 55 13C2 PFTeDA



56 Perfluorotetradecanoic acid



56 Perfluorotetradecanoic acid



FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-269628/2	2019.01.08ICALAA_002.d
Level 2	IC 320-269628/3	2019.01.08ICALAA_003.d
Level 3	IC 320-269628/4	2019.01.08ICALAA_004.d
Level 4	IC 320-269628/5	2019.01.08ICALAA_005.d
Level 5	IC 320-269628/6	2019.01.08ICALAA_006.d
Level 6	IC 320-269628/7	2019.01.08ICALAA_007.d
Level 7	IC 320-269628/8	2019.01.08ICALAA_008.d

ANALYTE	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6	LVL 7				RT WINDOW	AVG RT
Perfluorobutanoic acid (PFBA)	1.692	1.684	1.687	1.679	1.687	1.684	1.688				1.436 - 1.936	1.686
Perfluoropentanoic acid (PFPeA)	2.030	2.030	2.024	2.024	2.024	2.030	2.025				1.777 - 2.277	2.027
Perfluorobutanesulfonic acid (PFBS)	2.063	2.062	2.056	2.056	2.056	2.063	2.057				1.809 - 2.309	2.059
4:2 FTS	2.356	2.356	2.350	2.347	2.352	2.351	2.354				2.102 - 2.602	2.352
Perfluorohexanoic acid (PFHxA)	2.394	2.394	2.396	2.393	2.399	2.398	2.401				2.146 - 2.646	2.396
Perfluoropentanesulfonic acid (PFPeS)	2.403	2.412	2.414	2.402	2.408	2.417	2.411				2.160 - 2.660	2.410
HFPO-DA (GenX)	2.509	2.509	2.512	2.508	2.515	2.515	2.518				2.262 - 2.762	2.512
Perfluoroheptanoic acid (PFHpA)	2.792	2.792	2.786	2.791	2.788	2.789	2.790				2.540 - 3.040	2.790
Perfluorohexanesulfonic acid (PFHxS)	2.801	2.801	2.795	2.791	2.797	2.798	2.799				2.548 - 3.048	2.797
DONA	2.837	2.846	2.840	2.836	2.842	2.844	2.844				2.591 - 3.091	2.841
6:2 FTS	3.189	3.181	3.175	3.173	3.168	3.179	3.172				2.927 - 3.427	3.177
Perfluoroheptanesulfonic Acid (PFHpS)	3.189	3.197	3.190	3.188	3.184	3.195	3.196				2.941 - 3.441	3.191
Perfluorooctanoic acid (PFOA)	+++++	3.197	3.190	3.188	3.192	3.203	3.196				2.945 - 3.445	3.194
Perfluorooctanesulfonic acid (PFOS)	3.575	3.567	3.570	3.567	3.563	3.573	3.574				3.320 - 3.820	3.570
Perfluorononanoic acid (PFNA)	3.590	3.589	3.585	3.582	3.578	3.588	3.589				3.336 - 3.836	3.586
F-53B Major	3.781	3.774	3.770	3.768	3.771	3.779	3.774				3.524 - 4.024	3.774
Perfluorooctanesulfonamide (FOSA)	3.901	3.892	3.895	3.893	3.888	3.900	3.892				3.644 - 4.144	3.894
Perfluorononanesulfonic acid (PFNS)	3.918	3.918	3.921	3.918	3.913	3.926	3.918				3.669 - 4.169	3.919
Perfluorodecanoic acid (PFDA)	3.945	3.945	3.939	3.945	3.939	3.944	3.945				3.693 - 4.193	3.943
8:2 FTS	3.954	3.945	3.939	3.945	3.939	3.953	3.945				3.696 - 4.196	3.946
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	4.121	4.112	4.115	4.112	4.106	4.120	4.112				3.864 - 4.364	4.114
Perfluorodecanesulfonic acid (PFDS)	4.250	4.242	4.236	4.242	4.237	4.240	4.242				3.991 - 4.491	4.241
Perfluoroundecanoic acid (PFUnA)	+++++	4.276	4.262	4.268	4.263	4.275	4.267				4.020 - 4.520	4.269
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	4.285	4.276	4.279	4.276	4.271	4.283	4.276				4.028 - 4.528	4.278
F-53B Minor	4.411	4.410	4.404	4.401	4.405	4.409	4.410				4.157 - 4.657	4.407
Perfluorododecanoic acid (PFDoA)	4.565	4.565	4.559	4.557	4.560	4.565	4.557				4.311 - 4.811	4.561
10:2 FTS	4.583	4.573	4.575	4.573	4.576	4.582	4.583				4.328 - 4.828	4.578
Perfluorododecanesulfonic acid (PFDoS)	4.803	4.795	4.789	4.787	4.790	4.795	4.795				4.543 - 5.043	4.793
Perfluorotridecanoic acid (PFTriA)	4.838	4.831	4.826	4.825	4.827	4.831	4.832				4.580 - 5.080	4.830
Perfluorotetradecanoic acid (PFTeA)	+++++	5.083	5.076	5.075	5.077	5.082	5.075				4.830 - 5.330	5.078
Perfluoro-n-hexadecanoic acid (PFHxDA)	+++++	5.553	5.545	5.543	5.542	5.544	+++++				5.296 - 5.796	5.545
Perfluoro-n-octadecanoic acid (PFODA)	6.060	6.056	6.055	6.050	6.054	6.055	6.043				5.803 - 6.303	6.053

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

ANALYTE	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6	LVL 7				RT WINDOW	AVG RT
13C4 PFBA	1.684	1.684	1.687	1.679	1.687	1.684	1.688				1.435 - 1.935	1.685
13C5 PFPeA	2.030	2.030	2.024	2.014	2.024	2.030	2.025				1.775 - 2.275	2.025
13C3 PFBS	2.063	2.062	2.056	2.056	2.056	2.063	2.057				1.809 - 2.309	2.059
M2-4:2 FTS	2.356	2.356	2.350	2.347	2.352	2.351	2.346				2.101 - 2.601	2.351
13C2 PFHxA	2.394	2.394	2.396	2.393	2.390	2.398	2.392				2.144 - 2.644	2.394
13C3 HFPO-DA	2.509	2.509	2.512	2.508	2.515	2.515	2.518				2.262 - 2.762	2.512
13C4 PFHpA	2.792	2.792	2.786	2.791	2.788	2.798	2.790				2.541 - 3.041	2.791
18O2 PFHxS	2.801	2.801	2.795	2.791	2.797	2.798	2.799				2.548 - 3.048	2.797
M2-6:2 FTS	3.182	3.181	3.175	3.165	3.168	3.179	3.172				2.925 - 3.425	3.175
13C8 PFOA	3.197	3.197	3.190	3.188	3.184	3.195	3.188				2.941 - 3.441	3.191
13C4 PFOA	3.197	3.197	3.190	3.188	3.192	3.203	3.196				2.945 - 3.445	3.195
13C8 PFOS	3.575	3.567	3.562	3.559	3.563	3.566	3.567				3.316 - 3.816	3.566
13C4 PFOS	3.575	3.574	3.570	3.567	3.563	3.573	3.574				3.321 - 3.821	3.571
13C5 PFNA	3.590	3.582	3.585	3.574	3.578	3.588	3.589				3.334 - 3.834	3.584
13C8 FOSA	3.893	3.892	3.887	3.885	3.888	3.900	3.892				3.641 - 4.141	3.891
13C2 PFDA	3.945	3.945	3.939	3.936	3.939	3.944	3.945				3.692 - 4.192	3.942
M2-8:2 FTS	3.954	3.945	3.948	3.936	3.939	3.953	3.954				3.697 - 4.197	3.947
d3-NMeFOSAA	4.112	4.112	4.105	4.102	4.106	4.111	4.112				3.859 - 4.359	4.109
13C2 PFUnA	4.268	4.267	4.262	4.268	4.263	4.266	4.267				4.016 - 4.516	4.266
d5-NEtFOSAA	4.276	4.276	4.271	4.268	4.263	4.275	4.276				4.022 - 4.522	4.272
13C2 PFDoA	4.565	4.565	4.559	4.557	4.552	4.565	4.557				4.310 - 4.810	4.560
13C2 PFTeDA	5.090	5.083	5.076	5.075	5.077	5.082	5.075				4.830 - 5.330	5.080
13C2 PFHxDA	5.553	5.543	5.545	5.543	5.542	5.544	5.544				5.295 - 5.795	5.545

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-269628/2	2019.01.08ICALAA._002.d
Level 2	IC 320-269628/3	2019.01.08ICALAA._003.d
Level 3	IC 320-269628/4	2019.01.08ICALAA._004.d
Level 4	IC 320-269628/5	2019.01.08ICALAA._005.d
Level 5	IC 320-269628/6	2019.01.08ICALAA._006.d
Level 6	IC 320-269628/7	2019.01.08ICALAA._007.d
Level 7	IC 320-269628/8	2019.01.08ICALAA._008.d

ANALYTE	CF				CURVE TYPE	COEFFICIENT			#	MIN CF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 5	LVL 2 LVL 6	LVL 3 LVL 7	LVL 4		B	M1	M2								
13C8 PFOA	1996899 2335300	2548297 2377819	2478897 2242415	2561979	Ave		2363086.65				8.4		50.0			
13C8 PFOS	402934 517564	522319 526760	525528 492181	516972	Ave		500608.428				8.9		50.0			

Note: The M1 coefficient is the same as Ave CF for an Ave curve type.

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
Perfluorobutanoic acid (PFBA)	0.9592 0.9276	0.9639 0.8594	0.9339	0.9277	0.9083	AveID		0.9257				3.8		35.0			
Perfluoropentanoic acid (PFPeA)	1.1706 0.9704	0.9862 0.9109	1.0138	0.9817	0.9674	AveID		1.0002				8.1		35.0			
Perfluorobutanesulfonic acid (PFBS)	1.0035 0.9282	1.0737 0.8768	0.9696	0.9600	0.9423	AveID		0.9649				6.4		50.0			
4:2 FTS	0.1412 0.1514	0.1596 0.1453	0.1458	0.1522	0.1402	AveID		0.1480				4.6		50.0			
Perfluorohexanoic acid (PFHxA)	0.9257 0.8633	0.9242 0.7851	0.9247	0.8261	0.8136	AveID		0.8661				6.9		35.0			
Perfluoropentanesulfonic acid (PFPeS)	0.4390 0.4929	0.4776 0.4549	0.4702	0.4694	0.4779	AveID		0.4688				3.7		50.0			
HFPO-DA (GenX)	2.5573 1.9661	2.2089 1.8940	2.7329	1.9363	1.7123	AveID		2.1440				17.5		35.0			
Perfluoroheptanoic acid (PFHpA)	1.2298 0.9813	1.0813 0.8789	1.1459	0.9994	0.9664	AveID		1.0404				11.5		35.0			
Perfluorohexanesulfonic acid (PFHxS)	1.4480 1.1831	1.4079 1.1709	1.1880	1.1482	1.1143	AveID		1.2372				10.8		35.0			
DONA	2.3057 2.1901	2.6036 1.7768	2.5119	2.4478	2.3050	AveID		2.3059				11.8		50.0			
6:2 FTS	2.4022 2.2122	1.9893 2.2462	2.0890	2.0463	1.7959	AveID		2.1116				9.3		35.0			
Perfluoroheptanesulfonic Acid (PFHpS)	1.0916 1.1164	1.1031 0.9676	0.9971	1.0668	1.0434	AveID		1.0551				5.3		50.0			
Perfluorooctanoic acid (PFOA)	+++++ 0.9530	1.1797 0.8515	1.1733	1.0707	0.9915	AveID		1.0366				12.5		35.0			
Perfluorooctanesulfonic acid (PFOS)	1.1045 1.0961	1.0587 1.0486	1.0704	0.9856	1.0132	AveID		1.0539				4.1		35.0			
Perfluorononanoic acid (PFNA)	1.1267 0.9490	1.0476 0.8436	1.0735	0.9925	0.9354	AveID		0.9955				9.6		35.0			
F-53B Major	1.0521 0.9538	1.0145 0.8718	0.9597	0.9142	0.9212	AveID		0.9553				6.4		50.0			
Perfluorooctanesulfonamide (FOSA)	3.0381 2.7902	3.1964 2.3784	3.0372	2.9382	2.9692	AveID		2.9068				9.1		35.0			
Perfluorononanesulfonic acid (PFNS)	0.5380 0.6222	0.6153 0.5412	0.5813	0.5874	0.6098	AveID		0.5850				5.9		50.0			
Perfluorodecanoic acid (PFDA)	1.2472 1.0994	1.1925 0.9868	1.2622	1.1547	1.0982	AveID		1.1487				8.4		35.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
8:2 FTS	15.912 14.182	13.660 13.731	14.457	14.026	13.416	AveID		14.198				5.9		35.0			
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	0.8469 0.8840	0.9112 0.8799	0.9123	0.8377	0.7933	AveID		0.8665				5.0		35.0			
Perfluorodecanesulfonic acid (PFDS)	0.8954 0.8935	0.9293 0.7788	0.8788	0.8484	0.8976	AveID		0.8746				5.6		50.0			
Perfluoroundecanoic acid (PFUnA)	+++++ 0.7596	1.0648 0.7464	0.8809	0.7984	0.7527	AveID		0.8338				14.8		35.0			
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	0.8455 0.8246	0.8227 0.8731	0.8413	0.7965	0.7916	AveID		0.8279				3.4		35.0			
F-53B Minor	0.9427 1.1179	1.2509 0.9836	1.3042	1.1583	1.1375	AveID		1.1279				11.6		50.0			
Perfluorododecanoic acid (PFDoA)	0.9491 0.9734	1.0881 0.8211	1.0298	0.9270	0.9339	AveID		0.9604				8.8		35.0			
10:2 FTS	8.9892 8.6645	8.6300 9.5166	8.5814	9.0419	8.5435	AveID		8.8524				4.0		50.0			
Perfluorododecanesulfonic acid (PFDoS)	0.0794 0.0986	0.1012 0.0935	0.0902	0.0845	0.0884	AveID		0.0908				8.4		50.0			
Perfluorotridecanoic acid (PFTriA)	0.8359 0.7538	0.8500 0.6466	0.7676	0.7249	0.7349	AveID		0.7591				9.1		50.0			
Perfluorotetradecanoic acid (PFTeA)	+++++ 0.1703	0.1834 0.1618	0.1645	0.1502	0.1496	AveID		0.1633				7.8		50.0			
Perfluoro-n-hexadecanoic acid (PFHxDA)	+++++ 0.8804	1.3220 +++++	0.9668	0.9140	0.8883	L2ID	0.0220	0.8816							1.0000		0.9900
Perfluoro-n-octadecanoic acid (PFODA)	0.6056 0.6346	0.6119 0.6234	0.6196	0.6103	0.6157	AveID		0.6173				1.6		50.0			
13C4 PFBA	0.9386 0.9786	0.9212 0.9803	0.9762	0.9292	0.9584	Ave		0.9546				2.6		50.0			
13C5 PFPeA	0.8313 0.8500	0.8279 0.8245	0.8553	0.8185	0.8377	Ave		0.8350				1.6		50.0			
13C3 PFBS	1.3272 1.4280	1.3461 1.3854	1.3882	1.3411	1.3839	Ave		1.3714				2.6		50.0			
M2-4:2 FTS	0.0828 0.0875	0.0797 0.0840	0.0834	0.0825	0.0853	Ave		0.0836				2.9		50.0			
13C2 PFHxA	0.9071 0.9593	0.9125 0.9102	0.9521	0.9271	0.9279	Ave		0.9280				2.2		50.0			
13C3 HFPO-DA	0.0794 0.0898	0.0805 0.0949	0.0681	0.0790	0.0912	Ave		0.0833				11.1		50.0			
13C4 PFHpA	1.1413 1.1343	1.1788 1.0944	1.1483	1.1493	1.1429	Ave		1.1413				2.2		50.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
18O2 PFHxS	0.7794 0.8462	0.8062 0.8004	0.8266	0.7611	0.8280	Ave		0.8068				3.7		50.0			
M2-6:2 FTS	0.1129 0.1080	0.1149 0.1001	0.1191	0.1130	0.1192	Ave		0.1125				6.0		50.0			
13C4 PFOA	0.9873 0.9942	1.0060 0.9638	0.9964	0.9857	0.9939	Ave		0.9896				1.3		50.0			
13C4 PFOS	0.8064 0.8341	0.7839 0.8296	0.8611	0.8208	0.8283	Ave		0.8235				2.9		50.0			
13C5 PFNA	0.9024 0.8825	0.8832 0.8205	0.9466	0.8861	0.9198	Ave		0.8916				4.4		50.0			
13C8 FOSA	0.5353 0.5502	0.5297 0.5229	0.5725	0.5536	0.5308	Ave		0.5421				3.2		50.0			
13C2 PFDA	0.9094 0.8378	0.8603 0.7755	0.9401	0.8845	0.8973	Ave		0.8721				6.2		50.0			
M2-8:2 FTS	0.0121 0.0133	0.0129 0.0121	0.0145	0.0124	0.0132	Ave		0.0129				6.5		50.0			
d3-NMeFOSAA	0.2213 0.2378	0.2126 0.2448	0.2268	0.2218	0.2343	Ave		0.2285				4.9		50.0			
13C2 PFUnA	0.6674 0.7104	0.6739 0.6510	0.7053	0.6850	0.7076	Ave		0.6858				3.3		50.0			
d5-NEtFOSAA	0.1816 0.1964	0.1821 0.1818	0.2031	0.1864	0.2018	Ave		0.1905				5.1		50.0			
13C2 PFDoA	0.8250 0.8074	0.8422 0.8281	0.8855	0.8115	0.8191	Ave		0.8313				3.2		50.0			
13C2 PFTeDA	0.5356 0.5936	0.5549 0.5879	0.6156	0.5648	0.5816	Ave		0.5763				4.6		50.0			
13C2 PFHxDA	0.4866 0.5813	0.5207 0.5718	0.5718	0.5107	0.5263	Ave		0.5385				6.8		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.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-269628/2	2019.01.08ICALAA._002.d
Level 2	IC 320-269628/3	2019.01.08ICALAA._003.d
Level 3	IC 320-269628/4	2019.01.08ICALAA._004.d
Level 4	IC 320-269628/5	2019.01.08ICALAA._005.d
Level 5	IC 320-269628/6	2019.01.08ICALAA._006.d
Level 6	IC 320-269628/7	2019.01.08ICALAA._007.d
Level 7	IC 320-269628/8	2019.01.08ICALAA._008.d

ANALYTE	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
		LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
13C8 PFOA	Ave	4887410 5819713	6236957 5488311	6067101	6270444	5715646	2.45 2.45	2.45 2.45	2.45	2.45	2.45
13C8 PFOS	Ave	963013 1258957	1248342 1176313	1256011	1235564	1236979	2.39 2.39	2.39 2.39	2.39	2.39	2.39

Curve Type Legend:
Ave = Average

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-269628/2	2019.01.08ICALAA_002.d
Level 2	IC 320-269628/3	2019.01.08ICALAA_003.d
Level 3	IC 320-269628/4	2019.01.08ICALAA_004.d
Level 4	IC 320-269628/5	2019.01.08ICALAA_005.d
Level 5	IC 320-269628/6	2019.01.08ICALAA_006.d
Level 6	IC 320-269628/7	2019.01.08ICALAA_007.d
Level 7	IC 320-269628/8	2019.01.08ICALAA_008.d

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
Perfluorobutanoic acid (PFBA)		AveID	52411 12405215	127748 22503572	612485	2438059	5986449	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoropentanoic acid (PFPeA)		AveID	56652 11273703	117467 20061830	582577	2272772	5572651	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorobutanesulfonic acid (PFBS)		AveID	68538 16014412	183812 28684194	799390	3218990	7927952	0.0221 4.42	0.0442 8.84	0.221	0.884	2.21
4:2 FTS		AveID	10192 2759369	28867 5020417	127041	539183	1246253	0.0234 4.67	0.0467 9.34	0.234	0.934	2.34
Perfluorohexanoic acid (PFHxA)		AveID	48882 11318340	121338 19087472	591553	2166231	5191153	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoropentanesulfonic acid (PFPeS)		AveID	31812 9023563	86764 15788524	411331	1670078	4266313	0.0235 4.69	0.0469 9.38	0.235	0.938	2.35
HFPO-DA (GenX)		AveID	11825 2412304	25577 4802332	125040	432728	1074307	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoroheptanoic acid (PFHpA)		AveID	81703 15212052	183373 25691646	884057	3248928	7595555	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorohexanesulfonic acid (PFHxS)		AveID	59781 12450574	148596 22782070	600407	2249179	5773886	0.0228 4.55	0.0455 9.10	0.228	0.910	2.28
DONA		AveID	101966 23517529	276597 37090627	1369019	5353298	12368235	0.0236 4.71	0.0471 9.42	0.236	0.942	2.36
6:2 FTS		AveID	14964 3096454	31178 5692522	158416	620308	1395898	0.0237 4.74	0.0474 9.48	0.237	0.948	2.37
Perfluoroheptanesulfonic Acid (PFHpS)		AveID	48785 12115333	118430 20413351	549179	2357796	5658122	0.0238 4.76	0.0476 9.52	0.238	0.952	2.38
Perfluorooctanoic acid (PFOA)		AveID	+++++ 12961493	170895 21943062	786276	2985282	6777213	+++++ 5.01	0.0501 10.0	0.250	1.00	2.50
Perfluorooctanesulfonic acid (PFOS)		AveID	48116 11595430	110800 21564747	574710	2123428	5356171	0.0232 4.64	0.0464 9.28	0.232	0.928	2.32
Perfluorononanoic acid (PFNA)		AveID	59187 11446862	133105 18488723	682695	2487789	5916875	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
F-53B Major		AveID	46033 10133130	106636 18004596	517478	1978172	4890460	0.0233 4.66	0.0466 9.32	0.233	0.932	2.33
Perfluorooctanesulfonamide (FOSA)		AveID	94666 20981246	243572 33223713	1168208	4600640	10838937	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorononanesulfonic acid (PFNS)		AveID	24247 6809088	66612 11512885	322880	1309092	3334746	0.0240 4.80	0.0480 9.60	0.240	0.960	2.40
Perfluorodecanoic acid (PFDA)		AveID	66023 12588600	147589 20439043	797208	2888851	6776805	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
8:2 FTS		AveID	10771 2463128	24348 4238147	134797	470274	1163051	0.0240 4.79	0.0479 9.58	0.240	0.958	2.40
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)		AveID	10910 2872662	27866 5753566	139018	525573	1277915	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorodecanesulfonic acid (PFDS)		AveID	40522 9818093	101035 16637221	490163	1898813	4928942	0.0241 4.82	0.0482 9.64	0.241	0.964	2.41
Perfluoroundecanoic acid (PFUnA)		AveID	+++++ 7375387	103230 12978014	417423	1546932	3663033	+++++ 5.00	0.0500 10.0	0.250	1.00	2.50
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)		AveID	8936 2213775	21552 4238878	114808	419985	1098761	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
F-53B Minor		AveID	41689 12004201	132895 20532684	710802	2533141	6103712	0.0236 4.71	0.0471 9.42	0.236	0.942	2.36
Perfluorododecanoic acid (PFDoA)		AveID	45580 10740648	131839 18163168	612702	2127815	5260415	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
10:2 FTS		AveID	6123 1514293	15479 2955745	80516	305065	745273	0.0241 4.82	0.0482 9.64	0.241	0.964	2.41
Perfluorododecanesulfonic acid (PFDoS)		AveID	3606 1088185	11044 2005766	50524	189948	487663	0.0242 4.84	0.0484 9.68	0.242	0.968	2.42
Perfluorotridecanoic acid (PFTriA)		AveID	40141 8318177	102982 14302096	456680	1663999	4139637	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorotetradecanoic acid (PFTeA)		AveID	+++++ 1381405	14642 2539982	68013	240020	598200	+++++ 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoro-n-hexadecanoic acid (PFHxDA)		L2ID	+++++ 6994450	99036 +++++	371366	1320289	3214795	+++++ 5.00	0.0500 +++++	0.250	1.00	2.50
Perfluoro-n-octadecanoic acid (PFODA)		AveID	17157 5041488	45835 9520921	238017	881489	2228311	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
13C4 PFBA	13PFOA	Ave	5464013 6686954	6626549 6546007	6558378	6570522	6590555	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C5 PFPeA	13PFOA	Ave	4839403 5808535	5955293 5506117	5746206	5788060	5760664	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C3 PFBS	13PFOA	Ave	7185165 9075151	9005009 8603777	8673827	8819314	8850848	2.33 2.33	2.33 2.33	2.33	2.33	2.33
M2-4:2 FTS	13PFOA	Ave	450400 558337	535594 523894	523298	544735	548201	2.34 2.34	2.34 2.34	2.34	2.34	2.34

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1 Analy Batch No.: 269628

SDG No.:

Instrument ID: A9 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/08/2019 17:41 Calibration End Date: 01/08/2019 18:26 Calibration ID: 43086

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
13C2 PFHxA	13PF OA	Ave	5280647 6555120	6564174 6078302	6396944	6555817	6380794	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C3 HFPO-DA	13PF OA	Ave	462394 613460	578964 633898	457543	558716	627391	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C4 PFHpA	13PF OA	Ave	6643618 7751362	8479238 7308125	7714710	8127431	7859686	2.50 2.50	2.50 2.50	2.50	2.50	2.50
18O2 PFHxS	13PF OA	Ave	4291874 5470177	5485896 5056556	5253989	5091123	5386473	2.37 2.37	2.37 2.37	2.37	2.37	2.37
M2-6:2 FTS	13PF OA	Ave	624238 701339	785304 634902	759948	759427	778889	2.38 2.38	2.38 2.38	2.38	2.38	2.38
13C4 PFOA	13PF OA	Ave	5747530 6793920	7236127 6436164	6694520	6970295	6835040	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C4 PFOS	13PF OA	Ave	4487999 5448850	5390763 5296197	5531063	5548735	5445665	2.39 2.39	2.39 2.39	2.39	2.39	2.39
13C5 PFNA	13PF OA	Ave	5252906 6030787	6352900 5479314	6359521	6266243	6325367	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C8 FOSA	13PF OA	Ave	3116006 3759826	3810096 3492168	3846289	3914468	3650484	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFDA	13PF OA	Ave	5293647 5725271	6188008 5178371	6315840	6254581	6170874	2.50 2.50	2.50 2.50	2.50	2.50	2.50
M2-8:2 FTS	13PF OA	Ave	67691 86841	89123 77164	93242	83823	86690	2.40 2.40	2.40 2.40	2.40	2.40	2.40
d3-NMeFOSAA	13PF OA	Ave	1288202 1624805	1529044 1634654	1523768	1568547	1610985	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFUnA	13PF OA	Ave	3884957 4854709	4847529 4347109	4738780	4844062	4866308	2.50 2.50	2.50 2.50	2.50	2.50	2.50
d5-NEtFOSAA	13PF OA	Ave	1056882 1342267	1309789 1213767	1364722	1318160	1388082	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFDoA	13PF OA	Ave	4802312 5517310	6058099 5530079	5949453	5738372	5632761	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFTeDA	13PF OA	Ave	3117756 4056665	3991218 3925568	4135735	3993820	3999631	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFHxDA	13PF OA	Ave	2832913 3972465	3745598 3818410	3841385	3611152	3619229	2.50 2.50	2.50 2.50	2.50	2.50	2.50

Curve Type Legend:

Ave = Average ISTD
AveID = Average isotope dilution
L2ID = Linear 1/conc^2 IsoDil

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Lims ID: IC L1 Full
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 08-Jan-2019 17:41:10 ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CAL STD1
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub5

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:29:36 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 07:43:44
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.684	1.685	-0.001	0.527	5464013	2.46		98.3	24762	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.692	1.686	0.006	1.005	52411	0.0259		104	4.5	
D 3 13C5 PFPeA										
267.90 > 223.00	2.030	2.025	0.005	0.635	4839403	2.49		99.6	3917	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.030	2.027	0.003	1.000	56652	0.0293		117	3.5	
D 5 13C3 PFBS										
301.90 > 80.00	2.063	2.059	0.004	0.645	7185165	2.25		96.8	1132213	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.063	2.059	0.004	1.000	68538	0.0230	Target=2.70	104	89.6	
298.90 > 99.00	2.063	2.059	0.004	1.000	24082		2.85(1.35-4.05)	104	27.6	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.356	2.351	0.005	0.737	450400	2.31		99.1	613	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.356	2.352	0.004	1.142	10192	0.0223		95.5	39.5	
D 9 13C2 PFHxA										
315.00 > 270.00	2.394	2.394	0.0	0.749	5280647	2.44		97.7	2923	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.394	2.396	-0.002	1.000	48882	0.0267	Target=13.92	107	20.5	
313.00 > 119.00	2.403	2.396	0.007	1.004	4791		10.20(6.96-20.87)	107	11.5	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.403	2.410	-0.007	1.165	31812	0.0220	Target=2.30	93.6	114	
349.00 > 99.00	2.412	2.410	0.002	1.170	14852		2.14(1.15-3.45)	93.6	53.7	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.509	2.512	-0.003	1.000	11825	0.0298		119	7.5	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.509	2.512	-0.003	0.785	462394	2.38		95.4	1308	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.792	2.790	0.002	1.000	81703	0.0296	Target=4.34	118	24.3	
363.00 > 169.00	2.792	2.790	0.002	1.000	18159		4.50(2.17-6.52)	118	45.6	
D 16 13C4 PFHpA										
367.00 > 322.00	2.792	2.791	0.001	0.873	6643618	2.50		100	3068	
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.801	2.798	0.003	1.000	59781	0.0266	Target=3.80	117	136	M
399.00 > 99.00	2.801	2.798	0.003	1.000	17653		3.39(1.90-5.70)	117	22.3	M
D 17 18O2 PFHxS										
403.00 > 84.00	2.801	2.798	0.003	0.876	4291874	2.28		96.6	2061	
19 DONA										
377.00 > 251.00	2.837	2.841	-0.004	0.794	101966	0.0235	Target=2.26	100	259	
377.00 > 85.00	2.837	2.841	-0.004	0.794	44099		2.31(1.13-3.39)	100	60.5	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.182	3.175	0.007	0.995	624238	2.38		100	1063	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.189	3.177	0.012	1.002	14964	0.0270		114	26.8	
D 22 13C8 PFOA										
421.00 > 376.00	3.197	3.191	0.006		4887410	2.07		84.5	2575	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.189	3.191	-0.002	0.892	48785	0.0246	Target=3.69	103	102	
449.00 > 99.00	3.197	3.191	0.006	0.894	12544		3.89(1.84-5.53)	103	68.6	
* 24 13C2 PFOA										
415.00 > 370.00	3.197	3.194	0.003		5821271	2.50			2905	
D 25 13C4 PFOA										
417.00 > 372.00	3.197	3.195	0.002	1.000	5747530	2.49		99.8	2798	
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.197	3.195	0.002	1.000	79547	0.0334	Target=2.72	133	13.4	M
413.00 > 169.00	3.197	3.195	0.002	1.000	26233		3.03(1.36-4.08)	133	43.8	M
D 27 13C8 PFOS										
507.00 > 99.00	3.575	3.566	0.009		963013	1.92		80.5	2116	
29 Perfluorooctanesulfonic acid										M
499.00 > 80.00	3.575	3.570	0.005	1.000	48116	0.0243	Target=4.08	105	50.9	
499.00 > 99.00	3.575	3.570	0.005	1.000	10106		4.76(2.04-6.12)	105	48.8	M
D 28 13C4 PFOS										
503.00 > 80.00	3.575	3.571	0.004	1.118	4487999	2.34		97.9	3057	
D 31 13C5 PFNA										
468.00 > 423.00	3.590	3.584	0.006	1.123	5252906	2.53		101	3210	
30 Perfluorononanoic acid										M
463.00 > 419.00	3.590	3.586	0.004	1.000	59187	0.0283	Target=5.35	113	8.4	M
463.00 > 169.00	3.575	3.586	-0.011	0.996	7624		7.76(2.68-8.03)	113	21.7	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.781	3.774	0.007	1.058	46033	0.0257		110	42.8	
D 33 13C8 FOSA										
506.00 > 78.00	3.893	3.891	0.002	1.218	3116006	2.47		98.7	2952	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.901	3.894	0.007	1.002	94666	0.0261		105	300	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.918	3.919	-0.001	1.096	24247	0.0221	Target=6.03	92.0	85.8	
549.00 > 99.00	3.936	3.919	0.017	1.101	4136		5.86(3.02-9.05)	92.0	19.9	
D 36 13C2 PFDA										
515.00 > 470.00	3.945	3.942	0.003	1.234	5293647	2.61		104	3371	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.945	3.943	0.002	1.000	66023	0.0271	Target=14.23	109	36.5	
513.00 > 169.00	3.954	3.943	0.011	1.002	5895		11.20(7.12-21.35)	109	11.5	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.954	3.946	0.008	1.000	10771	0.0268		112	77.2	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.954	3.947	0.007	1.237	67691	2.25		94.0	261	
47 MeFOSA										
512.00 > 169.00	4.008	4.005	0.003		553	NC			0.8	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.112	4.109	0.003	1.286	1288202	2.42		96.9	1936	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.121	4.114	0.007	1.002	10910	0.0244		97.7	6.2	
42 Perfluorodecanesulfonic acid										R
599.00 > 80.00	4.250	4.241	0.009	1.189	40522	0.0247	Target=4.28	102	96.4	R
599.00 > 99.00	4.233	4.241	-0.008	1.184	5849		6.93(2.14-6.43)	102	17.8	
D 44 13C2 PFUnA										
565.00 > 520.00	4.268	4.266	0.002	1.335	3884957	2.43		97.3	3047	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.276	4.270	0.006	1.002	44237	0.0341	Target=10.48	137	13.4	
563.00 > 169.00	4.268	4.270	-0.002	1.000	4515		9.80(5.24-15.72)	137	18.8	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.276	4.272	0.004	1.338	1056882	2.38		95.3	1074	
46 N-ethylperfluorooctanesulfonamidoa										M
584.00 > 419.00	4.285	4.278	0.007	1.002	8936	0.0255		102	37.2	M
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.411	4.407	0.004	1.234	41689	0.0197		83.6	152	
D 49 13C2 PFDoA										
615.00 > 570.00	4.565	4.560	0.005	1.428	4802312	2.48		99.2	3407	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.565	4.561	0.004	1.000	45580	0.0247	Target=9.37	98.8	15.5	
613.00 > 169.00	4.565	4.561	0.004	1.000	5168		8.82(4.68-14.05)	98.8	23.7	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.583	4.578	0.005	1.159	6123	0.0245		102	30.2	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.803	4.793	0.010	1.344	3606	0.0211	Target=0.55	87.4	38.5	
699.00 > 99.00	4.803	4.793	0.010	1.344	8299		0.43(0.28-0.83)	87.4	62.4	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.838	4.830	0.008	1.060	40141	0.0275	Target=6.18	110	24.4	
663.00 > 169.00	4.838	4.830	0.008	1.060	5650		7.10(3.09-9.27)	110	33.0	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 55 13C2 PFTeDA										
715.00 > 670.00	5.090	5.080	0.010	1.592	3117756	2.32		92.9	4658	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.090	5.080	0.010	1.000	6977	0.0343	Target=1.39	137	37.4	
713.00 > 219.00	5.083	5.080	0.003	0.998	4800		1.45(0.70-2.09)	137	36.3	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.553	5.545	0.008	1.737	2832913	2.26		90.4	3226	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.553	5.546	0.007	1.000	53536	0.0286	Target=5.55	114	5.8	
813.00 > 169.00	5.553	5.546	0.007	1.000	9212		5.81(2.77-8.32)	114	67.0	
59 Perfluorooctadecanoic acid										M
913.00 > 869.00	6.060	6.053	0.007	1.091	17157	0.0245	Target=5.09	98.1	6.6	
913.00 > 169.00	6.069	6.053	0.016	1.093	3422		5.01(2.55-7.64)	98.1	37.1	M

QC Flag Legend

Processing Flags
- NC - Not Calibrated
- R - Failed Signal Ratio Test

Review Flags
- M - Manually Integrated

Reagents:

LCPFC_LL1_00010 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:29:38 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d

Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9

Lims ID: IC L1 Full

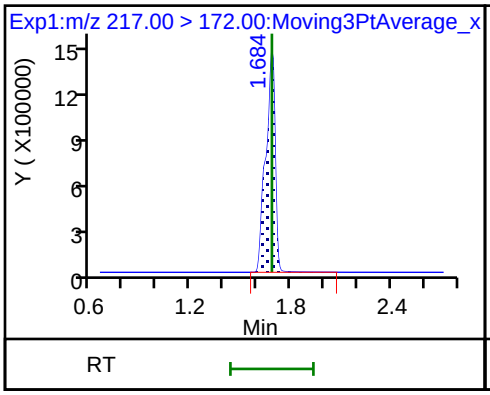
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2

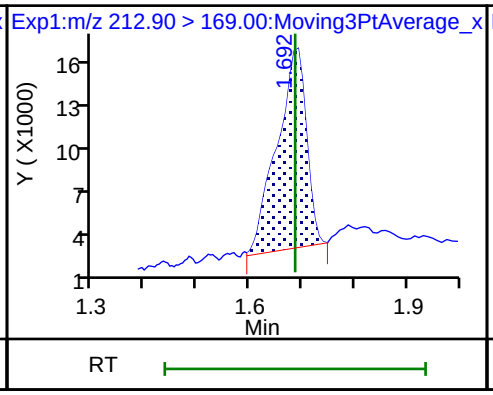
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

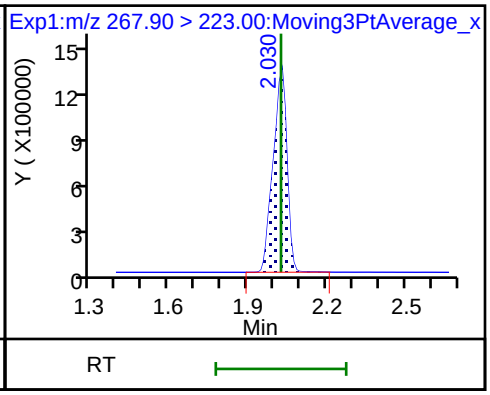
D 1 13C4 PFBA



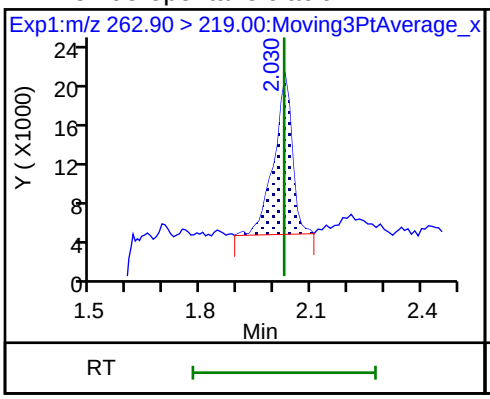
2 Perfluorobutanoic acid



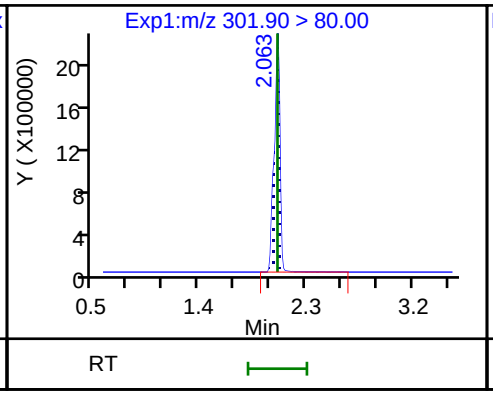
D 3 13C5 PFPeA



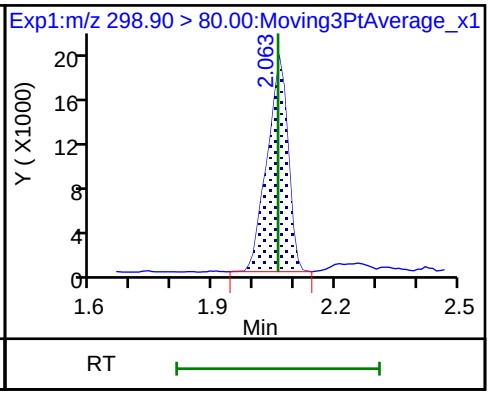
4 Perfluoropentanoic acid



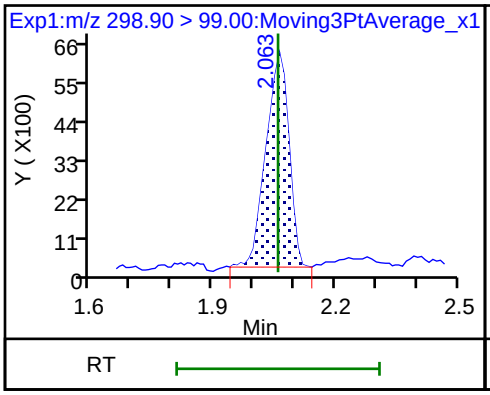
D 5 13C3 PFBS



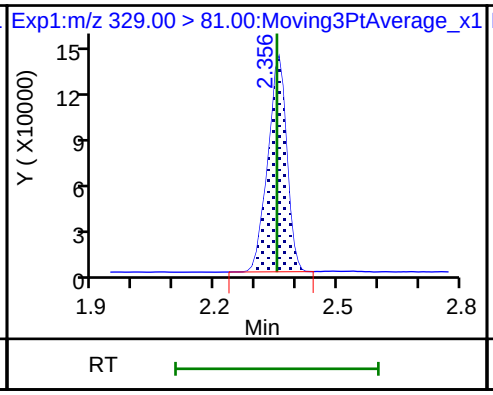
6 Perfluorobutanesulfonic acid



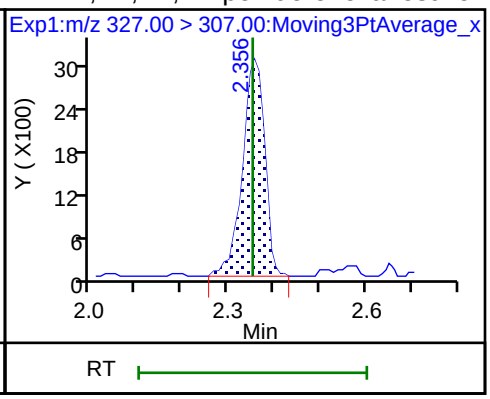
6 Perfluorobutanesulfonic acid



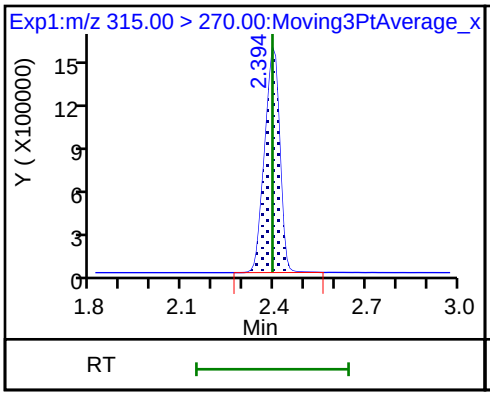
D 8 M2-4:2 FTS



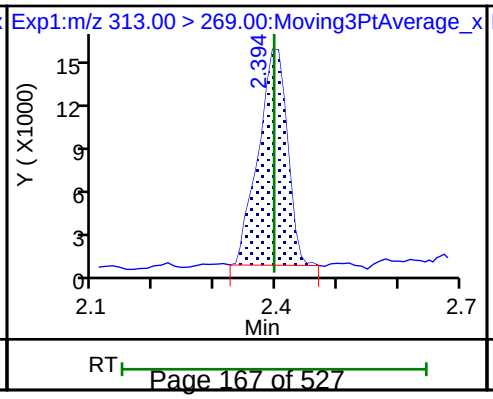
7 1H,1H,2H,2H-perfluorohexanesulfoni



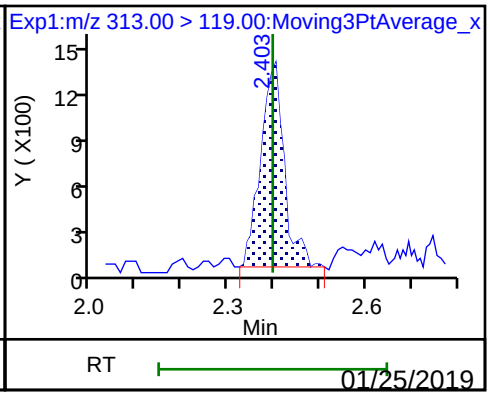
D 9 13C2 PFHxA



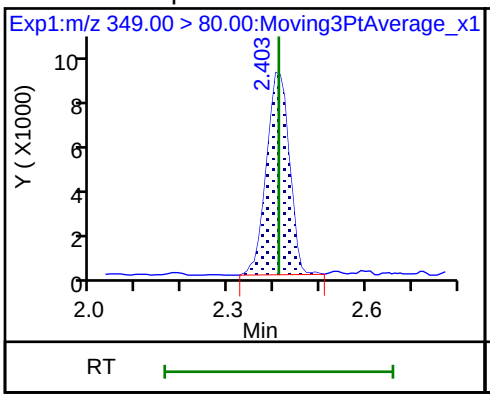
10 Perfluorohexanoic acid



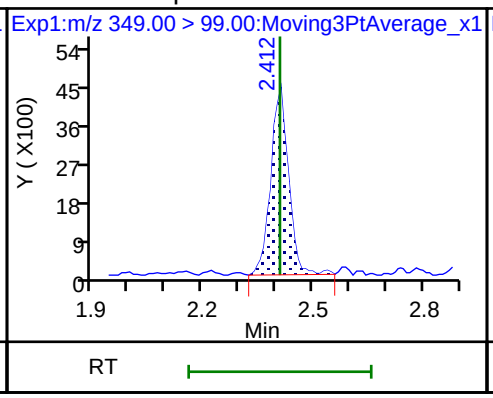
10 Perfluorohexanoic acid



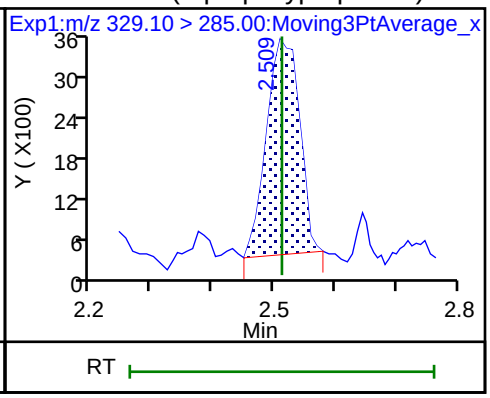
11 Perfluoropentanesulfonic acid



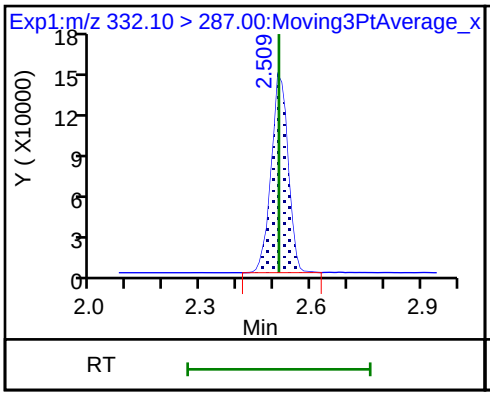
11 Perfluoropentanesulfonic acid



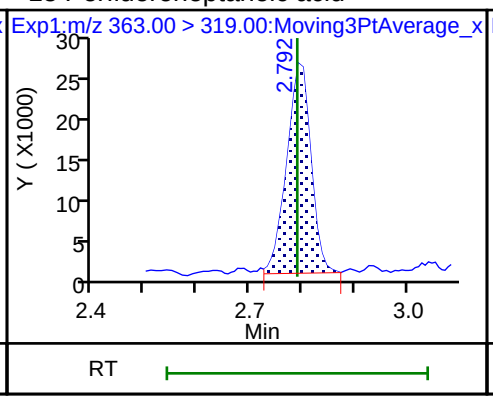
14 Perfluoro(2-propoxypropanoic) acid



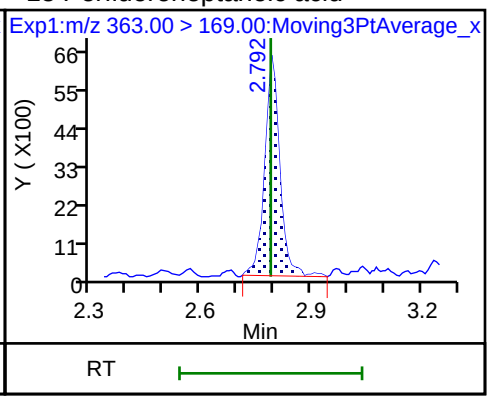
D 13 13C3 HFPO-DA



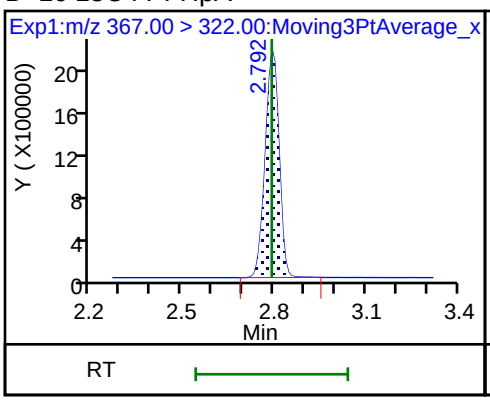
15 Perfluoroheptanoic acid



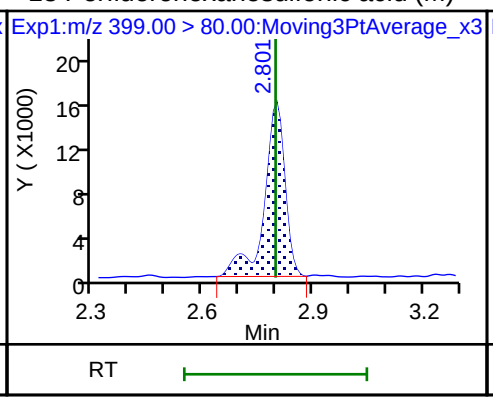
15 Perfluoroheptanoic acid



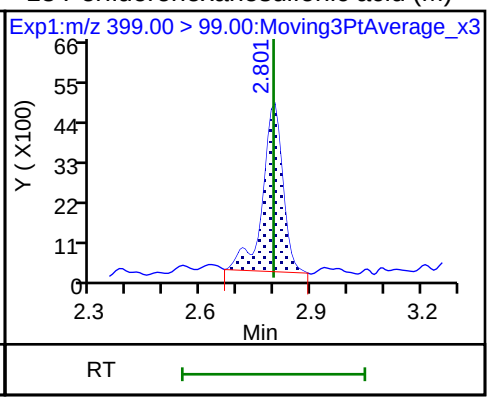
D 16 13C4 PFHpA



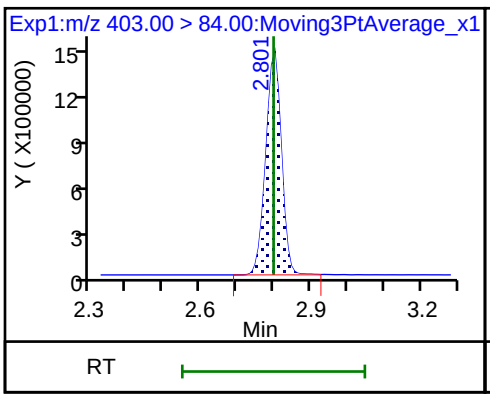
18 Perfluorohexanesulfonic acid (M)



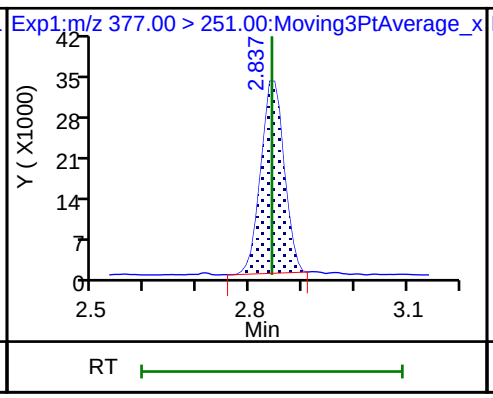
18 Perfluorohexanesulfonic acid (M)



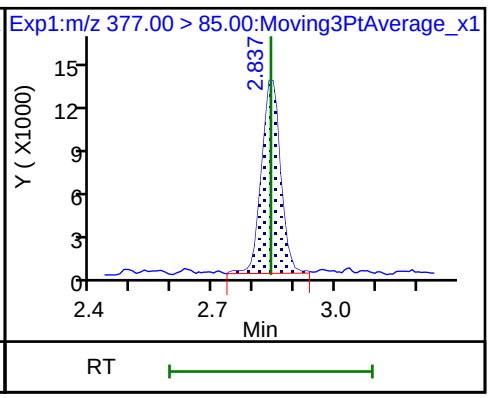
D 17 18O2 PFHxS



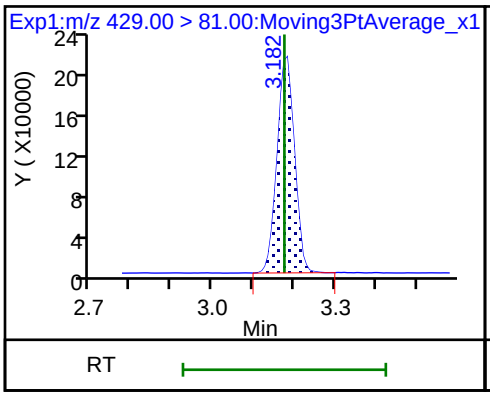
19 DONA



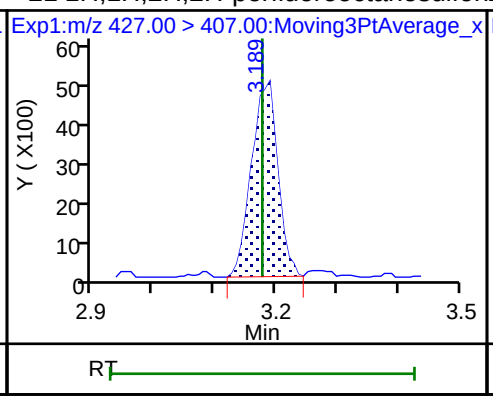
19 DONA



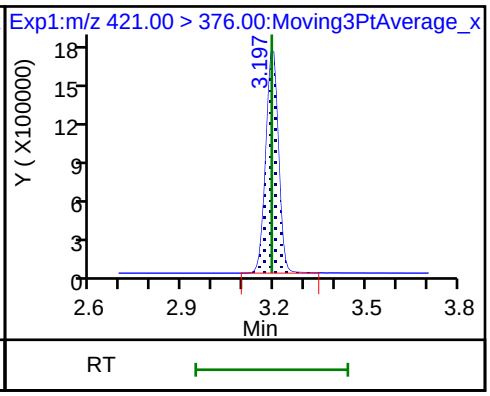
D 20 M2-6:2 FTS



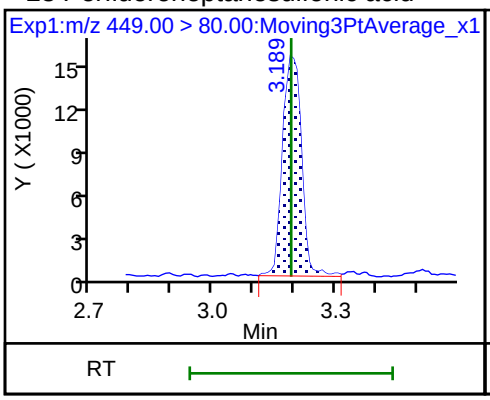
21 1H,1H,2H,2H-perfluorooctanesulfon



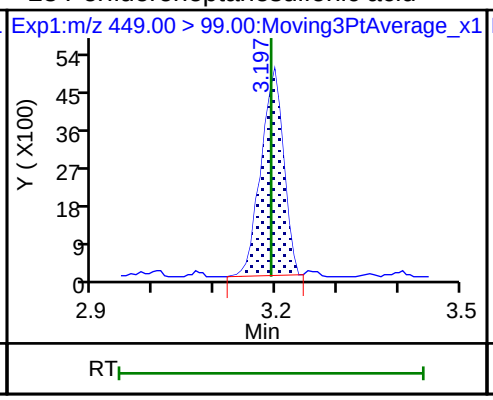
D 22 13C8 PFOA



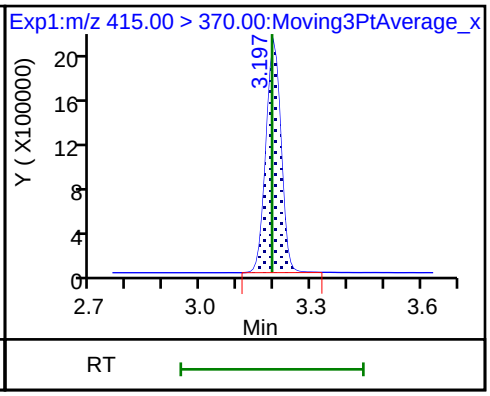
23 Perfluoroheptanesulfonic acid



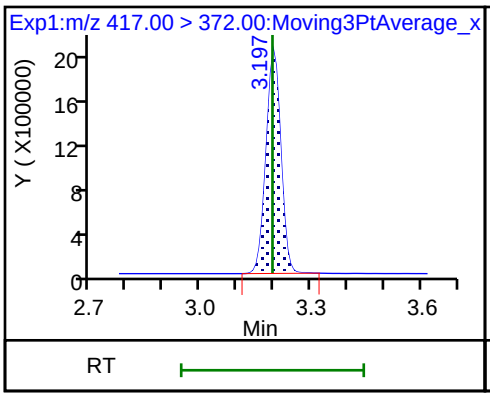
23 Perfluoroheptanesulfonic acid



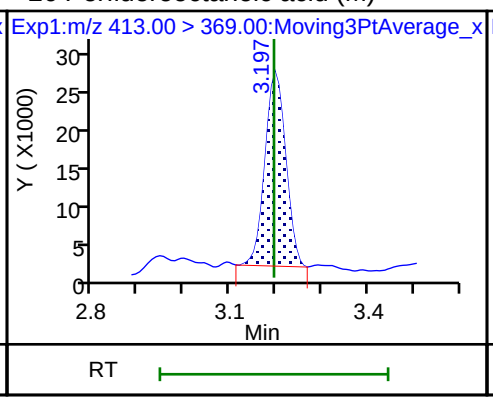
* 24 13C2 PFOA



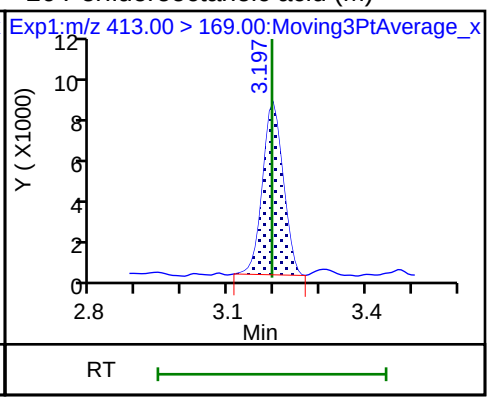
D 25 13C4 PFOA



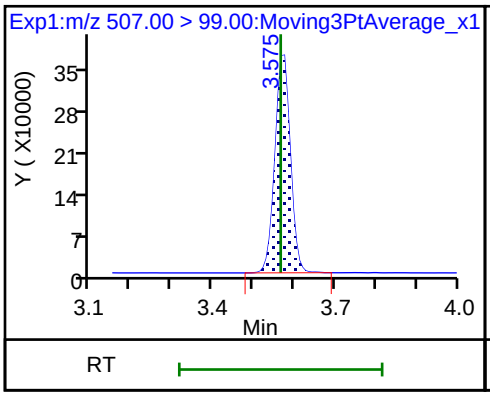
26 Perfluorooctanoic acid (M)



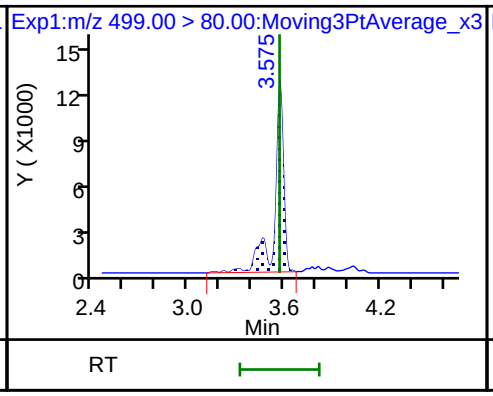
26 Perfluorooctanoic acid (M)



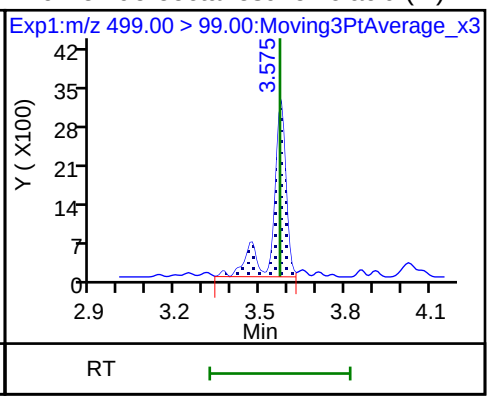
D 27 13C8 PFOS



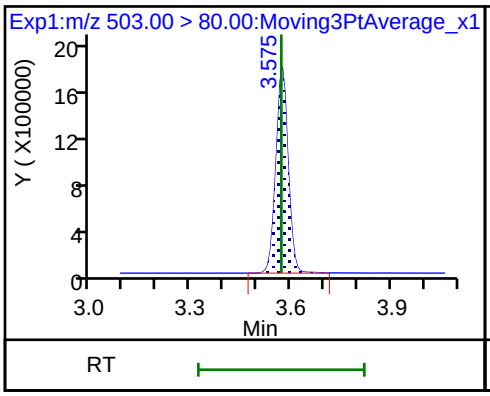
29 Perfluorooctanesulfonic acid



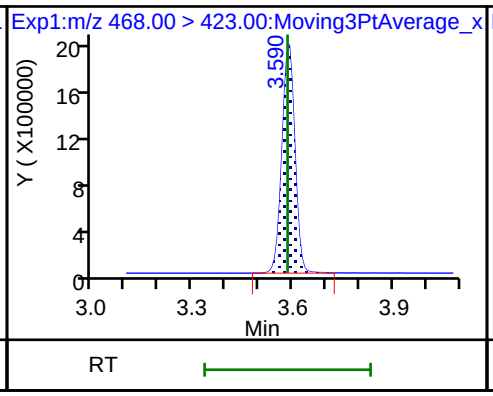
29 Perfluorooctanesulfonic acid (M)



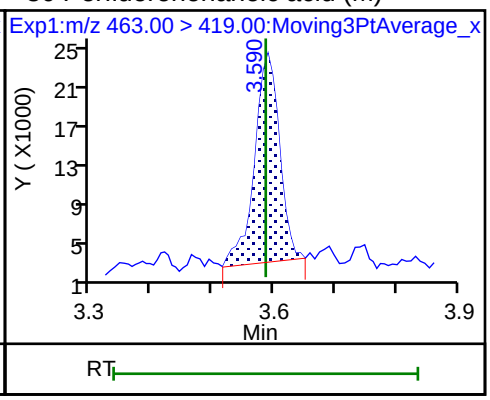
D 28 13C4 PFOS



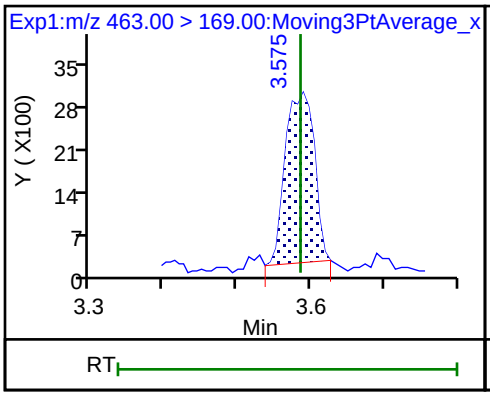
D 31 13C5 PFNA



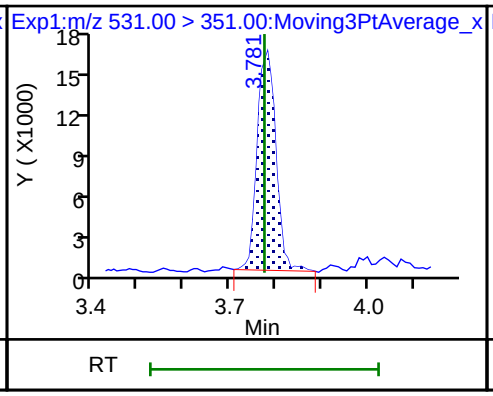
30 Perfluorononanoic acid (M)



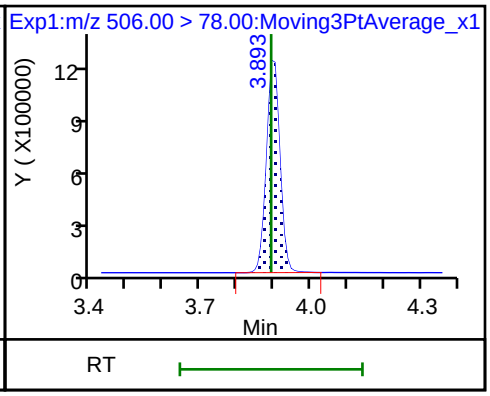
30 Perfluorononanoic acid



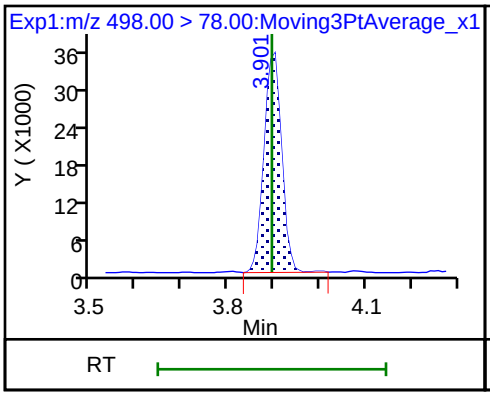
32 9-Chlorohexadecafluoro-3-oxanonane



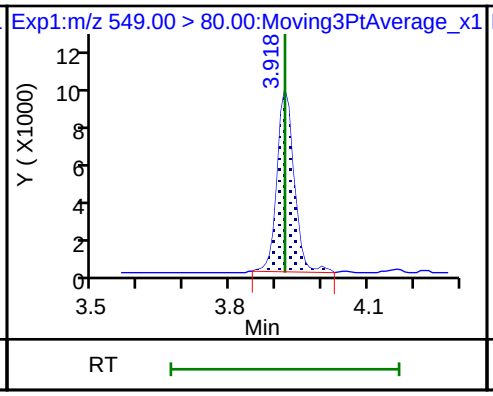
D 33 13C8 FOSA



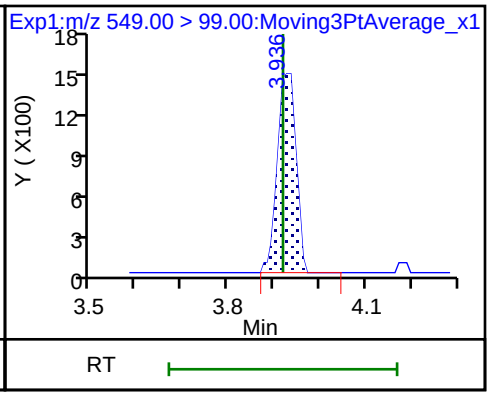
34 Perfluorooctanesulfonamide



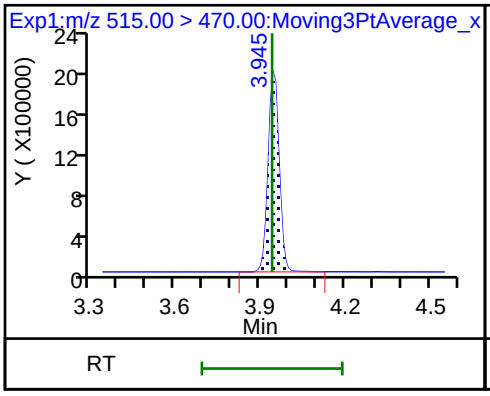
35 Perfluorononanesulfonic acid



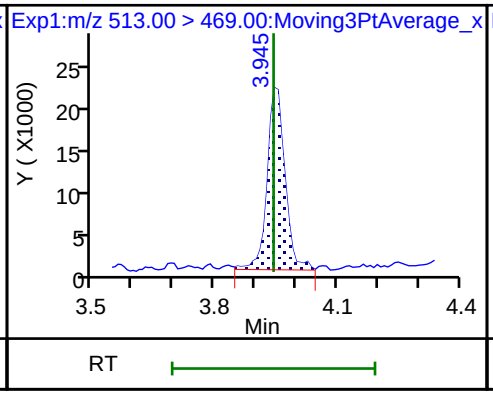
35 Perfluorononanesulfonic acid



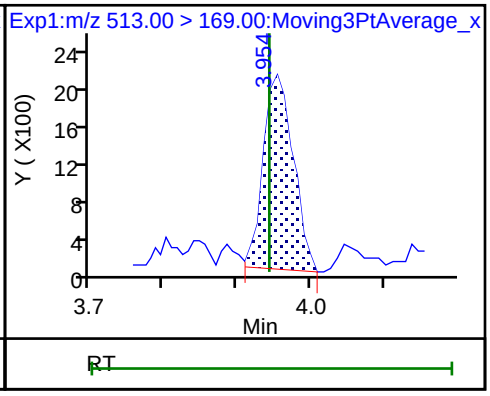
D 36 13C2 PFDA



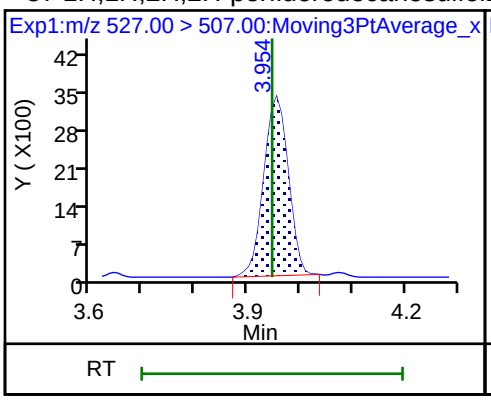
38 Perfluorodecanoic acid



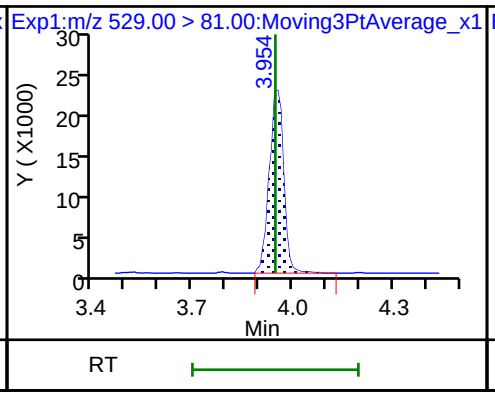
38 Perfluorodecanoic acid



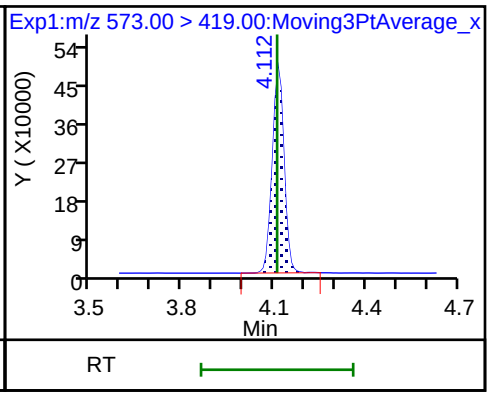
37 1H,1H,2H,2H-perfluorodecanesulfon



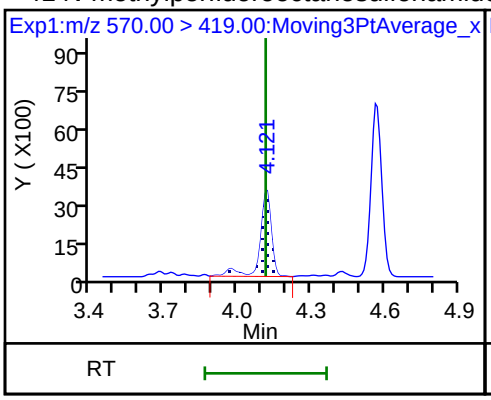
D 39 M2-8:2 FTS



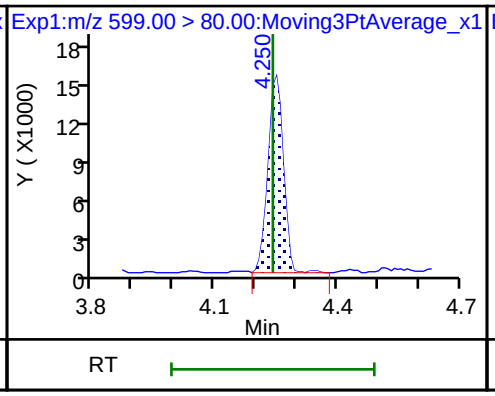
D 40 d3-NMeFOSAA



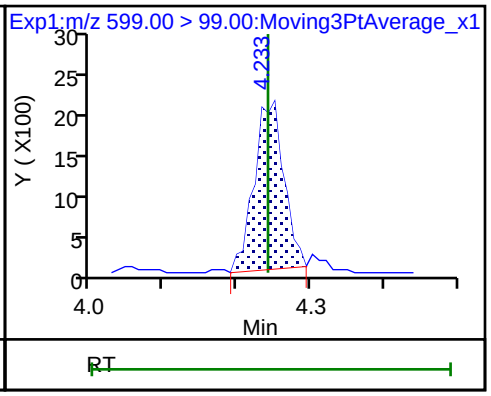
41 N-methylperfluorooctanesulfonamido



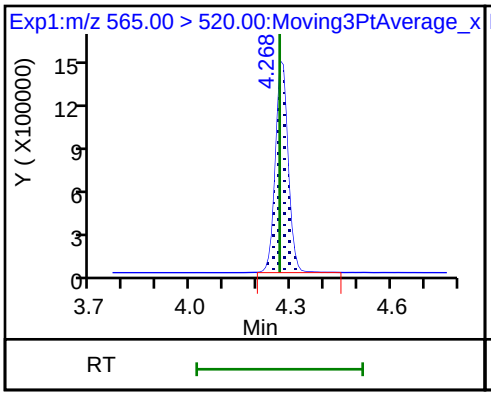
42 Perfluorodecanesulfonic acid



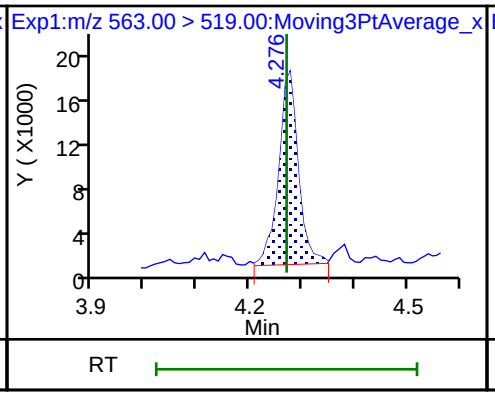
42 Perfluorodecanesulfonic acid



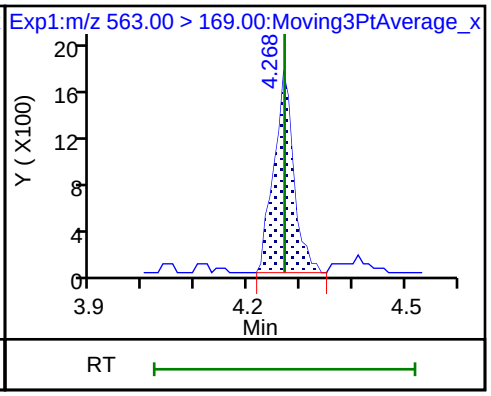
D 44 13C2 PFUnA



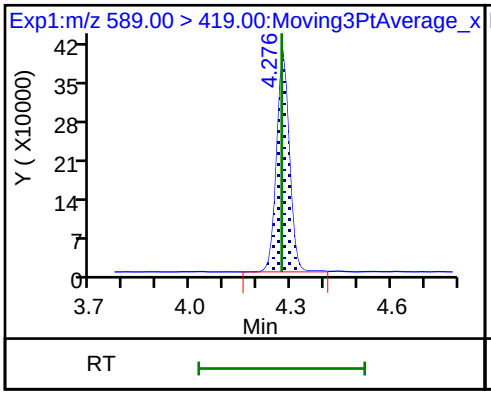
43 Perfluoroundecanoic acid



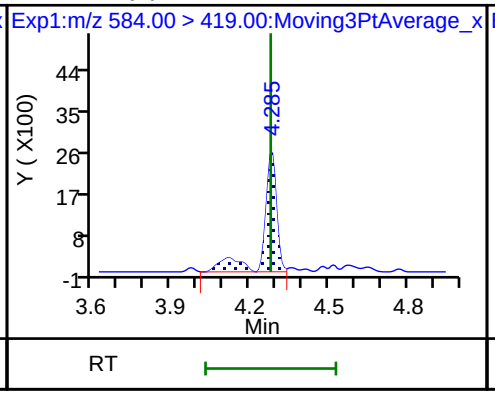
43 Perfluoroundecanoic acid



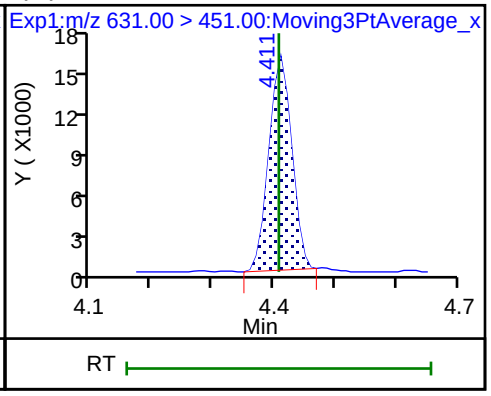
D 45 d5-NEtFOSAA



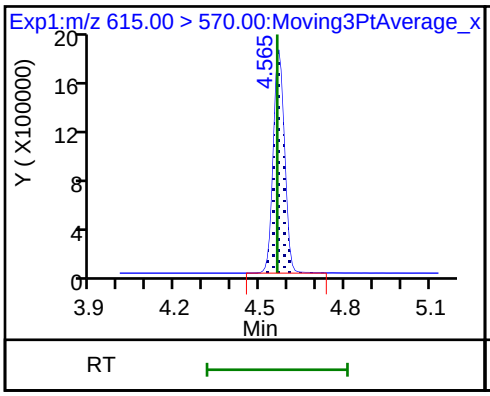
46 N-ethylperfluorooctanesulfonamidoa (NE



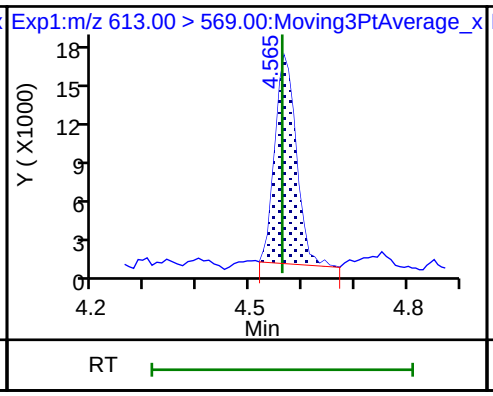
48 11-Chloroeicosafluoro-3-oxaundecan



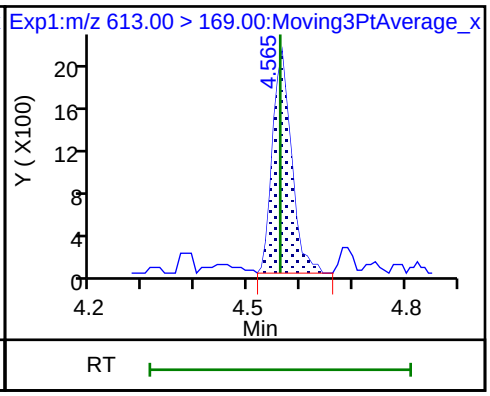
D 49 13C2 PFDoA



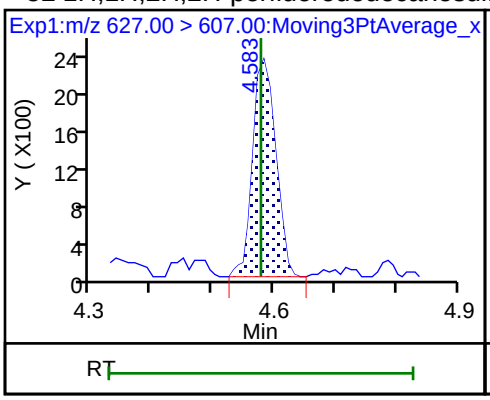
50 Perfluorododecanoic acid



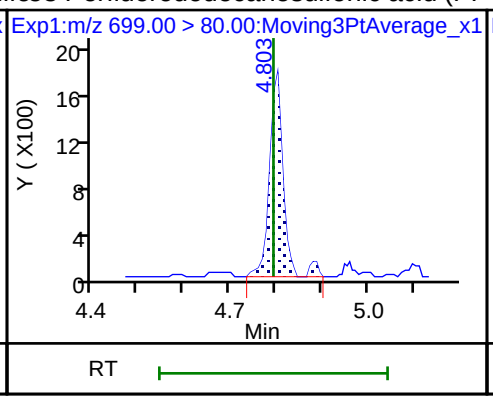
50 Perfluorododecanoic acid



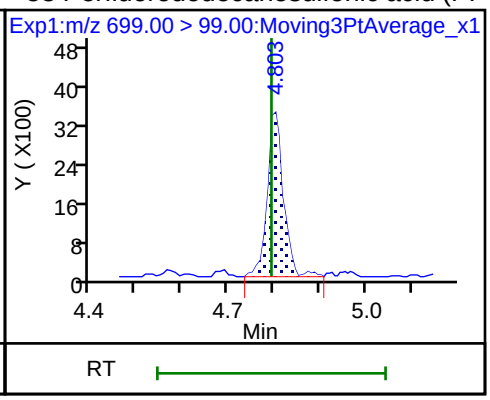
52 1H,1H,2H-perfluorododecanesulfo



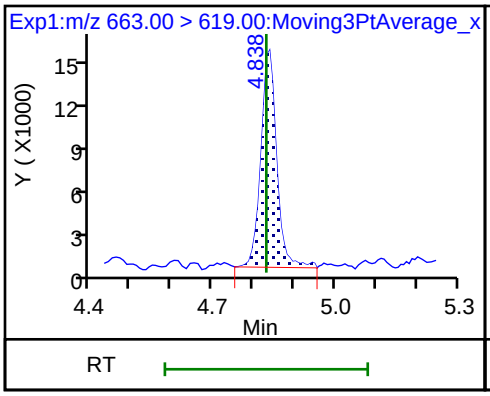
53 Perfluorododecanesulfonic acid (PF



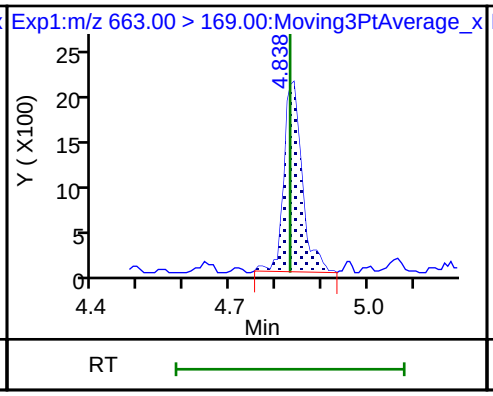
53 Perfluorododecanesulfonic acid (PF



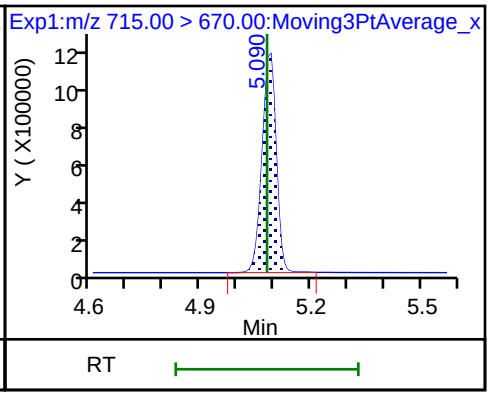
54 Perfluorotridecanoic acid



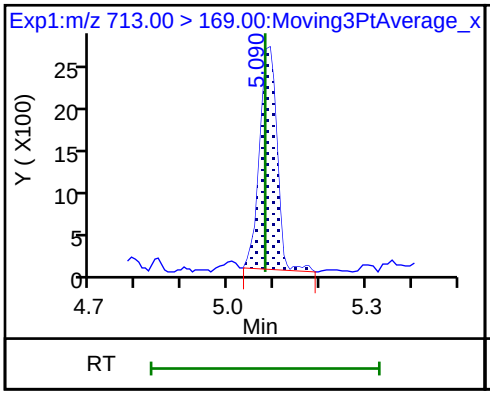
54 Perfluorotridecanoic acid



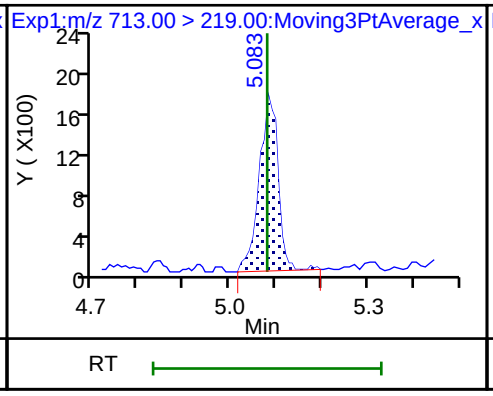
D 55 13C2 PFTeDA



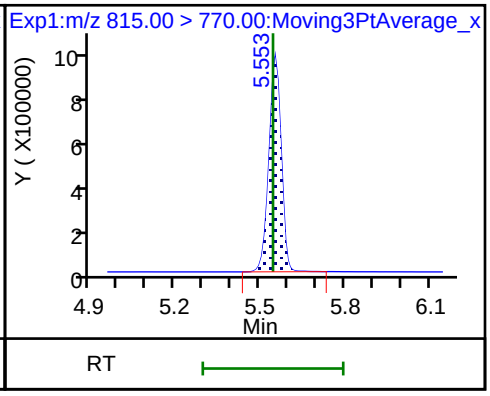
56 Perfluorotetradecanoic acid



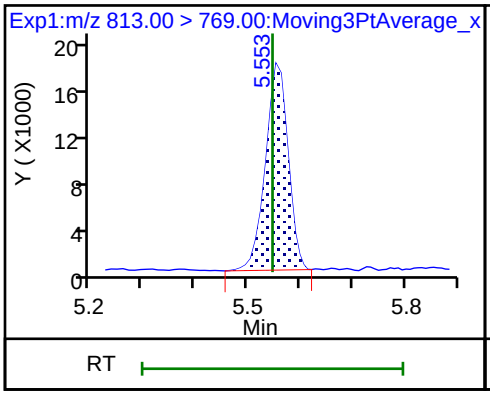
56 Perfluorotetradecanoic acid



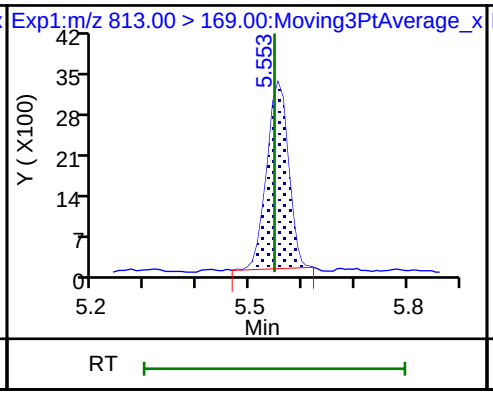
D 57 13C2 PFHxDA



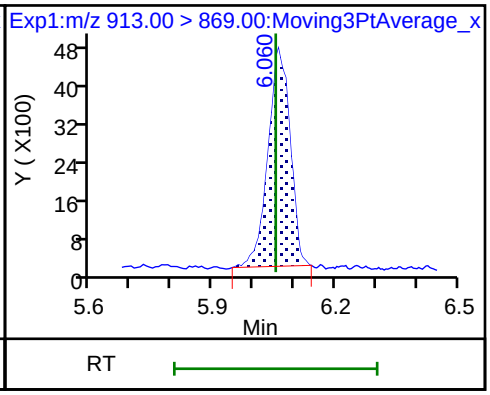
58 Perfluorohexadecanoic acid



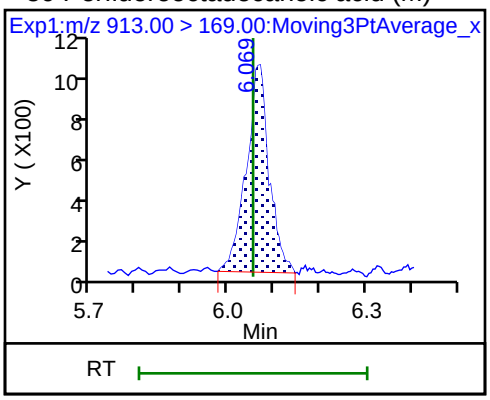
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid (M)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

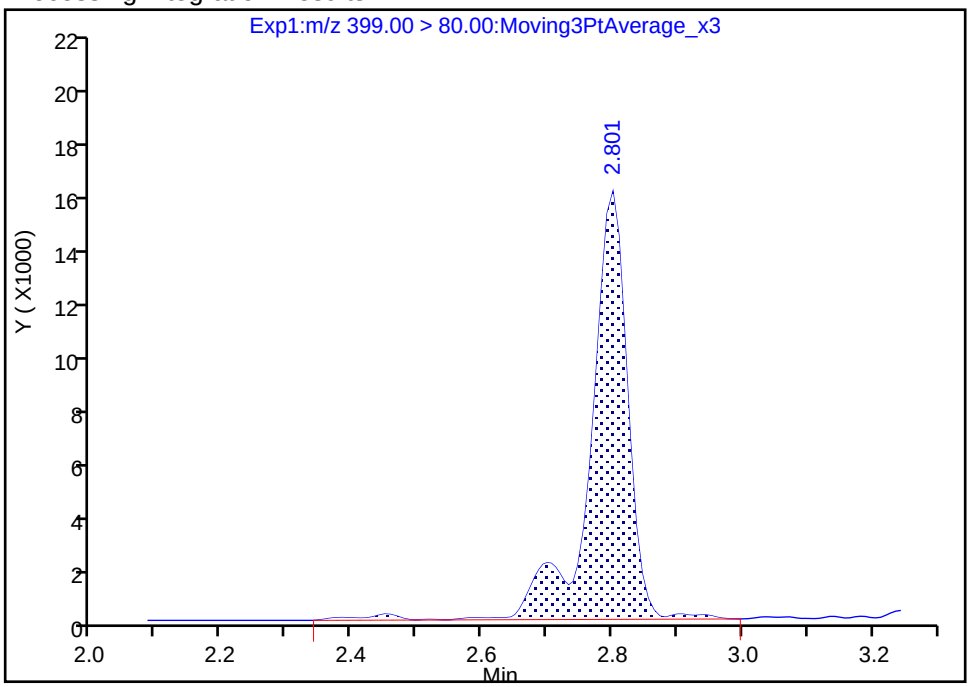
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9
Lims ID: IC L1 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

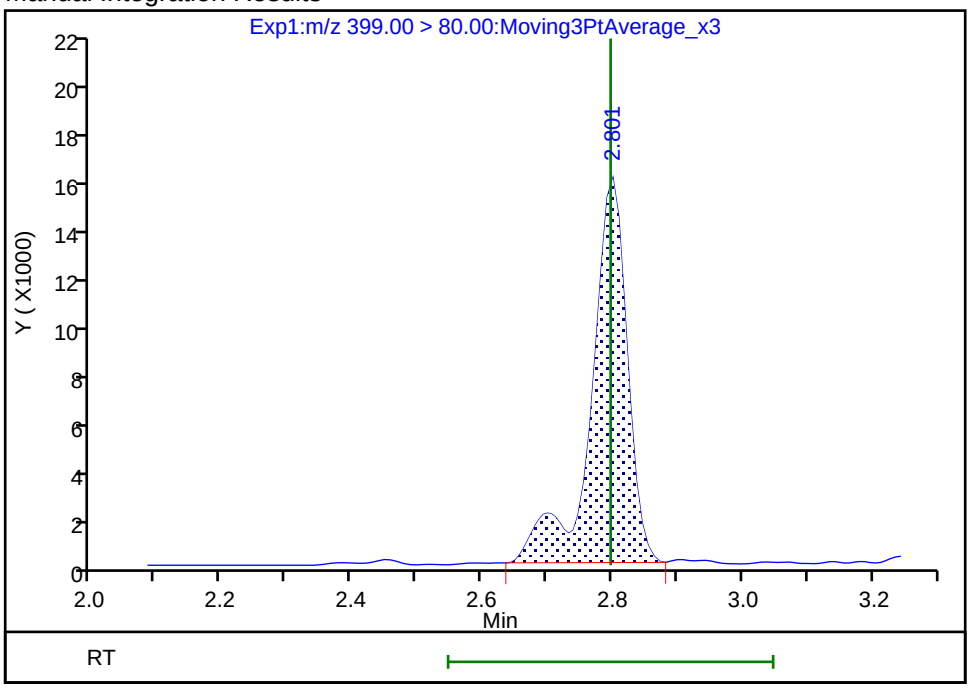
Processing Integration Results

RT: 2.80
Area: 62749
Amount: 0.027517
Amount Units: ng/ml



Manual Integration Results

RT: 2.80
Area: 59781
Amount: 0.026626
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 07:58:20
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

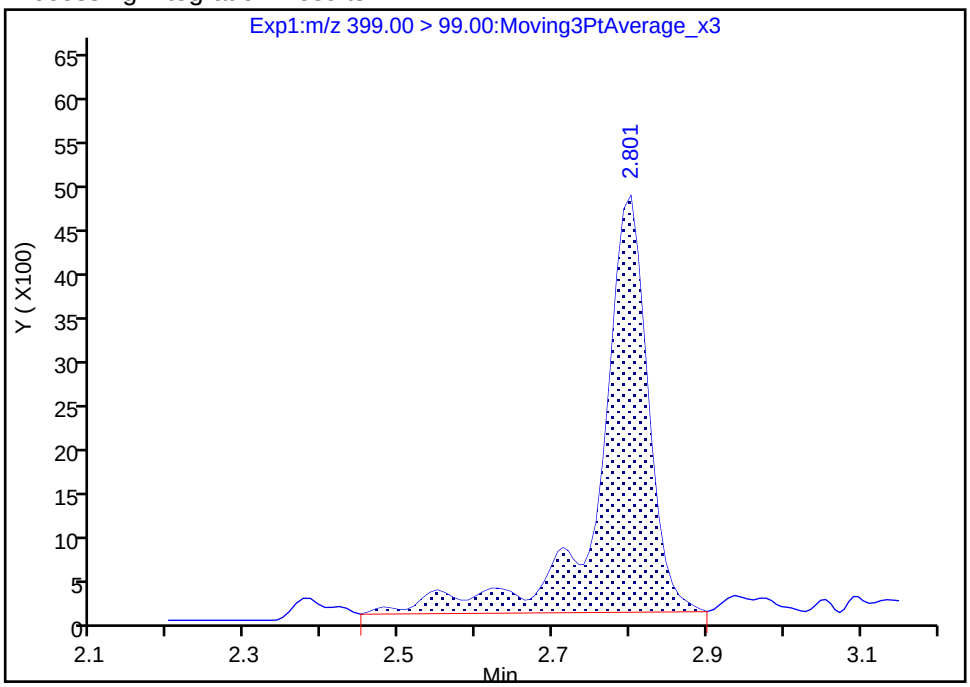
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9
Lims ID: IC L1 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 2

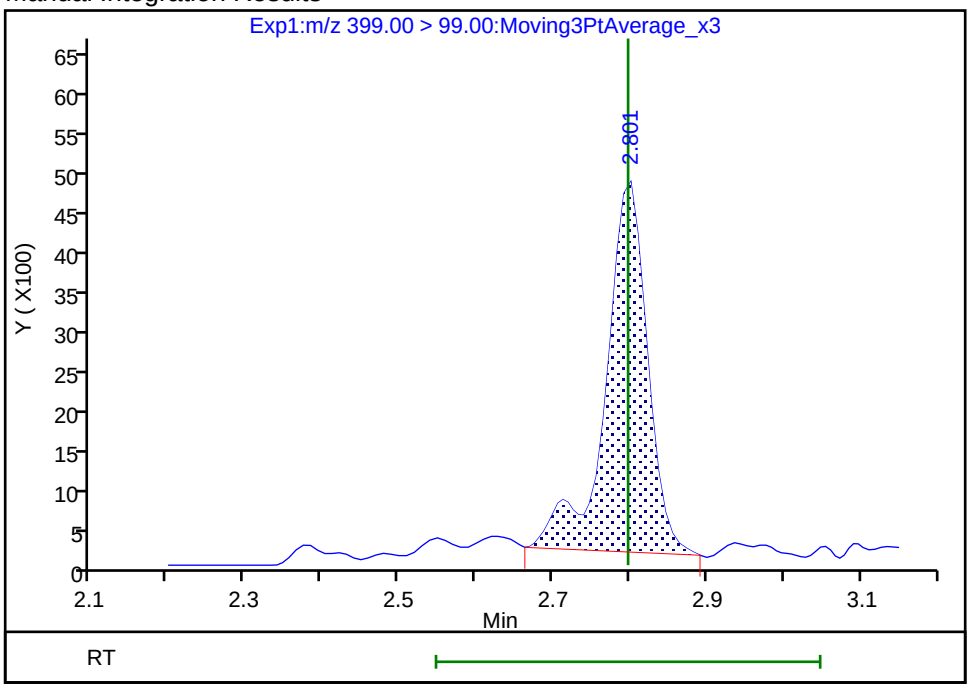
Processing Integration Results

RT: 2.80
Area: 20865
Amount: 0.027517
Amount Units: ng/ml



Manual Integration Results

RT: 2.80
Area: 17653
Amount: 0.026626
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 07:58:24
Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento

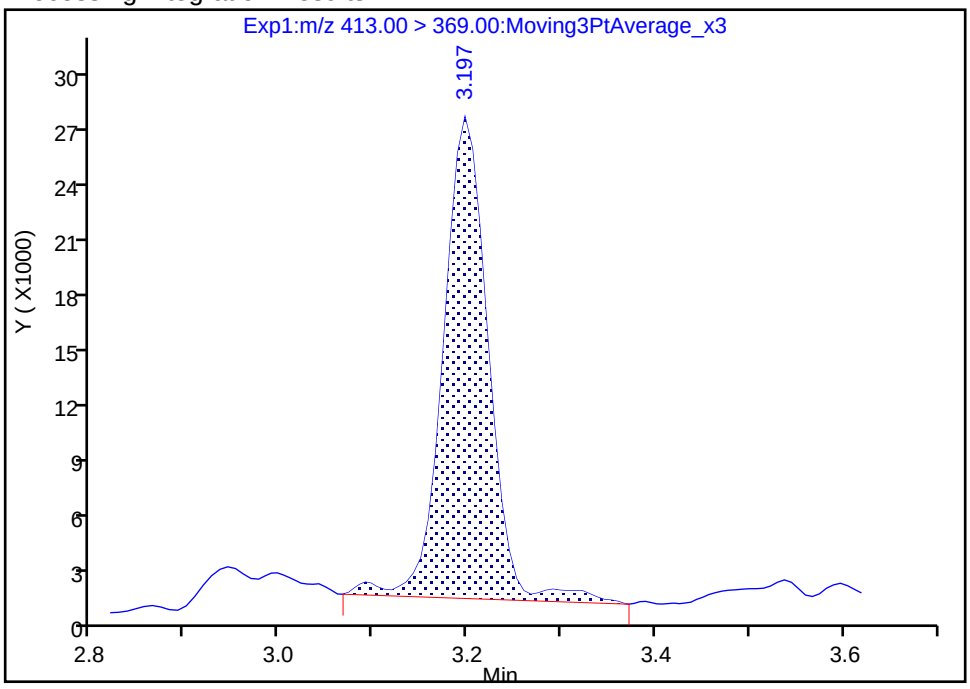
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9
Lims ID: IC L1 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

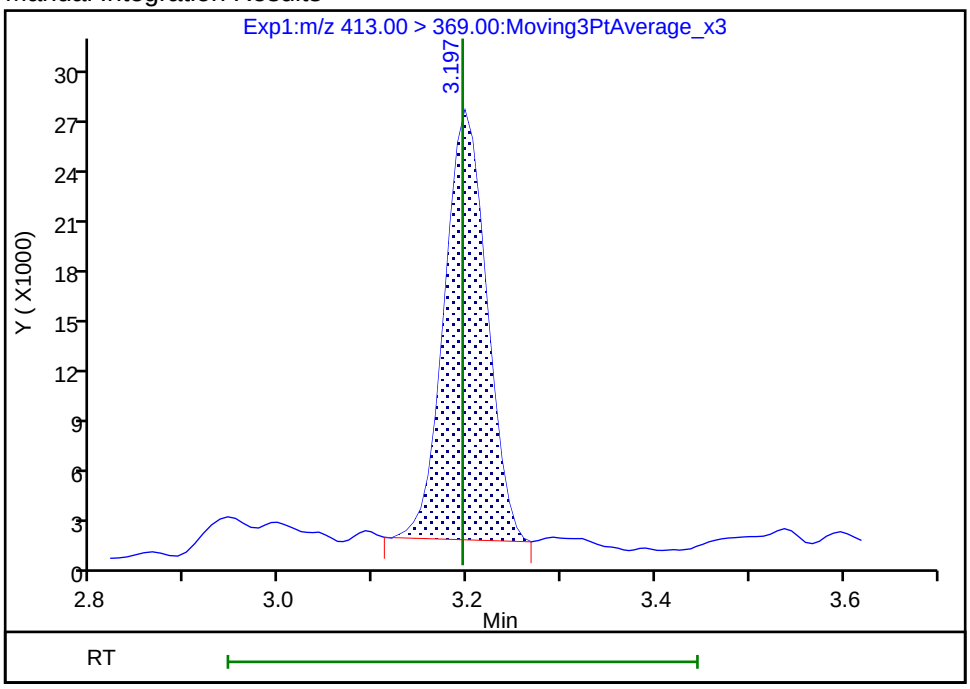
Processing Integration Results

RT: 3.20
Area: 86386
Amount: 0.033557
Amount Units: ng/ml



Manual Integration Results

RT: 3.20
Area: 79547
Amount: 0.033378
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 07:58:36
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

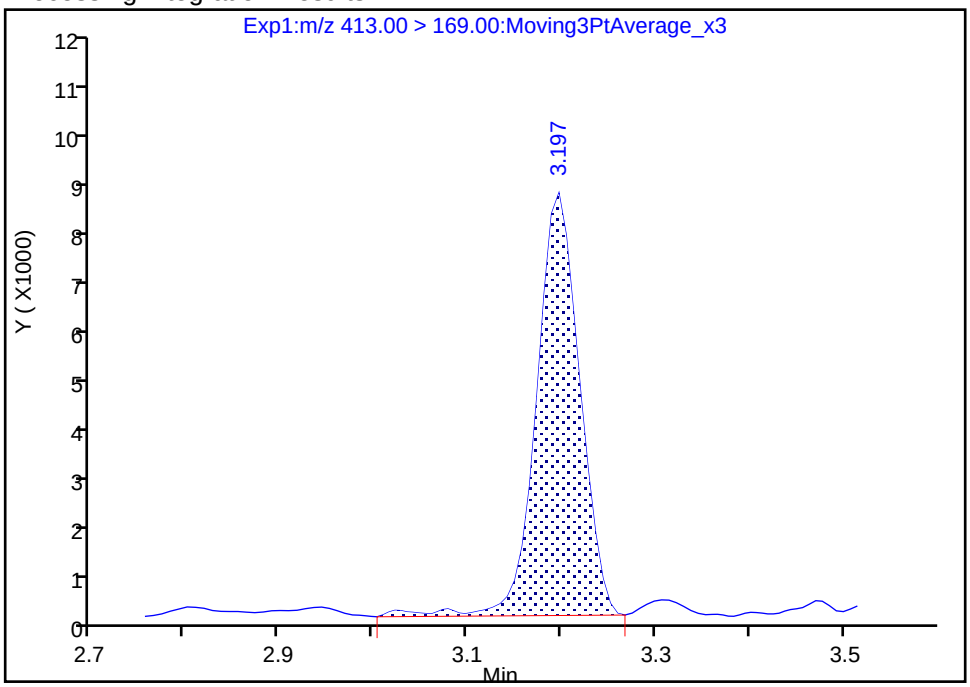
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9
Lims ID: IC L1 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

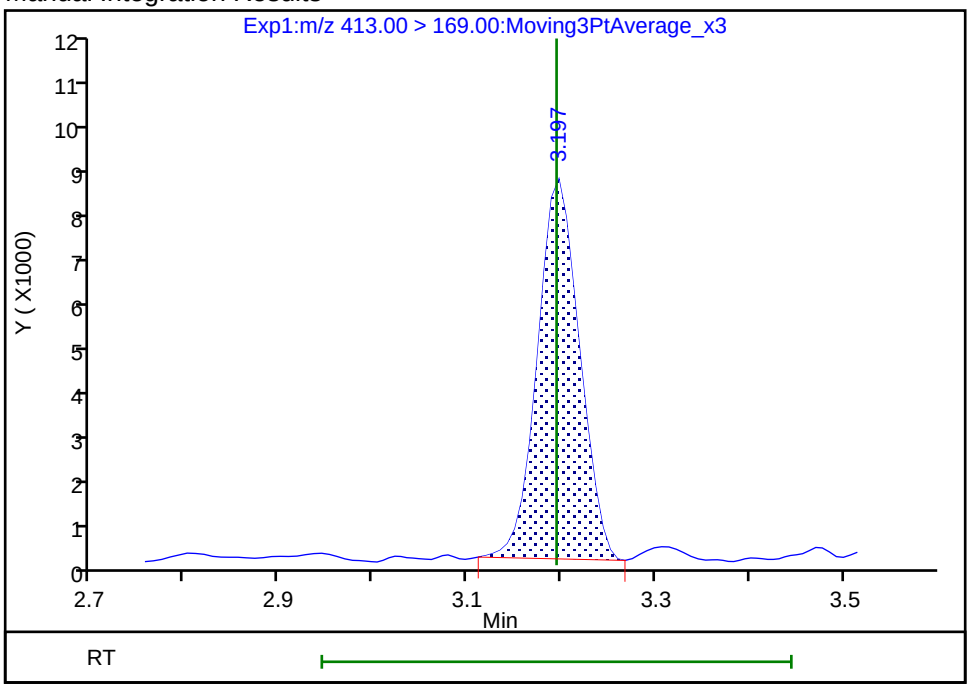
Processing Integration Results

RT: 3.20
Area: 27217
Amount: 0.033557
Amount Units: ng/ml



Manual Integration Results

RT: 3.20
Area: 26233
Amount: 0.033378
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 07:58:40
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

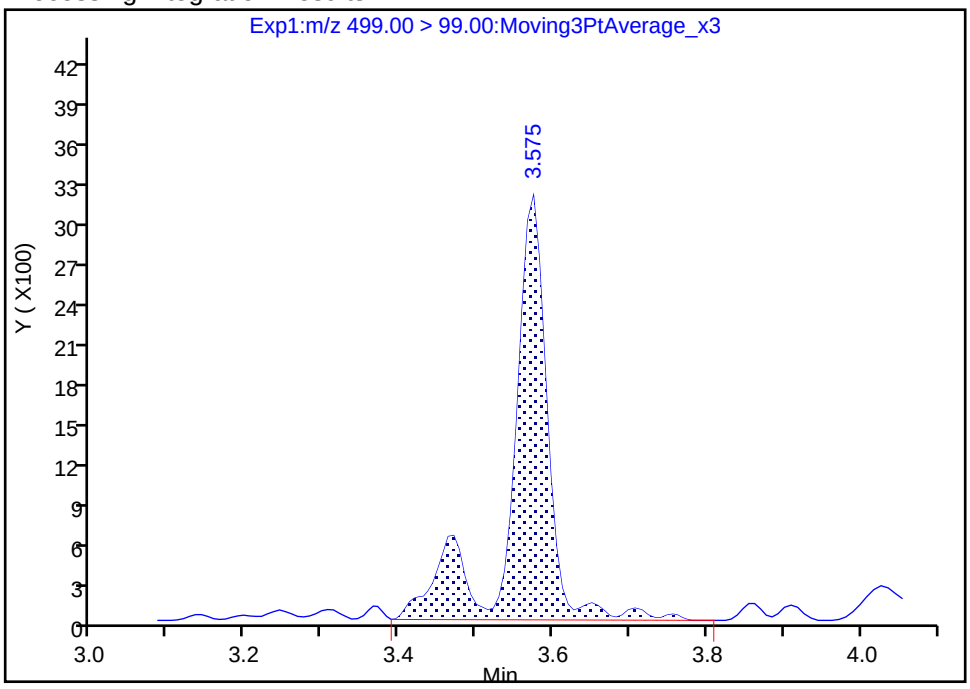
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9
Lims ID: IC L1 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

29 Perfluorooctanesulfonic acid, CAS: 1763-23-1

Signal: 2

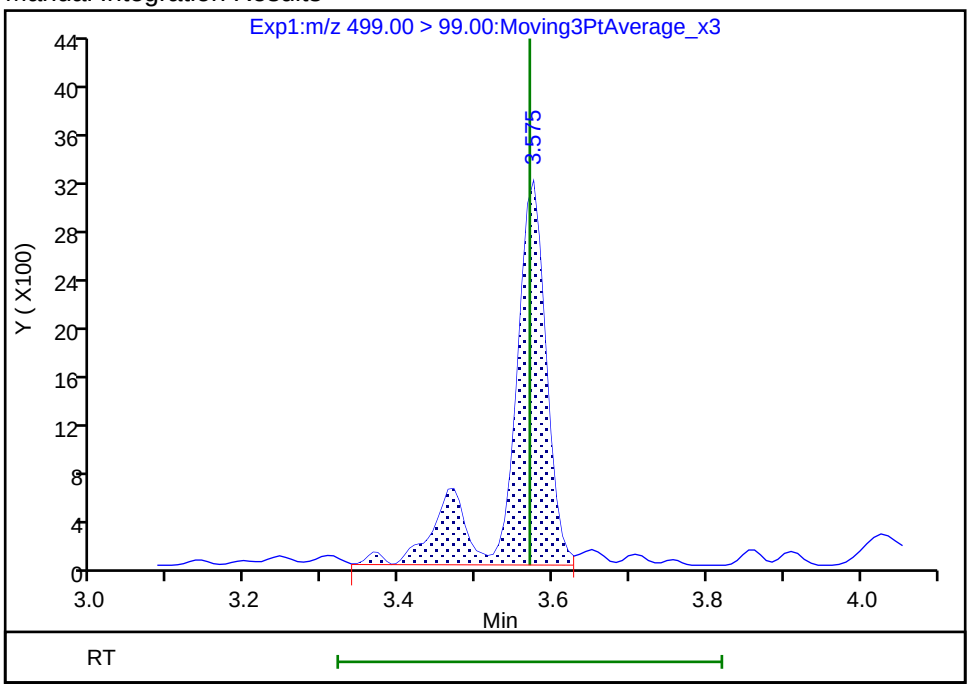
Processing Integration Results

RT: 3.57
Area: 10454
Amount: 0.024077
Amount Units: ng/ml



Manual Integration Results

RT: 3.57
Area: 10106
Amount: 0.024313
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 07:58:55
Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento

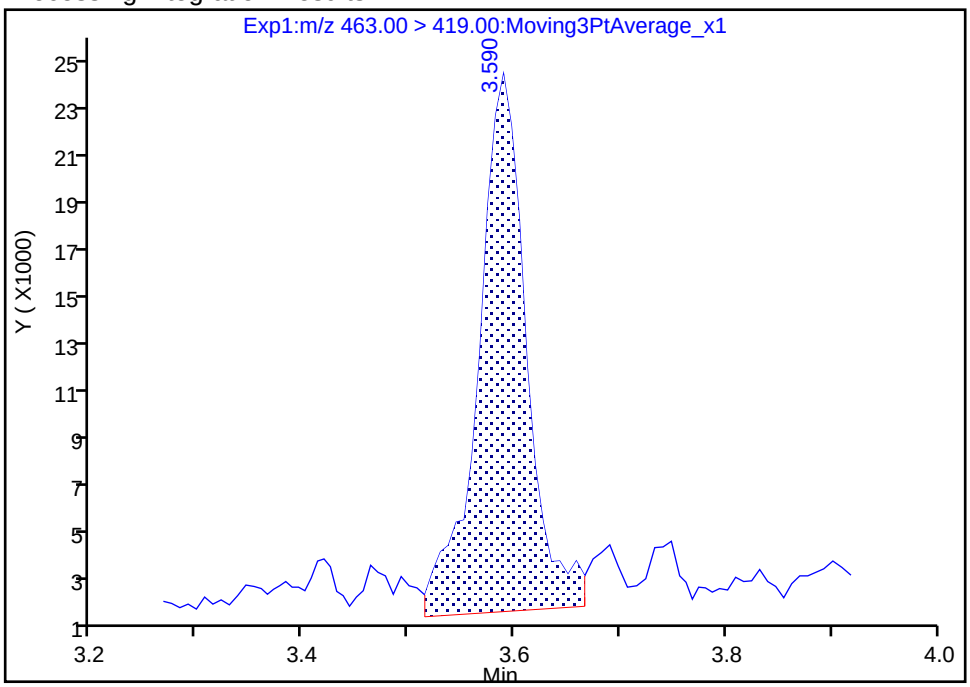
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9
Lims ID: IC L1 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

30 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

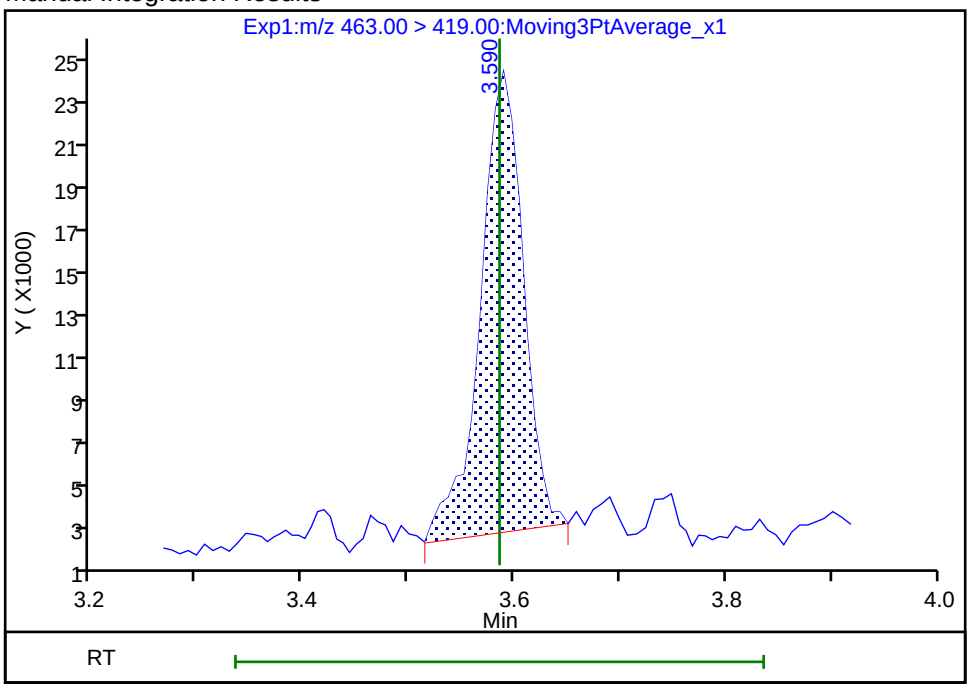
Processing Integration Results

RT: 3.59
Area: 69763
Amount: 0.031981
Amount Units: ng/ml



Manual Integration Results

RT: 3.59
Area: 59187
Amount: 0.028296
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 07:59:04
Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento

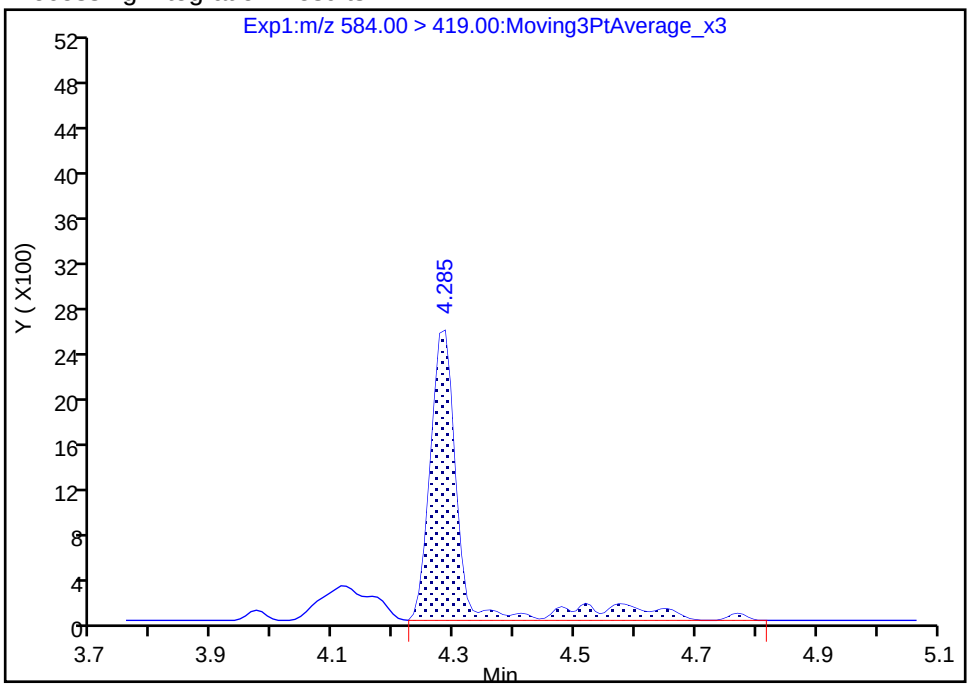
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9
Lims ID: IC L1 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

46 N-ethylperfluorooctanesulfonamidoacetic acid, CAS: 2991-50-6

Signal: 1

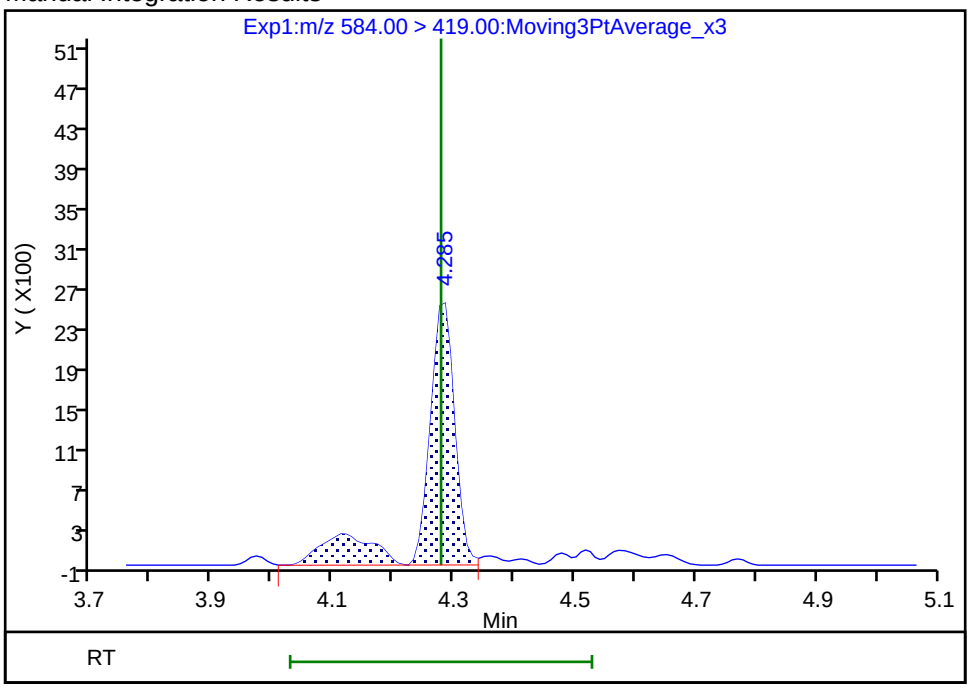
Processing Integration Results

RT: 4.28
Area: 8895
Amount: 0.025431
Amount Units: ng/ml



Manual Integration Results

RT: 4.28
Area: 8936
Amount: 0.025532
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 07:59:38
Audit Action: Manually Integrated Audit Reason: Isomers

TestAmerica Sacramento

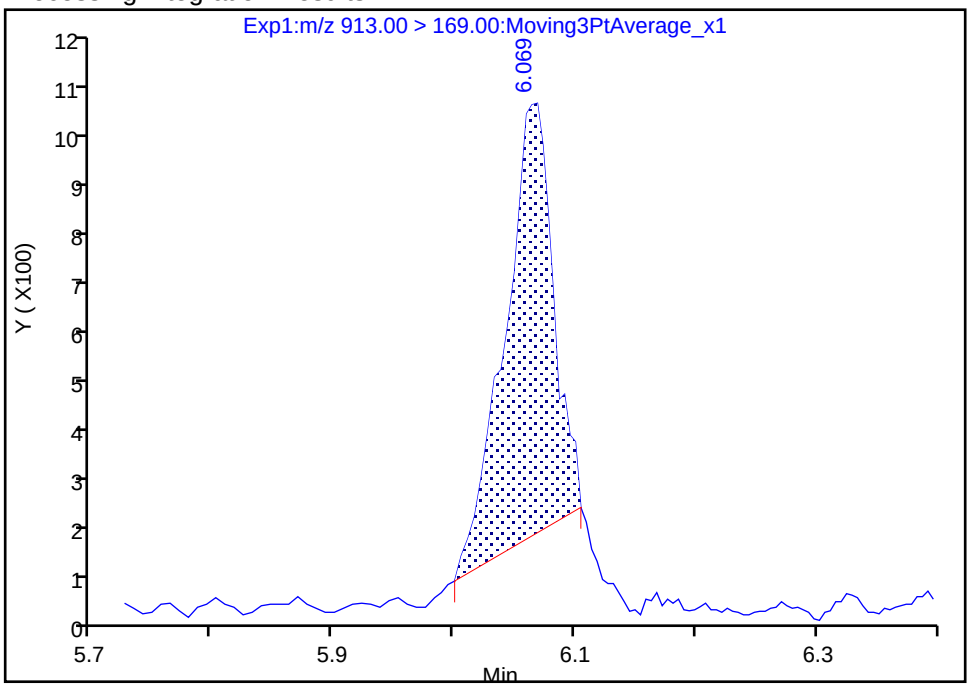
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._002.d
Injection Date: 08-Jan-2019 17:41:10 Instrument ID: A9
Lims ID: IC L1 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

59 Perfluorooctadecanoic acid, CAS: 16517-11-6

Signal: 2

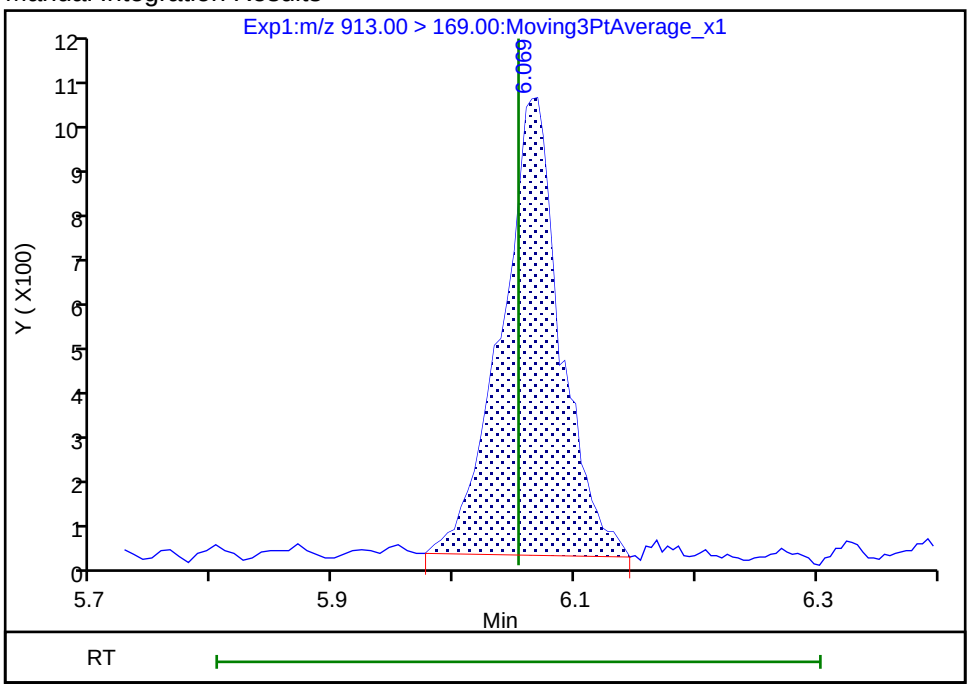
Processing Integration Results

RT: 6.07
Area: 2380
Amount: 0.024528
Amount Units: ng/ml



Manual Integration Results

RT: 6.07
Area: 3422
Amount: 0.024528
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 07:59:58
Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._003.d
Lims ID: IC L2 Full
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 08-Jan-2019 17:48:42 ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CAL STD2
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub5

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:29:44 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 08:03:26
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.684	1.685	-0.001	0.527	6626549	2.41		96.5	13018	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.684	1.686	-0.002	1.000	127748	0.0521		104	11.4	
D 3 13C5 PFPeA										
267.90 > 223.00	2.030	2.025	0.005	0.635	5955293	2.48		99.1	4189	
4 Perfluoropentanoic acid										M
262.90 > 219.00	2.030	2.027	0.003	1.000	117467	0.0493		98.6	6.6	M
D 5 13C3 PFBS										
301.90 > 80.00	2.062	2.059	0.003	0.645	9005009	2.28		98.2	445790	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.062	2.059	0.003	1.000	183812	0.0492	Target=2.70	111	222	
298.90 > 99.00	2.062	2.059	0.003	1.000	63067		2.91(1.35-4.05)	111	71.6	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.356	2.351	0.005	0.737	535594	2.23		95.3	695	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.356	2.352	0.004	1.142	28867	0.0504		108	240	
D 9 13C2 PFHxA										
315.00 > 270.00	2.394	2.394	0.0	0.749	6564174	2.46		98.3	4254	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.394	2.396	-0.002	1.000	121338	0.0534	Target=13.92	107	53.1	
313.00 > 119.00	2.403	2.396	0.007	1.004	8659		14.01(6.96-20.87)	107	25.5	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.412	2.410	0.002	1.170	86764	0.0478	Target=2.30	102	275	
349.00 > 99.00	2.412	2.410	0.002	1.170	39520		2.20(1.15-3.45)	102	114	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.509	2.512	-0.003	1.000	25577	0.0515		103	15.5	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.509	2.512	-0.003	0.785	578964	2.42		96.6	1277	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.792	2.790	0.002	1.000	183373	0.0520	Target=4.34	104	56.5	
363.00 > 169.00	2.792	2.790	0.002	1.000	36793		4.98(2.17-6.52)	104	70.4	
D 16 13C4 PFHpA										
367.00 > 322.00	2.792	2.791	0.001	0.873	8479238	2.58		103	3081	
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.801	2.798	0.003	1.000	148596	0.0518	Target=3.80	114	257	M
399.00 > 99.00	2.801	2.798	0.003	1.000	44056		3.37(1.90-5.70)	114	46.1	
D 17 18O2 PFHxS										
403.00 > 84.00	2.801	2.798	0.003	0.876	5485896	2.36		99.9	2764	
19 DONA										
377.00 > 251.00	2.846	2.841	0.005	0.796	276597	0.0532	Target=2.26	113	605	
377.00 > 85.00	2.846	2.841	0.005	0.796	111646		2.48(1.13-3.39)	113	128	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.181	3.175	0.006	0.995	785304	2.43		102	1363	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.181	3.177	0.004	1.000	31178	0.0447		94.2	60.5	
D 22 13C8 PFOA										
421.00 > 376.00	3.197	3.191	0.006		6236957	2.64		108	3191	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.197	3.191	0.006	0.894	118430	0.0498	Target=3.69	105	294	
449.00 > 99.00	3.189	3.191	-0.002	0.892	30833		3.84(1.84-5.53)	105	190	
* 24 13C2 PFOA										
415.00 > 370.00	3.197	3.194	0.003		7193228	2.50			3561	
D 25 13C4 PFOA										
417.00 > 372.00	3.197	3.195	0.002	1.000	7236127	2.54		102	3725	
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.197	3.195	0.002	1.000	170895	0.0570	Target=2.72	114	29.4	M
413.00 > 169.00	3.197	3.195	0.002	1.000	66065		2.59(1.36-4.08)	114	99.9	
D 27 13C8 PFOS										
507.00 > 99.00	3.567	3.566	0.001		1248342	2.49		104	1968	
29 Perfluorooctanesulfonic acid										M
499.00 > 80.00	3.567	3.570	-0.003	0.998	110800	0.0466	Target=4.08	100	122	M
499.00 > 99.00	3.567	3.570	-0.003	0.998	28877		3.84(2.04-6.12)	100	184	
D 28 13C4 PFOS										
503.00 > 80.00	3.574	3.571	0.003	1.118	5390763	2.28		95.2	3514	
D 31 13C5 PFNA										
468.00 > 423.00	3.582	3.584	-0.002	1.120	6352900	2.48		99.1	2753	
30 Perfluorononanoic acid										M
463.00 > 419.00	3.589	3.586	0.003	1.002	133105	0.0526	Target=5.35	105	20.2	M
463.00 > 169.00	3.589	3.586	0.003	1.002	23943		5.56(2.68-8.03)	105	70.2	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.774	3.774	0.0	1.056	106636	0.0495		106	120	
D 33 13C8 FOSA										
506.00 > 78.00	3.892	3.891	0.001	1.218	3810096	2.44		97.7	2885	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.892	3.894	-0.002	1.000	243572	0.0550		110	486	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.918	3.919	-0.001	1.096	66612	0.0505	Target=6.03	105	288	
549.00 > 99.00	3.918	3.919	-0.001	1.096	9151		7.28(3.02-9.05)	105	70.1	
D 36 13C2 PFDA										
515.00 > 470.00	3.945	3.942	0.003	1.234	6188008	2.47		98.6	2885	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.945	3.943	0.002	1.000	147589	0.0519	Target=14.23	104	90.0	
513.00 > 169.00	3.936	3.943	-0.007	0.998	9269		15.92(7.12-21.35)	104	17.7	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.945	3.946	-0.001	1.000	24348	0.0461		96.2	209	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.945	3.947	-0.002	1.234	89123	2.40		100	336	
47 MeFOSA										
512.00 > 169.00	3.972	4.005	-0.033		542	NC			0.5	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.112	4.109	0.003	1.286	1529044	2.33		93.0	1738	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.112	4.114	-0.002	1.000	27866	0.0526		105	10.5	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.242	4.241	0.001	1.187	101035	0.0512	Target=4.28	106	323	
599.00 > 99.00	4.242	4.241	0.001	1.187	20451		4.94(2.14-6.43)	106	83.0	
D 44 13C2 PFUnA										
565.00 > 520.00	4.267	4.266	0.001	1.335	4847529	2.46		98.3	2611	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.276	4.270	0.006	1.002	103230	0.0639	Target=10.48	128	25.9	
563.00 > 169.00	4.276	4.270	0.006	1.002	10907		9.46(5.24-15.72)	128	42.5	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.276	4.272	0.004	1.338	1309789	2.39		95.6	1488	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.276	4.278	-0.002	1.000	21552	0.0497		99.4	85.9	
51 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.285	4.279	0.006		905	NC			0.4	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.410	4.407	0.003	1.234	132895	0.0522		111	648	
D 49 13C2 PFDoA										
615.00 > 570.00	4.565	4.560	0.005	1.428	6058099	2.53		101	3512	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.565	4.561	0.004	1.000	131839	0.0567	Target=9.37	113	47.2	
613.00 > 169.00	4.565	4.561	0.004	1.000	16739		7.88(4.68-14.05)	113	68.3	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.573	4.578	-0.005	1.159	15479	0.0470		97.5	65.5	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.795	4.793	0.002	1.342	11044	0.0539	Target=0.55	111	99.8	
699.00 > 99.00	4.795	4.793	0.002	1.342	17302		0.64(0.28-0.83)	111	136	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.831	4.830	0.001	1.058	102982	0.0560	Target=6.18	112	72.8	
663.00 > 169.00	4.831	4.830	0.001	1.058	13507		7.62(3.09-9.27)	112	77.2	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.083	5.080	0.003	1.590	3991218	2.41		96.3	3103	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.083	5.080	0.003	1.000	14642	0.0562	Target=1.39	112	87.8	
713.00 > 219.00	5.074	5.080	-0.006	0.998	10252		1.43(0.70-2.09)	112	121	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.543	5.545	-0.002	1.734	3745598	2.42		96.7	3374	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.553	5.546	0.007	1.002	99036	0.0500	Target=5.55	100	9.4	
813.00 > 169.00	5.543	5.546	-0.003	1.000	18695		5.30(2.77-8.32)	100	135	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.056	6.053	0.003	1.092	45835	0.0496	Target=5.09	99.1	14.7	
913.00 > 169.00	6.050	6.053	-0.003	1.091	8364		5.48(2.55-7.64)	99.1	67.3	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Reagents:

LCPFC_LL2_00009 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:29:46 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._003.d

Injection Date: 08-Jan-2019 17:48:42 Instrument ID: A9

Lims ID: IC L2 Full

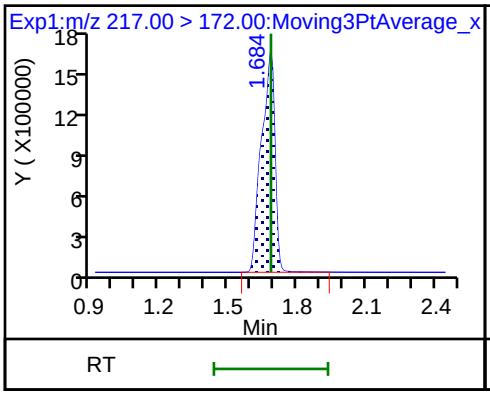
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 11 Worklist Smp#: 3

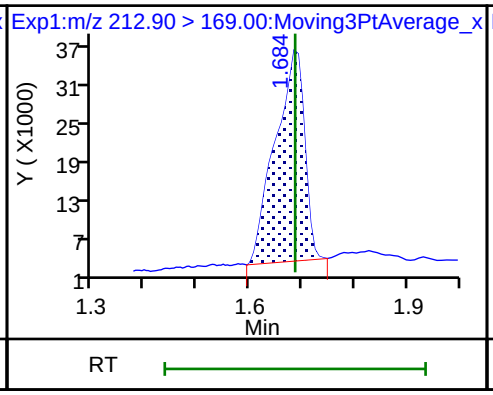
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

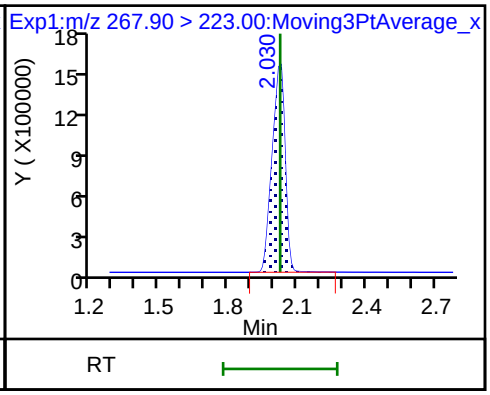
D 1 13C4 PFBA



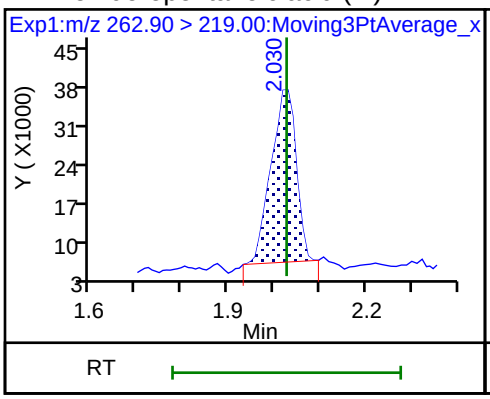
2 Perfluorobutanoic acid



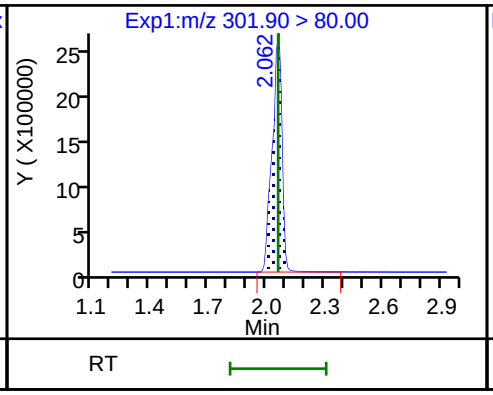
D 3 13C5 PFPeA



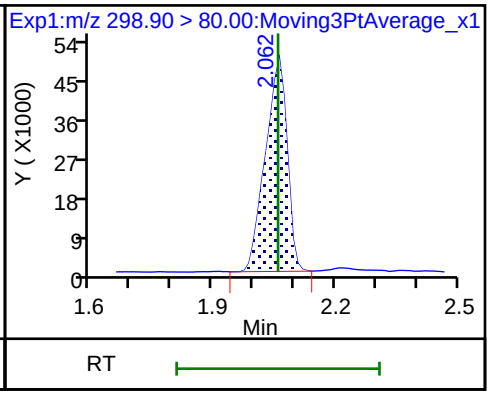
4 Perfluoropentanoic acid (M)



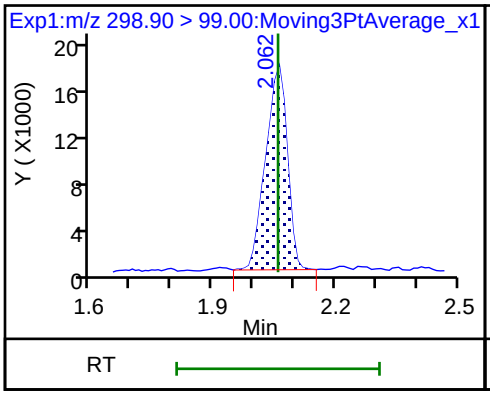
D 5 13C3 PFBS



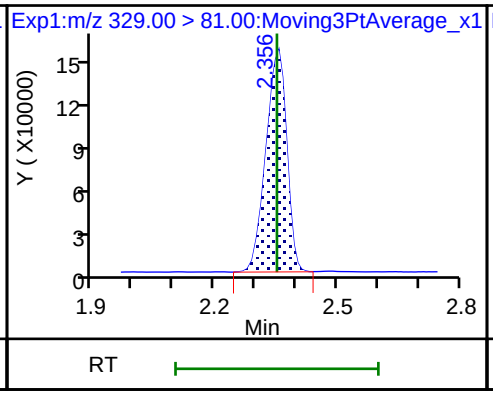
6 Perfluorobutanesulfonic acid



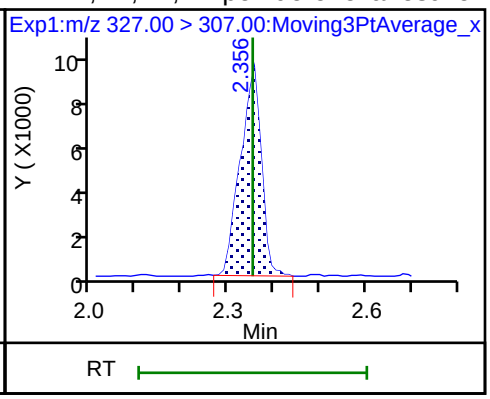
6 Perfluorobutanesulfonic acid



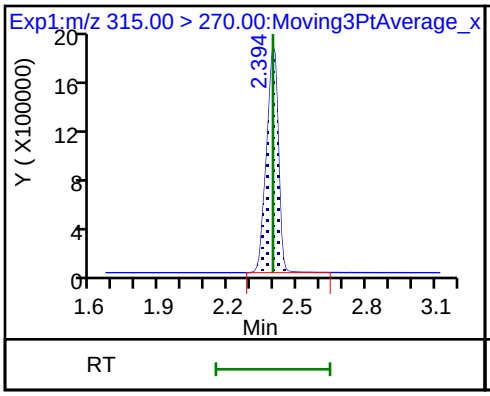
D 8 M2-4:2 FTS



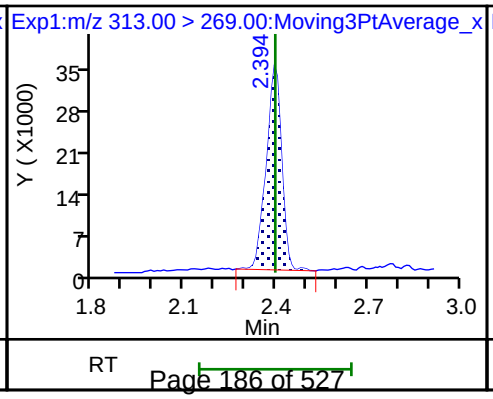
7 1H,1H,2H,2H-perfluorohexanesulfoni



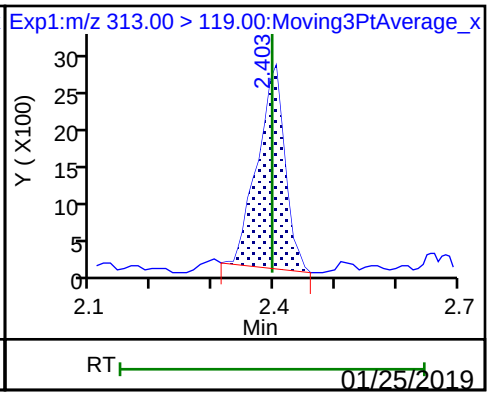
D 9 13C2 PFHxA



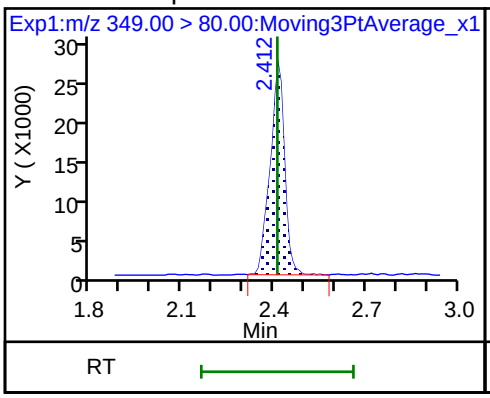
10 Perfluorohexanoic acid



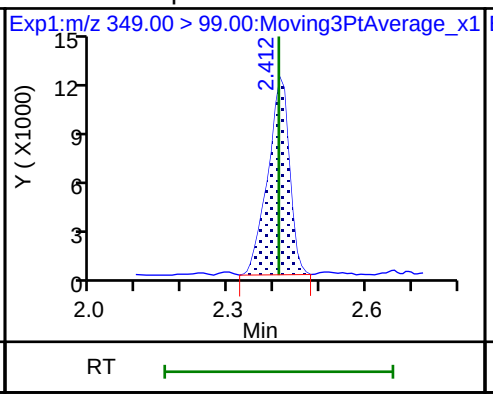
10 Perfluorohexanoic acid



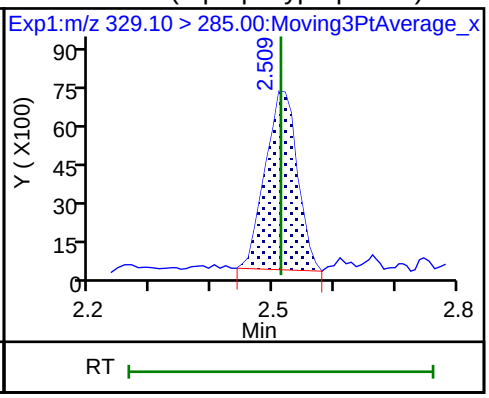
11 Perfluoropentanesulfonic acid



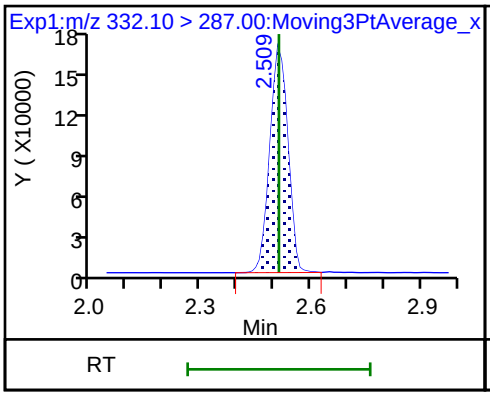
11 Perfluoropentanesulfonic acid



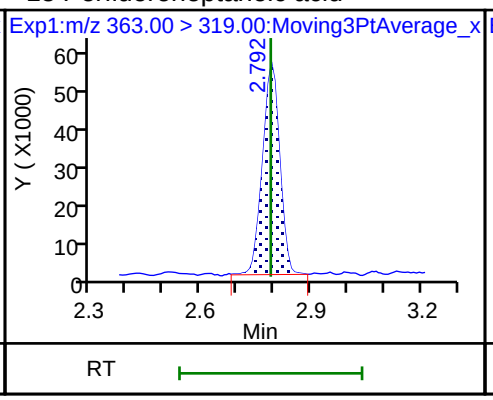
14 Perfluoro(2-propoxypropanoic) acid



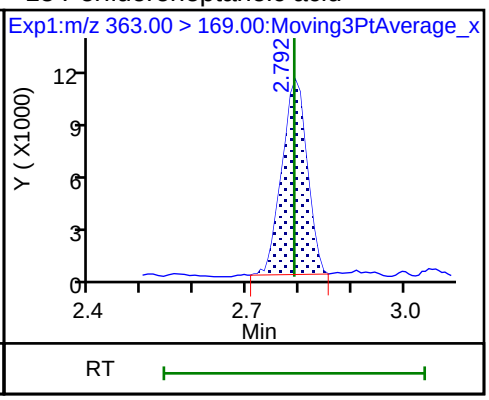
D 13 13C3 HFPO-DA



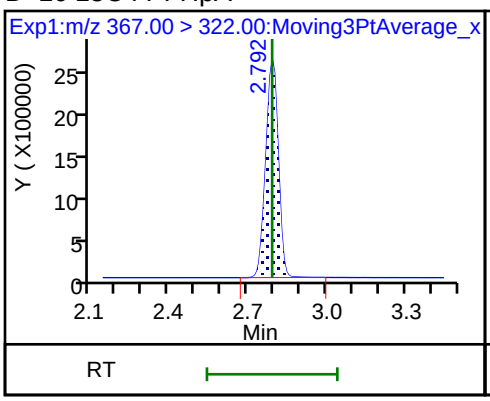
15 Perfluoroheptanoic acid



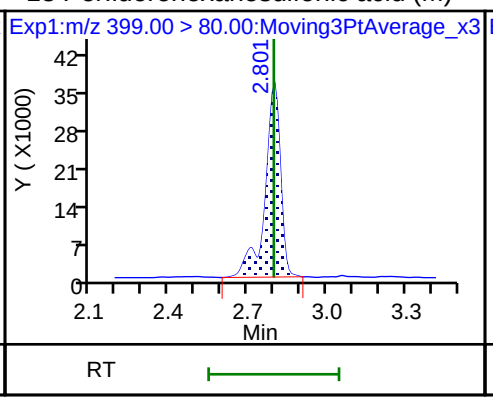
15 Perfluoroheptanoic acid



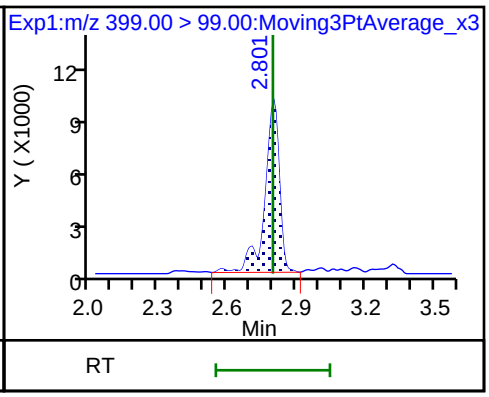
D 16 13C4 PFHpA



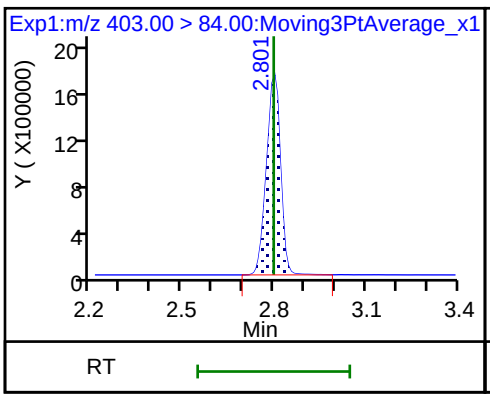
18 Perfluorohexanesulfonic acid (M)



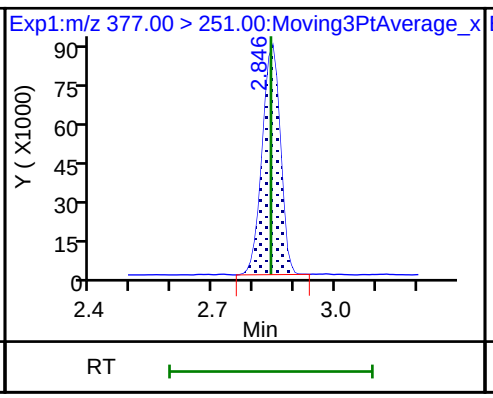
18 Perfluorohexanesulfonic acid



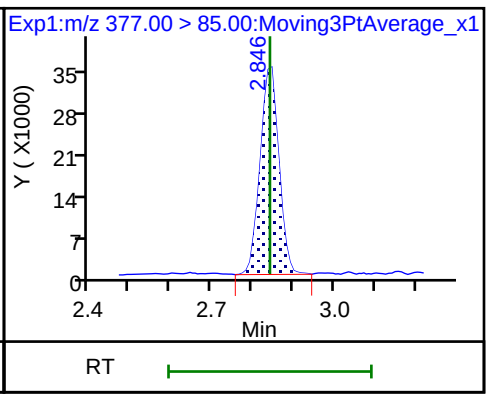
D 17 18O2 PFHxS



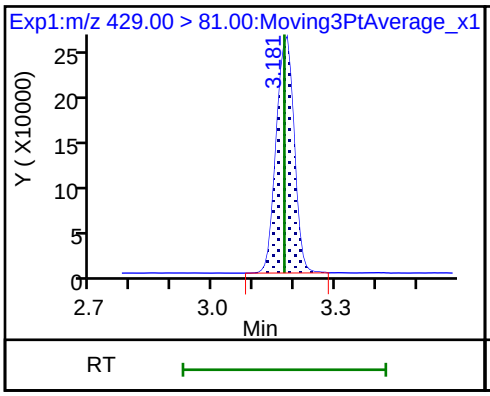
19 DONA



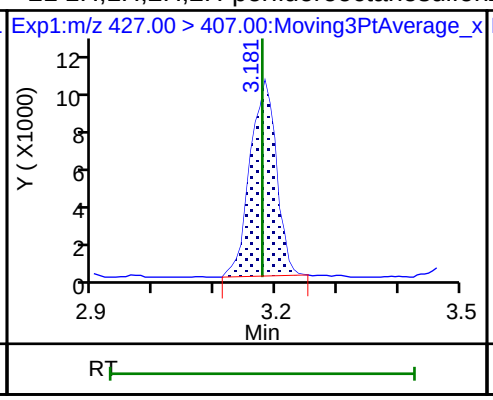
19 DONA



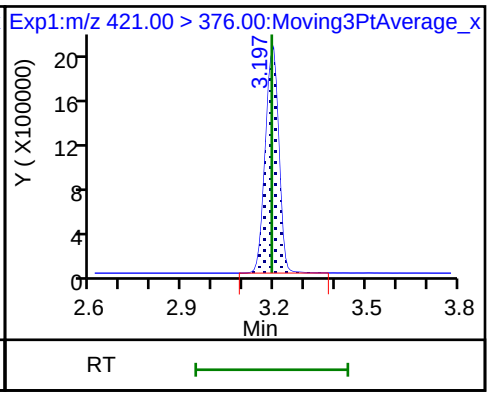
D 20 M2-6:2 FTS



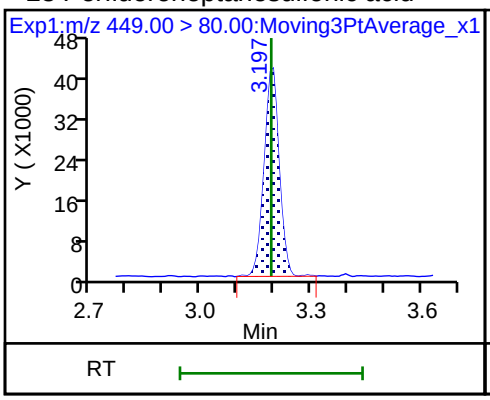
21 1H,1H,2H,2H-perfluorooctanesulfon



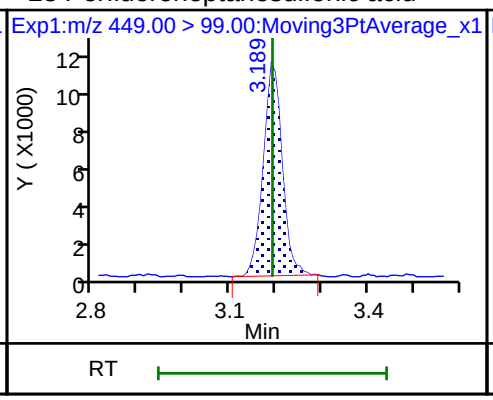
D 22 13C8 PFOA



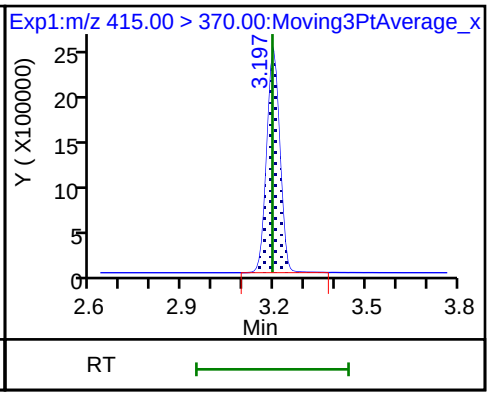
23 Perfluoroheptanesulfonic acid



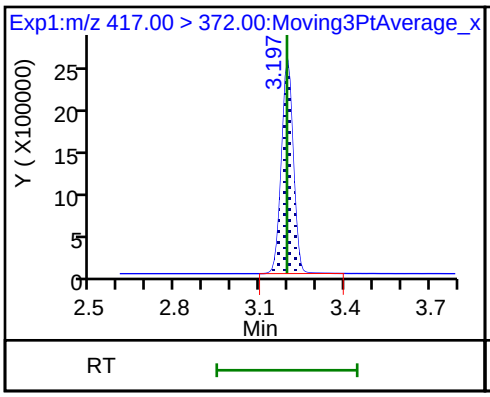
23 Perfluoroheptanesulfonic acid



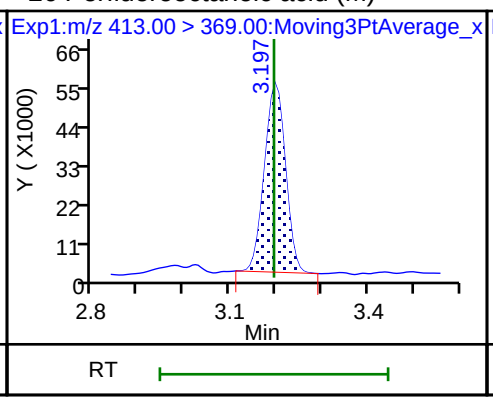
* 24 13C2 PFOA



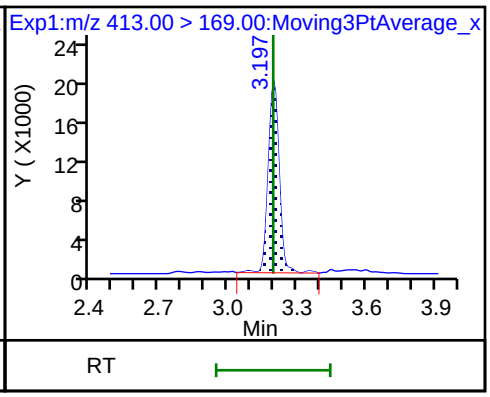
D 25 13C4 PFOA



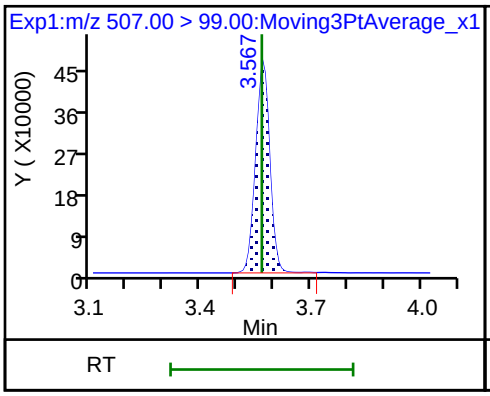
26 Perfluorooctanoic acid (M)



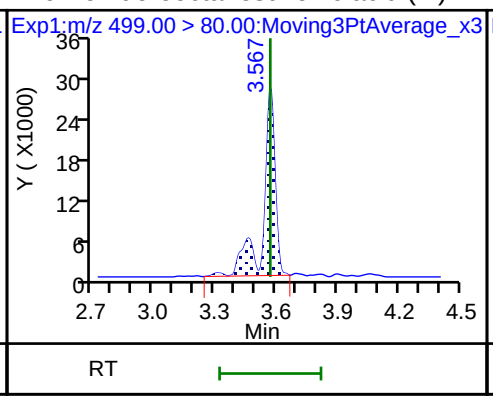
26 Perfluorooctanoic acid



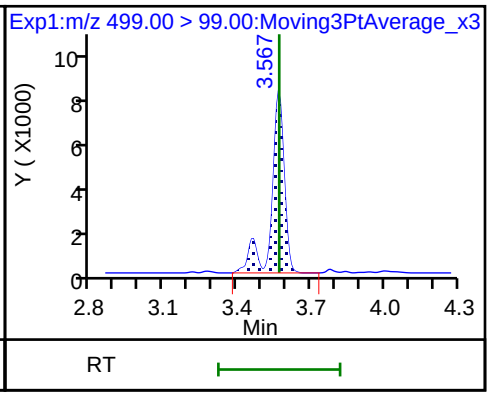
D 27 13C8 PFOS



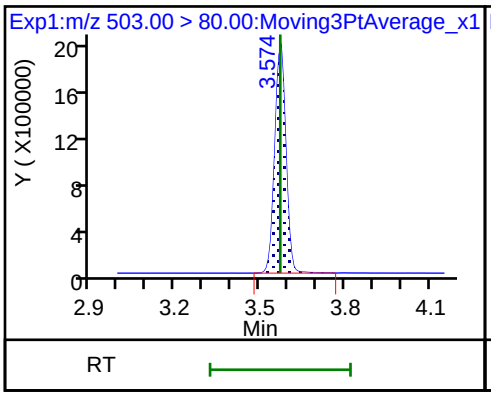
29 Perfluorooctanesulfonic acid (M)



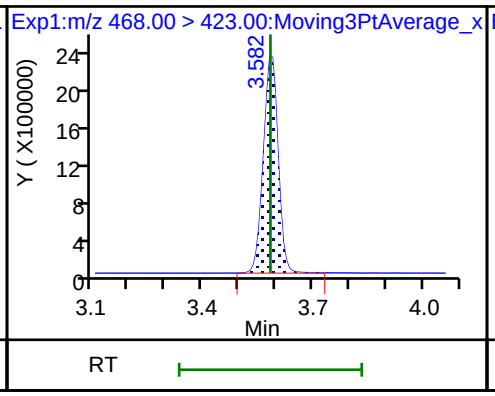
29 Perfluorooctanesulfonic acid



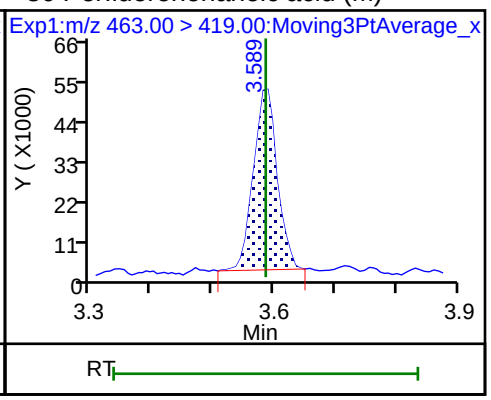
D 28 13C4 PFOS



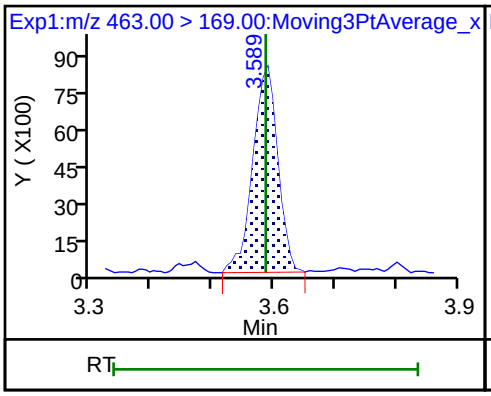
D 31 13C5 PFNA



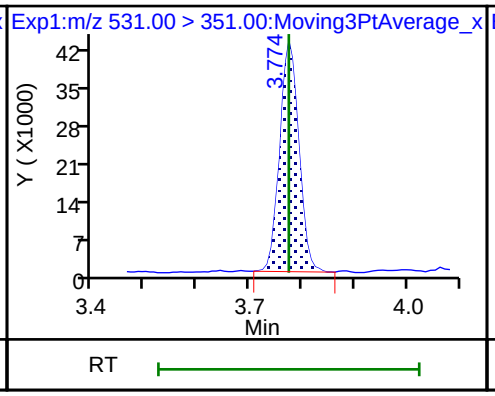
30 Perfluorononanoic acid (M)



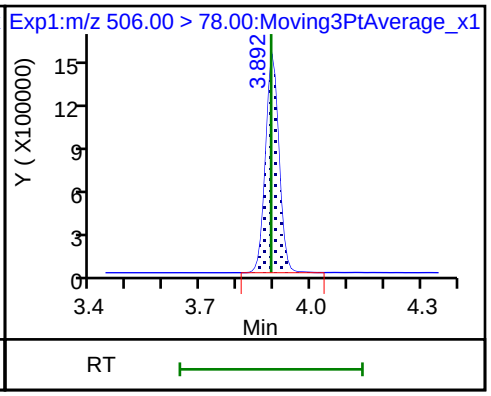
30 Perfluorononanoic acid



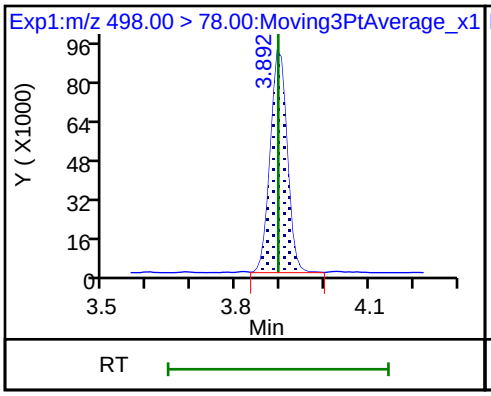
32 9-Chlorohexadecafluoro-3-oxanonane



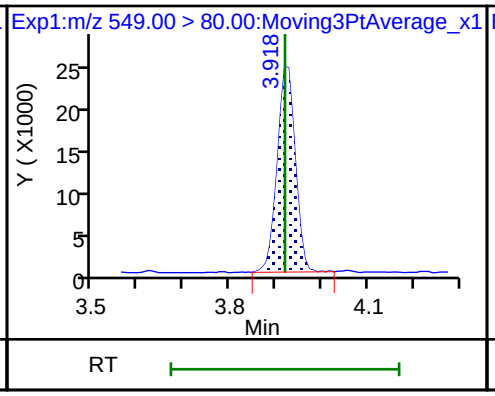
D 33 13C8 FOSA



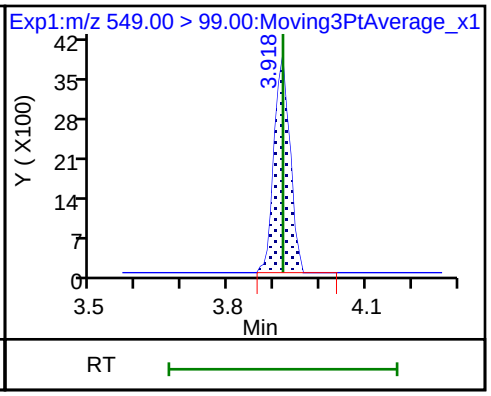
34 Perfluorooctanesulfonamide



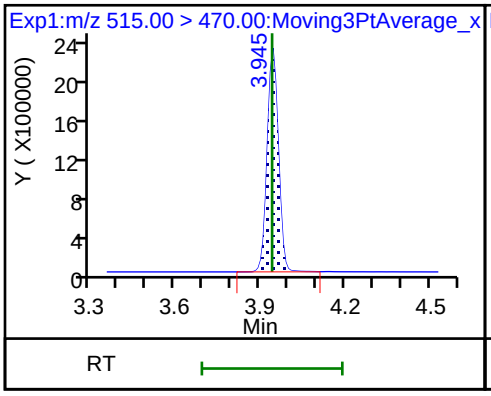
35 Perfluorononanesulfonic acid



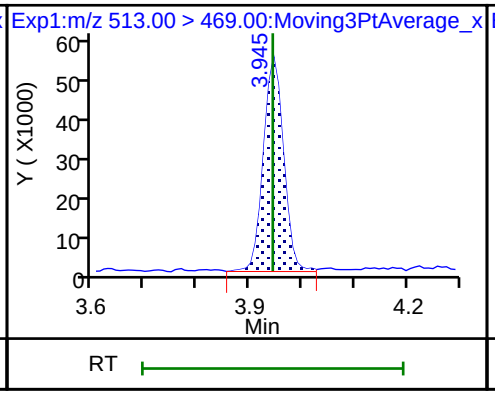
35 Perfluorononanesulfonic acid



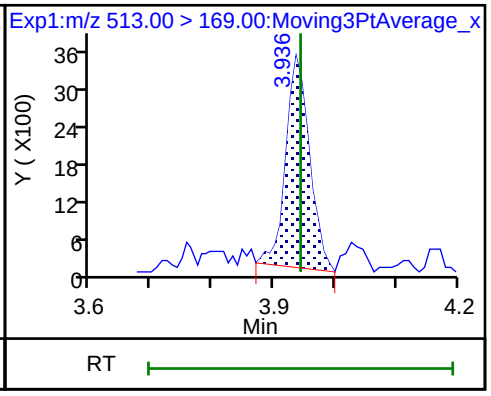
D 36 13C2 PFDA



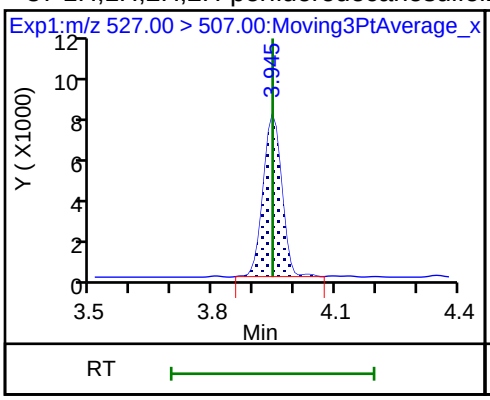
38 Perfluorodecanoic acid



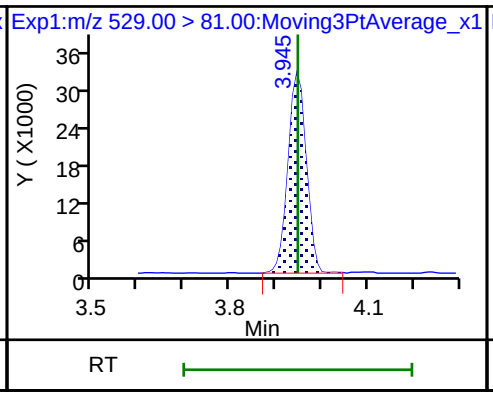
38 Perfluorodecanoic acid



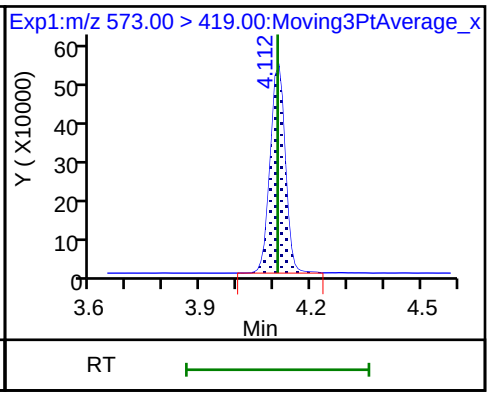
37 1H,1H,2H,2H-perfluorodecanesulfon



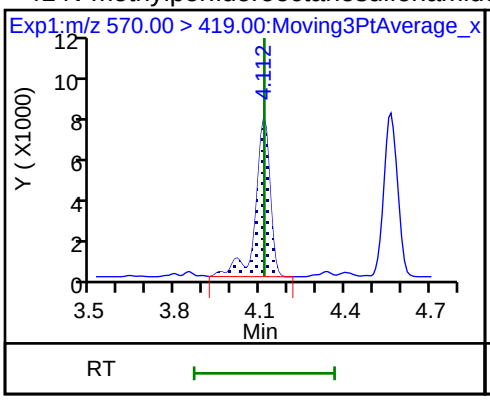
D 39 M2-8:2 FTS



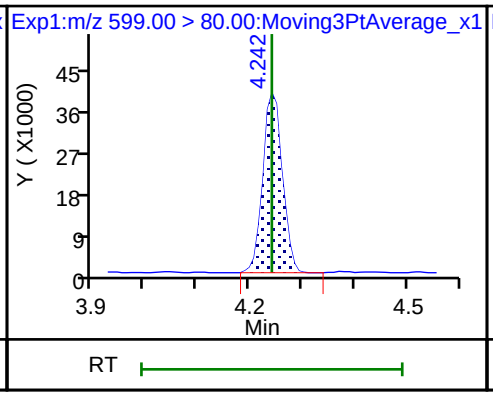
D 40 d3-NMeFOSAA



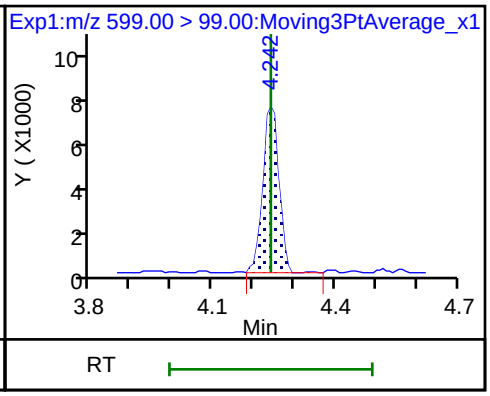
41 N-methylperfluorooctanesulfonamido



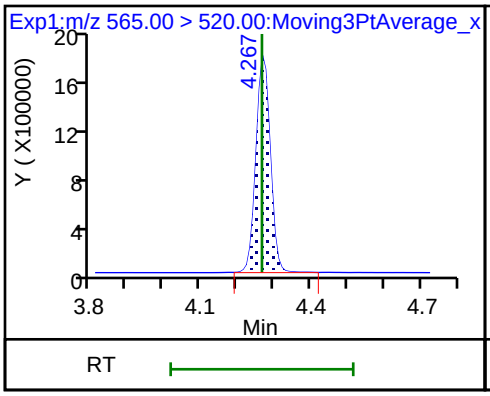
42 Perfluorodecanesulfonic acid



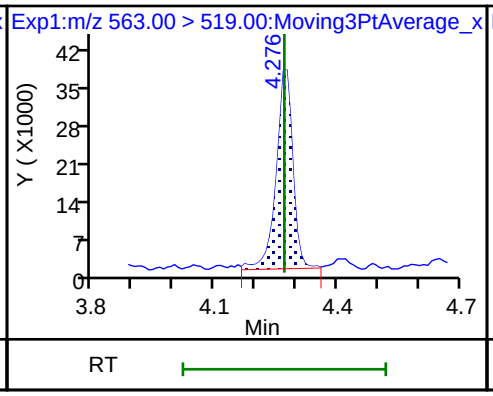
42 Perfluorodecanesulfonic acid



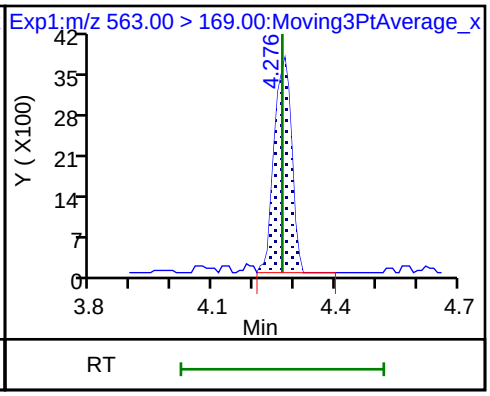
D 44 13C2 PFUnA



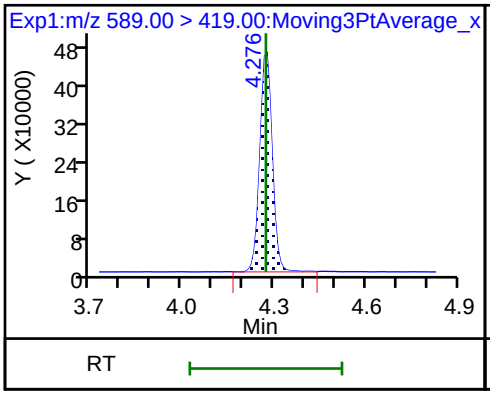
43 Perfluoroundecanoic acid



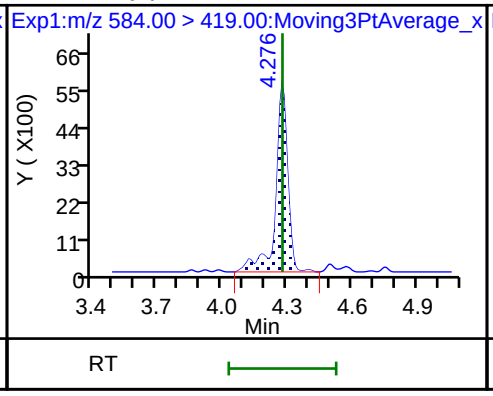
43 Perfluoroundecanoic acid



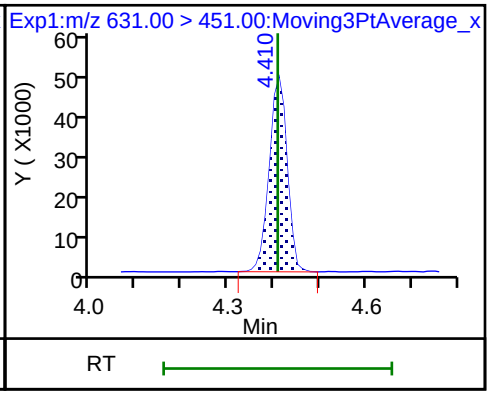
D 45 d5-NEtFOSAA



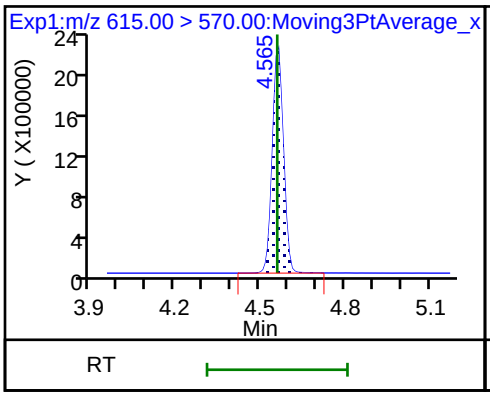
46 N-ethylperfluorooctanesulfonamidoa



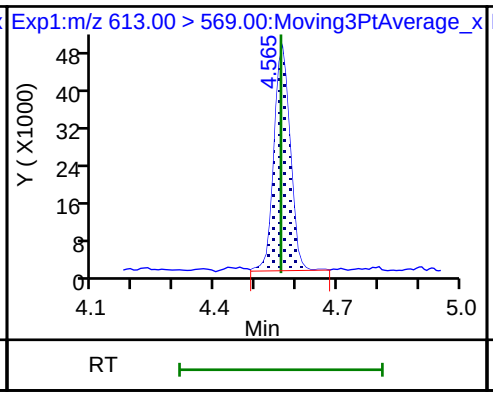
48 11-Chloroeicosafluoro-3-oxaundecan



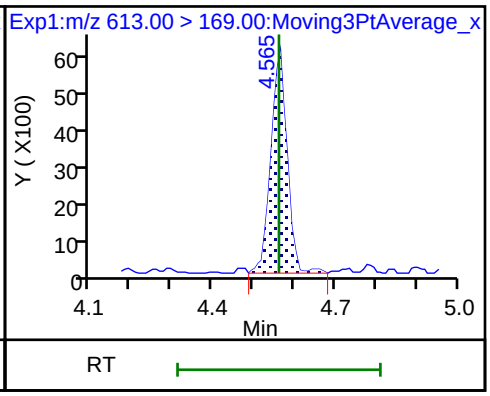
D 49 13C2 PFDoA



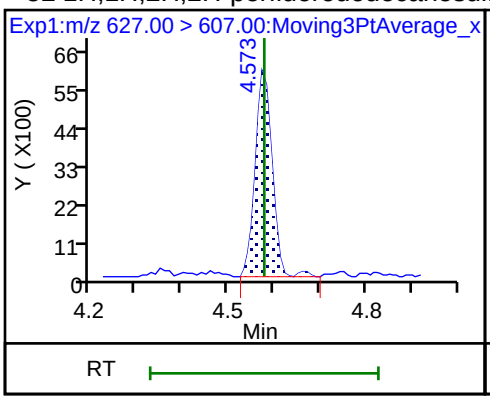
50 Perfluorododecanoic acid



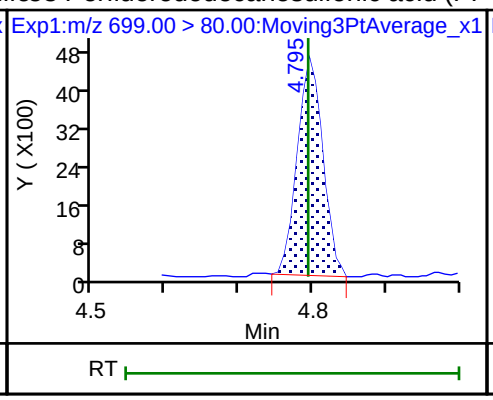
50 Perfluorododecanoic acid



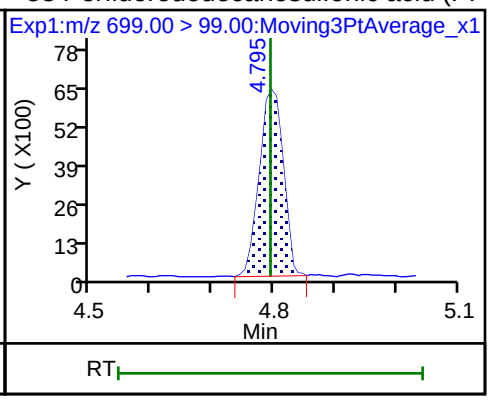
52 1H,1H,2H-perfluorododecanesulfo



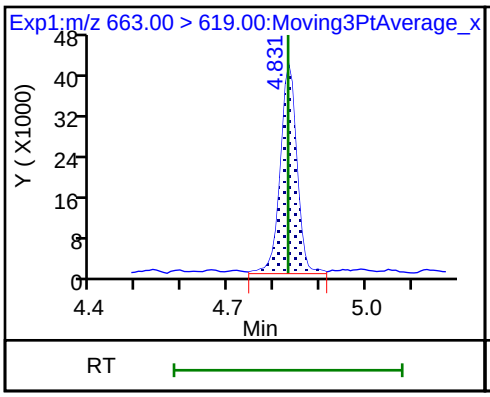
53 Perfluorododecanesulfonic acid (PF



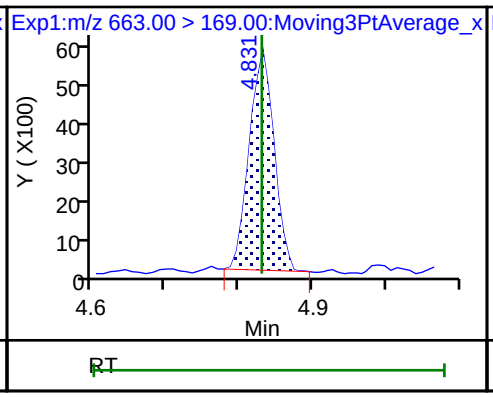
53 Perfluorododecanesulfonic acid (PF



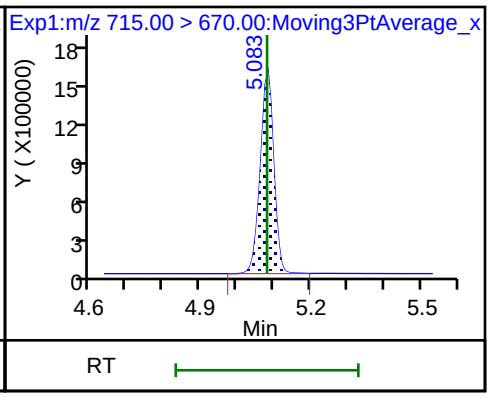
54 Perfluorotridecanoic acid



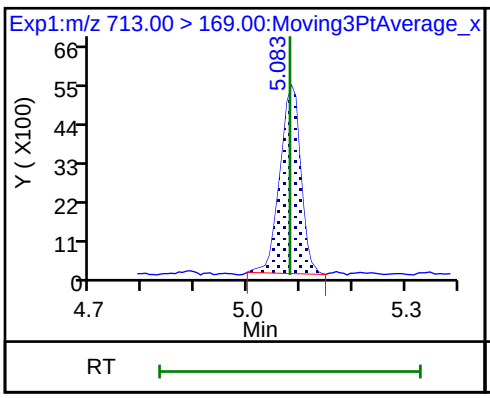
54 Perfluorotridecanoic acid



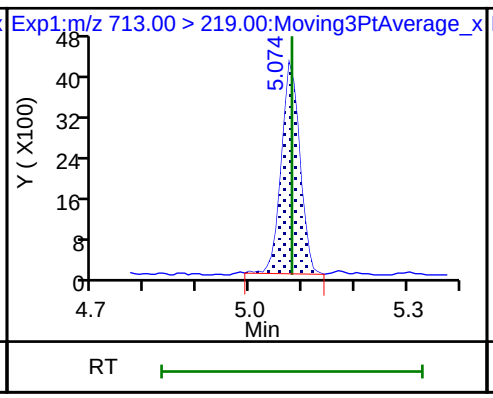
D 55 13C2 PFTeDA



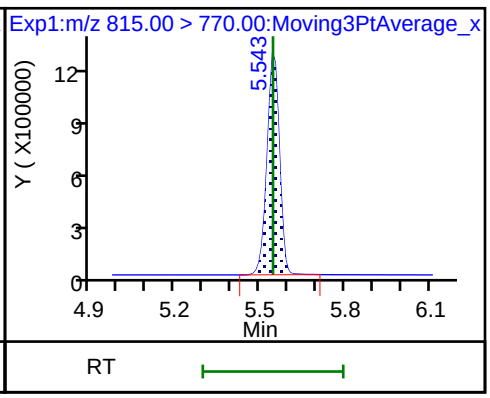
56 Perfluorotetradecanoic acid



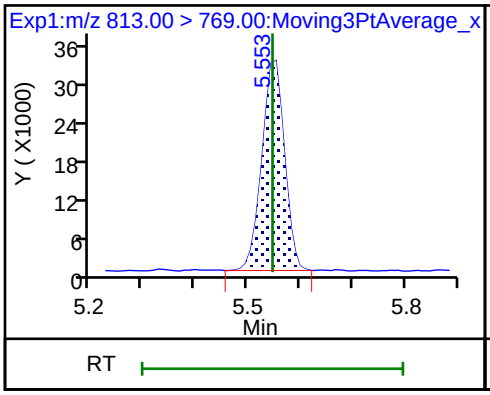
56 Perfluorotetradecanoic acid



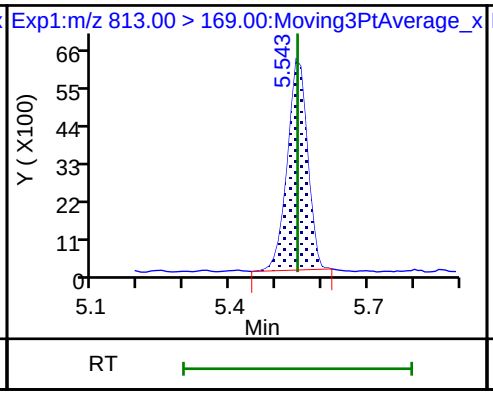
D 57 13C2 PFHxDA



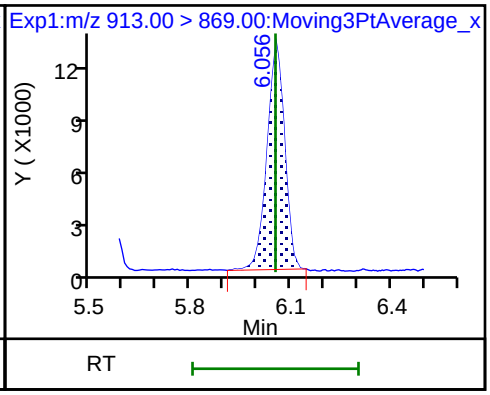
58 Perfluorohexadecanoic acid



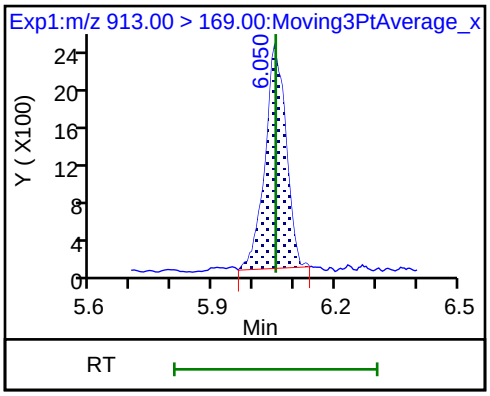
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

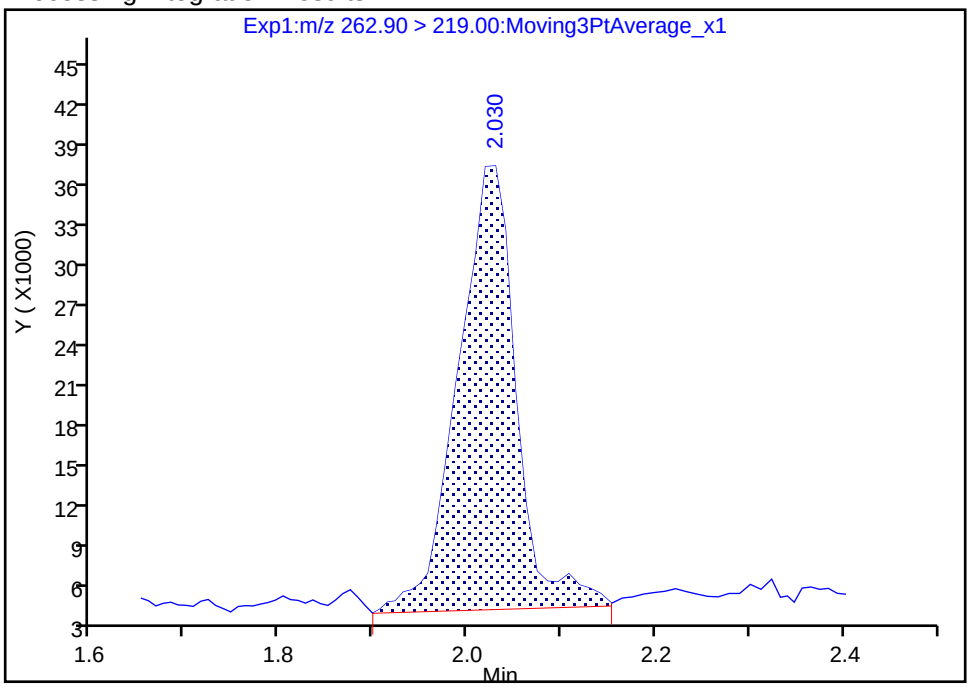
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._003.d
Injection Date: 08-Jan-2019 17:48:42 Instrument ID: A9
Lims ID: IC L2 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

4 Perfluoropentanoic acid, CAS: 2706-90-3

Signal: 1

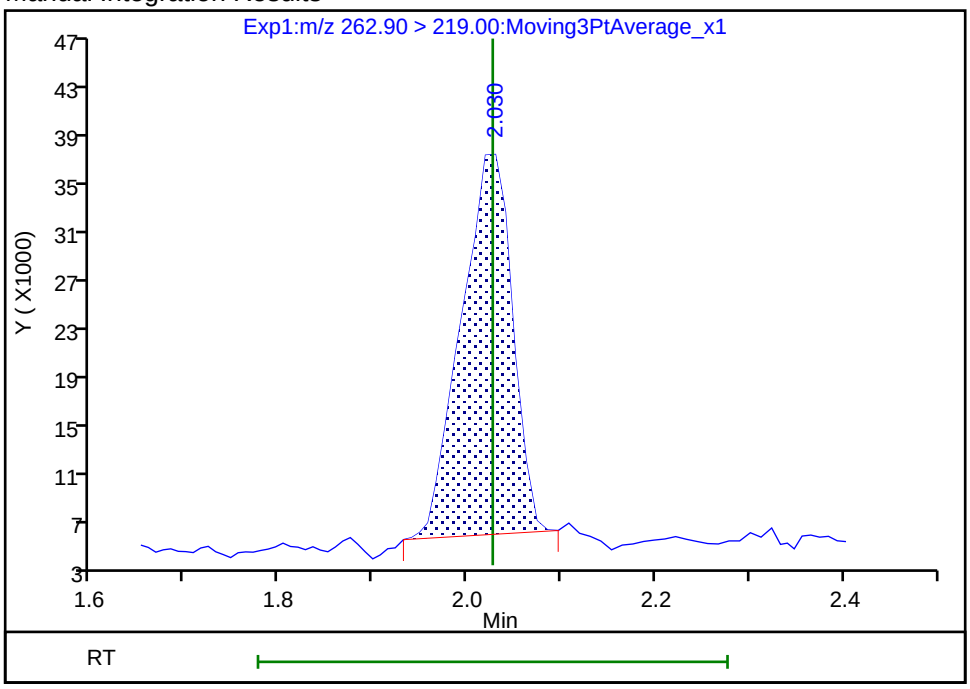
Processing Integration Results

RT: 2.03
Area: 140659
Amount: 0.057441
Amount Units: ng/ml



Manual Integration Results

RT: 2.03
Area: 117467
Amount: 0.049304
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 08:01:27
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

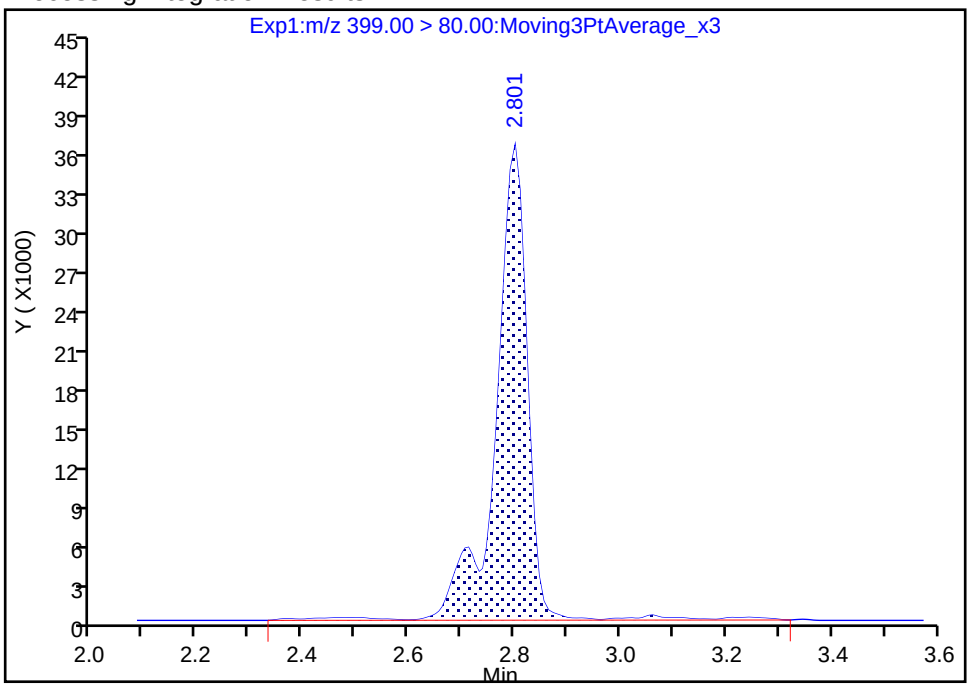
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._003.d
Injection Date: 08-Jan-2019 17:48:42 Instrument ID: A9
Lims ID: IC L2 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

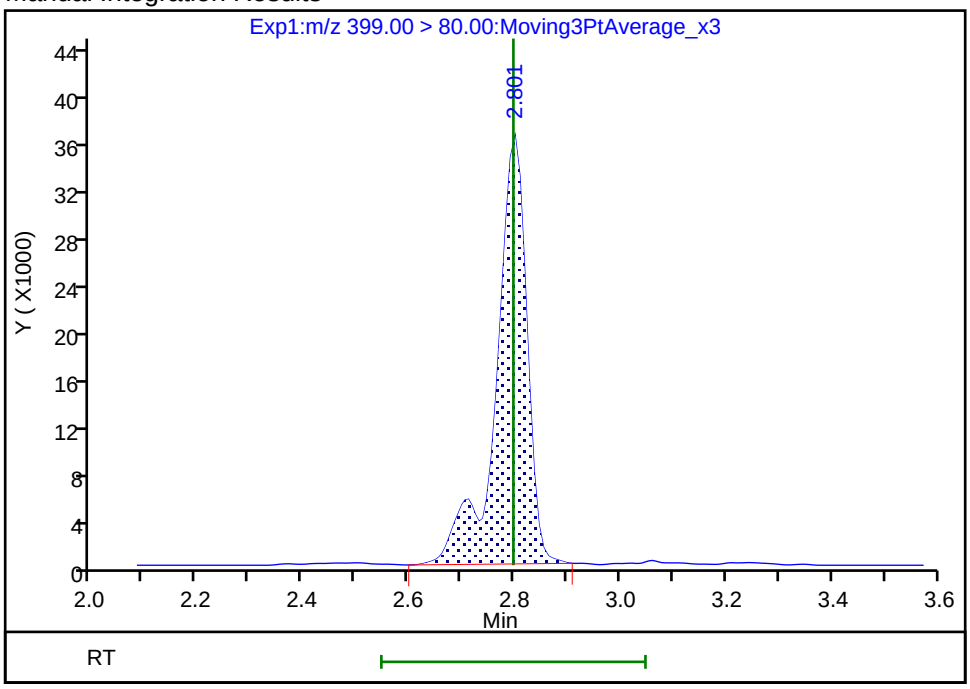
Processing Integration Results

RT: 2.80
Area: 155335
Amount: 0.053731
Amount Units: ng/ml



Manual Integration Results

RT: 2.80
Area: 148596
Amount: 0.051779
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 08:02:16
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

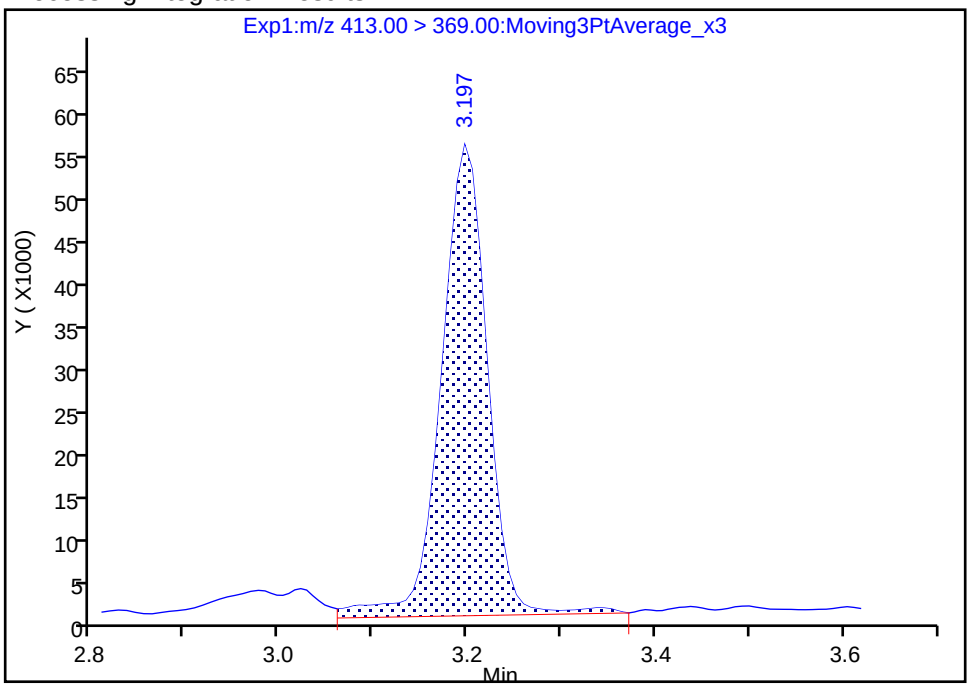
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._003.d
Injection Date: 08-Jan-2019 17:48:42 Instrument ID: A9
Lims ID: IC L2 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

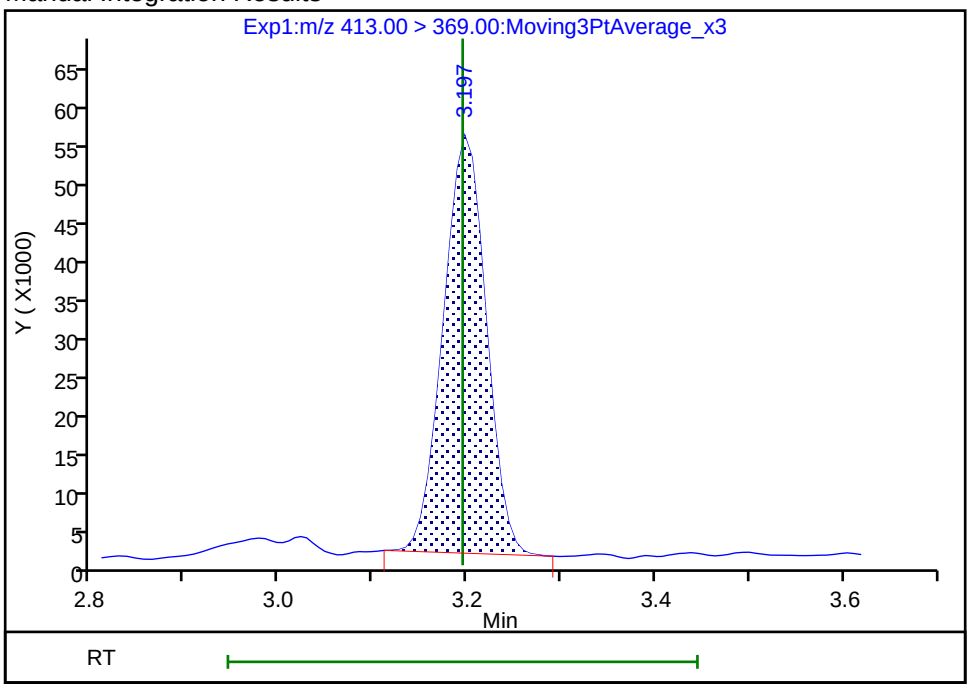
Processing Integration Results

RT: 3.20
Area: 187843
Amount: 0.058850
Amount Units: ng/ml



Manual Integration Results

RT: 3.20
Area: 170895
Amount: 0.056957
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 08:01:53
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

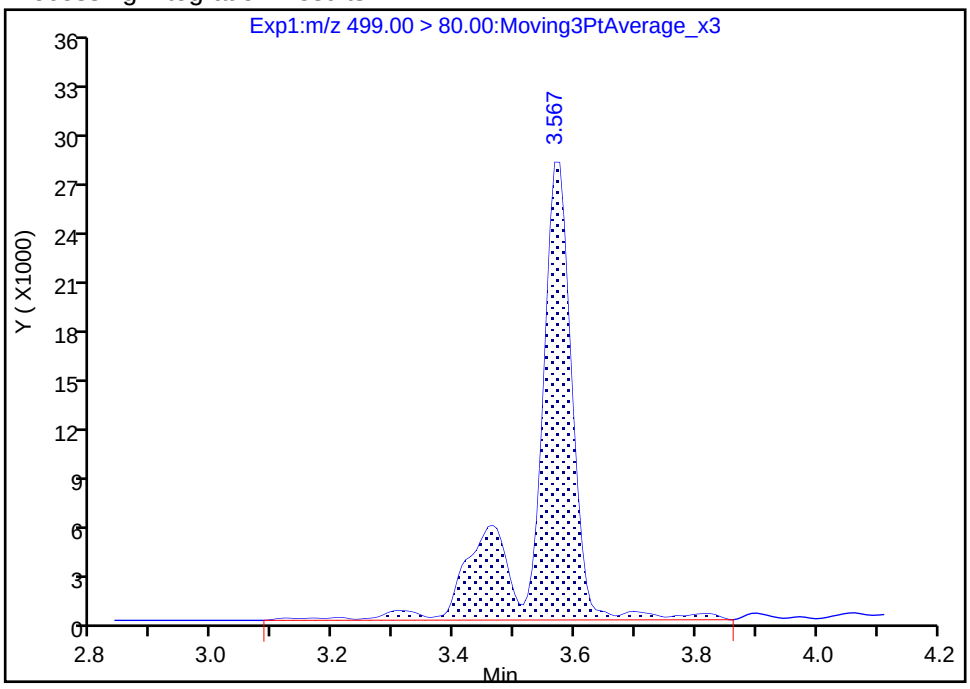
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._003.d
Injection Date: 08-Jan-2019 17:48:42 Instrument ID: A9
Lims ID: IC L2 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

29 Perfluorooctanesulfonic acid, CAS: 1763-23-1

Signal: 1

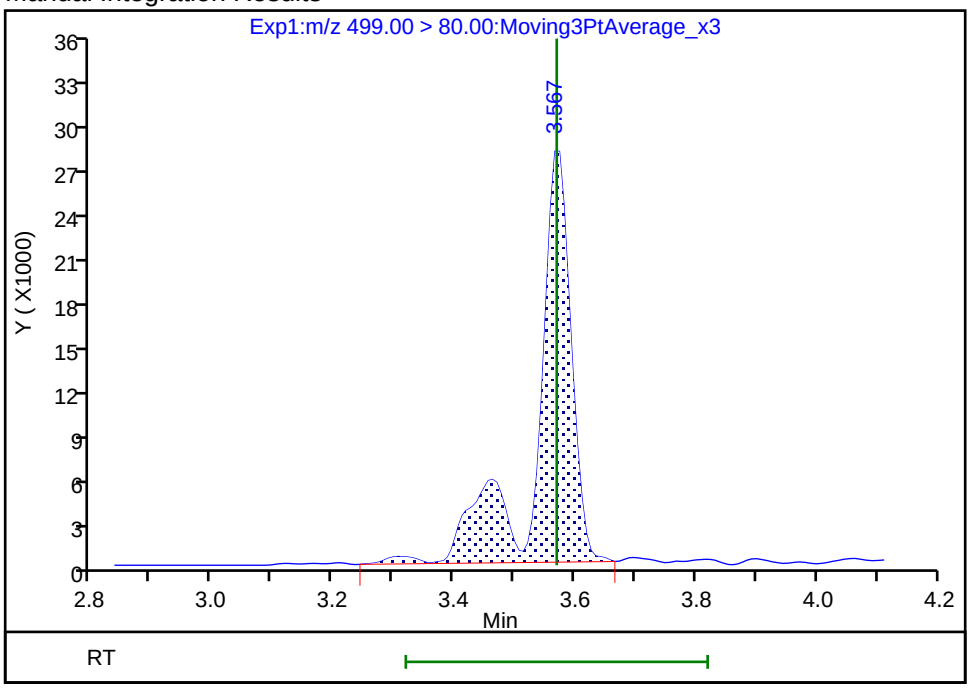
Processing Integration Results

RT: 3.57
Area: 118388
Amount: 0.049319
Amount Units: ng/ml



Manual Integration Results

RT: 3.57
Area: 110800
Amount: 0.046612
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 08:02:02
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

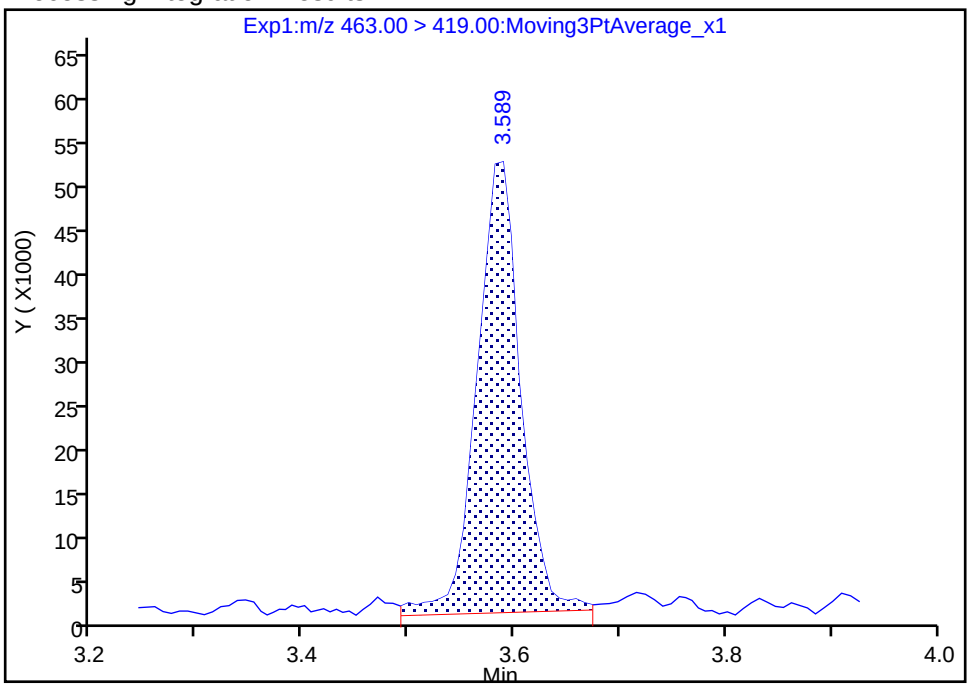
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._003.d
Injection Date: 08-Jan-2019 17:48:42 Instrument ID: A9
Lims ID: IC L2 Full
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

30 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

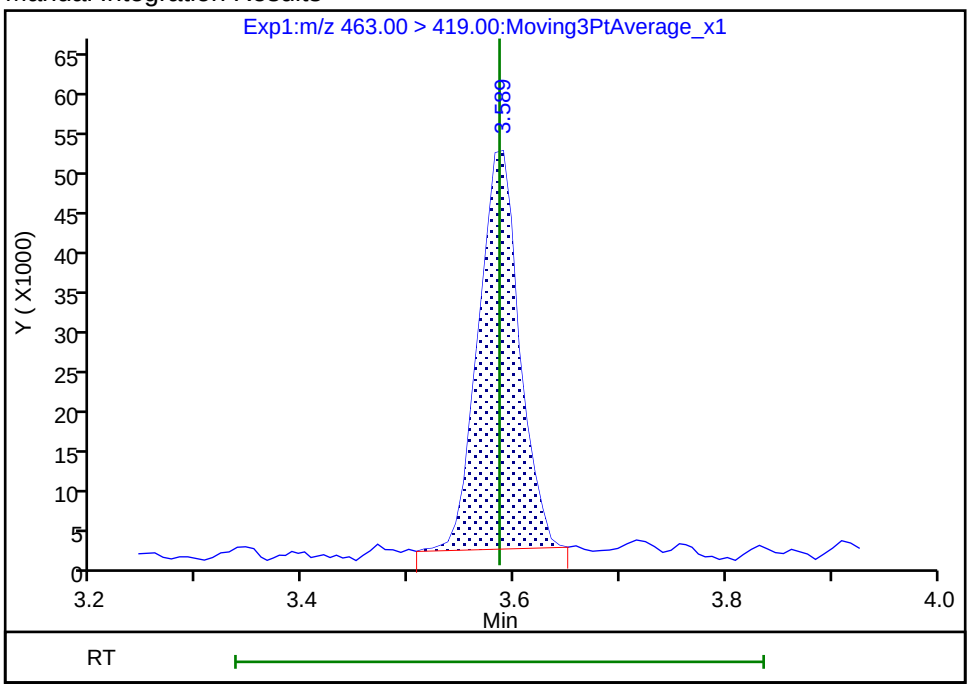
Processing Integration Results

RT: 3.59
Area: 145499
Amount: 0.056723
Amount Units: ng/ml



Manual Integration Results

RT: 3.59
Area: 133105
Amount: 0.052617
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 08:02:09
Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._004.d
Lims ID: IC L3 Full
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 08-Jan-2019 17:56:13 ALS Bottle#: 12 Worklist Smp#: 4
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CAL STD3
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub5

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:29:54 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 08:04:04
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.687	1.685	0.002	0.529	6558378	2.56		102	6961	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.687	1.686	0.001	1.000	612485	0.2522		101	53.2	
D 3 13C5 PFPeA										
267.90 > 223.00	2.024	2.025	-0.001	0.634	5746206	2.56		102	3869	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.024	2.027	-0.003	1.000	582577	0.2534		101	33.1	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.059	-0.003	0.644	8673827	2.35		101	2550828	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.056	2.059	-0.003	1.000	799390	0.2221	Target=2.70	100	705	
298.90 > 99.00	2.056	2.059	-0.003	1.000	290477		2.75(1.35-4.05)	100	307	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.350	2.351	-0.001	0.736	523298	2.33		99.7	1030	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.350	2.352	-0.002	1.143	127041	0.2302		98.6	609	
D 9 13C2 PFHxA										
315.00 > 270.00	2.396	2.394	0.002	0.751	6396944	2.56		103	2619	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.396	2.396	0.0	1.000	591553	0.2669	Target=13.92	107	227	
313.00 > 119.00	2.396	2.396	0.0	1.000	40431		14.63(6.96-20.87)	107	115	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.414	2.410	0.004	1.174	411331	0.2352	Target=2.30	100	750	
349.00 > 99.00	2.405	2.410	-0.005	1.170	203541		2.02(1.15-3.45)	100	581	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.512	2.512	0.0	1.000	125040	0.3187		127	80.7	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.512	2.512	0.0	0.787	457543	2.04		81.8	1000	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.786	2.790	-0.004	1.000	884057	0.2754	Target=4.34	110	275	
363.00 > 169.00	2.795	2.790	0.005	1.003	204384		4.33(2.17-6.52)	110	479	
D 16 13C4 PFHpA										
367.00 > 322.00	2.786	2.791	-0.005	0.873	7714710	2.52		101	3588	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.795	2.798	-0.003	1.000	600407	0.2184	Target=3.80	96.0	826	
399.00 > 99.00	2.795	2.798	-0.003	1.000	172085		3.49(1.90-5.70)	96.0	165	
D 17 18O2 PFHxS										
403.00 > 84.00	2.795	2.798	-0.003	0.876	5253989	2.42		102	2330	
19 DONA										
377.00 > 251.00	2.840	2.841	-0.001	0.796	1369019	0.2565	Target=2.26	109	2666	
377.00 > 85.00	2.840	2.841	-0.001	0.796	571940		2.39(1.13-3.39)	109	637	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.175	3.175	0.0	0.995	759948	2.51		106	1216	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.175	3.177	-0.002	1.000	158416	0.2345		98.9	245	
D 22 13C8 PFOA										
421.00 > 376.00	3.190	3.191	-0.001		6067101	2.57		105	2305	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.190	3.191	-0.001	0.894	549179	0.2249	Target=3.69	94.5	1039	
449.00 > 99.00	3.190	3.191	-0.001	0.894	134521		4.08(1.84-5.53)	94.5	599	
* 24 13C2 PFOA										
415.00 > 370.00	3.190	3.194	-0.004		6718606	2.50			2854	
D 25 13C4 PFOA										
417.00 > 372.00	3.190	3.195	-0.005	1.000	6694520	2.52		101	2455	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.190	3.195	-0.005	1.000	786276	0.2833	Target=2.72	113	120	
413.00 > 169.00	3.190	3.195	-0.005	1.000	263388		2.99(1.36-4.08)	113	538	
D 27 13C8 PFOS										
507.00 > 99.00	3.562	3.566	-0.004		1256011	2.51		105	1462	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.570	3.570	0.0	1.000	574710	0.2356	Target=4.08	102	536	
499.00 > 99.00	3.570	3.570	0.0	1.000	134116		4.29(2.04-6.12)	102	460	
D 28 13C4 PFOS										
503.00 > 80.00	3.570	3.571	-0.001	1.119	5531063	2.50		105	2743	
D 31 13C5 PFNA										
468.00 > 423.00	3.585	3.584	0.001	1.124	6359521	2.65		106	2876	
30 Perfluorononanoic acid										
463.00 > 419.00	3.585	3.586	-0.001	1.000	682695	0.2696	Target=5.35	108	99.9	
463.00 > 169.00	3.585	3.586	-0.001	1.000	114206		5.98(2.68-8.03)	108	365	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.770	3.774	-0.004	1.056	517478	0.2341		100	464	
D 33 13C8 FOSA										
506.00 > 78.00	3.887	3.891	-0.004	1.218	3846289	2.64		106	3949	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.895	3.894	0.001	1.002	1168208	0.2612		104	1810	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.921	3.919	0.001	1.098	322880	0.2385	Target=6.03	99.4	760	
549.00 > 99.00	3.921	3.919	0.001	1.098	52330		6.17(3.02-9.05)	99.4	225	
D 36 13C2 PFDA										
515.00 > 470.00	3.939	3.942	-0.003	1.235	6315840	2.69		108	3495	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.939	3.943	-0.004	1.000	797208	0.2747	Target=14.23	110	460	
513.00 > 169.00	3.948	3.943	0.005	1.002	56053		14.22(7.12-21.35)	110	83.6	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.939	3.946	-0.007	0.998	134797	0.2439		102	1011	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.948	3.947	0.001	1.237	93242	2.69		112	353	
47 MeFOSA										
512.00 > 169.00	4.020	4.005	0.015		685	NC			0.1	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.105	4.109	-0.004	1.287	1523768	2.48		99.3	1761	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.115	4.114	0.001	1.002	139018	0.2632		105	48.7	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.236	4.241	-0.005	1.187	490163	0.2422	Target=4.28	100	1427	
599.00 > 99.00	4.236	4.241	-0.005	1.187	101449		4.83(2.14-6.43)	100	315	
D 44 13C2 PFUnA										
565.00 > 520.00	4.262	4.266	-0.004	1.336	4738780	2.57		103	1935	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.262	4.270	-0.008	1.000	417423	0.2641	Target=10.48	106	116	
563.00 > 169.00	4.262	4.270	-0.008	1.000	42080		9.92(5.24-15.72)	106	151	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.271	4.272	-0.001	1.339	1364722	2.67		107	1514	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.279	4.278	0.001	1.002	114808	0.2540		102	517	
51 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.262	4.279	-0.017		1762	NC			0.1	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.404	4.407	-0.003	1.234	710802	0.2723		116	1309	
D 49 13C2 PFDoA										
615.00 > 570.00	4.559	4.560	-0.001	1.429	5949453	2.66		107	4349	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.559	4.561	-0.002	1.000	612702	0.2681	Target=9.37	107	241	
613.00 > 169.00	4.559	4.561	-0.002	1.000	63952		9.58(4.68-14.05)	107	264	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.575	4.578	-0.003	1.159	80516	0.2336		96.9	311	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.789	4.793	-0.004	1.342	50524	0.2404	Target=0.55	99.3	377	
699.00 > 99.00	4.789	4.793	-0.004	1.342	88200		0.57(0.28-0.83)	99.3	617	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.826	4.830	-0.004	1.059	456680	0.2528	Target=6.18	101	251	
663.00 > 169.00	4.826	4.830	-0.004	1.059	73572		6.21(3.09-9.27)	101	375	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.076	5.080	-0.004	1.591	4135735	2.67		107	4975	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.076	5.080	-0.004	1.000	68013	0.2518	Target=1.39	101	376	
713.00 > 219.00	5.068	5.080	-0.012	0.998	47025		1.45(0.70-2.09)	101	294	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.545	5.545	0.0	1.738	3841385	2.65		106	3812	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.545	5.546	-0.001	1.000	371366	0.2492	Target=5.55	99.7	31.1	
813.00 > 169.00	5.545	5.546	-0.001	1.000	64354		5.77(2.77-8.32)	99.7	367	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.055	6.053	0.002	1.092	238017	0.2509	Target=5.09	100	69.2	
913.00 > 169.00	6.050	6.053	-0.003	1.091	44135		5.39(2.55-7.64)	100	342	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL3_00009 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:29:56 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._004.d

Injection Date: 08-Jan-2019 17:56:13 Instrument ID: A9

Lims ID: IC L3 Full

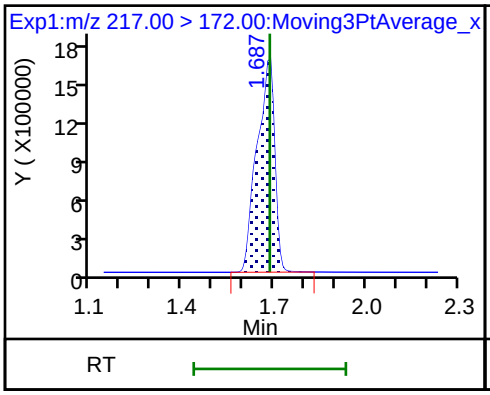
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 12 Worklist Smp#: 4

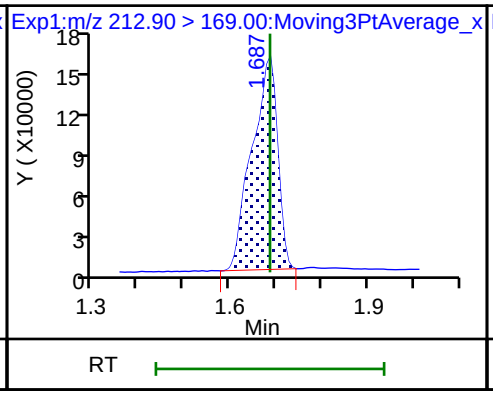
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

