Final
Site Inspection (SI) Addendum for Additional Per- and Polyfluoroalkyl Substances (PFAS) Sampling at Area of Contamination (AOC) 76 – Devens Fire Department and Long-Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL) Former Fort Devens Army Installation Devens, Massachusetts

August 3, 2018

US Army Corps of Engineers®

Prepared for:
U.S. Army Corps of Engineers
New England District, Concord, Massachusetts

Prepared by:
BERS-Weston Services, JVA, LLC
720 Corporate Circle, Suite D
Golden, CO 80401-5626
Contract No. W9128F-14-D-0009, Delivery Order No. 0027

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Devens, Massachusetts

Site Name/Project Name: Site Inspection Report Addendum for Per- and Polyfluoroalkyl Substances (PFAS) at Former Fort Devens Army Installation, Devens, Massachusetts

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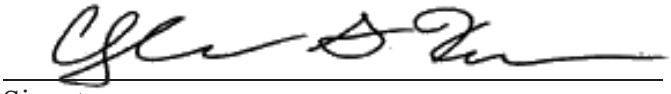

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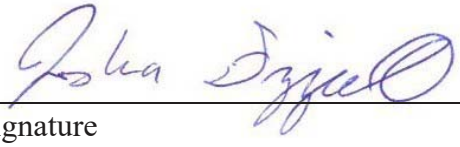

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Acronyms and Abbreviations

µg/kg	micrograms per kilogram
AFFF	aqueous film-forming foam
AOC	Area of Contamination
BERS-Weston	BERS-Weston Services JVA, LLC
bgs	below ground surface
DPT	direct push technology
EPA	U.S. Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
JLS	Jarvis Land Survey, Inc.
KGS	Koman Government Solutions
LDPE	low-density polyethylene
LHA	Lifetime Health Advisory
LTM	Long-term monitoring
MassDEP	Massachusetts Department of Environmental Protection
ng/L	nanograms per liter
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substance
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
RI	Remedial Investigation
SHL	Shepley's Hill Landfill
SI	Site Inspection
Subterra	Subterra Locating Services
USACE	United States Army Corps of Engineers
WP	Work Plan

1.0 INTRODUCTION

BERS-Weston Services JVA, LLC (BERS-Weston), under contract to the U.S. Army Corps of Engineers (USACE) New England District (Contract No. W9128F-14-D-0009, Delivery Order No. 0027), has conducted site inspections (SIs) at nine potential per- and polyfluoroalkyl substances (PFAS) release areas at the former Fort Devens Army Installation in Devens, Massachusetts. The purpose of conducting the SIs was to determine the presence or absence of PFAS in soil and groundwater where fire-fighting foams containing PFAS may have been used, stored, or released. In comments on the pre-final Fort Devens Preliminary Assessment (PA) dated 23 June 2017 [Koman Government Solutions (KGS), 2017a)], U.S. Environmental Protection Agency (EPA) requested that the Army identify the Devens Fire Station, located at 182 Jackson Road, as a Potential Source Area in the PA and issue an amendment to the SI Work Plan (WP) to specify the collection of soil and groundwater samples at that location to evaluate the presence or absence of PFAS.

On 6 July 2017, Army, USACE, and KGS personnel conducted a site walk and an additional interview with the Devens Deputy Fire Chief in support of this amendment to the PA/SI. Based on the findings of the site walk and additional interview, KGS prepared an addendum to the SI WP dated September 2017 (KGS, 2018a) describing proposed work to implement assessment for PFAS in soil and groundwater at the Devens Fire Station. The initial nine SIs were conducted in accordance with Final Expedited Site Inspection Work Plan for Per- and Polyfluoroalkyl Substances (PFAS), Former Fort Devens Army Installation (KGS, 2017b) and associated approved variances. Subsequently, additional SI work was performed at the Devens Fire Station in accordance with the September 2017 WP Addendum (WP Addendum). Based on laboratory analytical results indicating elevated concentrations of PFAS in soil and groundwater samples collected at the Devens Fire Station in accordance with the WP Addendum, the Fire Station was classified as Area of Contamination (AOC) 76. Amendment 1 (dated 5/19/17) to the initial SI WP regarding groundwater sampling methodology from temporary wells is applicable to work performed for the SI Addendum and is included as **Appendix A**. This report describes methods, findings, conclusions, and recommendations pertaining to the SI work conducted at AOC 76. The location of AOC 76 is shown on **Figure 1**.

In addition to the sampling performed at the Devens Fire Station, KGS sampled 29 monitoring wells that are part of the long-term monitoring program plus one surface water location at Fort Devens during December 2017 and January 2018. The samples were collected at the request of EPA to provide more information about the overall extent of PFAS in groundwater at Fort Devens and to help in the development of the planned Remedial Investigation. A copy of the "Technical Memorandum – Additional PFAS Sampling of Long-Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL) to Support Development of the PFAS Remedial Investigation (RI)" is provided in **Appendix B**.

2.0 SITE DESCRIPTION AND REGULATORY HISTORY

2.1 SITE HISTORY

Following the former Fort Devens base closure in 1996, the Moore Army Airfield Fire Department was closed, and all Army fire and emergency response operations were transitioned to MassDevelopment and the Devens Fire Department located at 182 Jackson Road, Devens, MA. Prior to 1996, the Jackson Road fire station was operated by the Army for Fort Devens. No environmental regulatory history prior to the investigation detailed in this SI Report Addendum is known for the Devens Fire Station.

2.2 PHYSICAL SETTING

AOC 76 is located at the intersection of Jackson Road and Barnum Road, in Devens, Worcester County, Massachusetts, and occupies 3.86 acres. Devens is located approximately 35 miles northwest of Boston, Massachusetts. The location of the AOC 76, along with areas investigated on the former Fort Devens site for the original SI, are shown on **Figure 1**.

AOC 76 is adjacent to the Natural Café and Market and the Estates at Harvard Hills Condominiums to the west, the Rogers Field outdoor recreational field to the north, the Oxbow Schoolhouse elementary school to the south, and undeveloped land to the east. There is a stormwater retention pond located to the northeast of the Devens Fire Station building. The Willow Branch River is located approximately 600 feet east of AOC 76 (Devens, 2018).

2.3 GEOLOGIC SETTING

Devens is located within the Upland Subprovince of the New England physiographic province. The land surface is covered with unconsolidated glacial deposits. The glacial deposits are typically thin; however, thicker ice contact features such as outwash plains, deltas, drumlins, eskers, and kames are common. The major glacial units consist of till, deltaic deposits from former glacial Lake Nashua, and deposits from glacial meltwater streams. Glacial till at Devens consists of unstratified gravel to silt and characteristically contains boulders. The till at the site is typically approximately 10 feet thick, but is up to 60 feet thick in the cores of drumlins. The glacial lake deposits consist of sand, and sands and gravels are found in deltas. Lake bottom deposits consist of sand, silt, and clay, which are typically covered by the delta deposits. Post-glacial deposits consist of river terrace sands and gravels, alluvial sands and silts, as well as, peat and silt and sands in swampy areas. Underlying bedrock in the former Fort Devens area is composed of four units, including: (1) Ayer Granite, consisting of equigranular to porphyritic gneissic biotite granite and granodiorite; (2) Chelmsford Granite, consisting of light gray, even and medium-grained muscovite-bearing granite; (3) the Oakdale Formation, consisting of metamorphosed thin-bedded, peltic and calcareous siltstone and muscovite schist; and (4) the Berwick Formation, consisting of thin- to thick-bedded metamorphosed calcareous sandstone, siltstone, and minor muscovite schist (USGS, 1983).

2.4 GROUNDWATER USE

BERS-Weston queried the Massachusetts Department of Environmental Protection (MassDEP) Geographic Information System (GIS) to identify water supply wells within 4 miles of the AOCs and Study Areas investigated for this SI. The database query was updated to include supply wells within 4 miles of AOC 76. An updated listing of those wells is provided in **Table 1**. The query identified 44 public water supply wells (Community Water System), 12 non-transient non-community wells, and 18 transient non-community wells. The locations of those wells are shown on **Figure 2**. Types of water systems are defined below according to Massachusetts 310 CMR 22.02:

(a) Community Water System means a Public Water System which serves at least 15 service connections used by year round residents or regularly serves at least 25 year round residents.

(b) Non community Water System means a Public Water System that is not a Community Water System.

1. Non-transient Non-community Water System means a Public Water System that is not a Community Water System and that has at least 15 service connections or regularly serves at least 25 of the same individuals or more approximately four or more hours per day, four or more days per week, more than 6 months or 180 days per year, such as a workplace providing water to its employees.

2. Transient Non-community Water System means a Public Water System that is not a Community Water System or a Non-transient Non-community Water System but is a Public Water System which has at least 15 service connections or serves water to 25 different persons at least 60 days of the year. Some examples of these types of systems are: restaurants, motels, camp grounds, parks, golf courses, ski areas, and community centers.

Public water supply service areas are shown on **Figure 3**, along with labeled water supply well locations and consist of the following suppliers in the areas surrounding the former Fort Devens:

- Ayer DPW Water Division
- DOC/MCI Shirley
- Devens Mass Development
- Groton Water Department
- Shirley Water District

The closest supply well to AOC 76 that was investigated for this SI Addendum is the Patton Replacement Well (source ID 2019001-05G) (**Figure 3**). This well is located approximately ¾-mile upgradient of the AOC 76 in the town of Devens and is not expected to be impacted by any PFAS contamination as it is located in a separate drainage basin, is upgradient, and AOC 76 is not within the Zone 2 of the Patton Replacement well.

Water supply wells downgradient of AOC 76 include the Walker Well (2270000-04G), the Patterson Road Well (2270000-03G), and the MacPherson Well (2019001-03G), which are located approximately 1.25 to 1.3 miles to the north of AOC 76. PFAS was not detected in samples collected from the Walker Well and Patterson Road Well on September 1, 2016. These wells are unlikely to be impacted by PFAS contamination from AOC 76 based on the fact that they are: (1) not located within the same drainage basin as AOC 76; (2) are located on the opposite side of the Nashua River from AOC 76; and (3) AOC 76 is not located within the Zone 2 of these municipal wells.

PFAS has been detected in the MacPherson Well, which was shut down on 27 February 2018 and is no longer operating. MassDEP submitted a letter to MassDevelopment on 1 March 2018, indicating that levels in the wells needed to be reduced to below 70 parts per trillion out of an abundance of caution based on the summing of five PFAS compounds. The five compounds include: perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorononanoic acid (PFNA), perfluorohexanesulfanoic acid (PFHxS), and perfluoroheptanoic acid (PFHpA), which were detected in the MacPherson well in December 2017, at a combined concentration of 134 nanograms per liter (ng/L). PFOS and PFOA were detected in the well at 40 and 22 ng/L, respectively, with a combined PFOS and PFOA concentration of 62 ng/L. AOC 76 is located within the Zone 2 of the MacPherson Well. PFAS analytical results from water samples collected from supply wells are included in **Table 1A**.

2.5 REGULATORY HISTORY

On 18 March 2016, EPA issued a Dispute Resolution Issues No. 6-8 letter to the Former Fort Devens Installation. This letter required the Army to conduct a base-wide evaluation of PFAS due to the emerging contaminant status of PFAS and potential historical use. The Army submitted a draft PA for the Former Fort Devens Installation to EPA in September 2016. Based on the findings of the PA, including revisions to incorporate regulatory agency comments, it was concluded that several areas at the Former Fort Devens warranted further investigation for potential PFAS under an SI, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act. On 23 June 2017, EPA issued comments on the pre-final PA which requested that the Army include the Jackson Road Fire Department (Devens Fire Station) as a potential source area for investigation under the SI because fire stations at many federal

facilities have historically stored aqueous film-forming foam (AFFF) and because little information is available regarding the specific historical use, storage, and/or release of AFFF at the Devens Fire Station.

2.6 OPERATIONAL HISTORY AND WASTE CHARACTERISTICS

Following the base closure in 1996, all Army fire and emergency response operations were transitioned to MassDevelopment and the Devens Fire Department located at 182 Jackson Road. Prior to 1996, the Jackson Road fire station was operated by the Army for Fort Devens. It has been reported that there was a fire in the dumpster located behind the fire station in the early 1990s that was extinguished using foam. The Fire Chief has indicated that the Devens Fire Department currently stores small quantities of AFFF at the Jackson Road fire station. Fire engines store AFFF in tanks or pails in quantities of approximately 20 to 30 gallons per engine and 22 5-gallon pails are stored at a warehouse on Cook Street. When needed, the AFFF is connected to a truck sprayer and mixed with water at the point of use. There is no mixed foam stored on the truck or at the Fire Department building. The Deputy Fire Chief indicated that, since 1996, the Devens Fire Department has conducted some training in the paved area behind the Jackson Road fire station where fire-fighting foams were discharged to the ground. During training, firefighting foams were sprayed over the paved area behind (southeast of) the fire station.

3.0 SI METHODS

Soil and groundwater samples were collected at nine locations within AOC 76. The sampling locations listed below were selected to assess for PFAS impacts at the potential discharge areas surrounding the Devens Fire Station, and it is noted where revisions to the location of the sample location were revised:

- Areas surrounding the paved area to the east-southeast of the fire station where firefighting foam was sprayed during training operations (boring locations FH-17-01 through FH-17-05).
    - The boring location planned for FH-17-04 was moved 11.19 feet to the south due to a buried concrete foundation.
    - The boring location planned for FH-17-05 was relocated 16 feet to the northeast to maintain clearance from an active sewer line.
- Area immediately south-southeast of the fire station (boring locations FH-17-06 and FH-17-07).
    - The boring location planned for FH-17-06 was relocated 6.94 feet to the south due to an adjacent tree and tree cover impacting the Global Positioning System (GPS) signal.
- Dumpster fire area that reportedly occurred just east of the fire station in the early 1990s and was extinguished with foam (boring location FH-17-08).
    - The boring location planned for FH-17-08 was moved 6 feet to the northeast to maintain clearance from an inactive sewer line.
- Nearby retention pond to the northeast that receives runoff from two catch basins located by the fire station and trench drains in the fire station garage bays (boring location FH-17-09).
    - The boring location planned for FH-17-09 was relocated due to heavy rains experienced during the field event. FH-17-09, located in the retention basin northeast of the Devens Fire Station, was submerged under water during the sampling event. An alternate location

in the retention basin was selected where stormwater was observed to enter the retention basin by surface runoff.

Boring and sample locations are shown on **Figures 4** and **5**.

3.1 SITE RECONNAISSANCE

On 11 January 2018, BERS-Weston conducted site reconnaissance at the Devens Fire Station/AOC 76. Field reconnaissance activities consisted of locating and marking proposed soil boring and temporary groundwater monitoring well locations. Additionally, BERS-Weston coordinated with Subterra Locating Services (Subterra), a private utility locating firm, to locate and mark subsurface utilities using electromagnetic and ground-penetrating radar utility locating methods. Proposed boring locations were marked to facilitate Dig Safe® clearance by participating utility companies. Nine boring locations were sited and marked.

Subterra identified multiple utilities in the vicinities of the proposed boring locations, including buried electric, gas, communications, and sewer utilities. Borings FH-17-05 and FH-17-08 were relocated as described in the previous section due to potential conflicts with an active sewer line and an abandoned sewer line. A site utility sketch prepared by Subterra is included in **Appendix C**.

3.2 SOIL BORINGS

Soil borings were advanced on January 22 and 23 January 2018. Composite soil samples were collected at 0 to 5 feet below ground (bgs) surface from soil borings advanced at each boring location to assess site soils for the presence of PFAS.

Soil samples were collected using a Geoprobe ® Macro-Core® core barrel fitted with a cutting shoe and dedicated, disposable acetate liner. The core barrel was advanced into the subsurface using a Geoprobe® 7822DT direct push technology (DPT) machine by BERS-Weston subcontractor, Eastern Analytical, Inc., located in Concord, New Hampshire. Soil lithologies were logged by a BERS-Weston geologist, and sample material was transferred to a decontaminated stainless steel mixing bowl. A composite soil sample was prepared by thoroughly mixing the soil with a decontaminated stainless steel mixing spoon. After the soil was homogenized, samples were collected into laboratory-provided containers for PFAS analysis by Modified Method 537 at TestAmerica, in West Sacramento, CA.

Soils observed during the SI Addendum activities at the AOC 76 predominantly consisted of poorly-sorted unconsolidated sands with trace to minor silt and pebble content consistent with glacial deposits. Surface soil permeability is expected to be generally high. Aquifer materials were not observed during the SI Addendum field work, because soil borings were performed to assess potential PFAS impacts in surface soils and were not advanced to the water table.

Soil borings were abandoned with cement-bentonite slurry from the bottom up after co-located temporary well groundwater samples (described in the following section) were collected.

Core barrels and stainless steel mixing bowls and spoons were decontaminated between samples. Soil boring logs are included in **Appendix D**. Photographs of the soil boring effort are included in **Appendix E**.

3.3 GROUNDWATER SAMPLING FROM TEMPORARY POINTS

Grab groundwater samples were collected from temporary points to assess for the presence of PFAS at the AOC 76. Temporary well details, including screened intervals and depth to water information, are presented in **Table 2**.

Groundwater samples were collected using the Geoprobe® SP22 groundwater sampler. The SP22 consisted of a 2.25-inch outer casing equipped with an expendable drive point and was advanced into the subsurface using a Geoprobe® 7822DT DPT machine. Once the outer casing was advanced to total depth at each temporary well location, a 48-inch stainless steel screen was attached to 1.25-inch inner rods and lowered to total depth inside the outer casing. The outer casing was retracted to expel the expendable drive point and expose the screen. The screened interval was selected to sample groundwater from the water table of the surficial aquifer. The water level was measured by inserting a decontaminated electronic water level meter into the inner rods and monitoring the water level until it appeared to stabilize. The screened interval was adjusted to coincide with the water table, as needed. A decontaminated stainless steel check valve threaded onto the end of new high (LDPE) tubing was inserted into the inner rods and lowered into the screened interval. The check valve sampling method was implemented as a variance from the original SI Work Plan with prior approval from EPA. As groundwater was withdrawn using the check valve and tubing assembly, a sample was collected and field parameters were measured including temperature, specific conductance, pH, dissolved oxygen, oxidation-reduction potential, and turbidity. Field parameters are summarized on **Table 3**. A groundwater sample was then collected directly from the LDPE tubing. Groundwater samples were collected for PFAS analysis in unpreserved high-density polyethylene containers with unlined lids by Modified Method 537 and submitted to TestAmerica, in West Sacramento, CA.

Upon collecting each groundwater sample, each borehole was abandoned by pumping cement-bentonite grout through the inner rods until the borehole was filled with grout from the bottom up. The inner rods and outer rods were then retracted and decontaminated. Decontamination fluids were containerized in 55-gallon drums for characterization and off-site disposal. Field records of temporary well screened intervals and field parameters are included in **Appendix D**. Photographs of the groundwater sampling effort are included in **Appendix E**.

3.4 SAMPLE LOCATION SURVEY

Select sample locations were re-located from the original mark-out locations due to potential subsurface utility conflicts identified during site reconnaissance or because of heavy rainfall experienced during the field event resulting in a submerged planned boring location. BERS-Weston coordinated with Jarvis Land Survey, Inc. (JLS) to survey the final sample locations for samples collected for the SI Addendum. JLS surveyed the sample locations using GPS and total station. Data was referenced to the Massachusetts State Plane Coordinate System NAD83 and the North American Vertical Datum 1988. Locations of soil borings, temporary points, sediment, and surface water that was sampled for the SI were surveyed. As described in previous sections, borings FH-17-04, FH-17-05, FH-17-06, FH-17-08, and FH-17-09 were relocated due to physical obstructions, utility conflicts, or due to site conditions previously noted. Actual boring locations are shown on **Figures 4** and **5.**

4.0 GROUNDWATER

4.1 DEPTH TO WATER

Depth to water was measured at the temporary points that were sampled during SI Addendum activities. Depth to water ranged from 12.7 feet bgs at FH-17-09 (located in a topographic low within the storm

water retention basin northeast of the Devens Fire Station) to 25.3 feet bgs at FH-17-07 (located near the southeast corner of the Devens Fire Station). Regional groundwater flow direction is toward the north. Depth to water measurements are shown on **Table 2**.

4.2 GROUNDWATER IMPACTS

Groundwater analytical results from the SI Addendum work performed at the AOC 76 are discussed below. The results are presented on **Table 4** and **Figure 4** and the laboratory reports are presented in **Appendix F**. Groundwater samples were analyzed by Modified EPA Method 537 for perfluorinated hydrocarbons, in accordance with the Work Plan and Quality Assurance Project Plan (KGS, 2018b).

Results were compared to the following comparison criteria:

- EPA Drinking Water Lifetime Health Advisories (LHAs) for PFOS and PFOA (EPA, 2016a, 2016b).
    - 70 ng/L for PFOS, PFOA, or the sum of concentrations of PFOS and PFOA.

LHAs for PFOS and/or PFOA were exceeded at FH-17-03, FH-17-05, FH-17-06, FH-17-08, and FH-17-09. The highest PFOS concentration (4,000 ng/L) was detected at FH-17-09, located in the stormwater basin northeast of the Devens Fire Station. The highest PFOS + PFOA concentration (4,160 ng/L) was also detected at FH-17-09. The highest PFOA concentration (330 ng/L) was detected at FH-17-03 (a duplicate sample collected from groundwater at FH-17-03 had a PFOA concentration of 260 ng/L).

5.0 SOIL

Soil analytical results from the SI Addendum work performed at the AOC 76 are discussed below. Soil samples were analyzed by EPA Modified Method 537 for Perfluorinated Hydrocarbons for the following compounds:

- PFBS (perfluorobutanesulfonic acid)
- PFHpA
- PFHxS
- PFNA
- PFOS
- PFOA

Soil sample results are presented in **Table 5** and **Figure 5**. The highest PFAS concentration detected was PFOS detected in soil boring FH-17-05 (located adjacent to the paved area east of the Devens Fire Station) at 200 micrograms per kilogram (µg/kg). PFOS concentrations in soil ranged from non-detect to 200 µg/kg in the soil sample collected at the site. PFOA concentrations in soil ranged from non-detect to 5.3 µg/kg, with the highest concentration detected in the soil sample collected at FH-17-01.

6.0 QUALITY CONTROL SAMPLES AND DATA VALIDATION

Quality control samples were collected according to the SI Work Plan Addendum and consisted of field duplicate samples, a matrix spike/matrix spike duplicate sample for groundwater, field blanks, and equipment blanks. Field duplicate analytical results are presented next to their respective parent samples in **Tables 4** and **5**.

Laboratory Analytical Reports are included in **Appendix F**. Data validation was performed by a third-party contracted firm, Laboratory Data Consultants, Inc. under Level IV guidelines. No data were rejected during validation, and all analytical results are considered usable and acceptable as reported. Validation reports are included in **Appendix G**.

7.0 CONCLUSIONS

The SI Addendum was conducted to evaluate the potential presence or absence of PFAS compounds in soil and groundwater at AOC 76. The groundwater results of the investigation indicate that six of the nine groundwater samples collected for the SI Addendum have PFAS concentrations and either exceed the LHA for PFOS and PFOA or the combined concentrations of PFOA and PFOS. The LHA for PFOS was exceeded at locations FH-17-08 and FH-17-09 with concentrations of 1,500 and 4,000 ng/L, respectively. The LHA for PFOA was exceeded at FH-17-03 and FH-17-09 with concentrations of 330 and 160 ng/L, respectively. At boring locations FH-17-04, FH-17-05, and FH-17-06, the LHA was exceeded due to the total concentrations of PFOS and PFOA (sum concentrations of 70, 80, and 72 ng/L, respectively). Of the locations sampled, the highest PFAS concentrations in groundwater were detected in the groundwater sample collected from within the stormwater detention basin northeast of the Devens Fire Station at sample location FH-17-09 (combined PFOS and PFOA concentration of 4,160 ng/L).

Soil was also sampled for PFAS at the Devens Fire Station/AOC 76. The highest PFOS concentration in soil was detected at FH-17-05 (200 µg/kg). The highest PFOA concentration was 5.3 µg/kg at location FH-17-01. These samples were located northeast and east, respectively, of the adjacent paved parking area behind the Devens Fire Station.

The Draft Site Inspection (SI) Addendum was reviewed by MassDEP and EPA and documentation of comments received by regulatory stakeholders and responses by USACE are included in **Appendix H.**

Based on the results of supplemental PFAS sampling activities and the confirmed presence of PFOS and PFOA in soils (AOC 76) and groundwater (AOCs 76, 57, 43G, 43J, 32, 43A, 50 and SHL), it is recommended that these AOCs be included in the Remedial Investigation (RI) Work Plan for the Former Fort Devens. Specifically, it is recommended that the RI focus on the following:

- Determine local groundwater flow direction, gradient, and rate of groundwater flow in the vicinity of AOC 76.
- Determine the nature and extent and source of contamination at AOC 76 in soil and groundwater.
- Assess potential sources of groundwater impacts and consider:
    - Runoff from catch basins and garage bays that may have historically directed impacted water to the retention basin northeast of the fire station.
        - Delineate PFAS exceedance detected at sample location FH-17-09.
    - Possible subsurface leaks from the sewer line running parallel to the northern edge of the paved area east of the fire station.
        - Conduct additional groundwater sampling upgradient of the sewer line and perform downgradient delineation after local groundwater flow direction is established.

- Runoff from training exercises historically conducted behind (east of) the fire station.
    - Delineate LHA exceedances in groundwater detected in groundwater samples east of the paved area behind the fire station.

- Assess potential impacts to supply wells in the vicinity of the AOC 76. The water supply well downgradient of AOC 76, the MacPherson Well, has been shut down. However, potential impacts to this supply well should also be assessed. The well survey should confirm that no pathways exist with other water supply wells.

- Assess potential discharge of groundwater to Willow Brook by collecting surface water/sediment samples downgradient of known PFAS contamination.

8.0 REFERENCES

Devens, Massachusetts Property Viewer GIS. 2018. https://www.axisgis.com/devensMA. 2018.

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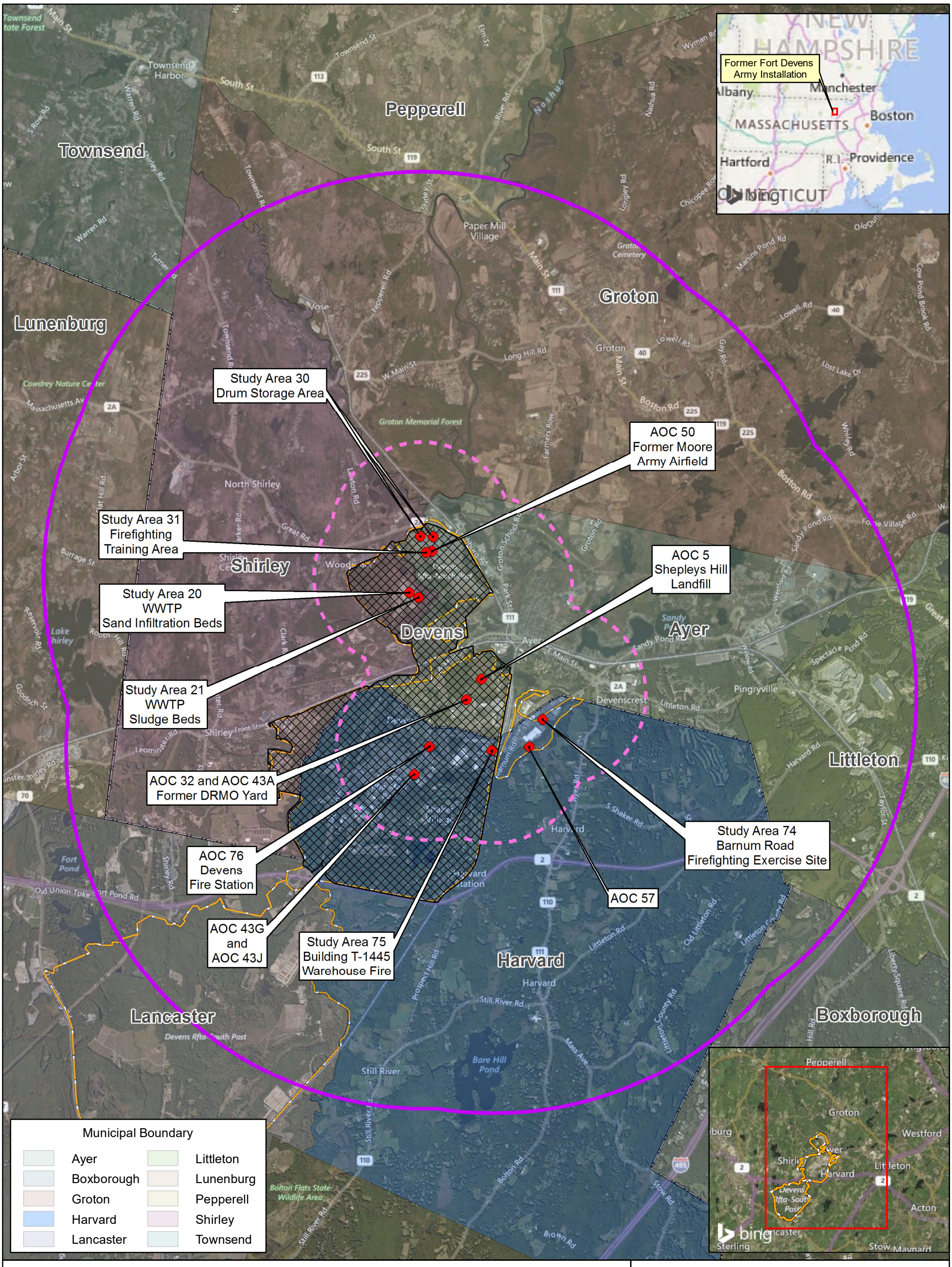
Figures



Legend

- Former Fort Devens Boundary
- 4 - Mile Buffer
- 1 - Mile Buffer
- Devens
- County Line
- Study Area or AOC

AOC – Area of Contamination
DRMO - Defense Reutilization and Marketing Office
WWTP – Waste Water Treatment Plant

Imagery:
ESRI, Bing Mapping Service 2016
Layers:
MassDEP GIS

Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at
Former Fort Devens Army Installation, Devens, Massachusetts

Figure 1
Former Fort Devens Location Map

N

0 0.5 1
Miles

BERS-Weston Services JVA, LLC

Figures are adapted from Final Expedited Site Inspection Work Plan for Per-and Polyfluoroalkyl Substances (PFAS).
Former Fort Devens Army Installation, Devens, MA, May 2017

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Study Area 30
Drum Storage Area

AOC 50
Former Moore
Army Airfield

Study Area 31
Firefighting
Training Area

Study Area 20
WWTP
Sand Infiltration Beds

AOC 5
Shepleys Hill
Landfill

Study Area 21
WWTP
Sludge Beds

AOC 32
Former
DRMO Yard

Study Area 74
Barnum Road
Firefighting Exercise Site

AOC 76
Devens
Fire Station

Study Area 75
Building T-1445
Warehouse Fire

Legend

- Former Fort Devens Boundary
- Wetlands
- 1 - Mile Buffer
- 4 - Mile Buffer
- County Line
- Study Area or AOC
- Public Water Supply Locations

AOC – Area of Contamination
SA – Study Area
WWTP – Waste Water Treatment Plant

Topographic Background:
ESRI, USGS Mapping Service 2016
Layers:
MassDEP GIS, Weston Solutions

Figures are adapted from Final Expedited Site Inspection Work Plan for Per-and Polyfluoroalkyl Substances (PFAS).
Former Fort Devens Army Installation, Devens, MA, May 2017

Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at
Former Fort Devens Army Installation, Devens, Massachusetts

Figure 2
USGS 7.5-minute Topographic Map

N

0 0.5 1
Miles

Bristol Environmental Remediation Services, LLC
WESTON SOLUTIONS
BERS-Weston Services JVA, LLC

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Note: USEPA guidance requires a 4-mile buffer

TUBULAR WELL FIELD (47 X 2.5")
2115001-01G

WELL 2
2270009-02G

WELL 1
2270009-01G

Study Area 30
Drum Storage Area

TOWN FOREST GP WELL
2115001-02G

AOC 50
Former Moore
Army Airfield

Study Area 31
Firefighting
Training Area

Study Area 20
WWTP
Sand Infiltration Beds

Study Area 21
WWTP
Sludge Beds

AOC 5
Shepleys Hill
Landfill

AOC 32
Former
DRMO Yard

AOC 76
Devens
Fire Station

Study Area 75
Building T-1445
Warehouse Fire

Study Area 74
Barnum Road
Firefighting Exercise Site

GROTONWOOD BAPTIST CAMP AND CONF.CTR.
2115002-02G

GROTONWOOD BAPTIST CAMP AND CONF.CTR.
2115002-01G

GROTONWOOD BAPTIST CAMP AND CONF.CTR.
2115002-03G

GROTONWOOD BAPTIST CAMP AND CONF.CTR.
2115002-04G

BOSTON ROAD MARKET
AND LIQUOR
2115011-01G

MACPHERSON
NATURALLY DEVELOPED WELL
2019001-03G

GROVE POND GRAVEL PACKED (12 8") WELLS 2019001-04G

WELL 7
2019000-07G

WELL 6
2019000-06G

GROVE POND WELL # 2
2019000-02G

GROVE POND WELL # 1
2019000-01G

WELL 8
2019000-08G

GPW SPECTACLE
POND (WELL 5)
2158000-04G

SPECTACLE POND 2
WELL
2019000-04G

SPECTACLE POND WELL
1A
2019000-05G

PATTERSON ROAD
GRAVEL PACKED WELL
2270000-03G

WALKER WELL
2270000-04G

CATACUNEMAUG ROAD
GRAVEL PACKED WELL
2270000-02G

PATTON
REPLACEMENT WELL
2019001-05G

KEATING WELL 1
2162000-08G

HORN PACKAGING
2147005-01G

GP WELL 2
2270001-02G

GP WELL 1
2270001-01G

YMCA CAMP LOWE
2147002-01G

U.S. ARMY DEVENS
(SOUTH POST)
2147006-03G

SHABOKIN GRAVEL PACKED WELL
2019001-02G

SHABOKIN REPLACEMENT WELL
2019001-06G

U.S. ARMY DEVENS (SOUTH POST)
2147006-02G

U.S. ARMY DEVENS (SOUTH POST)
2147006-01G

THE APPLEWORKS
2125007-01G

HARVARD PLAZA
2125010-01G

DRINKING WATER WELL
2125013-01G

SHAKER PLACE OFFICES
2125020-01G

JILL REALTY TRUST
2125003-01G

VANGUARD MEDICAL/RENAISSANCE
2125012-01G

TWF WHITCOMB AVE.,
(6 X 8") WELL #3/4
2158000-01G

GPW # 1,
WHITCOMB AVENUE
2158000-02G

WELL 1
2125014-01G

WELL 2
2125014-02G

WELL 1
2125021-01G

WELL 2
2125021-02G

WELL 3
2125021-03G

WELL 4
2125021-04G

VILLAGE NURSERY SCHOOL
2125005-01G

FRIENDLY CROSSWAYS
2125001-01G

OFFICES AT HARVARD PARK LLC
2125004-01G

OFFICES AT HARVARD PARK LLC
2125004-02G

OFFICES AT HARVARD PARK LLC
2125004-03G

COSGROVE REALTY
2037025-01G

COSGROVE REALTY
2037025-02G

CISCO SYSTEMS INC. SITE II
2037034-01G

WELL 4
2125016-04G

WELL 3
2125016-03G

WELL 2
2125016-02G

WELL 1
2125016-01G

FRUITLANDS MUSEUM
2125015-01G

FRUITLANDS MUSEUM
2125015-04G

CAMP GREEN EYRE
GIRL SCOUT CAMP
2125006-02G

CAMP GREEN EYRE
GIRL SCOUT CAMP
2125006-01G

CAMP GREEN EYRE
GIRL SCOUT CAMP
2125006-04G

CAMP GREEN EYRE
GIRL SCOUT CAMP
2125006-03G

BOLTON ROAD ROCK WELL #3 (03G)
2125000-03G

POND ROAD ROCK WELL #2 (02G)
2125000-02G

POND ROAD ROCK WELL #5 (05G)
2125000-05G

ROCK WELL 5
2125002-05G

ROCK WELL 3
2125002-03G

ROCK WELL 2
2125002-02G

ROCK WELL 1
2125002-01G

ROCK WELL 4
2125002-04G

IMMACULATE HEART OF MARY SCHOOL
2125011-03G

AOC – Area of Contamination
WWTP – Waste Water Treatment Plant

Legend

- Former Fort Devens Boundary
- 1 - Mile Buffer
- 4 - Mile Buffer
- County Line
- Study Area or AOC
- Public Water Supply Locations

Public Water Supply Service Areas

- Ayer DPW Water Division
- DOC/MCI Shirley
- Devens Mass Development
- Groton Water Department
- Littleton Water Department
- Lunenburg Water District
- Shirley Water District
- West Groton Water Department

Figures are adapted from Final Expedited Site Inspection Work Plan for Per-and Polyfluoroalkyl Substances (PFAS). Former Fort Devens Army Installation, Devens, MA, May 2017

Imagery:
ESRI, Bing Mapping Service 2016
Layers:
MassDEP GIS

Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at
Former Fort Devens Army Installation, Devens, Massachusetts

Figure 3
Public Water Supply Service Areas

N

0 0.5 1
Miles

Bristol Environmental Remediation Services, LLC
WESTON SOLUTIONS
BERS-Weston Services JVA, LLC

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Analyte	FH-17-09_GW012318
	1/23/2018
PFBS	18
PFHpA	130
PFHxS	780
PFNA	19
PFOS	4000
PFOA	160
PFOS + PFOA	4160

Analyte	FH-17-08_GW012218
	1/23/2018
PFBS	4.3
PFHpA	41
PFHxS	49
PFNA	45
PFOS	1500
PFOA	21
PFOS + PFOA	1521

Analyte	FH-17-05_GW012218
	1/22/2018
PFBS	9.5
PFHpA	14
PFHxS	140
PFNA	1.2 J
PFOS	46
PFOA	34
PFOS + PFOA	80

Analyte	FH-17-03_GW012218	FH-DUP01
	1/22/2018	1/22/2018
PFBS	60	67
PFHpA	19	18
PFHxS	670	540
PFNA	2.3 U	1.5 U
PFOS	26[(c)]	18[(c)]
PFOA	330	260
PFOS + PFOA	356	278

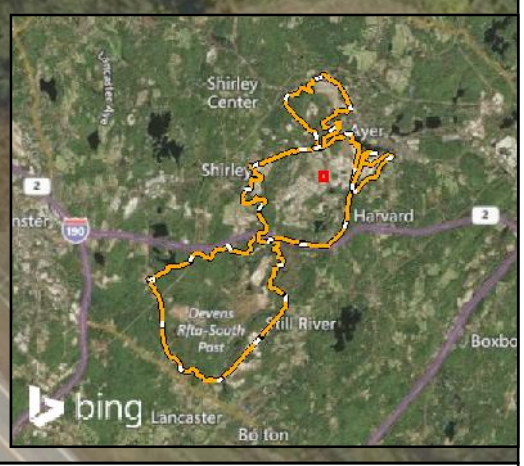
Analyte	FH-17-07_GW012318
	1/23/2018
PFBS	3.0
PFHpA	4.1
PFHxS	16
PFNA	0.55 J
PFOS	13
PFOA	11
PFOS + PFOA	24

Analyte	FH-17-02_GW012218
	1/22/2018
PFBS	20
PFHpA	4.0
PFHxS	170
PFNA	1.6 U
PFOS	5.3
PFOA	23
PFOS + PFOA	28.3

Analyte	FH-17-06_GW012318
	1/23/2018
PFBS	13
PFHpA	9.1
PFHxS	31
PFNA	2.6
PFOS	42
PFOA	30
PFOS + PFOA	72

Analyte	FH-17-01_GW012218
	1/22/2018
PFBS	7.7
PFHpA	2.1 J
PFHxS	110
PFNA	1.8 U
PFOS	3.7 U
PFOA	9.2
PFOS + PFOA	9.2

Analyte	FH-17-04_GW012218
	1/22/2018
PFBS	21
PFHpA	6.0
PFHxS	230
PFNA	3.0 U
PFOS	14 J
PFOA	56 J
PFOS + PFOA	70



Legend

- Former Fort Devens Boundary
- Study Area/AOC Boundary
- Groundwater Sample Location

Notes:
ng/L = nanograms per Liter
a = Regional Screening Level exists for tapwater but is not a requirement applicable to this SI
b = USEPA Drinking Water Health Advisories (sum of PFOA and PFOS concentrations)
c = Estimated in parent and "dup" based on poor precision as indicated by high RPD values but not "J" flagged since there are no criteria established in the National Functional Guidelines or the DoD for qualifications based on field duplicates.
NE = Not Established
J = Estimated: the analyte was positively identified but the quantitation is an estimation
U = Undetected at the Limit of Detection
Yellow highlighted values equal or exceed comparison criteria

Imagery:
ESRI, Bing Mapping Service 2016
Layers:
MassDEP GIS

Wells that do not have data presented were not sampled during the Site Inspection.
Figures are adapted from Final Expedited Site Inspection Work Plan for Per-and Polyfluoroalkyl Substances (PFAS). Former Fort Devens Army Installation, Devens, MA, May 2017

Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at
Former Fort Devens Army Installation, Devens, Massachusetts

Figure 4
AOC 76
Groundwater Analytical Results

N

0 30 60
Feet

BERS-Weston Services JVA, LLC

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Analyte	FH-17-09_SO0005
	1/23/2018
PFBS	0.12 U
PFHpA	0.12 U
PFHxS	0.12 U
PFNA	0.12 U
PFOS	0.58 U
PFOA	0.23 U
PFOS + PFOA	0

Analyte	FH-17-08_SO0005
	1/23/2018
PFBS	0.11 U
PFHpA	0.12 J
PFHxS	0.10 J
PFNA	0.35 J
PFOS	1.5
PFOA	0.21 J
PFOS + PFOA	1.71

Analyte	FH-17-05_SO0005
	1/22/2018
PFBS	0.11 U
PFHpA	0.32 J
PFHxS	1.5
PFNA	1.5
PFOS	200
PFOA	1.2
PFOS + PFOA	201.2

Analyte	FH-17-03_SO0005	FH-DUP02
	1/22/2018	1/22/2018
PFBS	0.11 U	0.11 U
PFHpA	0.28 J	0.28 J
PFHxS	0.055 J	0.064 J
PFNA	0.058 J	0.077 J
PFOS	0.23 J	0.29 J
PFOA	0.24 J	0.22 J
PFOS + PFOA	0.47	0.51

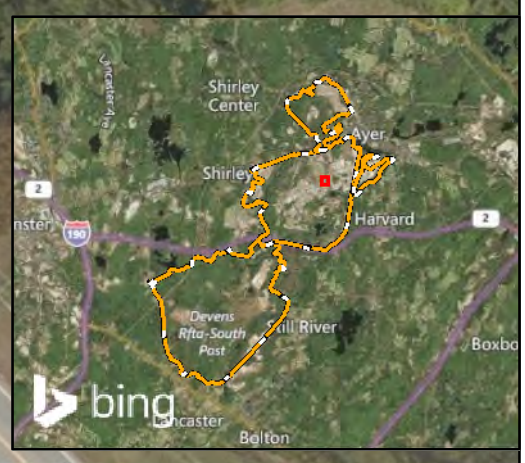
Analyte	FH-17-07_SO0005
	1/23/2018
PFBS	0.11 U
PFHpA	0.11 U
PFHxS	0.11 U
PFNA	0.043 J
PFOS	0.68 J
PFOA	0.22 U
PFOS + PFOA	0.68

Analyte	FH-17-02_SO0005
	1/22/2018
PFBS	0.11 U
PFHpA	0.85
PFHxS	0.85
PFNA	2.0
PFOS	18
PFOA	0.92
PFOS + PFOA	18.92

Analyte	FH-17-06_SO0005
	1/23/2018
PFBS	0.11 U
PFHpA	0.059 J
PFHxS	0.12 J
PFNA	0.059 J
PFOS	1.2
PFOA	0.24 J
PFOS + PFOA	1.44

Analyte	FH-17-01_SO0005
	1/22/2018
PFBS	0.12 U
PFHpA	1.2
PFHxS	2.5
PFNA	10
PFOS	30
PFOA	5.3
PFOS + PFOA	35.3

Analyte	FH-17-04_SO0005
	1/22/2018
PFBS	0.10 U
PFHpA	0.064 J
PFHxS	0.037 J
PFNA	0.17 J
PFOS	0.71 J
PFOA	0.16 J
PFOS + PFOA	0.87



Legend

- Former Fort Devens Boundary
- Study Area/AOC Boundary
- Soil Sample Location

Notes:
µg/Kg = micrograms per Kilogram
NE = Not Established
J = Estimated: the analyte was positively identified but the quantitation is an estimation
U = Undetected at the Limit of Detection

Imagery:
ESRI, Bing Mapping Service 2016
Layers:
MassDEP GIS

Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at
Former Fort Devens Army Installation, Devens, Massachusetts

Figure 5
AOC 76
Soil Analytical Results

N

0 30 60
Feet

Bristol Environmental Remediation Services, LLC
WESTON SOLUTIONS
BERS-Weston Services JVA, LLC

Wells that do not have data presented were not sampled during the Site Inspection.
Figures are adapted from Final Expedited Site Inspection Work Plan for Per-and Polyfluoroalkyl Substances (PFAS). Former Fort Devens Army Installation, Devens, MA, May 2017

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Tables

Table 1
Supply Wells within 4 Miles of Former Fort Devens AOC 76 Site
Devens, Massachusetts

SOURCE ID	WELL NAME	TOWN	LATITUDE	LONGITUDE	TYPE	STATUS
2019000-01G	GROVE POND WELL # 1	AYER	42.55144883	-71.58107001	GW	ACTIVE
2019000-02G	GROVE POND WELL # 2	AYER	42.55147943	-71.58155062	GW	INACTIVE
2019000-04G	SPECTACLE POND 2 WELL	AYER	42.56135156	-71.52372178	GW	ACTIVE
2019000-05G	SPECTACLE POND WELL # 1A	AYER	42.56049799	-71.52418941	GW	ACTIVE
2019000-06G	WELL 6	AYER	42.551475	-71.58188056	GW	ACTIVE
2019000-07G	WELL 7	AYER	42.55143611	-71.582225	GW	ACTIVE
2019000-08G	WELL 8	AYER	42.55119167	-71.58249722	GW	ACTIVE*
2019001-02G	SHABOKIN GRAVEL PACKED WELL	AYER	42.51992031	-71.61302957	GW	INACTIVE
2019001-03G	MACPHERSON NATURALLY DEVELOPED WELL	AYER	42.55765918	-71.61097709	GW	INACTIVE
2019001-04G	GROVE POND GRAVEL PACKED (12 8") WELLS	AYER	42.55073974	-71.58441855	GW	INACTIVE
2019001-05G	PATTON REPLACEMENT WELL	AYER	42.52957389	-71.60594146	GW	ACTIVE
2019001-06G	SHABOKIN REPLACEMENT WELL	AYER	42.52009638	-71.61311306	GW	ACTIVE
2037025-01G	COSGROVE REALTY	BOXBOROUGH	42.51305102	-71.53503746	NTNC	ACTIVE
2037025-02G	COSGROVE REALTY	BOXBOROUGH	42.51294813	-71.53554829	NTNC	ACTIVE
2037034-01G	CISCO SYSTEMS INC. SITE II	BOXBOROUGH	42.50439668	-71.53444424	NTNC	ACTIVE
2115001-01G	TUBULAR WELL FIELD (47 X 2.5")	GROTON	42.61544446	-71.63971784	GW	ACTIVE
2115001-02G	TOWN FOREST GP WELL	GROTON	42.58946849	-71.6159547	GW	ACTIVE
2115002-01G	GROTONWOOD BAPTIST CAMP AND CONF.CTR.	GROTON	42.59722124	-71.53041075	TNC	ACTIVE
2115002-02G	GROTONWOOD BAPTIST CAMP AND CONF.CTR.	GROTON	42.59693543	-71.53036491	TNC	ACTIVE
2115002-03G	GROTONWOOD BAPTIST CAMP AND CONF.CTR.	GROTON	42.59582926	-71.53252406	TNC	ACTIVE
2115002-04G	GROTONWOOD BAPTIST CAMP AND CONF.CTR.	GROTON	42.59632111	-71.5359649	TNC	ACTIVE
2115011-01G	BOSTON ROAD MARKET AND LIQUOR	GROTON	42.57501707	-71.51713636	TNC	INACTIVE
2125000-02G	POND ROAD ROCK WELL #2 (02G)	HARVARD	42.49558826	-71.58646435	GW	ACTIVE
2125000-03G	BOLTON ROAD ROCK WELL #3 (03G)	HARVARD	42.49093319	-71.5813576	GW	EMERGENCY
2125000-05G	POND ROAD ROCK WELL #5 (05G)	HARVARD	42.49541576	-71.58690662	GW	ACTIVE
2125001-01G	FRIENDLY CROSSWAYS	HARVARD	42.51407223	-71.53461465	TNC	ACTIVE
2125002-01G	ROCK WELL 1	HARVARD	42.48835345	-71.62103279	GW	INACTIVE
2125002-02G	ROCK WELL 2	HARVARD	42.48783741	-71.62231811	GW	ACTIVE
2125002-03G	ROCK WELL 3	HARVARD	42.48768296	-71.62334102	GW	ACTIVE
2125002-04G	ROCK WELL 4	HARVARD	42.48658122	-71.62111139	GW	EMERGENCY
2125002-05G	ROCK WELL 5	HARVARD	42.48814983	-71.6233523	GW	ACTIVE
2125003-01G	JILL REALTY TRUST	HARVARD	42.53132938	-71.57782042	TNC	ACTIVE
2125004-01G	OFFICES AT HARVARD PARK LLC	HARVARD	42.52557441	-71.57761963	NTNC	INACTIVE
2125004-02G	OFFICES AT HARVARD PARK LLC	HARVARD	42.52556997	-71.57753462	NTNC	INACTIVE
2125004-03G	OFFICES AT HARVARD PARK LLC	HARVARD	42.52555202	-71.57743761	NTNC	INACTIVE
2125005-01G	VILLAGE NURSERY SCHOOL	HARVARD	42.52100587	-71.56424073	NTNC	ACTIVE
2125006-01G	CAMP GREEN EYRE GIRL SCOUT CAMP	HARVARD	42.49776451	-71.59981529	TNC	ACTIVE
2125006-02G	CAMP GREEN EYRE GIRL SCOUT CAMP	HARVARD	42.50061033	-71.5952758	TNC	ACTIVE
2125006-03G	CAMP GREEN EYRE GIRL SCOUT CAMP	HARVARD	42.49781016	-71.59775541	TNC	ACTIVE
2125006-04G	CAMP GREEN EYRE GIRL SCOUT CAMP	HARVARD	42.49662807	-71.59770207	TNC	ACTIVE
2125007-01G	THE APPLEWORKS	HARVARD	42.54290193	-71.57545448	NTNC	ACTIVE
2125010-01G	HARVARD PLAZA	HARVARD	42.53696048	-71.5763473	TNC	ACTIVE
2125011-03G	IMMACULATE HEART OF MARY SCHOOL	HARVARD	42.48480837	-71.61814919	NTNC	ACTIVE
2125012-01G	VANGUARD MEDICAL/RENAISSANCE	HARVARD	42.53104389	-71.58096316	NTNC	ACTIVE
2125013-01G	DRINKING WATER WELL	HARVARD	42.53400667	-71.57872324	GW	ACTIVE
2125014-01G	WELL 1	HARVARD	42.52658029	-71.58456168	GW	ACTIVE
2125014-02G	WELL 2	HARVARD	42.52644964	-71.58420392	GW	ACTIVE
2125015-01G	FRUITLANDS MUSEUM	HARVARD	42.50860176	-71.60946176	TNC	ACTIVE
2125015-04G	FRUITLANDS MUSEUM	HARVARD	42.5074848	-71.60973528	TNC	EMERGENCY
2125016-01G	WELL 1	HARVARD	42.5032856	-71.54214179	GW	ACTIVE
2125016-02G	WELL 2	HARVARD	42.50339274	-71.54204537	GW	ACTIVE
2125016-03G	WELL 3	HARVARD	42.50353564	-71.54177205	GW	ACTIVE
2125016-04G	WELL 4	HARVARD	42.50370229	-71.54165958	GW	INACTIVE

Table 1
Supply Wells within 4 Miles of Former Fort Devens AOC 76 Site
Devens, Massachusetts

SOURCE ID	WELL NAME	TOWN	LATITUDE	LONGITUDE	TYPE	STATUS
2125020-01G	SHAKER PLACE OFFICES	HARVARD	42.53241369	-71.57761312	NTNC	ACTIVE
2125021-01G	WELL 1	HARVARD	42.52575079	-71.58609882	GW	ACTIVE
2125021-02G	WELL 2	HARVARD	42.52563413	-71.58603104	GW	ACTIVE
2125021-03G	WELL 3	HARVARD	42.52549833	-71.5860695	GW	ACTIVE
2125021-04G	WELL 4	HARVARD	42.52541507	-71.58593092	GW	ACTIVE
2147002-01G	YMCA CAMP LOWE	LANCASTER	42.52235193	-71.68188946	TNC	ABANDONED
2147005-01G	HORN PACKAGING	LANCASTER	42.5268605	-71.6771414	NTNC	ACTIVE
2147006-01G	U.S. ARMY DEVENS (SOUTH POST)	LANCASTER	42.49789904	-71.63464398	TNC	ACTIVE
2147006-02G	U.S. ARMY DEVENS (SOUTH POST)	LANCASTER	42.49796523	-71.63462705	TNC	ACTIVE
2147006-03G	U.S. ARMY DEVENS (SOUTH POST)	LANCASTER	42.51758784	-71.63788796	TNC	ACTIVE
2158000-01G	TWF WHITCOMB AVE., (6 X 8") WELL #3/4	LITTLETON	42.533977	-71.512375	GW	ACTIVE
2158000-02G	GPW # 1, WHITCOMB AVENUE	LITTLETON	42.53353428	-71.51272917	GW	ACTIVE
2158000-04G	GPW SPECTACLE POND (WELL 5)	LITTLETON	42.56555872	-71.51054202	GW	ACTIVE
2162000-08G	KEATING WELL 1	LUNENBURG	42.5373259	-71.67910802	GW	ACTIVE
2270000-02G	CATACUNEMAUG ROAD GRAVEL PACKED WELL	SHIRLEY	42.54818334	-71.66448532	GW	ACTIVE
2270000-03G	PATTERSON ROAD GRAVEL PACKED WELL	SHIRLEY	42.55727371	-71.62270354	GW	ACTIVE
2270000-04G	WALKER WELL	SHIRLEY	42.55693434	-71.62129628	GW	ACTIVE
2270001-01G	GP WELL 1	SHIRLEY	42.52246472	-71.64057151	GW	ACTIVE
2270001-02G	GP WELL 2	SHIRLEY	42.52282703	-71.63921361	GW	ACTIVE
2270009-01G	WELL 1	SHIRLEY	42.60391162	-71.63727983	GW	ACTIVE
2270009-02G	WELL 2	SHIRLEY	42.60390986	-71.63738177	GW	ACTIVE

Total GW Supply Wells	**44**
Total TNC Wells	**18**
Total NTNC Wells	**12**

Notes:
GW - Groundwater Supply Well
TNC - Transient, Non-Community Well
NTNC - Non-Transient, Non-Community Well
AOC - Area of Contamination
SA - Study Area
Well Details Source: MassDEP GIS, March 2018 query
Activity Status Source: Mr. Andrew Durham, MassDEP, email 3-21-2018
* - Ayer Well 8 is active but extracted water is not distributed.

Table 1A
Public Supply Well PFAS Data
(MassDEP Sampling Results 9/2016 to 3/2018)
Former Fort Devens Army Installation
Devens, Massachusetts

Location	Well ID	Date	PFOS (ug/L)	PFOA (ug/L)	PFOS+PFOA
Ayer Wells	Ayer Multi-Finished 4 Grove*	9/1/2016	0.028	0.01	0.038
		11/15/2016	0.029	0.011	0.04
		1/11/2017	0.025	0.01	0.035
		4/12/2017	0.045	0.014	0.059
		8/3/2017	0.038	0.015	0.053
		10/17/2017	0.038	0.016	0.054
		1/9/2018	0.032	0.005	0.047
		3/7/2018	0.007	0.008	0.015
	Ayer RW-06G/GW 6	9/1/2016	<0.004	0.006	0.006
		11/15/2016	<0.004	0.006	0.006
		1/11/2017	<0.004	0.007	0.007
		4/12/2017	<0.004	0.007	0.007
		8/3/2017	<0.004	0.007	0.007
		10/17/2017	<0.004	0.008	0.008
		1/9/2018	<0.004	0.007	0.007
	Ayer RW-07G/GW 7	9/1/2016	0.007	0.009	0.016
		11/15/2016	0.006	0.009	0.015
		1/11/2017	0.005	0.008	0.013
		4/12/2017	0.005	0.007	0.012
		8/3/2017	0.017	0.013	0.03
		10/17/2017	0.014	0.014	0.028
		1/9/2018	0.012	0.016	0.028
	Ayer RW-08G/GW 8	9/1/2016	0.085	0.018	0.103
		11/15/2016	0.077	0.017	0.094
		1/11/2017	0.070	0.017	0.087
		4/12/2017	0.080	0.021	0.101
		8/3/2017	0.081	0.024	0.105
		10/17/2017	0.091	0.023	0.114
		1/9/2018	0.066	0.027	0.093
	Ayer Grove Pond Well 1	2/8/2018	<0.004	0.007	0.007
		2/12/2018	0.017	0.008	0.025
	Spectacle Pond Well 1A	3/1/2018	0.007	0.006	0.013
	Spectacle Pond Well 2A	3/1/2018	0.006	0.008	0.014
	Spectacle Pond Finished	3/1/2018	0.007	0.007	0.014
	Grove Pond Raw Blend	1/9/2018	0.032	0.018	0.05
	Grove Pond Finished Blend	1/9/2018	0.032	0.015	0.047
	Pingry Hill Storage Tank	1/9/2018	0.009	0.009	0.018
	Washington Street Storage Tank	1/9/2018	0.020	0.012	0.032

Table 1A
Public Supply Well PFAS Data
(MassDEP Sampling Results 9/2016 to 3/2018)
Former Fort Devens Army Installation
Devens, Massachusetts

Location	Well ID	Date	PFOS (ug/L)	PFOA (ug/L)	PFOS+PFOA
Devens Wells	MacPherson Well 03G	7/28/2016	0.044	0.025	0.069
		9/1/2016	0.041	0.021	0.062
		12/28/2016	0.044	0.024	0.068
		2/22/2017	0.046	0.022	0.068
		5/16/2017	0.044	0.022	0.066
		9/19/2017	0.040	0.021	0.061
		12/19/2017	0.040	0.022	0.062
	Patton Well 05G	9/1/2016	<0.004	0.004	0.004
	Shabokin Well 06G	9/1/2016	0.004	0.004	0.008
		4/12/2017	0.004	0.007	0.011
W. Groton Well	W. Groton Well 2G	9/1/2016	<0.004	<0.002	--
Shirley Wells	Patterson 03G	9/1/2016	<0.004	<0.002	--
	Walker 04G	9/1/2016	<0.004	<0.002	--

*Location represents the blended water from a combination of Grove Pond Wells 6, 7, and 8. Grove Pond Well 8 was removed from service in February 2018. The sample collected from the Ayer Multi-Finished 4 Grove location on 3/7/18 represents blended water from a combination of Grove Pond Wells 1, 6, and 7.

Shaded cells indicate data equaled or exceeded EPA Lifetime Health Advisory (.070 µg/L) level

Table 2
Temporary Well Details and Depth to Water Information
Devens Fire Station, Devens Massachusetts

Boring ID	Surface Elevation (feet, NAVD 1988)	Depth to Water (feet bgs)	Groundwater Elevation (feet, NAVD 1988)	Temporary Well Screened Interval (feet bgs)
FH-17-01	253.88	15.3	238.6	15 - 19
FH-17-02	253.31	18.5	234.8	18 - 22
FH-17-03	252.93	20.2	232.7	20 - 24
FH-17-04	251.82	20.2	231.6	20 - 24
FH-17-05	255.36	15.3	240.1	15 - 19
FH-17-06	264.83	25.3	239.5	25 - 29
FH-17-07	261.90	16.6	245.3	17 - 21
FH-17-08	267.63	21.0	246.6	20 - 24
FH-17-09	245.83	12.7	233.1	12 - 16

Notes:
NAVD = North American Vertical Datum
bgs = below ground surface

Table 3
Field Parameters
Devens Fire Station
Devens, Massachusetts

Boring ID	Temperature (^{o}C)	Spec. Cond. (µS/cm)	Dissolved Oxygen (mg/L)	pH (S.U.)	ORP (mV)	Turbidity (NTU)
FH-17-01	7.06	135	0.55	6.91	17.2	>1000
FH-17-02	4.36	192	0.61	6.51	-34.1	>1000
FH-17-03	6.28	333	0.52	6.94	-117.8	>1000
FH-17-04	5.64	218	0.49	6.24	20.2	>1000
FH-17-05	5.50	1,000	0.87	6.82	-23.1	>1000
FH-17-06	6.53	772	3.81	7.31	-25.0	>1000
FH-17-07	5.50	1,097	5.46	7.05	30.1	>1000
FH-17-08	6.75	1,542	4.53	7.29	15.5	>1000
FH-17-09	3.67	683	5.42	6.77	133.1	>1000

Notes:
^{o}C = degrees Celsius
µS/cm = microSiemens per centimeter
mg/L = milligrams per liter
S.U. = Standard Units
ORP = oxidation-reduction potential
mV = millivolts
NTU = Nephelometric Turbidity Units

Table 4
AOC 76
Groundwater Analytical Results
Former Fort Devens Army Installation
Devens, Masschusetts

Analyte	Units	Criteria	FH-17-01_GW012218	FH-17-02_GW012218	FH-17-03_GW012218	FH-DUP01	FH-17-04_GW012218	FH-17-05_GW012218
			1/22/2018	1/22/2018	1/22/2018	1/22/2018	1/22/2018	1/22/2018
Perfluorobutanesulfonic acid (PFBS)	ng/L	NE[a]	7.7	20	60	67	21	9.5
Perfluoroheptanoic acid (PFHpA)	ng/L	NE	2.1 J	4	19	18	6	14
Perfluorohexanesulfonic acid (PFHxS)	ng/L	NE	110	170	670	540	230	140
Perfluorononanoic acid (PFNA)	ng/L	NE	1.8 U	1.6 U	2.3 U	1.5 U	3.0 U	1.2 J
Perfluorooctanesulfonic acid (PFOS)	ng/L	70[b]	3.7 U	5.3	26[(c)]	18[(c)]	14 J	46
Perfluorooctanoic acid (PFOA)	ng/L	70[b]	9.2	23	330	260	56 J	34
Total PFOS + PFOA	ng/L	70[b]	9.2	28.3	356	278	70	80

Analyte	Units	Criteria	FH-17-06_GW012318	FH-17-07_GW012318	FH-17-08_GW012218	FH-17-09_GW012318	FH-EB01	FH-FB01
			1/23/2018	1/23/2018	1/23/2018	1/23/2018	1/22/2018	1/23/2018
Perfluorobutanesulfonic acid (PFBS)	ng/L	NE[a]	13	3	4.3	18	1.0 U	0.97 U
Perfluoroheptanoic acid (PFHpA)	ng/L	NE	9.1	4.1	41	130	1.5 U	1.5 U
Perfluorohexanesulfonic acid (PFHxS)	ng/L	NE	31	16	49	780	1.0 U	0.97 U
Perfluorononanoic acid (PFNA)	ng/L	NE	2.6	0.55 J	45	19	1.5 U	1.5 U
Perfluorooctanesulfonic acid (PFOS)	ng/L	70[b]	42	13	1500	4000	3.0 U	2.9 U
Perfluorooctanoic acid (PFOA)	ng/L	70[b]	30	11	21	160	1.5 U	1.5 U
Total PFOS + PFOA	ng/L	70[b]	72	24	1521	4160	0	0

Notes:

ng/L = nanograms per liter

a = Regional Screening Level exists for tapwater but is not a requirement applicable to this SI

b = USEPA Drinking Water Health Advisories (sum of PFOA and PFOS concentrations)

c = Estimated in parent and "dup" based on poor precision as indicated by high RPD values but not "J" flagged since there are no criteria established in the National Functional Guidelines or the DoD for qualifications based on field duplicates.

NE = Not Established

J = Estimated: the analyte was positively identified but the quantitation is an estimation

U = Undetected at the Limit of Detection

Yellow highlighted values represent cumulative totals for PFOS and PFOA that equal or exceed criteria

Table 5
AOC 76
Soil Analytical Results
Former Fort Devens Army Installation
Devens, Masschusetts

Analyte	Units	Criteria	FH-17-01_SO0005	FH-17-02_SO0005	FH-17-03_SO0005	FH-DUP02	FH-17-04_SO0005
			1/22/2018	1/22/2018	1/22/2018	1/22/2018	1/22/2018
Perfluorobutanesulfonic acid (PFBS)	µg/kg	NE	0.12 U	0.11 U	0.11 U	0.11 U	0.10 U
Perfluoroheptanoic acid (PFHpA)	µg/kg	NE	1.2	0.85	0.28 J	0.28 J	0.064 J
Perfluorohexanesulfonic acid (PFHxS)	µg/kg	NE	2.5	0.85	0.055 J	0.064 J	0.037 J
Perfluorononanoic acid (PFNA)	µg/kg	NE	10	2.0	0.058 J	0.077 J	0.17 J
Perfluorooctanesulfonic acid (PFOS)	µg/kg	NE	30	18	0.23 J	0.29 J	0.71 J
Perfluorooctanoic acid (PFOA)	µg/kg	NE	5.3	0.92	0.24 J	0.22 J	0.16 J
Total PFOS + PFOA	µg/kg	NE	35.3	18.92	0.47	0.51	0.87

Analyte	Units	Criteria	FH-17-05_SO0005	FH-17-06_SO0005	FH-17-07_SO0005	FH-17-08_SO0005	FH-17-09_SO0005
			1/22/2018	1/23/2018	1/23/2018	1/23/2018	1/23/2018
Perfluorobutanesulfonic acid (PFBS)	µg/kg	NE	0.11 U	0.11 U	0.11 U	0.11 U	0.12 U
Perfluoroheptanoic acid (PFHpA)	µg/kg	NE	0.32 J	0.059 J	0.11 U	0.12 J	0.12 U
Perfluorohexanesulfonic acid (PFHxS)	µg/kg	NE	1.5	0.12 J	0.11 U	0.10 J	0.12 U
Perfluorononanoic acid (PFNA)	µg/kg	NE	1.5	0.059 J	0.043 J	0.35 J	0.12 U
Perfluorooctanesulfonic acid (PFOS)	µg/kg	NE	200	1.2	0.68 J	1.5	0.58 U
Perfluorooctanoic acid (PFOA)	µg/kg	NE	1.2	0.24 J	0.22 U	0.21 J	0.23 U
Total PFOS + PFOA	µg/kg	NE	201.2	1.44	0.68	1.71	0

Notes:

µg/kg = micrograms per kilogram

NE = Not Established

J = Estimated: the analyte was positively identified but the quantitation is an estimation

U = Undetected at the Limit of Detection

Appendix A

Amendment to Site Inspection Work Plan

PROPOSED AMENDMENT NO. 1 (5/19/17)

FINAL EXPEDITED SITE INSPECTION WORK PLAN (5/4/17)
FOR PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

FORMER FORT DEVENS ARMY INSTALLATION DEVENS, MA

BERS-Weston Services, JVA, LLC is proposing a variance from the Final Expedited Site Inspection Work Plan for Per- and Polyfluoralkyl Substances (PFAS) dated May 2017 (the Work Plan) at Former Fort Devens Army Installation – Base Realignment and Closure (BRAC) Legacy Sites, Devens, MA, Contract W9128F-14-D-0009. Specifically, the Work Plan indicates that temporary wells installed by direct push technology will be sampled using USEPA Region 1 Low Stress Purging and Sampling Procedures (USEPA, 2010). The Work plan further indicates that groundwater samples will be collected from temporary wells using a peristaltic pump (or bladder pump if dictated by depth to groundwater). We propose, however, that representative groundwater samples can be collected using an alternate procedure that will be more efficient and technically practical for the temporary wells.

As noted in EPA guidance Groundwater Sampling and Monitoring with Direct Push Technologies (August 2005), "Because they are sampled almost immediately, point-in-time DPT tools should not develop a stagnant water column that will affect most analytical results." The temporary wells that will be installed during Work Plan implementation will be advanced into the top of the water table and sampled almost immediately upon reaching the appropriate depth. An extended purge is not warranted as groundwater will enter the screen from the aquifer immediately upon exposing the screen.

Extended purging in an effort to reduce sample turbidity is also not warranted for this scope of work. Temporary wells are installed without filter pack and significant turbidity reductions may not be realized even if a low-flow purge is implemented. Additionally, potential analytical bias due to turbidity can be estimated by the log K_{ow} of an analyte (Groundwater Sampling and Monitoring with Direct Push Technologies [August 2005]). Although log K_{ow} of PFOS and PFOA cannot be directly measured, they are estimated to be 2.57 and 2.06, respectively, and do not "easily absorb to sediments or aquifer materials" (EPA Drinking Water Health Advisories for PFOS and PFOA, May 2016). Sample turbidity, therefore, is not expected to adversely affect analytical results and low-flow purging in an effort to reduce turbidity to minimal levels is not warranted.

The USEPA Region 1 Low Stress Purging and Sampling Procedures (Attachment C.3 of the Work Plan) also indicates that the procedure is applicable to wells with inside diameters of 1.5 inches or greater and appears to be most appropriate for permanent well installations. The temporary wells that will be installed during Work Plan implementation are expected to have an inner screen diameter of approximately 5/8

inch and are therefore not within the scope and application of the USEPA Region 1 Low Stress Purging and Sampling Procedures.

Based on the information presented above, we propose that low-flow purging in accordance with USEPA Region 1 Low Stress Purging and Sampling Procedures will not be implemented at temporary wells for groundwater sampling. USEPA Region 1 Low Stress Purging and Sampling Procedures will, however, be followed at existing permanent wells that will be sampled in accordance with the Work Plan.

Regarding pumping method to collected groundwater samples from the temporary wells, the bladder pump method indicated in the Work Plan is technically impractical as most commercially-available bladder pumps have a diameter that is too large for the tooling typically used to install temporary wells using Geoprobe/direct push technology. The peristaltic pump indicated in the work plan will be ineffective at numerous temporary well locations where depth to water is expected to exceed approximately 25 feet below ground surface. Alternatively, we recommend a check-valve lift system to collect groundwater samples from the temporary wells. The check valve method is expected to perform well with the depth to water conditions we expect to encounter, is readily available, and has a diameter that is compatible with the temporary well tooling that will be used. This type of sample collection is also consistent with SOPs prepared by Geoprobe for collecting samples from temporary wells. Peristatic and bladder pumps will be used to sample existing permanent wells in accordance with the Work Plan.

Work plan text that would be need to be amended as a result of the requested variance is summarized in the table below.

Section 2.1 – Groundwater Sample Collection	
Current	**Proposed Amendment**
Regarding temporary wells: Attach tubing to peristaltic pump at the ground surface and purge groundwater at a minimum rate of 100 milliliters per minute (mL/min) using USEPA Region 1 Low Stress Purging and Sampling Procedures (USEPA, 2010).	Groundwater samples will be collected using a check valve assembly from temporary wells.
If the groundwater sample cannot be collected using a peristaltic pump (e.g., due to the depth of the sampling interval), then a bladder pump will be used instead.	Remove from text.
Groundwater samples will be collected using low-flow procedures for both existing monitoring wells and temporary well points using USEPA Region 1 Low Stress Purging and Sampling Procedure (USEPA, 2010).	Groundwater samples will be collected using low-flow procedures for existing monitoring wells using USEPA Region 1 Low Stress Purging and Sampling Procedure (USEPA, 2010).

REFERENCES

Geoprobe Systems ®, 2006. *Geoprobe ® Screen Point 16 Groundwater Sampler, Standard Operating Procedure.* Technical Bulletin No. MK3142. November.

Geoprobe Systems ®, 2010. *Geoprobe ® Screen Point 22 Groundwater Sampler, Standard Operating Procedure.* Technical Bulletin No. MK3173. April.

USEPA, 2005. *Groundwater Sampling and Monitoring with Direct Push Technologies.* EPA 540/R-04/005. March.

USEPA, 2010. *Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells*. EQASOP-GW 001. January.

USEPA, 2016. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).* EPA 822-R-16-005. May.

USEPA, 2016. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS).* EPA 822-R-16-004. May.

Appendix B

Technical Memorandum – Additional PFAS Sampling of Long-Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL) to Support Development of the PFAS Remedial Investigation (RI)

TECHNICAL MEMORANDUM

Date:	June 20, 2018
To:	Carol Keating (USEPA)
cc:	Robert Simeone (Army)
	Penelope Reddy, Dan Groher, Mike Kulbersh, Yixian Zhang (USACE)
	Laurie O'Connor (USEPA)
	David Chaffin (MassDEP)
	Julie Corenzwit, Laurie Nehring, Richard Doherty (PACE)
From:	James Ropp, PE (KGS)
Subject:	Technical Memorandum – Additional PFAS Sampling of Long-Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50, and Shepley's Hill Landfill (SHL) to Support Development of the PFAS Remedial Investigation (RI) at the Former Fort Devens Army Installation, Devens, MA W912WJ-18-C-0011

1.0 INTRODUCTION

On behalf of the U.S. Army Corps of Engineers (USACE) New England District (NED), KOMAN Government Solutions, LLC (KGS), has prepared this Technical Memorandum to document the field activities and results conducted in accordance with the *Revised Work Plan for Additional Per- and Polyfluorinated Substances (PFAS) Sampling to Support the Development of the Remedial Investigation (RI) Work Plan* (KGS, 2017a). The work plan specified the sampling of PFAS from existing groundwater monitoring wells at Area of Concern (AOC) 57 Area 2 and Area 3, AOC 43G, AOC 43J, AOCs 32 and 43A, AOC 50, and Shepley's Hill Landfill (SHL).

These activities were conducted in accordance with the U.S. Environmental Protection Agency (USEPA) letter dated November 2, 2017 for PFAS Sampling of Existing Long-Term Monitoring Well, Fort Devens Superfund Site, Devens, Massachusetts. **Section 1.0** provides an introduction and overview, **Section 2.0** provides a summary of field activities, **Section 3.0** provides PFAS sample results, and **Section 4.0** lists the references used to prepare this Technical Memorandum.

1.1 Objectives

This Technical Memorandum presents the results of the additional PFAS sampling event that was completed from December 2017 to January 2018 in support of the RI Work Plan being prepared for the Former Fort Devens.

1.2 Area of Concern (AOC) Site Background

SHL, AOC 32, and AOC 50 were identified as potential sources of PFAS in the *Base-Wide Preliminary Assessment (PA) for Evaluation of PFAS* (KGS, 2017b) and were previously sampled as part of a *Site Inspection (SI) for PFAS* (BERS-Weston, 2018). The other AOCs included herein were not identified as potential PFAS source areas in the PA/SI; however, in accordance with USEPA's letter dated November 2, 2017, each of these AOCs were sampled during December 2017 and January 2018 in order to provide more information about the overall extent of PFAS in groundwater at the Former Fort Devens and to help assess potential impacts to the surrounding community's drinking water supply and to help scope and evaluate potential site risks for the Devens PFAS RI. Descriptions of the AOCs included in this sampling event are provided below.

AOC 57

Area 2 and Area 3 are part of AOC 57, located between Barnum Road and Cold Spring Brook on the northeast side of what was formerly the Main Post of Devens in the town of Harvard, Massachusetts. Area 3 is approximately 100 feet to the east of Area 2 at AOC 57. AOC 57 was identified due to a fuel oil release that had occurred in 1977. AOC 57 is located within a MassDEP Zone II wellhead protection area. In addition, portions of AOC 57 are located within a medium-yield Non-Potential Drinking Water Source Area (**Figures 1 and 2**). The portion of the former Devens site that includes AOC 57 was used primarily as a storage and maintenance area for military vehicles. AOC 57 consists of three sub-areas (Area 1, Area 2, and Area 3) that are located south to southeast of Building 3713 and former Buildings 3756, 3757, and 3758. These sub-areas received storm water runoff and waste from vehicle maintenance at former vehicle storage yards related to Building 3713 (known fuel oil spill) and former Buildings 3757 and 3758. The Army completed removal actions of impacted soil in 1994 and 1999 and then commenced a monitoring program for residual groundwater contamination. No historic source of PFAS was identified at AOC 57 during the PA; rather, AOC 57 was identified for sampling to provide more information about the overall extent of PFAS at the former Fort Devens and to support the RI.

AOC 43G

AOC 43G is located in the central portion of the former Main Post of Fort Devens. It is located at the southwestern corner of Feinburg Road and Queenstown Street. AOC 43G consists of the former Army Air Force Exchange Service (AAFES) gas station (Areas 2 and 3) and historical Gas Station G (Area 1) and has been the subject of RIs due to petroleum contamination in soil and groundwater resulting from the past operations. The former gas station was used as a motor pool fueling station during the World War II era. The Army has removed the identified underground storage tanks (USTs) at AOC 43G and has been conducting a long-term groundwater monitoring program for the intrinsic bioremediation of the residual petroleum contamination. No historic

source of PFAS was identified at AOC 43G during the PA; rather, AOC 43G was identified for sampling to provide more information about the overall extent of PFAS at the former Fort Devens and to support the RI.

AOC 43J

The Army historically used AOC 43J as a former gas station/motor pool, and subsequently as a vehicle storage yard and maintenance facility for the former Fort Devens. AOC 43J is located in the northwest quadrant of the Queenstown Street and Patton Road intersection. AOC 43J was first identified as a possible source of contamination in 1988 during the initiation of the Master Environmental Plan at Fort Devens. The Army identified several leaking USTs which held gasoline, waste oil, and diesel. No historic source of PFAS was identified at AOC 43J during the PA; rather, AOC 43J was identified for sampling to provide more information about the overall extent of PFAS at the former Fort Devens and to support the RI.

AOC 32 and 43A

AOCs 32 and 43A are located east of Cook Street and north of Independence Drive and partially borders the southern boundary of SHL. A portion of AOC 32 intersects a Zone II aquifer protection area. AOC 32 (Defense Reutilization and Marketing Office [DRMO] Yard) was used by the Army as an active materials storage facility from approximately 1964 to 1995, where various materials were processed and stored including a former waste oil UST. The Army conducted in-situ oxidation of contaminants at AOC 32 in 2009 and is currently conducting a monitored natural attenuation (MNA) program for addressing the residual groundwater contamination. AOC 32 was identified for further investigation of PFAS in the PA/SI due to the past storage of various materials at the DRMO. The Devens Fire Department currently stores some of its fire fighting foam stock in a warehouse (9 Cook St.) located near the DRMO.

AOC 43A (Petroleum, Oil, and Lubricants [POL] Storage Area) served as the central distribution point for all gasoline stations at Fort Devens during the 1940s and 1950s and was subsequently used to store fuels for various purposes. The distribution facility consisted of a main gasoline station, a pump house, four 12,000-gallon USTs, one 10,000-gallon UST, two 12,000-gallon above-ground storage tanks (AST), and two 8,000-gallon ASTs. Gasoline was delivered by rail car and transferred to the tanks. The POL Storage Area consisted of a fenced lot within a developed industrial area of buildings, roads, and grass lots. The Army is currently conducting a monitored natural attenuation (MNA) program for addressing the residual groundwater contamination.

Shepley's Hill Landfill

SHL encompasses approximately 84 acres in the northeast corner of the Main Post of the former Fort Devens. The landfill is bordered to the east by Plow Shop Pond and land formerly containing a railroad roundhouse, to the west by Shepley's Hill, to the south by recent commercial development, and to the north by wooded and residential areas. Nonacoicus Brook, which drains Plow Shop Pond to the Nashua River, is located north of the landfill in what is called the North Impact Area (NIA).

The Army reportedly operated SHL by the early 1940s; however, evidence from test pits within the landfill suggests earlier usage, possibly as early as the mid-nineteenth century. The landfill contains a variety of waste materials including, but not limited to, demolition debris, asbestos, sanitary wastes, glass, and incinerator ash. The maximum depth of the refuse occurs in the central portion of the landfill and is estimated to extend about 40 feet below ground surface (bgs). The volume of waste in the landfill has been estimated at over 1.5 million cubic yards (cy), of which approximately 160,000 cy (12%) is below the water table. The landfill was closed in five phases between 1987 and 1993 in accordance with state regulations and was capped with a 30 to 40-mil polyvinyl chloride (PVC) membrane and overlying soil cover. In 2006, the Army commenced operation of a groundwater extraction and treatment system to address groundwater contamination emanating from the landfill toward the NIA, and in 2012, the Army installed an impermeable, vertical barrier wall to protect Red Cove at Plow Shop Pond. In addition to the groundwater extraction system, land use controls, and landfill maintenance program, the Army is conducting a long-term groundwater monitoring program at SHL. SHL was identified for further investigation of PFAS in the PA/SI due to the past disposal of various wastes into the landfill.

AOC 50

The AOC 50 site is located on the northeastern boundary of the former Moore Army Airfield (MAAF), within the former North Post of the former Fort Devens Army Installation.

The airfield is closed to aircraft traffic and is currently used by the Massachusetts State Police for vehicle training purposes and vehicle storage. The Devens Army Installation retained approximately nine acres of the former airfield for vehicle storage and maintenance and approximately four acres in and around the AOC 50 Source Area for remediation activities.

The primary area of groundwater contamination at AOC 50 is referred to as the Southwest Plume, which extends from the Source Area approximately 3,000 feet (ft) downgradient towards the Nashua River. Sources of groundwater contamination at AOC 50 include two World War II fueling systems, a drywell formerly connected to the parachute shakeout tower, and the tetrachloroethene (PCE) Former Drum Storage Area (FDSA); these sources are collectively referred to as the AOC 50 Source Area**.** The AOC 50 Source Area is comprised of less than two acres and surrounds Building 3803 (the former parachute shop), Building 3840 (the former parachute shakeout tower), Building 3824 (a gazebo), and Building 3801 (the former 10th Special Forces airplane parachute simulation building). The Army has conducted several phases of treatment for the VOC plume including soil vapor extraction (SVE), enhanced reductive dechlorination (ERD), and in-well stripping (IWS) systems. Currently, the Army is conducting continued ERD treatment of the VOC plume and a long-term groundwater monitoring program. AOC 50 was identified for further investigation of PFAS in the PA/SI due to the past storage and use (release) of firefighting foams at the airfield.

1.3 Data Collection

The USEPA's November 2, 2017 letter identified 30 sampling locations to be sampled, including 29 monitoring wells and 1 surface water location, from seven AOCs. Sample locations are shown

on **Figures 1** through **8** and are summarized in **Table 1**. Samples were analyzed for 14 PFAS compounds using modified Method 537. The 14 PFAS Target Compound List includes:

- N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)
- N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)
- Perfluorobutanesulfonic acid (PFBS)
- Perfluorodecanoic acid (PFDA)
- Perfluorododecanoic acid (PFDoA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluorohexanoic acid (PFHxA)
- Perfluorononanoic acid (PFNA)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluorooctanoic acid (PFOA)
- Perfluorotetradecanoic acid (PFTeA)
- Perfluorotridecanoic Acid (PFTriA)
- Perfluoroundecanoic acid (PFUnA)

2.0 FIELD ACTIVITIES

2.1 Groundwater Sample Collection

Sample acquisition and analysis was conducted and consistent with the USEPA November 2017 letter, PFAS sampling work plan (KGS, 2017a), the site-specific Long-Term Monitoring and Maintenance Plan (LTMMP) for Fort Devens, and USEPA Region 1 Guidance Document entitled, "Low Stress (low-flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells", (USEPA, Region 1, 2017). Flow rates of 0.1 to 0.5 liters per minute (L/min) were used; however, this was dependent on site-specific hydrogeology. At the seven AOCs, peristaltic or submersible bladder pumps with disposable high-density polyethylene (HDPE) tubing were used to collect samples at the well screen interval below the water table at each specified well location. Groundwater low flow field forms are provided in **Attachment 1**. PFAS groundwater chemistry results are provided in the laboratory reports included in **Attachment 2**. Data validation reports are presented in **Attachment 3**. The past soil boring logs associated with the groundwater monitoring wells sampled herein are presented in **Attachment 4**.

2.2 Surface Water Sample Collection

One surface water sample was collected 500 feet southeast and downgradient of AOC 57 Area 3 in Cold Spring Brook. The grab sample was collected directly into laboratory-provided sample containers and submitted for chemical analysis of 14 PFAS compounds using modified Method 537. PFAS groundwater chemistry results for sample SW-1 are provided in the laboratory reports included in **Attachment 2**. Data validation reports for sample SW-1 are presented in **Attachment 3**.

2.3 Sample Collection Procedure

PFAS Cross-Contamination Prevention

Groundwater and surface water sampling procedures followed the protocols outlined in the "Field Sampling Protocols to Avoid Cross-Contamination at PFAS Sites" (see Attachment C of the *Final Expedited Site Inspection Work Plan for Per- and Polyfluoroalkyl Substances (PFAS),* KGS, 2017c).

Field measurements including dissolved oxygen, temperature, pH, oxidation-reduction potential (ORP), and specific conductance were collected prior to groundwater sample acquisition. No Teflon®-containing materials, which themselves contain fluorinated compounds, were permitted at site locations during sampling activities. Field logs were documented on loose paper on aluminum clipboards using a pen during sampling activities. Groundwater samples were collected by filling sample containers directly from tubing after detachment of multi-parameter field meter. In accordance with the QAPP Addendum in the *Work Plan* (KGS, 2017a), groundwater samples were collected in polypropylene or HDPE bottles provided by the laboratory and fitted with an unlined (no Teflon®), polypropylene HDPE screw cap and stored in coolers below 4°C. The groundwater samples were transported to a certified laboratory for analysis.

Field Clothing and Personal Protective Equipment

Field clothing made of synthetic and natural fibers (preferably cotton) were donned in compliance with PFAS sampling protocols. Field clothing was laundered without additive fabric softener. Field gear was made of cotton construction and well-laundered (six or more washes).

Safety footwear consisted of steel-toed boots made with polyurethane and polyvinyl chloride.

Disposable nitrile gloves were worn at all times during sample collection. A new pair of nitrile gloves were donned prior to contact with sample bottles or water containers; handling of any quality assurance/quality control (QA/QC) samples including field blanks and/or equipment blanks; and, after the handling of any sampling equipment, contact with non-decontaminated surfaces, or when judged necessary by field personnel.

2.4 Equipment Decontamination

Sampling and gauging equipment was decontaminated at each site before use, between sampling locations, and after its last use at the site. Procedures for decontaminating sampling equipment were in accordance with guidance in USEPA Region 1, 2017, *Low Stress (low-flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells.*

Disposable HDPE tubing was used with pumps to sample monitoring wells and reduce potential leaching associated with low-density polyethylene (LDPE) tubing. Water quality equipment was decontaminated prior to initial and after each subsequent use using a deionized water rinse. Sampling equipment was decontaminated using Alconox and deionized water.

Equipment or supplies that could not be effectively decontaminated were disposed of after sampling. Groundwater gauging equipment and non-dedicated sampling equipment and materials were decontaminated using the following procedure:

- Washed all equipment surfaces that contact the potentially contaminated media with Alconox using a brush, as needed, to remove particulate matter and surface films;
- Rinsed with potable tap water;
- Rinsed with non-PFAS, laboratory-supplied deionized water;
- Covered with aluminum foil (if not to be used immediately).

2.5 Quality Assurance/Quality Control (QA/QC) Samples

Groundwater field samples were collected along with specific QC sample collection as summarized below:

- Field duplicate samples were collected for every ten samples collected and summarized in **Tables 2** through **7**.
- Laboratory duplicate samples (selected by the laboratory) were prepared and analyzed with the field samples.
- Matrix spike/matrix spike duplicate (MS/MSD) samples were collected for every twenty samples collected.
- Field blank samples were collected for every ten samples collected using laboratory-grade, PFAS-free, deionized (DI) water.
- One equipment blank sample was collected from cleaned and decontaminated sampling equipment by pouring PFAS-free DI water over the sample equipment into a preserved sample bottle.

The laboratory data received a USEPA Level IIB review. No data were rejected during validation, and all analytical results are considered usable and acceptable as reported. Data validation reports are provided in **Attachment 3**.

2.6 Instrument Calibration

Field instrumentation used to monitor groundwater quality was calibrated daily during the sampling event. The water quality meter used to measure temperature, dissolved oxygen, specific conductivity, pH, and ORP during well groundwater purging was calibrated twice daily, in the morning prior to well purging activity and in the afternoon after sampling. The turbidity meter used to measure turbidity during well groundwater purging was calibrated twice daily. Instrument calibration logs for the water quality meter and turbidity meter are provided in **Attachment 1**.

2.7 Investigative-Derived Waste (IDW)

No IDW was generated from the sampling activities. Purge water generated during groundwater sampling activities was returned to the ground near the point of collection, consistent with USEPA and MassDEP protocols.

3.0 PFAS SAMPLE RESULTS

Groundwater samples collected from the 29 site-wide wells at Devens and one surface water location were analyzed for 14 PFAS compounds using Modified Method 537. Laboratory data results are presented in **Attachment 2** and are summarized in **Tables 2** through **7.**

Results were compared to USEPA's Drinking Water 2016 Lifetime Health Advisory (LHA) for combined PFOS and PFOA (PFOS+PFOA) of 70 nanograms per liter (ng/L), or 70 parts per trillion. Eleven of the 29 well locations (38%) had concentrations of combined PFOS and PFOA (PFOS+PFOA) greater than the EPA LHA. The surface water sample collected from Cold Spring Brook did not exceed the EPA LHA. MassDEP is currently considering adopting recommendations to address five PFAS compounds (70 ng/L for PFOS, PFOA, PFHpA, PFHxS, and PFNA, either individually or in combination). **Tables 2** through **7** compare data to both the EPA LHA and the MassDEP proposed criteria.

Of the 14 PFAS compounds analyzed, six of the compounds were below detection limits in each of the samples (NEtFOSAA, NMeFOSAA, PFDoA, PFTeA, PFTriA, and PFUnA).

3.1 AOC 57 – Area 2

Four wells were sampled for PFAS at AOC 57 Area 2 on January 9, 2018 (**Figure 1**). The well identification numbers included 57M-03-01X located in the northwest portion of Area 2; 57M-03-02X located in the west portion of Area 2; 57M-03-04X located in the southeast portion of Area 2 and 57M-03-06X located in the east portion of Area 2.

Eight of the 14 PFAS compounds analyzed were detected in the four wells sampled from Area 2. Three of the 4 sample locations had detections exceeding the EPA LHA for combined PFOS+PFOA (**Table 2**). Monitoring wells 57M-03-01X, 57M-03-04X, and 57M-03-06X had combined PFOS+PFOA concentrations of 125.2 ng/L, 91.7 ng/L, and 80.1 ng/L, respectively. The PFOS+PFOA concentration did not exceed the EPA LHA at 57M-03-02X.

3.2 AOC 57 – Area 3

Two wells and one surface water location were sampled for PFAS at AOC 57 Area 3 on January 10, 2018 (**Figure 2**). The well identification numbers included 57M-96-11X, located in the southern portion of Area 3 closest to Cold Spring Brook, and 57M-95-03X located in the northern portion of Area 3. The surface water sample was identified as Area 3-SW-1 and was located along the northern side of Cold Spring Brook.

Six of the 14 PFAS compounds analyzed were detected in the two wells and one surface water sampled from Area 3. Monitoring well 57M-95-03X had a combined PFOS+PFOA concentration

of 82 ng/L **(Table 2).** The combined PFOS+PFOA concentration did not exceed the EPA LHA at 57M-96-11X or in the Area 3 SW-1 sample.

3.3 AOC 43G

Two wells were sampled for PFAS at AOC 43G on January 2, 2018. (**Figure 3**). The well identification numbers included AAFES-7 and XGM-94-06X, both located topographically downgradient (east) of the former UST areas at AOC 43.

Seven of the 14 PFAS compounds analyzed were detected in the two wells sampled from AOC 43G. Both sample locations had detections exceeding the EPA LHA for combined PFOS+PFOA (**Table 3**). Monitoring well XGM-94-06X had a combined PFOS+PFOA concentration of 123 ng/L and monitoring well AAFES-7 had a combined PFOS+PFOA concentration of 116 ng/L.

3.4 AOC 43J

Four wells were sampled for PFAS at AOC 43J in December and January 2018 (**Figure 4**). The well identification numbers included XJM-97-13X, XJM-97-11X, XJM-94-07X and HA-3B all located in the south half of AOC 43J.

Seven of the 14 PFAS compounds analyzed were detected in the four wells sampled from AOC 43J; however, none of the locations had detections exceeding the EPA LHA (**Table 4**).

3.5 AOC 32 and 43A

Three wells were sampled for PFAS at AOC 32 and 43A on December 20, 2017 and January 2, 2018. (**Figure 5**). The well identification numbers included 32M-01-14XOB, 32M-01-14BR and 32M-01-17XBR. Two of the three wells are screened in bedrock.

Eight of the 14 PFAS compounds analyzed were detected in the three wells sampled from AOC 32/43A; however, none of the locations had detections exceeding the EPA LHA for PFOA+PFOS (**Table 5**).

3.6 Shepley's Hill Landfill

Six wells were sampled for PFAS at Shepley's Hill Landfill and the NIA between December 18, 2017 and January 8, 2018. (**Figure 6**). The well identification numbers included three wells located in the NIA (SHM-10-05A, SHM-13-03, and SHM-13-04); SHP-01-36X located near Plow Shop Pond; N5-P1 located at the landfill; and SHM-93-24A located upgradient of the landfill.

Seven of the 14 PFAS compounds analyzed were detected in the six wells sampled from SHL and the NIA; however, none of the locations had detections exceeding the EPA LHA (**Table 6**).

3.7 AOC 50

Eight wells were sampled for PFAS within the AOC 50 plume and source areas between December 20, 2017 and January 8, 2018. (**Figures 7** and **8**, respectively). The well identification numbers included G6M-96-22A, G6M-96-22B, and G6M-95-20X located in or upgradient of the AOC 50 Source Area and XSA-12-98X, G6M-04-14X, G6M-04-07X, G6M-01-01X, and G6M-02-06X located in the AOC 50 plume area.

Eight of the 14 PFAS compounds analyzed were detected in the eight wells sampled from AOC 50. Four well locations (two upgradient of the AOC 50 Source Area and two in the downgradient end of the plume area) had detections of PFAS exceeding the EPA LHA for combined PFOS+PFOA (**Table 7**). Upgradient of the AOC 50 Source Area, monitoring wells G6M-96-22A and G6M-96-22B had combined PFOS+PFOA concentrations of 181 and 204 ng/L, respectively. At the downgradient end of the AOC 50 plume area, monitoring wells G6M-01-01X and G6M-04-14X combined PFOS+PFOA concentrations of 71 and 75 ng/L, respectively.

4.0 Summary

PFAS concentrations exceeding the EPA LHA of 70 ng/L were detected in groundwater at AOC 57 Area 2 and Area 3, AOC 43G, and AOC 50. PFAS concentrations did not exceed the EPA LHA in the surface water sample from AOC 57 Area 3 or from the groundwater samples from AOC 43J, AOC 32/43A, or SHL. These results will be further evaluated as part of the PFAS RI for the former Fort Devens for the overall delineation of PFAS in groundwater and to inform the selection of future sampling locations.

5.0 REFERENCES

BERS-Weston Services, JVA, LLC. 2018. *Draft Final Site Inspection Report for Per- and Polyfluoroalkyl Substances (PFAS) at Former fort Devens Army Installation, Devens, Massachusetts*. Prepared for the U.S. Army Corps of Engineers – New England District. March 12.

KOMAN Government Solutions (KGS), 2016. *Quality Assurance Project Plan Annual Long-Term Monitoring and Maintenance Program.* Former Fort Devens Army Installation, Devens, MA. Prepared for the U.S. Army Corps of Engineers – New England District. October.

KGS, 2017a. *Revised Work Plan for Additional PFAS Sampling to Support the Development of the Remedial Investigation Work Plan, Former Fort Devens Army Installation, Devens, MA.* Prepared for the U.S. Army Corps of Engineers – New England District. December 29.

KGS, 2017b. *Final Base-Wide Preliminary Assessment for Evaluation for Perfluoroalkyl Substances, Former Fort Devens Army Installation.* Prepared for the U.S. Army Corps of Engineers – New England District. May.

KGS, 2017c. *Final Expedited Site Inspection Work Plan for Per- and Polyfluoroalkyl Substances (PFAS), Former Fort Devens Army Installation, Devens, Massachusetts*, Prepared for the U.S. Army Corps of Engineers – New England District. May.

Sovereign Consulting, Inc. (Sovereign) and HydroGeoLogic, Inc (HGL). 2015. *Long-Term Monitoring and Maintenance Plan for Former Fort Devens Army Installation, Devens MA.* Prepared for the U.S. Army Corps of Engineers – New England District. February.

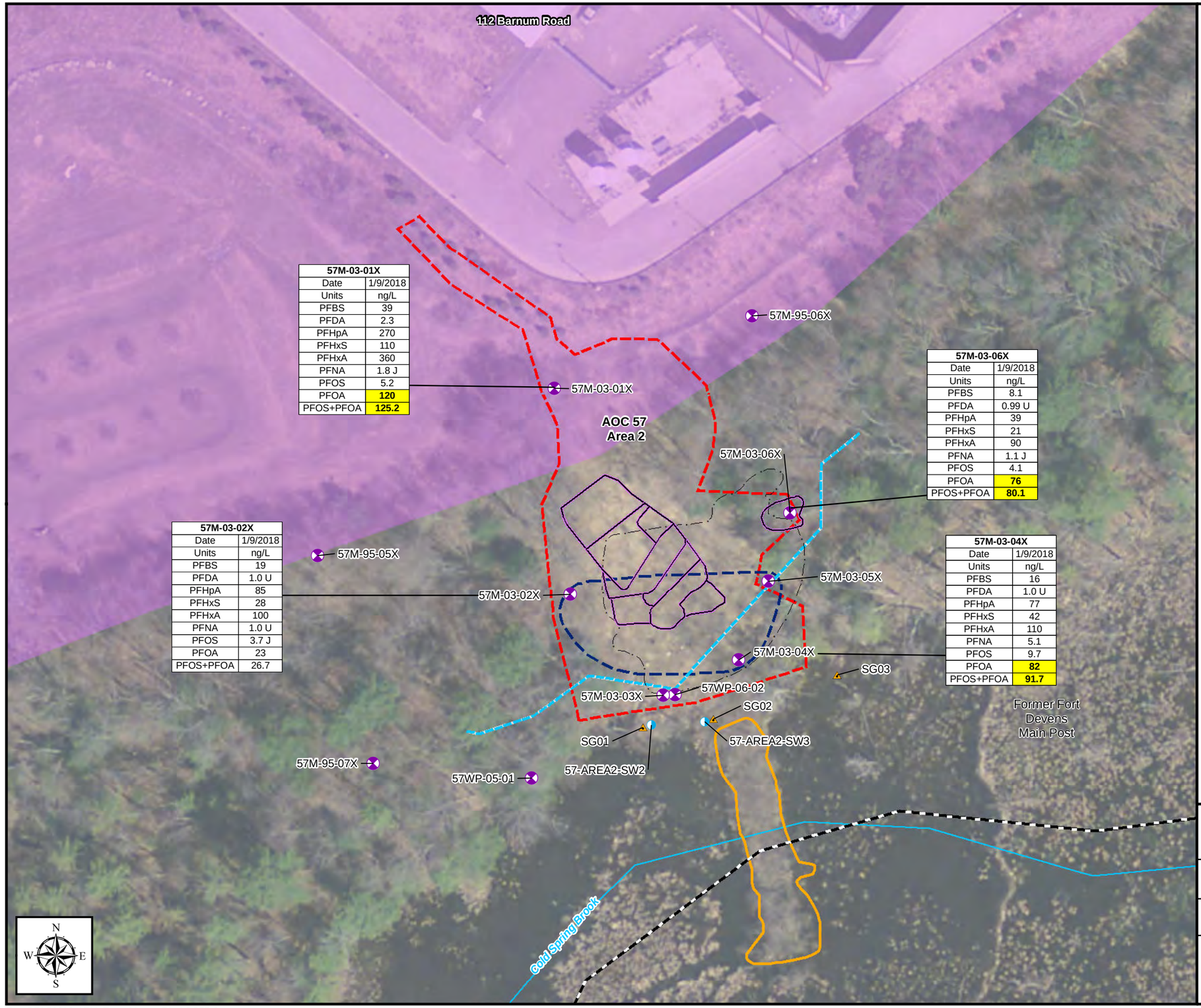
U.S. Environment Protection Agency (USEPA), 2016a. *Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS).* EPA 822-R-16-004. May.

USEPA, 2016b. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA).* EPA 822-R-16-005. May.

USEPA, 2010. *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells, SOP #: GW 0001, Revision 3*. July.

USEPA, 2017. *Standard Operating Procedure Calibration of Field Instruments, EQASOP-FieldCalibrat3, Region 1, Revision 3.* March.

FIGURES



Legend

- LTM Well - Gauge Only
- Staff Gauge
- Surface Water Sample Location
- 57M-03-06X — Well/Piezometer/Sample Location Identification
- Final Excavation Limit (2003)
- Conti Excavation Limit (2002)
- Former Fort Devens Boundary
- Flagged Wetland Limits
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on Fall 2003 to Spring 2008 analytical data) (2008 Annual Report, HGL, 2009)
- Containment Dam
- Area of Contamination (AOC)
- Stream

Non Potential Drinking Water Source Area

- Medium Yield

Note:

Bold/highlighted results exceed EPA HAL of 70 ng/L for separate or combined PFOS + PFOA.

AOC 57 lies within the MassDEP Zone II Wellhead Protection Area.

Aerial Sources: 2013, USGS, MassGIS

PFAS in Groundwater
January 2018
AOC 57 - Area 2

Former Fort Devens Army Installation
Devens, Massachusetts

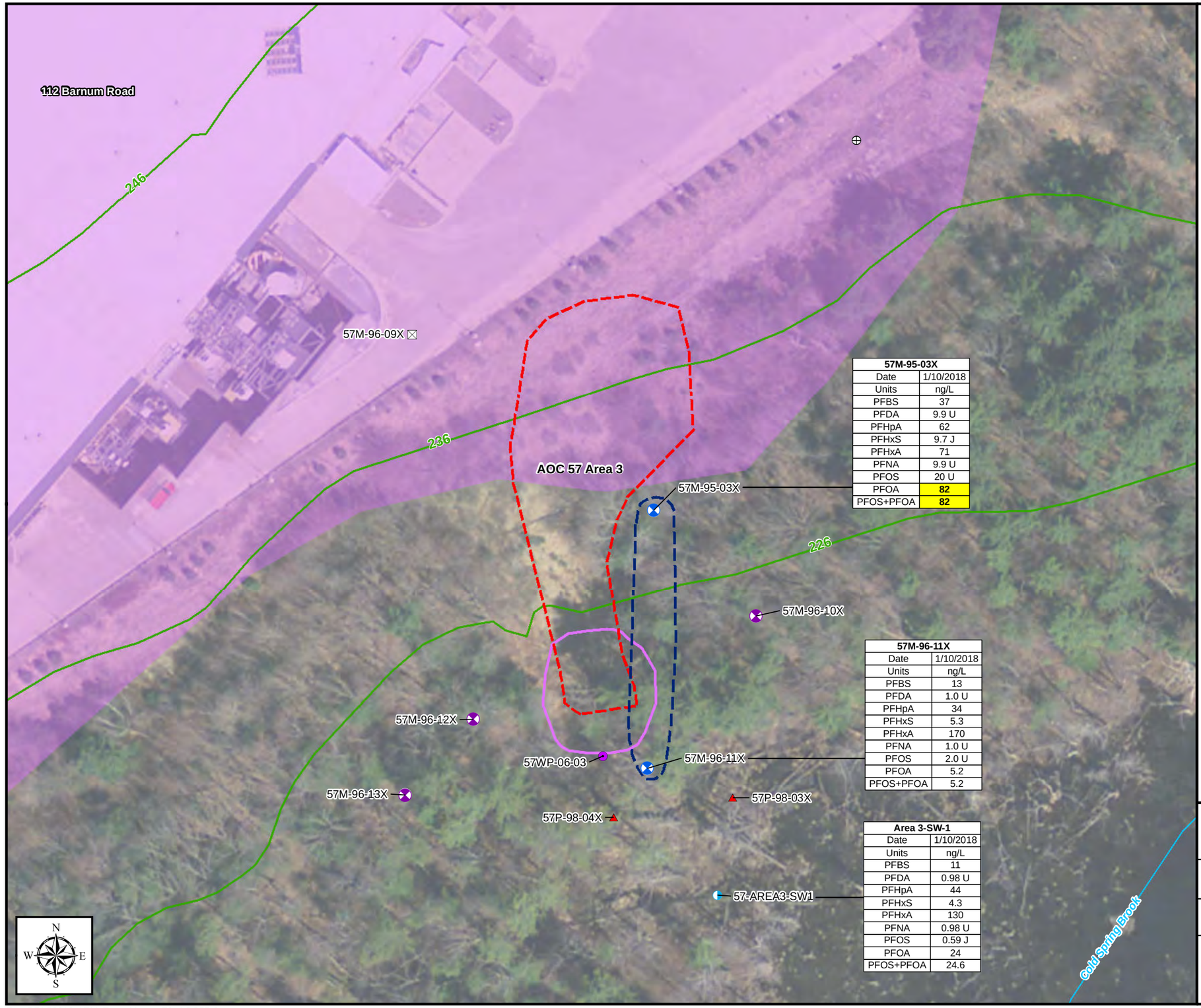
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date: 06/08/2018

Figure 1

File: PFAS2018_LTM_Tech_Memo_F1_AOC57-2.mxd



57M-95-03X	
Date	1/10/2018
Units	ng/L
PFBS	37
PFDA	9.9 U
PFHpA	62
PFHxS	9.7 J
PFHxA	71
PFNA	9.9 U
PFOS	20 U
PFOA	**82**
PFOS+PFOA	**82**

57M-96-11X	
Date	1/10/2018
Units	ng/L
PFBS	13
PFDA	1.0 U
PFHpA	34
PFHxS	5.3
PFHxA	170
PFNA	1.0 U
PFOS	2.0 U
PFOA	5.2
PFOS+PFOA	5.2

Area 3-SW-1	
Date	1/10/2018
Units	ng/L
PFBS	11
PFDA	0.98 U
PFHpA	44
PFHxS	4.3
PFHxA	130
PFNA	0.98 U
PFOS	0.59 J
PFOA	24
PFOS+PFOA	24.6

Legend

- LTM Sample Well
- LTM Well - Gauge Only
- Well Point - Gauge Only
- LTM Piezometer
- Surface Water Sample Location
- Monitoring Well - Abandoned (2012)
- Monitoring Well - Destroyed
- 57M-95-03X — Well/Piezometer/Sample Location Identification
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on Fall 2003 to Spring 2008 analytical data) (2008 Annual Report, HGL, 2009)
- Area of Contamination (AOC)
- Alternate III-2a Estimated Soil Excavation Area
- Stream
- Topographic Contour (Ft AMSL)

Non Potential Drinking Water Source Area

- Medium Yield

Notes:

Bold/highlighted results exceed EPA HAL of 70 ng/L for separate or combined PFOS + PFOA

AOC 57 lies within the MassDEP Zone II Wellhead Protection Area.
Well 57M-96-09X buried by construction.
LTM = Long-term monitoring

Aerial Sources: 2013, USGS, MassGIS

PFAS in Groundwater
January 2018
AOC 57 - Area 3

Former Fort Devens Army Installation
Devens, Massachusetts

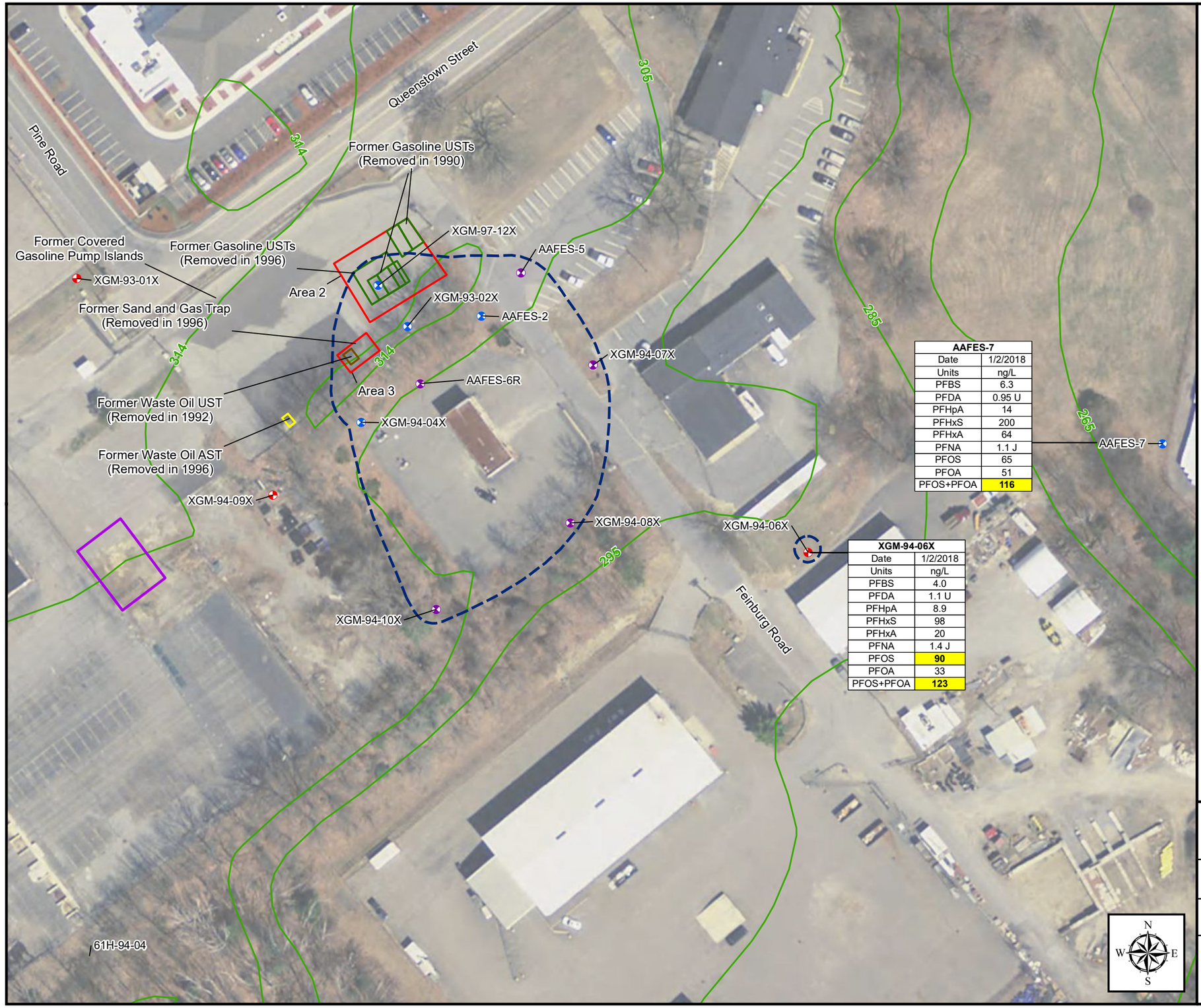
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date: 06/08/2018

Figure 2

File: PFAS2018_LTM_Tech_Memo_F2_AOC57-3.mxd



AAFES-7	
Date	1/2/2018
Units	ng/L
PFBS	6.3
PFDA	0.95 U
PFHpA	14
PFHxS	200
PFHxA	64
PFNA	1.1 J
PFOS	65
PFOA	51
PFOS+PFOA	**116**

XGM-94-06X	
Date	1/2/2018
Units	ng/L
PFBS	4.0
PFDA	1.1 U
PFHpA	8.9
PFHxS	98
PFHxA	20
PFNA	1.4 J
PFOS	**90**
PFOA	33
PFOS+PFOA	**123**

Legend

- LTM Sample Well
- LTM Well - Gauge Only
- Monitoring Well
- XGP-94-04X Well/Piezometer Identification
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on 1999 to 2008 analytical data) (2008 Annual Report, HGL, 2009)
- Area 1
- Former Gasoline UST(s)
- Former Waste Oil UST
- Former Waste Oil AST
- Former UST Area
- Topographic Contour (Ft AMSL)

Notes:

Bold/highlighted results meet or exceed EPA HAL of 70 ng/L for separate or combined PFOS + PFOA.

AST = Above ground storage tank
UST = Underground storage Tank
LTM = Long-term monitoring

Aerial Sources: 2013, USGS, MassGIS

PFAS in Groundwater
January 2018
AOC 43G

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 40 80
Feet

Date: 02/14/2018

Figure 3

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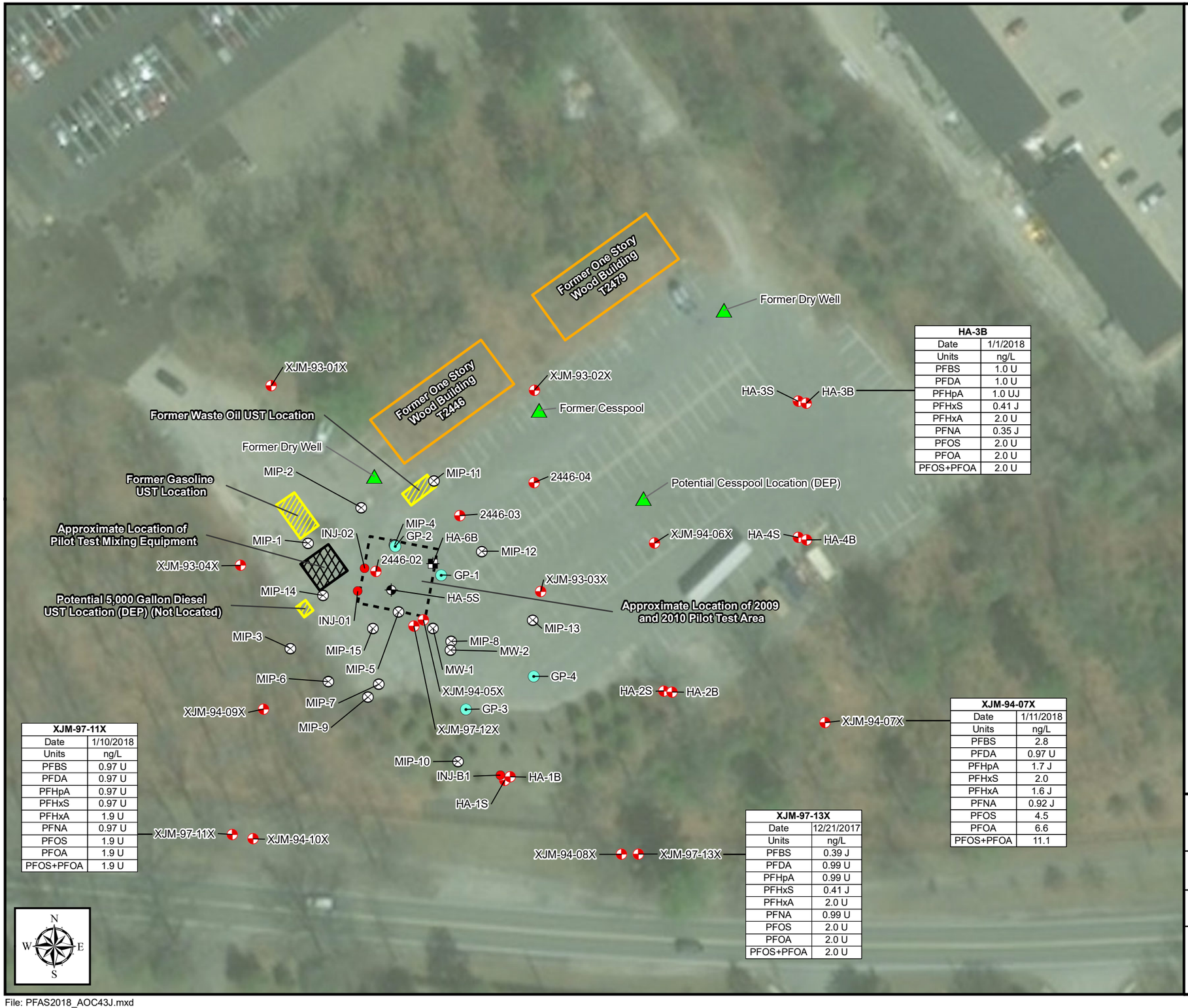


HA-3B	
Date	1/1/2018
Units	ng/L
PFBS	1.0 U
PFDA	1.0 U
PFHpA	1.0 UJ
PFHxS	0.41 J
PFHxA	2.0 U
PFNA	0.35 J
PFOS	2.0 U
PFOA	2.0 U
PFOS+PFOA	2.0 U

XJM-97-11X	
Date	1/10/2018
Units	ng/L
PFBS	0.97 U
PFDA	0.97 U
PFHpA	0.97 U
PFHxS	0.97 U
PFHxA	1.9 U
PFNA	0.97 U
PFOS	1.9 U
PFOA	1.9 U
PFOS+PFOA	1.9 U

XJM-97-13X	
Date	12/21/2017
Units	ng/L
PFBS	0.39 J
PFDA	0.99 U
PFHpA	0.99 U
PFHxS	0.41 J
PFHxA	2.0 U
PFNA	0.99 U
PFOS	2.0 U
PFOA	2.0 U
PFOS+PFOA	2.0 U

XJM-94-07X	
Date	1/11/2018
Units	ng/L
PFBS	2.8
PFDA	0.97 U
PFHpA	1.7 J
PFHxS	2.0
PFHxA	1.6 J
PFNA	0.92 J
PFOS	4.5
PFOA	6.6
PFOS+PFOA	11.1

Legend

- Direct-Push Boring
- Membrane Interface Probe
- Monitoring Well
- Bedrock Monitoring Well
- Overburden Monitoring Well/Piezometer
- Injection Well
- Approximate Location of Potential Former Source Area Investigated
- Approximate Location of Former UST
- Approximate Location of 2009 and 2010 Pilot Test Area
- Approximate Location of Pilot Test Mixing Equipment
- Former Building
- XJM-94-06X Well Location Identification

References:
HGL. LTMMP 2010, Haley Aldrich Inc. 2015

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PFAS in Groundwater
December 2017 & January 2018
AOC 43J

Former Fort Devens Army Installation
Devens, Massachusetts

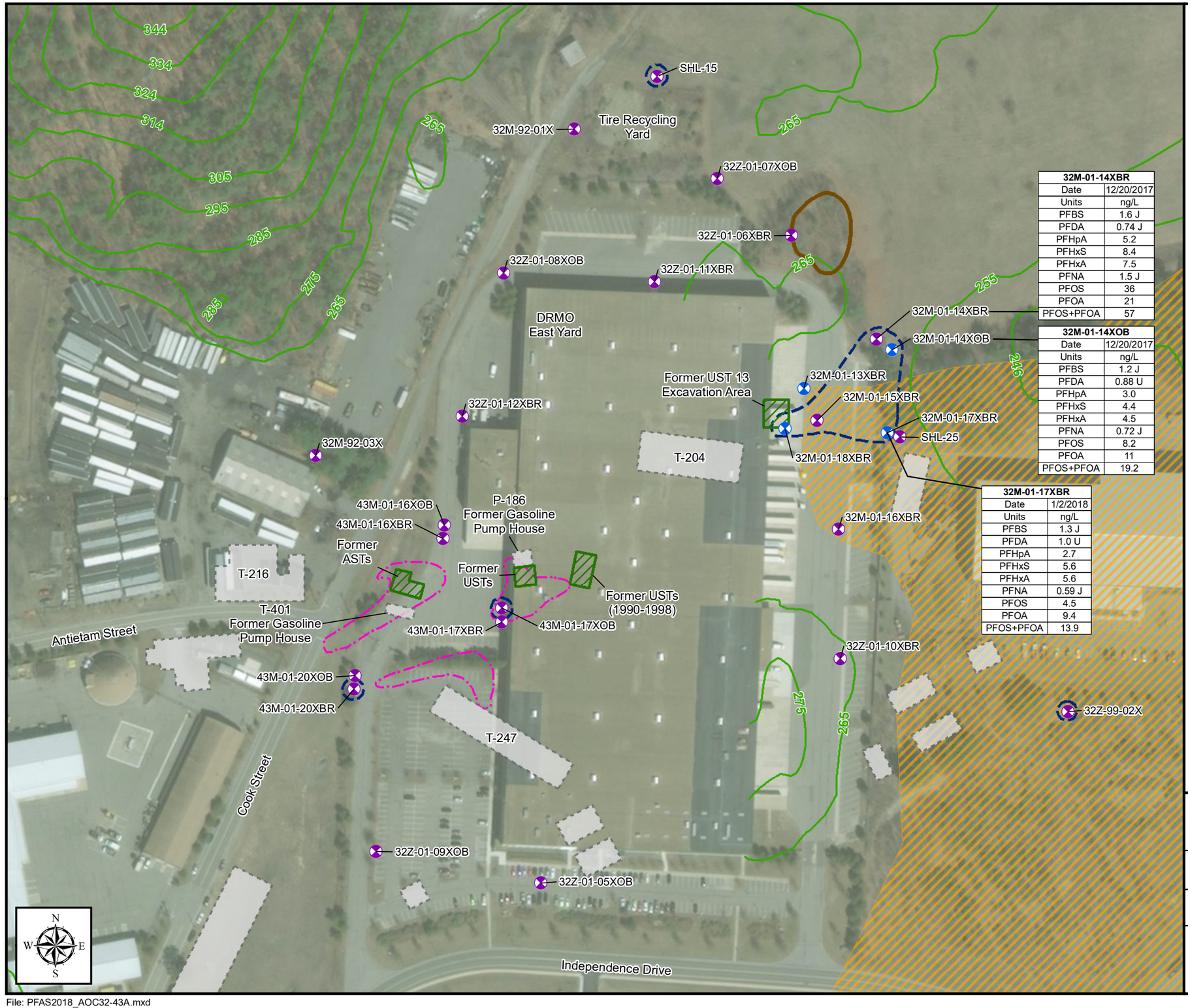
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 30 60
Feet

Date: 02/14/2018

Figure 4

File: PFAS2018_AOC43J.mxd



32M-01-14XBR	
Date	12/20/2017
Units	ng/L
PFBS	1.6 J
PFDA	0.74 J
PFHpA	5.2
PFHxS	8.4
PFHxA	7.5
PFNA	1.5 J
PFOS	36
PFOA	21
PFOS+PFOA	57

32M-01-14XOB	
Date	12/20/2017
Units	ng/L
PFBS	1.2 J
PFDA	0.88 U
PFHpA	3.0
PFHxS	4.4
PFHxA	4.5
PFNA	0.72 J
PFOS	8.2
PFOA	11
PFOS+PFOA	19.2

32M-01-17XBR	
Date	1/2/2018
Units	ng/L
PFBS	1.3 J
PFDA	1.0 U
PFHpA	2.7
PFHxS	5.6
PFHxA	5.6
PFNA	0.59 J
PFOS	4.5
PFOA	9.4
PFOS+PFOA	13.9

Legend

- LTM Sample Well
- LTM Well - Periodic Gauge Only
- DEP Approved Wellhead Protection Areas (Zone II)
- 32M-92-01X — Well Identification
- Former Storage Tank(s)
- Former Building
- T-247 — Former Building Number
- Approximate Historical Extent of Groundwater Contamination in Exceedance of Cleanup Goals (based on April 2002 to October 2008 analytical data) (2008 Annual Report, HGL, 2009)
- TPHC Soil Contamination
- Remaining Bedrock Outcrop
- Topographic Contour (Ft AMSL)

Notes:
AST = Above ground storage tank
UST = Underground storage Tank
DRMO = Defense Reutilization and Marketing Office
LTM = Long-term monitoring
TPHC = Total petroleum hydrocarbons

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PFAS in Groundwater
December 2017 & January 2018
AOC 32 and 43A

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 80 160
Feet

Date: 02/14/2018

Figure 5

KGS

File: PFAS2018_AOC32-43A.mxd

SHM-10-05A	
Date	12/18/2017
Units	ng/L
PFBS	2.9
PFDA	0.91 U
PFHpA	0.94 J
PFHxS	8.1
PFHxA	0.76 J
PFNA	0.47 J
PFOS	6.2
PFOA	4.2
PFOS+PFOA	10.4

SHM-13-03	
Date	12/18/2017
Units	ng/L
PFBS	2.6
PFDA	0.86 U
PFHpA	8.6
PFHxS	28
PFHxA	18
PFNA	0.26 J
PFOS	13
PFOA	23
PFOS+PFOA	36

SHM-13-04	
Date	12/18/2017
Units	ng/L
PFBS	1.5 J
PFDA	0.88 U
PFHpA	2.5
PFHxS	5.3
PFHxA	4.1
PFNA	0.48 J
PFOS	7.4
PFOA	7.6
PFOS+PFOA	15

SHP-01-36X	
Date	12/19/2017
Units	ng/L
PFBS	1.2 J
PFDA	0.89 U
PFHpA	2.9
PFHxS	3.1
PFHxA	4.7
PFNA	0.58 J
PFOS	3.0 J
PFOA	5.5
PFOS+PFOA	8.5

N5-P1	
Date	12/9/2017
Units	ng/L
PFBS	2.0
PFDA	0.97 U
PFHpA	5.1
PFHxS	16
PFHxA	8.9
PFNA	0.57 J
PFOS	8.4
PFOA	19
PFOS+PFOA	27.4

SHM-93-24A	
Date	1/8/2018
Units	ng/L
PFBS	3.8
PFDA	0.98 U
PFHpA	13
PFHxS	11
PFHxA	15
PFNA	0.80 J
PFOS	4.9
PFOA	19
PFOS+PFOA	23.9

Legend

- Overburden Monitoring Well/Piezometer
- Groundwater Profiling Location/Monitoring Well
- Monitoring Well
- Bedrock Monitoring Well
- Bedrock Study Core
- Extraction Well
- Stream Gauge
- Barrier Wall
- Shepley's Hill Landfill Boundary
- Former Fort Devens Boundary
- Landfill Access Road
- Culvert
- Drainage Swale
- Mowed Area

References: LTMMP Update (Sovereign, 2015)

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PFAS in Groundwater
December 2017 & January 2018
Shepley's Hill Landfill

Former Fort Devens Army Installation
Devens, Massachusetts

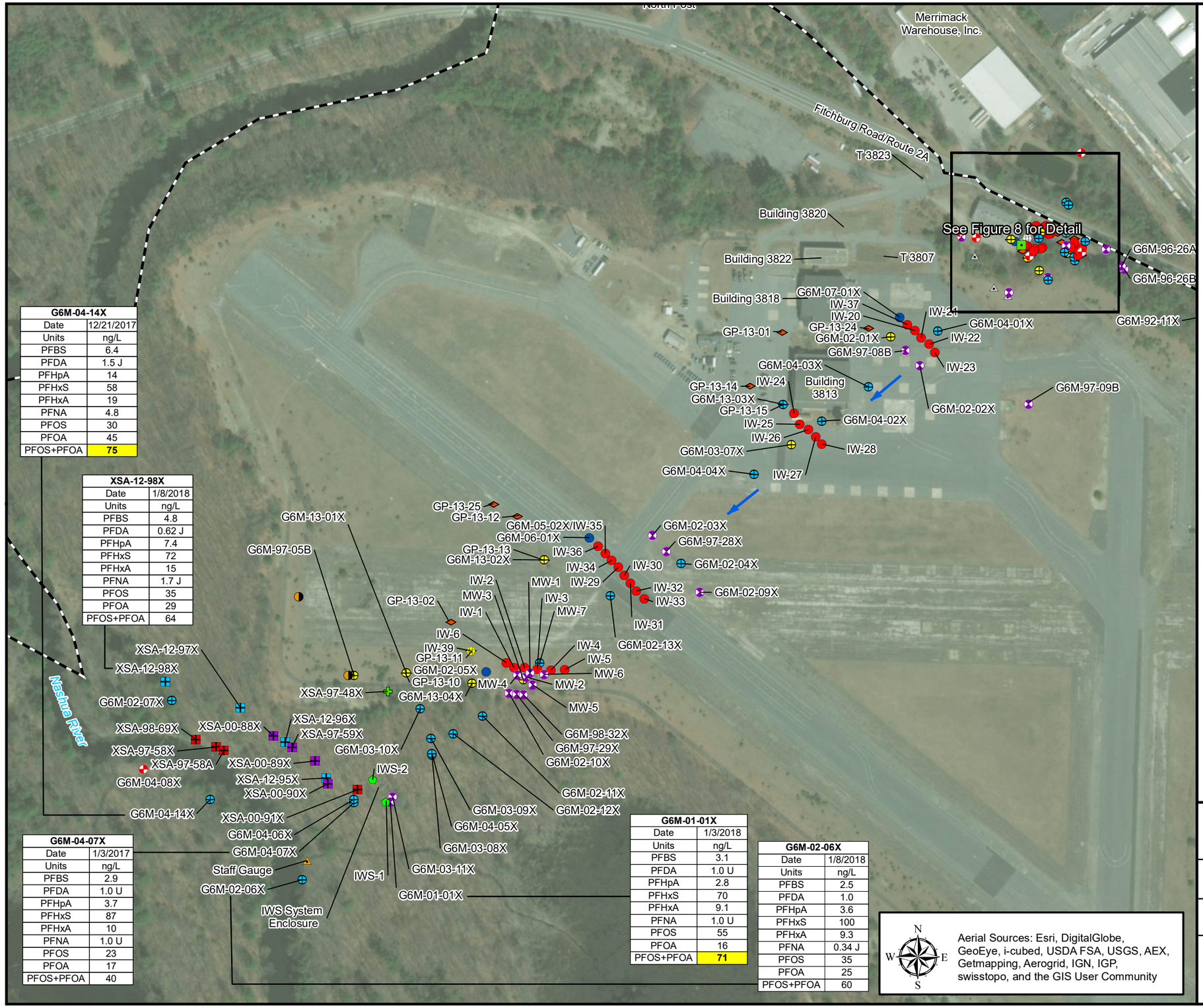
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 200 400
Feet

Date: 02/14/2018

Figure 6

File: PFAS2018_SHL.mxd



G6M-04-14X	
Date	12/21/2017
Units	ng/L
PFBS	6.4
PFDA	1.5 J
PFHpA	14
PFHxS	58
PFHxA	19
PFNA	4.8
PFOS	30
PFOA	45
PFOS+PFOA	**75**

XSA-12-98X	
Date	1/8/2018
Units	ng/L
PFBS	4.8
PFDA	0.62 J
PFHpA	7.4
PFHxS	72
PFHxA	15
PFNA	1.7 J
PFOS	35
PFOA	29
PFOS+PFOA	64

G6M-04-07X	
Date	1/3/2017
Units	ng/L
PFBS	2.9
PFDA	1.0 U
PFHpA	3.7
PFHxS	87
PFHxA	10
PFNA	1.0 U
PFOS	23
PFOA	17
PFOS+PFOA	40

G6M-01-01X	
Date	1/3/2018
Units	ng/L
PFBS	3.1
PFDA	1.0 U
PFHpA	2.8
PFHxS	70
PFHxA	9.1
PFNA	1.0 U
PFOS	55
PFOA	16
PFOS+PFOA	**71**

G6M-02-06X	
Date	1/8/2018
Units	ng/L
PFBS	2.5
PFDA	1.0
PFHpA	3.6
PFHxS	100
PFHxA	9.3
PFNA	0.34 J
PFOS	35
PFOA	25
PFOS+PFOA	60

Legend

- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Abandoned Well
- Historic Soil Boring
- Historic Vertical Groundwater Profiling Location
- In-Well Stripping System Well
- Injection Well
- Injection Well Installed 01/2014
- LTM Well - Gauge Only
- MicroWell
- MicroWell - Gauge Only
- MicroWell - Sampled Annually
- Monitoring Well
- Monitoring Well Converted to Injection Well
- Staff Gauge
- Vertical Groundwater Profiling Location
- Dry Well
- Floor Drain
- G6M-92-11X Well/Gauge/Piezometer Identification
- Groundwater Flow Direction
- Former Fort Devens Boundary

Notes:

Bold/highlighted results meet or exceed EPA HAL of 70 ng/L for separate or combined PFOS + PFOA

ERD = Enhanced reductive dechlorination
IWS = In-well stripping
LTM = Long-term monitoring

Aerial Sources: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

PFAS in Groundwater
December 2017 & January 2018
AOC 50

Former Fort Devens Army Installation
Devens, Massachusetts

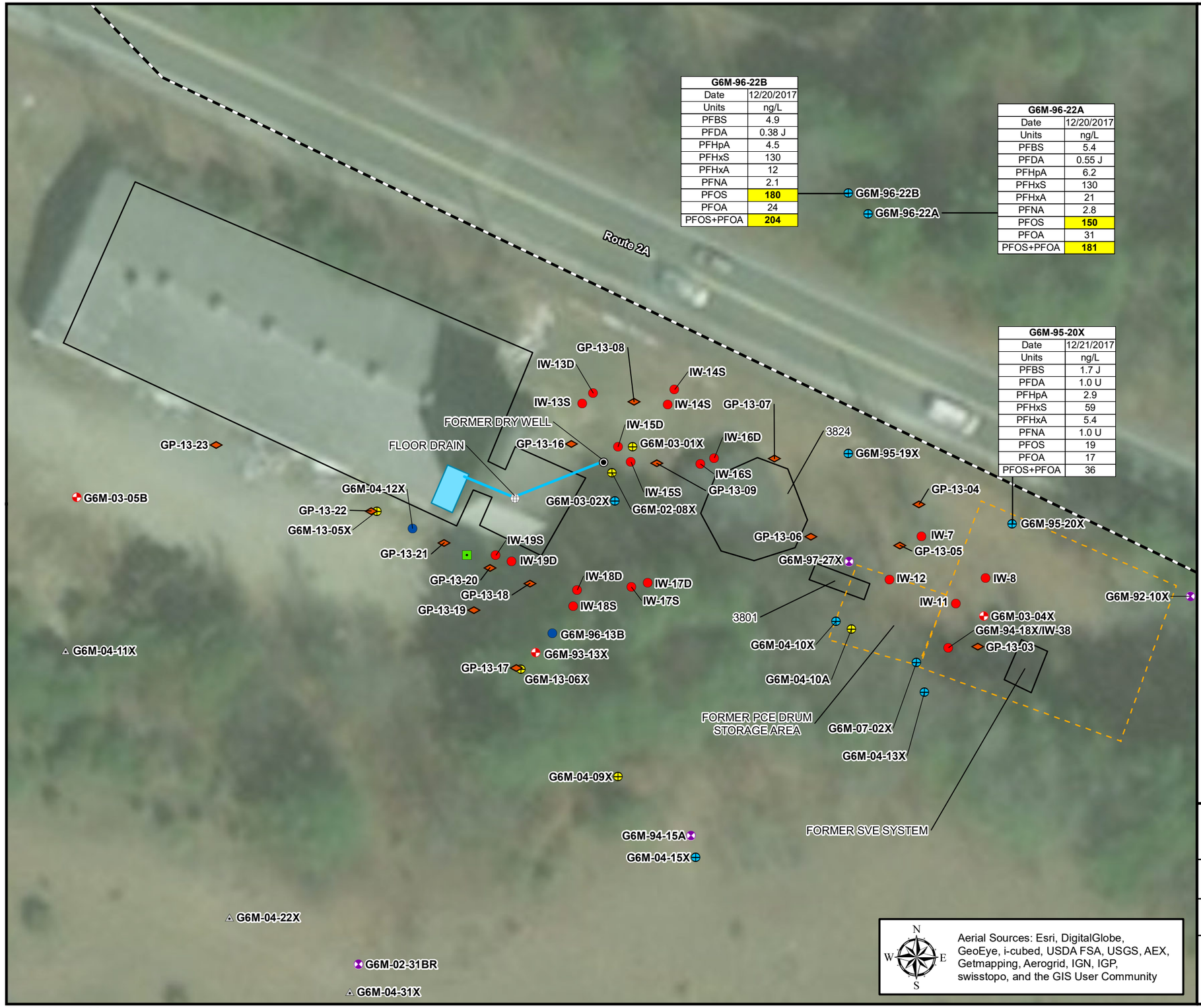
KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 150 300
Feet

Date: 02/14/2018

Figure 7

File: PFAS2018_AOC50.mxd



Legend

- ERD LTM Well - Sampled Semi-Annually
- ERD LTM Well - Sampled Annually
- ERD LTM Well - Sampled Biennially
- Historic Soil Boring
- Injection Well
- LTM Well - Gauge Only
- Monitoring Well
- Monitoring Well Converted to Injection Well
- Vertical Groundwater Profiling Location
- Former Dry Well
- Floor Drain
- Floor Drain Piping
- Janitor Sink
- Building Footprint
- Former Feature
- Former Fort Devens Boundary

Note:

Bold/highlighted results meet or exceed EPA HAL of 70 ng/L for separate or combined PFOS + PFOA

PFAS in Groundwater
December 2017
AOC 50 - Source Area

Former Fort Devens Army Installation
Devens, Massachusetts

KOMAN Government Solutions, LLC
293 Boston Post Road West, Suite 100, Marlborough, MA 01752

0 17.5 35
Feet

Date: 02/14/2018

Figure 8

File: PFAS2018_AOC50_Layout2.mxd

TABLES

Table 1
PFAS Groundwater Sample Locations
Former Fort Devens Army Installation, Devens, MA

Location	Description	Sample Location	Well Screen Interval (ft bgs)	Surface Elevation (ft NAVD 1988)	Depth to Water (ft bgs)	Groundwater Elevation (ft NAVD 1988)
AOC 57 - Area 2	Building 3713 Fuel Oil Spill	57M-03-01X	10.0 - 20.0	235.50	12.38	220.72
		57M-03-02X	2.0 - 12.0	225.30	3.51	219.99
		57M-03-04X	3.3 - 13.3	222.22	0.61	219.81
		57M-03-06X	2.0 - 12.0	223.06	1.46	220.1
AOC 57 - Area 3	Building 3713 Fuel Oil Spill	57M-95-03X	7 - 17	232.48	9.12	220.87
		57M-96-11X	2 - 12	222.18	2.01	217.97
AOC 43G	Historic Gas Station	XGM-94-06X	17 - 27	282.20	19.62	259.91
		AAFES-7	4.5 - 14.5	256.90	9.95	245.28
AOC 43J	Historic Gas Station	XJM-94-07X	3.7 - 13.7	362.51	5.54	353.66
		XJM-97-11X	25.5 - 35.5	370.12	9.24	358.68
		XJM-97-13X	41.5 - 51.5	367.42	8.47	356.25
		HA-3B	23.30 - 43.30	364.82	9.92	354.6
AOC 32/43A	DRMO Yard/Former POL Storage Area	32M-01-14XOB	17.3 - 27.3	255.20	24.13	228.85
		32M-01-14XBR	34 - 44	255.10	24.72	228.57
		32M-01-17XBR	41.4 - 51.4	257.10	24.50	230.21
SHL	Shepley's Hill Landfill	N5-P1	95.5 - 97.5	240.39	21.87	216.26
		SHP-01-36X	3 - 8	220.10	3.79	212.46
		SHM-93-24A	13.2 - 23.2	236.08	14.53	219.21
		SHM-13-03	42 - 52	209.83	3.22	204.39
		SHM-13-04	20 - 30	228.25	18.04	208.98
		SHM-10-05A	50 - 60	235.24	25.39	209.7
AOC 50	Moore Army Airfield	G6M-96-22A	40 - 50	216.20	3.39	210.31
		G6M-96-22B	65.5 - 70.5	216.47	4.22	210.05
		G6M-95-20X	18 - 23	223.41	11.92	209.18
		G6M-01-01X	130 - 150	264.41	61.75	200.29
		G6M-02-06X	55 - 65	208.79	5.38	201.36
		G6M-04-07X	120 - 130	262.25	59.54	200.03
		G6M-04-14X	80 - 90	210.57	13.61	195.81
		XSA-12-98X	60 - 70	207.75	not measured	--

Notes:
ft bgs = feet below ground surface

Table 2
PFAS Detection Summary
AOC 57 Areas 2 and 3
Former Fort Devens Army Installation, Devens, Massachusetts

AOC 57			Area 2					Area 3			
Analyte	**Units**	**Bench mark**	320-34977-5 **57M-03-01X-Dec17 1/9/18**	320-34977-6 **57M-03-02X-Dec17 1/9/18**	320-34977-7 **57M-03-04X-Dec17 1/9/18**	320-34977-8 **57M-03-06X-Dec17 1/9/18**	320-34977-9 **DUP-01-Dec17 1/9/18**	320-34977-10 **Area 3 SW-1-Dec17 1/10/18**	320-34977-11 **DUP-02-Dec17 1/10/18**	320-34977-12 **57M-96-11X-Dec17 1/10/18**	320-34977-13 **57M-95-03X-Dec17 1/10/18**
							57M-03-06X FD		Area 3 SW-1 FD		
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	-	10 U	10 U	10 U	9.9 U	10 U	9.8 U	10 U	10 U	99 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	-	10 U	10 U	10 U	9.9 U	10 U	9.8 U	10 U	10 U	99 U
Perfluorobutanesulfonic acid (PFBS)	ng/L	-	**39**	**19**	**16**	**8.1**	**7.9**	**11**	**12**	**13**	**37**
Perfluorodecanoic acid (PFDA)	ng/L	-	**2.3**	1.0 U	1.0 U	0.99 U	1.0 U	0.98 U	1.0 U	1.0 U	9.9 U
Perfluorododecanoic acid (PFDoA)	ng/L	-	2.0 U	2.0 U	2.0 U	2.0 U	2.1 U	2.0 U	2.0 U	2.0 U	20 U
Perfluoroheptanoic acid (PFHpA)	ng/L	70	**270**	**85**	**77**	**39**	**43**	**44**	**47**	**34**	**62**
Perfluorohexanesulfonic acid (PFHxS)	ng/L	70	**110**	**28**	**42**	**21**	**21**	**4.3**	**4.1**	**5.3**	**9.7 J**
Perfluorohexanoic acid (PFHxA)	ng/L	-	**360**	**100**	**110**	**90**	**93**	**130**	**130**	**170**	**71**
Perfluorononanoic acid (PFNA)	ng/L	70	**1.8 J**	1.0 U	**5.1**	**1.1 J**	**1.2 J**	0.98 U	1.0 U	1.0 U	9.9 U
Perfluorooctanesulfonic acid (PFOS)	ng/L	70	**5.2**	**3.7 J**	**9.7**	**4.1**	**3.8 J**	**0.59 J**	**0.60 J**	2.0 U	20 U
Perfluorooctanoic acid (PFOA)	ng/L	70	**120**	**23**	**82**	**76**	**76**	**24**	**24**	**5.2**	**82**
Perfluorotetradecanoic acid (PFTeA)	ng/L	-	1.0 U	1.0 U	1.0 U	0.99 U	1.0 U	0.98 U	1.0 U	1.0 U	9.9 U
Perfluorotridecanoic Acid (PFTriA)	ng/L	-	3.1 U	3.0 U	3.0 U	3.0 U	3.1 U	2.9 U	3.1 U	3.0 U	30 U
Perfluoroundecanoic acid (PFUnA)	ng/L	-	3.1 U	3.0 U	3.0 U	3.0 U	3.1 U	2.9 U	3.1 U	3.0 U	30 U
PFOS + PFOA (EPA)	ng/L	70	**125.2**	**26.7**	**91.7**	**80.1**	**79.8**	**24.6**	**24.6**	**5.2**	**82**
PFOS+PFOA+PFHpA+PFHxS+PFNA (MassDEP)	ng/L	70	**507**	**139.7**	**215.8**	**141.2**	**145**	**72.9**	**75.7**	**44.5**	**153.7**

Notes:
ng/L = nanogram per liter
EPA LHA = EPA Lifetime Health Advisory (2016)
U = non-detect
J = estimated result
FD = Field duplicate
ND results are reported at the Limit of Detection (LOD)
The proposed recommendation for 5 PFAS compounds is per MassDEP's Fact Sheet dated 3/1/2018 and MassDEP's 2018 letter from the Assistant Commissioner to the DOD Office of the Deputy Assistant Secretary of the Army.

Result is at or above the EPA LHA or MassDEP's recommendation.
Bolded data indicates detections of PFAS.

Table 3
PFAS Detection Summary
AOC 43G
Former Fort Devens Army Installation, Devens, Massachusetts

Analyte	Units	Benchmark	320-34815-2 AAFES-7-Dec17 1/2/2018	320-34815-3 XGM-94-06X-Dec17 1/2/2018
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	-	9.5 U	11 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	-	9.5 U	11 U
Perfluorobutanesulfonic acid (PFBS)	ng/L	-	**6.3**	**4.0**
Perfluorodecanoic acid (PFDA)	ng/L	-	0.95 U	1.1 U
Perfluorododecanoic acid (PFDoA)	ng/L	-	1.9 U	2.1 U
Perfluoroheptanoic acid (PFHpA)	ng/L	70	**14**	**8.9**
Perfluorohexanesulfonic acid (PFHxS)	ng/L	70	**200**	**98**
Perfluorohexanoic acid (PFHxA)	ng/L	-	**64**	**20**
Perfluorononanoic acid (PFNA)	ng/L	70	**1.1 J**	**1.4 J**
Perfluorooctanesulfonic acid (PFOS)	ng/L	70	**65**	**90**
Perfluorooctanoic acid (PFOA)	ng/L	70	**51**	**33**
Perfluorotetradecanoic acid (PFTeA)	ng/L	-	0.95 U	1.1 U
Perfluorotridecanoic Acid (PFTriA)	ng/L	-	2.9 U	3.2 U
Perfluoroundecanoic acid (PFUnA)	ng/L	-	2.9 U	3.2 U
PFOS + PFOA (EPA)	ng/L	70	**116**	**123**
PFOS+PFOA+PFHpA+PFHxS+PFNA (MassDEP)	ng/L	70	**507**	**139.7**

Notes:
ng/L = nanogram per liter
EPA LHA = EPA Lifetime Health Advisory (2016)
U = non-detect
J = estimated result
FD = Field duplicate
ND results are reported at the Limit of Detection (LOD)
The proposed recommendation for 5 PFAS compounds is per MassDEP's Fact Sheet dated 3/1/2018 and MassDEP's 2018 letter from the Assistant Commissioner to the DOD Office of the Deputy Assistant Secretary of the Army.

Result is at or above the EPA LHA or MassDEP's recommendation.
Bolded data indicates detections of PFAS.

Table 4
PFAS Detection Summary
AOC 43J
Former Fort Devens Army Installation, Devens, Massachusetts

Analyte	Units	Bench mark	320-34597-8 XJM-97-13X-Dec17 12/21/2017	320-34597-9 DUP-03-Dec17 12/21/2017	320-34977-14 XJM-97-11X-Dec17 1/10/2018	320-35041-1 XJM-94-07X-Dec17 1/11/2018	320-35041-2 HA-3B-Dec17 1/11/2018
				XJM-97-13XFD			
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	-	9.9 U	10 U	9.7 U	9.7 U	10 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	-	9.9 U	10 U	9.7 U	9.7 U	10 U
Perfluorobutanesulfonic acid (PFBS)	ng/L	-	**0.39 J**	1.0 U	0.97 U	**2.8**	1.0 U
Perfluorodecanoic acid (PFDA)	ng/L	-	0.99 U	1.0 U	0.97 U	0.97 U	1.0 U
Perfluorododecanoic acid (PFDoA)	ng/L	-	2.0 U	2.0 U	1.9 U	1.9 U	2.0 U
Perfluoroheptanoic acid (PFHpA)	ng/L	70	0.99 U	1.0 U	0.97 U	**1.7 J**	1.0 UJ
Perfluorohexanesulfonic acid (PFHxS)	ng/L	70	**0.41 J**	**0.34 J**	0.97 U	**2.0**	**0.41 J**
Perfluorohexanoic acid (PFHxA)	ng/L	-	2.0 U	**0.73 J**	1.9 U	**1.6 J**	2.0 U
Perfluorononanoic acid (PFNA)	ng/L	70	0.99 U	1.0 U	0.97 U	**0.92 J**	**0.35 J**
Perfluorooctanesulfonic acid (PFOS)	ng/L	70	2.0 U	2.0 U	1.9 U	**4.5**	2.0 U
Perfluorooctanoic acid (PFOA)	ng/L	70	2.0 U	2.0 U	1.9 U	**6.6**	2.0 U
Perfluorotetradecanoic acid (PFTeA)	ng/L	-	0.99 U	1.0 U	0.97 U	0.97 U	1.0 U
Perfluorotridecanoic Acid (PFTriA)	ng/L	-	3.0 U	3.0 U	2.9 U	2.9 U	3.0 U
Perfluoroundecanoic acid (PFUnA)	ng/L	-	3.0 U	3.0 U	2.9 U	2.9 U	3.0 U
PFOS + PFOA (EPA)	ng/L	70	2.0 U	2.0 U	1.9 U	**11.1**	2.0 U
PFOS+PFOA+PFHpA+PFHxS+PFNA (MassDEP)	ng/L	70	**0.41 J**	**0.34 J**	1.9 U	**15.7 J**	**0.76 J**

Notes:
ng/L = nanogram per liter
EPA LHA = EPA Lifetime Health Advisory (2016)
U = non-detect
J = estimated result
FD = Field duplicate
ND results are reported at the Limit of Detection (LOD)
The proposed recommendation for 5 PFAS compounds is per MassDEP's Fact Sheet dated 3/1/2018 and MassDEP's 2018 letter from the Assistant Commissioner to the DOD Office of the Deputy Assistant Secretary of the Army.

Result is at or above the EPA LHA or MassDEP's recommendation.
Bolded data indicates detections of PFAS.

Table 5
PFAS Detection Summary
AOCs 32 and 43A
Former Fort Devens Army Installation, Devens, Massachusetts

Analyte	Units	Bench mark	320-34597-3 32M-01-14X0B-Dec17 12/20/2017	320-34597-4 32M-01-14XBR-Dec17 12/20/2017	320-34815-1 32M-01-17XBR-Dec17 1/2/2018
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	-	8.8 U	10 U	10 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	-	8.8 U	10 U	10 U
Perfluorobutanesulfonic acid (PFBS)	ng/L	-	**1.2 J**	**1.6 J**	**1.3 J**
Perfluorodecanoic acid (PFDA)	ng/L	-	0.88 U	**0.74 J**	1.0 U
Perfluorododecanoic acid (PFDoA)	ng/L	-	1.8 U	2.1 U	2.0 U
Perfluoroheptanoic acid (PFHpA)	ng/L	70	**3.0**	**5.2**	**2.7**
Perfluorohexanesulfonic acid (PFHxS)	ng/L	70	**4.4**	**8.4**	**5.6**
Perfluorohexanoic acid (PFHxA)	ng/L	-	**4.5**	**7.5**	**5.6**
Perfluorononanoic acid (PFNA)	ng/L	70	**0.72 J**	**1.5 J**	**0.59 J**
Perfluorooctanesulfonic acid (PFOS)	ng/L	70	**8.2**	**36**	**4.5**
Perfluorooctanoic acid (PFOA)	ng/L	70	**11**	**21**	**9.4**
Perfluorotetradecanoic acid (PFTeA)	ng/L	-	0.88 U	1.0 U	1.0 U
Perfluorotridecanoic Acid (PFTriA)	ng/L	-	2.6 U	3.1 U	3.1 U
Perfluoroundecanoic acid (PFUnA)	ng/L	-	2.6 U	3.1 U	3.1 U
PFOS + PFOA (EPA)	ng/L	70	**19.2**	**57**	**13.9**
PFOS+PFOA+PFHpA+PFHxS+PFNA (MassDEP)	ng/L	70	**27.3**	**72.1**	**22.8**

Notes:
ng/L = nanogram per liter
EPA LHA = EPA Lifetime Health Advisory (2016)
U = non-detect
J = estimated result
FD = Field duplicate
ND results are reported at the Limit of Detection (LOD)
The proposed recommendation for 5 PFAS compounds is per MassDEP's Fact Sheet dated 3/1/2018 and MassDEP's 2018 letter from the Assistant Commissioner to the DOD Office of the Deputy Assistant Secretary of the Army.

Result is at or above the EPA LHA or MassDEP's recommendation.
Bolded data indicates detections of PFAS.

Table 6
PFAS Detection Summary
Shepley's Hill Landfill
Former Fort Devens Army Installation, Devens, Massachusetts

Analyte	Units	Bench mark	320-34594-1 SHM-10-05A-Dec17 12/18/2017	320-34594-2 SHM-13-03-Dec17 12/18/2017	320-34594-3 SHM-13-04-Dec17 12/18/2017	320-34594-4 SHP-01-36X-Dec17 12/19/2017	320-34594-6 N5-P1-Dec17 12/19/2017	320-34977-3 SHM-93-24A-Dec17 1/8/2018
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	-	9.1 U	8.6 U	8.8 U	8.9 U	9.7 U	9.8 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	-	9.1 U	8.6 U	8.8 U	8.9 U	9.7 U	9.8 U
Perfluorobutanesulfonic acid (PFBS)	ng/L	-	**2.9**	**2.6**	**1.5 J**	**1.2 J**	**2.0**	**3.8**
Perfluorodecanoic acid (PFDA)	ng/L	-	0.91 U	0.86 U	0.88 U	0.89 U	0.97 U	0.98 U
Perfluorododecanoic acid (PFDoA)	ng/L	-	1.8 U	1.7 U	1.8 U	1.8 U	1.9 U	2.0 U
Perfluoroheptanoic acid (PFHpA)	ng/L	70	**0.94 J**	**8.6**	**2.5**	**2.9**	**5.1**	**13**
Perfluorohexanesulfonic acid (PFHxS)	ng/L	70	**8.1**	**28**	**5.3**	**3.1**	**16**	**11**
Perfluorohexanoic acid (PFHxA)	ng/L	-	**0.76 J**	**18**	**4.1**	**4.7**	**8.9**	**15**
Perfluorononanoic acid (PFNA)	ng/L	70	**0.47 J**	**0.26 J**	**0.48 J**	**0.58 J**	**0.57 J**	**0.80 J**
Perfluorooctanesulfonic acid (PFOS)	ng/L	70	**6.2**	**13**	**7.4**	**3.0 J**	**8.4**	**4.9**
Perfluorooctanoic acid (PFOA)	ng/L	70	**4.2**	**23**	**7.6**	**5.5**	**19**	**19**
Perfluorotetradecanoic acid (PFTeA)	ng/L	-	0.91 U	0.86 U	0.88 U	0.89 U	0.97 U	0.98 U
Perfluorotridecanoic Acid (PFTriA)	ng/L	-	2.7 U	2.6 U	2.7 U	2.7 U	2.9 U	2.9 U
Perfluoroundecanoic acid (PFUnA)	ng/L	-	2.7 U	2.6 U	2.7 U	2.7 U	2.9 U	2.9 U
PFOS + PFOA	ng/L	70	**10.4**	**36**	**15**	**8.5**	**27.4**	**23.9**
PFOS+PFOA+PFHpA+PFHxS+PFNA (MassDEP)	ng/L	70	**19.9 J**	**72.9 J**	**23.3 J**	**15.1 J**	**49.1 J**	**48.7 J**

Notes:
ng/L = nanogram per liter
EPA LHA = EPA Lifetime Health Advisory (2016)
U = non-detect
J = estimated result
FD = Field duplicate
ND results are reported at the Limit of Detection (LOD)
The proposed recommendation for 5 PFAS compounds is per MassDEP's Fact Sheet dated 3/1/2018 and MassDEP's 2018 letter from the Assistant Commissioner to the DOD Office of the Deputy Assistant Secretary of the Army.

Result is at or above the EPA LHA or MassDEP's recommendation.
Bolded data indicates detections of PFAS.

Table 7
PFAS Detection Summary
AOC 50
Former Fort Devens Army Installation, Devens, Massachusetts

Analyte	Units	Bench mark	320-34597-1 G6M-96-22A-Dec17 12/20/2017	320-34597-2 G6M-96-22B-Dec17 12/20/2017	320-34597-6 G6M-95-20X-Dec17 12/21/2017	320-34597-7 DUP-04-Dec17 12/21/2017	320-34815-6 G6M-01-01X-Dec17 1/3/2018	320-34815-7 G6M-04-07X-Dec17 1/3/2018	320-34977-1 G6M-02-06X-Dec17 1/8/2018	320-34597-5 G6M-04-14X-Dec17 12/21/2017	320-34977-2 XSA-12-98X-Dec17 1/8/2018
						G6M-95-20XFD					
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	ng/L	-	8.9 U	8.7 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	ng/L	-	8.9 U	8.7 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Perfluorobutanesulfonic acid (PFBS)	ng/L	-	**5.4**	**4.9**	**1.7 J**	**1.9 J**	**3.1**	**2.9**	**2.5**	**6.4**	**4.8**
Perfluorodecanoic acid (PFDA)	ng/L	-	**0.55 J**	**0.38 J**	**1.0 U**	**1.0 U**	**1.0 U**	**1.0 U**	**1.0 U**	**1.5 J**	**0.62 J**
Perfluorododecanoic acid (PFDoA)	ng/L	-	1.8 U	1.7 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Perfluoroheptanoic acid (PFHpA)	ng/L	70	**6.2**	**4.5**	**2.9**	**3.0**	**2.8**	**3.7**	**3.6**	**14**	**7.4**
Perfluorohexanesulfonic acid (PFHxS)	ng/L	70	**130**	**130**	**59**	**57**	**70**	**87**	**100**	**58**	**72**
Perfluorohexanoic acid (PFHxA)	ng/L	-	**21**	**12**	**5.4**	**5.3**	**9.1**	**10**	**9.3**	**19**	**15**
Perfluorononanoic acid (PFNA)	ng/L	70	**2.8**	**2.1**	1.0 U	1.0 U	1.0 U	1.0 U	**0.34 J**	**4.8**	**1.7 J**
Perfluorooctanesulfonic acid (PFOS)	ng/L	70	**150**	**180**	**19**	**22**	**55**	**23**	**35**	**30**	**35**
Perfluorooctanoic acid (PFOA)	ng/L	70	**31**	**24**	**17**	**16**	**16**	**17**	**25**	**45**	**29**
Perfluorotetradecanoic acid (PFTeA)	ng/L	-	0.89 U	0.87 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Perfluorotridecanoic Acid (PFTriA)	ng/L	-	2.7 U	2.6 U	3.1 U	3.1 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Perfluoroundecanoic acid (PFUnA)	ng/L	-	2.7 U	2.6 U	3.1 U	3.1 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
PFOS + PFOA (EPA)	ng/L	70	**181**	**204**	**36**	**38**	**71**	**40**	**60**	**75**	**64**
PFOS+PFOA+PFHpA+PFHxS+PFNA (MassDEP)	ng/L	70	**320**	**340.6**	**97.9**	**98**	**143.8**	**130.7**	**163.9 J**	**151.8**	**145.1 J**

Notes:
ng/L = nanogram per liter
EPA LHA = EPA Lifetime Health Advisory (2016)
U = non-detect
J = estimated result
FD = Field duplicate
ND results are reported at the Limit of Detection (LOD)
The proposed recommendation for 5 PFAS compounds is per MassDEP's Fact Sheet dated 3/1/2018 and MassDEP's 2018 letter from the Assistant Commissioner to the DOD Office of the Deputy Assistant Secretary of the Army.

Result is at or above the EPA LHA or MassDEP's recommendation.
Bolded data indicates detections of PFAS.