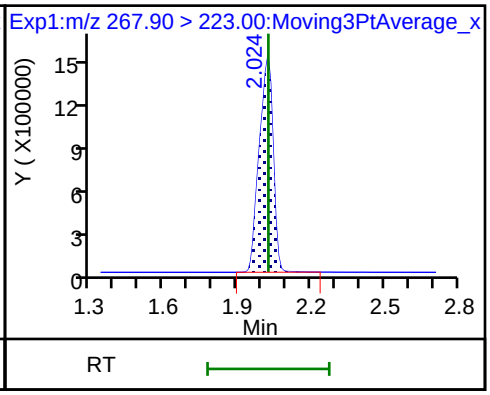
D 1 13C4 PFBA



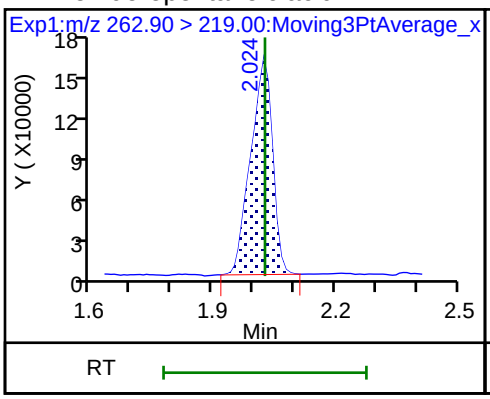
2 Perfluorobutanoic acid



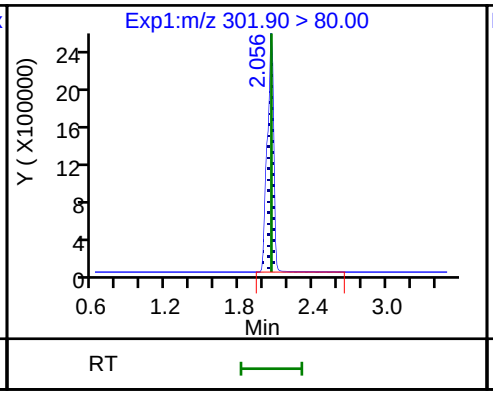
D 3 13C5 PFPeA



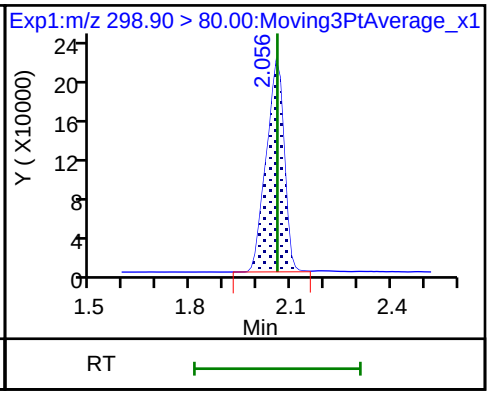
4 Perfluoropentanoic acid



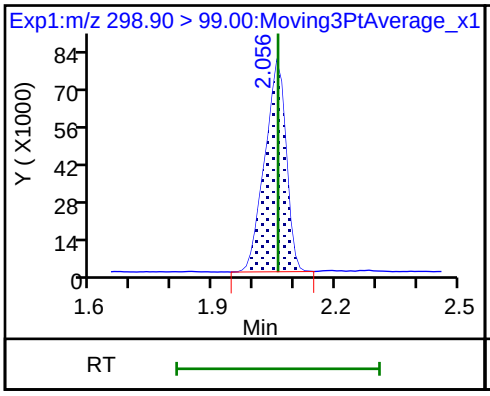
D 5 13C3 PFBS



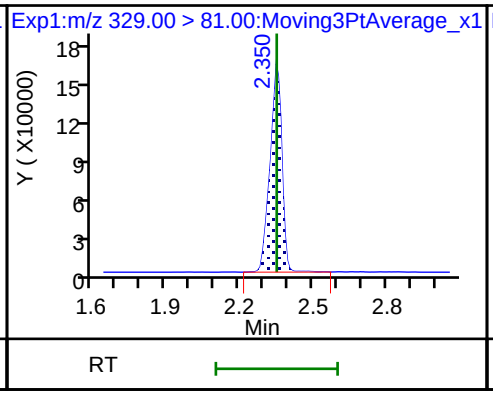
6 Perfluorobutanesulfonic acid



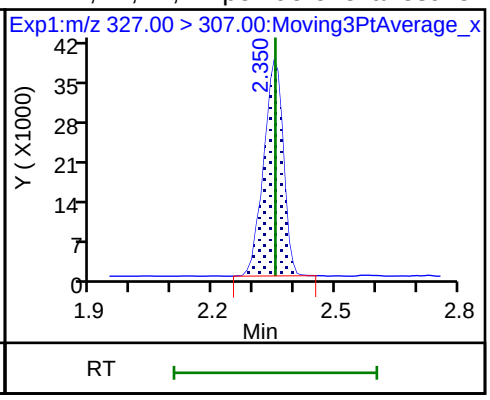
6 Perfluorobutanesulfonic acid



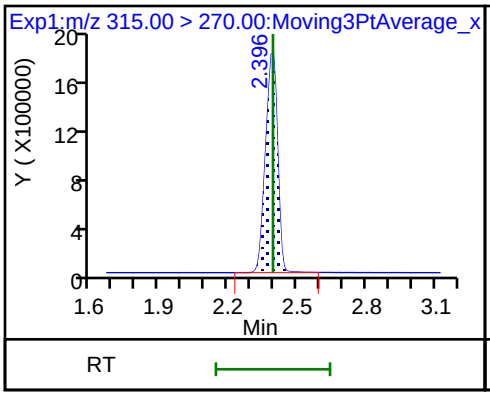
D 8 M2-4:2 FTS



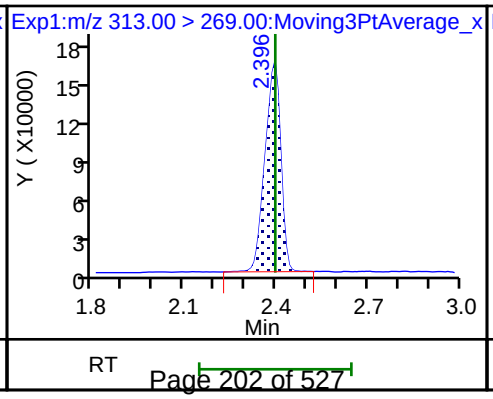
7 1H,1H,2H,2H-perfluorohexanesulfoni



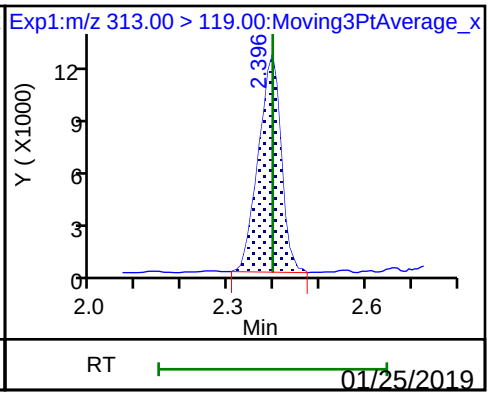
D 9 13C2 PFHxA



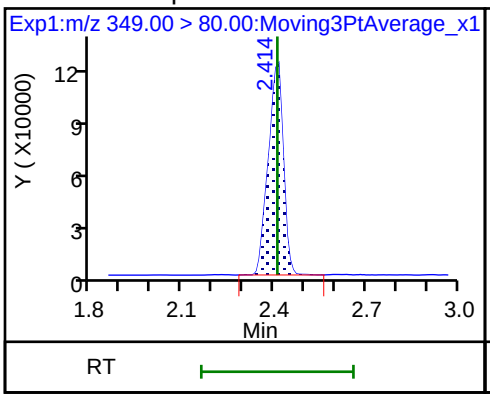
10 Perfluorohexanoic acid



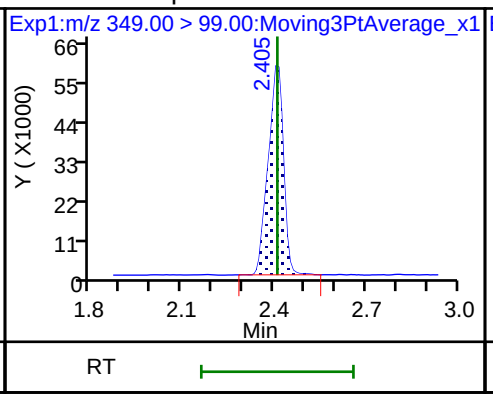
10 Perfluorohexanoic acid



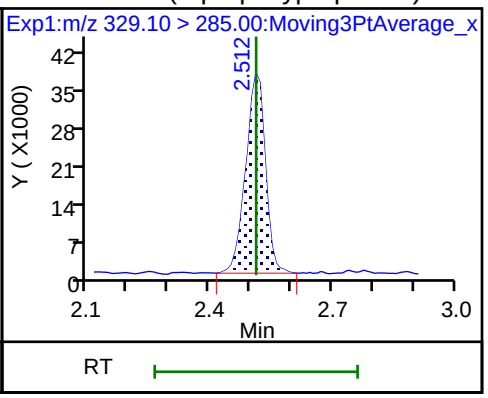
11 Perfluoropentanesulfonic acid



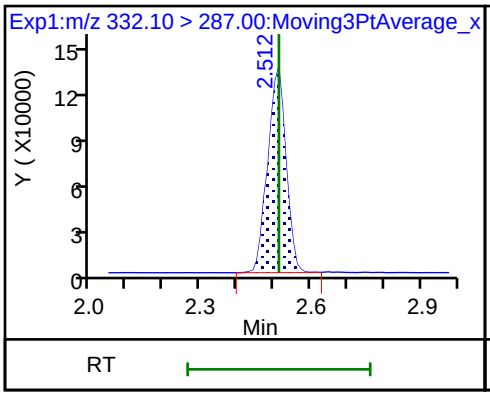
11 Perfluoropentanesulfonic acid



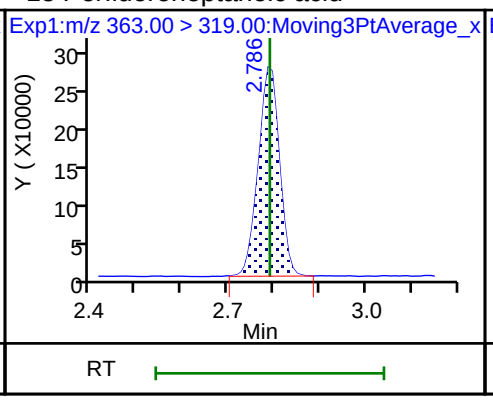
14 Perfluoro(2-propoxypropanoic) acid



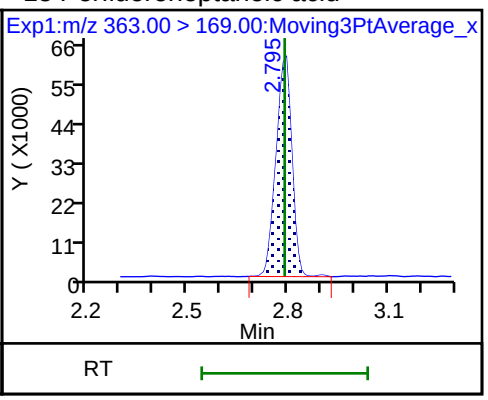
D 13 13C3 HFPO-DA



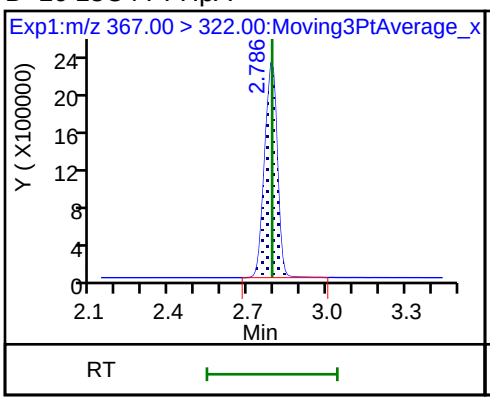
15 Perfluoroheptanoic acid



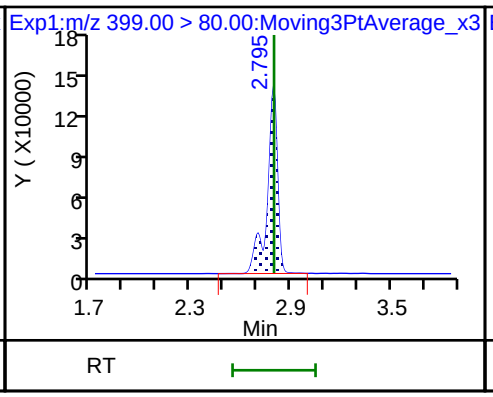
15 Perfluoroheptanoic acid



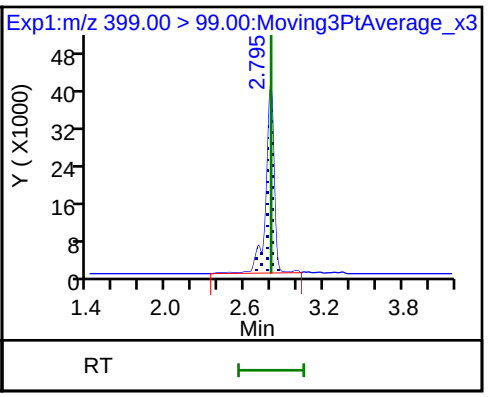
D 16 13C4 PFHpA



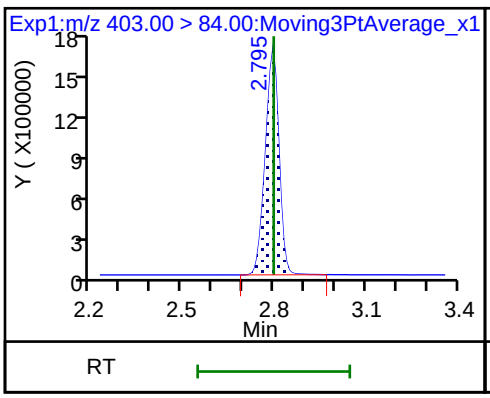
18 Perfluorohexanesulfonic acid



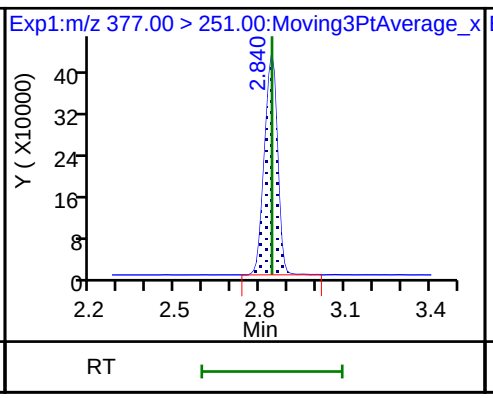
18 Perfluorohexanesulfonic acid



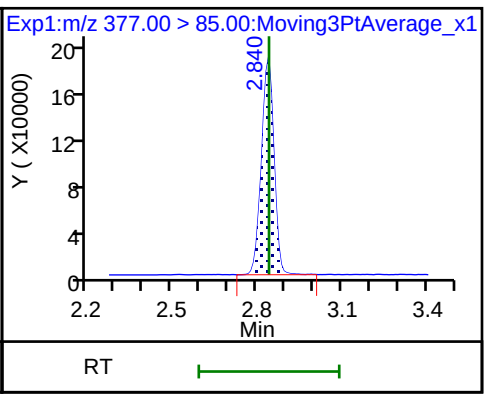
D 17 18O2 PFHxS



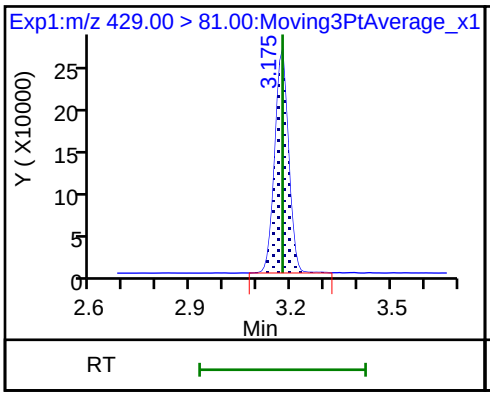
19 DONA



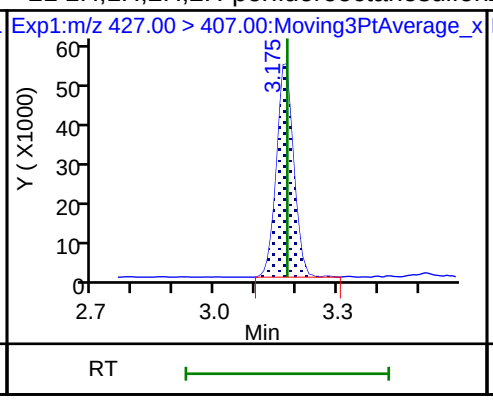
19 DONA



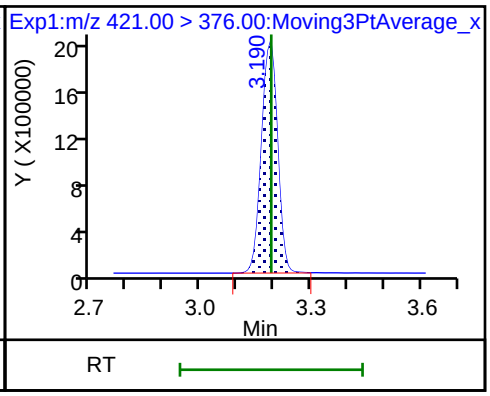
D 20 M2-6:2 FTS



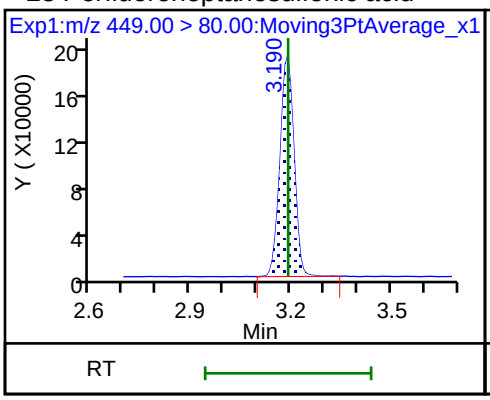
21 1H,1H,2H,2H-perfluorooctanesulfon



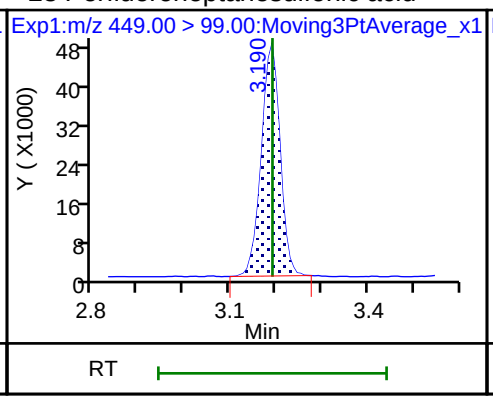
D 22 13C8 PFOA



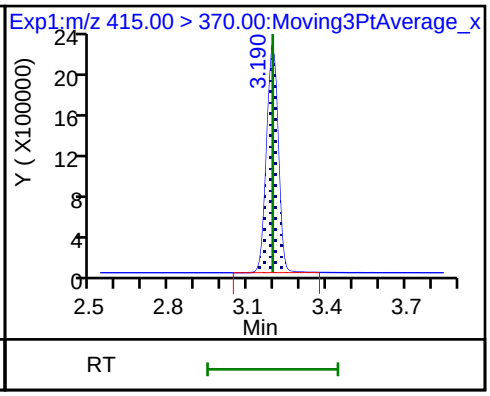
23 Perfluoroheptanesulfonic acid



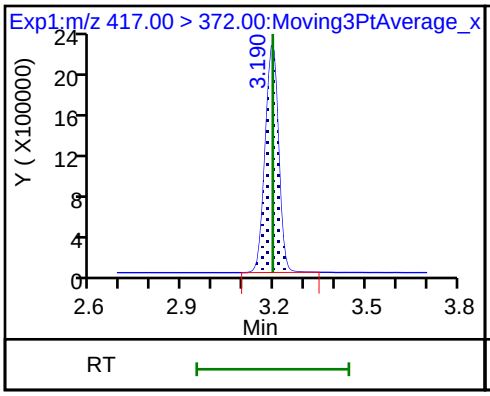
23 Perfluoroheptanesulfonic acid



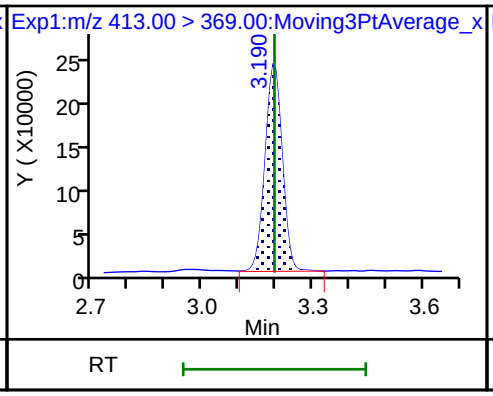
* 24 13C2 PFOA



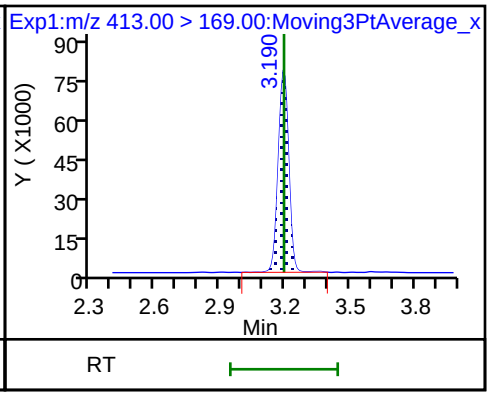
D 25 13C4 PFOA



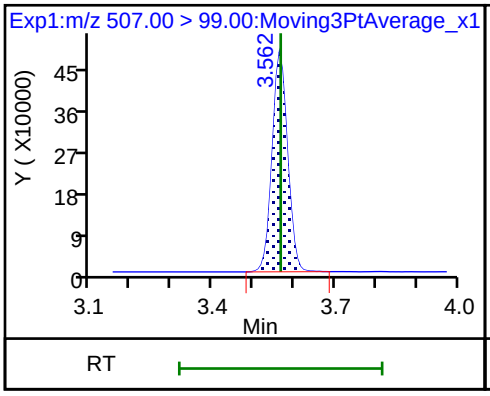
26 Perfluorooctanoic acid



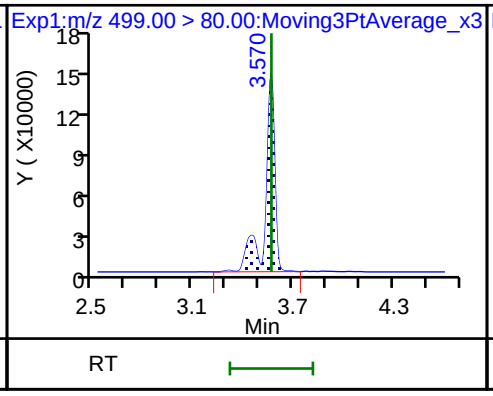
26 Perfluorooctanoic acid



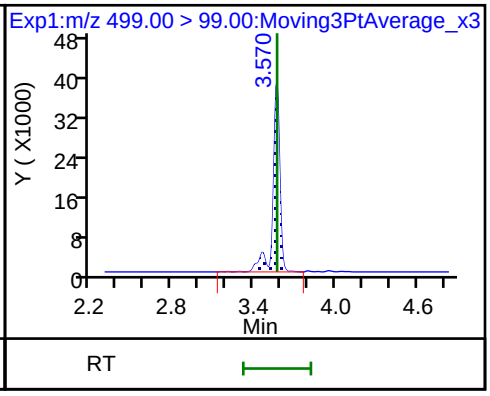
D 27 13C8 PFOS



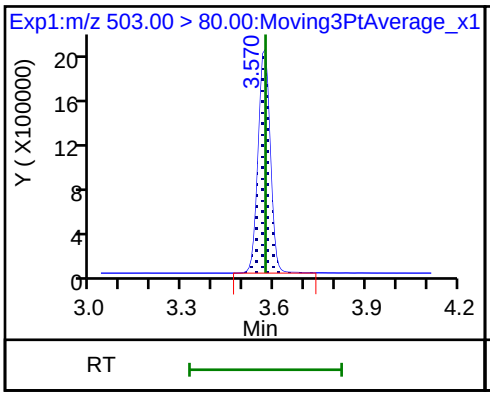
29 Perfluorooctanesulfonic acid



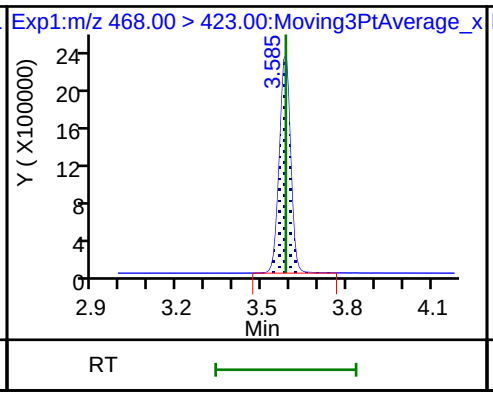
29 Perfluorooctanesulfonic acid



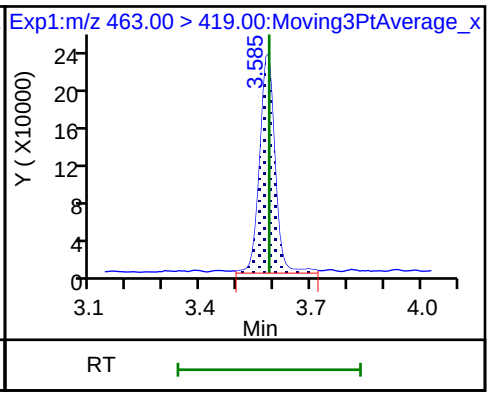
D 28 13C4 PFOS



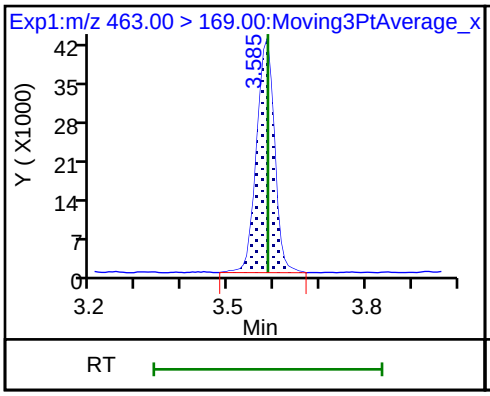
D 31 13C5 PFNA



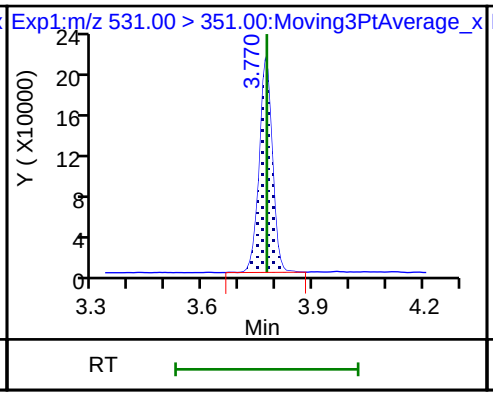
30 Perfluorononanoic acid



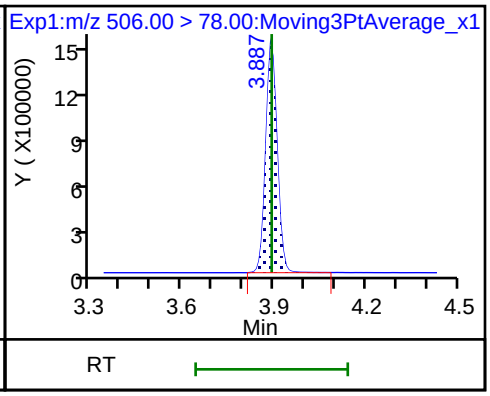
30 Perfluorononanoic acid



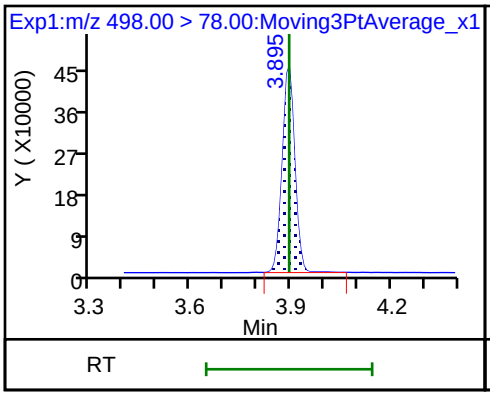
32 9-Chlorohexadecafluoro-3-oxanonane



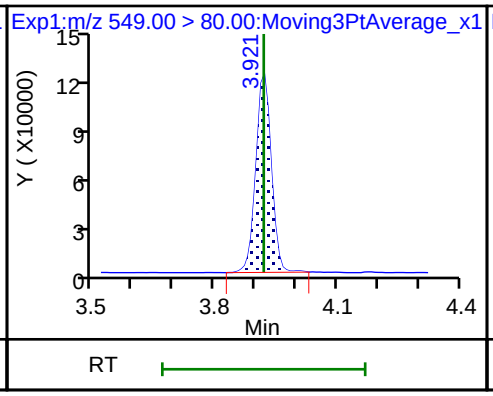
D 33 13C8 FOSA



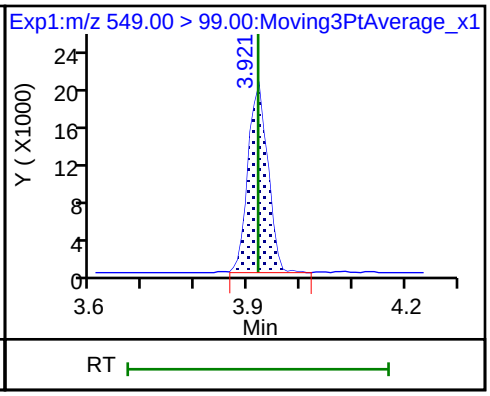
34 Perfluorooctanesulfonamide



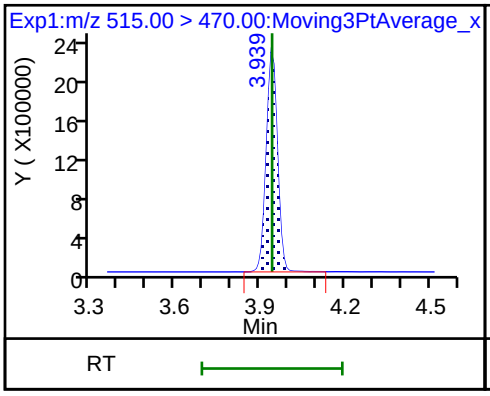
35 Perfluorononanesulfonic acid



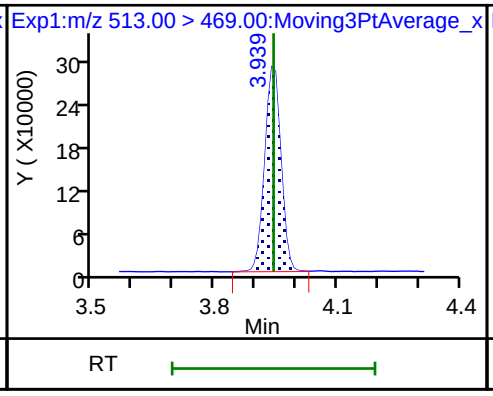
35 Perfluorononanesulfonic acid



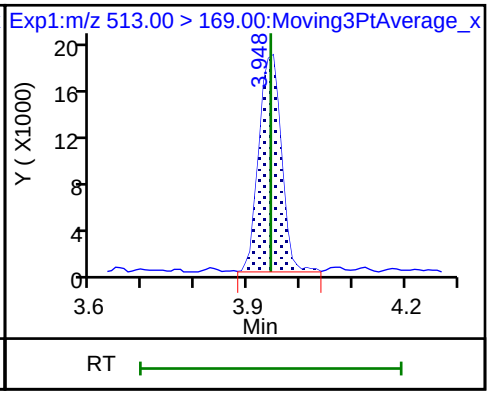
D 36 13C2 PFDA



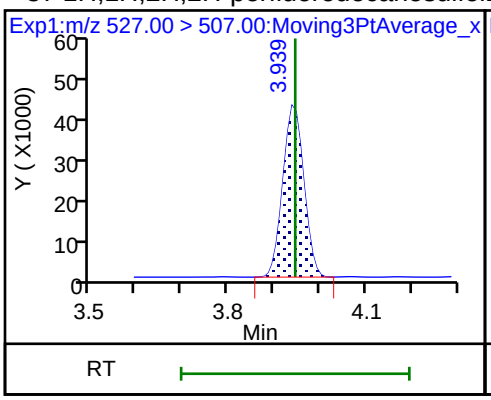
38 Perfluorodecanoic acid



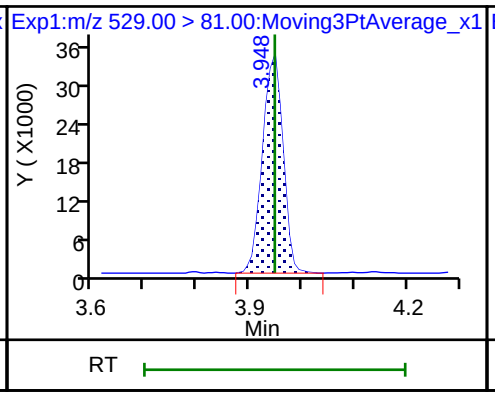
38 Perfluorodecanoic acid



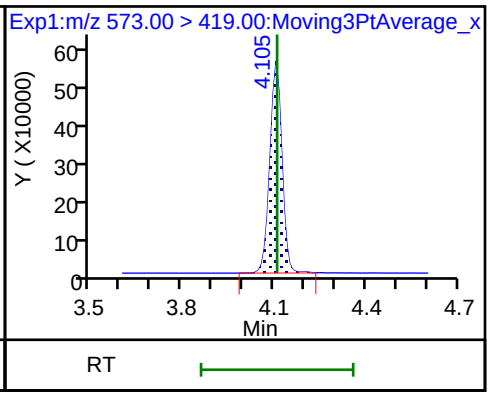
37 1H,1H,2H,2H-perfluorodecanesulfon



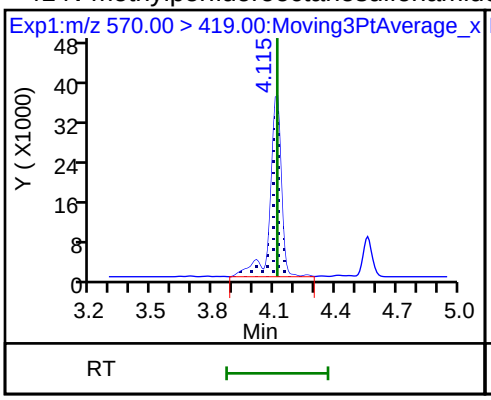
D 39 M2-8:2 FTS



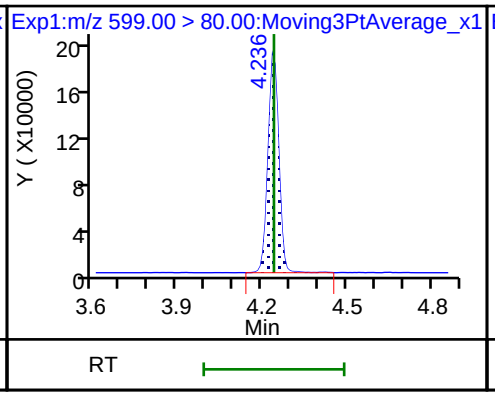
D 40 d3-NMeFOSAA



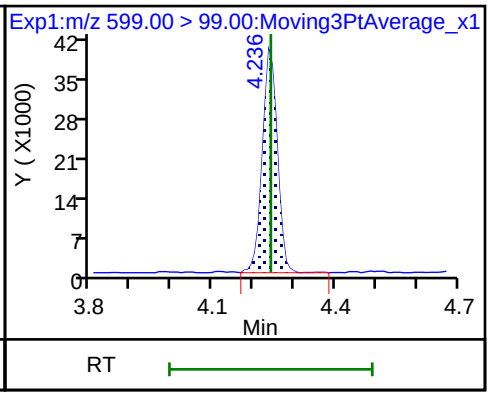
41 N-methylperfluorooctanesulfonamido



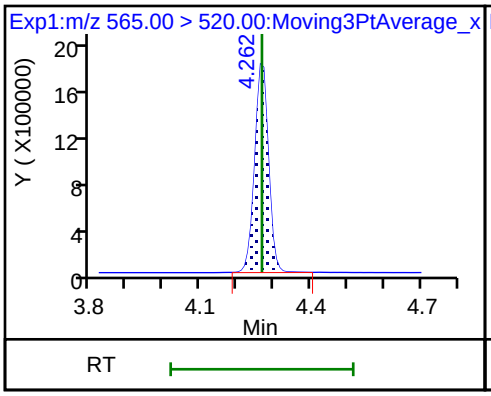
42 Perfluorodecanesulfonic acid



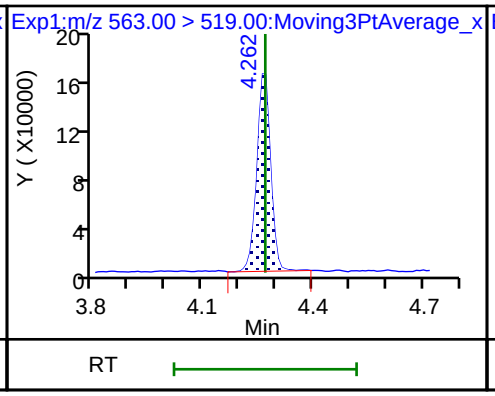
42 Perfluorodecanesulfonic acid



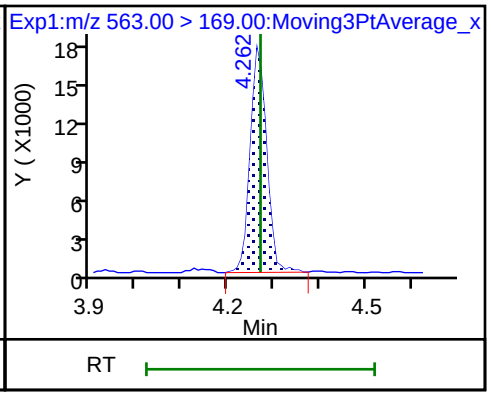
D 44 13C2 PFUnA



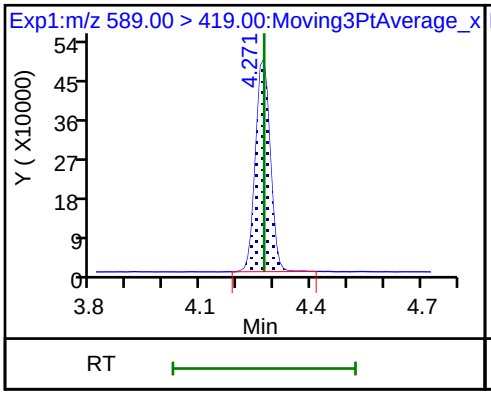
43 Perfluoroundecanoic acid



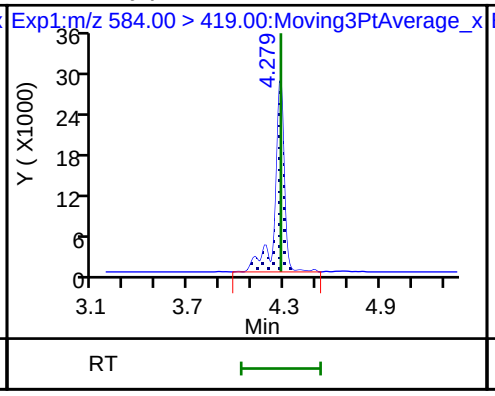
43 Perfluoroundecanoic acid



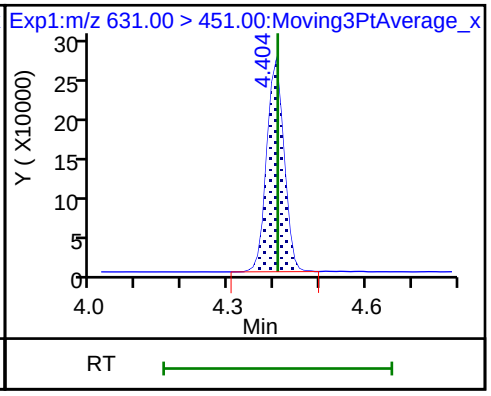
D 45 d5-NEtFOSAA



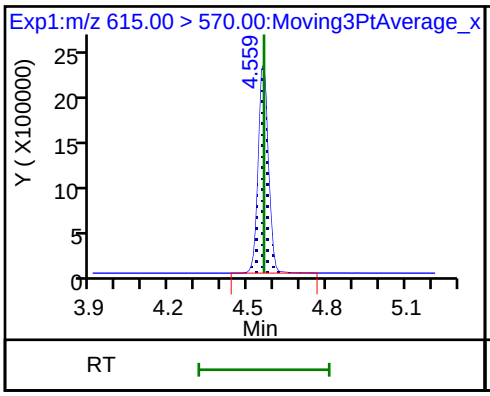
46 N-ethylperfluorooctanesulfonamidoa



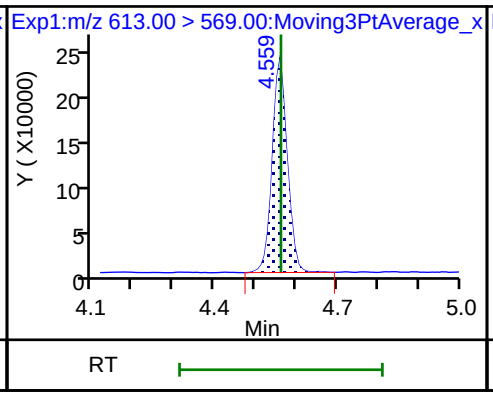
48 11-Chloroeicosafluoro-3-oxaundecan



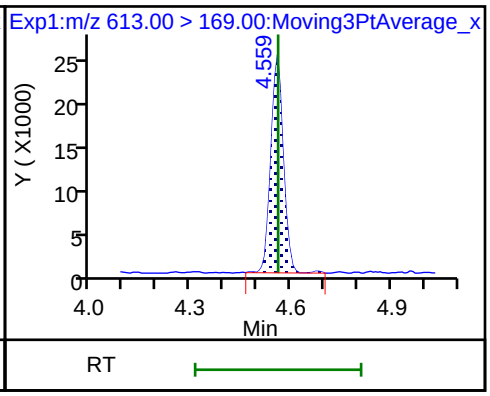
D 49 13C2 PFDoA



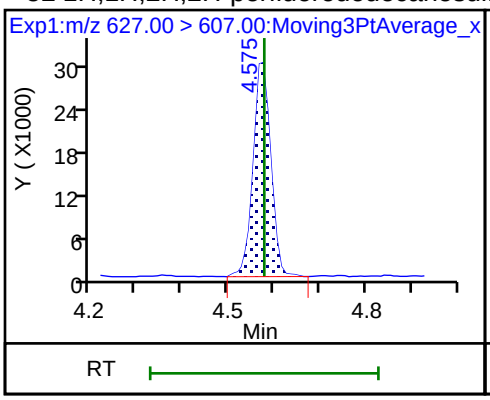
50 Perfluorododecanoic acid



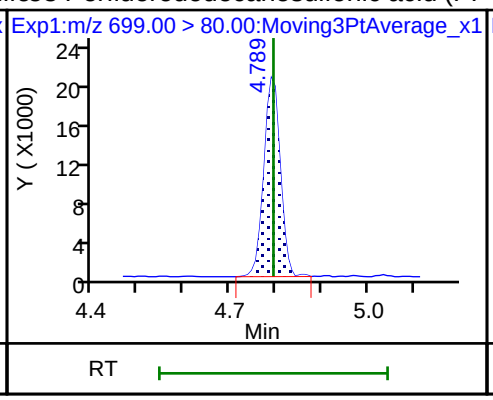
50 Perfluorododecanoic acid



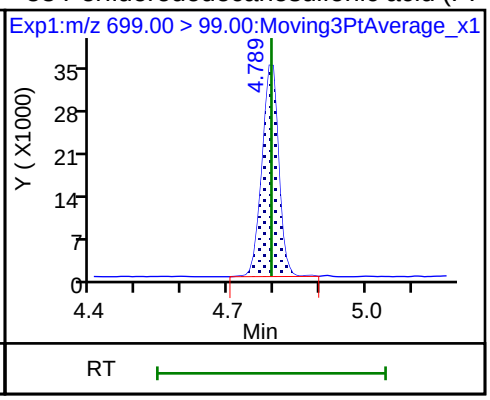
52 1H,1H,2H-perfluorododecanesulfo



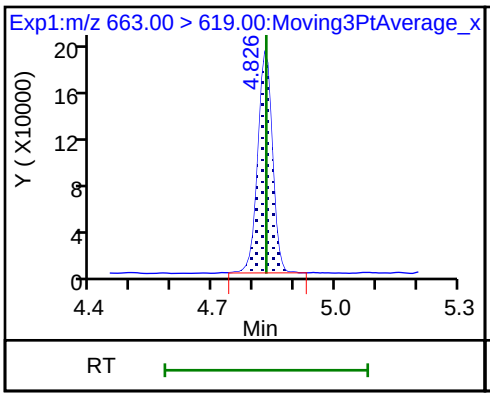
53 Perfluorododecanesulfonic acid (PF



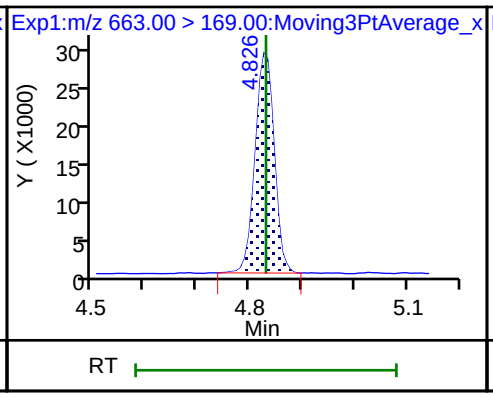
53 Perfluorododecanesulfonic acid (PF



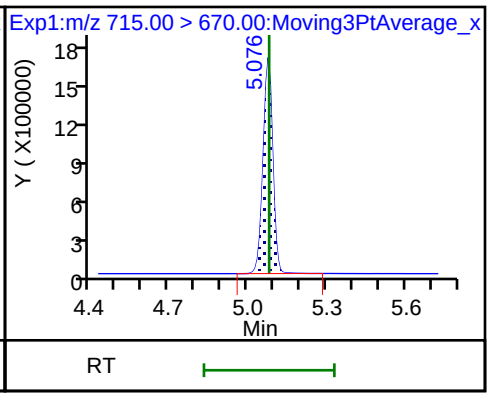
54 Perfluorotridecanoic acid



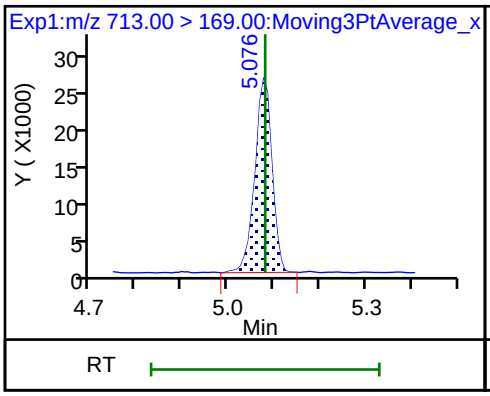
54 Perfluorotridecanoic acid



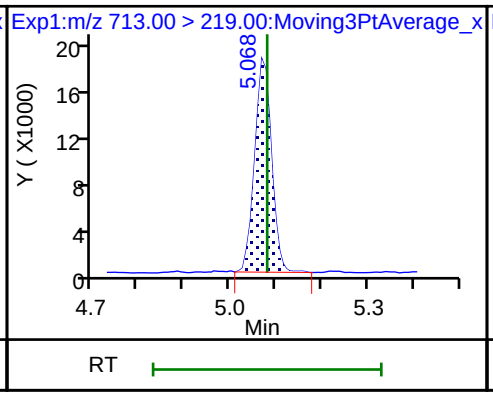
D 55 13C2 PFTeDA



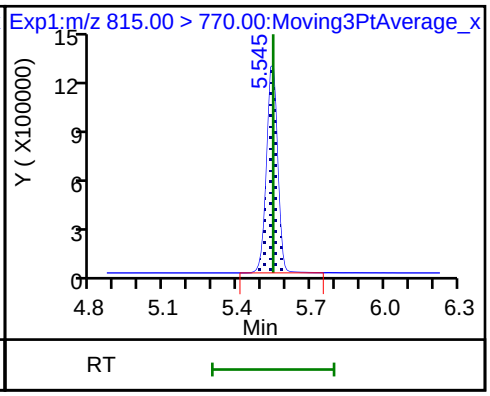
56 Perfluorotetradecanoic acid



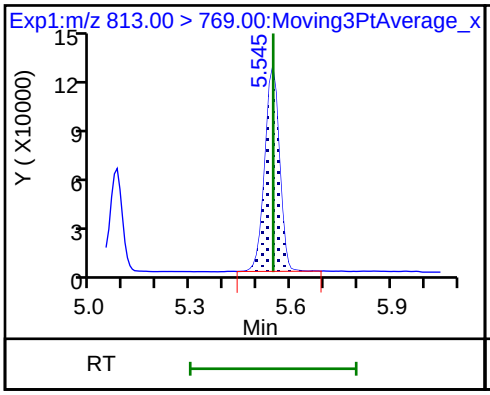
56 Perfluorotetradecanoic acid



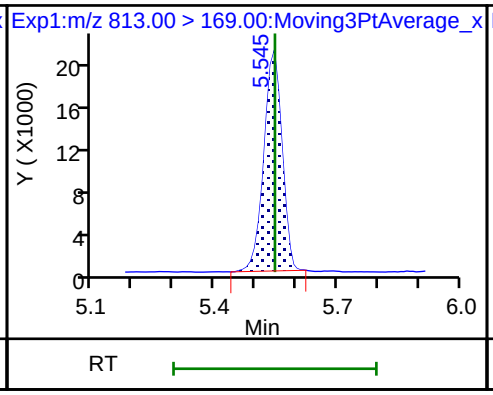
D 57 13C2 PFHxDA



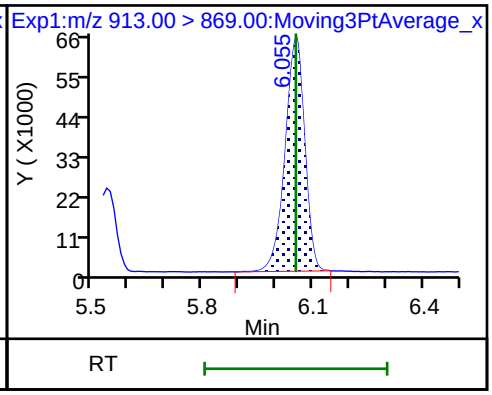
58 Perfluorohexadecanoic acid



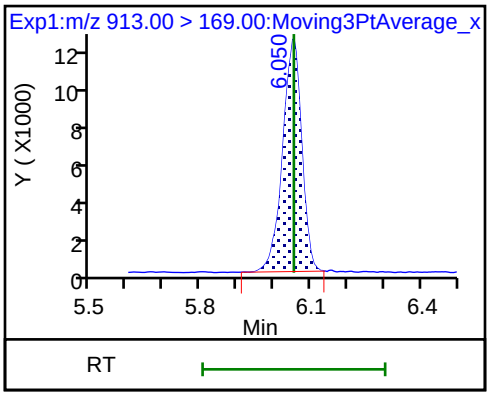
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._005.d
Lims ID: IC L4 Full
Client ID:
Sample Type: ICIS Calib Level: 4
Inject. Date: 08-Jan-2019 18:03:43 ALS Bottle#: 13 Worklist Smp#: 5
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CAL STD4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub5

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:25:31 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 08:05:12
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.679	1.685	-0.006	0.527	6570522	2.43		97.3	11764	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.679	1.686	-0.007	1.000	2438059	1.00		100	242	
D 3 13C5 PFPeA										
267.90 > 223.00	2.014	2.025	-0.011	0.632	5788060	2.45		98.0	5089	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.024	2.027	-0.003	1.005	2272772	0.9815		98.2	127	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.059	-0.003	0.645	8819314	2.27		97.8	323840	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.056	2.059	-0.003	1.000	3218990	0.8795	Target=2.70	99.5	2396	
298.90 > 99.00	2.056	2.059	-0.003	1.000	1125388		2.86(1.35-4.05)	99.5	1020	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.347	2.351	-0.004	0.736	544735	2.30		98.6	742	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.347	2.352	-0.005	1.141	539183	0.9607		103	1119	
D 9 13C2 PFHxA										
315.00 > 270.00	2.393	2.394	-0.001	0.751	6555817	2.50		99.9	2931	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.393	2.396	-0.003	1.000	2166231	0.9538	Target=13.92	95.4	720	
313.00 > 119.00	2.393	2.396	-0.003	1.000	155960		13.89(6.96-20.87)	95.4	353	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.402	2.410	-0.008	1.168	1670078	0.9391	Target=2.30	100	1985	
349.00 > 99.00	2.402	2.410	-0.008	1.168	730749		2.29(1.15-3.45)	100	1413	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.508	2.512	-0.004	1.000	432728	0.9031		90.3	285	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.508	2.512	-0.004	0.787	558716	2.37		94.9	1531	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.791	2.790	0.001	1.000	3248928	0.9605	Target=4.34	96.1	843	
363.00 > 169.00	2.782	2.790	-0.008	0.997	700005		4.64(2.17-6.52)	96.1	917	
D 16 13C4 PFHpA										
367.00 > 322.00	2.791	2.791	0.0	0.876	8127431	2.52		101	2807	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.791	2.798	-0.007	1.000	2249179	0.8445	Target=3.80	92.8	2565	
399.00 > 99.00	2.791	2.798	-0.007	1.000	644147		3.49(1.90-5.70)	92.8	539	
D 17 18O2 PFHxS										
403.00 > 84.00	2.791	2.798	-0.007	0.876	5091123	2.23		94.3	2727	
19 DONA										
377.00 > 251.00	2.836	2.841	-0.005	0.795	5353298	1.00	Target=2.26	106	2688	
377.00 > 85.00	2.836	2.841	-0.005	0.795	2228402		2.40(1.13-3.39)	106	1940	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.165	3.175	-0.010	0.993	759427	2.39		101	1558	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.173	3.177	-0.005	1.002	620308	0.9187		96.9	725	
D 22 13C8 PFOA										
421.00 > 376.00	3.188	3.191	-0.003		6270444	2.65		108	3342	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.188	3.191	-0.003	0.894	2357796	0.9625	Target=3.69	101	1915	
449.00 > 99.00	3.188	3.191	-0.003	0.894	553595		4.26(1.84-5.53)	101	1339	
* 24 13C2 PFOA										
415.00 > 370.00	3.188	3.194	-0.006		7071404	2.50			2958	
D 25 13C4 PFOA										
417.00 > 372.00	3.188	3.195	-0.007	1.000	6970295	2.49		99.6	3151	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.188	3.195	-0.007	1.000	2985282	1.03	Target=2.72	103	468	
413.00 > 169.00	3.188	3.195	-0.007	1.000	1078692		2.77(1.36-4.08)	103	1471	
D 27 13C8 PFOS										
507.00 > 99.00	3.559	3.566	-0.007		1235564	2.47		103	1683	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.567	3.570	-0.003	1.000	2123428	0.8679	Target=4.08	93.5	1850	
499.00 > 99.00	3.567	3.570	-0.003	1.000	493081		4.31(2.04-6.12)	93.5	943	
D 28 13C4 PFOS										
503.00 > 80.00	3.567	3.571	-0.004	1.119	5548735	2.38		99.7	3059	
D 31 13C5 PFNA										
468.00 > 423.00	3.574	3.584	-0.010	1.121	6266243	2.48		99.4	2664	
30 Perfluorononanoic acid										
463.00 > 419.00	3.582	3.586	-0.004	1.002	2487789	1.00	Target=5.35	99.7	362	
463.00 > 169.00	3.574	3.586	-0.012	1.000	449206		5.54(2.68-8.03)	99.7	885	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.768	3.774	-0.006	1.056	1978172	0.8919		95.7	1332	
D 33 13C8 FOSA										
506.00 > 78.00	3.885	3.891	-0.006	1.219	3914468	2.55		102	3155	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.893	3.894	-0.001	1.002	4600640	1.01		101	2701	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.918	3.919	-0.001	1.099	1309092	0.9638	Target=6.03	100	1720	
549.00 > 99.00	3.918	3.919	-0.001	1.099	207210		6.32(3.02-9.05)	100	883	
D 36 13C2 PFDA										
515.00 > 470.00	3.936	3.942	-0.006	1.235	6254581	2.54		101	3718	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.945	3.943	0.002	1.002	2888851	1.01	Target=14.23	101	1219	
513.00 > 169.00	3.936	3.943	-0.007	1.000	194924		14.82(7.12-21.35)	101	401	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.945	3.946	-0.001	1.002	470274	0.9464		98.8	1787	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.936	3.947	-0.011	1.235	83823	2.29		95.8	292	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.102	4.109	-0.007	1.287	1568547	2.43		97.1	2705	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.112	4.114	-0.002	1.002	525573	0.9668		96.7	75.1	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.242	4.241	0.001	1.189	1898813	0.9352	Target=4.28	97.0	2438	
599.00 > 99.00	4.233	4.241	-0.008	1.187	397372		4.78(2.14-6.43)	97.0	883	
D 44 13C2 PFUnA										
565.00 > 520.00	4.268	4.266	0.002	1.339	4844062	2.50		99.9	2848	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.268	4.270	-0.002	1.000	1546932	0.9575	Target=10.48	95.8	389	
563.00 > 169.00	4.268	4.270	-0.002	1.000	162132		9.54(5.24-15.72)	95.8	449	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.268	4.272	-0.004	1.339	1318160	2.45		97.9	1424	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.276	4.278	-0.002	1.002	419985	0.9621		96.2	724	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.401	4.407	-0.006	1.234	2533141	0.9674		103	2907	
D 49 13C2 PFDoA										
615.00 > 570.00	4.557	4.560	-0.003	1.429	5738372	2.44		97.6	3062	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.557	4.561	-0.004	1.000	2127815	0.9653	Target=9.37	96.5	705	
613.00 > 169.00	4.557	4.561	-0.004	1.000	223358		9.53(4.68-14.05)	96.5	588	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.573	4.578	-0.005	1.162	305065	0.9846		102	1053	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.787	4.793	-0.006	1.342	189948	0.9008	Target=0.55	93.1	1178	
699.00 > 99.00	4.796	4.793	0.003	1.344	349378		0.54(0.28-0.83)	93.1	1049	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.825	4.830	-0.005	1.059	1663999	0.9550	Target=6.18	95.5	806	
663.00 > 169.00	4.825	4.830	-0.005	1.059	290611		5.73(3.09-9.27)	95.5	1283	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.075	5.080	-0.005	1.592	3993820	2.45		98.0	5261	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.075	5.080	-0.005	1.000	240020	0.9201	Target=1.39	92.0	994	
713.00 > 219.00	5.075	5.080	-0.005	1.000	170356		1.41(0.70-2.09)	92.0	889	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.543	5.545	-0.002	1.739	3611152	2.37		94.8	2983	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.543	5.546	-0.003	1.000	1320289	1.01	Target=5.55	101	113	
813.00 > 169.00	5.543	5.546	-0.003	1.000	231123		5.71(2.77-8.32)	101	986	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.050	6.053	-0.003	1.091	881489	0.9886	Target=5.09	98.9	251	
913.00 > 169.00	6.050	6.053	-0.003	1.091	167525		5.26(2.55-7.64)	98.9	897	

Reagents:

LCPFC_LL4_00010 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:25:33 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._005.d

Injection Date: 08-Jan-2019 18:03:43 Instrument ID: A9

Lims ID: IC L4 Full

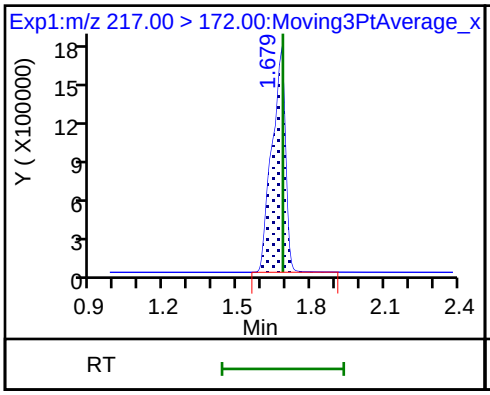
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 13 Worklist Smp#: 5

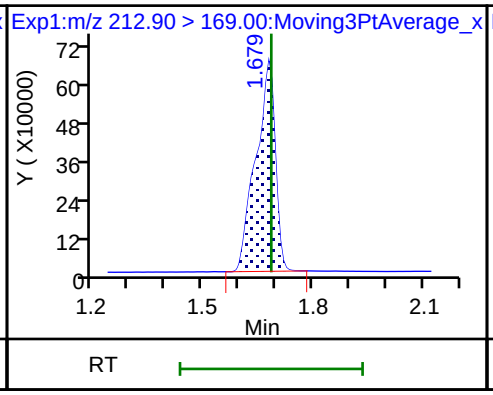
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

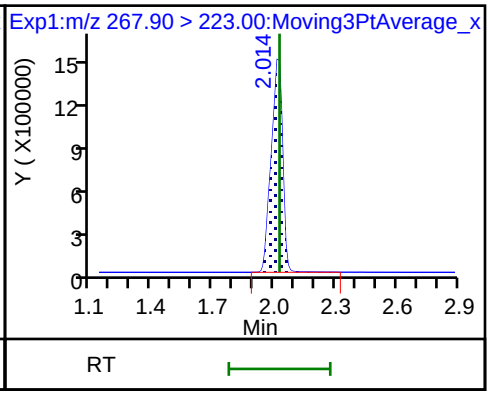
D 1 13C4 PFBA



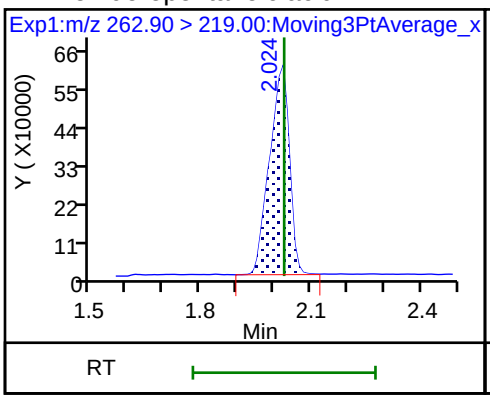
2 Perfluorobutanoic acid



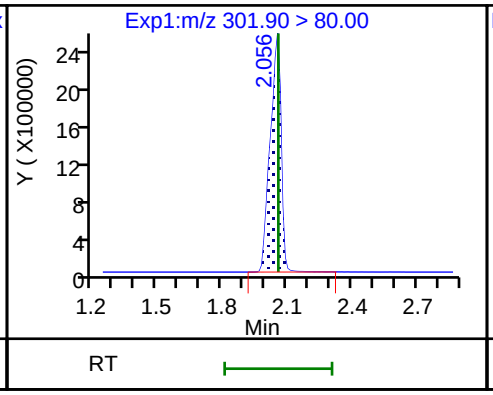
D 3 13C5 PFPeA



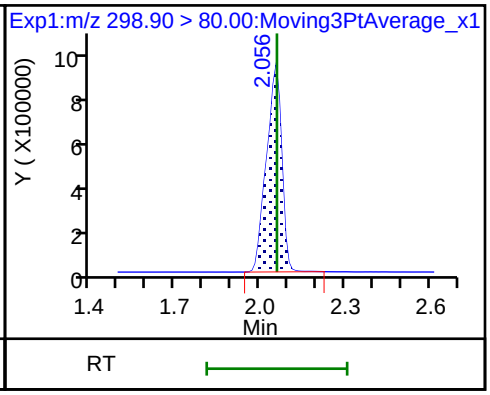
4 Perfluoropentanoic acid



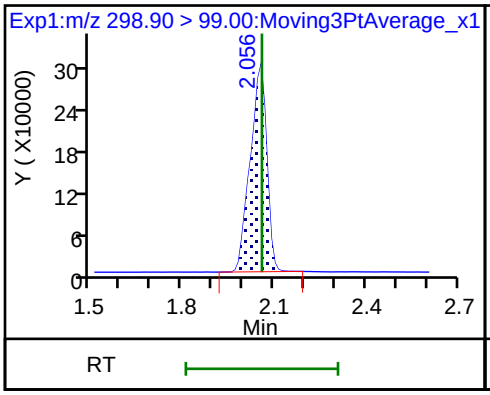
D 5 13C3 PFBS



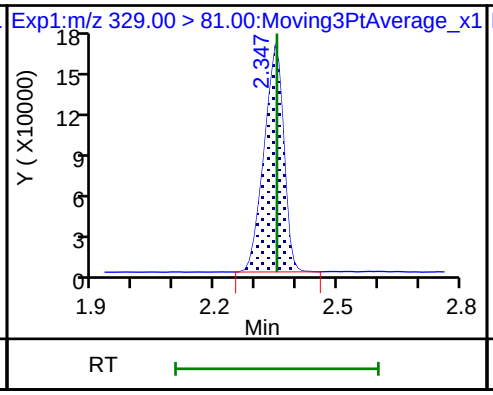
6 Perfluorobutanesulfonic acid



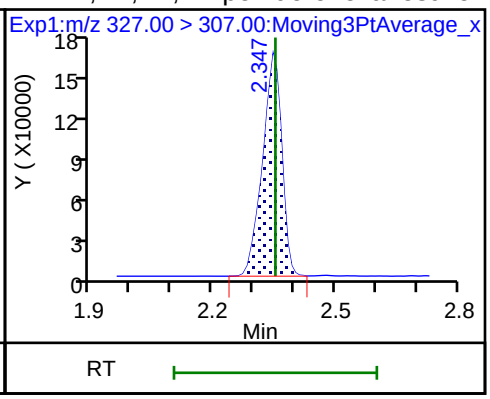
6 Perfluorobutanesulfonic acid



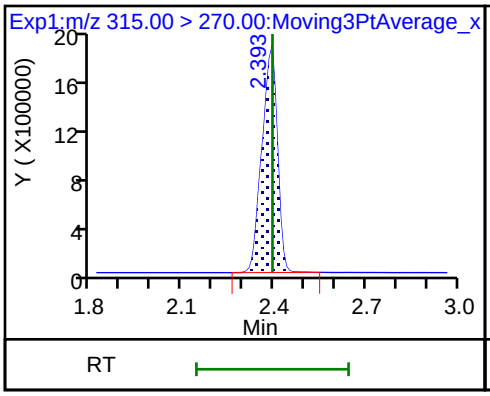
D 8 M2-4:2 FTS



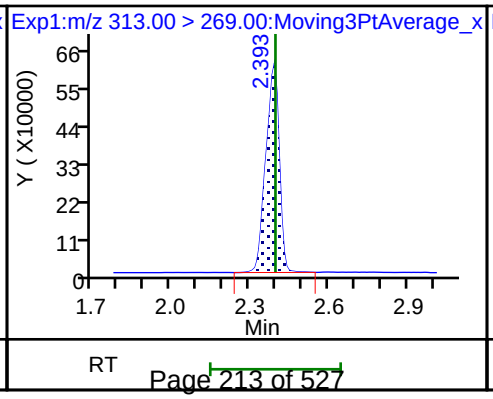
7 1H,1H,2H,2H-perfluorohexanesulfoni



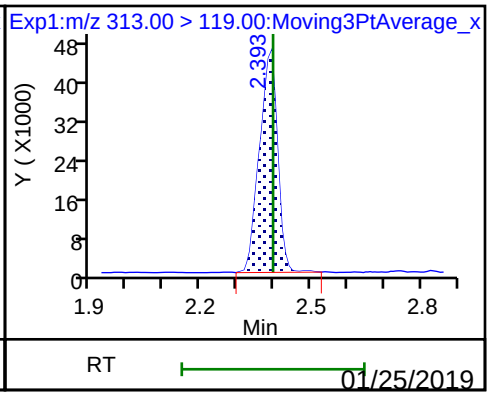
D 9 13C2 PFHxA



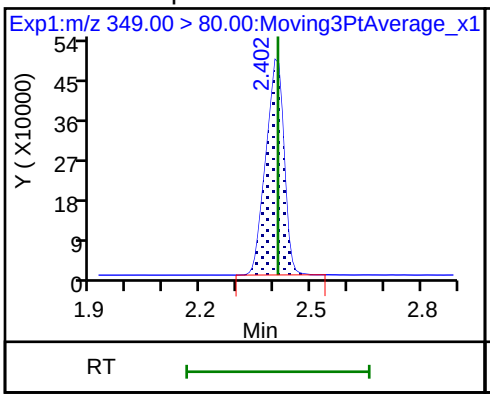
10 Perfluorohexanoic acid



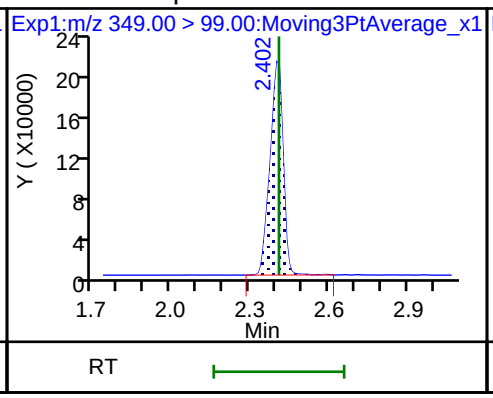
10 Perfluorohexanoic acid



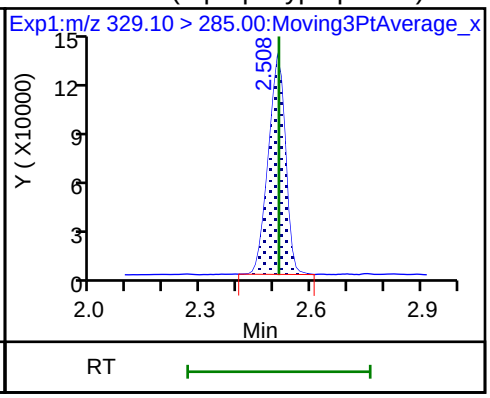
11 Perfluoropentanesulfonic acid



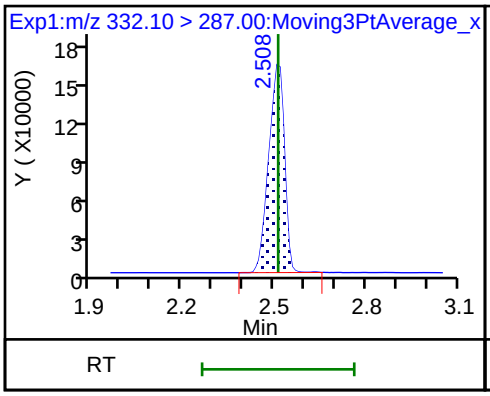
11 Perfluoropentanesulfonic acid



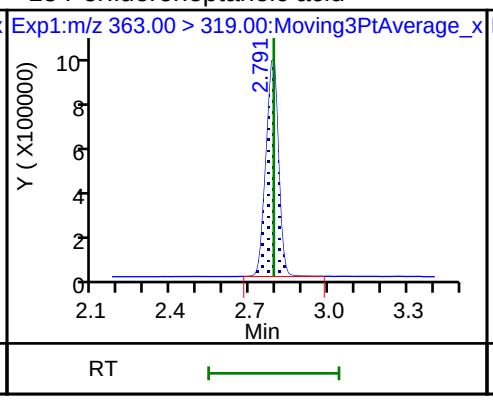
14 Perfluoro(2-propoxypropanoic) acid



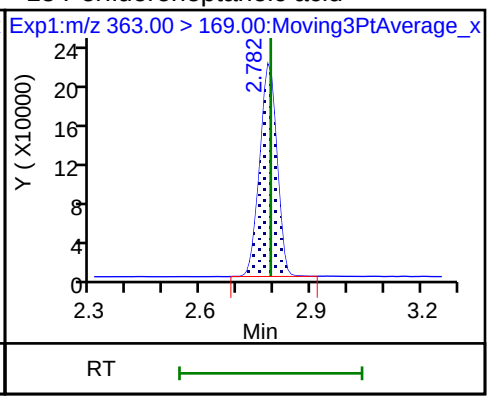
D 13 13C3 HFPO-DA



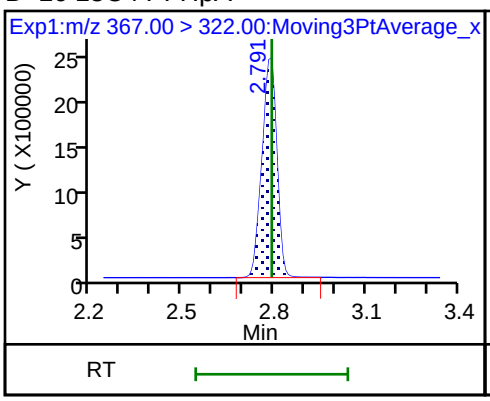
15 Perfluoroheptanoic acid



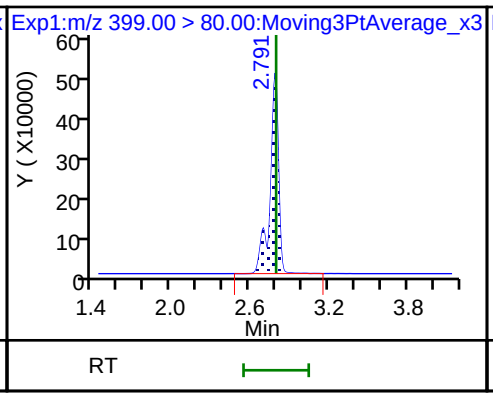
15 Perfluoroheptanoic acid



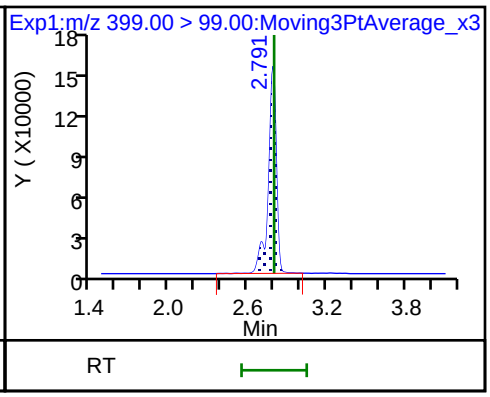
D 16 13C4 PFHpA



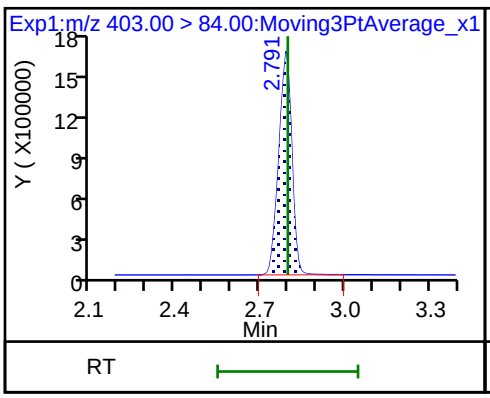
18 Perfluorohexanesulfonic acid



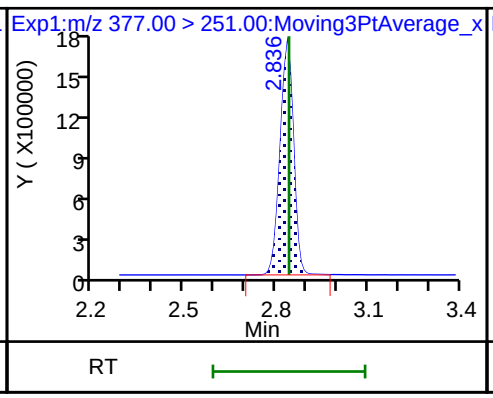
18 Perfluorohexanesulfonic acid



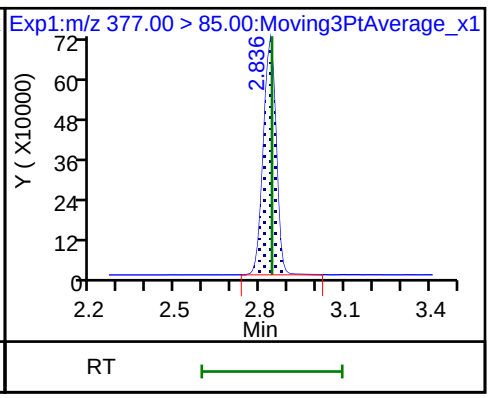
D 17 18O2 PFHxS



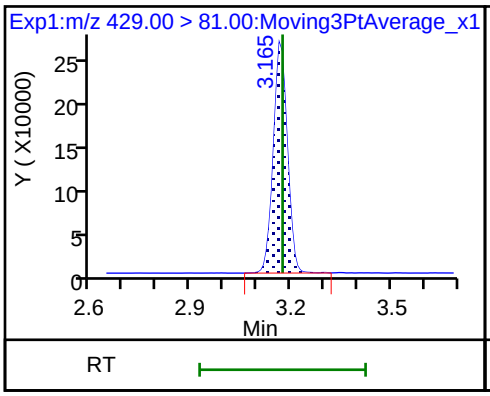
19 DONA



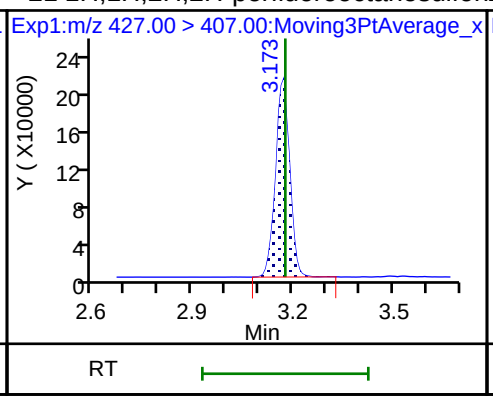
19 DONA



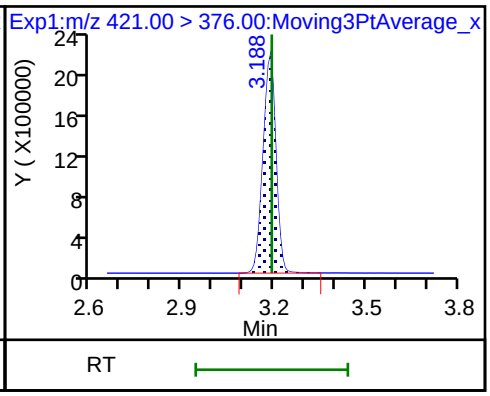
D 20 M2-6:2 FTS



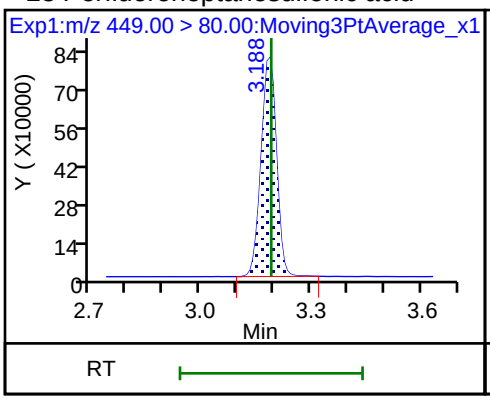
21 1H,1H,2H,2H-perfluorooctanesulfon



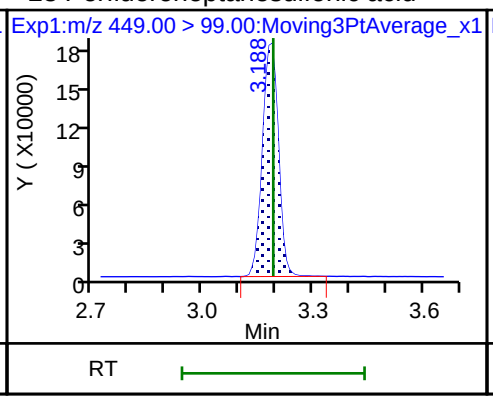
D 22 13C8 PFOA



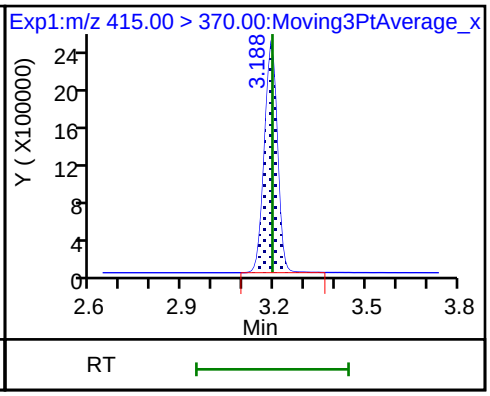
23 Perfluoroheptanesulfonic acid



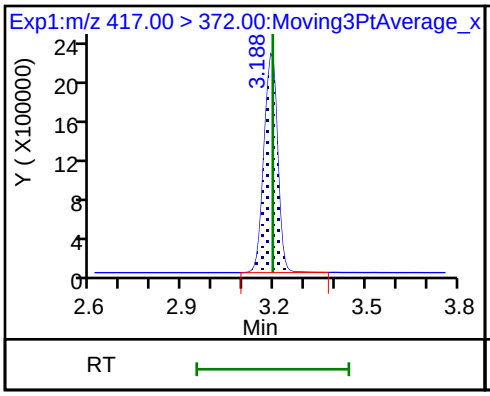
23 Perfluoroheptanesulfonic acid



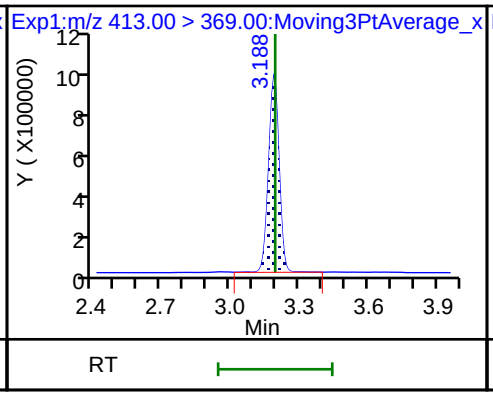
* 24 13C2 PFOA



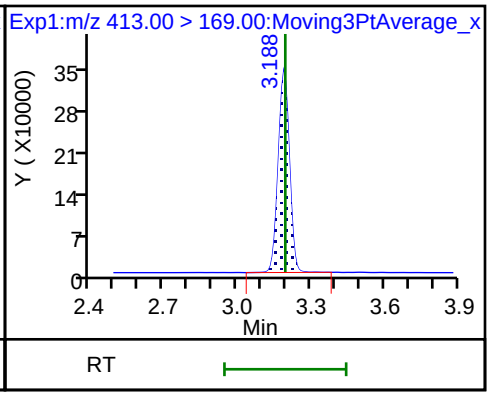
D 25 13C4 PFOA



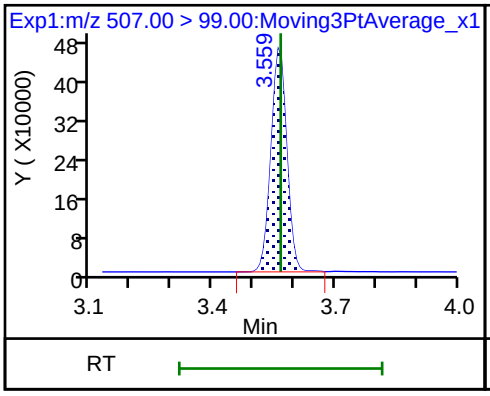
26 Perfluorooctanoic acid



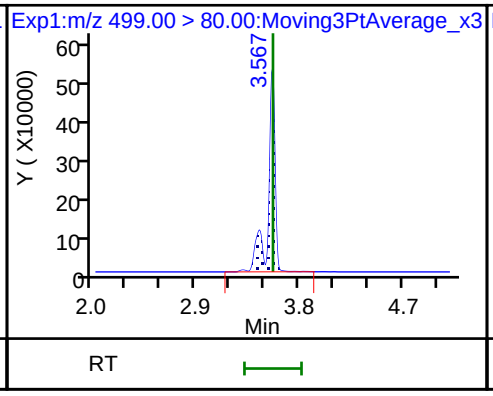
26 Perfluorooctanoic acid



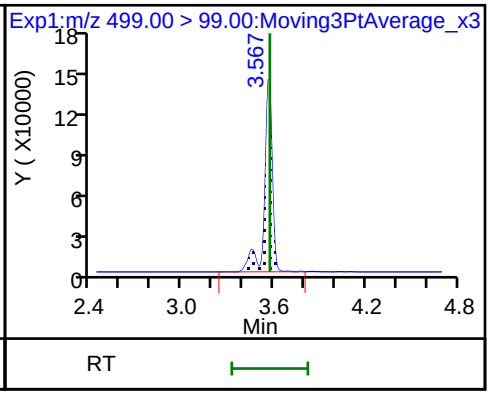
D 27 13C8 PFOS



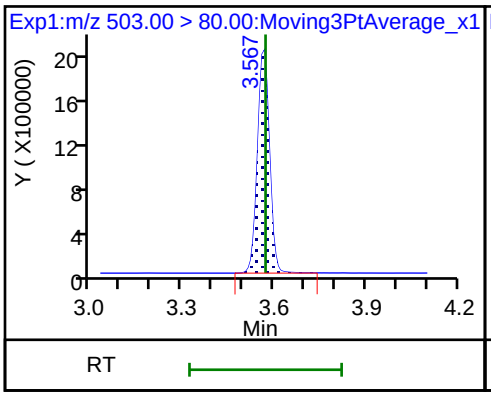
29 Perfluorooctanesulfonic acid



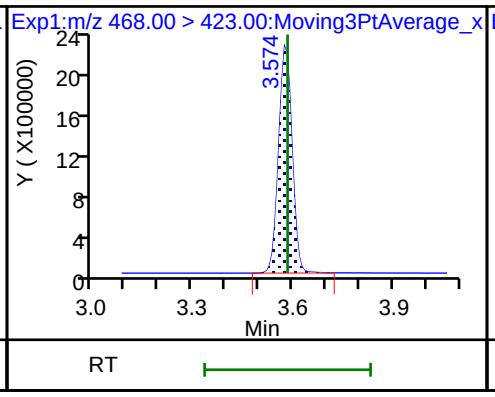
29 Perfluorooctanesulfonic acid



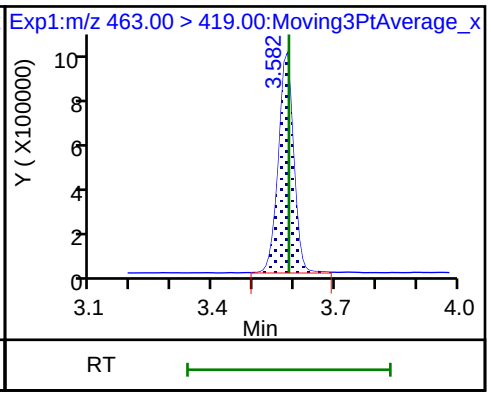
D 28 13C4 PFOS



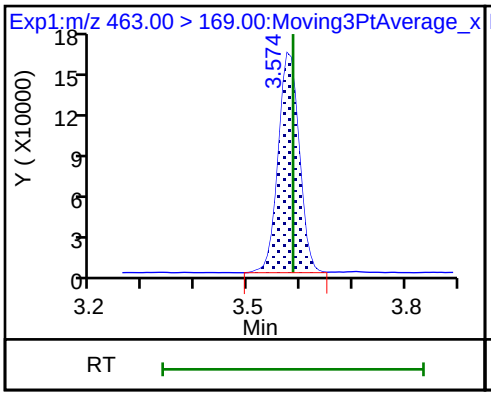
D 31 13C5 PFNA



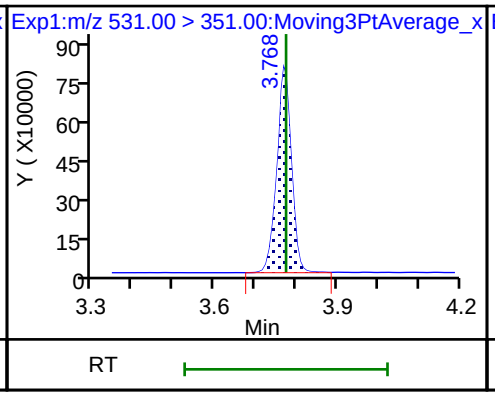
30 Perfluorononanoic acid



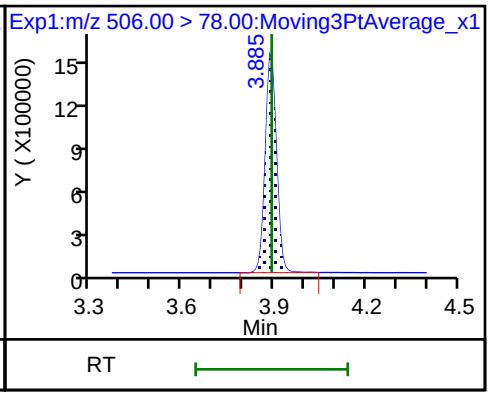
30 Perfluorononanoic acid



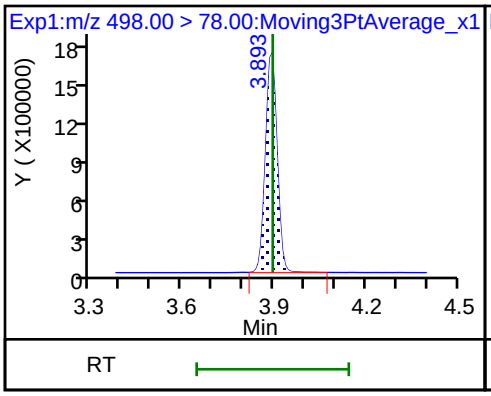
32 9-Chlorohexadecafluoro-3-oxanonane



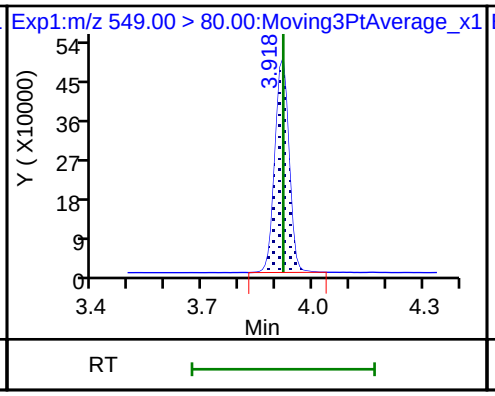
D 33 13C8 FOSA



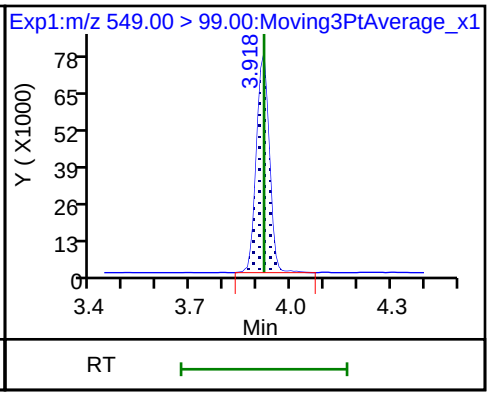
34 Perfluorooctanesulfonamide



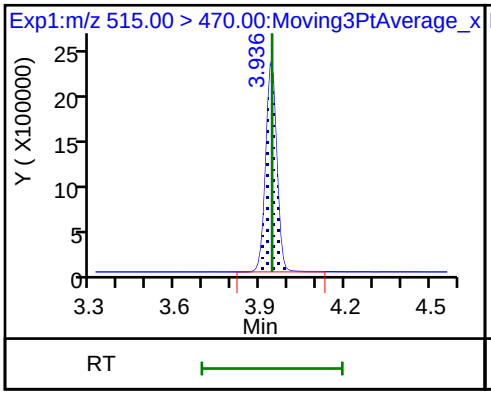
35 Perfluorononanesulfonic acid



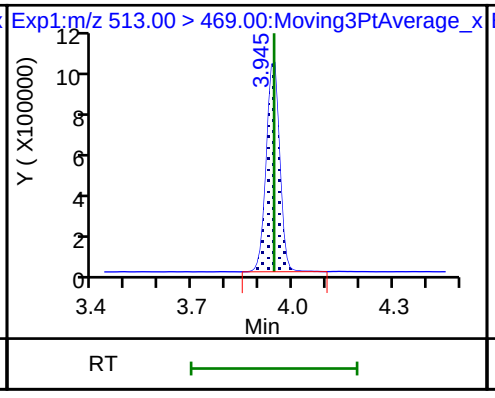
35 Perfluorononanesulfonic acid



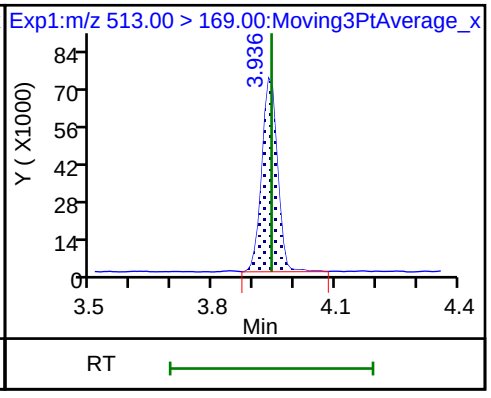
D 36 13C2 PFDA



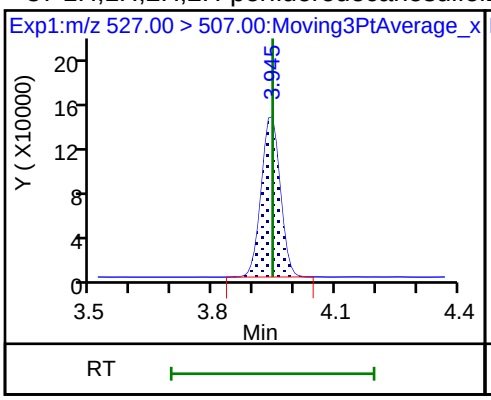
38 Perfluorodecanoic acid



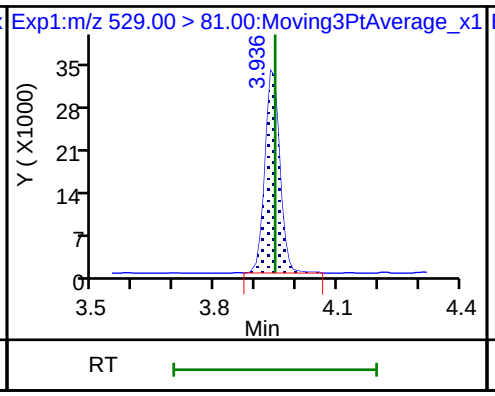
38 Perfluorodecanoic acid



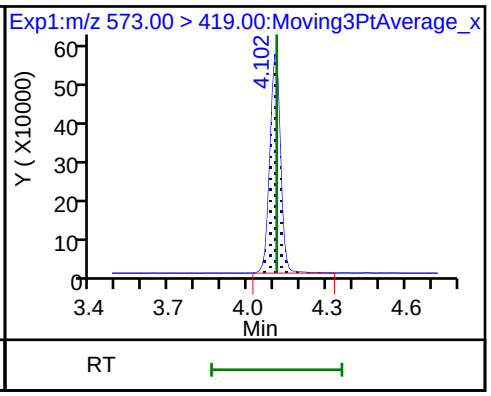
37 1H,1H,2H,2H-perfluorodecanesulfon



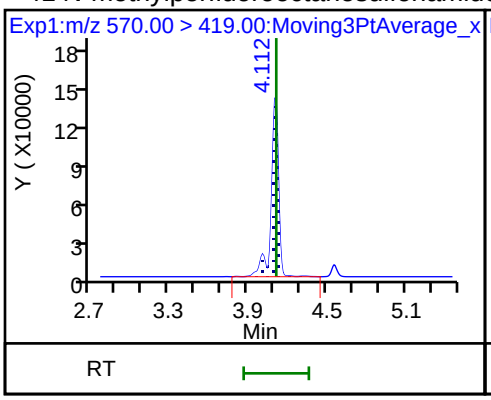
D 39 M2-8:2 FTS



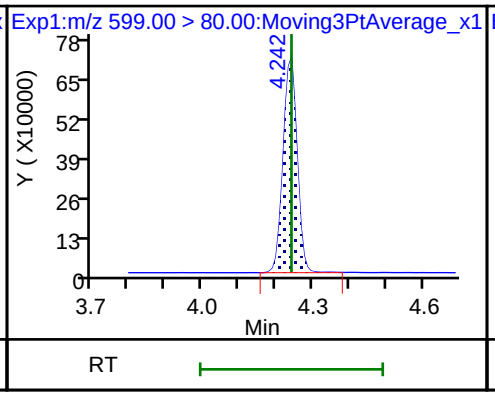
D 40 d3-NMeFOSAA



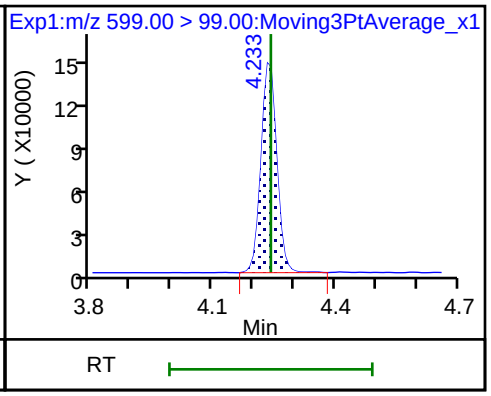
41 N-methylperfluorooctanesulfonamido



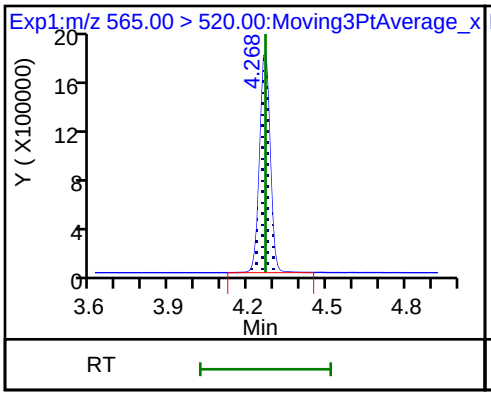
42 Perfluorodecanesulfonic acid



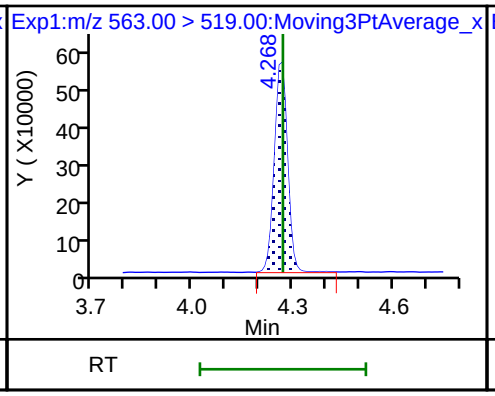
42 Perfluorodecanesulfonic acid



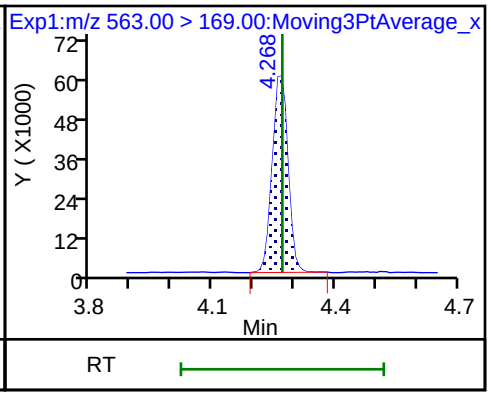
D 44 13C2 PFUnA



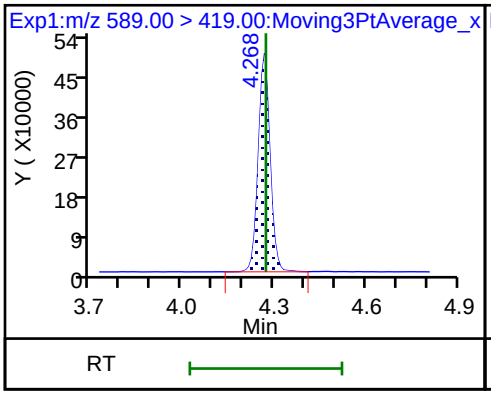
43 Perfluoroundecanoic acid



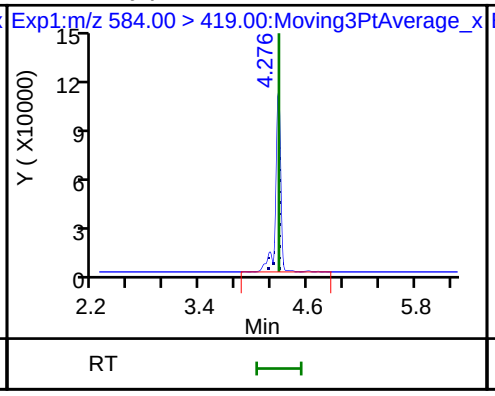
43 Perfluoroundecanoic acid



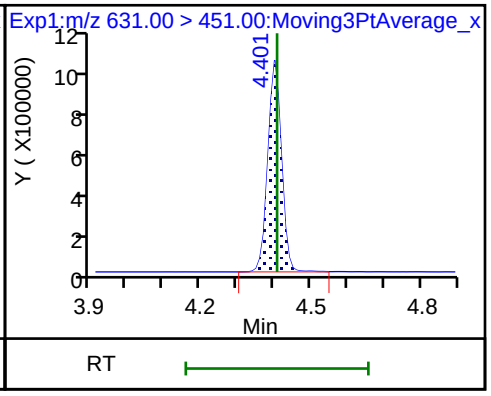
D 45 d5-NEtFOSAA



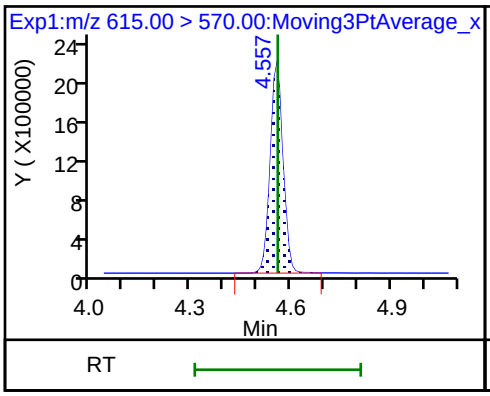
46 N-ethylperfluorooctanesulfonamidoa



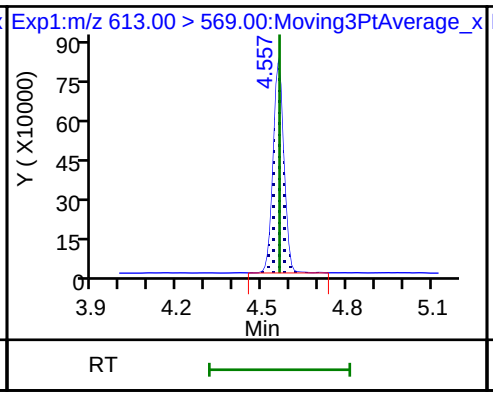
48 11-Chloroeicosafluoro-3-oxaundecan



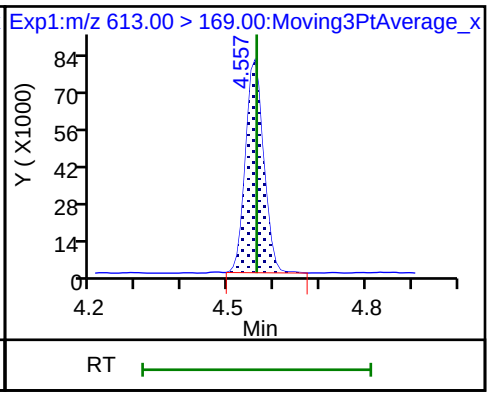
D 49 13C2 PFDoA



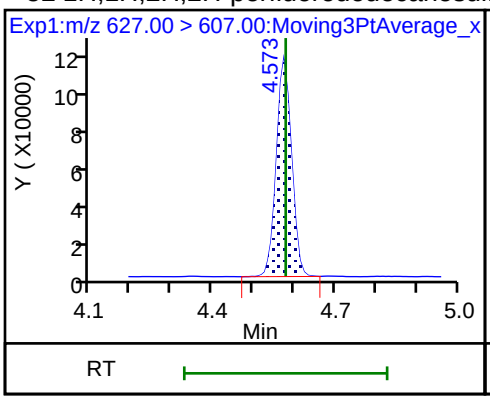
50 Perfluorododecanoic acid



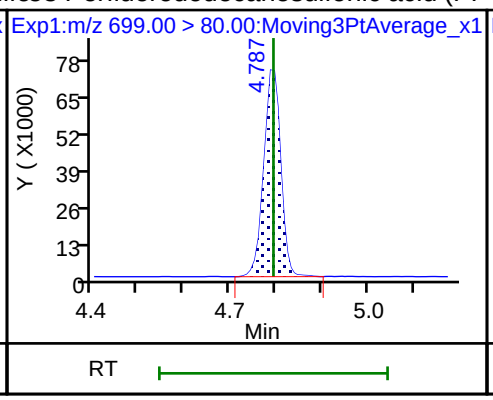
50 Perfluorododecanoic acid



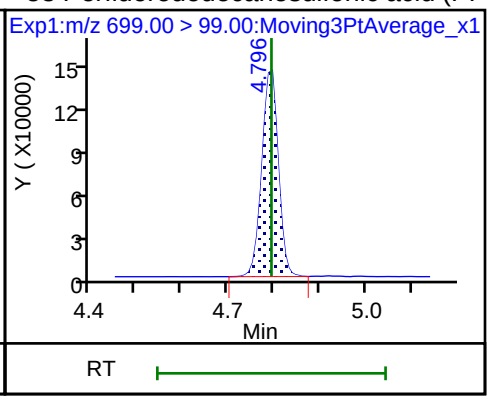
52 1H,1H,2H-perfluorododecanesulfo



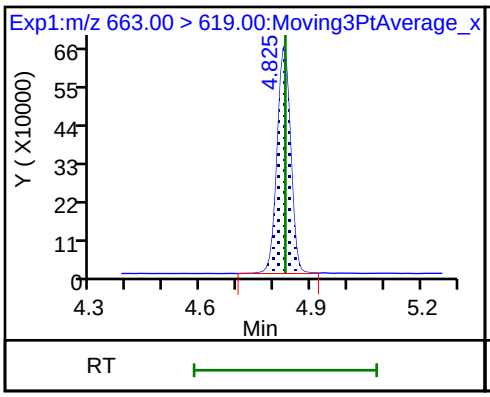
53 Perfluorododecanesulfonic acid (PF



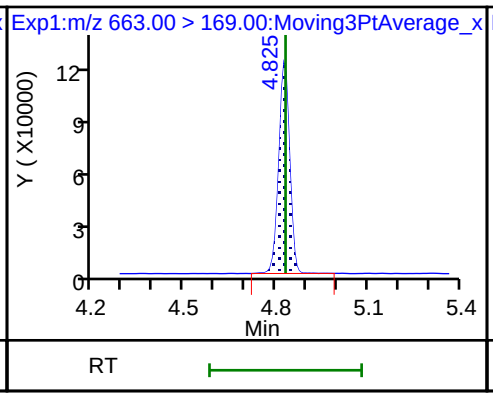
53 Perfluorododecanesulfonic acid (PF



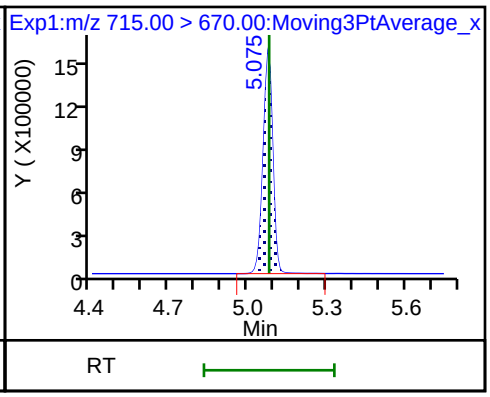
54 Perfluorotridecanoic acid



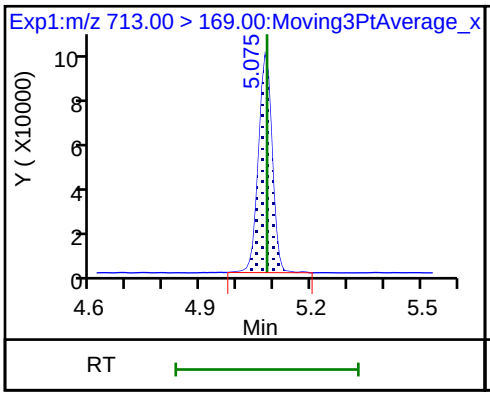
54 Perfluorotridecanoic acid



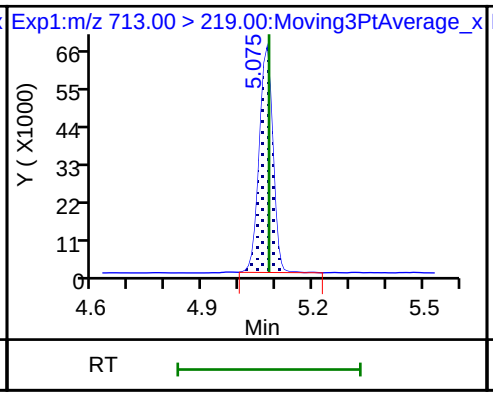
D 55 13C2 PFTeDA



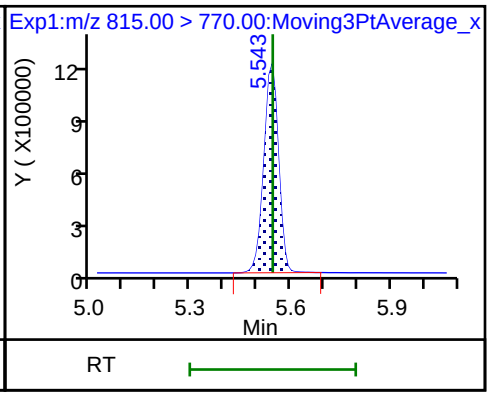
56 Perfluorotetradecanoic acid



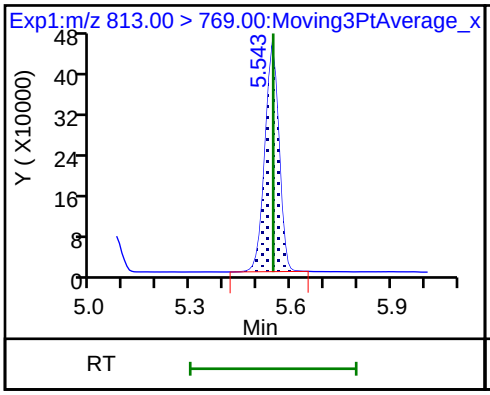
56 Perfluorotetradecanoic acid



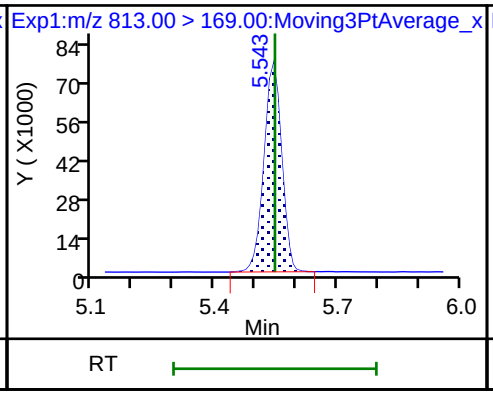
D 57 13C2 PFHxDA



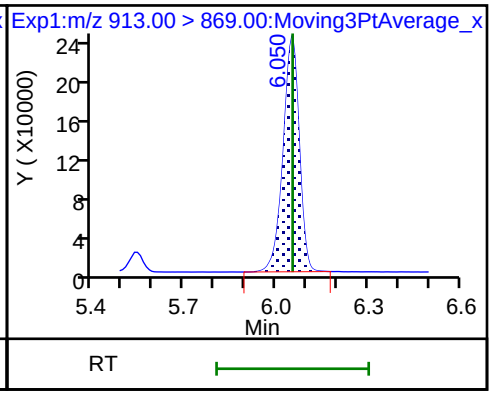
58 Perfluorohexadecanoic acid



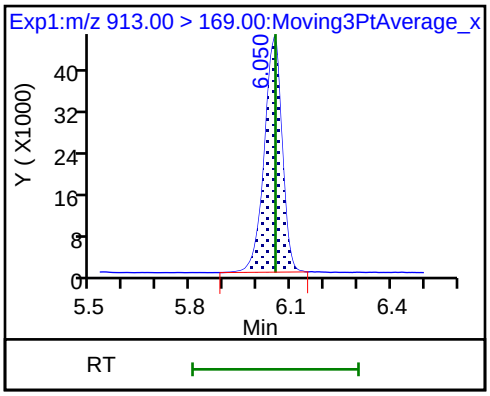
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._006.d
Lims ID: IC L5 Full
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 08-Jan-2019 18:11:15 ALS Bottle#: 14 Worklist Smp#: 6
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CAL STD5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub5

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:30:01 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 07:47:22
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.687	1.685	0.002	0.529	6590555	2.51		100	10972	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.687	1.686	0.001	1.000	5986449	2.45		98.1	507	
D 3 13C5 PFPeA										
267.90 > 223.00	2.024	2.025	-0.001	0.634	5760664	2.51		100	5102	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.024	2.027	-0.003	1.000	5572651	2.42		96.7	276	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.059	-0.003	0.644	8850848	2.35		101	846372	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.056	2.059	-0.003	1.000	7927952	2.16	Target=2.70	97.7	3425	
298.90 > 99.00	2.056	2.059	-0.003	1.000	2852885		2.78(1.35-4.05)	97.7	2081	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.352	2.351	0.001	0.737	548201	2.38		102	801	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.352	2.352	0.0	1.144	1246253	2.21		94.8	2089	
D 9 13C2 PFHxA										
315.00 > 270.00	2.390	2.394	-0.004	0.749	6380794	2.50		100.0	3357	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.399	2.396	0.003	1.004	5191153	2.35	Target=13.92	93.9	1306	
313.00 > 119.00	2.390	2.396	-0.006	1.000	379129		13.69(6.96-20.87)	93.9	776	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.408	2.410	-0.002	1.171	4266313	2.39	Target=2.30	102	3015	
349.00 > 99.00	2.408	2.410	-0.002	1.171	1953930		2.18(1.15-3.45)	102	1999	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.515	2.512	0.003	1.000	1074307	2.00		79.9	564	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.515	2.512	0.003	0.788	627391	2.74		110	1471	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.788	2.790	-0.002	1.000	7595555	2.32	Target=4.34	92.9	1334	
363.00 > 169.00	2.788	2.790	-0.002	1.000	1704700		4.46(2.17-6.52)	92.9	1562	
D 16 13C4 PFHpA										
367.00 > 322.00	2.788	2.791	-0.003	0.874	7859686	2.50		100	3482	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.797	2.798	-0.001	1.000	5773886	2.05	Target=3.80	90.1	3860	
399.00 > 99.00	2.797	2.798	-0.001	1.000	1641778		3.52(1.90-5.70)	90.1	1238	
D 17 18O2 PFHxS										
403.00 > 84.00	2.797	2.798	-0.001	0.876	5386473	2.43		103	2481	
19 DONA										
377.00 > 251.00	2.842	2.841	0.001	0.798	12368235	2.35	Target=2.26	100.0	3204	
377.00 > 85.00	2.842	2.841	0.001	0.798	5500531		2.25(1.13-3.39)	100.0	2368	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.168	3.175	-0.007	0.993	778889	2.52		106	1256	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.168	3.177	-0.009	1.000	1395898	2.02		85.1	1162	
D 22 13C8 PFOA										
421.00 > 376.00	3.184	3.191	-0.007		5715646	2.42		98.8	2911	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.184	3.191	-0.007	0.894	5658122	2.35	Target=3.69	98.9	2182	
449.00 > 99.00	3.184	3.191	-0.007	0.894	1362731		4.15(1.84-5.53)	98.9	1847	
* 24 13C2 PFOA										
415.00 > 370.00	3.192	3.194	-0.002		6876959	2.50			2969	
D 25 13C4 PFOA										
417.00 > 372.00	3.192	3.195	-0.003	1.000	6835040	2.51		100	2959	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.192	3.195	-0.003	1.000	6777213	2.39	Target=2.72	95.7	1028	
413.00 > 169.00	3.192	3.195	-0.003	1.000	2469770		2.74(1.36-4.08)	95.7	2207	
D 27 13C8 PFOS										
507.00 > 99.00	3.563	3.566	-0.003		1236979	2.47		103	1948	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.563	3.570	-0.007	1.000	5356171	2.23	Target=4.08	96.1	2097	
499.00 > 99.00	3.563	3.570	-0.007	1.000	1274376		4.20(2.04-6.12)	96.1	2247	
D 28 13C4 PFOS										
503.00 > 80.00	3.563	3.571	-0.008	1.116	5445665	2.40		101	2632	
D 31 13C5 PFNA										
468.00 > 423.00	3.578	3.584	-0.006	1.121	6325367	2.58		103	2853	
30 Perfluorononanoic acid										
463.00 > 419.00	3.578	3.586	-0.008	1.000	5916875	2.35	Target=5.35	94.0	804	
463.00 > 169.00	3.578	3.586	-0.008	1.000	1149761		5.15(2.68-8.03)	94.0	1861	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.771	3.774	-0.003	1.058	4890460	2.25		96.4	2445	
D 33 13C8 FOSA										
506.00 > 78.00	3.888	3.891	-0.003	1.218	3650484	2.45		97.9	2837	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.888	3.894	-0.006	1.000	10838937	2.55		102	2763	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.913	3.919	-0.006	1.098	3334746	2.50	Target=6.03	104	2925	
549.00 > 99.00	3.913	3.919	-0.006	1.098	516289		6.46(3.02-9.05)	104	1540	
D 36 13C2 PFDA										
515.00 > 470.00	3.939	3.942	-0.003	1.234	6170874	2.57		103	2493	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.939	3.943	-0.004	1.000	6776805	2.39	Target=14.23	95.6	2238	
513.00 > 169.00	3.939	3.943	-0.004	1.000	460949		14.70(7.12-21.35)	95.6	673	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.939	3.946	-0.007	1.000	1163051	2.26		94.5	2023	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.939	3.947	-0.008	1.234	86690	2.44		102	326	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.106	4.109	-0.003	1.287	1610985	2.56		103	1604	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.106	4.114	-0.008	1.000	1277915	2.29		91.5	403	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.237	4.241	-0.004	1.189	4928942	2.47	Target=4.28	103	3354	
599.00 > 99.00	4.237	4.241	-0.004	1.189	1028032		4.79(2.14-6.43)	103	1489	
D 44 13C2 PFUnA										
565.00 > 520.00	4.263	4.266	-0.003	1.336	4866308	2.58		103	2779	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.263	4.270	-0.007	1.000	3663033	2.26	Target=10.48	90.3	915	
563.00 > 169.00	4.263	4.270	-0.007	1.000	373259		9.81(5.24-15.72)	90.3	852	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.263	4.272	-0.009	1.336	1388082	2.65		106	1630	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.271	4.278	-0.007	1.002	1098761	2.39		95.6	1444	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.405	4.407	-0.002	1.236	6103712	2.38		101	3117	
D 49 13C2 PFDoA										
615.00 > 570.00	4.552	4.560	-0.008	1.426	5632761	2.46		98.5	3951	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.560	4.561	-0.001	1.002	5260415	2.43	Target=9.37	97.2	1696	
613.00 > 169.00	4.552	4.561	-0.009	1.000	566077		9.29(4.68-14.05)	97.2	1218	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.576	4.578	-0.002	1.162	745273	2.33		96.5	2071	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.790	4.793	-0.003	1.344	487663	2.36	Target=0.55	97.4	2117	
699.00 > 99.00	4.790	4.793	-0.003	1.344	890609		0.55(0.28-0.83)	97.4	2812	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.827	4.830	-0.003	1.060	4139637	2.42	Target=6.18	96.8	1725	
663.00 > 169.00	4.827	4.830	-0.003	1.060	688336		6.01(3.09-9.27)	96.8	1796	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.077	5.080	-0.003	1.591	3999631	2.52		101	7839	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.077	5.080	-0.003	1.000	598200	2.29	Target=1.39	91.6	2007	
713.00 > 219.00	5.069	5.080	-0.011	0.998	423132		1.41(0.70-2.09)	91.6	1172	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.542	5.545	-0.003	1.736	3619229	2.44		97.7	4523	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.542	5.546	-0.004	1.000	3214795	2.49	Target=5.55	99.8	245	
813.00 > 169.00	5.542	5.546	-0.004	1.000	573625		5.60(2.77-8.32)	99.8	1399	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.054	6.053	0.001	1.092	2228311	2.49	Target=5.09	99.7	536	
913.00 > 169.00	6.047	6.053	-0.006	1.091	425197		5.24(2.55-7.64)	99.7	1282	

Reagents:

LCPFC_LL5_00010 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:30:04 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._006.d

Injection Date: 08-Jan-2019 18:11:15 Instrument ID: A9

Lims ID: IC L5 Full

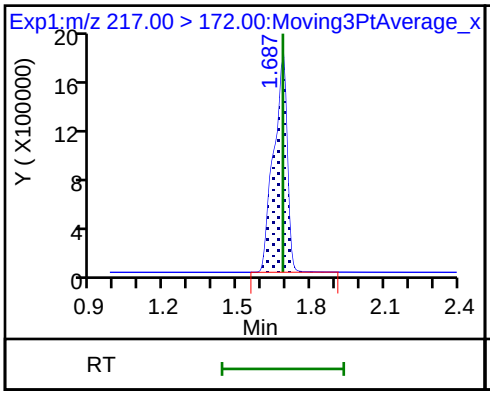
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 14 Worklist Smp#: 6

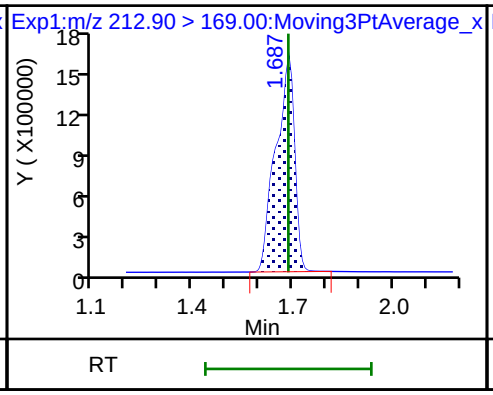
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

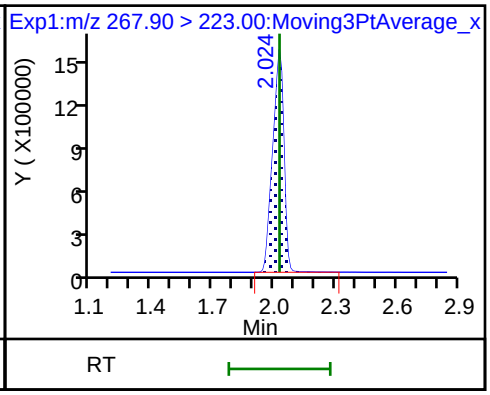
D 1 13C4 PFBA



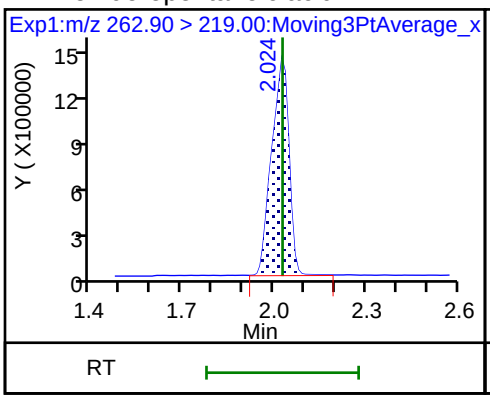
2 Perfluorobutanoic acid



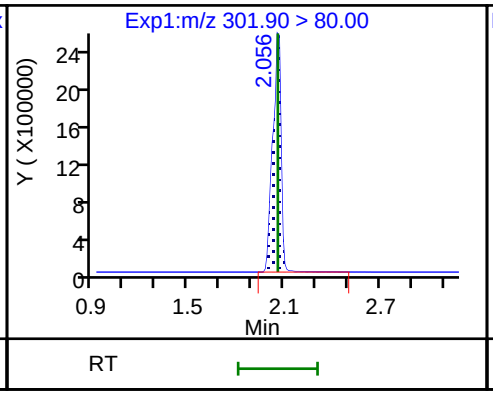
D 3 13C5 PFPeA



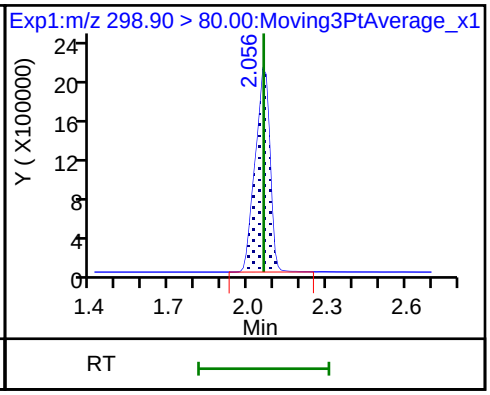
4 Perfluoropentanoic acid



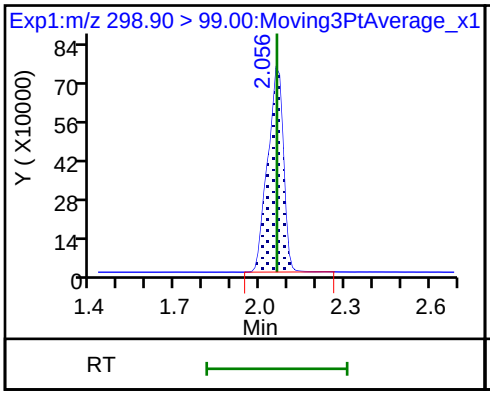
D 5 13C3 PFBS



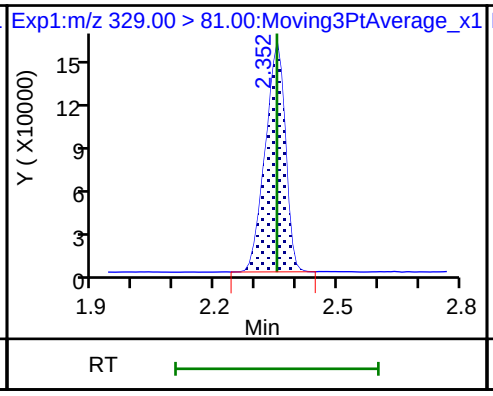
6 Perfluorobutanesulfonic acid



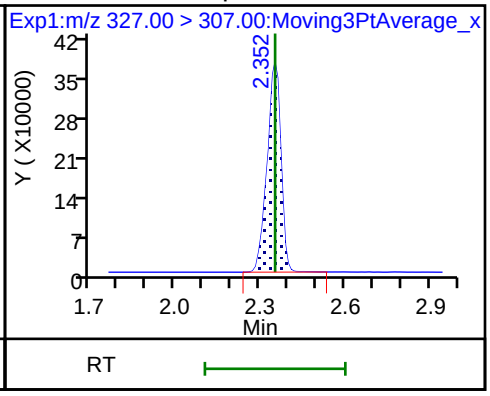
6 Perfluorobutanesulfonic acid



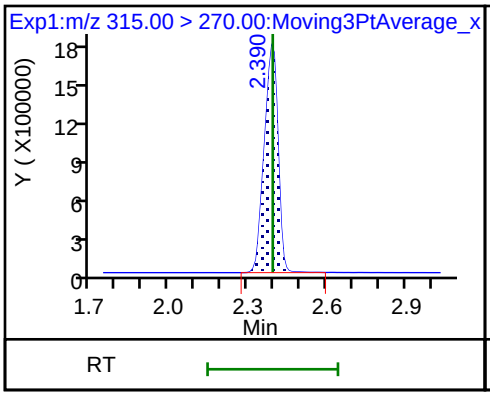
D 8 M2-4:2 FTS



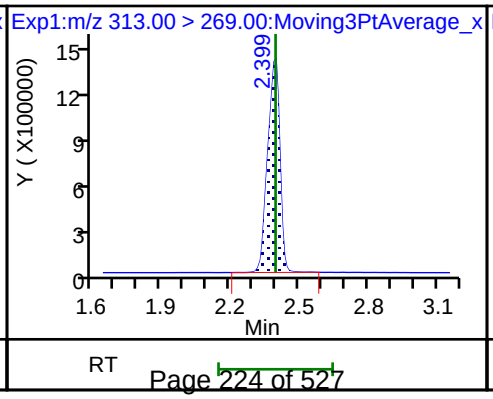
7 1H,1H,2H,2H-perfluorohexanesulfoni



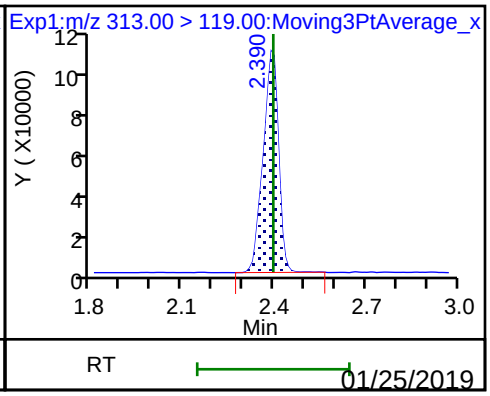
D 9 13C2 PFHxA



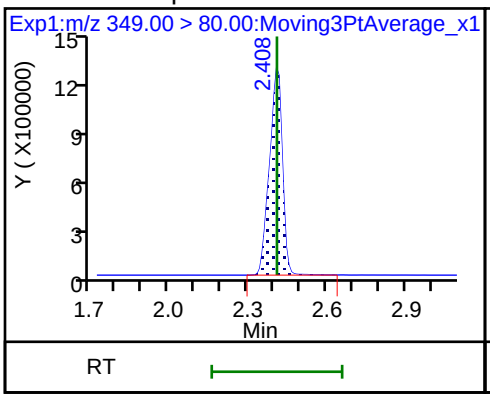
10 Perfluorohexanoic acid



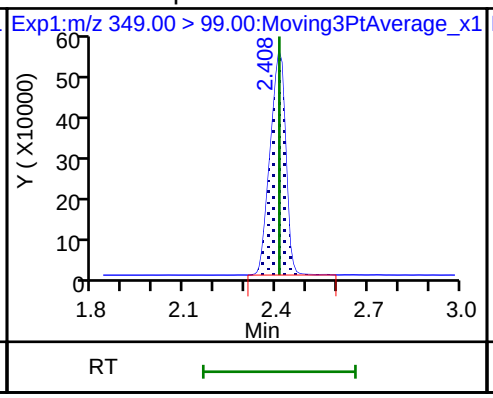
10 Perfluorohexanoic acid



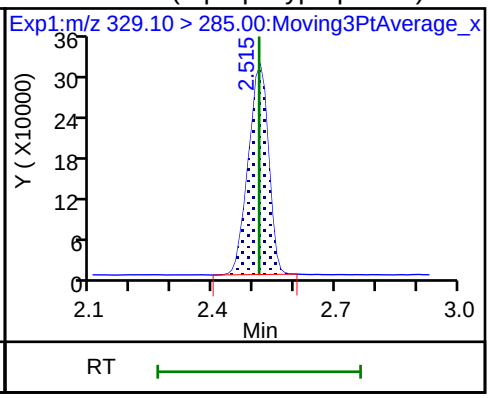
11 Perfluoropentanesulfonic acid



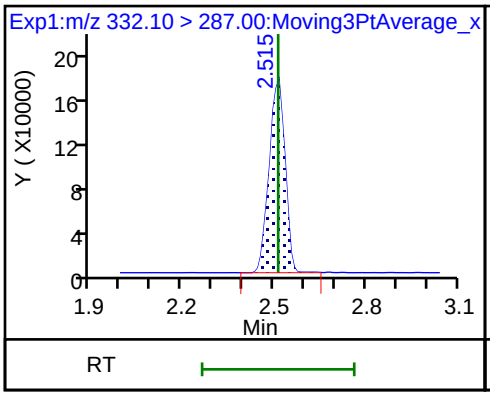
11 Perfluoropentanesulfonic acid



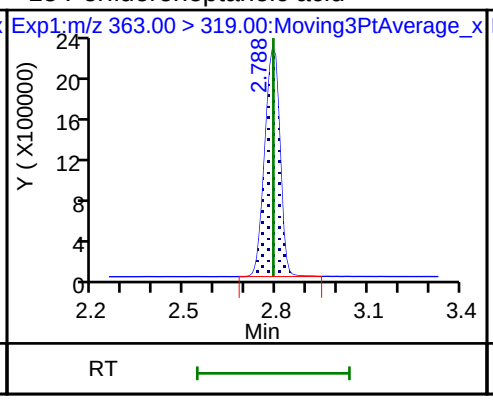
14 Perfluoro(2-propoxypropanoic) acid



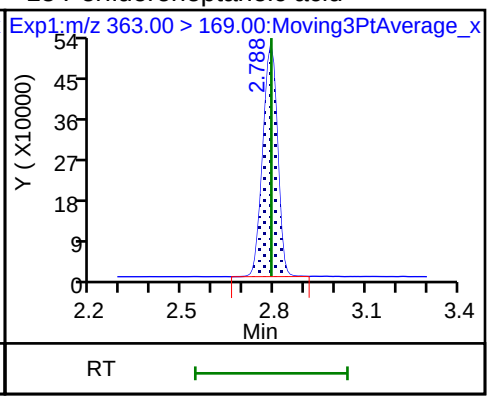
D 13 13C3 HFPO-DA



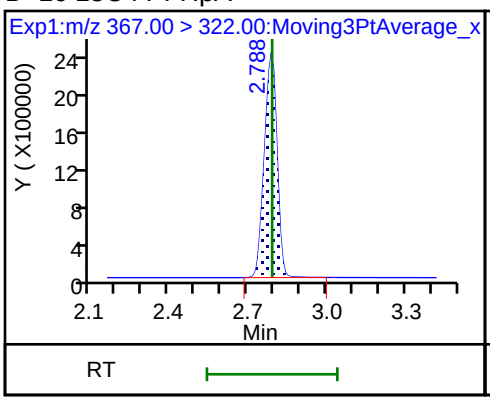
15 Perfluoroheptanoic acid



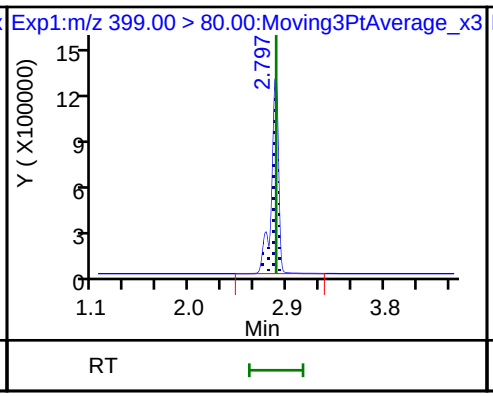
15 Perfluoroheptanoic acid



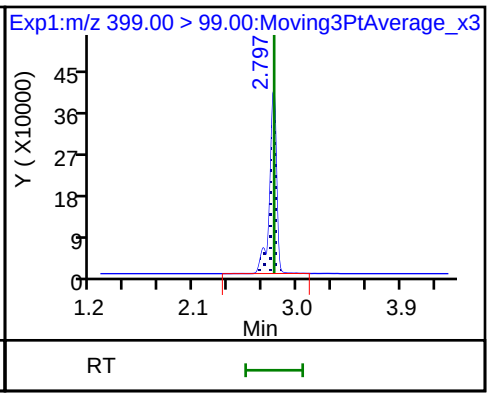
D 16 13C4 PFHpA



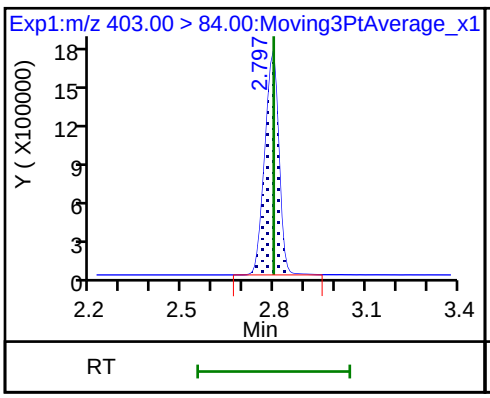
18 Perfluorohexanesulfonic acid



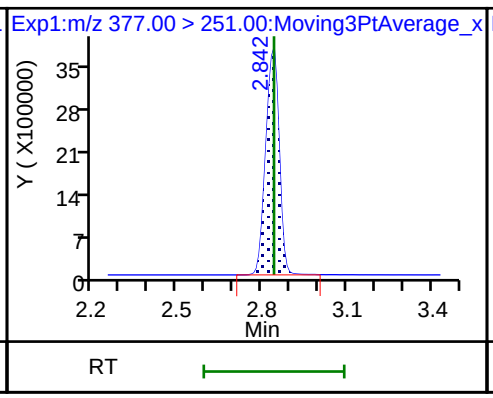
18 Perfluorohexanesulfonic acid



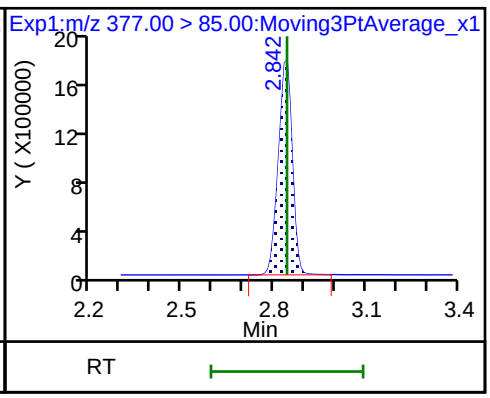
D 17 18O2 PFHxS



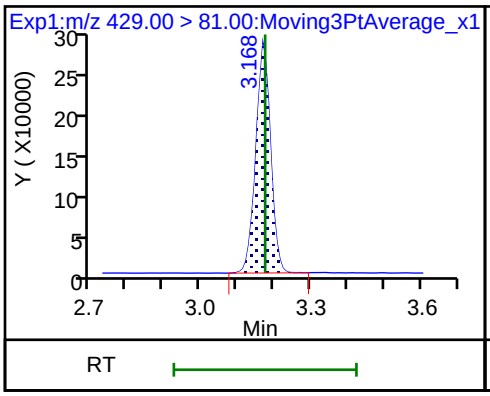
19 DONA



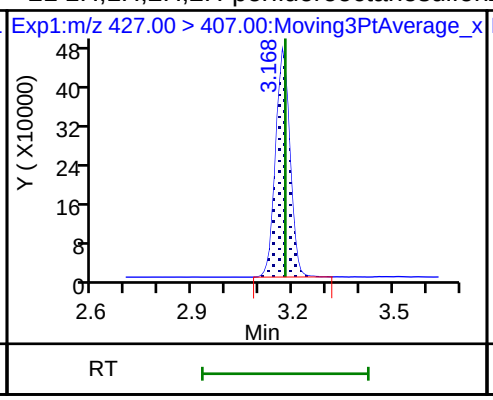
19 DONA



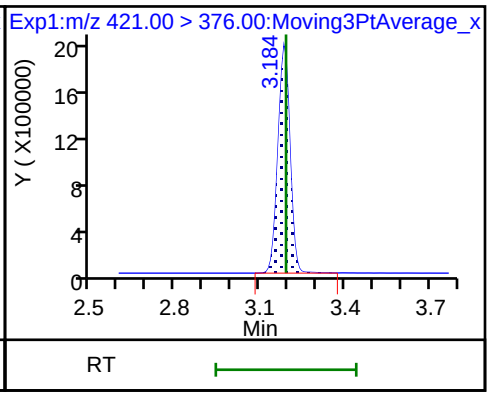
D 20 M2-6:2 FTS



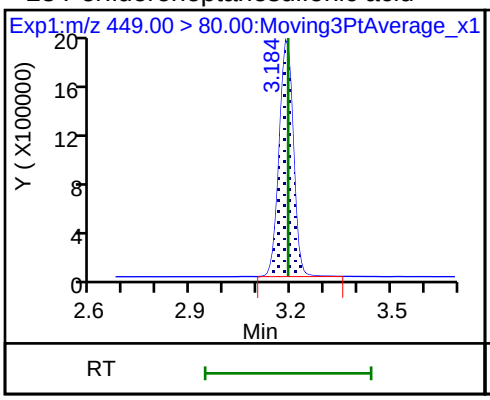
21 1H,1H,2H,2H-perfluorooctanesulfon



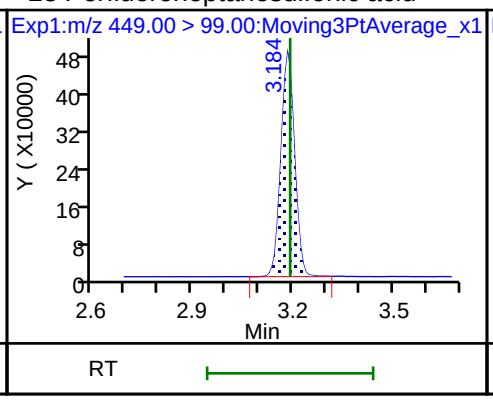
D 22 13C8 PFOA



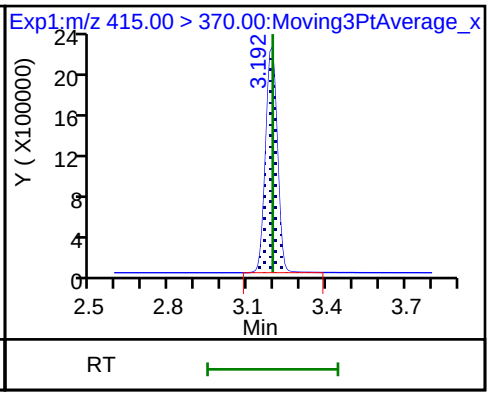
23 Perfluoroheptanesulfonic acid



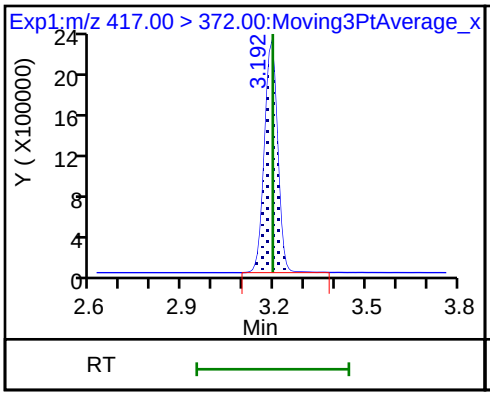
23 Perfluoroheptanesulfonic acid



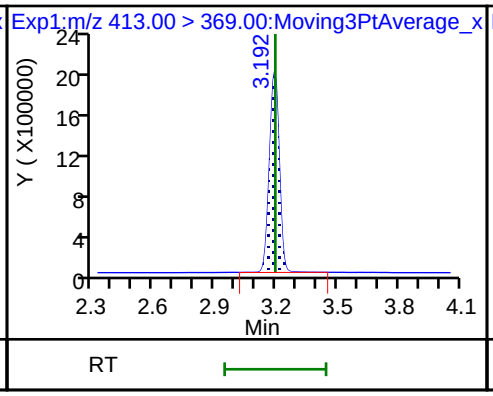
* 24 13C2 PFOA



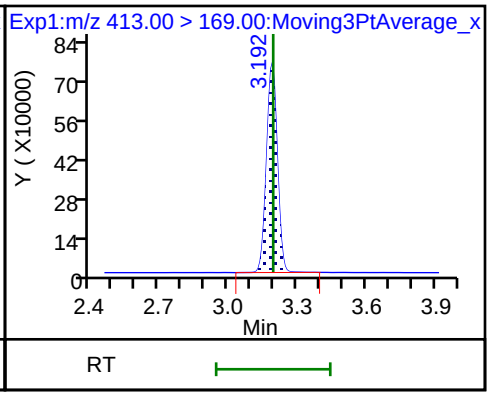
D 25 13C4 PFOA



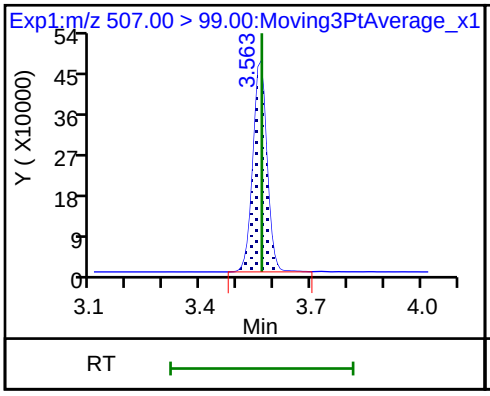
26 Perfluorooctanoic acid



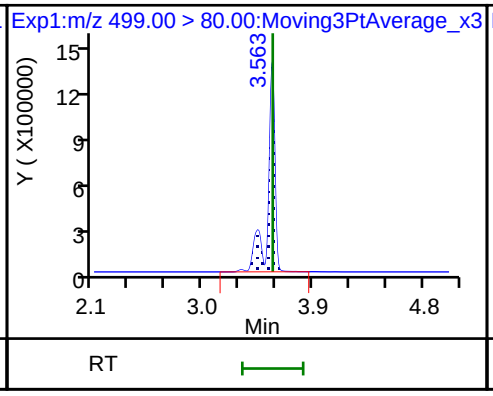
26 Perfluorooctanoic acid



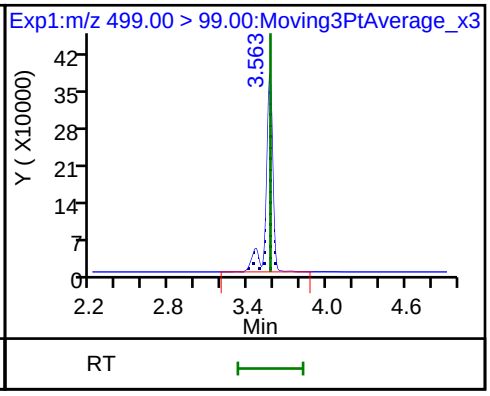
D 27 13C8 PFOS



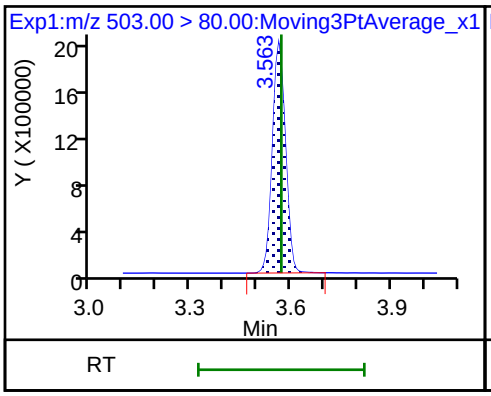
29 Perfluorooctanesulfonic acid



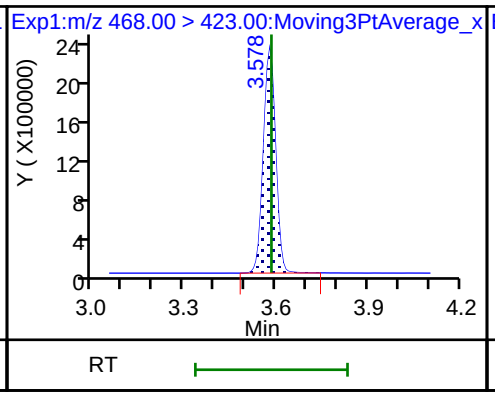
29 Perfluorooctanesulfonic acid



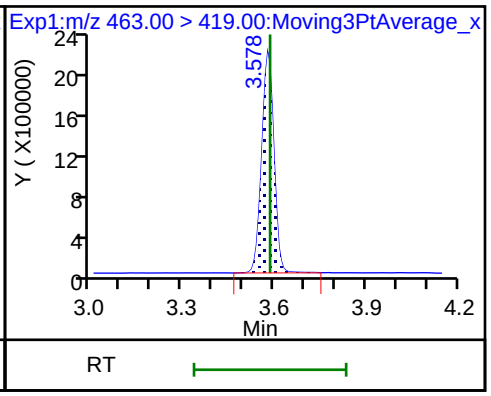
D 28 13C4 PFOS



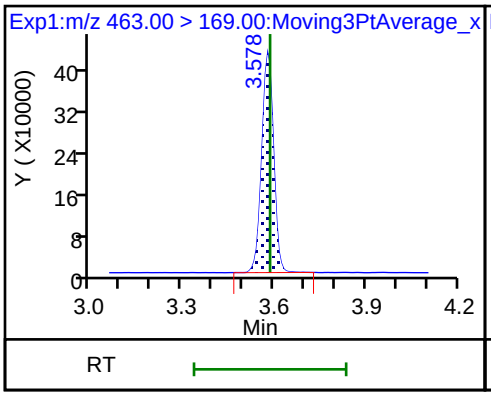
D 31 13C5 PFNA



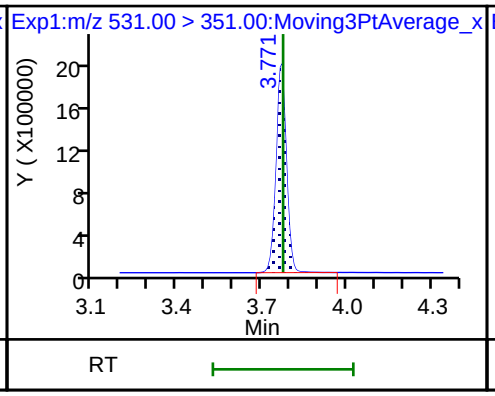
30 Perfluorononanoic acid



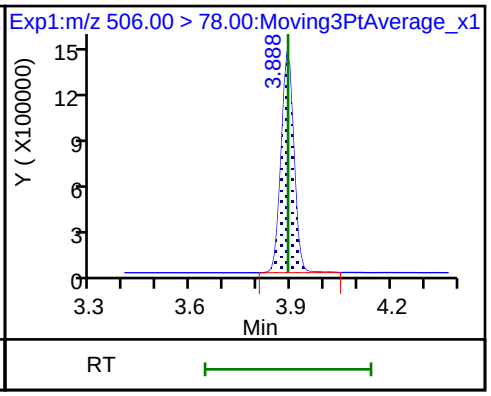
30 Perfluorononanoic acid



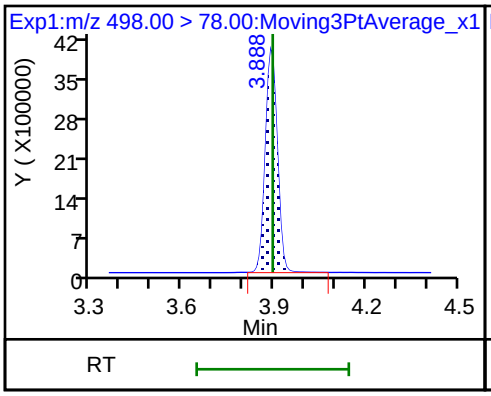
32 9-Chlorohexadecafluoro-3-oxanonane



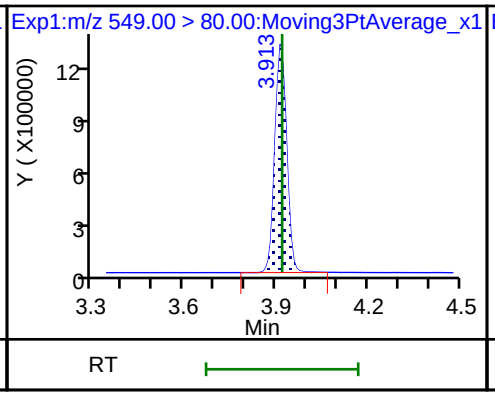
D 33 13C8 FOSA



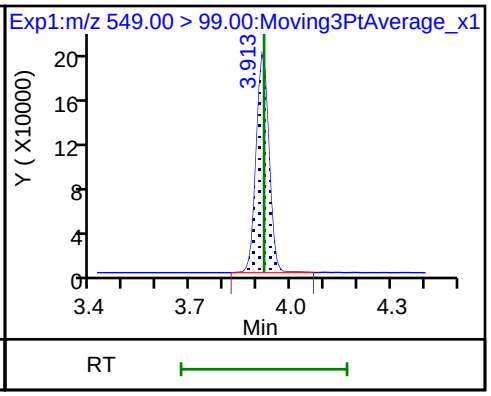
34 Perfluorooctanesulfonamide



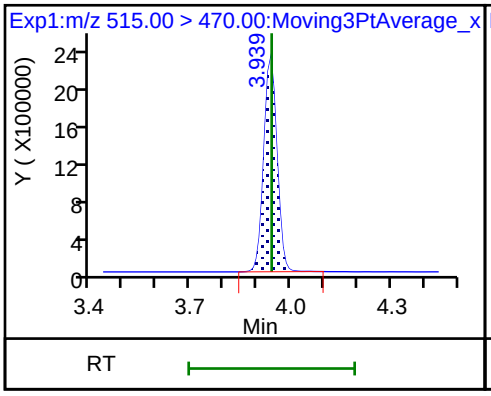
35 Perfluorononanesulfonic acid



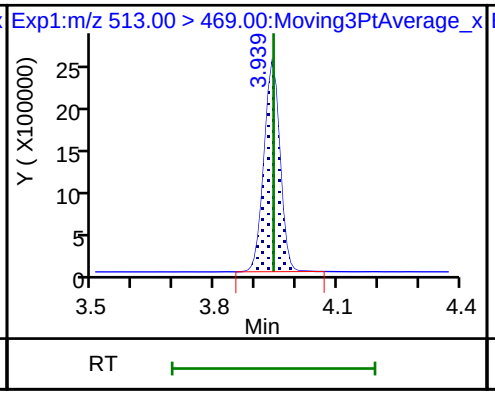
35 Perfluorononanesulfonic acid



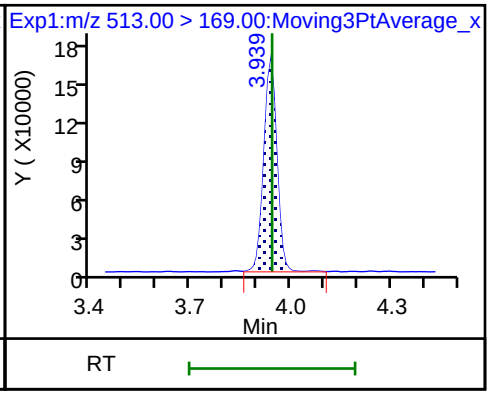
D 36 13C2 PFDA



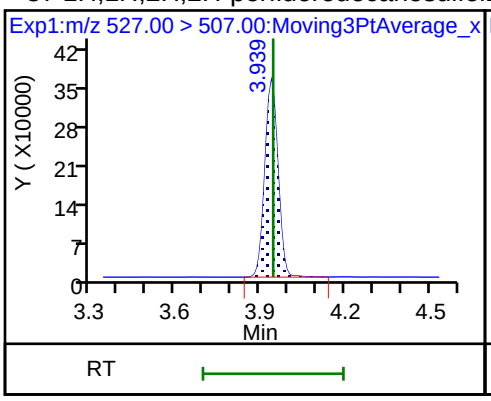
38 Perfluorodecanoic acid



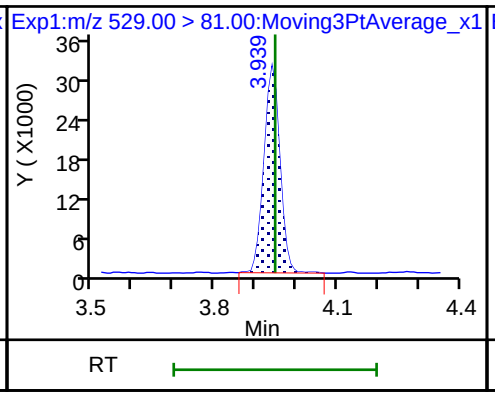
38 Perfluorodecanoic acid



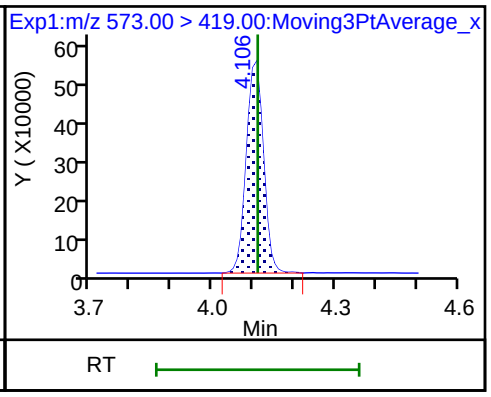
37 1H,1H,2H,2H-perfluorodecanesulfon



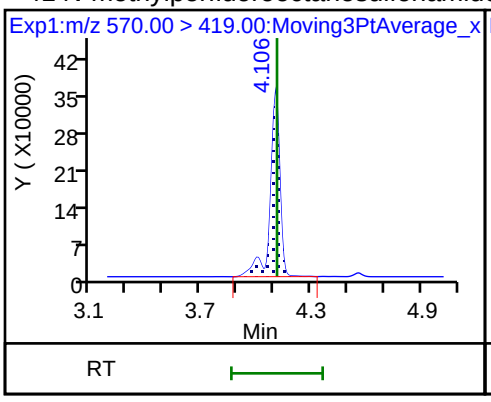
D 39 M2-8:2 FTS



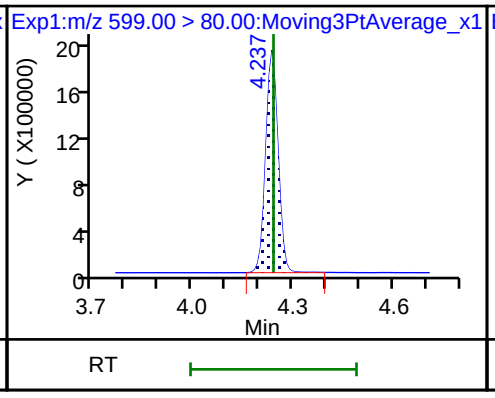
D 40 d3-NMeFOSAA



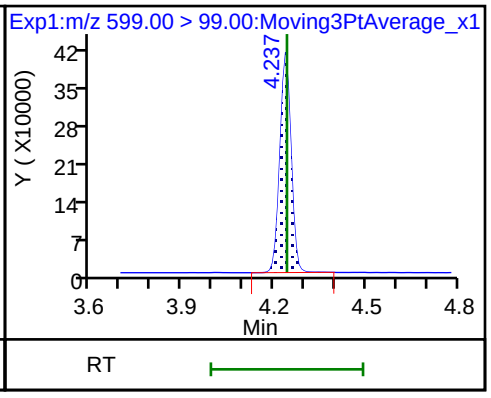
41 N-methylperfluorooctanesulfonamido



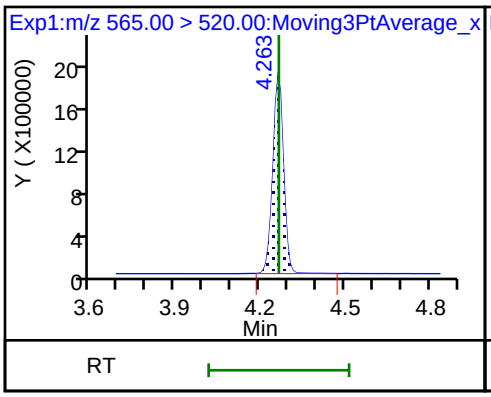
42 Perfluorodecanesulfonic acid



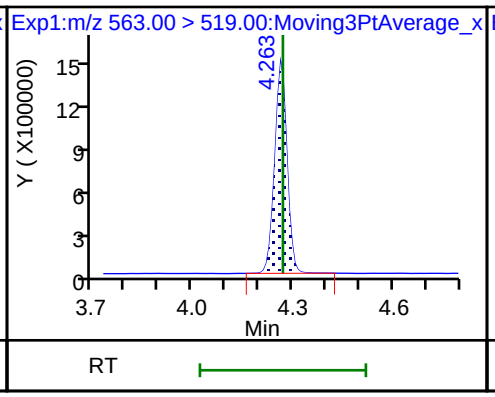
42 Perfluorodecanesulfonic acid



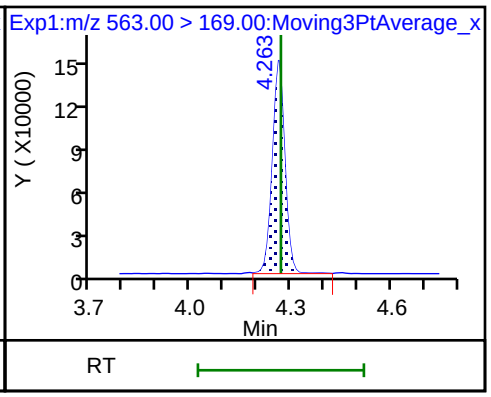
D 44 13C2 PFUnA



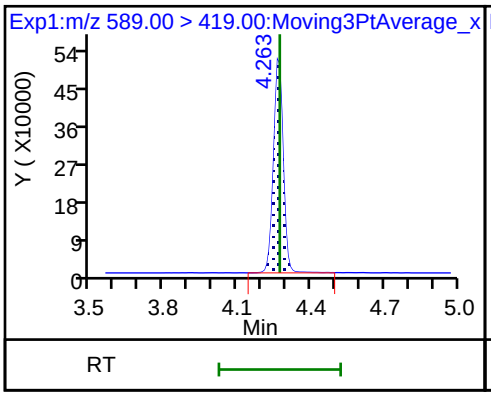
43 Perfluoroundecanoic acid



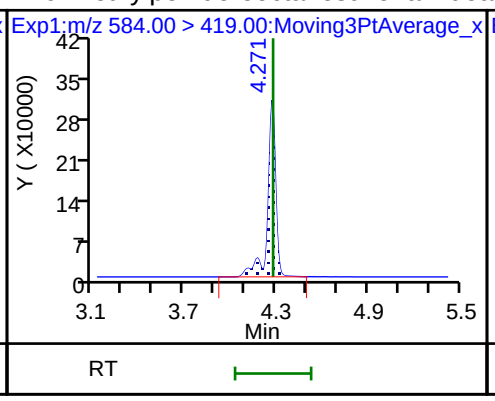
43 Perfluoroundecanoic acid



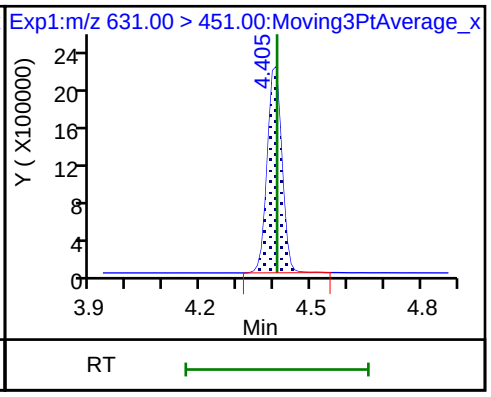
D 45 d5-NEtFOSAA



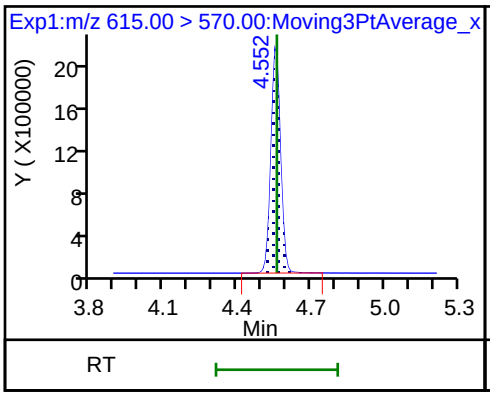
46 N-ethylperfluorooctanesulfonamidoa



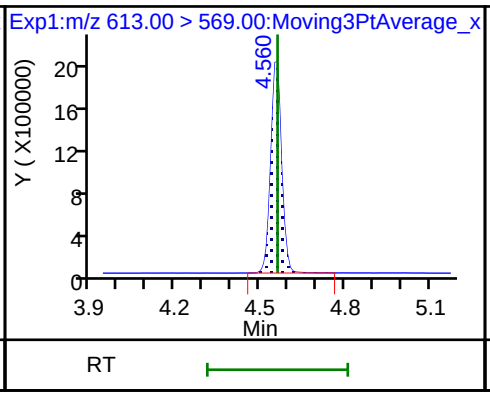
48 11-Chloroeicosafluoro-3-oxaundecan



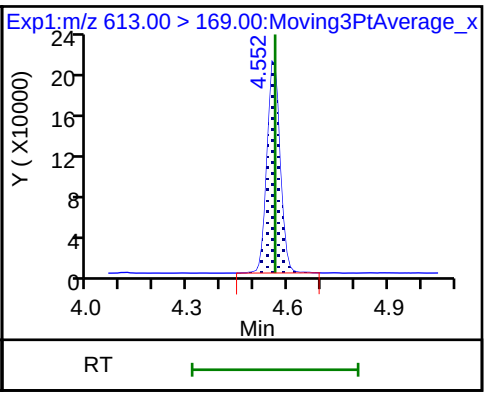
D 49 13C2 PFDoA



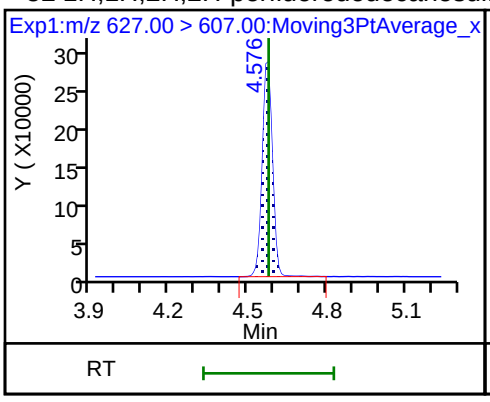
50 Perfluorododecanoic acid



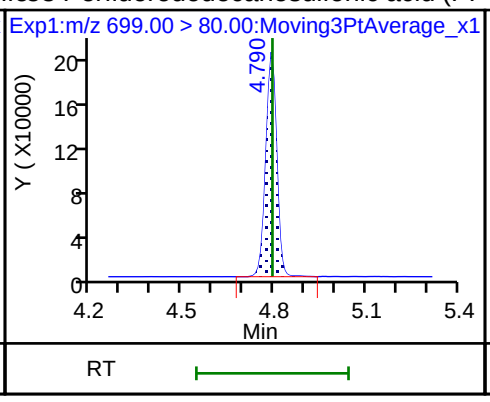
50 Perfluorododecanoic acid



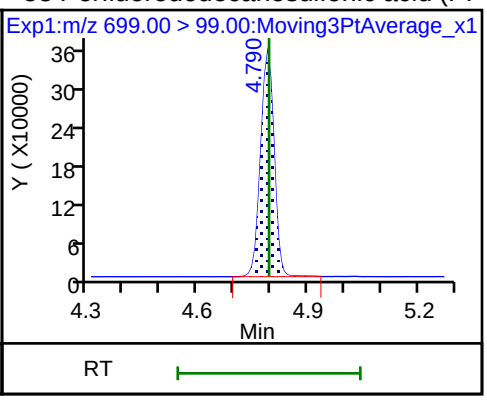
52 1H,1H,2H-perfluorododecanesulfo



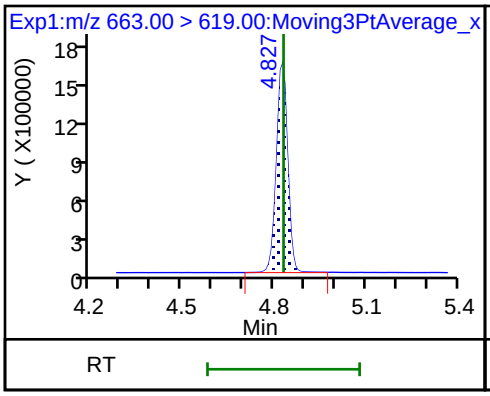
53 Perfluorododecanesulfonic acid (PF



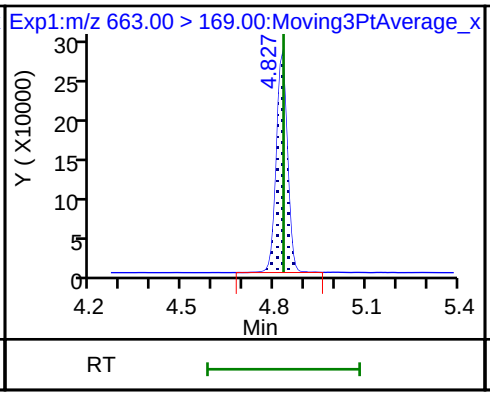
53 Perfluorododecanesulfonic acid (PF



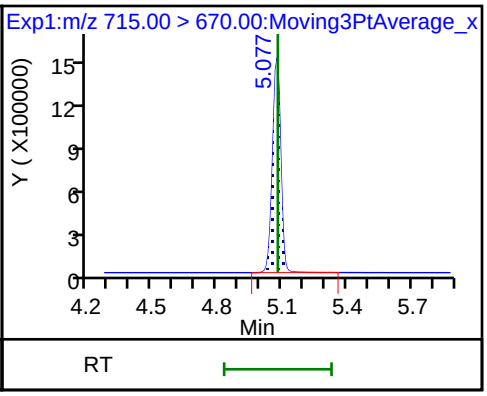
54 Perfluorotridecanoic acid



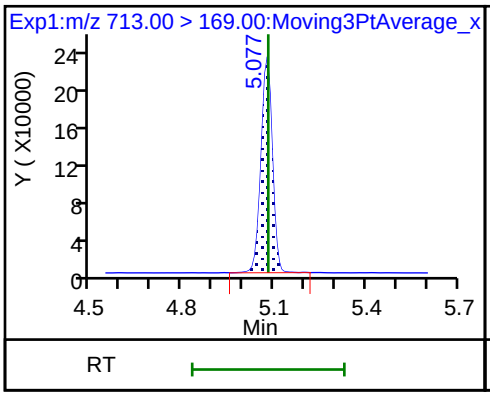
54 Perfluorotridecanoic acid



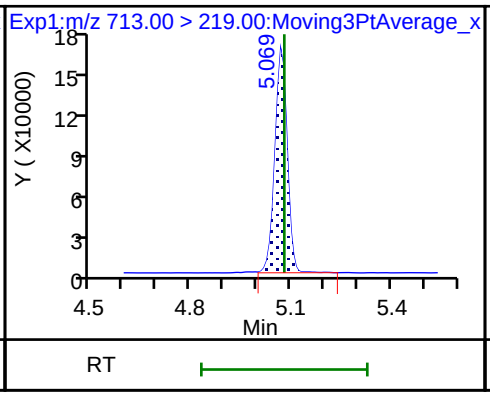
D 55 13C2 PFTeDA



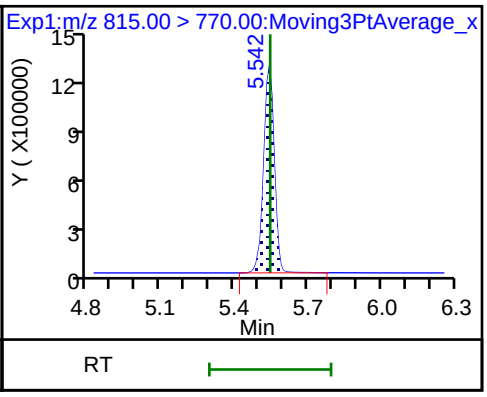
56 Perfluorotetradecanoic acid



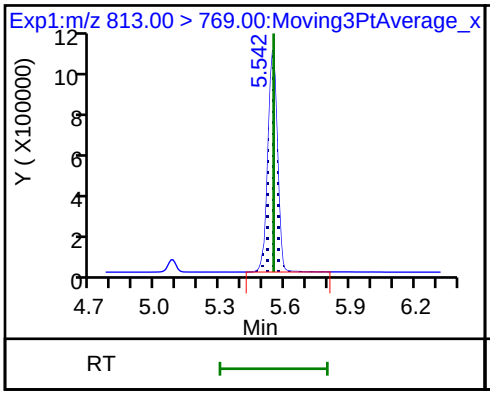
56 Perfluorotetradecanoic acid



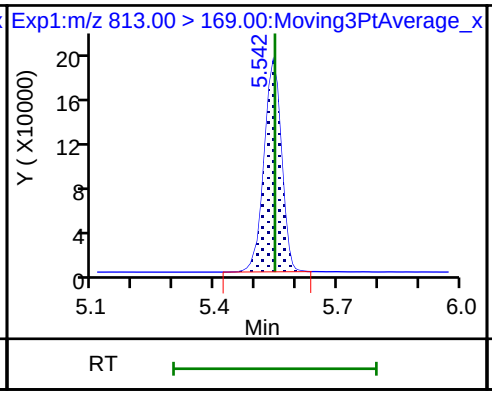
D 57 13C2 PFHxDA



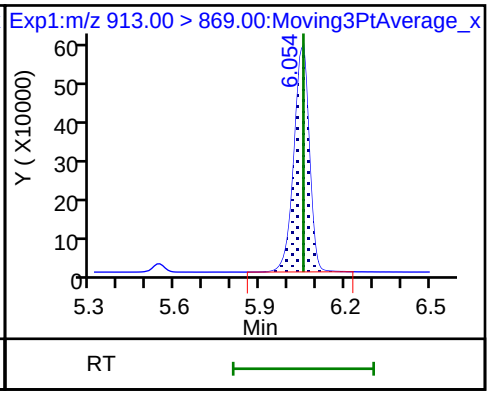
58 Perfluorohexadecanoic acid



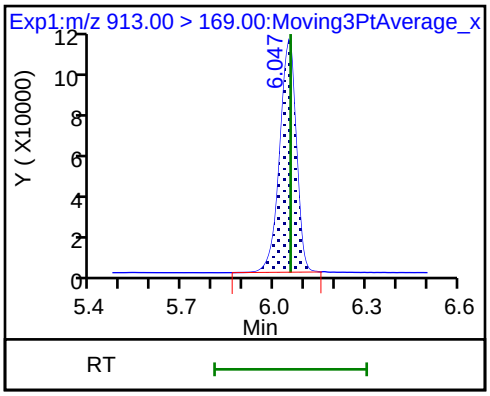
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._007.d
Lims ID: IC L6 Full
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 08-Jan-2019 18:18:45 ALS Bottle#: 15 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CAL STD6
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub5

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:30:11 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 08:06:18
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.684	1.685	-0.001	0.527	6686954	2.56		103	8549	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.684	1.686	-0.002	1.000	12405215	5.01		100	1012	
D 3 13C5 PFPeA										
267.90 > 223.00	2.030	2.025	0.005	0.635	5808535	2.54		102	5343	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.030	2.027	0.003	1.000	11273703	4.85		97.0	562	
D 5 13C3 PFBS										
301.90 > 80.00	2.063	2.059	0.004	0.646	9075151	2.42		104	731649	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.063	2.059	0.004	1.000	16014412	4.25	Target=2.70	96.2	7495	
298.90 > 99.00	2.063	2.059	0.004	1.000	6250955		2.56(1.35-4.05)	96.2	2758	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.351	2.351	0.0	0.736	558337	2.44		105	834	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.351	2.352	-0.001	1.140	2759369	4.78		102	2617	
D 9 13C2 PFHxA										
315.00 > 270.00	2.398	2.394	0.004	0.751	6555120	2.58		103	3825	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.398	2.396	0.002	1.000	11318340	4.98	Target=13.92	99.7	2144	
313.00 > 119.00	2.398	2.396	0.002	1.000	887945		12.75(6.96-20.87)	99.7	1437	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.417	2.410	0.007	1.172	9023563	4.93	Target=2.30	105	3203	
349.00 > 99.00	2.417	2.410	0.007	1.172	4441284		2.03(1.15-3.45)	105	3730	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.515	2.512	0.003	1.000	2412304	4.59		91.7	1056	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.515	2.512	0.003	0.787	613460	2.69		108	2119	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.789	2.790	-0.001	0.997	15212052	4.72	Target=4.34	94.3	2034	
363.00 > 169.00	2.798	2.790	0.008	1.000	3703974		4.11(2.17-6.52)	94.3	2408	
D 16 13C4 PFHpA										
367.00 > 322.00	2.798	2.791	0.007	0.876	7751362	2.48		99.4	3201	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.798	2.798	0.0	1.000	12450574	4.35	Target=3.80	95.6	1552	
399.00 > 99.00	2.798	2.798	0.0	1.000	3707886		3.36(1.90-5.70)	95.6	1238	
D 17 18O2 PFHxS										
403.00 > 84.00	2.798	2.798	0.0	0.876	5470177	2.48		105	2104	
19 DONA										
377.00 > 251.00	2.844	2.841	0.003	0.796	23517529	4.47	Target=2.26	95.0	3345	
377.00 > 85.00	2.844	2.841	0.003	0.796	11382346		2.07(1.13-3.39)	95.0	3661	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.179	3.175	0.004	0.995	701339	2.28		96.1	1325	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.179	3.177	0.002	1.000	3096454	4.97		105	1997	
D 22 13C8 PFOA										
421.00 > 376.00	3.195	3.191	0.004		5819713	2.46		101	2198	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.195	3.191	0.004	0.894	12115333	5.04	Target=3.69	106	2868	
449.00 > 99.00	3.195	3.191	0.004	0.894	3166925		3.83(1.84-5.53)	106	2217	
* 24 13C2 PFOA										
415.00 > 370.00	3.195	3.194	0.001		6833524	2.50			2831	
D 25 13C4 PFOA										
417.00 > 372.00	3.203	3.195	0.008	1.002	6793920	2.51		100	2826	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.203	3.195	0.008	1.000	12961493	4.60	Target=2.72	91.9	1320	
413.00 > 169.00	3.195	3.195	0.0	0.998	5112613		2.54(1.36-4.08)	91.9	4745	
D 27 13C8 PFOS										
507.00 > 99.00	3.566	3.566	0.0		1258957	2.51		105	2050	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.573	3.570	0.003	1.000	11595430	4.83	Target=4.08	104	2908	
499.00 > 99.00	3.573	3.570	0.003	1.000	2867811		4.04(2.04-6.12)	104	4357	
D 28 13C4 PFOS										
503.00 > 80.00	3.573	3.571	0.002	1.118	5448850	2.42		101	2374	
D 31 13C5 PFNA										
468.00 > 423.00	3.588	3.584	0.004	1.123	6030787	2.47		99.0	2583	
30 Perfluorononanoic acid										
463.00 > 419.00	3.588	3.586	0.002	1.000	11446862	4.77	Target=5.35	95.3	1330	
463.00 > 169.00	3.588	3.586	0.002	1.000	2333691		4.91(2.68-8.03)	95.3	2242	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.779	3.774	0.005	1.058	10133130	4.65		99.8	2763	
D 33 13C8 FOSA										
506.00 > 78.00	3.900	3.891	0.009	1.221	3759826	2.54		101	3460	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.900	3.894	0.006	1.000	20981246	4.80		96.0	3426	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.926	3.919	0.007	1.099	6809088	5.11	Target=6.03	106	3083	
549.00 > 99.00	3.926	3.919	0.007	1.099	1092325		6.23(3.02-9.05)	106	1585	
D 36 13C2 PFDA										
515.00 > 470.00	3.944	3.942	0.002	1.234	5725271	2.40		96.1	2918	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.944	3.943	0.001	1.000	12588600	4.79	Target=14.23	95.7	2505	
513.00 > 169.00	3.953	3.943	0.010	1.002	915170		13.76(7.12-21.35)	95.7	359	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.953	3.946	0.007	1.000	2463128	4.78		99.9	3009	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.953	3.947	0.006	1.237	86841	2.46		103	398	
47 MeFOSA										
512.00 > 169.00	4.016	4.005	0.011		11058	NC			0.1	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.111	4.109	0.002	1.287	1624805	2.60		104	2040	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.120	4.114	0.006	1.002	2872662	5.10		102	650	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.240	4.241	-0.001	1.187	9818093	4.92	Target=4.28	102	2957	
599.00 > 99.00	4.240	4.241	-0.001	1.187	2207917		4.45(2.14-6.43)	102	3252	
D 44 13C2 PFUnA										
565.00 > 520.00	4.266	4.266	0.0	1.335	4854709	2.59		104	4474	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.275	4.270	0.005	1.002	7375387	4.56	Target=10.48	91.1	1507	
563.00 > 169.00	4.266	4.270	-0.004	1.000	783138		9.42(5.24-15.72)	91.1	1869	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.275	4.272	0.003	1.338	1342267	2.58		103	1294	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.283	4.278	0.005	1.002	2213775	4.98		99.6	1633	
51 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.283	4.279	0.004		31468	NC			0.2	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.409	4.407	0.002	1.234	12004201	4.67		99.1	3046	
D 49 13C2 PFDoA										
615.00 > 570.00	4.565	4.560	0.005	1.429	5517310	2.43		97.1	3740	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.565	4.561	0.004	1.000	10740648	5.07	Target=9.37	101	1984	
613.00 > 169.00	4.565	4.561	0.004	1.000	1252659		8.57(4.68-14.05)	101	1781	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.582	4.578	0.004	1.159	1514293	4.72		97.9	3111	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.795	4.793	0.002	1.342	1088185	5.25	Target=0.55	109	3097	
699.00 > 99.00	4.795	4.793	0.002	1.342	1995012		0.55(0.28-0.83)	109	2472	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.831	4.830	0.001	1.058	8318177	4.97	Target=6.18	99.3	2280	
663.00 > 169.00	4.831	4.830	0.001	1.058	1549135		5.37(3.09-9.27)	99.3	2791	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.082	5.080	0.002	1.591	4056665	2.58		103	6446	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.082	5.080	0.002	1.000	1381405	5.21	Target=1.39	104	3105	
713.00 > 219.00	5.074	5.080	-0.006	0.998	959856		1.44(0.70-2.09)	104	1951	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.544	5.545	-0.001	1.735	3972465	2.70		108	3898	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.544	5.546	-0.002	1.000	6994450	4.97	Target=5.55	99.4	504	
813.00 > 169.00	5.544	5.546	-0.002	1.000	1269911		5.51(2.77-8.32)	99.4	2168	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.055	6.053	0.002	1.092	5041488	5.14	Target=5.09	103	897	
913.00 > 169.00	6.049	6.053	-0.004	1.091	977684		5.16(2.55-7.64)	103	1717	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL6_00010 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:30:13 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._007.d

Injection Date: 08-Jan-2019 18:18:45 Instrument ID: A9

Lims ID: IC L6 Full

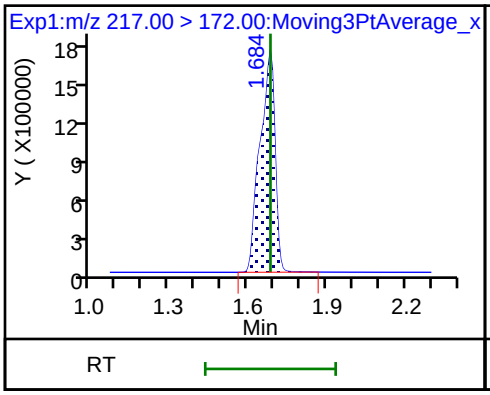
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 15 Worklist Smp#: 7

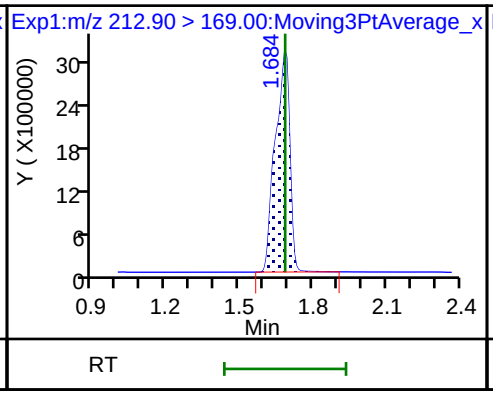
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

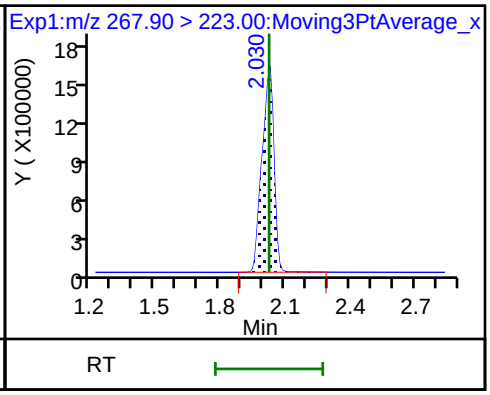
D 1 13C4 PFBA



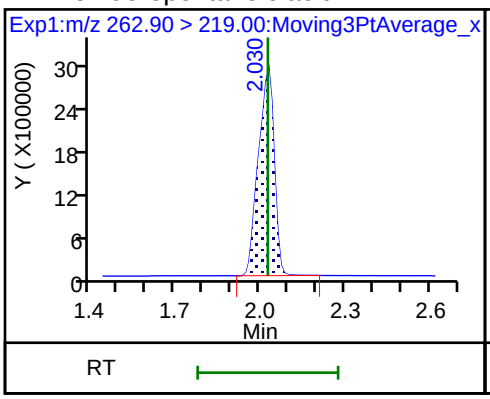
2 Perfluorobutanoic acid



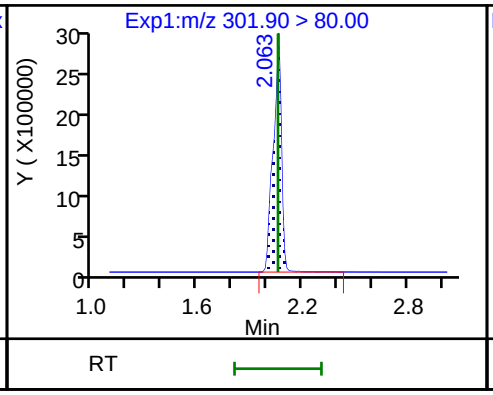
D 3 13C5 PFPeA



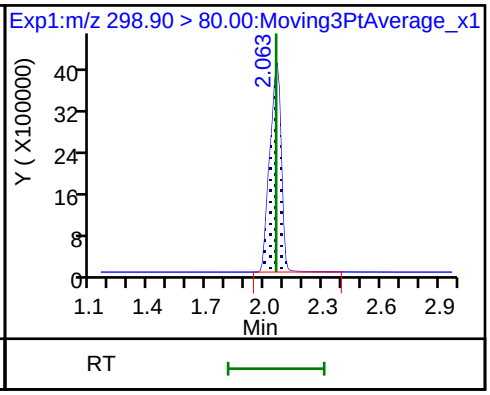
4 Perfluoropentanoic acid



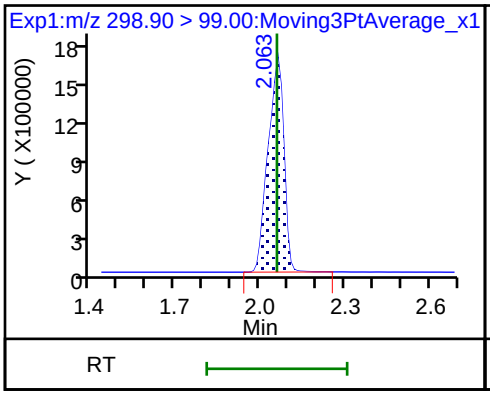
D 5 13C3 PFBS



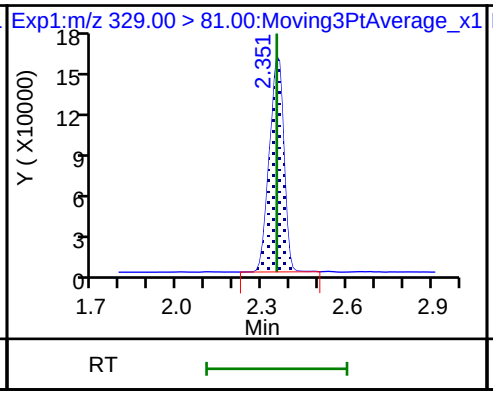
6 Perfluorobutanesulfonic acid



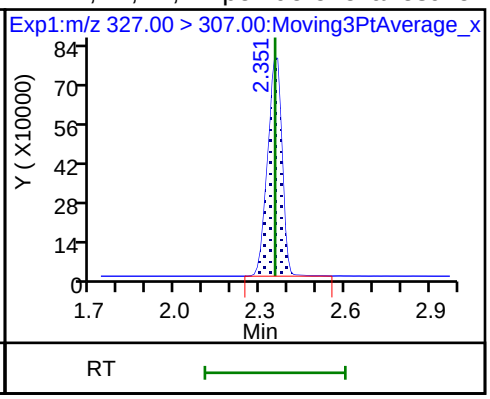
6 Perfluorobutanesulfonic acid



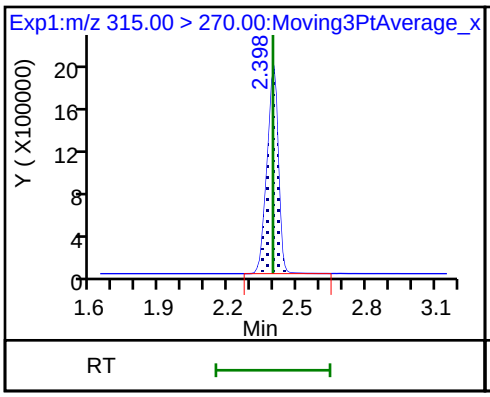
D 8 M2-4:2 FTS



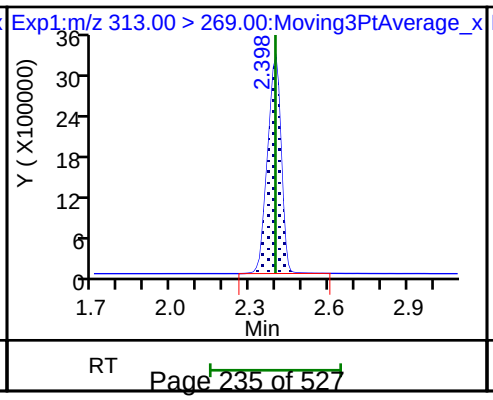
7 1H,1H,2H,2H-perfluorohexanesulfoni



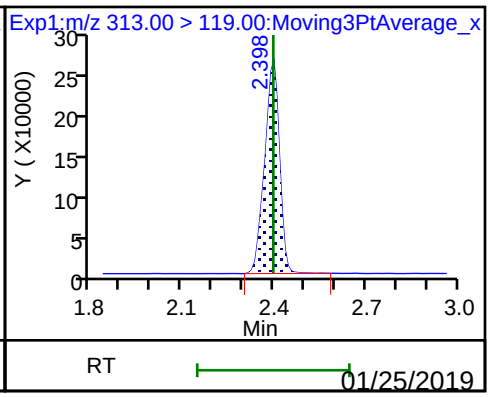
D 9 13C2 PFHxA



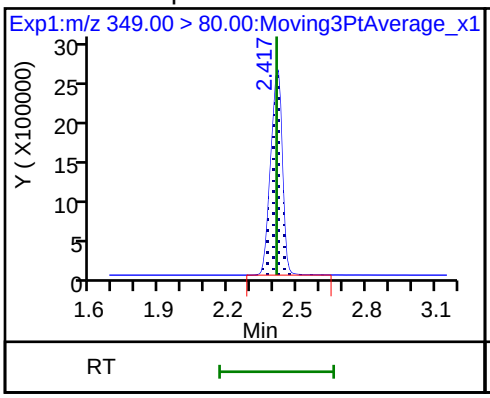
10 Perfluorohexanoic acid



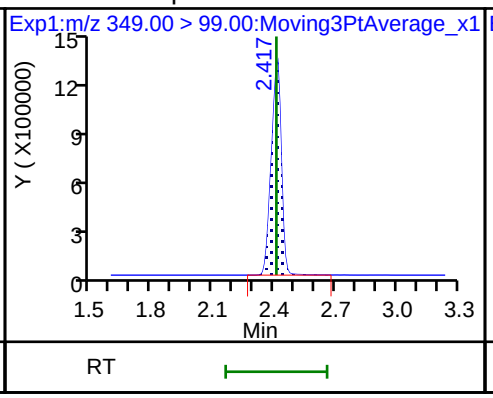
10 Perfluorohexanoic acid



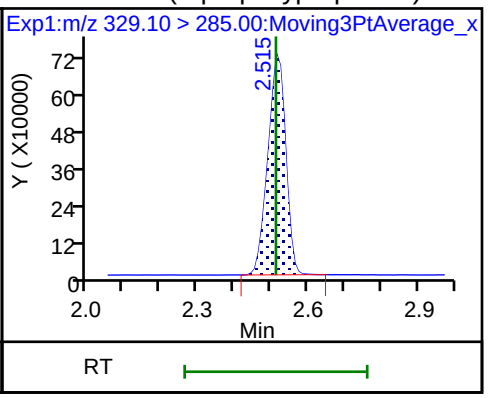
11 Perfluoropentanesulfonic acid



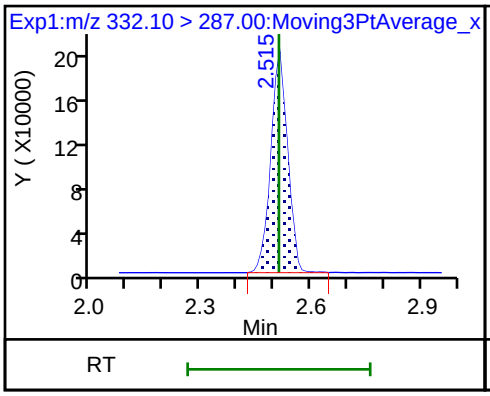
11 Perfluoropentanesulfonic acid



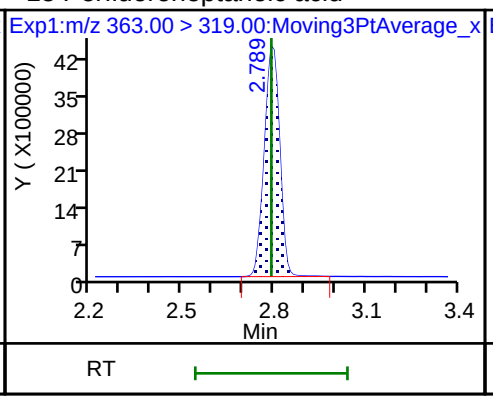
14 Perfluoro(2-propoxypropanoic) acid



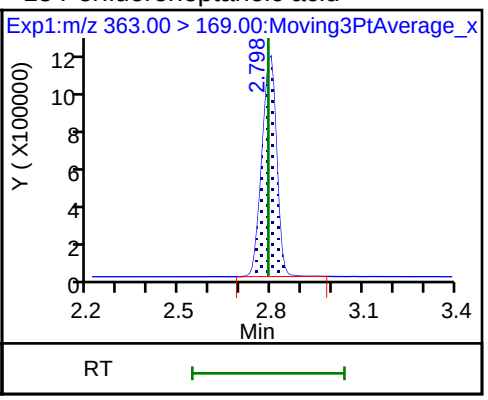
D 13 13C3 HFPO-DA



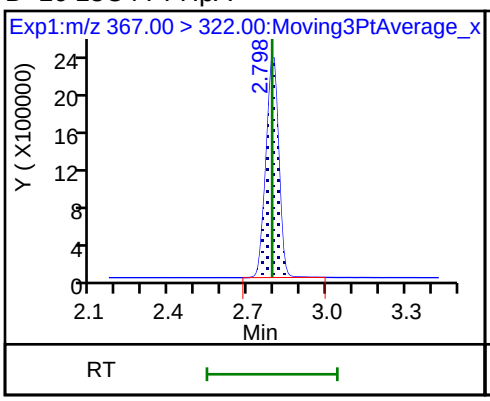
15 Perfluoroheptanoic acid



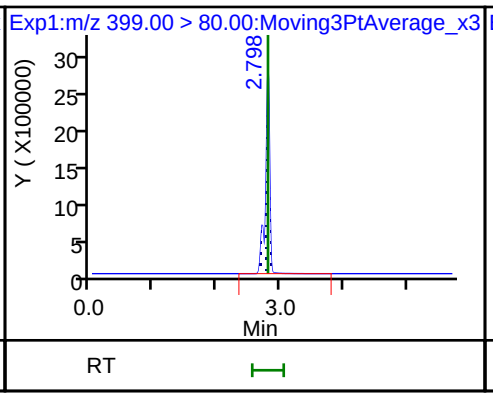
15 Perfluoroheptanoic acid



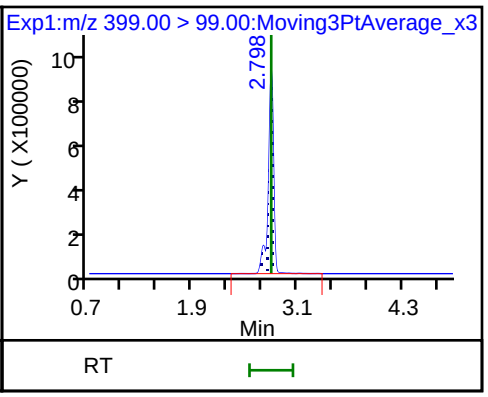
D 16 13C4 PFHpA



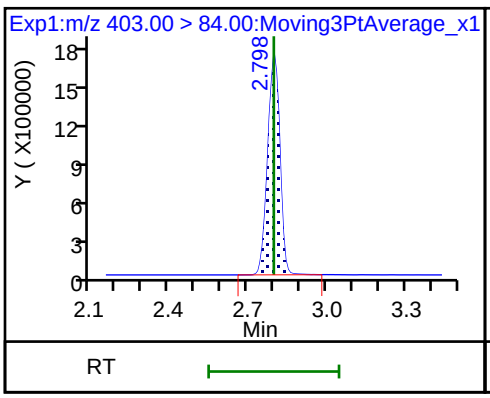
18 Perfluorohexanesulfonic acid



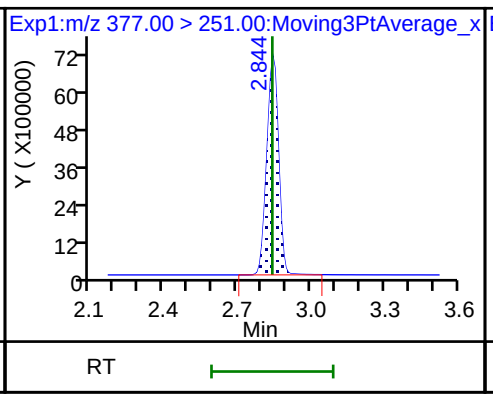
18 Perfluorohexanesulfonic acid



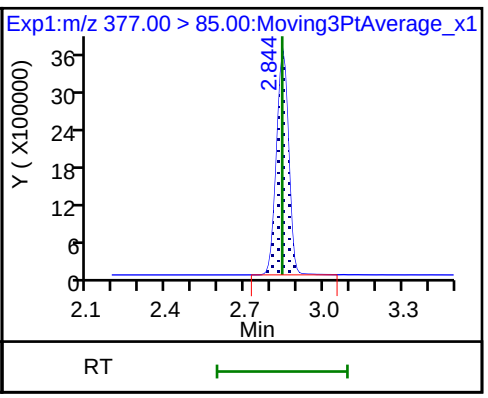
D 17 18O2 PFHxS



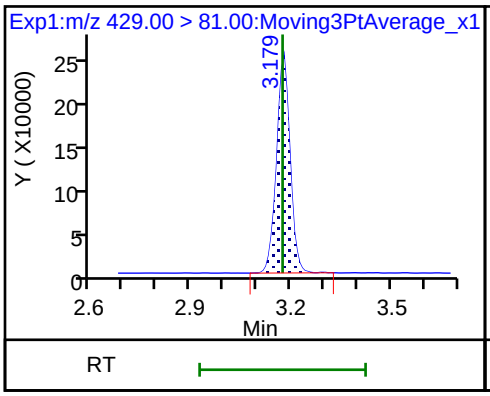
19 DONA



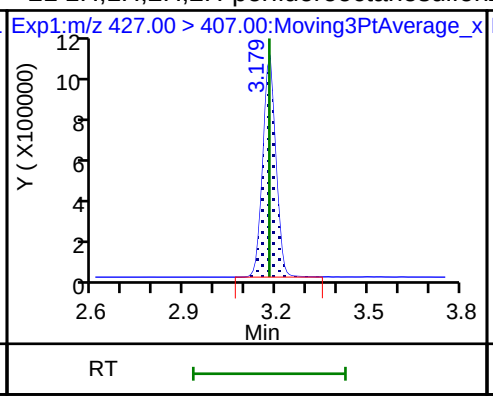
19 DONA



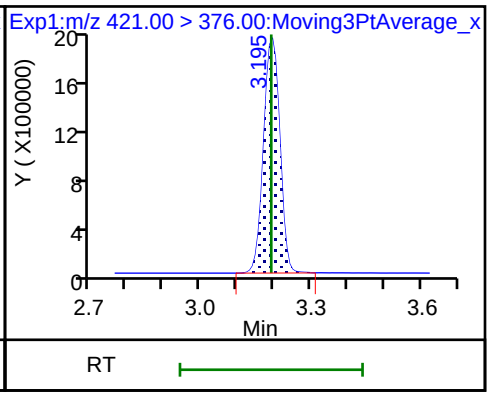
D 20 M2-6:2 FTS



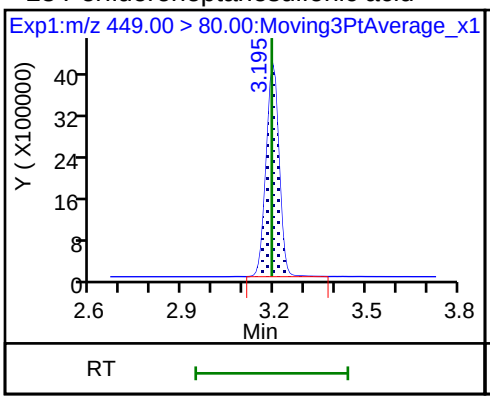
21 1H,1H,2H,2H-perfluorooctanesulfon



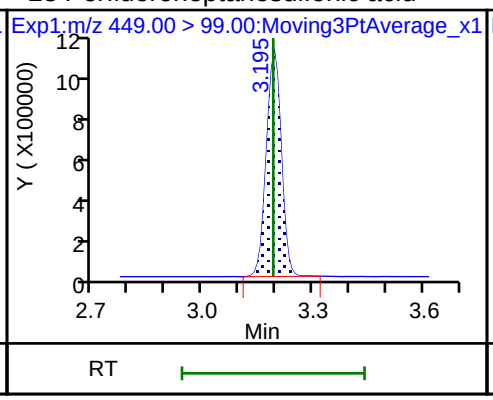
D 22 13C8 PFOA



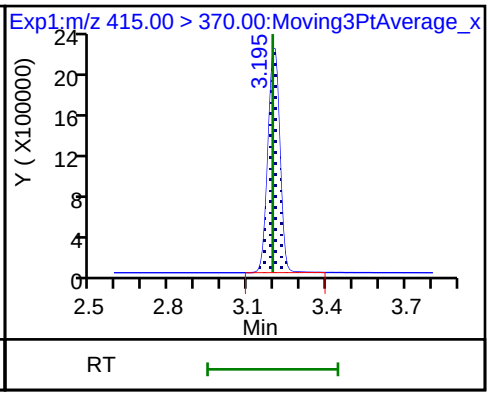
23 Perfluoroheptanesulfonic acid



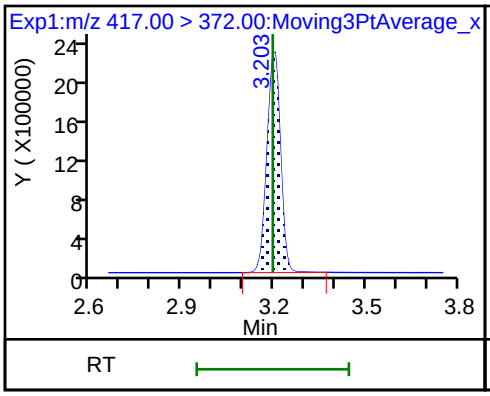
23 Perfluoroheptanesulfonic acid



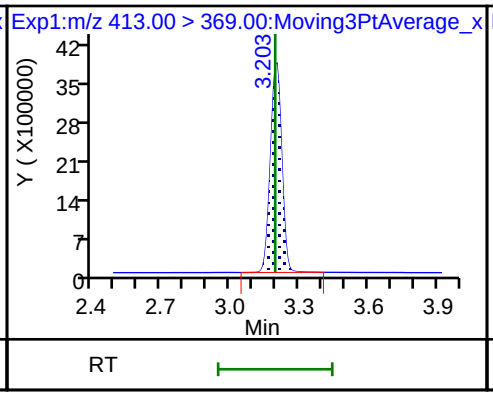
* 24 13C2 PFOA



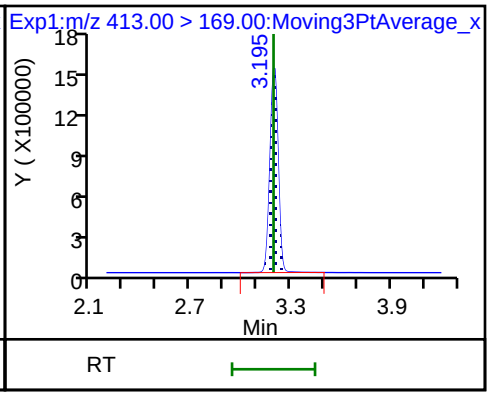
D 25 13C4 PFOA



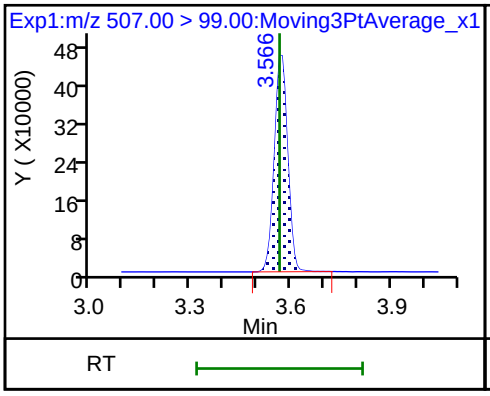
26 Perfluorooctanoic acid



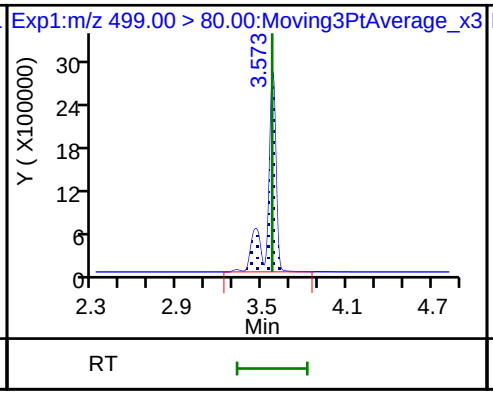
26 Perfluorooctanoic acid



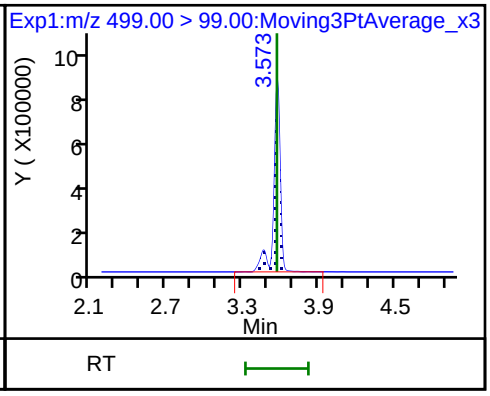
D 27 13C8 PFOS



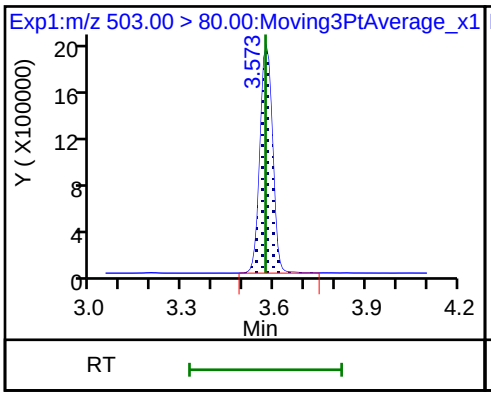
29 Perfluorooctanesulfonic acid



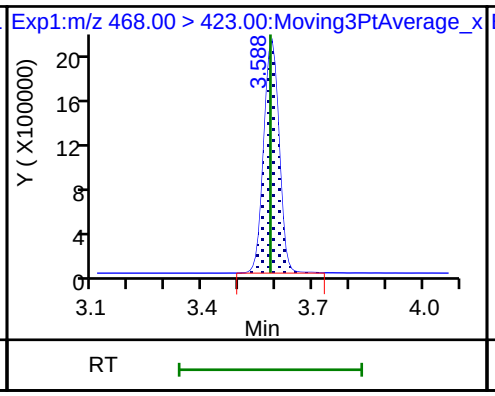
29 Perfluorooctanesulfonic acid



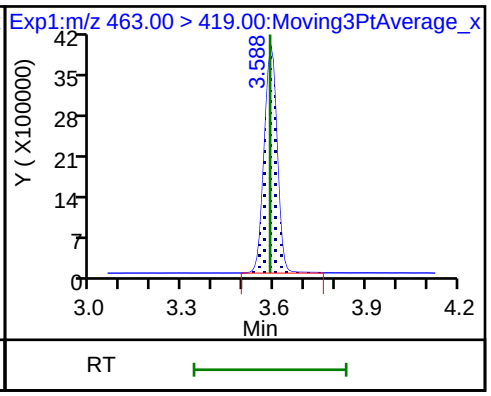
D 28 13C4 PFOS



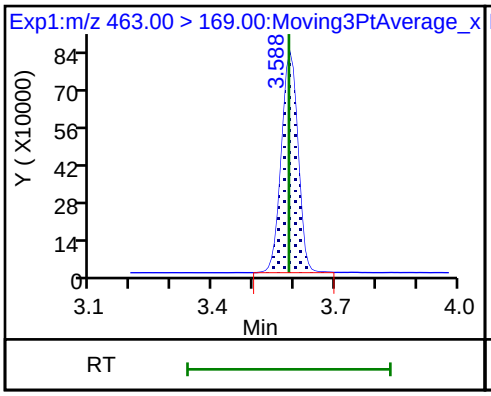
D 31 13C5 PFNA



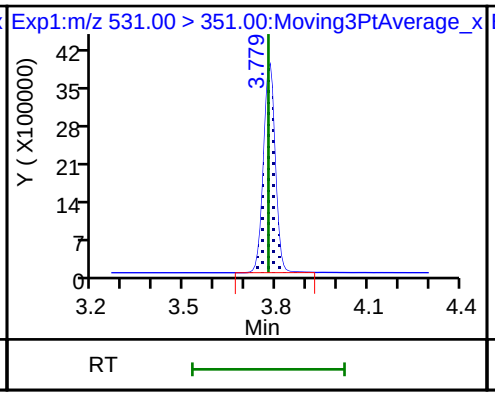
30 Perfluorononanoic acid



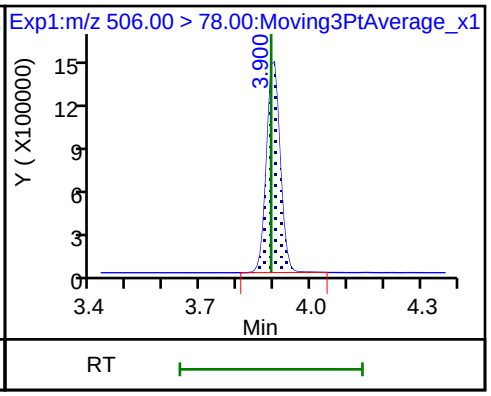
30 Perfluorononanoic acid



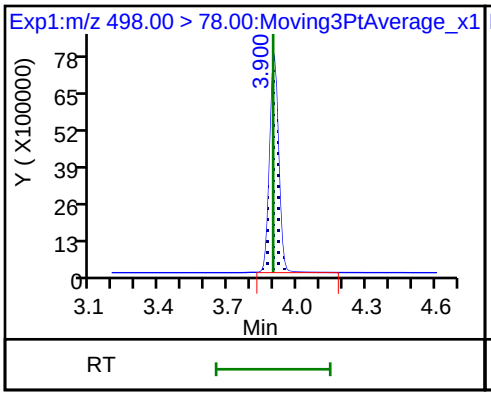
32 9-Chlorohexadecafluoro-3-oxanonane



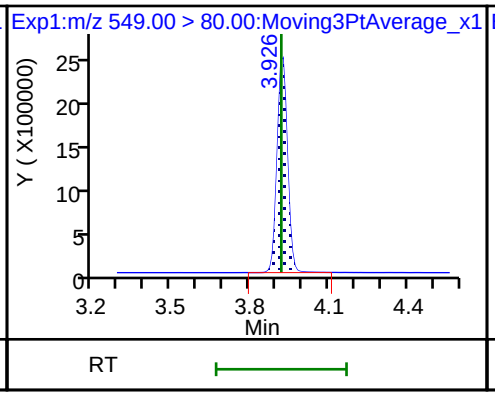
D 33 13C8 FOSA



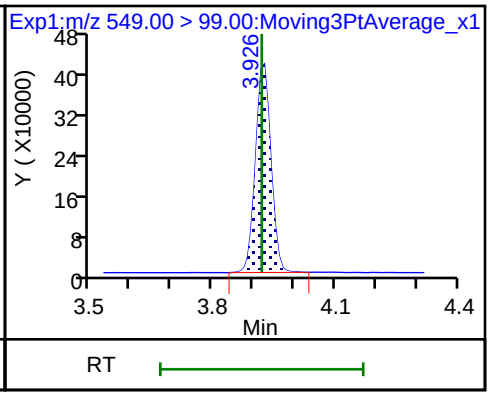
34 Perfluorooctanesulfonamide



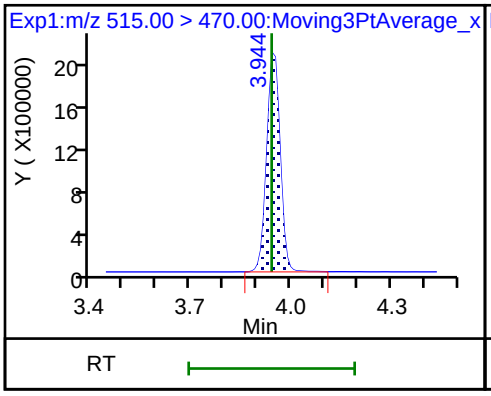
35 Perfluorononanesulfonic acid



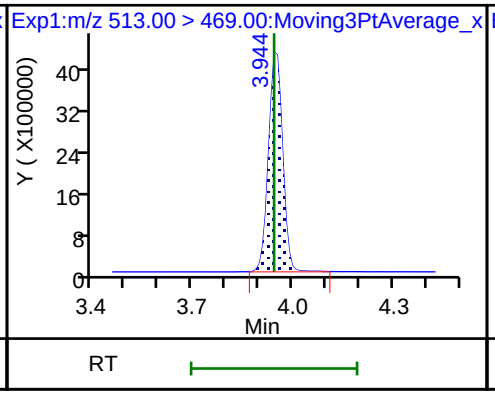
35 Perfluorononanesulfonic acid



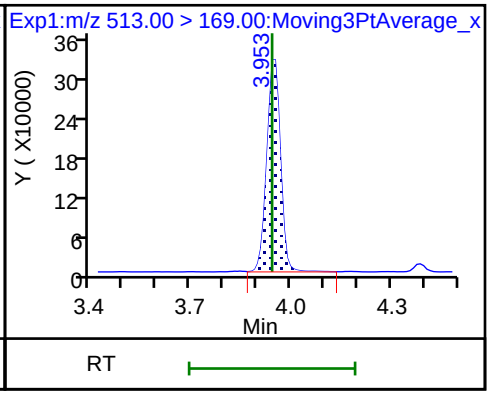
D 36 13C2 PFDA



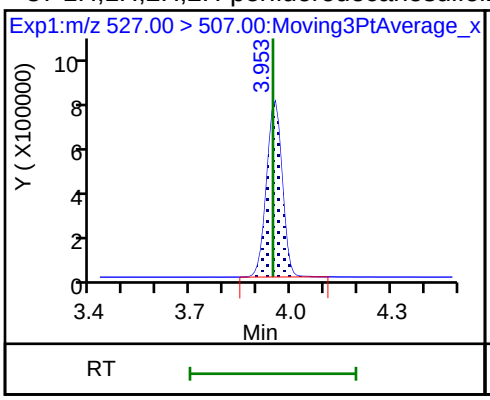
38 Perfluorodecanoic acid



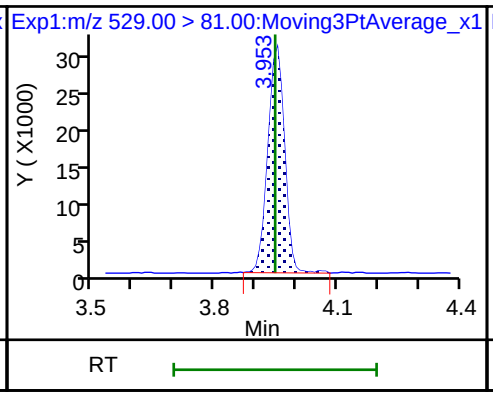
38 Perfluorodecanoic acid



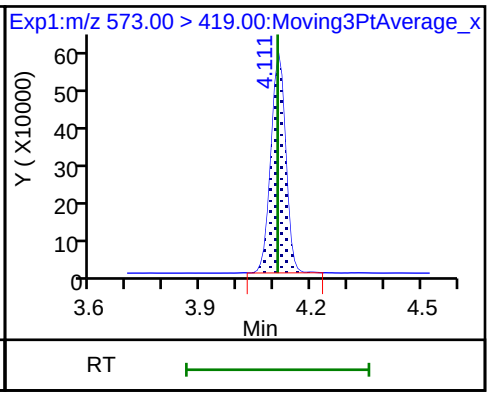
37 1H,1H,2H,2H-perfluorodecanesulfon



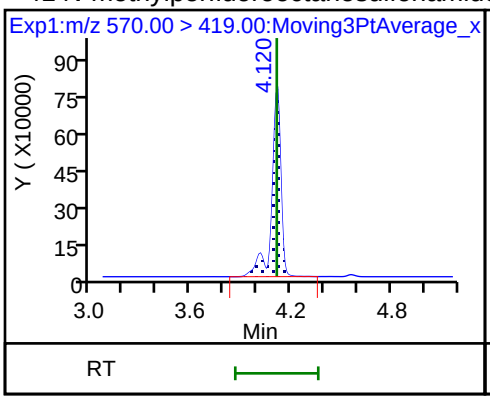
D 39 M2-8:2 FTS



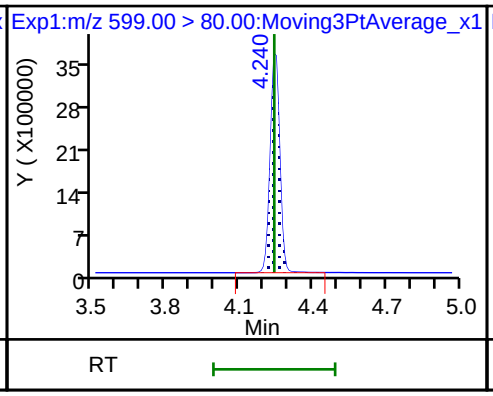
D 40 d3-NMeFOSAA



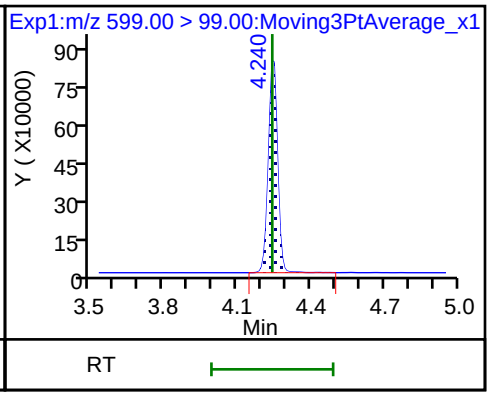
41 N-methylperfluorooctanesulfonamido



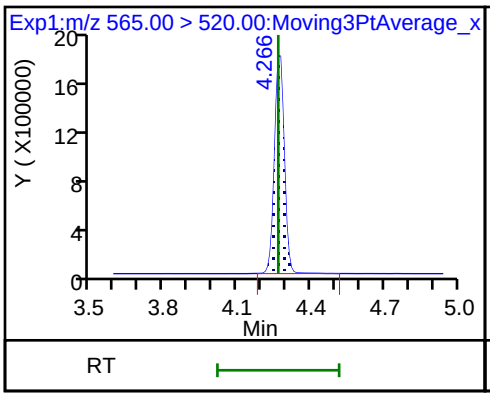
42 Perfluorodecanesulfonic acid



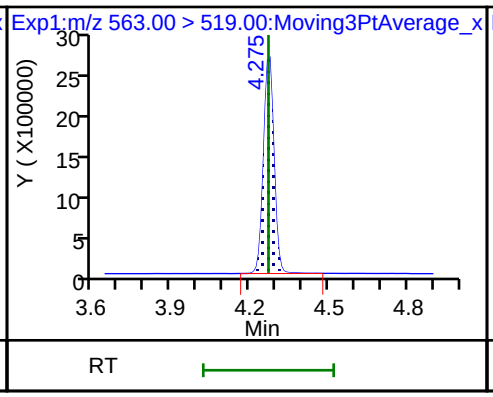
42 Perfluorodecanesulfonic acid



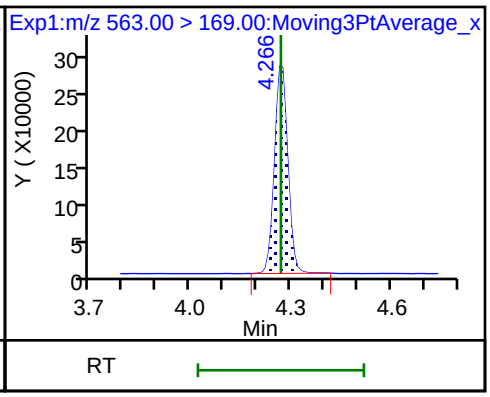
D 44 13C2 PFUnA



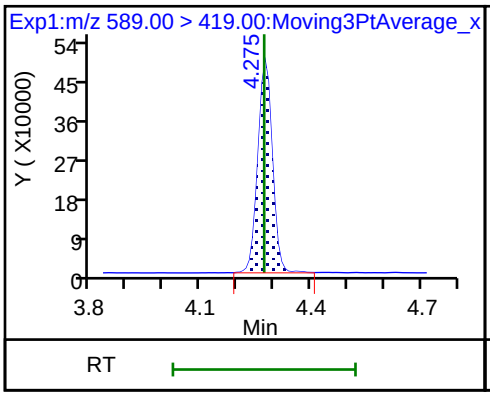
43 Perfluoroundecanoic acid



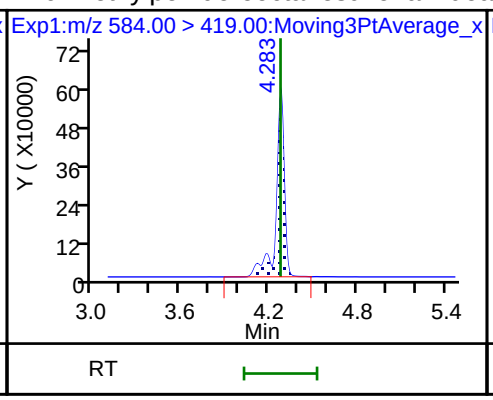
43 Perfluoroundecanoic acid



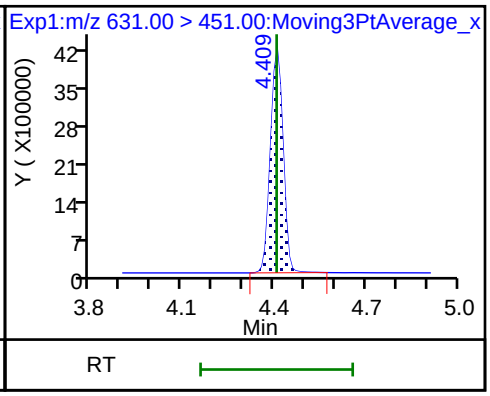
D 45 d5-NEtFOSAA



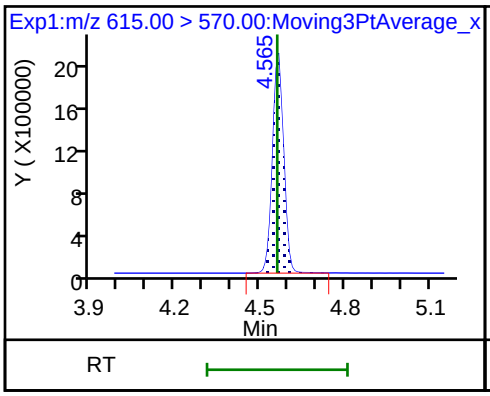
46 N-ethylperfluorooctanesulfonamidoa



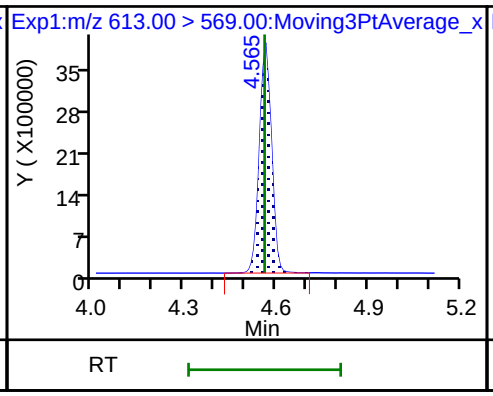
48 11-Chloroeicosafluoro-3-oxaundecan



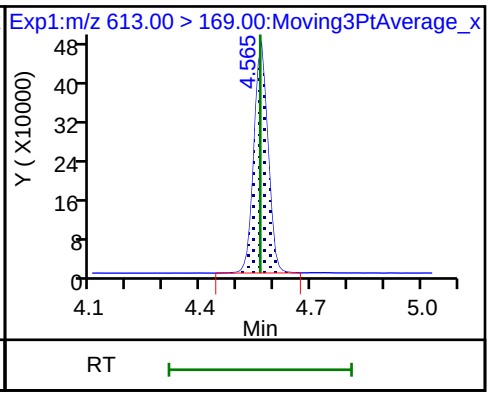
D 49 13C2 PFDoA



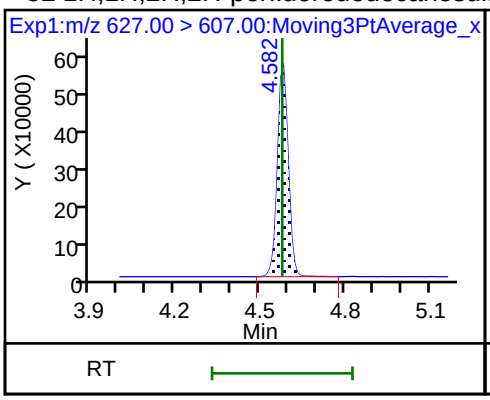
50 Perfluorododecanoic acid



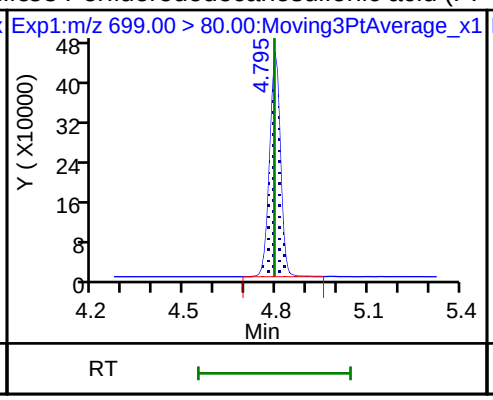
50 Perfluorododecanoic acid



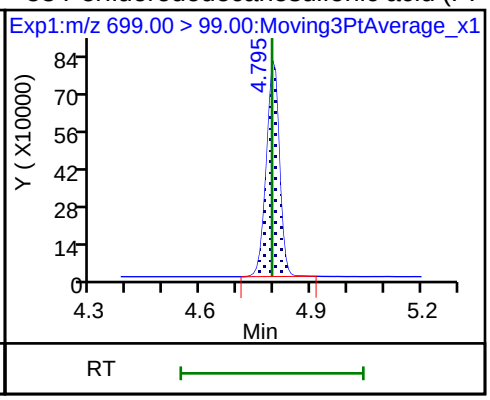
52 1H,1H,2H-perfluorododecanesulfo



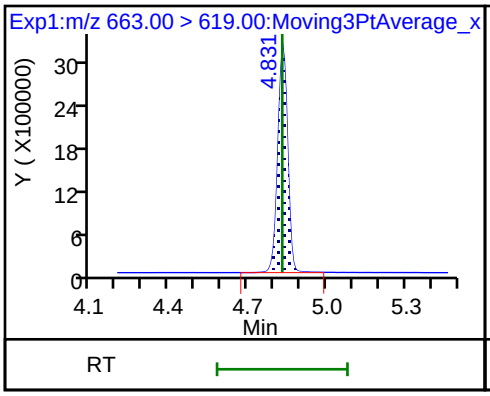
53 Perfluorododecanesulfonic acid (PF



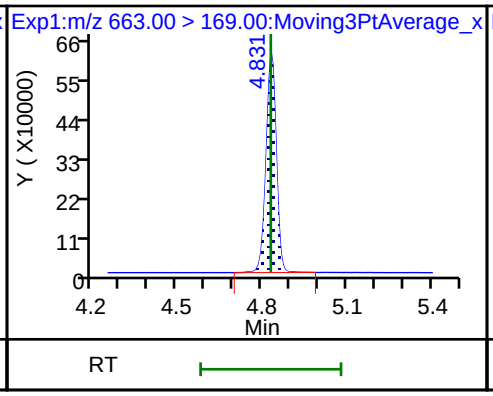
53 Perfluorododecanesulfonic acid (PF



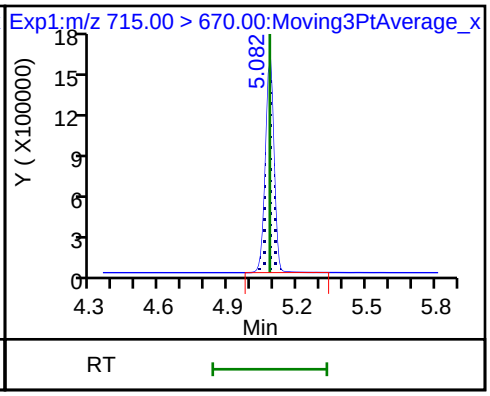
54 Perfluorotridecanoic acid



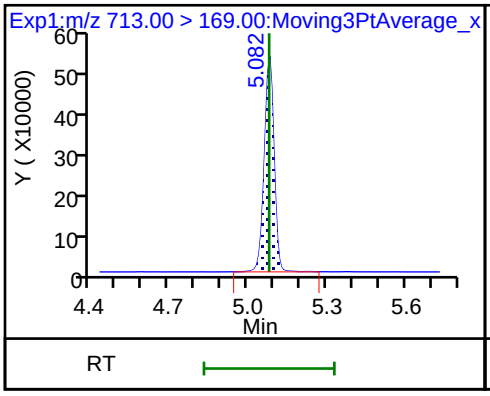
54 Perfluorotridecanoic acid



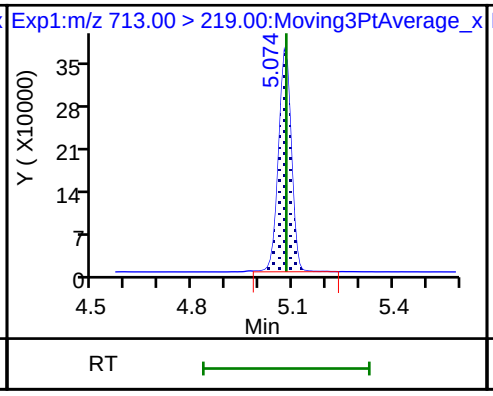
D 55 13C2 PFTeDA



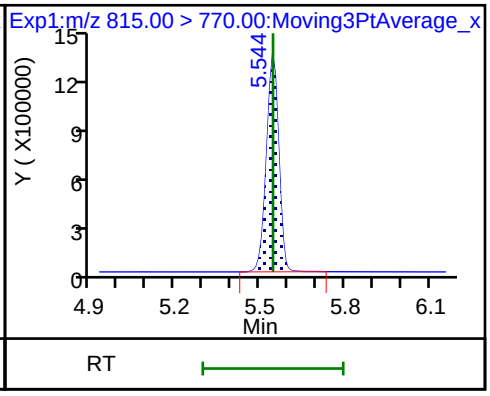
56 Perfluorotetradecanoic acid



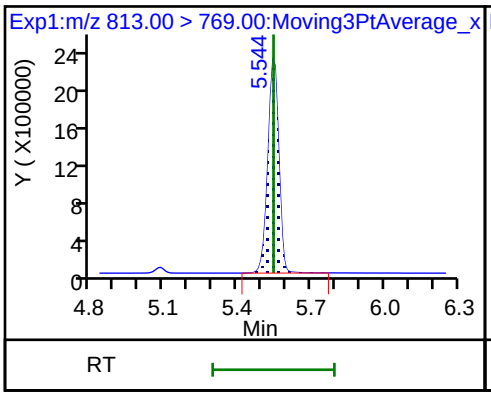
56 Perfluorotetradecanoic acid



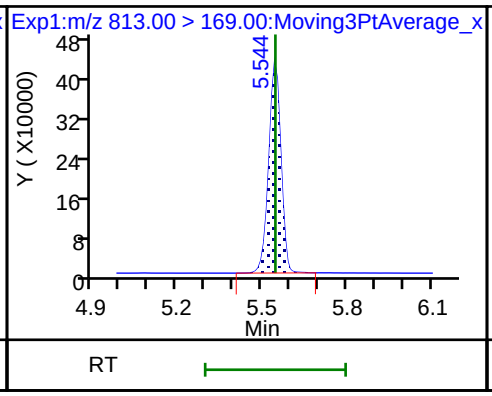
D 57 13C2 PFHxDA



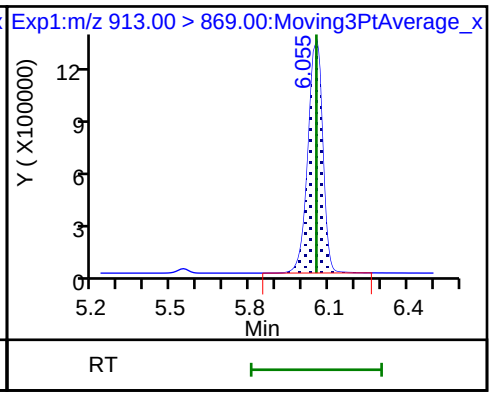
58 Perfluorohexadecanoic acid



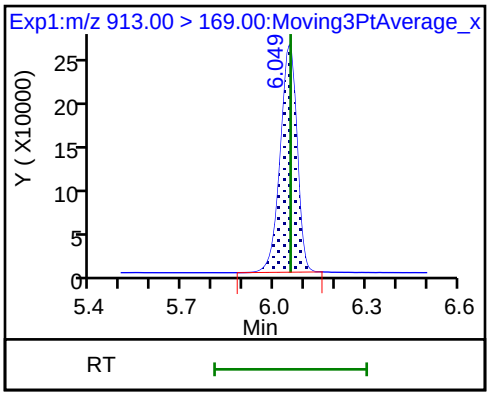
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d
Lims ID: IC L7 Full
Client ID:
Sample Type: IC Calib Level: 7
Inject. Date: 08-Jan-2019 18:26:16 ALS Bottle#: 16 Worklist Smp#: 8
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CAL STD7
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub5

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:30:18 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 08:06:50
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.688	1.685	0.003	0.528	6546007	2.57		103	12099	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.688	1.686	0.002	1.000	22503572	9.28		92.8	1715	
D 3 13C5 PFPeA										
267.90 > 223.00	2.025	2.025	0.0	0.634	5506117	2.47		98.7	4359	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.025	2.027	-0.002	1.000	20061830	9.11		91.1	899	
D 5 13C3 PFBS										
301.90 > 80.00	2.057	2.059	-0.002	0.644	8603777	2.35		101	637015	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.057	2.059	-0.002	1.000	28684194	8.03	Target=2.70	90.9	3140	
298.90 > 99.00	2.057	2.059	-0.002	1.000	11703268		2.45(1.35-4.05)	90.9	5809	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.346	2.351	-0.005	0.734	523894	2.35		100	763	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.354	2.352	0.002	1.145	5020417	9.17		98.2	2614	
D 9 13C2 PFHxA										
315.00 > 270.00	2.392	2.394	-0.002	0.748	6078302	2.45		98.1	2382	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.401	2.396	0.005	1.004	19087472	9.06	Target=13.92	90.6	2012	
313.00 > 119.00	2.392	2.396	-0.004	1.000	1623120		11.76(6.96-20.87)	90.6	1824	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.411	2.410	0.001	1.172	15788524	9.10	Target=2.30	97.0	3921	
349.00 > 99.00	2.411	2.410	0.001	1.172	7999912		1.97(1.15-3.45)	97.0	3310	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.518	2.512	0.006	1.000	4802332	8.83		88.3	1546	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.518	2.512	0.006	0.788	633898	2.85		114	1514	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.790	2.790	0.0	1.000	25691646	8.45	Target=4.34	84.5	2334	
363.00 > 169.00	2.790	2.790	0.0	1.000	6833188		3.76(2.17-6.52)	84.5	3044	
D 16 13C4 PFHpA										
367.00 > 322.00	2.790	2.791	-0.001	0.873	7308125	2.40		95.9	2880	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.799	2.798	0.001	1.000	22782070	8.61	Target=3.80	94.6	1516	
399.00 > 99.00	2.799	2.798	0.001	1.000	6957685		3.27(1.90-5.70)	94.6	3124	
D 17 18O2 PFHxS										
403.00 > 84.00	2.799	2.798	0.001	0.876	5056556	2.35		99.2	2596	
19 DONA										
377.00 > 251.00	2.844	2.841	0.003	0.796	37090627	7.26	Target=2.26	77.1	2018	
377.00 > 85.00	2.844	2.841	0.003	0.796	20009836		1.85(1.13-3.39)	77.1	3279	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.172	3.175	-0.003	0.993	634902	2.11		89.0	1286	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.172	3.177	-0.005	1.000	5692522	10.1		106	1958	
D 22 13C8 PFOA										
421.00 > 376.00	3.188	3.191	-0.003		5488311	2.32		94.9	2169	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.196	3.191	0.005	0.894	20413351	8.73	Target=3.69	91.7	2352	
449.00 > 99.00	3.196	3.191	0.005	0.894	5994201		3.41(1.84-5.53)	91.7	2963	
* 24 13C2 PFOA										
415.00 > 370.00	3.196	3.194	0.002		6677826	2.50			2197	
D 25 13C4 PFOA										
417.00 > 372.00	3.196	3.195	0.001	1.000	6436164	2.43		97.4	2180	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.196	3.195	0.001	1.000	21943062	8.22	Target=2.72	82.1	3519	
413.00 > 169.00	3.196	3.195	0.001	1.000	9548636		2.30(1.36-4.08)	82.1	6624	
D 27 13C8 PFOS										
507.00 > 99.00	3.567	3.566	0.001		1176313	2.35		98.3	1992	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.574	3.570	0.004	1.000	21564747	9.23	Target=4.08	99.5	3583	
499.00 > 99.00	3.574	3.570	0.004	1.000	5445921		3.96(2.04-6.12)	99.5	6490	
D 28 13C4 PFOS										
503.00 > 80.00	3.574	3.571	0.003	1.118	5296197	2.41		101	2277	
D 31 13C5 PFNA										
468.00 > 423.00	3.589	3.584	0.005	1.123	5479314	2.30		92.0	2853	
30 Perfluorononanoic acid										
463.00 > 419.00	3.589	3.586	0.003	1.000	18488723	8.47	Target=5.35	84.7	1796	
463.00 > 169.00	3.582	3.586	-0.004	0.998	4168552		4.44(2.68-8.03)	84.7	2722	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.774	3.774	0.0	1.056	18004596	8.50		91.3	4399	
D 33 13C8 FOSA										
506.00 > 78.00	3.892	3.891	0.001	1.218	3492168	2.41		96.5	2926	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.892	3.894	-0.002	1.000	33223713	8.18		81.8	2931	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.918	3.919	-0.001	1.096	11512885	8.88	Target=6.03	92.5	4214	
549.00 > 99.00	3.918	3.919	-0.001	1.096	2091874		5.50(3.02-9.05)	92.5	2760	
D 36 13C2 PFDA										
515.00 > 470.00	3.945	3.942	0.003	1.234	5178371	2.22		88.9	2621	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.945	3.943	0.002	1.000	20439043	8.59	Target=14.23	85.9	4004	
513.00 > 169.00	3.945	3.943	0.002	1.000	1848613		11.06(7.12-21.35)	85.9	478	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.945	3.946	-0.001	0.998	4238147	9.27		96.7	2569	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.954	3.947	0.007	1.237	77164	2.24		93.4	421	
47 MeFOSA										
512.00 > 169.00	4.008	4.005	0.003		20386	NC			0.1	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.112	4.109	0.003	1.287	1634654	2.68		107	1857	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.112	4.114	-0.002	1.000	5753566	10.2		102	37778	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.242	4.241	0.001	1.187	16637221	8.58	Target=4.28	89.1	3164	
599.00 > 99.00	4.242	4.241	0.001	1.187	3963953		4.20(2.14-6.43)	89.1	2893	
D 44 13C2 PFUnA										
565.00 > 520.00	4.267	4.266	0.001	1.335	4347109	2.37		94.9	3472	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.267	4.270	-0.003	1.000	12978014	8.95	Target=10.48	89.5	2126	
563.00 > 169.00	4.267	4.270	-0.003	1.000	1486986		8.73(5.24-15.72)	89.5	2010	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.276	4.272	0.004	1.338	1213767	2.39		95.4	1483	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.276	4.278	-0.002	1.000	4238878	10.5		105	1961	
51 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.285	4.279	0.006		56746	NC			0.2	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.410	4.407	0.003	1.234	20532684	8.22		87.2	2890	
D 49 13C2 PFDoA										
615.00 > 570.00	4.557	4.560	-0.003	1.426	5530079	2.49		99.6	3244	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.557	4.561	-0.004	1.000	18163168	8.55	Target=9.37	85.5	2761	
613.00 > 169.00	4.557	4.561	-0.004	1.000	2449684		7.41(4.68-14.05)	85.5	2284	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.583	4.578	0.005	1.159	2955745	10.4		108	2862	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.795	4.793	0.002	1.342	2005766	9.97	Target=0.55	103	2488	
699.00 > 99.00	4.795	4.793	0.002	1.342	3737556		0.54(0.28-0.83)	103	2946	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.832	4.830	0.002	1.060	14302096	8.52	Target=6.18	85.2	3724	
663.00 > 169.00	4.832	4.830	0.002	1.060	2837895		5.04(3.09-9.27)	85.2	2925	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.075	5.080	-0.005	1.588	3925568	2.55		102	5030	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.075	5.080	-0.005	1.000	2539982	9.91	Target=1.39	99.1	3503	
713.00 > 219.00	5.075	5.080	-0.005	1.000	1824940		1.39(0.70-2.09)	99.1	2114	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.544	5.545	-0.001	1.735	3818410	2.65		106	4015	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.544	5.546	-0.002	1.000	12447415	9.22	Target=5.55	92.2	847	
813.00 > 169.00	5.544	5.546	-0.002	1.000	2507736		4.96(2.77-8.32)	92.2	3927	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.043	6.053	-0.010	1.090	9520921	10.1	Target=5.09	101	1500	
913.00 > 169.00	6.043	6.053	-0.010	1.090	1852712		5.14(2.55-7.64)	101	2139	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL7_00009 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:30:21 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Injection Date: 08-Jan-2019 18:26:16 Instrument ID: A9

Lims ID: IC L7 Full

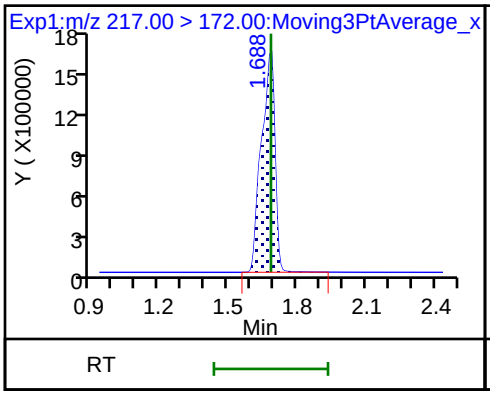
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 16 Worklist Smp#: 8

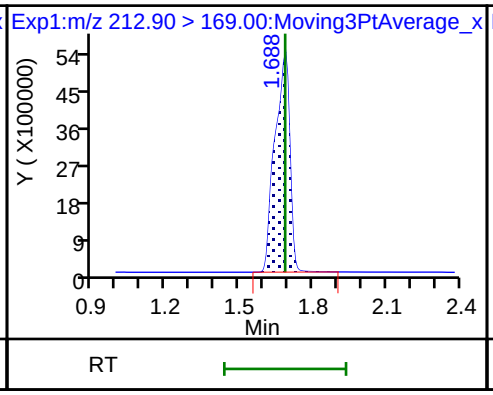
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