ATTACHMENT 1

Field Forms

Field Instrument Calibration Log

Date: 12/18/17 **Weather:** 20's light snow

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: MA **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 830		Cal. Temperature °C	Afternoon Calibration Time 1400		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm°)	7/18	1.410	1.413	~~12.15~~ 12.15	1.412	1.413	13.37
pH (7)	6/30/18	7.13	7.00		7.03	7.00	
pH (4)	6/31/19	4.02	4.00		4.06	4.00	
pH (10)	10/18	9.97	10.09		9.99	10.00	
ORP (240 mv)	6/22	239.7	240.0		240.7	240.0	
Dissolved Oxygen (%)	-	101.7%	100.0%		100.9%	100.0%	
Dissolved Oxygen (mg/L)	-		-				
Barometric Pressure (mmHg)	-		-				

Notes:

Signature: [signature] **Date:** 12/18/17

KGS

Field Instrument Calibration Log

Date: 12/19/17 **Weather:** 20's

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: KA **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 809		Cal. Temperature °C	Afternoon Calibration Time 1315		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm°)	7/18	1.411	1.413	13.27	1.412	1.413	12.97
pH (7)	6/30/18	7.00	7.00		7.09	7.00	
pH (4)	6/31/19	4.09	4.00		4.02	4.00	
pH (10)	6/18	10.11	10.00		10.03	10.00	
ORP (240 mv)	6/22	241.6	240.0		236.1	240.0	
Dissolved Oxygen (%)	-	92.9%	100.0%		102.1%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: [signature] **Date:** 12/19/17

KGS

Field Instrument Calibration Log

Date: 12/20/17 **Weather:** 20's

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: VLA **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 710		Cal. Temperature °C	Afternoon Calibration Time 1325		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm[c])	7/18	1.410	1.413	12.25	1.412	1.413	12.03
pH (7)	6/30/18	6.89	7.00		7.03	7.00	
pH (4)	6/31/19	3.87	4.09		4.01	4.00	
pH (10)	10/18	9.96	10.00		10.04	10.00	
ORP (240 mv)	6/22	234.1	240.0		241.6	240.0	
Dissolved Oxygen (%)	-	94.9%	100.0%		103.2%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: [signature] **Date:** 12/20/17

KGS

Field Instrument Calibration Log

Date: 12/21/17 **Weather:** 20's

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: VM **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 720		Cal. Temperature °C	Afternoon Calibration Time 1355		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm[c])	7/18	1.410	1.413	13.16°	1.402	1.413	12.49°
pH (7)	6/30/18	7.10	7.00		7.01	7.00	
pH (4)	6/31/19	4.03	4.00		4.02	4.00	
pH (10)	10/18	9.86	10.00		10.01	10.00	
ORP (240 mv)	6/22	243.9	240.0		241.1	240.0	
Dissolved Oxygen (%)	-	94.2%	100.0%		96.9%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: _____ **Date:** 12/21/17

Turbidity Instrument Calibration Log

Project/Site Name: Devens PFAS Dec 2017/Jan 2018
Calibrated By: KGA

Instrument: LaMotte 2020we
Serial Number: 22090

Date	Pre-Cal 0 NTU AM	Post-Cal 0 NTU AM	Pre-Cal 10 NTU AM	Post-Cal 10 NTU AM	Pre-Cal 0 NTU PM	Post-Cal 0 NTU PM	Pre-Cal 10 NTU PM	Post-Cal 10 NTU PM
12/18/17	0.09	0.00	10.07	10.09	0.01	0.00	9.99	10.00
12/19/17	0.03	0.00	10.03	10.09	0.07	0.00	10.03	10.00
12/20/17	0.03	0.00	10.10	10.09	0.04	0.00	10.01	10.00
12/21/17	0.01	0.00	10.03	10.00	0.02	0.00	10.00	10.00

Signature: [signature]

Date: 12/21/17

KGS

Field Instrument Calibration Log

Date: 1/2/18 **Weather:** 0°

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: MH **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 830		Cal. Temperature °C	Afternoon Calibration Time 1535		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm°)	7/18	1.400	1.413	12.09°	1.410	1.413	11.67°
pH (7)	6/30/18	7.21	7.00		6.96	7.00	
pH (4)	6/31/19	3.87	4.00		3.89	4.00	
pH (10)	10/18	9.90	10.00		10.11	10.00	
ORP (240 mv)	6/20/22	246.9	240.0		237.6	240.0	
Dissolved Oxygen (%)	-	93.2%	100.0%		92.7%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: [signature] **Date:** 1/2/18

KGS

Field Instrument Calibration Log

Date: 1/3/18 **Weather:** 0°

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: MA **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 745		Cal. Temperature °C	Afternoon Calibration Time 1415		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm°)	7/18	1.439	1.413	11.97°	1.420	1.413	12-13°
pH (7)	6/30/18	7.11	7.00		6.89	7.00	
pH (4)	6/31/19	4.09	4.00		3.94	4.00	
pH (10)	10/18	10.15	10.00		9.93	10.00	
ORP (240 mv)	6/20/22	246.7	240.0		242.1	240.0	
Dissolved Oxygen (%)	-	103.7%	100.0%		96.2%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: _____ **Date:** 1/3/18

Field Instrument Calibration Log

Date: 1/8/18 **Weather:** 20°

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: KGA **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 740		Cal. Temperature °C	Afternoon Calibration Time 1440		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm°)	7/18	1.429	1.413	11.99°	1.399	1.413	13.20°
pH (7)	6/30/18	7.13	7.00		7.03	7.00	
pH (4)	6/3/19	3.89	4.00		3.96	4.00	
pH (10)	10/18	10.12	10.00		10.11	10.00	
ORP (240 mv)	6/20/22	246.3	240.0		236.2	240.0	
Dissolved Oxygen (%)	-	114.7%	100.0%		98.2%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: [signature] **Date:** 1/8/18

KGS

Field Instrument Calibration Log

Date: 1/9/18 **Weather:** 20°

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: KA **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 730		Cal. Temperature °C	Afternoon Calibration Time 1455		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm°)	7/18	1.410	1.413	12.97°	1.411	1.413	13.07°
pH (7)	6/30/18	6.89	7.00		7.07	7.00	
pH (4)	6/31/19	3.92	4.00		4.06	4.00	
pH (10)	10/18	10.07	10.00		10.13	10.00	
ORP (240 mv)	6/20/22	241.3	240		237.2	240	
Dissolved Oxygen (%)	-	108.2%	100.0%		106.2%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: _____ **Date:** 1/9/18

KGS

Field Instrument Calibration Log

Date: 1/10/18 **Weather:** 20°

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: KGA **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 735		Cal. Temperature °C	Afternoon Calibration Time 1450		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm°)	7/18	1.397	1.413	13.20°	1.410	1.413	14.09°
pH (7)	6/30/18	6.87	7.00		6.97	7.00	
pH (4)	6/31/19	3.86	4.00		3.98	4.09	
pH (10)	10/18	9.79	10.00		10.01	10.00	
ORP (240 mv)	6/20/22	237.2	240.0		238.7	240.0	
Dissolved Oxygen (%)	-	107.2%	100.0%		102.6%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: _____ **Date:** 1/10/18

KGS

Field Instrument Calibration Log

Date: 1/11/18 **Weather:** 30°

Project/Site Name: Devens PFAS Dec 2017/Jan 2018 **Instrument:** YSI 556 MPS

Calibrated By: MR **Serial Number:** 16A104326

Parameters	Solution Expiration Date	Morning Calibration Time 735		Cal. Temperature °C	Afternoon Calibration Time 1200		Cal. Temperature °C
Specific Conductivity (1.413 µS/cm°)	7/18	1.410	1.413	13.40°	1.412	1.413	13.47°
pH (7)	6/30/18	6.97	7.00		6.97	7.00	
pH (4)	6/31/19	3.87	4.00		4.03	4.00	
pH (10)	10/18	9.92	10.00		10.07	10.00	
ORP (240 mv)	6/20/22	238.1	240.9		242.6	240.0	
Dissolved Oxygen (%)	-	92.6%	100.0%		98.6%	100.0%	
Dissolved Oxygen (mg/L)	-						
Barometric Pressure (mmHg)	-						

Notes:

Signature: MR **Date:** 1/11/18

Turbidity Instrument Calibration Log

Project/Site Name: Devens PFAS Dec 2017/Jan 2018
Calibrated By: [illegible]

Instrument: LaMotte 2020we
Serial Number: 2-2090

Date	Pre-Cal 0 NTU AM	Post-Cal 0 NTU AM	Pre-Cal 10 NTU AM	Post-Cal 10 NTU AM	Pre-Cal 0 NTU PM	Post-Cal 0 NTU PM	Pre-Cal 10 NTU PM	Post-Cal 10 NTU PM
1/2/18	0.09	0.00	10.13	10.00	0.02	0.00	10.11	10.00
1/3/18	0.08	0.00	10.20	10.00	~~0.07~~ 0.00	~~0.00~~ 0.00	9.97	10.00
1/8/18	0.11	0.00	10.17	10.00	0.04	0.00	9.97	10.00
1/9/18	0.07	0.00	10.09	10.00	0.03	0.00	10.13	10.00
1/10/18	0.11	0.00	10.20	10.00	0.01	0.00	10.00	10.00
1/11/18	0.07	0.00	10.09	10.00	0.06	0.00	9.97	10.00

Signature: [signature]

Date: 1/11/18

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: SHM-10-05A

Project: PFAS Sampling DEC 2017 Date: 12/18/17
Location: Fort Devens Massachusetts Sampler: MA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present		✓	
Locked (stickup wells)			✓

Well Information

Diameter	1.5"
Material	PVC
Depth to water (ft BTOR)	25.54
Depth to bottom (ft BTOR)	59.90
Screen Interval (ft BTOR)	49.68 → 59.68
Total volume purged (gal)	3.0

Sampling Type

Purging Method peristaltic Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 1000/ Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI EXO2 MPS 16A104326 / LaMotte 202006 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1000	200	25.54	10.66	7.12	163	2.32	61.6	0.80	clear
1005	200	25.54	10.38	6.99	166	1.39	72.6	0.79	↓
1010	200	25.54	10.35	6.83	168	1.34	74.5	0.77	
1015	200	25.54	10.39	6.91	169	1.34	75.1	0.76	
1020	200	25.54	10.40	6.93	169	1.33	75.6	0.75	
1025	200	25.54	10.47	6.95	171	1.31	75.7	0.75	↓
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments SHM-10-05A-Dec 17 @ 1030

MA 12/18/17
Signature Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: SMM-13-03

Project: PFAS Sampling DEC 2017 Date: 12/18/17
Location: Fort Devens Massachusetts Sampler: KA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present			✓
Locked (stickup wells)	✓		

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	5.44
Depth to bottom (ft BTOR)	51.01
Screen Interval (ft BTOR)	44.14 → 54.14
Total volume purged (gal)	3.0

Sampling Type

Purging Method: peristaltic Tubing type: HDPE Dedicated pump (Y/N): N
Purge start/stop time: 1205 / Tubing diameter: 1/4" Air source: N/A
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020we 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1205	200	5.44	10.03	6.04	518	1.00	75.3	1.29	Clear
1210	200	5.44	10.03	6.07	523	0.85	59.4	0.97	Clear
1215	200	5.44	10.00	6.09	527	0.84	57.6	0.93	Clear
1220	200	5.44	9.97	6.10	529	0.83	56.9	0.91	Clear
1225	200	5.44	9.96	6.11	532	0.82	56.3	0.90	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A
Dedicated Tubing: (Y/N) Y

Comments SMM-13-03-Dec17 @ 1230

Signature

12/18/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: SHM-13-04

Project: PFAS Sampling DEC 2017 Date: 12/18/17
Location: Fort Devens Massachusetts Sampler: MA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present			✓
Bolts present	✓		
Locked (stickup wells)	✓		

Well Information

Diameter	2
Material	PVC
Depth to water (ft BTOR)	19.27
Depth to bottom (ft BTOR)	29.97
Screen Interval (ft BTOR)	19.68 → 29.68
Total volume purged (gal)	3.0

Sampling Type

Purging Method: geotech Tubing type: HDPE Dedicated pump (Y/N): N
Purge start/stop time: 1315/1340 Tubing diameter: 1/4" Air source: N/A
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020we 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1315	200	19.27	9.98	6.33	666	4.29	25.2	6.99	slightly cloudy
1320	200	19.27	9.97	6.34	689	2.27	39.7	4.21	↓
1325	200	19.27	9.99	6.36	691	2.19	42.1	4.19	
1330	200	19.27	9.96	6.38	697	2.13	43.6	4.18	
1335	200	19.27	9.95	6.37	699	2.10	44.5	4.20	
1340	200	19.27	9.94	6.37	703	2.10	44.9	4.22	↓
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: —

Dedicated Tubing: (Y/N) Y

Comments SHM-B04-Dec 17 @ 1345

MA
Signature

12/18/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: SHP-01-36X

Project: PFAS Sampling DEC 2017 Date: 12/19/17
Location: Fort Devens Massachusetts Sampler: VGL

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present		✓	
Bolts present			✓
Locked (stickup wells)		✓	

Well Information

Diameter	1"
Material	Steel
Depth to water (ft BTOR)	7.64
Depth to bottom (ft BTOR)	12.89
Screen Interval (ft BTOR)	6.96 → 11.98
Total volume purged (gal)	3.0

Sampling Type

Purging Method: geotech
Purge start/stop time: 930/950
Tubing type: HDPE
Tubing diameter: 1/4"
Dedicated pump (Y/N): N
Air source: —
Field Instrument (Model/S/N): —

YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
930	200	7.64	6.09	6.19	312	2.15	37.6	1.29	clear
935	200	7.64	5.99	6.01	307	1.89	26.9	0.92	clear
940	200	7.64	5.99	5.96	305	1.77	23.7	0.89	clear
945	200	7.64	6.03	5.97	304	1.63	22.9	0.87	clear
950	200	7.64	6.02	5.97	303	1.62	22.2	0.86	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N
Filter Size: N/A
Duplicate (Y/N): N
Dup ID/Time: N/A
MS/MSD (Y/N): Y

Dedicated Tubing: (Y/N) N

Comments SHP-01-36X - Dec 17 @ 955

Signature

12/19/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: MW-01

Project: PFAS Sampling DEC 2017 Date: 12/19/17
Location: Fort Devens Massachusetts Sampler: MK

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present			✓
Locked (stickup wells)	✓		

Well Information

Diameter	1"
Material	PVC
Depth to water (ft BTOR)	24.13
Depth to bottom (ft BTOR)	99.76
Screen Interval (ft BTOR)	97.69 → 97.69
Total volume purged (gal)	3.0

Sampling Type

Purging Method geotech Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 1120/1200 Tubing diameter 1/4" Air source —
Field Instrument (Model/S/N) YSI 556 MPS 16A101326 / Lamotte 2020we 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1120	100	24.13	9.59	7.61	382	1.02	9.0	1.27	Clear
1125	100	24.13	9.68	7.50	409	1.18	3.6	0.98	clear
1130	100	24.13	9.70	7.43	480	1.12	-0.3	0.97	Clear
1135	100	24.13	9.85	7.30	502	1.01	-5.0	0.96	Clear
1140	100	24.13	9.86	7.11	518	0.98	-5.7	0.96	Clear
1145	100	24.13	9.82	7.07	532	0.97	-6.9	0.95	clear
1150	100	24.13	9.80	7.06	536	0.96	-7.1	0.95	clear
1155	100	24.13	9.84	7.06	538	0.96	-7.3	0.93	clear
1200	100	24.13	9.86	7.06	539	0.95	-7.4	0.92	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments MW-01-Dec 17 @ 1205

Signature

12/19/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: GM-96-22A

Project: PFAS Sampling DEC 2017 Date: 12/20/17
Location: Fort Devens Massachusetts Sampler: KA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present			✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	5.89
Depth to bottom (ft BTOR)	52.47
Screen Interval (ft BTOR)	42.50 → 52.50
Total volume purged (gal)	3.0

Sampling Type

Purging Method peristaltic Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 845/905 Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
845	200	5.89	10.21	6.54	789	6.39	78.7	2.39	clear
850	200	5.89	10.39	6.39	842	6.34	79.1	1.56	↓
855	200	5.89	10.42	6.23	850	6.33	80.1	1.49	↓
900	200	5.89	10.45	6.22	852	6.32	80.4	1.46	↓
905	200	5.89	10.46	6.21	853	6.32	80.3	1.45	↓
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments GM-96-22A-Dec17 @ 910

KA
Signature

12/20/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 66M-96-22B

Project: PFAS Sampling DEC 2017 Date: 12/19/17
Location: Fort Devens Massachusetts Sampler: MR

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	6.42
Depth to bottom (ft BTOR)	71.94
Screen Interval (ft BTOR)	63.80 → 73.80
Total volume purged (gal)	3.0

Sampling Type

Purging Method Peristaltic Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 940/1005 Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020wE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
940	200	6.42	10.91	6.57	1827	2.49	122.1	2.31	clear
945	200	6.42	11.09	6.54	1832	2.29	114.3	2.11	clear
950	200	6.42	11.15	6.53	1834	2.24	111.3	2.09	clear
955	200	6.42	11.18	6.53	1836	2.23	110.2	2.04	clear
1000	200	6.42	11.20	6.52	1837	2.21	109.6	2.03	clear
1005	200	6.42	11.21	6.52	1838	2.20	109.4	2.03	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments 66M-96-22B-Dec17 @ 1010

Signature

12/20/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 32M-01-14XOB

Project: PFAS Sampling DEC 2017 Date: 12/20/17
Location: Fort Devens Massachusetts Sampler: VH

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		✓
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	26.35
Depth to bottom (ft BTOR)	29.93
Screen Interval (ft BTOR)	19.52 → 29.52
Total volume purged (gal)	3.0

Sampling Type

Purging Method geotech Tubing type HDPE Dedicated pump (Y/N) N/A (hand)
Purge start/stop time 1115/1140 Tubing diameter ¼" Air source N/A
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020LE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1115	200	26.35	10.03	6.35	506	1.47	91.7	3.99	Clear
1120	200	26.44	9.89	6.33	499	0.87	86.9	2.73	Clear
1125	200	26.57	9.62	6.33	495	0.68	83.4	2.69	Clear
1130	200	26.64	9.79	6.34	494	0.67	82.6	2.33	Clear
1135	200	26.72	9.76	6.33	493	0.66	81.9	2.31	Clear
1140	200	26.83	9.80	6.32	491	0.65	80.7	2.39	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments 32M-01-14XOB-Dec 17 @ 1145

VH 12/20/17
Signature Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 32M-01-14XBR

Project: PFAS Sampling DEC 2017 Date: 12/20/17
Location: Fort Devens Massachusetts Sampler: MA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present			✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	26.53
Depth to bottom (ft BTOR)	44.94
Screen Interval (ft BTOR)	35.81 → 45.81
Total volume purged (gal)	5.0

Sampling Type

Purging Method: Geotech
Purge start/stop time: 1220/1240
Tubing type: HDPE
Tubing diameter: 1/4"
Dedicated pump (Y/N): Y (Not used)
Air source: N/A
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020wE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1220	~100	26.53	9.39	6.16	741	2.37	66.6	2.13	clear
1225	100	26.97	9.69	6.34	741	2.33	66.4	1.98	clear
1230	100	27.58	9.73	6.34	742	2.29	65.7	1.97	clear
1235	100	27.99	9.78	6.35	743	2.28	65.3	1.94	clear
1240	100	28.43	9.83	6.35	743	2.26	65.1	1.93	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N
Filter Size: N/A
Duplicate (Y/N): N
Dup ID/Time: N/A
MS/MSD (Y/N): ~~N~~ Y

Dedicated Tubing: (Y/N) N

Comments 32M-01-14XBR- Dec 17 @ 1245

Signature

12/20/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: bbm-04-14X

Project: PFAS Sampling DEC 2017 Date: 12/21/17
Location: Fort Devens Massachusetts Sampler: MK

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present			✓
Bolts present			✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	14.76
Depth to bottom (ft BTOR)	92.73
Screen Interval (ft BTOR)	79.83 → 89.83
Total volume purged (gal)	3.0

Sampling Type

Purging Method geotech Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 900/925 Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
900	150	14.76	10.38	6.80	219	3.72	74.0	5.29	clear
905	159	14.76	10.42	6.47	221	2.01	63.7	4.77	clear
910	150	14.76	10.43	6.36	223	1.79	61.4	4.89	clear
915	150	14.76	10.43	6.35	224	1.62	60.9	4.79	
920	150	14.76	10.47	6.34	226	1.59	59.3	4.78	
925	150	14.76	10.39	6.33	225	1.57	59.1	4.83	
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: DUP @ 930

Dedicated Tubing: (Y/N)

Comments bbm-04-14X- Dec17 @ 930

Signature

12/21/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: MW-95-20X

Project: PFAS Sampling DEC 2017 Date: 12/21/17
Location: Fort Devens Massachusetts Sampler: MK

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	14.23
Depth to bottom (ft BTOR)	24.83
Screen Interval (ft BTOR)	20.31 → 25.31
Total volume purged (gal)	3.0

Sampling Type

Purging Method Geotech Tubing type HDPE Dedicated pump (Y/N) N/A
Purge start/stop time 1100/1135 Tubing diameter 1/4" Air source ~~AA~~
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1100	100	14.23	9.09	5.79	426	0.44	32.7	16.7	cloudy
1105	100	14.23	8.60	5.78	436	0.54	19.9	9.41	partly cloudy
1110	100	14.23	8.49	5.79	437	0.56	17.8	9.23	Partly cloudy
1115	100	14.23	8.47	5.77	439	0.57	13.2	9.39	partly cloudy
1120	100	14.23	8.44	5.76	440	0.60	10.8	9.41	~~Clear~~ partly cloudy
1125	100	14.23	8.46	5.77	441	0.61	9.7	9.31	partly cloudy
1130	100	14.23	8.45	5.74	443	0.62	9.6	9.29	partly cloudy
1135	100	14.23	8.47	5.74	443	0.60	9.3	9.30	partly cloudy
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): Y MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: DUP-04-Dec17 @ 1145
Dedicated Tubing: (Y/N) Y

Comments MW-95-20X-Dec17 @ 1140

Signature

12/21/17
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: XJM-97-13X

Project: PFAS Sampling DEC 2017 Date: 12/21/17
Location: Fort Devens Massachusetts Sampler: MK

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	11.17
Depth to bottom (ft BTOR)	54.18
Screen Interval (ft BTOR)	44.20 → 54.20
Total volume purged (gal)	3.0

Sampling Type

Purging Method peristaltic Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 1305/1335 Tubing diameter 1/4" Air source —
Field Instrument (Model/S/N) — YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1305	100	11.17	10.68	6.87	586	2.45	15.2	3.99	Clear
1310	100	11.17	10.67	6.93	570	0.97	7.8	3.56	clear
1315	100	11.17	10.65	7.08	562	0.49	1.8	3.40	clear
1320	100	11.17	10.59	7.09	543	0.49	-3.6	3.46	clear
1325	100	11.17	10.47	7.11	538	0.47	-5.7	3.47	clear
1330	100	11.17	10.52	7.12	549	0.46	-5.9	3.46	clear
1335	100	11.17	10.54	7.11	542	0.45	-6.3	3.44	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): Y MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: DUP-3-Dec17 @ 1345

Dedicated Tubing: (Y/N)

Comments XJM-97-13X-Dec17 @ 1340

Signature 12/21/17 Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: XJM-94-07X

Project: PFAS Sampling DEC 2017 Date: 1/11/18
Location: Fort Devens Massachusetts Sampler: VMK

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	4"
Material	PVC
Depth to water (ft BTOR)	8.85
Depth to bottom (ft BTOR)	16.49
Screen Interval (ft BTOR)	19.60 - 7 = 29.60
Total volume purged (gal)	4.0

Sampling Type

Purging Method: Geotech
Purge start/stop time: 845/920
Tubing type: HDPE
Tubing diameter: 1/4"
Dedicated pump (Y/N): N
Air source: N/A
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
845	200	8.85	9.48	6.03	568	6.28	85.9	2.48	Clear
850	200	8.85	9.13	5.70	523	6.09	69.7	2.60	Clear
855	200	8.85	9.03	5.66	518	6.09	65.9	2.59	Clear
900	200	8.85	9.06	5.73	503	6.13	67.4	2.57	Clear
905	200	8.85	9.07	5.73	502	6.10	68.7	2.60	Clear
910	200	8.85	9.19	5.74	497	6.09	70.9	2.58	Clear
915	200	8.85	9.18	5.75	496	6.08	71.0	2.57	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N
Filter Size: N/A
Duplicate (Y/N): N
Dup ID/Time: N/A
MS/MSD (Y/N): N

Dedicated Tubing: (Y/N) N

Comments XJM-94-07X Dec17 @ 920

Signature

1/11/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: HA-3B

Project: PFAS Sampling DEC 2017 Date: 1/11/18
Location: Fort Devens Massachusetts Sampler: WA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present	✓(1)		
Locked (stickup wells)			✓

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	10.22
Depth to bottom (ft BTOR)	42.92
Screen Interval (ft BTOR)	23.00 → 43.00
Total volume purged (gal)	3.0

Sampling Type

Purging Method: geotech Tubing type: HDPE Dedicated pump (Y/N): N
Purge start/stop time: 1020/1105 Tubing diameter: 1/4" Air source: N/A
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020WE 22010

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1020	100	10.22	12.60	7.24	378	2.00	40.5	10.68	Clear
1025	100	11.44	12.94	7.24	371	1.13	18.0	8.08	Clear
1030	100	12.02	12.98	7.24	377	1.02	9.9	6.78	Clear
1035	100	12.63	13.08	7.25	376	0.92	3.0	3.49	Clear
1040	100	13.23	13.19	7.27	375	0.87	-12.6	3.42	Clear
1045	100	14.01	13.25	7.28	376	0.84	-18.3	3.37	Clear
1050	100	14.63	13.24	7.27	376	0.83	-23.1	3.36	Clear
1055	100	15.21	13.23	7.26	375	0.82	-24.1	3.40	Clear
1100	100	15.83	13.26	7.25	375	0.83	-24.7	3.37	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) Y

Comments HA-3B- Dec 17 @ 1105

Signature 1/11/18 **Date**

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 32M-01-17XBR

Project: PFAS Sampling DEC 2017 Date: 1/2/18
Location: Fort Devens Massachusetts Sampler: VLR

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present	✓		✓
Locked (stickup wells)			

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	26.89
Depth to bottom (ft BTOR)	54.24
Screen Interval (ft BTOR)	43.79 → 53.79
Total volume purged (gal)	3.0

Sampling Type
Purging Method: Bladder pump
Purge start/stop time: 1050/1115
Tubing type: HDPE
Tubing diameter: 1/4" + 1/4"
Dedicated pump (Y/N): N
Air source: N
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1050	150	26.89	8.81	7.25	1234	0.83	90.9	21.6	partly cloudy
1055	150	26.89	8.47	7.15	1229	0.69	79.9	17.4	"
1100	150	26.89	8.31	6.95	1202	0.52	76.6	17.3	"
1105	150	26.89	8.29	6.94	1200	0.46	74.3	17.1	"
1110	150	26.89	8.37	6.93	1197	0.44	73.9	16.9	"
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details
Field Filtered (Y/N): N
Filter Size: N/A
Duplicate (Y/N): N
Dup ID/Time: N/A
MS/MSD (Y/N): N
Dedicated Tubing: (Y/N) N

Comments 32M-01-17XBR-Dec17 @ 1115

Signature

Date 1/2/18

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: AAFES-7

Project: PFAS Sampling DEC 2017 Date: 1/2/18
Location: Fort Devens Massachusetts Sampler: [illegible]

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		✓
Bolts present	✓		✓
Locked (stickup wells)	✓		

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	11.62
Depth to bottom (ft BTOR)	16.98
Screen Interval (ft BTOR)	6.17 → 16.17
Total volume purged (gal)	3.0

Sampling Type

Purging Method geotech Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 1220/1250 Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1220	200	11.62	7.83	6.14	2488	6.86	109.4	13.1	clear
1225	200	11.62	7.49	6.03	2590	5.97	111.1	10.20	clear
1230	200	11.62	7.35	5.99	2529	5.90	113.2	9.70	clear
1235	200	11.62	7.32	5.98	2531	5.90	114.7	9.67	clear
1240	200	11.62	7.31	5.98	2532	5.87	114.8	9.62	clear
1245	200	11.62	7.30	5.99	2530	5.86	114.9	9.60	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) Y

Comments AAFES-7 - Dec 17 @ 1250

[signature]
Signature

1/2/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: XBM-94-06X

Project: PFAS Sampling DEC 2017 Date: 1/2/18
Location: Fort Devens Massachusetts Sampler: MK

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		✓
Bolts present		✓	
Locked (stickup wells)		✓	

Well Information

Diameter	4"
Material	PVC
Depth to water (ft BTOR)	22.29
Depth to bottom (ft BTOR)	30.18
Screen Interval (ft BTOR)	19.60 → 29.60
Total volume purged (gal)	7.0

Sampling Type

Purging Method: peristaltic Tubing type: HDPE Dedicated pump (Y/N): N
Purge start/stop time: 1355 / 1430 Tubing diameter: 1/4" Air source: N/A
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1355	150	22.29	8.59	7.44	1859	1.52	63.9	12.1	Clear
1400	150	22.29	8.43	7.70	1796	1.68	-21.6	9.99	Clear
1405	150	22.29	8.00	7.80	1778	1.75	-128.3	9.97	Clear
1410	150	22.29	8.07	6.81	1773	1.75	-47.2	8.81	Clear
1415	150	22.29	8.09	6.79	1761	1.77	-40.1	8.79	Clear
1420	150	22.29	8.08	6.78	1757	1.78	-38.7	8.77	Clear
1425	150	22.29	8.07	6.77	1755	1.79	-37.9	8.73	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments XBM-94-06X - Dec17 @ 1430

Signature

1/2/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 66M-01-01X

Project: PFAS Sampling DEC 2017 Date: 1/3/18
Location: Fort Devens Massachusetts Sampler: CLR

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present			✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	64.12
Depth to bottom (ft BTOR)	149.70
Screen Interval (ft BTOR)	137.37 → 152.37
Total volume purged (gal)	3.0

Sampling Type
Purging Method: Bladder pump
Purge start/stop time: 930/1010
Tubing type: HDPE
Tubing diameter: 1/4" + 1/4"
Dedicated pump (Y/N): Y
Air source: Y
Field Instrument (Model/S/N): —
YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm°)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
930	200	64.12	10.27	5.94	790	0.40	56.8	3.47	clear
935	200	64.12	9.99	5.94	870	0.39	51.2	3.36	clear
940	200	64.12	9.97	5.96	873	0.39	47.0	3.21	clear
945	200	64.12	10.12	6.01	888	0.34	39.6	2.97	clear
950	200	64.12	10.39	6.04	905	0.37	33.0	2.99	clear
955	200	64.12	10.36	6.04	912	0.36	29.0	2.97	clear
1000	200	64.12	9.34	6.03	914	0.35	28.7	2.96	clear
1005	200	64.12	10.32	6.03	915	0.36	28.4	2.92	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N
Filter Size: N/A
Duplicate (Y/N): Y
Dup ID/Time: MW
MS/MSD (Y/N): N

Dedicated Tubing: (Y/N) Y

Comments 66M-01-01X-Dec17 @ 1010

Signature

1/3/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 66M-04-07X

Project: PFAS Sampling DEC 2017 Date: 1/31/18
Location: Fort Devens Massachusetts Sampler: MH

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		✓
Bolts present	✓		✓
Locked (stickup wells)	✓		

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	62.22
Depth to bottom (ft BTOR)	131.42
Screen Interval (ft BTOR)	122.68 – 132.68
Total volume purged (gal)	3.0

Sampling Type

Purging Method: Bladder pump Tubing type: MDPE Dedicated pump (Y/N): N
Purge start/stop time: 1200/1235 Tubing diameter: 1/4" x 1/4" Air source: N
Field Instrument (Model/S/N): YSI 556MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1200	200	62.22	12.65	6.15	484	0.59	3.8	2.10	Clear
1205	200	62.22	10.69	6.13	483	0.47	6.2	1.97	Clear
1210	200	62.22	10.75	6.11	469	0.47	7.2	1.90	Clear
1215	200	62.22	10.73	6.07	459	0.46	7.4	1.98	Clear
1220	200	62.22	10.72	6.09	457	0.45	7.6	1.96	Clear
1225	200	62.22	10.70	6.08	457	0.45	7.9	1.94	Clear
1230	200	62.22	10.68	6.08	455	0.44	8.1	1.93	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments 66M-04-07X- Dec 17 @ 1235

Signature

1/31/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 66M-02-06X

Project: PFAS Sampling DEC 2017 Date: 1/8/18
Location: Fort Devens Massachusetts Sampler: [illegible]

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		✓
Bolts present			✓
Locked (stickup wells)	✓		

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	7.43
Depth to bottom (ft BTOR)	66.88
Screen Interval (ft BTOR)	57.05 → 67.05
Total volume purged (gal)	3.0

Sampling Type

Purging Method: Peristaltic Tubing type: HDPE Dedicated pump (Y/N): N
Purge start/stop time: 930/1000 Tubing diameter: 1/4" Air source: N/A
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020LE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
930	150	7.43	9.21	7.50	151	6.49	132.6	2.63	clear
935	150	7.43	9.27	7.33	151	6.19	130.1	2.47	clear
940	150	7.43	9.30	7.21	153	5.47	128.3	2.43	clear
945	150	7.43	9.11	7.18	153	5.46	126.1	2.43	clear
950	150	7.43	9.10	7.15	154	5.33	125.3	2.41	clear
955	150	7.43	9.07	7.14	154	5.31	125.2	2.40	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): Y Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) Y

Comments 66M-02-06X - Dec17 @ 1000

9h
Signature

1/8/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: XSA-12-98X

Project: PFAS Sampling DEC 2017 Date: 1/8/18
Location: Fort Devens Massachusetts Sampler: VDH

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact			✓
Well gripper present		✓	✓
Bolts present			✓
Locked (stickup wells)		✓	

Well Information

Diameter	15"
Material	Steel
Depth to water (ft BTOR)	N/A Micro
Depth to bottom (ft BTOR)	~73'
Screen Interval (ft BTOR)	63.22 → 73.22
Total volume purged (gal)	3.0

Sampling Type

Purging Method: Geotech Tubing type: HDPE Dedicated pump (Y/N): N
Purge start/stop time: 1100/1125 Tubing diameter: 1/4" Air source: N/A
Field Instrument (Model/S/N): YSI 556MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1100	150	N/A	8.39	7.20	605	0.49	57.1	12.9	Clear
1105	150	N/A	8.77	7.15	606	0.48	66.2	9.97	Clear
1110	150	N/A	8.95	7.11	606	0.47	48.0	8.90	Clear
1115	150	N/A	8.99	7.10	607	0.46	47.3	8.88	Clear
1120	150	N/A	8.98	7.10	607	0.46	47.1	8.87	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments XSA-12-98X-Dec17 @ 1125

VDH 1/8/18
Signature Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: SMM-93-24A

Project: PFAS Sampling DEC 2017 Date: 1/8/18
Location: Fort Devens Massachusetts Sampler: MM

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		✓
Bolts present	✓		✓
Locked (stickup wells)	✓		

Well Information

Diameter	4"
Material	PVC
Depth to water (ft BTOR)	16.87
Depth to bottom (ft BTOR)	25.70
Screen Interval (ft BTOR)	16.23 → 26.23
Total volume purged (gal)	3.0

Sampling Type

Purging Method geotech Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 1315 / 1345 Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020wE 22098

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1315	200	16.87	9.67	5.92	589	6.27	93.5	2.62	Clear
1320	200	16.87	9.69	5.90	588	5.09	99.9	2.56	Clear
1325	200	16.87	9.72	5.87	587	4.77	108.4	2.47	Clear
1330	200	16.87	9.77	5.88	586	4.76	109.9	2.46	Clear
1335	200	16.87	9.78	5.90	587	4.73	111.6	2.47	Clear
1340	200	16.87	9.80	5.91	583	4.72	112.3	2.43	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments SMM-93-24A - Dec 17 @ 1345

Signature

1/8/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 57M-03-01X

Project: PFAS Sampling DEC 2017 Date: 1/9/18
Location: Fort Devens Massachusetts Sampler: MW

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	14.78
Depth to bottom (ft BTOR)	20.83
Screen Interval (ft BTOR)	12.40 → 22.40
Total volume purged (gal)	3.0

Sampling Type

Purging Method geotech Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 910/940 Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
910	200	14.78	11.67	5.92	1749	7.30	155.7	2.49	Clear
915	200	14.78	11.59	5.80	1699	5.69	160.3	2.30	Clear
920	200	14.78	11.53	5.73	1682	5.20	161.2	2.21	Clear
925	200	14.78	11.50	5.71	1659	5.19	167.1	2.12	Clear
930	200	14.78	11.49	5.72	1646	5.18	164.0	2.09	Clear
935	200	14.78	11.48	5.72	1642	5.17	164.3	2.08	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) Y

Comments 57M-03-01X- Dec17 @ 940

Signature

1/9/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 57M-03-02X

Project: PFAS Sampling DEC 2017 Date: 1/9/18
Location: Fort Devens Massachusetts Sampler: MA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present		✓	
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	5.31
Depth to bottom (ft BTOR)	13.68
Screen Interval (ft BTOR)	3.80 → 13.80
Total volume purged (gal)	3.0

Sampling Type

Purging Method: Peristaltic Tubing type: MDPE Dedicated pump (Y/N): N
Purge start/stop time: 1010/1040 Tubing diameter: 1/4" Air source: N/A
Field Instrument (Model/S/N): YSI556 MPS 16A104326 / LaMotte 2020WE 2-2090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1000	200	5.31	7.70	5.21	713	1.95	112.3	34.5	partly cloudy
1015	200	5.31	7.57	5.17	723	8.95	113.7	14.6	clear
1020	200	5.31	7.49	5.19	735	0.47	106.3	8.97	clear
1025	200	5.31	7.52	5.20	741	0.49	101.7	8.88	clear
1030	200	5.31	7.54	5.22	744	0.51	100.9	8.79	clear
1035	200	5.31	7.51	5.21	748	0.53	97.7	8.82	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments 57M-03-02X - Dec 17 @ 1040

Signature

1/9/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 57M03-04X

Project: PFAS Sampling DEC 2017 Date: 1/9/18
Location: Fort Devens Massachusetts Sampler: MM

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present		✓	
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	2.41
Depth to bottom (ft BTOR)	12.43
Screen Interval (ft BTOR)	3.80 → 13.80
Total volume purged (gal)	3.0

Sampling Type

Purging Method peristaltic Tubing type MDPE Dedicated pump (Y/N) N
Purge start/stop time 1200/1230 Tubing diameter 1/4" Air source —
Field Instrument (Model/S/N) — YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1200	200	2.41	8.18	5.74	750	0.85	104.4	28.7	Clear
1205	200	2.41	7.81	5.79	752	0.52	105.2	14.2	Clear
1210	200	2.41	7.59	5.81	753	0.49	107.6	13.2	Clear
1215	200	2.41	7.63	5.82	755	0.48	107.1	12.9	Clear
1220	200	2.41	7.64	5.83	756	0.48	108.2	13.0	Clear
1225	200	2.41	7.65	5.85	757	0.47	108.3	12.9	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) Y

Comments 57M-03-04X - Dec 17 @ 1230

Signature

1/9/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 57M-0306X

Project: PFAS Sampling DEC 2017 Date: 1/9/18
Location: Fort Devens Massachusetts Sampler: VH

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present		✓	
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	2.96
Depth to bottom (ft BTOR)	24.57
Screen Interval (ft BTOR)	3.50 → 13.50
Total volume purged (gal)	3.0

Sampling Type

Purging Method: geotech Tubing type: HDPE Dedicated pump (Y/N): N
Purge start/stop time: 1320/1350 Tubing diameter: 1/4" Air source: N/A
Field Instrument (Model/S/N): YSI 556 MPS 16A104326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1320	150	2.96	8.89	5.57	414	3.47	113.2	6.49	clear
1325	150	2.96	8.89	5.67	413	1.97	119.3	6.29	clear
1330	150	2.96	8.90	5.69	412	1.74	122.5	5.97	clear
1335	150	2.96	8.92	5.71	411	1.63	123.7	5.62	clear
1340	150	2.96	8.91	5.72	410	1.59	124.6	5.63	clear
1345	150	2.96	8.93	5.72	410	1.57	125.9	5.60	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): Y MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: DUP-01-Dec17 @ 1355

Dedicated Tubing: (Y/N) N

Comments 57M-03-06X-Dec17 @ 1350

Signature

1/9/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 57M-96-11X

Project: PFAS Sampling DEC 2017 Date: 12/10/18
Location: Fort Devens Massachusetts Sampler: VLA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		✓
Bolts present	✓		✓
Locked (stickup wells)	✓		

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	4.21
Depth to bottom (ft BTOR)	14.63
Screen Interval (ft BTOR)	4-20 → 14-20
Total volume purged (gal)	5-0

Sampling Type

Purging Method geotech Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 1005/1045 Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI 556 MPS 16A101326 / LaMotte 2020WE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1005	150	4.21	7.90	5.93	733	0.50	46.4	66.6	cloudy
1010	150	4.21	7.91	5.88	730	0.48	33.7	63.1	cloudy
1015	150	4.21	7.92	5.85	726	0.47	28.6	52.8	cloudy
1020	150	4.21	7.93	5.84	725	0.44	26.7	38.7	cloudy
1025	150	4.21	7.91	5.84	723	0.45	26.4	34.2	cloudy
1030	150	4.21	7.90	5.86	721	0.46	25.9	35.1	cloudy
1035	150	4.21	7.91	5.86	720	0.45	25.7	33.2	cloudy
1040	150	4.21	7.91	5.86	723	0.44	25.6	35.3	cloudy
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments 57M-96-11X- Dec17 @1045

Signature

12/10/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: 57M-95-03X

Project: PFAS Sampling DEC 2017 Date: 1/10/18
Location: Fort Devens Massachusetts Sampler: VA

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		✓
Bolts present	✓		✓
Locked (stickup wells)	✓		

Well Information

Diameter	4"
Material	PVC
Depth to water (ft BTOR)	11.61
Depth to bottom (ft BTOR)	19.56
Screen Interval (ft BTOR)	9.49 → 19.49
Total volume purged (gal)	3.0

Sampling Type

Purging Method peristaltic Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 1120/1150 Tubing diameter 1/4" Air source N/A
Field Instrument (Model/S/N) YSI 556MPS 16A104326 / LaMotte 2020LE 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1120	200	11.61	8.88	6.07	606	0.50	1.9	9.86	clear
1125	200	11.61	8.97	6.05	609	0.49	0.3	5.21	clear
1130	200	11.61	9.15	6.04	608	0.48	-7.8	4.29	clear
1135	200	11.61	9.17	6.03	611	0.47	-9.6	4.19	clear
1140	200	11.61	9.14	6.04	611	0.47	-9.9	4.14	clear
1145	200	11.61	9.12	6.06	612	0.47	-10.3	4.16	clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) Y

Comments 57M-95-03X-Dec 17 @ 1150

Signature

1/10/18
Date

KOMAN GOVERNMENT SOLUTIONS LLC
Low Flow/ Low Stress Groundwater Sampling Log

Well Identification: XJM-97-11X

Project: PFAS Sampling DEC 2017 Date: 1/10/18
Location: Fort Devens Massachusetts Sampler: VB/A

Well Integrity

	Yes	No	N/A
Casing Secure	✓		
Concrete Pad intact	✓		
PVC casing intact	✓		
Well gripper present	✓		
Bolts present		✓	✓
Locked (stickup wells)		✓	

Well Information

Diameter	2"
Material	PVC
Depth to water (ft BTOR)	11.44
Depth to bottom (ft BTOR)	37.50
Screen Interval (ft BTOR)	27.70 → 37.70
Total volume purged (gal)	3.0

Sampling Type

Purging Method Peristaltic Tubing type HDPE Dedicated pump (Y/N) N
Purge start/stop time 1245/1320 Tubing diameter 1/4" Air source —
Field Instrument (Model/S/N) YSI 556 MPS 16A104326 / LaMotte 2020we# 22090

Stabilization Parameters

Time (hhmm)	Flow Rate (ml/min)	Depth to Water (ft)	Temp (°C)	pH (STD)	SPC (µS/cm^c)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Color/Clarity
1245	100	11.44	8.68	6.66	330	2.43	-5.2	4.69	Clear
1250	100	11.46	8.31	6.69	328	1.97	1.0	4.33	Clear
1255	100	11.48	8.06	6.68	323	1.58	1.1	4.23	Clear
1300	100	11.51	8.09	6.66	321	1.37	1.0	4.19	Clear
1305	100	11.53	8.13	6.66	320	1.34	1.1	4.18	Clear
1310	100	11.55	8.11	6.67	319	1.29	1.2	4.17	Clear
1315	100	11.57	8.09	6.67	317	1.28	1.4	4.18	Clear
Acceptance Criteria:		<0.3ft	±3%	±0.1	±3%	±10%	± 10mv	10%	

2" Screen Volume = 0.163 gal/ft or 616 ml per foot

Sampling Details

Field Filtered (Y/N): N Duplicate (Y/N): N MS/MSD (Y/N): N
Filter Size: N/A Dup ID/Time: N/A

Dedicated Tubing: (Y/N) N

Comments XJM-97-11X-Dec17 @ 1320

Signature

1/10/18
Date

ATTACHMENT 2

Laboratory Reports

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-34594-1
Client Project/Site: Fort Devens / PFAS Dec. 2017

For:
KOMAN Government Solutions, LLC
293 Boston Post Road
Suite 100
Marlborough, Massachusetts 01752

Attn: Laurie Ekes

Jerry Lanier

Authorized for release by:
1/10/2018 5:28:45 PM

Jerry Lanier, Project Manager I
(912)354-7858 e.3410
jerry.lanier@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 320-34594-1

Laboratory: TestAmerica Sacramento

Narrative

CASE NARRATIVE

Client: KOMAN Government Solutions, LLC

Project: Fort Devens / PFAS Dec. 2017

Report Number: 320-34594-1

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

RECEIPT

The samples were received on 12/21/2017; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 4.3 C.

PERFLUORINATED HYDROCARBONS

Samples SHM-10-05A-Dec17 (320-34594-1), SHM-13-03-Dec17 (320-34594-2), SHM-13-04-Dec17 (320-34594-3), SHP-01-36X-Dec17 (320-34594-4), FB-01-Dec17 (320-34594-5) and N5-P1-Dec17 (320-34594-6) were analyzed for Perfluorinated Hydrocarbons in accordance with TestAmerica SOP. The samples were prepared on 12/29/2017 and analyzed on 01/04/2018.

The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

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

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Sample Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34594-1	SHM-10-05A-Dec17	Water	12/18/17 10:30	12/21/17 11:00
320-34594-2	SHM-13-03-Dec17	Water	12/18/17 12:30	12/21/17 11:00
320-34594-3	SHM-13-04-Dec17	Water	12/18/17 13:45	12/21/17 11:00
320-34594-4	SHP-01-36X-Dec17	Water	12/19/17 09:55	12/21/17 11:00
320-34594-5	FB-01-Dec17	Water	12/19/17 10:30	12/21/17 11:00
320-34594-6	N5-P1-Dec17	Water	12/19/17 12:05	12/21/17 11:00

Method Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Qualifiers

LCMS

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
M	Manual integrated compound.

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)

Detection Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

Client Sample ID: SHM-10-05A-Dec17 — Lab Sample ID: 320-34594-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.9		1.8	0.27	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.94	J	1.8	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.1		1.8	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	0.76	J M	3.6	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.47	J	1.8	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	6.2		3.6	0.49	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	4.2	M	3.6	0.78	ng/L	1		537 (modified)	Total/NA

Client Sample ID: SHM-13-03-Dec17 — Lab Sample ID: 320-34594-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.6	M	1.7	0.26	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.6		1.7	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	28		1.7	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	18	M	3.5	0.50	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.26	J	1.7	0.23	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	13		3.5	0.47	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	23	M	3.5	0.73	ng/L	1		537 (modified)	Total/NA

Client Sample ID: SHM-13-04-Dec17 — Lab Sample ID: 320-34594-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.5	J	1.8	0.27	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.5		1.8	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.3		1.8	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	4.1	M	3.5	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.48	J	1.8	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	7.4	M	3.5	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	7.6	M	3.5	0.75	ng/L	1		537 (modified)	Total/NA

Client Sample ID: SHP-01-36X-Dec17 — Lab Sample ID: 320-34594-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.2	J	1.8	0.27	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.9		1.8	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	3.1		1.8	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	4.7		3.6	0.52	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.58	J	1.8	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.0	J	3.6	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	5.5	M	3.6	0.76	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FB-01-Dec17 — Lab Sample ID: 320-34594-5

No Detections.

Client Sample ID: N5-P1-Dec17 — Lab Sample ID: 320-34594-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.0	M	1.9	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.1	M	1.9	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	16		1.9	0.29	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample ID: N5-P1-Dec17 (Continued)

Lab Sample ID: 320-34594-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanoic acid (PFHxA)	8.9	M	3.9	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.57	J	1.9	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.4		3.9	0.52	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	19	M	3.9	0.82	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: SHM-10-05A-Dec17

Lab Sample ID: 320-34594-1

Date Collected: 12/18/17 10:30

Matrix: Water

Date Received: 12/21/17 11:00

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.1	U	18	2.7	ng/L		12/29/17 19:55	01/04/18 04:02	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.1	U	18	2.8	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorobutanesulfonic acid (PFBS)	**2.9**		1.8	0.27	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorodecanoic acid (PFDA)	0.91	U	1.8	0.28	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorododecanoic acid (PFDoA)	1.8	U	3.6	0.50	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluoroheptanoic acid (PFHpA)	**0.94**	**J**	1.8	0.23	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorohexanesulfonic acid (PFHxS)	**8.1**		1.8	0.27	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorohexanoic acid (PFHxA)	**0.76**	**J M**	3.6	0.53	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorononanoic acid (PFNA)	**0.47**	**J**	1.8	0.25	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorooctanesulfonic acid (PFOS)	**6.2**		3.6	0.49	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorooctanoic acid (PFOA)	**4.2**	**M**	3.6	0.78	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorotetradecanoic acid (PFTeA)	0.91	U	1.8	0.26	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluorotridecanoic Acid (PFTriA)	2.7	U	3.6	1.2	ng/L		12/29/17 19:55	01/04/18 04:02	1
Perfluoroundecanoic acid (PFUnA)	2.7	U	3.6	1.0	ng/L		12/29/17 19:55	01/04/18 04:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*106*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C2 PFDoA	*99*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C4-PFHpA	*100*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C2 PFHxA	*102*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C5 PFNA	*104*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C4 PFOA	*100*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C4 PFOS	*99*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C2 PFUnA	*103*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
18O2 PFHxS	*100*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C3-PFBS	*98*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
13C2-PFTeDA	*106*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
d5-NEtFOSAA	*112*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*
d3-NMeFOSAA	*100*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:02*	*1*

Client Sample ID: SHM-13-03-Dec17

Lab Sample ID: 320-34594-2

Date Collected: 12/18/17 12:30

Matrix: Water

Date Received: 12/21/17 11:00

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.6	U	17	2.6	ng/L		12/29/17 19:55	01/04/18 04:10	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.6	U	17	2.7	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorobutanesulfonic acid (PFBS)	**2.6**	**M**	1.7	0.26	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorodecanoic acid (PFDA)	0.86	U	1.7	0.27	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorododecanoic acid (PFDoA)	1.7	U	3.5	0.47	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluoroheptanoic acid (PFHpA)	**8.6**		1.7	0.22	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorohexanesulfonic acid (PFHxS)	**28**		1.7	0.26	ng/L		12/29/17 19:55	01/04/18 04:10	1

Client Sample ID: SHM-13-03-Dec17

Lab Sample ID: 320-34594-2

Date Collected: 12/18/17 12:30

Matrix: Water

Date Received: 12/21/17 11:00

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**18**	**M**	3.5	0.50	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorononanoic acid (PFNA)	**0.26**	**J**	1.7	0.23	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorooctanesulfonic acid (PFOS)	**13**		3.5	0.47	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorooctanoic acid (PFOA)	**23**	**M**	3.5	0.73	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorotetradecanoic acid (PFTeA)	0.86	U	1.7	0.25	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluorotridecanoic Acid (PFTriA)	2.6	U	3.5	1.1	ng/L		12/29/17 19:55	01/04/18 04:10	1
Perfluoroundecanoic acid (PFUnA)	2.6	U	3.5	0.95	ng/L		12/29/17 19:55	01/04/18 04:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*88*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C2 PFDoA	*87*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C4-PFHpA	*89*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C2 PFHxA	*80*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C5 PFNA	*89*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C4 PFOA	*93*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C4 PFOS	*90*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C2 PFUnA	*88*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
18O2 PFHxS	*90*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C3-PFBS	*94*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
13C2-PFTeDA	*93*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
d5-NEtFOSAA	*96*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*
d3-NMeFOSAA	*96*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:10*	*1*

Client Sample ID: SHM-13-04-Dec17

Lab Sample ID: 320-34594-3

Date Collected: 12/18/17 13:45

Matrix: Water

Date Received: 12/21/17 11:00

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.8	U	18	2.7	ng/L		12/29/17 19:55	01/04/18 04:17	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.8	U	18	2.7	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorobutanesulfonic acid (PFBS)	**1.5**	**J**	1.8	0.27	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorodecanoic acid (PFDA)	0.88	U	1.8	0.27	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorododecanoic acid (PFDoA)	1.8	U	3.5	0.49	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluoroheptanoic acid (PFHpA)	**2.5**		1.8	0.22	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorohexanesulfonic acid (PFHxS)	**5.3**		1.8	0.27	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorohexanoic acid (PFHxA)	**4.1**	**M**	3.5	0.51	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorononanoic acid (PFNA)	**0.48**	**J**	1.8	0.24	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorooctanesulfonic acid (PFOS)	**7.4**	**M**	3.5	0.48	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorooctanoic acid (PFOA)	**7.6**	**M**	3.5	0.75	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorotetradecanoic acid (PFTeA)	0.88	U	1.8	0.26	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluorotridecanoic Acid (PFTriA)	2.7	U	3.5	1.1	ng/L		12/29/17 19:55	01/04/18 04:17	1
Perfluoroundecanoic acid (PFUnA)	2.7	U	3.5	0.97	ng/L		12/29/17 19:55	01/04/18 04:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*98*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:17*	*1*
13C2 PFDoA	*99*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:17*	*1*

Client Sample ID: SHM-13-04-Dec17

Lab Sample ID: 320-34594-3

Date Collected: 12/18/17 13:45

Matrix: Water

Date Received: 12/21/17 11:00

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4-PFHpA	102		25 - 150	12/29/17 19:55	01/04/18 04:17	1
13C2 PFHxA	94		25 - 150	12/29/17 19:55	01/04/18 04:17	1
13C5 PFNA	102		25 - 150	12/29/17 19:55	01/04/18 04:17	1
13C4 PFOA	98		25 - 150	12/29/17 19:55	01/04/18 04:17	1
13C4 PFOS	97		25 - 150	12/29/17 19:55	01/04/18 04:17	1
13C2 PFUnA	98		25 - 150	12/29/17 19:55	01/04/18 04:17	1
18O2 PFHxS	97		25 - 150	12/29/17 19:55	01/04/18 04:17	1
13C3-PFBS	99		25 - 150	12/29/17 19:55	01/04/18 04:17	1
13C2-PFTeDA	95		25 - 150	12/29/17 19:55	01/04/18 04:17	1
d5-NEtFOSAA	100		25 - 150	12/29/17 19:55	01/04/18 04:17	1
d3-NMeFOSAA	99		25 - 150	12/29/17 19:55	01/04/18 04:17	1

Client Sample ID: SHP-01-36X-Dec17

Lab Sample ID: 320-34594-4

Date Collected: 12/19/17 09:55

Matrix: Water

Date Received: 12/21/17 11:00

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.9	U	18	2.7	ng/L		12/29/17 19:55	01/04/18 04:25	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.9	U	18	2.8	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorobutanesulfonic acid (PFBS)	**1.2**	**J**	1.8	0.27	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorodecanoic acid (PFDA)	0.89	U	1.8	0.28	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorododecanoic acid (PFDoA)	1.8	U	3.6	0.49	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluoroheptanoic acid (PFHpA)	**2.9**		1.8	0.22	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorohexanesulfonic acid (PFHxS)	**3.1**		1.8	0.27	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorohexanoic acid (PFHxA)	**4.7**		3.6	0.52	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorononanoic acid (PFNA)	**0.58**	**J**	1.8	0.24	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorooctanesulfonic acid (PFOS)	**3.0**	**J**	3.6	0.48	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorooctanoic acid (PFOA)	**5.5**	**M**	3.6	0.76	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorotetradecanoic acid (PFTeA)	0.89	U	1.8	0.26	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluorotridecanoic Acid (PFTriA)	2.7	U	3.6	1.2	ng/L		12/29/17 19:55	01/04/18 04:25	1
Perfluoroundecanoic acid (PFUnA)	2.7	U	3.6	0.98	ng/L		12/29/17 19:55	01/04/18 04:25	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	89		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C2 PFDoA	84		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C4-PFHpA	92		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C2 PFHxA	85		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C5 PFNA	89		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C4 PFOA	86		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C4 PFOS	91		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C2 PFUnA	88		25 - 150	12/29/17 19:55	01/04/18 04:25	1
18O2 PFHxS	89		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C3-PFBS	84		25 - 150	12/29/17 19:55	01/04/18 04:25	1
13C2-PFTeDA	88		25 - 150	12/29/17 19:55	01/04/18 04:25	1
d5-NEtFOSAA	94		25 - 150	12/29/17 19:55	01/04/18 04:25	1
d3-NMeFOSAA	91		25 - 150	12/29/17 19:55	01/04/18 04:25	1

Client Sample ID: FB-01-Dec17

Date Collected: 12/19/17 10:30
Date Received: 12/21/17 11:00

Lab Sample ID: 320-34594-5
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.4	U	17	2.5	ng/L		12/29/17 19:55	01/04/18 04:49	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.4	U	17	2.6	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorobutanesulfonic acid (PFBS)	0.84	U	1.7	0.25	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorodecanoic acid (PFDA)	0.84	U	1.7	0.26	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorododecanoic acid (PFDoA)	1.7	U	3.3	0.46	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluoroheptanoic acid (PFHpA)	0.84	U	1.7	0.21	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorohexanesulfonic acid (PFHxS)	0.84	U	1.7	0.25	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorohexanoic acid (PFHxA)	1.7	U	3.3	0.48	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorononanoic acid (PFNA)	0.84	U	1.7	0.23	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorooctanesulfonic acid (PFOS)	1.7	U	3.3	0.45	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorooctanoic acid (PFOA)	1.7	U	3.3	0.71	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorotetradecanoic acid (PFTeA)	0.84	U	1.7	0.24	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluorotridecanoic Acid (PFTriA)	2.5	U	3.3	1.1	ng/L		12/29/17 19:55	01/04/18 04:49	1
Perfluoroundecanoic acid (PFUnA)	2.5	U	3.3	0.92	ng/L		12/29/17 19:55	01/04/18 04:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*96*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C2 PFDoA	*98*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C4-PFHpA	*92*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C2 PFHxA	*94*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C5 PFNA	*101*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C4 PFOA	*98*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C4 PFOS	*102*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C2 PFUnA	*98*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
18O2 PFHxS	*94*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C3-PFBS	*92*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
13C2-PFTeDA	*107*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
d5-NEtFOSAA	*109*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*
d3-NMeFOSAA	*101*		*25 - 150*	*12/29/17 19:55*	*01/04/18 04:49*	*1*

Client Sample ID: N5-P1-Dec17

Date Collected: 12/19/17 12:05
Date Received: 12/21/17 11:00

Lab Sample ID: 320-34594-6
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.7	U	19	2.9	ng/L		12/29/17 19:55	01/04/18 05:04	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.7	U	19	3.0	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorobutanesulfonic acid (PFBS)	**2.0**	**M**	1.9	0.29	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorodecanoic acid (PFDA)	0.97	U	1.9	0.30	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorododecanoic acid (PFDoA)	1.9	U	3.9	0.53	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluoroheptanoic acid (PFHpA)	**5.1**	**M**	1.9	0.24	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorohexanesulfonic acid (PFHxS)	**16**		1.9	0.29	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorohexanoic acid (PFHxA)	**8.9**	**M**	3.9	0.56	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorononanoic acid (PFNA)	**0.57**	**J**	1.9	0.26	ng/L		12/29/17 19:55	01/04/18 05:04	1

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

Client Sample ID: N5-P1-Dec17
Date Collected: 12/19/17 12:05
Date Received: 12/21/17 11:00

Lab Sample ID: 320-34594-6
Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**8.4**		3.9	0.52	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorooctanoic acid (PFOA)	**19**	**M**	3.9	0.82	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorotetradecanoic acid (PFTeA)	0.97	U	1.9	0.28	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluorotridecanoic Acid (PFTriA)	2.9	U	3.9	1.3	ng/L		12/29/17 19:55	01/04/18 05:04	1
Perfluoroundecanoic acid (PFUnA)	2.9	U	3.9	1.1	ng/L		12/29/17 19:55	01/04/18 05:04	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*101*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C2 PFDoA	*97*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C4-PFHpA	*99*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C2 PFHxA	*99*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C5 PFNA	*101*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C4 PFOA	*101*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C4 PFOS	*100*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C2 PFUnA	*95*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
18O2 PFHxS	*100*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C3-PFBS	*96*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
13C2-PFTeDA	*102*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
d5-NEtFOSAA	*97*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*
d3-NMeFOSAA	*99*		*25 - 150*	*12/29/17 19:55*	*01/04/18 05:04*	*1*

Isotope Dilution Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFDA (25-150)	PFDoA (25-150)	PFHpA (25-150)	PFHxA (25-150)	PFNA (25-150)	PFOA (25-150)	PFOS (25-150)	PFUnA (25-150)
320-34594-1	SHM-10-05A-Dec17	106	99	100	102	104	100	99	103
320-34594-2	SHM-13-03-Dec17	88	87	89	80	89	93	90	88
320-34594-3	SHM-13-04-Dec17	98	99	102	94	102	98	97	98
320-34594-4	SHP-01-36X-Dec17	89	84	92	85	89	86	91	88
320-34594-4 MS	SHP-01-36X-Dec17	87	80	86	86	87	86	94	88
320-34594-4 MSD	SHP-01-36X-Dec17	86	81	87	86	90	88	92	83
320-34594-5	FB-01-Dec17	96	98	92	94	101	98	102	98
320-34594-6	N5-P1-Dec17	101	97	99	99	101	101	100	95
LCS 320-202009/2-A	Lab Control Sample	90	89	87	88	89	89	91	93
LCSD 320-202009/3-A	Lab Control Sample Dup	91	92	94	90	92	92	93	92
MB 320-202009/1-A	Method Blank	102	99	99	98	100	102	102	103

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxS (25-150)	3C3-PFBS (25-150)	PFTDA (25-150)	-NEtFOSA (25-150)	-NMeFOSA (25-150)			
320-34594-1	SHM-10-05A-Dec17	100	98	106	112	100			
320-34594-2	SHM-13-03-Dec17	90	94	93	96	96			
320-34594-3	SHM-13-04-Dec17	97	99	95	100	99			
320-34594-4	SHP-01-36X-Dec17	89	84	88	94	91			
320-34594-4 MS	SHP-01-36X-Dec17	93	90	81	88	91			
320-34594-4 MSD	SHP-01-36X-Dec17	91	89	77	86	91			
320-34594-5	FB-01-Dec17	94	92	107	109	101			
320-34594-6	N5-P1-Dec17	100	96	102	97	99			
LCS 320-202009/2-A	Lab Control Sample	91	90	95	94	97			
LCSD 320-202009/3-A	Lab Control Sample Dup	92	93	103	102	95			
MB 320-202009/1-A	Method Blank	102	98	104	106	107			

Surrogate Legend

PFDA = 13C2 PFDA
PFDoA = 13C2 PFDoA
PFHpA = 13C4-PFHpA
PFHxA = 13C2 PFHxA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFUnA = 13C2 PFUnA
PFHxS = 18O2 PFHxS
13C3-PFBS = 13C3-PFBS
PFTDA = 13C2-PFTeDA
d5-NEtFOSAA = d5-NEtFOSAA
d3-NMeFOSAA = d3-NMeFOSAA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-202009/1-A
Matrix: Water
Analysis Batch: 202595

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 202009

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		12/29/17 19:55	01/04/18 03:38	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.30	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorohexanoic acid (PFHxA)	2.0	U	4.0	0.58	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		12/29/17 19:55	01/04/18 03:38	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		12/29/17 19:55	01/04/18 03:38	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*102*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C2 PFDoA	*99*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C4-PFHpA	*99*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C2 PFHxA	*98*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C5 PFNA	*100*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C4 PFOA	*102*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C4 PFOS	*102*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C2 PFUnA	*103*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
18O2 PFHxS	*102*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C3-PFBS	*98*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
13C2-PFTeDA	*104*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
d5-NEtFOSAA	*106*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*
d3-NMeFOSAA	*107*		*25 - 150*	*12/29/17 19:55*	*01/04/18 03:38*	*1*

Lab Sample ID: LCS 320-202009/2-A
Matrix: Water
Analysis Batch: 202595

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 202009

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	40.0	40.5		ng/L		101	86 - 132
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	40.0	42.9		ng/L		107	87 - 128
Perfluorobutanesulfonic acid (PFBS)	35.4	38.1		ng/L		108	88 - 130
Perfluorodecanoic acid (PFDA)	40.0	44.8		ng/L		112	84 - 123
Perfluorododecanoic acid (PFDoA)	40.0	42.1		ng/L		105	82 - 122
Perfluoroheptanoic acid (PFHpA)	40.0	41.7		ng/L		104	89 - 127

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

Lab Sample ID: LCS 320-202009/2-A
Matrix: Water
Analysis Batch: 202595

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 202009

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			36.4	35.5		ng/L		98	87 - 126		
Perfluorohexanoic acid (PFHxA)			40.0	40.6		ng/L		101	86 - 126		
Perfluorononanoic acid (PFNA)			40.0	40.6		ng/L		102	77 - 137		
Perfluorooctanesulfonic acid (PFOS)			37.1	37.6		ng/L		101	83 - 126		
Perfluorooctanoic acid (PFOA)			40.0	40.3		ng/L		101	80 - 120		
Perfluorotetradecanoic acid (PFTeA)			40.0	42.3		ng/L		106	66 - 120		
Perfluorotridecanoic Acid (PFTriA)			40.0	49.2		ng/L		123	56 - 163		
Perfluoroundecanoic acid (PFUnA)			40.0	35.0		ng/L		88	73 - 122		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFDA	*90*		*25 - 150*
13C2 PFDoA	*89*		*25 - 150*
13C4-PFHpA	*87*		*25 - 150*
13C2 PFHxA	*88*		*25 - 150*
13C5 PFNA	*89*		*25 - 150*
13C4 PFOA	*89*		*25 - 150*
13C4 PFOS	*91*		*25 - 150*
13C2 PFUnA	*93*		*25 - 150*
18O2 PFHxS	*91*		*25 - 150*
13C3-PFBS	*90*		*25 - 150*
13C2-PFTeDA	*95*		*25 - 150*
d5-NEtFOSAA	*94*		*25 - 150*
d3-NMeFOSAA	*97*		*25 - 150*

Lab Sample ID: LCSD 320-202009/3-A
Matrix: Water
Analysis Batch: 202595

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 202009

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)			40.0	39.9		ng/L		100	86 - 132	2	30
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)			40.0	40.9		ng/L		102	87 - 128	5	30
Perfluorobutanesulfonic acid (PFBS)			35.4	36.3		ng/L		103	88 - 130	5	30
Perfluorodecanoic acid (PFDA)			40.0	42.7		ng/L		107	84 - 123	5	30
Perfluorododecanoic acid (PFDoA)			40.0	42.9		ng/L		107	82 - 122	2	30
Perfluoroheptanoic acid (PFHpA)			40.0	37.9		ng/L		95	89 - 127	9	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	35.8		ng/L		98	87 - 126	1	30
Perfluorohexanoic acid (PFHxA)			40.0	39.4		ng/L		98	86 - 126	3	30
Perfluorononanoic acid (PFNA)			40.0	38.8		ng/L		97	77 - 137	5	30

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

Lab Sample ID: LCSD 320-202009/3-A
Matrix: Water
Analysis Batch: 202595

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 202009

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanesulfonic acid (PFOS)			37.1	36.0		ng/L		97	83 - 126	4	30
Perfluorooctanoic acid (PFOA)			40.0	39.0		ng/L		98	80 - 120	3	30
Perfluorotetradecanoic acid (PFTeA)			40.0	40.1		ng/L		100	66 - 120	6	30
Perfluorotridecanoic Acid (PFTriA)			40.0	43.7		ng/L		109	56 - 163	12	30
Perfluoroundecanoic acid (PFUnA)			40.0	36.9		ng/L		92	73 - 122	5	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFDA	*91*		*25 - 150*
13C2 PFDoA	*92*		*25 - 150*
13C4-PFHpA	*94*		*25 - 150*
13C2 PFHxA	*90*		*25 - 150*
13C5 PFNA	*92*		*25 - 150*
13C4 PFOA	*92*		*25 - 150*
13C4 PFOS	*93*		*25 - 150*
13C2 PFUnA	*92*		*25 - 150*
18O2 PFHxS	*92*		*25 - 150*
13C3-PFBS	*93*		*25 - 150*
13C2-PFTeDA	*103*		*25 - 150*
d5-NEtFOSAA	*102*		*25 - 150*
d3-NMeFOSAA	*95*		*25 - 150*

Lab Sample ID: 320-34594-4 MS
Matrix: Water
Analysis Batch: 202595

Client Sample ID: SHP-01-36X-Dec17
Prep Type: Total/NA
Prep Batch: 202009

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.9	U	37.6	36.4		ng/L		97	86 - 132
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.9	U	37.6	37.7		ng/L		100	87 - 128
Perfluorobutanesulfonic acid (PFBS)	1.2	J	33.2	34.9		ng/L		102	88 - 130
Perfluorodecanoic acid (PFDA)	0.89	U	37.6	41.4		ng/L		110	84 - 123
Perfluorododecanoic acid (PFDoA)	1.8	U	37.6	38.8		ng/L		103	82 - 122
Perfluoroheptanoic acid (PFHpA)	2.9		37.6	42.2		ng/L		105	89 - 127
Perfluorohexanesulfonic acid (PFHxS)	3.1		34.2	36.3		ng/L		97	87 - 126
Perfluorohexanoic acid (PFHxA)	4.7		37.6	39.6		ng/L		93	86 - 126
Perfluorononanoic acid (PFNA)	0.58	J	37.6	39.0		ng/L		102	77 - 137
Perfluorooctanesulfonic acid (PFOS)	3.0	J	34.9	36.3	M	ng/L		96	83 - 126
Perfluorooctanoic acid (PFOA)	5.5	M	37.6	42.5		ng/L		98	80 - 120
Perfluorotetradecanoic acid (PFTeA)	0.89	U	37.6	38.9		ng/L		103	66 - 120

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

Lab Sample ID: 320-34594-4 MS
Matrix: Water
Analysis Batch: 202595

Client Sample ID: SHP-01-36X-Dec17
Prep Type: Total/NA
Prep Batch: 202009

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorotridecanoic Acid (PFTriA)	2.7	U	37.6	37.0		ng/L		99	56 - 163
Perfluoroundecanoic acid (PFUnA)	2.7	U	37.6	33.4		ng/L		89	73 - 122

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFDA	*87*		*25 - 150*
13C2 PFDoA	*80*		*25 - 150*
13C4-PFHpA	*86*		*25 - 150*
13C2 PFHxA	*86*		*25 - 150*
13C5 PFNA	*87*		*25 - 150*
13C4 PFOA	*86*		*25 - 150*
13C4 PFOS	*94*		*25 - 150*
13C2 PFUnA	*88*		*25 - 150*
18O2 PFHxS	*93*		*25 - 150*
13C3-PFBS	*90*		*25 - 150*
13C2-PFTeDA	*81*		*25 - 150*
d5-NEtFOSAA	*88*		*25 - 150*
d3-NMeFOSAA	*91*		*25 - 150*

Lab Sample ID: 320-34594-4 MSD
Matrix: Water
Analysis Batch: 202595

Client Sample ID: SHP-01-36X-Dec17
Prep Type: Total/NA
Prep Batch: 202009

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.9	U	34.8	36.2		ng/L		104	86 - 132	1	30
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.9	U	34.8	34.8		ng/L		100	87 - 128	8	30
Perfluorobutanesulfonic acid (PFBS)	1.2	J	30.8	30.6		ng/L		95	88 - 130	13	30
Perfluorodecanoic acid (PFDA)	0.89	U	34.8	36.0		ng/L		103	84 - 123	14	30
Perfluorododecanoic acid (PFDoA)	1.8	U	34.8	36.2		ng/L		104	82 - 122	7	30
Perfluoroheptanoic acid (PFHpA)	2.9		34.8	35.5		ng/L		94	89 - 127	17	30
Perfluorohexanesulfonic acid (PFHxS)	3.1		31.7	32.4		ng/L		92	87 - 126	11	30
Perfluorohexanoic acid (PFHxA)	4.7		34.8	37.6		ng/L		95	86 - 126	5	30
Perfluorononanoic acid (PFNA)	0.58	J	34.8	32.3		ng/L		91	77 - 137	19	30
Perfluorooctanesulfonic acid (PFOS)	3.0	J	32.3	32.8		ng/L		92	83 - 126	10	30
Perfluorooctanoic acid (PFOA)	5.5	M	34.8	38.7		ng/L		95	80 - 120	9	30
Perfluorotetradecanoic acid (PFTeA)	0.89	U	34.8	35.7		ng/L		102	66 - 120	8	30
Perfluorotridecanoic Acid (PFTriA)	2.7	U	34.8	36.5		ng/L		105	56 - 163	1	30
Perfluoroundecanoic acid (PFUnA)	2.7	U	34.8	31.8		ng/L		91	73 - 122	5	30

Isotope Dilution	MSD %Recovery	MSD Qualifier	Limits
13C2 PFDA	86		25 - 150
13C2 PFDoA	81		25 - 150
13C4-PFHpA	87		25 - 150
13C2 PFHxA	86		25 - 150
13C5 PFNA	90		25 - 150
13C4 PFOA	88		25 - 150
13C4 PFOS	92		25 - 150
13C2 PFUnA	83		25 - 150
18O2 PFHxS	91		25 - 150
13C3-PFBS	89		25 - 150
13C2-PFTeDA	77		25 - 150
d5-NEtFOSAA	86		25 - 150
d3-NMeFOSAA	91		25 - 150

QC Association Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

LCMS

Prep Batch: 202009

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34594-1	SHM-10-05A-Dec17	Total/NA	Water	3535	
320-34594-2	SHM-13-03-Dec17	Total/NA	Water	3535	
320-34594-3	SHM-13-04-Dec17	Total/NA	Water	3535	
320-34594-4	SHP-01-36X-Dec17	Total/NA	Water	3535	
320-34594-5	FB-01-Dec17	Total/NA	Water	3535	
320-34594-6	N5-P1-Dec17	Total/NA	Water	3535	
MB 320-202009/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-202009/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-202009/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
320-34594-4 MS	SHP-01-36X-Dec17	Total/NA	Water	3535	
320-34594-4 MSD	SHP-01-36X-Dec17	Total/NA	Water	3535	

Analysis Batch: 202595

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34594-1	SHM-10-05A-Dec17	Total/NA	Water	537 (modified)	202009
320-34594-2	SHM-13-03-Dec17	Total/NA	Water	537 (modified)	202009
320-34594-3	SHM-13-04-Dec17	Total/NA	Water	537 (modified)	202009
320-34594-4	SHP-01-36X-Dec17	Total/NA	Water	537 (modified)	202009
320-34594-5	FB-01-Dec17	Total/NA	Water	537 (modified)	202009
320-34594-6	N5-P1-Dec17	Total/NA	Water	537 (modified)	202009
MB 320-202009/1-A	Method Blank	Total/NA	Water	537 (modified)	202009
LCS 320-202009/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	202009
LCSD 320-202009/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	202009
320-34594-4 MS	SHP-01-36X-Dec17	Total/NA	Water	537 (modified)	202009
320-34594-4 MSD	SHP-01-36X-Dec17	Total/NA	Water	537 (modified)	202009

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

Client Sample ID: SHM-10-05A-Dec17
Lab Sample ID: 320-34594-1
Date Collected: 12/18/17 10:30
Matrix: Water
Date Received: 12/21/17 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			274 mL	10.00 mL	202009	12/29/17 19:55	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202595	01/04/18 04:02	ABH	TAL SAC

Client Sample ID: SHM-13-03-Dec17
Lab Sample ID: 320-34594-2
Date Collected: 12/18/17 12:30
Matrix: Water
Date Received: 12/21/17 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			289.6 mL	10.00 mL	202009	12/29/17 19:55	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202595	01/04/18 04:10	ABH	TAL SAC

Client Sample ID: SHM-13-04-Dec17
Lab Sample ID: 320-34594-3
Date Collected: 12/18/17 13:45
Matrix: Water
Date Received: 12/21/17 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			283 mL	10.00 mL	202009	12/29/17 19:55	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202595	01/04/18 04:17	ABH	TAL SAC

Client Sample ID: SHP-01-36X-Dec17
Lab Sample ID: 320-34594-4
Date Collected: 12/19/17 09:55
Matrix: Water
Date Received: 12/21/17 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			279.4 mL	10.00 mL	202009	12/29/17 19:55	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202595	01/04/18 04:25	ABH	TAL SAC

Client Sample ID: FB-01-Dec17
Lab Sample ID: 320-34594-5
Date Collected: 12/19/17 10:30
Matrix: Water
Date Received: 12/21/17 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			299 mL	10.00 mL	202009	12/29/17 19:55	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202595	01/04/18 04:49	ABH	TAL SAC

Client Sample ID: N5-P1-Dec17
Lab Sample ID: 320-34594-6
Date Collected: 12/19/17 12:05
Matrix: Water
Date Received: 12/21/17 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			258.2 mL	10.00 mL	202009	12/29/17 19:55	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202595	01/04/18 05:04	ABH	TAL SAC

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

Laboratory References:

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

PO #	New	Devens - PFAS Dec 2017 Sampling 1082-112	**Chain of Custody Record**	360-Westfield	Page: 1	of: 1

Company	KOMAN GS, LLC	Laboratory:	Test America - Savannah
Address:	293 Boston Post Road West, Suite 100 Marlborough, MA 01752	Address:	510 LaRoche Ave Savannah, GA 31404
Phone: 508-366-7442	Fax: 508-366-7445	Contact:	Jerry Lanier
Sampled by [Print Name(s)]/Affilliation	Kara L Anderson	Project Name:	Devens Additional PFAS
Sampler(s) Signature(s)		Sampling QAP No.:	
		Approval Date:	
		TAT	Routine
		Other:	

Item No.	Field ID No.	Sampled Date	Sampled Time	Col. Method (see codes)	Matrix (see codes)	Number of Containers	PFAS (Method 537-modified) 2-250ml HDPE	Remarks	Lab. No.
	SHM-1005A-Dec 17	12/18	1030	P	GW	2	✓		
	SHM-1303-Dec 17	12/18	1230	P	GW	2	✓		
	SHM-13-04-Dec 17	12/18	1345	P	GW	2	✓		
	SHP-91-36X-Dec 17	12/19	955	P	GW	6 ~~2~~	✓	MS/MSD	
	FB-01- Dec 17	12/19	1030	P	~~GW~~ DI	2	✓		
	MS-91- Dec 17	12/19	1205	P	GW	2	✓		

Preservatives (see codes): I

Analyses Requested

320-34594 Chain of Custody

Shipping Details	courier pick up	10	← Total Number of Containers

Date Out:	Via:	Item No.	Relinquished by/Affiliation	Date	Time		Date	Time
Returned:	Via:			12/19/17	1325		12/19/17	1325
Additional Comments:				12/19/17	1515		12/20/17	1100

email logins and results to:

lekes@komangs.com

Lab Comments

Preserve Where Applicable ☐

On ICE ☐

Temperature _____C

MATRIX CODES:	GW = Groundwater	SW = Surface Water	O = Other
PRESERVATIVE CODES:	I = Ice Only		O = Other
COLLECTION METHOD CODES:	G=Grab	P= Pumping	O = Other

Login Sample Receipt Checklist

Client: KOMAN Government Solutions, LLC

Job Number: 320-34594-1

Login Number: 34594
List Number: 1
Creator: Nelson, Kym D

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

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	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17 *
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17 *
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Savannah

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		SAVLAB	
Alabama	State Program	4	41450	06-30-18
Alaska	State Program	10		06-30-18
Alaska (UST)	State Program	10	UST-104	09-22-19
Arizona	State Program	9	AZ808	12-14-18
Arkansas DEQ	State Program	6	88-0692	02-01-19
California	State Program	9	2939	06-30-18
Colorado	State Program	8	N/A	12-31-18
Connecticut	State Program	1	PH-0161	03-31-19
Florida	NELAP	4	E87052	06-30-18
GA Dept. of Agriculture	State Program	4	N/A	06-12-18
Georgia	State Program	4	803	06-30-18
Guam	State Program	9	15-005r	04-16-18
Hawaii	State Program	9	N/A	06-30-18
Illinois	NELAP	5	200022	11-30-18
Indiana	State Program	5	N/A	06-30-18

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

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34594-1

Laboratory: TestAmerica Savannah (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
Iowa	State Program	7	353	06-30-19
Kentucky (DW)	State Program	4	90084	12-31-18
Kentucky (UST)	State Program	4	18	06-30-18
Kentucky (WW)	State Program	4	90084	12-31-18 *
L-A-B	DoD ELAP		L2463	09-22-19
L-A-B	ISO/IEC 17025		L2463.01	09-22-19
Louisiana	NELAP	6	30690	06-30-18
Louisiana (DW)	NELAP	6	LA160019	12-31-18
Maine	State Program	1	GA00006	09-24-18
Maryland	State Program	3	250	12-31-18
Massachusetts	State Program	1	M-GA006	06-30-18
Michigan	State Program	5	9925	06-30-18
Mississippi	State Program	4	N/A	06-30-18
Nebraska	State Program	7	TestAmerica-Savannah	06-30-18
New Jersey	NELAP	2	GA769	06-30-18
New Mexico	State Program	6	N/A	06-30-18
New York	NELAP	2	10842	03-31-18
North Carolina (DW)	State Program	4	13701	07-31-18
North Carolina (WW/SW)	State Program	4	269	12-31-18
Oklahoma	State Program	6	9984	08-31-18
Pennsylvania	NELAP	3	68-00474	06-30-18
Puerto Rico	State Program	2	GA00006	12-31-18
South Carolina	State Program	4	98001	06-30-18
Tennessee	State Program	4	TN02961	06-30-18
Texas	NELAP	6	T104704185-16-9	11-30-18
Texas	State Program	6	T104704185	06-30-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		SAV 3-04	06-14-20 *
Virginia	NELAP	3	460161	06-14-18
Washington	State Program	10	C805	06-10-18
West Virginia DEP	State Program	3	094	06-30-18
Wisconsin	State Program	5	999819810	08-31-18
Wyoming	State Program	8	8TMS-L	06-30-16 *

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-34597-1
Client Project/Site: Fort Devens / PFAS Dec. 2017

For:
KOMAN Government Solutions, LLC
293 Boston Post Road
Suite 100
Marlborough, Massachusetts 01752

Attn: Laurie Ekes

Jerry Lanier

Authorized for release by:
1/12/2018 12:42:35 PM

Jerry Lanier, Project Manager I
(912)354-7858 e.3410
jerry.lanier@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 320-34597-1

Laboratory: TestAmerica Sacramento

Narrative

CASE NARRATIVE

Client: KOMAN Government Solutions, LLC

Project: Fort Devens / PFAS Dec. 2017

Report Number: 320-34597-1

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

RECEIPT

The samples were received on 12/22/2017; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 0.4 C.

PERFLUORINATED HYDROCARBONS

Samples G6M-96-22A-Dec17 (320-34597-1), G6M-96-22B-Dec17 (320-34597-2), 32M-01-14X08-Dec17 (320-34597-3), 32M-01-14XBR-Dec17 (320-34597-4), G6M-04-14X-Dec17 (320-34597-5), G6M-95-20X-Dec17 (320-34597-6), DUP-04-Dec17 (320-34597-7), XJM-97-13X-Dec17 (320-34597-8) and DUP-03-Dec17 (320-34597-9) were analyzed for Perfluorinated Hydrocarbons in accordance with TestAmerica SOP. The samples were prepared on 01/03/2018 and 01/04/2018 and analyzed on 01/05/2018 and 01/07/2018.

The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

The following samples: G6M-04-14X-Dec17 (320-34597-5) and DUP-04-Dec17 (320-34597-7) were decanted prior to extraction due to containing excess sediment that had the potential to clog the solid phase column.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-202572.

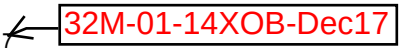
No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Sample Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34597-1	G6M-96-22A-Dec17	Water	12/20/17 09:10	12/22/17 11:15
320-34597-2	G6M-96-22B-Dec17	Water	12/20/17 10:10	12/22/17 11:15
320-34597-3	32M-01-14X08-Dec17	Water	12/20/17 11:45	12/22/17 11:15
320-34597-4	32M-01-14XBR-Dec17	Water	12/20/17 12:45	12/22/17 11:15
320-34597-5	G6M-04-14X-Dec17	Water	12/21/17 09:30	12/22/17 11:15
320-34597-6	G6M-95-20X-Dec17	Water	12/21/17 11:40	12/22/17 11:15
320-34597-7	DUP-04-Dec17	Water	12/21/17 11:45	12/22/17 11:15
320-34597-8	XJM-97-13X-Dec17	Water	12/21/17 13:40	12/22/17 11:15
320-34597-9	DUP-03-Dec17	Water	12/21/17 13:45	12/22/17 11:15



Method Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Qualifiers

LCMS

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
M	Manual integrated compound.
J	Estimated: The analyte was positively identified; the quantitation is an estimation

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)

Detection Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

Client Sample ID: G6M-96-22A-Dec17 — Lab Sample ID: 320-34597-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	5.4	M	1.8	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.55	J	1.8	0.28	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.2		1.8	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	130		1.8	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	21		3.6	0.52	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	2.8		1.8	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	150		3.6	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	31	M	3.6	0.76	ng/L	1		537 (modified)	Total/NA

Client Sample ID: G6M-96-22B-Dec17 — Lab Sample ID: 320-34597-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.9	M	1.7	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.38	J	1.7	0.27	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.5		1.7	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	130		1.7	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	12	M	3.5	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	2.1		1.7	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	180		3.5	0.47	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	24	M	3.5	0.74	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 32M-01-14X08-Dec17 — Lab Sample ID: 320-34597-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.2	J	1.8	0.26	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.0		1.8	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.4		1.8	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	4.5	M	3.5	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.72	J	1.8	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	8.2		3.5	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	11	M	3.5	0.75	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 32M-01-14XBR-Dec17 — Lab Sample ID: 320-34597-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.6	J M	2.1	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.74	J	2.1	0.32	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.2		2.1	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.4		2.1	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	7.5	M	4.1	0.60	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.5	J	2.1	0.28	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	36		4.1	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	21	M	4.1	0.88	ng/L	1		537 (modified)	Total/NA

Client Sample ID: G6M-04-14X-Dec17 — Lab Sample ID: 320-34597-5

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	6.4	M	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	1.5	J	2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	14	M	2.0	0.25	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample ID: G6M-04-14X-Dec17 (Continued) — Lab Sample ID: 320-34597-5

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	58		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	19	M	4.1	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	4.8		2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	30		4.1	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	45	M	4.1	0.86	ng/L	1		537 (modified)	Total/NA

Client Sample ID: G6M-95-20X-Dec17 — Lab Sample ID: 320-34597-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.7	J M	2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.9	M	2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	59		2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	5.4	M	4.1	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	19		4.1	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	17		4.1	0.87	ng/L	1		537 (modified)	Total/NA

Client Sample ID: DUP-04-Dec17 — Lab Sample ID: 320-34597-7

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.9	J M	2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.0		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	57		2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	5.3	M	4.1	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	22		4.1	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	16		4.1	0.87	ng/L	1		537 (modified)	Total/NA

Client Sample ID: XJM-97-13X-Dec17 — Lab Sample ID: 320-34597-8

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	0.39	J M	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.41	J	2.0	0.30	ng/L	1		537 (modified)	Total/NA

Client Sample ID: DUP-03-Dec17 — Lab Sample ID: 320-34597-9

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.34	J	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	0.73	J M	4.0	0.59	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: G6M-96-22A-Dec17

Lab Sample ID: 320-34597-1

Date Collected: 12/20/17 09:10

Matrix: Water

Date Received: 12/22/17 11:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.9	U	18	2.7	ng/L		01/03/18 16:50	01/05/18 07:43	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.9	U	18	2.8	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorobutanesulfonic acid (PFBS)	**5.4**	**M**	1.8	0.27	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorodecanoic acid (PFDA)	**0.55**	**J**	1.8	0.28	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorododecanoic acid (PFDoA)	1.8	U	3.6	0.49	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluoroheptanoic acid (PFHpA)	**6.2**		1.8	0.22	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorohexanesulfonic acid (PFHxS)	**130**		1.8	0.27	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorohexanoic acid (PFHxA)	**21**		3.6	0.52	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorononanoic acid (PFNA)	**2.8**		1.8	0.24	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorooctanesulfonic acid (PFOS)	**150**		3.6	0.48	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorooctanoic acid (PFOA)	**31**	**M**	3.6	0.76	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorotetradecanoic acid (PFTeA)	0.89	U	1.8	0.26	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluorotridecanoic Acid (PFTriA)	2.7	U	3.6	1.2	ng/L		01/03/18 16:50	01/05/18 07:43	1
Perfluoroundecanoic acid (PFUnA)	2.7	U	3.6	0.98	ng/L		01/03/18 16:50	01/05/18 07:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*82*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C2 PFDoA	*80*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C4-PFHpA	*80*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C2 PFHxA	*80*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C5 PFNA	*80*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C4 PFOA	*80*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C4 PFOS	*83*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C2 PFUnA	*82*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
18O2 PFHxS	*82*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C3-PFBS	*82*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
13C2-PFTeDA	*80*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
d5-NEtFOSAA	*95*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*
d3-NMeFOSAA	*91*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:43*	*1*

Client Sample ID: G6M-96-22B-Dec17

Lab Sample ID: 320-34597-2

Date Collected: 12/20/17 10:10

Matrix: Water

Date Received: 12/22/17 11:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.7	U	17	2.6	ng/L		01/03/18 16:50	01/05/18 07:51	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.7	U	17	2.7	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorobutanesulfonic acid (PFBS)	**4.9**	**M**	1.7	0.26	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorodecanoic acid (PFDA)	**0.38**	**J**	1.7	0.27	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorododecanoic acid (PFDoA)	1.7	U	3.5	0.48	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluoroheptanoic acid (PFHpA)	**4.5**		1.7	0.22	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorohexanesulfonic acid (PFHxS)	**130**		1.7	0.26	ng/L		01/03/18 16:50	01/05/18 07:51	1

Client Sample ID: G6M-96-22B-Dec17

Lab Sample ID: 320-34597-2

Date Collected: 12/20/17 10:10

Matrix: Water

Date Received: 12/22/17 11:15

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**12**	**M**	3.5	0.51	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorononanoic acid (PFNA)	**2.1**		1.7	0.24	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorooctanesulfonic acid (PFOS)	**180**		3.5	0.47	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorooctanoic acid (PFOA)	**24**	**M**	3.5	0.74	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorotetradecanoic acid (PFTeA)	0.87	U	1.7	0.25	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluorotridecanoic Acid (PFTriA)	2.6	U	3.5	1.1	ng/L		01/03/18 16:50	01/05/18 07:51	1
Perfluoroundecanoic acid (PFUnA)	2.6	U	3.5	0.96	ng/L		01/03/18 16:50	01/05/18 07:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*89*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C2 PFDoA	*80*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C4-PFHpA	*82*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C2 PFHxA	*84*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C5 PFNA	*83*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C4 PFOA	*85*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C4 PFOS	*89*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C2 PFUnA	*81*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
18O2 PFHxS	*86*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C3-PFBS	*86*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
13C2-PFTeDA	*82*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
d5-NEtFOSAA	*89*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*
d3-NMeFOSAA	*90*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:51*	*1*

Client Sample ID: 32M-01-14X08-Dec17

Lab Sample ID: 320-34597-3

Date Collected: 12/20/17 11:45

Matrix: Water

Date Received: 12/22/17 11:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.8	U	18	2.6	ng/L		01/03/18 16:50	01/05/18 07:59	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.8	U	18	2.7	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorobutanesulfonic acid (PFBS)	**1.2**	**J**	1.8	0.26	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorodecanoic acid (PFDA)	0.88	U	1.8	0.27	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorododecanoic acid (PFDoA)	1.8	U	3.5	0.48	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluoroheptanoic acid (PFHpA)	**3.0**		1.8	0.22	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorohexanesulfonic acid (PFHxS)	**4.4**		1.8	0.26	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorohexanoic acid (PFHxA)	**4.5**	**M**	3.5	0.51	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorononanoic acid (PFNA)	**0.72**	**J**	1.8	0.24	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorooctanesulfonic acid (PFOS)	**8.2**		3.5	0.48	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorooctanoic acid (PFOA)	**11**	**M**	3.5	0.75	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorotetradecanoic acid (PFTeA)	0.88	U	1.8	0.26	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluorotridecanoic Acid (PFTriA)	2.6	U	3.5	1.1	ng/L		01/03/18 16:50	01/05/18 07:59	1
Perfluoroundecanoic acid (PFUnA)	2.6	U	3.5	0.97	ng/L		01/03/18 16:50	01/05/18 07:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*74*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:59*	*1*
13C2 PFDoA	*65*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:59*	*1*

Client Sample ID: 32M-01-14X08-Dec17

Lab Sample ID: 320-34597-3
Date Collected: 12/20/17 11:45
Matrix: Water
Date Received: 12/22/17 11:15

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4-PFHpA	74		25 - 150	01/03/18 16:50	01/05/18 07:59	1
13C2 PFHxA	67		25 - 150	01/03/18 16:50	01/05/18 07:59	1
13C5 PFNA	70		25 - 150	01/03/18 16:50	01/05/18 07:59	1
13C4 PFOA	70		25 - 150	01/03/18 16:50	01/05/18 07:59	1
13C4 PFOS	71		25 - 150	01/03/18 16:50	01/05/18 07:59	1
13C2 PFUnA	68		25 - 150	01/03/18 16:50	01/05/18 07:59	1
18O2 PFHxS	75		25 - 150	01/03/18 16:50	01/05/18 07:59	1
13C3-PFBS	73		25 - 150	01/03/18 16:50	01/05/18 07:59	1
13C2-PFTeDA	64		25 - 150	01/03/18 16:50	01/05/18 07:59	1
d5-NEtFOSAA	76		25 - 150	01/03/18 16:50	01/05/18 07:59	1
d3-NMeFOSAA	74		25 - 150	01/03/18 16:50	01/05/18 07:59	1

Client Sample ID: 32M-01-14XBR-Dec17

Lab Sample ID: 320-34597-4
Date Collected: 12/20/17 12:45
Matrix: Water
Date Received: 12/22/17 11:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	21	3.1	ng/L		01/03/18 16:50	01/05/18 08:07	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	21	3.2	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorobutanesulfonic acid (PFBS)	**1.6**	**J M**	2.1	0.31	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorodecanoic acid (PFDA)	**0.74**	**J**	2.1	0.32	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorododecanoic acid (PFDoA)	2.1	U	4.1	0.57	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluoroheptanoic acid (PFHpA)	**5.2**		2.1	0.26	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorohexanesulfonic acid (PFHxS)	**8.4**		2.1	0.31	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorohexanoic acid (PFHxA)	**7.5**	**M**	4.1	0.60	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorononanoic acid (PFNA)	**1.5**	**J**	2.1	0.28	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorooctanesulfonic acid (PFOS)	**36**		4.1	0.56	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorooctanoic acid (PFOA)	**21**	**M**	4.1	0.88	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.1	0.30	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluorotridecanoic Acid (PFTriA)	3.1	U	4.1	1.3	ng/L		01/03/18 16:50	01/05/18 08:07	1
Perfluoroundecanoic acid (PFUnA)	3.1	U M	4.1	1.1	ng/L		01/03/18 16:50	01/05/18 08:07	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	78		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C2 PFDoA	72		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C4-PFHpA	73		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C2 PFHxA	73		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C5 PFNA	71		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C4 PFOA	78		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C4 PFOS	77		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C2 PFUnA	73		25 - 150	01/03/18 16:50	01/05/18 08:07	1
18O2 PFHxS	80		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C3-PFBS	80		25 - 150	01/03/18 16:50	01/05/18 08:07	1
13C2-PFTeDA	74		25 - 150	01/03/18 16:50	01/05/18 08:07	1
d5-NEtFOSAA	80		25 - 150	01/03/18 16:50	01/05/18 08:07	1
d3-NMeFOSAA	76		25 - 150	01/03/18 16:50	01/05/18 08:07	1

Client Sample ID: G6M-04-14X-Dec17

Lab Sample ID: 320-34597-5

Date Collected: 12/21/17 09:30

Matrix: Water

Date Received: 12/22/17 11:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/04/18 14:57	01/07/18 09:46	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorobutanesulfonic acid (PFBS)	**6.4**	**M**	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorodecanoic acid (PFDA)	**1.5**	**J**	2.0	0.31	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.1	0.56	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluoroheptanoic acid (PFHpA)	**14**	**M**	2.0	0.25	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorohexanesulfonic acid (PFHxS)	**58**		2.0	0.30	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorohexanoic acid (PFHxA)	**19**	**M**	4.1	0.59	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorononanoic acid (PFNA)	**4.8**		2.0	0.27	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorooctanesulfonic acid (PFOS)	**30**		4.1	0.55	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorooctanoic acid (PFOA)	**45**	**M**	4.1	0.86	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.1	1.3	ng/L		01/04/18 14:57	01/07/18 09:46	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.1	1.1	ng/L		01/04/18 14:57	01/07/18 09:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*100*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C2 PFDoA	*99*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C4-PFHpA	*92*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C2 PFHxA	*89*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C5 PFNA	*99*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C4 PFOA	*97*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C4 PFOS	*97*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C2 PFUnA	*100*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
18O2 PFHxS	*95*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C3-PFBS	*93*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
13C2-PFTeDA	*90*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
d5-NEtFOSAA	*130*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*
d3-NMeFOSAA	*123*		*25 - 150*	*01/04/18 14:57*	*01/07/18 09:46*	*1*

Client Sample ID: G6M-95-20X-Dec17

Lab Sample ID: 320-34597-6

Date Collected: 12/21/17 11:40

Matrix: Water

Date Received: 12/22/17 11:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.1	ng/L		01/04/18 14:57	01/07/18 10:17	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.2	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorobutanesulfonic acid (PFBS)	**1.7**	**J M**	2.0	0.31	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.32	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.1	0.56	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluoroheptanoic acid (PFHpA)	**2.9**	**M**	2.0	0.25	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorohexanesulfonic acid (PFHxS)	**59**		2.0	0.31	ng/L		01/04/18 14:57	01/07/18 10:17	1

Client Sample ID: G6M-95-20X-Dec17

Lab Sample ID: 320-34597-6

Date Collected: 12/21/17 11:40
Matrix: Water
Date Received: 12/22/17 11:15

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**5.4**	**M**	4.1	0.59	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.28	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorooctanesulfonic acid (PFOS)	**19**		4.1	0.55	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorooctanoic acid (PFOA)	**17**		4.1	0.87	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluorotridecanoic Acid (PFTriA)	3.1	U	4.1	1.3	ng/L		01/04/18 14:57	01/07/18 10:17	1
Perfluoroundecanoic acid (PFUnA)	3.1	U	4.1	1.1	ng/L		01/04/18 14:57	01/07/18 10:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*96*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C2 PFDoA	*93*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C4-PFHpA	*89*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C2 PFHxA	*92*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C5 PFNA	*94*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C4 PFOA	*93*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C4 PFOS	*96*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C2 PFUnA	*96*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
18O2 PFHxS	*92*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C3-PFBS	*97*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
13C2-PFTeDA	*91*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
d5-NEtFOSAA	*109*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*
d3-NMeFOSAA	*116*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:17*	*1*

Client Sample ID: DUP-04-Dec17

Lab Sample ID: 320-34597-7

Date Collected: 12/21/17 11:45
Matrix: Water
Date Received: 12/22/17 11:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.1	ng/L		01/04/18 14:57	01/07/18 10:25	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.2	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorobutanesulfonic acid (PFBS)	**1.9**	**J M**	2.0	0.31	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.32	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.1	0.56	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluoroheptanoic acid (PFHpA)	**3.0**		2.0	0.25	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorohexanesulfonic acid (PFHxS)	**57**		2.0	0.31	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorohexanoic acid (PFHxA)	**5.3**	**M**	4.1	0.59	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.28	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorooctanesulfonic acid (PFOS)	**22**		4.1	0.55	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorooctanoic acid (PFOA)	**16**		4.1	0.87	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluorotridecanoic Acid (PFTriA)	3.1	U	4.1	1.3	ng/L		01/04/18 14:57	01/07/18 10:25	1
Perfluoroundecanoic acid (PFUnA)	3.1	U	4.1	1.1	ng/L		01/04/18 14:57	01/07/18 10:25	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*126*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:25*	*1*
13C2 PFDoA	*120*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:25*	*1*

Client Sample ID: DUP-04-Dec17

Lab Sample ID: 320-34597-7
Matrix: Water
Date Collected: 12/21/17 11:45
Date Received: 12/22/17 11:15

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4-PFHpA	122		25 - 150	01/04/18 14:57	01/07/18 10:25	1
13C2 PFHxA	119		25 - 150	01/04/18 14:57	01/07/18 10:25	1
13C5 PFNA	122		25 - 150	01/04/18 14:57	01/07/18 10:25	1
13C4 PFOA	124		25 - 150	01/04/18 14:57	01/07/18 10:25	1
13C4 PFOS	121		25 - 150	01/04/18 14:57	01/07/18 10:25	1
13C2 PFUnA	120		25 - 150	01/04/18 14:57	01/07/18 10:25	1
18O2 PFHxS	125		25 - 150	01/04/18 14:57	01/07/18 10:25	1
13C3-PFBS	130	M	25 - 150	01/04/18 14:57	01/07/18 10:25	1
13C2-PFTeDA	135		25 - 150	01/04/18 14:57	01/07/18 10:25	1
d5-NEtFOSAA	139		25 - 150	01/04/18 14:57	01/07/18 10:25	1
d3-NMeFOSAA	142		25 - 150	01/04/18 14:57	01/07/18 10:25	1

Client Sample ID: XJM-97-13X-Dec17

Lab Sample ID: 320-34597-8
Matrix: Water
Date Collected: 12/21/17 13:40
Date Received: 12/22/17 11:15

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.9	U	20	3.0	ng/L		01/04/18 14:57	01/07/18 10:33	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.9	U	20	3.1	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorobutanesulfonic acid (PFBS)	**0.39**	**J M**	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorodecanoic acid (PFDA)	0.99	U	2.0	0.31	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.54	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluoroheptanoic acid (PFHpA)	0.99	U	2.0	0.25	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorohexanesulfonic acid (PFHxS)	**0.41**	**J**	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorohexanoic acid (PFHxA)	2.0	U	4.0	0.57	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorononanoic acid (PFNA)	0.99	U	2.0	0.27	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.53	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.84	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorotetradecanoic acid (PFTeA)	0.99	U	2.0	0.29	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/04/18 14:57	01/07/18 10:33	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/04/18 14:57	01/07/18 10:33	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	74		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C2 PFDoA	71		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C4-PFHpA	68		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C2 PFHxA	73		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C5 PFNA	74		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C4 PFOA	73		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C4 PFOS	73		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C2 PFUnA	70		25 - 150	01/04/18 14:57	01/07/18 10:33	1
18O2 PFHxS	71		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C3-PFBS	72		25 - 150	01/04/18 14:57	01/07/18 10:33	1
13C2-PFTeDA	70		25 - 150	01/04/18 14:57	01/07/18 10:33	1
d5-NEtFOSAA	85		25 - 150	01/04/18 14:57	01/07/18 10:33	1
d3-NMeFOSAA	82		25 - 150	01/04/18 14:57	01/07/18 10:33	1

Client Sample ID: DUP-03-Dec17

Date Collected: 12/21/17 13:45
Date Received: 12/22/17 11:15

Lab Sample ID: 320-34597-9

Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/04/18 14:57	01/07/18 10:41	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.56	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorohexanesulfonic acid (PFHxS)	**0.34**	**J**	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorohexanoic acid (PFHxA)	**0.73**	**J M**	4.0	0.59	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.55	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.86	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/04/18 14:57	01/07/18 10:41	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/04/18 14:57	01/07/18 10:41	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*108*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C2 PFDoA	*103*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C4-PFHpA	*103*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C2 PFHxA	*102*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C5 PFNA	*102*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C4 PFOA	*103*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C4 PFOS	*108*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C2 PFUnA	*109*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
18O2 PFHxS	*107*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C3-PFBS	*110*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
13C2-PFTeDA	*107*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
d5-NEtFOSAA	*122*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*
d3-NMeFOSAA	*128*		*25 - 150*	*01/04/18 14:57*	*01/07/18 10:41*	*1*

Isotope Dilution Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFDA (25-150)	PFDoA (25-150)	PFHpA (25-150)	PFHxA (25-150)	PFNA (25-150)	PFOA (25-150)	PFOS (25-150)	PFUnA (25-150)
320-34597-1	G6M-96-22A-Dec17	82	80	80	80	80	80	83	82
320-34597-2	G6M-96-22B-Dec17	89	80	82	84	83	85	89	81
320-34597-3	32M-01-14X08-Dec17	74	65	74	67	70	70	71	68
320-34597-4	32M-01-14XBR-Dec17	78	72	73	73	71	78	77	73
320-34597-4 MS	32M-01-14XBR-Dec17	79	67	76	73	77	75	76	70
320-34597-4 MSD	32M-01-14XBR-Dec17	75	66	72	71	73	71	71	72
320-34597-5	G6M-04-14X-Dec17	100	99	92	89	99	97	97	100
320-34597-6	G6M-95-20X-Dec17	96	93	89	92	94	93	96	96
320-34597-7	DUP-04-Dec17	126	120	122	119	122	124	121	120
320-34597-8	XJM-97-13X-Dec17	74	71	68	73	74	73	73	70
320-34597-9	DUP-03-Dec17	108	103	103	102	102	103	108	109
LCS 320-202426/2-A	Lab Control Sample	81	79	73	71	75	73	77	75
LCS 320-202572/2-A	Lab Control Sample	96	90	96	95	97	94	97	92
LCSD 320-202426/3-A	Lab Control Sample Dup	87	73	81	78	79	78	81	77
LCSD 320-202572/3-A	Lab Control Sample Dup	104	100	103	105	106	106	110	106
MB 320-202426/1-A	Method Blank	71	74	74	68	71	68	70	75
MB 320-202572/1-A	Method Blank	113	111	108	107	110	110	108	105

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxS (25-150)	3C3-PFBS (25-150)	PFTDA (25-150)	-NEtFOSA (25-150)	-NMeFOSA (25-150)			
320-34597-1	G6M-96-22A-Dec17	82	82	80	95	91			
320-34597-2	G6M-96-22B-Dec17	86	86	82	89	90			
320-34597-3	32M-01-14X08-Dec17	75	73	64	76	74			
320-34597-4	32M-01-14XBR-Dec17	80	80	74	80	76			
320-34597-4 MS	32M-01-14XBR-Dec17	75	75	72	75	81			
320-34597-4 MSD	32M-01-14XBR-Dec17	76	73	67	75	79			
320-34597-5	G6M-04-14X-Dec17	95	93	90	130	123			
320-34597-6	G6M-95-20X-Dec17	92	97	91	109	116			
320-34597-7	DUP-04-Dec17	125	130 M	135	139	142			
320-34597-8	XJM-97-13X-Dec17	71	72	70	85	82			
320-34597-9	DUP-03-Dec17	107	110	107	122	128			
LCS 320-202426/2-A	Lab Control Sample	74	71	79	83	87			
LCS 320-202572/2-A	Lab Control Sample	95	96	90	107	107			
LCSD 320-202426/3-A	Lab Control Sample Dup	78	76	73	79	82			
LCSD 320-202572/3-A	Lab Control Sample Dup	110	115	109	134	129			
MB 320-202426/1-A	Method Blank	70	69	81	88	90			
MB 320-202572/1-A	Method Blank	102	108	102	129	135			

Surrogate Legend

PFDA = 13C2 PFDA
PFDoA = 13C2 PFDoA
PFHpA = 13C4-PFHpA
PFHxA = 13C2 PFHxA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFUnA = 13C2 PFUnA
PFHxS = 18O2 PFHxS
13C3-PFBS = 13C3-PFBS

Isotope Dilution Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

PFTDA = 13C2-PFTeDA
d5-NEtFOSAA = d5-NEtFOSAA
d3-NMeFOSAA = d3-NMeFOSAA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-202426/1-A
Matrix: Water
Analysis Batch: 202748

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 202426

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/03/18 16:50	01/05/18 07:20	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.30	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorohexanoic acid (PFHxA)	2.0	U	4.0	0.58	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/03/18 16:50	01/05/18 07:20	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/03/18 16:50	01/05/18 07:20	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*71*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C2 PFDoA	*74*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C4-PFHpA	*74*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C2 PFHxA	*68*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C5 PFNA	*71*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C4 PFOA	*68*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C4 PFOS	*70*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C2 PFUnA	*75*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
18O2 PFHxS	*70*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C3-PFBS	*69*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
13C2-PFTeDA	*81*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
d5-NEtFOSAA	*88*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*
d3-NMeFOSAA	*90*		*25 - 150*	*01/03/18 16:50*	*01/05/18 07:20*	*1*

Lab Sample ID: LCS 320-202426/2-A
Matrix: Water
Analysis Batch: 202748

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 202426

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	40.0	37.4		ng/L		94	86 - 132
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	40.0	39.4		ng/L		99	87 - 128
Perfluorobutanesulfonic acid (PFBS)	35.4	35.0		ng/L		99	88 - 130
Perfluorodecanoic acid (PFDA)	40.0	37.4		ng/L		93	84 - 123
Perfluorododecanoic acid (PFDoA)	40.0	39.4		ng/L		98	82 - 122
Perfluoroheptanoic acid (PFHpA)	40.0	35.5		ng/L		89	89 - 127

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

Lab Sample ID: LCS 320-202426/2-A
Matrix: Water
Analysis Batch: 202748

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 202426

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			36.4	32.2		ng/L		88	87 - 126		
Perfluorohexanoic acid (PFHxA)			40.0	37.5		ng/L		94	86 - 126		
Perfluorononanoic acid (PFNA)			40.0	37.2		ng/L		93	77 - 137		
Perfluorooctanesulfonic acid (PFOS)			37.1	32.9		ng/L		89	83 - 126		
Perfluorooctanoic acid (PFOA)			40.0	36.8		ng/L		92	80 - 120		
Perfluorotetradecanoic acid (PFTeA)			40.0	41.8		ng/L		104	66 - 120		
Perfluorotridecanoic Acid (PFTriA)			40.0	36.6		ng/L		91	56 - 163		
Perfluoroundecanoic acid (PFUnA)			40.0	36.3		ng/L		91	73 - 122		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFDA	*81*		*25 - 150*
13C2 PFDoA	*79*		*25 - 150*
13C4-PFHpA	*73*		*25 - 150*
13C2 PFHxA	*71*		*25 - 150*
13C5 PFNA	*75*		*25 - 150*
13C4 PFOA	*73*		*25 - 150*
13C4 PFOS	*77*		*25 - 150*
13C2 PFUnA	*75*		*25 - 150*
18O2 PFHxS	*74*		*25 - 150*
13C3-PFBS	*71*		*25 - 150*
13C2-PFTeDA	*79*		*25 - 150*
d5-NEtFOSAA	*83*		*25 - 150*
d3-NMeFOSAA	*87*		*25 - 150*

Lab Sample ID: LCSD 320-202426/3-A
Matrix: Water
Analysis Batch: 202748

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 202426

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)			40.0	38.3		ng/L		96	86 - 132	2	30
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)			40.0	41.5		ng/L		104	87 - 128	5	30
Perfluorobutanesulfonic acid (PFBS)			35.4	35.7		ng/L		101	88 - 130	2	30
Perfluorodecanoic acid (PFDA)			40.0	37.3		ng/L		93	84 - 123	0	30
Perfluorododecanoic acid (PFDoA)			40.0	39.8		ng/L		100	82 - 122	1	30
Perfluoroheptanoic acid (PFHpA)			40.0	35.9		ng/L		90	89 - 127	1	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	33.3		ng/L		92	87 - 126	4	30
Perfluorohexanoic acid (PFHxA)			40.0	37.8		ng/L		95	86 - 126	1	30
Perfluorononanoic acid (PFNA)			40.0	36.9		ng/L		92	77 - 137	1	30

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

Lab Sample ID: LCSD 320-202426/3-A
Matrix: Water
Analysis Batch: 202748

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 202426

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanesulfonic acid (PFOS)			37.1	33.7	M	ng/L		91	83 - 126	3	30
Perfluorooctanoic acid (PFOA)			40.0	37.9		ng/L		95	80 - 120	3	30
Perfluorotetradecanoic acid (PFTeA)			40.0	42.2		ng/L		106	66 - 120	1	30
Perfluorotridecanoic Acid (PFTriA)			40.0	37.9		ng/L		95	56 - 163	4	30
Perfluoroundecanoic acid (PFUnA)			40.0	35.9		ng/L		90	73 - 122	1	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFDA	*87*		*25 - 150*
13C2 PFDoA	*73*		*25 - 150*
13C4-PFHpA	*81*		*25 - 150*
13C2 PFHxA	*78*		*25 - 150*
13C5 PFNA	*79*		*25 - 150*
13C4 PFOA	*78*		*25 - 150*
13C4 PFOS	*81*		*25 - 150*
13C2 PFUnA	*77*		*25 - 150*
18O2 PFHxS	*78*		*25 - 150*
13C3-PFBS	*76*		*25 - 150*
13C2-PFTeDA	*73*		*25 - 150*
d5-NEtFOSAA	*79*		*25 - 150*
d3-NMeFOSAA	*82*		*25 - 150*

Lab Sample ID: 320-34597-4 MS
Matrix: Water
Analysis Batch: 202748

Client Sample ID: 32M-01-14XBR-Dec17
Prep Type: Total/NA
Prep Batch: 202426

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	39.9	38.0		ng/L		95	86 - 132
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	39.9	39.2		ng/L		98	87 - 128
Perfluorobutanesulfonic acid (PFBS)	1.6	J M	35.3	37.3		ng/L		101	88 - 130
Perfluorodecanoic acid (PFDA)	0.74	J	39.9	39.4		ng/L		97	84 - 123
Perfluorododecanoic acid (PFDoA)	2.1	U	39.9	39.8		ng/L		100	82 - 122
Perfluoroheptanoic acid (PFHpA)	5.2		39.9	42.6		ng/L		94	89 - 127
Perfluorohexanesulfonic acid (PFHxS)	8.4		36.3	42.5		ng/L		94	87 - 126
Perfluorohexanoic acid (PFHxA)	7.5	M	39.9	46.6		ng/L		98	86 - 126
Perfluorononanoic acid (PFNA)	1.5	J	39.9	37.7		ng/L		91	77 - 137
Perfluorooctanesulfonic acid (PFOS)	36		37.0	72.4		ng/L		98	83 - 126
Perfluorooctanoic acid (PFOA)	21	M	39.9	59.1	M	ng/L		95	80 - 120
Perfluorotetradecanoic acid (PFTeA)	1.0	U	39.9	36.4		ng/L		91	66 - 120

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

Lab Sample ID: 320-34597-4 MS
Matrix: Water
Analysis Batch: 202748

Client Sample ID: 32M-01-14XBR-Dec17
Prep Type: Total/NA
Prep Batch: 202426

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorotridecanoic Acid (PFTriA)	3.1	U	39.9	39.2		ng/L		98	56 - 163
Perfluoroundecanoic acid (PFUnA)	3.1	U M	39.9	34.6		ng/L		87	73 - 122

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C2 PFDA	*79*		*25 - 150*
13C2 PFDoA	*67*		*25 - 150*
13C4-PFHpA	*76*		*25 - 150*
13C2 PFHxA	*73*		*25 - 150*
13C5 PFNA	*77*		*25 - 150*
13C4 PFOA	*75*		*25 - 150*
13C4 PFOS	*76*		*25 - 150*
13C2 PFUnA	*70*		*25 - 150*
18O2 PFHxS	*75*		*25 - 150*
13C3-PFBS	*75*		*25 - 150*
13C2-PFTeDA	*72*		*25 - 150*
d5-NEtFOSAA	*75*		*25 - 150*
d3-NMeFOSAA	*81*		*25 - 150*

Lab Sample ID: 320-34597-4 MSD
Matrix: Water
Analysis Batch: 202748

Client Sample ID: 32M-01-14XBR-Dec17
Prep Type: Total/NA
Prep Batch: 202426

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	43.0	41.4		ng/L		96	86 - 132	9	30
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	43.0	42.6		ng/L		99	87 - 128	8	30
Perfluorobutanesulfonic acid (PFBS)	1.6	J M	38.0	40.6		ng/L		102	88 - 130	8	30
Perfluorodecanoic acid (PFDA)	0.74	J	43.0	42.1		ng/L		96	84 - 123	7	30
Perfluorododecanoic acid (PFDoA)	2.1	U	43.0	44.6		ng/L		104	82 - 122	11	30
Perfluoroheptanoic acid (PFHpA)	5.2		43.0	45.6		ng/L		94	89 - 127	7	30
Perfluorohexanesulfonic acid (PFHxS)	8.4		39.1	44.3		ng/L		92	87 - 126	4	30
Perfluorohexanoic acid (PFHxA)	7.5	M	43.0	50.4		ng/L		100	86 - 126	8	30
Perfluorononanoic acid (PFNA)	1.5	J	43.0	40.8		ng/L		92	77 - 137	8	30
Perfluorooctanesulfonic acid (PFOS)	36		39.9	78.3	M	ng/L		106	83 - 126	8	30
Perfluorooctanoic acid (PFOA)	21	M	43.0	61.2	M	ng/L		93	80 - 120	3	30
Perfluorotetradecanoic acid (PFTeA)	1.0	U	43.0	43.6		ng/L		101	66 - 120	18	30
Perfluorotridecanoic Acid (PFTriA)	3.1	U	43.0	41.9		ng/L		97	56 - 163	7	30
Perfluoroundecanoic acid (PFUnA)	3.1	U M	43.0	37.9		ng/L		88	73 - 122	9	30

Isotope Dilution	MSD %Recovery	MSD Qualifier	Limits
13C2 PFDA	75		25 - 150
13C2 PFDoA	66		25 - 150
13C4-PFHpA	72		25 - 150
13C2 PFHxA	71		25 - 150
13C5 PFNA	73		25 - 150
13C4 PFOA	71		25 - 150
13C4 PFOS	71		25 - 150
13C2 PFUnA	72		25 - 150
18O2 PFHxS	76		25 - 150
13C3-PFBS	73		25 - 150
13C2-PFTeDA	67		25 - 150
d5-NEtFOSAA	75		25 - 150
d3-NMeFOSAA	79		25 - 150

Lab Sample ID: MB 320-202572/1-A
Matrix: Water
Analysis Batch: 202972

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 202572

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/04/18 14:57	01/07/18 07:25	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.30	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorohexanoic acid (PFHxA)	2.0	U	4.0	0.58	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/04/18 14:57	01/07/18 07:25	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/04/18 14:57	01/07/18 07:25	1

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	113		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C2 PFDoA	111		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C4-PFHpA	108		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C2 PFHxA	107		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C5 PFNA	110		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C4 PFOA	110		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C4 PFOS	108		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C2 PFUnA	105		25 - 150	01/04/18 14:57	01/07/18 07:25	1
18O2 PFHxS	102		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C3-PFBS	108		25 - 150	01/04/18 14:57	01/07/18 07:25	1
13C2-PFTeDA	102		25 - 150	01/04/18 14:57	01/07/18 07:25	1
d5-NEtFOSAA	129		25 - 150	01/04/18 14:57	01/07/18 07:25	1
d3-NMeFOSAA	135		25 - 150	01/04/18 14:57	01/07/18 07:25	1

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

Lab Sample ID: LCS 320-202572/2-A
Matrix: Water
Analysis Batch: 202972

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 202572

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	40.0	35.0		ng/L		87	86 - 132
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	40.0	40.8		ng/L		102	87 - 128
Perfluorobutanesulfonic acid (PFBS)	35.4	35.2		ng/L		100	88 - 130
Perfluorodecanoic acid (PFDA)	40.0	41.5		ng/L		104	84 - 123
Perfluorododecanoic acid (PFDoA)	40.0	40.4		ng/L		101	82 - 122
Perfluoroheptanoic acid (PFHpA)	40.0	36.4		ng/L		91	89 - 127
Perfluorohexanesulfonic acid (PFHxS)	36.4	32.1		ng/L		88	87 - 126
Perfluorohexanoic acid (PFHxA)	40.0	37.3	M	ng/L		93	86 - 126
Perfluorononanoic acid (PFNA)	40.0	38.6		ng/L		96	77 - 137
Perfluorooctanesulfonic acid (PFOS)	37.1	34.1		ng/L		92	83 - 126
Perfluorooctanoic acid (PFOA)	40.0	38.8		ng/L		97	80 - 120
Perfluorotetradecanoic acid (PFTeA)	40.0	39.1		ng/L		98	66 - 120
Perfluorotridecanoic Acid (PFTriA)	40.0	39.8		ng/L		100	56 - 163
Perfluoroundecanoic acid (PFUnA)	40.0	35.0		ng/L		87	73 - 122

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFDA	*96*		*25 - 150*
13C2 PFDoA	*90*		*25 - 150*
13C4-PFHpA	*96*		*25 - 150*
13C2 PFHxA	*95*		*25 - 150*
13C5 PFNA	*97*		*25 - 150*
13C4 PFOA	*94*		*25 - 150*
13C4 PFOS	*97*		*25 - 150*
13C2 PFUnA	*92*		*25 - 150*
18O2 PFHxS	*95*		*25 - 150*
13C3-PFBS	*96*		*25 - 150*
13C2-PFTeDA	*90*		*25 - 150*
d5-NEtFOSAA	*107*		*25 - 150*
d3-NMeFOSAA	*107*		*25 - 150*

Lab Sample ID: LCSD 320-202572/3-A
Matrix: Water
Analysis Batch: 202972

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 202572

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	40.0	37.6		ng/L		94	86 - 132	7	30

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

Lab Sample ID: LCSD 320-202572/3-A
Matrix: Water
Analysis Batch: 202972

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 202572

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)			40.0	39.9		ng/L		100	87 - 128	2	30
Perfluorobutanesulfonic acid (PFBS)			35.4	34.0	M	ng/L		96	88 - 130	4	30
Perfluorodecanoic acid (PFDA)			40.0	39.3		ng/L		98	84 - 123	5	30
Perfluorododecanoic acid (PFDoA)			40.0	40.3		ng/L		101	82 - 122	0	30
Perfluoroheptanoic acid (PFHpA)			40.0	36.8		ng/L		92	89 - 127	1	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	32.6		ng/L		90	87 - 126	2	30
Perfluorohexanoic acid (PFHxA)			40.0	38.0	M	ng/L		95	86 - 126	2	30
Perfluorononanoic acid (PFNA)			40.0	39.1		ng/L		98	77 - 137	1	30
Perfluorooctanesulfonic acid (PFOS)			37.1	33.0		ng/L		89	83 - 126	3	30
Perfluorooctanoic acid (PFOA)			40.0	38.2		ng/L		95	80 - 120	2	30
Perfluorotetradecanoic acid (PFTeA)			40.0	39.9		ng/L		100	66 - 120	2	30
Perfluorotridecanoic Acid (PFTriA)			40.0	40.0		ng/L		100	56 - 163	0	30
Perfluoroundecanoic acid (PFUnA)			40.0	34.1		ng/L		85	73 - 122	3	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFDA	*104*		*25 - 150*
13C2 PFDoA	*100*		*25 - 150*
13C4-PFHpA	*103*		*25 - 150*
13C2 PFHxA	*105*		*25 - 150*
13C5 PFNA	*106*		*25 - 150*
13C4 PFOA	*106*		*25 - 150*
13C4 PFOS	*110*		*25 - 150*
13C2 PFUnA	*106*		*25 - 150*
18O2 PFHxS	*110*		*25 - 150*
13C3-PFBS	*115*		*25 - 150*
13C2-PFTeDA	*109*		*25 - 150*
d5-NEtFOSAA	*134*		*25 - 150*
d3-NMeFOSAA	*129*		*25 - 150*

LCMS

Prep Batch: 202426

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34597-1	G6M-96-22A-Dec17	Total/NA	Water	3535	
320-34597-2	G6M-96-22B-Dec17	Total/NA	Water	3535	
320-34597-3	32M-01-14X08-Dec17	Total/NA	Water	3535	
320-34597-4	32M-01-14XBR-Dec17	Total/NA	Water	3535	
MB 320-202426/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-202426/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-202426/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
320-34597-4 MS	32M-01-14XBR-Dec17	Total/NA	Water	3535	
320-34597-4 MSD	32M-01-14XBR-Dec17	Total/NA	Water	3535	

Prep Batch: 202572

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34597-5	G6M-04-14X-Dec17	Total/NA	Water	3535	
320-34597-6	G6M-95-20X-Dec17	Total/NA	Water	3535	
320-34597-7	DUP-04-Dec17	Total/NA	Water	3535	
320-34597-8	XJM-97-13X-Dec17	Total/NA	Water	3535	
320-34597-9	DUP-03-Dec17	Total/NA	Water	3535	
MB 320-202572/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-202572/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-202572/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 202748

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34597-1	G6M-96-22A-Dec17	Total/NA	Water	537 (modified)	202426
320-34597-2	G6M-96-22B-Dec17	Total/NA	Water	537 (modified)	202426
320-34597-3	32M-01-14X08-Dec17	Total/NA	Water	537 (modified)	202426
320-34597-4	32M-01-14XBR-Dec17	Total/NA	Water	537 (modified)	202426
MB 320-202426/1-A	Method Blank	Total/NA	Water	537 (modified)	202426
LCS 320-202426/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	202426
LCSD 320-202426/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	202426
320-34597-4 MS	32M-01-14XBR-Dec17	Total/NA	Water	537 (modified)	202426
320-34597-4 MSD	32M-01-14XBR-Dec17	Total/NA	Water	537 (modified)	202426

Analysis Batch: 202972

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34597-5	G6M-04-14X-Dec17	Total/NA	Water	537 (modified)	202572
320-34597-6	G6M-95-20X-Dec17	Total/NA	Water	537 (modified)	202572
320-34597-7	DUP-04-Dec17	Total/NA	Water	537 (modified)	202572
320-34597-8	XJM-97-13X-Dec17	Total/NA	Water	537 (modified)	202572
320-34597-9	DUP-03-Dec17	Total/NA	Water	537 (modified)	202572
MB 320-202572/1-A	Method Blank	Total/NA	Water	537 (modified)	202572
LCS 320-202572/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	202572
LCSD 320-202572/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	202572

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

Client Sample ID: G6M-96-22A-Dec17
Date Collected: 12/20/17 09:10
Date Received: 12/22/17 11:15

Lab Sample ID: 320-34597-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			281.3 mL	10.00 mL	202426	01/03/18 16:50	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202748	01/05/18 07:43	TTP	TAL SAC

Client Sample ID: G6M-96-22B-Dec17
Date Collected: 12/20/17 10:10
Date Received: 12/22/17 11:15

Lab Sample ID: 320-34597-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			286.1 mL	10.00 mL	202426	01/03/18 16:50	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202748	01/05/18 07:51	TTP	TAL SAC

Client Sample ID: 32M-01-14X08-Dec17
Date Collected: 12/20/17 11:45
Date Received: 12/22/17 11:15

Lab Sample ID: 320-34597-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			283.7 mL	10.00 mL	202426	01/03/18 16:50	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202748	01/05/18 07:59	TTP	TAL SAC

Client Sample ID: 32M-01-14XBR-Dec17
Date Collected: 12/20/17 12:45
Date Received: 12/22/17 11:15

Lab Sample ID: 320-34597-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			242 mL	10.00 mL	202426	01/03/18 16:50	JER	TAL SAC
Total/NA	Analysis	537 (modified)		1			202748	01/05/18 08:07	TTP	TAL SAC

Client Sample ID: G6M-04-14X-Dec17
Date Collected: 12/21/17 09:30
Date Received: 12/22/17 11:15

Lab Sample ID: 320-34597-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			246.2 mL	10.00 mL	202572	01/04/18 14:57	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			202972	01/07/18 09:46	ABH	TAL SAC

Client Sample ID: G6M-95-20X-Dec17
Date Collected: 12/21/17 11:40
Date Received: 12/22/17 11:15

Lab Sample ID: 320-34597-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			245.3 mL	10.00 mL	202572	01/04/18 14:57	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			202972	01/07/18 10:17	ABH	TAL SAC

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

Client Sample ID: DUP-04-Dec17

Lab Sample ID: 320-34597-7

Date Collected: 12/21/17 11:45

Matrix: Water

Date Received: 12/22/17 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			245.4 mL	10.00 mL	202572	01/04/18 14:57	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			202972	01/07/18 10:25	ABH	TAL SAC

Client Sample ID: XJM-97-13X-Dec17

Lab Sample ID: 320-34597-8

Date Collected: 12/21/17 13:40

Matrix: Water

Date Received: 12/22/17 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			252.6 mL	10.00 mL	202572	01/04/18 14:57	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			202972	01/07/18 10:33	ABH	TAL SAC

Client Sample ID: DUP-03-Dec17

Lab Sample ID: 320-34597-9

Date Collected: 12/21/17 13:45

Matrix: Water

Date Received: 12/22/17 11:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			247 mL	10.00 mL	202572	01/04/18 14:57	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			202972	01/07/18 10:41	ABH	TAL SAC

Laboratory References:

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

PO #	New	Devens - PFAS Dec 2017 Sampling 1082-112	**Chain of Custody Record**	Page: 1 of: 2

Company	KOMAN GS, LLC	Preservatives (see codes)	Laboratory: Test America - Savannah
Address:	293 Boston Post Road West, Suite 100 Marlborough, MA 01752	I	Address: 510 LaRoche Ave Savannah, GA 31404
Phone: 508-366-7442	Fax: 508-366-7445	Analyses Requested	Contact: Jerry Lanier
Sampled by [Print Name(s)]/Affilliation	Kevin G. Anderson		Project Name: Devens Additional PFAS
Sampler(s) Signature(s)			Sampling QAP No.:
			Approval Date:
			AT Routine
			her:

320-34597 Chain of Custody

Item No.	Field ID No.	Sampled Date	Sampled Time	Col. Method (see codes)	Matrix (see codes)	Number of Containers	PFAS (Method 537-modified) 2-250ml HDPE	Remarks	Lab. No.
66M-96-22A-Dec17		12/20	910	P	GW	2	X		
66M-96-22B-Dec17		12/20	1010	P	GW	2	X		
32M-01-14X0B-Dec17		12/20	1145	P	GW	2	X		
32M-01-14X BR-Dec17		12/20	1245	P	GW	6 ~~2~~	X	MS/MSD	
66M-04-14X-Dec17		12/21	930	P	GW	2	X		
66M-95-20X-Dec 17		12/21	1140	P	GW	2	X		
DVP-04-Dec-17		12/21	1145	P	GW	2	X		
XM-97-13X-Dec17		12/21	1340	P	GW	2	X		
Shipping Details				courier pick up		~~10~~	← Total Number of Containers		

Date Out:	Via:	Item No.	Relinquished by/Affiliation	Date	Time	Rec'd by	Date	Time
Returned:	Via:		[signature]	12/21/17	1415			
Additional Comments:			[signature]	12-21-17	1415			
			[signature]	12-21-17	1600	[signature]	12-22-17	1115

email logins and results to:

lekes@komangs.com

Lab Comments

Preserve Where Applicable ☐

On ICE ☐

Temperature _____ C

0.4°C

MATRIX CODES:	GW = Groundwater	SW = Surface Water	O = Other
PRESERVATIVE CODES:	I = Ice Only		O = Other
COLLECTION METHOD CODES:	G=Grab	P= Pumping	O = Other

Chain of Custody Record

PO # New | Devens - PFAS Dec 2017 Sampling 1082-112 | Page: 2 of: 2

Company	KOMAN GS, LLC
Address:	293 Boston Post Road West, Suite 100 Marlborough, MA 01752
Phone: 508-366-7442	Fax: 508-366-7445
Sampled by [Print Name(s)]/Affiliation	Kevin Anderson
Sampler(s) Signature(s)	

Laboratory:	Test America - Savannah
Address:	510 LaRoche Ave Savannah, GA 31404
Contact:	Jerry Lanier
Project Name:	Devens Additional PFAS
Sampling QAP No.:	
Approval Date:	
TAT	Routine
Other:	

Preservatives (see codes): I

Analyses Requested: PFAS (Method 537-modified) 2-250ml HDPE

Item No.	Field ID No.	Sampled Date	Sampled Time	Col. Method (see codes)	Matrix (see codes)	Number of Containers	PFAS	Remarks	Lab. No.
1	DVP-03-Dec17	12/1	1345	P	GW	2	X		
				P	GW	2			
				P	GW	2			
				P	GW	2			
				P	GW	2			

Shipping Details: courier pick up | ~~10~~ ← Total Number of Containers

Date Out: Via:
Returned: Via:
Additional Comments:

Item No.	Relinquished by/Affiliation	Date	Time	received by	Date	Time
	Jerry Lanier	12/4/17	1415			
	Jerry Lanier	12/2/17	1645			
	Jerry Lanier	12/2/17	1600		12/2/17	1115

email logins and results to:
lekes@komangs.com

Lab Comments

Preserve Where Applicable ☐
On ICE ☐
Temperature _____C

MATRIX CODES:	GW = Groundwater	SW = Surface Water	O = Other
PRESERVATIVE CODES:	I = Ice Only		O = Other
COLLECTION METHOD CODES:	G=Grab	P= Pumping	O = Other

Login Sample Receipt Checklist

Client: KOMAN Government Solutions, LLC

Job Number: 320-34597-1

Login Number: 34597
List Number: 1
Creator: Nelson, Kym D

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

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	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-18
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17 *
L-A-B	DoD ELAP		L2468	01-20-18
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-28-18
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	12-30-17 *
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Savannah

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		SAVLAB	
Alabama	State Program	4	41450	06-30-18
Alaska	State Program	10		06-30-18
Alaska (UST)	State Program	10	UST-104	09-22-19
Arizona	State Program	9	AZ808	12-14-18
Arkansas DEQ	State Program	6	88-0692	02-01-19
California	State Program	9	2939	06-30-18
Colorado	State Program	8	N/A	12-31-18
Connecticut	State Program	1	PH-0161	03-31-19
Florida	NELAP	4	E87052	06-30-18
GA Dept. of Agriculture	State Program	4	N/A	06-12-18
Georgia	State Program	4	803	06-30-18
Guam	State Program	9	15-005r	04-16-18
Hawaii	State Program	9	N/A	06-30-18
Illinois	NELAP	5	200022	11-30-18
Indiana	State Program	5	N/A	06-30-18

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

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34597-1

Laboratory: TestAmerica Savannah (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
Iowa	State Program	7	353	06-30-19
Kentucky (DW)	State Program	4	90084	12-31-18
Kentucky (UST)	State Program	4	18	06-30-18
Kentucky (WW)	State Program	4	90084	12-31-18 *
L-A-B	DoD ELAP		L2463	09-22-19
L-A-B	ISO/IEC 17025		L2463.01	09-22-19
Louisiana	NELAP	6	30690	06-30-18
Louisiana (DW)	NELAP	6	LA160019	12-31-18
Maine	State Program	1	GA00006	09-24-18
Maryland	State Program	3	250	12-31-18
Massachusetts	State Program	1	M-GA006	06-30-18
Michigan	State Program	5	9925	06-30-18
Mississippi	State Program	4	N/A	06-30-18
Nebraska	State Program	7	TestAmerica-Savannah	06-30-18
New Jersey	NELAP	2	GA769	06-30-18
New Mexico	State Program	6	N/A	06-30-18
New York	NELAP	2	10842	03-31-18
North Carolina (DW)	State Program	4	13701	07-31-18
North Carolina (WW/SW)	State Program	4	269	12-31-18
Oklahoma	State Program	6	9984	08-31-18
Pennsylvania	NELAP	3	68-00474	06-30-18
Puerto Rico	State Program	2	GA00006	12-31-18
South Carolina	State Program	4	98001	06-30-18
Tennessee	State Program	4	TN02961	06-30-18
Texas	NELAP	6	T104704185-16-9	11-30-18
Texas	State Program	6	T104704185	06-30-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		SAV 3-04	06-14-20 *
Virginia	NELAP	3	460161	06-14-18
Washington	State Program	10	C805	06-10-18
West Virginia DEP	State Program	3	094	06-30-18
Wisconsin	State Program	5	999819810	08-31-18
Wyoming	State Program	8	8TMS-L	06-30-16 *

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-34815-1
Client Project/Site: Fort Devens / PFAS Dec. 2017

For:
KOMAN Government Solutions, LLC
293 Boston Post Road
Suite 100
Marlborough, Massachusetts 01752

Attn: Laurie Ekes

Michele R Kersey

Authorized for release by:
1/18/2018 4:07:18 PM
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Designee for

Jerry Lanier, Project Manager I
(912)354-7858 e.3410
jerry.lanier@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 320-34815-1

Laboratory: TestAmerica Sacramento

Narrative

CASE NARRATIVE

Client: KOMAN Government Solutions, LLC

Project: Fort Devens / PFAS Dec. 2017

Report Number: 320-34815-1

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

RECEIPT

The samples were received on 1/4/2018 10:05 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.8º C.

PERFLUORINATED HYDROCARBONS

Samples 32M-01-17XBR-Dec17 (320-34815-1), AAFES-7-Dec17 (320-34815-2), XGM-94-06X-Dec17 (320-34815-3), FB-02-Dec17 (320-34815-4), EB-01-Dec17 (320-34815-5), G6M-01-01X-Dec17 (320-34815-6) and G6M-04-07X-Dec17 (320-34815-7) were analyzed for Perfluorinated Hydrocarbons in accordance with TestAmerica SOP. The samples were prepared on 01/09/2018 and analyzed on 01/10/2018 and 01/15/2018.

The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

Perfluorohexanesulfonic acid (PFHxS) was detected in method blank MB 320-203152/1-A at a level that was above the method detection limit but below the reporting limit. The value should be considered an estimate, and has been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged. Refer to the QC report for details.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-203152.

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

Sample Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34815-1	32M-01-17XBR-Dec17	Water	01/02/18 11:15	01/04/18 10:05
320-34815-2	AAFES-7-Dec17	Water	01/02/18 12:50	01/04/18 10:05
320-34815-3	XGM-94-06X-Dec17	Water	01/02/18 14:30	01/04/18 10:05
320-34815-4	FB-02-Dec17	Water	01/02/18 15:20	01/04/18 10:05
320-34815-5	EB-01-Dec17	Water	01/03/18 08:40	01/04/18 10:05
320-34815-6	G6M-01-01X-Dec17	Water	01/03/18 10:10	01/04/18 10:05
320-34815-7	G6M-04-07X-Dec17	Water	01/03/18 12:35	01/04/18 10:05

Method Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Qualifiers

LCMS

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
M	Manual integrated compound.

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)

Detection Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Client Sample ID: 32M-01-17XBR-Dec17 — Lab Sample ID: 320-34815-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	1.3	J M	2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.7		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.6		2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	5.6	M	4.1	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.59	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.5		4.1	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	9.4	M	4.1	0.87	ng/L	1		537 (modified)	Total/NA

Client Sample ID: AAFES-7-Dec17 — Lab Sample ID: 320-34815-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	6.3	M	1.9	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	14	M	1.9	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	200		1.9	0.29	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	64		3.8	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	1.9	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	65		3.8	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	51	M	3.8	0.81	ng/L	1		537 (modified)	Total/NA

Client Sample ID: XGM-94-06X-Dec17 — Lab Sample ID: 320-34815-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.0	M	2.1	0.32	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	8.9	M	2.1	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	98		2.1	0.32	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	20	M	4.3	0.62	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.4	J	2.1	0.29	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	90		4.3	0.58	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	33	M	4.3	0.91	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FB-02-Dec17 — Lab Sample ID: 320-34815-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.31	J	2.0	0.30	ng/L	1		537 (modified)	Total/NA

Client Sample ID: EB-01-Dec17 — Lab Sample ID: 320-34815-5

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.30	J	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.64	J	4.0	0.54	ng/L	1		537 (modified)	Total/NA

Client Sample ID: G6M-01-01X-Dec17 — Lab Sample ID: 320-34815-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.1	M	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.8	M	2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	70		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	9.1	M	4.0	0.58	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	55		4.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	16	M	4.0	0.85	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Detection Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Client Sample ID: G6M-04-07X-Dec17

Lab Sample ID: 320-34815-7

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.9	M	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.7		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	87		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	10	M	4.0	0.58	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	23		4.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	17	M	4.0	0.85	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: 32M-01-17XBR-Dec17

Lab Sample ID: 320-34815-1

Date Collected: 01/02/18 11:15

Matrix: Water

Date Received: 01/04/18 10:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.1	ng/L		01/09/18 09:23	01/15/18 21:19	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.2	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorobutanesulfonic acid (PFBS)	**1.3**	**J M**	2.0	0.31	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.32	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.1	0.56	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluoroheptanoic acid (PFHpA)	**2.7**		2.0	0.25	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorohexanesulfonic acid (PFHxS)	**5.6**		2.0	0.31	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorohexanoic acid (PFHxA)	**5.6**	**M**	4.1	0.59	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorononanoic acid (PFNA)	**0.59**	**J**	2.0	0.27	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorooctanesulfonic acid (PFOS)	**4.5**		4.1	0.55	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorooctanoic acid (PFOA)	**9.4**	**M**	4.1	0.87	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.30	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluorotridecanoic Acid (PFTriA)	3.1	U	4.1	1.3	ng/L		01/09/18 09:23	01/15/18 21:19	1
Perfluoroundecanoic acid (PFUnA)	3.1	U	4.1	1.1	ng/L		01/09/18 09:23	01/15/18 21:19	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*103*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C2 PFDoA	*94*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C4-PFHpA	*96*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C2 PFHxA	*94*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C5 PFNA	*98*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C4 PFOA	*96*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C2 PFUnA	*99*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
18O2 PFHxS	*98*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C3-PFBS	*95*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
13C2-PFTeDA	*94*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
d5-NEtFOSAA	*103*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*
d3-NMeFOSAA	*98*		*25 - 150*	*01/09/18 09:23*	*01/15/18 21:19*	*1*

Client Sample ID: AAFES-7-Dec17

Lab Sample ID: 320-34815-2

Date Collected: 01/02/18 12:50

Matrix: Water

Date Received: 01/04/18 10:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.5	U	19	2.9	ng/L		01/09/18 09:23	01/10/18 21:55	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.5	U	19	2.9	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorobutanesulfonic acid (PFBS)	**6.3**	**M**	1.9	0.29	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorodecanoic acid (PFDA)	0.95	U	1.9	0.29	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorododecanoic acid (PFDoA)	1.9	U	3.8	0.52	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluoroheptanoic acid (PFHpA)	**14**	**M**	1.9	0.24	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorohexanesulfonic acid (PFHxS)	**200**		1.9	0.29	ng/L		01/09/18 09:23	01/10/18 21:55	1

Client Sample ID: AAFES-7-Dec17

Date Collected: 01/02/18 12:50
Date Received: 01/04/18 10:05

Lab Sample ID: 320-34815-2
Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**64**		3.8	0.55	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorononanoic acid (PFNA)	**1.1**	**J**	1.9	0.26	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorooctanesulfonic acid (PFOS)	**65**		3.8	0.51	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorooctanoic acid (PFOA)	**51**	**M**	3.8	0.81	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorotetradecanoic acid (PFTeA)	0.95	U	1.9	0.28	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluorotridecanoic Acid (PFTriA)	2.9	U	3.8	1.2	ng/L		01/09/18 09:23	01/10/18 21:55	1
Perfluoroundecanoic acid (PFUnA)	2.9	U	3.8	1.0	ng/L		01/09/18 09:23	01/10/18 21:55	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*103*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C2 PFDoA	*97*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C4-PFHpA	*91*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C2 PFHxA	*91*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C5 PFNA	*100*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C4 PFOA	*96*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C4 PFOS	*101*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C2 PFUnA	*96*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
18O2 PFHxS	*95*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C3-PFBS	*90*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
13C2-PFTeDA	*94*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
d5-NEtFOSAA	*114*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*
d3-NMeFOSAA	*112*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:55*	*1*

Client Sample ID: XGM-94-06X-Dec17

Date Collected: 01/02/18 14:30
Date Received: 01/04/18 10:05

Lab Sample ID: 320-34815-3
Matrix: Water

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	11	U	21	3.2	ng/L		01/09/18 09:23	01/10/18 22:03	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	11	U	21	3.3	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorobutanesulfonic acid (PFBS)	**4.0**	**M**	2.1	0.32	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorodecanoic acid (PFDA)	1.1	U	2.1	0.33	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorododecanoic acid (PFDoA)	2.1	U	4.3	0.59	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluoroheptanoic acid (PFHpA)	**8.9**	**M**	2.1	0.27	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorohexanesulfonic acid (PFHxS)	**98**		2.1	0.32	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorohexanoic acid (PFHxA)	**20**	**M**	4.3	0.62	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorononanoic acid (PFNA)	**1.4**	**J**	2.1	0.29	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorooctanesulfonic acid (PFOS)	**90**		4.3	0.58	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorooctanoic acid (PFOA)	**33**	**M**	4.3	0.91	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorotetradecanoic acid (PFTeA)	1.1	U	2.1	0.31	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluorotridecanoic Acid (PFTriA)	3.2	U	4.3	1.4	ng/L		01/09/18 09:23	01/10/18 22:03	1
Perfluoroundecanoic acid (PFUnA)	3.2	U	4.3	1.2	ng/L		01/09/18 09:23	01/10/18 22:03	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*100*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:03*	*1*
13C2 PFDoA	*87*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:03*	*1*

Client Sample ID: XGM-94-06X-Dec17

Lab Sample ID: 320-34815-3

Date Collected: 01/02/18 14:30

Matrix: Water

Date Received: 01/04/18 10:05

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4-PFHpA	103		25 - 150	01/09/18 09:23	01/10/18 22:03	1
13C2 PFHxA	97		25 - 150	01/09/18 09:23	01/10/18 22:03	1
13C5 PFNA	101		25 - 150	01/09/18 09:23	01/10/18 22:03	1
13C4 PFOA	99		25 - 150	01/09/18 09:23	01/10/18 22:03	1
13C4 PFOS	104		25 - 150	01/09/18 09:23	01/10/18 22:03	1
13C2 PFUnA	95		25 - 150	01/09/18 09:23	01/10/18 22:03	1
18O2 PFHxS	96		25 - 150	01/09/18 09:23	01/10/18 22:03	1
13C3-PFBS	93		25 - 150	01/09/18 09:23	01/10/18 22:03	1
13C2-PFTeDA	93		25 - 150	01/09/18 09:23	01/10/18 22:03	1
d5-NEtFOSAA	118		25 - 150	01/09/18 09:23	01/10/18 22:03	1
d3-NMeFOSAA	126		25 - 150	01/09/18 09:23	01/10/18 22:03	1

Client Sample ID: FB-02-Dec17

Lab Sample ID: 320-34815-4

Date Collected: 01/02/18 15:20

Matrix: Water

Date Received: 01/04/18 10:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/09/18 09:23	01/10/18 22:11	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorohexanesulfonic acid (PFHxS)	**0.31**	**J**	2.0	0.30	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorohexanoic acid (PFHxA)	2.0	U	4.0	0.58	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/09/18 09:23	01/10/18 22:11	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/09/18 09:23	01/10/18 22:11	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	104		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C2 PFDoA	104		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C4-PFHpA	103		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C2 PFHxA	98		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C5 PFNA	107		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C4 PFOA	103		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C4 PFOS	108		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C2 PFUnA	107		25 - 150	01/09/18 09:23	01/10/18 22:11	1
18O2 PFHxS	100		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C3-PFBS	102		25 - 150	01/09/18 09:23	01/10/18 22:11	1
13C2-PFTeDA	108		25 - 150	01/09/18 09:23	01/10/18 22:11	1
d5-NEtFOSAA	130		25 - 150	01/09/18 09:23	01/10/18 22:11	1
d3-NMeFOSAA	119		25 - 150	01/09/18 09:23	01/10/18 22:11	1

Client Sample ID: EB-01-Dec17

Lab Sample ID: 320-34815-5
Date Collected: 01/03/18 08:40
Matrix: Water
Date Received: 01/04/18 10:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/09/18 09:23	01/10/18 22:27	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorohexanesulfonic acid (PFHxS)	**0.30**	**J**	2.0	0.30	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorohexanoic acid (PFHxA)	2.0	U M	4.0	0.58	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorooctanesulfonic acid (PFOS)	**0.64**	**J**	4.0	0.54	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/09/18 09:23	01/10/18 22:27	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/09/18 09:23	01/10/18 22:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*104*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C2 PFDoA	*100*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C4-PFHpA	*98*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C2 PFHxA	*97*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C5 PFNA	*104*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C4 PFOA	*101*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C4 PFOS	*106*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C2 PFUnA	*108*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
18O2 PFHxS	*96*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C3-PFBS	*91*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
13C2-PFTeDA	*112*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
d5-NEtFOSAA	*129*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*
d3-NMeFOSAA	*121*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:27*	*1*

Client Sample ID: G6M-01-01X-Dec17

Lab Sample ID: 320-34815-6
Date Collected: 01/03/18 10:10
Matrix: Water
Date Received: 01/04/18 10:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/09/18 09:23	01/10/18 22:34	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorobutanesulfonic acid (PFBS)	**3.1**	**M**	2.0	0.30	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluoroheptanoic acid (PFHpA)	**2.8**	**M**	2.0	0.25	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorohexanesulfonic acid (PFHxS)	**70**		2.0	0.30	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorohexanoic acid (PFHxA)	**9.1**	**M**	4.0	0.58	ng/L		01/09/18 09:23	01/10/18 22:34	1

Client Sample ID: G6M-01-01X-Dec17

Lab Sample ID: 320-34815-6

Date Collected: 01/03/18 10:10

Matrix: Water

Date Received: 01/04/18 10:05

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorooctanesulfonic acid (PFOS)	**55**		4.0	0.54	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorooctanoic acid (PFOA)	**16**	**M**	4.0	0.85	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/09/18 09:23	01/10/18 22:34	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/09/18 09:23	01/10/18 22:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*94*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C2 PFDoA	*91*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C4-PFHpA	*99*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C2 PFHxA	*98*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C5 PFNA	*101*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C4 PFOA	*98*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C4 PFOS	*100*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C2 PFUnA	*98*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
18O2 PFHxS	*100*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C3-PFBS	*99*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
13C2-PFTeDA	*91*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
d5-NEtFOSAA	*110*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*
d3-NMeFOSAA	*111*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:34*	*1*

Client Sample ID: G6M-04-07X-Dec17

Lab Sample ID: 320-34815-7

Date Collected: 01/03/18 12:35

Matrix: Water

Date Received: 01/04/18 10:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/09/18 09:23	01/10/18 22:42	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorobutanesulfonic acid (PFBS)	**2.9**	**M**	2.0	0.30	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluoroheptanoic acid (PFHpA)	**3.7**		2.0	0.25	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorohexanesulfonic acid (PFHxS)	**87**		2.0	0.30	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorohexanoic acid (PFHxA)	**10**	**M**	4.0	0.58	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorooctanesulfonic acid (PFOS)	**23**		4.0	0.54	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorooctanoic acid (PFOA)	**17**	**M**	4.0	0.85	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/09/18 09:23	01/10/18 22:42	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/09/18 09:23	01/10/18 22:42	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*97*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:42*	*1*
13C2 PFDoA	*93*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:42*	*1*
13C4-PFHpA	*96*		*25 - 150*	*01/09/18 09:23*	*01/10/18 22:42*	*1*

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Client Sample ID: G6M-04-07X-Dec17
Date Collected: 01/03/18 12:35
Date Received: 01/04/18 10:05

Lab Sample ID: 320-34815-7
Matrix: Water

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	98		25 - 150	01/09/18 09:23	01/10/18 22:42	1
13C5 PFNA	100		25 - 150	01/09/18 09:23	01/10/18 22:42	1
13C4 PFOA	96		25 - 150	01/09/18 09:23	01/10/18 22:42	1
13C4 PFOS	100		25 - 150	01/09/18 09:23	01/10/18 22:42	1
13C2 PFUnA	96		25 - 150	01/09/18 09:23	01/10/18 22:42	1
18O2 PFHxS	93		25 - 150	01/09/18 09:23	01/10/18 22:42	1
13C3-PFBS	97		25 - 150	01/09/18 09:23	01/10/18 22:42	1
13C2-PFTeDA	91		25 - 150	01/09/18 09:23	01/10/18 22:42	1
d5-NEtFOSAA	112		25 - 150	01/09/18 09:23	01/10/18 22:42	1
d3-NMeFOSAA	106		25 - 150	01/09/18 09:23	01/10/18 22:42	1

Isotope Dilution Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFDA (25-150)	PFDoA (25-150)	PFHpA (25-150)	PFHxA (25-150)	PFNA (25-150)	PFOA (25-150)	PFOS (25-150)	PFUnA (25-150)
320-34815-1	32M-01-17XBR-Dec17	103	94	96	94	98	96	98	99
320-34815-2	AAFES-7-Dec17	103	97	91	91	100	96	101	96
320-34815-3	XGM-94-06X-Dec17	100	87	103	97	101	99	104	95
320-34815-4	FB-02-Dec17	104	104	103	98	107	103	108	107
320-34815-5	EB-01-Dec17	104	100	98	97	104	101	106	108
320-34815-6	G6M-01-01X-Dec17	94	91	99	98	101	98	100	98
320-34815-7	G6M-04-07X-Dec17	97	93	96	98	100	96	100	96
LCS 320-203152/2-A	Lab Control Sample	101	98	96	97	100	96	101	100
LCSD 320-203152/3-A	Lab Control Sample Dup	101	99	93	99	100	99	102	103
MB 320-203152/1-A	Method Blank	99	96	97	95	97	99	98	99

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	3C3-PFBS (25-150)	PFTDA (25-150)	-NEtFOSA (25-150)	-NMeFOSA (25-150)
320-34815-1	32M-01-17XBR-Dec17	98	95	94	103	98
320-34815-2	AAFES-7-Dec17	95	90	94	114	112
320-34815-3	XGM-94-06X-Dec17	96	93	93	118	126
320-34815-4	FB-02-Dec17	100	102	108	130	119
320-34815-5	EB-01-Dec17	96	91	112	129	121
320-34815-6	G6M-01-01X-Dec17	100	99	91	110	111
320-34815-7	G6M-04-07X-Dec17	93	97	91	112	106
LCS 320-203152/2-A	Lab Control Sample	92	94	98	109	113
LCSD 320-203152/3-A	Lab Control Sample Dup	101	97	102	108	119
MB 320-203152/1-A	Method Blank	94	93	102	106	116

Surrogate Legend

PFDA = 13C2 PFDA
PFDoA = 13C2 PFDoA
PFHpA = 13C4-PFHpA
PFHxA = 13C2 PFHxA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFUnA = 13C2 PFUnA
PFHxS = 18O2 PFHxS
13C3-PFBS = 13C3-PFBS
PFTDA = 13C2-PFTeDA
d5-NEtFOSAA = d5-NEtFOSAA
d3-NMeFOSAA = d3-NMeFOSAA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-203152/1-A
Matrix: Water
Analysis Batch: 203489

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 203152

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/09/18 09:23	01/10/18 21:08	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorohexanesulfonic acid (PFHxS)	0.303	J	2.0	0.30	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorohexanoic acid (PFHxA)	2.0	U M	4.0	0.58	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/09/18 09:23	01/10/18 21:08	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/09/18 09:23	01/10/18 21:08	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*99*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C2 PFDoA	*96*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C4-PFHpA	*97*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C2 PFHxA	*95*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C5 PFNA	*97*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C4 PFOA	*99*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C2 PFUnA	*99*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
18O2 PFHxS	*94*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C3-PFBS	*93*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
13C2-PFTeDA	*102*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
d5-NEtFOSAA	*106*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*
d3-NMeFOSAA	*116*		*25 - 150*	*01/09/18 09:23*	*01/10/18 21:08*	*1*

Lab Sample ID: LCS 320-203152/2-A
Matrix: Water
Analysis Batch: 203489

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 203152

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	40.0	40.3		ng/L		101	86 - 132
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	40.0	42.6		ng/L		107	87 - 128
Perfluorobutanesulfonic acid (PFBS)	35.4	36.5		ng/L		103	88 - 130
Perfluorodecanoic acid (PFDA)	40.0	43.5		ng/L		109	84 - 123
Perfluorododecanoic acid (PFDoA)	40.0	37.7		ng/L		94	82 - 122
Perfluoroheptanoic acid (PFHpA)	40.0	38.5		ng/L		96	89 - 127

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

Lab Sample ID: LCS 320-203152/2-A
Matrix: Water
Analysis Batch: 203489

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 203152

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			36.4	35.9		ng/L		99	87 - 126		
Perfluorohexanoic acid (PFHxA)			40.0	38.8		ng/L		97	86 - 126		
Perfluorononanoic acid (PFNA)			40.0	38.1		ng/L		95	77 - 137		
Perfluorooctanesulfonic acid (PFOS)			37.1	34.6		ng/L		93	83 - 126		
Perfluorooctanoic acid (PFOA)			40.0	39.5		ng/L		99	80 - 120		
Perfluorotetradecanoic acid (PFTeA)			40.0	40.6		ng/L		102	66 - 120		
Perfluorotridecanoic Acid (PFTriA)			40.0	41.9		ng/L		105	56 - 163		
Perfluoroundecanoic acid (PFUnA)			40.0	34.0		ng/L		85	73 - 122		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFDA	*101*		*25 - 150*
13C2 PFDoA	*98*		*25 - 150*
13C4-PFHpA	*96*		*25 - 150*
13C2 PFHxA	*97*		*25 - 150*
13C5 PFNA	*100*		*25 - 150*
13C4 PFOA	*96*		*25 - 150*
13C4 PFOS	*101*		*25 - 150*
13C2 PFUnA	*100*		*25 - 150*
18O2 PFHxS	*92*		*25 - 150*
13C3-PFBS	*94*		*25 - 150*
13C2-PFTeDA	*98*		*25 - 150*
d5-NEtFOSAA	*109*		*25 - 150*
d3-NMeFOSAA	*113*		*25 - 150*

Lab Sample ID: LCSD 320-203152/3-A
Matrix: Water
Analysis Batch: 203489

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 203152

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)			40.0	37.8		ng/L		95	86 - 132	6	30
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)			40.0	40.0		ng/L		100	87 - 128	6	30
Perfluorobutanesulfonic acid (PFBS)			35.4	36.4		ng/L		103	88 - 130	0	30
Perfluorodecanoic acid (PFDA)			40.0	38.9		ng/L		97	84 - 123	11	30
Perfluorododecanoic acid (PFDoA)			40.0	39.4		ng/L		99	82 - 122	5	30
Perfluoroheptanoic acid (PFHpA)			40.0	40.1		ng/L		100	89 - 127	4	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	32.4		ng/L		89	87 - 126	10	30
Perfluorohexanoic acid (PFHxA)			40.0	37.8		ng/L		94	86 - 126	3	30
Perfluorononanoic acid (PFNA)			40.0	39.8		ng/L		99	77 - 137	4	30

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

Lab Sample ID: LCSD 320-203152/3-A
Matrix: Water
Analysis Batch: 203489

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 203152

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanesulfonic acid (PFOS)			37.1	35.5		ng/L		96	83 - 126	3	30
Perfluorooctanoic acid (PFOA)			40.0	37.2		ng/L		93	80 - 120	6	30
Perfluorotetradecanoic acid (PFTeA)			40.0	40.3		ng/L		101	66 - 120	1	30
Perfluorotridecanoic Acid (PFTriA)			40.0	40.4		ng/L		101	56 - 163	4	30
Perfluoroundecanoic acid (PFUnA)			40.0	32.8		ng/L		82	73 - 122	4	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFDA	*101*		*25 - 150*
13C2 PFDoA	*99*		*25 - 150*
13C4-PFHpA	*93*		*25 - 150*
13C2 PFHxA	*99*		*25 - 150*
13C5 PFNA	*100*		*25 - 150*
13C4 PFOA	*99*		*25 - 150*
13C4 PFOS	*102*		*25 - 150*
13C2 PFUnA	*103*		*25 - 150*
18O2 PFHxS	*101*		*25 - 150*
13C3-PFBS	*97*		*25 - 150*
13C2-PFTeDA	*102*		*25 - 150*
d5-NEtFOSAA	*108*		*25 - 150*
d3-NMeFOSAA	*119*		*25 - 150*

LCMS

Prep Batch: 203152

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34815-1	32M-01-17XBR-Dec17	Total/NA	Water	3535	
320-34815-2	AAFES-7-Dec17	Total/NA	Water	3535	
320-34815-3	XGM-94-06X-Dec17	Total/NA	Water	3535	
320-34815-4	FB-02-Dec17	Total/NA	Water	3535	
320-34815-5	EB-01-Dec17	Total/NA	Water	3535	
320-34815-6	G6M-01-01X-Dec17	Total/NA	Water	3535	
320-34815-7	G6M-04-07X-Dec17	Total/NA	Water	3535	
MB 320-203152/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-203152/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-203152/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 203489

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34815-2	AAFES-7-Dec17	Total/NA	Water	537 (modified)	203152
320-34815-3	XGM-94-06X-Dec17	Total/NA	Water	537 (modified)	203152
320-34815-4	FB-02-Dec17	Total/NA	Water	537 (modified)	203152
320-34815-5	EB-01-Dec17	Total/NA	Water	537 (modified)	203152
320-34815-6	G6M-01-01X-Dec17	Total/NA	Water	537 (modified)	203152
320-34815-7	G6M-04-07X-Dec17	Total/NA	Water	537 (modified)	203152
MB 320-203152/1-A	Method Blank	Total/NA	Water	537 (modified)	203152
LCS 320-203152/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	203152
LCSD 320-203152/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	203152

Analysis Batch: 204077

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34815-1	32M-01-17XBR-Dec17	Total/NA	Water	537 (modified)	203152

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Client Sample ID: 32M-01-17XBR-Dec17
Lab Sample ID: 320-34815-1
Date Collected: 01/02/18 11:15
Matrix: Water
Date Received: 01/04/18 10:05

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			245.6 mL	10.0 mL	203152	01/09/18 09:23	CCB	TAL SAC
Total/NA	Analysis	537 (modified)		1			204077	01/15/18 21:19	JRB	TAL SAC

Client Sample ID: AAFES-7-Dec17
Lab Sample ID: 320-34815-2
Date Collected: 01/02/18 12:50
Matrix: Water
Date Received: 01/04/18 10:05

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			262.9 mL	10.0 mL	203152	01/09/18 09:23	CCB	TAL SAC
Total/NA	Analysis	537 (modified)		1			203489	01/10/18 21:55	JRB	TAL SAC

Client Sample ID: XGM-94-06X-Dec17
Lab Sample ID: 320-34815-3
Date Collected: 01/02/18 14:30
Matrix: Water
Date Received: 01/04/18 10:05

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			234.7 mL	10.0 mL	203152	01/09/18 09:23	CCB	TAL SAC
Total/NA	Analysis	537 (modified)		1			203489	01/10/18 22:03	JRB	TAL SAC

Client Sample ID: FB-02-Dec17
Lab Sample ID: 320-34815-4
Date Collected: 01/02/18 15:20
Matrix: Water
Date Received: 01/04/18 10:05

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			251.2 mL	10.0 mL	203152	01/09/18 09:23	CCB	TAL SAC
Total/NA	Analysis	537 (modified)		1			203489	01/10/18 22:11	JRB	TAL SAC

Client Sample ID: EB-01-Dec17
Lab Sample ID: 320-34815-5
Date Collected: 01/03/18 08:40
Matrix: Water
Date Received: 01/04/18 10:05

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			250.3 mL	10.0 mL	203152	01/09/18 09:23	CCB	TAL SAC
Total/NA	Analysis	537 (modified)		1			203489	01/10/18 22:27	JRB	TAL SAC

Client Sample ID: G6M-01-01X-Dec17
Lab Sample ID: 320-34815-6
Date Collected: 01/03/18 10:10
Matrix: Water
Date Received: 01/04/18 10:05

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			248.7 mL	10.0 mL	203152	01/09/18 09:23	CCB	TAL SAC
Total/NA	Analysis	537 (modified)		1			203489	01/10/18 22:34	JRB	TAL SAC

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Client Sample ID: G6M-04-07X-Dec17
Date Collected: 01/03/18 12:35
Date Received: 01/04/18 10:05

Lab Sample ID: 320-34815-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			249.3 mL	10.0 mL	203152	01/09/18 09:23	CCB	TAL SAC
Total/NA	Analysis	537 (modified)		1			203489	01/10/18 22:42	JRB	TAL SAC

Laboratory References:

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

360325-Boston

Chain of Custody Record

PO # New | Devens - PFAS Dec 2017 Sampling 1082-112 | Page: | of:

Company	KOMAN GS, LLC
Address:	293 Boston Post Road West, Suite 100 Marlborough, MA 01752
Phone: 508-366-7442	Fax: 508-366-7445
Sampled by [Print Name(s)]/Affilliation	
Sampler(s) Signature(s)	

Laboratory:	Test America - Savannah
Address:	510 LaRoche Ave Savannah, GA 31404
Contact:	Jerry Lanier
Project Name:	Devens Additional PFAS
Sampling QAP No.:	
Approval Date:	
TAT	Routine
Other:	

Item No.	Field ID No.	Sampled Date	Sampled Time	Col. Method (see codes)	Matrix (see codes)	Number of Containers	PFAS (Method 537-modified) 2-250ml HDPE	Preservatives (see codes) I	Remarks	Lab. No.
	SM-01-17XBR-Dec17	1/2/18	1115	P	GW	2	✓			
	AAFES-7-Dec17	1/2/18	1250	P	GW	2	✓			
	XM-94-06X-Dec17	1/2/18	1430	P	GW	2	✓			
	FB-02-Dec17	1/2/18	1520	P	GW	2	✓			
	EB-01-Dec17	1/3/18	840	P	GW	2	✓			
	MM-01-01X-Dec17	1/3/18	1010	P	GW	2	✓			
	MM-04-07X-Dec17	1/3/18	1235	P	GW	2	✓			

Analyses Requested

Shipping Details: courier pick up — ~~10~~ ← Total Number of Containers

Date Out: Via:
Returned: Via:
Additional Comments:

Item No.	Relinquished by/Affiliation	Date	Time		Date	Time
		1/3/18	1445		1-3-18	14:45
		1-3-18	1800		1-4-18	10:05

email logins and results to:
lekes@komangs.com

Lab Comments

Preserve Where Applicable ☐
On ICE ☒
Temperature 4.8 C

320-34815 Chain of Custody

MATRIX CODES:	GW = Groundwater	SW = Surface Water	O = Other
PRESERVATIVE CODES:	I = Ice Only		O = Other
COLLECTION METHOD CODES:	G=Grab	P= Pumping	O = Other

Login Sample Receipt Checklist

Client: KOMAN Government Solutions, LLC

Job Number: 320-34815-1

Login Number: 34815
List Number: 1
Creator: Nelson, Kym D

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

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	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17 *
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Savannah

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		SAVLAB	
Alabama	State Program	4	41450	06-30-18
Alaska	State Program	10		06-30-18
Alaska (UST)	State Program	10	UST-104	09-22-19
Arizona	State Program	9	AZ808	12-14-18
Arkansas DEQ	State Program	6	88-0692	02-01-19
California	State Program	9	2939	06-30-18
Colorado	State Program	8	N/A	12-31-18
Connecticut	State Program	1	PH-0161	03-31-19
Florida	NELAP	4	E87052	06-30-18
GA Dept. of Agriculture	State Program	4	N/A	06-12-18
Georgia	State Program	4	803	06-30-18
Guam	State Program	9	15-005r	04-16-18
Hawaii	State Program	9	N/A	06-30-18
Illinois	NELAP	5	200022	11-30-18
Indiana	State Program	5	N/A	06-30-18

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

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Laboratory: TestAmerica Savannah (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
Iowa	State Program	7	353	06-30-19
Kentucky (DW)	State Program	4	90084	12-31-18
Kentucky (UST)	State Program	4	18	06-30-18
Kentucky (WW)	State Program	4	90084	12-31-18 *
L-A-B	DoD ELAP		L2463	09-22-19
L-A-B	ISO/IEC 17025		L2463.01	09-22-19
Louisiana	NELAP	6	30690	06-30-18
Louisiana (DW)	NELAP	6	LA160019	12-31-18
Maine	State Program	1	GA00006	09-24-18
Maryland	State Program	3	250	12-31-18
Massachusetts	State Program	1	M-GA006	06-30-18
Michigan	State Program	5	9925	06-30-18
Mississippi	State Program	4	N/A	06-30-18
Nebraska	State Program	7	TestAmerica-Savannah	06-30-18
New Jersey	NELAP	2	GA769	06-30-18
New Mexico	State Program	6	N/A	06-30-18
New York	NELAP	2	10842	03-31-18
North Carolina (DW)	State Program	4	13701	07-31-18
North Carolina (WW/SW)	State Program	4	269	12-31-18
Oklahoma	State Program	6	9984	08-31-18
Pennsylvania	NELAP	3	68-00474	06-30-18
Puerto Rico	State Program	2	GA00006	12-31-18
South Carolina	State Program	4	98001	06-30-18
Tennessee	State Program	4	TN02961	06-30-18
Texas	NELAP	6	T104704185-16-9	11-30-18
Texas	State Program	6	T104704185	06-30-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		SAV 3-04	06-14-20 *
Virginia	NELAP	3	460161	06-14-18
Washington	State Program	10	C805	06-10-18
West Virginia DEP	State Program	3	094	06-30-18
Wisconsin	State Program	5	999819810	08-31-18
Wyoming	State Program	8	8TMS-L	06-30-16 *

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

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

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	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-18
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	12-31-17 *
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-18-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Savannah

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		SAVLAB	
Alabama	State Program	4	41450	06-30-18
Alaska	State Program	10		06-30-18
Alaska (UST)	State Program	10	UST-104	09-22-19
Arizona	State Program	9	AZ808	12-14-18
Arkansas DEQ	State Program	6	88-0692	02-01-19
California	State Program	9	2939	06-30-18
Colorado	State Program	8	N/A	12-31-18
Connecticut	State Program	1	PH-0161	03-31-19
Florida	NELAP	4	E87052	06-30-18
GA Dept. of Agriculture	State Program	4	N/A	06-12-18
Georgia	State Program	4	803	06-30-18
Guam	State Program	9	15-005r	04-16-18
Hawaii	State Program	9	N/A	06-30-18
Illinois	NELAP	5	200022	11-30-18
Indiana	State Program	5	N/A	06-30-18

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

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Laboratory: TestAmerica Savannah (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
Iowa	State Program	7	353	06-30-19
Kentucky (DW)	State Program	4	90084	12-31-18
Kentucky (UST)	State Program	4	18	06-30-18
Kentucky (WW)	State Program	4	90084	12-31-18 *
L-A-B	DoD ELAP		L2463	09-22-19
L-A-B	ISO/IEC 17025		L2463.01	09-22-19
Louisiana	NELAP	6	30690	06-30-18
Louisiana (DW)	NELAP	6	LA160019	12-31-18
Maine	State Program	1	GA00006	09-24-18
Maryland	State Program	3	250	12-31-18
Massachusetts	State Program	1	M-GA006	06-30-18
Michigan	State Program	5	9925	06-30-18
Mississippi	State Program	4	N/A	06-30-18
Nebraska	State Program	7	TestAmerica-Savannah	06-30-18
New Jersey	NELAP	2	GA769	06-30-18
New Mexico	State Program	6	N/A	06-30-18
New York	NELAP	2	10842	03-31-18
North Carolina (DW)	State Program	4	13701	07-31-18
North Carolina (WW/SW)	State Program	4	269	12-31-18
Oklahoma	State Program	6	9984	08-31-18
Pennsylvania	NELAP	3	68-00474	06-30-18
Puerto Rico	State Program	2	GA00006	12-31-18
South Carolina	State Program	4	98001	06-30-18
Tennessee	State Program	4	TN02961	06-30-18
Texas	NELAP	6	T104704185-16-9	11-30-18
Texas	State Program	6	T104704185	06-30-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		SAV 3-04	06-14-20 *
Virginia	NELAP	3	460161	06-14-18
Washington	State Program	10	C805	06-10-18
West Virginia DEP	State Program	3	094	06-30-18
Wisconsin	State Program	5	999819810	08-31-18
Wyoming	State Program	8	8TMS-L	06-30-16 *

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

Method Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34815-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-34977-1
Client Project/Site: Fort Devens / PFAS Dec. 2017

For:
KOMAN Government Solutions, LLC
293 Boston Post Road
Suite 100
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Attn: Laurie Ekes

Jerry Lanier

Authorized for release by:
1/25/2018 3:51:04 PM

Jerry Lanier, Project Manager I
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LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 320-34977-1

Laboratory: TestAmerica Sacramento

Narrative

CASE NARRATIVE

Client: KOMAN Government Solutions, LLC

Project: Fort Devens / PFAS Dec. 2017

Report Number: 320-34977-1

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

RECEIPT

The samples were received on 01/11/2018; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 1.8 C.

PERFLUORINATED HYDROCARBONS

Samples G6M-02-06X-Dec17 (320-34977-1), XSA-12-98X-Dec17 (320-34977-2), SHM-93-24A-Dec17 (320-34977-3), FB-03-Dec17 (320-34977-4), 57M-03-01X-Dec17 (320-34977-5), 57M-03-02X-Dec17 (320-34977-6), 57M-03-04X-Dec17 (320-34977-7), 57M-03-06X-Dec17 (320-34977-8), DUP-01-Dec17 (320-34977-9), Area 3 SW-1-Dec17 (320-34977-10), DUP-02-Dec17 (320-34977-11), 57M-96-11X-Dec17 (320-34977-12), 57M-95-03X-Dec17 (320-34977-13) and XJM-97-11X-Dec17 (320-34977-14) were analyzed for Perfluorinated Hydrocarbons in accordance with TestAmerica SOP. The samples were prepared on 01/16/2018 and analyzed on 01/20/2018 and 01/23/2018.

The following samples: 57M-03-02X-Dec17 (320-34977-6), 57M-03-04X-Dec17 (320-34977-7), 57M-03-06X-Dec17 (320-34977-8), DUP-01-Dec17 (320-34977-9), Area 3 SW-1-Dec17 (320-34977-10), DUP-02-Dec17 (320-34977-11), 57M-96-11X-Dec17 (320-34977-12), 57M-95-03X-Dec17 (320-34977-13) and XJM-97-11X-Dec17 (320-34977-14) were decanted prior to extraction, due to containing an excess amount of sediment which had the potential to clog the solid-phase column.

The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

The following sample was diluted due to the nature of the sample matrix which caused high recovery of several Isotope Dilution Analytes (IDA). 57M-95-03X-Dec17 (320-34977-13). Elevated reporting limits (RLs) are provided.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-204155.

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

Sample Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-34977-1	G6M-02-06X-Dec17	Water	01/08/18 10:00	01/11/18 10:20
320-34977-2	XSA-12-98X-Dec17	Water	01/08/18 11:25	01/11/18 10:20
320-34977-3	SHM-93-24A-Dec17	Water	01/08/18 13:45	01/11/18 10:20
320-34977-4	FB-03-Dec17	Water	01/08/18 14:30	01/11/18 10:20
320-34977-5	57M-03-01X-Dec17	Water	01/09/18 09:40	01/11/18 10:20
320-34977-6	57M-03-02X-Dec17	Water	01/09/18 10:40	01/11/18 10:20
320-34977-7	57M-03-04X-Dec17	Water	01/09/18 12:30	01/11/18 10:20
320-34977-8	57M-03-06X-Dec17	Water	01/09/18 13:50	01/11/18 10:20
320-34977-9	DUP-01-Dec17	Water	01/09/18 13:55	01/11/18 10:20
320-34977-10	Area 3 SW-1-Dec17	Water	01/10/18 09:30	01/11/18 10:20
320-34977-11	DUP-02-Dec17	Water	01/10/18 09:35	01/11/18 10:20
320-34977-12	57M-96-11X-Dec17	Water	01/10/18 10:45	01/11/18 10:20
320-34977-13	57M-95-03X-Dec17	Water	01/10/18 11:50	01/11/18 10:20
320-34977-14	XJM-97-11X-Dec17	Water	01/10/18 13:20	01/11/18 10:20

Method Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Qualifiers

LCMS

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
M	Manual integrated compound.
D	The reported value is from a dilution.

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)

Detection Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Client Sample ID: G6M-02-06X-Dec17 — Lab Sample ID: 320-34977-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.5		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.6		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	100		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	9.3		4.0	0.58	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.34	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	35		4.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	25	M	4.0	0.86	ng/L	1		537 (modified)	Total/NA

Client Sample ID: XSA-12-98X-Dec17 — Lab Sample ID: 320-34977-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.8	M	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	0.62	J	2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.4		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	72		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	15		4.0	0.58	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.7	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	35		4.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	29	M	4.0	0.85	ng/L	1		537 (modified)	Total/NA

Client Sample ID: SHM-93-24A-Dec17 — Lab Sample ID: 320-34977-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.8	M	2.0	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	13		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	11		2.0	0.29	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	15		3.9	0.57	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.80	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.9	M	3.9	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	19	M	3.9	0.84	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FB-03-Dec17 — Lab Sample ID: 320-34977-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.31	J	2.0	0.30	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 57M-03-01X-Dec17 — Lab Sample ID: 320-34977-5

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	39	M	2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	2.3		2.0	0.32	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	270		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	110		2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	360		4.1	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.8	J	2.0	0.28	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.2	M	4.1	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	120	M	4.1	0.87	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 57M-03-02X-Dec17 — Lab Sample ID: 320-34977-6

This Detection Summary does not include radiochemical test results.

Client Sample ID: 57M-03-02X-Dec17 (Continued) — Lab Sample ID: 320-34977-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	19	M	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	85		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	28		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	100		4.0	0.58	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.7	J M	4.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	23	M	4.0	0.85	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 57M-03-04X-Dec17 — Lab Sample ID: 320-34977-7

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	16	M	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	77		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	42		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	110	M	4.1	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	5.1		2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	9.7	M	4.1	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	82	M	4.1	0.86	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 57M-03-06X-Dec17 — Lab Sample ID: 320-34977-8

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	8.1		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	39		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	21		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	90		4.0	0.57	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.1	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.1		4.0	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	76	M	4.0	0.84	ng/L	1		537 (modified)	Total/NA

Client Sample ID: DUP-01-Dec17 — Lab Sample ID: 320-34977-9

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.9	M	2.1	0.31	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	43		2.1	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	21		2.1	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	93		4.1	0.60	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J	2.1	0.28	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	3.8	J	4.1	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	76		4.1	0.88	ng/L	1		537 (modified)	Total/NA

Client Sample ID: Area 3 SW-1-Dec17 — Lab Sample ID: 320-34977-10

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	11	M	2.0	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	44		2.0	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.3		2.0	0.29	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	130		3.9	0.57	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.59	J M	3.9	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	24	M	3.9	0.83	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Client Sample ID: DUP-02-Dec17 — Lab Sample ID: 320-34977-11

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	12		2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	47		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	4.1		2.0	0.31	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	130		4.1	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.60	J M	4.1	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	24	M	4.1	0.86	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 57M-96-11X-Dec17 — Lab Sample ID: 320-34977-12

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	13	M	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	34		2.0	0.25	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.3		2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	170		4.0	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	5.2	M	4.0	0.86	ng/L	1		537 (modified)	Total/NA

Client Sample ID: 57M-95-03X-Dec17 — Lab Sample ID: 320-34977-13

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS) - DL	37	D M	20	3.0	ng/L	10		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA) - DL	62	D M	20	2.5	ng/L	10		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	9.7	J D	20	3.0	ng/L	10		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA) - DL	71	D M	39	5.7	ng/L	10		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA) - DL	82	D M	39	8.4	ng/L	10		537 (modified)	Total/NA

Client Sample ID: XJM-97-11X-Dec17 — Lab Sample ID: 320-34977-14

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.29	J	1.9	0.29	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: G6M-02-06X-Dec17

Lab Sample ID: 320-34977-1

Date Collected: 01/08/18 10:00

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 04:27	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorobutanesulfonic acid (PFBS)	**2.5**		2.0	0.30	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluoroheptanoic acid (PFHpA)	**3.6**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorohexanesulfonic acid (PFHxS)	**100**		2.0	0.30	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorohexanoic acid (PFHxA)	**9.3**		4.0	0.58	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorononanoic acid (PFNA)	**0.34**	**J**	2.0	0.27	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorooctanesulfonic acid (PFOS)	**35**		4.0	0.54	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorooctanoic acid (PFOA)	**25**	**M**	4.0	0.86	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/16/18 12:31	01/20/18 04:27	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/16/18 12:31	01/20/18 04:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C2 PFDoA	*95*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C4-PFHpA	*96*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C2 PFHxA	*99*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C5 PFNA	*106*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C4 PFOA	*104*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C2 PFUnA	*106*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
18O2 PFHxS	*98*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C2-PFTeDA	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
13C3-PFBS	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
d3-NMeFOSAA	*106*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*
d5-NEtFOSAA	*112*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:27*	*1*

Client Sample ID: XSA-12-98X-Dec17

Lab Sample ID: 320-34977-2

Date Collected: 01/08/18 11:25

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 04:35	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorobutanesulfonic acid (PFBS)	**4.8**	**M**	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorodecanoic acid (PFDA)	**0.62**	**J**	2.0	0.31	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluoroheptanoic acid (PFHpA)	**7.4**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorohexanesulfonic acid (PFHxS)	**72**		2.0	0.30	ng/L		01/16/18 12:31	01/20/18 04:35	1

Client Sample ID: XSA-12-98X-Dec17

Lab Sample ID: 320-34977-2

Date Collected: 01/08/18 11:25

Matrix: Water

Date Received: 01/11/18 10:20

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanoic acid (PFHxA)	**15**		4.0	0.58	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorononanoic acid (PFNA)	**1.7**	**J**	2.0	0.27	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorooctanesulfonic acid (PFOS)	**35**		4.0	0.54	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorooctanoic acid (PFOA)	**29**	**M**	4.0	0.85	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/16/18 12:31	01/20/18 04:35	1
Perfluoroundecanoic acid (PFUnA)	3.0	U M	4.0	1.1	ng/L		01/16/18 12:31	01/20/18 04:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*103*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C2 PFDoA	*96*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C4-PFHpA	*102*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C2 PFHxA	*103*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C5 PFNA	*106*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C4 PFOA	*103*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C4 PFOS	*102*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C2 PFUnA	*107*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
18O2 PFHxS	*99*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C2-PFTeDA	*107*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
13C3-PFBS	*97*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
d3-NMeFOSAA	*117*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*
d5-NEtFOSAA	*118*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:35*	*1*

Client Sample ID: SHM-93-24A-Dec17

Lab Sample ID: 320-34977-3

Date Collected: 01/08/18 13:45

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.8	U	20	2.9	ng/L		01/16/18 12:31	01/20/18 04:43	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.8	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorobutanesulfonic acid (PFBS)	**3.8**	**M**	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorodecanoic acid (PFDA)	0.98	U	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorododecanoic acid (PFDoA)	2.0	U	3.9	0.54	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluoroheptanoic acid (PFHpA)	**13**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorohexanesulfonic acid (PFHxS)	**11**		2.0	0.29	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorohexanoic acid (PFHxA)	**15**		3.9	0.57	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorononanoic acid (PFNA)	**0.80**	**J**	2.0	0.27	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorooctanesulfonic acid (PFOS)	**4.9**	**M**	3.9	0.53	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorooctanoic acid (PFOA)	**19**	**M**	3.9	0.84	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorotetradecanoic acid (PFTeA)	0.98	U	2.0	0.28	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluorotridecanoic Acid (PFTriA)	2.9	U	3.9	1.3	ng/L		01/16/18 12:31	01/20/18 04:43	1
Perfluoroundecanoic acid (PFUnA)	2.9	U	3.9	1.1	ng/L		01/16/18 12:31	01/20/18 04:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*101*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:43*	*1*
13C2 PFDoA	*91*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:43*	*1*

Client Sample ID: SHM-93-24A-Dec17

Lab Sample ID: 320-34977-3

Date Collected: 01/08/18 13:45

Matrix: Water

Date Received: 01/11/18 10:20

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4-PFHpA	101		25 - 150	01/16/18 12:31	01/20/18 04:43	1
13C2 PFHxA	95		25 - 150	01/16/18 12:31	01/20/18 04:43	1
13C5 PFNA	99		25 - 150	01/16/18 12:31	01/20/18 04:43	1
13C4 PFOA	102		25 - 150	01/16/18 12:31	01/20/18 04:43	1
13C4 PFOS	100		25 - 150	01/16/18 12:31	01/20/18 04:43	1
13C2 PFUnA	107		25 - 150	01/16/18 12:31	01/20/18 04:43	1
18O2 PFHxS	100		25 - 150	01/16/18 12:31	01/20/18 04:43	1
13C2-PFTeDA	101		25 - 150	01/16/18 12:31	01/20/18 04:43	1
13C3-PFBS	103		25 - 150	01/16/18 12:31	01/20/18 04:43	1
d3-NMeFOSAA	106		25 - 150	01/16/18 12:31	01/20/18 04:43	1
d5-NEtFOSAA	111		25 - 150	01/16/18 12:31	01/20/18 04:43	1

Client Sample ID: FB-03-Dec17

Lab Sample ID: 320-34977-4

Date Collected: 01/08/18 14:30

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 04:51	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorohexanesulfonic acid (PFHxS)	**0.31**	**J**	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorohexanoic acid (PFHxA)	2.0	U	4.0	0.58	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/16/18 12:31	01/20/18 04:51	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/16/18 12:31	01/20/18 04:51	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	103		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C2 PFDoA	95		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C4-PFHpA	97		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C2 PFHxA	98		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C5 PFNA	109		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C4 PFOA	103		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C4 PFOS	106		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C2 PFUnA	106		25 - 150	01/16/18 12:31	01/20/18 04:51	1
18O2 PFHxS	97		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C2-PFTeDA	105		25 - 150	01/16/18 12:31	01/20/18 04:51	1
13C3-PFBS	101		25 - 150	01/16/18 12:31	01/20/18 04:51	1
d3-NMeFOSAA	114		25 - 150	01/16/18 12:31	01/20/18 04:51	1
d5-NEtFOSAA	115		25 - 150	01/16/18 12:31	01/20/18 04:51	1

Client Sample ID: 57M-03-01X-Dec17

Lab Sample ID: 320-34977-5
Date Collected: 01/09/18 09:40
Matrix: Water
Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.1	ng/L		01/16/18 12:31	01/20/18 04:58	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.2	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorobutanesulfonic acid (PFBS)	**39**	**M**	2.0	0.31	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorodecanoic acid (PFDA)	**2.3**		2.0	0.32	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.1	0.56	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluoroheptanoic acid (PFHpA)	**270**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorohexanesulfonic acid (PFHxS)	**110**		2.0	0.31	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorohexanoic acid (PFHxA)	**360**		4.1	0.59	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorononanoic acid (PFNA)	**1.8**	**J**	2.0	0.28	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorooctanesulfonic acid (PFOS)	**5.2**	**M**	4.1	0.55	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorooctanoic acid (PFOA)	**120**	**M**	4.1	0.87	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluorotridecanoic Acid (PFTriA)	3.1	U	4.1	1.3	ng/L		01/16/18 12:31	01/20/18 04:58	1
Perfluoroundecanoic acid (PFUnA)	3.1	U	4.1	1.1	ng/L		01/16/18 12:31	01/20/18 04:58	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*102*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C2 PFDoA	*87*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C4-PFHpA	*84*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C2 PFHxA	*80*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C5 PFNA	*106*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C4 PFOA	*99*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C4 PFOS	*99*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C2 PFUnA	*101*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
18O2 PFHxS	*91*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C2-PFTeDA	*90*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
13C3-PFBS	*90*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
d3-NMeFOSAA	*110*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*
d5-NEtFOSAA	*107*		*25 - 150*	*01/16/18 12:31*	*01/20/18 04:58*	*1*

Client Sample ID: 57M-03-02X-Dec17

Lab Sample ID: 320-34977-6
Date Collected: 01/09/18 10:40
Matrix: Water
Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 05:06	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorobutanesulfonic acid (PFBS)	**19**	**M**	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluoroheptanoic acid (PFHpA)	**85**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorohexanesulfonic acid (PFHxS)	**28**		2.0	0.30	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorohexanoic acid (PFHxA)	**100**		4.0	0.58	ng/L		01/16/18 12:31	01/20/18 05:06	1

Client Sample ID: 57M-03-02X-Dec17

Lab Sample ID: 320-34977-6

Date Collected: 01/09/18 10:40

Matrix: Water

Date Received: 01/11/18 10:20

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorooctanesulfonic acid (PFOS)	**3.7**	**J M**	4.0	0.54	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorooctanoic acid (PFOA)	**23**	**M**	4.0	0.85	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/16/18 12:31	01/20/18 05:06	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/16/18 12:31	01/20/18 05:06	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*97*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C2 PFDoA	*71*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C4-PFHpA	*85*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C2 PFHxA	*78*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C5 PFNA	*104*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C4 PFOA	*104*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C4 PFOS	*97*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C2 PFUnA	*89*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
18O2 PFHxS	*92*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C2-PFTeDA	*79*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
13C3-PFBS	*85*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
d3-NMeFOSAA	*87*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*
d5-NEtFOSAA	*89*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:06*	*1*

Client Sample ID: 57M-03-04X-Dec17

Lab Sample ID: 320-34977-7

Date Collected: 01/09/18 12:30

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 05:14	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.2	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorobutanesulfonic acid (PFBS)	**16**	**M**	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.32	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.1	0.56	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluoroheptanoic acid (PFHpA)	**77**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorohexanesulfonic acid (PFHxS)	**42**		2.0	0.30	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorohexanoic acid (PFHxA)	**110**	**M**	4.1	0.59	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorononanoic acid (PFNA)	**5.1**		2.0	0.27	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorooctanesulfonic acid (PFOS)	**9.7**	**M**	4.1	0.55	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorooctanoic acid (PFOA)	**82**	**M**	4.1	0.86	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.1	1.3	ng/L		01/16/18 12:31	01/20/18 05:14	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.1	1.1	ng/L		01/16/18 12:31	01/20/18 05:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*109*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:14*	*1*
13C2 PFDoA	*99*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:14*	*1*
13C4-PFHpA	*91*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:14*	*1*

Client Sample ID: 57M-03-04X-Dec17

Lab Sample ID: 320-34977-7

Date Collected: 01/09/18 12:30

Matrix: Water

Date Received: 01/11/18 10:20

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	88		25 - 150	01/16/18 12:31	01/20/18 05:14	1
13C5 PFNA	108		25 - 150	01/16/18 12:31	01/20/18 05:14	1
13C4 PFOA	100		25 - 150	01/16/18 12:31	01/20/18 05:14	1
13C4 PFOS	100		25 - 150	01/16/18 12:31	01/20/18 05:14	1
13C2 PFUnA	107		25 - 150	01/16/18 12:31	01/20/18 05:14	1
18O2 PFHxS	95		25 - 150	01/16/18 12:31	01/20/18 05:14	1
13C2-PFTeDA	91		25 - 150	01/16/18 12:31	01/20/18 05:14	1
13C3-PFBS	92		25 - 150	01/16/18 12:31	01/20/18 05:14	1
d3-NMeFOSAA	121		25 - 150	01/16/18 12:31	01/20/18 05:14	1
d5-NEtFOSAA	126		25 - 150	01/16/18 12:31	01/20/18 05:14	1

Client Sample ID: 57M-03-06X-Dec17

Lab Sample ID: 320-34977-8

Date Collected: 01/09/18 13:50

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.9	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 05:30	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.9	U	20	3.1	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorobutanesulfonic acid (PFBS)	**8.1**		2.0	0.30	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorodecanoic acid (PFDA)	0.99	U	2.0	0.31	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.54	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluoroheptanoic acid (PFHpA)	**39**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorohexanesulfonic acid (PFHxS)	**21**		2.0	0.30	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorohexanoic acid (PFHxA)	**90**		4.0	0.57	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorononanoic acid (PFNA)	**1.1**	**J**	2.0	0.27	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorooctanesulfonic acid (PFOS)	**4.1**		4.0	0.53	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorooctanoic acid (PFOA)	**76**	**M**	4.0	0.84	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorotetradecanoic acid (PFTeA)	0.99	U	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/16/18 12:31	01/20/18 05:30	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/16/18 12:31	01/20/18 05:30	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	101		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C2 PFDoA	94		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C4-PFHpA	99		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C2 PFHxA	97		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C5 PFNA	99		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C4 PFOA	103		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C4 PFOS	99		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C2 PFUnA	103		25 - 150	01/16/18 12:31	01/20/18 05:30	1
18O2 PFHxS	101		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C2-PFTeDA	99		25 - 150	01/16/18 12:31	01/20/18 05:30	1
13C3-PFBS	102		25 - 150	01/16/18 12:31	01/20/18 05:30	1
d3-NMeFOSAA	106		25 - 150	01/16/18 12:31	01/20/18 05:30	1
d5-NEtFOSAA	115		25 - 150	01/16/18 12:31	01/20/18 05:30	1

Client Sample ID: DUP-01-Dec17

Lab Sample ID: 320-34977-9

Date Collected: 01/09/18 13:55

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	21	3.1	ng/L		01/16/18 12:31	01/20/18 05:38	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	21	3.2	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorobutanesulfonic acid (PFBS)	**7.9**	**M**	2.1	0.31	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.1	0.32	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorododecanoic acid (PFDoA)	2.1	U	4.1	0.57	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluoroheptanoic acid (PFHpA)	**43**		2.1	0.26	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorohexanesulfonic acid (PFHxS)	**21**		2.1	0.31	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorohexanoic acid (PFHxA)	**93**		4.1	0.60	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorononanoic acid (PFNA)	**1.2**	**J**	2.1	0.28	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorooctanesulfonic acid (PFOS)	**3.8**	**J**	4.1	0.56	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorooctanoic acid (PFOA)	**76**		4.1	0.88	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.1	0.30	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluorotridecanoic Acid (PFTriA)	3.1	U	4.1	1.3	ng/L		01/16/18 12:31	01/20/18 05:38	1
Perfluoroundecanoic acid (PFUnA)	3.1	U	4.1	1.1	ng/L		01/16/18 12:31	01/20/18 05:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C2 PFDoA	*92*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C4-PFHpA	*94*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C2 PFHxA	*95*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C5 PFNA	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C4 PFOA	*98*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C2 PFUnA	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
18O2 PFHxS	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C2-PFTeDA	*93*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
13C3-PFBS	*97*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
d3-NMeFOSAA	*106*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*
d5-NEtFOSAA	*110*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:38*	*1*

Client Sample ID: Area 3 SW-1-Dec17

Lab Sample ID: 320-34977-10

Date Collected: 01/10/18 09:30

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.8	U	20	2.9	ng/L		01/16/18 12:31	01/20/18 05:45	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.8	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorobutanesulfonic acid (PFBS)	**11**	**M**	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorodecanoic acid (PFDA)	0.98	U	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorododecanoic acid (PFDoA)	2.0	U	3.9	0.54	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluoroheptanoic acid (PFHpA)	**44**		2.0	0.24	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorohexanesulfonic acid (PFHxS)	**4.3**		2.0	0.29	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorohexanoic acid (PFHxA)	**130**		3.9	0.57	ng/L		01/16/18 12:31	01/20/18 05:45	1

Client Sample ID: Area 3 SW-1-Dec17

Lab Sample ID: 320-34977-10

Date Collected: 01/10/18 09:30

Matrix: Water

Date Received: 01/11/18 10:20

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorononanoic acid (PFNA)	0.98	U	2.0	0.26	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorooctanesulfonic acid (PFOS)	**0.59**	**J M**	3.9	0.53	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorooctanoic acid (PFOA)	**24**	**M**	3.9	0.83	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorotetradecanoic acid (PFTeA)	0.98	U	2.0	0.28	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluorotridecanoic Acid (PFTriA)	2.9	U	3.9	1.3	ng/L		01/16/18 12:31	01/20/18 05:45	1
Perfluoroundecanoic acid (PFUnA)	2.9	U	3.9	1.1	ng/L		01/16/18 12:31	01/20/18 05:45	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*103*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C2 PFDoA	*87*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C4-PFHpA	*92*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C2 PFHxA	*88*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C5 PFNA	*105*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C4 PFOA	*104*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C4 PFOS	*102*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C2 PFUnA	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
18O2 PFHxS	*94*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C2-PFTeDA	*89*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
13C3-PFBS	*99*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
d3-NMeFOSAA	*110*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*
d5-NEtFOSAA	*107*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:45*	*1*

Client Sample ID: DUP-02-Dec17

Lab Sample ID: 320-34977-11

Date Collected: 01/10/18 09:35

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.1	ng/L		01/16/18 12:31	01/20/18 05:53	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.2	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorobutanesulfonic acid (PFBS)	**12**		2.0	0.31	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.32	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.1	0.56	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluoroheptanoic acid (PFHpA)	**47**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorohexanesulfonic acid (PFHxS)	**4.1**		2.0	0.31	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorohexanoic acid (PFHxA)	**130**		4.1	0.59	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorooctanesulfonic acid (PFOS)	**0.60**	**J M**	4.1	0.55	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorooctanoic acid (PFOA)	**24**	**M**	4.1	0.86	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluorotridecanoic Acid (PFTriA)	3.1	U	4.1	1.3	ng/L		01/16/18 12:31	01/20/18 05:53	1
Perfluoroundecanoic acid (PFUnA)	3.1	U	4.1	1.1	ng/L		01/16/18 12:31	01/20/18 05:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*106*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:53*	*1*
13C2 PFDoA	*91*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:53*	*1*
13C4-PFHpA	*93*		*25 - 150*	*01/16/18 12:31*	*01/20/18 05:53*	*1*

Client Sample ID: DUP-02-Dec17

Lab Sample ID: 320-34977-11

Date Collected: 01/10/18 09:35

Matrix: Water

Date Received: 01/11/18 10:20

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	93		25 - 150	01/16/18 12:31	01/20/18 05:53	1
13C5 PFNA	101		25 - 150	01/16/18 12:31	01/20/18 05:53	1
13C4 PFOA	103		25 - 150	01/16/18 12:31	01/20/18 05:53	1
13C4 PFOS	106		25 - 150	01/16/18 12:31	01/20/18 05:53	1
13C2 PFUnA	101		25 - 150	01/16/18 12:31	01/20/18 05:53	1
18O2 PFHxS	97		25 - 150	01/16/18 12:31	01/20/18 05:53	1
13C2-PFTeDA	100		25 - 150	01/16/18 12:31	01/20/18 05:53	1
13C3-PFBS	101		25 - 150	01/16/18 12:31	01/20/18 05:53	1
d3-NMeFOSAA	109		25 - 150	01/16/18 12:31	01/20/18 05:53	1
d5-NEtFOSAA	110		25 - 150	01/16/18 12:31	01/20/18 05:53	1

Client Sample ID: 57M-96-11X-Dec17

Lab Sample ID: 320-34977-12

Date Collected: 01/10/18 10:45

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/16/18 12:31	01/20/18 06:01	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorobutanesulfonic acid (PFBS)	**13**	**M**	2.0	0.30	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluoroheptanoic acid (PFHpA)	**34**		2.0	0.25	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorohexanesulfonic acid (PFHxS)	**5.3**		2.0	0.30	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorohexanoic acid (PFHxA)	**170**		4.0	0.59	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorooctanoic acid (PFOA)	**5.2**	**M**	4.0	0.86	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/16/18 12:31	01/20/18 06:01	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/16/18 12:31	01/20/18 06:01	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDA	112		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C2 PFDoA	93		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C4-PFHpA	96		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C2 PFHxA	87		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C5 PFNA	107		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C4 PFOA	108		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C4 PFOS	104		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C2 PFUnA	109		25 - 150	01/16/18 12:31	01/20/18 06:01	1
18O2 PFHxS	103		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C2-PFTeDA	90		25 - 150	01/16/18 12:31	01/20/18 06:01	1
13C3-PFBS	93		25 - 150	01/16/18 12:31	01/20/18 06:01	1
d3-NMeFOSAA	113		25 - 150	01/16/18 12:31	01/20/18 06:01	1
d5-NEtFOSAA	115		25 - 150	01/16/18 12:31	01/20/18 06:01	1

Client Sample ID: 57M-95-03X-Dec17

Lab Sample ID: 320-34977-13

Date Collected: 01/10/18 11:50

Matrix: Water

Date Received: 01/11/18 10:20

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	99	U	200	30	ng/L		01/16/18 12:31	01/23/18 11:09	10
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	99	U	200	31	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorobutanesulfonic acid (PFBS)	**37**	**D M**	20	3.0	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorodecanoic acid (PFDA)	9.9	U	20	3.1	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorododecanoic acid (PFDoA)	20	U	39	5.4	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluoroheptanoic acid (PFHpA)	**62**	**D M**	20	2.5	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorohexanesulfonic acid (PFHxS)	**9.7**	**J D**	20	3.0	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorohexanoic acid (PFHxA)	**71**	**D M**	39	5.7	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorononanoic acid (PFNA)	9.9	U	20	2.7	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorooctanesulfonic acid (PFOS)	20	U M	39	5.3	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorooctanoic acid (PFOA)	**82**	**D M**	39	8.4	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorotetradecanoic acid (PFTeA)	9.9	U	20	2.9	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluorotridecanoic Acid (PFTriA)	30	U	39	13	ng/L		01/16/18 12:31	01/23/18 11:09	10
Perfluoroundecanoic acid (PFUnA)	30	U	39	11	ng/L		01/16/18 12:31	01/23/18 11:09	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*115*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C2 PFDoA	*98*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C4-PFHpA	*84*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C2 PFHxA	*88*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C5 PFNA	*117*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C4 PFOA	*103*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C4 PFOS	*103*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C2 PFUnA	*105*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
18O2 PFHxS	*106*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C2-PFTeDA	*82*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
13C3-PFBS	*102*	*M*	*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
d3-NMeFOSAA	*114*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*
d5-NEtFOSAA	*112*		*25 - 150*	*01/16/18 12:31*	*01/23/18 11:09*	*10*

Client Sample ID: XJM-97-11X-Dec17

Lab Sample ID: 320-34977-14

Date Collected: 01/10/18 13:20

Matrix: Water

Date Received: 01/11/18 10:20

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.7	U	19	2.9	ng/L		01/16/18 12:31	01/20/18 06:17	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.7	U	19	3.0	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorobutanesulfonic acid (PFBS)	0.97	U	1.9	0.29	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorodecanoic acid (PFDA)	0.97	U	1.9	0.30	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorododecanoic acid (PFDoA)	1.9	U	3.9	0.54	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluoroheptanoic acid (PFHpA)	0.97	U	1.9	0.24	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorohexanesulfonic acid (PFHxS)	**0.29**	**J**	1.9	0.29	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorohexanoic acid (PFHxA)	1.9	U	3.9	0.56	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorononanoic acid (PFNA)	0.97	U	1.9	0.26	ng/L		01/16/18 12:31	01/20/18 06:17	1

Client Sample ID: XJM-97-11X-Dec17
Date Collected: 01/10/18 13:20
Date Received: 01/11/18 10:20

Lab Sample ID: 320-34977-14
Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	1.9	U	3.9	0.53	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorooctanoic acid (PFOA)	1.9	U	3.9	0.83	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorotetradecanoic acid (PFTeA)	0.97	U	1.9	0.28	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluorotridecanoic Acid (PFTriA)	2.9	U	3.9	1.3	ng/L		01/16/18 12:31	01/20/18 06:17	1
Perfluoroundecanoic acid (PFUnA)	2.9	U	3.9	1.1	ng/L		01/16/18 12:31	01/20/18 06:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*99*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C2 PFDoA	*93*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C4-PFHpA	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C2 PFHxA	*100*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C5 PFNA	*96*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C4 PFOA	*105*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C4 PFOS	*95*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C2 PFUnA	*101*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
18O2 PFHxS	*98*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C2-PFTeDA	*92*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
13C3-PFBS	*98*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
d3-NMeFOSAA	*109*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*
d5-NEtFOSAA	*110*		*25 - 150*	*01/16/18 12:31*	*01/20/18 06:17*	*1*

Isotope Dilution Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFDA (25-150)	PFDoA (25-150)	PFHpA (25-150)	PFHxA (25-150)	PFNA (25-150)	PFOA (25-150)	PFOS (25-150)	PFUnA (25-150)
320-34977-1	G6M-02-06X-Dec17	100	95	96	99	106	104	98	106
320-34977-2	XSA-12-98X-Dec17	103	96	102	103	106	103	102	107
320-34977-3	SHM-93-24A-Dec17	101	91	101	95	99	102	100	107
320-34977-4	FB-03-Dec17	103	95	97	98	109	103	106	106
320-34977-5	57M-03-01X-Dec17	102	87	84	80	106	99	99	101
320-34977-6	57M-03-02X-Dec17	97	71	85	78	104	104	97	89
320-34977-7	57M-03-04X-Dec17	109	99	91	88	108	100	100	107
320-34977-8	57M-03-06X-Dec17	101	94	99	97	99	103	99	103
320-34977-9	DUP-01-Dec17	100	92	94	95	100	98	98	100
320-34977-10	Area 3 SW-1-Dec17	103	87	92	88	105	104	102	100
320-34977-11	DUP-02-Dec17	106	91	93	93	101	103	106	101
320-34977-12	57M-96-11X-Dec17	112	93	96	87	107	108	104	109
320-34977-13 - DL	57M-95-03X-Dec17	115	98	84	88	117	103	103	105
320-34977-14	XJM-97-11X-Dec17	99	93	100	100	96	105	95	101
LCS 320-204155/2-A	Lab Control Sample	105	90	106	99	103	103	102	103
LCSD 320-204155/3-A	Lab Control Sample Dup	104	96	101	104	103	99	105	102
LCSD 320-204155/3-A - RA	Lab Control Sample Dup							108	
MB 320-204155/1-A	Method Blank	107	98	107	103	106	108	102	108

		Percent Isotope Dilution Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFTDA (25-150)	3C3-PFBS (25-150)	-NMeFOSA (25-150)	-NEtFOSA (25-150)
320-34977-1	G6M-02-06X-Dec17	98	100	100	106	112
320-34977-2	XSA-12-98X-Dec17	99	107	97	117	118
320-34977-3	SHM-93-24A-Dec17	100	101	103	106	111
320-34977-4	FB-03-Dec17	97	105	101	114	115
320-34977-5	57M-03-01X-Dec17	91	90	90	110	107
320-34977-6	57M-03-02X-Dec17	92	79	85	87	89
320-34977-7	57M-03-04X-Dec17	95	91	92	121	126
320-34977-8	57M-03-06X-Dec17	101	99	102	106	115
320-34977-9	DUP-01-Dec17	100	93	97	106	110
320-34977-10	Area 3 SW-1-Dec17	94	89	99	110	107
320-34977-11	DUP-02-Dec17	97	100	101	109	110
320-34977-12	57M-96-11X-Dec17	103	90	93	113	115
320-34977-13 - DL	57M-95-03X-Dec17	106	82	102 M	114	112
320-34977-14	XJM-97-11X-Dec17	98	92	98	109	110
LCS 320-204155/2-A	Lab Control Sample	96	97	94	107	112
LCSD 320-204155/3-A	Lab Control Sample Dup	95	99	96		106
LCSD 320-204155/3-A - RA	Lab Control Sample Dup				105	
MB 320-204155/1-A	Method Blank	99	107	99	115	114

Surrogate Legend

PFDA = 13C2 PFDA
PFDoA = 13C2 PFDoA
PFHpA = 13C4-PFHpA
PFHxA = 13C2 PFHxA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFUnA = 13C2 PFUnA

Isotope Dilution Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

PFHxS = 18O2 PFHxS
PFTDA = 13C2-PFTeDA
13C3-PFBS = 13C3-PFBS
d3-NMeFOSAA = d3-NMeFOSAA
d5-NEtFOSAA = d5-NEtFOSAA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-204155/1-A
Matrix: Water
Analysis Batch: 204801

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 204155

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/16/18 12:30	01/20/18 04:03	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.30	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorohexanoic acid (PFHxA)	2.0	U	4.0	0.58	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/16/18 12:30	01/20/18 04:03	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/16/18 12:30	01/20/18 04:03	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*107*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C2 PFDoA	*98*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C4-PFHpA	*107*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C2 PFHxA	*103*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C5 PFNA	*106*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C4 PFOA	*108*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C4 PFOS	*102*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C2 PFUnA	*108*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
18O2 PFHxS	*99*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C2-PFTeDA	*107*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
13C3-PFBS	*99*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
d3-NMeFOSAA	*115*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*
d5-NEtFOSAA	*114*		*25 - 150*	*01/16/18 12:30*	*01/20/18 04:03*	*1*

Lab Sample ID: LCS 320-204155/2-A
Matrix: Water
Analysis Batch: 204801

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 204155

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	40.0	36.5		ng/L		91	86 - 132
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	40.0	38.5		ng/L		96	87 - 128
Perfluorobutanesulfonic acid (PFBS)	35.4	34.0		ng/L		96	88 - 130
Perfluorodecanoic acid (PFDA)	40.0	39.6		ng/L		99	84 - 123
Perfluorododecanoic acid (PFDoA)	40.0	41.9		ng/L		105	82 - 122
Perfluoroheptanoic acid (PFHpA)	40.0	35.7		ng/L		89	89 - 127

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

Lab Sample ID: LCS 320-204155/2-A
Matrix: Water
Analysis Batch: 204801

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 204155

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			36.4	34.4		ng/L		94	87 - 126		
Perfluorohexanoic acid (PFHxA)			40.0	37.3		ng/L		93	86 - 126		
Perfluorononanoic acid (PFNA)			40.0	37.9		ng/L		95	77 - 137		
Perfluorooctanesulfonic acid (PFOS)			37.1	33.3		ng/L		90	83 - 126		
Perfluorooctanoic acid (PFOA)			40.0	36.3		ng/L		91	80 - 120		
Perfluorotetradecanoic acid (PFTeA)			40.0	40.9		ng/L		102	66 - 120		
Perfluorotridecanoic Acid (PFTriA)			40.0	38.9		ng/L		97	56 - 163		
Perfluoroundecanoic acid (PFUnA)			40.0	36.4		ng/L		91	73 - 122		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFDA	*105*		*25 - 150*
13C2 PFDoA	*90*		*25 - 150*
13C4-PFHpA	*106*		*25 - 150*
13C2 PFHxA	*99*		*25 - 150*
13C5 PFNA	*103*		*25 - 150*
13C4 PFOA	*103*		*25 - 150*
13C4 PFOS	*102*		*25 - 150*
13C2 PFUnA	*103*		*25 - 150*
18O2 PFHxS	*96*		*25 - 150*
13C2-PFTeDA	*97*		*25 - 150*
13C3-PFBS	*94*		*25 - 150*
d3-NMeFOSAA	*107*		*25 - 150*
d5-NEtFOSAA	*112*		*25 - 150*

Lab Sample ID: LCSD 320-204155/3-A
Matrix: Water
Analysis Batch: 204801

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 204155

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)			40.0	35.9		ng/L		90	86 - 132	2	30
Perfluorobutanesulfonic acid (PFBS)			35.4	32.9		ng/L		93	88 - 130	3	30
Perfluorodecanoic acid (PFDA)			40.0	39.2		ng/L		98	84 - 123	1	30
Perfluorododecanoic acid (PFDoA)			40.0	38.4		ng/L		96	82 - 122	9	30
Perfluoroheptanoic acid (PFHpA)			40.0	35.5		ng/L		89	89 - 127	1	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	33.0		ng/L		91	87 - 126	4	30
Perfluorohexanoic acid (PFHxA)			40.0	35.0		ng/L		88	86 - 126	6	30
Perfluorononanoic acid (PFNA)			40.0	35.6		ng/L		89	77 - 137	6	30
Perfluorooctanoic acid (PFOA)			40.0	36.1		ng/L		90	80 - 120	1	30
Perfluorotetradecanoic acid (PFTeA)			40.0	39.7		ng/L		99	66 - 120	3	30

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

Lab Sample ID: LCSD 320-204155/3-A
Matrix: Water
Analysis Batch: 204801

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 204155

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorotridecanoic Acid (PFTriA)			40.0	36.8		ng/L		92	56 - 163	5	30
Perfluoroundecanoic acid (PFUnA)			40.0	34.2		ng/L		85	73 - 122	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFDA	*104*		*25 - 150*
13C2 PFDoA	*96*		*25 - 150*
13C4-PFHpA	*101*		*25 - 150*
13C2 PFHxA	*104*		*25 - 150*
13C5 PFNA	*103*		*25 - 150*
13C4 PFOA	*99*		*25 - 150*
13C4 PFOS	*105*		*25 - 150*
13C2 PFUnA	*102*		*25 - 150*
18O2 PFHxS	*95*		*25 - 150*
13C2-PFTeDA	*99*		*25 - 150*
13C3-PFBS	*96*		*25 - 150*
d5-NEtFOSAA	*106*		*25 - 150*

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

Lab Sample ID: LCSD 320-204155/3-A
Matrix: Water
Analysis Batch: 204981

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 204155

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA) - RA			40.0	35.2		ng/L		88	87 - 128	9	30
Perfluorooctanesulfonic acid (PFOS) - RA			37.1	31.4		ng/L		85	83 - 126	6	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C4 PFOS - RA	*108*		*25 - 150*
d3-NMeFOSAA - RA	*105*		*25 - 150*

LCMS

Prep Batch: 204155

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34977-1	G6M-02-06X-Dec17	Total/NA	Water	3535	
320-34977-2	XSA-12-98X-Dec17	Total/NA	Water	3535	
320-34977-3	SHM-93-24A-Dec17	Total/NA	Water	3535	
320-34977-4	FB-03-Dec17	Total/NA	Water	3535	
320-34977-5	57M-03-01X-Dec17	Total/NA	Water	3535	
320-34977-6	57M-03-02X-Dec17	Total/NA	Water	3535	
320-34977-7	57M-03-04X-Dec17	Total/NA	Water	3535	
320-34977-8	57M-03-06X-Dec17	Total/NA	Water	3535	
320-34977-9	DUP-01-Dec17	Total/NA	Water	3535	
320-34977-10	Area 3 SW-1-Dec17	Total/NA	Water	3535	
320-34977-11	DUP-02-Dec17	Total/NA	Water	3535	
320-34977-12	57M-96-11X-Dec17	Total/NA	Water	3535	
320-34977-13 - DL	57M-95-03X-Dec17	Total/NA	Water	3535	
320-34977-14	XJM-97-11X-Dec17	Total/NA	Water	3535	
MB 320-204155/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-204155/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-204155/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
LCSD 320-204155/3-A - RA	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 204801

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34977-1	G6M-02-06X-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-2	XSA-12-98X-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-3	SHM-93-24A-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-4	FB-03-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-5	57M-03-01X-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-6	57M-03-02X-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-7	57M-03-04X-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-8	57M-03-06X-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-9	DUP-01-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-10	Area 3 SW-1-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-11	DUP-02-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-12	57M-96-11X-Dec17	Total/NA	Water	537 (modified)	204155
320-34977-14	XJM-97-11X-Dec17	Total/NA	Water	537 (modified)	204155
MB 320-204155/1-A	Method Blank	Total/NA	Water	537 (modified)	204155
LCS 320-204155/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	204155
LCSD 320-204155/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	204155

Analysis Batch: 204981

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 320-204155/3-A - RA	Lab Control Sample Dup	Total/NA	Water	537 (modified)	204155

Analysis Batch: 205152

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-34977-13 - DL	57M-95-03X-Dec17	Total/NA	Water	537 (modified)	204155

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Client Sample ID: G6M-02-06X-Dec17
Date Collected: 01/08/18 10:00
Date Received: 01/11/18 10:20

Lab Sample ID: 320-34977-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			248.5 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 04:27	ABH	TAL SAC

Client Sample ID: XSA-12-98X-Dec17
Date Collected: 01/08/18 11:25
Date Received: 01/11/18 10:20

Lab Sample ID: 320-34977-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			248.7 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 04:35	ABH	TAL SAC

Client Sample ID: SHM-93-24A-Dec17
Date Collected: 01/08/18 13:45
Date Received: 01/11/18 10:20

Lab Sample ID: 320-34977-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			254.4 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 04:43	ABH	TAL SAC

Client Sample ID: FB-03-Dec17
Date Collected: 01/08/18 14:30
Date Received: 01/11/18 10:20

Lab Sample ID: 320-34977-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			249.1 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 04:51	ABH	TAL SAC

Client Sample ID: 57M-03-01X-Dec17
Date Collected: 01/09/18 09:40
Date Received: 01/11/18 10:20

Lab Sample ID: 320-34977-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			245.1 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 04:58	ABH	TAL SAC

Client Sample ID: 57M-03-02X-Dec17
Date Collected: 01/09/18 10:40
Date Received: 01/11/18 10:20

Lab Sample ID: 320-34977-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			250.8 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 05:06	ABH	TAL SAC

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Client Sample ID: 57M-03-04X-Dec17
Lab Sample ID: 320-34977-7
Date Collected: 01/09/18 12:30
Matrix: Water
Date Received: 01/11/18 10:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			246 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 05:14	ABH	TAL SAC

Client Sample ID: 57M-03-06X-Dec17
Lab Sample ID: 320-34977-8
Date Collected: 01/09/18 13:50
Matrix: Water
Date Received: 01/11/18 10:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			253.1 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 05:30	ABH	TAL SAC

Client Sample ID: DUP-01-Dec17
Lab Sample ID: 320-34977-9
Date Collected: 01/09/18 13:55
Matrix: Water
Date Received: 01/11/18 10:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			242.7 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 05:38	ABH	TAL SAC

Client Sample ID: Area 3 SW-1-Dec17
Lab Sample ID: 320-34977-10
Date Collected: 01/10/18 09:30
Matrix: Water
Date Received: 01/11/18 10:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			255.8 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 05:45	ABH	TAL SAC

Client Sample ID: DUP-02-Dec17
Lab Sample ID: 320-34977-11
Date Collected: 01/10/18 09:35
Matrix: Water
Date Received: 01/11/18 10:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			245.7 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 05:53	ABH	TAL SAC

Client Sample ID: 57M-96-11X-Dec17
Lab Sample ID: 320-34977-12
Date Collected: 01/10/18 10:45
Matrix: Water
Date Received: 01/11/18 10:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			247.8 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 06:01	ABH	TAL SAC

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Client Sample ID: 57M-95-03X-Dec17

Lab Sample ID: 320-34977-13

Date Collected: 01/10/18 11:50

Matrix: Water

Date Received: 01/11/18 10:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535	DL		253.2 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10			205152	01/23/18 11:09	ABH	TAL SAC

Client Sample ID: XJM-97-11X-Dec17

Lab Sample ID: 320-34977-14

Date Collected: 01/10/18 13:20

Matrix: Water

Date Received: 01/11/18 10:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			256.9 mL	10.0 mL	204155	01/16/18 12:31	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204801	01/20/18 06:17	ABH	TAL SAC

Laboratory References:

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

360325-Boston 360325-Boston 360325-Boston

PO #	New	Devens - PFAS Dec 2017 Sampling 1082-112	**Chain of Custody Record**	Page: 1 of: 2

Company	KOMAN GS, LLC	Laboratory:	Test America - Savannah
Address:	293 Boston Post Road West, Suite 100 Marlborough, MA 01752	Address:	510 LaRoche Ave Savannah, GA 31404
Phone: 508-366-7442	Fax: 508-366-7445	Contact:	Jerry Lanier
Sampled by [Print Name(s)]/Affilliation	Mamba Anderson	Project Name:	Devens Additional PFAS
Sampler(s) Signature(s)		Sampling QAP No.:	
		Approval Date:	
		TAT	Routine
		Other:	

Item No.	Field ID No.	Sampled Date	Sampled Time	Col. Method (see codes)	Matrix (see codes)	Number of Containers	PFAS (Method 537-modified) 2-250ml HDPE	Remarks	Lab. No.
	66M-02-06X-Dec17	1/8/18	1000	P	GW	2	✓		
	XSA-12-98X-Dec17	1/8/18	1125	P	GW	2	✓		
	SMM-93-24A-Dec17	1/8/18	1345	P	GW	2	✓		
	FB-03-Dec17	1/8/18	1430	P	GW	2	✓		
	57M-03-01X-Dec17	1/9/18	940	P	GW	2	✓		
	57M-03-02X-Dec17	1/9/18	1040	P	GW	2	✓		
	57M-03-04X-Dec17	1/9/18	1230	P	GW	2	✓		
	57M-03-06X-Dec17	1/9/18	1350	P	GW	2	✓		
Shipping Details				courier pick up		~~10~~	← Total Number of Containers		

320-34977 Chain of Custody

Date Out:	Via:	Item No.	Relinquished by/Affiliation	Date	Time		Date	Time
Returned:	Via:			1/10/18	1430		1-10-18	1430
Additional Comments:				1-10-18	1800		1/11/18	1020

TH-Sue 1-8

email logins and results to:

lekes@komangs.com

Lab Comments

Preserve Where Applicable ☐

On ICE ☐

Temperature 1.8 C

MATRIX CODES:	GW = Groundwater	SW = Surface Water	O = Other
PRESERVATIVE CODES:	I = Ice Only		O = Other
COLLECTION METHOD CODES:	G=Grab	P= Pumping	O = Other

360325-Boston 360325-Boston 360325-Boston

PO # New | Devens - PFAS Dec 2017 Sampling 1082-112

Chain of Custody Record

Page: 2 of: 2

Company	KOMAN GS, LLC
Address:	293 Boston Post Road West, Suite 100 Marlborough, MA 01752
Phone: 508-366-7442	Fax: 508-366-7445
Sampled by [Print Name(s)]/Affilliation	Chris G. Anderson
Sampler(s) Signature(s)	

Preservatives (see codes): I

Analyses Requested: PFAS (Method 537-modified) 2-250ml HDPE

Laboratory:	Test America - Savannah
Address:	510 LaRoche Ave Savannah, GA 31404
Contact:	Jerry Lanier
Project Name:	Devens Additional PFAS
Sampling QAP No.:	
Approval Date:	
TAT	Routine
Other:	

Item No.	Field ID No.	Sampled Date	Sampled Time	Col. Method (see codes)	Matrix (see codes)	Number of Containers	PFAS (Method 537-modified) 2-250ml HDPE	Remarks	Lab. No.
	DUP-01-Dec17	1/9/18	1355	P	GW	2	✓		
	Area 3Sw-1-Dec17	1/10/18	930	P	GW	2	✓		
	DUP-02-Dec17	1/10/18	935	P	GW	2	✓		
	57M-96-11X-Dec17	1/10/18	1045	P	GW	2	✓		
	57M-95-03X-Dec17	1/10/18	1150	P	GW	2	✓		
	XM-97-11X-Dec17	1/10/18	1320	P	GW	2	✓		

Shipping Details: courier pick up | ~~10~~ ← Total Number of Containers

Date Out: Via:

Returned: Via:

Additional Comments:

Item No.	Relinquished by/Affiliation	Date	Time		Date	Time
		1/10/18	1430		1/11/18	1430
		1-10-18	1800		1/11/18	1020

TAT see 12

email logins and results to:

lekes@komangs.com

Lab Comments

Preserve Where Applicable ☐

On ICE ☐

Temperature _____ C

MATRIX CODES: GW = Groundwater SW = Surface Water O = Other

PRESERVATIVE CODES: I = Ice Only O = Other

COLLECTION METHOD CODES: G=Grab P= Pumping O = Other

Login Sample Receipt Checklist

Client: KOMAN Government Solutions, LLC

Job Number: 320-34977-1

Login Number: 34977
List Number: 1
Creator: Hytrek, Cheryl

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

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	UST-055	01-31-18
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Savannah

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		SAVLAB	
Alabama	State Program	4	41450	06-30-18
Alaska	State Program	10		06-30-18
Alaska (UST)	State Program	10	UST-104	09-22-19
Arizona	State Program	9	AZ0808	12-14-18
Arkansas DEQ	State Program	6	88-0692	02-01-19
California	State Program	9	2939	06-30-18
Colorado	State Program	8	N/A	12-31-18
Connecticut	State Program	1	PH-0161	03-31-19
Florida	NELAP	4	E87052	06-30-18
GA Dept. of Agriculture	State Program	4	N/A	06-12-18
Georgia	State Program	4	803	06-30-18
Guam	State Program	9	15-005r	04-16-18
Hawaii	State Program	9	N/A	06-30-18
Illinois	NELAP	5	200022	11-30-18
Indiana	State Program	5	N/A	06-30-18

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-34977-1

Laboratory: TestAmerica Savannah (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
Iowa	State Program	7	353	06-30-19
Kentucky (DW)	State Program	4	90084	12-31-18
Kentucky (UST)	State Program	4	18	06-30-18
Kentucky (WW)	State Program	4	90084	12-31-18 *
L-A-B	DoD ELAP		L2463	09-22-19
L-A-B	ISO/IEC 17025		L2463.01	09-22-19
Louisiana	NELAP	6	30690	06-30-18
Louisiana (DW)	NELAP	6	LA160019	12-31-18
Maine	State Program	1	GA00006	09-24-18
Maryland	State Program	3	250	12-31-18
Massachusetts	State Program	1	M-GA006	06-30-18
Michigan	State Program	5	9925	06-30-18
Mississippi	State Program	4	N/A	06-30-18
Nebraska	State Program	7	TestAmerica-Savannah	06-30-18
New Jersey	NELAP	2	GA769	06-30-18
New Mexico	State Program	6	N/A	06-30-18
New York	NELAP	2	10842	03-31-18
North Carolina (DW)	State Program	4	13701	07-31-18
North Carolina (WW/SW)	State Program	4	269	12-31-18
Oklahoma	State Program	6	9984	08-31-18
Pennsylvania	NELAP	3	68-00474	06-30-18
Puerto Rico	State Program	2	GA00006	12-31-18
South Carolina	State Program	4	98001	06-30-18
Tennessee	State Program	4	TN02961	06-30-18
Texas	NELAP	6	T104704185-16-9	11-30-18
Texas	State Program	6	T104704185	06-30-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		SAV 3-04	06-14-20 *
Virginia	NELAP	3	460161	06-14-18
Washington	State Program	10	C805	06-10-18
West Virginia DEP	State Program	3	094	06-30-18
Wisconsin	State Program	5	999819810	08-31-18
Wyoming	State Program	8	8TMS-L	06-30-16 *

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-35041-1
Client Project/Site: Fort Devens / PFAS Dec. 2017

For:
KOMAN Government Solutions, LLC
293 Boston Post Road
Suite 100
Marlborough, Massachusetts 01752

Attn: Laurie Ekes

Jerry Lanier

Authorized for release by:
1/31/2018 8:37:42 AM

Jerry Lanier, Project Manager I
(912)354-7858 e.3410
jerry.lanier@testamericainc.com

LINKS

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 320-35041-1

Laboratory: TestAmerica Sacramento

Narrative

CASE NARRATIVE

Client: KOMAN Government Solutions, LLC

Project: Fort Devens / PFAS Dec. 2017

Report Number: 320-35041-1

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

RECEIPT

The samples were received on 01/15/2018; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 1.8 C.

PERFLUORINATED HYDROCARBONS

Samples XJM-94-07X-Dec17 (320-35041-1) and HA-3B-Dec17 (320-35041-2) were analyzed for Perfluorinated Hydrocarbons in accordance with TestAmerica SOP. The samples were prepared on 01/17/2018 and analyzed on 01/20/2018.

The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

The following analyte recovered outside control limits for the laboratory control sample duplicate (LCSD) associated with preparation batch 320-204339 and analytical batch 320-204803: Perfluoroheptanoic acid (PFHpA). This is not indicative of a systematic control problem because this was a random marginal exceedances. Qualified results have been reported.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-205579.

3535_PFC - water - 320-205579

The following samples: XJM-94-07X-Dec17 (320-35041-1) and HA-3B-Dec17 (320-35041-2) were decanted prior to extraction, due to the original sample bottles containing an excess of sediment which had the potential to clog the solid-phase column.

3535_PFC - water - 320-205579

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

Sample Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35041-1	XJM-94-07X-Dec17	Water	01/11/18 09:20	01/15/18 09:05
320-35041-2	HA-3B-Dec17	Water	01/11/18 11:05	01/15/18 09:05

Method Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	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)

Detection Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

Client Sample ID: XJM-94-07X-Dec17 — Lab Sample ID: 320-35041-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	2.8	M	1.9	0.29	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.7	J M Q	1.9	0.24	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	2.0		1.9	0.29	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	1.6	J M	3.9	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.92	J	1.9	0.26	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	4.5	M	3.9	0.52	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	6.6	M	3.9	0.83	ng/L	1		537 (modified)	Total/NA

Client Sample ID: HA-3B-Dec17 — Lab Sample ID: 320-35041-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.41	J	2.0	0.30	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.35	J	2.0	0.27	ng/L	1		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: XJM-94-07X-Dec17

Lab Sample ID: 320-35041-1

Date Collected: 01/11/18 09:20

Matrix: Water

Date Received: 01/15/18 09:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.7	U	19	2.9	ng/L		01/17/18 13:08	01/20/18 07:43	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.7	U	19	3.0	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorobutanesulfonic acid (PFBS)	**2.8**	**M**	1.9	0.29	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorodecanoic acid (PFDA)	0.97	U	1.9	0.30	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorododecanoic acid (PFDoA)	1.9	U	3.9	0.53	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluoroheptanoic acid (PFHpA)	**1.7**	**J M Q**	1.9	0.24	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorohexanesulfonic acid (PFHxS)	**2.0**		1.9	0.29	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorohexanoic acid (PFHxA)	**1.6**	**J M**	3.9	0.56	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorononanoic acid (PFNA)	**0.92**	**J**	1.9	0.26	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorooctanesulfonic acid (PFOS)	**4.5**	**M**	3.9	0.52	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorooctanoic acid (PFOA)	**6.6**	**M**	3.9	0.83	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorotetradecanoic acid (PFTeA)	0.97	U	1.9	0.28	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluorotridecanoic Acid (PFTriA)	2.9	U	3.9	1.3	ng/L		01/17/18 13:08	01/20/18 07:43	1
Perfluoroundecanoic acid (PFUnA)	2.9	U	3.9	1.1	ng/L		01/17/18 13:08	01/20/18 07:43	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*101*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C2 PFDoA	*95*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C4-PFHpA	*97*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C2 PFHxA	*94*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C5 PFNA	*101*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C4 PFOA	*104*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C4 PFOS	*101*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C2 PFUnA	*105*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
18O2 PFHxS	*99*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C2-PFTeDA	*94*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
13C3-PFBS	*95*	*M*	*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
d3-NMeFOSAA	*113*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*
d5-NEtFOSAA	*117*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:43*	*1*

Client Sample ID: HA-3B-Dec17

Lab Sample ID: 320-35041-2

Date Collected: 01/11/18 11:05

Matrix: Water

Date Received: 01/15/18 09:05

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/17/18 13:08	01/20/18 07:51	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.56	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluoroheptanoic acid (PFHpA)	1.0	U Q	2.0	0.25	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorohexanesulfonic acid (PFHxS)	**0.41**	**J**	2.0	0.30	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorohexanoic acid (PFHxA)	2.0	U M	4.0	0.59	ng/L		01/17/18 13:08	01/20/18 07:51	1

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

Client Sample ID: HA-3B-Dec17
Date Collected: 01/11/18 11:05
Date Received: 01/15/18 09:05

Lab Sample ID: 320-35041-2
Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorononanoic acid (PFNA)	**0.35**	**J**	2.0	0.27	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.55	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.86	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/17/18 13:08	01/20/18 07:51	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/17/18 13:08	01/20/18 07:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*107*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C2 PFDoA	*96*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C4-PFHpA	*100*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C2 PFHxA	*101*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C5 PFNA	*101*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C4 PFOA	*105*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C4 PFOS	*99*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C2 PFUnA	*105*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
18O2 PFHxS	*95*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C2-PFTeDA	*106*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
13C3-PFBS	*103*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
d3-NMeFOSAA	*117*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*
d5-NEtFOSAA	*116*		*25 - 150*	*01/17/18 13:08*	*01/20/18 07:51*	*1*

Isotope Dilution Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFDA (25-150)	PFDoA (25-150)	PFHpA (25-150)	PFHxA (25-150)	PFNA (25-150)	PFOA (25-150)	PFOS (25-150)	PFUnA (25-150)
320-35041-1	XJM-94-07X-Dec17	101	95	97	94	101	104	101	105
320-35041-2	HA-3B-Dec17	107	96	100	101	101	105	99	105
LCS 320-204339/2-A	Lab Control Sample	111	101	101	99	110	110	105	107
LCSD 320-204339/3-A	Lab Control Sample Dup	107	100	106	101	108	108	108	110
MB 320-204339/1-A	Method Blank	108	98	98	99	104	103	98	106

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFTDA (25-150)	3C3-PFBS (25-150)	-NMeFOS (25-150)	-NEtFOS (25-150)			
320-35041-1	XJM-94-07X-Dec17	99	94	95 M	113	117			
320-35041-2	HA-3B-Dec17	95	106	103	117	116			
LCS 320-204339/2-A	Lab Control Sample	101	103	99	116	116			
LCSD 320-204339/3-A	Lab Control Sample Dup	102	103	101	118	117			
MB 320-204339/1-A	Method Blank	95	102	99	113	113			

Surrogate Legend

PFDA = 13C2 PFDA
PFDoA = 13C2 PFDoA
PFHpA = 13C4-PFHpA
PFHxA = 13C2 PFHxA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFUnA = 13C2 PFUnA
PFHxS = 18O2 PFHxS
PFTDA = 13C2-PFTeDA
13C3-PFBS = 13C3-PFBS
d3-NMeFOSAA = d3-NMeFOSAA
d5-NEtFOSAA = d5-NEtFOSAA

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-204339/1-A
Matrix: Water
Analysis Batch: 204803

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 204339

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	U	20	3.0	ng/L		01/17/18 13:08	01/20/18 06:40	1
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	U	20	3.1	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.30	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorodecanoic acid (PFDA)	1.0	U	2.0	0.31	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorododecanoic acid (PFDoA)	2.0	U	4.0	0.55	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluoroheptanoic acid (PFHpA)	1.0	U	2.0	0.25	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.30	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorohexanoic acid (PFHxA)	2.0	U	4.0	0.58	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorononanoic acid (PFNA)	1.0	U	2.0	0.27	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorooctanesulfonic acid (PFOS)	2.0	U	4.0	0.54	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorooctanoic acid (PFOA)	2.0	U	4.0	0.85	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorotetradecanoic acid (PFTeA)	1.0	U	2.0	0.29	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluorotridecanoic Acid (PFTriA)	3.0	U	4.0	1.3	ng/L		01/17/18 13:08	01/20/18 06:40	1
Perfluoroundecanoic acid (PFUnA)	3.0	U	4.0	1.1	ng/L		01/17/18 13:08	01/20/18 06:40	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFDA	*108*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C2 PFDoA	*98*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C4-PFHpA	*98*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C2 PFHxA	*99*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C5 PFNA	*104*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C4 PFOA	*103*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C2 PFUnA	*106*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
18O2 PFHxS	*95*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C2-PFTeDA	*102*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
13C3-PFBS	*99*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
d3-NMeFOSAA	*113*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*
d5-NEtFOSAA	*113*		*25 - 150*	*01/17/18 13:08*	*01/20/18 06:40*	*1*

Lab Sample ID: LCS 320-204339/2-A
Matrix: Water
Analysis Batch: 204803

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 204339

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	40.0	36.2		ng/L		91	86 - 132
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	40.0	36.1		ng/L		90	87 - 128
Perfluorobutanesulfonic acid (PFBS)	35.4	33.8		ng/L		96	88 - 130
Perfluorodecanoic acid (PFDA)	40.0	38.4		ng/L		96	84 - 123
Perfluorododecanoic acid (PFDoA)	40.0	37.4		ng/L		94	82 - 122
Perfluoroheptanoic acid (PFHpA)	40.0	35.9		ng/L		90	89 - 127

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

Lab Sample ID: LCS 320-204339/2-A
Matrix: Water
Analysis Batch: 204803

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 204339

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluorohexanesulfonic acid (PFHxS)			36.4	33.0		ng/L		91	87 - 126		
Perfluorohexanoic acid (PFHxA)			40.0	37.4		ng/L		93	86 - 126		
Perfluorononanoic acid (PFNA)			40.0	36.1		ng/L		90	77 - 137		
Perfluorooctanesulfonic acid (PFOS)			37.1	33.4		ng/L		90	83 - 126		
Perfluorooctanoic acid (PFOA)			40.0	35.0		ng/L		87	80 - 120		
Perfluorotetradecanoic acid (PFTeA)			40.0	41.2		ng/L		103	66 - 120		
Perfluorotridecanoic Acid (PFTriA)			40.0	36.7		ng/L		92	56 - 163		
Perfluoroundecanoic acid (PFUnA)			40.0	36.6		ng/L		91	73 - 122		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2 PFDA	*111*		*25 - 150*
13C2 PFDoA	*101*		*25 - 150*
13C4-PFHpA	*101*		*25 - 150*
13C2 PFHxA	*99*		*25 - 150*
13C5 PFNA	*110*		*25 - 150*
13C4 PFOA	*110*		*25 - 150*
13C4 PFOS	*105*		*25 - 150*
13C2 PFUnA	*107*		*25 - 150*
18O2 PFHxS	*101*		*25 - 150*
13C2-PFTeDA	*103*		*25 - 150*
13C3-PFBS	*99*		*25 - 150*
d3-NMeFOSAA	*116*		*25 - 150*
d5-NEtFOSAA	*116*		*25 - 150*

Lab Sample ID: LCSD 320-204339/3-A
Matrix: Water
Analysis Batch: 204803

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 204339

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)			40.0	36.9		ng/L		92	86 - 132	2	30
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)			40.0	36.1		ng/L		90	87 - 128	0	30
Perfluorobutanesulfonic acid (PFBS)			35.4	35.5		ng/L		100	88 - 130	5	30
Perfluorodecanoic acid (PFDA)			40.0	40.3		ng/L		101	84 - 123	5	30
Perfluorododecanoic acid (PFDoA)			40.0	39.2		ng/L		98	82 - 122	5	30
Perfluoroheptanoic acid (PFHpA)			40.0	34.5	Q	ng/L		86	89 - 127	4	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	34.2		ng/L		94	87 - 126	3	30
Perfluorohexanoic acid (PFHxA)			40.0	37.8		ng/L		94	86 - 126	1	30
Perfluorononanoic acid (PFNA)			40.0	37.8		ng/L		95	77 - 137	5	30

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

Lab Sample ID: LCSD 320-204339/3-A
Matrix: Water
Analysis Batch: 204803

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 204339

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanesulfonic acid (PFOS)			37.1	33.8	M	ng/L		91	83 - 126	1	30
Perfluorooctanoic acid (PFOA)			40.0	36.3		ng/L		91	80 - 120	4	30
Perfluorotetradecanoic acid (PFTeA)			40.0	39.8		ng/L		100	66 - 120	4	30
Perfluorotridecanoic Acid (PFTriA)			40.0	37.7		ng/L		94	56 - 163	3	30
Perfluoroundecanoic acid (PFUnA)			40.0	37.2		ng/L		93	73 - 122	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C2 PFDA	*107*		*25 - 150*
13C2 PFDoA	*100*		*25 - 150*
13C4-PFHpA	*106*		*25 - 150*
13C2 PFHxA	*101*		*25 - 150*
13C5 PFNA	*108*		*25 - 150*
13C4 PFOA	*108*		*25 - 150*
13C4 PFOS	*108*		*25 - 150*
13C2 PFUnA	*110*		*25 - 150*
18O2 PFHxS	*102*		*25 - 150*
13C2-PFTeDA	*103*		*25 - 150*
13C3-PFBS	*101*		*25 - 150*
d3-NMeFOSAA	*118*		*25 - 150*
d5-NEtFOSAA	*117*		*25 - 150*

QC Association Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

LCMS

Prep Batch: 204339

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35041-1	XJM-94-07X-Dec17	Total/NA	Water	3535	
320-35041-2	HA-3B-Dec17	Total/NA	Water	3535	
MB 320-204339/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-204339/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-204339/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Analysis Batch: 204803

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35041-1	XJM-94-07X-Dec17	Total/NA	Water	537 (modified)	204339
320-35041-2	HA-3B-Dec17	Total/NA	Water	537 (modified)	204339
MB 320-204339/1-A	Method Blank	Total/NA	Water	537 (modified)	204339
LCS 320-204339/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	204339
LCSD 320-204339/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	204339

Lab Chronicle

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

Client Sample ID: XJM-94-07X-Dec17

Lab Sample ID: 320-35041-1

Date Collected: 01/11/18 09:20

Matrix: Water

Date Received: 01/15/18 09:05

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			257.3 mL	10.00 mL	204339	01/17/18 13:08	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204803	01/20/18 07:43	JRB	TAL SAC

Client Sample ID: HA-3B-Dec17

Lab Sample ID: 320-35041-2

Date Collected: 01/11/18 11:05

Matrix: Water

Date Received: 01/15/18 09:05

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			247.3 mL	10.00 mL	204339	01/17/18 13:08	KMK	TAL SAC
Total/NA	Analysis	537 (modified)		1			204803	01/20/18 07:51	JRB	TAL SAC

Laboratory References:

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

360325 Boston 360325 Boston

PO #	New	Devens - PFAS Dec 2017 Sampling 1082-112	**Chain of Custody Record**	Page: 1 of: 1

Company	KOMAN GS, LLC	Laboratory:	Test America - Savannah
Address:	293 Boston Post Road West, Suite 100 Marlborough, MA 01752	Address:	510 LaRoche Ave Savannah, GA 31404
Phone: 508-366-7442	Fax: 508-366-7445	Contact:	Jerry Lanier
Sampled by [Print Name(s)]/Affiliation	Laura Anderson	Project Name:	Devens Additional PFAS
Sampler(s) Signature(s)		Sampling QAP No.:	
		Approval Date:	
		TAT	Routine
		Other:	

Item No.	Field ID No.	Sampled Date	Sampled Time	Col. Method (see codes)	Matrix (see codes)	Number of Containers	PFAS (Method 537-modified) 2-250ml HDPE	Remarks	Lab. No.
	KM-94-07X - Dec17	1/11/18	920	P	GW	2	✓		
	MA-3B- Dec17	1/11/18	1105	P	GW	2	✓		
				P	GW	2	N/A		
				P	GW	2			
				P	GW	2			

Preservatives (see codes): 1

Analyses Requested

Shipping Details	courier pick up	10	← Total Number of Containers

Date Out:	Via:	Item No.	Relinquished by/Affiliation	Date	Time		Date	Time
Returned:	Via:		KGS	1/11/18	1620	KGS OFFICE MAIL		1620
Additional Comments:			KGS	1/12/18	1200		1/15/18	0810
				1-12-18	1800	Troy D. Tupper TA-SAV	1/15/18	0905

email logins and results to:

lekes@komangs.com

Lab Comments

Preserve Where Applicable ☐

On ICE ☒

Temperature 1.8 °C AL-2

320-35041 Chain of Custody

MATRIX CODES:	GW = Groundwater	SW = Surface Water	O = Other
PRESERVATIVE CODES:	I = Ice Only		O = Other
COLLECTION METHOD CODES:	G=Grab	P= Pumping	O = Other

Login Sample Receipt Checklist

Client: KOMAN Government Solutions, LLC

Job Number: 320-35041-1

Login Number: 35041
List Number: 1
Creator: Hytrek, Cheryl

List Source: TestAmerica Sacramento

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	False	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

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	UST-055	01-31-18 *
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Savannah

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		SAVLAB	
Alabama	State Program	4	41450	06-30-18
Alaska	State Program	10		06-30-18
Alaska (UST)	State Program	10	UST-104	09-22-19
Arizona	State Program	9	AZ0808	12-14-18
Arkansas DEQ	State Program	6	88-0692	02-01-19
California	State Program	9	2939	06-30-18
Colorado	State Program	8	N/A	12-31-18
Connecticut	State Program	1	PH-0161	03-31-19
Florida	NELAP	4	E87052	06-30-18
GA Dept. of Agriculture	State Program	4	N/A	06-12-18
Georgia	State Program	4	803	06-30-18
Guam	State Program	9	15-005r	04-16-18
Hawaii	State Program	9	N/A	06-30-18
Illinois	NELAP	5	200022	11-30-18
Indiana	State Program	5	N/A	06-30-18

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

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

Laboratory: TestAmerica Savannah (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
Iowa	State Program	7	353	06-30-19
Kentucky (DW)	State Program	4	90084	12-31-18
Kentucky (UST)	State Program	4	18	06-30-18
Kentucky (WW)	State Program	4	90084	12-31-18 *
L-A-B	DoD ELAP		L2463	09-22-19
L-A-B	ISO/IEC 17025		L2463.01	09-22-19
Louisiana	NELAP	6	30690	06-30-18
Louisiana (DW)	NELAP	6	LA160019	12-31-18
Maine	State Program	1	GA00006	09-24-18
Maryland	State Program	3	250	12-31-18
Massachusetts	State Program	1	M-GA006	06-30-18
Michigan	State Program	5	9925	06-30-18
Mississippi	State Program	4	N/A	06-30-18
Nebraska	State Program	7	TestAmerica-Savannah	06-30-18
New Jersey	NELAP	2	GA769	06-30-18
New Mexico	State Program	6	N/A	06-30-18
New York	NELAP	2	10842	03-31-18
North Carolina (DW)	State Program	4	13701	07-31-18
North Carolina (WW/SW)	State Program	4	269	12-31-18
Oklahoma	State Program	6	9984	08-31-18
Pennsylvania	NELAP	3	68-00474	06-30-18
Puerto Rico	State Program	2	GA00006	12-31-18
South Carolina	State Program	4	98001	06-30-18
Tennessee	State Program	4	TN02961	06-30-18
Texas	NELAP	6	T104704185-16-9	11-30-18
Texas	State Program	6	T104704185	06-30-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		SAV 3-04	06-14-20 *
Virginia	NELAP	3	460161	06-14-18
Washington	State Program	10	C805	06-10-18
West Virginia DEP	State Program	3	094	06-30-18
Wisconsin	State Program	5	999819810	08-31-18
Wyoming	State Program	8	8TMS-L	06-30-16 *

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

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

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	UST-055	01-31-18 *
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-18
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18
Michigan	State Program	5	9947	01-31-18 *
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
New York	NELAP	2	11666	04-01-18
Oregon	NELAP	10	4040	01-29-20
Pennsylvania	NELAP	3	68-01272	03-31-18
Texas	NELAP	6	T104704399	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-18
Virginia	NELAP	3	460278	03-14-18
Washington	State Program	10	C581	05-05-18
Wyoming	State Program	8	8TMS-L	01-28-19

Laboratory: TestAmerica Savannah

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		SAVLAB	
Alabama	State Program	4	41450	06-30-18
Alaska	State Program	10		06-30-18
Alaska (UST)	State Program	10	UST-104	09-22-19
Arizona	State Program	9	AZ0808	12-14-18
Arkansas DEQ	State Program	6	88-0692	02-01-19
California	State Program	9	2939	06-30-18
Colorado	State Program	8	N/A	12-31-18
Connecticut	State Program	1	PH-0161	03-31-19
Florida	NELAP	4	E87052	06-30-18
GA Dept. of Agriculture	State Program	4	N/A	06-12-18
Georgia	State Program	4	803	06-30-18
Guam	State Program	9	15-005r	04-16-18
Hawaii	State Program	9	N/A	06-30-18
Illinois	NELAP	5	200022	11-30-18
Indiana	State Program	5	N/A	06-30-18

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

Accreditation/Certification Summary

Client: KOMAN Government Solutions, LLC
Project/Site: Fort Devens / PFAS Dec. 2017

TestAmerica Job ID: 320-35041-1

Laboratory: TestAmerica Savannah (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
Iowa	State Program	7	353	06-30-19
Kentucky (DW)	State Program	4	90084	12-31-18
Kentucky (UST)	State Program	4	18	06-30-18
Kentucky (WW)	State Program	4	90084	12-31-18 *
L-A-B	DoD ELAP		L2463	09-22-19
L-A-B	ISO/IEC 17025		L2463.01	09-22-19
Louisiana	NELAP	6	30690	06-30-18
Louisiana (DW)	NELAP	6	LA160019	12-31-18
Maine	State Program	1	GA00006	09-24-18
Maryland	State Program	3	250	12-31-18
Massachusetts	State Program	1	M-GA006	06-30-18
Michigan	State Program	5	9925	06-30-18
Mississippi	State Program	4	N/A	06-30-18
Nebraska	State Program	7	TestAmerica-Savannah	06-30-18
New Jersey	NELAP	2	GA769	06-30-18
New Mexico	State Program	6	N/A	06-30-18
New York	NELAP	2	10842	03-31-18
North Carolina (DW)	State Program	4	13701	07-31-18
North Carolina (WW/SW)	State Program	4	269	12-31-18
Oklahoma	State Program	6	9984	08-31-18
Pennsylvania	NELAP	3	68-00474	06-30-18
Puerto Rico	State Program	2	GA00006	12-31-18
South Carolina	State Program	4	98001	06-30-18
Tennessee	State Program	4	TN02961	06-30-18
Texas	NELAP	6	T104704185-16-9	11-30-18
Texas	State Program	6	T104704185	06-30-18
US Fish & Wildlife	Federal		LE058448-0	07-31-18
USDA	Federal		SAV 3-04	06-14-20 *
Virginia	NELAP	3	460161	06-14-18
Washington	State Program	10	C805	06-10-18
West Virginia DEP	State Program	3	094	06-30-18
Wisconsin	State Program	5	999819810	08-31-18
Wyoming	State Program	8	8TMS-L	06-30-16 *

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

ATTACHMENT 3

Data Validation Reports

Per and Polyfluoroalkyl Substances (PFAS)
Method 537 (Modified)
USEPA Level IIB Review

Site: Former Fort Devens - Select Groundwater Wells	SDG #: 320-34594
Laboratory: Test America - Sacramento, CA	Date: 02/06/2018
KGS Reviewer: Laurie Ekes	Project: 1082

Lab Sample ID	Client Sample ID	Collection Date	Analysis	Matrix
320-34594-1	SHM-10-05A-Dec17	12/18/2017	PFAS	Groundwater
320-34594-2	SHM-13-03-Dec17	12/18/2017	PFAS	Groundwater
320-34594-3	SHM-13-04-Dec17	12/18/2017	PFAS	Groundwater
320-34594-4	SHP-01-36X-Dec17	12/19/2017	PFAS	Groundwater
320-34594-5	FB-01-Dec17	12/19/2017	PFAS	Field Blank
320-34594-6	N5-P1-Dec17	12/19/2017	PFAS	Groundwater

Summary - This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed above. Data validation was performed in accordance with the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by Test America, Sacramento, CA following their SOP: *Per- and Polyfluorinated Substances (PFAS) in Water, Soils, Sediment and Tissues (SOP WS-LC-0025, Rev 2.9 (11/22/2017).* Test America, Sacramento is accredited for PFAS analysis under DoD QSM 5.1, Table B.15.

Data validation was performed on the data for five (5) groundwater samples and one (1) field blank sample. All sample results in this SDG were subjected to Level IIB data validation, which includes evaluation of preparatory batch and instrument-related QC results.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. No discrepancies were noted.

Sample Delivery and Condition – All samples arrived at the laboratory on 12/21/2017 in acceptable condition and temperature and were properly preserved. Proper custody was documented.

Qualification: None required.

Holding Times – All samples were extracted within 14-days of collection and analyzed within 40 days from extraction.

Qualification: None required.

LC/MS Tuning – Instrument performance was checked at 12-hour intervals.

Qualification: None required.

Initial Calibration and Initial Calibration Verification (ICV) – An initial calibration was performed on 1/3/2018 required by the method and reported in analytical batch 202514.

The percent relative standard deviations (%RSD) for the ICAL were within QC limits.

The percent differences (%D) of the ICV standard (ICV 320-202514/10) were less than or equal to 30% for all compounds.

Qualification: None required.

Continuing Calibration Verification (CCV): - Continuing calibration verification standards were performed at the required frequencies.

The percent differences (%Ds) for the CCV (CCV 320-202595/1) analyzed and reported on 1/4/2018 were less than or equal to 25% for all PFAS.

Qualification: None required.

Laboratory Blanks – Laboratory blanks were analyzed as required by the method. The laboratory blank (MB 320-202009/1-A) prepared and analyzed with these samples was free of contamination.

Qualification: None required.

Field Blanks – Sample FB-01-Dec17 (Lab Sample ID: 320-34594-5) was a field blank submitted with these samples. The FB sample was non-detect for all target PFAS.

Qualification: None required.

Isotope Dilution Recoveries – Isotope dilution analytes (IDA) are added to each field and QC sample at the time of extraction. They are reported by the laboratory on Form IIs as surrogate recoveries. The %Rs for the spiked IDA analytes were within QC limits of 50-150% for all samples.

Qualification: None required.

Laboratory Control Samples/Laboratory Control Sample Duplicate (LCS/LCSD) – LCS/LCSDs were analyzed as required by the method. The %Rs for all PFAS from the LCS/LCSDs (LCS 320-202009/2-A, LCSD 320-202009/3-A) prepared and analyzed with these samples were within laboratory control limits and the %RPDs were less than 30%.

Qualification: None required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample SHP-01-36-Dec17 (Lab Sample ID: 320-34594-4) was spiked and analyzed as MS/MSD samples. The %Rs for the spiked PFAS were within laboratory control limits and the %RPDs were less than 30%.

Qualification: None required.

Field Duplicate – Field duplicate samples were not submitted with this sample set.

Qualification: None required.

Compound Quantitation and Target Compound Identifications – All target compound quantitation and identifications met validation criteria. All results were reviewed by the laboratory; some compounds required manual integration to assure that the results were quantitated correctly; these results were "M" qualified by the laboratory. The 'M" qualified results were with reviewed during data validation; the results were acceptable. PFAS non-detected results should be considered the equivalent of "LOD U." Analyte detections below the PQL were reported as estimated qualified results (J). These J qualifiers were retained unless superseded by a more severe qualifier.

Qualification: None required.

Overall Assessment of Data – The analysis was conducted within the specifications of the method. No results were rejected. The PFAS results reported in this SDG are acceptable as reported and may be used for their intended purpose.

Lab Sample ID	Client Sample ID	Analysis	Lab Value (ng/L)	Lab Qualifier	Validated Value (ng/L)	Validation Qualifier
320-34594-1	SHM-10-05A-Dec17	PFAS	No qualifications needed.			
320-34594-2	SHM-13-03-Dec17	PFAS	No qualifications needed.			
320-34594-3	SHM-13-04-Dec17	PFAS	No qualifications needed.			
320-34594-4	SHP-01-36X-Dec17	PFAS	No qualifications needed.			
320-34594-5	FB-01-Dec17	PFAS	No qualifications needed.			
320-34594-6	N5-P1-Dec17	PFAS	No qualifications needed.			

Notes:
ng/L = nanogram per liter
PFAS = Per and Polyfluoroalkyl Substances

PFAS Sampling December 2017 - SDG 320-34594 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.1	ng/L	U	18	9.1	2.7
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.1	ng/L	U	18	9.1	2.8
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	2.9	ng/L		1.8	0.91	0.27
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.91	ng/L	U	1.8	0.91	0.28
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.8	ng/L	U	3.6	1.8	0.5
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	0.94	ng/L	J	1.8	0.91	0.23
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	8.1	ng/L		1.8	0.91	0.27
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	0.76	ng/L	J	3.6	1.8	0.53
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorononanoic acid (PFNA)	0.47	ng/L	J	1.8	0.91	0.25
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	6.2	ng/L		3.6	1.8	0.49
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	4.2	ng/L		3.6	1.8	0.78
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.91	ng/L	U	1.8	0.91	0.26
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.7	ng/L	U	3.6	2.7	1.2
320-34594-1	SHM-10-05A-Dec17	12/18/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.7	ng/L	U	3.6	2.7	1
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.6	ng/L	U	17	8.6	2.6
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.6	ng/L	U	17	8.6	2.7
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	2.6	ng/L		1.7	0.86	0.26
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.86	ng/L	U	1.7	0.86	0.27
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.7	ng/L	U	3.5	1.7	0.47
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	8.6	ng/L		1.7	0.86	0.22
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	28	ng/L		1.7	0.86	0.26
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	18	ng/L		3.5	1.7	0.5
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorononanoic acid (PFNA)	0.26	ng/L	J	1.7	0.86	0.23
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	13	ng/L		3.5	1.7	0.47
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	23	ng/L		3.5	1.7	0.73
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.86	ng/L	U	1.7	0.86	0.25
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.6	ng/L	U	3.5	2.6	1.1
320-34594-2	SHM-13-03-Dec17	12/18/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.6	ng/L	U	3.5	2.6	0.95
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.8	ng/L	U	18	8.8	2.7
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.8	ng/L	U	18	8.8	2.7
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.5	ng/L	J	1.8	0.88	0.27
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.88	ng/L	U	1.8	0.88	0.27
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.8	ng/L	U	3.5	1.8	0.49
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	2.5	ng/L		1.8	0.88	0.22
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	5.3	ng/L		1.8	0.88	0.27
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	4.1	ng/L		3.5	1.8	0.51
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorononanoic acid (PFNA)	0.48	ng/L	J	1.8	0.88	0.24
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	7.4	ng/L		3.5	1.8	0.48
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	7.6	ng/L		3.5	1.8	0.75
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.88	ng/L	U	1.8	0.88	0.26

PFAS Sampling December 2017 - SDG 320-34594 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.7	ng/L	U	3.5	2.7	1.1
320-34594-3	SHM-13-04-Dec17	12/18/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.7	ng/L	U	3.5	2.7	0.97
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.9	ng/L	U	18	8.9	2.7
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.9	ng/L	U	18	8.9	2.8
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.2	ng/L	J	1.8	0.89	0.27
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.89	ng/L	U	1.8	0.89	0.28
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.8	ng/L	U	3.6	1.8	0.49
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	2.9	ng/L		1.8	0.89	0.22
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	3.1	ng/L		1.8	0.89	0.27
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	4.7	ng/L		3.6	1.8	0.52
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorononanoic acid (PFNA)	0.58	ng/L	J	1.8	0.89	0.24
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	3.0	ng/L	J	3.6	1.8	0.48
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	5.5	ng/L		3.6	1.8	0.76
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.89	ng/L	U	1.8	0.89	0.26
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.7	ng/L	U	3.6	2.7	1.2
320-34594-4	SHP-01-36X-Dec17	12/19/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.7	ng/L	U	3.6	2.7	0.98
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	8.4	ng/L	U	17	8.4	2.5
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	8.4	ng/L	U	17	8.4	2.6
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	0.84	ng/L	U	1.7	0.84	0.25
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.84	ng/L	U	1.7	0.84	0.26
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.7	ng/L	U	3.3	1.7	0.46
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	0.84	ng/L	U	1.7	0.84	0.21
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	0.84	ng/L	U	1.7	0.84	0.25
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	1.7	ng/L	U	3.3	1.7	0.48
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorononanoic acid (PFNA)	0.84	ng/L	U	1.7	0.84	0.23
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	1.7	ng/L	U	3.3	1.7	0.45
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	1.7	ng/L	U	3.3	1.7	0.71
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.84	ng/L	U	1.7	0.84	0.24
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.5	ng/L	U	3.3	2.5	1.1
320-34594-5	FB-01-Dec17	12/19/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.5	ng/L	U	3.3	2.5	0.92
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.7	ng/L	U	19	9.7	2.9
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.7	ng/L	U	19	9.7	3
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	2.0	ng/L		1.9	0.97	0.29
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.97	ng/L	U	1.9	0.97	0.3
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.9	ng/L	U	3.9	1.9	0.53
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	5.1	ng/L		1.9	0.97	0.24
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	16	ng/L		1.9	0.97	0.29
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	8.9	ng/L		3.9	1.9	0.56
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorononanoic acid (PFNA)	0.57	ng/L	J	1.9	0.97	0.26
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	8.4	ng/L		3.9	1.9	0.52

PFAS Sampling December 2017 - SDG 320-34594 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	19	ng/L		3.9	1.9	0.82
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.97	ng/L	U	1.9	0.97	0.28
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.9	ng/L	U	3.9	2.9	1.3
320-34594-6	N5-P1-Dec17	12/19/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.9	ng/L	U	3.9	2.9	1.1

Notes:

ng/l =nanogram per liter

U = Non-detect

J = Estimated result

LOQ = Limit of Quantitation

LOD = Limit of Detection

DL = Method Detection Limit

ND results are reported at the Limit of Detection (LOD)

Per and Polyfluoroalkyl Substances (PFAS)
Method 537 (Modified)
USEPA Level IIB Review

Site: Former Fort Devens - Select Groundwater Wells	SDG #: 320-34597
Laboratory: Test America - Sacramento, CA	Date: 02/07/2018
KGS Reviewer: Laurie Ekes	Project: 1082

Lab Sample ID	Client Sample ID	Collection Date	Analysis	Matrix
320-34597-1	G6M-96-22A-Dec17	12/20/2017	PFAS	Groundwater
320-34597-2	G6M-96-22B-Dec17	12/20/2017	PFAS	Groundwater
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	PFAS	Groundwater
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	PFAS	Groundwater
320-34597-5	G6M-04-14X-Dec17	12/21/2017	PFAS	Groundwater
320-34597-6	G6M-95-20X-Dec17	12/21/2017	PFAS	Groundwater
320-34597-7	DUP-04-Dec17	12/21/2017	PFAS	Groundwater
320-34597-8	XJM-97-13X-Dec17	12/21/2017	PFAS	Groundwater
320-34597-9	DUP-03-Dec17	12/21/2017	PFAS	Groundwater

Summary - This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed above. Data validation was performed in accordance with the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by Test America, Sacramento, CA following their SOP: *Per- and Polyfluorinated Substances (PFAS) in Water, Soils, Sediment and Tissues (SOP WS-LC-0025, Rev 2.9 (11/22/2017).* Test America, Sacramento is accredited for PFAS analysis under DoD QSM 5.1, Table B.15.

Data validation was performed on the data for seven (7) groundwater samples and two (2) field duplicate samples. All sample results in this SDG were subjected to Level IIB data validation, which includes evaluation of preparatory batch and instrument-related QC results.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. The laboratory noted that samples: G6M-04-14X-Dec17 (Lab Sample ID: 320-34597-5) and DUP-04-Dec17 (Lab Sample ID: 320-34597-7) were decanted prior to extraction, due to containing an excess amount of sediment which had the potential to clog the solid-phase extraction column. No other discrepancies were noted.

Sample Delivery and Condition – All samples arrived at the laboratory on 12/22/2017 in acceptable condition and temperature and were properly preserved. Proper custody was documented.

Qualification: None required.

Holding Times – All samples were extracted within 14-days of collection and analyzed within 40 days from extraction.

Qualification: None required.

LC/MS Tuning – Instrument performance was checked at 12-hour intervals.

Qualification: None required.

Initial Calibration and Initial Calibration Verification (ICV) – An initial calibration was performed on 1/3/2018 required by the method and reported in analytical batch 202514.

The percent relative standard deviations (%RSD) for the ICAL were within QC limits.

The percent differences (%D) of the ICV standard (ICV 320-202514/10) were less than or equal to 30% for all compounds.

Qualification: None required.

Continuing Calibration Verification (CCV): - Continuing calibration verification standards were performed at the required frequencies.

The percent differences (%Ds) for the CCVs (CCV 320-202748/1 and CCV 320-202972/2) analyzed and reported on 1/5 and 1/7/2018 were less than or equal to 25% for all PFAS.

Qualification: None required.

Laboratory Blanks – Laboratory blanks were analyzed as required by the method. The laboratory blank (MB 320-202426/1-A) prepared and analyzed with these samples was free of contamination.

Qualification: None required.

Field Blanks – Field blank samples were not submitted with this sample set.

Qualification: None required.

Isotope Dilution Recoveries – Isotope dilution analytes (IDA) are added to each field and QC sample at the time of extraction. They are reported by the laboratory on Form IIs as surrogate recoveries. The %Rs for the spiked IDA analytes were within QC limits of 50-150% for all samples.

Qualification: None required.

Laboratory Control Samples/Laboratory Control Sample Duplicate (LCS/LCSD) – LCS/LCSDs were analyzed as required by the method. The %Rs for all PFAS from the LCS/LCSDs (LCS 320-202426/2-A, LCSD 320-202426/3-A) prepared and analyzed with these samples were within laboratory control limits and the %RPDs were less than 30%.

Qualification: None required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Sample 32M-01-14XBR-Dec17 (Lab Sample ID: 320-34597-4) was spiked and analyzed as MS/MSD samples. The %Rs for the spiked PFAS were within laboratory control limits and the %RPDs were less than 30%.

Qualification: None required.

Field Duplicate – Two sets of field duplicate samples were submitted with this sample set. Sample DUP-04-Dec17 (Lab Sample ID: 320-34597-7) was the field duplicate of sample G6M-95-20X-Dec17 (Lab Sample ID: 320-34597-6) and sample DUP-03-Dec17 (Lab Sample ID: 320-34597-9) was the field duplicate of sample XJM-97-13X-Dec17 (Lab Sample ID: 320-34597-8). Low level estimated results and non-detect results were reported in the FD sample pair XJM-97-13X-Dec17/DUP-03-Dec17; %RPDs could not be calculated for these PFAS. The FD results for detected PFAS were comparable with %RPDs less than 20%. FD sample results are summarized in the table below.

Lab Sample ID	320-34597-6	320-34597-7	
Client Sample ID	G6M-95-20X-Dec17	DUP-04-Dec17	
Collection Date	12/21/2017	12/21/2017	
Analyte	**Result (ng/L)**	**Result (ng/L)**	**RPD (%)**
Perfluorobutanesulfonic acid (PFBS)	1.7	1.9	11.1
Perfluoroheptanoic acid (PFHpA)	2.9	3.0	3.4
Perfluorohexanesulfonic acid (PFHxS)	59	57	3.4
Perfluorohexanoic acid (PFHxA)	5.4	5.3	1.9
Perfluorooctanesulfonic acid (PFOS)	19	22	14.6
Perfluorooctanoic acid (PFOA)	17	16	6.1
	320-34597-8	320-34597-9	
	XJM-97-13X-Dec17	DUP-03-Dec17	
	12/21/2017	12/21/2017	
Analyte	**Result (ng/L)**	**Result (ng/L)**	**RPD (%)**
Perfluorobutanesulfonic acid (PFBS)	0.39 J	1.0 U	NC
Perfluorohexanesulfonic acid (PFHxS)	0.41 J	0.34 J	18.9
Perfluorohexanoic acid (PFHxA)	2.0 U	0.73 J	NC

NC = Not calculated

Qualification: None required.

Compound Quantitation and Target Compound Identifications – All target compound quantitation and identifications met validation criteria. All results were reviewed by the laboratory; some compounds required manual integration to assure that the results were quantitated correctly; these results were "M" qualified by the laboratory. The 'M" qualified results were reviewed during data validation; the results were acceptable. PFAS non-detected results should be considered the equivalent of "LOD U." Analyte detections below the PQL were reported as estimated qualified results (J). These J qualifiers were retained unless superseded by a more severe qualifier.

Qualification: None required.

Overall Assessment of Data – The analysis was conducted within the specifications of the method. No results were rejected. The PFAS results reported in this SDG are acceptable as reported and may be used for their intended purpose.

Lab Sample ID	Client Sample ID	Analysis	Lab Value (ng/L)	Lab Qualifier	Validated Value (ng/L)	Validation Qualifier
320-34597-1	G6M-96-22A-Dec17	PFAS	No qualifications needed.			
320-34597-2	G6M-96-22B-Dec17	PFAS	No qualifications needed.			
320-34597-3	32M-01-14X08-Dec17	PFAS	No qualifications needed.			
320-34597-4	32M-01-14XBR-Dec17	PFAS	No qualifications needed.			
320-34597-5	G6M-04-14X-Dec17	PFAS	No qualifications needed.			
320-34597-6	G6M-95-20X-Dec17	PFAS	No qualifications needed.			
320-34597-7	DUP-04-Dec17	PFAS	No qualifications needed.			
320-34597-8	XJM-97-13X-Dec17	PFAS	No qualifications needed.			
320-34597-9	DUP-03-Dec17	PFAS	No qualifications needed.			

Notes:
ng/L = nanogram per liter
PFAS = Per and Polyfluoroalkyl Substances

PFAS Sampling December 2017 - SDG 320-34597 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	8.9	ng/L	U	18	8.9	2.7
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	8.9	ng/L	U	18	8.9	2.8
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	5.4	ng/L		1.8	0.89	0.27
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.55	ng/L	J	1.8	0.89	0.28
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.8	ng/L	U	3.6	1.8	0.49
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	6.2	ng/L		1.8	0.89	0.22
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	130	ng/L		1.8	0.89	0.27
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	21	ng/L		3.6	1.8	0.52
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorononanoic acid (PFNA)	2.8	ng/L		1.8	0.89	0.24
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	150	ng/L		3.6	1.8	0.48
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	31	ng/L		3.6	1.8	0.76
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.89	ng/L	U	1.8	0.89	0.26
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.7	ng/L	U	3.6	2.7	1.2
320-34597-1	G6M-96-22A-Dec17	12/20/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.7	ng/L	U	3.6	2.7	0.98
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	8.7	ng/L	U	17	8.7	2.6
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	8.7	ng/L	U	17	8.7	2.7
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	4.9	ng/L		1.7	0.87	0.26
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.38	ng/L	J	1.7	0.87	0.27
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.7	ng/L	U	3.5	1.7	0.48
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	4.5	ng/L		1.7	0.87	0.22
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	130	ng/L		1.7	0.87	0.26
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	12	ng/L		3.5	1.7	0.51
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorononanoic acid (PFNA)	2.1	ng/L		1.7	0.87	0.24
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	180	ng/L		3.5	1.7	0.47
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	24	ng/L		3.5	1.7	0.74
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.87	ng/L	U	1.7	0.87	0.25
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.6	ng/L	U	3.5	2.6	1.1
320-34597-2	G6M-96-22B-Dec17	12/20/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.6	ng/L	U	3.5	2.6	0.96
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	8.8	ng/L	U	18	8.8	2.6
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	8.8	ng/L	U	18	8.8	2.7
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.2	ng/L	J	1.8	0.88	0.26
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.88	ng/L	U	1.8	0.88	0.27
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.8	ng/L	U	3.5	1.8	0.48
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	3.0	ng/L		1.8	0.88	0.22
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	4.4	ng/L		1.8	0.88	0.26
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	4.5	ng/L		3.5	1.8	0.51
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorononanoic acid (PFNA)	0.72	ng/L	J	1.8	0.88	0.24

PFAS Sampling December 2017 - SDG 320-34597 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	8.2	ng/L		3.5	1.8	0.48
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	11	ng/L		3.5	1.8	0.75
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.88	ng/L	U	1.8	0.88	0.26
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.6	ng/L	U	3.5	2.6	1.1
320-34597-3	32M-01-14X0B-Dec17	12/20/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.6	ng/L	U	3.5	2.6	0.97
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	10	ng/L	U	21	10	3.1
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	10	ng/L	U	21	10	3.2
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.6	ng/L	J	2.1	1	0.31
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.74	ng/L	J	2.1	1	0.32
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.1	ng/L	U	4.1	2.1	0.57
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	5.2	ng/L		2.1	1	0.26
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	8.4	ng/L		2.1	1	0.31
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	7.5	ng/L		4.1	2.1	0.6
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorononanoic acid (PFNA)	1.5	ng/L	J	2.1	1	0.28
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	36	ng/L		4.1	2.1	0.56
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	21	ng/L		4.1	2.1	0.88
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2.1	1	0.3
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.1	ng/L	U	4.1	3.1	1.3
320-34597-4	32M-01-14XBR-Dec17	12/20/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.1	ng/L	U	4.1	3.1	1.1
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	10	ng/L	U	20	10	3
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	10	ng/L	U	20	10	3.1
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	6.4	ng/L		2	1	0.3
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	1.5	ng/L	J	2	1	0.31
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4.1	2	0.56
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	14	ng/L		2	1	0.25
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	58	ng/L		2	1	0.3
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	19	ng/L		4.1	2	0.59
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorononanoic acid (PFNA)	4.8	ng/L		2	1	0.27
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	30	ng/L		4.1	2	0.55
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	45	ng/L		4.1	2	0.86
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4.1	3	1.3
320-34597-5	G6M-04-14X-Dec17	12/21/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4.1	3	1.1
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	10	ng/L	U	20	10	3.1
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	10	ng/L	U	20	10	3.2
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.7	ng/L	J	2	1	0.31
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.32

PFAS Sampling December 2017 - SDG 320-34597 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4.1	2	0.56
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	2.9	ng/L		2	1	0.25
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	59	ng/L		2	1	0.31
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	5.4	ng/L		4.1	2	0.59
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.28
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	19	ng/L		4.1	2	0.55
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	17	ng/L		4.1	2	0.87
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.3
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.1	ng/L	U	4.1	3.1	1.3
320-34597-6	G6M-95-20X-Dec17	12/21/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.1	ng/L	U	4.1	3.1	1.1
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	10	ng/L	U	20	10	3.1
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	10	ng/L	U	20	10	3.2
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.9	ng/L	J	2	1	0.31
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.32
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4.1	2	0.56
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	3.0	ng/L		2	1	0.25
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	57	ng/L		2	1	0.31
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	5.3	ng/L		4.1	2	0.59
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.28
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	22	ng/L		4.1	2	0.55
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	16	ng/L		4.1	2	0.87
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.3
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.1	ng/L	U	4.1	3.1	1.3
320-34597-7	DUP-04-Dec17	12/21/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.1	ng/L	U	4.1	3.1	1.1
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	9.9	ng/L	U	20	9.9	3
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	9.9	ng/L	U	20	9.9	3.1
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	0.39	ng/L	J	2	0.99	0.3
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	0.99	ng/L	U	2	0.99	0.31
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.54
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	0.99	ng/L	U	2	0.99	0.25
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	0.41	ng/L	J	2	0.99	0.3
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	2.0	ng/L	U	4	2	0.57
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorononanoic acid (PFNA)	0.99	ng/L	U	2	0.99	0.27
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	2.0	ng/L	U	4	2	0.53
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	2.0	ng/L	U	4	2	0.84
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.99	ng/L	U	2	0.99	0.29
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3

PFAS Sampling December 2017 - SDG 320-34597 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34597-8	XJM-97-13X-Dec17	12/21/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (N	10	ng/L	U	20	10	3
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid	10	ng/L	U	20	10	3.1
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.0	ng/L	U	2	1	0.3
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.56
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluoroheptanoic acid (PFHpA)	1.0	ng/L	U	2	1	0.25
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	0.34	ng/L	J	2	1	0.3
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorohexanoic acid (PFHxA)	0.73	ng/L	J	4	2	0.59
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	2.0	ng/L	U	4	2	0.55
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorooctanoic acid (PFOA)	2.0	ng/L	U	4	2	0.86
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34597-9	DUP-03-Dec17	12/21/2017	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1

Notes:

ng/l =nanogram per liter

U = Non-detect

J = Estimated result

LOQ = Limit of Quantitation

LOD = Limit of Detection

DL = Method Detection Limit

ND results are reported at the Limit of Detection (LOD)

Per and Polyfluoroalkyl Substances (PFAS)
Method 537 (Modified)
USEPA Level IIB Review

Site: Former Fort Devens - Select Groundwater Wells	SDG #: 320-34815
Laboratory: Test America - Sacramento, CA	Date: 02/06/2018
KGS Reviewer: Laurie Ekes	Project: 1082

Lab Sample ID	Client Sample ID	Collection Date	Analysis	Matrix
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	PFAS	Groundwater
320-34815-2	AAFES-7-Dec17	1/2/2018	PFAS	Groundwater
320-34815-3	XGM-94-06X-Dec17	1/2/2018	PFAS	Groundwater
320-34815-4	FB-02-Dec17	1/2/2018	PFAS	Field Blank
320-34815-5	EB-01-Dec17	1/3/2018	PFAS	Equipment Blank
320-34815-6	G6M-01-01X-Dec17	1/3/2018	PFAS	Groundwater
320-34815-7	G6M-04-07X-Dec17	1/3/2018	PFAS	Groundwater

Summary - This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed above. Data validation was performed in accordance with the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by Test America, Sacramento, CA following their SOP: *Per- and Polyfluorinated Substances (PFAS) in Water, Soils, Sediment and Tissues (SOP WS-LC-0025, Rev 2.9 (11/22/2017).* Test America, Sacramento is accredited for PFAS analysis under DoD QSM 5.1, Table B.15.

Data validation was performed on the data for five (5) groundwater samples, one (1) field blank (FB) sample and one (1) equipment blank (EB) sample. All sample results in this SDG were subjected to Level IIB data validation, which includes evaluation of preparatory batch and instrument-related QC results.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. No discrepancies were noted.

Sample Delivery and Condition – All samples arrived at the laboratory on 1/04/2018 in acceptable condition and temperature and were properly preserved. Proper custody was documented.

Qualification: None required.

Holding Times – All samples were extracted within 14-days of collection and analyzed within 40 days from extraction.

Qualification: None required.

LC/MS Tuning – Instrument performance was checked at 12-hour intervals.

Qualification: None required.

Initial Calibration and Initial Calibration Verification (ICV) – An initial calibration was performed on 1/3/2018 required by the method and reported in analytical batch 202514.

The percent relative standard deviations (%RSD) for the ICAL were within QC limits.

The percent differences (%D) of the ICV standard (ICV 320-202514/10) were less than or equal to 30% for all compounds.

Qualification: None required.

Continuing Calibration Verification (CCV): - Continuing calibration verification standards were performed at the required frequencies.

The percent differences (%Ds) for the CCVs (CCV 320-202489/1 and 320-204077/1) analyzed and reported on 1/10/18 and 1/15/18 were less than or equal to 25% for all PFAS.

Qualification: None required.

Laboratory Blank – Laboratory blanks were analyzed as required by the method. The laboratory blank (MB 320-203152/1-A) prepared and analyzed with these samples had a low-level detection of perfluorohexanesulfonic acid (PFHxS) at 0.303 ng/L.

Qualification: The results for PFHxS in the FB and EB samples, FB-02-Dec17 (0.31 ng/L) and EB-01-Dec17 (0.30 ng/L) were qualified as non-detect (1.0 U).

Field Blanks – Samples FB-02-Dec17 and EB-01-Dec17 (Lab Sample IDs: 320-34815-4 and 5) were a field blank and an equipment blank submitted with these samples. The FB sample results were non-detect for all target PFAS, after qualification based on the associated laboratory blank. The EB sample had a low-level detection of perfluorooctanesulfonic acid (PFOS) at 0.64 J ng/L. The results for PFOS in the associated native samples were greater than ten (10) times 0.64 ng/L and were not adversely affected by this low-level EB result.

Qualification: None required.

Isotope Dilution Recoveries – Isotope dilution analytes (IDA) are added to each field and QC sample at the time of extraction. They are reported by the laboratory on Form IIs as surrogate recoveries. The %Rs for the spiked IDA analytes were within QC limits of 50-150% for all samples.

Qualification: None required.

Laboratory Control Samples/Laboratory Control Sample Duplicate (LCS/LCSD) – LCS/LCSDs were analyzed as required by the method. The %Rs for all PFAS from the LCS/LCSDs (LCS 320-203152/2-A, LCSD 320-203152/3-A) prepared and analyzed with these samples were within laboratory control limits and the %RPDs were less than 30%.

Qualification: None required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – MS/MSD samples were not submitted with this sample set.

Qualification: None required.

Field Duplicate – Field duplicate samples were not submitted with this sample set.

Qualification: None required.

Compound Quantitation and Target Compound Identifications – All target compound quantitation and identifications met validation criteria. All results were reviewed by the laboratory; some compounds required manual integration to assure that the results were quantitated correctly; these results were "M" qualified by the laboratory. The 'M" qualified results were with reviewed during data validation; the results were acceptable. PFAS non-detected results should be considered the equivalent of "LOD U." Analyte detections below the PQL were reported as estimated qualified results (J). These J qualifiers were retained unless superseded by a more severe qualifier.

Qualification: None required.

Overall Assessment of Data – The analysis was conducted within the specifications of the method. No results were rejected. The PFAS results reported in this SDG are acceptable with the noted qualifications and may be used for their intended purpose.

Lab Sample ID	Client Sample ID	Analysis	Lab Value (ng/L)	Lab Qualifier	Validated Value (ng/L)	Validation Qualifier
320-34815-1	32M-01-17XBR-Dec17	PFAS	No qualifications needed.			
320-34815-2	AAFES-7-Dec17	PFAS	No qualifications needed.			
320-34815-3	XGM-94-06X-Dec17	PFAS	No qualifications needed.			
320-34815-4	FB-02-Dec17	PFHxS	0.31	J	1.0	U
320-34815-5	EB-01-Dec17	PFHxS	0.30	J	1.0	U
320-34815-6	G6M-01-01X-Dec17	PFAS	No qualifications needed.			
320-34815-7	G6M-04-07X-Dec17	PFAS	No qualifications needed.			

Notes:
ng/L = nanogram per liter
PFAS = Per and Polyfluoroalkyl Substances
PFHxS = perfluorohexanesulfonic acid
J = Estimated result
U = non-detect

PFAS Sampling December 2017 - SDG 320-34815 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3.1
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.2
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.3	ng/L	J	2	1	0.31
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.32
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4.1	2	0.56
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	2.7	ng/L		2	1	0.25
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	5.6	ng/L		2	1	0.31
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	5.6	ng/L		4.1	2	0.59
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorononanoic acid (PFNA)	0.59	ng/L	J	2	1	0.27
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	4.5	ng/L		4.1	2	0.55
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	9.4	ng/L		4.1	2	0.87
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.3
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.1	ng/L	U	4.1	3.1	1.3
320-34815-1	32M-01-17XBR-Dec17	1/2/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.1	ng/L	U	4.1	3.1	1.1
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.5	ng/L	U	19	9.5	2.9
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.5	ng/L	U	19	9.5	2.9
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	6.3	ng/L		1.9	0.95	0.29
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	0.95	ng/L	U	1.9	0.95	0.29
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.9	ng/L	U	3.8	1.9	0.52
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	14	ng/L		1.9	0.95	0.24
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	200	ng/L		1.9	0.95	0.29
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	64	ng/L		3.8	1.9	0.55
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.1	ng/L	J	1.9	0.95	0.26
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	65	ng/L		3.8	1.9	0.51
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	51	ng/L		3.8	1.9	0.81
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.95	ng/L	U	1.9	0.95	0.28
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.9	ng/L	U	3.8	2.9	1.2
320-34815-2	AAFES-7-Dec17	1/2/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.9	ng/L	U	3.8	2.9	1
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	11	ng/L	U	21	11	3.2
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	11	ng/L	U	21	11	3.3
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	4.0	ng/L		2.1	1.1	0.32
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.1	ng/L	U	2.1	1.1	0.33
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.1	ng/L	U	4.3	2.1	0.59
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	8.9	ng/L		2.1	1.1	0.27
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	98	ng/L		2.1	1.1	0.32
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	20	ng/L		4.3	2.1	0.62
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.4	ng/L	J	2.1	1.1	0.29
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	90	ng/L		4.3	2.1	0.58
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	33	ng/L		4.3	2.1	0.91
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.1	ng/L	U	2.1	1.1	0.31
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.2	ng/L	U	4.3	3.2	1.4
320-34815-3	XGM-94-06X-Dec17	1/2/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.2	ng/L	U	4.3	3.2	1.2
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.0	ng/L	U	2	1	0.3

PFAS Sampling December 2017 - SDG 320-34815 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	1.0	ng/L	U	2	1	0.25
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	1.0	ng/L	U	2	1	0.3
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	2.0	ng/L	U	4	2	0.58
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	2.0	ng/L	U	4	2	0.54
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	2.0	ng/L	U	4	2	0.85
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34815-4	FB-02-Dec17	1/2/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.0	ng/L	U	2	1	0.3
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	1.0	ng/L	U	2	1	0.25
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	1.0	ng/L	U	2	1	0.3
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	2.0	ng/L	U	4	2	0.58
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	0.64	ng/L	J	4	2	0.54
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	2.0	ng/L	U	4	2	0.85
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34815-5	EB-01-Dec17	1/3/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	3.1	ng/L		2	1	0.3
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	2.8	ng/L		2	1	0.25
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	70	ng/L		2	1	0.3
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	9.1	ng/L		4	2	0.58
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	55	ng/L		4	2	0.54
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	16	ng/L		4	2	0.85
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34815-6	G6M-01-01X-Dec17	1/3/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	2.9	ng/L		2	1	0.3
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	3.7	ng/L		2	1	0.25

PFAS Sampling December 2017 - SDG 320-34815 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	87	ng/L		2	1	0.3
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	10	ng/L		4	2	0.58
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	23	ng/L		4	2	0.54
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	17	ng/L		4	2	0.85
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34815-7	G6M-04-07X-Dec17	1/3/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1

Notes:

Qualified data

ng/l =nanogram per liter

U = Non-detect

J = Estimated result

LOQ = Limit of Quantitation

LOD = Limit of Detection

DL = Method Detection Limit

ND results are reported at the Limit of Detection (LOD)

Per and Polyfluoroalkyl Substances (PFAS)
Method 537 (Modified)
USEPA Level IIB Review

Site: Former Fort Devens - Select Groundwater Wells	SDG #: 320-34977
Laboratory: Test America - Sacramento, CA	Date: 02/06/2018
KGS Reviewer: Laurie Ekes	Project: 1082

Lab Sample ID	Client Sample ID	Collection Date	Analysis	Matrix
320-34977-1	G6M-02-06X-Dec17	1/8/2018	PFAS	Groundwater
320-34977-2	XSA-12-98X-Dec17	1/8/2018	PFAS	Groundwater
320-34977-3	SHM-93-24A-Dec17	1/8/2018	PFAS	Groundwater
320-34977-4	FB-03-Dec17	1/8/2018	PFAS	Field Blank
320-34977-5	57M-03-01X-Dec17	1/9/2018	PFAS	Groundwater
320-34977-6	57M-03-02X-Dec17	1/9/2018	PFAS	Groundwater
320-34977-7	57M-03-04X-Dec17	1/9/2018	PFAS	Groundwater
320-34977-8	57M-03-06X-Dec17	1/9/2018	PFAS	Groundwater
320-34977-9	DUP-01-Dec17	1/9/2018	PFAS	Groundwater
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	PFAS	Surface Water
320-34977-11	DUP-02-Dec17	1/10/2018	PFAS	Surface Water
320-34977-12	57M-96-11X-Dec17	1/10/2018	PFAS	Groundwater
320-34977-13	57M-95-03X-Dec17	1/10/2018	PFAS	Groundwater
320-34977-14	XJM-97-11X-Dec17	1/10/2018	PFAS	Groundwater

Summary - This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed above. Data validation was performed in accordance with the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by Test America, Sacramento, CA following their SOP: *Per- and Polyfluorinated Substances (PFAS) in Water, Soils, Sediment and Tissues (SOP WS-LC-0025, Rev 2.9 (11/22/2017).* Test America, Sacramento is accredited for PFAS analysis under DoD QSM 5.1, Table B.15.

Data validation was performed on the data for ten (10) groundwater samples, one (1) surface water sample, one (1) groundwater field duplicate sample, one (1) surface water field duplicate sample and one (1) field blank (FB) sample. All sample results in this SDG were subjected to Level IIB data validation, which includes evaluation of preparatory batch and instrument-related QC results.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. The laboratory noted that the following nine (9) samples: 57M-03-02X-Dec17 (Lab Sample ID: 320-34977-6), 57M-03-04X-Dec17 (Lab Sample ID: 320-34977-7), 57M-03-06X-

Dec17 (Lab Sample ID: 320-34977-8), DUP-01-Dec17 (Lab Sample ID: 320-34977-9), Area 3 SW-1-Dec17 (Lab Sample ID: 320-34977-10), DUP-02-Dec17 (Lab Sample ID: 320-34977-11), 57M-96-11X-Dec17 (Lab Sample ID: 320-34977-12), 57M-95-03X-Dec17 (Lab Sample ID: 320-34977-13) and XJM-97-11X-Dec17 (Lab Sample ID: 320-34977-14) were decanted prior to extraction, due to containing an excess amount of sediment which had the potential to clog the solid-phase extraction column. No other discrepancies were noted.

Sample Delivery and Condition – All samples arrived at the laboratory on 1/11/2018 in acceptable condition and temperature and were properly preserved. Proper custody was documented.

Qualification: None required.

Holding Times – All samples were extracted within 14-days of collection and analyzed within 40 days from extraction.

Qualification: None required.

LC/MS Tuning – Instrument performance was checked at 12-hour intervals.

Qualification: None required.

Initial Calibration and Initial Calibration Verification (ICV) – An initial calibration was performed on 1/17/2018 required by the method and reported in analytical batch 204375.

The percent relative standard deviations (%RSD) for the ICAL were within QC limits.

The percent differences (%D) of the ICV standard (ICV 320-202375/10) were less than or equal to 30% for all compounds.

Qualification: None required.

Continuing Calibration Verification (CCV): - Continuing calibration verification standards were performed at the required frequencies.

The percent differences (%Ds) for the CCVs (CCV 320-204801/1 and 320-205152/1) analyzed and reported on 1/20/18 and 1/23/18 were less than or equal to 25% for all PFAS.

Qualification: None required.

Laboratory Blank – Laboratory blanks were analyzed as required by the method. The laboratory blank (MB 320-204155/1-A) prepared and analyzed with these samples was free of contamination.

Qualification: None required.

Field Blanks – Sample FB-03-Dec17 (Lab Sample IDs: 320-34977-4) was a field blank submitted with these samples. An estimated level of perfluorohexanesulfonic acid (PFHxS) at 0.31 ng/L was reported in the FB sample.

Qualification: The estimated result for PFHxS (0.29 ng/L) in sample XJM-97-11X-Dec17 (Lab Sample ID: 320-34977-14) was qualified as non-detect (0.97 U).

Isotope Dilution Recoveries – Isotope dilution analytes (IDA) are added to each field and QC sample at the time of extraction. They are reported by the laboratory on Form IIs as surrogate recoveries. The %Rs for the spiked IDA analytes were within QC limits of 50-150% for all samples.

Qualification: None required.

Laboratory Control Samples/Laboratory Control Sample Duplicate (LCS/LCSD) – LCS/LCSDs were analyzed as required by the method. The %Rs for all PFAS from the LCS/LCSDs (LCS 320-204155/2-A, LCSD 320-204155/3-A) prepared and analyzed with these samples were within laboratory control limits and the %RPDs were less than 30%.

Qualification: None required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – MS/MSD samples were not submitted with this sample set.

Qualification: None required.

Field Duplicate – Two sets of field duplicate samples were submitted with this sample set. Sample DUP-01-Dec17 (Lab Sample ID: 320-34977-9) was the field duplicate sample of groundwater sample 57M-03-06X-Dec17 (Lab Sample ID: 320-34977-8) and sample DUP-02-Dec17 (Lab Sample ID: 320-34977-11) was the field duplicate of surface water sample Area3 SW-1-Dec17 (Lab Sample ID: 320-34977-10). The FD results for detected PFAS were comparable with %RPDs less than 20%. FD sample results are summarized in the table below.

Lab Sample ID	320-34977-8	320-34977-9	
Client Sample ID	57M-03-06X-Dec17	DUP-01-Dec17	
Collection Date	1/9/2018	1/9/2018	
Analyte	**Result (ng/L)**	**Result (ng/L)**	**RPD (%)**
Perfluorobutanesulfonic acid (PFBS)	8.1	7.9	2.5
Perfluoroheptanoic acid (PFHpA)	39	43	9.8
Perfluorohexanesulfonic acid (PFHxS)	21	21	0
Perfluorohexanoic acid (PFHxA)	90	93	3.3
Perfluorononanoic acid (PFNA)	1.1	1.2	8.7
Perfluorooctanesulfonic acid (PFOS)	4.1	3.8	7.6
Perfluorooctanoic acid (PFOA)	76	76	0
Lab Sample ID	320-34977-10	320-34977-11	
Client Sample ID	Area 3 SW-1-Dec17	DUP-02-Dec17	
Collection Date	1/10/2018	1/10/2018	
Analyte	**Result (ng/L)**	**Result (ng/L)**	**RPD (%)**
Perfluorobutanesulfonic acid (PFBS)	11	12	8.7
Perfluoroheptanoic acid (PFHpA)	44	47	6.6
Perfluorohexanesulfonic acid (PFHxS)	4.3	4.1	4.8
Perfluorohexanoic acid (PFHxA)	130	130	0
Perfluorooctanesulfonic acid (PFOS)	0.59	0.6	1.7
Perfluorooctanoic acid (PFOA)	24	24	0

Qualification: None required.

Compound Quantitation and Target Compound Identifications – All target compound quantitation and identifications met validation criteria. Sample 57M-95-03X-Dec17 (Lab Sample ID: 320-34977-13) was analyzed at a ten (10) times dilution due to the nature of the sample matrix which caused high recovery of several Isotope Dilution Analytes. Reporting limits were adjusted

accordingly. All results were reviewed by the laboratory; some compounds required manual integration to assure that the results were quantitated correctly; these results were "M" qualified by the laboratory. The 'M" qualified results were with reviewed during data validation; the results were acceptable. PFAS non-detected results should be considered the equivalent of "LOD U." Analyte detections below the PQL were reported as estimated qualified results (J). These J qualifiers were retained unless superseded by a more severe qualifier.

Qualification: None required.

Overall Assessment of Data – The analysis was conducted within the specifications of the method. No results were rejected. The PFAS results reported in this SDG are acceptable with the noted qualifications and may be used for their intended purpose.

Lab Sample ID	Client Sample ID	Analysis	Lab Value (ng/L)	Lab Qualifier	Validated Value (ng/L)	Validation Qualifier
320-34977-1	G6M-02-06X-Dec17	PFAS	No qualification needed.			
320-34977-2	XSA-12-98X-Dec17	PFAS	No qualification needed.			
320-34977-3	SHM-93-24A-Dec17	PFAS	No qualification needed.			
320-34977-4	FB-03-Dec17	PFAS	No qualification needed.			
320-34977-5	57M-03-01X-Dec17	PFAS	No qualification needed.			
320-34977-6	57M-03-02X-Dec17	PFAS	No qualification needed.			
320-34977-7	57M-03-04X-Dec17	PFAS	No qualification needed.			
320-34977-8	57M-03-06X-Dec17	PFAS	No qualification needed.			
320-34977-9	DUP-01-Dec17	PFAS	No qualification needed.			
320-34977-10	Area 3 SW-1-Dec17	PFAS	No qualification needed.			
320-34977-11	DUP-02-Dec17	PFAS	No qualification needed.			
320-34977-12	57M-96-11X-Dec17	PFAS	No qualification needed.			
320-34977-13	57M-95-03X-Dec17	PFAS	No qualification needed.			
320-34977-14	XJM-97-11X-Dec17	PFHxS	0.29	J	0.97	U

Notes:
ng/L = nanogram per liter
PFAS = Per and Polyfluoroalkyl Substances
PFHxS = perfluorohexanesulfonic acid
J = Estimated result
U = non-detect

PFAS Sampling December 2017 - SDG 320-34977 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	2.5	ng/L		2	1	0.3
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	3.6	ng/L		2	1	0.25
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	100	ng/L		2	1	0.3
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	9.3	ng/L		4	2	0.58
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorononanoic acid (PFNA)	0.34	ng/L	J	2	1	0.27
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	35	ng/L		4	2	0.54
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	25	ng/L		4	2	0.86
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34977-1	G6M-02-06X-Dec17	1/8/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.8	ng/L	U	20	9.8	2.9
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.8	ng/L	U	20	9.8	3
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	11	ng/L		2	0.98	0.29
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	0.98	ng/L	U	2	0.98	0.3
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	3.9	2	0.54
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	44	ng/L		2	0.98	0.24
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	4.3	ng/L		2	0.98	0.29
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	130	ng/L		3.9	2	0.57
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorononanoic acid (PFNA)	0.98	ng/L	U	2	0.98	0.26
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	0.59	ng/L	J	3.9	2	0.53
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	24	ng/L		3.9	2	0.83
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.98	ng/L	U	2	0.98	0.28
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.9	ng/L	U	3.9	2.9	1.3
320-34977-10	Area 3 SW-1-Dec17	1/10/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.9	ng/L	U	3.9	2.9	1.1
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3.1
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.2
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	12	ng/L		2	1	0.31
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.32
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4.1	2	0.56
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	47	ng/L		2	1	0.25
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	4.1	ng/L		2	1	0.31
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	130	ng/L		4.1	2	0.59
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	0.60	ng/L	J	4.1	2	0.55

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Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	24	ng/L		4.1	2	0.86
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.3
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.1	ng/L	U	4.1	3.1	1.3
320-34977-11	DUP-02-Dec17	1/10/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.1	ng/L	U	4.1	3.1	1.1
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	13	ng/L		2	1	0.3
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	34	ng/L		2	1	0.25
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	5.3	ng/L		2	1	0.3
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	170	ng/L		4	2	0.59
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	2.0	ng/L	U	4	2	0.54
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	5.2	ng/L		4	2	0.86
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34977-12	57M-96-11X-Dec17	1/10/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	99	ng/L	U	200	99	30
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	99	ng/L	U	200	99	31
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	37	ng/L		20	9.9	3
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	9.9	ng/L	U	20	9.9	3.1
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	20	ng/L	U	39	20	5.4
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	62	ng/L		20	9.9	2.5
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	9.7	ng/L	J	20	9.9	3
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	71	ng/L		39	20	5.7
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorononanoic acid (PFNA)	9.9	ng/L	U	20	9.9	2.7
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	20	ng/L	U	39	20	5.3
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	82	ng/L		39	20	8.4
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	9.9	ng/L	U	20	9.9	2.9
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	30	ng/L	U	39	30	13
320-34977-13	57M-95-03X-Dec17	1/10/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	30	ng/L	U	39	30	11
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.7	ng/L	U	19	9.7	2.9
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.7	ng/L	U	19	9.7	3
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	0.97	ng/L	U	1.9	0.97	0.29
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	0.97	ng/L	U	1.9	0.97	0.3
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.9	ng/L	U	3.9	1.9	0.54
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	0.97	ng/L	U	1.9	0.97	0.24

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Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	0.97	ng/L	U	1.9	0.97	0.29
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	1.9	ng/L	U	3.9	1.9	0.56
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorononanoic acid (PFNA)	0.97	ng/L	U	1.9	0.97	0.26
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	1.9	ng/L	U	3.9	1.9	0.53
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	1.9	ng/L	U	3.9	1.9	0.83
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.97	ng/L	U	1.9	0.97	0.28
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.9	ng/L	U	3.9	2.9	1.3
320-34977-14	XJM-97-11X-Dec17	1/10/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.9	ng/L	U	3.9	2.9	1.1
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	4.8	ng/L		2	1	0.3
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	0.62	ng/L	J	2	1	0.31
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	7.4	ng/L		2	1	0.25
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	72	ng/L		2	1	0.3
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	15	ng/L		4	2	0.58
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.7	ng/L	J	2	1	0.27
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	35	ng/L		4	2	0.54
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	29	ng/L		4	2	0.85
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34977-2	XSA-12-98X-Dec17	1/8/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.8	ng/L	U	20	9.8	2.9
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.8	ng/L	U	20	9.8	3
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	3.8	ng/L		2	0.98	0.29
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	0.98	ng/L	U	2	0.98	0.3
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	3.9	2	0.54
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	13	ng/L		2	0.98	0.25
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	11	ng/L		2	0.98	0.29
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	15	ng/L		3.9	2	0.57
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorononanoic acid (PFNA)	0.80	ng/L	J	2	0.98	0.27
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	4.9	ng/L		3.9	2	0.53
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	19	ng/L		3.9	2	0.84
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.98	ng/L	U	2	0.98	0.28
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.9	ng/L	U	3.9	2.9	1.3
320-34977-3	SHM-93-24A-Dec17	1/8/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.9	ng/L	U	3.9	2.9	1.1
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1

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Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.0	ng/L	U	2	1	0.3
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	1.0	ng/L	U	2	1	0.25
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	0.31	ng/L	J	2	1	0.3
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	2.0	ng/L	U	4	2	0.58
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	2.0	ng/L	U	4	2	0.54
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	2.0	ng/L	U	4	2	0.85
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34977-4	FB-03-Dec17	1/8/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3.1
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.2
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	39	ng/L		2	1	0.31
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	2.3	ng/L		2	1	0.32
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4.1	2	0.56
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	270	ng/L		2	1	0.25
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	110	ng/L		2	1	0.31
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	360	ng/L		4.1	2	0.59
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.8	ng/L	J	2	1	0.28
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	5.2	ng/L		4.1	2	0.55
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	120	ng/L		4.1	2	0.87
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.3
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.1	ng/L	U	4.1	3.1	1.3
320-34977-5	57M-03-01X-Dec17	1/9/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.1	ng/L	U	4.1	3.1	1.1
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	19	ng/L		2	1	0.3
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.55
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	85	ng/L		2	1	0.25
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	28	ng/L		2	1	0.3
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	100	ng/L		4	2	0.58
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.0	ng/L	U	2	1	0.27
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	3.7	ng/L	J	4	2	0.54
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	23	ng/L		4	2	0.85
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29

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Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34977-6	57M-03-02X-Dec17	1/9/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.2
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	16	ng/L		2	1	0.3
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.32
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4.1	2	0.56
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	77	ng/L		2	1	0.25
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	42	ng/L		2	1	0.3
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	110	ng/L		4.1	2	0.59
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorononanoic acid (PFNA)	5.1	ng/L		2	1	0.27
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	9.7	ng/L		4.1	2	0.55
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	82	ng/L		4.1	2	0.86
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4.1	3	1.3
320-34977-7	57M-03-04X-Dec17	1/9/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4.1	3	1.1
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.9	ng/L	U	20	9.9	3
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.9	ng/L	U	20	9.9	3.1
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	8.1	ng/L		2	0.99	0.3
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	0.99	ng/L	U	2	0.99	0.31
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.54
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	39	ng/L		2	0.99	0.25
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	21	ng/L		2	0.99	0.3
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	90	ng/L		4	2	0.57
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.1	ng/L	J	2	0.99	0.27
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	4.1	ng/L		4	2	0.53
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	76	ng/L		4	2	0.84
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.99	ng/L	U	2	0.99	0.29
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-34977-8	57M-03-06X-Dec17	1/9/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	21	10	3.1
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	21	10	3.2
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	7.9	ng/L		2.1	1	0.31
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2.1	1	0.32
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.1	ng/L	U	4.1	2.1	0.57
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	43	ng/L		2.1	1	0.26
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	21	ng/L		2.1	1	0.31
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	93	ng/L		4.1	2.1	0.6

PFAS Sampling December 2017 - SDG 320-34977 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorononanoic acid (PFNA)	1.2	ng/L	J	2.1	1	0.28
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	3.8	ng/L	J	4.1	2.1	0.56
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	76	ng/L		4.1	2.1	0.88
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2.1	1	0.3
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.1	ng/L	U	4.1	3.1	1.3
320-34977-9	DUP-01-Dec17	1/9/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.1	ng/L	U	4.1	3.1	1.1

Qualified result

Notes:

ng/l =nanogram per liter

U = Non-detect

J = Estimated result

LOQ = Limit of Quantitation

LOD = Limit of Detection

DL = Method Detection Limit

ND results are reported at the Limit of Detection (LOD)

Per and Polyfluoroalkyl Substances (PFAS)
Method 537 (Modified)
USEPA Level IIB Review

Site: Former Fort Devens - Select Groundwater Wells	SDG #: 320-345041
Laboratory: Test America - Sacramento, CA	Date: 02/06/2018
KGS Reviewer: Laurie Ekes	Project: 1082

Lab Sample ID	Client Sample ID	Collection Date	Analysis	Matrix
320-35041-1	XJM-94-07X-Dec17	1/11/2018	PFAS	Groundwater
320-345041-2	HA-3B-Dec17	1/11/2018	PFAS	Groundwater

Summary - This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed above. Data validation was performed in accordance with the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by Test America, Sacramento, CA following their SOP: *Per- and Polyfluorinated Substances (PFAS) in Water, Soils, Sediment and Tissues (SOP WS-LC-0025, Rev 2.9 (11/22/2017).* Test America, Sacramento is accredited for PFAS analysis under DoD QSM 5.1, Table B.15.

Data validation was performed on the data for two (2) groundwater samples. All sample results in this SDG were subjected to Level IIB data validation, which includes evaluation of preparatory batch and instrument-related QC results.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. The laboratory noted that both samples were decanted prior to extraction, due to containing an excess amount of sediment which had the potential to clog the solid-phase extraction column. No other discrepancies were noted.

Sample Delivery and Condition – All samples arrived at the laboratory on 1/15/2018 in acceptable condition and temperature and were properly preserved. Proper custody was documented.

Qualification: None required.

Holding Times – All samples were extracted within 14-days of collection and analyzed within 40 days from extraction.

Qualification: None required.

LC/MS Tuning – Instrument performance was checked at 12-hour intervals.

Qualification: None required.

Initial Calibration and Initial Calibration Verification (ICV) – An initial calibration was performed on 1/17/2018 required by the method and reported in analytical batch 204375.

The percent relative standard deviations (%RSD) for the ICAL were within QC limits.

The percent differences (%D) of the ICV standard (ICV 320-202375/10) were less than or equal to 30% for all compounds.

Qualification: None required.

Continuing Calibration Verification (CCV): - Continuing calibration verification standards were performed at the required frequencies.

The percent differences (%Ds) for the CCV (CCV 320-204803/1) analyzed and reported on 1/20/18 were less than or equal to 25% for all PFAS.

Qualification: None required.

Laboratory Blank – Laboratory blanks were analyzed as required by the method. The laboratory blank (MB 320-204339/1-A) prepared and analyzed with these samples was free of contamination.

Qualification: None required.

Field Blanks – Field blank samples were not submitted with this sample set.

Qualification: None required.

Isotope Dilution Recoveries – Isotope dilution analytes (IDA) are added to each field and QC sample at the time of extraction. They are reported by the laboratory on Form IIs as surrogate recoveries. The %Rs for the spiked IDA analytes were within QC limits of 50-150% for all samples.

Qualification: None required.

Laboratory Control Samples/Laboratory Control Sample Duplicate (LCS/LCSD) – LCS/LCSDs were analyzed as required by the method. The %Rs from the LCS/LCSD (LCS 320-204339/2-A, LCSD 320-204339/3-A) prepared and analyzed with these samples were within laboratory control limits for all PFAS with the exception of a low LCSD %R for perfluoroheptanoic acid (PFHpA); the %RPDs were less than 30% for all PFAS.

Qualification: The results for PFHpA in the two groundwater samples in this SDG were qualified as estimated (J/UJ).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – MS/MSD samples were not submitted with this sample set.

Qualification: None required.

Field Duplicate – Field duplicate samples were not submitted with this sample set.

Qualification: None required.

Compound Quantitation and Target Compound Identifications – All target compound quantitation and identifications met validation criteria. All results were reviewed by the laboratory; some compounds required manual integration to assure that the results were quantitated correctly; these results were "M" qualified by the laboratory. The 'M" qualified results were with reviewed during data validation; the results were acceptable. PFAS non-detected results should be considered the equivalent of "LOD U." Analyte detections below the PQL were reported as estimated qualified results (J). These J qualifiers were retained unless superseded by a more severe qualifier.

Qualification: None required.

Overall Assessment of Data – The analysis was conducted within the specifications of the method. No results were rejected. The PFAS results reported in this SDG are acceptable with the noted qualifications and may be used for their intended purpose.

Lab Sample ID	Client Sample ID	Analysis	Lab Value (ng/L)	Lab Qualifier	Validated Value (ng/L)	Validation Qualifier
320-35041-1	XJM-94-07X-Dec17	PFHpA	1.7		1.7	J
320-35041-2	HA3B-Dec17	PFHpA	1.0	U	1.0	UJ

Notes:
ng/L = nanogram per liter
J = Estimated result
U = Non-detect
UJ = Estimated non-detect.

PFAS Sampling December 2017 - SDG 320-35041 Validated Results

Lab Sample ID	Client Sample ID	Collection Date	Analysis Method	Analyte	Result	Unit	Flag	LOQ	LOD	DL
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	9.7	ng/L	U	19	9.7	2.9
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	9.7	ng/L	U	19	9.7	3
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	2.8	ng/L		1.9	0.97	0.29
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	0.97	ng/L	U	1.9	0.97	0.3
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	1.9	ng/L	U	3.9	1.9	0.53
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	1.7	ng/L	J	1.9	0.97	0.24
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	2.0	ng/L		1.9	0.97	0.29
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	1.6	ng/L	J	3.9	1.9	0.56
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorononanoic acid (PFNA)	0.92	ng/L	J	1.9	0.97	0.26
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	4.5	ng/L		3.9	1.9	0.52
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	6.6	ng/L		3.9	1.9	0.83
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	0.97	ng/L	U	1.9	0.97	0.28
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	2.9	ng/L	U	3.9	2.9	1.3
320-35041-1	XJM-94-07X-Dec17	1/11/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	2.9	ng/L	U	3.9	2.9	1.1
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	10	ng/L	U	20	10	3
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	10	ng/L	U	20	10	3.1
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorobutanesulfonic acid (PFBS)	1.0	ng/L	U	2	1	0.3
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorodecanoic acid (PFDA)	1.0	ng/L	U	2	1	0.31
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorododecanoic acid (PFDoA)	2.0	ng/L	U	4	2	0.56
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluoroheptanoic acid (PFHpA)	1.0	ng/L	UJ	2	1	0.25
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorohexanesulfonic acid (PFHxS)	0.41	ng/L	J	2	1	0.3
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorohexanoic acid (PFHxA)	2.0	ng/L	U	4	2	0.59
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorononanoic acid (PFNA)	0.35	ng/L	J	2	1	0.27
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorooctanesulfonic acid (PFOS)	2.0	ng/L	U	4	2	0.55
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorooctanoic acid (PFOA)	2.0	ng/L	U	4	2	0.86
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorotetradecanoic acid (PFTeA)	1.0	ng/L	U	2	1	0.29
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluorotridecanoic Acid (PFTriA)	3.0	ng/L	U	4	3	1.3
320-35041-2	HA-3B-Dec17	1/11/2018	537 (modified)	Perfluoroundecanoic acid (PFUnA)	3.0	ng/L	U	4	3	1.1

Notes:

Qualified data

ng/l =nanogram per liter

U = Non-detect

J = Estimated result

UJ = Estimated non-detect

LOQ = Limit of Quantitation

LOD = Limit of Detection

DL = Method Detection Limit

ND results are reported at the Limit of Detection (LOD)

ATTACHMENT 4

Historical Soil Boring Logs for Sampled Monitoring Wells

TEST BORING REPORT

Boring No32M-01-14XBR

Project MONITORING WELL INSTALLATION AOC 32/43A DEVENS, MA
Client MASSDEVELOPMENT/DEVENS COMMERCE CENTER
Contractor EARTH EXPLORATION SERVICES, WRENTHAM, MA

File No. 10884-056
Sheet No. 1 of 3
Start November 27, 2001
Finish November 29, 2001
Driller T. Martinelli
H&A Rep. J.Morey/A.Nichols
Elevation 255.1
Datum NGVD (1929)
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	SW	S	HQ	Rig Make & Model: Mobile B-57 ATV
Inside Diameter (in.)	6.0	1 3/8	2.5	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: driven
				Hoist/Hammer: Winch Doughnut Hammer

Depth (ft.)	SPT*	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size**, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0					254.6		-TOPSOIL-										
					0.5												
					253.1		Note: Cluster well with Boring 32M-01-14XOB. No sampling required in overburden soils.										
					2.0		-FILL-										
5																	
10																	
15							-GLACIOFLUVIAL DEPOSITS-										
20																	

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
12/17/01	0745	18 Days	-	-	24.4
1/12/02	1400	46 Days	-	42.5	24.1

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 30.4
Rock Cored (lin. ft.) 15
Samples C3

Boring No. 32M-01-14XBR

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High
Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

*SPT = Sampler blows per 6 in **Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters)

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1.GDT
USCSLI83.GLB US
S_TB3

HALEY & ALDRICH

TEST BORING REPORT

Boring No. 32M-01-14XBR
File No. 10884-056
Sheet No. 2 of 3

Depth (ft.)	SPT*	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size**, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20							-GLACIOFLUVIAL DEPOSITS-										
25																	
							TOP OF BEDROCK 29.4 FT										
30							SEE CORE BORING REPORT FOR ROCK DETAILS										
35																	
40																	
45																	

*SPT = Sampler blows per 6 in. **Maximum particle size (mm) is determined by direct observation within the limitations of sampler

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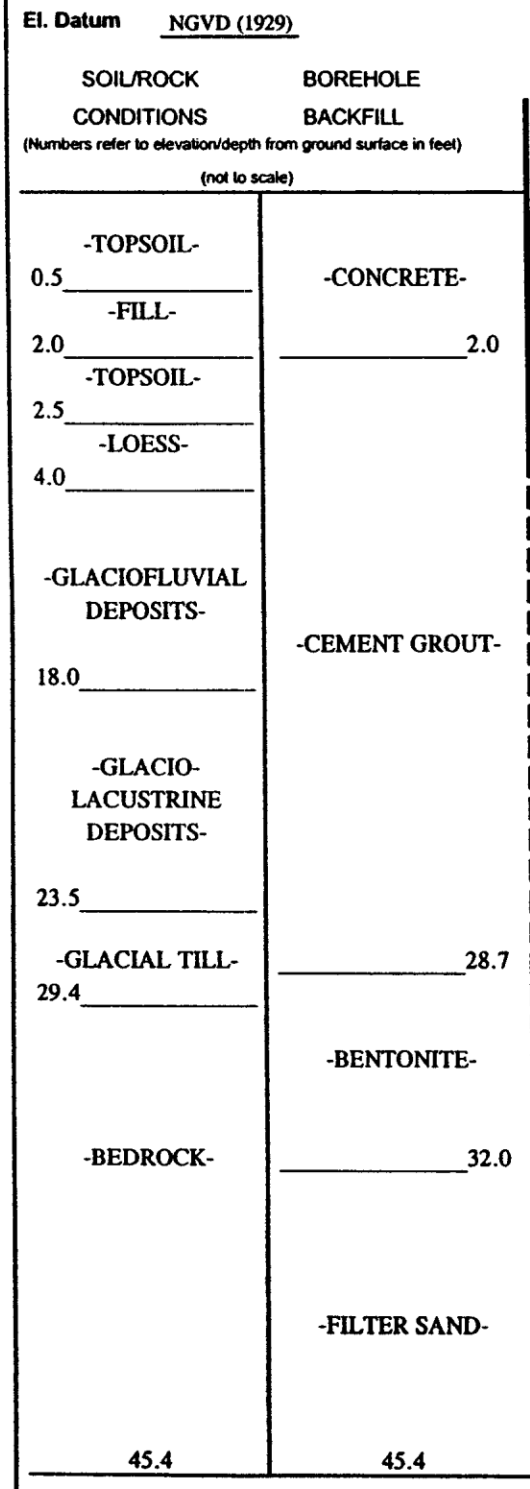
USCSLIB3.GLB

HALEY & ALDRICH

OBSERVATION WELL INSTALLATION REPORT

Observation Well	32M-01-14XBR		
Test Boring	32M-01-14XBR		
Project	MONITORING WELL INSTALLATION AOC32/43A	**Installation Date**	29-Nov-01
City/State	DEVENS, MA	**Location**	See Plan
Client	MASSDEVELOPMENT/DEVENS COMMERCE CENTER		
Contractor	EARTH EXPLORATION SERVICES, WRENTHAM, MA	**H&A File No.**	10884-056
Driller	T. MARTINELLI	**H&A Rep.**	A. Nichols

Ground El. 255.1
El. Datum NGVD (1929)



Type of protective cover/lock: Cover/Padlock

Height of top of casing above ground surface: 2.5 ft

Height of top of riser pipe above ground surface: 1.8 ft

Type of protective casing: Guard Pipe

Length: 5.0 ft

Inside diameter: 6.0 in

Depth of bottom of roadway box: 2.0 ft

Seals:

Type	Depth to top (ft)	Thickness (ft)
Concrete	0.0	2.0
Grout	3.0	25.7
Bentonite Seal	28.7	3.3

Type of riser pipe: Sch 40 PVC Solid

Inside diameter of riser pipe: 2.0 in

Type of backfill around riser: Seal

Diameter of borehole: 6.0 in

Depth of top of well screen: 34.0 ft

Type of screen or manufacturer: Machine Slotted PVC

Screen gauge or size of openings: 0.010 in

Diameter of well screen: 2.0 in

Type of backfill around screen: Filter Sand

Depth of bottom of well screen: 44.0 ft

Depth of bottom of silt trap

Depth of bottom of borehole: 45.4 ft

Bottom of Exploration

(Depths refer to ground surface)

Remarks: Soil conditions based on adjacent Cluster Boring 32M-01-14XOB. Ground El. Reflects estimated ground surface at time of drilling.

HALEY & ALDRICH

TEST BORING REPORT

Boring No32M-01-14XOB

Project MONITORING WELL INSTALLATION AOC 32/43A DEVENS, MA
Client MASSDEVELOPMENT/DEVENS COMMERCE CENTER
Contractor EARTH EXPLORATION SERVICES, WRENTHAM, MA

File No. 10884-056
Sheet No. 1 of 2
Start November 26, 2001
Finish November 29, 2001
Driller T. Martinelli
H&A Rep. A. Nichols
Elevation 255.2
Datum NGVD (1929)
Location See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	SW	S	-	Rig Make & Model: Mobile B-57 ATV
Inside Diameter (in.)	6.0	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: driven
				Hoist/Hammer: Cat-Head Safety Hammer

Depth (ft.)	SPT*	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size**, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	2	S1	0.0		254.7	SM	Very loose brown TOPSOIL with roots										
	2	14	2.0		0.5	SM	-TOPSOIL FILL-	5		5	10	60	20				
	3						Loose brown silty SAND (SM), mps 1.0 in., no odor, dry										
	15				253.2		-FILL-										
	15	S2	2.0		2.0	SM	Medium dense black silty SAND (SM), little roots, mps 0.25 in.,		5				30				
	14	4	2.5		252.7	ML	organic odor, dry				10	30	60				
	14	S2A	2.5		2.5		-FORMER TOPSOIL-										
	14	13	4.0				Medium dense brown sandy SILT (ML), mps 2.0 mm, no odor, dry										
					251.2		-LOESS-										
	10	S3	4.0		4.0	SP	Medium dense brown poorly graded SAND (SP), mps 1.0 in., no odor,	5	5	10	30	50					
5	12	4	6.0				moist										
	17																
	17																
	14	S4	6.0			SP	Same as above, except dense	5	5	10	30	50					
	15	10	8.0														
	16						-GLACIOFLUVIAL DEPOSITS-										
	15																
	8	S5	8.0			SP	Same as above, except medium dense										
	16	5	9.0		246.2												
	20	S5A	9.0		9.0	SP	Dense gray-brown poorly graded SAND with gravel (SP), mps 2.0 in.,	20	25			15	5				
	14	4	10.0				no odor, moist										
10	21	S6	10.0			SP	Same as above	20	20			15	5				
	16	11	12.0														
	15						-GLACIOFLUVIAL DEPOSITS-										
	12																
	15	S7	12.0			SP	Same as above, except medium dense	10	20			15	5				
	15	5	13.0		242.2												
	12	S7A	13.0		13.0	SM	Medium dense yellow-brown silty SAND (SM), mps 2.0 mm, in				5	80	15				
	12	7	14.0				partings, no odor, moist										
	7	S8	14.0			SM	Same as above				5	80	15				
15	11	13	16.0														
	13						-GLACIOFLUVIAL DEPOSITS-										
	11																
	11	S9	16.0			SM	Same as above										
	11	5	17.0		238.2												
	11	S9A	17.0		17.0	SP	Medium dense gray-brown poorly graded SAND with gravel (SP), mps	5	10	25	30	25	5				
	15	5	18.0		237.2		1.0 in., no odor, moist										
	9	S10	18.0		18.0	ML	-GLACIOFLUVIAL DEPOSITS-				5	30	65			N	
	9	12	20.0				Medium dense yellow-brown sandy SILT (ML), mps 1.0 mm, in										
	10						partings, no odor, moist										
20	14						-GLACIOLACUSTRINE DEPOSITS-										

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft.) to: Bottom of Casing	Bottom of Hole	Water
11/26/01	1225	0.5	19.0	21.0	18.0
11/26/01	1426	0.3	19.0	25.5	21.5
1/12/02	1345	44 Days	-	27.6	24.9

Sample Identification

O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Overburden (lin. ft.) 28.4
Rock Cored (lin. ft.) -
Samples S14

Boring No. 32M-01-14XOB

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None
Toughness: L-Low, M-Medium, H-High
Plasticity: N-Nonplastic, L-Low, M-Medium, H-High, V-Very High
Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

*SPT = Sampler blows per 6 in. **Maximum particle size (mm) is determined by direct observation within the limitations of sampler size (in millimeters)

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HALEY & ALDRICH

TEST BORING REPORT

Boring No. 32M-01-14XOB
File No. 10884-056
Sheet No. 2 of 2

Depth (ft.)	SPT*	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size**, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20					235.2												
					20.0		Note: Boulder from 20.0 to 22.0 ft.										
							-GLACIOLACUSTRINE DEPOSITS-										
	19 16 23	S11 9	22.0 23.5			ML	Dense yellow-brown SILT with sand (ML), mps 0.25 in., in partings, no odor, moist		5	5	5	10	75				
	25	S11A	23.5		231.7 23.5	GM	Dense yellow-brown silty GRAVEL with sand (GM), mps 2.0 in., well	15	35	5	10	15	20				
	25	3	24.0			GM	bonded, no odor, wet	15	30	5	10	20	20				
	21	S12	24.0				Same as above										
25	24	11	26.0														
	25						-GLACIAL TILL-										
	32 16 15 53	S13 11	26.0 28.0			GM	Same as above										
	12	S14	28.0			GM	Same as above										
	100/5"	5	28.9		226.3												
					28.9		BOTTOM OF EXPLORATION 28.9 FT										
							INSTALLED OBSERVATION WELL AT 27.3 FT										

*SPT = Sampler blows per 6 in. **Maximum particle size (mm) is determined by direct observation within the limitations of samples

32M-01-14XOB

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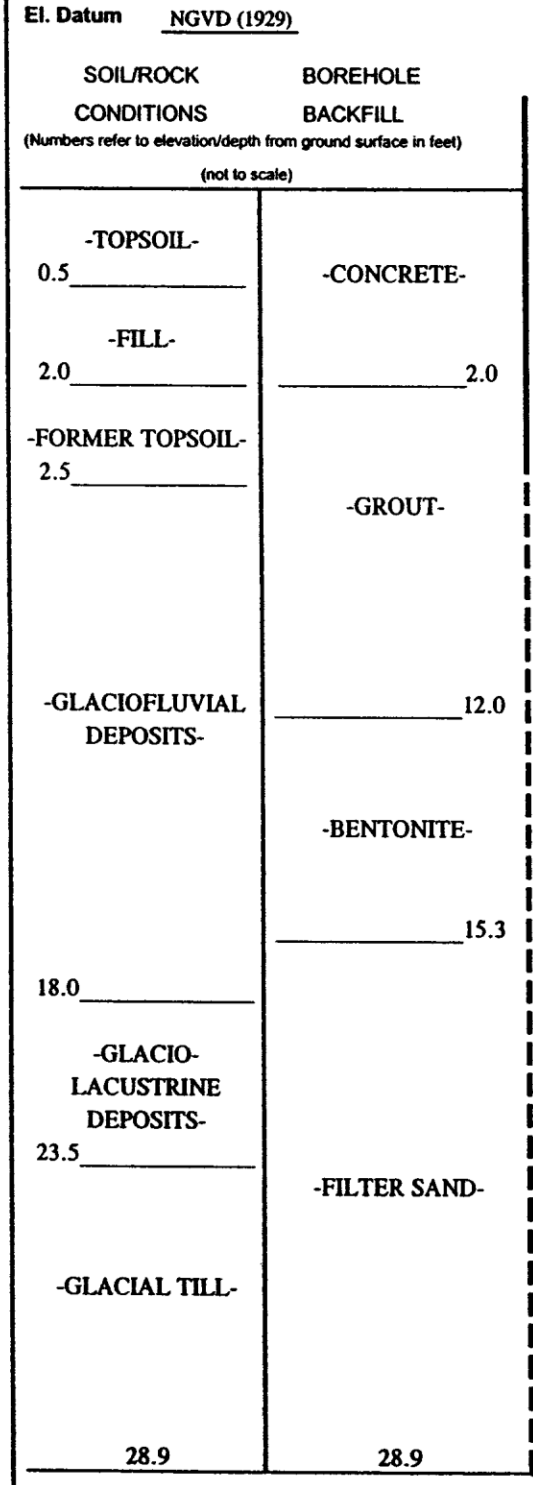
HALEY & ALDRICH

OBSERVATION WELL INSTALLATION REPORT

Observation Well	32M-01-14XOB
Test Boring	32M-01-14XOB
Installation Date	27-Nov-01
Location	See Plan
H&A File No.	10884-056
H&A Rep.	A. Nichols

Project	MONITORING WELL INSTALLATION AOC32/43A
City/State	DEVENS, MA
Client	MASSDEVELOPMENT/DEVENS COMMERCE CENTER
Contractor	EARTH EXPLORATION SERVICES, WRENTHAM, MA
Driller	T. MARTINELLI

Ground El. 255.2
El. Datum NGVD (1929)



Type of protective cover/lock: Cover/Padlock

Height of top of casing above ground surface: 2.5 ft

Height of top of riser pipe above ground surface: 2.2 ft

Type of protective casing: Guard Pipe

Length: 5.0 ft

Inside diameter: 6.0 in

Depth of bottom of roadway box: 2.0 ft

Seals:

Type	Depth to top (ft)	Thickness (ft)
Concrete	0.0	2.0
Bentonite Seal	12.0	3.3
Grout	2.0	10.0

Type of riser pipe: Sch 40 PVC Solid

Inside diameter of riser pipe: 2.0 in

Type of backfill around riser: Grout

Diameter of borehole: 6.5 in

Depth of top of well screen: 17.3 ft

Type of screen or manufacturer: Machine Slotted PVC

Screen gauge or size of openings: 0.010 in

Diameter of well screen: 2.0 in

Type of backfill around screen: Filter Sand

Depth of bottom of well screen: 27.3 ft

Depth of bottom of silt trap

Depth of bottom of borehole: 28.9 ft

(Depths refer to ground surface)

Remarks: Ground El. reflects estimated ground surface at time of drilling, prior to gravel pad placement.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. 32M-01-17XBR
File No. 10884-056
Sheet No. 2 of 3

Depth	SPT*	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size**, structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test: Dilatancy	Field Test: Toughness	Field Test: Plasticity	Field Test: Strength
20	10	S11	20.0			SP-SM	Same as above, except medium dense			5	15	70	10				
	19	6	21.0		236.1		-GLACIOFLUVIAL DEPOSITS-										
	19	S11A	21.0		21.0	SW	Dense brown well graded SAND (SW), mps 0.5 in., no odor, wet	5	5	40	30	20					
	20	10	22.0		235.1		-GLACIOFLUVIAL DEPOSITS-										
	15	S12	22.0		22.0	SM	Dense yellow-brown silty SAND (SM), mps 1.0 mm, in partings, no odor, wet			5	5	75	15				
	13	14	24.0														
	21						-GLACIOFLUVIAL DEPOSITS-										
	24																
	23	S13	24.0			SM	Same as above, except with a single layer of well graded sand			5	5	75	15				
25	23	17	26.0														
	18																
	26				231.1												
	10	S14	26.0		26.0	ML	Dense red-brown SILT with sand (ML), mps 1.0 mm, in partings, no odor, wet					20	80	S	M	N	
	11	10	28.0														
	25						-GLACIOLACUSTRINE DEPOSITS-										
	15				229.1												
	21	S15	28.0		28.0	SP	Very dense red-brown poorly graded SAND (SP), mps 0.25 in., no odor, wet		5	45	35	15	5				
	33	15	30.0														
	32						-GLACIOFLUVIAL DEPOSITS-										
	30				227.1												
30	12	S16	30.0		30.0	ML	Medium dense red-brown SILT (ML), mps 0.1 mm, in partings, no odor, wet					5	95	S	M	N-L	
	10	18	32.0														
	17						-GLACIOLACUSTRINE DEPOSITS-										
	17																
	15	S17	32.0			ML	Same as above, except dense					10	90	S	M	N	
	14	25	34.0														
	21																
	30				223.1												
	15	S18	34.0		34.0	SM	Dense yellow-brown silty SAND with gravel (SM), mps 1.0 in., moderately bonded, no odor, wet	5	10	10	20	25	30				
35	20	12	36.0														
	21						-GLACIAL TILL-										
	34																
	23	S19	36.0			SM	Same as above	5	10	10	20	30	25				
	22	16	38.0														
	19																
	22				219.1												
	100/0"	S20	38.0		38.0		TOP OF BEDROCK AT 38.0 FT										
		0					SEE CORE BORING REPORT FOR ROCK DETAILS										
40																	
45																	

*SPT = Sampler blows per 6 in. **Maximum particle size (mm) is determined by direct observation within the limitations of sampler

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CORE BORING REPORT

Boring No. 32M-01-17XBR
File No. 10884-056
Sheet No. 3 of 3

oth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD in.	Recovery/RQD %	Weathering	Well Diagram	Elev./ Depth (ft)	Visual Description and Remarks
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
								219.1 38.0	TOP OF BEDROCK AT 38.0 FT Note: Water loss noted below 38.0 ft. Advanced with roller bit to 41.5 ft. -BEDROCK-
40	5	C1	41.5 46.5	56 42	93 70	Fresh to Slight			C1: Very hard, fresh to slightly weathered, gray, aphanitic to fine grained QUARTZITE. Foliation extremely thin, at high angle, disturbed, occasionally microfaulted. Primary joint set at low angle, extremely close to wide, smooth to rough, stepped, oxidized, tight to open. Secondary joint set at high angle, close to wide, smooth, planar, oxidized, tight to open
	4								
	5								
45	4								-BEDROCK- (Possible Vaughn Hills Formation)
	5								
	5	C2	46.5 51.5	58 46	97 77	Fresh			C2: Same as above, except fresh
	4								
	5								
50	4								Note: Water loss in Bedrock during drilling is approximately 2800 gallons.
	5							205.6 51.5	BOTTOM OF EXPLORATION 51.5 FT INSTALLED OBSERVATION WELL AT 51.4 FT

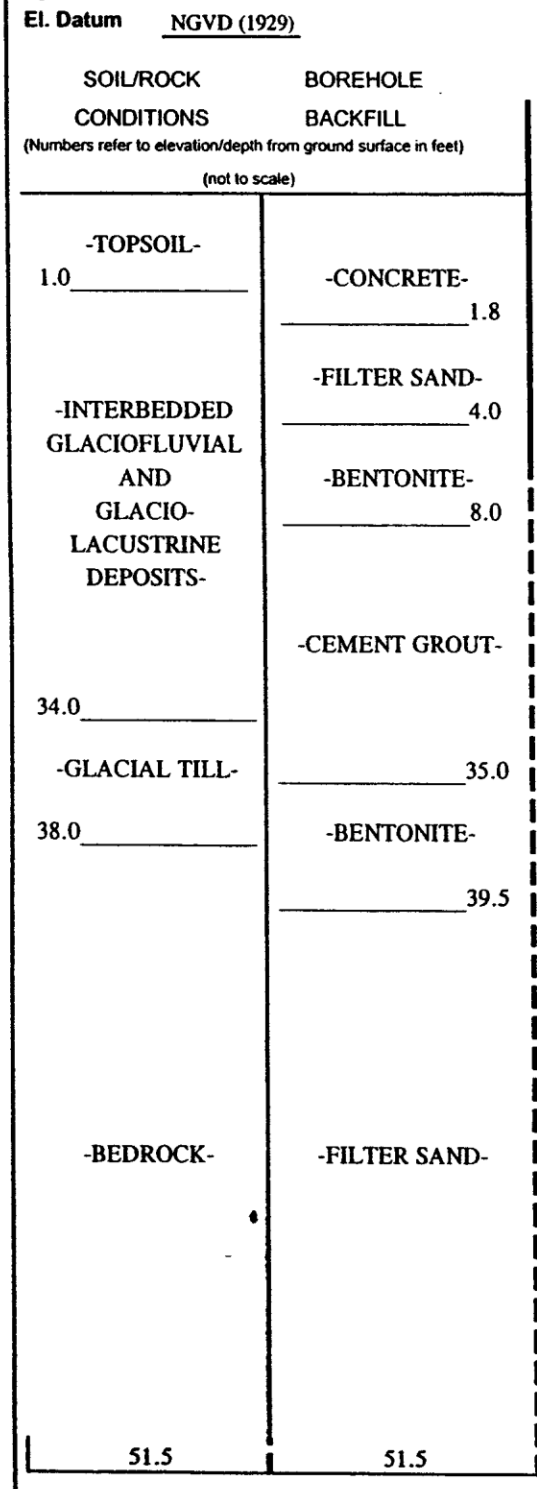
A_CORE+WELL3 USCSLIB' 1SCSTBC2.GDT G:\10884\056\LOGS.GPJ Mar 27, 02

HALEY & ALDRICH

OBSERVATION WELL INSTALLATION REPORT

Observation Well	32M-01-17XBR		
Test Boring	32M-01-17XBR		
Project	MONITORING WELL INSTALLATION AOC32/43A	**Installation Date**	5-Dec-01
City/State	DEVENS, MA	**Location**	See Plan
Client	MASSDEVELOPMENT/DEVENS COMMERCE CENTER		
Contractor	EARTH EXPLORATION SERVICES, WRENTHAM, MA	**H&A File No.**	10884-056
Driller	T. MARTINELLI	**H&A Rep.**	A. Nichols

Ground El. 257.1
El. Datum NGVD (1929)



Type of protective cover/lock: Cover/Padlock

Height of top of casing above ground surface: 2.9 ft

Height of top of riser pipe above ground surface: 2.4 ft

Type of protective casing: Guard Pipe

Length: 5.0 ft

Inside diameter: 6.0 in

Depth of bottom of casing: 2.0 ft

Seals:

Type	Depth to top (ft)	Thickness (ft)
Concrete	0.0	1.8
Bentonite Seal	4.0	4.0
Cement Grout	8.0	27.0
Bentonite	35.0	4.5

Type of riser pipe: Sch 40 PVC Solid

Inside diameter of riser pipe: 2.0 in

Type of backfill around riser: Seal

Diameter of borehole: 6.0 in

Depth of top of well screen: 41.4 ft

Type of screen or manufacturer: Machine Slotted PVC

Screen gauge or size of openings: 0.010 in

Diameter of well screen: 2.0 in

Type of backfill around screen: Filter Sand

Depth of bottom of well screen: 51.4 ft

Depth of bottom of silt trap

Depth of bottom of borehole: 51.5 ft

(Depths refer to ground surface)

Remarks: Ground El. reflects estimated ground surface at time of drilling, prior to placement of gravel pad.

92021590 (c)

SOIL BORING LOG

Client: USATHAMA	Project No. 9144-02	~~Study Area:~~ AOC 57
		Boring No.: 57M-95-03X
Contractor: D.L. MAHER	Date Started: 10-3-95	Protection: D
Method: 6½" (ID) HSA	Casing Size: 6" steel	Completed: 10-3-95
Ground Elev.:	Soil Drilled: 18 FT.	PI Meter: TE 580B OVM
Logged by: SJM	Checked by:	Total Depth: 18 FT.
Screen: 10 (ft.) Riser: 9.5 (ft.)	Diam: 4" (ID) Material: Sched 40 PVC	Below Ground: 10.2 FT
		Page 1 of: 2

DEPTH NOT TO SCALE

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH (FT)	CLP/SCREENING	RECOVERY (FT)	PID (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS	BLOWS/6-IN.	WELL DATA	LITHOLOGY	ELEVATION (FT.)
0		0-2		1.4	0.0	Silty f SAND, well graded, 2% c sand, 30% m sand, 30% silt, nonplastic, loose, dry, brown.	SM	2 4 8 13			
2		2-4		1.3	0.0	Silty f SAND, well graded, 10% f gravel, 2% c sand, 20% m sand, 30% silt, nonplastic, loose, dry, brown.	SM	11 9 14 10			
4		4-6		1.9	0.0	TOP 1/4': Gravelly, silty f SAND, well graded, 10% vc gravel to ½" max., 5% f gravel, 1% c sand, 15-20% m sand, 30% silt, nonplastic, loose, dry to damp, brown. BOTTOM 0.5': Silty f SAND, moderately graded, 20% silt, nonplastic, loose, damp, yellowish tan.	SM / SM	4 9 15 10			
6		6-8		1.8	0.0	Silty f SAND, moderately graded, 10-15% silt, nonplastic, loose, damp, tan.	SM	4 7 8 7			
8		8-10		1.6	0.0	Silty f to m SAND, well graded, 10% silt, nonplastic, loose, moist, t. grayish tan, non-colored staining (rust) - thin, faint laminations visible.	SW-SM	5 7 8 6			
10	MXS10310	10-12		1.6	4.2	Silty f SAND, 20% m sand, 15% silt, nonplastic, loose, saturated, light grayish tan, very strong petroleum odor.	SM	5 6 5 8			
12											

PROPORTIONS	(-) AMOUNT (+)
Trace (tr)	0-10%
Little (ll)	10-20%
Some (so)	20-35%
and	35-50%

ABBREVIATIONS

f = fine	gr = gray	MS = Split Spoon
m = medium	bn = brown	BW = Screened Auger
c = coarse	blk = black	HP = Hydropunch

ABB Environmental Services, Inc.