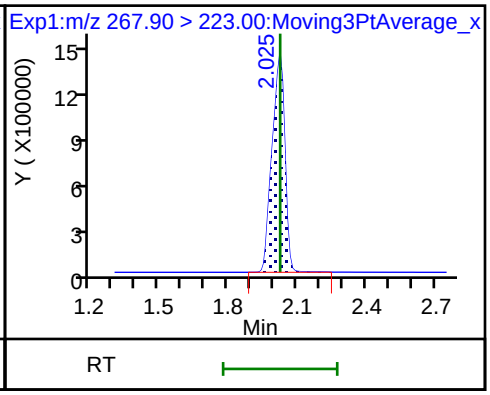
D 1 13C4 PFBA



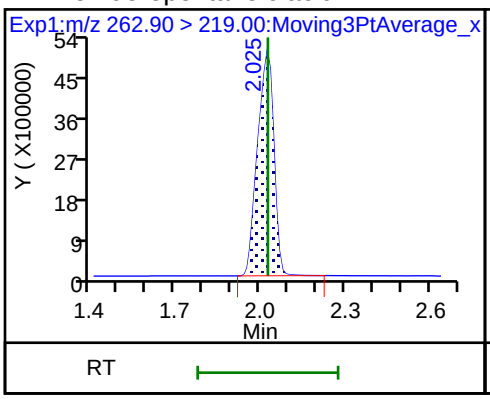
2 Perfluorobutanoic acid



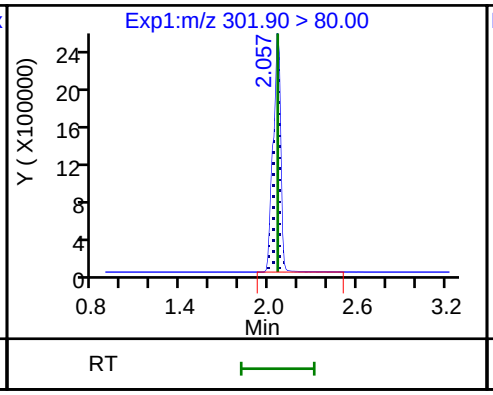
D 3 13C5 PFPeA



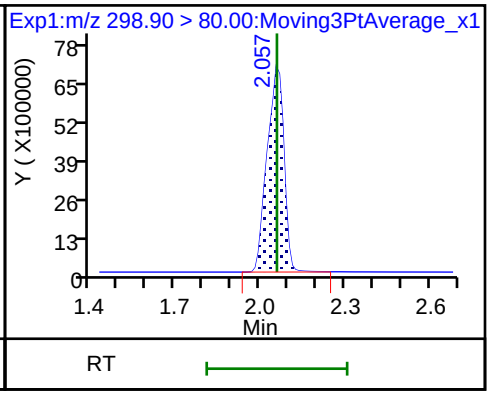
4 Perfluoropentanoic acid



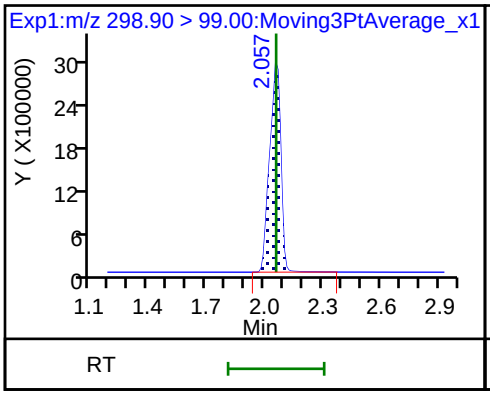
D 5 13C3 PFBS



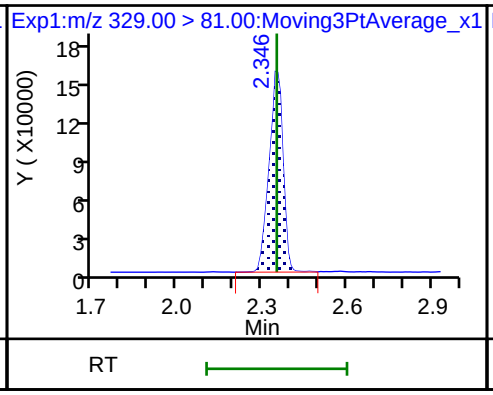
6 Perfluorobutanesulfonic acid



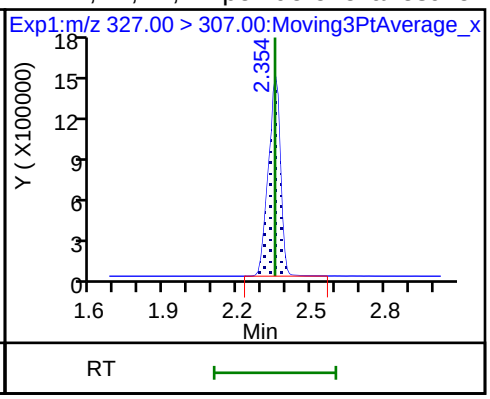
6 Perfluorobutanesulfonic acid



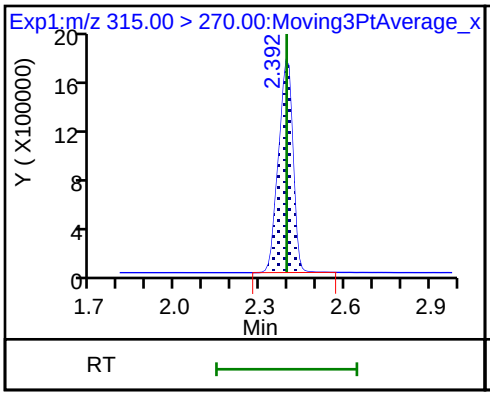
D 8 M2-4:2 FTS



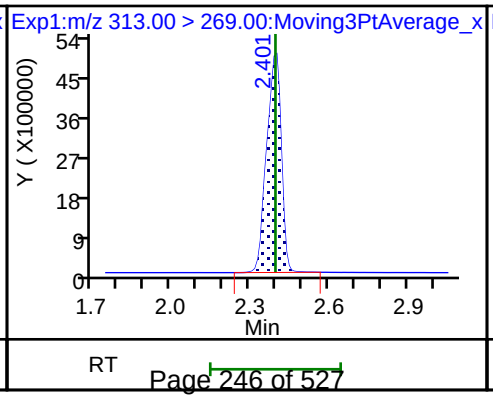
7 1H,1H,2H,2H-perfluorohexanesulfoni



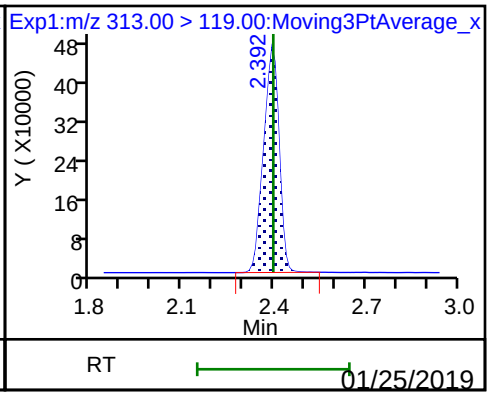
D 9 13C2 PFHxA



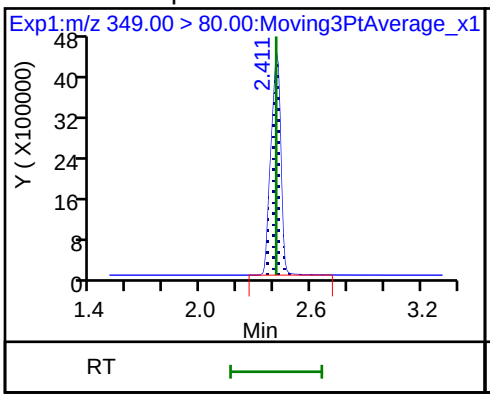
10 Perfluorohexanoic acid



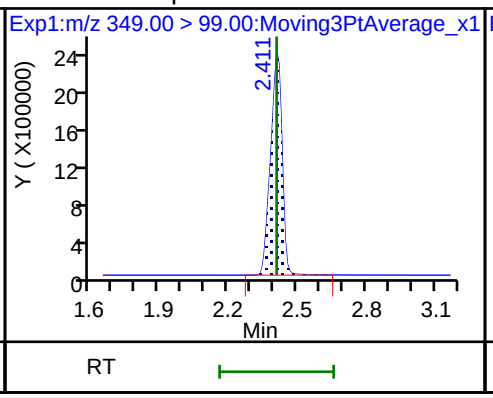
10 Perfluorohexanoic acid



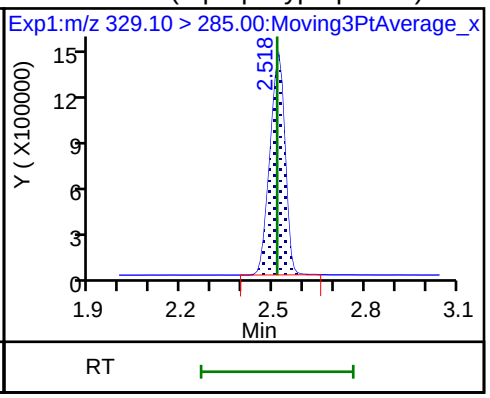
11 Perfluoropentanesulfonic acid



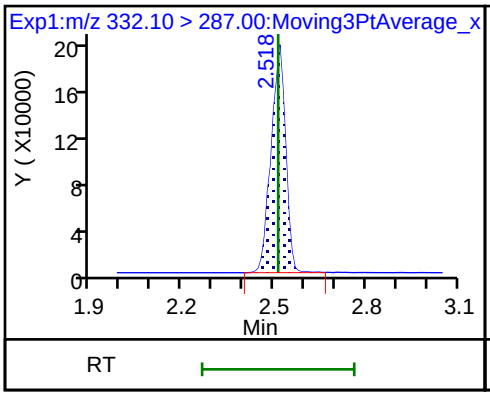
11 Perfluoropentanesulfonic acid



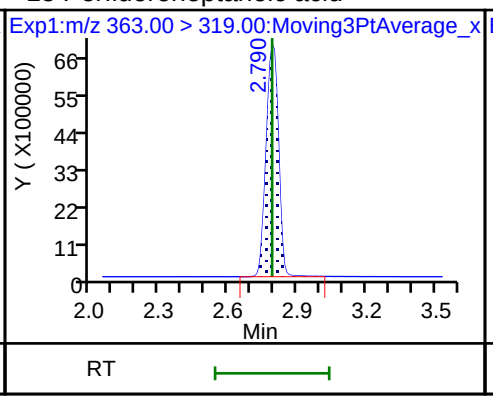
14 Perfluoro(2-propoxypropanoic) acid



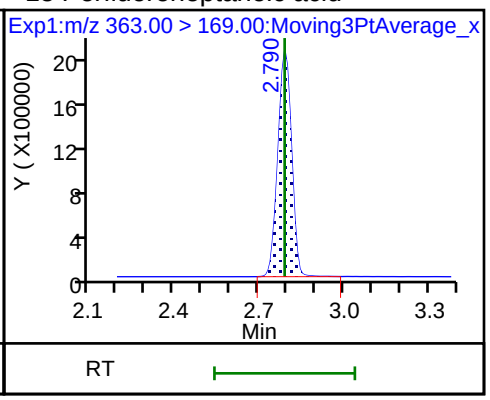
D 13 13C3 HFPO-DA



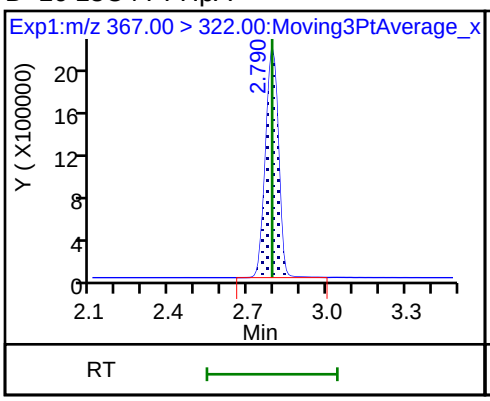
15 Perfluoroheptanoic acid



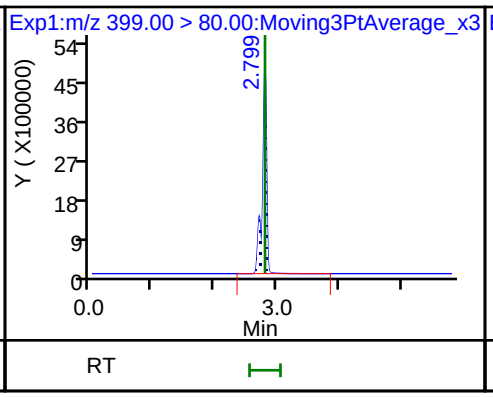
15 Perfluoroheptanoic acid



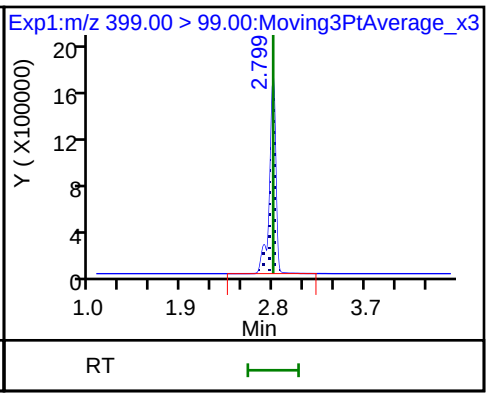
D 16 13C4 PFHpA



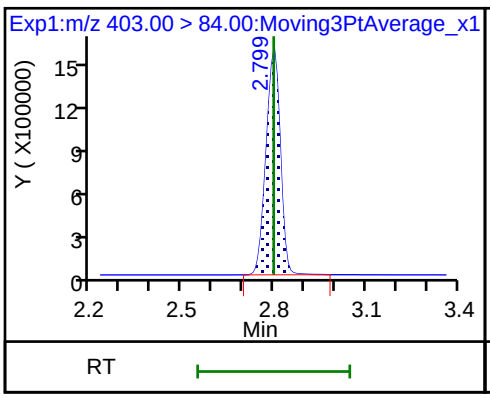
18 Perfluorohexanesulfonic acid



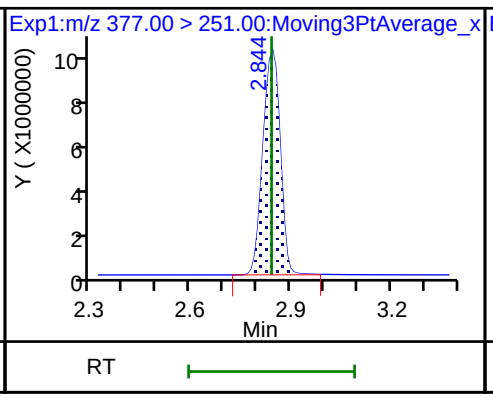
18 Perfluorohexanesulfonic acid



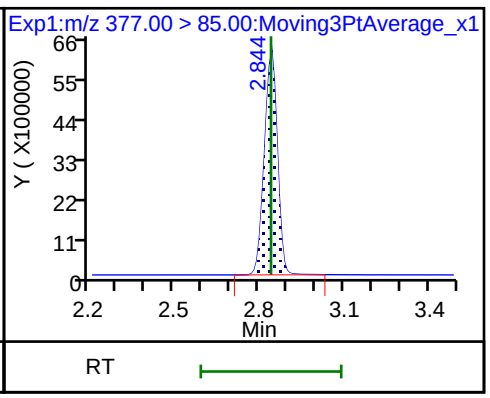
D 17 18O2 PFHxS



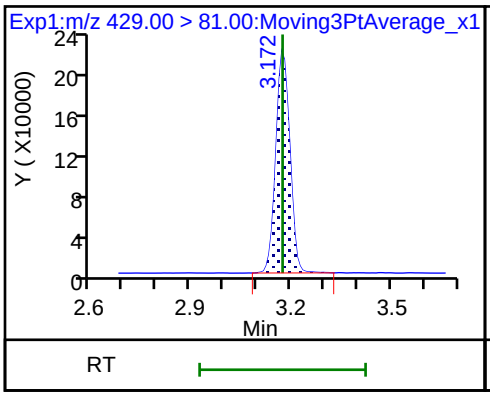
19 DONA



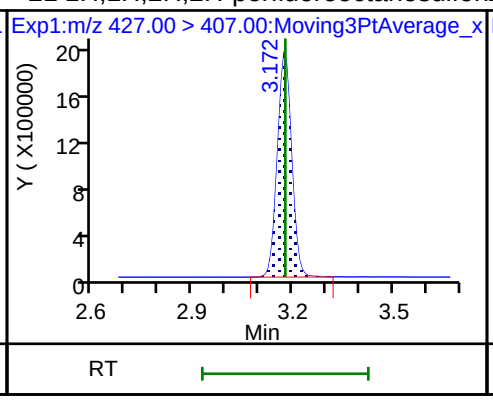
19 DONA



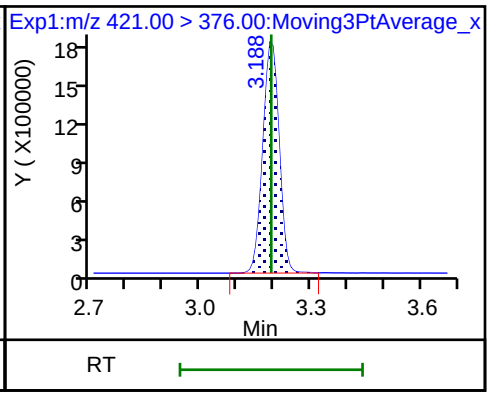
D 20 M2-6:2 FTS



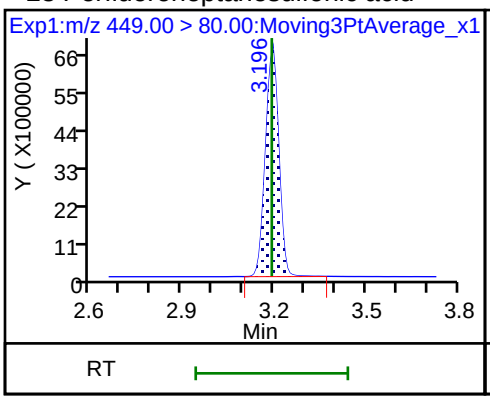
21 1H,1H,2H,2H-perfluorooctanesulfon



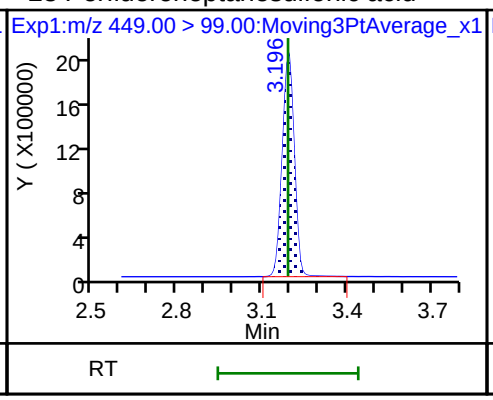
D 22 13C8 PFOA



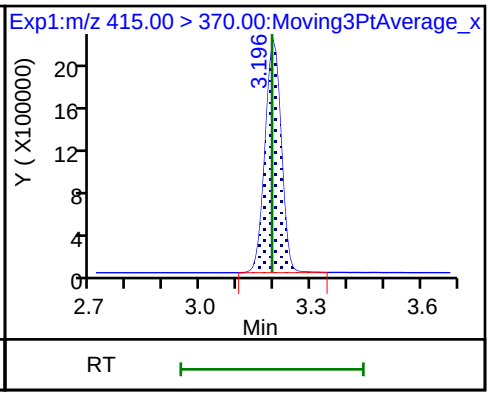
23 Perfluoroheptanesulfonic acid



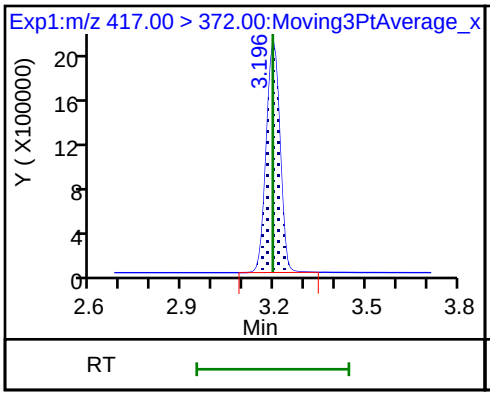
23 Perfluoroheptanesulfonic acid



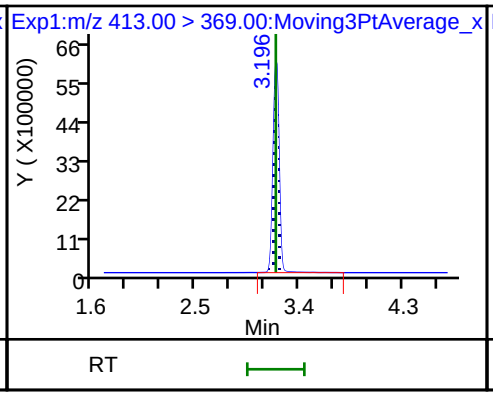
* 24 13C2 PFOA



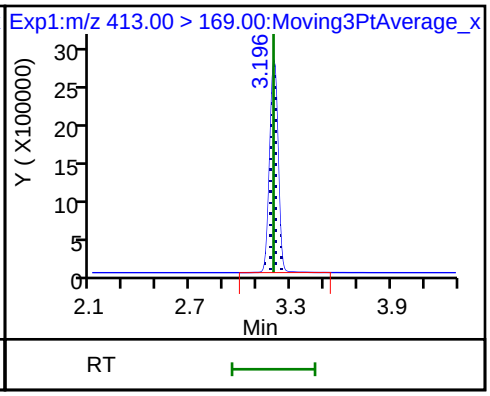
D 25 13C4 PFOA



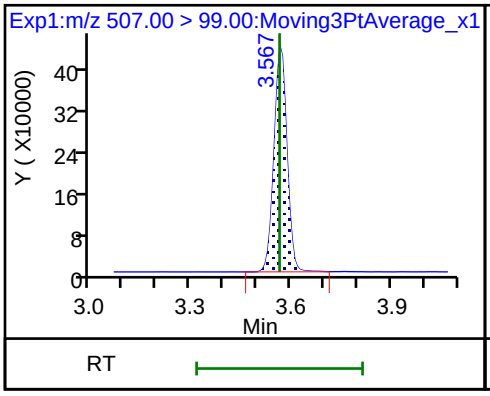
26 Perfluorooctanoic acid



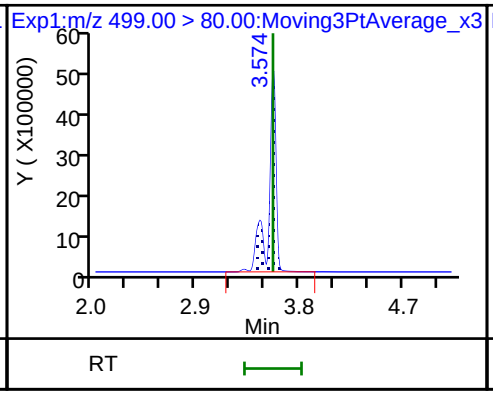
26 Perfluorooctanoic acid



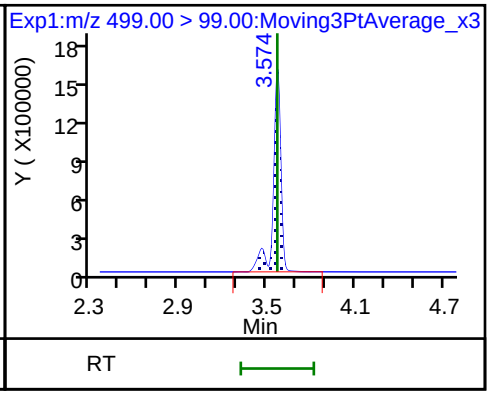
D 27 13C8 PFOS



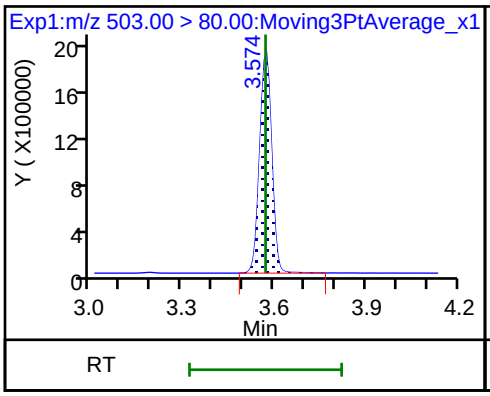
29 Perfluorooctanesulfonic acid



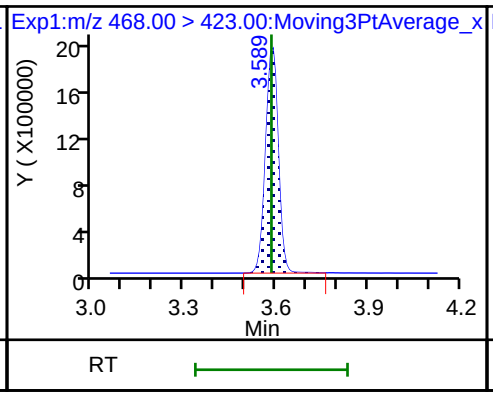
29 Perfluorooctanesulfonic acid



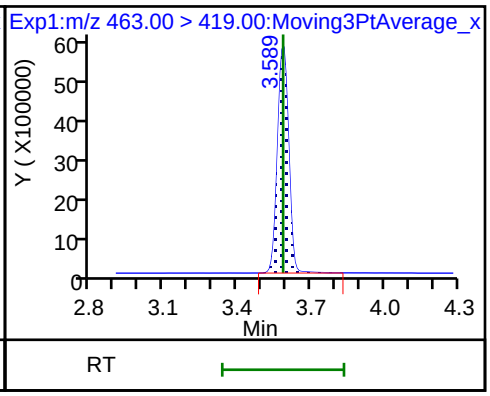
D 28 13C4 PFOS



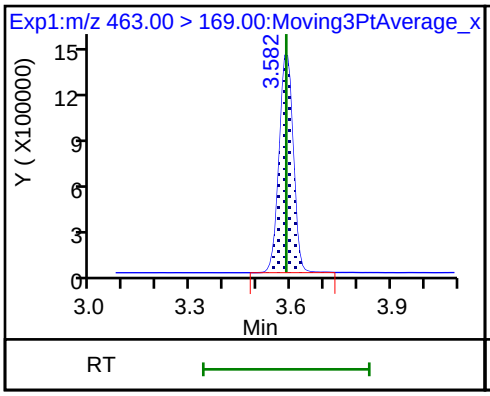
D 31 13C5 PFNA



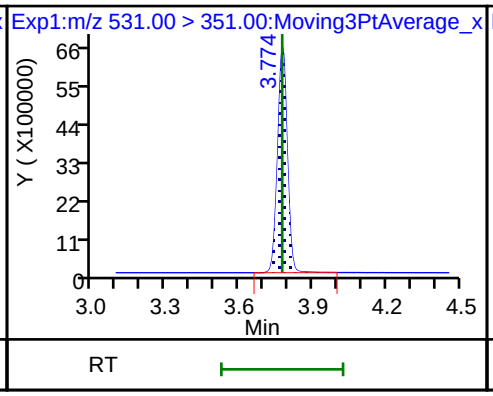
30 Perfluorononanoic acid



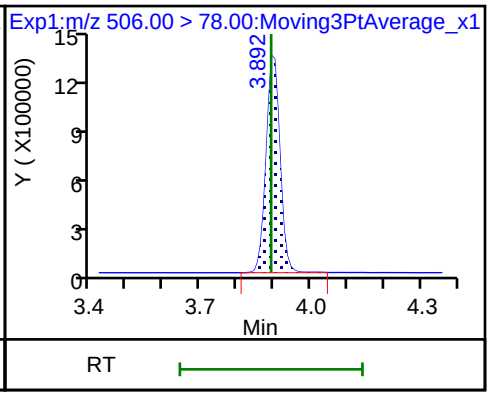
30 Perfluorononanoic acid



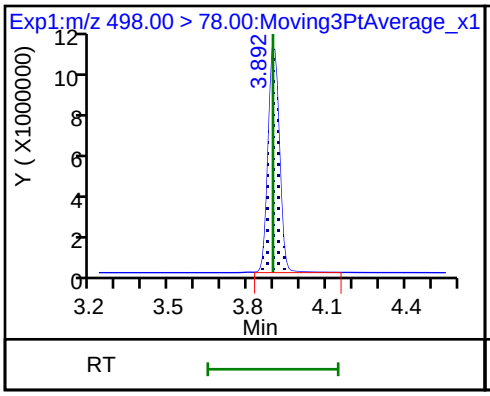
32 9-Chlorohexadecafluoro-3-oxanonane



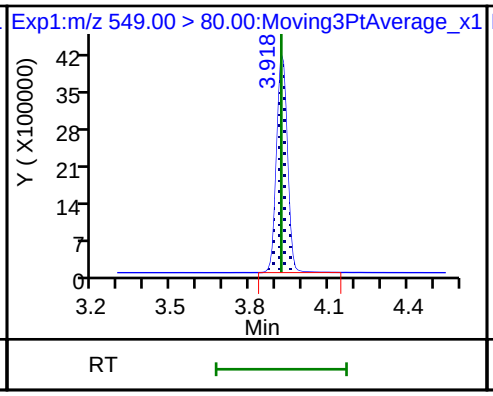
D 33 13C8 FOSA



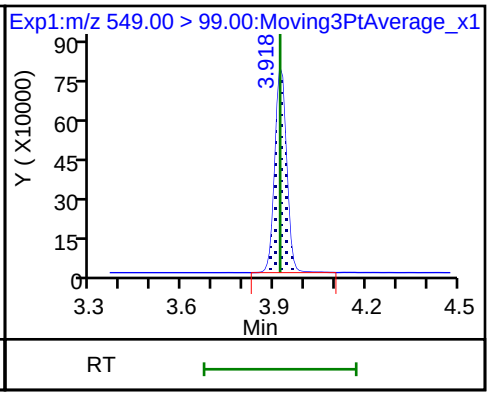
34 Perfluorooctanesulfonamide



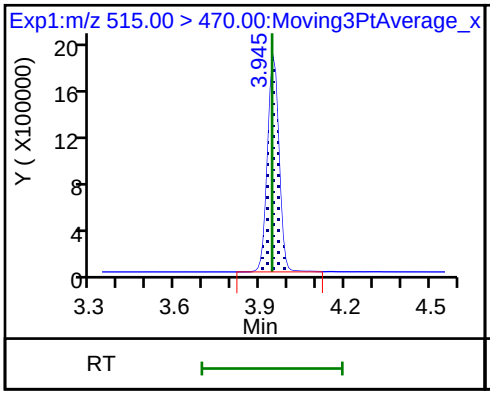
35 Perfluorononanesulfonic acid



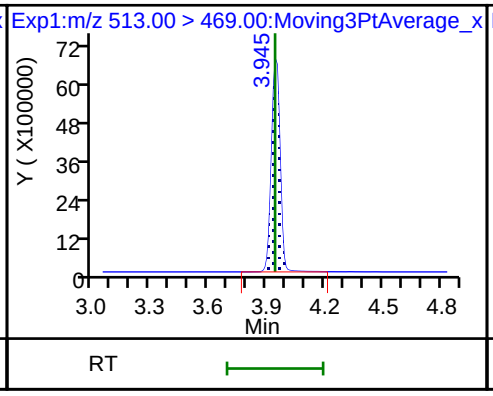
35 Perfluorononanesulfonic acid



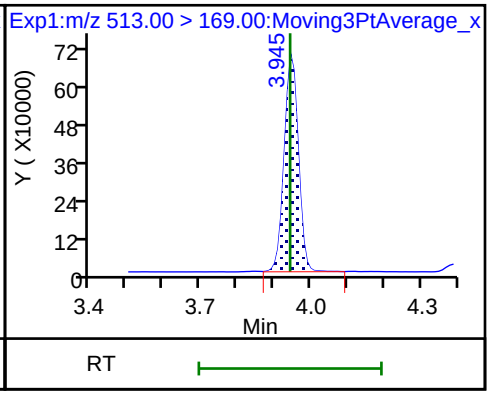
D 36 13C2 PFDA



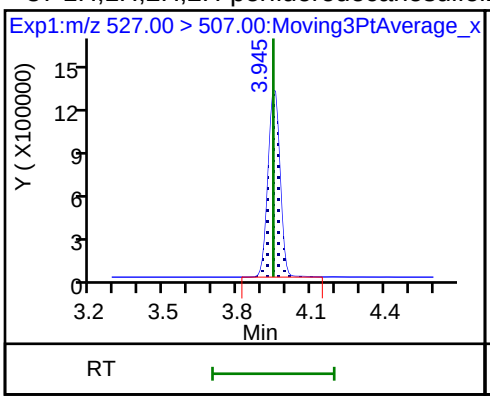
38 Perfluorodecanoic acid



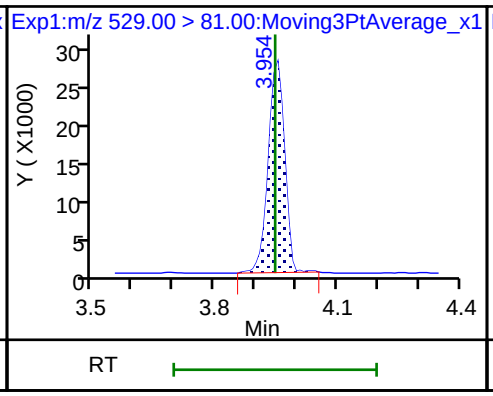
38 Perfluorodecanoic acid



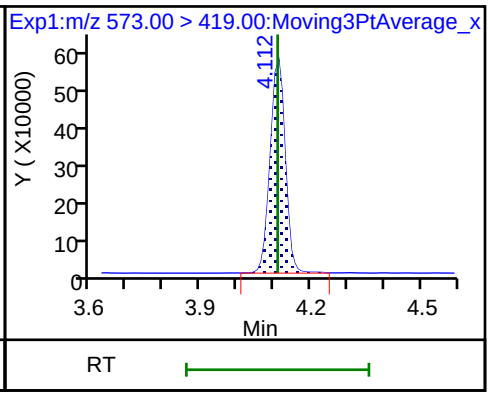
37 1H,1H,2H,2H-perfluorodecanesulfon



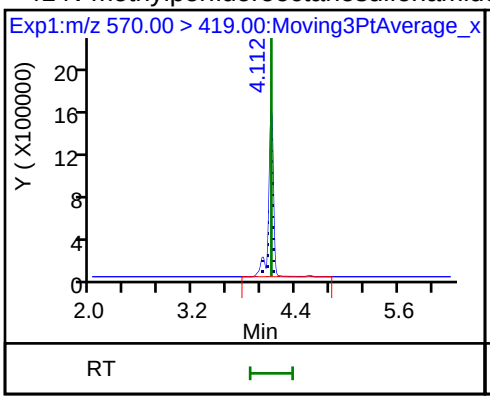
D 39 M2-8:2 FTS



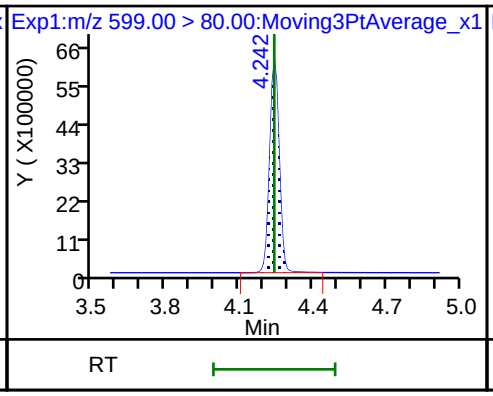
D 40 d3-NMeFOSAA



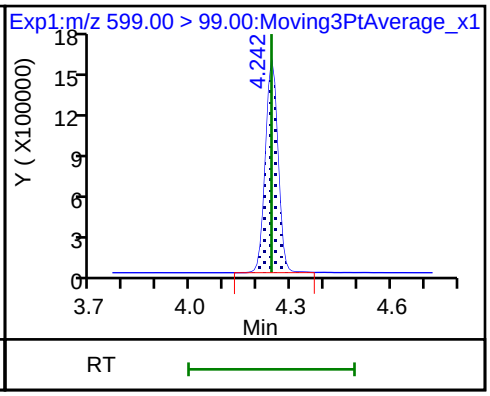
41 N-methylperfluorooctanesulfonamido



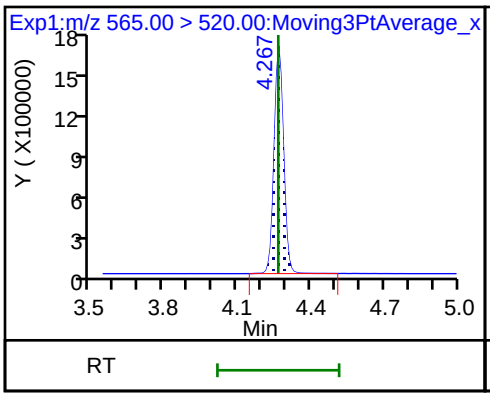
42 Perfluorodecanesulfonic acid



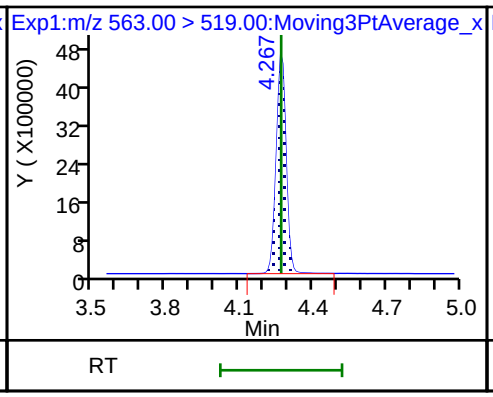
42 Perfluorodecanesulfonic acid



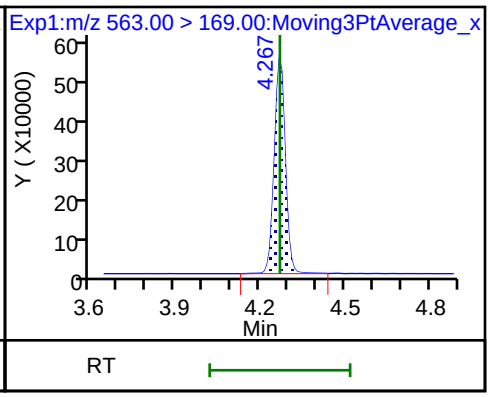
D 44 13C2 PFUnA



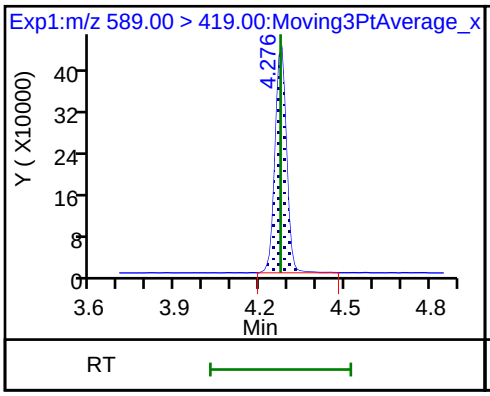
43 Perfluoroundecanoic acid



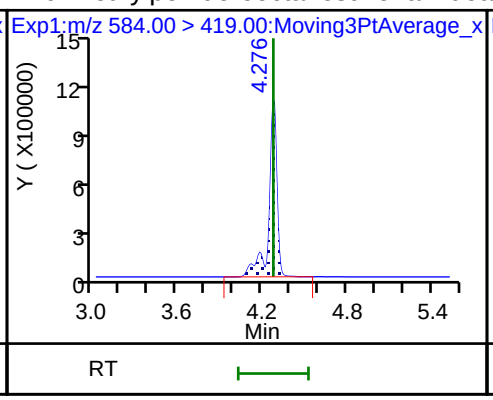
43 Perfluoroundecanoic acid



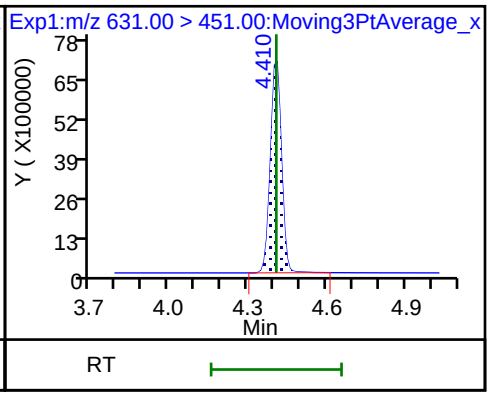
D 45 d5-NEtFOSAA



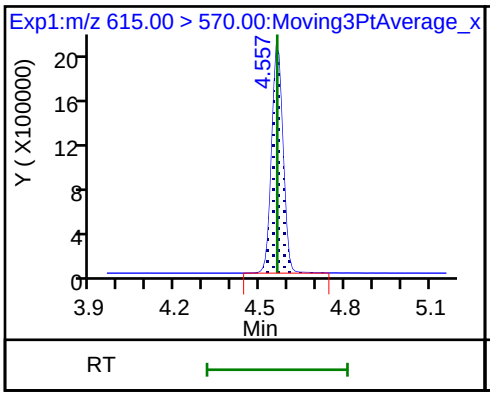
46 N-ethylperfluorooctanesulfonamidoa



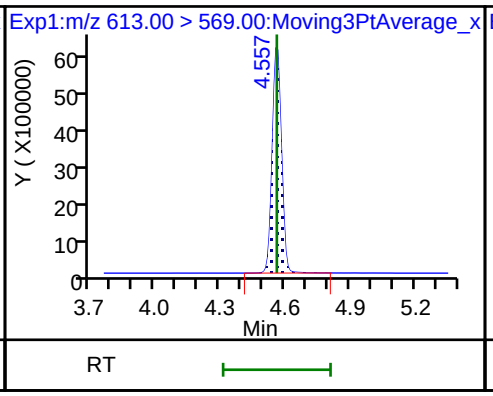
48 11-Chloroeicosafluoro-3-oxaundecan



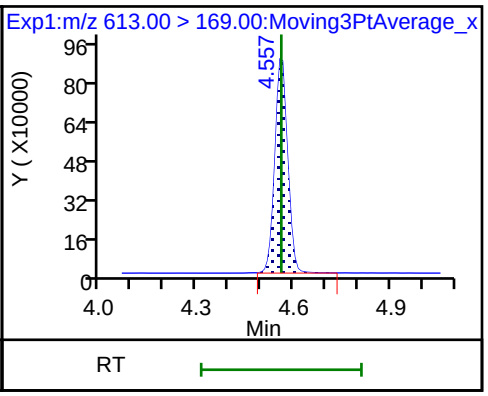
D 49 13C2 PFDoA



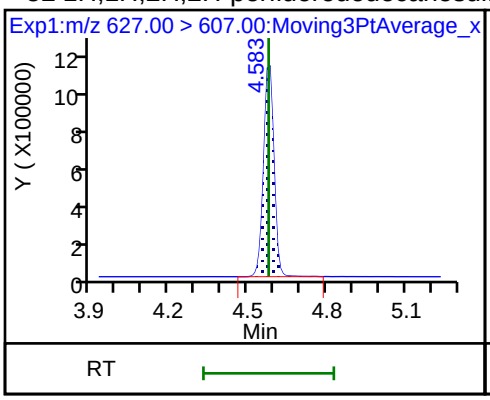
50 Perfluorododecanoic acid



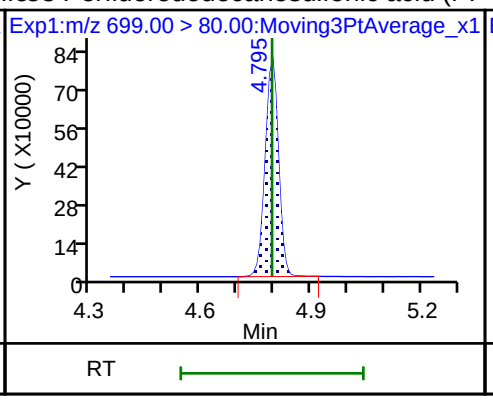
50 Perfluorododecanoic acid



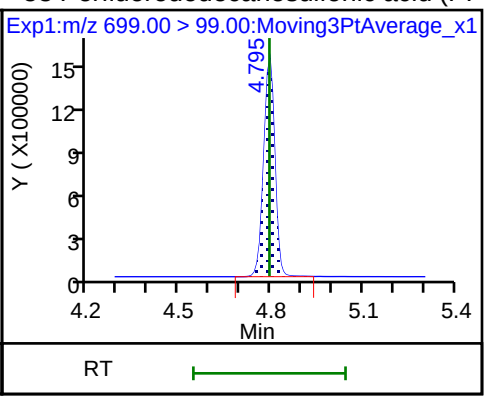
52 1H,1H,2H,2H-perfluorododecanesulfo



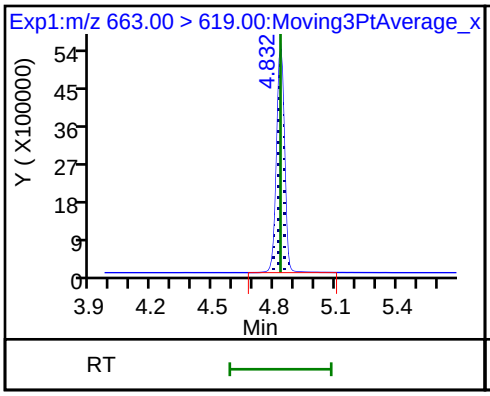
53 Perfluorododecanesulfonic acid (PF



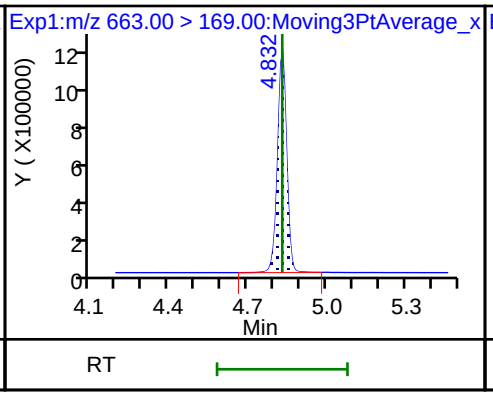
53 Perfluorododecanesulfonic acid (PF



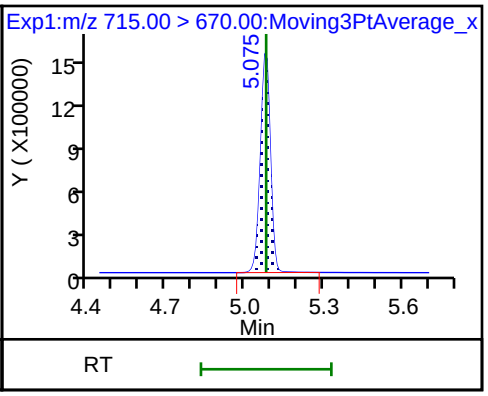
54 Perfluorotridecanoic acid



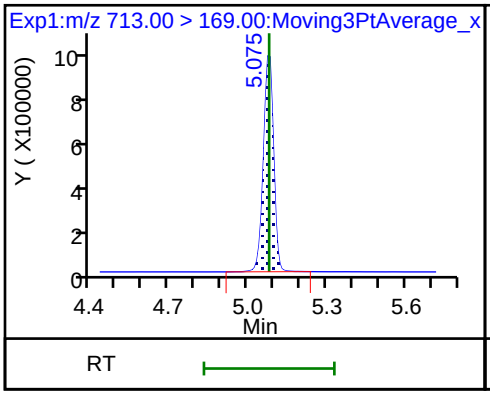
54 Perfluorotridecanoic acid



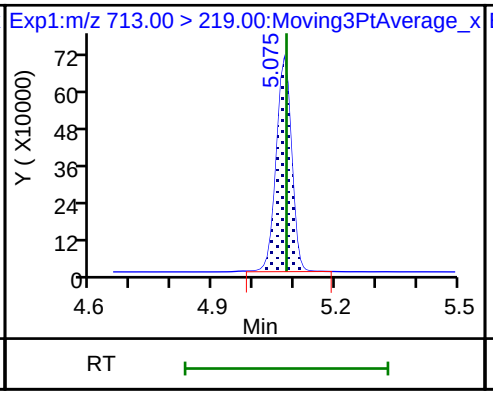
D 55 13C2 PFTeDA



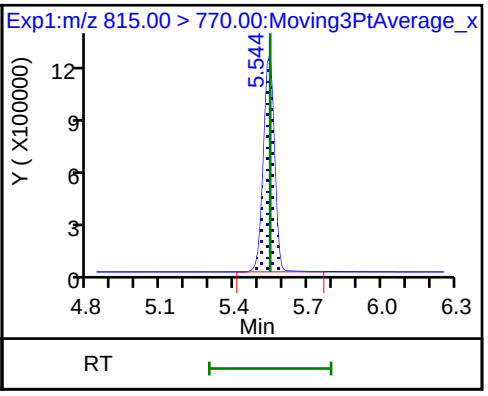
56 Perfluorotetradecanoic acid



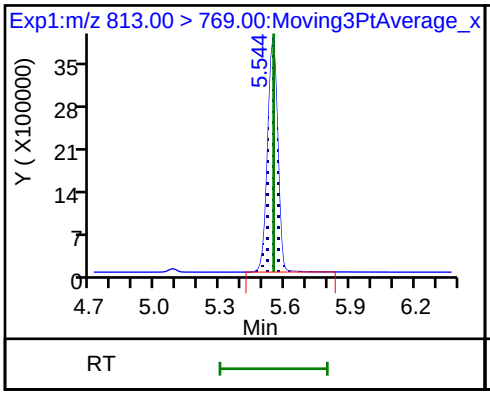
56 Perfluorotetradecanoic acid



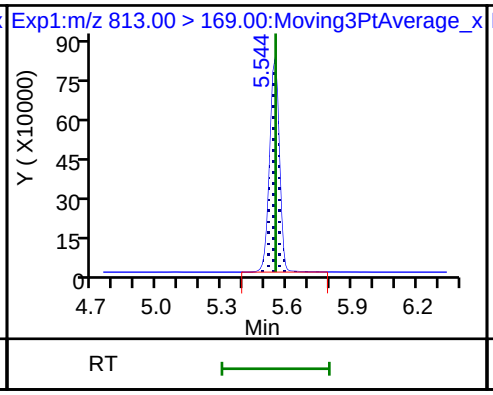
D 57 13C2 PFHxDA



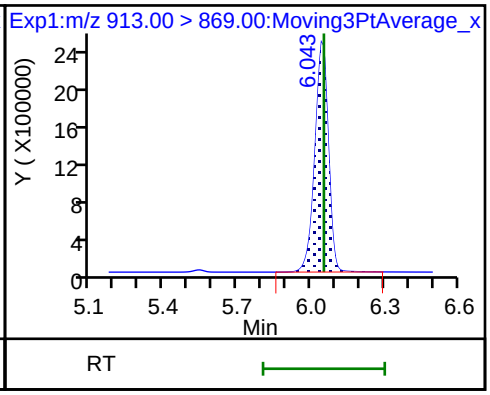
58 Perfluorohexadecanoic acid



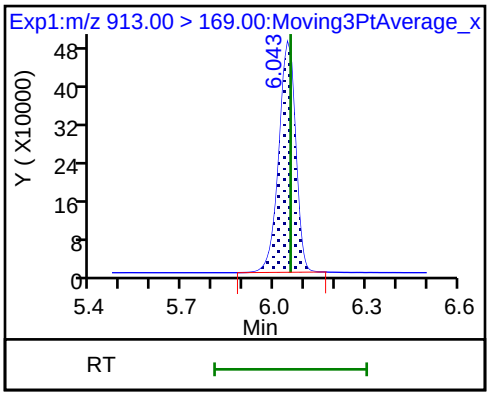
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



Calibration / Perfluorobutanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

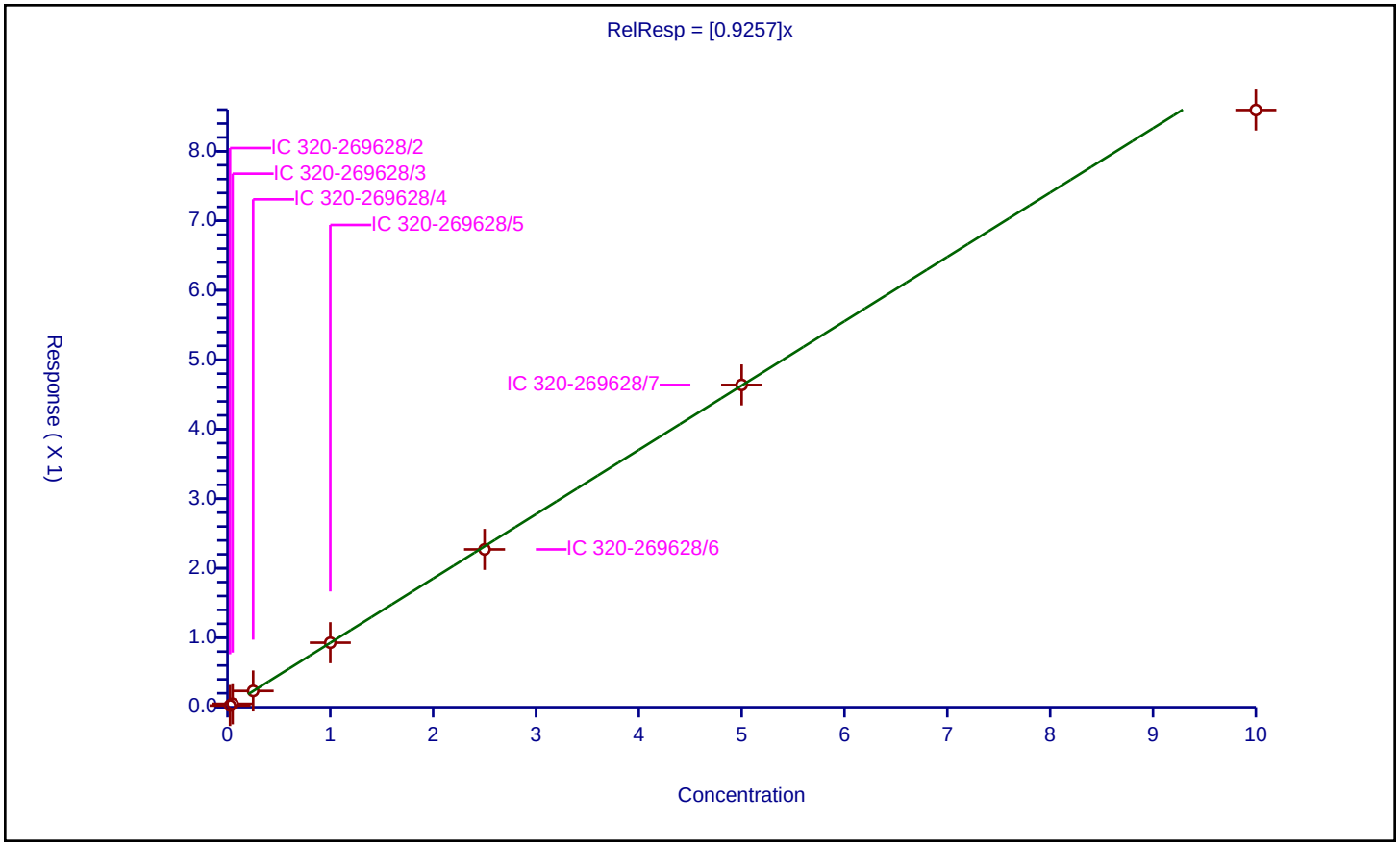
Curve Coefficients

Intercept:	0
Slope:	0.9257

Error Coefficients

Standard Error:	10800000
Relative Standard Error:	3.8
Correlation Coefficient:	0.998
Coefficient of Determination (Adjusted):	0.998

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.02398	2.5	5464013.0	0.959203	Y
2	IC 320-269628/3	0.05	0.048196	2.5	6626549.0	0.96391	Y
3	IC 320-269628/4	0.25	0.233474	2.5	6558378.0	0.933897	Y
4	IC 320-269628/5	1.0	0.92765	2.5	6570522.0	0.92765	Y
5	IC 320-269628/6	2.5	2.270844	2.5	6590555.0	0.908338	Y
6	IC 320-269628/7	5.0	4.637842	2.5	6686954.0	0.927568	Y
7	IC 320-269628/8	10.0	8.594389	2.5	6546007.0	0.859439	Y



Calibration / Perfluoropentanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

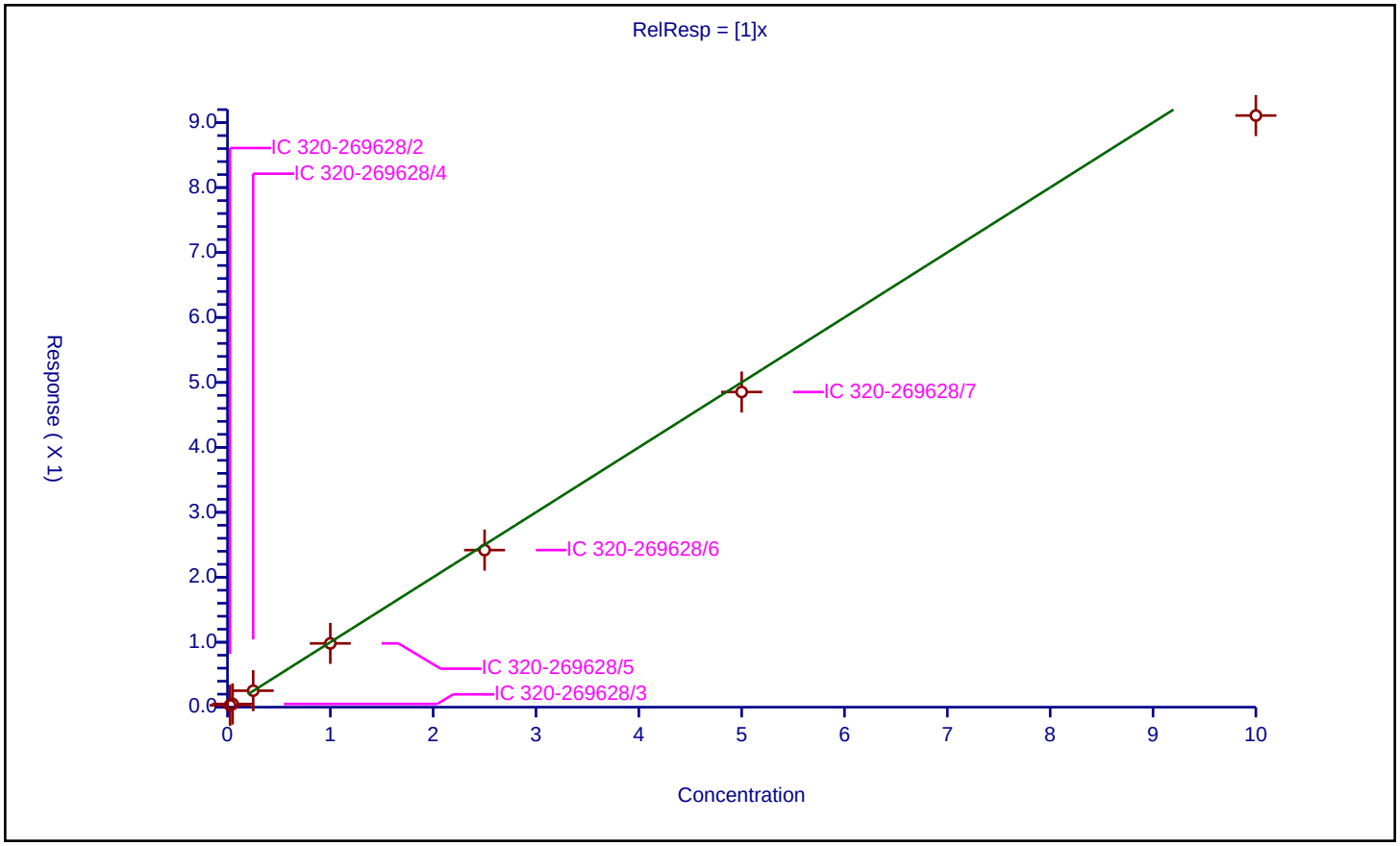
Curve Coefficients

Intercept:	0
Slope:	1

Error Coefficients

Standard Error:	9710000
Relative Standard Error:	8.1
Correlation Coefficient:	0.996
Coefficient of Determination (Adjusted):	0.991

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.029266	2.5	4839403.0	1.17064	Y
2	IC 320-269628/3	0.05	0.049312	2.5	5955293.0	0.98624	Y
3	IC 320-269628/4	0.25	0.253462	2.5	5746206.0	1.013846	Y
4	IC 320-269628/5	1.0	0.981664	2.5	5788060.0	0.981664	Y
5	IC 320-269628/6	2.5	2.418407	2.5	5760664.0	0.967363	Y
6	IC 320-269628/7	5.0	4.852214	2.5	5808535.0	0.970443	Y
7	IC 320-269628/8	10.0	9.108883	2.5	5506117.0	0.910888	Y



Calibration / Perfluorobutanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

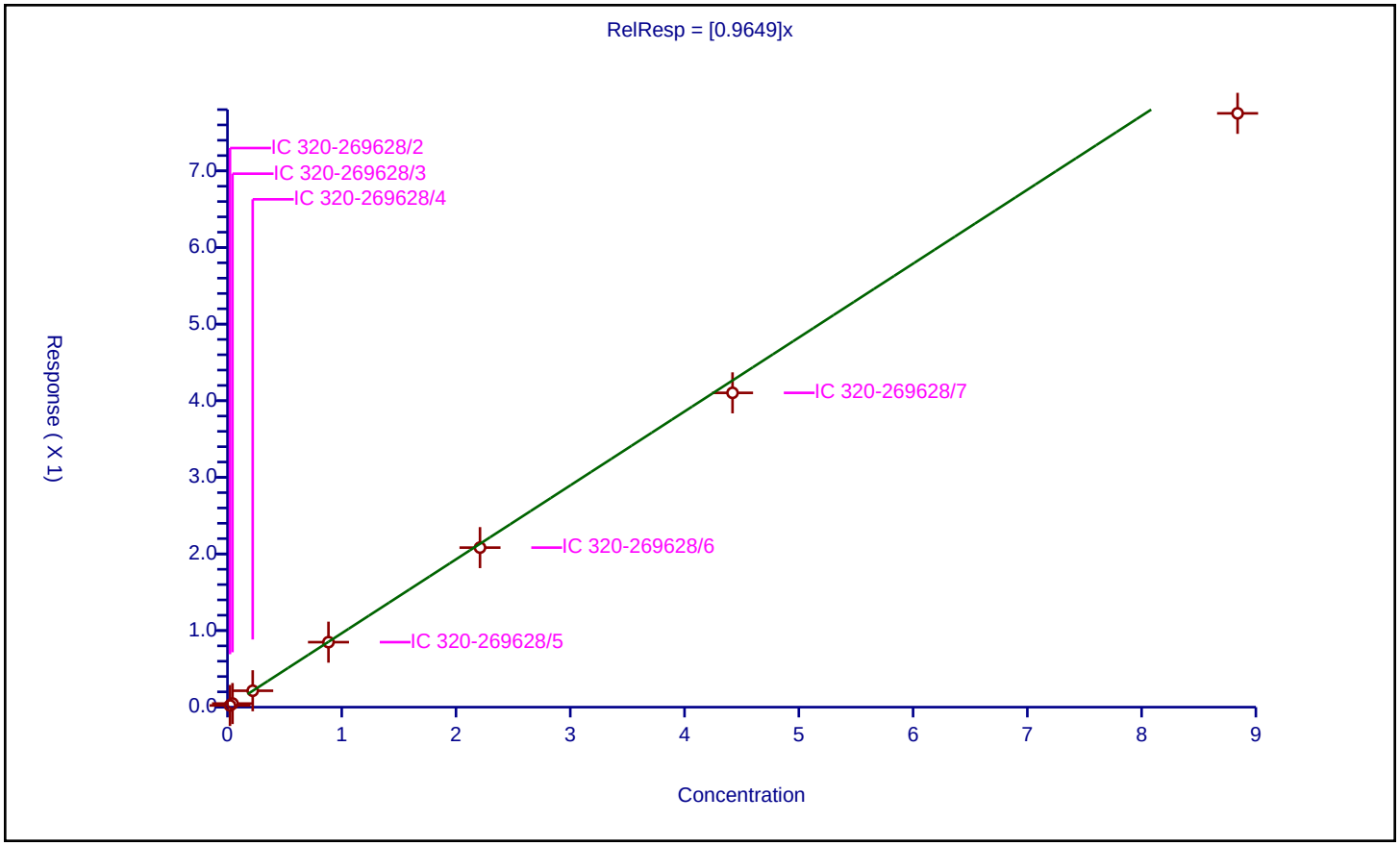
Curve Coefficients

Intercept:	0
Slope:	0.9649

Error Coefficients

Standard Error:	13900000
Relative Standard Error:	6.4
Correlation Coefficient:	0.997
Coefficient of Determination (Adjusted):	0.995

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.0221	0.022178	2.325	7185165.0	1.003518	Y
2	IC 320-269628/3	0.0442	0.047458	2.325	9005009.0	1.073718	Y
3	IC 320-269628/4	0.221	0.214275	2.325	8673827.0	0.969569	Y
4	IC 320-269628/5	0.884	0.848609	2.325	8819314.0	0.959965	Y
5	IC 320-269628/6	2.21	2.082568	2.325	8850848.0	0.942338	Y
6	IC 320-269628/7	4.42	4.102798	2.325	9075151.0	0.928235	Y
7	IC 320-269628/8	8.84	7.751334	2.325	8603777.0	0.876848	Y



Calibration / 1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2)

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

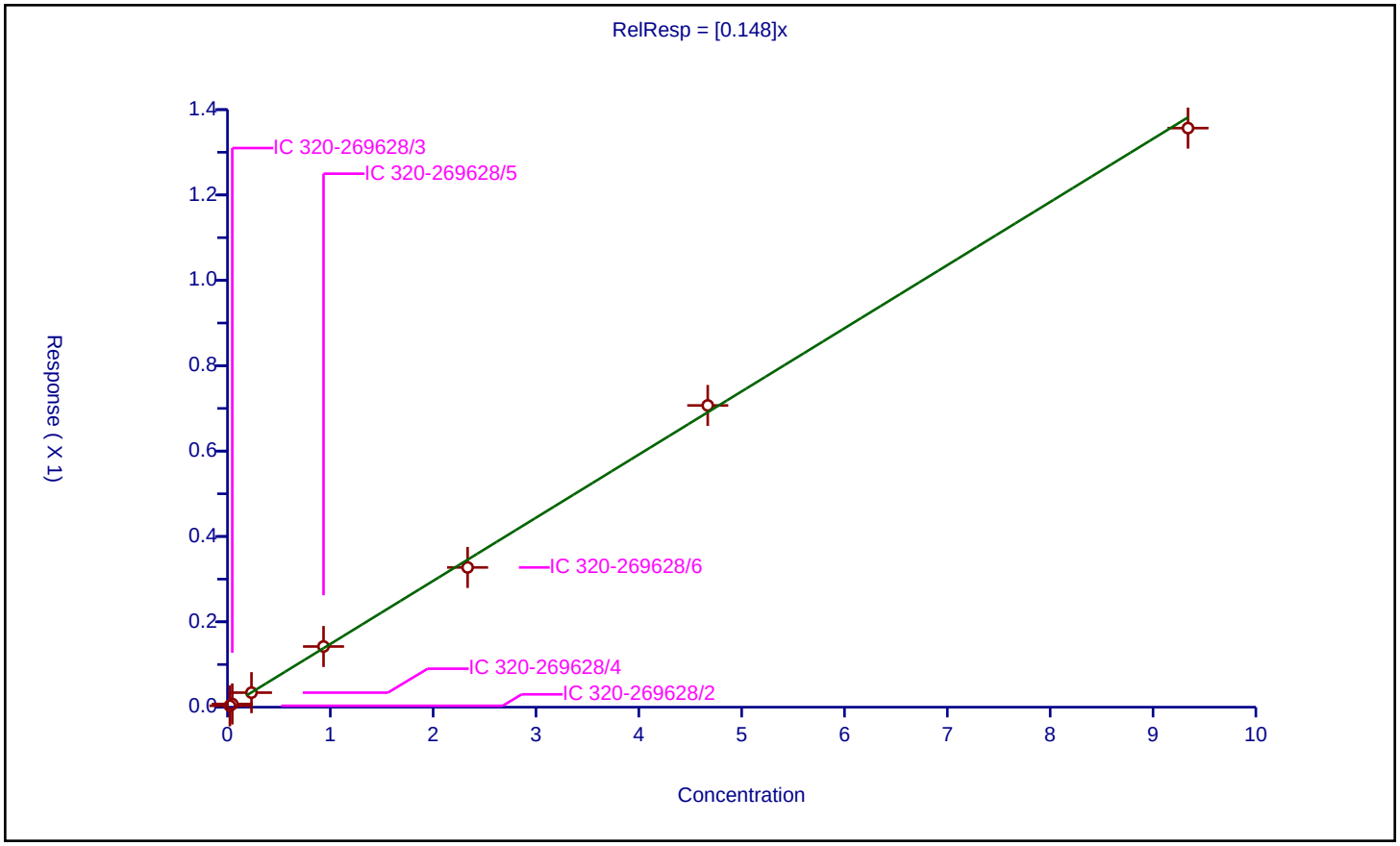
Curve Coefficients

Intercept:	0
Slope:	0.148

Error Coefficients

Standard Error:	2400000
Relative Standard Error:	4.6
Correlation Coefficient:	0.998
Coefficient of Determination (Adjusted):	0.997

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.02335	0.003298	2.325	7185165.0	0.14124	Y
2	IC 320-269628/3	0.0467	0.007453	2.325	9005009.0	0.159597	Y
3	IC 320-269628/4	0.2335	0.034053	2.325	8673827.0	0.145838	Y
4	IC 320-269628/5	0.934	0.142143	2.325	8819314.0	0.152187	Y
5	IC 320-269628/6	2.335	0.327374	2.325	8850848.0	0.140203	Y
6	IC 320-269628/7	4.67	0.706934	2.325	9075151.0	0.151378	Y
7	IC 320-269628/8	9.34	1.356668	2.325	8603777.0	0.145254	Y



Calibration / Perfluorohexanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

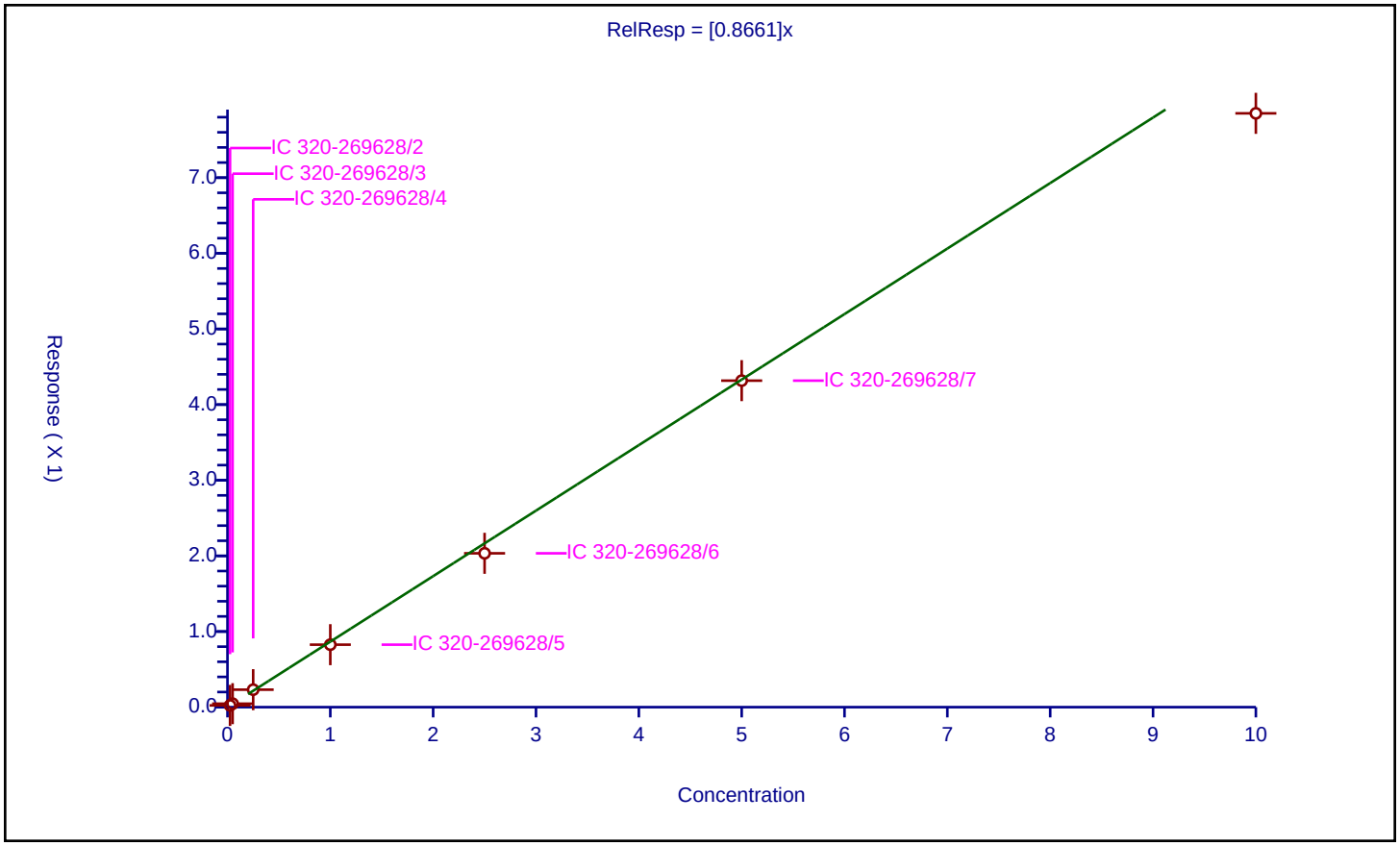
Curve Coefficients

Intercept:	0
Slope:	0.8661

Error Coefficients

Standard Error:	9350000
Relative Standard Error:	6.9
Correlation Coefficient:	0.993
Coefficient of Determination (Adjusted):	0.994

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.023142	2.5	5280647.0	0.925682	Y
2	IC 320-269628/3	0.05	0.046212	2.5	6564174.0	0.924244	Y
3	IC 320-269628/4	0.25	0.231186	2.5	6396944.0	0.924743	Y
4	IC 320-269628/5	1.0	0.826072	2.5	6555817.0	0.826072	Y
5	IC 320-269628/6	2.5	2.033898	2.5	6380794.0	0.813559	Y
6	IC 320-269628/7	5.0	4.316603	2.5	6555120.0	0.863321	Y
7	IC 320-269628/8	10.0	7.85066	2.5	6078302.0	0.785066	Y



Calibration / Perfluoropentanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

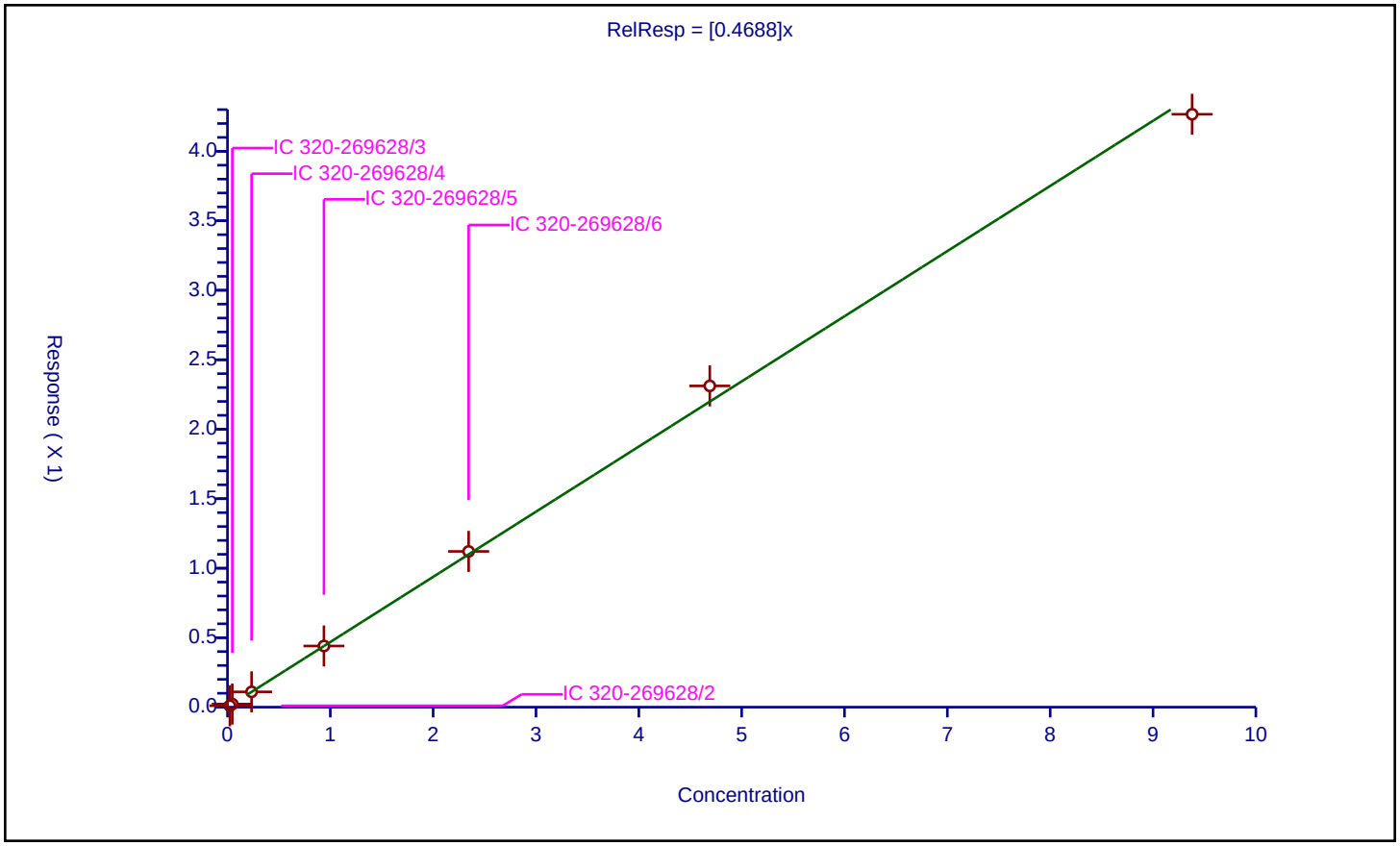
Curve Coefficients

Intercept:	0
Slope:	0.4688

Error Coefficients

Standard Error:	7660000
Relative Standard Error:	3.7
Correlation Coefficient:	0.995
Coefficient of Determination (Adjusted):	0.998

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.02345	0.010294	2.325	7185165.0	0.438969	Y
2	IC 320-269628/3	0.0469	0.022402	2.325	9005009.0	0.477645	Y
3	IC 320-269628/4	0.2345	0.110256	2.325	8673827.0	0.470176	Y
4	IC 320-269628/5	0.938	0.440276	2.325	8819314.0	0.469377	Y
5	IC 320-269628/6	2.345	1.120704	2.325	8850848.0	0.477912	Y
6	IC 320-269628/7	4.69	2.311783	2.325	9075151.0	0.492918	Y
7	IC 320-269628/8	9.38	4.266535	2.325	8603777.0	0.454855	Y



Calibration / Perfluoro(2-propoxypropanoic) acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

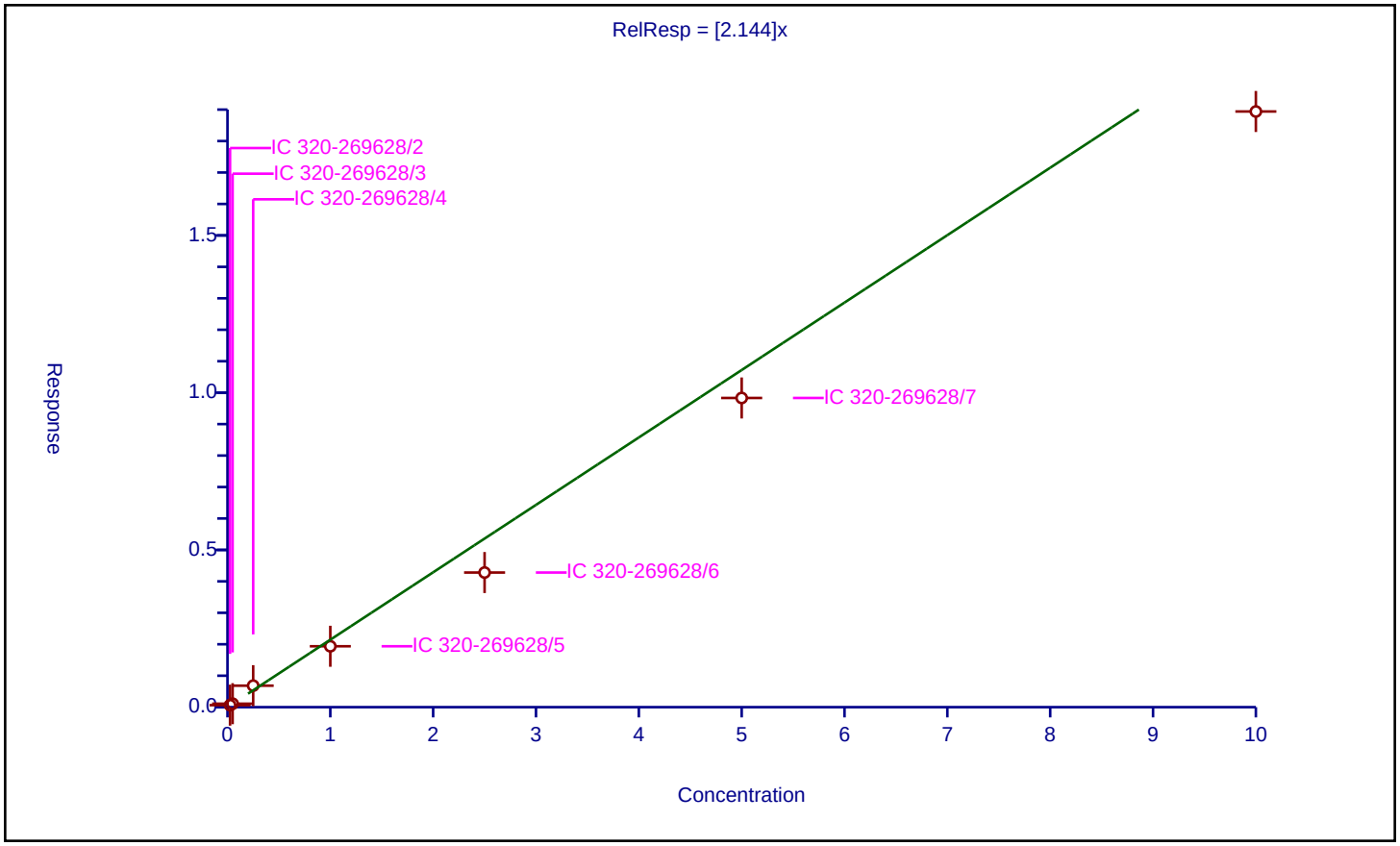
Curve Coefficients

Intercept:	0
Slope:	2.144

Error Coefficients

Standard Error:	2240000
Relative Standard Error:	17.5
Correlation Coefficient:	0.999
Coefficient of Determination (Adjusted):	0.958

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.063934	2.5	462394.0	2.557343	Y
2	IC 320-269628/3	0.05	0.110443	2.5	578964.0	2.208859	Y
3	IC 320-269628/4	0.25	0.683214	2.5	457543.0	2.732858	Y
4	IC 320-269628/5	1.0	1.936261	2.5	558716.0	1.936261	Y
5	IC 320-269628/6	2.5	4.280851	2.5	627391.0	1.71234	Y
6	IC 320-269628/7	5.0	9.830731	2.5	613460.0	1.966146	Y
7	IC 320-269628/8	10.0	18.939687	2.5	633898.0	1.893969	Y



Calibration / Perfluoroheptanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

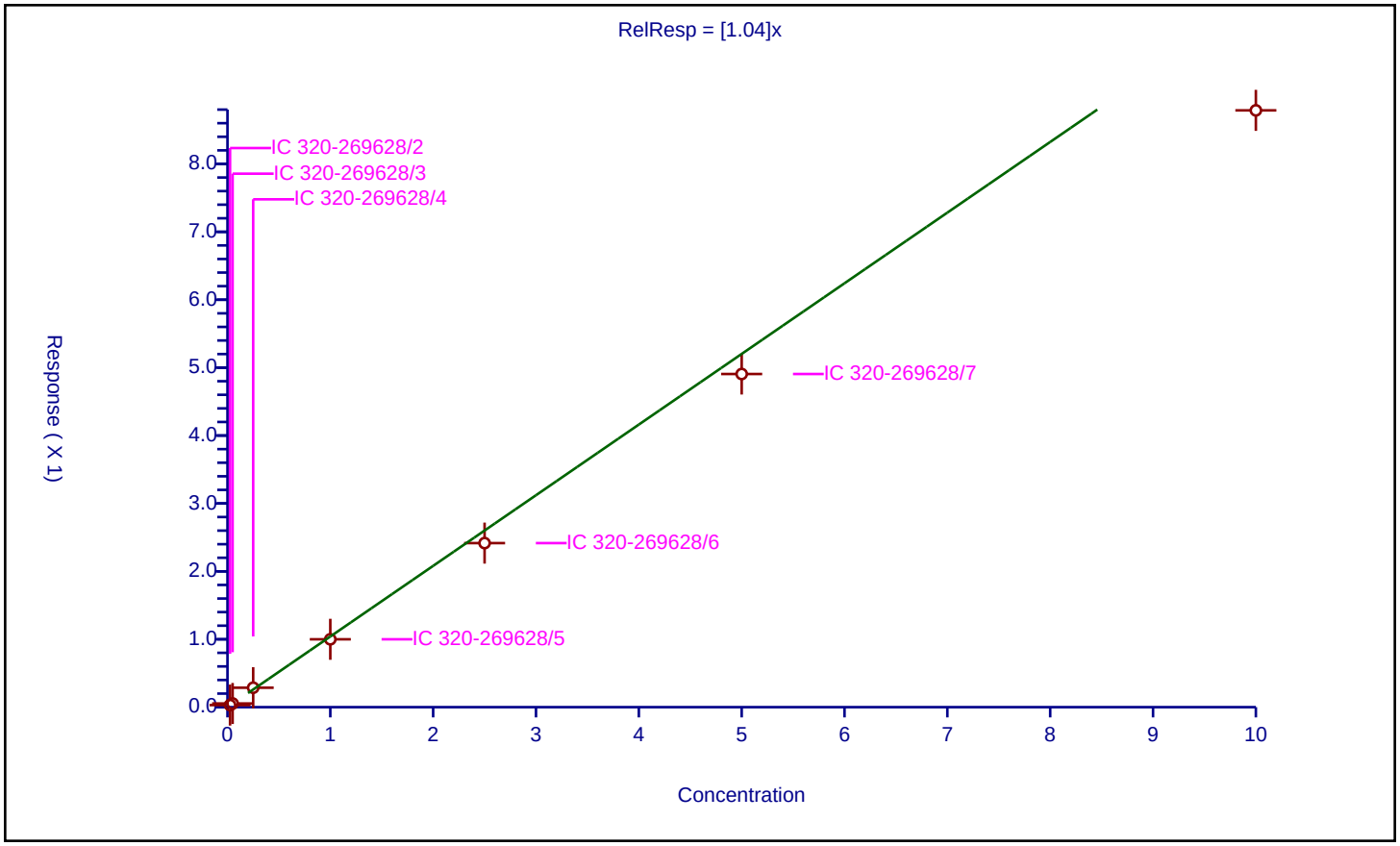
Curve Coefficients

Intercept:	0
Slope:	1.04

Error Coefficients

Standard Error:	12700000
Relative Standard Error:	11.5
Correlation Coefficient:	0.992
Coefficient of Determination (Adjusted):	0.982

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.030745	2.5	6643618.0	1.229797	Y
2	IC 320-269628/3	0.05	0.054065	2.5	8479238.0	1.081306	Y
3	IC 320-269628/4	0.25	0.286484	2.5	7714710.0	1.145937	Y
4	IC 320-269628/5	1.0	0.999371	2.5	8127431.0	0.999371	Y
5	IC 320-269628/6	2.5	2.415986	2.5	7859686.0	0.966394	Y
6	IC 320-269628/7	5.0	4.906251	2.5	7751362.0	0.98125	Y
7	IC 320-269628/8	10.0	8.788727	2.5	7308125.0	0.878873	Y



Calibration / Perfluorohexanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

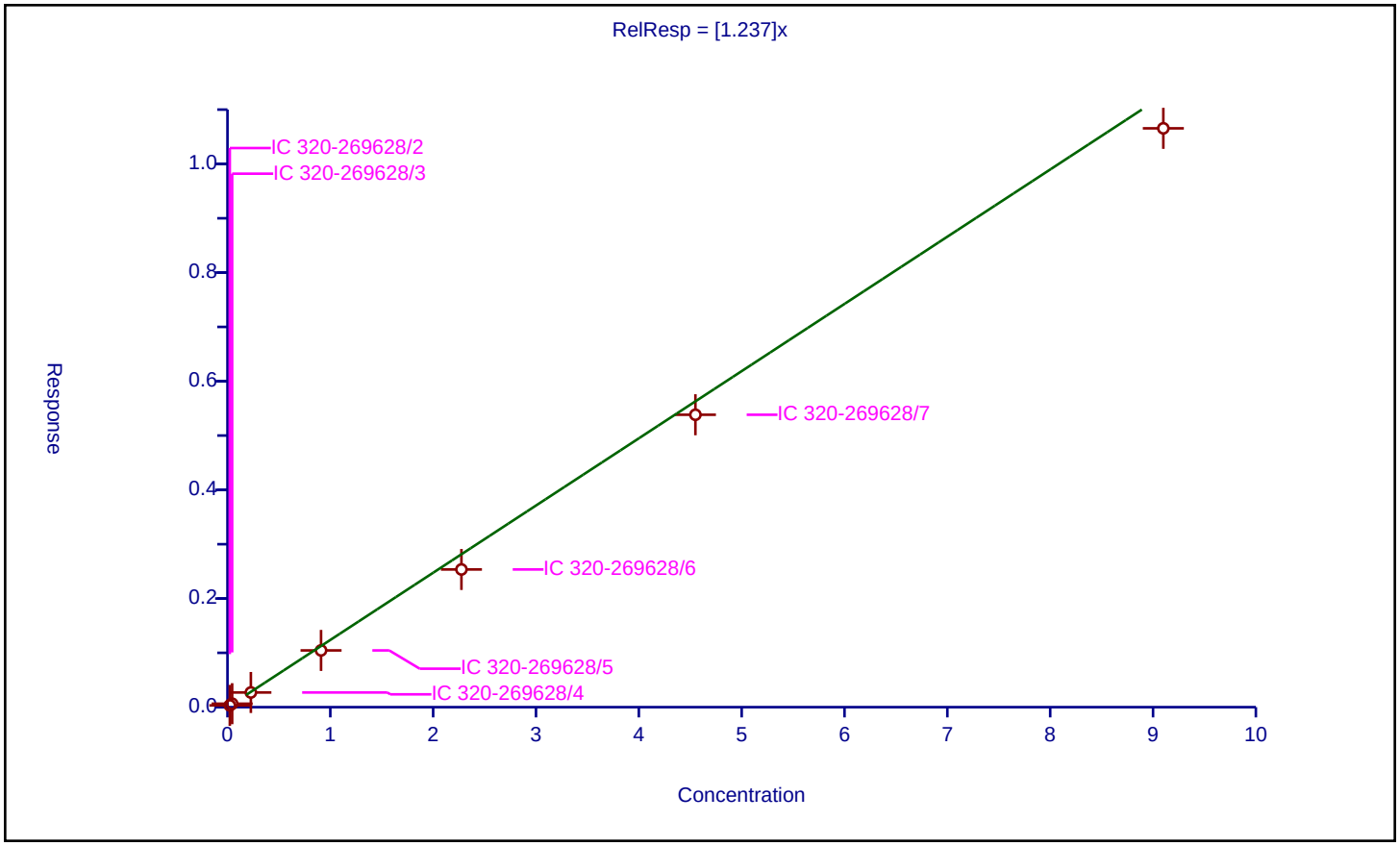
Curve Coefficients

Intercept:	0
Slope:	1.237

Error Coefficients

Standard Error:	10900000
Relative Standard Error:	10.8
Correlation Coefficient:	0.998
Coefficient of Determination (Adjusted):	0.984

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.02275	0.032942	2.365	4291874.0	1.447991	Y
2	IC 320-269628/3	0.0455	0.064061	2.365	5485896.0	1.407924	Y
3	IC 320-269628/4	0.2275	0.270264	2.365	5253989.0	1.187972	Y
4	IC 320-269628/5	0.91	1.04482	2.365	5091123.0	1.148154	Y
5	IC 320-269628/6	2.275	2.535099	2.365	5386473.0	1.114329	Y
6	IC 320-269628/7	4.55	5.382935	2.365	5470177.0	1.183063	Y
7	IC 320-269628/8	9.1	10.655394	2.365	5056556.0	1.170922	Y



Calibration / DONA

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

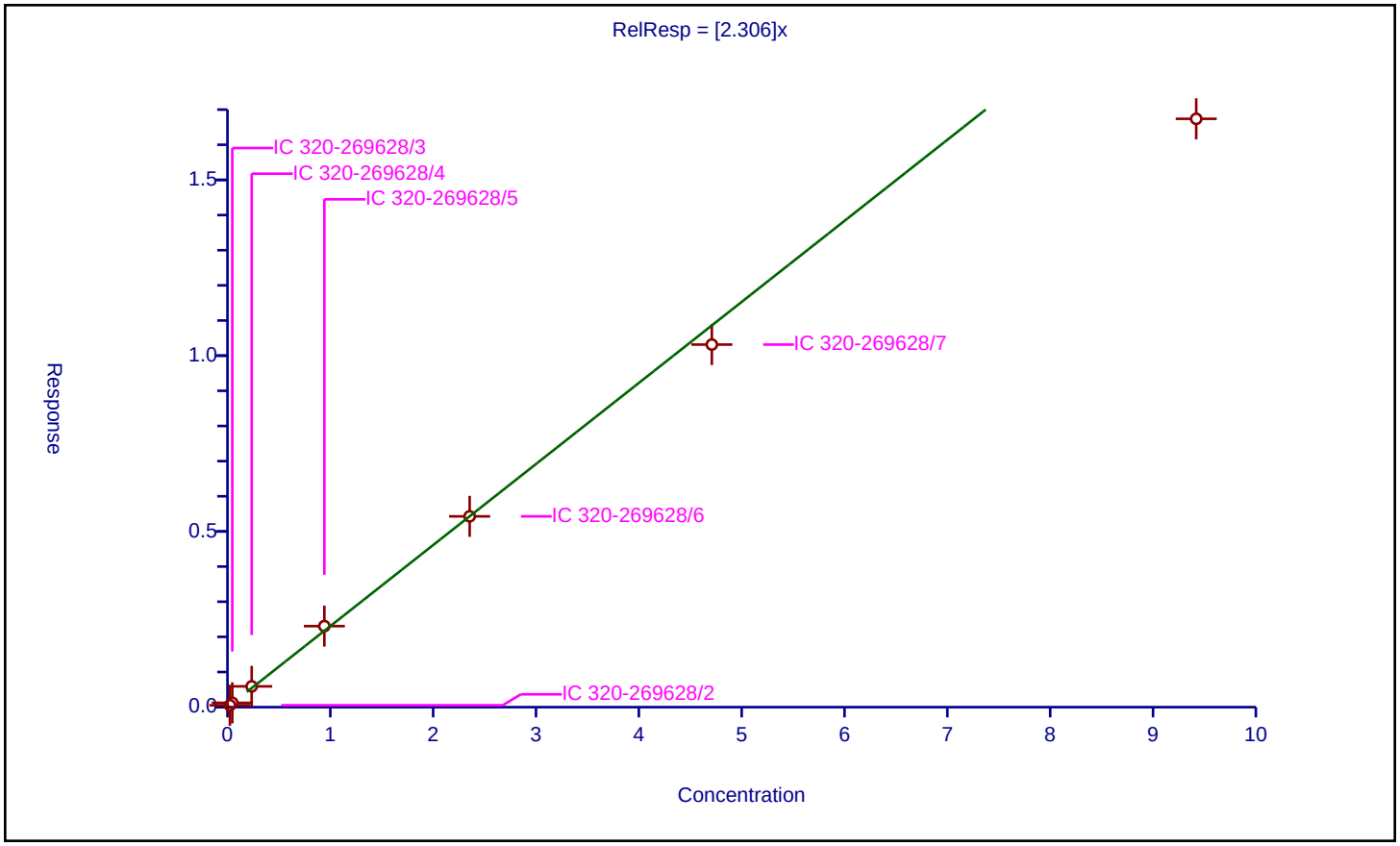
Curve Coefficients

Intercept:	0
Slope:	2.306

Error Coefficients

Standard Error:	18800000
Relative Standard Error:	11.8
Correlation Coefficient:	0.982
Coefficient of Determination (Adjusted):	0.982

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.02355	0.0543	2.39	4487999.0	2.305736	Y
2	IC 320-269628/3	0.0471	0.12263	2.39	5390763.0	2.6036	Y
3	IC 320-269628/4	0.2355	0.59156	2.39	5531063.0	2.511932	Y
4	IC 320-269628/5	0.942	2.30582	2.39	5548735.0	2.447792	Y
5	IC 320-269628/6	2.355	5.428186	2.39	5445665.0	2.304962	Y
6	IC 320-269628/7	4.71	10.315368	2.39	5448850.0	2.190099	Y
7	IC 320-269628/8	9.42	16.737783	2.39	5296197.0	1.776835	Y



Calibration / 1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2)

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

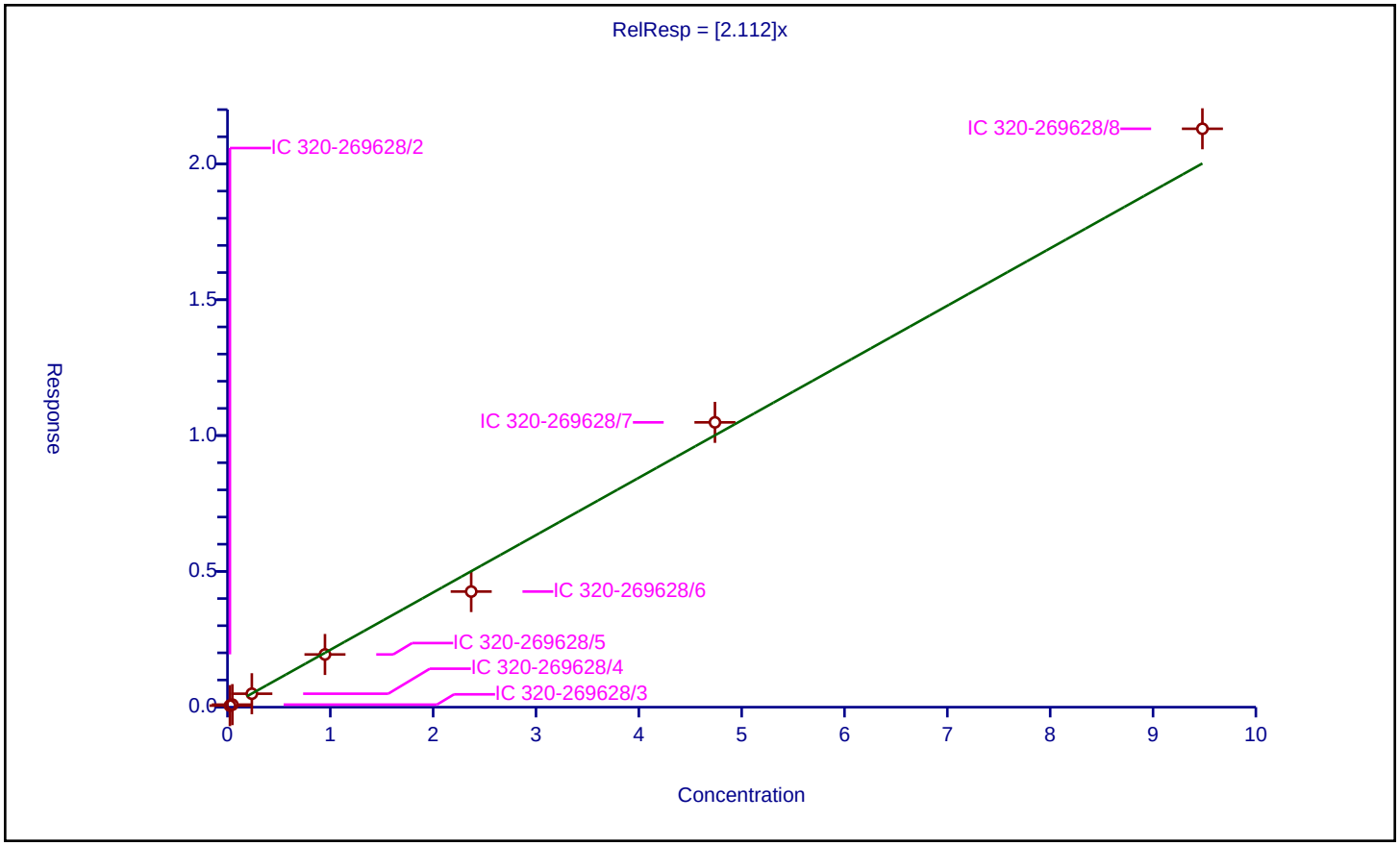
Curve Coefficients

Intercept:	0
Slope:	2.112

Error Coefficients

Standard Error:	2720000
Relative Standard Error:	9.3
Correlation Coefficient:	0.998
Coefficient of Determination (Adjusted):	0.989

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.0237	0.056933	2.375	624238.0	2.40222	Y
2	IC 320-269628/3	0.0474	0.094292	2.375	785304.0	1.989279	Y
3	IC 320-269628/4	0.237	0.495084	2.375	759948.0	2.088961	Y
4	IC 320-269628/5	0.948	1.939925	2.375	759427.0	2.046334	Y
5	IC 320-269628/6	2.37	4.256393	2.375	778889.0	1.795946	Y
6	IC 320-269628/7	4.74	10.485768	2.375	701339.0	2.212187	Y
7	IC 320-269628/8	9.48	21.294215	2.375	634902.0	2.246225	Y



Calibration / Perfluoroheptanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

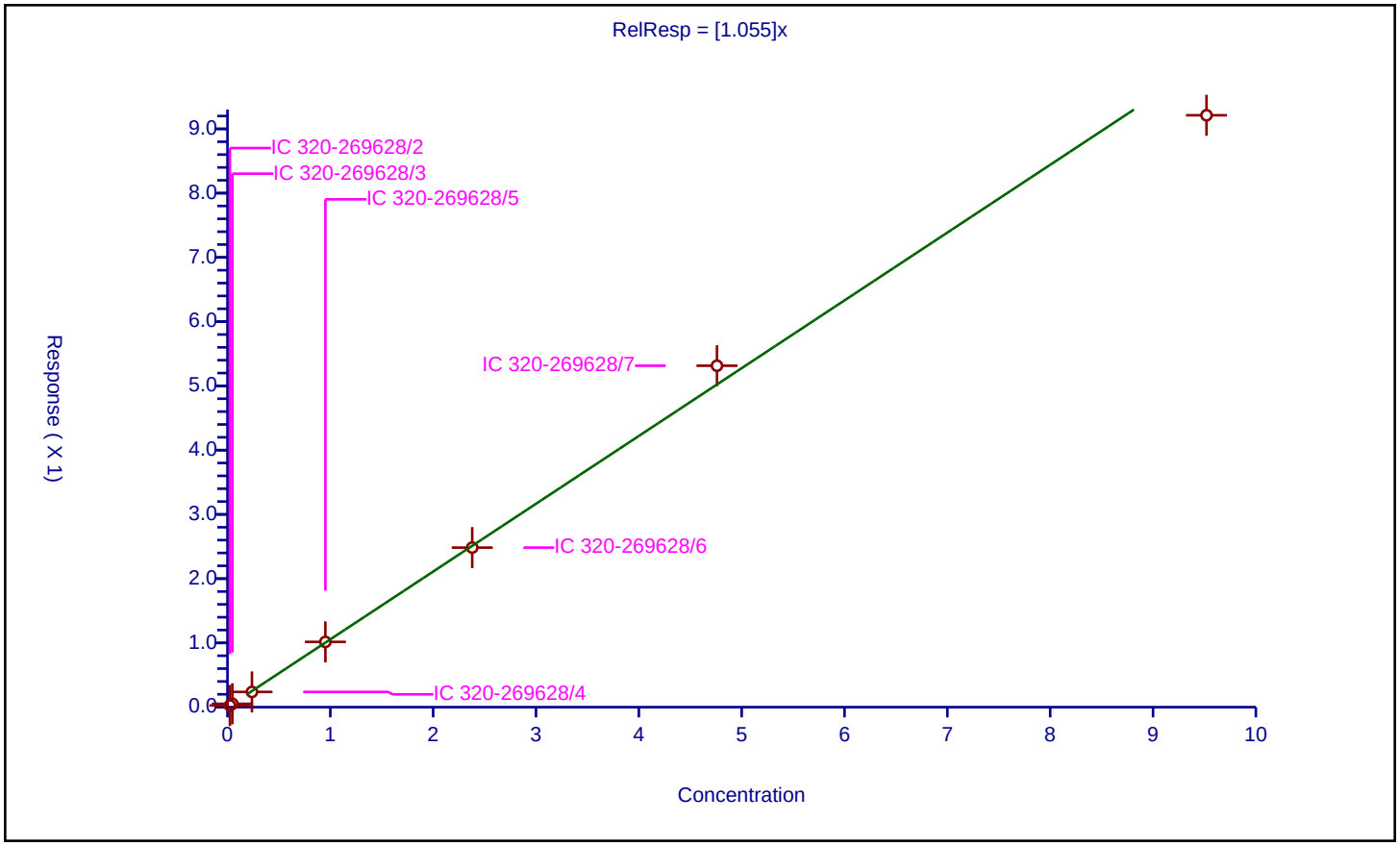
Curve Coefficients

Intercept:	0
Slope:	1.055

Error Coefficients

Standard Error:	10000000
Relative Standard Error:	5.3
Correlation Coefficient:	0.992
Coefficient of Determination (Adjusted):	0.996

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.0238	0.02598	2.39	4487999.0	1.091577	Y
2	IC 320-269628/3	0.0476	0.052506	2.39	5390763.0	1.103068	Y
3	IC 320-269628/4	0.238	0.237303	2.39	5531063.0	0.997071	Y
4	IC 320-269628/5	0.952	1.015571	2.39	5548735.0	1.066776	Y
5	IC 320-269628/6	2.38	2.483243	2.39	5445665.0	1.04338	Y
6	IC 320-269628/7	4.76	5.314084	2.39	5448850.0	1.116404	Y
7	IC 320-269628/8	9.52	9.211876	2.39	5296197.0	0.967634	Y



Calibration / Perfluorooctanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

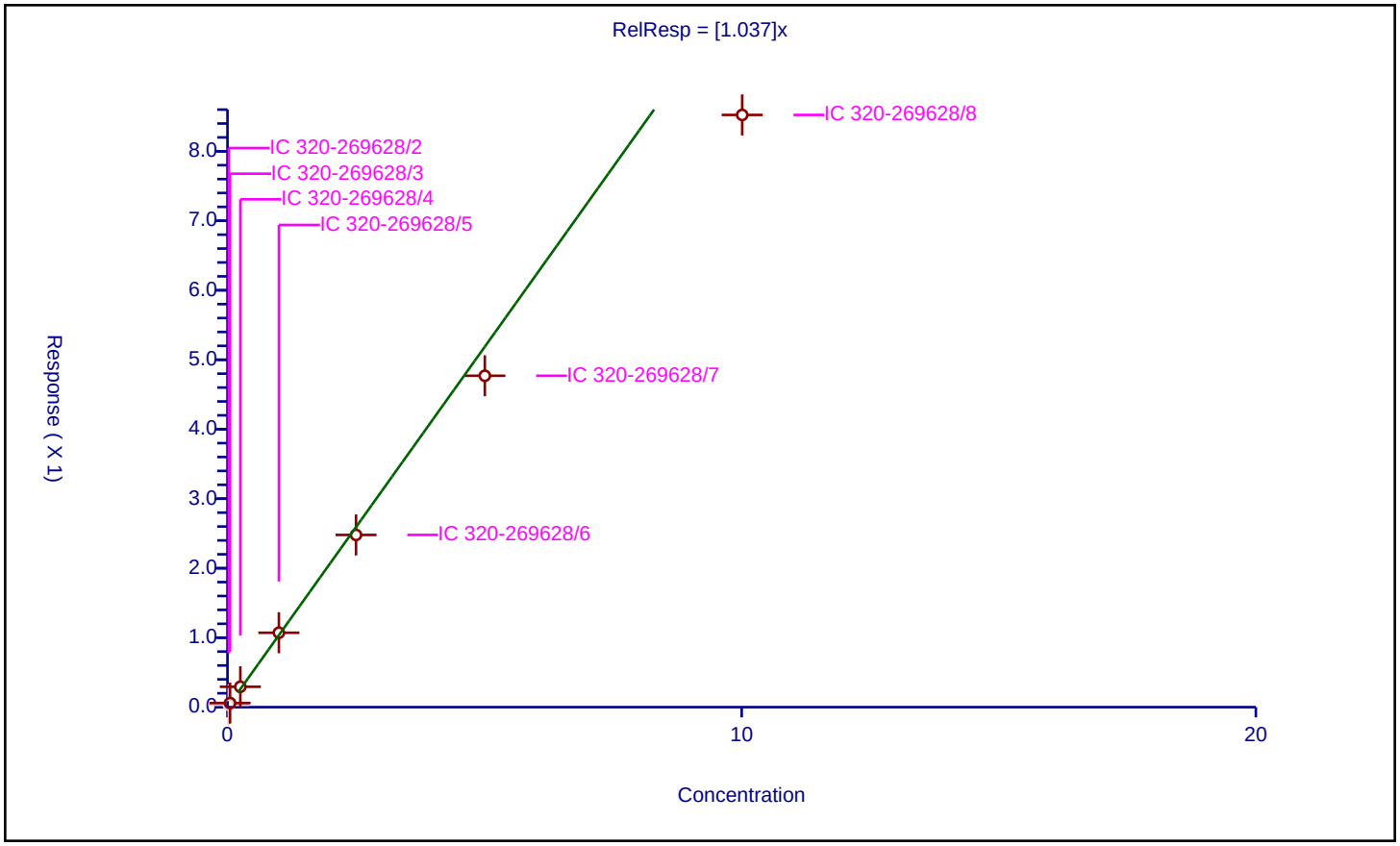
Curve Coefficients

Intercept:	0
Slope:	1.037

Error Coefficients

Standard Error:	11900000
Relative Standard Error:	12.5
Correlation Coefficient:	0.991
Coefficient of Determination (Adjusted):	0.981

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025025	0.034601	2.5	5747530.0	1.382638	N
2	IC 320-269628/3	0.05005	0.059042	2.5	7236127.0	1.179666	Y
3	IC 320-269628/4	0.25025	0.293627	2.5	6694520.0	1.173334	Y
4	IC 320-269628/5	1.0	1.070716	2.5	6970295.0	1.070716	Y
5	IC 320-269628/6	2.5	2.478849	2.5	6835040.0	0.99154	Y
6	IC 320-269628/7	5.005	4.769519	2.5	6793920.0	0.952951	Y
7	IC 320-269628/8	10.01	8.523346	2.5	6436164.0	0.851483	Y



Calibration / Perfluorooctanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

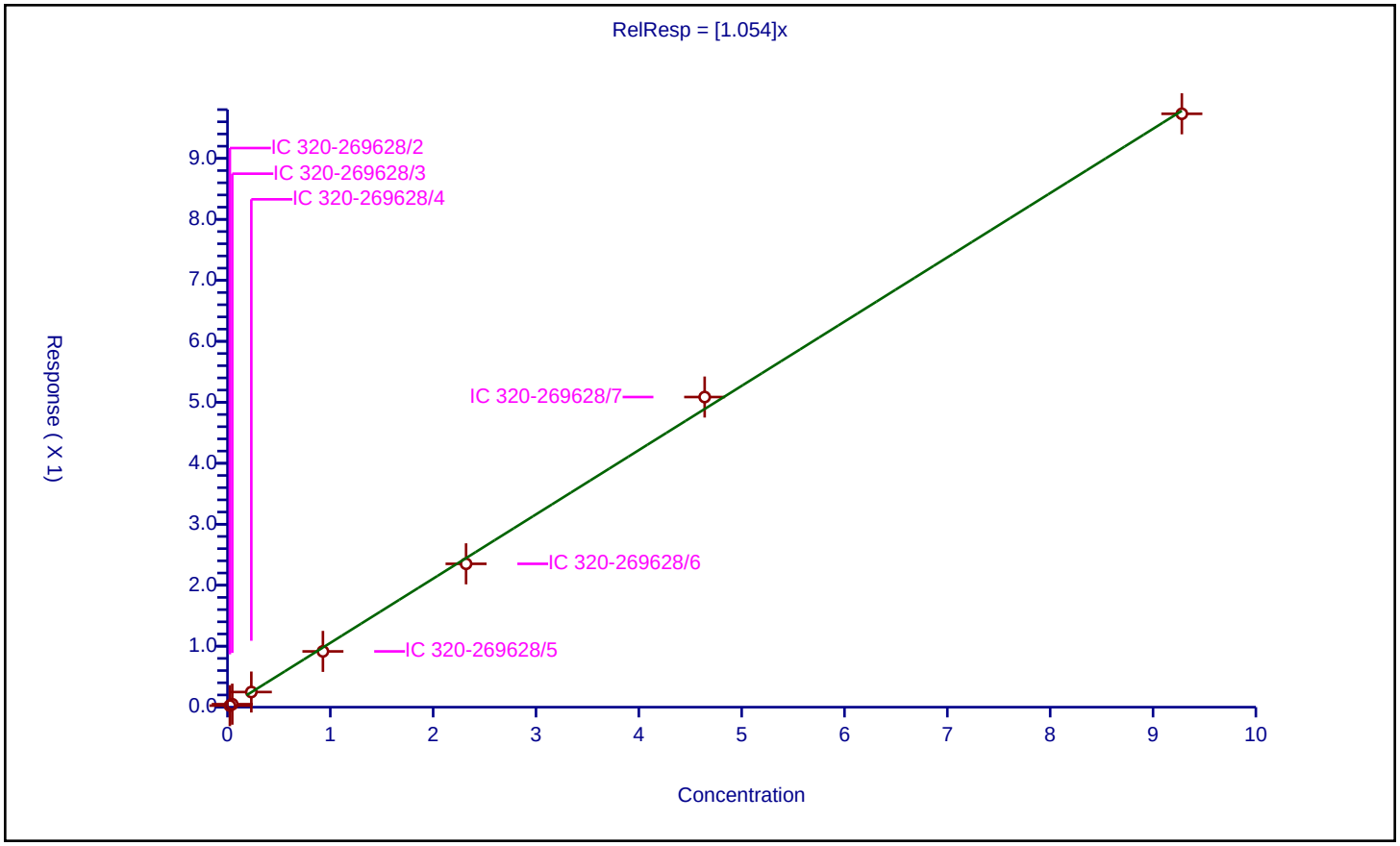
Curve Coefficients

Intercept:	0
Slope:	1.054

Error Coefficients

Standard Error:	10300000
Relative Standard Error:	4.1
Correlation Coefficient:	0.999
Coefficient of Determination (Adjusted):	0.998

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.0232	0.025623	2.39	4487999.0	1.104452	Y
2	IC 320-269628/3	0.0464	0.049123	2.39	5390763.0	1.058692	Y
3	IC 320-269628/4	0.232	0.248335	2.39	5531063.0	1.07041	Y
4	IC 320-269628/5	0.928	0.914622	2.39	5548735.0	0.985584	Y
5	IC 320-269628/6	2.32	2.350723	2.39	5445665.0	1.013243	Y
6	IC 320-269628/7	4.64	5.086042	2.39	5448850.0	1.09613	Y
7	IC 320-269628/8	9.28	9.731463	2.39	5296197.0	1.048649	Y



Calibration / Perfluorononanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

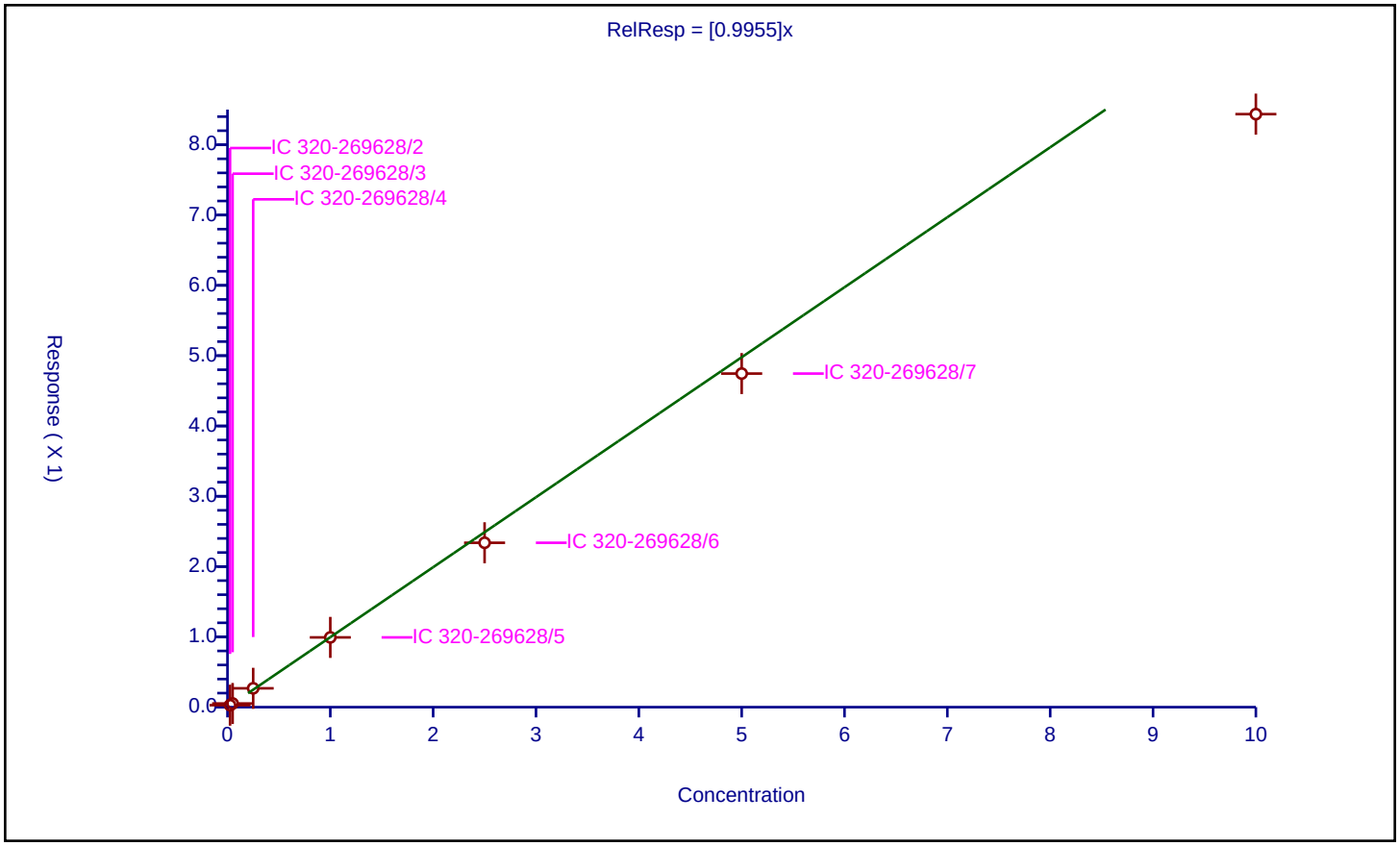
Curve Coefficients

Intercept:	0
Slope:	0.9955

Error Coefficients

Standard Error:	9260000
Relative Standard Error:	9.6
Correlation Coefficient:	0.986
Coefficient of Determination (Adjusted):	0.988

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.028169	2.5	5252906.0	1.126748	Y
2	IC 320-269628/3	0.05	0.05238	2.5	6352900.0	1.047592	Y
3	IC 320-269628/4	0.25	0.268375	2.5	6359521.0	1.073501	Y
4	IC 320-269628/5	1.0	0.992536	2.5	6266243.0	0.992536	Y
5	IC 320-269628/6	2.5	2.33855	2.5	6325367.0	0.93542	Y
6	IC 320-269628/7	5.0	4.745178	2.5	6030787.0	0.949036	Y
7	IC 320-269628/8	10.0	8.435692	2.5	5479314.0	0.843569	Y



Calibration / 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonate

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

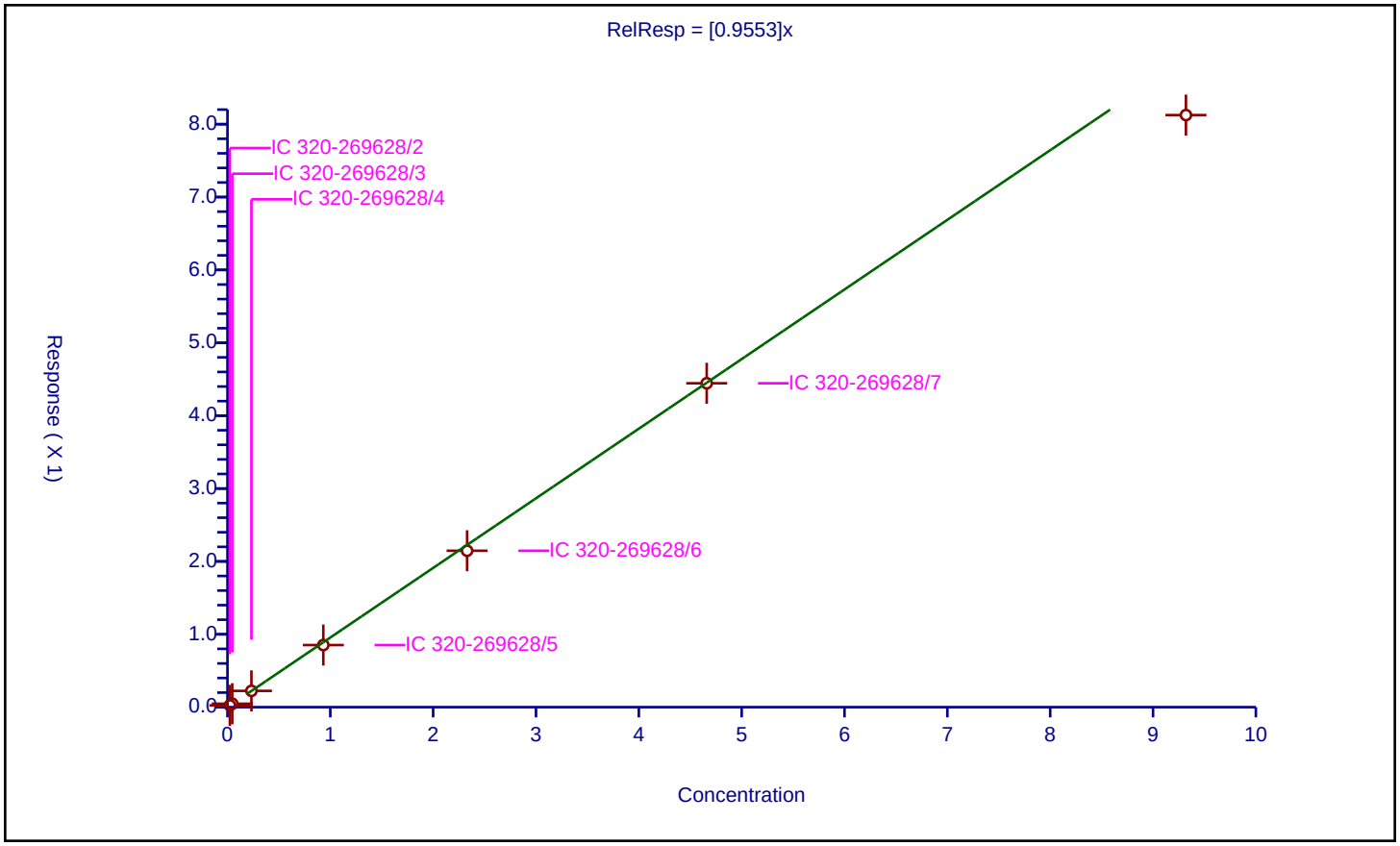
Curve Coefficients

Intercept:	0
Slope:	0.9553

Error Coefficients

Standard Error:	8710000
Relative Standard Error:	6.4
Correlation Coefficient:	0.996
Coefficient of Determination (Adjusted):	0.995

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.0233	0.024514	2.39	4487999.0	1.052104	Y
2	IC 320-269628/3	0.0466	0.047277	2.39	5390763.0	1.014532	Y
3	IC 320-269628/4	0.233	0.223605	2.39	5531063.0	0.959677	Y
4	IC 320-269628/5	0.932	0.852056	2.39	5548735.0	0.914223	Y
5	IC 320-269628/6	2.33	2.146331	2.39	5445665.0	0.921172	Y
6	IC 320-269628/7	4.66	4.444641	2.39	5448850.0	0.953786	Y
7	IC 320-269628/8	9.32	8.124884	2.39	5296197.0	0.871769	Y



Calibration / Perfluorooctanesulfonamide

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

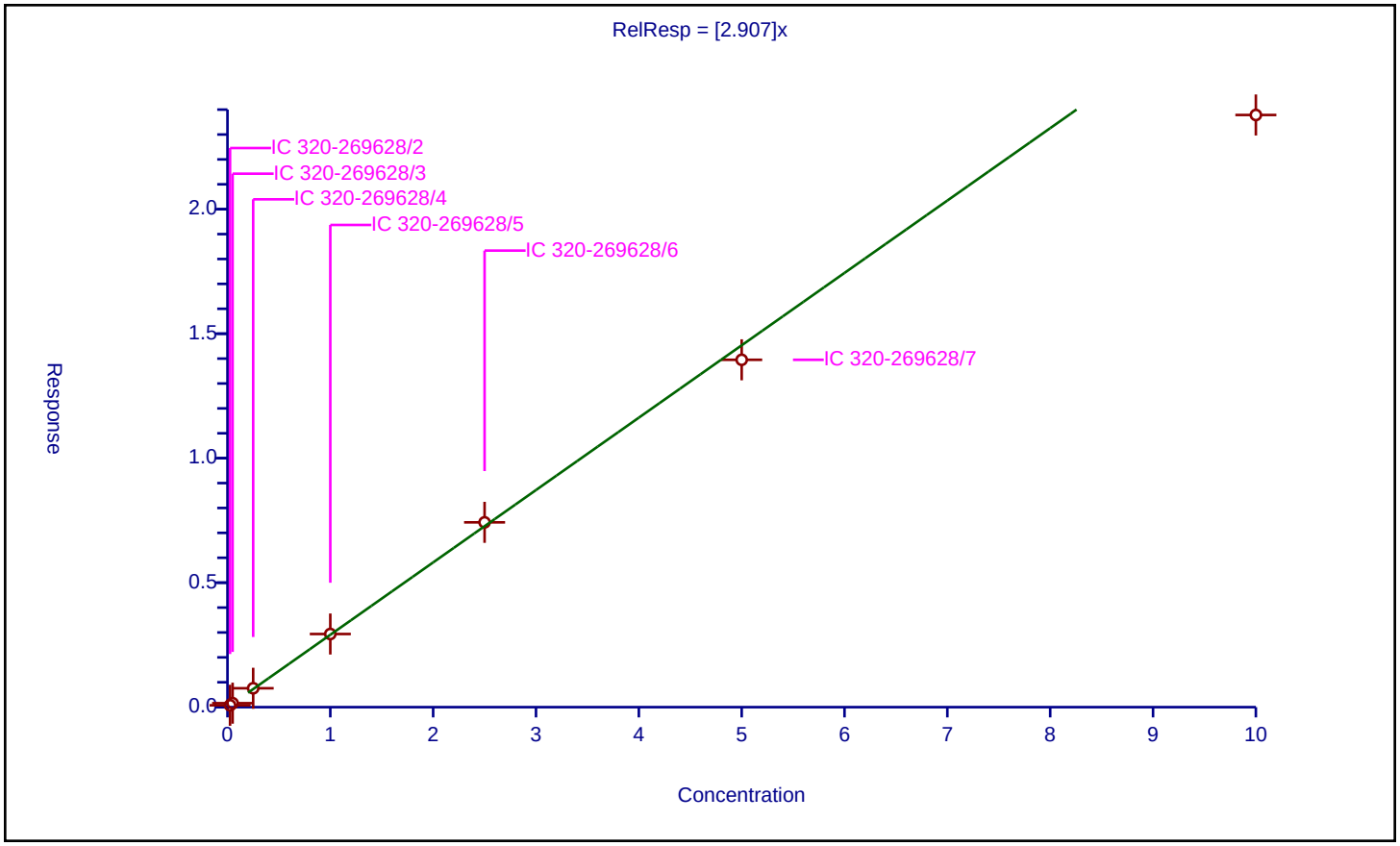
Curve Coefficients

Intercept:	0
Slope:	2.907

Error Coefficients

Standard Error:	16800000
Relative Standard Error:	9.1
Correlation Coefficient:	0.983
Coefficient of Determination (Adjusted):	0.989

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.075951	2.5	3116006.0	3.038056	Y
2	IC 320-269628/3	0.05	0.15982	2.5	3810096.0	3.196402	Y
3	IC 320-269628/4	0.25	0.759309	2.5	3846289.0	3.037234	Y
4	IC 320-269628/5	1.0	2.938228	2.5	3914468.0	2.938228	Y
5	IC 320-269628/6	2.5	7.422945	2.5	3650484.0	2.969178	Y
6	IC 320-269628/7	5.0	13.950942	2.5	3759826.0	2.790188	Y
7	IC 320-269628/8	10.0	23.784446	2.5	3492168.0	2.378445	Y



Calibration / Perfluorononanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

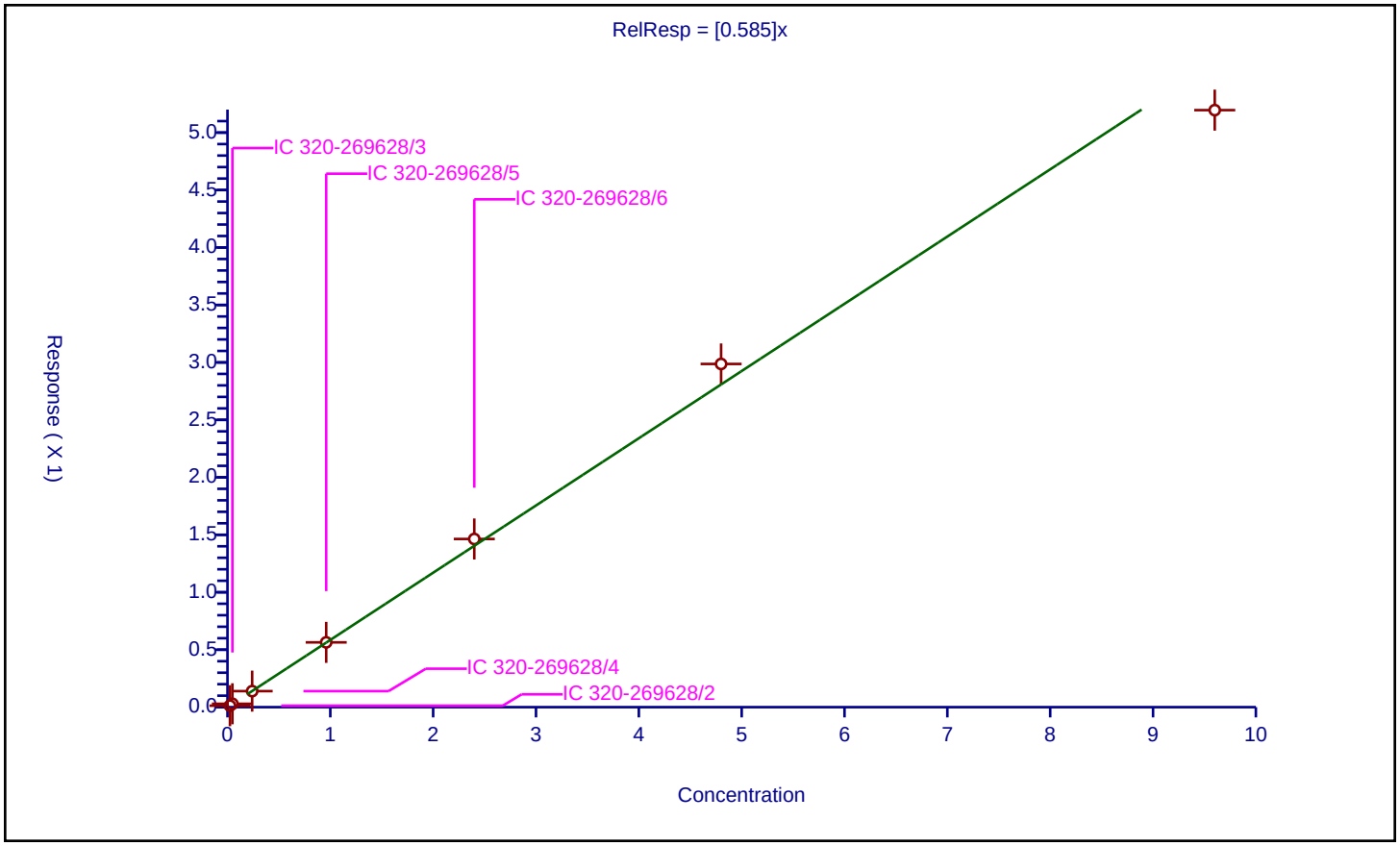
Curve Coefficients

Intercept:	0
Slope:	0.585

Error Coefficients

Standard Error:	5650000
Relative Standard Error:	5.9
Correlation Coefficient:	0.992
Coefficient of Determination (Adjusted):	0.996

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.024	0.012912	2.39	4487999.0	0.538012	Y
2	IC 320-269628/3	0.048	0.029532	2.39	5390763.0	0.61526	Y
3	IC 320-269628/4	0.24	0.139518	2.39	5531063.0	0.581325	Y
4	IC 320-269628/5	0.96	0.563864	2.39	5548735.0	0.587358	Y
5	IC 320-269628/6	2.4	1.463557	2.39	5445665.0	0.609816	Y
6	IC 320-269628/7	4.8	2.986634	2.39	5448850.0	0.622215	Y
7	IC 320-269628/8	9.6	5.195387	2.39	5296197.0	0.541186	Y



Calibration / 1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2)

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

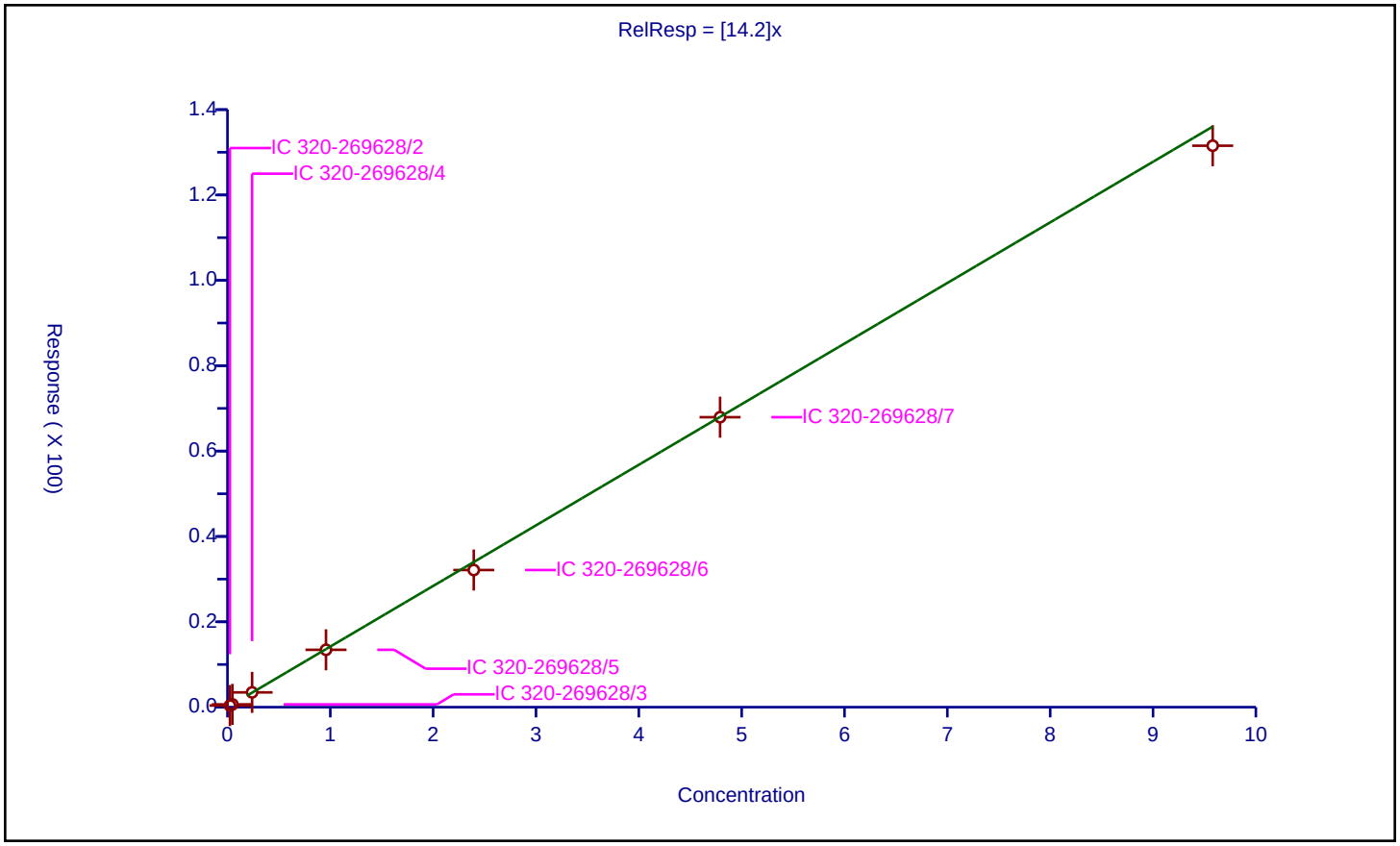
Curve Coefficients

Intercept:	0
Slope:	14.2

Error Coefficients

Standard Error:	2070000
Relative Standard Error:	5.9
Correlation Coefficient:	0.994
Coefficient of Determination (Adjusted):	0.996

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.02395	0.381093	2.395	67691.0	15.912012	Y
2	IC 320-269628/3	0.0479	0.654303	2.395	89123.0	13.659774	Y
3	IC 320-269628/4	0.2395	3.462375	2.395	93242.0	14.456683	Y
4	IC 320-269628/5	0.958	13.436721	2.395	83823.0	14.025804	Y
5	IC 320-269628/6	2.395	32.131816	2.395	86690.0	13.416207	Y
6	IC 320-269628/7	4.79	67.930949	2.395	86841.0	14.181827	Y
7	IC 320-269628/8	9.58	131.542715	2.395	77164.0	13.730972	Y



Calibration / Perfluorodecanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

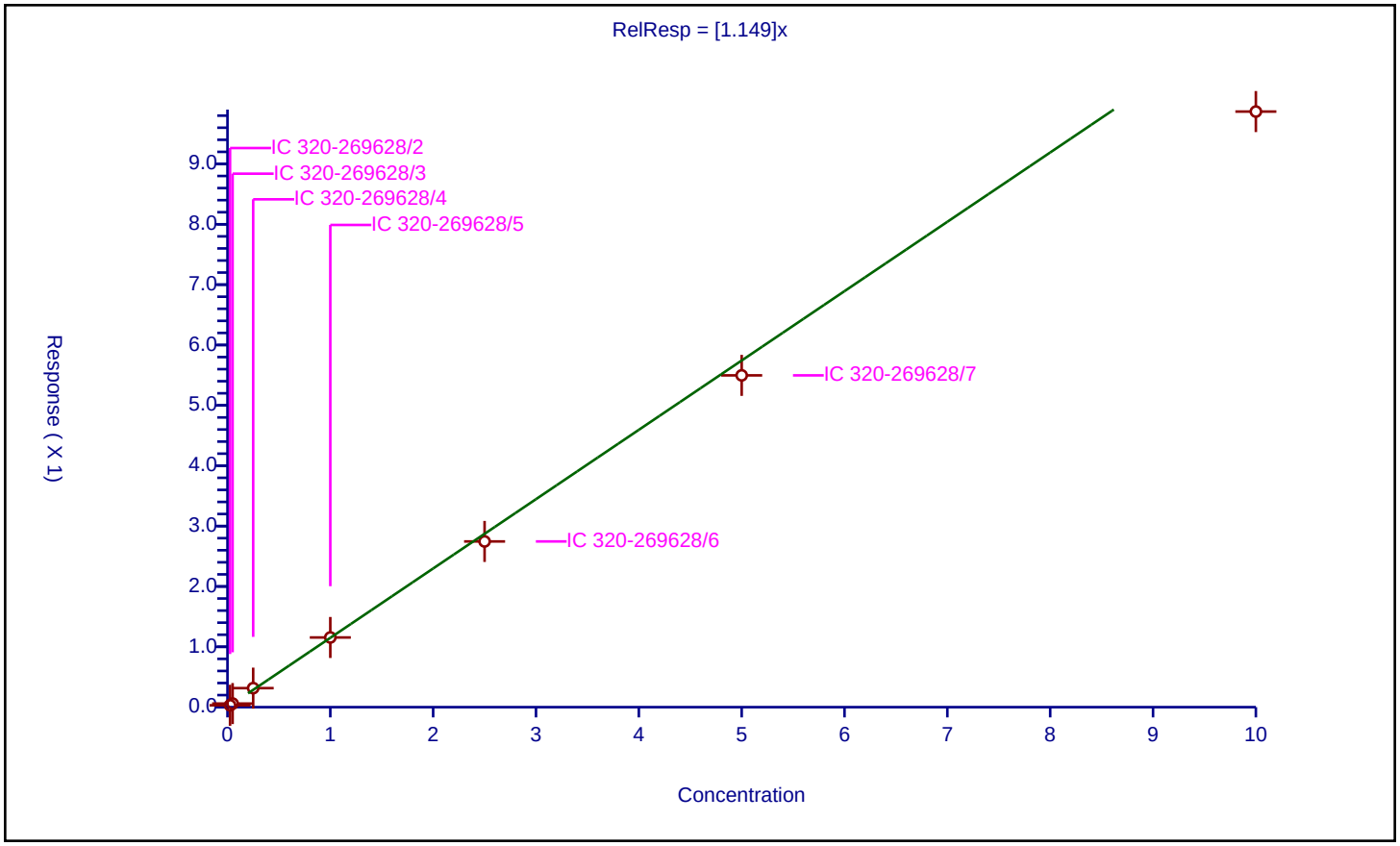
Curve Coefficients

Intercept:	0
Slope:	1.149

Error Coefficients

Standard Error:	10300000
Relative Standard Error:	8.4
Correlation Coefficient:	0.986
Coefficient of Determination (Adjusted):	0.991

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.03118	2.5	5293647.0	1.247212	Y
2	IC 320-269628/3	0.05	0.059627	2.5	6188008.0	1.19254	Y
3	IC 320-269628/4	0.25	0.315559	2.5	6315840.0	1.262236	Y
4	IC 320-269628/5	1.0	1.154694	2.5	6254581.0	1.154694	Y
5	IC 320-269628/6	2.5	2.74548	2.5	6170874.0	1.098192	Y
6	IC 320-269628/7	5.0	5.496945	2.5	5725271.0	1.099389	Y
7	IC 320-269628/8	10.0	9.867506	2.5	5178371.0	0.986751	Y



Calibration / N-methylperfluorooctanesulfonamidoacetic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

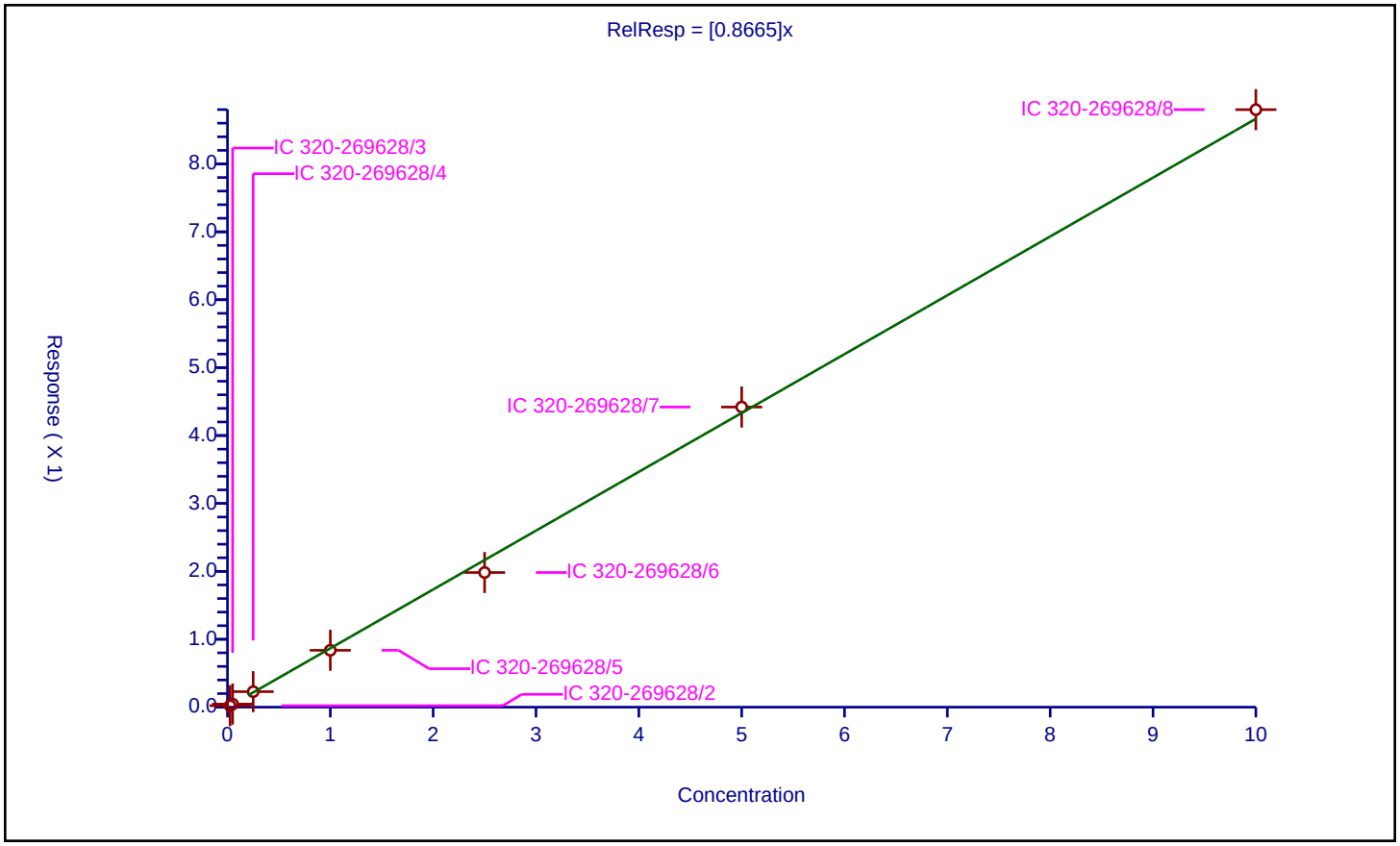
Curve Coefficients

Intercept:	0
Slope:	0.8665

Error Coefficients

Standard Error:	2690000
Relative Standard Error:	5.0
Correlation Coefficient:	0.999
Coefficient of Determination (Adjusted):	0.997

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.021173	2.5	1288202.0	0.846917	Y
2	IC 320-269628/3	0.05	0.045561	2.5	1529044.0	0.911223	Y
3	IC 320-269628/4	0.25	0.228083	2.5	1523768.0	0.91233	Y
4	IC 320-269628/5	1.0	0.837675	2.5	1568547.0	0.837675	Y
5	IC 320-269628/6	2.5	1.983127	2.5	1610985.0	0.793251	Y
6	IC 320-269628/7	5.0	4.42001	2.5	1624805.0	0.884002	Y
7	IC 320-269628/8	10.0	8.799364	2.5	1634654.0	0.879936	Y



Calibration / Perfluorodecanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

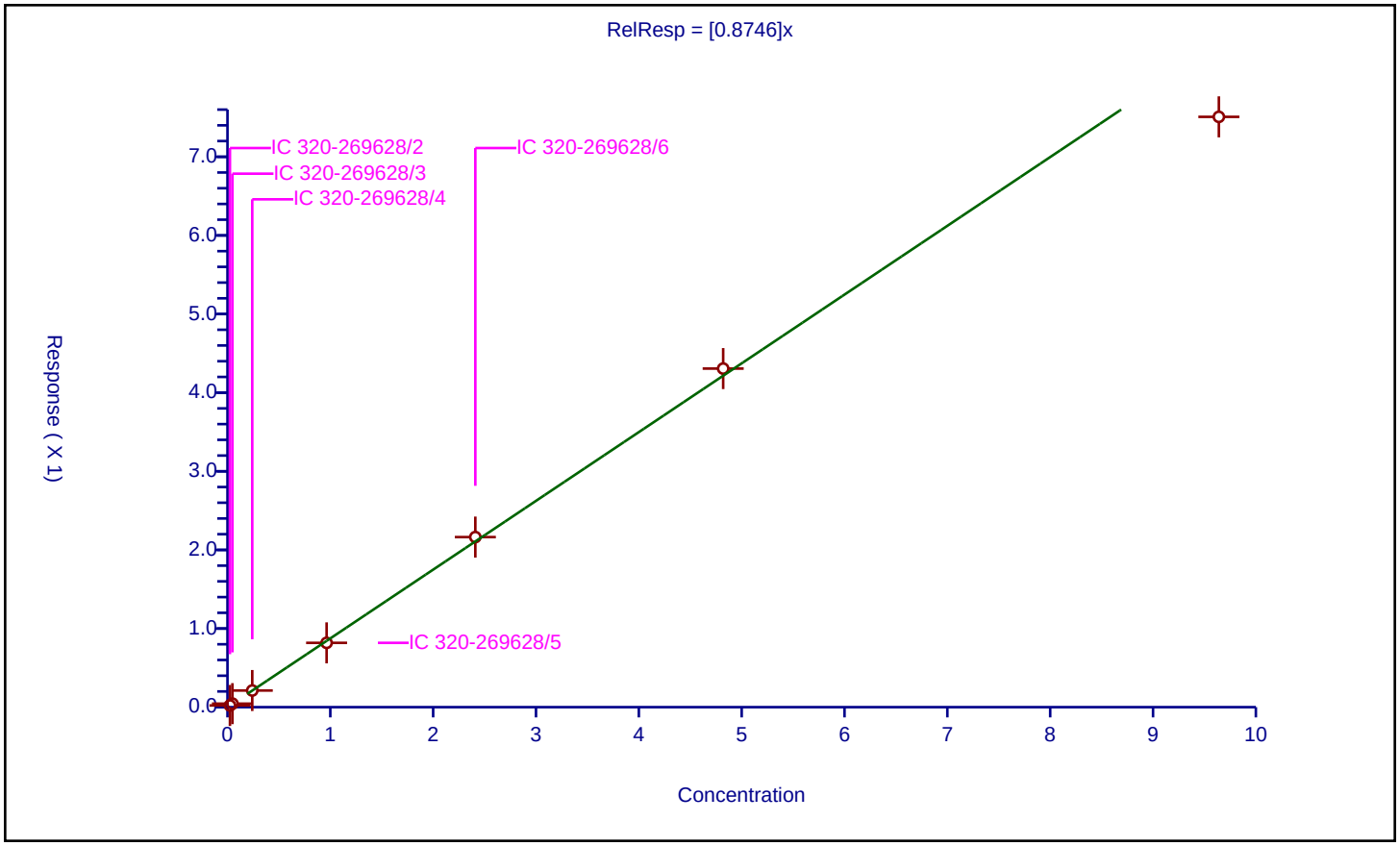
Curve Coefficients

Intercept:	0
Slope:	0.8746

Error Coefficients

Standard Error:	8180000
Relative Standard Error:	5.6
Correlation Coefficient:	0.992
Coefficient of Determination (Adjusted):	0.996

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.0241	0.021579	2.39	4487999.0	0.895404	Y
2	IC 320-269628/3	0.0482	0.044794	2.39	5390763.0	0.929335	Y
3	IC 320-269628/4	0.241	0.211802	2.39	5531063.0	0.878846	Y
4	IC 320-269628/5	0.964	0.817873	2.39	5548735.0	0.848416	Y
5	IC 320-269628/6	2.41	2.16322	2.39	5445665.0	0.897602	Y
6	IC 320-269628/7	4.82	4.306458	2.39	5448850.0	0.893456	Y
7	IC 320-269628/8	9.64	7.507832	2.39	5296197.0	0.778821	Y



Calibration / Perfluoroundecanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

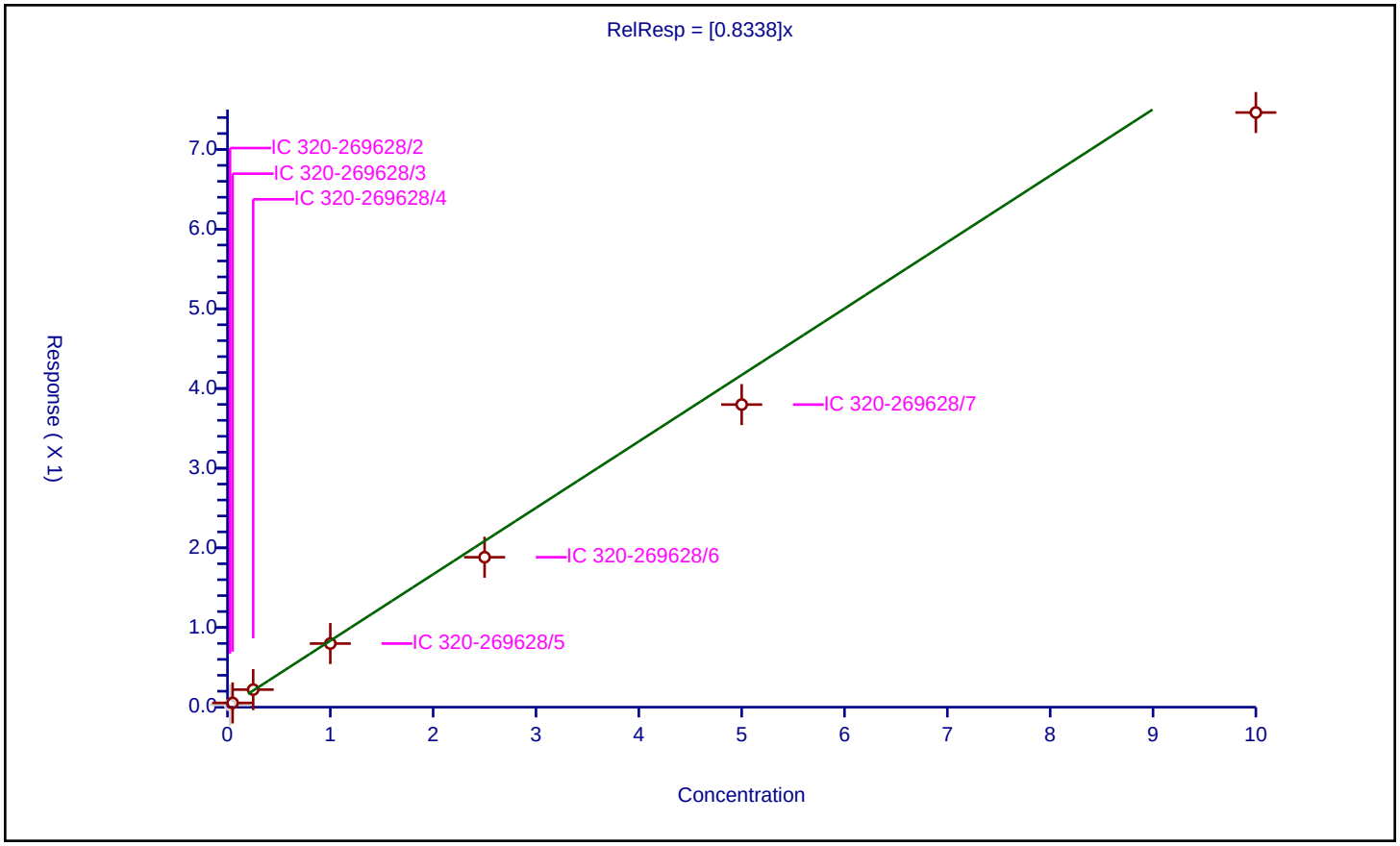
Curve Coefficients

Intercept:	0
Slope:	0.8338

Error Coefficients

Standard Error:	6910000
Relative Standard Error:	14.8
Correlation Coefficient:	0.996
Coefficient of Determination (Adjusted):	0.971

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.028467	2.5	3884957.0	1.138674	N
2	IC 320-269628/3	0.05	0.053238	2.5	4847529.0	1.064769	Y
3	IC 320-269628/4	0.25	0.220216	2.5	4738780.0	0.880866	Y
4	IC 320-269628/5	1.0	0.798365	2.5	4844062.0	0.798365	Y
5	IC 320-269628/6	2.5	1.881834	2.5	4866308.0	0.752733	Y
6	IC 320-269628/7	5.0	3.798058	2.5	4854709.0	0.759612	Y
7	IC 320-269628/8	10.0	7.463589	2.5	4347109.0	0.746359	Y



Calibration / N-ethylperfluorooctanesulfonamidoacetic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

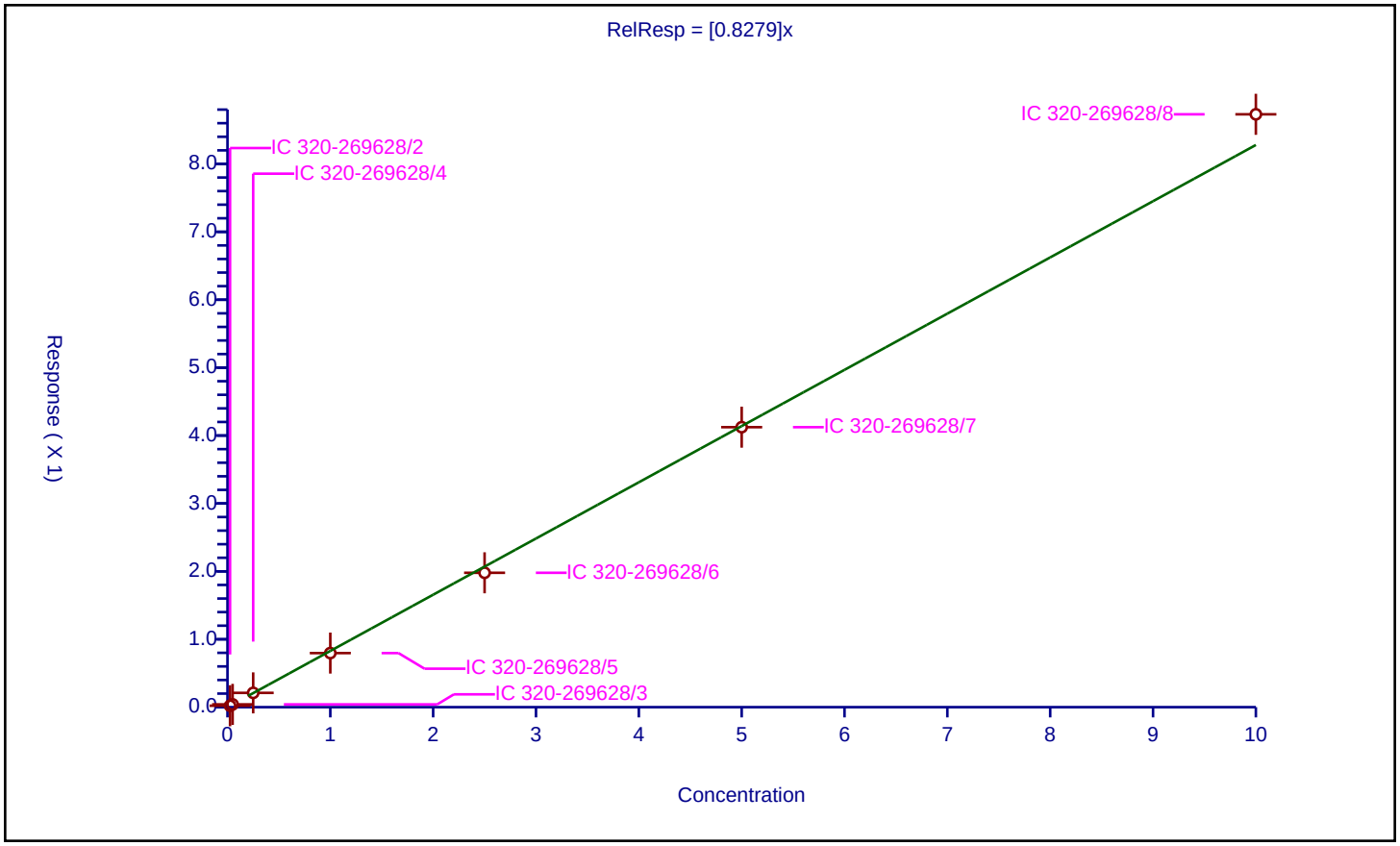
Curve Coefficients

Intercept:	0
Slope:	0.8279

Error Coefficients

Standard Error:	2010000
Relative Standard Error:	3.4
Correlation Coefficient:	1.000
Coefficient of Determination (Adjusted):	0.999

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.021138	2.5	1056882.0	0.845506	Y
2	IC 320-269628/3	0.05	0.041136	2.5	1309789.0	0.822728	Y
3	IC 320-269628/4	0.25	0.210314	2.5	1364722.0	0.841256	Y
4	IC 320-269628/5	1.0	0.796536	2.5	1318160.0	0.796536	Y
5	IC 320-269628/6	2.5	1.978919	2.5	1388082.0	0.791568	Y
6	IC 320-269628/7	5.0	4.123202	2.5	1342267.0	0.82464	Y
7	IC 320-269628/8	10.0	8.730831	2.5	1213767.0	0.873083	Y



Calibration / 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonate

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

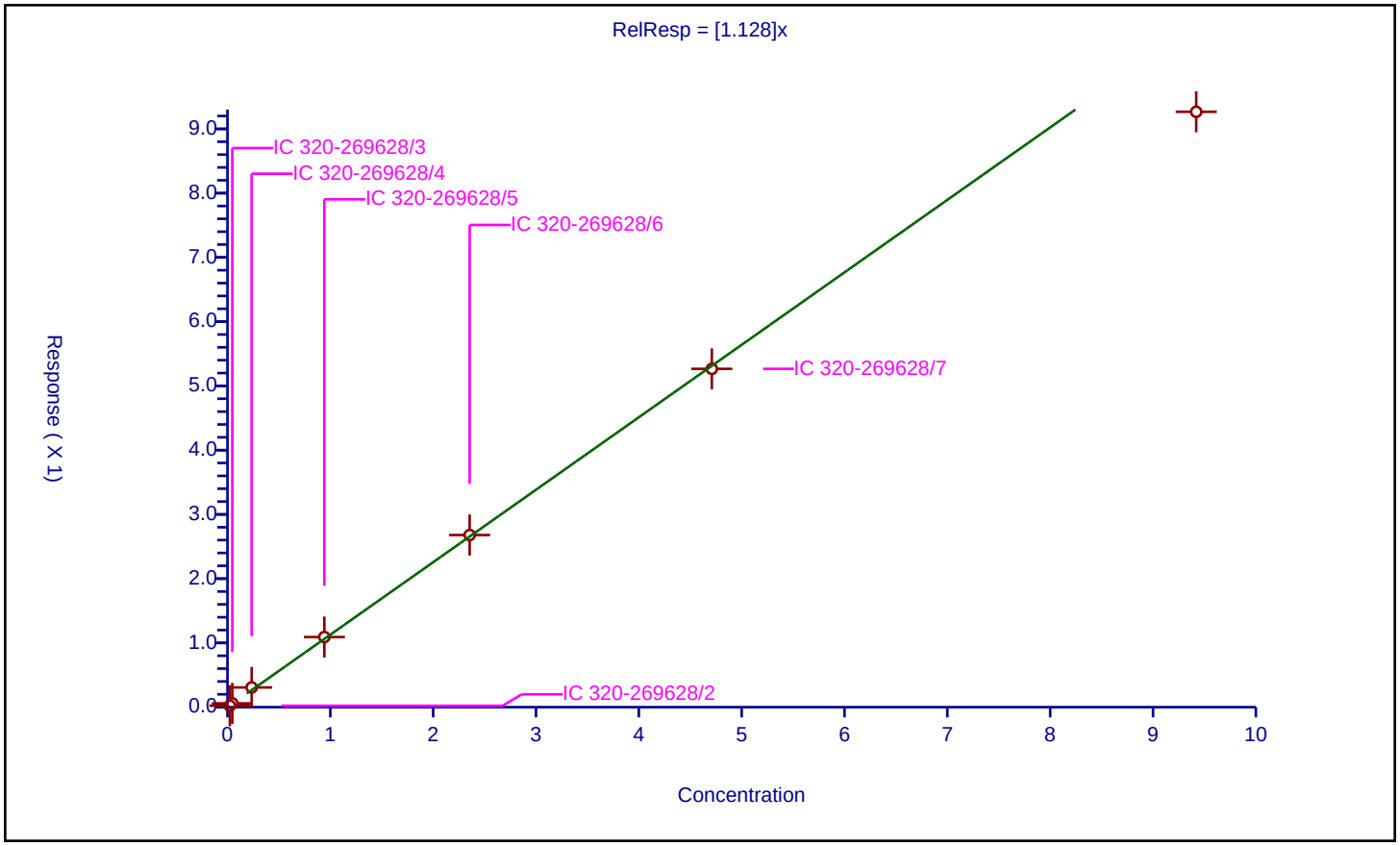
Curve Coefficients

Intercept:	0
Slope:	1.128

Error Coefficients

Standard Error:	10100000
Relative Standard Error:	11.6
Correlation Coefficient:	0.993
Coefficient of Determination (Adjusted):	0.984

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.02355	0.022201	2.39	4487999.0	0.942705	Y
2	IC 320-269628/3	0.0471	0.058919	2.39	5390763.0	1.250937	Y
3	IC 320-269628/4	0.2355	0.307141	2.39	5531063.0	1.304208	Y
4	IC 320-269628/5	0.942	1.091097	2.39	5548735.0	1.158277	Y
5	IC 320-269628/6	2.355	2.678804	2.39	5445665.0	1.137497	Y
6	IC 320-269628/7	4.71	5.265339	2.39	5448850.0	1.117906	Y
7	IC 320-269628/8	9.42	9.265727	2.39	5296197.0	0.983623	Y



Calibration / Perfluorododecanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

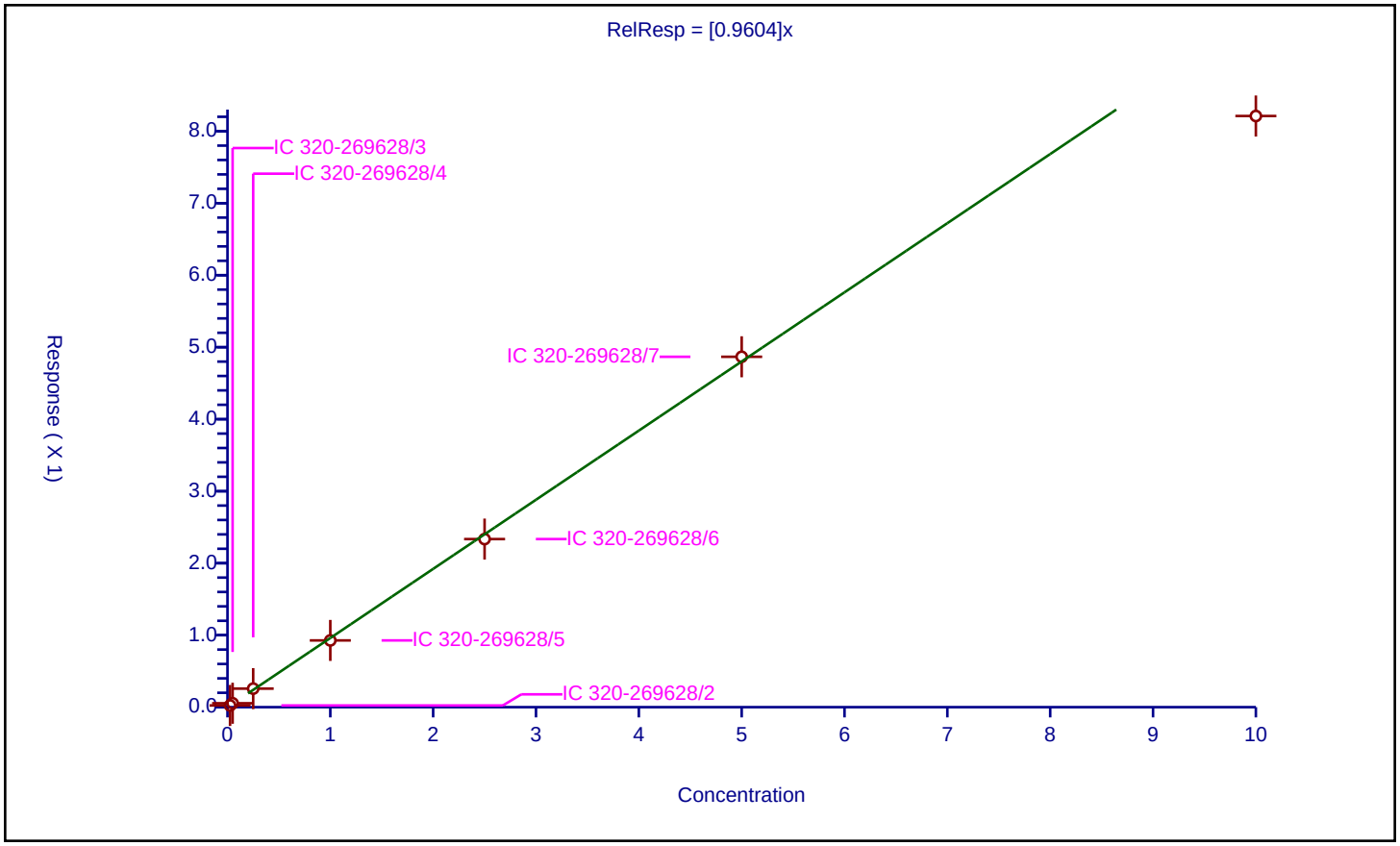
Curve Coefficients

Intercept:	0
Slope:	0.9604

Error Coefficients

Standard Error:	8920000
Relative Standard Error:	8.8
Correlation Coefficient:	0.992
Coefficient of Determination (Adjusted):	0.990

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.023728	2.5	4802312.0	0.949126	Y
2	IC 320-269628/3	0.05	0.054406	2.5	6058099.0	1.088122	Y
3	IC 320-269628/4	0.25	0.257461	2.5	5949453.0	1.029846	Y
4	IC 320-269628/5	1.0	0.927012	2.5	5738372.0	0.927012	Y
5	IC 320-269628/6	2.5	2.334741	2.5	5632761.0	0.933896	Y
6	IC 320-269628/7	5.0	4.866796	2.5	5517310.0	0.973359	Y
7	IC 320-269628/8	10.0	8.21108	2.5	5530079.0	0.821108	Y



Calibration / 1H,1H,2H,2H-perfluorododecanesulfonic acid (10:2)

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

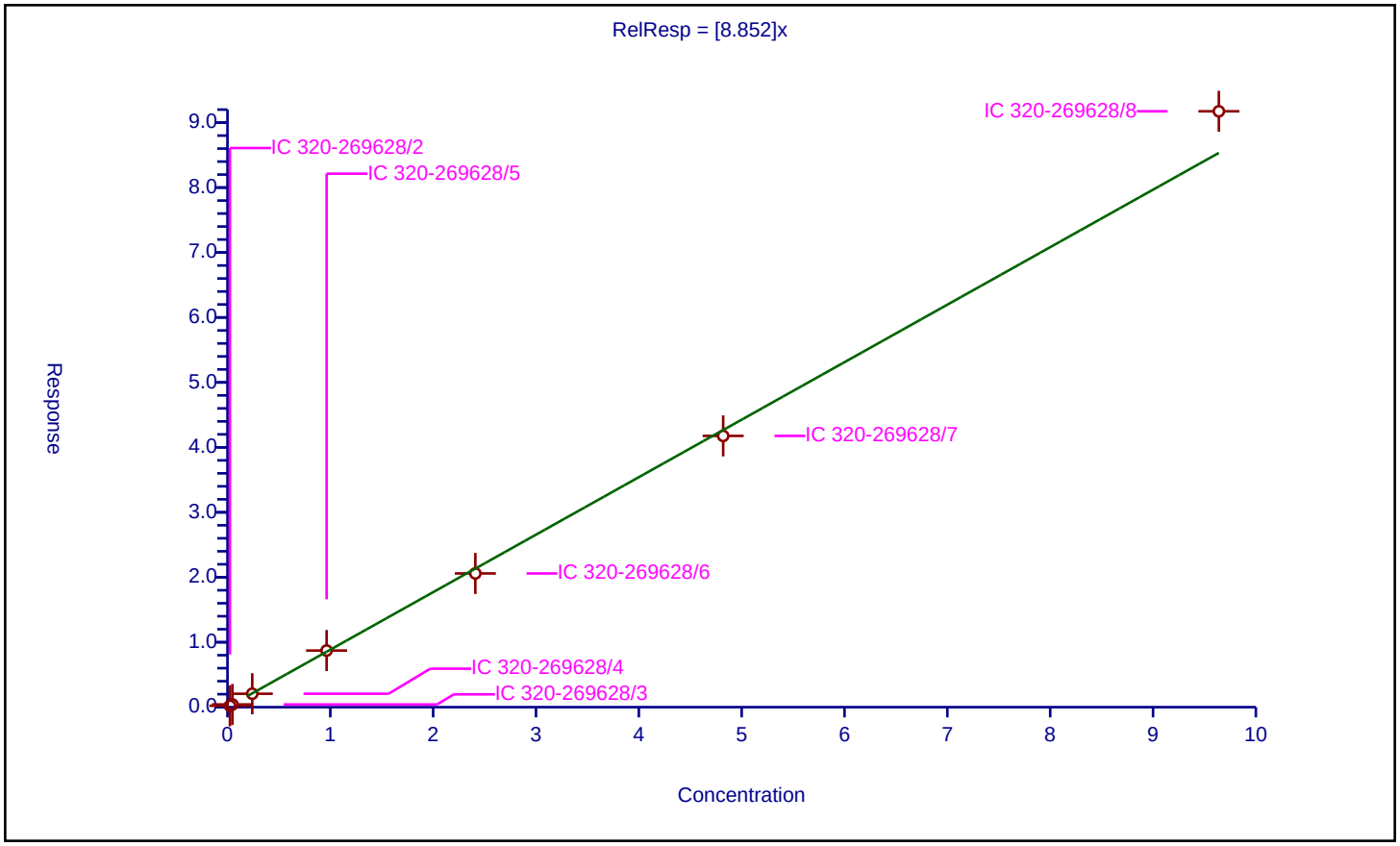
Curve Coefficients

Intercept:	0
Slope:	8.852

Error Coefficients

Standard Error:	1400000
Relative Standard Error:	4.0
Correlation Coefficient:	1.000
Coefficient of Determination (Adjusted):	0.998

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.0241	0.21664	2.395	67691.0	8.989216	Y
2	IC 320-269628/3	0.0482	0.415967	2.395	89123.0	8.630016	Y
3	IC 320-269628/4	0.241	2.068122	2.395	93242.0	8.581419	Y
4	IC 320-269628/5	0.964	8.716351	2.395	83823.0	9.041858	Y
5	IC 320-269628/6	2.41	20.589789	2.395	86690.0	8.543481	Y
6	IC 320-269628/7	4.82	41.762897	2.395	86841.0	8.664501	Y
7	IC 320-269628/8	9.64	91.739792	2.395	77164.0	9.516576	Y



Calibration / Perfluorododecanesulfonic acid (PFDoS)

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

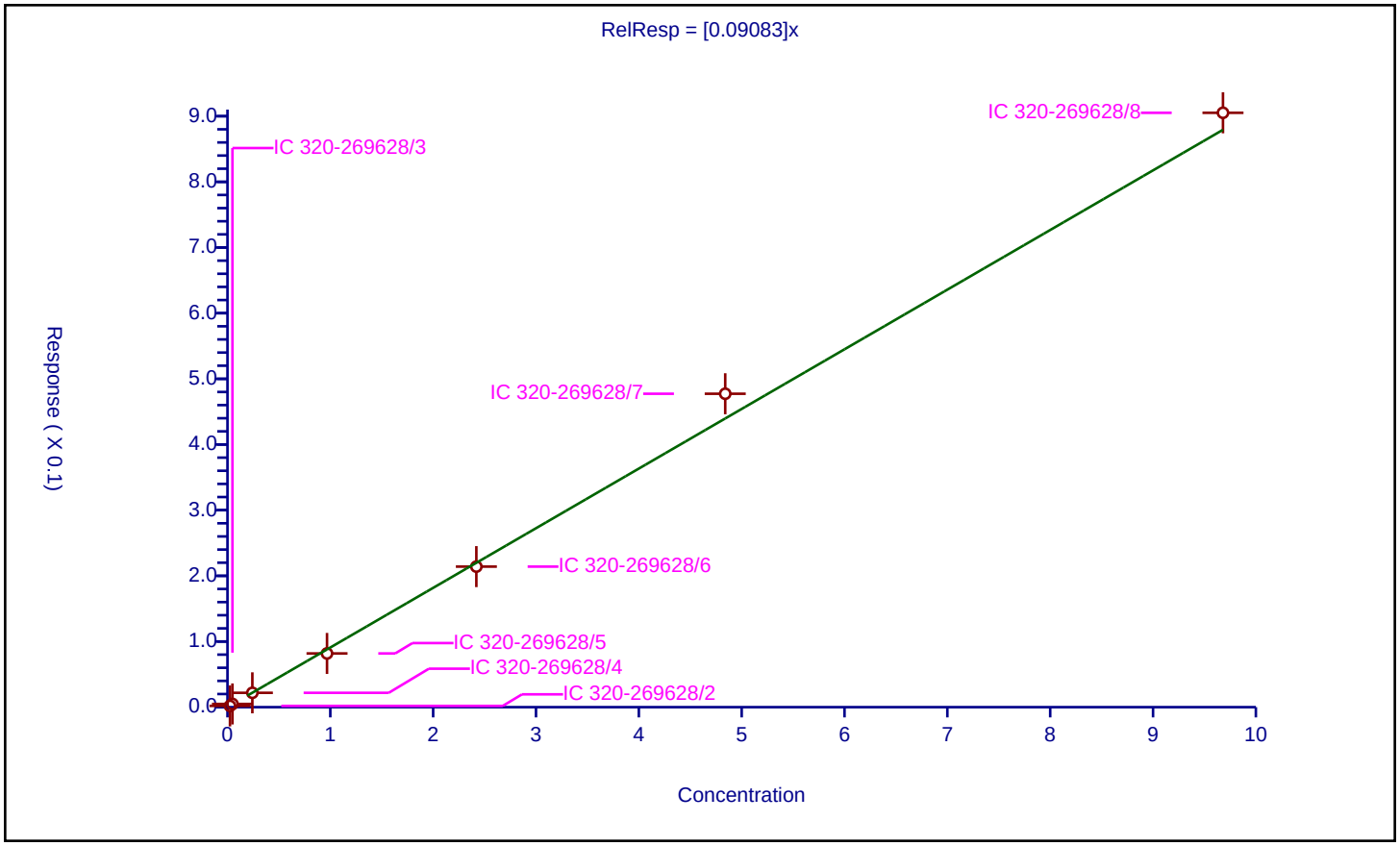
Curve Coefficients

Intercept:	0
Slope:	0.09083

Error Coefficients

Standard Error:	956000
Relative Standard Error:	8.4
Correlation Coefficient:	0.998
Coefficient of Determination (Adjusted):	0.992

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.0242	0.00192	2.39	4487999.0	0.079352	Y
2	IC 320-269628/3	0.0484	0.004896	2.39	5390763.0	0.101165	Y
3	IC 320-269628/4	0.242	0.021832	2.39	5531063.0	0.090214	Y
4	IC 320-269628/5	0.968	0.081816	2.39	5548735.0	0.084521	Y
5	IC 320-269628/6	2.42	0.214026	2.39	5445665.0	0.088441	Y
6	IC 320-269628/7	4.84	0.477305	2.39	5448850.0	0.098617	Y
7	IC 320-269628/8	9.68	0.905136	2.39	5296197.0	0.093506	Y



Calibration / Perfluorotridecanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

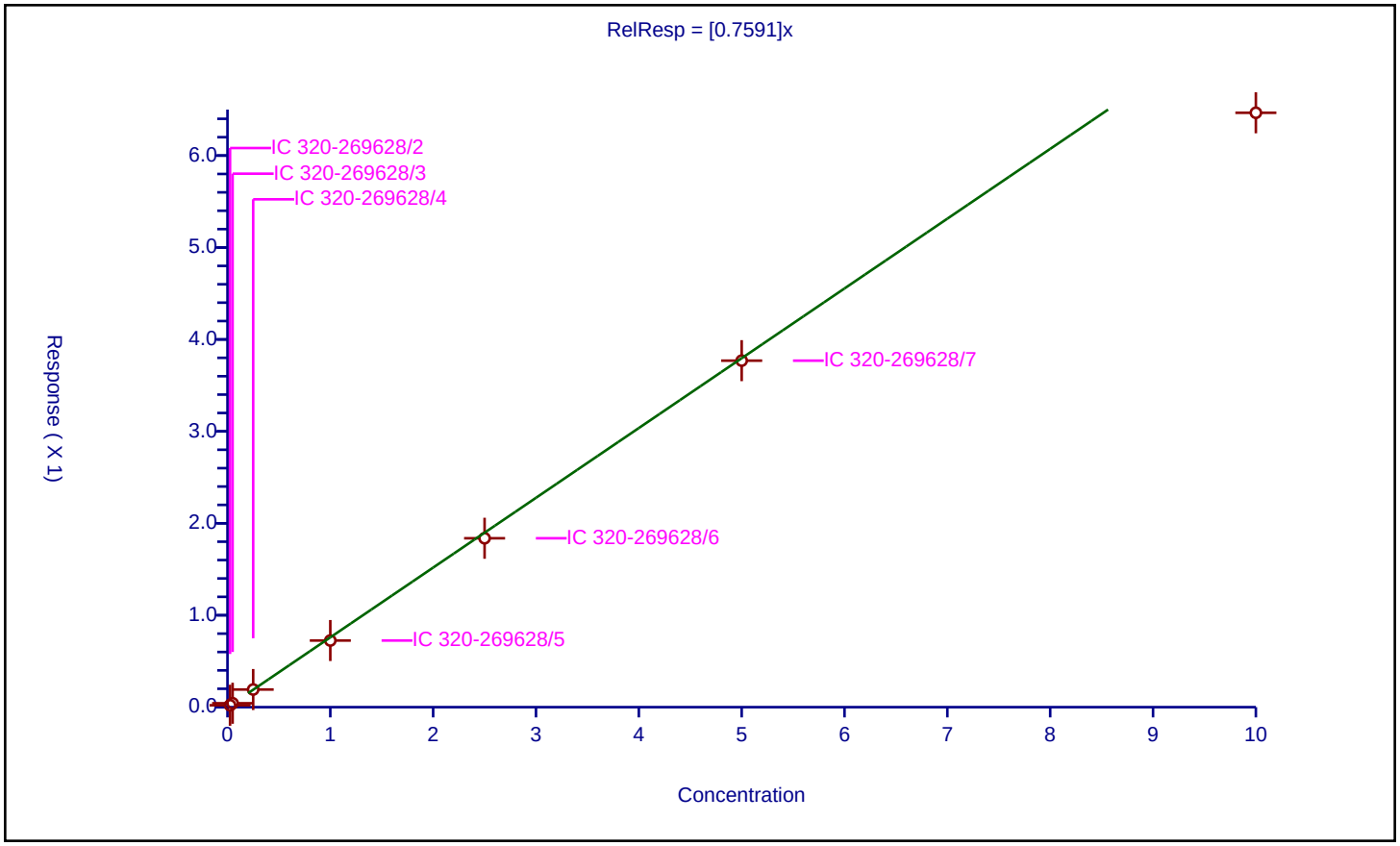
Curve Coefficients

Intercept:	0
Slope:	0.7591

Error Coefficients

Standard Error:	7000000
Relative Standard Error:	9.1
Correlation Coefficient:	0.994
Coefficient of Determination (Adjusted):	0.989

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.020897	2.5	4802312.0	0.835868	Y
2	IC 320-269628/3	0.05	0.042498	2.5	6058099.0	0.849953	Y
3	IC 320-269628/4	0.25	0.1919	2.5	5949453.0	0.7676	Y
4	IC 320-269628/5	1.0	0.724944	2.5	5738372.0	0.724944	Y
5	IC 320-269628/6	2.5	1.837304	2.5	5632761.0	0.734921	Y
6	IC 320-269628/7	5.0	3.769127	2.5	5517310.0	0.753825	Y
7	IC 320-269628/8	10.0	6.465593	2.5	5530079.0	0.646559	Y



Calibration / Perfluorotetradecanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

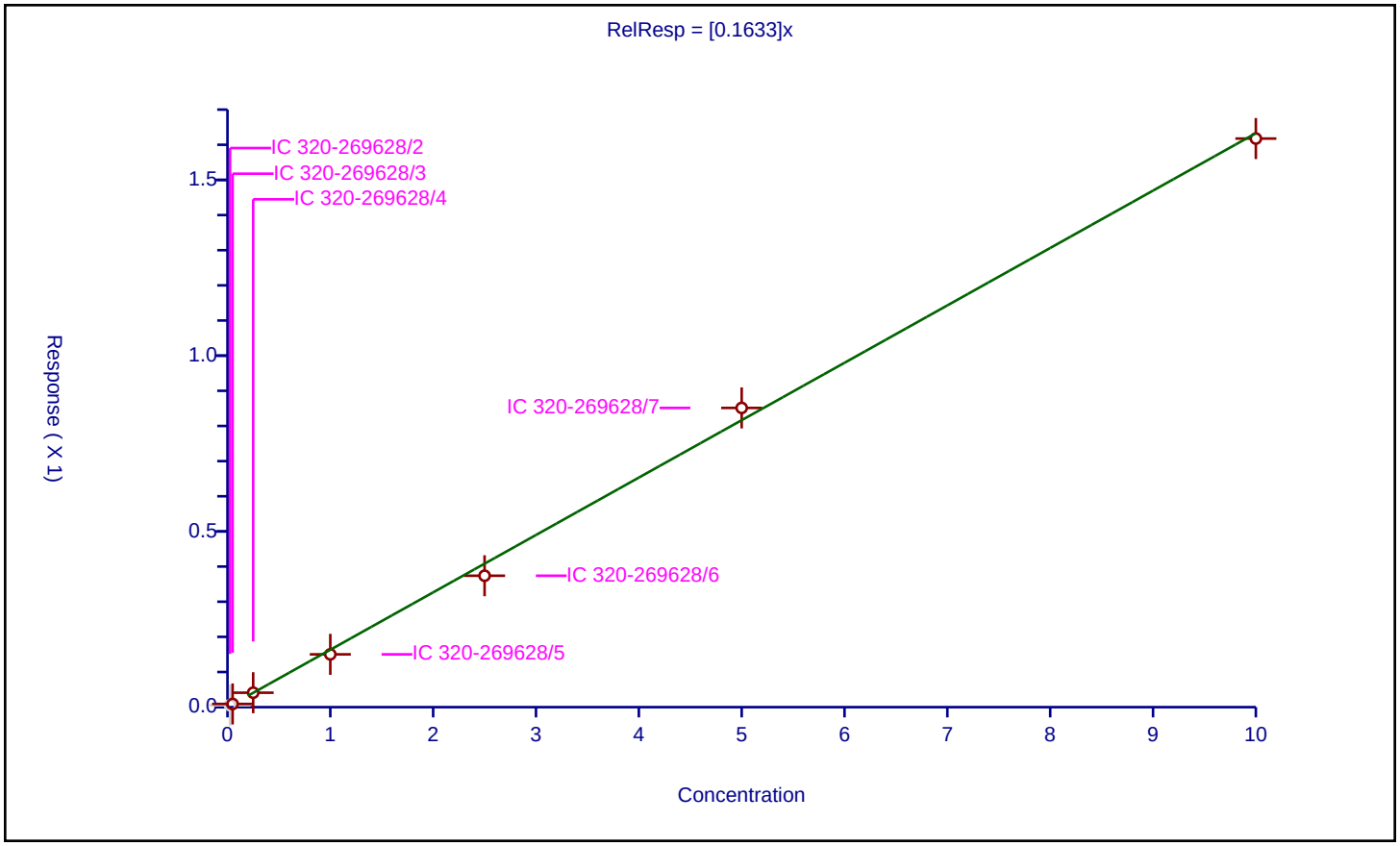
Curve Coefficients

Intercept:	0
Slope:	0.1633

Error Coefficients

Standard Error:	1330000
Relative Standard Error:	7.8
Correlation Coefficient:	0.997
Coefficient of Determination (Adjusted):	0.993

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.005595	2.5	3117756.0	0.223783	N
2	IC 320-269628/3	0.05	0.009171	2.5	3991218.0	0.183428	Y
3	IC 320-269628/4	0.25	0.041113	2.5	4135735.0	0.164452	Y
4	IC 320-269628/5	1.0	0.150245	2.5	3993820.0	0.150245	Y
5	IC 320-269628/6	2.5	0.373909	2.5	3999631.0	0.149564	Y
6	IC 320-269628/7	5.0	0.851318	2.5	4056665.0	0.170264	Y
7	IC 320-269628/8	10.0	1.617589	2.5	3925568.0	0.161759	Y



Calibration / Perfluorohexadecanoic acid

Curve Type:	Linear
Weighting:	Conc_Sq
Origin:	None
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

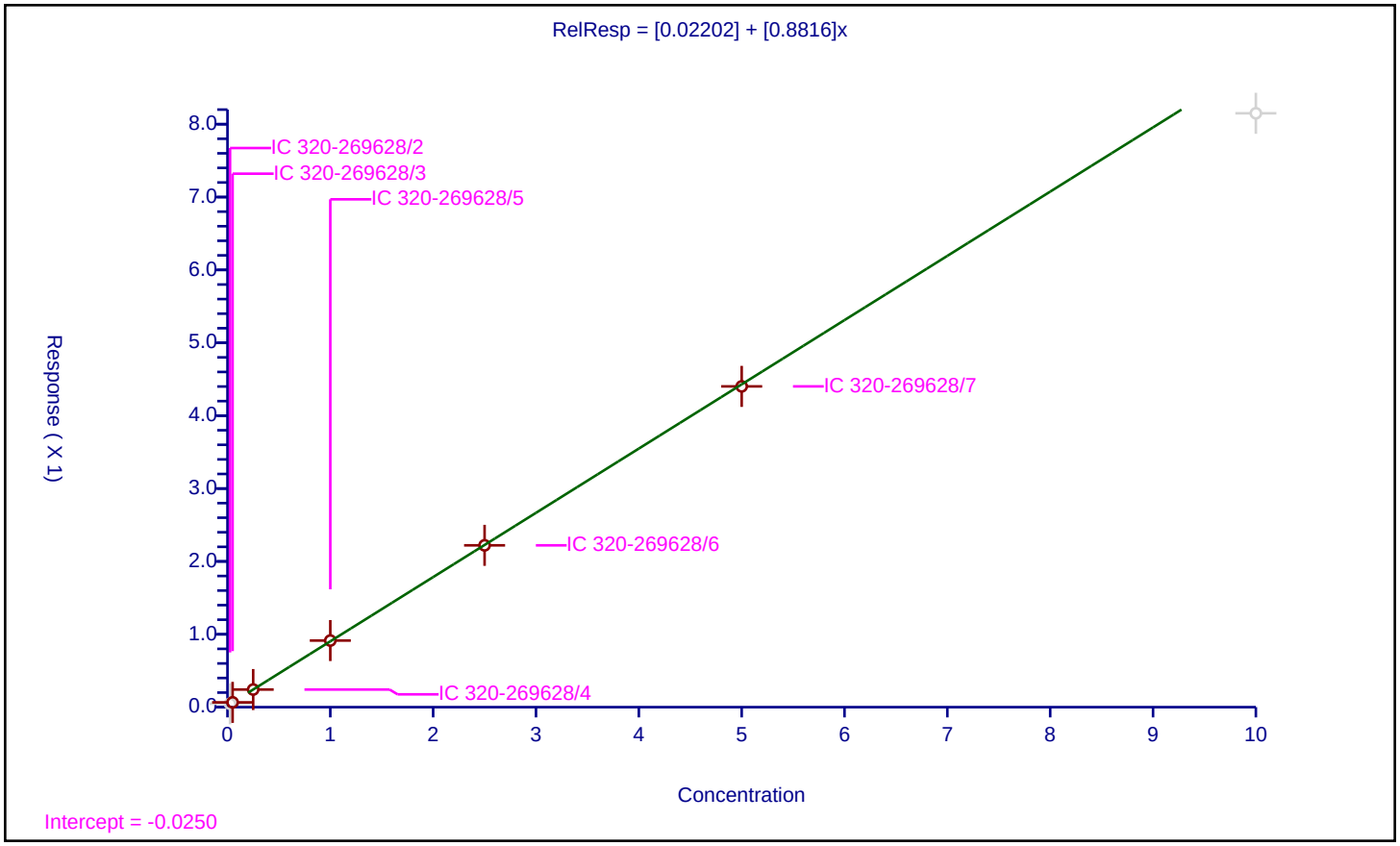
Curve Coefficients

Intercept:	0.02202
Slope:	0.8816

Error Coefficients

Standard Error:	4510000
Relative Standard Error:	0.8
Correlation Coefficient:	0.998
Coefficient of Determination (Adjusted):	1.000

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.047245	2.5	2832913.0	1.889786	N
2	IC 320-269628/3	0.05	0.066102	2.5	3745598.0	1.322032	Y
3	IC 320-269628/4	0.25	0.241688	2.5	3841385.0	0.96675	Y
4	IC 320-269628/5	1.0	0.914036	2.5	3611152.0	0.914036	Y
5	IC 320-269628/6	2.5	2.220635	2.5	3619229.0	0.888254	Y
6	IC 320-269628/7	5.0	4.401832	2.5	3972465.0	0.880366	Y
7	IC 320-269628/8	10.0	8.149606	2.5	3818410.0	0.814961	N



Calibration / Perfluorooctadecanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	IsoDil
Response Base:	AREA
RF Rounding:	0

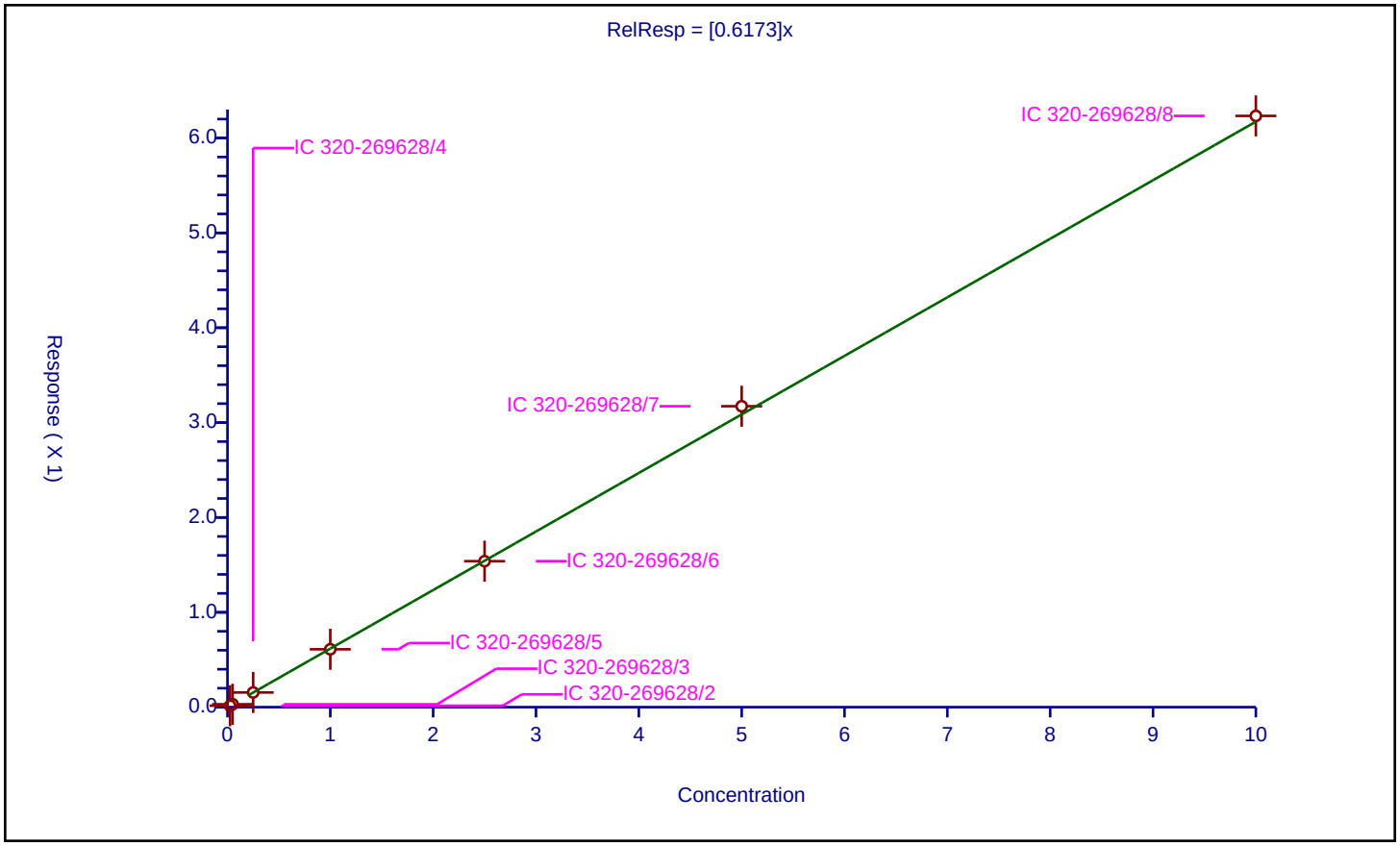
Curve Coefficients

Intercept:	0
Slope:	0.6173

Error Coefficients

Standard Error:	4510000
Relative Standard Error:	1.6
Correlation Coefficient:	0.999
Coefficient of Determination (Adjusted):	1.000

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-269628/2	0.025	0.015141	2.5	2832913.0	0.605631	Y
2	IC 320-269628/3	0.05	0.030593	2.5	3745598.0	0.611852	Y
3	IC 320-269628/4	0.25	0.154903	2.5	3841385.0	0.619612	Y
4	IC 320-269628/5	1.0	0.610255	2.5	3611152.0	0.610255	Y
5	IC 320-269628/6	2.5	1.539217	2.5	3619229.0	0.615687	Y
6	IC 320-269628/7	5.0	3.172771	2.5	3972465.0	0.634554	Y
7	IC 320-269628/8	10.0	6.233564	2.5	3818410.0	0.623356	Y



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: ICV 320-269628/10 Calibration Date: 01/08/2019 18:41

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08ICALAA._010.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.9458		2.55	2.50	2.2	40.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	1.028		2.57	2.50	2.8	40.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	0.997		2.29	2.21	3.3	50.0
4:2 FTS	AveID	0.1480	0.1577		2.49	2.34	6.6	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.8831		2.55	2.50	2.0	40.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.4897		2.45	2.35	4.4	50.0
HFPO-DA (GenX)	AveID	2.144	2.178		2.54	2.50	1.6	40.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	0.9810		2.36	2.50	-5.7	40.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.161		2.14	2.28	-6.1	40.0
DONA	AveID	2.306	2.447		2.50	2.36	6.1	50.0
6:2 FTS	AveID	2.112	2.299		2.59	2.38	8.9	40.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.122		2.53	2.38	6.3	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	1.105		2.66	2.50	6.6	40.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	1.106		2.43	2.31	4.9	40.0
Perfluorononanoic acid (PFNA)	AveID	0.995	1.013		2.54	2.50	1.8	40.0
F-53B Major	AveID	0.9553	0.9727		2.37	2.33	1.8	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	3.080		2.65	2.50	6.0	40.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.6275		2.57	2.40	7.3	50.0
8:2 FTS	AveID	14.20	15.12		2.56	2.40	6.5	40.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.148		2.50	2.50	-0.0	40.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.9720		2.80	2.50	12.2	40.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.9044		2.50	2.41	3.4	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.8218		2.46	2.50	-1.4	40.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.8993		2.72	2.50	8.6	40.0
F-53B Minor	AveID	1.128	1.306		2.73	2.36	15.8	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	0.9917		2.58	2.50	3.3	40.0
10:2 FTS	AveID	8.852	9.347		2.55	2.41	5.6	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0891		2.37	2.42	-1.9	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.7399		2.44	2.50	-2.5	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1578		2.42	2.50	-3.3	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9316		2.62	2.50	4.7	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: ICV 320-269628/10 Calibration Date: 01/08/2019 18:41

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08ICALAA._010.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.6269		2.54	2.50	1.6	50.0
13C4 PFBA	Ave	0.9546	1.010		2.64	2.50	5.8	50.0
13C5 PFPeA	Ave	0.8350	0.8711		2.61	2.50	4.3	50.0
13C3 PFBS	Ave	1.371	1.416		2.40	2.33	3.2	50.0
M2-4:2 FTS	Ave	0.0836	0.0864		2.41	2.34	3.4	50.0
13C2 PFHxA	Ave	0.9280	0.9744		2.63	2.50	5.0	50.0
13C3 HFPO-DA	Ave	0.0833	0.0834		2.50	2.50	0.2	50.0
13C4 PFHpA	Ave	1.141	1.208		2.65	2.50	5.9	50.0
18O2 PFHxS	Ave	0.8068	0.8237		2.41	2.37	2.1	50.0
M2-6:2 FTS	Ave	0.1125	0.1071		2.26	2.38	-4.8	40.0
13C8 PFOA	Ave	2363087	1934118		2.00	2.45	-18.2	50.0
13C4 PFOA	Ave	0.9896	0.997		2.52	2.50	0.7	50.0
13C4 PFOS	Ave	0.8235	0.8259		2.40	2.39	0.3	50.0
13C8 PFOS	Ave	500608	395231		1.89	2.39	-21.0	50.0
13C5 PFNA	Ave	0.8916	0.8954		2.51	2.50	0.4	50.0
13C8 FOSA	Ave	0.5421	0.5475		2.53	2.50	1.0	50.0
13C2 PFDA	Ave	0.8721	0.9284		2.66	2.50	6.5	50.0
M2-8:2 FTS	Ave	0.0129	0.0127		2.36	2.40	-1.4	40.0
d3-NMeFOSAA	Ave	0.2285	0.2306		2.52	2.50	0.9	50.0
13C2 PFUnA	Ave	0.6858	0.6780		2.47	2.50	-1.1	50.0
d5-NEtFOSAA	Ave	0.1905	0.1960		2.57	2.50	2.9	50.0
13C2 PFDoA	Ave	0.8313	0.8481		2.55	2.50	2.0	50.0
13C2 PFTeDA	Ave	0.5763	0.5761		2.50	2.50	-0.0	50.0
13C2 PFHxDA	Ave	0.5385	0.5378		2.50	2.50	-0.1	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._010.d
Lims ID: ICV Full
Client ID:
Sample Type: ICV
Inject. Date: 08-Jan-2019 18:41:20 ALS Bottle#: 17 Worklist Smp#: 10
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: ICV
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist:

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:25:48 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 08:22:00
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.684	1.685	-0.001	0.527	5465099	2.64		106	6802	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.684	1.686	-0.002	1.000	5168645	2.55			428	
D 3 13C5 PFPeA										
267.90 > 223.00	2.019	2.025	-0.006	0.632	4715290	2.61		104	4765	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.019	2.027	-0.008	1.000	4847504	2.57			262	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.062	2.059	0.003	1.000	6760892	2.29	Target=2.70		5875	
298.90 > 99.00	2.062	2.059	0.003	1.000	2452734		2.76(1.35-4.05)		2478	
D 5 13C3 PFBS										
301.90 > 80.00	2.062	2.059	0.003	0.645	7127356	2.40		103	720191	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.354	2.351	0.003	0.737	436957	2.41		103	658	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.354	2.352	0.002	1.142	1129748	2.49			2222	
D 9 13C2 PFHxA										
315.00 > 270.00	2.391	2.394	-0.003	0.748	5274812	2.62		105	3120	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.391	2.396	-0.005	1.000	4657996	2.55	Target=13.92		1569	
313.00 > 119.00	2.391	2.396	-0.005	1.000	344006		13.54(6.96-20.87)		829	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.410	2.410	0.0	1.169	3527612	2.45	Target=2.30		2357	
349.00 > 99.00	2.410	2.410	0.0	1.169	1659275		2.13(1.15-3.45)		2486	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.517	2.512	0.005	0.788	451502	2.50		100	1652	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.517	2.512	0.005	1.000	983416	2.54			561	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.790	2.790	0.0	1.000	6417162	2.36	Target=4.34		1291	
363.00 > 169.00	2.790	2.790	0.0	1.000	1450974		4.42(2.17-6.52)		1954	
D 16 13C4 PFHpA										
367.00 > 322.00	2.790	2.791	-0.001	0.873	6541494	2.65		106	3035	
D 17 18O2 PFHxS										
403.00 > 84.00	2.799	2.798	0.001	0.876	4218044	2.41		102	2797	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.799	2.798	0.001	1.000	4722998	2.14	Target=3.80		2797	
399.00 > 99.00	2.799	2.798	0.001	1.000	1284740		3.68(1.90-5.70)		1062	
19 DONA										
377.00 > 251.00	2.835	2.841	-0.006	0.795	10306652	2.50	Target=2.26		3354	
377.00 > 85.00	2.835	2.841	-0.006	0.795	4597208		2.24(1.13-3.39)		2448	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.172	3.175	-0.003	0.993	550540	2.26		95.2	1006	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.172	3.177	-0.005	1.000	1265514	2.59			1203	
D 22 13C8 PFOA										
421.00 > 376.00	3.187	3.191	-0.004		4733754	2.00		81.8	2827	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.187	3.191	-0.004	0.894	4764770	2.53	Target=3.69		2826	
449.00 > 99.00	3.187	3.191	-0.004	0.894	1140509		4.18(1.84-5.53)		1870	
* 24 13C2 PFOA										
415.00 > 370.00	3.195	3.194	0.001		5413310	2.50			3524	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.195	3.195	0.0	1.000	5960287	2.66	Target=2.72		990	
413.00 > 169.00	3.195	3.195	0.0	1.000	2083596		2.86(1.36-4.08)		2328	
D 25 13C4 PFOA										
417.00 > 372.00	3.195	3.195	0.0	1.000	5394834	2.52		101	2137	
D 27 13C8 PFOS										
507.00 > 99.00	3.566	3.566	0.0		944602	1.89		79.0	2130	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.566	3.570	-0.004	1.000	4574009	2.43	Target=4.08		2569	
499.00 > 99.00	3.566	3.570	-0.004	1.000	1073510		4.26(2.04-6.12)		2509	
D 28 13C4 PFOS										
503.00 > 80.00	3.566	3.571	-0.005	1.116	4273871	2.40		100	2440	
D 31 13C5 PFNA										
468.00 > 423.00	3.581	3.584	-0.003	1.121	4847213	2.51		100	4536	
30 Perfluorononanoic acid										
463.00 > 419.00	3.581	3.586	-0.005	1.000	4910795	2.54	Target=5.35		708	
463.00 > 169.00	3.581	3.586	-0.005	1.000	860663		5.71(2.68-8.03)		1262	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.767	3.774	-0.007	1.056	4052776	2.37			2257	
D 33 13C8 FOSA										
506.00 > 78.00	3.892	3.891	0.001	1.218	2963801	2.52		101	3613	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.892	3.894	-0.002	1.000	9128024	2.65			3298	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.917	3.919	-0.002	1.098	2693079	2.57	Target=6.03		2017	
549.00 > 99.00	3.917	3.919	-0.002	1.098	406913		6.62(3.02-9.05)		985	
D 36 13C2 PFDA										
515.00 > 470.00	3.944	3.942	0.002	1.234	5025846	2.66		106	3216	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.944	3.943	0.001	1.000	5771643	2.50	Target=14.23		2024	
513.00 > 169.00	3.944	3.943	0.001	1.000	382062		15.11(7.12-21.35)		581	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.944	3.946	-0.002	1.000	1000439	2.56			1434	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.944	3.947	-0.003	1.234	66025	2.36		98.6	258	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.102	4.109	-0.007	1.284	1248062	2.52		101	2267	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.111	4.114	-0.003	1.002	1213086	2.80			438	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.241	4.241	0.0	1.189	3901541	2.49	Target=4.28		2913	
599.00 > 99.00	4.241	4.241	0.0	1.189	830140		4.70(2.14-6.43)		1749	
D 44 13C2 PFUnA										
565.00 > 520.00	4.267	4.266	0.001	1.335	3670143	2.47		98.9	2542	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.258	4.270	-0.012	0.998	3016266	2.46	Target=10.48		681	
563.00 > 169.00	4.258	4.270	-0.012	0.998	301113		10.02(5.24-15.72)		627	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.267	4.272	-0.005	1.335	1061088	2.57		103	1459	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.275	4.278	-0.003	1.002	954213	2.72			3055	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.400	4.407	-0.007	1.234	5498299	2.73			2981	
D 49 13C2 PFDoA										
615.00 > 570.00	4.557	4.560	-0.003	1.426	4591022	2.55		102	5160	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.557	4.561	-0.004	1.000	4552694	2.58	Target=9.37		1331	
613.00 > 169.00	4.549	4.561	-0.012	0.998	504569		9.02(4.68-14.05)		1311	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.573	4.578	-0.005	1.159	621007	2.54			1542	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.787	4.793	-0.006	1.342	385523	2.37	Target=0.55		1268	
699.00 > 99.00	4.787	4.793	-0.006	1.342	737573		0.52(0.28-0.83)		2366	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.824	4.830	-0.006	1.059	3396810	2.44	Target=6.18		1511	
663.00 > 169.00	4.824	4.830	-0.006	1.059	566255		6.00(3.09-9.27)		1606	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.075	5.080	-0.005	1.000	492149	2.42	Target=1.39		1706	
713.00 > 219.00	5.066	5.080	-0.014	0.998	361476		1.36(0.70-2.09)		2413	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.075	5.080	-0.005	1.588	3118376	2.50		100.0	3955	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.533	5.545	-0.012	1.732	2911295	2.50		99.9	3786	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.533	5.546	-0.013	1.000	2712142	2.62	Target=5.55		264	
813.00 > 169.00	5.533	5.546	-0.013	1.000	492245		5.51(2.77-8.32)		1977	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.039	6.053	-0.014	1.091	1824995	2.54	Target=5.09		530	
913.00 > 169.00	6.035	6.053	-0.018	1.091	353287		5.17(2.55-7.64)		1264	

Reagents:

LCPFCIC_FULL_00016 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:25:50 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._010.d

Injection Date: 08-Jan-2019 18:41:20 Instrument ID: A9

Lims ID: ICV Full

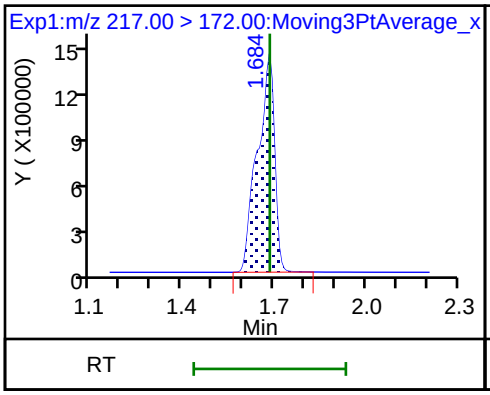
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 17 Worklist Smp#: 10

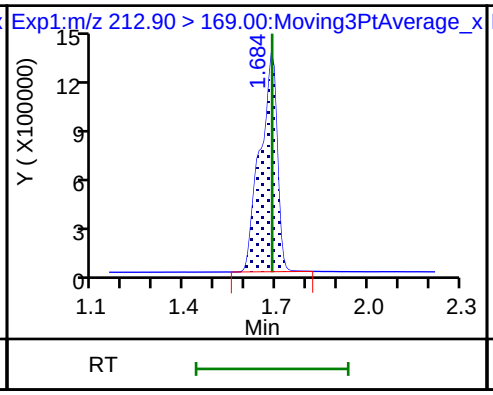
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