92021590 (c)

SOIL BORING LOG

Client: USATHAMA	Project No. 9144-02	Study Area: AOC 57
		Boring No.: 57M-95-03X
		Protection: D
Contractor: D.L. MAHER	Date Started: 10-3-95	Completed: 10-3-95
Method: 6 1/2 (ID) HSA	Casing Size: 6" steel	PI Meter: TE 580 B OVM
Ground Elev.:	Soil Drilled: 18 FT.	Total Depth: 18 FT.
Logged by: S. Montgomery	Checked by:	▽ Below Ground: 10.2 FT.
Screen: 10 (ft.) Riser: 9.5 (ft.)	Diam: 4" (ID) Material: sched. 40 PVC	Page 2 of: 2

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH (FT)	CLP/SCREENING	RECOVERY (FT)	PID (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS	BLOWS/6-IN.	WELL DATA	LITHOLOGY	ELEVATION (FT.)
12		12-14		1.6	2.3	Silty f SAND, well graded, 5% m sand, 10% silt, nonplastic, loose, saturated, lt. grayish ~~brown~~ tan, rust-colored staining 0.6' from bottom of spoon, strong petroleum odor.	SW-SM	6 7 6 8			
14		14-16		1.6	15.4	Silty f SAND, moderately graded, 10% silt, med. dense, saturated, lt. grayish tan, strong petroleum odor.	SW-SM	8 9 9 16			
16		16-18		1.7	13.5	Silty f SAND, as in 14-16' interval, but very dense.	SW-SM	31 38 50 28			
18						— Augers and spoons advanced to 18 ft bgs —					

DEPTH NOT TO SCALE

PROPORTIONS	(-) AMOUNT (+)
Trace (tr)	0-10%
Little (ll)	10-20%
Some (so)	20-35%
and	35-50%

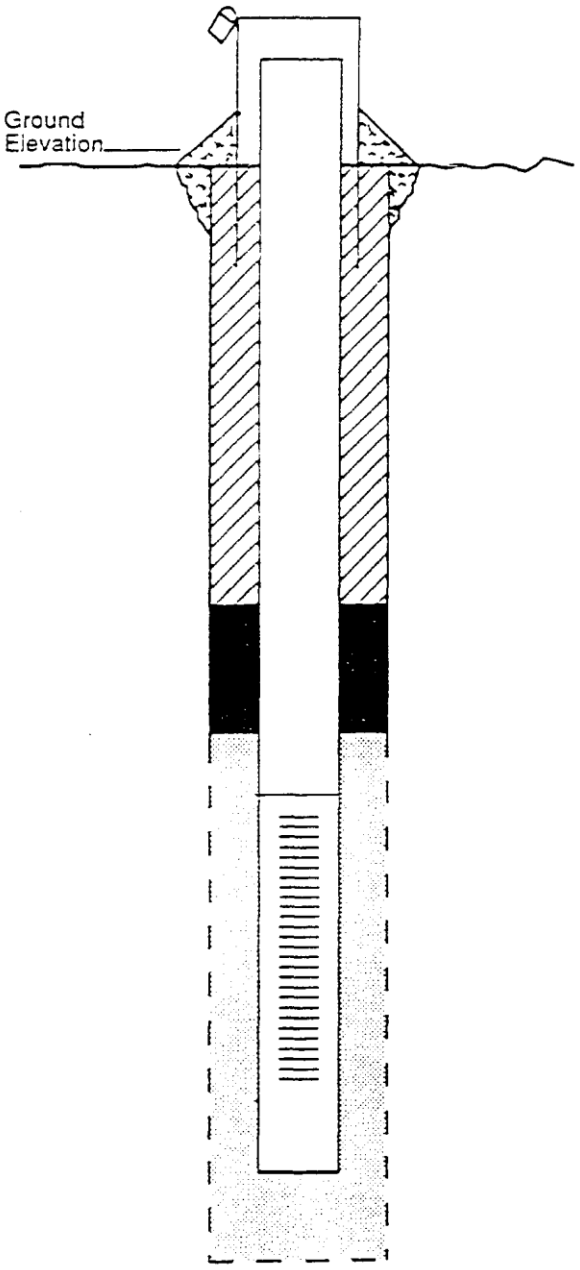
ABBREVIATIONS

f = fine	gr = gray	MS = Split Spoon
m = medium	bn = brown	BW = Screened Auger
c = coarse	blk = black	HP = Hydropunch

ABB Environmental Services, Inc.

MONITORING WELL CONSTRUCTION DIAGRAM

Project Fort Devens | Study Area AOC 57 | Driller D.L. Maher — B. Burns
Project No. 9144-02 | Boring No. 57M-95-03X | Drilling Method 6½" (ID) HSAs
Date Installed 10-3-95 | Development Method dedicated submersible pump (SM)
Field Geologist S. Montgomery (SM)



Stick-up of Casing Above Ground Surface: (SM) 3' 2.90'
Type of Surface Seal/ Other Protection: gravel pad
Type of Surface Casing: steel, above-grade
ID of Surface Casing: 6"
Diameter of Borehole: 0.9'
Riser Pipe ID: 4"
Type of Riser Pipe: Schedule 40 PVC
Type of Backfill: Type I-II Portland cement + Volclay grout
Depth of Top of Seal: 3'
Type of Seal: ¼" bentonite pellets (Volclay Pure Gold)
Depth of Top of Sand: 5'
Depth of Top of Screen: 7'
Type of Screen: Schedule 40 PVC
Slot Size x Length: 0.010" x 10'
ID of Screen: 4"
Type of Sandpack: 20-40 silica sand
Depth of Bottom of Screen: 17'
Depth of Sediment Sump with Plug: N/A (SM)
Depth of Bottom of Borehole: 18'

ABB Environmental Services, Inc.

9312005S L16

SOIL BORING LOG

Client: USAEC	Project No. 9144.08	Study Area: ACC 57	Boring No.: 57M96-11X
Contractor: NXB	Date Started: ~~9144.08~~ 8/30/96	Protection: Mod D	Completed: 8/30/96
Method: HSA 4 1/4 ID.	Casing Size: ———	PI Meter: TE 580S OVM	
Ground Elev.:	Soil Drilled: 12'	Total Depth: 12'	
Logged by: HKW	Checked by: RRR	▽ Below Ground: ~2'	
Screen: 10 (ft.)	Riser: 2 (ft.)	Diam: 2 (ID)	Material: PVC
Page 1 of: 1			

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	ON SITE SCREENING	RECOVERY	PID (ppm)	SOIL/ROCK/DISCHARGE WATER DESCRIPTION	SOIL CLASS	WELL DATA
2								2
4								
6	TOC, G.S.	5-7	NO	1.3'	0.4	TAN SILTY FINE SAND ~25% SILT ~~[illegible]~~ (AR) LOOSE, SATURATED	~~SP~~	6 6 8 8
8						(AR) (SM)		
10								
12						END OF BORING AT 12' BLS SCREENED WELL 2-12' SAND 1 1/2-12' BENTONITE 0-1.5'		12

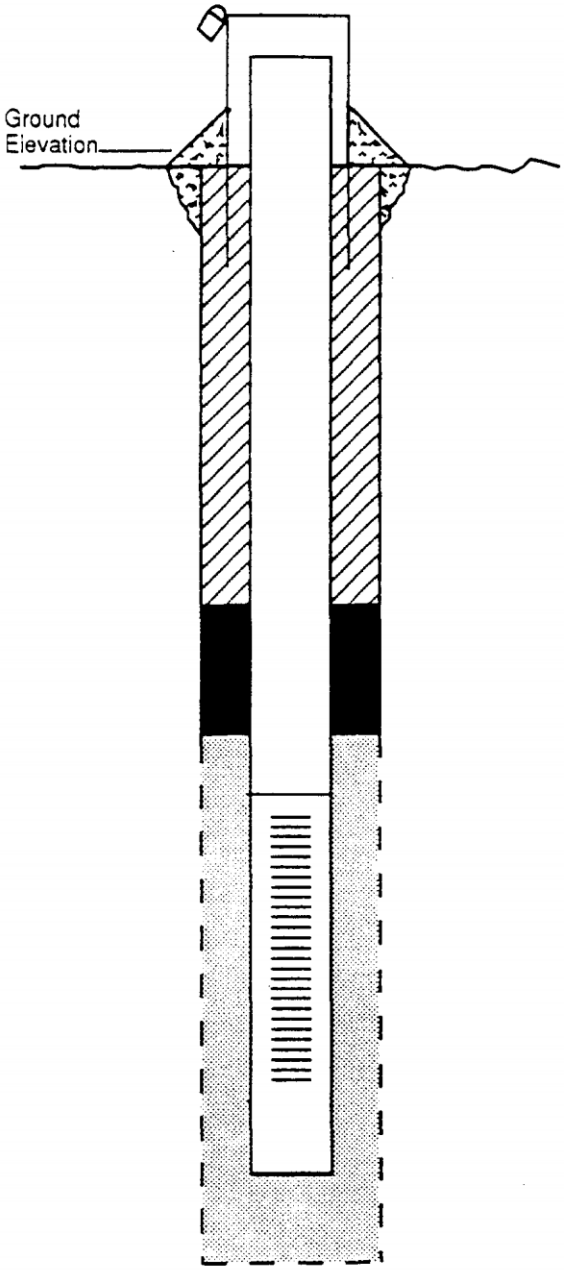
SOIL BORING LOG
PROJECT OPERATIONS PLAN
FORT DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.

9312005S L7

MONITORING WELL CONSTRUCTION DIAGRAM

Project Fort Devens | Study Area 57 | Driller NRC
Project No. 9144.08 | Boring No. 57M-96-11X | Drilling Method HSA 4¼"
Date Installed 8/30/96 | Development Method Pump + Surge
Field Geologist K. Wilson



Stick-up of Casing Above Ground Surface: 2.5'
Type of Surface Seal/ Other Protection: GRAVEL PAD + MORTAR COLLAR
Type of Surface Casing: STEEL
ID of Surface Casing: 6"
Diameter of Borehole: 6"
Riser Pipe ID: 2"
Type of Riser Pipe: PVC
Type of Backfill: N/A
Depth of Top of Seal: 0'
Type of Seal: BENTONITE PELLETS
Depth of Top of Sand: 1.5'
Depth of Top of Screen: 2'
Type of Screen: PVC
Slot Size x Length: 0.01" x 10'
ID of Screen: 2"
Type of Sandpack: NO. 2
Depth of Bottom of Screen: 12'
Depth of Sediment Sump with Plug: 12'
Depth of Bottom of Borehole: 12'

MONITORING WELL CONSTRUCTION DIAGRAM
PROJECT OPERATIONS PLAN
FORT DEVENS, MASSACHUSETTS

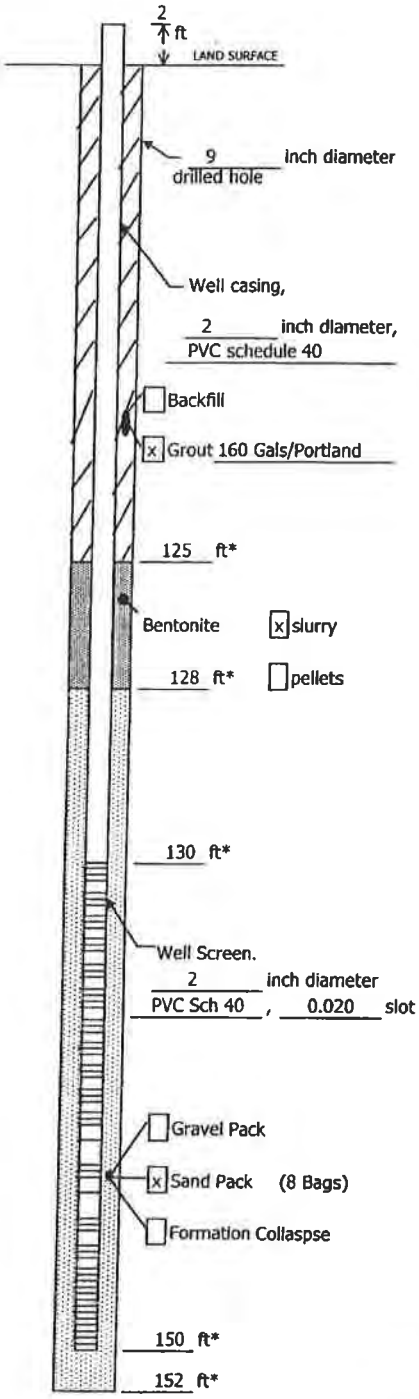
ABB Environmental Services, Inc.

9312005S L16

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project AOC 50 - Fort Devens Well G6M-01-01X

Town/City Ayer

County Middlesex State MA

Permit No.

Land-Surface Elevation and Datum:

264.1 feet [x] Surveyed [ ] Estimated

Installation Date(s) 12/21/01

Drilling Method Hollow Stem Auger

Drilling Contractor DRAGIN Drilling, Inc.

Drilling Fluid Water

Development Technique(s) and Date(s)

Submersible Pump on 12/24/01

Fluid Loss During Drilling approx. 100 gallons

Water Removed During Development approx. 150 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration 3 hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Groundwater Monitoring Point

Remarks Begin well development 8:00 a.m.; complete 11:00 a.m. Groundwater appeared to be clear and void of fine material at well development completion.

Prepared by A. Robinson

ARCADIS G&M

Sample/Core Log

Boring/Well G6M-02-06X Project/No. AOC 50/MA0006640003 Page 1 of 2

Site Location: Ayer, MA

Drilling Started: 2/7/2002 Drilling Completed: 2/8/2002

Total Depth Drilled: 65 Feet Hole Diameter: 8.5 inches Type of Sample/ Coring Device: Split Spoon

Length and Diameter of Coring Device: 2 feet x 2 inches Sampling Interval: 2 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used _____ Drilling Method: Hollow Stem Auger

Drilling Contractor: DRAGIN Drilling, Inc. Driller: Todd Helper _____

Prepared By: A. Robinson Hammer Weight _____ Hammer Drop _____ ins.

Sample #	Depth (ft bls)	Core Recovery (inches)	Blow counts per 6 Inches	PID (ppm)	Sample/Core Description	USCS
S-1	0-2	0.5	1/1/1/1		Dry, frozen, some organics, well sorted fine SAND	SM
S-2	5-7	6.5	2/3/3/3		Top 4" dry bown well sorted fine SAND	SM
					Bottom 2" dry light brown well sorted fine SAND	
S-3	10-12	1.0	2/3/3/4		Wet, well sorted brownish grey fine to medium SAND	SW
					0.2" zone of wood (hard) brownish red.	
S-4	15-17	1.0	3/5/7/8		Saturated top 3" brown fine grained SAND. Bottom 7" medium	SM/SW
					to coarse grained SAND, some fine, medium cobbles	
					throughout (glacial outwash) lense of gravel at 18'	
S-5	20-22	1.75	5/7/8/8		Well sorted brown medium to coarse grained SAND trace of	SW
					mica and cobbles throughout. No odors.	
S-6	25-27	1.75	6/10/10/11		Similar to S-5	SW
S-7	30-32	0.5	12/3/3/4	0.0	Medium grained, brown sand, well sorted SAND. Some fines	SW
					(approximately 25%)	
S-8	35-37	0.8	7/8/4/8	0.3	Similar to S-7	SW
S-8	40-42	1.4	4/5/2/2	0.0	Top 1" is same as above, bottom 0.4' brown medium, grained	
					poorly sorted SAND, some gravel.	
S-9	45-47	0.8	3/4/4/5	0.1	Brown medium, grained SAND, bottom 0.2' some gravel	SW
					interspersed, poorly sorted with some coarse grains (15%)	

ARCADIS G&M

Sample/Core Log (Cont.d)

Boring/Well G6M-02-06X

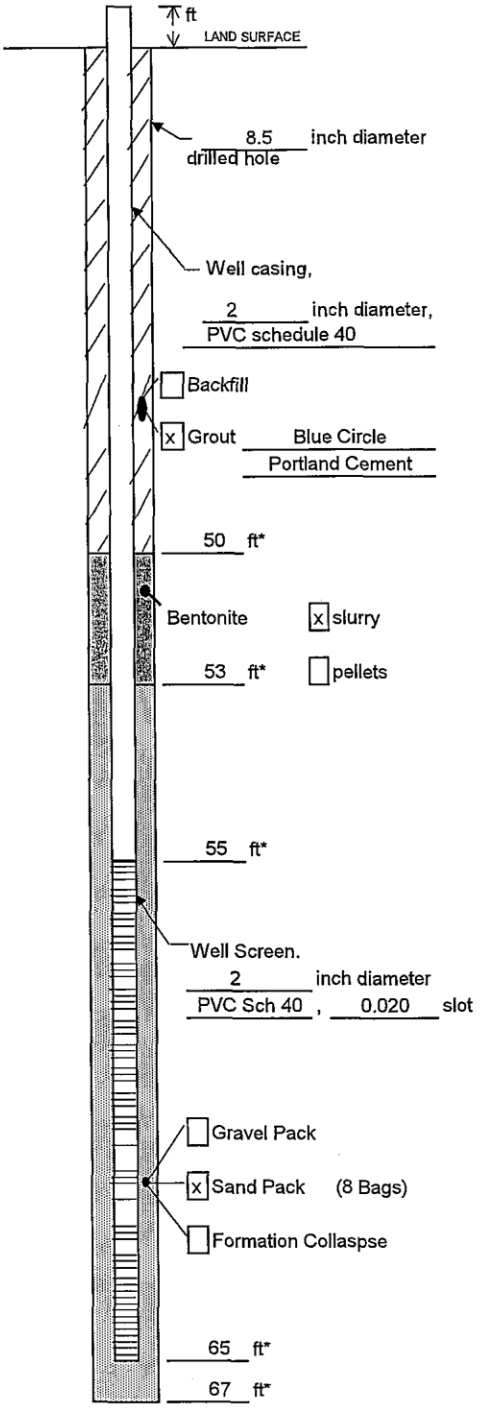
Prepared by A. Robinson

Sample #	Depth (ft bls)	Core Recovery (inches)	Blow counts per 6 Inches	PID (ppm)	Sample/Core Description	USCS
S-10	50-52	0.8	8/10/13/14	0.2	Brown medium grained poorly-sorted SAND interspersed,	SW
					with some cobbles, some fines.	
S-11	55-57	NR	6/3/4/6		No recovery, pieces of gravel in tip.	
S-12	60-62	0.5	4/3/3/3	0.2	Brown, medium grained poorly sorted SAND some loose	SW
					cobbles and silt.	
S-13	65-67	0.25	2/3/1934	0.1	Brown firm grained well-sorted, SAND, some medium grained	
					sand and medium sized cobbles in tip.	
					Bottom of Boring is 65 ft bgs	
					No refusal encountered	

ARCADIS G&M Inc.

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project AOC 50, Fort Devens Well G6M-02-06X

Town/City Ayer

County Middlesex State MA

Permit No.

Land-Surface Elevation and Datum:

208.48 feet [x] Surveyed [ ] Estimated

Installation Date(s) 2/7/02 to 2/8/02

Drilling Method Hollow Stem Auger

Drilling Contractor DRAGIN Drilling, Inc.

Drilling Fluid Water

Development Technique(s) and Date(s)

2" Submersible Grundfos Pump/2/20/02

Fluid Loss During Drilling 25 gallons

Water Removed During Development approx. 105 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water Screen Interval feet below M.P.

Pumping Duration 1 hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Groundwater Monitoring Point

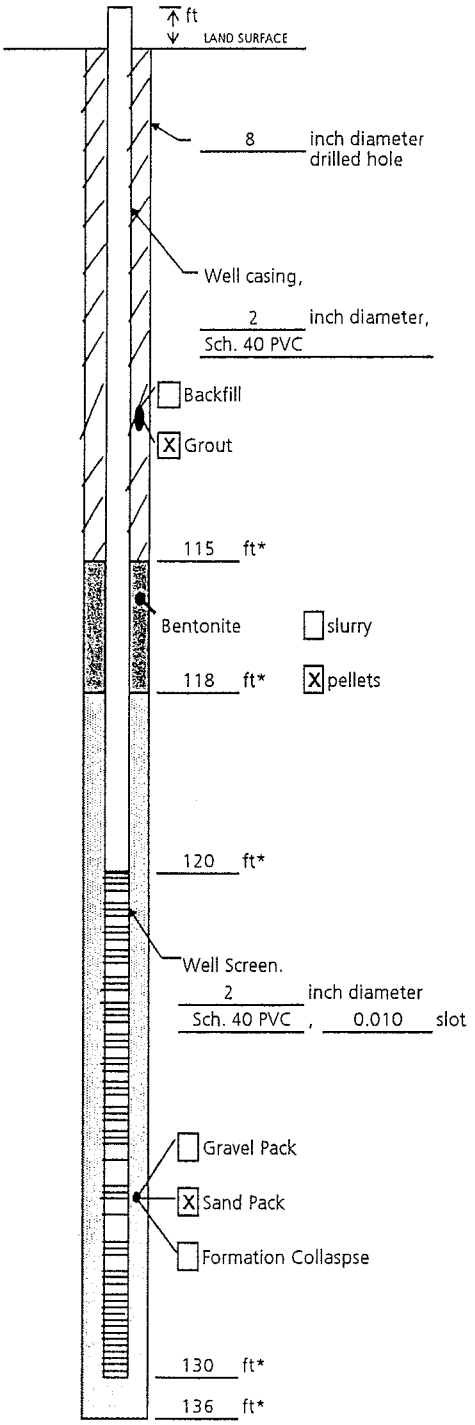
Remarks Lowered pump from top of screen incrementally to bottom of the screen zone. Groundwater appeared clear and void of fine material at completion of well development

Prepared by Brian Therriault

ARCADIS G&M, Inc.

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project AOC 50, Fort Devens Well G6M-04-07X

Town/City Ayer

County Middlesex State MA

Permit No.

Land-Surface Elevation and Datum:

feet ☐ Surveyed ☐ Estimated

Installation Date(s) 8/11 - 8/13/2004

Drilling Method Hollow Stem Auger

Drilling Contractor DRAGIN Drilling, Inc.

Drilling Fluid Water

Development Technique(s) and Date(s)

Pump and Surge with Air-Lift

Fluid Loss During Drilling ~300 gallons

Water Removed During Development 352 gallons

Static Depth to Water feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

Well Purpose Monitoring Well

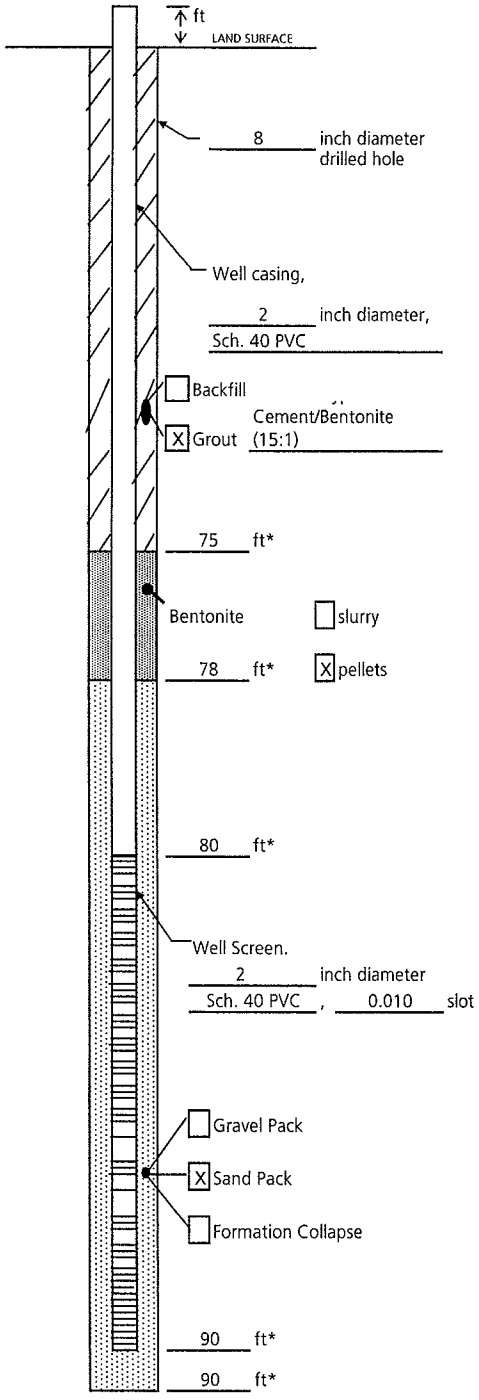
Remarks

Prepared by Diane Mosher

ARCADIS G&M, Inc.

Well Construction Log

(Unconsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project AOC 50, Fort Devens Well G6M-04-14X

Town/City Ayer

County Middlesex State MA

Permit No.

Land-Surface Elevation and Datum:

_____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 10/7/2004

Drilling Method Hollow Stem Auger

Drilling Contractor DRAGIN Drilling, Inc.

Drilling Fluid Water

Development Technique(s) and Date(s)

Pump and Surge with Air-Lift

Fluid Loss During Drilling ~300 gallons

Water Removed During Development ~350 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring Well

Remarks

Prepared by A. Robinson

SOIL BORING LOG - FORT DEVENS, MA.			PROJECT NO.: 6917.07		BORING NO.: G6M-95-20X (p. 1 of 4)
CLIENT: AEC			DATE STARTED: 1/16/95		STUDY AREA: 50
CONTRACTOR: New Hampshire Boring			DATE COMPLETED: 1/17/95		PROTECTION: Modified D
METHOD: HSA and drive & wash			BORING DIAMETER: DRAFT		PID METER: Model 5808 OVM
GROUND ELEV:			REFERENCE PT. ELEV.:		TOTAL DEPTH: 89'
LOGGED BY: J. Healey			CHECKED BY:		WATER TABLE BGS: 8'

SAMPLE NO.	DEPTH (ft.)	PEN./REC. (ft./ft.)	PID: HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND PHYSICAL CONDITIONS	BLOWS/6 IN.	USCS SOIL CLASS.	GC SCREENING RESULTS FOR PCE (ug/kg) / COMMENTS
S-1	0-2	2.0/1.6	0	Top 0.3': Sandy SILT, nonplastic, 30% f sand, very stiff, moist, dark brown. Next 0.7': SAND, mod. well graded, f to c (mostly med), loose, damp, light yellow-brown. Bottom 0.6': SAND, poorly graded, fine, loose, damp, tan.	13-33-13-11	SM-ML SW SP	68.1 roots in top 0.3' a few pieces of coal in 0.3' to 1.0' interval
S-2	2-4	2.0/1.4	0	SAND, poorly graded, 10% med to coarse, fine sand, loose, damp, banded tan and yellow with a 1" band of dark brown silty sand at 0.2'	8-5-4-6	SP	< 16.6
S-3	4-6	2.0/1.4	0	SAND, poorly graded, fine, loose, damp. Top 0.4' is banded tan and yellow with one band of dark silt; bottom 1.0' is tan.	3-4-6-8	SP	< 23.5
S-4	6-8	2.0/1.3	0	SAND, poorly graded, fine, med dense, damp (bottom 0.1' wet), tan	6-8-8-11	SP	< 2400
S-5	8-10	2.0/1.1	0	SAND, poorly graded, fine, band of silt at 0.3', med dense, top 0.2' wet, bottom 0.9' saturated, tan	3-6-7-7	SP	< 2300
S-6	10-12	2.0/1.6	2	SAND, poorly graded, fine, 10% silt, med dense, saturated, tan with a few bands of rust, laminated	4-6-6-8	SP-SM	98.3
S-7	12-14	2.0/1.8	4	SAND, poorly graded, fine, band of silt at 1', med dense, saturated, tan with some thick bands of rust, laminated	8-9-16-13	SP-SM	166
S-8	14-16	2.0/1.5	2	SAND, poorly graded, fine, less silt than in S-7, med dense, saturated, tan with thinner bands of rust, laminated	7-7-7-8	SP	242
S-9	16-18	2.0/2.0	12	SAND, poorly graded, fine, med dense, saturated, tan with thin bands of rust, laminated	10-10-10-10	SP	516E
S-10	18-20	2.0/	76	SAND, as in S-9	5-7-7-8	SP	1090E
S-11	20-22	2.0/2.0	74	SAND, as in S-9, but more reddish	6-6-7-5	SP	1760
S-12	22-24	2.0/2.0	60	Sandy SILT, 28% fine sand, very stiff, saturated, lt brown with thin bands of rust, laminated	5-9-9-9	ML	1870
S-13	24-26	2.0/2.0	10	SAND, as in S-12	5-7-9-9	ML	700E
S-14	26-28	2.0/2.0	12	Silty SAND, fine sand, 18% fines, med dense, saturated, light brown with thin bands of rust, laminated	10-12-14-14	SM	230E
S-15	28-30	2.0/	7	SAND, as in S-14	0-4-6-12	SM	480E
S-16	30-32	2.0/2.0	10	Silty SAND, 1% medium sand, fine sand, 17% fines, med dense, saturated, light brown with thin rust bands, laminated	8-11-14-10	SM	13E

SOIL BORING LOG - FORT DEVENS, MA.	PROJECT NO.: 6917.07	BORING NO.: G6M-95-20X (p. 2 of 4)
CLIENT: AEC	DATE STARTED: 1/16/95	STUDY AREA: 50
CONTRACTOR: New Hampshire Boring	DATE COMPLETED: 1/17/95	PROTECTION: Modified D
METHOD: HSA and drive & wash	BORING DIAMETER: DRAFT	PID METER: Model 580B OVM
GROUND ELEV:	REFERENCE PT. ELEV.:	TOTAL DEPTH: 89'
LOGGED BY: J. Healey	CHECKED BY:	WATER TABLE BGS: 8'

SAMPLE NO.	SAMPLE DEPTH (ft.)	PEN./REC. (ft./ft.)	PID: HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND PHYSICAL CONDITIONS	BLOWS/6 IN.	USCS SOIL CLASS.	GC SCREENING RESULTS FOR PCE (ug/kg)
S-17	32-34	2.0/2.0	13	SAND, as in S-16	13-16-19-23	SM	26E
S-18	34-36	2.0/0.3	0	Silty SAND, 1% medium sand, fine sand, 26% fines, med dense, saturated, light brown with thin rust bands, laminated	not recorded	SM	10E
S-19	36-38	2.0/1.8	7	SAND, as in S-18	8-12-16-19	SM	5E
S-20	38-40	2.0/0.9	0	Silty SAND, fine sand, 32% fines, medium dense, saturated, tan with some rust laminations	6-9-16-18	SM	< 23.5
S-21	40-42	2.0/1.5	0	SAND, as in S-20	9-12-20-23	SM	< 30.4
S-22	42-44	2.0/2.0	57	SAND, as in S-20	8-6-10-18	SM	< 23.5
S-23	44-46	2.0/1.3	33 NOTE: PID readings suspect; may be due to moisture	Top 0.2': Silty CLAY, slightly plastic, very stiff, saturated, lt brn Next 0.4': SILT, nonplastic, 25 - 30% f sand, very stiff, saturated, tan and rust, highly laminated Bottom 0.7': SAND, poorly graded, fine, grain size decreases with depth, dense, saturated, tan with rust bands, laminated	8-15-18-23	CL ML SP	< 23.8
S-24	46-48	2.0/2.0	10	Top 1.5': SAND, as in bottom 0.7' of S-23. Bottom 0.5': Interbedded fine SAND, SILT, and CLAY, sand is poorly graded, 50% fines, saturated, tan and gray-brown, thin laminar beds	6-8-8-14	SP SM, ML, and CL	< 21.7
S-25	48-50	2.0/2.0	49	Top 0.8': Silty SAND, poorly graded, fine, 15 - 20% fines, saturated, tan with rust laminations. Bottom 1.2': Interbedded SILT and CLAY, slightly plastic, 15% f sand, very stiff, saturated, tan and gray-brown and rust, highly laminated	not recorded	SM ML and CL	< 30.9
S-26	50-52	2.0/2.0	46	Top 1.0': SAND, poorly graded, fine, 10 - 20% fines, dense, saturated, tan with rust laminations. Bottom 1.0': SAND, poorly graded, fine, dense, saturated, tan with rust laminations	12-16-18-20	SM SP	< 29.2
S-27	52-54	2.0/2.0	0	SAND, poorly graded, fine, 5 - 10% fines (a few thin bands of silt and clay), medium dense, saturated, tan with rust staining	8-11-13-22	SP	< 21.3
S-28	54-56	2.0/2.0	0	SAND, poorly graded, fine, dense, saturated, tan with rust laminations	10-18-14-14	SP	3.7E
S-29	56-58	2.0/2.0	0	SAND, poorly graded, fine, 5% fines (a few thin bands of silt), dense, saturated, tan with rust laminations	10-12-19-21	SP	< 30.4
S-30	58-60	2.0/1.7	0	SAND, poorly graded, fine, dense, saturated, tan with rust laminations	12-13-14-23	SP	< 22.9

SOIL BORING LOG - FORT DEVENS, MA.	PROJECT NO.: 6917.07	BORING NO.: G6M-95-20X (p. 3 of 4)
CLIENT: AEC	DATE STARTED: 1/16/95	STUDY AREA: 50
CONTRACTOR: New Hampshire Boring	DATE COMPLETED: 1/17/95	PROTECTION: Modified D
METHOD: HSA and drive & wash	BORING DIAMETER: DRAFT	PID METER: Model 5808 OVM
GROUND ELEV:	REFERENCE PT. ELEV.:	TOTAL DEPTH: 89'
LOGGED BY: J. Healey	CHECKED BY:	WATER TABLE BGS: 8'

SAMPLE NO.	SAMPLE DEPTH (ft.)	PEN./REC. (ft./ft.)	PID: HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND PHYSICAL CONDITIONS	BLOWS/6 IN.	USCS SOIL CLASS.	GC SCREENING RESULTS FOR PCE (ug/kg)
S-31	60-62	2.0/1.8	0	SAND, poorly graded, fine, dense, saturated, tan with rust laminations	28-21-21-35	SP	< 21.1
S-32	62-64	2.0/1.3	0	SAND, as in S-31, but with increasing rust color at bottom of interval	6-9-12-26	SP	< 17.9
S-33	64-66	2.0/2.0	0	Top 0.6': SAND, poorly graded, fine, dense, saturated, rust colored Bottom 1.4': SAND, poorly graded, fine, dense, saturated, tan with rust laminations	10-30-45-61	SP SP	< 21.2
S-34	66-68	2.0/1.4	0	SAND, poorly graded, fine, dense, saturated, tan with very little rust	13-17-25-27	SP	< 28.2
S-35	68-70	2.0/2.0	0	Top 1.2': SAND, poorly graded, fine, dense, saturated, light reddish brown Bottom 0.8': SAND, poorly graded, fine (finer than in top 1.2'), dense, saturated, tan	14-20-27-41	SP SP	< 33.3
S-36	70-72	2.0/1.2	0	Top 0.8': SAND, poorly graded, fine, dense, saturated, light reddish brown Bottom 0.4': SAND, poorly graded, fine (finer than in top 0.8'), dense, saturated, tan	9-12-20-26	SP SP	< 29.9
S-37	72-74	2.0/2.0	0	SAND, poorly graded, fine (becoming finer at bottom 0.3'), medium dense, saturated, tan with rust-colored striations	5-11-17-21	SP	< 28.0
S-38	74-76	2.0/2.0	0	SAND, poorly graded, fine, dense, saturated, tan, some rust striations	9-14-28-28	SP	< 22.6
S-39	76-78	2.0/2.0	0	SAND, poorly graded, fine, med dense, saturated, tan	8-3-13-17	SP	< 27.7
S-40	78-80	2.0/	0	SAND, as in S-39	11-13-17-21	SP	< 30.3
S-41	80-82	2.0/2.0	0	Top 1.2': SAND, poorly graded, fine, medium dense, saturated, tan Bottom 0.3': SAND, poorly graded, fine, 10% fines, medium dense, saturated, gray-brown	9-11-14-17	SP SP-SM	< 26.0
S-42	82-84	1.5/1.5	0	Top 0.8': SAND, poorly graded, fine, dense, saturated, tan. Bottom 0.7': Silty, gravelly SAND, well graded, 25 - 30% f to c gravel, fine, 25 - 30% fines, dense, saturated, gray-brown.	26-28-31-50/0"	SP SM	< 28.3
S-43	84-86	2.0/1.0	0	Top 0.5': Silty, gravelly SAND, as in bottom 0.7' of S-42 Bottom 0.5': Silty SAND, well graded, 10 - 15% fine gravel, fine to coarse, 15% fines, dense, saturated, gray	35-20-27-15	SM SM	10EB

SOIL BORING LOG - FORT DEVENS, MA.	PROJECT NO.: 6917.07	BORING NO.: G6M-95-20X (p. 4 of 4)
CLIENT: AEC	DATE STARTED: 1/16/95	STUDY AREA: 50
CONTRACTOR: New Hampshire Boring	DATE COMPLETED: 1/17/95	PROTECTION: Modified D
METHOD: HSA and drive & wash	BORING DIAMETER: DRAFT	PID METER: Model 5808 OVM
GROUND ELEV:	REFERENCE PT. ELEV.:	TOTAL DEPTH: 89'
LOGGED BY: J. Healey	CHECKED BY:	WATER TABLE BGS: 8'

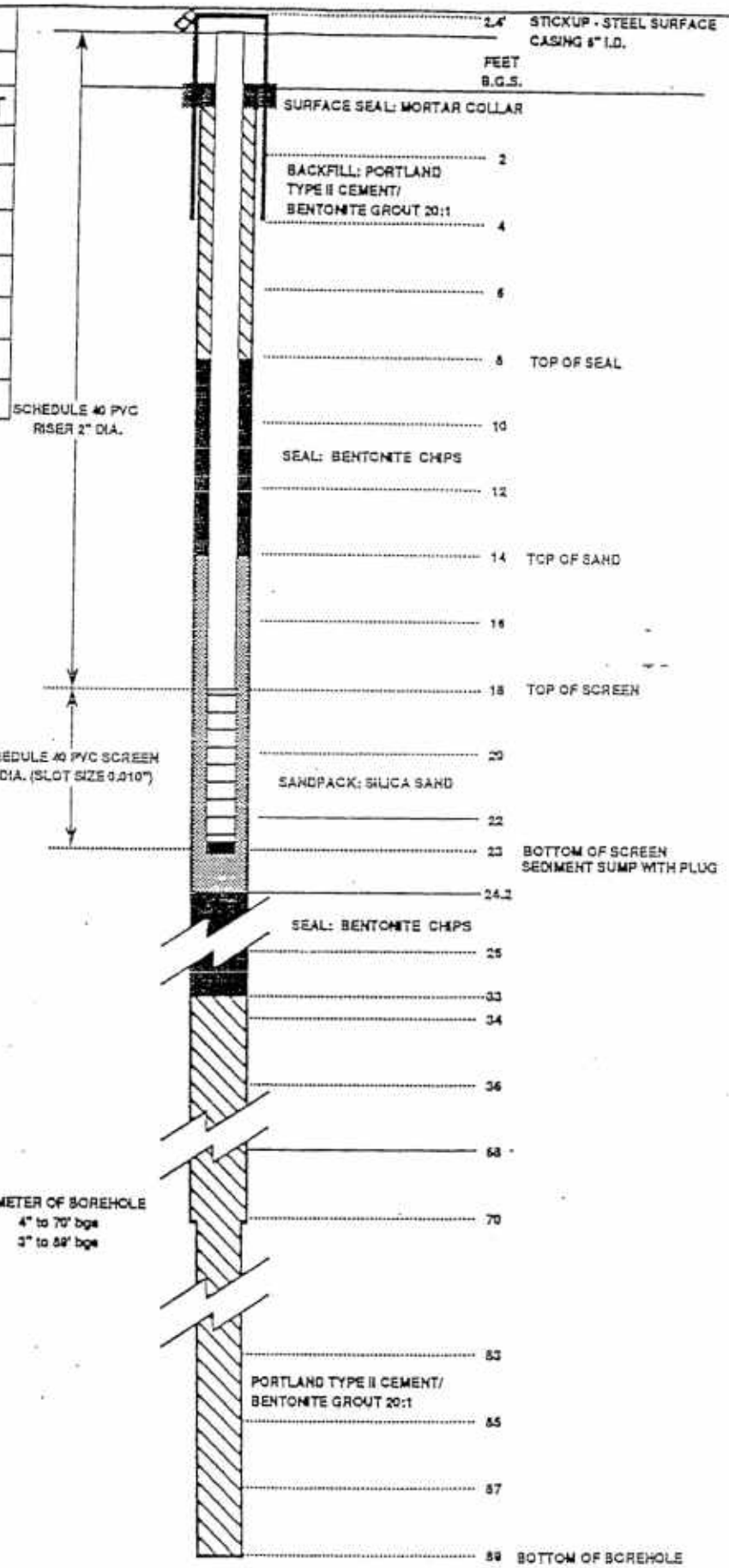
SAMPLE NO.	SAMPLE DEPTH (ft.)	PEN./REC. (ft./ft.)	PID: HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND PHYSICAL CONDITIONS	BLOWS/6 IN.	USCS SOIL CLASS.	GC SCREENING RESULTS FOR PCE (ug/kg)
S-44	86-88	2.0/2.0	0	Top 1.2': SAND, poorly graded, fine, dense, saturated, tan Next 0.3': Gravelly SAND, well graded, 40% fine gravel, fine to coarse sand, dense, saturated, gray Bottom 0.5': SAND, poorly graded, 15% fine gravel, fine to medium sand, 5 - 10% fines, dense, saturated, gray, TILL	8-18-15-38	SP SW SP-SM	< 26.5
S-45	88-89	1.0/1.0	0	Top 0.5': SAND, poorly graded, 10% fine gravel, fine to coarse sand, very dense, saturated, gray Bottom 0.5': SAND, poorly graded, 15% fine gravel, fine sand, 5% fines, very dense, saturated, gray	60-88-100/0"	SP SP	< 27.9

BOE at 89'

MONITORING WELL DIAGRAM

ABB ENVIRONMENTAL SERVICES, INC.

PROJECT: FORT DEVENS
PROJECT No.: 6917-04
STUDY AREA: WWII FUEL POINT
BORING No.: G6M-95-20X
GEOLOGIST: J. HEALEY
DRILLER: NHB
DRILLING METHOD: 4" D & W
DATE INSTALLED: 1/19/95
TOP OF RISER ELEV.: 225.31'
GROUND SURF. ELEV.: 223.00'



SOIL BORING LOG - FORT DEVENS, MA. PROJECT NO.: 8740.02 BORING NO.: G6M-96-22A

CLIENT: COE
CONTRACTOR: NHB
METHOD: HSA, 4.25"
GROUND ELEV.:
LOGGED BY: JP

DATE STARTED: 10/28/96
DATE COMPLETED: 10/28/96
BORING DIAMETER: 6"
REFERENCE PT. ELEV.:
CHECKED BY: JCR

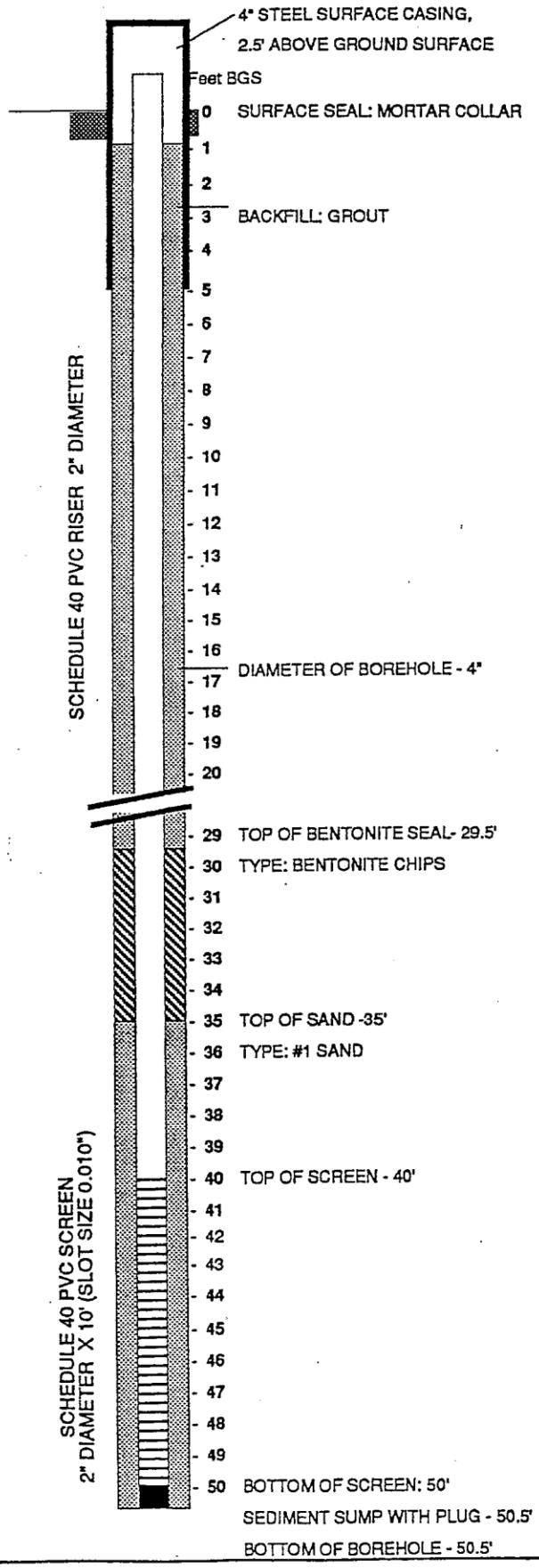
STUDY AREA: AOC 50
PROTECTION: D (Mod.)
PID METER: OVM 580B
TOTAL DEPTH: 50.5'
WATER TABLE BGS: 4'

SAMPLE NO.	SAMPLE DEPTH	PEN.	REC.	PID OF SPOON	SOIL/ROCK DESCRIPTION AND PHYSICAL CONDITIONS	BLOWS/6 IN.	USCS SOIL CLASS.	ON SITE SCREENING
					Muddy sand, org. material, wet, used auger for 5'.		SM	
S1	44-46'	2.0/	1.6		Poorly graded sand with very coarse sand 5%, silt <5%, 2.5y6/4 lt. yellowish brown.	6,4,4,7	SP	

ABB Environmental Services, Inc.

MONITORING WELL DIAGRAM

PROJECT:	FORT DEVENS
PROJECT NO.:	8740-03
STUDY AREA:	A0C 50
BORING NO.:	G6M-96-22A
GEOLOGIST:	G. PORTANTE
DRILLER:	NHB
DRILLING METHOD:	DRIVE & WASH
DATE INSTALLED	10/28/96
DEVELOPMENT:	SURGE & PUMP



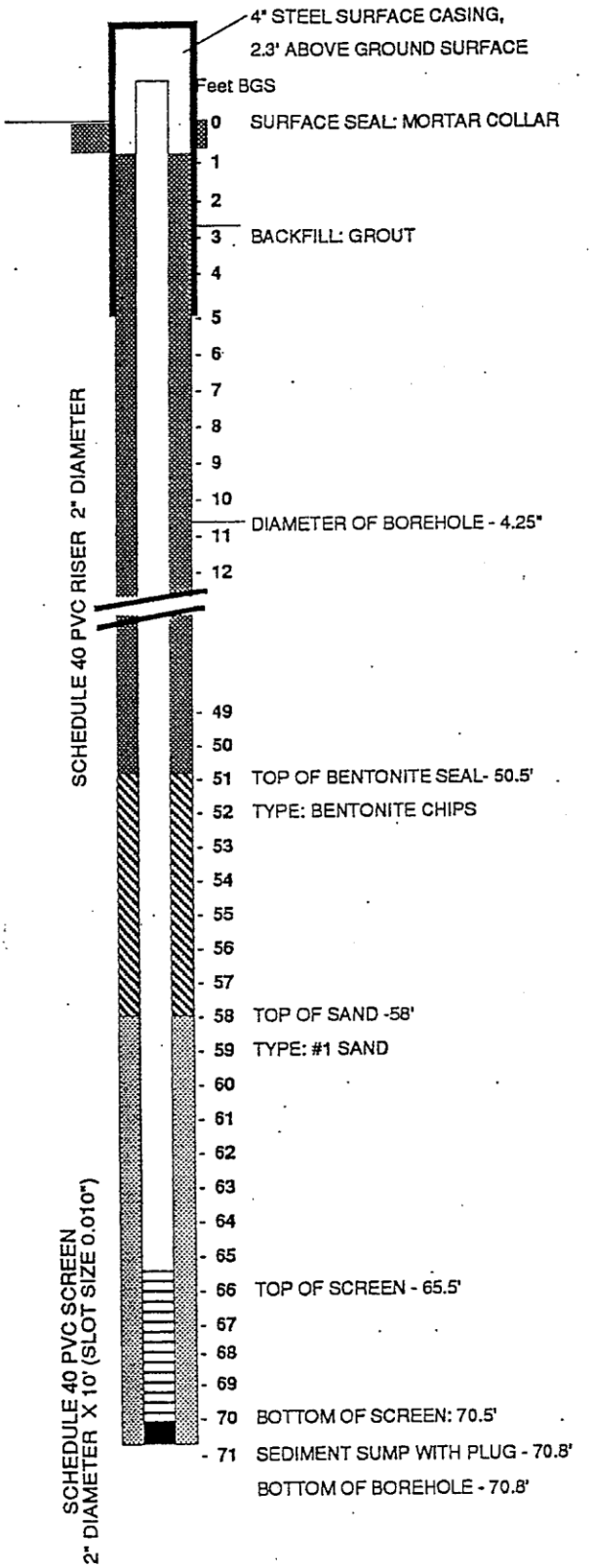
SOIL BORING LOG - FORT DEVENS, MA.	PROJECT NO.: 8740.02	BORING NO.: G6M-96-22B
CLIENT: COE CONTRACTOR: NHB METHOD: D&W GROUND ELEV.: LOGGED BY : JCR	DATE STARTED: 10/24/96 DATE COMPLETED: 10/25/96 BORING DIAMETER: 4" REFERENCE PT. ELEV.: CHECKED BY: JCR	STUDY AREA: AOC 50 PROTECTION: D (Mod.) PID METER: OVM 580B TOTAL DEPTH: 71.5' WATER TABLE BGS: 4'

SAMPLE NO.	SAMPLE DEPTH	PEN. REC.	PID OF SPOON	SOIL/ROCK DESCRIPTION AND PHYSICAL CONDITIONS	BLOWS/6 IN.	USCS SOIL CLASS.	ON SITE SCREENING
			0	Drive and wash to 60', no spoons.			
			0	Washed to 25', water silty brown, fine to medium sands.		SW	
			0	30-40': water pale brown, uniform fine sands.		SP	
				40-45': water pale brown, slightly silty, fine to medium sands, poorly graded.		SP	
				45-55': similar to above, uniform fine sands.		SP	
				55-60': wash same as above.		SP	
S1	59-61'	2.0/ 1.5	0	0-1.2': fine sand, uniform, medium dense, 10% silt, saturated, 2.5y6/3 yellow brown. 1.2-1.3': fine to medium sand, poorly graded. 1.3-1.5': Same as 0-1.2'.	4,7,8,3	SP	
S2	64-66'	2.0/ 1.2	0	Sand, fine, uniform, 5-10% silt, loose, saturated, 2.5y7/6 yellow.	4,5,4,7	SP	
S3	69-71'	2.0/ 2	0	Fine sand, similar to above. 0-0.6': lightly oxidized 2.5y7/8 yellow. 0.6-1.5': 2.5y6/3 l. yellowish brown. 1.5-2.0': highly oxidized, some banding, 5yr5/8 yellowish red. Tip of spoon: sandy silt, 20% fine sand, <5% clay, nonplastic-slightly plastic, slightly sticky, medium dense, damp.	4,4,10,26	SP ML	
S4	71.5-72.5'	2.0/ 1.5	0	Top 1.1': blow-in (sands). Bottom .4': till, gravelly, sandy, silt, 10% ang. gravel (max. diam. .5") 20% fine sands, <5% clay, hard, damp	50,50	ML	
				Casing driven to 71.5' bgs. End of boring.			

ABB Environmental Services, Inc.

MONITORING WELL DIAGRAM

PROJECT:	FORT DEVENS
PROJECT NO.:	8740-03
STUDY AREA:	A0C 50
BORING NO.:	G6M-96-22B
GEOLOGIST:	G. PORTANTE
DRILLER:	NHB
DRILLING METHOD:	DRIVE & WASH
DATE INSTALLED	10/24/96
DEVELOPMENT:	SURGE & PUMP



Stone & Webster Engineering Corporation	BORING LOG	Boring N-5 J.O. 05000.03 Sheet 1 of 4

Site: SHEPLEY'S HILL LANDFILL — Logged by: R. GILLESPIE

Client: C.O.E. — Date Start - Finish: 7/26/95 - 8/2/95

Coordinates: — Ground Elevation: ft

Groundwater Depth: 22.7 FT. — Depth to Bedrock: 88.5' — Total Depth Drilled: 99 ft

Contractor: REDWING DRILLING — Driller: VERNON — Rig Type: MOBILE B-53

Methods:

Drilling Soil: 8.25" HOLLOW-STEM AUGERS TO 30 FT. — Casing Used: 4.0" CASING TO 88.5 FT., 3.0" CASING TO 98'

Sampling Soil: 2.0" OD. SPT

Drilling Rock: NW CORE FROM 88.5 TO 99 FT. REAMED ROCK W/ 2 15/16" ROLLER BIT

Comments:

Elev (ft)	Depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol	Sample Description
	0						PVC LINER AT 18" NO SAMPLES 0-5'
	5	SS	1	6-7-8 (4")	15	SP	SAND, WITH TRASH, UNIFORM, MED. & FINE, 5-10% NON-PLASTIC FINES, COMPACT, DRY, YELLOW BROWN. FOUL ODOR, MOSTLY PLASTIC HOUSEHOLD TRASH. 2.5Y8/4 [0 PPM VOC] MISCELLANEOUS TRASH ON AUGERS (PAPER, PLASTICS, METAL, CLOTH, GRASS CLIPPINGS)
	10	SS	2	3" SPOON 13-19-22 (20")	41	SP	GRAVELLY SAND POORLY GRADED SUBROUND GRAVEL TO 1/2", C-F SAND, MOSTLY FINE, <5% NON-PLASTIC FINES, DENSE, DRY, GRAY-BROWN. 2.5Y4/2 [0 PPM VOC] 4" LAYER OF TRASH AT TOP. TRASH ON AUGERS
	15	SS	3	14-8-5 0 REC	13		NO RECOVERY

Legend/Notes

- Datum is
- ▽ indicates groundwater level.
- ▌ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
  Recovery = % rock core recovery.
  RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- * indicates use of 300 pound hammer.
- Sample Type:

Approved	Date

FIGURE 4-2
BORING LOG

Stone & Webster Engineering Corporation	BORING LOG	Boring N-5 J.O. 05000.03 Sheet 2 of 4

Site: SHEPLEY'S HILL LANDFILL — Logged by: RPG

Elev (ft)	depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol	Sample Description
	20	SS	4	18-15-10 (11")	25	SP	GRAVELLY SAND, POORLY GRADED, 20-25% GRAVEL TO ½", C-F SAND MOSTLY MED. AND FINE, 8-12% NON PLASTIC FINES, COMPACT, DAMP, BROWN-GRAY. [0 ppm VOC] 10YR 5/1 PCS. OF WOOD, METAL WIRE, PLASTIC.
	25	SS	5	45-8 (17")	13	SP	SAND, UNIFORM, MED. AND FINE, TRACE GRAVEL, 5-8% NON-PLASTIC FINES, COMPACT, SATURATED, BROWN-GRAY. [0ppm VOC] 2.5Y 5/2. LAYERS OF CINDERS AND ASH NEAR TOP, NATURAL SOIL AT BOTTOM(?) W.T. ~ 23 FT.
	30	SS	6	4-3-6 (8")	9	Pt	PEAT, MIXED WITH FINE SAND AND PLASTIC SILT, LOOSE, SATURATED, DARK BROWN TO BLACK. [0 ppm VOC] 10YR 2/1 (PEAT IN WASH)
	35	SS	7	8-9-11 (6")	20	SM	SILTY SAND, POORLY GRADED, C-F SAND, MOSTLY FINE, TRACE GRAVEL, 20-30% NON PLASTIC FINES, COMPACT, SATURATED, GRAY-BROWN. 10YR5/2 [0 ppm VOC]
	40	SS	8	4-4-4 (3")	8	SP	SAND, POORLY GRADED, C-F, TRACE FINE GRAVEL, 0-3% NON PLASTIC FINES, LOOSE, SATURATED, PROBABLE WASH, BROWN. [0 ppm VOC] 10YR 6/3
	45	SS	9	6-4-5	9	SW	SAND, WELL GRADED, C-F, 15-20% GRAVEL TO ½", <5% NON-PLASTIC FINES, LOOSE, SATURATED, LT BROWN-GRAY. [0 ppm VOC] 2.5Y 6/2

Note: See Sheet 1 for Boring Summary and Legend Information | Approved | Date

FIGURE 4-2 cont.
BORING LOG

Stone & Webster Engineering Corporation	BORING LOG	Boring N-5 J.O. 05000.03 Sheet 3 of 4

Site: SHEPLEY'S HILL LANDFILL Logged by: RPG

Elev (ft)	depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol	Sample Description
	50	SS	10	6-5-5 (3")	10	SP	SAND, POORLY GRADED, C-F MOSTLY FINE, 5-8% NONPLASTIC FINES, LOOSE, SATURATED, LT. GRAY. [0 ppm VOC] 2.5Y 6/2 (MOSTLY WASH IN SAMPLE)
	55	SS	11	5-6-5 (8")	11	SP	SAND, POORLY GRADED, C-F, MOSTLY FINE, <5% NON PLASTIC FINES, COMPACT, SATURATED, BROWN-GRAY. [0 ppm VOC] 5Y6/2
	60	SS	12	3-4-5 (8")	9	SM	SILTY SAND, UNIFORM, FINE, TRACE COARSE SAND-FINE GRAVEL, 20-30% NON PLASTIC FINES, LOOSE, SATURATED, BROWN-GRAY. [0 ppm VOC] 5Y6/3
	65	SS	13	3-3-4 (20")	7	SP	GRAVELLY SAND, POORLY GRADED, 15-25% GRAVEL TO 1/2", SUBROUND TO SUBANGULAR, MOSTLY FINE SAND, 5-10% NON-PLASTIC FINES, LOOSE, SATURATED, LT. BROWN-GRAY. [0 ppm VOC] 5Y6/2
	70	SS	14	3-4-8 (18")	12	SM	SILTY SAND, POORLY GRADED, 20-25% GRAVEL, M-F SAND, 10-20% NON PLASTIC FINES, COMPACT, SATURATED, LT. OLIVE-GRAY. [0 ppm VOC] 5Y5/2
	75	SS	15	6-8-25 (24")	33	SP	GRAVELLY SAND, POORLY GRADED, 20-30% GRAVEL TO 3/4", C-F SAND, MOSTLY FINE, 5-10% NON PLASTIC FINES, DENSE, SATURATED, LT. OLIVE-GRAY. [0 ppm VOC] 5Y5/2

Note: See Sheet 1 for Boring Summary and Legend Information Approved Date

FIGURE 4-2 cont.
BORING LOG

Stone & Webster Engineering Corporation	BORING LOG	Boring N-5 J.O. 05000.03 Sheet 4 of 4

Site: SHEPLEY'S HILL LANDFILL — Logged by: R. GILLESPIE

Elev (ft)	depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol	Sample Description
	80	SS	16	5-7-10 (18")	17	SP	SAND, POORLY GRADED, MOSTLY FINE, TRACE FINE GRAVEL IN LAYER, 5-8% NON-PLASTIC FINES, COMPACT, SATURATED, LT. OLIVE-GRAY. 5Y6/2 [0 ppm VOC]
	85	SS	17	48-21-21 (10")	42	SP, GM	SAND, SIMILAR TO ABOVE. TOP 8". SILTY GRAVEL, POORLY GRADED, GRAVEL TO 3/4", SUBROUND TO ANGULAR, 15-25% SAND, 10-20% NONPLASTIC FINES, V. DENSE, SATURATED, LT. GREEN-GRAY, TILL [0 ppm VOC] 5Y6/3
88.5							TOP OF ROCK @ 88.5 FT.
	90	C	1	60/13		10 MIN/FT 2.5 MIN/FT 9 MIN/FT	FELDSPAR-QUARTZ-MUSCOVITE GNEISSIC GRANITE, V. HARD, SL. WEATHERED TO FRESH, CLOSELY JOINTED AND FRACTURED, MED. GRAIN, JTS. PLANAR TO IRREG., SMOOTH TO ROUGH, MOD. FEOx STN. ON JOINTS, CLOSE FOLIATION @ 45°, MOST JTS. AT LOW ANGLE (LOST ALL WATER @ START)
		C	2	83/43		5-7 MIN/FT.	GNEISSIC GRANITE, SIMILAR TO ABOVE, FEOx STAIN ON MOST JOINTS, TOP 1 FT FRACTURED ROCK, JTS @ 45° TO 70° (NO WATER RETURN)
		C	3	90/75		7 MIN/FT	SIMILAR TO ABOVE, BECOMES MORE COMPETENT, WIDELY JOINTED, FEOx STAIN ON JTS, TOP FEW INCHES IS GRAVEL (ROCK FRAGS. FALLING IN).
							END OF BORING @ 99 FT.

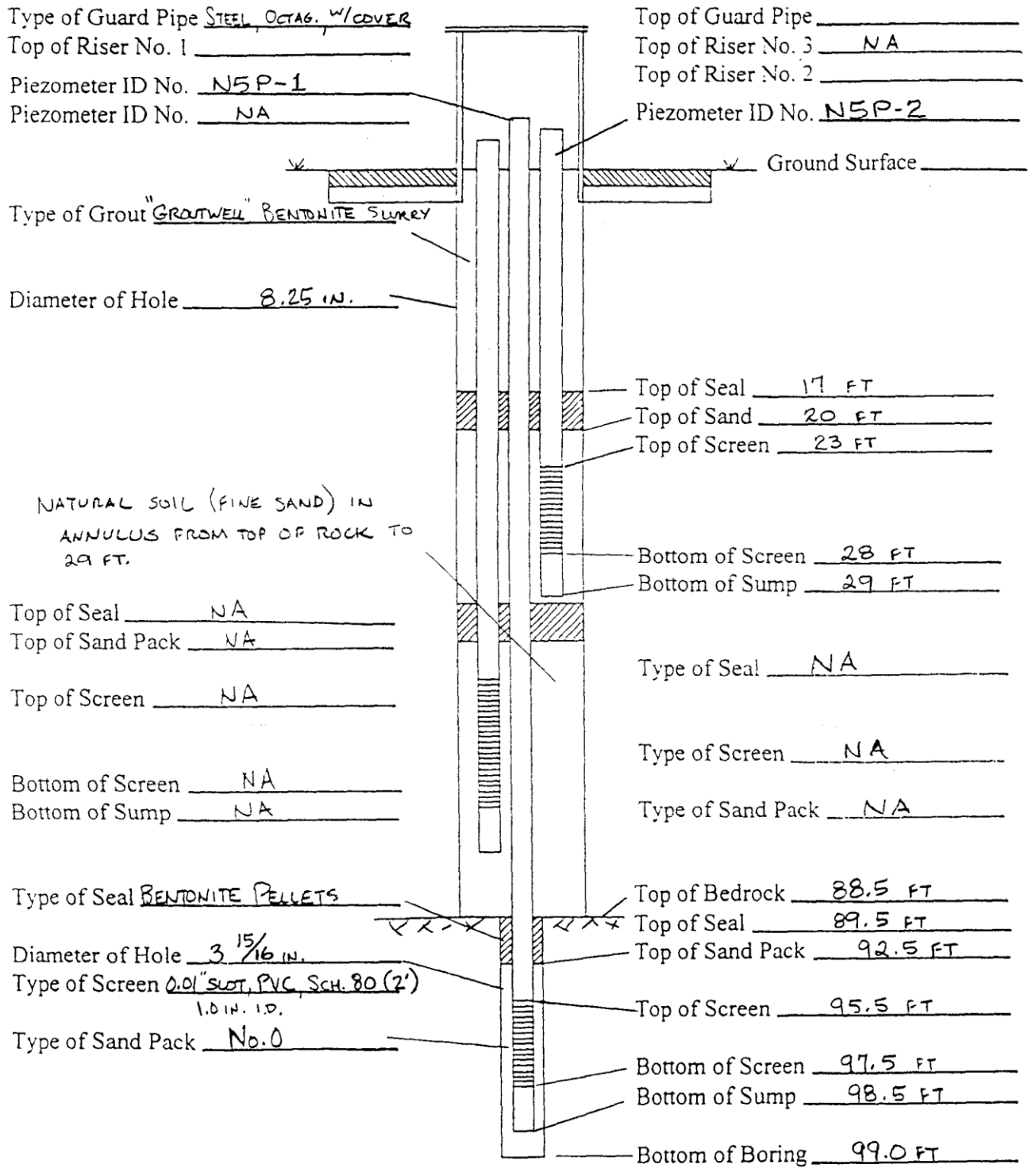
Note: See Sheet 1 for Boring Summary and Legend Information | Approved | Date

FIGURE 4-2 cont.
BORING LOG

PIEZOMETER CONSTRUCTION DIAGRAM

Project SHEPLEY'S HILL LANDFILL Boring No. N-5 Piezometer ID Nos. N5P-1, N5P-2

Contract No. DACW33-94-D-0007 Drilling Contractor/Driller REDWING/VERNON Inspector R. GILLESPIE



Sovereign Consulting Inc.
905B South Main Street
Mansfield, Massachusetts

Boring/Well ID: **SHM-10-05A**

Sheet 1 of 4

Client:	USACE	Drilling Co.:	Geosearch
Project:	SHL - Fort Devens	Drill Rig:	Geoprobe 6610DT
Project Number:	AC001	Drill Method:	Direct Push
Location:	Fort Devens Ayer, MA	Foreman:	Rodney Kaddy
		SCI Inspector:	Carolyn Hardt
		Start Date:	7/2/2010
		Completion Date:	7/2/2010

Casing		Sampler
Type:	Steel	Geoprobe Spoon
Size:	3.25"	60"
Hammer		Fall
NA lbs		NA"

Casing Elevation: 234.92 - NGVD 29'
Surface Elevation: NA
Wellhead Type: Flush Mount

Depth	Sample Information: Sample ID	Pen./Rec. (in.)	Interval (Ft.)	Blow/6"	Field As Testing	Sample Type	Water Detected	Sample Description	Stratum Change (ft.)	Notes	Test Boring/ Monitoring Well Construction
2								Asphalt Pavement (3-inches)	ASPHALT		Cement 0-2'
4								Location pre-cleared of utilities by vacuum truck to 8' bgs			
6											
8											
10	S-1	24/22	8-10	NA	NA			Dark brown, moist, FINE SAND, trace medium and coarse sand. (well sorted)	SAND		
12	S-2	60/48	10-15	NA	NA			Brown, moist, FINE SAND, trace medium sand			1.5" Schedule 40 PVC Riser 0-50'
14											
16	S-3	60/60	15-20	NA	NA			Brown, moist, FINE SAND, trace medium sand	SAND		
18											
20											
22	S-4	60/51	20-25	NA	NA			Light brown, moist, FINE SAND, some medium sand, trace gravel. (increasing percentages of medium sand with depth)	SAND		Grout 2'-45'
24											

Notes:
1) Direct Push groundwater profile sampling conducted on 6/9/10.
2) Groundwater profile sampler refusal @ 110'. As = <5 ug/L @ 109'.
3)
4)
5)
6)

Key:
- Cement
- Drill Cuttings/Native Soils
- Bentonite/Grout
- Sand
- Screen
- Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field As testing values represent arsenic concentrations in ug/L collected using Industrial Test Systems Arsenic Quick Test Kits. Additionally, samples were collected at the same depth interval and submitted to a laboratory for testing. Please see tables for laboratory data.
3) Sample is designated as either "C" for composite or "G" for a discrete grab sample.

▼ Approximate water table NA Not Applicable NR No Recovery bgs below ground surface ags above ground surface

Sovereign Consulting Inc.
905B South Main Street
Mansfield, Massachusetts

Boring/Well ID: **SHM-10-05A**

Sheet 2 of 4

Client:	USACE	Drilling Co.:	Geoscarch
Project:	SHL - Fort Devens	Drill Rig:	Geoprobe 6610DT
Project Number:	AC001	Drill Method:	Direct Push
Location:	Fort Devens Ayer, MA	Foreman:	Rodney Kaddy
		SCI Inspector:	Carolyn Hardt
		Start Date:	7/2/2010
		Completion Date:	7/2/2010

Casing		Sampler
Type:	Steel	Geoprobe Spoon
Size:	3.25"	60"
Hammer		Fall
	NA lbs	NA"

Casing Elevation: 234.92 - NGVD 29'
Surface Elevation: NA
Wellhead Type: Flush Mount

Depth	Sample ID	Pen./Rec. (in.)	Interval (ft.)	Blow/6"	Field As Testing	Sample Type	Water Detected	Sample Description	Stratum Change (ft.)	Notes	Test Boring/ Monitoring Well Construction
26	S-5	60/56	25-30	NA	NA		▼	Light brown to dark brown, moist to wet, FINE TO MEDIUM SAND, trace coarse sand and gravel.			
28											
					<5			As Field Testing Results		1	
30									SAND		
	S-6	60/60	30-35	NA	NA			Dark brown to light brown, wet, FINE TO MEDIUM SAND, trace coarse sand and gravel.			
32											
34											
36		60/0	35-40	NA	NA			NO RECOVERY			
38											1.5" Schedule 40 PVC Riser 0-50'
					<5			As Field Testing Results		1	
40									SAND		
	S-7	60/23	40-45	NA	NA			Light brown, saturated, FINE SAND.			
42											
44											Grout 2'-45'
46	S-8	60/24	45-50	NA	NA			Light brown, saturated, FINE SAND.			Bentonite 45'-47'
48									SAND		
50					<5			As Field Testing Results		1	#2 Morie Sand 47'-60'

Notes:
1) Direct Push groundwater profile sampling conducted on 6/9/10.
2) Groundwater profile sampler refusal @ 110'. As = <5 ug/L @ 109'.
3)
4)
5)
6)

Key:
- Cement
- Drill Cuttings/Native Soils
- Bentonite/Grout
- Sand
- Screen
- Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field As testing values represent arsenic concentrations in ug/L collected using Industrial Test Systems Arsenic Quick Test Kits. Additionally, samples were collected at the same depth interval and submitted to a laboratory for testing. Please see tables for laboratory data.
3) Sample is designated as either "C" for composite or "G" for a discrete grab sample.
▼– Approximate water table NA–Not Applicable NR–No Recovery bgs–below ground surface ags–above ground surface

Sovereign Consulting Inc. **905B South Main Street** **Mansfield, Massachusetts**	Boring/Well ID: **SHM-10-05A**	Sheet 3 of 4

Client:	USACE	Drilling Co.:	Geosearch	Casing	Sampler
Project:	SHL - Fort Devens	Drill Rig:	Geoprobe 6610DT	Type: Steel	Geoprobe Spoon
Project Number:	AC001	Drill Method:	Direct Push	Size: 3.25"	60"
Location:	Fort Devens Ayer, MA	Foreman:	Rodney Kaddy	Hammer	Fall
		SCI Inspector:	Carolyn Hardt	NA lbs	NA"
		Start Date:	7/2/2010	Casing Elevation:	234.92 - NGVD 29'
		Completion Date:	7/2/2010	Surface Elevation:	NA
				Wellhead Type:	Flush Mount

Depth	Sample Information: Sample ID	Pen./Rec. (in.)	Interval (Ft.)	Blow/6"	Field As Testing	Sample Type	Water Detected	Sample Description	Stratum Change (ft.)	Notes	Test Boring/ Monitoring Well Construction
52	S-9	60/30	50-55	NA	NA			Light brown, saturated, FINE SAND.			#2 Morie Sand 47'-60'
54											
56	S-10	60/13	55-60	NA	NA			Light brown, saturated, FINE SAND.	SAND		
58											1.5" Schedule 40 PVC Well screen - 0.01" slot 50'-60'
60					<5			As Field Testing Results		1	
62	S-11	60/50	60-65	NA	NA			Light brown, saturated, FINE SAND.			CASING REFUSAL @ 60'
64											
66	S-13	60/30	65-70	NA	NA			Light brown, saturated, FINE SAND.	SAND		
68											
70					<5			As Field Testing Results		1	
72								SAMPLER REFUSAL @ 70'			
74											

Notes:
1) Direct Push groundwater profile sampling conducted on 6/9/10.
2) Groundwater profile sampler refusal @ 110'. As = <5 ug/L @ 109'.
3)
4)
5)
6)

Key:
- Cement
- Drill Cuttings/Native Soils
- Bentonite/Grout
- Sand
- Screen
- Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field As testing values represent arsenic concentrations in ug/L collected using Industrial Test Systems Arsenic Quick Test Kits. Additionally, samples were collected at the same depth interval and submitted to a laboratory for testing. Please see tables for laboratory data.
3) Sample is designated as either "C" for composite or "G" for a discrete grab sample.

▼ Approximate water table NA Not Applicable NR No Recovery bgs below ground surface ags above ground surface

Sovereign Consulting Inc.
905B South Main Street
Mansfield, Massachusetts

Boring/Well ID: **SHM-10-05A**

Sheet 4 of 4

Client:	USACE	Drilling Co.:	Geoscarch
Project:	SHL - Fort Devens	Drill Rig:	Geoprobe 6610DT
Project Number:	AC001	Drill Method:	Direct Push
Location:	Fort Devens Ayer, MA	Foreman:	Rodney Kaddy
		SCI Inspector:	Carolyn Hardt
		Start Date:	7/2/2010
		Completion Date:	7/2/2010

Casing		Sampler
Type:	Steel	Geoprobe Spoon
Size:	3.25"	60"
Hammer		Fall
NA lbs		NA"

Casing Elevation: 234.92 - NGVD 29'
Surface Elevation: NA
Wellhead Type: Flush Mount

Depth	Sample Information: Sample ID	Pen./Rec. (in.)	Interval (Ft.)	Blow/6"	Field As Testing	Sample Type	Water Detected	Sample Description	Stratum Change (ft.)	Notes	Test Boring/ Monitoring Well Construction
76											
78											
80					<5					1	
82											
84											
86											
88											
90					<5					1	
92											
94											
96											
98											
100					<5					1 2	

Notes:
1) Direct Push groundwater profile sampling conducted on 6/9/10.
2) Groundwater profile sampler refusal @ 110'. As <5 ug/L @ 109'.
3)
4)
5)
6)

Key:
- Cement
- Drill Cuttings/Native Soils
- Bentonite/Grout
- Sand
- Screen
- Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field As testing values represent arsenic concentrations in ug/L collected using Industrial Test Systems Arsenic Quick Test Kits. Additionally, samples were collected at the same depth interval and submitted to a laboratory for testing. Please see tables for laboratory data.
3) Sample is designated as either "C" for composite or "G" for a discrete grab sample.
▼= Approximate water table NA=Not Applicable NR=No Recovery bgs=below ground surface ags=above ground surface

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Boring/Well ID
SHM-13-03
Sheet 1 of 3

Client:	US ACE
Project:	Fort Devens - SHL
Project Number:	AC001
Location:	Former Fort Devens Shepley Hill Landfill
Drilling Co.:	Glacier Drilling
Drill Rig:	Geoprobe 8140 LS
Drill Method:	Roto-sonic
Foreman:	Mark Schock
SCI Inspector:	PJV & JAG
Start Date:	4/22/2013
Completion Date:	4/24/2013

Drilling Method Details

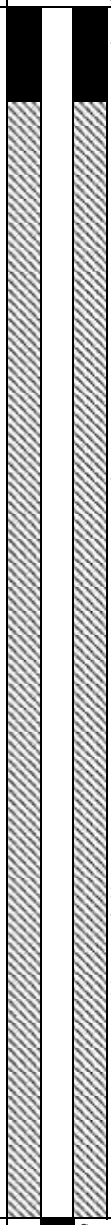
	Bit	Casing	Soil Sampler	Rock Core
Type:	Sonic	Steel	Sonic	Sonic
Size:	6"	6"	4'	4"
SPT:	Hammer-	NA	Fall - NA	

Monitoring Well Details

Well Type:	Overburden	Diameter:	2"
Well Head:	Standpipe	Casing:	PVC
Latitude:		Surface Elev:	
Longitude:		Casing Elev:	

Depth	Sample ID	Pen./Rec. (in.)	Interval (Ft.)	SPT - Blow/6"	Rock coring time min/sec/1'	Field Testing PID (ppmv)	Water Table	Sample Description	Stratum Change (ft.)	Notes
	S-1	96/52	0-8	NA	NA	NA		0-8" - Topsoil and organic materials	TOP SOIL	1
2								8" - 40" - Very dark grayish brown (2.5Y 3/2), wet, coarse SAND, some angular fine gravel, little medium sand, trace angular coarse gravel to cobbles		
4								40" - 52" - Olive brown (2.5Y 4/3) wet, coarse SAND, some sub-angular fine gravel, trace angular coarse gravel to cobbles		
6										
8									SAND & GRAVEL	
	S-2	144/47	8-20	NA	NA	NA	▼	Olive brown (2.5Y 4/4) wet, medium to coarse SAND, little sub-angular coarse gravel, little sub-rounded fine gravel, trace cobbles		
10								GP-13-03-010 – <1.0 ppb		2
12										
14										
16										
18									SAND & GRAVEL	
20								GP-13-03-020 = 1.7 ppb		2
	S-3	120/94	20-30	NA	NA	NA		Olive brown (2.5Y 4/3) wet, medium to coarse SAND, little sub-angular coarse gravel, little sub-rounded fine gravel, trace cobbles		
22								Light olive brown (2.5Y 5/4) wet, medium to coarse SAND		
24								Yellowish brown (10YR 5/6), wet, medium to coarse sand, little sub-rounded fine gravel, trace sub-rounded coarse gravel		

Test Boring/ Monitoring Well Construction



Notes:
1) Recovery values are skewed due to the soil sample collection bag technique used with roto-sonic drilling
2) GW profile sampling location for dissolved As
3) RQD % maybe skewed low due to sonic method making distinction between natural and mechanical breaks difficult resulting in low sum of sticks (Σ) values
4) Bedrock hole grouted on 4/22/13. PVC well installed 4/24/13.
5)

Key: Bedrock, Steel Casing, Grout, Open bedrock; Cement, Drill Cuttings/Native Soils, Bentonite, Sand, Screen, Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field testing values represent total volatile organic vapors (referenced to an isobutylene standard) measured in the headspace of a sealed soil sample with a Ion Science photoionization detector with a 10.6 Ev lamp and set to a reference factor of 0.53 (benzene).
▼– Approximate water table NA–Not Applicable NR–No Recovery bgs–below ground surface ags–above ground surface

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Client:	US ACE
Project:	Fort Devens - SHL
Project Number:	AC001
Location:	Former Fort Devens Shepley Hill Landfill

Boring/Well ID
SHM-13-03
Sheet 2 of 3

Drilling Co.:	Glacier Drilling
Drill Rig:	Geoprobe 8140 LS
Drill Method:	Roto-sonic
Foreman:	Mark Schock
SCI Inspector:	PJV & JAG
Start Date:	4/22/2013
Completion Date:	4/24/2013

Drilling Method Details

	Bit	Casing	Soil Sampler	Rock Core
Type:	Sonic	Steel	Sonic	Sonic
Size:	6"	6"	4'	4"
SPT:	Hammer-	NA	Fall - NA	

Monitoring Well Details

Well Type:	Overburden	Diameter:	2"
Well Head:	Standpipe	Casing:	PVC
Latitude:		Surface Elev:	
Longitude:		Casing Elev:	

Depth	Sample Information: Sample ID	Pen./Rec. (in.)	Interval (Ft.)	SPT - Blow/6"	Rock coring time min/sec/1'	Field Testing PID (ppmv)	Water Table	Sample Description	Stratum Change (ft.)	Notes	Test Boring/ Monitoring Well Construction
26											
28											2" Schedule 40 PVC Riser 0' - 42' (– 2.5' Stick up)
30								GP-13-03-030 = 17.6 ppb	SAND & GRAVEL	2	Drilling Cuttings 2' - 37'
	S-4	120/102	30-40	NA	NA	NA		Reddish brown (2.5YR 4/3) wet, fine to medium SAND, trace coarse sand, trace sub-rounded fine gravel			
32											
34								Bottom 8" - Dark yellowish brown (10YR 4/4), wet, coarse SAND, some medium sand, little sub-rounded fine gravel, little sub-rounded coarse gravel, trace sub-rounded cobbles			
36											2" Schedule 40 PVC Riser 0' - 42' (2.5' Stick up)
38											
40								GP-13-03-040 22.6 ppb	SAND & GRAVEL	2	Bentonite 37' - 40'
	S-5	120/77	40-50	NA	NA	NA					
42								0-10" - Olive brown (2.5Y 4/3), wet, fine SAND			
44								10"-60" - Dark gray (2.5Y 4/1), wet, coarse SAND, trace sub-angular fine gravel			#2 Morie Sand 40' - 53'
46								60"-77" - Grayish brown (2.5Y 5/2), wet, medium to coarse SAND, some sub-angular fine gravel, little sub-rounded coarse gravel, trace sub-rounded cobbles			2" Schedule 40 PVC Wellscreen - 0.01" slot 42' - 52'
48									SAND & GRAVEL		
								GP-13-03-050 357 ppb		2	

Notes:
1) Recovery values are skewed due to the soil sample collection bag technique used with roto-sonic drilling
2) GW profile sampling location for dissolved As
3) RQD % maybe skewed low due to sonic method making distinction between natural and mechanical breaks difficult resulting in low sum of sticks (Σ) values
4) Bedrock hole grouted on 4/22/13. PVC well installed 4/24/13.
5)

Key: Bedrock, Steel Casing, Grout, Open bedrock; Cement, Drill Cuttings/Native Soils, Bentonite, Sand, Screen, Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field testing values represent total volatile organic vapors (referenced to an isobutylene standard) measured in the headspace of a sealed soil sample with a Ion Science photoionization detector with a 10.6 Ev lamp and set to a reference factor of 0.53 (benzene).
▼ Approximate water table NA Not Applicable NR No Recovery bgs below ground surface ags above ground surface

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Boring/Well ID
SHM-13-03
Sheet 3 of 3

Client:	US ACE
Project:	Fort Devens - SHL
Project Number:	AC001
Location:	Former Fort Devens Shepley Hill Landfill
Drilling Co.:	Glacier Drilling
Drill Rig:	Geoprobe 8140 LS
Drill Method:	Roto-sonic
Foreman:	Mark Schock
SCI Inspector:	PJV & JAG
Start Date:	4/22/2013
Completion Date:	4/24/2013

Drilling Method Details

	Bit	Casing	Soil Sampler	Rock Core
Type:	Sonic	Steel	Sonic	Sonic
Size:	6"	6"	4'	4"
SPT:	Hammer-	NA	Fall -	NA

Monitoring Well Details

Well Type:	Overburden	Diameter:	2"
Well Head:	Standpipe	Casing:	PVC
Latitude:		Surface Elev:	
Longitude:		Casing Elev:	

Depth	Sample ID	Pen./Rec. (in.)	Interval (Ft.)	SPT - Blow/6"	Rock coring time min/sec/1'	Field Testing PID (ppmv)	Water Table	Sample Description	Stratum Change (ft.)	Notes	Test Boring/ Monitoring Well Construction
52	S-6	36/36	50-53	NA	NA	NA		Gray (2.5Y 5/1), saturated, fine to medium SAND, some coarse sand, some silt, little sub-angular fine gravel, trace sub-angular coarse gravel. Rock frags and pucks (TILL)	TILL		2" Schedule 40 PVC Wellscreen - 0.01" slot 42' - 52'
											#2 Morie Sand 52' - 53'
54	R-1	60/57	53-58	NA	NA	NA		Bedrock @ 53' Sonic core 53' - 58' Σ of sticks 21" RQD = 35%	BEDROCK	3 4	
56								Igneous rock, coarse grained granodiorite, dark gray (NO3) matrix with white (N9) to very light gray (N8) grains, (Ayer Granodiorite)			Grout 53' - 58'
58								BORING END @ 58'			
60											
62											
64											
66											
68											
70											
72											
74											

Notes:
1) Recovery values are skewed due to the soil sample collection bag technique used with roto-sonic drilling
2) GW profile sampling location for dissolved As
3) RQD % maybe skewed low due to sonic method making distinction between natural and mechanical breaks difficult resulting in low sum of sticks (Σ) values
4) Bedrock hole grouted on 4/22/13. PVC well installed 4/24/13.
5)

Key:
Bedrock
Steel Casing
Grout
Open bedrock
Cement
Drill Cuttings/Native Soils
Bentonite
Sand
Screen
Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field testing values represent total volatile organic vapors (referenced to an isobutylene standard) measured in the headspace of a sealed soil sample with a Ion Science photoionization detector with a 10.6 Ev lamp and set to a reference factor of 0.53 (benzene).

▼ Approximate water table NA Not Applicable NR No Recovery bgs below ground surface ags above ground surface

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Boring/Well ID
SHM-13-04
Sheet 1 of 2

Client:	US ACE
Project:	Fort Devens - SHL
Project Number:	AC001
Location:	Former Fort Devens Shepley Hill Landfill
Drilling Co.:	Glacier Drilling
Drill Rig:	Geoprobe 8140 LS
Drill Method:	Roto-sonic
Foreman:	Mark Schock
SCI Inspector:	PJV & JAG
Start Date:	4/15/2013
Completion Date:	4/16/2013

Drilling Method Details

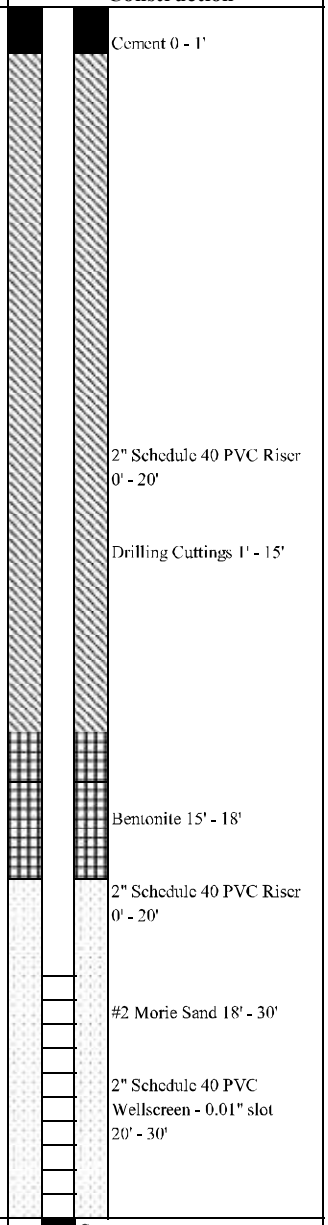
	Bit	Casing	Soil Sampler	Rock Core
Type:	Sonic	Steel	Sonic	Sonic
Size:	6"	6"	4'	4"
SPT:	Hammer-	NA	Fall - NA	

Monitoring Well Details

Well Type:	Overburden	Diameter:	2"
Well Head:	Flush Mount	Casing:	PVC
Latitude:		Surface Elev:	
Longitude:		Casing Elev:	

Depth	Sample ID	Pen./Rec. (in.)	Interval (Ft.)	SPT - Blow/6"	Rock coring time min/sec/1'	Field Testing PID (ppmv)	Water Table	Sample Description	Stratum Change (ft.)	Notes
0	S-1	60/6	0-5	NA	NA	NA		Asphalt and concrete sidewalk base materials	ASPHALT BASE	1
2								Very dark grayish brown (2.5Y 3/2), dry, fine to medium SAND, some coarse sand, some sub-angular fine gravel, little sub-angular coarse gravel, trace silt trace cobbles		
4										
6	S-2	60/27	5-10	NA	NA	NA		Yellowish brown (10YR 5/4), damp, medium to coarse SAND, some sub-rounded fine gravel, trace sub-rounded coarse gravel	SAND & GRAVEL	
8										
10										
12								Bit sunk 10' - 12'		
14	S-3	96/48	12-20	NA	NA	NA		0-24" - Pale brown (10YR 6/3), damp, fine SAND 24"-48" - Very dark grayish brown (10YR 3/2), damp, fine to medium SAND, some coarse sand, some sun-rounded fine gravel, little sub-rounded coarse gravel, trace silt		
16									SAND & GRAVEL	
18							▼			
20										
22	S-4	120/91	20-30	NA	NA	NA		0-30" - Dark grayish brown (2.5Y 4/2), wet, fine to medium SAND, some coarse sand, some sub-rounded fine gravel, little sub-rounded coarse gravel, trace silt		
24								30"-50" - Light olive brown (2.5Y 5/3), wet, fine to medium SAND	SAND	
								GP-13-04-025 = 3,510 ppb		2

Test Boring/ Monitoring Well Construction



Notes:
1) Recovery values are skewed due to the soil sample collection bag technique used with roto-sonic drilling
2) GW profile sampling location for dissolved As
3) RQD % maybe skewed low due to sonic method making distinction between natural and mechanical breaks difficult resulting in low sum of sticks (Σ) values
4) Bedrock hole grouted on 4/16/13. PVC well installed 4/16/13.
5)

Key: Bedrock, Steel Casing, Grout, Open bedrock; Cement, Drill Cuttings/Native Soils, Bentonite, Sand, Screen, Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field testing values represent total volatile organic vapors (referenced to an isobutylene standard) measured in the headspace of a sealed soil sample with a Ion Science photoionization detector with a 10.6 Ev lamp and set to a reference factor of 0.53 (benzene).
▼= Approximate water table NA=Not Applicable NR=No Recovery bgs=below ground surface ags=above ground surface

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Boring/Well ID
SHM-13-04
Sheet 2 of 2

Client:	US ACE
Project:	Fort Devens - SHL
Project Number:	AC001
Location:	Former Fort Devens Shepley Hill Landfill
Drilling Co.:	Glacier Drilling
Drill Rig:	Geoprobe 8140 LS
Drill Method:	Roto-sonic
Foreman:	Mark Schock
SCI Inspector:	PJV & JAG
Start Date:	4/15/2013
Completion Date:	4/16/2013

Drilling Method Details

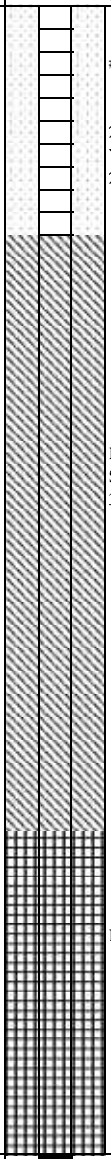
	Bit	Casing	Soil Sampler	Rock Core
Type:	Sonic	Steel	Sonic	Sonic
Size:	6"	6"	4'	4"
SPT:	Hammer-	NA	Fall - NA	

Monitoring Well Details

Well Type:	Overburden	Diameter:	2"
Well Head:	Flush Mount	Casing:	PVC
Latitude:		Surface Elev:	
Longitude:		Casing Elev:	

Depth	Sample ID	Pen./Rec. (in.)	Interval (Ft.)	SPT - Blow/6"	Rock coring time min/sec/1'	Field Testing PID (ppmv)	Water Table	Sample Description	Stratum Change (ft.)	Notes
26								50'-91" - Olive gray (5Y 4/2), wet, fine to medium SAND		
28										
30									SAND	
	S-5	120/72	30-40	NA	NA	NA				
32								0-48" - Olive brown (2.5Y 4/3), wet, fine to medium SAND, some coarse sand, trace sub-rounded fine gravel		
34										
36								GP-13-04-035 = 21.1 ppb		2
38								48"-72" - Olive gray (5Y 4/2), wet, fine to medium SAND		
40									SAND	
	S-6	60/58	40-45	NA	NA	NA		0-30" - Light olive brown (2.5Y 5/4), wet, fine to medium SAND		
42								30"-38" - Light olive brown (2.5Y 5/3), wet, fine SAND and SILT		
44								38"-58" - Gray (2.5Y 5/1), damp, fine to medium SAND, some coarse sand, some silt, little sub-angular fine gravel, trace sub-angular coarse gravel. Rock frags and pucks (TILL)	TILL	
								GP-13-04-045 3.0 ppb		2
	R-1	60/57	45-50	NA	NA	NA				
46								Bedrock @ 45' Sonic core 45' - 50'		
								Σ of sticks = 19"		3
								RQD = 32%	BEDROCK	4
48								Igneous rock, coarse grained granodiorite, dark gray (NO3) matrix with white (N9) to very light gray (N8) grains, (Ayer Granodiorite)		

Test Boring/ Monitoring Well Construction



Notes:
1) Recovery values are skewed due to the soil sample collection bag technique used with roto-sonic drilling
2) GW profile sampling location for dissolved As
3) RQD % maybe skewed low due to sonic method making distinction between natural and mechanical breaks difficult resulting in low sum of sticks (Σ) values
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5)

Key:
Bedrock
Steel Casing
Grout
Open bedrock
Cement
Drill Cuttings/Native Soils
Bentonite
Sand
Screen
Riser

Remarks:
1) Stratification lines represent approximate boundaries between soil types and the transition may be gradual. Water level readings were completed at times and under conditions stated. Fluctuations of groundwater may occur due to factors other than those present at the time measurements were made.
2) Field testing values represent total volatile organic vapors (referenced to an isobutylene standard) measured in the headspace of a sealed soil sample with a Ion Science photoionization detector with a 10.6 Ev lamp and set to a reference factor of 0.53 (benzene).
▼ Approximate water table NA Not Applicable NR No Recovery bgs below ground surface ags above ground surface

SOIL BORING LOG					Study Area: Shepley's Hill Landfill	
Client: AEC		Project No. 7005-04			Boring No.: SHM-93-24A	
Contractor: New Hampshire Boring		Date Started: 01/20/93			Completed: 01/20/93	Method: HSA
Ground Elev.: 235.5		Soil Drilled: 24 ft.			Total Depth: 24 ft.	Casing Size: 6.25 ID
Logged by: RRR		Checked by: DSP			Groundwater Below Ground: 15.5 ft.	
Screen: 10 (ft)	Riser: 16 (ft)	Diam.: 4.0"' (ID)	Material: Sch 40PVC	Protection: Mod.D	Page 1 of 2	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH (FT)	REC. / PEN.	PID (ppm)	SOIL-ROCK DESCRIPTION	BLOWS\6-IN.	COMMENTS
1	S-1	0'-2'	1.2 / 2.0	BKG	0'-0.5' SAND, well graded, fine to medium , 20% coarse, 3.5 silt, angular, very loose, dry, dark brown, glacial outwash topsoil (SW) 0.5'-1.2' SAND, well graded,medium to coarse, 20% fine sand, subangular, dry, very loose, tannish brown (SW)	2-3-3-2	Start 11:30
5	S-2	5'-7'	1.4 / 2.0	BKG	SAND, well graded, medium to coarse, 20% fine sand, similar to above, coarse fraction increasing with depth to 35-40% (SW)	6-8-9-10	
11	S-3	10-12	1.5 / 2.0	BKG	SAND, poorly graded, medium, 15% sand, 15% coarse, subrounded, dry, loose, (PR), tan, brown (SP)	7-4-6-6	

SOIL BORING LOG					Study Area: Shepley's Hill Landfill	
Client: AEC		Project No. 7005-04			Boring No.: SHM-93-24A	
Contractor: New Hampshire Boring		Date Started: 01/20/93			Completed: 01/20/93	Method: HSA
Ground Elev.: 235.5		Soil Drilled: 24 ft.			Total Depth: 24 ft.	Casing Size: 6.25 ID
Logged by: RRR		Checked by: DSP			Groundwater Below Ground: 15.5 ft.	
Screen: 10 (ft)	Riser: 16 (ft)	Diam.: 4.0"' (ID)	Material: Sch 40PVC	Protection: Mod.D	Page 2 of 2	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	PEN. / REC.	PID (ppm)	SOIL-ROCK DESCRIPTION	BLOWS\6-IN.	COMMENTS
15							
16	S-4	15-17	1.5 / 2.0	BKG	SAND, similar to above except very loose and wet (SP)	4/4/6/7	Water at 15' TOC analytical collected
17							
18							
19							
20							
21	S-5	20-22	1.8 / 2.0	BKG	SAND, poorly graded, similar to above (SP)	0-2-3-6	
22							
23							
24					BOE = 1440 hours 1/20/93		
25							
26							
27							
28							

WELL INSTALLATION DIAGRAM

WELL NO.: SHM-93-24A

PROJECT NAME: FORT DEVENS 1A SITES

DATE INSTALLED: 1/20/93

PROJECT NO.: 7005-04

DRILLING METHOD: HSA

WATER ELEV.: 220.49

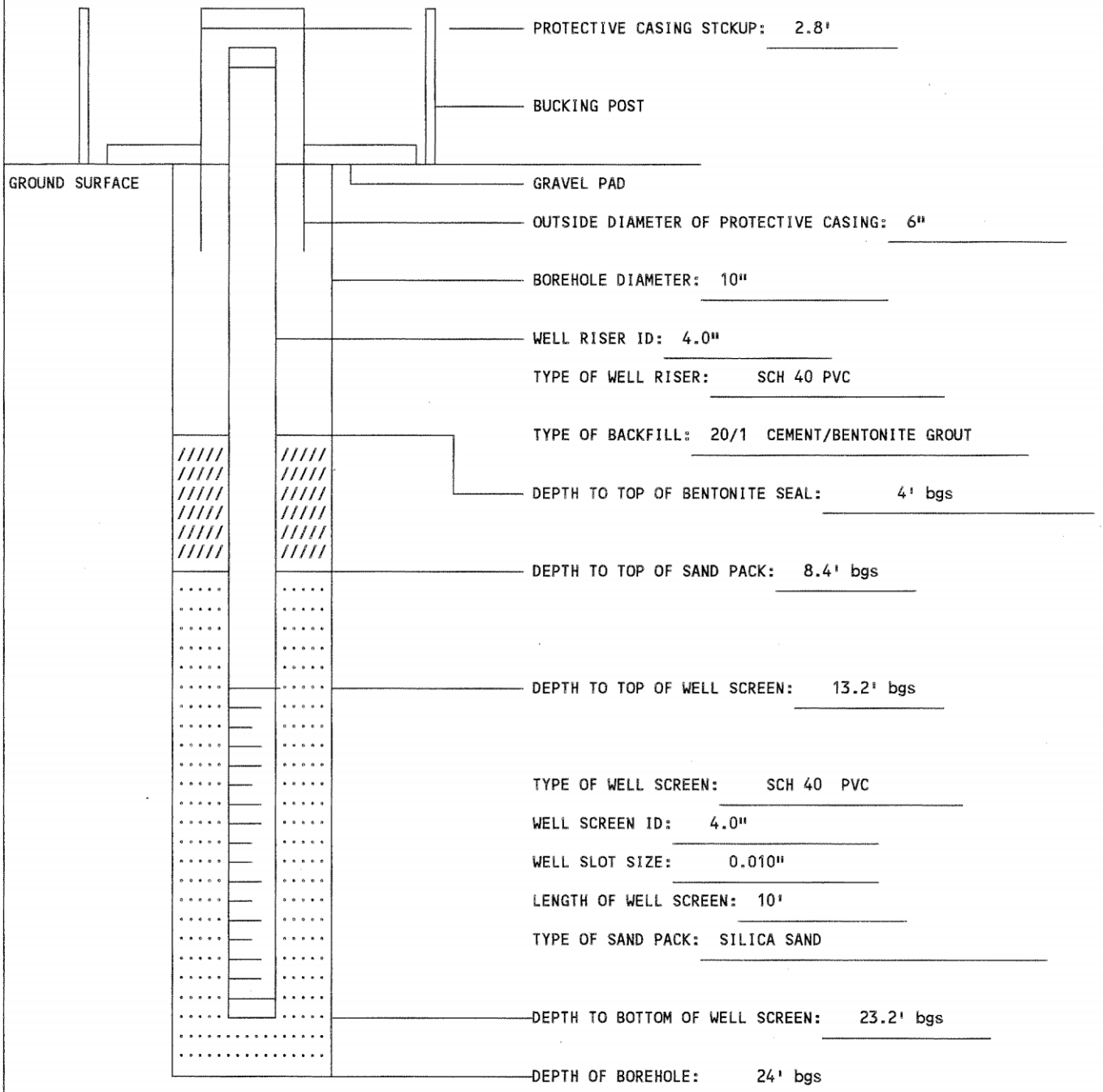
GROUND ELEVATION: 235.5'

CASING ID: 6.25"

DATE: June 21, 1993

WELL CASING ELEVATION: 237.53'

RIG GEOLOGIST: Rod Rustad



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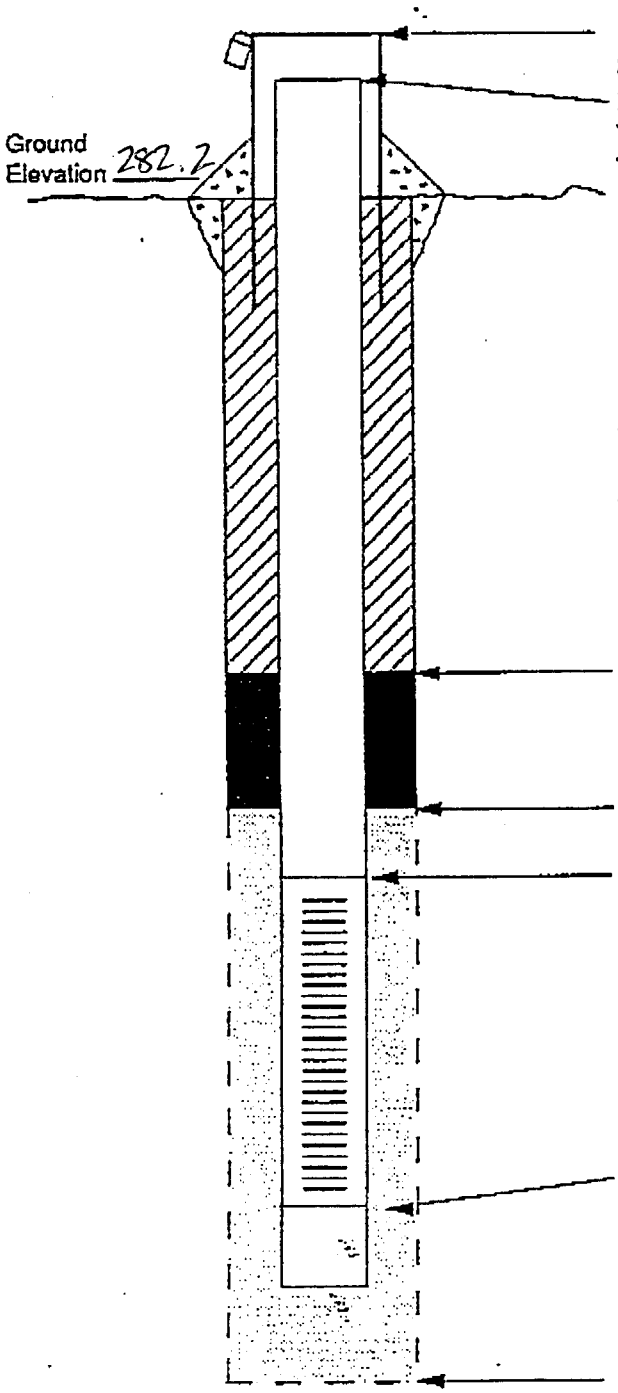
MONITORING WELL CONSTRUCTION DIAGRAM

Project: Fort Devens
Project No.: 7053-40
Study Area: AOC 43G
Boring No.: XGM-94-06X
Date Installed: 21 OCT 94
Driller: D.L. Maher
Drilling Method: HSA
Development Method: HSA + 6" CASING
Field Geologist: D. Lovejoy



Elevation of Top of Surface Casing: 285.1
Stick-up of Casing Above Ground Surface: 3'
Elevation of Top of Riser Pipe: 284.8
Type of Surface Seal: Cement grout
Type of Surface Casing:

Ground Elevation: 282.2

ID of Surface Casing: 6"

Diameter of Borehole: 6"

Riser Pipe ID: 4"
Type of Riser Pipe: SCH 40 PVC

Type of Backfill: Cement grout
30:1
TYPE II - BENTONITE

Elevation of Top of Seal: 275.2
Depth of Top of Seal: 7' bgs
Type of Seal: Bentonite pellets

Elevation of Top of Sand: 270.2
Depth of Top of Sand: 12' bgs
Elevation of Top of Screen: 265.2
Depth of Top of Screen: 17' bgs

Type of Screen: SCH 40 PVC
Slot Size x Length: 0.01" x 10'
ID of Screen: 4 inch

Type of Sandpack: #00N Filter sand

Elevation of Bottom of Screen: 255.2
Depth of Bottom of Screen: 27' bgs
Depth of Sediment Sump with Plug: ~~25.7~~ 27' BGS (RR)

Elevation of Bottom of Borehole: 254.7
Depth of Bottom of Borehole: 27.5

ABB Environmental Services, Inc.

92051330 (e)

SOIL BORING LOG

Client: USATHAMA	Project No. 07053.14	Study Area: AOC 43 J
		Boring No.: XJM-94-07X
Contractor: D.I. MAHER	Date Started: 10.24.94	Protection: MODIFIED D
		Completed: 10.25.94
Method: HSA	Casing Size: 4 1/4" I.D. ~~7"~~ O.D.	PI Meter: TE 580B
Ground Elev.:	Soil Drilled: 9 ft.	Total Depth: 16.4 ft.
Logged by: RKR	Checked by: RKR	▽ Below Ground: 6.5'
Screen: 10 (ft.)	Riser: 6.5 (ft.) Diam: 4" (ID) Material: Sch. 40 PVC	Page | of:

ALL DEPTHS BGS
SOIL REFERENCE SAMPLE COLLECTED FROM EACH SPOON (UNLESS NOTED)

DEPTH (FT)	SAMPLE NUMBER	SAMPLE DEPTH	CLP/SCREENING	RECOVERY	PID (ppm)	SOIL/ROCK DESCRIPTION	SOIL CLASS	BLOWS/6-IN.	WELL DATA (4")	LITHOLOGY	ELEVATION (FT.)
0	S1	0'-2'		1.4/2.0	0.0	0-0.5 - SILTY ORGANIC SAND, WELL GRADED, FINE TO MEDIUM 10% FINES DRY LOOSE, DARK BROWN (SM-SP)	SM SP	8 10 15 25			AMBIENT P.I.D 0.0
2						0.5'-1.4' - SILTY SAND, WELL GRADED, FINE, 10-20% SILT ROUNDED COBBLES >25 mm, DRY MEDIUM DENSE LIGHT BROWN.	SM				
4											
6	S2	5'-7'		1.3/2.0	0.0	5-5.5' - SILTY SAND SIMILAR TO ABOVE (0.5-1.4') 5.5-6.3' - SAND, WELL GRADED FINE TO MEDIUM, 10% COARSE, 5% GRAVEL, <5% FINES, MOIST MEDIUM DENSE, MEDIUM BROWN. GRAVEL SEAM AT 5.8' BGS, 10 mm ROUNDED GRAVEL	SM	8 11 22 35			0.0
8						ENCOUNTER ROCK AT 9' BGS PREPARE TO CORE. REFER TO ROCK CORING LOGS					
10							(PAR)				
12											
14											
16						BOE = 16.4 FT BGS					
18											

PROPORTIONS	(-) AMOUNT (+)	ABBREVIATIONS		
Trace (tr)	0-10%	f = fine	gr = gray	MS = Split Spoon
Little (ll)	10-20%	m = medium	bn = brown	BW = Screened Auger
Some (so)	20-35%	c = coarse	blk = black	HP = Hydropunch
and	35-50%			

ABB Environmental Services, Inc.

Stone & Webster Engineering Corporation	BORING LOG	Boring ~~I.D.~~ XJM-97-11X Sheet 1 of 2

Site: AOC 43J
Client: NED
Coordinates:
Groundwater Depth: ~7' bgs
Contractor: Earth Exploration Services
Depth to Bedrock: 21.5'
Driller: T. Marshnelli
Logged by: SJM
Date Start - Finish: 2/20/97 - 1/1
Ground Elevation: ft
Total Depth Drilled: ft
Rig Type: Truck-mounted

Methods:
Drilling Soil: 3 7/8" tri-cone roller bit
Sampling Soil: N/A
Drilling Rock: NQ core barrel
Casing Used: 4" diam. to 21'
3" diam to 21.5'

Comments: skatch weathering

Drilling rate (min/ft)

Elev (ft)	Depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N	USC Symbol	Sample Description
	0						Refer to XJM-94-10X soil boring log (adjacent well) for soil description of overburden
	21.5						
0	22.5	Run #1		Total 4" core = 4.42'			Slightly wthd. phyllite of the Oakdale Fm. Calcite stringers. Bedding planes faint Lt. gray. Chemical weathering along fractures
1:50 ~~2:50~~ (5m)	23.5						
2:01	24.5			RQD= 4.42'/5.0' (good)			
2:05	25.5						
2:10	26.5						

Legend/Notes

- Datum is
- · Sample Type:
- ▽ indicates groundwater level.
- ▌ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- * indicates use of 300 pound hammer.

Approved	Date

FIGURE 4-2
BORING LOG

Stone & Webster Engineering Corporation	BORING LOG	Boring ~~I.D.~~ XJM-97-11X Sheet 2 of 2

Site: AOC 43J Sketch | Logged by: SJM

Drilling Rate (ft/min) (min/ft)

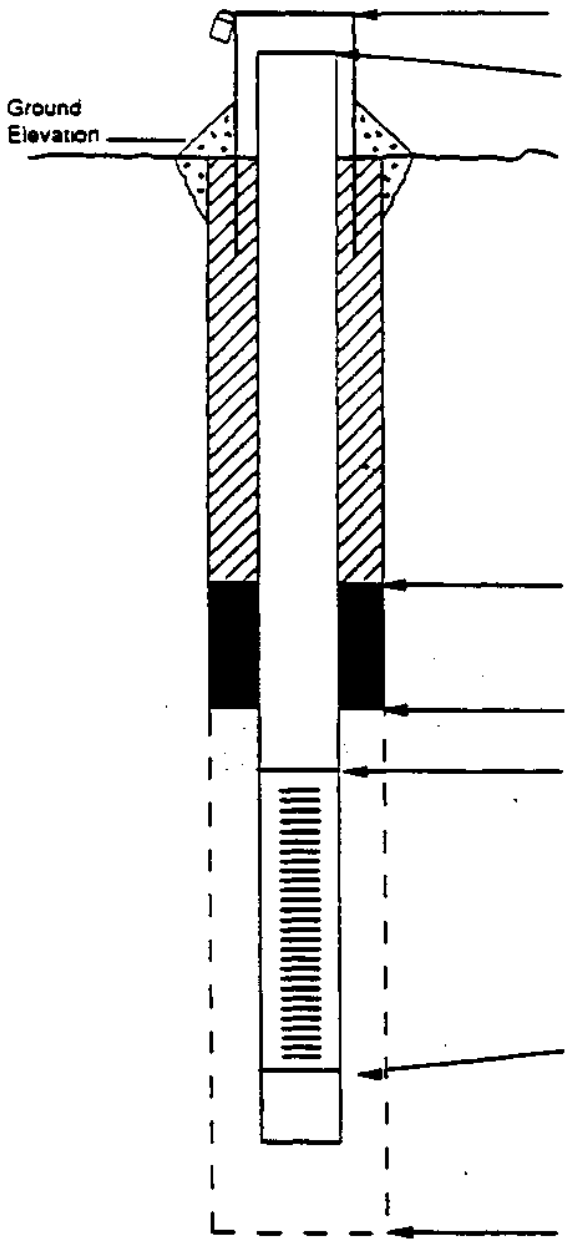
Elev (ft)	depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N / u / uc	USC Symbol	Sample Description
	26.5						
2:00	27.5		Run #2	Total 4" core = 1.55' RQD = 1.55'/5.0' (poor)			Phyllite, ~~as in~~ similar to Run #1 but more strongly weathered. Some fracture surfaces have a micaceous sheen. Calcite stringers. Rock is lt. brownish gray.
1:45	28.5						
2:15	29.5						
2:00	30.5						
1:40	31.5						
2:00	32.5		Run #3	Total 4" core = 4.41 RQD = 4.41/5.0' (good)			Phyllite — more competent (less chemical weathering). Lt. gray. Mechanical breaks show micaceous sheen. Kink banding. Some natural fractures are oxidized.
1:55	33.5						
2:00	34.5						
2:20	35.5						
2:15	36.5						

Note: See Sheet 1 for Boring Summary and Legend Information | Approved | Date

FIGURE 4-2 cont.
BORING LOG

MONITORING WELL CONSTRUCTION DIAGRAM

Project I.R.A. Study Area AOC 43J Driller EARTH EXPLORATION SERVICES
Project No. 9221-02 Boring No. XTM-97-11X Drilling Method Drive & Wash/NQ core barrel
Date Installed 2/26/97 Development Method submersible pump
Field Geologist Sarah Montgomery



Elevation of Top of Surface Casing: _____
Stick-up of Casing Above Ground Surface: 2.72'
Elevation of Top of Riser Pipe: _____
Type of Surface Seal: _____
Type of Surface Casing: steel (4½" OD)

TOC - BOC = 0.10 feet

ID of Surface Casing: 0.36'

Diameter of Borehole: 3⅞"(0'-23.5') / 3"(23.5'-36.5')

Riser Pipe ID: 2"
Type of Riser Pipe: Schedule 40 PVC

Type of Backfill: grout mix

Elevation of Top of Seal: _____
Depth of Top of Seal: 19.5'
Type of Seal: medium bentonite chips

Elevation of Top of Sand: _____
Depth of Top of Sand: 23.5
Elevation of Top of Screen: _____
Depth of Top of Screen: 25.5'

Type of Screen: Schedule 40 PVC
Slot Size x Length: 0.010" x 10'
ID of Screen: 2"

Type of Sandpack: Ø GRADE FILTER SAND

Elevation of Bottom of Screen: _____
Depth of Bottom of Screen: 35.5'
Depth of Sediment Sump with Plug: N/A

Elevation of Bottom of Borehole: _____
Depth of Bottom of Borehole: 36.5'

Stone & Webster Engineering Corporation	BORING LOG	Boring ~~T.O.~~ XJM-97-13X Sheet 1 of 2

Site: AOC 43J
Client: NED
Coordinates:
Groundwater Depth: ≈ 8' bgs
Contractor: Earth Exploration Svcs.
Logged by: sjm
Date Start - Finish: ~~2-19-97~~ - 2/25/97
Ground Elevation: ft
Depth to Bedrock: 37.5'
Driller: C. DeVillers
Total Depth Drilled: 52.5 ft
Rig Type: truck-mounted

Methods:
Drilling Soil: 3 7/8" tri-cone rollerbit
Sampling Soil: N/A
Drilling Rock: NQ core barrel
Casing Used: 4" diam. to 34.0' bgs
3" diam to 36.0' bgs

Comments:

Drilling rate (min/ft)

Elev (ft)	Depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N	USC Symbol	Sample Description
	0						Refer to XJM-97-08X soil boring log (adjacent well) for soil description in overburden.
	37.5			RQD ~~0%~~ Total 4" core = 0.33' RQD: 0.33'/5.0' (very poor)			Moderately to strongly weathered ~~metasiltstone~~ phyllite, light olive gray, some weathering appears to be by dissolution. No apparent mechanical breaks. Oxidation at some fractures. Bedding planes are faint — dip at ≈ 40°. Evidence of groundwater flow within chemically weathered areas.
	42.5						Likely within the Oriskany Formation

Legend/Notes
- Datum is
- ▽ indicates groundwater level.
- ▌ indicates location of samples.
- Blows = number of blows required to drive 2" O.D. sample spoon 6" or distance shown using 140 pound hammer falling 30".
- ( ) = inches of sample recovery.
- Recovery = % rock core recovery.
- RQD = Rock Quality Designation.
- SPT N = Standard Penetration Test resistance to driving, blows/ft.
- USC = Unified Soil Classification system.
- * indicates use of 300 pound hammer.
- Sample Type:

Approved	Date

FIGURE 4-2
BORING LOG

Stone & Webster Engineering Corporation	BORING LOG	Boring ~~I.O.~~ XJM-97-13X Sheet 2 of 2

Site: AOC 43J Logged by: [illegible]

✓ = natural break
x = mechanical break

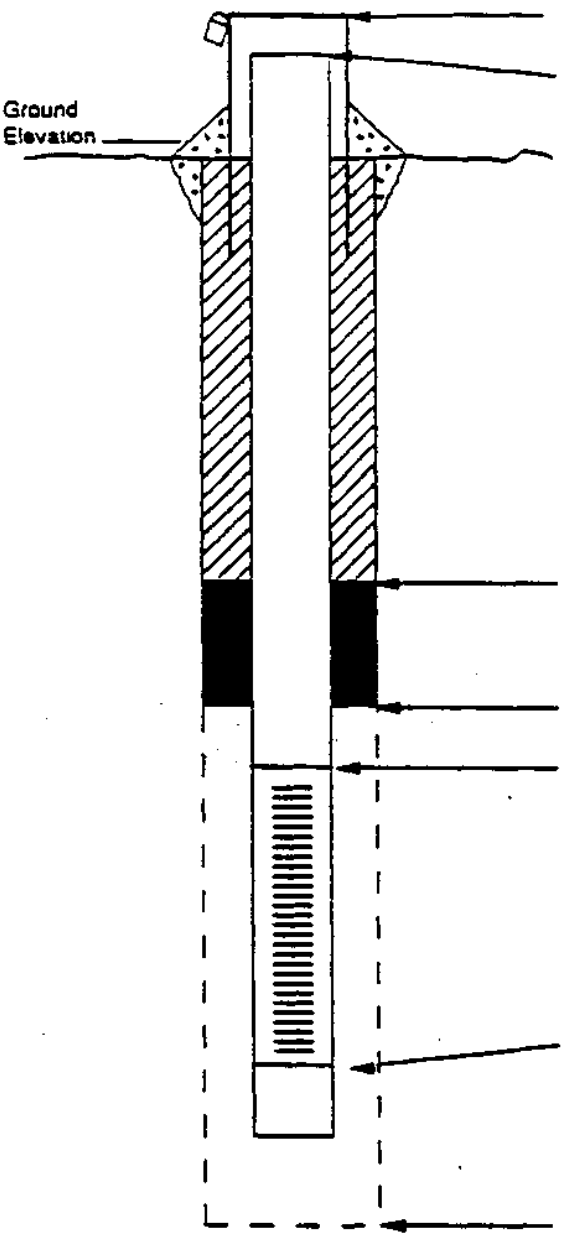
Elev (ft)	depth (ft)	Sample Type	Sample No.	Blows or Recovery / RQD	SPT N Value	USC Symbol	Sample Description
	42.5						Top 2.0 feet: (42.5'–44.5') phyllite (SW)
2:20	43.5			(SW) ~~RQD~~		✓75° ✓10° ✓10° ✓20° ✓30°	Moderately to strongly weathered ~~metasiltstone~~, very similar to R-1. Light olive gray, but more grayish than green. Bedding planes very faint.
1:55	44.5		#2	~~2.20~~ Total 4" core = 1.05'		x 20° ✓10° ✓10° ✓10° ✓45° ✓20° ✓10° ✓10°	
2:55	45.5		RUN	RQD = 1.05' / 5.0' (very poor)		strong chemical withring	Bottom 3.0 feet: (44.5'–47.5') Strongly weathered phyllite, also likely ~~from~~ of the Oakdale Formation light gray. Kink banding. Strongly withrd area (shown at left) is strongly oxidized; weathering appears to be primarily chemical (little mechanical withring). Sheen on some cleavage surfaces (micaceous).
2:10	46.5					✓40° ✓10° ✓10° ✓10° ✓10° ✓30° ✓20° ✓30°	
2:30	47.5						Slightly to moderately weathered phyllite of the Oakdale Formation; more competent than the core at 44.5'–47.5'; light gray. Kink banding is pronounced. Many of the cleavage surfaces have a micaceous sheen on them. Bedding planes are faint. Calcite stringers.
2:20	48.5			(SW) ~~RQD~~		✓40° ✓30° ✓30° ✓30° ✓30° ✓20° ✓20° ✓10° ✓10°	
2:45	49.5		#3	~~0.70~~ Total 4" core = 1.37'		✓20° ✓20° ✓20° ✓45° ✓30° ✓20°	
1:40	50.5		RUN	RQD = 1.37' / 5.0' (poor)			
2:55	51.5						
3:45	52.5						

Note: See Sheet 1 for Boring Summary and Legend Information Approved Date

FIGURE 4-2 cont.
BORING LOG

MONITORING WELL CONSTRUCTION DIAGRAM

Project: Intrinsic Remediation Assessment
Study Area: AOC 43T
Driller: Earth Exploration Services
Project No.: 9221.02
Boring No.: XJM-97-13X
Drilling Method: Drive & wash/rock coring
Date Installed: 2-25-97
Development Method: submersible pump
Field Geologist: Sarah Montgomery



Elevation of Top of Surface Casing: 2.68' (sjm)
Stick-up of Casing Above Ground Surface: ~~3.15' (with no gravel pad)~~
Elevation of Top of Riser Pipe:
Type of Surface Seal: gravel pad
Type of Surface Casing: steel — 4½" diam.
Casing - riser = ~~0.39~~ 0.07' (sjm)
ID of Surface Casing: 0.36"
Diameter of Borehole: 3 7/8" (0'-37.5') / 3" (37.5'-52.5')
Riser Pipe ID: 2"
Type of Riser Pipe: Schedule 40 PVC
Type of Backfill: grout mix: Type I Portland cement + high yield bentonite powder
Elevation of Top of Seal:
Depth of Top of Seal: 34.0'
Type of Seal: medium bentonite chips
Elevation of Top of Sand:
Depth of Top of Sand: 38.5'
Elevation of Top of Screen:
Depth of Top of Screen: 41.5'
Type of Screen: Schedule 40 PVC
Slot Size x Length: 0.010" x 10'
ID of Screen: 2"
Type of Sandpack: Size Ø
Elevation of Bottom of Screen:
Depth of Bottom of Screen: 51.5'
Depth of Sediment Sump with Plug: N/A
Elevation of Bottom of Borehole:
Depth of Bottom of Borehole: 52.5'

MICROWELL® CONSTRUCTION DETAILS

FIELD REPRESENTATIVE: MIKE JACKSON
SITE NAME: AOC 50
LOCATION WITHIN SITE: AREA 5 / SOUTHWEST
DRILLING CONTRACTOR: Pine & Swallow
ELEVATION (AMSL):
DRILLING TECHNIQUE: KANGO JACKHAMMER / 950S
EQUIPMENT MAKE/MODEL: JACKHAMMER
TYPE OF WELL CAP: LOCKABLE
TYPE OF END CAP: STEEL POINT

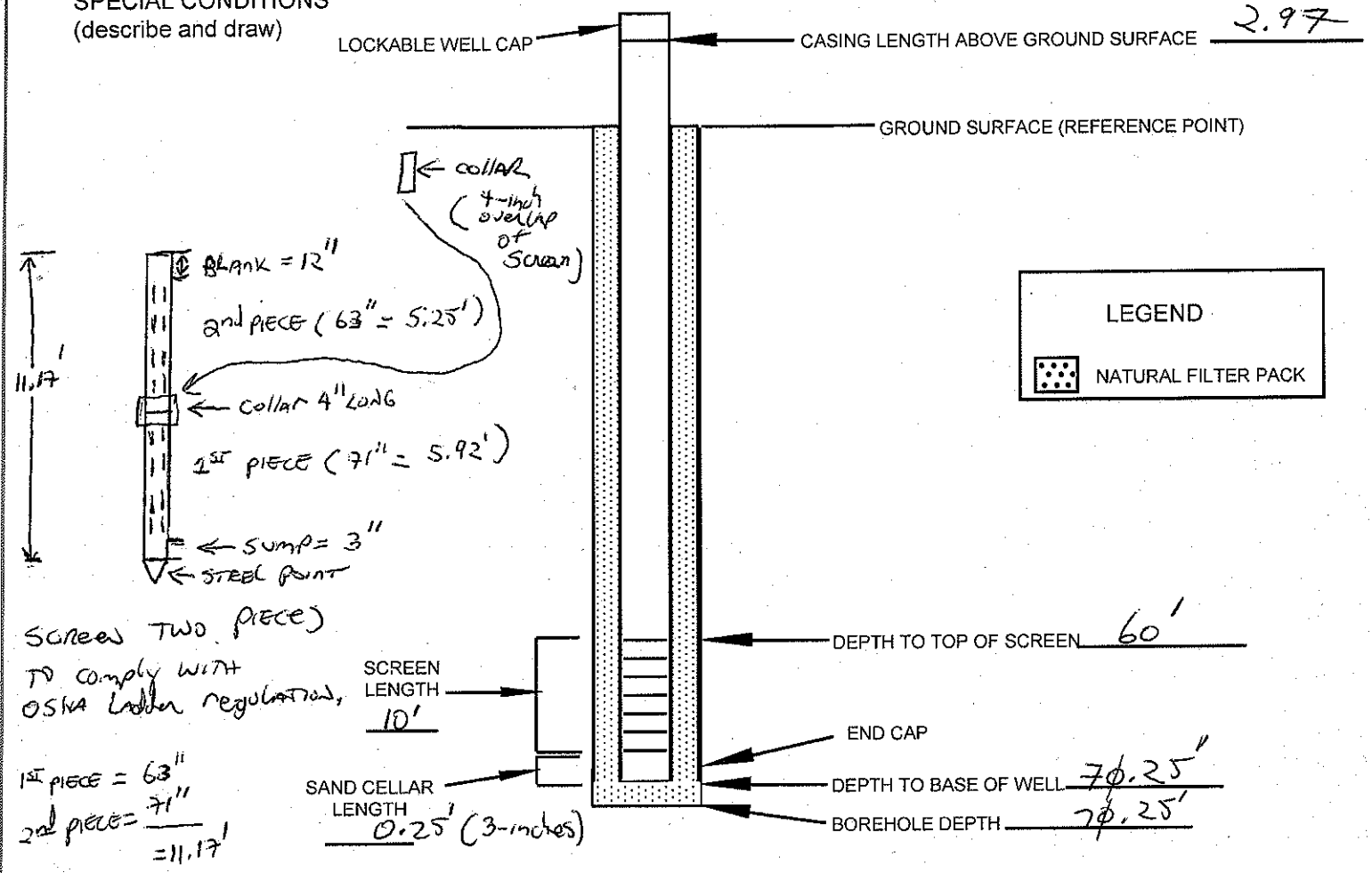
BOREHOLE IDENTIFICATION: XSA-12-98X
COMMENTS:
BOREHOLE DIAMETER: 0.82-inch
WELL IDENTIFICATION/WELL #: XSA-12-98X

WELL CONSTRUCTION START DATE: 6/7/12
WELL CONSTRUCTION COMPLETE DATE: 6/7/12

SCREEN MATERIAL: STAINLESS STEEL (0.015 inch SLOTTED)
SCREEN DIAMETER: 0.62-inch (ID), 0.82-inch (OD)
STRATUM-SCREENED INTERVAL (FT): 60' - 70' bgs

CASING MATERIAL: STEEL
CASING DIAMETER: 0.62-inch (ID), 0.82-inch (OD)

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: Pine & Swallow (MIKE COWLIN)
INSTALLATION OBSERVED BY: Hydro GeoLogic (HGL) (MIKE JACKSON)
DISCREPANCIES: None

ATTACHMENT 5

Responses to Comments

Army Responses to EPA Comments on the
Technical Memorandum
Additional PFAS Sampling to Support the Development of the
Remedial Investigation Work Plan
Former Fort Devens Army Installation, Devens, MA
20 June 2018

The following U.S. Army responses pertain to the U.S. Environmental Protection Agency (EPA) comments, dated 4 June 2018, on the technical memorandum entitled *Additional PFAS Sampling to Support the Development of the Remedial Investigation Work Plan for the Former Fort Devens Army Installation, Devens, Massachusetts*, dated 20 April 2018.

General Comments

Comment 1 – To more accurately describe the information presented therein, please amend the title of the draft document to "Technical Memorandum – Additional PFAS Sampling of Long Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL) to Support Development of the PFAS Remedial Investigation (RI) at the Former Fort Devens Army Installation, Devens, MA."

> **Response** – The title has been changed as requested.

Comment 2 – Please include a copy of the final Technical Memorandum in Appendix B of the "Site Inspection (SI) Addendum for Additional Per- and Polyfluoroalkyl Substances (PFAS) Sampling at Area of Contamination (AOC) 76 – Devens Fire Department and Long-Term Monitoring (LTM) Well Locations at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL)."

> **Response** – The Technical Memorandum will be included as an appendix to the SI Addendum.

Page-Specific Comments

Comment 1 – Page 2, Section 1.2, AOC 57 – The discussion in the third sentence regarding AOC 57's inclusion in a "Zone II aquifer protection area" and partial inclusion in a "Non-Potential Drinking Water Source Area" and "medium-yield aquifer" is confusing. Please amend the discussion to clearly describe/discuss each of the three classifications and clearly show the boundaries of each on Figures 1 and 2.

> **Response** – As already noted on Figures 1 and 2, all of the AOC 57 area is located within the MassDEP Zone II Wellhead Protection Area. The medium yield non-potential drinking water source area has been added to Figures 1 and 2. The text has been revised to read as follows:

"AOC 57 is located within a MassDEP Zone II wellhead protection area. In addition, portions of AOC 57 are located within a medium-yield Non-Potential Drinking Water Source Area (Figures 1 and 2)."

Comment 2 – Page 2, Section 1.2, AOC 57 – The fourth sentence states that, "The portion of the former Devens site that includes AOC 57 was used primarily as a storage and maintenance area for military vehicles." However, historical documentation suggests that the three subareas (Areas 1, 2 and 3) referenced in this discussion were downgradient of the former vehicle maintenance buildings and storage yards and were created by storm water runoff and wastes from these military vehicle storage and maintenance areas to the north to northwest. Please evaluate and amend, if necessary.

Response – The existing text following the cited sentence already describes it, as follows:

"The portion of the former Devens site that includes AOC 57 was used primarily as a storage and maintenance area for military vehicles. AOC 57 consists of three sub-areas (Area 1, Area 2, and Area 3) that are located south to southeast of Building 3713 and former Buildings 3756, 3757, and 3758. These sub-areas received storm water runoff and waste from vehicle maintenance at former vehicle storage yards related to Building 3713 (known fuel oil spill) and former Buildings 3757 and 3758."

Comment 3 – Page 3, Section 1.2, AOCs 32 and 43A – In an interview conducted with Deputy Fire Chief Tim Kelley on July 6, 2017, as documented in the Final Base-Wide Preliminary Assessment for Evaluation of Perfluoroalkyl Substances, fire-fighting foams are currently stored at the "warehouse" at 9 Cook Street "near the DRMO Yard". This information should be included in this section.

Response – The following sentence has been added to the end of the AOC 32/43A paragraph:

"The Devens Fire Department currently stores some of its fire fighting foam stock in a warehouse (9 Cook St.) located near the DRMO."

Comment 4 – Page 10, Section 4.0, Summary – Although PFAS was detected above the EPA LHA of 70 ng/L in groundwater associated with the AOCs identified in the first paragraph, per EPA's January 29, 2018 comments on the Army's Response to EPA Comments on the revised Draft Site Inspection (SI) Report for Per- and Polyfluoroalkyl Substances (PFAS), the purpose of SI sampling was to *confirm or deny the presence of contamination*. The RI will define the nature and extent and evaluate potential human health risks/impacts associated with sites with confirmed PFAS detections. As such, all SI SAs/AOCs with confirmed PFAS detections, regardless of the concentration detected, must be carried through to the PFAS RI for additional sampling/evaluation.

Response – Comment noted. The RI will include AOCs 57, 43G, 43J, 32/43A, 50, and SHL.

Comment 5 – Tables – To more fully evaluate PFAS sampling results, please include a table summarizing monitoring well construction details, including surface and groundwater elevations (in feet, NAVD 1988), depth to water and depth of screened interval (in feet bgs) for each of the LTM wells evaluated as part of this supplemental PFAS field sampling program.

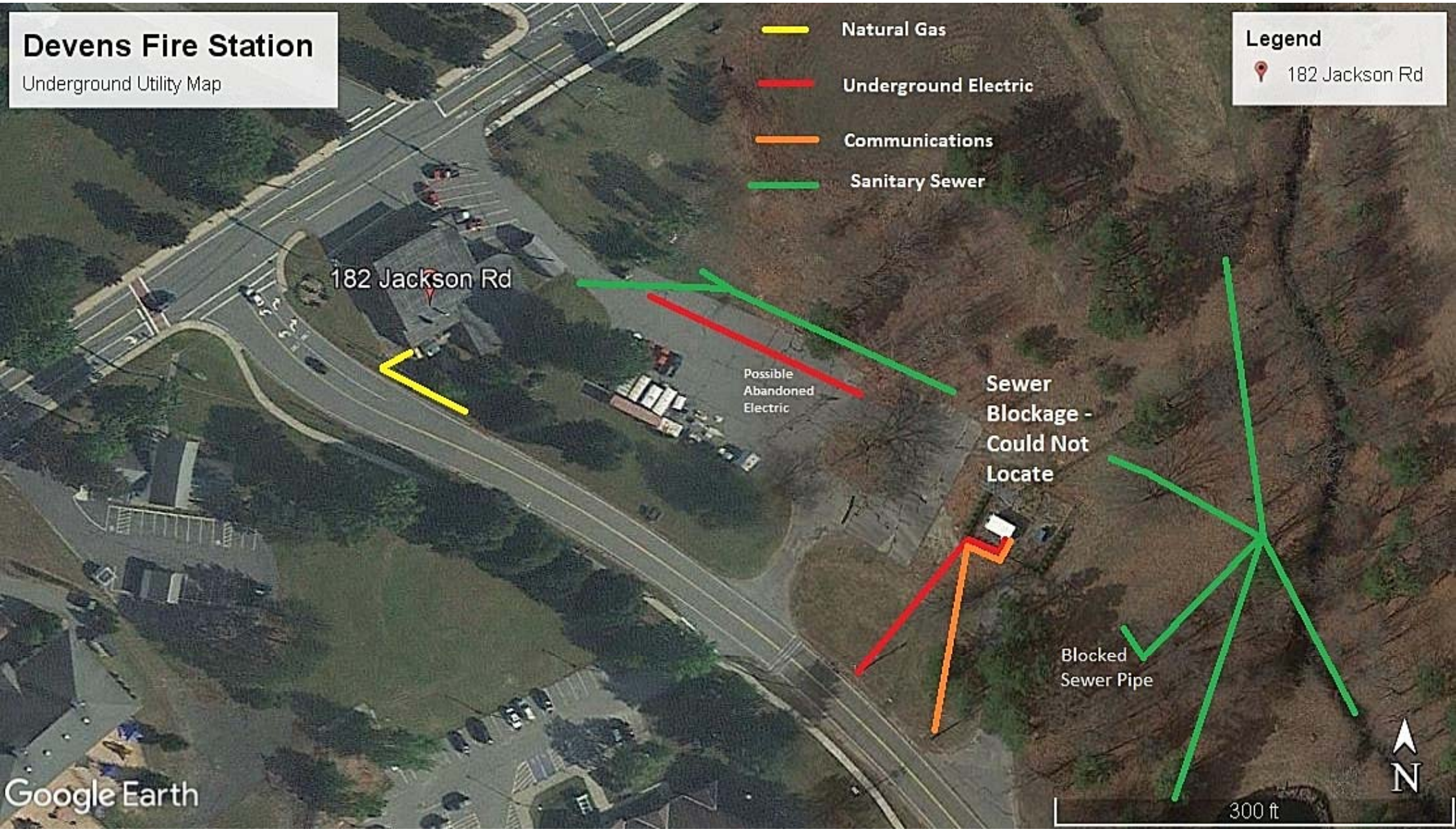
Response – The requested table has been added.

Comment 6 – Appendices – To more fully evaluate PFAS detections and identify data gaps to be addressed in the PFAS RI, please provide soil boring logs for each of the LTM wells evaluated as part of this supplemental PFAS field sampling program in an appendix to the draft final Tech Memo.

Response – Soil boring logs have been added to new Attachment 4.

Appendix C

Utility Markout Sketch


Devens Fire Station
Underground Utility Map
Natural Gas
Underground Electric
Communications
Sanitary Sewer
Legend
182 Jackson Rd
182 Jackson Rd
Possible Abandoned Electric
Sewer Blockage - Could Not Locate
Blocked Sewer Pipe
Google Earth
N
300 ft

Appendix D

Soil Boring Logs

KOMAN Government Solutions, LLC
SOIL BORING LOG

Project: Fort Devens	Boring No.: FH-17-01
Project No.:	Drilling Co.: Eastern Analytical
Address: Devens Fire Station	Driller: Brian Law
Logger: Josh Frizzell	Drilling Method: DPT
Dates: 1-22-2018	Drilling Equip: Geoprobe 7822 DT
Total Boring Depth: 24'	Static Water: 15.3' bgs

Core Section	Recovery (ft)	Interval (ft)	PID (ppm)	Soil Profile	GEOLOGIC LOG
					Grass surface
1	3.5				0-0.4 = 10YR4/2 dark grayish brown silt, some poorly sorted fine-coarse sub angular sand, very firm, non-plastic, 2" thick layer of asphalt @ 0.4'
					0.4-1.0 = 10YR5/6 reddish yellow well sorted subangular medium sand, little silt, dry, loose
					1.0-2.0 = 10YR 6/3 pale brown silt, some very fine sand, firm, non-plastic, dry
					2.0-5.0 = 10YR 6/3 pale brown well sorted fine sand, trace silt, very loose, dry
					— End of soil core @ 5' —
					GW screened 15-19' bgs
					Temp = 7.06°C
					Spec. Cond = 135 µS/cm
					D.O. = 0.55 mg/L
					pH = 6.91
					ORP = -17.2 mv
					Turb. > 1000 NTU

JDF 1-22-2018

Notes: start @ 1200, collected soil @ 1220, collected GW @ 1230

1. Borehole grouted to surface upon completion ~~and sealed with cement pad.~~ 2.
PID readings not collected for soil characterization of ~~metals~~ PFAS.

Soil Characterization

- Top soil
- Primarily Sand
- Primarily Silt
- Primarily Clay
- Till
- Shale
- Gravel
- Heterogeneous Mixture
- Bedrock

KOMAN Government Solutions, LLC
160 East Main Street
Westboro, MA 01581

KOMAN Government Solutions, LLC
SOIL BORING LOG

Project: Fort Devens	Boring No.: FH-17-02
Project No.:	Drilling Co.: Eastern Analytical
Address: Devens Fire Station	Driller: Brian Law
Logger: Josh Frizzell	Drilling Method: DPT
Dates: 1-22-2018	Drilling Equip: Geoprobe ~~DT~~ 7822 DT
Total Boring Depth: 24'	Static Water: 18.5' bgs

Core Section	Recovery (ft)	Interval (ft)	PID (ppm)	Soil Profile	GEOLOGIC LOG
					Grass surface
1	3.5				0-1.2' = 10YR 4/2 dark grayish brown silt, some very fine-fine sand, soft (upper 6" frozen), dry, non-plastic
					1.2-2.2' = 10YR 5/6 yellowish brown poorly sorted fine-coarse subangular sand, little silt, some subangular gravel, loose, dry
					2.2-5' - 10YR 5/4 yellowish brown poorly sorted fine-coarse subangular sand, loose, dry
					- End of soil core @ 5'
					Screened GW ~~20-24' bgs~~ 18-22' bgs
					Temp = 4.36°C
					Spec. cond. = 192 µS/cm
					D.O. = 0.61 mg/l
					pH = 6.51
					ORP = -34.1 mV
					Turbidity 7/1000 NTU

Notes: Start @ 1100, collected soil @ 1115, GW @ 1130

1. Borehole grouted to surface upon completion ~~and sealed with cement pad.~~
2.

PID readings not collected for soil characterization of ~~metals~~ PFAS

Soil Characterization

Top soil	Primarily Clay	Gravel
Primarily Sand	Till	Heterogeneous Mixture
Primarily Silt	Shale	Bedrock

KOMAN Government Solutions, LLC
160 East Main Street
Westboro, MA 01581

KOMAN Government Solutions, LLC
SOIL BORING LOG

Project: Fort Devens	Boring No.: FH-17-03
Project No.:	Drilling Co.: Eastern Analytical
Address: Devens Fire Station	Driller: Brian Law
Logger: Josh Frizzell	Drilling Method: DPT
Dates: 1-22-2018	Drilling Equip: Geoprobe 7822 DT
Total Boring Depth: 24	Static Water: 20.2' bgs

Core Section	Recovery (ft)	Interval (ft)	PID (ppm)	Soil Profile	Grass surface GEOLOGIC LOG
1	3.5		NM		0-0.8'-10YR4/3 brown silt, trace very fine sand, roots, very firm, non-plastic, dry, 1" thick lens of white poorly sorted angular gravel @ 8"
					8"-5'-10YR 5/3 brown poorly sorted fine-coarse subangular sand, some silt, loose, dry
					—End of soil core @ 5'—
					GW screened 20-24' bgs
					temp 6.28°C
					pH 6.94
					Cond 333 mS/cm
					ORP -117.8 mV
					DO 0.52 mg/L
					turb > 1000 NTU
					GW sample @ ~~092~~ 0915
					Soil sample @ 0920

JDF 1-22-2018

Notes: FH-DUP01 (groundwater); FH-DUP02 (soil) @ this location

1. Borehole grouted to surface upon completion ~~and sealed with cement pad.~~ 2.
PID readings ~~not collected for soil characterization of metals.~~ PFAs

Soil Characterization

Top soil	Primarily Clay	Gravel
Primarily Sand	Till	Heterogeneous Mixture
Primarily Silt	Shale	Bedrock

KGS
KOMAN Government Solutions, LLC
160 East Main Street
Westboro, MA 01581

KOMAN Government Solutions, LLC
SOIL BORING LOG

Project: Fort Devens	Boring No.: FH-17-04
Project No.:	Drilling Co.: Eastern Analytical
Address: Devens Fire Station	Driller: Brian Law
Logger: Josh Frizzell	Drilling Method: DPT
Dates: ~~Brian Law~~ 1-22-2018	Drilling Equip: Geoprobe 7822 DT
Total Boring Depth: 24'	Static Water: 20.2' bgs

Core Section	Recovery (ft)	Interval (ft)	PID (ppm)	Soil Profile	Grass surface — GEOLOGIC LOG
1	3.2		NM		0-8" 10YR3/3 dark brown silt, trace very fine sand, very firm, non-plastic, dry; ~1" thick layer of ~~root~~ angular gravel
					8"-5' - 10YR 6/3 pale brown poorly sorted fine to coarse subangular sand, trace silt, very loose, dry - End of soil core @ 5'
					GW screened 20-24' bgs
					Temp = 5.64°C
					S. cond. = 218 µS/cm
					D.O. = 0.49 mg/L
					pH = 6.24
					ORP = 20.2 mV
					Turbidity > 1000 NTU

JDF 1-22-2018

Notes: Start @ 1000. MS/MSD for groundwater, soil sample FH-17-04 @ 1020
1. Borehole grouted to surface upon completion ~~and sealed with cement pad~~. GW sample @ 1030 2.
PID readings not collected for soil characterization ~~of metals~~. PFAS

Soil Characterization

Top soil	Primarily Clay	Gravel
Primarily Sand	Till	Heterogeneous Mixture
Primarily Silt	Shale	Bedrock

KGS
KOMAN Government Solutions, LLC
160 East Main Street
Westboro, MA 01581

offset hole ~5' to the east due to concrete slab encountered ~2" below grass surface

KOMAN Government Solutions, LLC
SOIL BORING LOG

Project: Fort Devens	Boring No.: FH-17-05
Project No.:	Drilling Co.: Eastern Analytical
Address: Devens Fire Station	Driller: Brian Law
Logger: Josh Frizzell	Drilling Method: DPT
Dates: 1-22-2018	Drilling Equip: Geoprobe 7822 DT
Total Boring Depth: 24'	Static Water: 15.3' bgs

Core Section	Recovery (ft)	Interval (ft)	PID (ppm)	Soil Profile	Grass Surface GEOLOGIC LOG
1	2.5				0-0.8' - 10YR3/3 dark brown - 10YR 4/4 dark yellowish brown poorly sorted sub angular gravel, some poorly sorted fine-coarse subangular sand, some silt, loose, dry
					0.8-5' = 10YR 5/6 yellowish brown poorly sorted Fine-coarse subangular sand, some sub angular gravel, some silt, loose, dry
					- End of soil core @ 5' -
					Screened GW 15-19'
					Temp = 5.50°C
					Spec. Cond = 1,000 µS/cm
					pH = 6.82
					D.O. = 0.87 mg/L
					ORP = -23.1 mV
					Turb. >1000 NTU

Notes: Start @ 1315, sampled soil @ 1325, sampled GW @ 1345

1. Borehole grouted to surface upon completion ~~and sealed with cement pad.~~
PID readings not collected for soil characterization of ~~metals.~~ PFAS

2.

Soil Characterization

Top soil	Primarily Clay	Gravel
Primarily Sand	Till	Heterogeneous Mixture
Primarily Silt	Shale	Bedrock

KOMAN Government Solutions, LLC
160 East Main Street
Westboro, MA 01581

KOMAN Government Solutions, LLC
SOIL BORING LOG

Project: Fort Devens	Boring No.: FH-17-08
Project No.:	Drilling Co.: Eastern Analytical
Address: Devens Fire Station	Driller: Brian Law
Logger: Josh Frizzell	Drilling Method: DPT
Dates: 1-22-2018	Drilling Equip: Geoprobe 7822 DT
Total Boring Depth: 24'	Static Water: 21.0' bgs

Core Section	Recovery (ft)	Interval (ft)	PID (ppm)	Soil Profile	GEOLOGIC LOG
1	3.5				0-0.4 = 10YR 3/3 dark brown silt, some poorly sorted fine-coarse ~~sand~~ sub angular sand, firm, non-plastic dry
					0.4-5 = 10YR 5/6 yellowish brown to 10YR 4/3 brown poorly sorted fine-coare subangular sand, trace sub angular gravel, little silt, loose, dry
					- End of soil core @ 5'
					Screened GW sample 20-24' bgs
					Temp = 6.75°C
					Spec. Cond. = 1,542 µS/cm
					pH = 7.29
					ORP = 15.5 mV
					D.O. = 4.53 mg/L

Notes: Started @ 1415, soil sample @ 1425, GW sample @ 1435

1. Borehole grouted to surface upon completion ~~and sealed with cement pad.~~ 2.
PID readings not collected for soil characterization ~~of~~ metals.
PFAS

Soil Characterization

- Top soil
- Primarily Sand
- Primarily Silt
- Primarily Clay
- Till
- Shale
- Gravel
- Heterogeneous Mixture
- Bedrock

KGS
KOMAN Government Solutions, LLC
160 East Main Street
Westboro, MA 01581

GEOPROBE Soil Boring Log

ne Ft. Devens Fire Station	Boring No. FH-17-06 Page 1 of 1	Logged By Josh Frizzell
lled 1-23-2018 Co. Eastern Analytical eman Brian Law	Boring Method/ Sample Method Geoprobe / Macrocore 4-ft ~~5-ft~~ Completion Depth 29' Location Devens Fire Station, Devens, MA	

or inches)	PID every 6"	Visual Description	Sample No.	Comments
		Grass surface Start @ 0900		
5	NM	0 - 1.0' 10 YR 3/3 dark brown silt, little fine sand, non plastic, firm dry 1.0 - 5.0 = 10 YR 5/6 yellowish brown poorly sorted fine - coarse sand, little silt, loose, dry, layer of white angular gravel 1" thick @ 1.5' screened GW sample 25-29' bgs DTW = 25.3' bgs Temp = 6.53°C Spec. cond. 772 µS/cm D.O = 3.81 mg/L pH = 7.31 ORP = -25.0 mV Turb > 1000 NTU		Sampled soil @ 0915 sampled GW @ 0930
		JDF 1-23-18		

roundwater: ~~N/A~~ 25.3' bgs

Well Installed? (YES) NO (Temp.)

Well ID: N/A

urveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite Bentonite Asphalt / Concrete Grout From bottom up

GEOPROBE Soil Boring Log

e Ft. Devens Fire Station	Boring No. FH-17-07 Page 1 of 1	Logged By Josh Frizzell
led 1-23-18 :o. Eastern Analytical eman Brian Law	Boring Method/ Sample Method Geoprobe / Macrocore 4-ft 5-ft Completion Depth 30' Location Devens, MA	

or inches)	PID every 6"	Visual Description	Sample No.	Comments
5	NM	Grass Surface 0-0.8 = 10YR 3/3 dark brown silt, some coarse angular fine sand, very firm, non plastic, dry 0.8-5' = 10YR 5/6 yellowish brown poorly sorted fine-coarse subangular sand, some angular gravel, little silt, loose, dry End of soil core @ 5' ~~GW~~ DTW @ 16.6' bgs Screened GW = 17-21' bgs Temp.: 5.50 °C Spec. Cond. = 1097 µS/cm D.O. = 5.46 mg/L pH = 7.05 ORP = 30.1 mV Turb = > 1000 NTU		Sampled soil @ 1020 Sampled GW @ 1030

Groundwater: 16.6' bgs

Well Installed? (YES) NO Temporary

Well ID: N/A

Surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite Bentonite Asphalt / Concrete

Grout from bottom up to surface

GEOPROBE Soil Boring Log

Ft. Devens Fire Station	Boring No. FH-17-09 Page 1 of 1	Logged By Josh Frizzell
d 1-23-2018). Eastern Analytical nan Brian Law	Boring Method/ Sample Method Geoprobe / Macrocore 4-ft (5-ft) Completion Depth 20' Location Devens, MA	

PID every 6"	Visual Description	Sample No.	Comments
	Grass surface in stormwater basin		
NM	0-0.4 = 10YR3/3 dark brown silt, low plasticity, some well sorted fine sand, soft, moist-wet (heavy rain)		Soil collected @ 1150
	0.4-5.0 = 10YR 5/6 yellowish brown poorly sorted fine-coarse sand, little silt, loose, moist		GW collected @ 1145
	-End of soil core @ 5'-		
	screened GW 12-16' bgs		
	DTW = 12.7' bgs		
	Temp = 3.67°C		
	Spec. Cond. = 683 uS/cm		
	D.O = 5.42 mg/L		
	pH = 6.77		
	ORP = 133.1 mV		
	Turb. > 1000 NTU		

Groundwater: 12.7'

ng Well Installed? (YES) NO Temporary

ng Well ID: N/A

surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite Bentonite Asphalt / Concrete

Grout to surface from bottom up

Appendix E

Photo Log

Photographic Log – Devens Fire Station PFAS Investigation
Devens, Massachusetts

Geoprobe on site behind Devens Fire Station



Geoprobe on site behind Devens Fire Station



Photographic Log – Devens Fire Station PFAS Investigation
Devens, Massachusetts

Soil core collected at Devens Fire Station



Collecting a groundwater sample from a temporary well at the Devens Fire Station



Photographic Log – Devens Fire Station PFAS Investigation
Devens, Massachusetts

Check valve used to collect groundwater samples at Devens Fire Station



Pressure grout borehole abandonment at the Devens Fire Station



Photographic Log – Devens Fire Station PFAS Investigation
Devens, Massachusetts

Proposed location FH-17-09 (marked by orange cone) submerged during the sampling event



Setting up Geoprobe at alternate FH-17-09 sampling location



Appendix F

Laboratory Analytical Report

(Provided on CD)

ANALYTICAL REPORT

Job Number: 320-35310-1

Job Description: PFAS, Fort Devens, Rapid Response

For:
Bristol Env. Remediation Services LLC
720 Corporate Circle #D
Golden, CO 80401-5626

Attention: Ms. Meg Watson



Approved for release.
Jill Kellmann
Manager of Project Management
4/6/2018 1:15 PM

Jill Kellmann, Manager of Project Management
880 Riverside Parkway, West Sacramento, CA, 95605
(916)374-4402
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04/06/2018
Revision: 1

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Qualifiers

LCMS

Qualifier	Qualifier Description
M	Manual integrated compound.
U	Undetected at the Limit of Detection.
D	The reported value is from a dilution.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J1	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

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)

Revision - April 6, 2018
Report revised to remove J1 flag from PFHpA on sample FH-17-04_GW012218 (320-35310-7) which was incorrectly applied in the original report.

Receipt
The samples were received on 1/24/2018 9:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.1º C and 3.2º C.

LCMS
Method(s) 537 (modified): The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

Method(s) 537 (modified): Due to the high concentration of Perfluorohexanesulfonic acid (PFHxS), the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 320-205514 and analytical batch 320-205677 could not be evaluated for accuracy and precision for this analyte. The associated laboratory control sample (LCS) met acceptance criteria.

Method(s) 537 (modified): The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 320-205514 and analytical batch 320-205677 were outside control limits for Perfluorooctanoic acid (PFOA). Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method(s) 537 (modified): The matrix spike / matrix spike duplicate (MS/MSD) precision for preparation batch 320-205514 and analytical batch 320-205677 was outside control limits for Perfluorooctanesulfonic acid (PFOS) and Perfluorononanoic acid (PFNA). Sample matrix interference is suspected.

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

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

Organic Prep
Method(s) 3535: Due to excessive amount of sediment present in the original sample bottle, the aqueous portion of the following samples were decanted to new polypropylene bottles prior to spiking and extraction: FH-17-03_GW012218 (320-35310-1), FH-DUP01 (320-35310-2), FH-17-04_GW012218 (320-35310-7), FH-17-04_GW012218 (320-35310-7[MS]), FH-17-04_GW012218 (320-35310-7[MSD]), FH-17-02_GW012218 (320-35310-9), FH-17-01_GW012218 (320-35310-11), FH-17-05_GW012218 (320-35310-13), FH-17-08_GW012218 (320-35310-15), FH-17-06_GW012318 (320-35310-17), FH-17-07_GW012318 (320-35310-20) and FH-17-09_GW012318 (320-35310-22). The samples are associated with preparation batch 320-205514.

Method(s) 3535: The aqueous portion of the following samples was decanted prior to spiking and extraction due to excess sediment present in the samples. As a result, reduced volume was available for extraction. The reporting limits (RLs) have been adjusted proportionately. FH-17-03_GW012218 (320-35310-1), FH-17-04_GW012218 (320-35310-7), FH-17-04_GW012218 (320-35310-7[MS]), FH-17-04_GW012218 (320-35310-7[MSD]) and FH-17-01_GW012218 (320-35310-11). Samples are associated with preparation batch 320-205514

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

Detection Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-03_GW012218 — Lab Sample ID: 320-35310-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	60	M	3.1	0.71	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	19	M	3.1	0.94	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	330	M	3.1	0.84	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	26		6.2	1.7	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	670	D	15	2.9	ng/L	5		537 (modified)	Total/NA

Client Sample ID: FH-DUP01 — Lab Sample ID: 320-35310-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	67	M	2.0	0.46	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	18	M	2.0	0.61	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	260	M	2.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		4.0	1.1	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	540	D	10	1.9	ng/L	5		537 (modified)	Total/NA

Client Sample ID: FH-17-03_SO0005 — Lab Sample ID: 320-35310-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.055	J	0.54	0.033	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.28	J	0.54	0.031	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.24	J	0.54	0.092	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.23	J	1.1	0.21	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.058	J	0.54	0.039	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-DUP02 — Lab Sample ID: 320-35310-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.064	J	0.53	0.033	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.28	J	0.53	0.031	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.22	J	0.53	0.092	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.29	J	1.1	0.21	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.077	J	0.53	0.038	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-EB01 — Lab Sample ID: 320-35310-5

No Detections.

Client Sample ID: FH-17-04_SO0005 — Lab Sample ID: 320-35310-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.037	J	0.52	0.032	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.064	J	0.52	0.030	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.16	J	0.52	0.089	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.71	J	1.0	0.21	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.17	J	0.52	0.037	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-04_GW012218 — Lab Sample ID: 320-35310-7

This Detection Summary does not include radiochemical test results.

Client Sample ID: FH-17-04_GW012218 (Continued) — Lab Sample ID: 320-35310-7

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	21	M	4.0	0.92	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	230	J1	4.0	0.76	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.0	M	4.0	1.2	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	56	M J1	4.0	1.1	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14	J1	8.0	2.2	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-02_SO0005 — Lab Sample ID: 320-35310-8

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.85		0.53	0.033	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.85		0.53	0.031	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.92	M	0.53	0.091	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		1.1	0.21	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	2.0		0.53	0.038	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-02_GW012218 — Lab Sample ID: 320-35310-9

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	20	M	2.1	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	170		2.1	0.40	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.0	M	2.1	0.64	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	23	M	2.1	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.3		4.2	1.1	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-01_SO0005 — Lab Sample ID: 320-35310-10

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.5		0.58	0.036	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.2		0.58	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	5.3		0.58	0.10	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	10		0.58	0.042	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	30	D	12	2.3	ug/Kg	10	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-01_GW012218 — Lab Sample ID: 320-35310-11

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.7		2.4	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	110		2.4	0.46	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.1	J M	2.4	0.74	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	9.2	M	2.4	0.66	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-05_SO0005 — Lab Sample ID: 320-35310-12

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.5		0.55	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.32	J	0.55	0.032	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	1.2		0.55	0.095	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.5		0.55	0.040	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	200	D	22	4.4	ug/Kg	20	☼	537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: FH-17-05_GW012218 — Lab Sample ID: 320-35310-13

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.5	M	2.0	0.46	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	140		2.0	0.38	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	14		2.0	0.60	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	34	M	2.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	46		4.0	1.1	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.52	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-08_SO0005 — Lab Sample ID: 320-35310-14

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.10	J	0.54	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.12	J M	0.54	0.031	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.21	J	0.54	0.093	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.5		1.1	0.22	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.35	J	0.54	0.039	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-08_GW012218 — Lab Sample ID: 320-35310-15

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.3	M	2.0	0.47	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	49	M	2.0	0.38	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	41		2.0	0.62	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	21	M	2.0	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	45		2.0	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1500	D	40	11	ng/L	10		537 (modified)	Total/NA

Client Sample ID: FH-17-06_SO0005 — Lab Sample ID: 320-35310-16

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.12	J	0.55	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.059	J	0.55	0.032	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.24	J	0.55	0.094	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.2		1.1	0.22	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.059	J	0.55	0.040	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-06_GW012318 — Lab Sample ID: 320-35310-17

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	13	M	1.9	0.44	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	31	M	1.9	0.36	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.1	M	1.9	0.58	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	30	M	1.9	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	42		3.8	1.0	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	2.6		1.9	0.49	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-FB01 — Lab Sample ID: 320-35310-18

No Detections.

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-07_SO0005 — Lab Sample ID: 320-35310-19

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	0.68	J	1.1	0.22	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.043	J	0.54	0.039	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-07_GW012318 — Lab Sample ID: 320-35310-20

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.0	M	2.0	0.46	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	16		2.0	0.38	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.1	M	2.0	0.61	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	11	M	2.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	13		4.0	1.1	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.55	J	2.0	0.52	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-09_SO0005 — Lab Sample ID: 320-35310-21

No Detections.

Client Sample ID: FH-17-09_GW012318 — Lab Sample ID: 320-35310-22

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	18	M	1.9	0.45	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	130		1.9	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	160	M	1.9	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	19		1.9	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	780	D	39	7.4	ng/L	20		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	4000	D	78	21	ng/L	20		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: FH-17-03_GW012218

Lab Sample ID: 320-35310-1

Date Collected: 01/22/18 09:15

Matrix: Water

Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	60	M	3.1	0.71	ng/L		01/25/18 09:10	01/25/18 22:12	1
Perfluoroheptanoic acid (PFHpA)	19	M	3.1	0.94	ng/L		01/25/18 09:10	01/25/18 22:12	1
Perfluorooctanoic acid (PFOA)	330	M	3.1	0.84	ng/L		01/25/18 09:10	01/25/18 22:12	1
Perfluorooctanesulfonic acid (PFOS)	26		6.2	1.7	ng/L		01/25/18 09:10	01/25/18 22:12	1
Perfluorononanoic acid (PFNA)	2.3	U M	3.1	0.81	ng/L		01/25/18 09:10	01/25/18 22:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4-PFHpA	*105*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*
13C4 PFOA	*104*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*
13C4 PFOS	*115*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*
13C5 PFNA	*113*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*
13C3-PFBS	*106*	*M*	*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	670	D	15	2.9	ng/L		01/25/18 09:10	01/26/18 21:35	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:35*	*5*

Client Sample ID: FH-DUP01

Lab Sample ID: 320-35310-2

Date Collected: 01/22/18 09:15

Matrix: Water

Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	67	M	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 22:20	1
Perfluoroheptanoic acid (PFHpA)	18	M	2.0	0.61	ng/L		01/25/18 09:10	01/25/18 22:20	1
Perfluorooctanoic acid (PFOA)	260	M	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 22:20	1
Perfluorooctanesulfonic acid (PFOS)	18		4.0	1.1	ng/L		01/25/18 09:10	01/25/18 22:20	1
Perfluorononanoic acid (PFNA)	1.5	U	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 22:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4-PFHpA	*98*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*
13C4 PFOA	*109*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*
13C4 PFOS	*112*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*
13C5 PFNA	*117*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*
13C3-PFBS	*97*	*M*	*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	540	D	10	1.9	ng/L		01/25/18 09:10	01/26/18 21:42	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:42*	*5*

Client Sample ID: FH-17-03_SO0005

Lab Sample ID: 320-35310-3

Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.4

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.43	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluorohexanesulfonic acid (PFHxS)	**0.055**	**J**	0.54	0.033	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluoroheptanoic acid (PFHpA)	**0.28**	**J**	0.54	0.031	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluorooctanoic acid (PFOA)	**0.24**	**J**	0.54	0.092	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluorooctanesulfonic acid (PFOS)	**0.23**	**J**	1.1	0.21	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluorononanoic acid (PFNA)	**0.058**	**J**	0.54	0.039	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C4-PFHpA	*93*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C4 PFOA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C4 PFOS	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C5 PFNA	*100*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C3-PFBS	*100*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*

Client Sample ID: FH-DUP02

Lab Sample ID: 320-35310-4

Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.0

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.43	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluorohexanesulfonic acid (PFHxS)	**0.064**	**J**	0.53	0.033	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluoroheptanoic acid (PFHpA)	**0.28**	**J**	0.53	0.031	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluorooctanoic acid (PFOA)	**0.22**	**J**	0.53	0.092	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluorooctanesulfonic acid (PFOS)	**0.29**	**J**	1.1	0.21	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluorononanoic acid (PFNA)	**0.077**	**J**	0.53	0.038	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C4-PFHpA	*90*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C4 PFOA	*97*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C5 PFNA	*104*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C3-PFBS	*91*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*

Client Sample ID: FH-EB01

Lab Sample ID: 320-35310-5

Date Collected: 01/22/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.38	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluoroheptanoic acid (PFHpA)	1.5	U	2.0	0.61	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluorooctanoic acid (PFOA)	1.5	U	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluorooctanesulfonic acid (PFOS)	3.0	U	4.0	1.1	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluorononanoic acid (PFNA)	1.5	U	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 22:27	1

Client Sample ID: FH-EB01

Lab Sample ID: 320-35310-5

Date Collected: 01/22/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	105		25 - 150	01/25/18 09:10	01/25/18 22:27	1
13C4-PFHpA	103		25 - 150	01/25/18 09:10	01/25/18 22:27	1
13C4 PFOA	104		25 - 150	01/25/18 09:10	01/25/18 22:27	1
13C4 PFOS	112		25 - 150	01/25/18 09:10	01/25/18 22:27	1
13C5 PFNA	111		25 - 150	01/25/18 09:10	01/25/18 22:27	1
13C3-PFBS	97		25 - 150	01/25/18 09:10	01/25/18 22:27	1

Client Sample ID: FH-17-04_SO0005

Lab Sample ID: 320-35310-6

Date Collected: 01/22/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 94.8

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.10	U	0.42	0.026	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluorohexanesulfonic acid (PFHxS)	**0.037**	**J**	0.52	0.032	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluoroheptanoic acid (PFHpA)	**0.064**	**J**	0.52	0.030	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluorooctanoic acid (PFOA)	**0.16**	**J**	0.52	0.089	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluorooctanesulfonic acid (PFOS)	**0.71**	**J**	1.0	0.21	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluorononanoic acid (PFNA)	**0.17**	**J**	0.52	0.037	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	92		25 - 150	01/25/18 12:10	01/26/18 17:01	1
13C4-PFHpA	94		25 - 150	01/25/18 12:10	01/26/18 17:01	1
13C4 PFOA	96		25 - 150	01/25/18 12:10	01/26/18 17:01	1
13C4 PFOS	101		25 - 150	01/25/18 12:10	01/26/18 17:01	1
13C5 PFNA	99		25 - 150	01/25/18 12:10	01/26/18 17:01	1
13C3-PFBS	88		25 - 150	01/25/18 12:10	01/26/18 17:01	1

Client Sample ID: FH-17-04_GW012218

Lab Sample ID: 320-35310-7

Date Collected: 01/22/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**21**	**M**	4.0	0.92	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluorohexanesulfonic acid (PFHxS)	**230**	**J1**	4.0	0.76	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluoroheptanoic acid (PFHpA)	**6.0**	**M**	4.0	1.2	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluorooctanoic acid (PFOA)	**56**	**M J1**	4.0	1.1	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluorooctanesulfonic acid (PFOS)	**14**	**J1**	8.0	2.2	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluorononanoic acid (PFNA)	3.0	U J1	4.0	1.0	ng/L		01/25/18 09:10	01/25/18 22:35	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	110		25 - 150	01/25/18 09:10	01/25/18 22:35	1
13C4-PFHpA	107		25 - 150	01/25/18 09:10	01/25/18 22:35	1
13C4 PFOA	112		25 - 150	01/25/18 09:10	01/25/18 22:35	1
13C4 PFOS	113		25 - 150	01/25/18 09:10	01/25/18 22:35	1
13C5 PFNA	118		25 - 150	01/25/18 09:10	01/25/18 22:35	1
13C3-PFBS	106		25 - 150	01/25/18 09:10	01/25/18 22:35	1

Client Sample ID: FH-17-02_SO0005
Lab Sample ID: 320-35310-8

Date Collected: 01/22/18 11:15
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 93.6

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.42	0.026	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluorohexanesulfonic acid (PFHxS)	**0.85**		0.53	0.033	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluoroheptanoic acid (PFHpA)	**0.85**		0.53	0.031	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluorooctanoic acid (PFOA)	**0.92**	**M**	0.53	0.091	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluorooctanesulfonic acid (PFOS)	**18**		1.1	0.21	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluorononanoic acid (PFNA)	**2.0**		0.53	0.038	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*91*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C4-PFHpA	*88*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C4 PFOA	*98*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C5 PFNA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C3-PFBS	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*

Client Sample ID: FH-17-02_GW012218
Lab Sample ID: 320-35310-9

Date Collected: 01/22/18 11:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**20**	**M**	2.1	0.48	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluorohexanesulfonic acid (PFHxS)	**170**		2.1	0.40	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluoroheptanoic acid (PFHpA)	**4.0**	**M**	2.1	0.64	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluorooctanoic acid (PFOA)	**23**	**M**	2.1	0.56	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluorooctanesulfonic acid (PFOS)	**5.3**		4.2	1.1	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluorononanoic acid (PFNA)	1.6	U	2.1	0.54	ng/L		01/25/18 09:10	01/25/18 22:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C4-PFHpA	*107*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C4 PFOA	*110*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C4 PFOS	*112*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C5 PFNA	*114*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C3-PFBS	*98*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*

Client Sample ID: FH-17-01_SO0005
Lab Sample ID: 320-35310-10

Date Collected: 01/22/18 12:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 86.1

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.12	U M	0.46	0.029	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1
Perfluorohexanesulfonic acid (PFHxS)	**2.5**		0.58	0.036	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1
Perfluoroheptanoic acid (PFHpA)	**1.2**		0.58	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1
Perfluorooctanoic acid (PFOA)	**5.3**		0.58	0.10	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1
Perfluorononanoic acid (PFNA)	**10**		0.58	0.042	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1

Client Sample ID: FH-17-01_SO0005
Lab Sample ID: 320-35310-10
Date Collected: 01/22/18 12:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 86.1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	90		25 - 150	01/25/18 12:10	01/26/18 17:17	1
13C4-PFHpA	89		25 - 150	01/25/18 12:10	01/26/18 17:17	1
13C4 PFOA	95		25 - 150	01/25/18 12:10	01/26/18 17:17	1
13C5 PFNA	95		25 - 150	01/25/18 12:10	01/26/18 17:17	1
13C3-PFBS	88		25 - 150	01/25/18 12:10	01/26/18 17:17	1

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**30**	**D**	12	2.3	ug/Kg	☼	01/25/18 12:10	01/29/18 16:28	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	105		25 - 150	01/25/18 12:10	01/29/18 16:28	10

Client Sample ID: FH-17-01_GW012218
Lab Sample ID: 320-35310-11
Date Collected: 01/22/18 12:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**7.7**		2.4	0.56	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluorohexanesulfonic acid (PFHxS)	**110**		2.4	0.46	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluoroheptanoic acid (PFHpA)	**2.1**	**J M**	2.4	0.74	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluorooctanoic acid (PFOA)	**9.2**	**M**	2.4	0.66	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluorooctanesulfonic acid (PFOS)	3.7	U M	4.9	1.3	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluorononanoic acid (PFNA)	1.8	U	2.4	0.63	ng/L		01/25/18 09:10	01/25/18 23:07	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	113		25 - 150	01/25/18 09:10	01/25/18 23:07	1
13C4-PFHpA	108		25 - 150	01/25/18 09:10	01/25/18 23:07	1
13C4 PFOA	114		25 - 150	01/25/18 09:10	01/25/18 23:07	1
13C4 PFOS	114		25 - 150	01/25/18 09:10	01/25/18 23:07	1
13C5 PFNA	116		25 - 150	01/25/18 09:10	01/25/18 23:07	1
13C3-PFBS	110		25 - 150	01/25/18 09:10	01/25/18 23:07	1

Client Sample ID: FH-17-05_SO0005
Lab Sample ID: 320-35310-12
Date Collected: 01/22/18 13:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.0

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.028	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1
Perfluorohexanesulfonic acid (PFHxS)	**1.5**		0.55	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1
Perfluoroheptanoic acid (PFHpA)	**0.32**	**J**	0.55	0.032	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1
Perfluorooctanoic acid (PFOA)	**1.2**		0.55	0.095	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1
Perfluorononanoic acid (PFNA)	**1.5**		0.55	0.040	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	92		25 - 150	01/25/18 12:10	01/26/18 17:24	1
13C4-PFHpA	88		25 - 150	01/25/18 12:10	01/26/18 17:24	1
13C4 PFOA	94		25 - 150	01/25/18 12:10	01/26/18 17:24	1

Client Sample ID: FH-17-05_SO0005

Lab Sample ID: 320-35310-12
Date Collected: 01/22/18 13:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.0

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFNA	78		25 - 150	01/25/18 12:10	01/26/18 17:24	1
13C3-PFBS	96		25 - 150	01/25/18 12:10	01/26/18 17:24	1

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	200	D	22	4.4	ug/Kg	☼	01/25/18 12:10	01/29/18 16:36	20

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	111		25 - 150	01/25/18 12:10	01/29/18 16:36	20

Client Sample ID: FH-17-05_GW012218

Lab Sample ID: 320-35310-13
Date Collected: 01/22/18 13:45
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.5	M	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluorohexanesulfonic acid (PFHxS)	140		2.0	0.38	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluoroheptanoic acid (PFHpA)	14		2.0	0.60	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluorooctanoic acid (PFOA)	34	M	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluorooctanesulfonic acid (PFOS)	46		4.0	1.1	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 23:22	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	103		25 - 150	01/25/18 09:10	01/25/18 23:22	1
13C4-PFHpA	104		25 - 150	01/25/18 09:10	01/25/18 23:22	1
13C4 PFOA	106		25 - 150	01/25/18 09:10	01/25/18 23:22	1
13C4 PFOS	113		25 - 150	01/25/18 09:10	01/25/18 23:22	1
13C5 PFNA	118		25 - 150	01/25/18 09:10	01/25/18 23:22	1
13C3-PFBS	98		25 - 150	01/25/18 09:10	01/25/18 23:22	1

Client Sample ID: FH-17-08_SO0005

Lab Sample ID: 320-35310-14
Date Collected: 01/22/18 14:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.5

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U	0.43	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluorohexanesulfonic acid (PFHxS)	0.10	J	0.54	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluoroheptanoic acid (PFHpA)	0.12	J M	0.54	0.031	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluorooctanoic acid (PFOA)	0.21	J	0.54	0.093	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluorooctanesulfonic acid (PFOS)	1.5		1.1	0.22	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluorononanoic acid (PFNA)	0.35	J	0.54	0.039	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	85		25 - 150	01/25/18 12:10	01/26/18 17:40	1
13C4-PFHpA	84		25 - 150	01/25/18 12:10	01/26/18 17:40	1
13C4 PFOA	101		25 - 150	01/25/18 12:10	01/26/18 17:40	1

Client Sample ID: FH-17-08_SO0005

Lab Sample ID: 320-35310-14
Date Collected: 01/22/18 14:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.5

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	92		25 - 150	01/25/18 12:10	01/26/18 17:40	1
13C5 PFNA	103		25 - 150	01/25/18 12:10	01/26/18 17:40	1
13C3-PFBS	86		25 - 150	01/25/18 12:10	01/26/18 17:40	1

Client Sample ID: FH-17-08_GW012218

Lab Sample ID: 320-35310-15
Date Collected: 01/22/18 14:35
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.3	M	2.0	0.47	ng/L		01/25/18 09:10	01/25/18 23:30	1
Perfluorohexanesulfonic acid (PFHxS)	49	M	2.0	0.38	ng/L		01/25/18 09:10	01/25/18 23:30	1
Perfluoroheptanoic acid (PFHpA)	41		2.0	0.62	ng/L		01/25/18 09:10	01/25/18 23:30	1
Perfluorooctanoic acid (PFOA)	21	M	2.0	0.55	ng/L		01/25/18 09:10	01/25/18 23:30	1
Perfluorononanoic acid (PFNA)	45		2.0	0.53	ng/L		01/25/18 09:10	01/25/18 23:30	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	103		25 - 150	01/25/18 09:10	01/25/18 23:30	1
13C4-PFHpA	98		25 - 150	01/25/18 09:10	01/25/18 23:30	1
13C4 PFOA	101		25 - 150	01/25/18 09:10	01/25/18 23:30	1
13C5 PFNA	90		25 - 150	01/25/18 09:10	01/25/18 23:30	1
13C3-PFBS	96		25 - 150	01/25/18 09:10	01/25/18 23:30	1

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	1500	D	40	11	ng/L		01/25/18 09:10	01/26/18 21:50	10

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOS	117		25 - 150	01/25/18 09:10	01/26/18 21:50	10

Client Sample ID: FH-17-06_SO0005

Lab Sample ID: 320-35310-16
Date Collected: 01/23/18 09:15
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.8

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluorohexanesulfonic acid (PFHxS)	0.12	J	0.55	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluoroheptanoic acid (PFHpA)	0.059	J	0.55	0.032	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluorooctanoic acid (PFOA)	0.24	J	0.55	0.094	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluorooctanesulfonic acid (PFOS)	1.2		1.1	0.22	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluorononanoic acid (PFNA)	0.059	J	0.55	0.040	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	94		25 - 150	01/25/18 12:10	01/26/18 17:48	1
13C4-PFHpA	87		25 - 150	01/25/18 12:10	01/26/18 17:48	1
13C4 PFOA	99		25 - 150	01/25/18 12:10	01/26/18 17:48	1
13C4 PFOS	99		25 - 150	01/25/18 12:10	01/26/18 17:48	1
13C5 PFNA	109		25 - 150	01/25/18 12:10	01/26/18 17:48	1

Client Sample ID: FH-17-06_SO0005
Lab Sample ID: 320-35310-16

Date Collected: 01/23/18 09:15
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.8

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C3-PFBS	101		25 - 150	01/25/18 12:10	01/26/18 17:48	1

Client Sample ID: FH-17-06_GW012318
Lab Sample ID: 320-35310-17

Date Collected: 01/23/18 09:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**13**	**M**	1.9	0.44	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluorohexanesulfonic acid (PFHxS)	**31**	**M**	1.9	0.36	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluoroheptanoic acid (PFHpA)	**9.1**	**M**	1.9	0.58	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluorooctanoic acid (PFOA)	**30**	**M**	1.9	0.51	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluorooctanesulfonic acid (PFOS)	**42**		3.8	1.0	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluorononanoic acid (PFNA)	**2.6**		1.9	0.49	ng/L		01/25/18 09:10	01/25/18 23:38	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	96		25 - 150	01/25/18 09:10	01/25/18 23:38	1
13C4-PFHpA	89		25 - 150	01/25/18 09:10	01/25/18 23:38	1
13C4 PFOA	106		25 - 150	01/25/18 09:10	01/25/18 23:38	1
13C4 PFOS	107		25 - 150	01/25/18 09:10	01/25/18 23:38	1
13C5 PFNA	112		25 - 150	01/25/18 09:10	01/25/18 23:38	1
13C3-PFBS	98		25 - 150	01/25/18 09:10	01/25/18 23:38	1

Client Sample ID: FH-FB01
Lab Sample ID: 320-35310-18

Date Collected: 01/23/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.97	U	1.9	0.45	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluorohexanesulfonic acid (PFHxS)	0.97	U	1.9	0.37	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluoroheptanoic acid (PFHpA)	1.5	U	1.9	0.59	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluorooctanoic acid (PFOA)	1.5	U	1.9	0.52	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluorooctanesulfonic acid (PFOS)	2.9	U	3.9	1.1	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluorononanoic acid (PFNA)	1.5	U	1.9	0.50	ng/L		01/25/18 09:10	01/25/18 23:46	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	98		25 - 150	01/25/18 09:10	01/25/18 23:46	1
13C4-PFHpA	97		25 - 150	01/25/18 09:10	01/25/18 23:46	1
13C4 PFOA	101		25 - 150	01/25/18 09:10	01/25/18 23:46	1
13C4 PFOS	105		25 - 150	01/25/18 09:10	01/25/18 23:46	1
13C5 PFNA	109		25 - 150	01/25/18 09:10	01/25/18 23:46	1
13C3-PFBS	92		25 - 150	01/25/18 09:10	01/25/18 23:46	1

Client Sample ID: FH-17-07_SO0005
Lab Sample ID: 320-35310-19
Date Collected: 01/23/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 91.7

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluorohexanesulfonic acid (PFHxS)	0.11	U	0.54	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluoroheptanoic acid (PFHpA)	0.11	U	0.54	0.032	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluorooctanoic acid (PFOA)	0.22	U	0.54	0.094	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluorooctanesulfonic acid (PFOS)	**0.68**	**J**	1.1	0.22	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluorononanoic acid (PFNA)	**0.043**	**J**	0.54	0.039	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:56*	*1*
13C4-PFHpA	*84*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:56*	*1*
13C4 PFOA	*100*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:56*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:56*	*1*
13C5 PFNA	*105*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:56*	*1*
13C3-PFBS	*89*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:56*	*1*

Client Sample ID: FH-17-07_GW012318
Lab Sample ID: 320-35310-20
Date Collected: 01/23/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**3.0**	**M**	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluorohexanesulfonic acid (PFHxS)	**16**		2.0	0.38	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluoroheptanoic acid (PFHpA)	**4.1**	**M**	2.0	0.61	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluorooctanoic acid (PFOA)	**11**	**M**	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluorooctanesulfonic acid (PFOS)	**13**		4.0	1.1	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluorononanoic acid (PFNA)	**0.55**	**J**	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 23:54	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*106*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:54*	*1*
13C4-PFHpA	*109*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:54*	*1*
13C4 PFOA	*115*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:54*	*1*
13C4 PFOS	*118*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:54*	*1*
13C5 PFNA	*119*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:54*	*1*
13C3-PFBS	*104*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:54*	*1*

Client Sample ID: FH-17-09_SO0005
Lab Sample ID: 320-35310-21
Date Collected: 01/23/18 11:50
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 85.0

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.12	U	0.47	0.029	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluorohexanesulfonic acid (PFHxS)	0.12	U	0.58	0.036	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluoroheptanoic acid (PFHpA)	0.12	U	0.58	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluorooctanoic acid (PFOA)	0.23	U	0.58	0.10	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluorooctanesulfonic acid (PFOS)	0.58	U M	1.2	0.23	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluorononanoic acid (PFNA)	0.12	U	0.58	0.042	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1

Client Sample ID: FH-17-09_SO0005

Lab Sample ID: 320-35310-21

Date Collected: 01/23/18 11:50
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 85.0

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*92*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*
13C4-PFHpA	*93*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*
13C4 PFOA	*100*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*
13C4 PFOS	*103*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*
13C5 PFNA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*
13C3-PFBS	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*

Client Sample ID: FH-17-09_GW012318

Lab Sample ID: 320-35310-22

Date Collected: 01/23/18 11:45
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**18**	**M**	1.9	0.45	ng/L		01/25/18 09:10	01/26/18 00:02	1
Perfluoroheptanoic acid (PFHpA)	**130**		1.9	0.59	ng/L		01/25/18 09:10	01/26/18 00:02	1
Perfluorooctanoic acid (PFOA)	**160**	**M**	1.9	0.53	ng/L		01/25/18 09:10	01/26/18 00:02	1
Perfluorononanoic acid (PFNA)	**19**		1.9	0.51	ng/L		01/25/18 09:10	01/26/18 00:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4-PFHpA	*105*		*25 - 150*	*01/25/18 09:10*	*01/26/18 00:02*	*1*
13C4 PFOA	*107*		*25 - 150*	*01/25/18 09:10*	*01/26/18 00:02*	*1*
13C5 PFNA	*94*		*25 - 150*	*01/25/18 09:10*	*01/26/18 00:02*	*1*
13C3-PFBS	*111*		*25 - 150*	*01/25/18 09:10*	*01/26/18 00:02*	*1*

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**780**	**D**	39	7.4	ng/L		01/25/18 09:10	01/26/18 21:58	20
Perfluorooctanesulfonic acid (PFOS)	**4000**	**D**	78	21	ng/L		01/25/18 09:10	01/26/18 21:58	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*112*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:58*	*20*
13C4 PFOS	*121*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:58*	*20*

Default Detection Limits

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: 3535

Analyte	LOQ	DL	Units	Method
Perfluorobutanesulfonic acid (PFBS)	2.0	0.46	ng/L	537 (modified)
Perfluoroheptanoic acid (PFHpA)	2.0	0.61	ng/L	537 (modified)
Perfluorohexanesulfonic acid (PFHxS)	2.0	0.38	ng/L	537 (modified)
Perfluorononanoic acid (PFNA)	2.0	0.52	ng/L	537 (modified)
Perfluorooctanesulfonic acid (PFOS)	4.0	1.1	ng/L	537 (modified)
Perfluorooctanoic acid (PFOA)	2.0	0.54	ng/L	537 (modified)

Method: 537 (modified) - Fluorinated Alkyl Substances

Prep: SHAKE

Analyte	LOQ	DL	Units	Method
Perfluorobutanesulfonic acid (PFBS)	0.40	0.025	ug/Kg	537 (modified)
Perfluoroheptanoic acid (PFHpA)	0.50	0.029	ug/Kg	537 (modified)
Perfluorohexanesulfonic acid (PFHxS)	0.50	0.031	ug/Kg	537 (modified)
Perfluorononanoic acid (PFNA)	0.50	0.036	ug/Kg	537 (modified)
Perfluorooctanesulfonic acid (PFOS)	1.0	0.20	ug/Kg	537 (modified)
Perfluorooctanoic acid (PFOA)	0.50	0.086	ug/Kg	537 (modified)

Isotope Dilution Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)	3C3-PFBS (25-150)
320-35310-3	FH-17-03_SO0005	94	93	101	101	100	100
320-35310-3 MS	FH-17-03_SO0005	92	94	95	91	93	93
320-35310-3 MSD	FH-17-03_SO0005	97	92	101	100	99	92
320-35310-4	FH-DUP02	93	90	97	98	104	91
320-35310-6	FH-17-04_SO0005	92	94	96	101	99	88
320-35310-8	FH-17-02_SO0005	91	88	98	98	101	94
320-35310-10	FH-17-01_SO0005	90	89	95		95	88
320-35310-10 - DL	FH-17-01_SO0005				105		
320-35310-12	FH-17-05_SO0005	92	88	94		78	96
320-35310-12 - DL	FH-17-05_SO0005				111		
320-35310-14	FH-17-08_SO0005	85	84	101	92	103	86
320-35310-16	FH-17-06_SO0005	94	87	99	99	109	101
320-35310-19	FH-17-07_SO0005	96	84	100	98	105	89
320-35310-21	FH-17-09_SO0005	92	93	100	103	101	94
LCS 320-205574/2-A	Lab Control Sample	104	103	103	106	100	95
MB 320-205574/1-A	Method Blank	100	101	97	105	108	101

Surrogate Legend

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

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)	3C3-PFBS (25-150)
320-35310-1	FH-17-03_GW012218		105	104	115	113	106 M
320-35310-1 - DL	FH-17-03_GW012218	105					
320-35310-2	FH-DUP01		98	109	112	117	97 M
320-35310-2 - DL	FH-DUP01	108					
320-35310-5	FH-EB01	105	103	104	112	111	97
320-35310-7	FH-17-04_GW012218	110	107	112	113	118	106
320-35310-7 MS	FH-17-04_GW012218	126	123	126	122	130	127
320-35310-7 MSD	FH-17-04_GW012218	105	96	109	113	115	106
320-35310-9	FH-17-02_GW012218	104	107	110	112	114	98
320-35310-11	FH-17-01_GW012218	113	108	114	114	116	110
320-35310-13	FH-17-05_GW012218	103	104	106	113	118	98
320-35310-15	FH-17-08_GW012218	103	98	101		90	96
320-35310-15 - DL	FH-17-08_GW012218				117		
320-35310-17	FH-17-06_GW012318	96	89	106	107	112	98
320-35310-18	FH-FB01	98	97	101	105	109	92
320-35310-20	FH-17-07_GW012318	106	109	115	118	119	104
320-35310-22	FH-17-09_GW012318		105	107		94	111
320-35310-22 - DL	FH-17-09_GW012318	112			121		

Isotope Dilution Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

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

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)	3C3-PFBS (25-150)		
LCS 320-205514/2-A	Lab Control Sample	109	110	113	111	116	97		
MB 320-205514/1-A	Method Blank	110	111	111	118	116	102		

Surrogate Legend

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

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-205514/1-A
Matrix: Water
Analysis Batch: 205677

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 205514

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.38	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluoroheptanoic acid (PFHpA)	1.5	U	2.0	0.61	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluorooctanoic acid (PFOA)	1.5	U	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluorooctanesulfonic acid (PFOS)	3.0	U	4.0	1.1	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluorononanoic acid (PFNA)	1.5	U	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 21:56	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C4-PFHpA	*111*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C4 PFOA	*111*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C4 PFOS	*118*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C5 PFNA	*116*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C3-PFBS	*102*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*

Lab Sample ID: LCS 320-205514/2-A
Matrix: Water
Analysis Batch: 205677

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 205514

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	35.4	37.9		ng/L		107	87 - 120
Perfluorohexanesulfonic acid (PFHxS)	36.4	33.4		ng/L		92	81 - 106
Perfluoroheptanoic acid (PFHpA)	40.0	34.7		ng/L		87	80 - 113
Perfluorooctanoic acid (PFOA)	40.0	35.3		ng/L		88	80 - 107
Perfluorooctanesulfonic acid (PFOS)	37.1	34.7		ng/L		93	82 - 112
Perfluorononanoic acid (PFNA)	40.0	36.9		ng/L		92	83 - 113

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*109*		*25 - 150*
13C4-PFHpA	*110*		*25 - 150*
13C4 PFOA	*113*		*25 - 150*
13C4 PFOS	*111*		*25 - 150*
13C5 PFNA	*116*		*25 - 150*
13C3-PFBS	*97*		*25 - 150*

Lab Sample ID: 320-35310-7 MS
Matrix: Water
Analysis Batch: 205677

Client Sample ID: FH-17-04_GW012218
Prep Type: Total/NA
Prep Batch: 205514

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	21	M	55.9	76.3		ng/L		99	87 - 120
Perfluorohexanesulfonic acid (PFHxS)	230	J1	57.5	263	4	ng/L		53	81 - 106
Perfluoroheptanoic acid (PFHpA)	6.0	M	63.2	60.8		ng/L		87	80 - 113
Perfluorooctanoic acid (PFOA)	56	M J1	63.2	104	M J1	ng/L		76	80 - 107

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

Lab Sample ID: 320-35310-7 MS — **Client Sample ID: FH-17-04_GW012218**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 205677 — **Prep Batch: 205514**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorooctanesulfonic acid (PFOS)	14	J1	58.7	71.1		ng/L		98	82 - 112
Perfluorononanoic acid (PFNA)	3.0	U J1	63.2	57.9		ng/L		92	83 - 113

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
18O2 PFHxS	*126*		*25 - 150*
13C4-PFHpA	*123*		*25 - 150*
13C4 PFOA	*126*		*25 - 150*
13C4 PFOS	*122*		*25 - 150*
13C5 PFNA	*130*		*25 - 150*
13C3-PFBS	*127*		*25 - 150*

Lab Sample ID: 320-35310-7 MSD — **Client Sample ID: FH-17-04_GW012218**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 205677 — **Prep Batch: 205514**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	21	M	41.5	60.9	M	ng/L		97	87 - 120	22	30
Perfluorohexanesulfonic acid (PFHxS)	230	J1	42.7	214	4	ng/L		-44	81 - 106	21	30
Perfluoroheptanoic acid (PFHpA)	6.0	M	46.9	48.8		ng/L		91	80 - 113	22	30
Perfluorooctanoic acid (PFOA)	56	M J1	46.9	82.1	M J1	ng/L		56	80 - 107	23	30
Perfluorooctanesulfonic acid (PFOS)	14	J1	43.5	51.3	J1	ng/L		86	82 - 112	32	30
Perfluorononanoic acid (PFNA)	3.0	U J1	46.9	40.8	J1	ng/L		87	83 - 113	35	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
18O2 PFHxS	*105*		*25 - 150*
13C4-PFHpA	*96*		*25 - 150*
13C4 PFOA	*109*		*25 - 150*
13C4 PFOS	*113*		*25 - 150*
13C5 PFNA	*115*		*25 - 150*
13C3-PFBS	*106*		*25 - 150*

Lab Sample ID: MB 320-205574/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 205921 — **Prep Batch: 205574**

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.10	U	0.40	0.025	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluorohexanesulfonic acid (PFHxS)	0.10	U	0.50	0.031	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluoroheptanoic acid (PFHpA)	0.10	U	0.50	0.029	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluorooctanoic acid (PFOA)	0.20	U	0.50	0.086	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluorooctanesulfonic acid (PFOS)	0.50	U	1.0	0.20	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluorononanoic acid (PFNA)	0.10	U	0.50	0.036	ug/Kg		01/25/18 12:10	01/26/18 16:14	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:14*	*1*
13C4-PFHpA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:14*	*1*

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

Lab Sample ID: MB 320-205574/1-A
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 205574

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	97		25 - 150	01/25/18 12:10	01/26/18 16:14	1
13C4 PFOS	105		25 - 150	01/25/18 12:10	01/26/18 16:14	1
13C5 PFNA	108		25 - 150	01/25/18 12:10	01/26/18 16:14	1
13C3-PFBS	101		25 - 150	01/25/18 12:10	01/26/18 16:14	1

Lab Sample ID: LCS 320-205574/2-A
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 205574

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	1.77	1.82		ug/Kg		103	73 - 142
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.69		ug/Kg		93	75 - 121
Perfluoroheptanoic acid (PFHpA)	2.00	1.98		ug/Kg		99	76 - 124
Perfluorooctanoic acid (PFOA)	2.00	1.87		ug/Kg		93	76 - 121
Perfluorooctanesulfonic acid (PFOS)	1.86	1.73		ug/Kg		93	69 - 131
Perfluorononanoic acid (PFNA)	2.00	1.95		ug/Kg		98	74 - 126

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	104		25 - 150
13C4-PFHpA	103		25 - 150
13C4 PFOA	103		25 - 150
13C4 PFOS	106		25 - 150
13C5 PFNA	100		25 - 150
13C3-PFBS	95		25 - 150

Lab Sample ID: 320-35310-3 MS
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: FH-17-03_SO0005
Prep Type: Total/NA
Prep Batch: 205574

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	1.90	1.92		ug/Kg	☼	101	73 - 142
Perfluorohexanesulfonic acid (PFHxS)	0.055	J	1.95	1.92		ug/Kg	☼	95	75 - 121
Perfluoroheptanoic acid (PFHpA)	0.28	J	2.15	2.20		ug/Kg	☼	89	76 - 124
Perfluorooctanoic acid (PFOA)	0.24	J	2.15	2.21		ug/Kg	☼	92	76 - 121
Perfluorooctanesulfonic acid (PFOS)	0.23	J	1.99	2.08		ug/Kg	☼	93	69 - 131
Perfluorononanoic acid (PFNA)	0.058	J	2.15	2.15		ug/Kg	☼	98	74 - 126

Isotope Dilution	MS %Recovery	MS Qualifier	Limits
18O2 PFHxS	92		25 - 150
13C4-PFHpA	94		25 - 150
13C4 PFOA	95		25 - 150
13C4 PFOS	91		25 - 150
13C5 PFNA	93		25 - 150
13C3-PFBS	93		25 - 150

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

Lab Sample ID: 320-35310-3 MSD
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: FH-17-03_SO0005
Prep Type: Total/NA
Prep Batch: 205574

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	1.89	1.91		ug/Kg	☼	101	73 - 142	0	30
Perfluorohexanesulfonic acid (PFHxS)	0.055	J	1.94	1.76		ug/Kg	☼	88	75 - 121	9	30
Perfluoroheptanoic acid (PFHpA)	0.28	J	2.13	2.20		ug/Kg	☼	90	76 - 124	0	30
Perfluorooctanoic acid (PFOA)	0.24	J	2.13	2.11		ug/Kg	☼	87	76 - 121	5	30
Perfluorooctanesulfonic acid (PFOS)	0.23	J	1.98	2.07		ug/Kg	☼	93	69 - 131	1	30
Perfluorononanoic acid (PFNA)	0.058	J	2.13	2.10		ug/Kg	☼	96	74 - 126	3	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
18O2 PFHxS	*97*		*25 - 150*
13C4-PFHpA	*92*		*25 - 150*
13C4 PFOA	*101*		*25 - 150*
13C4 PFOS	*100*		*25 - 150*
13C5 PFNA	*99*		*25 - 150*
13C3-PFBS	*92*		*25 - 150*

LCMS

Prep Batch: 205514

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-1	FH-17-03_GW012218	Total/NA	Water	3535	
320-35310-1 - DL	FH-17-03_GW012218	Total/NA	Water	3535	
320-35310-2 - DL	FH-DUP01	Total/NA	Water	3535	
320-35310-2	FH-DUP01	Total/NA	Water	3535	
320-35310-5	FH-EB01	Total/NA	Water	3535	
320-35310-7	FH-17-04_GW012218	Total/NA	Water	3535	
320-35310-9	FH-17-02_GW012218	Total/NA	Water	3535	
320-35310-11	FH-17-01_GW012218	Total/NA	Water	3535	
320-35310-13	FH-17-05_GW012218	Total/NA	Water	3535	
320-35310-15 - DL	FH-17-08_GW012218	Total/NA	Water	3535	
320-35310-15	FH-17-08_GW012218	Total/NA	Water	3535	
320-35310-17	FH-17-06_GW012318	Total/NA	Water	3535	
320-35310-18	FH-FB01	Total/NA	Water	3535	
320-35310-20	FH-17-07_GW012318	Total/NA	Water	3535	
320-35310-22	FH-17-09_GW012318	Total/NA	Water	3535	
320-35310-22 - DL	FH-17-09_GW012318	Total/NA	Water	3535	
MB 320-205514/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-205514/2-A	Lab Control Sample	Total/NA	Water	3535	
320-35310-7 MS	FH-17-04_GW012218	Total/NA	Water	3535	
320-35310-7 MSD	FH-17-04_GW012218	Total/NA	Water	3535	

Prep Batch: 205574

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-3	FH-17-03_SO0005	Total/NA	Solid	SHAKE	
320-35310-4	FH-DUP02	Total/NA	Solid	SHAKE	
320-35310-6	FH-17-04_SO0005	Total/NA	Solid	SHAKE	
320-35310-8	FH-17-02_SO0005	Total/NA	Solid	SHAKE	
320-35310-10	FH-17-01_SO0005	Total/NA	Solid	SHAKE	
320-35310-10 - DL	FH-17-01_SO0005	Total/NA	Solid	SHAKE	
320-35310-12	FH-17-05_SO0005	Total/NA	Solid	SHAKE	
320-35310-12 - DL	FH-17-05_SO0005	Total/NA	Solid	SHAKE	
320-35310-14	FH-17-08_SO0005	Total/NA	Solid	SHAKE	
320-35310-16	FH-17-06_SO0005	Total/NA	Solid	SHAKE	
320-35310-19	FH-17-07_SO0005	Total/NA	Solid	SHAKE	
320-35310-21	FH-17-09_SO0005	Total/NA	Solid	SHAKE	
MB 320-205574/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-205574/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
320-35310-3 MS	FH-17-03_SO0005	Total/NA	Solid	SHAKE	
320-35310-3 MSD	FH-17-03_SO0005	Total/NA	Solid	SHAKE	

Analysis Batch: 205677

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-1	FH-17-03_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-2	FH-DUP01	Total/NA	Water	537 (modified)	205514
320-35310-5	FH-EB01	Total/NA	Water	537 (modified)	205514
320-35310-7	FH-17-04_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-9	FH-17-02_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-11	FH-17-01_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-13	FH-17-05_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-15	FH-17-08_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-17	FH-17-06_GW012318	Total/NA	Water	537 (modified)	205514

LCMS (Continued)

Analysis Batch: 205677 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-18	FH-FB01	Total/NA	Water	537 (modified)	205514
320-35310-20	FH-17-07_GW012318	Total/NA	Water	537 (modified)	205514
320-35310-22	FH-17-09_GW012318	Total/NA	Water	537 (modified)	205514
MB 320-205514/1-A	Method Blank	Total/NA	Water	537 (modified)	205514
LCS 320-205514/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	205514
320-35310-7 MS	FH-17-04_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-7 MSD	FH-17-04_GW012218	Total/NA	Water	537 (modified)	205514

Analysis Batch: 205921

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-3	FH-17-03_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-4	FH-DUP02	Total/NA	Solid	537 (modified)	205574
320-35310-6	FH-17-04_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-8	FH-17-02_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-10	FH-17-01_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-12	FH-17-05_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-14	FH-17-08_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-16	FH-17-06_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-19	FH-17-07_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-21	FH-17-09_SO0005	Total/NA	Solid	537 (modified)	205574
MB 320-205574/1-A	Method Blank	Total/NA	Solid	537 (modified)	205574
LCS 320-205574/2-A	Lab Control Sample	Total/NA	Solid	537 (modified)	205574
320-35310-3 MS	FH-17-03_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-3 MSD	FH-17-03_SO0005	Total/NA	Solid	537 (modified)	205574

Analysis Batch: 205928

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-1 - DL	FH-17-03_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-2 - DL	FH-DUP01	Total/NA	Water	537 (modified)	205514
320-35310-15 - DL	FH-17-08_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-22 - DL	FH-17-09_GW012318	Total/NA	Water	537 (modified)	205514

Analysis Batch: 206109

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-10 - DL	FH-17-01_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-12 - DL	FH-17-05_SO0005	Total/NA	Solid	537 (modified)	205574

General Chemistry

Analysis Batch: 205642

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-3	FH-17-03_SO0005	Total/NA	Solid	D 2216	
320-35310-4	FH-DUP02	Total/NA	Solid	D 2216	
320-35310-6	FH-17-04_SO0005	Total/NA	Solid	D 2216	
320-35310-8	FH-17-02_SO0005	Total/NA	Solid	D 2216	
320-35310-10	FH-17-01_SO0005	Total/NA	Solid	D 2216	
320-35310-12	FH-17-05_SO0005	Total/NA	Solid	D 2216	
320-35310-14	FH-17-08_SO0005	Total/NA	Solid	D 2216	
320-35310-16	FH-17-06_SO0005	Total/NA	Solid	D 2216	
320-35310-19	FH-17-07_SO0005	Total/NA	Solid	D 2216	

General Chemistry (Continued)

Analysis Batch: 205642 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-21	FH-17-09_SO0005	Total/NA	Solid	D 2216	
320-35310-3 DU	FH-17-03_SO0005	Total/NA	Solid	D 2216	

Client Sample ID: FH-17-03_GW012218
Lab Sample ID: 320-35310-1
Date Collected: 01/22/18 09:15
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 22:12	CBW	TAL SAC
Total/NA	Prep	3535	DL		205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	5	205928	01/26/18 21:35	CBW	TAL SAC

Client Sample ID: FH-DUP01
Lab Sample ID: 320-35310-2
Date Collected: 01/22/18 09:15
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 22:20	CBW	TAL SAC
Total/NA	Prep	3535	DL		205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	5	205928	01/26/18 21:42	CBW	TAL SAC

Client Sample ID: FH-17-03_SO0005
Lab Sample ID: 320-35310-3
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-03_SO0005
Lab Sample ID: 320-35310-3
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.4

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 16:30	ABH	TAL SAC

Client Sample ID: FH-DUP02
Lab Sample ID: 320-35310-4
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-DUP02
Lab Sample ID: 320-35310-4
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 16:53	ABH	TAL SAC

Client Sample ID: FH-EB01
Lab Sample ID: 320-35310-5
Date Collected: 01/22/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 22:27	CBW	TAL SAC

Client Sample ID: FH-17-04_SO0005
Lab Sample ID: 320-35310-6
Date Collected: 01/22/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-04_SO0005
Lab Sample ID: 320-35310-6
Date Collected: 01/22/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 94.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 17:01	ABH	TAL SAC

Client Sample ID: FH-17-04_GW012218
Lab Sample ID: 320-35310-7
Date Collected: 01/22/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 22:35	CBW	TAL SAC

Client Sample ID: FH-17-02_SO0005
Lab Sample ID: 320-35310-8
Date Collected: 01/22/18 11:15
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-02_SO0005
Lab Sample ID: 320-35310-8
Date Collected: 01/22/18 11:15
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 93.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 17:09	ABH	TAL SAC

Client Sample ID: FH-17-02_GW012218
Lab Sample ID: 320-35310-9
Date Collected: 01/22/18 11:30
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 22:59	CBW	TAL SAC

Client Sample ID: FH-17-01_SO0005
Lab Sample ID: 320-35310-10
Date Collected: 01/22/18 12:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-01_SO0005
Lab Sample ID: 320-35310-10
Date Collected: 01/22/18 12:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 86.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 17:17	ABH	TAL SAC
Total/NA	Prep	SHAKE	DL		205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10	206109	01/29/18 16:28	ABH	TAL SAC

Client Sample ID: FH-17-01_GW012218
Lab Sample ID: 320-35310-11
Date Collected: 01/22/18 12:30
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 23:07	CBW	TAL SAC

Client Sample ID: FH-17-05_SO0005
Lab Sample ID: 320-35310-12
Date Collected: 01/22/18 13:25
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-05_SO0005
Lab Sample ID: 320-35310-12
Date Collected: 01/22/18 13:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 17:24	ABH	TAL SAC
Total/NA	Prep	SHAKE	DL		205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)	DL	20	206109	01/29/18 16:36	ABH	TAL SAC

Client Sample ID: FH-17-05_GW012218
Lab Sample ID: 320-35310-13
Date Collected: 01/22/18 13:45
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 23:22	CBW	TAL SAC

Client Sample ID: FH-17-08_SO0005
Lab Sample ID: 320-35310-14
Date Collected: 01/22/18 14:25
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-08_SO0005
Lab Sample ID: 320-35310-14
Date Collected: 01/22/18 14:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 17:40	ABH	TAL SAC

Client Sample ID: FH-17-08_GW012218
Lab Sample ID: 320-35310-15
Date Collected: 01/22/18 14:35
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 23:30	CBW	TAL SAC
Total/NA	Prep	3535	DL		205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10	205928	01/26/18 21:50	CBW	TAL SAC

Client Sample ID: FH-17-06_SO0005
Lab Sample ID: 320-35310-16
Date Collected: 01/23/18 09:15
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-06_SO0005
Lab Sample ID: 320-35310-16
Date Collected: 01/23/18 09:15
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 17:48	ABH	TAL SAC

Client Sample ID: FH-17-06_GW012318
Lab Sample ID: 320-35310-17
Date Collected: 01/23/18 09:30
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 23:38	CBW	TAL SAC

Client Sample ID: FH-FB01
Lab Sample ID: 320-35310-18
Date Collected: 01/23/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 23:46	CBW	TAL SAC

Client Sample ID: FH-17-07_SO0005
Lab Sample ID: 320-35310-19
Date Collected: 01/23/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-07_SO0005
Lab Sample ID: 320-35310-19
Date Collected: 01/23/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 91.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 17:56	ABH	TAL SAC

Client Sample ID: FH-17-07_GW012318
Lab Sample ID: 320-35310-20
Date Collected: 01/23/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/25/18 23:54	CBW	TAL SAC

Client Sample ID: FH-17-09_SO0005
Lab Sample ID: 320-35310-21
Date Collected: 01/23/18 11:50
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-09_SO0005
Lab Sample ID: 320-35310-21
Date Collected: 01/23/18 11:50
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 85.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1	205921	01/26/18 18:04	ABH	TAL SAC

Client Sample ID: FH-17-09_GW012318
Lab Sample ID: 320-35310-22
Date Collected: 01/23/18 11:45
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1	205677	01/26/18 00:02	CBW	TAL SAC
Total/NA	Prep	3535	DL		205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	20	205928	01/26/18 21:58	CBW	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Bristol Env. Remediation Services LLC
TestAmerica Job ID: 320-35310-1
Project/Site: PFAS, Fort Devens, Rapid Response

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
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18 *
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
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	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-18
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.

Method Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
D 2216	Percent Moisture	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

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

Sample Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35310-1	FH-17-03_GW012218	Water	01/22/18 09:15	01/24/18 09:55
320-35310-2	FH-DUP01	Water	01/22/18 09:15	01/24/18 09:55
320-35310-3	FH-17-03_SO0005	Solid	01/22/18 09:20	01/24/18 09:55
320-35310-4	FH-DUP02	Solid	01/22/18 09:20	01/24/18 09:55
320-35310-5	FH-EB01	Water	01/22/18 09:45	01/24/18 09:55
320-35310-6	FH-17-04_SO0005	Solid	01/22/18 10:20	01/24/18 09:55
320-35310-7	FH-17-04_GW012218	Water	01/22/18 10:30	01/24/18 09:55
320-35310-8	FH-17-02_SO0005	Solid	01/22/18 11:15	01/24/18 09:55
320-35310-9	FH-17-02_GW012218	Water	01/22/18 11:30	01/24/18 09:55
320-35310-10	FH-17-01_SO0005	Solid	01/22/18 12:20	01/24/18 09:55
320-35310-11	FH-17-01_GW012218	Water	01/22/18 12:30	01/24/18 09:55
320-35310-12	FH-17-05_SO0005	Solid	01/22/18 13:25	01/24/18 09:55
320-35310-13	FH-17-05_GW012218	Water	01/22/18 13:45	01/24/18 09:55
320-35310-14	FH-17-08_SO0005	Solid	01/22/18 14:25	01/24/18 09:55
320-35310-15	FH-17-08_GW012218	Water	01/22/18 14:35	01/24/18 09:55
320-35310-16	FH-17-06_SO0005	Solid	01/23/18 09:15	01/24/18 09:55
320-35310-17	FH-17-06_GW012318	Water	01/23/18 09:30	01/24/18 09:55
320-35310-18	FH-FB01	Water	01/23/18 09:45	01/24/18 09:55
320-35310-19	FH-17-07_SO0005	Solid	01/23/18 10:20	01/24/18 09:55
320-35310-20	FH-17-07_GW012318	Water	01/23/18 10:30	01/24/18 09:55
320-35310-21	FH-17-09_SO0005	Solid	01/23/18 11:50	01/24/18 09:55
320-35310-22	FH-17-09_GW012318	Water	01/23/18 11:45	01/24/18 09:55

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 204375

Lab Sample ID: IC 320-204375/2 Client Sample ID:

Date Analyzed: 01/17/18 14:19 Lab File ID: 2018.01.17CURVELLA_002.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanoic acid (PFHxA)	1.94	Baseline	hannigana	01/17/18 16:49

Lab Sample ID: IC 320-204375/3 Client Sample ID:

Date Analyzed: 01/17/18 14:27 Lab File ID: 2018.01.17CURVELLA_003.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluoropentanoic acid (PFPeA)	1.66	Baseline	hannigana	01/17/18 16:50
Perfluorohexanoic acid (PFHxA)	1.94	Baseline	hannigana	01/17/18 16:50

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 205637

Lab Sample ID: CCVL 320-205637/1 Client Sample ID:

Date Analyzed: 01/25/18 10:13 Lab File ID: 2018.01.25LLAA_006.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanoic acid (PFBA)	1.41	Baseline	roycea	01/25/18 14:41

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 205677

Lab Sample ID: 320-35310-1 Client Sample ID: FH-17-03_GW012218

Date Analyzed: 01/25/18 22:12 Lab File ID: 2018.01.25LLAAXZ_036.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
13C3-PFBS	1.69	Baseline	barnettj	01/26/18 14:25
Perfluorobutanesulfonic acid (PFBS)	1.70	Baseline	barnettj	01/26/18 14:22
Perfluoroheptanoic acid (PFHpA)	2.26	Baseline	barnettj	01/26/18 14:23
Perfluorooctanoic acid (PFOA)	2.62	Isomers	barnettj	01/26/18 14:23
Perfluorononanoic acid (PFNA)		Invalid Compound ID	barnettj	01/26/18 14:24

Lab Sample ID: 320-35310-2 Client Sample ID: FH-DUP01

Date Analyzed: 01/25/18 22:20 Lab File ID: 2018.01.25LLAAXZ_037.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
13C3-PFBS	1.70	Baseline	barnettj	01/26/18 14:26
Perfluorobutanesulfonic acid (PFBS)	1.70	Baseline	barnettj	01/26/18 14:26
Perfluoroheptanoic acid (PFHpA)	2.27	Baseline	barnettj	01/26/18 14:26
Perfluorooctanoic acid (PFOA)	2.63	Isomers	barnettj	01/26/18 14:27

Lab Sample ID: 320-35310-7 Client Sample ID: FH-17-04_GW012218

Date Analyzed: 01/25/18 22:35 Lab File ID: 2018.01.25LLAAXZ_039.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.70	Baseline	barnettj	01/26/18 14:34
Perfluoroheptanoic acid (PFHpA)	2.27	Baseline	barnettj	01/26/18 14:34
Perfluorooctanoic acid (PFOA)	2.62	Isomers	barnettj	01/26/18 14:35

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 205677

Lab Sample ID: 320-35310-7 MS Client Sample ID: FH-17-04_GW012218 MS

Date Analyzed: 01/25/18 22:43 Lab File ID: 2018.01.25LLAAXZ_040.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorooctanoic acid (PFOA)	2.63	Isomers	barnettj	01/26/18 14:36

Lab Sample ID: 320-35310-7 MSD Client Sample ID: FH-17-04_GW012218 MSD

Date Analyzed: 01/25/18 22:51 Lab File ID: 2018.01.25LLAAXZ_041.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.70	Baseline	barnettj	01/26/18 14:38
Perfluorooctanoic acid (PFOA)	2.62	Isomers	barnettj	01/26/18 14:38

Lab Sample ID: 320-35310-9 Client Sample ID: FH-17-02_GW012218

Date Analyzed: 01/25/18 22:59 Lab File ID: 2018.01.25LLAAXZ_042.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.69	Baseline	barnettj	01/26/18 16:10
Perfluoroheptanoic acid (PFHpA)	2.27	Baseline	barnettj	01/26/18 16:10
Perfluorooctanoic acid (PFOA)	2.62	Isomers	barnettj	01/26/18 16:11

Lab Sample ID: 320-35310-11 Client Sample ID: FH-17-01_GW012218

Date Analyzed: 01/25/18 23:07 Lab File ID: 2018.01.25LLAAXZ_043.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluoroheptanoic acid (PFHpA)	2.28	Baseline	barnettj	01/26/18 16:12
Perfluorooctanoic acid (PFOA)	2.63	Isomers	barnettj	01/26/18 16:12
Perfluorooctanesulfonic acid (PFOS)	3.01	Baseline	barnettj	01/26/18 16:13

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 205677

Lab Sample ID: 320-35310-13 Client Sample ID: FH-17-05_GW012218

Date Analyzed: 01/25/18 23:22 Lab File ID: 2018.01.25LLAAXZ_045.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.70	Baseline	barnettj	01/26/18 16:17
Perfluorooctanoic acid (PFOA)	2.62	Isomers	barnettj	01/26/18 16:18

Lab Sample ID: 320-35310-15 Client Sample ID: FH-17-08_GW012218

Date Analyzed: 01/25/18 23:30 Lab File ID: 2018.01.25LLAAXZ_046.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.70	Baseline	barnettj	01/26/18 16:19
Perfluorohexanesulfonic acid (PFHxS)	2.28	Baseline	barnettj	01/26/18 16:19
Perfluorooctanoic acid (PFOA)	2.62	Isomers	barnettj	01/26/18 16:19

Lab Sample ID: 320-35310-17 Client Sample ID: FH-17-06_GW012318

Date Analyzed: 01/25/18 23:38 Lab File ID: 2018.01.25LLAAXZ_047.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.69	Baseline	barnettj	01/26/18 16:20
Perfluoroheptanoic acid (PFHpA)	2.27	Baseline	barnettj	01/26/18 16:21
Perfluorohexanesulfonic acid (PFHxS)	2.28	Baseline	barnettj	01/26/18 16:20
Perfluorooctanoic acid (PFOA)	2.61	Isomers	barnettj	01/26/18 16:21

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 205677

Lab Sample ID: 320-35310-20 Client Sample ID: FH-17-07_GW012318

Date Analyzed: 01/25/18 23:54 Lab File ID: 2018.01.25LLAAXZ_049.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.70	Baseline	barnettj	01/26/18 16:22
Perfluoroheptanoic acid (PFHpA)	2.26	Baseline	barnettj	01/26/18 16:23
Perfluorooctanoic acid (PFOA)	2.63	Isomers	barnettj	01/26/18 16:23

Lab Sample ID: 320-35310-22 Client Sample ID: FH-17-09_GW012318

Date Analyzed: 01/26/18 00:02 Lab File ID: 2018.01.25LLAAXZ_050.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.69	Baseline	barnettj	01/26/18 14:46
Perfluorooctanoic acid (PFOA)	2.62	Isomers	barnettj	01/26/18 14:46

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 205921

Lab Sample ID: 320-35310-3 Client Sample ID: FH-17-03_SO0005

Date Analyzed: 01/26/18 16:30 Lab File ID: 2018.01.26LLA_029.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.69	Wrong peak	hannigana	01/30/18 09:48

Lab Sample ID: 320-35310-4 Client Sample ID: FH-DUP02

Date Analyzed: 01/26/18 16:53 Lab File ID: 2018.01.26LLA_032.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.70	Wrong peak	hannigana	01/30/18 09:57

Lab Sample ID: 320-35310-8 Client Sample ID: FH-17-02_SO0005

Date Analyzed: 01/26/18 17:09 Lab File ID: 2018.01.26LLA_034.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.70	Wrong peak	hannigana	01/30/18 10:22
Perfluorooctanoic acid (PFOA)	2.62	Isomers	hannigana	01/30/18 10:22

Lab Sample ID: 320-35310-10 Client Sample ID: FH-17-01_SO0005

Date Analyzed: 01/26/18 17:17 Lab File ID: 2018.01.26LLA_035.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.69	Wrong peak	hannigana	01/30/18 10:53

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 205921

Lab Sample ID: 320-35310-12 Client Sample ID: FH-17-05_SO0005

Date Analyzed: 01/26/18 17:24 Lab File ID: 2018.01.26LLA_036.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)	1.70	Wrong peak	hannigana	01/30/18 11:00

Lab Sample ID: 320-35310-14 Client Sample ID: FH-17-08_SO0005

Date Analyzed: 01/26/18 17:40 Lab File ID: 2018.01.26LLA_038.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluoroheptanoic acid (PFHpA)	2.26	Baseline	hannigana	01/30/18 11:02

Lab Sample ID: 320-35310-16 Client Sample ID: FH-17-06_SO0005

Date Analyzed: 01/26/18 17:48 Lab File ID: 2018.01.26LLA_039.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)		Wrong peak	hannigana	01/30/18 11:04

Lab Sample ID: 320-35310-19 Client Sample ID: FH-17-07_SO0005

Date Analyzed: 01/26/18 17:56 Lab File ID: 2018.01.26LLA_040.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanesulfonic acid (PFBS)		Invalid Compound ID	hannigana	01/30/18 11:05

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 205921

Lab Sample ID: 320-35310-21 Client Sample ID: FH-17-09_SO0005

Date Analyzed: 01/26/18 18:04 Lab File ID: 2018.01.26LLA_041.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorooctanesulfonic acid (PFOS)	3.00	Baseline	hannigana	01/30/18 11:06

537 (modified)

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 206057

Lab Sample ID: CCVL 320-206057/1 Client Sample ID:

Date Analyzed: 01/29/18 11:29 Lab File ID: 2018.01.29LLA_003.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorobutanoic acid (PFBA)	1.41	Baseline	roycea	01/29/18 15:54
Perfluorohexanoic acid (PFHxA)	1.95	Baseline	roycea	01/29/18 15:54

537 (modified)

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
LCMPFC_ALL_SU_00039	07/13/18	01/13/18	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
.LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
.LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
.LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
.LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
.LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
.LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
.LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
.LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
.LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
.LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
.LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
.LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
.LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
.LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
.LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
.LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
.LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
.LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
LCMPFC_ALL_SU_00040	07/13/18	01/13/18	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
.LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
.LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
.LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
.LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
.LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
.LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
.LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
.LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
.LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
.LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
.LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
.LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
.LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
.LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
.LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
.LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
.LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
.LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
LCPFC-IS_00026	07/24/18	01/24/18	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
.LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
LCPFC-IS_00027	07/24/18	01/24/18	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
.LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
LCPFC_CCVL_00002	06/23/18	01/17/18	MeOH/H2O, Lot 090285	200 mL	LCMPFC_ALL_SU_00029	500 uL	d3-NMeFOSAA	2.5 ng/mL
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL
							13C2 PFDA	2.5 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFCSP_00129	100 uL	Perfluorobutanesulfonic acid (PFBS)	0.0442 ng/mL
							Perfluoroheptanoic acid (PFHpA)	0.05 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.0455 ng/mL
							Perfluorononanoic acid (PFNA)	0.05 ng/mL
							Perfluorooctanoic acid (PFOA)	0.05 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	0.0464 ng/mL
.LCMPFC_ALL_SU_00029	06/28/18	12/28/17	Methanol, Lot Baker 141039	10000 uL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	1 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	1 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.95 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.958 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	1 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	1 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	1 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	1 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.93 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	1 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	1 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	1 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.946 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	1 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	1 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.956 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	1 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFCSP_00129	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LCPFCSP_00127	1 mL	Perfluorobutanesulfonic acid (PFBS)	0.0884 ug/mL
							Perfluoroheptanoic acid (PFHpA)	0.1 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.091 ug/mL
							Perfluorononanoic acid (PFNA)	0.1 ug/mL
							Perfluorooctanoic acid (PFOA)	0.1 ug/mL
							Perfluorooctanesulfonic acid (PFOS)	0.0928 ug/mL
..LCPFCSP_00127	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LCPFBS_00008	200 uL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFHpA_00008	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHxS-br_00004	200 uL	Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA_00009	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00009	200 uL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFOS-br_00004	200 uL	Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
...LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
...LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
...LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
...LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
...LCPFOA_00009	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
...LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
LCPFC_LL1_00003	06/23/18	01/02/18	MeOH/H2O, Lot 90285	200 mL	LCMPFC_ALL_SU_00032	10 mL	d3-NMeFOSAA	2.5 ng/mL
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							13C2 PFDA	2.5 ng/mL
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFC-IS_00023	10 mL	13C2-PFOA	2.5 ng/mL
					LCPFCSP_00129	50 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.02335 ng/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.0237 ng/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.02395 ng/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	0.025 ng/mL
							N-methyl perfluorooctane sulfonamidoacetic acid	0.025 ng/mL
							Perfluorobutyric acid	0.025 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	0.0221 ng/mL
							Perfluorodecanoic acid	0.025 ng/mL
							Perfluorododecanoic acid	0.025 ng/mL
							Perfluorodecane Sulfonic acid	0.0241 ng/mL
							Perfluoroheptanoic acid (PFHpA)	0.025 ng/mL
							Perfluoroheptanesulfonic acid	0.0238 ng/mL
							Perfluorohexanoic acid	0.025 ng/mL
							Perfluorohexadecanoic acid	0.025 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.02275 ng/mL
							Perfluorononanoic acid (PFNA)	0.025 ng/mL
							Perfluorooctanoic acid (PFOA)	0.025 ng/mL
							Perfluorooctadecanoic acid	0.025 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	0.0232 ng/mL
							Perfluorooctane Sulfonamide	0.025 ng/mL
							Perfluoropentanoic acid	0.025 ng/mL
							Perfluorotetradecanoic acid	0.025 ng/mL
							Perfluorotridecanoic acid	0.025 ng/mL
							Perfluoroundecanoic acid	0.025 ng/mL
.LCMPFC_ALL_SU_00032	06/28/18	12/28/17	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFC-IS_00023	06/28/18	12/28/17	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
..LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
.LCPFCSP_00129	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LCPFCSP_00127	1 mL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.0934 ug/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.0948 ug/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.0958 ug/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	0.1 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							N-methyl perfluorooctane sulfonamidoacetic acid	0.1 ug/mL
							Perfluorobutyric acid	0.1 ug/mL
							Perfluorobutanesulfonic acid (PFBS)	0.0884 ug/mL
							Perfluorodecanoic acid	0.1 ug/mL
							Perfluorododecanoic acid	0.1 ug/mL
							Perfluorodecane Sulfonic acid	0.0964 ug/mL
							Perfluoroheptanoic acid (PFHpA)	0.1 ug/mL
							Perfluoroheptanesulfonic acid	0.0952 ug/mL
							Perfluorohexanoic acid	0.1 ug/mL
							Perfluorohexadecanoic acid	0.1 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.091 ug/mL
							Perfluorononanoic acid (PFNA)	0.1 ug/mL
							Perfluorooctanoic acid (PFOA)	0.1 ug/mL
							Perfluorooctadecanoic acid	0.1 ug/mL
							Perfluorooctanesulfonic acid (PFOS)	0.0928 ug/mL
							Perfluorooctane Sulfonamide	0.1 ug/mL
							Perfluoropentanoic acid	0.1 ug/mL
							Perfluorotetradecanoic acid	0.1 ug/mL
							Perfluorotridecanoic acid	0.1 ug/mL
							Perfluoroundecanoic acid	0.1 ug/mL
..LCPFCSP_00127	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LC4:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.934 ug/mL
					LC6:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.948 ug/mL
					LC8:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.958 ug/mL
					LCN-EtFOSAA_00004	200 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCN-MeFOSAA_00005	200 uL	N-methyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCPFBA_00007	200 uL	Perfluorobutyric acid	1 ug/mL
					LCPFBS_00008	200 uL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA_00008	200 uL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA_00008	200 uL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA_00002	200 uL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00008	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA_00003	200 uL	Perfluoroheptanesulfonic acid	0.952 ug/mL
					LCPFHxA_00007	200 uL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA_00009	200 uL	Perfluorohexadecanoic acid	1 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCPFHxS-br_00004	200 uL	Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA_00009	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00009	200 uL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00009	200 uL	Perfluorooctadecanoic acid	1 ug/mL
					LCPFOS-br_00004	200 uL	Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
					LCPFOSA_00010	200 uL	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00007	200 uL	Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00006	200 uL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00006	200 uL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA_00007	200 uL	Perfluoroundecanoic acid	1 ug/mL
...LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
...LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
...LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
...LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
...LCN-MeFOSAA_00005	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
...LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
...LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
...LCPFDA_00008	05/29/22	Wellington Laboratories, Lot PFDA0517			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL
...LCPFDoA_00008	05/29/22	Wellington Laboratories, Lot PFDoA0517			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
...LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL
...LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
...LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL
...LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
...LCPFHxDA_00009	07/13/22	Wellington Laboratories, Lot PFHxDA0717			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
...LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
...LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
...LCPFOA_00009	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
...LCPFODA_00009	07/13/22	Wellington Laboratories, Lot PFODA0717			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
...LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
...LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
...LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
...LCPFTeDA_00006	12/09/20	Wellington Laboratories, Lot PFTeDA1215			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
...LCPFTrDA_00006	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
...LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL
LCPFC_LL2_00003	06/23/18	01/02/18	MeOH/H2O, Lot 090285	200 mL	LCMPFC_ALL_SU_00032	10 mL	d3-NMeFOSAA	2.5 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL
							13C2 PFDA	2.5 ng/mL
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFC-IS_00023	10 mL	13C2-PFOA	2.5 ng/mL
					LCPFCSP_00129	100 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.0467 ng/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.0474 ng/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.0479 ng/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	0.05 ng/mL
							N-methyl perfluorooctane sulfonamidoacetic acid	0.05 ng/mL
							Perfluorobutyric acid	0.05 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	0.0442 ng/mL
							Perfluorodecanoic acid	0.05 ng/mL
							Perfluorododecanoic acid	0.05 ng/mL
							Perfluorodecane Sulfonic acid	0.0482 ng/mL
							Perfluoroheptanoic acid (PFHpA)	0.05 ng/mL
							Perfluoroheptanesulfonic acid	0.0476 ng/mL
							Perfluorohexanoic acid	0.05 ng/mL
							Perfluorohexadecanoic acid	0.05 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.0455 ng/mL
							Perfluorononanoic acid (PFNA)	0.05 ng/mL
							Perfluorooctanoic acid (PFOA)	0.05 ng/mL
							Perfluorooctadecanoic acid	0.05 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Perfluorooctanesulfonic acid (PFOS)	0.0464 ng/mL
							Perfluorooctane Sulfonamide	0.05 ng/mL
							Perfluoropentanoic acid	0.05 ng/mL
							Perfluorotetradecanoic acid	0.05 ng/mL
							Perfluorotridecanoic acid	0.05 ng/mL
							Perfluoroundecanoic acid	0.05 ng/mL
.LCMPFC_ALL_SU_00032	06/28/18	12/28/17	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFC-IS_00023	06/28/18	12/28/17	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
..LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.LCPFCSP_00129	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LCPFCSP_00127	1 mL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.0934 ug/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.0948 ug/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.0958 ug/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	0.1 ug/mL
							N-methyl perfluorooctane sulfonamidoacetic acid	0.1 ug/mL
							Perfluorobutyric acid	0.1 ug/mL
							Perfluorobutanesulfonic acid (PFBS)	0.0884 ug/mL
							Perfluorodecanoic acid	0.1 ug/mL
							Perfluorododecanoic acid	0.1 ug/mL
							Perfluorodecane Sulfonic acid	0.0964 ug/mL
							Perfluoroheptanoic acid (PFHpA)	0.1 ug/mL
							Perfluoroheptanesulfonic acid	0.0952 ug/mL
							Perfluorohexanoic acid	0.1 ug/mL
							Perfluorohexadecanoic acid	0.1 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.091 ug/mL
							Perfluorononanoic acid (PFNA)	0.1 ug/mL
							Perfluorooctanoic acid (PFOA)	0.1 ug/mL
							Perfluorooctadecanoic acid	0.1 ug/mL
							Perfluorooctanesulfonic acid (PFOS)	0.0928 ug/mL
							Perfluorooctane Sulfonamide	0.1 ug/mL
							Perfluoropentanoic acid	0.1 ug/mL
							Perfluorotetradecanoic acid	0.1 ug/mL
							Perfluorotridecanoic acid	0.1 ug/mL
							Perfluoroundecanoic acid	0.1 ug/mL
..LCPFCSP_00127	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LC4:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.934 ug/mL
					LC6:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.948 ug/mL
					LC8:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.958 ug/mL
					LCN-EtFOSAA_00004	200 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCN-MeFOSAA_00005	200 uL	N-methyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCPFBA_00007	200 uL	Perfluorobutyric acid	1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCPFBS_00008	200 uL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA_00008	200 uL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA_00008	200 uL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA_00002	200 uL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00008	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA_00003	200 uL	Perfluoroheptanesulfonic acid	0.952 ug/mL
					LCPFHxA_00007	200 uL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA_00009	200 uL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxS-br_00004	200 uL	Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA_00009	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00009	200 uL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00009	200 uL	Perfluorooctadecanoic acid	1 ug/mL
					LCPFOS-br_00004	200 uL	Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
					LCPFOSA_00010	200 uL	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00007	200 uL	Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00006	200 uL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00006	200 uL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA_00007	200 uL	Perfluoroundecanoic acid	1 ug/mL
...LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
...LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
...LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
...LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
...LCN-MeFOSAA_00005	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
...LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
...LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
...LCPFDA_00008	05/29/22	Wellington Laboratories, Lot PFDA0517			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL
...LCPFDoA_00008	05/29/22	Wellington Laboratories, Lot PFDoA0517			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
...LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL
...LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
...LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL
...LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
...LCPFHxDA_00009	07/13/22	Wellington Laboratories, Lot PFHxDA0717			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
...LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
...LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
...LCPFOA_00009	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
...LCPFODA_00009	07/13/22	Wellington Laboratories, Lot PFODA0717			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
...LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
...LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
...LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
...LCPFTeDA_00006	12/09/20	Wellington Laboratories, Lot PFTeDA1215			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
...LCPFTrDA_00006	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
...LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL
LCPFC_LL3_00003	06/23/18	01/02/18	MeOH/H2O, Lot 090285	200 mL	LCMPFC_ALL_SU_00032	10 mL	d3-NMeFOSAA	2.5 ng/mL
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL
							13C2 PFDA	2.5 ng/mL
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFC-IS_00023	10 mL	13C2-PFOA	2.5 ng/mL
					LCPFCSP_00129	500 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.2335 ng/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.237 ng/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.2395 ng/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	0.25 ng/mL
							N-methyl perfluorooctane sulfonamidoacetic acid	0.25 ng/mL
							Perfluorobutyric acid	0.25 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	0.221 ng/mL
							Perfluorodecanoic acid	0.25 ng/mL
							Perfluorododecanoic acid	0.25 ng/mL
							Perfluorodecane Sulfonic acid	0.241 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Perfluoroheptanoic acid (PFHpA)	0.25 ng/mL
							Perfluoroheptanesulfonic acid	0.238 ng/mL
							Perfluorohexanoic acid	0.25 ng/mL
							Perfluorohexadecanoic acid	0.25 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.2275 ng/mL
							Perfluorononanoic acid (PFNA)	0.25 ng/mL
							Perfluorooctanoic acid (PFOA)	0.25 ng/mL
							Perfluorooctadecanoic acid	0.25 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	0.232 ng/mL
							Perfluorooctane Sulfonamide	0.25 ng/mL
							Perfluoropentanoic acid	0.25 ng/mL
							Perfluorotetradecanoic acid	0.25 ng/mL
							Perfluorotridecanoic acid	0.25 ng/mL
							Perfluoroundecanoic acid	0.25 ng/mL
.LCMPFC_ALL_SU_00032	06/28/18	12/28/17	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL

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SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFC-IS_00023	06/28/18	12/28/17	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
..LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
.LCPFCSP_00129	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LCPFCSP_00127	1 mL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.0934 ug/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.0948 ug/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.0958 ug/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	0.1 ug/mL
							N-methyl perfluorooctane sulfonamidoacetic acid	0.1 ug/mL
							Perfluorobutyric acid	0.1 ug/mL
							Perfluorobutanesulfonic acid (PFBS)	0.0884 ug/mL
							Perfluorodecanoic acid	0.1 ug/mL
							Perfluorododecanoic acid	0.1 ug/mL
							Perfluorodecane Sulfonic acid	0.0964 ug/mL
							Perfluoroheptanoic acid (PFHpA)	0.1 ug/mL
							Perfluoroheptanesulfonic acid	0.0952 ug/mL
							Perfluorohexanoic acid	0.1 ug/mL
							Perfluorohexadecanoic acid	0.1 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.091 ug/mL
							Perfluorononanoic acid (PFNA)	0.1 ug/mL
							Perfluorooctanoic acid (PFOA)	0.1 ug/mL
							Perfluorooctadecanoic acid	0.1 ug/mL
							Perfluorooctanesulfonic acid (PFOS)	0.0928 ug/mL
							Perfluorooctane Sulfonamide	0.1 ug/mL
							Perfluoropentanoic acid	0.1 ug/mL
							Perfluorotetradecanoic acid	0.1 ug/mL
							Perfluorotridecanoic acid	0.1 ug/mL
							Perfluoroundecanoic acid	0.1 ug/mL
..LCPFCSP_00127	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LC4:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.934 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LC6:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.948 ug/mL
					LC8:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.958 ug/mL
					LCN-EtFOSAA_00004	200 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCN-MeFOSAA_00005	200 uL	N-methyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCPFBA_00007	200 uL	Perfluorobutyric acid	1 ug/mL
					LCPFBS_00008	200 uL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA_00008	200 uL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA_00008	200 uL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA_00002	200 uL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00008	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA_00003	200 uL	Perfluoroheptanesulfonic acid	0.952 ug/mL
					LCPFHxA_00007	200 uL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA_00009	200 uL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxS-br_00004	200 uL	Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA_00009	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00009	200 uL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00009	200 uL	Perfluorooctadecanoic acid	1 ug/mL
					LCPFOS-br_00004	200 uL	Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
					LCPFOSA_00010	200 uL	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00007	200 uL	Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00006	200 uL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00006	200 uL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA_00007	200 uL	Perfluoroundecanoic acid	1 ug/mL
...LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
...LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
...LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
...LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
...LCN-MeFOSAA_00005	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
...LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
...LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
...LCPFDA_00008	05/29/22	Wellington Laboratories, Lot PFDA0517			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
...LCPFDoA_00008	05/29/22	Wellington Laboratories, Lot PFDoA0517			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
...LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL
...LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
...LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL
...LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
...LCPFHxDA_00009	07/13/22	Wellington Laboratories, Lot PFHxDA0717			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
...LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
...LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
...LCPFOA_00009	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
...LCPFODA_00009	07/13/22	Wellington Laboratories, Lot PFODA0717			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
...LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
...LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
...LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
...LCPFTeDA_00006	12/09/20	Wellington Laboratories, Lot PFTeDA1215			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
...LCPFTrDA_00006	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
...LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL
LCPFC_LL4_00003	06/23/18	01/02/18	MeOH/H2O, Lot 090285	200 mL	LCMPFC_ALL_SU_00032	10 mL	d3-NMeFOSAA	2.5 ng/mL
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL
							13C2 PFDA	2.5 ng/mL
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFC-IS_00023	10 mL	13C2-PFOA	2.5 ng/mL
					LCPFCSP_00127	200 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.934 ng/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.948 ng/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.958 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							N-ethyl perfluorooctane sulfonamidoacetic acid	1 ng/mL
							N-methyl perfluorooctane sulfonamidoacetic acid	1 ng/mL
							Perfluorobutyric acid	1 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	0.884 ng/mL
							Perfluorodecanoic acid	1 ng/mL
							Perfluorododecanoic acid	1 ng/mL
							Perfluorodecane Sulfonic acid	0.964 ng/mL
							Perfluoroheptanoic acid (PFHpA)	1 ng/mL
							Perfluoroheptanesulfonic acid	0.952 ng/mL
							Perfluorohexanoic acid	1 ng/mL
							Perfluorohexadecanoic acid	1 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.91 ng/mL
							Perfluorononanoic acid (PFNA)	1 ng/mL
							Perfluorooctanoic acid (PFOA)	1 ng/mL
							Perfluorooctadecanoic acid	1 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	0.928 ng/mL
							Perfluorooctane Sulfonamide	1 ng/mL
							Perfluoropentanoic acid	1 ng/mL
							Perfluorotetradecanoic acid	1 ng/mL
							Perfluorotridecanoic acid	1 ng/mL
							Perfluoroundecanoic acid	1 ng/mL
.LCMPFC_ALL_SU_00032	06/28/18	12/28/17	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFC-IS_00023	06/28/18	12/28/17	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
..LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
.LCPFCSP_00127	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LC4:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.934 ug/mL
					LC6:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.948 ug/mL
					LC8:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.958 ug/mL
					LCN-EtFOSAA_00004	200 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCN-MeFOSAA_00005	200 uL	N-methyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCPFBA_00007	200 uL	Perfluorobutyric acid	1 ug/mL
					LCPFBS_00008	200 uL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA_00008	200 uL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA_00008	200 uL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA_00002	200 uL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00008	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA_00003	200 uL	Perfluoroheptanesulfonic acid	0.952 ug/mL
					LCPFHxA_00007	200 uL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA_00009	200 uL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxS-br_00004	200 uL	Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA_00009	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00009	200 uL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00009	200 uL	Perfluorooctadecanoic acid	1 ug/mL

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Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCPFOS-br_00004	200 uL	Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
					LCPFOSA_00010	200 uL	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00007	200 uL	Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00006	200 uL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00006	200 uL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA_00007	200 uL	Perfluoroundecanoic acid	1 ug/mL
..LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
..LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
..LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
..LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
..LCN-MeFOSAA_00005	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
..LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
..LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFDA_00008	05/29/22	Wellington Laboratories, Lot PFDA0517			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL
..LCPFDoA_00008	05/29/22	Wellington Laboratories, Lot PFDoA0517			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
..LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL
..LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL
..LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
..LCPFHxDA_00009	07/13/22	Wellington Laboratories, Lot PFHxDA0717			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
..LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00009	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFODA_00009	07/13/22	Wellington Laboratories, Lot PFODA0717			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
..LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
..LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
..LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
..LCPFTeDA_00006	12/09/20	Wellington Laboratories, Lot PFTeDA1215			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
..LCPFTrDA_00006	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
..LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL
LCPFC_LL5_00003	06/23/18	01/02/18	MeOH/H2O, Lot 090285	200 mL	LCMPFC_ALL_SU_00032	10 mL	d3-NMeFOSAA	2.5 ng/mL
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL

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Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL
							13C2 PFDA	2.5 ng/mL
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFC-IS_00023	10 mL	13C2-PFOA	2.5 ng/mL
					LCPFCSP_00127	500 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	2.335 ng/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	2.37 ng/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	2.395 ng/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	2.5 ng/mL
							N-methyl perfluorooctane sulfonamidoacetic acid	2.5 ng/mL
							Perfluorobutyric acid	2.5 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	2.21 ng/mL
							Perfluorodecanoic acid	2.5 ng/mL
							Perfluorododecanoic acid	2.5 ng/mL
							Perfluorodecane Sulfonic acid	2.41 ng/mL
							Perfluoroheptanoic acid (PFHpA)	2.5 ng/mL
							Perfluoroheptanesulfonic acid	2.38 ng/mL
							Perfluorohexanoic acid	2.5 ng/mL
							Perfluorohexadecanoic acid	2.5 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	2.275 ng/mL
							Perfluorononanoic acid (PFNA)	2.5 ng/mL
							Perfluorooctanoic acid (PFOA)	2.5 ng/mL
							Perfluorooctadecanoic acid	2.5 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	2.32 ng/mL
							Perfluorooctane Sulfonamide	2.5 ng/mL
							Perfluoropentanoic acid	2.5 ng/mL
							Perfluorotetradecanoic acid	2.5 ng/mL
							Perfluorotridecanoic acid	2.5 ng/mL

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SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Perfluoroundecanoic acid	2.5 ng/mL
.LCMPFC_ALL_SU_00032	06/28/18	12/28/17	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFC-IS_00023	06/28/18	12/28/17	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
..LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
.LCPFCSP_00127	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LC4:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.934 ug/mL
					LC6:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.948 ug/mL

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Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LC8:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.958 ug/mL
					LCN-EtFOSAA_00004	200 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCN-MeFOSAA_00005	200 uL	N-methyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCPFBA_00007	200 uL	Perfluorobutyric acid	1 ug/mL
					LCPFBS_00008	200 uL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA_00008	200 uL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA_00008	200 uL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA_00002	200 uL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00008	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA_00003	200 uL	Perfluoroheptanesulfonic acid	0.952 ug/mL
					LCPFHxA_00007	200 uL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA_00009	200 uL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxS-br_00004	200 uL	Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA_00009	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00009	200 uL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00009	200 uL	Perfluorooctadecanoic acid	1 ug/mL
					LCPFOS-br_00004	200 uL	Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
					LCPFOSA_00010	200 uL	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00007	200 uL	Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00006	200 uL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00006	200 uL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA_00007	200 uL	Perfluoroundecanoic acid	1 ug/mL
..LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
..LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
..LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
..LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
..LCN-MeFOSAA_00005	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
..LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
..LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFDA_00008	05/29/22	Wellington Laboratories, Lot PFDA0517			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL
..LCPFDoA_00008	05/29/22	Wellington Laboratories, Lot PFDoA0517			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
..LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL

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Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL
..LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
..LCPFHxDA_00009	07/13/22	Wellington Laboratories, Lot PFHxDA0717			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
..LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00009	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFODA_00009	07/13/22	Wellington Laboratories, Lot PFODA0717			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
..LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
..LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
..LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
..LCPFTeDA_00006	12/09/20	Wellington Laboratories, Lot PFTeDA1215			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
..LCPFTrDA_00006	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
..LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL
LCPFC_LL6_00004	06/23/18	01/02/18	MeOH/H2O, Lot 090285	200 mL	LCMPFC_ALL_SU_00032	10 mL	d3-NMeFOSAA	2.5 ng/mL
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL
							13C2 PFDA	2.5 ng/mL
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFC-IS_00023	10 mL	13C2-PFOA	2.5 ng/mL
					LCPFCSP_00127	1 mL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	4.67 ng/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	4.74 ng/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	4.79 ng/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	5 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							N-methyl perfluorooctane sulfonamidoacetic acid	5 ng/mL
							Perfluorobutyric acid	5 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	4.42 ng/mL
							Perfluorodecanoic acid	5 ng/mL
							Perfluorododecanoic acid	5 ng/mL
							Perfluorodecane Sulfonic acid	4.82 ng/mL
							Perfluoroheptanoic acid (PFHpA)	5 ng/mL
							Perfluoroheptanesulfonic acid	4.76 ng/mL
							Perfluorohexanoic acid	5 ng/mL
							Perfluorohexadecanoic acid	5 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	4.55 ng/mL
							Perfluorononanoic acid (PFNA)	5 ng/mL
							Perfluorooctanoic acid (PFOA)	5 ng/mL
							Perfluorooctadecanoic acid	5 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	4.64 ng/mL
							Perfluorooctane Sulfonamide	5 ng/mL
							Perfluoropentanoic acid	5 ng/mL
							Perfluorotetradecanoic acid	5 ng/mL
							Perfluorotridecanoic acid	5 ng/mL
							Perfluoroundecanoic acid	5 ng/mL
.LCMPFC_ALL_SU_00032	06/28/18	12/28/17	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFC-IS_00023	06/28/18	12/28/17	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
..LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
.LCPFCSP_00127	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LC4:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.934 ug/mL
					LC6:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.948 ug/mL
					LC8:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.958 ug/mL
					LCN-EtFOSAA_00004	200 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCN-MeFOSAA_00005	200 uL	N-methyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCPFBA_00007	200 uL	Perfluorobutyric acid	1 ug/mL
					LCPFBS_00008	200 uL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA_00008	200 uL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA_00008	200 uL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA_00002	200 uL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00008	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA_00003	200 uL	Perfluoroheptanesulfonic acid	0.952 ug/mL
					LCPFHxA_00007	200 uL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA_00009	200 uL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxS-br_00004	200 uL	Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA_00009	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00009	200 uL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00009	200 uL	Perfluorooctadecanoic acid	1 ug/mL
					LCPFOS-br_00004	200 uL	Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
					LCPFOSA_00010	200 uL	Perfluorooctane Sulfonamide	1 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCPFPeA_00007	200 uL	Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00006	200 uL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00006	200 uL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA_00007	200 uL	Perfluoroundecanoic acid	1 ug/mL
..LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
..LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
..LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
..LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
..LCN-MeFOSAA_00005	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
..LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
..LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFDA_00008	05/29/22	Wellington Laboratories, Lot PFDA0517			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL
..LCPFDoA_00008	05/29/22	Wellington Laboratories, Lot PFDoA0517			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
..LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL
..LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL
..LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
..LCPFHxDA_00009	07/13/22	Wellington Laboratories, Lot PFHxDA0717			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
..LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00009	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFODA_00009	07/13/22	Wellington Laboratories, Lot PFODA0717			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
..LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
..LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
..LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
..LCPFTeDA_00006	12/09/20	Wellington Laboratories, Lot PFTeDA1215			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
..LCPFTrDA_00006	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
..LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL
LCPFC_LL7_00003	06/23/18	01/02/18	MeOH/H2O, Lot 090285	200 mL	LCMPFC_ALL_SU_00032	10 mL	d3-NMeFOSAA	2.5 ng/mL
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL
							13C2 PFDA	2.5 ng/mL
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFC-IS_00023	10 mL	13C2-PFOA	2.5 ng/mL
					LCPFCSP_00127	2 mL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	9.34 ng/mL
							Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	9.48 ng/mL
							Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	9.58 ng/mL
							N-ethyl perfluorooctane sulfonamidoacetic acid	10 ng/mL
							N-methyl perfluorooctane sulfonamidoacetic acid	10 ng/mL
							Perfluorobutyric acid	10 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	8.84 ng/mL
							Perfluorodecanoic acid	10 ng/mL
							Perfluorododecanoic acid	10 ng/mL
							Perfluorodecane Sulfonic acid	9.64 ng/mL
							Perfluoroheptanoic acid (PFHpA)	10 ng/mL
							Perfluoroheptanesulfonic acid	9.52 ng/mL
							Perfluorohexanoic acid	10 ng/mL
							Perfluorohexadecanoic acid	10 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	9.1 ng/mL
							Perfluorononanoic acid (PFNA)	10 ng/mL
							Perfluorooctanoic acid (PFOA)	10 ng/mL
							Perfluorooctadecanoic acid	10 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	9.28 ng/mL
							Perfluorooctane Sulfonamide	10 ng/mL
							Perfluoropentanoic acid	10 ng/mL
							Perfluorotetradecanoic acid	10 ng/mL
							Perfluorotridecanoic acid	10 ng/mL
							Perfluoroundecanoic acid	10 ng/mL
.LCMPFC_ALL_SU_00032	06/28/18	12/28/17	Methanol, Lot Baker 141039	200 mL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	0.05 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	0.05 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.0475 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.0479 ug/mL
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	0.05 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	0.05 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	0.05 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	0.05 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	0.05 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	0.05 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.0465 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	0.05 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	0.05 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	0.05 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.0473 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	0.05 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	0.05 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.0478 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	0.05 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFC-IS_00023	06/28/18	12/28/17	Methanol, Lot 090285	200 mL	LCM2PFOA_00008	200 uL	13C2-PFOA	0.05 ug/mL
..LCM2PFOA_00008	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
.LCPFCSP_00127	06/23/18	12/23/17	Methanol, Lot 090285	10000 uL	LC4:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.934 ug/mL
					LC6:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.948 ug/mL
					LC8:2FTS_00003	200 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.958 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCN-EtFOSAA_00004	200 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCN-MeFOSAA_00005	200 uL	N-methyl perfluorooctane sulfonamidoacetic acid	1 ug/mL
					LCPFBA_00007	200 uL	Perfluorobutyric acid	1 ug/mL
					LCPFBS_00008	200 uL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA_00008	200 uL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA_00008	200 uL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA_00002	200 uL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00008	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA_00003	200 uL	Perfluoroheptanesulfonic acid	0.952 ug/mL
					LCPFHxA_00007	200 uL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA_00009	200 uL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxS-br_00004	200 uL	Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA_00009	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00009	200 uL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00009	200 uL	Perfluorooctadecanoic acid	1 ug/mL
					LCPFOS-br_00004	200 uL	Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
					LCPFOSA_00010	200 uL	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00007	200 uL	Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00006	200 uL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00006	200 uL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA_00007	200 uL	Perfluoroundecanoic acid	1 ug/mL
..LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
..LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
..LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
..LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
..LCN-MeFOSAA_00005	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
..LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
..LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFDA_00008	05/29/22	Wellington Laboratories, Lot PFDA0517			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL
..LCPFDoA_00008	05/29/22	Wellington Laboratories, Lot PFDoA0517			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
..LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL
..LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
..LCPFHxDA_00009	07/13/22	Wellington Laboratories, Lot PFHxDA0717			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
..LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00009	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFODA_00009	07/13/22	Wellington Laboratories, Lot PFODA0717			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
..LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
..LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
..LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
..LCPFTeDA_00006	12/09/20	Wellington Laboratories, Lot PFTeDA1215			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
..LCPFTrDA_00006	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
..LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL
LCPFCIC_FULL_00009	06/28/18	01/02/18	MeOH/H2O, Lot 09285	200 mL	LCMPFC_ALL_SU_00029	0.5 mL	d3-NMeFOSAA	2.5 ng/mL
							d5-NEtFOSAA	2.5 ng/mL
							M2-6:2FTS	2.375 ng/mL
							M2-8:2FTS	2.395 ng/mL
							13C2-PFHxDA	2.5 ng/mL
							13C2-PFTeDA	2.5 ng/mL
							13C4-PFHpA	2.5 ng/mL
							13C5-PFPeA	2.5 ng/mL
							13C8 FOSA	2.5 ng/mL
							13C4 PFBA	2.5 ng/mL
							13C3-PFBS	2.325 ng/mL
							13C2 PFDA	2.5 ng/mL
							13C2 PFDoA	2.5 ng/mL
							13C2 PFHxA	2.5 ng/mL
							18O2 PFHxS	2.365 ng/mL
							13C5 PFNA	2.5 ng/mL
							13C4 PFOA	2.5 ng/mL
							13C4 PFOS	2.39 ng/mL
							13C2 PFUnA	2.5 ng/mL
					LCPFAC-24PAR_00001	250 uL	Perfluorobutanesulfonic acid (PFBS)	2.2125 ng/mL
							Perfluoroheptanoic acid (PFHpA)	2.5 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	2.28 ng/mL
							Perfluorononanoic acid (PFNA)	2.5 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	2.31375 ng/mL
							Perfluorooctanoic acid (PFOA)	2.5 ng/mL
.LCMPFC_ALL_SU_00029	06/28/18	12/28/17	Methanol, Lot Baker 141039	10000 uL	LCd3-NMeFOSAA_00006	200 uL	d3-NMeFOSAA	1 ug/mL
					LCd5-NEtFOSAA_00006	200 uL	d5-NEtFOSAA	1 ug/mL
					LCM2-6:FTS_00006	200 uL	M2-6:2FTS	0.95 ug/mL
					LCM2-8:2FTS_00008	200 uL	M2-8:2FTS	0.958 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCM2PFHxDA_00013	200 uL	13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA_00012	200 uL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA_00012	200 uL	13C4-PFHpA	1 ug/mL
					LCM5PFPEA_00013	200 uL	13C5-PFPeA	1 ug/mL
					LCM8FOSA_00016	200 uL	13C8 FOSA	1 ug/mL
					LCMPFBA_00013	200 uL	13C4 PFBA	1 ug/mL
					LCMPFBS_00006	200 uL	13C3-PFBS	0.93 ug/mL
					LCMPFDA_00018	200 uL	13C2 PFDA	1 ug/mL
					LCMPFDoA_00013	200 uL	13C2 PFDoA	1 ug/mL
					LCMPFHxA_00019	200 uL	13C2 PFHxA	1 ug/mL
					LCMPFHxS_00013	200 uL	18O2 PFHxS	0.946 ug/mL
					LCMPFNA_00013	200 uL	13C5 PFNA	1 ug/mL
					LCMPFOA_00017	200 uL	13C4 PFOA	1 ug/mL
					LCMPFOS_00025	200 uL	13C4 PFOS	0.956 ug/mL
					LCMPFUdA_00014	200 uL	13C2 PFUnA	1 ug/mL
..LCd3-NMeFOSAA_00006	05/19/22	WELLINGTON, Lot d3NMeFOSAA0517			(Purchased Reagent)		d3-NMeFOSAA	50 ug/mL
..LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
..LCM2-6:FTS_00006	02/17/22	WELLINGTON, Lot M262FTS0217			(Purchased Reagent)		M2-6:2FTS	47.5 ug/mL
..LCM2-8:2FTS_00008	07/05/22	WELLINGTON, Lot M282FTS0717			(Purchased Reagent)		M2-8:2FTS	47.9 ug/mL
..LCM2PFHxDA_00013	07/13/22	Wellington Laboratories, Lot M2PFHxDA0717			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
..LCM2PFTeDA_00012	11/30/22	Wellington Laboratories, Lot M2PFTeDA1117			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
..LCM4PFHPA_00012	05/03/22	Wellington Laboratories, Lot M4PFHpA0517			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
..LCM5PFPEA_00013	07/20/22	Wellington Laboratories, Lot M5PFPeA0717			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
..LCM8FOSA_00016	10/11/22	Wellington Laboratories, Lot M8FOSA1017I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
..LCMPFBA_00013	04/12/22	Wellington Laboratories, Lot MPFBA0417			(Purchased Reagent)		13C4 PFBA	50 ug/mL
..LCMPFBS_00006	05/24/22	Wellington Laboratories, Lot M3PFBS0815			(Purchased Reagent)		13C3-PFBS	46.5 ug/mL
..LCMPFDA_00018	07/13/22	Wellington Laboratories, Lot MPFDA0717			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFDoA_00013	05/23/22	Wellington Laboratories, Lot MPFDoA0517			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
..LCMPFHxA_00019	10/27/22	Wellington Laboratories, Lot MPFHxA1017			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
..LCMPFHxS_00013	02/17/22	Wellington Laboratories, Lot MPFHxS0217			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
..LCMPFNA_00013	09/30/21	Wellington Laboratories, Lot MPFNA0916			(Purchased Reagent)		13C5 PFNA	50 ug/mL
..LCMPFOA_00017	10/17/22	Wellington Laboratories, Lot MPFOA1017			(Purchased Reagent)		13C4 PFOA	50 ug/mL
..LCMPFOS_00025	10/17/22	Wellington Laboratories, Lot MPFOS1017			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
..LCMPFUdA_00014	11/22/21	Wellington Laboratories, Lot MPFUdA1116			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
.LCPFAC-24PAR_00001	09/15/22	Wellington Laboratories, Lot PFAC24PAR0917			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	1.77 ug/mL
							Perfluoroheptanoic acid (PFHpA)	2 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	1.824 ug/mL
							Perfluorononanoic acid (PFNA)	2 ug/mL
							Perfluorooctanesulfonic acid (PFOS)	1.851 ug/mL
							Perfluorooctanoic acid (PFOA)	2 ug/mL
LCPFCSP_00118	03/29/18	10/02/17	Methanol, Lot 090285	250 mL	LC4:2FTS_00003	100 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.01868 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LC6:2FTS_00003	100 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.01896 ug/mL
					LC8:2FTS_00003	100 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.01916 ug/mL
					LCN-EtFOSA-M_00005	100 uL	N-ethylperfluoro-1-octanesulfonamide	0.02 ug/mL
					LCN-EtFOSAA_00004	100 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	0.02 ug/mL
					LCN-MeFOSA-M_00004	100 uL	MeFOSA	0.02 ug/mL
					LCN-MeFOSAA_00004	100 uL	N-methyl perfluorooctane sulfonamidoacetic acid	0.02 ug/mL
					LCPFBA_00007	100 uL	Perfluorobutyric acid	0.02 ug/mL
					LCPFBS_00008	100 uL	Perfluorobutane Sulfonate	0.01768 ug/mL
							Perfluorobutanesulfonic acid (PFBS)	0.01768 ug/mL
					LCPFDA_00007	100 uL	Perfluorodecanoic acid	0.02 ug/mL
					LCPFDoA_00007	100 uL	Perfluorododecanoic acid	0.02 ug/mL
					LCPFDSA_00002	100 uL	Perfluorodecane Sulfonic acid	0.01928 ug/mL
					LCPFHpA_00008	100 uL	Perfluoroheptanoic acid (PFHpA)	0.02 ug/mL
					LCPFHpSA_00003	100 uL	Perfluoroheptanesulfonic acid	0.01904 ug/mL
					LCPFHxA_00007	100 uL	Perfluorohexanoic acid	0.02 ug/mL
					LCPFHxDA_00008	100 uL	Perfluorohexadecanoic acid	0.02 ug/mL
					LCPFHxS-br_00004	100 uL	Perfluorohexane Sulfonate	0.0182 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.0182 ug/mL
					LCPFNA_00009	100 uL	Perfluorononanoic acid (PFNA)	0.02 ug/mL
					LCPFOA_00008	100 uL	Perfluorooctanoic acid (PFOA)	0.02 ug/mL
					LCPFODA_00008	100 uL	Perfluorooctadecanoic acid	0.02 ug/mL
					LCPFOS-br_00004	100 uL	Perfluorooctanesulfonic acid (PFOS)	0.01856 ug/mL
					LCPFOSA_00010	100 uL	Perfluorooctane Sulfonamide	0.02 ug/mL
					LCPFPeA_00007	100 uL	Perfluoropentanoic acid	0.02 ug/mL
					LCPFTeDA_00007	100 uL	Perfluorotetradecanoic acid	0.02 ug/mL
					LCPFTrDA_00007	100 uL	Perfluorotridecanoic acid	0.02 ug/mL
					LCPFUdA_00007	100 uL	Perfluoroundecanoic acid	0.02 ug/mL
.LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
.LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
.LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
.LCN-EtFOSA-M_00005	05/24/21	WELLINGTON, Lot NEtFOSA0516M			(Purchased Reagent)		N-ethylperfluoro-1-octanesulfonamide	50 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
.LCN-MeFOSA-M_00004	05/24/21	WELLINGTON, Lot NMeFOSA0516M			(Purchased Reagent)		MeFOSA	50 ug/mL
.LCN-MeFOSAA_00004	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
.LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
.LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutane Sulfonate	44.2 ug/mL
							Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
.LCPFDA_00007	05/31/21	Wellington Laboratories, Lot PFDA0516			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL
.LCPFDoA_00007	05/31/21	Wellington Laboratories, Lot PFDoA0516			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
.LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL
.LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
.LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL
.LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
.LCPFHxDA_00008	05/25/21	Wellington Laboratories, Lot PFHxDA0516			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
.LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexane Sulfonate	45.5 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
.LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
.LCPFOA_00008	08/02/21	Wellington Laboratories, Lot PFOA0716			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
.LCPFODA_00008	04/29/21	Wellington Laboratories, Lot PFODA0416			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
.LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
.LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
.LCPFTeDA_00007	09/30/21	Wellington Laboratories, Lot PFTeDA0916			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
.LCPFTrDA_00007	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
.LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL
LCPFCSP_00119	03/29/18	10/02/17	Methanol, Lot 090285	250 mL	LC4:2FTS_00003	100 uL	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	0.01868 ug/mL
					LC6:2FTS_00003	100 uL	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	0.01896 ug/mL
					LC8:2FTS_00003	100 uL	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	0.01916 ug/mL
					LCN-EtFOSA-M_00005	100 uL	N-ethylperfluoro-1-octanesulfonamide	0.02 ug/mL
					LCN-EtFOSAA_00004	100 uL	N-ethyl perfluorooctane sulfonamidoacetic acid	0.02 ug/mL
					LCN-MeFOSA-M_00004	100 uL	MeFOSA	0.02 ug/mL
					LCN-MeFOSAA_00004	100 uL	N-methyl perfluorooctane sulfonamidoacetic acid	0.02 ug/mL
					LCPFBA_00007	100 uL	Perfluorobutyric acid	0.02 ug/mL
					LCPFBS_00008	100 uL	Perfluorobutane Sulfonate	0.01768 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Perfluorobutanesulfonic acid (PFBS)	0.01768 ug/mL
					LCPFDA_00007	100 uL	Perfluorodecanoic acid	0.02 ug/mL
					LCPFDoA_00007	100 uL	Perfluorododecanoic acid	0.02 ug/mL
					LCPFDSA_00002	100 uL	Perfluorodecane Sulfonic acid	0.01928 ug/mL
					LCPFHpA_00008	100 uL	Perfluoroheptanoic acid (PFHpA)	0.02 ug/mL
					LCPFHpSA_00003	100 uL	Perfluoroheptanesulfonic acid	0.01904 ug/mL
					LCPFHxA_00007	100 uL	Perfluorohexanoic acid	0.02 ug/mL
					LCPFHxDA_00008	100 uL	Perfluorohexadecanoic acid	0.02 ug/mL
					LCPFHxS-br_00004	100 uL	Perfluorohexane Sulfonate	0.0182 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.0182 ug/mL
					LCPFNA_00009	100 uL	Perfluorononanoic acid (PFNA)	0.02 ug/mL
					LCPFOA_00008	100 uL	Perfluorooctanoic acid (PFOA)	0.02 ug/mL
					LCPFODA_00008	100 uL	Perfluorooctadecanoic acid	0.02 ug/mL
					LCPFOS-br_00004	100 uL	Perfluorooctanesulfonic acid (PFOS)	0.01856 ug/mL
					LCPFOSA_00010	100 uL	Perfluorooctane Sulfonamide	0.02 ug/mL
					LCPFPeA_00007	100 uL	Perfluoropentanoic acid	0.02 ug/mL
					LCPFTeDA_00007	100 uL	Perfluorotetradecanoic acid	0.02 ug/mL
					LCPFTrDA_00007	100 uL	Perfluorotridecanoic acid	0.02 ug/mL
					LCPFUdA_00007	100 uL	Perfluoroundecanoic acid	0.02 ug/mL
.LC4:2FTS_00003	12/12/21	WELLINGTON, Lot 42FTS1216			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	46.7 ug/mL
.LC6:2FTS_00003	06/25/21	WELLINGTON, Lot 62FTS0616			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	47.4 ug/mL
.LC8:2FTS_00003	08/22/21	WELLINGTON, Lot 82FTS0816			(Purchased Reagent)		Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	47.9 ug/mL
.LCN-EtFOSA-M_00005	05/24/21	WELLINGTON, Lot NEtFOSA0516M			(Purchased Reagent)		N-ethylperfluoro-1-octanesulfonamide	50 ug/mL
.LCN-EtFOSAA_00004	09/30/21	WELLINGTON, Lot NEtFOSAA0916			(Purchased Reagent)		N-ethyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
.LCN-MeFOSA-M_00004	05/24/21	WELLINGTON, Lot NMeFOSA0516M			(Purchased Reagent)		MeFOSA	50 ug/mL
.LCN-MeFOSAA_00004	10/12/21	WELLINGTON, Lot NMeFOSAA0916			(Purchased Reagent)		N-methyl perfluorooctane sulfonamidoacetic acid	50 ug/mL
.LCPFBA_00007	05/27/21	Wellington Laboratories, Lot PFBA0516			(Purchased Reagent)		Perfluorobutyric acid	50 ug/mL
.LCPFBS_00008	03/15/21	Wellington Laboratories, Lot LPFBS0316			(Purchased Reagent)		Perfluorobutane Sulfonate	44.2 ug/mL
							Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
.LCPFDA_00007	05/31/21	Wellington Laboratories, Lot PFDA0516			(Purchased Reagent)		Perfluorodecanoic acid	50 ug/mL
.LCPFDoA_00007	05/31/21	Wellington Laboratories, Lot PFDoA0516			(Purchased Reagent)		Perfluorododecanoic acid	50 ug/mL
.LCPFDSA_00002	05/24/21	Wellington Laboratories, Lot LPFDS0516			(Purchased Reagent)		Perfluorodecane Sulfonic acid	48.2 ug/mL
.LCPFHpA_00008	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
.LCPFHpSA_00003	09/01/22	Wellington Laboratories, Lot LPFHpS0817			(Purchased Reagent)		Perfluoroheptanesulfonic acid	47.6 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.LCPFHxA_00007	12/22/20	Wellington Laboratories, Lot PFHxA1215			(Purchased Reagent)		Perfluorohexanoic acid	50 ug/mL
.LCPFHxDA_00008	05/25/21	Wellington Laboratories, Lot PFHxDA0516			(Purchased Reagent)		Perfluorohexadecanoic acid	50 ug/mL
.LCPFHxS-br_00004	07/03/20	Wellington Laboratories, Lot brPFHxSK0615			(Purchased Reagent)		Perfluorohexane Sulfonate	45.5 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
.LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
.LCPFOA_00008	08/02/21	Wellington Laboratories, Lot PFOA0716			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
.LCPFODA_00008	04/29/21	Wellington Laboratories, Lot PFODA0416			(Purchased Reagent)		Perfluorooctadecanoic acid	50 ug/mL
.LCPFOS-br_00004	10/14/20	Wellington Laboratories, Lot brPFOSK1015			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LCPFOSA_00010	09/30/21	Wellington Laboratories, Lot FOSA0916I			(Purchased Reagent)		Perfluorooctane Sulfonamide	50 ug/mL
.LCPFPeA_00007	05/31/21	Wellington Laboratories, Lot PFPeA0516			(Purchased Reagent)		Perfluoropentanoic acid	50 ug/mL
.LCPFTeDA_00007	09/30/21	Wellington Laboratories, Lot PFTeDA0916			(Purchased Reagent)		Perfluorotetradecanoic acid	50 ug/mL
.LCPFTrDA_00007	02/12/21	Wellington Laboratories, Lot PFTrDA0216			(Purchased Reagent)		Perfluorotridecanoic acid	50 ug/mL
.LCPFUdA_00007	10/18/21	Wellington Laboratories, Lot PFUdA1016			(Purchased Reagent)		Perfluoroundecanoic acid	50 ug/mL

Reagent

LC4:2FTS_00003

n: 7/12/17 SK

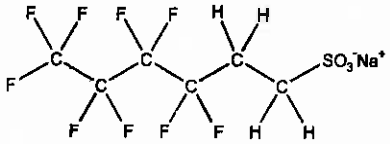
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: 4:2FTS **LOT NUMBER:** 42FTS1216

COMPOUND: Sodium 1H,1H,2H,2H-perfluorohexane sulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$C_8H_4F_8SO_3Na$	**MOLECULAR WEIGHT:**	350.13
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt)	**SOLVENT(S):**	Methanol
	46.7 ± 2.3 µg/ml (4:2FTS anion)		
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	12/12/2016		
EXPIRY DATE: (mm/dd/yyyy)	12/12/2021		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 12/21/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

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

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

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

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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

CALA

ANAB ACCREDITED

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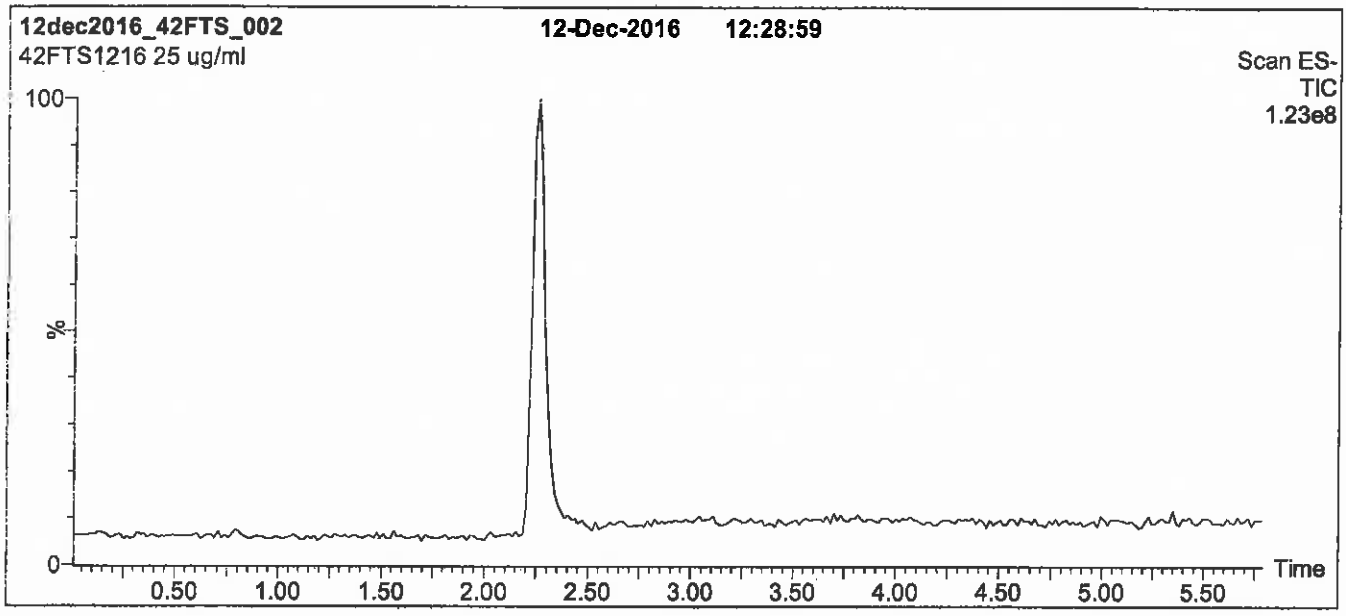
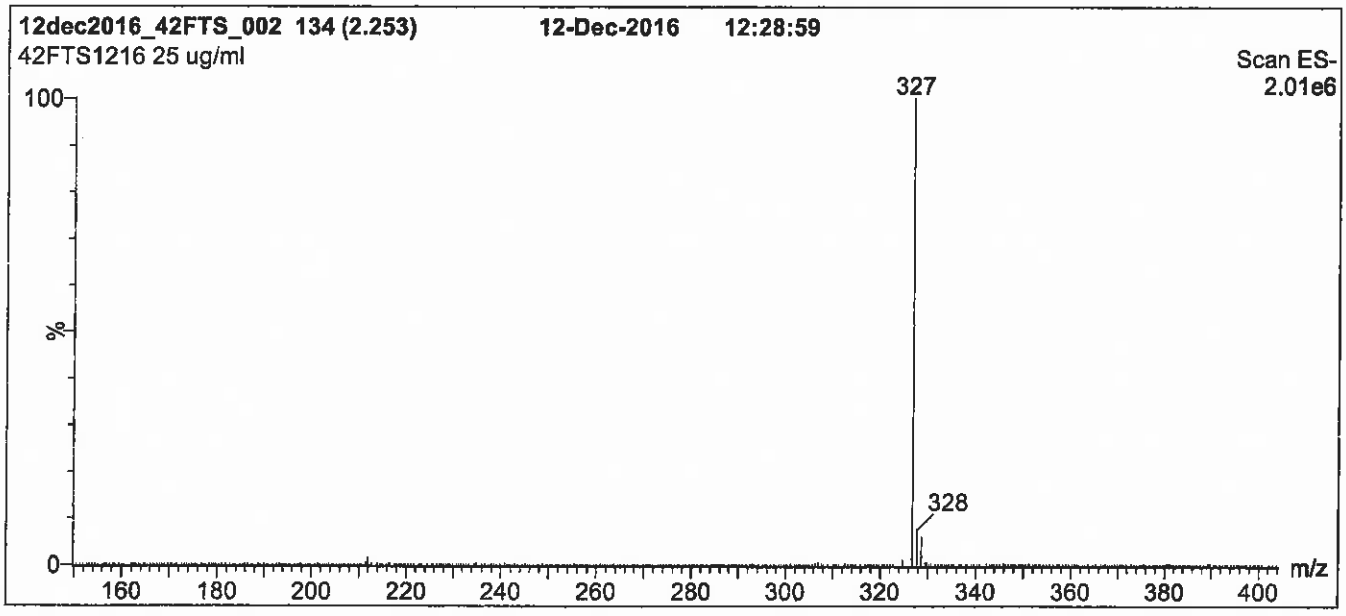
Figure 1: **4:2FTS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

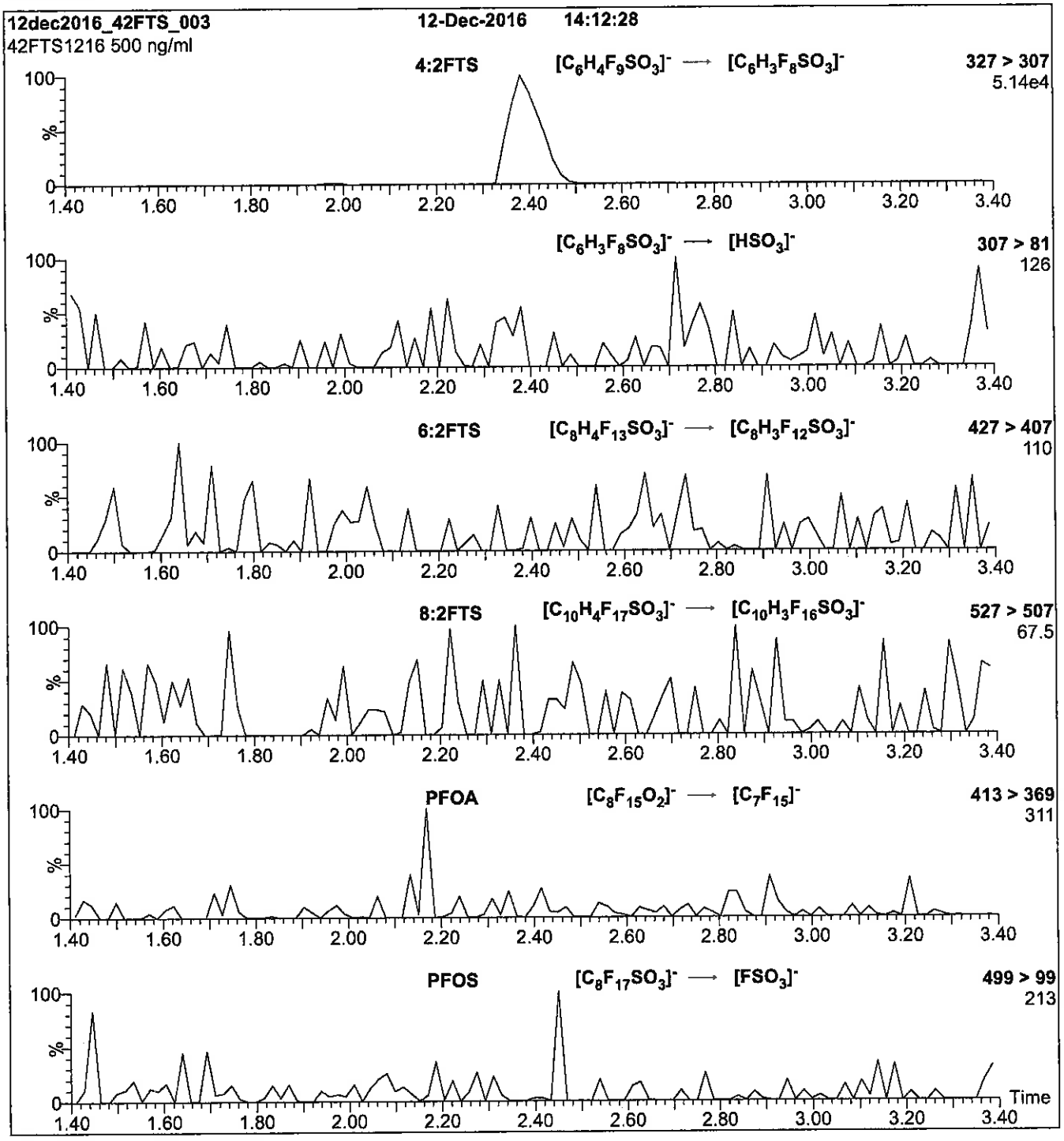
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **4:2FTS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection:	Direct loop injection 10 µl (500 ng/ml 4:2FTS)
Mobile phase:	Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O (both with 10 mM NH_4OAc buffer)
Flow:	300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 25

Reagent

LC6:2FTS_00003

P: 12/29/16 SRV

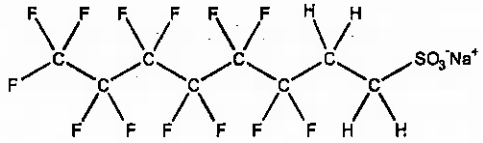
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: 6:2FTS **LOT NUMBER:** 62FTS0616

COMPOUND: Sodium 1H,1H,2H,2H-perfluorooctane sulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$C_8H_4F_{13}SO_3Na$	**MOLECULAR WEIGHT:**	450.15
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt)	**SOLVENT(S):**	Methanol
	47.4 ± 2.4 µg/ml (6:2FTS anion)		
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	06/25/2016		
EXPIRY DATE: (mm/dd/yyyy)	06/25/2021		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 06/29/2016 (mm/dd/yyyy)

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

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

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

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

TRACEABILITY:

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

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QUALITY MANAGEMENT:

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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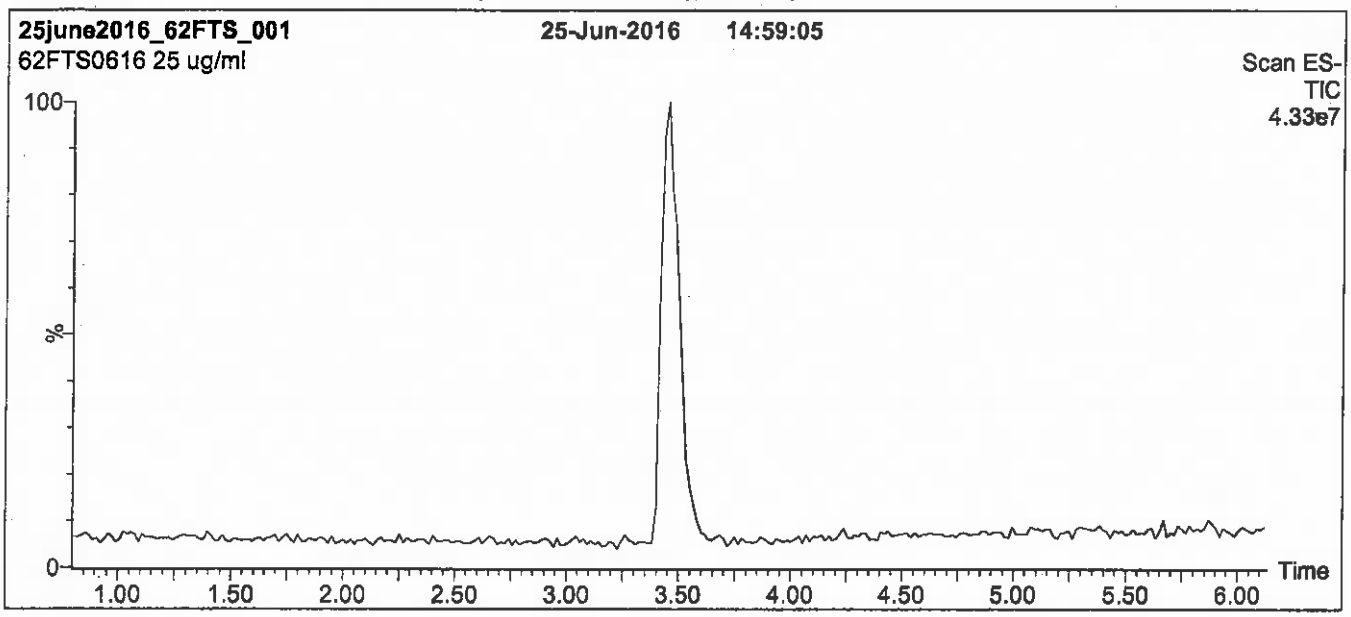
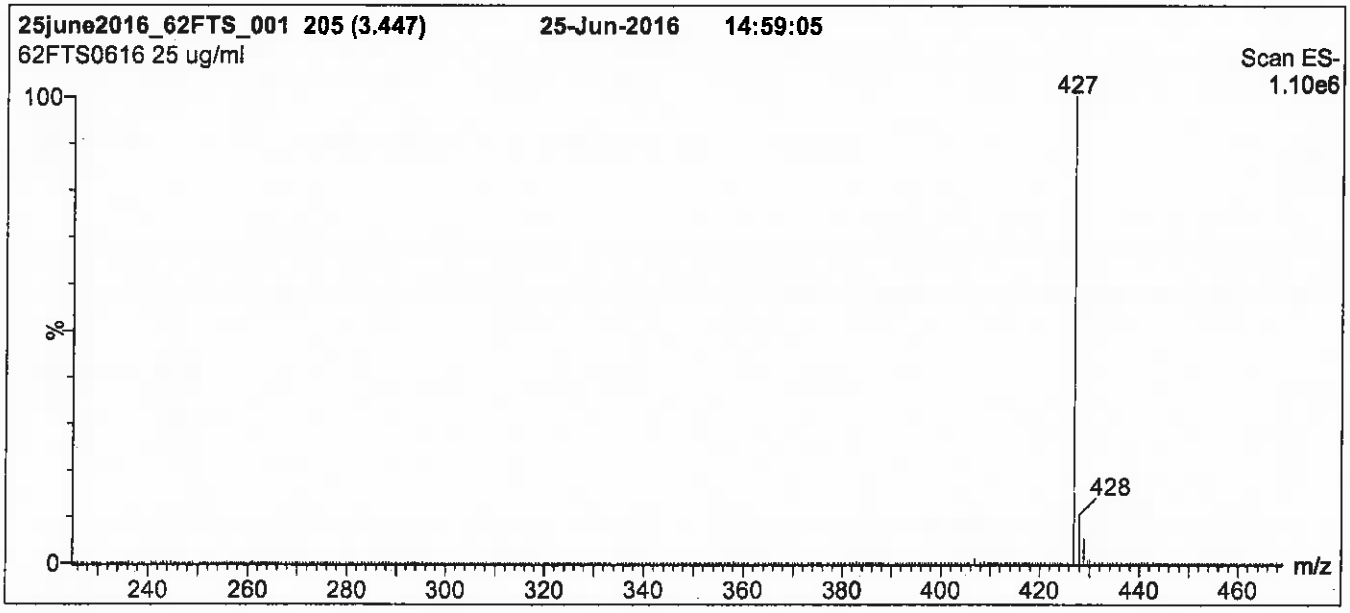
Figure 1: **6:2FTS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

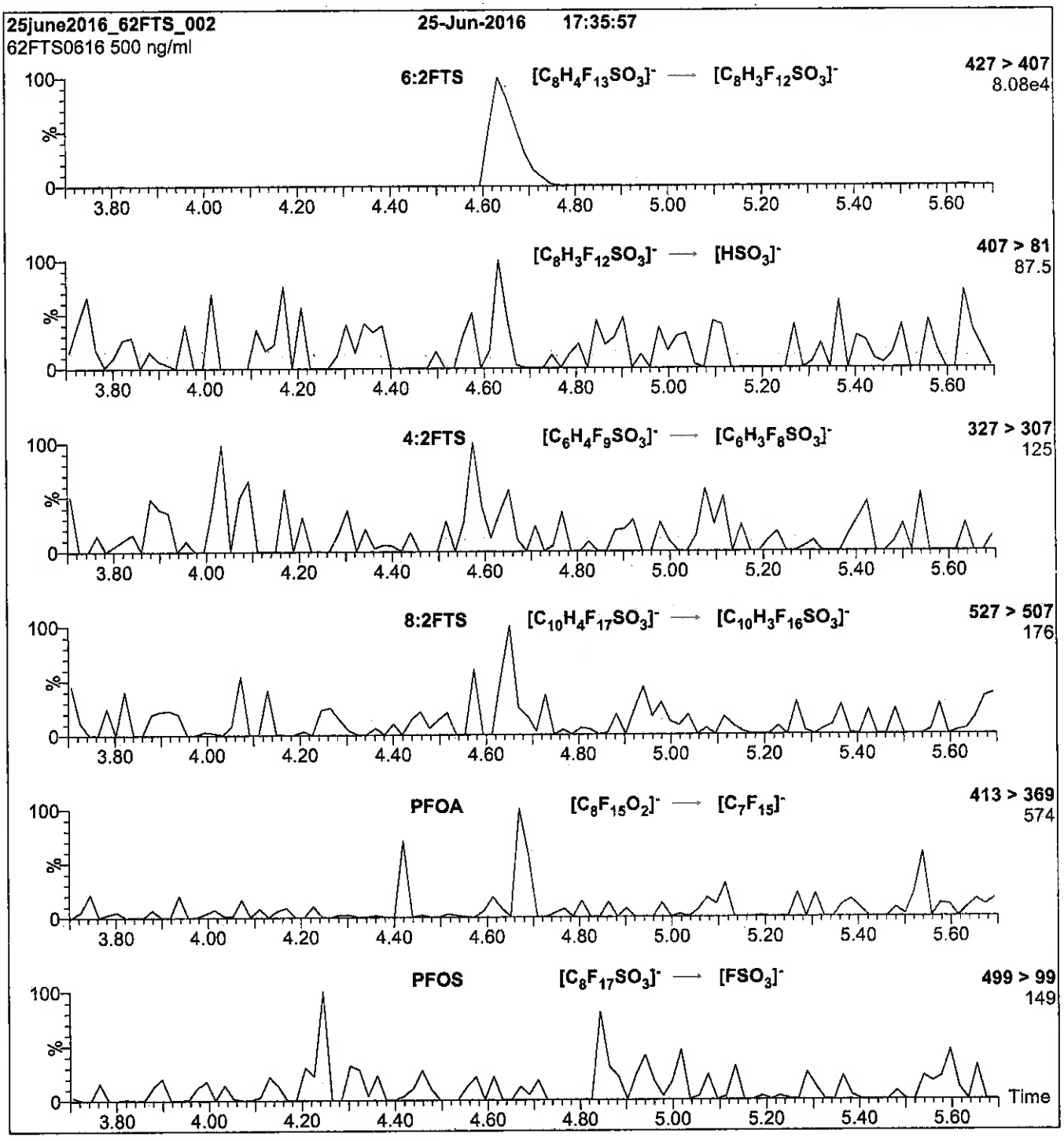
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 30.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **6:2FTS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml 6:2FTS)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 25

Reagent

LC8:2FTS_00003

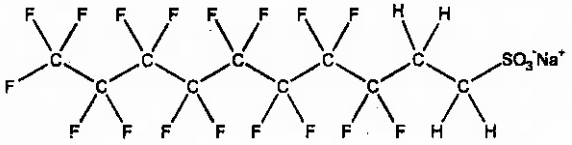
P: 12/29/16

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: 8:2FTS **LOT NUMBER:** 82FTS0816
COMPOUND: Sodium 1H,1H,2H,2H-perfluorodecane sulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$C_{10}H_4F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	550.16
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt)	**SOLVENT(S):**	Methanol
	47.9 ± 2.4 µg/ml (8:2FTS anion)		
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	08/22/2016		
EXPIRY DATE: (mm/dd/yyyy)	08/22/2021		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 08/25/2016 (mm/dd/yyyy)

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

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CALA

ANAB ACCREDITED

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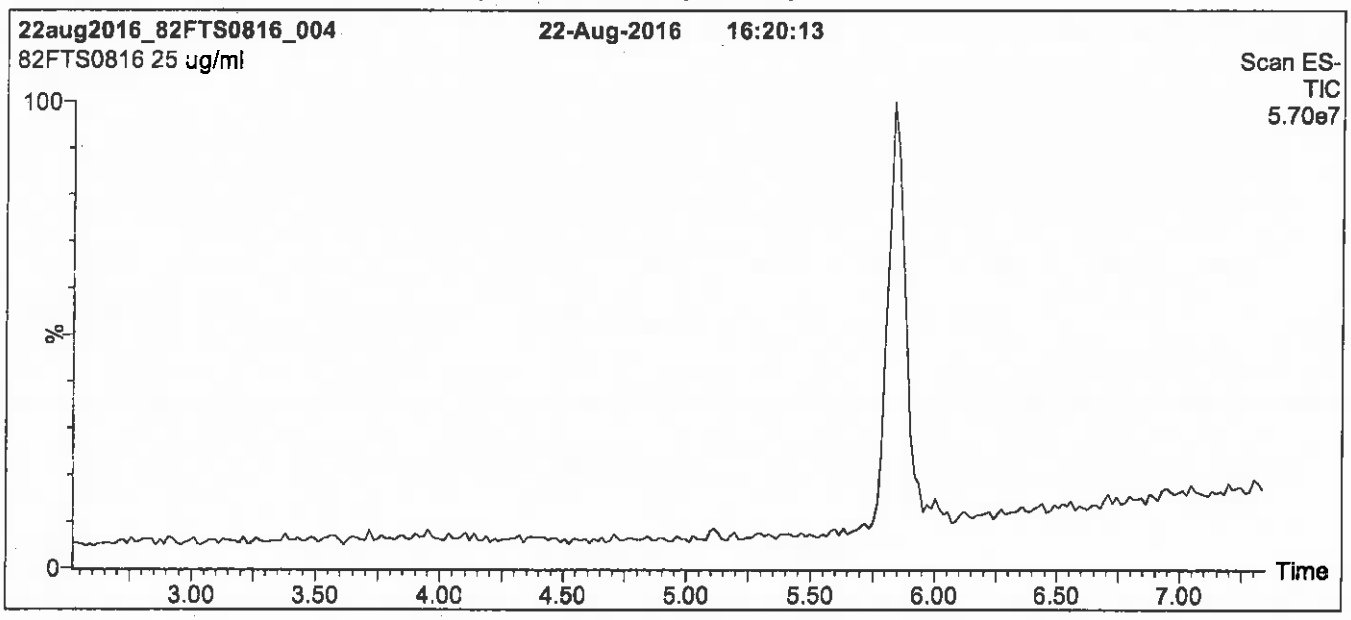
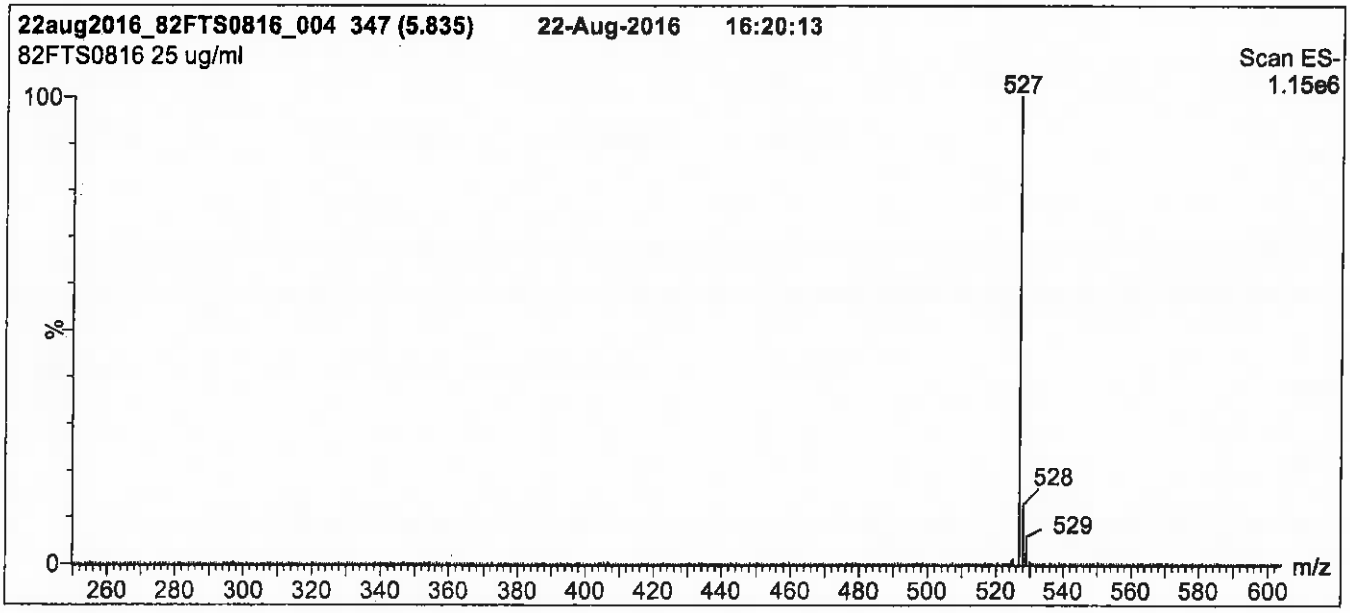
Figure 1: **8:2FTS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

Column: Agilent Zorbax Bonus-RP
1.8 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH/ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

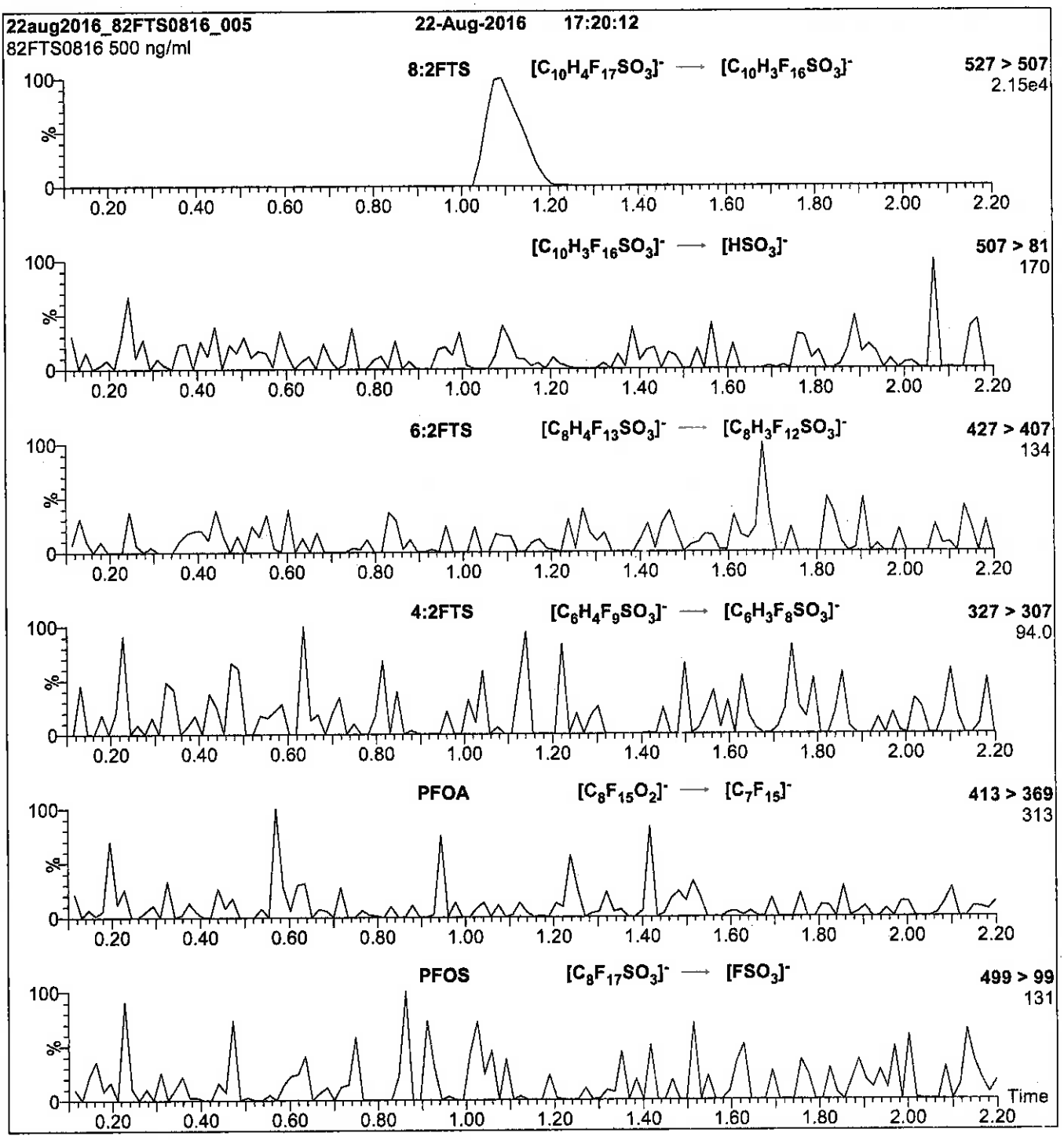
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250- 850 amu)

Source:Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 30.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **8:2FTS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml 8:2FTS)

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCd3-NMeFOSAA_00006

1106123
ID: LCd3-NMeFOSAA_00006
Exp: 05/19/22 Prpd: CCL
d3-N-MeFOSAA

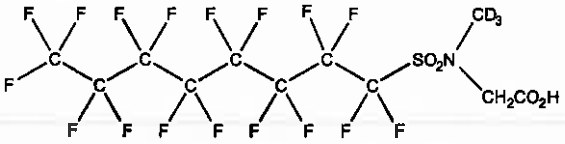
R: 12/4/17 CCL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: d3-N-MeFOSAA **LOT NUMBER:** d3NMeFOSAA0517
COMPOUND: N-methyl-d3-perfluoro-1-octanesulfonamidoacetic acid

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$C_{11}D_3H_3F_{17}NO_4S$	**MOLECULAR WEIGHT:**	574.23
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥98% $^2H_3$
LAST TESTED: (mm/dd/yyyy)	05/19/2017		
EXPIRY DATE: (mm/dd/yyyy)	05/19/2022		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 05/31/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

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EXPIRY DATE / PERIOD OF VALIDITY:

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

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CALA

ANAB ACCREDITED

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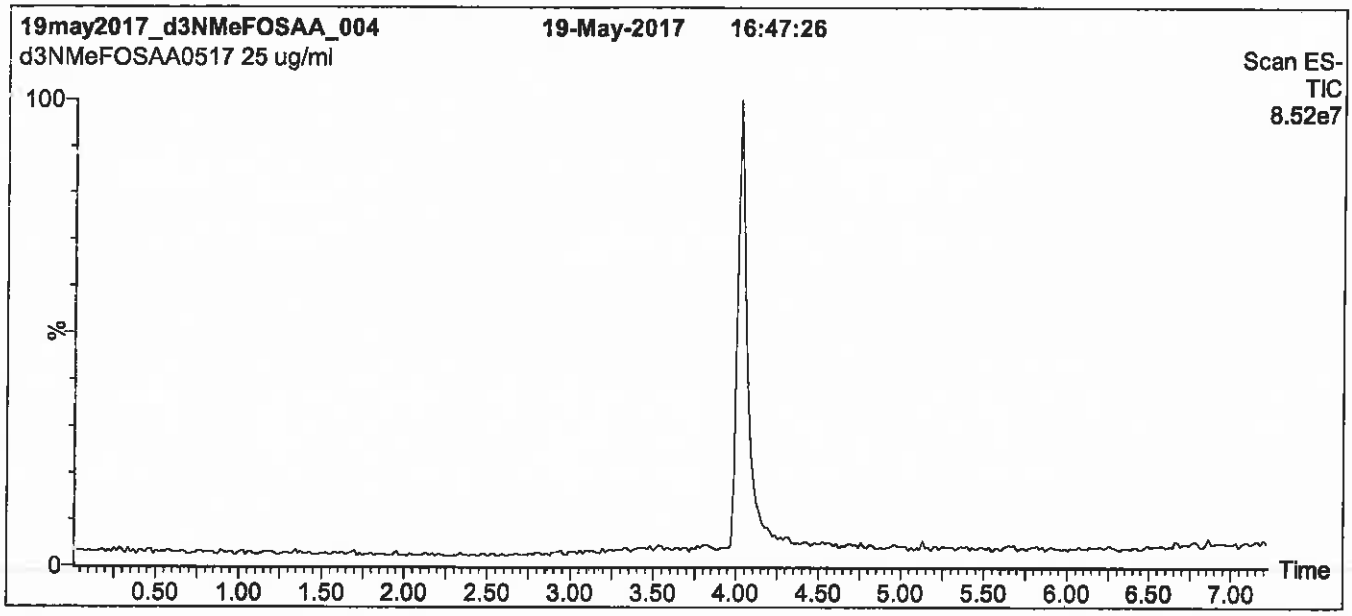
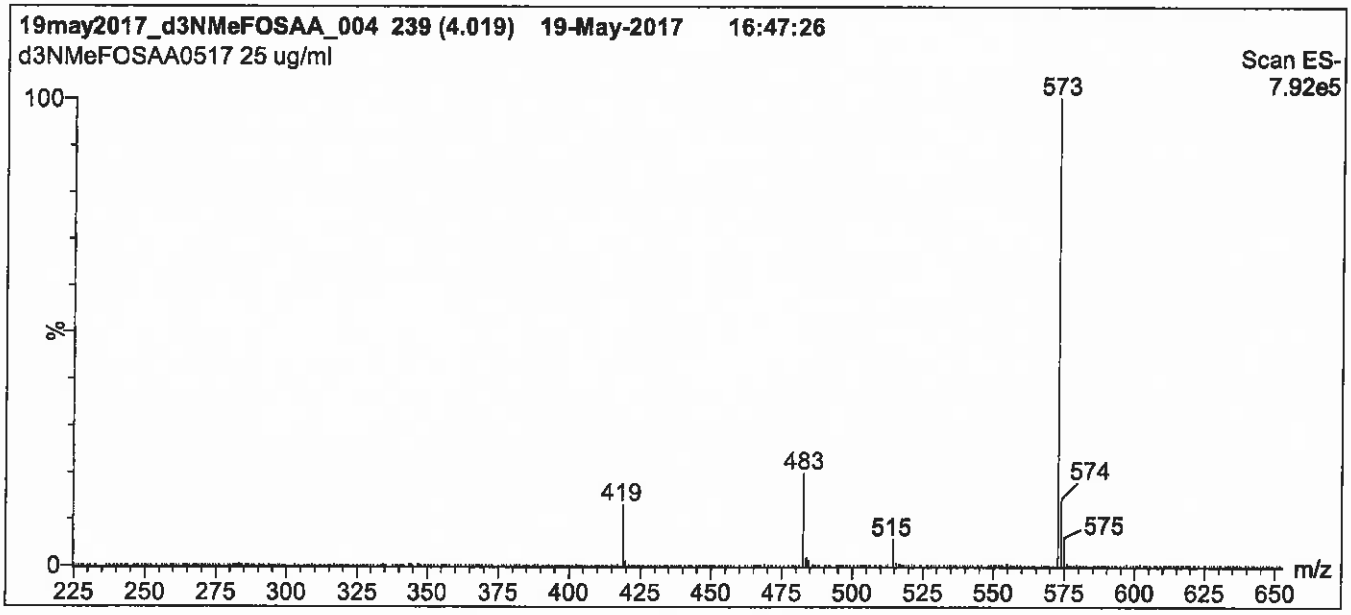
Figure 1: **d3-N-MeFOSAA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

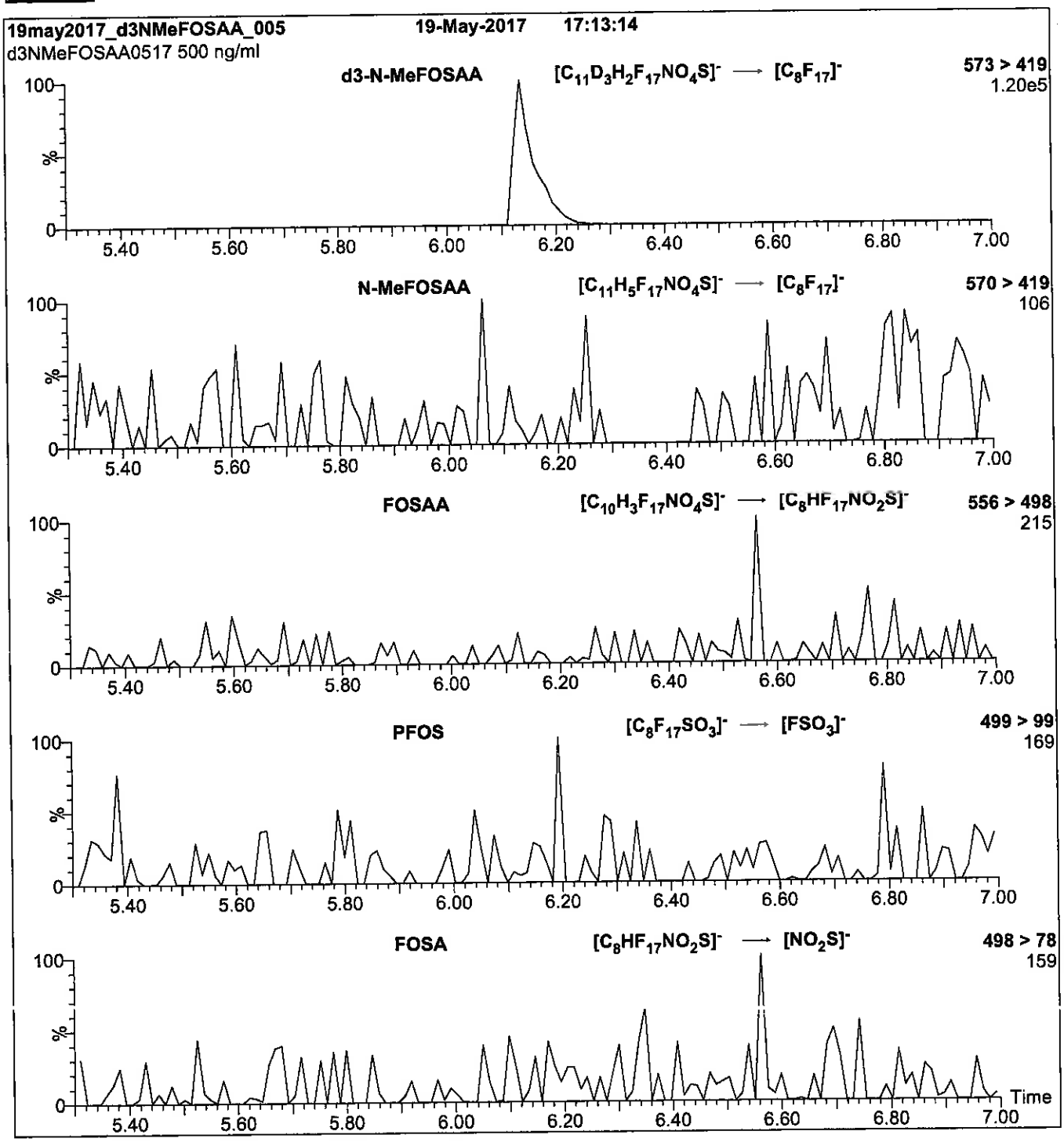
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 35.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **d3-N-MeFOSAA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection:	Direct loop injection 10 µl (500 ng/ml d3-N-MeFOSAA)
Mobile phase:	Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O (both with 10 mM NH_4OAc buffer)
Flow:	300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 20

Reagent

LCd5-NEtFOSAA_00006

1106105
ID: LCd5-NEtFOSAA_00006
Exp: 11/08/22 Prpd: CCL
d5-N-EtFOSAA

R: 12/4/17 ccc

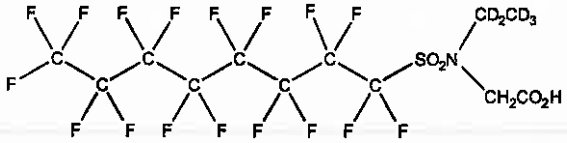
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: d5-N-EtFOSAA **LOT NUMBER:** d5NEtFOSAA1117

COMPOUND: N-ethyl-d5-perfluoro-1-octanesulfonamidoacetic acid

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$C_{12}D_5H_3F_{17}NO_4S$	**MOLECULAR WEIGHT:**	590.26
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥98% $^2H_5$
LAST TESTED: (mm/dd/yyyy)	11/08/2017		
EXPIRY DATE: (mm/dd/yyyy)	11/08/2022		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim, General Manager **Date:** 11/16/2017 (mm/dd/yyyy)

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

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CALA

ANAB ACCREDITED

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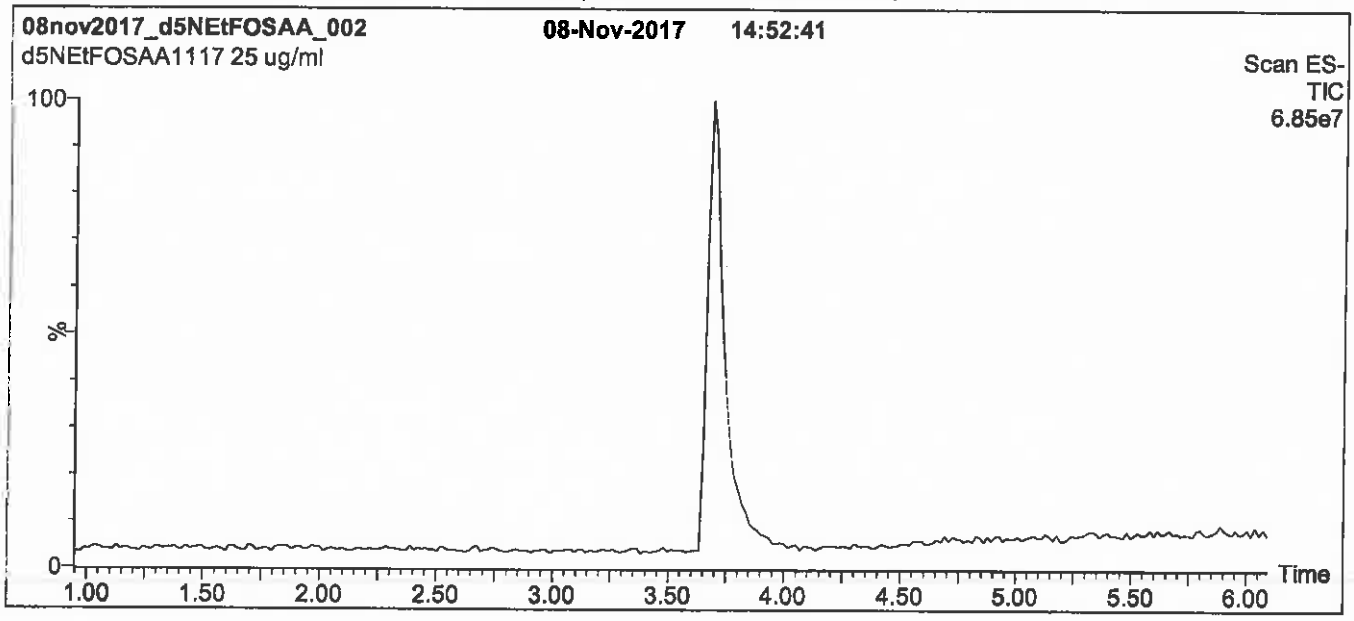
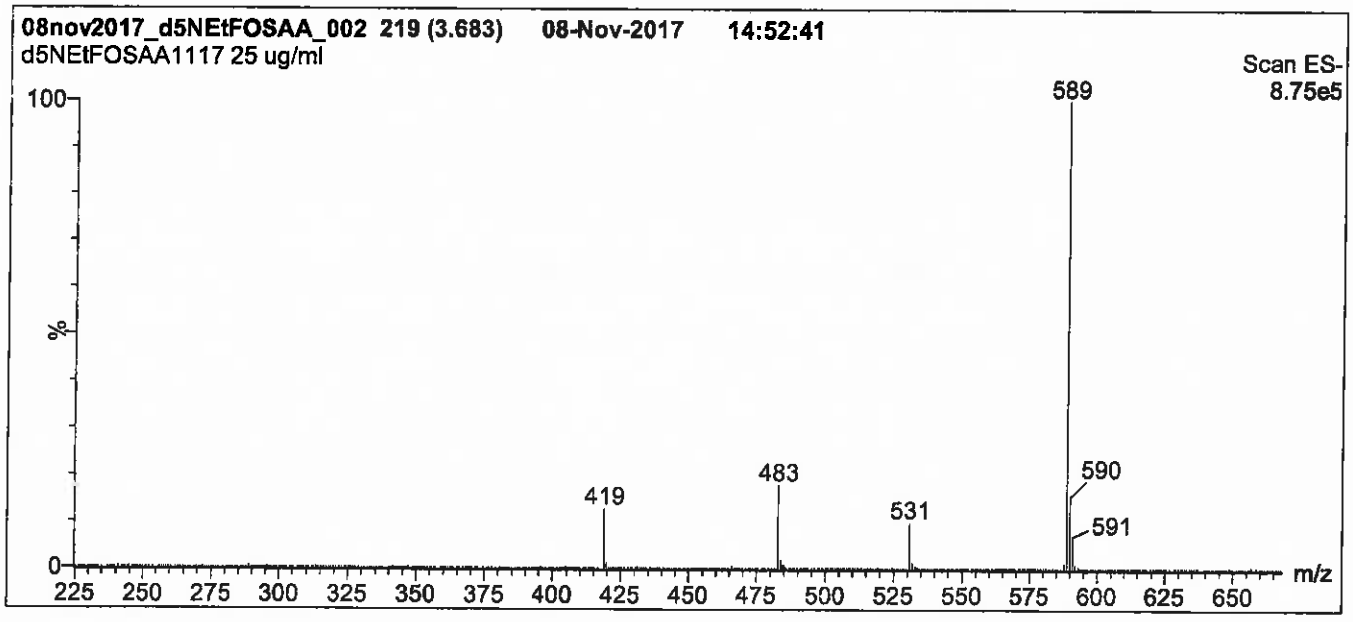
Figure 1: **d5-N-EtFOSAA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

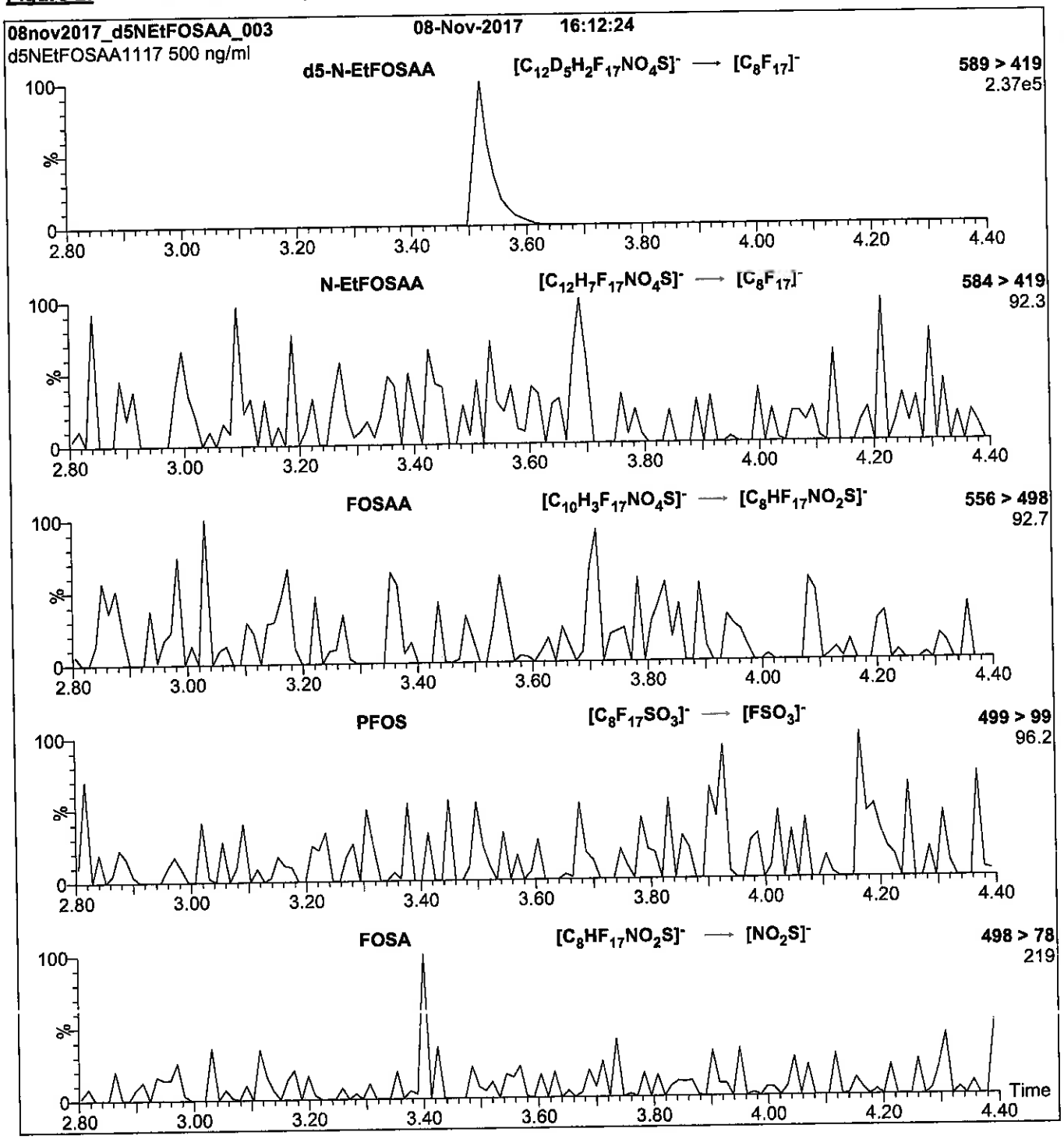
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 35.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **d5-N-EtFOSAA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml d5-N-EtFOSAA)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 20

Reagent

LCM2-6:FTS_00006

1106100
ID: LCM2-6:FTS_00006
Exp: 02/17/22 Prpd: CCL
M2-6:2FTS

R: 12/4/17 CCL

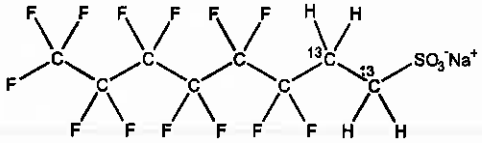
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: M2-6:2FTS **LOT NUMBER:** M262FTS0217

COMPOUND: Sodium 1H,1H,2H,2H-perfluoro-[1,2-$^{13}C_2$]octane sulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_6H_4F_{13}SO_3Na$	**MOLECULAR WEIGHT:**	452.13
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt)	**SOLVENT(S):**	Methanol
	47.5 ± 2.4 µg/ml (M2-6:2FTS anion)		
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2\text{-}^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	02/17/2017		
EXPIRY DATE: (mm/dd/yyyy)	02/17/2022		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- The native 6:2FTS contains 4.22% of ^{34}S (due to natural isotopic abundance) therefore both native 6:2FTS and M2-6:2FTS will produce signals in the m/z 429 to m/z 409 channel during SRM analysis. We recommend using the m/z 429 to m/z 81 transition to monitor for M2-6:2FTS during quantitative analysis as it will be free of any native contribution (see Figure 2).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 02/24/2017 (mm/dd/yyyy)

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

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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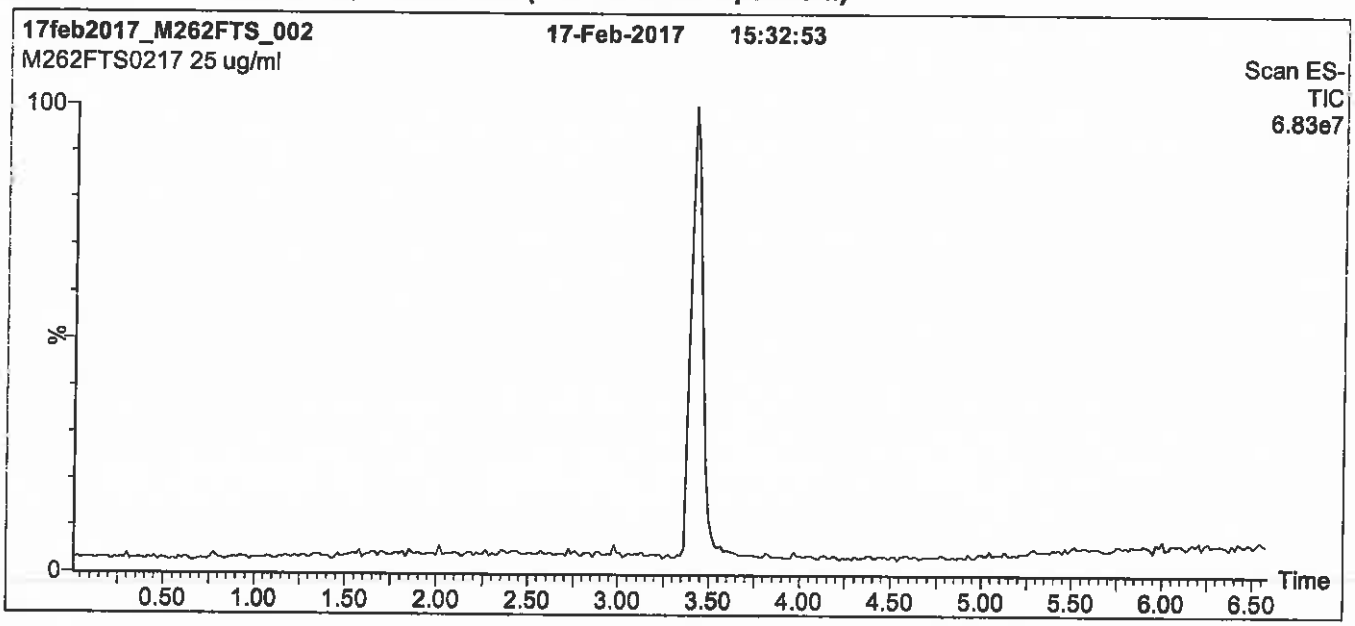
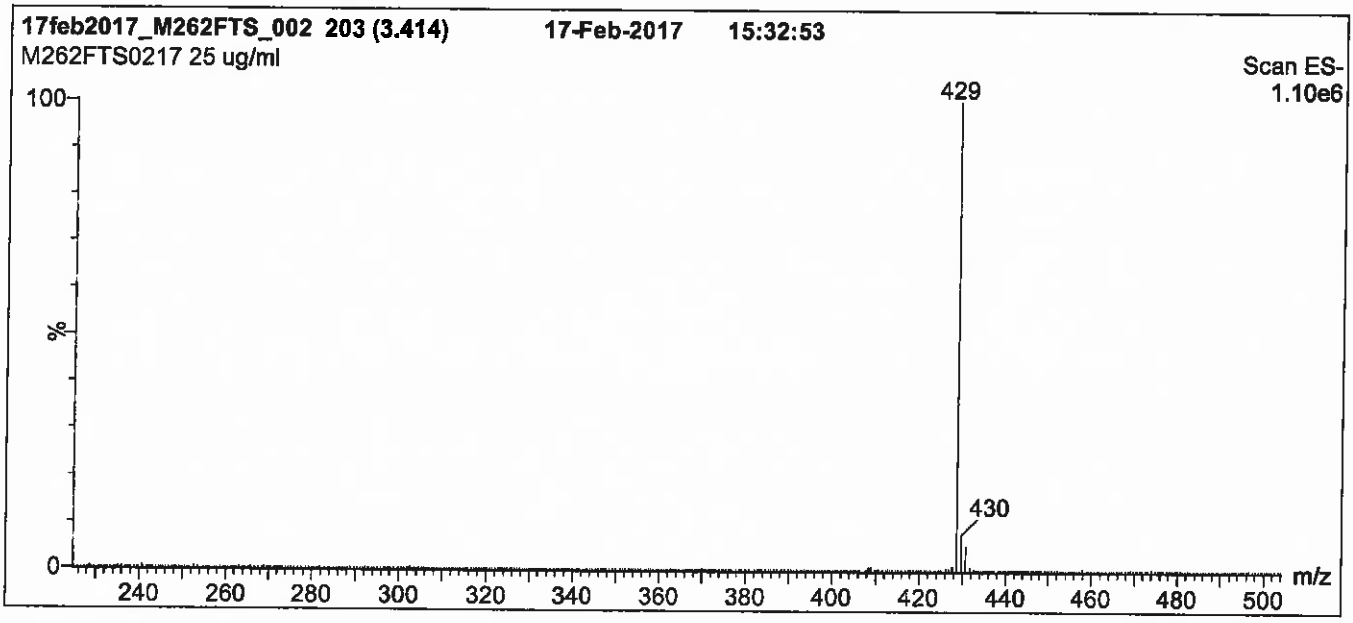
Figure 1: **M2-6:2FTS; LC/MS Data (TIC and Mass Spectrum)**





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

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

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Start: 50% (80:20 MeOH:ACN) / 50% H_2O
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Ramp to 90% organic over 8 min and hold for 1 min
before returning to initial conditions in 0.5 min.
Time: 10 min

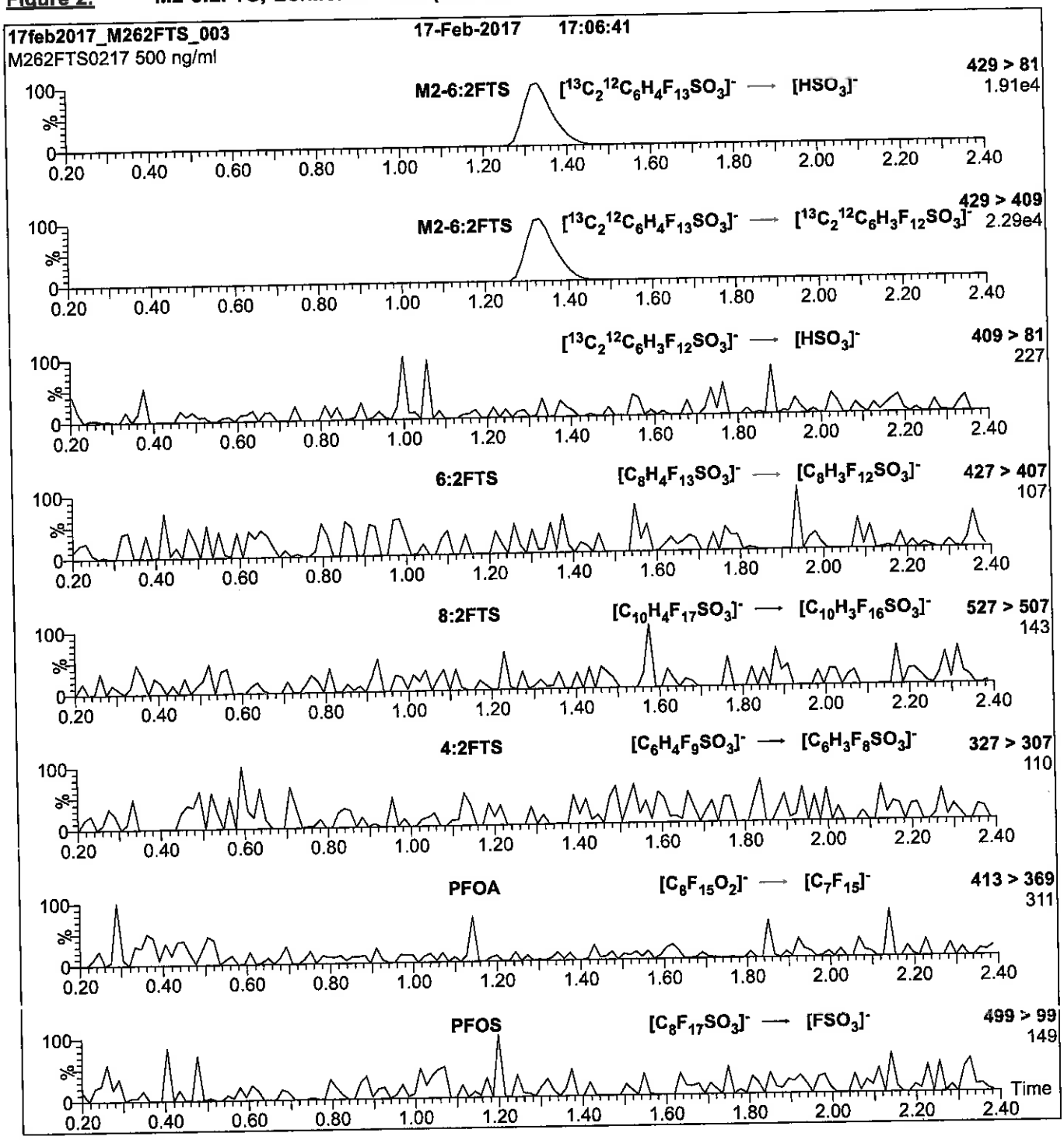
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source:Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 30.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **M2-6:2FTS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml M2-6:2FTS)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 25

Reagent

LCM2-8:2FTS_00008

1106092
ID: LCM2-8:2FTS_00008
Exp: 07/05/22 Prpd: CCL
M2-8:2FTS

V: 12/4/17 CCL

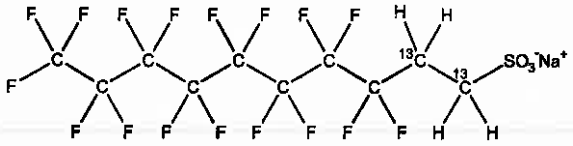
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: M2-8:2FTS **LOT NUMBER:** M282FTS0717

COMPOUND: Sodium 1H,1H,2H,2H-perfluoro-[1,2-$^{13}C_2$]decane sulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_8H_4F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	552.15
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt)	**SOLVENT(S):**	Methanol
	47.9 ± 2.4 µg/ml (M2-8:2FTS anion)		
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C
LAST TESTED: (mm/dd/yyyy)	07/05/2017		(1,2-$^{13}C_2$)
EXPIRY DATE: (mm/dd/yyyy)	07/05/2022		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- The native 8:2FTS contains 4.22% of ^{34}S (due to natural isotopic abundance) therefore both native 8:2FTS and M2-8:2FTS will produce signals in the m/z 529 to m/z 509 channel during SRM analysis. We recommend using the m/z 529 to m/z 81 transition to monitor for M2-8:2FTS during quantitative analysis as it will be free of any native contribution (see Figure 2).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 07/07/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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

HAZARDS:

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

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HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

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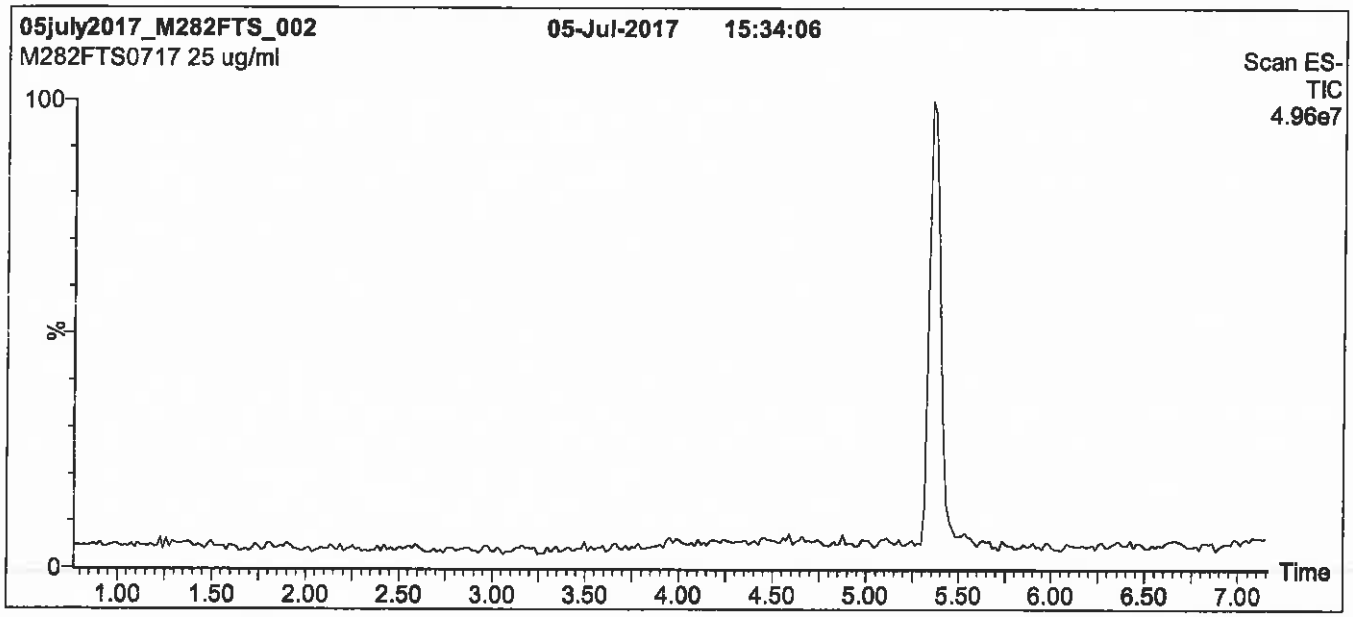
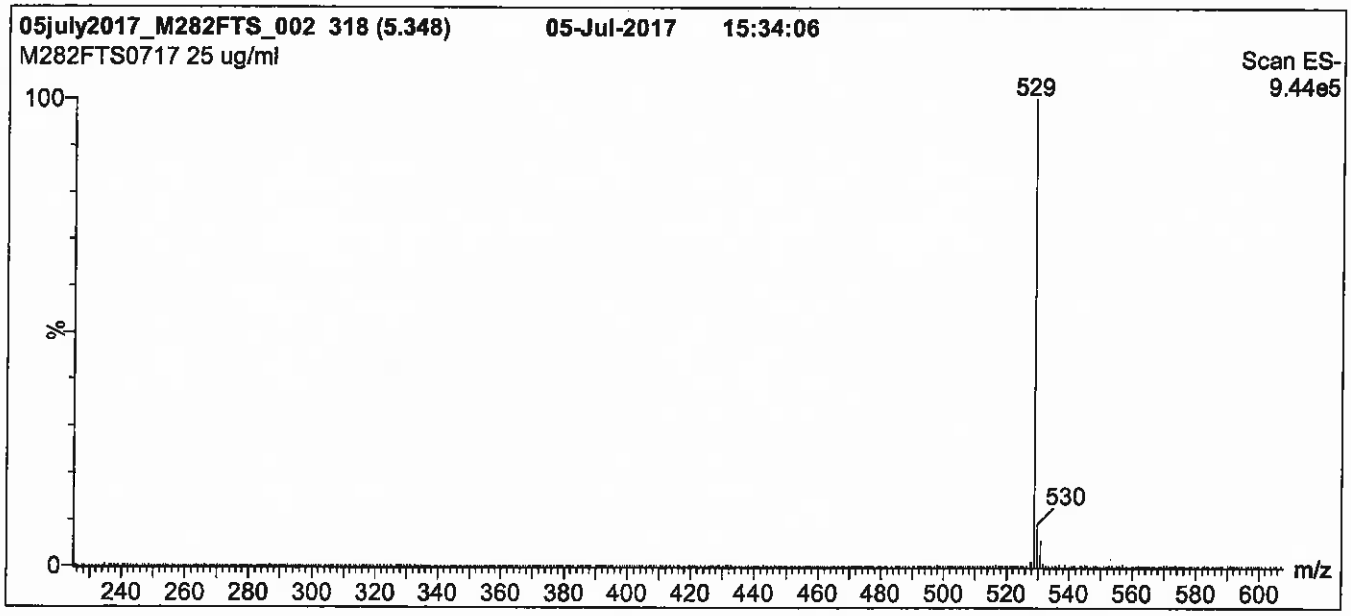
CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