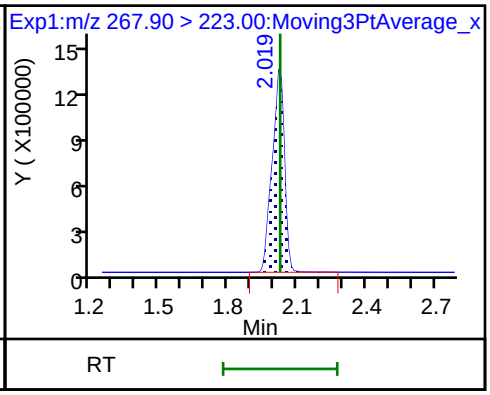
D 1 13C4 PFBA



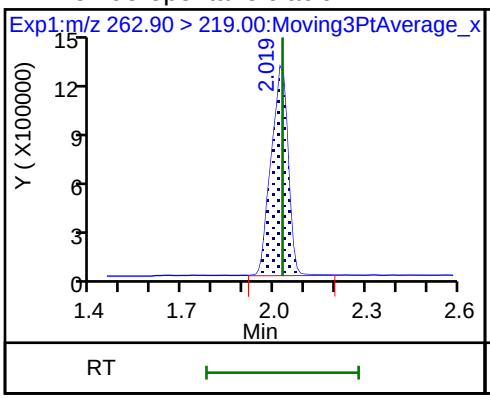
2 Perfluorobutanoic acid



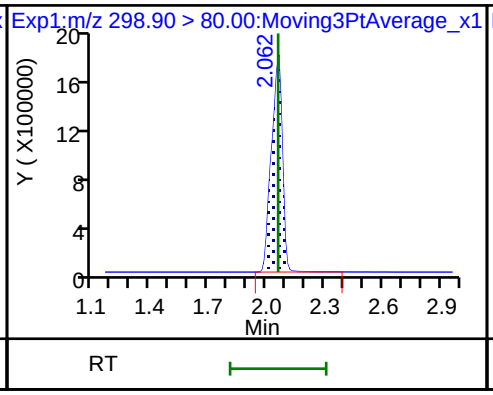
D 3 13C5 PFPeA



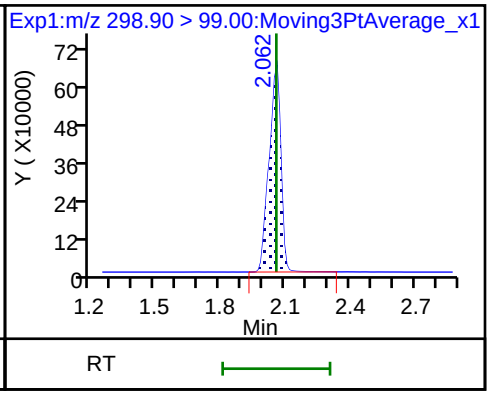
4 Perfluoropentanoic acid



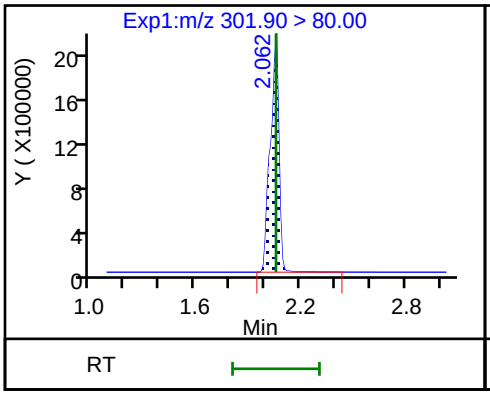
6 Perfluorobutanesulfonic acid



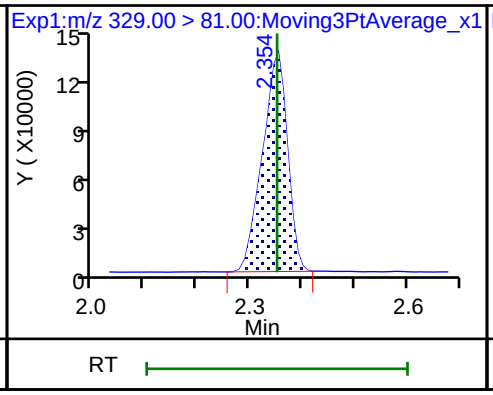
6 Perfluorobutanesulfonic acid



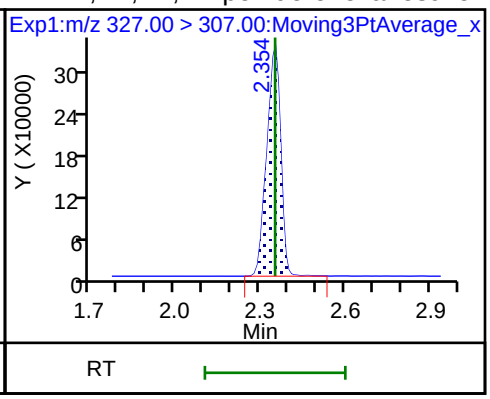
D 5 13C3 PFBS



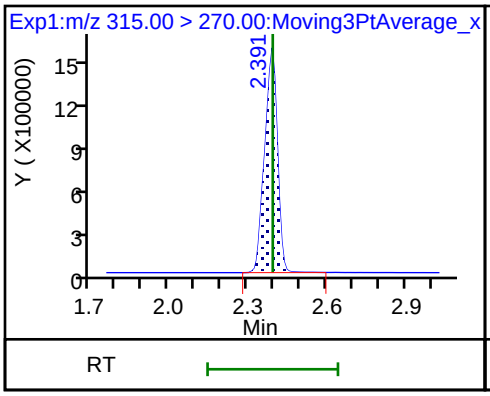
D 8 M2-4:2 FTS



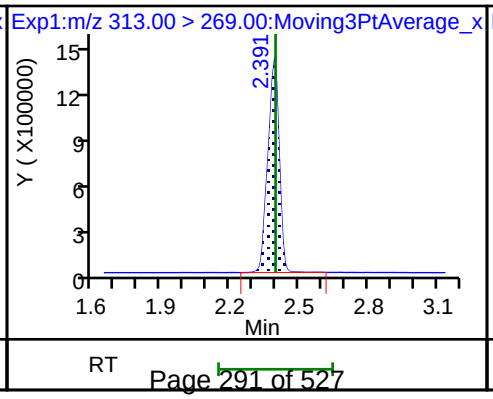
7 1H,1H,2H,2H-perfluorohexanesulfoni



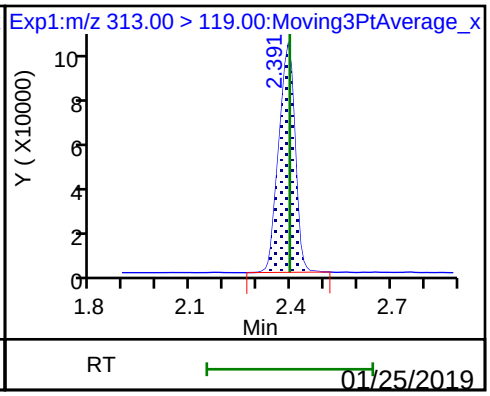
D 9 13C2 PFHxA



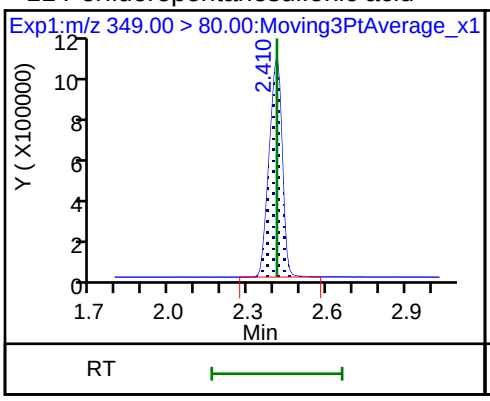
10 Perfluorohexanoic acid



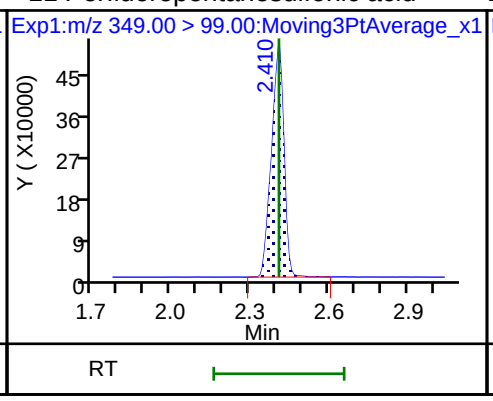
10 Perfluorohexanoic acid



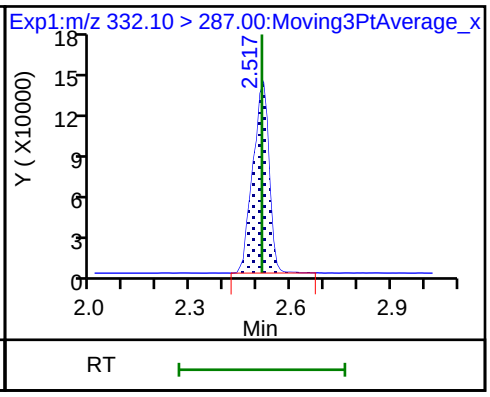
11 Perfluoropentanesulfonic acid



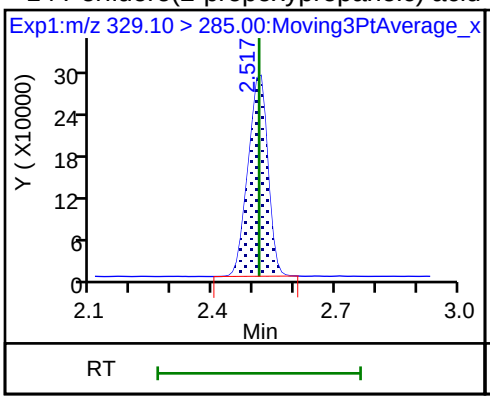
11 Perfluoropentanesulfonic acid



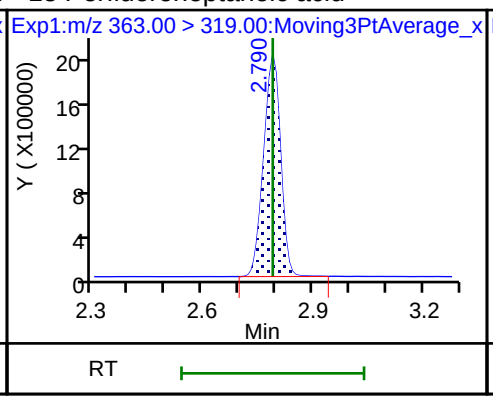
D 13 13C3 HFPO-DA



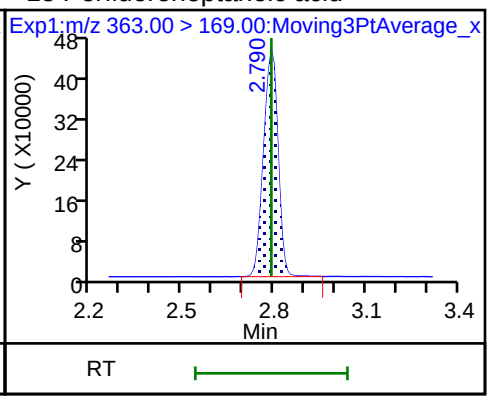
14 Perfluoro(2-propoxypropanoic) acid



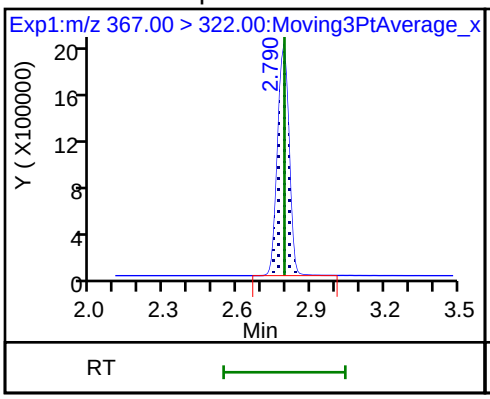
15 Perfluoroheptanoic acid



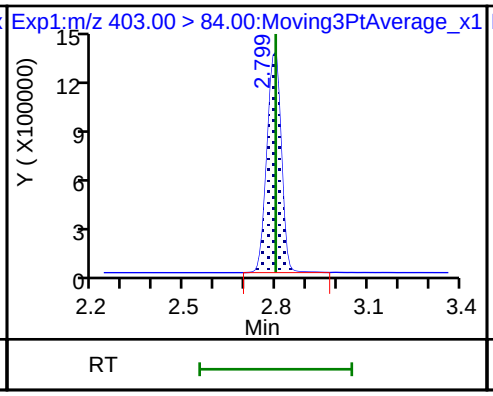
15 Perfluoroheptanoic acid



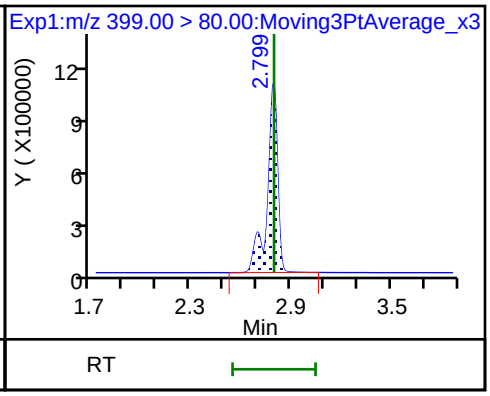
D 16 13C4 PFHpA



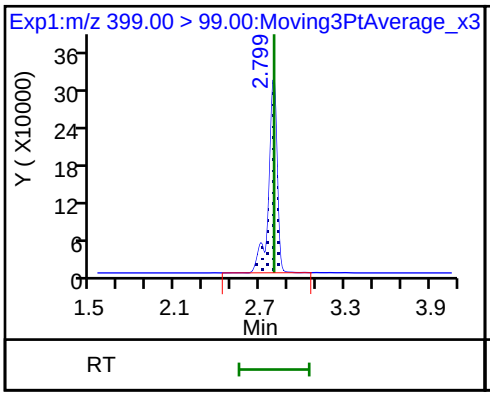
D 17 18O2 PFHxS



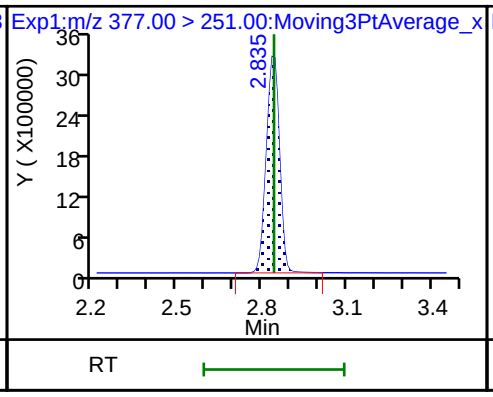
18 Perfluorohexanesulfonic acid



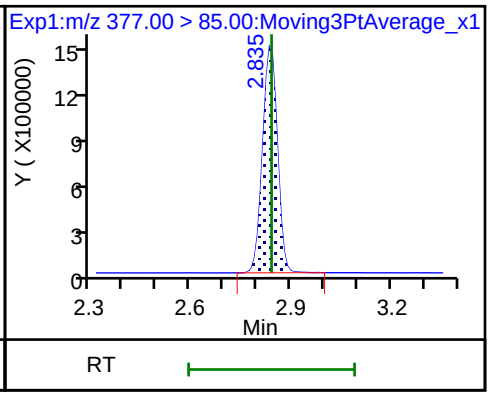
18 Perfluorohexanesulfonic acid



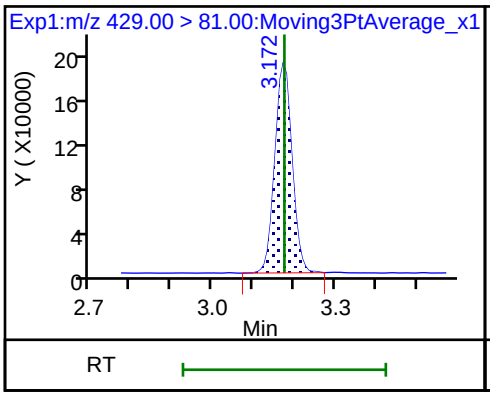
19 DONA



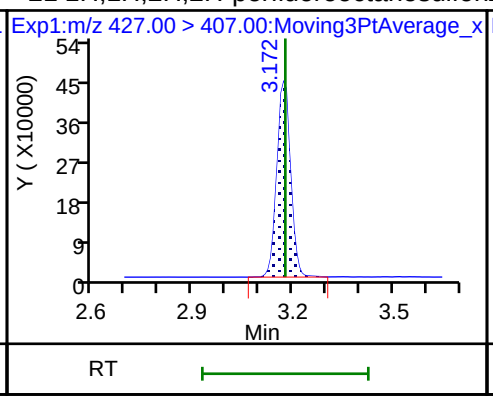
19 DONA



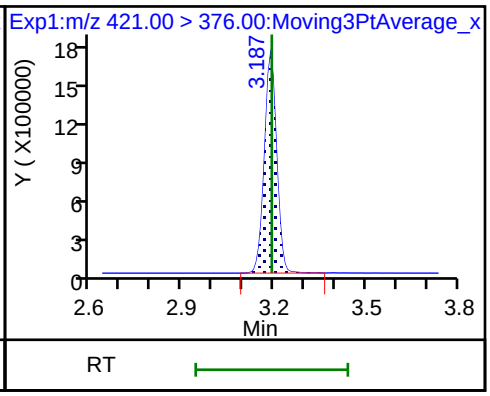
D 20 M2-6:2 FTS



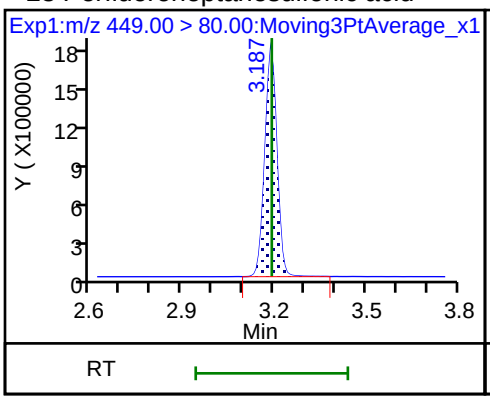
21 1H,1H,2H,2H-perfluorooctanesulfon



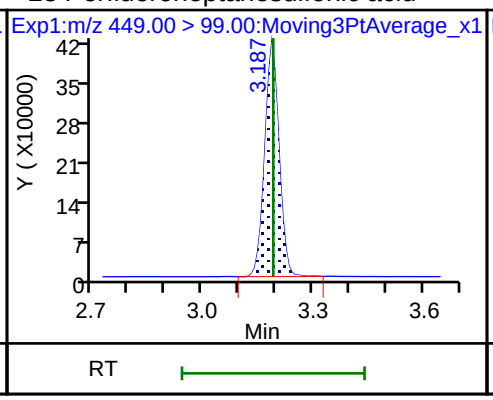
D 22 13C8 PFOA



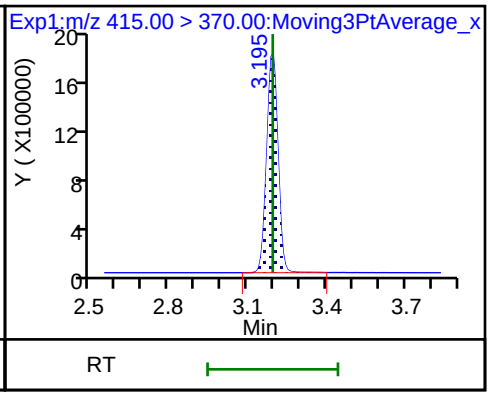
23 Perfluoroheptanesulfonic acid



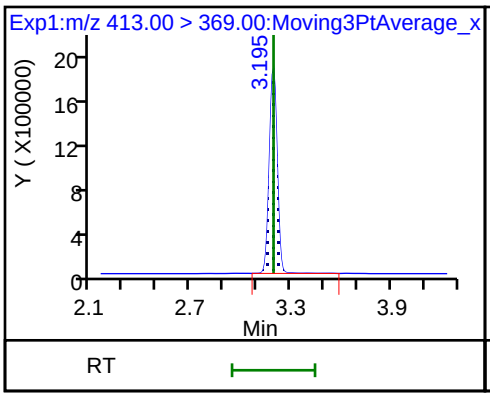
23 Perfluoroheptanesulfonic acid



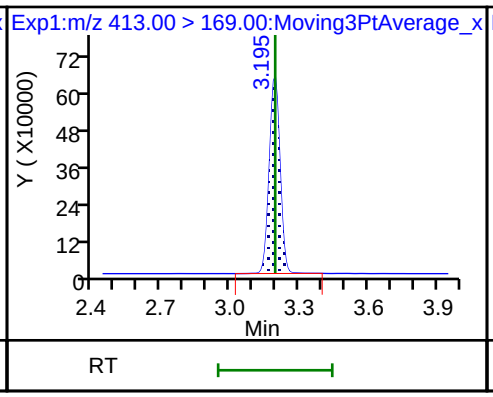
* 24 13C2 PFOA



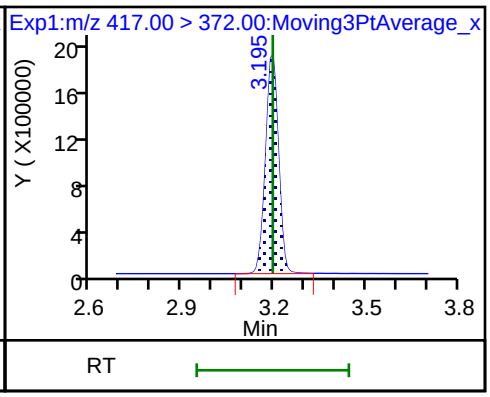
26 Perfluorooctanoic acid



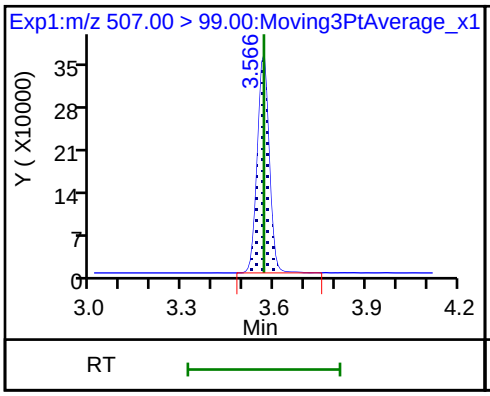
26 Perfluorooctanoic acid



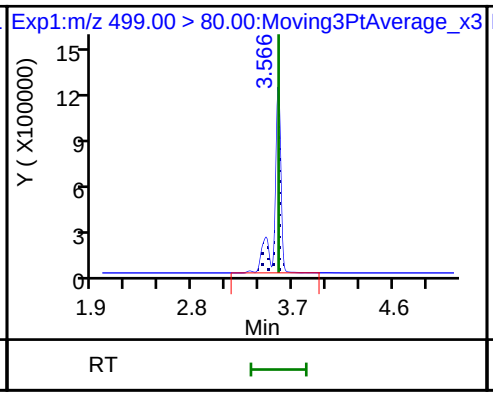
D 25 13C4 PFOA



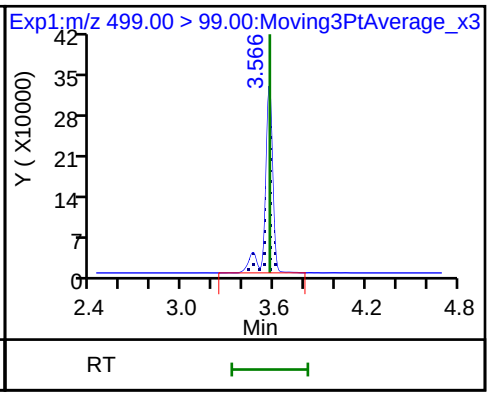
D 27 13C8 PFOS



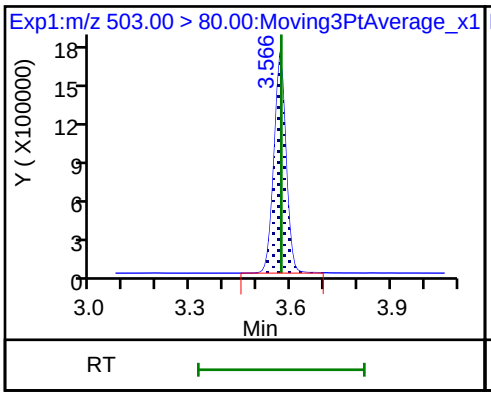
29 Perfluorooctanesulfonic acid



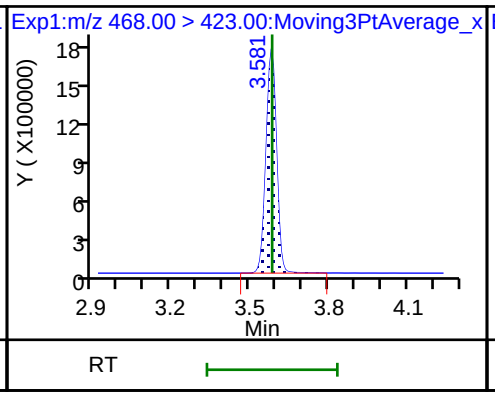
29 Perfluorooctanesulfonic acid



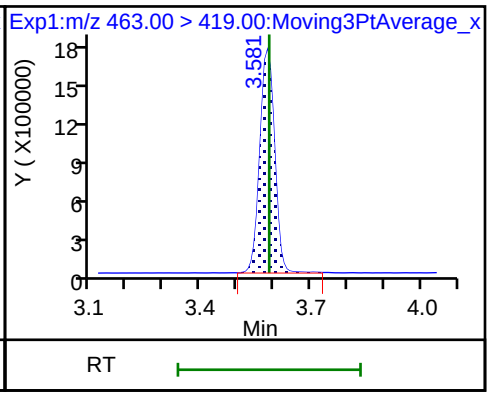
D 28 13C4 PFOS



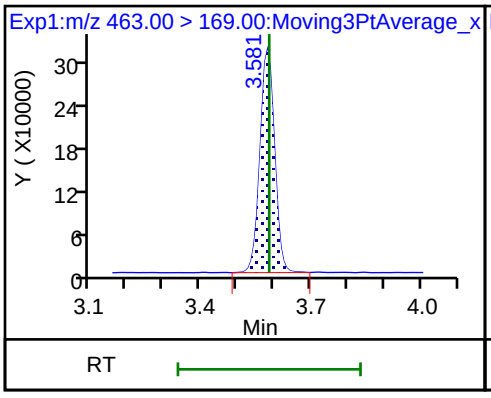
D 31 13C5 PFNA



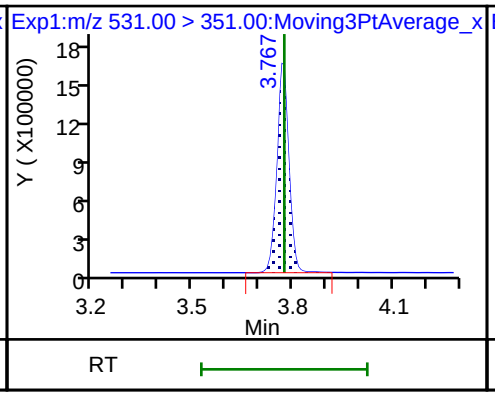
30 Perfluorononanoic acid



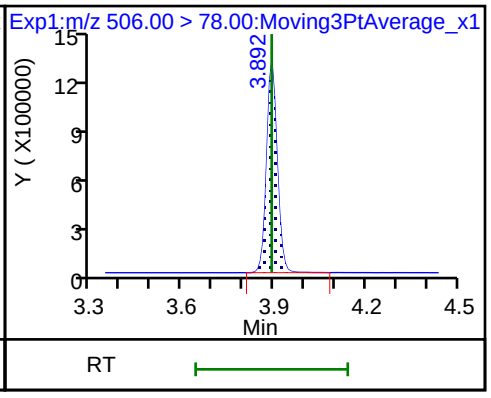
30 Perfluorononanoic acid



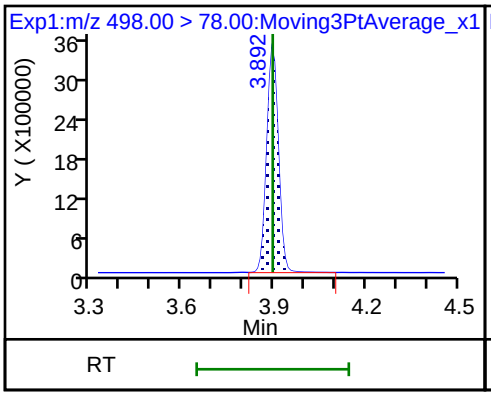
32 9-Chlorohexadecafluoro-3-oxanonane



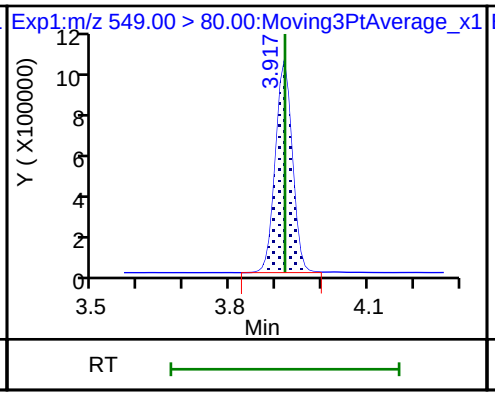
D 33 13C8 FOSA



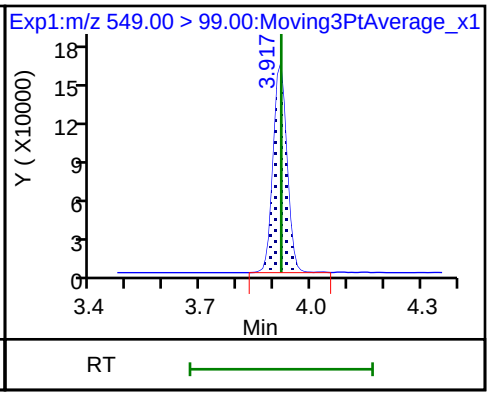
34 Perfluorooctanesulfonamide



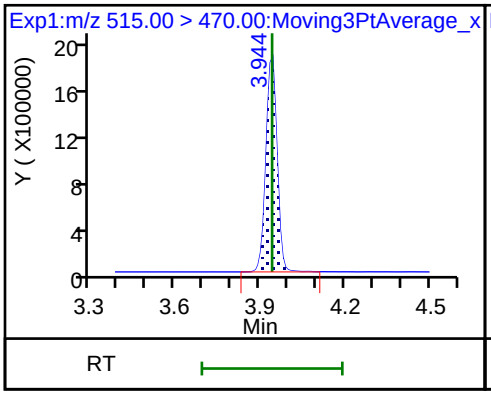
35 Perfluorononanesulfonic acid



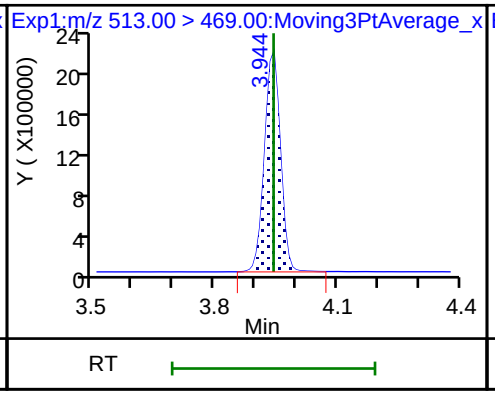
35 Perfluorononanesulfonic acid



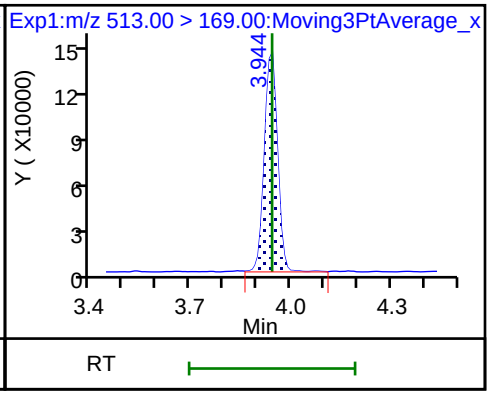
D 36 13C2 PFDA



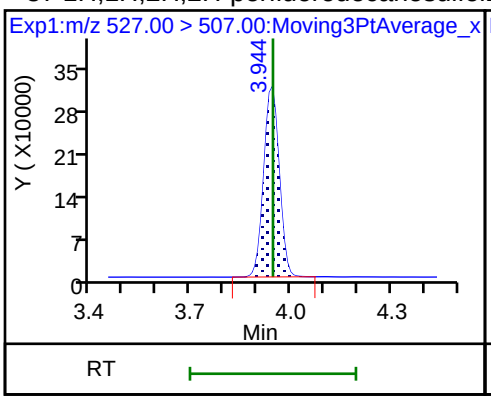
38 Perfluorodecanoic acid



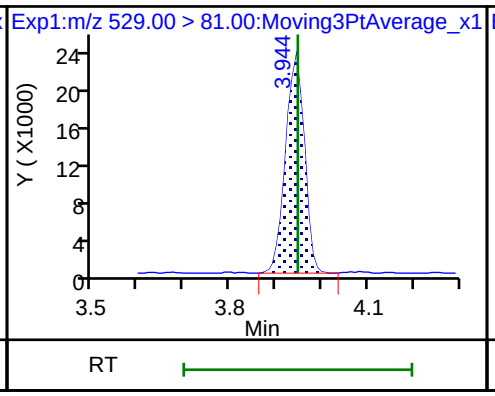
38 Perfluorodecanoic acid



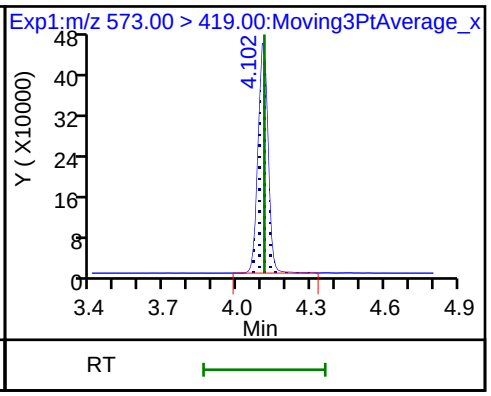
37 1H,1H,2H,2H-perfluorodecanesulfon



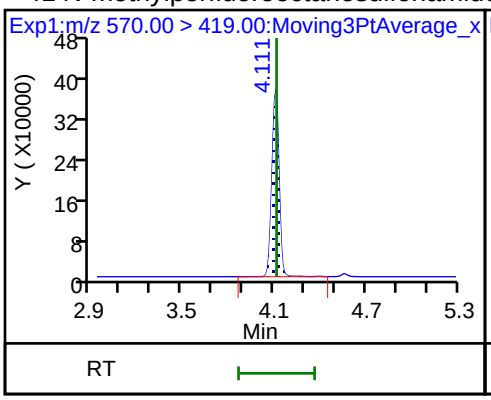
D 39 M2-8:2 FTS



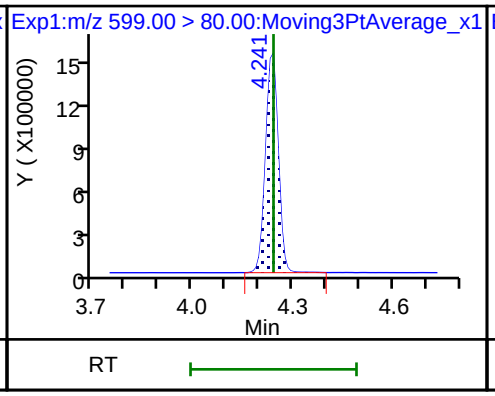
D 40 d3-NMeFOSAA



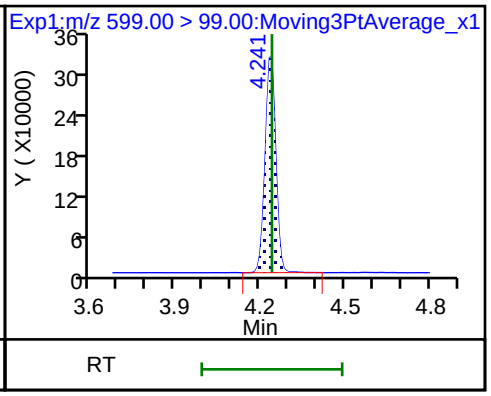
41 N-methylperfluorooctanesulfonamido



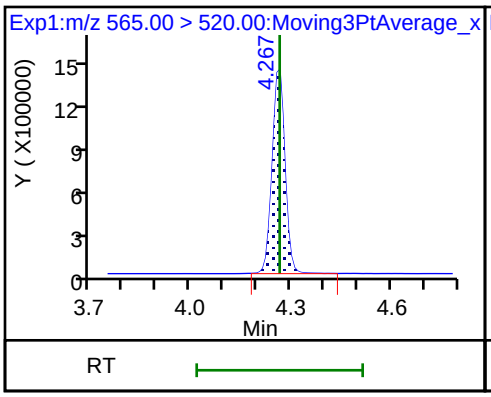
42 Perfluorodecanesulfonic acid



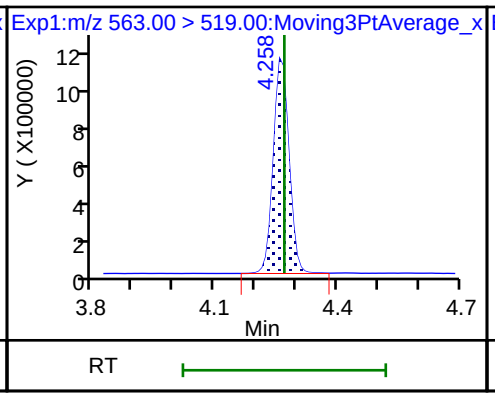
42 Perfluorodecanesulfonic acid



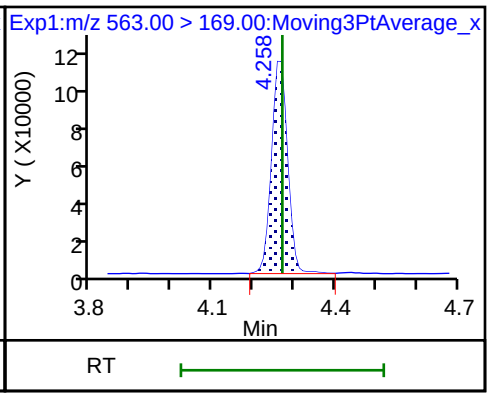
D 44 13C2 PFUnA



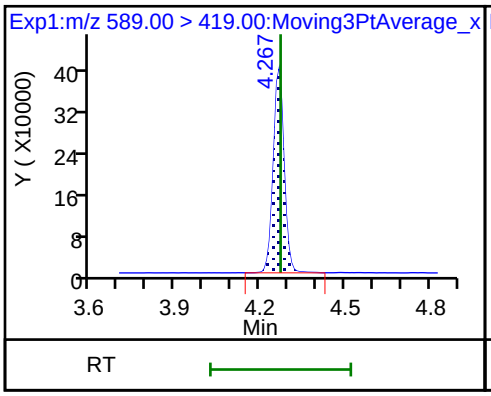
43 Perfluoroundecanoic acid



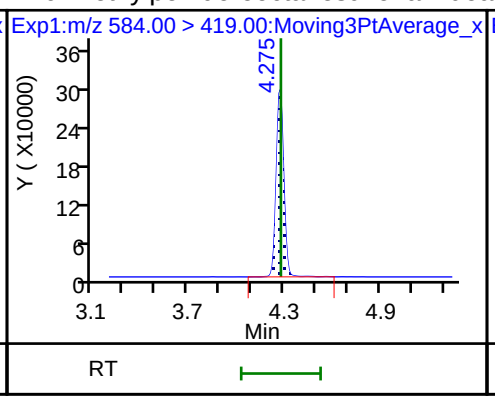
43 Perfluoroundecanoic acid



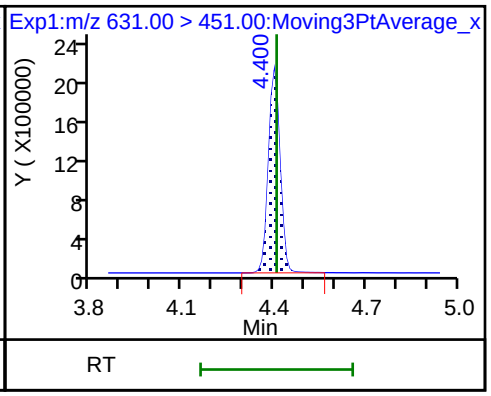
D 45 d5-NEtFOSAA



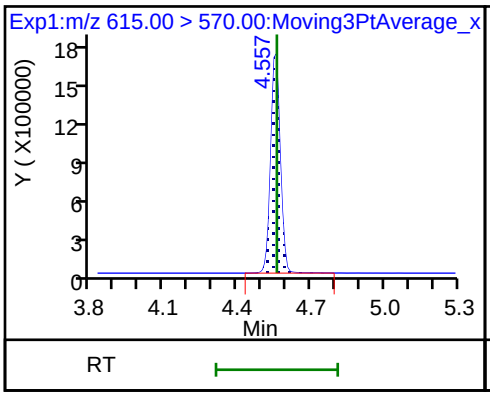
46 N-ethylperfluorooctanesulfonamidoa



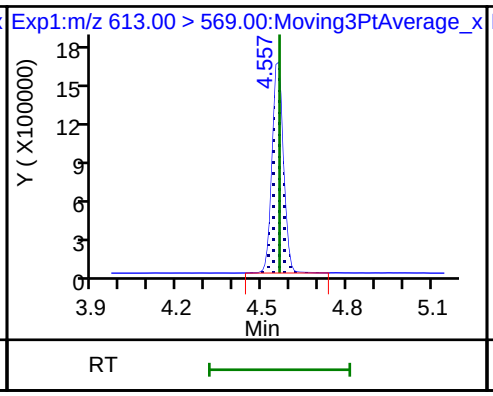
48 11-Chloroeicosafluoro-3-oxaundecan



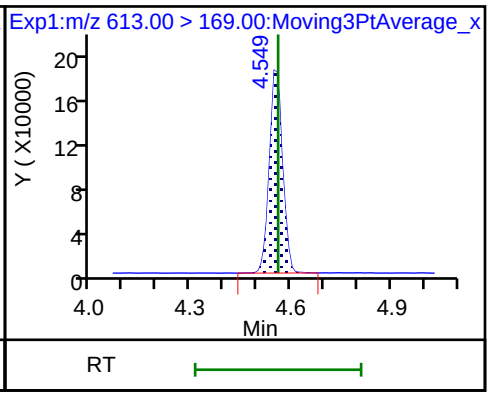
D 49 13C2 PFDoA



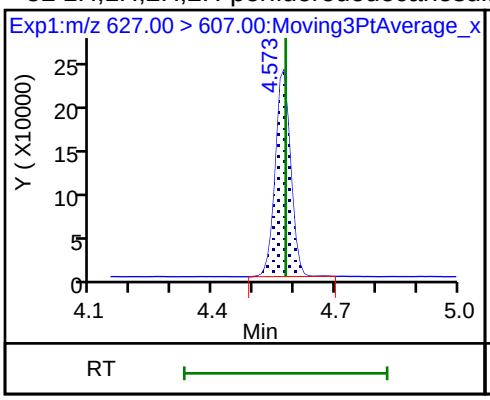
50 Perfluorododecanoic acid



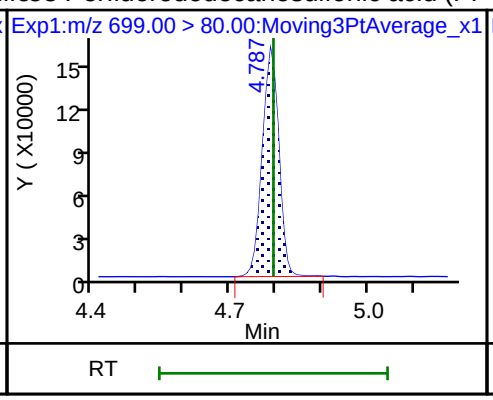
50 Perfluorododecanoic acid



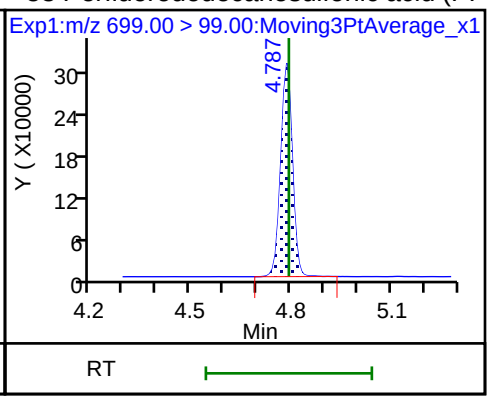
52 1H,1H,2H-perfluorododecanesulfo



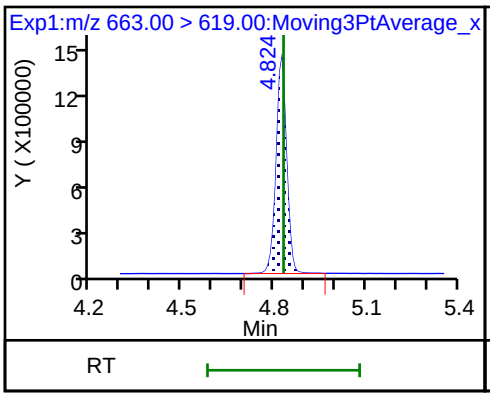
53 Perfluorododecanesulfonic acid (PF



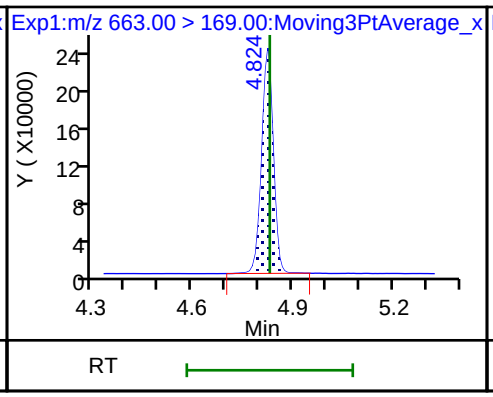
53 Perfluorododecanesulfonic acid (PF



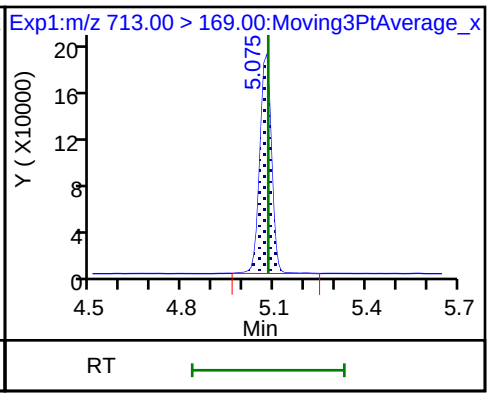
54 Perfluorotridecanoic acid



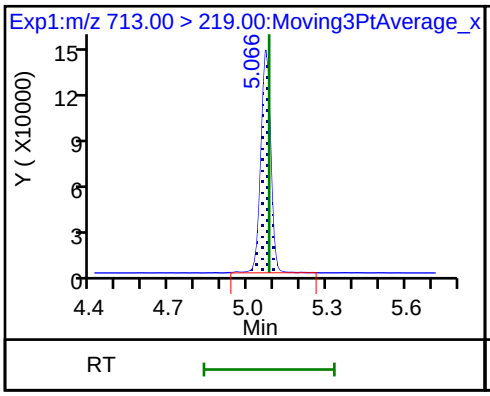
54 Perfluorotridecanoic acid



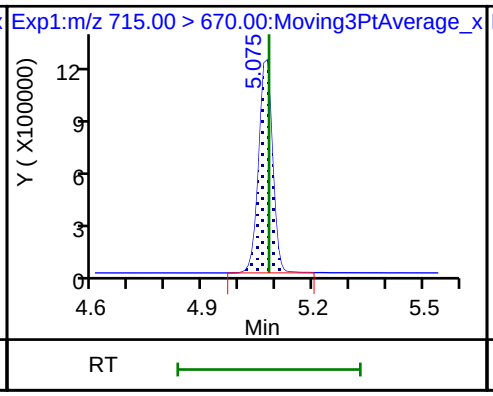
56 Perfluorotetradecanoic acid



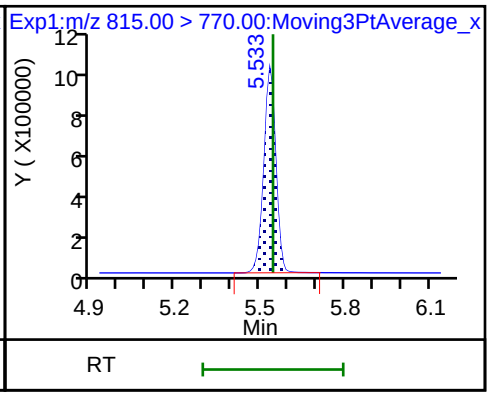
56 Perfluorotetradecanoic acid



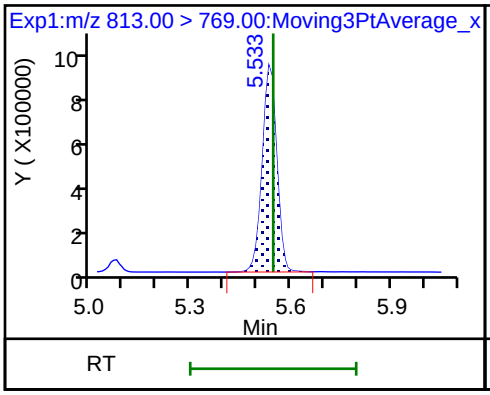
D 55 13C2 PFTeDA



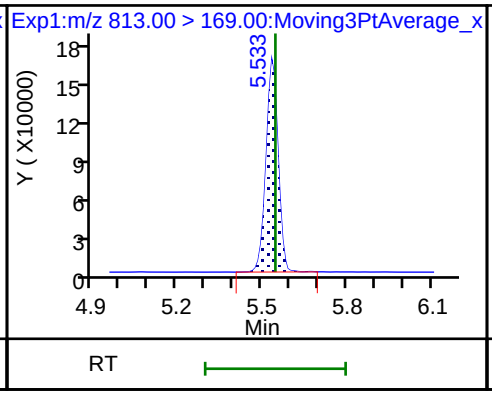
D 57 13C2 PFHxDA



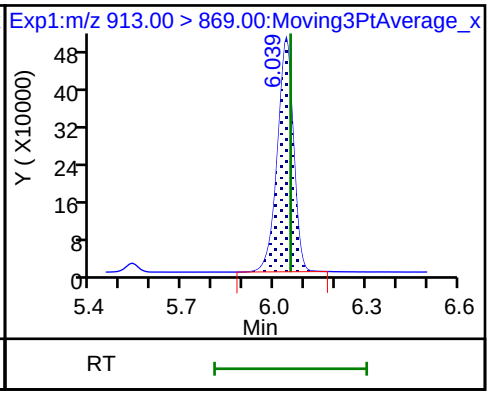
58 Perfluorohexadecanoic acid



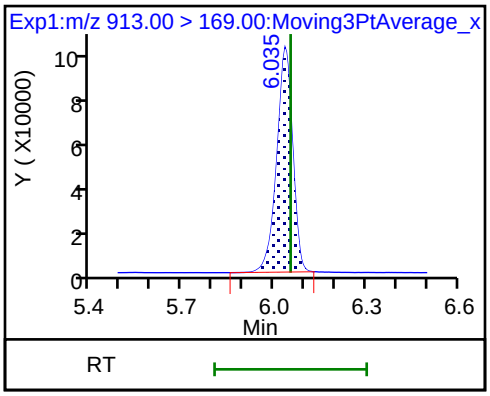
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCVL 320-269668/2 Calibration Date: 01/08/2019 19:26

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_005.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.9300		0.0502	0.0500	0.5	50.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	1.069		0.0534	0.0500	6.8	50.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	0.8994		0.0412	0.0442	-6.8	50.0
4:2 FTS	AveID	0.1480	0.1591		0.502	0.467	7.5	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.9893		0.0571	0.0500	14.2	50.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.4661		0.0466	0.0469	-0.6	50.0
HFPO-DA (GenX)	AveID	2.144	1.778		0.0415	0.0500	-17.1	50.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	1.285		0.0618	0.0500	23.5	50.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.358		0.0499	0.0455	9.7	50.0
DONA	AveID	2.306	2.395		0.0489	0.0471	3.9	50.0
6:2 FTS	AveID	2.112	2.328		0.523	0.474	10.2	50.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.037		0.0468	0.0476	-1.7	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	1.308		0.0632	0.0501	26.2	50.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	1.094		0.0482	0.0464	3.8	50.0
Perfluorononanoic acid (PFNA)	AveID	0.995	0.996		0.0500	0.0500	0.0	50.0
F-53B Major	AveID	0.9553	0.8928		0.0436	0.0466	-6.5	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	2.949		0.0507	0.0500	1.5	50.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.6123		0.0502	0.0480	4.7	50.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.163		0.0506	0.0500	1.3	50.0
8:2 FTS	AveID	14.20	15.64		0.528	0.479	10.2	50.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.8646		0.499	0.500	-0.2	50.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.8875		0.0489	0.0482	1.5	50.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.8793		0.531	0.500	6.2	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.9155		0.0549	0.0500	9.8	50.0
F-53B Minor	AveID	1.128	1.199		0.0501	0.0471	6.3	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	1.086		0.0565	0.0500	13.0	50.0
10:2 FTS	AveID	8.852	9.060		0.0493	0.0482	2.3	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0761		0.0406	0.0484	-16.2	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.8160		0.0538	0.0500	7.5	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1572		0.0481	0.0500	-3.7	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		1.344		0.0512	0.0500	2.5	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCVL 320-269668/2 Calibration Date: 01/08/2019 19:26

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_005.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.5934		0.0481	0.0500	-3.9	50.0
13C4 PFBA	Ave	0.9546	0.9305		2.44	2.50	-2.5	50.0
13C5 PFPeA	Ave	0.8350	0.8114		2.43	2.50	-2.8	50.0
13C3 PFBS	Ave	1.371	1.359		2.31	2.33	-0.9	50.0
M2-4:2 FTS	Ave	0.0836	0.0827		2.31	2.34	-1.1	50.0
13C2 PFHxA	Ave	0.9280	0.9043		2.44	2.50	-2.6	50.0
13C3 HFPO-DA	Ave	0.0833	0.0867		2.60	2.50	4.1	50.0
13C4 PFHpA	Ave	1.141	1.142		2.50	2.50	0.0	50.0
18O2 PFHxS	Ave	0.8068	0.7819		2.29	2.37	-3.1	50.0
M2-6:2 FTS	Ave	0.1125	0.1057		2.23	2.38	-6.0	50.0
13C4 PFOA	Ave	0.9896	1.009		2.55	2.50	1.9	50.0
13C8 PFOA	Ave	2363087	2500633		2.59	2.45	5.8	50.0
13C8 PFOS	Ave	500608	535111		2.56	2.39	6.9	50.0
13C4 PFOS	Ave	0.8235	0.8268		2.40	2.39	0.4	50.0
13C5 PFNA	Ave	0.8916	0.8700		2.44	2.50	-2.4	50.0
13C8 FOSA	Ave	0.5421	0.5126		2.36	2.50	-5.4	50.0
13C2 PFDA	Ave	0.8721	0.8696		2.49	2.50	-0.3	50.0
M2-8:2 FTS	Ave	0.0129	0.0131		2.42	2.40	1.1	50.0
d3-NMeFOSAA	Ave	0.2285	0.2403		2.63	2.50	5.2	50.0
13C2 PFUnA	Ave	0.6858	0.6784		2.47	2.50	-1.1	50.0
d5-NEtFOSAA	Ave	0.1905	0.1905		2.50	2.50	-0.0	50.0
13C2 PFDoA	Ave	0.8313	0.7750		2.33	2.50	-6.8	50.0
13C2 PFTeDA	Ave	0.5763	0.5681		2.47	2.50	-1.4	50.0
13C2 PFHxDA	Ave	0.5385	0.5351		2.48	2.50	-0.6	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_005.d
Lims ID: CCVL
Client ID:
Sample Type: CCVL
Inject. Date: 08-Jan-2019 19:26:21 ALS Bottle#: 21 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCVL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub6

Method: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 09:35:43 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0325

First Level Reviewer: ruangyotsakuld Date: 10-Jan-2019 09:35:43
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutanoic acid										
212.90 > 169.00	1.679	1.692	-0.013	1.000	126502	0.0502		100	11.1	
D 1 13C4 PFBA										
217.00 > 172.00	1.679	1.679	0.0	0.526	6801289	2.44		97.5	9858	
D 3 13C5 PFPeA										
267.90 > 223.00	2.014	2.022	-0.008	0.631	5930856	2.43		97.2	6159	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.024	2.030	-0.006	1.005	126748	0.0534		107	7.3	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.056	2.061	-0.005	1.000	157995	0.0412	Target=2.70	93.2	199	
298.90 > 99.00	2.056	2.061	-0.005	1.000	60418		2.62(1.35-4.05)		65.6	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.054	0.002	0.644	9240604	2.30		99.1	941141	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.350	2.350	0.0	1.143	295291	0.5022		108	1213	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.350	2.346	0.004	0.736	564526	2.31		98.9	1067	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.386	2.386	0.0	1.000	130775	0.0571	Target=13.92	114	58.2	
313.00 > 119.00	2.396	2.386	0.010	1.004	7458		17.53(6.96-20.87)		18.4	
D 9 13C2 PFHxA										
315.00 > 270.00	2.386	2.383	0.003	0.748	6609546	2.44		97.4	2916	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.405	2.405	0.0	1.170	86890	0.0466	Target=2.30	99.4	251	
349.00 > 99.00	2.405	2.405	0.0	1.170	37940		2.29(1.15-3.45)		91.6	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.502	2.502	0.0	0.996	22537	0.0415		82.9	16.1	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.512	2.508	0.004	0.787	633935	2.60		104	2018	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.787	2.791	-0.004	1.000	214499	0.0618	Target=4.34	124	71.3	
363.00 > 169.00	2.787	2.791	-0.004	1.000	41648		5.15(2.17-6.52)		82.9	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.787	2.800	-0.013	1.000	141209	0.0499	Target=3.80	110	217	
399.00 > 99.00	2.787	2.800	-0.013	1.000	40360		3.50(1.90-5.70)		46.9	
D 16 13C4 PFHpA										
367.00 > 322.00	2.787	2.782	0.005	0.873	8343939	2.50		100	2993	
D 17 18O2 PFHxS										
403.00 > 84.00	2.787	2.782	0.005	0.873	5406441	2.29		96.9	1971	
19 DONA										
377.00 > 251.00	2.832	2.845	-0.013	0.795	272686	0.0489	Target=2.26	104	768	
377.00 > 85.00	2.832	2.845	-0.013	0.795	114349		2.38(1.13-3.39)		140	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.168	3.173	-0.005	1.000	341056	0.5225		110	527	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.168	3.165	0.003	0.993	734200	2.23		94.0	1314	
* 24 13C2 PFOA										
415.00 > 370.00	3.192	3.197	-0.005		7309378	2.50			2525	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.184	3.184	0.0	0.894	119328	0.0468	Target=3.69	98.3	217	
449.00 > 99.00	3.184	3.184	0.0	0.894	30036		3.97(1.84-5.53)		151	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.184	3.197	-0.013	1.000	193030	0.0631	Target=2.72	126	32.2	
413.00 > 169.00	3.184	3.197	-0.013	1.000	66247		2.91(1.36-4.08)		115	
D 25 13C4 PFOA										
417.00 > 372.00	3.184	3.180	0.004	0.998	7372066	2.55		102	3161	
D 22 13C8 PFOA										
421.00 > 376.00	3.184	3.180	0.004		6120300	2.59		106	3881	
D 28 13C4 PFOS										
503.00 > 80.00	3.563	3.552	0.011	1.116	5777146	2.40		100	4132	
D 27 13C8 PFOS										
507.00 > 99.00	3.555	3.552	0.003		1278915	2.55		107	1958	
30 Perfluorononanoic acid										M
463.00 > 419.00	3.578	3.590	-0.012	1.002	126683	0.0500	Target=5.35	100	20.0	M
463.00 > 169.00	3.570	3.590	-0.020	1.000	23634		5.36(2.68-8.03)		97.1	
D 31 13C5 PFNA										
468.00 > 423.00	3.570	3.567	0.003	1.119	6358953	2.44		97.6	3298	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.563	3.568	-0.005	1.000	122695	0.0482	Target=4.08	104	120	
499.00 > 99.00	3.563	3.568	-0.005	1.000	29596		4.15(2.04-6.12)		220	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.765	3.781	-0.017	1.057	100569	0.0436		93.5	122	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.888	3.893	-0.005	1.000	220998	0.0507		101	507	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 33 13C8 FOSA										
506.00 > 78.00	3.888	3.885	0.003	1.218	3746878	2.36		94.6	2702	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.913	3.913	0.0	1.098	71040	0.0502	Target=6.03	105	275	
549.00 > 99.00	3.904	3.913	-0.009	1.096	7826		9.08(3.02-9.05)		28.4	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.939	3.939	0.0	1.002	286204	0.5278		110	1042	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.930	3.945	-0.015	1.000	147851	0.0506	Target=14.23	101	85.4	
513.00 > 169.00	3.930	3.945	-0.015	1.000	11694		12.64(7.12-21.35)		21.3	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.930	3.927	0.003	1.231	91482	2.42		101	466	
D 36 13C2 PFDA										
515.00 > 470.00	3.930	3.927	0.003	1.231	6356031	2.49		99.7	3906	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.096	4.096	0.0	1.000	303701	0.4989		99.8	69.4	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.096	4.093	0.003	1.284	1756233	2.63		105	1904	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.228	4.228	0.0	1.187	103399	0.0489	Target=4.28	101	335	
599.00 > 99.00	4.220	4.228	-0.008	1.184	20932		4.94(2.14-6.43)		55.2	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.263	4.268	-0.005	1.002	90792	0.0549	Target=10.48	110	25.4	
563.00 > 169.00	4.263	4.268	-0.005	1.002	8002		11.35(5.24-15.72)		31.1	
D 44 13C2 PFUnA										
565.00 > 520.00	4.254	4.250	0.004	1.333	4958471	2.47		98.9	2664	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.263	4.250	0.013	1.336	1392042	2.50		100	1262	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.263	4.263	0.0	1.000	244813	0.5311		106	526	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.395	4.391	0.004	1.234	136518	0.0501		106	475	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.552	4.542	0.010	1.002	122985	0.0565	Target=9.37	113	44.6	
613.00 > 169.00	4.552	4.542	0.010	1.002	11873		10.36(4.68-14.05)		74.4	
D 49 13C2 PFDoA										
615.00 > 570.00	4.544	4.541	0.003	1.424	5664600	2.33		93.2	3435	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.568	4.700	-0.132	1.162	16681	0.0493		102	55.7	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.781	4.781	0.0	1.342	8906	0.0406	Target=0.55	83.8	79.5	
699.00 > 99.00	4.781	4.781	0.0	1.342	17428		0.51(0.28-0.83)		121	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.820	4.825	-0.005	1.061	92447	0.0537	Target=6.18	107	61.2	
663.00 > 169.00	4.820	4.825	-0.005	1.061	14320		6.46(3.09-9.27)		90.8	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.069	5.075	-0.006	1.002	13057	0.0481	Target=1.39	96.3	87.8	
713.00 > 219.00	5.060	5.075	-0.015	1.000	10175		1.28(0.70-2.09)		93.3	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.060	5.049	0.011	1.586	4152361	2.46		98.6	6972	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.525	5.534	-0.009	1.000	105100	0.0512	Target=5.55	102	9.5	
813.00 > 169.00	5.525	5.534	-0.009	1.000	19495		5.39(2.77-8.32)		150	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.525	5.514	0.011	1.731	3911192	2.48		99.4	4359	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.023	6.023	0.0	1.090	46417	0.0481	Target=5.09	96.1	14.7	
913.00 > 169.00	6.023	6.023	0.0	1.090	8699		5.34(2.55-7.64)		85.0	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

LCPFC_LLCCVL_00001 Amount Added: 1.00 Units: mL

Report Date: 10-Jan-2019 09:35:46 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_005.d

Injection Date: 08-Jan-2019 19:26:21 Instrument ID: A9

Lims ID: CCVL

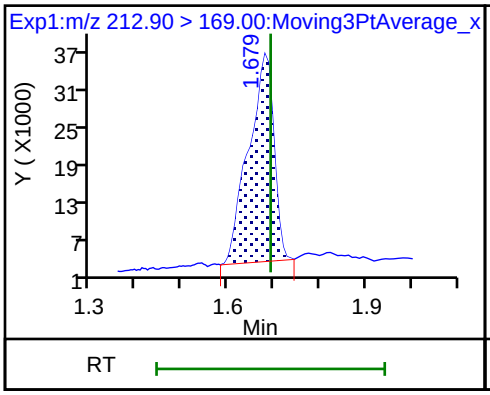
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 21 Worklist Smp#: 2

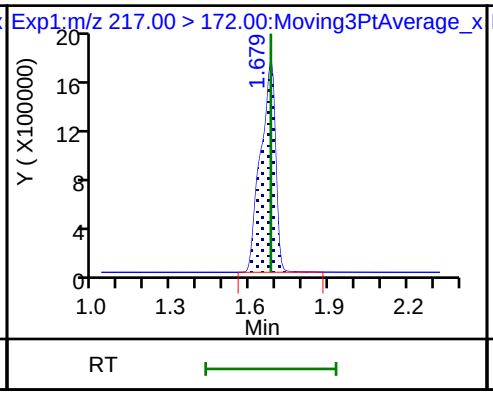
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

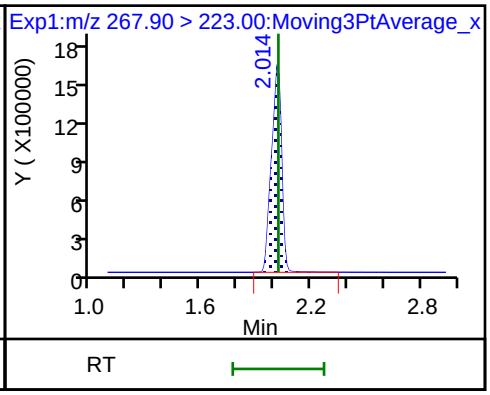
2 Perfluorobutanoic acid



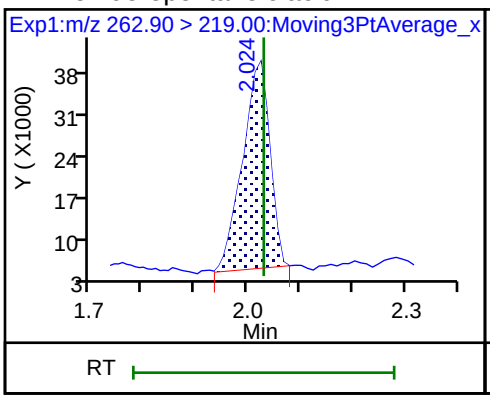
D 1 13C4 PFBA



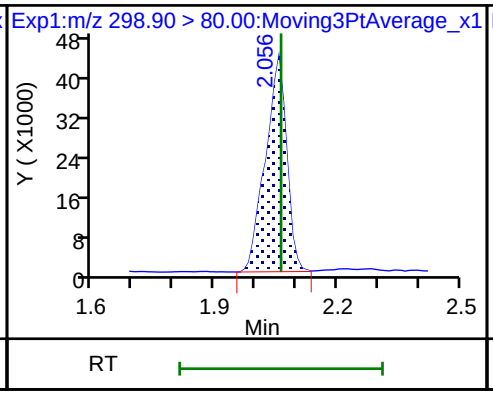
D 3 13C5 PFPeA



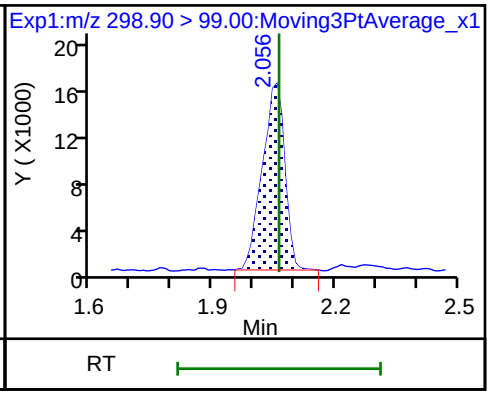
4 Perfluoropentanoic acid



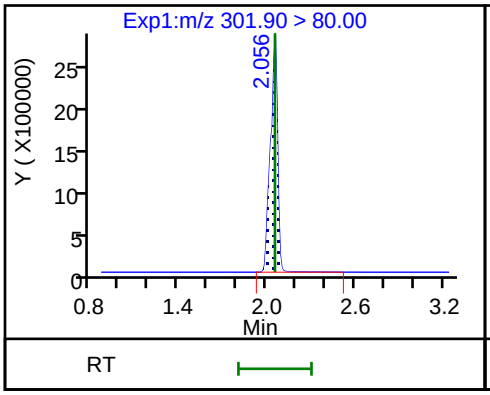
6 Perfluorobutanesulfonic acid



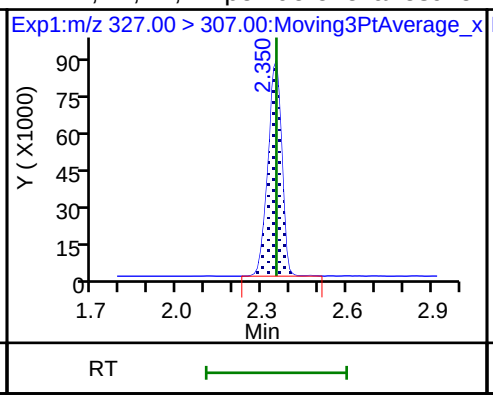
6 Perfluorobutanesulfonic acid



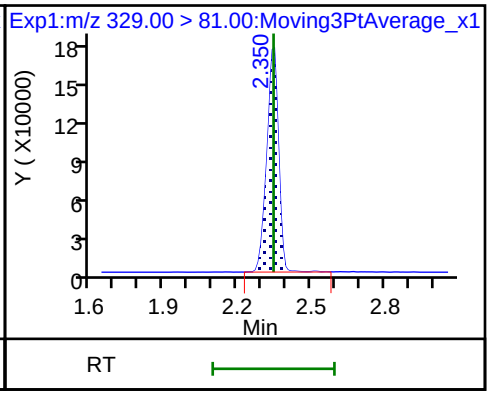
D 5 13C3 PFBS



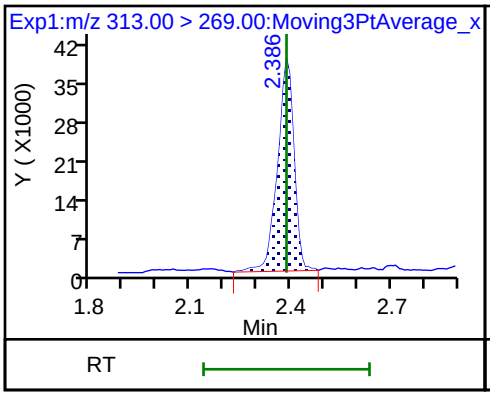
7 1H,1H,2H,2H-perfluorohexanesulfon



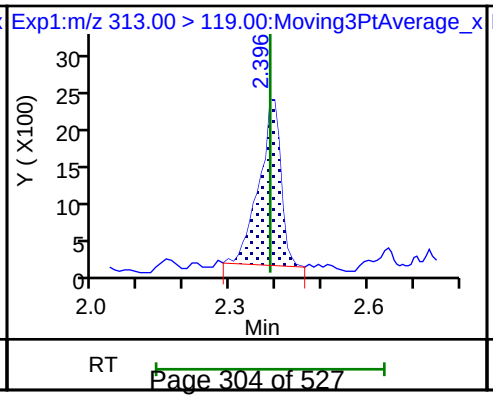
D 8 M2-4:2 FTS



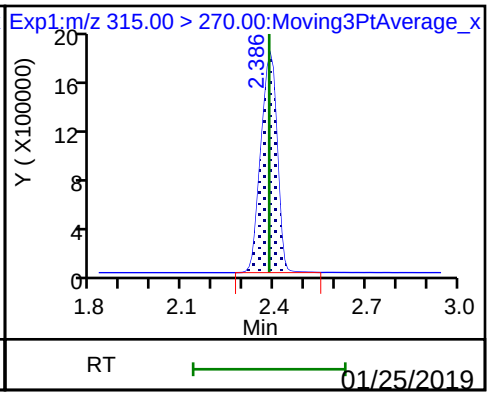
10 Perfluorohexanoic acid



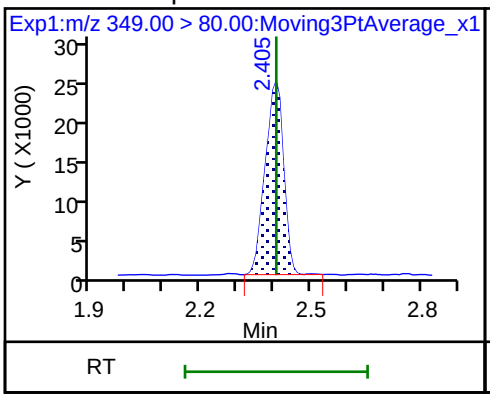
10 Perfluorohexanoic acid



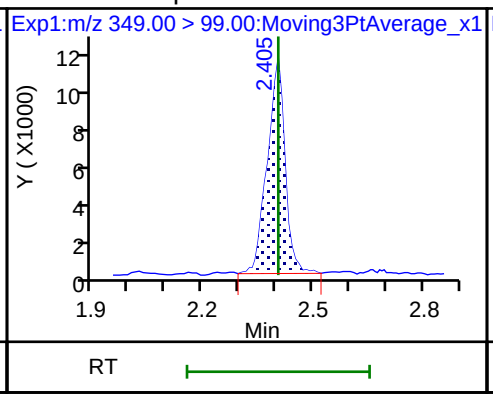
D 9 13C2 PFHxA



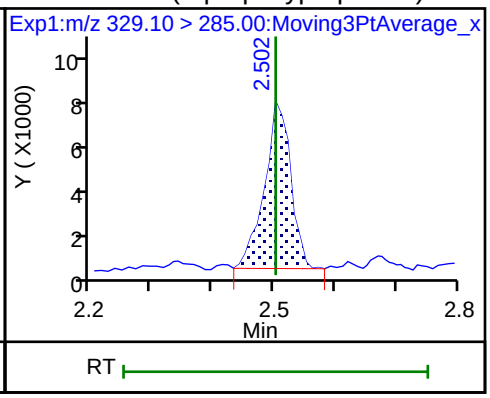
11 Perfluoropentanesulfonic acid



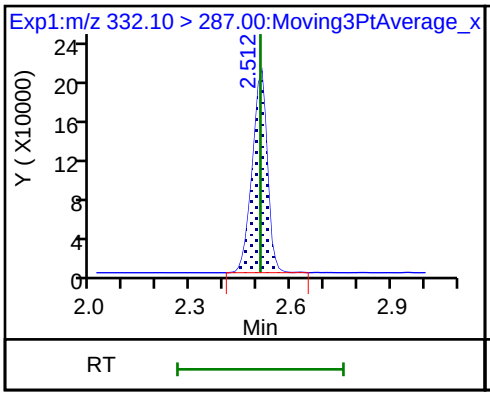
11 Perfluoropentanesulfonic acid



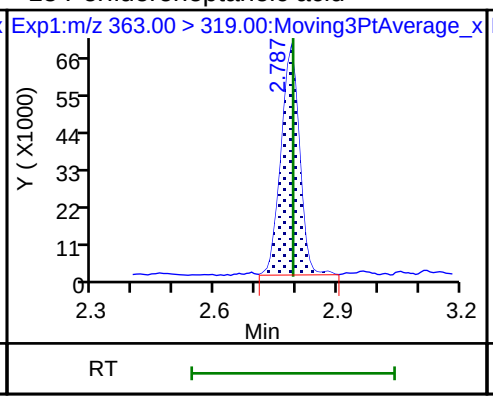
14 Perfluoro(2-propoxypropanoic) acid



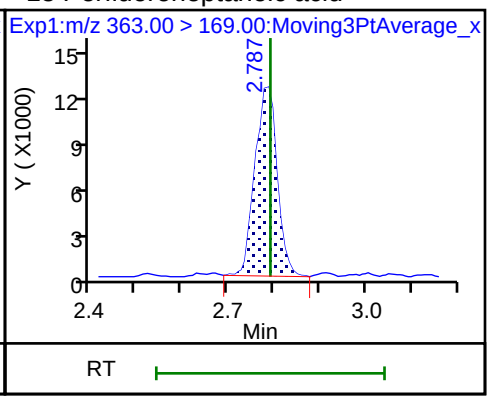
D 13 13C3 HFPO-DA



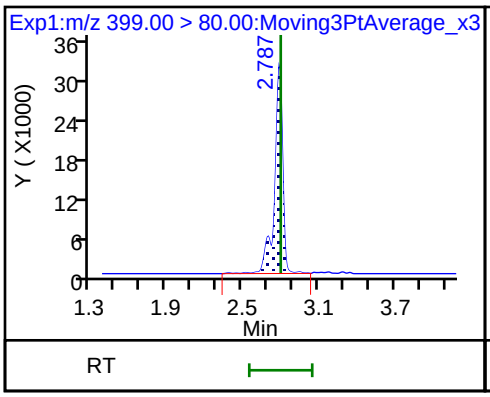
15 Perfluoroheptanoic acid



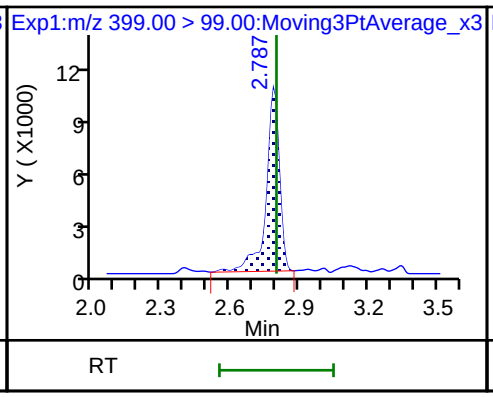
15 Perfluoroheptanoic acid



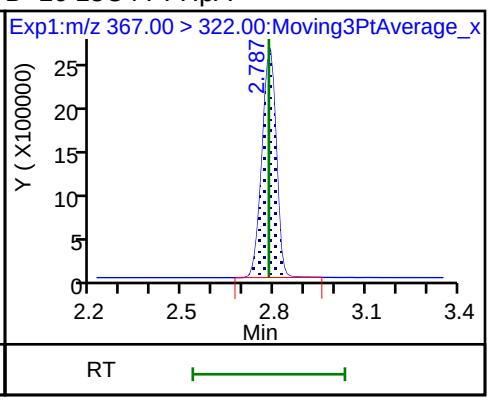
18 Perfluorohexanesulfonic acid



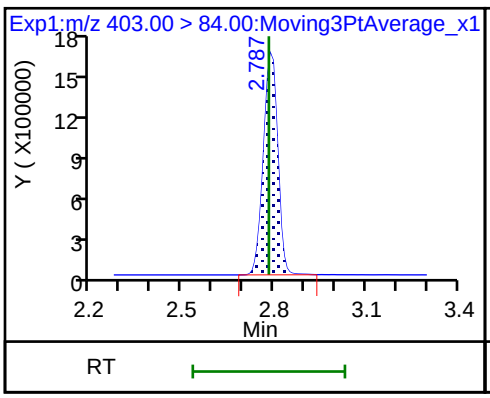
18 Perfluorohexanesulfonic acid



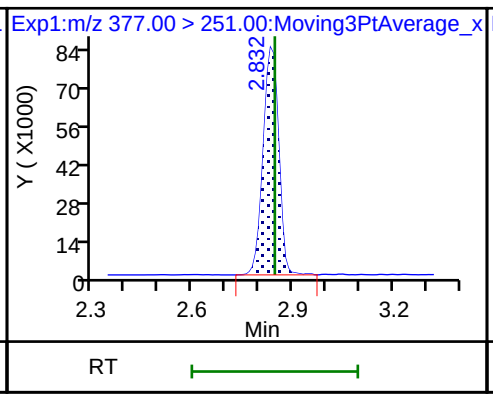
D 16 13C4 PFHpA



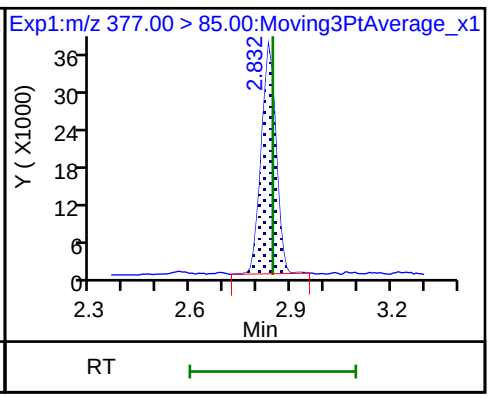
D 17 18O2 PFHxS



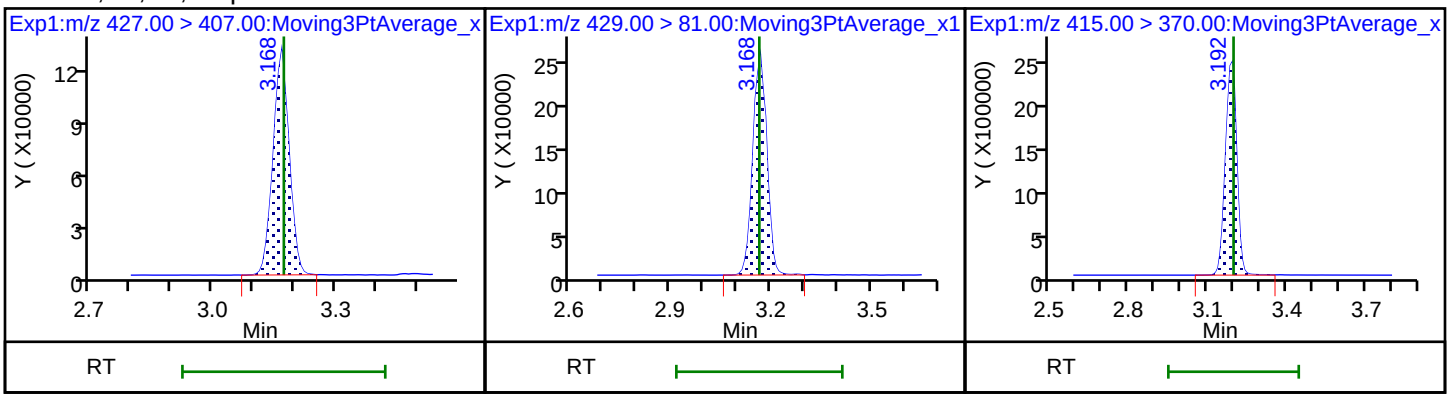
19 DONA



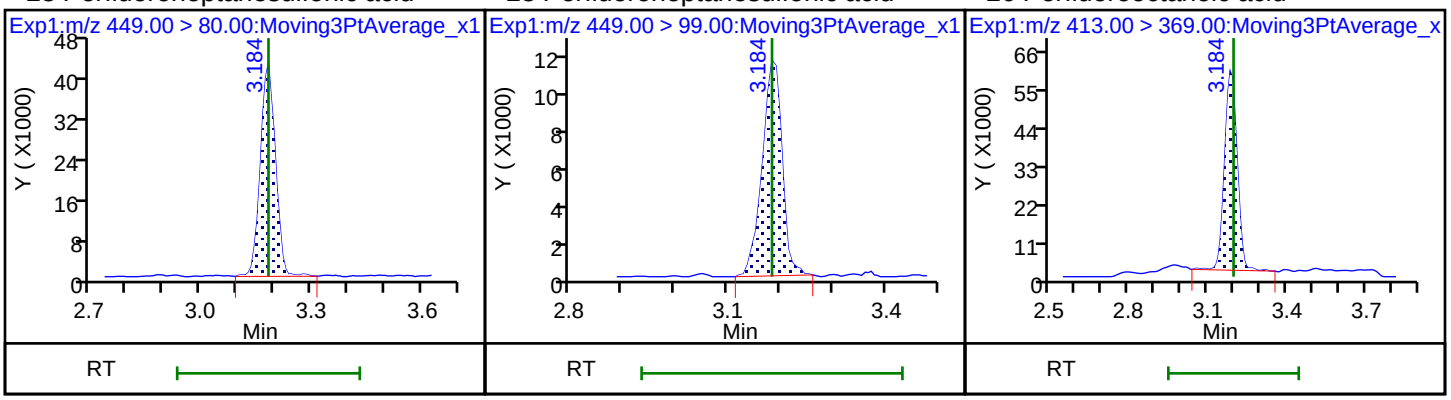
19 DONA



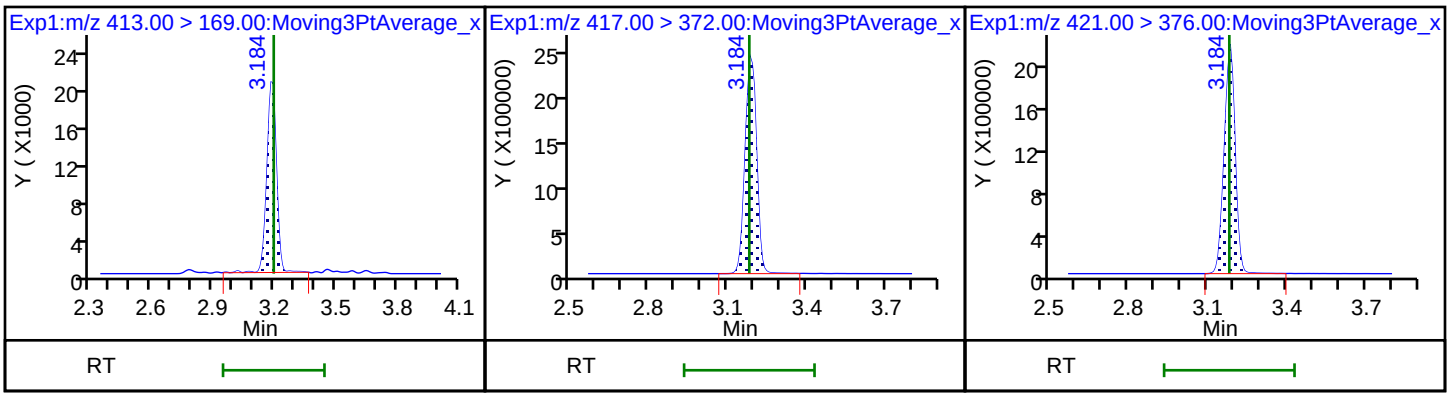
21 1H,1H,2H,2H-perfluorooctanesulfonD 20 M2-6:2 FTS * 24 13C2 PFOA



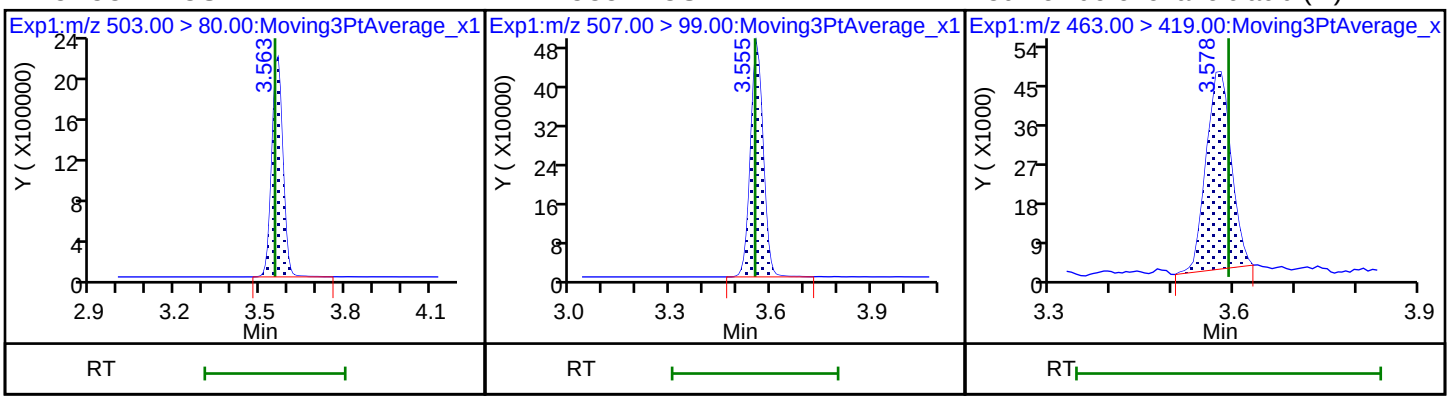
23 Perfluoroheptanesulfonic acid 23 Perfluoroheptanesulfonic acid 26 Perfluorooctanoic acid



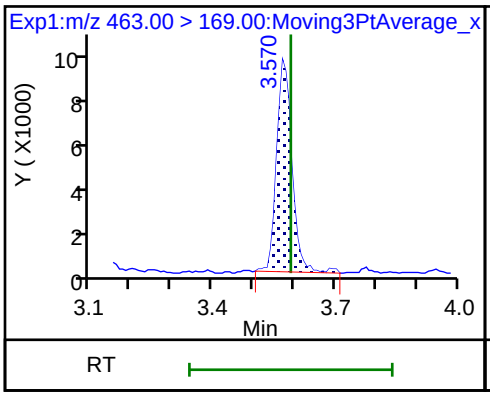
26 Perfluorooctanoic acid D 25 13C4 PFOA D 22 13C8 PFOA



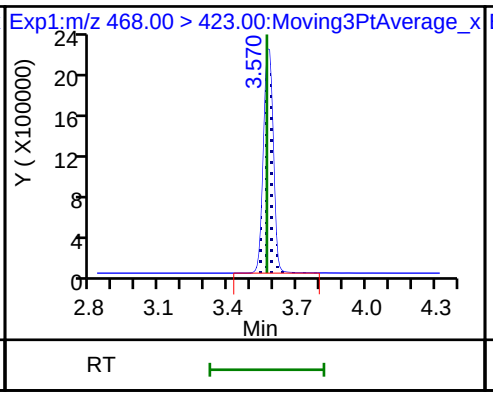
D 28 13C4 PFOS D 27 13C8 PFOS 30 Perfluorononanoic acid (M)



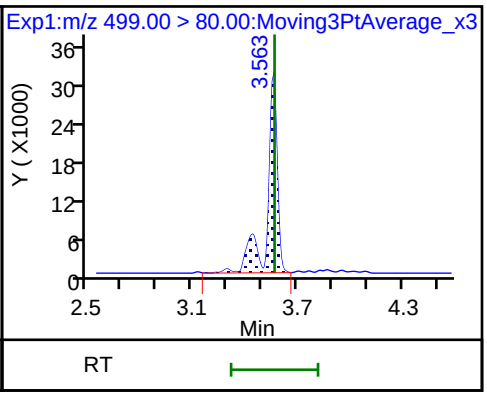
30 Perfluorononanoic acid



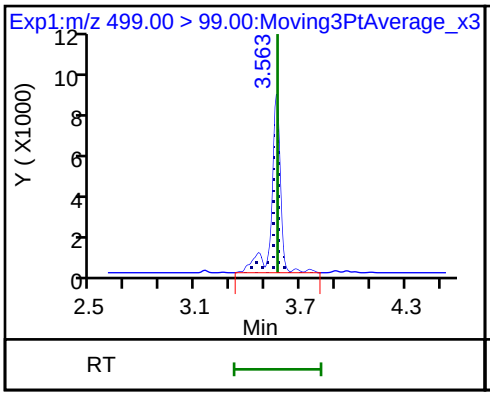
D 31 13C5 PFNA



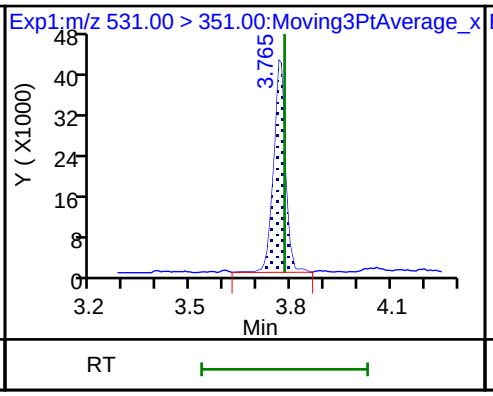
29 Perfluorooctanesulfonic acid



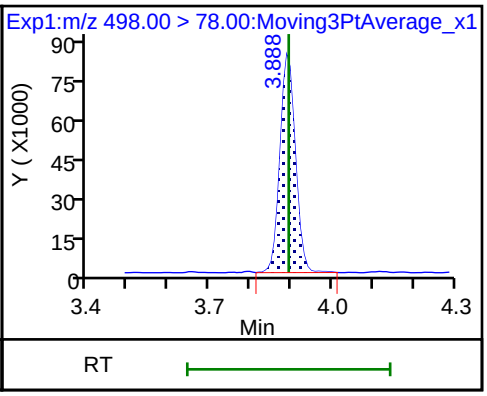
29 Perfluorooctanesulfonic acid



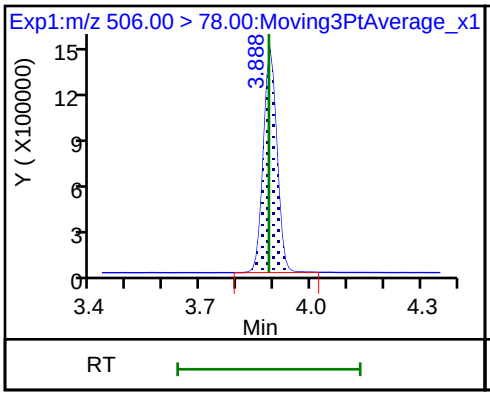
32 9-Chlorohexadecafluoro-3-oxanonane



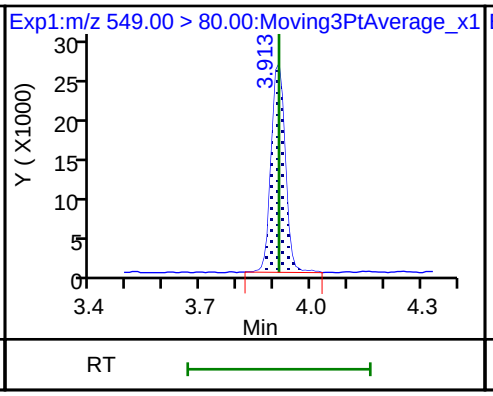
34 Perfluorooctanesulfonamide



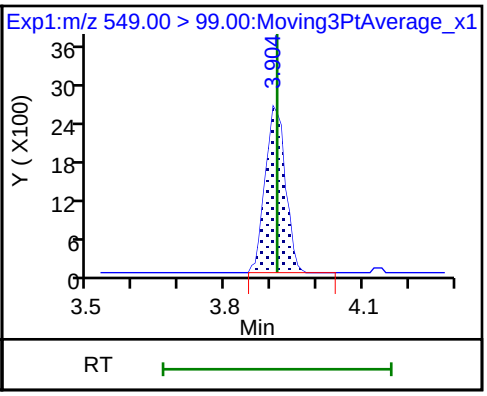
D 33 13C8 FOSA



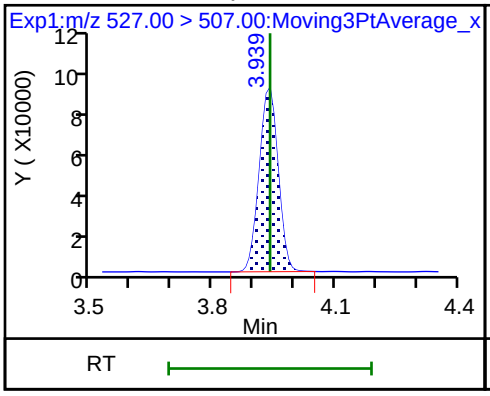
35 Perfluorononanesulfonic acid



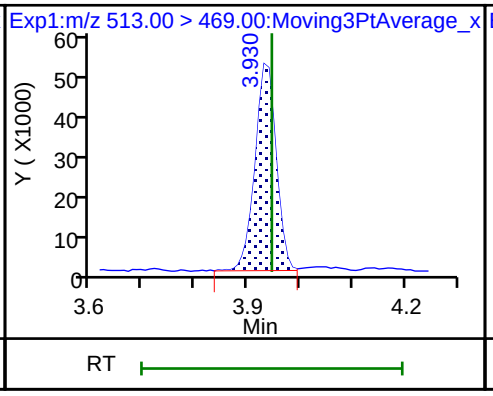
35 Perfluorononanesulfonic acid



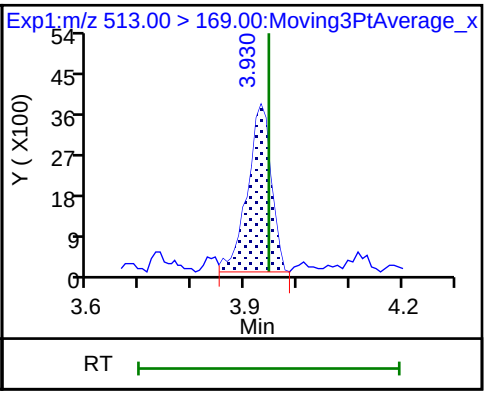
37 1H,1H,2H,2H-perfluorodecanesulfoni



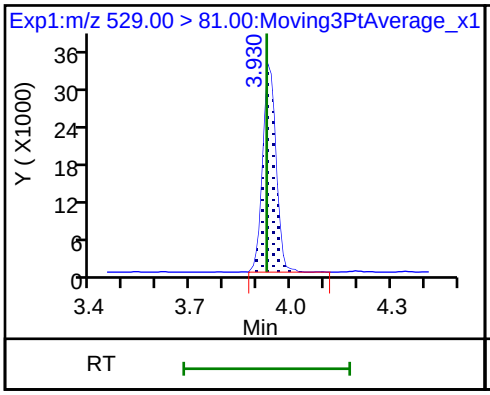
38 Perfluorodecanoic acid



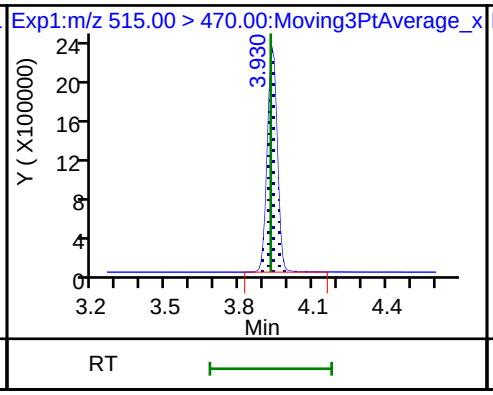
38 Perfluorodecanoic acid



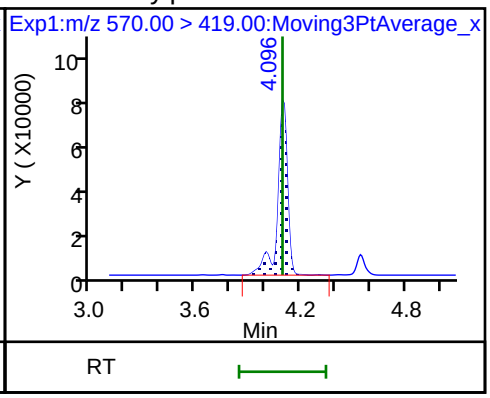
D 39 M2-8:2 FTS



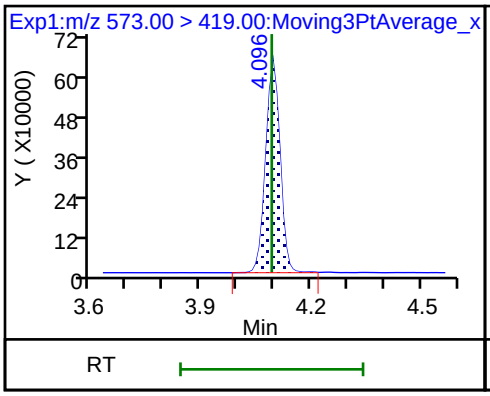
D 36 13C2 PFDA



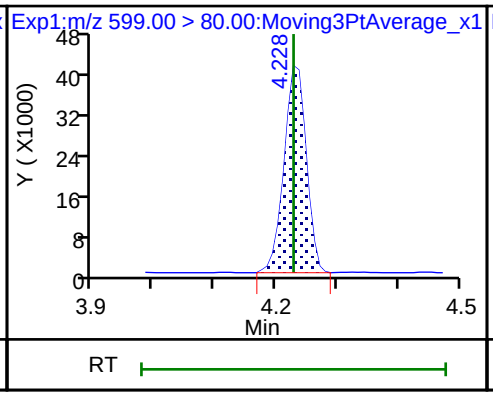
41 N-methylperfluorooctanesulfonamido



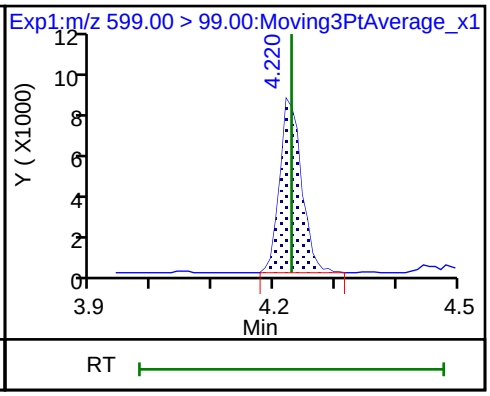
D 40 d3-NMeFOSAA



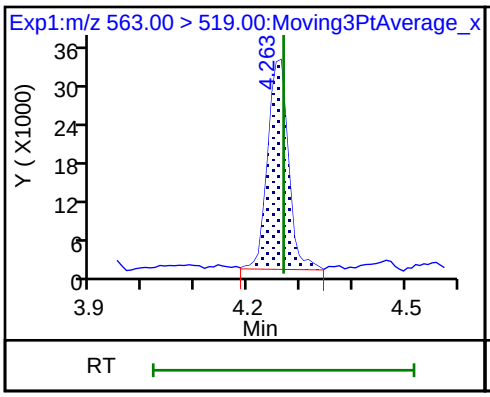
42 Perfluorodecanesulfonic acid



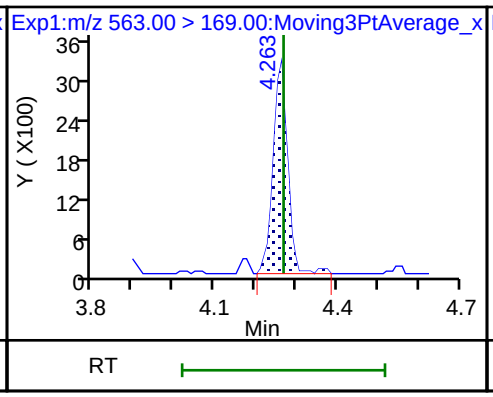
42 Perfluorodecanesulfonic acid



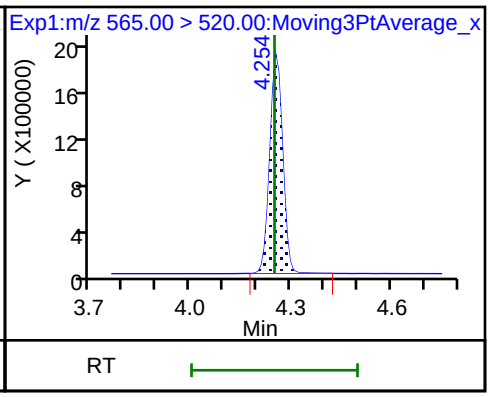
43 Perfluoroundecanoic acid



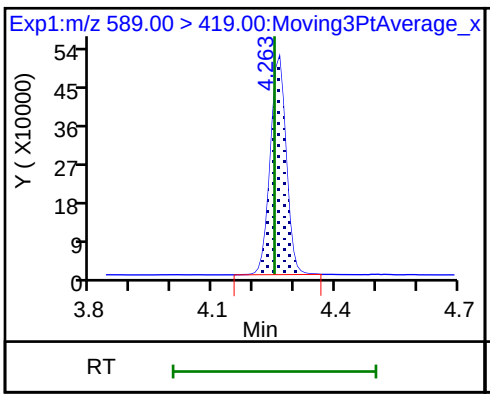
43 Perfluoroundecanoic acid



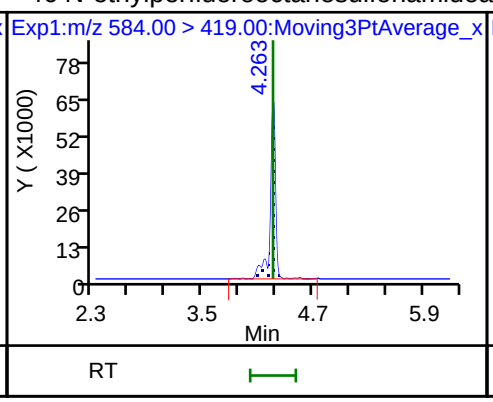
D 44 13C2 PFUnA



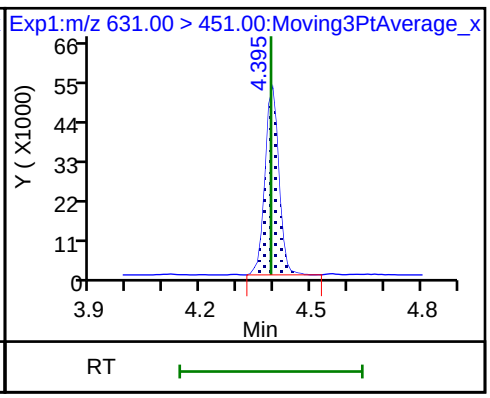
D 45 d5-NEtFOSAA



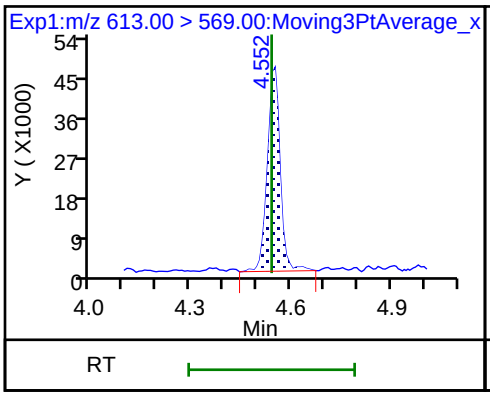
46 N-ethylperfluorooctanesulfonamidoa



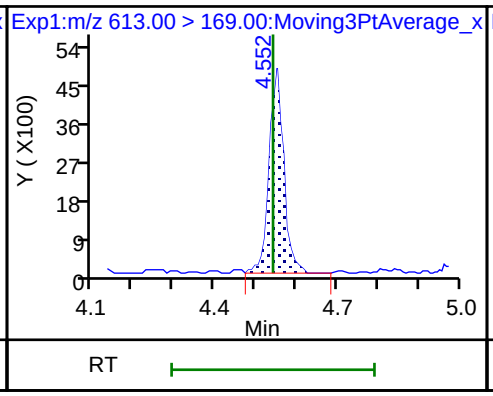
48 11-Chloroeicosafluoro-3-oxaundecan



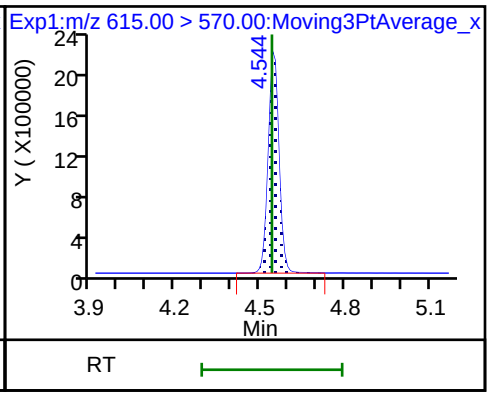
50 Perfluorododecanoic acid



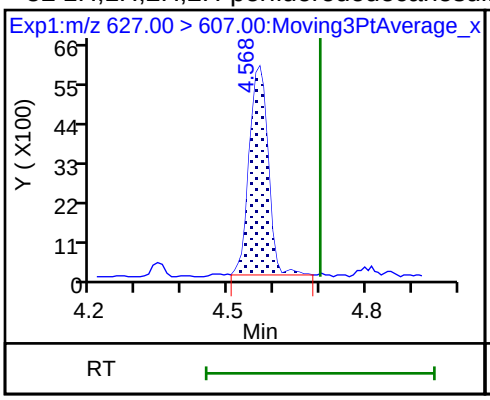
50 Perfluorododecanoic acid



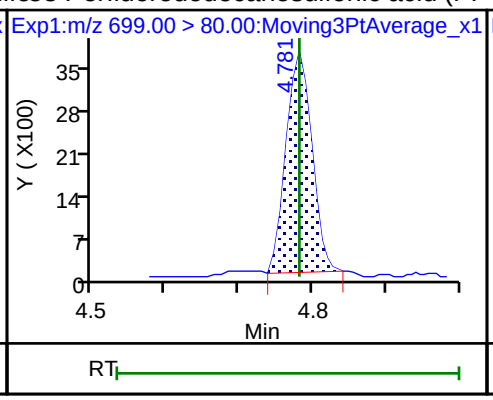
D 49 13C2 PFDoA



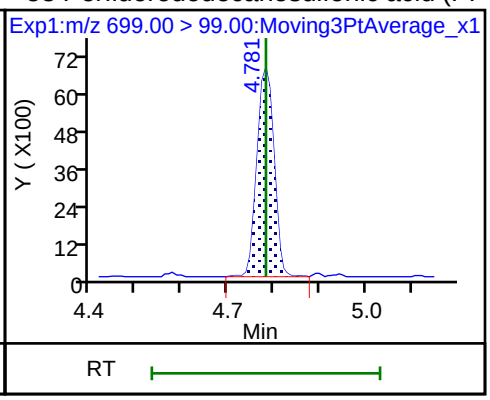
52 1H,1H,2H-perfluorododecanesulfo



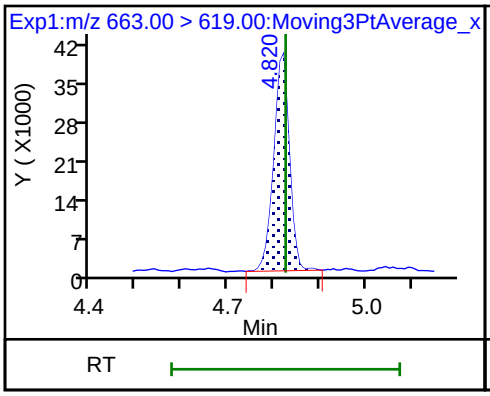
53 Perfluorododecanesulfonic acid (PF



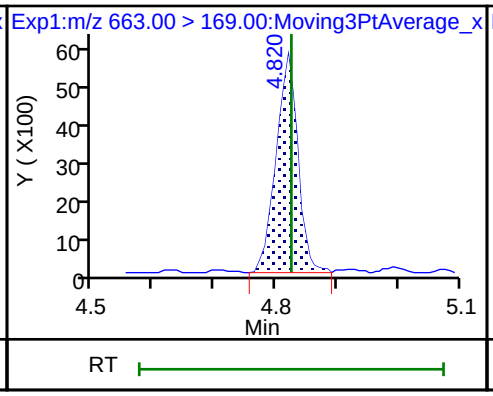
53 Perfluorododecanesulfonic acid (PF



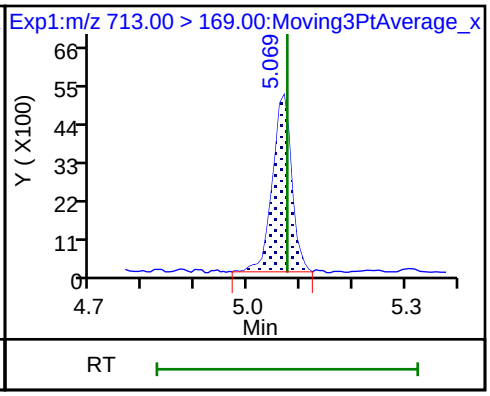
54 Perfluorotridecanoic acid



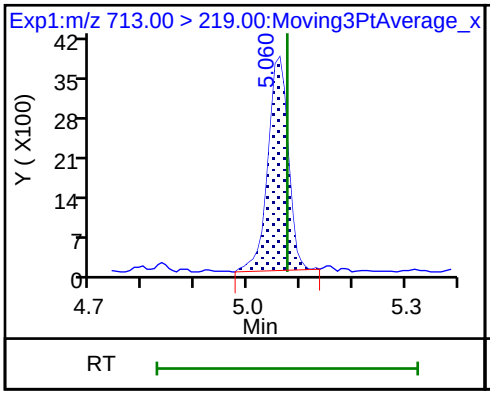
54 Perfluorotridecanoic acid



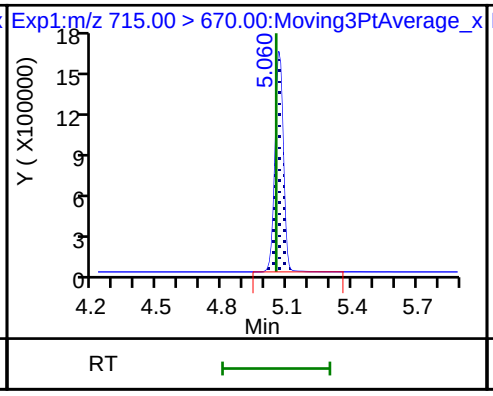
56 Perfluorotetradecanoic acid



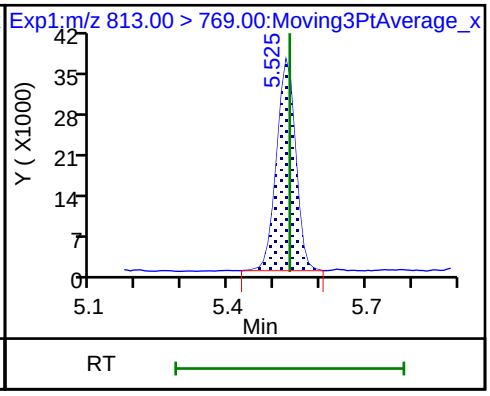
56 Perfluorotetradecanoic acid



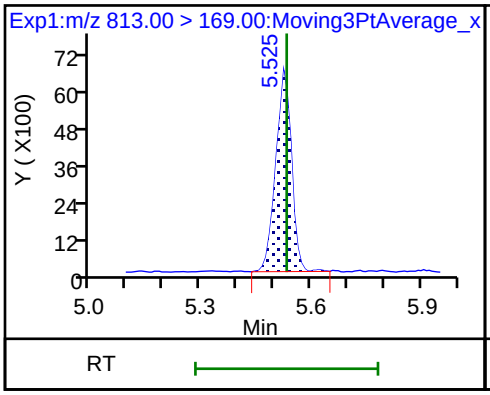
D 55 13C2 PFTeDA



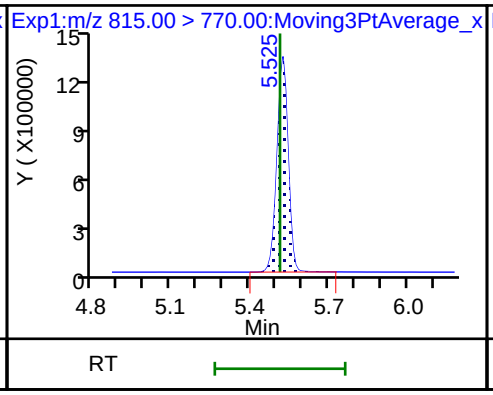
58 Perfluorohexadecanoic acid



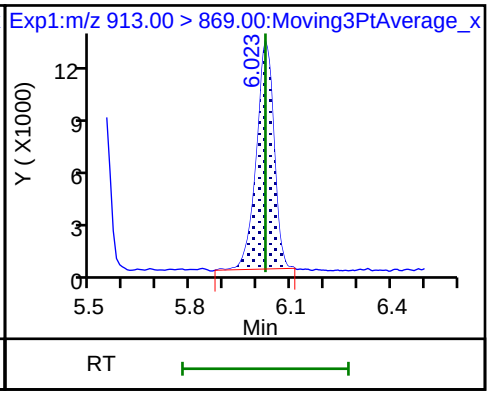
58 Perfluorohexadecanoic acid



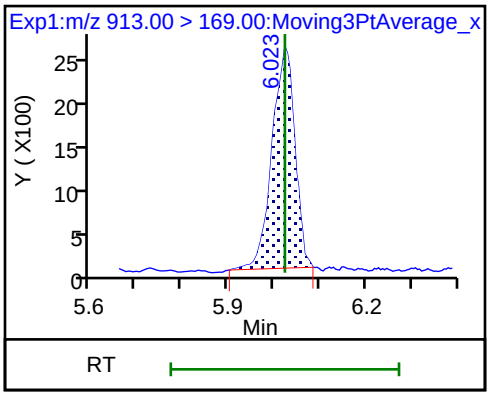
D 57 13C2 PFHxDA



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

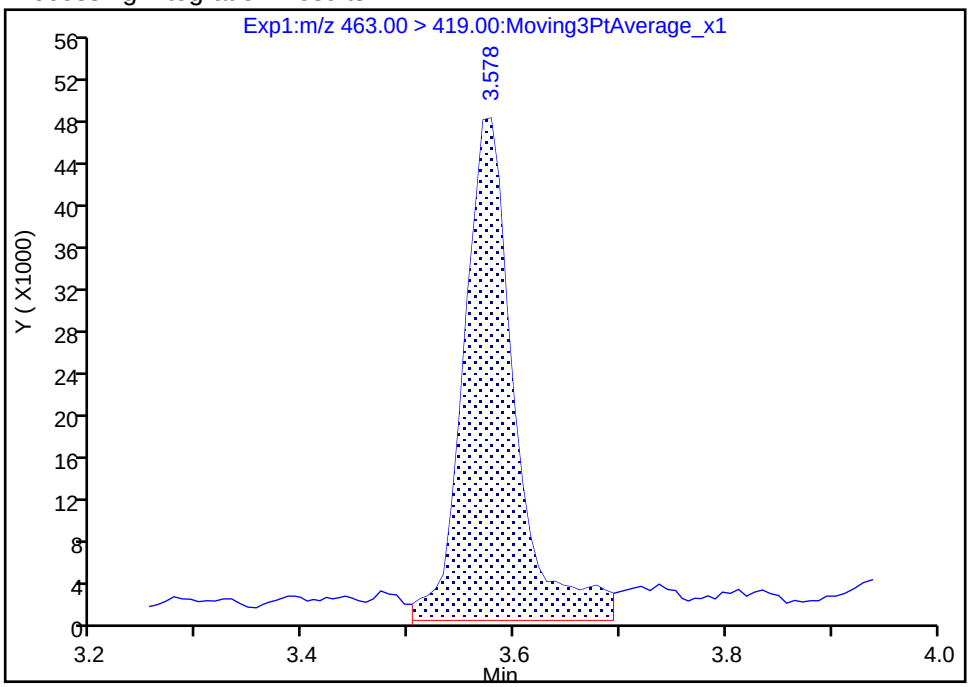
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_005.d
Injection Date: 08-Jan-2019 19:26:21 Instrument ID: A9
Lims ID: CCVL
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 21 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

30 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

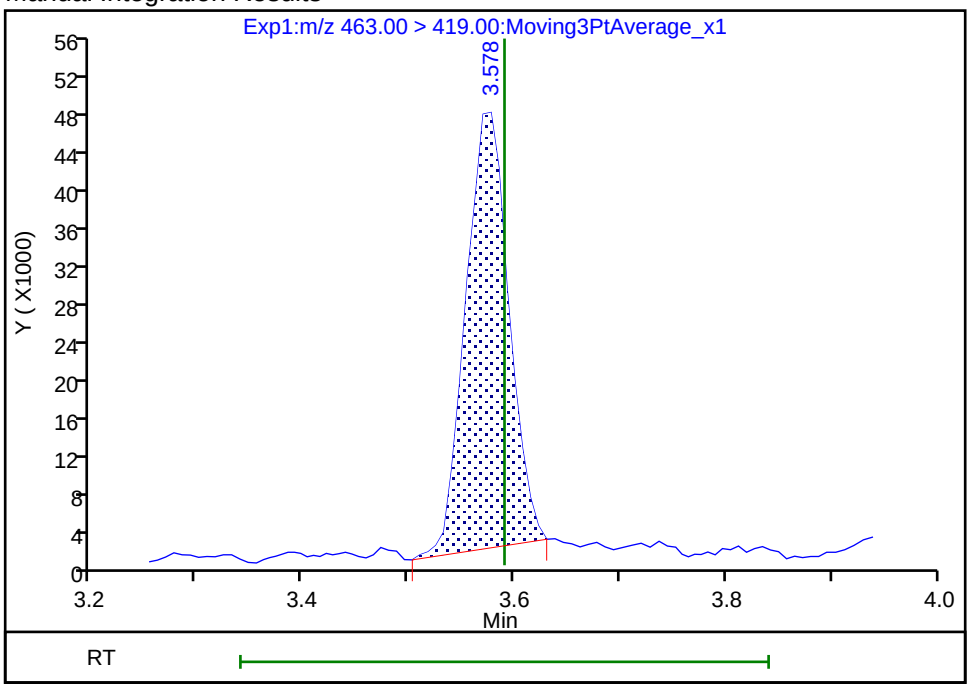
Processing Integration Results

RT: 3.58
Area: 158387
Amount: 0.062552
Amount Units: ng/ml



Manual Integration Results

RT: 3.58
Area: 126683
Amount: 0.050031
Amount Units: ng/ml



Reviewer: ruangyotsakuld, 10-Jan-2019 09:35:26
Audit Action: Manually Integrated Audit Reason: Baseline

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-269668/3 Calibration Date: 01/08/2019 19:33

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_006.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.9040		0.977	1.00	-2.3	40.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	0.9796		0.979	1.00	-2.1	40.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	0.9210		0.844	0.884	-4.6	50.0
4:2 FTS	AveID	0.1480	0.1469		0.927	0.934	-0.7	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.8126		0.938	1.00	-6.2	40.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.4585		0.917	0.938	-2.2	50.0
HFPO-DA (GenX)	AveID	2.144	1.652		0.771	1.00	-22.9	40.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	0.9902		0.952	1.00	-4.8	40.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.114		0.819	0.910	-10.0	40.0
DONA	AveID	2.306	2.434		0.994	0.942	5.6	50.0
6:2 FTS	AveID	2.112	2.036		0.914	0.948	-3.6	40.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.064		0.960	0.952	0.8	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	1.040		1.00	1.00	0.4	40.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	1.034		0.911	0.928	-1.9	40.0
Perfluorononanoic acid (PFNA)	AveID	0.995	0.9586		0.963	1.00	-3.7	40.0
F-53B Major	AveID	0.9553	0.9277		0.905	0.932	-2.9	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	2.988		1.03	1.00	2.8	40.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.6039		0.991	0.960	3.2	50.0
8:2 FTS	AveID	14.20	14.18		0.957	0.958	-0.1	40.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.116		0.972	1.00	-2.8	40.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.8921		1.03	1.00	3.0	40.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.9031		0.996	0.964	3.3	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.8110		0.973	1.00	-2.7	40.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.7691		0.929	1.00	-7.1	40.0
F-53B Minor	AveID	1.128	1.273		1.06	0.942	12.8	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	0.9358		0.974	1.00	-2.6	40.0
10:2 FTS	AveID	8.852	9.694		1.06	0.964	9.5	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0842		0.897	0.968	-7.3	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.7225		0.952	1.00	-4.8	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1543		0.945	1.00	-5.5	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.8920		0.987	1.00	-1.3	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-269668/3 Calibration Date: 01/08/2019 19:33

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_006.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.5930		0.961	1.00	-3.9	50.0
13C4 PFBA	Ave	0.9546	0.9585		2.51	2.50	0.4	50.0
13C5 PFPeA	Ave	0.8350	0.8252		2.47	2.50	-1.2	50.0
13C3 PFBS	Ave	1.371	1.371		2.33	2.33	-0.0	50.0
M2-4:2 FTS	Ave	0.0836	0.0792		2.21	2.34	-5.3	50.0
13C2 PFHxA	Ave	0.9280	0.9384		2.53	2.50	1.1	50.0
13C3 HFPO-DA	Ave	0.0833	0.0974		2.92	2.50	16.9	50.0
13C4 PFHpA	Ave	1.141	1.178		2.58	2.50	3.2	50.0
18O2 PFHxS	Ave	0.8068	0.8016		2.35	2.37	-0.6	50.0
M2-6:2 FTS	Ave	0.1125	0.1155		2.44	2.38	2.7	40.0
13C4 PFOA	Ave	0.9896	1.001		2.53	2.50	1.2	50.0
13C8 PFOA	Ave	2363087	2426004		2.51	2.45	2.7	50.0
13C4 PFOS	Ave	0.8235	0.8155		2.37	2.39	-1.0	50.0
13C8 PFOS	Ave	500608	508521		2.43	2.39	1.6	50.0
13C5 PFNA	Ave	0.8916	0.9129		2.56	2.50	2.4	50.0
13C8 FOSA	Ave	0.5421	0.5402		2.49	2.50	-0.4	50.0
13C2 PFDA	Ave	0.8721	0.8978		2.57	2.50	2.9	50.0
M2-8:2 FTS	Ave	0.0129	0.0118		2.18	2.40	-8.9	40.0
d3-NMeFOSAA	Ave	0.2285	0.2248		2.46	2.50	-1.6	50.0
13C2 PFUnA	Ave	0.6858	0.6816		2.49	2.50	-0.6	50.0
d5-NEtFOSAA	Ave	0.1905	0.1890		2.48	2.50	-0.8	50.0
13C2 PFDoA	Ave	0.8313	0.8397		2.53	2.50	1.0	50.0
13C2 PFTeDA	Ave	0.5763	0.5613		2.44	2.50	-2.6	50.0
13C2 PFHxDA	Ave	0.5385	0.5290		2.46	2.50	-1.8	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_006.d
Lims ID: CCV L4
Client ID:
Sample Type: CCVIS
Inject. Date: 08-Jan-2019 19:33:50 ALS Bottle#: 13 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCV L4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub7

Method: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 09:36:40 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0325

First Level Reviewer: ruangyotsakuld Date: 10-Jan-2019 09:36:40
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.679	1.679	0.0	0.528	6771332	2.51		100	14814	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.679	1.679	0.0	1.000	2448431	0.9765		97.7	214	
D 3 13C5 PFPeA										
267.90 > 223.00	2.013	2.022	-0.009	0.633	5829515	2.47		98.8	3843	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.024	2.024	0.0	1.005	2284212	0.9794		97.9	122	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.054	0.002	0.646	9008943	2.32		100	2750831	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.056	2.056	0.0	1.000	3154667	0.8438	Target=2.70	95.4	2735	
298.90 > 99.00	2.056	2.056	0.0	1.000	1133977		2.78(1.35-4.05)		1171	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.347	2.350	-0.003	1.141	531638	0.9273		99.3	1529	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.347	2.346	0.001	0.738	522589	2.21		94.7	1009	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.383	2.386	-0.003	1.000	2154798	0.9383	Target=13.92	93.8	660	
313.00 > 119.00	2.383	2.386	-0.003	1.000	150708		14.30(6.96-20.87)		381	
D 9 13C2 PFHxA										
315.00 > 270.00	2.383	2.383	0.0	0.749	6629052	2.53		101	2690	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.402	2.405	-0.003	1.168	1666414	0.9173	Target=2.30	97.8	2592	
349.00 > 99.00	2.402	2.405	-0.003	1.168	801615		2.08(1.15-3.45)		1623	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.508	2.502	0.006	1.000	454612	0.7706		77.1	265	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.508	2.508	0.0	0.789	687948	2.92		117	2273	
D 17 18O2 PFHxS										
403.00 > 84.00	2.791	2.782	0.009	0.877	5357003	2.35		99.4	2332	
D 16 13C4 PFHpA										
367.00 > 322.00	2.782	2.782	0.0	0.875	8324422	2.58		103	3519	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.782	2.787	-0.005	1.000	3297107	0.9517	Target=4.34	95.2	779	
363.00 > 169.00	2.782	2.787	-0.005	1.000	693075		4.76(2.17-6.52)		987	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.782	2.787	-0.005	0.997	2295754	0.8192	Target=3.80	90.0	1496	
399.00 > 99.00	2.791	2.787	0.004	1.000	642441		3.57(1.90-5.70)		496	
19 DONA										
377.00 > 251.00	2.836	2.832	0.004	0.798	5283192	0.99	Target=2.26	106	3483	
377.00 > 85.00	2.827	2.832	-0.005	0.796	2163161		2.44(1.13-3.39)		1575	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.165	3.165	0.0	0.995	775390	2.44		103	1192	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.165	3.168	-0.003	1.000	630067	0.9139		96.4	725	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.181	3.184	-0.003	0.895	2333737	0.9598	Target=3.69	101	2057	
449.00 > 99.00	3.181	3.184	-0.003	0.895	594579		3.93(1.84-5.53)		1665	
D 22 13C8 PFOA										
421.00 > 376.00	3.181	3.180	0.001		5937646	2.51		103	3450	
D 25 13C4 PFOA										
417.00 > 372.00	3.181	3.180	0.001	1.000	7072455	2.53		101	3055	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.181	3.184	-0.003	1.000	2943453	1.00	Target=2.72	100	407	
413.00 > 169.00	3.181	3.184	-0.003	1.000	1044674		2.82(1.36-4.08)		1410	
* 24 13C2 PFOA										
415.00 > 370.00	3.181	3.192	-0.011		7064205	2.50			3439	
D 28 13C4 PFOS										
503.00 > 80.00	3.553	3.552	0.001	1.117	5507334	2.37		99.0	3641	
D 27 13C8 PFOS										
507.00 > 99.00	3.553	3.552	0.001		1215365	2.43		102	1269	
D 31 13C5 PFNA										
468.00 > 423.00	3.568	3.567	0.001	1.122	6448642	2.56		102	3131	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.560	3.563	-0.003	1.002	2211071	0.9105	Target=4.08	98.1	988	
499.00 > 99.00	3.560	3.563	-0.003	1.002	507781		4.35(2.04-6.12)		1976	
30 Perfluorononanoic acid										
463.00 > 419.00	3.568	3.578	-0.010	1.000	2472577	0.9629	Target=5.35	96.3	387	
463.00 > 169.00	3.568	3.578	-0.010	1.000	430656		5.74(2.68-8.03)		865	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.757	3.765	-0.007	1.057	1992259	0.9050		97.1	1348	
D 33 13C8 FOSA										
506.00 > 78.00	3.886	3.885	0.001	1.222	3815706	2.49		99.6	3041	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.886	3.888	-0.002	1.000	4560369	1.03		103	2942	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.911	3.913	-0.002	1.101	1335815	0.99	Target=6.03	103	1631	
549.00 > 99.00	3.902	3.913	-0.011	1.098	199026		6.71(3.02-9.05)		587	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.928	3.939	-0.011	1.000	451841	0.9569		99.9	2199	
D 36 13C2 PFDA										
515.00 > 470.00	3.928	3.927	0.001	1.235	6342077	2.57		103	2680	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.928	3.927	0.001	1.235	79658	2.18		91.1	322	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.928	3.930	-0.002	1.000	2831606	0.9717	Target=14.23	97.2	1619	
513.00 > 169.00	3.928	3.930	-0.002	1.000	203482		13.92(7.12-21.35)		384	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.094	4.096	-0.002	1.000	566665	1.03		103	116	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.094	4.093	0.001	1.287	1588052	2.46		98.4	1698	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.226	4.228	-0.002	1.189	2006152	1.00	Target=4.28	103	2819	
599.00 > 99.00	4.226	4.228	-0.002	1.189	415037		4.83(2.14-6.43)		1522	
D 44 13C2 PFUnA										
565.00 > 520.00	4.252	4.250	0.002	1.337	4814954	2.48		99.4	2955	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.252	4.250	0.002	1.337	1335238	2.48		99.2	1387	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.260	4.263	-0.003	1.002	410748	0.9289		92.9	937	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.252	4.263	-0.011	1.000	1561869	0.9726	Target=10.48	97.3	390	
563.00 > 169.00	4.252	4.263	-0.011	1.000	157619		9.91(5.24-15.72)		432	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.393	4.395	-0.002	1.236	2762457	1.06		113	3053	
D 49 13C2 PFDoA										
615.00 > 570.00	4.542	4.541	0.001	1.428	5931951	2.53		101	3092	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.542	4.552	-0.010	1.000	2220406	0.9744	Target=9.37	97.4	701	
613.00 > 169.00	4.542	4.552	-0.010	1.000	240749		9.22(4.68-14.05)		954	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.558	4.568	-0.010	1.160	310831	1.06		110	1160	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.779	4.781	-0.002	1.345	187726	0.8969	Target=0.55	92.7	686	
699.00 > 99.00	4.779	4.781	-0.002	1.345	332440		0.56(0.28-0.83)		1345	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.811	4.820	-0.009	1.059	1714324	0.9518	Target=6.18	95.2	833	
663.00 > 169.00	4.811	4.820	-0.009	1.059	300059		5.71(3.09-9.27)		1344	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.059	5.049	0.010	1.590	3964922	2.43		97.4	4612	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.059	5.069	-0.010	1.000	244669	0.9448	Target=1.39	94.5	972	
713.00 > 219.00	5.059	5.069	-0.010	1.000	173471		1.41(0.70-2.09)		795	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.525	5.514	0.011	1.737	3736594	2.46		98.2	3265	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.525	5.525	0.0	1.000	1333253	0.9869	Target=5.55	98.7	114	
813.00 > 169.00	5.525	5.525	0.0	1.000	233547		5.71(2.77-8.32)		1019	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.017	6.023	-0.006	1.089	886370	0.9607	Target=5.09	96.1	228	
913.00 > 169.00	6.022	6.023	-0.001	1.090	170811		5.19(2.55-7.64)		906	

Reagents:

LCPFC_LL4_00010 Amount Added: 1.00 Units: mL

Report Date: 10-Jan-2019 09:36:43 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_006.d

Injection Date: 08-Jan-2019 19:33:50 Instrument ID: A9

Lims ID: CCV L4

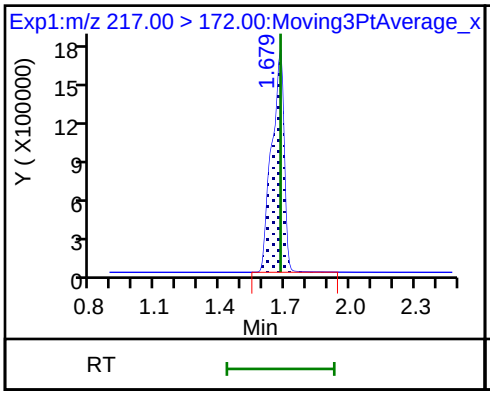
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 13 Worklist Smp#: 3

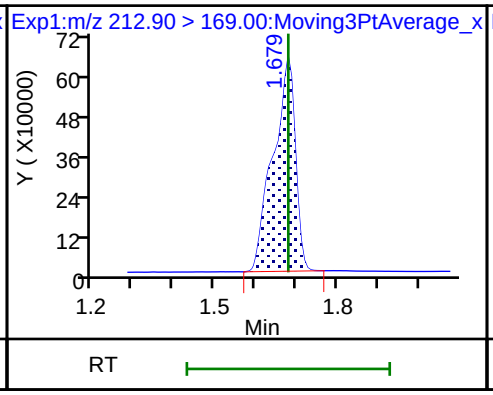
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

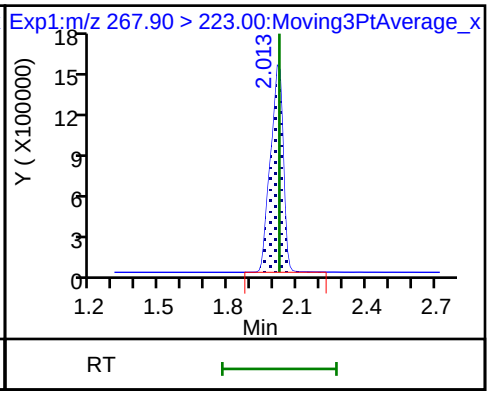
D 1 13C4 PFBA



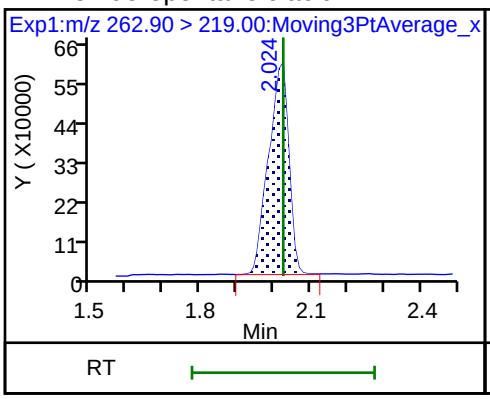
2 Perfluorobutanoic acid



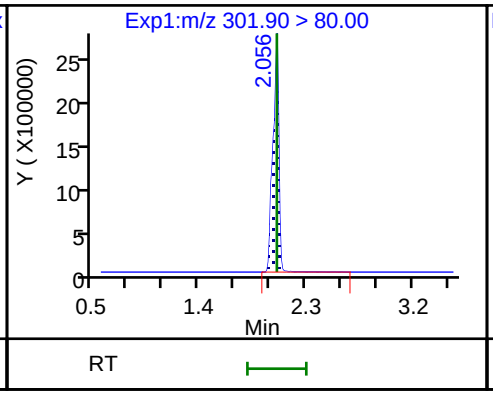
D 3 13C5 PFPeA



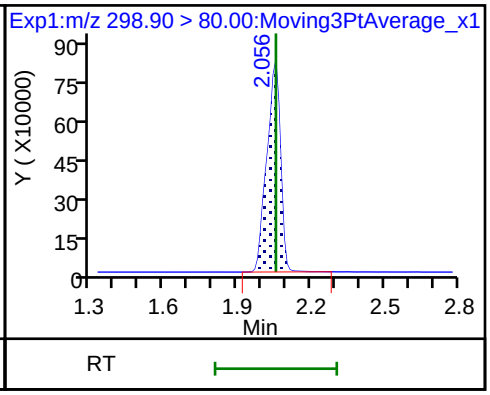
4 Perfluoropentanoic acid



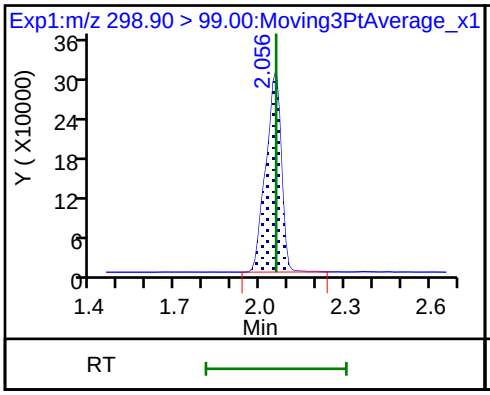
D 5 13C3 PFBS



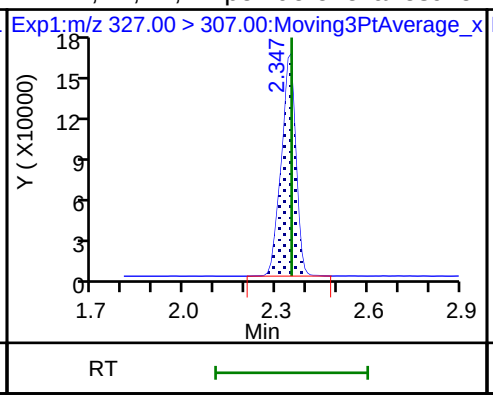
6 Perfluorobutanesulfonic acid



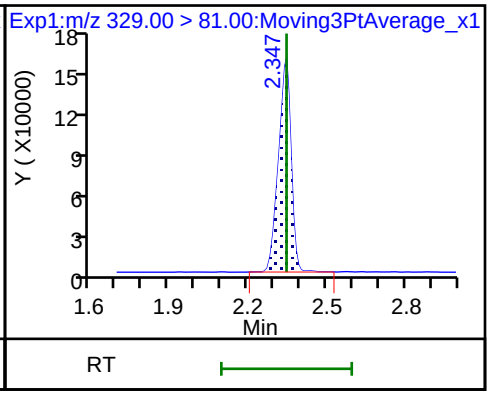
6 Perfluorobutanesulfonic acid



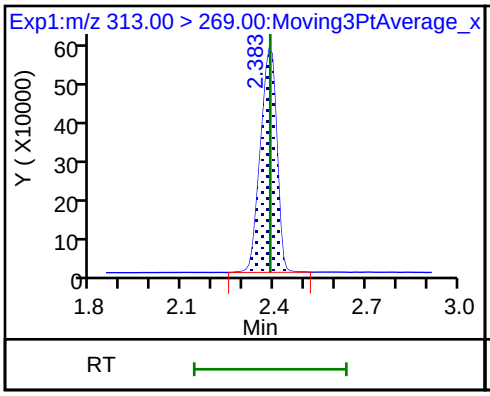
7 1H,1H,2H,2H-perfluorohexanesulfon



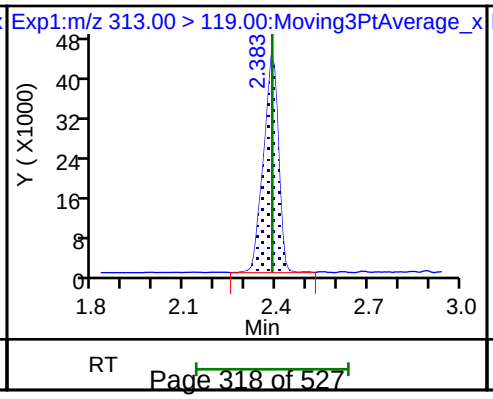
D 8 M2-4:2 FTS



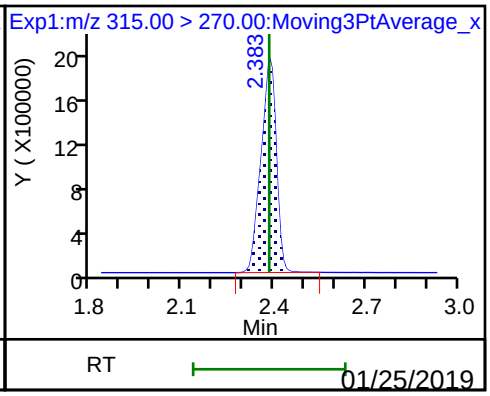
10 Perfluorohexanoic acid



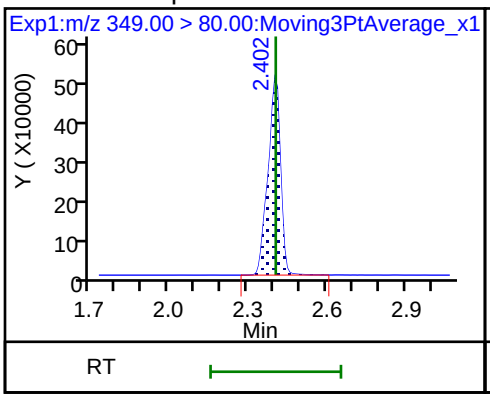
10 Perfluorohexanoic acid



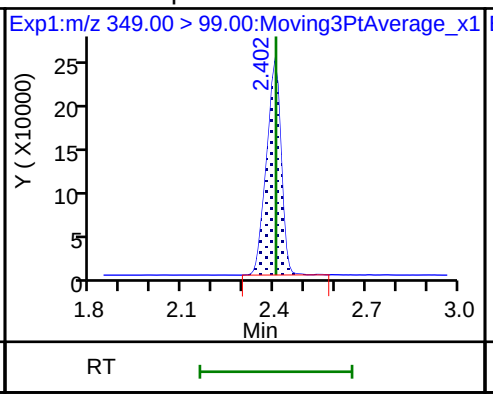
D 9 13C2 PFHxA



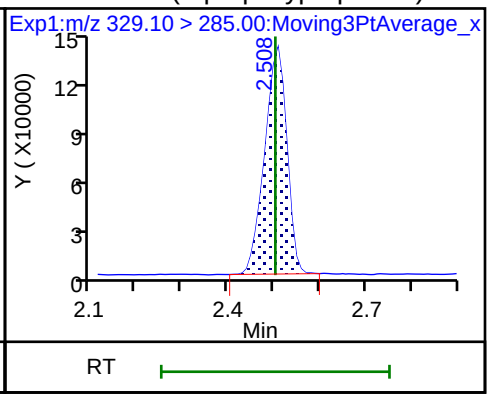
11 Perfluoropentanesulfonic acid



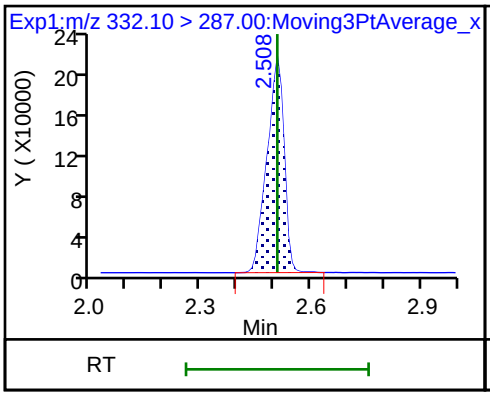
11 Perfluoropentanesulfonic acid



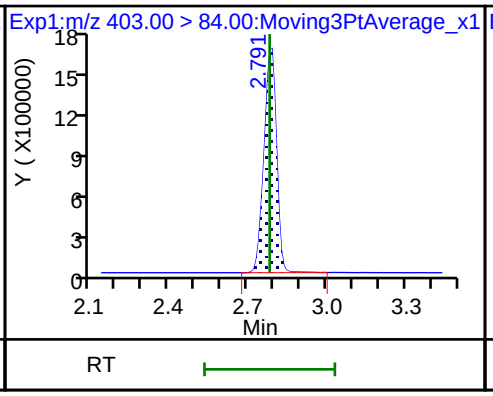
14 Perfluoro(2-propoxypropanoic) acid



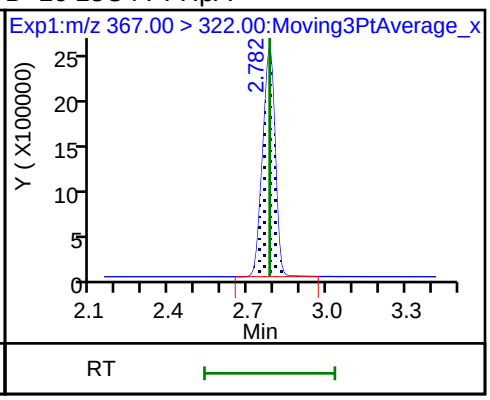
D 13 13C3 HFPO-DA



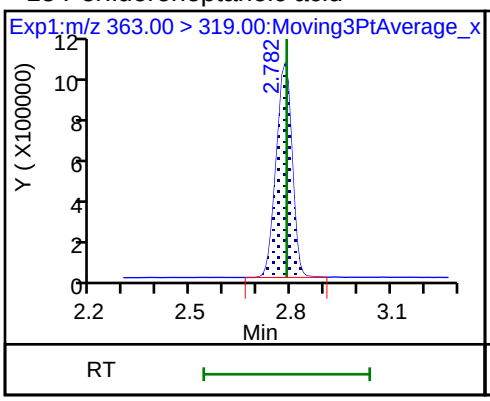
D 17 18O2 PFHxS



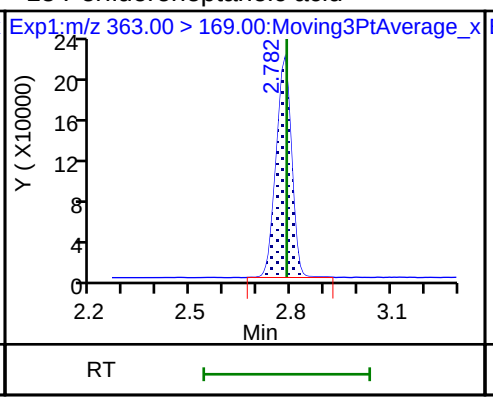
D 16 13C4 PFHpA



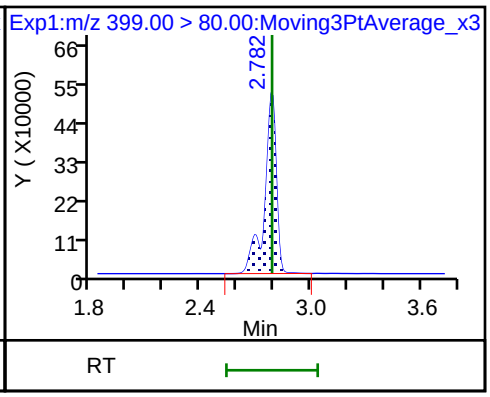
15 Perfluoroheptanoic acid



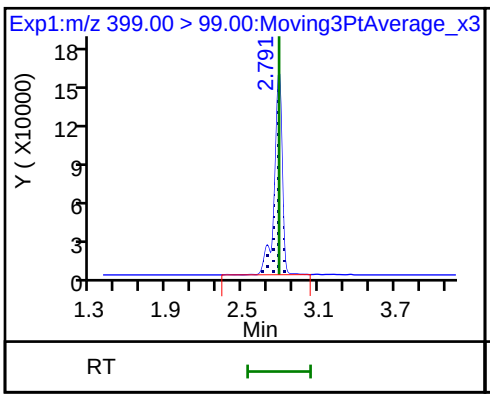
15 Perfluoroheptanoic acid



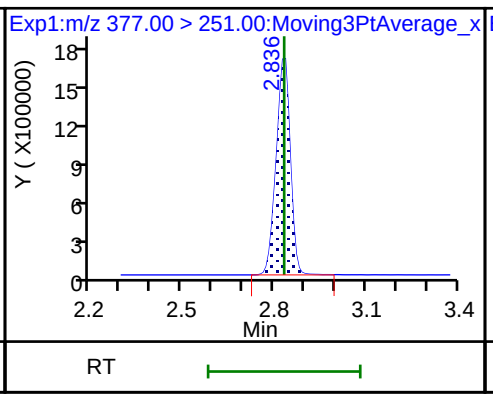
18 Perfluorohexanesulfonic acid



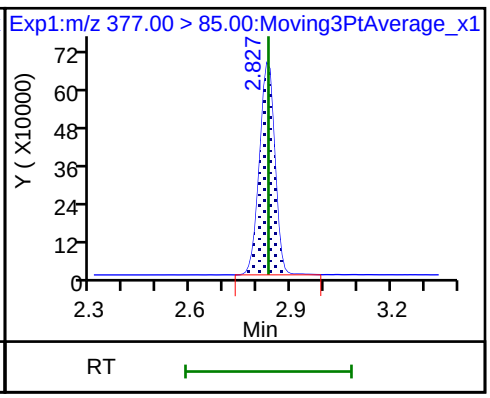
18 Perfluorohexanesulfonic acid



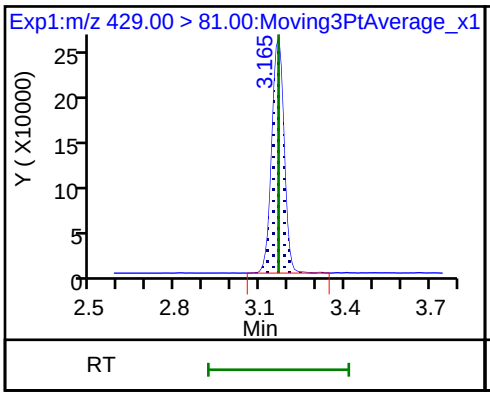
19 DONA



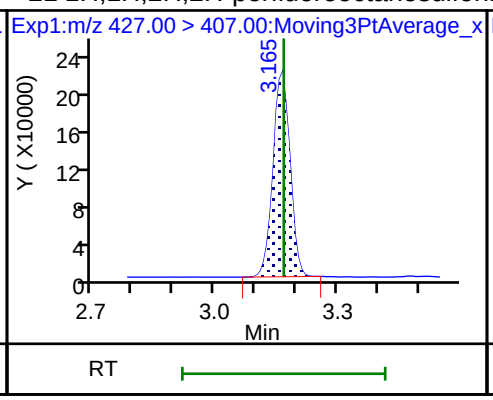
19 DONA



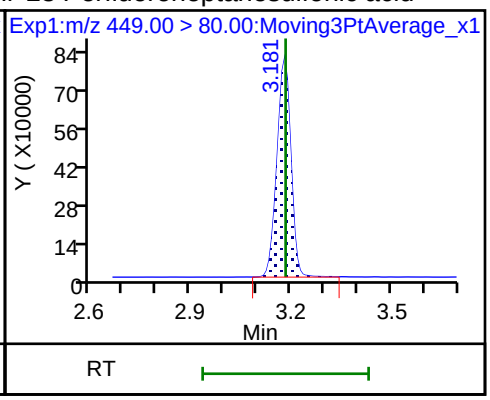
D 20 M2-6:2 FTS



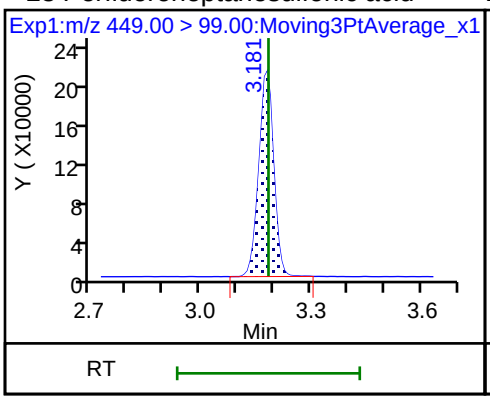
21 1H,1H,2H,2H-perfluorooctanesulfoni



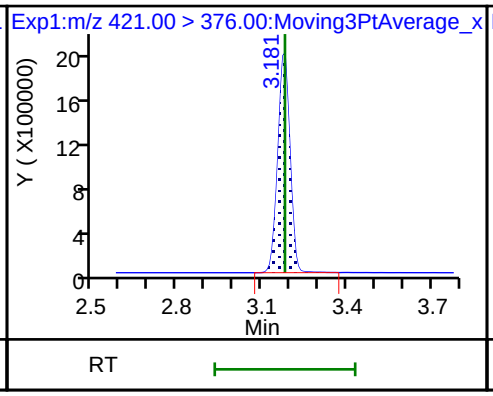
23 Perfluoroheptanesulfonic acid



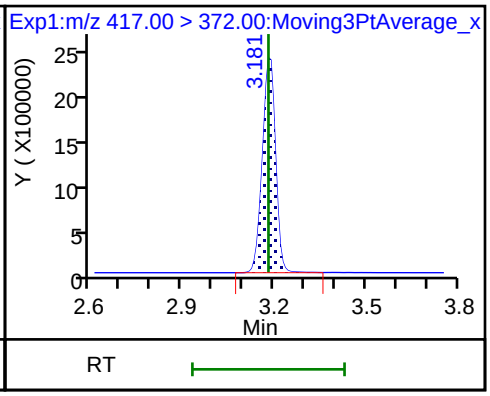
23 Perfluoroheptanesulfonic acid



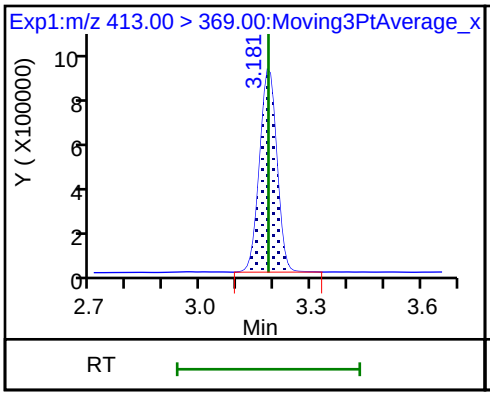
D 22 13C8 PFOA



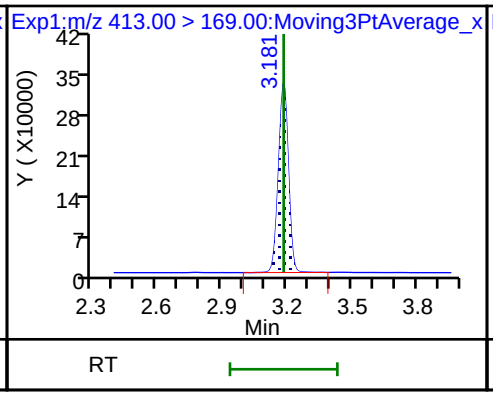
D 25 13C4 PFOA



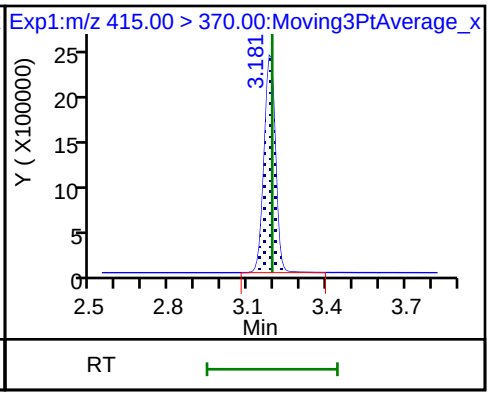
26 Perfluorooctanoic acid



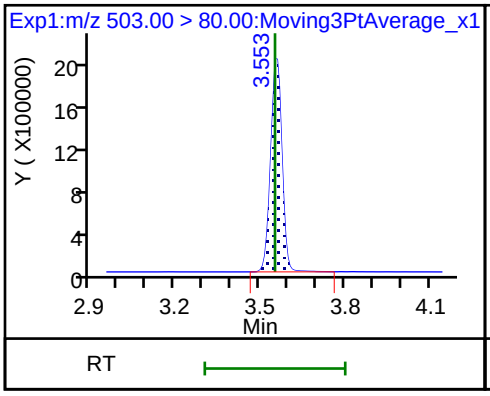
26 Perfluorooctanoic acid



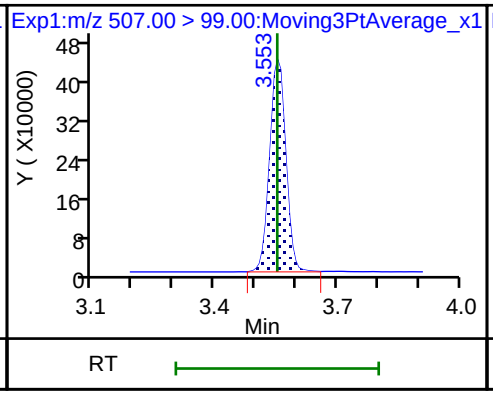
* 24 13C2 PFOA



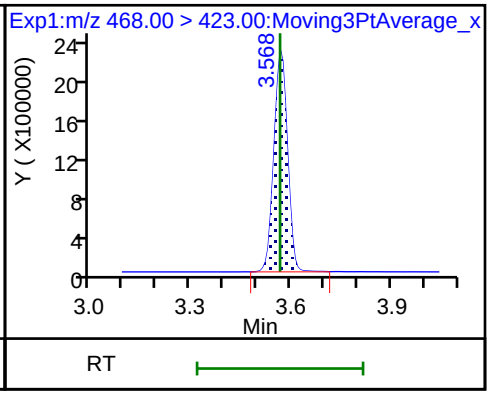
D 28 13C4 PFOS



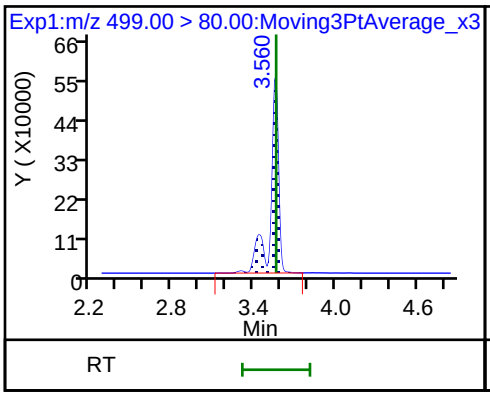
D 27 13C8 PFOS



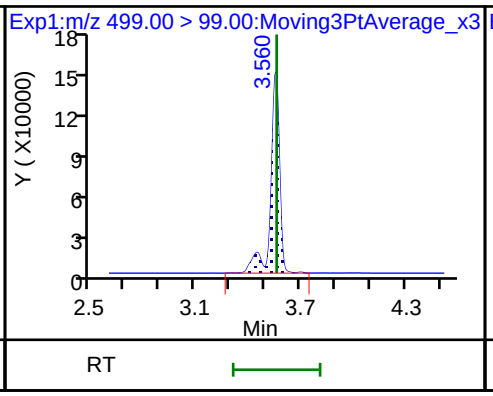
D 31 13C5 PFNA



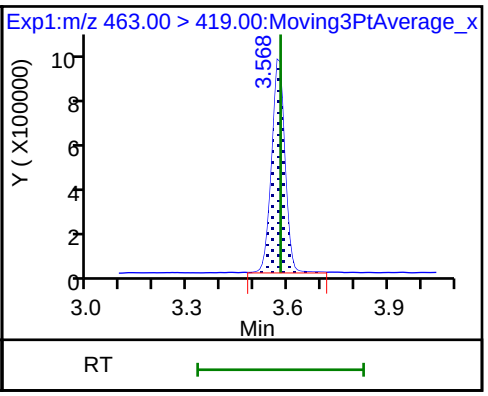
29 Perfluorooctanesulfonic acid



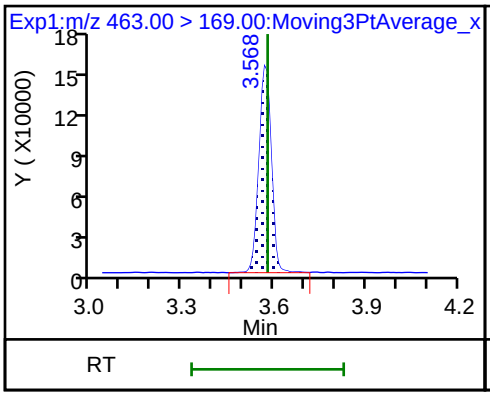
29 Perfluorooctanesulfonic acid



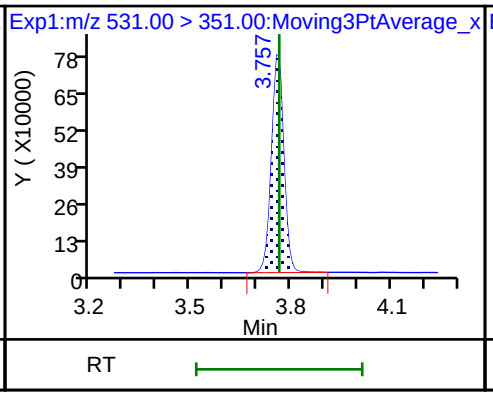
30 Perfluorononanoic acid



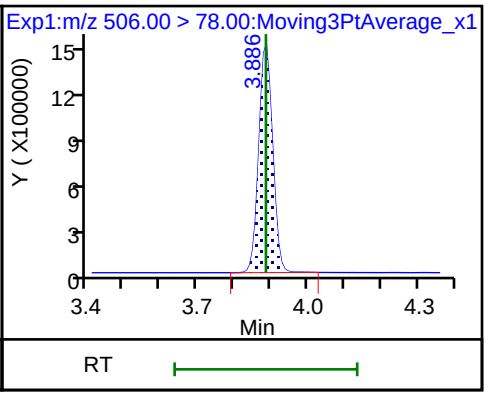
30 Perfluorononanoic acid



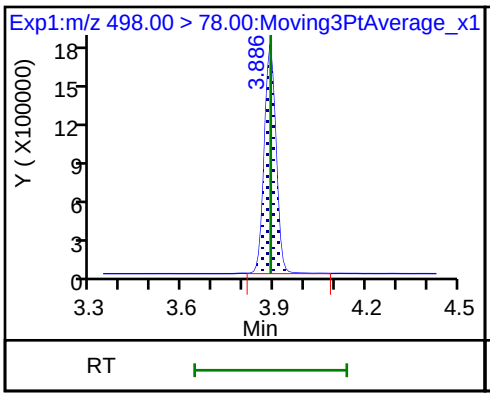
32 9-Chlorohexadecafluoro-3-oxanonane



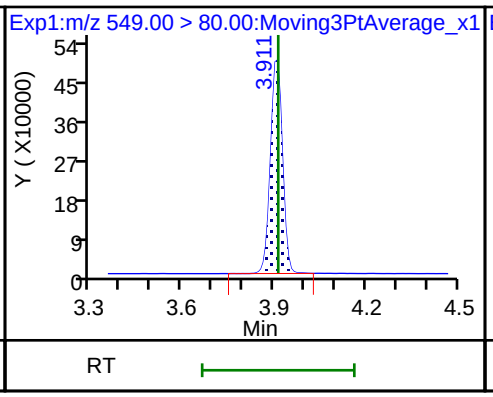
D 33 13C8 FOSA



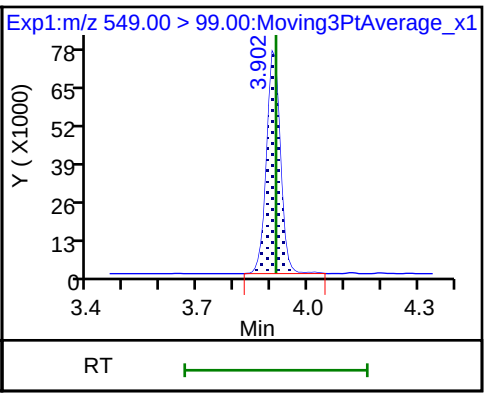
34 Perfluorooctanesulfonamide



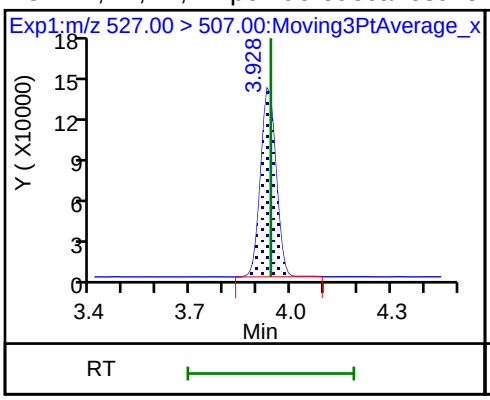
35 Perfluorononanesulfonic acid



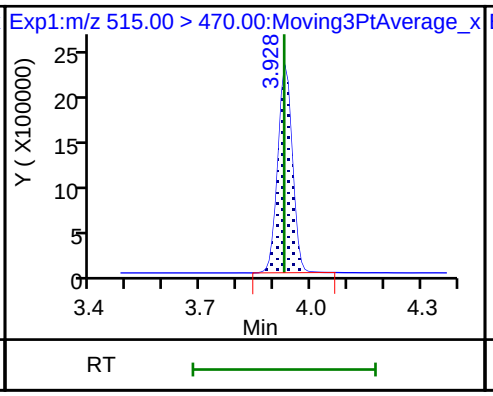
35 Perfluorononanesulfonic acid



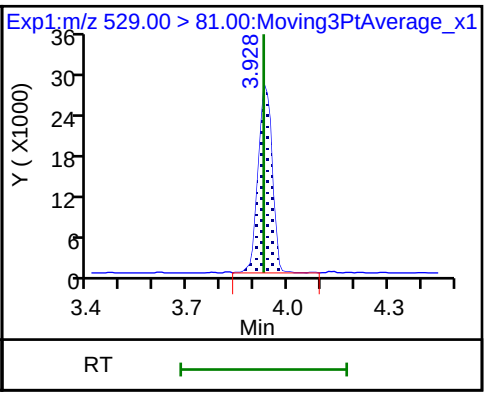
37 1H,1H,2H,2H-perfluorodecanesulfon



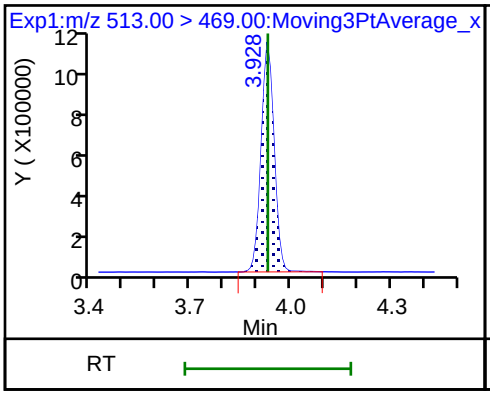
D 36 13C2 PFDA



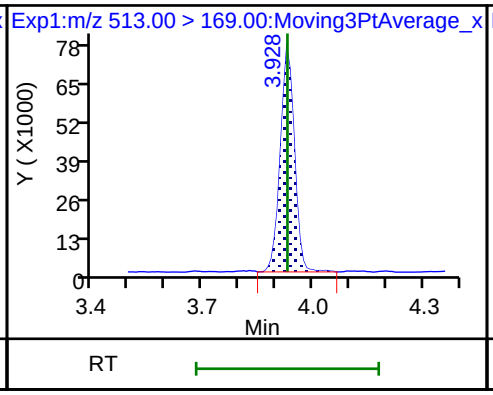
D 39 M2-8:2 FTS



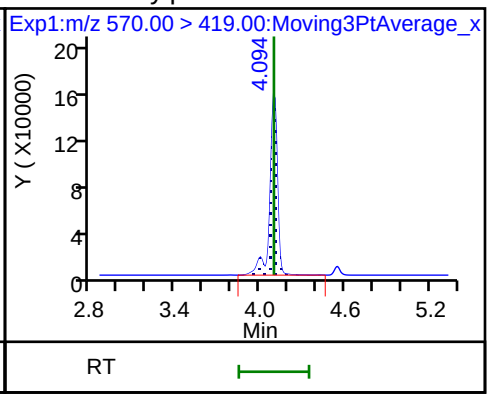
38 Perfluorodecanoic acid



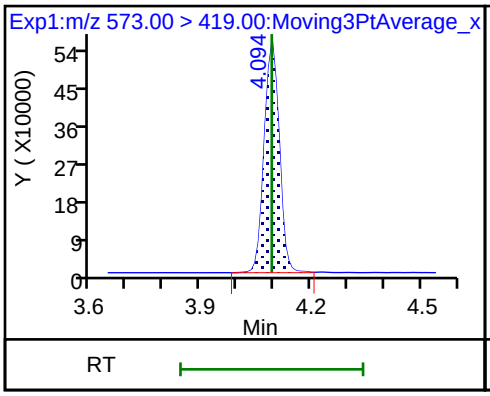
38 Perfluorodecanoic acid



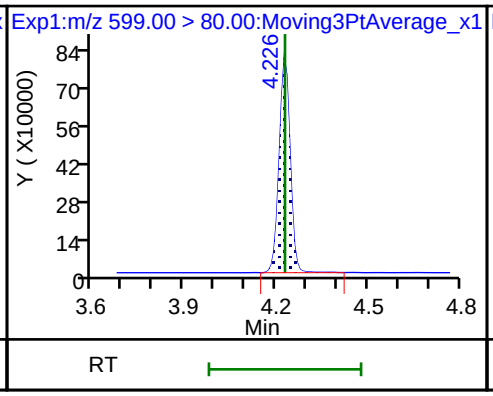
41 N-methylperfluorooctanesulfonamido



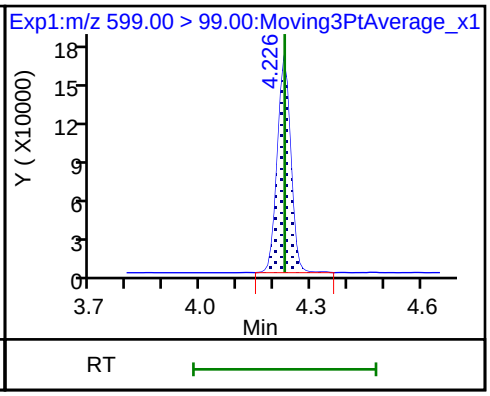
D 40 d3-NMeFOSAA



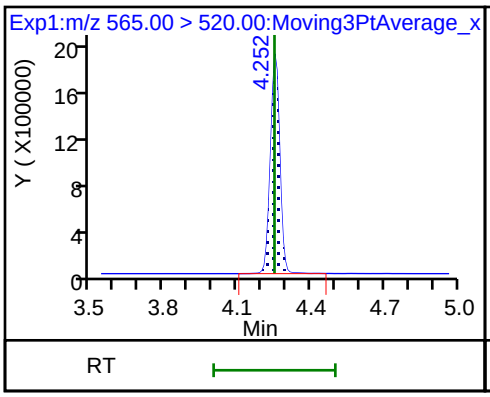
42 Perfluorodecanesulfonic acid



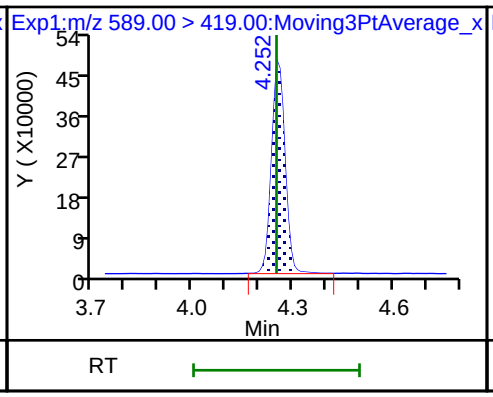
42 Perfluorodecanesulfonic acid



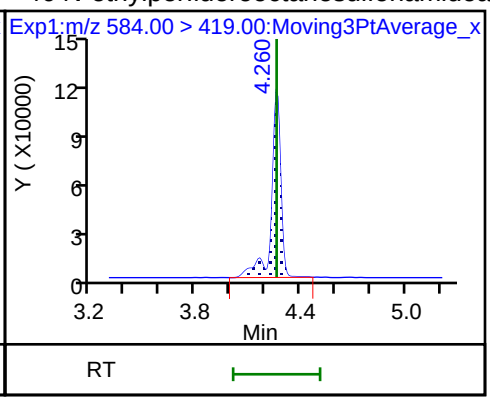
D 44 13C2 PFUnA



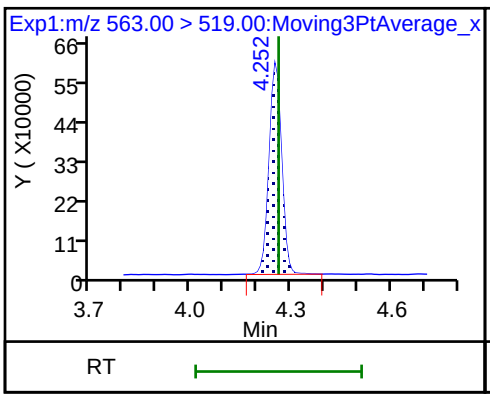
D 45 d5-NEtFOSAA



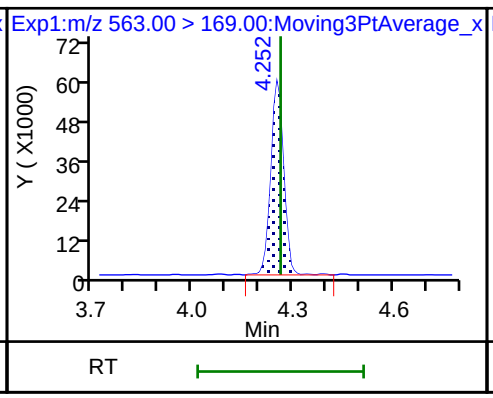
46 N-ethylperfluorooctanesulfonamidoa



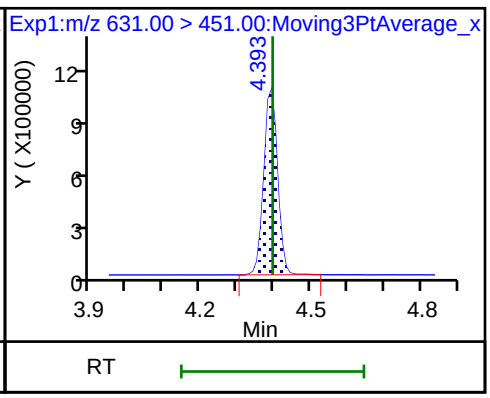
43 Perfluoroundecanoic acid



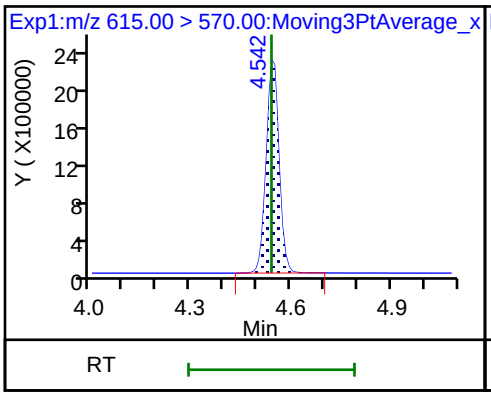
43 Perfluoroundecanoic acid



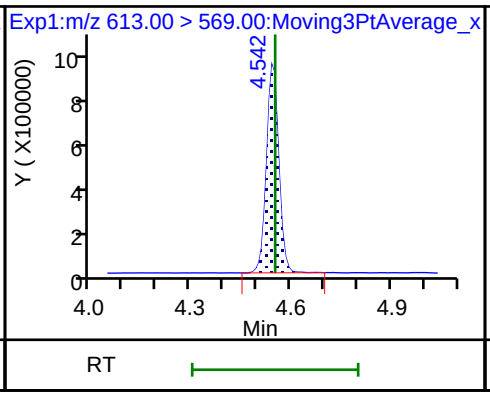
48 11-Chloroeicosafluoro-3-oxaundecan



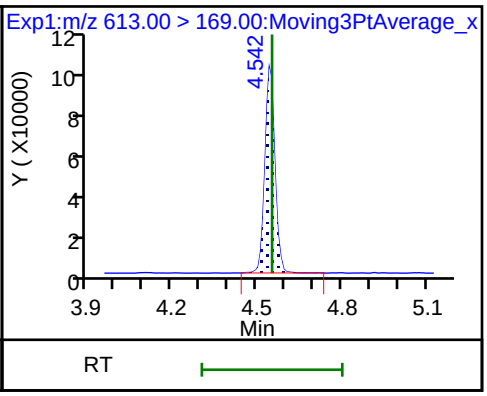
D 49 13C2 PFDoA



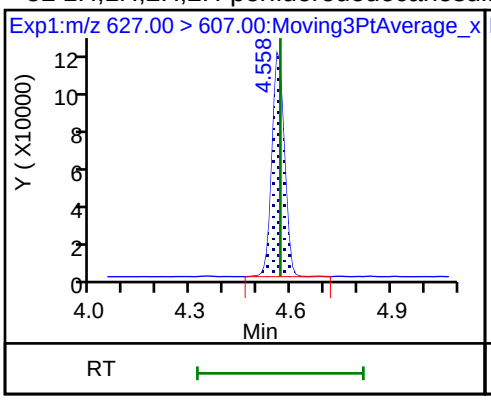
50 Perfluorododecanoic acid



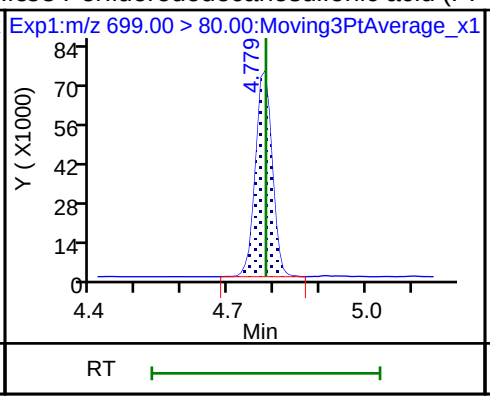
50 Perfluorododecanoic acid



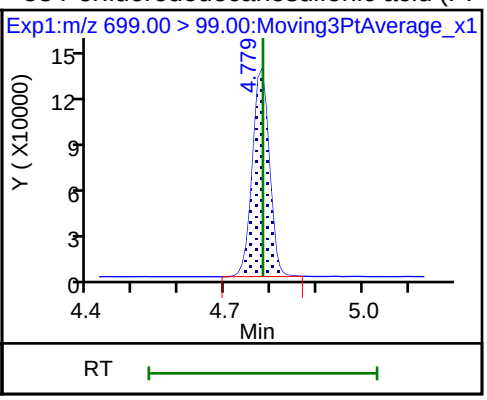
52 1H,1H,2H-perfluorododecanesulfo



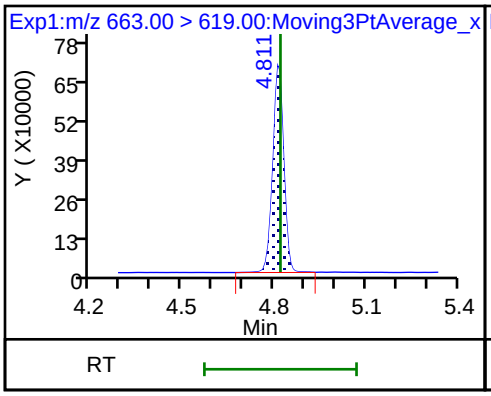
53 Perfluorododecanesulfonic acid (PF



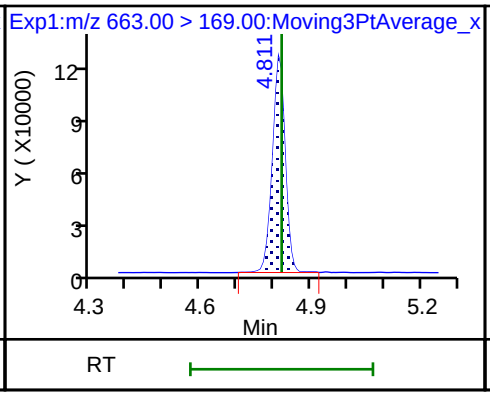
53 Perfluorododecanesulfonic acid (PF



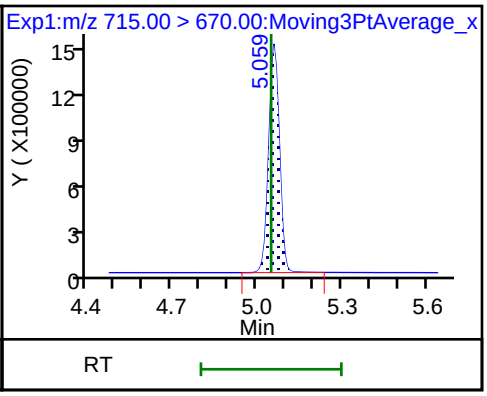
54 Perfluorotridecanoic acid



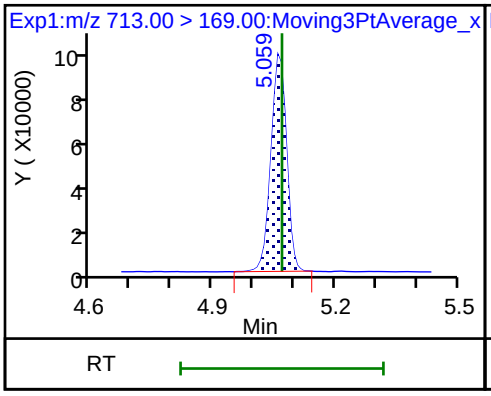
54 Perfluorotridecanoic acid



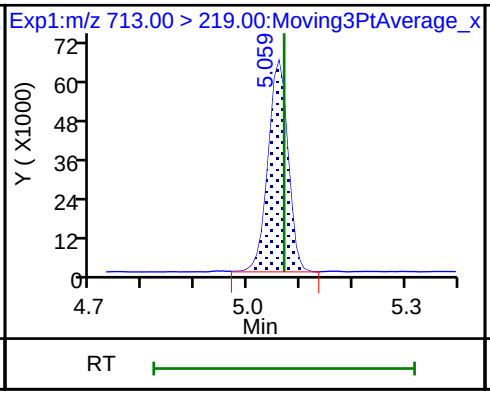
D 55 13C2 PFTeDA



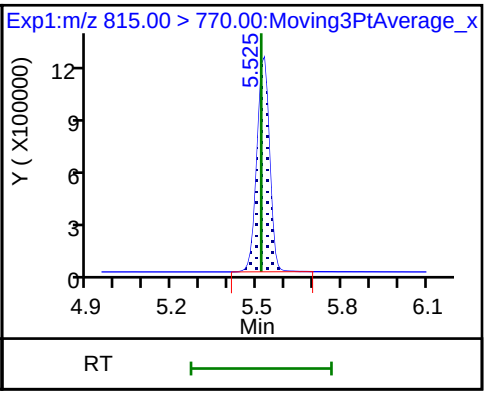
56 Perfluorotetradecanoic acid



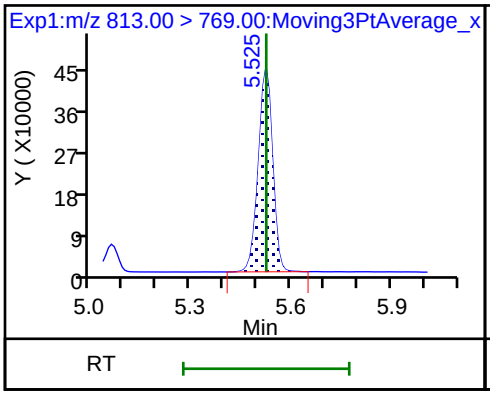
56 Perfluorotetradecanoic acid



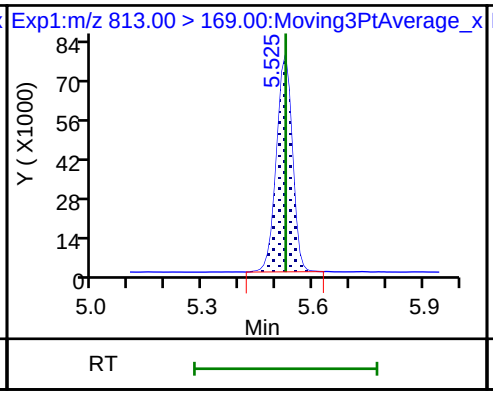
D 57 13C2 PFHxDA



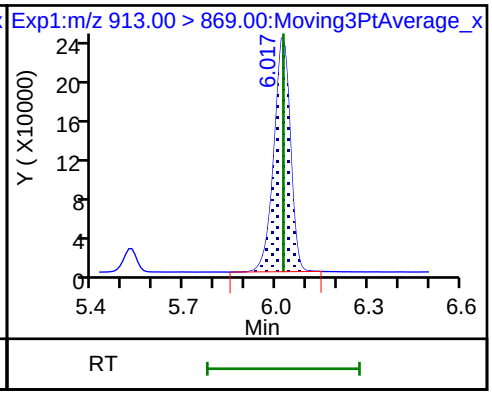
58 Perfluorohexadecanoic acid



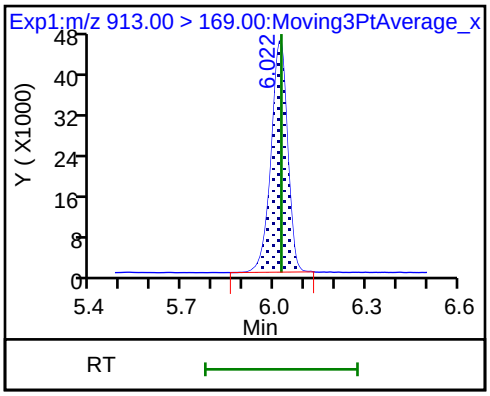
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-269672/1 Calibration Date: 01/08/2019 22:33

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_030.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.8976		2.42	2.50	-3.0	40.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	0.9703		2.43	2.50	-3.0	40.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	0.9624		2.20	2.21	-0.3	50.0
4:2 FTS	AveID	0.1480	0.1362		2.15	2.34	-7.9	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.8077		2.33	2.50	-6.7	40.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.4819		2.41	2.35	2.8	50.0
HFPO-DA (GenX)	AveID	2.144	1.839		2.14	2.50	-14.2	40.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	0.9794		2.35	2.50	-5.9	40.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.195		2.20	2.28	-3.4	40.0
DONA	AveID	2.306	2.221		2.27	2.36	-3.7	50.0
6:2 FTS	AveID	2.112	2.164		2.43	2.37	2.5	40.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.089		2.46	2.38	3.3	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	0.9741		2.35	2.50	-6.0	40.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	1.012		2.23	2.32	-4.0	40.0
Perfluorononanoic acid (PFNA)	AveID	0.995	0.9480		2.38	2.50	-4.8	40.0
F-53B Major	AveID	0.9553	0.9332		2.28	2.33	-2.3	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	2.931		2.52	2.50	0.8	40.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.6041		2.48	2.40	3.3	50.0
8:2 FTS	AveID	14.20	12.74		2.15	2.40	-10.3	40.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.128		2.46	2.50	-1.8	40.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.8499		2.45	2.50	-1.9	40.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.8636		2.38	2.41	-1.2	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.7880		2.36	2.50	-5.5	40.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.7798		2.36	2.50	-5.8	40.0
F-53B Minor	AveID	1.128	1.154		2.41	2.36	2.3	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	0.9111		2.37	2.50	-5.1	40.0
10:2 FTS	AveID	8.852	8.324		2.27	2.41	-6.0	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0838		2.23	2.42	-7.8	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.7569		2.49	2.50	-0.3	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1501		2.30	2.50	-8.1	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.8782		2.47	2.50	-1.4	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-269672/1 Calibration Date: 01/08/2019 22:33

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_030.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.6185		2.51	2.50	0.2	50.0
13C4 PFBA	Ave	0.9546	0.9571		2.51	2.50	0.3	50.0
13C5 PFPeA	Ave	0.8350	0.8017		2.40	2.50	-4.0	50.0
13C3 PFBS	Ave	1.371	1.344		2.28	2.33	-2.0	50.0
M2-4:2 FTS	Ave	0.0836	0.0729		2.04	2.34	-12.8	50.0
13C2 PFHxA	Ave	0.9280	0.9611		2.59	2.50	3.6	50.0
13C3 HFPO-DA	Ave	0.0833	0.0851		2.55	2.50	2.2	50.0
13C4 PFHpA	Ave	1.141	1.143		2.50	2.50	0.1	50.0
18O2 PFHxS	Ave	0.8068	0.8006		2.35	2.37	-0.8	50.0
M2-6:2 FTS	Ave	0.1125	0.1033		2.18	2.38	-8.1	40.0
13C4 PFOA	Ave	0.9896	1.000		2.53	2.50	1.0	50.0
13C8 PFOA	Ave	2363087	2411221		2.50	2.45	2.0	50.0
13C8 PFOS	Ave	500608	498495		2.38	2.39	-0.4	50.0
13C4 PFOS	Ave	0.8235	0.8093		2.35	2.39	-1.7	50.0
13C5 PFNA	Ave	0.8916	0.8431		2.36	2.50	-5.4	50.0
13C8 FOSA	Ave	0.5421	0.5267		2.43	2.50	-2.8	50.0
13C2 PFDA	Ave	0.8721	0.8478		2.43	2.50	-2.8	50.0
M2-8:2 FTS	Ave	0.0129	0.0130		2.40	2.40	0.3	40.0
d3-NMeFOSAA	Ave	0.2285	0.2263		2.48	2.50	-1.0	50.0
13C2 PFUnA	Ave	0.6858	0.6759		2.46	2.50	-1.4	50.0
d5-NEtFOSAA	Ave	0.1905	0.2015		2.65	2.50	5.8	50.0
13C2 PFDoA	Ave	0.8313	0.7914		2.38	2.50	-4.8	50.0
13C2 PFTeDA	Ave	0.5763	0.5636		2.45	2.50	-2.2	50.0
13C2 PFHxDA	Ave	0.5385	0.5239		2.43	2.50	-2.7	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_030.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 08-Jan-2019 22:33:55 ALS Bottle#: 14 Worklist Smp#: 1
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub7

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 12:36:23 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0329

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:41:11
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.684	1.679	0.005	0.528	6686476	2.51		100	7217	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.684	1.684	0.0	1.000	6001475	2.42		97.0	363	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.020	2.020	0.0	1.000	5435109	2.43		97.0	271	
D 3 13C5 PFPeA										
267.90 > 223.00	2.020	2.022	-0.002	0.633	5601224	2.40		96.0	3443	
D 5 13C3 PFBS										
301.90 > 80.00	2.052	2.054	-0.002	0.643	8729497	2.28		98.0	2732013	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.052	2.052	0.0	1.000	7985284	2.20	Target=2.70	99.7	3599	
298.90 > 99.00	2.052	2.052	0.0	1.000	2800027		2.85(1.35-4.05)		1680	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.346	2.346	0.0	1.144	1194069	2.15		92.1	1788	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.346	2.346	0.0	0.736	475728	2.04		87.2	717	
D 9 13C2 PFHxA										
315.00 > 270.00	2.392	2.383	0.009	0.750	6714608	2.59		104	3977	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.392	2.392	0.0	1.000	5423557	2.33	Target=13.92	93.3	1123	
313.00 > 119.00	2.392	2.392	0.0	1.000	396400		13.68(6.96-20.87)		842	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.401	2.401	0.0	1.171	4242803	2.41	Target=2.30	103	2309	
349.00 > 99.00	2.401	2.401	0.0	1.171	1912652		2.22(1.15-3.45)		1628	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.498	2.508	-0.010	0.783	594365	2.55		102	1430	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.508	2.508	0.0	1.004	1092958	2.14		85.8	605	
D 16 13C4 PFHpA										
367.00 > 322.00	2.782	2.782	0.0	0.872	7985372	2.50		100	3302	
D 17 18O2 PFHxS										
403.00 > 84.00	2.791	2.782	0.009	0.875	5291342	2.35		99.2	2705	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.782	2.782	0.0	1.000	7820925	2.35	Target=4.34	94.1	1412	
363.00 > 169.00	2.782	2.782	0.0	1.000	1734507		4.51(2.17-6.52)		2038	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.791	2.791	0.0	1.000	6082760	2.20	Target=3.80	96.6	10417	
399.00 > 99.00	2.791	2.791	0.0	1.000	1630071		3.73(1.90-5.70)		1137	
19 DONA										
377.00 > 251.00	2.836	2.836	0.0	0.797	11830386	2.27	Target=2.26	96.3	3396	
377.00 > 85.00	2.827	2.836	-0.009	0.794	5347075		2.21(1.13-3.39)		2266	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.165	3.165	0.0	1.000	1480332	2.43		102	1095	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.165	3.165	0.0	0.993	685665	2.18		91.9	1223	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.180	3.180	0.0	0.893	5864212	2.46	Target=3.69	103	2983	
449.00 > 99.00	3.180	3.180	0.0	0.893	1451195		4.04(1.84-5.53)		2237	
* 24 13C2 PFOA										
415.00 > 370.00	3.188	3.188	0.0		6986478	2.50			2576	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.188	3.188	0.0	1.002	6803635	2.35	Target=2.72	94.0	957	
413.00 > 169.00	3.188	3.188	0.0	1.002	2536862		2.68(1.36-4.08)		1829	
D 22 13C8 PFOA										
421.00 > 376.00	3.180	3.180	0.0		5901463	2.50		102	3457	
D 25 13C4 PFOA										
417.00 > 372.00	3.180	3.180	0.0	0.998	6984580	2.53		101	2554	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.559	3.559	0.0	1.000	5309355	2.23	Target=4.08	96.0	3545	
499.00 > 99.00	3.559	3.559	0.0	1.000	1251141		4.24(2.04-6.12)		2333	
D 28 13C4 PFOS										
503.00 > 80.00	3.559	3.552	0.007	1.116	5405191	2.35		98.3	3119	
D 27 13C8 PFOS										
507.00 > 99.00	3.552	3.552	0.0		1191402	2.38		99.6	1961	
30 Perfluorononanoic acid										
463.00 > 419.00	3.574	3.574	0.0	1.002	5584009	2.38	Target=5.35	95.2	793	
463.00 > 169.00	3.574	3.574	0.0	1.002	1050480		5.32(2.68-8.03)		1557	
D 31 13C5 PFNA										
468.00 > 423.00	3.567	3.567	0.0	1.119	5890465	2.36		94.6	2040	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.762	3.762	0.0	1.057	4917545	2.28		97.7	2442	
D 33 13C8 FOSA										
506.00 > 78.00	3.892	3.885	0.007	1.221	3679933	2.43		97.2	3797	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.892	3.892	0.0	1.000	10785063	2.52		101	2694	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.901	3.901	0.0	1.096	3278694	2.48	Target=6.03	103	3157	
549.00 > 99.00	3.901	3.901	0.0	1.096	525322		6.24(3.02-9.05)		1701	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.927	3.927	0.0	1.232	86706	2.40		100	387	
D 36 13C2 PFDA										
515.00 > 470.00	3.927	3.927	0.0	1.232	5922819	2.43		97.2	3394	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.927	3.927	0.0	1.000	1104357	2.15		89.7	1958	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.927	3.927	0.0	1.000	6682629	2.46	Target=14.23	98.2	2433	
513.00 > 169.00	3.927	3.927	0.0	1.000	452498		14.77(7.12-21.35)		728	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.093	4.093	0.0	1.284	1581016	2.48		99.0	2115	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.093	4.093	0.0	1.000	1343726	2.45		98.1	271	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.224	4.224	0.0	1.187	4707140	2.38	Target=4.28	98.8	3680	
599.00 > 99.00	4.224	4.224	0.0	1.187	1022924		4.60(2.14-6.43)		1782	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.259	4.250	0.009	1.336	1408024	2.65		106	1409	
D 44 13C2 PFUnA										
565.00 > 520.00	4.250	4.250	0.0	1.333	4722017	2.46		98.6	3632	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.000	3720880	2.36	Target=10.48	94.5	983	
563.00 > 169.00	4.250	4.250	0.0	1.000	361430		10.29(5.24-15.72)		905	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.259	4.259	0.0	1.000	1097914	2.35		94.2	3920	
48 11-Chloroeicosafluoro-3-oxaundecan										a
631.00 > 451.00	4.391	4.391	0.0	1.233	6147937	2.41		102	2852	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.542	4.542	0.0	1.000	5037721	2.37	Target=9.37	94.9	1570	
613.00 > 169.00	4.542	4.542	0.0	1.000	543599		9.27(4.68-14.05)		1215	
D 49 13C2 PFDoA										
615.00 > 570.00	4.542	4.541	0.001	1.424	5529011	2.38		95.2	4163	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.557	4.557	0.0	1.161	726227	2.27		94.0	1879	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.779	4.779	0.0	1.342	458474	2.23	Target=0.55	92.2	2541	
699.00 > 99.00	4.779	4.779	0.0	1.342	860678		0.53(0.28-0.83)		2610	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.810	4.810	0.0	1.059	4184715	2.49	Target=6.18	99.7	1859	
663.00 > 169.00	4.810	4.810	0.0	1.059	689735		6.07(3.09-9.27)		1858	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.058	5.049	0.009	1.586	3937554	2.45		97.8	3175	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.058	5.058	0.0	1.000	590932	2.30	Target=1.39	91.9	1906	
713.00 > 219.00	5.049	5.058	-0.009	0.998	414367		1.43(0.70-2.09)		1253	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.514	5.514	0.0	1.000	3214463	2.47	Target=5.55	98.6	310	
813.00 > 169.00	5.514	5.514	0.0	1.000	569696		5.64(2.77-8.32)		1663	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.514	5.514	0.0	1.730	3660216	2.43		97.3	4144	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	6.002	6.002	0.0	1.089	2263881	2.50	Target=5.09	100	547	
913.00 > 169.00	5.996	6.002	-0.006	1.087	424679		5.33(2.55-7.64)		1266	

QC Flag Legend

Review Flags

a - User Assigned ID

Reagents:

LCPFC_LL5_00010 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 12:36:25 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_030.d

Injection Date: 08-Jan-2019 22:33:55 Instrument ID: A9

Lims ID: CCV L5

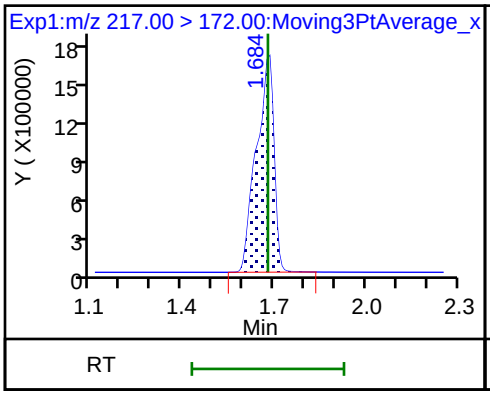
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 14 Worklist Smp#: 1

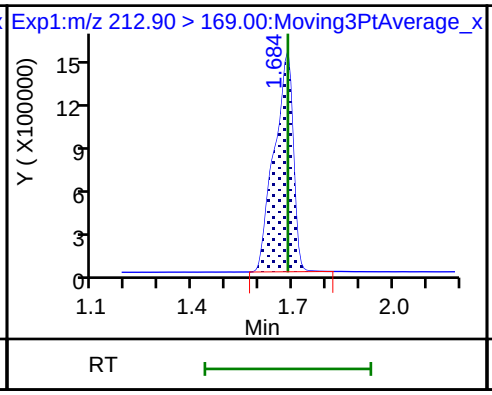
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

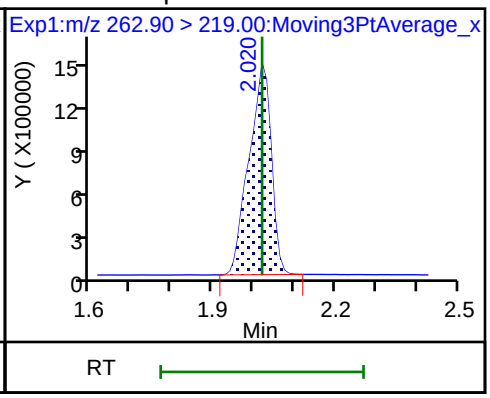
D 1 13C4 PFBA



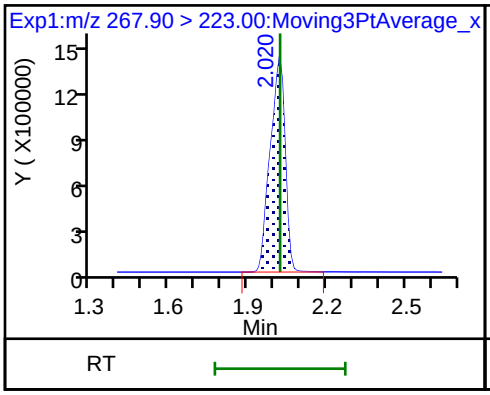
2 Perfluorobutanoic acid



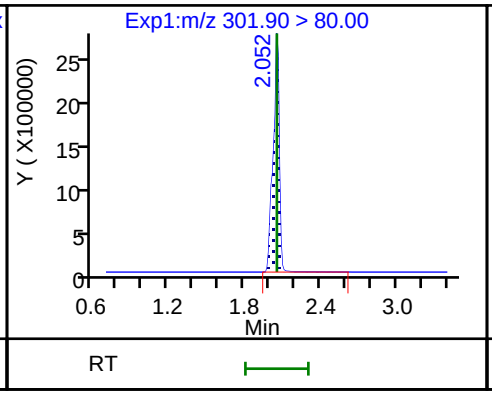
4 Perfluoropentanoic acid



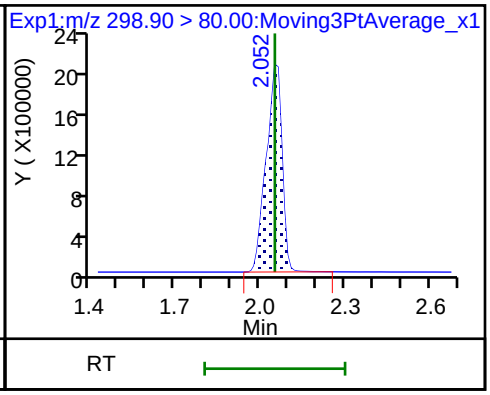
D 3 13C5 PFPeA



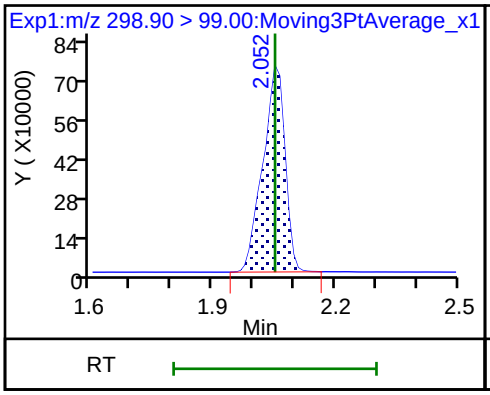
D 5 13C3 PFBS



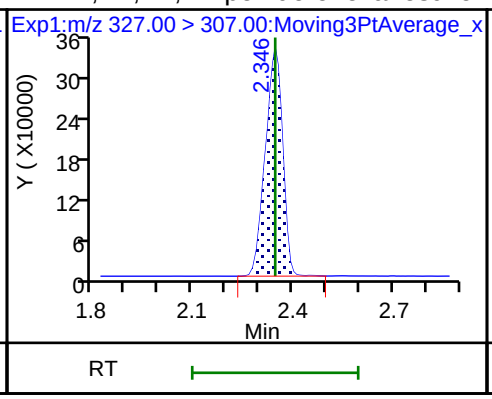
6 Perfluorobutanesulfonic acid



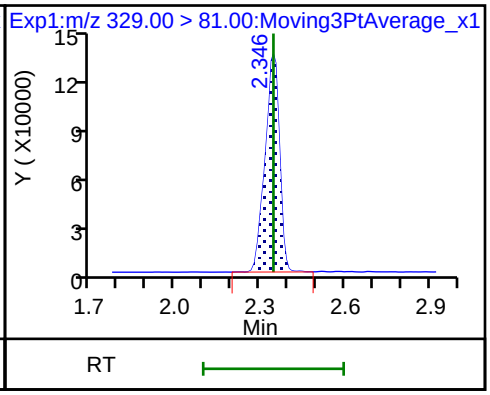
6 Perfluorobutanesulfonic acid



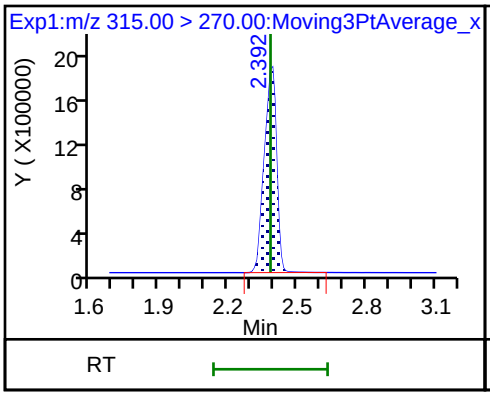
7 1H,1H,2H,2H-perfluorohexanesulfon



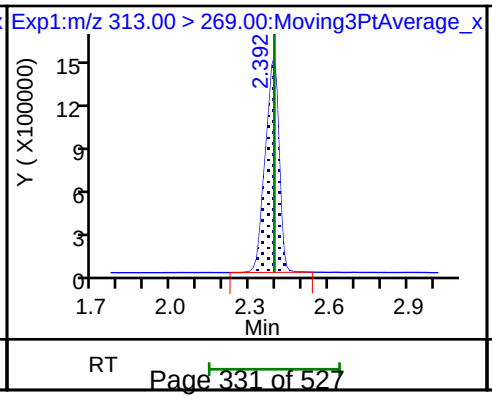
D 8 M2-4:2 FTS



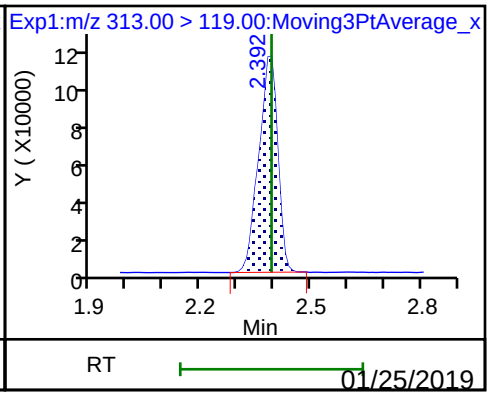
D 9 13C2 PFHxA



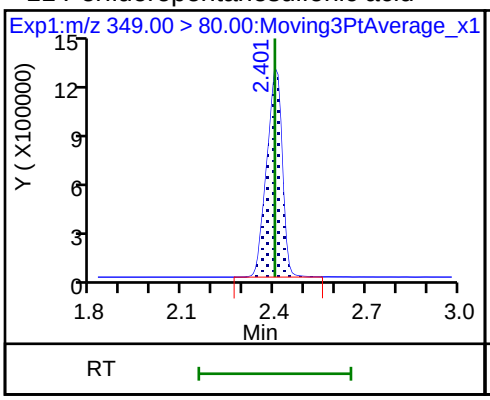
10 Perfluorohexanoic acid



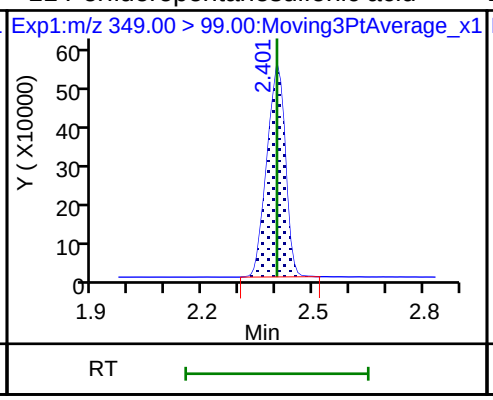
10 Perfluorohexanoic acid



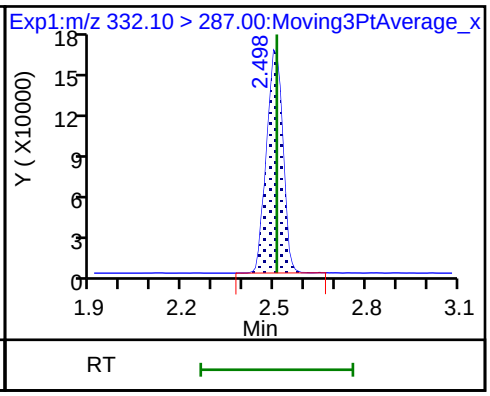
11 Perfluoropentanesulfonic acid



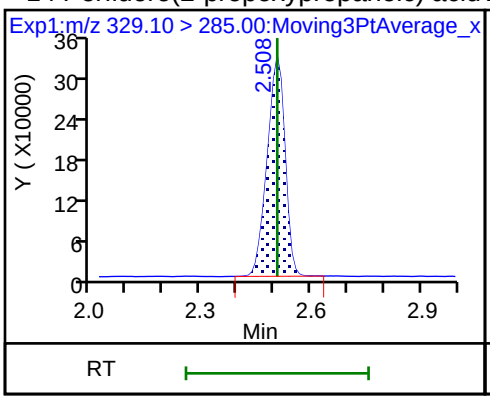
11 Perfluoropentanesulfonic acid



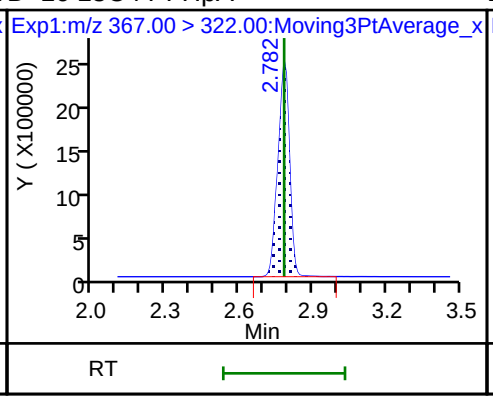
D 13 13C3 HFPO-DA



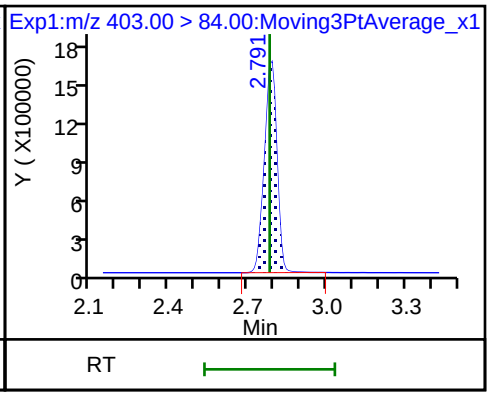
14 Perfluoro(2-propoxypropanoic) acid



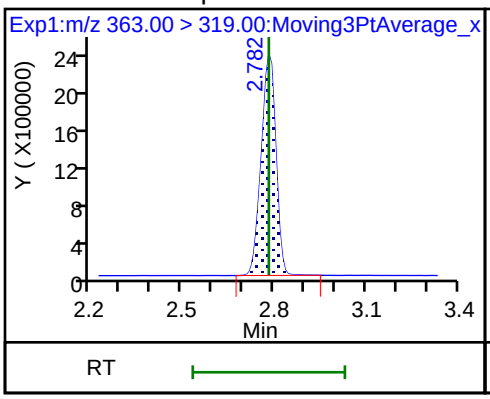
D 16 13C4 PFHpA



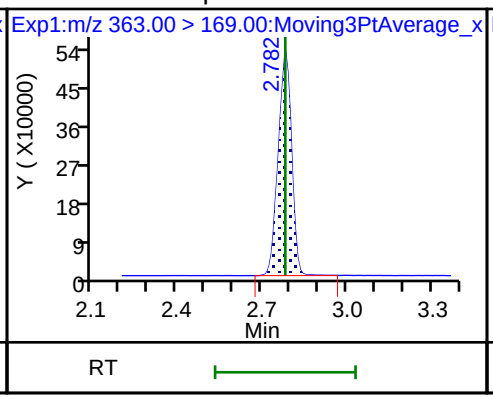
D 17 18O2 PFHxS



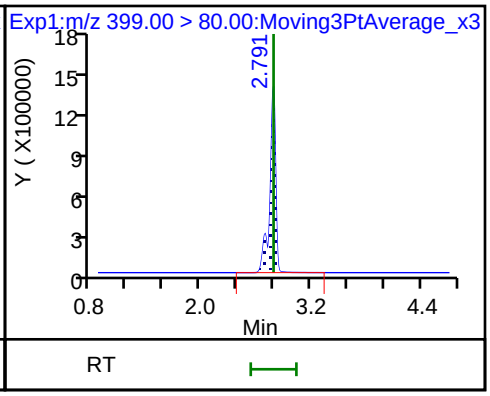
15 Perfluoroheptanoic acid



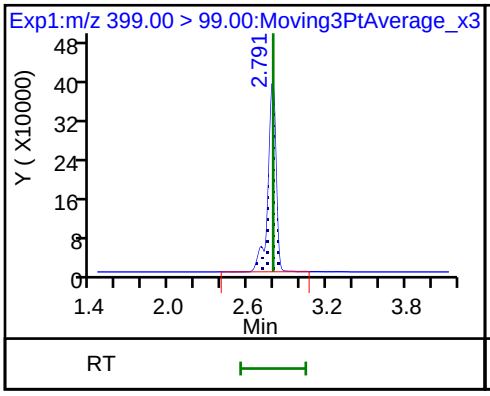
15 Perfluoroheptanoic acid



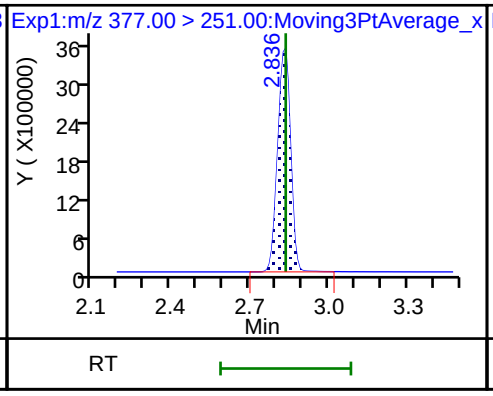
18 Perfluorohexanesulfonic acid



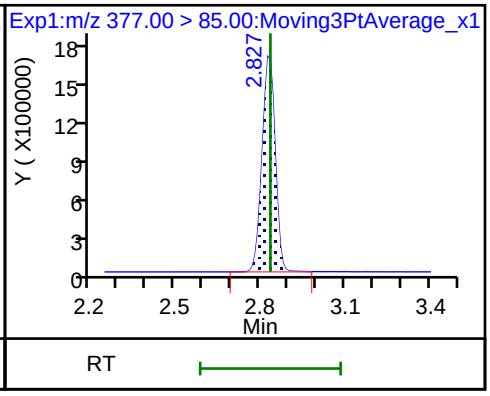
18 Perfluorohexanesulfonic acid



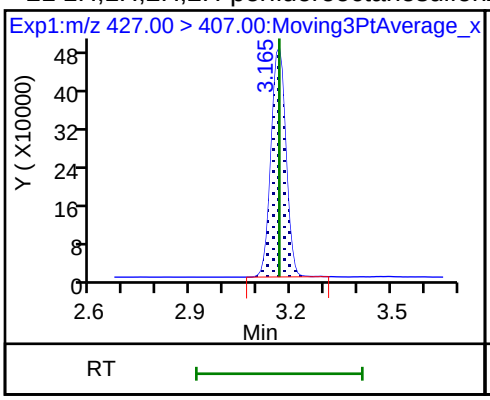
19 DONA



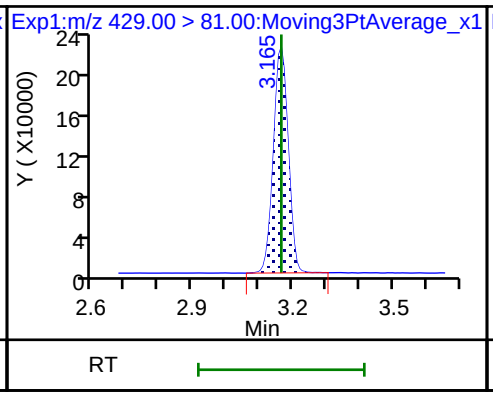
19 DONA



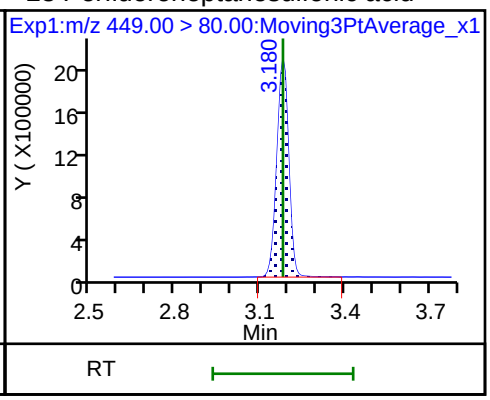
21 1H,1H,2H,2H-perfluorooctanesulfon



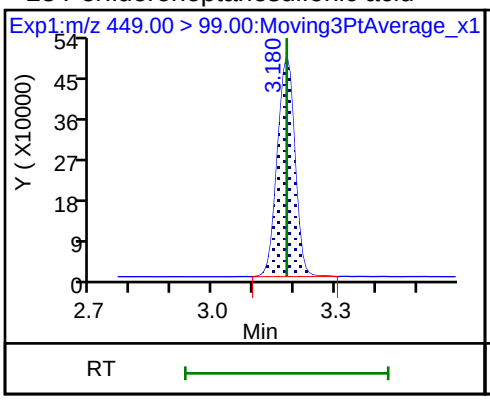
D 20 M2-6:2 FTS



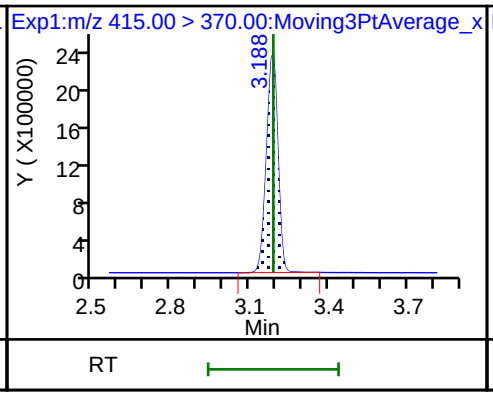
23 Perfluoroheptanesulfonic acid



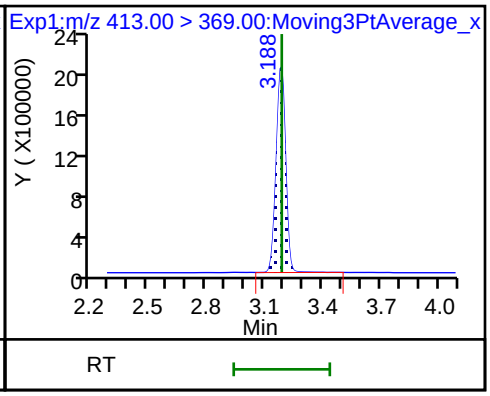
23 Perfluoroheptanesulfonic acid



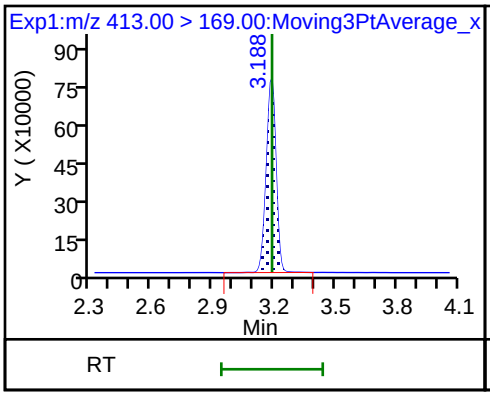
* 24 13C2 PFOA



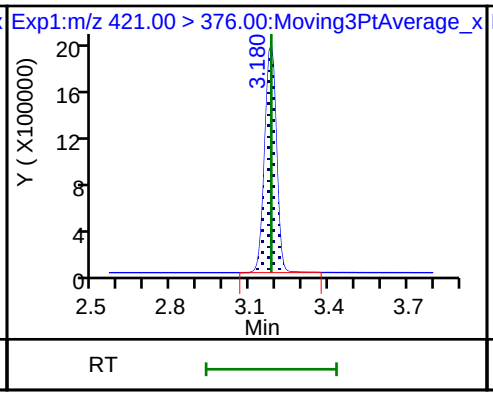
26 Perfluorooctanoic acid



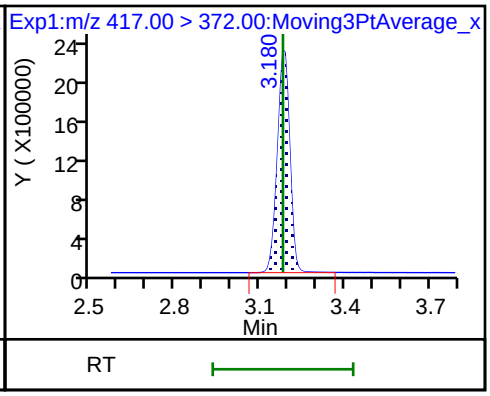
26 Perfluorooctanoic acid



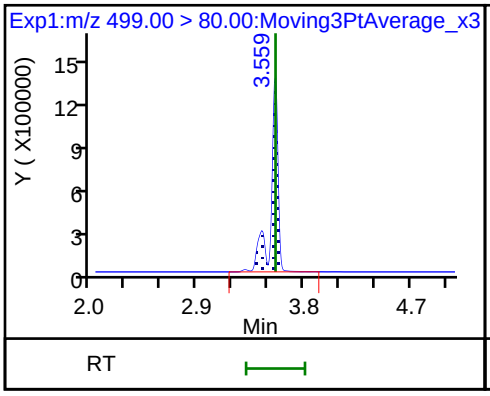
D 22 13C8 PFOA



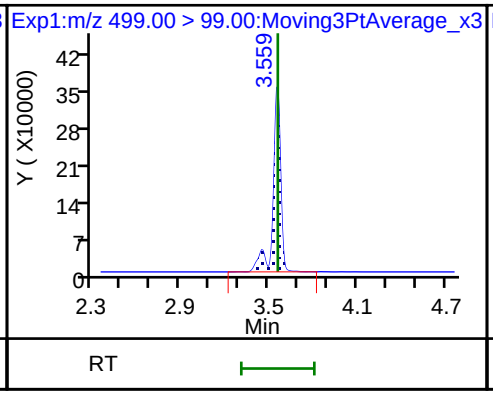
D 25 13C4 PFOA



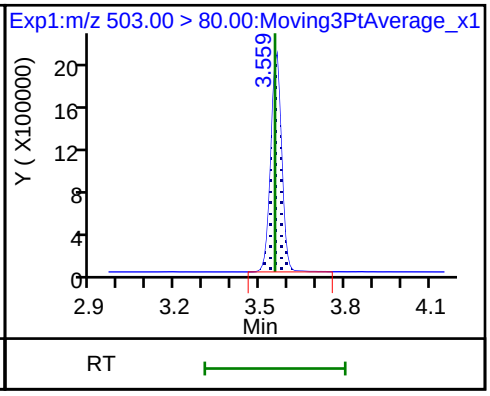
29 Perfluorooctanesulfonic acid



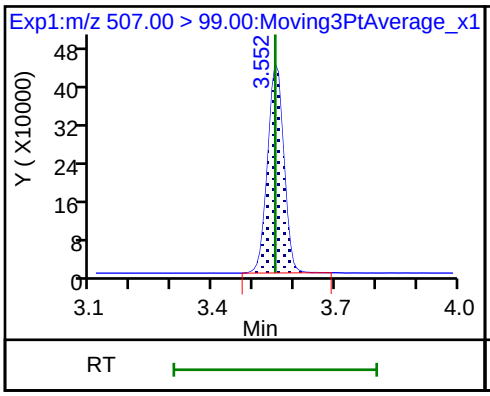
29 Perfluorooctanesulfonic acid



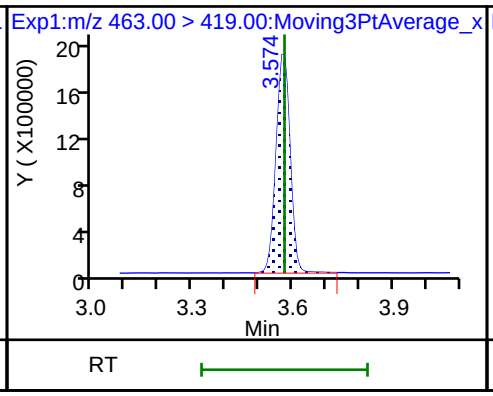
D 28 13C4 PFOS



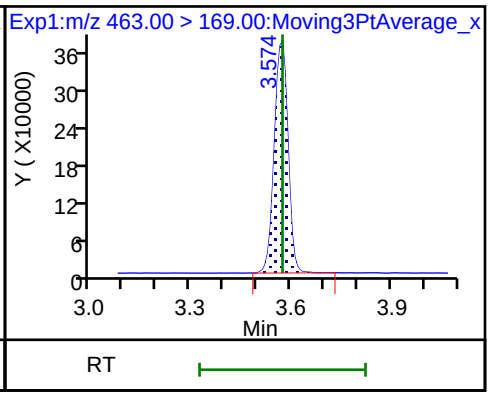
D 27 13C8 PFOS



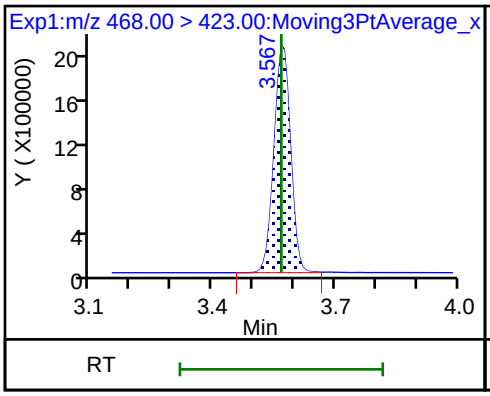
30 Perfluorononanoic acid



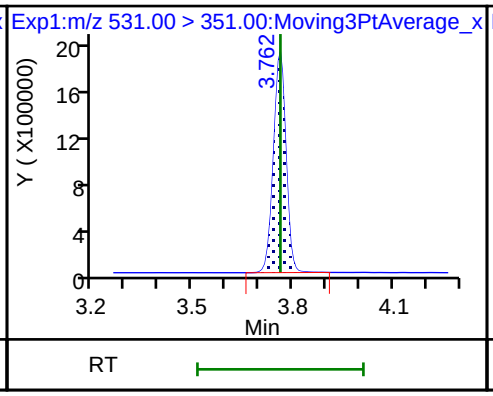
30 Perfluorononanoic acid



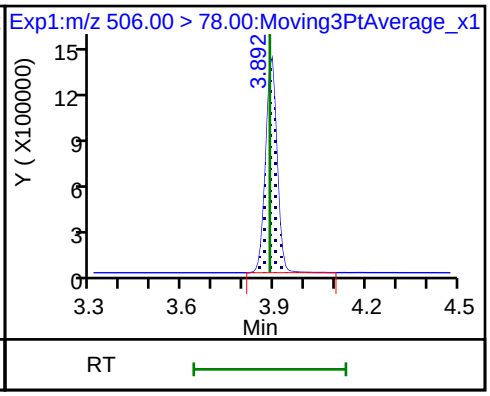
D 31 13C5 PFNA



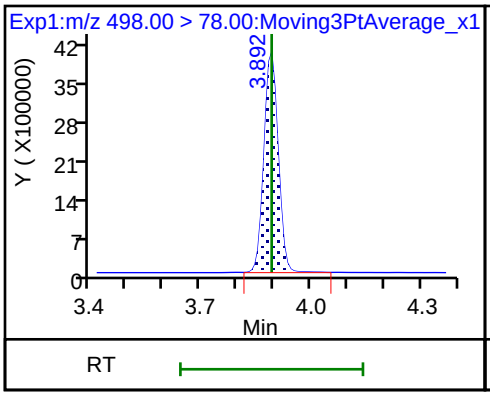
32 9-Chlorohexadecafluoro-3-oxanonane



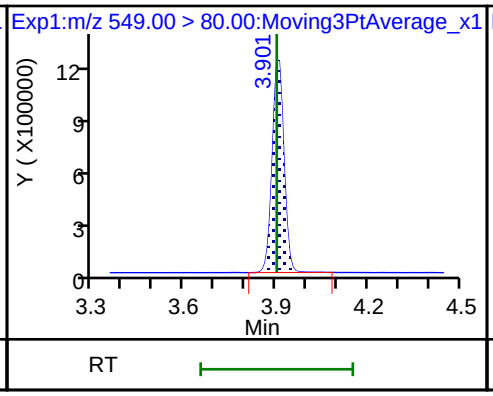
D 33 13C8 FOSA



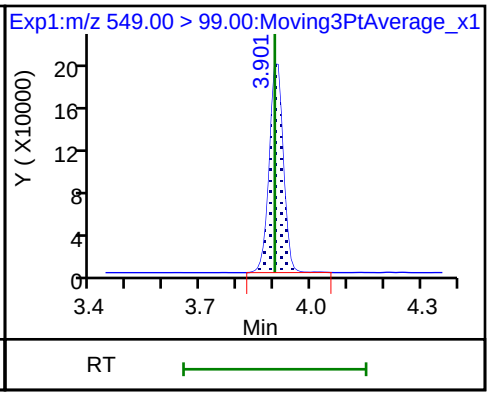
34 Perfluorooctanesulfonamide



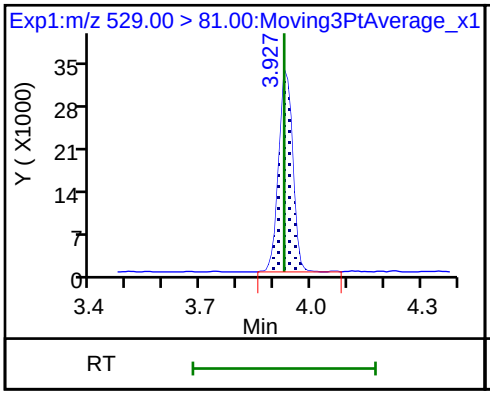
35 Perfluorononanesulfonic acid



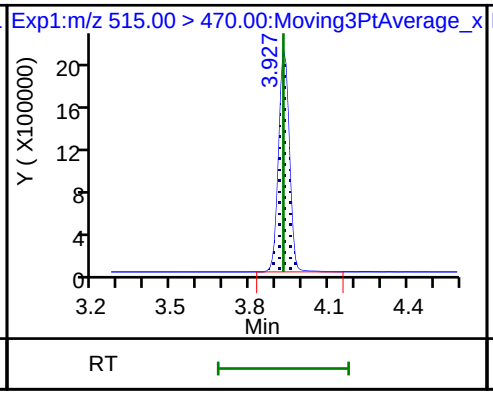
35 Perfluorononanesulfonic acid



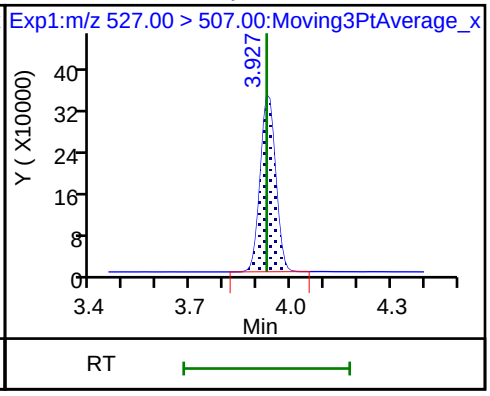
D 39 M2-8:2 FTS



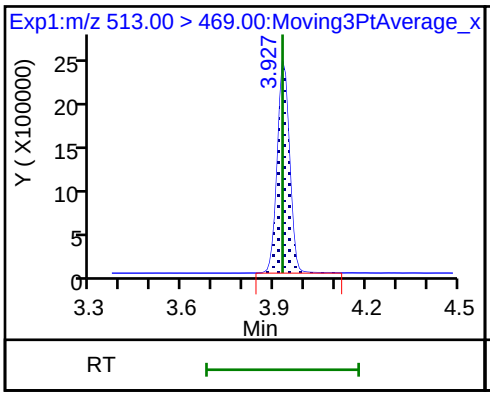
D 36 13C2 PFDA



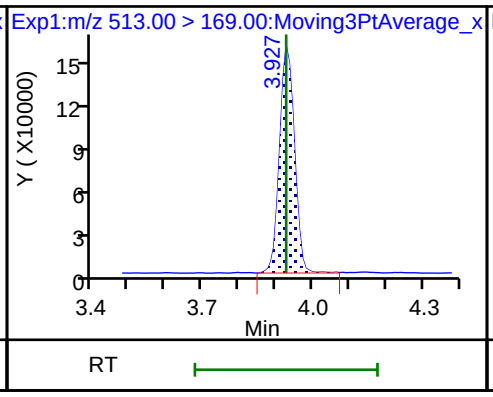
37 1H,1H,2H,2H-perfluorodecanesulfoni



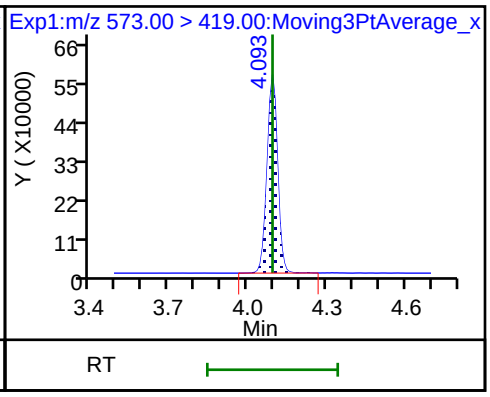
38 Perfluorodecanoic acid



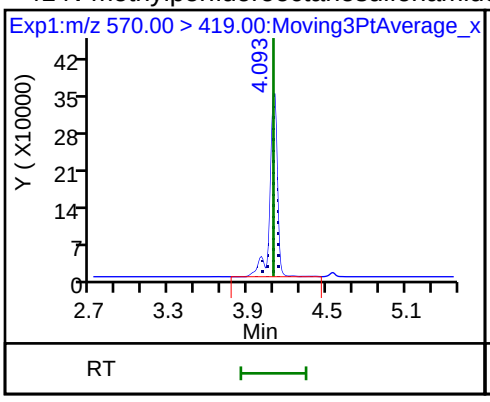
38 Perfluorodecanoic acid



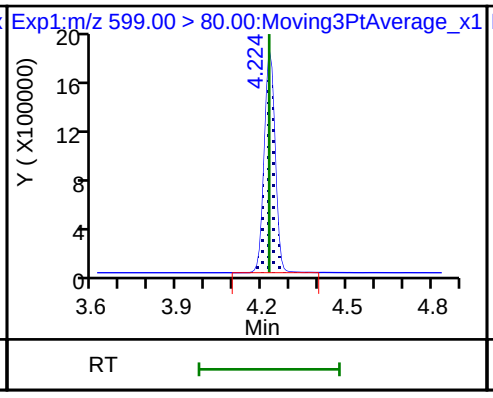
D 40 d3-NMeFOSAA



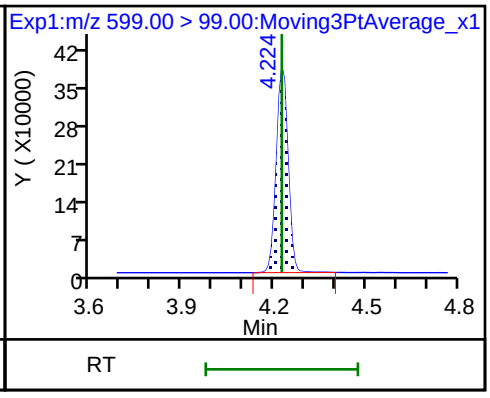
41 N-methylperfluorooctanesulfonamido



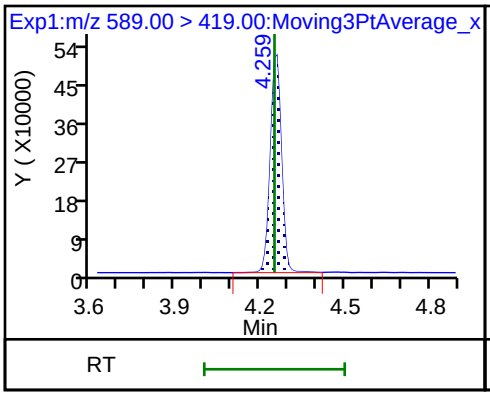
42 Perfluorodecanesulfonic acid



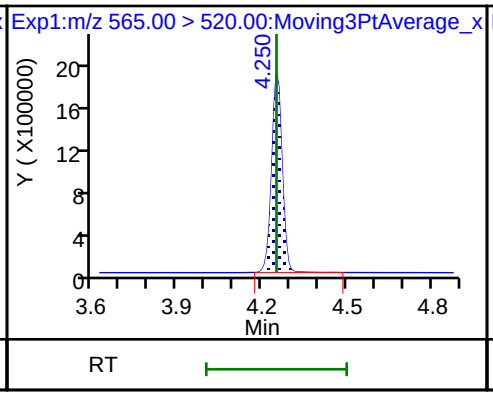
42 Perfluorodecanesulfonic acid



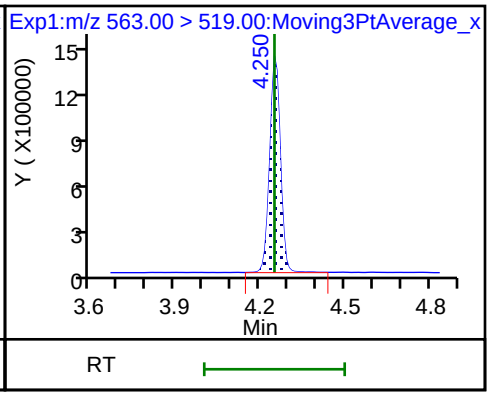
D 45 d5-NEtFOSAA



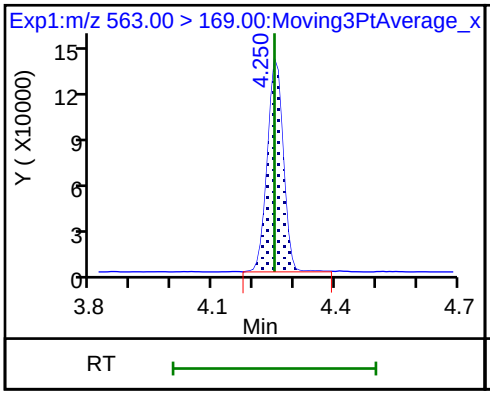
D 44 13C2 PFUnA



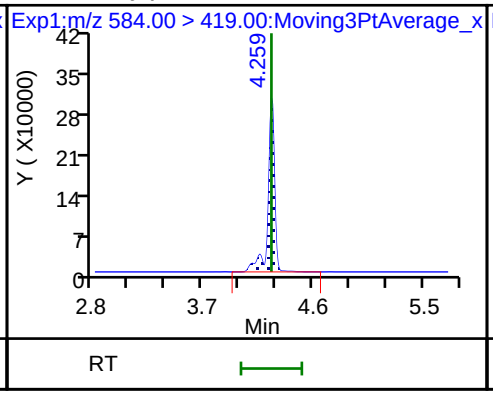
43 Perfluoroundecanoic acid



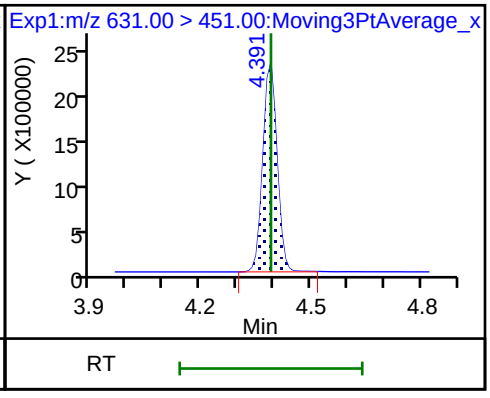
43 Perfluoroundecanoic acid



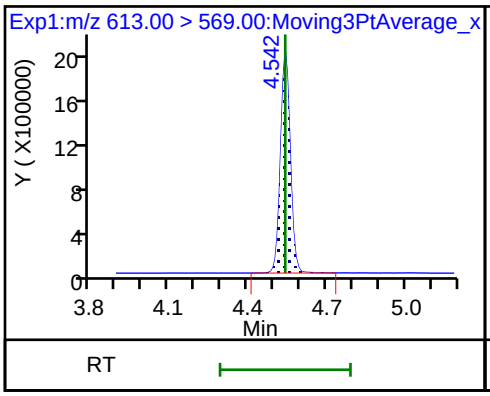
46 N-ethylperfluorooctanesulfonamidoa



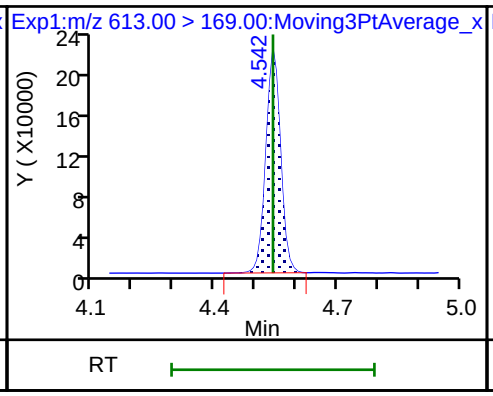
48 11-Chloroeicosafluoro-3-oxaundecan (M)



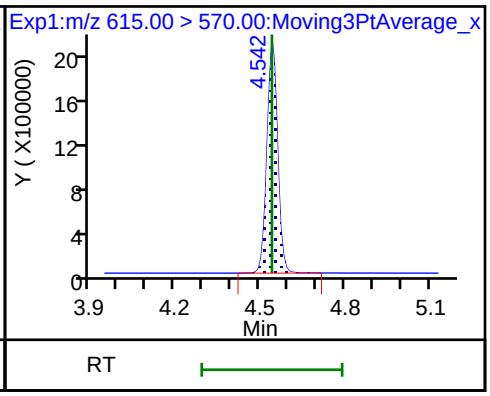
50 Perfluorododecanoic acid



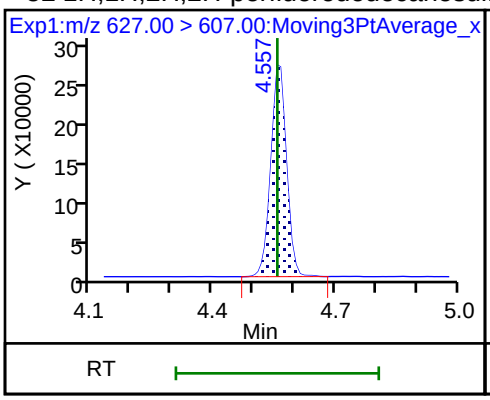
50 Perfluorododecanoic acid



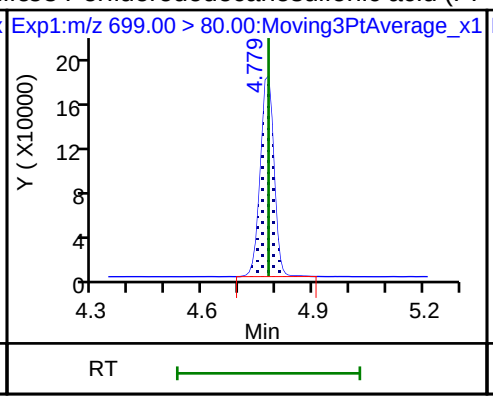
D 49 13C2 PFDoA



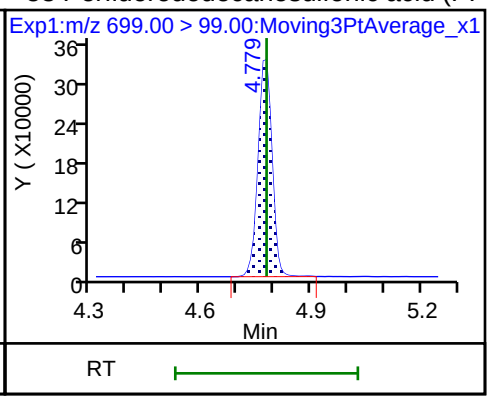
52 1H,1H,2H,2H-perfluorododecanesulfo



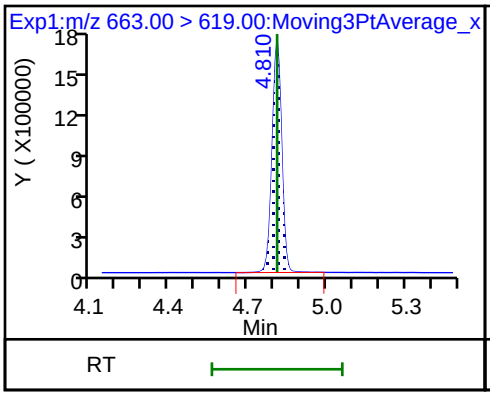
53 Perfluorododecanesulfonic acid (PF



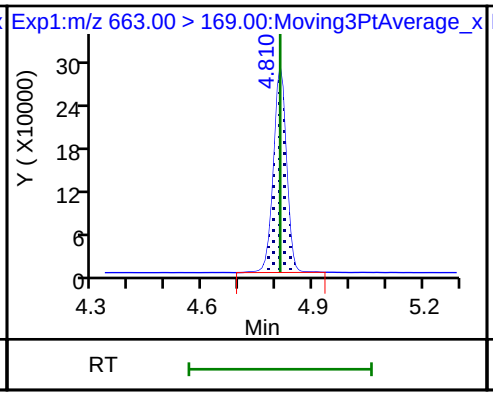
53 Perfluorododecanesulfonic acid (PF



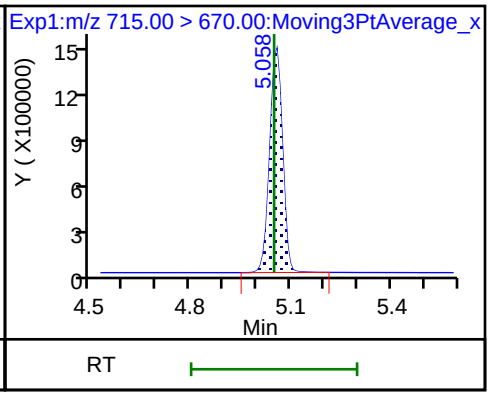
54 Perfluorotridecanoic acid



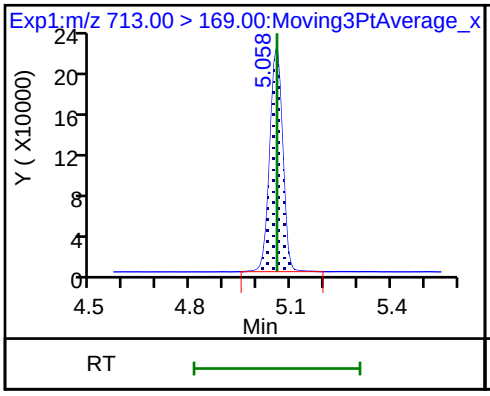
54 Perfluorotridecanoic acid



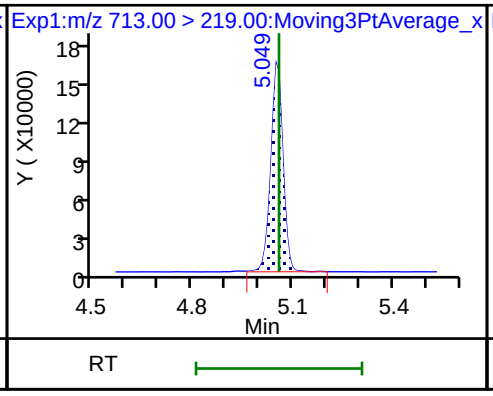
D 55 13C2 PFTeDA



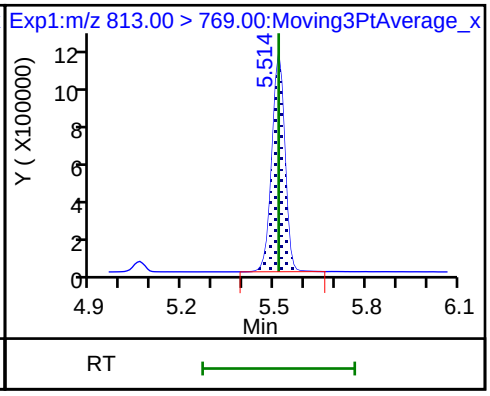
56 Perfluorotetradecanoic acid



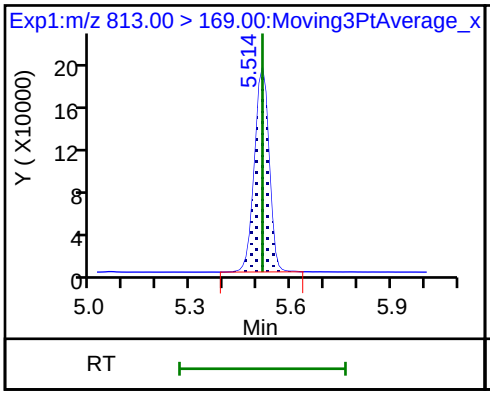
56 Perfluorotetradecanoic acid



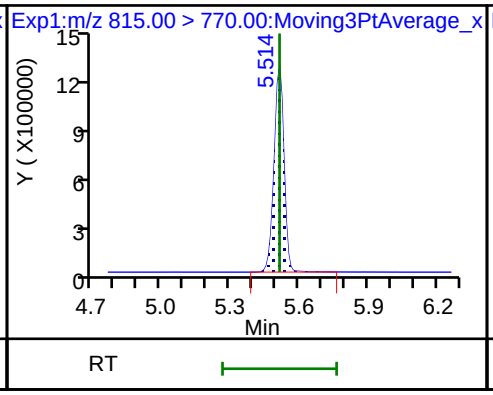
58 Perfluorohexadecanoic acid



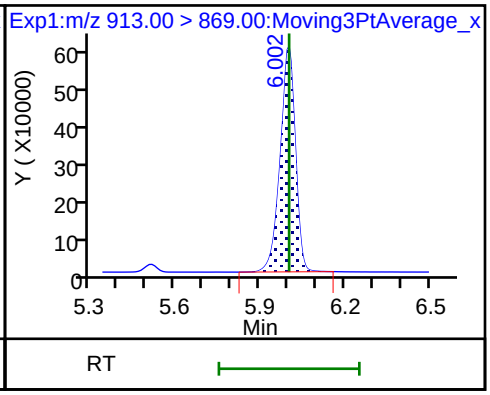
58 Perfluorohexadecanoic acid



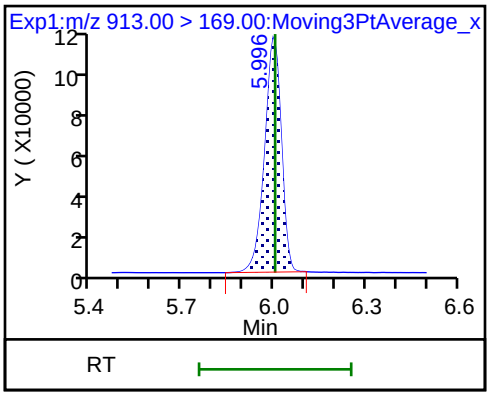
D 57 13C2 PFHxDA



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

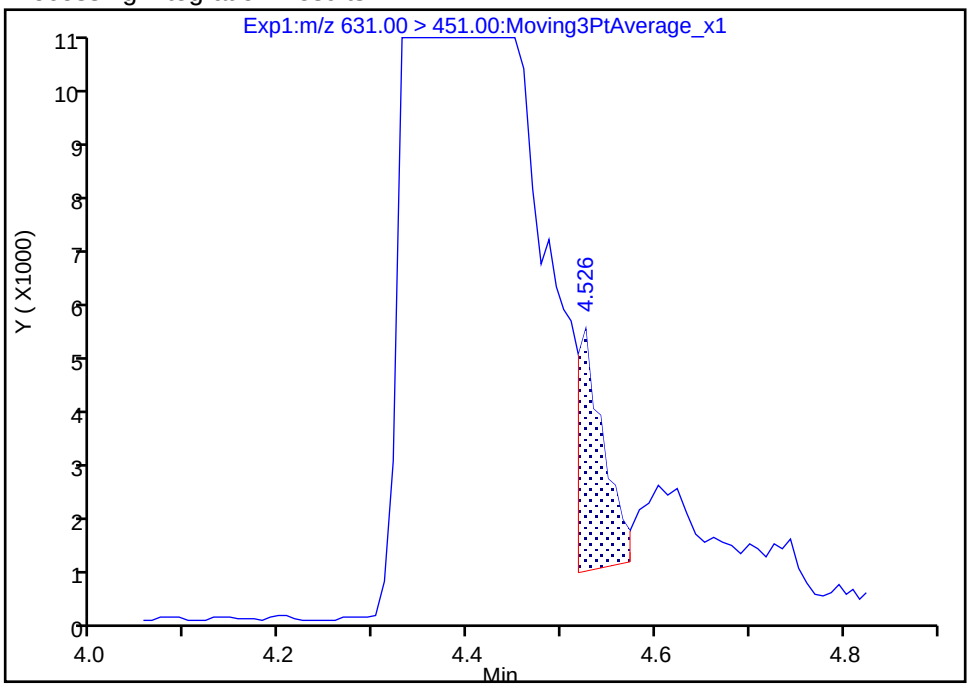
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_030.d
Injection Date: 08-Jan-2019 22:33:55 Instrument ID: A9
Lims ID: CCV L5
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 14 Worklist Smp#: 1
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

48 11-Chloroeicosafluoro-3-oxaundecane-1-sulfon, CAS: 83329-89-9

Signal: 1

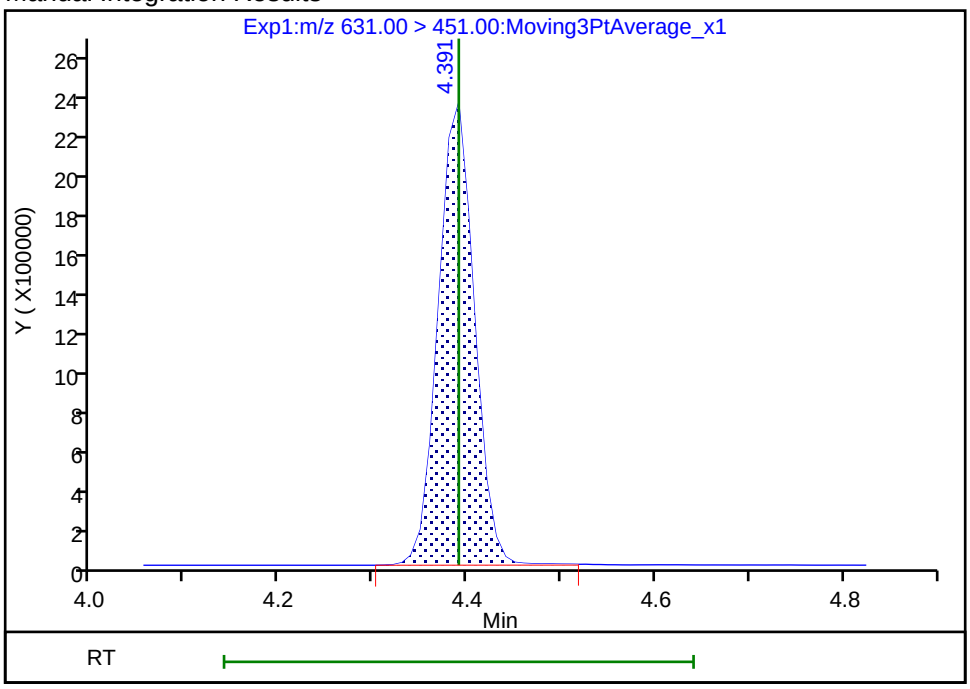
Processing Integration Results

RT: 4.53
Area: 7415
Amount: 0.002907
Amount Units: ng/ml



Manual Integration Results

RT: 4.39
Area: 6147937
Amount: 2.410204
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:41:06
Audit Action: Assigned Compound ID Audit Reason: Peak assignment corrected

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-269672/11 Calibration Date: 01/08/2019 23:49

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_040.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.9228		0.997	1.00	-0.3	40.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	0.9247		0.925	1.00	-7.5	40.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	0.9074		0.831	0.884	-6.0	50.0
4:2 FTS	AveID	0.1480	0.1490		0.940	0.934	0.7	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.8392		0.969	1.00	-3.1	40.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.4452		0.891	0.938	-5.0	50.0
HFPO-DA (GenX)	AveID	2.144	1.821		0.850	1.00	-15.0	40.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	1.013		0.974	1.00	-2.6	40.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.114		0.819	0.910	-10.0	40.0
DONA	AveID	2.306	2.384		0.974	0.942	3.4	50.0
6:2 FTS	AveID	2.112	1.959		0.880	0.948	-7.2	40.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.064		0.960	0.952	0.8	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	0.996		0.961	1.00	-3.9	40.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	1.020		0.898	0.928	-3.2	40.0
Perfluorononanoic acid (PFNA)	AveID	0.995	0.9844		0.989	1.00	-1.1	40.0
F-53B Major	AveID	0.9553	0.9210		0.899	0.932	-3.6	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	3.200		1.10	1.00	10.1	40.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.5989		0.983	0.960	2.4	50.0
8:2 FTS	AveID	14.20	13.50		0.911	0.958	-4.9	40.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.164		1.01	1.00	1.3	40.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.8249		0.952	1.00	-4.8	40.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.9059		0.999	0.964	3.6	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.8008		0.960	1.00	-4.0	40.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.7748		0.936	1.00	-6.4	40.0
F-53B Minor	AveID	1.128	1.248		1.04	0.942	10.7	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	0.8985		0.936	1.00	-6.4	40.0
10:2 FTS	AveID	8.852	8.694		0.947	0.964	-1.8	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0879		0.937	0.968	-3.2	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.7362		0.970	1.00	-3.0	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1531		0.937	1.00	-6.3	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.8802		0.974	1.00	-2.6	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-269672/11 Calibration Date: 01/08/2019 23:49

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_040.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.7075		1.15	1.00	14.6	50.0
13C4 PFBA	Ave	0.9546	0.9770		2.56	2.50	2.3	50.0
13C5 PFPeA	Ave	0.8350	0.8570		2.57	2.50	2.6	50.0
13C3 PFBS	Ave	1.371	1.410		2.39	2.33	2.8	50.0
M2-4:2 FTS	Ave	0.0836	0.0938		2.62	2.34	12.2	50.0
13C2 PFHxA	Ave	0.9280	0.9487		2.56	2.50	2.2	50.0
13C3 HFPO-DA	Ave	0.0833	0.0868		2.60	2.50	4.2	50.0
13C4 PFHpA	Ave	1.141	1.138		2.49	2.50	-0.3	50.0
18O2 PFHxS	Ave	0.8068	0.8316		2.44	2.37	3.1	50.0
M2-6:2 FTS	Ave	0.1125	0.1238		2.61	2.38	10.0	40.0
13C8 PFOA	Ave	2363087	2486385		2.58	2.45	5.2	50.0
13C4 PFOA	Ave	0.9896	1.037		2.62	2.50	4.8	50.0
13C4 PFOS	Ave	0.8235	0.8424		2.45	2.39	2.3	50.0
13C8 PFOS	Ave	500608	502299		2.40	2.39	0.3	50.0
13C5 PFNA	Ave	0.8916	0.9100		2.55	2.50	2.1	50.0
13C8 FOSA	Ave	0.5421	0.5316		2.45	2.50	-1.9	50.0
13C2 PFDA	Ave	0.8721	0.8815		2.53	2.50	1.1	50.0
M2-8:2 FTS	Ave	0.0129	0.0138		2.55	2.40	6.6	40.0
d3-NMeFOSAA	Ave	0.2285	0.2329		2.55	2.50	1.9	50.0
13C2 PFUnA	Ave	0.6858	0.7237		2.64	2.50	5.5	50.0
d5-NEtFOSAA	Ave	0.1905	0.2031		2.67	2.50	6.7	50.0
13C2 PFDoA	Ave	0.8313	0.8208		2.47	2.50	-1.3	50.0
13C2 PFTeDA	Ave	0.5763	0.6055		2.63	2.50	5.1	50.0
13C2 PFHxDA	Ave	0.5385	0.5686		2.64	2.50	5.6	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_040.d
Lims ID: CCV L4
Client ID:
Sample Type: CCV
Inject. Date: 08-Jan-2019 23:49:00 ALS Bottle#: 13 Worklist Smp#: 11
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCV L4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub7

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 12:36:55 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0329

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:55:57
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutanoic acid										
212.90 > 169.00	1.679	1.679	0.0	1.000	2471230	1.00		99.7	144	
D 1 13C4 PFBA										
217.00 > 172.00	1.679	1.679	0.0	0.528	6695095	2.56		102	15905	
D 3 13C5 PFPeA										
267.90 > 223.00	2.013	2.022	-0.009	0.633	5872793	2.57		103	4633	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.013	2.013	0.0	1.000	2172258	0.9246		92.5	109	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.055	2.055	0.0	1.000	3101144	0.8313	Target=2.70	94.0	2239	
298.90 > 99.00	2.055	2.055	0.0	1.000	1111824		2.79(1.35-4.05)		838	
D 5 13C3 PFBS										
301.90 > 80.00	2.055	2.054	0.001	0.646	8988742	2.39		103	670760	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.346	2.346	0.0	1.142	537869	0.9403		101	1322	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.346	2.346	0.0	0.738	600160	2.62		112	814	
D 9 13C2 PFHxA										
315.00 > 270.00	2.382	2.383	-0.001	0.749	6501197	2.56		102	3779	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.382	2.382	0.0	1.000	2182185	0.9689	Target=13.92	96.9	690	
313.00 > 119.00	2.382	2.382	0.0	1.000	162067		13.46(6.96-20.87)		308	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.401	2.401	0.0	1.168	1614414	0.8907	Target=2.30	95.0	2665	
349.00 > 99.00	2.401	2.401	0.0	1.168	783747		2.06(1.15-3.45)		1319	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.497	2.497	0.0	0.996	433153	0.8496		85.0	248	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.507	2.508	-0.001	0.788	594504	2.60		104	2446	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.781	2.781	0.0	1.000	3159545	0.9739	Target=4.34	97.4	698	
363.00 > 169.00	2.781	2.781	0.0	1.000	688483		4.59(2.17-6.52)		898	
D 16 13C4 PFHpA										
367.00 > 322.00	2.781	2.782	-0.001	0.875	7795146	2.49		99.7	2998	
D 17 18O2 PFHxS										
403.00 > 84.00	2.781	2.782	-0.001	0.875	5391060	2.44		103	2722	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.781	2.781	0.0	1.000	2309980	0.8191	Target=3.80	90.0	2105	
399.00 > 99.00	2.781	2.781	0.0	1.000	644380		3.58(1.90-5.70)		539	
19 DONA										
377.00 > 251.00	2.826	2.826	0.0	0.796	5186007	0.9740	Target=2.26	103	3557	
377.00 > 85.00	2.826	2.826	0.0	0.796	2139953		2.42(1.13-3.39)		1401	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.156	3.165	-0.009	0.993	805631	2.61		110	1505	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.164	3.164	0.0	1.002	629989	0.8795		92.8	510	
* 24 13C2 PFOA										
415.00 > 370.00	3.180	3.180	0.0		6852489	2.50			2859	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.180	3.180	0.0	0.895	2338450	0.9598	Target=3.69	101	2042	
449.00 > 99.00	3.180	3.180	0.0	0.895	569754		4.10(1.84-5.53)		1491	
D 25 13C4 PFOA										
417.00 > 372.00	3.180	3.180	0.0	1.000	7105578	2.62		105	3626	
D 22 13C8 PFOA										
421.00 > 376.00	3.172	3.180	-0.008		6085427	2.58		105	3150	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.180	3.180	0.0	1.000	2831044	0.9609	Target=2.72	96.1	459	
413.00 > 169.00	3.180	3.180	0.0	1.000	1036026		2.73(1.36-4.08)		1355	
D 27 13C8 PFOS										
507.00 > 99.00	3.551	3.552	-0.001		1200495	2.40		100	2491	
D 28 13C4 PFOS										
503.00 > 80.00	3.551	3.552	-0.001	1.117	5518696	2.45		102	2455	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.551	3.551	0.0	1.000	2186313	0.8984	Target=4.08	96.8	1221	
499.00 > 99.00	3.551	3.551	0.0	1.000	508166		4.30(2.04-6.12)		1356	
30 Perfluorononanoic acid										
463.00 > 419.00	3.566	3.566	0.0	1.000	2455412	0.9889	Target=5.35	98.9	402	
463.00 > 169.00	3.566	3.566	0.0	1.000	458172		5.36(2.68-8.03)		873	
D 31 13C5 PFNA										
468.00 > 423.00	3.566	3.567	-0.001	1.122	6235857	2.55		102	3477	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.756	3.756	0.0	1.057	1981992	0.8985		96.4	1626	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.884	3.884	0.0	1.000	4663405	1.10		110	2937	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 33 13C8 FOSA										
506.00 > 78.00	3.884	3.885	-0.001	1.222	3642996	2.45		98.1	3111	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.901	3.901	0.0	1.098	1327599	0.9828	Target=6.03	102	1837	
549.00 > 99.00	3.901	3.901	0.0	1.098	203497		6.52(3.02-9.05)		1112	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.926	3.926	0.0	1.000	2811650	1.01	Target=14.23	101	1236	
513.00 > 169.00	3.926	3.926	0.0	1.000	186455		15.08(7.12-21.35)		359	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.926	3.926	0.0	1.000	488380	0.9111		95.1	1736	
D 36 13C2 PFDA										
515.00 > 470.00	3.926	3.927	-0.001	1.235	6040701	2.53		101	2503	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.926	3.927	-0.001	1.235	90426	2.55		107	404	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.092	4.092	0.0	1.002	526658	0.9520		95.2	128	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.082	4.093	-0.011	1.284	1596096	2.55		102	1411	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.000	1588500	0.9604	Target=10.48	96.0	415	
563.00 > 169.00	4.250	4.250	0.0	1.000	152228		10.44(5.24-15.72)		385	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.250	4.250	0.0	1.336	1392017	2.67		107	1322	
D 44 13C2 PFUnA										
565.00 > 520.00	4.250	4.250	0.0	1.336	4959309	2.64		106	4293	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.258	4.258	0.0	1.002	431402	0.9358		93.6	1399	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.215	4.215	0.0	1.187	2016562	1.00	Target=4.28	104	2508	
599.00 > 99.00	4.224	4.215	0.009	1.189	409183		4.93(2.14-6.43)		1138	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.380	4.380	0.0	1.233	2714660	1.04		111	2861	
D 49 13C2 PFDoA										
615.00 > 570.00	4.534	4.541	-0.007	1.426	5624222	2.47		98.7	4369	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.534	4.534	0.0	1.000	2021251	0.9356	Target=9.37	93.6	751	
613.00 > 169.00	4.534	4.534	0.0	1.000	231204		8.74(4.68-14.05)		762	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.557	4.557	0.0	1.161	316434	0.9467		98.2	970	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.770	4.770	0.0	1.343	196557	0.9372	Target=0.55	96.8	1085	
699.00 > 99.00	4.770	4.770	0.0	1.343	354308		0.55(0.28-0.83)		1281	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.803	4.803	0.0	1.059	1656165	0.9698	Target=6.18	97.0	756	
663.00 > 169.00	4.803	4.803	0.0	1.059	292004		5.67(3.09-9.27)		1280	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.049	5.049	0.0	1.588	4149453	2.63		105	4055	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.049	5.049	0.0	1.000	254035	0.9373	Target=1.39	93.7	1360	
713.00 > 219.00	5.041	5.049	-0.008	0.998	169187		1.50(0.70-2.09)		784	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.504	5.504	0.0	1.000	1371976	0.9735	Target=5.55	97.4	116	
813.00 > 169.00	5.504	5.504	0.0	1.000	241136		5.69(2.77-8.32)		1131	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.504	5.514	-0.010	1.731	3896595	2.64		106	3949	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	5.986	5.986	0.0	1.088	1102675	1.15	Target=5.09	115	276	
913.00 > 169.00	5.986	5.986	0.0	1.088	209114		5.27(2.55-7.64)		860	

Reagents:

LCPFC_LL4_00010 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 12:36:56 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_040.d

Injection Date: 08-Jan-2019 23:49:00 Instrument ID: A9

Lims ID: CCV L4

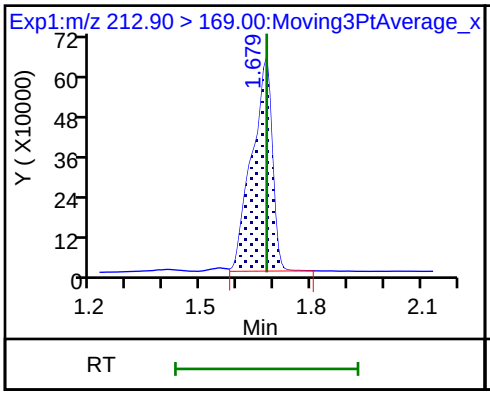
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 13 Worklist Smp#: 11

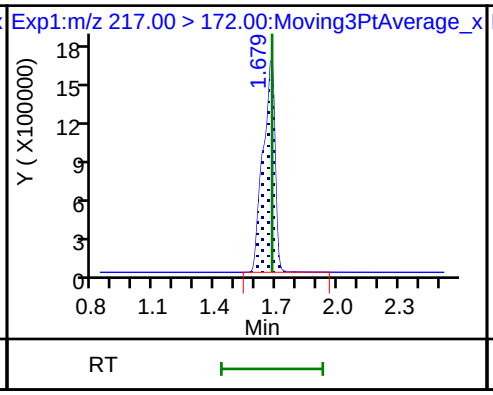
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

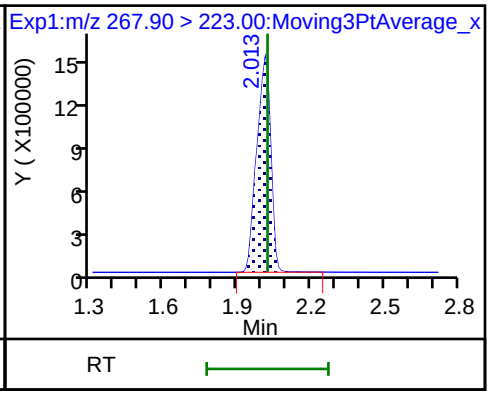
2 Perfluorobutanoic acid



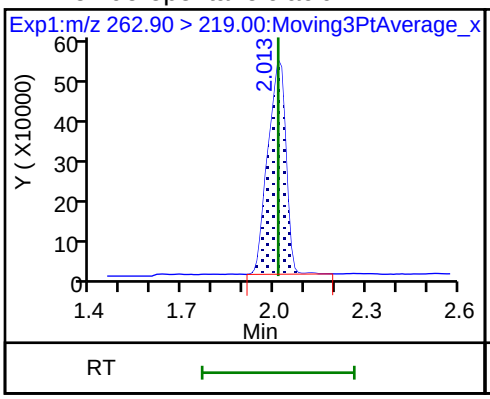
D 1 13C4 PFBA



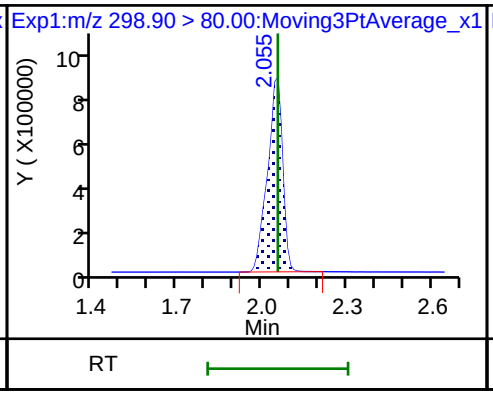
D 3 13C5 PFPeA



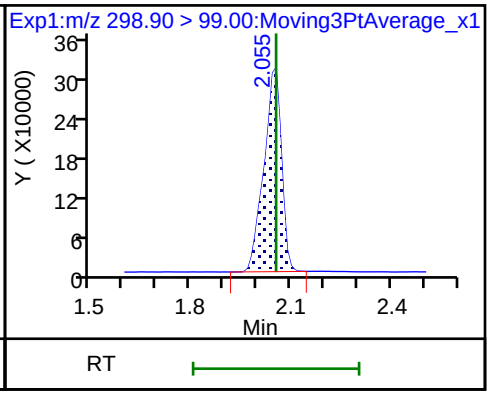
4 Perfluoropentanoic acid



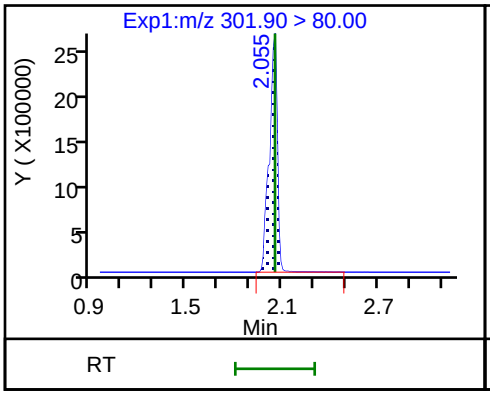
6 Perfluorobutanesulfonic acid



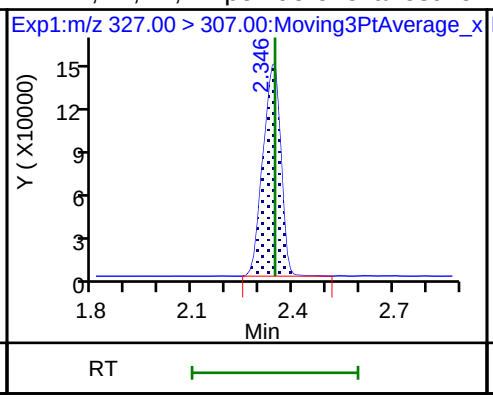
6 Perfluorobutanesulfonic acid



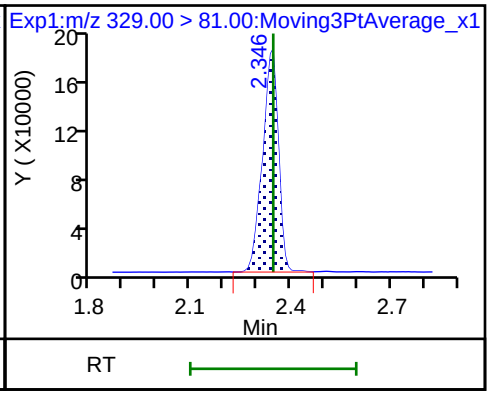
D 5 13C3 PFBS



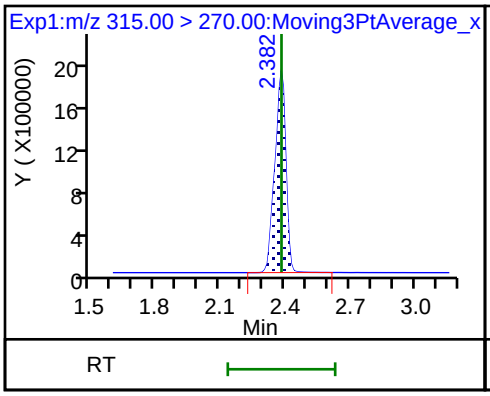
7 1H,1H,2H,2H-perfluorohexanesulfon



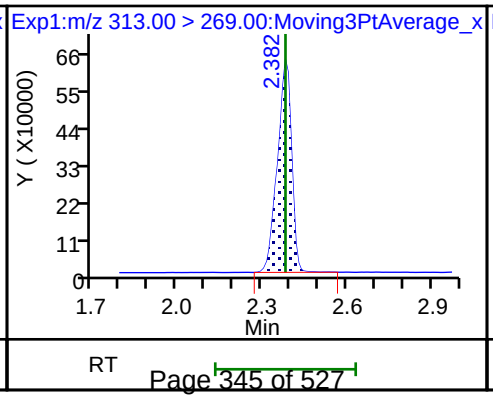
D 8 M2-4:2 FTS



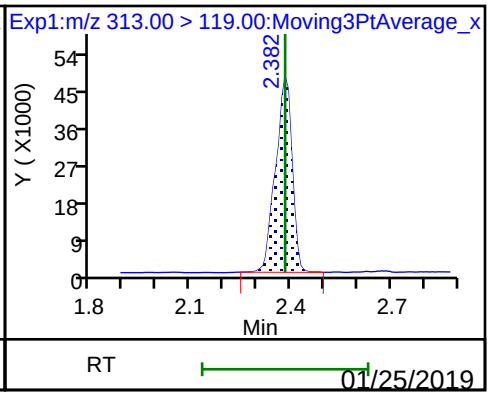
D 9 13C2 PFHxA



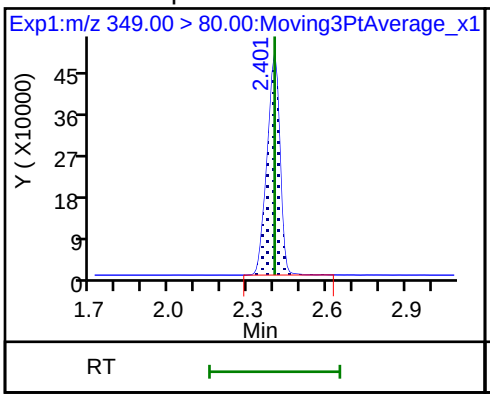
10 Perfluorohexanoic acid



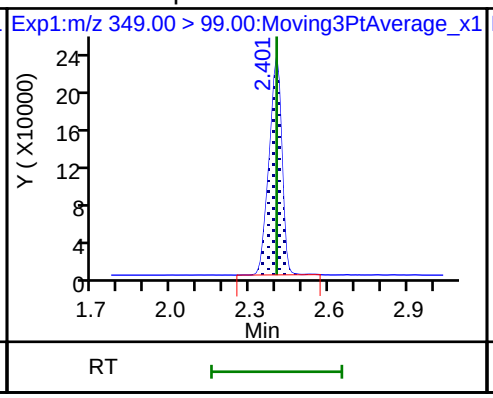
10 Perfluorohexanoic acid



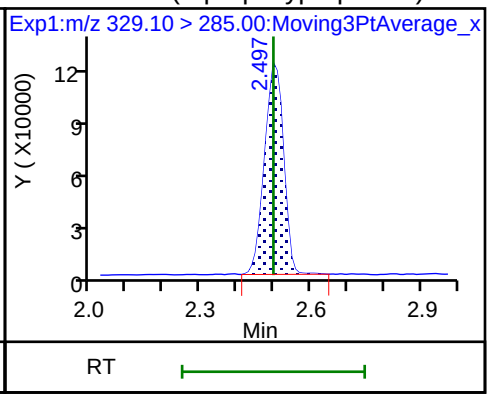
11 Perfluoropentanesulfonic acid



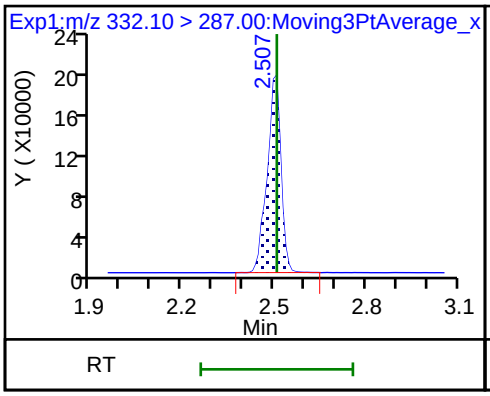
11 Perfluoropentanesulfonic acid



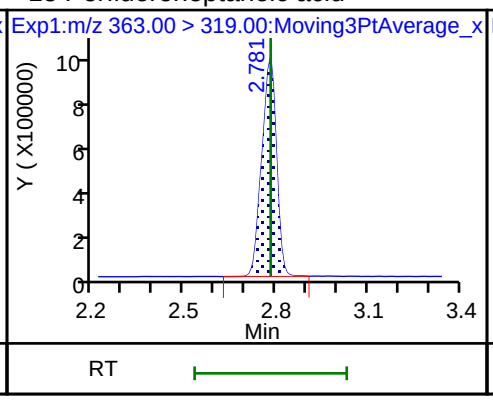
14 Perfluoro(2-propoxypropanoic) acid



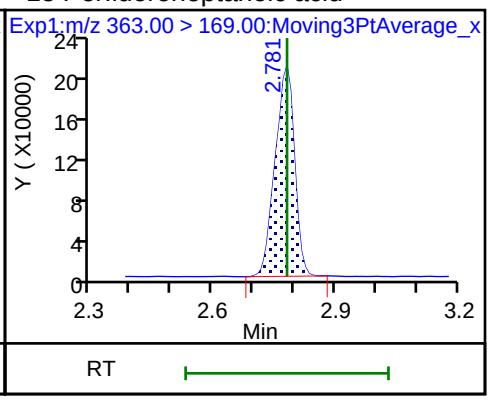
D 13 13C3 HFPO-DA



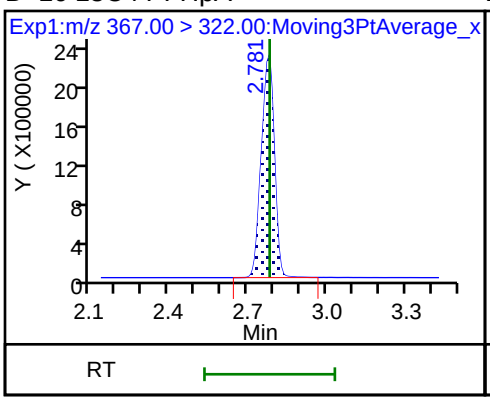
15 Perfluoroheptanoic acid



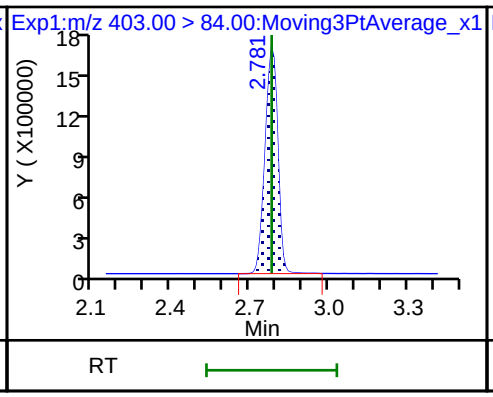
15 Perfluoroheptanoic acid



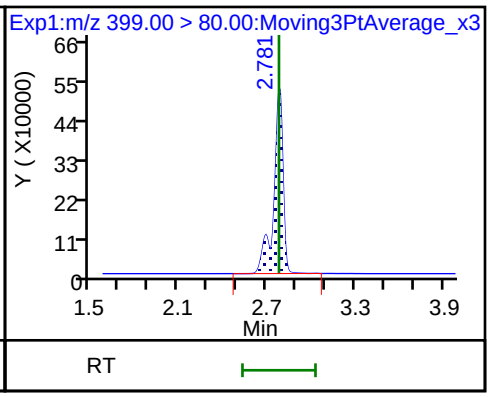
D 16 13C4 PFHpA



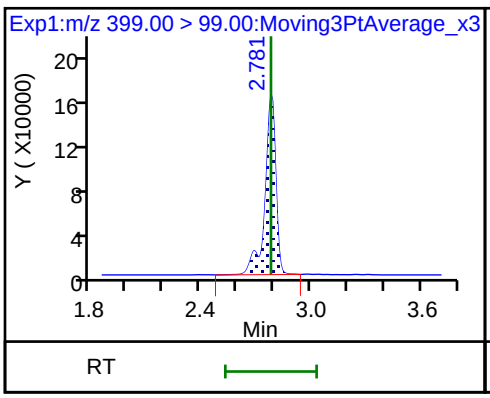
D 17 18O2 PFHxS



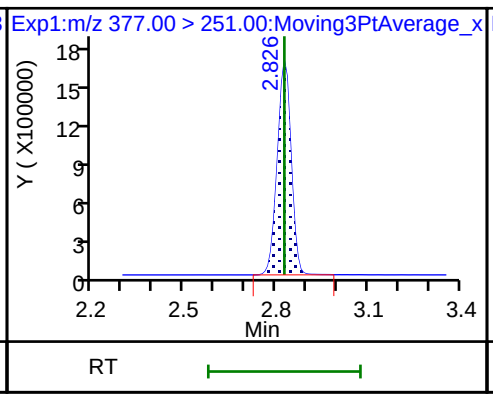
18 Perfluorohexanesulfonic acid



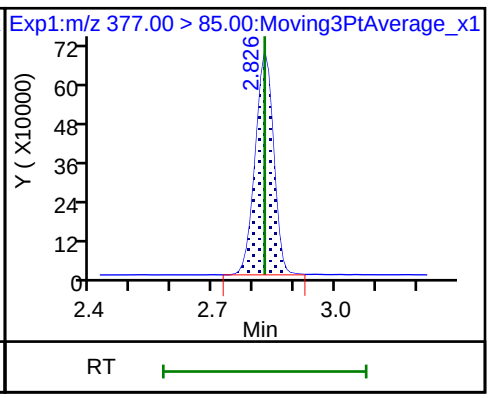
18 Perfluorohexanesulfonic acid



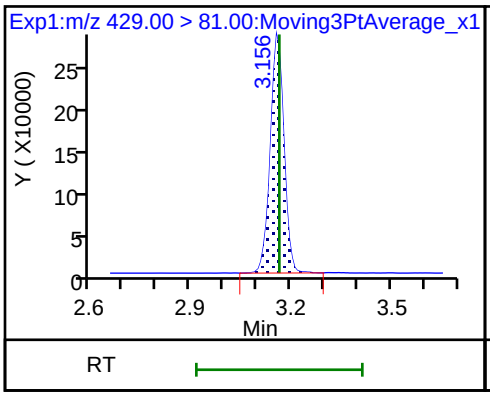
19 DONA



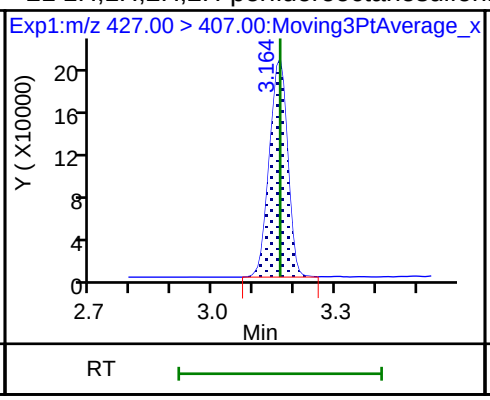
19 DONA



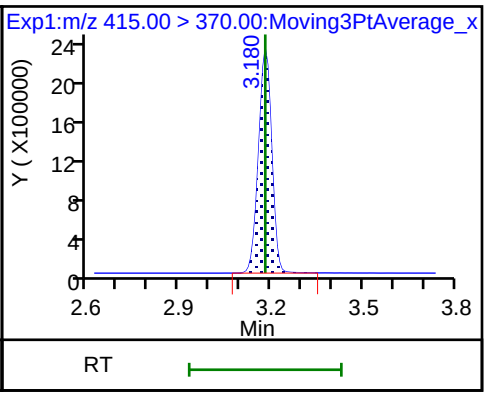
D 20 M2-6:2 FTS



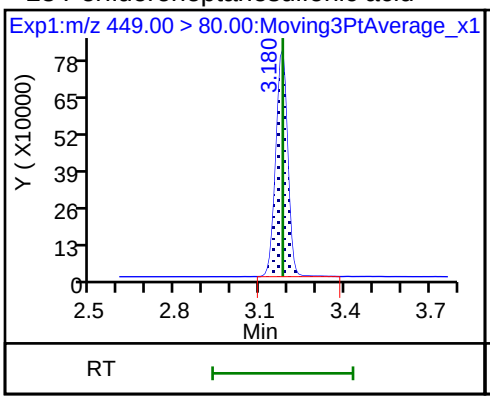
21 1H,1H,2H,2H-perfluorooctanesulfonic



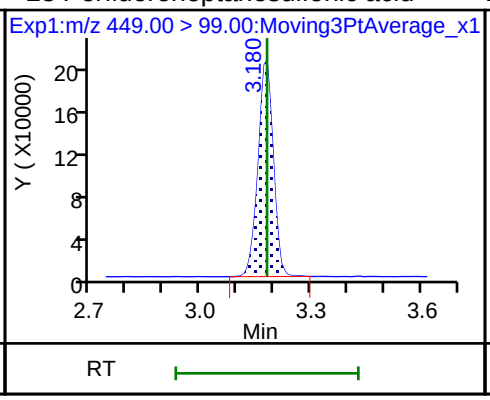
D 24 13C2 PFOA



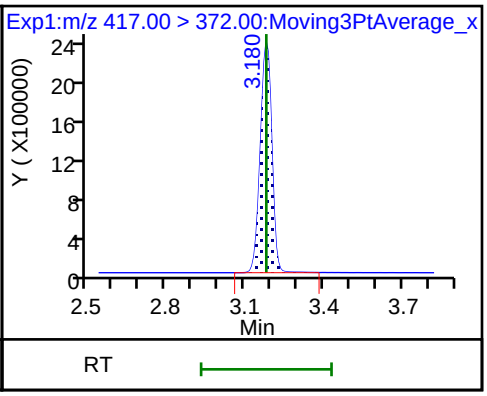
23 Perfluoroheptanesulfonic acid



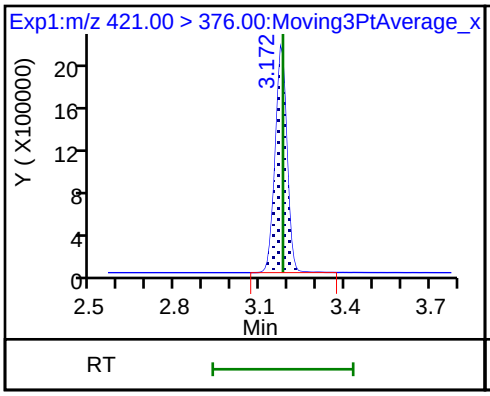
23 Perfluoroheptanesulfonic acid



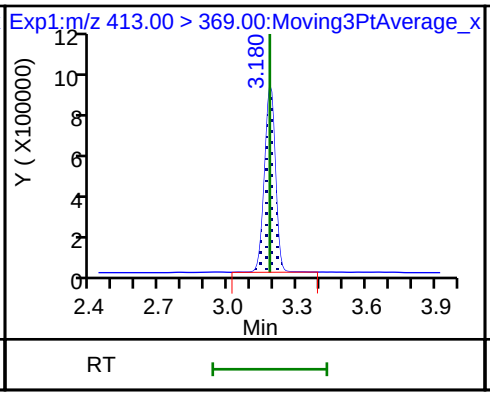
D 25 13C4 PFOA



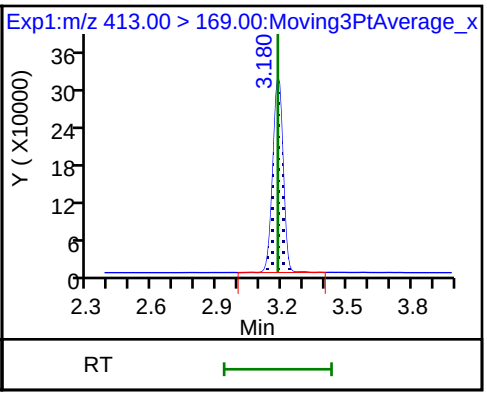
D 22 13C8 PFOA



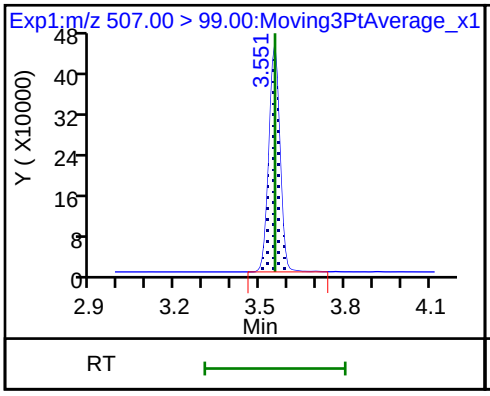
26 Perfluorooctanoic acid



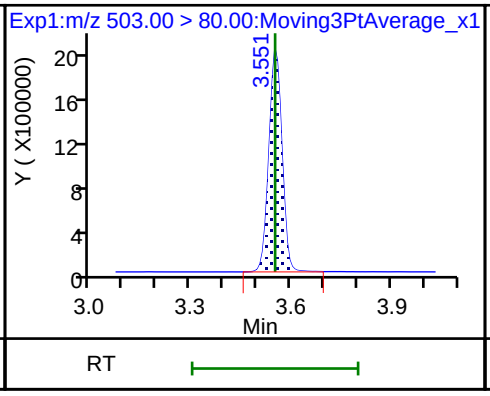
26 Perfluorooctanoic acid



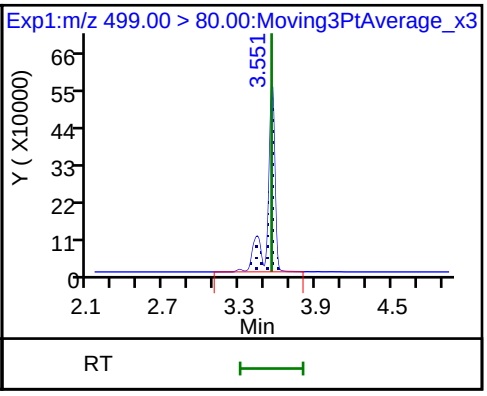
D 27 13C8 PFOS



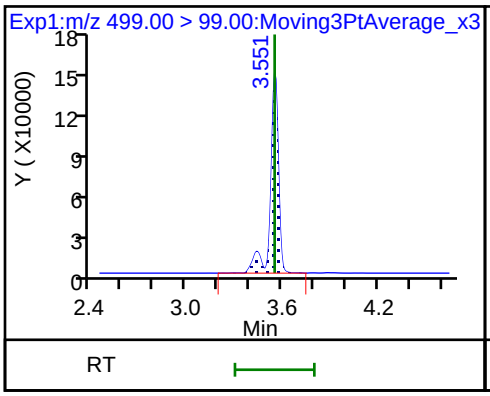
D 28 13C4 PFOS



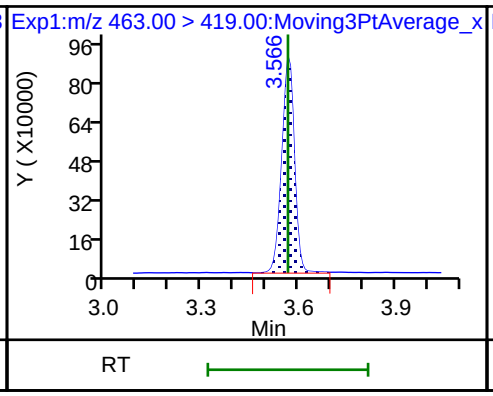
29 Perfluorooctanesulfonic acid



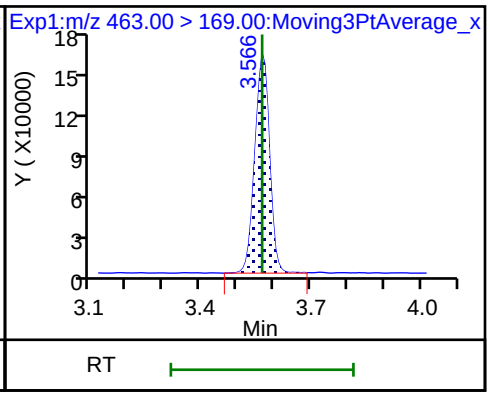
29 Perfluorooctanesulfonic acid



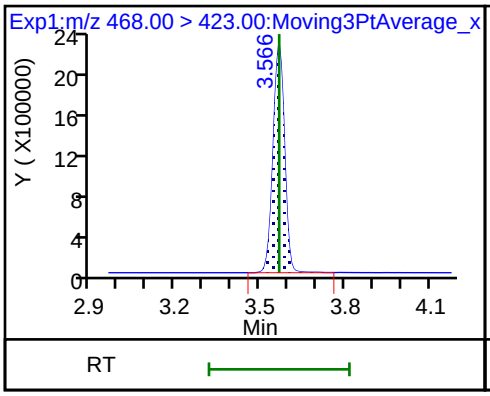
30 Perfluorononanoic acid



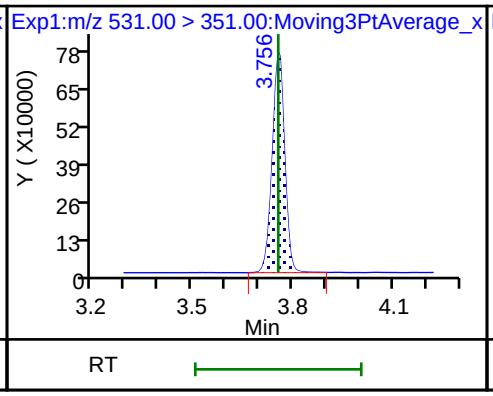
30 Perfluorononanoic acid



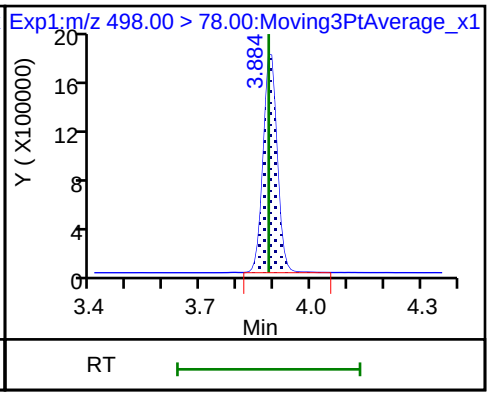
D 31 13C5 PFNA



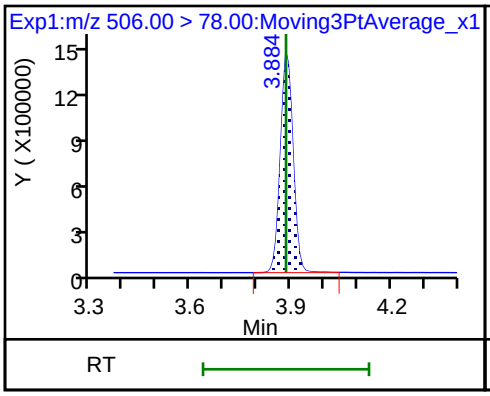
32 9-Chlorohexadecafluoro-3-oxanonane



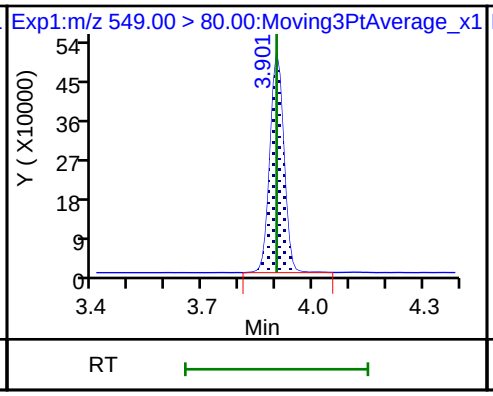
34 Perfluorooctanesulfonamide



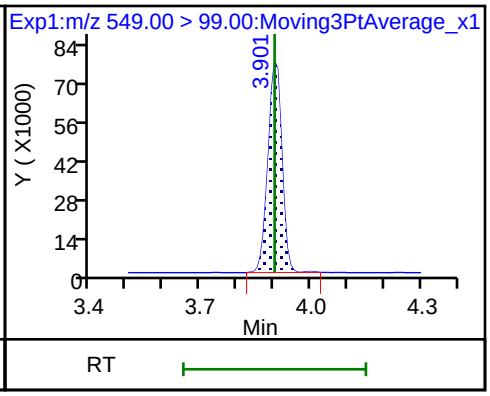
D 33 13C8 FOSA



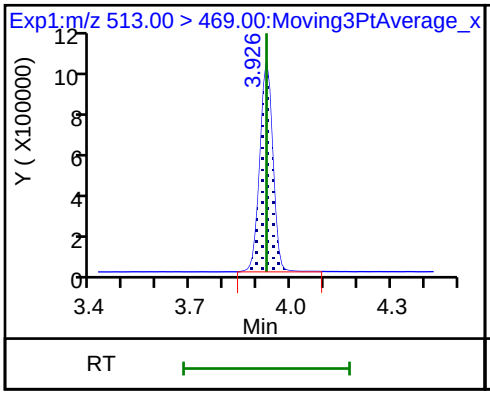
35 Perfluorononanesulfonic acid



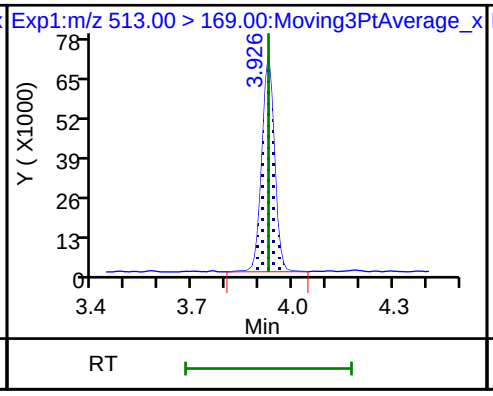
35 Perfluorononanesulfonic acid



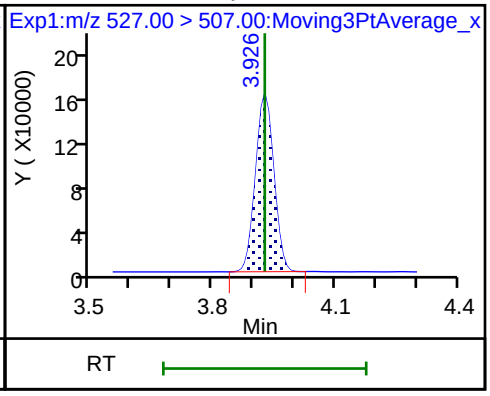
38 Perfluorodecanoic acid



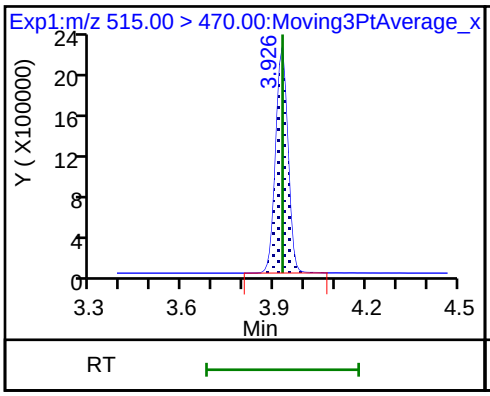
38 Perfluorodecanoic acid



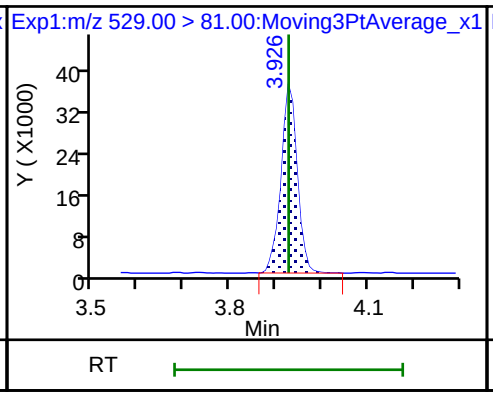
37 1H,1H,2H,2H-perfluorodecanesulfoni



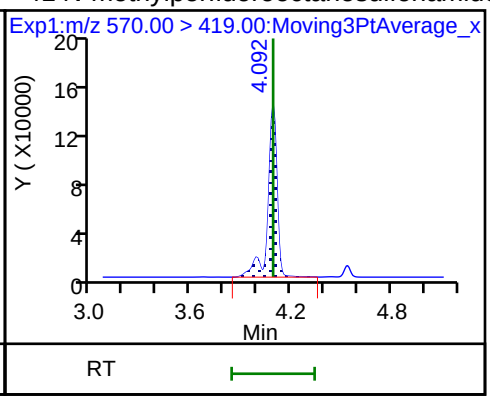
D 36 13C2 PFDA



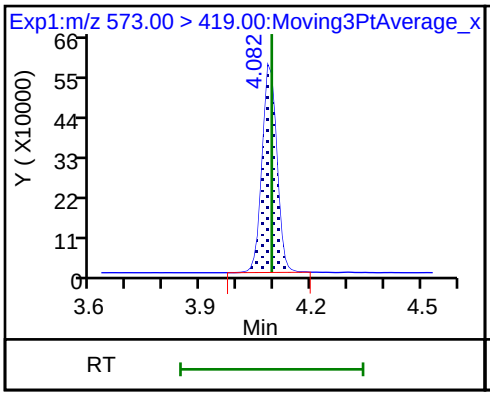
D 39 M2-8:2 FTS



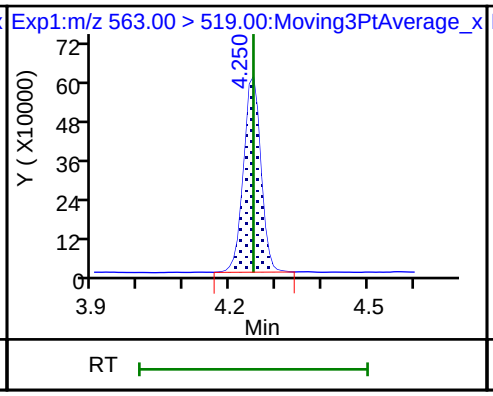
41 N-methylperfluorooctanesulfonamido



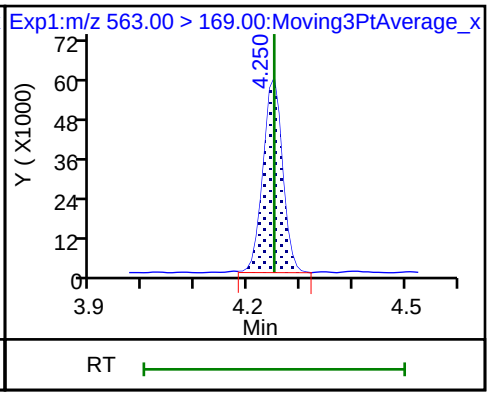
D 40 d3-NMeFOSAA



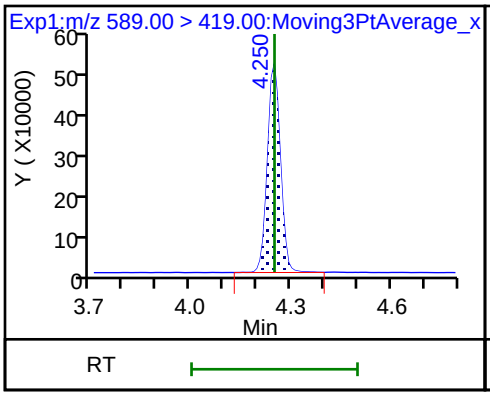
43 Perfluoroundecanoic acid



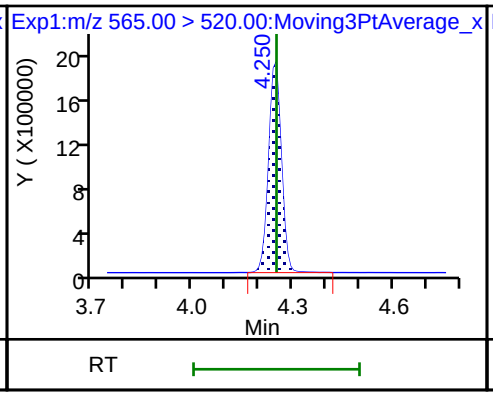
43 Perfluoroundecanoic acid



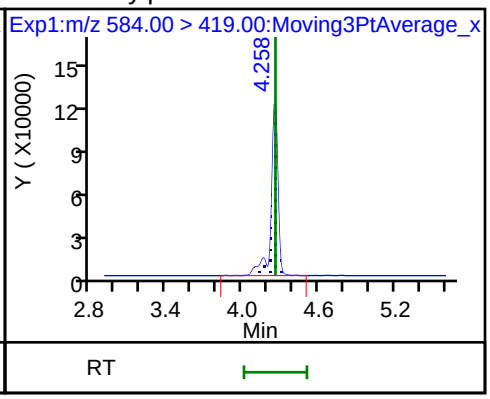
D 45 d5-NEtFOSAA



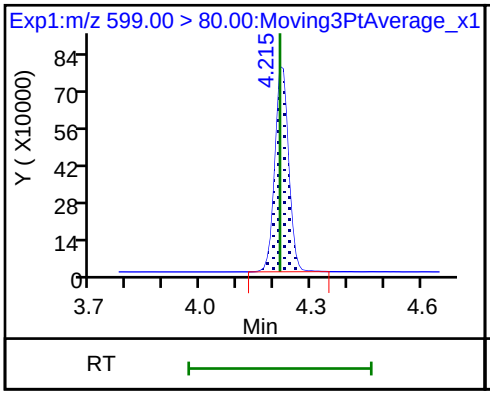
D 44 13C2 PFUnA



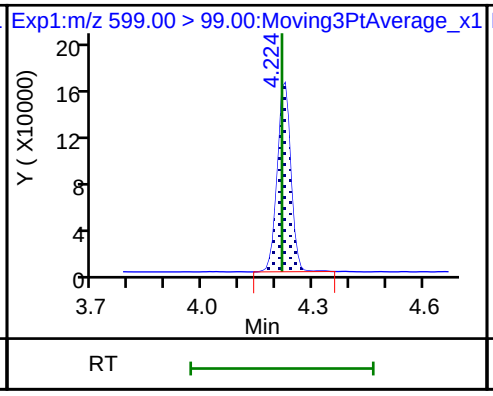
46 N-ethylperfluorooctanesulfonamidoa



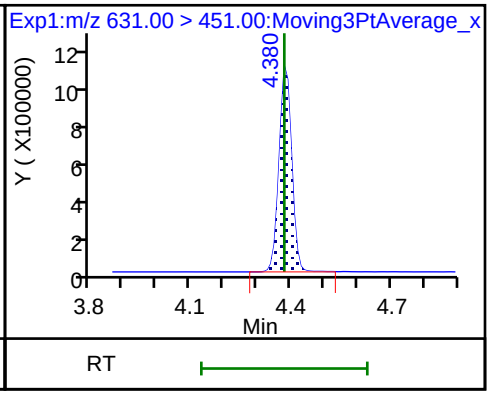
42 Perfluorodecanesulfonic acid



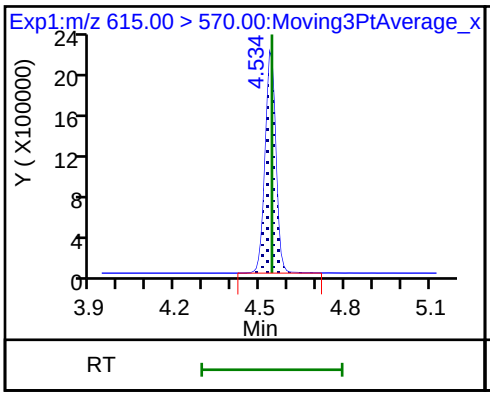
42 Perfluorodecanesulfonic acid



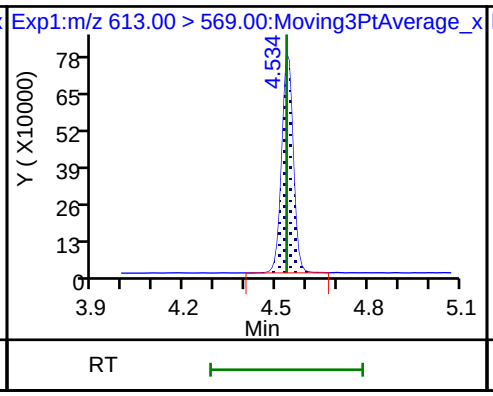
48 11-Chloroeicosafluoro-3-oxaundecan



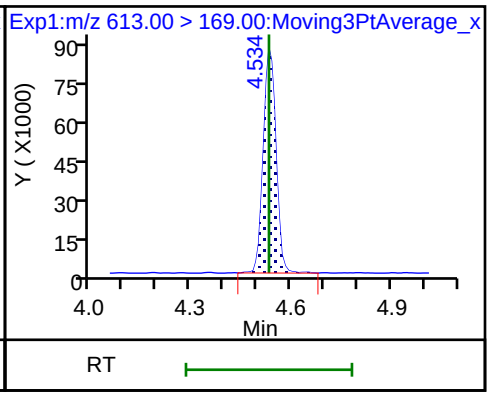
D 49 13C2 PFDoA



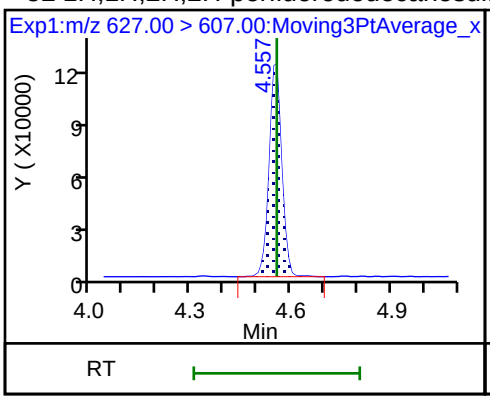
50 Perfluorododecanoic acid



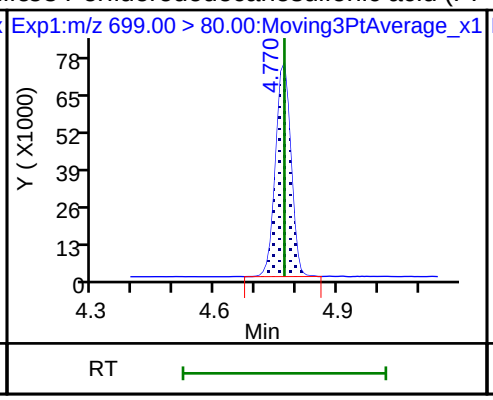
50 Perfluorododecanoic acid



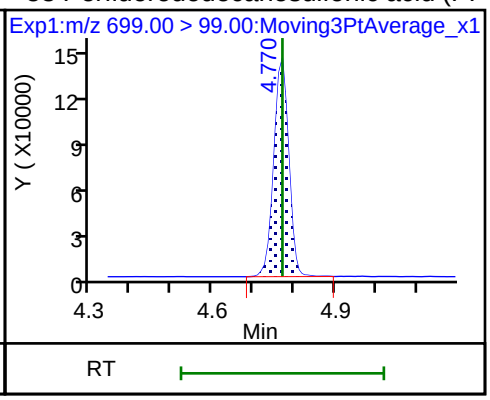
52 1H,1H,2H,2H-perfluorododecanesulfo



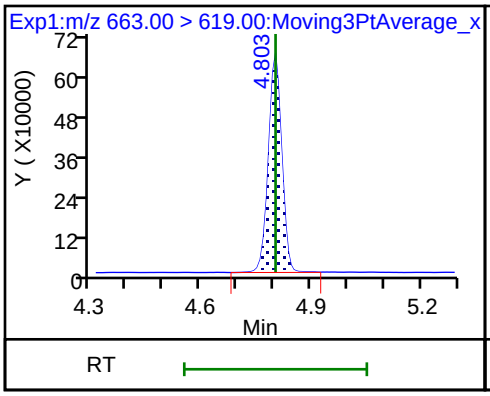
53 Perfluorododecanesulfonic acid (PF



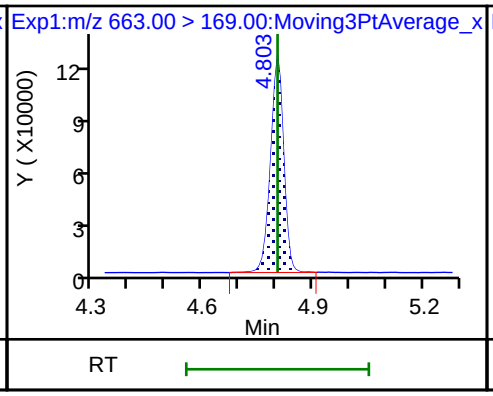
53 Perfluorododecanesulfonic acid (PF



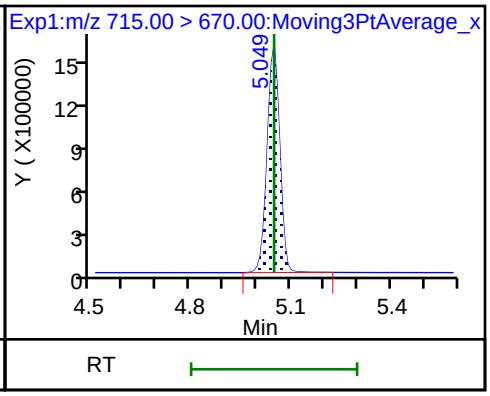
54 Perfluorotridecanoic acid



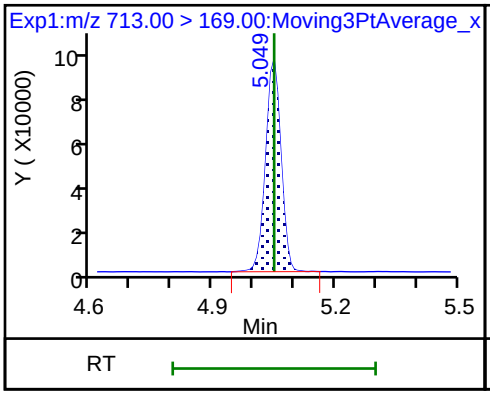
54 Perfluorotridecanoic acid



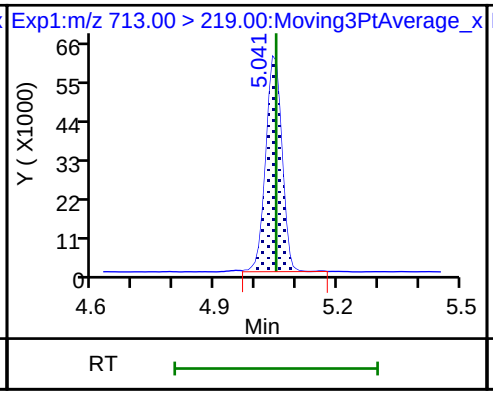
D 55 13C2 PFTeDA



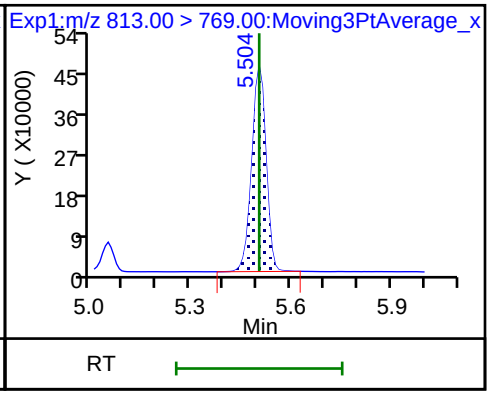
56 Perfluorotetradecanoic acid



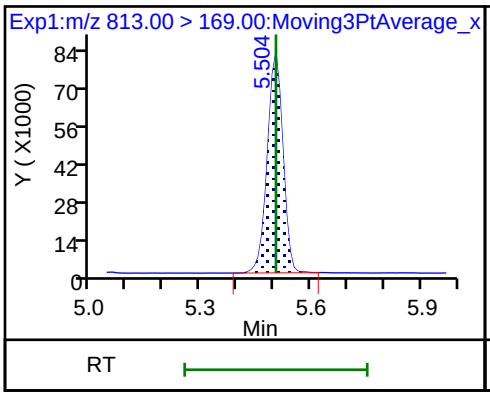
56 Perfluorotetradecanoic acid



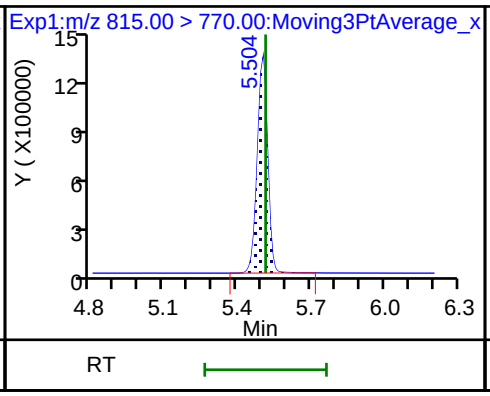
58 Perfluorohexadecanoic acid



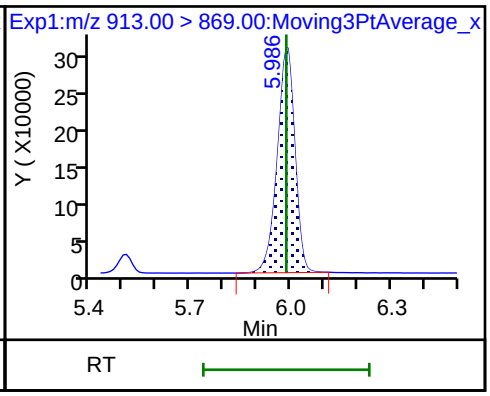
58 Perfluorohexadecanoic acid



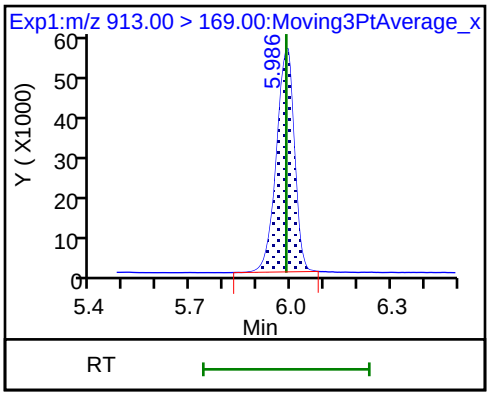
D 57 13C2 PFHxDA



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-269672/16 Calibration Date: 01/09/2019 00:26

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_045.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.9121		2.46	2.50	-1.5	40.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	0.9620		2.41	2.50	-3.8	40.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	0.9293		2.13	2.21	-3.7	50.0
4:2 FTS	AveID	0.1480	0.1663		2.62	2.34	12.4	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.8407		2.43	2.50	-2.9	40.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.4740		2.37	2.35	1.1	50.0
HFPO-DA (GenX)	AveID	2.144	1.781		2.08	2.50	-16.9	40.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	1.019		2.45	2.50	-2.1	40.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.147		2.11	2.28	-7.3	40.0
DONA	AveID	2.306	2.399		2.45	2.36	4.0	50.0
6:2 FTS	AveID	2.112	2.048		2.30	2.37	-3.0	40.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.059		2.39	2.38	0.3	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	1.014		2.45	2.50	-2.2	40.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	1.034		2.28	2.32	-1.9	40.0
Perfluorononanoic acid (PFNA)	AveID	0.995	1.011		2.54	2.50	1.5	40.0
F-53B Major	AveID	0.9553	0.9334		2.28	2.33	-2.3	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	2.906		2.50	2.50	-0.0	40.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.5945		2.44	2.40	1.6	50.0
8:2 FTS	AveID	14.20	14.74		2.49	2.40	3.8	40.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.124		2.45	2.50	-2.2	40.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.8425		2.43	2.50	-2.8	40.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.9051		2.49	2.41	3.5	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.7954		2.39	2.50	-4.6	40.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.8319		2.51	2.50	0.5	40.0
F-53B Minor	AveID	1.128	1.216		2.54	2.36	7.8	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	0.8888		2.31	2.50	-7.5	40.0
10:2 FTS	AveID	8.852	8.778		2.39	2.41	-0.8	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0853		2.27	2.42	-6.1	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.7094		2.34	2.50	-6.5	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1445		2.21	2.50	-11.5	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.8572		2.41	2.50	-3.8	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-269672/16 Calibration Date: 01/09/2019 00:26

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.08LLAAXX_045.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.6202		2.51	2.50	0.5	50.0
13C4 PFBA	Ave	0.9546	0.9343		2.45	2.50	-2.1	50.0
13C5 PFPeA	Ave	0.8350	0.7938		2.38	2.50	-4.9	50.0
13C3 PFBS	Ave	1.371	1.200		2.04	2.33	-12.5	50.0
M2-4:2 FTS	Ave	0.0836	0.0787		2.20	2.34	-5.9	50.0
13C2 PFHxA	Ave	0.9280	0.9094		2.45	2.50	-2.0	50.0
13C3 HFPO-DA	Ave	0.0833	0.0814		2.44	2.50	-2.3	50.0
13C4 PFHpA	Ave	1.141	1.116		2.45	2.50	-2.2	50.0
18O2 PFHxS	Ave	0.8068	0.7194		2.11	2.37	-10.8	50.0
M2-6:2 FTS	Ave	0.1125	0.1092		2.31	2.38	-2.9	40.0
13C8 PFOA	Ave	2363087	2357312		2.44	2.45	-0.2	50.0
13C4 PFOA	Ave	0.9896	0.9697		2.45	2.50	-2.0	50.0
13C4 PFOS	Ave	0.8235	0.7503		2.18	2.39	-8.9	50.0
13C8 PFOS	Ave	500608	443087		2.12	2.39	-11.5	50.0
13C5 PFNA	Ave	0.8916	0.8321		2.33	2.50	-6.7	50.0
13C8 FOSA	Ave	0.5421	0.5390		2.49	2.50	-0.6	50.0
13C2 PFDA	Ave	0.8721	0.8766		2.51	2.50	0.5	50.0
M2-8:2 FTS	Ave	0.0129	0.0131		2.43	2.40	1.6	40.0
d3-NMeFOSAA	Ave	0.2285	0.2301		2.52	2.50	0.7	50.0
13C2 PFUnA	Ave	0.6858	0.6764		2.47	2.50	-1.4	50.0
d5-NEtFOSAA	Ave	0.1905	0.1902		2.50	2.50	-0.1	50.0
13C2 PFDoA	Ave	0.8313	0.8268		2.49	2.50	-0.5	50.0
13C2 PFTeDA	Ave	0.5763	0.5745		2.49	2.50	-0.3	50.0
13C2 PFHxDA	Ave	0.5385	0.5314		2.47	2.50	-1.3	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_045.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 09-Jan-2019 00:26:33 ALS Bottle#: 14 Worklist Smp#: 16
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub7

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 12:37:09 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0329

First Level Reviewer: westendorfc Date: 09-Jan-2019 12:36:08
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.679	1.679	0.0	0.528	6306496	2.45		97.9	6260	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.679	1.679	0.0	1.000	5752343	2.46		98.5	384	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.014	2.014	0.0	1.000	5154480	2.40		96.2	261	
D 3 13C5 PFPeA										
267.90 > 223.00	2.014	2.022	-0.008	0.633	5357838	2.38		95.1	3540	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.054	0.002	0.647	7533753	2.03		87.5	1162217	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.056	2.056	0.0	1.000	6654854	2.13	Target=2.70	96.3	3104	
298.90 > 99.00	2.056	2.056	0.0	1.000	2361916		2.82(1.35-4.05)		1868	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.340	2.340	0.0	1.138	1257980	2.62		112	2146	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.340	2.346	-0.006	0.736	495829	2.20		94.1	862	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.384	2.384	0.0	1.000	5160028	2.43	Target=13.92	97.1	1246	
313.00 > 119.00	2.384	2.384	0.0	1.000	358903		14.38(6.96-20.87)		602	
D 9 13C2 PFHxA										
315.00 > 270.00	2.384	2.383	0.001	0.749	6137871	2.45		98.0	2510	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.402	2.402	0.0	1.168	3601917	2.37	Target=2.30	101	2573	
349.00 > 99.00	2.402	2.402	0.0	1.168	1648733		2.18(1.15-3.45)		1891	
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.509	2.509	0.0	1.000	978292	2.08		83.1	514	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.509	2.508	0.001	0.789	549375	2.44		97.7	1482	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.782	2.782	0.0	1.000	7679157	2.45	Target=4.34	97.9	1278	
363.00 > 169.00	2.782	2.782	0.0	1.000	1579773		4.86(2.17-6.52)		1609	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.782	2.782	0.0	1.000	5068498	2.11	Target=3.80	92.7	8294	
399.00 > 99.00	2.782	2.782	0.0	1.000	1404537		3.61(1.90-5.70)		883	
D 17 18O2 PFHxS										
403.00 > 84.00	2.782	2.782	0.0	0.875	4593826	2.11		89.2	2244	
D 16 13C4 PFHpA										
367.00 > 322.00	2.782	2.782	0.0	0.875	7535404	2.45		97.8	3133	
19 DONA										
377.00 > 251.00	2.827	2.827	0.0	0.796	11445017	2.45	Target=2.26	104	3321	
377.00 > 85.00	2.827	2.827	0.0	0.796	5088496		2.25(1.13-3.39)		2556	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.165	3.165	0.0	1.002	1431271	2.30		97.0	1346	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.157	3.165	-0.008	0.993	700351	2.31		97.1	1016	
* 24 13C2 PFOA										
415.00 > 370.00	3.180	3.180	0.0		6749752	2.50			3035	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.180	3.180	0.0	0.895	5103669	2.39	Target=3.69	100	2361	
449.00 > 99.00	3.173	3.180	-0.007	0.893	1236612		4.13(1.84-5.53)		2145	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.180	3.180	0.0	1.000	6635014	2.44	Target=2.72	97.8	1098	
413.00 > 169.00	3.180	3.180	0.0	1.000	2526673		2.63(1.36-4.08)		2262	
D 22 13C8 PFOA										
421.00 > 376.00	3.173	3.180	-0.007		5769522	2.44		99.8	2974	
D 25 13C4 PFOA										
417.00 > 372.00	3.180	3.180	0.0	1.000	6545525	2.45		98.0	3187	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.552	3.552	0.0	1.000	4860132	2.28	Target=4.08	98.1	4060	
499.00 > 99.00	3.552	3.552	0.0	1.000	1187961		4.09(2.04-6.12)		2844	
D 28 13C4 PFOS										
503.00 > 80.00	3.552	3.552	0.0	1.117	4841308	2.18		91.1	3239	
D 27 13C8 PFOS										
507.00 > 99.00	3.552	3.552	0.0		1058978	2.12		88.5	2108	
30 Perfluorononanoic acid										
463.00 > 419.00	3.567	3.567	0.0	1.000	5677136	2.54	Target=5.35	102	892	
463.00 > 169.00	3.567	3.567	0.0	1.000	1008192		5.63(2.68-8.03)		1395	
D 31 13C5 PFNA										
468.00 > 423.00	3.567	3.567	0.0	1.122	5616278	2.33		93.3	6359	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.756	3.756	0.0	1.057	4405429	2.28		97.7	2233	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.885	3.885	0.0	0.998	10570947	2.50		100.0	3239	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 33 13C8 FOSA										
506.00 > 78.00	3.893	3.885	0.008	1.224	3637885	2.49		99.4	2750	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.901	3.901	0.0	1.098	2890078	2.44	Target=6.03	102	2792	
549.00 > 99.00	3.901	3.901	0.0	1.098	439379		6.58(3.02-9.05)		1696	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.927	3.927	0.0	1.000	6648500	2.45	Target=14.23	97.8	1863	
513.00 > 169.00	3.927	3.927	0.0	1.000	451314		14.73(7.12-21.35)		735	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.927	3.927	0.0	1.000	1250384	2.49		104	2460	
D 36 13C2 PFDA										
515.00 > 470.00	3.927	3.927	0.0	1.235	5916743	2.51		101	3204	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.927	3.927	0.0	1.235	84839	2.43		102	292	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.093	4.093	0.0	1.002	1308646	2.43		97.2	277	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.083	4.093	-0.010	1.284	1553235	2.52		101	2477	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.225	4.225	0.0	1.189	4418368	2.49	Target=4.28	103	2999	
599.00 > 99.00	4.225	4.225	0.0	1.189	936073		4.72(2.14-6.43)		1867	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.000	3631763	2.39	Target=10.48	95.4	928	
563.00 > 169.00	4.250	4.250	0.0	1.000	370432		9.80(5.24-15.72)		776	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.250	4.250	0.0	1.336	1283860	2.50		99.9	1583	
D 44 13C2 PFUnA										
565.00 > 520.00	4.250	4.250	0.0	1.336	4565783	2.47		98.6	3103	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.259	4.259	0.0	1.002	1068079	2.51		100	4090	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.381	4.381	0.0	1.233	5799094	2.54		108	3021	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.534	4.534	0.0	1.000	4960001	2.31	Target=9.37	92.5	1407	
613.00 > 169.00	4.534	4.534	0.0	1.000	550068		9.02(4.68-14.05)		1565	
D 49 13C2 PFDoA										
615.00 > 570.00	4.534	4.541	-0.007	1.426	5580865	2.49		99.5	3767	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.550	4.550	0.0	1.159	749372	2.39		99.2	1846	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.770	4.770	0.0	1.343	418163	2.27	Target=0.55	93.9	1189	
699.00 > 99.00	4.770	4.770	0.0	1.343	805597		0.52(0.28-0.83)		1895	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.803	4.803	0.0	1.059	3959238	2.34	Target=6.18	93.5	1405	
663.00 > 169.00	4.803	4.803	0.0	1.059	676045		5.86(3.09-9.27)		1763	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.050	5.049	0.001	1.588	3877756	2.49		99.7	4510	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.050	5.050	0.0	1.000	560311	2.21	Target=1.39	88.5	1618	
713.00 > 219.00	5.041	5.050	-0.009	0.998	408366		1.37(0.70-2.09)		1247	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.504	5.504	0.0	1.000	3074195	2.41	Target=5.55	96.2	305	
813.00 > 169.00	5.504	5.504	0.0	1.000	566314		5.43(2.77-8.32)		1885	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.504	5.514	-0.010	1.731	3586477	2.47		98.7	4202	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	5.983	5.983	0.0	1.087	2224286	2.51	Target=5.09	100	543	
913.00 > 169.00	5.983	5.983	0.0	1.087	428605		5.19(2.55-7.64)		1224	

Reagents:

LCPFC_LL5_00010 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 12:37:11 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_045.d

Injection Date: 09-Jan-2019 00:26:33 Instrument ID: A9

Lims ID: CCV L5

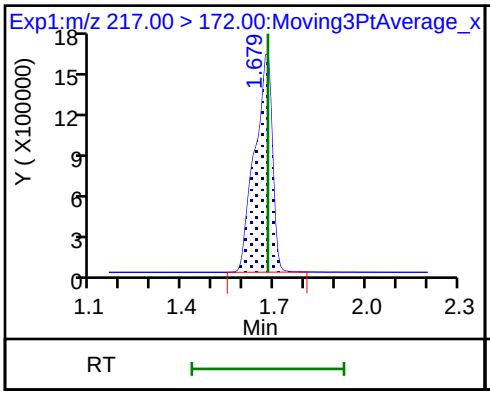
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 14 Worklist Smp#: 16

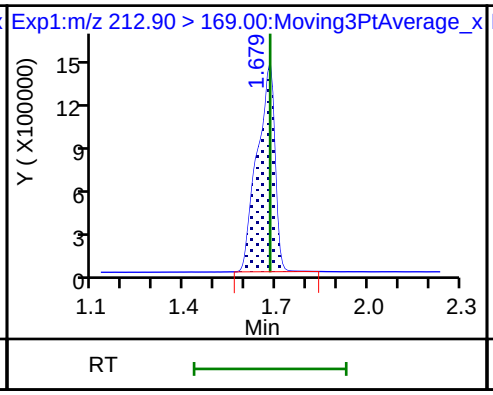
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

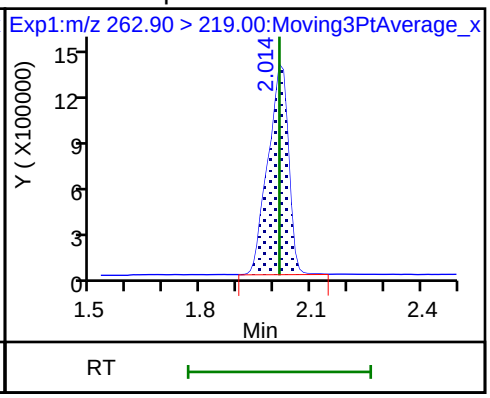
D 1 13C4 PFBA



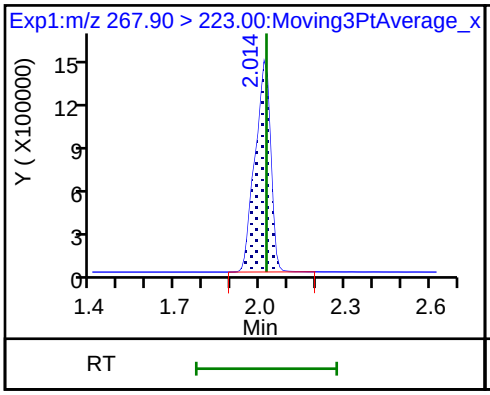
2 Perfluorobutanoic acid



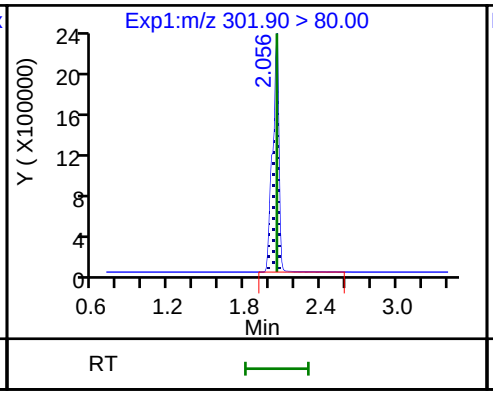
4 Perfluoropentanoic acid



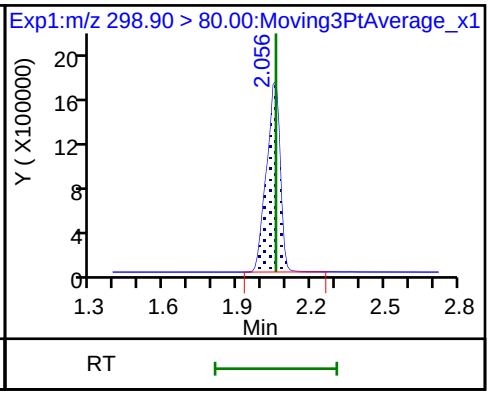
D 3 13C5 PFPeA



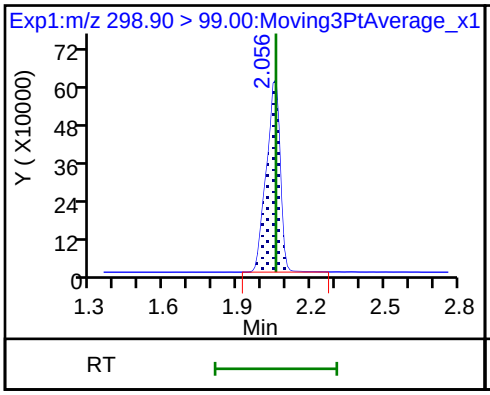
D 5 13C3 PFBS



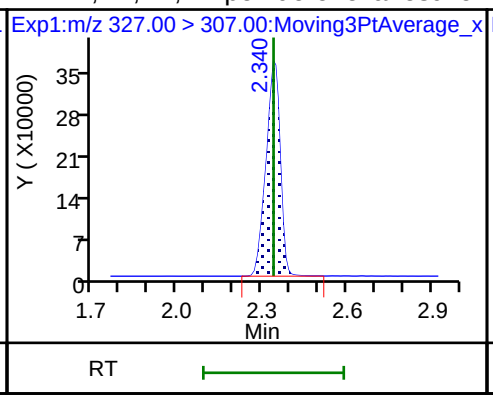
6 Perfluorobutanesulfonic acid



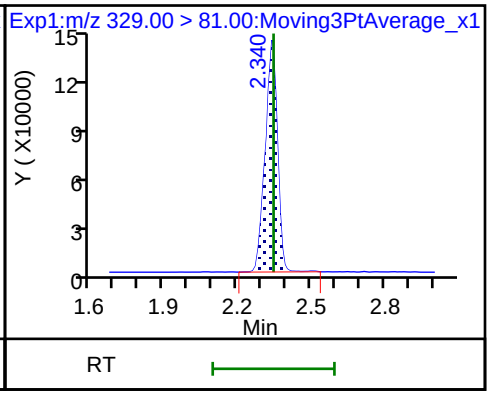
6 Perfluorobutanesulfonic acid



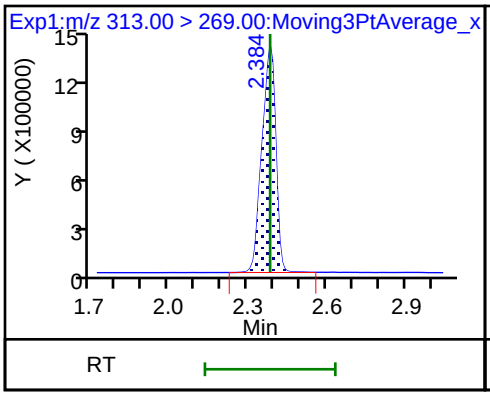
7 1H,1H,2H,2H-perfluorohexanesulfon



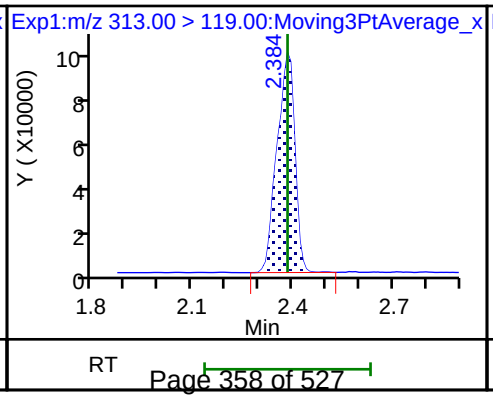
D 8 M2-4:2 FTS



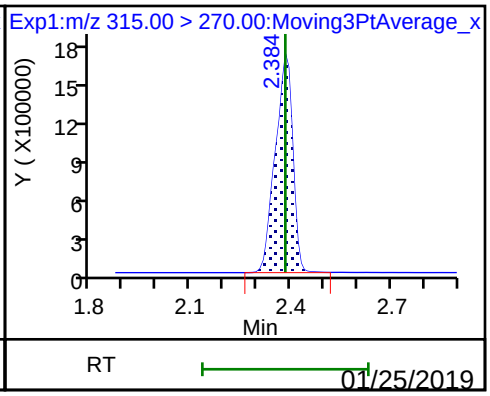
10 Perfluorohexanoic acid



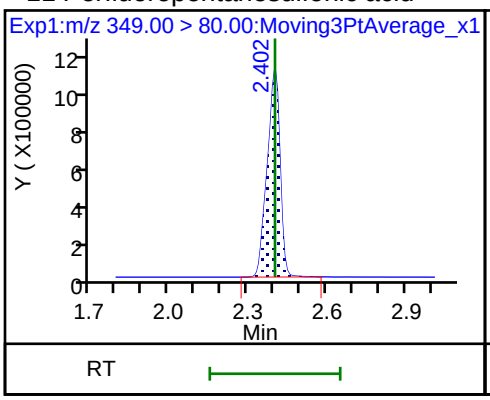
10 Perfluorohexanoic acid



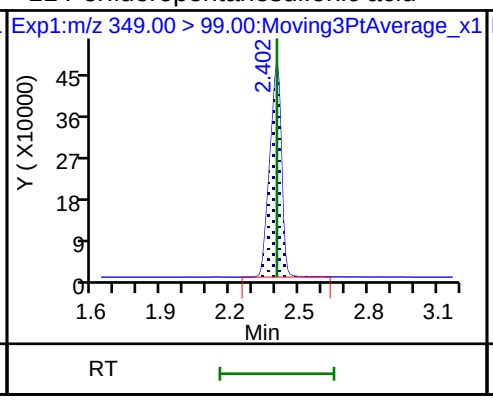
D 9 13C2 PFHxA



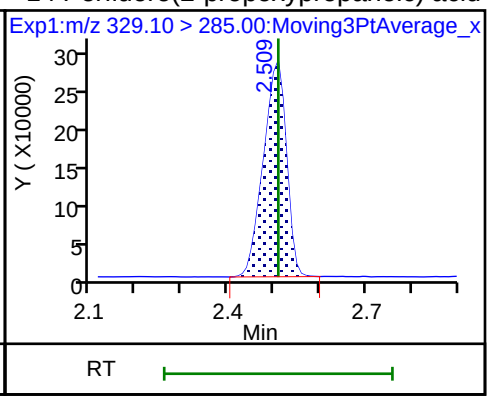
11 Perfluoropentanesulfonic acid



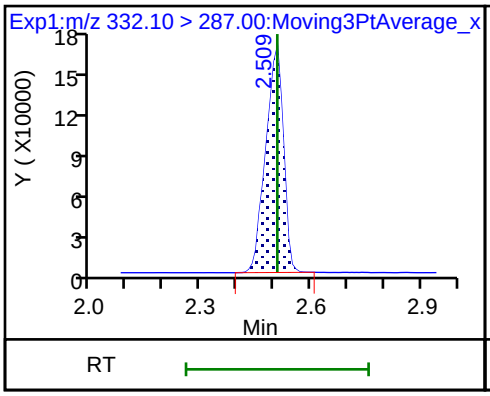
11 Perfluoropentanesulfonic acid



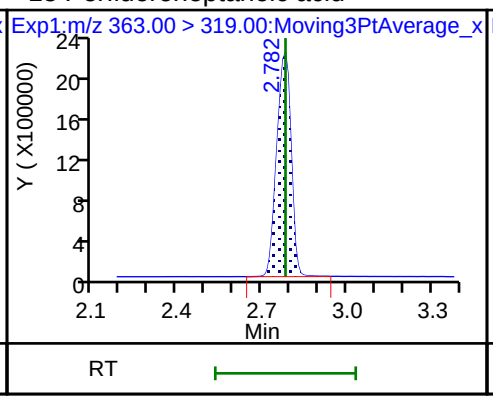
14 Perfluoro(2-propoxypropanoic) acid



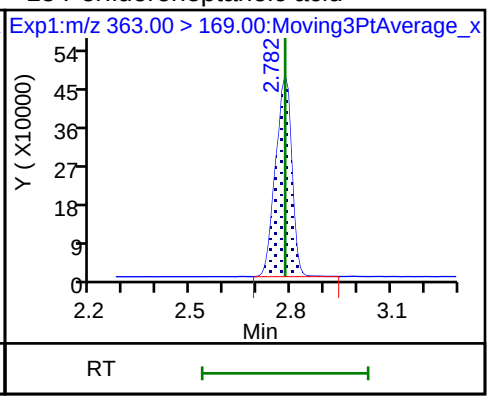
D 13 13C3 HFPO-DA



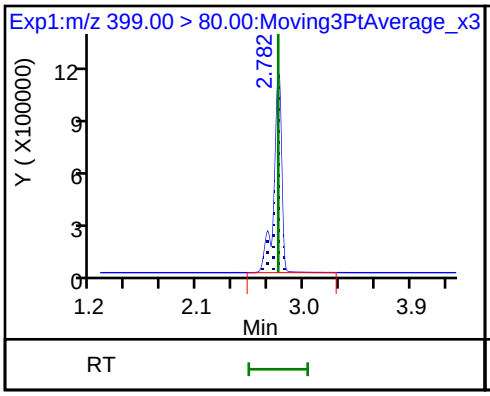
15 Perfluoroheptanoic acid



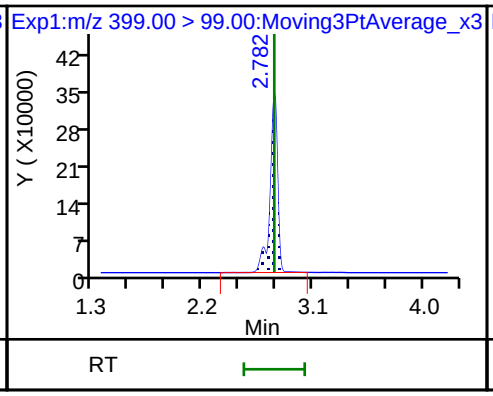
15 Perfluoroheptanoic acid



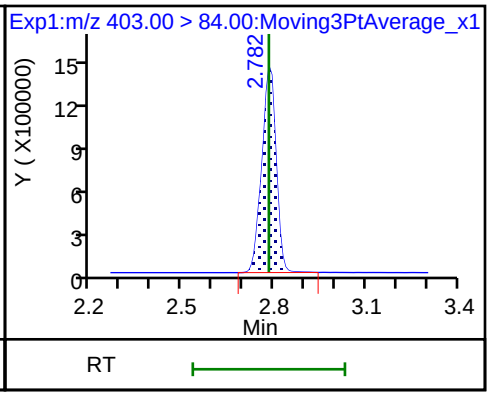
18 Perfluorohexanesulfonic acid



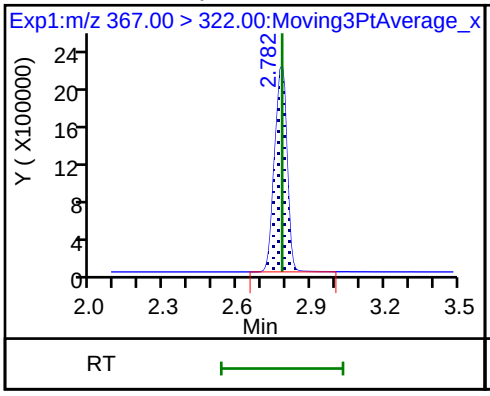
18 Perfluorohexanesulfonic acid



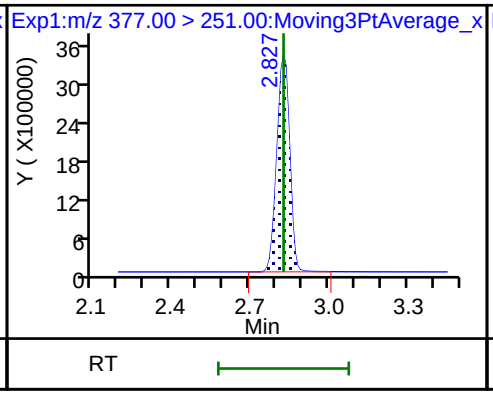
D 17 18O2 PFHxS



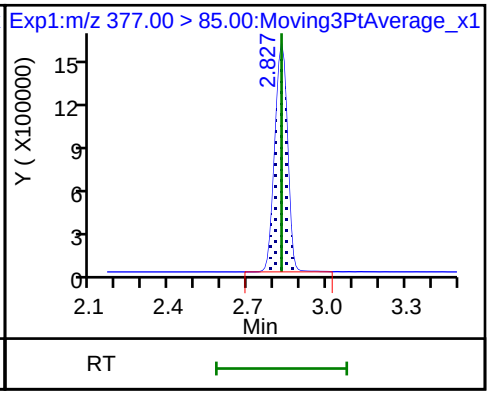
D 16 13C4 PFHpA



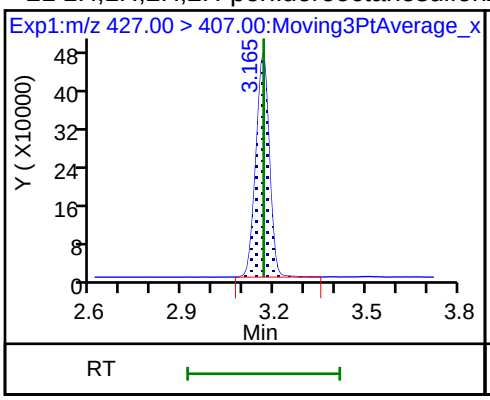
19 DONA



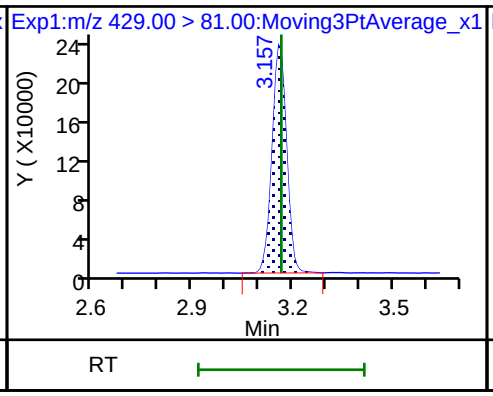
19 DONA



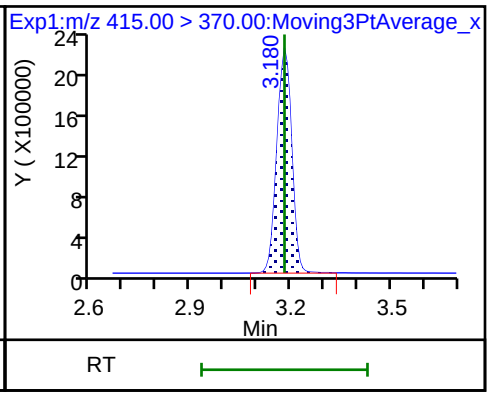
21 1H,1H,2H,2H-perfluorooctanesulfon



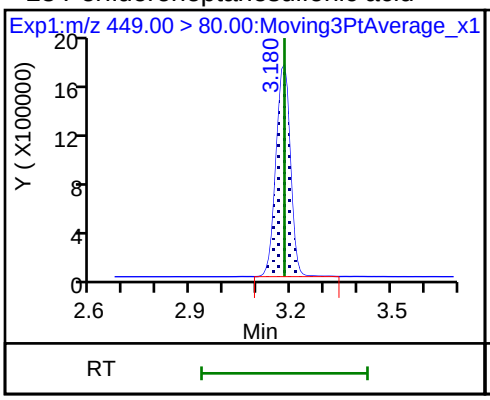
D 20 M2-6:2 FTS



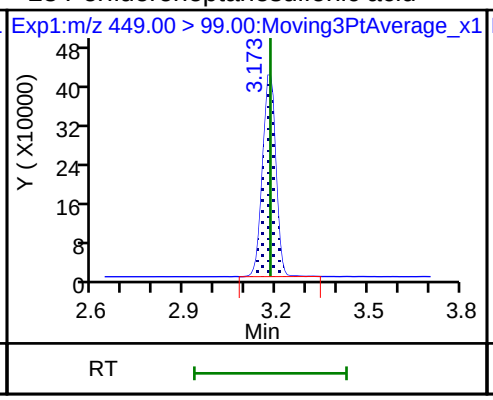
* 24 13C2 PFOA



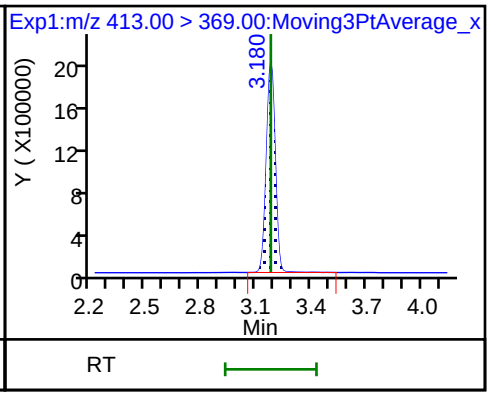
23 Perfluoroheptanesulfonic acid



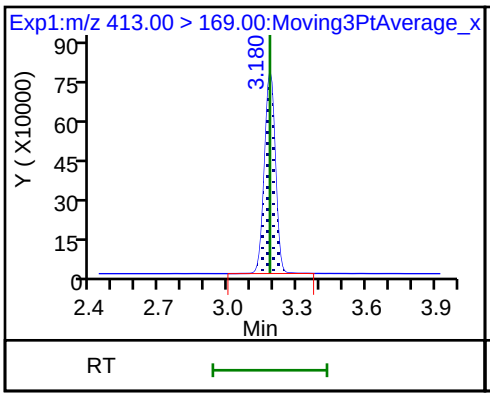
23 Perfluoroheptanesulfonic acid



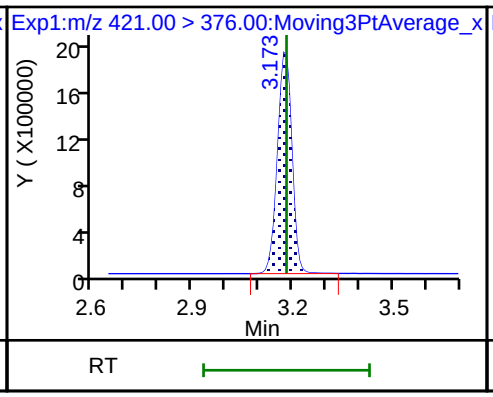
26 Perfluorooctanoic acid



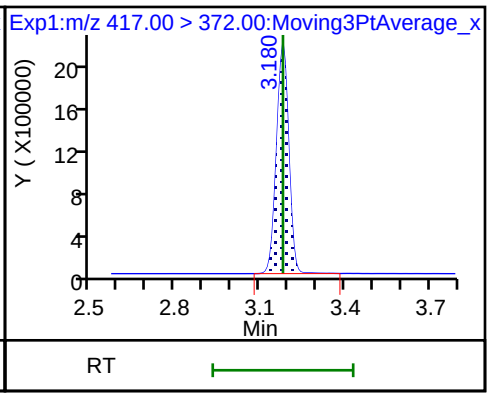
26 Perfluorooctanoic acid



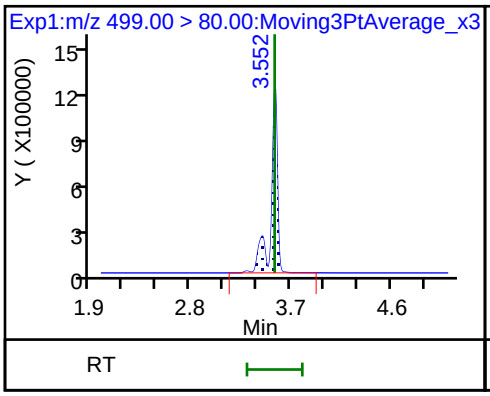
D 22 13C8 PFOA



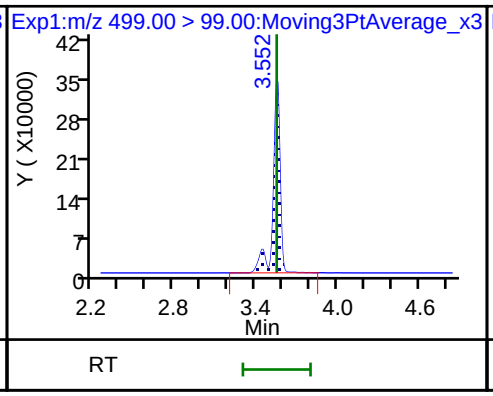
D 25 13C4 PFOA



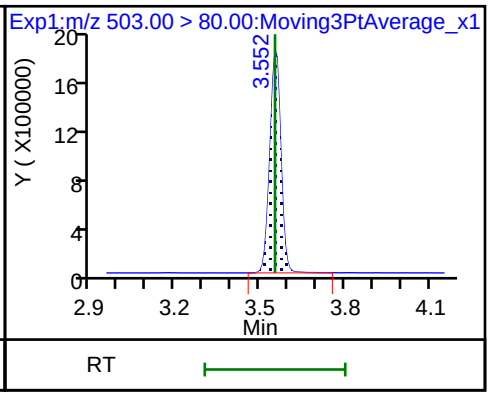
29 Perfluorooctanesulfonic acid



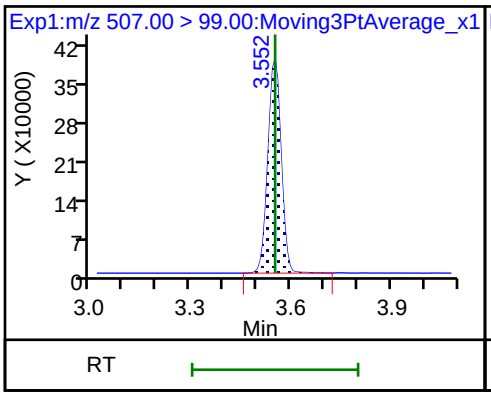
29 Perfluorooctanesulfonic acid



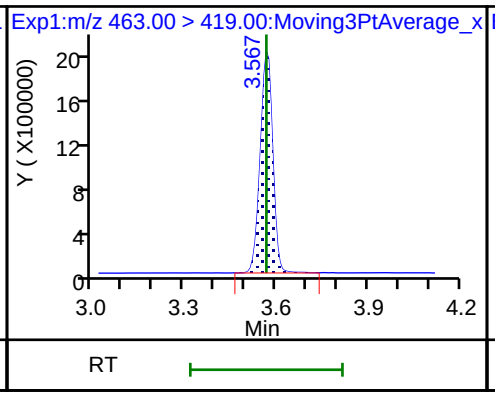
D 28 13C4 PFOS



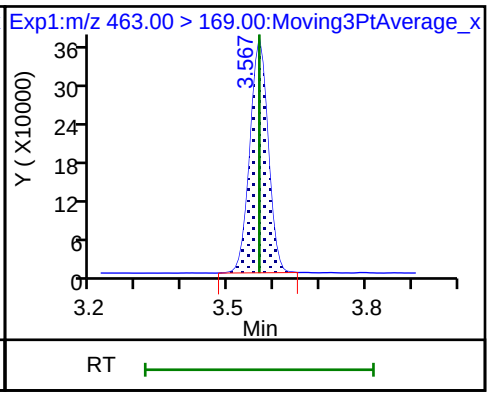
D 27 13C8 PFOS



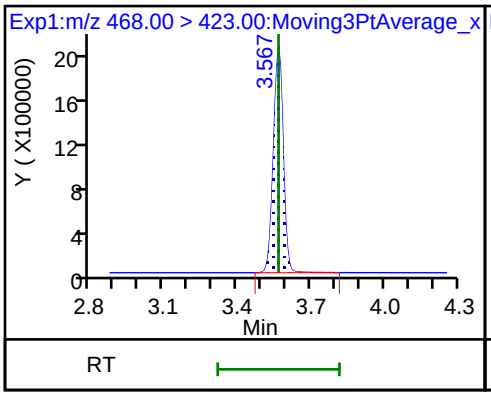
30 Perfluorononanoic acid



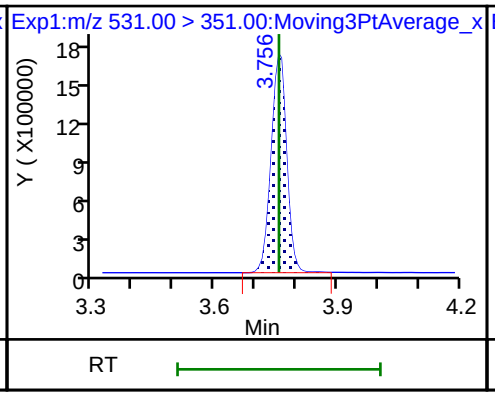
30 Perfluorononanoic acid



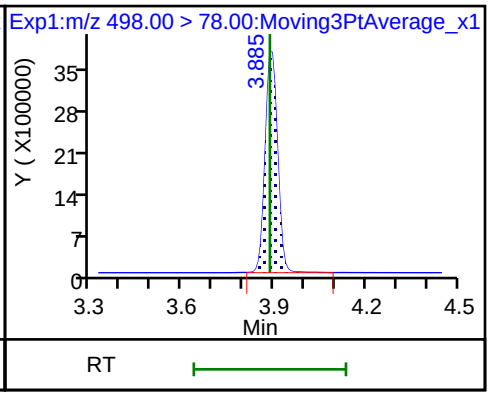
D 31 13C5 PFNA



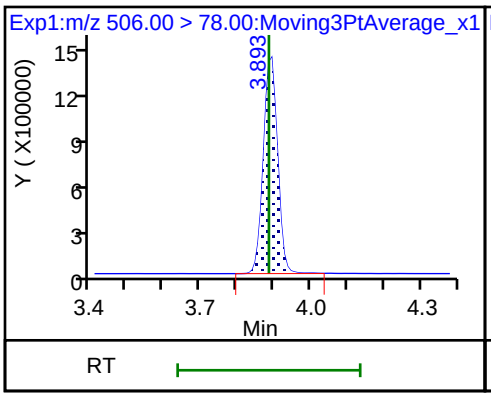
32 9-Chlorohexadecafluoro-3-oxanonane



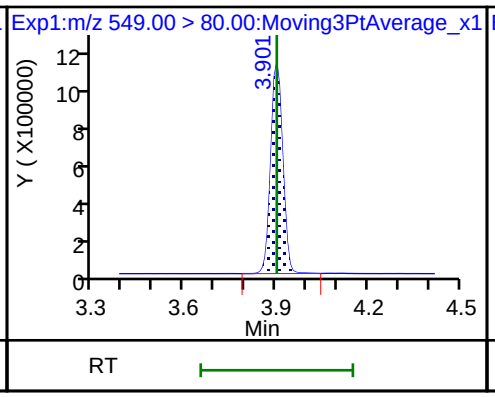
34 Perfluorooctanesulfonamide



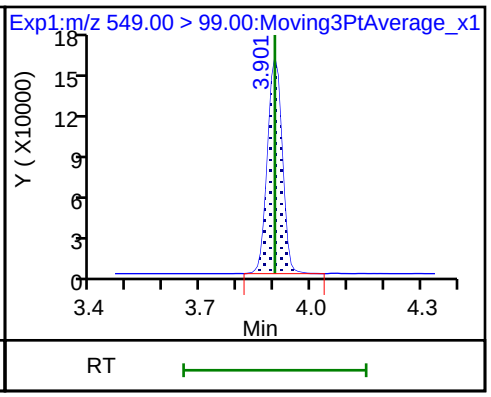
D 33 13C8 FOSA



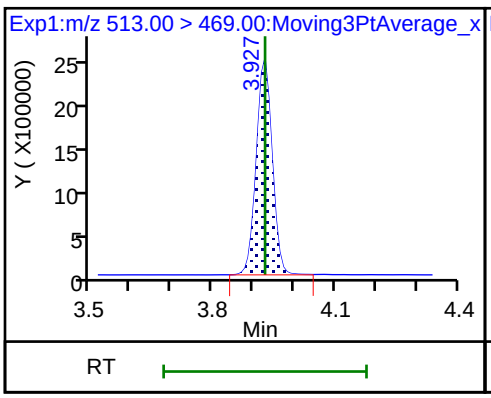
35 Perfluorononanesulfonic acid



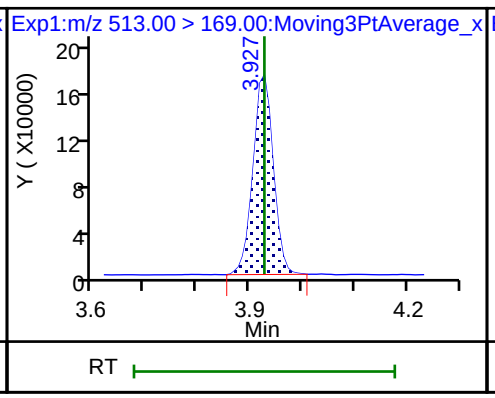
35 Perfluorononanesulfonic acid



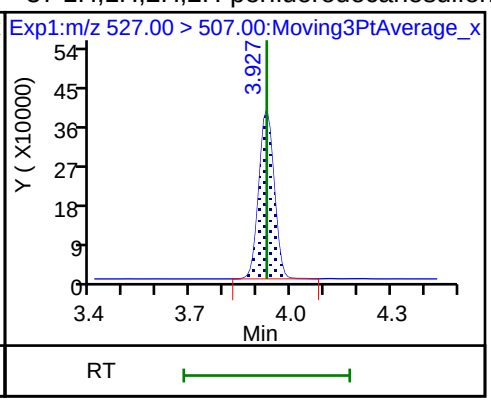
38 Perfluorodecanoic acid



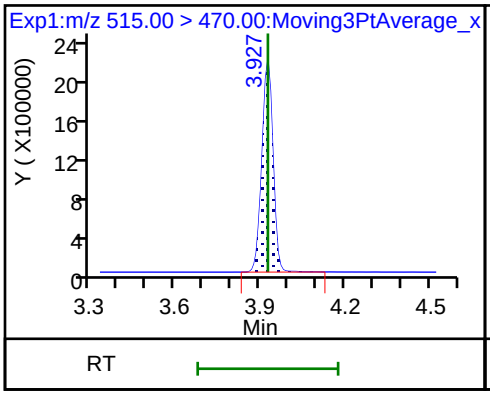
38 Perfluorodecanoic acid



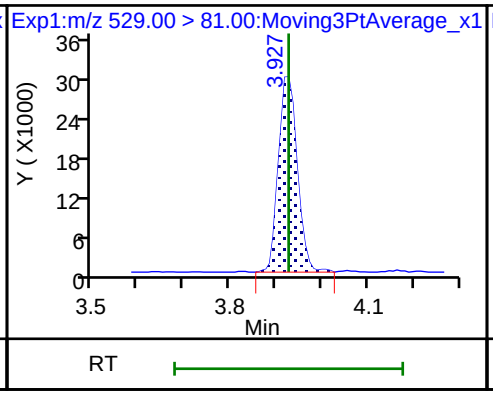
37 1H,1H,2H,2H-perfluorodecanesulfoni



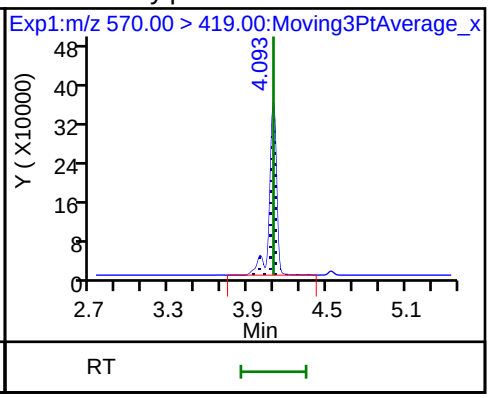
D 36 13C2 PFDA



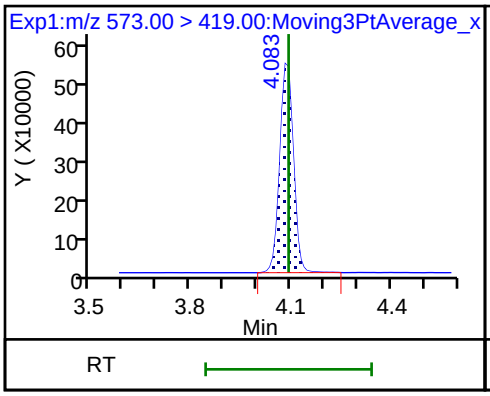
D 39 M2-8:2 FTS



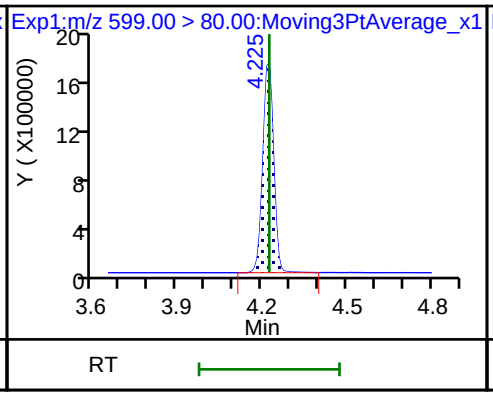
41 N-methylperfluorooctanesulfonamido



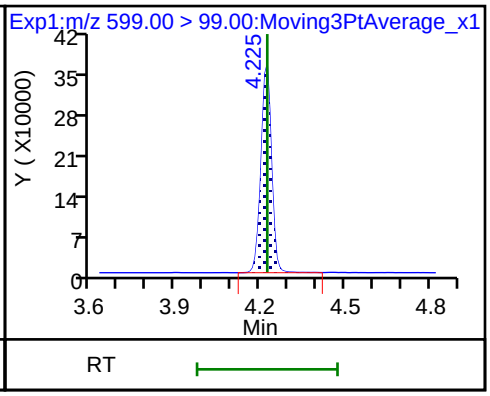
D 40 d3-NMeFOSAA



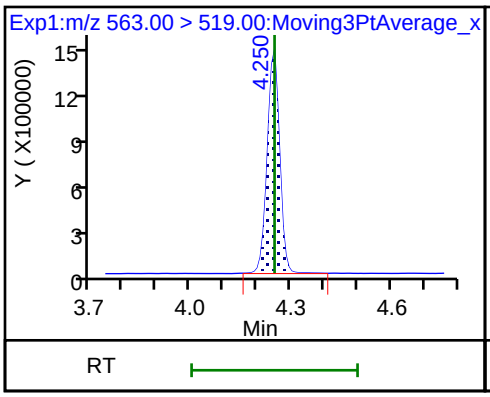
42 Perfluorodecanesulfonic acid



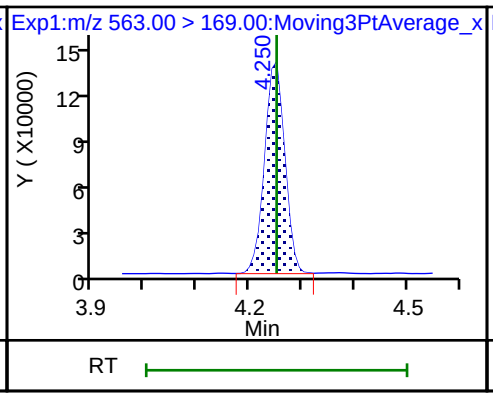
42 Perfluorodecanesulfonic acid



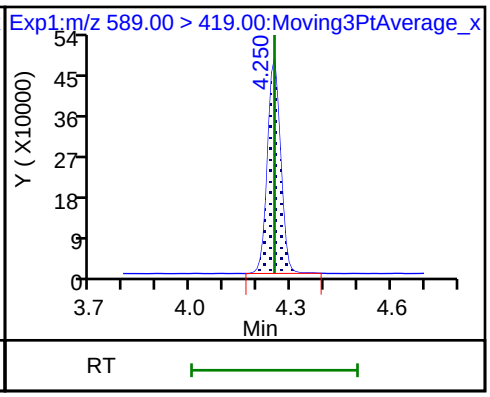
43 Perfluoroundecanoic acid



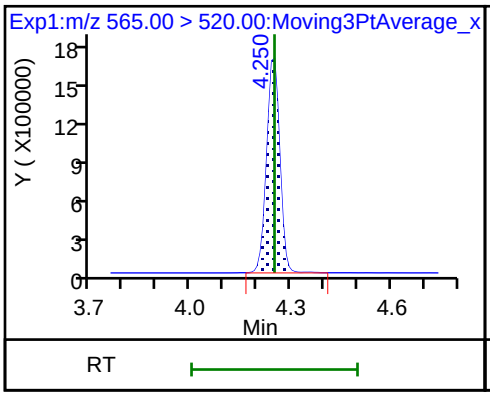
43 Perfluoroundecanoic acid



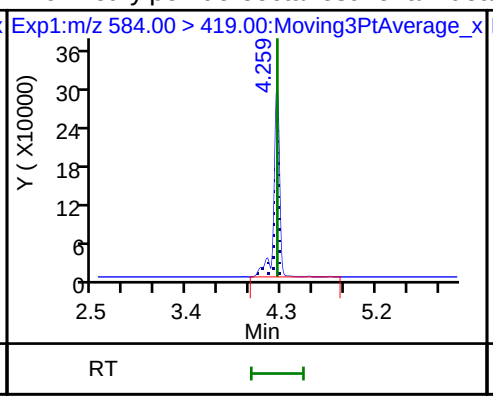
D 45 d5-NEtFOSAA



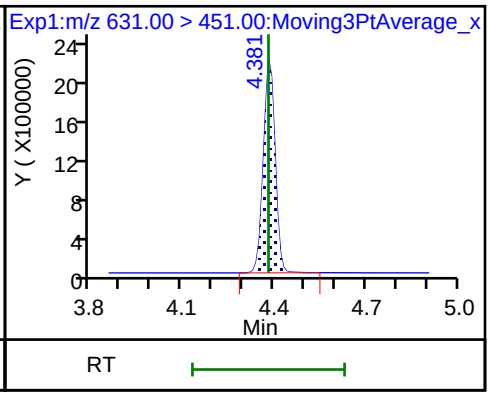
D 44 13C2 PFUnA



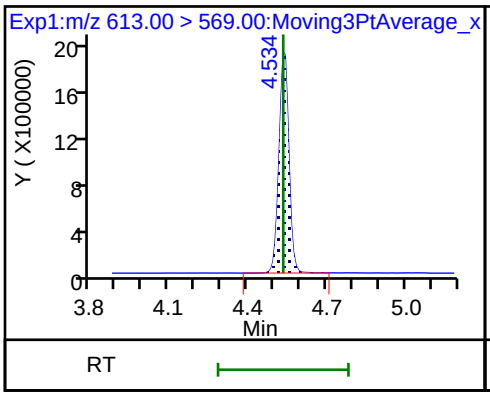
46 N-ethylperfluorooctanesulfonamidoa



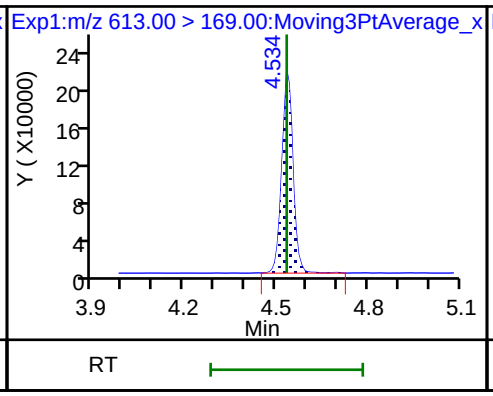
48 11-Chloroeicosafluoro-3-oxaundecan



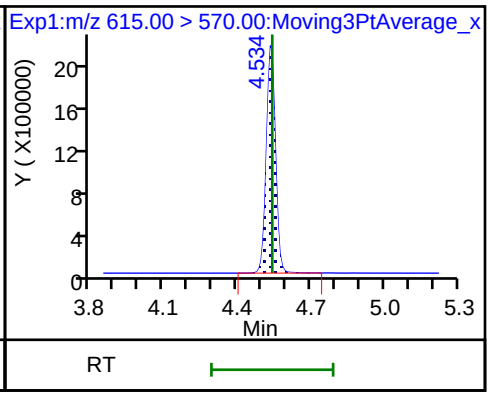
50 Perfluorododecanoic acid



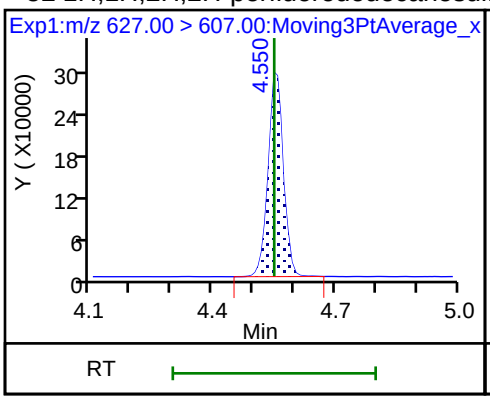
50 Perfluorododecanoic acid



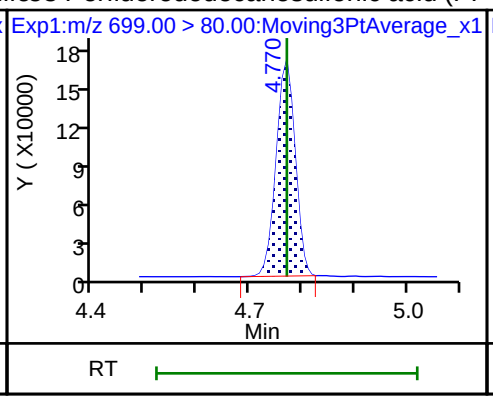
D 49 13C2 PFDoA



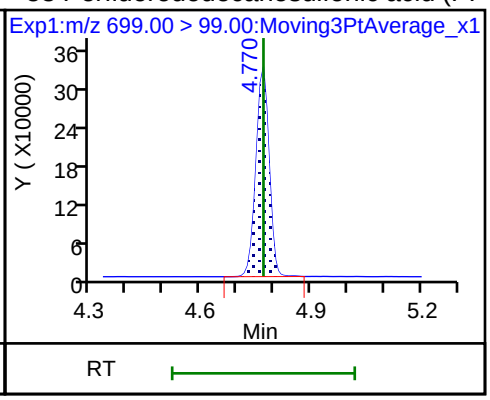
52 1H,1H,2H,2H-perfluorododecanesulfo



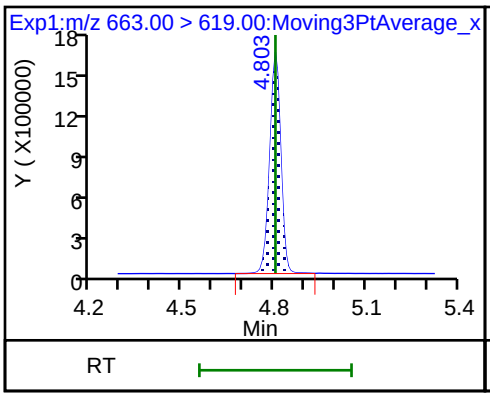
53 Perfluorododecanesulfonic acid (PF



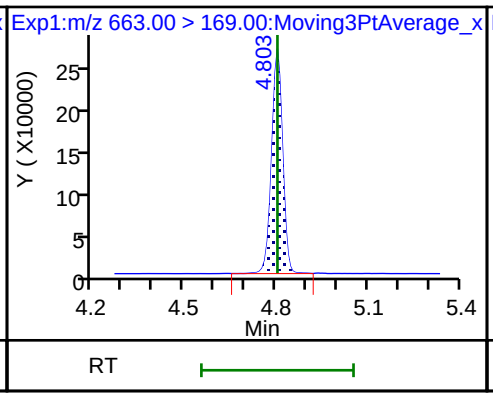
53 Perfluorododecanesulfonic acid (PF



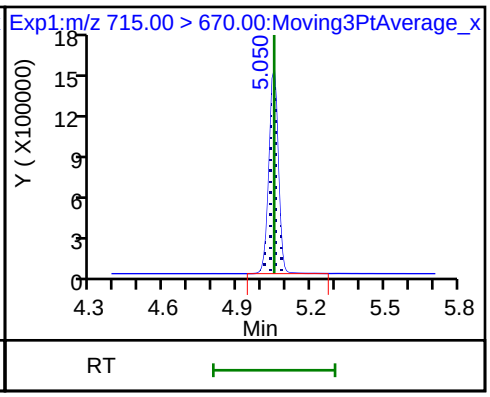
54 Perfluorotridecanoic acid



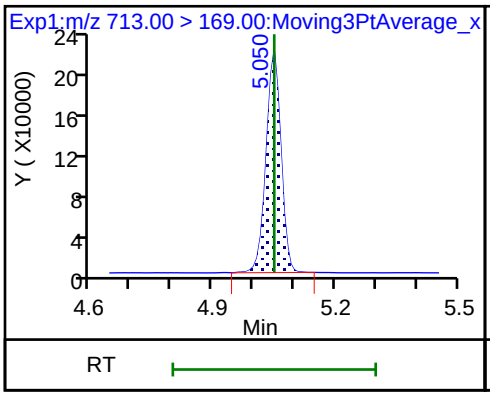
54 Perfluorotridecanoic acid



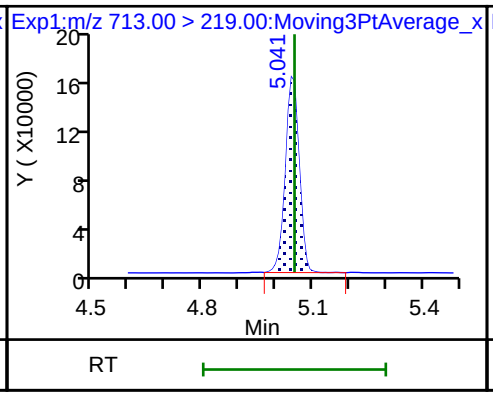
D 55 13C2 PFTeDA



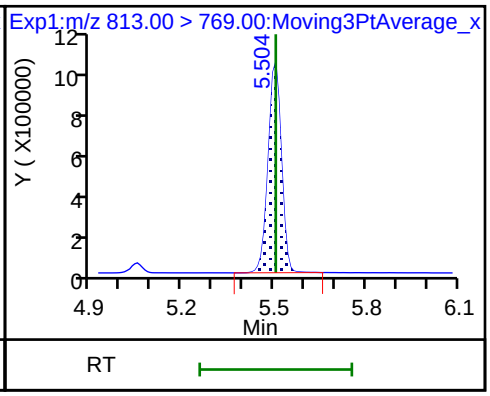
56 Perfluorotetradecanoic acid



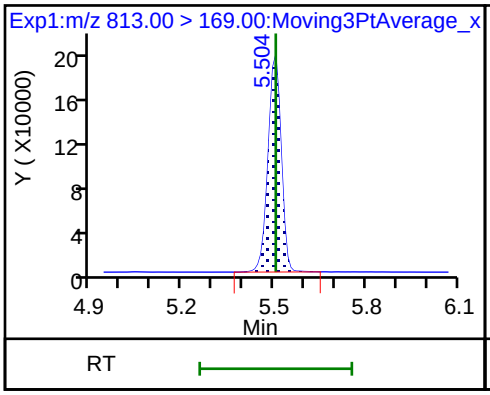
56 Perfluorotetradecanoic acid



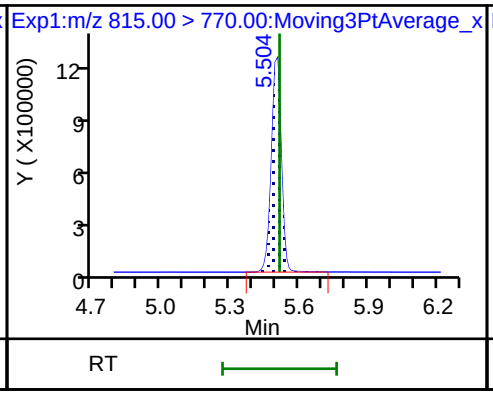
58 Perfluorohexadecanoic acid



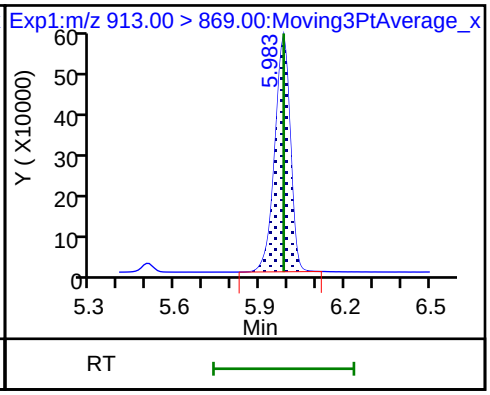
58 Perfluorohexadecanoic acid



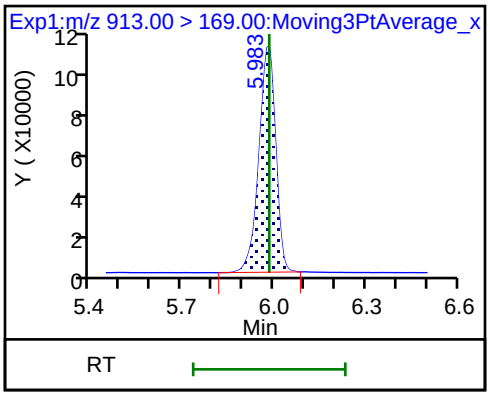
D 57 13C2 PFHxDA



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCVL 320-270021/2 Calibration Date: 01/10/2019 13:45

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.10LLA_005.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.8823		0.0477	0.0500	-4.7	50.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	1.037		0.0519	0.0500	3.7	50.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	1.019		0.0467	0.0442	5.6	50.0
4:2 FTS	AveID	0.1480	0.1875		0.592	0.467	26.7	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.8815		0.0509	0.0500	1.8	50.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.5103		0.0511	0.0469	8.8	50.0
HFPO-DA (GenX)	AveID	2.144	1.791		0.0418	0.0500	-16.5	50.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	1.105		0.0531	0.0500	6.2	50.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.274		0.0469	0.0455	3.0	50.0
DONA	AveID	2.306	2.349		0.0480	0.0471	1.9	50.0
6:2 FTS	AveID	2.112	2.110		0.474	0.474	-0.0	50.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.071		0.0483	0.0476	1.5	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	1.086		0.0524	0.0501	4.8	50.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	0.9424		0.0415	0.0464	-10.6	50.0
Perfluorononanoic acid (PFNA)	AveID	0.995	0.9432		0.0474	0.0500	-5.3	50.0
F-53B Major	AveID	0.9553	0.9226		0.0450	0.0466	-3.4	50.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.6091		0.0500	0.0480	4.1	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	2.990		0.0514	0.0500	2.9	50.0
8:2 FTS	AveID	14.20	13.65		0.461	0.479	-3.9	50.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.235		0.0538	0.0500	7.5	50.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.9266		0.535	0.500	6.9	50.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.8104		0.0447	0.0482	-7.3	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.9749		0.0585	0.0500	16.9	50.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.7931		0.479	0.500	-4.2	50.0
F-53B Minor	AveID	1.128	1.338		0.0559	0.0471	18.7	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	1.022		0.0532	0.0500	6.5	50.0
10:2 FTS	AveID	8.852	7.677		0.0418	0.0482	-13.3	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0919		0.0490	0.0484	1.1	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.8012		0.0528	0.0500	5.6	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1812		0.0555	0.0500	11.0	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		1.341		0.0511	0.0500	2.1	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCVL 320-270021/2 Calibration Date: 01/10/2019 13:45

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.10LLA_005.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.6545		0.0530	0.0500	6.0	50.0
13C4 PFBA	Ave	0.9546	0.9117		2.39	2.50	-4.5	50.0
13C5 PFPeA	Ave	0.8350	0.8460		2.53	2.50	1.3	50.0
13C3 PFBS	Ave	1.371	1.249		2.12	2.33	-8.9	50.0
M2-4:2 FTS	Ave	0.0836	0.0844		2.36	2.34	0.9	50.0
13C2 PFHxA	Ave	0.9280	0.9049		2.44	2.50	-2.5	50.0
13C3 HFPO-DA	Ave	0.0833	0.0876		2.63	2.50	5.1	50.0
13C4 PFHpA	Ave	1.141	1.184		2.59	2.50	3.7	50.0
18O2 PFHxS	Ave	0.8068	0.7871		2.31	2.37	-2.5	50.0
M2-6:2 FTS	Ave	0.1125	0.1246		2.63	2.38	10.8	50.0
13C4 PFOA	Ave	0.9896	0.9923		2.51	2.50	0.3	50.0
13C8 PFOA	Ave	2363087	2450588		2.54	2.45	3.7	50.0
13C8 PFOS	Ave	500608	509826		2.43	2.39	1.8	50.0
13C4 PFOS	Ave	0.8235	0.8244		2.39	2.39	0.1	50.0
13C5 PFNA	Ave	0.8916	0.8840		2.48	2.50	-0.9	50.0
13C8 FOSA	Ave	0.5421	0.5413		2.50	2.50	-0.2	50.0
13C2 PFDA	Ave	0.8721	0.8991		2.58	2.50	3.1	50.0
M2-8:2 FTS	Ave	0.0129	0.0143		2.66	2.40	10.9	50.0
d3-NMeFOSAA	Ave	0.2285	0.2194		2.40	2.50	-4.0	50.0
13C2 PFUnA	Ave	0.6858	0.6875		2.51	2.50	0.2	50.0
d5-NEtFOSAA	Ave	0.1905	0.1960		2.57	2.50	2.9	50.0
13C2 PFDoA	Ave	0.8313	0.7984		2.40	2.50	-3.9	50.0
13C2 PFTeDA	Ave	0.5763	0.5882		2.55	2.50	2.1	50.0
13C2 PFHxDA	Ave	0.5385	0.5058		2.35	2.50	-6.1	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_005.d
Lims ID: CCVL
Client ID:
Sample Type: CCVL
Inject. Date: 10-Jan-2019 13:45:24 ALS Bottle#: 29 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCVL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub6

Method: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 11-Jan-2019 09:32:15 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0316

First Level Reviewer: mongkols Date: 11-Jan-2019 09:32:15
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.668	1.660	0.008	0.526	6443932	2.39		95.5	9639	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.668	1.668	0.0	1.000	113714	0.0477		95.3	14.9	
D 3 13C5 PFPeA										
267.90 > 223.00	2.009	1.998	0.011	0.633	5979522	2.53		101	4163	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.009	2.009	0.0	1.000	124064	0.0519		104	6.5	
D 5 13C3 PFBS										
301.90 > 80.00	2.051	2.040	0.011	0.647	8212090	2.12		91.1	767036	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.051	2.051	0.0	1.000	159032	0.0467	Target=2.70	106	206	
298.90 > 99.00	2.051	2.051	0.0	1.000	52601		3.02(1.35-4.05)		72.9	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.339	2.331	0.008	0.737	556886	2.36		101	977	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.339	2.339	0.0	1.140	309330	0.5919		127	1109	
D 9 13C2 PFHxA										
315.00 > 270.00	2.383	2.373	0.010	0.751	6395949	2.44		97.5	3086	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.383	2.382	0.001	1.000	112754	0.0509	Target=13.92	102	47.6	
313.00 > 119.00	2.383	2.382	0.001	1.000	8216		13.72(6.96-20.87)		18.3	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.401	2.401	0.0	1.171	84529	0.0510	Target=2.30	109	354	
349.00 > 99.00	2.392	2.401	-0.009	1.166	41552		2.03(1.15-3.45)		112	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.497	2.487	0.010	0.787	618933	2.63		105	1965	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.508	2.497	0.011	1.004	22164	0.0418		83.5	16.5	
D 16 13C4 PFHpA										
367.00 > 322.00	2.772	2.763	0.009	0.874	8368120	2.59		104	2350	
D 17 18O2 PFHxS										
403.00 > 84.00	2.772	2.772	0.0	0.874	5262695	2.31		97.5	2447	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.772	2.772	0.0	1.000	184879	0.0531	Target=4.34	106	58.3	
363.00 > 169.00	2.772	2.772	0.0	1.000	34084		5.42(2.17-6.52)		65.1	
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.781	2.781	0.0	1.003	129009	0.0469	Target=3.80	103	259	M
399.00 > 99.00	2.781	2.781	0.0	1.003	35749		3.61(1.90-5.70)		38.8	M
19 DONA										
377.00 > 251.00	2.817	2.826	-0.009	0.795	257857	0.0480	Target=2.26	102	517	
377.00 > 85.00	2.817	2.826	-0.009	0.795	109944		2.35(1.13-3.39)		117	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.149	3.141	0.008	1.000	352363	0.4736		99.9	444	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.149	3.141	0.008	0.993	836850	2.63		111	1533	
D 22 13C8 PFOA										
421.00 > 376.00	3.165	3.157	0.008		5997815	2.54		104	2269	
D 25 13C4 PFOA										
417.00 > 372.00	3.165	3.157	0.008	0.998	7014101	2.51		100	4568	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.165	3.164	0.001	0.893	118815	0.0483	Target=3.69	101	355	
449.00 > 99.00	3.165	3.164	0.001	0.893	29619		4.01(1.84-5.53)		118	
* 24 13C2 PFOA										
415.00 > 370.00	3.172	3.172	0.0		7068234	2.50			2857	
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.172	3.172	0.0	1.002	152497	0.0524	Target=2.72	105	22.4	M
413.00 > 169.00	3.172	3.172	0.0	1.002	59427		2.57(1.36-4.08)		129	
D 27 13C8 PFOS										
507.00 > 99.00	3.537	3.529	0.008		1218484	2.43		102	1871	
D 28 13C4 PFOS										
503.00 > 80.00	3.544	3.529	0.015	1.117	5570534	2.39		100	3123	
29 Perfluorooctanesulfonic acid										M
499.00 > 80.00	3.544	3.544	0.0	1.000	101923	0.0415	Target=4.08	89.4	170	M
499.00 > 99.00	3.537	3.544	-0.007	0.998	25801		3.95(2.04-6.12)		149	
D 31 13C5 PFNA										
468.00 > 423.00	3.552	3.544	0.008	1.120	6248259	2.48		99.1	3096	
30 Perfluorononanoic acid										
463.00 > 419.00	3.552	3.552	0.0	1.000	117862	0.0474	Target=5.35	94.7	32.4	
463.00 > 169.00	3.559	3.552	0.007	1.002	21988		5.36(2.68-8.03)		81.0	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.748	3.740	0.008	1.057	100204	0.0450		96.6	122	
D 33 13C8 FOSA										
506.00 > 78.00	3.885	3.877	0.008	1.225	3826185	2.50		99.8	2733	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.885	3.885	0.0	1.096	68139	0.0500	Target=6.03	104	176	
549.00 > 99.00	3.892	3.885	0.007	1.098	7794		8.74(3.02-9.05)		76.7	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.885	3.885	0.0	1.000	228785	0.0514		103	587	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.909	3.892	0.017	1.232	96967	2.66		111	555	
D 36 13C2 PFDA										
515.00 > 470.00	3.909	3.901	0.008	1.232	6355035	2.58		103	3947	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.909	3.909	0.0	1.000	157014	0.0538	Target=14.23	108	107	
513.00 > 169.00	3.901	3.909	-0.008	0.998	9919		15.83(7.12-21.35)		16.8	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.909	3.909	0.0	1.000	264698	0.4605		96.1	703	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.073	4.063	0.010	1.284	1550774	2.40		96.0	2105	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.073	4.072	0.001	1.000	287403	0.5347		107	97.6	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.207	4.207	0.0	1.187	91043	0.0447	Target=4.28	92.7	240	
599.00 > 99.00	4.207	4.207	0.0	1.187	20763		4.38(2.14-6.43)		68.8	
D 44 13C2 PFUnA										
565.00 > 520.00	4.224	4.224	0.0	1.332	4859518	2.51		100	1886	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.233	4.224	0.009	1.334	1385395	2.57		103	1793	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.233	4.233	0.0	1.002	94749	0.0585	Target=10.48	117	21.8	
563.00 > 169.00	4.224	4.233	-0.009	1.000	7830		12.10(5.24-15.72)		24.0	
46 N-ethylperfluorooctanesulfonamidoa										M
584.00 > 419.00	4.241	4.241	0.0	1.002	219738	0.4790		95.8	528	M
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.370	4.370	0.0	1.233	146935	0.0559		119	697	
D 49 13C2 PFDoA										
615.00 > 570.00	4.518	4.510	0.008	1.424	5643432	2.40		96.1	2874	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.518	4.518	0.0	1.000	115396	0.0532	Target=9.37	106	54.9	
613.00 > 169.00	4.510	4.518	-0.008	0.998	11991		9.62(4.68-14.05)		54.6	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.526	4.533	-0.007	1.158	14982	0.0418		86.7	46.8	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.752	4.743	0.009	1.341	10364	0.0490	Target=0.55	101	80.0	
699.00 > 99.00	4.744	4.743	0.001	1.338	18193		0.57(0.28-0.83)		148	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.778	4.778	0.0	1.058	90434	0.0528	Target=6.18	106	54.6	
663.00 > 169.00	4.787	4.778	0.009	1.060	14877		6.08(3.09-9.27)		103	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.024	5.016	0.008	1.584	4157515	2.55		102	4213	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.024	5.024	0.0	1.000	15068	0.0555	Target=1.39	111	99.9	
713.00 > 219.00	5.024	5.024	0.0	1.000	11446		1.32(0.70-2.09)		113	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.465	5.456	0.009	1.723	3575226	2.35		93.9	3865	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.465	5.465	0.0	1.000	95854	0.0511	Target=5.55	102	7.0	
813.00 > 169.00	5.465	5.465	0.0	1.000	18440		5.20(2.77-8.32)		111	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	5.930	5.930	0.0	1.085	46799	0.0530	Target=5.09	106	13.7	
913.00 > 169.00	5.922	5.930	-0.008	1.084	9810		4.77(2.55-7.64)		101	

QC Flag Legend

Review Flags

M - Manually Integrated

Reagents:

LCPFC_LLCCVL_00001 Amount Added: 1.00 Units: mL

Report Date: 11-Jan-2019 09:32:17 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_005.d

Injection Date: 10-Jan-2019 13:45:24 Instrument ID: A9

Lims ID: CCVL

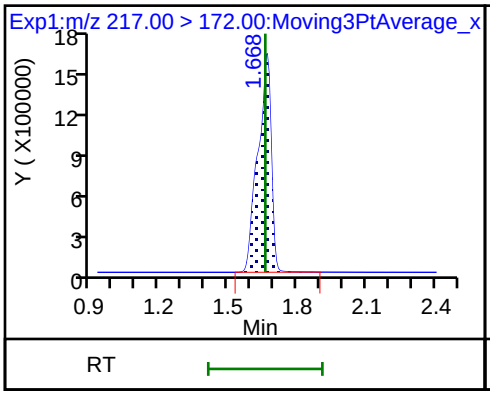
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 29 Worklist Smp#: 2

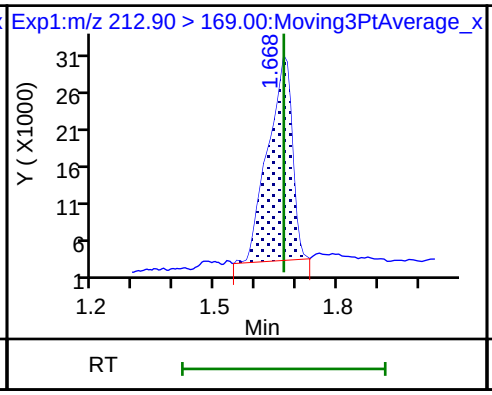
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

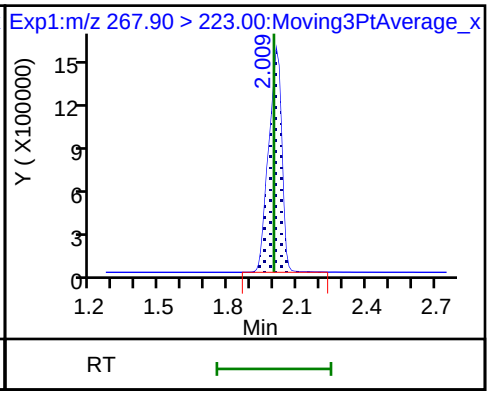
D 1 13C4 PFBA



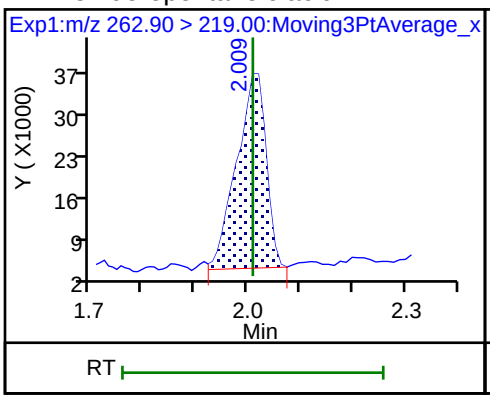
2 Perfluorobutanoic acid



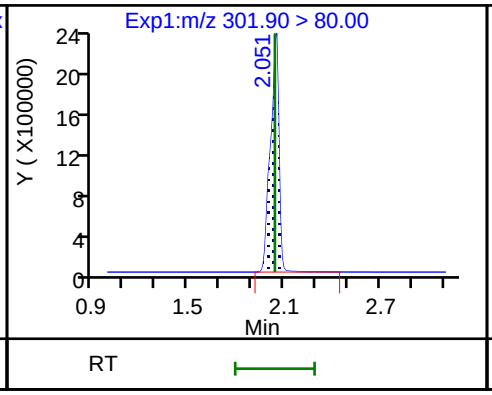
D 3 13C5 PFPeA



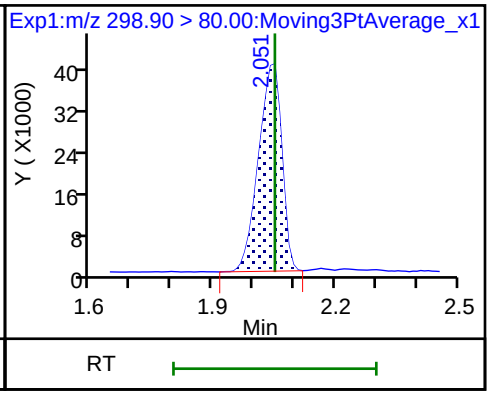
4 Perfluoropentanoic acid



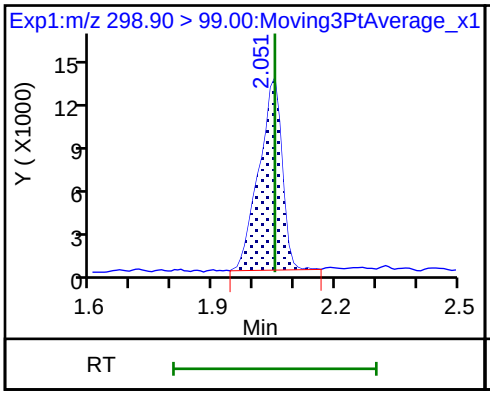
D 5 13C3 PFBS



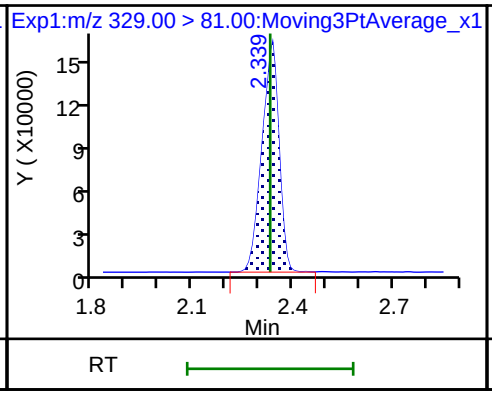
6 Perfluorobutanesulfonic acid



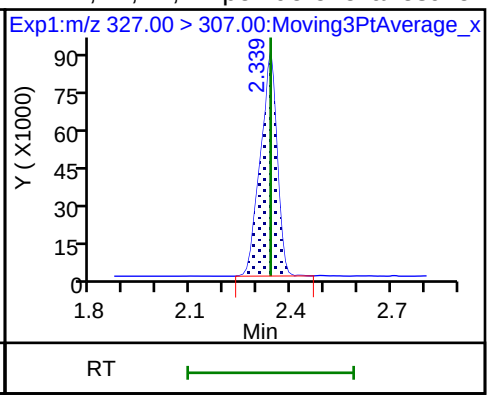
6 Perfluorobutanesulfonic acid



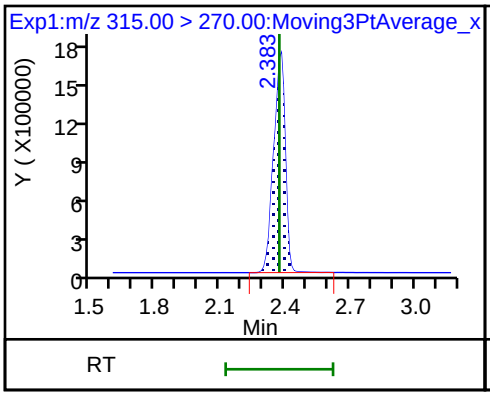
D 8 M2-4:2 FTS



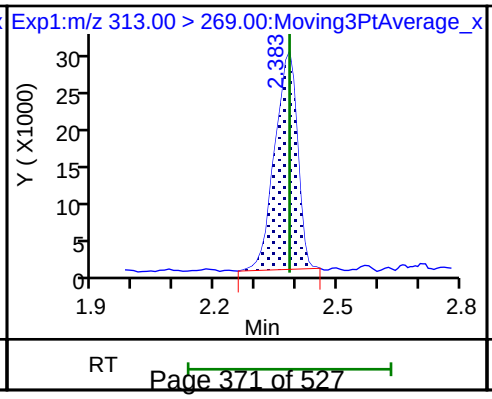
7 1H,1H,2H,2H-perfluorohexanesulfoni



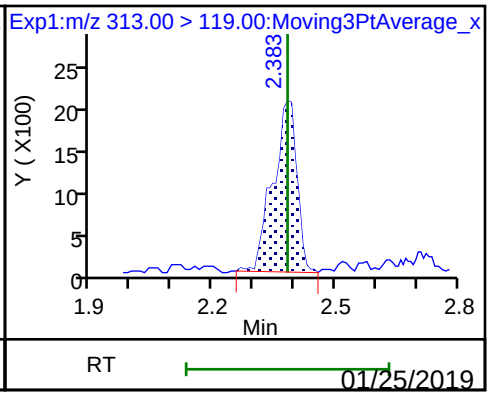
D 9 13C2 PFHxA



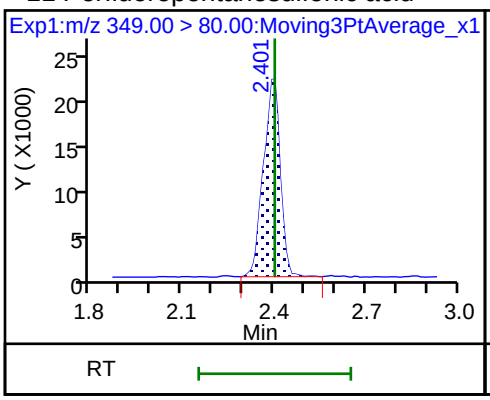
10 Perfluorohexanoic acid



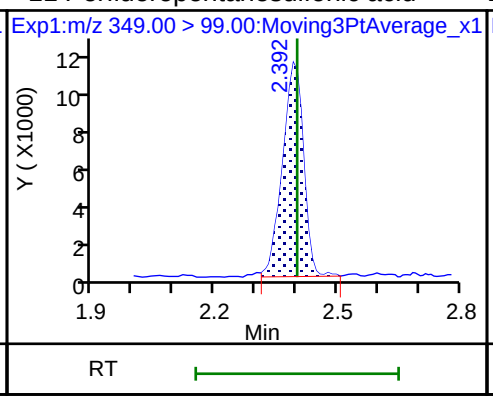
10 Perfluorohexanoic acid



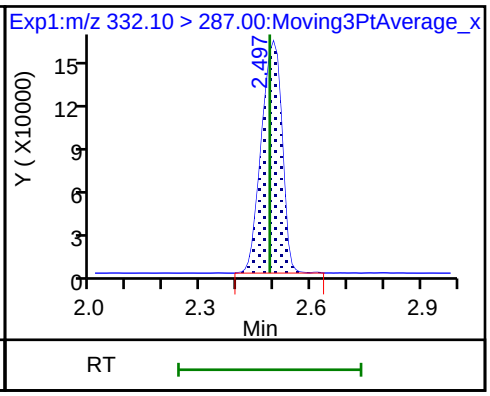
11 Perfluoropentanesulfonic acid



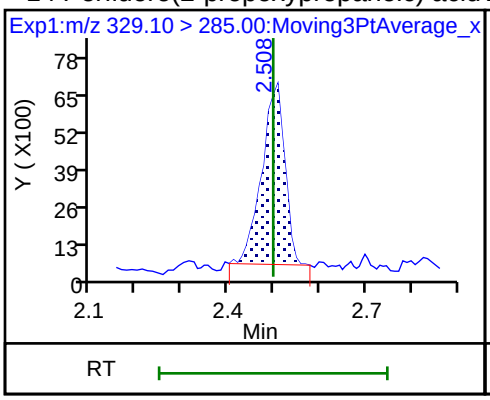
11 Perfluoropentanesulfonic acid



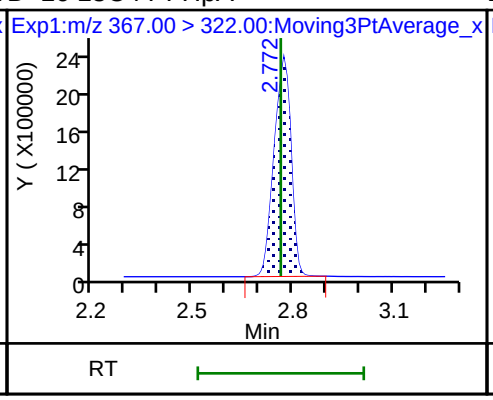
D 13 13C3 HFPO-DA



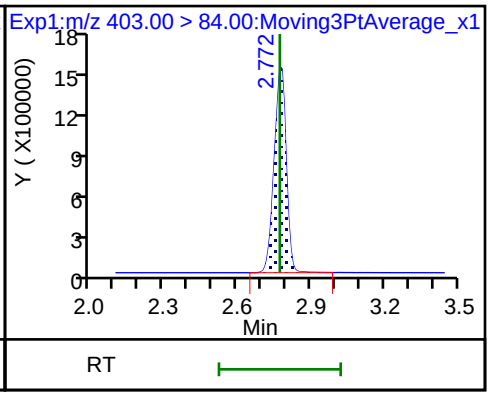
14 Perfluoro(2-propoxypropanoic) acid



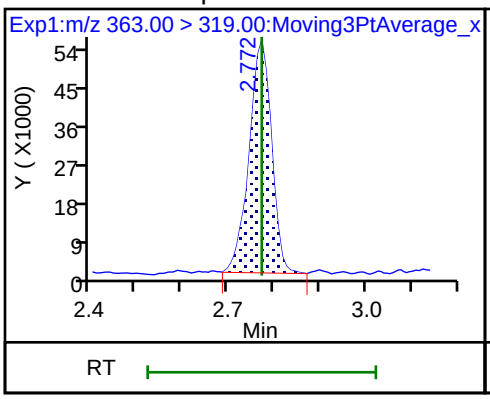
D 16 13C4 PFHpA



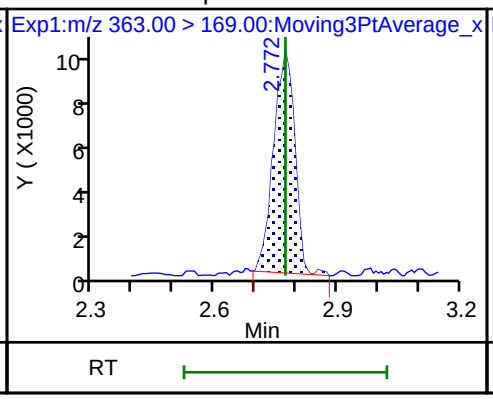
D 17 18O2 PFHxS



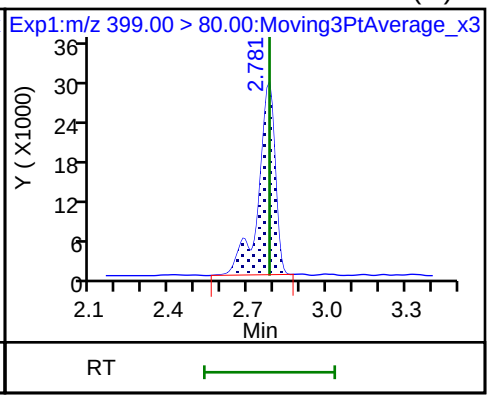
15 Perfluoroheptanoic acid



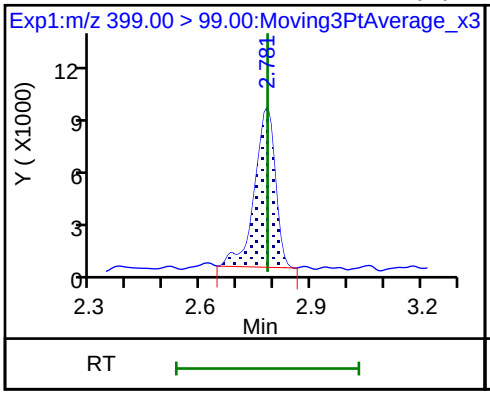
15 Perfluoroheptanoic acid



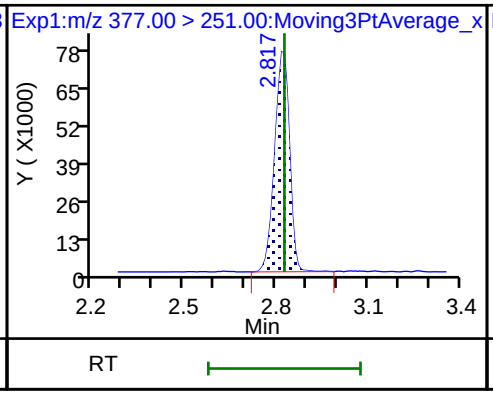
18 Perfluorohexanesulfonic acid (M)



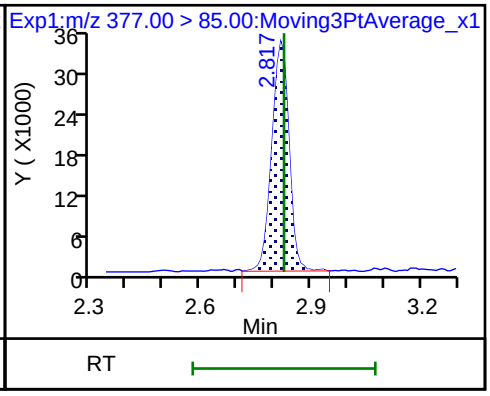
18 Perfluorohexanesulfonic acid (M)



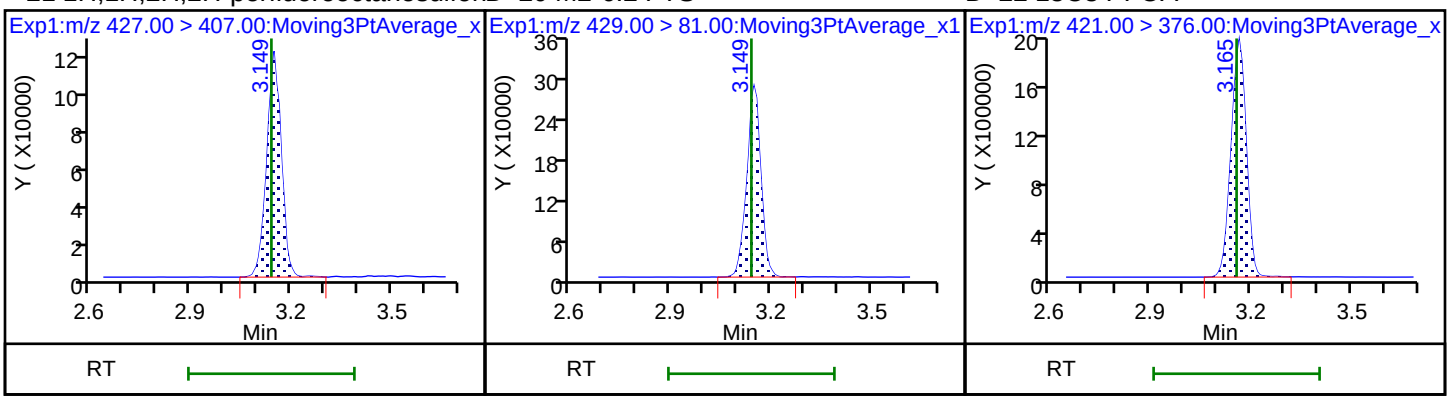
19 DONA



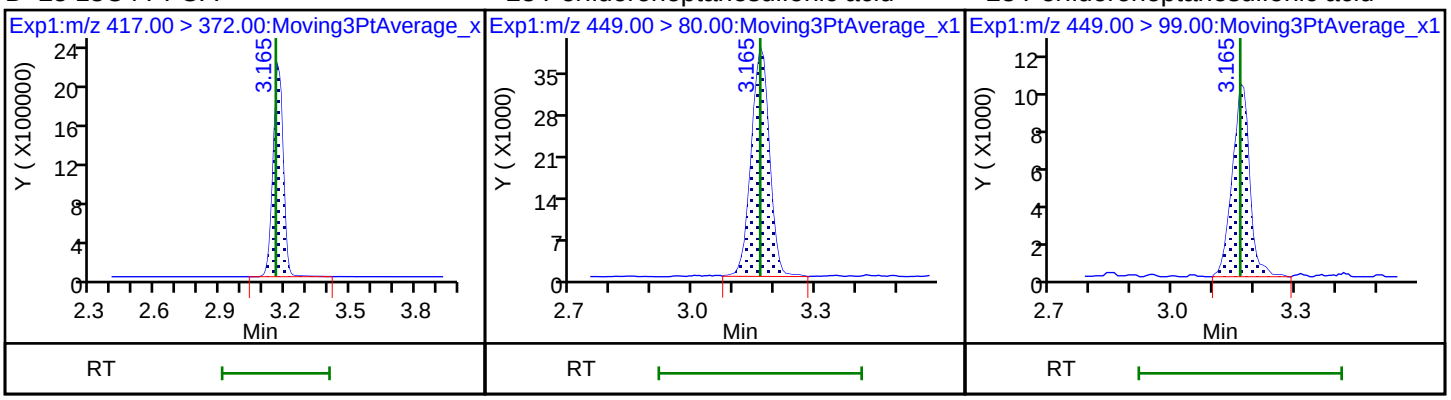
19 DONA



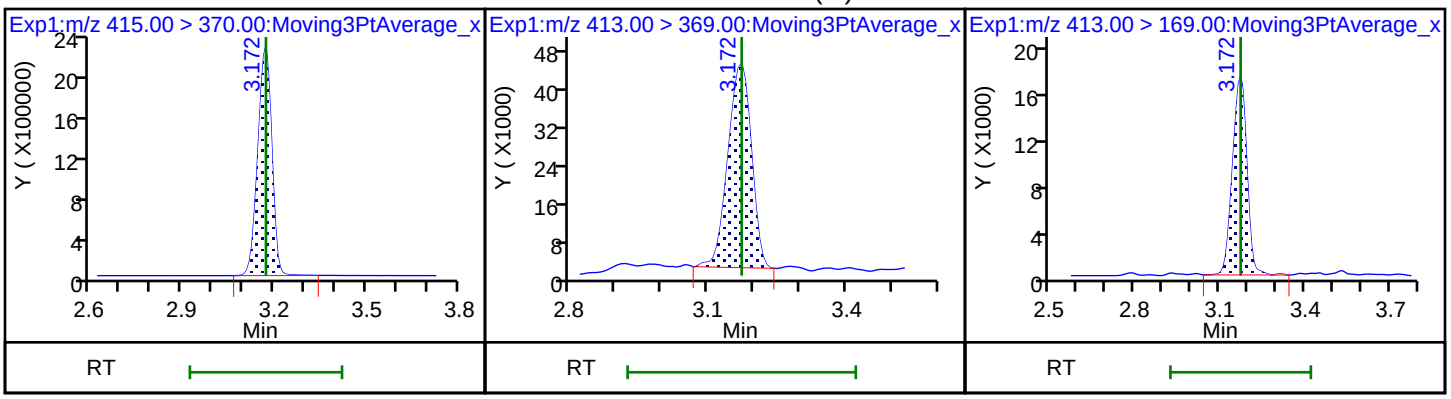
21 1H,1H,2H,2H-perfluorooctanesulfonD 20 M2-6:2 FTS D 22 13C8 PFOA



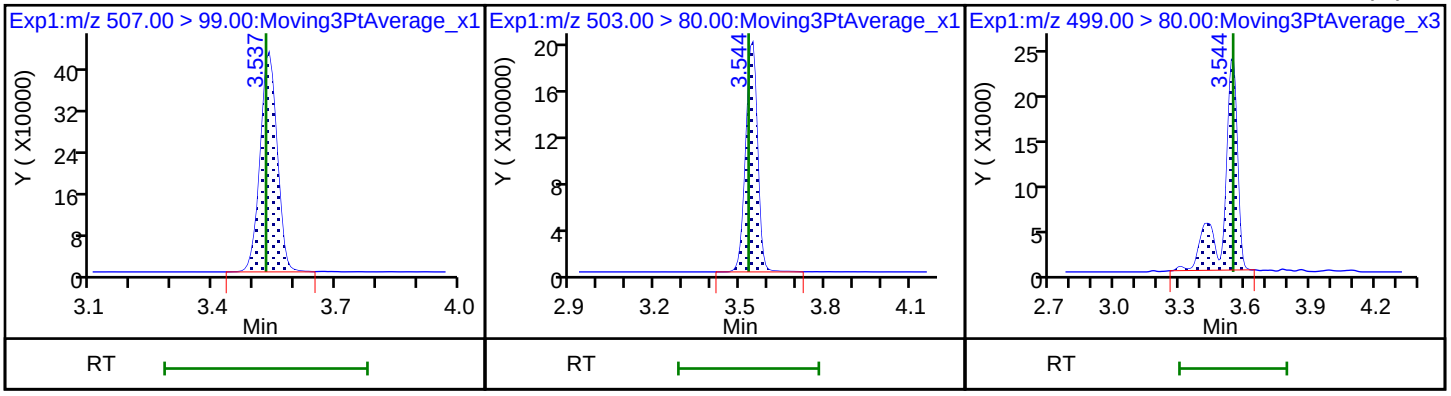
D 25 13C4 PFOA 23 Perfluoroheptanesulfonic acid 23 Perfluoroheptanesulfonic acid



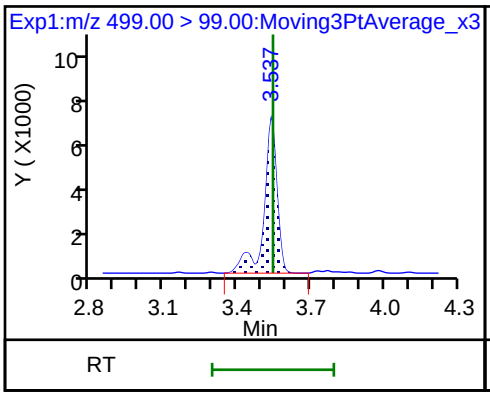
* 24 13C2 PFOA 26 Perfluorooctanoic acid (M) 26 Perfluorooctanoic acid



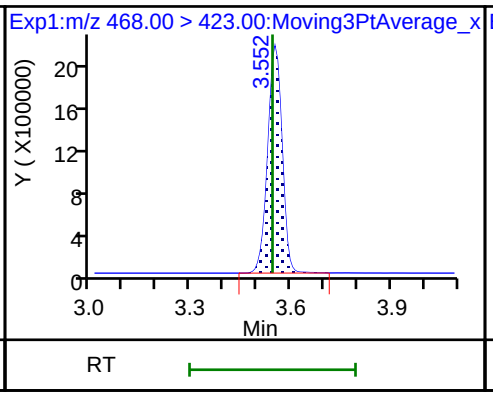
D 27 13C8 PFOS D 28 13C4 PFOS 29 Perfluorooctanesulfonic acid (M)



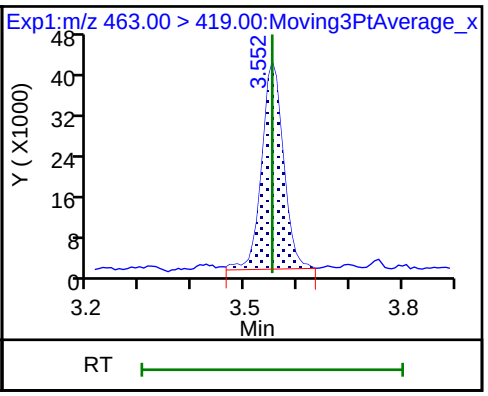
29 Perfluorooctanesulfonic acid



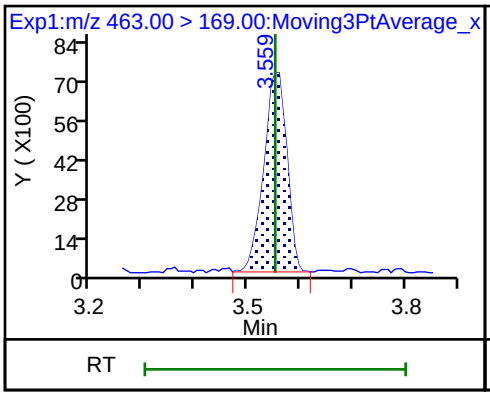
D 31 13C5 PFNA



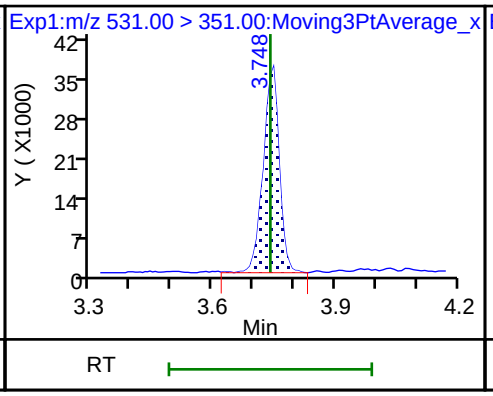
30 Perfluorononanoic acid



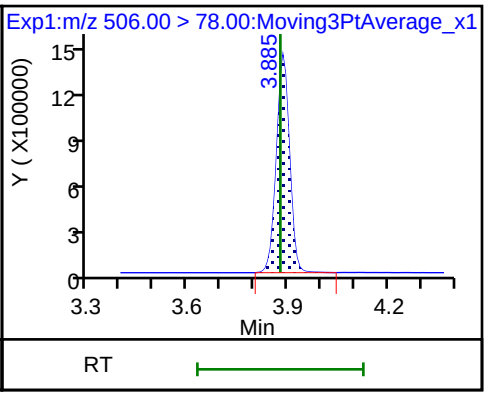
30 Perfluorononanoic acid



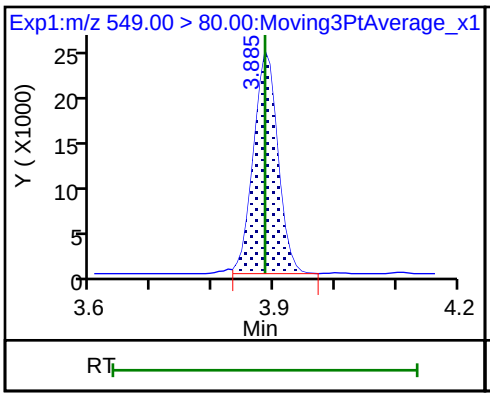
32 9-Chlorohexadecafluoro-3-oxanonane



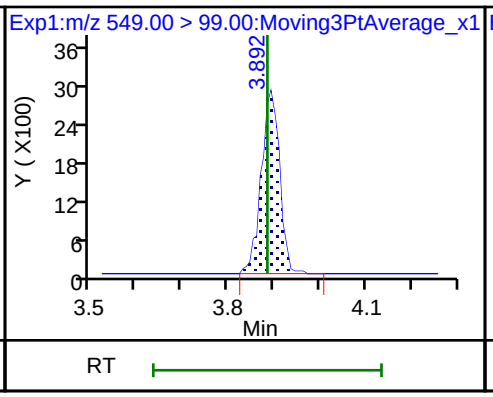
D 33 13C8 FOSA



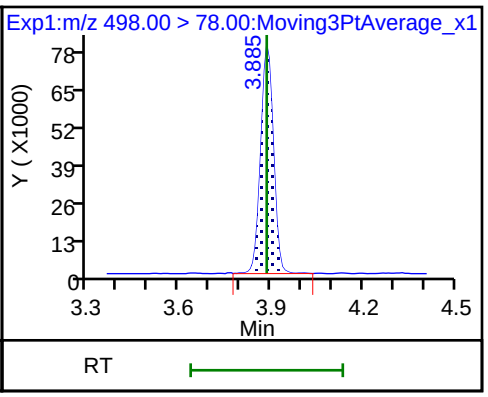
35 Perfluorononanesulfonic acid



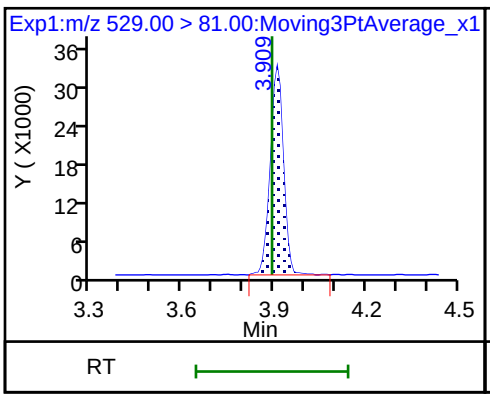
35 Perfluorononanesulfonic acid



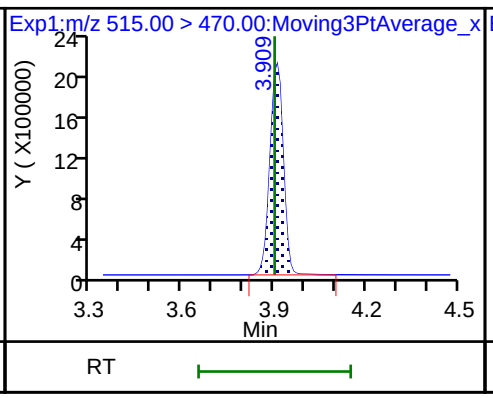
34 Perfluorooctanesulfonamide



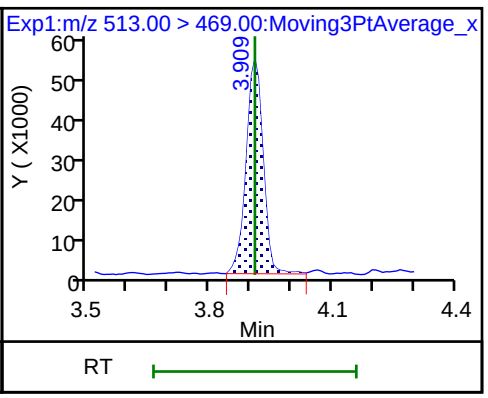
D 39 M2-8:2 FTS



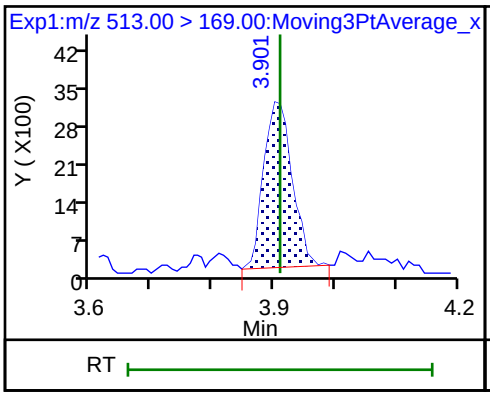
D 36 13C2 PFDA



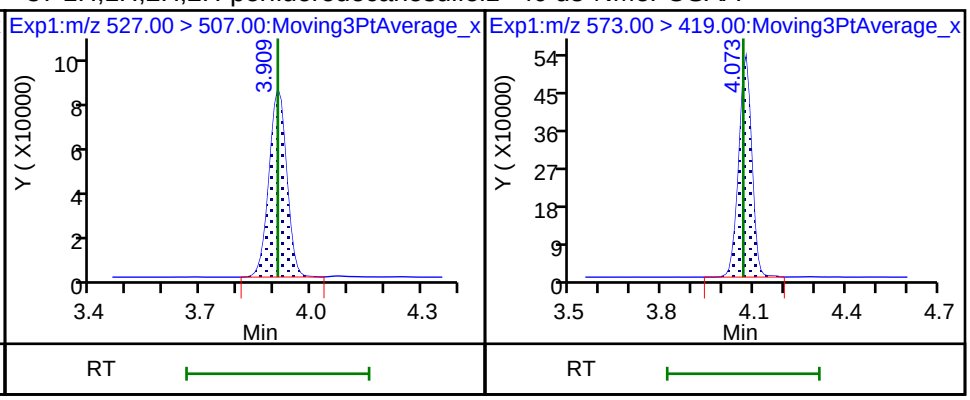
38 Perfluorodecanoic acid



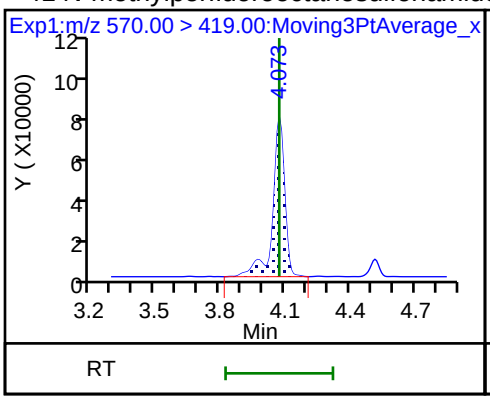
38 Perfluorodecanoic acid



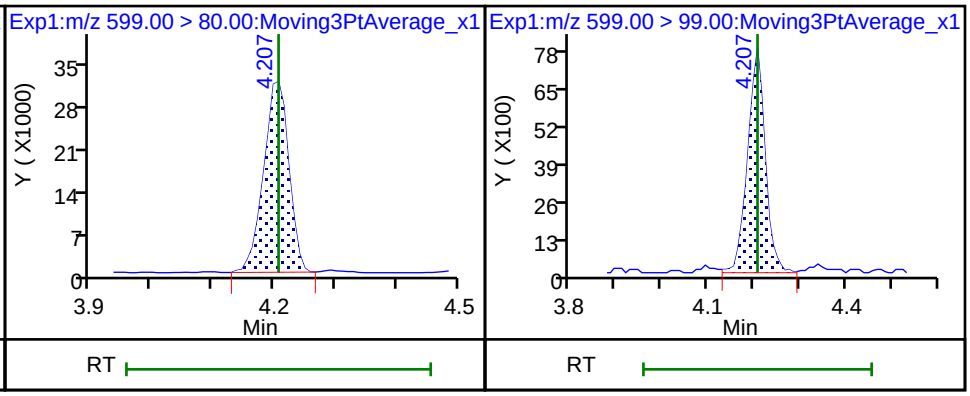
37 1H,1H,2H,2H-perfluorodecanesulfonD 40 d3-NMeFOSAA



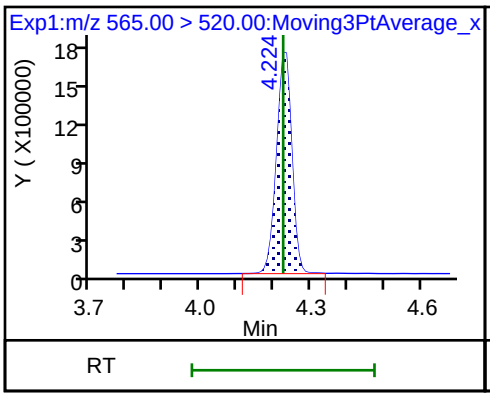
41 N-methylperfluorooctanesulfonamido 42 Perfluorodecanesulfonic acid



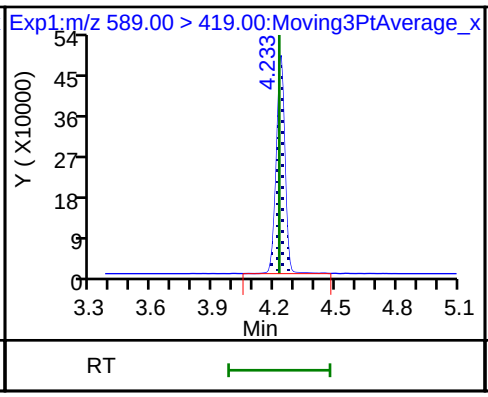
42 Perfluorodecanesulfonic acid



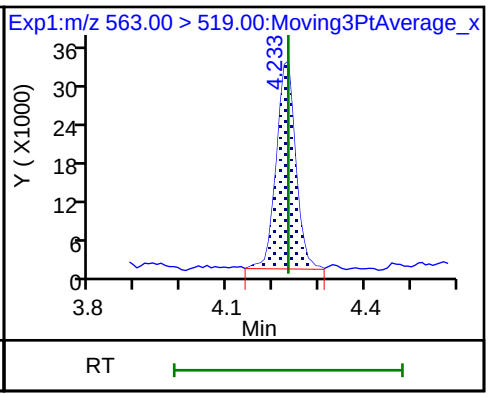
D 44 13C2 PFUnA



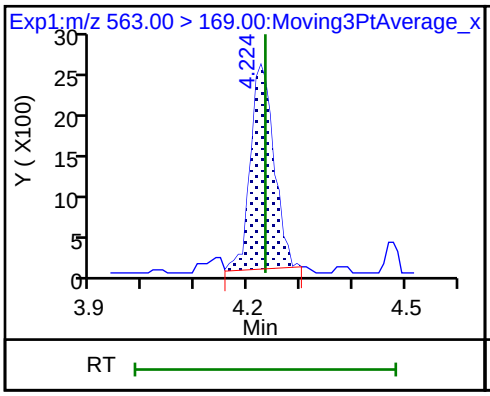
D 45 d5-NEtFOSAA



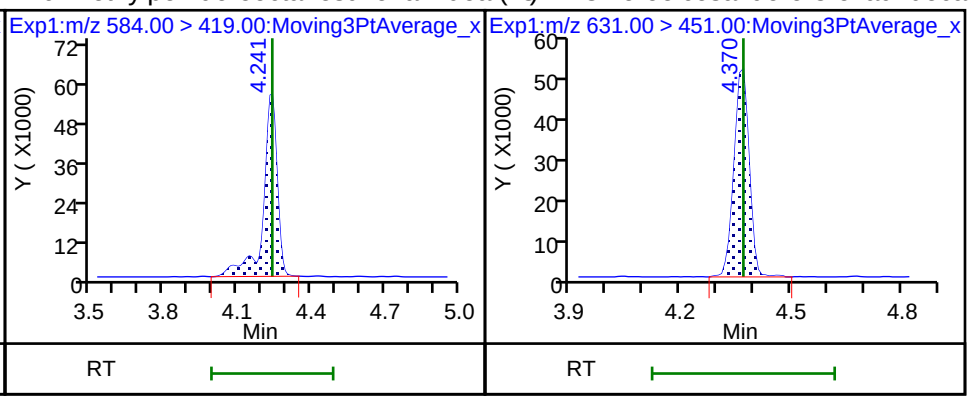
43 Perfluoroundecanoic acid



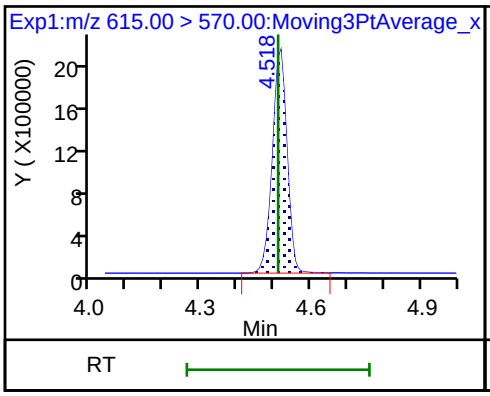
43 Perfluoroundecanoic acid



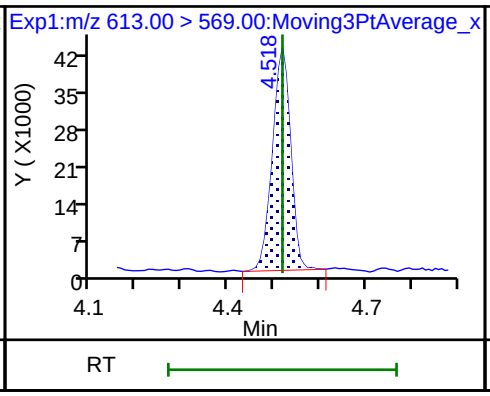
46 N-ethylperfluorooctanesulfonamidoa (48) 11-Chloroeicosafluoro-3-oxaundecan



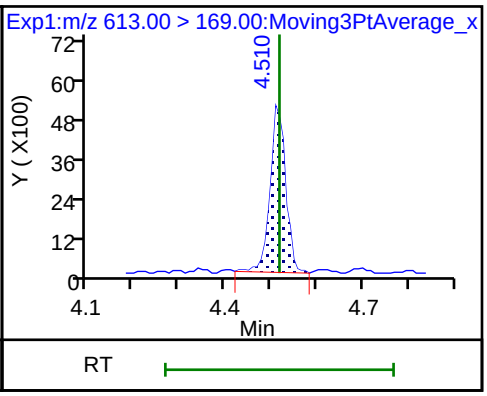
D 49 13C2 PFDoA



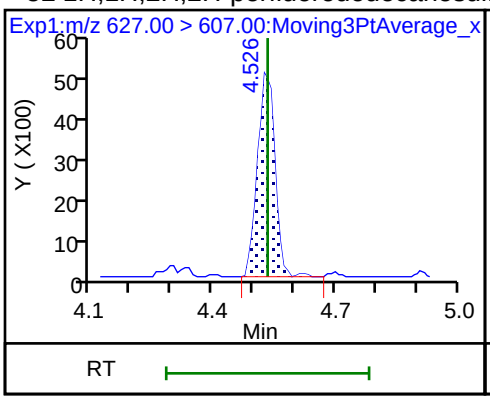
50 Perfluorododecanoic acid



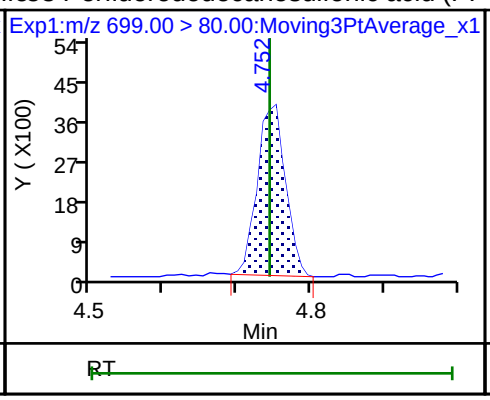
50 Perfluorododecanoic acid



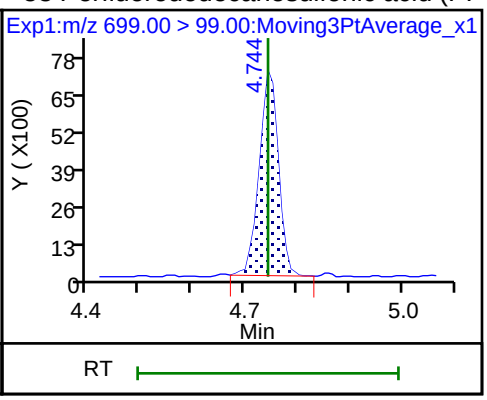
52 1H,1H,2H-perfluorododecanesulfo



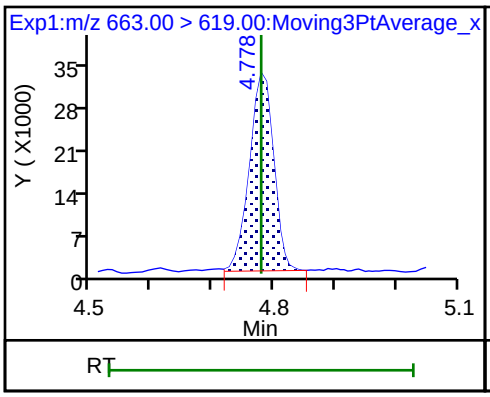
53 Perfluorododecanesulfonic acid (PF



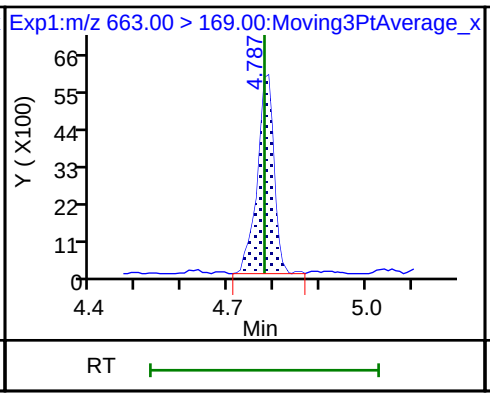
53 Perfluorododecanesulfonic acid (PF



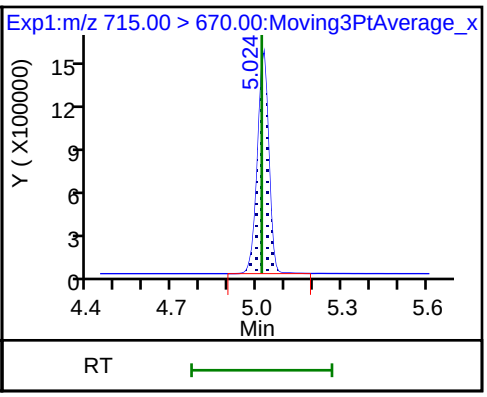
54 Perfluorotridecanoic acid



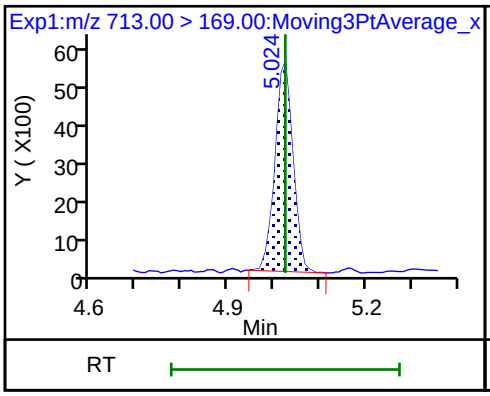
54 Perfluorotridecanoic acid



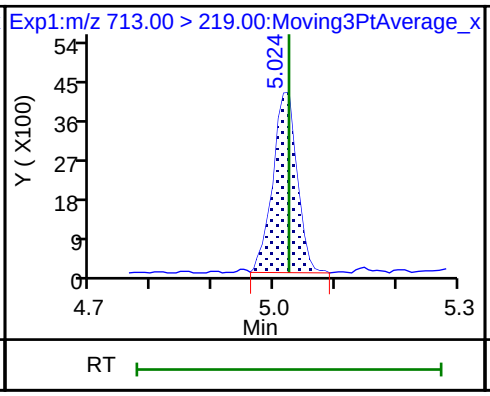
D 55 13C2 PFTeDA



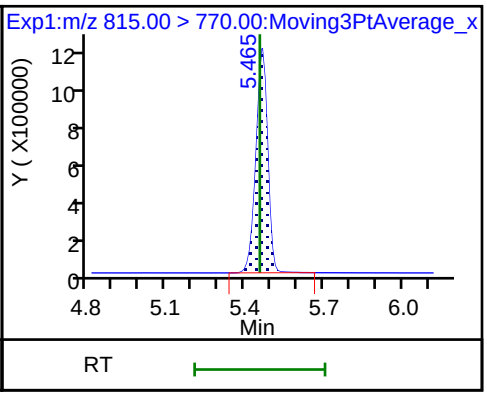
56 Perfluorotetradecanoic acid



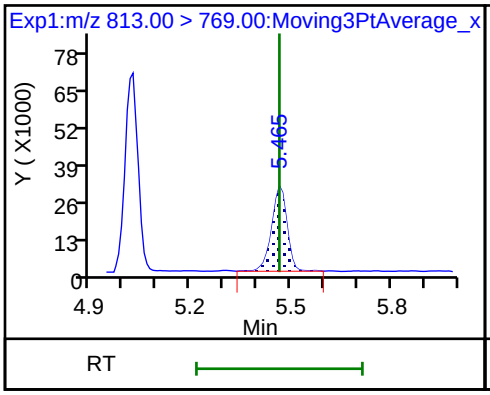
56 Perfluorotetradecanoic acid



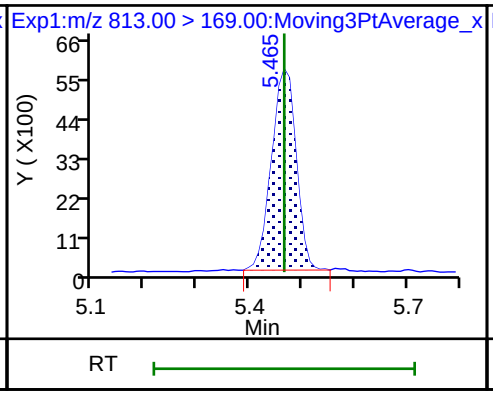
D 57 13C2 PFHxDA



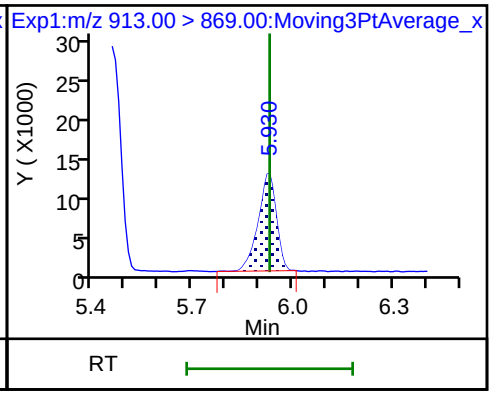
58 Perfluorohexadecanoic acid



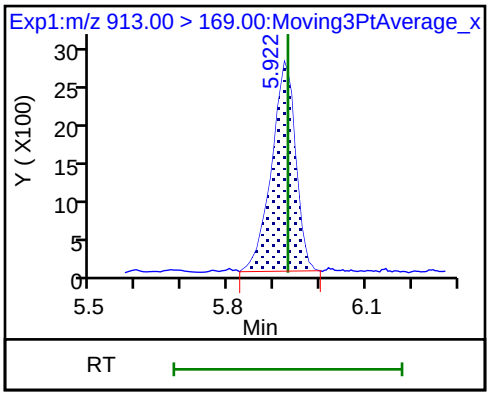
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

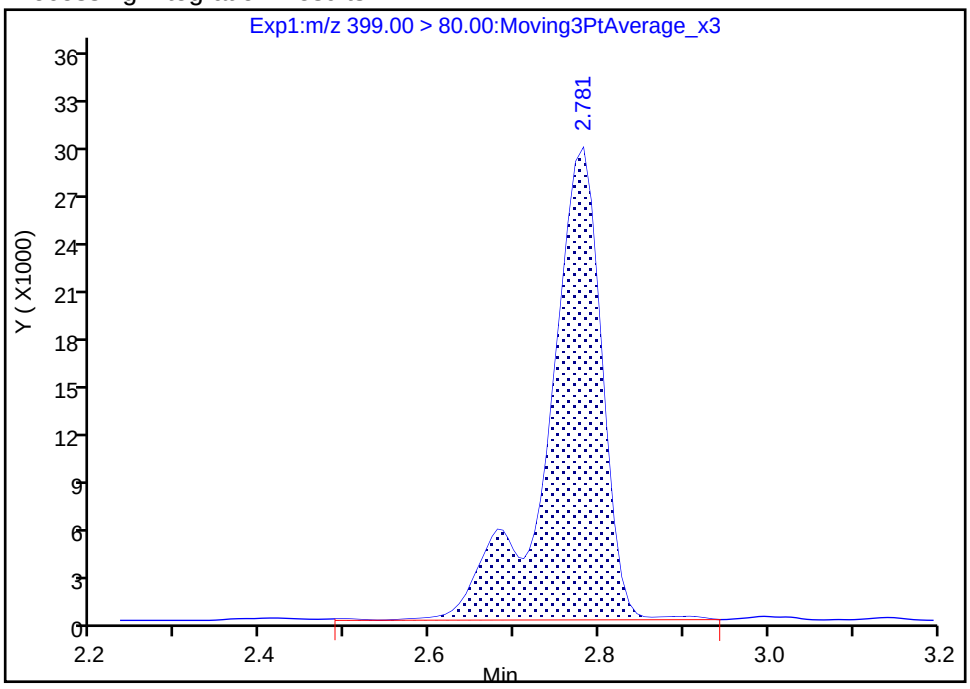
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_005.d
Injection Date: 10-Jan-2019 13:45:24 Instrument ID: A9
Lims ID: CCVL
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 29 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

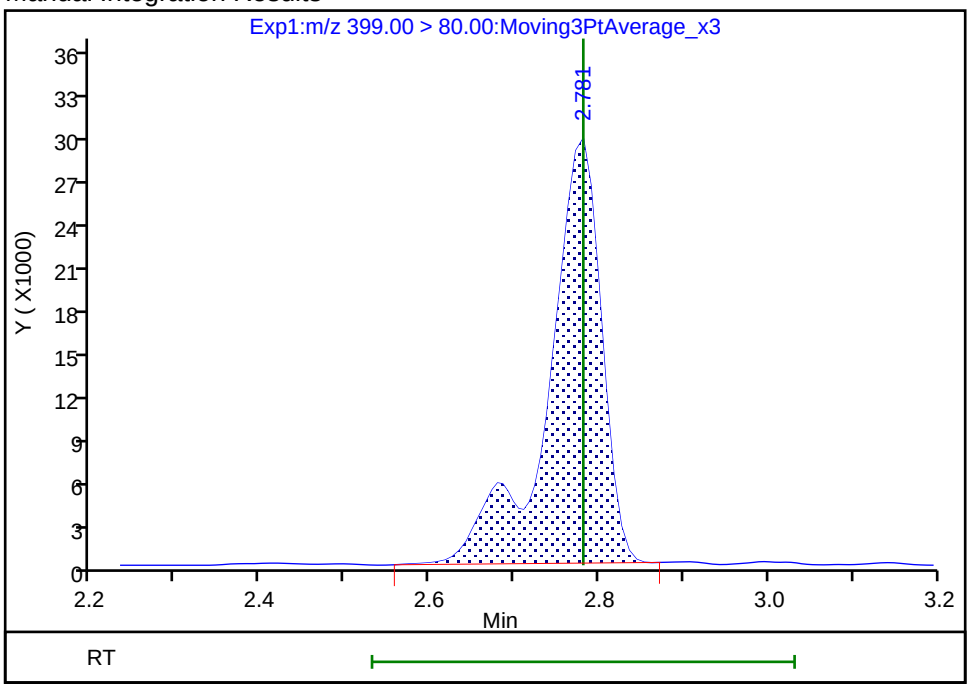
Processing Integration Results

RT: 2.78
Area: 131479
Amount: 0.047758
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 129009
Amount: 0.046860
Amount Units: ng/ml



Reviewer: mongkols, 11-Jan-2019 09:31:38
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

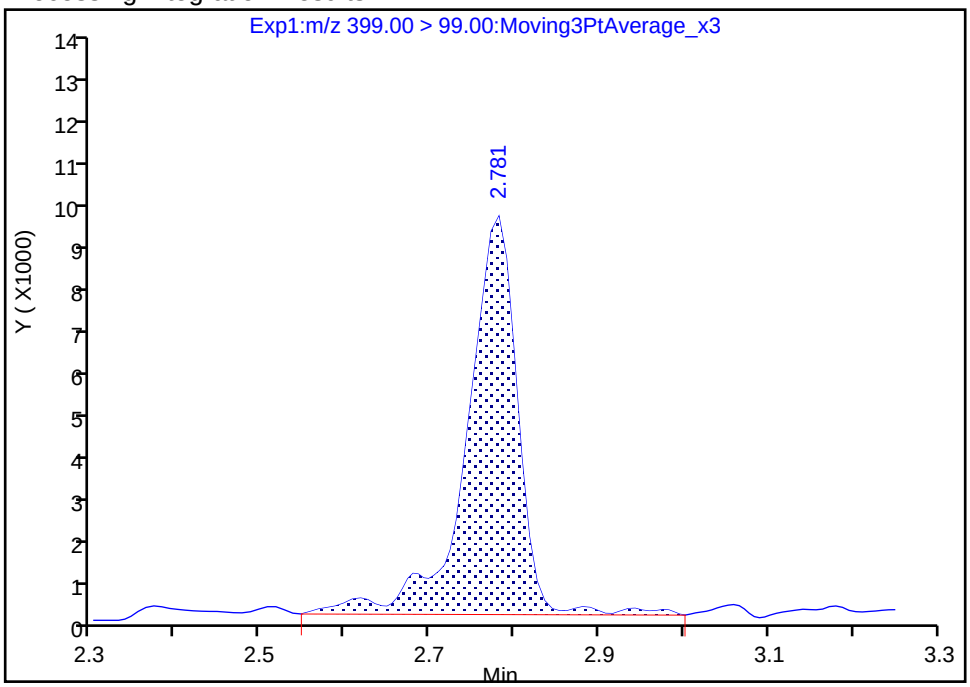
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_005.d
Injection Date: 10-Jan-2019 13:45:24 Instrument ID: A9
Lims ID: CCVL
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 29 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 2

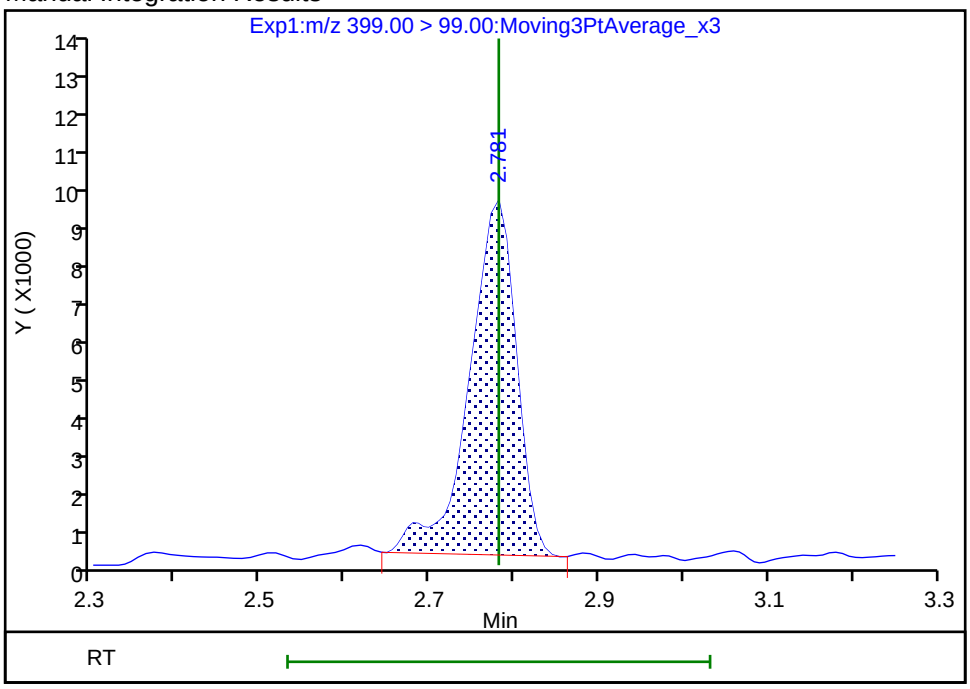
Processing Integration Results

RT: 2.78
Area: 39736
Amount: 0.047758
Amount Units: ng/ml



Manual Integration Results

RT: 2.78
Area: 35749
Amount: 0.046860
Amount Units: ng/ml



Reviewer: mongkols, 11-Jan-2019 09:31:41
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

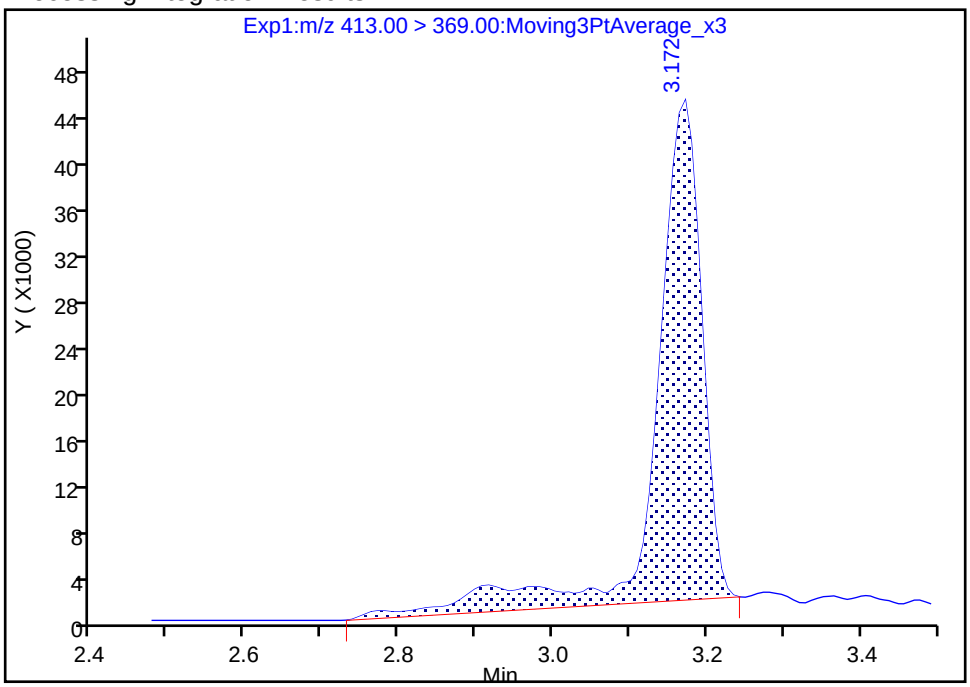
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_005.d
Injection Date: 10-Jan-2019 13:45:24 Instrument ID: A9
Lims ID: CCVL
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 29 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

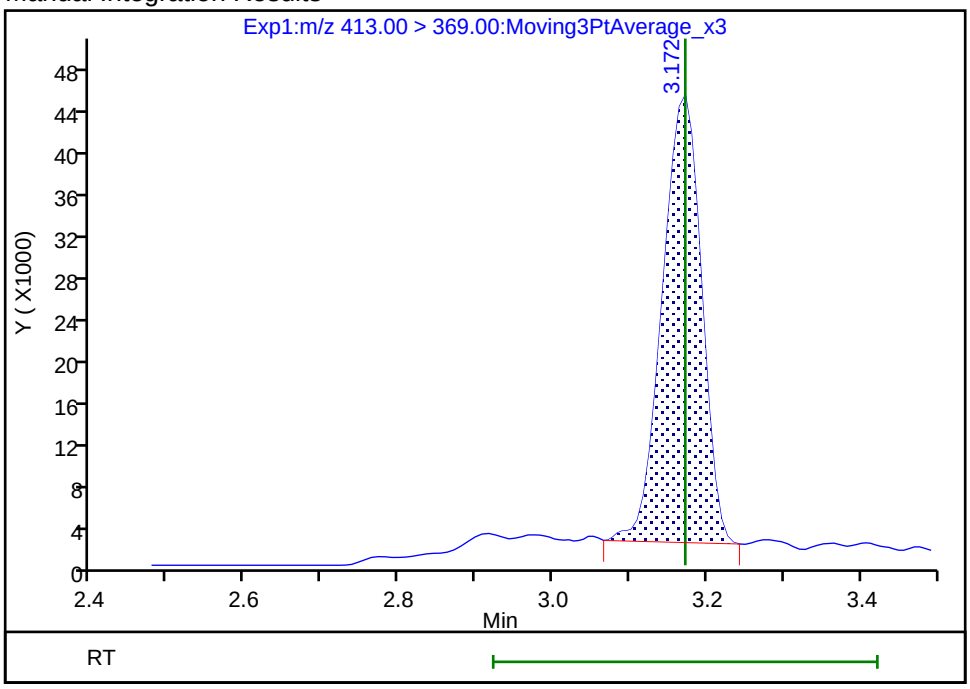
Processing Integration Results

RT: 3.17
Area: 182097
Amount: 0.062611
Amount Units: ng/ml



Manual Integration Results

RT: 3.17
Area: 152497
Amount: 0.052434
Amount Units: ng/ml



Reviewer: mongkols, 11-Jan-2019 09:31:49
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

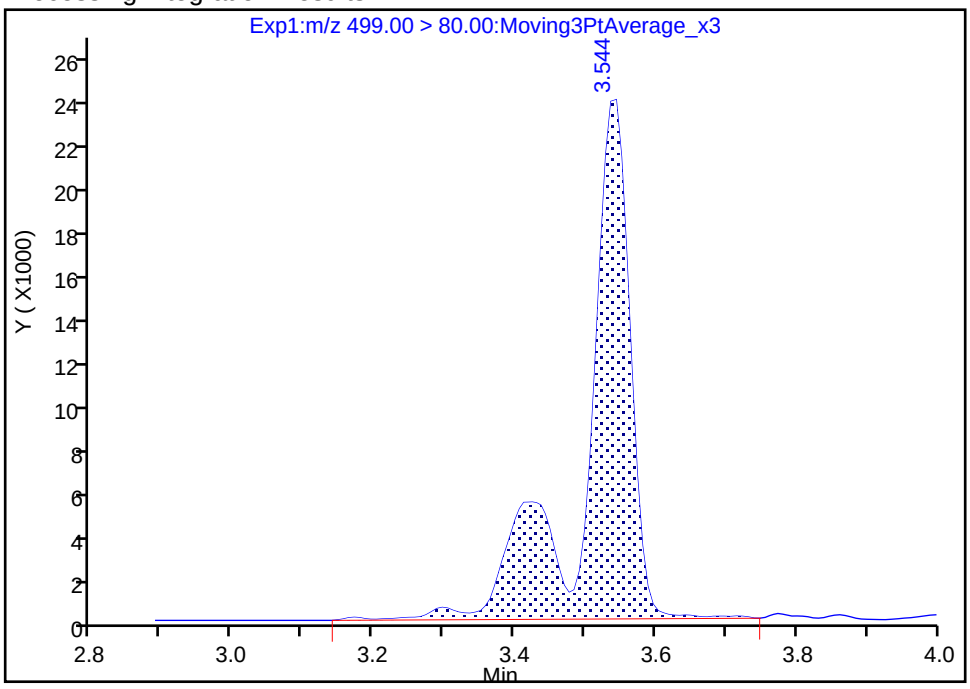
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_005.d
Injection Date: 10-Jan-2019 13:45:24 Instrument ID: A9
Lims ID: CCVL
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 29 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

29 Perfluorooctanesulfonic acid, CAS: 1763-23-1

Signal: 1

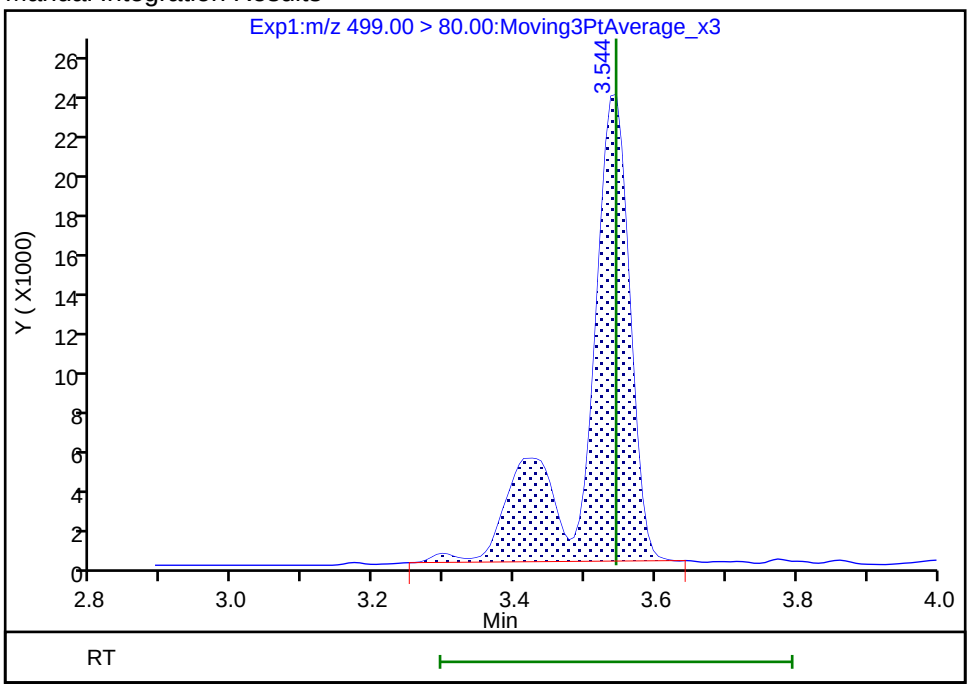
Processing Integration Results

RT: 3.54
Area: 106051
Amount: 0.043174
Amount Units: ng/ml



Manual Integration Results

RT: 3.54
Area: 101923
Amount: 0.041494
Amount Units: ng/ml



Reviewer: mongkols, 11-Jan-2019 09:31:54
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

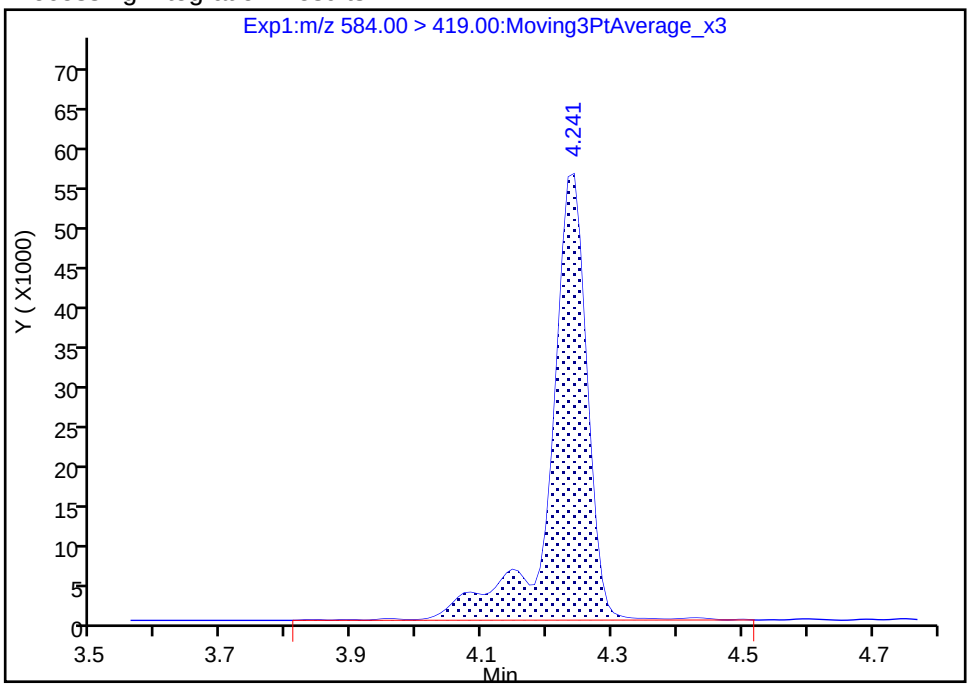
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_005.d
Injection Date: 10-Jan-2019 13:45:24 Instrument ID: A9
Lims ID: CCVL
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 29 Worklist Smp#: 2
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

46 N-ethylperfluorooctanesulfonamidoacetic acid, CAS: 2991-50-6

Signal: 1

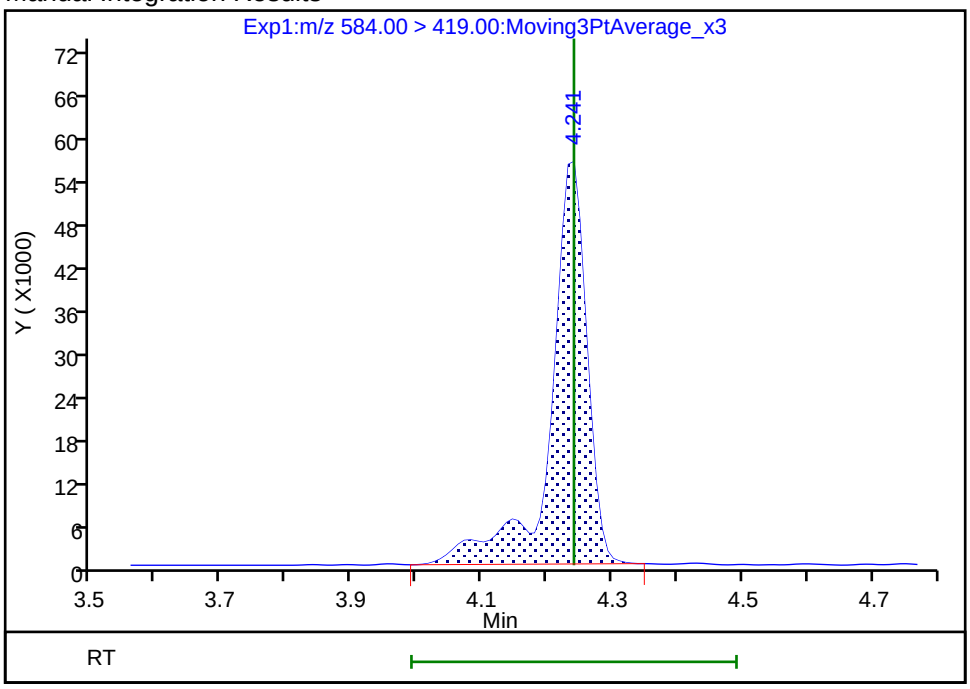
Processing Integration Results

RT: 4.24
Area: 224257
Amount: 0.488802
Amount Units: ng/ml



Manual Integration Results

RT: 4.24
Area: 219738
Amount: 0.478952
Amount Units: ng/ml



Reviewer: mongkols, 11-Jan-2019 09:32:10
Audit Action: Manually Integrated Audit Reason: Baseline

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-270021/3 Calibration Date: 01/10/2019 13:52

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.10LLA_006.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.9080		0.981	1.00	-1.9	40.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	1.019		1.02	1.00	1.8	40.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	0.9538		0.874	0.884	-1.1	50.0
4:2 FTS	AveID	0.1480	0.1584		1.000	0.934	7.1	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.8435		0.974	1.00	-2.6	40.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.4538		0.908	0.938	-3.2	50.0
HFPO-DA (GenX)	AveID	2.144	1.722		0.803	1.00	-19.7	40.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	1.001		0.962	1.00	-3.8	40.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.126		0.828	0.910	-9.0	40.0
DONA	AveID	2.306	2.470		1.01	0.942	7.1	50.0
6:2 FTS	AveID	2.112	1.961		0.880	0.948	-7.1	40.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.055		0.952	0.952	-0.0	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	1.029		0.993	1.00	-0.7	40.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	1.053		0.927	0.928	-0.1	40.0
Perfluorononanoic acid (PFNA)	AveID	0.995	0.9681		0.973	1.00	-2.8	40.0
F-53B Major	AveID	0.9553	0.9089		0.887	0.932	-4.9	50.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.6020		0.988	0.960	2.9	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	2.973		1.02	1.00	2.3	40.0
8:2 FTS	AveID	14.20	12.30		0.830	0.958	-13.4	40.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.202		1.05	1.00	4.7	40.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.8636		0.997	1.00	-0.3	40.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.8536		0.941	0.964	-2.4	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.7540		0.904	1.00	-9.6	40.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.8297		1.00	1.00	0.2	40.0
F-53B Minor	AveID	1.128	1.276		1.07	0.942	13.1	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	0.9401		0.979	1.00	-2.1	40.0
10:2 FTS	AveID	8.852	7.946		0.865	0.964	-10.2	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0906		0.966	0.968	-0.3	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.7738		1.02	1.00	1.9	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1508		0.923	1.00	-7.7	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.8805		0.974	1.00	-2.6	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-270021/3 Calibration Date: 01/10/2019 13:52

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.10LLA_006.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.7184		1.16	1.00	16.4	50.0
13C4 PFBA	Ave	0.9546	0.9236		2.42	2.50	-3.3	50.0
13C5 PFPeA	Ave	0.8350	0.8072		2.42	2.50	-3.3	50.0
13C3 PFBS	Ave	1.371	1.343		2.28	2.33	-2.1	50.0
M2-4:2 FTS	Ave	0.0836	0.0882		2.46	2.34	5.5	50.0
13C2 PFHxA	Ave	0.9280	0.9296		2.50	2.50	0.2	50.0
13C3 HFPO-DA	Ave	0.0833	0.0856		2.57	2.50	2.8	50.0
13C4 PFHpA	Ave	1.141	1.151		2.52	2.50	0.8	50.0
18O2 PFHxS	Ave	0.8068	0.8094		2.37	2.37	0.3	50.0
M2-6:2 FTS	Ave	0.1125	0.1203		2.54	2.38	6.9	40.0
13C8 PFOA	Ave	2363087	2334484		2.42	2.45	-1.2	50.0
13C4 PFOA	Ave	0.9896	0.9704		2.45	2.50	-1.9	50.0
13C8 PFOS	Ave	500608	529002		2.53	2.39	5.7	50.0
13C4 PFOS	Ave	0.8235	0.8230		2.39	2.39	-0.0	50.0
13C5 PFNA	Ave	0.8916	0.9019		2.53	2.50	1.2	50.0
13C8 FOSA	Ave	0.5421	0.5501		2.54	2.50	1.5	50.0
13C2 PFDA	Ave	0.8721	0.8480		2.43	2.50	-2.8	50.0
M2-8:2 FTS	Ave	0.0129	0.0147		2.73	2.40	14.1	40.0
d3-NMeFOSAA	Ave	0.2285	0.2133		2.33	2.50	-6.6	50.0
13C2 PFUnA	Ave	0.6858	0.6765		2.47	2.50	-1.4	50.0
d5-NEtFOSAA	Ave	0.1905	0.1823		2.39	2.50	-4.3	50.0
13C2 PFDoA	Ave	0.8313	0.8016		2.41	2.50	-3.6	50.0
13C2 PFTeDA	Ave	0.5763	0.5975		2.59	2.50	3.7	50.0
13C2 PFHxDA	Ave	0.5385	0.5245		2.44	2.50	-2.6	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_006.d
Lims ID: CCV L4
Client ID:
Sample Type: CCVIS
Inject. Date: 10-Jan-2019 13:52:55 ALS Bottle#: 30 Worklist Smp#: 3
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCV L4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub7

Method: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 11-Jan-2019 09:32:53 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0316

First Level Reviewer: mongkols Date: 11-Jan-2019 09:32:53
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.668	1.660	0.008	0.526	6380465	2.42		96.7	12788	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.668	1.668	0.0	1.000	2317270	0.9808		98.1	294	
D 3 13C5 PFPeA										
267.90 > 223.00	2.009	1.998	0.011	0.633	5576568	2.42		96.7	4248	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.009	2.009	0.0	1.000	2272166	1.02		102	120	
D 5 13C3 PFBS										
301.90 > 80.00	2.041	2.040	0.001	0.643	8627553	2.28		97.9	407957	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.051	2.051	0.0	1.005	3128894	0.8739	Target=2.70	98.9	2674	
298.90 > 99.00	2.051	2.051	0.0	1.005	1109016		2.82(1.35-4.05)		885	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.339	2.331	0.008	0.737	569336	2.46		106	1107	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.339	2.339	0.0	1.146	549002	1.00		107	1407	
D 9 13C2 PFHxA										
315.00 > 270.00	2.382	2.373	0.009	0.751	6421749	2.50		100	2311	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.382	2.382	0.0	1.000	2166634	0.9739	Target=13.92	97.4	524	
313.00 > 119.00	2.382	2.382	0.0	1.000	156259		13.87(6.96-20.87)		384	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.401	2.401	0.0	1.177	1579690	0.9080	Target=2.30	96.8	2012	
349.00 > 99.00	2.401	2.401	0.0	1.177	733581		2.15(1.15-3.45)		1101	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.507	2.487	0.020	0.790	591266	2.57		103	1734	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.497	2.497	0.0	0.996	407288	0.8032		80.3	240	
D 16 13C4 PFHpA										
367.00 > 322.00	2.772	2.763	0.009	0.874	7950897	2.52		101	3110	
D 17 18O2 PFHxS										
403.00 > 84.00	2.772	2.772	0.0	0.874	5289423	2.37		100	2531	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.772	2.772	0.0	1.000	3182107	0.9617	Target=4.34	96.2	810	
363.00 > 169.00	2.772	2.772	0.0	1.000	667047		4.77(2.17-6.52)		1056	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.781	2.781	0.0	1.003	2291475	0.8281	Target=3.80	91.0	1263	
399.00 > 99.00	2.772	2.781	-0.009	1.000	638127		3.59(1.90-5.70)		511	
19 DONA										
377.00 > 251.00	2.826	2.826	0.0	0.797	5290684	1.01	Target=2.26	107	4092	
377.00 > 85.00	2.826	2.826	0.0	0.797	2181933		2.42(1.13-3.39)		1472	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.141	3.141	0.0	0.998	617842	0.8804		92.9	575	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.149	3.141	0.008	0.993	789325	2.54		107	1527	
D 22 13C8 PFOA										
421.00 > 376.00	3.164	3.157	0.007		5713649	2.42		98.8	3016	
D 25 13C4 PFOA										
417.00 > 372.00	3.172	3.157	0.015	1.000	6703680	2.45		98.1	2038	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.164	3.164	0.0	0.893	2283912	0.9518	Target=3.69	100.0	1469	
449.00 > 99.00	3.164	3.164	0.0	0.893	590744		3.87(1.84-5.53)		1064	
* 24 13C2 PFOA										
415.00 > 370.00	3.172	3.172	0.0		6908427	2.50			2624	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.172	3.172	0.0	1.000	2759655	0.99	Target=2.72	99.3	427	
413.00 > 169.00	3.172	3.172	0.0	1.000	994397		2.78(1.36-4.08)		1425	
D 27 13C8 PFOS										
507.00 > 99.00	3.537	3.529	0.008		1264314	2.53		106	1729	
D 28 13C4 PFOS										
503.00 > 80.00	3.544	3.529	0.015	1.117	5435384	2.39		99.9	2838	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.544	3.544	0.0	1.000	2221477	0.9269	Target=4.08	99.9	3481	
499.00 > 99.00	3.544	3.544	0.0	1.000	507289		4.38(2.04-6.12)		1746	
D 31 13C5 PFNA										
468.00 > 423.00	3.552	3.544	0.008	1.120	6230565	2.53		101	3234	
30 Perfluorononanoic acid										
463.00 > 419.00	3.552	3.552	0.0	1.000	2412739	0.9725	Target=5.35	97.2	495	
463.00 > 169.00	3.559	3.552	0.007	1.002	438604		5.50(2.68-8.03)		855	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.740	3.740	0.0	1.055	1926439	0.8867		95.1	1580	
D 33 13C8 FOSA										
506.00 > 78.00	3.885	3.877	0.008	1.225	3800549	2.54		101	2773	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.885	3.885	0.0	1.096	1314326	0.9879	Target=6.03	103	1918	
549.00 > 99.00	3.885	3.885	0.0	1.096	196342		6.69(3.02-9.05)		793	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.885	3.885	0.0	1.000	4519646	1.02		102	2487	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.918	3.892	0.026	1.235	97524	2.73		114	368	
D 36 13C2 PFDA										
515.00 > 470.00	3.909	3.901	0.008	1.232	5858428	2.43		97.2	2365	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.909	3.909	0.0	1.000	2817408	1.05	Target=14.23	105	1216	
513.00 > 169.00	3.909	3.909	0.0	1.000	176683		15.95(7.12-21.35)		280	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.909	3.909	0.0	0.998	479737	0.8298		86.6	2134	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.072	4.063	0.009	1.284	1473786	2.33		93.4	1996	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.072	4.072	0.0	1.000	509115	1.00		99.7	146	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.207	4.207	0.0	1.187	1871274	0.9408	Target=4.28	97.6	2557	
599.00 > 99.00	4.207	4.207	0.0	1.187	412671		4.53(2.14-6.43)		939	
D 44 13C2 PFUnA										
565.00 > 520.00	4.233	4.224	0.009	1.334	4673860	2.47		98.6	3214	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.233	4.224	0.009	1.334	1259070	2.39		95.7	1371	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.233	4.233	0.0	1.000	1409650	0.9043	Target=10.48	90.4	314	
563.00 > 169.00	4.233	4.233	0.0	1.000	153629		9.18(5.24-15.72)		476	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.241	4.241	0.0	1.002	417846	1.00		100	2541	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.370	4.370	0.0	1.233	2733872	1.07		113	3654	
D 49 13C2 PFDoA										
615.00 > 570.00	4.518	4.510	0.008	1.424	5537714	2.41		96.4	3551	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.518	4.518	0.0	1.000	2082407	0.9789	Target=9.37	97.9	861	
613.00 > 169.00	4.518	4.518	0.0	1.000	217178		9.59(4.68-14.05)		858	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.533	4.533	0.0	1.157	311908	0.8653		89.8	1243	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.743	4.743	0.0	1.338	199449	0.9655	Target=0.55	99.7	1007	
699.00 > 99.00	4.743	4.743	0.0	1.338	344863		0.58(0.28-0.83)		1119	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.778	4.778	0.0	1.058	1714123	1.02	Target=6.18	102	748	
663.00 > 169.00	4.778	4.778	0.0	1.058	295593		5.80(3.09-9.27)		985	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.024	5.016	0.008	1.584	4127413	2.59		104	3410	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.024	5.024	0.0	1.000	248928	0.9234	Target=1.39	92.3	914	
713.00 > 219.00	5.015	5.024	-0.009	0.998	181190		1.37(0.70-2.09)		891	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.465	5.456	0.009	1.723	3623227	2.44		97.4	3059	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.465	5.465	0.0	1.000	1276035	0.9738	Target=5.55	97.4	92.0	
813.00 > 169.00	5.465	5.465	0.0	1.000	228514		5.58(2.77-8.32)		937	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	5.930	5.930	0.0	1.085	1041216	1.16	Target=5.09	116	270	
913.00 > 169.00	5.922	5.930	-0.008	1.084	203773		5.11(2.55-7.64)		937	

Reagents:

LCPFC_LL4_00010 Amount Added: 1.00 Units: mL

Report Date: 11-Jan-2019 09:32:56 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_006.d

Injection Date: 10-Jan-2019 13:52:55 Instrument ID: A9

Lims ID: CCV L4

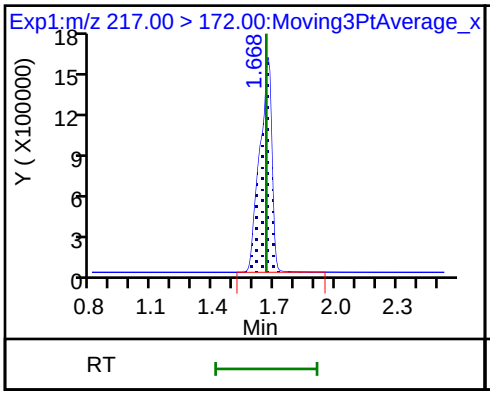
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 30 Worklist Smp#: 3

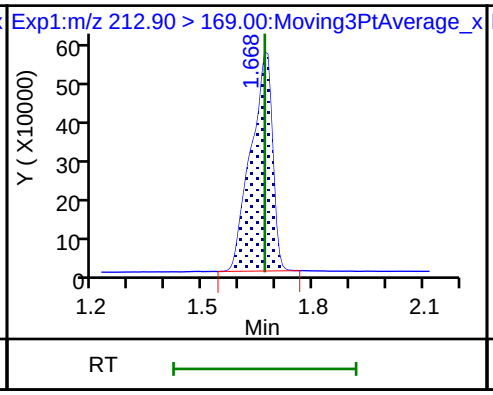
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