Figure 1: **M2-8:2FTS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

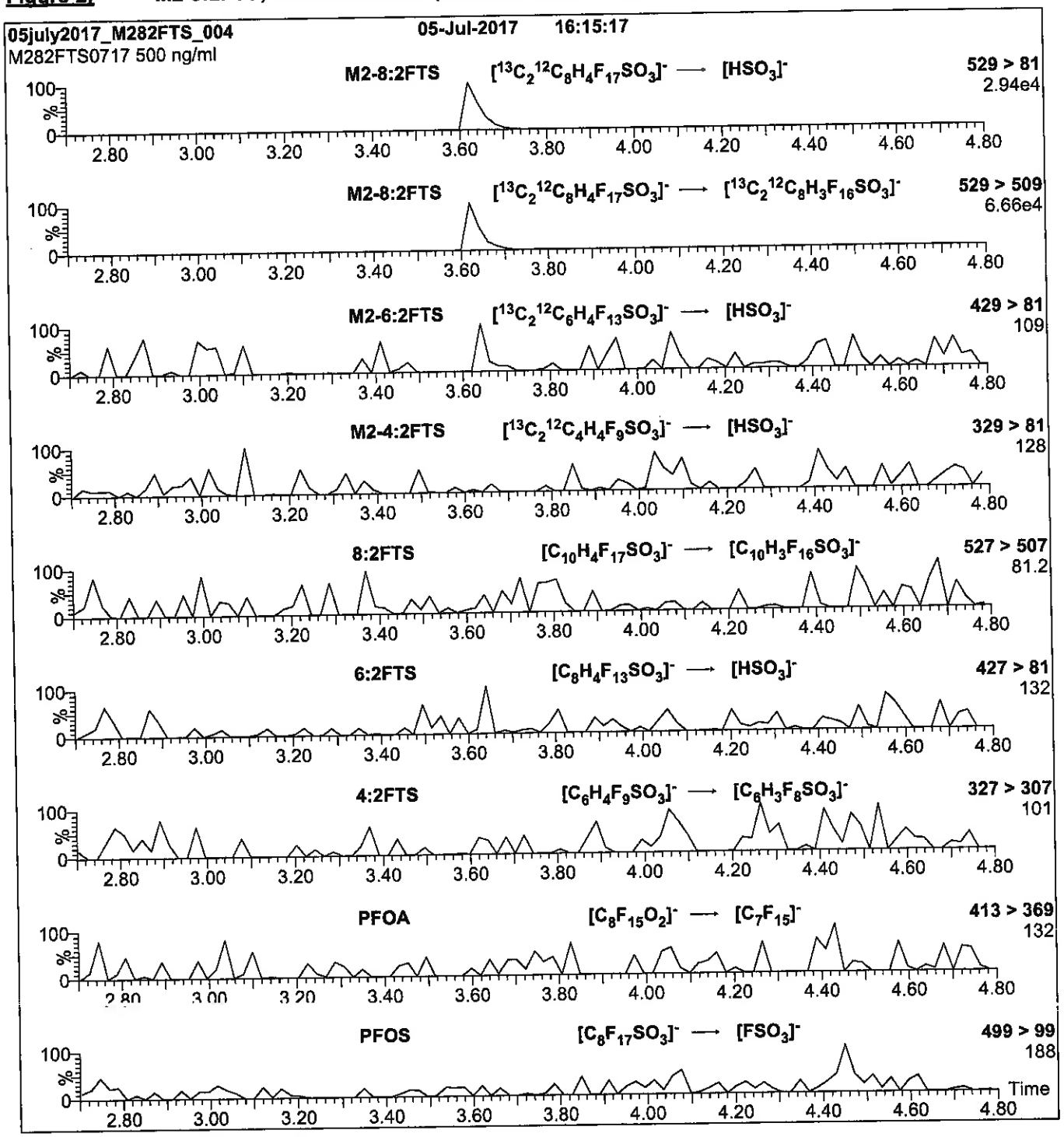
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source:Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 30.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **M2-8:2FTS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml M2-8:2FTS)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 30

Reagent

LCM2PFHxDA_00013

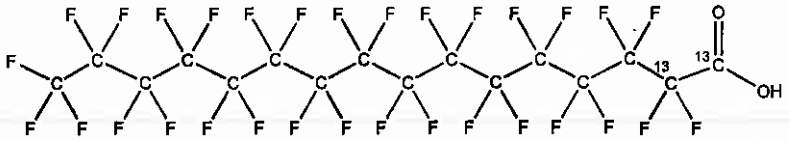
1106068
ID: LCM2PFHxDA_00013
Exp: 07/13/22 Prpd: CCL
13C2-PFHxDA at 50ug/mL

R: 12/4/17 CCL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M2PFHxDA	**LOT NUMBER:**	M2PFHxDA0717
COMPOUND:	Perfluoro-n-[1,2-$^{13}C_2$]hexadecanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_{14}HF_{31}O_2$	**MOLECULAR WEIGHT:**	816.11
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2-$^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	07/13/2017		
EXPIRY DATE: (mm/dd/yyyy)	07/13/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 07/14/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

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SYNTHESIS / CHARACTERIZATION:

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CALA

ANAB ACCREDITED

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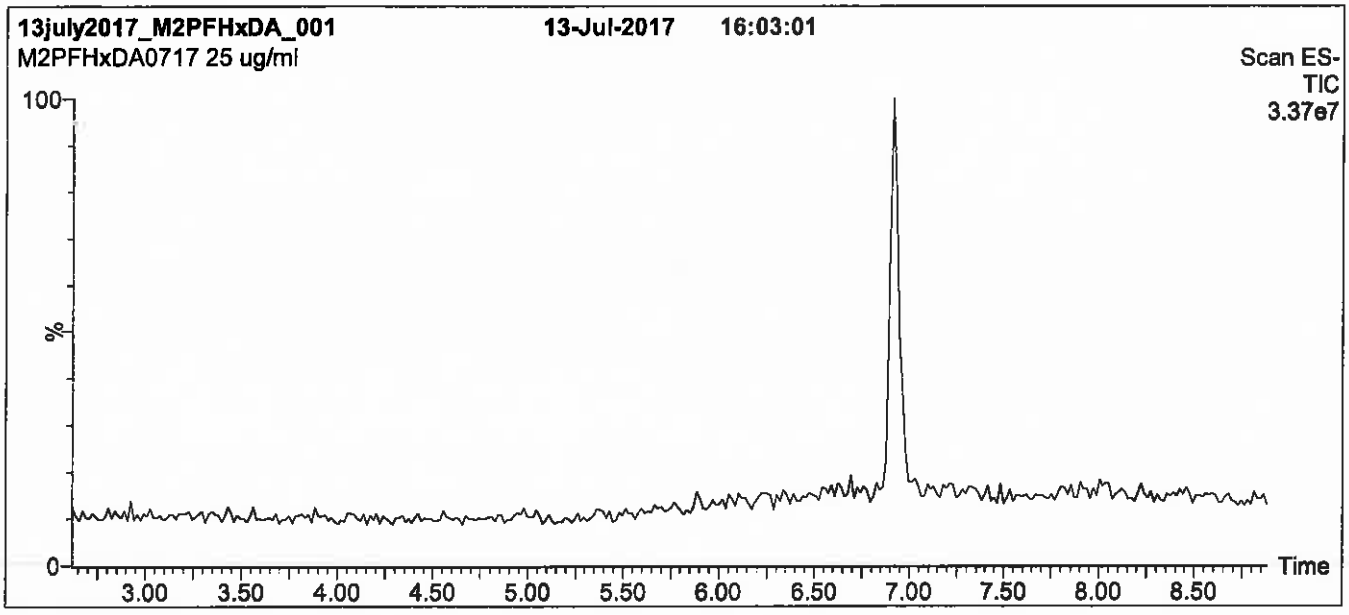
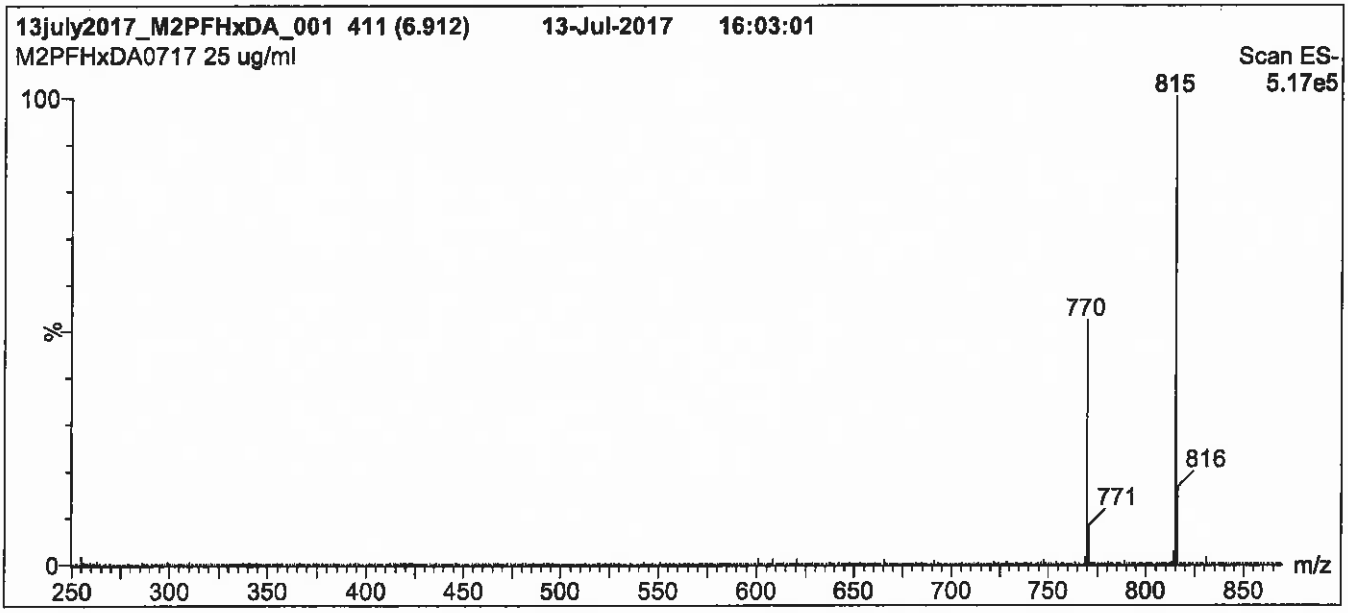
Figure 1: **M2PFHxDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

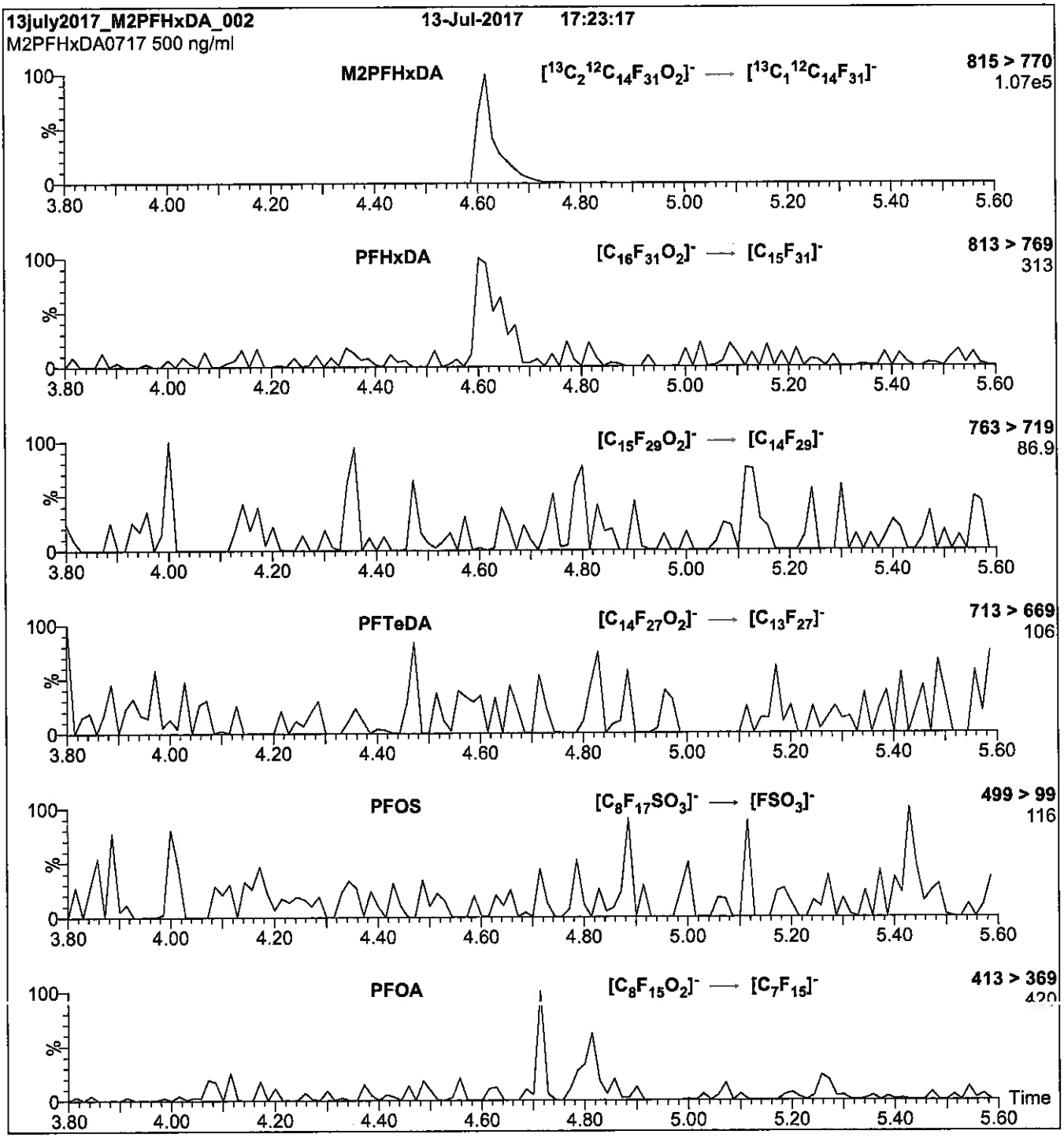
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 1250 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 15

Reagent

LCM2PFOA_00008

r: 5/3/17 SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

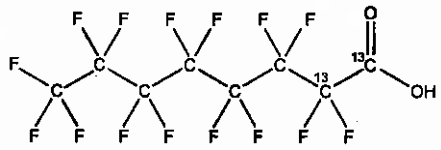
PRODUCT CODE: M2PFOA

LOT NUMBER: M2PFOA0216

COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]octanoic acid

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_2{}^{12}C_6HF_{15}O_2$

MOLECULAR WEIGHT: 416.05

CONCENTRATION: 50 ± 2.5 µg/ml

SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%

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

LAST TESTED: (mm/dd/yyyy) 02/12/2016

EXPIRY DATE: (mm/dd/yyyy) 02/12/2021

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim

Date: 02/24/2016 (mm/dd/yyyy)

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

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CALA ANAB

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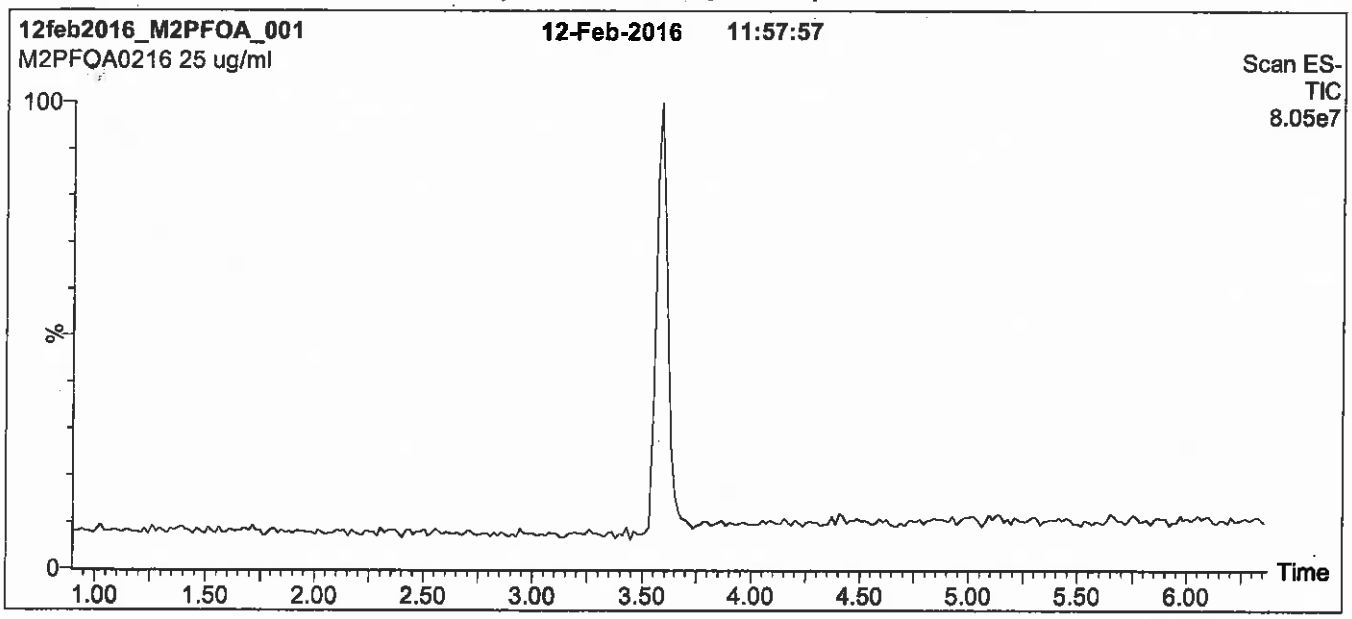
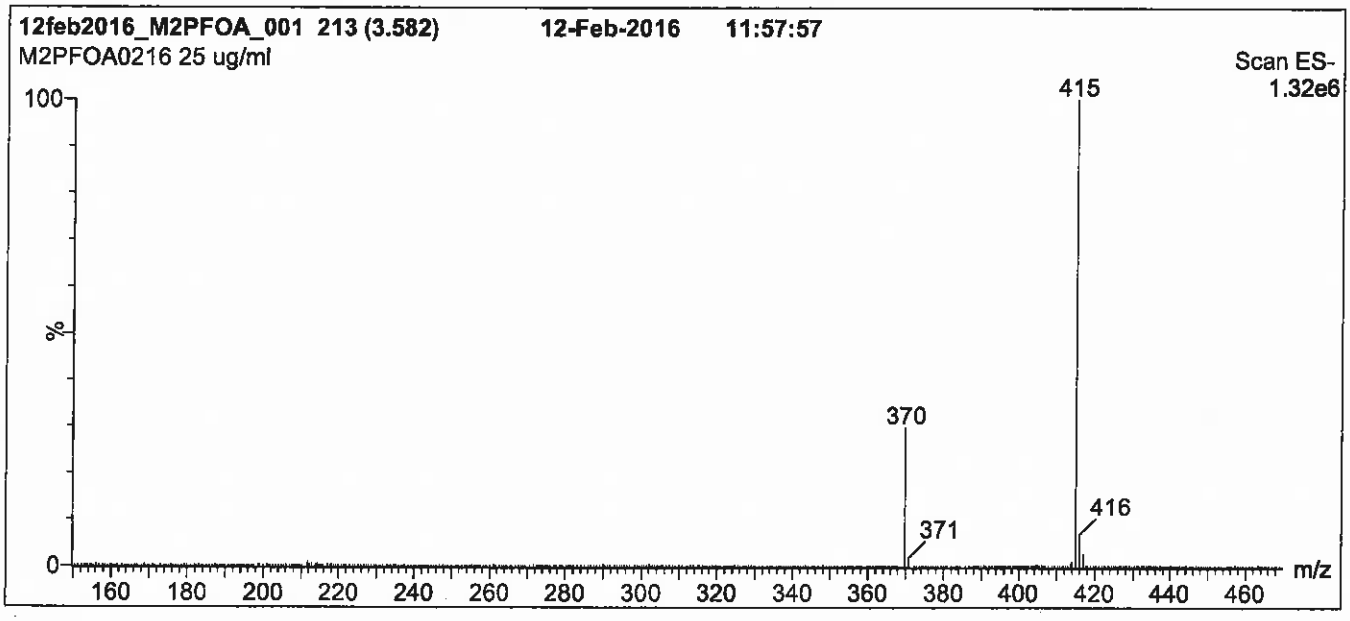
Figure 1: **M2PFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

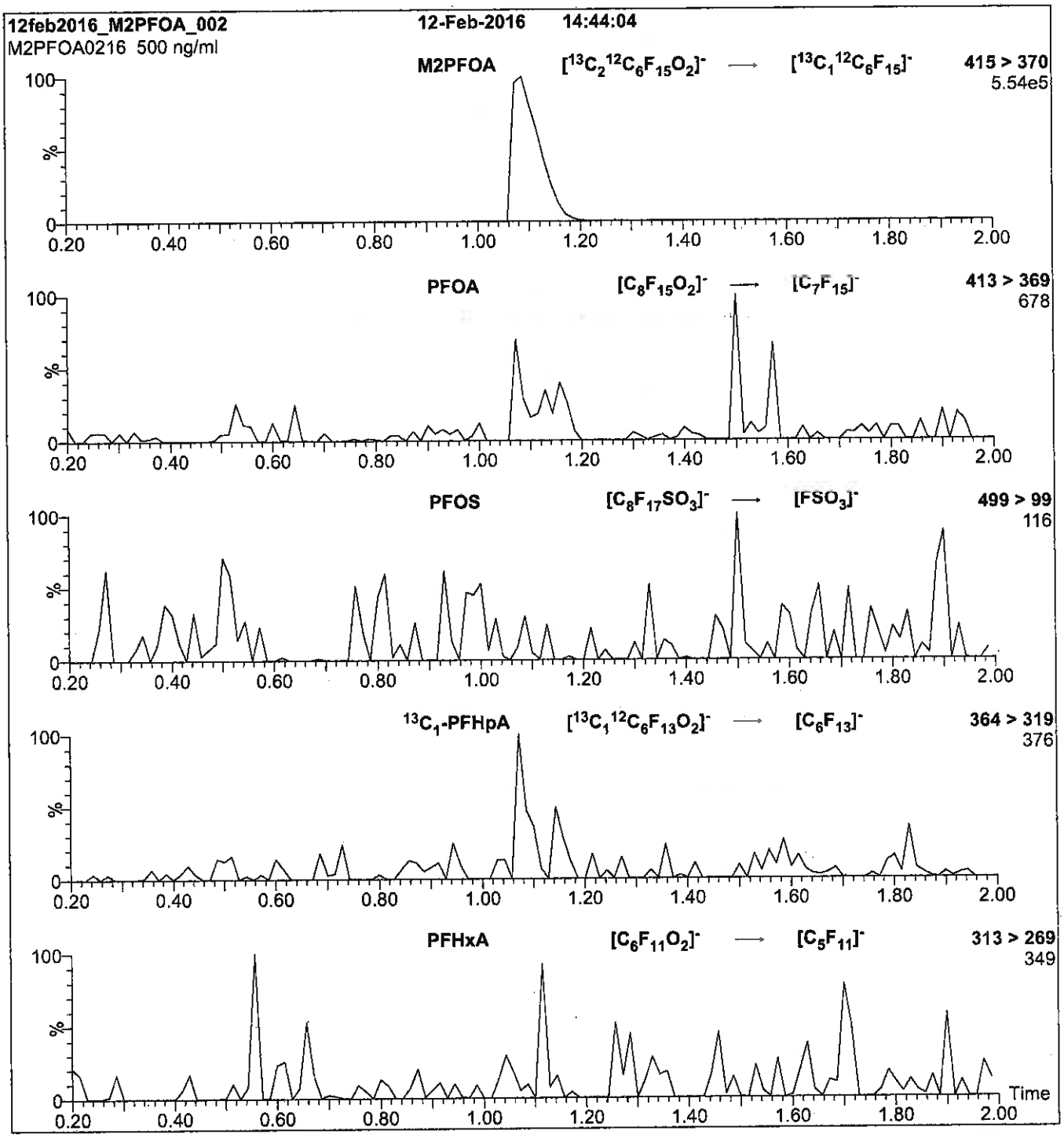
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

Figure 2: **M2PFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml M2PFOA)

Mobile phase: Isocratic 80% MeOH / 20% H_2O

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 10

Reagent

LCM2PFTeDA_00012

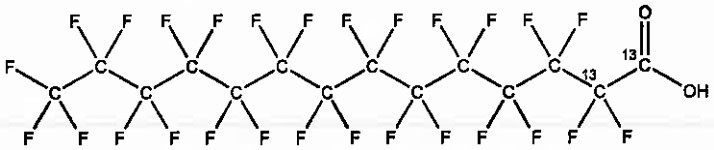
1106065
ID: LCM2PFTeDA_00012
Exp: 11/30/22 Prpd: CCL
13C2-PFTeDA at 50ug/mL

r: 12/4/17 ccl

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M2PFTeDA	**LOT NUMBER:**	M2PFTeDA1117
COMPOUND:	Perfluoro-n-[1,2-$^{13}C_2$]tetradecanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_{12}HF_{27}O_2$	**MOLECULAR WEIGHT:**	716.10
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2\text{-}^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	11/30/2017		
EXPIRY DATE: (mm/dd/yyyy)	11/30/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 12/01/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

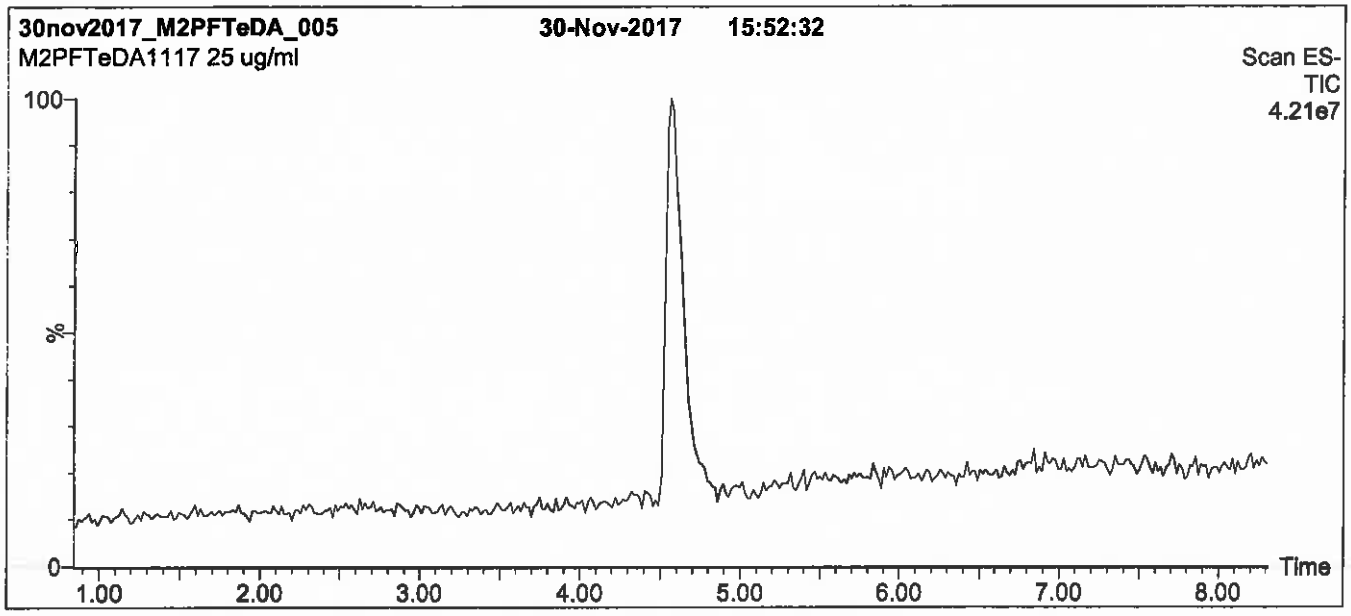
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

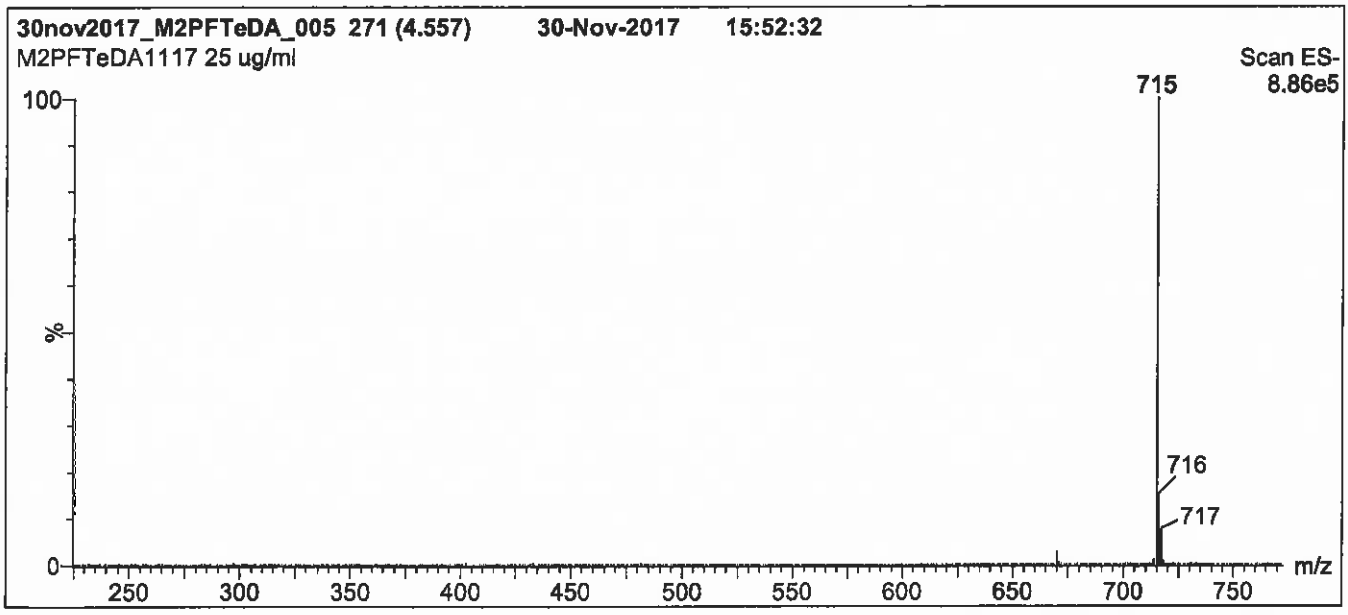
CALA

ANAB ACCREDITED

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

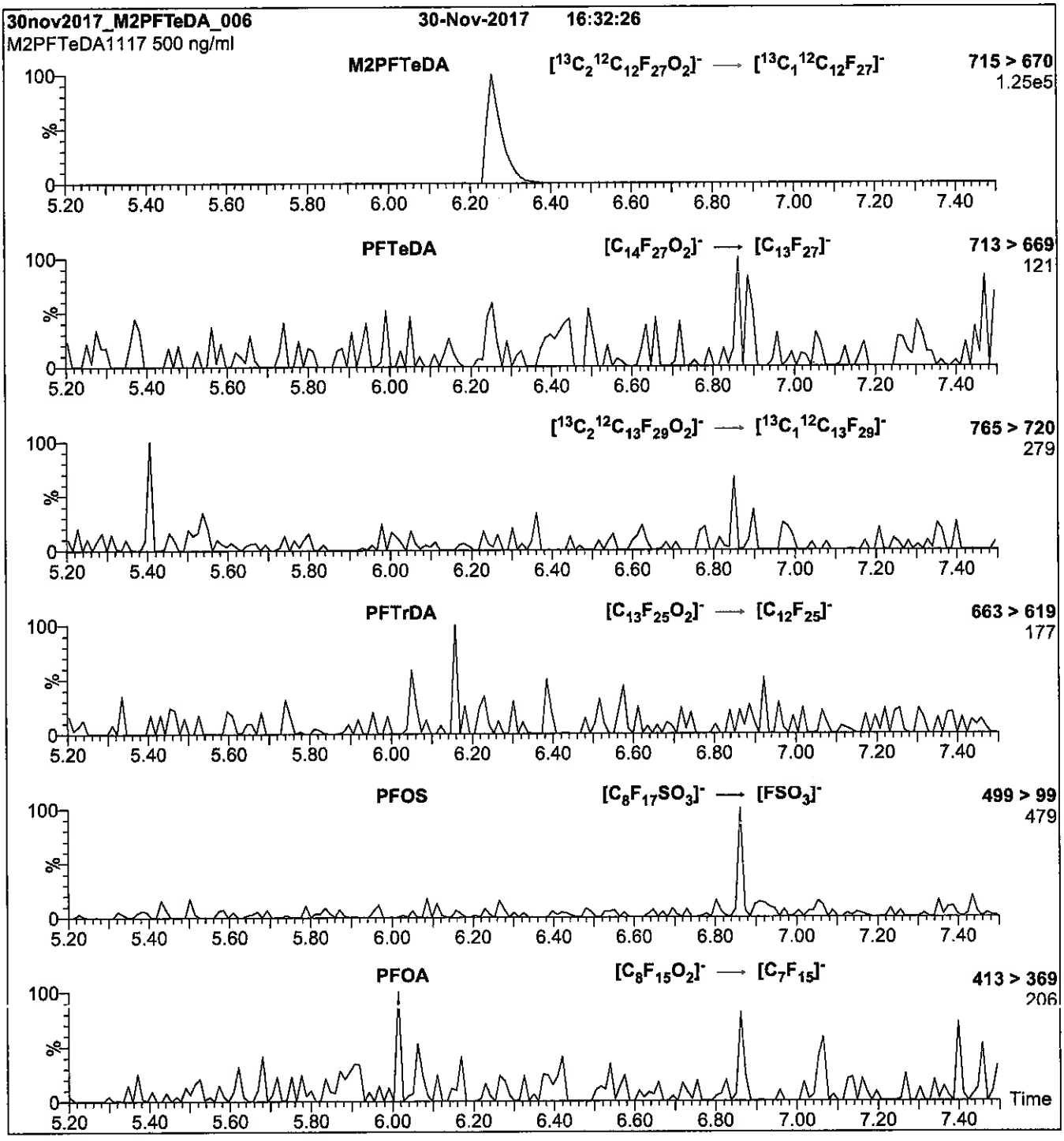
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 14

Reagent

LCM4PFHPA_00012

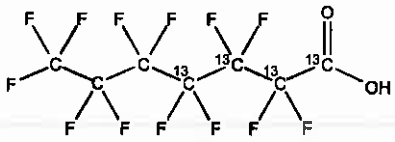
1106316
ID: LCM4PFHPA_00012
Exp: 05/03/22 Prpd: CCL
13C4-Perfluoroheptanoic a

v: 12/4/17 CCL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M4PFHpA	**LOT NUMBER:**	M4PFHpA0517
COMPOUND:	Perfluoro-n-[1,2,3,4-$^{13}C_4$]heptanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_3HF_{13}O_2$	**MOLECULAR WEIGHT:**	368.03
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2,3,4-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	05/03/2017		
EXPIRY DATE: (mm/dd/yyyy)	05/03/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 05/11/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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

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

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EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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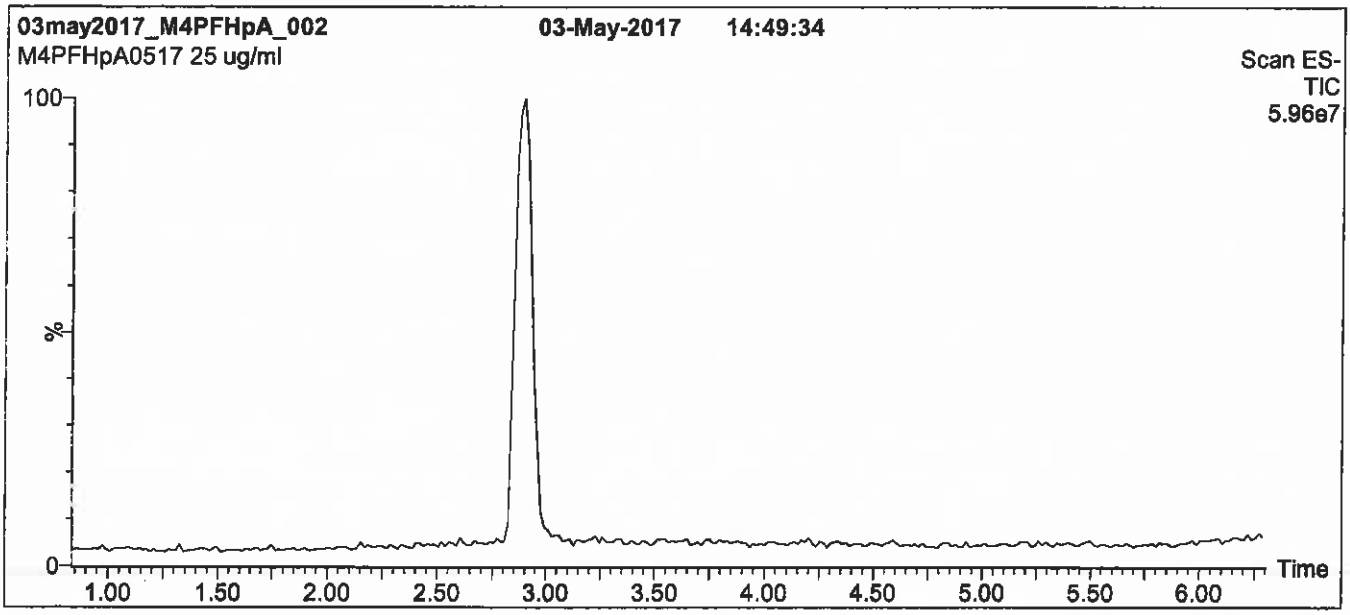
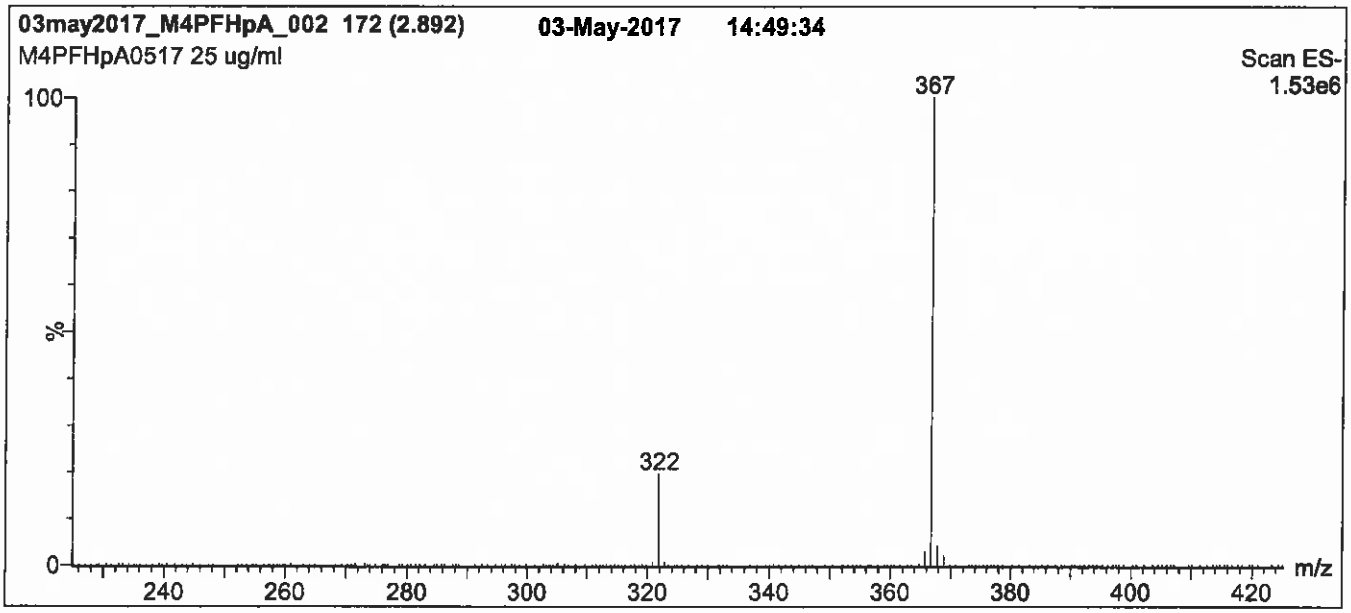
CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 1 min
before returning to initial conditions in 0.5 min.
Time: 10 min

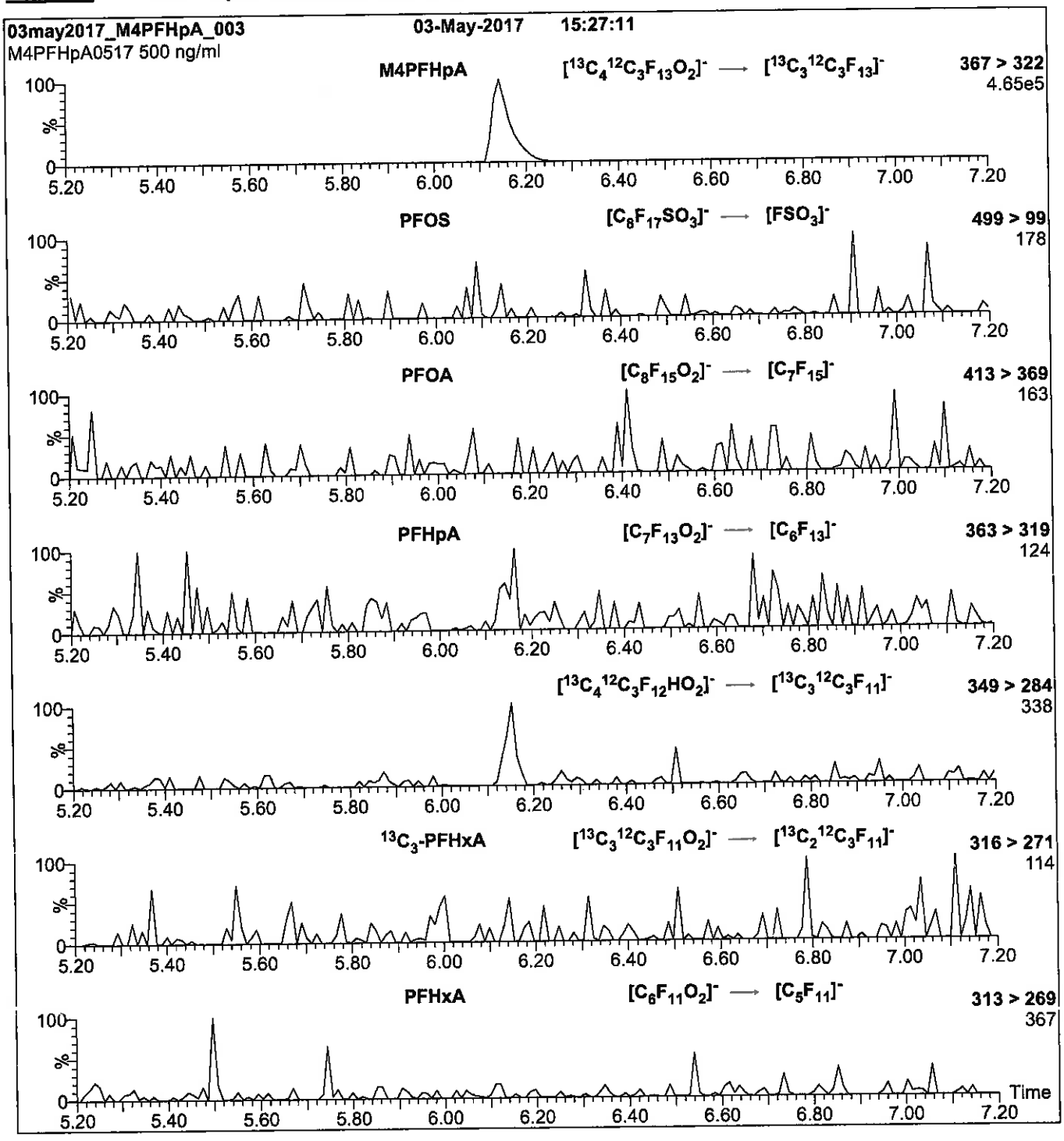
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 9

Reagent

LCM5PFPEA_00013

1106313
ID: LCM5PFPEA_00013
Exp: 07/20/22 Rpd: CCL
13C5-Perfluoropentanoic a

r: 12/4/17 CCL

WELLINGTON LABORATORIES

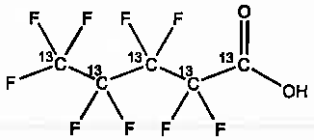
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: M5PFPeA0717

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_5HF_8O_2$	**MOLECULAR WEIGHT:**	269.01
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($^{13}C_5$)
LAST TESTED: (mm/dd/yyyy)	07/20/2017		
EXPIRY DATE: (mm/dd/yyyy)	07/20/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 07/26/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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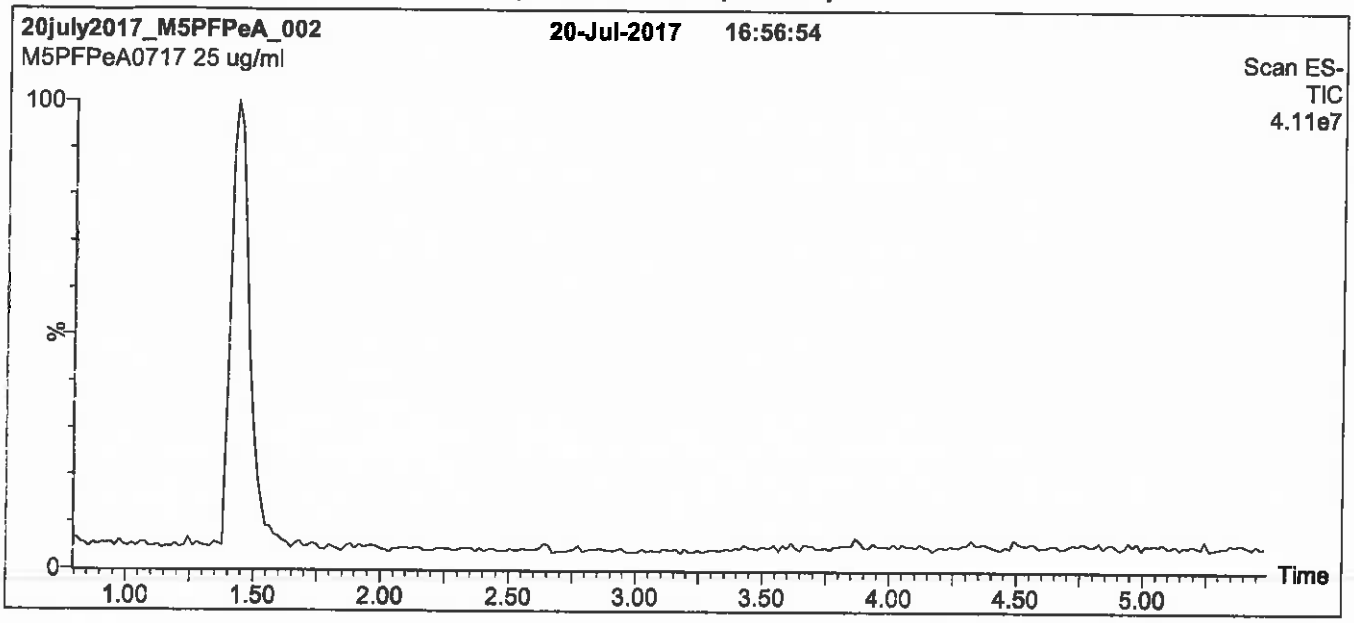
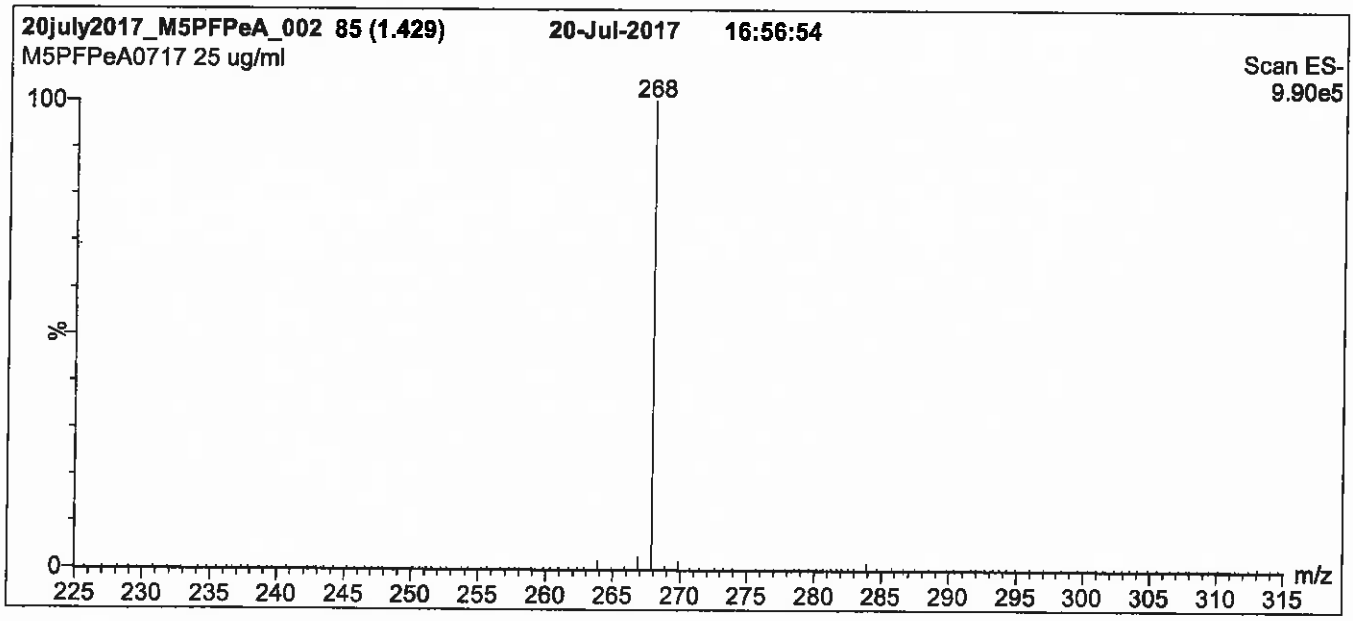
Figure 1: **M5PFPeA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Hold for 1 min. Ramp to 90% organic over 7 min and hold for 1 min before returning to initial conditions in 0.5 min.
Time: 10 min

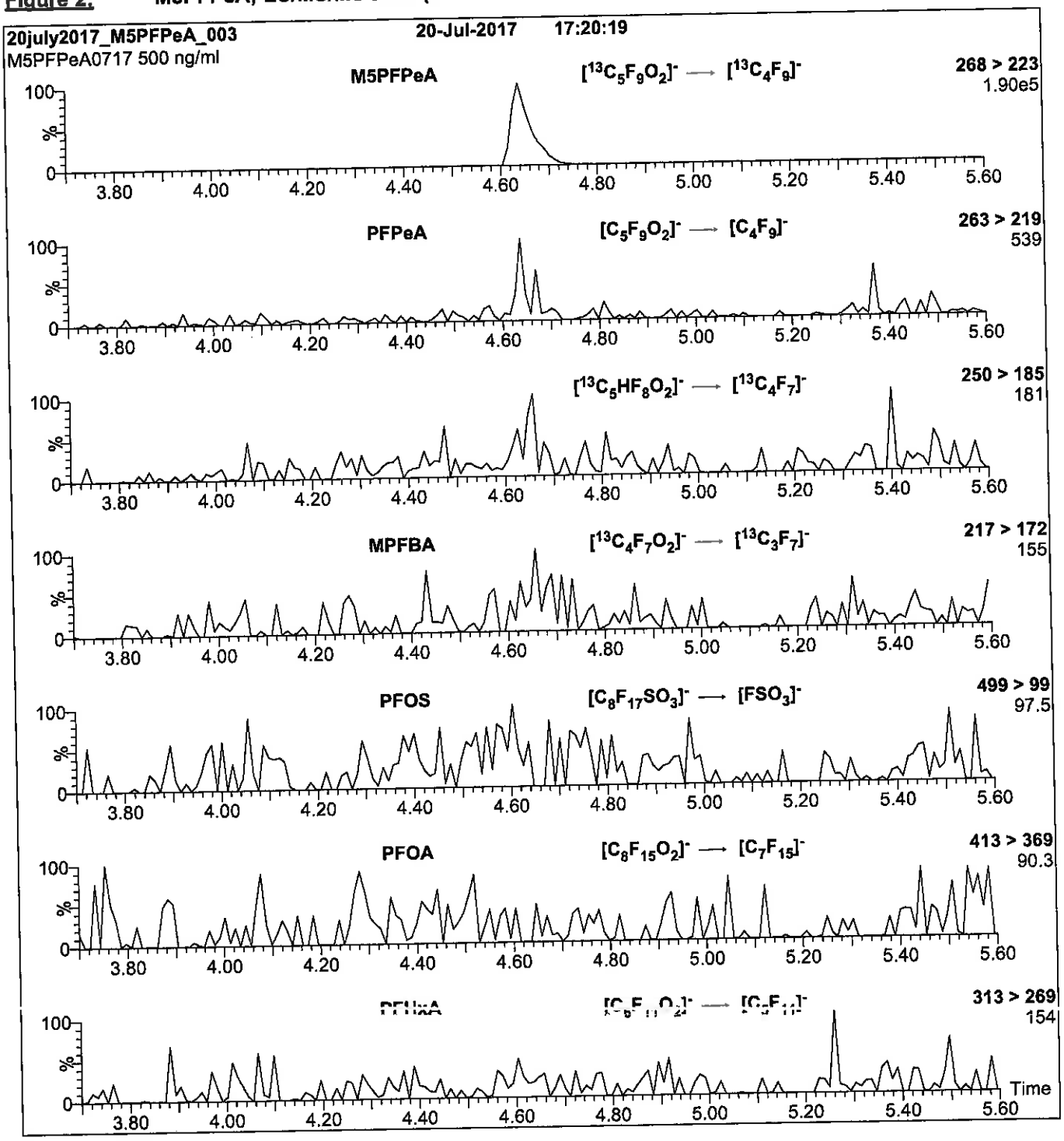
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 9

Reagent

LCM8FOSA_00016

1106276
ID: LCM8FOSA_00016
Exp: 13/11/22 Prpd: CCL
13C8-Perfluorooctanesulfo

r: 12/4/17
CCL

WELLINGTON LABORATORIES

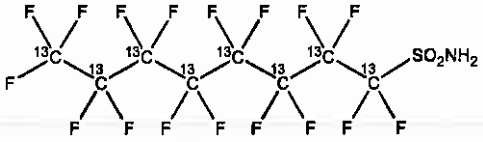
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: M8FOSA1017I

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_8H_2F_{17}NO_2S$	**MOLECULAR WEIGHT:**	507.09
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Isopropanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($^{13}C_8$)
LAST TESTED: (mm/dd/yyyy)	10/11/2017		
EXPIRY DATE: (mm/dd/yyyy)	10/11/2022		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 1.1% of perfluoro-1-[$^{13}C_4$]octanesulfonamide and ~ 0.01% of perfluoro-1-[$^{13}C_7$]heptanesulfonamide.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 10/20/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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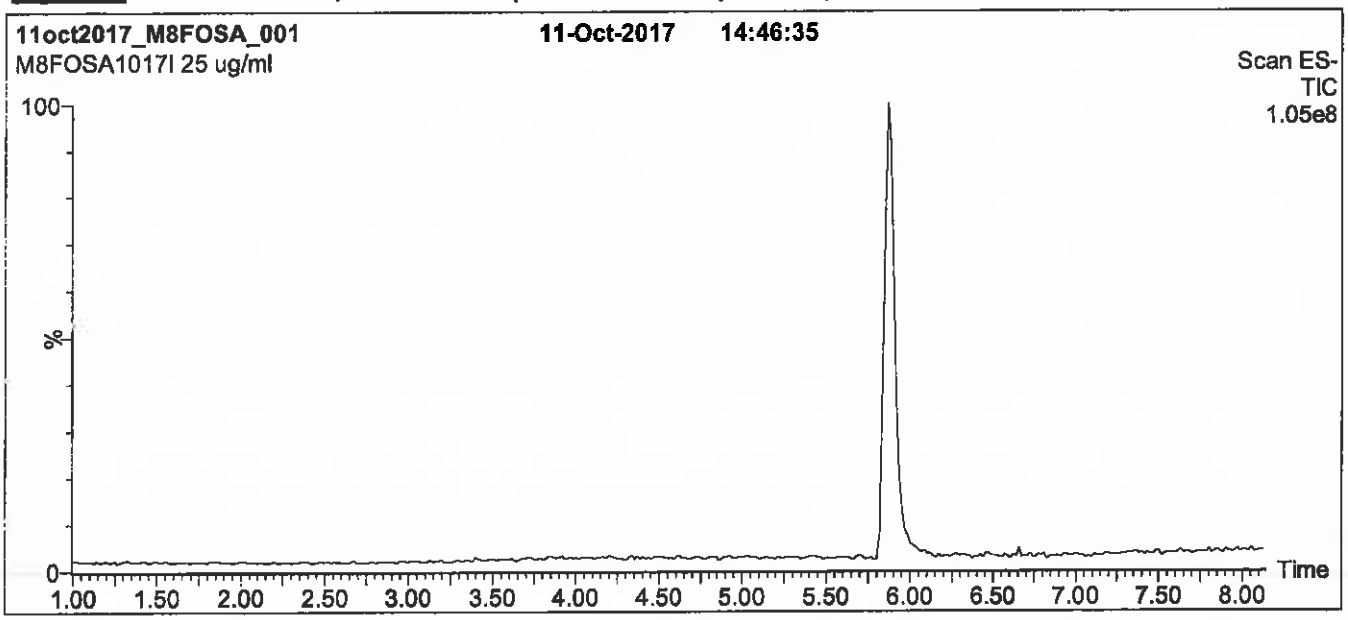
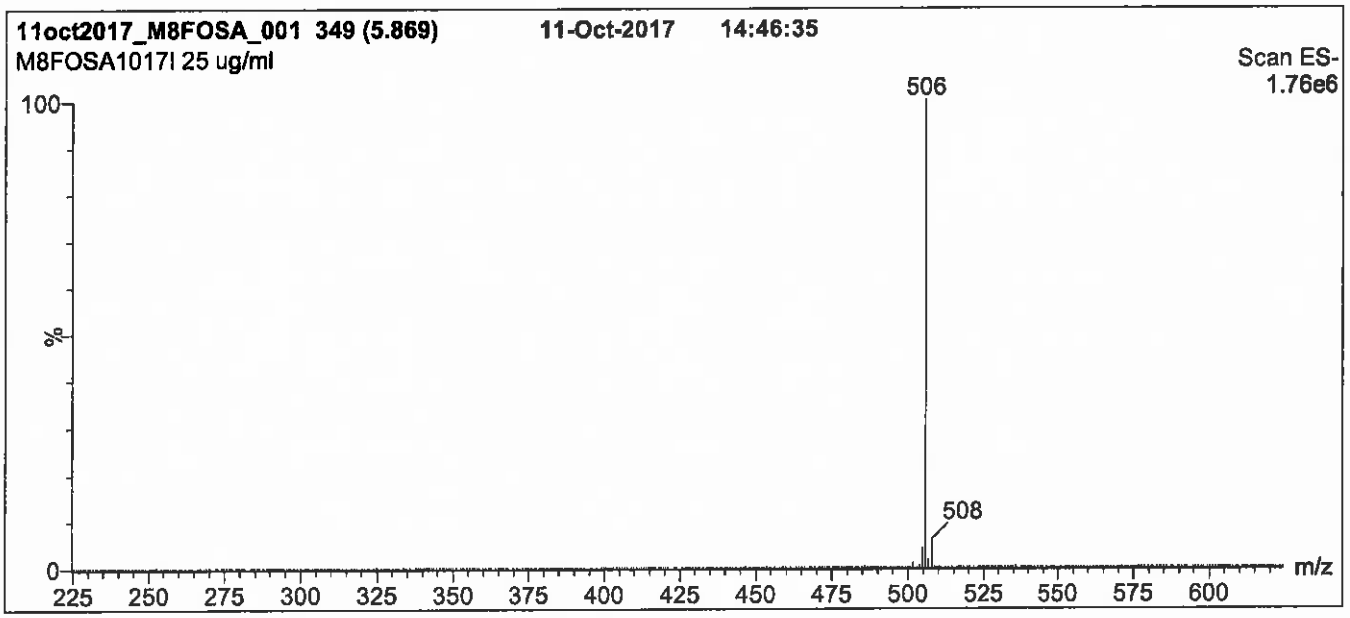
Figure 1: **M8FOSA-I; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 85% organic over 7.5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

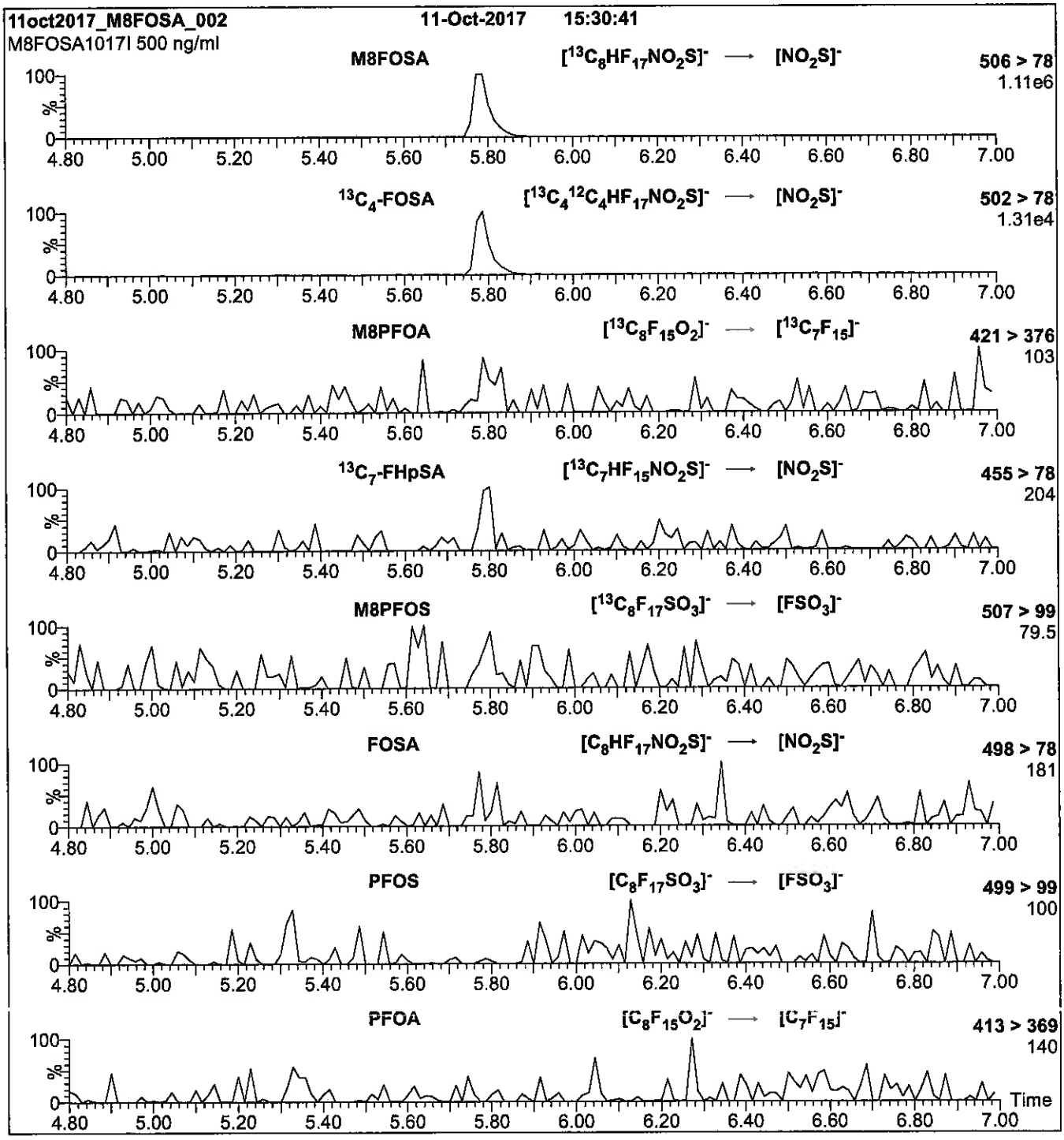
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 30

Reagent

LCMPFBA_00013

1106251
ID: LCMPFBA_00013
Exp: 04/12/22 Prpd: CCL
13C4-Perfluorobutanoic ac

r: 12/4/17 ccc

WELLINGTON LABORATORIES

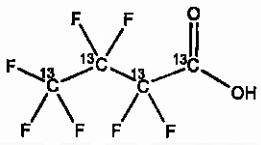
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFBA0417

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_4HF_7O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 218.01
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 04/12/2017
EXPIRY DATE: (mm/dd/yyyy) 04/12/2022
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

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Certified By: _____ **Date:** 04/20/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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CALA

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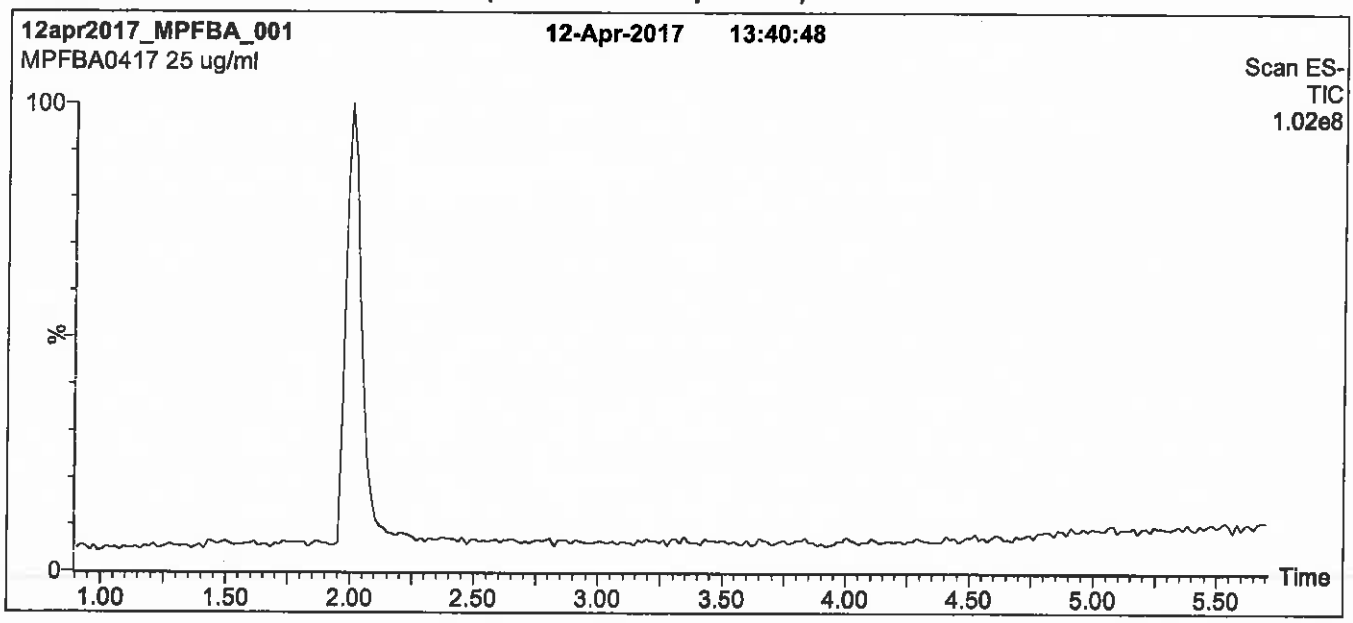
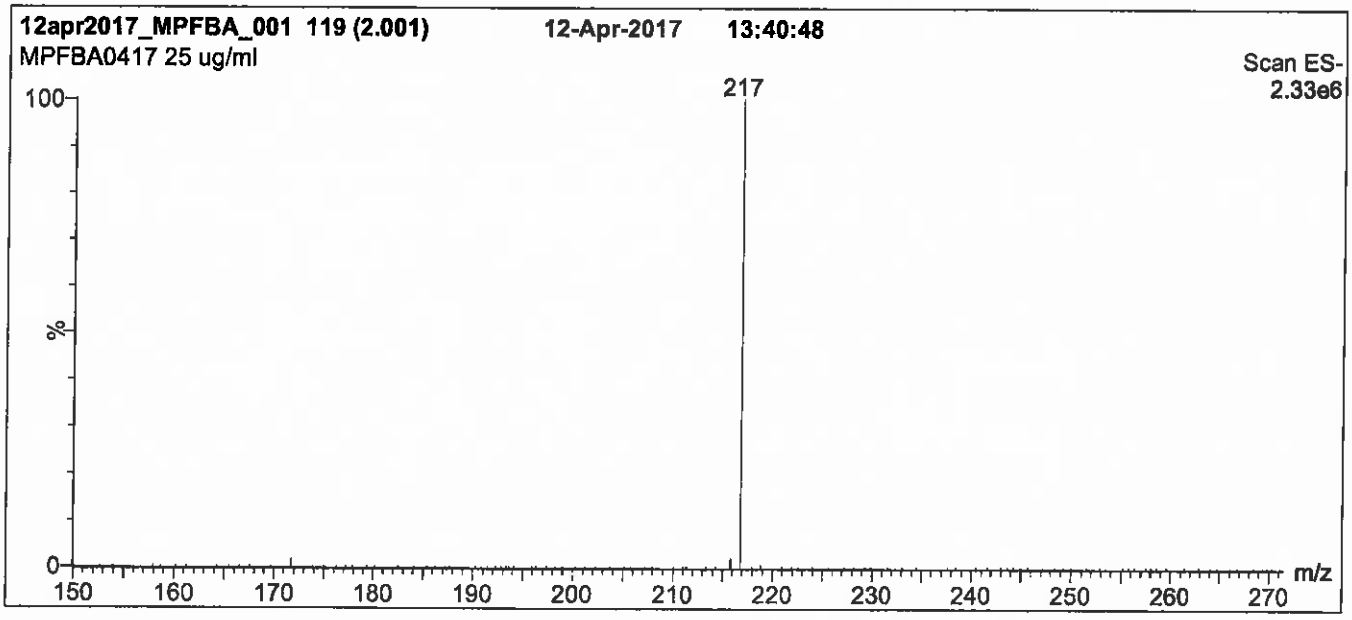
Figure 1: **MPFBA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

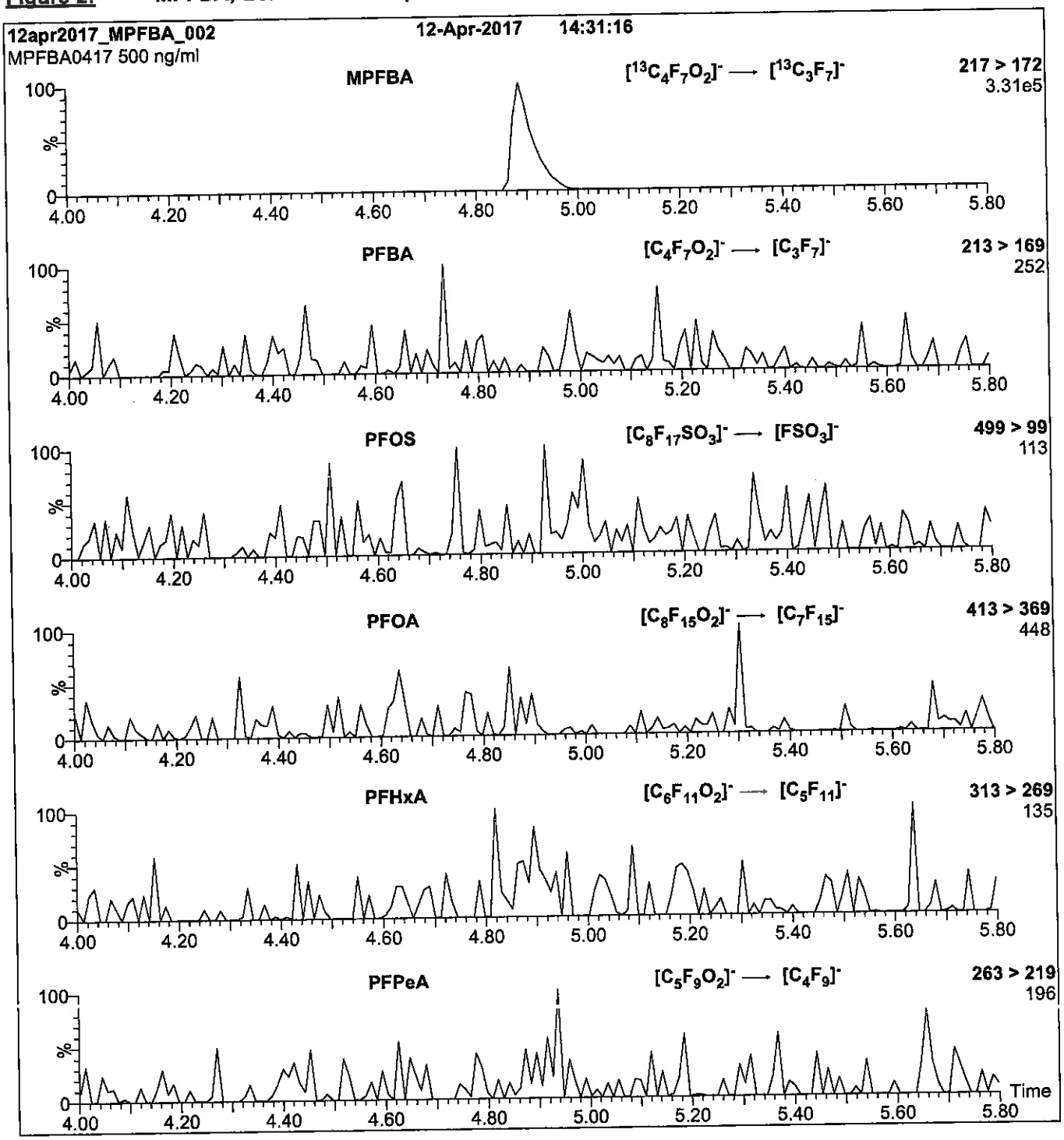
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 10.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 10

Reagent

LCMPFBS_00006

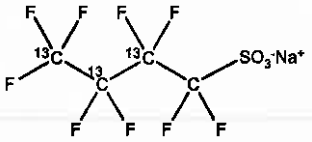
1106130
ID: LCMPFBS_00006
Exp: 05/24/22 Prpd: CCL
13C3-Perfluorobutanesulfo

r: 12/4/17 CCL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M3PFBS	**LOT NUMBER:**	M3PFBS0815
COMPOUND:	Sodium perfluoro-1-[2,3,4-$^{13}C_3$]butanesulfonate		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_3{}^{12}CF_8SO_3Na$	**MOLECULAR WEIGHT:**	325.06
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 46.5 ± 2.3 µg/ml (M3PFBS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($2,3,4\text{-}^{13}C_3$)
LAST TESTED: (mm/dd/yyyy)	05/24/2017		
EXPIRY DATE: (mm/dd/yyyy)	05/24/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

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Certified By: _____ **Date:** 05/25/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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CALA

ANAB ACCREDITED

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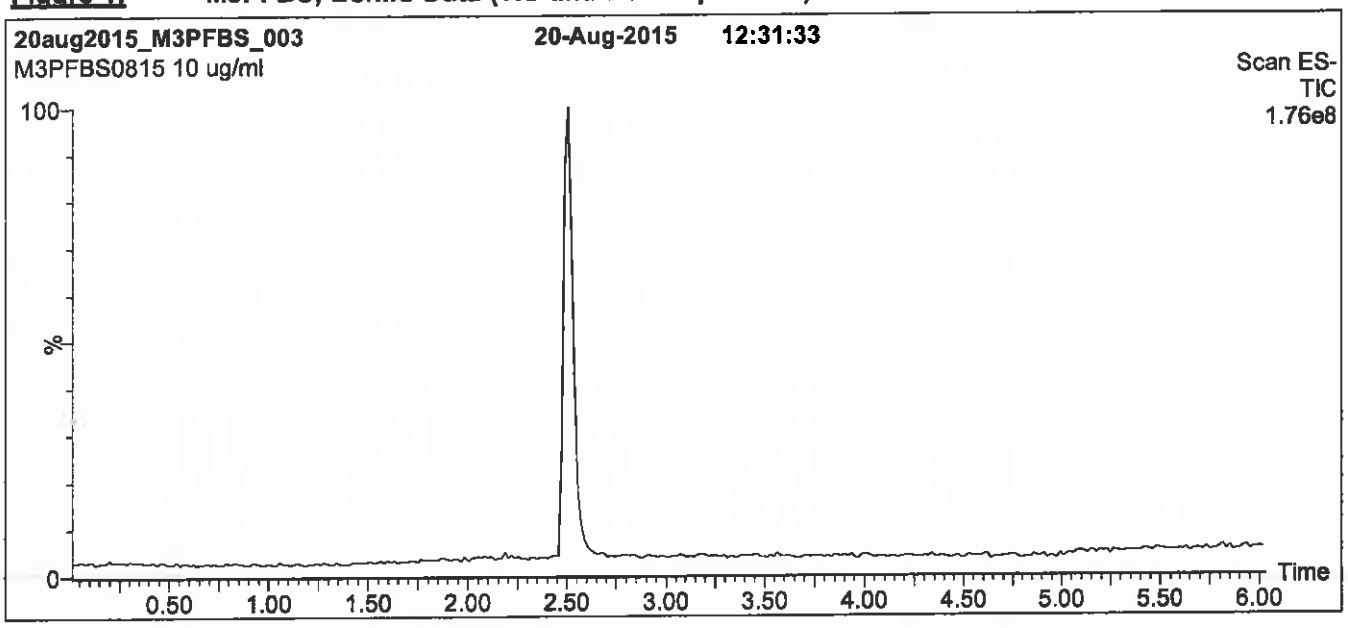
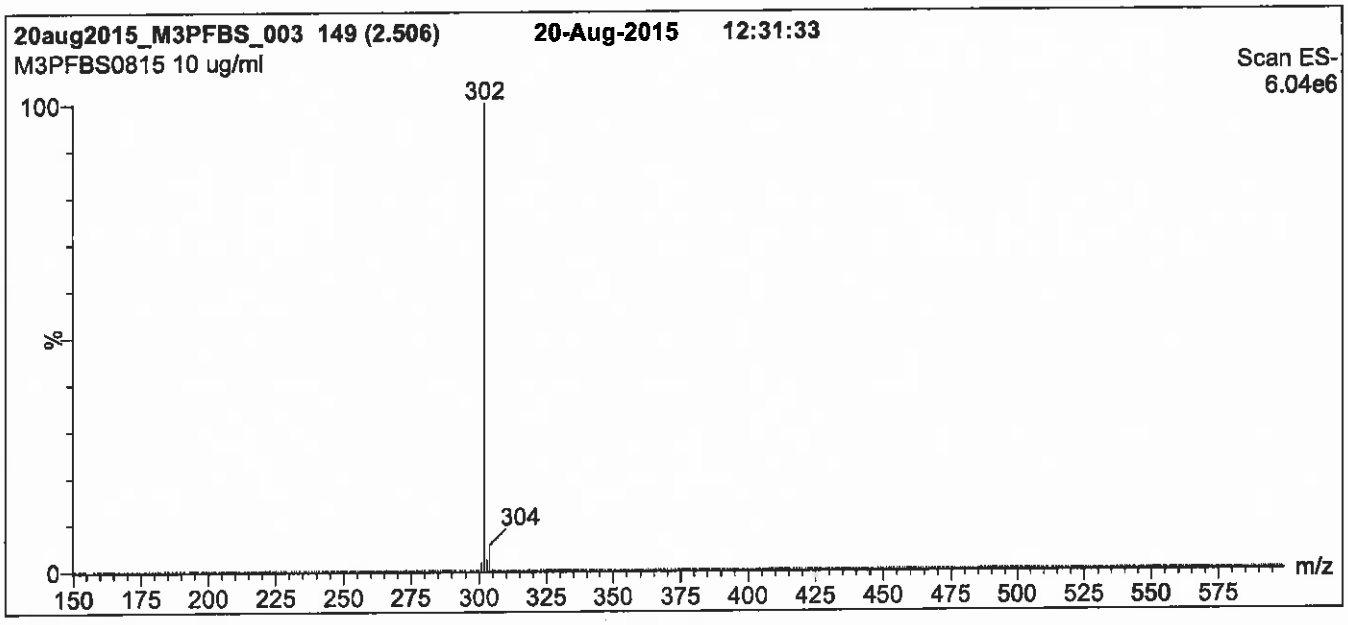
Figure 1: **M3PFBS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

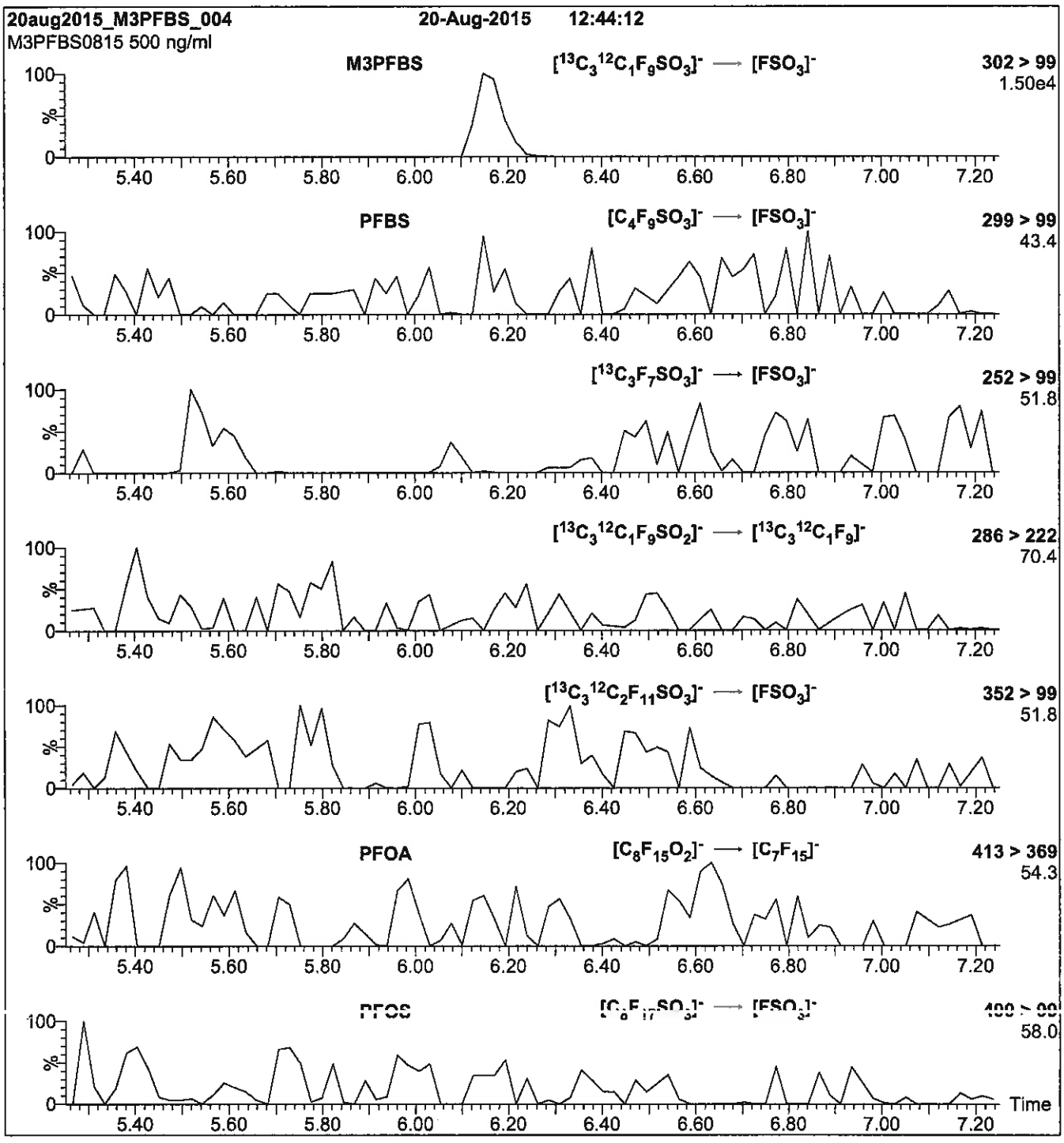
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **M3PFBS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml M3PFBS)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 25

Reagent

LCMPFDA_00018

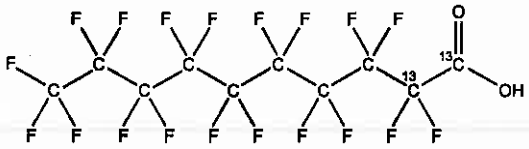
1106159
ID: LCMPFDA_00018
Exp: 07/13/22 Prpd: CCL
13C2-Perfluorodecanoic a

r: 12/4/17 cc

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFDA	**LOT NUMBER:**	MPFDA0717
COMPOUND:	Perfluoro-n-[1,2-$^{13}C_2$]decanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_8HF_{19}O_2$	**MOLECULAR WEIGHT:**	516.07
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2\text{-}^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	07/13/2017		
EXPIRY DATE: (mm/dd/yyyy)	07/13/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

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

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EXPIRY DATE / PERIOD OF VALIDITY:

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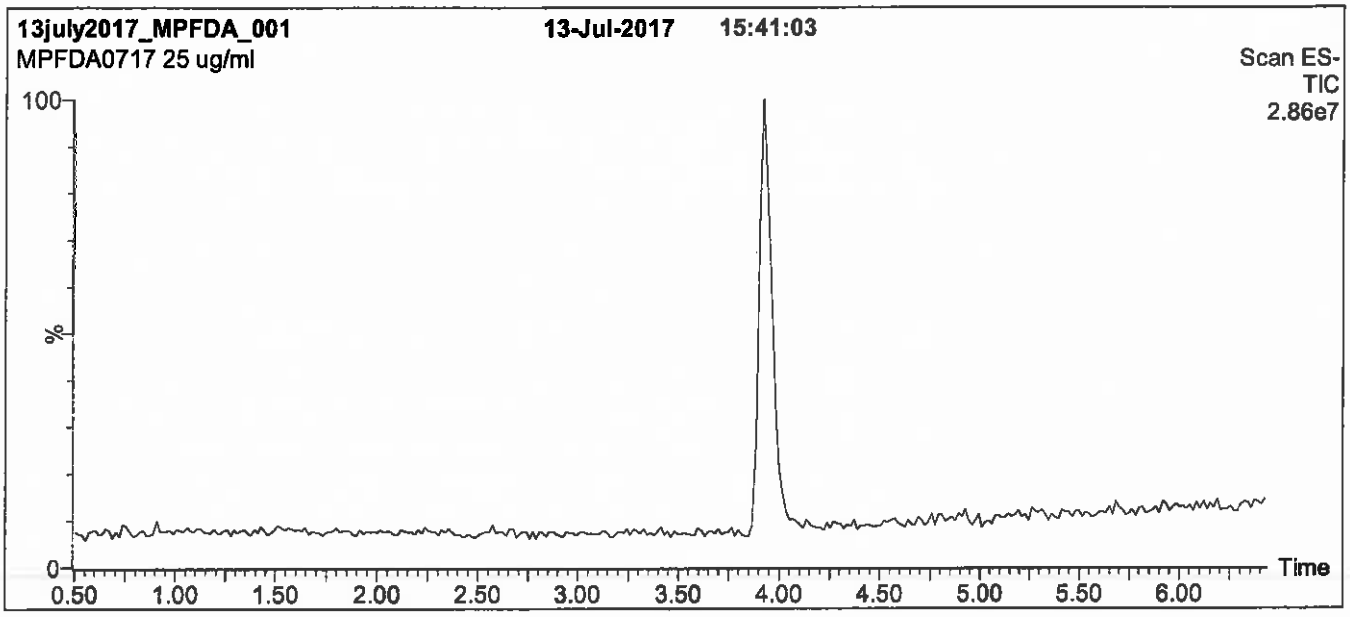
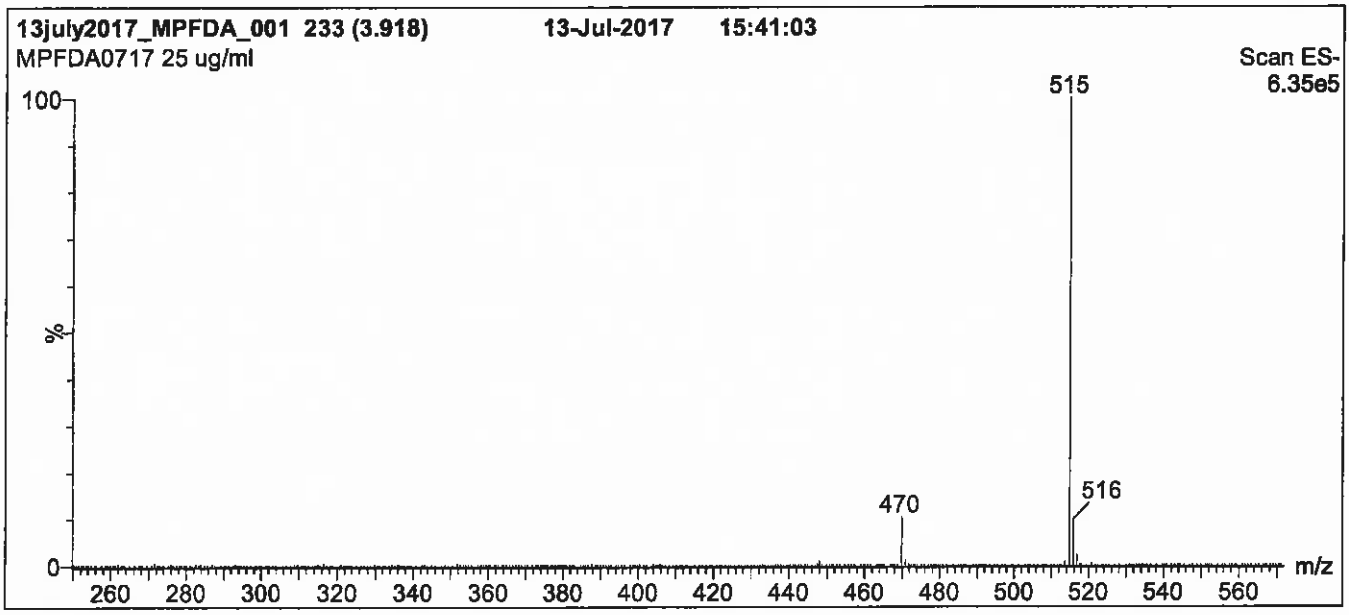
CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

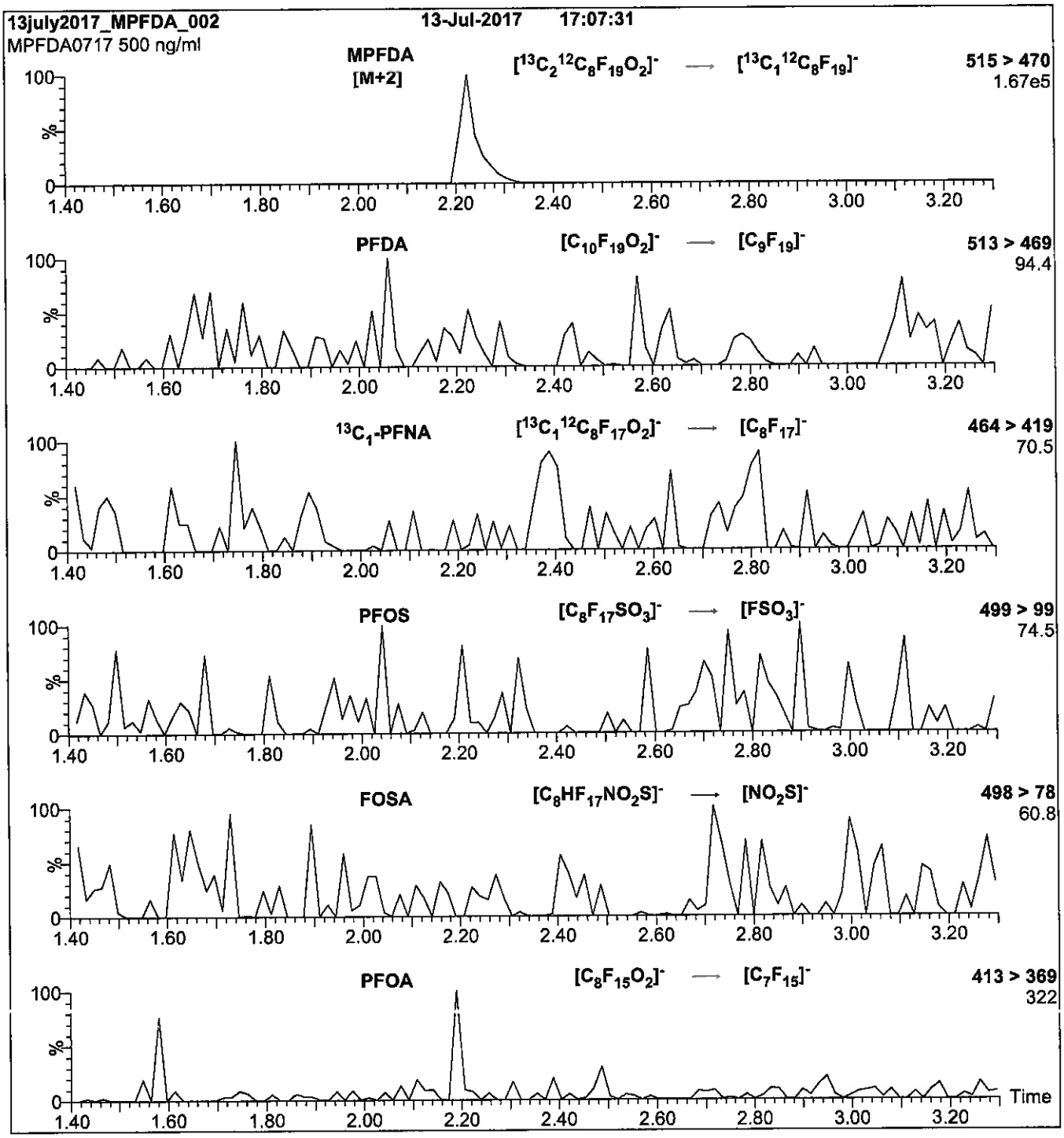
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

MS Parameters

Collision Gas (mbar) = 3.17e-3
Collision Energy (eV) = 13

Reagent

LCMPFDoA_00013

1106319
ID: LCMPFDoA_00013
Exp: 05/23/22 Prpd: CCL
13C2-Perfluorododecanoic

r: 12/4/17 cc

WELLINGTON LABORATORIES

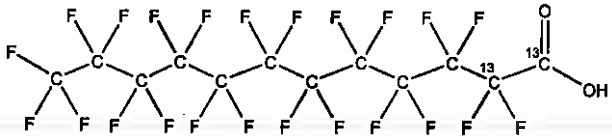
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFDoA0517

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_2{}^{12}C_{10}HF_{23}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 616.08
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 05/23/2017
EXPIRY DATE: (mm/dd/yyyy) 05/23/2022
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 05/26/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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CALA

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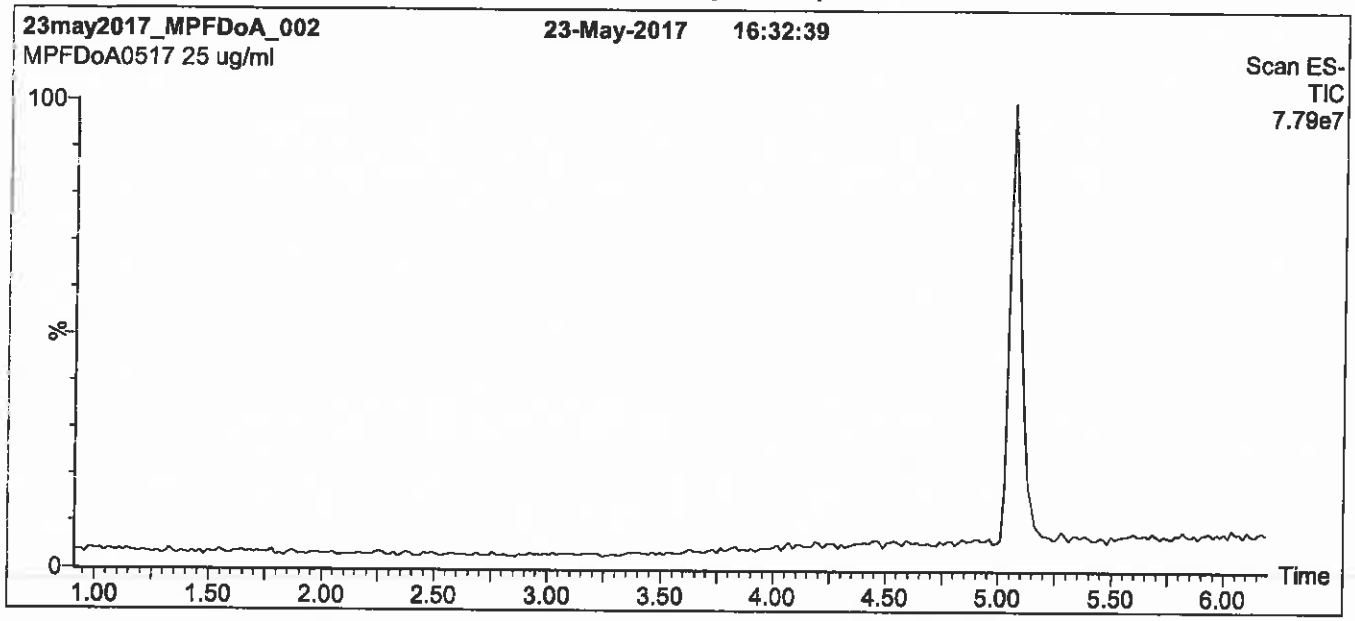
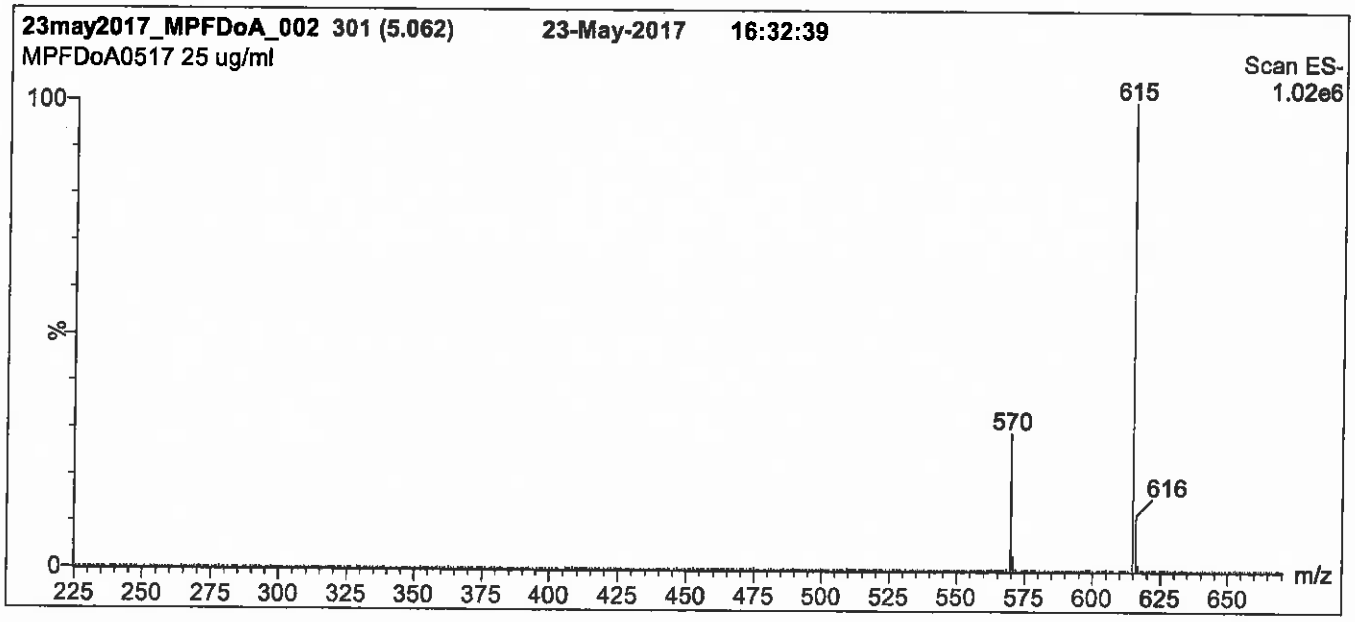




Conditions for Figure 1:

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

Chromatographic Conditions

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

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

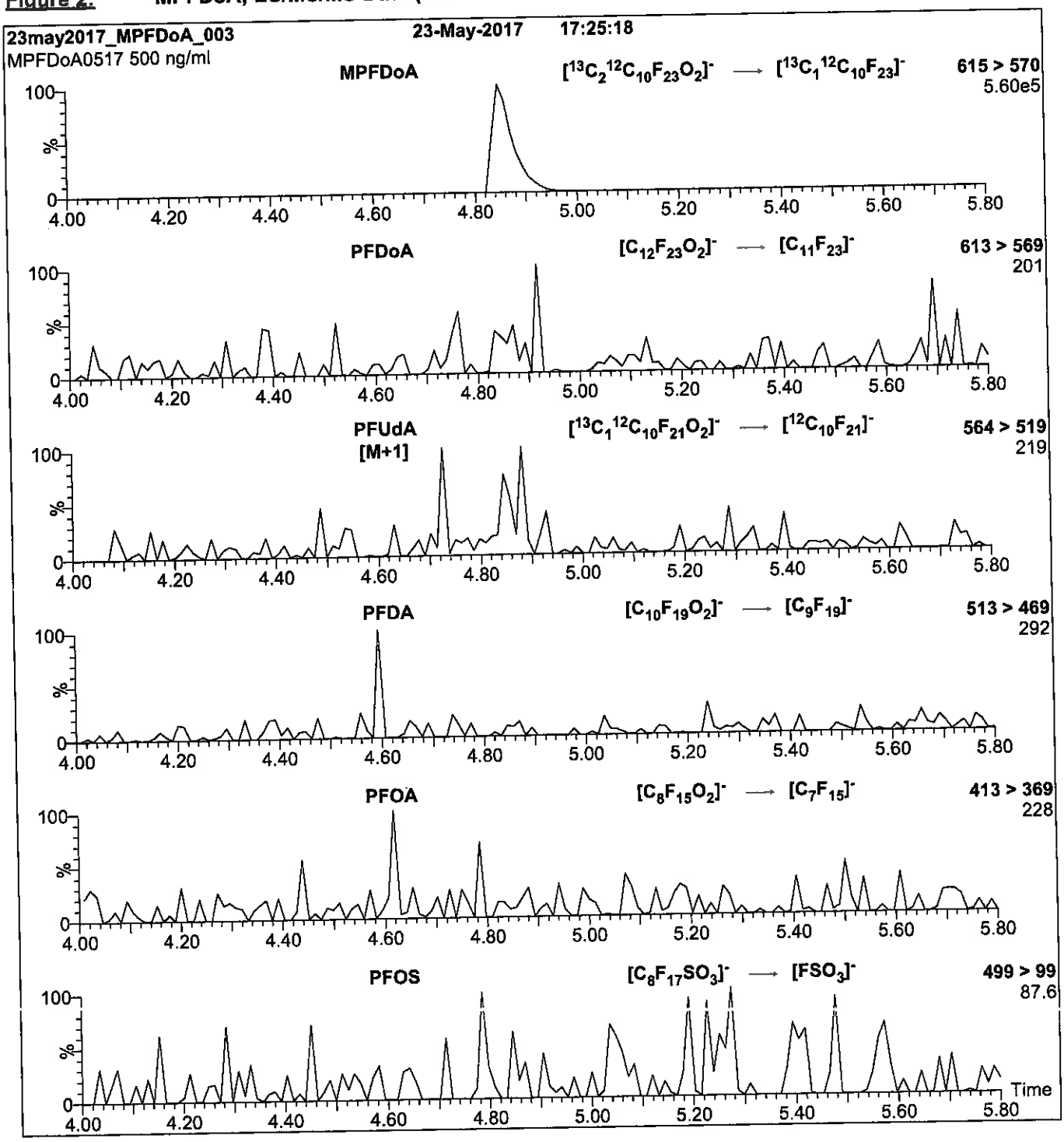
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

MS Parameters

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

Reagent

LCMPFHxA_00019

1106139
ID: LCMPFHxA_00019
Exp: 10/27/22 Prpd: CCL
13C2-Perfluorohexanoic ac

r: 12/14/17 ccc

WELLINGTON LABORATORIES

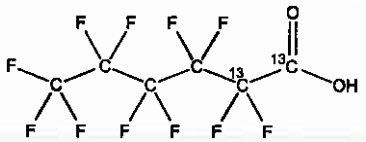
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFHxA1017

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_4HF_{11}O_2$	**MOLECULAR WEIGHT:**	316.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2-$^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	10/27/2017		
EXPIRY DATE: (mm/dd/yyyy)	10/27/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 10/30/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

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CALA

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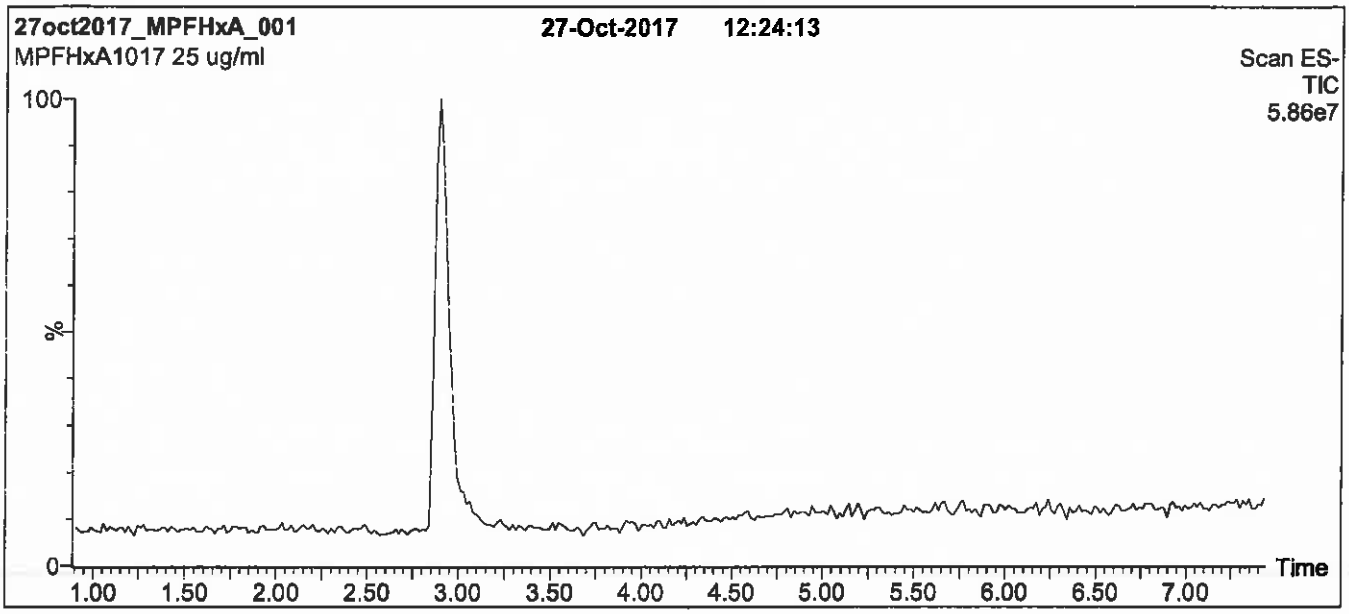
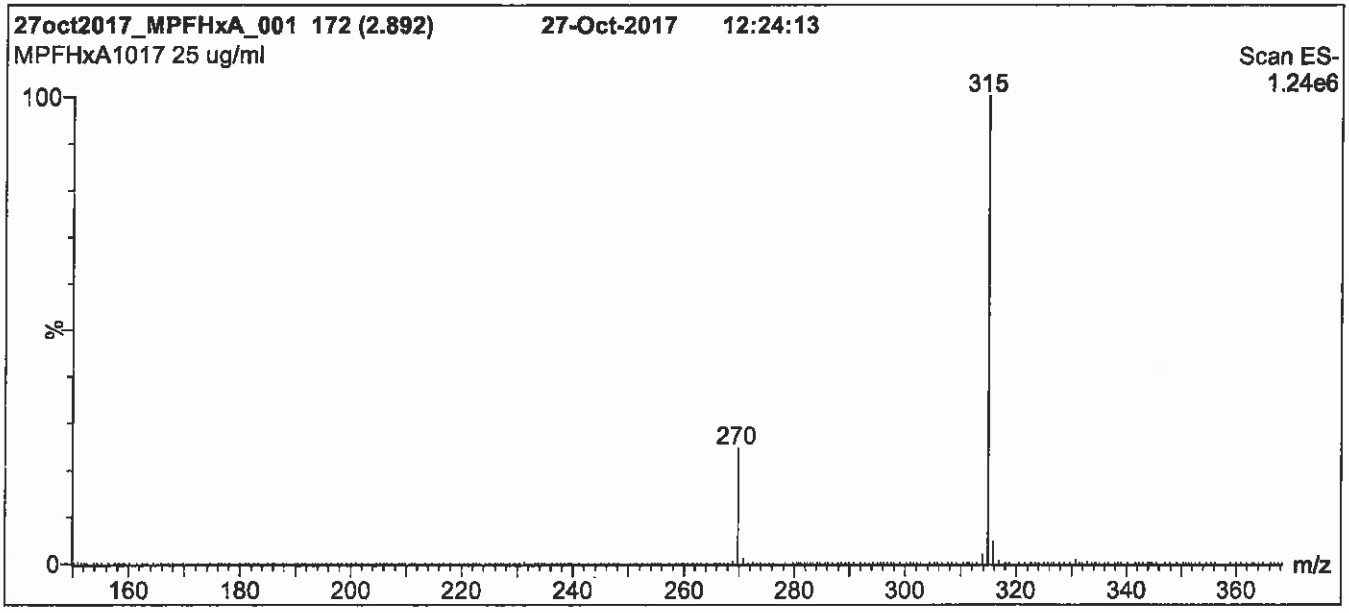




Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions over 0.5 min.
Time: 10 min

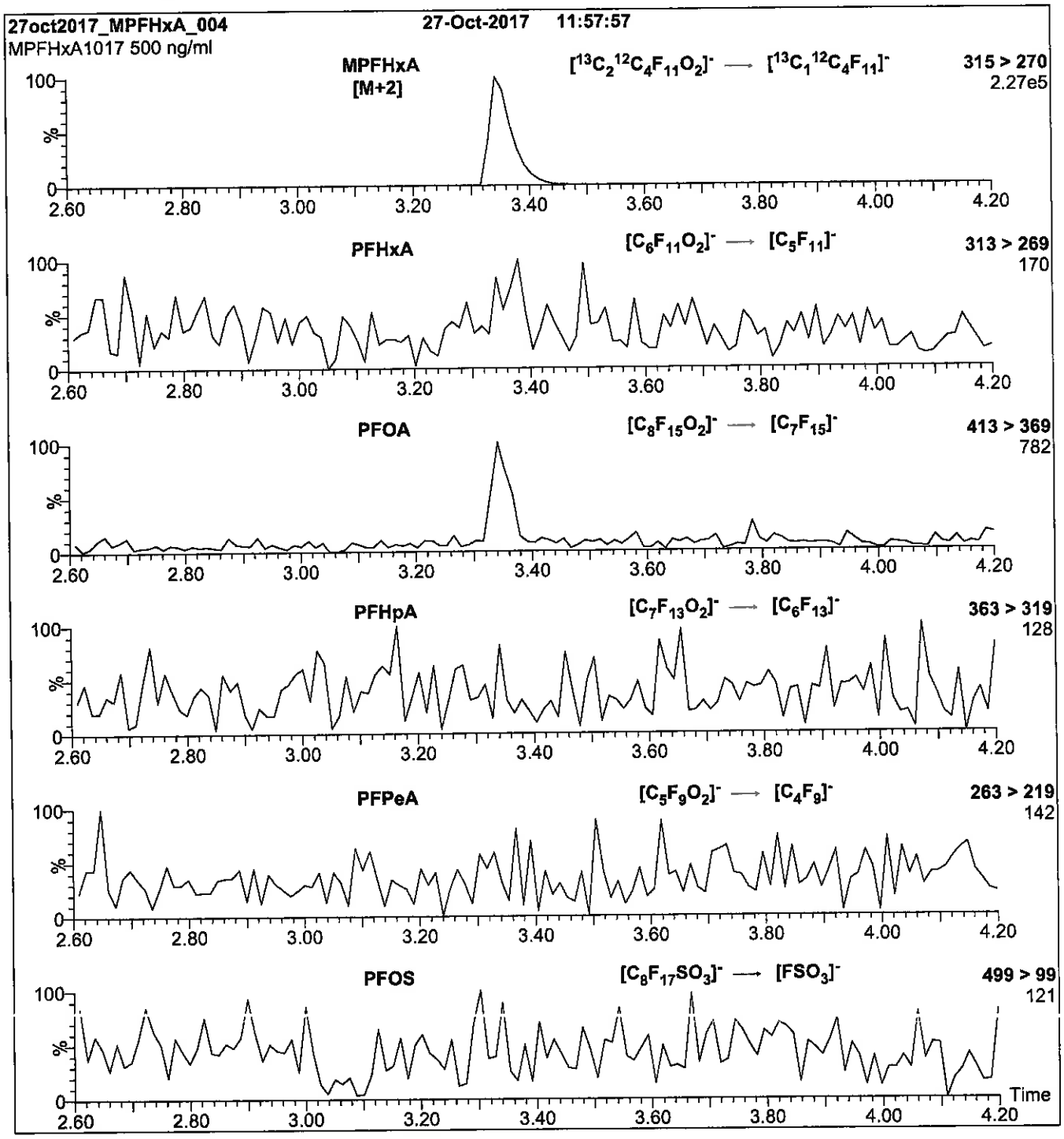
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFHxS_00013

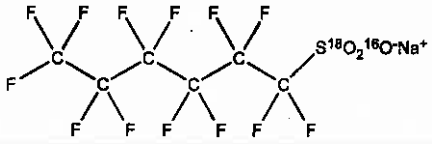
1106238
ID: LCMPFHxS_00013
Exp: 02/17/22 Prpd: CCL
18O2-Perfluorohexanesulfo

r: 12/4/17 CCL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFHxS	**LOT NUMBER:**	MPFHxS0217
COMPOUND:	Sodium perfluoro-1-hexane[$^{18}O_2$]sulfonate		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$C_6F_{13}S^{18}O_2{}^{16}ONa$	**MOLECULAR WEIGHT:**	426.10
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.3 ± 2.4 µg/ml (MPFHxS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	>94% ($^{18}O_2$)
LAST TESTED: (mm/dd/yyyy)	02/17/2017		
EXPIRY DATE: (mm/dd/yyyy)	02/17/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- The response factor for MPFHxS ($C_6F_{13}S^{18}O_2{}^{16}O^-$) has been observed to be up to 10% lower than for PFHxS ($C_6F_{13}S^{16}O_3^-$) when both compounds are injected together. This difference may vary between instruments.
- Contains ~ 1.0% of sodium perfluoro-1-octane[$^{18}O_2$]sulfonate ($^{18}O_2$-PFOS).
- Due to the isotopic purity of the starting material ($^{18}O_2$ >94%), MPFHxS contains ~ 0.3% of PFHxS. This value agrees with the theoretical percent relative abundance that is expected based on the stated isotopic purity.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 03/02/2017 (mm/dd/yyyy)

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

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

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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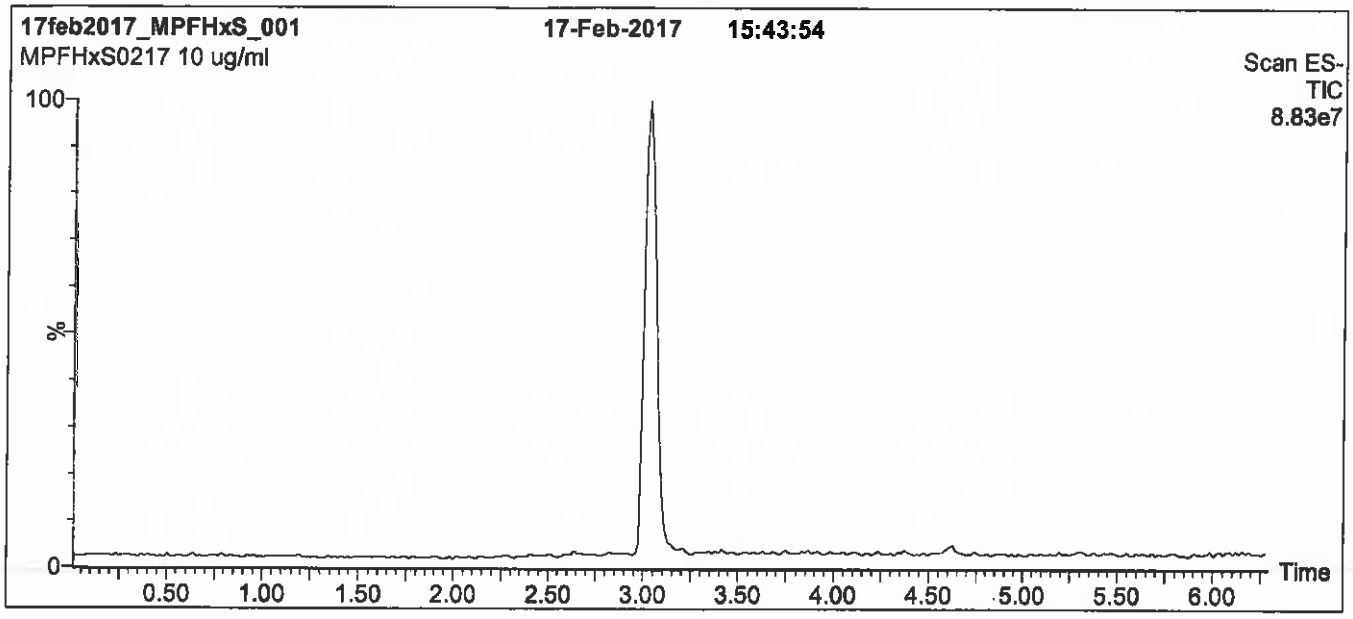
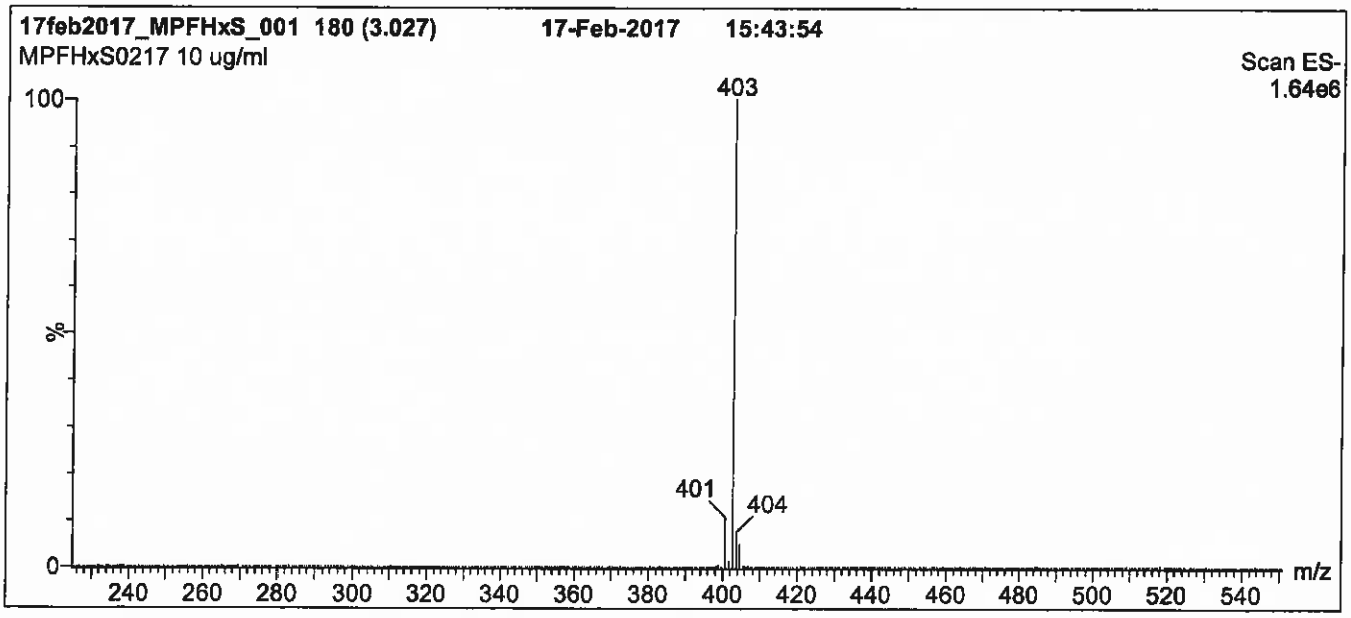
Figure 1: **MPFHxS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 1 min before returning to initial conditions in 0.5 min.
Time: 10 min

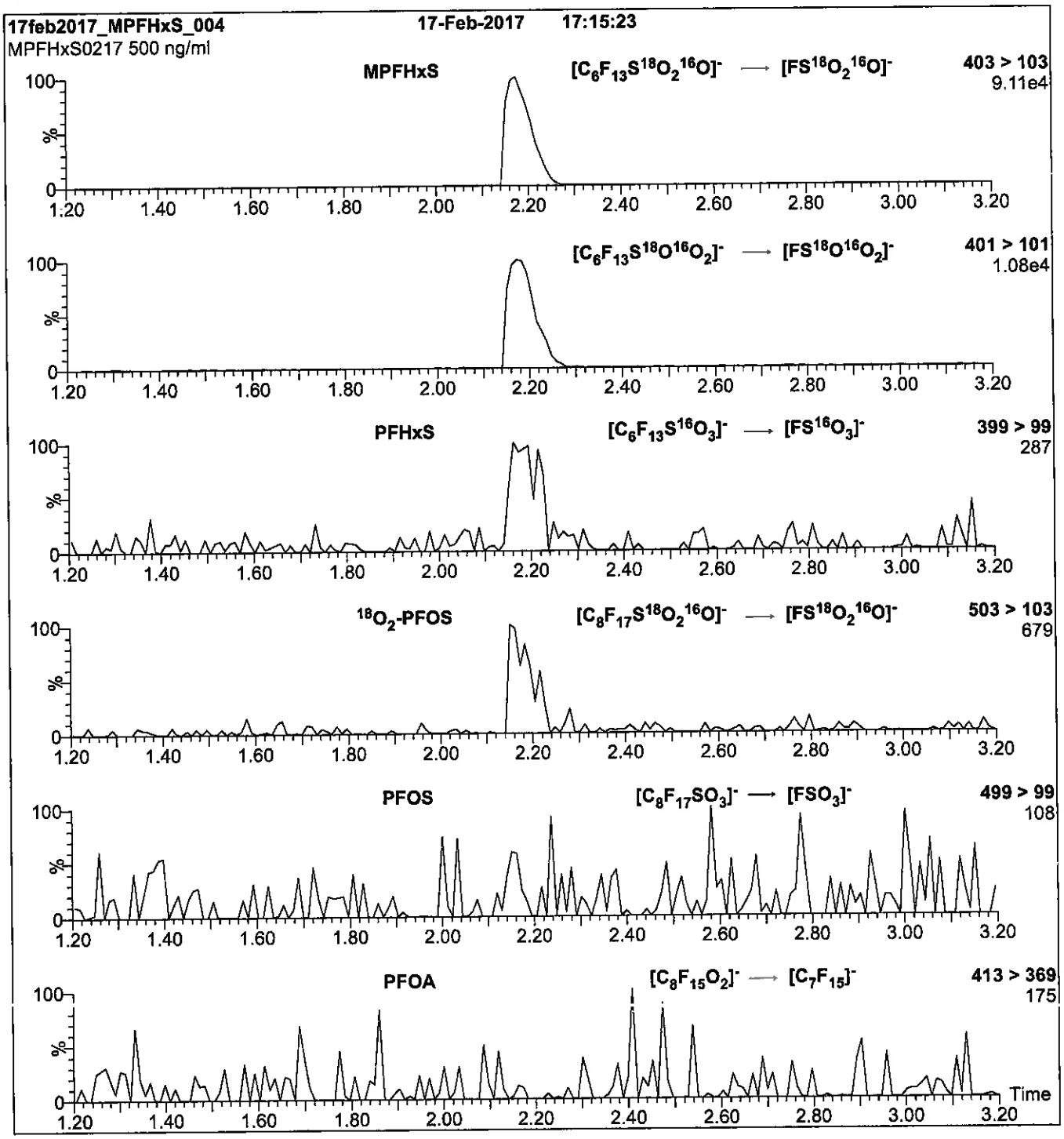
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 30

Reagent

LCMPFNA_00013

1105307
ID: LCMPFNA_00013
Exp: 09/30/21 Prpd: CCL
13C5-Perfluorononanoic aci

r: 12/4/17 ccc

WELLINGTON LABORATORIES

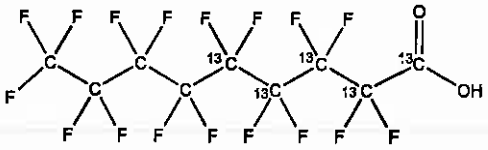
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFNA0916

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_5{}^{12}C_4HF_{17}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 469.04
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 09/30/2016
EXPIRY DATE: (mm/dd/yyyy) 09/30/2021
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

ISOTOPIC PURITY: ≥99% ^{13}C ($1,2,3,4,5\text{-}^{13}C_5$)

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 10/11/2016 (mm/dd/yyyy)

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

INTENDED USE:

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HAZARDS:

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CALA

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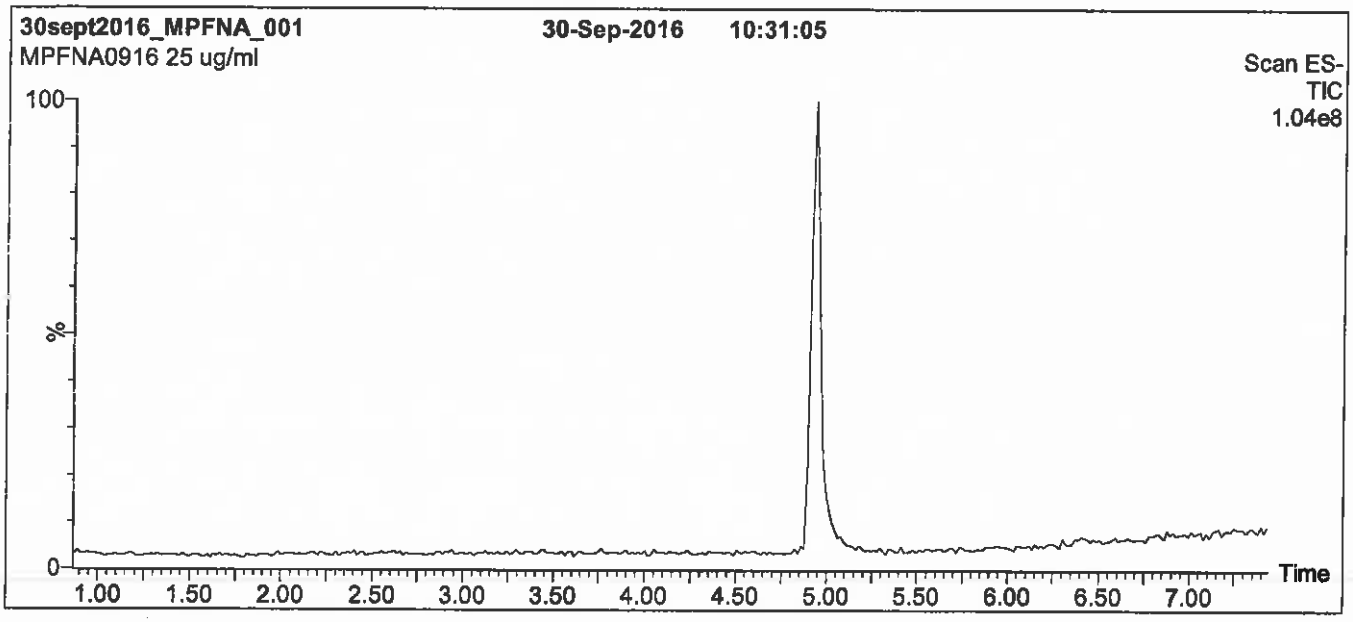

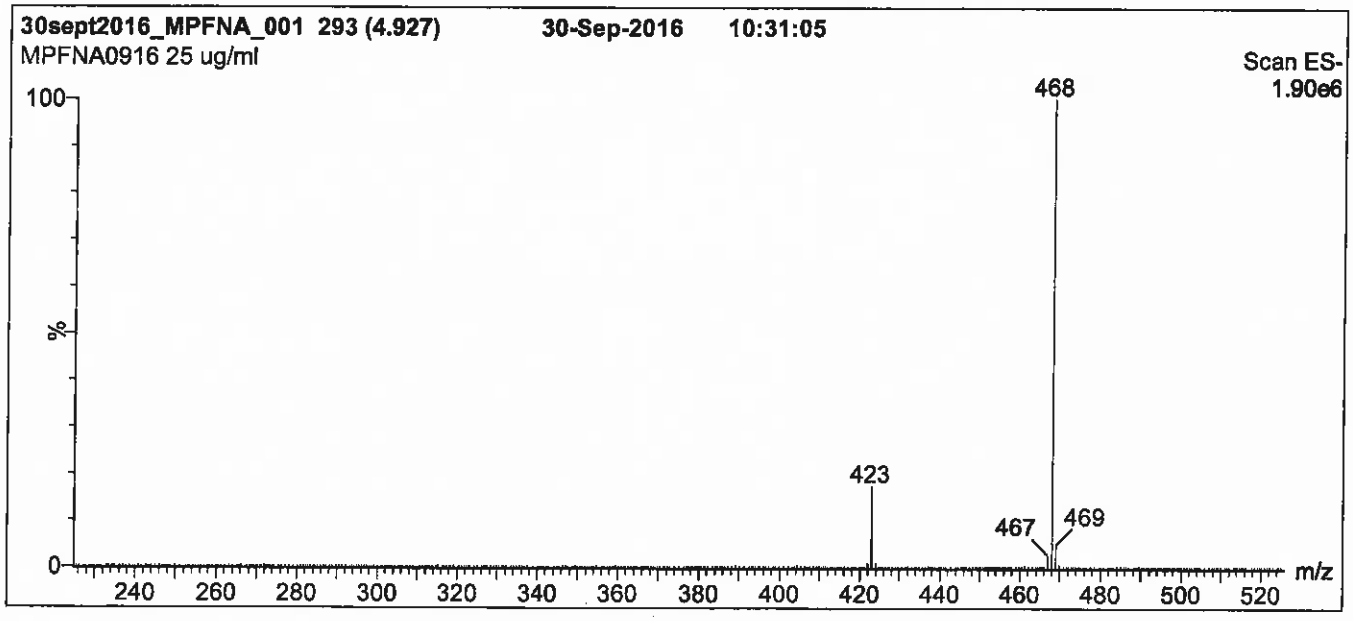

Conditions for Figure 1:

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

Chromatographic Conditions

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

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

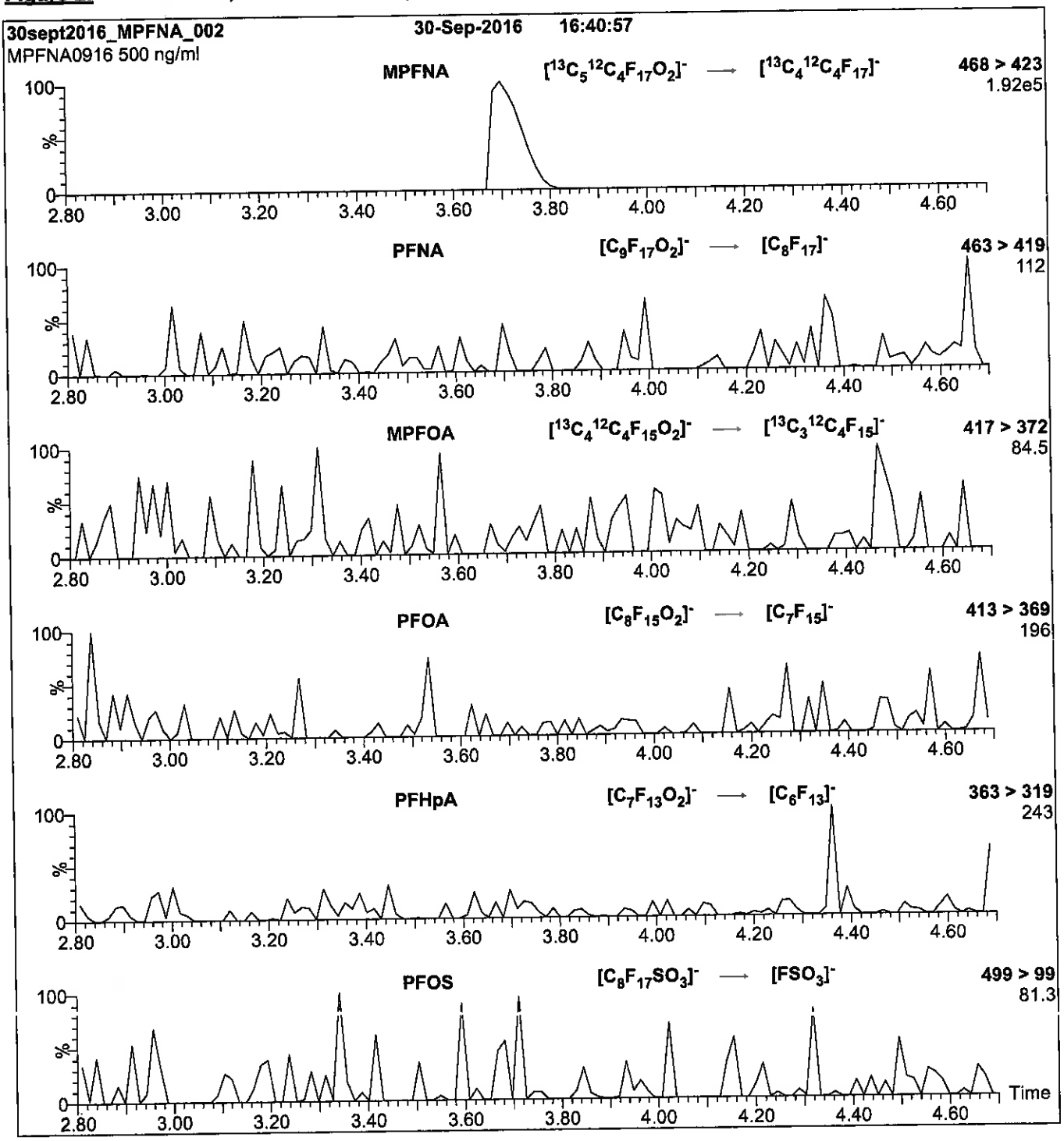
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

MS Parameters

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 11

Reagent

LCMPFOA_00017

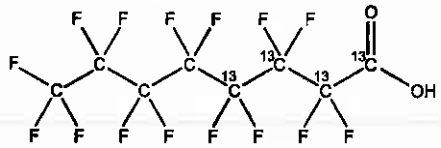
1106032
ID: LCMPFOA_00017
Exp: 10/17/22 Prpd: SKV
13C4-Perfluorooctanoic ac

R: 12/4/19 cc

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFOA	**LOT NUMBER:**	MPFOA1017
COMPOUND:	Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_4HF_{16}O_2$	**MOLECULAR WEIGHT:**	418.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2,3,4-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	10/17/2017		
EXPIRY DATE: (mm/dd/yyyy)	10/17/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 10/19/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

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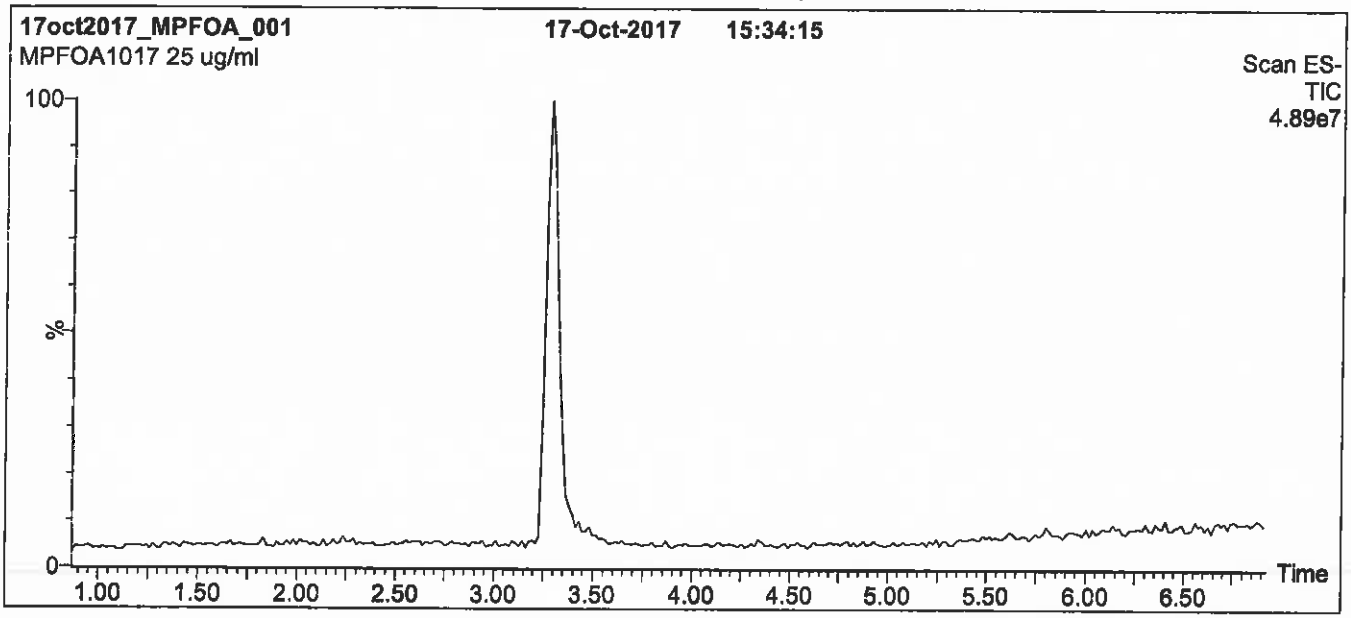
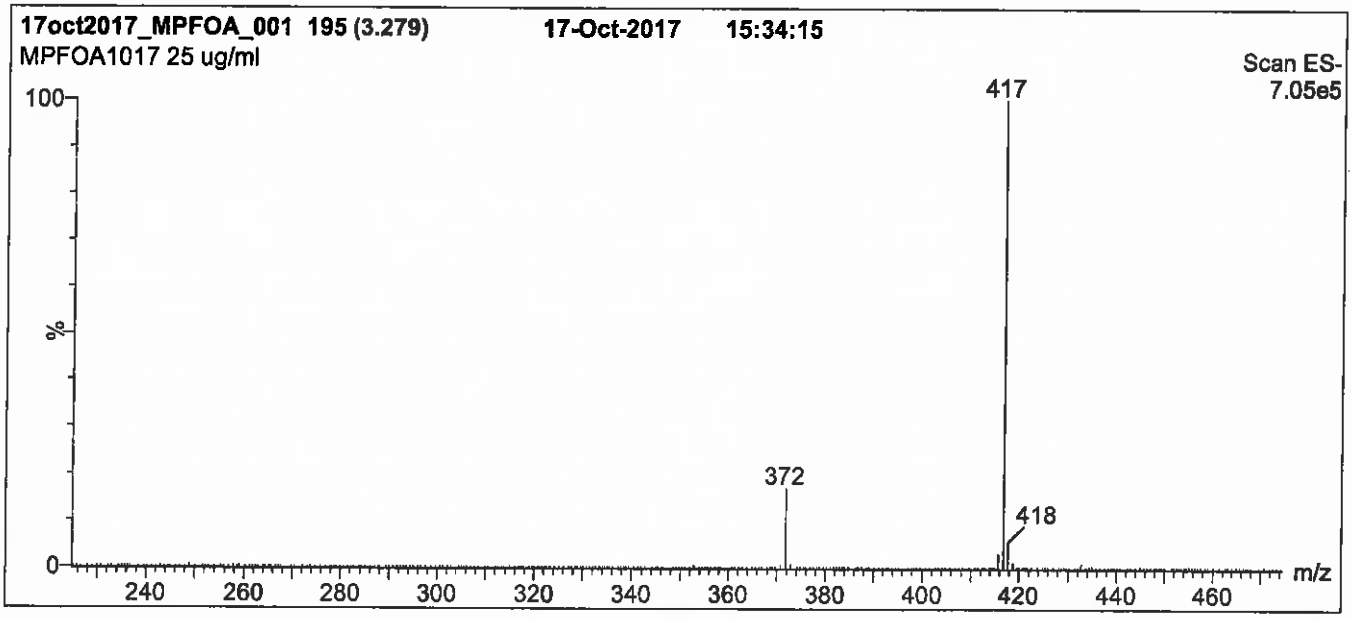




Conditions for Figure 1:

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

Chromatographic Conditions

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

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

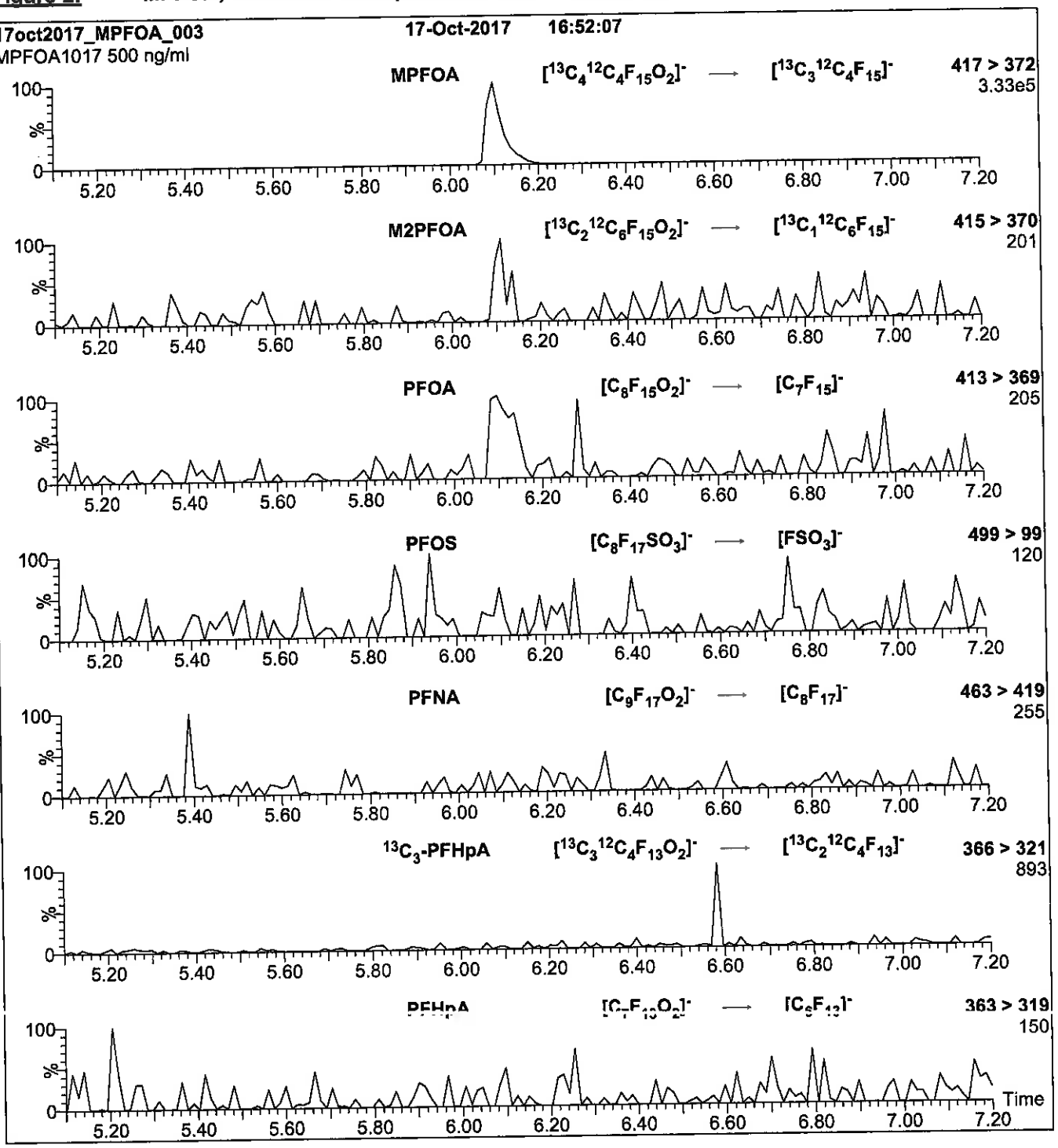
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFOS_00025

1106029
ID: LCMPFOS_00025
Exp: 10/17/22 Prpd: SKV
13C4-Perfluorooctanesulfo

P: 12/4/17 CCL

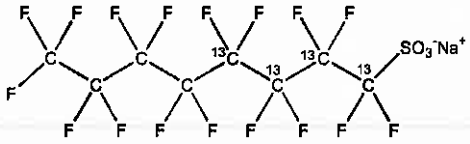
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: MPFOS **LOT NUMBER:** MPFOS1017

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

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_4F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	526.08
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.8 ± 2.4 µg/ml (MPFOS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4\text{-}^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	10/17/2017		
EXPIRY DATE: (mm/dd/yyyy)	10/17/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.4% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 10/18/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

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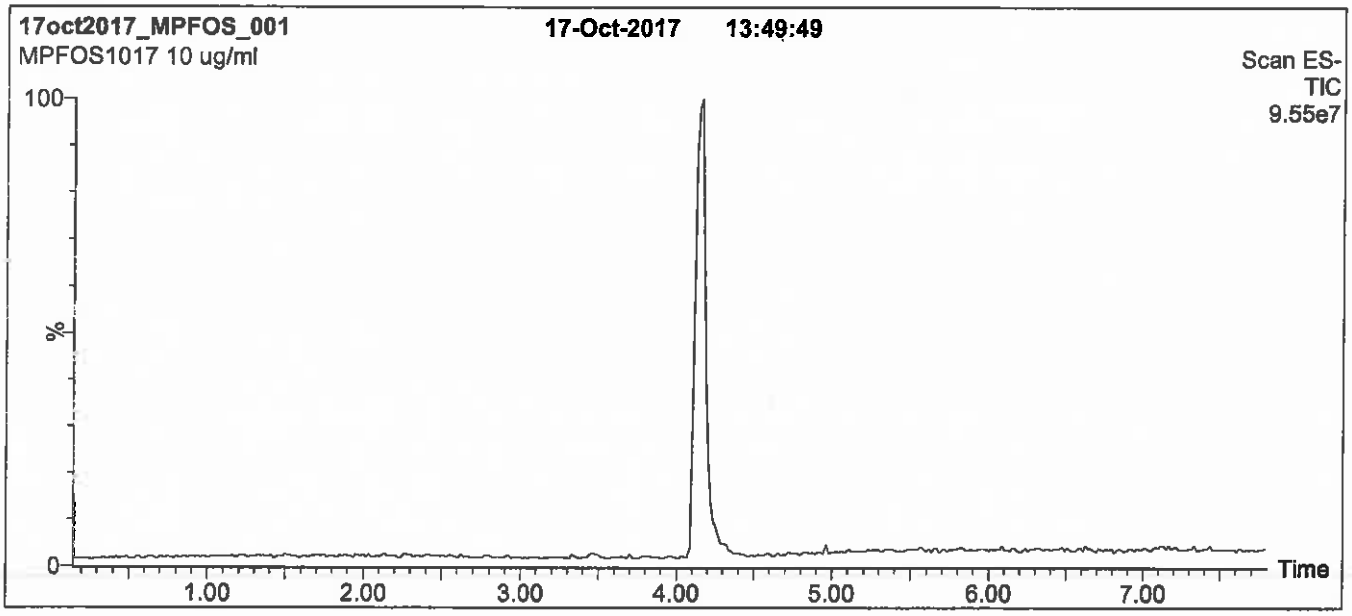
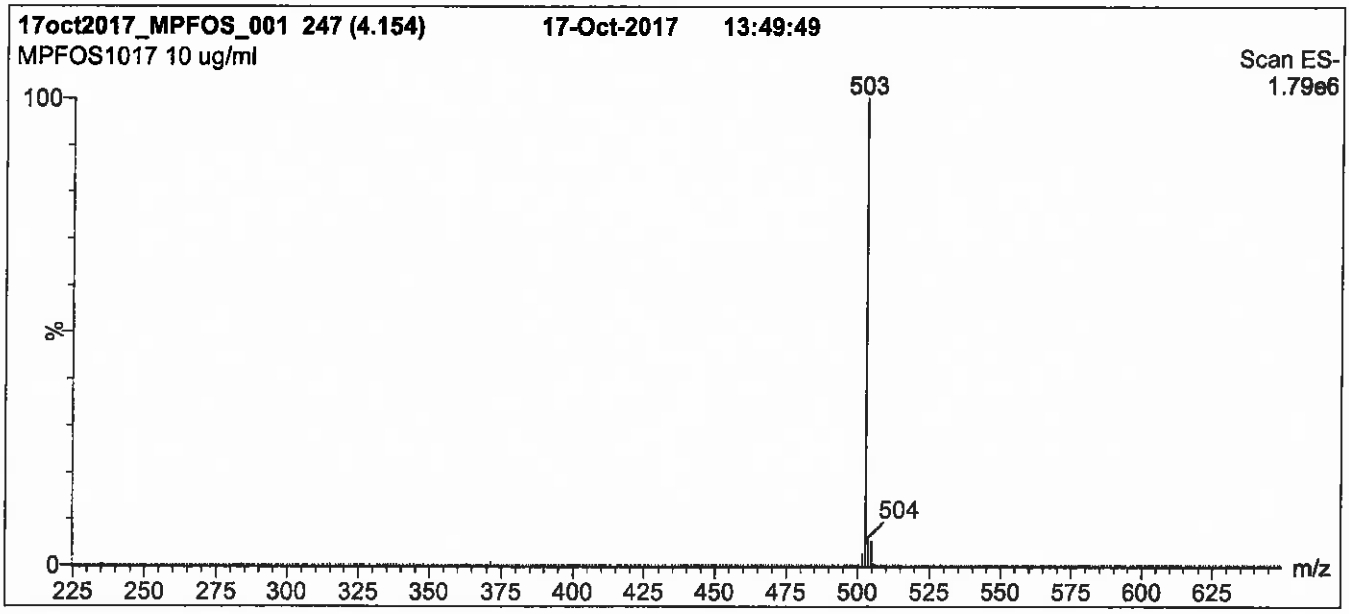
Figure 1: **MPFOS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

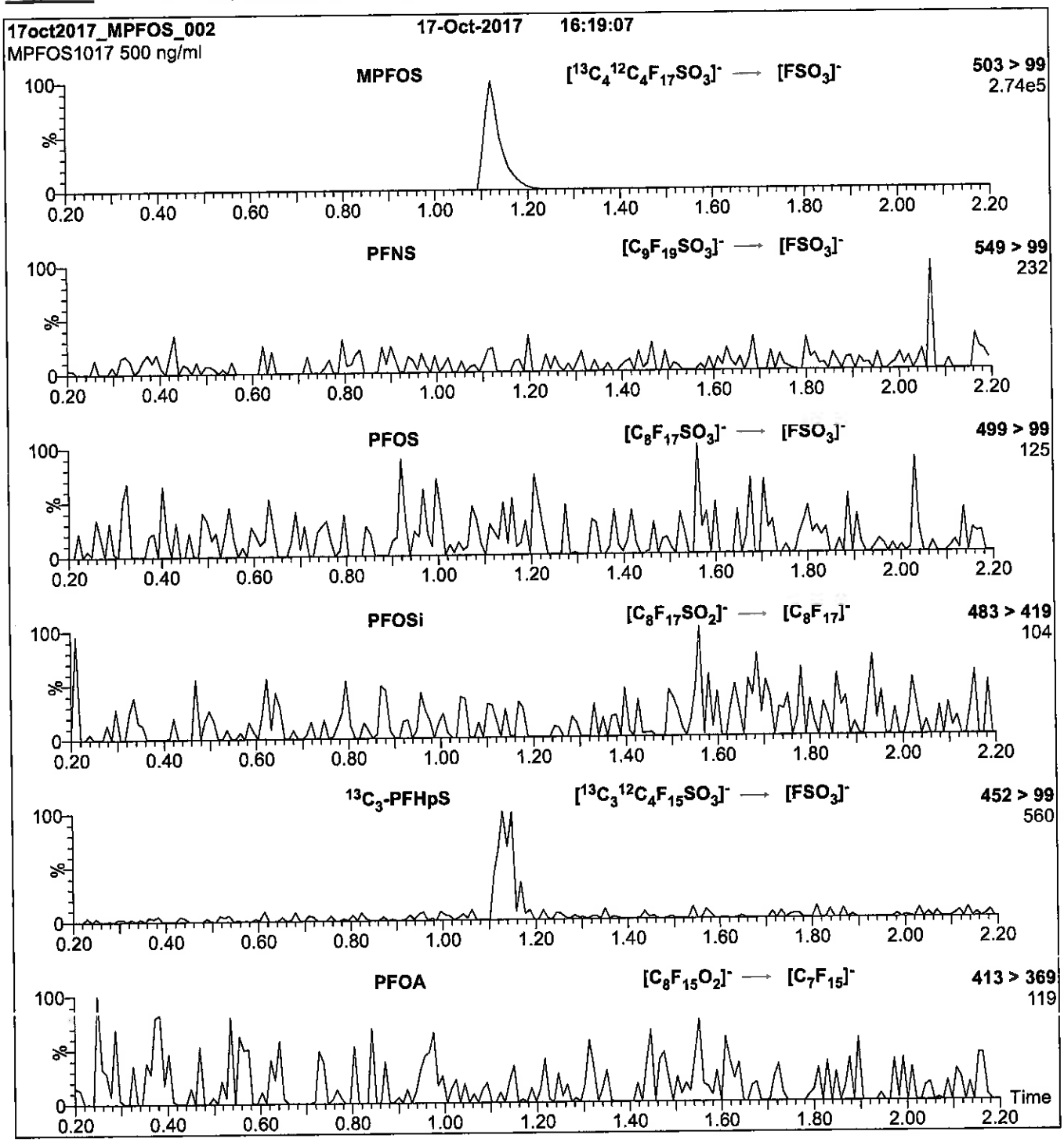
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 40

Reagent

LCMPFUdA_00014

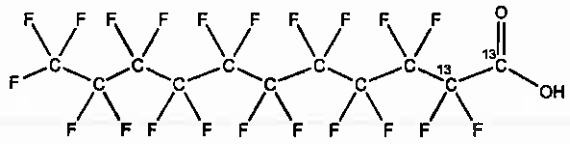
1106187
ID: LCMPFUdA_00014
Exp: 11/22/21 Prpd: CCL
13C2-Perfluoroundecanoic

R: 12/4/17 ccl

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFUdA	**LOT NUMBER:**	MPFUdA1116
COMPOUND:	Perfluoro-n-[1,2-$^{13}C_2$]undecanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_9HF_{21}O_2$	**MOLECULAR WEIGHT:**	566.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2-$^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	11/22/2016		
EXPIRY DATE: (mm/dd/yyyy)	11/22/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Presence of 1-$^{13}C_1$-PFUdA (~1%; see Figure 2), 2-$^{13}C_1$-PFUdA (~1%), and PFUdA (~0.2%; see Figure 2) are due to the isotopic purity of the ^{13}C-precursor.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 12/07/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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

CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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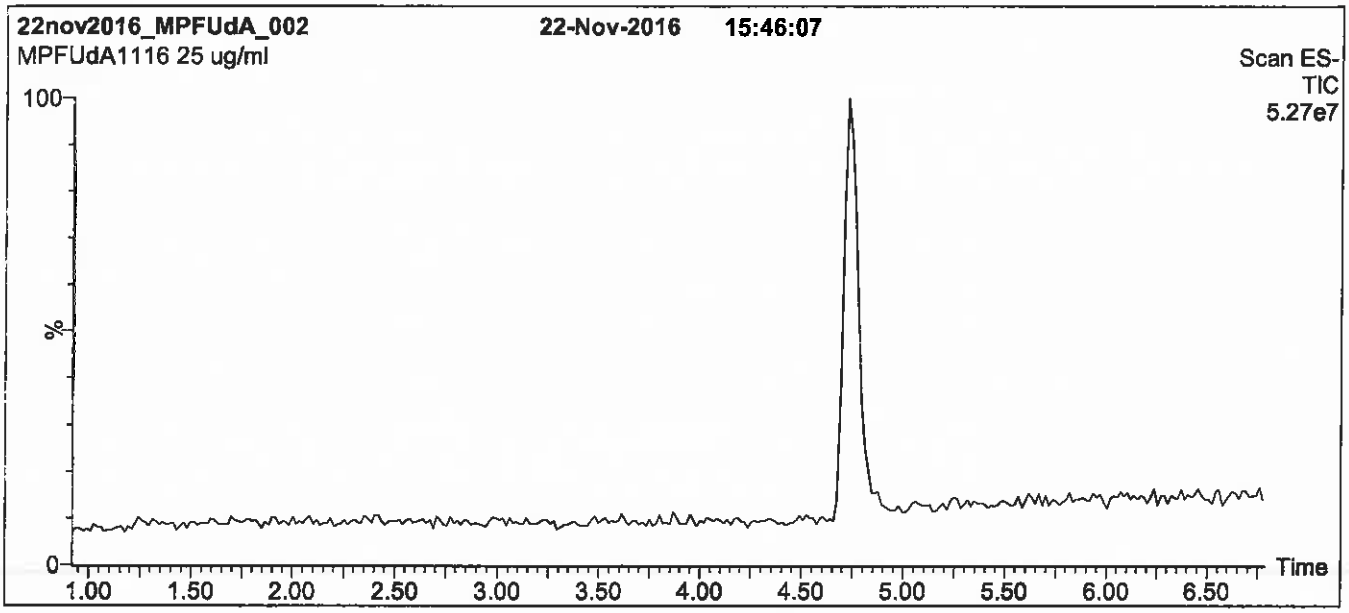
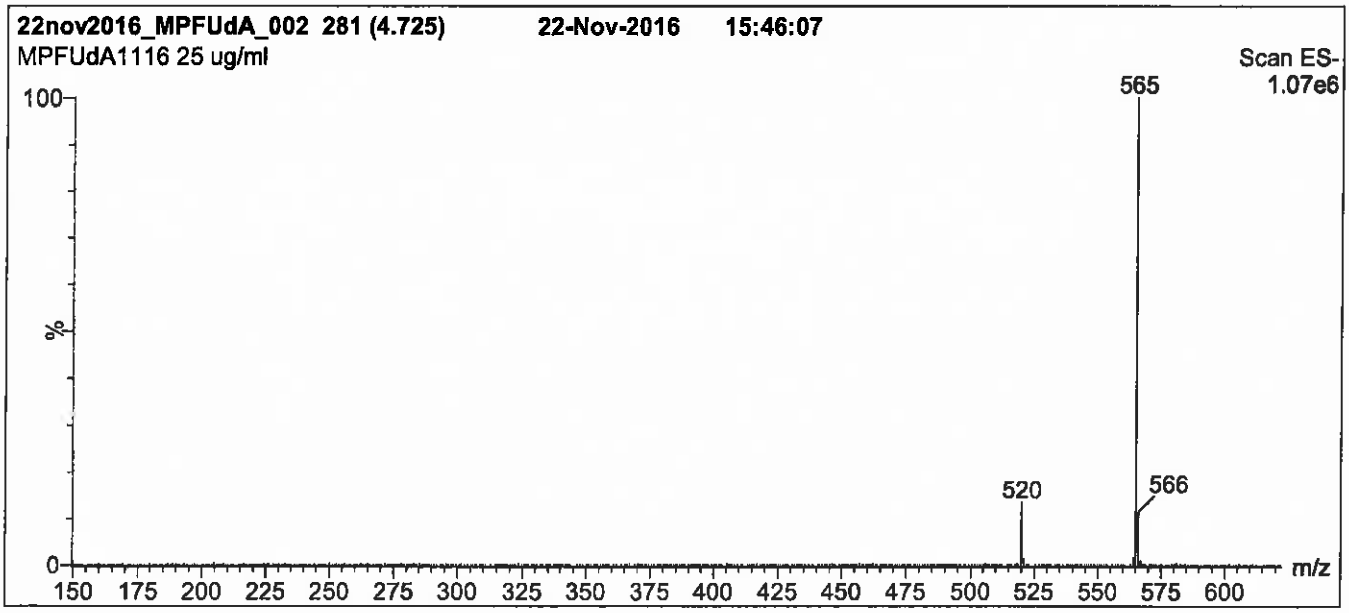




Conditions for Figure 1:

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

Chromatographic Conditions

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

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

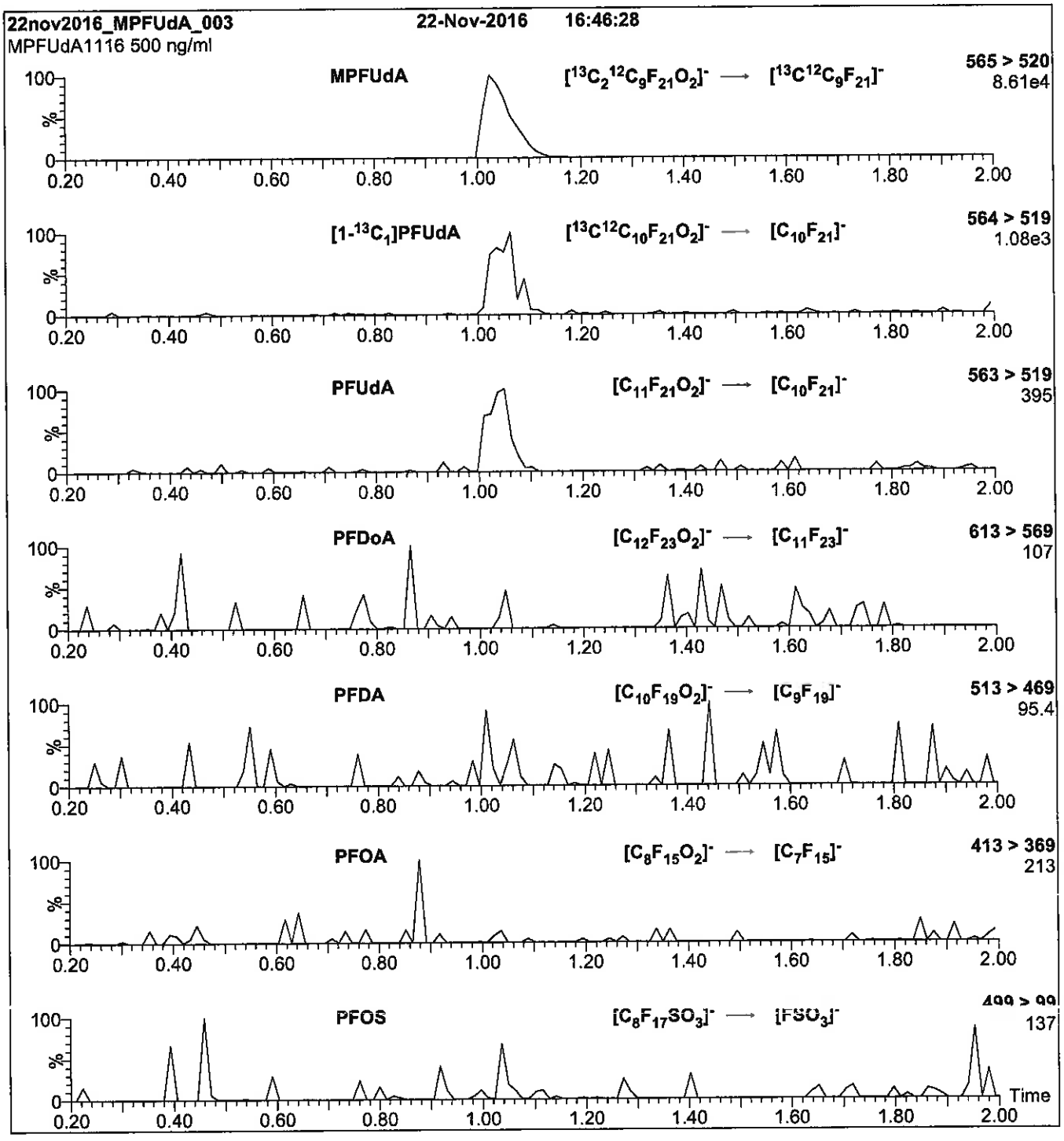
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

Reagent

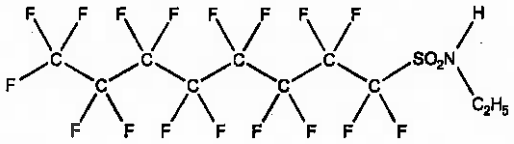
LCN-EtFOSA-M_00005

R: 12/20/16 SK✓

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	N-EtFOSA-M	**LOT NUMBER:**	NEtFOSA0516M
COMPOUND:	N-ethylperfluoro-1-octanesulfonamide		
STRUCTURE:		**CAS #:**	4151-50-2



MOLECULAR FORMULA:	$C_{10}H_5F_{17}NO_2S$	**MOLECULAR WEIGHT:**	527.20
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/24/2016		
EXPIRY DATE: (mm/dd/yyyy)	05/24/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/27/2016 (mm/dd/yyyy)

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

INTENDED USE:

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HAZARDS:

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

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

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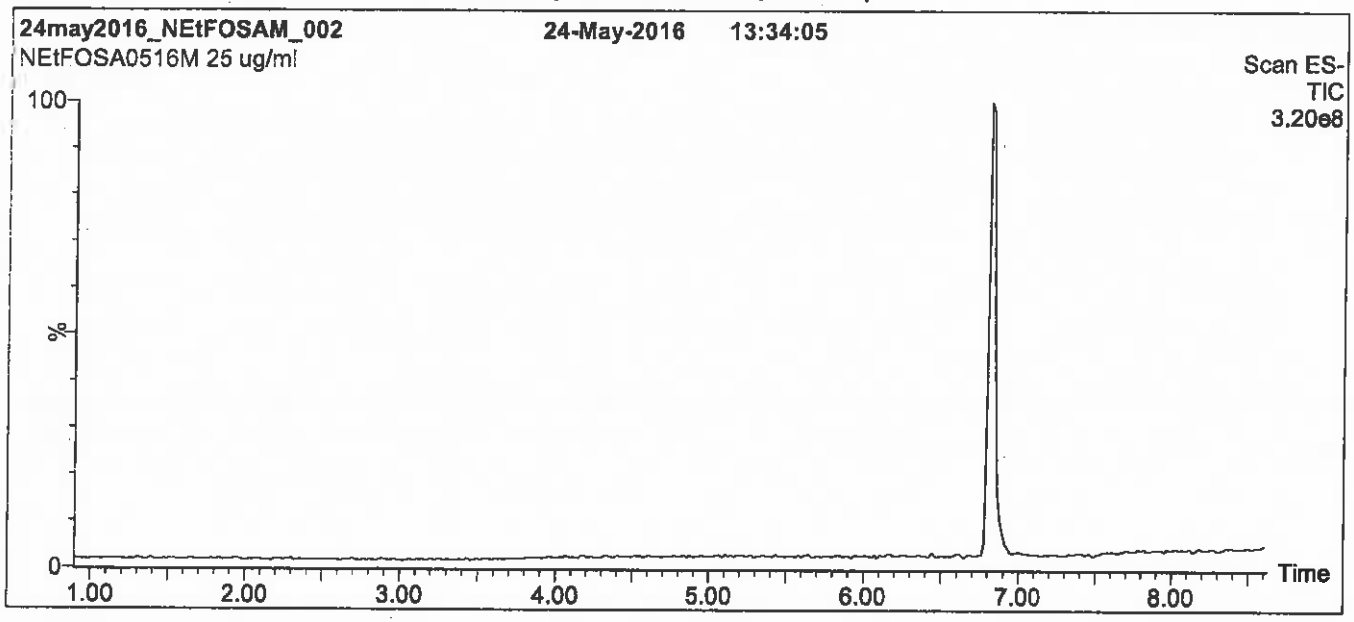
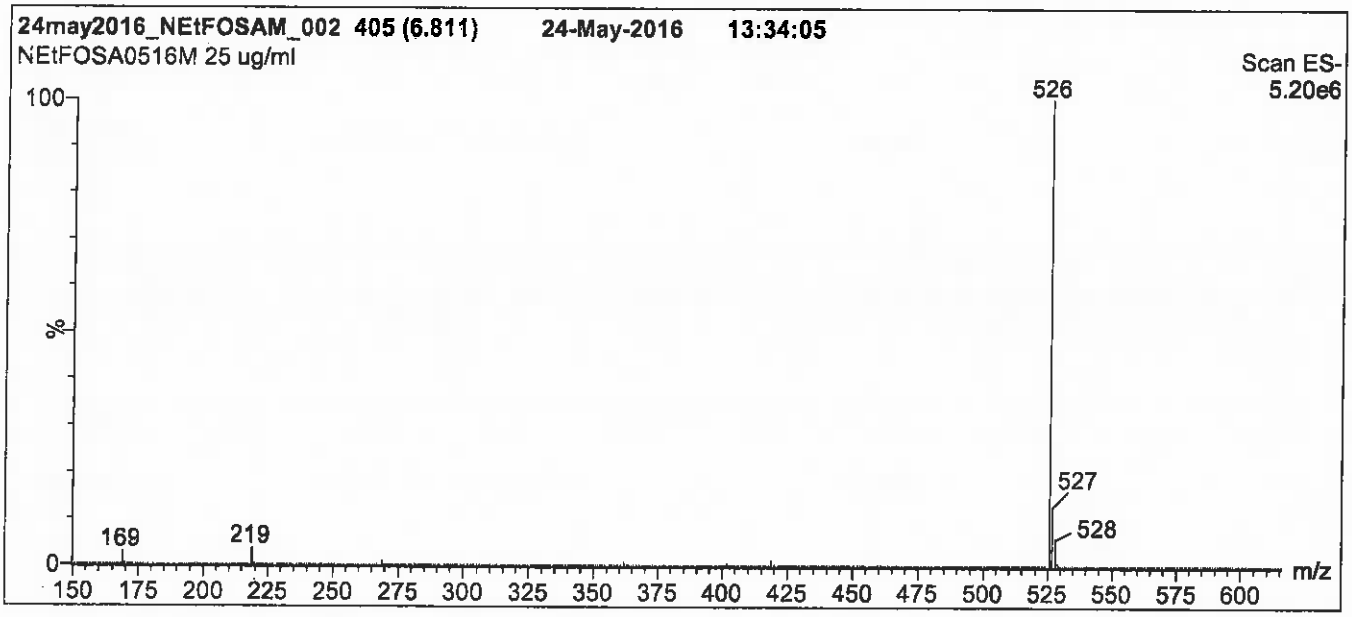
Figure 1: **N-EtFOSA-M; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 45% H_2O / 55% (80:20 MeOH:ACN)
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

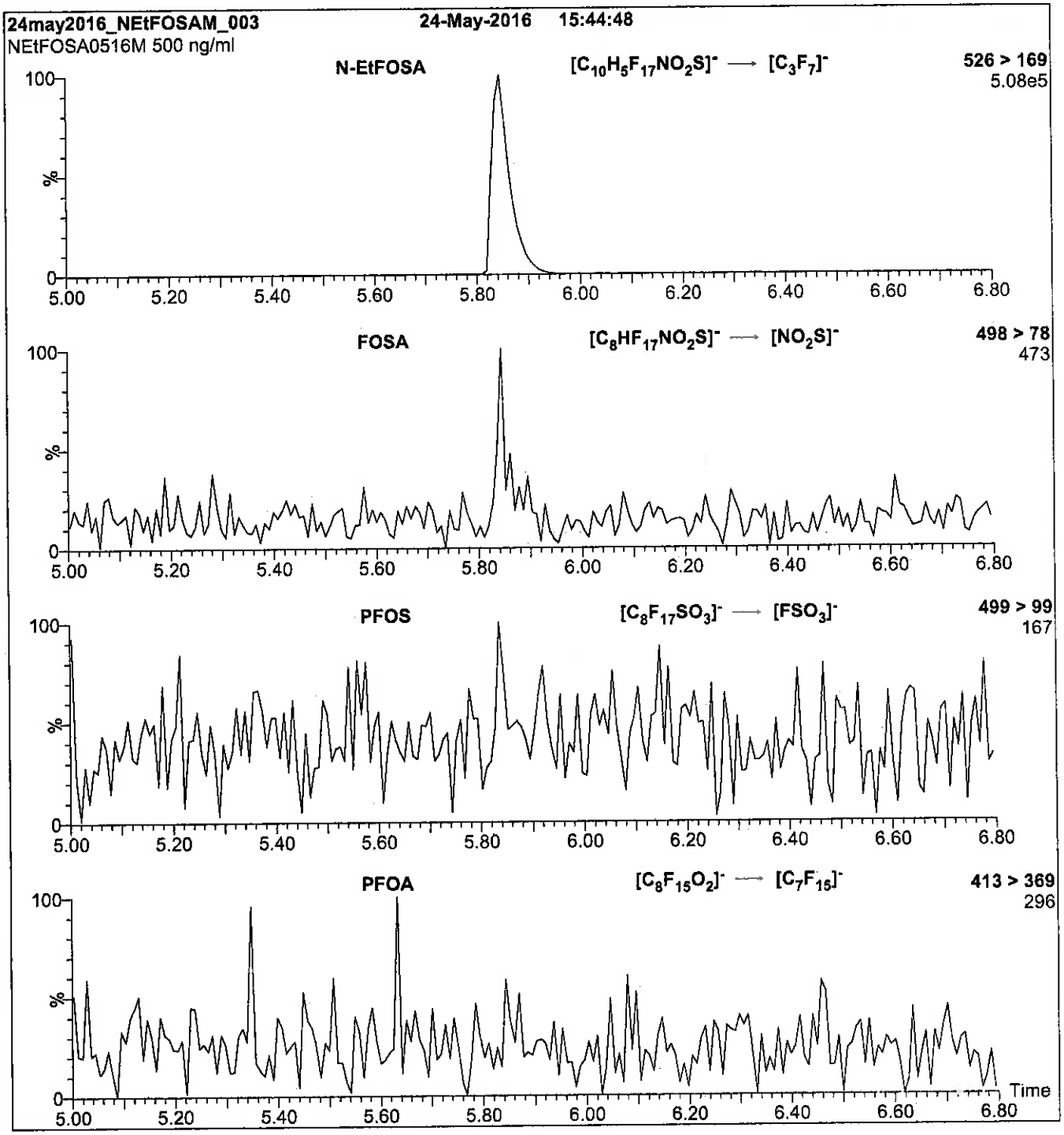
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

Figure 2: **N-EtFOSA-M; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml N-EtFOSA-M)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 30

Reagent

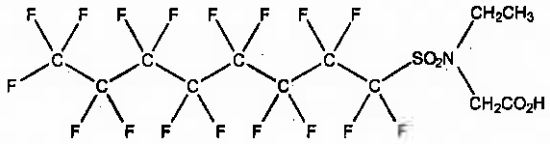
LCN-EtFOSAA_00004

P: 12/29/16 SFV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	N-EtFOSAA	**LOT NUMBER:**	NEtFOSAA0916
COMPOUND:	N-ethylperfluoro-1-octanesulfonamidoacetic acid		
STRUCTURE:		**CAS #:**	2991-50-6



MOLECULAR FORMULA:	$C_{12}H_8F_{17}NO_4S$	**MOLECULAR WEIGHT:**	585.23
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	09/30/2016		
EXPIRY DATE: (mm/dd/yyyy)	09/30/2021		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 10/07/2016 (mm/dd/yyyy)

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

ANAB ACCREDITED

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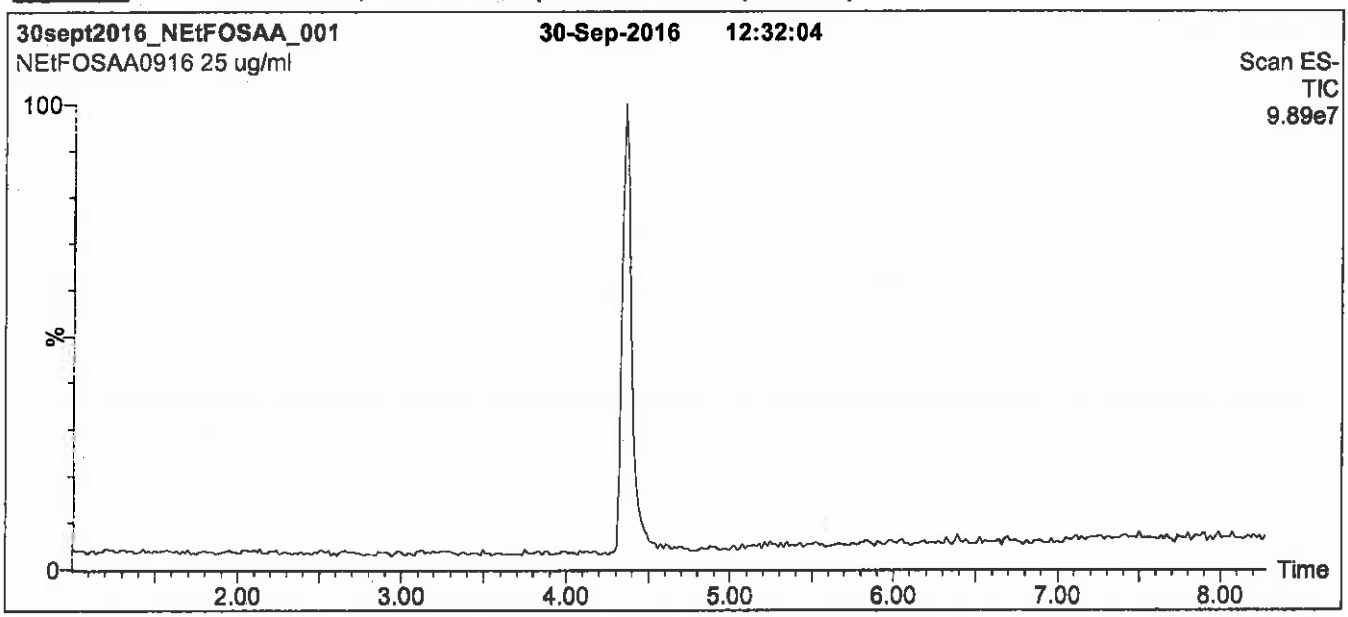
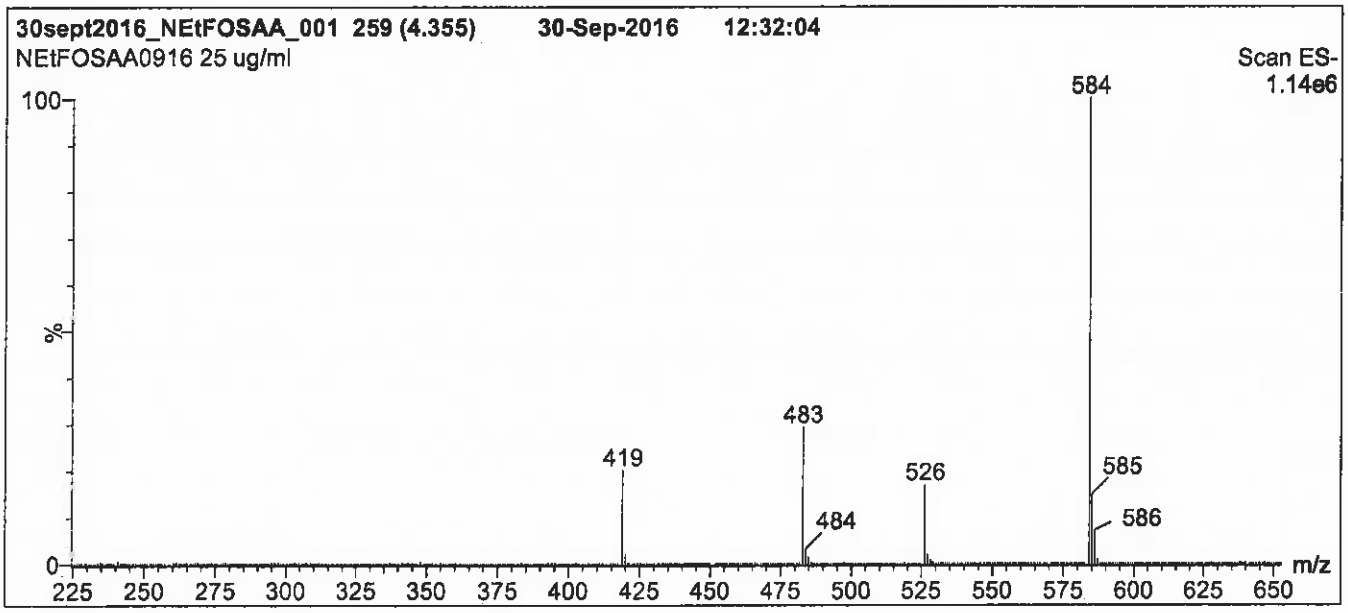
Figure 1: **N-EtFOSAA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

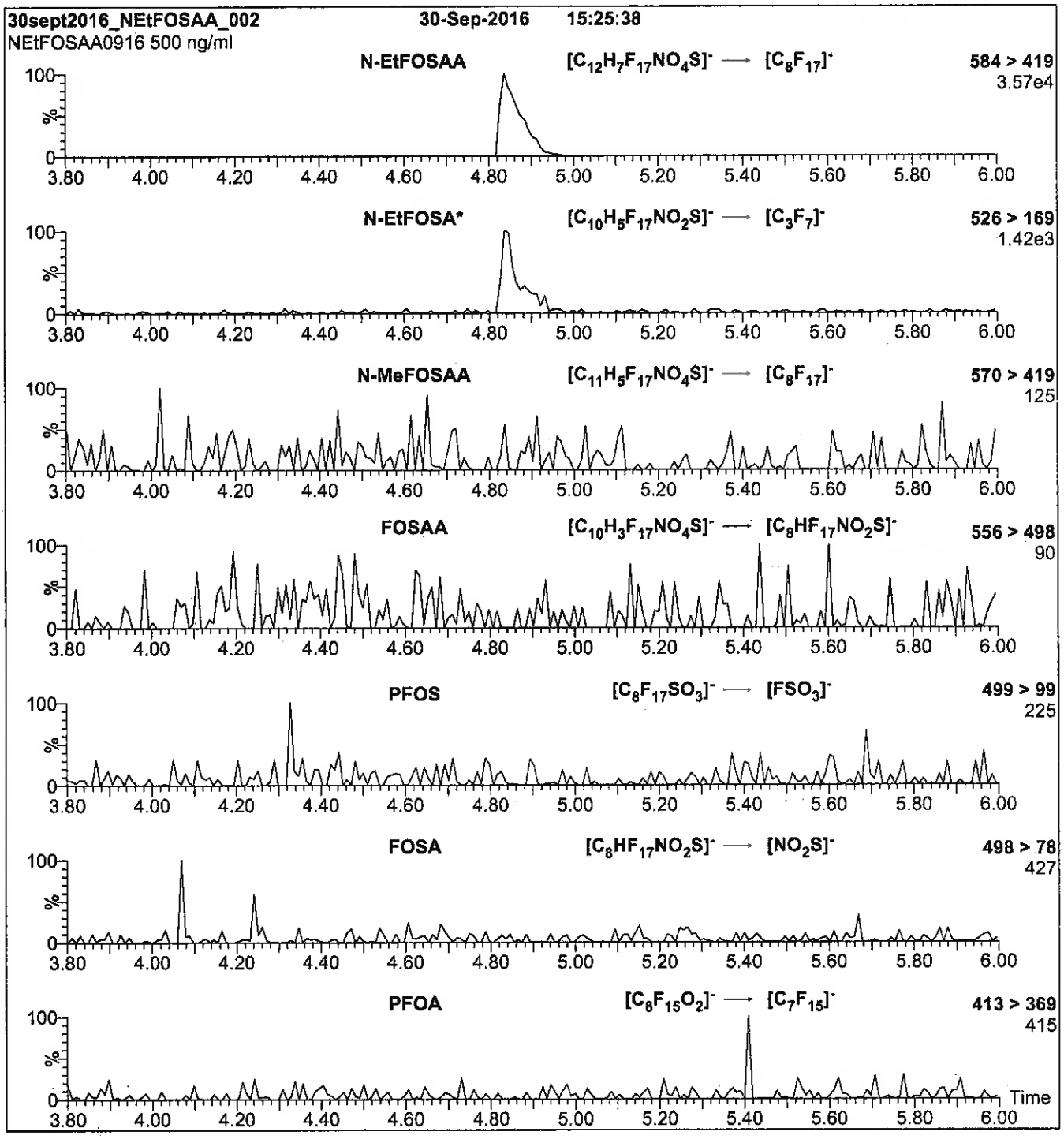
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 35.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **N-EtFOSAA; LC/MS/MS Data (Selected MRM Transitions)**



Note: N-EtFOSA is formed by fragmentation of N-EtFOSAA.

Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml N-EtFOSAA)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 20

Reagent

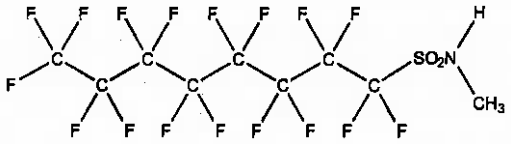
LCN-MeFOSA-M_00004

P: 12/20/16 SRV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	N-MeFOSA-M	**LOT NUMBER:**	NMeFOSA0516M
COMPOUND:	N-methylperfluoro-1-octanesulfonamide		
STRUCTURE:		**CAS #:**	31506-32-8



MOLECULAR FORMULA:	$C_8H_4F_{17}NO_2S$	**MOLECULAR WEIGHT:**	513.17
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/24/2016		
EXPIRY DATE: (mm/dd/yyyy)	05/24/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/26/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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HOMOGENEITY:

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UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

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

CALA

ANAB ACCREDITED

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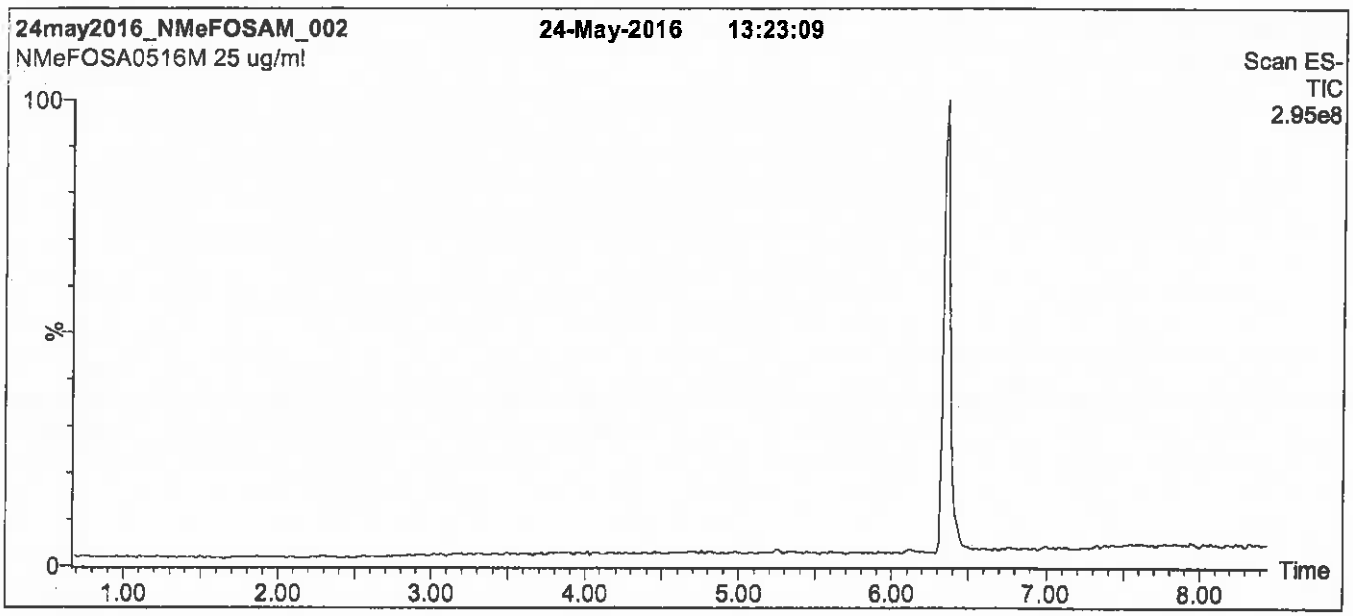
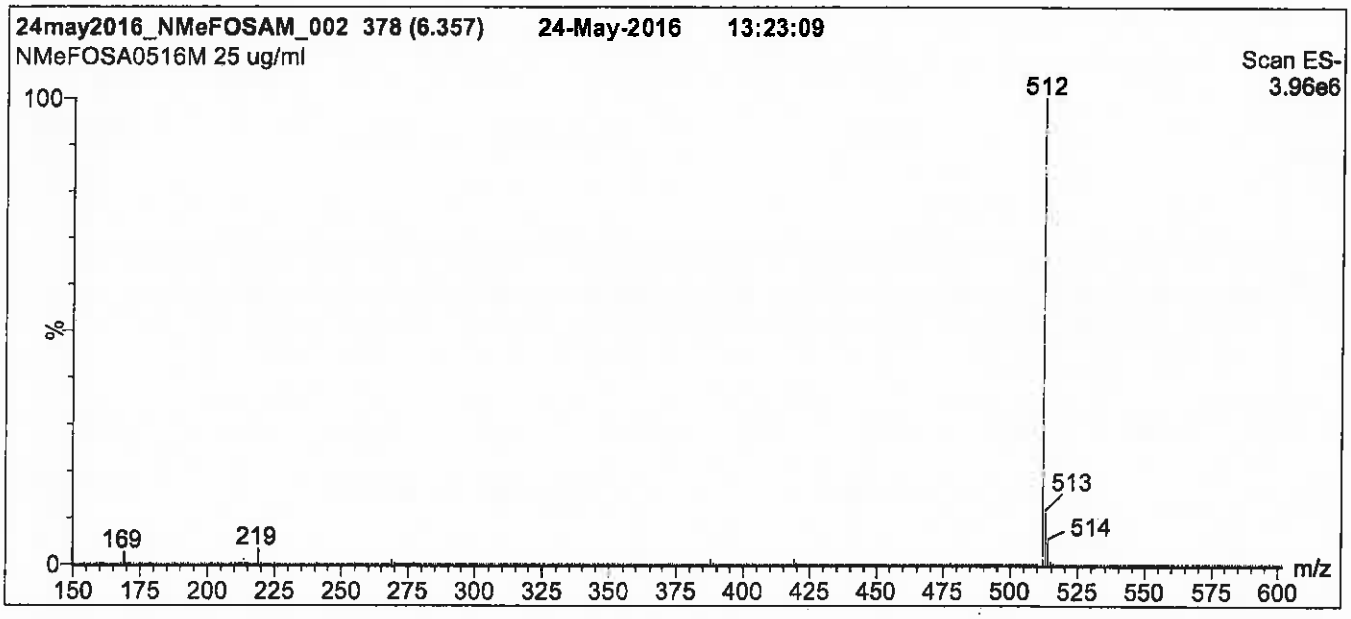
Figure 1: **N-MeFOSA-M; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

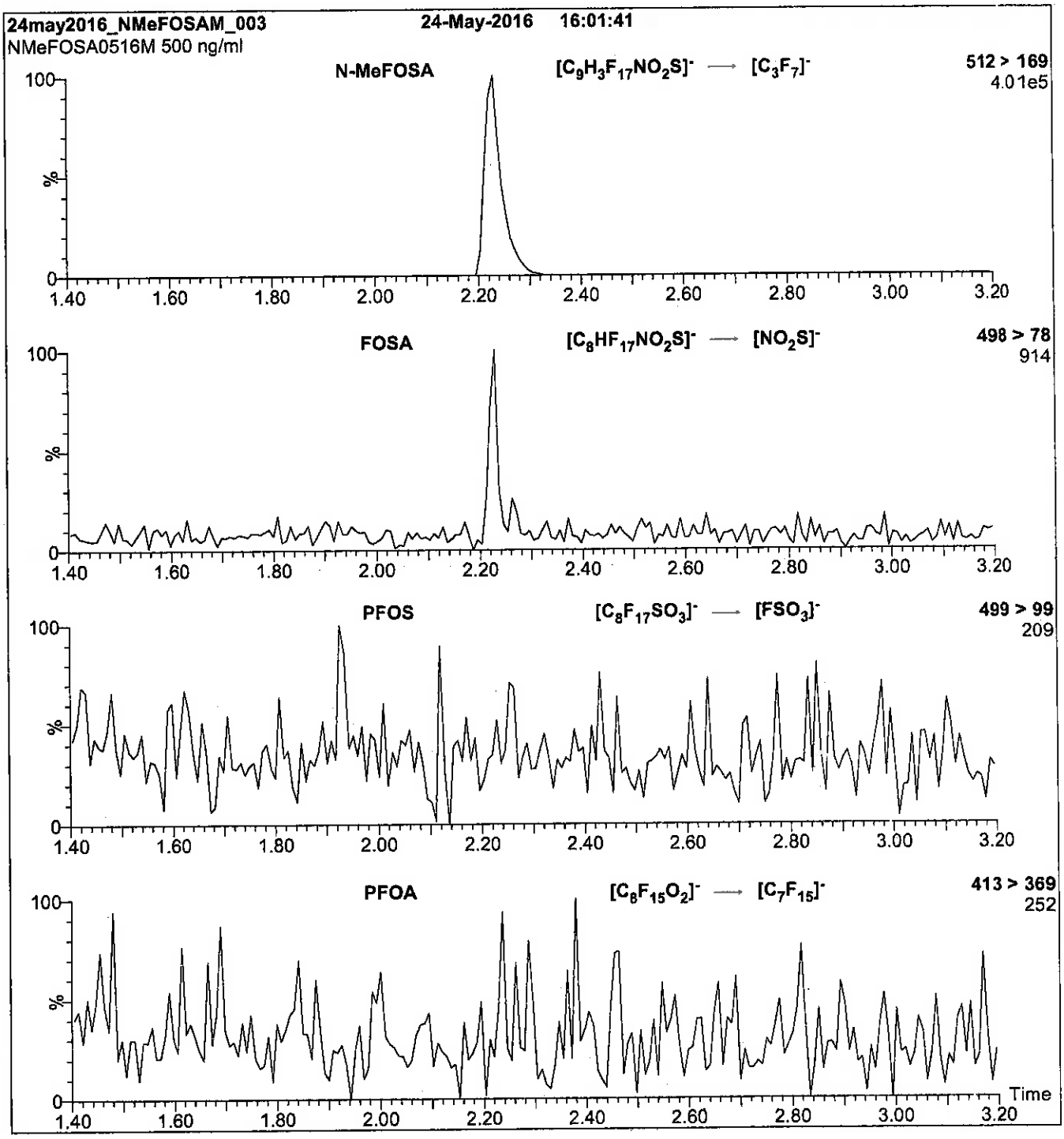
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

Figure 2: **N-MeFOSA-M; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml N-MeFOSA-M)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 30

Reagent

LCN-MeFOSAA_00004

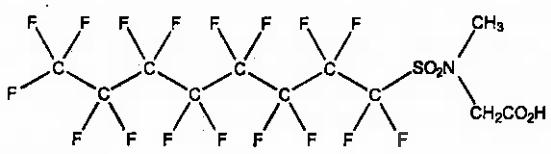
P: R/28/16 SRV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: N-MeFOSAA **LOT NUMBER:** NMeFOSAA0916
COMPOUND: N-methylperfluoro-1-octanesulfonamidoacetic acid

STRUCTURE: **CAS #:** 2355-31-9



MOLECULAR FORMULA: $C_{11}H_8F_{17}NO_4S$ **MOLECULAR WEIGHT:** 571.21
CONCENTRATION: 50 ± 2.5 µg/ml **SOLVENT(S):** Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 10/12/2016
EXPIRY DATE: (mm/dd/yyyy) 10/12/2021
RECOMMENDED STORAGE: Refrigerate ampoule

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 10/25/2016 (mm/dd/yyyy)

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

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

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

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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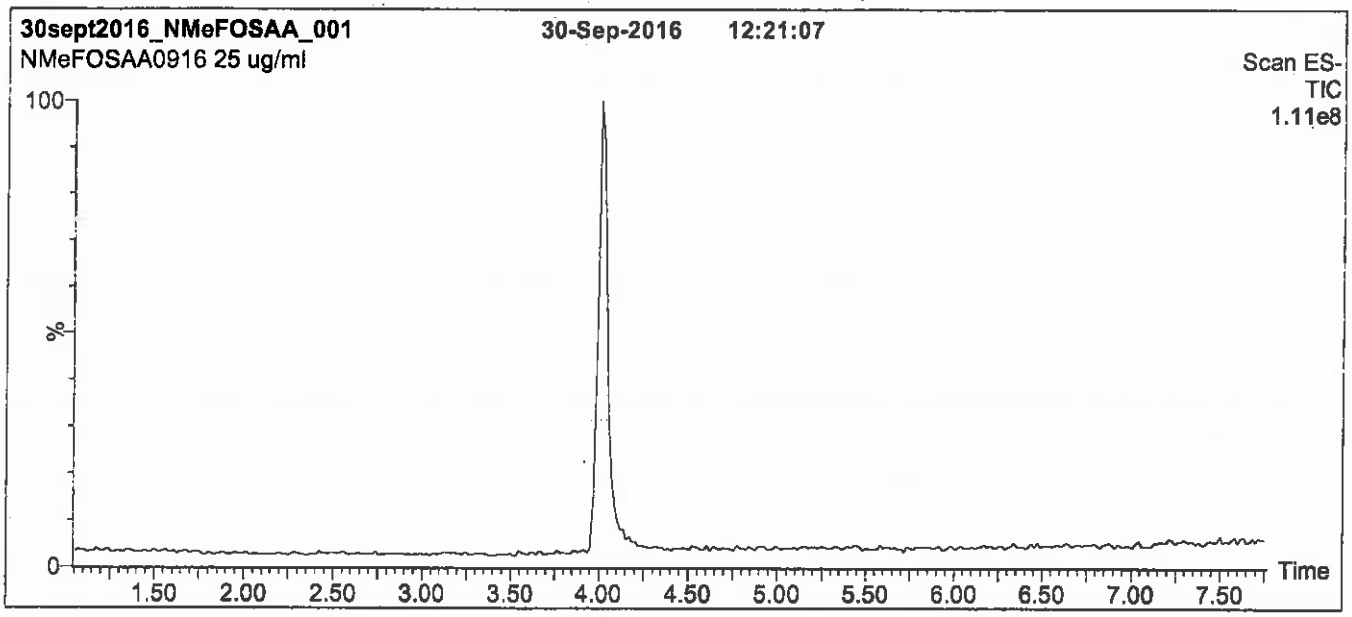
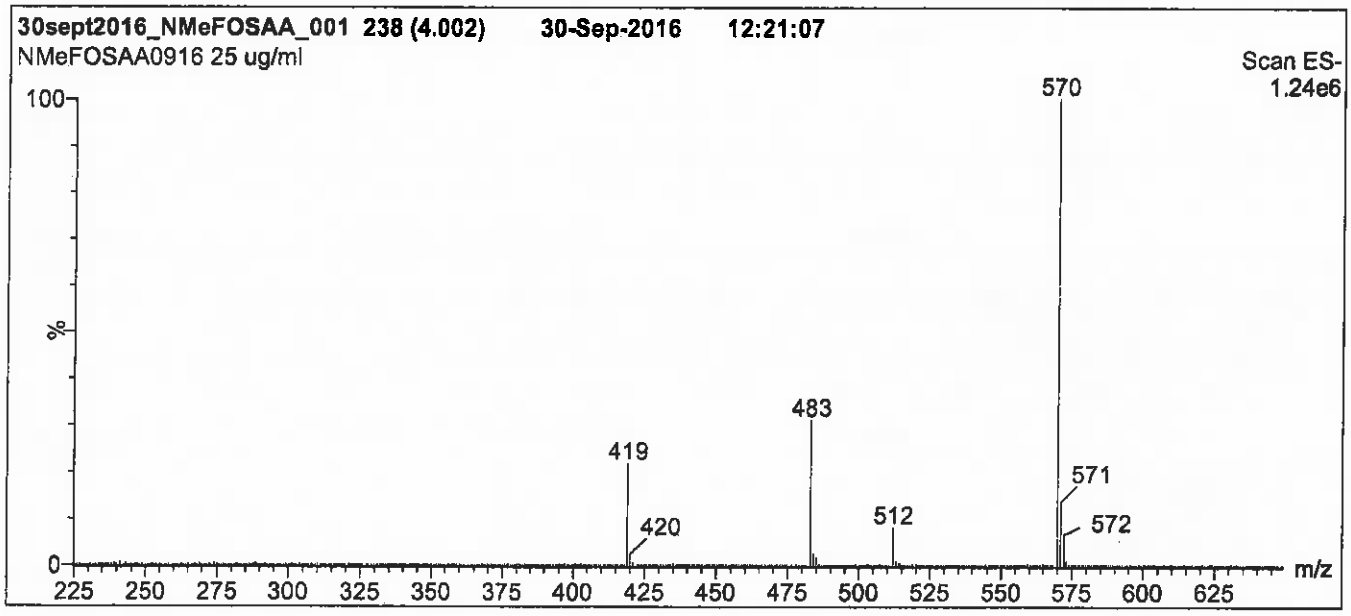
Figure 1: **N-MeFOSAA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

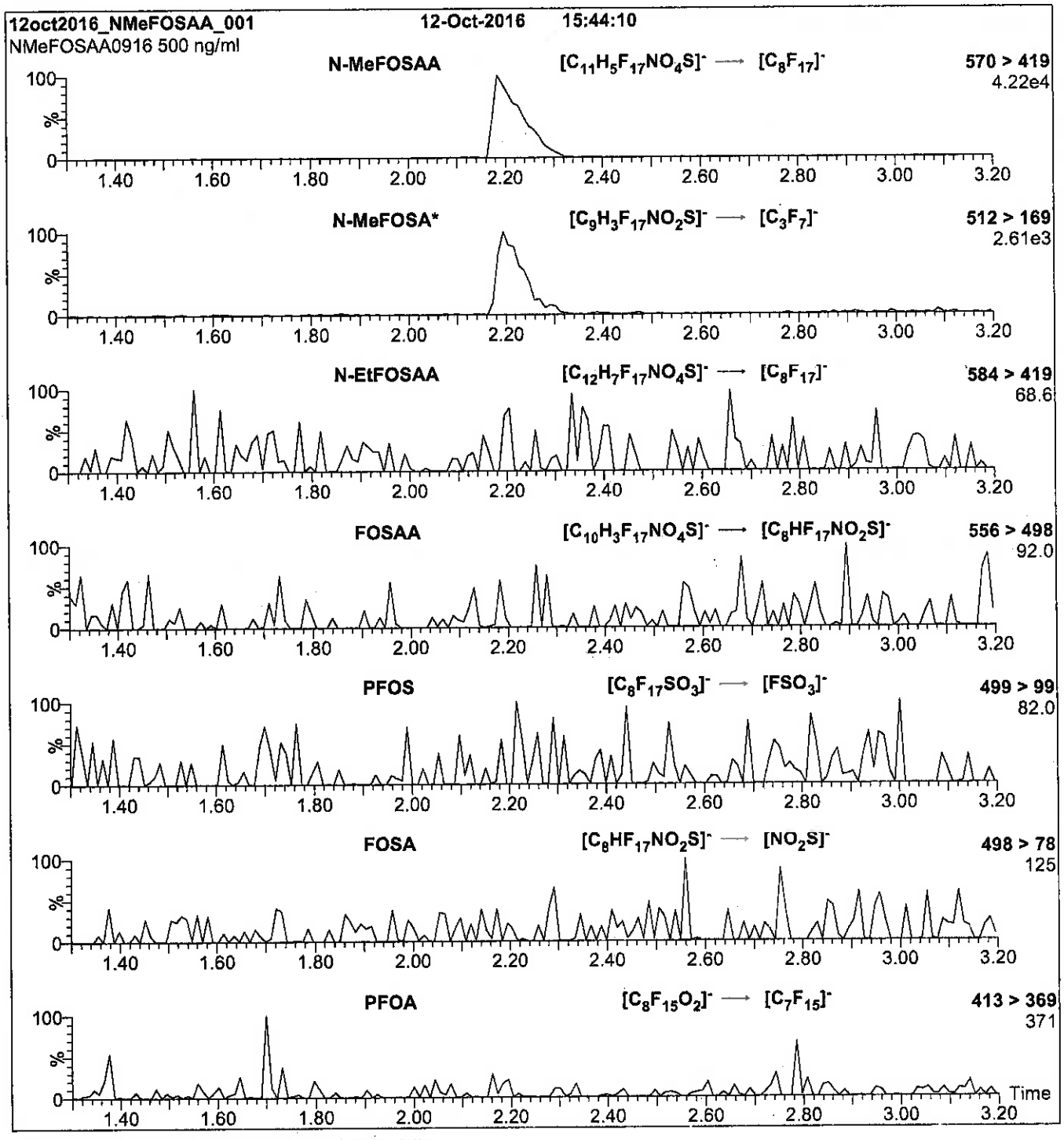
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 35.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **N-MeFOSAA; LC/MS/MS Data (Selected MRM Transitions)**



***Note**: N-MeFOSA is formed by in-source fragmentation.

Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml N-MeFOSAA)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 20

Reagent

LCN-MeFOSAA_00005

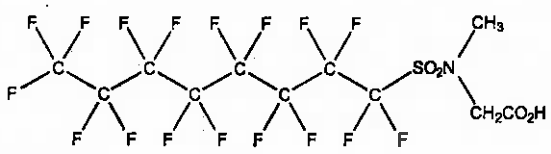
P: R/28/16 SRV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: N-MeFOSAA **LOT NUMBER:** NMeFOSAA0916
COMPOUND: N-methylperfluoro-1-octanesulfonamidoacetic acid

STRUCTURE: **CAS #:** 2355-31-9



MOLECULAR FORMULA: $C_{11}H_8F_{17}NO_4S$ **MOLECULAR WEIGHT:** 571.21
CONCENTRATION: 50 ± 2.5 µg/ml **SOLVENT(S):** Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 10/12/2016
EXPIRY DATE: (mm/dd/yyyy) 10/12/2021
RECOMMENDED STORAGE: Refrigerate ampoule

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

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Certified By: B.G. Chittim **Date:** 10/25/2016 (mm/dd/yyyy)

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CALA

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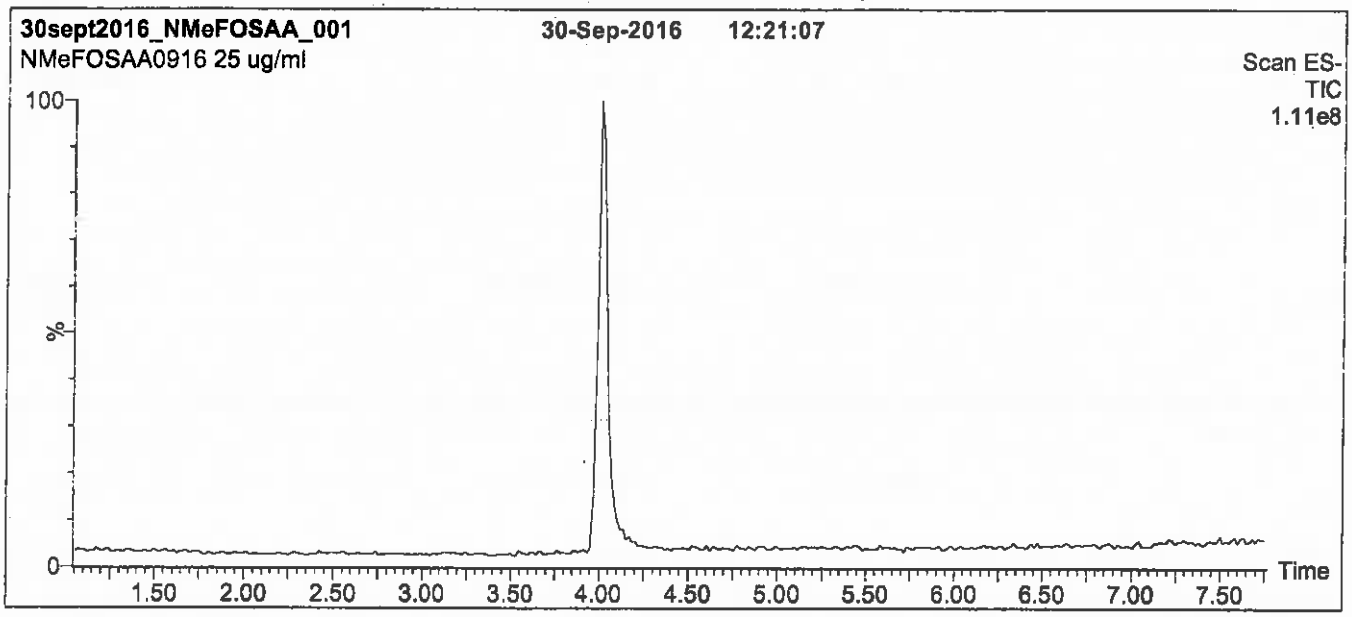
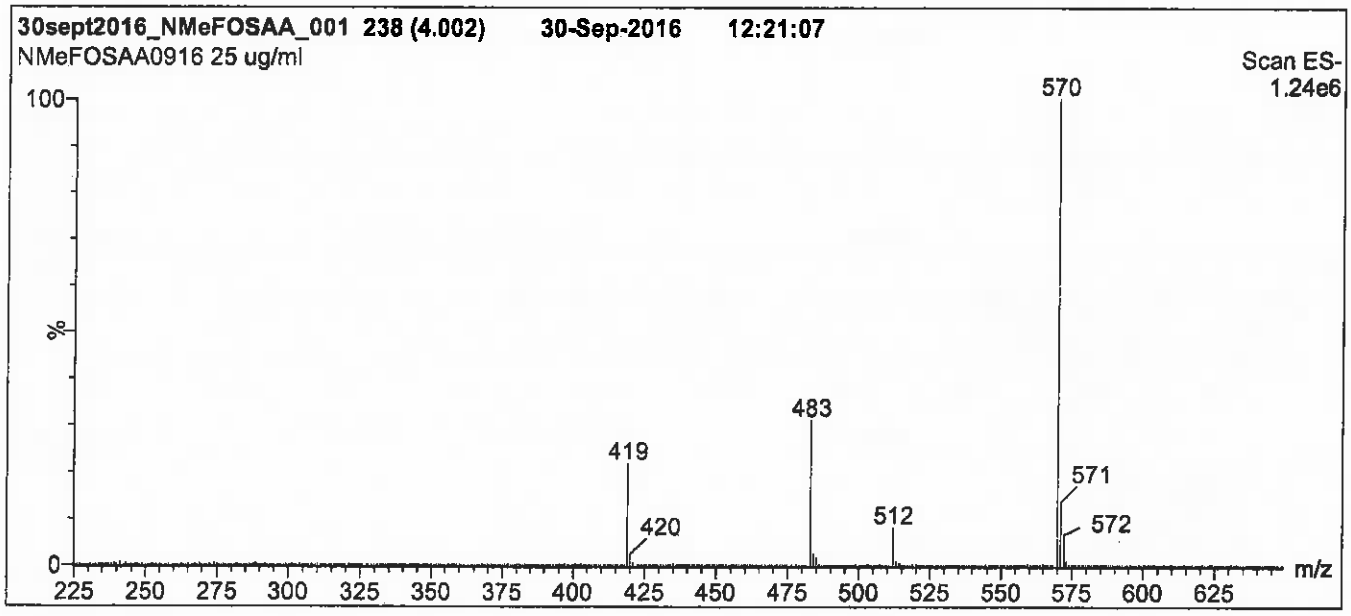
Figure 1: **N-MeFOSAA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

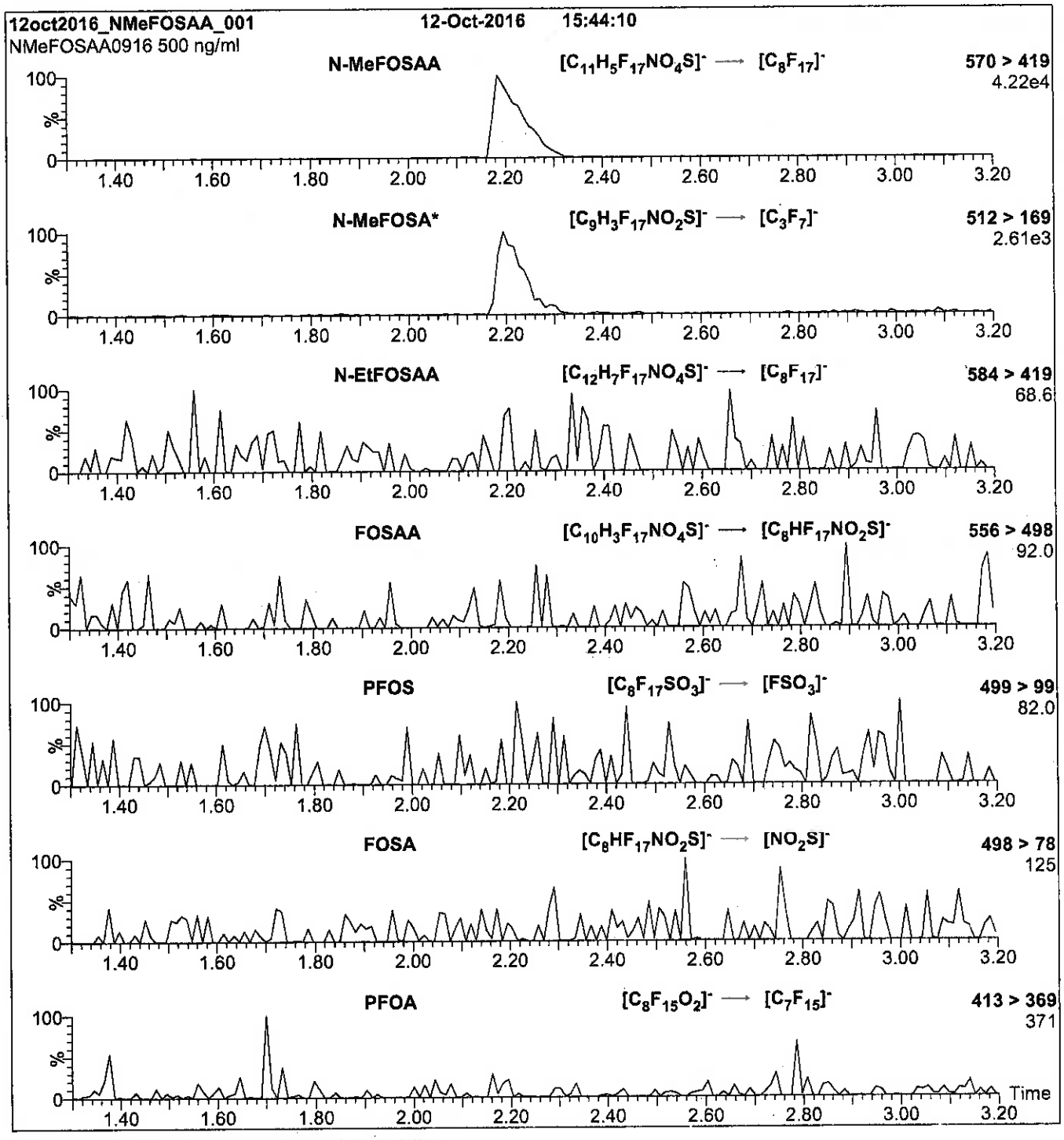
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 35.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **N-MeFOSAA; LC/MS/MS Data (Selected MRM Transitions)**



***Note**: N-MeFOSA is formed by in-source fragmentation.

Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml N-MeFOSAA)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 20

Reagent

LCPFAC-24PAR_00001

P: 11/B/17SW SW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PFAC-24PAR

Native Per- and Poly-fluoroalkyl Substance Precision and Recovery Standard Solution

PRODUCT CODE:	PFAC-24PAR
LOT NUMBER:	PFAC24PAR0917
SOLVENT(S):	Methanol / Isopropanol (4%) / Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	09/13/2017
LAST TESTED: (mm/dd/yyyy)	09/15/2017
EXPIRY DATE: (mm/dd/yyyy)	09/15/2022
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

PFAC-24PAR is a solution/mixture of eleven native linear perfluoroalkylcarboxylic acids (C_4-C_{14}), seven native perfluoroalkylsulfonates (C_4, C_5, C_7, C_9, and C_{10} linear; C_8 and C_8 linear and branched), three native telomer sulfonates (4:2, 6:2, and 8:2), two native perfluorooctanesulfonamidoacetic acids, and perfluoro-1-octanesulfonamide. The components and their concentrations are given in Table A.

The individual native perfluoroalkylcarboxylic acids, native perfluoroalkylsulfonates, native telomer sulfonates, native perfluorooctanesulfonamidoacetic acids, and perfluoro-1-octanesulfonamide all have chemical purities of >98%.

DOCUMENTATION/ DATA ATTACHED:

Table A: Components and Concentrations of the Solution/Mixture
Table B: Isomeric Components and Percent Composition of PFHxSK
Table C: Isomeric Components and Percent Composition of PFOSK
Figure 1: LC/MS Data (SIR)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acids to their respective methyl esters.

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SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products, as well as mixtures and calibration solutions, are compared to older lots in a similar manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

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

CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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Table A: **PFAC-24PAR; Components and Concentrations (ng/ml, ± 5% in Methanol / Isopropanol (4%) / Water (<1%))**

Compound	Abbreviation	Concentration (ng/ml)	Peak Assignment in Figure 1
Perfluoro-n-butanoic acid	PFBA	2000	A
Perfluoro-n-pentanoic acid	PFPeA	2000	B
Perfluoro-n-hexanoic acid	PFHxA	2000	E
Perfluoro-n-heptanoic acid	PFHpA	2000	G
Perfluoro-n-octanoic acid	PFOA	2000	K
Perfluoro-n-nonanoic acid	PFNA	2000	M
Perfluoro-n-decanoic acid	PFDA	2000	Q
Perfluoro-n-undecanoic acid	PFUdA	2000	V
Perfluoro-n-dodecanoic acid	PFDoA	2000	X
Perfluoro-n-tridecanoic acid	PFTrDA	2000	Y
Perfluoro-n-tetradecanoic acid	PFTeDA	2000	Z
Perfluoro-1-octanesulfonamide	FOSA	2000	T
N-methylperfluoro-1-octanesulfonamidoacetic acid	N-MeFOSAA	2000	S
N-ethylperfluoro-1-octanesulfonamidoacetic acid	N-EtFOSAA	2000	U

Compound	Abbreviation	Concentration (ng/ml)		Peak Assignment in Figure 1
		as the salt	as the anion	
Potassium perfluoro-1-butanesulfonate	L-PFBS	2000	1770	C
Sodium perfluoro-1-pentanesulfonate	L-PFPeS	2000	1880	F
Potassium perfluorohexanesulfonate*	PFHxSK: linear isomer	1620	1480	I
	PFHxSK: ∑ branched isomers	378	344	H
Sodium perfluoro-1-heptanesulfonate	L-PFHpS	2000	1900	L
Potassium perfluorooctanesulfonate**	PFOSK: linear isomer	1580	1460	O
	PFOSK: ∑ branched isomers	422	391	N
Sodium perfluoro-1-nonanesulfonate	L-PFNS	2000	1920	R
Sodium perfluoro-1-decanesulfonate	L-PFDS	2000	1930	W
Sodium 1H,1H,2H,2H-perfluoro-1-hexanesulfonate	4:2FTS	2000	1870	D
Sodium 1H,1H,2H,2H-perfluoro-1-octanesulfonate	6:2FTS	2000	1900	J
Sodium 1H,1H,2H,2H-perfluoro-1-decanesulfonate	8:2FTS	2000	1920	P

* See Table B for percent composition of linear and branched PFHxSK isomers.
** See Table C for percent composition of linear and branched PFOSK isomers.

Table B: **PFHxSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Name	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-hexanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	81.1	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	$CF_3CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	2.9	18.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	1.4	
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	5.0	
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	8.9	
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	$CF_3C(CF_3)_2CF_2CF_2SO_3^-K^+$	0.2	
7	Other Unidentified Isomers		0.5	

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

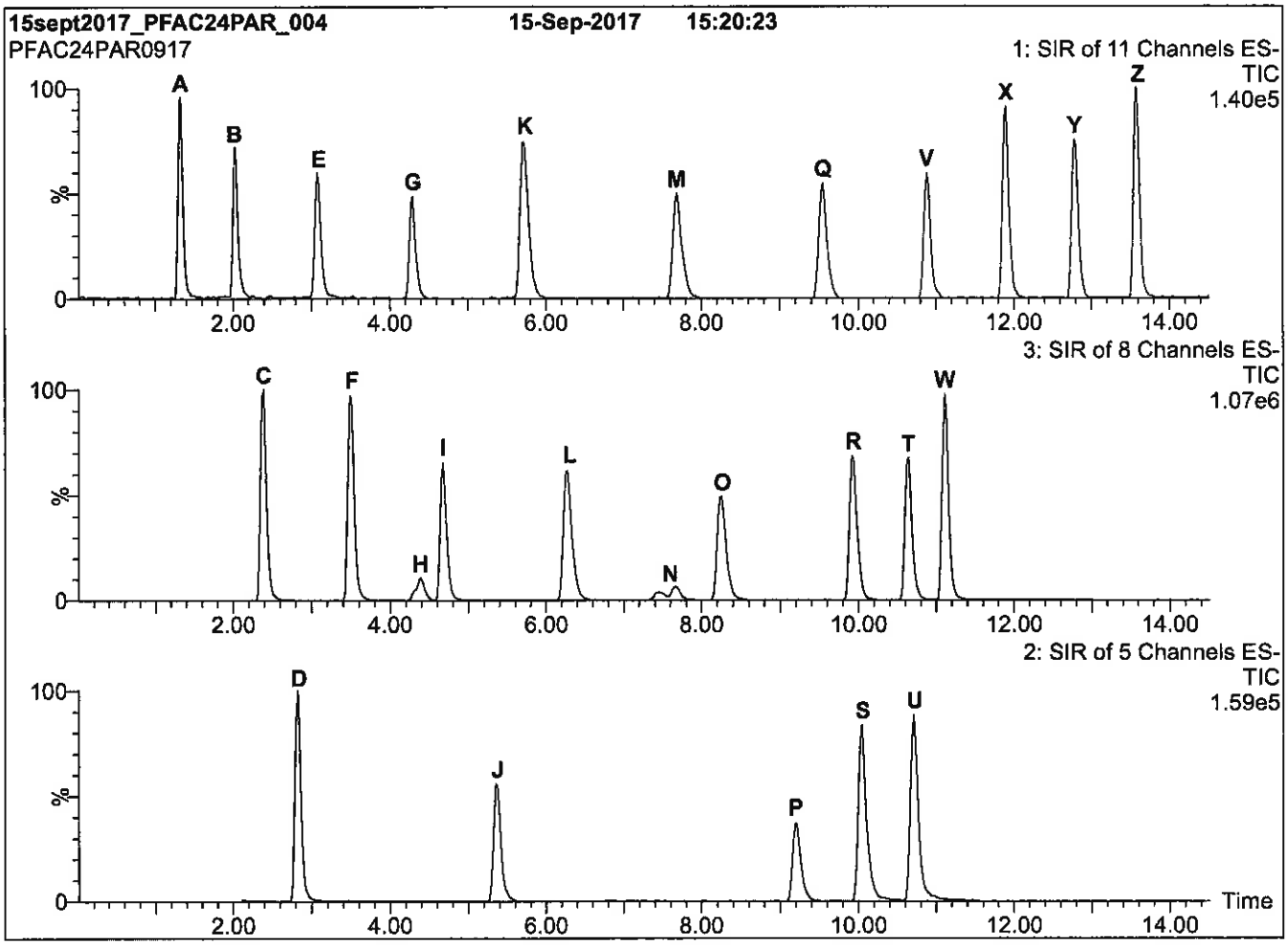
Table C: **PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Name	Structure	Percent Composition by ^{19}F-NMR	
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	1.2	21.1
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	0.6	
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	1.9	
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	2.2	
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	4.5	
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	10.0	
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3C(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.2	
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF_2C(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.03	
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.4	
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	0.07	

* Percent of total perfluorooctanesulfonate isomers only.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

Certified By: _____ **Date:** 09/19/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

Figure 1: **PFAC-24PAR; LC/MS Data (Total Ion Current Chromatogram; SIR)**



Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 55% organic over 3.5 min.
Ramp to 70% organic over 6.5 min.
Ramp to 85% organic over 5 min and hold for
1 min before returning to initial conditions in 0.5 min.
Time: 17 min

Flow: 300 µl/min

MS Parameters

Experiment: SIR

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = variable (10-70)
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFAC-24PAR; LC/MS/MS Data (Selected MRM Transitions)**

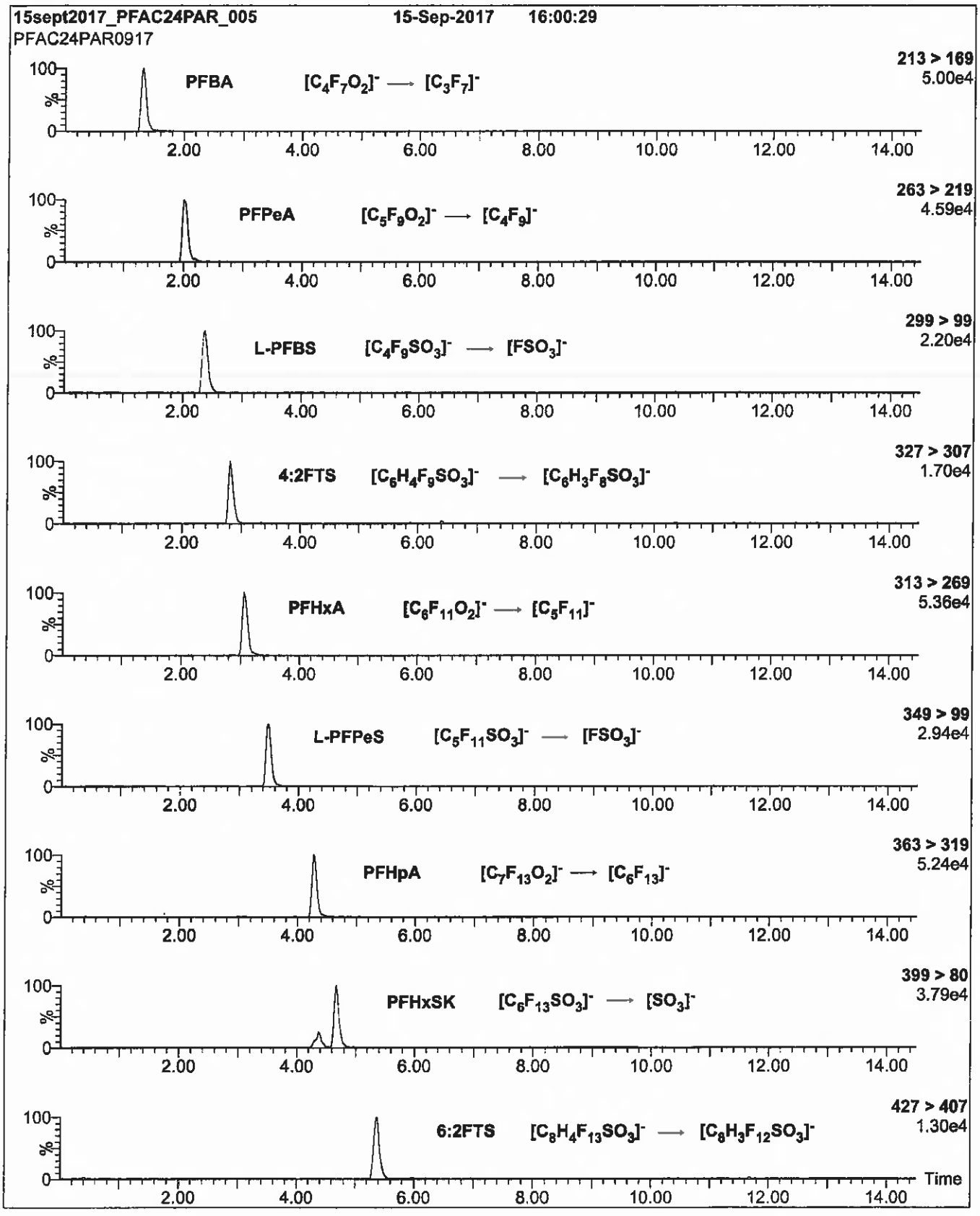


Figure 2: **PFAC-24PAR; LC/MS/MS Data (Selected MRM Transitions)**

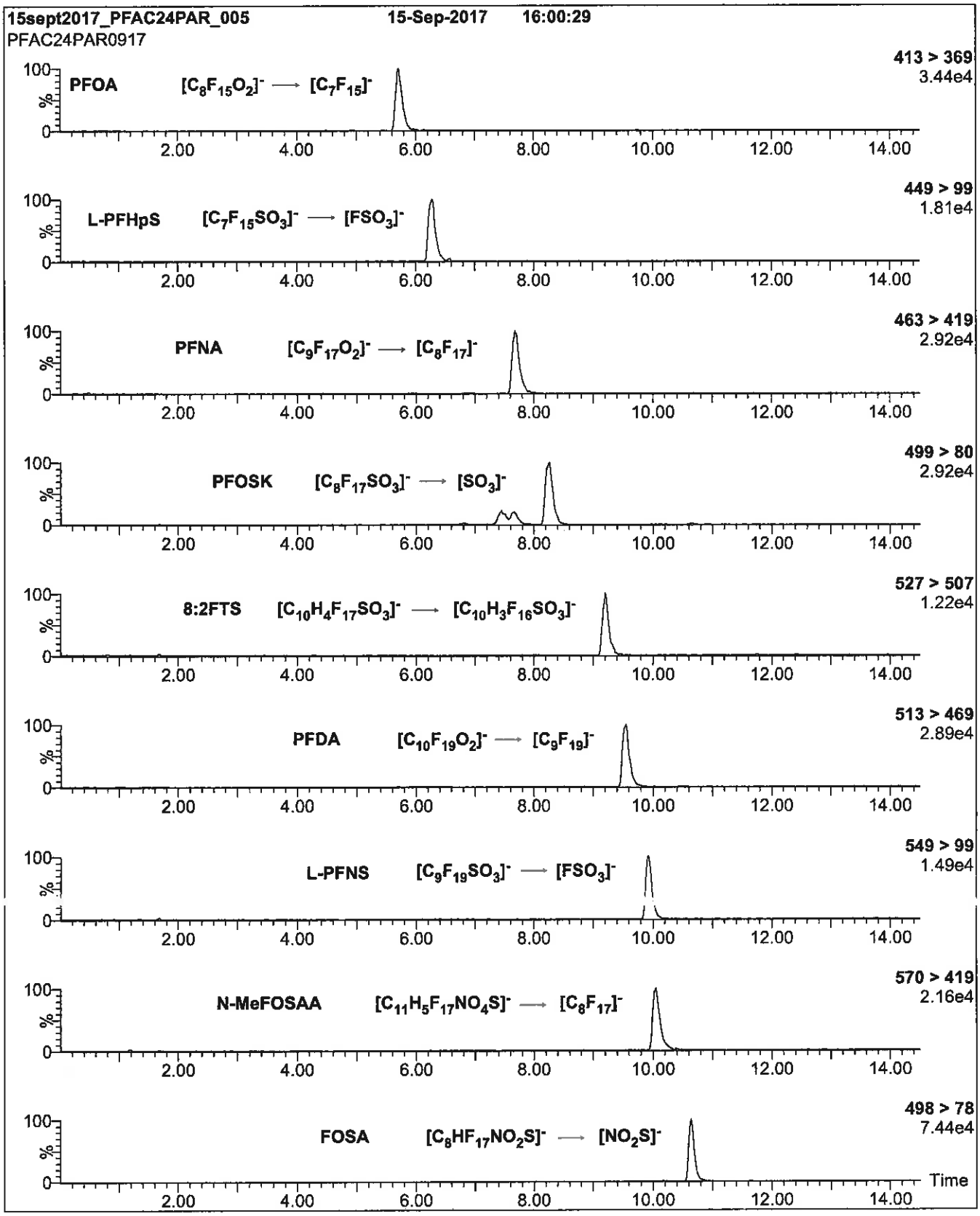
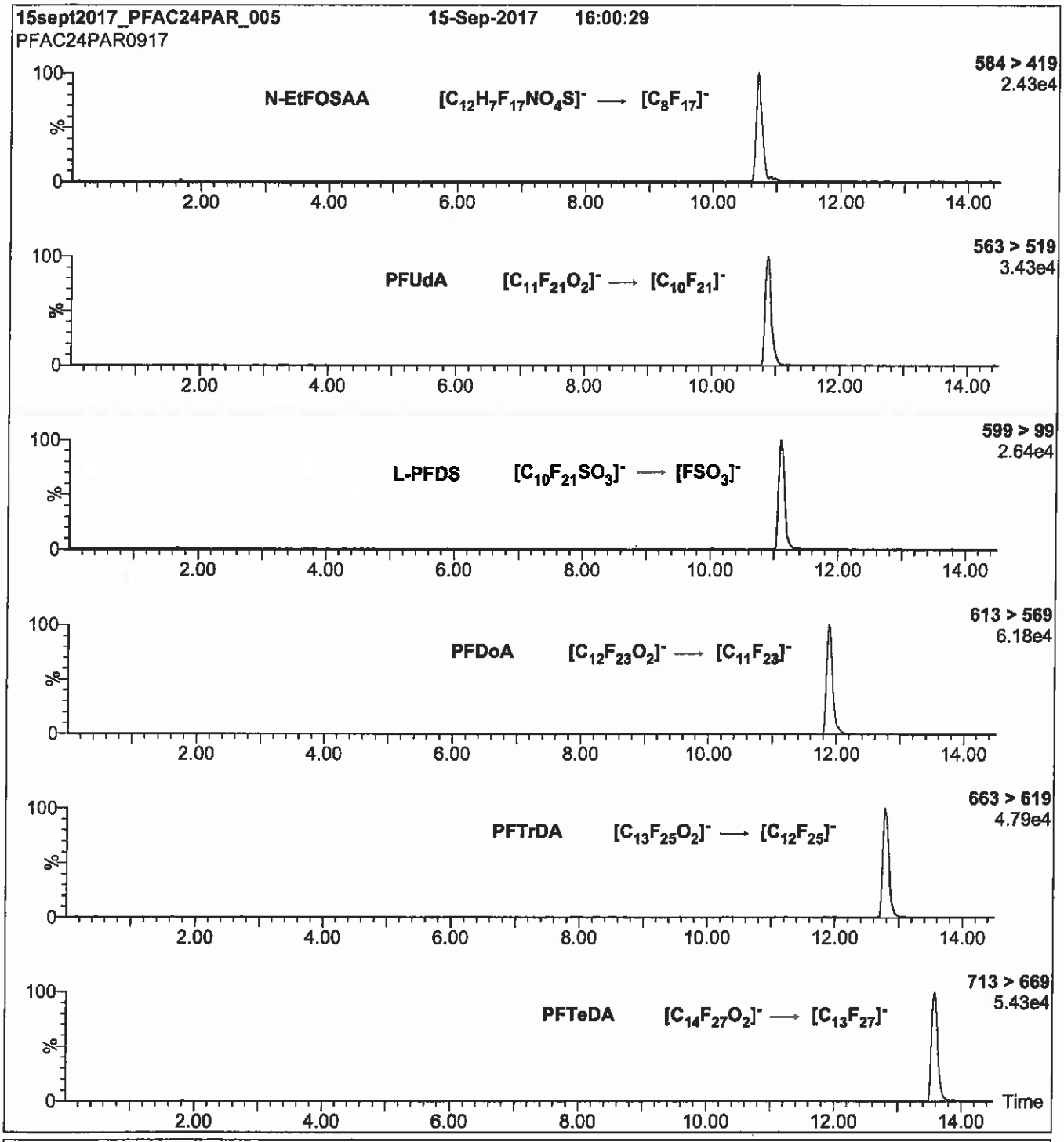


Figure 2: **PFAC-24PAR; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (PFAC-24PAR)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3

Collision Energy (eV) = 8-50 (variable)

Reagent

LCPFBA_00007

r: 12/29/16 SN
S

WELLINGTON LABORATORIES

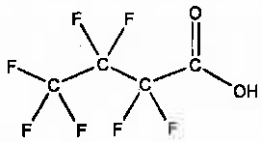
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFBA
COMPOUND: Perfluoro-n-butanoic acid

LOT NUMBER: PFBA0516

STRUCTURE:

CAS #: 375-22-4



MOLECULAR FORMULA: $C_4HF_7O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 214.04
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 05/27/2016
EXPIRY DATE: (mm/dd/yyyy) 05/27/2021
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/31/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

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

CALA

ANAB ACCREDITED

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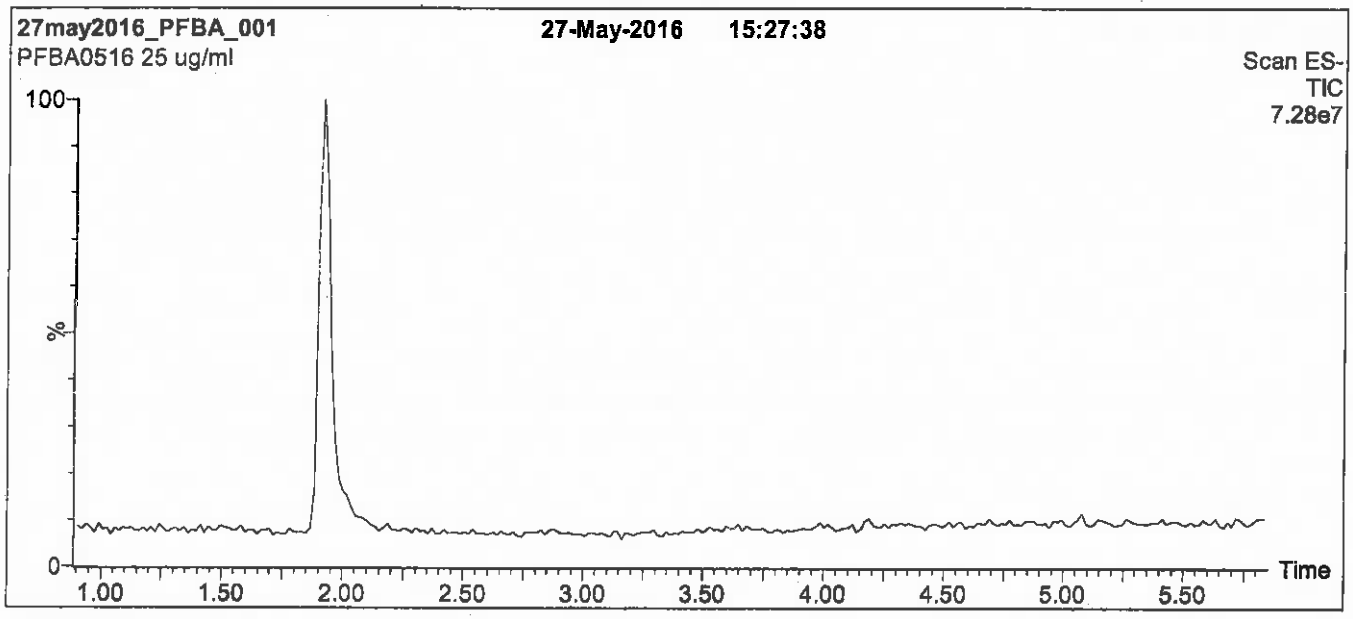
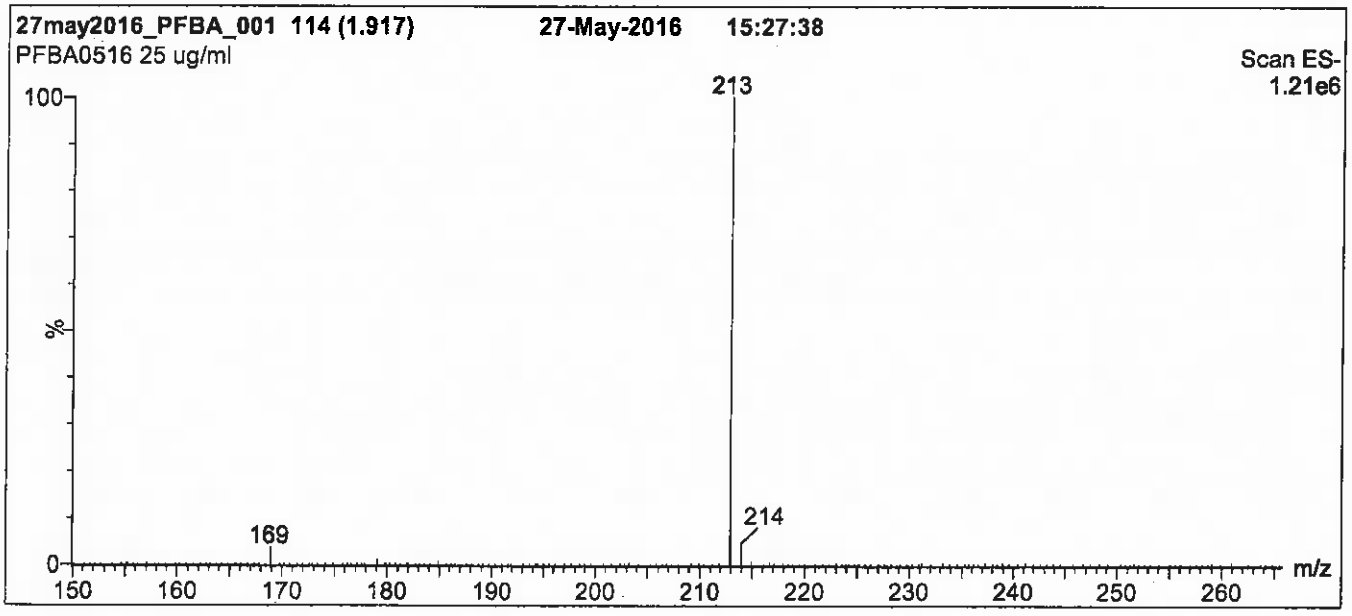
Figure 1: **PFBA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

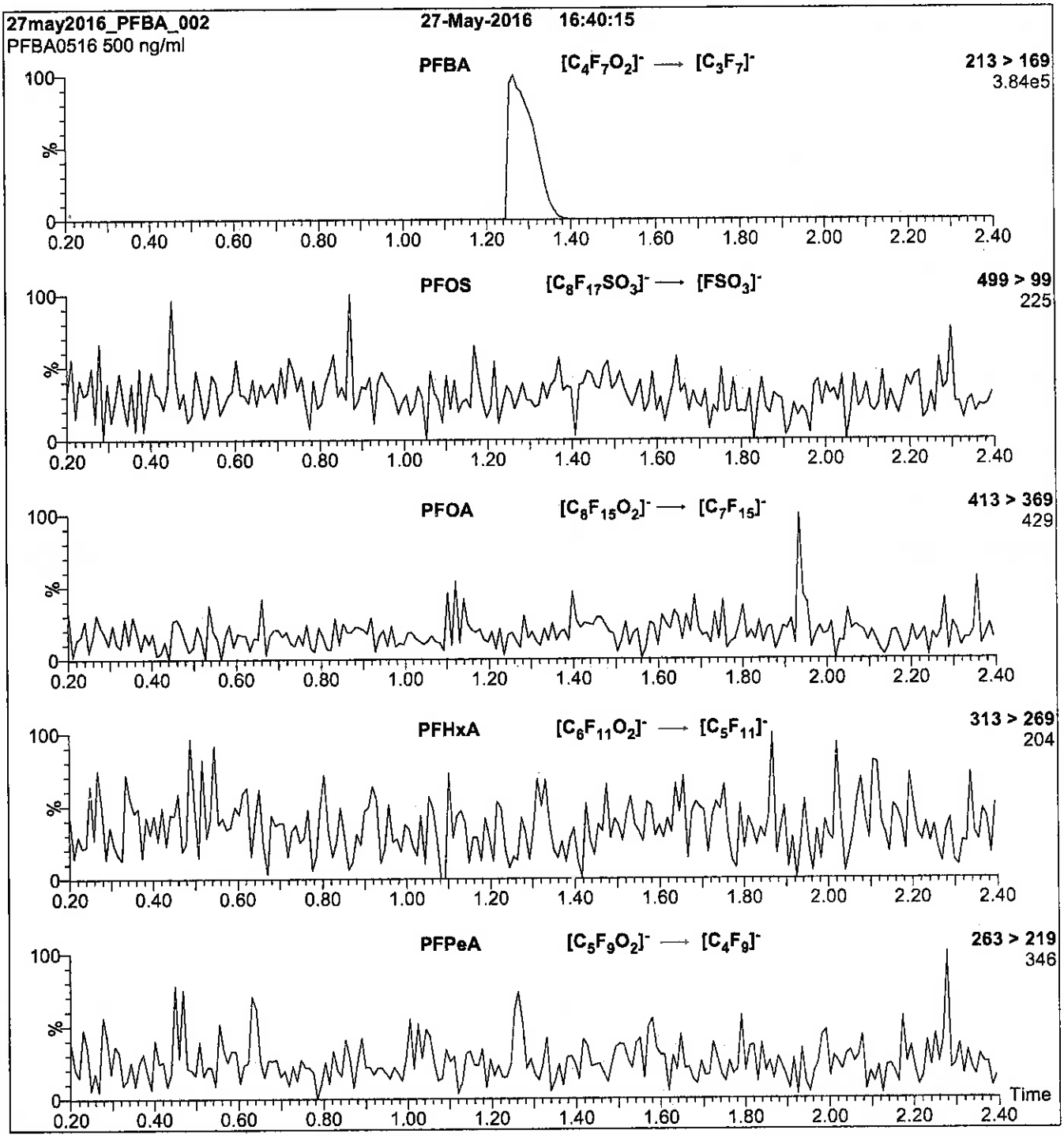
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 10.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

Injection:	Direct loop injection 10 µl (500 ng/ml PFBA)
Mobile phase:	Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O (both with 10 mM NH_4OAc buffer)
Flow:	300 µl/min

MS Parameters

Collision Gas (mbar) = 3.62e-3
Collision Energy (eV) = 10

Reagent

LCPFBS_00008

R: SBC 9/13/16

730724
ID: LCPFBS_00007
Exp: 03/15/21 Prpd: SBC
PF-1-butanesulfonate K sa

730725
ID: LCPFBS_00008
Exp: 03/15/21 Prpd: SBC
PF-1-butanesulfonate K sa

WELLINGTON LABORATORIES

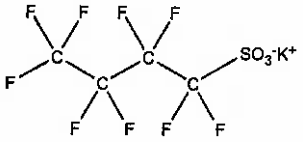
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: L-PFBS
COMPOUND: Potassium perfluoro-1-butanesulfonate

LOT NUMBER: LPFBS0316

STRUCTURE:

CAS #: 29420-49-3



MOLECULAR FORMULA:	$C_4F_9SO_3K$	**MOLECULAR WEIGHT:**	338.19
CONCENTRATION:	50.0 ± 2.5 µg/ml (K salt) 44.2 ± 2.2 µg/ml (PFBS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	03/15/2016		
EXPIRY DATE: (mm/dd/yyyy)	03/15/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

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Certified By: B.G. Chittim **Date:** 03/21/2016 (mm/dd/yyyy)

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

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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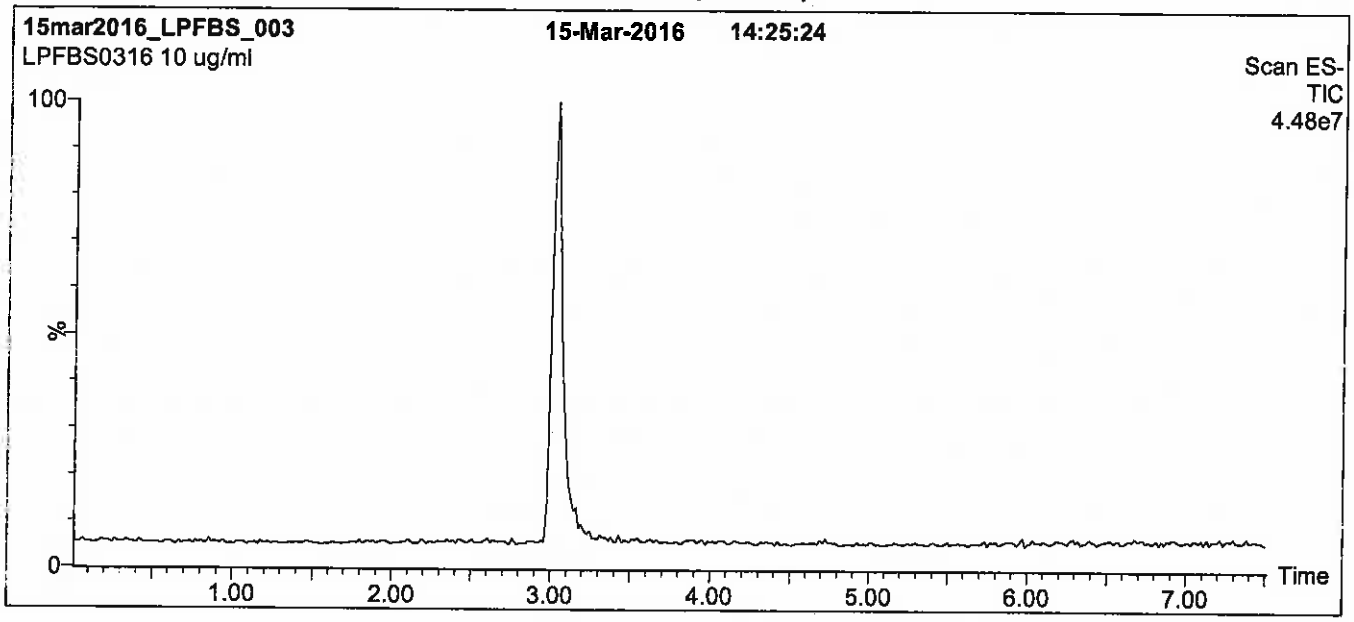
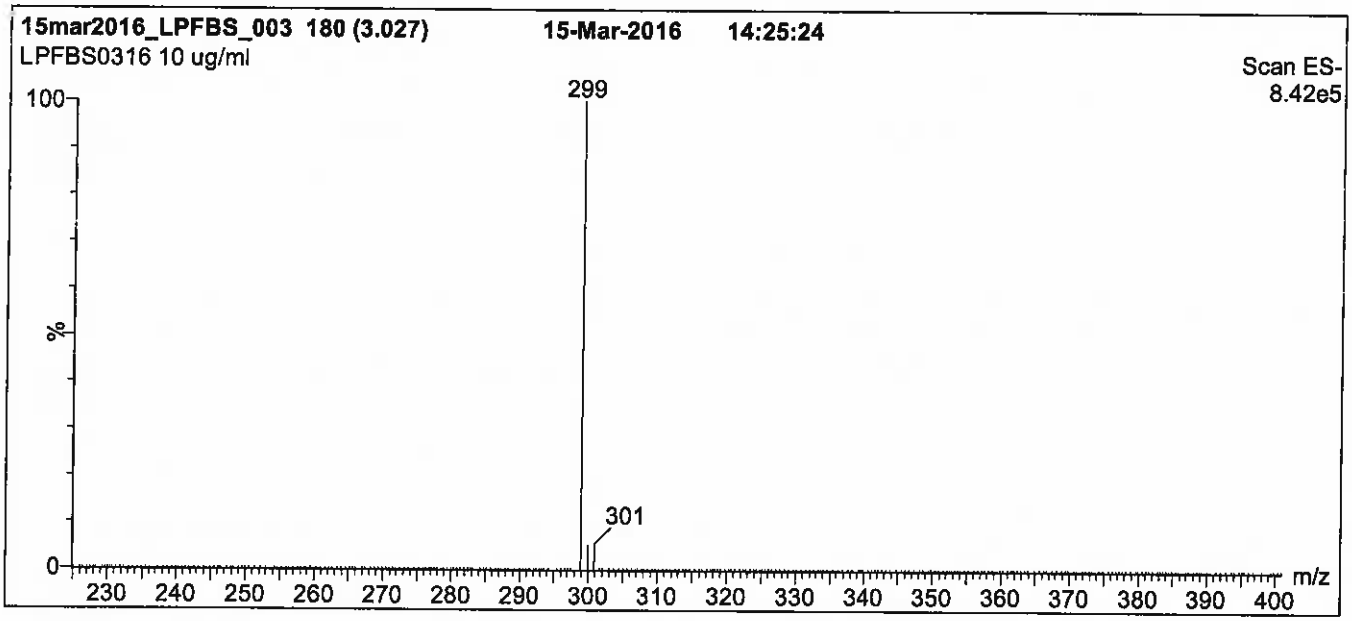
Figure 1: **L-PFBS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

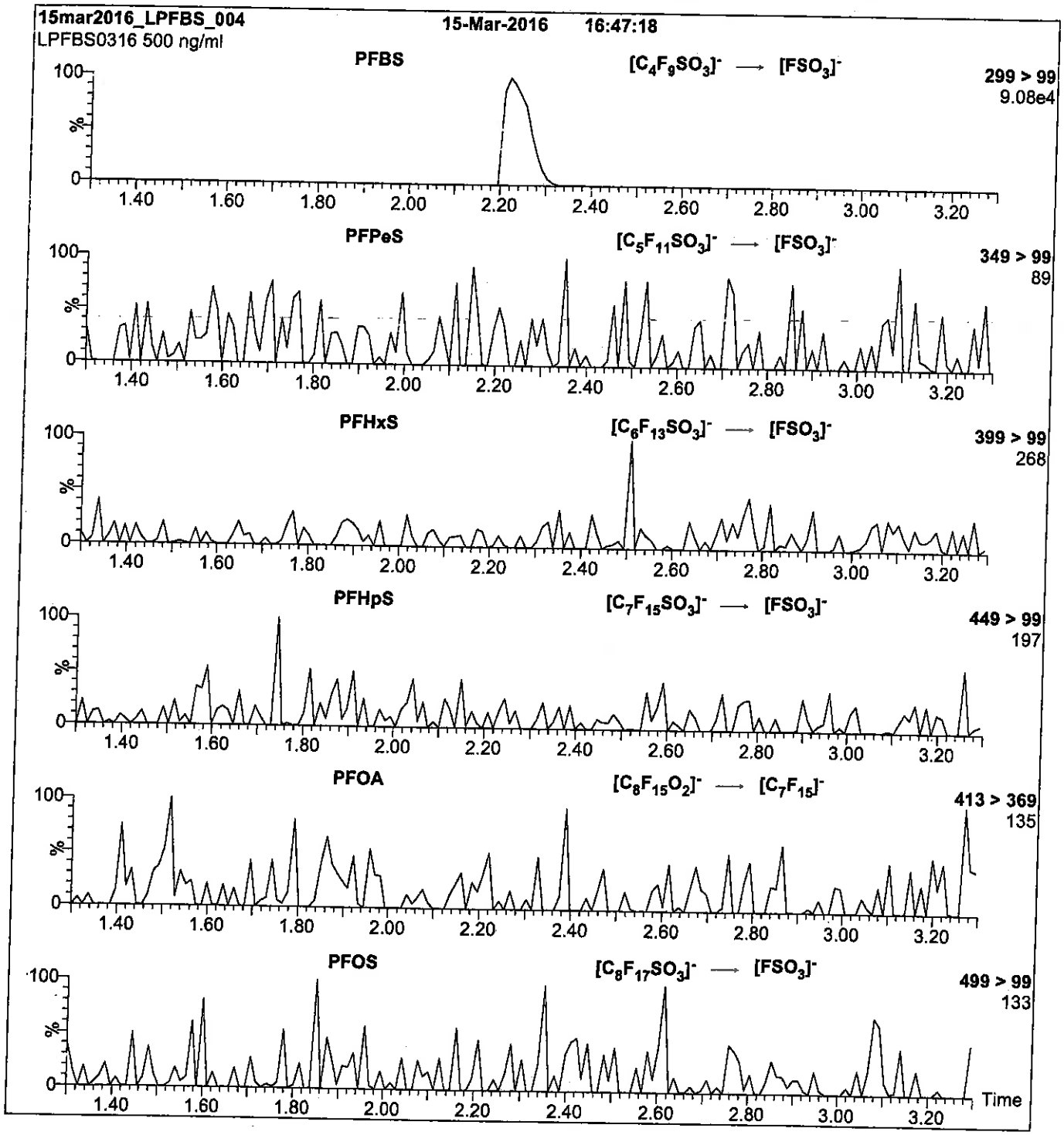
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFBS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFBS)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.20e-3
Collision Energy (eV) = 25

Reagent

LCPFDA_00007

R: SBC 9/13/16
scanned 10/4/16 SR

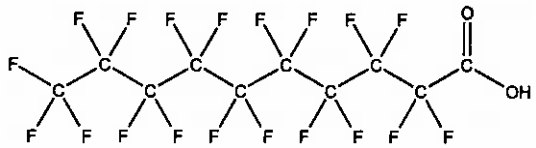
730620
ID: LCPFDA_00006
Exp: 05/31/21 Prpd: SBC
PF-n-decanoic acid

730621
ID: LCPFDA_00007
Exp: 05/31/21 Prpd: SBC
PF-n-decanoic acid

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFDA	**LOT NUMBER:**	PFDA0516
COMPOUND:	Perfluoro-n-decanoic acid		
STRUCTURE:		**CAS #:**	335-76-2



MOLECULAR FORMULA:	$C_{10}HF_{19}O_2$	**MOLECULAR WEIGHT:**	514.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/31/2016		
EXPIRY DATE: (mm/dd/yyyy)	05/31/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.2% of Perfluoro-n-nonanoic acid (PFNA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 06/13/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

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

CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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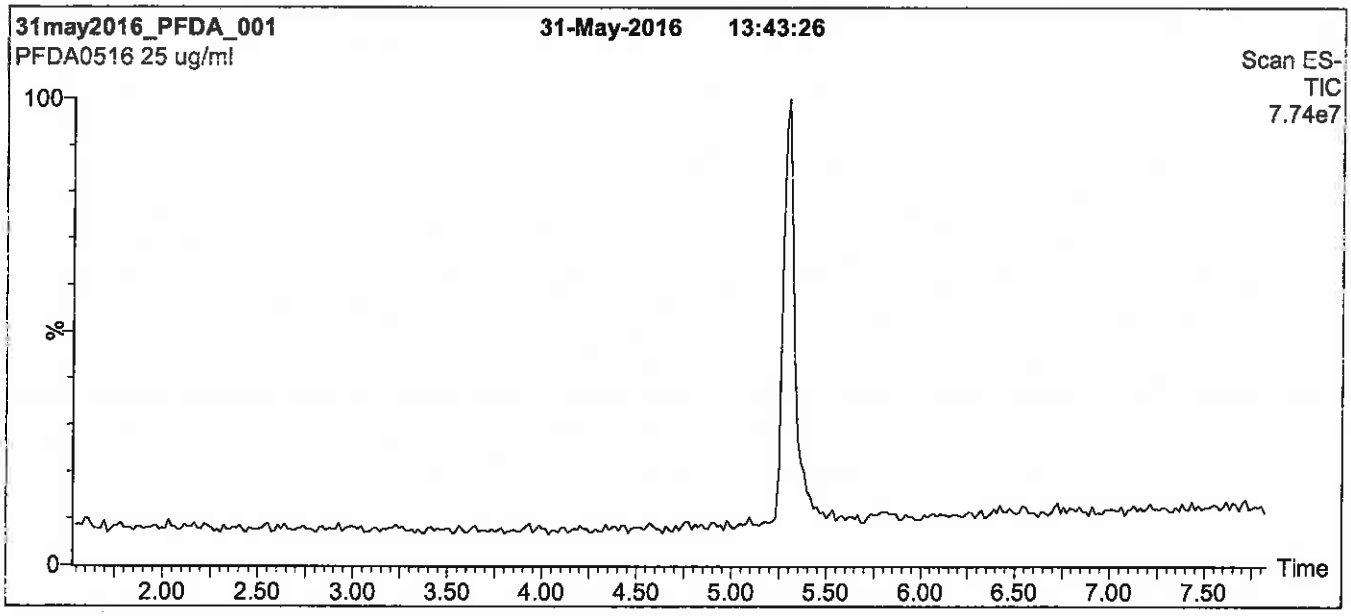
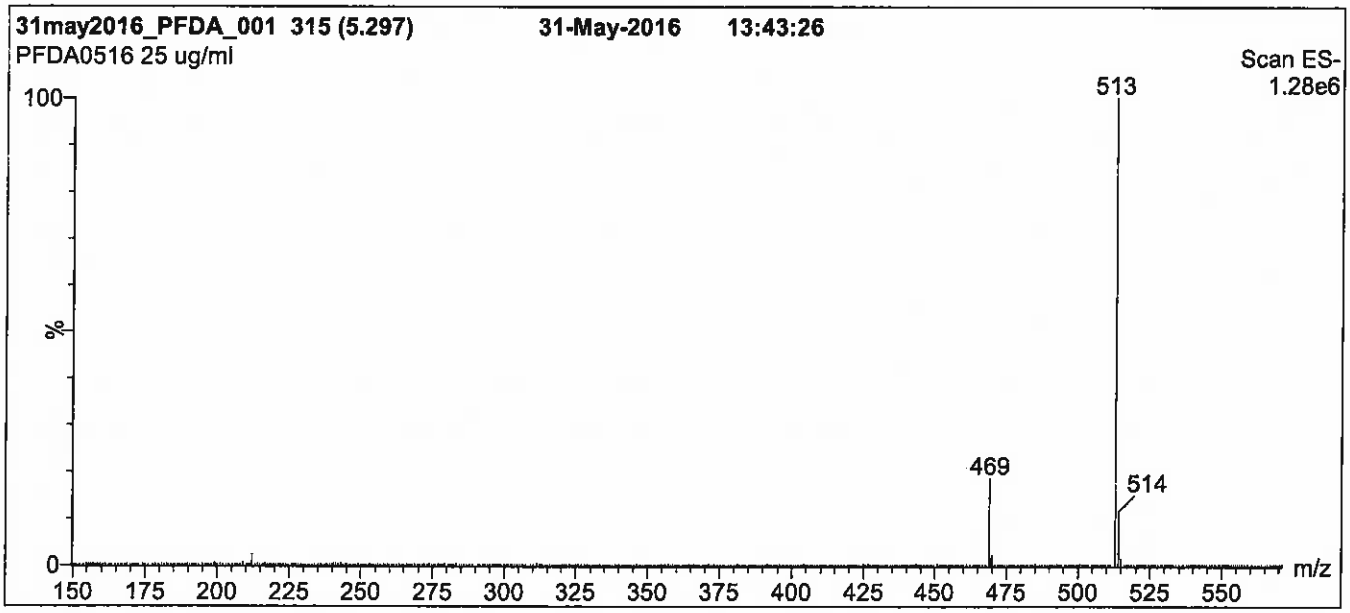
Figure 1: **PFDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

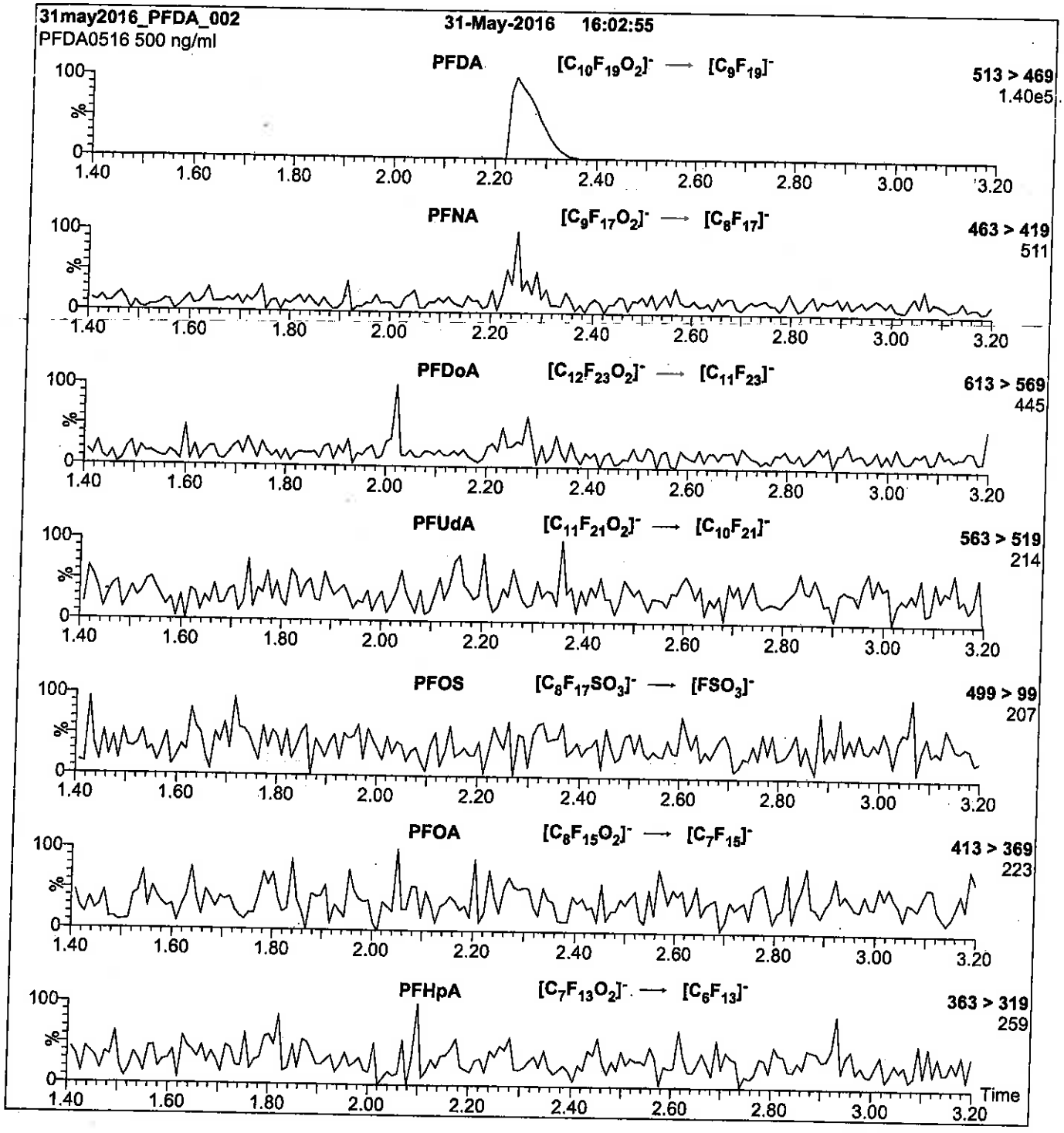
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

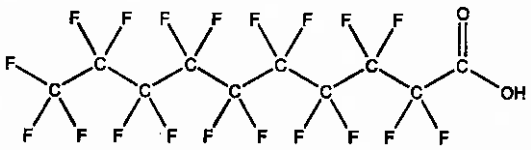
LCPFDA_00008

R: 9/21/17 SKJ

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	PFDA	**LOT NUMBER:**	PFDA0517
COMPOUND:	Perfluoro-n-decanoic acid		
STRUCTURE:		**CAS #:**	335-76-2



MOLECULAR FORMULA:	$C_{10}HF_{19}O_2$	**MOLECULAR WEIGHT:**	514.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/29/2017		
EXPIRY DATE: (mm/dd/yyyy)	05/29/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.2% of perfluoro-n-nonanoic acid (PFNA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 05/30/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

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SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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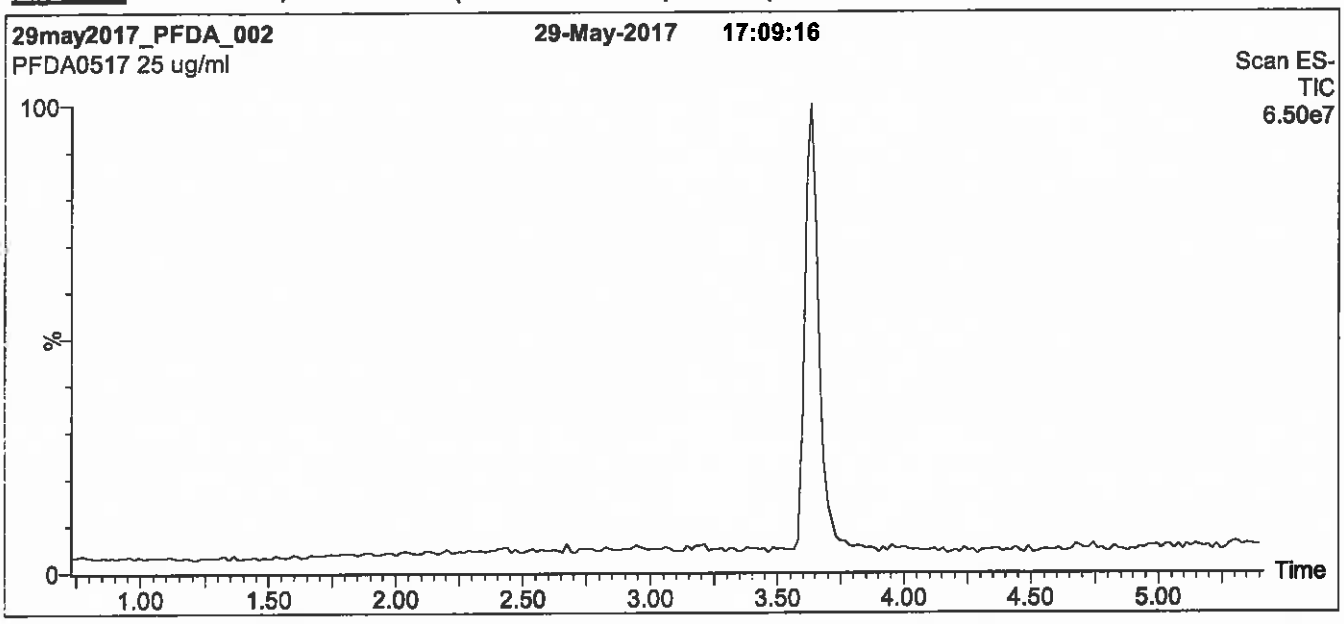
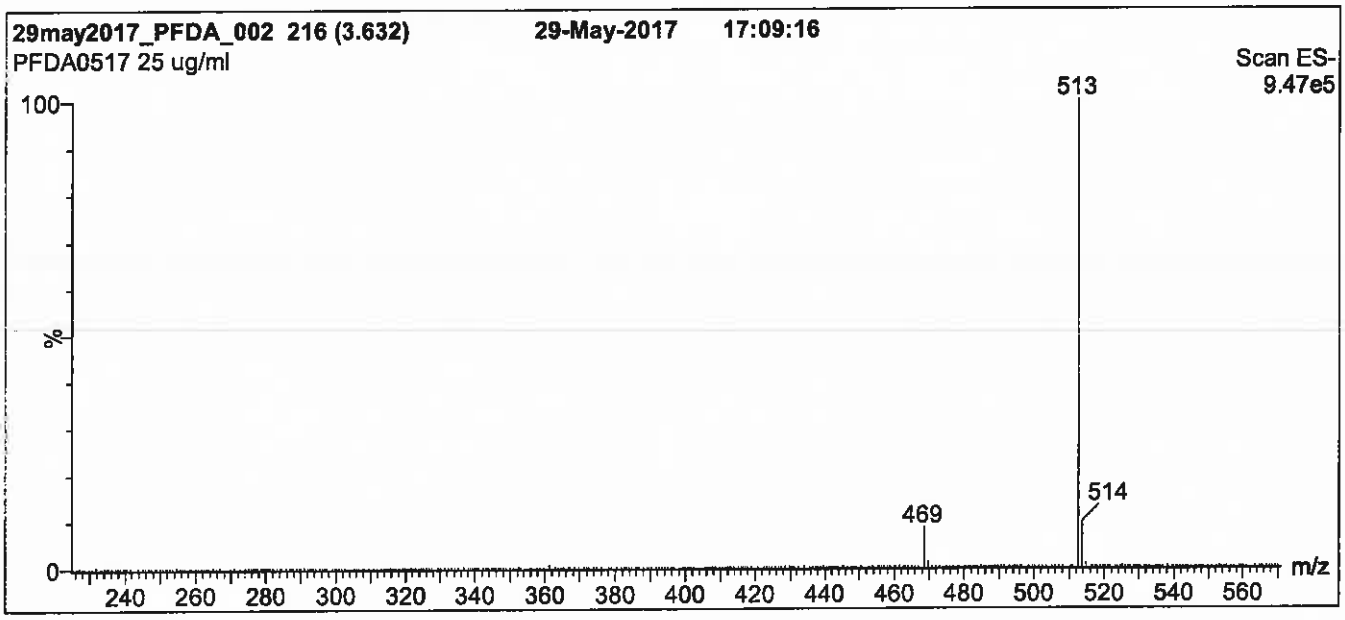
Figure 1: **PFDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

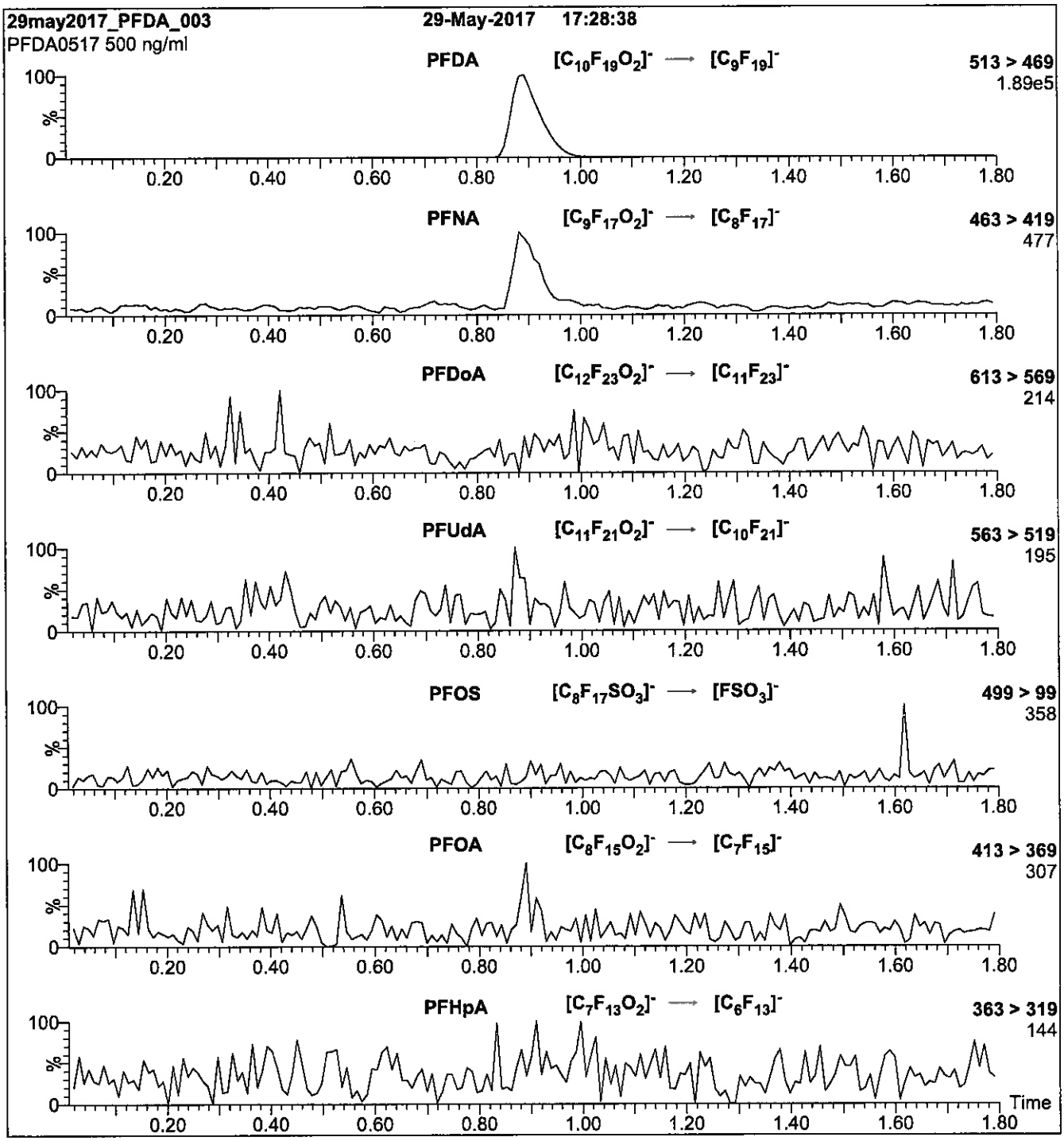
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.20e-3
Collision Energy (eV) = 13

Reagent

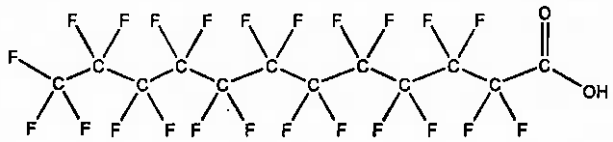
LCPFDoA_00007

R: 12/21/16 SPV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFDoA	**LOT NUMBER:**	PFDoA0516
COMPOUND:	Perfluoro-n-dodecanoic acid		
STRUCTURE:		**CAS #:**	307-55-1



MOLECULAR FORMULA:	$C_{12}HF_{23}O_2$	**MOLECULAR WEIGHT:**	614.10
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/31/2016		
EXPIRY DATE: (mm/dd/yyyy)	05/31/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 06/02/2016 (mm/dd/yyyy)

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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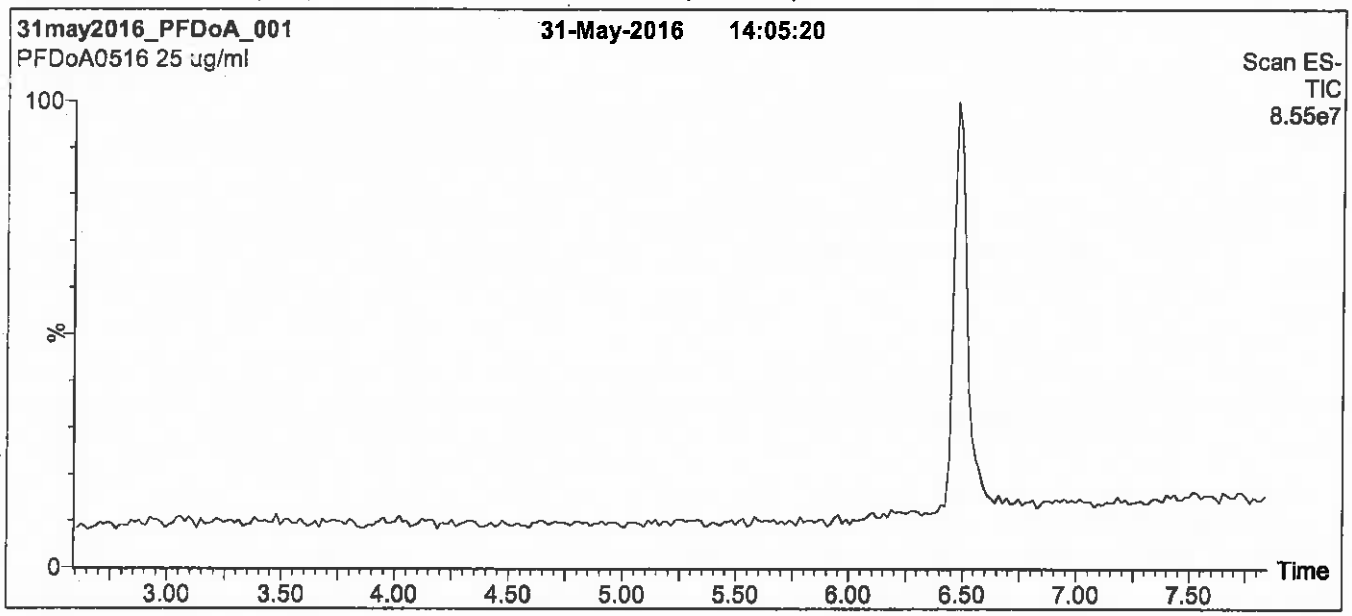
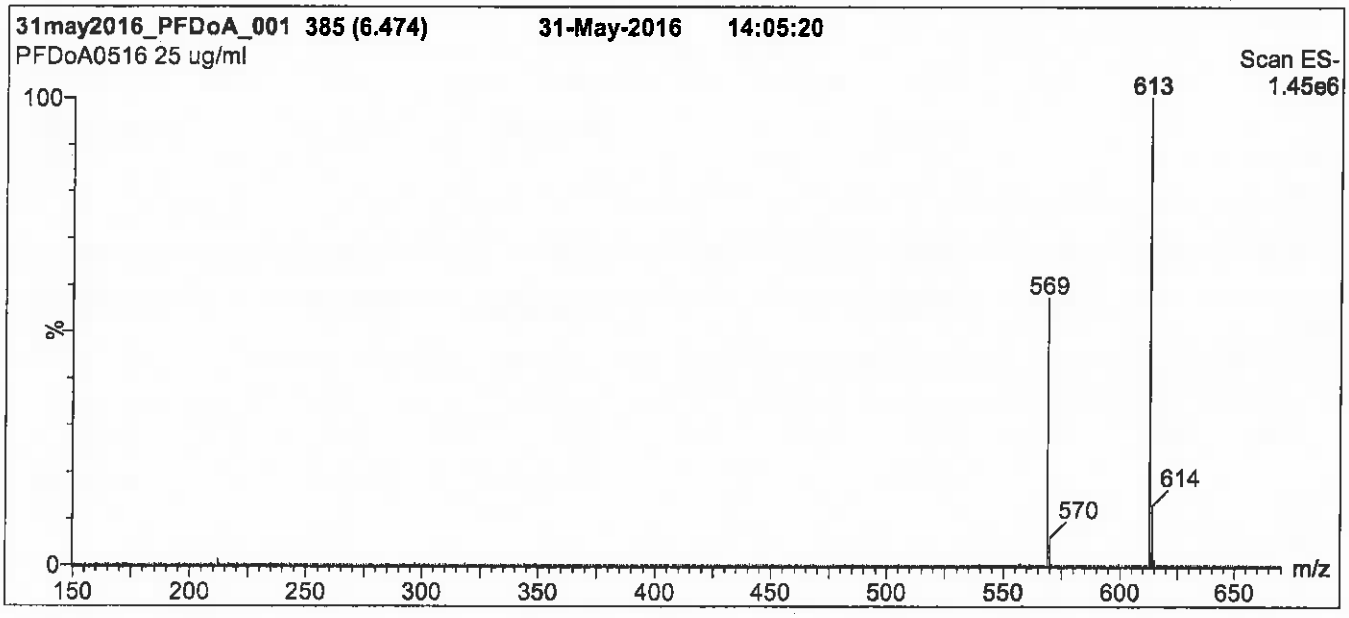
Figure 1: **PFDoA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

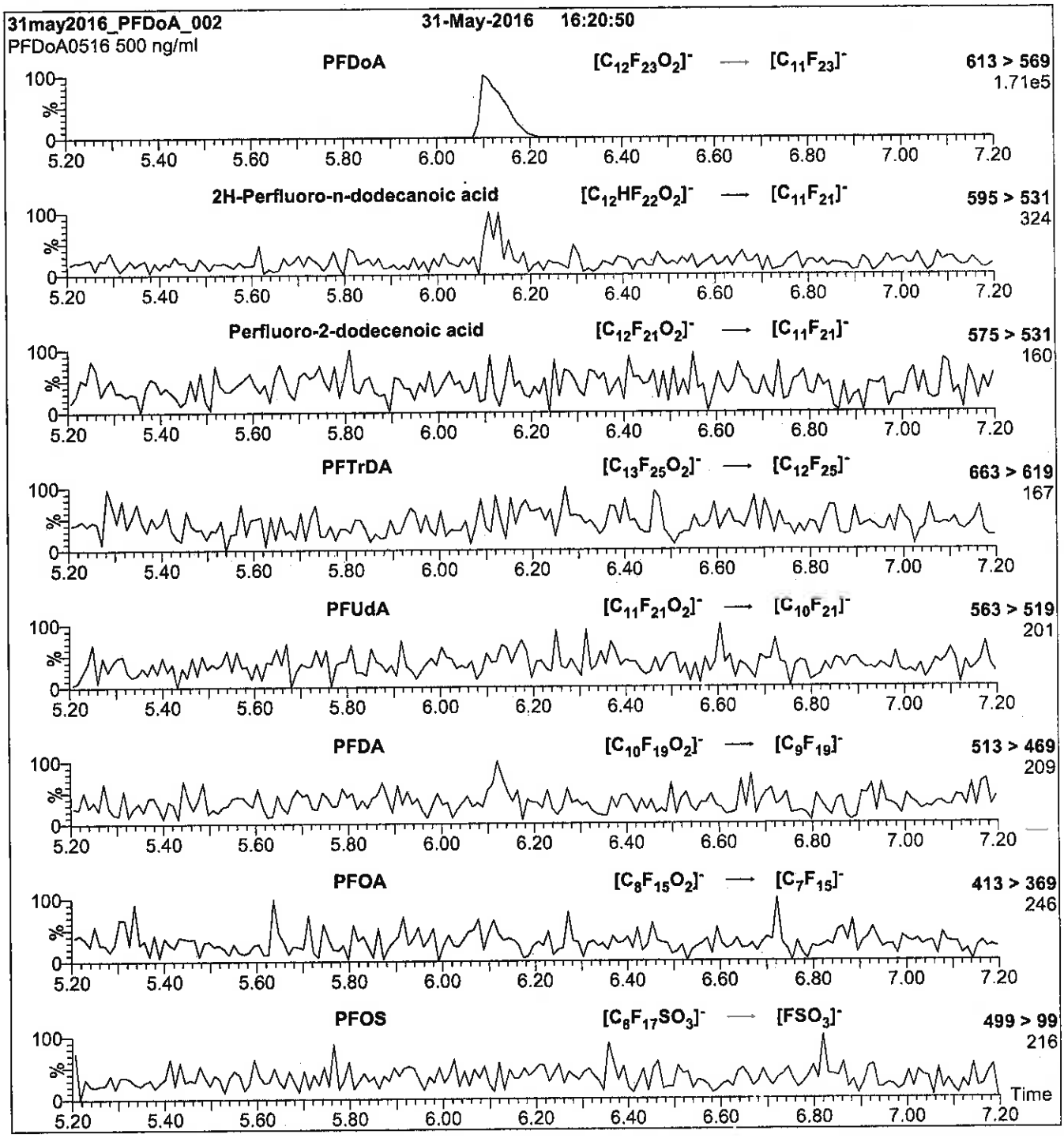
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

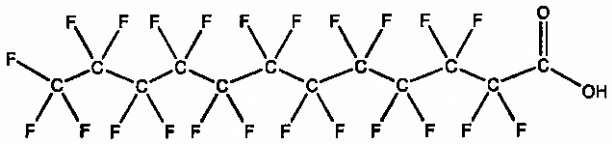
LCPFDoA_00008

P: 10/20/17 SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFDoA	**LOT NUMBER:**	PFDoA0517
COMPOUND:	Perfluoro-n-dodecanoic acid		
STRUCTURE:		**CAS #:**	307-55-1



MOLECULAR FORMULA:	$C_{12}HF_{23}O_2$	**MOLECULAR WEIGHT:**	614.10
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/29/2017		
EXPIRY DATE: (mm/dd/yyyy)	05/29/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 05/30/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

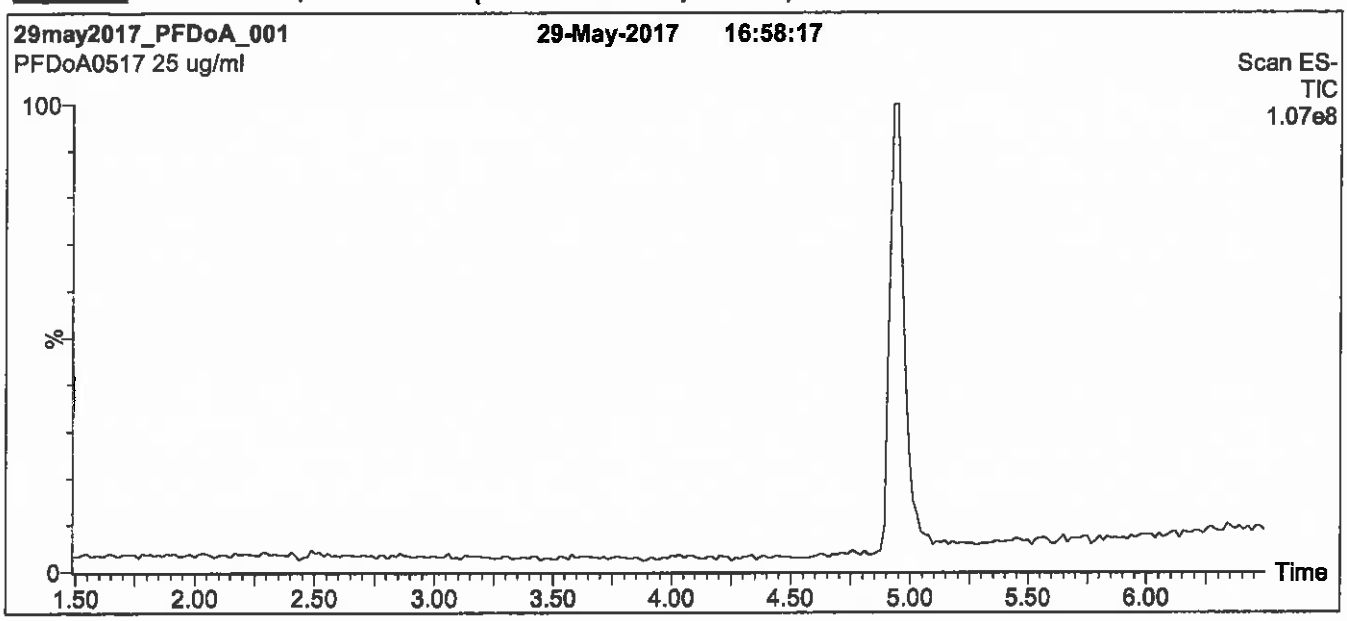
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

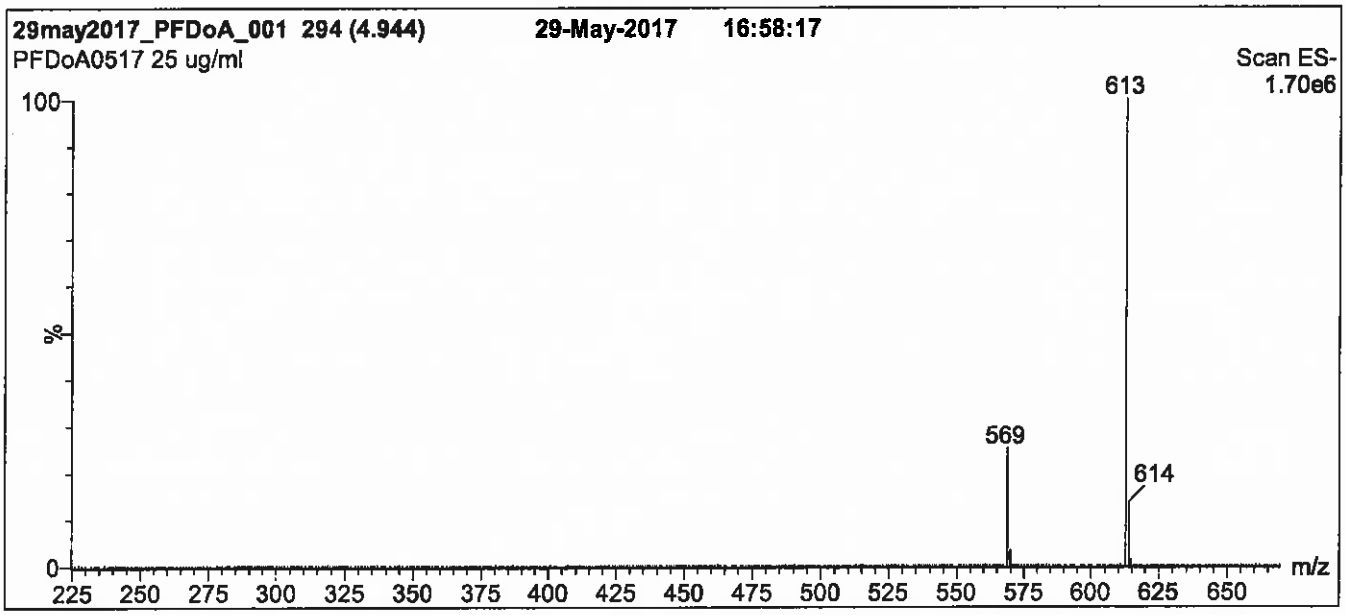
CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

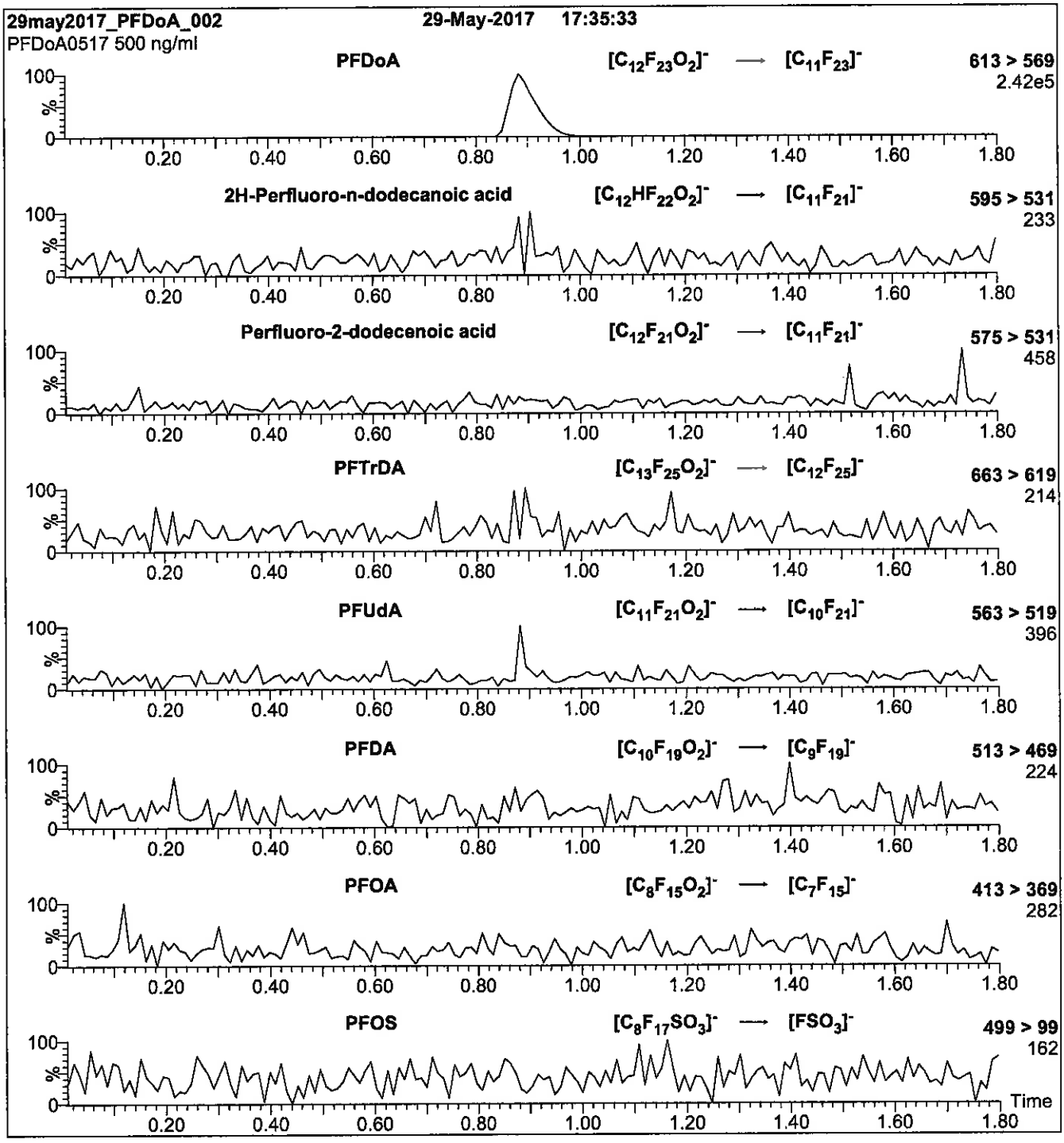
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

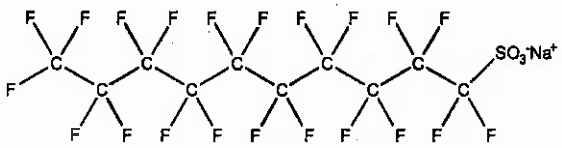
LCPFDSA_00002

D: 12/29/16 SK✓

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	L-PFDS	**LOT NUMBER:**	LPFDS0516
COMPOUND:	Sodium perfluoro-1-decanesulfonate		
STRUCTURE:		**CAS #:**	2806-15-7



MOLECULAR FORMULA:	$C_{10}F_{21}SO_3Na$	**MOLECULAR WEIGHT:**	622.13
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 48.2 ± 2.4 µg/ml (PFDS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/24/2016		
EXPIRY DATE: (mm/dd/yyyy)	05/24/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.9% of sodium perfluoro-1-dodecanesulfonate (L-PFDoS).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/26/2016 (mm/dd/yyyy)

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

INTENDED USE:

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HAZARDS:

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HOMOGENEITY:

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UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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QUALITY MANAGEMENT:

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CALA

ANAB ACCREDITED

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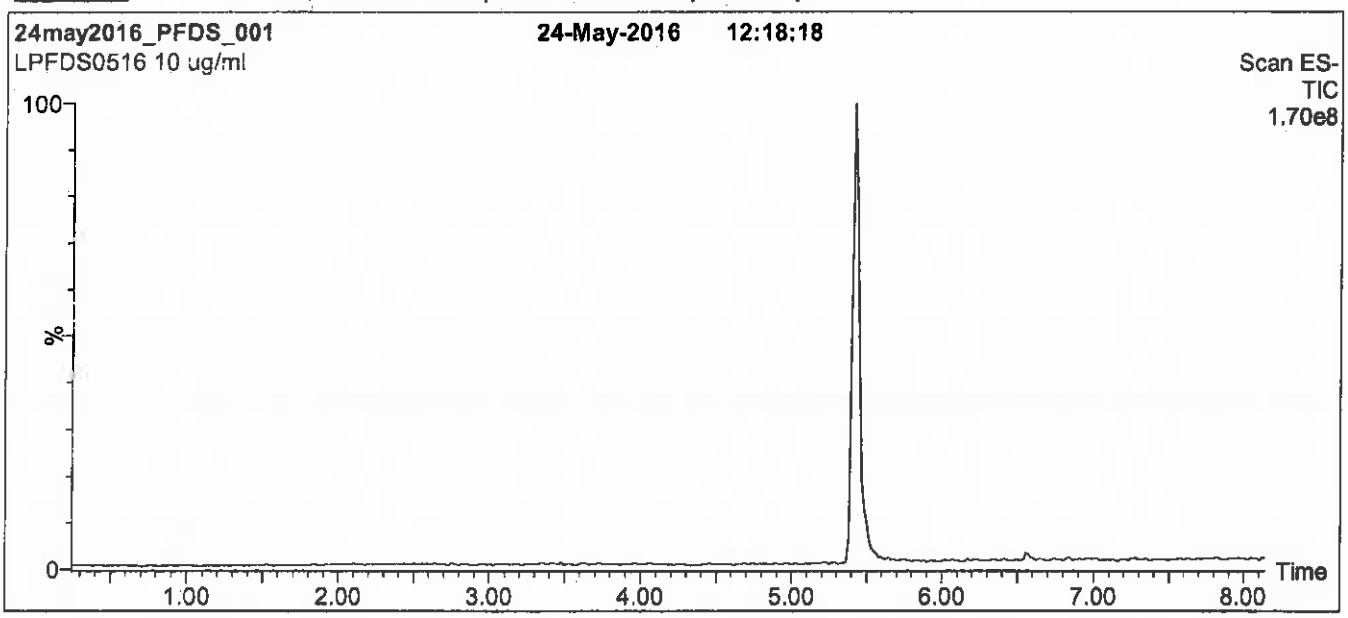
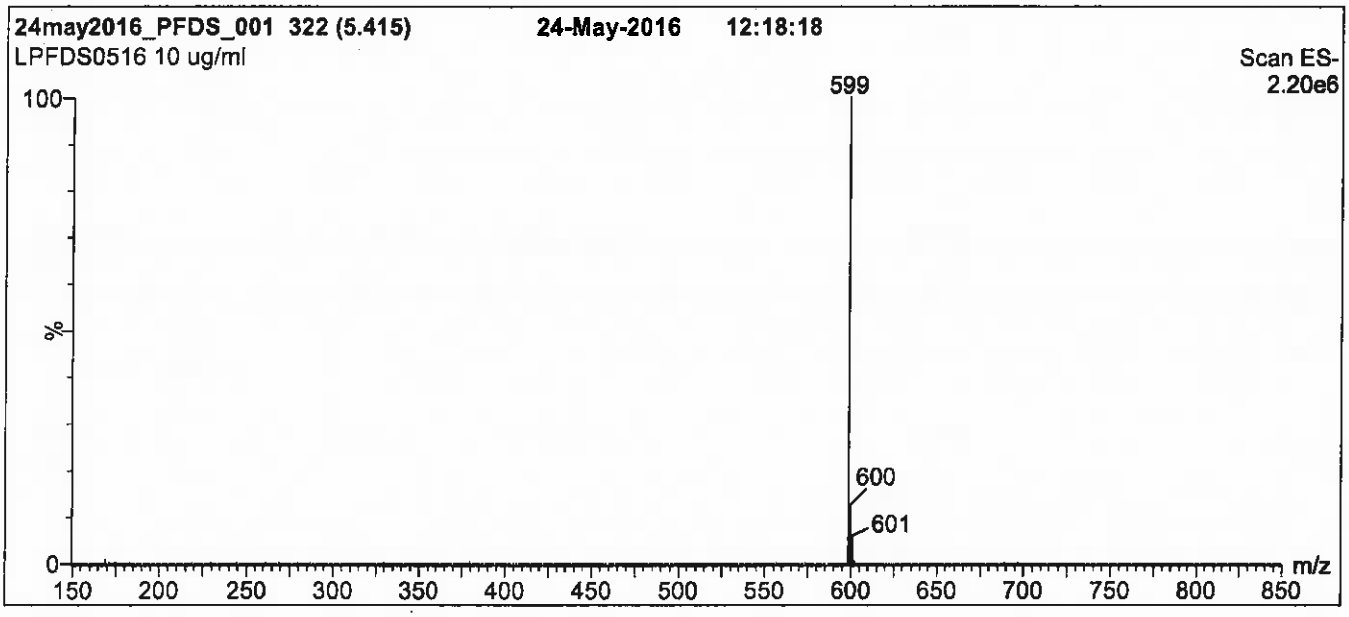
Figure 1: **L-PFDS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

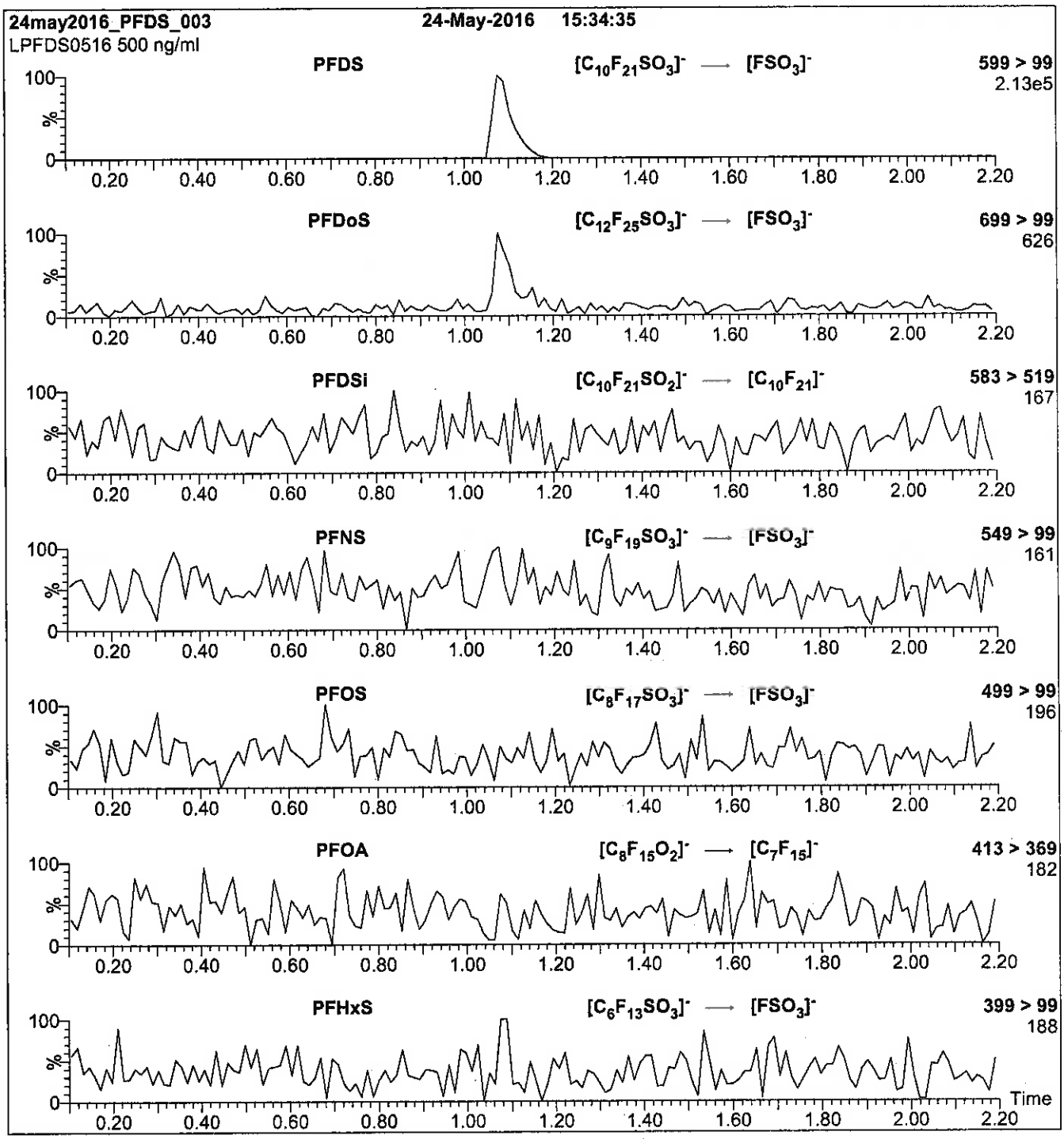
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 70.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFDS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFDS)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.70e-3
Collision Energy (eV) = 50

Reagent

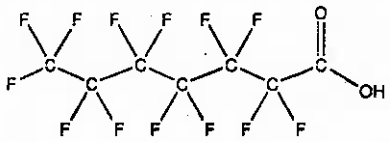
LCPFHpA_00008

P: 12/29/16 SKN

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFHpA	**LOT NUMBER:**	PFHpA1216
COMPOUND:	Perfluoro-n-heptanoic acid		
STRUCTURE:		**CAS #:**	375-85-9



MOLECULAR FORMULA:	$C_7HF_{13}O_2$	**MOLECULAR WEIGHT:**	364.06
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	12/02/2016		
EXPIRY DATE: (mm/dd/yyyy)	12/02/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 12/12/2016 (mm/dd/yyyy)

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

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

EXPIRY DATE / PERIOD OF VALIDITY:

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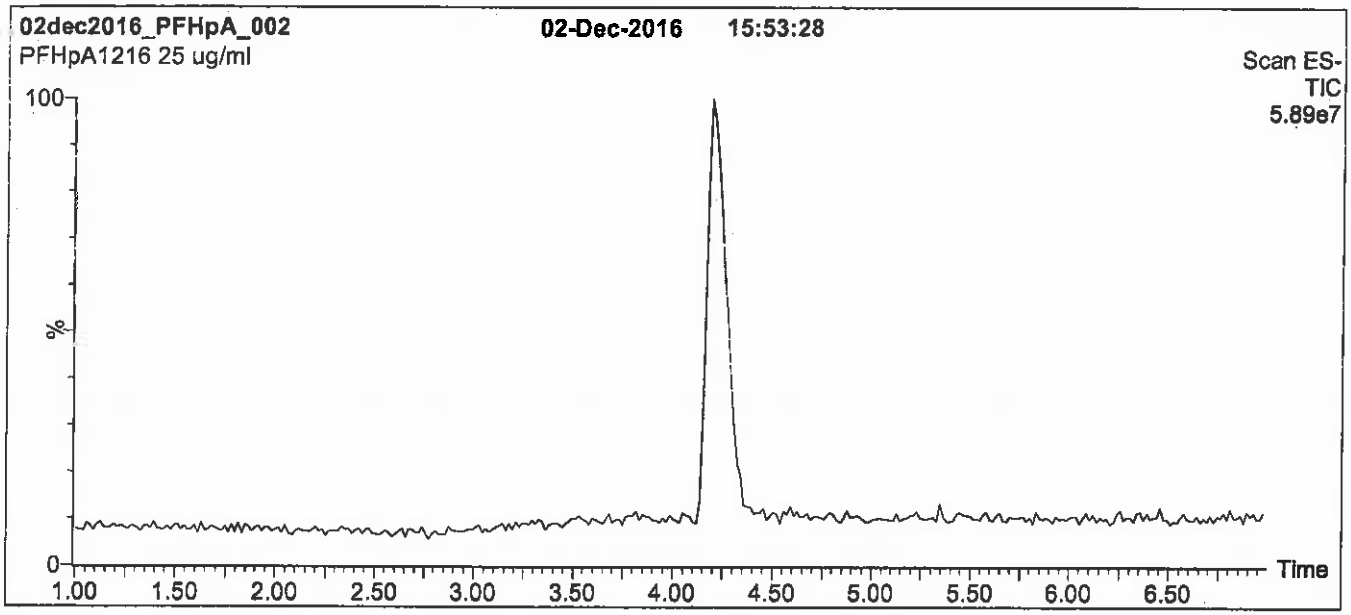
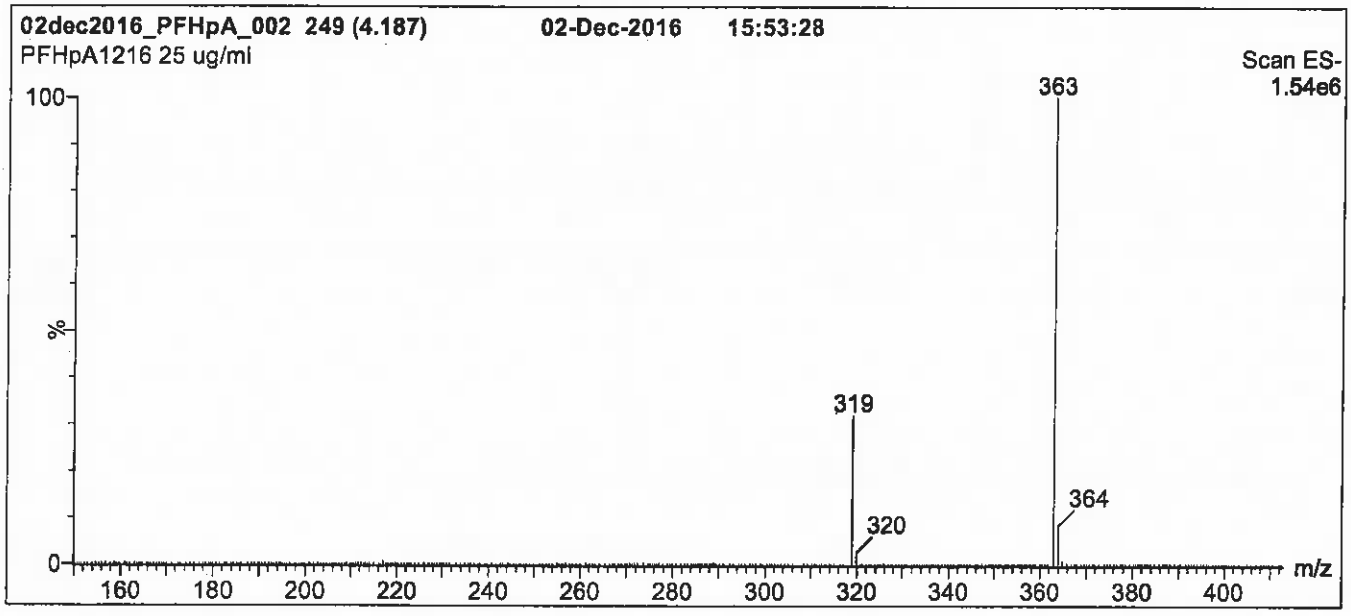
CALA

ANAB ACCREDITED

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

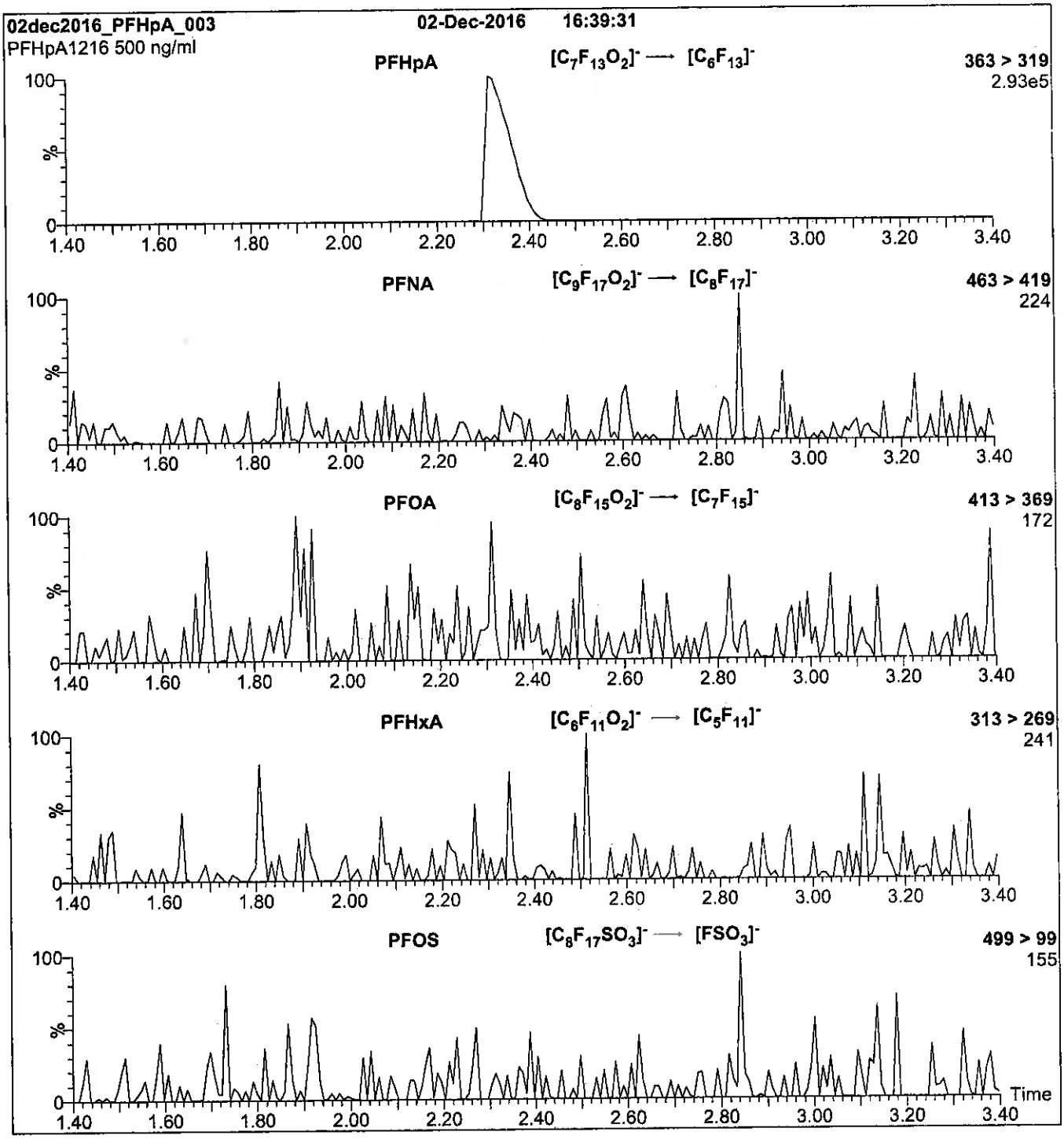
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 11

Reagent

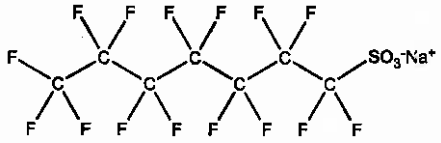
LCPFHpSA_00003

R: 9/21/17 SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	L-PFHpS	**LOT NUMBER:**	LPFHpS0817
COMPOUND:	Sodium perfluoro-1-heptanesulfonate		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$C_7F_{15}SO_3Na$	**MOLECULAR WEIGHT:**	472.10
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.6 ± 2.4 µg/ml (PFHpS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	09/01/2017		
EXPIRY DATE: (mm/dd/yyyy)	09/01/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.2% of L-PFHxS ($C_6F_{13}SO_3Na$) and ~ 0.1% of L-PFOS ($C_8F_{17}SO_3Na$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 09/07/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

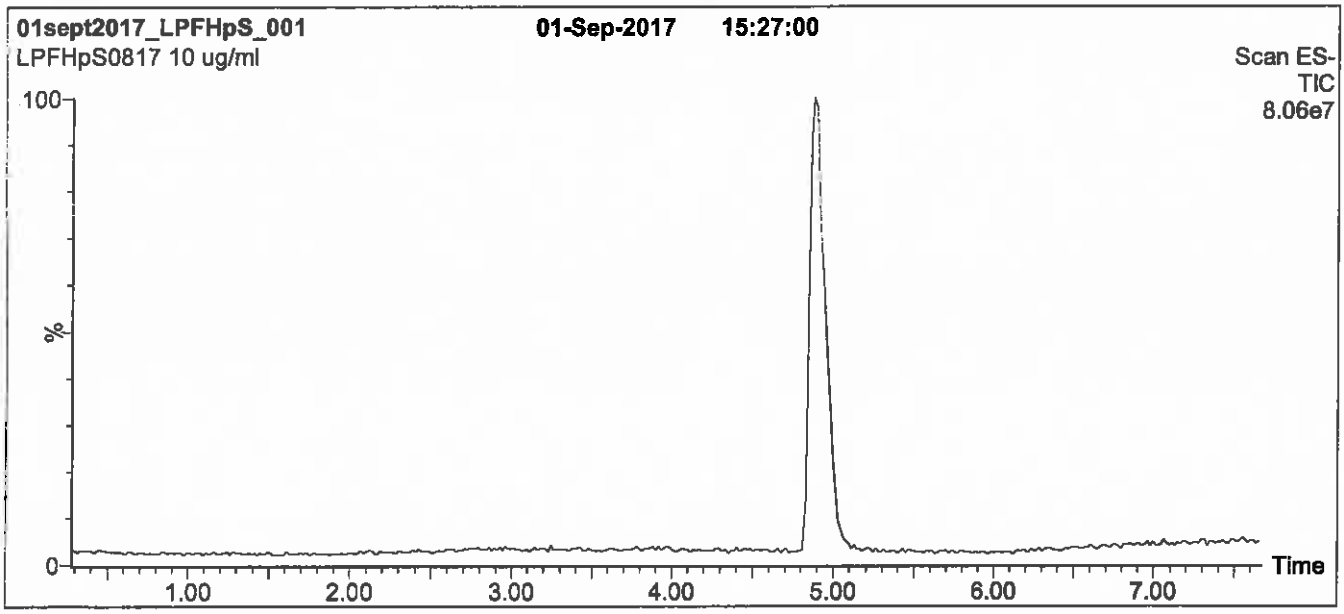
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

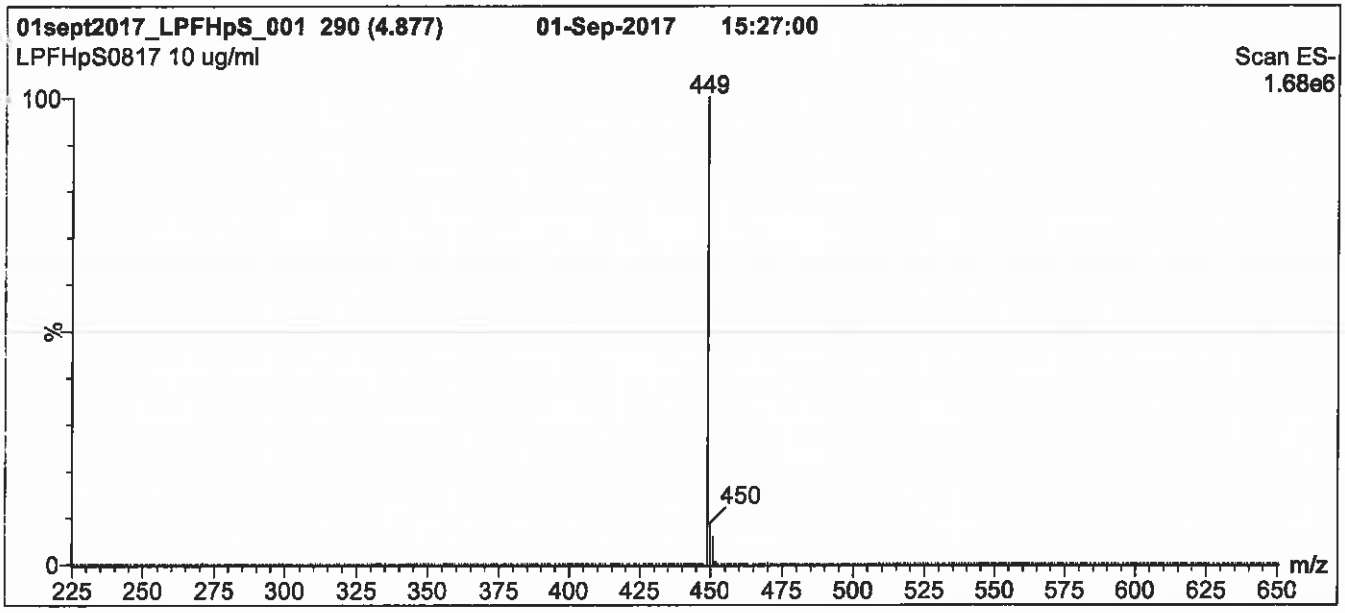
CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold
for 1 min before returning to initial conditions in 0.5 min.
Time: 10 min

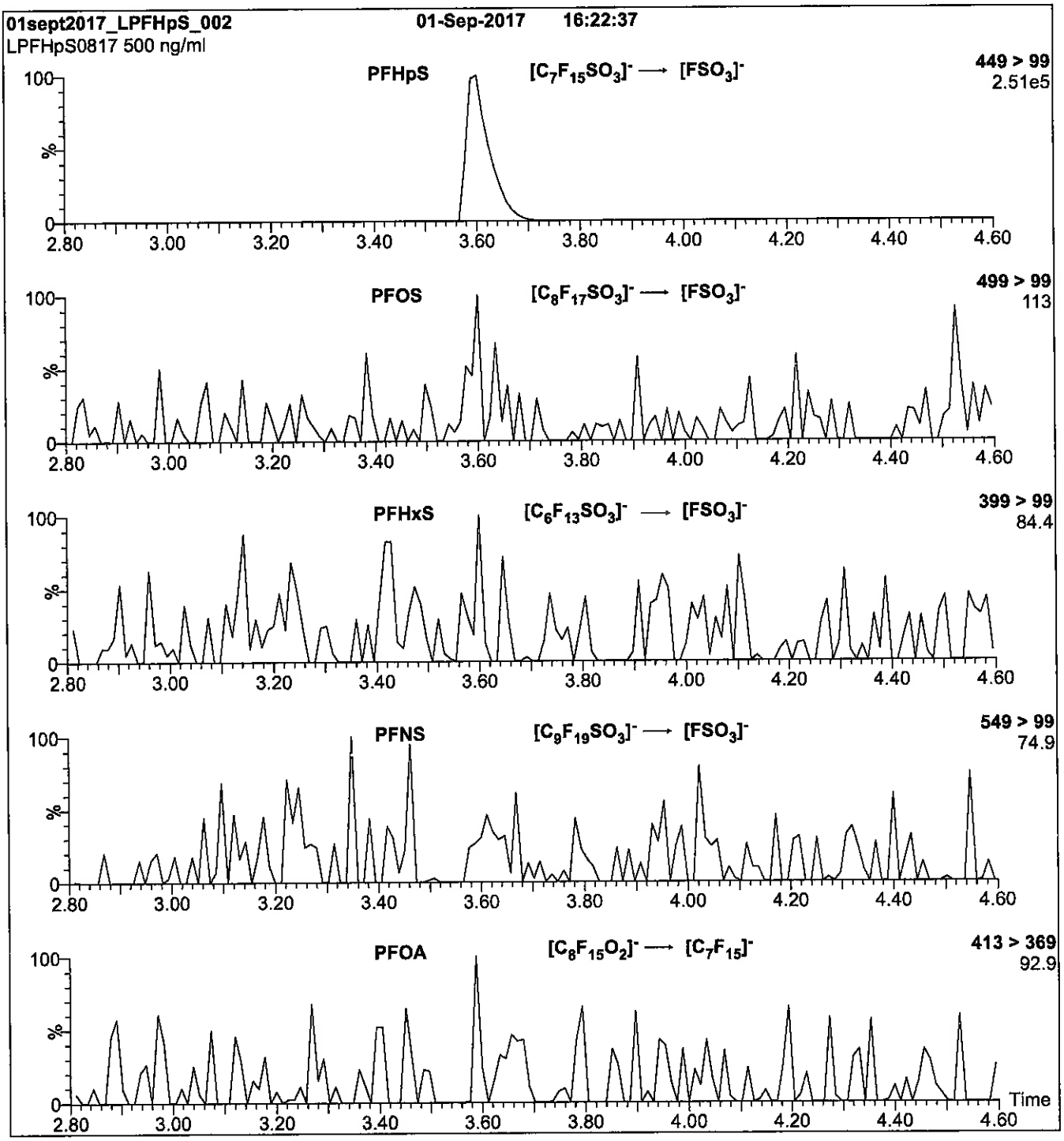
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFHpS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection:	Direct loop injection 10 µl (500 ng/ml L-PFHpS)
Mobile phase:	Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O (both with 10 mM NH_4OAc buffer)
Flow:	300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 35

Reagent

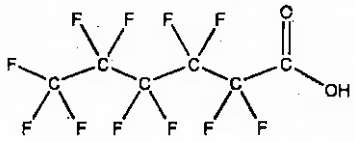
LCPFHxA_00007

R: 12/29/16 SAV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFHxA	**LOT NUMBER:**	PFHxA1215
COMPOUND:	Perfluoro-n-hexanoic acid		
STRUCTURE:		**CAS #:**	307-24-4



MOLECULAR FORMULA:	$C_6HF_{11}O_2$	**MOLECULAR WEIGHT:**	314.05
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	12/22/2015		
EXPIRY DATE: (mm/dd/yyyy)	12/22/2020		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.2% of Perfluoro-n-pentanoic acid (PFPeA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 12/23/2015 (mm/dd/yyyy)
B.G. Chittim

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

INTENDED USE:

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HAZARDS:

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CALA

ANAB ACCREDITED

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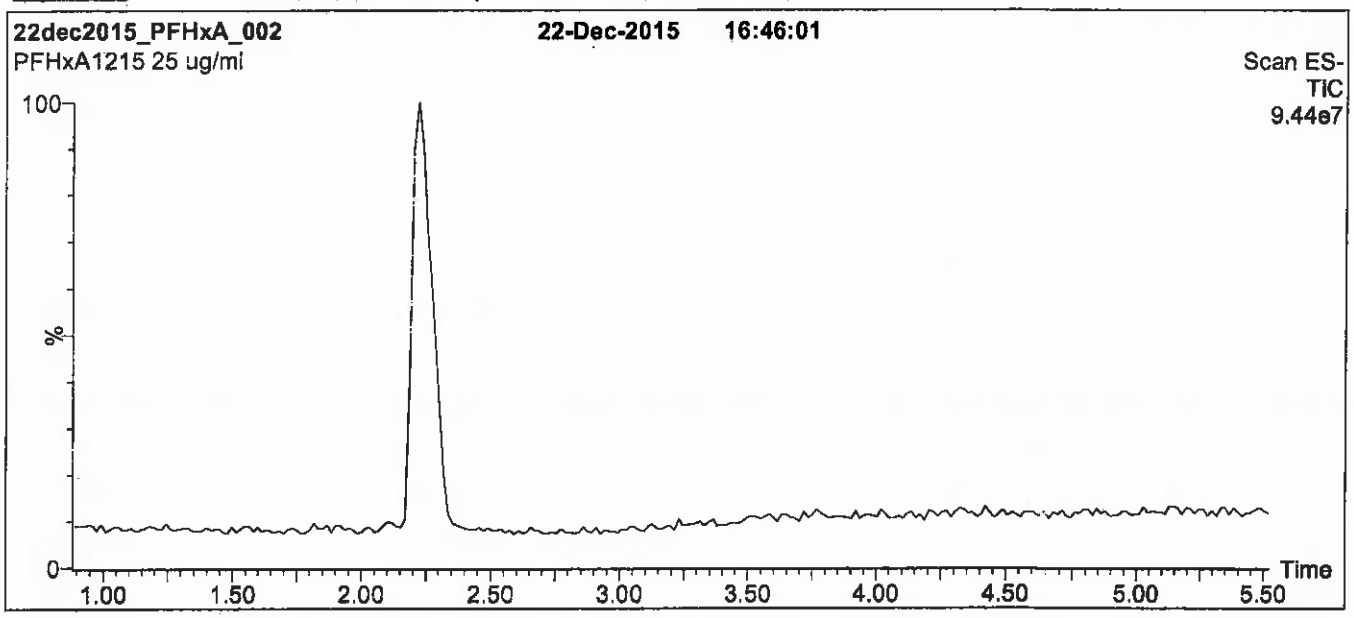
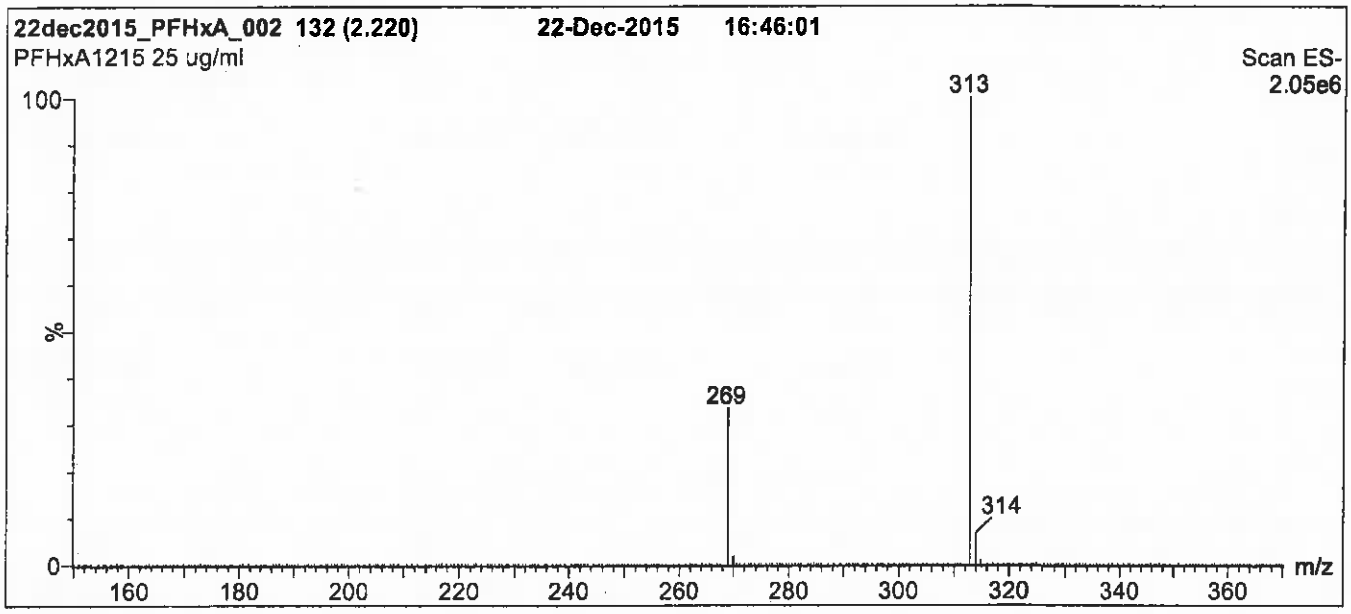
Figure 1: **PFHxA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

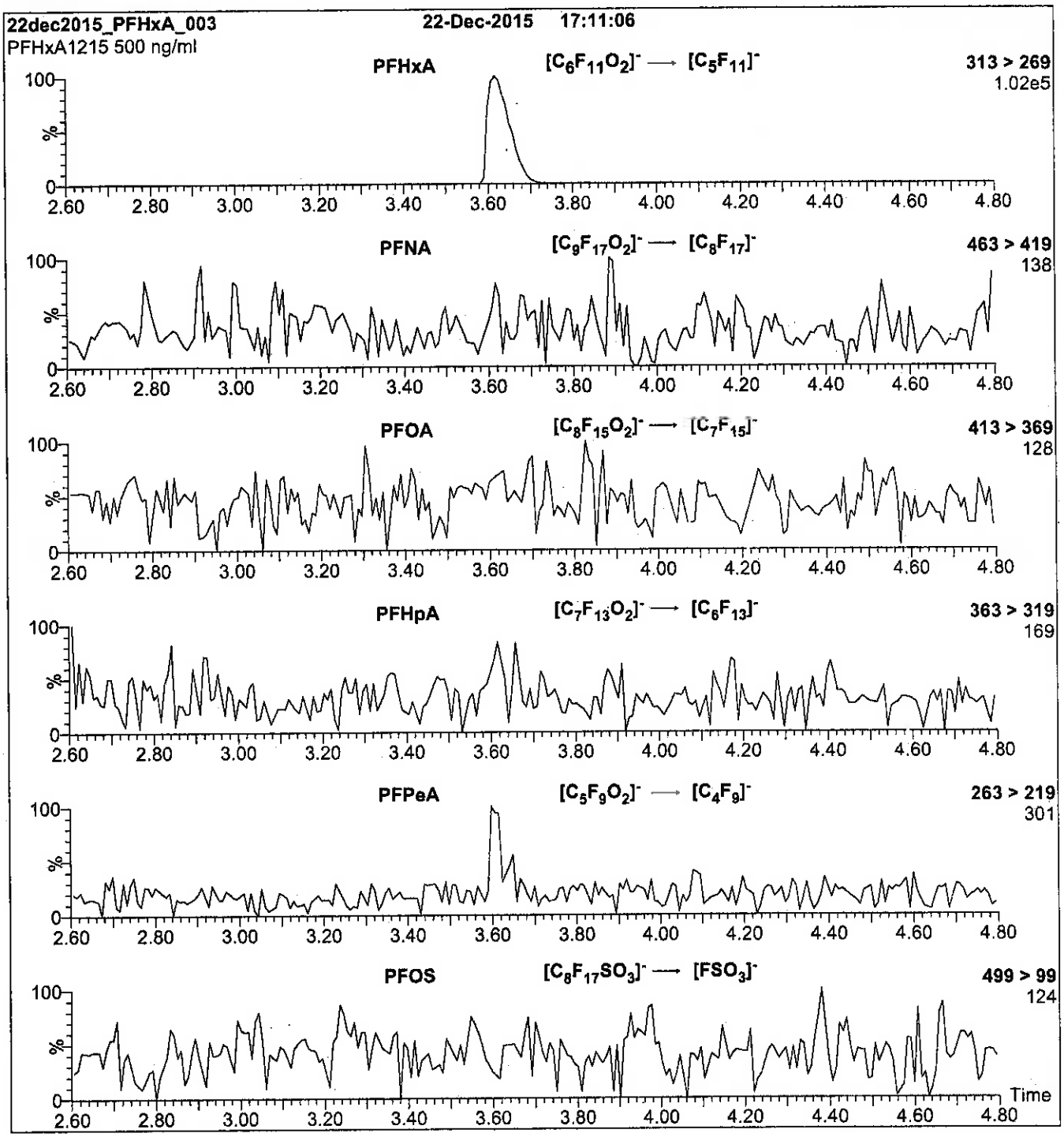
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

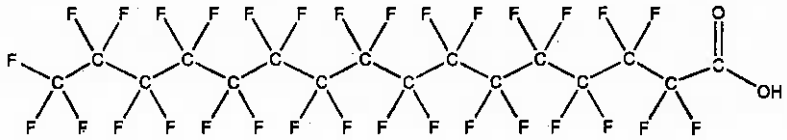
LCPFHxDA_00008

T: 12/29/16 SEV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFHxDA	**LOT NUMBER:**	PFHxDA0516
COMPOUND:	Perfluoro-n-hexadecanoic acid		
STRUCTURE:		**CAS #:**	67905-19-5



MOLECULAR FORMULA:	$C_{16}HF_{31}O_2$	**MOLECULAR WEIGHT:**	814.13
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/25/2016		
EXPIRY DATE: (mm/dd/yyyy)	05/25/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.4% of PFODA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/27/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

TRACEABILITY:

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

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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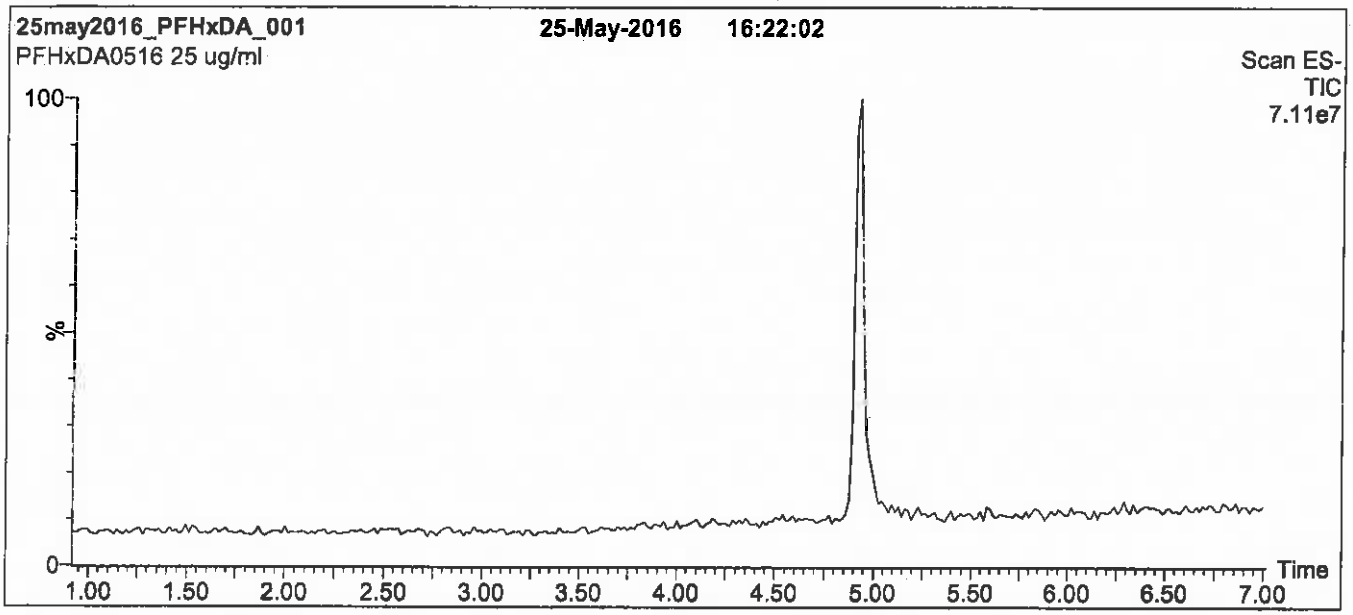
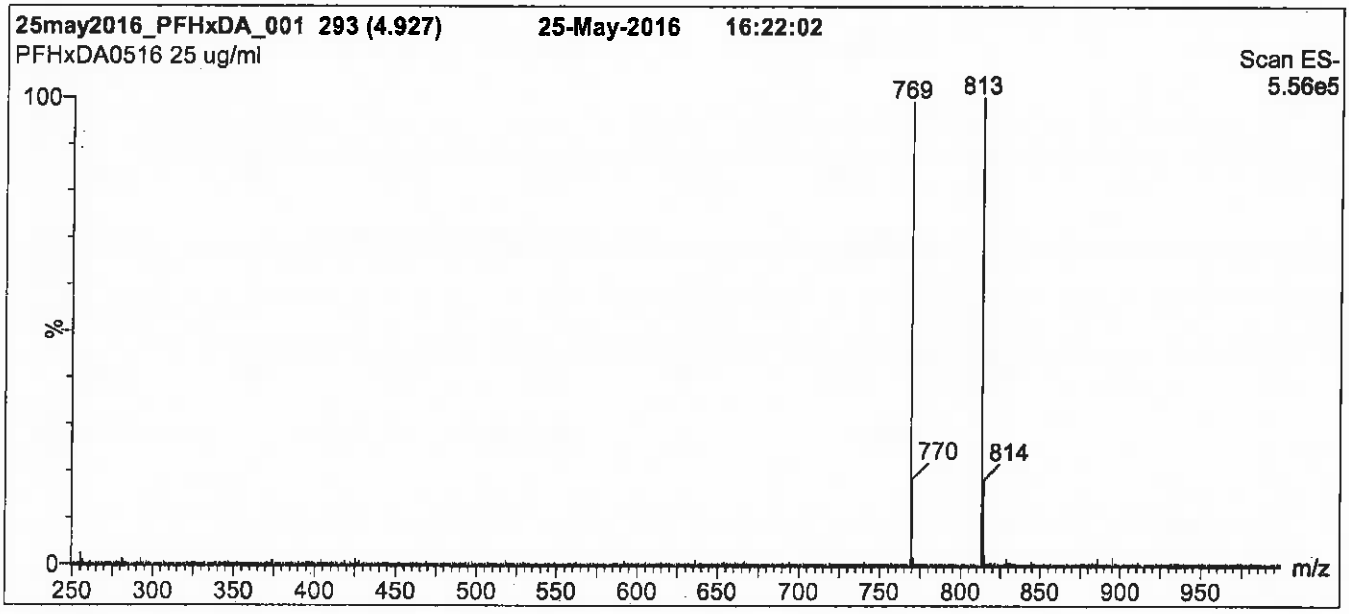
Figure 1: **PFHxDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 70% (80:20 MeOH:ACN) / 30% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 95% organic over 6 min and hold for 2.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

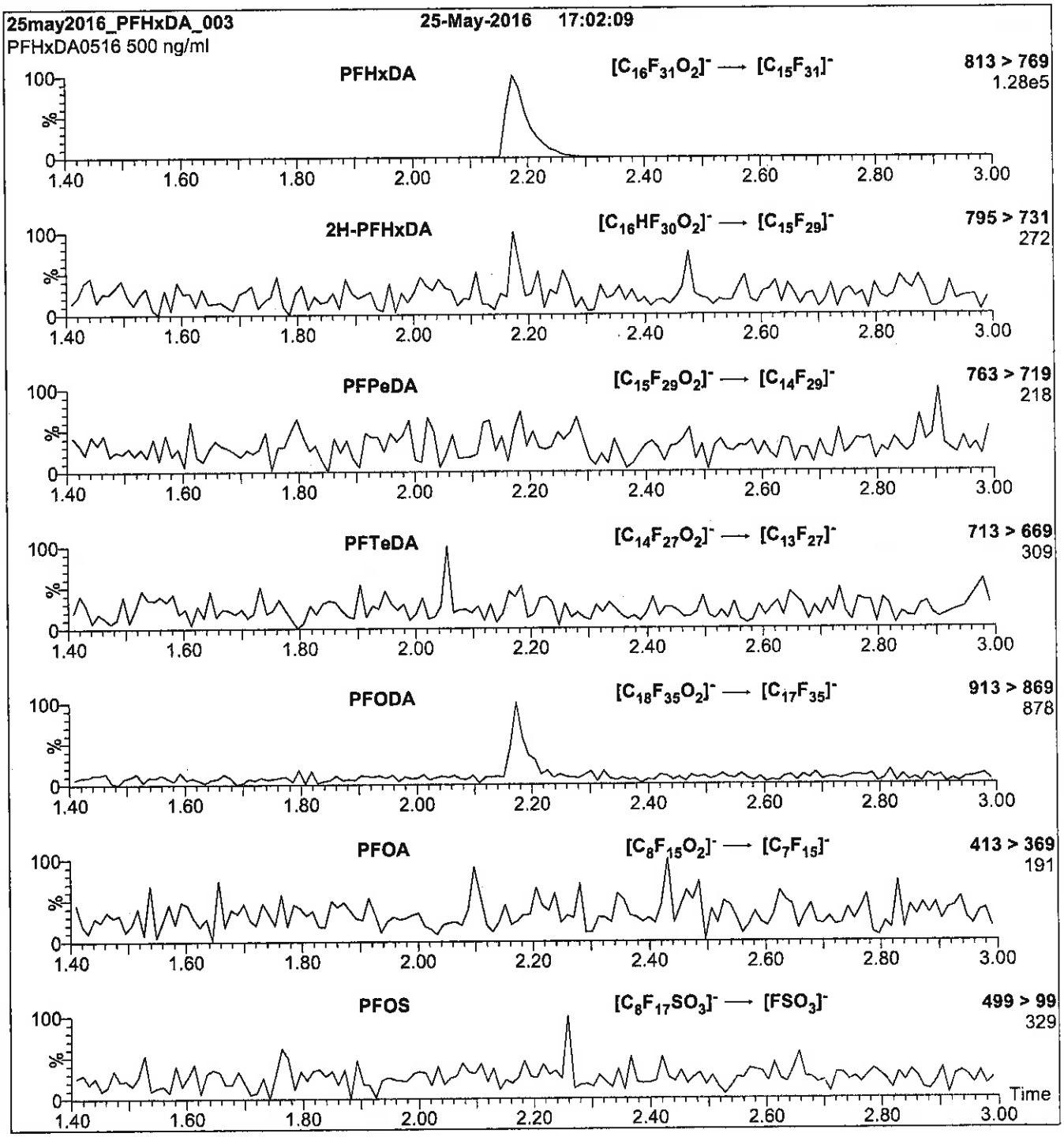
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 1250 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.66e-3
Collision Energy (eV) = 15

Reagent

LCPFHxDA_00009

r: 9/21/17 SKJ

WELLINGTON LABORATORIES

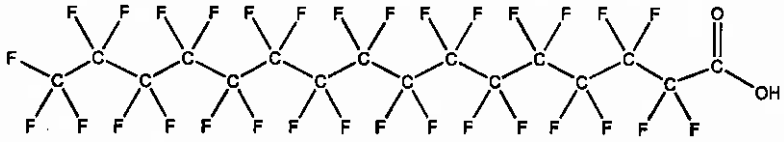
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: PFHxDA
COMPOUND: Perfluoro-n-hexadecanoic acid

LOT NUMBER: PFHxDA0717

STRUCTURE:

CAS #: 67905-19-5



MOLECULAR FORMULA: $C_{16}HF_{31}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 814.13
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 07/13/2017
EXPIRY DATE: (mm/dd/yyyy) 07/13/2022
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

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Certified By: B.G. Chittim, General Manager

Date: 08/04/2017 (mm/dd/yyyy)

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

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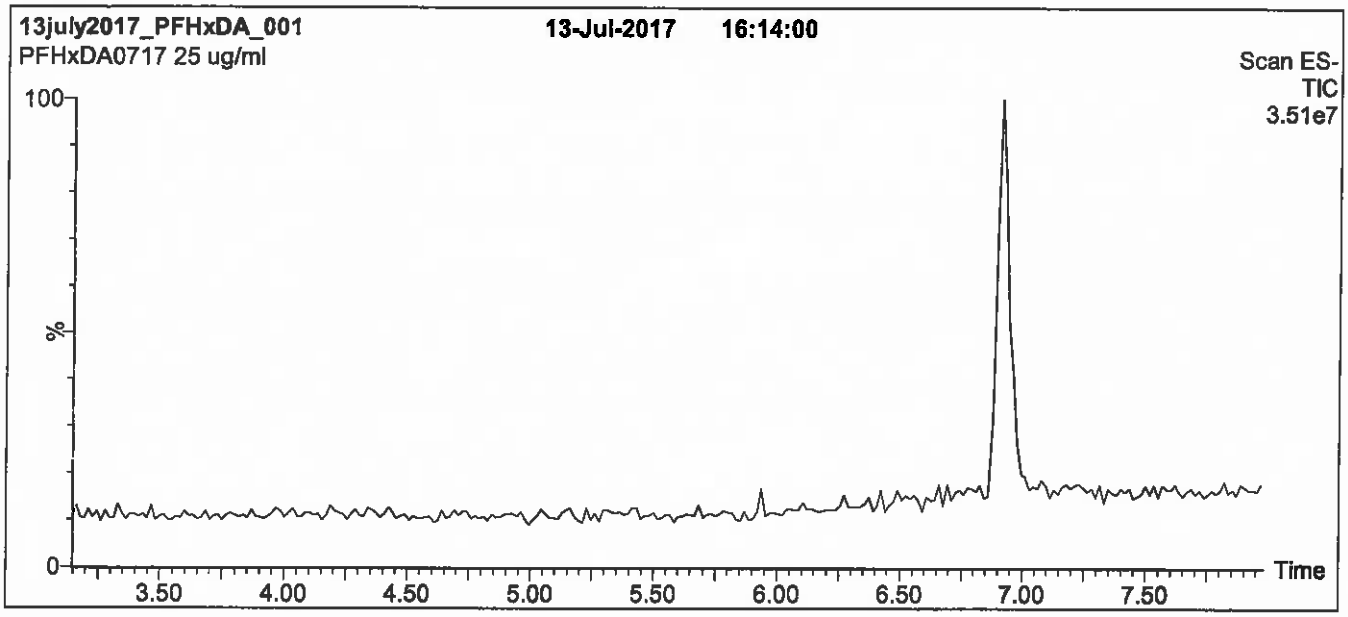
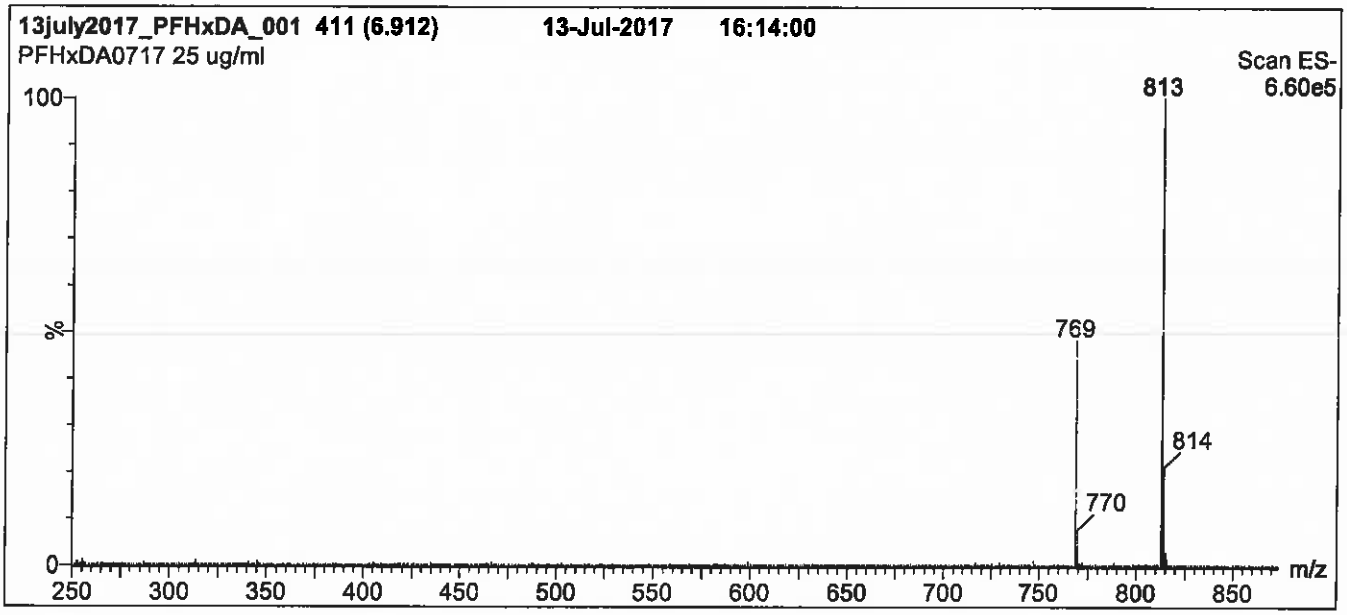
Figure 1: **PFHxDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

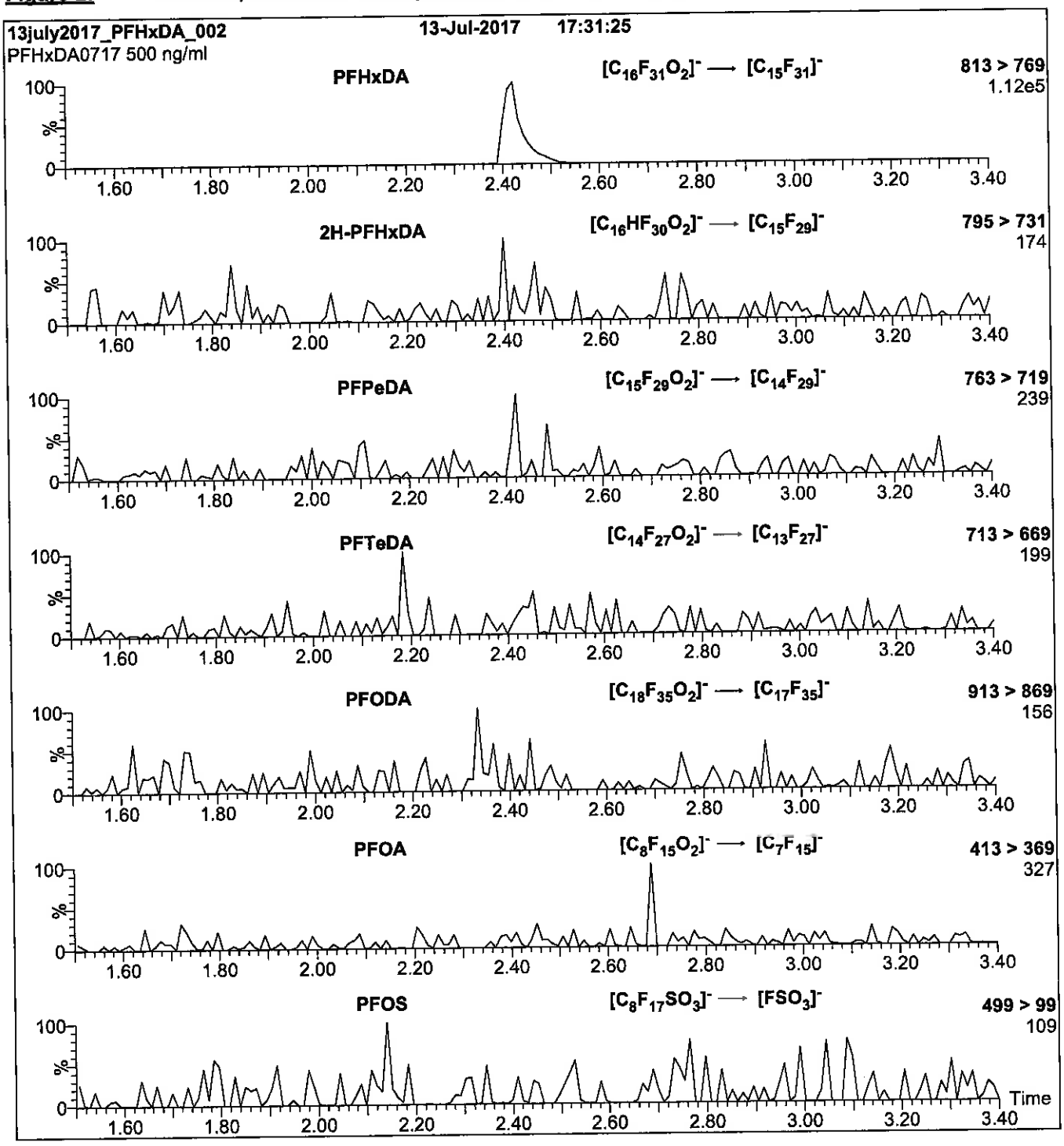
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 1250 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.13e-3
Collision Energy (eV) = 15

Reagent

LCPFHxS-br_00004

R: 12/29/16 SK

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

br-PFHxSK

Potassium Perfluorohexanesulfonate
Solution/Mixture of Linear and
Branched Isomers

PRODUCT CODE:	br-PFHxSK
LOT NUMBER:	brPFHxSK0615
CONCENTRATION:	50.0 ± 2.5 µg/ml (total potassium salt)
	45.5 ± 2.3 µg/ml (total PFHxS anion)
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	06/29/2015
LAST TESTED: (mm/dd/yyyy)	07/03/2015
EXPIRY DATE: (mm/dd/yyyy)	07/03/2020
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

The chemical purity has been determined to be ≥98% perfluorohexanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the identified isomeric components are given in Table A.