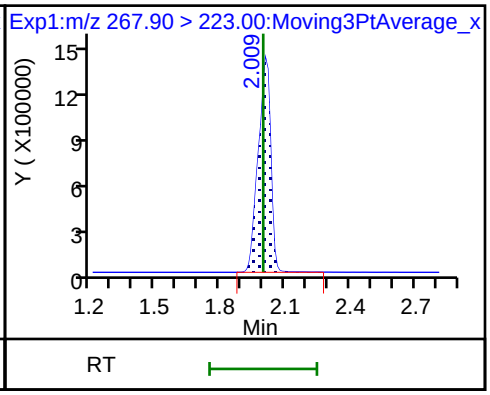
D 1 13C4 PFBA



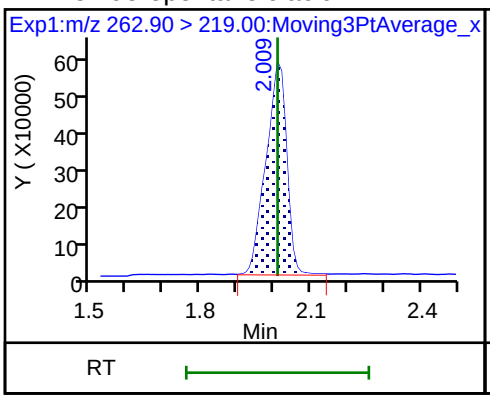
2 Perfluorobutanoic acid



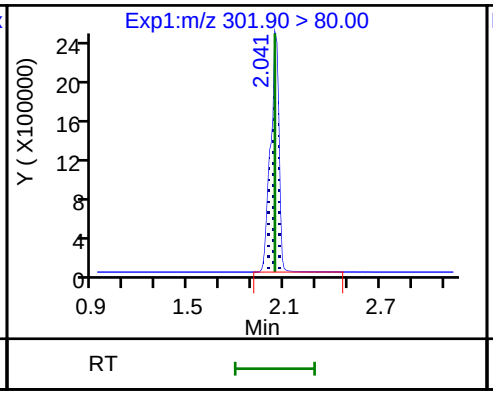
D 3 13C5 PFPeA



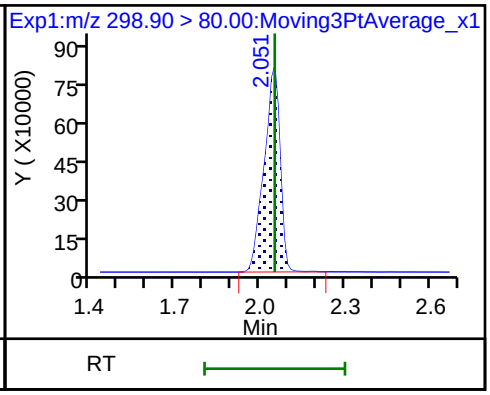
4 Perfluoropentanoic acid



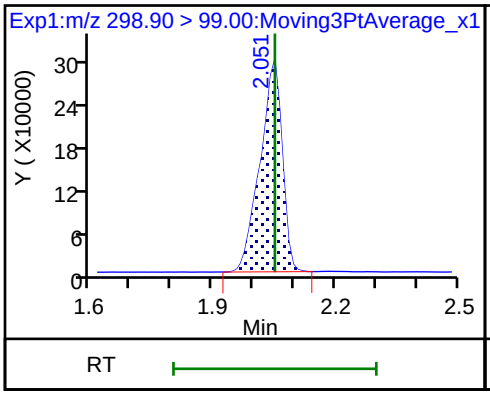
D 5 13C3 PFBS



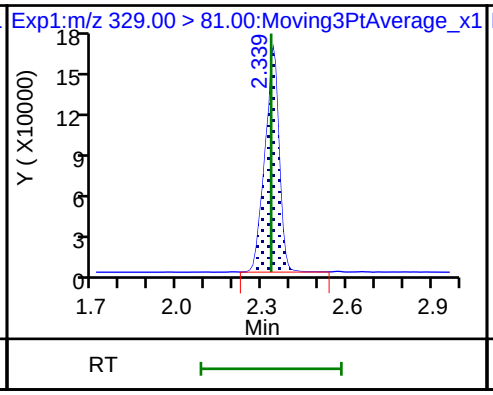
6 Perfluorobutanesulfonic acid



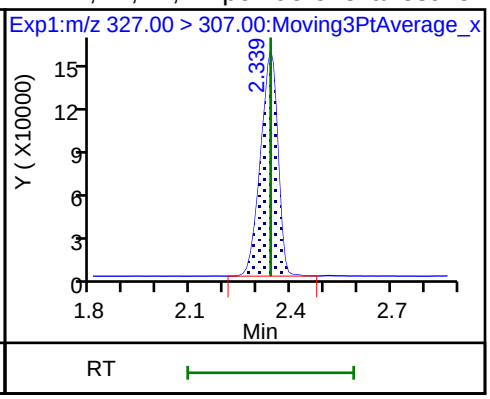
6 Perfluorobutanesulfonic acid



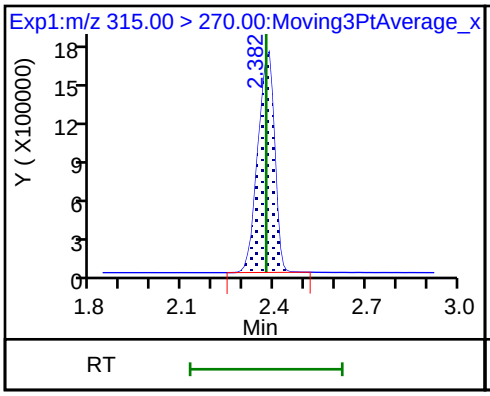
D 8 M2-4:2 FTS



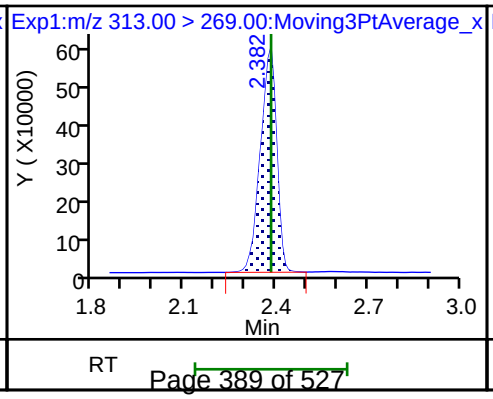
7 1H,1H,2H,2H-perfluorohexanesulfoni



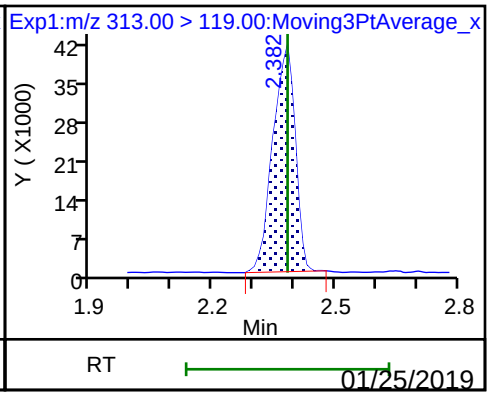
D 9 13C2 PFHxA



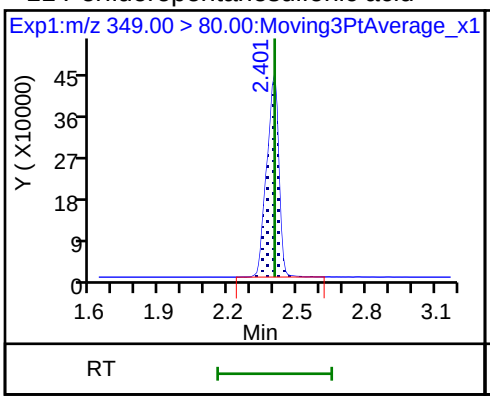
10 Perfluorohexanoic acid



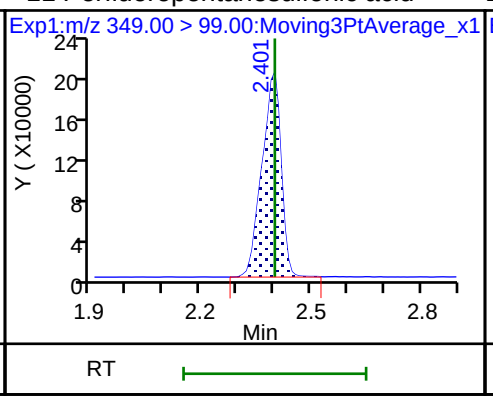
10 Perfluorohexanoic acid



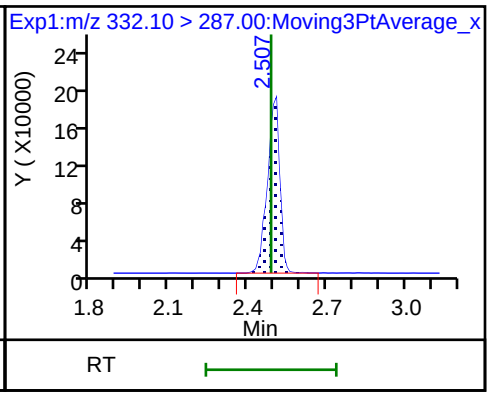
11 Perfluoropentanesulfonic acid



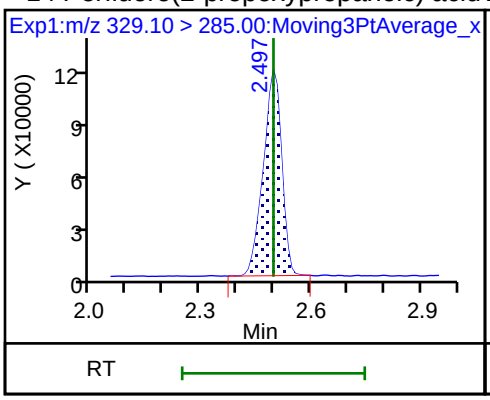
11 Perfluoropentanesulfonic acid



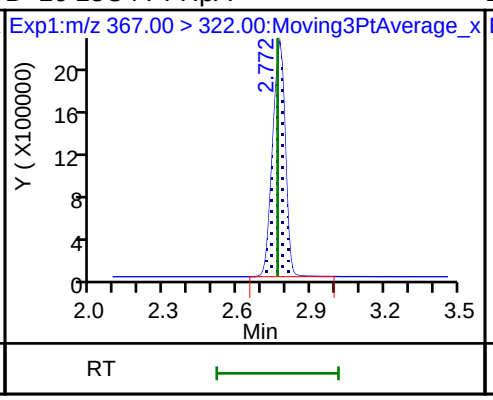
D 13 13C3 HFPO-DA



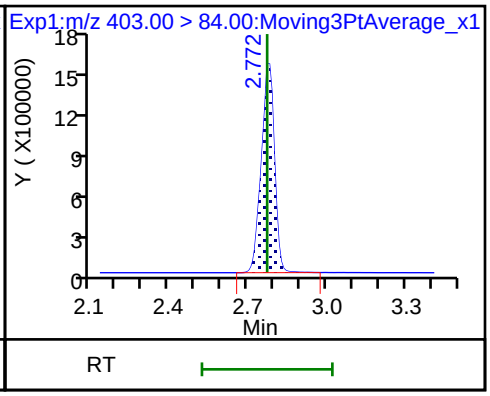
14 Perfluoro(2-propoxypropanoic) acid



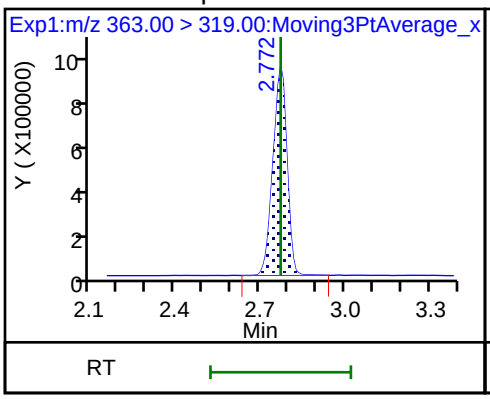
D 16 13C4 PFHpA



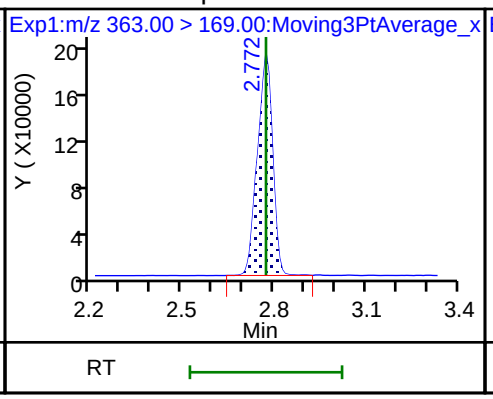
D 17 18O2 PFHxS



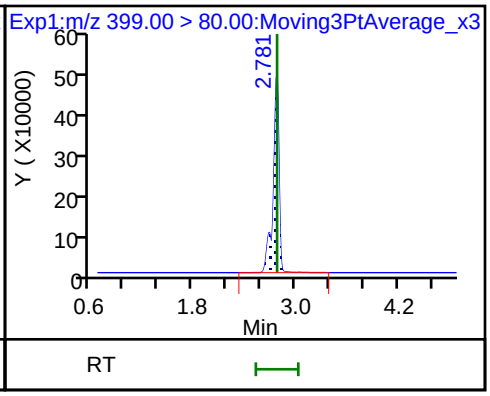
15 Perfluoroheptanoic acid



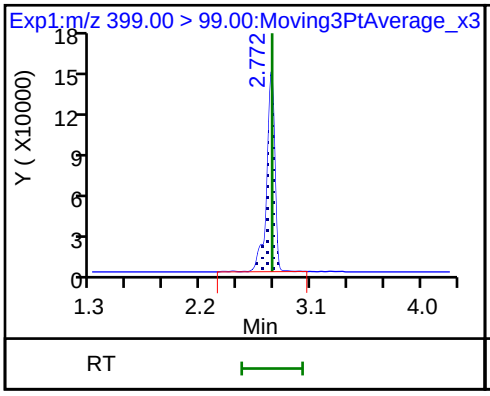
15 Perfluoroheptanoic acid



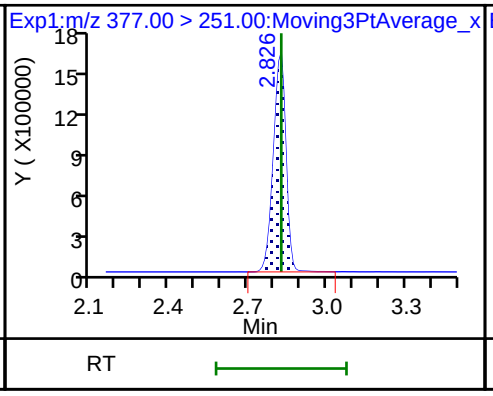
18 Perfluorohexanesulfonic acid



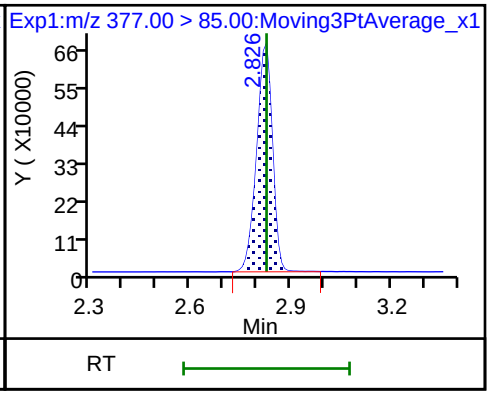
18 Perfluorohexanesulfonic acid



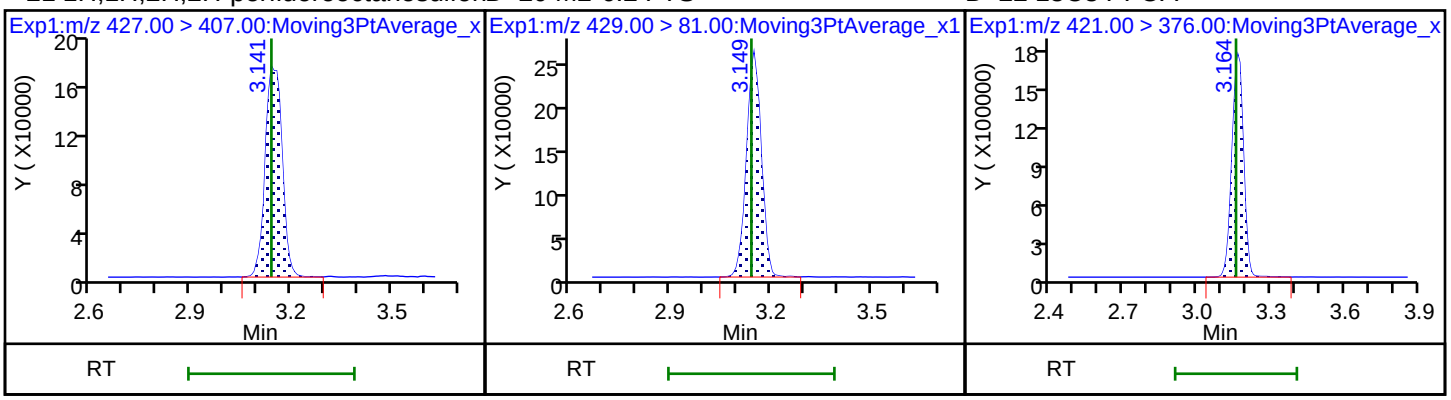
19 DONA



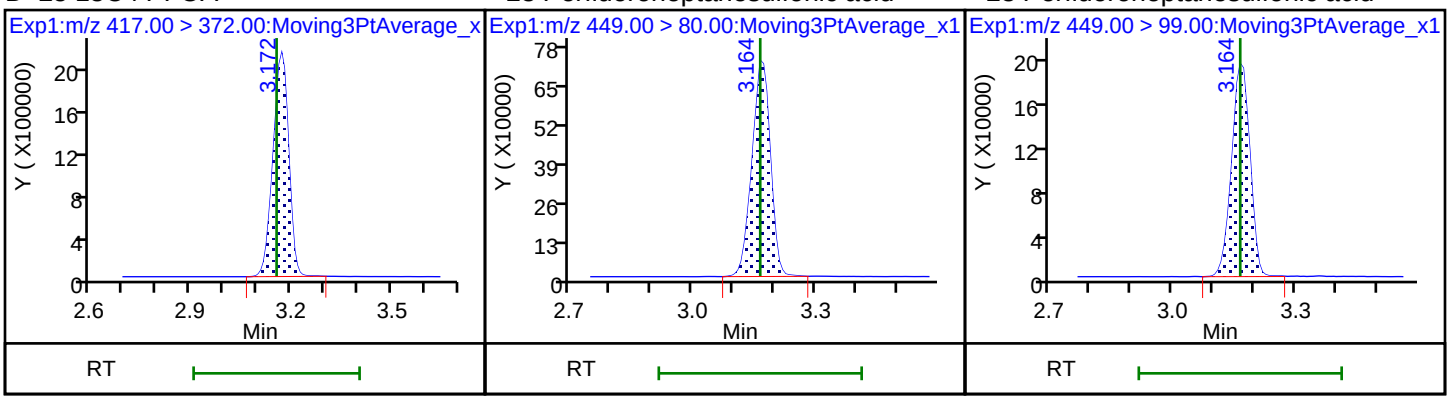
19 DONA



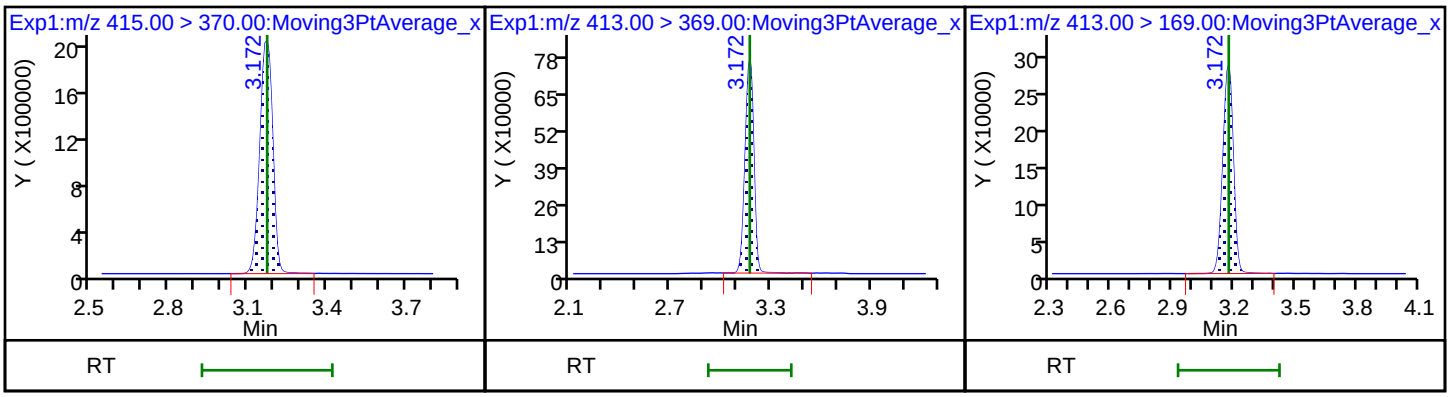
21 1H,1H,2H,2H-perfluorooctanesulfonD 20 M2-6:2 FTS D 22 13C8 PFOA



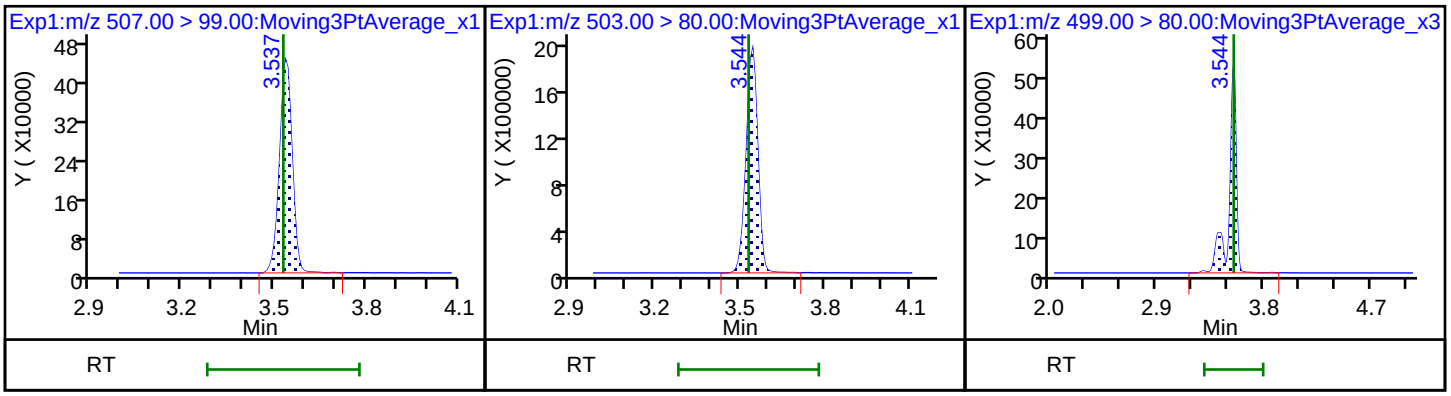
D 25 13C4 PFOA 23 Perfluoroheptanesulfonic acid 23 Perfluoroheptanesulfonic acid



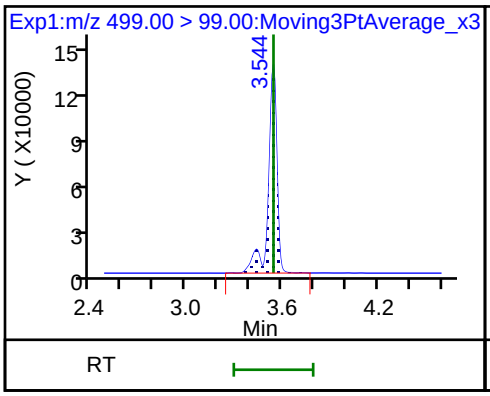
* 24 13C2 PFOA 26 Perfluorooctanoic acid 26 Perfluorooctanoic acid



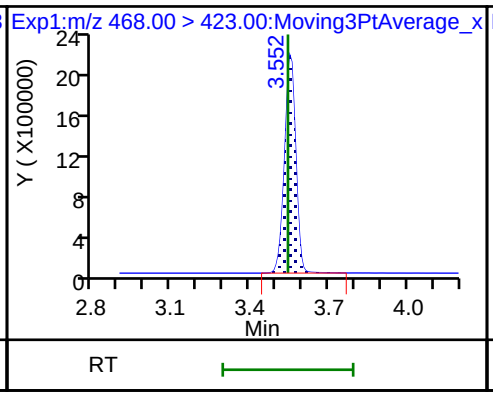
D 27 13C8 PFOS D 28 13C4 PFOS 29 Perfluorooctanesulfonic acid



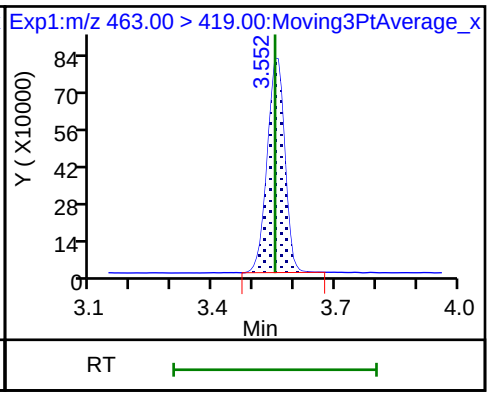
29 Perfluorooctanesulfonic acid



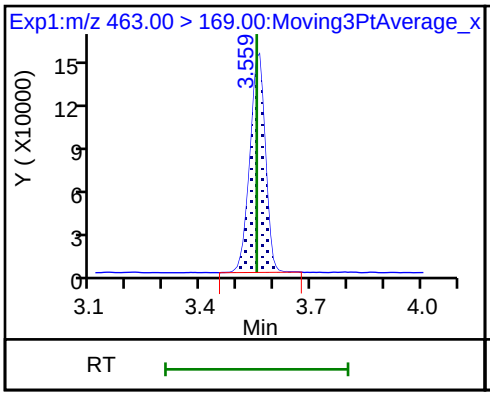
D 31 13C5 PFNA



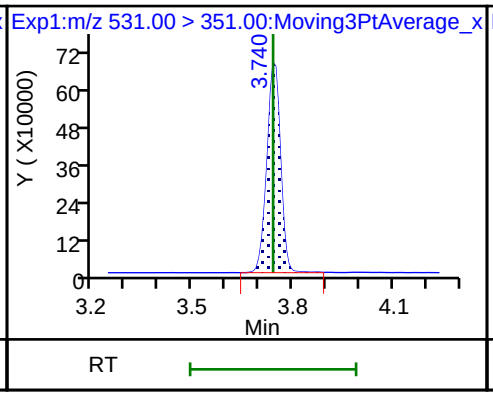
30 Perfluorononanoic acid



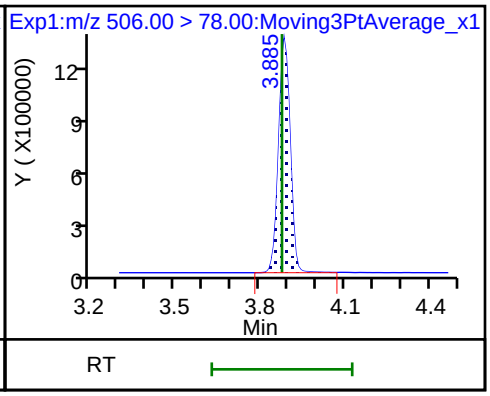
30 Perfluorononanoic acid



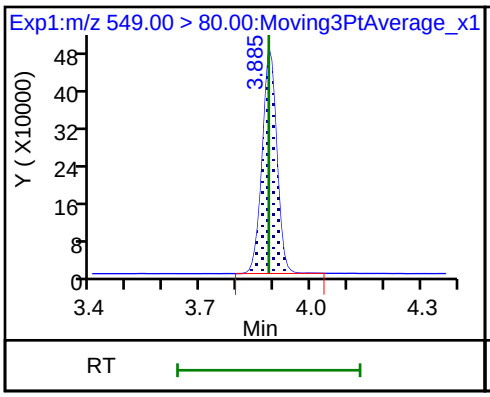
32 9-Chlorohexadecafluoro-3-oxanonane



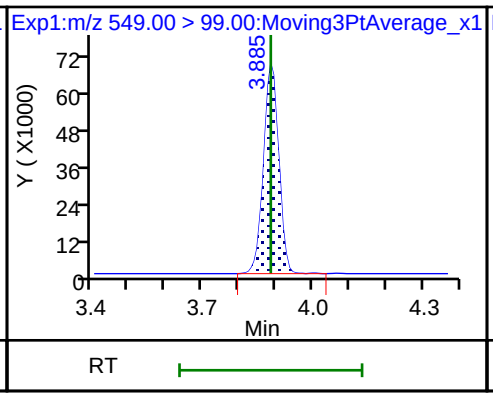
D 33 13C8 FOSA



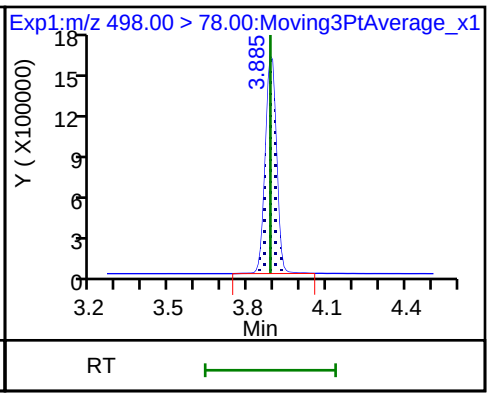
35 Perfluorononanesulfonic acid



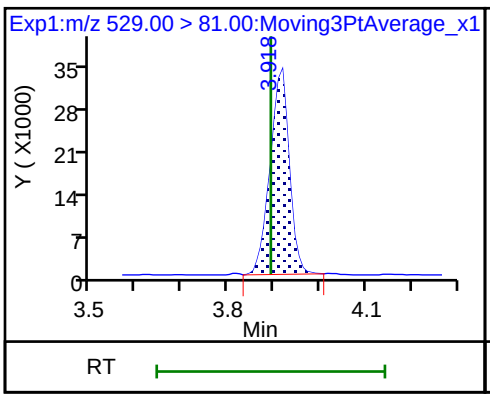
35 Perfluorononanesulfonic acid



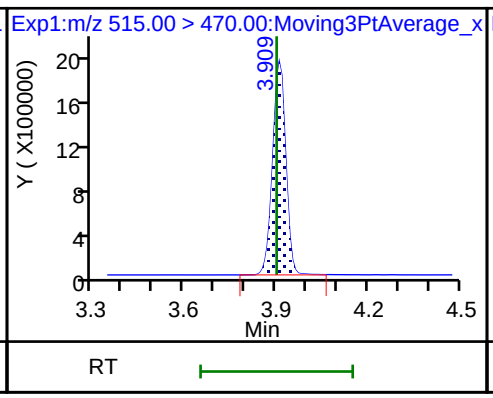
34 Perfluorooctanesulfonamide



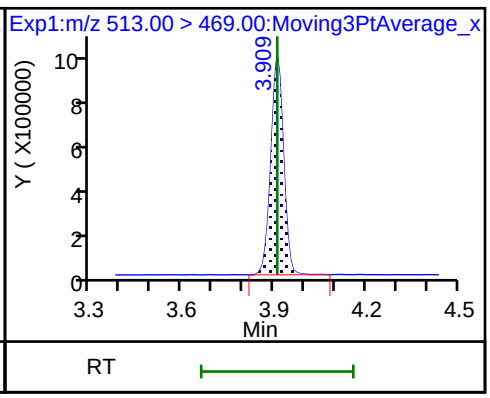
D 39 M2-8:2 FTS



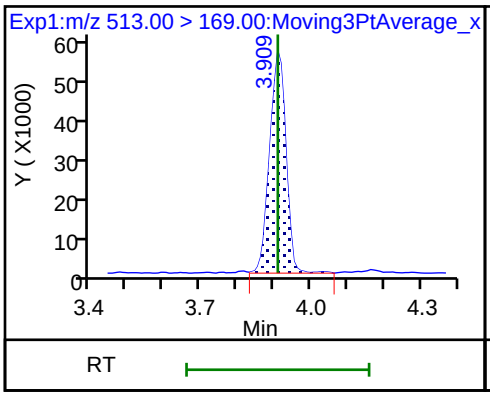
D 36 13C2 PFDA



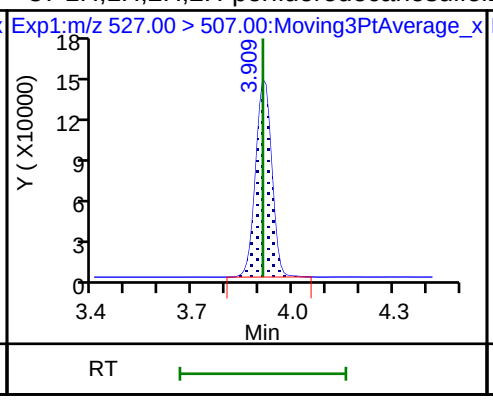
38 Perfluorodecanoic acid



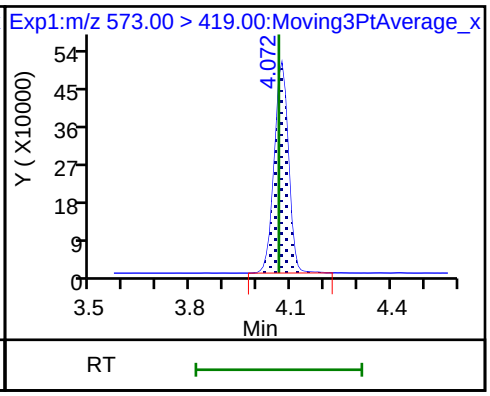
38 Perfluorodecanoic acid



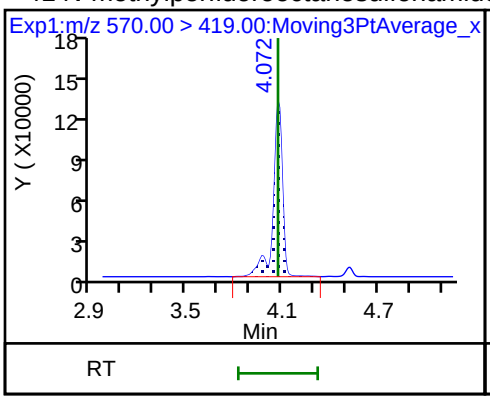
37 1H,1H,2H,2H-perfluorodecanesulfon



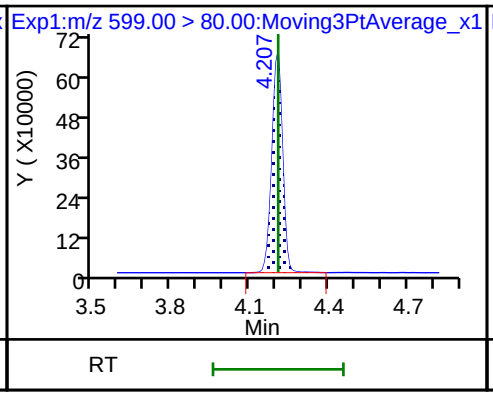
D 40 d3-NMeFOSAA



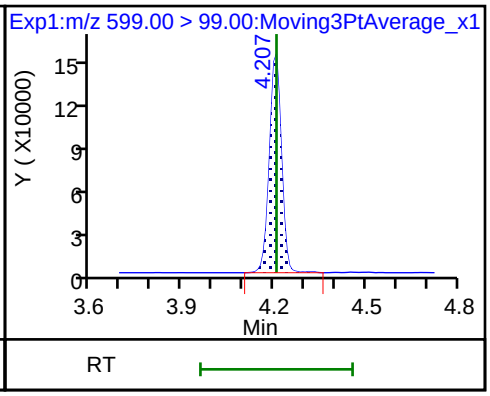
41 N-methylperfluorooctanesulfonamido



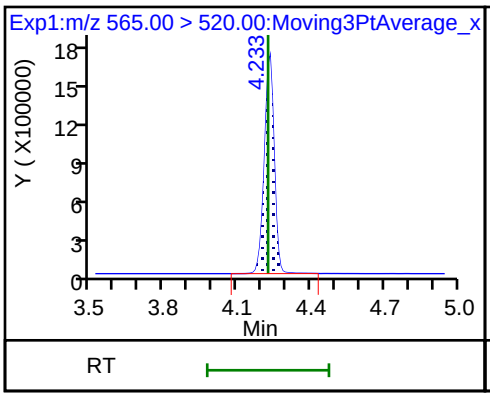
42 Perfluorodecanesulfonic acid



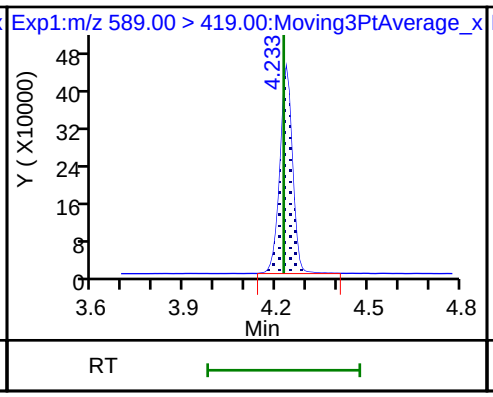
42 Perfluorodecanesulfonic acid



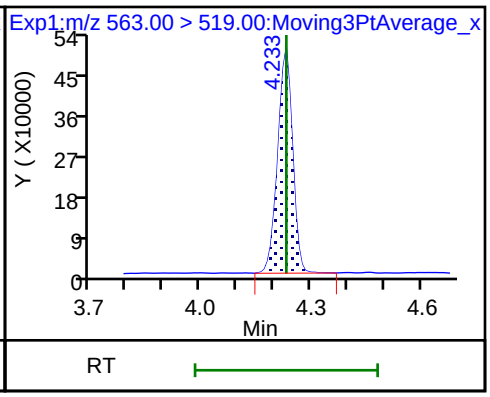
D 44 13C2 PFUnA



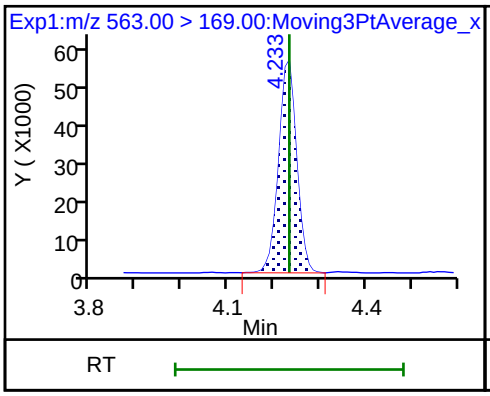
D 45 d5-NEtFOSAA



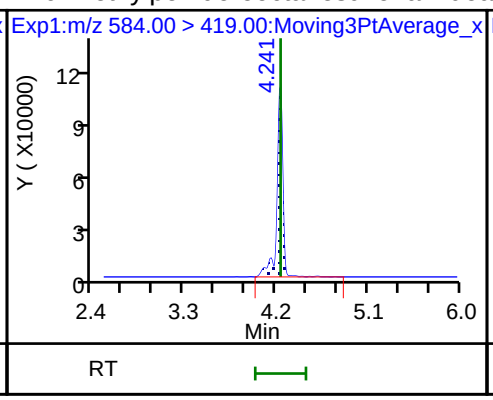
43 Perfluoroundecanoic acid



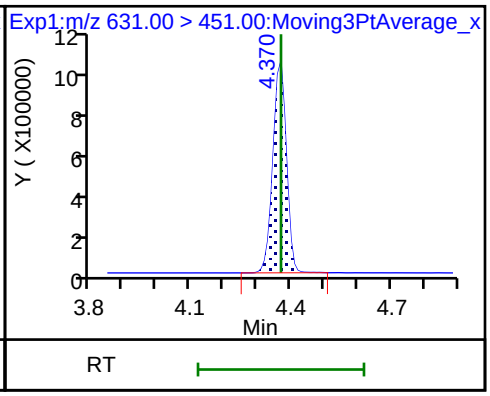
43 Perfluoroundecanoic acid



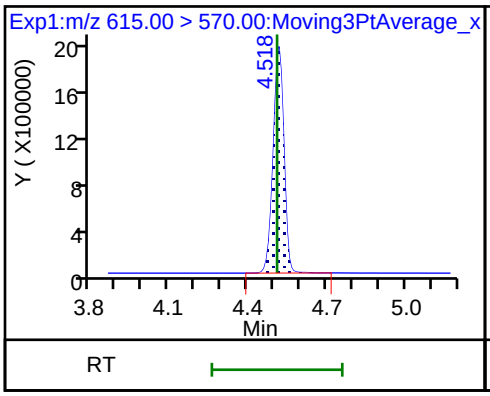
46 N-ethylperfluorooctanesulfonamidoa



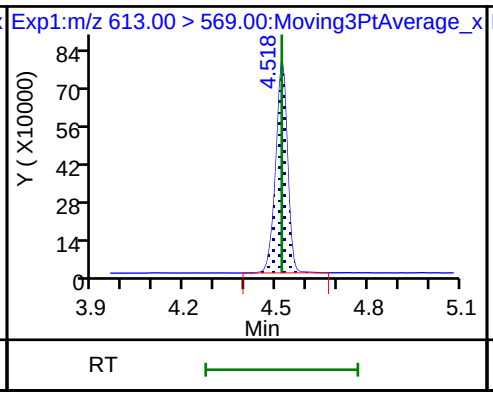
48 11-Chloroeicosafluoro-3-oxaundecan



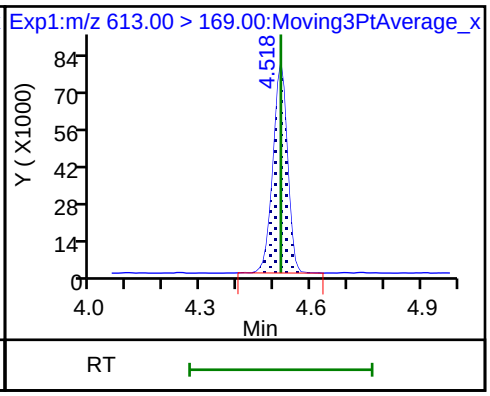
D 49 13C2 PFDoA



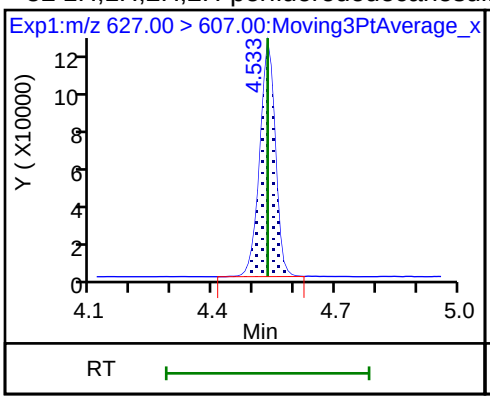
50 Perfluorododecanoic acid



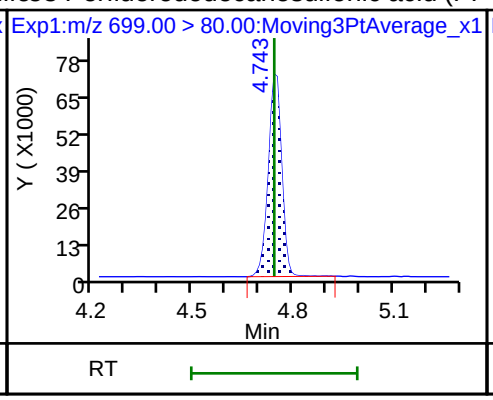
50 Perfluorododecanoic acid



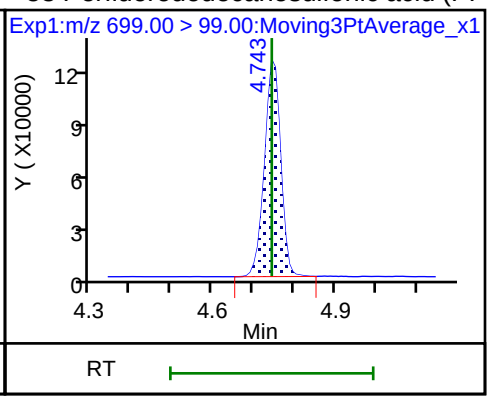
52 1H,1H,2H-perfluorododecanesulfo



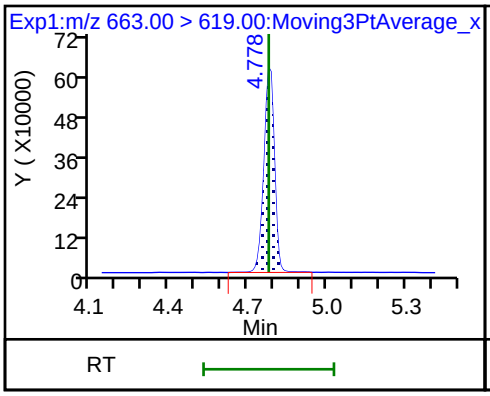
53 Perfluorododecanesulfonic acid (PF



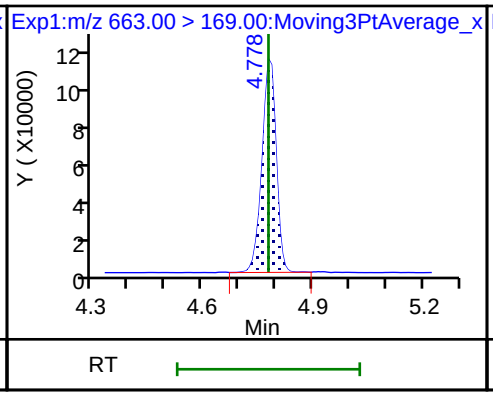
53 Perfluorododecanesulfonic acid (PF



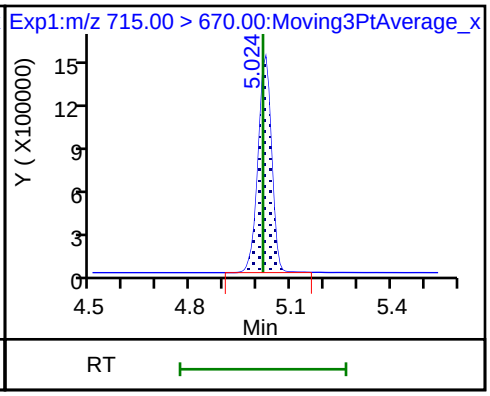
54 Perfluorotridecanoic acid



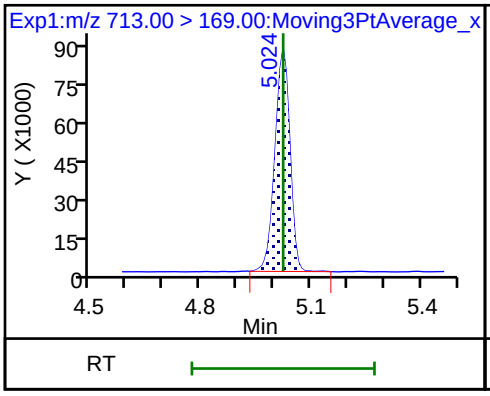
54 Perfluorotridecanoic acid



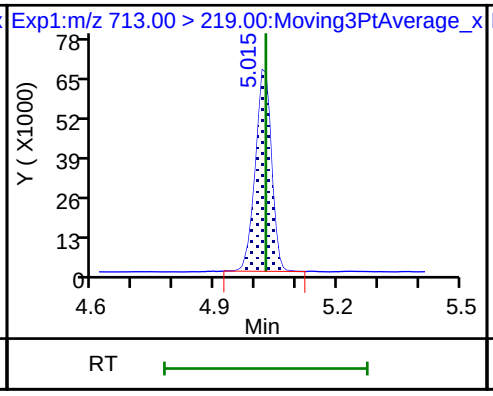
D 55 13C2 PFTeDA



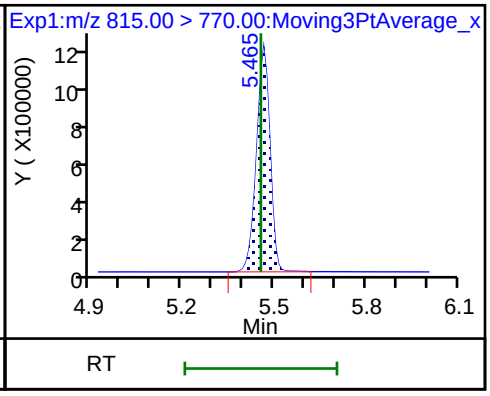
56 Perfluorotetradecanoic acid



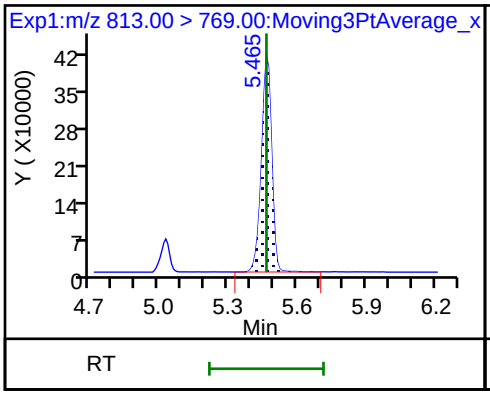
56 Perfluorotetradecanoic acid



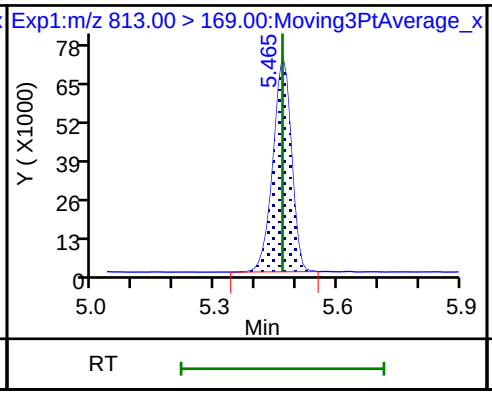
D 57 13C2 PFHxDA



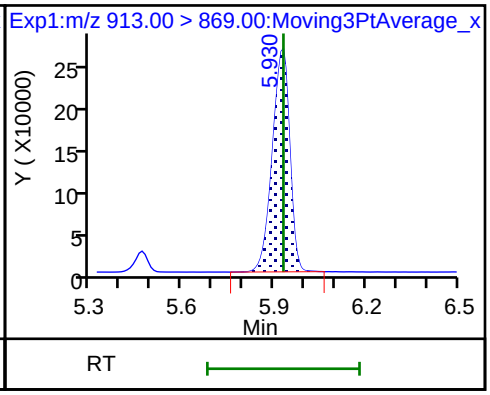
58 Perfluorohexadecanoic acid



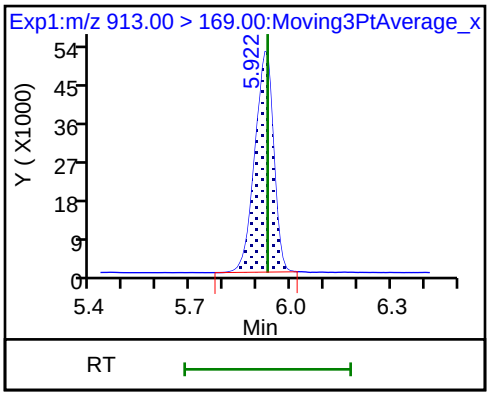
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-270021/9 Calibration Date: 01/10/2019 14:37

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.10LLA_037.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9257	0.8952		0.967	1.00	-3.3	40.0
Perfluoropentanoic acid (PFPeA)	AveID	1.000	0.9819		0.982	1.00	-1.8	40.0
Perfluorobutanesulfonic acid (PFBS)	AveID	0.9649	0.9179		0.841	0.884	-4.9	50.0
4:2 FTS	AveID	0.1480	0.1660		1.05	0.934	12.2	50.0
Perfluorohexanoic acid (PFHxA)	AveID	0.8661	0.8427		0.973	1.00	-2.7	40.0
Perfluoropentanesulfonic acid (PFPeS)	AveID	0.4688	0.4450		0.890	0.938	-5.1	50.0
HFPO-DA (GenX)	AveID	2.144	1.968		0.918	1.00	-8.2	40.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.040	1.017		0.978	1.00	-2.2	40.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.237	1.117		0.822	0.910	-9.7	40.0
DONA	AveID	2.306	2.397		0.979	0.942	3.9	50.0
6:2 FTS	AveID	2.112	2.005		0.900	0.948	-5.0	40.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.055	1.046		0.944	0.952	-0.9	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.037	0.9896		0.955	1.00	-4.5	40.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.054	1.010		0.889	0.928	-4.2	40.0
Perfluorononanoic acid (PFNA)	AveID	0.995	0.9678		0.972	1.00	-2.8	40.0
F-53B Major	AveID	0.9553	0.9003		0.878	0.932	-5.8	50.0
Perfluorononanesulfonic acid (PFNS)	AveID	0.5850	0.5550		0.911	0.960	-5.1	50.0
Perfluorooctanesulfonamide (FOSA)	AveID	2.907	3.124		1.08	1.00	7.5	40.0
Perfluorodecanoic acid (PFDA)	AveID	1.149	1.171		1.02	1.00	2.0	40.0
8:2 FTS	AveID	14.20	13.92		0.939	0.958	-2.0	40.0
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	AveID	0.8665	0.8340		0.963	1.00	-3.8	40.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.8746	0.8121		0.895	0.964	-7.1	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	0.8338	0.7274		0.872	1.00	-12.8	40.0
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	AveID	0.8279	0.8019		0.969	1.00	-3.1	40.0
F-53B Minor	AveID	1.128	1.223		1.02	0.942	8.4	50.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9604	0.9142		0.952	1.00	-4.8	40.0
10:2 FTS	AveID	8.852	8.681		0.945	0.964	-1.9	50.0
Perfluorododecanesulfonic acid (PFDoS)	AveID	0.0908	0.0850		0.906	0.968	-6.5	50.0
Perfluorotridecanoic acid (PFTriA)	AveID	0.7591	0.7371		0.971	1.00	-2.9	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.1633	0.1512		0.926	1.00	-7.4	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.8996		0.996	1.00	-0.5	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Lab Sample ID: CCV 320-270021/9 Calibration Date: 01/10/2019 14:37

Instrument ID: A9 Calib Start Date: 01/08/2019 17:41

GC Column: Acquity ID: 2.10(mm) Calib End Date: 01/08/2019 18:26

Lab File ID: 2019.01.10LLA_037.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluoro-n-octadecanoic acid (PFODA)	AveID	0.6173	0.8202		1.33	1.00	32.9	50.0
13C4 PFBA	Ave	0.9546	0.9587		2.51	2.50	0.4	50.0
13C5 PFPeA	Ave	0.8350	0.8431		2.52	2.50	1.0	50.0
13C3 PFBS	Ave	1.371	1.390		2.36	2.33	1.3	50.0
M2-4:2 FTS	Ave	0.0836	0.0818		2.29	2.34	-2.1	50.0
13C2 PFHxA	Ave	0.9280	0.8958		2.41	2.50	-3.5	50.0
13C3 HFPO-DA	Ave	0.0833	0.0728		2.19	2.50	-12.6	50.0
13C4 PFHpA	Ave	1.141	1.142		2.50	2.50	0.1	50.0
18O2 PFHxS	Ave	0.8068	0.8129		2.38	2.37	0.7	50.0
M2-6:2 FTS	Ave	0.1125	0.1310		2.77	2.38	16.4	40.0
13C4 PFOA	Ave	0.9896	0.997		2.52	2.50	0.8	50.0
13C8 PFOA	Ave	2363087	1948596		2.02	2.45	-17.5	50.0
13C8 PFOS	Ave	500608	422813		2.02	2.39	-15.5	50.0
13C4 PFOS	Ave	0.8235	0.8067		2.34	2.39	-2.0	50.0
13C5 PFNA	Ave	0.8916	0.8777		2.46	2.50	-1.6	50.0
13C8 FOSA	Ave	0.5421	0.4900		2.26	2.50	-9.6	50.0
13C2 PFDA	Ave	0.8721	0.8128		2.33	2.50	-6.8	50.0
M2-8:2 FTS	Ave	0.0129	0.0128		2.37	2.40	-1.2	40.0
d3-NMeFOSAA	Ave	0.2285	0.2104		2.30	2.50	-7.9	50.0
13C2 PFUnA	Ave	0.6858	0.6544		2.39	2.50	-4.6	50.0
d5-NEtFOSAA	Ave	0.1905	0.1774		2.33	2.50	-6.9	50.0
13C2 PFDoA	Ave	0.8313	0.7977		2.40	2.50	-4.0	50.0
13C2 PFTeDA	Ave	0.5763	0.5669		2.46	2.50	-1.6	50.0
13C2 PFHxDA	Ave	0.5385	0.5021		2.33	2.50	-6.8	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_037.d
Lims ID: CCV L4
Client ID:
Sample Type: CCV
Inject. Date: 10-Jan-2019 14:37:54 ALS Bottle#: 30 Worklist Smp#: 9
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCV L4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9
Sublist: chrom-PFAS_A9*sub7

Method: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 11-Jan-2019 10:43:00 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0332

First Level Reviewer: westendorfc Date: 11-Jan-2019 08:49:20
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.668	1.660	0.008	0.527	5441682	2.51		100	8672	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.668	1.668	0.0	1.000	1948473	0.9670		96.7	197	
D 3 13C5 PFPeA										
267.90 > 223.00	2.009	1.998	0.011	0.635	4785498	2.52		101	4368	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.009	2.009	0.0	1.000	1879575	0.9818		98.2	103	
D 5 13C3 PFBS										
301.90 > 80.00	2.041	2.040	0.001	0.645	7337084	2.36		101	744729	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.041	2.041	0.0	1.000	2560552	0.8409	Target=2.70	95.1	4425	
298.90 > 99.00	2.041	2.041	0.0	1.000	928403		2.76(1.35-4.05)		1017	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.339	2.331	0.008	0.739	433796	2.29		97.9	805	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.331	2.331	0.0	1.143	489217	1.05		112	1560	
D 9 13C2 PFHxA										
315.00 > 270.00	2.373	2.373	0.0	0.750	5084936	2.41		96.5	4200	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.373	2.373	0.0	1.000	1713962	0.9729	Target=13.92	97.3	454	
313.00 > 119.00	2.373	2.373	0.0	1.000	123716		13.85(6.96-20.87)		254	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.392	2.392	0.0	1.172	1317355	0.8904	Target=2.30	94.9	1897	
349.00 > 99.00	2.392	2.392	0.0	1.172	596610		2.21(1.15-3.45)		1121	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.497	2.487	0.010	0.789	413067	2.18		87.4	992	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
14 Perfluoro(2-propoxypropanoic) acid										
329.10 > 285.00	2.497	2.497	0.0	1.000	325152	0.9179		91.8	188	
D 16 13C4 PFHpA										
367.00 > 322.00	2.765	2.763	0.002	0.873	6484682	2.50		100	2691	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.765	2.765	0.0	1.000	2638221	0.9776	Target=4.34	97.8	678	
363.00 > 169.00	2.765	2.765	0.0	1.000	566989		4.65(2.17-6.52)		906	
D 17 18O2 PFHxS										
403.00 > 84.00	2.774	2.772	0.002	0.876	4364855	2.38		101	2196	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.774	2.774	0.0	1.000	1876449	0.8218	Target=3.80	90.3	2607	
399.00 > 99.00	2.774	2.774	0.0	1.000	513441		3.65(1.90-5.70)		515	
19 DONA										
377.00 > 251.00	2.819	2.819	0.0	0.797	4135181	0.9792	Target=2.26	104	2493	
377.00 > 85.00	2.819	2.819	0.0	0.797	1711611		2.42(1.13-3.39)		1547	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.150	3.141	0.009	0.995	706123	2.77		116	1326	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.142	3.142	0.0	0.998	565113	0.9001		95.0	626	
D 22 13C8 PFOA										
421.00 > 376.00	3.165	3.157	0.008		4769189	2.02		82.5	3016	
D 25 13C4 PFOA										
417.00 > 372.00	3.165	3.157	0.008	1.000	5660439	2.52		101	2416	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.165	3.165	0.0	0.895	1823978	0.9439	Target=3.69	99.1	2069	
449.00 > 99.00	3.165	3.165	0.0	0.895	451343		4.04(1.84-5.53)		1388	
* 24 13C2 PFOA										
415.00 > 370.00	3.165	3.165	0.0		5676216	2.50			3421	
26 Perfluorooctanoic acid										
413.00 > 369.00	3.165	3.165	0.0	1.000	2240609	0.9546	Target=2.72	95.5	351	
413.00 > 169.00	3.165	3.165	0.0	1.000	808001		2.77(1.36-4.08)		1522	
D 27 13C8 PFOS										
507.00 > 99.00	3.531	3.529	0.002		1010522	2.02		84.5	1893	
D 28 13C4 PFOS										
503.00 > 80.00	3.538	3.529	0.009	1.118	4377250	2.34		98.0	3123	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.538	3.538	0.0	1.000	1716728	0.8894	Target=4.08	95.8	102760	
499.00 > 99.00	3.538	3.538	0.0	1.000	407032		4.22(2.04-6.12)		2069	
D 31 13C5 PFNA										
468.00 > 423.00	3.546	3.544	0.002	1.120	4982076	2.46		98.4	3695	
30 Perfluorononanoic acid										
463.00 > 419.00	3.546	3.546	0.0	1.000	1928553	0.9721	Target=5.35	97.2	437	
463.00 > 169.00	3.546	3.546	0.0	1.000	337927		5.71(2.68-8.03)		917	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.742	3.742	0.0	1.058	1536786	0.8783		94.2	1300	
D 33 13C8 FOSA										
506.00 > 78.00	3.877	3.877	0.0	1.225	2781210	2.26		90.4	2096	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.877	3.877	0.0	1.096	975747	0.9107	Target=6.03	94.9	1939	
549.00 > 99.00	3.885	3.877	0.008	1.098	148840		6.56(3.02-9.05)		529	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.885	3.885	0.0	1.002	3475191	1.07		107	2075	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.910	3.892	0.018	1.235	69423	2.37		98.8	345	
D 36 13C2 PFDA										
515.00 > 470.00	3.901	3.901	0.0	1.232	4613718	2.33		93.2	1878	
38 Perfluorodecanoic acid										
513.00 > 469.00	3.901	3.901	0.0	1.000	2161477	1.02	Target=14.23	102	982	
513.00 > 169.00	3.901	3.901	0.0	1.000	141749		15.25(7.12-21.35)		310	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.910	3.910	0.0	1.000	386500	0.9392		98.0	1692	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.064	4.063	0.001	1.284	1193971	2.30		92.1	1444	
41 N-methylperfluorooctanesulfonamido										
570.00 > 419.00	4.073	4.073	0.0	1.002	398294	0.9625		96.2	146	
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.199	4.199	0.0	1.187	1433728	0.8951	Target=4.28	92.9	1563	
599.00 > 99.00	4.199	4.199	0.0	1.187	309787		4.63(2.14-6.43)		793	
D 44 13C2 PFUnA										
565.00 > 520.00	4.224	4.224	0.0	1.335	3714613	2.39		95.4	2658	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.233	4.224	0.009	1.337	1006937	2.33		93.1	1158	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.224	4.224	0.0	1.000	1080765	0.8724	Target=10.48	87.2	268	
563.00 > 169.00	4.224	4.224	0.0	1.000	118572		9.11(5.24-15.72)		473	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.233	4.233	0.0	1.000	322972	0.9686		96.9	704	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.360	4.360	0.0	1.232	2109350	1.02		108	3185	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.510	4.510	0.0	1.000	1655817	0.9519	Target=9.37	95.2	757	
613.00 > 169.00	4.510	4.510	0.0	1.000	175651		9.43(4.68-14.05)		786	
D 49 13C2 PFDoA										
615.00 > 570.00	4.510	4.510	0.0	1.425	4528147	2.40		96.0	4118	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.526	4.526	0.0	1.158	242585	0.9454		98.1	920	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.744	4.744	0.0	1.341	150633	0.9055	Target=0.55	93.5	982	
699.00 > 99.00	4.744	4.744	0.0	1.341	266176		0.57(0.28-0.83)		1249	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.779	4.779	0.0	1.060	1334985	0.9710	Target=6.18	97.1	610	
663.00 > 169.00	4.779	4.779	0.0	1.060	233957		5.71(3.09-9.27)		842	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.016	5.016	0.0	1.000	194598	0.9259	Target=1.39	92.6	867	
713.00 > 219.00	5.016	5.016	0.0	1.000	133292		1.46(0.70-2.09)		628	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.016	5.016	0.0	1.585	3217718	2.46		98.4	3309	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.465	5.456	0.009	1.727	2849886	2.33		93.2	2457	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.465	5.465	0.0	1.000	1025508	1.00	Target=5.55	99.5	107	
813.00 > 169.00	5.465	5.465	0.0	1.000	184794		5.55(2.77-8.32)		1252	
59 Perfluorooctadecanoic acid										
913.00 > 869.00	5.922	5.922	0.0	1.084	935017	1.33	Target=5.09	133	297	
913.00 > 169.00	5.922	5.922	0.0	1.084	186783		5.01(2.55-7.64)		867	

Reagents:

LCPFC_LL4_00010 Amount Added: 1.00 Units: mL

Report Date: 11-Jan-2019 10:43:01 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_037.d

Injection Date: 10-Jan-2019 14:37:54 Instrument ID: A9

Lims ID: CCV L4

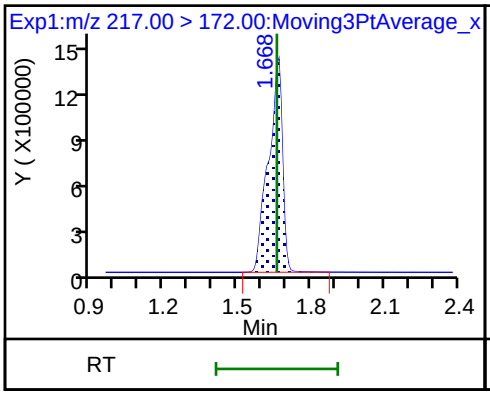
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 30 Worklist Smp#: 9

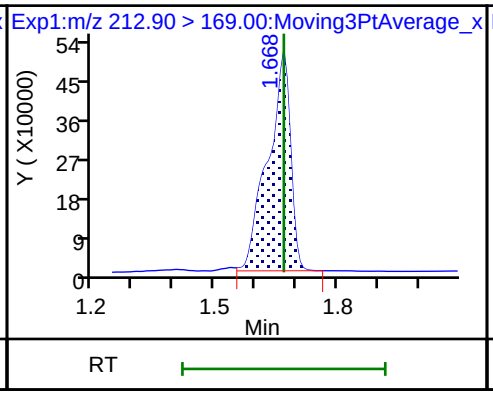
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

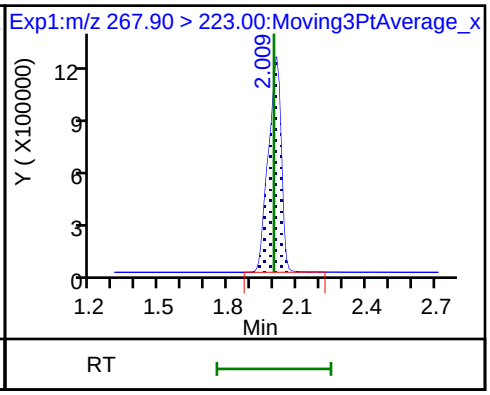
D 1 13C4 PFBA



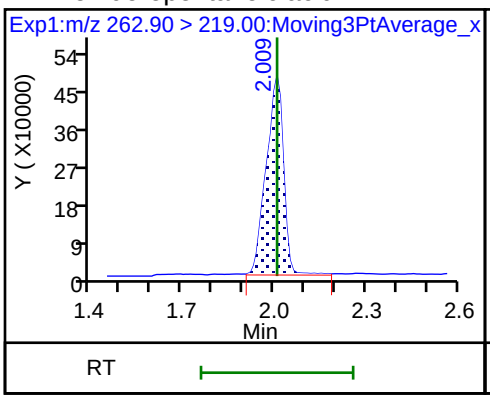
2 Perfluorobutanoic acid



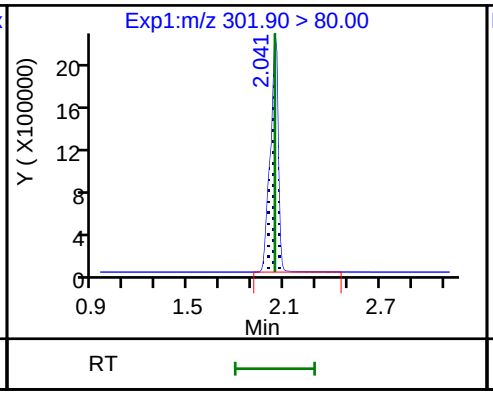
D 3 13C5 PFPeA



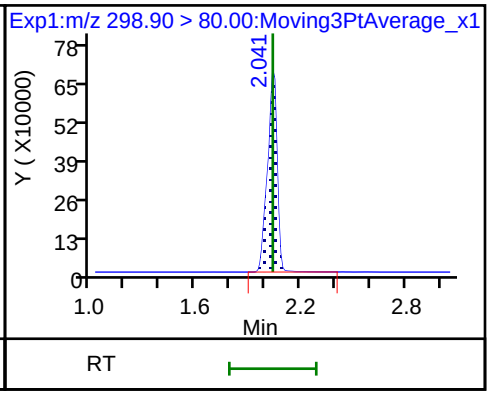
4 Perfluoropentanoic acid



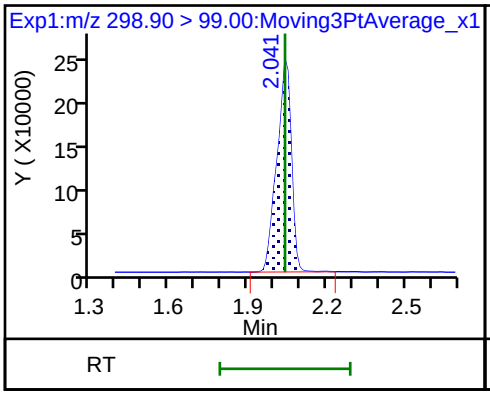
D 5 13C3 PFBS



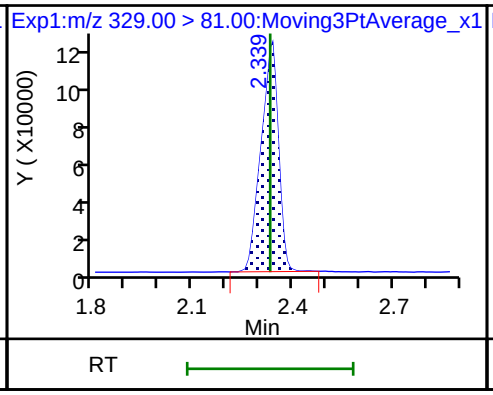
6 Perfluorobutanesulfonic acid



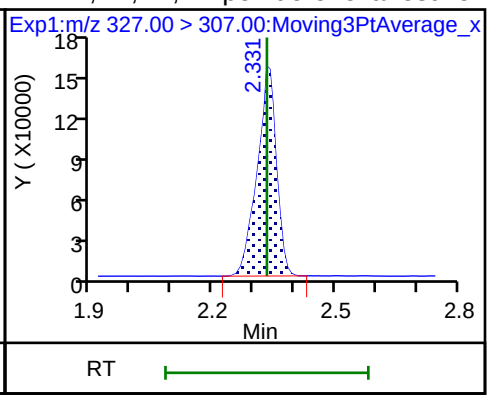
6 Perfluorobutanesulfonic acid



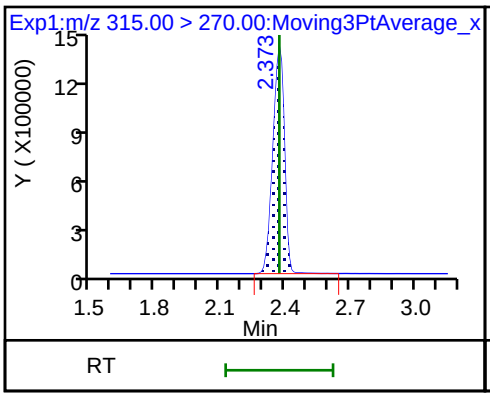
D 8 M2-4:2 FTS



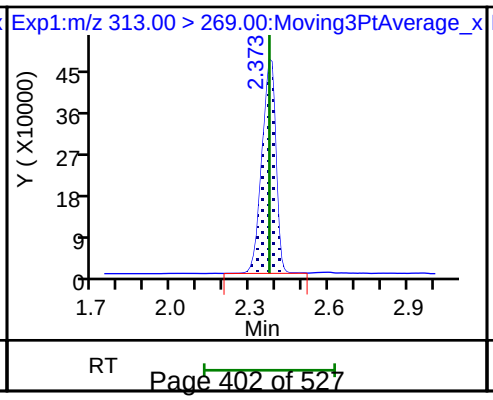
7 1H,1H,2H,2H-perfluorohexanesulfoni



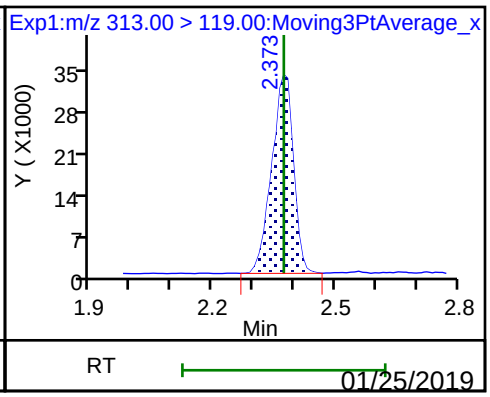
D 9 13C2 PFHxA



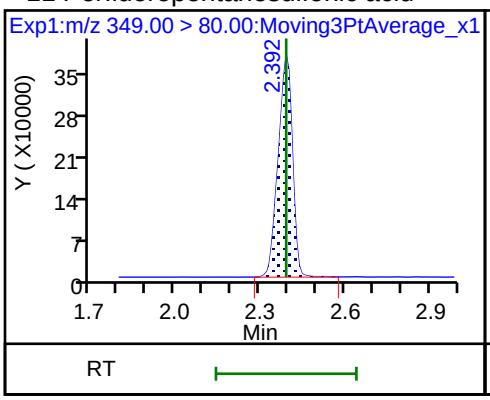
10 Perfluorohexanoic acid



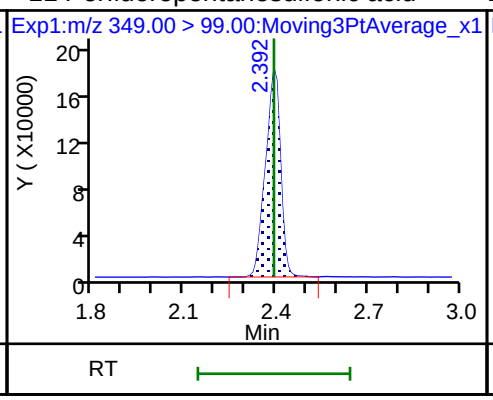
10 Perfluorohexanoic acid



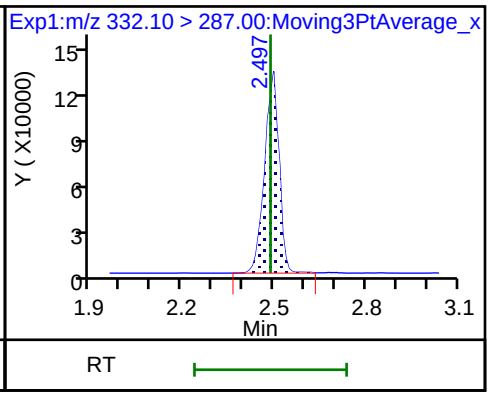
11 Perfluoropentanesulfonic acid



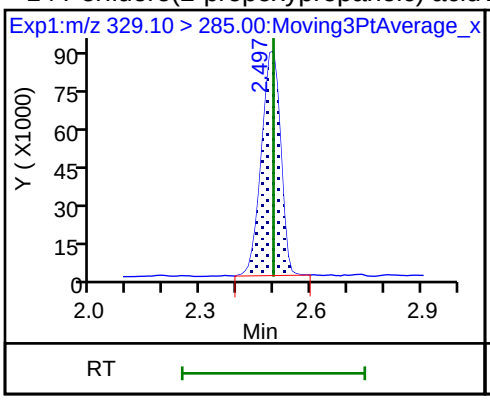
11 Perfluoropentanesulfonic acid



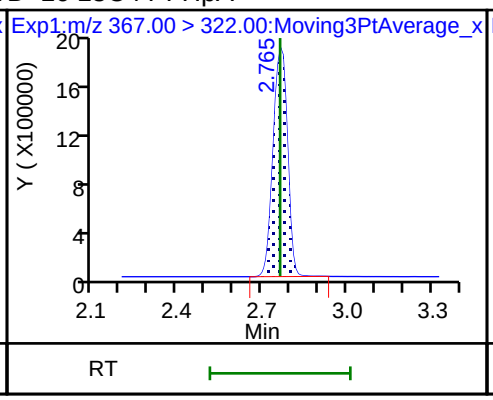
D 13 13C3 HFPO-DA



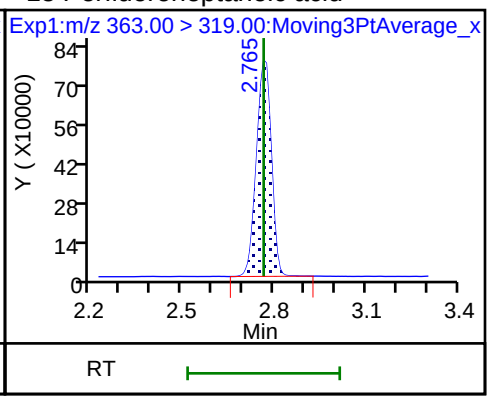
14 Perfluoro(2-propoxypropanoic) acid



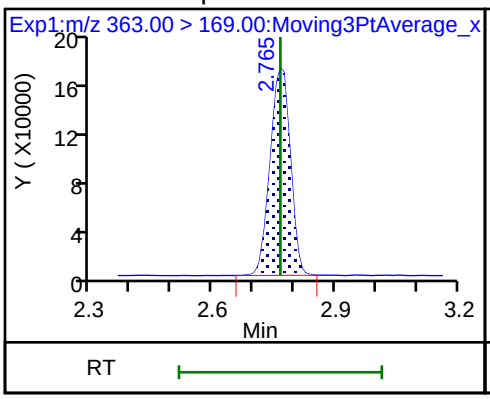
D 16 13C4 PFHpA



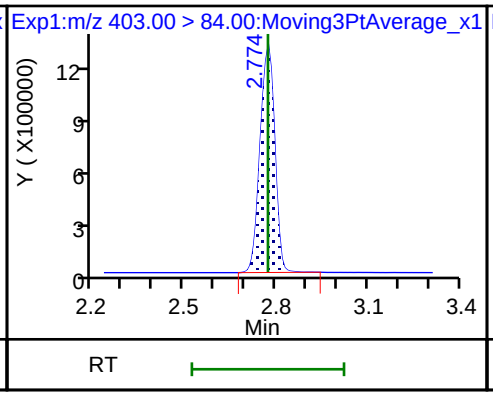
15 Perfluoroheptanoic acid



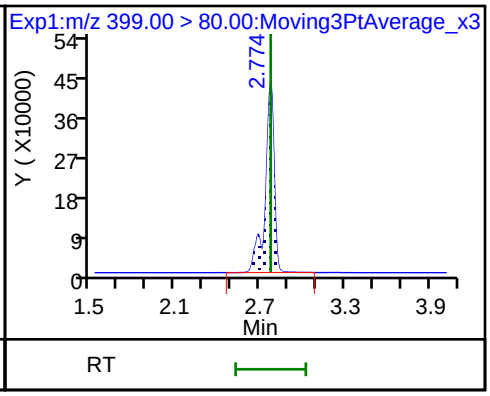
15 Perfluoroheptanoic acid



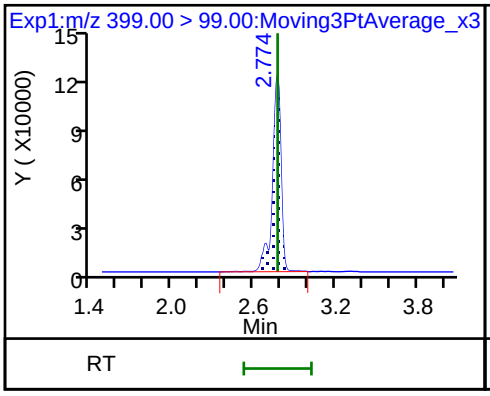
D 17 18O2 PFHxS



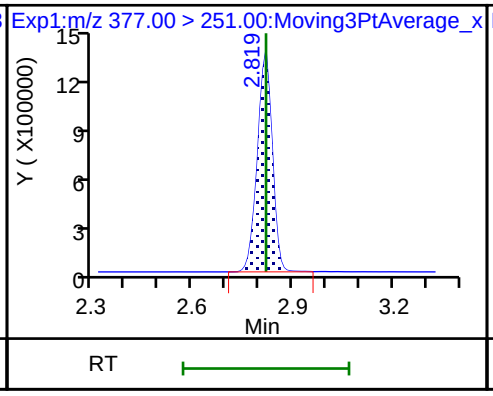
18 Perfluorohexanesulfonic acid



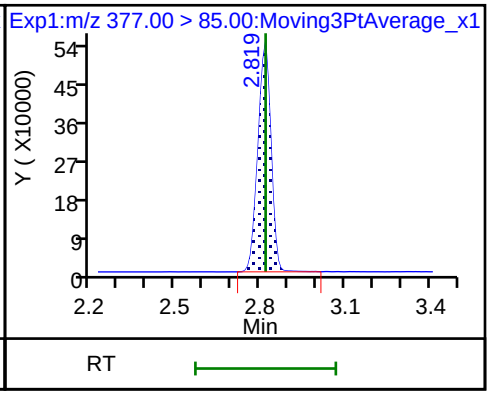
18 Perfluorohexanesulfonic acid



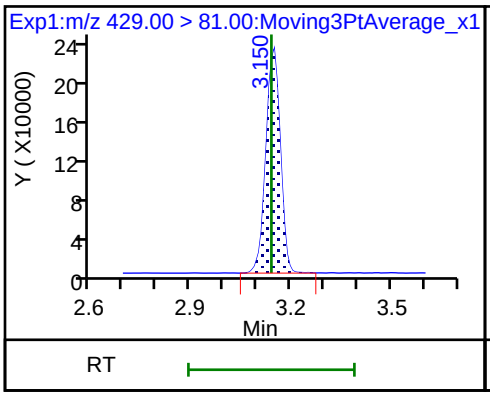
19 DONA



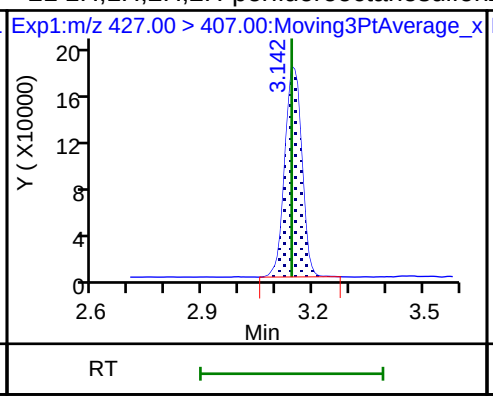
19 DONA



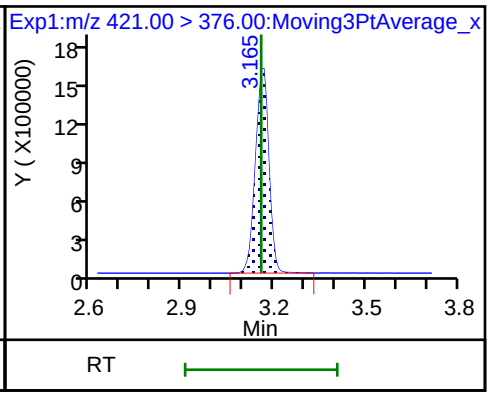
D 20 M2-6:2 FTS



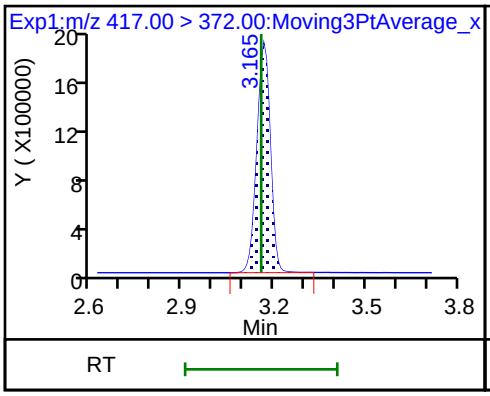
21 1H,1H,2H,2H-perfluorooctanesulfon



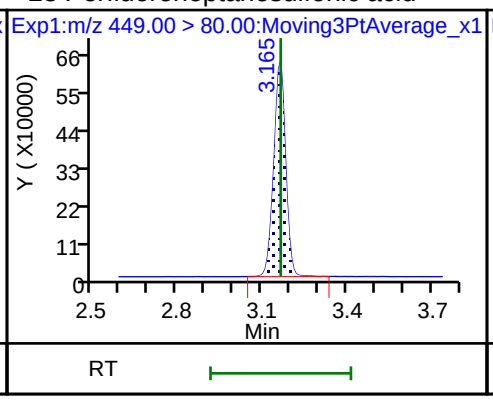
D 22 13C8 PFOA



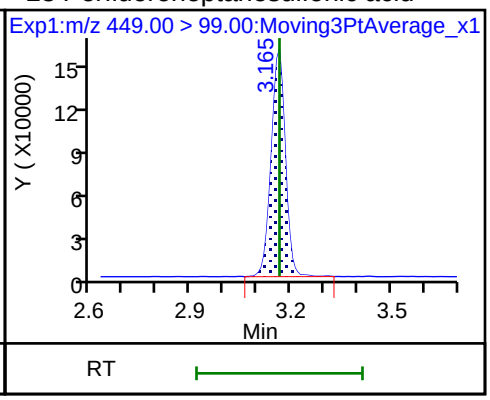
D 25 13C4 PFOA



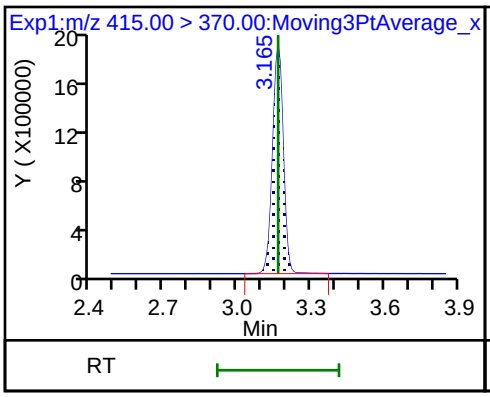
23 Perfluoroheptanesulfonic acid



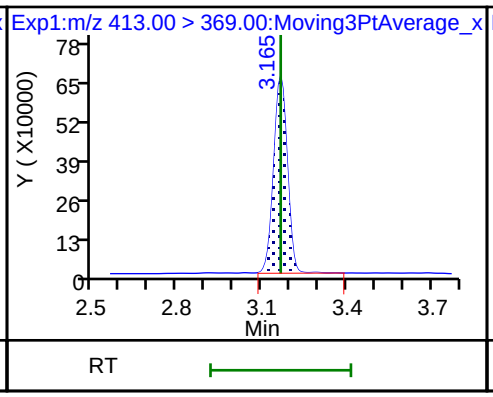
23 Perfluoroheptanesulfonic acid



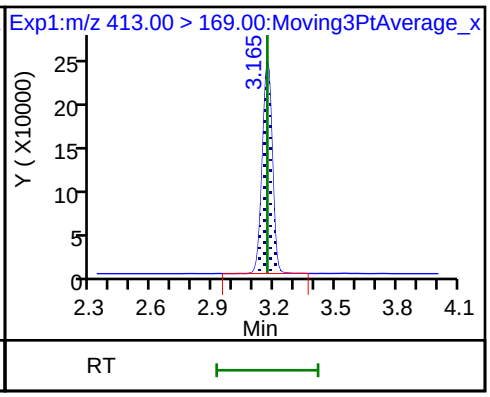
* 24 13C2 PFOA



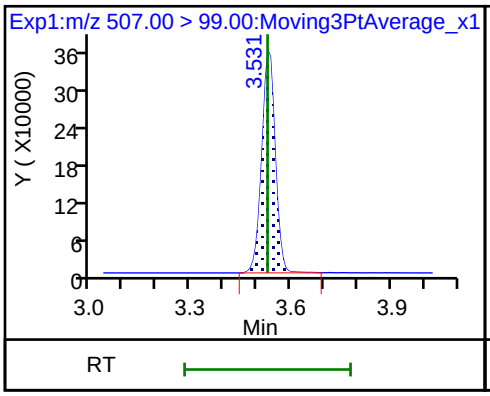
26 Perfluorooctanoic acid



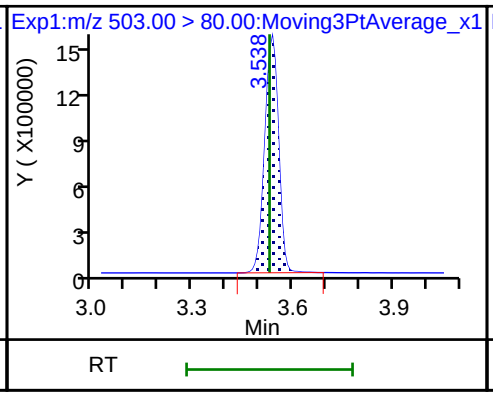
26 Perfluorooctanoic acid



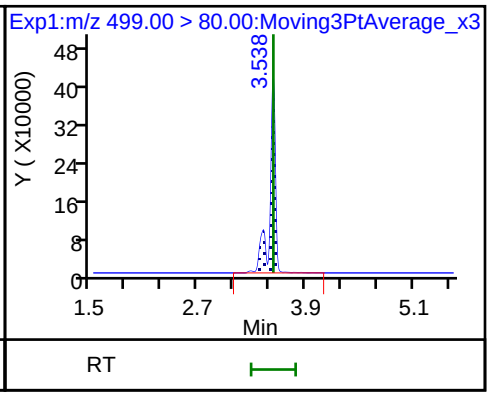
D 27 13C8 PFOS



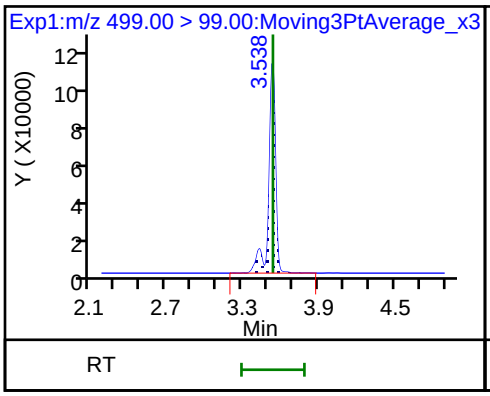
D 28 13C4 PFOS



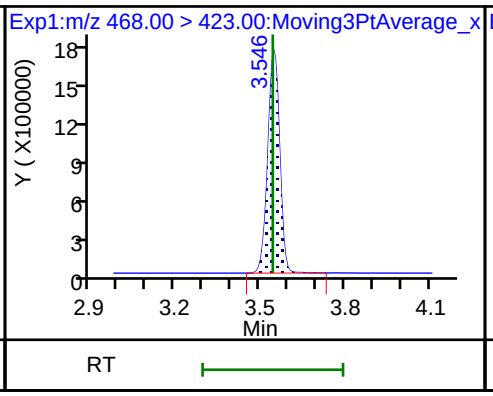
29 Perfluorooctanesulfonic acid



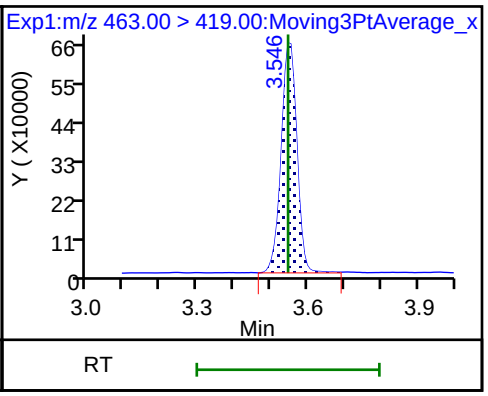
29 Perfluorooctanesulfonic acid



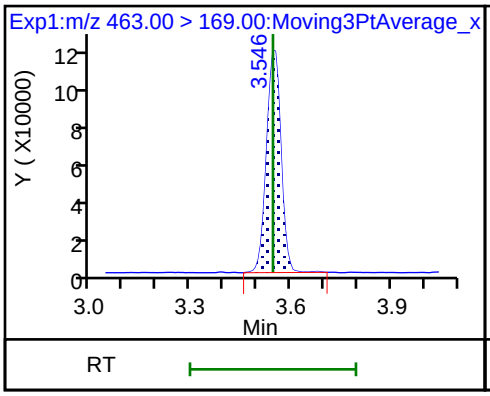
D 31 13C5 PFNA



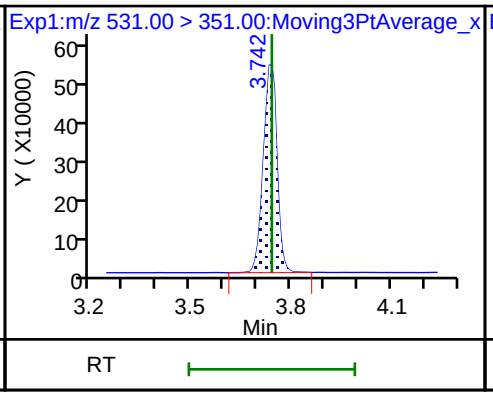
30 Perfluorononanoic acid



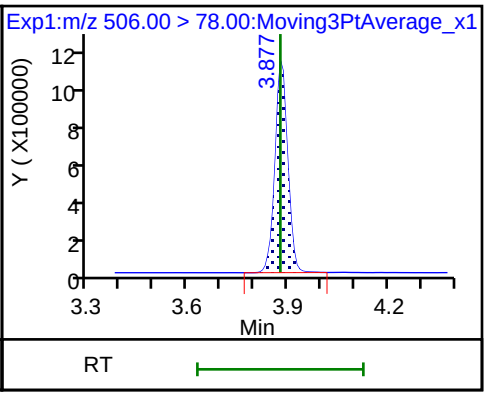
30 Perfluorononanoic acid



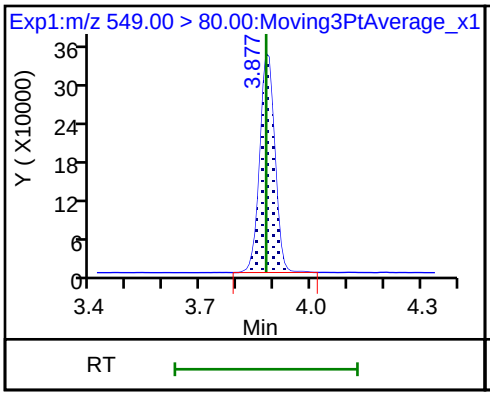
32 9-Chlorohexadecafluoro-3-oxanonane



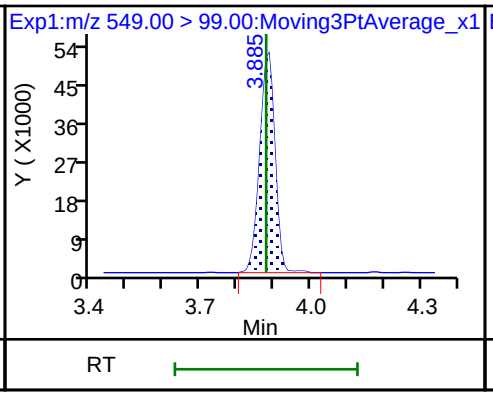
D 33 13C8 FOSA



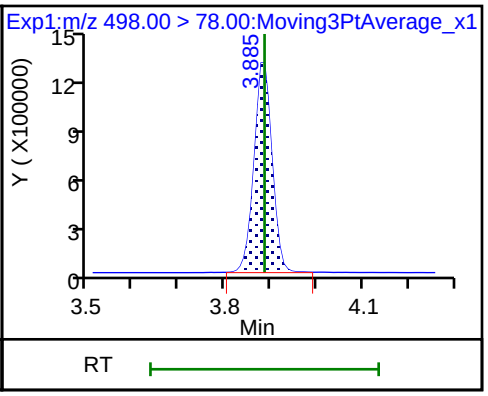
35 Perfluorononanesulfonic acid



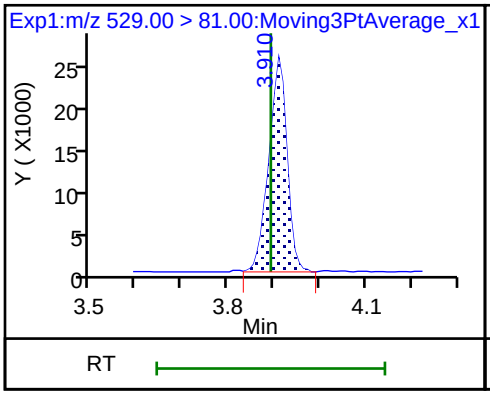
35 Perfluorononanesulfonic acid



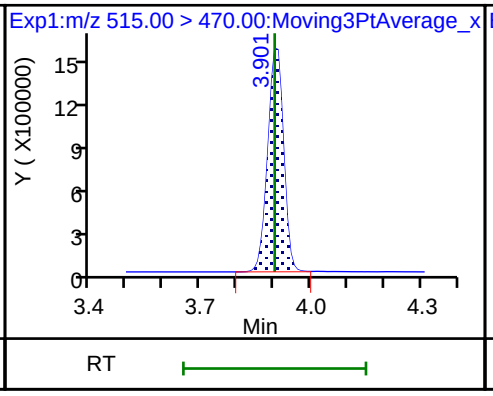
34 Perfluorooctanesulfonamide



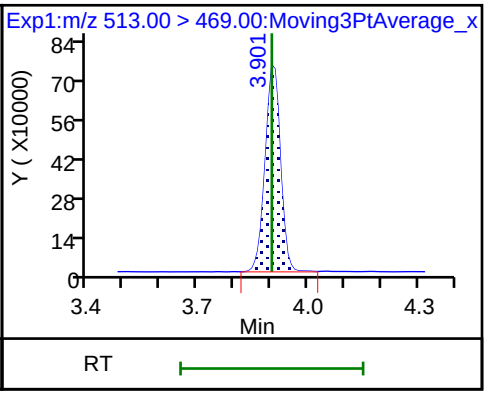
D 39 M2-8:2 FTS



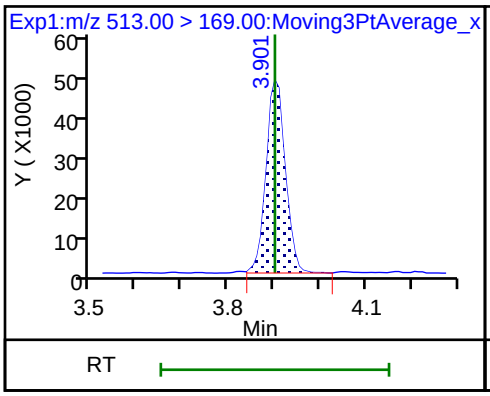
D 36 13C2 PFDA



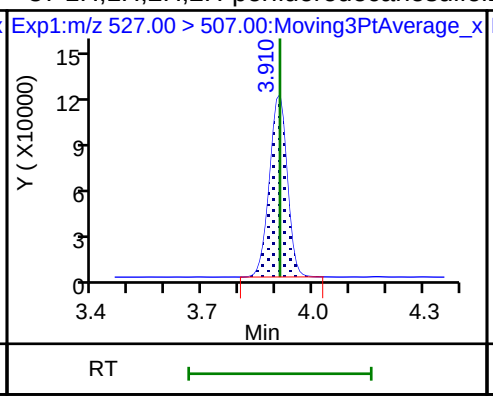
38 Perfluorodecanoic acid



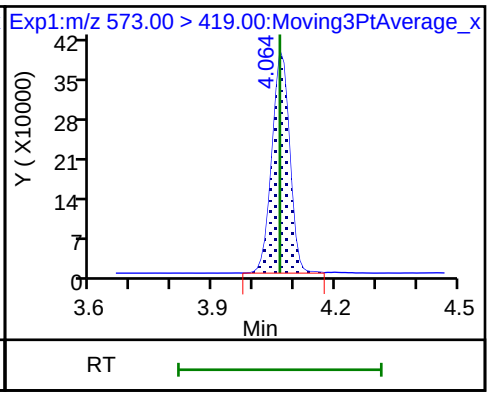
38 Perfluorodecanoic acid



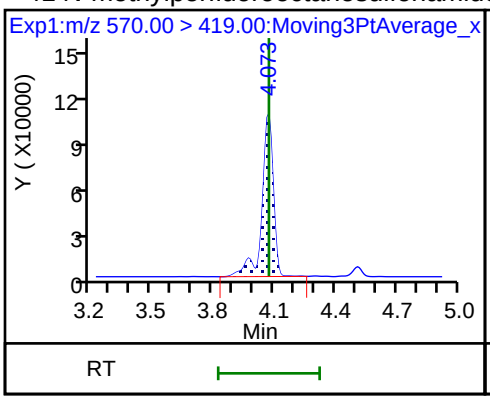
37 1H,1H,2H,2H-perfluorodecanesulfon



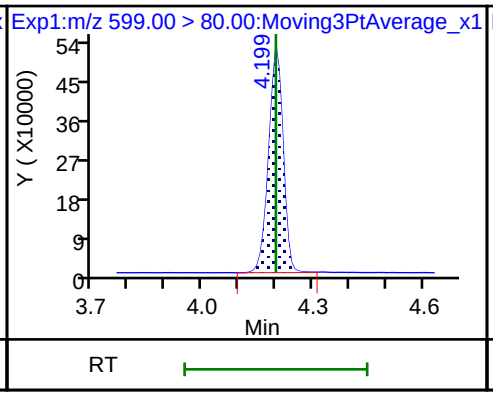
D 40 d3-NMeFOSAA



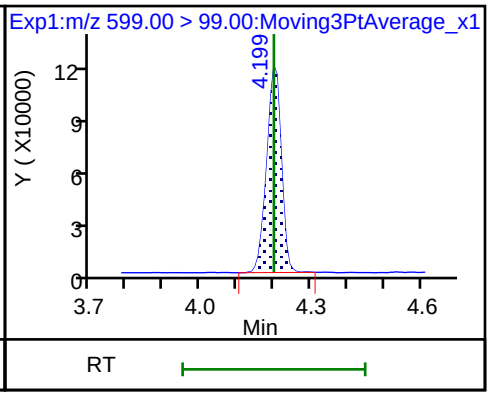
41 N-methylperfluorooctanesulfonamido



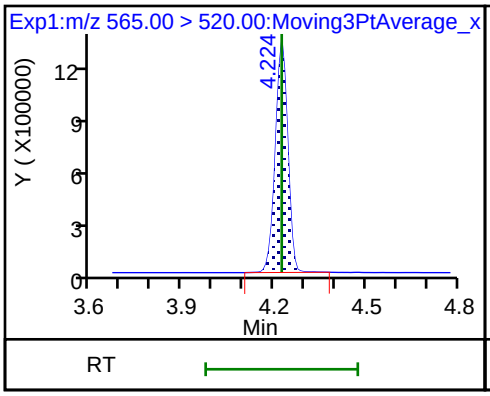
42 Perfluorodecanesulfonic acid



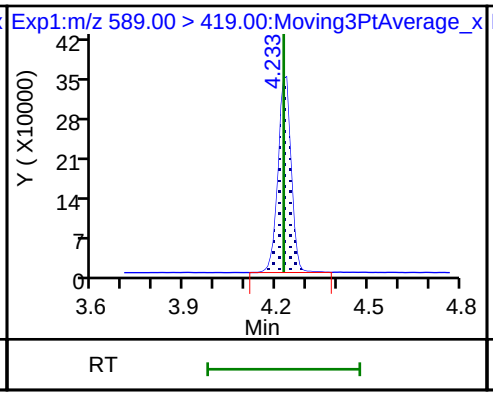
42 Perfluorodecanesulfonic acid



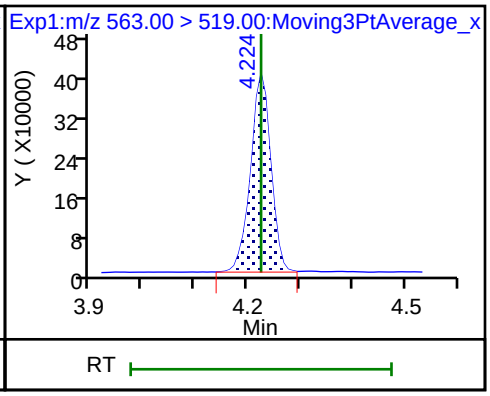
D 44 13C2 PFUnA



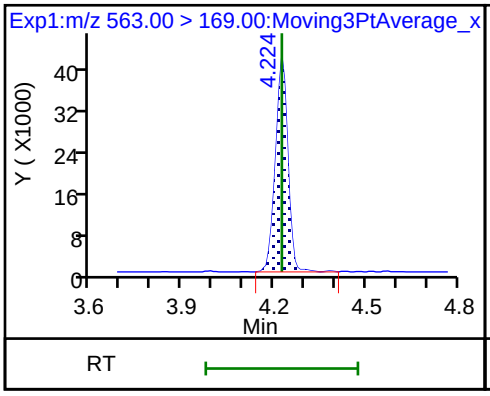
D 45 d5-NEtFOSAA



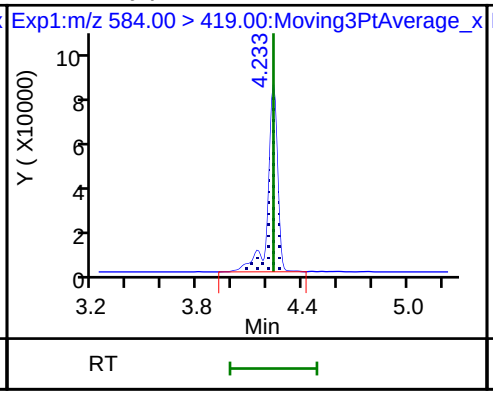
43 Perfluoroundecanoic acid



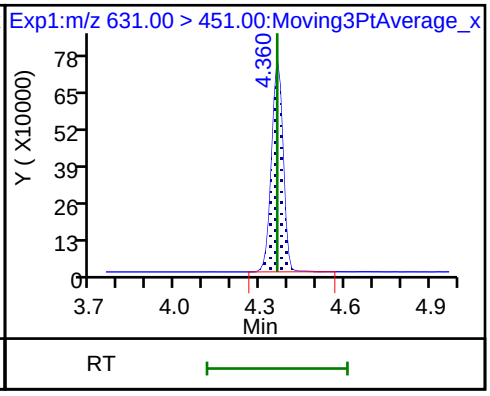
43 Perfluoroundecanoic acid



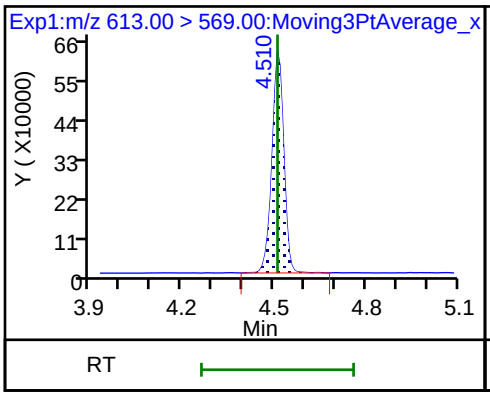
46 N-ethylperfluorooctanesulfonamidoa



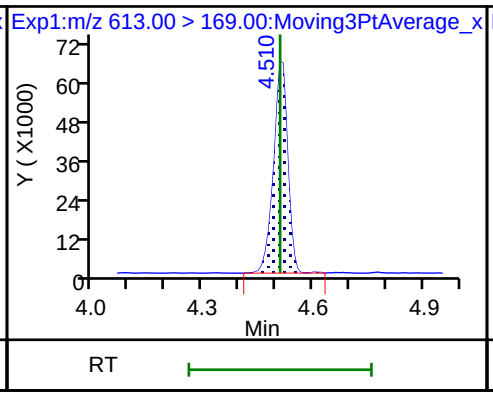
48 11-Chloroeicosafluoro-3-oxaundecan



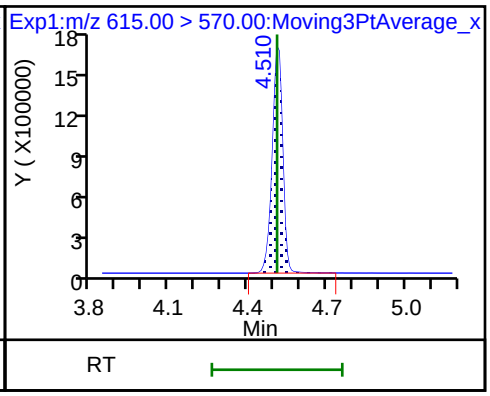
50 Perfluorododecanoic acid



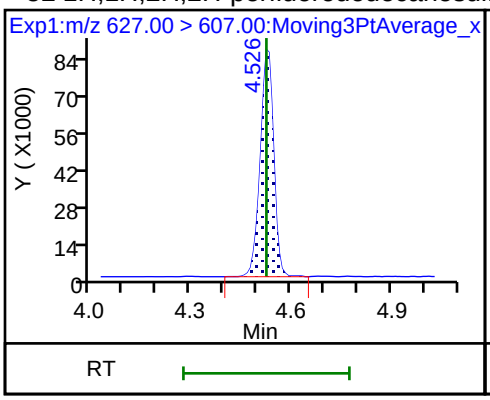
50 Perfluorododecanoic acid



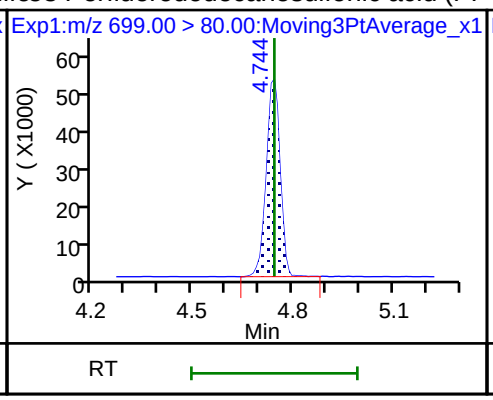
D 49 13C2 PFDoA



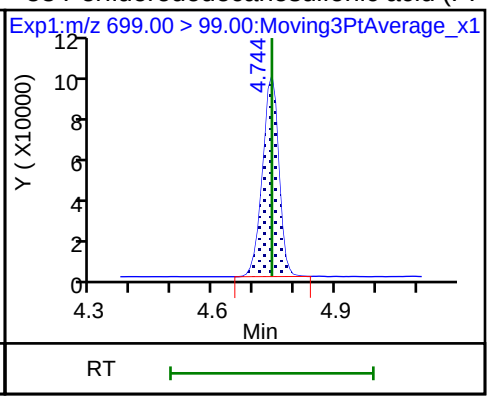
52 1H,1H,2H,2H-perfluorododecanesulfo



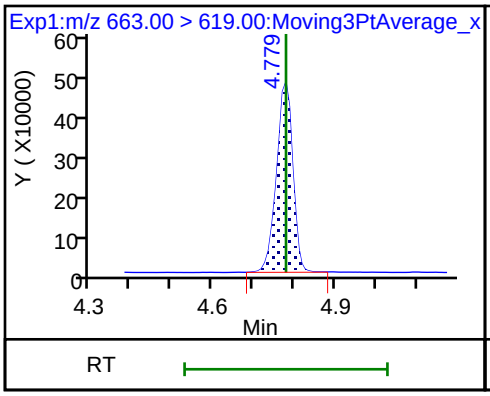
53 Perfluorododecanesulfonic acid (PF



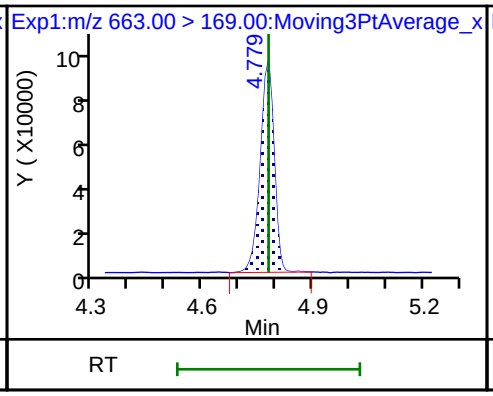
53 Perfluorododecanesulfonic acid (PF



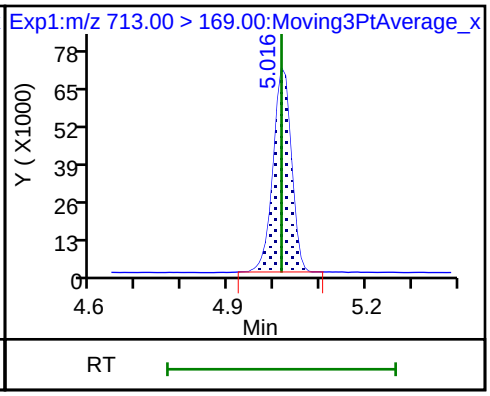
54 Perfluorotridecanoic acid



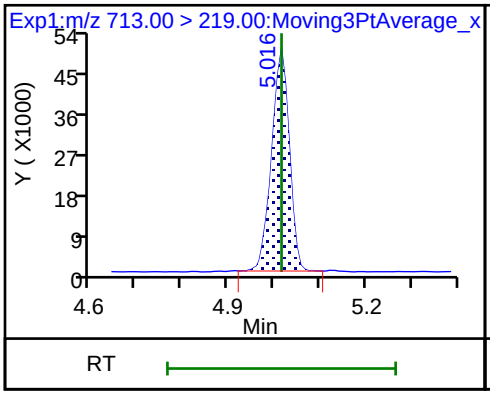
54 Perfluorotridecanoic acid



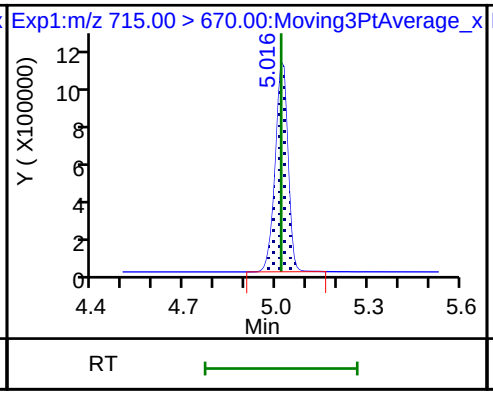
56 Perfluorotetradecanoic acid



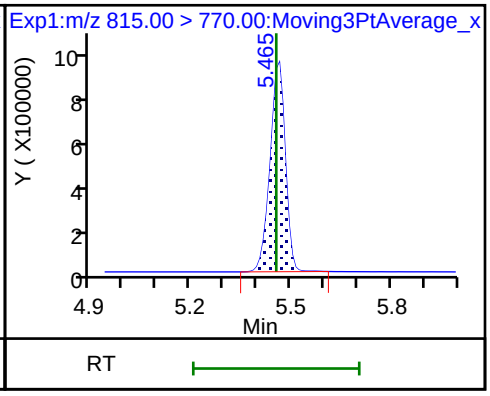
56 Perfluorotetradecanoic acid



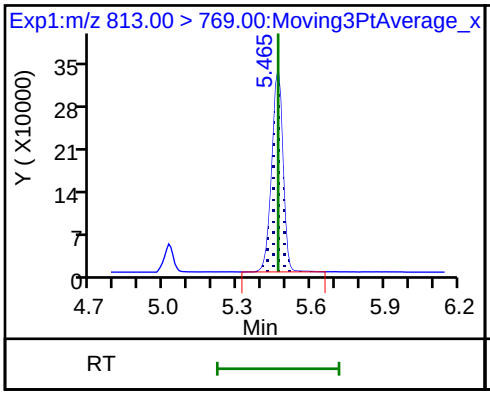
D 55 13C2 PFTeDA



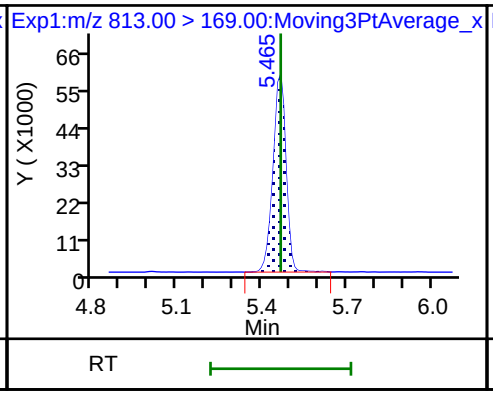
D 57 13C2 PFHxDA



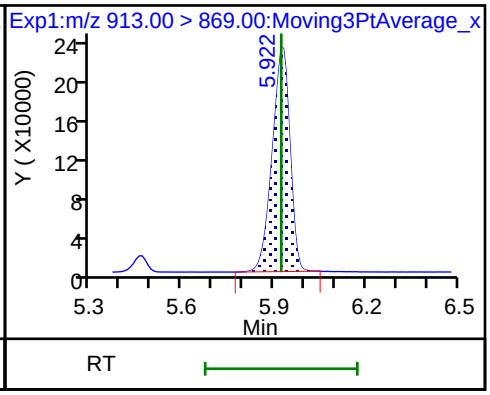
58 Perfluorohexadecanoic acid



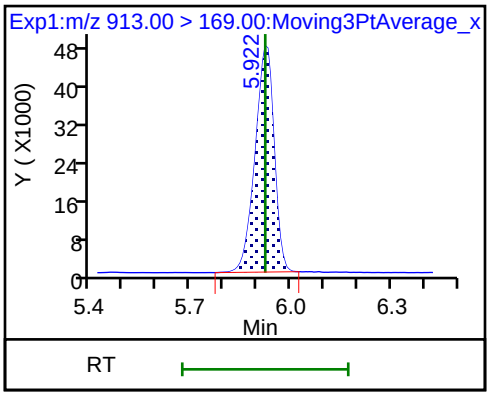
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid



59 Perfluorooctadecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 140-13780-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-267851/1-C

Matrix: Air | Lab File ID: 2019.01.10LLA_032.d

Analysis Method: 537 (modified) | Date Collected:

Extraction Method: None | Date Extracted: 12/28/2018 01:41

Sample wt/vol: 1(Sample) | Date Analyzed: 01/10/2019 14:00

Con. Extract Vol.: 50(mL) | Dilution Factor: 1

Injection Volume: 20(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 270021 | Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	ND		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	ND		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	ND		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	ND		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	ND		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	ND		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	85		25-150
STL01892	13C4 PFHpA	80		25-150
STL00995	13C5 PFNA	90		25-150
STL00990	13C4 PFOA	89		25-150
STL00991	13C4 PFOS	91		25-150
STL00994	18O2 PFHxS	83		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_032.d
Lims ID: MB 320-267851/1-C
Client ID:
Sample Type: MB
Inject. Date: 10-Jan-2019 14:00:25 ALS Bottle#: 16 Worklist Smp#: 4
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-267851/1-c
Misc. Info.: Plate: 1 Rack: 2
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 11-Jan-2019 08:49:37 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0332

First Level Reviewer: westendorfc Date: 11-Jan-2019 08:43:37
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										M
217.00 > 172.00	1.668	1.660	0.008	0.528	6418608	2.03		81.3	8663	M
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.668	1.668	0.0	1.000	26996	0.0114			2.9	M
D 3 13C5 PFPeA										
267.90 > 223.00	2.008	1.998	0.010	0.635	5926342	2.15		85.8	4312	
D 5 13C3 PFBS										
301.90 > 80.00	2.040	2.040	0.0	0.645	8970449	1.98		85.0	19914	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.338	2.331	0.007	0.739	699683	2.53		108	532	
D 9 13C2 PFHxA										
315.00 > 270.00	2.372	2.373	-0.001	0.750	6512686	2.12		84.9	3105	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.506	2.487	0.019	0.793	563394	2.04		81.8	907	
14 Perfluoro(2-propoxypropanoic) acid										M
329.10 > 285.00	2.486	2.497	-0.011	0.992	13990	0.0290			7.8	M
D 16 13C4 PFHpA										
367.00 > 322.00	2.771	2.763	0.008	0.877	7525681	1.99		79.7	1932	
D 17 18O2 PFHxS										
403.00 > 84.00	2.771	2.772	-0.001	0.877	5245676	1.97		83.1	2178	
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.771	2.774	-0.003	1.000	22463	0.008186	Target=3.80		30.5	M
399.00 > 99.00	2.771	2.774	-0.003	1.000	8447		2.66(1.90-5.70)		5.2	M
D 20 M2-6:2 FTS										M
429.00 > 81.00	3.146	3.141	0.005	0.995	1029791	2.77		117	1002	M
D 22 13C8 PFOA										
421.00 > 376.00	3.146	3.157	-0.011		34962	0.0148		0.0	28.6	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 25 13C4 PFOA										
417.00 > 372.00	3.162	3.157	0.005	1.000	7309043	2.23		89.3	1974	
* 24 13C2 PFOA										
415.00 > 370.00	3.162	3.165	-0.003		8270494	2.50			2855	
D 27 13C8 PFOS										
507.00 > 99.00	3.513	3.529	-0.016		1254	0.002505		0.0	5.0	
D 28 13C4 PFOS										
503.00 > 80.00	3.535	3.529	0.006	1.118	5896520	2.16		90.6	3085	
D 31 13C5 PFNA										
468.00 > 423.00	3.550	3.544	0.006	1.123	6652498	2.26		90.2	2294	
D 33 13C8 FOSA										
506.00 > 78.00	3.883	3.877	0.006	1.228	3037126	1.69		67.7	1746	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.875	3.885	-0.010	0.998	6116	0.001732			12.5	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.898	3.892	0.006	1.233	118589	2.78		116	400	
D 36 13C2 PFDA										
515.00 > 470.00	3.898	3.901	-0.003	1.233	6432749	2.23		89.2	3170	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.061	4.063	-0.002	1.284	1428776	1.89		75.6	1007	
47 MeFOSA										
512.00 > 169.00	4.377	4.194	0.183		550	NC			2.4	
D 44 13C2 PFUnA										
565.00 > 520.00	4.222	4.224	-0.002	1.335	5041034	2.22		88.9	3877	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.222	4.224	-0.002	1.335	1441361	2.29		91.5	1407	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.356	4.360	-0.004	1.232	2203	0.000792			8.5	
D 49 13C2 PFDoA										
615.00 > 570.00	4.507	4.510	-0.003	1.426	5936185	2.16		86.3	3816	
51 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.807	4.694	0.113		330	NC			1.3	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.011	5.016	-0.005	1.585	4289529	2.25		90.0	2597	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.458	5.456	0.002	1.726	5005742	2.81		112	5778	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.458	5.465	-0.007	1.000	57448	0.007572	Target=5.55		5.0	
813.00 > 169.00	5.458	5.465	-0.007	1.000	9157		6.27(2.77-8.32)		56.7	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags
M - Manually Integrated

Report Date: 11-Jan-2019 10:42:48 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_032.d

Injection Date: 10-Jan-2019 14:00:25 Instrument ID: A9

Lims ID: MB 320-267851/1-C

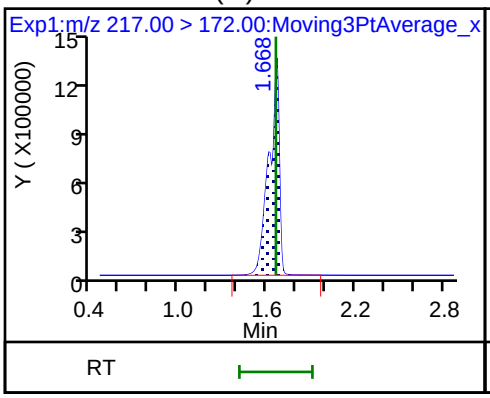
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 16 Worklist Smp#: 4

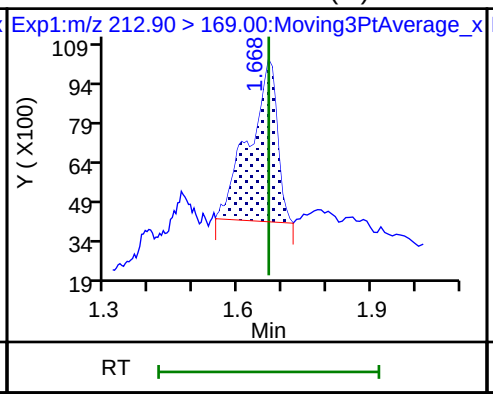
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

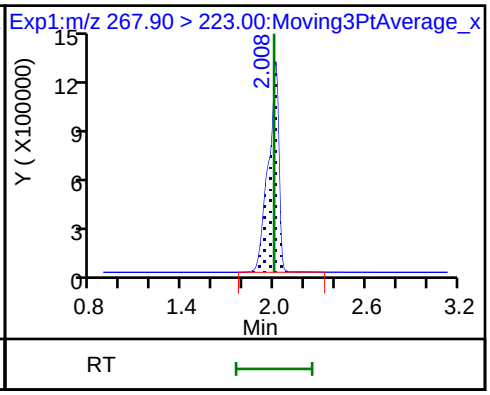
D 1 13C4 PFBA (M)



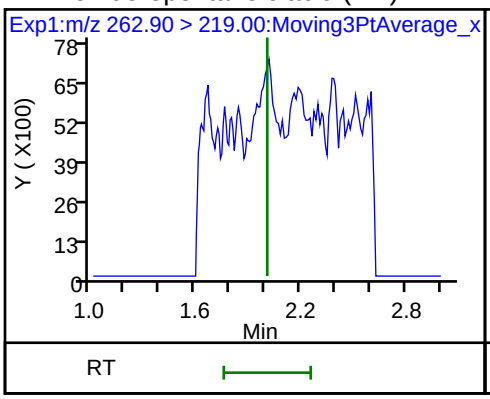
2 Perfluorobutanoic acid (M)



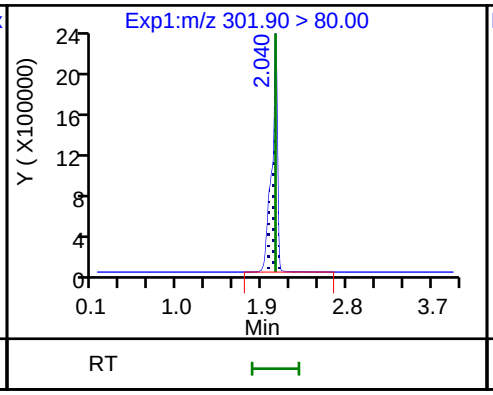
D 3 13C5 PFPeA



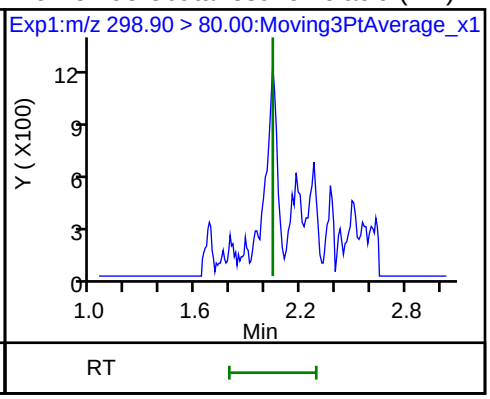
4 Perfluoropentanoic acid (ND)



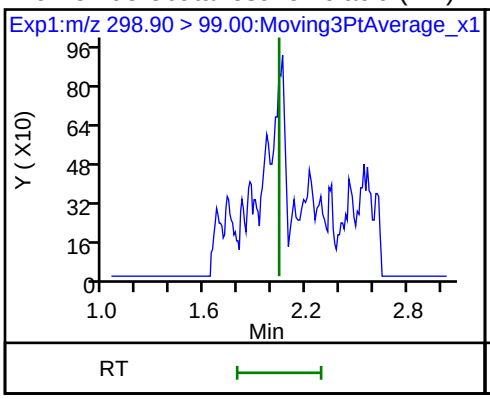
D 5 13C3 PFBS



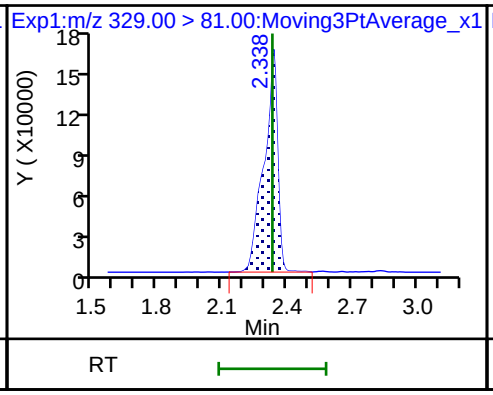
6 Perfluorobutanesulfonic acid (ND)



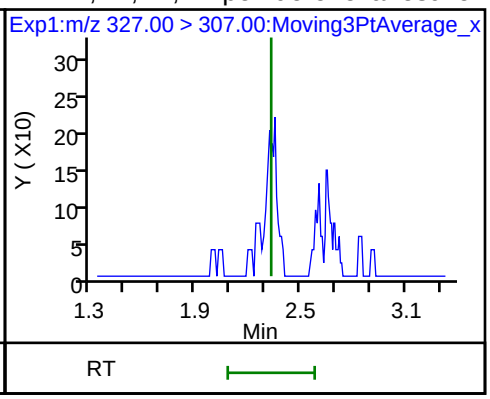
6 Perfluorobutanesulfonic acid (ND)



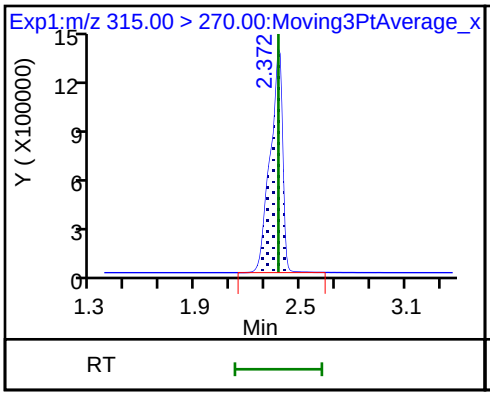
D 8 M2-4:2 FTS



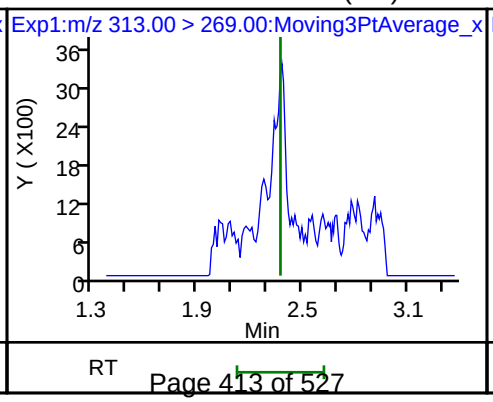
7 1H,1H,2H,2H-perfluorohexanesulfoni (ND)



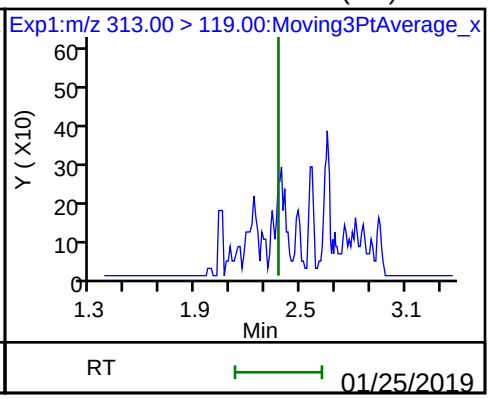
D 9 13C2 PFHxA



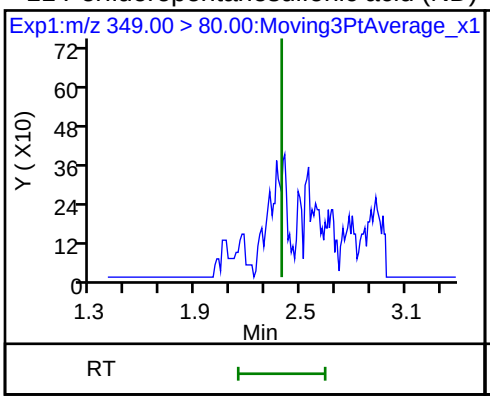
10 Perfluorohexanoic acid (ND)



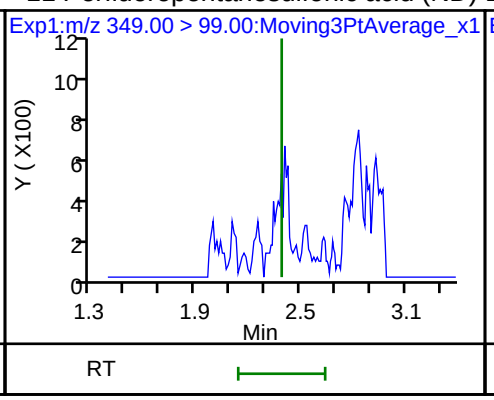
10 Perfluorohexanoic acid (ND)

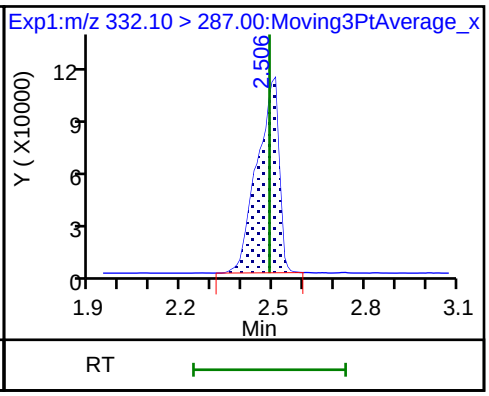


11 Perfluoropentanesulfonic acid (ND)

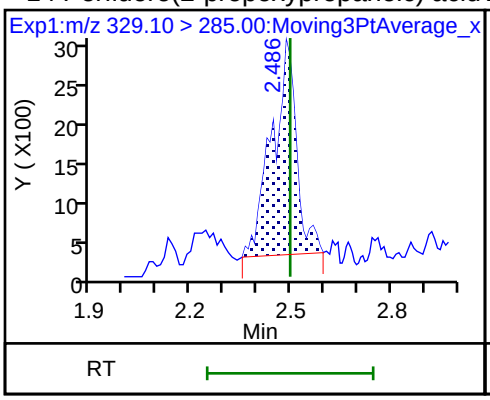


11 Perfluoropentanesulfonic acid (ND) D 13 13C3 HFPO-DA

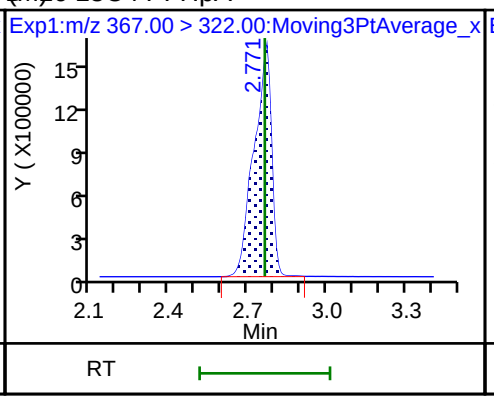




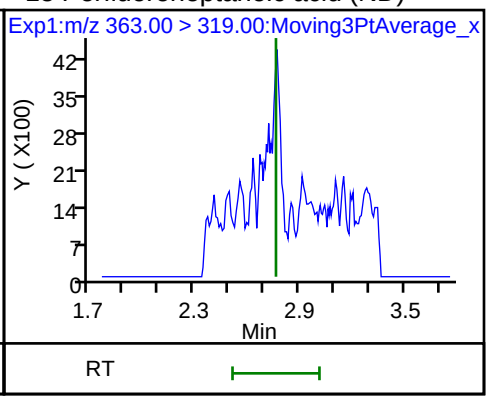
14 Perfluoro(2-propoxypropanoic) acid (M)



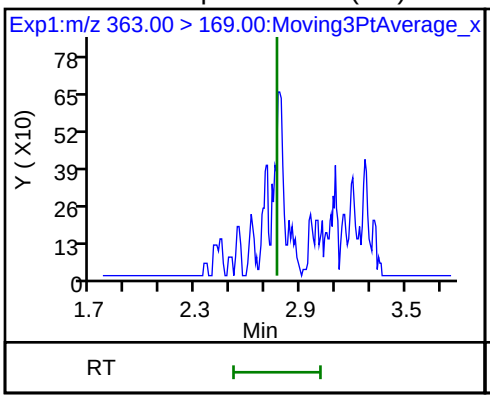
D 16 13C4 PFHpA



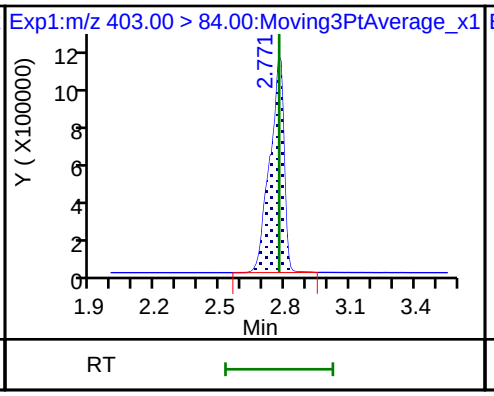
15 Perfluoroheptanoic acid (ND)



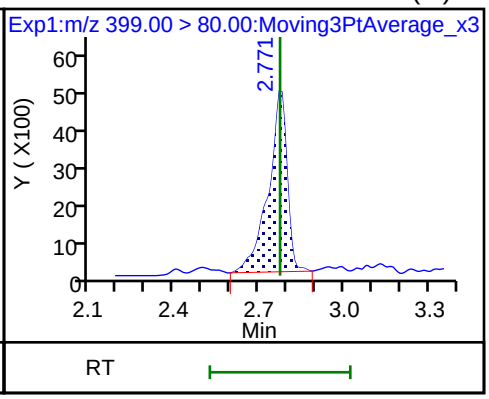
15 Perfluoroheptanoic acid (ND)



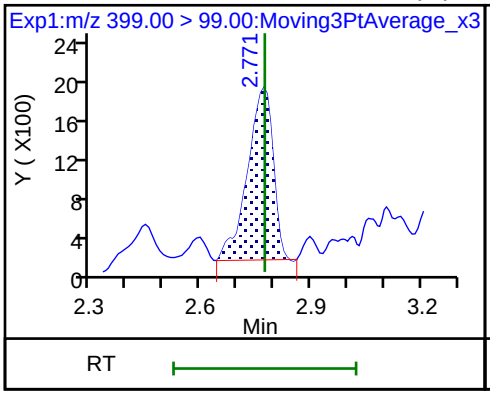
D 17 18O2 PFHxS



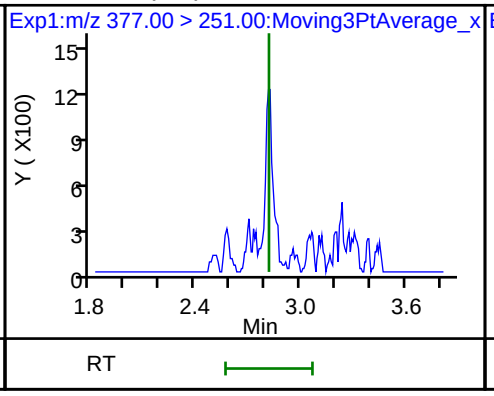
18 Perfluorohexanesulfonic acid (M)



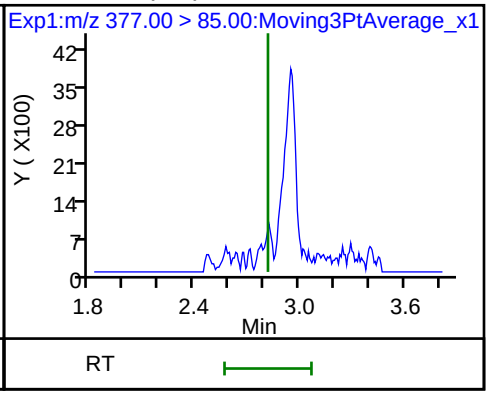
18 Perfluorohexanesulfonic acid (M)



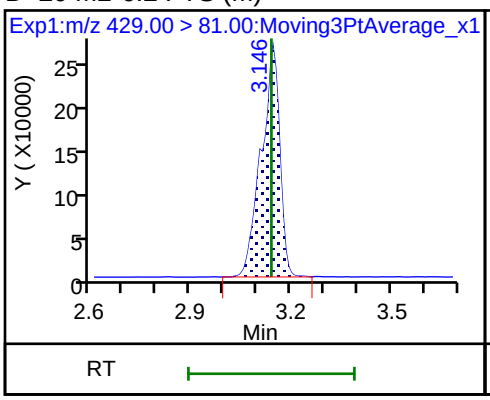
19 DONA (ND)



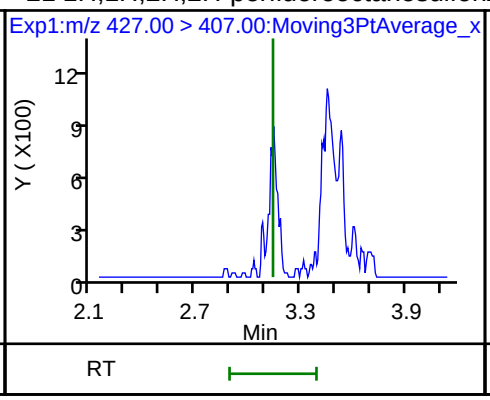
19 DONA (ND)



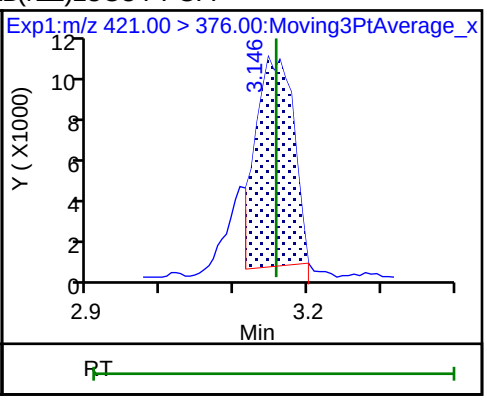
D 20 M2-6:2 FTS (M)



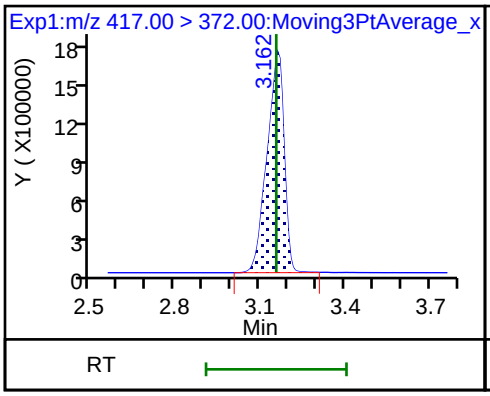
21 1H,1H,2H,2H-perfluorooctanesulfonic (M2)



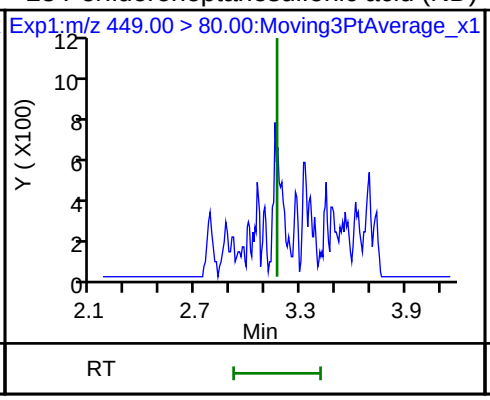
D 22 13C8 PFOA



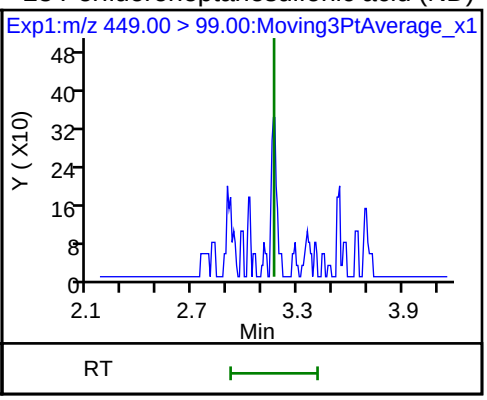
D 25 13C4 PFOA



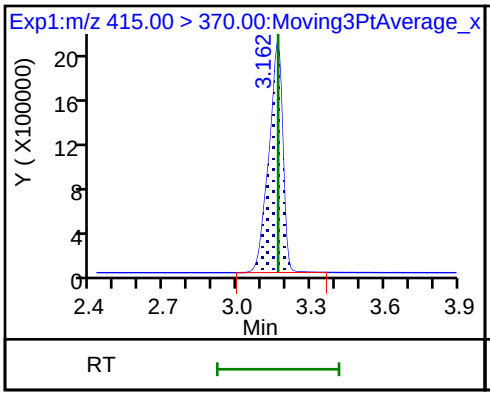
23 Perfluoroheptanesulfonic acid (ND)



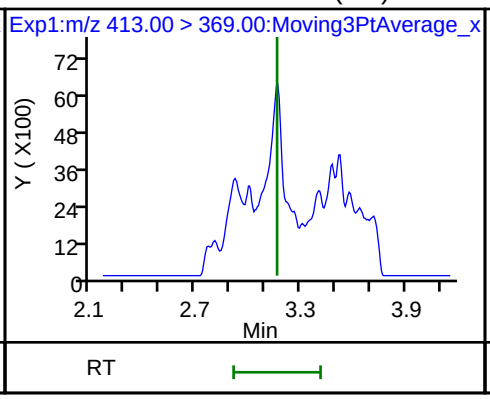
23 Perfluoroheptanesulfonic acid (ND)



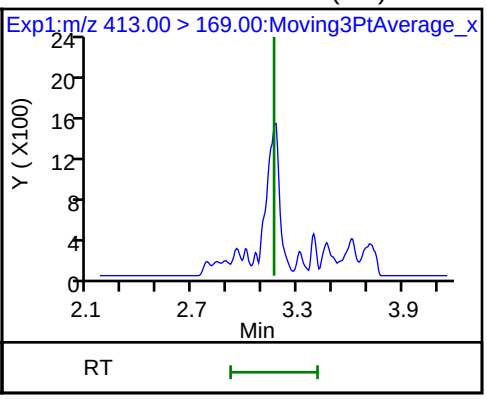
* 24 13C2 PFOA



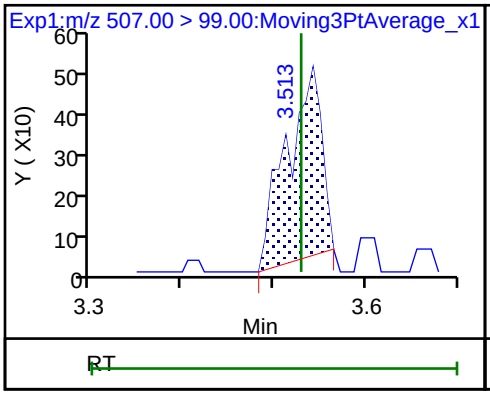
26 Perfluorooctanoic acid (ND)



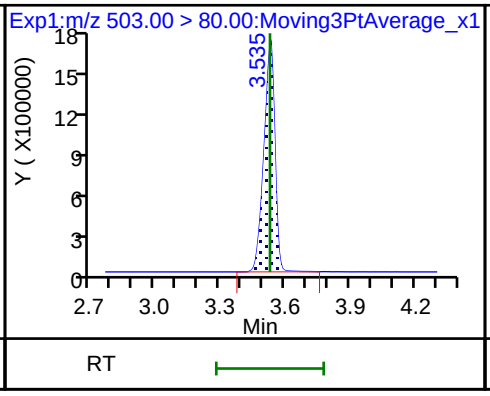
26 Perfluorooctanoic acid (ND)



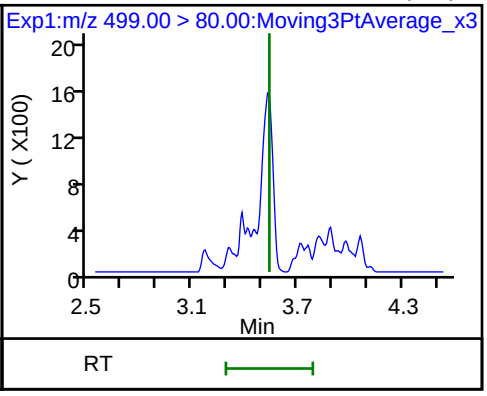
D 27 13C8 PFOS



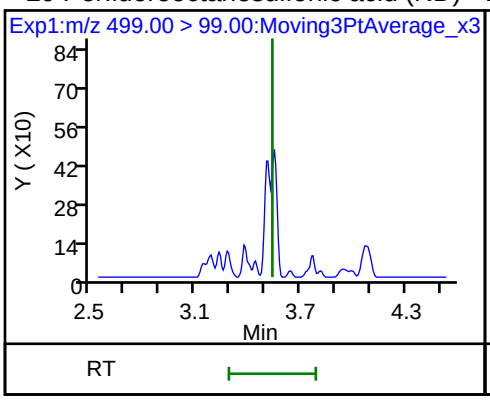
D 28 13C4 PFOS



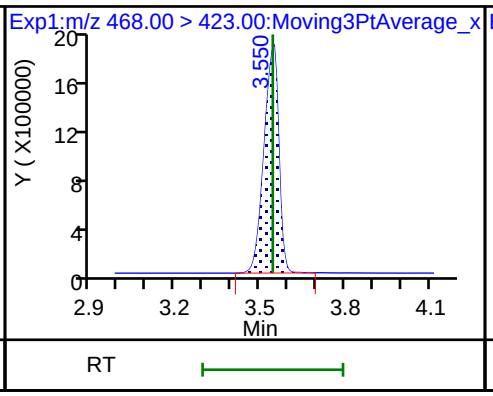
29 Perfluorooctanesulfonic acid (ND)



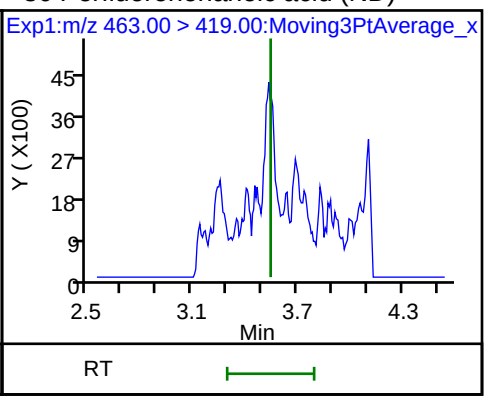
29 Perfluorooctanesulfonic acid (ND)



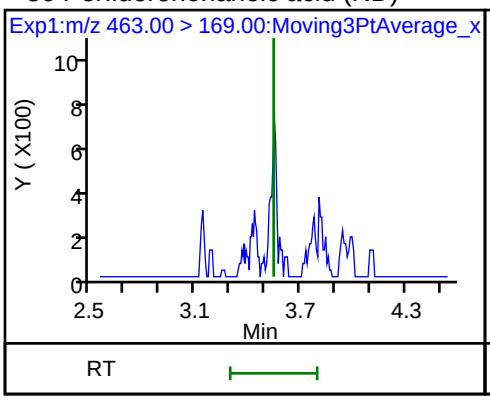
D 31 13C5 PFNA



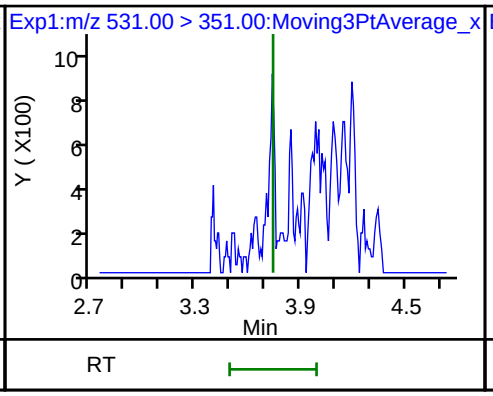
30 Perfluorononanoic acid (ND)



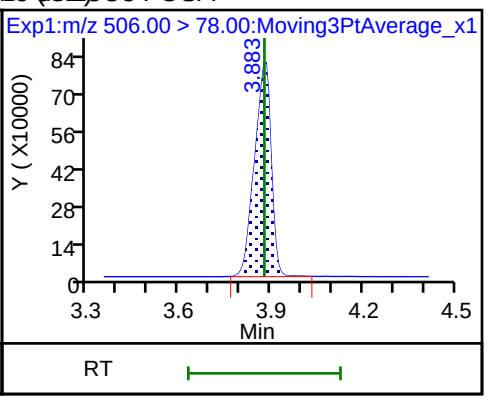
30 Perfluorononanoic acid (ND)



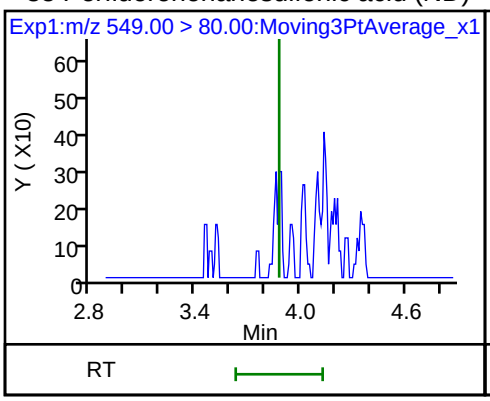
32 9-Chlorohexadecafluoro-3-oxanonane (3D)



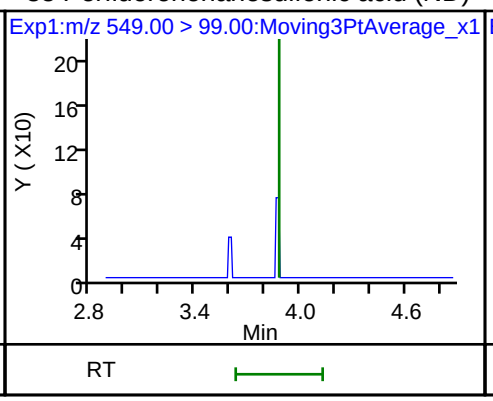
D 33 13C8 FOSA



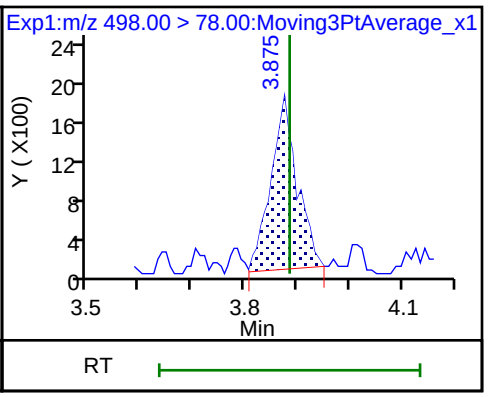
35 Perfluorononanesulfonic acid (ND)



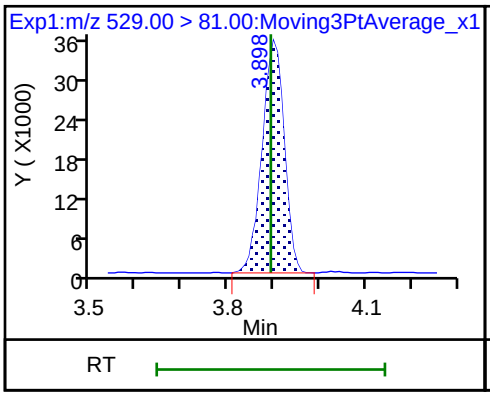
35 Perfluorononanesulfonic acid (ND)



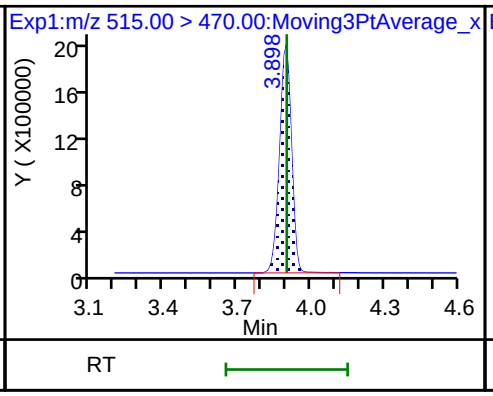
34 Perfluorooctanesulfonamide



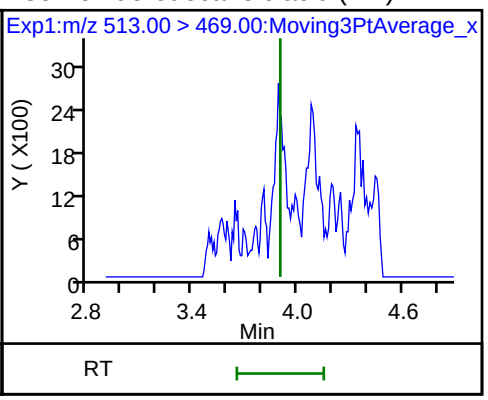
D 39 M2-8:2 FTS



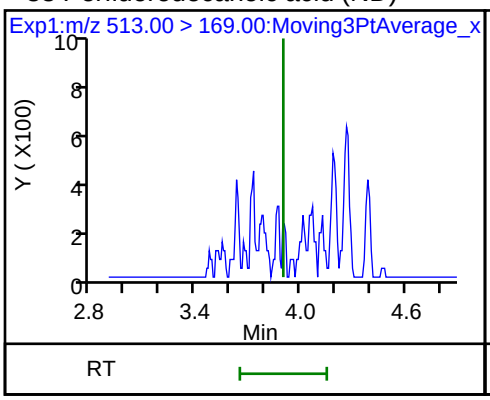
D 36 13C2 PFDA



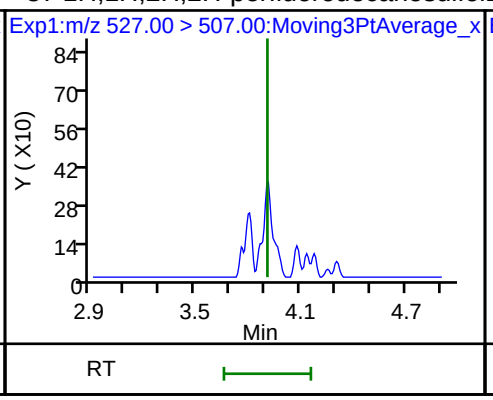
38 Perfluorodecanoic acid (ND)



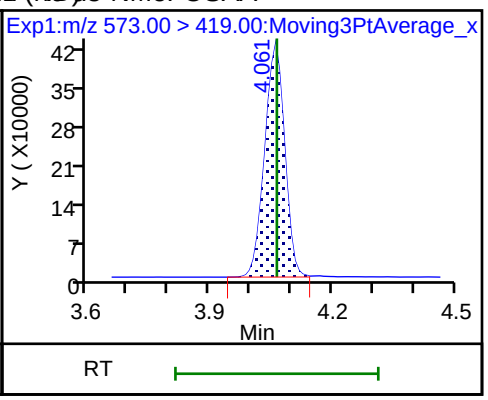
38 Perfluorodecanoic acid (ND)



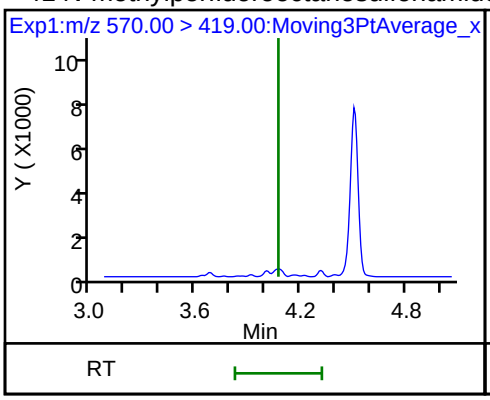
37 1H,1H,2H,2H-perfluorodecanesulfonic acid (ND)



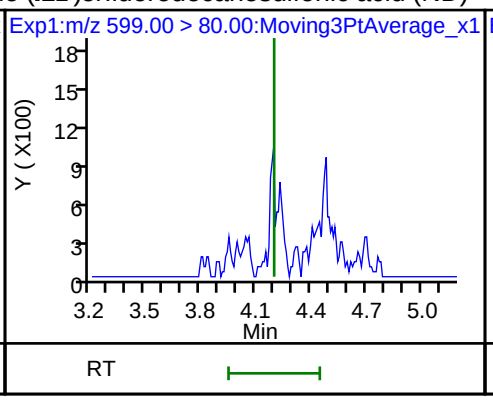
D 40 d3-NMeFOSAA



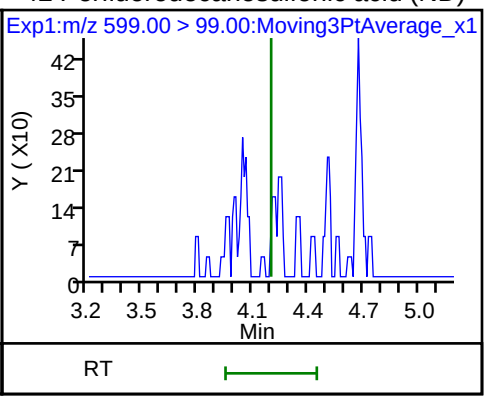
41 N-methylperfluorooctanesulfonamido (ND)



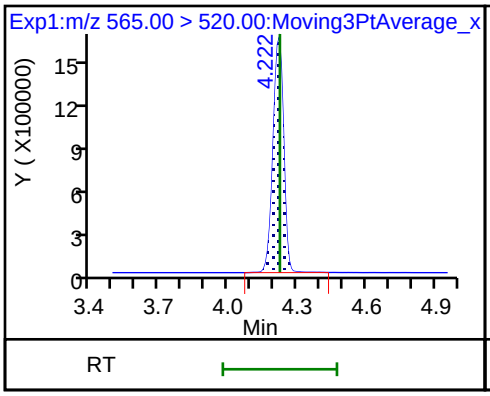
42D Perfluorodecanesulfonic acid (ND)



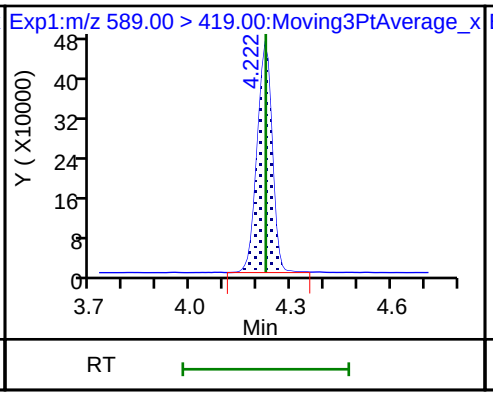
42 Perfluorodecanesulfonic acid (ND)



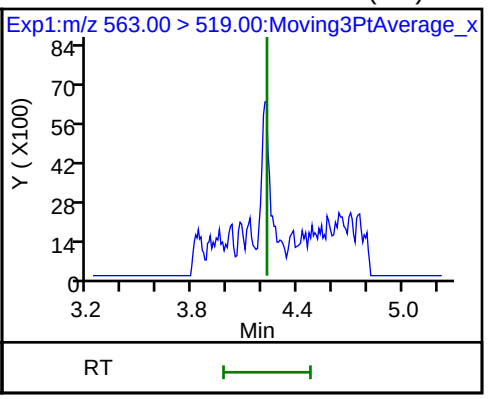
D 44 13C2 PFUnA



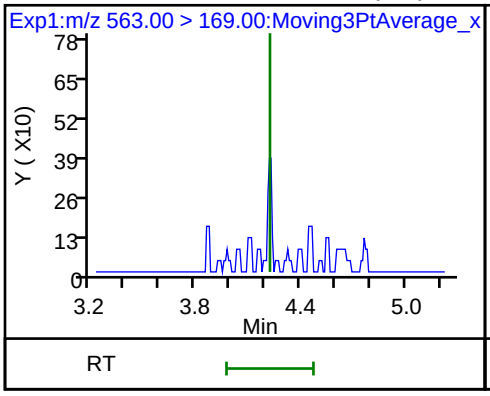
D 45 d5-NEtFOSAA



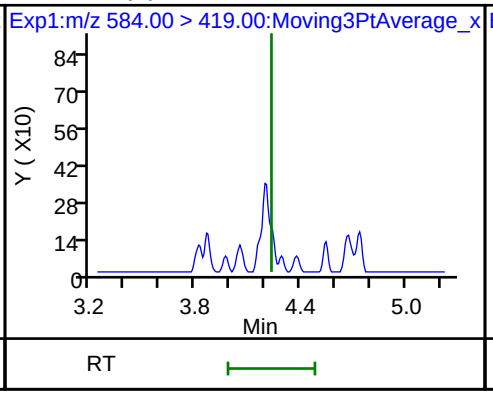
43 Perfluoroundecanoic acid (ND)



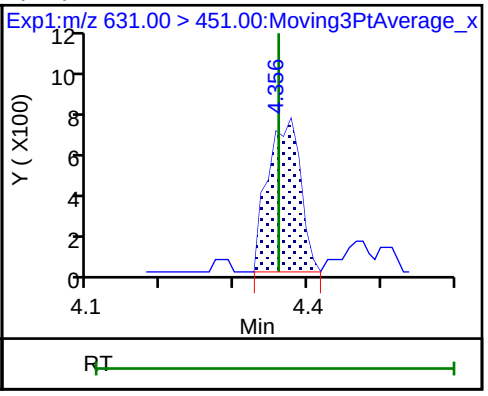
43 Perfluoroundecanoic acid (ND)



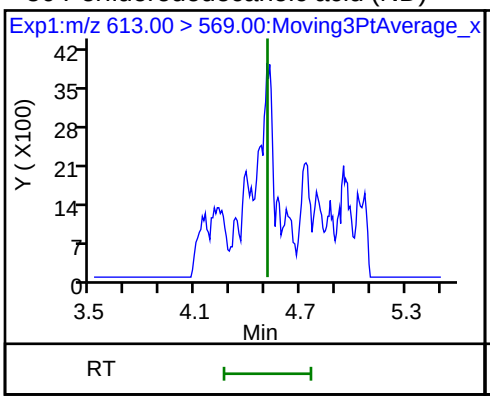
46 N-ethylperfluorooctanesulfonamidoa (ND)



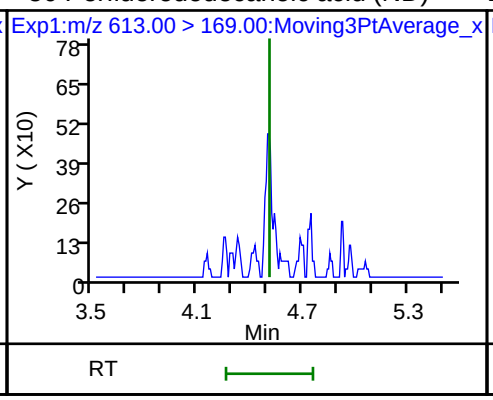
48 11-Chloroeicosafluoro-3-oxaundecan



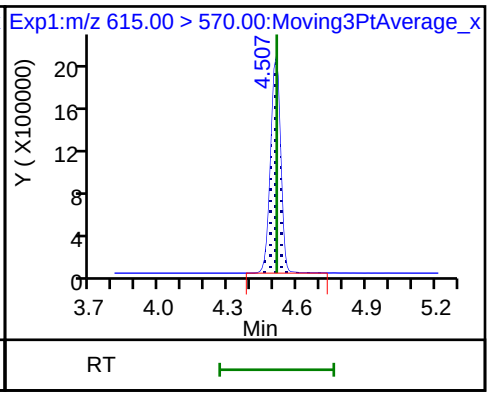
50 Perfluorododecanoic acid (ND)



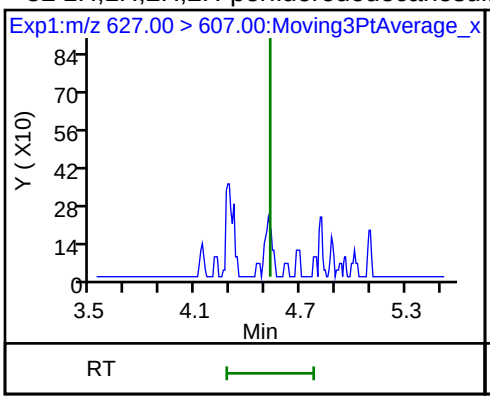
50 Perfluorododecanoic acid (ND)



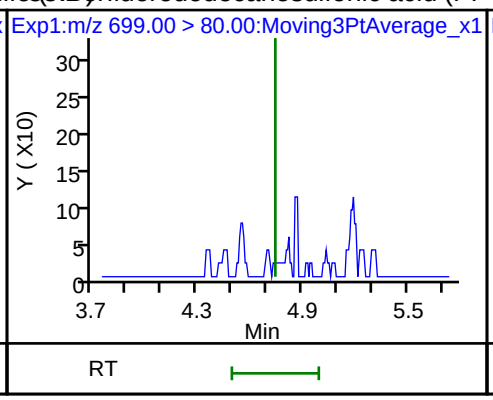
D 49 13C2 PFDoA



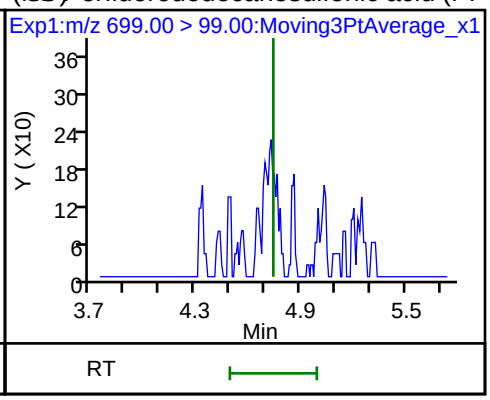
52 1H,1H,2H-perfluorododecanesulfonic acid (ND)



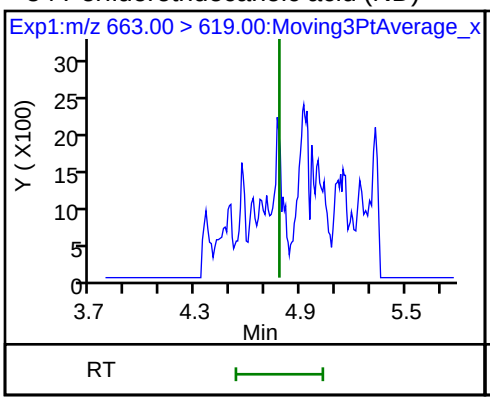
53 Perfluorododecanesulfonic acid (PF (ND)



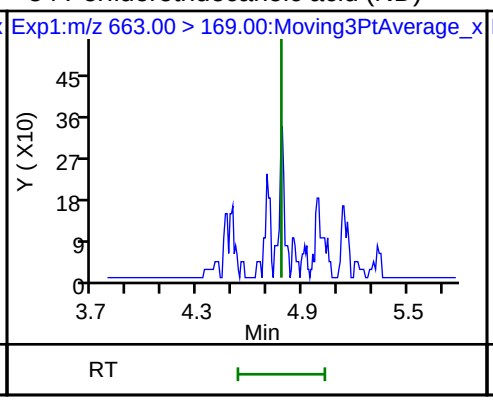
53 Perfluorododecanesulfonic acid (PF (ND)



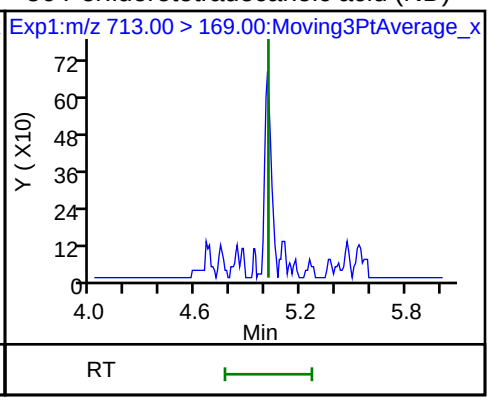
54 Perfluorotridecanoic acid (ND)



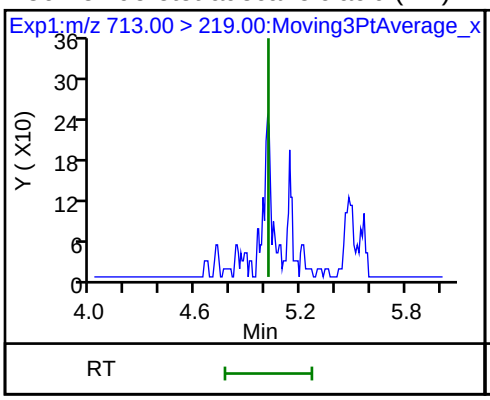
54 Perfluorotridecanoic acid (ND)



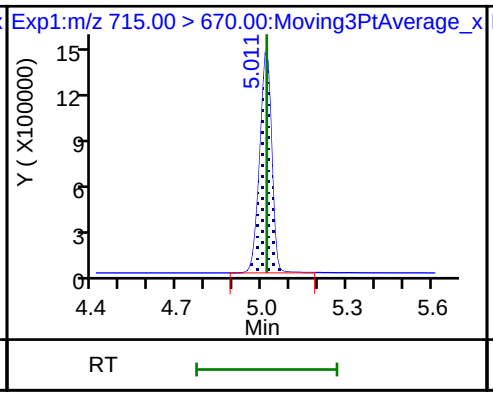
56 Perfluorotetradecanoic acid (ND)



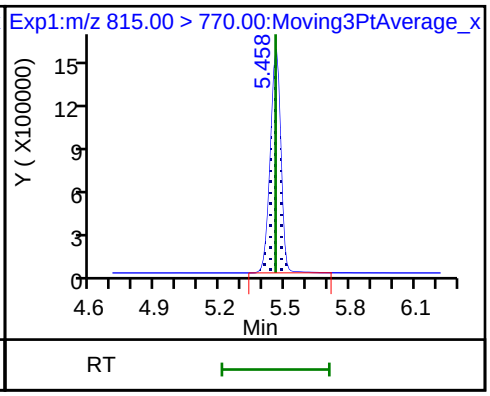
56 Perfluorotetradecanoic acid (ND)



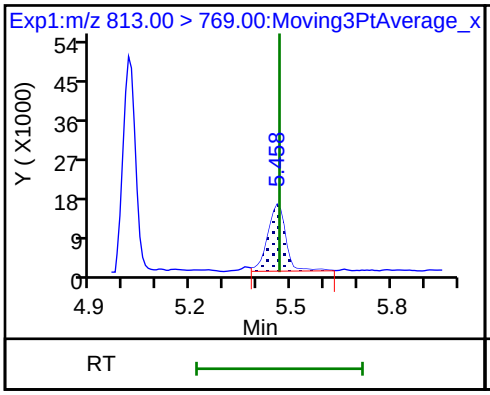
D 55 13C2 PFTeDA



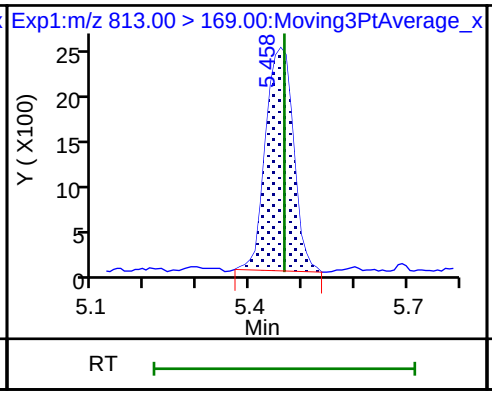
D 57 13C2 PFHxDA



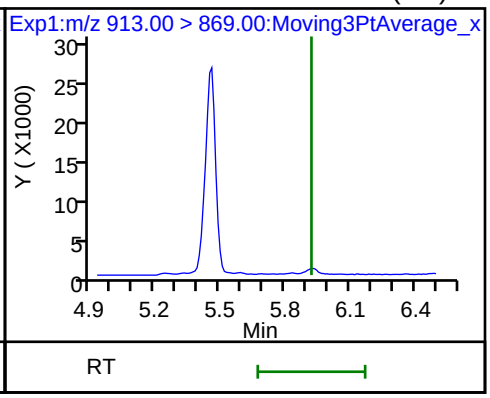
58 Perfluorohexadecanoic acid



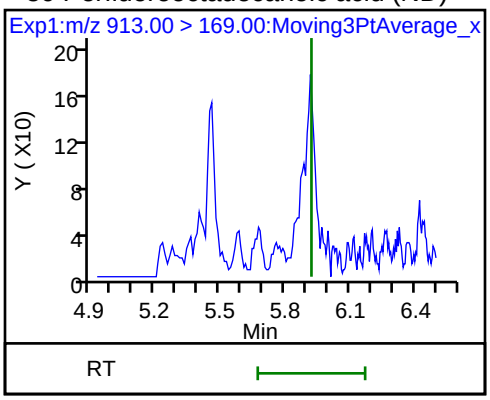
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid (ND)



59 Perfluorooctadecanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

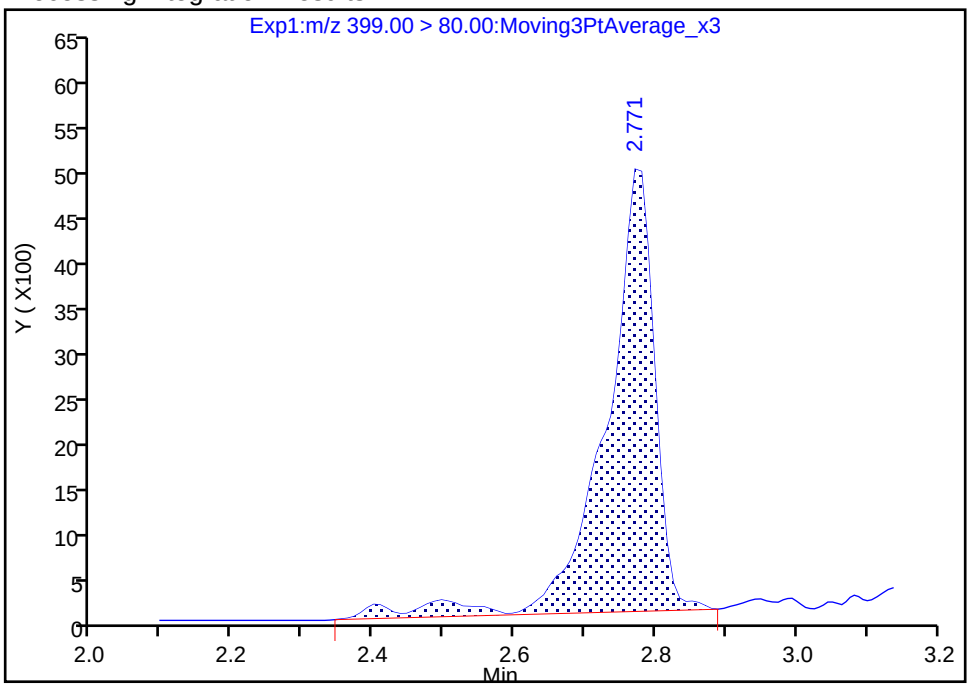
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_032.d
Injection Date: 10-Jan-2019 14:00:25 Instrument ID: A9
Lims ID: MB 320-267851/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 16 Worklist Smp#: 4
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

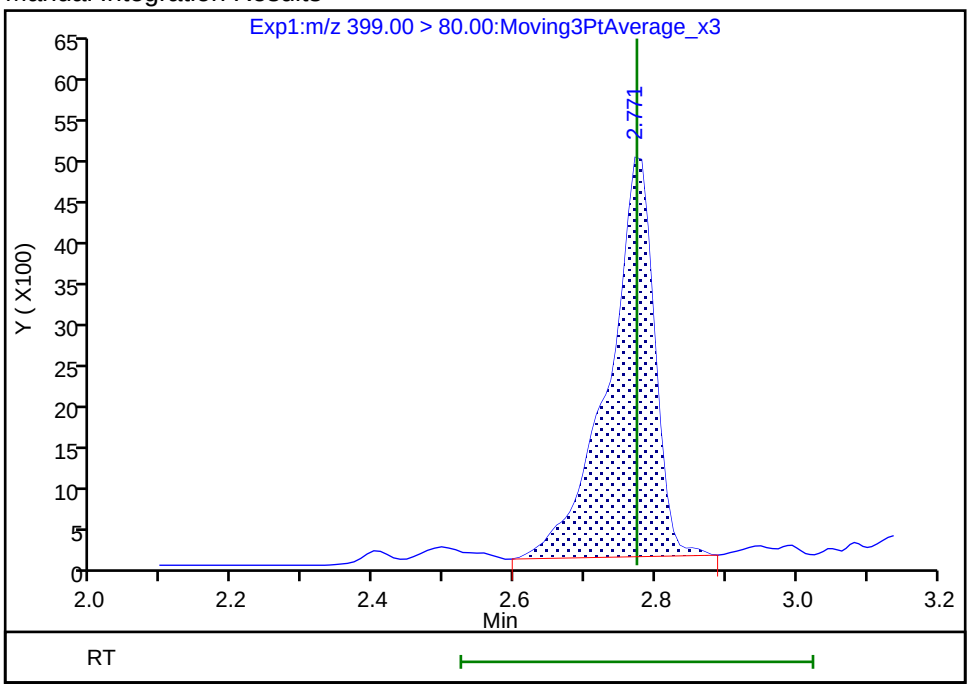
Processing Integration Results

RT: 2.77
Area: 23971
Amount: 0.000699
Amount Units: ng/ml



Manual Integration Results

RT: 2.77
Area: 22463
Amount: 0.008186
Amount Units: ng/ml



Reviewer: westendorfc, 11-Jan-2019 08:42:59
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

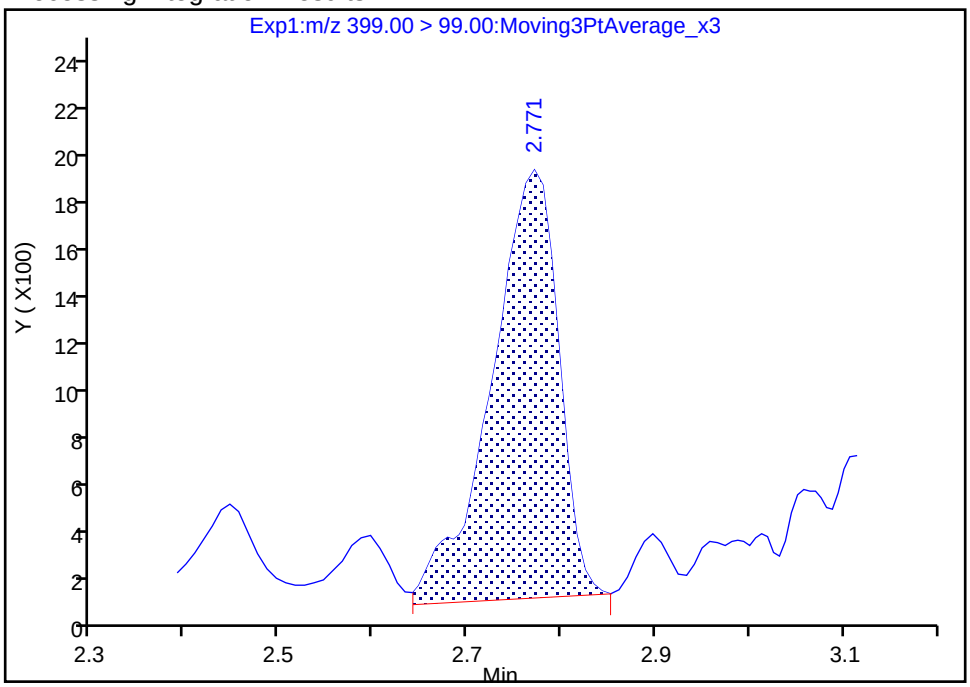
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_032.d
Injection Date: 10-Jan-2019 14:00:25 Instrument ID: A9
Lims ID: MB 320-267851/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 16 Worklist Smp#: 4
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 2

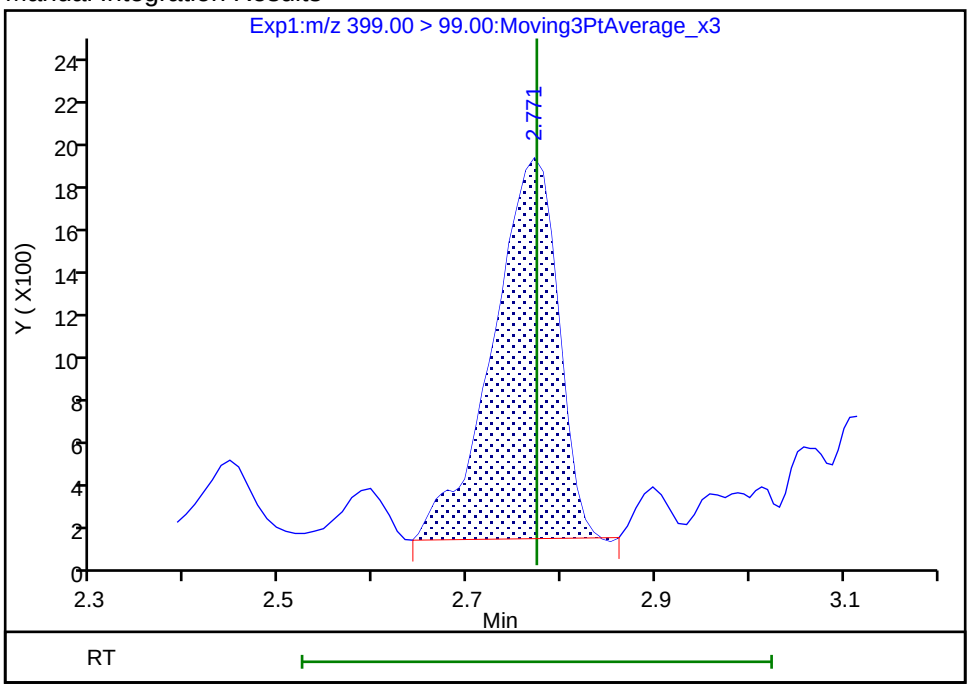
Processing Integration Results

RT: 2.77
Area: 8873
Amount: 0.000699
Amount Units: ng/ml



Manual Integration Results

RT: 2.77
Area: 8447
Amount: 0.008186
Amount Units: ng/ml



Reviewer: westendorfc, 11-Jan-2019 08:43:01
Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 140-13780-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-267852/1-C

Matrix: Air | Lab File ID: 2019.01.08LLAAXX_036.d

Analysis Method: 537 (modified) | Date Collected:

Extraction Method: None | Date Extracted: 12/20/2018 12:25

Sample wt/vol: 1(Sample) | Date Analyzed: 01/08/2019 23:19

Con. Extract Vol.: 360(mL) | Dilution Factor: 1

Injection Volume: 20(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 | Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	11.89		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.7172		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.7087		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	ND		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.8044		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	ND		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	58		25-150
STL01892	13C4 PFHpA	80		25-150
STL00995	13C5 PFNA	93		25-150
STL00990	13C4 PFOA	93		25-150
STL00991	13C4 PFOS	97		25-150
STL00994	18O2 PFHxS	86		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Lims ID: MB 320-267852/1-C
Client ID:
Sample Type: MB
Inject. Date: 08-Jan-2019 23:19:00 ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-267852/1-c
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:49:04
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.687	1.679	0.008	0.529	2623858	0.9378		37.5	473	
D 3 13C5 PFPeA										M
267.90 > 223.00	2.024	2.022	0.002	0.635	3260239	1.33		53.3	979	M
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.054	0.002	0.645	5410686	1.35		57.9	141649	
6 Perfluorobutanesulfonic acid										M
298.90 > 80.00	2.068	2.056	0.012	1.006	1335323	0.5947	Target=2.70		110	M
298.90 > 99.00	2.056	2.056	0.0	1.000	450301		2.97(1.35-4.05)		61.0	M
D 8 M2-4:2 FTS										
329.00 > 81.00	2.355	2.346	0.009	0.739	828564	3.38		145	187	
D 9 13C2 PFHxA										M
315.00 > 270.00	2.393	2.383	0.010	0.751	4811141	1.77		70.8	1823	M
10 Perfluorohexanoic acid										M
313.00 > 269.00	2.393	2.384	0.009	1.000	183295	0.1100	Target=13.92		13.7	M
313.00 > 119.00	2.393	2.384	0.009	1.000	14724		12.45(6.96-20.87)		8.6	M
D 13 13C3 HFPO-DA										M
332.10 > 287.00	2.509	2.508	0.001	0.787	376243	1.54		61.7	522	M
D 16 13C4 PFHpA										M
367.00 > 322.00	2.792	2.782	0.010	0.876	6693196	2.00		80.0	2209	M
D 17 18O2 PFHxS										M
403.00 > 84.00	2.792	2.782	0.010	0.876	4819396	2.04		86.2	3688	M
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.792	2.782	0.010	1.000	89334	0.0354	Target=3.80		3.4	M
399.00 > 99.00	2.792	2.782	0.010	1.000	19991		4.47(1.90-5.70)		3.5	M
15 Perfluoroheptanoic acid										M
363.00 > 319.00	2.792	2.782	0.010	1.000	99885	0.0359	Target=4.34		7.0	M
363.00 > 169.00	2.792	2.782	0.010	1.000	23324		4.28(2.17-6.52)		14.4	M

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
21 1H,1H,2H,2H-perfluorooctanesulfoni										M
427.00 > 407.00	3.165	3.165	0.0	0.998	13505	0.0144			15.9	M
D 20 M2-6:2 FTS										
429.00 > 81.00	3.173	3.165	0.008	0.995	1051196	3.19		134	659	
* 24 13C2 PFOA										
415.00 > 370.00	3.188	3.180	0.008		7327335	2.50			2945	
D 22 13C8 PFOA										
421.00 > 376.00	3.180	3.180	0.0		30150	0.0128		0.0	30.4	
D 25 13C4 PFOA										
417.00 > 372.00	3.188	3.180	0.008	1.000	6756427	2.33		93.2	2165	
29 Perfluorooctanesulfonic acid										M
499.00 > 80.00	3.560	3.552	0.008	1.000	99356	0.0402	Target=4.08		28.3	M
499.00 > 99.00	3.552	3.552	0.0	0.998	20180		4.92(2.04-6.12)		31.0	M
D 28 13C4 PFOS										
503.00 > 80.00	3.560	3.552	0.008	1.116	5602113	2.32		97.1	2347	
D 31 13C5 PFNA										
468.00 > 423.00	3.574	3.567	0.007	1.121	6083379	2.33		93.1	2455	
D 33 13C8 FOSA										
506.00 > 78.00	3.893	3.885	0.008	1.221	3382976	2.13		85.2	2713	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.927	3.927	0.0	1.232	113732	3.00		125	323	
D 36 13C2 PFDA										
515.00 > 470.00	3.927	3.927	0.0	1.232	6443208	2.52		101	2834	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.936	3.927	0.009	1.002	2368	0.003512			25.2	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.093	4.093	0.0	1.284	1536971	2.30		91.8	1154	
47 MeFOSA										
512.00 > 169.00	4.130	4.241	-0.111		1024	NC			3.8	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.250	4.250	0.0	1.333	1422931	2.55		102	1360	
D 44 13C2 PFUnA										
565.00 > 520.00	4.250	4.250	0.0	1.333	4982996	2.48		99.2	3197	
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.250	4.250	0.0	1.000	18874	0.0114	Target=10.48		4.1	
563.00 > 169.00	4.250	4.250	0.0	1.000	1242		15.20(5.24-15.72)		5.3	
51 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.469	4.430	0.039		330	NC			1.7	
D 49 13C2 PFDoA										
615.00 > 570.00	4.542	4.541	0.001	1.424	5764378	2.37		94.6	3158	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.050	5.049	0.001	1.584	4044320	2.39		95.8	2328	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.514	5.504	0.010	1.000	66349	0.003783	Target=5.55		9.6	
813.00 > 169.00	5.504	5.504	0.0	0.998	12715		5.22(2.77-8.32)		113	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.514	5.514	0.0	1.730	6543133	4.15		166	4475	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:31 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d

Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9

Lims ID: MB 320-267852/1-C

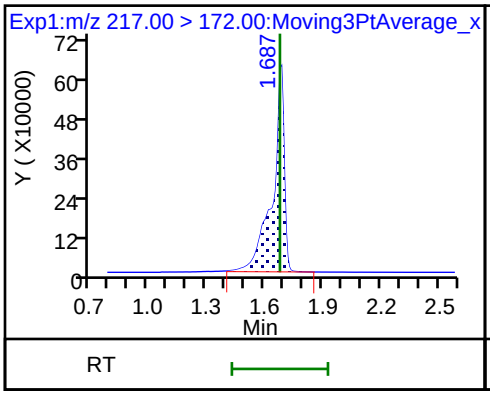
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7

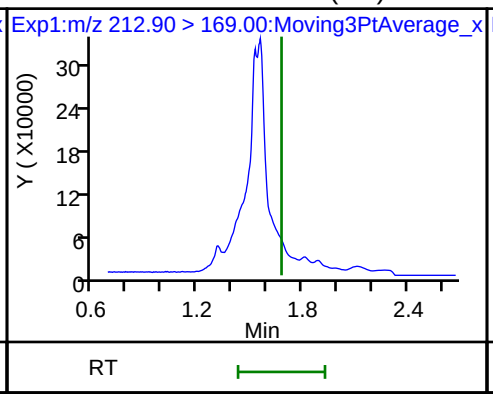
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

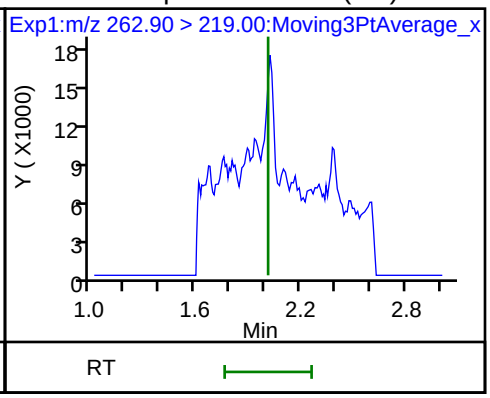
D 1 13C4 PFBA



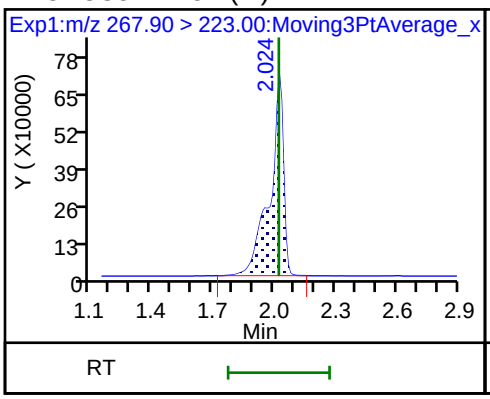
2 Perfluorobutanoic acid (ND)



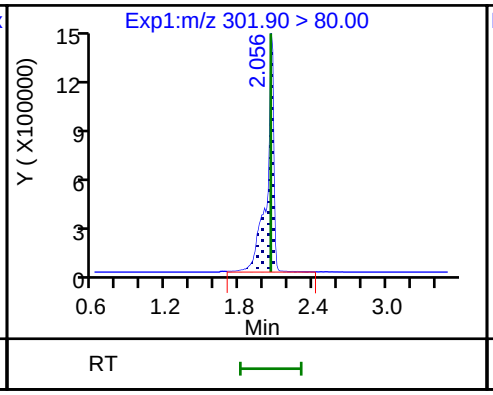
4 Perfluoropentanoic acid (ND)



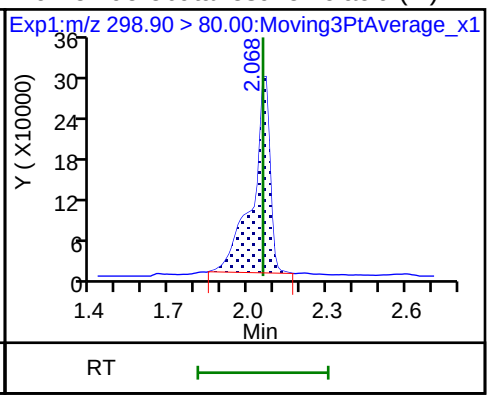
D 3 13C5 PFPeA (M)



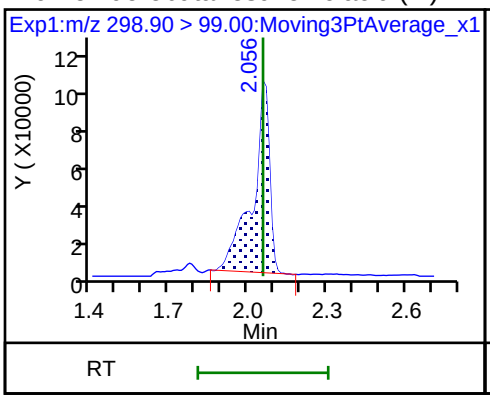
D 5 13C3 PFBS



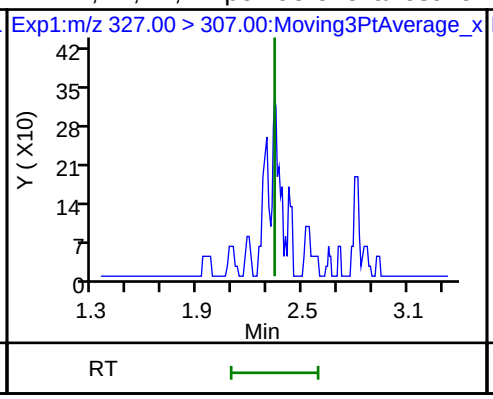
6 Perfluorobutanesulfonic acid (M)



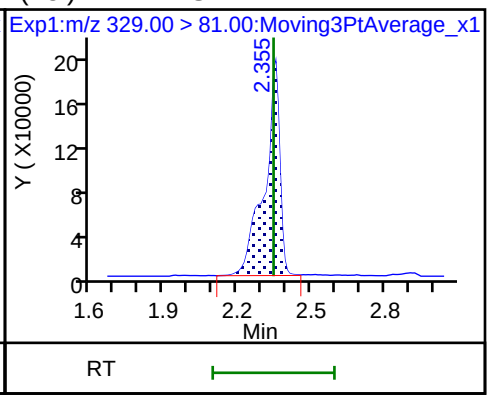
6 Perfluorobutanesulfonic acid (M)



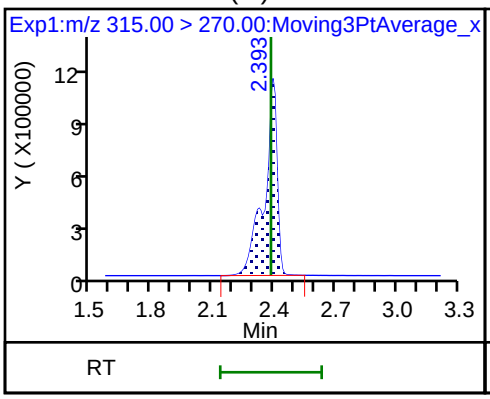
7 1H,1H,2H,2H-perfluorohexanesulfonic (M)



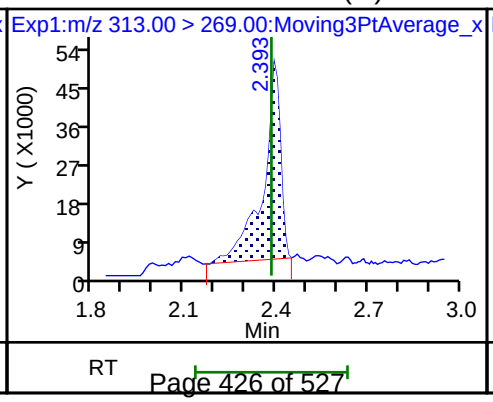
D 8 M2-4:2 FTS



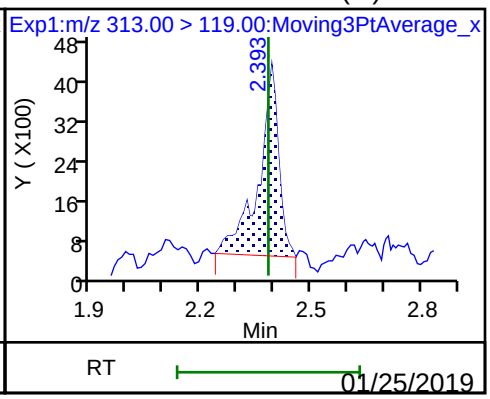
D 9 13C2 PFHxA (M)



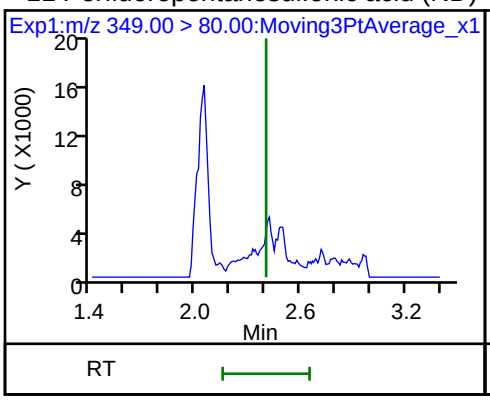
10 Perfluorohexanoic acid (M)



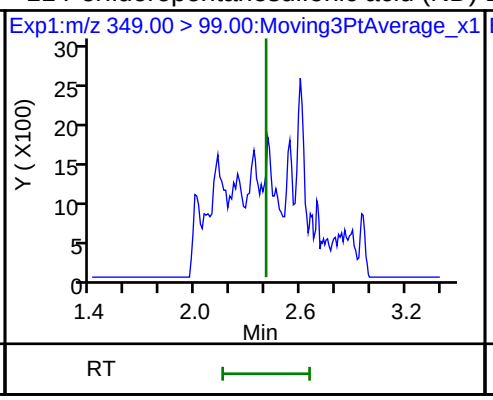
10 Perfluorohexanoic acid (M)



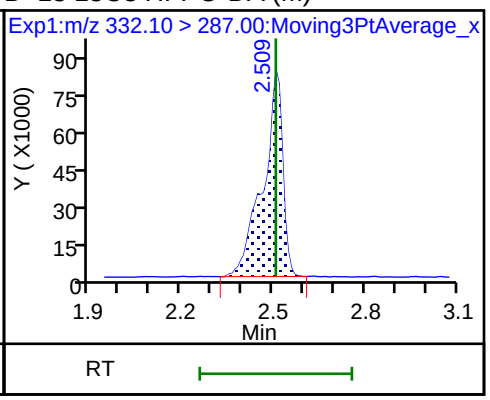
11 Perfluoropentanesulfonic acid (ND)



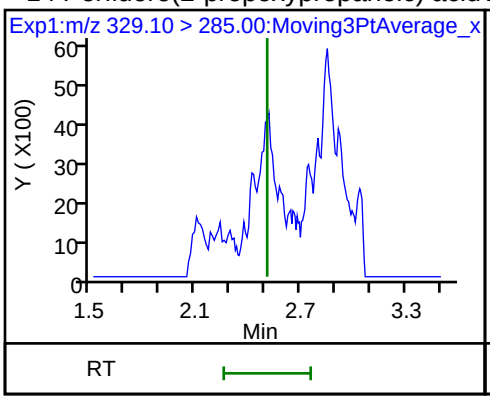
11 Perfluoropentanesulfonic acid (ND) D



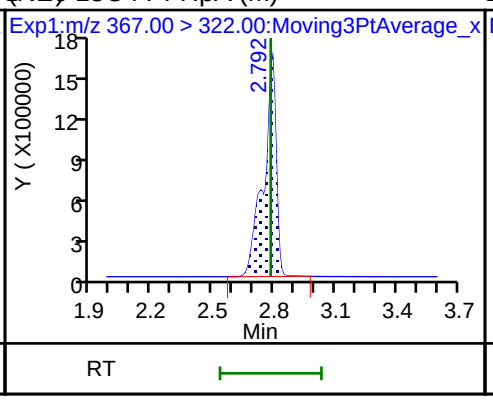
13 13C3 HFPO-DA (M)



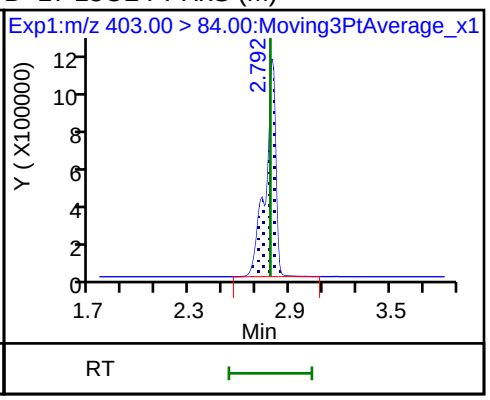
14 Perfluoro(2-propoxypropanoic) acid (ND)



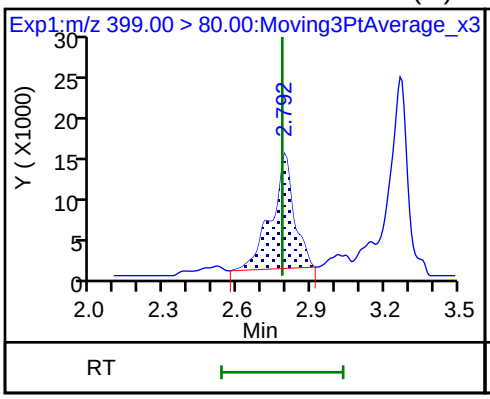
16 13C4 PFHpA (M)



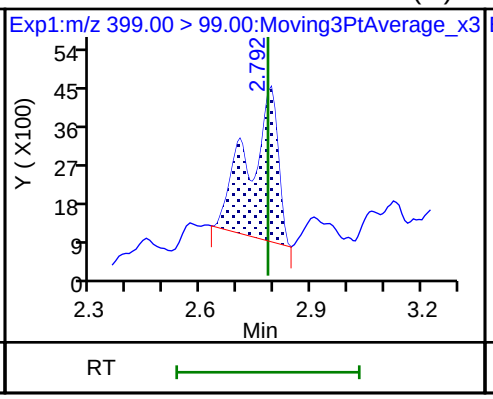
17 18O2 PFHxS (M)



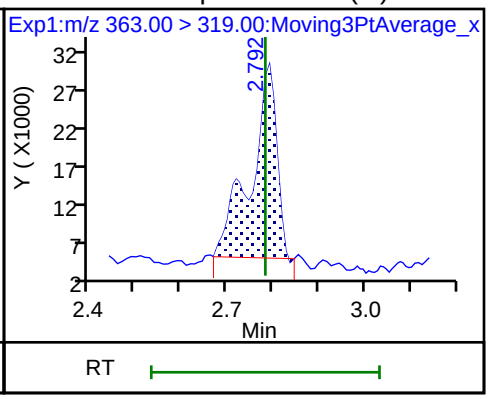
18 Perfluorohexanesulfonic acid (M)



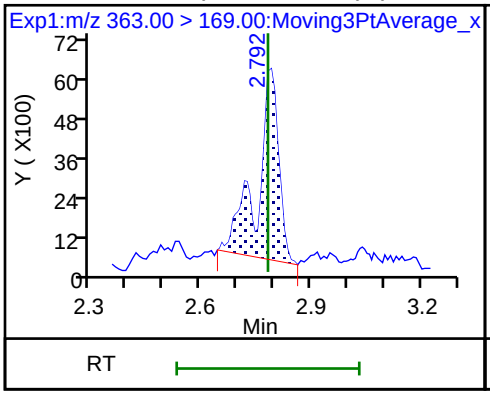
18 Perfluorohexanesulfonic acid (M)



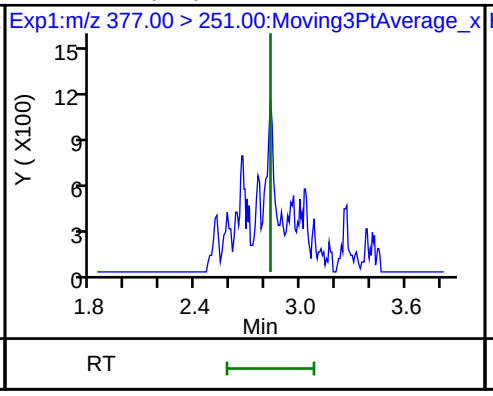
15 Perfluoroheptanoic acid (M)



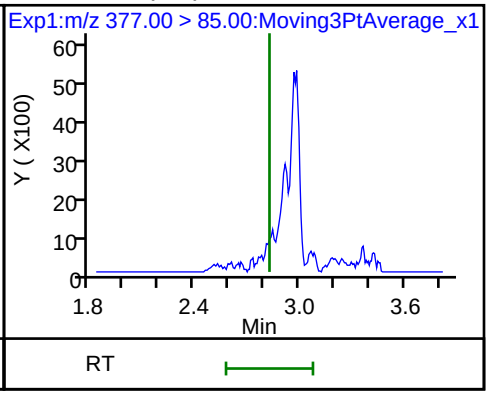
15 Perfluoroheptanoic acid (M)



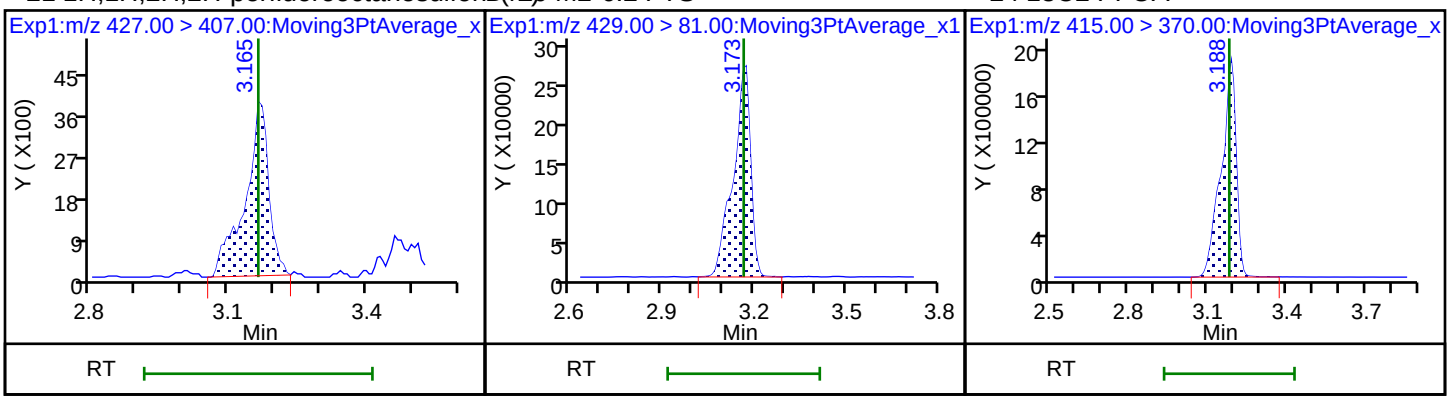
19 DONA (ND)



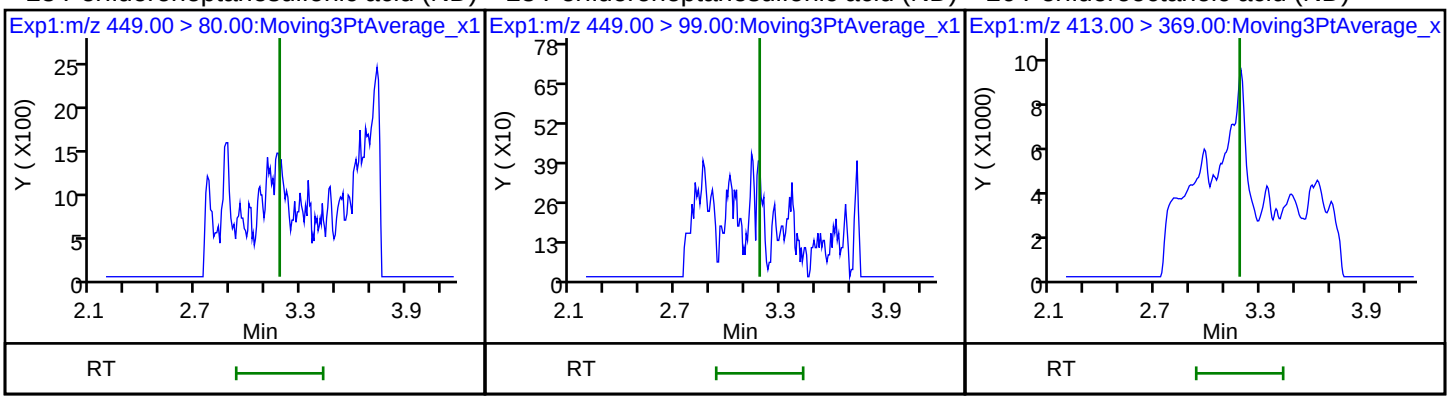
19 DONA (ND)



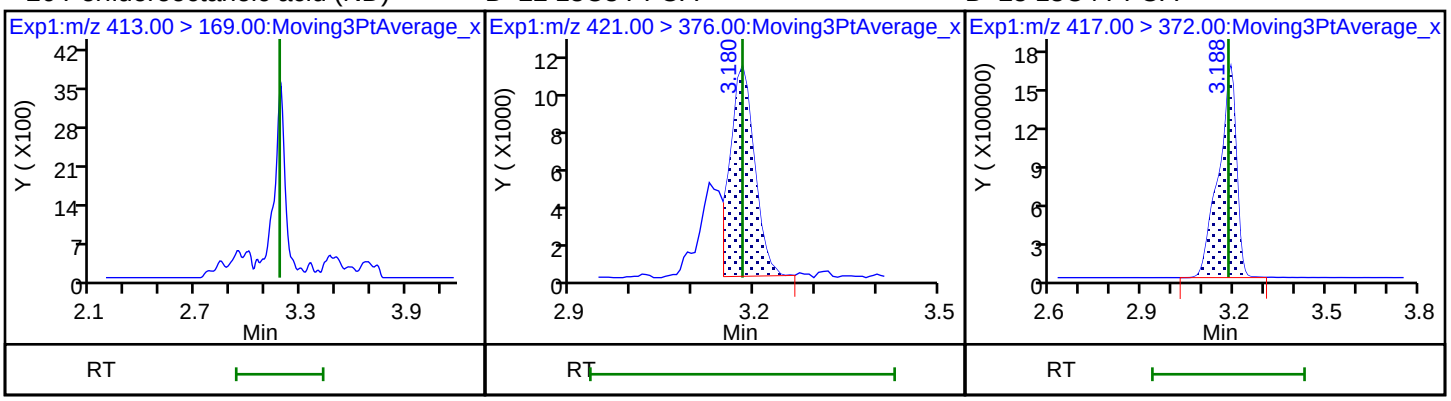
21 1H,1H,2H,2H-perfluorooctanesulfonic (M2) D 20 M2-6:2 FTS * 24 13C2 PFOA



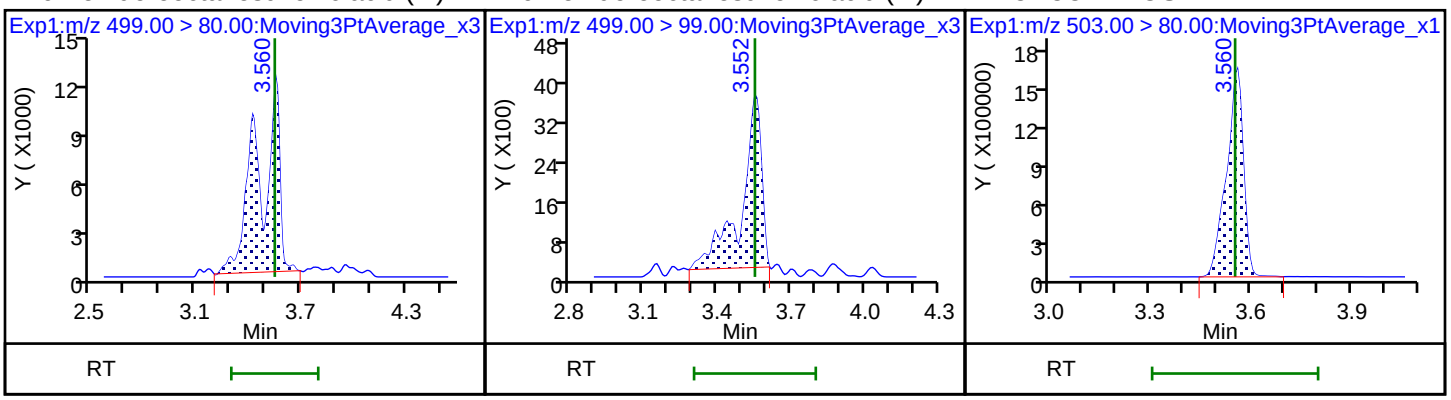
23 Perfluoroheptanesulfonic acid (ND) 23 Perfluoroheptanesulfonic acid (ND) 26 Perfluorooctanoic acid (ND)



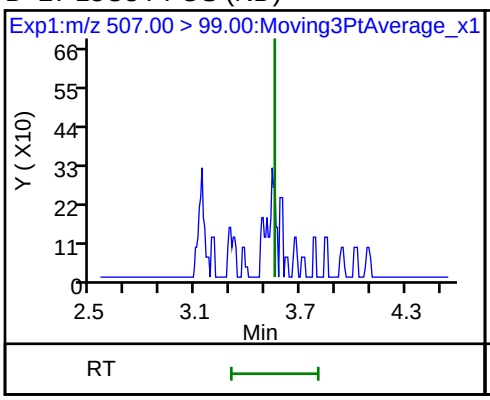
26 Perfluorooctanoic acid (ND) D 22 13C8 PFOA D 25 13C4 PFOA



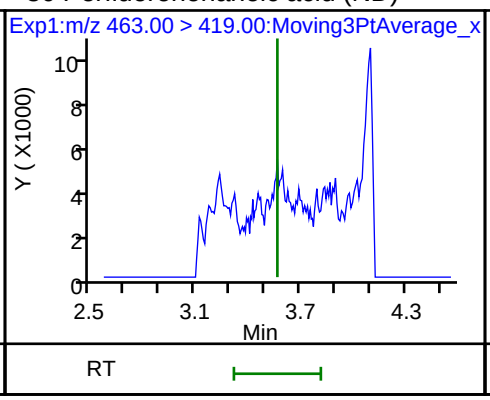
29 Perfluorooctanesulfonic acid (M) 29 Perfluorooctanesulfonic acid (M) D 28 13C4 PFOS



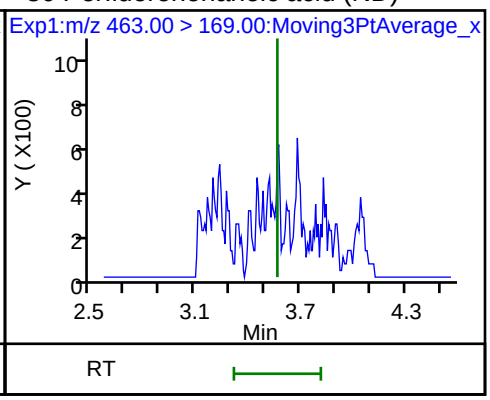
D 27 13C8 PFOS (ND)



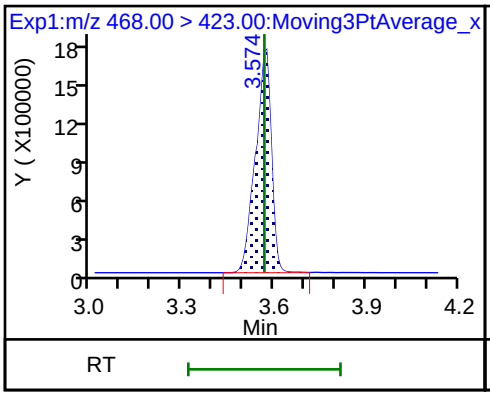
30 Perfluorononanoic acid (ND)



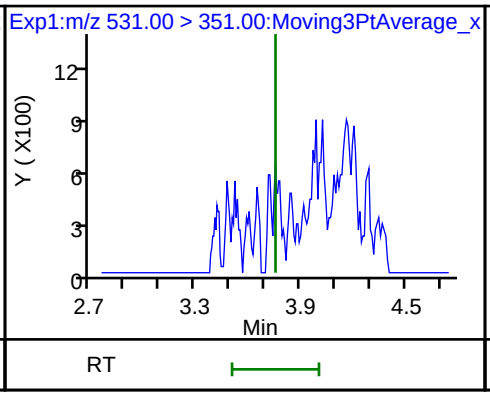
30 Perfluorononanoic acid (ND)



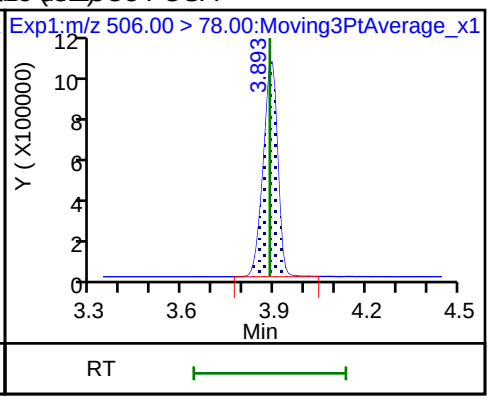
D 31 13C5 PFNA



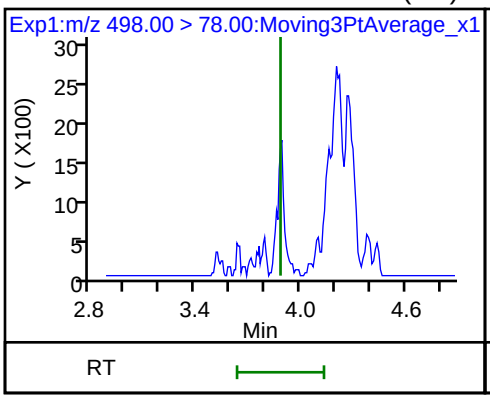
32 9-Chlorohexadecafluoro-3-oxanonane (ND)



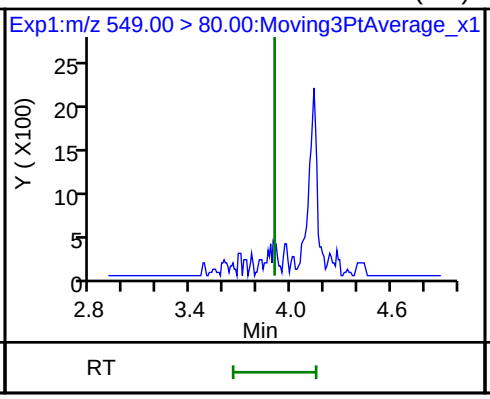
D 33 13C8 FOSA



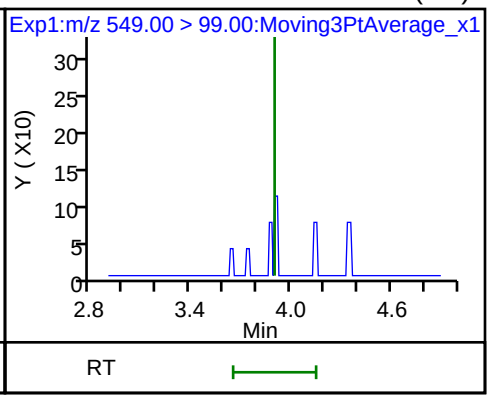
34 Perfluorooctanesulfonamide (ND)



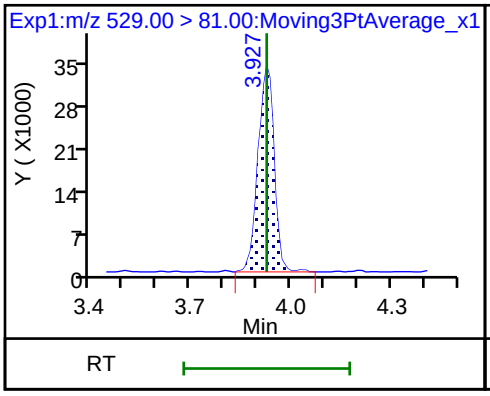
35 Perfluorononanesulfonic acid (ND)



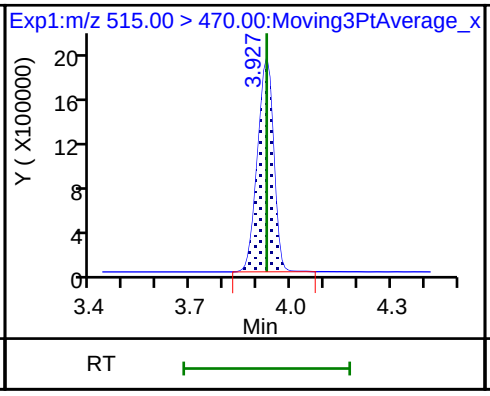
35 Perfluorononanesulfonic acid (ND)



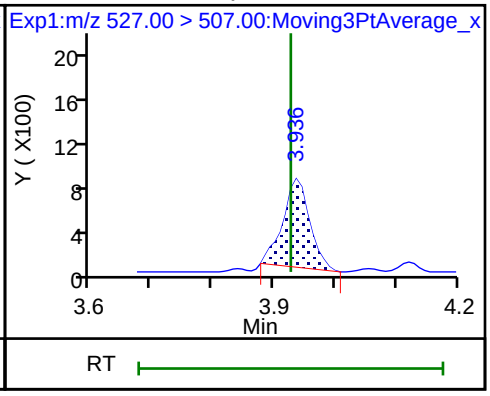
D 39 M2-8:2 FTS



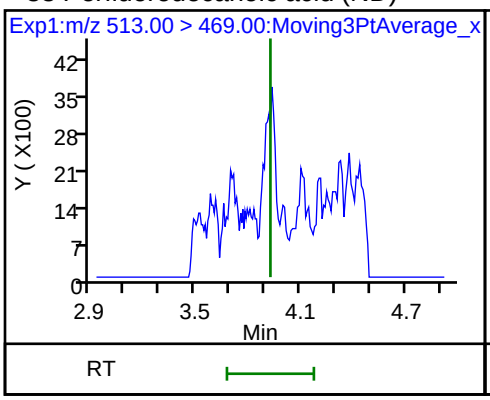
D 36 13C2 PFDA



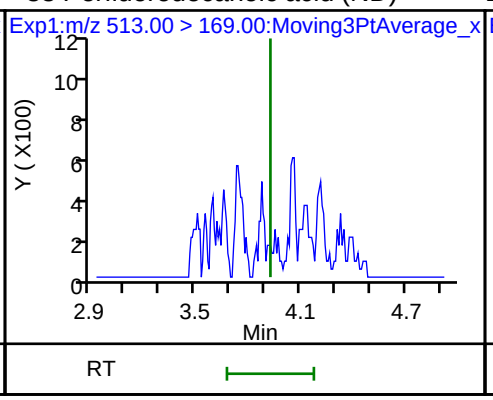
37 1H,1H,2H,2H-perfluorodecanesulfoni



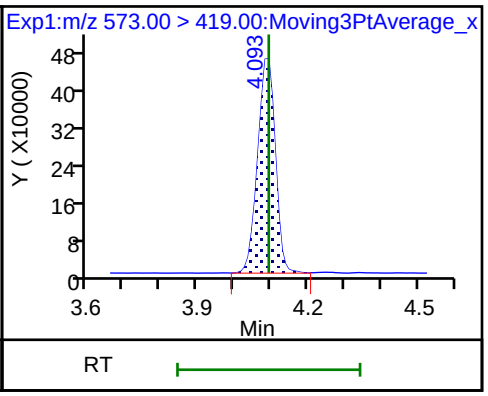
38 Perfluorodecanoic acid (ND)



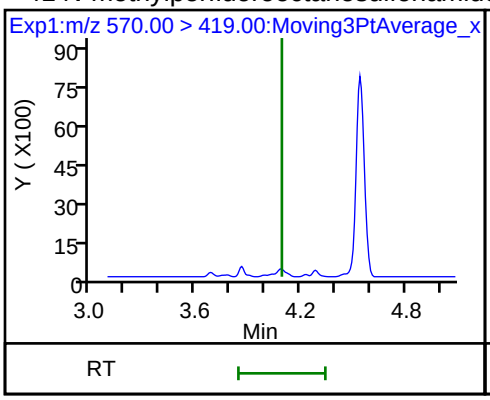
38 Perfluorodecanoic acid (ND)



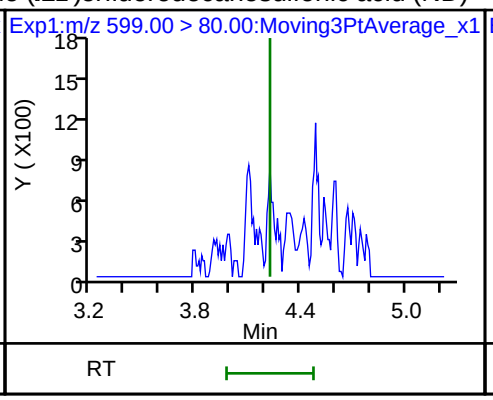
D 40 d3-NMeFOSAA



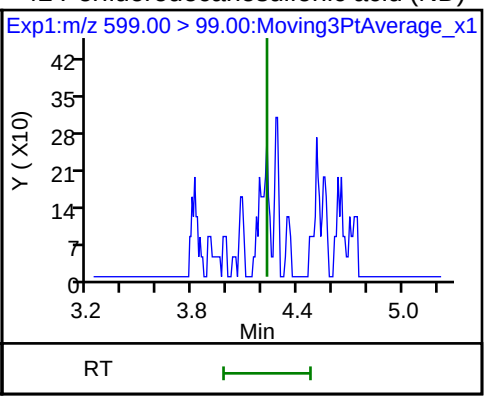
41 N-methylperfluorooctanesulfonamido (ND)



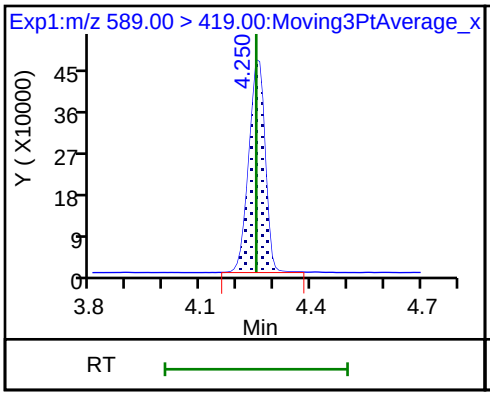
42D Perfluorodecanesulfonic acid (ND)



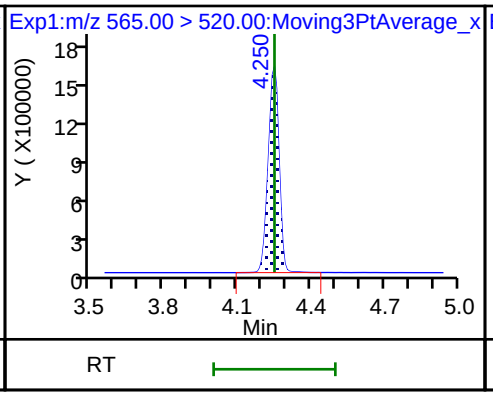
42 Perfluorodecanesulfonic acid (ND)



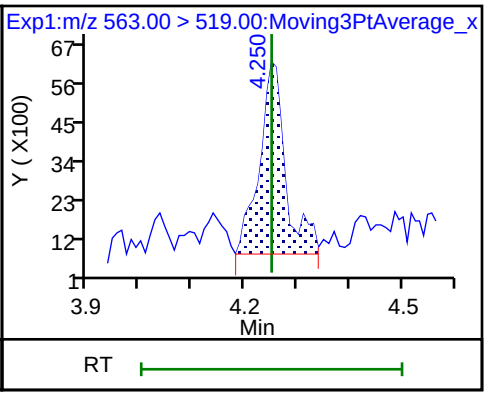
D 45 d5-NEtFOSAA



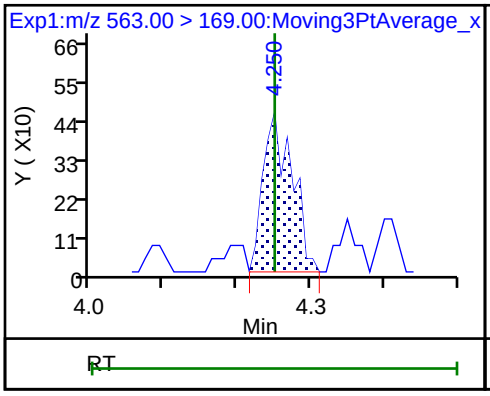
D 44 13C2 PFUnA



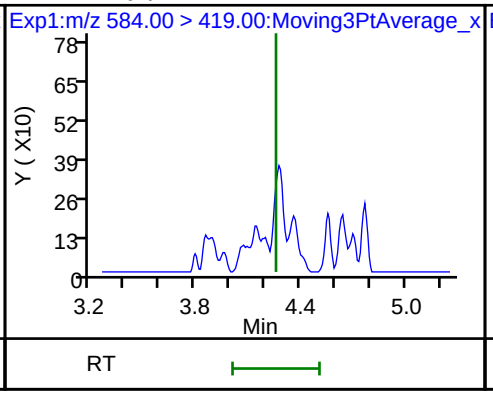
43 Perfluoroundecanoic acid



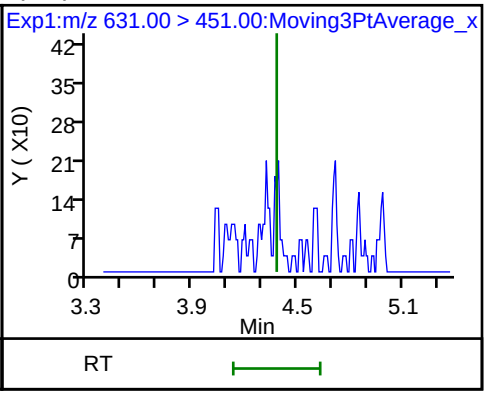
43 Perfluoroundecanoic acid



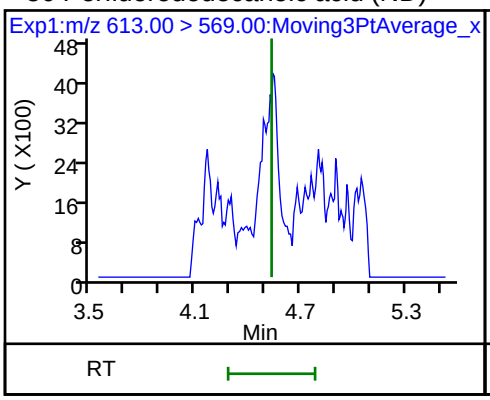
46 N-ethylperfluorooctanesulfonamidoa (ND)



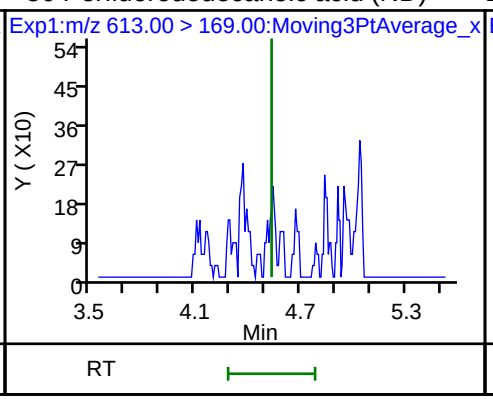
11-Chloroeicosafluoro-3-oxaundecan (ND)



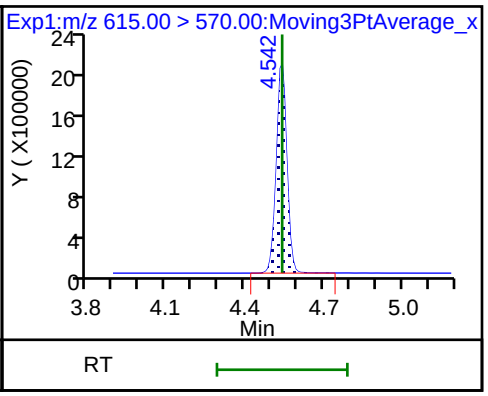
50 Perfluorododecanoic acid (ND)



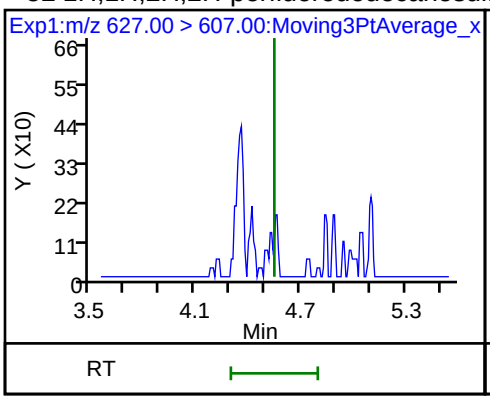
50 Perfluorododecanoic acid (ND)



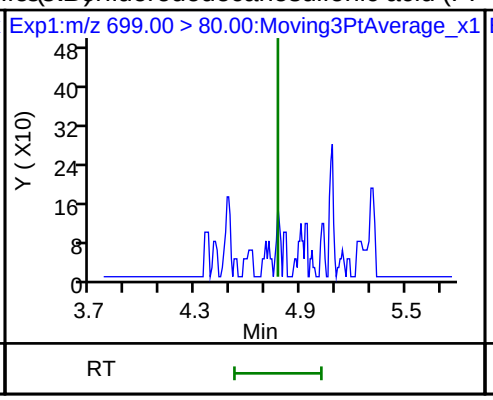
D 49 13C2 PFDoA



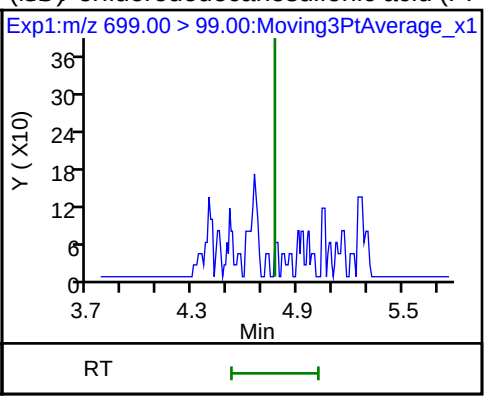
52 1H,1H,2H-perfluorododecanesulfonic acid (ND)



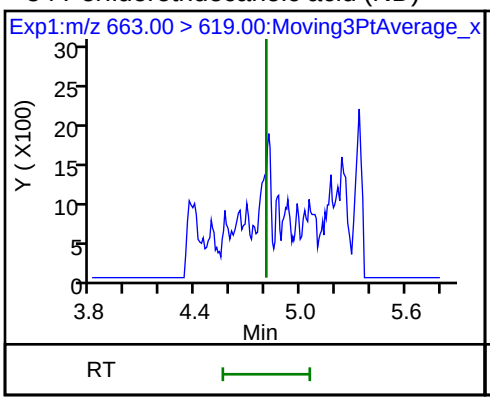
53 Perfluorododecanesulfonic acid (PF (ND)



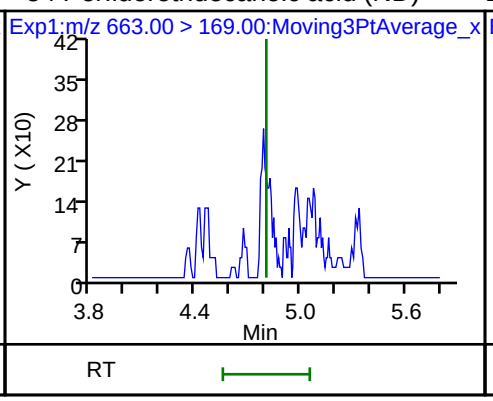
53 Perfluorododecanesulfonic acid (PF (ND)



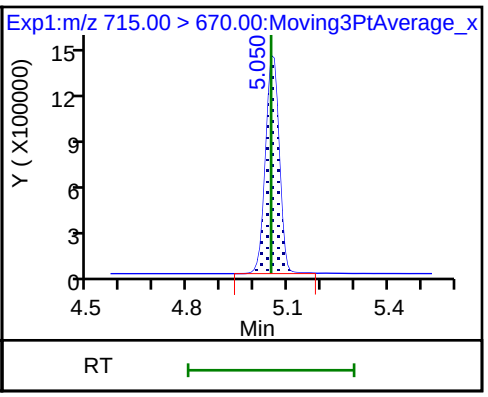
54 Perfluorotridecanoic acid (ND)



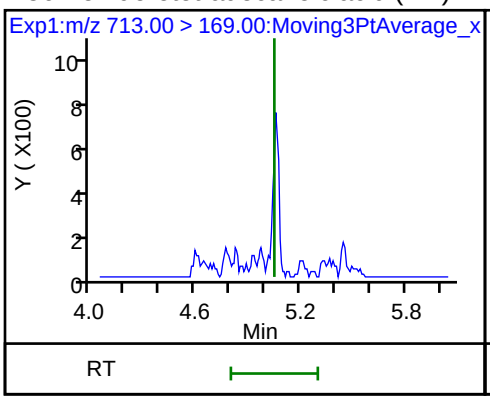
54 Perfluorotridecanoic acid (ND)



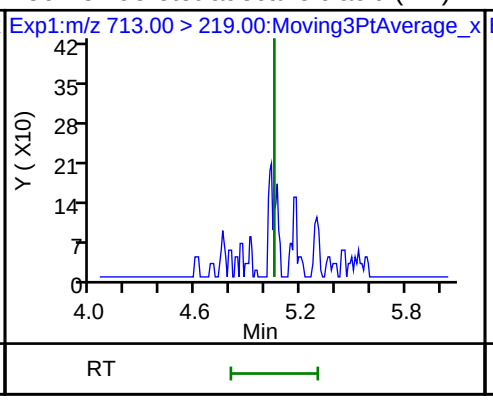
D 55 13C2 PFTeDA



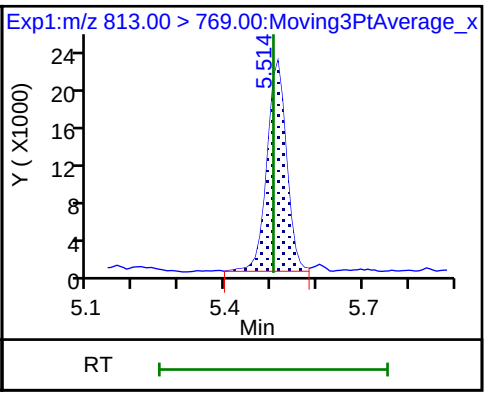
56 Perfluorotetradecanoic acid (ND)



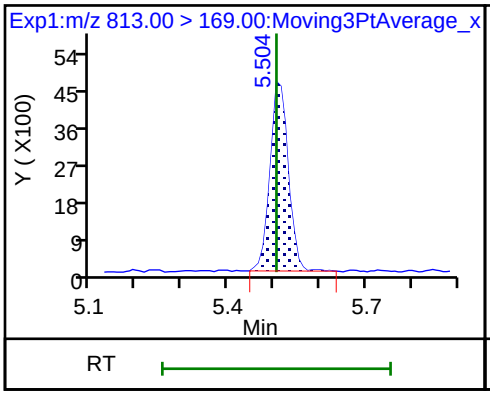
56 Perfluorotetradecanoic acid (ND)



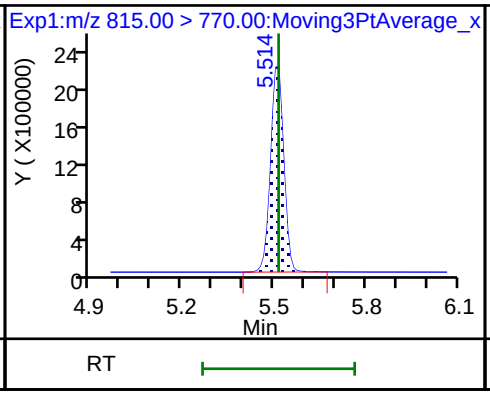
58 Perfluorohexadecanoic acid



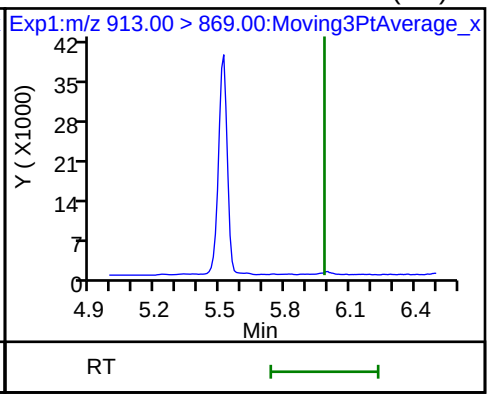
58 Perfluorohexadecanoic acid



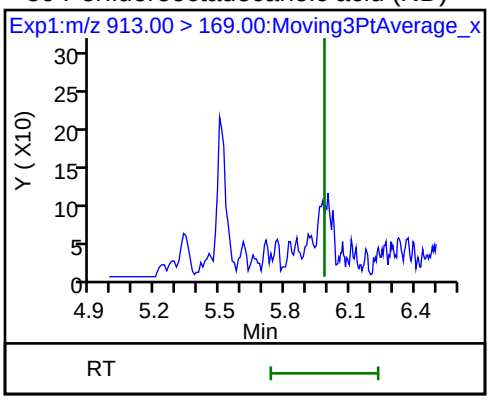
D 57 13C2 PFHxDA



59 Perfluorooctadecanoic acid (ND)



59 Perfluorooctadecanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

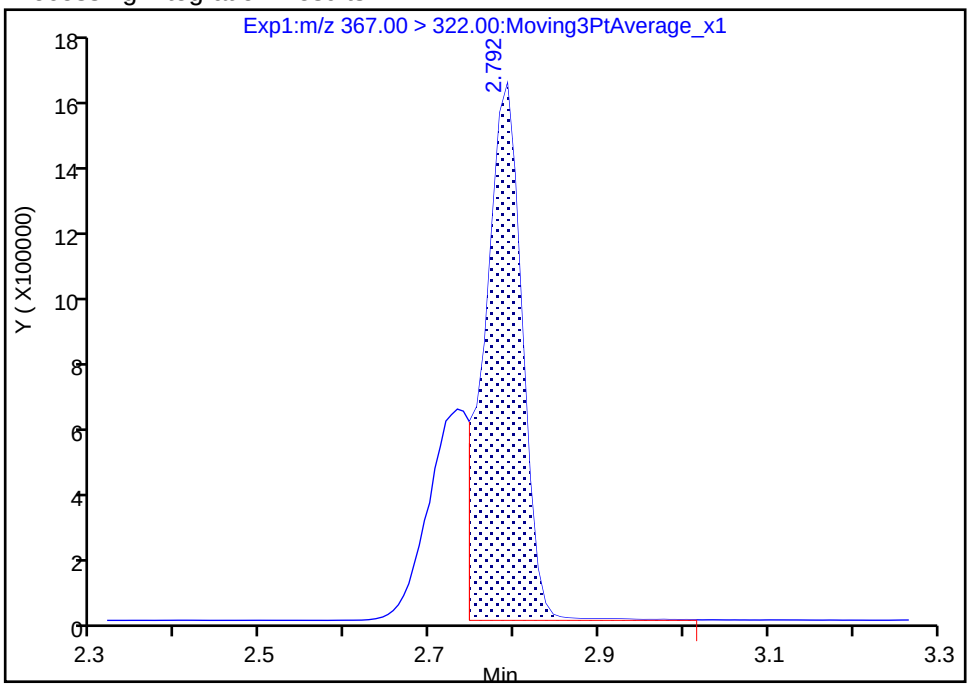
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

D 16 13C4 PFHpA, CAS: STL01892

Signal: 1

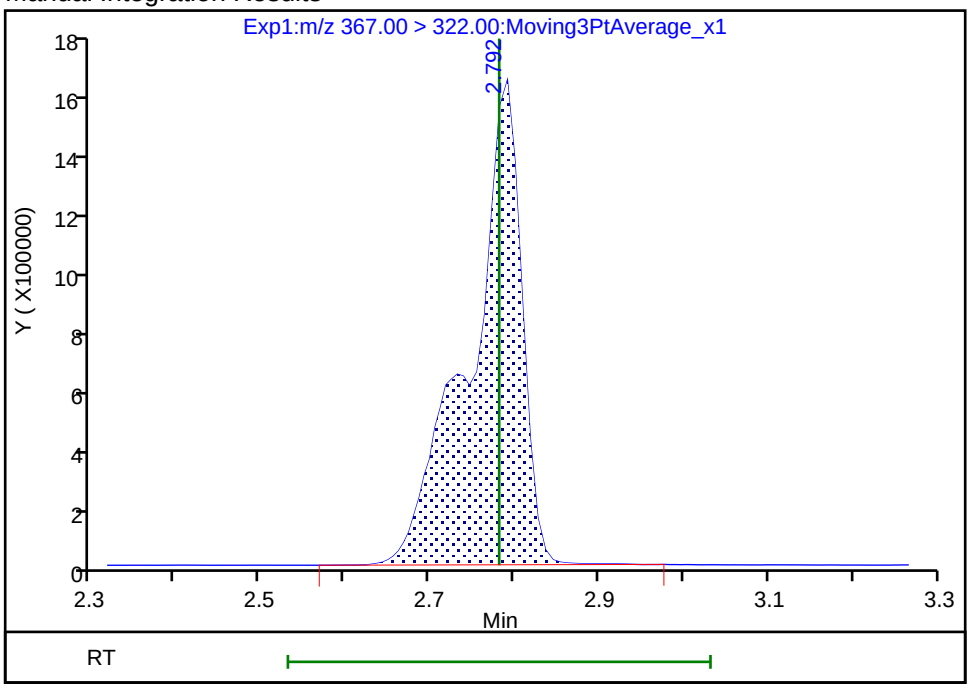
Processing Integration Results

RT: 2.79
Area: 4738187
Amount: 1.416441
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 6693196
Amount: 2.000874
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:46:26
Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

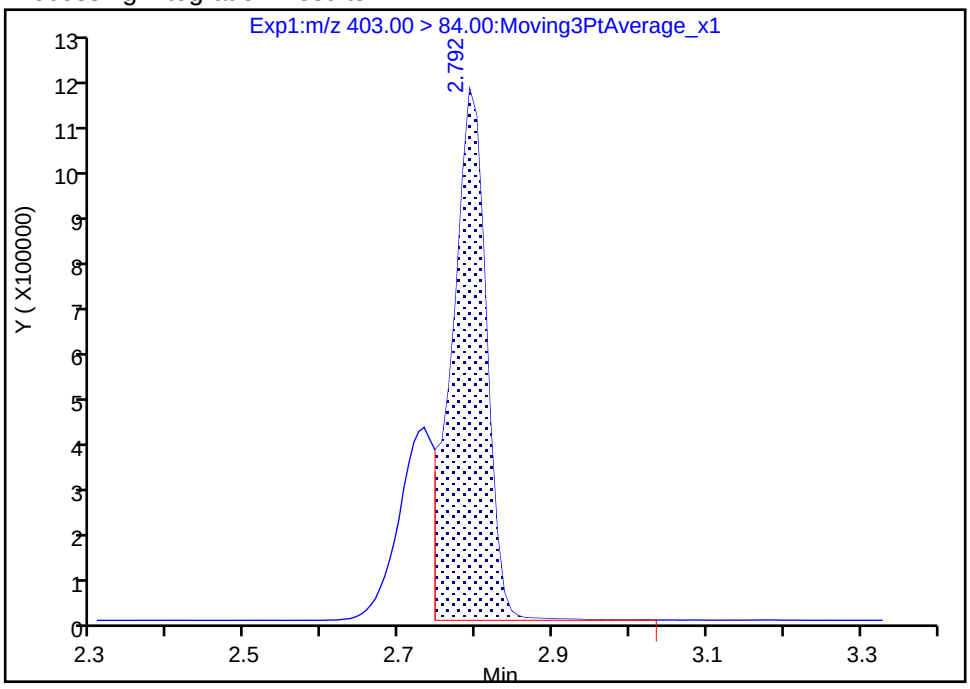
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

D 17 18O2 PFHxS, CAS: STL00994

Signal: 1

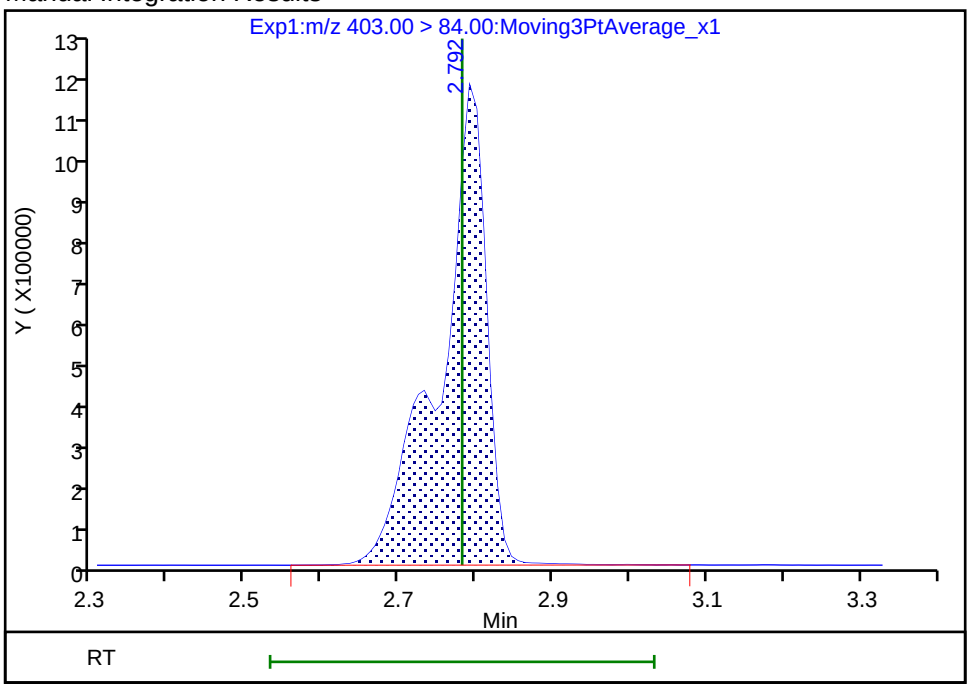
Processing Integration Results

RT: 2.79
Area: 3527119
Amount: 1.491522
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 4819396
Amount: 2.037990
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:46:23
Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

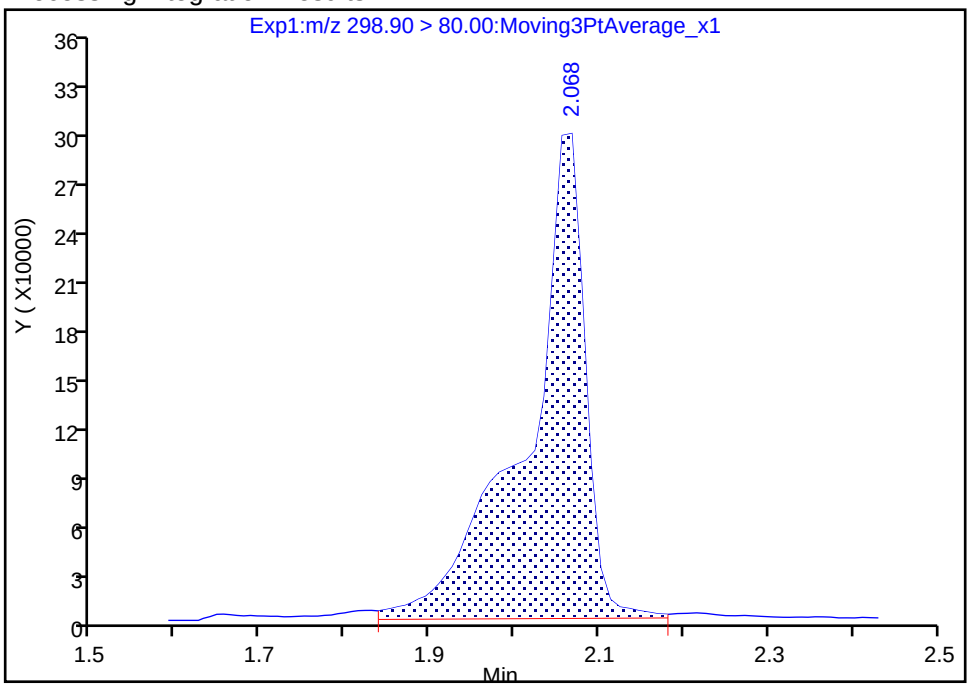
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

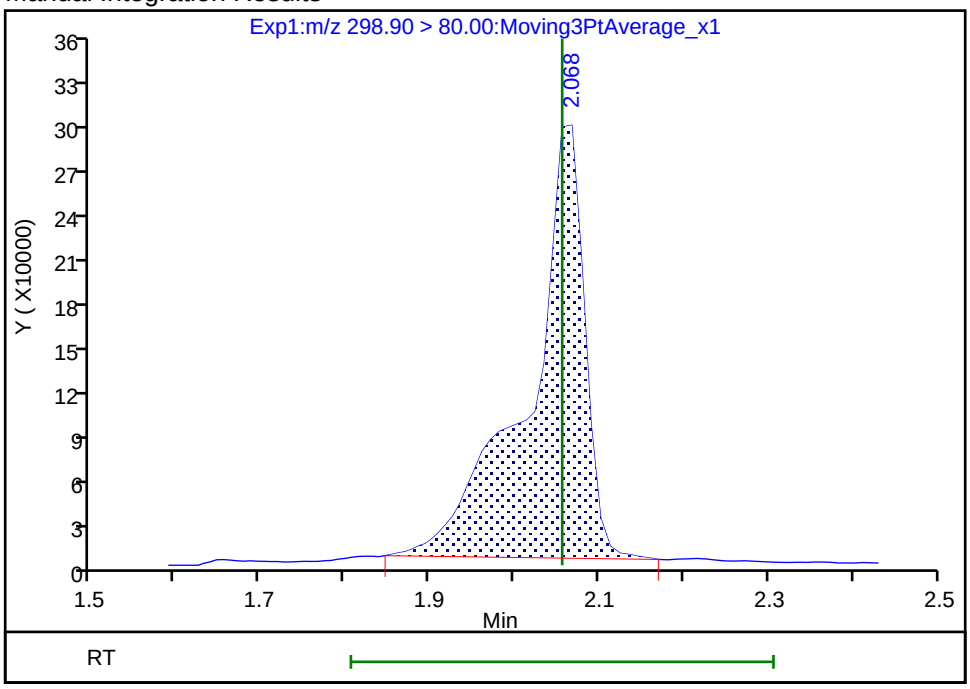
Processing Integration Results

RT: 2.07
Area: 1419726
Amount: 0.007025
Amount Units: ng/ml



Manual Integration Results

RT: 2.07
Area: 1335323
Amount: 0.594678
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:47:01
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

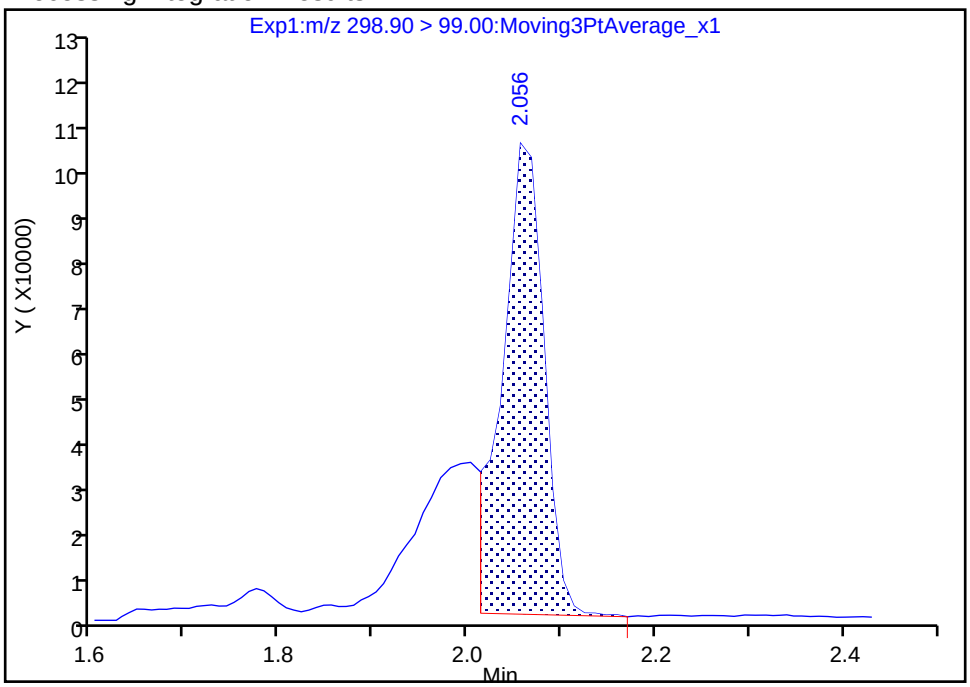
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

6 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

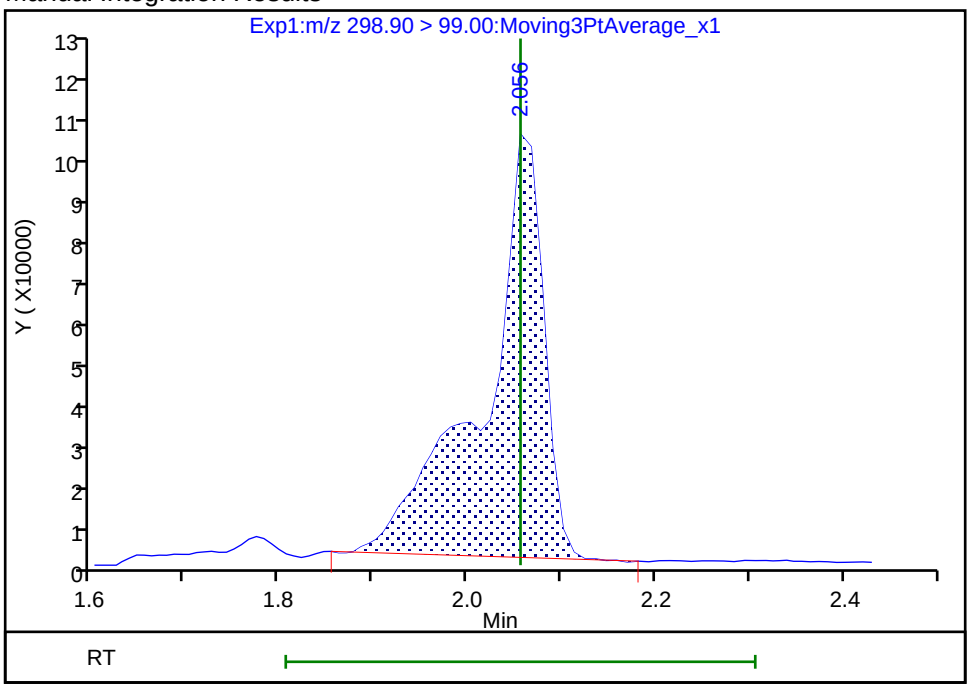
Processing Integration Results

RT: 2.06
Area: 312937
Amount: 0.007025
Amount Units: ng/ml



Manual Integration Results

RT: 2.06
Area: 450301
Amount: 0.594678
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:47:06
Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

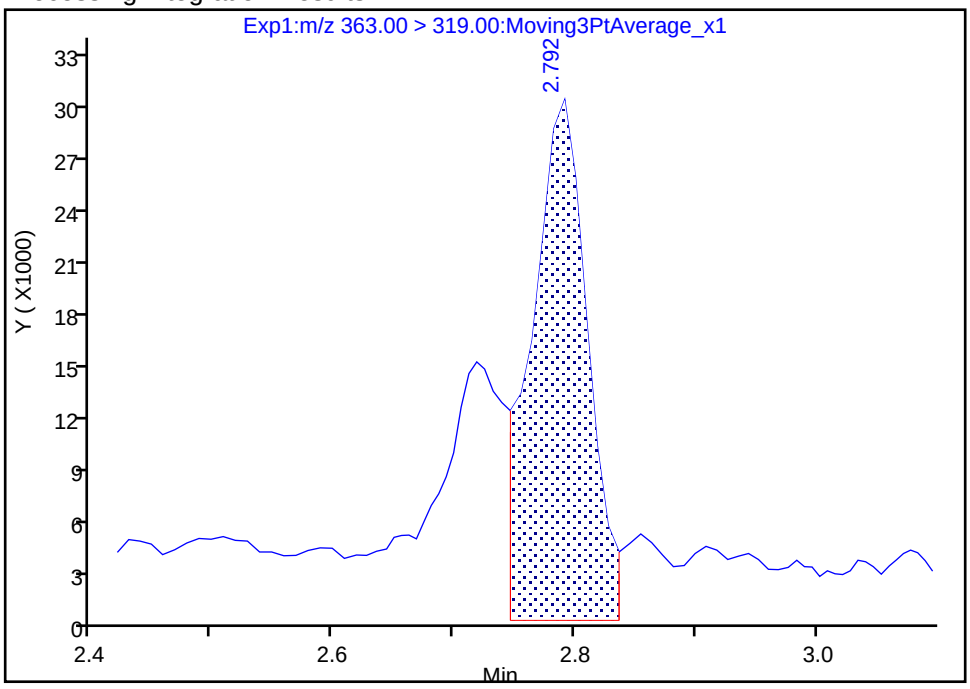
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

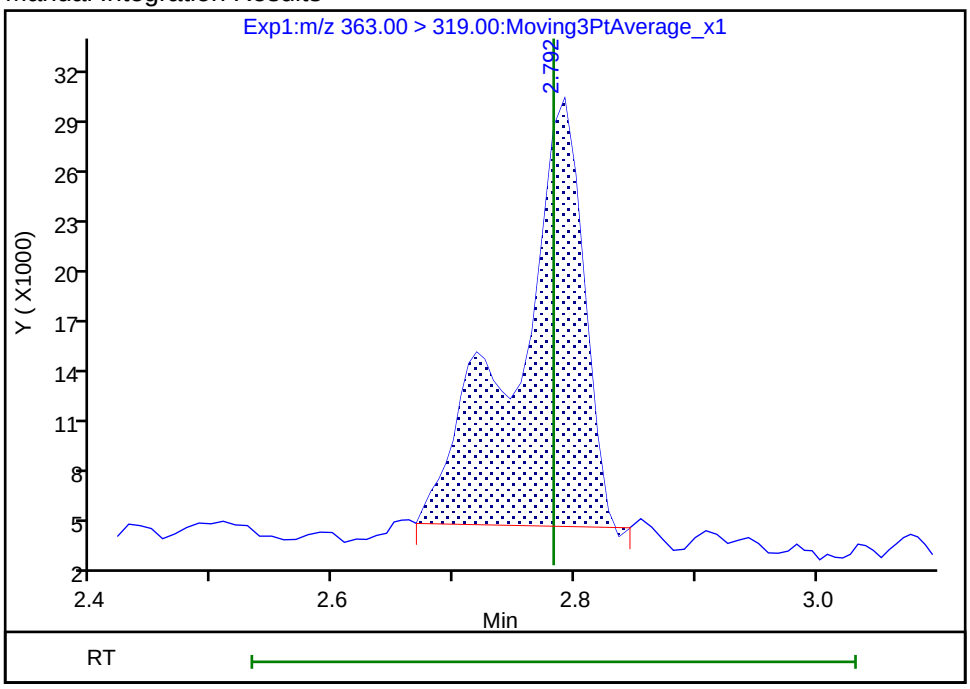
Processing Integration Results

RT: 2.79
Area: 95469
Amount: 0.000381
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 99885
Amount: 0.035859
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:47:38
Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

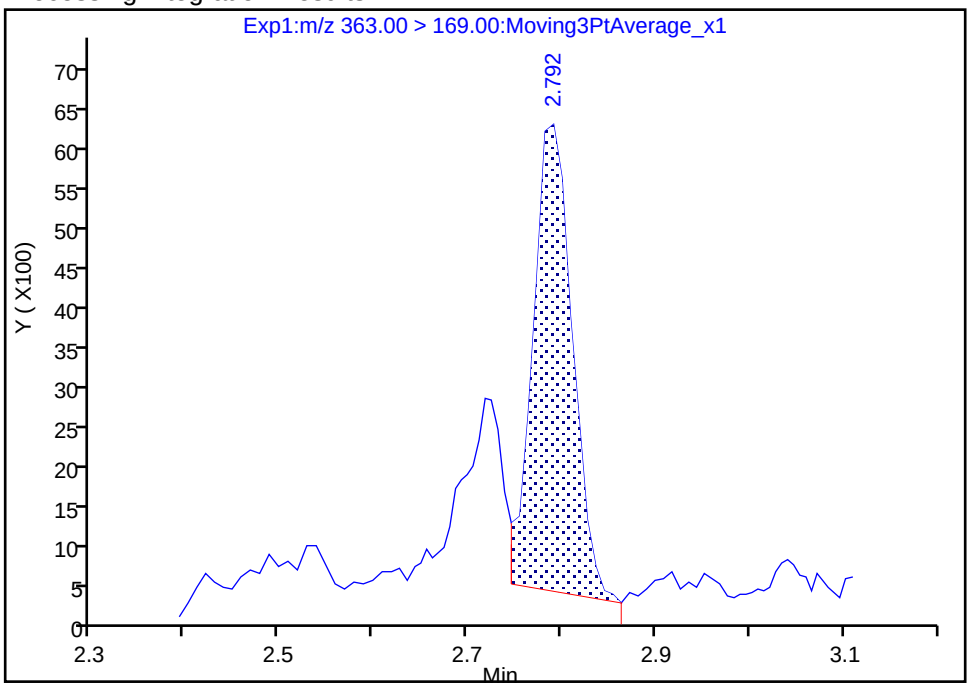
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

15 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 2

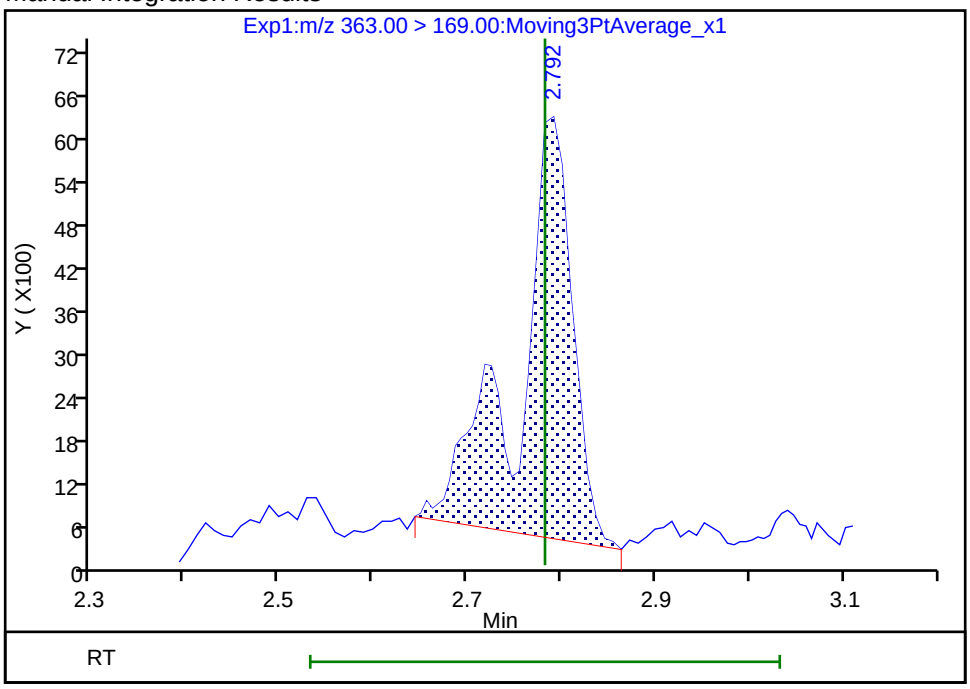
Processing Integration Results

RT: 2.79
Area: 16966
Amount: 0.000381
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 23324
Amount: 0.035859
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:47:42
Audit Action: Manually Integrated Audit Reason: Incomplete Integration

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

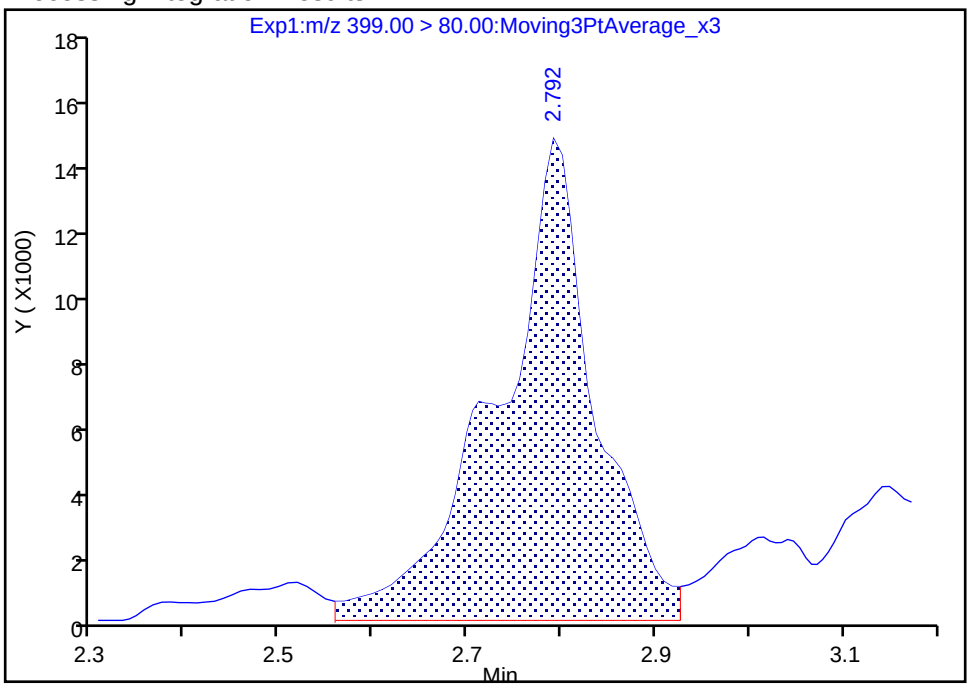
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

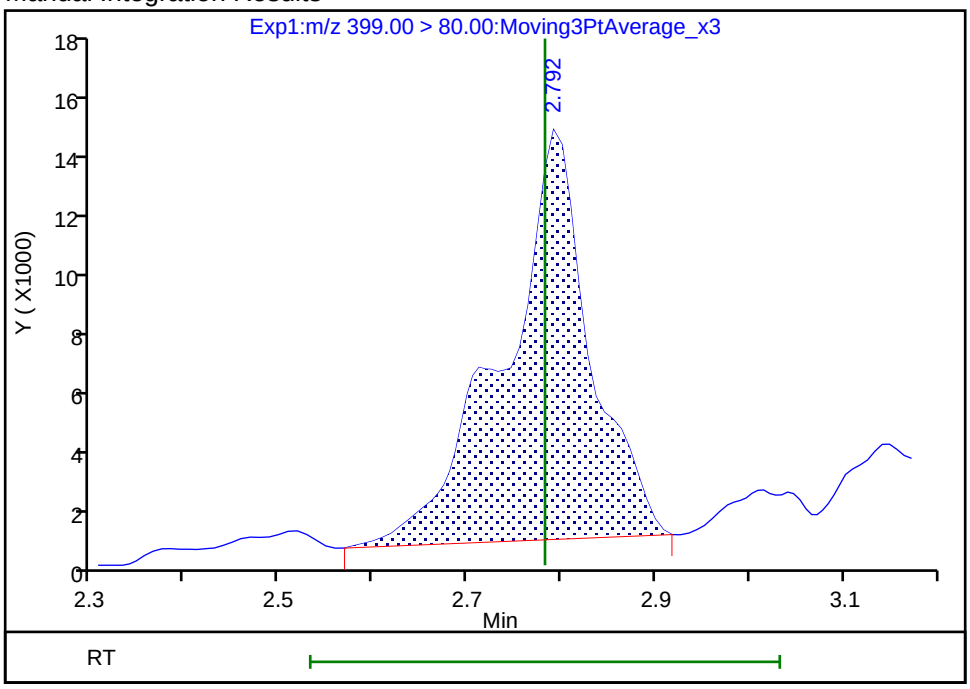
Processing Integration Results

RT: 2.79
Area: 107288
Amount: 0.000473
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 89334
Amount: 0.035434
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:47:55
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

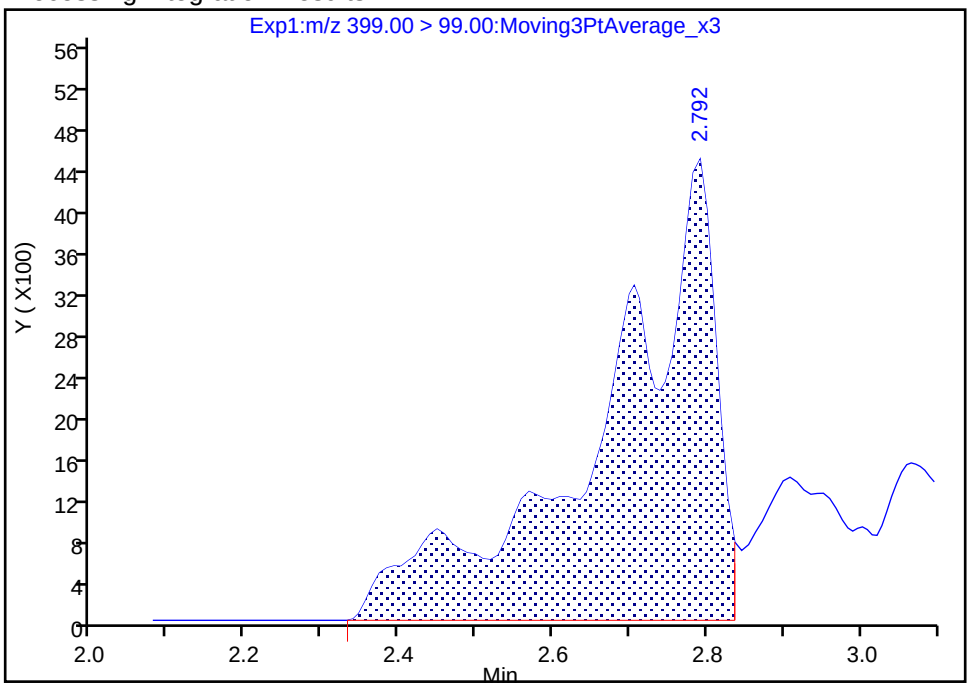
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 2

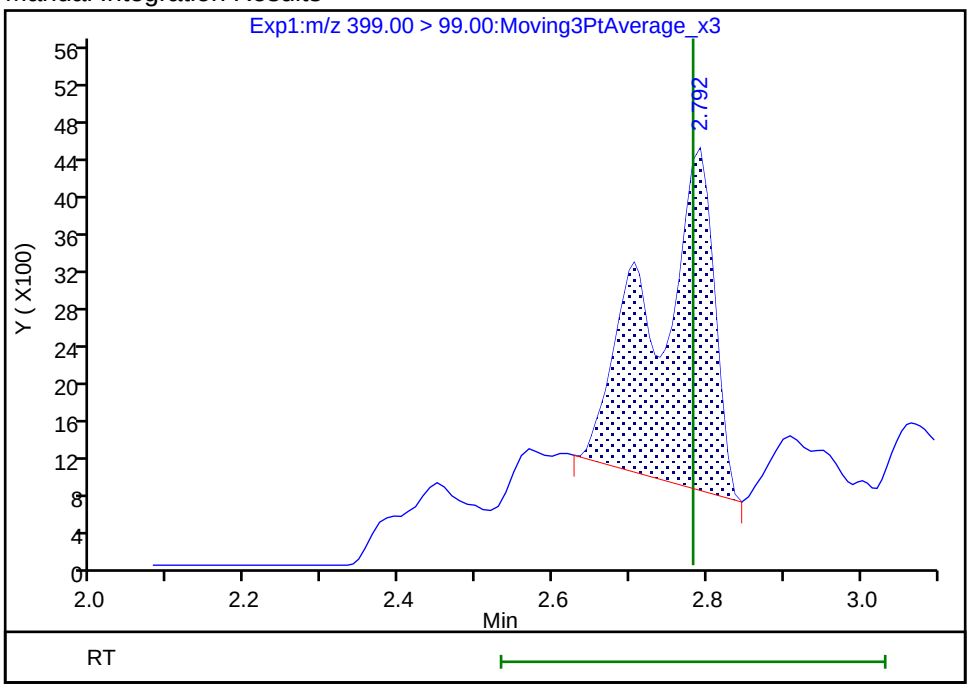
Processing Integration Results

RT: 2.79
Area: 44762
Amount: 0.000473
Amount Units: ng/ml



Manual Integration Results

RT: 2.79
Area: 19991
Amount: 0.035434
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:47:57
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

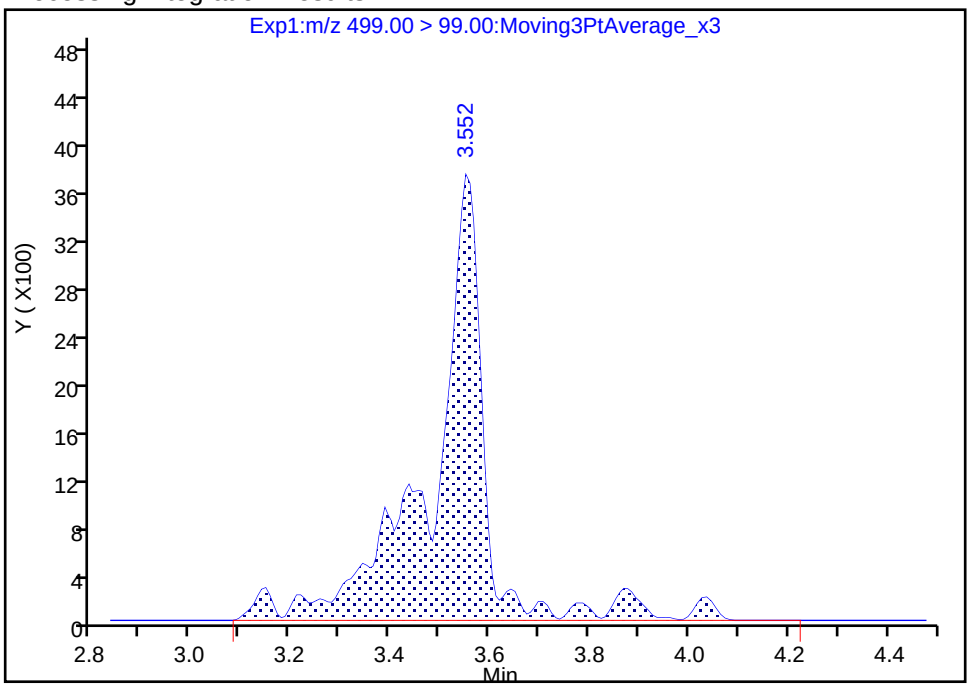
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

29 Perfluorooctanesulfonic acid, CAS: 1763-23-1

Signal: 2

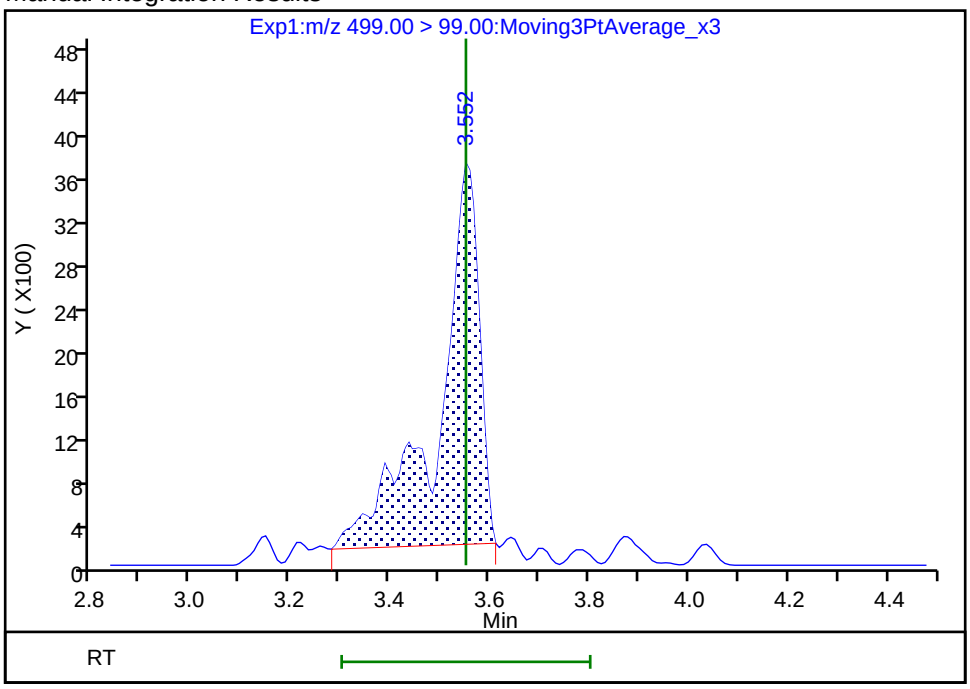
Processing Integration Results

RT: 3.55
Area: 28268
Amount: 0.000493
Amount Units: ng/ml



Manual Integration Results

RT: 3.55
Area: 20180
Amount: 0.040221
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:48:31
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

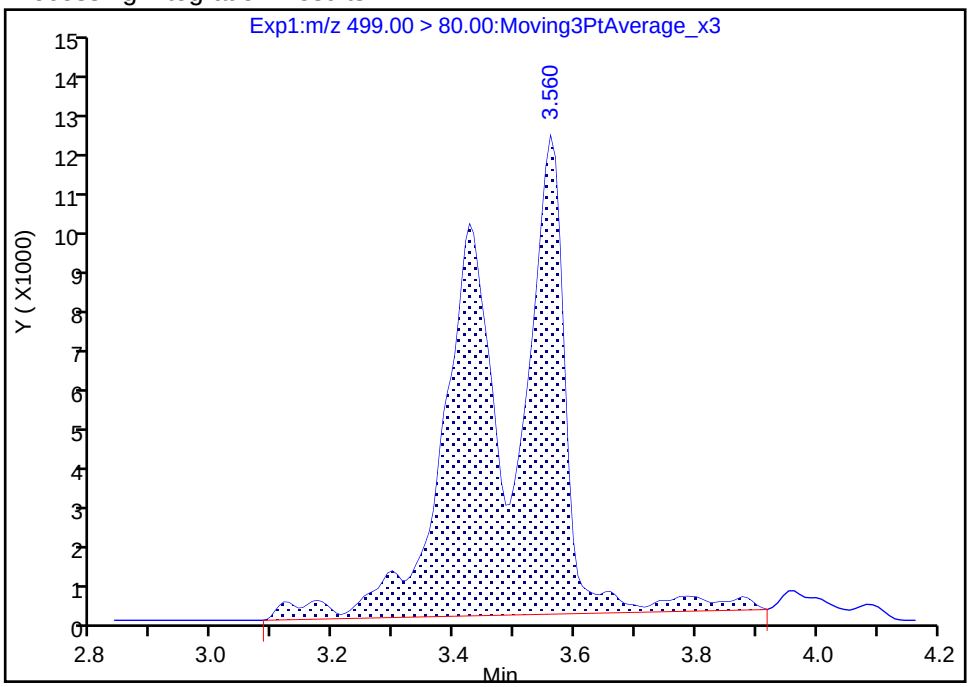
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_036.d
Injection Date: 08-Jan-2019 23:19:00 Instrument ID: A9
Lims ID: MB 320-267852/1-C
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 24 Worklist Smp#: 7
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

29 Perfluorooctanesulfonic acid, CAS: 1763-23-1

Signal: 1

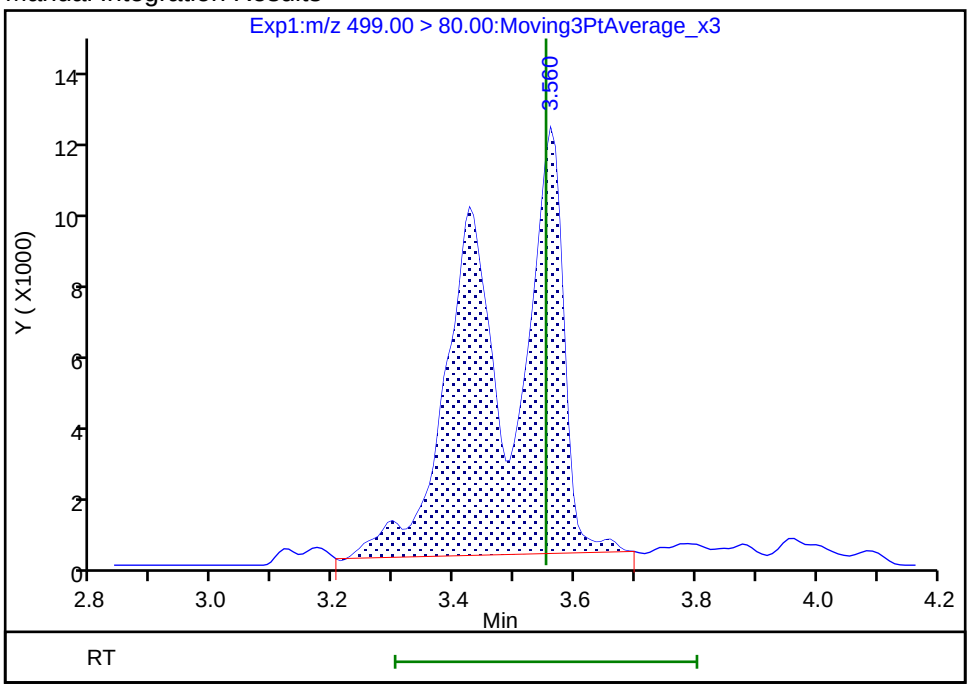
Processing Integration Results

RT: 3.56
Area: 109626
Amount: 0.000493
Amount Units: ng/ml



Manual Integration Results

RT: 3.56
Area: 99356
Amount: 0.040221
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 11:48:36
Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 140-13780-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-267857/1-B

Matrix: Air | Lab File ID: 2019.01.08LLAAXX_041.d

Analysis Method: 537 (modified) | Date Collected:

Extraction Method: None | Date Extracted: 12/28/2018 03:39

Sample wt/vol: 1(Sample) | Date Analyzed: 01/08/2019 23:56

Con. Extract Vol.: 500(mL) | Dilution Factor: 1

Injection Volume: 20(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 269672 | Units: ng/Sample

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	ND		0.500	0.490
375-85-9	Perfluoroheptanoic acid (PFHpA)	ND		0.500	0.490
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	ND		0.500	0.490
375-95-1	Perfluorononanoic acid (PFNA)	ND		0.500	0.490
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	ND		0.500	0.490
335-67-1	Perfluorooctanoic acid (PFOA)	ND		0.500	0.490

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	90		25-150
STL01892	13C4 PFHpA	95		25-150
STL00995	13C5 PFNA	98		25-150
STL00990	13C4 PFOA	95		25-150
STL00991	13C4 PFOS	101		25-150
STL00994	18O2 PFHxS	90		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_041.d
Lims ID: MB 320-267857/1-B
Client ID:
Sample Type: MB
Inject. Date: 08-Jan-2019 23:56:31 ALS Bottle#: 28 Worklist Smp#: 12
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-267857/1-b
Misc. Info.: Plate: 1 Rack: 3
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 10:32:21 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0310

First Level Reviewer: westendorfc Date: 09-Jan-2019 11:58:21
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										M
217.00 > 172.00	1.679	1.679	0.0	0.526	7035056	2.48		99.3	6038	M
2 Perfluorobutanoic acid										M
212.90 > 169.00	1.687	1.679	0.008	1.005	21673	0.008320			1.2	M
D 3 13C5 PFPeA										
267.90 > 223.00	2.024	2.022	0.002	0.634	5953991	2.40		96.0	4965	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.054	0.002	0.644	8485132	2.08		89.6	655677	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.350	2.346	0.004	0.737	603332	2.43		104	852	
D 9 13C2 PFHxA										
315.00 > 270.00	2.387	2.383	0.004	0.748	6766101	2.45		98.2	3754	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.512	2.508	0.004	0.787	573820	2.32		92.8	2169	
D 16 13C4 PFHpA										
367.00 > 322.00	2.787	2.782	0.005	0.873	8025358	2.37		94.7	2786	
D 17 18O2 PFHxS										
403.00 > 84.00	2.796	2.782	0.014	0.876	5119083	2.14		90.3	3175	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.787	2.782	0.005	0.997	19589	0.007315	Target=3.80		51.7	
399.00 > 99.00	2.796	2.782	0.014	1.000	7293		2.69(1.90-5.70)		4.5	
19 DONA										
377.00 > 251.00	2.832	2.827	0.005	0.795	6185	0.001082	Target=2.26		22.8	
377.00 > 85.00	2.832	2.827	0.005	0.795	3191		1.94(1.13-3.39)		4.3	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.167	3.165	0.002	1.000	4208	0.005414			6.2	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.167	3.165	0.002	0.993	874265	2.62		110	1610	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
* 24 13C2 PFOA										
415.00 > 370.00	3.191	3.180	0.011		7425179	2.50			3376	
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.191	3.180	0.011	1.002	24604	0.008490	Target=2.72		4.1	M
413.00 > 169.00	3.191	3.180	0.011	1.002	9752		2.52(1.36-4.08)		17.3	
D 22 13C8 PFOA										
421.00 > 376.00	3.183	3.180	0.003		24882	0.0105		0.0	139	
D 25 13C4 PFOA										
417.00 > 372.00	3.183	3.180	0.003	0.998	6989066	2.38		95.1	2720	
D 28 13C4 PFOS										
503.00 > 80.00	3.562	3.552	0.010	1.116	5927172	2.42		101	3735	
D 27 13C8 PFOS										
507.00 > 99.00	3.555	3.552	0.003		1332	0.002661		0.0	7.7	
D 31 13C5 PFNA										
468.00 > 423.00	3.570	3.567	0.003	1.119	6469921	2.44		97.7	2492	
D 33 13C8 FOSA										
506.00 > 78.00	3.895	3.885	0.010	1.221	3669317	2.28		91.2	2431	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.895	3.885	0.010	1.000	9130	0.002140			25.3	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.912	3.901	0.011	1.098	2340	0.001613	Target=6.03		9.4	
549.00 > 99.00	3.912	3.901	0.011	1.098	554		4.22(3.02-9.05)		3.4	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.929	3.927	0.002	1.231	96753	2.52		105	426	
D 36 13C2 PFDA										
515.00 > 470.00	3.929	3.927	0.002	1.231	6531310	2.52		101	4489	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.095	4.093	0.002	1.283	1765099	2.60		104	1780	
47 MeFOSA										
512.00 > 169.00	4.209	4.241	-0.032		1521	NC			2.8	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.252	4.250	0.002	1.333	1452355	2.57		103	1680	
D 44 13C2 PFUnA										
565.00 > 520.00	4.252	4.250	0.002	1.333	5070719	2.49		99.6	3168	
43 Perfluoroundecanoic acid										M
563.00 > 519.00	4.252	4.250	0.002	1.000	14634	0.008653	Target=10.48		5.2	M
563.00 > 169.00	4.261	4.250	0.011	1.002	1849		7.91(5.24-15.72)		6.6	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.393	4.381	0.012	1.233	3758	0.001344			14.7	
51 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.584	4.430	0.154		277	NC			1.4	
D 49 13C2 PFDoA										
615.00 > 570.00	4.543	4.541	0.002	1.424	5954938	2.41		96.5	3384	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.804	4.803	0.001	1.058	6637	0.003671	Target=6.18		3.7	
663.00 > 169.00	4.804	4.803	0.001	1.058	1457		4.56(3.09-9.27)		5.9	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 55 13C2 PFTeDA										
715.00 > 670.00	5.051	5.049	0.002	1.583	4334892	2.53		101	9647	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.515	5.504	0.011	1.002	38750	0.002847	Target=5.55		4.7	
813.00 > 169.00	5.506	5.504	0.002	1.000	7690		5.04(2.77-8.32)		54.2	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.506	5.514	-0.008	1.725	3949947	2.47		98.8	3744	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 10-Jan-2019 11:21:21 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_041.d

Injection Date: 08-Jan-2019 23:56:31 Instrument ID: A9

Lims ID: MB 320-267857/1-B

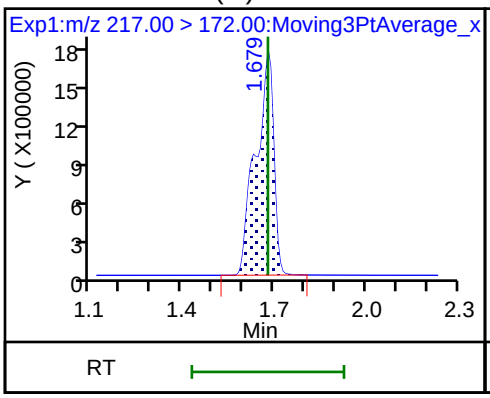
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 28 Worklist Smp#: 12

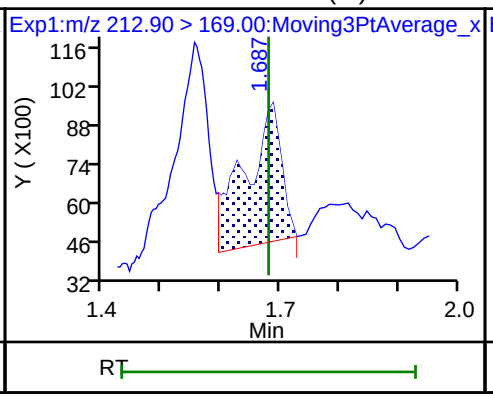
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

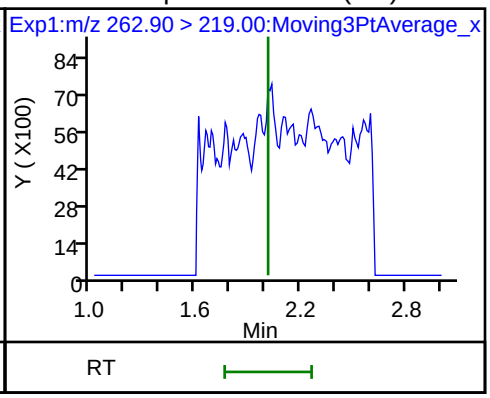
D 1 13C4 PFBA (M)



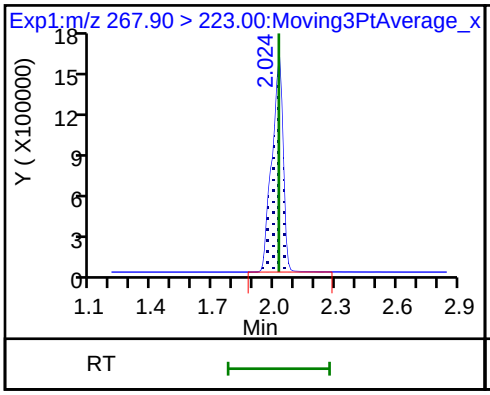
2 Perfluorobutanoic acid (M)



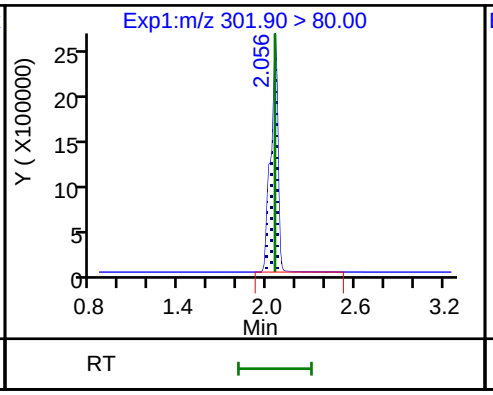
4 Perfluoropentanoic acid (ND)



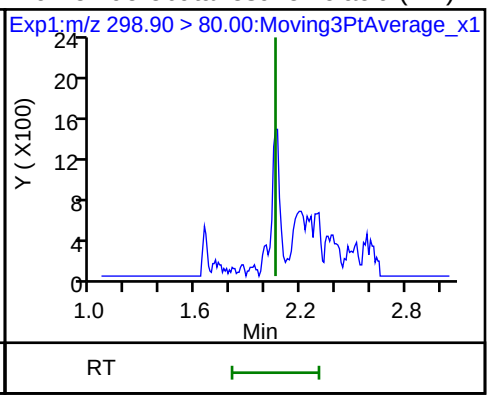
D 3 13C5 PFPeA



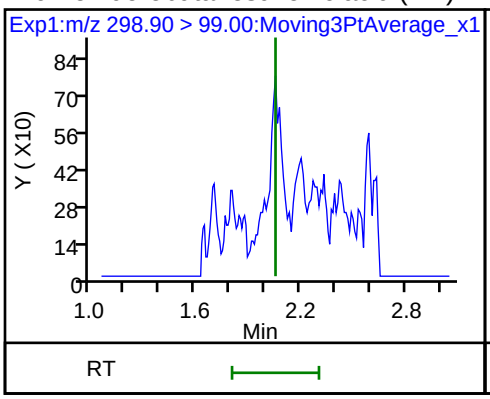
D 5 13C3 PFBS



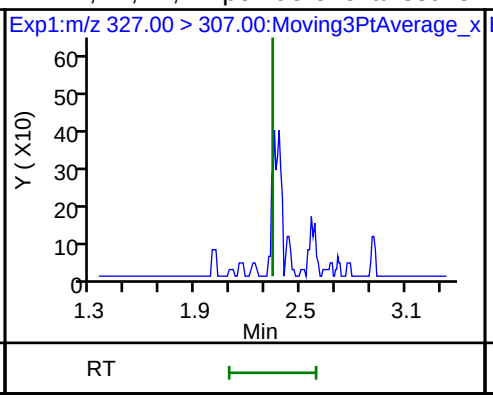
6 Perfluorobutanesulfonic acid (ND)



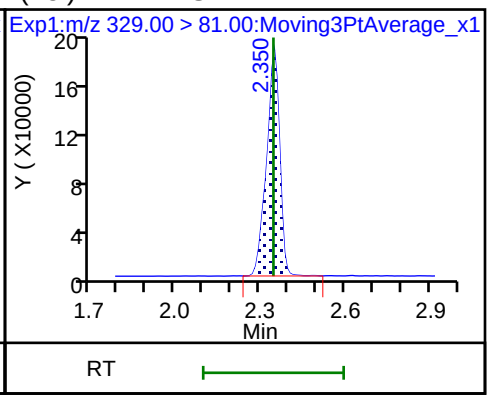
6 Perfluorobutanesulfonic acid (ND)



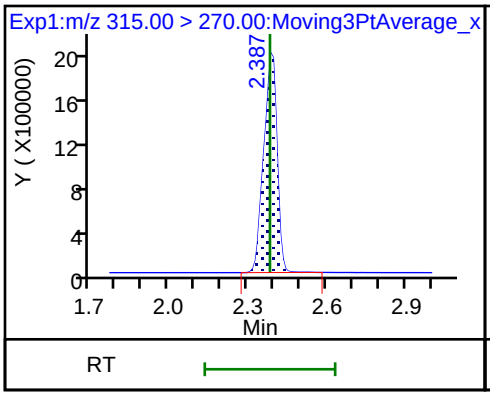
7 1H,1H,2H,2H-perfluorohexanesulfonic (ND)



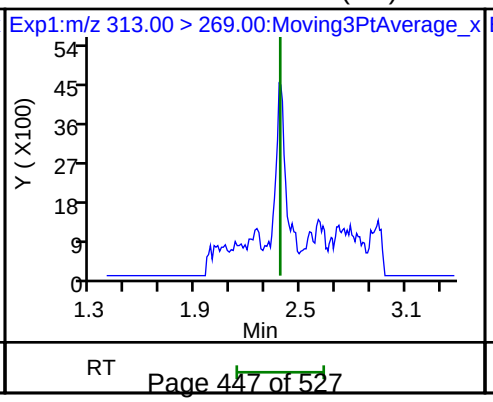
8 M2-4:2 FTS



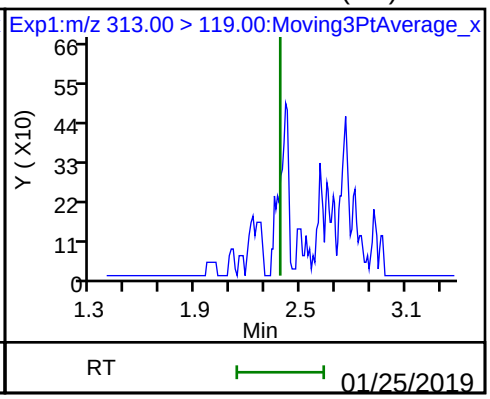
D 9 13C2 PFHxA



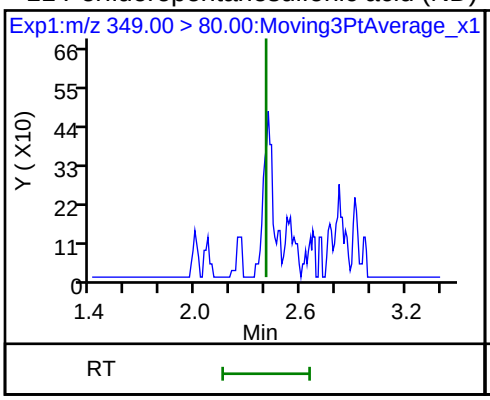
10 Perfluorohexanoic acid (ND)



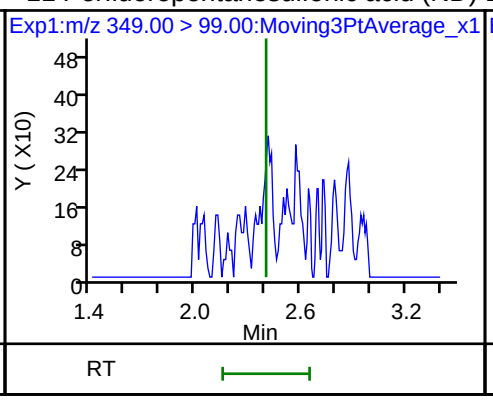
10 Perfluorohexanoic acid (ND)



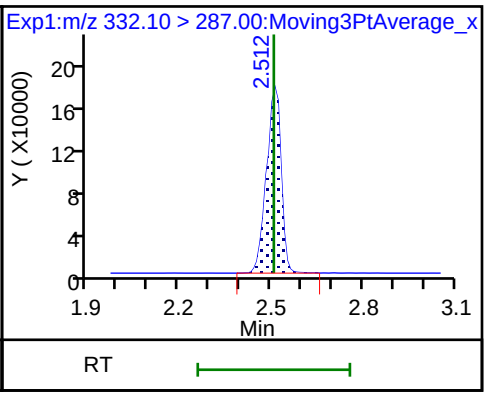
11 Perfluoropentanesulfonic acid (ND)



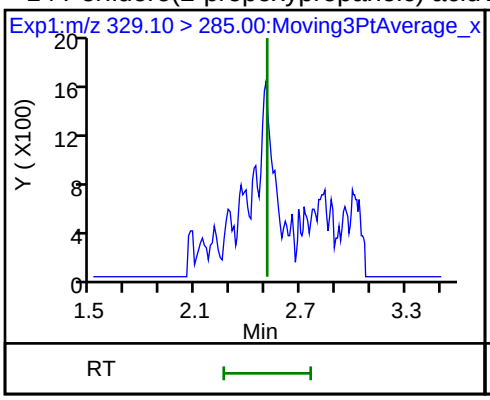
11 Perfluoropentanesulfonic acid (ND) D



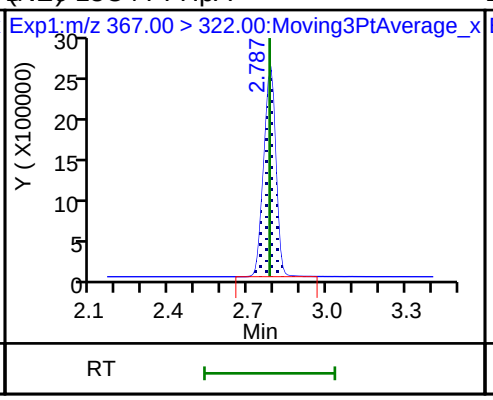
13 13C3 HFPO-DA



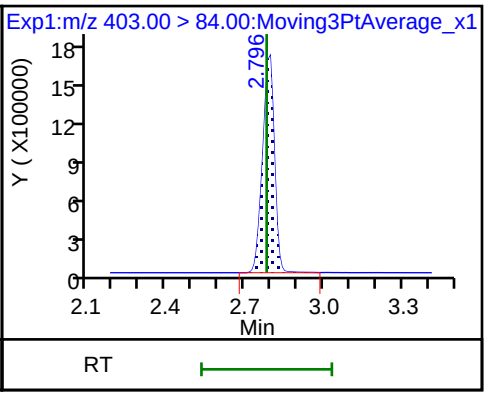
14 Perfluoro(2-propoxypropanoic) acid (ND)



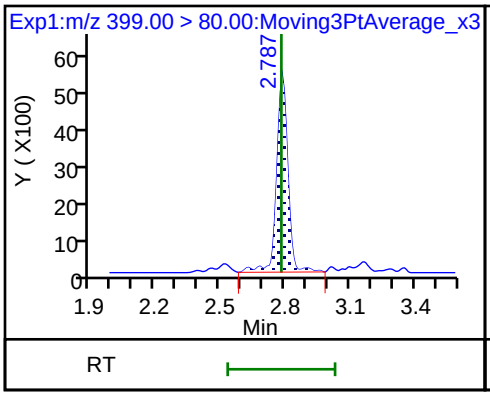
16 13C4 PFHpA



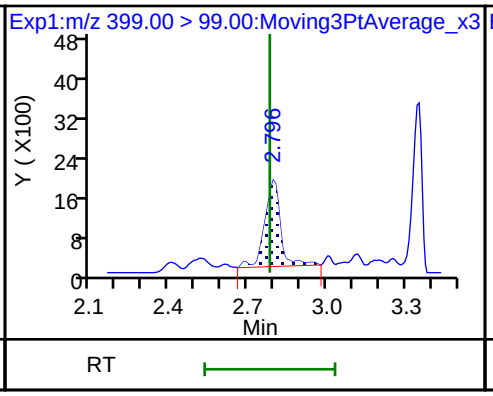
17 18O2 PFHxS



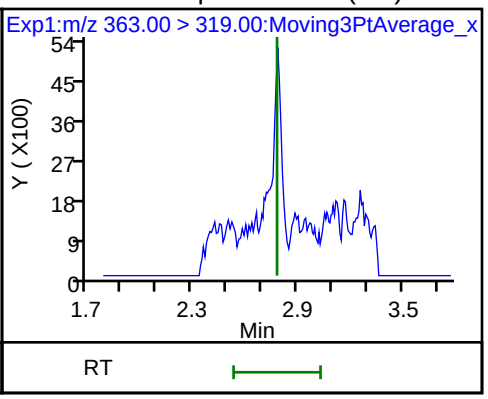
18 Perfluorohexanesulfonic acid



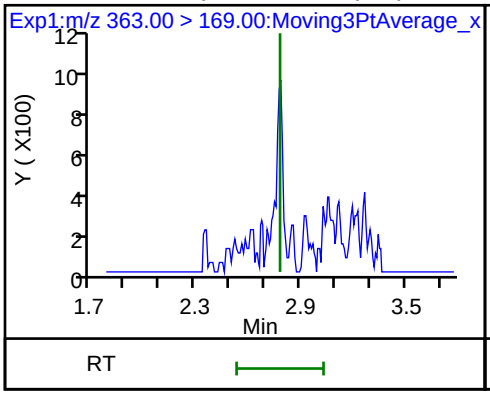
18 Perfluorohexanesulfonic acid



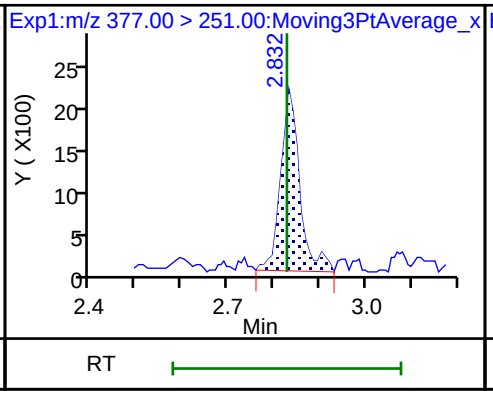
15 Perfluoroheptanoic acid (ND)



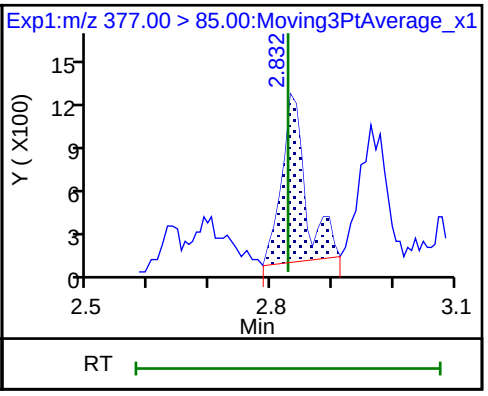
15 Perfluoroheptanoic acid (ND)



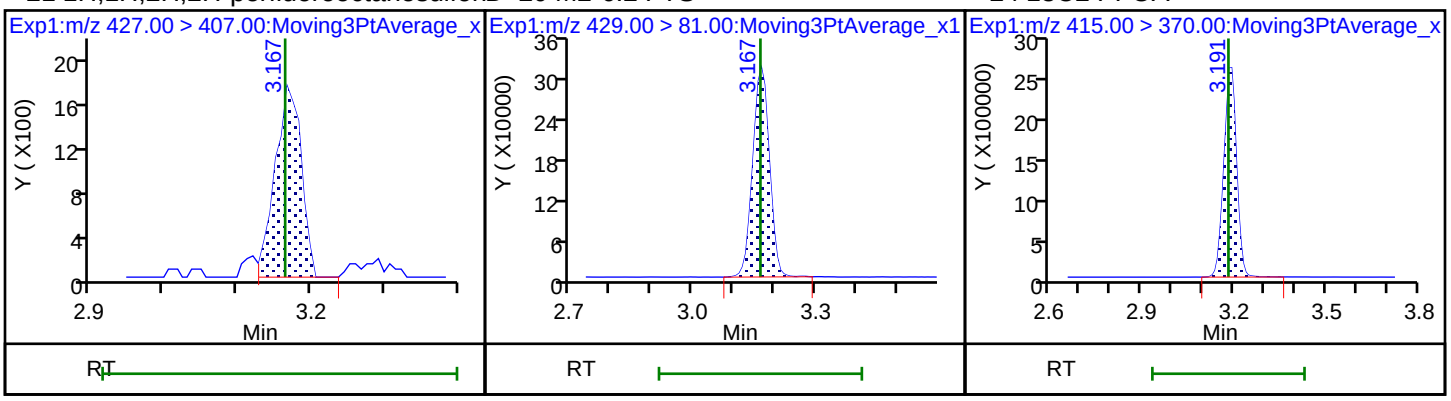
19 DONA



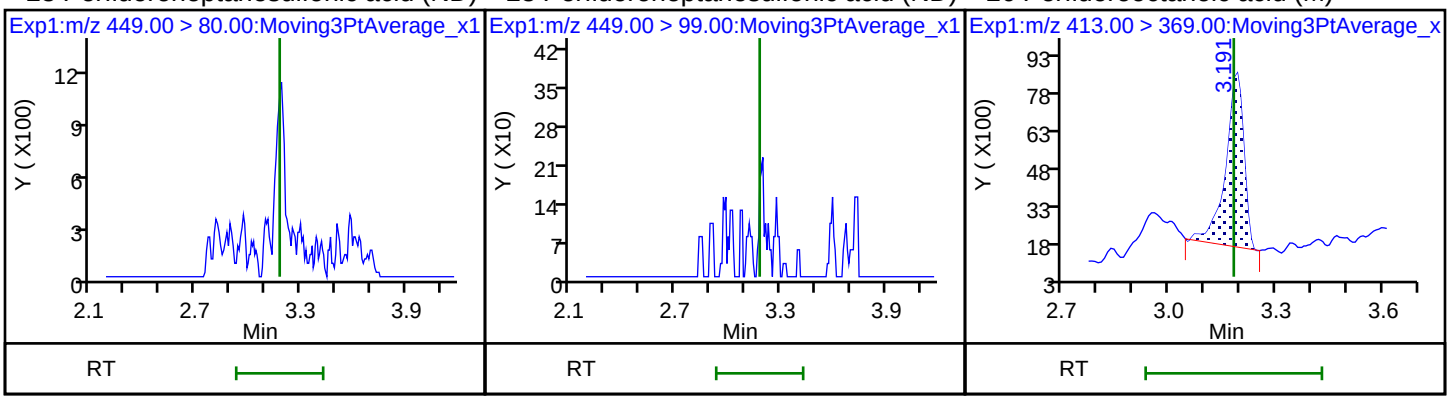
19 DONA



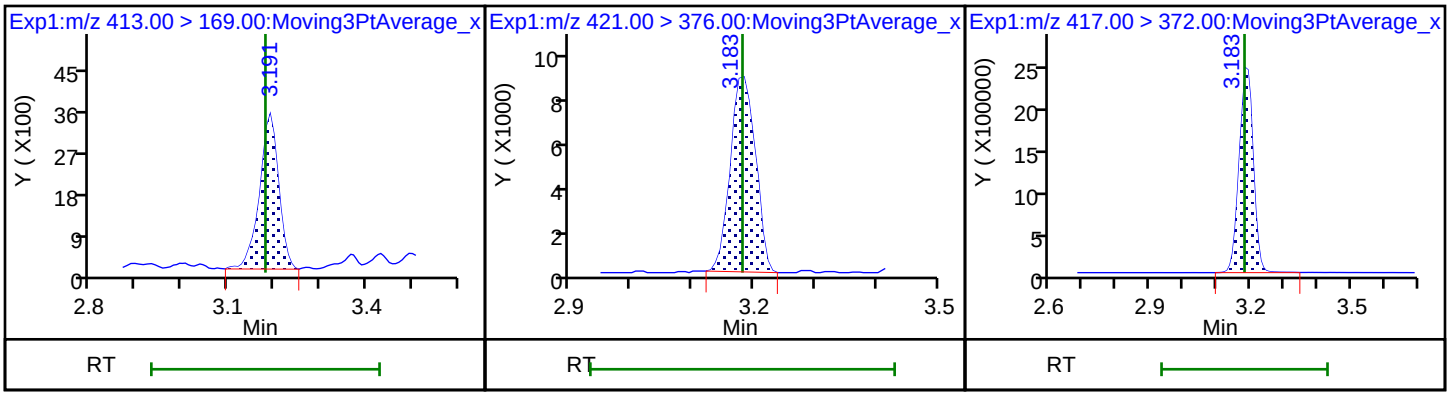
21 1H,1H,2H,2H-perfluorooctanesulfonD 20 M2-6:2 FTS * 24 13C2 PFOA



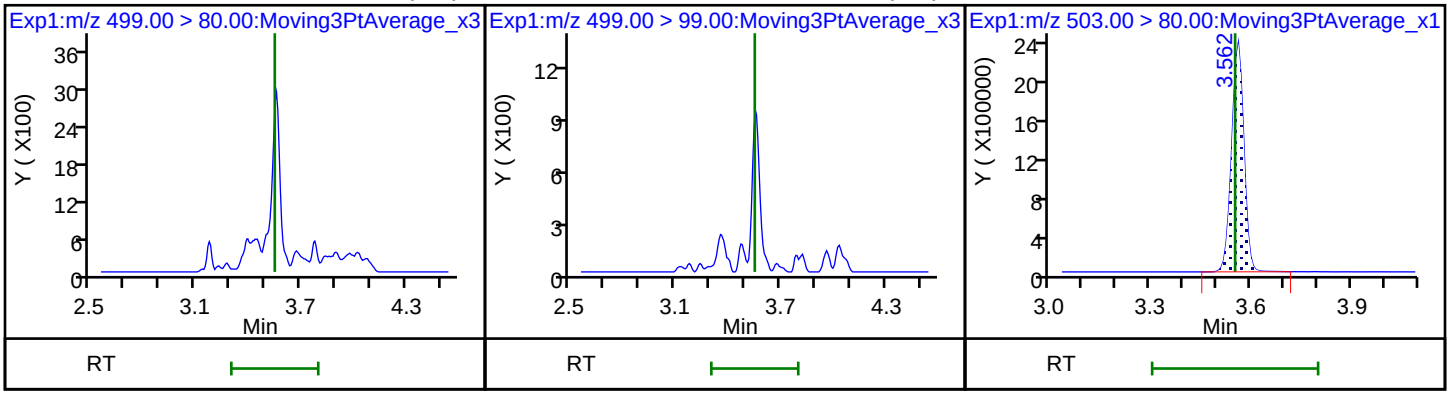
23 Perfluoroheptanesulfonic acid (ND) 23 Perfluoroheptanesulfonic acid (ND) 26 Perfluorooctanoic acid (M)



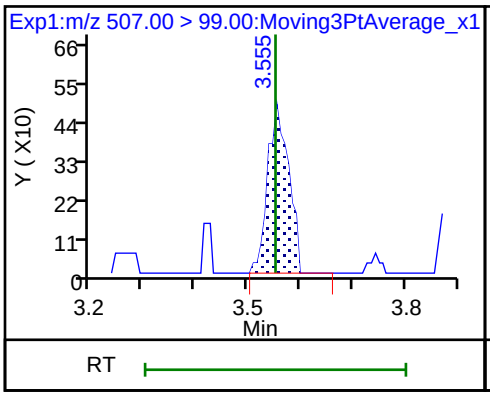
26 Perfluorooctanoic acid D 22 13C8 PFOA D 25 13C4 PFOA



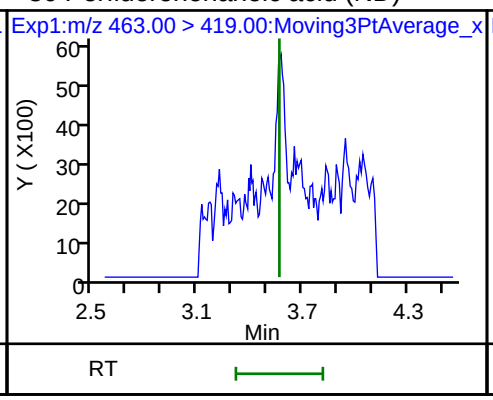
29 Perfluorooctanesulfonic acid (ND) 29 Perfluorooctanesulfonic acid (ND) D 28 13C4 PFOS



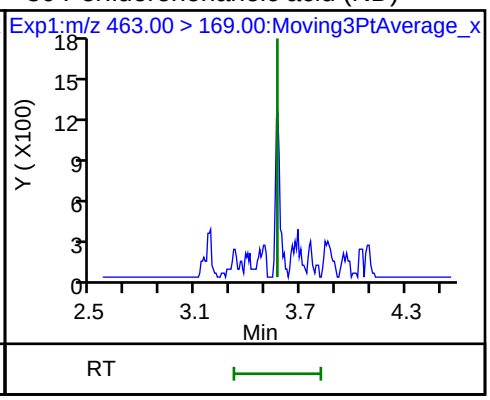
D 27 13C8 PFOS



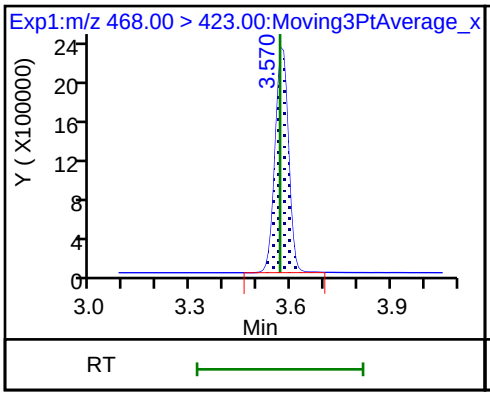
30 Perfluorononanoic acid (ND)



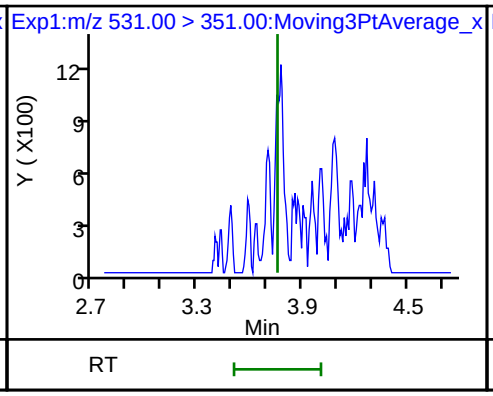
30 Perfluorononanoic acid (ND)



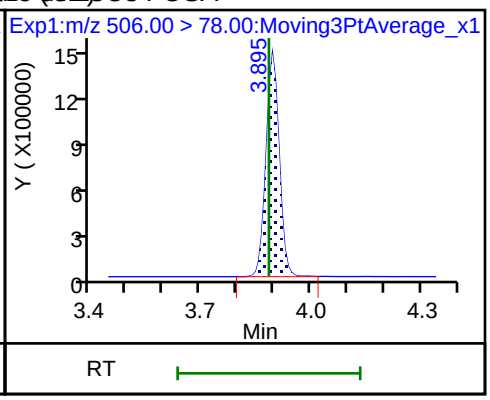
D 31 13C5 PFNA



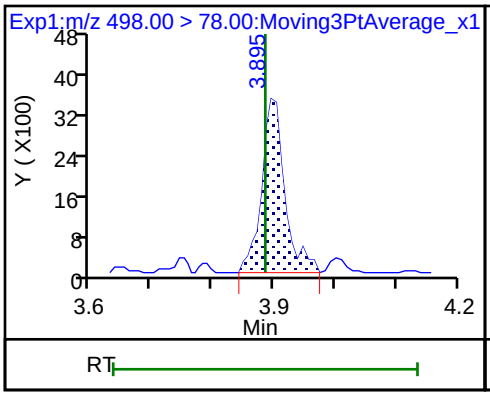
32 9-Chlorohexadecafluoro-3-oxanonane (ND)



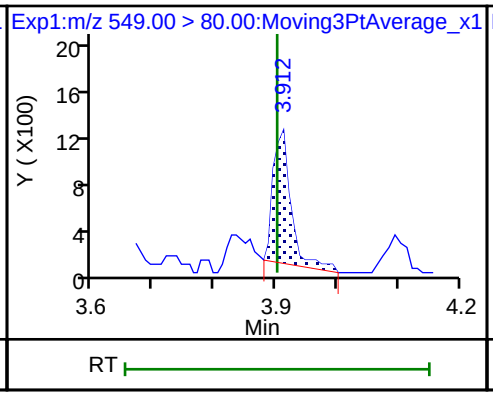
D 33 13C8 FOSA



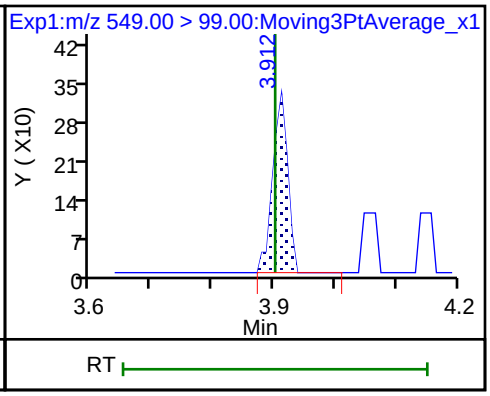
34 Perfluorooctanesulfonamide



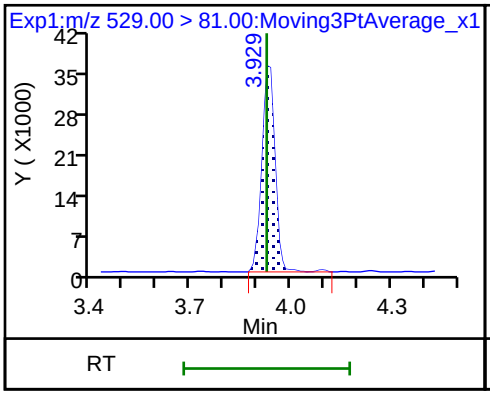
35 Perfluorononanesulfonic acid



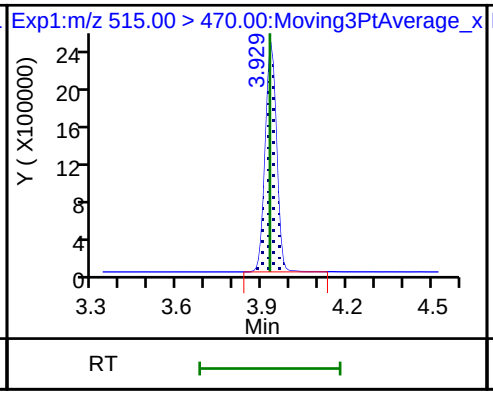
35 Perfluorononanesulfonic acid



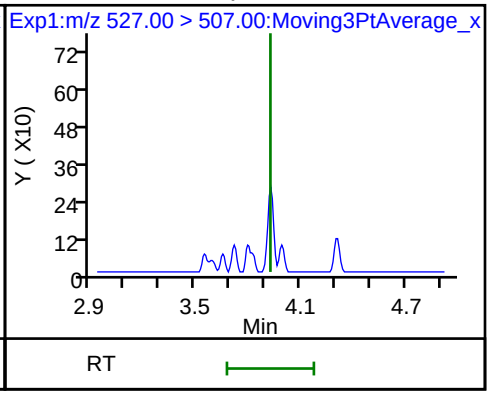
D 39 M2-8:2 FTS



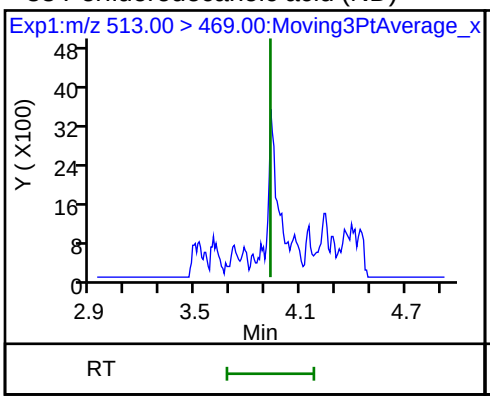
D 36 13C2 PFDA



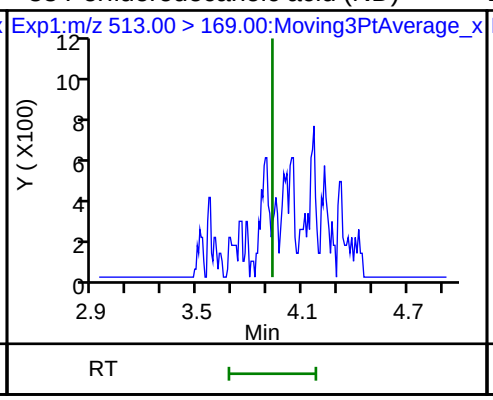
37 1H,1H,2H,2H-perfluorodecanesulfoni (ND)



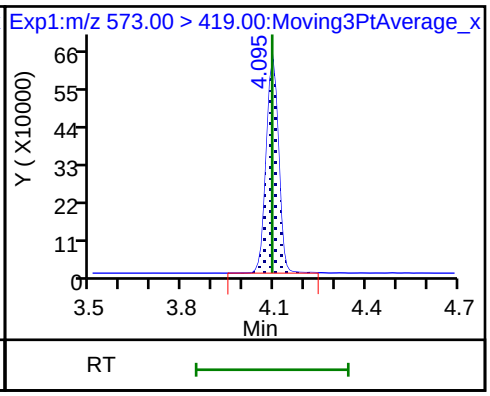
38 Perfluorodecanoic acid (ND)



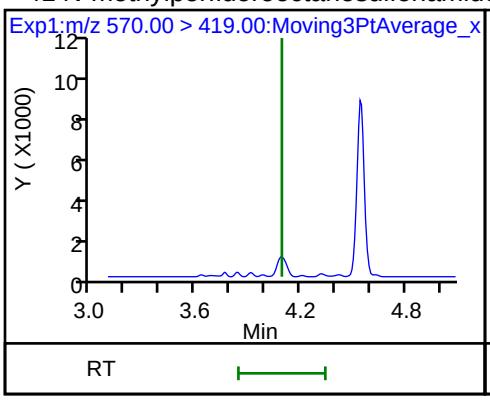
38 Perfluorodecanoic acid (ND)



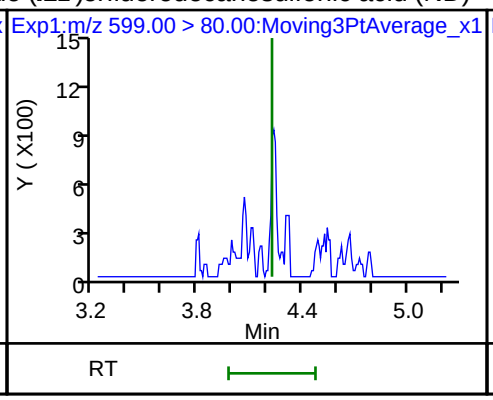
D 40 d3-NMeFOSAA



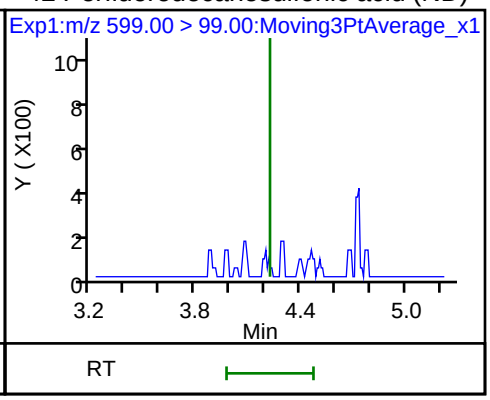
41 N-methylperfluorooctanesulfonamido (ND)



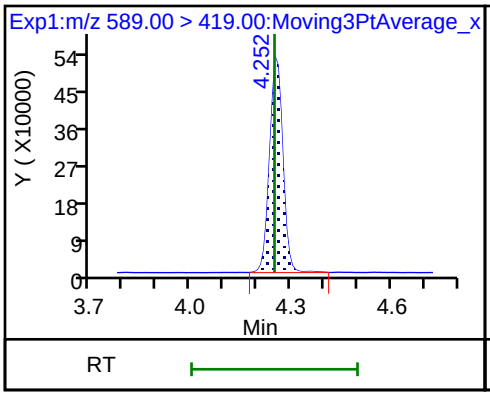
42D Perfluorodecanesulfonic acid (ND)



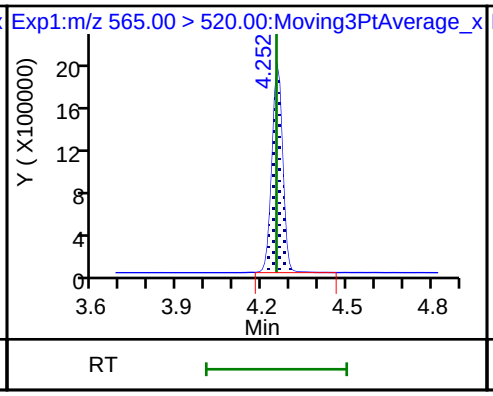
42 Perfluorodecanesulfonic acid (ND)



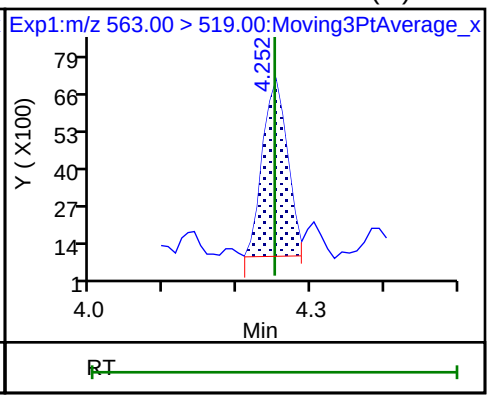
D 45 d5-NEtFOSAA



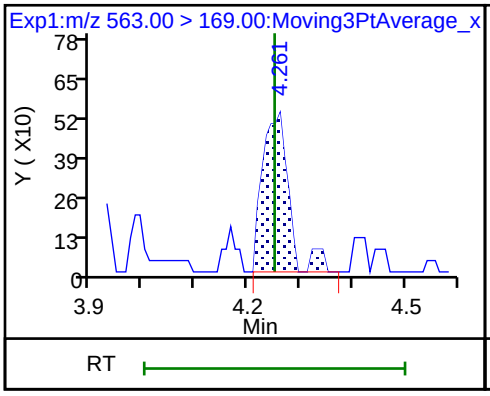
D 44 13C2 PFUnA



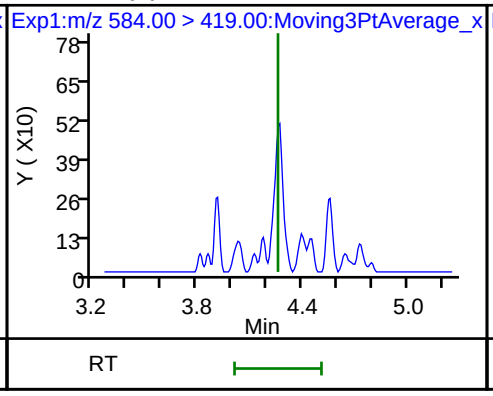
43 Perfluoroundecanoic acid (M)



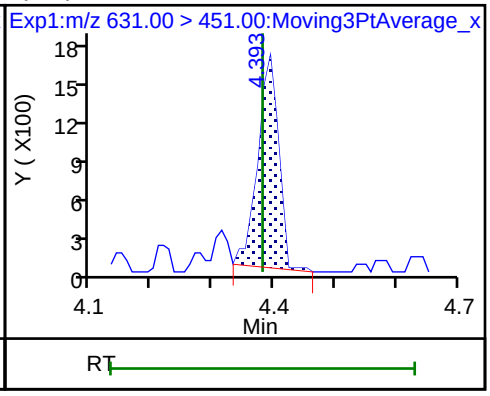
43 Perfluoroundecanoic acid



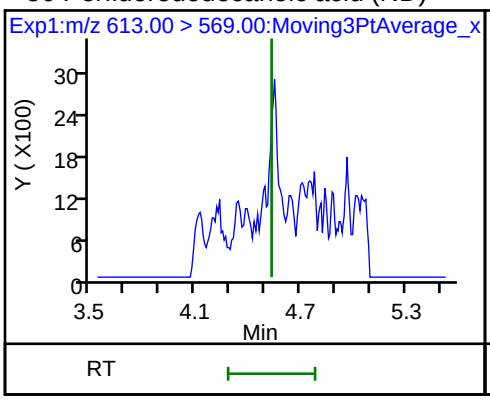
46 N-ethylperfluorooctanesulfonamidoa (ND)



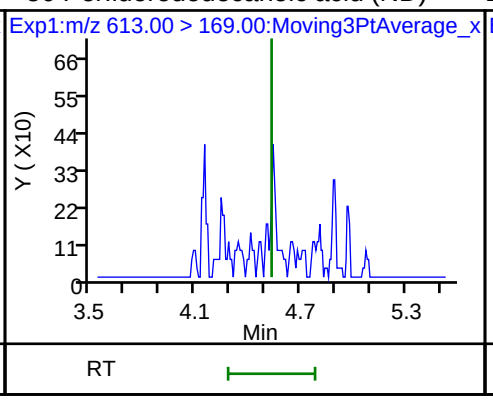
48 11-Chloroeicosafluoro-3-oxaundecan



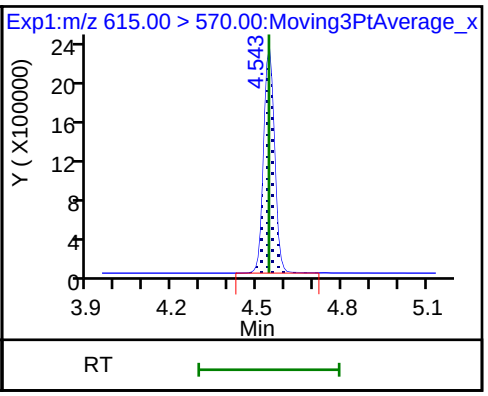
50 Perfluorododecanoic acid (ND)



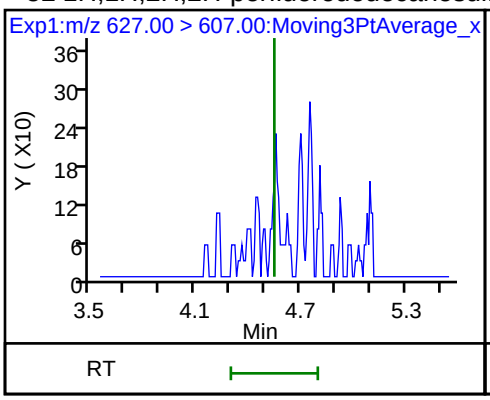
50 Perfluorododecanoic acid (ND)



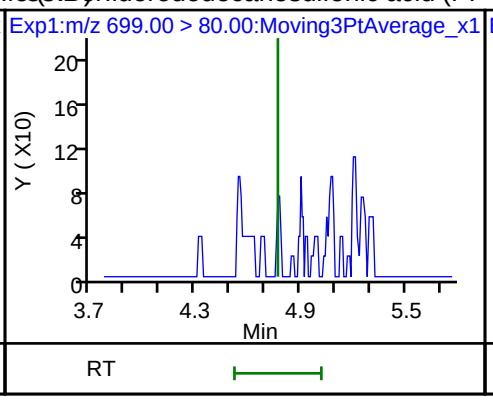
D 49 13C2 PFDoA



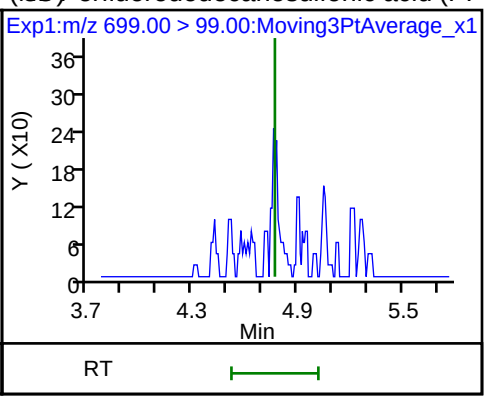
52 1H,1H,2H,2H-perfluorododecanesulfonic acid (ND)



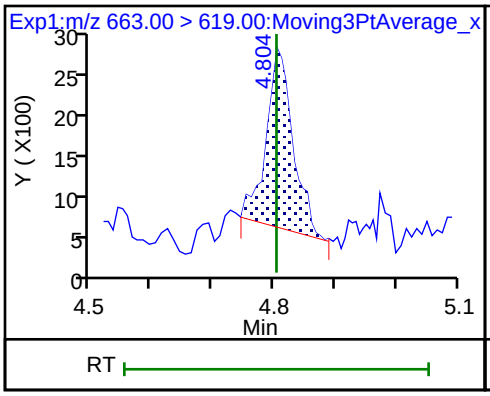
53 Perfluorododecanesulfonic acid (PF (ND)



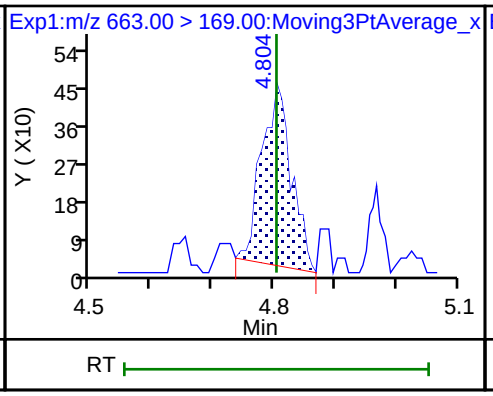
53 Perfluorododecanesulfonic acid (PF (ND)



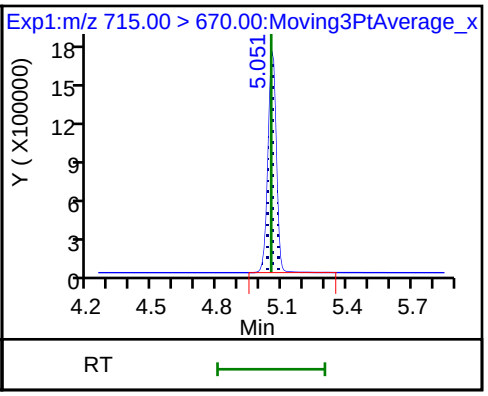
54 Perfluorotridecanoic acid



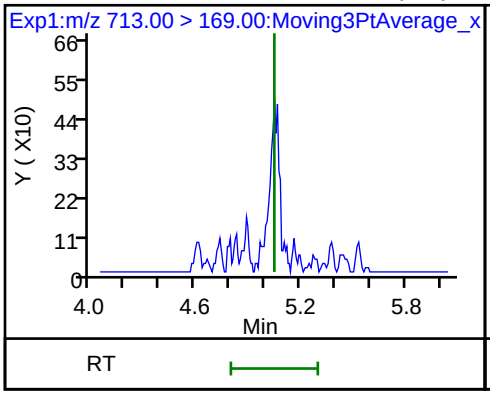
54 Perfluorotridecanoic acid



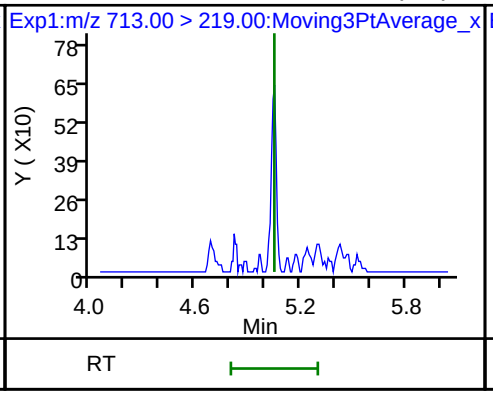
D 55 13C2 PFTeDA



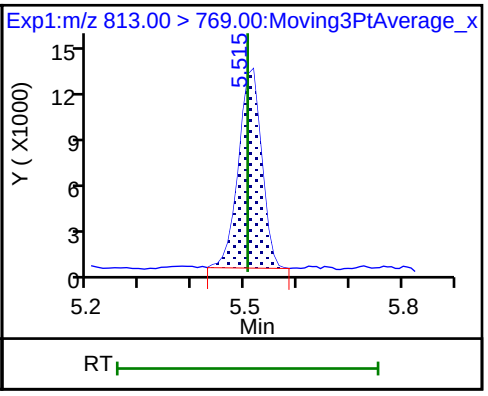
56 Perfluorotetradecanoic acid (ND)



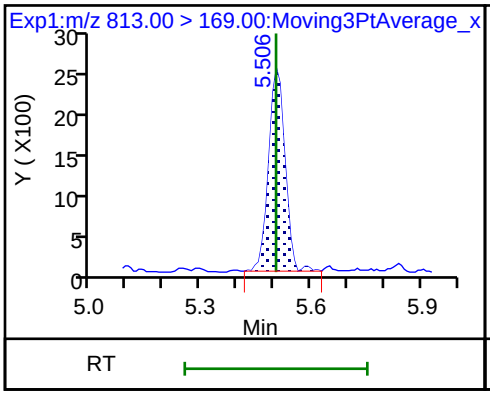
56 Perfluorotetradecanoic acid (ND)



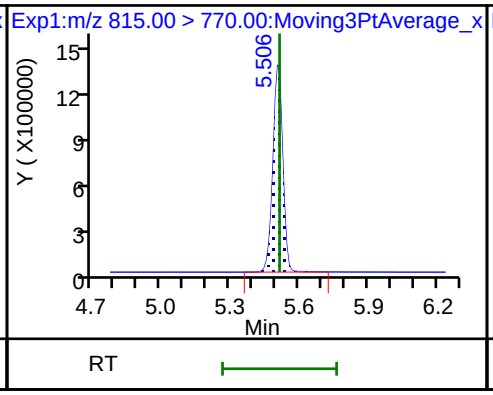
58 Perfluorohexadecanoic acid



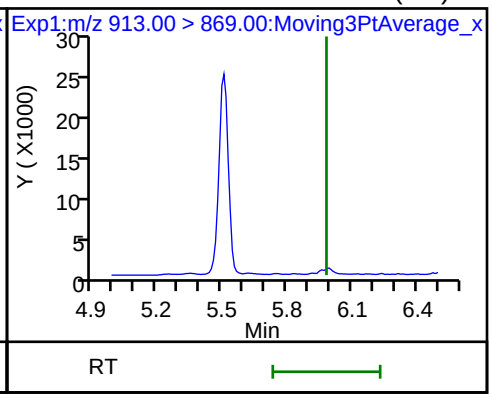
58 Perfluorohexadecanoic acid



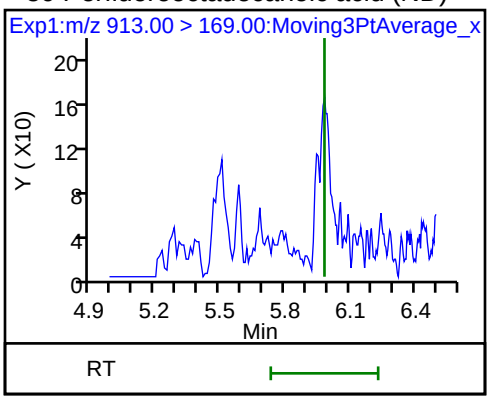
D 57 13C2 PFHxDA



59 Perfluorooctadecanoic acid (ND)



59 Perfluorooctadecanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

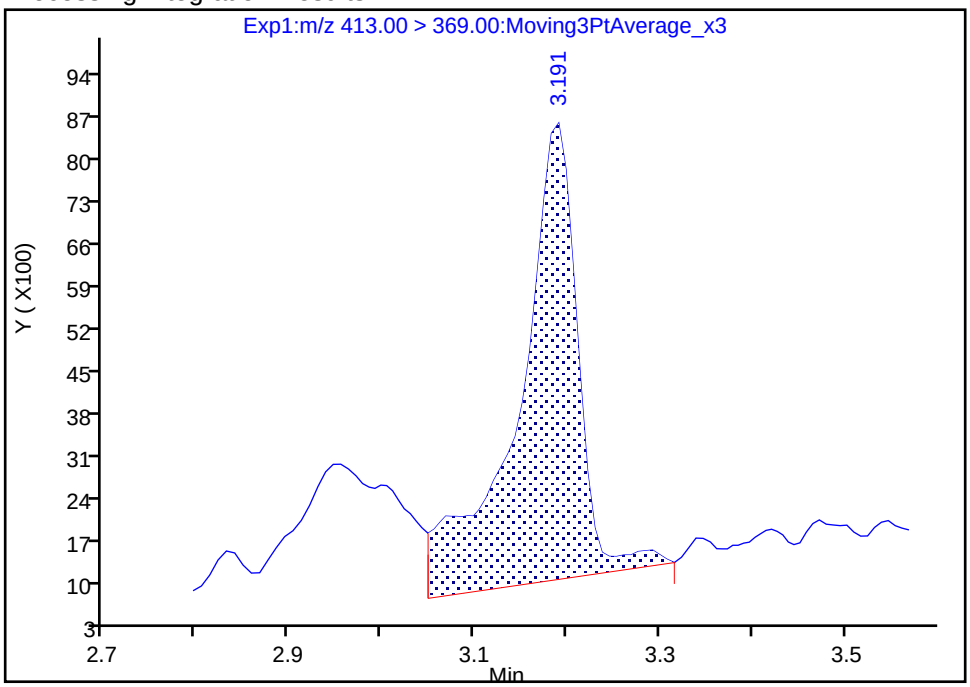
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70291.b\2019.01.08LLAAXX_041.d
Injection Date: 08-Jan-2019 23:56:31 Instrument ID: A9
Lims ID: MB 320-267857/1-B
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 28 Worklist Smp#: 12
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

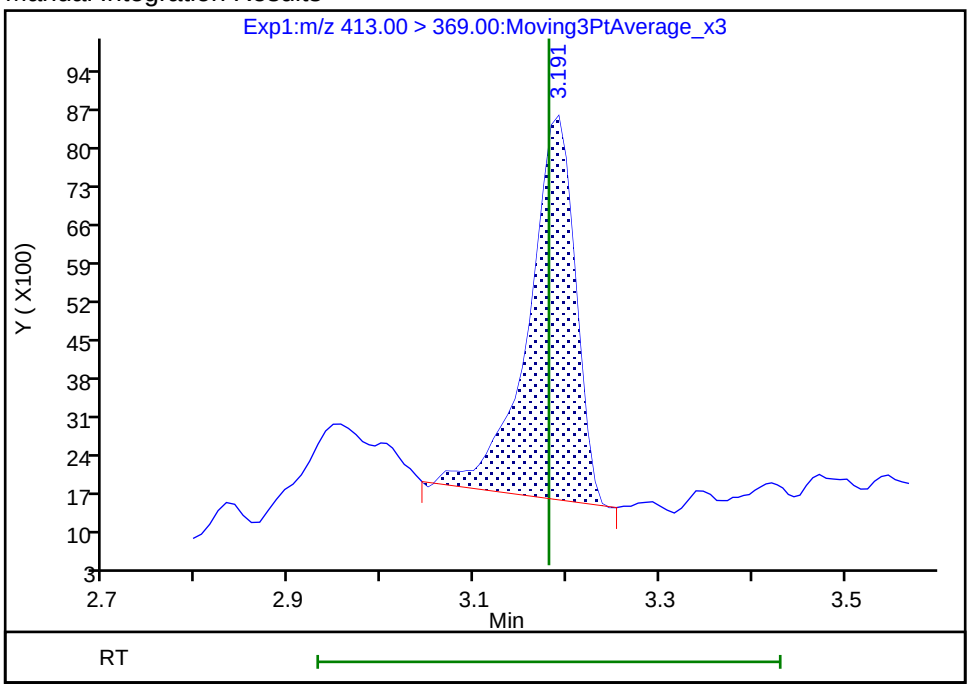
Processing Integration Results

RT: 3.19
Area: 33797
Amount: 0.011662
Amount Units: ng/ml



Manual Integration Results

RT: 3.19
Area: 24604
Amount: 0.008490
Amount Units: ng/ml



Reviewer: westendorfc, 09-Jan-2019 12:32:49
Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: Lab Sample ID: CCB 320-269668/1

Matrix: Air Lab File ID: 2019.01.08LLAAXX_004.d

Analysis Method: 537 (modified) Date Collected:

Extraction Method: Date Extracted:

Sample wt/vol: 1(mL) Date Analyzed: 01/08/2019 19:18

Con. Extract Vol.: Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 269668 Units: ng/mL

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	ND		0.0500	0.00500
375-85-9	Perfluoroheptanoic acid (PFHpA)	ND		0.0500	0.00630
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.007183	J	0.0500	0.00430
375-95-1	Perfluorononanoic acid (PFNA)	ND		0.0500	0.00680
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	ND		0.0500	0.0140
335-67-1	Perfluorooctanoic acid (PFOA)	ND		0.0500	0.0210

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	94		25-150
STL01892	13C4 PFHpA	99		25-150
STL00995	13C5 PFNA	99		25-150
STL00990	13C4 PFOA	101		25-150
STL00991	13C4 PFOS	99		25-150
STL00994	18O2 PFHxS	92		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_004.d
Lims ID: CCB
Client ID:
Sample Type: CCB
Inject. Date: 08-Jan-2019 19:18:52 ALS Bottle#: 20 Worklist Smp#: 1
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCB
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 10-Jan-2019 09:33:09 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0325

First Level Reviewer: ruangyotsakuld Date: 10-Jan-2019 09:33:08
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutanoic acid										
212.90 > 169.00	1.692	1.692	0.0	1.005	2514	0.000973			0.3	
D 1 13C4 PFBA										
217.00 > 172.00	1.684	1.679	0.005	0.527	6981022	2.43		97.3	12112	
D 3 13C5 PFPeA										
267.90 > 223.00	2.030	2.022	0.008	0.635	6042471	2.41		96.3	5123	
4 Perfluoropentanoic acid										
262.90 > 219.00	2.030	2.030	0.0	1.000	15836	0.006551			0.7	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.061	2.061	0.0	1.000	7467	0.001987	Target=2.70		9.7	
298.90 > 99.00	2.051	2.061	-0.010	0.995	3971		1.88(1.35-4.05)		5.1	
D 5 13C3 PFBS										
301.90 > 80.00	2.061	2.054	0.007	0.645	9057159	2.20		94.5	876315	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.355	2.346	0.009	0.737	564935	2.25		96.2	818	
D 9 13C2 PFHxA										
315.00 > 270.00	2.393	2.383	0.010	0.749	6952607	2.49		99.7	3642	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.508	2.508	0.0	0.785	719178	2.87		115	1790	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.791	2.791	0.0	1.000	8175	0.002306	Target=4.34		3.1	
363.00 > 169.00	2.800	2.791	0.009	1.003	3044		2.69(2.17-6.52)		7.3	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.800	2.800	0.0	1.003	19914	0.007183	Target=3.80		51.2	
399.00 > 99.00	2.791	2.800	-0.009	1.000	8900		2.24(1.90-5.70)		7.6	
D 16 13C4 PFHpA										
367.00 > 322.00	2.791	2.782	0.009	0.873	8518329	2.48		99.3	4121	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 17 18O2 PFHxS										
403.00 > 84.00	2.791	2.782	0.009	0.873	5299872	2.18		92.4	2644	
19 DONA										R
377.00 > 251.00	2.845	2.845	0.0	0.797	1143	0.000203	Target=2.26		3.8	R
377.00 > 85.00	2.836	2.845	-0.009	0.795	1342		0.85(1.13-3.39)		2.2	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.173	3.173	0.0	1.000	4026	0.005905			8.3	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.173	3.165	0.008	0.993	766837	2.27		95.5	1278	
* 24 13C2 PFOA										
415.00 > 370.00	3.197	3.197	0.0		7516388	2.50			3450	
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.197	3.197	0.0	1.002	19878	0.006353	Target=2.72		3.5	M
413.00 > 169.00	3.197	3.197	0.0	1.002	7656		2.60(1.36-4.08)		12.9	M
D 25 13C4 PFOA										
417.00 > 372.00	3.189	3.180	0.009	0.998	7545837	2.54		101	2899	
D 22 13C8 PFOA										
421.00 > 376.00	3.189	3.180	0.009		6536858	2.77		113	2789	
29 Perfluorooctanesulfonic acid										M
499.00 > 80.00	3.568	3.568	0.0	1.000	12987	0.005048	Target=4.08		30.4	
499.00 > 99.00	3.576	3.568	0.008	1.002	1254		10.36(2.04-6.12)		6.7	M
D 27 13C8 PFOS										
507.00 > 99.00	3.561	3.552	0.009		1284753	2.57		107	3658	
D 28 13C4 PFOS										
503.00 > 80.00	3.568	3.552	0.016	1.116	5834313	2.36		98.6	3321	
30 Perfluorononanoic acid										
463.00 > 419.00	3.590	3.590	0.0	1.002	2520	0.000956	Target=5.35		0.4	
463.00 > 169.00	3.628	3.590	0.038	1.012	413		6.10(2.68-8.03)		2.9	
D 31 13C5 PFNA										
468.00 > 423.00	3.583	3.567	0.016	1.121	6623233	2.47		98.8	3474	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.781	3.781	0.0	1.060	2215	0.000950			2.9	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.893	3.893	0.0	1.000	3896	0.000794			8.1	
D 33 13C8 FOSA										
506.00 > 78.00	3.893	3.885	0.008	1.218	4218185	2.59		104	2970	
38 Perfluorodecanoic acid										R
513.00 > 469.00	3.945	3.945	0.0	1.000	7527	0.002419	Target=14.23		3.6	R
513.00 > 169.00	3.936	3.945	-0.009	0.998	1268		5.94(7.12-21.35)		1.7	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.945	3.927	0.018	1.234	90235	2.32		97.0	347	
D 36 13C2 PFDA										
515.00 > 470.00	3.945	3.927	0.018	1.234	6772629	2.58		103	3045	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.103	4.093	0.010	1.283	1759576	2.56		102	2431	
47 MeFOSA										
512.00 > 169.00	3.945	3.945	0.0		214	NC			1.0	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
43 Perfluoroundecanoic acid										
563.00 > 519.00	4.268	4.268	0.0	1.000	14125	0.008126	Target=10.48		4.1	
563.00 > 169.00	4.285	4.268	0.017	1.004	1898		7.44(5.24-15.72)		8.4	
D 44 13C2 PFUnA										
565.00 > 520.00	4.268	4.250	0.018	1.335	5211856	2.53		101	2563	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.268	4.250	0.018	1.335	1439882	2.51		101	1950	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.391	4.391	0.0	1.231	729	0.000265			2.8	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.542	4.542	0.0	0.997	4179	0.001758	Target=9.37		1.3	
613.00 > 169.00	4.573	4.542	0.031	1.003	593		7.05(4.68-14.05)		1.9	
D 49 13C2 PFDoA										
615.00 > 570.00	4.557	4.541	0.016	1.426	6189063	2.48		99.1	4449	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.700	4.700	0.0	1.191	412	0.001235			2.1	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.825	4.825	0.0	1.059	4051	0.002156	Target=6.18		2.4	
663.00 > 169.00	4.810	4.825	-0.015	1.056	535		7.57(3.09-9.27)		3.2	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.075	5.075	0.0	1.000	1577	0.005656	Target=1.39		12.1	
713.00 > 219.00	5.066	5.075	-0.009	0.998	1257		1.25(0.70-2.09)		11.5	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.075	5.049	0.026	1.588	4268960	2.46		98.6	6485	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.534	5.534	0.0	1.000	40720	0.003228	Target=5.55		3.4	
813.00 > 169.00	5.534	5.534	0.0	1.000	6910		5.89(2.77-8.32)		45.8	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.534	5.514	0.020	1.731	4094679	2.53		101	3189	

QC Flag Legend

Processing Flags

NC - Not Calibrated

R - Failed Signal Ratio Test

Review Flags

M - Manually Integrated

Reagents:

LCPFC_LL0_00011 Amount Added: 1.00 Units: mL

Report Date: 10-Jan-2019 09:33:14 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_004.d

Injection Date: 08-Jan-2019 19:18:52 Instrument ID: A9

Lims ID: CCB

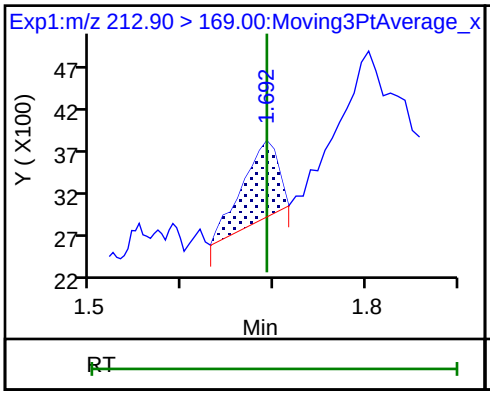
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 20 Worklist Smp#: 1

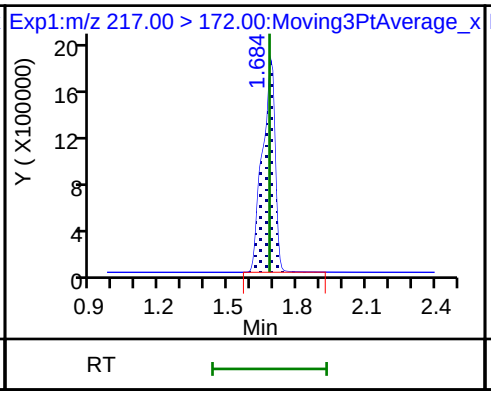
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

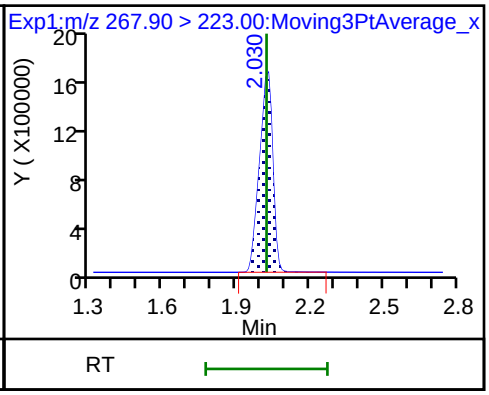
2 Perfluorobutanoic acid



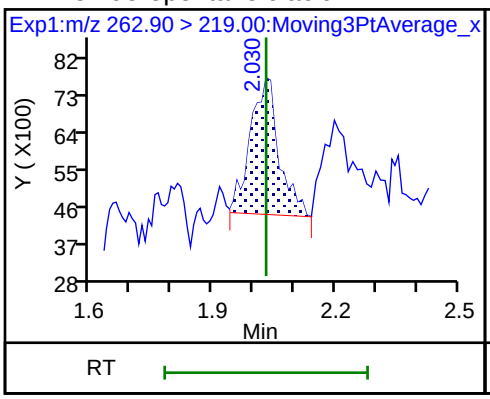
D 1 13C4 PFBA



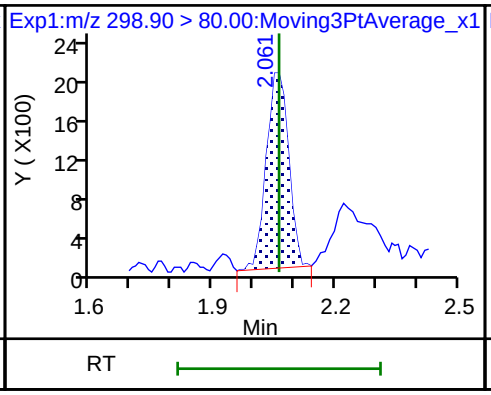
D 3 13C5 PFPeA



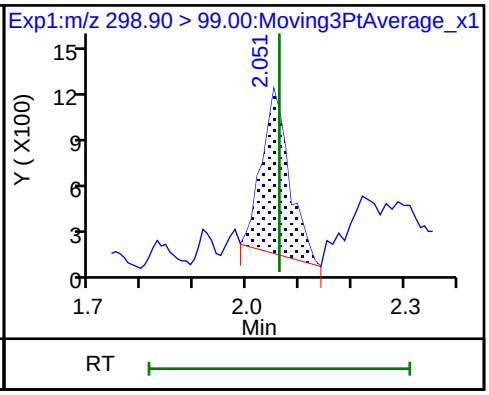
4 Perfluoropentanoic acid



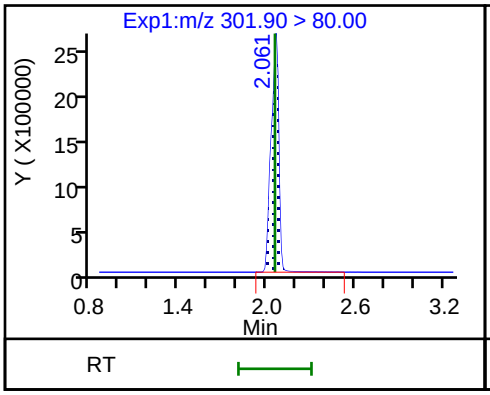
6 Perfluorobutanesulfonic acid



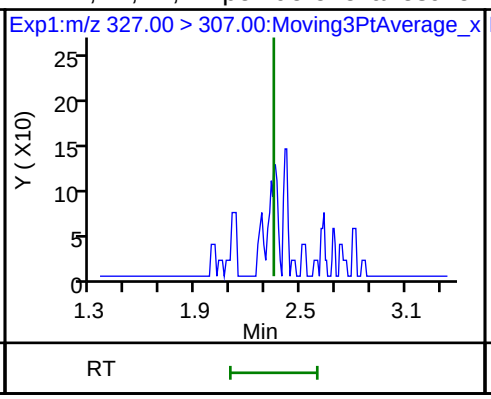
6 Perfluorobutanesulfonic acid



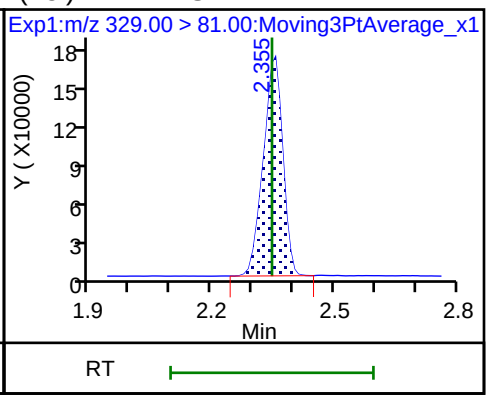
D 5 13C3 PFBS



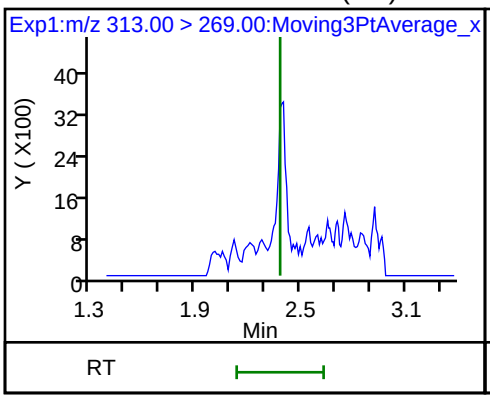
7 1H,1H,2H,2H-perfluorohexanesulfonic acid (ND)



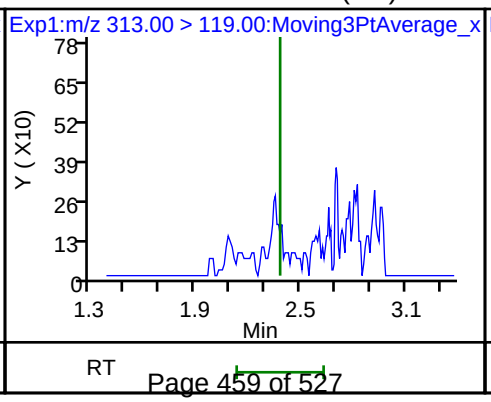
D 8 M2-4:2 FTS



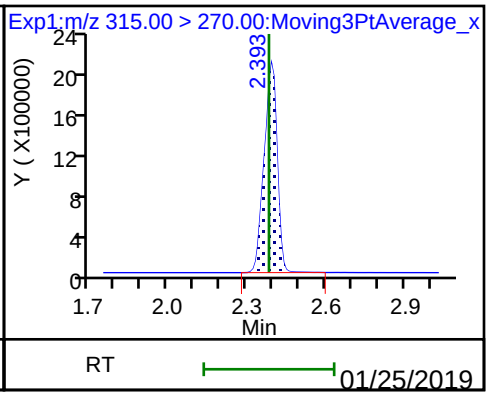
10 Perfluorohexanoic acid (ND)



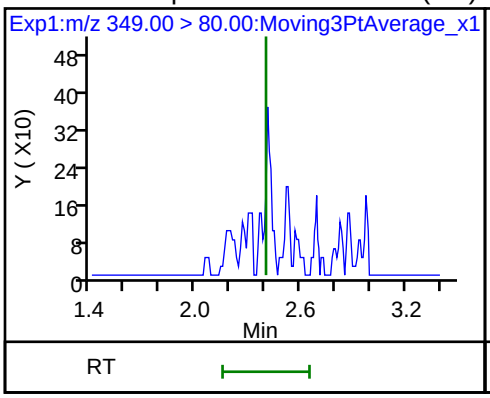
10 Perfluorohexanoic acid (ND)



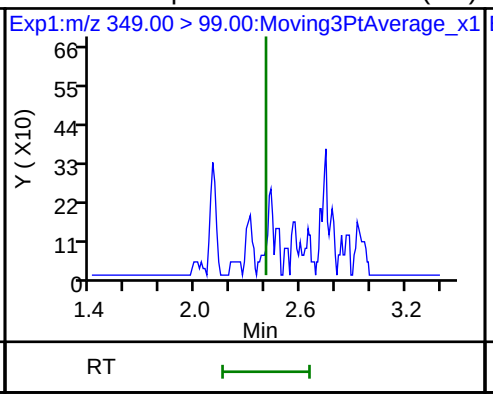
D 9 13C2 PFHxA



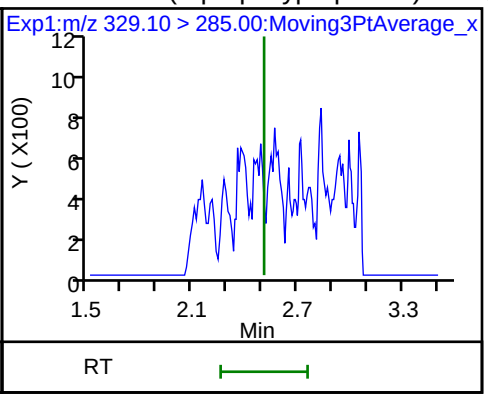
11 Perfluoropentanesulfonic acid (ND)



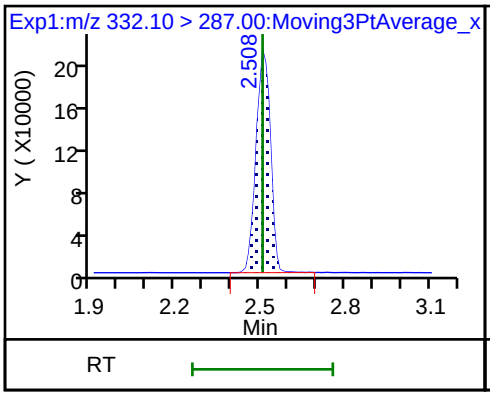
11 Perfluoropentanesulfonic acid (ND)



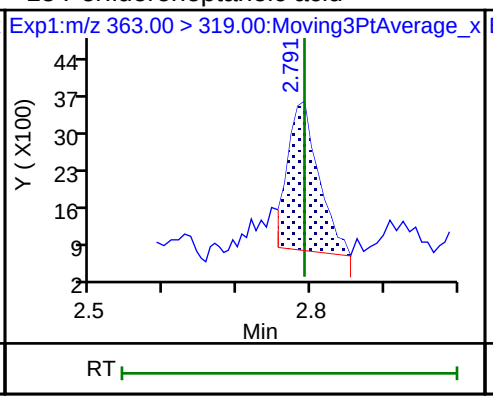
14 Perfluoro(2-propoxypropanoic) acid (ND)



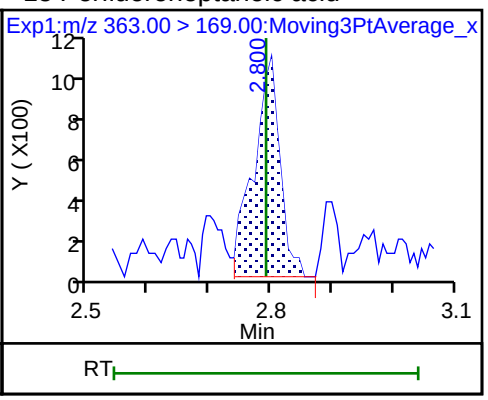
D 13 13C3 HFPO-DA



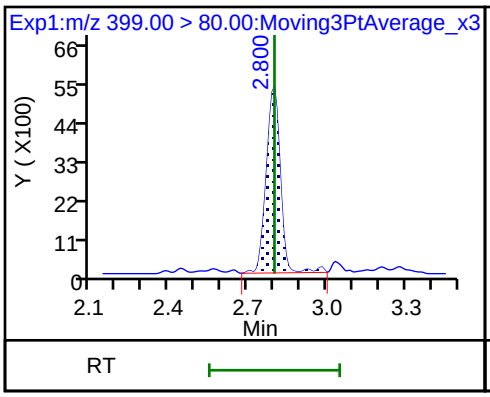
15 Perfluoroheptanoic acid



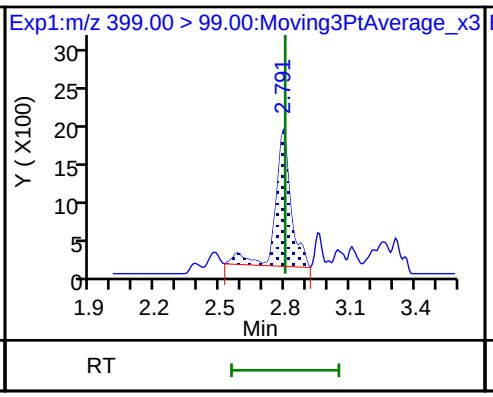
15 Perfluoroheptanoic acid



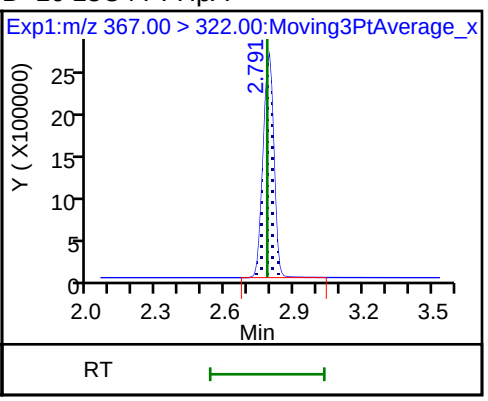
18 Perfluorohexanesulfonic acid



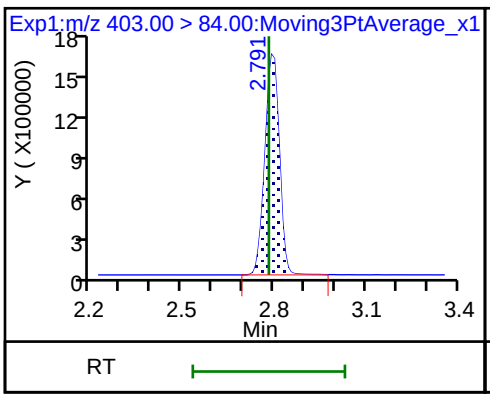
18 Perfluorohexanesulfonic acid



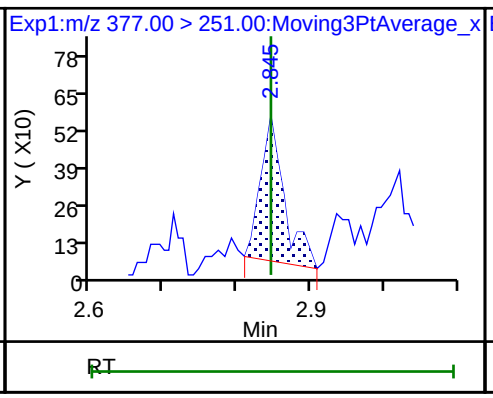
D 16 13C4 PFHpA



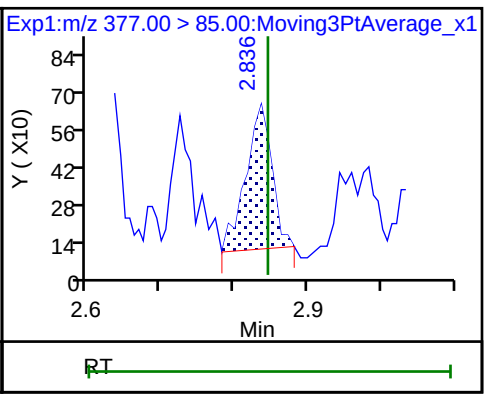
D 17 18O2 PFHxS



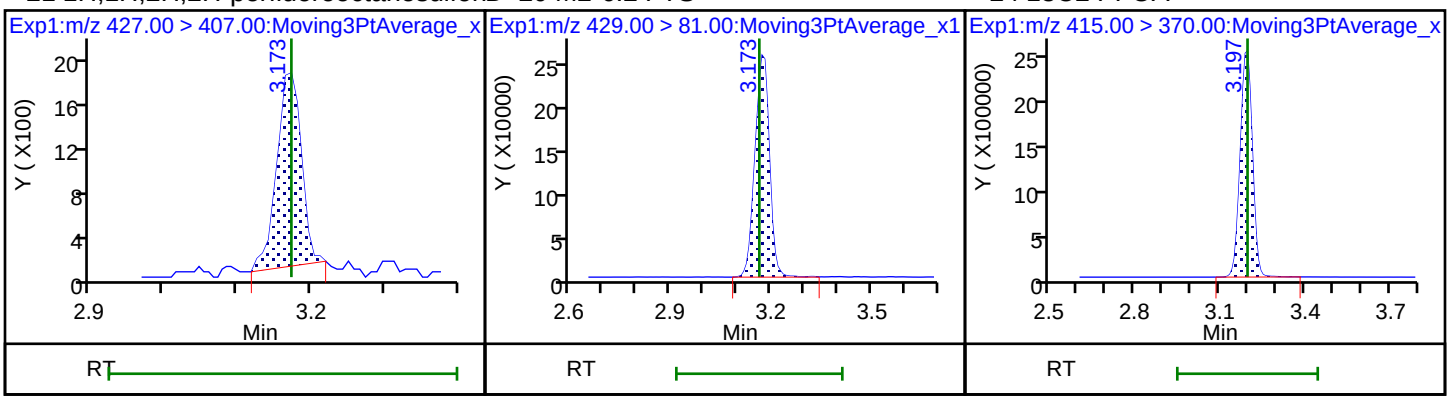
19 DONA



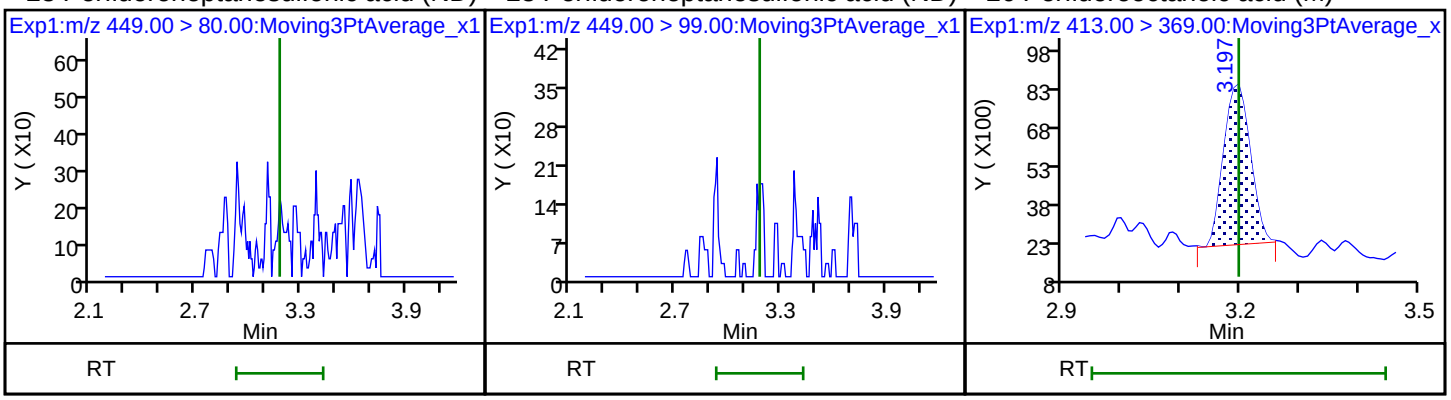
19 DONA



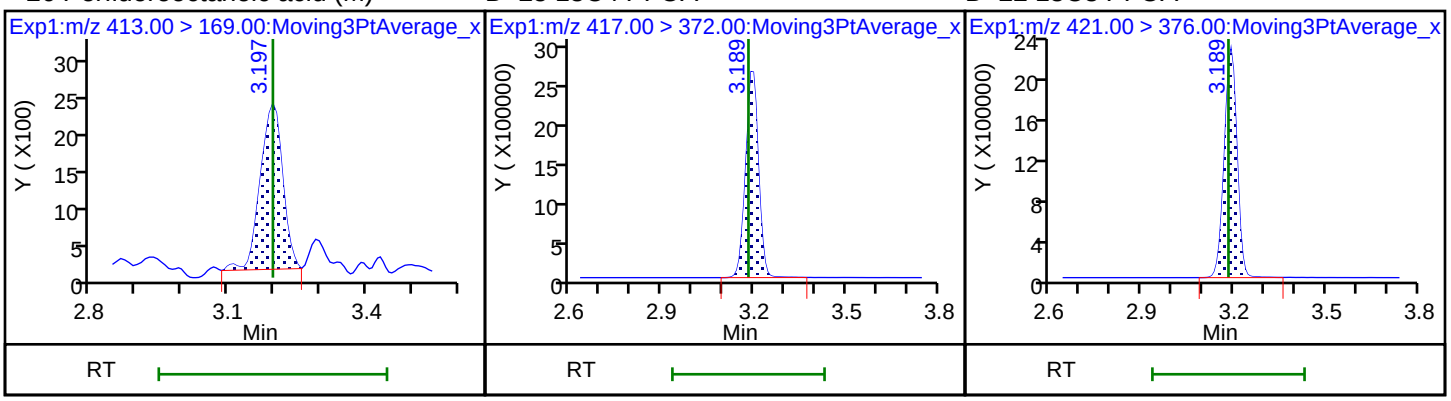
21 1H,1H,2H,2H-perfluorooctanesulfonD 20 M2-6:2 FTS * 24 13C2 PFOA



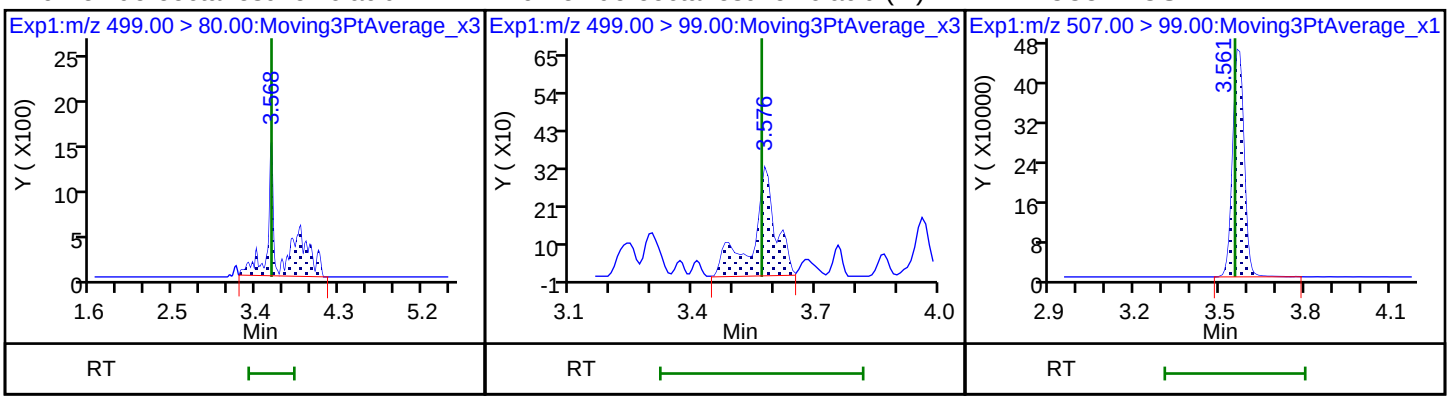
23 Perfluoroheptanesulfonic acid (ND) 23 Perfluoroheptanesulfonic acid (ND) 26 Perfluorooctanoic acid (M)



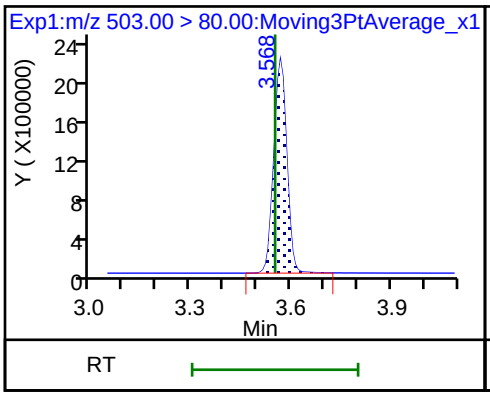
26 Perfluorooctanoic acid (M) D 25 13C4 PFOA D 22 13C8 PFOA



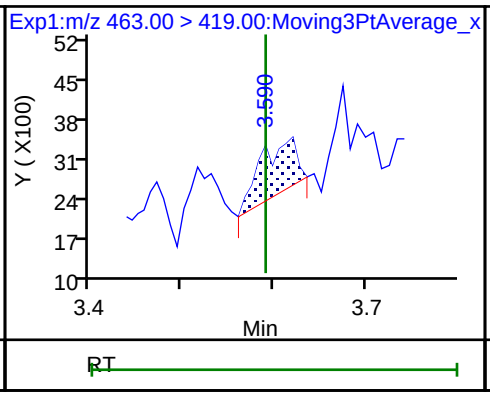
29 Perfluorooctanesulfonic acid 29 Perfluorooctanesulfonic acid (M) D 27 13C8 PFOS



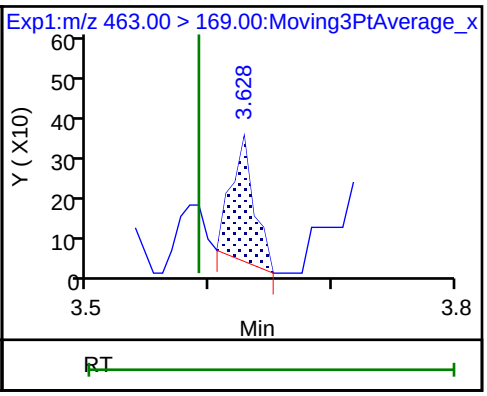
D 28 13C4 PFOS



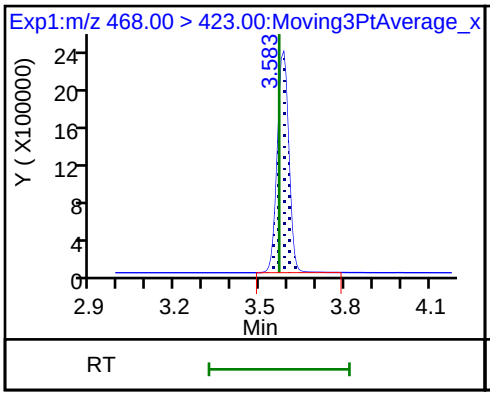
30 Perfluorononanoic acid



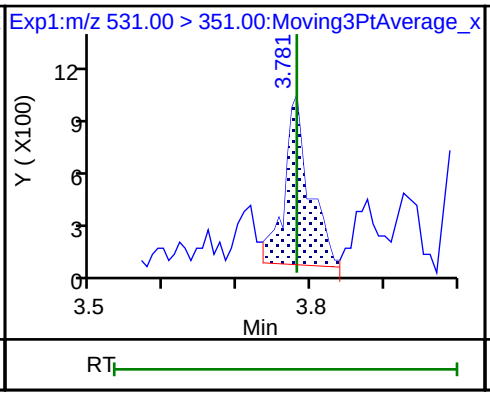
30 Perfluorononanoic acid



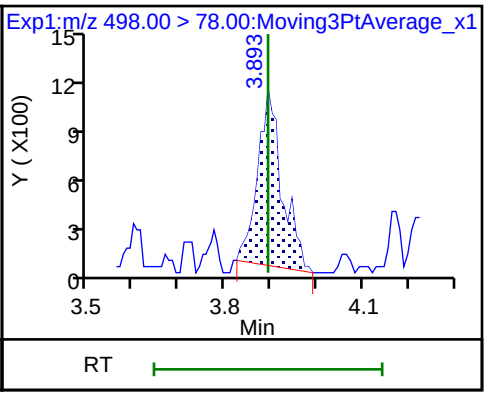
D 31 13C5 PFNA



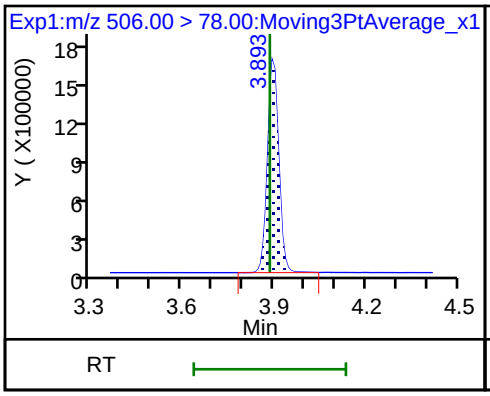
32 9-Chlorohexadecafluoro-3-oxanonane



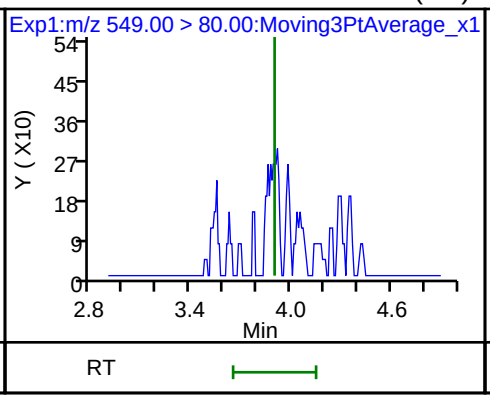
34 Perfluorooctanesulfonamide



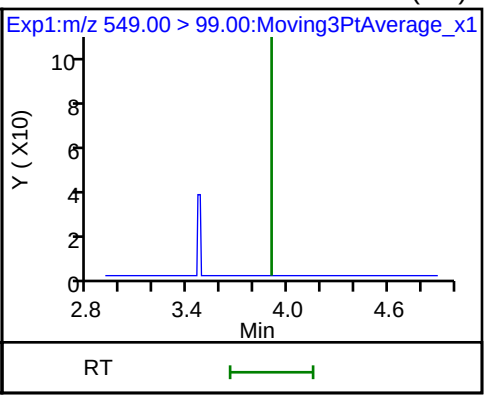
D 33 13C8 FOSA



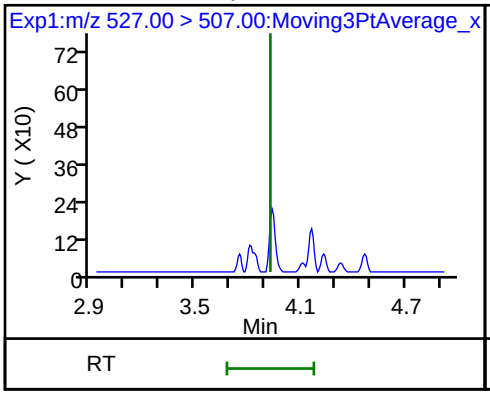
35 Perfluorononanesulfonic acid (ND)



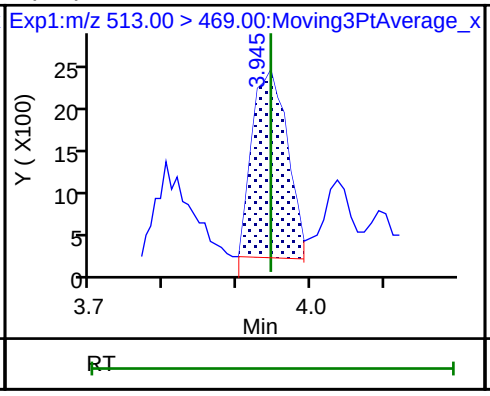
35 Perfluorononanesulfonic acid (ND)



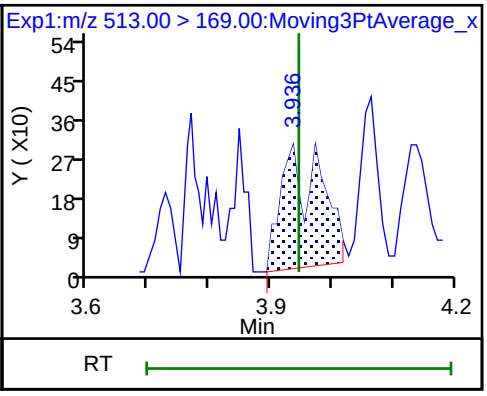
37 1H,1H,2H,2H-perfluorodecanesulfoni acid (ND)



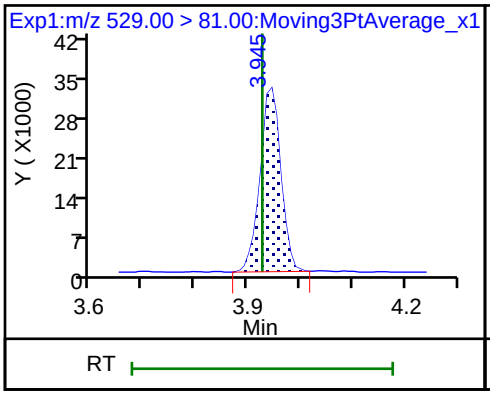
38 Perfluorodecanoic acid



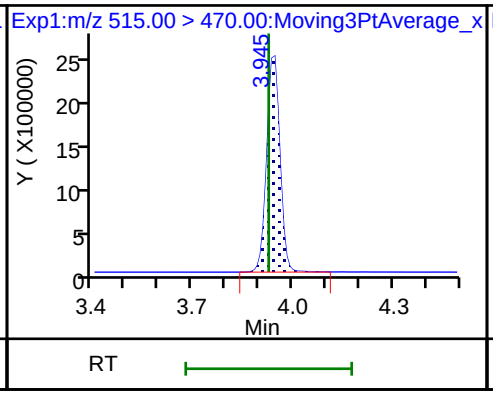
38 Perfluorodecanoic acid



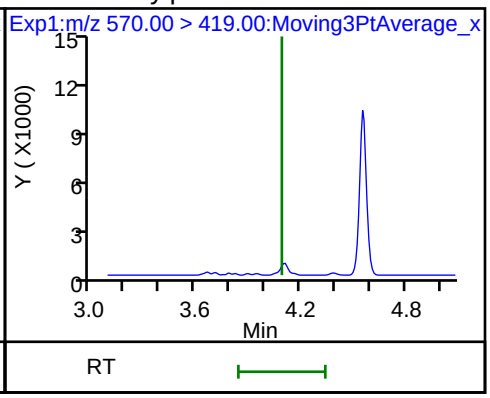
D 39 M2-8:2 FTS



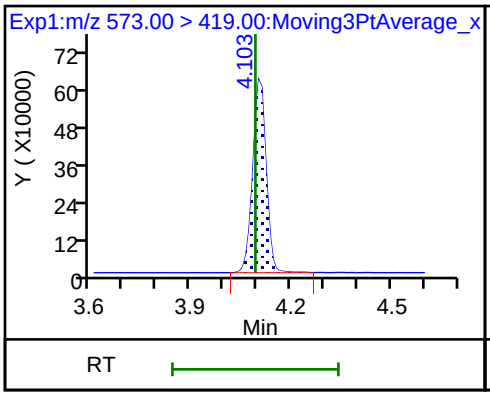
D 36 13C2 PFDA



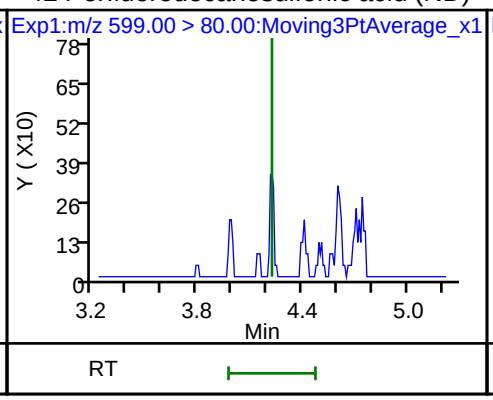
41 N-methylperfluorooctanesulfonamido (ND)



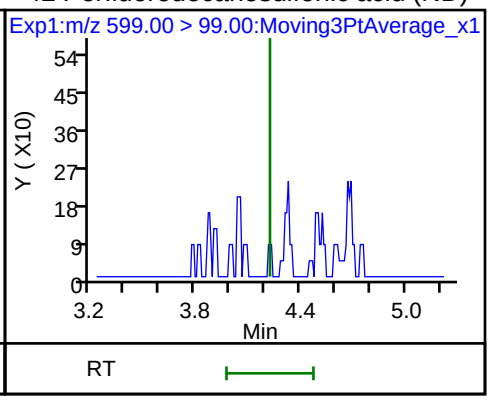
D 40 d3-NMeFOSAA



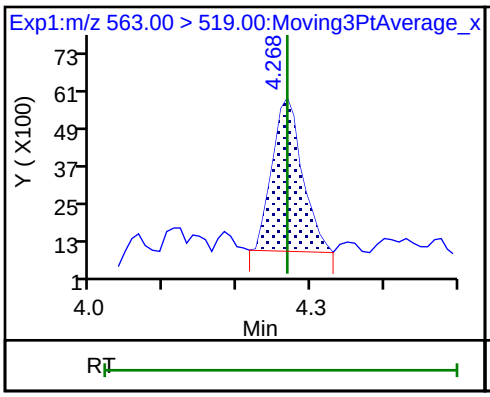
42 Perfluorodecanesulfonic acid (ND)



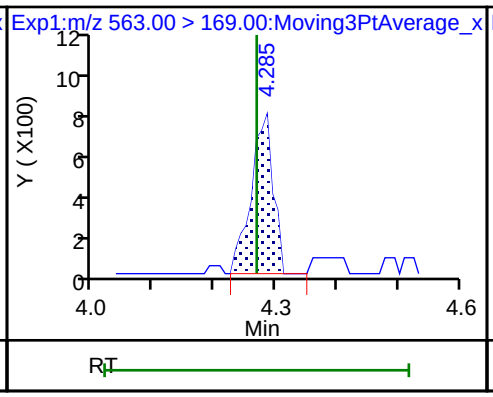
42 Perfluorodecanesulfonic acid (ND)



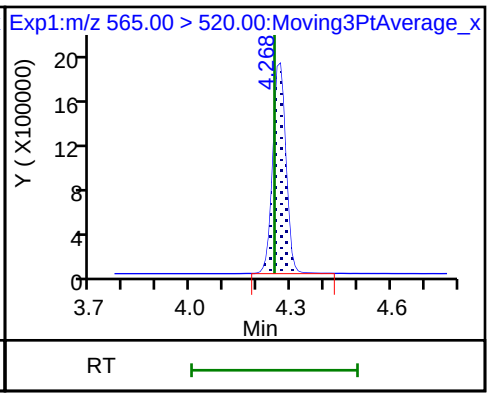
43 Perfluoroundecanoic acid



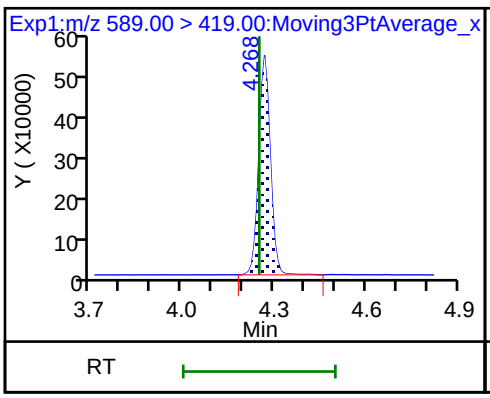
43 Perfluoroundecanoic acid



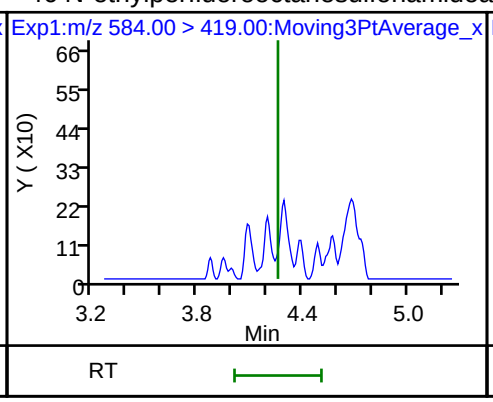
D 44 13C2 PFUnA



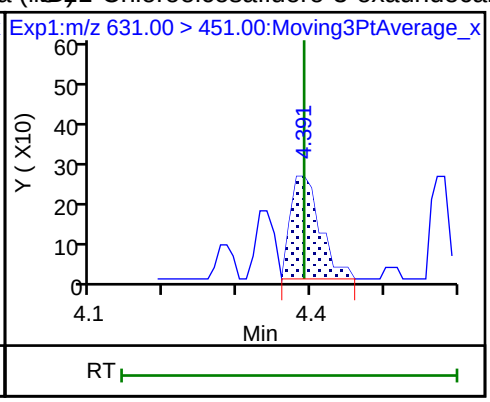
D 45 d5-NEtFOSAA



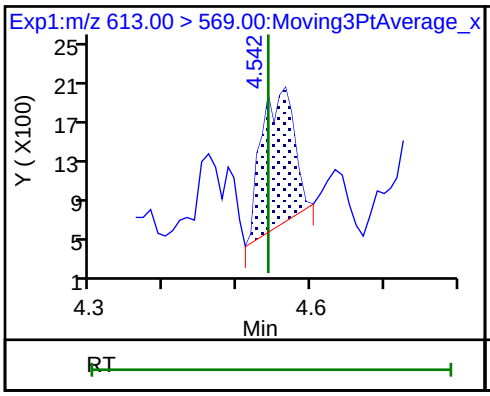
46 N-ethylperfluorooctanesulfonamidoa (ND)



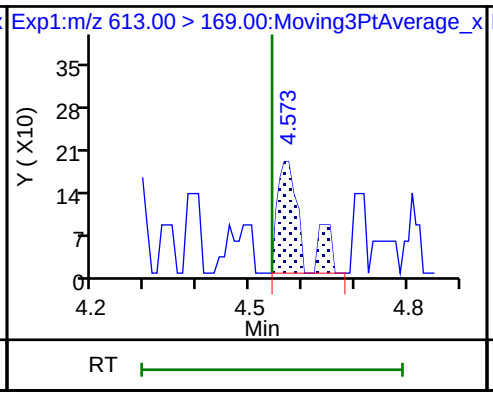
48 11-Chloroeicosafluoro-3-oxaundecan



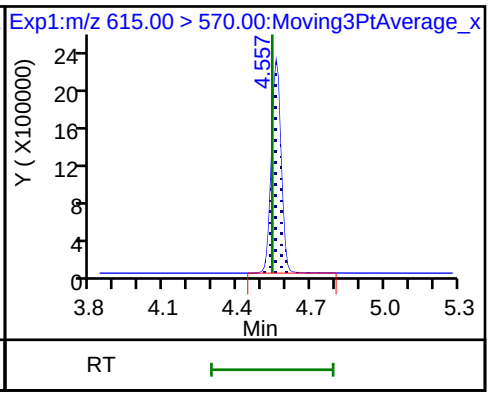
50 Perfluorododecanoic acid



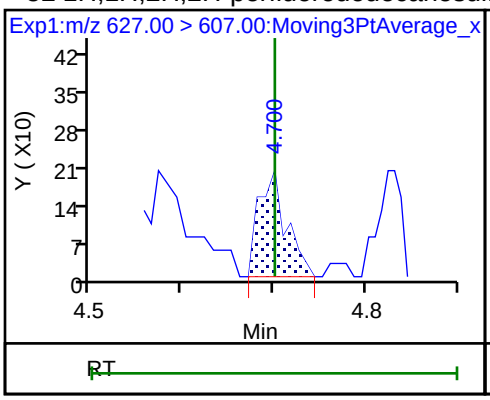
50 Perfluorododecanoic acid



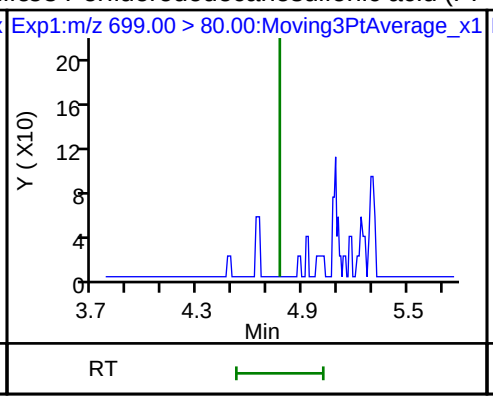
D 49 13C2 PFDoA



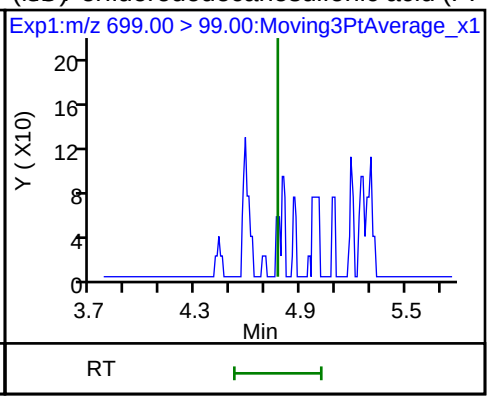
52 1H,1H,2H,2H-perfluorododecanesulfo



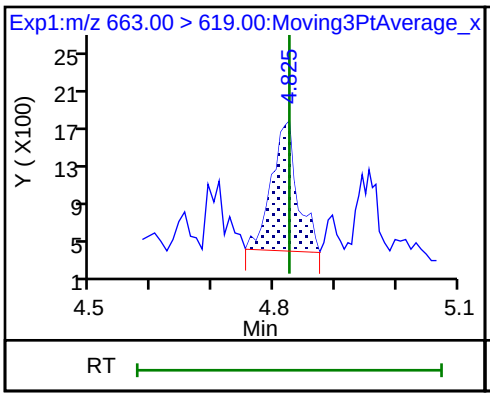
53 Perfluorododecanesulfonic acid (PF (NB)



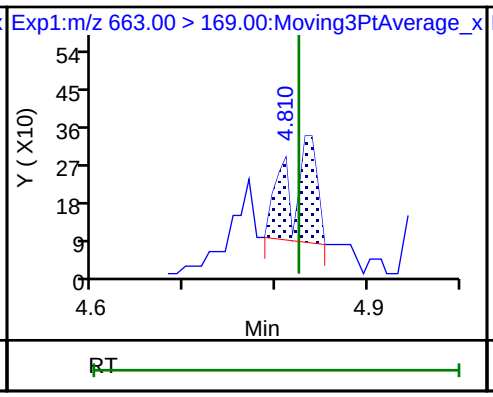
53 Perfluorododecanesulfonic acid (PF (ND)



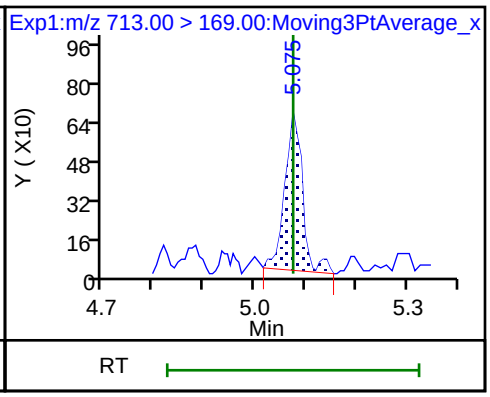
54 Perfluorotridecanoic acid



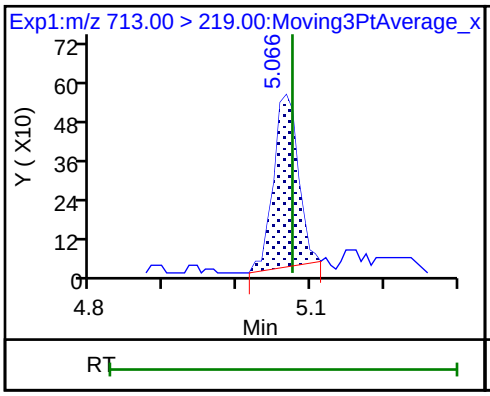
54 Perfluorotridecanoic acid



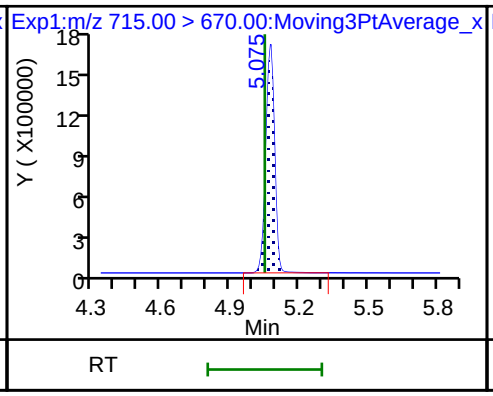
56 Perfluorotetradecanoic acid



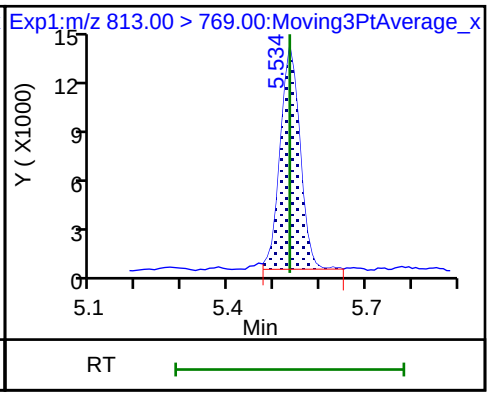
56 Perfluorotetradecanoic acid



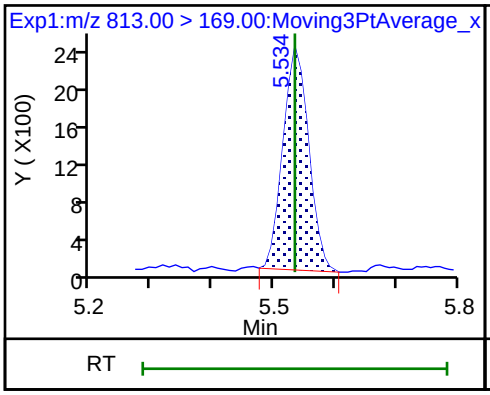
D 55 13C2 PFTeDA



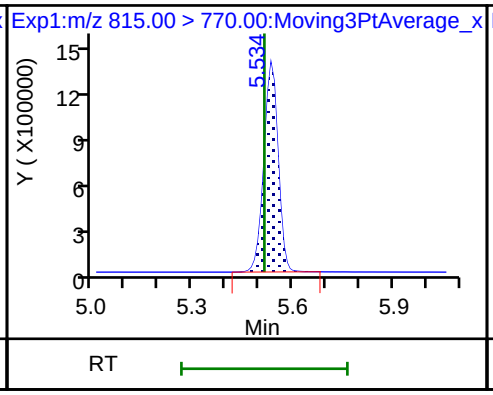
58 Perfluorohexadecanoic acid



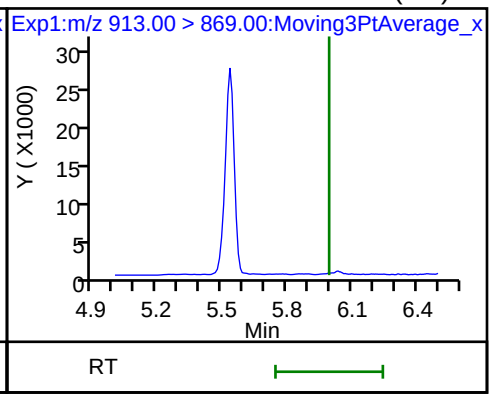
58 Perfluorohexadecanoic acid



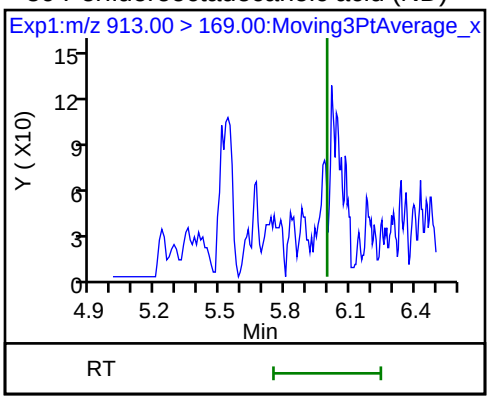
D 57 13C2 PFHxDA



59 Perfluorooctadecanoic acid (ND)



59 Perfluorooctadecanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

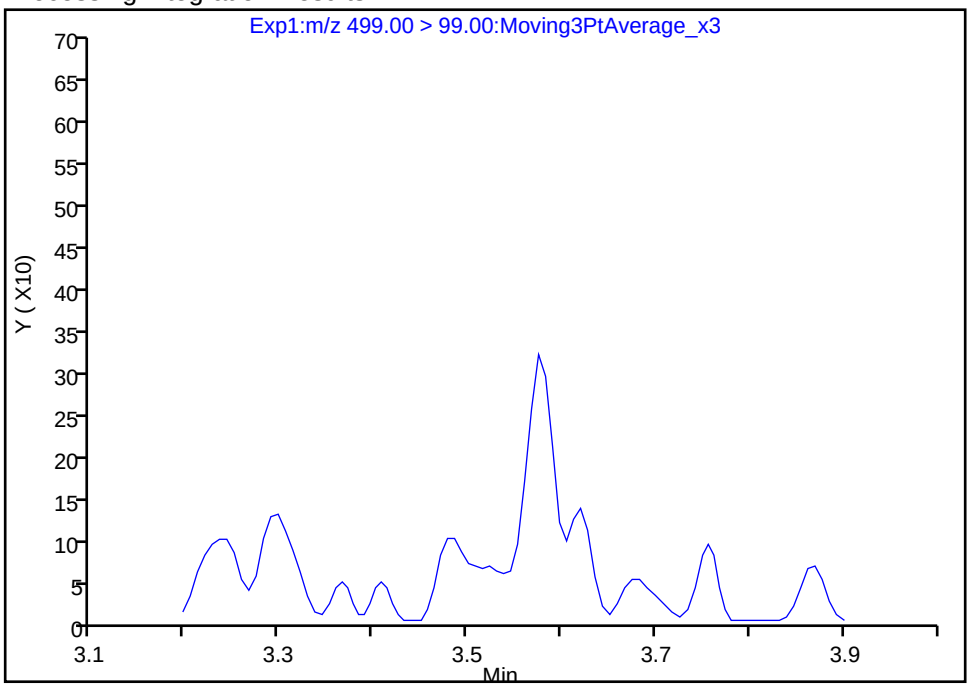
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_004.d
Injection Date: 08-Jan-2019 19:18:52 Instrument ID: A9
Lims ID: CCB
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 20 Worklist Smp#: 1
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

29 Perfluorooctanesulfonic acid, CAS: 1763-23-1

Signal: 2

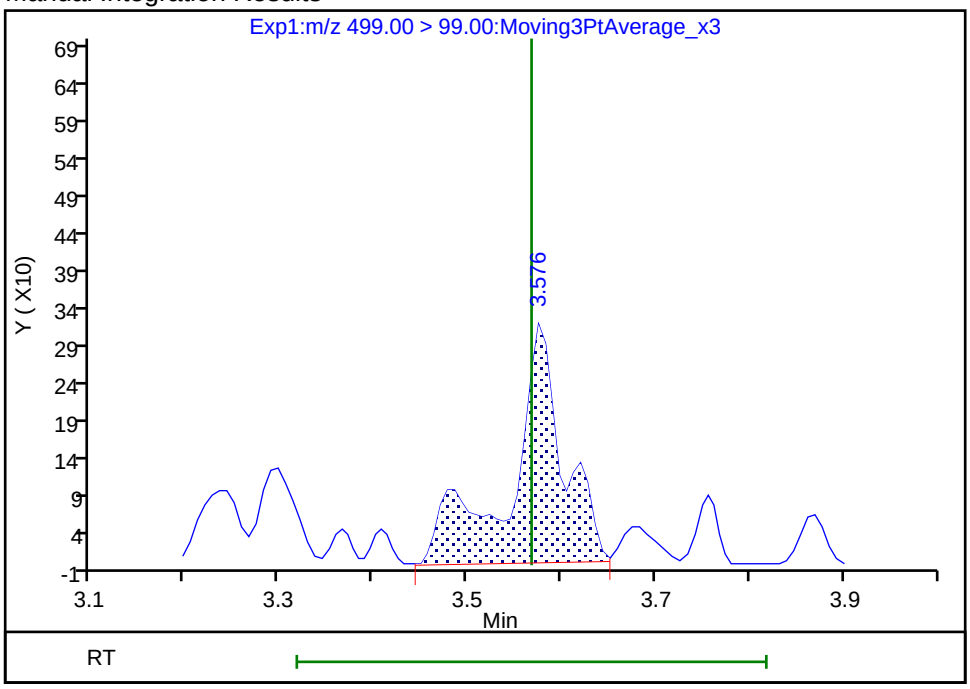
Processing Integration Results

RT: 3.56
Area: 0
Amount: 0.005048
Amount Units: ng/ml



Manual Integration Results

RT: 3.58
Area: 1254
Amount: 0.005048
Amount Units: ng/ml



Reviewer: ruangyotsakuld, 10-Jan-2019 09:32:58
Audit Action: Manually Integrated Audit Reason: Assign Peak

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

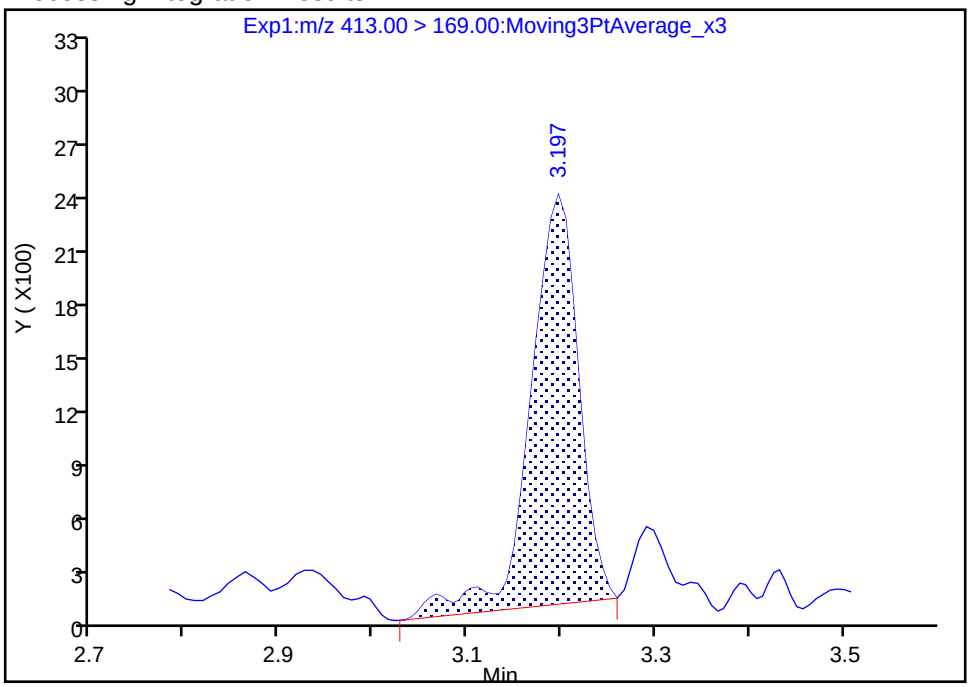
Data File:	\\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_004.d				
Injection Date:	08-Jan-2019 19:18:52	Instrument ID:	A9		
Lims ID:	CCB				
Client ID:					
Operator ID:	A9\Administrator	ALS Bottle#:	20	Worklist Smp#:	1
Injection Vol:	20.0 ul	Dil. Factor:	1.0000		
Method:	PFAS_A9	Limit Group:	LC PFC ICAL		
Column:		Detector	EXP1		

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

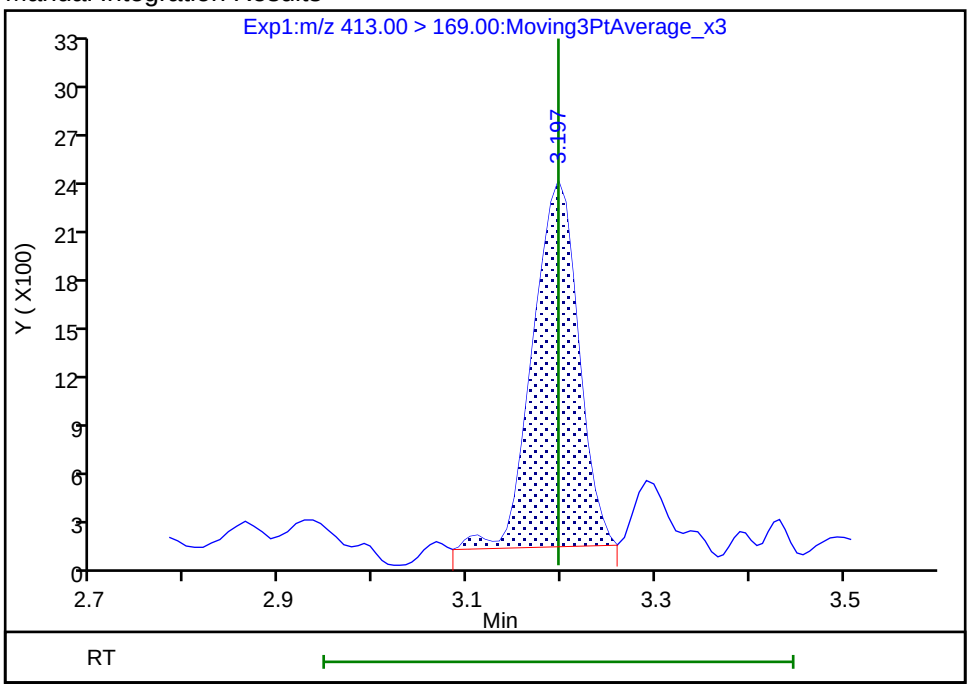
Processing Integration Results

RT: 3.20
Area: 8228
Amount: 0.013213
Amount Units: ng/ml



Manual Integration Results

RT: 3.20
Area: 7656
Amount: 0.006353
Amount Units: ng/ml



Reviewer: ruangyotsakuld, 10-Jan-2019 09:32:35

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

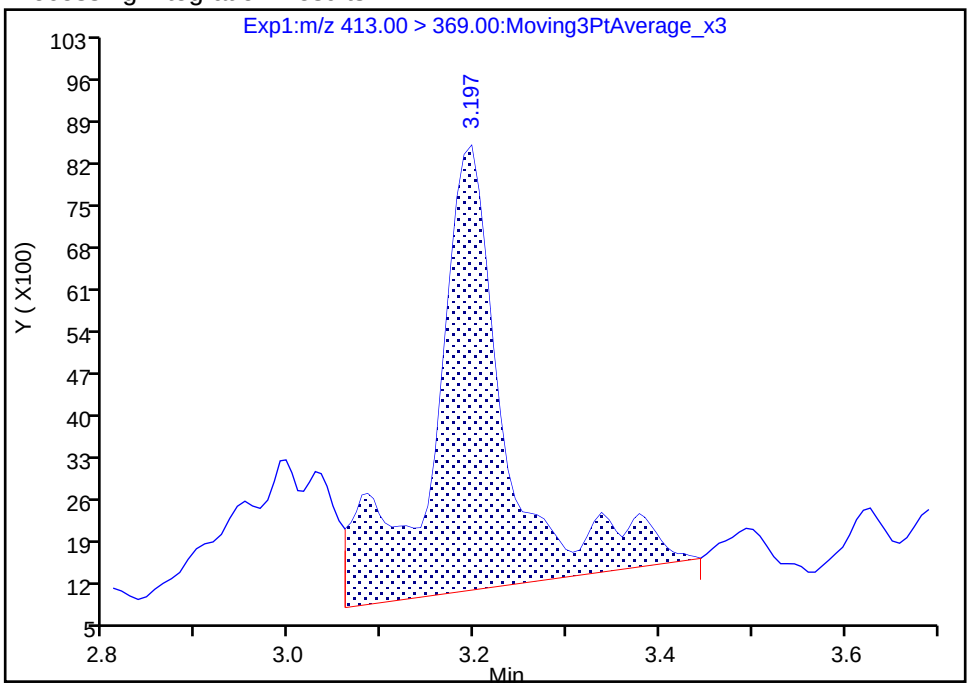
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70284.b\2019.01.08LLAAXX_004.d
Injection Date: 08-Jan-2019 19:18:52 Instrument ID: A9
Lims ID: CCB
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 20 Worklist Smp#: 1
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

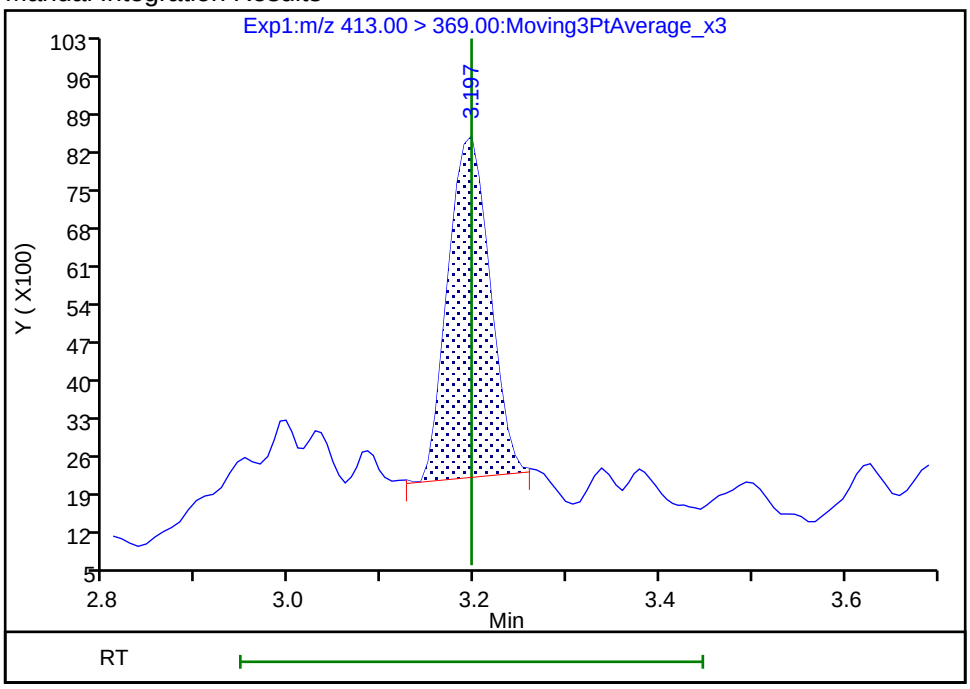
Processing Integration Results

RT: 3.20
Area: 41343
Amount: 0.013213
Amount Units: ng/ml



Manual Integration Results

RT: 3.20
Area: 19878
Amount: 0.006353
Amount Units: ng/ml



Reviewer: ruangyotsakuld, 10-Jan-2019 09:32:46
Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Client Sample ID: Lab Sample ID: CCB 320-270021/1

Matrix: Air Lab File ID: 2019.01.10LLA_004.d

Analysis Method: 537 (modified) Date Collected:

Extraction Method: Date Extracted:

Sample wt/vol: 1(mL) Date Analyzed: 01/10/2019 13:37

Con. Extract Vol.: Dilution Factor: 1

Injection Volume: 20(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 270021 Units: ng/mL

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	ND		0.0500	0.00500
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.007737	J	0.0500	0.00630
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.007204	J	0.0500	0.00430
375-95-1	Perfluorononanoic acid (PFNA)	ND		0.0500	0.00680
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	ND		0.0500	0.0140
335-67-1	Perfluorooctanoic acid (PFOA)	ND		0.0500	0.0210

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	99		25-150
STL01892	13C4 PFHpA	99		25-150
STL00995	13C5 PFNA	101		25-150
STL00990	13C4 PFOA	101		25-150
STL00991	13C4 PFOS	99		25-150
STL00994	18O2 PFHxS	100		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_004.d
Lims ID: CCB
Client ID:
Sample Type: CCB
Inject. Date: 10-Jan-2019 13:37:55 ALS Bottle#: 28 Worklist Smp#: 1
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: CCB
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 11-Jan-2019 09:27:01 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0316

First Level Reviewer: mongkols Date: 11-Jan-2019 09:27:01
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.664	1.660	0.004	0.526	6759661	2.37		94.9	8087	
D 3 13C5 PFPeA										
267.90 > 223.00	2.014	1.998	0.016	0.636	5980066	2.40		96.0	3434	
D 5 13C3 PFBS										
301.90 > 80.00	2.046	2.040	0.006	0.646	9434780	2.31		99.2	2639728	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.014	2.051	-0.037	0.984	7151	0.001826	Target=2.70		8.6	
298.90 > 99.00	2.057	2.051	0.006	1.005	2414		2.96(1.35-4.05)		4.8	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.340	2.331	0.009	0.739	589081	2.36		101	1001	
D 9 13C2 PFHxA										
315.00 > 270.00	2.375	2.373	0.002	0.750	6766338	2.44		97.8	2665	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.499	2.487	0.012	0.789	557144	2.24		89.7	1454	
D 16 13C4 PFHpA										
367.00 > 322.00	2.774	2.763	0.011	0.876	8452771	2.48		99.3	3003	
D 17 18O2 PFHxS										
403.00 > 84.00	2.774	2.772	0.002	0.876	5702790	2.37		100	2320	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.765	2.772	-0.007	0.997	27218	0.007737	Target=4.34		7.5	
363.00 > 169.00	2.765	2.772	-0.007	0.997	4172		6.52(2.17-6.52)		8.1	
18 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.774	2.781	-0.007	1.000	21491	0.007204	Target=3.80		58.7	
399.00 > 99.00	2.774	2.781	-0.007	1.000	5203		4.13(1.90-5.70)		6.8	M
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.150	3.141	0.009	1.000	7559	0.0105			10.5	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 20 M2-6:2 FTS										
429.00 > 81.00	3.150	3.141	0.009	0.995	812268	2.42		102	1540	
D 22 13C8 PFOA										
421.00 > 376.00	3.165	3.157	0.008		6486214	2.74		112	2729	
D 25 13C4 PFOA										
417.00 > 372.00	3.173	3.157	0.016	1.002	7445424	2.52		101	2835	
* 24 13C2 PFOA										
415.00 > 370.00	3.165	3.172	-0.007		7457853	2.50			2793	
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.173	3.172	0.001	1.000	22027	0.007135	Target=2.72		3.3	M
413.00 > 169.00	3.173	3.172	0.001	1.000	8008		2.75(1.36-4.08)		17.2	
D 27 13C8 PFOS										
507.00 > 99.00	3.538	3.529	0.009		1329444	2.66		111	1523	
D 28 13C4 PFOS										
503.00 > 80.00	3.538	3.529	0.009	1.118	5817368	2.37		99.1	3100	
D 31 13C5 PFNA										
468.00 > 423.00	3.553	3.544	0.009	1.122	6701943	2.52		101	2836	
D 33 13C8 FOSA										
506.00 > 78.00	3.885	3.877	0.008	1.227	3992184	2.47		98.7	3153	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.893	3.885	0.008	1.002	3076	0.000663			11.0	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.910	3.892	0.018	1.235	96627	2.51		105	389	
D 36 13C2 PFDA										
515.00 > 470.00	3.910	3.901	0.009	1.235	6307189	2.42		97.0	2912	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.073	4.063	0.010	1.287	1624507	2.38		95.3	1627	
47 MeFOSA										
512.00 > 169.00	4.147	4.194	-0.047		790	NC			2.6	
D 44 13C2 PFUnA										
565.00 > 520.00	4.225	4.224	0.001	1.335	5046445	2.47		98.7	3320	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.225	4.224	0.001	1.335	1422154	2.50		100	1290	
D 49 13C2 PFDoA										
615.00 > 570.00	4.518	4.510	0.008	1.427	5873885	2.37		94.8	3162	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.024	5.016	0.008	1.587	4402800	2.56		102	2365	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.465	5.456	0.009	1.726	3798956	2.37		94.6	3199	
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.465	5.465	0.0	1.000	36089	0.001967	Target=5.55		3.0	
813.00 > 169.00	5.465	5.465	0.0	1.000	6704		5.38(2.77-8.32)		60.9	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Reagents:

LCPFC_LL0_00011 Amount Added: 1.00 Units: mL

Report Date: 11-Jan-2019 09:27:01 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_004.d

Injection Date: 10-Jan-2019 13:37:55 Instrument ID: A9

Lims ID: CCB

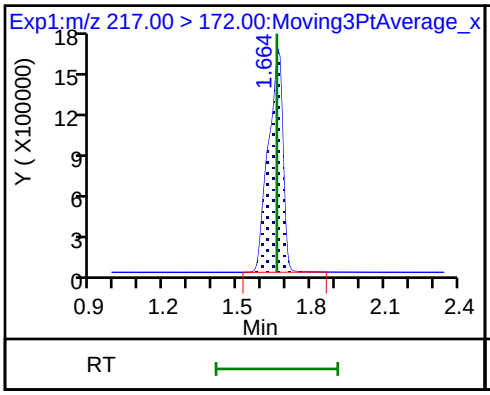
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 28 Worklist Smp#: 1

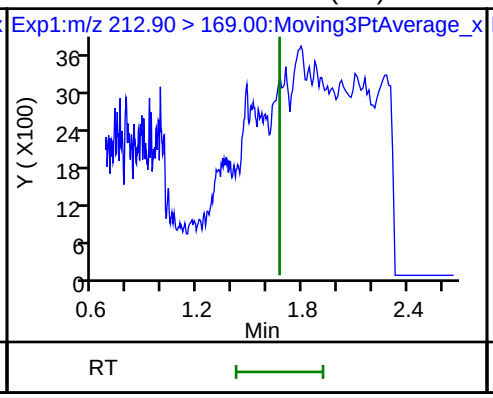
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

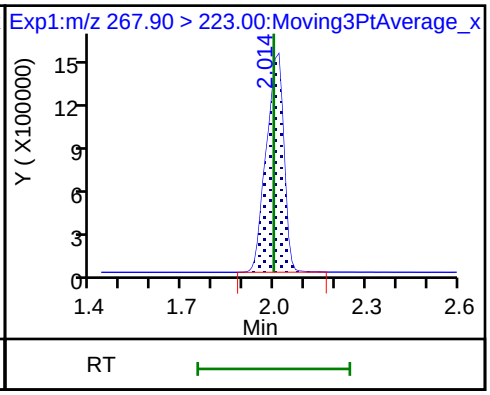
D 1 13C4 PFBA



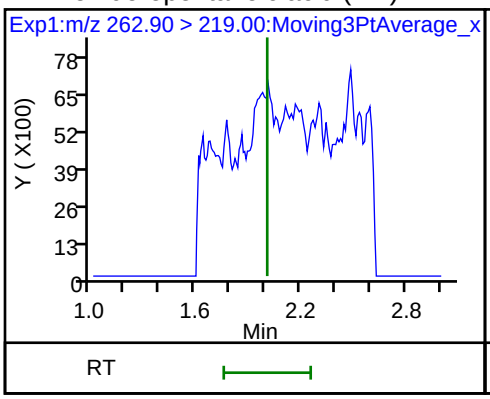
2 Perfluorobutanoic acid (ND)



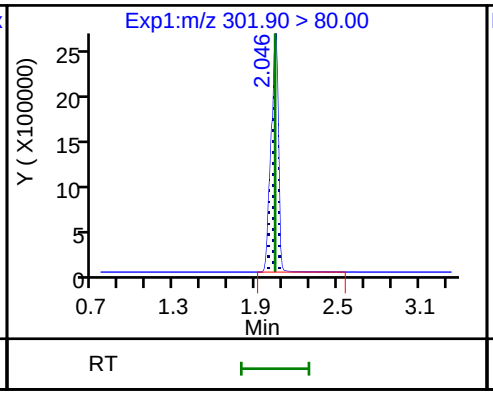
D 3 13C5 PFPeA



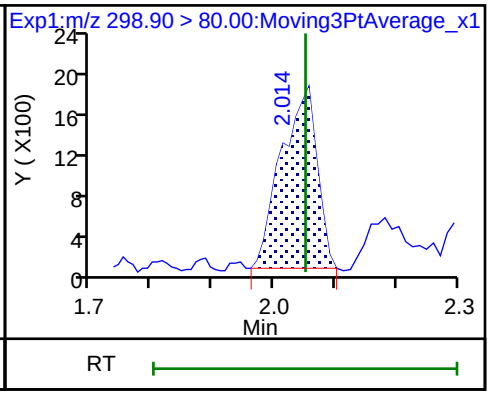
4 Perfluoropentanoic acid (ND)



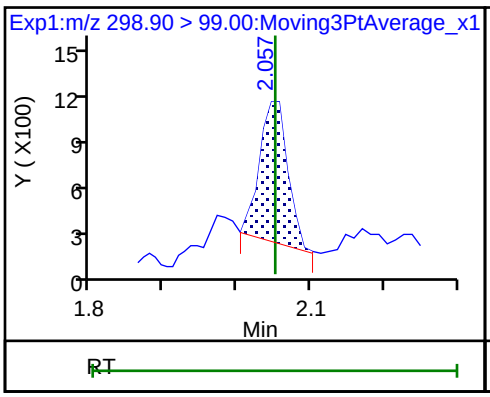
D 5 13C3 PFBS



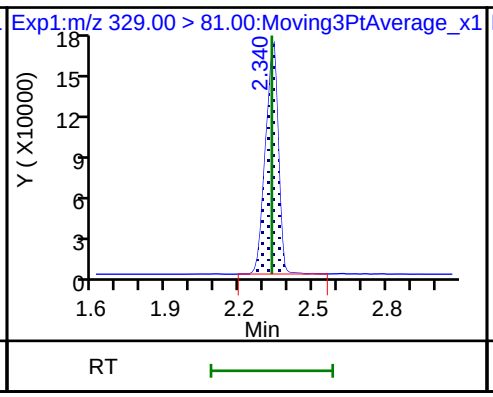
6 Perfluorobutanesulfonic acid



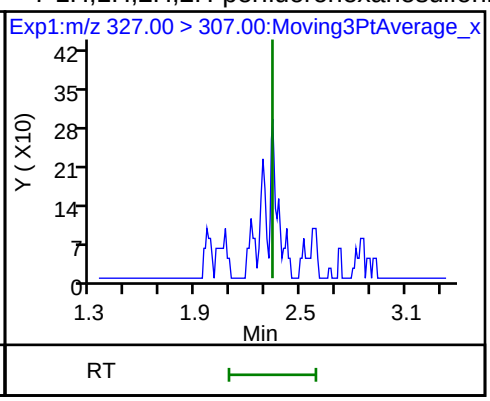
6 Perfluorobutanesulfonic acid



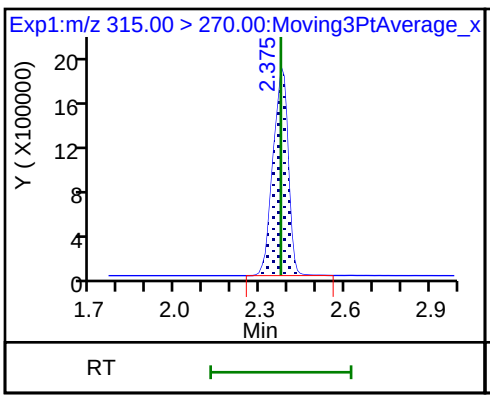
D 8 M2-4:2 FTS



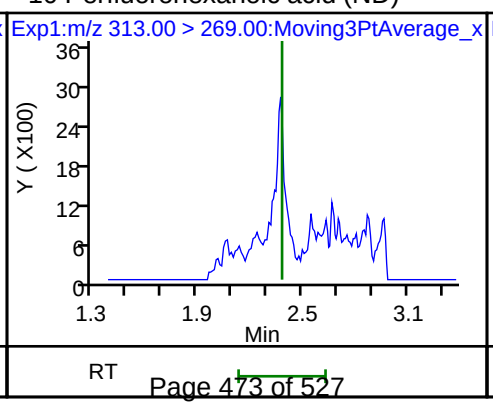
7 1H,1H,2H,2H-perfluorohexanesulfoni (ND)



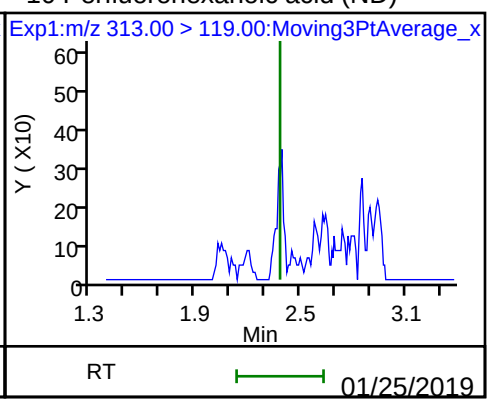
D 9 13C2 PFHxA



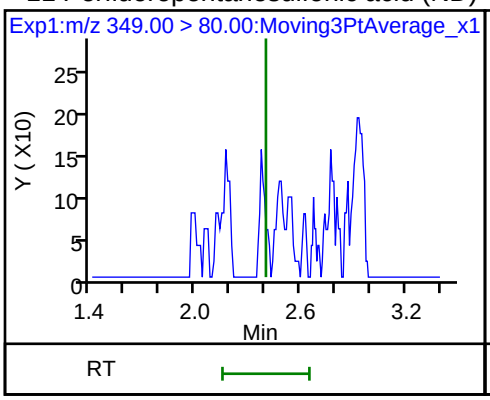
10 Perfluorohexanoic acid (ND)



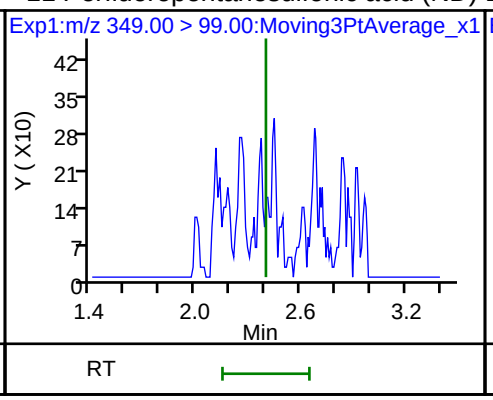
10 Perfluorohexanoic acid (ND)



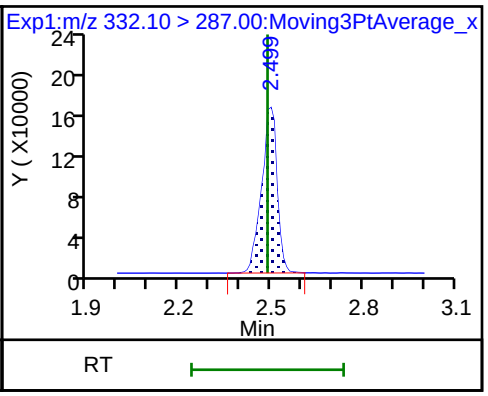
11 Perfluoropentanesulfonic acid (ND)



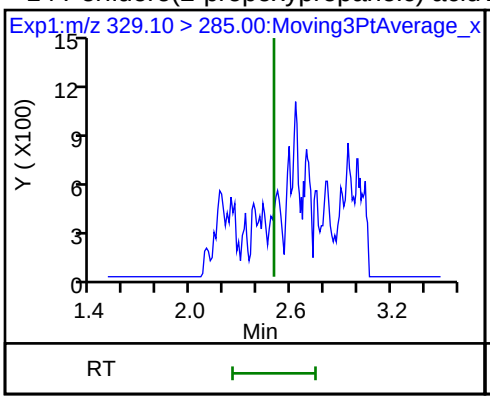
11 Perfluoropentanesulfonic acid (ND) D



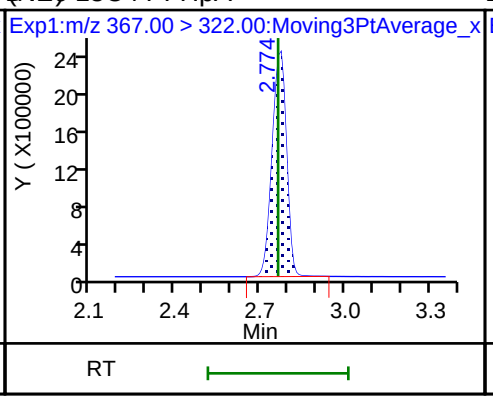
13 13C3 HFPO-DA



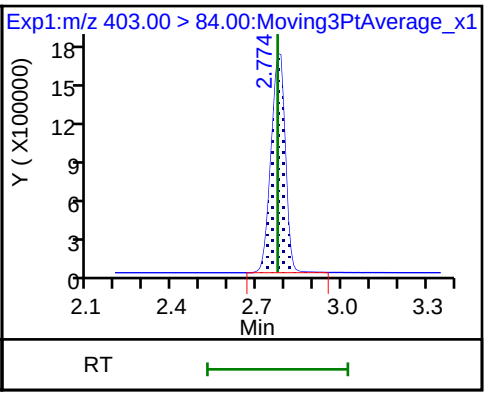
14 Perfluoro(2-propoxypropanoic) acid (ND)



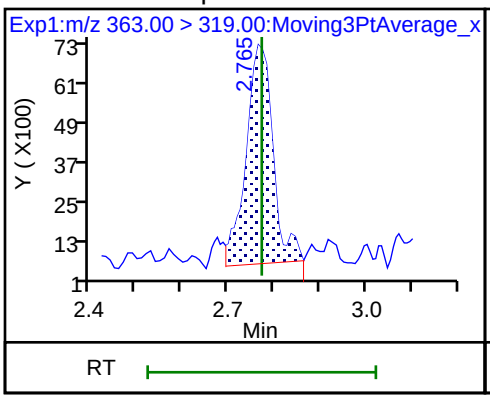
16 13C4 PFHpA D



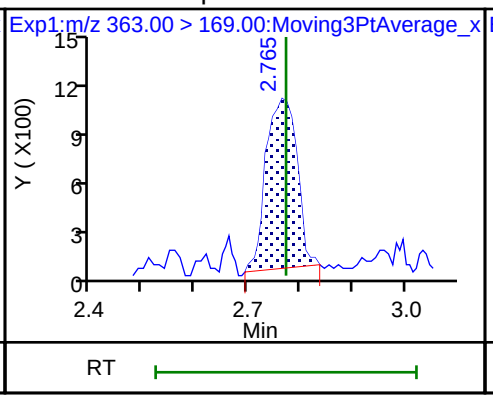
17 18O2 PFHxS D



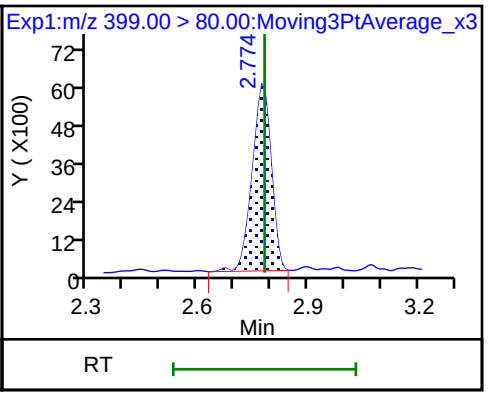
15 Perfluoroheptanoic acid



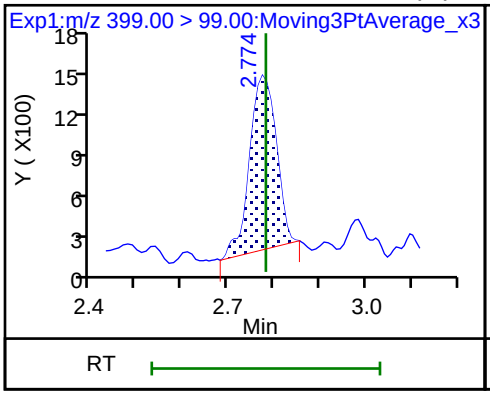
15 Perfluoroheptanoic acid



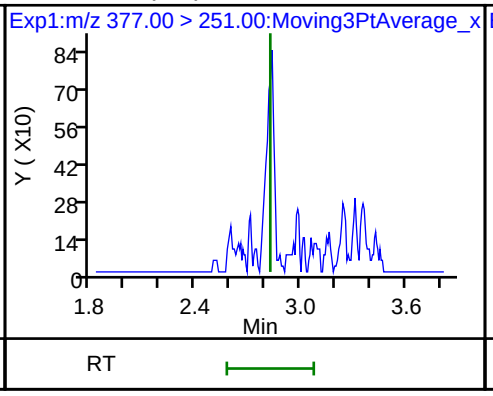
18 Perfluorohexanesulfonic acid



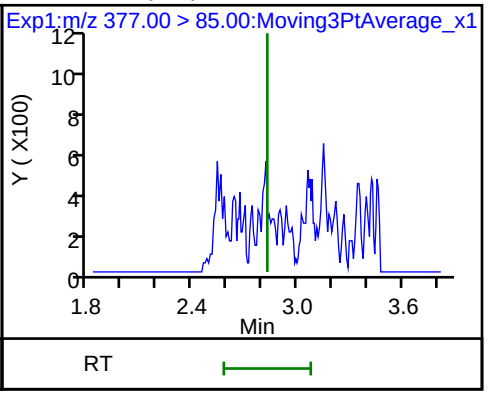
18 Perfluorohexanesulfonic acid (M)



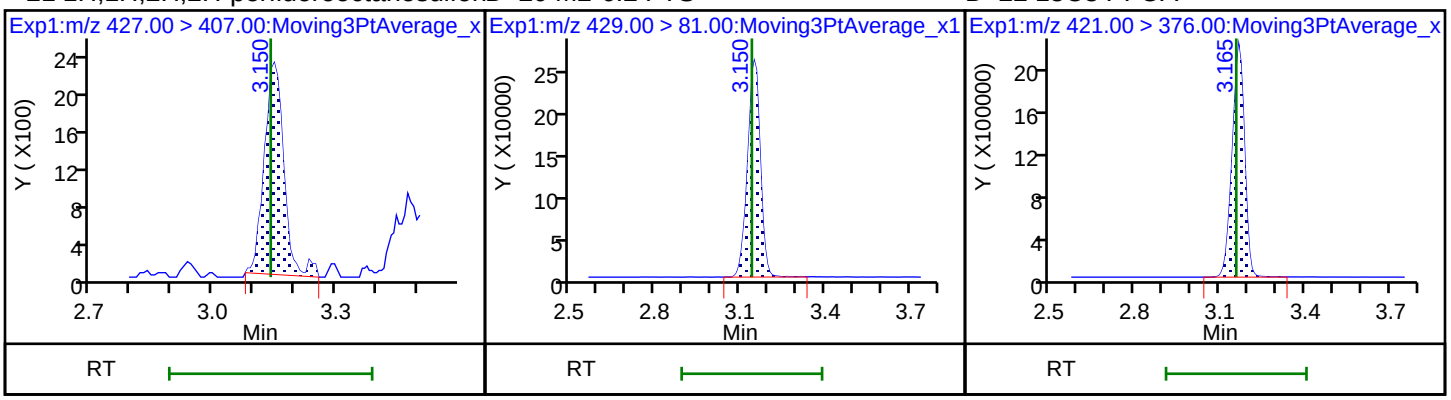
19 DONA (ND)



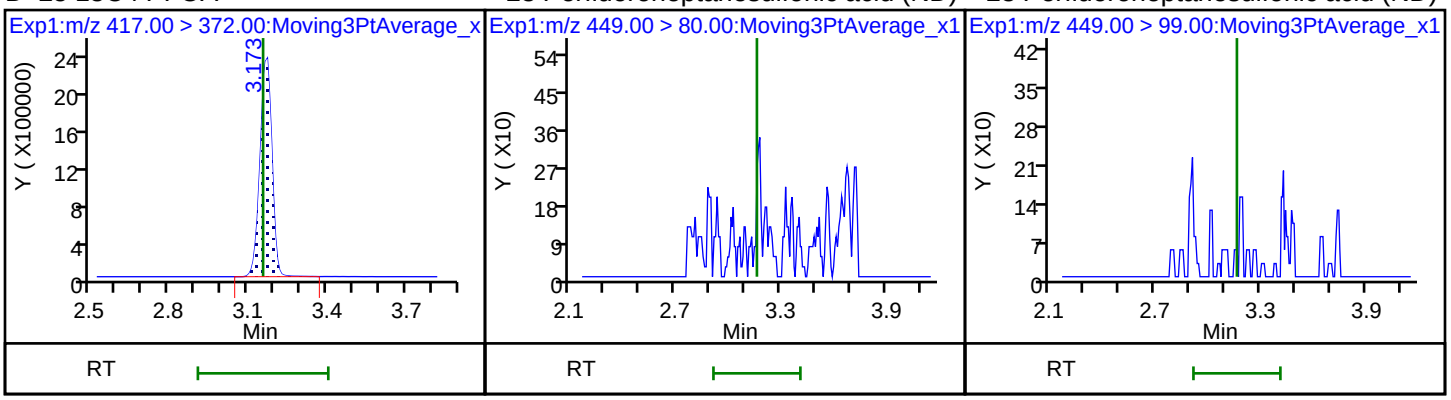
19 DONA (ND)



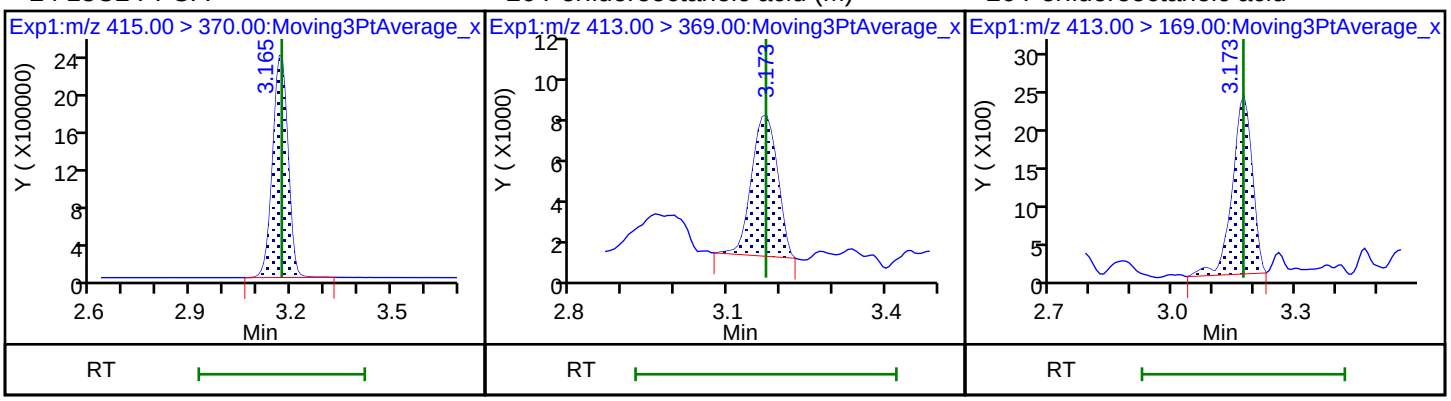
21 1H,1H,2H,2H-perfluorooctanesulfonD 20 M2-6:2 FTS D 22 13C8 PFOA



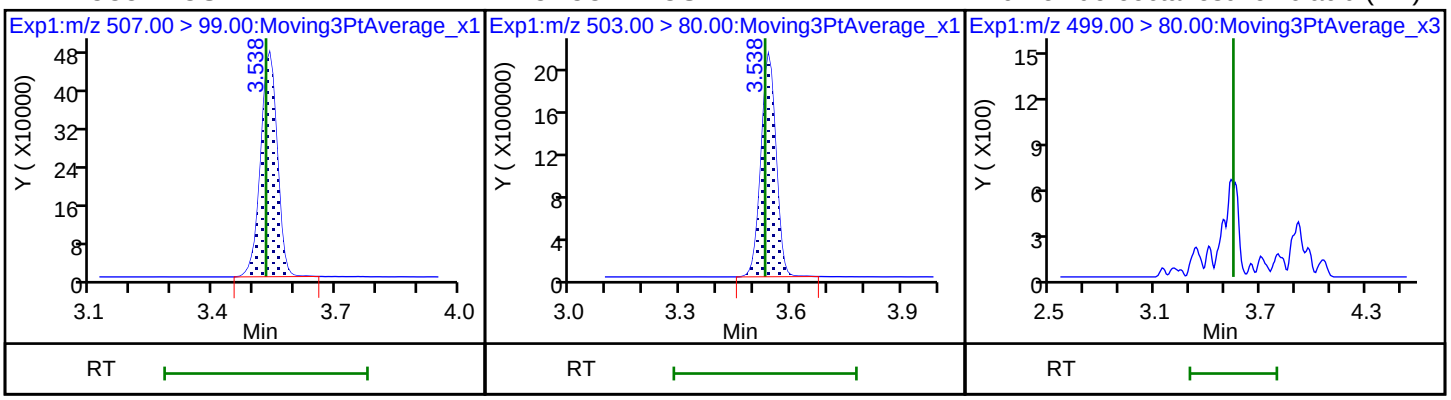
D 25 13C4 PFOA 23 Perfluoroheptanesulfonic acid (ND) 23 Perfluoroheptanesulfonic acid (ND)



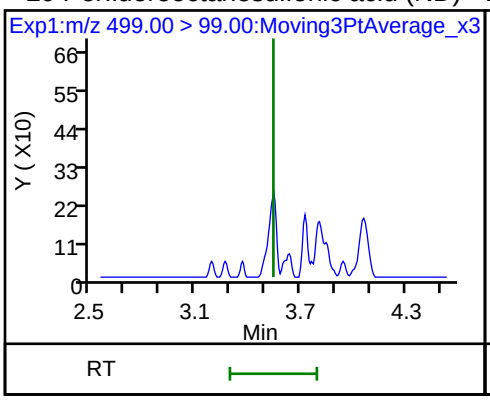
* 24 13C2 PFOA 26 Perfluorooctanoic acid (M) 26 Perfluorooctanoic acid



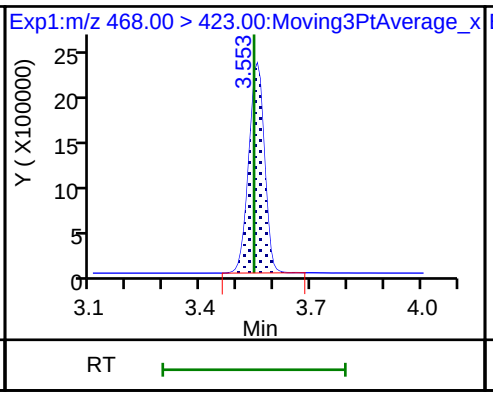
D 27 13C8 PFOS D 28 13C4 PFOS 29 Perfluorooctanesulfonic acid (ND)



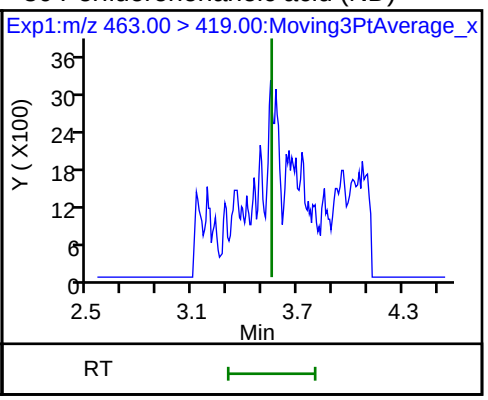
29 Perfluorooctanesulfonic acid (ND)



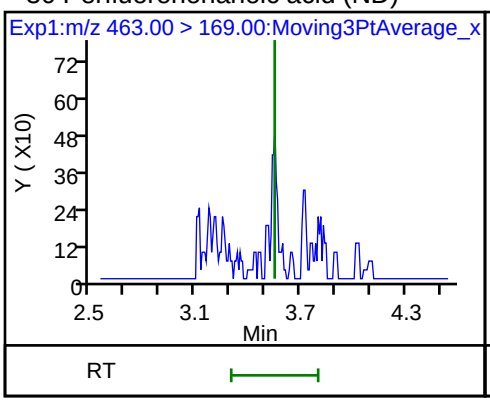
D 31 13C5 PFNA



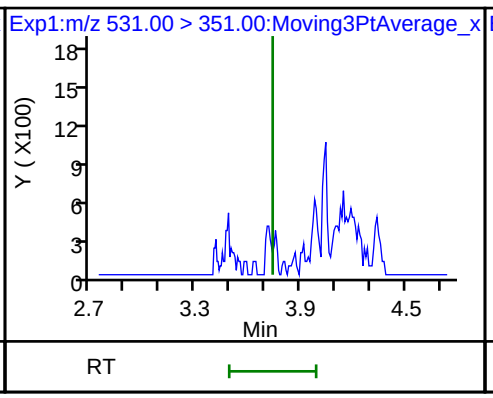
30 Perfluorononanoic acid (ND)



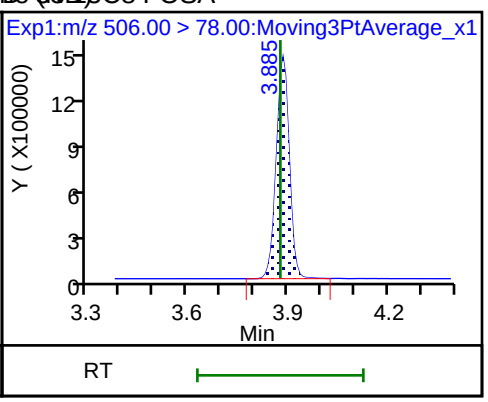
30 Perfluorononanoic acid (ND)



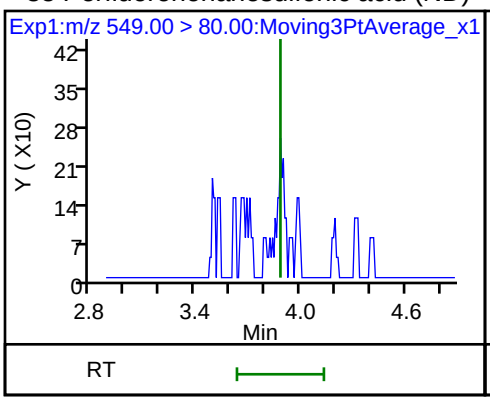
32 9-Chlorohexadecafluoro-3-oxanonane (ND)



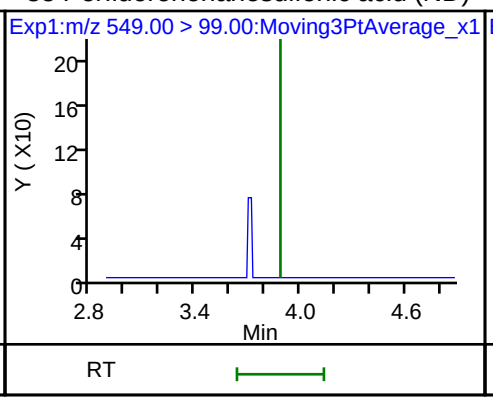
D 33 13C8 FOSA



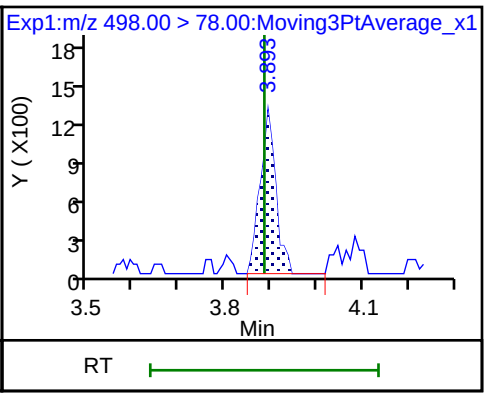
35 Perfluorononanesulfonic acid (ND)



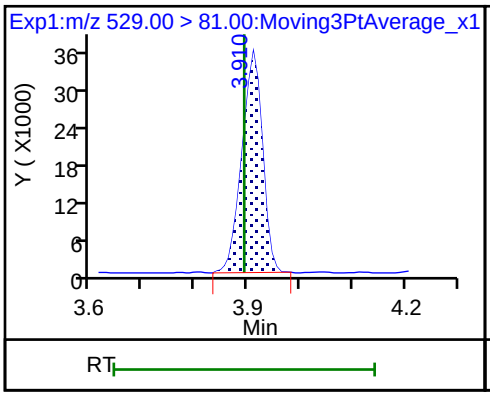
35 Perfluorononanesulfonic acid (ND)



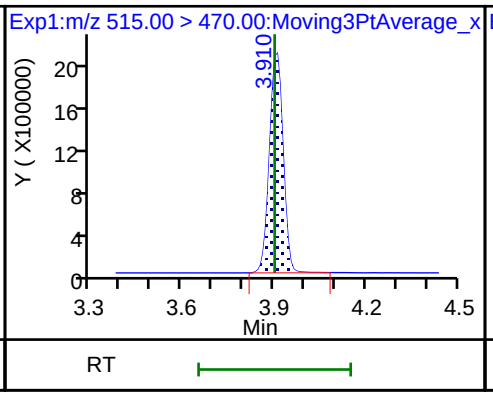
34 Perfluorooctanesulfonamide



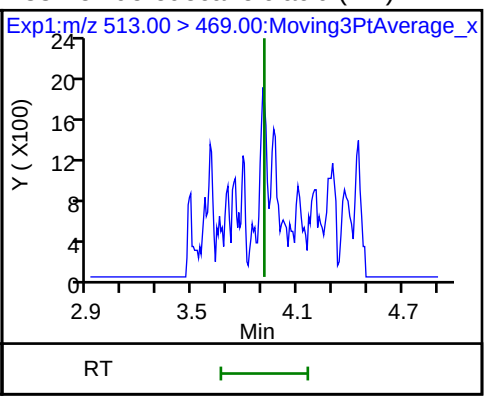
D 39 M2-8:2 FTS



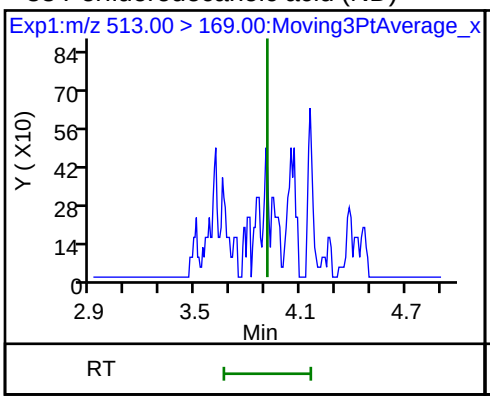
D 36 13C2 PFDA



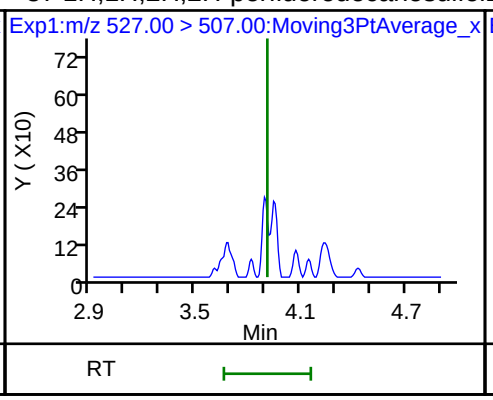
38 Perfluorodecanoic acid (ND)



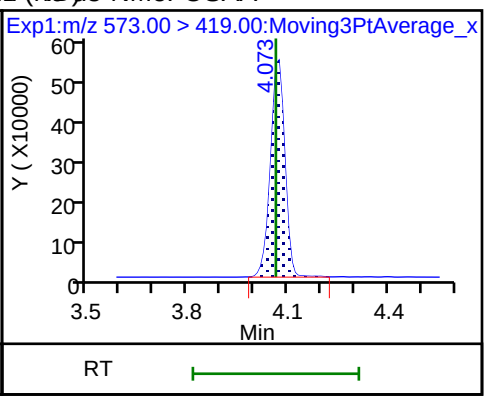
38 Perfluorodecanoic acid (ND)



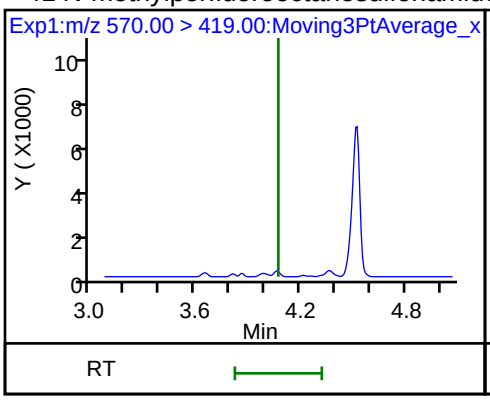
37 1H,1H,2H,2H-perfluorodecanesulfonic acid (ND)



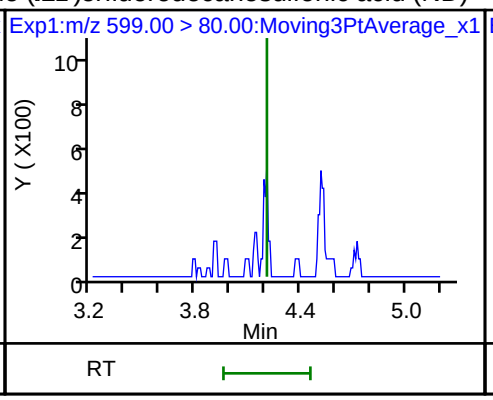
D 40 d3-NMeFOSAA



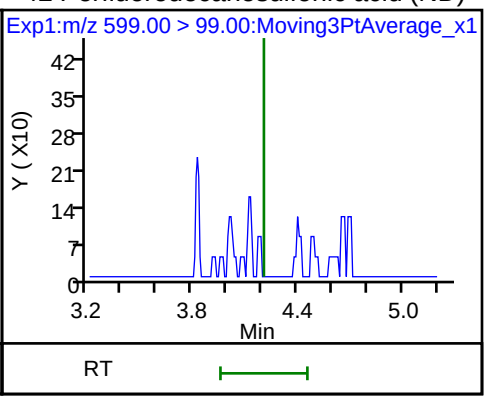
41 N-methylperfluorooctanesulfonamido (ND)



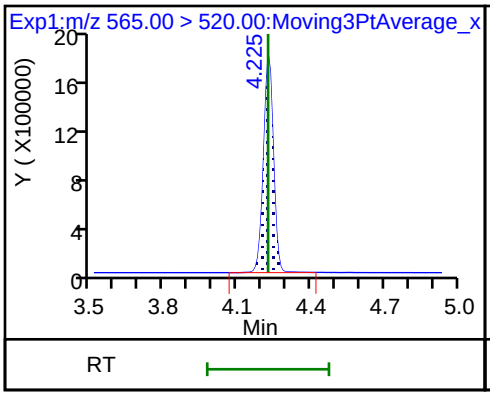
42 Perfluorodecanesulfonic acid (ND)



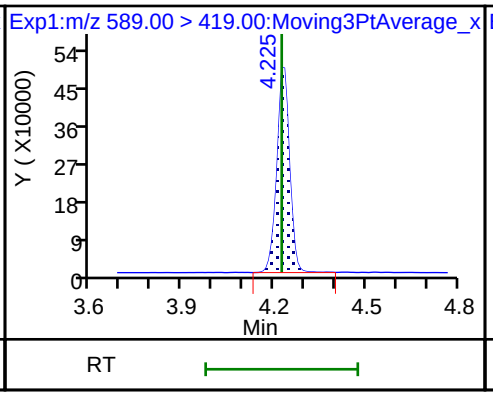
42 Perfluorodecanesulfonic acid (ND)



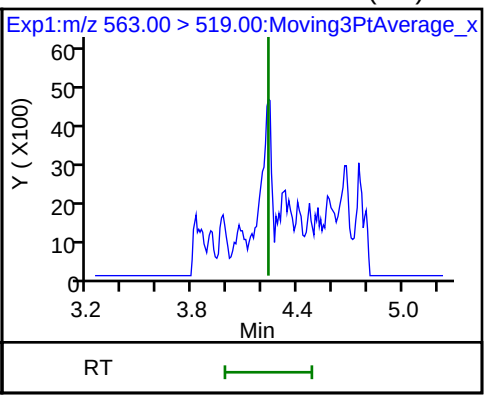
D 44 13C2 PFUnA



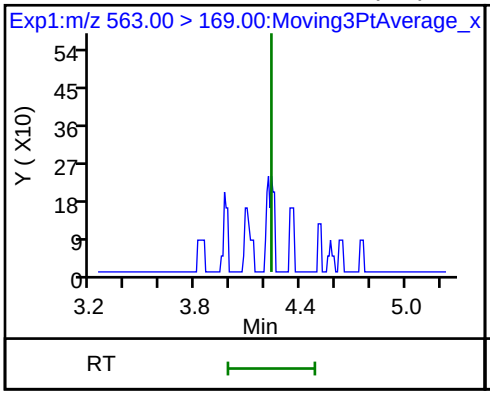
D 45 d5-NEtFOSAA



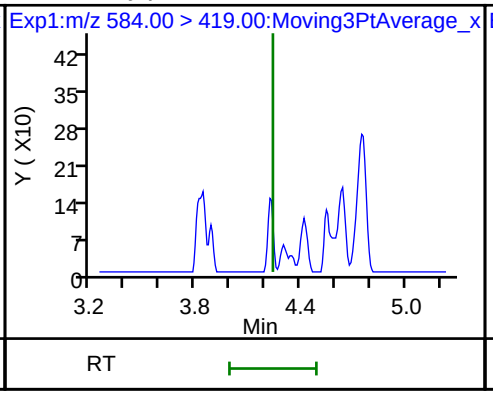
43 Perfluoroundecanoic acid (ND)



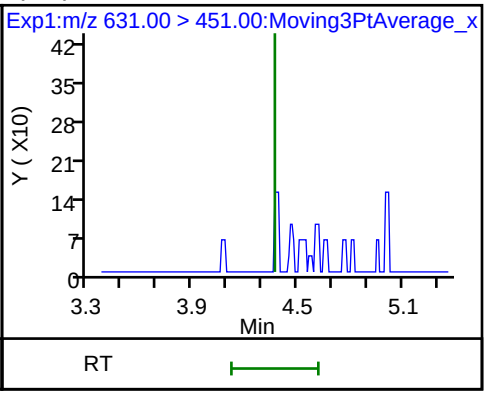
43 Perfluoroundecanoic acid (ND)



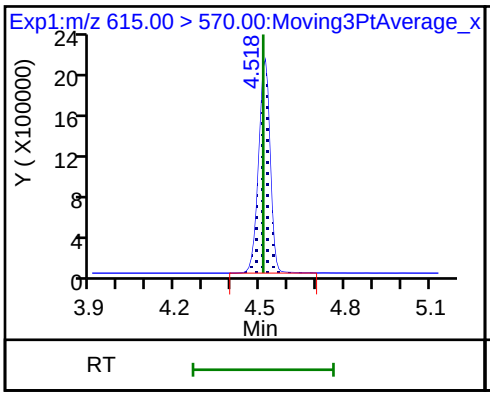
46 N-ethylperfluorooctanesulfonamidoa (ND)



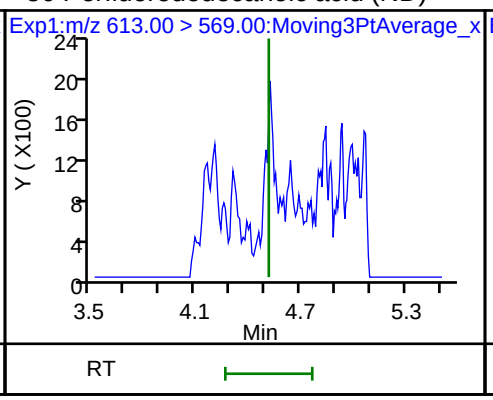
48 11-Chloroeicosafluoro-3-oxaundecan (ND)



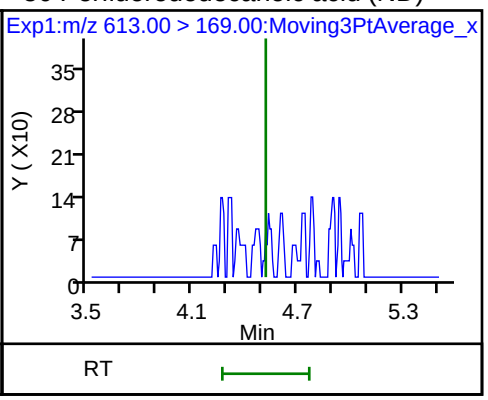
D 49 13C2 PFDoA



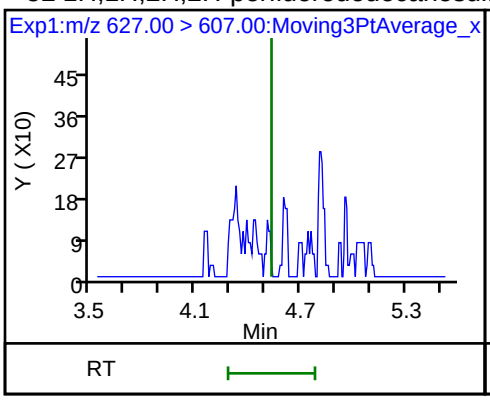
50 Perfluorododecanoic acid (ND)



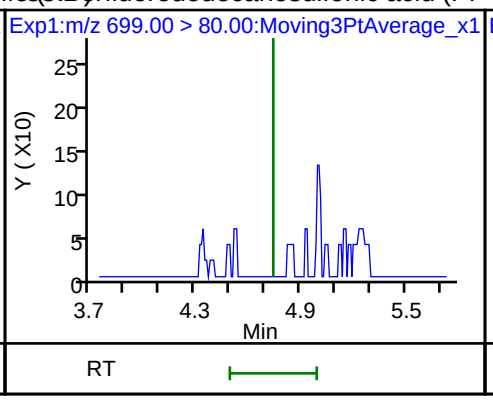
50 Perfluorododecanoic acid (ND)



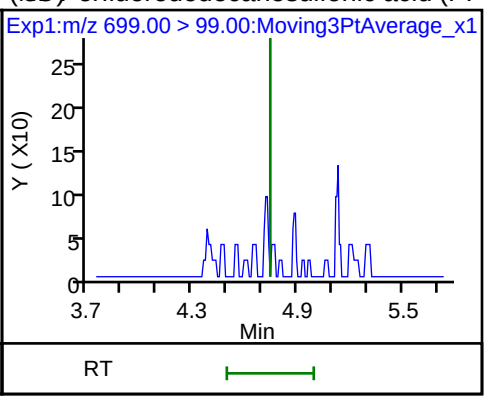
52 1H,1H,2H-perfluorododecanesulfonic acid (NE)



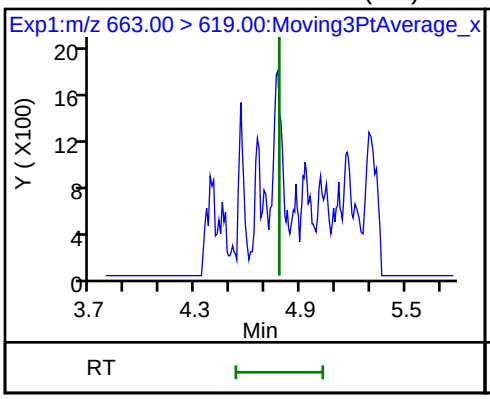
53 Perfluorododecanesulfonic acid (PF (ND)



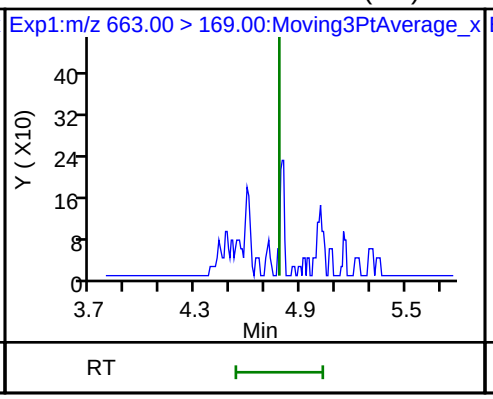
53 Perfluorododecanesulfonic acid (PF (ND)



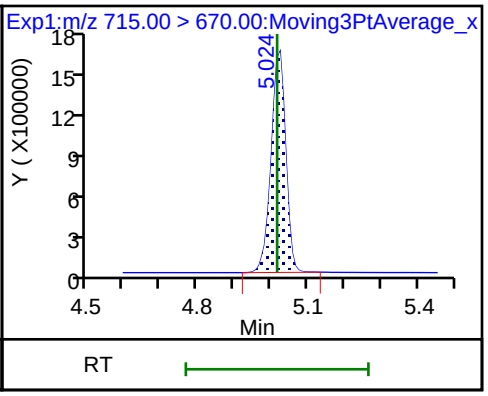
54 Perfluorotridecanoic acid (ND)



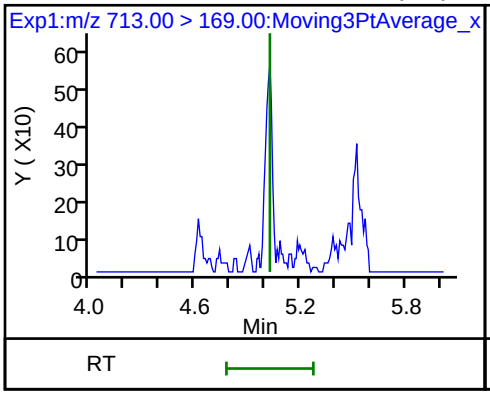
54 Perfluorotridecanoic acid (ND)



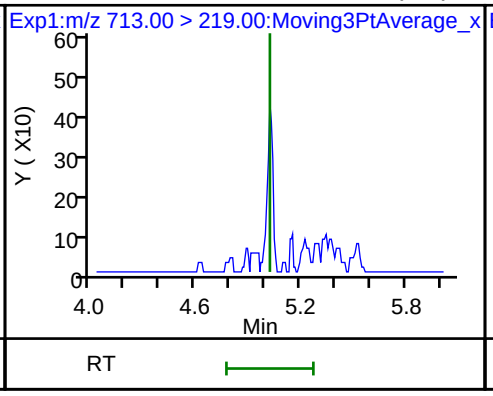
D 55 13C2 PFTeDA



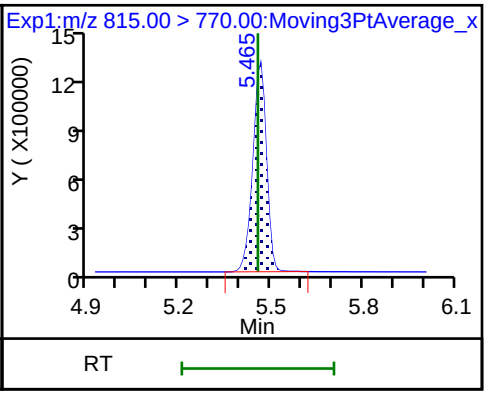
56 Perfluorotetradecanoic acid (ND)



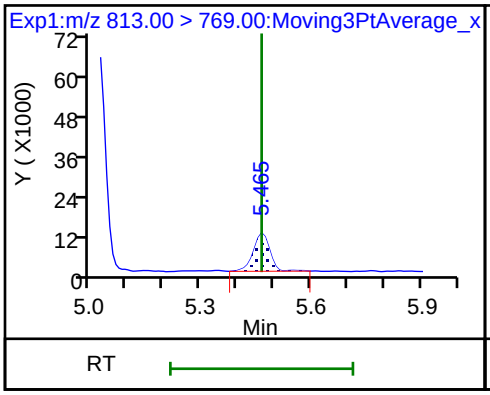
56 Perfluorotetradecanoic acid (ND)



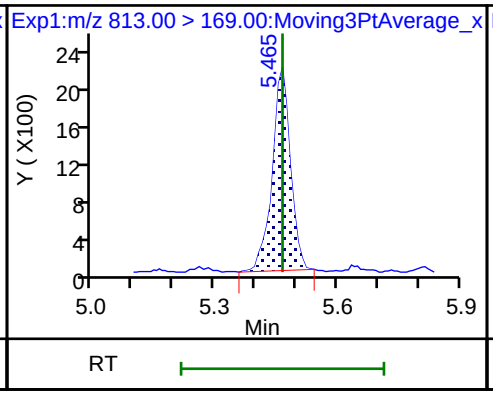
D 57 13C2 PFHxDA



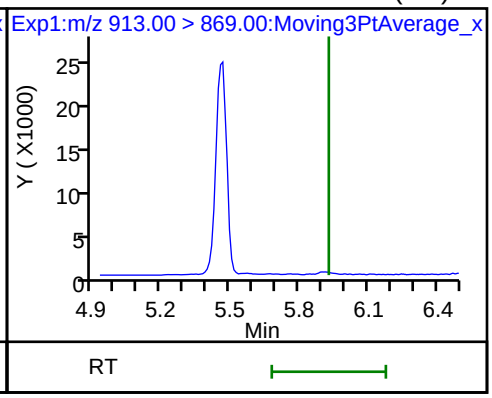
58 Perfluorohexadecanoic acid



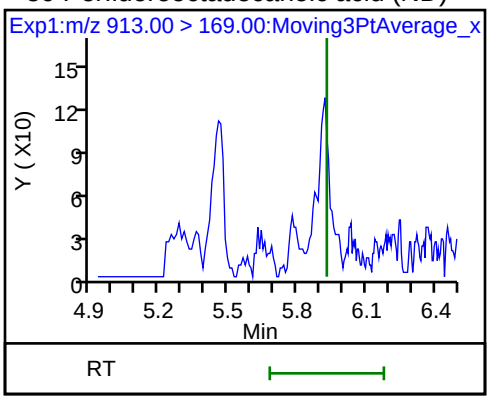
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid (ND)



59 Perfluorooctadecanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

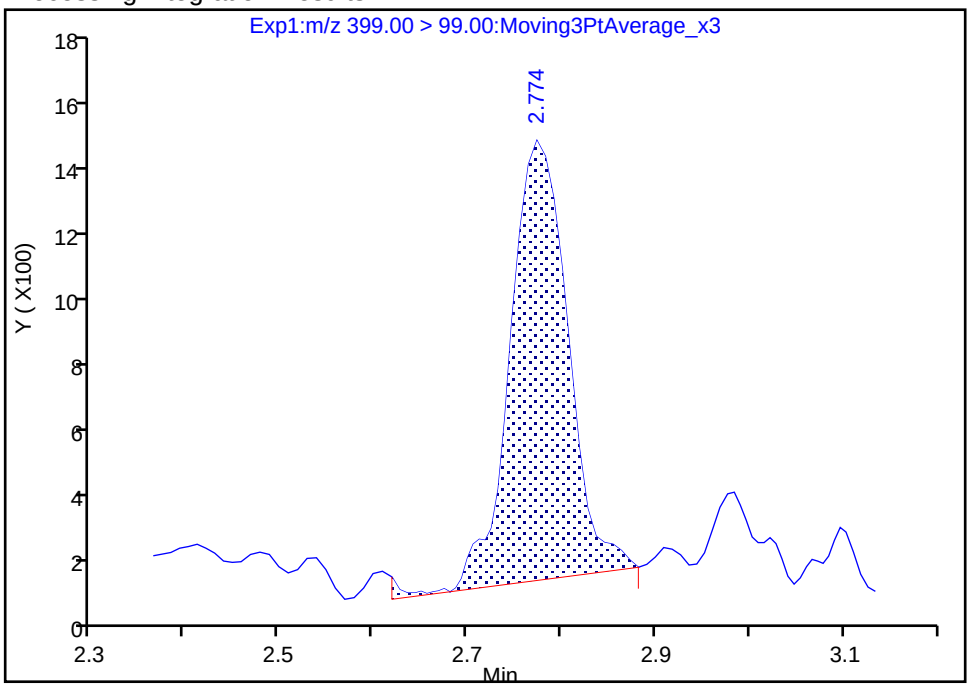
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_004.d
Injection Date: 10-Jan-2019 13:37:55 Instrument ID: A9
Lims ID: CCB
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 28 Worklist Smp#: 1
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

18 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 2

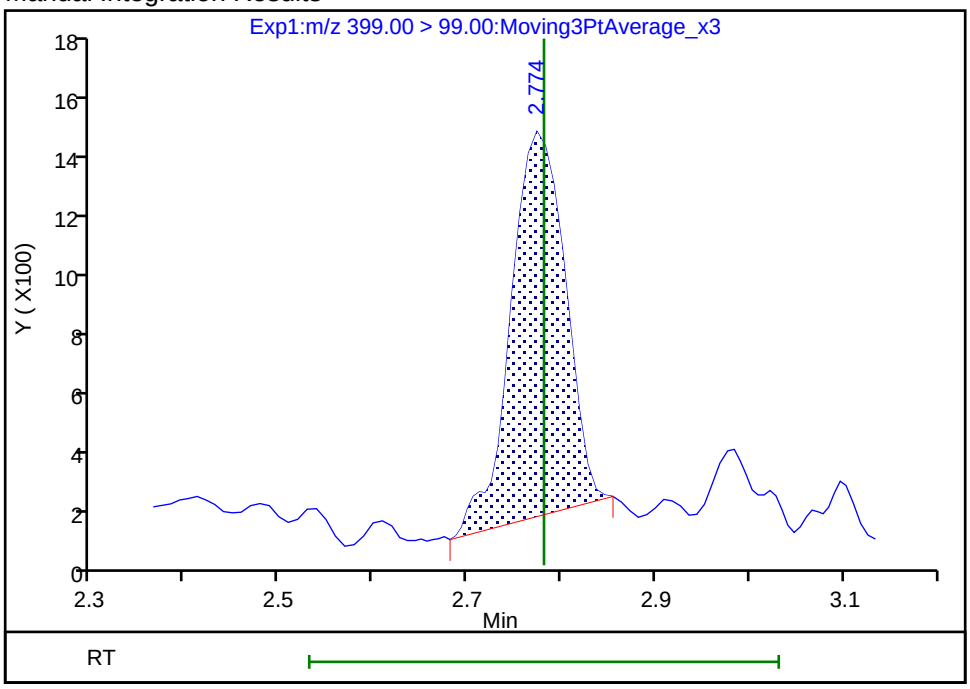
Processing Integration Results

RT: 2.77
Area: 5738
Amount: 0.007204
Amount Units: ng/ml



Manual Integration Results

RT: 2.77
Area: 5203
Amount: 0.007204
Amount Units: ng/ml



Reviewer: mongkols, 11-Jan-2019 09:26:34
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

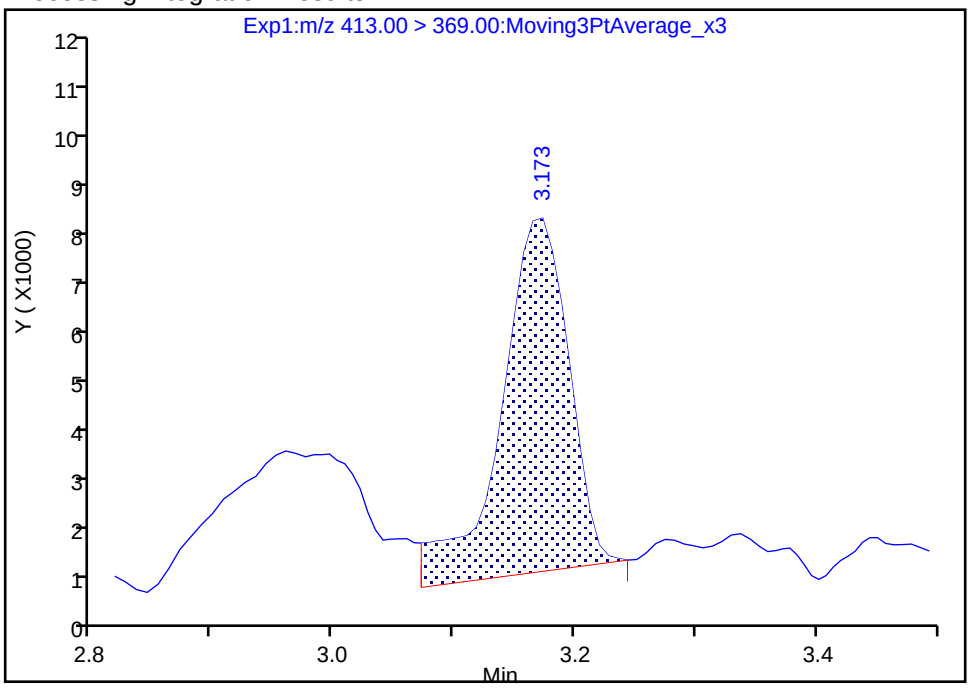
Data File: \\chromna\Sacramento\ChromData\A9\20190110-70381.b\2019.01.10LLA_004.d
Injection Date: 10-Jan-2019 13:37:55 Instrument ID: A9
Lims ID: CCB
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 28 Worklist Smp#: 1
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

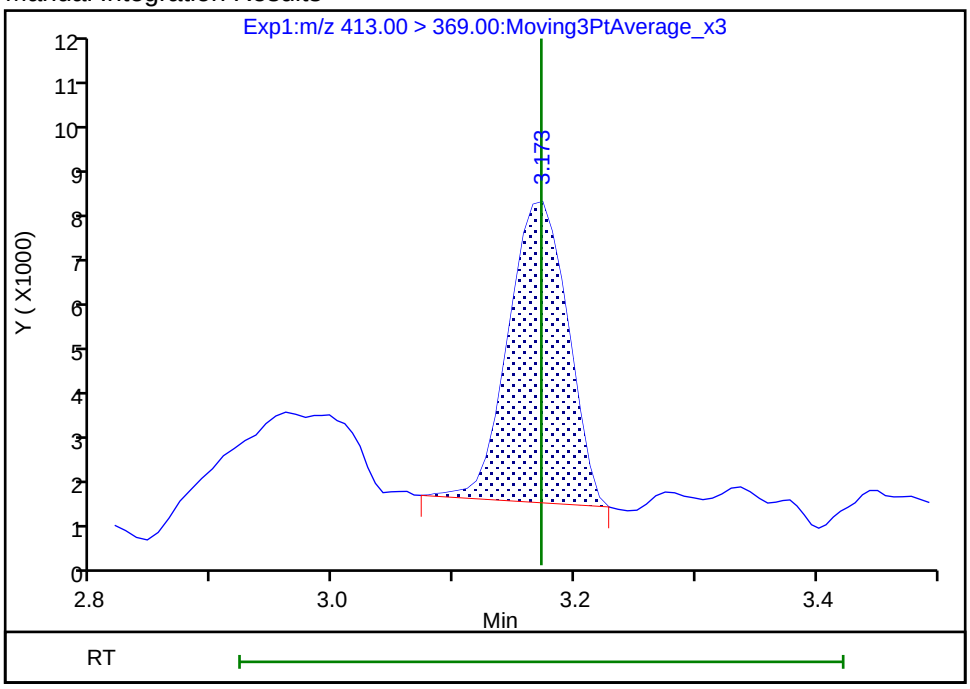
Processing Integration Results

RT: 3.17
Area: 26697
Amount: 0.008648
Amount Units: ng/ml



Manual Integration Results

RT: 3.17
Area: 22027
Amount: 0.007135
Amount Units: ng/ml



Reviewer: mongkols, 11-Jan-2019 09:26:44
Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 140-13780-1

SDG No.:

Client Sample ID: | Lab Sample ID: ICB 320-269628/9

Matrix: Air | Lab File ID: 2019.01.08ICALAA._009.d

Analysis Method: 537 (modified) | Date Collected:

Extraction Method: | Date Extracted:

Sample wt/vol: 1(mL) | Date Analyzed: 01/08/2019 18:33

Con. Extract Vol.: | Dilution Factor: 1

Injection Volume: 20(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 269628 | Units: ng/mL

CAS NO.	COMPOUND NAME	RESULT	Q	RL	MDL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.006684	J	0.0500	0.00500
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.008960	J	0.0500	0.00630
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.01258	J	0.0500	0.00430
375-95-1	Perfluorononanoic acid (PFNA)	0.007706	J	0.0500	0.00680
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	ND		0.0500	0.0140
335-67-1	Perfluorooctanoic acid (PFOA)	ND		0.0500	0.0210

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL02337	13C3 PFBS	98		25-150
STL01892	13C4 PFHpA	95		25-150
STL00995	13C5 PFNA	100		25-150
STL00990	13C4 PFOA	101		25-150
STL00991	13C4 PFOS	102		25-150
STL00994	18O2 PFHxS	95		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._009.d
Lims ID: ICB
Client ID:
Sample Type: ICB
Inject. Date: 08-Jan-2019 18:33:47 ALS Bottle#: 20 Worklist Smp#: 9
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Sample Info: ICB
Misc. Info.: Plate: 1 Rack: 1
Operator ID: A9\Administrator Instrument ID: A9

Method: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\PFAS_A9.m
Limit Group: LC PFC ICAL
Last Update: 09-Jan-2019 08:27:59 Calib Date: 08-Jan-2019 18:26:16
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._008.d

Column 1 : Det: EXP1
Process Host: CTX0309

First Level Reviewer: roycea Date: 09-Jan-2019 08:21:13
Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
217.00 > 172.00	1.680	1.685	-0.005	0.526	6898764	2.44		97.6	8958	
2 Perfluorobutanoic acid										
212.90 > 169.00	1.688	1.686	0.002	1.005	14304	0.005599			1.7	
D 3 13C5 PFPeA										
267.90 > 223.00	2.025	2.025	0.0	0.634	6053296	2.45		97.9	3121	
D 5 13C3 PFBS										
301.90 > 80.00	2.056	2.059	-0.003	0.644	9261454	2.28		98.1	2822190	
6 Perfluorobutanesulfonic acid										
298.90 > 80.00	2.068	2.059	0.009	1.006	25690	0.006684	Target=2.70		34.9	
298.90 > 99.00	2.068	2.059	0.009	1.006	9075		2.83(1.35-4.05)		13.6	
D 8 M2-4:2 FTS										
329.00 > 81.00	2.350	2.351	-0.001	0.736	572228	2.31		99.0	833	
7 1H,1H,2H,2H-perfluorohexanesulfoni										
327.00 > 307.00	2.350	2.352	-0.002	1.143	1909	0.003239			15.8	
D 9 13C2 PFHxA										
315.00 > 270.00	2.396	2.394	0.002	0.751	6930098	2.52		101	2689	
10 Perfluorohexanoic acid										
313.00 > 269.00	2.396	2.396	0.0	1.000	21493	0.008952	Target=13.92		9.9	
313.00 > 119.00	2.396	2.396	0.0	1.000	1612		13.33(6.96-20.87)		4.8	
11 Perfluoropentanesulfonic acid										
349.00 > 80.00	2.415	2.410	0.005	1.174	9670	0.005178	Target=2.30		39.6	
349.00 > 99.00	2.415	2.410	0.005	1.174	5242		1.84(1.15-3.45)		22.2	
D 13 13C3 HFPO-DA										
332.10 > 287.00	2.523	2.512	0.011	0.790	621614	2.52		101	1447	
15 Perfluoroheptanoic acid										
363.00 > 319.00	2.796	2.790	0.006	1.003	30014	0.008960	Target=4.34		11.2	
363.00 > 169.00	2.805	2.790	0.015	1.006	6954		4.32(2.17-6.52)		15.5	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 16 13C4 PFHpA										
367.00 > 322.00	2.787	2.791	-0.004	0.873	8048758	2.38		95.3	3299	
18 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.796	2.798	-0.002	1.000	35230	0.0126	Target=3.80		79.5	
399.00 > 99.00	2.796	2.798	-0.002	1.000	9864		3.57(1.90-5.70)		12.3	
D 17 18O2 PFHxS										
403.00 > 84.00	2.796	2.798	-0.002	0.876	5351338	2.24		94.7	2742	
19 DONA										
377.00 > 251.00	2.841	2.841	0.0	0.796	35314	0.006142	Target=2.26		110	
377.00 > 85.00	2.841	2.841	0.0	0.796	14547		2.43(1.13-3.39)		18.7	
D 20 M2-6:2 FTS										
429.00 > 81.00	3.176	3.175	0.001	0.995	816708	2.45		103	1034	
21 1H,1H,2H,2H-perfluorooctanesulfoni										
427.00 > 407.00	3.176	3.177	-0.001	1.000	8261	0.0114			15.0	
D 22 13C8 PFOA										
421.00 > 376.00	3.192	3.191	0.001		6108527	2.58		106	2604	
23 Perfluoroheptanesulfonic acid										
449.00 > 80.00	3.192	3.191	0.001	0.894	16753	0.006368	Target=3.69		39.3	
449.00 > 99.00	3.200	3.191	0.009	0.896	3699		4.53(1.84-5.53)		14.9	
* 24 13C2 PFOA										
415.00 > 370.00	3.192	3.194	-0.002		7403106	2.50			3259	
D 25 13C4 PFOA										
417.00 > 372.00	3.192	3.195	-0.003	1.000	7387771	2.52		101	2891	
26 Perfluorooctanoic acid										M
413.00 > 369.00	3.200	3.195	0.005	1.002	40785	0.0133	Target=2.72		7.0	M
413.00 > 169.00	3.200	3.195	0.005	1.002	14239		2.86(1.36-4.08)		27.9	
D 27 13C8 PFOS										
507.00 > 99.00	3.563	3.566	-0.003		1274405	2.55		107	1678	
29 Perfluorooctanesulfonic acid										
499.00 > 80.00	3.571	3.570	0.001	1.000	18462	0.007026	Target=4.08		17.0	
499.00 > 99.00	3.578	3.570	0.008	1.002	4473		4.13(2.04-6.12)		25.0	
D 28 13C4 PFOS										
503.00 > 80.00	3.571	3.571	0.0	1.119	5959332	2.44		102	4381	
D 31 13C5 PFNA										
468.00 > 423.00	3.578	3.584	-0.006	1.121	6570327	2.49		99.5	2370	
30 Perfluorononanoic acid										M
463.00 > 419.00	3.585	3.586	-0.001	1.002	20162	0.007706	Target=5.35		3.4	M
463.00 > 169.00	3.585	3.586	-0.001	1.002	4639		4.35(2.68-8.03)		13.8	
32 9-Chlorohexadecafluoro-3-oxanonane										
531.00 > 351.00	3.771	3.774	-0.003	1.056	16558	0.006951			19.7	
D 33 13C8 FOSA										
506.00 > 78.00	3.896	3.891	0.005	1.221	3929051	2.45		97.9	2826	
34 Perfluorooctanesulfonamide										
498.00 > 78.00	3.896	3.894	0.002	1.000	33418	0.007315			54.2	
35 Perfluorononanesulfonic acid										
549.00 > 80.00	3.913	3.919	-0.006	1.096	9004	0.006173	Target=6.03		34.2	
549.00 > 99.00	3.930	3.919	0.011	1.101	991		9.09(3.02-9.05)			

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 36 13C2 PFDA										
515.00 > 470.00	3.940	3.942	-0.002	1.234	6374647	2.47		98.7	3724	
37 1H,1H,2H,2H-perfluorodecanesulfoni										
527.00 > 507.00	3.949	3.946	0.003	1.002	3241	0.006237			21.4	
D 39 M2-8:2 FTS										
529.00 > 81.00	3.940	3.947	-0.007	1.234	87659	2.29		95.7	388	
47 MeFOSA										
512.00 > 169.00	3.958	4.005	-0.047		524	NC			1.4	
D 40 d3-NMeFOSAA										
573.00 > 419.00	4.106	4.109	-0.003	1.287	1591263	2.35		94.1	1981	
41 N-methylperfluorooctanesulfonamido										M
570.00 > 419.00	4.116	4.114	0.002	1.002	28509	0.0517			10.4	M
42 Perfluorodecanesulfonic acid										
599.00 > 80.00	4.237	4.241	-0.004	1.187	12814	0.005876	Target=4.28		36.0	
599.00 > 99.00	4.237	4.241	-0.004	1.187	2923		4.38(2.14-6.43)		14.4	
D 44 13C2 PFUnA										
565.00 > 520.00	4.263	4.266	-0.003	1.336	5270559	2.60		104	4446	
D 45 d5-NEtFOSAA										
589.00 > 419.00	4.272	4.272	0.0	1.338	1421897	2.52		101	1560	
46 N-ethylperfluorooctanesulfonamidoa										
584.00 > 419.00	4.280	4.278	0.002	1.002	20606	0.0438			61.8	
51 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.254	4.279	-0.025		1034	NC			1.5	
48 11-Chloroeicosafluoro-3-oxaundecan										
631.00 > 451.00	4.405	4.407	-0.002	1.234	13547	0.004817			41.3	
D 49 13C2 PFDoA										
615.00 > 570.00	4.560	4.560	0.0	1.429	6042591	2.45		98.2	3569	
50 Perfluorododecanoic acid										
613.00 > 569.00	4.553	4.561	-0.008	0.998	22958	0.009891	Target=9.37		6.8	
613.00 > 169.00	4.560	4.561	-0.001	1.000	1765		13.01(4.68-14.05)		7.6	
52 1H,1H,2H,2H-perfluorododecanesulfo										
627.00 > 607.00	4.586	4.578	0.008	1.164	1645	0.005077			7.7	
53 Perfluorododecanesulfonic acid (PF										
699.00 > 80.00	4.798	4.793	0.005	1.344	821	0.003625	Target=0.55		7.0	
699.00 > 99.00	4.790	4.793	-0.003	1.342	1394		0.59(0.28-0.83)		16.4	
54 Perfluorotridecanoic acid										
663.00 > 619.00	4.827	4.830	-0.003	1.058	14970	0.008159	Target=6.18		10.6	
663.00 > 169.00	4.827	4.830	-0.003	1.058	2283		6.56(3.09-9.27)		14.3	
D 55 13C2 PFTeDA										
715.00 > 670.00	5.077	5.080	-0.003	1.591	4169820	2.44		97.7	4304	
56 Perfluorotetradecanoic acid										
713.00 > 169.00	5.068	5.080	-0.012	0.998	2064	0.007579	Target=1.39		9.3	
713.00 > 219.00	5.077	5.080	-0.003	1.000	2393		0.86(0.70-2.09)		19.6	
D 57 13C2 PFHxDA										
815.00 > 770.00	5.536	5.545	-0.009	1.734	4004108	2.51		100	5087	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
58 Perfluorohexadecanoic acid										
813.00 > 769.00	5.546	5.546	0.0	1.002	47723	0.008826	Target=5.55		3.9	
813.00 > 169.00	5.536	5.546	-0.010	1.000	7714		6.19(2.77-8.32)		48.2	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Reagents:

LCPFC_LL0_00011 Amount Added: 1.00 Units: mL

Report Date: 09-Jan-2019 08:28:04 Chrom Revision: 2.3 13-Dec-2018 17:23:12

TestAmerica Sacramento

Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._009.d

Injection Date: 08-Jan-2019 18:33:47 Instrument ID: A9

Lims ID: ICB

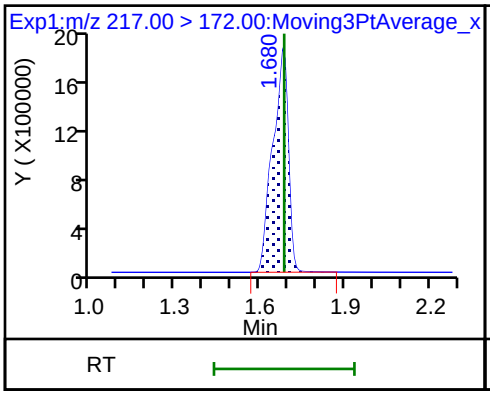
Client ID:

Operator ID: A9\Administrator ALS Bottle#: 20 Worklist Smp#: 9

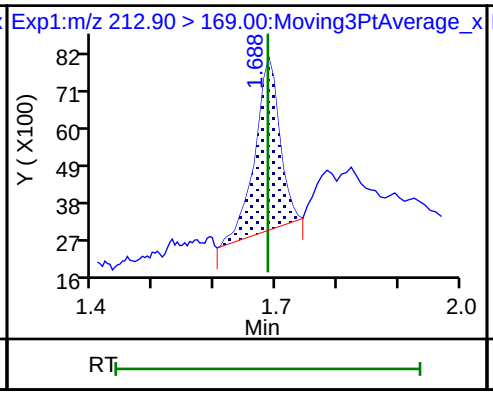
Injection Vol: 20.0 ul Dil. Factor: 1.0000

Method: PFAS_A9 Limit Group: LC PFC ICAL

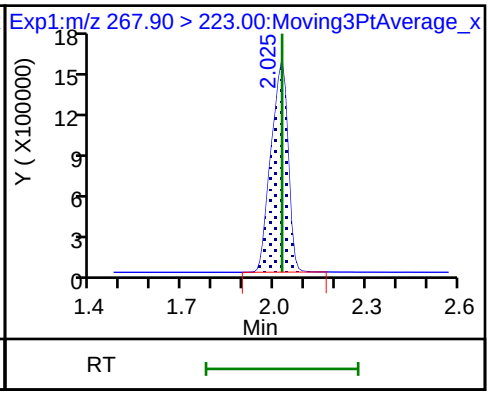
D 1 13C4 PFBA



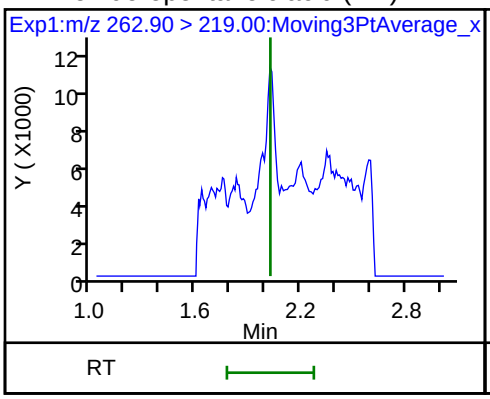
2 Perfluorobutanoic acid



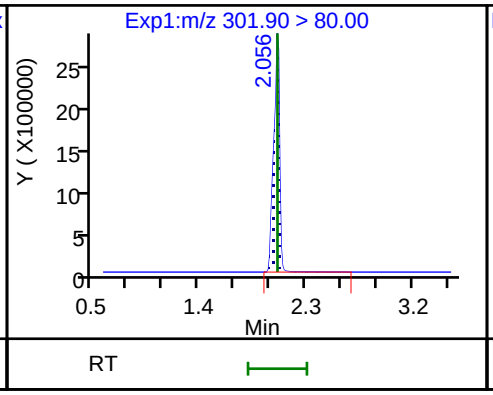
D 3 13C5 PFPeA



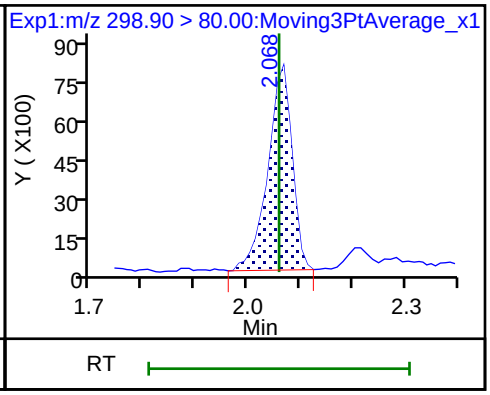
4 Perfluoropentanoic acid (ND)



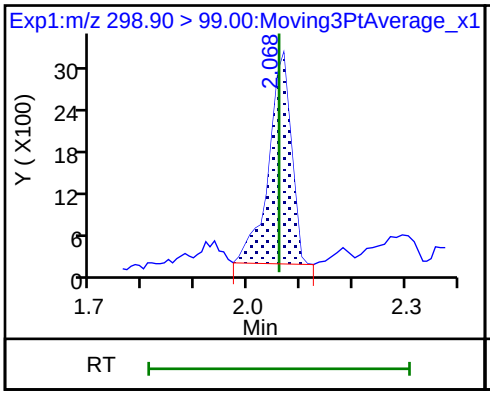
D 5 13C3 PFBS



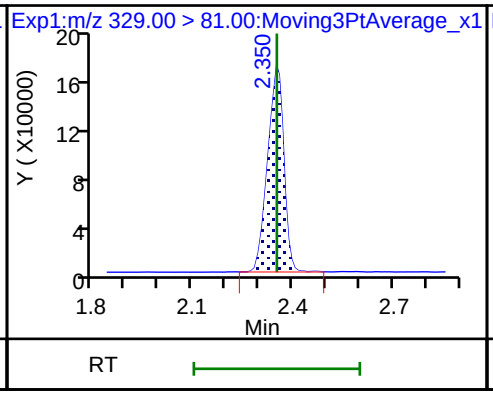
6 Perfluorobutanesulfonic acid



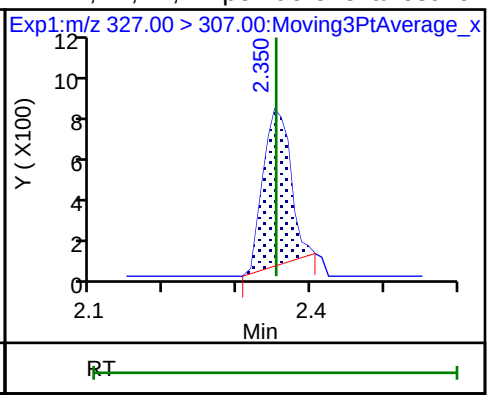
6 Perfluorobutanesulfonic acid



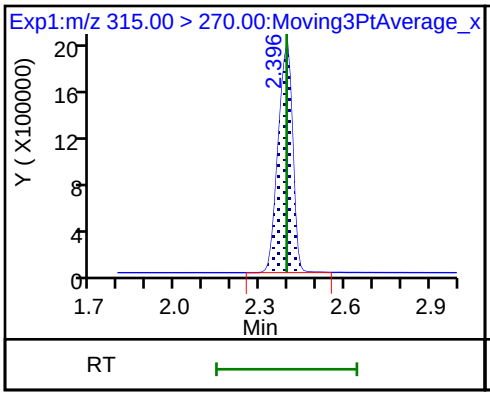
D 8 M2-4:2 FTS



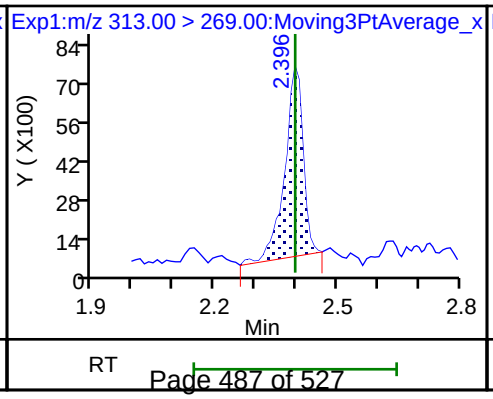
7 1H,1H,2H,2H-perfluorohexanesulfoni



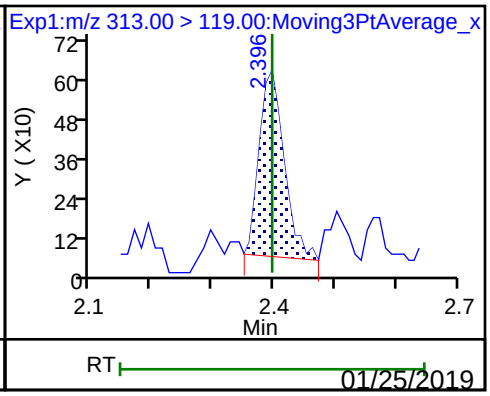
D 9 13C2 PFHxA



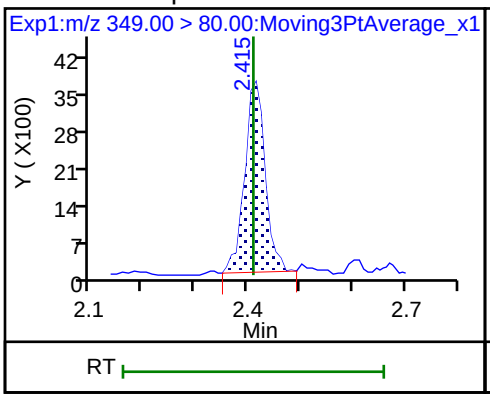
10 Perfluorohexanoic acid



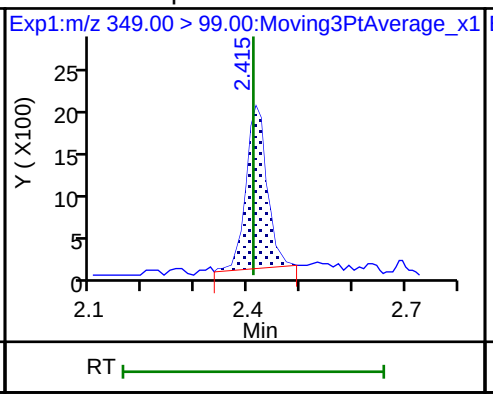
10 Perfluorohexanoic acid



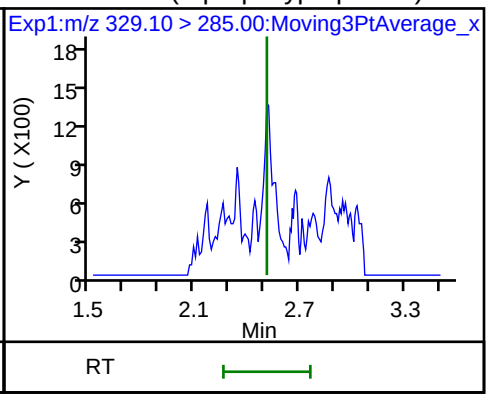
11 Perfluoropentanesulfonic acid



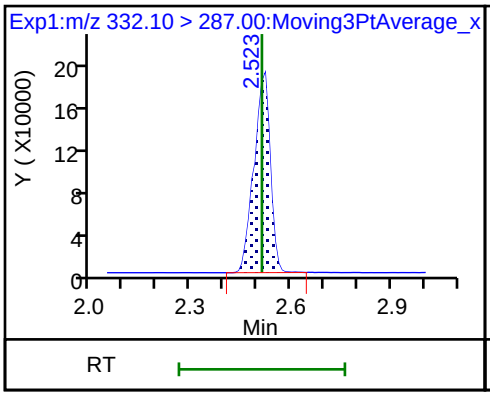
11 Perfluoropentanesulfonic acid



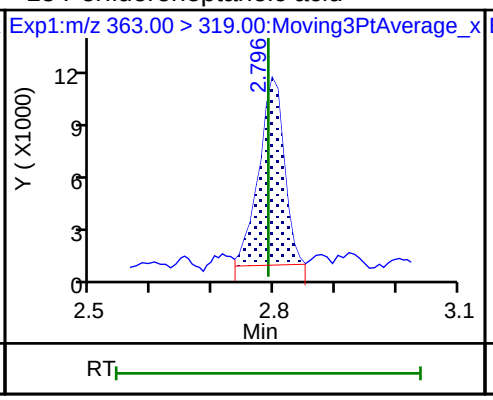
14 Perfluoro(2-propoxypropanoic) acid (ND)



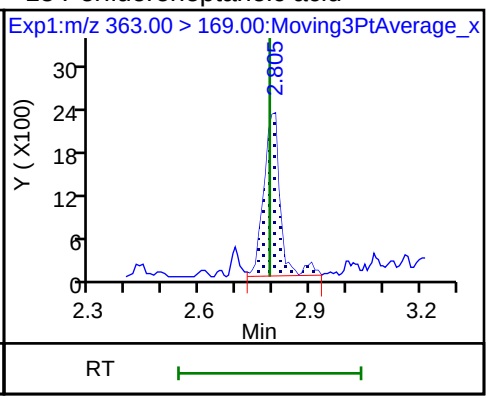
D 13 13C3 HFPO-DA



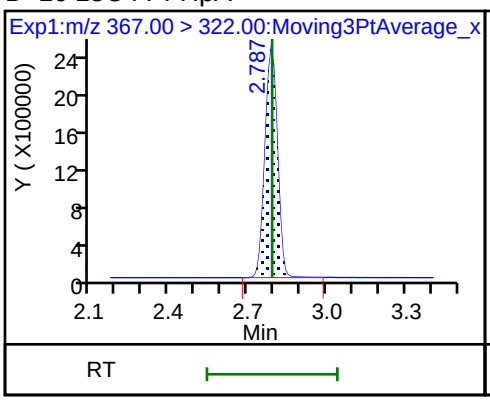
15 Perfluoroheptanoic acid



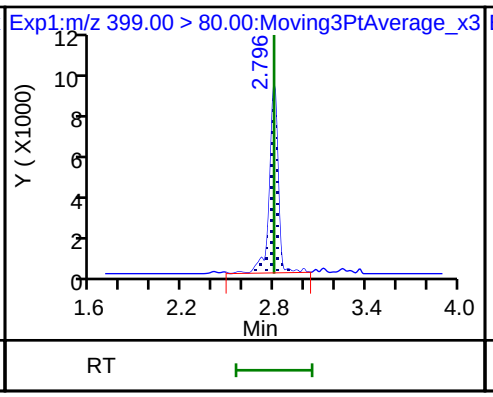
15 Perfluoroheptanoic acid



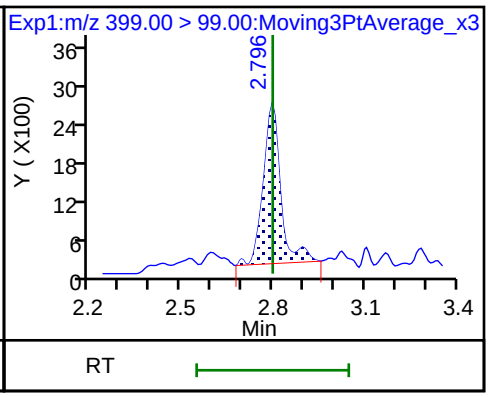
D 16 13C4 PFHpA



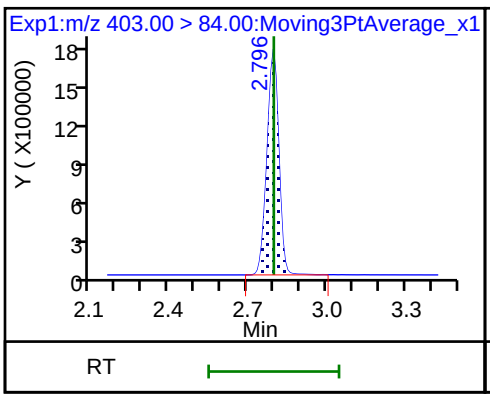
18 Perfluorohexanesulfonic acid



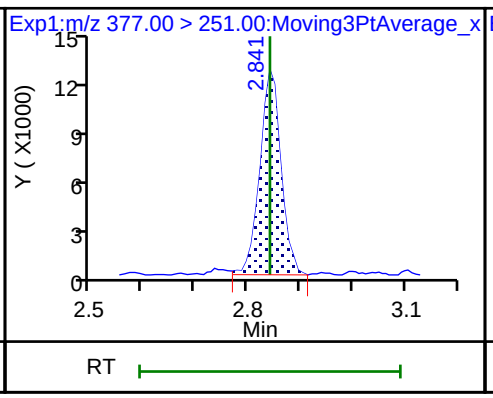
18 Perfluorohexanesulfonic acid



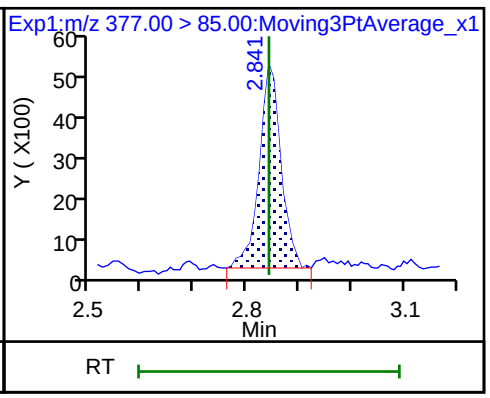
D 17 18O2 PFHxS



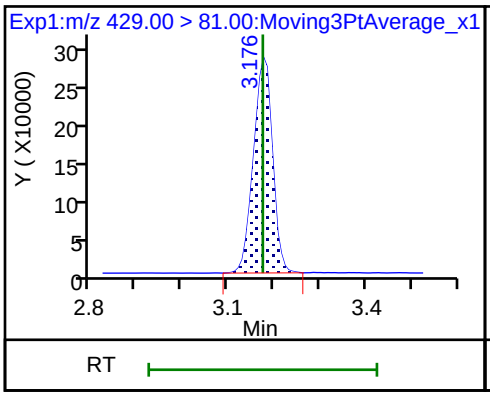
19 DONA



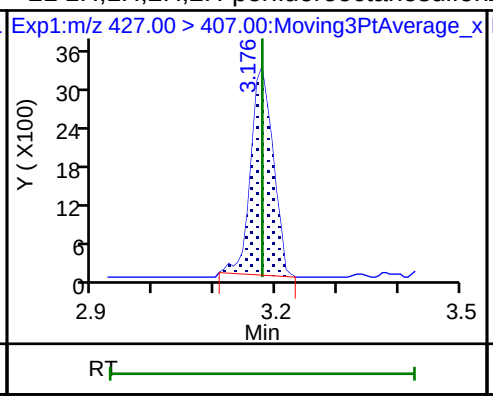
19 DONA



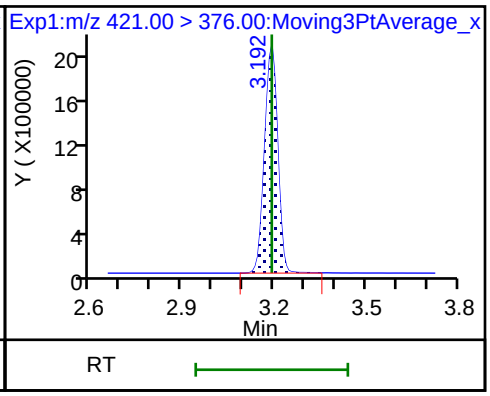
D 20 M2-6:2 FTS



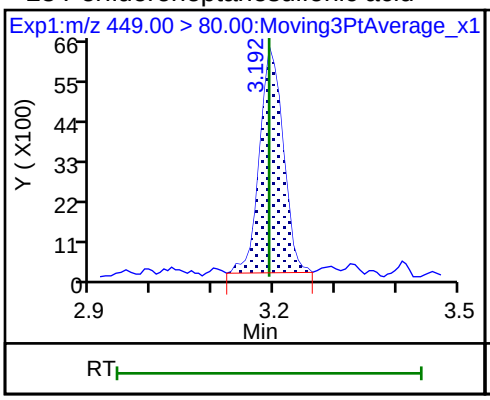
21 1H,1H,2H,2H-perfluorooctanesulfon



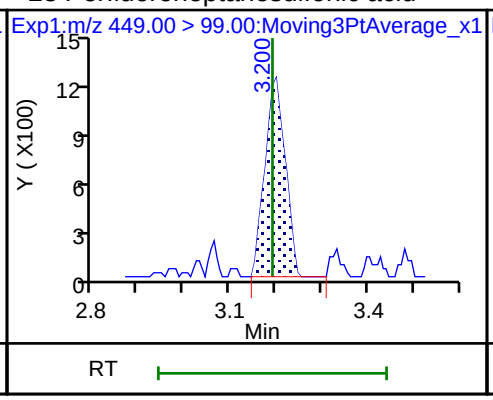
D 22 13C8 PFOA



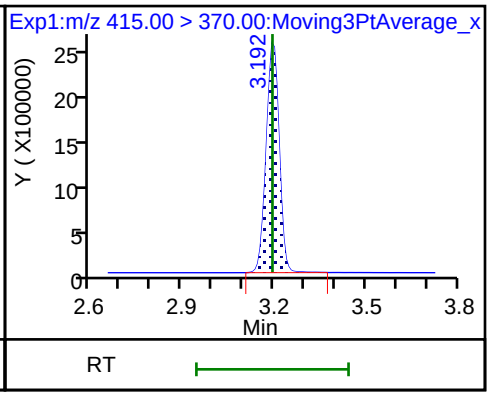
23 Perfluoroheptanesulfonic acid



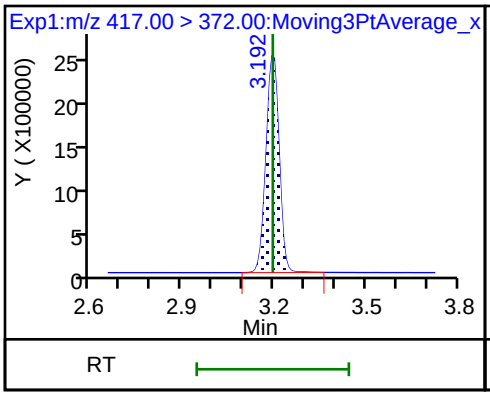
23 Perfluoroheptanesulfonic acid



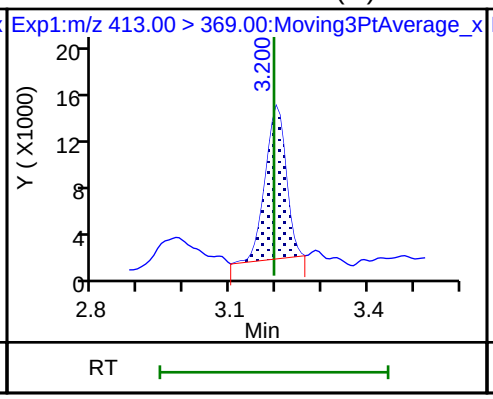
* 24 13C2 PFOA



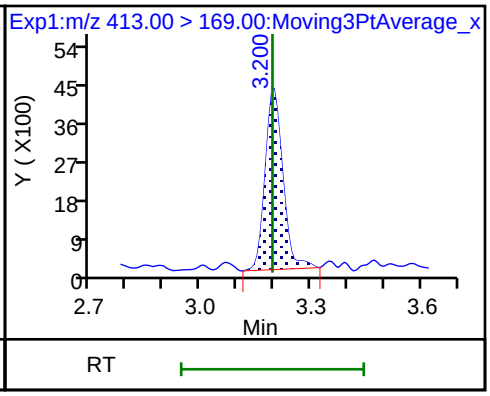
D 25 13C4 PFOA



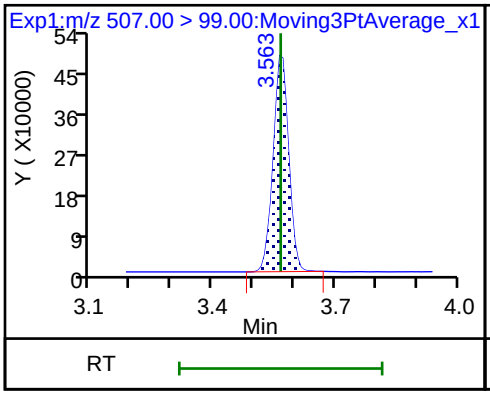
26 Perfluorooctanoic acid (M)



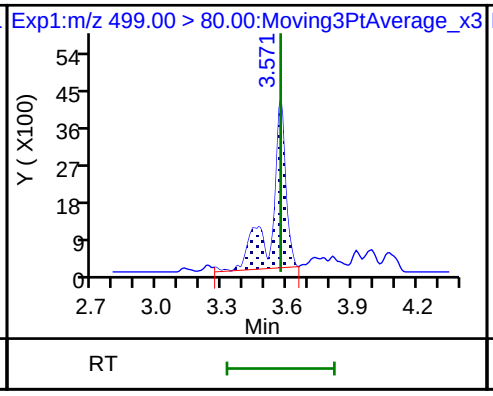
26 Perfluorooctanoic acid



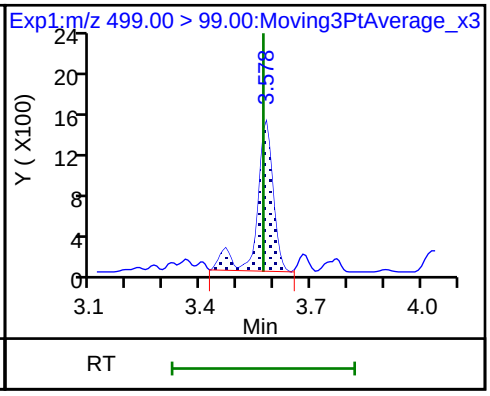
D 27 13C8 PFOS



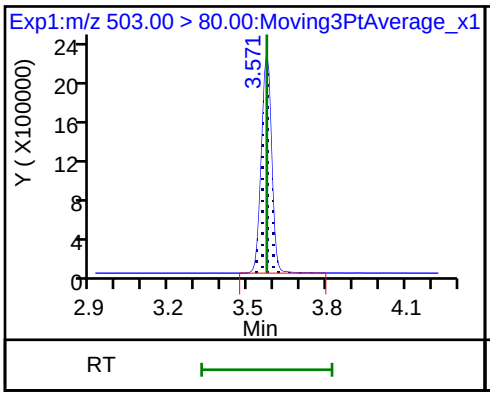
29 Perfluorooctanesulfonic acid



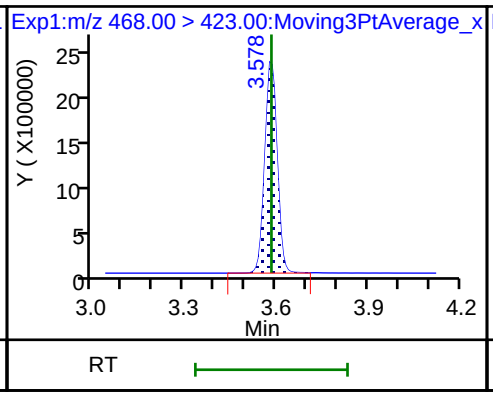
29 Perfluorooctanesulfonic acid



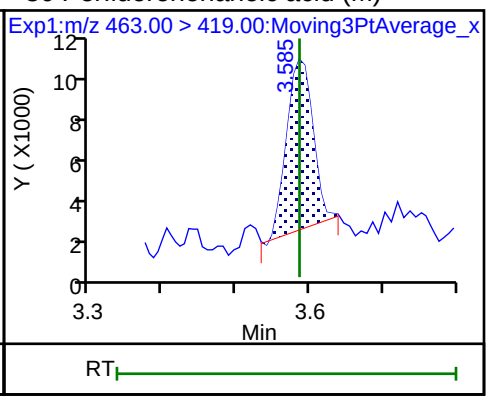
D 28 13C4 PFOS



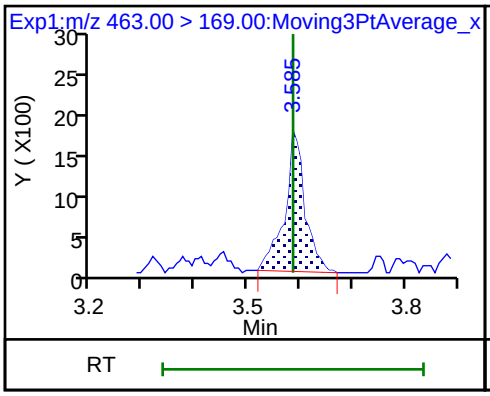
D 31 13C5 PFNA



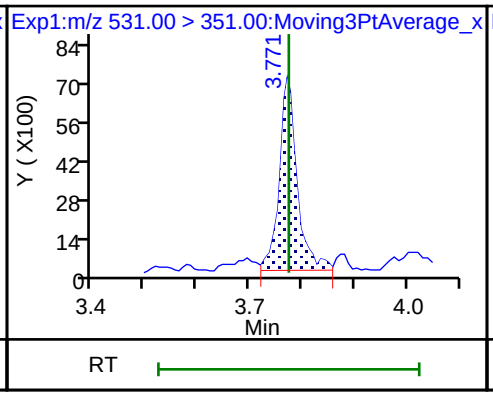
30 Perfluorononanoic acid (M)



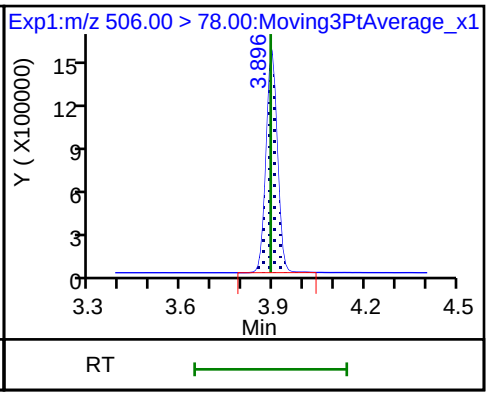
30 Perfluorononanoic acid



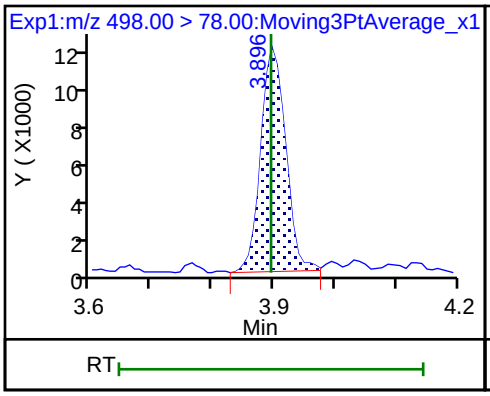
32 9-Chlorohexadecafluoro-3-oxanonane



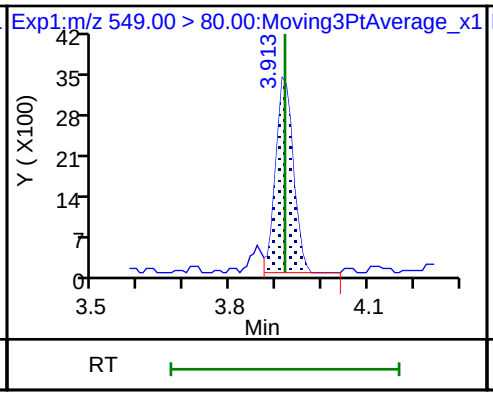
D 33 13C8 FOSA



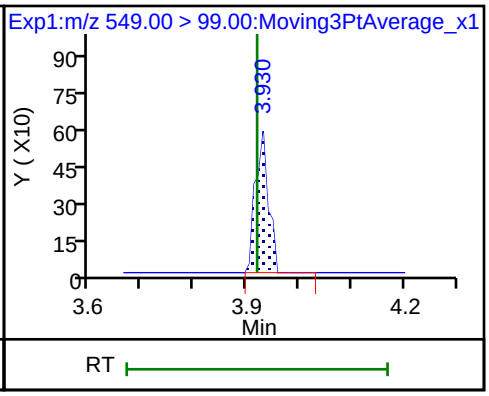
34 Perfluorooctanesulfonamide



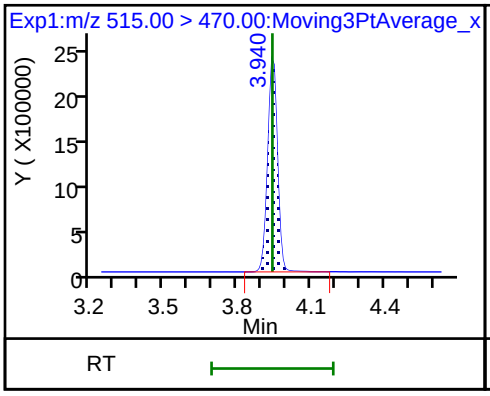
35 Perfluorononanesulfonic acid



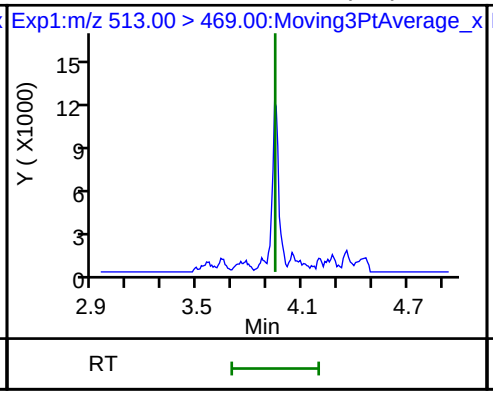
35 Perfluorononanesulfonic acid



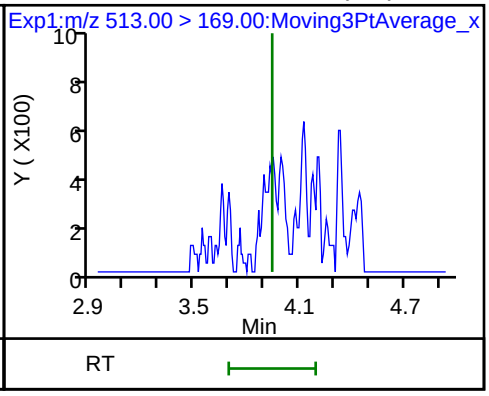
D 36 13C2 PFDA



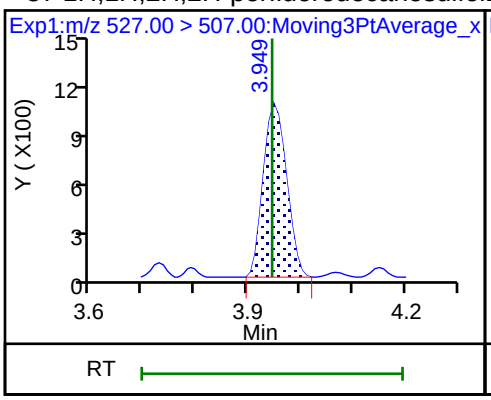
38 Perfluorodecanoic acid (ND)



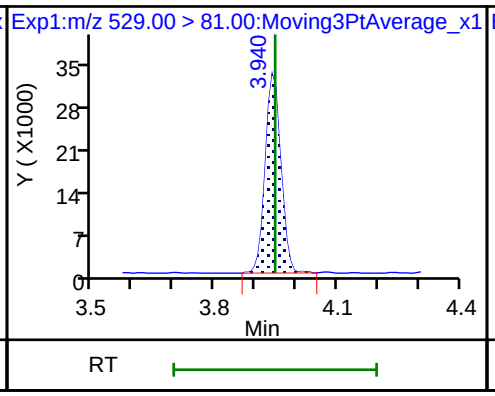
38 Perfluorodecanoic acid (ND)



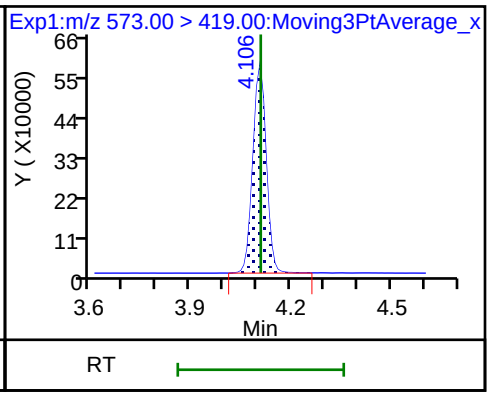
37 1H,1H,2H,2H-perfluorodecanesulfon



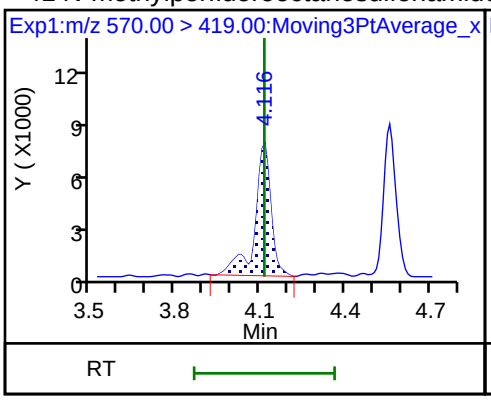
D 39 M2-8:2 FTS



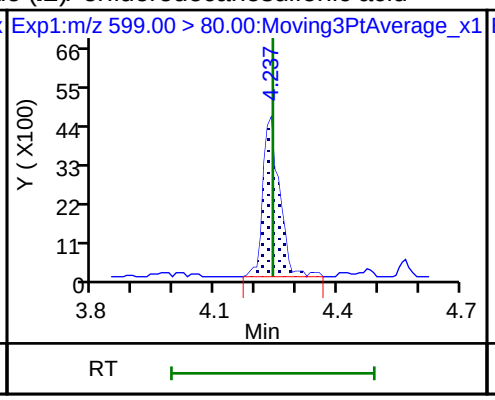
D 40 d3-NMeFOSAA



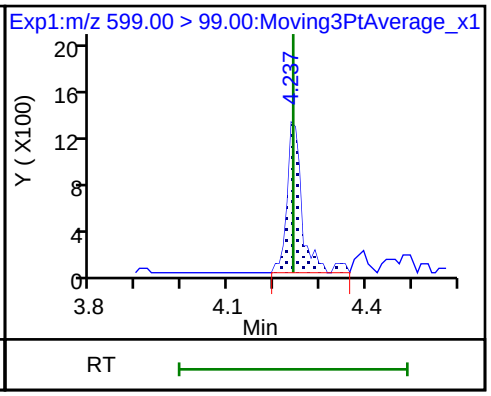
41 N-methylperfluorooctanesulfonamido a



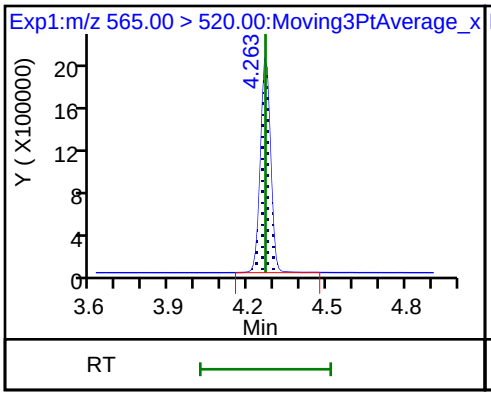
42 Perfluorodecanesulfonic acid



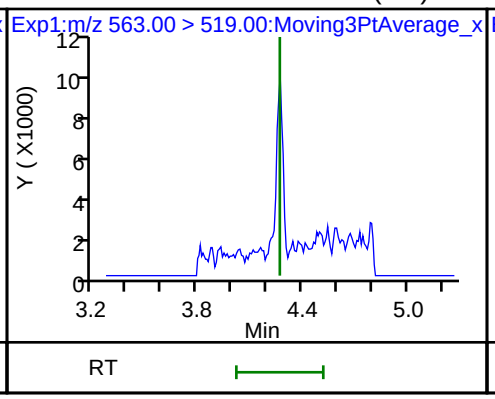
42 Perfluorodecanesulfonic acid



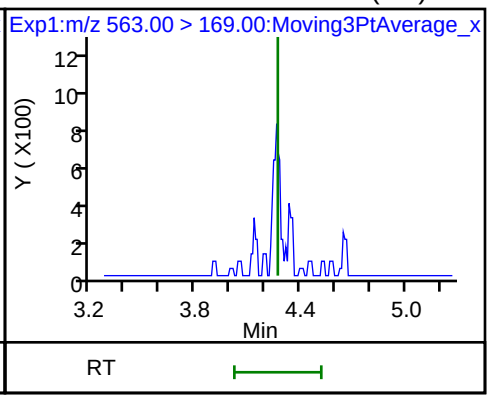
D 44 13C2 PFUnA



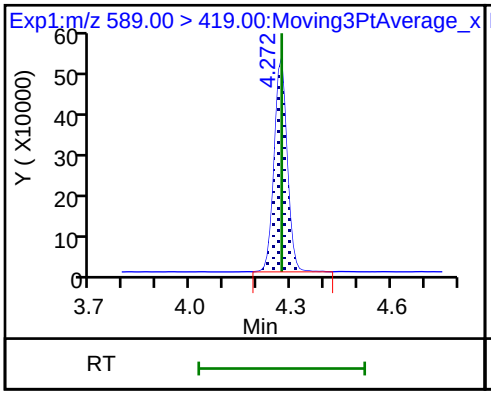
43 Perfluoroundecanoic acid (ND)



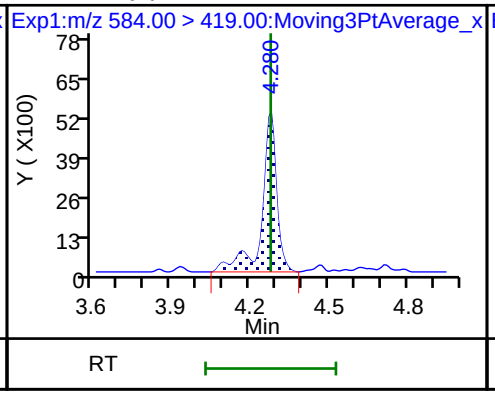
43 Perfluoroundecanoic acid (ND)



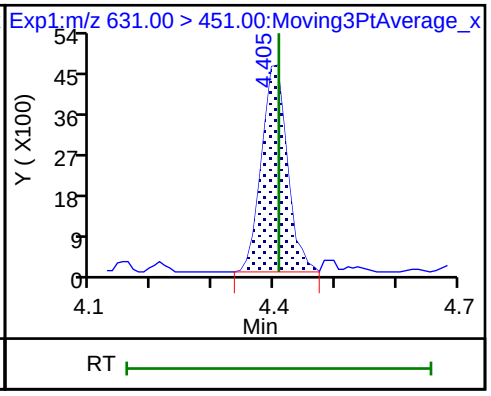
D 45 d5-NEtFOSAA



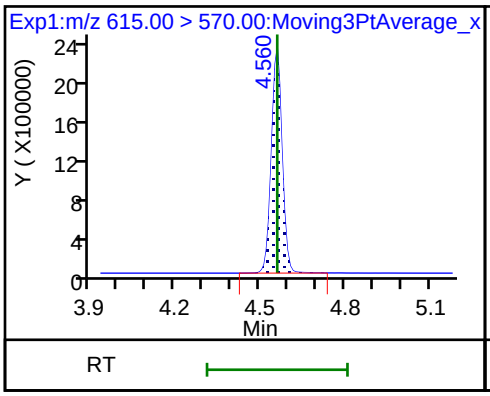
46 N-ethylperfluorooctanesulfonamidoa



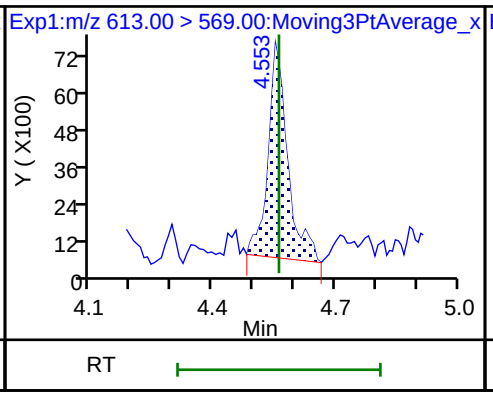
48 11-Chloroeicosafluoro-3-oxaundecan



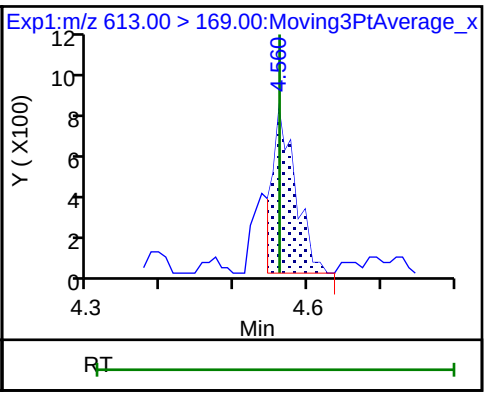
D 49 13C2 PFDoA



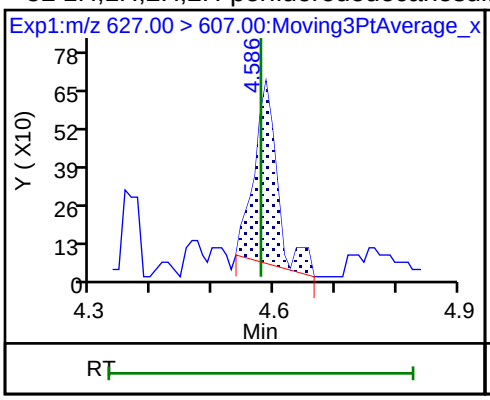
50 Perfluorododecanoic acid



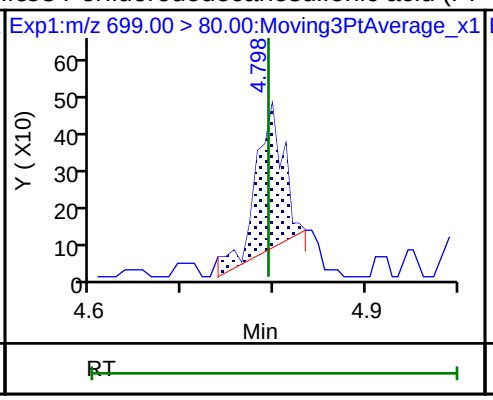
50 Perfluorododecanoic acid



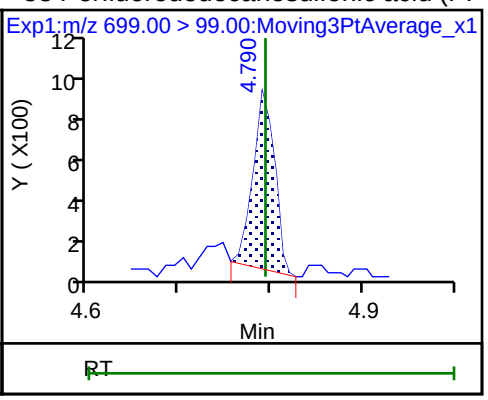
52 1H,1H,2H-perfluorododecanesulfo



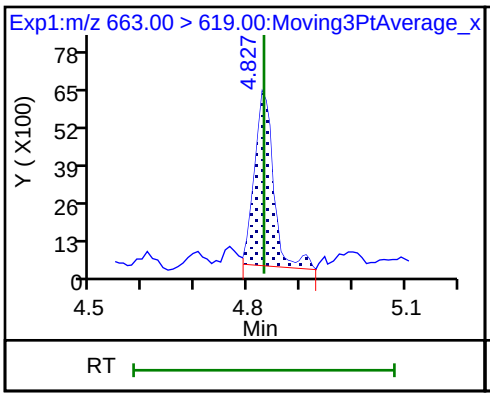
53 Perfluorododecanesulfonic acid (PF



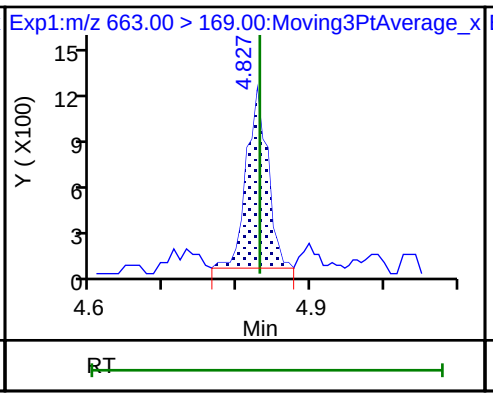
53 Perfluorododecanesulfonic acid (PF



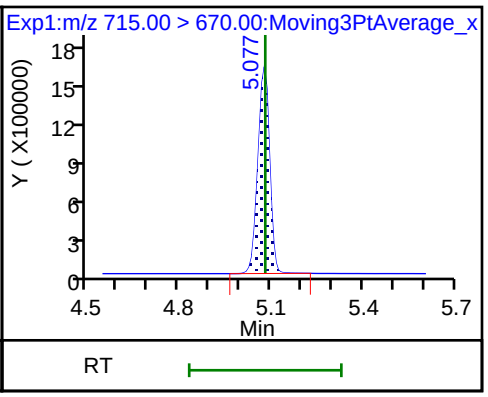
54 Perfluorotridecanoic acid



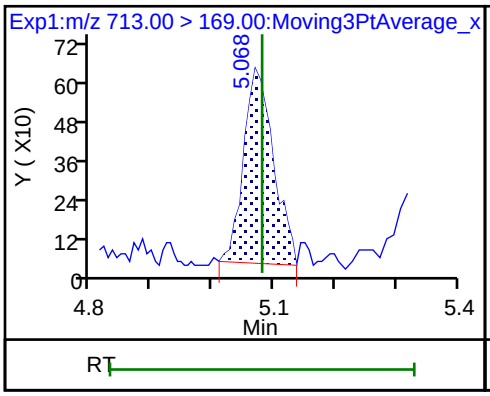
54 Perfluorotridecanoic acid



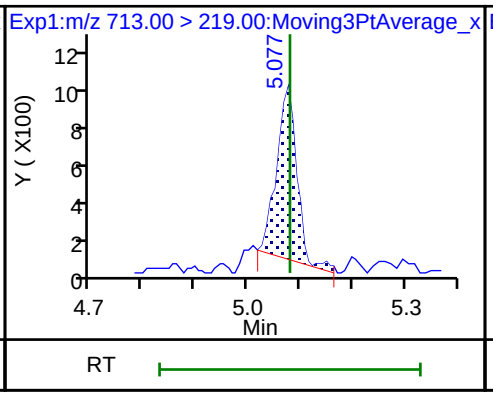
D 55 13C2 PFTeDA



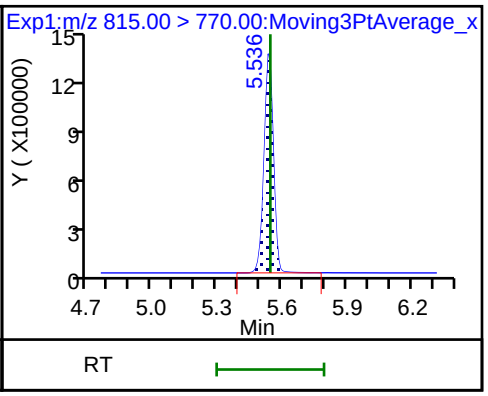
56 Perfluorotetradecanoic acid



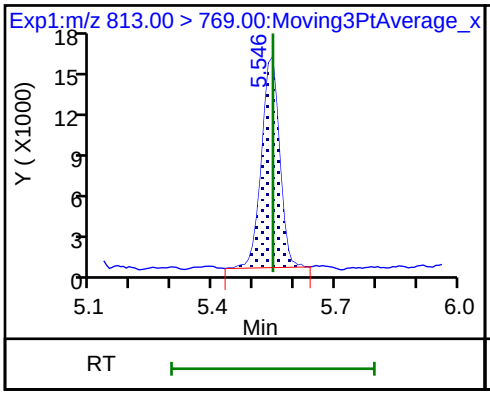
56 Perfluorotetradecanoic acid



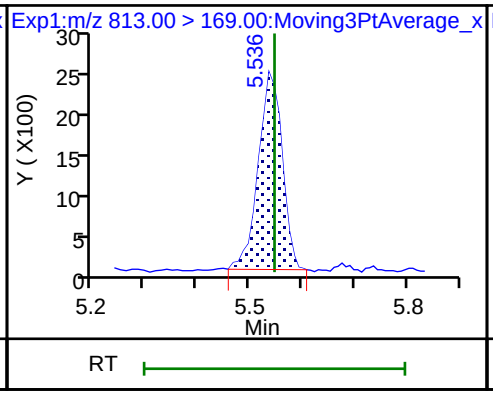
D 57 13C2 PFHxDA



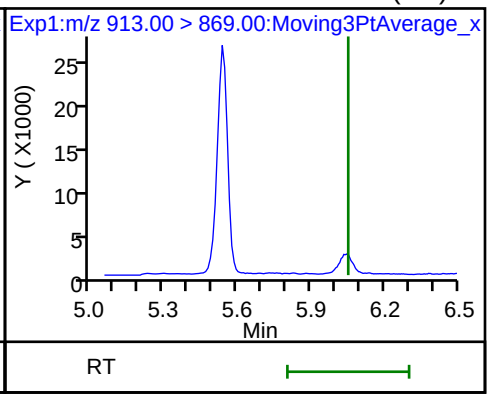
58 Perfluorohexadecanoic acid



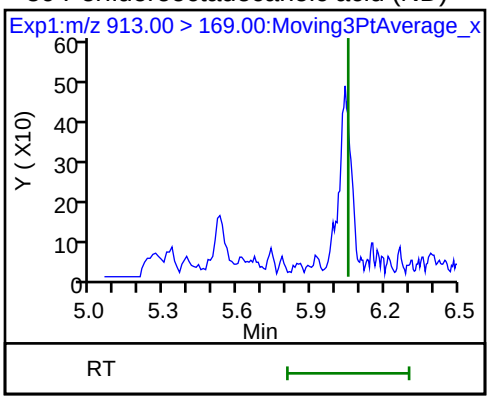
58 Perfluorohexadecanoic acid



59 Perfluorooctadecanoic acid (ND)



59 Perfluorooctadecanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

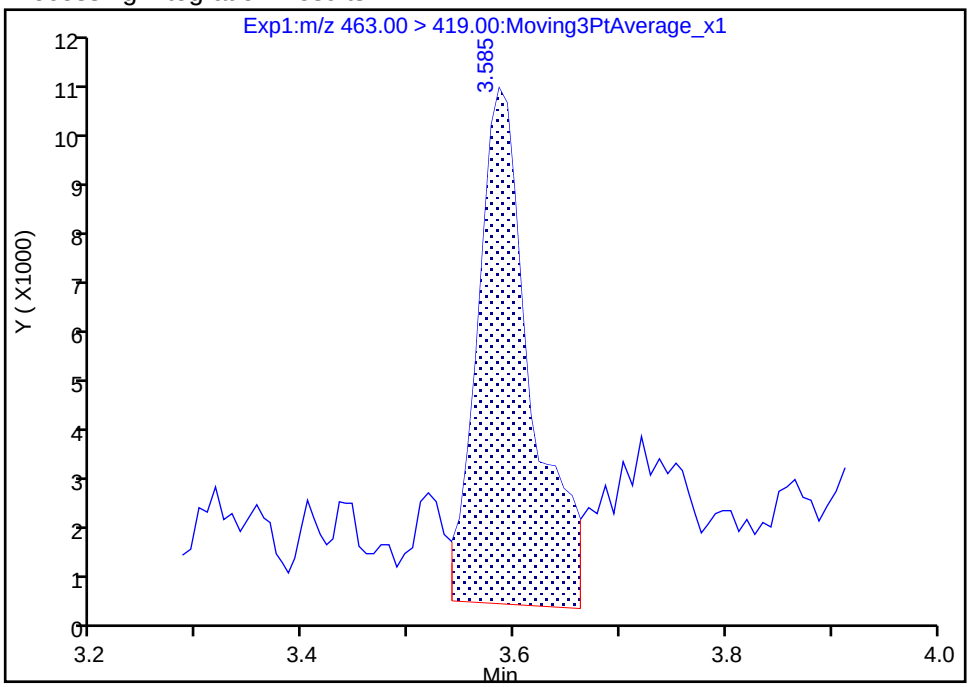
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._009.d
Injection Date: 08-Jan-2019 18:33:47 Instrument ID: A9
Lims ID: ICB
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 20 Worklist Smp#: 9
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

30 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

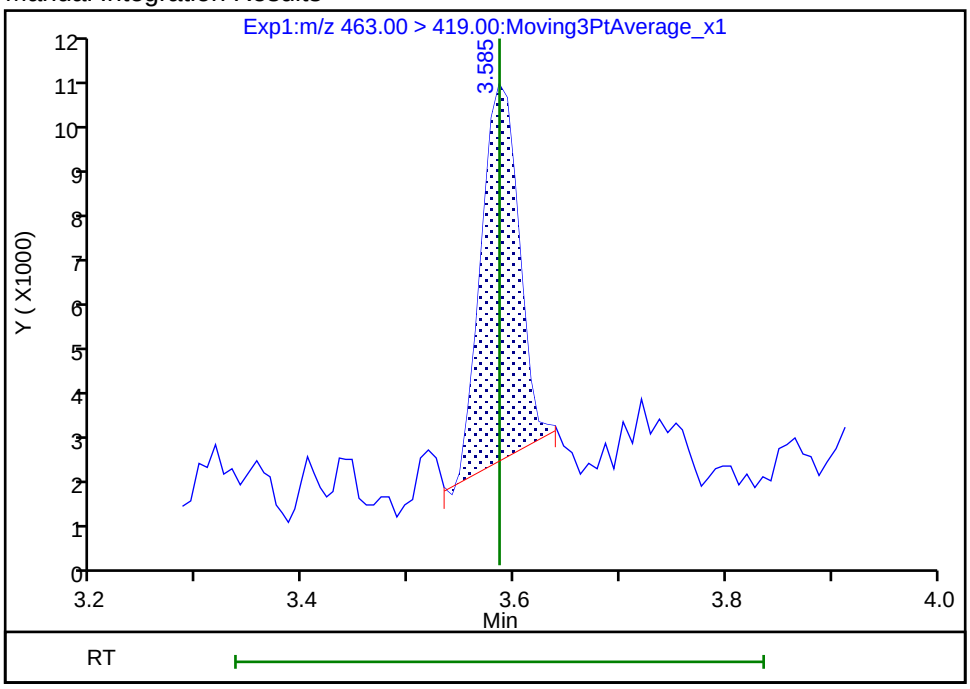
Processing Integration Results

RT: 3.59
Area: 35062
Amount: 0.013402
Amount Units: ng/ml



Manual Integration Results

RT: 3.59
Area: 20162
Amount: 0.007706
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 08:19:45
Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento

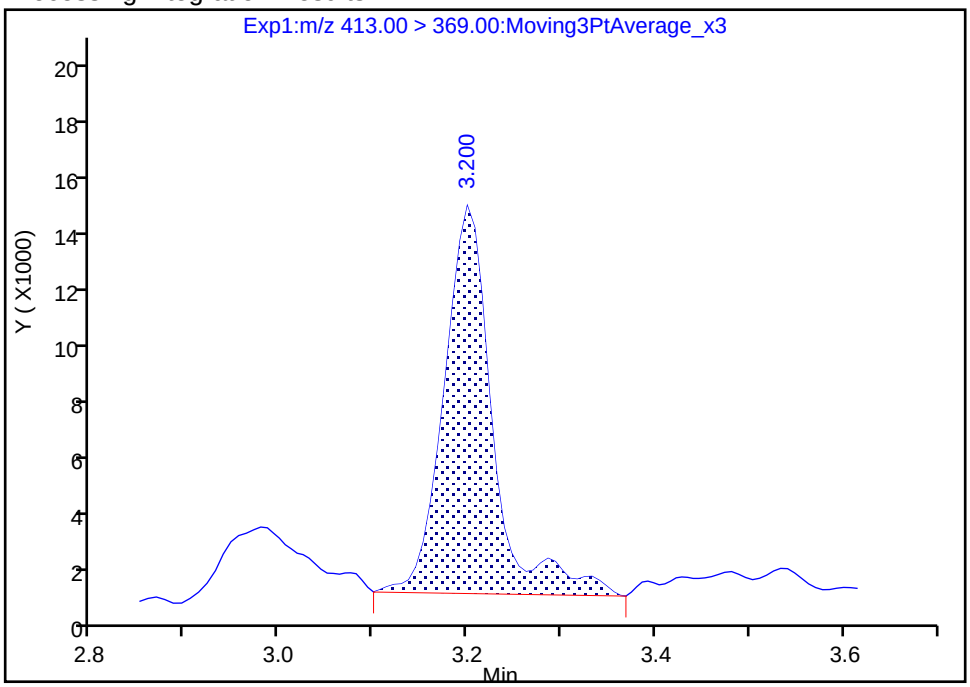
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._009.d
Injection Date: 08-Jan-2019 18:33:47 Instrument ID: A9
Lims ID: ICB
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 20 Worklist Smp#: 9
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

26 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

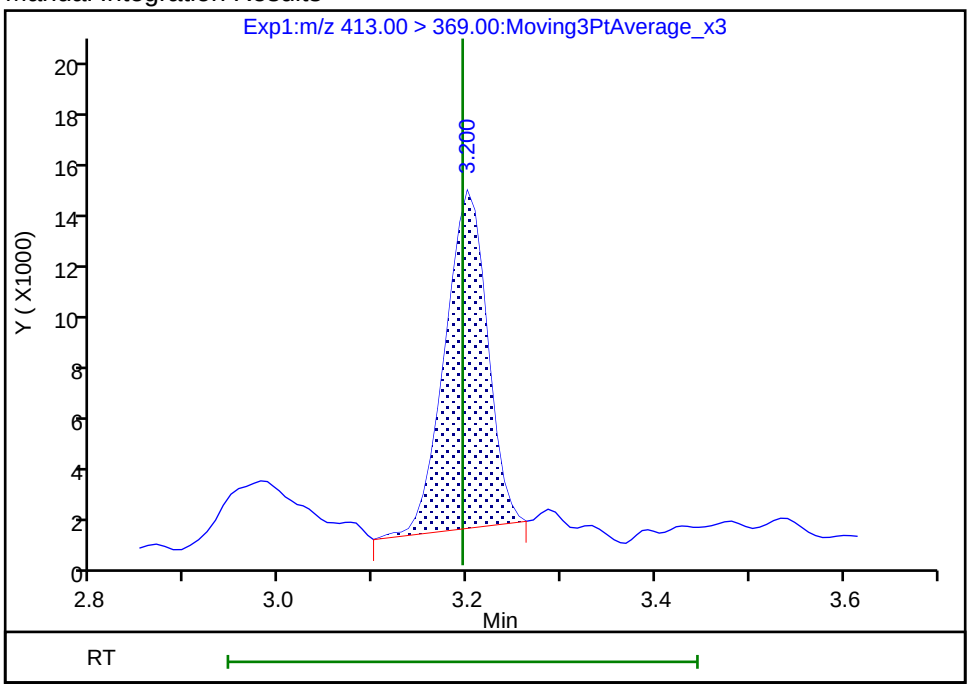
Processing Integration Results

RT: 3.20
Area: 48905
Amount: 0.015965
Amount Units: ng/ml



Manual Integration Results

RT: 3.20
Area: 40785
Amount: 0.013314
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 08:21:02
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

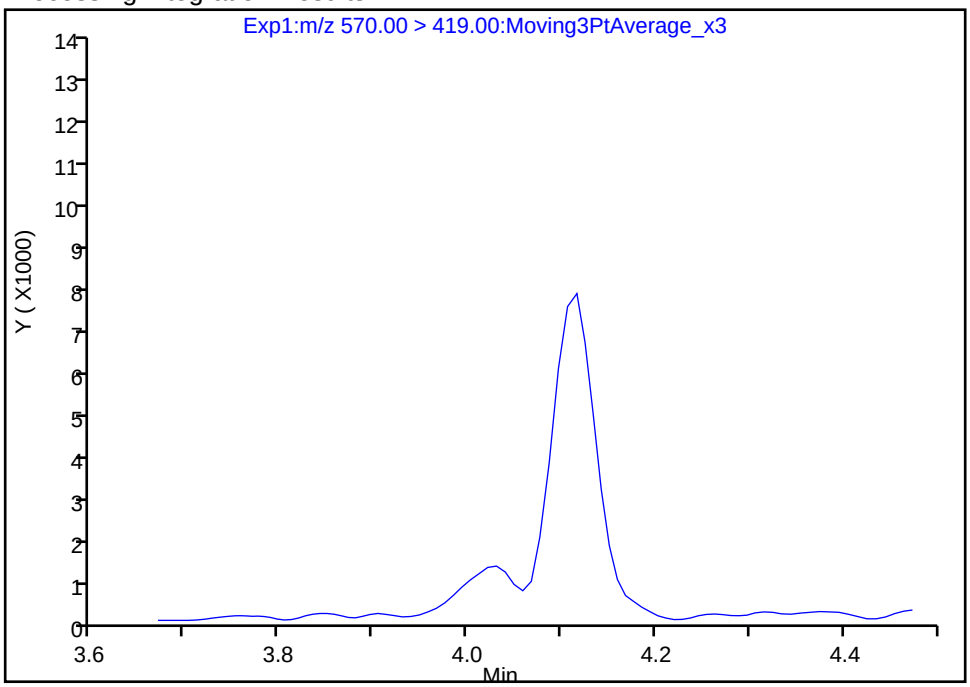
Data File: \\chromna\Sacramento\ChromData\A9\20190109-70278.b\2019.01.08ICALAA._009.d
Injection Date: 08-Jan-2019 18:33:47 Instrument ID: A9
Lims ID: ICB
Client ID:
Operator ID: A9\Administrator ALS Bottle#: 20 Worklist Smp#: 9
Injection Vol: 20.0 ul Dil. Factor: 1.0000
Method: PFAS_A9 Limit Group: LC PFC ICAL
Column: Detector EXP1

41 N-methylperfluorooctanesulfonamidoacetic aci, CAS: 2355-31-9

Signal: 1

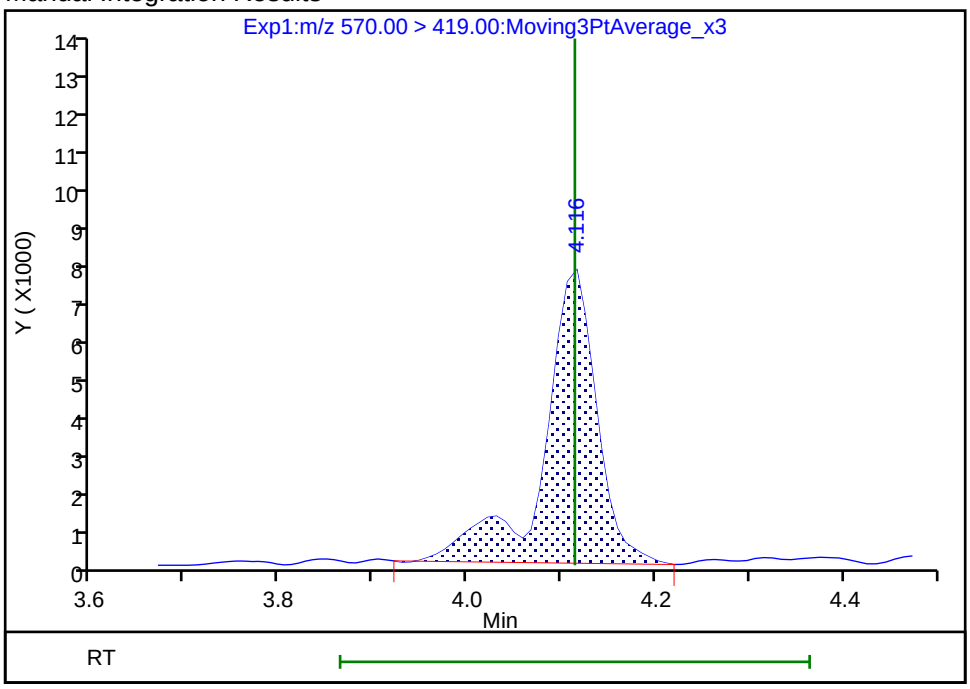
Not Detected
Expected RT: 4.11

Processing Integration Results



Manual Integration Results

RT: 4.12
Area: 28509
Amount: 0.051692
Amount Units: ng/ml



Reviewer: roycea, 09-Jan-2019 08:20:11
Audit Action: Manually Integrated Audit Reason: Assign Peak

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Start Date: 01/08/2019 17:41

Analysis Batch Number: 269628 End Date: 01/08/2019 18:41

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-269628/2		01/08/2019 17:41	1	2019.01.08ICALA A. 002.d	Acquity 2.1(mm)
IC 320-269628/3		01/08/2019 17:48	1	2019.01.08ICALA A. 003.d	Acquity 2.1(mm)
IC 320-269628/4		01/08/2019 17:56	1	2019.01.08ICALA A. 004.d	Acquity 2.1(mm)
IC 320-269628/5 ICIS		01/08/2019 18:03	1	2019.01.08ICALA A. 005.d	Acquity 2.1(mm)
IC 320-269628/6		01/08/2019 18:11	1	2019.01.08ICALA A. 006.d	Acquity 2.1(mm)
IC 320-269628/7		01/08/2019 18:18	1	2019.01.08ICALA A. 007.d	Acquity 2.1(mm)
IC 320-269628/8		01/08/2019 18:26	1	2019.01.08ICALA A. 008.d	Acquity 2.1(mm)
ICB 320-269628/9		01/08/2019 18:33	1	2019.01.08ICALA A. 009.d	Acquity 2.1(mm)
ICV 320-269628/10		01/08/2019 18:41	1	2019.01.08ICALA A. 010.d	Acquity 2.1(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Start Date: 01/08/2019 19:18

Analysis Batch Number: 269668 End Date: 01/08/2019 22:26

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCB 320-269668/1		01/08/2019 19:18	1	2019.01.08LLAAX X 004.d	Acquity 2.1(mm)
CCVL 320-269668/2		01/08/2019 19:26	1	2019.01.08LLAAX X 005.d	Acquity 2.1(mm)
CCV 320-269668/3 CCVIS		01/08/2019 19:33	1	2019.01.08LLAAX X 006.d	Acquity 2.1(mm)
ZZZZZ		01/08/2019 19:48	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 19:56	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 20:03	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 20:11	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 20:18	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 20:26	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 20:33	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 20:41	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 20:48	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 20:56	1		Acquity 2.1(mm)
CCV 320-269668/15		01/08/2019 21:03	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 21:11	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 21:18	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 21:26	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 21:33	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 21:41	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 21:48	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 21:56	1		Acquity 2.1(mm)
ZZZZZ		01/08/2019 22:03	100		Acquity 2.1(mm)
ZZZZZ		01/08/2019 22:11	100		Acquity 2.1(mm)
ZZZZZ		01/08/2019 22:18	1		Acquity 2.1(mm)
CCV 320-269668/26		01/08/2019 22:26	1		Acquity 2.1(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Start Date: 01/08/2019 22:33

Analysis Batch Number: 269672 End Date: 01/09/2019 00:26

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-269672/1		01/08/2019 22:33	1	2019.01.08LLAAX X 030.d	Acquity 2.1(mm)
ZZZZZ		01/08/2019 22:41	1		Acquity 2.1(mm)
140-13780-1		01/08/2019 22:48	1	2019.01.08LLAAX X 032.d	Acquity 2.1(mm)
140-13780-2		01/08/2019 22:56	1	2019.01.08LLAAX X 033.d	Acquity 2.1(mm)
140-13780-3		01/08/2019 23:03	1	2019.01.08LLAAX X 034.d	Acquity 2.1(mm)
ZZZZZ		01/08/2019 23:11	1		Acquity 2.1(mm)
MB 320-267852/1-C		01/08/2019 23:19	1	2019.01.08LLAAX X 036.d	Acquity 2.1(mm)
140-13780-4		01/08/2019 23:26	1	2019.01.08LLAAX X 037.d	Acquity 2.1(mm)
140-13780-5		01/08/2019 23:34	1	2019.01.08LLAAX X 038.d	Acquity 2.1(mm)
140-13780-6		01/08/2019 23:41	1	2019.01.08LLAAX X 039.d	Acquity 2.1(mm)
CCV 320-269672/11		01/08/2019 23:49	1	2019.01.08LLAAX X 040.d	Acquity 2.1(mm)
MB 320-267857/1-B		01/08/2019 23:56	1	2019.01.08LLAAX X 041.d	Acquity 2.1(mm)
140-13780-7		01/09/2019 00:04	1	2019.01.08LLAAX X 042.d	Acquity 2.1(mm)
140-13780-8		01/09/2019 00:11	1	2019.01.08LLAAX X 043.d	Acquity 2.1(mm)
140-13780-9		01/09/2019 00:19	1	2019.01.08LLAAX X 044.d	Acquity 2.1(mm)
CCV 320-269672/16		01/09/2019 00:26	1	2019.01.08LLAAX X 045.d	Acquity 2.1(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Instrument ID: A9 Start Date: 01/10/2019 13:37

Analysis Batch Number: 270021 End Date: 01/10/2019 14:37

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCB 320-270021/1		01/10/2019 13:37	1	2019.01.10LLA_004.d	Acquity 2.1(mm)
CCVL 320-270021/2		01/10/2019 13:45	1	2019.01.10LLA_005.d	Acquity 2.1(mm)
CCV 320-270021/3 CCVIS		01/10/2019 13:52	1	2019.01.10LLA_006.d	Acquity 2.1(mm)
MB 320-267851/1-C		01/10/2019 14:00	1	2019.01.10LLA_032.d	Acquity 2.1(mm)
ZZZZZ		01/10/2019 14:07	1		Acquity 2.1(mm)
ZZZZZ		01/10/2019 14:15	1		Acquity 2.1(mm)
ZZZZZ		01/10/2019 14:22	1		Acquity 2.1(mm)
ZZZZZ		01/10/2019 14:30	1		Acquity 2.1(mm)
CCV 320-270021/9		01/10/2019 14:37	1	2019.01.10LLA_037.d	Acquity 2.1(mm)

537 (modified)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Batch Number: 267851 Batch Start Date: 12/20/18 12:25 Batch Analyst: Stout, David W

Batch Method: None Batch End Date: 12/21/18 10:25

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	CalcMsg	LCMPFC_ALL_SU 00143	LCPFCSP 00202	
MB 320-267851/1		None, Split, Preparation, 537 (modified)		1 Sample	50 mL	CALC NOT SET TO RUN	1 mL		
140-13780-A-1	D-2082 R1 Quartz Filter #1	None, Split, Preparation, 537 (modified)	T	1 Sample	50 mL	CALC NOT SET TO RUN	1 mL	1 mL	
140-13780-A-2	D-2083 R2 Quartz Filter #2	None, Split, Preparation, 537 (modified)	T	1 Sample	50 mL	CALC NOT SET TO RUN	1 mL	1 mL	
140-13780-A-3	D-2084 R3 Quartz Filter #3	None, Split, Preparation, 537 (modified)	T	1 Sample	50 mL	CALC NOT SET TO RUN	1 mL	1 mL	

Batch Notes	
Extraction End time	10:25
Extraction End Date	12/21/2018
Analyst ID - Extraction	DWS
Extraction Start time	12:25
Extraction Start Date	12/20/2018
Methanol ID	MeOH / 5% NH4OH 1464407
Analyst ID - Spike Analyst	DWS
Analyst ID - Spike Witness Analyst	DLW

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.

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Batch Number: 267852 Batch Start Date: 12/20/18 12:25 Batch Analyst: Stout, David W

Batch Method: None Batch End Date: 12/22/18 07:30

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	LCMPFC_ALL_SU 00143	LCPFCSP 00202		
MB 320-267852/1		None, Split, Preparation, 537 (modified)		1 Sample	360 mL	1 mL			
140-13780-A-4	D-2085 R1 XAD-2 Resin #1	None, Split, Preparation, 537 (modified)	T	1 Sample	360 mL	1 mL	1 mL		
140-13780-A-5	D-2086 R2 XAD-2 Resin #2	None, Split, Preparation, 537 (modified)	T	1 Sample	360 mL	1 mL	1 mL		
140-13780-A-6	D-2087 R3 XAD-2 Resin #3	None, Split, Preparation, 537 (modified)	T	1 Sample	360 mL	1 mL	1 mL		

Batch Notes	
Analyst ID - Extraction	DWS
Extraction 1 End Time	12/21/2018 10:25
Extraction 1 Start Time	12/20/2018 12:25
Methanol ID	MeOH / 5% NH4OH
Extraction 2 End Time	12/22/2018 07:30
Extraction 2 Start Time	12/21/2018 10:40
Analyst ID - Spike Analyst	DWS
Analyst ID - Spike Witness Analyst	DLW

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.

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Batch Number: 267853 Batch Start Date: 12/24/18 05:00 Batch Analyst: Stout, David W

Batch Method: Split Batch End Date: 12/28/18 06:25

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount				
MB 320-267851/1-A		Split, Preparation, 537 (modified)		25 mL	2 mL				
140-13780-A-1-A	D-2082 R1 Quartz Filter #1	Split, Preparation, 537 (modified)	T	25 mL	2 mL				
140-13780-A-2-A	D-2083 R2 Quartz Filter #2	Split, Preparation, 537 (modified)	T	25 mL	2 mL				
140-13780-A-3-A	D-2084 R3 Quartz Filter #3	Split, Preparation, 537 (modified)	T	25 mL	2 mL				

Batch Notes	

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.

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Batch Number: 267854 Batch Start Date: 12/24/18 05:00 Batch Analyst: Stout, David W

Batch Method: Split Batch End Date: 12/28/18 06:30

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount				
MB 320-267852/1-A		Split, Preparation, 537 (modified)		180 mL	2 mL				
140-13780-A-4-A	D-2085 R1 XAD-2 Resin #1	Split, Preparation, 537 (modified)	T	180 mL	2 mL				
140-13780-A-5-A	D-2086 R2 XAD-2 Resin #2	Split, Preparation, 537 (modified)	T	180 mL	2 mL				
140-13780-A-6-A	D-2087 R3 XAD-2 Resin #3	Split, Preparation, 537 (modified)	T	180 mL	2 mL				

Batch Notes	

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.

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Batch Number: 267855 Batch Start Date: 12/28/18 06:36 Batch Analyst: Stout, David W

Batch Method: Preparation Batch End Date: 01/04/19 11:30

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	LCPFC-IS 00126			
MB 320-267851/1-B		Preparation, 537 (modified)		2 mL	10.00 mL	500 uL			
140-13780-A-1-B	D-2082 R1 Quartz Filter #1	Preparation, 537 (modified)	T	2 mL	10.00 mL	500 uL			
140-13780-A-2-B	D-2083 R2 Quartz Filter #2	Preparation, 537 (modified)	T	2 mL	10.00 mL	500 uL			
140-13780-A-3-B	D-2084 R3 Quartz Filter #3	Preparation, 537 (modified)	T	2 mL	10.00 mL	500 uL			

Batch Notes	
Batch Comment	internal standard to be added by Sacramento
Pipette/Syringe/Dispenser ID	I46345G
Reagent ID	Methanol 1476778

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.

10mL from the KD concentration at this point. The 2 spike tests will resume KD concentration at another time.

12/18/18 - Started concentrating the 2 spike tests by KD with the addition of a couple PTFE boiling chips @ 06:05. The temperature of the steam bath was observed at 86.5°C. The N-EVAP concentration ended @ 11:25. *Note. The temperature of the N-EVAP @ 60°C.
DWS

12/20/18 - Test America Knoxville, log# 1787
DWS
Three test samples for Front half and three test samples for Back half were prepared for PFAS testing. The Front half samples were prepared by placing a pre-cleaned (meoh) glass fiber filter into a 125mL polypropylene bottle. A method blank was prepared as well. All front half tests were spiked with 1.0mL IDA (including method blank) (IDA Sacramento TALS container # 1450742). The test samples were also spiked with 1.0mL PFAS native (Sacramento TALS container # 1449352). 50mL of methanol / 5% ammonium hydroxide was added to the method blank and each spike test. Three test samples and method blank for the back half fraction was prepared by adding ~20-30g XAD2 to a 500mL polypropylene bottle. The same amounts and of IDA / native were added to the method blank and spike tests with an addition of 12/18/18 DWS

Continued on Page

Read and Understood By

Signed	Date	Signed	Date
DWS	12/20/18		

180mL of methanol / 5% ammonium hydroxide. All method blanks and spike tests were placed on a shaker table for a minimum of 18hrs. extraction starting at 12:25. The container # of methanol / 5% ammonium hydroxide used was 1464407).

12/21/18 - turned tests off @ 10:25. The methanol / 5% ammonium hydroxide was decanted from the back half tests into a 500mL polypropylene bottle and stored in a refrigerator. Another 180mL portion of methanol / 5% ammonium hydroxide was added to the XAD-2 back half bottles and placed on shaker table for 18hr. minimum. The back half tests were started at 10:40. The front half tests (samples) were filtered through a plastic funnel and filter paper into a 125mL polypropylene bottle. The samples were capped after filtration and placed into the refrigerator awaiting concentration.

12/22/18 - The 2nd extraction of the back half tests were completed at 07:30. The extracts were placed in a refrigerator.

12/24/18 - 25mL of each front half test / MB were measured via graduated cylinder and placed in a 70mL polypropylene digestion vessel. The extraction solvent from the 2nd extraction of each back half test / MB → Continued on Page

Read and Understood By

Signed	Date	Signed	Date
	12/24/18		

were combined with the 1st extraction solvent from the extraction. The sample extracts/mB were thoroughly mixed and 180mL was measured via graduated cylinder into 3 - 70mL polypropylene digestion vessels. ~~An adequate~~ RWS 12/24/18 Each graduated cylinder was rinsed with methanol into the respective sample's digestion vessel. All digestion vessels were placed in a hotblock @ 60°C starting @ 05:30. The front half tests/mB were finished concentrating in the hot block at 10:00. The back half tests/mB were combined into one vessel and rinsed each vessel with methanol. The vessels concentrated on the hotblock until 14:05 and will continue concentration at a later time.

RWS 12/26/18 - Started back half tests in hotblock @ 60°C starting at 10:15. Tests were turned off at 17:00.

RWS 12/27/18 - Started back half tests at 10:30 on hotblock. The last sample had finished concentrating on the hotblock (< 10mL) at 14:15.

RWS 12/28/18 - Started N-EVAP concentration of front half and back half test samples and method blanks at 05:10 and ended at 06:45. All test samples and method blanks were brought up to 2mL in DI H_2O. 3 test samples and method blank were created for the condensate fraction by measuring 500mL DI H_2O and placing into a 500mL polyethylene bottle. The test samples and method blank were spiked with 1.0mL IDA (SAE container # 1450742) and 1.0mL native (SAE container # 1449352) for all test samples. The samples and method

→ Continued ~~on Page~~ RWS to logbook 54 pg 2/28/18 pg 1.

Read and Understood By

Signed	Date	Signed	Date
RWS	12/28/18		

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Batch Number: 267856 Batch Start Date: 12/29/18 06:38 Batch Analyst: Stout, David W

Batch Method: Preparation Batch End Date: 01/04/19 11:55

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	LCPFC-IS 00126			
MB 320-267852/1-B		Preparation, 537 (modified)		2 mL	10.00 mL	500 uL			
140-13780-A-4-B	D-2085 R1 XAD-2 Resin #1	Preparation, 537 (modified)	T	2 mL	10.00 mL	500 uL			
140-13780-A-5-B	D-2086 R2 XAD-2 Resin #2	Preparation, 537 (modified)	T	2 mL	10.00 mL	500 uL			
140-13780-A-6-B	D-2087 R3 XAD-2 Resin #3	Preparation, 537 (modified)	T	2 mL	10.00 mL	500 uL			

Batch Notes	
Batch Comment	internal standard to be added by Sacramento
Pipette/Syringe/Dispenser ID	I46345G
Reagent ID	1476778

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.

10mL from the KD concentration at this point. The 2 spike tests will resume KD concentration at another time.

12/18/18 - Started concentrating the 2 spike tests by KD with the addition of a couple PTFE boiling chips @ 06:05. The temperature of the steam bath was observed at 86.5°C. The N-EVAP concentration ended @ 11:25. *Note. The temperature of the N-EVAP @ 60°C.
DWS

12/20/18 - Test America Knoxville, log# 1787
DWS
Three test samples for Front half and three test samples for Back half were prepared for PFAS testing. The Front half samples were prepared by placing a pre-cleaned (meoh) glass fiber filter into a 125mL polypropylene bottle. A method blank was prepared as well. All front half tests were spiked with 1.0mL IDA (including method blank) (IDA Sacramento TALS container # 1450742). The test samples were also spiked with 1.0mL PFAS native (Sacramento TALS container # 1449352). 50mL of methanol / 5% ammonium hydroxide was added to the method blank and each spike test. Three test samples and method blank for the back half fraction was prepared by adding ~20-30g XAD2 to a 500mL polypropylene bottle. The same amounts ~~and~~ of IDA / native were added to the method blank and spike tests with an addition of 12/18/18 DWS

Continued on Page

Read and Understood By

Signed	Date	Signed	Date
DWS	12/20/18		

180mL of methanol / 5% ammonium hydroxide. All method blanks and spike tests were placed on a shaker table for a minimum of 18hrs. extraction starting at 12:25. The container # of methanol / 5% ammonium hydroxide used was 1464407).

12/21/18 - turned tests off @ 10:25. The methanol / 5% ammonium hydroxide was decanted from the back half tests into a 500mL polypropylene bottle and stored in a refrigerator. Another 180mL portion of methanol / 5% ammonium hydroxide was added to the XAD-2 back half bottles and placed on shaker table for 18 hr. minimum. The back half tests were started at 10:40. The front half tests (samples) were filtered through a plastic funnel and filter paper into a 125mL polypropylene bottle. The samples were capped after filtration and placed into the refrigerator awaiting concentration.

12/22/18 - The 2nd extraction of the back half tests were completed at 07:30. The extracts were placed in a refrigerator.

12/24/18 - 25mL of each front half test / MB were measured via graduated cylinder and placed in a 70mL polypropylene digestion vessel. The extraction solvent from the 2nd extraction of each back half test / MB → Continued on Page

Read and Understood By

Signed	Date	Signed	Date
	12/24/18		

were combined with the 1st extraction solvent from the extraction. The sample extracts/mB were thoroughly mixed and 180mL was measured via graduated cylinder into 3 - 70mL polypropylene digestion vessels. ~~An adequate~~ RWS 12/24/18 Each graduated cylinder was rinsed with methanol into the respective sample's digestion vessel. All digestion vessels were placed in a hotblock @ 60°C starting @ 05:30. The front half tests/mB were finished concentrating in the hot block at 10:00. The back half tests/mB were combined into one vessel and rinsed each vessel with methanol. The vessels concentrated on the hotblock until 14:05 and will continue concentration at a later time.

RWS 12/26/18 - Started back half tests in hotblock @ 60°C starting at 10:15. Tests were turned off at 17:00.

RWS 12/27/18 - Started back half tests at 10:30 on hotblock. The last sample had finished concentrating on the hotblock (< 10mL) at 14:15.

RWS 12/28/18 - Started N-EVAP concentration of front half and back half test samples and method blanks at 05:10 and ended at 06:45. All test samples and method blanks were brought up to 2mL in DI H_2O. 3 test samples and method blank were created for the condensate fraction by measuring 500mL DI H_2O and placing into a 500mL polyethylene bottle. The test samples and method blank were spiked with 1.0mL IDA (SAE container # 1450742) and 1.0mL native (SAE container # 1449352) for all test samples. The samples and method

Continued ~~on Page~~ RWS to logbook 54 pg 2/28/18 pg 1.

Read and Understood By

Signed	Date	Signed	Date
RWS	12/28/18		

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Batch Number: 267857 Batch Start Date: 12/28/18 07:00 Batch Analyst: Stout, David W

Batch Method: None Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	LCMPFC_ALL_SU 00143	LCPFCSP 00202		
MB 320-267857/1		None, Preparation, 537 (modified)		1 Sample	500 mL	1 mL			
140-13780-A-7	D-2088 R1 DI Water #1	None, Preparation, 537 (modified)	T	1 Sample	500 mL	1 mL	1 mL		
140-13780-A-8	D-2089 R2 DI Water #2	None, Preparation, 537 (modified)	T	1 Sample	500 mL	1 mL	1 mL		
140-13780-A-9	D-2090 R2 DI Water #3	None, Preparation, 537 (modified)	T	1 Sample	500 mL	1 mL	1 mL		

Batch Notes	
Analyst ID - Spike Analyst	DWS
Analyst ID - Spike Witness Analyst	DLW

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.

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 140-13780-1

SDG No.:

Batch Number: 267869 Batch Start Date: 12/28/18 09:24 Batch Analyst: Stout, David W

Batch Method: Preparation Batch End Date: 01/04/19 12:15

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	LCPFC-IS 00126			
MB 320-267857/1-A		Preparation, 537 (modified)		250 mL	10.00 mL	500 uL			
140-13780-A-7-A	D-2088 R1 DI Water #1	Preparation, 537 (modified)	T	250 mL	10.00 mL	500 uL			
140-13780-A-8-A	D-2089 R2 DI Water #2	Preparation, 537 (modified)	T	250 mL	10.00 mL	500 uL			
140-13780-A-9-A	D-2090 R2 DI Water #3	Preparation, 537 (modified)	T	250 mL	10.00 mL	500 uL			

Batch Notes	
Batch Comment	SPE extraction to be performed by Sacramento
First End time	01/04/2019 12:15
H2O ID	1/03/2019
Hexane ID	1451478
Manifold ID	L
Methanol ID	1476769
Sodium Hydroxide ID	1453142
Pipette/Syringe/Dispenser ID	I46345G
Analyst ID - IS Reagent Drop	HJA
Analyst ID - IS Reagent Drop Witness	DTH
Solvent Lot #	1476932
Solvent Name	0.3% NH4OH / MeOH
SPE Cartridge Lot ID	004238285A
SPE Cartridge Type	WAX 500mg
First Start time	12/28/2018 09:24

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.

were combined with the 1st extraction solvent from the extraction. The sample extracts/MB were thoroughly mixed and 180mL was measured via graduated cylinder into 3-70mL polypropylene digestion vessels. ~~An adequate~~ RWS 12/27/18 Each graduated cylinder was rinsed with methanol into the respective sample's digestion vessel. All digestion vessels were placed in a hotblock @ 60°C starting @ 05:30. The front half tests/MB were finished concentrating in the hot block at 10:00. The back half tests/MB were combined into one vessel and rinsed each vessel with methanol. The vessels concentrated on the hotblock until 14:05 and will continue concentration at a later time.

RWS 12/26/18 - Started back half tests in hotblock @ 60°C starting at 10:15. Tests were turned off at 17:00.

RWS 12/27/18 - Started back half tests at 10:30 on hotblock. The last sample had finished concentrating on the hotblock (< 10mL) at 14:15.

RWS 12/28/18 - Started N-EVAP concentration of front half and back half test samples and method blanks at 05:10 and ended at 06:45. All test samples and method blanks were brought up to 2mL in DI H_2O. 3 test samples and method blank were created for the condensate fraction by measuring 500mL DI H_2O and placing into a 500mL polyethylene bottle. The test samples and method blank were spiked with 1.0mL IDA (SAE container # 1450742) and 1.0mL native (SAE container # 1449352) for all test samples. The samples and method

Continued ~~on Page~~ RWS to logbook 5419 12/28/18 pg 1.

Read and Understood By

Signed	Date	Signed	Date
RWS	12/28/18		

TestAmerica Knoxville, log # 5419

This entry is a continuation for PFAS testing from log # 1787, pg 100.

→ blank were ~~divided~~ shaken Ans 12/28/18 + 250mL of each test/mB were placed into a 250mL polypropylene bottle.

Continued on Page

Read and Understood By

Signed _____ Date _____ Signed _____ Date _____

Shipping and Receiving Documents

Request for Analysis/Chain-of-Custody – RFA/COC #001 (Filters)
EA Engineering, Science and Technology, Inc.
PFAS DRE Performance Test Method 0010 Sampling Train Spike Test

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Knoxville TALS Job Number: 13890 **TestAmerica Knoxville TALS Project Number: 14005035**

Project Identification:	**PFAS Pilot Study – Spike Tests**
Client Name:	EA Engineering, Science & Technology, Inc.
Client Contact:	Ms. Ivy Harvey Office: (410) 671-6051) Ext. 1426
TestAmerica Project Manager:	Ms. Courtney Adkins Office: (865) 291-3019
TestAmerica Program Manager:	Mr. Billy Anderson Office: (865) 291-3080 Cell: (865) 206-9004

Analytical Testing QC Requirements:
The Legend for Project-Specific Quality Control Testing is designated in the "QC" column as follows: "BT" = Blank Train, "RB" = Reagent Blank, "MS" = Matrix Spike, "MSD" = Matrix Spike Duplicate, "DUP" = Duplicate, "PB" = Proof Blank, "TB" = Trip Blank

Laboratory Deliverable Turnaround Requirements:	
Analytical Due Date: (Review-Released Data)	21 Days from Lab Receipt
Data Package Due Date:	28 Days from Lab Receipt
Laboratory Destination:	TestAmerica Laboratories, Inc. 5815 Middlebrook Pike Knoxville, TN 37921
Lab Phone Number:	865.291.3000
Courier:	FedEx

Project Deliverables:
Report analytical results on TALS Report form Std_Tal_L4. Include "Field Sample Number", "Sample Type", and "Run Number" on all TALS Reports.

Analytical Parameter:	**Holding Time Requirements:**	**Preservation Requirements:**
PFAS Target Analyte List	14 Days to Extraction; 40 Days to Analysis	Cool, 4°C

***The Target Analyte List of PFAS consists of the following six (6) compounds:**

1) **Perfluorooctanoic Acid (PFOA)**
2) **Perfluoroheptanoic Acid (PFHpA)**
3) **Perfluorononanoic Acid (PFNA)**
4) **Perfluorooctane Sulfonate (PFOS)**
5) **Perfluorohexane Sulfonate (PFHxS)**
6) **Perfluorobutane Sulfonate (PFBS)**

Field Sample No./Sample Coding ID	**Spike Test No.**	**Sample Collection Date**	**Project QC Require-ments**	**Sample Bottle/ Container**	**Sample Type/Analysis**	**Analytical Specifications**
D-2082 Quartz Filter #1 (Front Half)	1	12/20/2018		Petri Dish	**90 mm Quartz Fiber Particulate Filter #1 Spiked with Native & IDS PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.
D-2083 Quartz Filter #2 (Front Half)	1	12/20/2018		Petri Dish	**90 mm Quartz Fiber Particulate Filter #2 Spiked with Native & IDS PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.

Field Sample No./Sample Coding ID	Spike Test No.	Sample Collection Date	Project QC Require-ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
D-2084 Quartz Filter #3 (Front Half)	1	12/20/2018		Petri Dish	**90 mm Quartz Fiber Particulate Filter #3 Spiked with Native & IDS PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.

Sample Receipt Log and Condition of the Samples Upon Receipt:

Please fill in the following information:	Comments (Please write "NONE" if no comment applicable)
(1) Record the identities of any samples that were listed on the RFA but were not found in the sample shipment.	
(2) Record the sample shipping cooler temperature of all coolers transporting samples listed on this RFA:	
(3) Record any apparent sample loss/breakage.	
(4) Record any unidentified samples transported with this shipment of samples:	
(5) Indicate if all samples were received according to the project's required specifications (i.e. no nonconformances):	

Custody Transfer:

	Name	Company	Date/Time
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			

Request for Analysis/Chain-of-Custody – RFA/COC #002 (XAD-2)
EA Engineering, Science and Technology, Inc.
PFAS DRE Performance Test Method 0010 Sampling Train Spike Test

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Knoxville TALS Job Number: 13890 **TestAmerica Knoxville TALS Project Number: 14005035**

Project Identification:	**PFAS Pilot Study – Spike Tests**
Client Name:	EA Engineering, Science & Technology, Inc.
Client Contact:	Ms. Ivy Harvey Office: (410) 671-6051) Ext. 1426
TestAmerica Project Manager:	Ms. Courtney Adkins Office: (865) 291-3019
TestAmerica Program Manager:	Mr. Billy Anderson Office: (865) 291-3080 Cell: (865) 206-9004

Analytical Testing QC Requirements:
The Legend for Project-Specific Quality Control Testing is designated in the "QC" column as follows: "BT" = Blank Train, "RB" = Reagent Blank, "MS" = Matrix Spike, "MSD" = Matrix Spike Duplicate, "DUP" = Duplicate, "PB" = Proof Blank, "TB" = Trip Blank

Laboratory Deliverable Turnaround Requirements:	
Analytical Due Date: (Review-Released Data)	21 Days from Lab Receipt
Data Package Due Date:	28 Days from Lab Receipt
Laboratory Destination:	TestAmerica Laboratories, Inc. 5815 Middlebrook Pike Knoxville, TN 37921
Lab Phone Number:	865.291.3000
Courier:	FedEx

Project Deliverables:
Report analytical results on TALS Report form Std_Tal_L4. Include "Field Sample Number", "Sample Type", and "Run Number" on all TALS Reports.

Analytical Parameter:	**Holding Time Requirements:**	**Preservation Requirements:**
PFAS Target Analyte List	14 Days to Extraction; 40 Days to Analysis	Cool, 4°C

***The Target Analyte List of PFAS consists of the following six (6) compounds:**

1) **Perfluorooctanoic Acid (PFOA)**
2) **Perfluoroheptanoic Acid (PFHpA)**
3) **Perfluorononanoic Acid (PFNA)**
4) **Perfluorooctane Sulfonate (PFOS)**
5) **Perfluorohexane Sulfonate (PFHxS)**
6) **Perfluorobutane Sulfonate (PFBS)**

Field Sample No./Sample Coding ID	**Spike Test No.**	**Sample Collection Date**	**Project QC Require-ments**	**Sample Bottle/ Container**	**Sample Type/Analysis**	**Analytical Specifications**
D-2085 XAD-2 Resin #1 (Back Half)	2	12/20/2018		XAD-2 Resin Tube	**XAD-2 Resin Tube #1 Spiked with Native & IDA PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.
D-2086 XAD-2 Resin #2 (Back Half)	2	12/20/2018		XAD-2 Resin Tube	**XAD-2 Resin Tube #2 Spiked with Native & IDA PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.

Field Sample No./Sample Coding ID	Spike Test No.	Sample Collection Date	Project QC Require-ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
D-2087 XAD-2 Resin #3 (Back Half)	2	12/20/2018		XAD-2 Resin Tube	**XAD-2 Resin Tube #3 Spiked with Native & IDA PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.

Sample Receipt Log and Condition of the Samples Upon Receipt:

Please fill in the following information:	Comments (Please write "NONE" if no comment applicable)
(1) Record the identities of any samples that were listed on the RFA but were not found in the sample shipment.	
(2) Record the sample shipping cooler temperature of all coolers transporting samples listed on this RFA:	
(3) Record any apparent sample loss/breakage.	
(4) Record any unidentified samples transported with this shipment of samples:	
(5) Indicate if all samples were received according to the project's required specifications (i.e. no nonconformances):	

Custody Transfer:

	Name	Company	Date/Time
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			

Request for Analysis/Chain-of-Custody – RFA/COC #003 (Condensate)
EA Engineering, Science and Technology, Inc.
PFAS DRE Performance Test Method 0010 Sampling Train Spike Test

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Knoxville TALS Job Number: 13890 **TestAmerica Knoxville TALS Project Number: 14005035**

Project Identification:	**PFAS Pilot Study – Spike Tests**
Client Name:	EA Engineering, Science & Technology, Inc.
Client Contact:	Ms. Ivy Harvey Office: (410) 671-6051) Ext. 1426
TestAmerica Project Manager:	Ms. Courtney Adkins Office: (865) 291-3019
TestAmerica Program Manager:	Mr. Billy Anderson Office: (865) 291-3080 Cell: (865) 206-9004

Analytical Testing QC Requirements:
The Legend for Project-Specific Quality Control Testing is designated in the "QC" column as follows: "BT" = Blank Train, "RB" = Reagent Blank, "MS" = Matrix Spike, "MSD" = Matrix Spike Duplicate, "DUP" = Duplicate, "PB" = Proof Blank, "TB" = Trip Blank

Laboratory Deliverable Turnaround Requirements:	
Analytical Due Date: (Review-Released Data)	21 Days from Lab Receipt
Data Package Due Date:	28 Days from Lab Receipt
Laboratory Destination:	TestAmerica Laboratories, Inc. 5815 Middlebrook Pike Knoxville, TN 37921
Lab Phone Number:	865.291.3000
Courier:	FedEx

Project Deliverables:
Report analytical results on TALS Report form Std_Tal_L4. Include "Field Sample Number", "Sample Type", and "Run Number" on all TALS Reports.

Analytical Parameter:	**Holding Time Requirements:**	**Preservation Requirements:**
PFAS Target Analyte List	14 Days to Extraction; 40 Days to Analysis	Cool, 4°C

***The Target Analyte List of PFAS consists of the following six (6) compounds:**

1) **Perfluorooctanoic Acid (PFOA)**
2) **Perfluoroheptanoic Acid (PFHpA)**
3) **Perfluorononanoic Acid (PFNA)**
4) **Perfluorooctane Sulfonate (PFOS)**
5) **Perfluorohexane Sulfonate (PFHxS)**
6) **Perfluorobutane Sulfonate (PFBS)**

Field Sample No./Sample Coding ID	**Spike Test No.**	**Sample Collection Date**	**Project QC Require-ments**	**Sample Bottle/ Container**	**Sample Type/Analysis**	**Analytical Specifications**
D-2088 DI Water #1 (Condensate)	3	12/20/2018		500 mL HDPE Wide-Mouth Bottle	**Condensate (DI Water) #1 Spiked with Native & IDA PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.
D-2089 DI Water #2 (Condensate)	3	12/20/2018		500 mL HDPE Wide-Mouth Bottle	**Condensate (DI Water) #2 Spiked with Native & IDA PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.

Field Sample No./Sample Coding ID	Spike Test No.	Sample Collection Date	Project QC Require-ments	Sample Bottle/ Container	Sample Type/Analysis	Analytical Specifications
D-2090 DI Water #3 (Condensate)	3	12/20/2018		500 mL HDPE Wide-Mouth Bottle	**Condensate (DI Water) #3 Spiked with Native & IDA PFAS** Method 0010 Train Six (6) Target PFAS	**Knoxville**: Spike the sample with the Native Standard and the Isotope Dilution Internal Standard (IDA). **Sacramento**: Analyze for the Target Native PFAS Compounds using the EPA Method 537 Expanded List.

Sample Receipt Log and Condition of the Samples Upon Receipt:

Please fill in the following information:	Comments (Please write "NONE" if no comment applicable)
(1) Record the identities of any samples that were listed on the RFA but were not found in the sample shipment.	
(2) Record the sample shipping cooler temperature of all coolers transporting samples listed on this RFA:	
(3) Record any apparent sample loss/breakage.	
(4) Record any unidentified samples transported with this shipment of samples:	
(5) Indicate if all samples were received according to the project's required specifications (i.e. no nonconformances):	

Custody Transfer:

	Name	Company	Date/Time
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			
Relinquished By:			
Accepted By:			

TestAmerica Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921
Phone (865) 291-3000 Fax (865) 584-4315

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Adkins, Courtney M	Carrier Tracking No(s):	COC No: 140-4857.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: courtney.adkins@testamericainc.com	State of Origin: Texas	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 140-13780-1
Address: 880 Riverside Parkway, ,	Due Date Requested: 1/18/2019			Preservation Codes:
City: West Sacramento	TAT Requested (days):			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
State, Zip: CA, 95605				
Phone: 916-373-5600(Tel) 916-372-1059(Fax)	PO #:			Other:
Email:	WO #:			
Project Name: PFAS Pilot Study - Spike Tests	Project #: 14005035			
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA/Air_AT_FH PFAS, Standard List FH	PFC_IDA/Air_AT_BH PFAS, Standard List BH	PFC_IDA/Air_AT_Condens PFAS, Standard List COND	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
Front Half #1 (140-13780-1)	12/20/18	08:00 Central		Air			X			1	Also ship:
Front Half #2 (140-13780-2)	12/20/18	08:00 Central		Air			X			1	MB 320-267851 1 FH
Front Half #3 (140-13780-3)	12/20/18	08:00 Central		Air			X			1	MB 320-267852 1 BH
Back Half #1 (140-13780-4)	12/20/18	08:00 Central		Air				X		1	MB 320-267857 1 COND
Back Half #2 (140-13780-5)	12/20/18	08:00 Central		Air				X		1	
Back Half #3 (140-13780-6)	12/20/18	08:00 Central		Air				X		1	
Condensate #1 (140-13780-7)	12/20/18	08:00 Central		Air					X	1	
Condensate #2 (140-13780-8)	12/20/18	08:00 Central		Air					X	1	
Condensate #3 (140-13780-9)	12/20/18	08:00 Central		Air					X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)*
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 4	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by:	12-28-18 11:00	TA KNX	Received by:	12/29/18 9:45	TA-WSAC
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.: 729399	Cooler Temperature(s) °C and Other Remarks: 2-6 C

Ver: 09/20/2016

01/25/2019

Appendix B

Photographic Log

Photo 1: Thermal Desorption Unit Vessel

Photo 2: Indirect Thermal Desorption Unit and Thermal Oxidizer

Photo 3: Indirect Thermal Desorption Unit

Photo 4: Looking Inside Thermal Oxidizer

Photo 5: Checking Combustion Properties Inside Thermal Oxidizer

Photo 6: Air and Fuel Delivery Manifold

Photo 7: Additional View of Air and Fuel Delivery Manifold

Photo 8: Sand Used to Create PFAS-Impacted IDW

Photo 9: Soil Mixing Unit

Photo 10: Mixed Soil

Photo 11: Additional Hand Mixing of Soil

Photo 12 and 13: Feeding Soil to Indirect Thermal Desorption Unit

Photo 14: ITD/TO Control Panel

Photo 15: Feed Soil Sample Collection

Photo 16: Sampling Equipment Decontamination Station

Photo 17: Mixing Paddle Inside ITD Unit

Photo 18: Post-Treatment (PROD) Soil Sample Collection

Appendix C

Field Documentation

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT1-1

Target Treatment Temperature: 500 (°C)

Feed Soil Sample Start Weight: 48.6 lbs

Feed Soil Sample End (Tare) Weight: 1.8 lbs

Date: 4/12/19

Shift: 1ST

Operators: Pena / Karlen

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
1118	100	19	768	23	12			Light Dryer Burner
1150	428	98	775					
1218	490	260	777					
1250	540	462	787					
1300	550	500	788					Stop Dryer Burner
1307		514						Max Product Temp

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT1-2

Target Treatment Temperature: 500 (°C)

Feed Soil Sample Start Weight: 58.0 lbs

Feed Soil Sample End (Tare) Weight: 1.8 lbs

Date: 4/12/19

Shift: 1ST

Operators: Pena / Karlen

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
1556	53	30	491	23	12			Light Dryer Burner
1630	415	97	752					
1700	411	263	765					
1730	457	412	764					
1755	505	500	772					Stop Dryer Burner
1800		507						Max Product Temp

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT2a-1

Target Treatment Temperature: 650 (°C)

Feed Soil Sample Start Weight: 53.4155

Feed Soil Sample End (Tare) Weight: 1.8

Date: 4/15/19

Shift: 1ST

Operators: Pena / Karlen

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
1214	23	20	985	50	32	2.8	32	Start Dryer Burner
1245	260	97	985					
1315	377	162	987					
1345	468	329	1002					
1415	561	510	1009					
1447	627	627	1002					
1455	635	650	1003					Stop Dryer Burner
1458		653						Peak Product Temp
1500								N2 Purge Off / Stop Stack Sample

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT2a-2

Date: 4/15/19

Target Treatment Temperature: 650 (°C)

Shift: 1ST

Feed Soil Sample Start Weight: 51.0 lbs

Operators: Pena / Karlen

Feed Soil Sample End (Tare) Weight: 1.8 lbs

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
1730	23	25	985	50	32	2.8	32	Start Dryer Burner
1800	391	117	991					
1830	550	422	1007					
1900	654	618	1006					
1907	648	650	1006					Stop Dryer Burner
1909		653						Peak Product Temp
1910								Stop N2 Purge / Stop Sampling

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT2b-1

Date: 4/16/19

Target Treatment Temperature: 650 (°C)

Shift: 1ST

Feed Soil Sample Start Weight: 54.4 lbs

Operators: Pena/ Karlen

Feed Soil Sample End (Tare) Weight: 1.8 lbs

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
1050 1050	20	19	1010					Start Dryer Burner
1120	311	113	997					
1150	445	354	1001					
1220	565	559	1004					
1238	621	650	1005					Stop Dryer Burner
1245								Stop Stack Sampling / N2 Off
1240		655						Peak Product Temp

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT26-2

Date: 4/16/19

Target Treatment Temperature: 650 (°C)

Shift: 1ST

Feed Soil Sample Start Weight: 53.6lbs

Operators: Pena/Karlen

Feed Soil Sample End (Tare) Weight: 1.8lbs

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
1515	25	26	1013					Start Dryer Burner
1545	464	174	1002					
1615	452	397	1002					
1645	630	543	1005					
1715	705	628	1006					
1723	717	650	1002					Stop Dryer Burner
1725		652						Peak Product Temp
1730								N2 Purge off / Stop Sampling

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT3-1

Date: 4/13/19

Target Treatment Temperature: 500 (°C)

Shift: 1ST

Feed Soil Sample Start Weight: 53.4 lbs

Operators: Pena/Karlen

Feed Soil Sample End (Tare) Weight: 2.2 lbs

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
0855	65	22	610					Start Dryer Burner
								Stop
0900	70	22	630					Start Dryer Burner
0930	380	128	715					
1000	483	486	754					
1002	485	500	757					Stop Dryer Burner
1007		524						Peak Product Temp

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT3-2

Target Treatment Temperature: 500 (°C)

Feed Soil Sample Start Weight: 52.0 lbs

Feed Soil Sample End (Tare) Weight: 2.0 lbs

Date: 4/13/19

Shift: 1ST

Operators: Pena/Karlen

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
1232	45	28	609					Start Dryer Burner
1300	321	78	685					
1330	418	96	715					
1400	580	235	730					
1430	559	476	750					
1434	541	495	750					Stop Dryer Burner
1437		501						Peak Product Temp

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT4-1

Target Treatment Temperature: 650 (°C)

Feed Soil Sample Start Weight: 50.6 lbs

Feed Soil Sample End (Tare) Weight: 2.2 lbs

Date: 4/14/19

Shift: 1ST

Operators: Pena / Hay

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
0930	8	8	732					Start Dryer Burner
1003	567	158	753					
1032	590	505	765					
1100	633	619	773					
1110	659	650	774					Stop Dryer Burner
1114		662						Peak Product Temp

Comments: N2 Purge = 8 scfh

SERDP PFAS / AFFF PILOT TEST DATA SHEET

Test Run: DT4-2

Date: 4/14/19

Target Treatment Temperature: 650 (°C)

Shift: 1ST

Feed Soil Sample Start Weight: 47.4 lbs

Operators: Pena / Hay

Feed Soil Sample End (Tare) Weight: _____

TIME	TEMPERATURES (°C)			TO BURNER FLOW RATES				REMARKS
	Furnace	Product	TO	Propane (scfh)	Air (scfm)	Air VH (in WC)	Air SP (in WC)	
1345	15	18	618					Start Dryer Burner
1415	517	220	737					
1445	531	480	782					
1545	616	595	778					
1535	663	650	773					Stop Dryer Burner
1538		654						Peak Product Temp

Comments: N_2 Purge = 8 scfh

PFAS Liquid Spike Preparation (5500 ml Aqueous Solution)

	PFAS Compound	DT1	Spike Weight (mg) DT2a	DT2b	
*	Perfluorononanoic acid		1.04 g	1.05 g	3rd
dissolves fast	Sodium perfluorooctanoate		~~1.039~~ ~~1.04 g~~ JP	1.02 g	2nd
*	Potassium nonafluoro-1-butanesulfonate		1.04 g	1.01 g	1st
*	Heptadecafluorooctanesulfonic acid		1.00 g	1.00 g	4th
**	Tridecafluorohexane-1-sulfonic acid potassium salt		1.01 g	1.02 g	5th
	Perfluoropentanoic acid		1.04 g	1.02 g	6th

* = dissolves slow ** = dissolves very slow

Heptadeca...

- powder spread on surface, then dissolved

Mixing initiated at 1300 hrs on 4/13/19. Still some minor solid granules in bottom of 5.5L water at 14:54 hrs.

Appendix D

Analytical Data

Due to file size constraints analytical data will be provided upon request.

Appendix E

Thermal Oxidizer Emissions Sampling Report

August 23, 2019

George Hay, P.E.
Test Director
TD*X Associates, LP
3277 County Road 69
Robstown, Texas 78380
419-348-9250

Re: Year 2019 Pilot Unit PFAS DRE Test
TD*X Pilot Unit Indirect ITDU
US Ecology of Texas (USET)
Robstown, Texas

Dear Mr. Hay:

Enclosed is the test report for the above referenced testing program. We understand that TD*X will incorporate this stack test report into your overall final report. Should there be any questions concerning the enclosed report, please contact me at (484) 252-4335 or chris@lchconsulting.com at any time.

Respectfully,

L. Christopher Heilner

L. Christopher Heilner
Project Manager 2019 TDX PFAS DRE Pilot Test

Enclosures

cc: George Hay, TD*X Associates, Via Email: george@fmtinc.com
Chris Heilner, LCH Consulting Associates, Via E-Mail: Chris@LCHConsulting.com

YEAR 2019
Testing of Indirect Thermal Desorption Coupled with Thermal Oxidation (ITD/TO) Technology to Treat Solid PFAS-Impacted Investigation Derived Waste (IDW) Destruction Removal Efficiency Stack Test Report
of
TD*X Pilot Unit ITD/TO
US Ecology of Texas (USET)
Robstown, TX

August 23, 2019

Prepared for:

George Hay, P.E.
Test Director
TD*X Associates, LP
3277 County Road 69
Robstown, Texas 78380
Telephone: 419-348-9250
E-Mail: George@fmtinc.com

Prepared by:

L. Christopher Heilner
LCH Consulting Associates
88 Glocker Way
PMB 287
Pottstown, Pennsylvania 19465
Telephone: (610) 484-252-4335
E-Mail: Chris@LCHConsulting.com

TABLE OF CONTENTS

DESCRIPTION **PAGE**

Tables

ATTACHMENTS

CERTIFICATION OF ACCURACY AND COMPLETION

I, Mr. L. Christopher Heilner, as the LCH Consulting Associates report author, certify under penalty of law that I believe the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties, including the possibility of fine or imprisonment, or both, for submitting false, inaccurate, or incomplete information.

Signed: L. Christopher Heilner Date: 8/26/19

L. Christopher Heilner
CDT 2019 Project Manager
LCH Consulting Associates
Telephone: (484) 252-4335

1.0 EXECUTIVE SUMMARY

On April 15th and 16th, 2019 LCH Consulting Associates, LLC (LCH) conducted a PFAS Destruction Removal Efficiency Stack Test for TD*X Associates, LP (TD*X) at the US Ecology of Texas (USET) in Robstown, Texas Sampling was conducted on the TD*X Pilot Unit Indirect Thermal Desorption Unit coupled with Thermal Oxidative reduction (ITDU/TO) . Testing occurred on the Thermal Oxidizer Unit stack (TOU).

The test series and following report is being provided to TD*X in compliance with the test plan testing of indirect thermal desorption coupled with thermal oxidation (ITDU/TO) technology to treat solid PFAS-Impacted investigation derived waste (IDW) Contract Number: W912HQ18C0035 prepared for the Strategic Environmental Research and Development Program (SERDP), U.S. Department of Defense prepared by EA Engineering and Science, and Technology, Inc., PBC of Hunt Valley, Maryland found in attachment E.

According to the test plan, the data collected and presented in this report will comply with United States Environmental Protection Agency (USEPA)'s methods and standards of practice.

2019 Compliance Demonstration Test Personnel

Ms. Ivy Harvey, PE, Program Director, EA Engineering, Science, and Technology, Inc., PBC

Mr. George Hay, PE, Test Director, TD*X Associates LP

Mr. L. Christopher Heilner, Stack Test Leader, LCH Consulting Associates, LLC

TABLE 1.0
US Ecology Texas, TD*X Associates, LP
Pilot Unit ITDU/TO PFAS DRE
Testing Methodology Summary

Parameter	EPA Method
Gas Flow	1, 2, 3A and 4
O_2 and CO_2	3A
Fluorine	26a
PFAS Compounds	0010/537

Table 2.0 M0010 Lab Data

Analyte	FEED DT2A-1-1 (ug/kg)	FEED DT2A-1-2 (ug/kg)	TO2A-1-1 BH (ng)	TO2A-1-1 B-T XAD-2 (ng)	TO2A-1-1 FH (ng)	TO2A-1-1 IMP COND (ng)
Perfluorobutanesulfonic acid (PFBS)	14400	12900	8.6 B	8.33 B	< 0.495 U	< 0.5 U
Perfluorohexanesulfonic acid (PFHxS)	14600	11600	0.634	0.497 J	< 0.495 U	< 0.5 U
Perfluorononanoic acid (PFNA)	15400	15200	< 0.5 U	< 0.5 U	< 0.495 U	< 0.5 U
Perfluorooctanesulfonic acid (PFOS)	14400	13900	1.22 B	1.21 B	< 0.495 U	< 0.5 U
Perfluorooctanoic acid (PFOA)	14200	12000	13.5 B	11.6 B	< 0.495 U	1.13
Perfluoropentanoic acid (PFPeA)	15600	13300	4.03 B	2.43 B	0.783	0.761

Table 3.0 M0010 Reporting Values

Analyte	FEED DT2A-1-1 (ug/kg)	FEED DT2A-1-2 (ug/kg)	TO2A-1-1 BH (ng)	TO2A-1-1 B-T XAD-2 (ng)	TO2A-1-1 FH (ng)	TO2A-1-1 IMP COND (ng)
Perfluorobutanesulfonic acid (PFBS)	14400	12900	8.6	8.33	0.495	0.5
Perfluorohexanesulfonic acid (PFHxS)	14600	11600	0.634	0.497	0.495	0.5
Perfluorononanoic acid (PFNA)	15400	15200	0.5	0.5	0.495	0.5
Perfluorooctanesulfonic acid (PFOS)	14400	13900	1.22	1.21	0.495	0.5
Perfluorooctanoic acid (PFOA)	14200	12000	13.5	11.6	0.495	1.13
Perfluoropentanoic acid (PFPeA)	15600	13300	4.03	2.43	0.783	0.761

Table 4.0 EPA Method 0010 PFAS DRE

Parameter	DT2A-1	DT2A-2
Soil Feed Parameter		
Feed Weight, wet (kg)	23.4	22.31
Feed Moisture Content (% wt)	9.5%	9.9%
Feed Weight, dry (kg)	21.18	20.11
PFAS Feed Concentration (ug/kg, dry)	84216	91117
PFAS Feed Mass (ug)	1783436	1832586
TO Stack Gas Parameter		
M0010 Sample PFAS Catch (ng)	60.2	63.9
M0010 Sample Volume (dscm)	2.59	1.59
TO Stack Gas PFAS Concentration (ng/dscm)	23	40
TO Stack Gas Flow Rate (dscm/min)	1.47	1.47
Sample Duration (min)	165	100
TO Stack Volume (dscm)	243.0	147.3
TO Stack Gas PFAS Mass (ng)	5659	5921
PFAS DRE (%)	99.9997%	99.9997%

Note: ug/kg = microgram per kilogram
% wt = percent weight.
dscm = dry standard cubic meter.
ng/dscm = nanogram per dry standard cubic meter.
dscm/min = dry standard cubic meter per minute
kg = kilogram
ng = nanogram
DRE = destruction and removal efficiency

Table 5.0 Field Blanks M0010

Analyte	FEED DT2A-1-1 (ug/kg)	FEED DT2A-1-2 (ug/kg)	TO2A-1-1-QC BH PB	TO2A-1-1-QC B-T XAD-2 PB	TO2A-1-1-QC DI WATER RB	TO2A-1-1-QC FH PB
Perfluorobutanesulfonic acid (PFBS)	14400	12900	9.61 B	9.44 B	< 0.5 U	< 0.5 U
Perfluorohexanesulfonic acid (PFHxS)	14600	11600	0.749	0.555	< 0.5 U	< 0.5 U
Perfluorononanoic acid (PFNA)	15400	15200	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Perfluorooctanesulfonic acid (PFOS)	14400	13900	1.27 B	1.21 B	< 0.5 U	< 0.5 U
Perfluorooctanoic acid (PFOA)	14200	12000	12.9 B	12.7 B	< 0.5 U	< 0.5 U
Perfluoropentanoic acid (PFPeA)	15600	13300	3.12 B	3.48 B	< 0.5 U	< 0.5 U

Table 6.0 Feed Soil Fluorine Concentration

Analyte	Chemical Formula	FEED DT2B-1-1 (ug/kg)	FEED DT2B-1-2 (ug/kg)	Fluorine Content (% wt)	Fluorine Content (ug/kg)
Perfluorobutanesulfonic acid (PFBS)	$C_4HF_9O_3S$	13900	11400	57.0%	7208
Perfluorohexanesulfonic acid (PFHxS)	$C_6HF_{13}O_3S$	15000	12600	61.7%	8519
Perfluorononanoic acid (PFNA)	$C_9HF_{17}O_2$	19000	17200	69.6%	12598
Perfluorooctanesulfonic acid (PFOS)	$C_8HF_{17}O_3S$	16500	15600	64.6%	10366
Perfluorooctanoic acid (PFOA)	$C_8HF_{15}O_2$	14300	12700	68.8%	9292
Perfluoropentanoic acid (PFPeA)	$C_5HF_9O_2$	14600	12600	64.8%	8807
Total Fluorine in Feed Soil (ug/kg)					56790

Note: ug/kg = microgram per kilogram

Table 7.0 EPA Method 26A Fluorine Mass Balance / PFAS DRE

Parameter	DT2B-1	DT2B-2
Soil Feed Parameter		
Feed Weight, wet (kg)	23.85	23.49
Feed Moisture Content (% wt)	9.2%	9.0%
Feed Weight, dry (kg)	21.67	21.38
Fluorine Feed Concentration (ug/kg, dry)	56790	53522
Fluorine Feed Mass (ug)	1230510	1144081
TO Stack Gas Parameter		
M26A Sample HF Catch (ug)	11800	14100
M26A Sample Fluorine Catch (ug)	11206	13390
M26A Sample Volume (dscm)	1.76	2.04
TO Stack Gas Fluorine Concentration (ug/dscm)	6367	6562
TO Stack Gas Flow Rate (dscm/min)	1.42	1.47
Sample Duration (min)	115	135
TO Stack Volume (dscm)	162.8	198.8
TO Stack Gas Fluorine Mass (ug)	1036815	1304559
PFAS DRE from Fluorine Mass Balance (%)	84%	114%

Note: ug/kg = microgram per kilogram
% wt = percent weight.
dscm = dry standard cubic meter.
ug/dscm = microgram per dry standard cubic meter.
kg = kilogram
DRE = destruction and removal efficiency

2.0 PROCESS DESCRIPTION

Testing was conducted at the US Ecology of Texas (USET) Resource Conservation and Recovery Act (RCR) permitted Treatment Storage and Disposal Facility (TSDF) located in Robstown, Texas. The facility includes multiple operating hazardous waste treatment units including a commercial-scale Indirect Thermal Desorption Unit (ITDU), a landfill, various storage areas, two waste stabilization units, and an underground injection (deep well) unit.

The pilot-scale apparatus consisted of two stages; a thermal separation unit (desorber) and a thermal oxidizer. Contaminated solids were heated by several propane burners. The products of combustion did not mix the waste or volatilized materials. The contaminated soil sample was fed into the seal dryer cylinder through and airlock where it was heated by conduction and radiation from the heated steel cylinder. Internal paddles rotated to mix the solids and desorb their chemical constituents as vapors, where the were transported to a thermal oxidizer with a nitrogen carrier gas.

3.0 SCOPE AND OBJECTIVES

The objective of the testing was to determine the destruction removal efficiency of the TDX ITDU/TO pilot unit for presentation to EA Engineering, Science and Technology, Inc., PCB for presentation to the Strategic Environmental Research and Development Program (SERDP), U.S. Department of Defense.

The scope of the project involved two test runs at the ITDU/TO exhaust stack for each emission parameter. The following emission parameters were determined.

4.0 FIELD TESTING PROGRAM

4.1 Testing Location and Traverse Points

The ITDU exhaust stack is square in geometry with each inside diameter being six inches. The ITDU exhaust stack is just over 15 feet long stack with a cross-sectional area of 0.250 square feet one three-inch test port located on the horizontal cross-sectional plane. Stack wall thickness is approximately six inches at the test ports. The nearest flow disturbances are located six feet (12.0

duct diameters) upstream and two feet (4.0 duct diameters) downstream from the test port. A single point testing approach was followed due to a Method 1 variance approach adopted by TDX for testing these types of scenarios.

Access to the testing locations is provided on ground level. Safety equipment required for access to the testing locations was hard hat, steel toed shoes, safety glasses, and hearing protection.

4.2 Testing Summary

Testing was conducted according to the EA test plan and the Test America test plan and the methodologies of the U.S. EPA Federal Register 40 CFR 60 Appendix A. The following procedures were utilized at the ITDU exhaust stack.

Procedures[1]

Method 1:	Sample and Velocity Traverses for Stationary Sources
Method 2:	Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
Method 3:	Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources
Method 4:	Determination of Moisture in Stack Gases
Method 0010:	Modified Method 5 Train, part of Test Methods for Evaluating Solid Waste Physical/Chemical Methods (specifically PFAS)
Method 26A	Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources - Isokinetic Method

Two test runs were performed for each emission parameter. Some emission parameters where possible, were determined concurrently. All test runs included concurrent gas flow rate determinations by EPA Methods 1, 2, 3A, and 4.

The average of the two test runs were used to determine PFAS destruction removal efficiency.

[1]Source: U.S. EPA, *Federal Register*, Title 40 Part 60, Appendix A

4.3 Process Operations and Emission Testing

The pilot unit PFAS destruction removal efficiency demonstration test was conducted in two runs. PFAS impacted IDW was fed to the ITDU at representative feed rates by TDX.

4.4 Sampling Procedures

The following sections provide descriptions of sampling procedures and the sampling trains that were used for emissions testing.

4.4.1 Gas Flow and Temperature Measurements

Gas flow rate and temperature profiles were measured by conducting velocity and temperature traverses simultaneously with each isokinetic sampling parameter according to the principles of EPA Method 2. Gas velocity heads were measured with a Type-S Pitot tube connected to an inclined manometer. The static pressure was measured using the same Pitot tube and manometer. A Chrome-Alumel thermocouple attached to a digital indicator were used to measure the gas temperature at each traverse point.

4.4.2 Oxygen and Carbon Dioxide Emission Concentration Determinations

Oxygen (O_2) and carbon dioxide (CO_2) emission concentrations were determined by EPA Method 3 *Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)*. Oxygen and CO_2 emission concentrations were used primarily for the determination of gas molecular weight required for gas flow rate calculations and to express emission concentrations. Oxygen and Carbon Dioxide values were ~~calculated~~ reported ~~stoichiometrically~~ by Mr. George Hay and reported to LCH.

Note: Concentrations of O2, CO2 and CO were measured using an E-Instruments Model E6000 continuous emissions monitor. - Revisions by EA on 2.28.2020

4.4.3 Moisture Content Sampling

Moisture content determinations were conducted for each test run simultaneously with each isokinetic sampling train using the principles presented in EPA Method 4, "*Determination of Moisture Content in Stack Gases."* Parameters to be evaluated in order to determine the gas stream moisture content were sample gas volume, sample gas temperature, sample gas pressure, impinger

moisture gain, and silica gel moisture gain. Impinger moisture gain were determined volumetrically or gravimetrically. Each individual impinger was weighed to the nearest $1/10^{th}$ of a gram before and after each sample on a field calibrated scale and recorded on the corresponding field data sheet. This information is available in Attachment A and Attachment C.

4.4.4 Hydrochloric Acid Emission Testing Methodology

Procedures of EPA Methods 26A were used to determine fluorine emissions. A quartz glass filter was used, and a Teflon filter support was used.

The size of the nozzle required to maintain isokinetic sampling was calculated from the results of a previously completed velocity and temperature traverse. The sample train used a quartz glass liner with a calibrated, integrated nozzle of 0.688" diameter. The probe was not externally heated because of extreme heat of the ITDU gas. The liner was wrapped in fiber glass sleeving to provide cushioning and retain heat. An S type Inconel pitot tube and an Inconel shrouded Chromel-Alumel thermocouple were attached to the probe and used to monitor the velocity head and temperature at the traverse points during the sampling period. Sample gas passed through the nozzle and the probe to a quartz fiber filter for the removal of suspended particulate. The filter was housed in a heated chamber. From the filter, the stack gas passed to an impinger train, incorporating for hydrochloric acid determination.

1. The first impingers was Greenburg-Smith Modified design and each was uncharged.
2. The next two impingers were Greenburg-Smith design and each contained 0.1 N sodium hydroxide (NaOH) for the collection of HF and F^-
3. The final impinger was charged with 250-300 grams of color indicating silica gel desiccant.
4. As per 26A test requirements, the filter temperatures were maintained at a temperature between 248 to 273°F.
5. As per directions from Test America only the 0.1N NaOH sample fractions were submitted for fluorine analysis.

The procedures and sampling train are described as follows:

From the filter, the stack gas passed to an impinger train, incorporating five impingers. The first impinger was a Greenburg-Smith impinger and was uncharged. The next two impingers were

Greenburg-Smith impingers each containing 100 milliliters (ml) of 0.1 N NaOH for the collection of HF and F^-. The fourth contained approximately 250 grams of 6-12 mesh color-indicating silica gel, to collect any moisture and/or vapors not captured in the preceding impingers. The impinger train was immersed in an ice bath for the entire test period so that the exit gas temperature did not exceed 68°F.

From the impinger train, the gas were conducted through an umbilical cord to the control console, which contain the following pieces of equipment (listed in the order in which sample gas passes through them): a main valve, a bypass valve for flow adjustment, an airtight vacuum pump, a dry gas meter, and a calibrated orifice. The orifice is equipped with pressure taps connected across an inclined manometer used to ensure that isokinetic conditions are maintained.

The sampling train were checked for leaks before and after each sample run. The inlet of the nozzle was plugged, and the pump vacuum held at the highest vacuum attained during that period of testing. All sample runs were valid, having a leakage rate not exceeding 0.02 cubic feet per minute.

The contents of the first, second, and third impingers were measured gravimetrically, rinsed with deionized water and placed in a sample bottle labeled Container No. 1. The fourth impingers were measured gravimetrically. The back-half of the filter holder, filter support, first, second, and third impingers, and all connecting glassware were rinsed with distilled water and washings added to container No. 1. The silica gel used in the fourth impinger were removed, placed in its sample bottle, and a final weight obtained. The samples were stored in 500ml HDPE sample bottles with Teflon coated lids.

Appropriate reagents blanks were obtained and analyzed by the lab. All reagent blanks were found to be non-detect. All data is presented without blank correction.

Impinger samples were placed on ice for transportation to the laboratory, where they were analyzed by ion chromatography to determine fluorine concentrations.

4.4.5 Determination of PFAS Emissions

Emissions of PFAS compounds were determined in the same sampling train using sampling and sample recovery procedures of EPA Method 0010 and Method 537 along with the test plan as prepared by Test America. Due to the possibility of PFAS contamination, brand new glass ware was purchased and used for the sampling program. Care was taken avoid any Teflon components or accessories. The following seven fractions were captured and submitted for the sampling analyses:

1. The particulate filter was a prepared 82.6mm glass fiber filter that was removed and carefully folded into a 125ml HDPE sample bottle.

2. The nozzle, probe and front half of the filter holder was brushed and rinsed three times with Methanol/5% Ammonium Hydroxide reagent and placed in a 250ml HDPE sample bottle.

3. The primary XAD-2 resin trap was recovered, sealed with parafilm, wrapped with foil and bagged and labeled.

4. The back half of the filter holder, coil condenser and connecting glassware was rinsed three times with Methanol/5% Ammonium Hydroxide reagent and placed in a 250ml HDPE sample bottle.

5. The condensate of impingers 1, 2 and 3 were measured gravimetrically and collected into a 500ml HDPE sample bottle. The impingers were rinsed three times with PFAS free water and collected again into a 250ml HDPE sample bottle.

6. The breakthrough XAD-2 Resin Trap was recovered, sealed with parafilm, wrapped with foil and bagged and labeled.

7. The silica gel impinger was measured gravimetrically and the silica gel was recovered into its original 500ml HDPE sample bottle.

The sampling train included the following components. Note that sealant grease was not used in assembling the sampling train.

1. A quartz glass liner with an integrated, calibrated 0.688" nozzle.
2. Glass fiber filter (cleaned as per Method 23) heated to 248 ºF ±25 ºF,
3. Teflon filter support and Teflon O Rings for sealing filter holder
4. Glass condenser (with thermocouple to assure gas stream temperature below 68 ºF)
5. Sorbent module containing XAD-2 resin (prepared and spiked with appropriate PFAS surrogates)
6. Two impingers each containing 100 ml of water,
7. Empty impinger,
8. A breakthrough sorbent module containing XAD-2 resin (prepared and spiked with appropriate PFAS surrogates)
9. A final impinger containing approximately 250 grams of silica gel.

The size of the nozzle required to maintain isokinetic sampling was calculated from the results of a previously completed velocity and temperature traverse. The sample train used a quartz glass liner with a calibrated, integrated nozzle of 0.688" diameter. The probe was not externally heated because of extreme heat of the ITDU gas. The liner was wrapped in fiber glass sleeving to provide cushioning and retain heat. An S type Inconel pitot tube and an Inconel shrouded Chromel-Alumel thermocouple were attached to the probe and used to monitor the velocity head and temperature at the traverse points during the sampling period. Sample gas passed through the nozzle and the probe to a glass fiber filter for the removal of suspended particulate. The filter was housed in a heated chamber. From the filter, the stack gas passed to an impinger train, incorporating for PFAS determination.

An "S"- type pitot tube and a Chromel-Alumel thermocouple were used to monitor the velocity head and temperature at the traverse points during the sampling period. Sample gas passed through the nozzle and probe to a glass fiber filter for the removal of suspended particulate. The filter was housed in a heated chamber with the temperature maintained at 248±25°F. From the filter, the stack gas passed through a condenser and packed column of XAD-2 resin. The condenser and packed column were cooled by re-circulating ice water to assure resin inlet gas temperature does not exceed 68°F. From the resin, the stack gas is routed to an impinger train, which collected any moisture from the sample gas. The impinger train were immersed in an ice bath for the entire test period so that the exiting gas temperature does not exceed 68°F. The packed columns were

wrapped with aluminum foil for protection from sunlight. From the impinger train, the gas is conducted through an umbilical cord to the control console.

The sampling trains were checked for leaks before and after each sample run. The inlet of the nozzle was plugged, and the pump vacuum is held at the highest vacuum attained during that period of testing. An acceptable test did not exceed the maximum allowable leakage rate of 0.02 cubic feet per minute (cfm). The samples were placed on ice or refrigerated immediately for shipment to the laboratory. Appropriate reagents blanks were obtained and analyzed by the lab. All reagent blanks were found to be non-detect. All data is presented without blank correction.

The cleanliness and thoroughness of the glassware preparation procedures were challenged by collecting a M0010 Field Blank Train.

4.5 Laboratory Analyses

All samples were submitted FedEx dangerous goods shipping to Eurofins/Test America in Knoxville, Tennessee. Laboratory contact information is as follows:

Dr. William Anderson
Eurofins/Test America
5815 Middlebrook Pike
Knoxville, Tennessee 37921
William.anderson@testamericainc.com
Telephone: 865-291-3080

4.7 Equipment Calibrations

All equipment used in the testing program were calibrated according to test method requirements. Equipment calibration data were included in this final test report include:

1. Pitot construction standards
2. Stack temperature thermocouple calibrations
3. Nozzles,
4. Dry gas meter calibrations,
5. Method 4 on site scale calibrations,

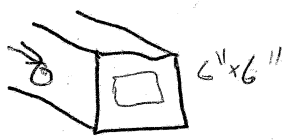
5.0 DATA EVALUATION AND REPORT PREPARATION

5.1 Emission Calculations

Emissions were calculated by Mr. George Hay of TDX and were reported to LCH in table form. All sample volumes, flow rates, moisture content and isokinetic sampling rates were calculated by LCH and are available in Attachment B along with standard source evaluation calculation examples.

ATTACHMENTA
RAW DATA

Date	4/15/17	Meter Box	0049
Facility	TD*X USET Robstown, TX	Calibration Data	DH@ 1.83 Yd 0.995
Unit	Pilot Unit	Probe ID	1802056
Test ID	M537 R1	Pitot Cp	0.84
Initial Leak Rate	0.000141	Nozzle ID	6"x6" 446
Final Leak Rate		Nozzle Size	.462 DN .688
Pitot +	✓	Pitot -	✓
Pitot +		Pitot -	
Stack Diameter	6"x6"	Assumed Moisture	7.5
No. of Points	NA	Barometric Pressure	30.00



Clock Time	Elapsed Time	Point	Delta P	Delta H	Sample Volume	Stack	XAD2 Trap	Meter	Probe	Filter	Exit	Vacuum
1214	0	A1	.02	1.0	626.884	1729		80	NA	244	51	6
	5	2	.02	1.0	629.7	1735		81		238	50	6
	10	3						82				
	15	4	.02	1.0	635.4	1739	45	83		247	49	7
	20	5	.02	1.0	638.1	1744	46	84		241	49	7
	25	6	.02	1.0	640.9	1737	48	84		241	50	7
	30	B1										
	35	2	.02	1.0	646.3	1739	50	85		242	51	7
	40	3	.02	1.0	650.1	1736	51	86		243	53	7
	45	4	.02	1.0	652.3	1737	51	86		243	54	7
	50	5	.02	1.0		1735	51	87		241	54	7
	55	6	.02	1.0	657.1	1736	51	87		247	54	7
	60	C1	.02	1.0		1738	55	87		248	56	7
	65	2	.02	1.0	663.7	1740	57	87		248	58	7
	70	3	.02	1.0	666.6	1745	57	88		250	57	7
	75	4	.02	1.0	670.0	1747	58	88		248	57	7
	80	5	.02	1.0	672.4	1747	59	88		242	57	7
	85	6	.02	1.0	675.3	1752	54	88		244	56	7
	90	D1	.02	1.0	678.6	1753	62	88		246	56	7
	95	2	.02	1.0	681.2	1751	61	88		247	57	7
	100	3	.02	1.0	684.0	1751	61	88		243	58	7
	105	4	.02	1.0	—	1751	36	88		244	54	7
	110	5	.02	1.0	689.8	1752	36	89		249	52	7
	115	6	.02	1.0	692.6	1756	37	81		247	51	7
	120					Final Gas Meter Reading						

Method 4 Data

Impinger	Initial Weight	Final Weight	Difference
1	364.3	610.2	
2	713.5	712.2	
3	695.8	695.9	
4	954.2	980.1	
5			
6			
7			

Nozzle Size	.462		
K-Factor	51.1		
Oxygen	~~4~~ 10%		
Carbon Dioxide	~~4~~ 6%		
Static 1		6.01	
Static 2			

PAGE 1 of 2

Notes

Date	4/15/19		Meter Box	0649		
Facility	TD*X USET Robstown, TX		Calibration Data	DH@ ~~1.83~~ 1.85	Yd 0.995	
Unit	Pilot Unit		Probe ID	1902056	Pitot Cp	0.84
Test ID	M537 R1		Nozzle ID	NA	Nozzle Size	0.688 LOW

Initial Leak Rate	0.009@14	✓ Pitot +	✓ Pitot -	Stack Diameter	6"x6"	Assumed Moisture	7.5
Final Leak Rate	0.000@10"	✓ Pitot +	✓ Pitot -	No. of Points	NA	Barometric Pressure	30.1

Clock Time	Elapsed Time	Point	Delta P	Delta H	Sample Volume	Stack	XAD2 Trap	Meter	Probe	Filter	Exit	Vacuum
	120	A1	.12	1.1	695.6	1755	37	89		244	50	7
	125	2	.02	1.0	697.8	1750	38	89		247	52	7
	130	3	.02	1.0	701.1	1745	39	89		242	52	7
	~~15~~ 135	4	.02	1.0	704.3	1745	39	89		244	53	7
	~~20~~ 140	5	.02	1.0	708.0	1740	34	89		245	49	7
	~~25~~ 145	6	.02	1.0	710.3	1741	35	89		252	49	7
	~~30~~ 150	B1	.02	1.0	712.9	1741	35	89		252	48	7
	~~35~~ 155	2	.02	1.0	715.5	1743	36	89		251	48	8
	~~40~~ 160	3	.02	1.0	718.4	1740	37	88		243	49	8
1500	~~45~~ 165	4			721.308							
STOP	~~50~~ 170	5										
	~~55~~ 175	6										
	~~60~~ 180	C1										
	~~65~~ 185	2										
	~~70~~ 190	3										
	~~75~~ 195	4										
	~~80~~ 200	5										
	~~85~~ 205	6										
	~~90~~ 210	D1										
	~~95~~ 215	2										
	~~100~~ 220	3										
	~~105~~ 225	4										
	~~110~~ 230	5										
	~~115~~ 235	6										
	240 ~~120~~					Final Gas Meter Reading						

Method 4 Data				Nozzle Size		K-Factor	Oxygen
Impinger	Initial Weight	Final Weight	Difference			51.1	~~n/a~~ 10%
1							Carbon Dioxide
2							~~n/a~~ 6%
3							
4							
5							
6				Static 1			
7				Static 2			

Notes:

PG, 2 / 2

STOP @ 1500

2'45" INTO TEST

PILOT UNIT TARGET

TEMP ACHIEVED

Date	04-15-19		Meter Box	0049	
Facility	TD*X USET Robstown, TX		Calibration Data	DH@ 1.83	Yd 0.995
Unit	Pilot Unit		Probe ID	19020560	Pitot Cp 0.84
Test ID	M537R2		Nozzle ID	NA	Nozzle Size ~~.468~~ .688 Cal
Initial Leak Rate	0.000015	✓ Pitot + / ✓ Pitot -	Stack Diameter	6×6	Assumed Moisture 7.5
Final Leak Rate		Pitot + / Pitot -	No. of Points	NA	Barometric Pressure 30.18

Clock Time	Elapsed Time	Point	Delta P	Delta H	Sample Volume	Stack	XAD2 Trap	Meter	Probe	Filter	Exit	Vacuum
1730	0	A1	.02	1.0	721.606	1678	44	79	NA	242	64	5
	5	2	.02	1.6	724.5	1694	40	79		240	49	5
	10	3	.02	1.0	727.4	1708	40	79		248	51	5
	15	4	.02	1.6	730.0	1723	39	80		253	52	5
	20	5	.02	1.0	732.9	1726	42	80		247	52	7
	25	6	.02	1.6	735.8	1727	43	81		251	53	7
	30	B1	.02	1.0	738.7	1732	44	81		260	53	7
	35	2	.02	1.0	741.4	1739	43	81		244	53	7
	40	3	.02	1.0	744.6	1745	44	81		240	54	7
	45	4	.02	1.0	747.7	1751	48	81		245	54	7
	50	5	.02	1.0	750.0	1748	49	81		250	55	7
	55	6	.02	1.0	753.1	1751	49	81		249	56	7
	60	C1	.02	1.0	757.8	1750	49	80		249	57	7
	65	2	.02	1.0	760.1	1750	49	80		248	56	7
	70	3	.02	1.0	762.1	1748	48	80		249	55	7
	75	4	.02	1.0	764.0	1747	48	80		248	55	7
	80	5	.02	1.0	767.1	1746	54	81		244	60	7
	85	6	.02	1.0	770.9	1746	47	81		244	57	7
	90	D1	.02	1.0	773.2	1749	45	81		252	54	7
	95	2	.02	1.0	776.9	1747	48	81		246	53	7
1910	100	3			779.171							
	105	4										
	110	5										
	115	6										
	120					Final Gas Meter Reading						

Method 4 Data				Nozzle Size		K-Factor	Oxygen
Impinger	Initial Weight	Final Weight	Difference			51.1	~~9~~ 1.67.
1	368.6	533.6					Carbon Dioxide
2	712.9	713.3					~~9~~ 6.7.
3	698.3	698.7					
4	~~982.9~~ 991.8	991.8					
5							
6				Static 1	.01		
7				Static 2			

Notes

Date	04-16-19	Meter Box	0041
Facility	TD*X USET Robstown, TX	Calibration Data	DH@ 1.83 Yd 0.995
Unit	Pilot Unit	Probe ID	19020502
Test ID	M26a R1	Pitot Cp	0.84
Initial Leak Rate	0.000B 10" ✓ Pitot + ✓ Pitot - ✓	Nozzle ID	NA
Final Leak Rate	0.000B 8" ✓ Pitot + ✓ Pitot -	Nozzle Size	462 .688
		Stack Diameter	6×6
		Assumed Moisture	7.57
		No. of Points	NA
		Barometric Pressure	29.96

Clock Time	Elapsed Time	Point	Delta P	Delta H	Sample Volume	Stack	XAD2 Trap	Meter	Probe	Filter	Exit	Vacuum
1055 ~~0940~~	0	A1	.02	0.96	779.464	1725	NA	79	NA	264	65	5
	5	2	.02	0.96	782.3	1723	NA	80		262	65	5
	10	3	.02	0.96	785.3	1731		82		257	65	5
	15	4	.02	0.96	789.1	1742		84		262	65	5
	20	5	.02	0.96	790.5	1741		85		260	66	5
	25	6	.015	0.96	793.1	1739		86		270	64	5
	30	B1	.015	0.96	796.1	1738		87		263	62	5
	35	2	.015	0.96	799.0	1746		88		265	61	5
	40	3	.02	0.96	801.9	1744		89		259	61	5
	45	4	.02	0.96	804.6	1744		90		262	61	5
	50	5	.015	0.96	807.6	1739		91		263	61	5
	55	6	.015	0.96	811.8	1730		91		266	61	5
	60	C1	.015	0.96	813.1	1730		91		256	61	5
	65	2	.015	0.96	816.0	1733		92		259	62	5
	70	3	.015	0.96	818.8	1733		92		257	63	5
	75	4	.02	0.96	821.7	1732		93		261	63	5
	80	5	.02	0.96	824.5	1733		93		255	63	5
	85	6	.02	0.96	828.1	1735		94		252	63	5
	90	D1	.02	0.96	831.0	1731		94		253	64	5
	95	2	.02	.96	833.8	1731		95		262	63	5
	100	3	.02	.96	837.7	1730		95		259	63	5
	105	4	.02	.96	840.0	1728		95		265	63	5
	110	5	.02	.96	841.3	1730		95		269	64	5
1245	115	6			844.240							
	120				Final Gas Meter Reading							

Method 4 Data				Nozzle Size		K-Factor	Oxygen
Impinger	Initial Weight	Final Weight	Difference				~~4~~
1	717.2	884.3				51.1	
2	702.7	703.2				48	Carbon Dioxide
3	611.0	613.6					~~4~~
4	1009.2	1018.5					
5							
6				Static 1			
7				Static 2			

100 O2

6 CO2

Notes

Date	4-16-24	Meter Box	0049
Facility	TD*X USET Robstown, TX	Calibration Data	1.83 DH@ 0.995 Yd
Unit	Pilot Unit	Probe ID	190208L
Test ID	M26 R2	Pitot Cp	0.84
Initial Leak Rate	0.00@10"	Pitot + ✓	Pitot - ✓
Final Leak Rate		Pitot +	Pitot -
Nozzle ID	NA	Nozzle Size	.688
Stack Diameter	6x6	Assumed Moisture	12%
No. of Points	NA	Barometric Pressure	29.96

PAGE 1 of 2

Clock Time	Elapsed Time	Point	Delta P	Delta H	Sample Volume	Stack	XAD2 Trap	Meter	Probe	Filter	Exit	Vacuum
1515	0	A1	.02	0.96	844.496	1738	NA	83	NA	260	63	5
	5	2	.02	0.96	847.2	1734		83		260	62	5
	10	3	.02	.96	850.0	1735		83		260	61	5
	15	4	.02	.96	853.1	1730		84		263	60	5
	20	5	.02	.96	856.3	1737		84		260	60	5
	25	6	.02	.96	857.9	1747		86		261	61	5
	30	B1	.02	.96	860.3	1750		86		261	61	5
	35	2	.02	.96	864.3	1743		87		257	62	5
	40	3	.02	.96	866.5	1733		88		258	63	5
	45	4	.02	.96	869.4	1740		89		263	62	5
	50	5	.02	.96	872.3	1756		90		260	61	5
	55	6	.02	.96	874.8	1750		90		261	64	5
	60	C1	.02	.96	877.5	1750		91		266	65	5
	65	2	.02	.96	880.7	1747		92		260	66	5
	70	3	.02	.96	884.0	1748		92		260	68	5
	75	4	.02	.96	886.5	1747		93		263	67	5
	80	5	.02	.96	889.0	1751		93		260	63	5
	85	6	.02	.96	891.7	1751		94		261	63	5
	90	D1	.02	.96	894.9	1746		94		260	63	5
	95	2	.02	.96	897.9	1744		94		260	61	5
	100	3	.02	.96	900.00	1746		94		260	63	5
	105	4	.02	.96	902.8	1745		94		260	63	5
	110	5	.02	.96	905.7	1745		94		260	63	5
	115	6	.02	.96	908.7	1751		95		262	64	5
	120					Final Gas Meter Reading						

Method 4 Data

Impinger	Initial Weight	Final Weight	Difference
1	722.3	912.0	
2	699.2	699.8	
3	613.4	616.2	
4	1026.8	1038.7	
5			
6			
7			

Nozzle Size | K-Factor | Static 1 | Static 2

Oxygen -10

Carbon Dioxide -6

WALL BUILT TO PREVENT AMBIENT INTRUSION TO STACK

Notes

Date	04-16-1A	Meter Box	0094
Facility	TD*X USET Robstown, TX	Calibration Data	DH@ 1.83 Yd 0.995
Unit	Pilot Unit	Probe ID	1902056
Test ID	M26-R2	Pitot Cp	0.84
Initial Leak Rate		Nozzle ID	NA
Final Leak Rate	0.000 10"	Nozzle Size	.656
Pitot +	✓	Stack Diameter	656
Pitot -	✓	Assumed Moisture	12.5%
		No. of Points	NA
		Barometric Pressure	29.96

Clock Time	Elapsed Time	Point	Delta P	Delta H	Sample Volume	Stack	XAD2 Trap	Meter	Probe	Filter	Exit	Vacuum
	120	A1	.02	.96	911.1	1744	NA	94	NA	260	64	5
	125	2	.02	.96	913.4	1745		95		261	64	5
	130	3	.02	.96	916.9	1733		95		262	64	5
	135	4			919.696							
	140	5										
	25	6										
	30	B1										
	35	2										
	40	3										
	45	4										
	50	5										
	55	6										
	60	C1										
	65	2										
	70	3										
	75	4										
	80	5										
	85	6										
	90	D1										
	95	2										
	100	3										
	105	4										
	110	5										
	115	6										
	120				Final Gas Meter Reading							

Method 4 Data			
Impinger	Initial Weight	Final Weight	Difference
1			
2			
3			
4			
5			
6			
7			

Nozzle Size		K-Factor	Oxygen
			Carbon Dioxide
Static 1			
Static 2			

PAGE 2 of 2

Notes

ATTACHMENT B
CALCULATIONS

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	TDX
Jobsite:	Robstown
Emission Source(s):	Pilot Test
Sampling Location:	Outlet Stack

Date:	4/15/2019
Run No.:	M537R1
Run Times:	1214-1510
Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	94.424
Total Water Caught (grams) [Wc]:	265.6
Static Pressure	-0.01
Barometric Pressure ("Hg) [Pb]:	30.00
Carbon Dioxide (%) [CO2]:	6.0
Oxygen (%) [O2]:	10.0
Methane (%) [CH4]	0.0
Nozzle Diameter (inches) [Dn]:	0.688
Pitot Tube Factor [Cp]:	0.840
Meter Correction Factor [Y]:	0.995
Stack Cross-Section Area (Square Feet) [CSA]:	0.250
Total Sample Time (minutes) [min]:	165
Gas Volume Correction Temperature (F) [Tc]	68
Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	91.279
Water Volume (cubic feet @ stp) [Vws]:	12.50
Moisture (%) [Bws]:	12.04
Dry Molecular Weight (lb/lb-mol) [MWd]:	29.360
Wet Molecular Weight (lb/lb-mol) [MWw]:	27.992
Absolute Stack Pressure ("Hg) [Pa]:	29.999
Gas Velocities (feet/second) [Vsa]	16.453
Stack Flow Rate (cubic feet/ minute)	
Actual [ACFM]:	247
@ stp [SCFM]:	59
Dry @ stp [DSCFM]:	52
Sample Isokinetics (%) [I]:	102.74

Traverse Point	Delta-P ("H_2O)	Delta-H ("H_2O)	Temperatures °F			Square Root of Delta-P
			Meter In	Meter Out	Stack	
1	0.02	1.00	80	80	1729	0.141
2			81	81	1735	
3			82	82	1739	
4			83	83	1744	
5			84	84	1737	
6			84	84	1739	
7			85	85	1736	
8			86	86	1737	
9			86	86	1735	
10			87	87	1736	
11			87	87	1738	
12			87	87	1740	
13			87	87	1745	
14			88	88	1747	
15			88	88	1747	
16			88	88	1752	
17			88	88	1753	
18			88	88	1751	
19			88	88	1751	
20			88	88	1751	
21			88	88	1752	
22			89	89	1756	
23			89	89	1755	
24			89	89	1750	
25					1745	
		[H]		[Tm]	[Ts]	[dP]
Averages:	**0.020**	**1.000**		**86.3**	**1744.0**	**0.1414**

Date:	4/15/2019
Run No.:	M537R2
Run Times:	1730-1910
Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	57.565
Total Water Caught (grams) [Wc]:	169.7
Stack Static Pressure ("H2O) [Ps]:	0.01
Barometric Pressure ("Hg) [Pb]:	29.95
Carbon Dioxide (%) [CO2]:	6.0
Oxygen (%) [O2]:	10.0
Methane (%) [CH4]	0.0
Nozzle Diameter (inches) [Dn]:	0.688
Pitot Tube Factor [Cp]:	0.840
Meter Correction Factor [Y]:	0.995
Stack Cross-Section Area (Square Feet) [CSA]:	0.250
Total Sample Time (minutes) [min]:	100
Gas Volume Correction Temperature (F) [Tc]	68
Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	56.157
Water Volume (cubic feet @ stp) [Vws]:	7.99
Moisture (%) [Bws]:	12.45
Dry Molecular Weight (lb/lb-mol) [MWd]:	29.360
Wet Molecular Weight (lb/lb-mol) [MWw]:	27.946
Absolute Stack Pressure ("Hg) [Pa]:	29.951
Gas Velocities (feet/second) [Vsa]	16.446
Stack Flow Rate (cubic feet/ minute)	
Actual [ACFM]:	247
@ stp [SCFM]:	59
Dry @ stp [DSCFM]:	52
Sample Isokinetics (%) [I]:	104.56

Traverse Point	Delta-P ("H_2O)	Delta-H ("H_2O)	Temperatures °F			Square Root of Delta-P
			Meter In	Meter Out	Stack	
1	0.02	1.00	79	79	1678	0.141
2			79	79	1694	
3			79	79	1708	
4			80	80	1723	
5			80	80	1726	
6			81	81	1727	
7			81	81	1732	
8			81	81	1739	
9			81	81	1745	
10			81	81	1751	
11			81	81	1748	
12			81	81	1751	
13			81	81	1750	
14			80	80	1750	
15			80	80	1748	
16			80	80	1747	
17			80	80	1740	
18			81	81	1746	
19			81	81	1749	
20			81	81	1747	
21						
22						
23						
24						
25						
		[H]		[Tm]	[Ts]	[dP]
Averages:	**0.020**	**1.000**		**80.4**	**1735.0**	**0.1414**

Date:	
Run No.:	
Run Times:	
Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	
Total Water Caught (grams) [Wc]:	
Stack Static Pressure ("H2O) [Ps]:	
Barometric Pressure ("Hg) [Pb]:	
Carbon Dioxide (%) [CO2]:	
Oxygen (%) [O2]:	
Methane (%) [CH4]	
Nozzle Diameter (inches) [Dn]:	
Pitot Tube Factor [Cp]:	
Meter Correction Factor [Y]:	
Stack Cross-Section Area (Square Feet) [CSA]:	
Total Sample Time (minutes) [min]:	
Gas Volume Correction Temperature (F) [Tc]	
Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	#DIV/0!
Water Volume (cubic feet @ stp) [Vws]:	0.00
Moisture (%) [Bws]:	#DIV/0!
Dry Molecular Weight (lb/lb-mol) [MWd]:	28.000
Wet Molecular Weight (lb/lb-mol) [MWw]:	#DIV/0!
Absolute Stack Pressure ("Hg) [Pa]:	0.000
Gas Velocities (feet/second) [Vsa]	#DIV/0!
Stack Flow Rate (cubic feet/ minute)	
Actual [ACFM]:	#DIV/0!
@ stp [SCFM]:	#DIV/0!
Dry @ stp [DSCFM]:	#DIV/0!
Sample Isokinetics (%) [I]:	#DIV/0!

Stp = standard conditions = 29.92" Hg & [Tc] degress F

Traverse Point	Delta-P ("H_2O)	Delta-H ("H_2O)	Temperatures °F			Square Root of Delta-P
			Meter In	Meter Out	Stack	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
		[H]		[Tm]	[Ts]	[dP]
Averages:	**#DIV/0!**	**#DIV/0!**		**#DIV/0!**	**#DIV/0!**	**#DIV/0!**

ISOKINETIC SAMPLE CALCULATIONS

Client Name:	TDX
Jobsite:	USET Robstown
Emission Source(s):	Pilot Test
Sampling Location:	Outlet Stack

Date:	10/2/2013
Run No.:	M26a R1
Run Times:	1050-1245
Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	64.776
Total Water Caught (grams) [Wc]:	183.9
Stack Static Pressure ("H2O) [Ps]:	0.01
Barometric Pressure ("Hg) [Pb]:	29.96
Carbon Dioxide (%) [CO2]:	6.0
Oxygen (%) [O2]:	10.0
Methane (%) [CH4]	0.0
Nozzle Diameter (inches) [Dn]:	0.688
Pitot Tube Factor [Cp]:	0.840
Meter Correction Factor [Y]:	0.995
Stack Cross-Section Area (Square Feet) [CSA]:	0.250
Total Sample Time (minutes) [min]:	115
Gas Volume Correction Temperature (F) [Tc]	68
Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	62.147
Water Volume (cubic feet @ stp) [Vws]:	8.65
Moisture (%) [Bws]:	12.22
Dry Molecular Weight (lb/lb-mol) [MWd]:	29.360
Wet Molecular Weight (lb/lb-mol) [MWw]:	27.971
Absolute Stack Pressure ("Hg) [Pa]:	29.961
Gas Velocities (feet/second) [Vsa]	15.762
Stack Flow Rate (cubic feet/ minute)	
Actual [ACFM]:	236
@ stp [SCFM]:	57
Dry @ stp [DSCFM]:	50
Sample Isokinetics (%) [I]:	104.63

Traverse Point	Delta-P ("H_2O)	Delta-H ("H_2O)	Temperatures °F			Square Root of Delta-P
			Meter In	Meter Out	Stack	
1	0.02	0.96	79	79	1725	0.141
2	0.02		80	80	1723	0.141
3	0.02		82	82	1731	0.141
4	0.02		84	84	1742	0.141
5	0.02		85	85	1741	0.141
6	0.02		86	86	1739	0.122
7	0.02		87	87	1738	0.122
8	0.02		88	88	1740	0.141
9	0.02		89	89	1744	0.141
10	0.02		90	90	1744	0.122
11	0.02		91	91	1739	0.122
12	0.02		91	91	1730	0.122
13	0.02		91	91	1730	0.122
14	0.02		92	92	1733	0.122
15	0.02		92	92	1733	0.141
16	0.02		93	93	1732	0.141
17	0.02		93	93	1733	0.141
18	0.02		94	94	1735	0.141
19	0.02		94	94	1731	0.141
20	0.02		95	95	1731	0.141
21	0.02		95	95	1730	0.141
22	0.02		95	95	1728	0.141
23	0.02		95	95	1730	0.141
24						
25						
		[H]		[Tm]	[Ts]	[dP]
Averages:	**0.018**	**0.960**		**89.6**	**1734.0**	**0.1357**

Date:	4/16/2019
Run No.:	M26aR2
Run Times:	1515-1740
Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	75.200
Total Water Caught (grams) [Wc]:	211.0
Stack Static Pressure ("H2O) [Ps]:	0.01
Barometric Pressure ("Hg) [Pb]:	29.96
Carbon Dioxide (%) [CO2]:	6.0
Oxygen (%) [O2]:	10.0
Methane (%) [CH4]	0.0
Nozzle Diameter (inches) [Dn]:	0.688
Pitot Tube Factor [Cp]:	0.840
Meter Correction Factor [Y]:	0.995
Stack Cross-Section Area (Square Feet) [CSA]:	0.250
Total Sample Time (minutes) [min]:	135
Gas Volume Correction Temperature (F) [Tc]	68
Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	72.055
Water Volume (cubic feet @ stp) [Vws]:	9.93
Moisture (%) [Bws]:	12.11
Dry Molecular Weight (lb/lb-mol) [MWd]:	29.360
Wet Molecular Weight (lb/lb-mol) [MWw]:	27.984
Absolute Stack Pressure ("Hg) [Pa]:	29.961
Gas Velocities (feet/second) [Vsa]	16.467
Stack Flow Rate (cubic feet/ minute)	
Actual [ACFM]:	247
@ stp [SCFM]:	59
Dry @ stp [DSCFM]:	52
Sample Isokinetics (%) [I]:	99.26

Traverse Point	Delta-P ("H_2O)	Delta-H ("H_2O)	Temperatures °F			Square Root of Delta-P
			Meter In	Meter Out	Stack	
1	0.02	0.96	83	83	1738	0.141
2	0.02	0.96	83	83	1734	0.141
3	0.02	0.96	83	83	1735	0.141
4	0.02	0.96	84	84	1730	0.141
5	0.02	0.96	86	86	1737	0.141
6	0.02	0.96	86	86	1747	0.141
7	0.02	0.96	87	87	1750	0.141
8	0.02	0.96	88	88	1743	0.141
9	0.02	0.96	89	89	1733	0.141
10	0.02	0.96	90	90	1740	0.141
11	0.02	0.96	90	90	1750	0.141
12	0.02	0.96	91	91	1750	0.141
13	0.02	0.96	92	92	1750	0.141
14	0.02	0.96	92	92	1747	0.141
15	0.02	0.96	93	93	1748	0.141
16	0.02	0.96	93	93	1747	0.141
17	0.02	0.96	94	94	1751	0.141
18	0.02	0.96	94	94	1751	0.141
19	0.02	0.96	94	94	1749	0.141
20	0.02	0.96	94	94	1744	0.141
21	0.02	0.96	94	94	1746	0.141
22	0.02	0.96	94	94	1745	0.141
23	0.02	0.96	95	95	1745	0.141
24	0.02	0.96	94	94	1751	0.141
25	0.02	0.96	95	95	1745	0.141
		[H]		[Tm]	[Ts]	[dP]
Averages:	**0.020**	**0.960**		**90.3**	**1744.2**	**0.1414**

Date:	
Run No.:	
Run Times:	
Input Data:	
Total Metered Volume (Cubic Feet) [Vm]:	
Total Water Caught (grams) [Wc]:	
Stack Static Pressure ("H2O) [Ps]:	
Barometric Pressure ("Hg) [Pb]:	
Carbon Dioxide (%) [CO2]:	
Oxygen (%) [O2]:	
Methane (%) [CH4]	
Nozzle Diameter (inches) [Dn]:	
Pitot Tube Factor [Cp]:	
Meter Correction Factor [Y]:	
Stack Cross-Section Area (Square Feet) [CSA]:	
Total Sample Time (minutes) [min]:	
Gas Volume Correction Temperature (F) [Tc]	
Output Data:	
Metered Volume (dry cubic feet @stp)[Vms]:	#DIV/0!
Water Volume (cubic feet @ stp) [Vws]:	0.00
Moisture (%) [Bws]:	#DIV/0!
Dry Molecular Weight (lb/lb-mol) [MWd]:	28.000
Wet Molecular Weight (lb/lb-mol) [MWw]:	#DIV/0!
Absolute Stack Pressure ("Hg) [Pa]:	0.000
Gas Velocities (feet/second) [Vsa]	#DIV/0!
Stack Flow Rate (cubic feet/ minute)	
Actual [ACFM]:	#DIV/0!
@ stp [SCFM]:	#DIV/0!
Dry @ stp [DSCFM]:	#DIV/0!
Sample Isokinetics (%) [I]:	#DIV/0!

Stp = standard conditions = 29.92" Hg & [Tc] degress F

Traverse Point	Delta-P ("H_2O)	Delta-H ("H_2O)	Temperatures °F			Square Root of Delta-P
			Meter In	Meter Out	Stack	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
		[H]		[Tm]	[Ts]	[dP]
Averages:	**#DIV/0!**	**#DIV/0!**		**#DIV/0!**	**#DIV/0!**	**#DIV/0!**

EQUATIONS FOR TSP, PM-10, AND METALS EMISSIONS, MOISTURE CONTENT, AND FLOW RATE CALCULATIONS
(Based on Standard Conditions of 70ºF and 29.92"Hg)

1. $V_{w\,(std)} = 0.0473\ V_{wc}$

2. $V_{m\,(std)} = 17.71\ V_m\ \dfrac{P_{bar} + (0.07355\ \Delta H)}{T_m + 460}\ \gamma$

3. $B_{wo} = \dfrac{V_{w\,(std)}}{V_{m\,(std)} + V_{w\,(std)}}$

4. $B_{WS} = (B_{WO})\ (100)$

5. $M_d = 0.44\ (\%CO_2) = 0.28\ (\%CO) + 0.32\ (\%O_2) + 0.28\ (\%N_2)$

6. $M_s = M_d\ (1 - B_{wo}) + 18\ B_{wo}$

7. $P_s = P_{bar} + \dfrac{P_A}{13.6}$

8. $V_s = (85.49)(60)(C_p)\ \sqrt{\Delta P}\ \sqrt{\dfrac{T_s + 460}{(P_s)\ (M_s)}}$

9. $A_s = \dfrac{(\pi)\ (D/2)^2}{144}$

10. $Q_s = V_s\ A_s$

11. $Q_{s\,(std)} = Q_s\ (1\text{-}B_{wo})\ 17.71\ \dfrac{P_s}{T_s + 460}$

12. $C'_s = 0.0154\ \dfrac{W_t}{V_{m\,(std)}}$

13. $E = 0.00857\ Q_{s\,(std)}\ C'_s$

14. $A_n = \dfrac{(\pi)\ (D_n)^2}{(144)(4)}$

15. $I = \dfrac{(60)\ (1.667)\ (T_s + 460)\ \left[(0.00267\ V_{wc}) + (V_{m\,(std)}/17.71)\right]}{(\theta)(V_s)(P_s)(A_n)}$

LEGEND

A_n =	Area of nozzle, ft^2
A_S =	Area of stack, ft^2
B_{wo} =	Moisture content of gas stream, fractional value
B_{ws} =	Moisture content of gas stream, percent by volume
C_p =	Pitot correction factor, dimensionless
C'_s =	Emission concentration corrected to standard conditions(dry), gr/dscf
D =	Inside diameter of stack, in.
D_n =	Diameter of nozzle, in.
E =	Emission rate, lb/hr
ΔH =	Orifice pressure drop, in. H_2O
I =	Isokinetic ratio, percent
M_d =	Dry molecular weight of stack gas, lb/lb-mole
M_s =	Molecular weight of stack gas, lb/lb-mole
P_A =	Stack static pressure, in. H_20
P_{bar} =	Barometric pressure, in. Hg
P_s =	Absolute stack pressure, in. Hg
$\sqrt{\Delta P}$ =	Average of square roots of pitot pressure differential, in. H_2O
Q_s =	Stack gas flow rate, acfm
$Q_{s(std)}$ =	Stack gas flow rate, dscfm
T_m =	Average dry gas meter temperature, ºF
T_s =	Average stack temperature, ºF
V_m =	Dry sample volume (meter conditions), cf
$V_{m(std)}$ =	Dry sample volume (standard conditions), dscf
V_s =	Stack gas velocity, ft/min
V_{wc} =	Volume of liquid collected in impingers and silica gel, ml
$V_{w(std)}$ =	Volume of liquid collected, cf
W_t =	Total weight of particulate, PM-10, or metals collected, mg
θ =	Duration of test, min.
γ =	Meter box calibration factor, dimensionless

EQUATIONS FOR EMISSION CALCULATIONS
(Based on Standard Conditions of 70°F and 29.92 in Hg)

O_2, CO_2, SO_2, NO_X, CO, and TOC, Concentration Calculation (% or ppmv), Eq. 7E-5

$$C_{gas} = (C_{avg}-C_o)\,[C_{ma}/(C_m-C_o)]$$

where:
- C_{gas} = Emission concentration corrected for instrument bias and drift, ppmvd or %
- C_{avg} = Average test run instrument response, ppmvd or %
- C_o = Average system calibration response to zero span gas during pre and post test bias check, ppmvd or %
- C_m = Average system calibration response to upscale span gas during pre and post test bias check, ppmvd or %
- C_{ma} = Span gas concentration, ppmvd or %

TOC Emission Concentration Conversion from Wet to Dry Basis

$$TOC_{dry} = TOC_{wet}\,[100 / (100-B_{ws})]$$

where:
- TOC_{dry} = TOC emission concentration, dry basis, ppmvd
- TOC_{wet} = TOC emission concentration as measured by Method 25A analyzer, ppmv wet
- B_{ws} = Stack gas moisture content, % by volume

TOC Emission Concentration as Methane (in the event propane standards are used)

$$TOC_{methane} = TOC_{propane}\,(3/1)$$

where:
- $TOC_{methane}$ = TOC emission concentration expressed as methane, ppmvd
- $TOC_{propane}$ = TOC emission concentration, dry basis, ppmvd as propane
- 3 = Number of carbon atoms in propane
- 1 = Number of carbon atoms in carbon

VOC Emission Concentration Calculation, expressed as methane

$$VOC = TOC_{methane} - Methane$$

where:
- VOC = VOC emission concentration expressed as methane, ppmvd
- $TOC_{methane}$ = TOC emission concentration expressed as methane, ppmvd
- Methane = Methane concentration (from Method 18), ppmvd

VOC and NH_3 Emission Concentration at 7% Oxygen

$C @ 7\% O_2 = C_{gas} [(20.9 – 7.0) / (20.9 – O_2)]$

where:	$C @ 7\% O_2$ =	Emission concentration corrected to 7% oxygen, ppmv
	C_{gas} =	Emission concentration, ppmv
	O_2 =	Emission concentration of oxygen, % by volume

Ammonia Emission Concentration Calculation

$C_{gas} = [W_t / (28.32) (V_{m\ (std)})] (24.13 / MW)$

where:	C_{gas} =	Emission concentration, ppmv
	W_t =	Total amount of NH_3 collected, µg
	$V_{m\ (std)}$ =	Sample volume corrected to standard conditions, dry standard cubic feet
	28.32 =	Liters per cubic foot
	24.13 =	Molar volume of a gas at 70°F and 29.92 inches Hg
	MW =	Molecular weight, 17.03 g/mole

SO_2, NO_X, CO, VOC, and NH_3 Pound per Hour Emission Rate Calculation

$E = (C_{gas}) (Q_{s\ std}) (60) (MW) / 387\ E6$

where:	E =	Emission rate, lb/hr
	C_{gas} =	Emission concentration, ppmvd
	$Q_{s\ std}$ =	Stack gas flow rate, dscfm
	60 =	Minutes per hour
	MW =	Molecular weight of pollutant, g/mole (64.06 for SO_2, 46.01 for NO_X as NO_2, 28.01 for CO, and 16.04 for VOC as methane, 17.03 for NH_3)
	387 E6	Standard molar volume of a gas at 70°F

Heat Input Calculation

Btu input = (Fuel flow rate) (Btu content) / 1 E06

where:	Btu input =	Heat input, mmBtu/hr
	Fuel flow rate =	Fuel gas usage rate, lb/hr or scf/hr
	Btu content =	Heat content of fuel gas, Btu/lb or Btu/scf

Mercury Pound Per Mega Watt Hour Emission Rate

$E_{lb/MW\text{-}hr} = E / Output$

where:	$E_{lb/MW\text{-}hr}$ =	Emission rate, pounds per mega watt hour, lb/MW-hr
	E =	Emission rate, lb/hr
	Output =	Gross energy output, MW

Particulate Pound Per Million Btu Emission Rate, Oxygen Based - Eq. 19-1

$E_{Btu} = C_d F_d [(20.9 / (20.9 – \%O_{2d})]$

where:	E_{Btu} =	Pollutant emission rate, lb/mm Btu
	C_d =	Emission concentration dry basis, lb/dscf
	$\%O_{2d}$ =	Oxygen emission concentration, dry basis, % by vol.
	F_d =	Volume of combustion gas per unit of heat content, dscf/mm Btu, 9780 for bituminous coal and 8710 for natural gas

Sulfuric acid Emission Concentration Calculation, lb/dscf

$C_{H2SO4} = (W_t / 1000 / 453.6) / V_{m(std)}]$

where:	C_{H2SO4} =	Sulfuric acid emission concentration, lb/dscf
	W_t =	Total oxides of sulfuric acid in sample, mg
	1,000 =	milligrams per gram
	453.6 =	grams per pound
	$V_{m(std)}$ =	Dry sample volume (standard conditions), dscf

Sulfuric Acid Emission Rate Calculation, lb/hr

$E = (C_{H2SO4}) (Q_{s\ std}) (60)$

where:	E =	Sulfuric acid emission rate, lb/hr
	C_{H2SO4} =	Emission concentration, lb/dscf
	$Q_{s\ std}$ =	Stack gas flow rate, dscfm
	60 =	Minutes per hour

ATTACHMENT C
CALIBRATION DATA

LCH Consulting Associates, LLC
88 Glocker Way PMB 287
Pottstown, PA 19465
484-252-4335
www.lchconsulting.com

April 15th, 2019 TDX Pilot Test Nozzle Calibrations

Method 4 Scale Calibration	
Date	16-Apr
Facility	ESMI NH
Unit	ITDU
Test ID	M537 and 26a R1 and R2

Scale ID	LCH1
Trial 1	499.9
Trial 2	499.9
Trial 3	500.0
Average	**499.933**

Cal Mass ID	**4053**
Weight (g)	**500**

	y/n	initials
Weight measured to nearest .1g?	Y	LCH
Any one measurement exceed by 0.5g?	N	LCH

Composition

Scale ID	
Trial 1	
Trial 2	
Trial 3	
Average	**#DIV/0!**

Cal Mass ID	**4053**
Weight (g)	**500**

	y/n	initials
Weight measured to nearest .1g?	Y	LCH
Any one measurement exceed by 0.5%?	N	LCH

LCH Consulting Associates, LLC
88 Glocker Way PMB 287
Pottstown, PA 19465
484-252-4335
www.lchconsulting.com

April 15th, 2019 TDX Pilot Test Nozzle Calibrations

NOZZLE CALIBRATION WORKSHEET				
		Composition		
Nozzle ID	**QTZ6**	SS	GLASS	**QUARTZ**
Trial 1	0.688			
Trial 2	0.688			
Trial 3	0.688			
Average	**0.688**			
			y/n	initials
Nozzle measured to nearest .001 inch/.025mm?			Y	LCH
Any one measurement exceed .004inch/.1mm?			N	LCH

NOZZLE CALIBRATION WORKSHEET				
		Composition		
Nozzle ID	**QTZ7**	SS	GLASS	**QUARTZ**
Trial 1	0.688			
Trial 2	0.688			
Trial 3	0.688			
Average	**0.688**			
			y/n	initials
Nozzle measured to nearest .001 inch/.025mm?			Y	LCH
Any one measurement exceed .004inch/.1mm?			N	LCH

NOZZLE CALIBRATION WORKSHEET				
		Composition		
Nozzle ID	**QTZ8**	SS	GLASS	**QUARTZ**
Trial 1	0.688			
Trial 2	0.688			
Trial 3	0.688			
Average	**0.688**			
			y/n	initials
Nozzle measured to nearest .001 inch/.025mm?			Y	LCH
Any one measurement exceed .004inch/.1mm?			N	LCH

NOZZLE CALIBRATION WORKSHEET				
		Composition		
Nozzle ID	**QTZ9**	SS	GLASS	**QUARTZ**
Trial 1	0.688			
Trial 2	0.688			
Trial 3	0.688			
Average	**0.688**			
			y/n	initials
Nozzle measured to nearest .001 inch/.025mm?			Y	LCH
Any one measurement exceed .004inch/.1mm?			N	LCH

NOZZLE CALIBRATION WORKSHEET				
		Composition		
Nozzle ID		SS	GLASS	QUARTZ
Trial 1				
Trial 2				
Trial 3				
Average				
			y/n	initials
Nozzle measured to nearest .001 inch/.025mm?				
Any one measurement exceed .004inch/.1mm?				

NOZZLE CALIBRATION WORKSHEET				
		Composition		
Nozzle ID		SS	GLASS	QUARTZ
Trial 1				
Trial 2				
Trial 3				
Average				
			y/n	initials
Nozzle measured to nearest .001 inch/.025mm?				
Any one measurement exceed .004inch/.1mm?				

LCH Consulting Associates
EPA Method 5
522 Series Meter Box Calibration
Pre-Test Orifice Method
English Meter Box Units, English K' Factor

Revised: 7/25/95 Version: 2.2

Model #: MB 0001 Date: ----------> 4-Oct-18
Serial #: SN0808025 Barometric Pressure: ----------> 29.78 (in. Hg)
Theoretical Critical Vacuum:---> 14.05 (in. Hg)

!!!!!!!!!
IMPORTANT! For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT! The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!!

---------- DRY GAS METER READINGS ---------- -CRITICAL ORIFICE READINGS-

dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Ambient Temperature Initial (deg F)	Ambient Temperature Final (deg F)	Ambient Temperature Average (deg F)
0.34	33	666.479	676.958	10.479	84	84	82	82	40	0.2359	15	76	77	76.5
0.695	23	676.958	687.665	10.707	82	82	83	83	48	0.3478	15	78	79	78.5
1.15	15	687.665	696.812	9.147	83	83	84	84	55	0.4552	15	79	79	79
1.8	26	696.812	716.728	19.916	84	84	86	86	63	0.5774	15	80	82	81
3.35	10	716.728	727.164	10.436	86	86	88	88	73	0.7897	15	82	83	82.5

********** RESULTS **********

--- DRY GAS METER --- VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	--------- ORIFICE --------- VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	-- DRY GAS METER -- CALIBRATION FACTOR Y Value (number)	Variation (number)	--------- ORIFICE --------- CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)	
10.1463004	287.343	10.0087931	283.44902	10.22182	0.986448	-0.0053	2.012130218	51.11	0.150142	
10.3857043	294.123	10.2657162	290.725082	10.52329	0.988447	-0.0033	1.900967822	48.28	0.038979	
8.86612429	251.089	8.75838079	248.037344	8.986474	0.987848	-0.0039	1.834618217	46.60	-0.02737	
19.2821196	546.07	19.2210093	544.338983	19.79476	0.996831	0.005082	1.78641707	45.37	-0.07557	
10.1052598	286.181	10.0968745	285.943487	10.4271	0.99917	0.007422	1.775808369	45.11	-0.08618	
		Average Y ------->			0.992		1.86	47.29	<------- Average dH@	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

SIGNED:_____ Date:_____

LCH Consulting Associates
EPA Method 5
522 Series Meter Box Calibration
Pre-Test Orifice Method
English Meter Box Units, English K' Factor

Revised: 7/25/95 Version: 2.2

Model #: MB 0001
Serial #: SN0808025

Date: ----------> 6-May-19
Barometric Pressure: ----------> 29.91 (in. Hg)
Theoretical Critical Vacuum:---> 14.11 (in. Hg)

!!!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!!

---------- DRY GAS METER READINGS ---------- -CRITICAL ORIFICE READINGS-

dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Ambient Temperature Initial (deg F)	Ambient Temperature Final (deg F)	Ambient Temperature Average (deg F)
0.3	18.5	11.859	17.458	5.599	59	59	61	61	40	0.2359	15	64	65	64.5
0.65	11.5	17.458	22.689	5.231	61	61	62	62	48	0.3478	15	66	66	66
1.1	13	22.689	30.231	7.542	62	62	62	62	55	0.4552	15	66	66	66
1.8	8	30.231	36.125	5.894	63	63	63	63	63	0.5774	15	66	67	66.5
3.35	6	36.125	42.289	6.164	63	63	64	64	73	0.7897	15	67	67	67

********** RESULTS **********

--- DRY GAS METER --- --------- ORIFICE --------- -- DRY GAS METER -- --------- ORIFICE ---------

VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	CALIBRATION FACTOR Y Value (number)	CALIBRATION FACTOR Y Variation (number)	CALIBRATION FACTOR dH@ Value (in H2O)	CALIBRATION FACTOR dH@ Value (mm H2O)	CALIBRATION FACTOR dH@ Variation (in H2O)
5.6851548	161.004	5.69958633	161.412285	5.665964	1.002538	0.004537	1.804591691	45.84	0.009178
5.30076828	150.118	5.21616066	147.72167	5.20022	0.984039	-0.01396	1.798693082	45.69	0.00328
7.64370379	216.47	7.71736688	218.55583	7.693782	1.009637	0.011636	1.775312664	45.09	-0.0201
5.97229109	169.135	6.02121302	170.520753	6.008518	1.008191	0.01019	1.803794525	45.82	0.008381
6.26358418	177.385	6.17340108	174.830719	6.166236	0.985602	-0.0124	1.794675325	45.58	-0.00074
		Average Y ------->			0.998		1.80	45.60	<------- Average dH@

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

SIGNED: L. Christopher Heilner Date: 05 06 19

THERMOCOUPLE CALIBRATION
EPA Method 2

Probe or Thermocouple ID:	1902056
Date:	05/06/19
Calibrated By:	LCH

TEMPERATURE SOURCE	REFERENCE TEMPERATURE (°F)	(°R)	THERMOCOUPLE TEMPERATURE (°F)	(°R)	DIFFERENCE (°F)	DIFFERENCE % (°R)
ICE WATER	34.0	494.0	35.0	495.0	-1.0	-0.2
AMBIENT AIR	67.0	527.0	68.0	528.0	-1.0	-0.2
BOILING WATER	209.0	669.0	208.0	668.0	1.0	0.1

According to EPA Method 2: If the absolute temperatures (°R) measured with the stack thermocouple and the reference gauge agree within 1.5 percent, the thermocouple calibration will be considered valid.

% Difference, °R = [(Reference Temp. °R - Thermocouple Temp. °R) / Reference Temp. °R X 100]

According to Alternative EPA Method 2 (Alt-011): If the temperature measured with the thermocouple and the refernce gauge agree within ±2 °F, the thermocouple calibration will be considered valid.

Certification

I certify that Probe 6 meets or exceeds all specifications, criteria and/or applicable design features and is calibrated as per 40 CFR Pt. 60 App. A Method 2 (Alt 011)

Certified by: L M 5/6/19

Personnel (Signature/Date)

LCH Consulting Associates, LLC
539 W. Cedarville Road
Pottstown, PA 19465
484-252-4335 phone
info@lchconsulting.com

PITOT TUBE INSPECTION AND CALIBRATION
EPA Method 2

Probe or Pitot ID:	1902056
Date:	5/6/2019
Calibrated By:	LCH

Level and Perpendicular?	Yes
Obstruction?	No
Damaged?	No
α_1 ($-10° \leq \alpha_1 \leq +10°$)	0
α_2 ($-10° \leq \alpha_2 \leq +10°$)	0
β_1 ($-5° \leq \beta_1 \leq +5°$)	0
β_2 ($-5° \leq \beta_2 \leq +5°$)	0
γ	0
θ	0
A	0.839
D_t ($0.188" \leq D_t \leq 0.375"$)	0.375
$z = A \tan \gamma$ ($\leq 0.125"$)	0.000
$w = A \tan \theta$ ($\leq 0.03125"$)	0.00000
$A/2D_t = P_A/D_t$ ($1.05 \leq P_A/D_t \leq 1.5"$)	1.12

Certification

I certify that Probe 6 meets or exceeds all specifications, criteria and/or applicable design features and is calibrated and assigned a pitot tube certification factor of 0.84 as per 40 CFR Pt. 60 App. A Method 2

Certified by: LCH 5/6/19

Personnel (Signature/Date)

LCH Consulting Associates, LLC
539 W. Cedarville Road
Pottstown, PA 19465
484-252-4335 phone
info@lchconsulting.com

THERMOCOUPLE CALIBRATION METER BOX SPECIFIC
EPA Method 2

Probe or Thermocouple ID:	1902056
Date:	12/02/13
Meter Box Used:	Meter 103
Calibrated By:	LCH

TEMPERATURE SOURCE	REFERENCE TEMPERATURE (°F)	(°R)	THERMOCOUPLE TEMPERATURE (°F)	(°R)	DIFFERENCE (°F)	DIFFERENCE % (°R)
AMBIENT AIR	68.0	528.0	69.0	529.0	-1.0	-0.2

According to EPA Method 2: If the absolute temperatures (°R) measured with the stack thermocouple and the reference gauge agree within 1.5 percent, the thermocouple calibration will be considered valid.

% Difference, °R = [(Reference Temp. °R - Thermocouple Temp. °R) / Reference Temp. °R X 100]

According to Alternative EPA Method 2 (Alt-011): If the temperature measured with the thermocouple and the refernce gauge agree within ±2 °F, the thermocouple calibration will be considered valid.

Certification

I certify that Probe6 meets or exceeds all specifications, criteria and/or applicable design features and is calibrated as per 40 CFR Pt. 60 App. A Method 2 (Alt 011)

Certified by: 5/2/13
Personnel (Signature/Date)

LCH Consulting Associates, LLC
539 W. Cedarville Road
Pottstown, PA 19465
484-252-4335 phone
info@lchconsulting.com

THERMOCOUPLE CALIBRATION
EPA Method 2

Probe or Thermocouple ID:	1902052
Date:	05/06/19
Calibrated By:	LCH

TEMPERATURE SOURCE	REFERENCE TEMPERATURE (°F)	(°R)	THERMOCOUPLE TEMPERATURE (°F)	(°R)	DIFFERENCE (°F)	DIFFERENCE % (°R)
ICE WATER	33.0	493.0	34.0	494.0	-1.0	-0.2
AMBIENT AIR	68.0	528.0	68.0	528.0	0.0	0.0
BOILING WATER	210.0	670.0	209.0	669.0	1.0	0.1

According to EPA Method 2: If the absolute temperatures (°R) measured with the stack thermocouple and the reference gauge agree within 1.5 percent, the thermocouple calibration will be considered valid.

% Difference, °R = [(Reference Temp. °R - Thermocouple Temp. °R) / Reference Temp. °R X 100]

According to Alternative EPA Method 2 (Alt-011): If the temperature measured with the thermocouple and the refernce gauge agree within ±2 °F, the thermocouple calibration will be considered valid.

Certification

I certify that Probe 6 meets or exceeds all specifications, criteria and/or applicable design features and is calibrated as per 40 CFR Pt. 60 App. A Method 2 (Alt 011)

Certified by: LCH 5/6/19

Personnel (Signature/Date)

LCH Consulting Associates, LLC
539 W. Cedarville Road
Pottstown, PA 19465
484-252-4335 phone
info@lchconsulting.com

PITOT TUBE INSPECTION AND CALIBRATION
EPA Method 2

Probe or Pitot ID:	1902052
Date:	5/6/2019
Calibrated By:	LCH

Level and Perpendicular?	Yes
Obstruction?	No
Damaged?	No
α_1 ($-10° \leq \alpha_1 \leq +10°$)	5
α_2 ($-10° \leq \alpha_2 \leq +10°$)	-5
β_1 ($-5° \leq \beta_1 \leq +5°$)	0
β_2 ($-5° \leq \beta_2 \leq +5°$)	0
γ	0
θ	0
A	0.839
D_t ($0.188" \leq D_t \leq 0.375"$)	0.375
$z = A \tan \gamma$ ($\leq 0.125"$)	0.000
$w = A \tan \theta$ ($\leq 0.03125"$)	0.00000
$A/2D_t = P_A/D_t$ ($1.05 \leq P_A/D_t \leq 1.5"$)	1.12

Certification

I certify that Probe 6 meets or exceeds all specifications, criteria and/or applicable design features and is calibrated and assigned a pitot tube certification factor of 0.84 as per 40 CFR Pt. 60 App. A Method 2

Certified by: CH 5/6/19

Personnel (Signature/Date)

LCH Consulting Associates, LLC
539 W. Cedarville Road
Pottstown, PA 19465
484-252-4335 phone
info@lchconsulting.com

THERMOCOUPLE CALIBRATION METER BOX SPECIFIC
EPA Method 2

Probe or Thermocouple ID:	1902052
Date:	12/02/13
Meter Box Used:	Meter 0003
Calibrated By:	LCH

TEMPERATURE SOURCE	REFERENCE TEMPERATURE (°F)	(°R)	THERMOCOUPLE TEMPERATURE (°F)	(°R)	DIFFERENCE (°F)	DIFFERENCE % (°R)
AMBIENT AIR	68.0	528.0	67.0	527.0	1.0	0.2

According to EPA Method 2: If the absolute temperatures (°R) measured with the stack thermocouple and the reference gauge agree within 1.5 percent, the thermocouple calibration will be considered valid.

% Difference, °R = [(Reference Temp. °R - Thermocouple Temp. °R) / Reference Temp. °R X 100]

According to Alternative EPA Method 2 (Alt-011): If the temperature measured with the thermocouple and the refernce gauge agree within ±2 °F, the thermocouple calibration will be considered valid.

Certification

I certify that Probe6 meets or exceeds all specifications, criteria and/or applicable design features and is calibrated as per 40 CFR Pt. 60 App. A Method 2 (Alt 011)

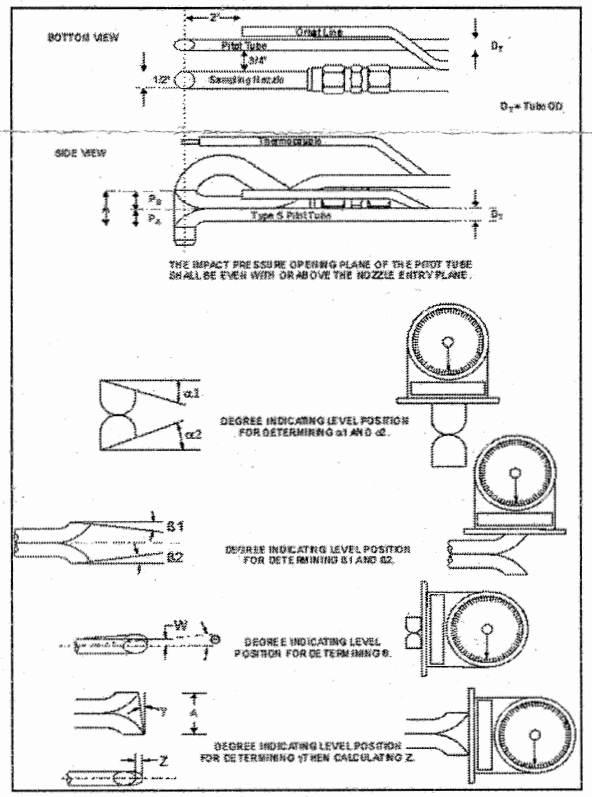
Certified by: CH 5/6/13

Personnel (Signature/Date)

LCH Consulting Associates, LLC
539 W. Cedarville Road
Pottstown, PA 19465
484-252-4335 phone
info@lchconsulting.com

APEX INSTRUMENTS SOURCE TESTING EQUIPMENT

Type S Pitot Tube Inspection Form



PITOT TUBE/PROBE # 8609

Parameter	Value	Allowable Range	Check
Assembly Level?	yes	Yes	OK
Ports Damaged?	no	No	OK
$\alpha 1$	0	$-10° < \alpha 1 < +10°$	OK
$\alpha 2$	0	$-10° < \alpha 2 < +10°$	OK
1	1	$-5° < b1 < +5°$	OK
1	0	$-5° < \beta 2 < +5°$	OK
γ	0		
0	0		
$Z = A \tan \gamma$	0.000	$Z \leq .125"$	OK
$W = A \tan \theta$	0.000	$W \leq .031"$	OK
Dt	0.375	.188" to .375"	OK
A/2Dt	1.216	$1.05 \leq P_A/D_t \leq 1.5$	OK
A	0.912	$2.1D_t \leq A \leq 3D_t$	OK

Certification

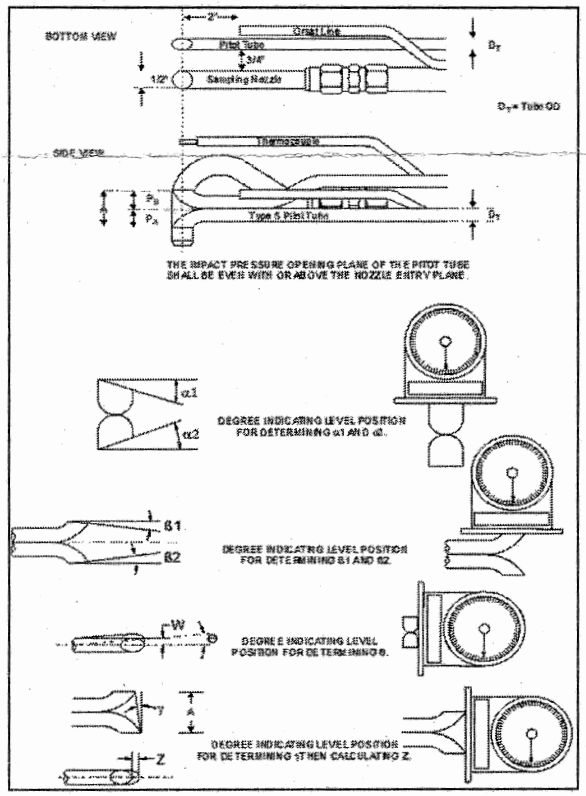
I certify that pitot tube/probe number 8609 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube certification factor of 0.84. See 40 CFR Pt. 60, App. A, EPA Method 2.

Certified by: JP 2-15-19

Personnel (Signature/Date)

APEX INSTRUMENTS SOURCE TESTING EQUIPMENT

Type S Pitot Tube Inspection Form



PITOT TUBE/PROBE # 8610

Parameter	Value	Allowable Range	Check
Assembly Level?	yes	Yes	OK
Ports Damaged?	no	No	OK
$\alpha 1$	0	$-10° < \alpha 1 < +10°$	OK
$\alpha 2$	0	$-10° < \alpha 2 < +10°$	OK
1	1	$-5° < b1 < +5°$	OK
1	1	$-5° < \beta 2 < +5°$	OK
γ	1		
0	0		
$Z = A \tan \gamma$	0.000	$Z \leq .125"$	OK
$W = A \tan \theta$	0.000	$W \leq .031"$	OK
Dt	0.375	.188" to .375"	OK
A/2Dt	1.176	$1.05 \leq P_A/D_t \leq 1.5$	OK
A	0.882	$2.1D_t \leq A \leq 3D_t$	OK

Certification

I certify that pitot tube/probe number 8610 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube certification factor of 0.84. See 40 CFR Pt. 60, App. A, EPA Method 2.

Certified by: JP 2-15-19

Personnel (Signature/Date)