DOCUMENTATION/ DATA ATTACHED:

Table A: Isomeric Components and Percent Composition by ^{19}F-NMR
Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.5% of perfluoro-1-pentanesulfonate and ~ 0.2% of perfluoro-1-octanesulfonate.
- CAS#: 3871-99-6 (for linear isomer; potassium salt).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

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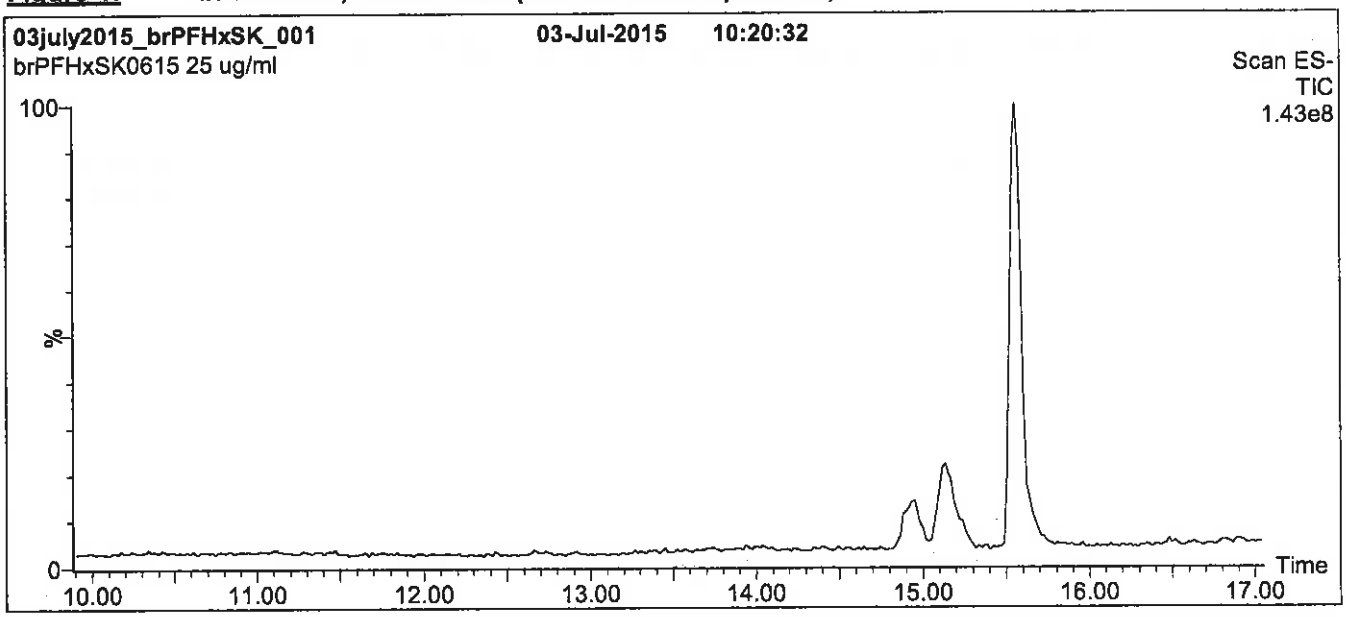
Table A: **br-PFHxSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

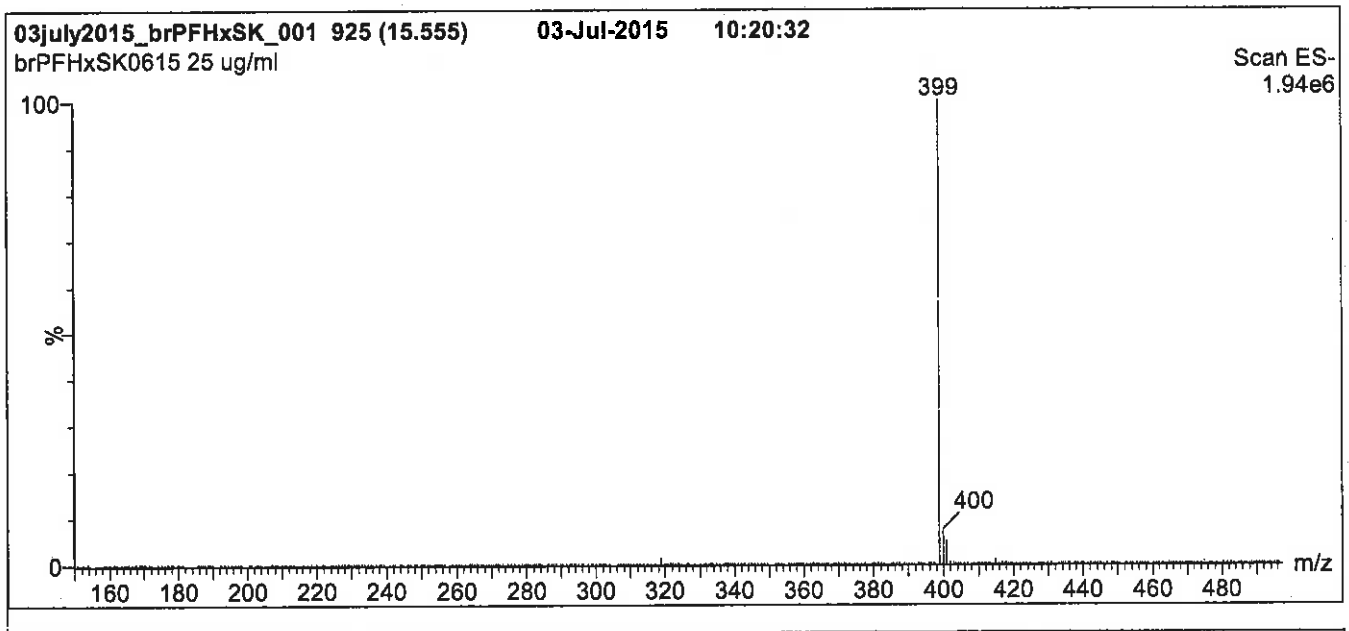
Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	Potassium perfluoro-1-hexanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	$CF_3CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	2.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	1.4
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	5.0
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	8.9
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	$CF_3C(CF_3)CF_2CF_2SO_3^-K^+$	0.2
7	Other Unidentified Isomers		0.5

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

Certified By: _____ **Date:** 09/27/2016 (mm/dd/yyyy)
B.G. Chittim

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 20% (80:20 MeOH:ACN) / 80% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 50% organic over 14 min. Ramp to 90% organic over 3 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 20 min

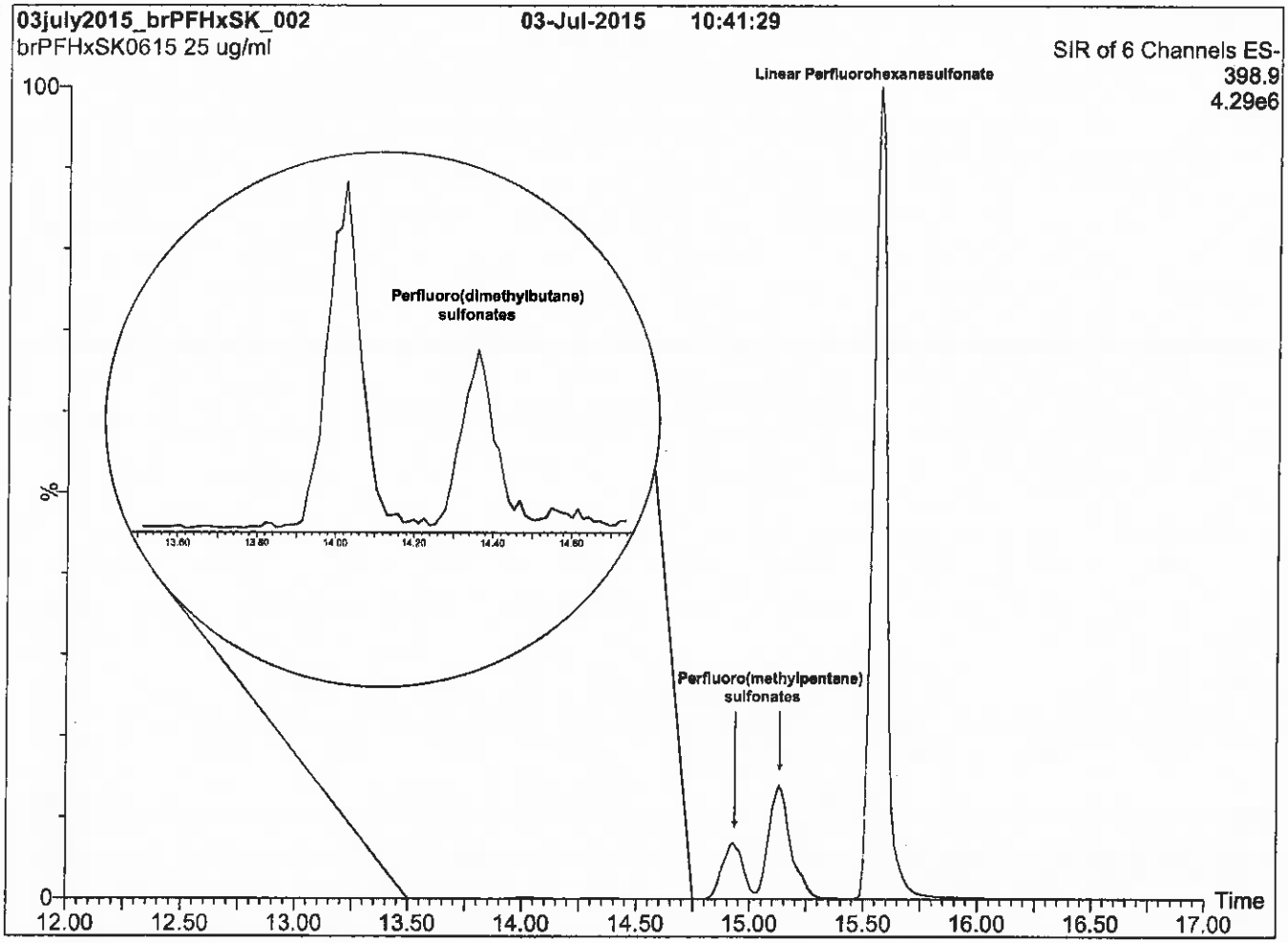
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

Figure 2: **br-PFHxSK; LC/MS Data**



Conditions for Figure 2:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 20% (80:20 MeOH:ACN) / 80% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 50% organic over 14 min. Ramp to 90% organic over 3 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 20 min

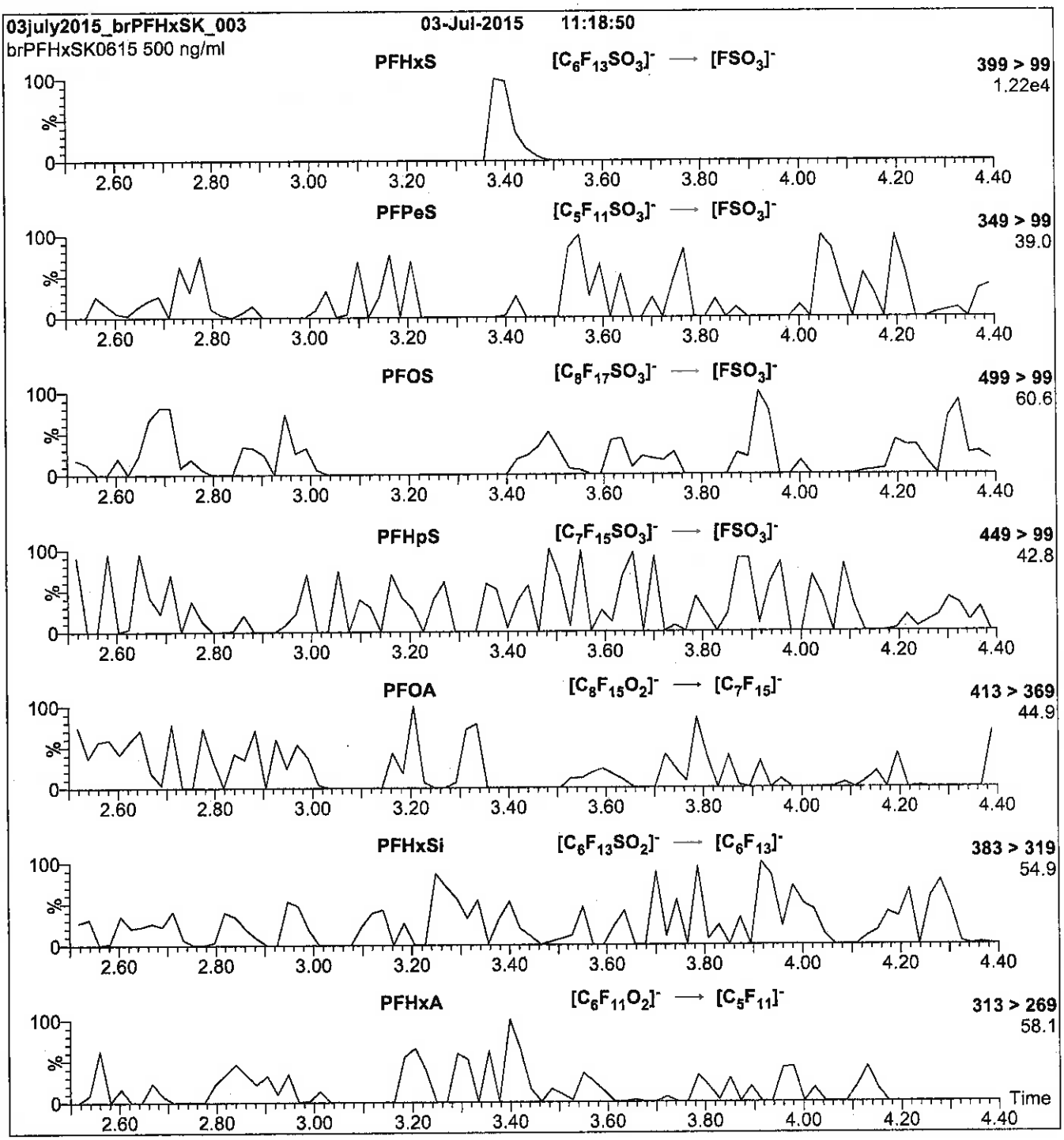
Flow: 300 µl/min

MS Parameters

Experiment: SIR (6 channels)

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

Figure 3: **br-PFHxSK; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 3:

Injection: Direct loop injection
10 µl (500 ng/ml br-PFHxSK)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 30

Reagent

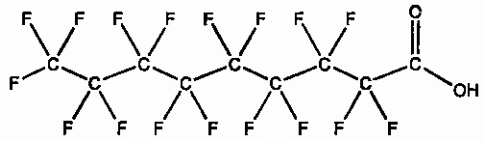
LCPFNA_00009

R: 9/21/17 SKJ

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	PFNA	**LOT NUMBER:**	PFNA0717
COMPOUND:	Perfluoro-n-nonanoic acid		
STRUCTURE:		**CAS #:**	375-95-1



MOLECULAR FORMULA:	$C_9HF_{17}O_2$	**MOLECULAR WEIGHT:**	464.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	07/20/2017		
EXPIRY DATE: (mm/dd/yyyy)	07/20/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of perfluoro-n-octanoic acid (PFOA), < 0.1% of perfluoro-n-heptanoic acid (PFHpA), and < 0.1% of perfluoro-n-undecanoic acid (PFUdA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 07/24/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

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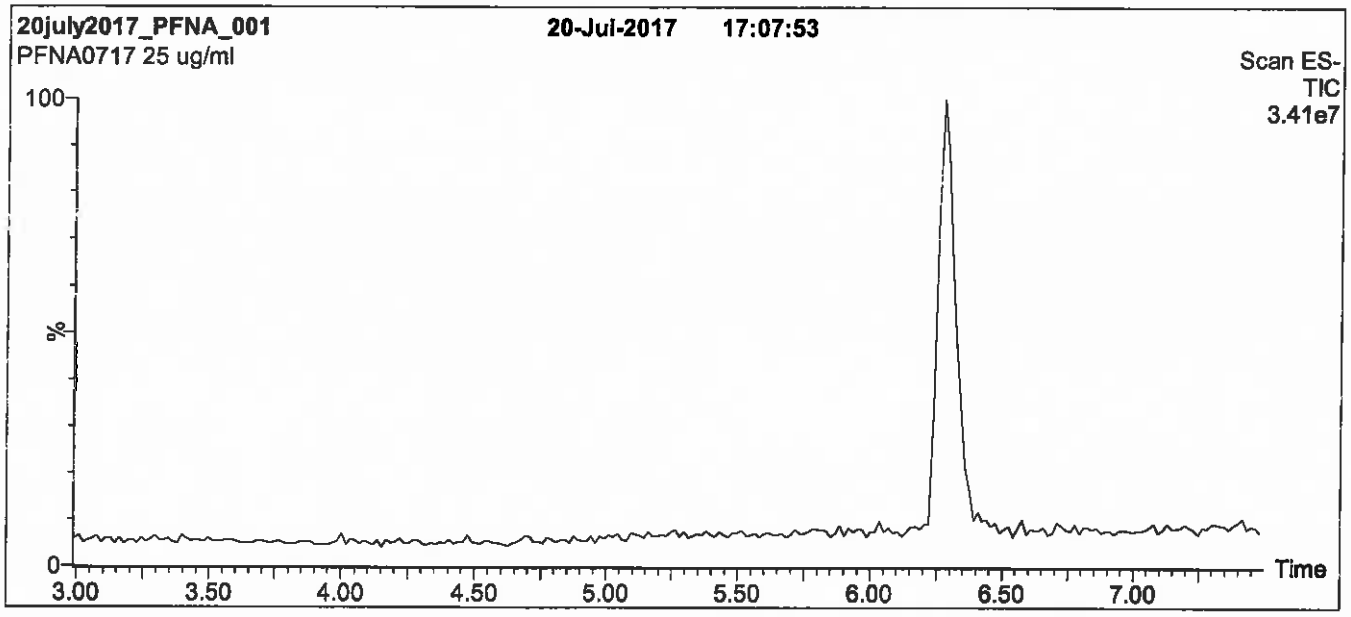
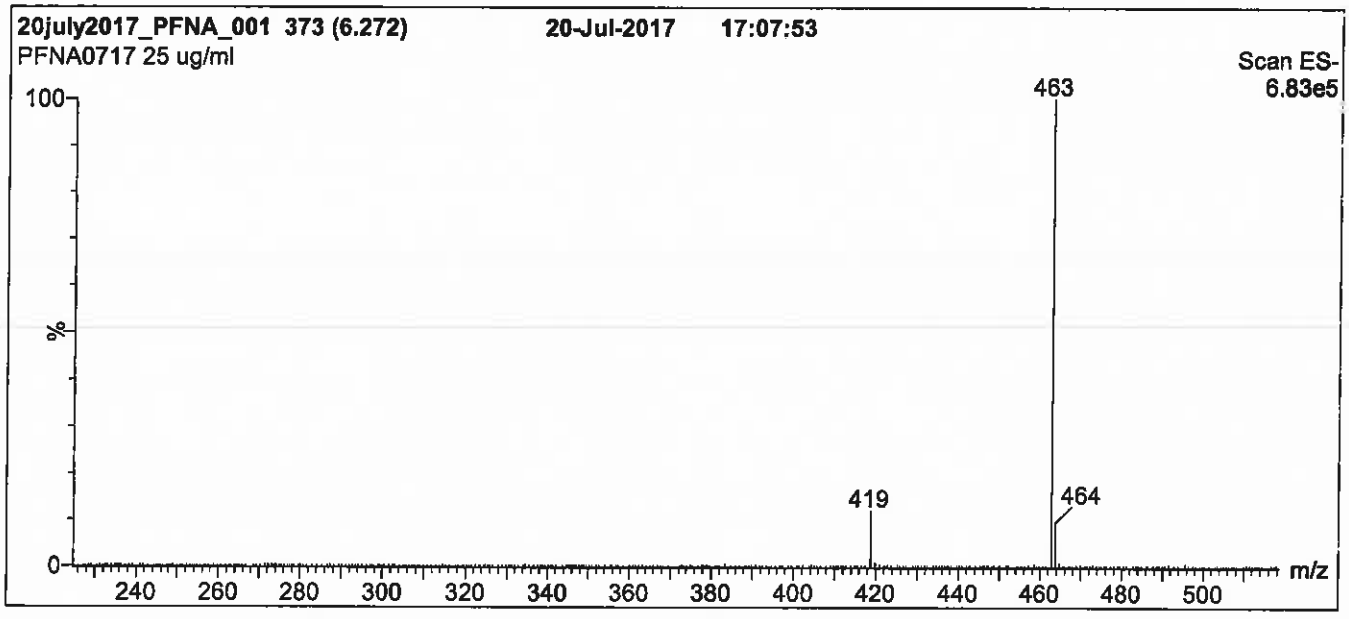
Figure 1: **PFNA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Hold for 1 min. Ramp to 90% organic over 7 min and hold for 1 min before returning to initial conditions in 0.5 min.
Time: 10 min

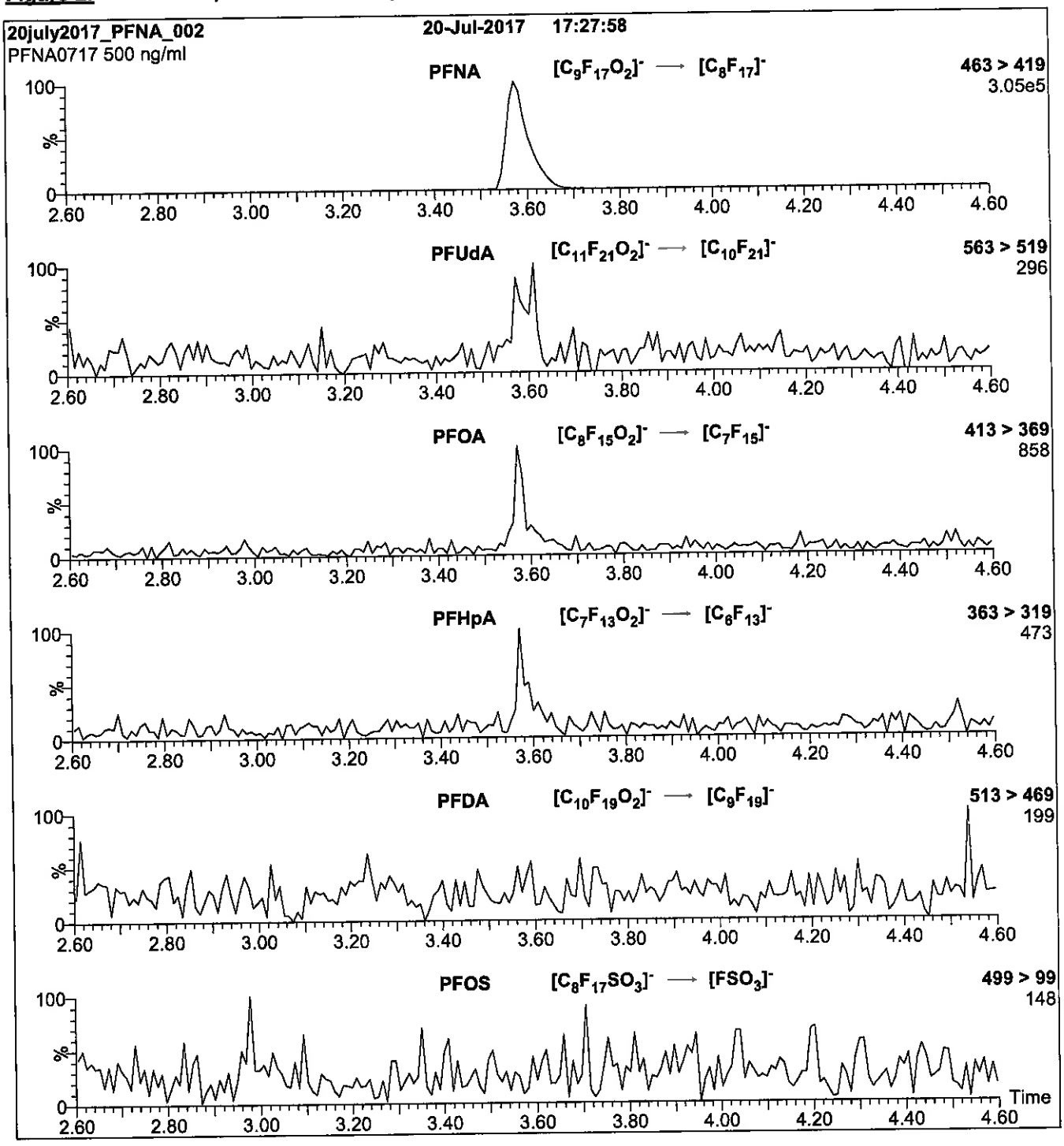
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 11

Reagent

LCPFOA_00008

n: 12/29/16 Sgd

WELLINGTON LABORATORIES

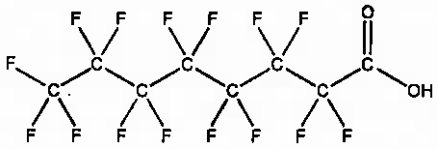
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFOA
COMPOUND: Perfluoro-n-octanoic acid

LOT NUMBER: PFOA0716

STRUCTURE:

CAS #: 335-67-1



MOLECULAR FORMULA: $C_8HF_{16}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 414.07
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 08/02/2016
EXPIRY DATE: (mm/dd/yyyy) 08/02/2021
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 08/05/2016 (mm/dd/yyyy)

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

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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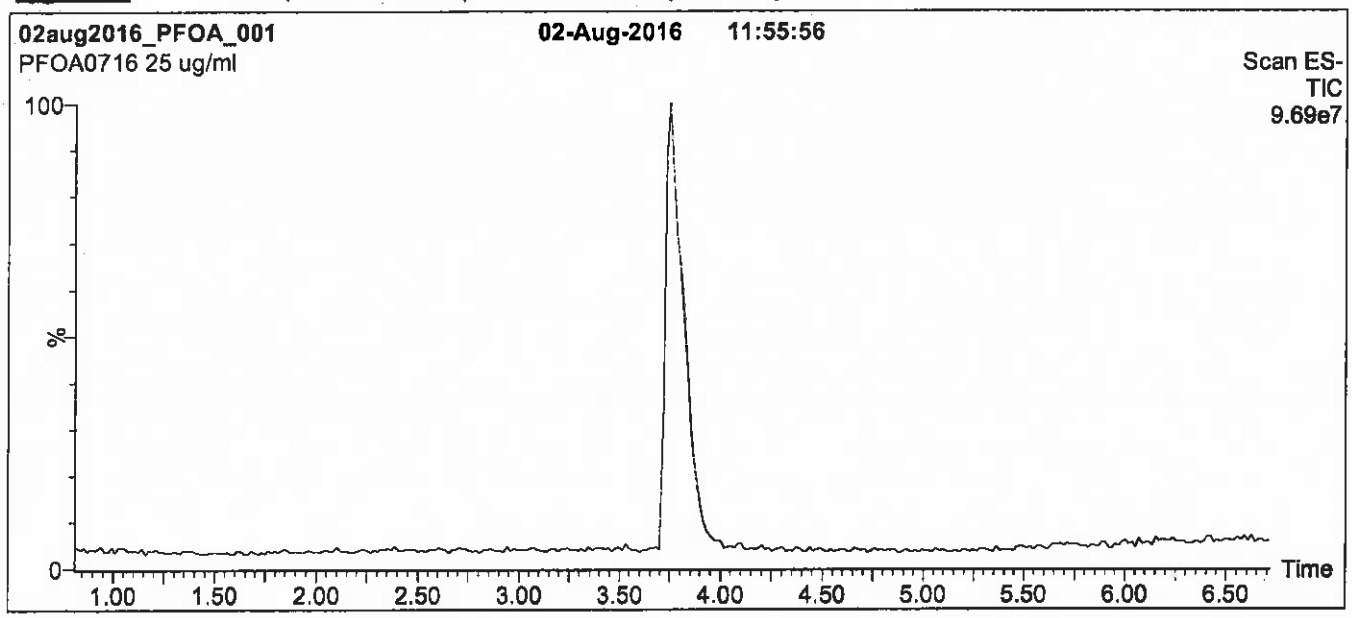
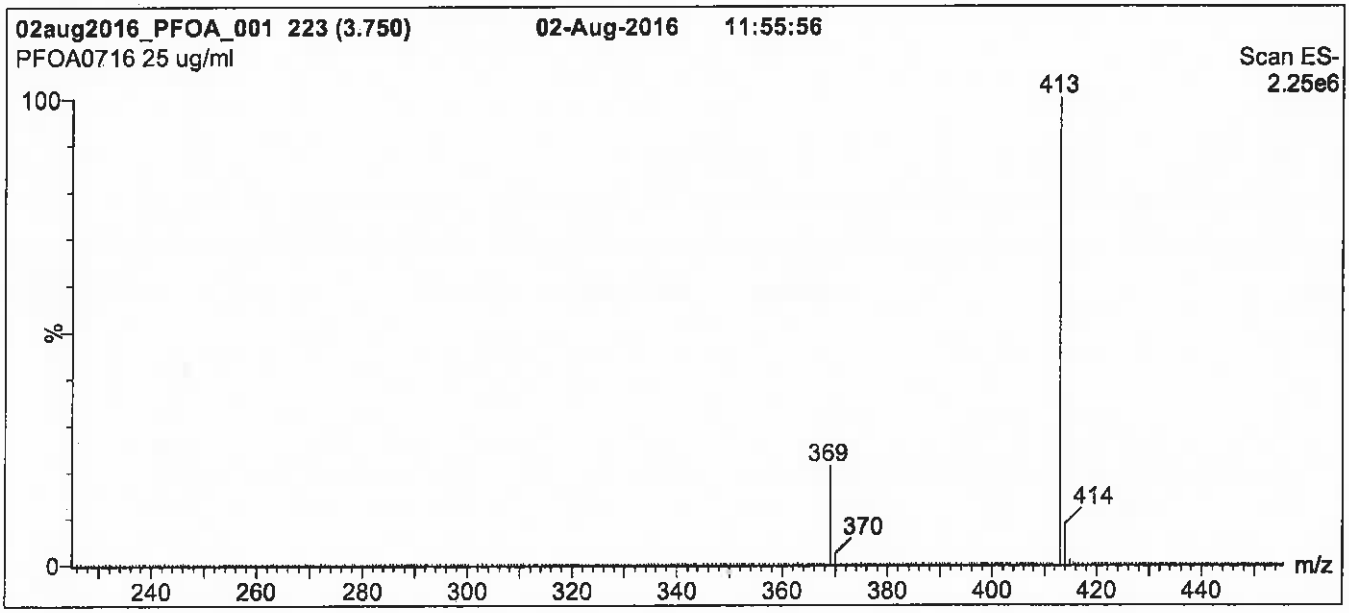
Figure 1: **PFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

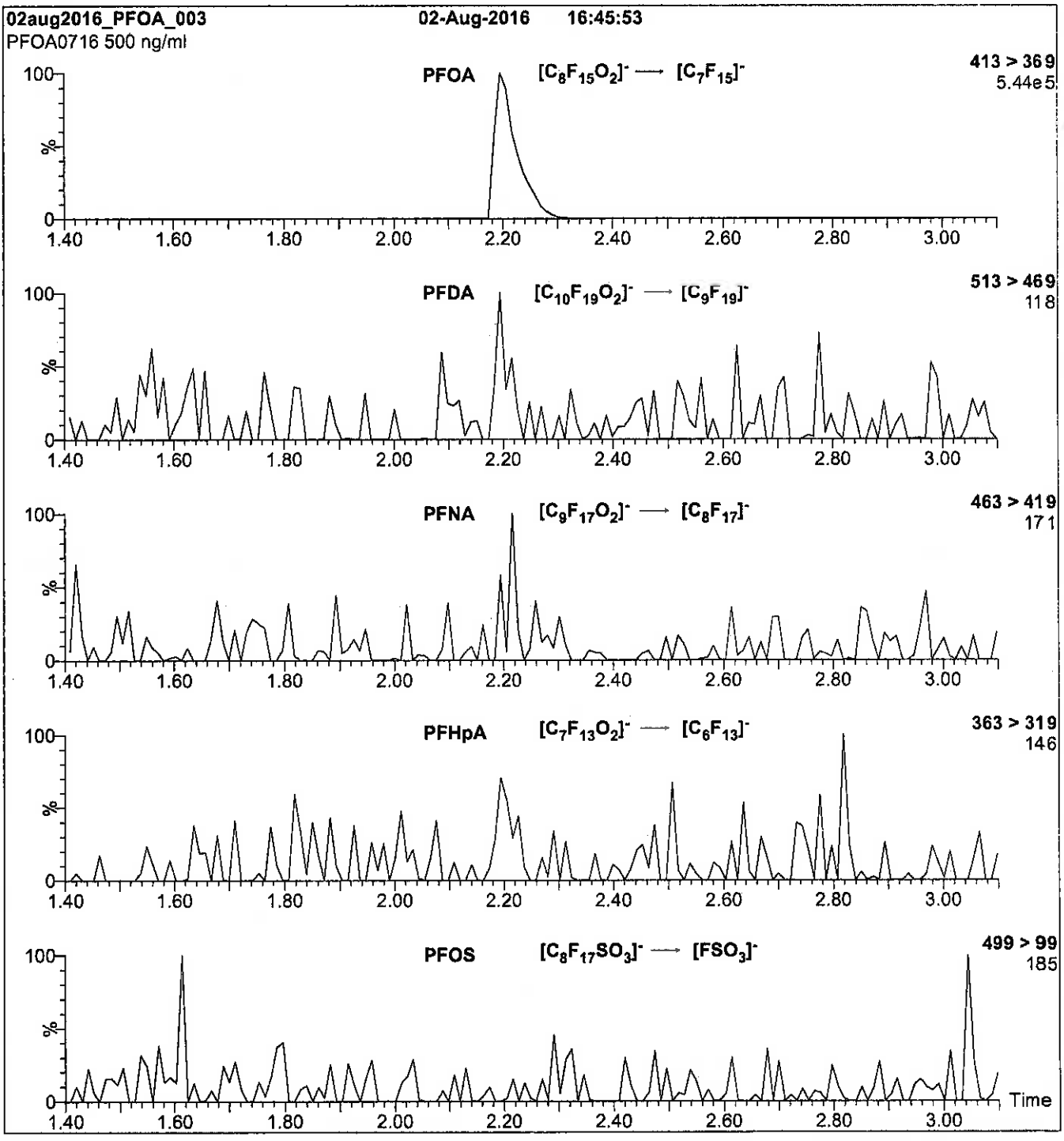
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

Injection:	Direct loop injection 10 µl (500 ng/ml PFOA)
Mobile phase:	Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O (both with 10 mM NH_4OAc buffer)
Flow:	300 µl/min

MS Parameters

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

Reagent

LCPFOA_00009

P: 10/2017 SKV

WELLINGTON LABORATORIES

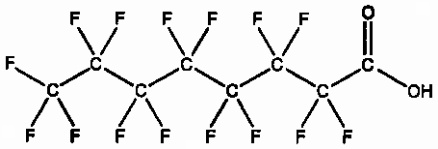
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: PFOA
COMPOUND: Perfluoro-n-octanoic acid

LOT NUMBER: PFOA0917

STRUCTURE:

CAS #: 335-67-1



MOLECULAR FORMULA: $C_8HF_{15}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 414.07
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 09/27/2017
EXPIRY DATE: (mm/dd/yyyy) 09/27/2022
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 09/28/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

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UNCERTAINTY:

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

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

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TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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CALA

ANAB ACCREDITED

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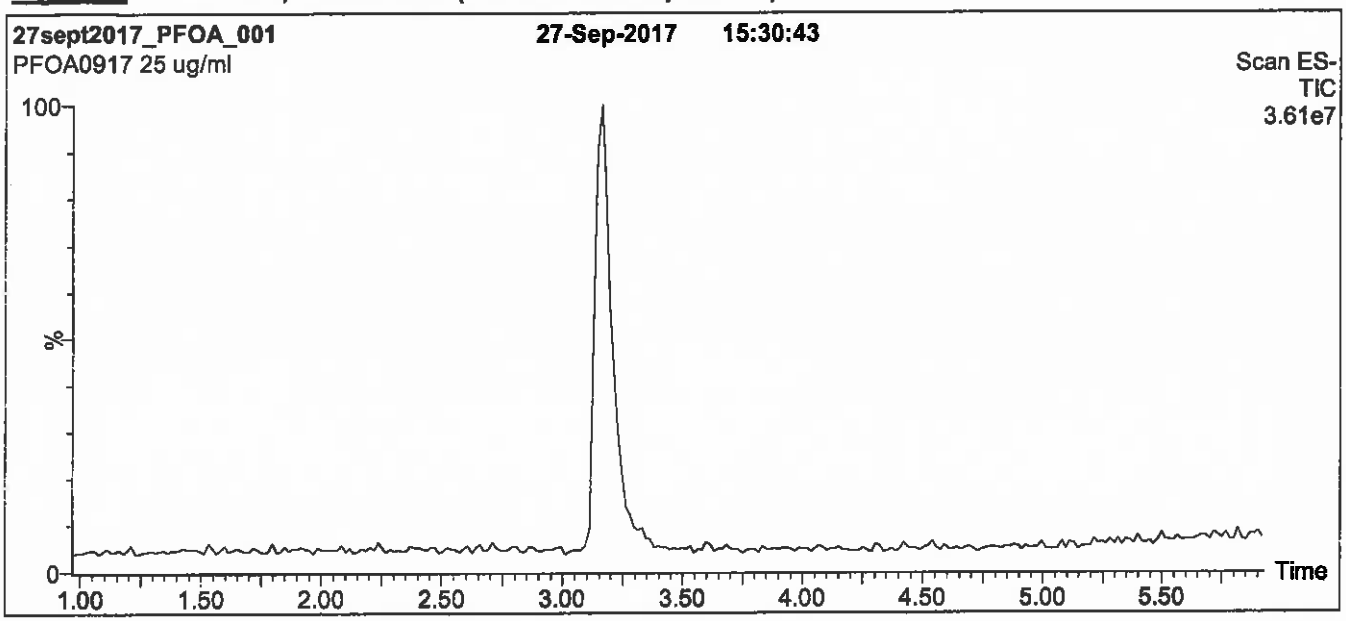

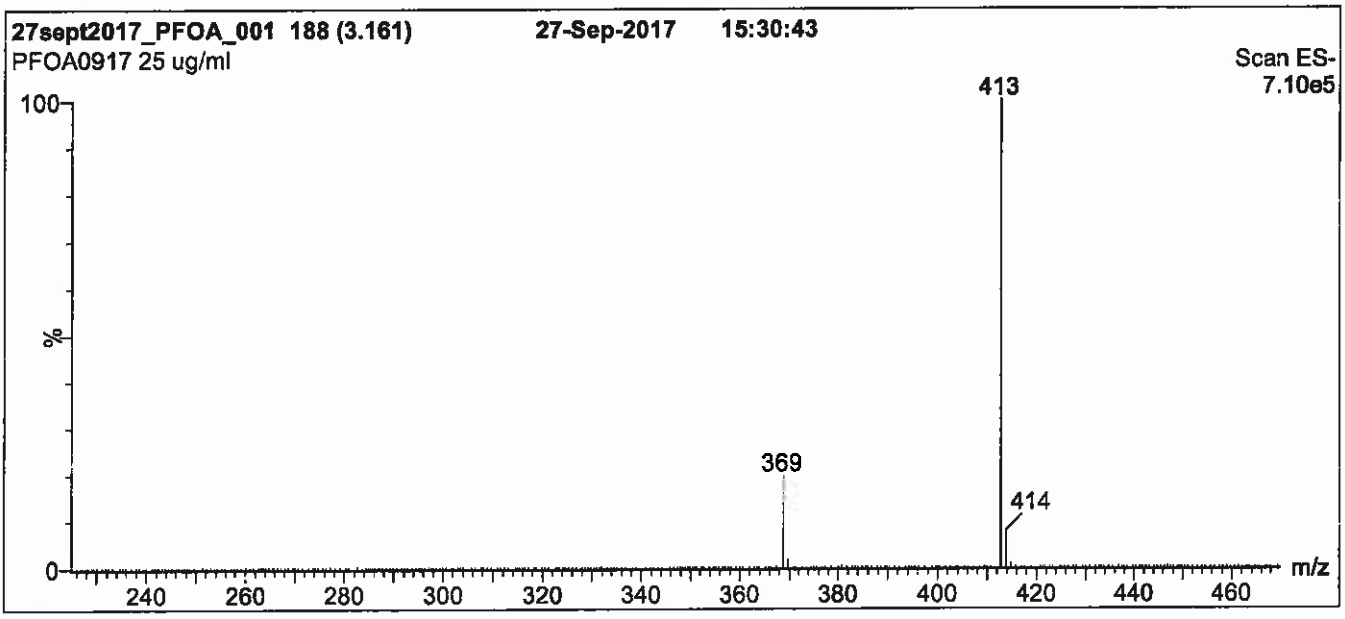

Conditions for Figure 1:

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

Chromatographic Conditions

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

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

Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
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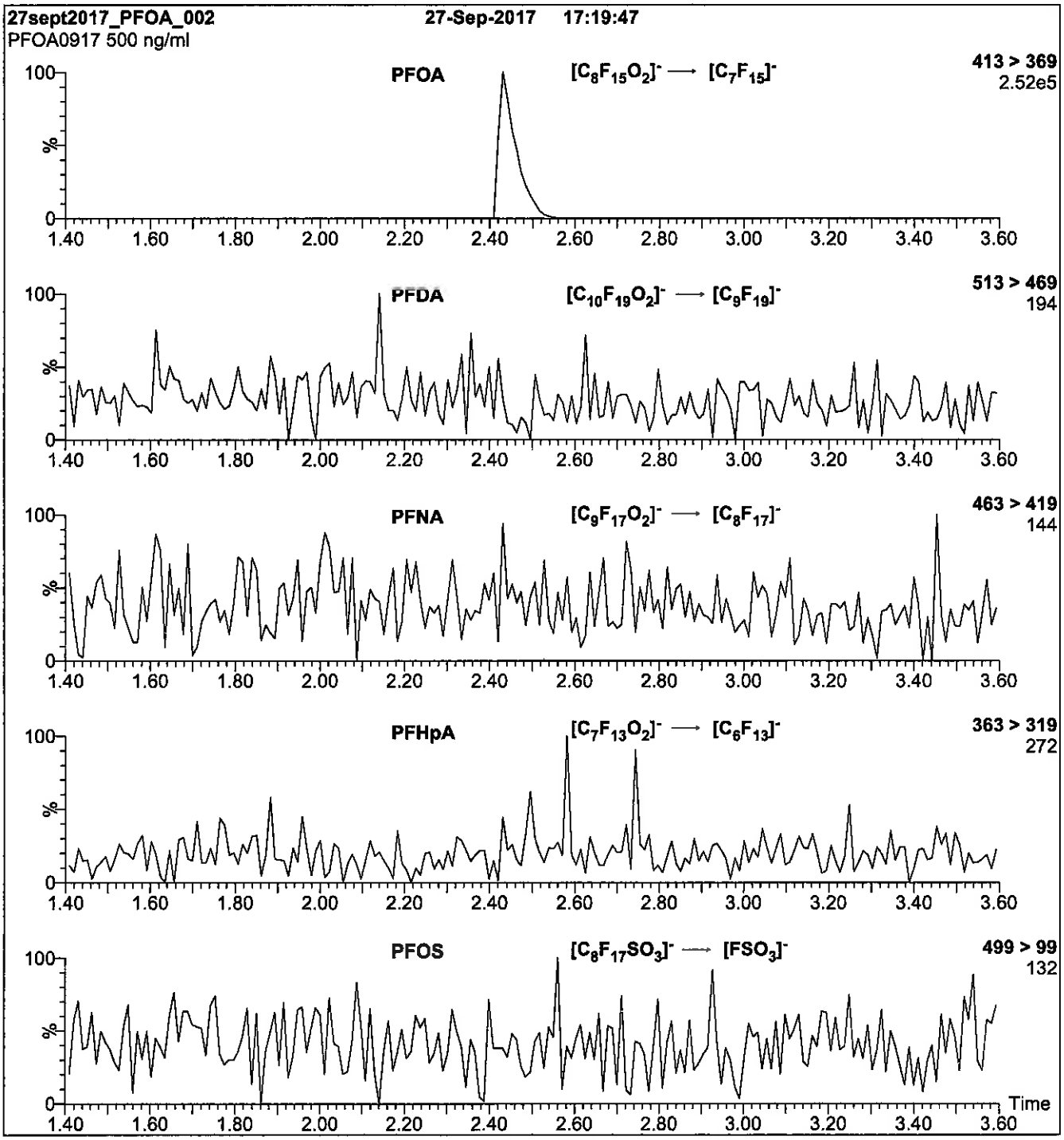
Figure 2: **PFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

Reagent

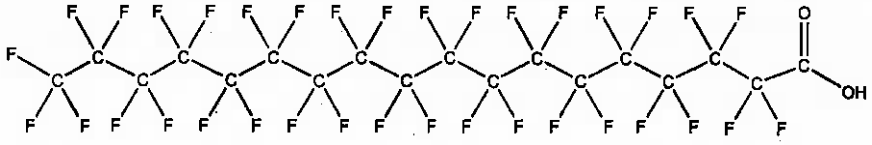
LCPFODA_00008

R: 12/20/16 SFN

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFODA	**LOT NUMBER:**	PFODA0416
COMPOUND:	Perfluoro-n-octadecanoic acid		
STRUCTURE:		**CAS #:**	16517-11-6



MOLECULAR FORMULA:	$C_{18}HF_{35}O_2$	**MOLECULAR WEIGHT:**	914.14
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	04/29/2016		
EXPIRY DATE: (mm/dd/yyyy)	04/29/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/20/2016 (mm/dd/yyyy)

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

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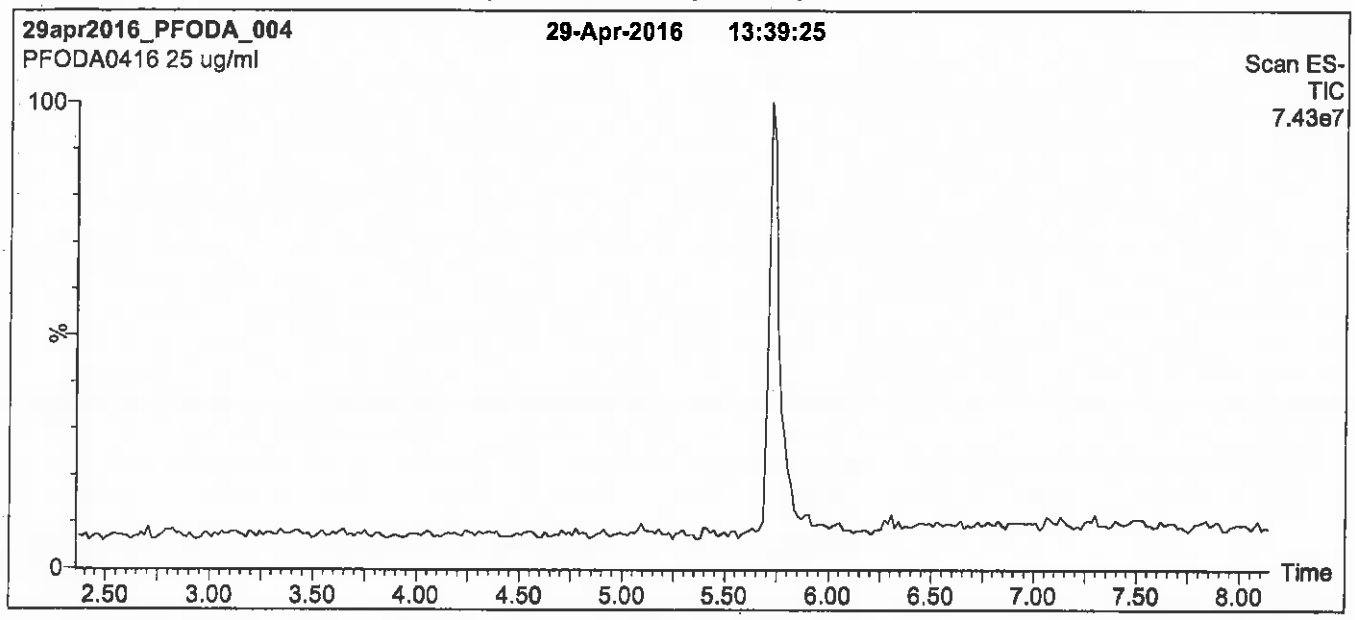
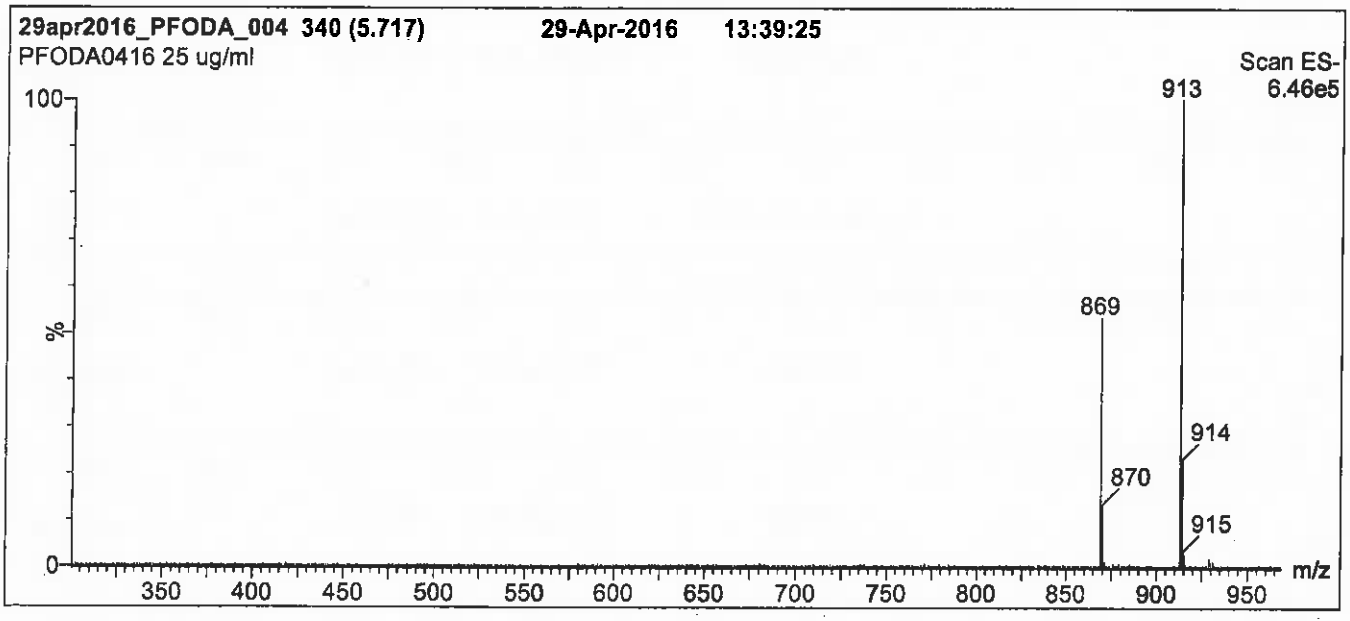




Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 70% (80:20 MeOH:ACN) / 30% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 95% organic over 6 min and hold for
2.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

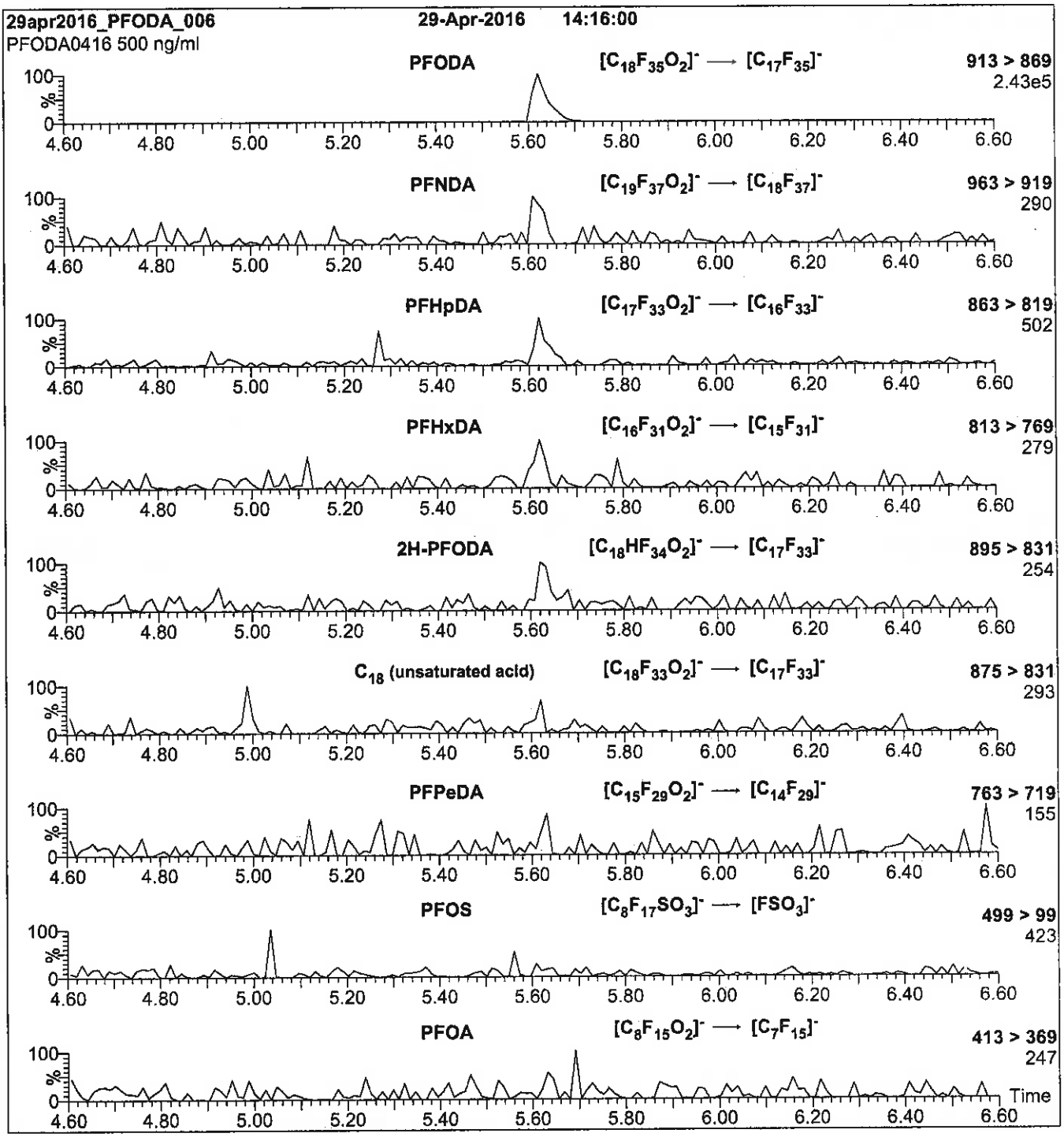
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 1000 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

Mobile phase: Isocratic 90% (80:20 MeOH:ACN) / 10% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

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

Reagent

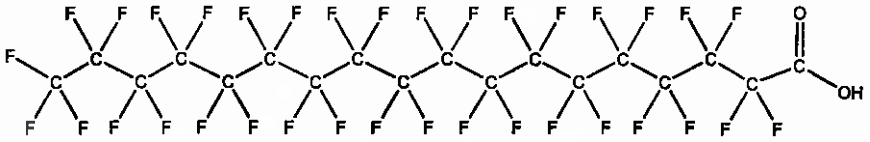
LCPFODA_00009

r: 9/2/17 SW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFODA	**LOT NUMBER:**	PFODA0717
COMPOUND:	Perfluoro-n-octadecanoic acid		
STRUCTURE:		**CAS #:**	16517-11-6



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CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	07/13/2017		
EXPIRY DATE: (mm/dd/yyyy)	07/13/2022		
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Certified By: _____ **Date:** 07/14/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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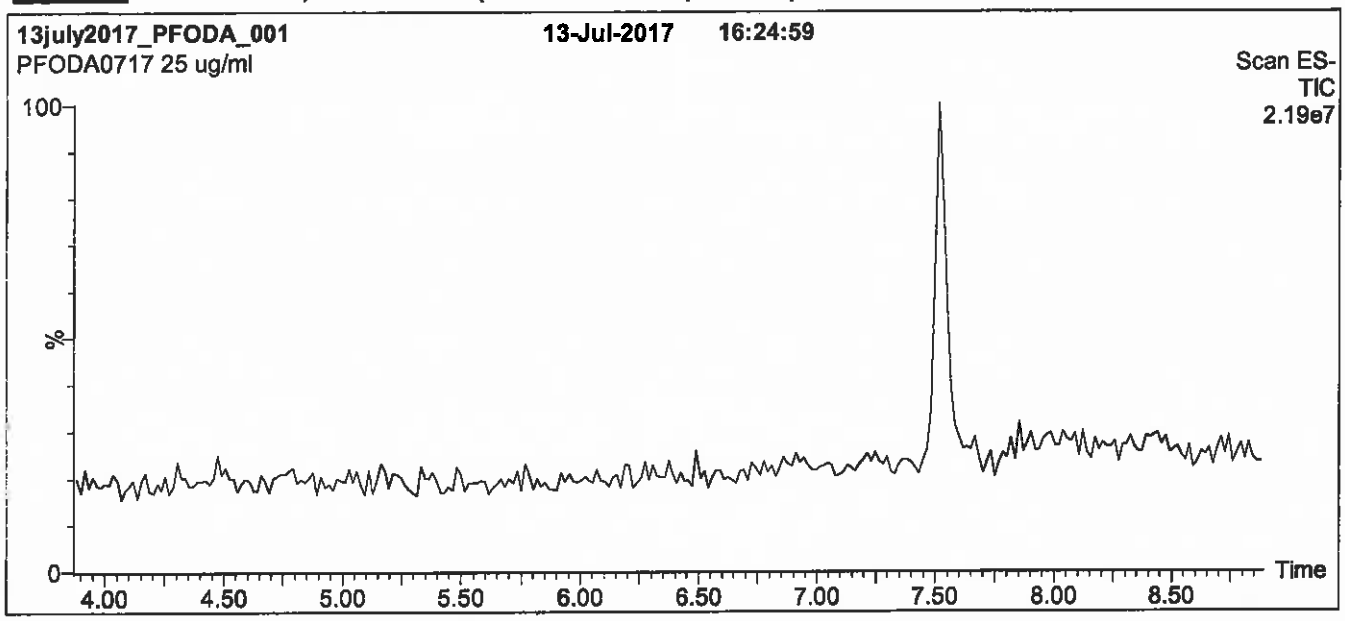

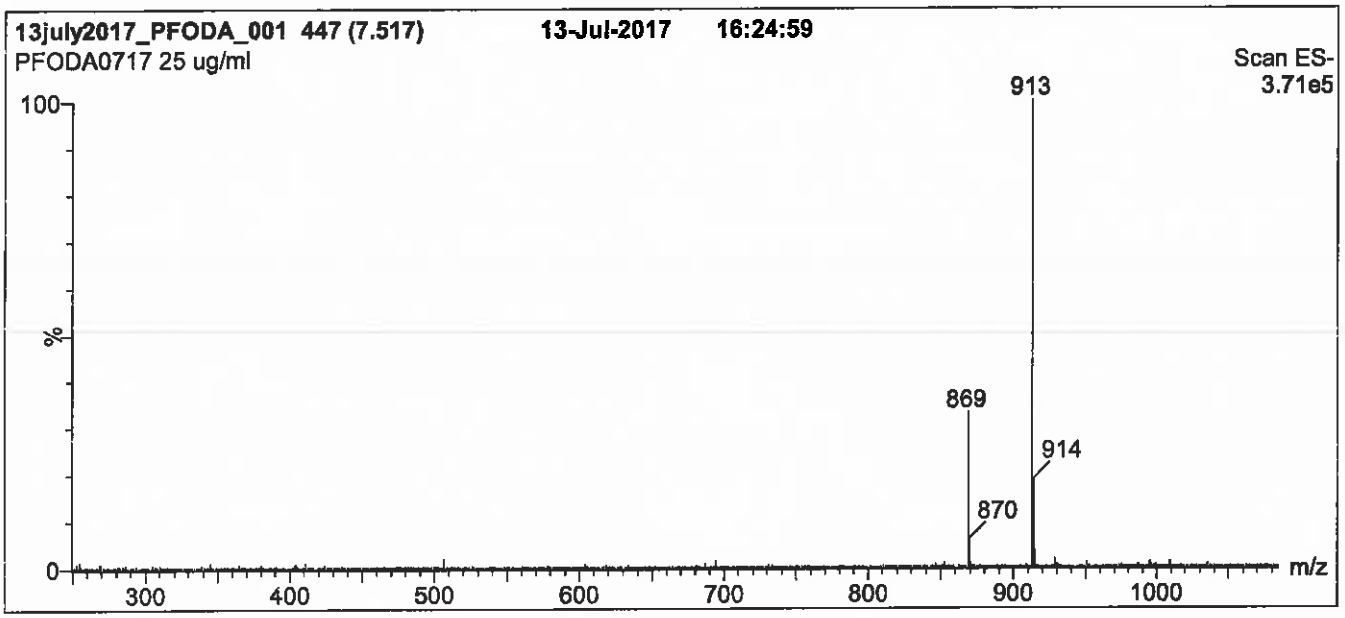

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MS: Micromass Quattro *micro* API MS

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1.7 µm, 2.1 x 100 mm

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

Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 1250 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

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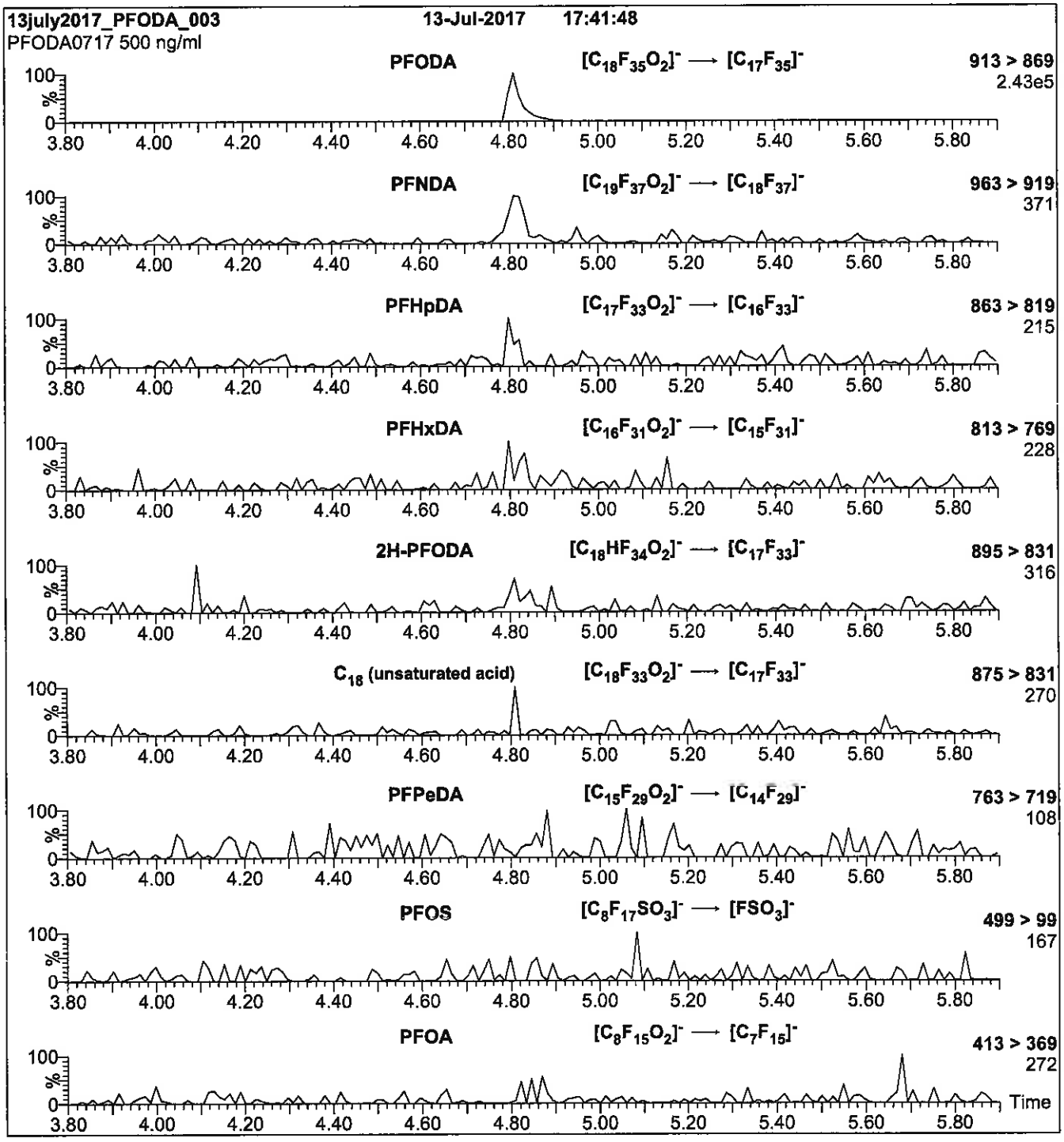

Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 15

Reagent

LCPFOS-br_00004

T: 12/29/16 SFN

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

br-PFOSK

Potassium Perfluorooctanesulfonate Solution/Mixture of Linear and Branched Isomers

PRODUCT CODE:	br-PFOSK
LOT NUMBER:	brPFOSK1015
CONCENTRATION:	50 ± 2.5 µg/ml (total potassium salt)
	46.4 ± 2.3 µg/ml (total PFOS anion)
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	10/13/2015
LAST TESTED: (mm/dd/yyyy)	10/14/2015
EXPIRY DATE: (mm/dd/yyyy)	10/14/2020
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

The chemical purity has been determined to be ≥98% perfluorooctanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the isomeric components are given in Table A.

DOCUMENTATION/ DATA ATTACHED:

Table A: Isomeric Components and Percent Composition by ^{19}F-NMR
Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data (SIR)
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- A 5-point calibration curve was generated using linear PFOS (potassium salt) and mass-labelled PFOS as an internal standard to enable quantitation of br-PFOSK using isotopic dilution.
- CAS#: 2795-39-3 (for linear isomer; potassium salt).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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CALA

ANAB ACCREDITED

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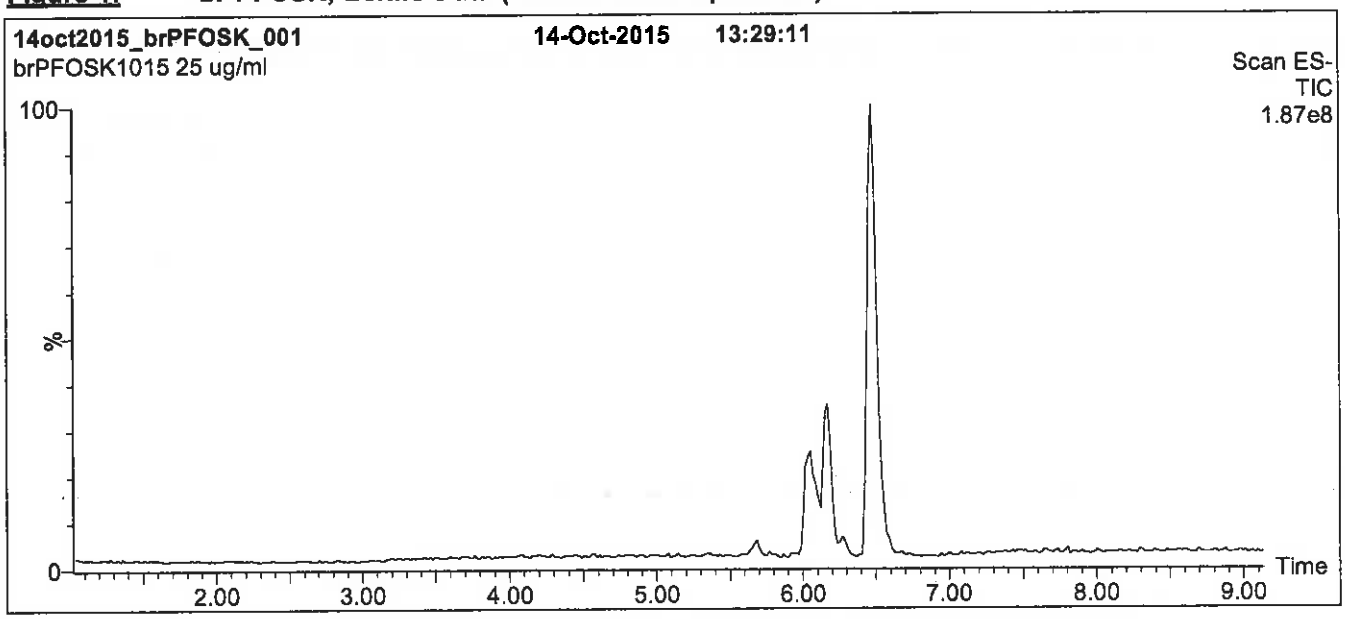
Table A: **br-PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

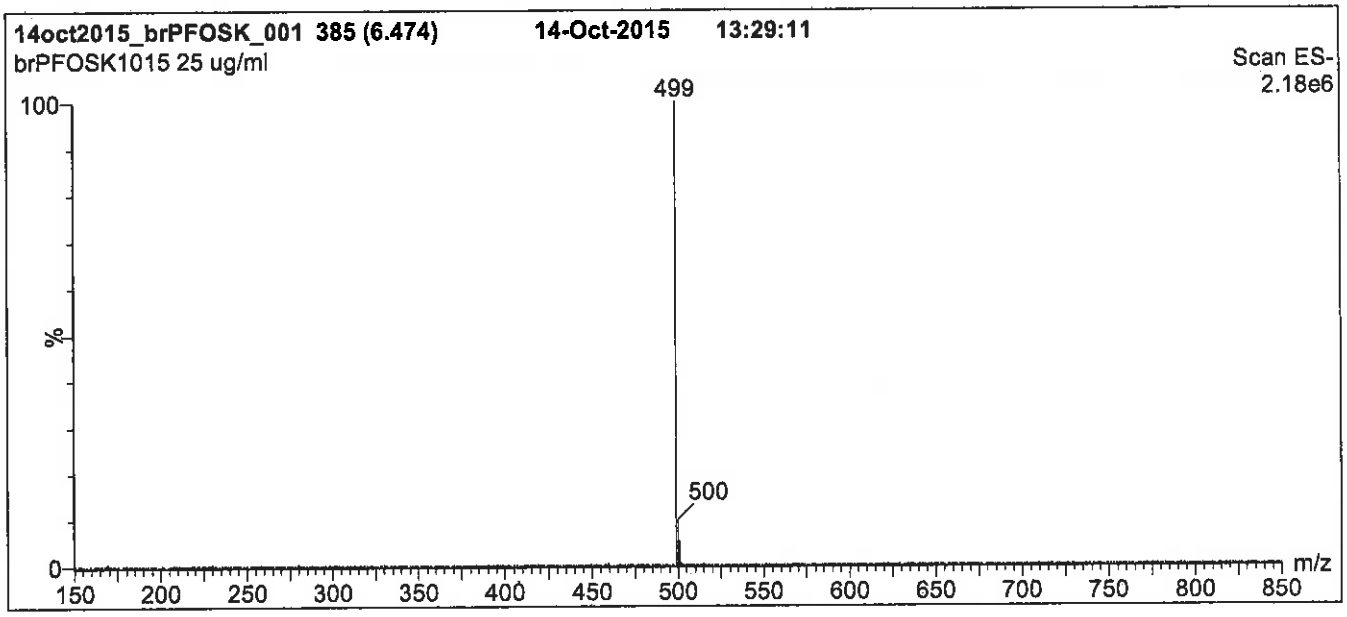
Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	1.2
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	0.6
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	1.9
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	2.2
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	4.5
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	10.0
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3-C(CF_3)(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.2
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF_2-C(CF_3)(CF_3)-CF_2CF_2CF_2SO_3^-K^+$	0.03
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3-CF(CF_3)-CF(CF_3)-CF_2CF_2CF_2SO_3^-K^+$	0.4
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3-CF(CF_3)-CF_2-CF(CF_3)-CF_2CF_2SO_3^-K^+$	0.07

* Percent of total perfluorooctanesulfonate isomers only. Isomers are labelled in Figure 2.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

Certified By: B.G. Chittim **Date:** 10/15/2015 (mm/dd/yyyy)

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 12 min and hold for 2 min.
Return to initial conditions over 0.5 min.
Time: 16 min

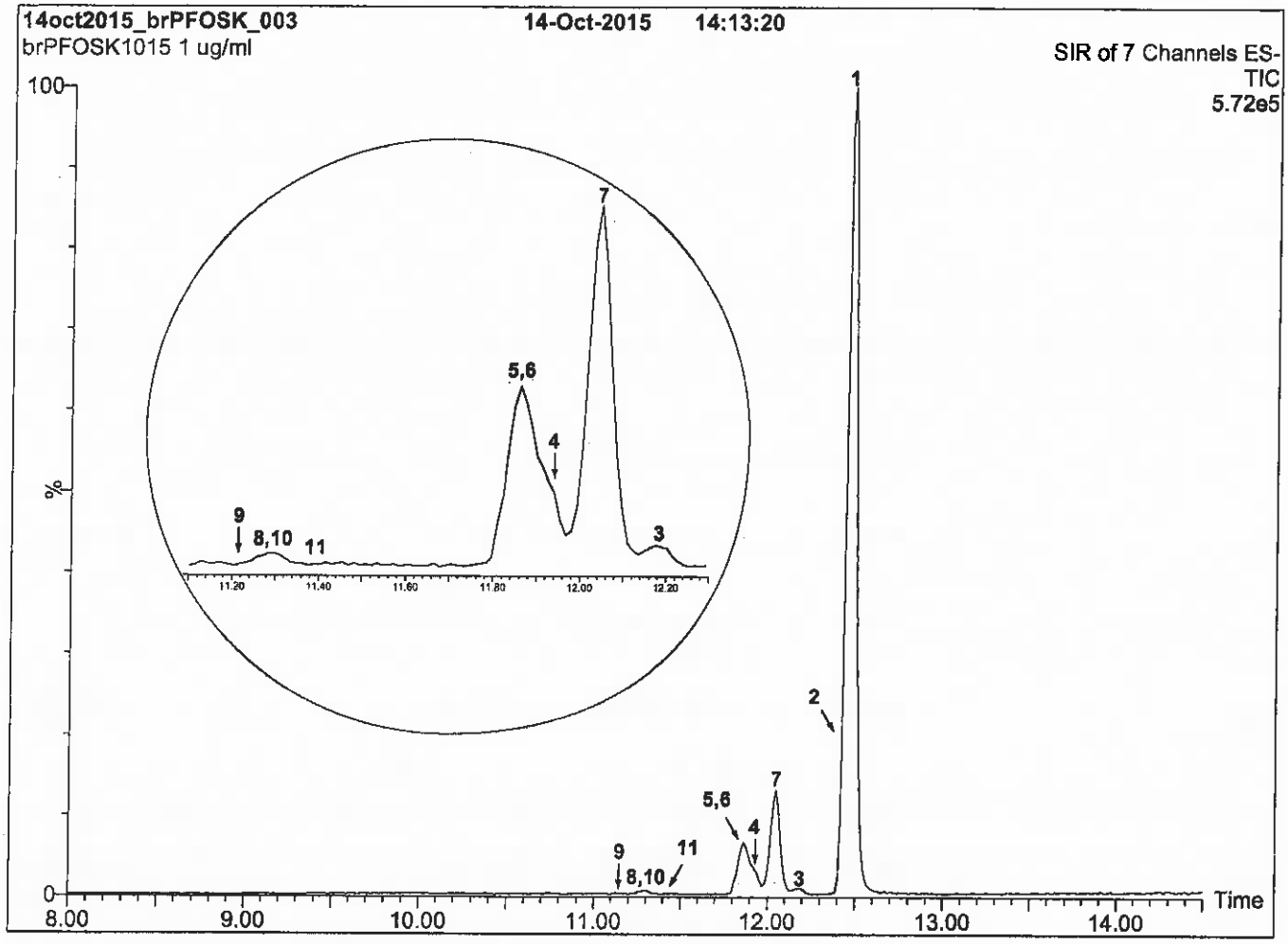
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

Figure 2: **br-PFOSK; LC/MS Data (SIR)**



Conditions for Figure 2:

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

Chromatographic Conditions:

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

Injection: 1.0 µg/ml of br-PFOSK

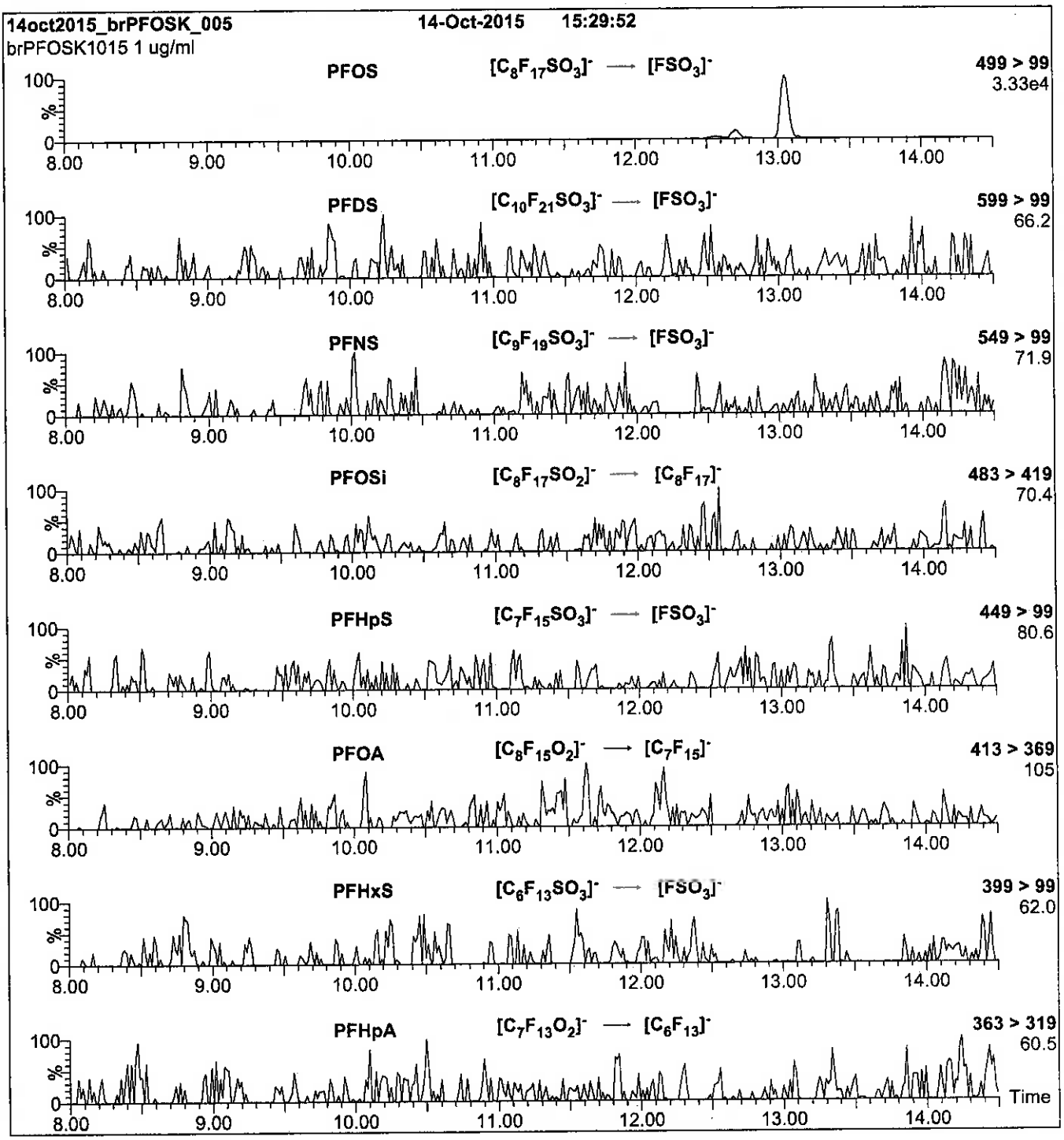
Mobile Phase: Gradient
45% (80:20 MeOH:ACN) / 55% H_2O (both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 15 min and hold for 3 min.
Return to initial conditions over 1 min.
Time: 20 min

Flow: 300 µl/min

MS Conditions:

SIR (ES^-)
Source = 110 °C
Desolvation = 325 °C
Cone Voltage = 60V

Figure 3: **br-PFOSK; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 3:

Injection: On-column

Mobile phase: Same as Figure 2

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.06e-3
Collision Energy (eV) = 11-50 (variable)

Reagent

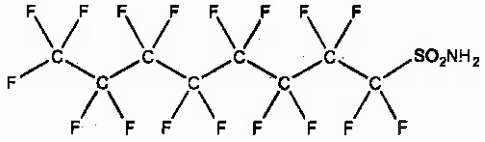
LCPFOSA_00010

12/20/16 SKI

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	FOSA-I	**LOT NUMBER:**	FOSA0916I
COMPOUND:	Perfluoro-1-octanesulfonamide		
STRUCTURE:		**CAS #:**	754-91-6



MOLECULAR FORMULA:	$C_8H_2F_{17}NO_2S$	**MOLECULAR WEIGHT:**	499.14
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Isopropanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	09/30/2016		
EXPIRY DATE: (mm/dd/yyyy)	09/30/2021		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

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Certified By: B.G. Chittim **Date:** 10/07/2016 (mm/dd/yyyy)

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INTENDED USE:

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HAZARDS:

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HOMOGENEITY:

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UNCERTAINTY:

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

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

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

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

TRACEABILITY:

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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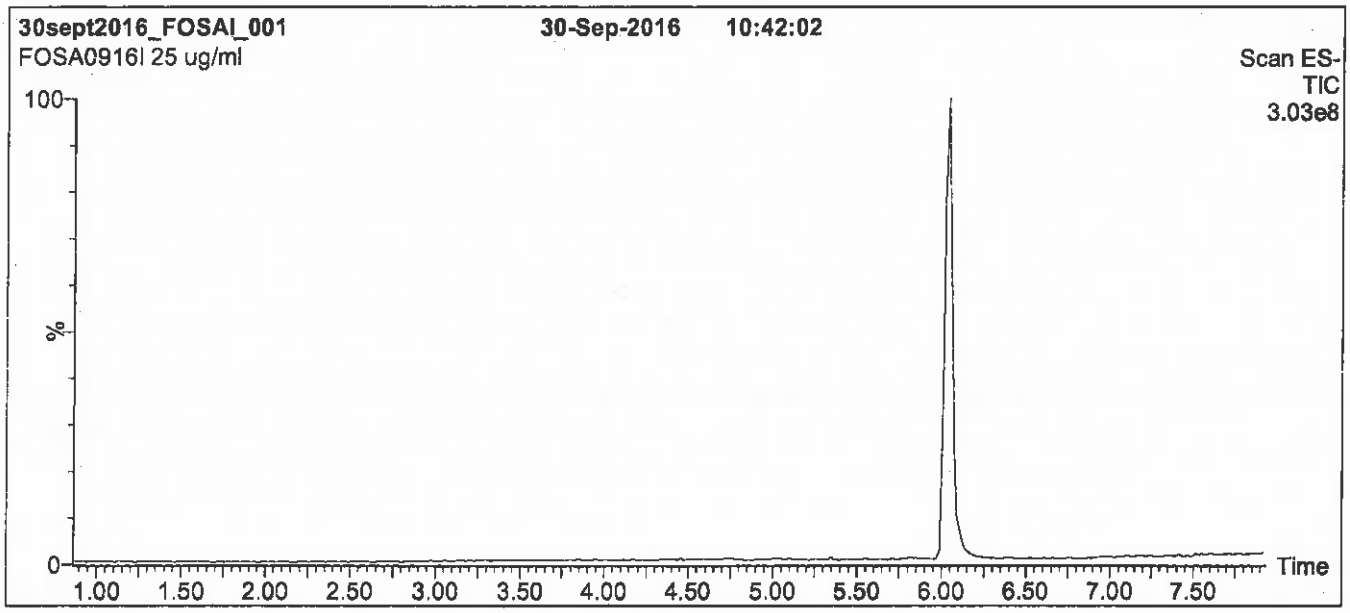
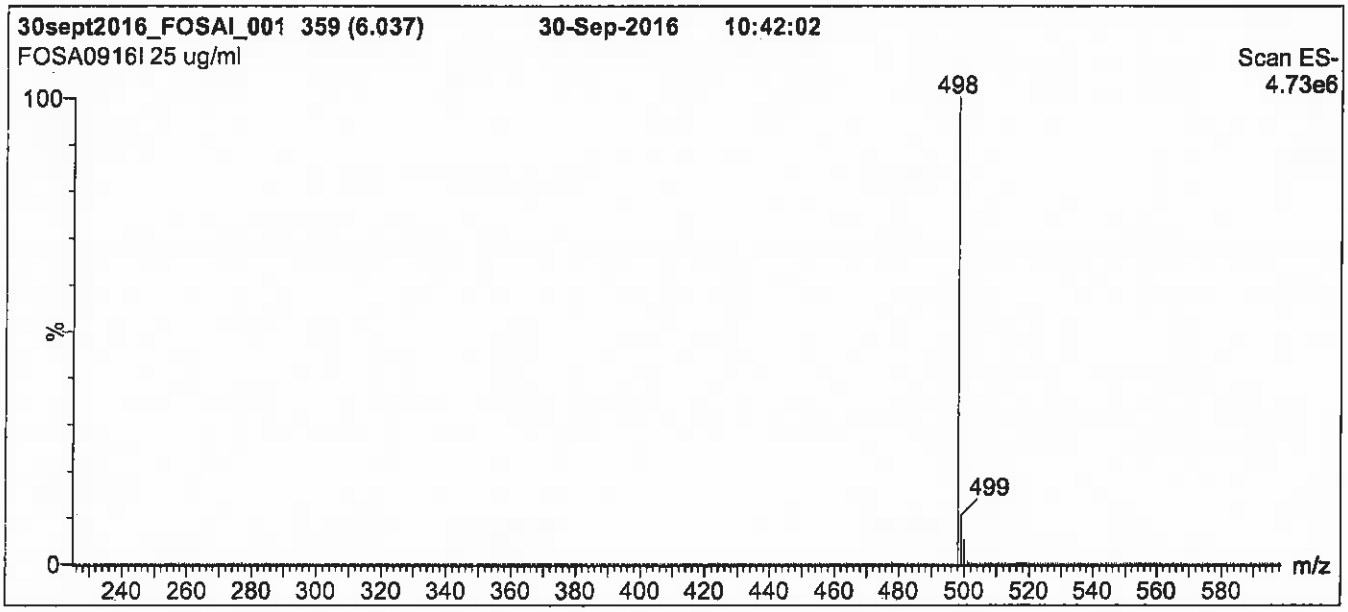
Figure 1: **FOSA-I; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

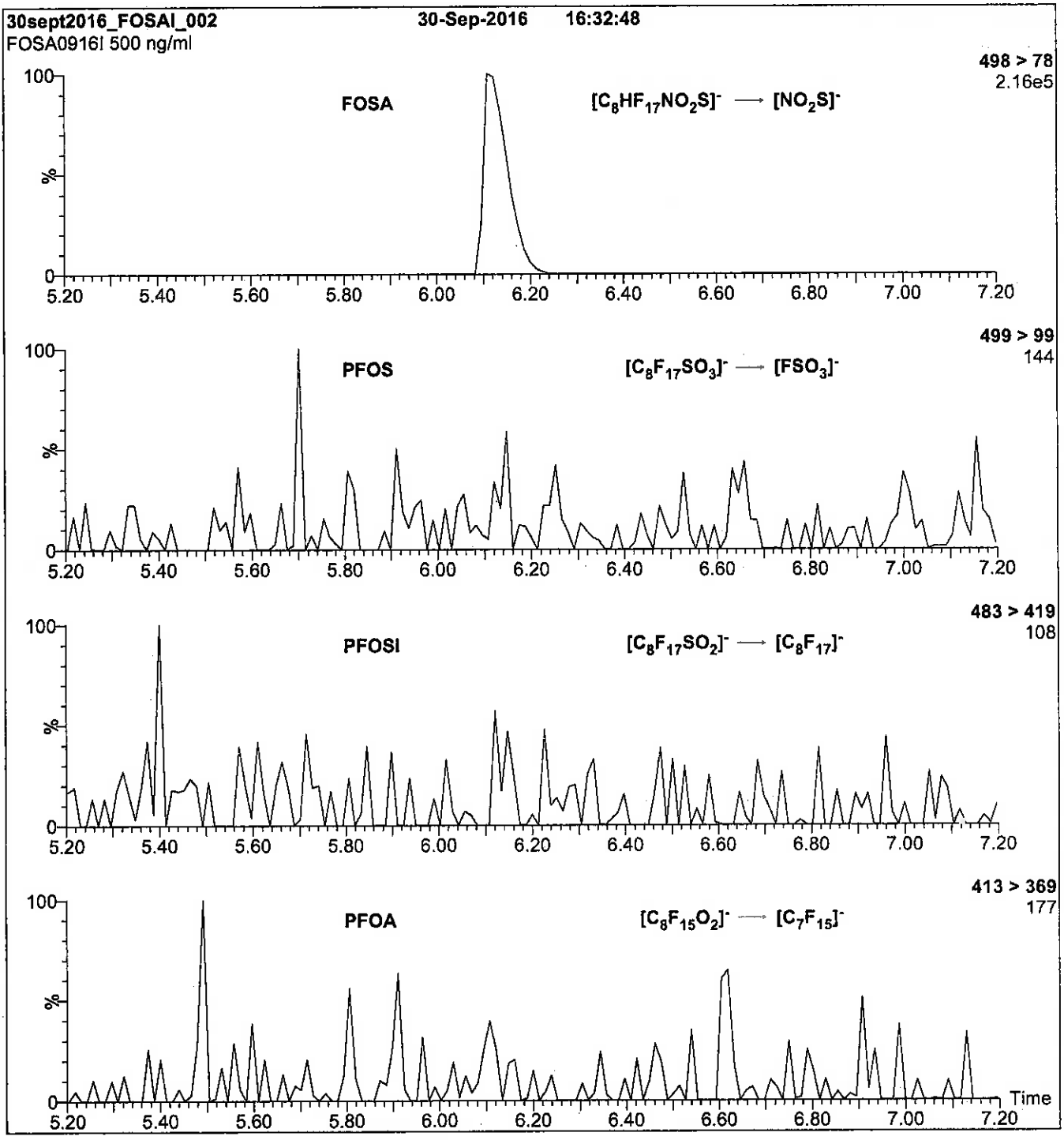
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.20e-3
Collision Energy (eV) = 30

Reagent

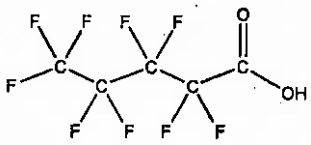
LCPFPeA_00007

r: 12/29/16 SH
s: 1/6/17 SH

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFPeA	**LOT NUMBER:**	PFPeA0516
COMPOUND:	Perfluoro-n-pentanoic acid		
STRUCTURE:		**CAS #:**	2706-90-3



MOLECULAR FORMULA:	$C_5HF_8O_2$	**MOLECULAR WEIGHT:**	264.05
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/31/2016		
EXPIRY DATE: (mm/dd/yyyy)	05/31/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.3% of Perfluoro-n-heptanoic acid (PFHpA) and ~ 0.2% of $C_5H_2F_8O_2$ (hydrido - derivative) as measured by ^{19}F NMR.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 06/02/2016 (mm/dd/yyyy)

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

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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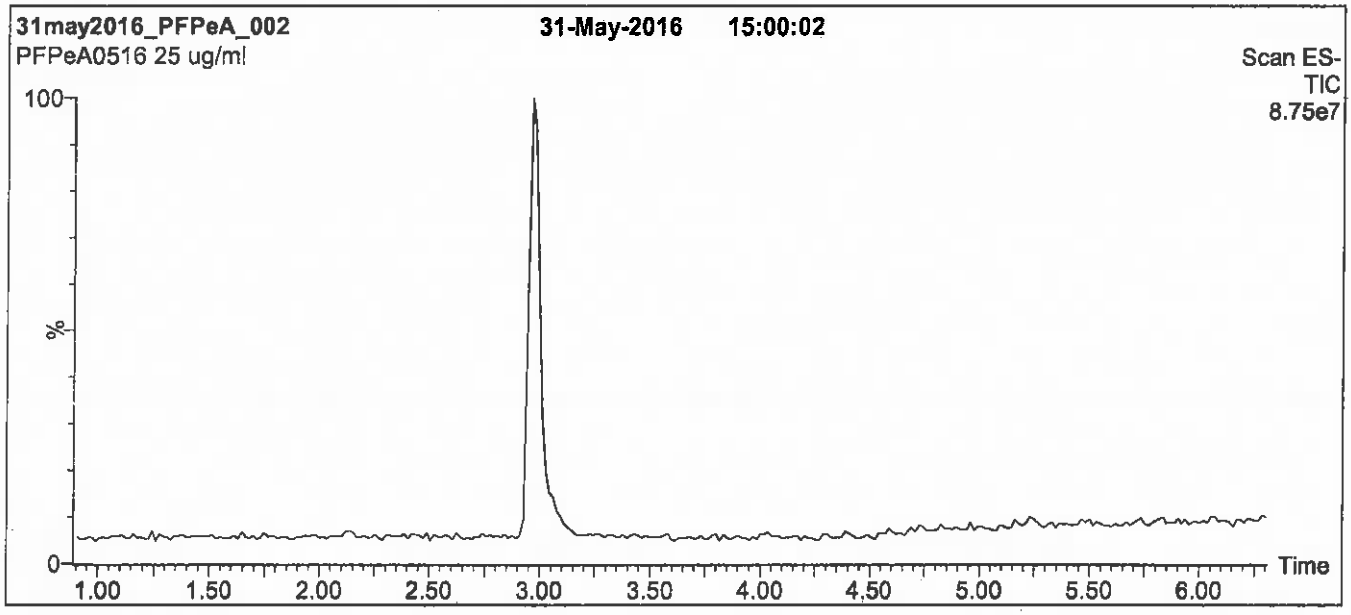
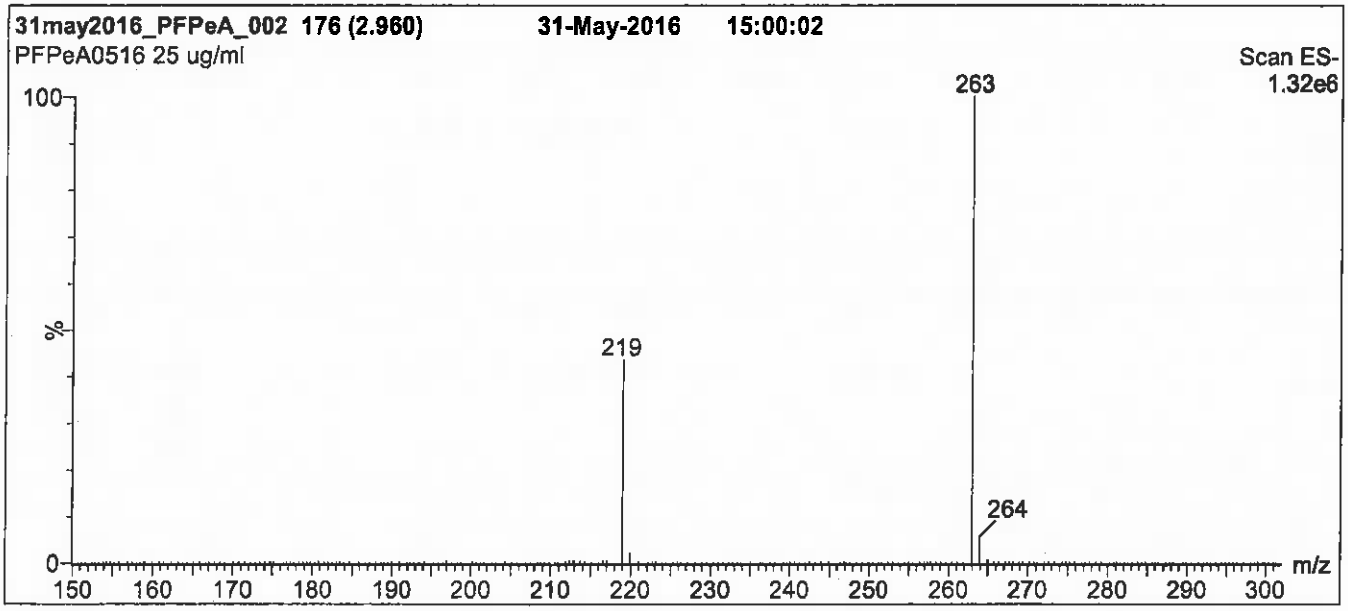
Figure 1: **PFPeA; LC/MS Data (TIC and Mass Spectrum)**





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MS: Micromass Quattro *micro* API MS

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1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

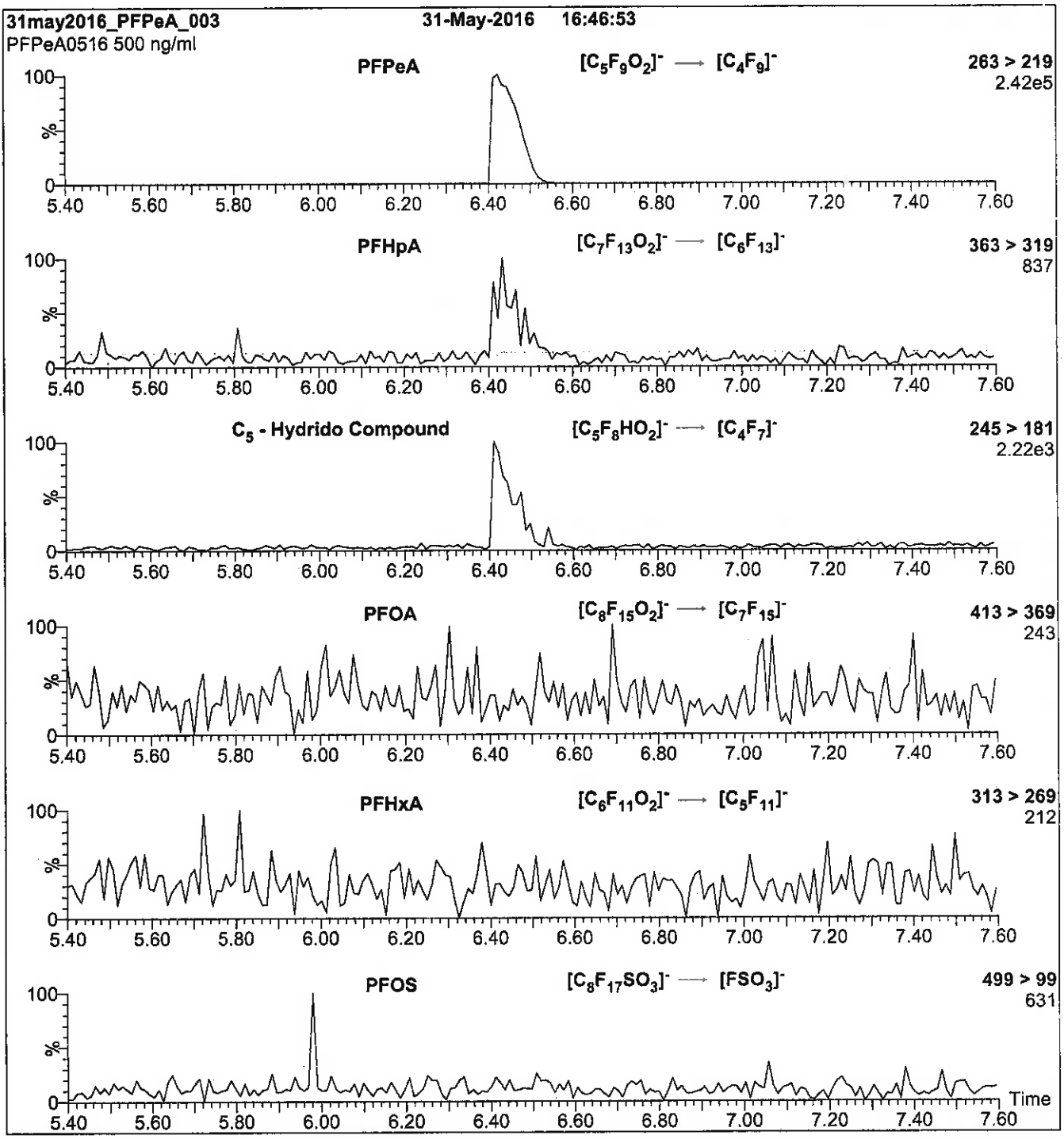
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.20e-3
Collision Energy (eV) = 9

Reagent

LCPFTeDA_00006

R: SBG 9/13/16

730645
ID: LCPFTeDA_00005
Exp: 12/09/20 Prpd: SBC
PF-n-tetradecanoic acid

730659
ID: LCPFTeDA_00006
Exp: 12/09/20 Prpd: SBC
PF-n-tetradecanoic acid

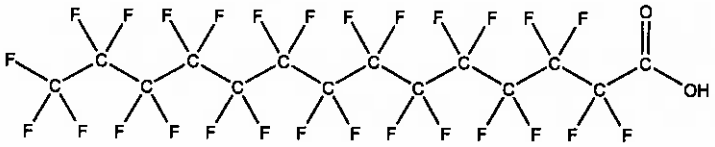
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: PFTeDA
LOT NUMBER: PFTeDA1215
COMPOUND: Perfluoro-n-tetradecanoic acid

STRUCTURE:

CAS #: 376-06-7



MOLECULAR FORMULA: $C_{14}HF_{27}O_2$
MOLECULAR WEIGHT: 714.11
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 12/09/2015
EXPIRY DATE: (mm/dd/yyyy) 12/09/2020
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.2% of PFDoA ($C_{12}HF_{23}O_2$) and ~ 0.2% of PFPeDA ($C_{15}HF_{29}O_2$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 12/09/2015 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

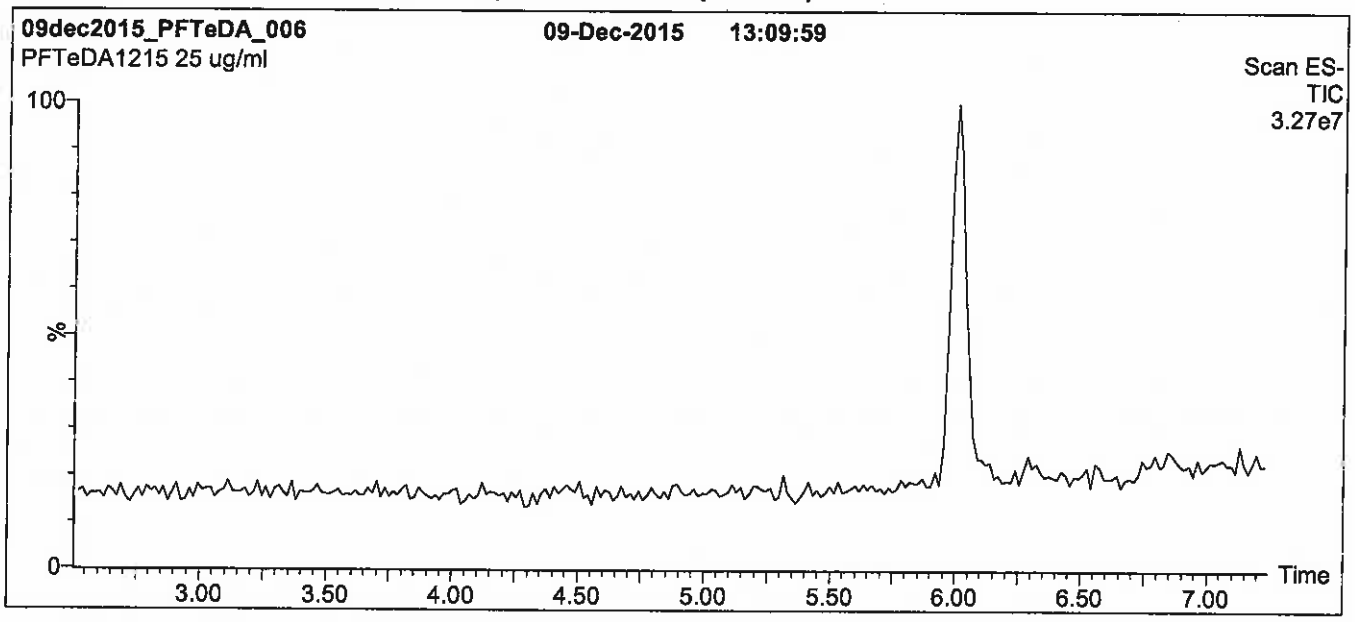
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

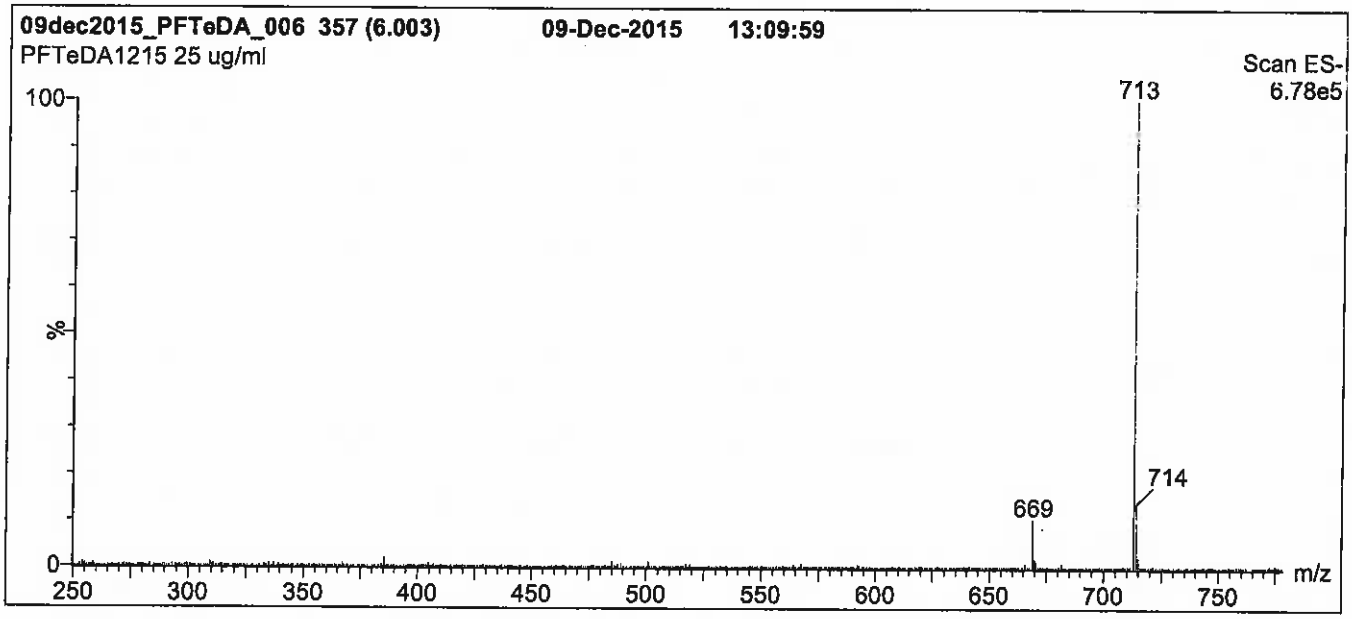
CALA

ANAB ACCREDITED

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

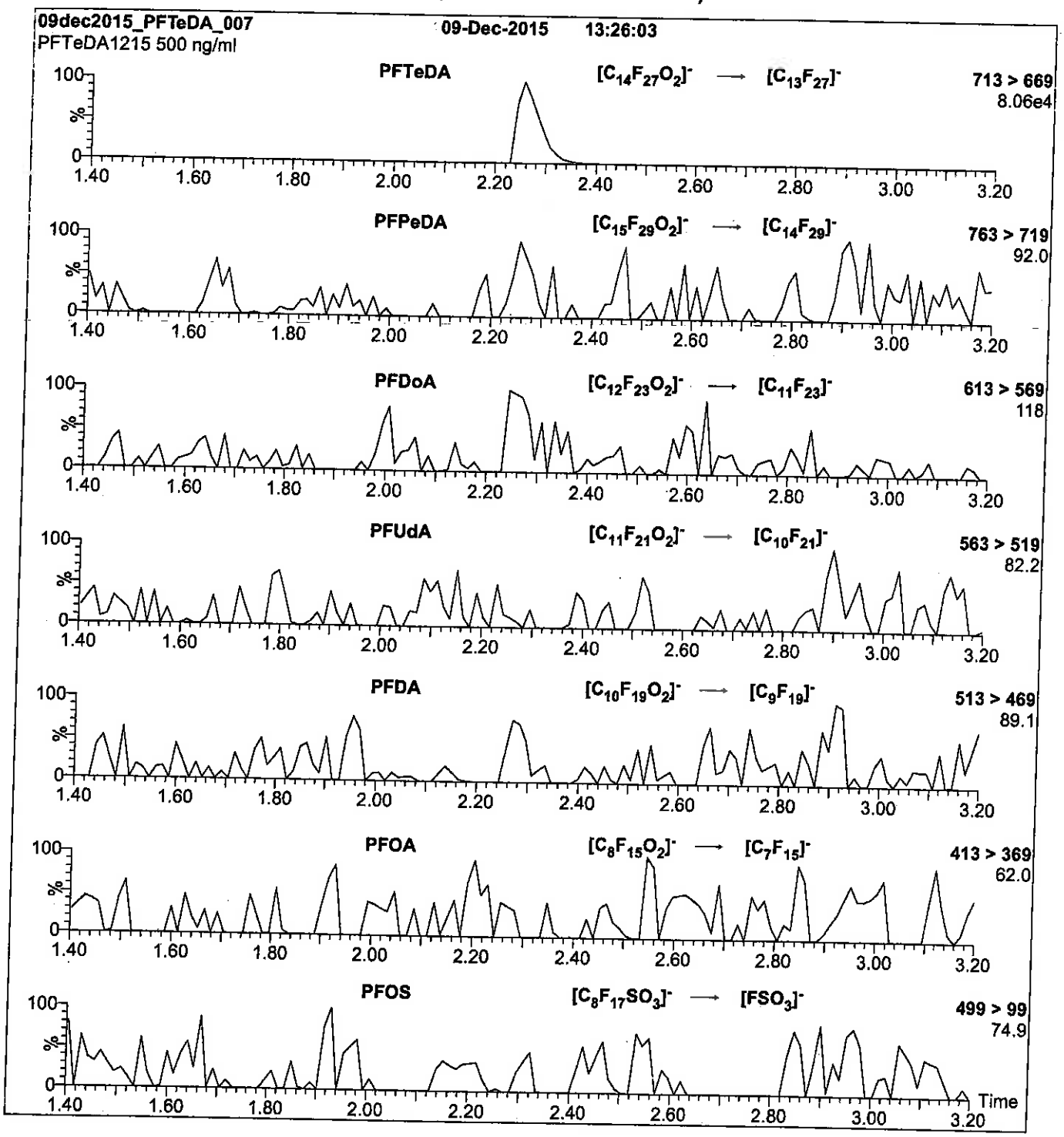
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 1250 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 14

Reagent

LCPFTeDA_00007

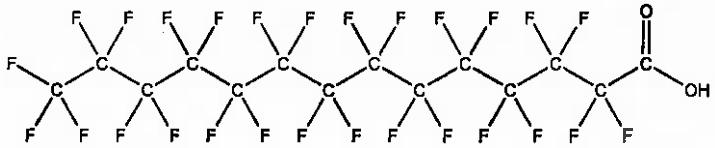
D: 12/20/16 SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: PFTeDA
COMPOUND: Perfluoro-n-tetradecanoic acid
LOT NUMBER: PFTeDA0916

STRUCTURE:
CAS #: 376-06-7



MOLECULAR FORMULA: $C_{14}HF_{27}O_2$
MOLECULAR WEIGHT: 714.11
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 09/30/2016
EXPIRY DATE: (mm/dd/yyyy) 09/30/2021
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.2% of PFDoA ($C_{12}HF_{23}O_2$) and ~ 0.2% of PFPeDA ($C_{15}HF_{29}O_2$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 10/05/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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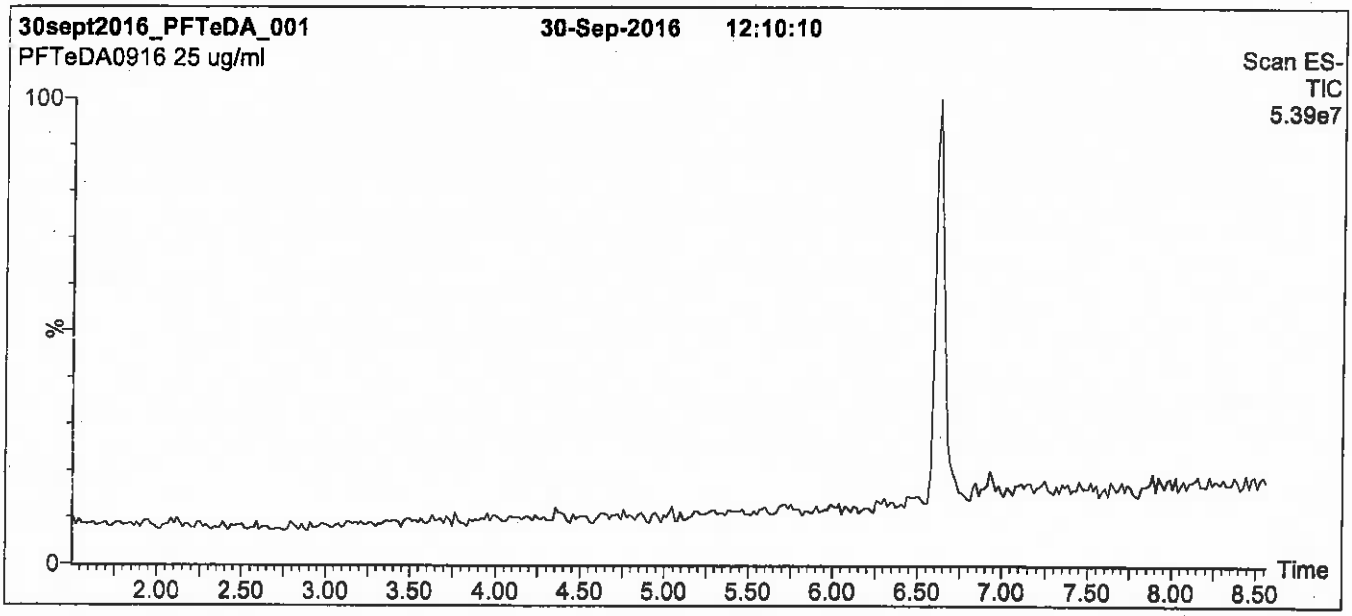
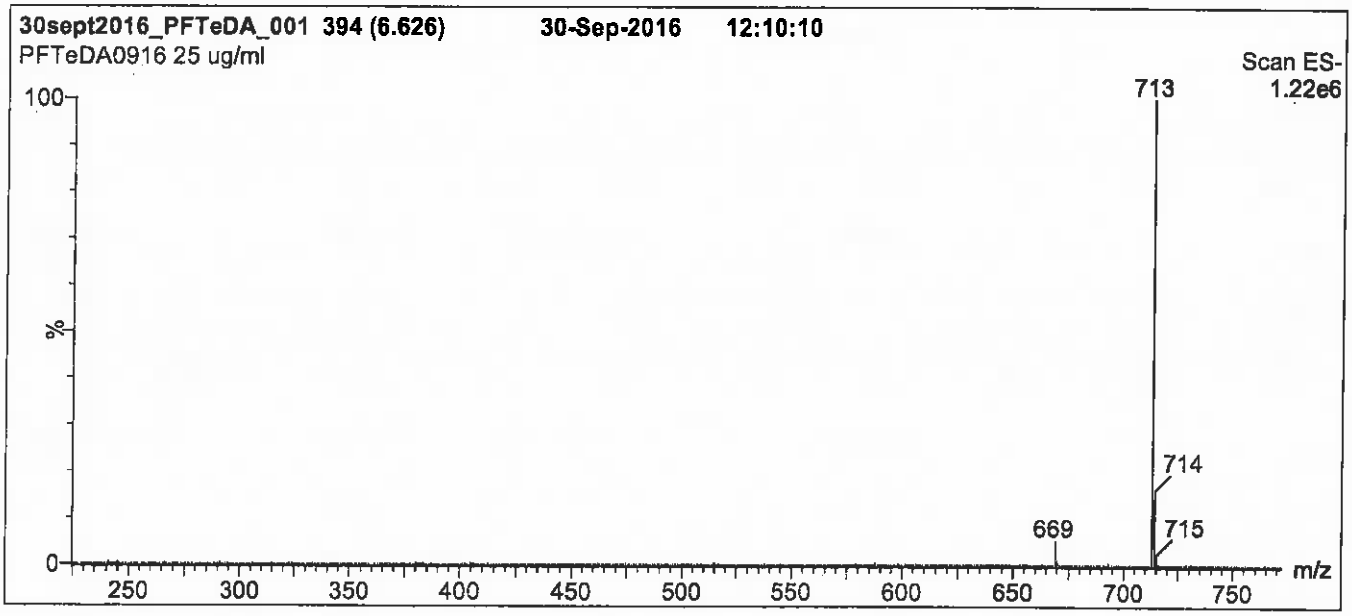
CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

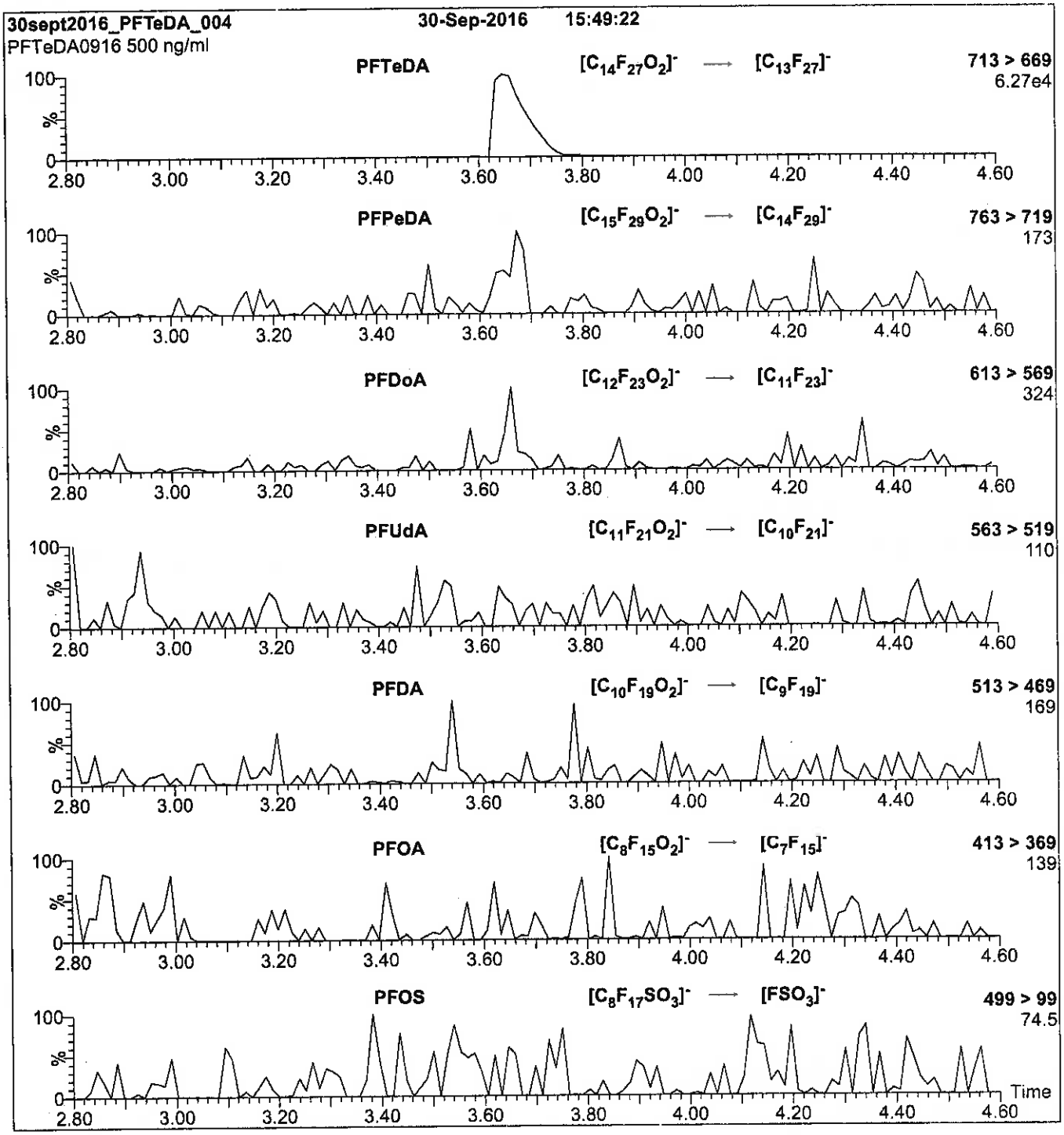
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.20e-3
Collision Energy (eV) = 14

Reagent

LCPFTrDA_00006

R: SBC 9/13/16

730665
ID: LCPFTrDA_00005
Exp: 02/12/21 Prpd: SBC
PF-n-tridecanoic acid

730666
ID: LCPFTrDA_00006
Exp: 02/12/21 Prpd: SBC
PF-n-tridecanoic acid

WELLINGTON LABORATORIES

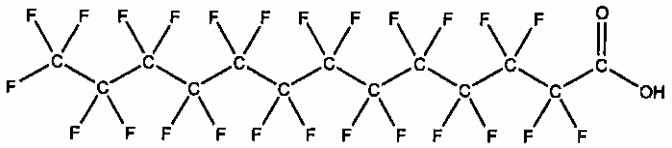
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFTrDA
COMPOUND: Perfluoro-n-tridecanoic acid

LOT NUMBER: PFTrDA0216

STRUCTURE:

CAS #: 72629-94-8



MOLECULAR FORMULA: $C_{13}HF_{25}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 664.11
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 02/12/2016
EXPIRY DATE: (mm/dd/yyyy) 02/12/2021
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of PFUdA ($C_{11}HF_{21}O_2$), ~ 0.4% of PFDoA ($C_{12}HF_{23}O_2$), and ~ 0.1% of PFTeDA ($C_{14}HF_{27}O_2$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 02/16/2016 (mm/dd/yyyy)

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

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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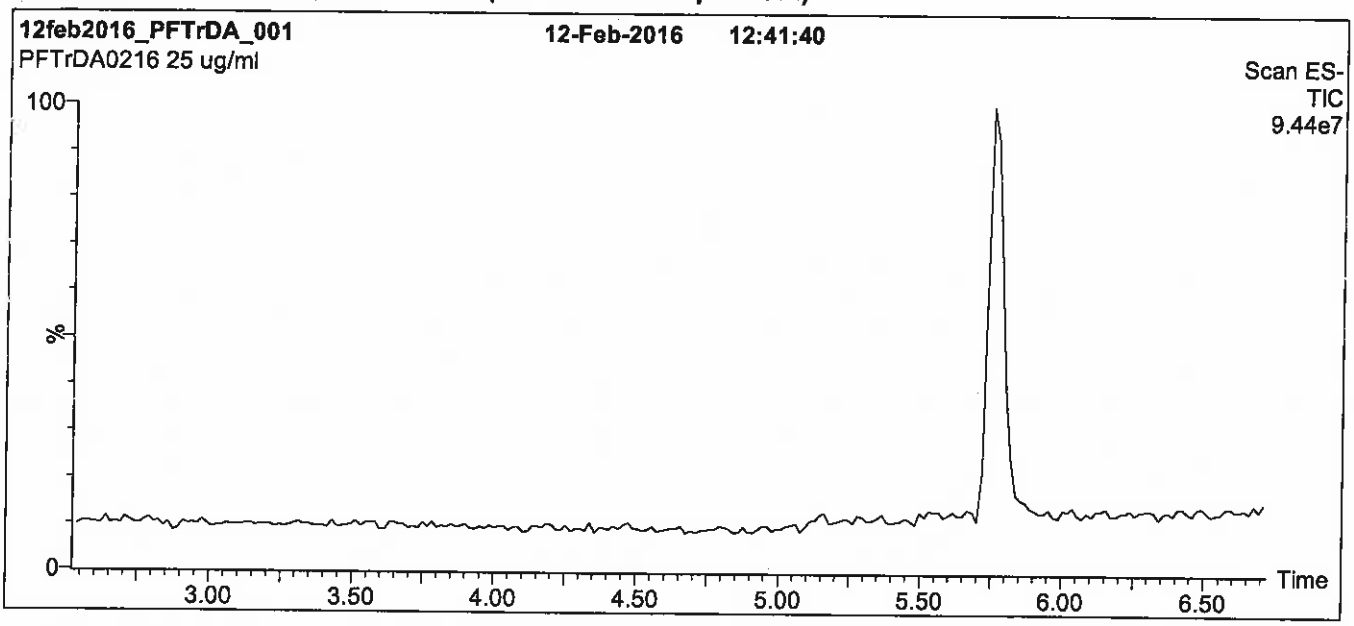
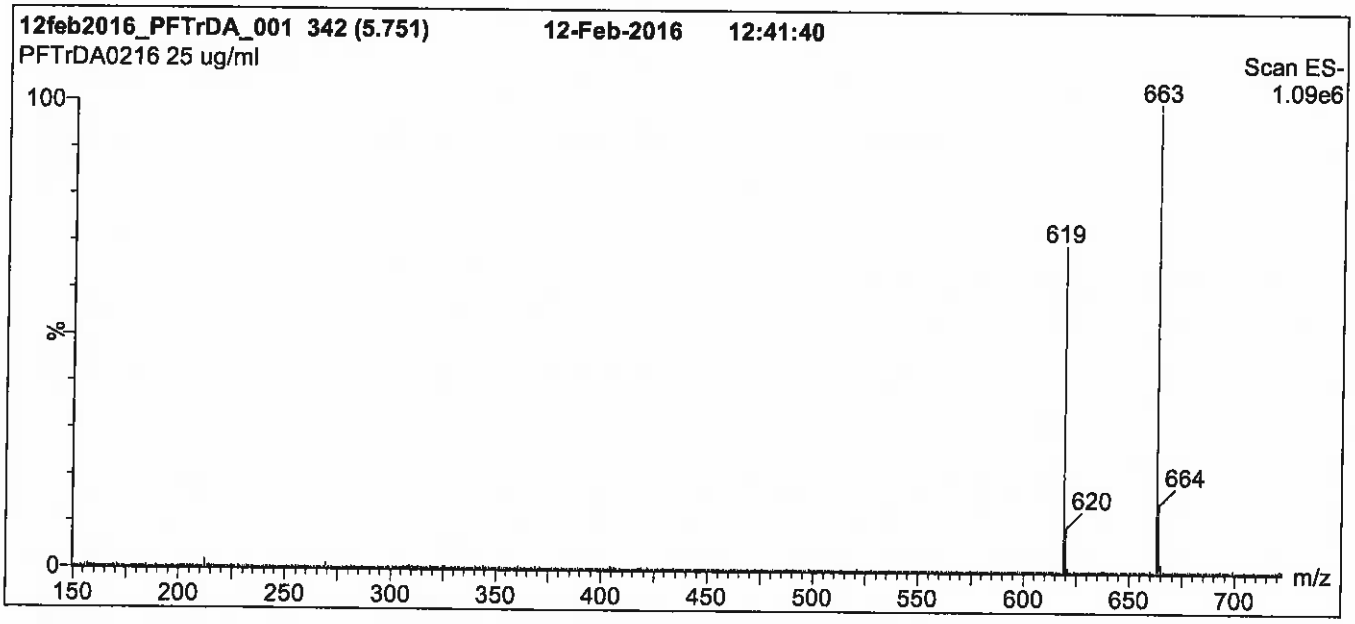
Figure 1: **PFTrDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

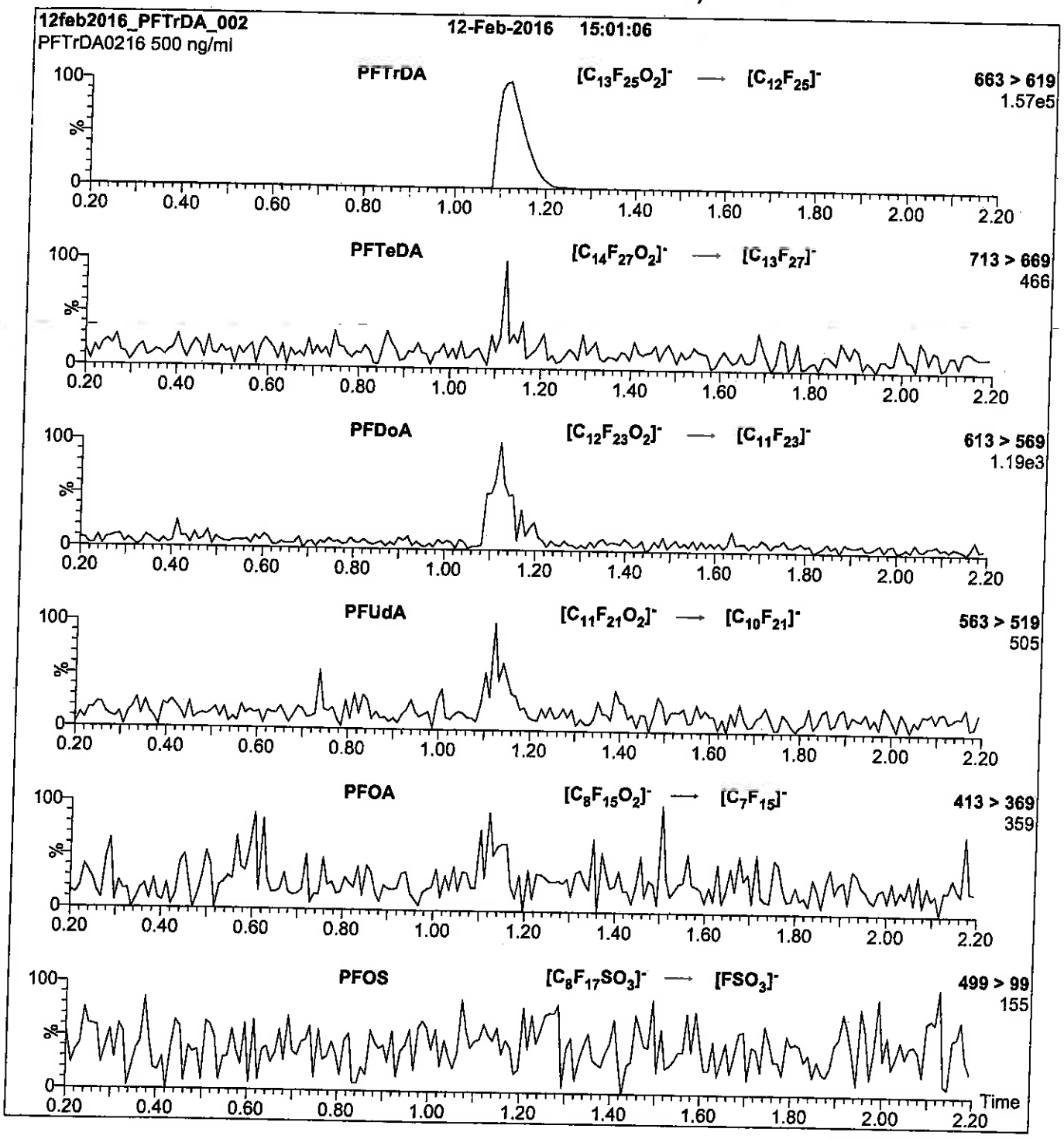
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 22.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 650

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



Conditions for Figure 2:

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

Mobile phase: Isocratic 80% MeOH / 20% H_2O

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 15

Reagent

LCPFTrDA_00007

r : 12/29/16 SJ

WELLINGTON LABORATORIES

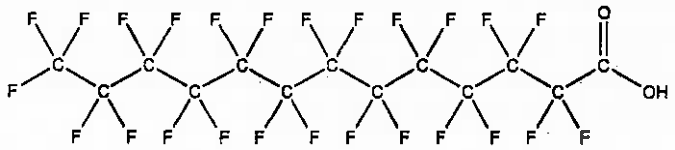
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: PFTrDA
COMPOUND: Perfluoro-n-tridecanoic acid

LOT NUMBER: PFTrDA0216

STRUCTURE:

CAS #: 72629-94-8



MOLECULAR FORMULA: $C_{13}HF_{25}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 664.11
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 02/12/2016
EXPIRY DATE: (mm/dd/yyyy) 02/12/2021
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of PFUdA ($C_{11}HF_{21}O_2$), ~ 0.4% of PFDoA ($C_{12}HF_{23}O_2$), and ~ 0.1% of PFTeDA ($C_{14}HF_{27}O_2$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 02/16/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

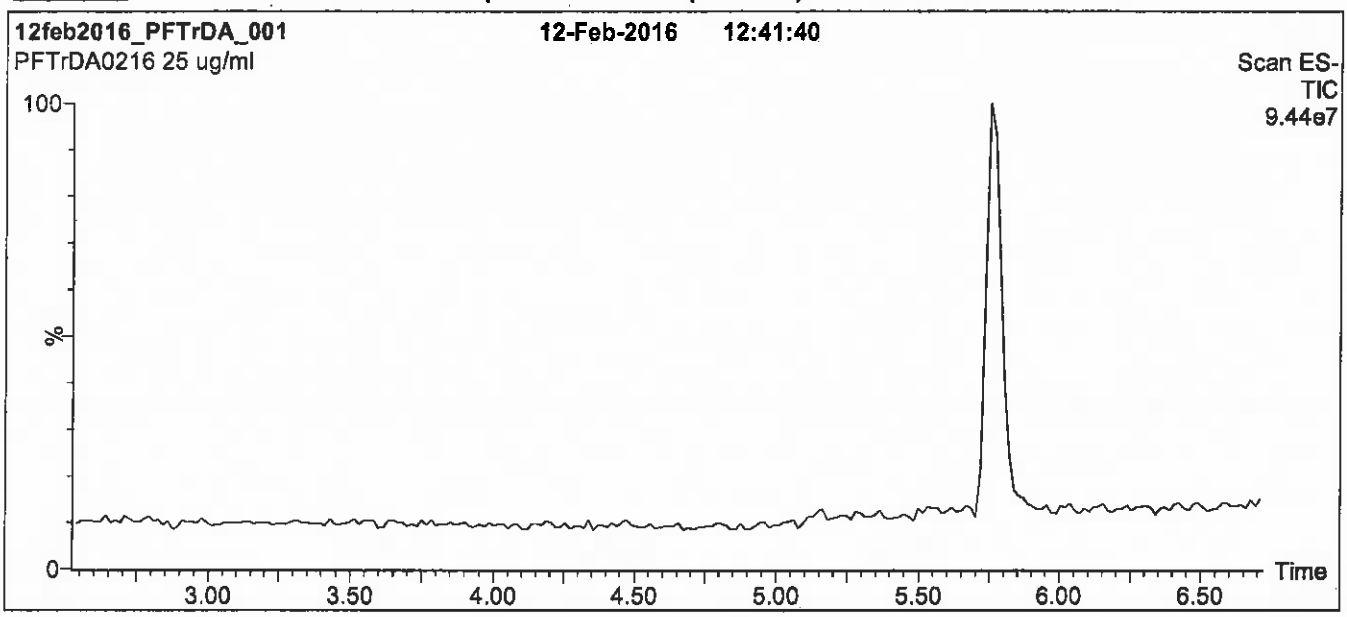
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

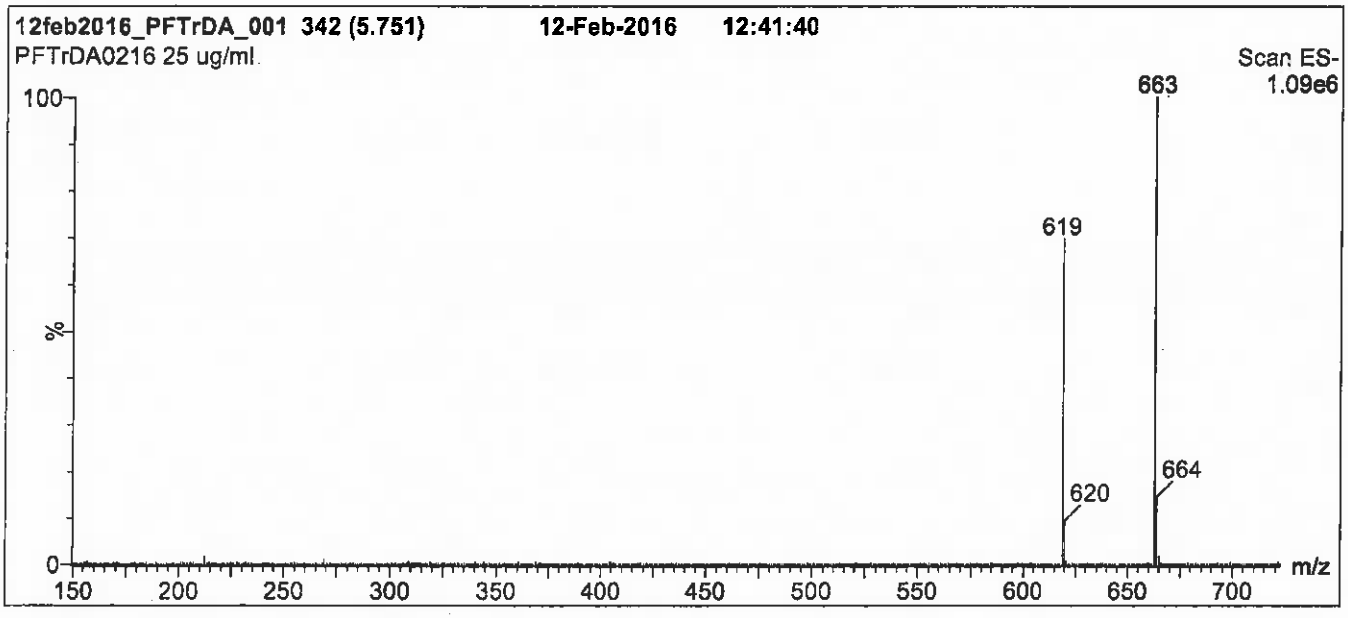
CALA

ANAB ACCREDITED

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

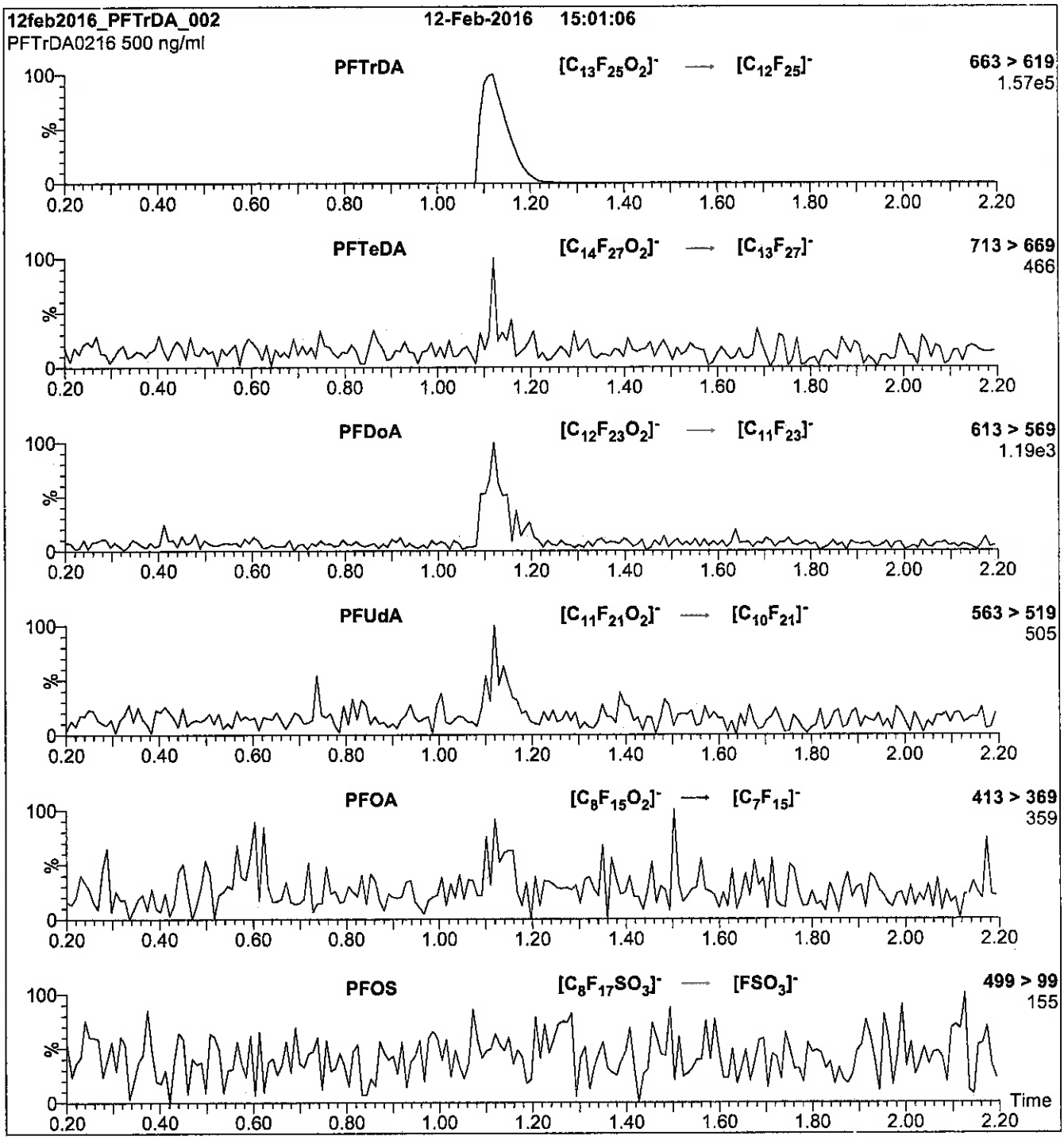
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 22.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 650

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



Conditions for Figure 2:

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

Mobile phase: Isocratic 80% MeOH / 20% H_2O

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 15

Reagent

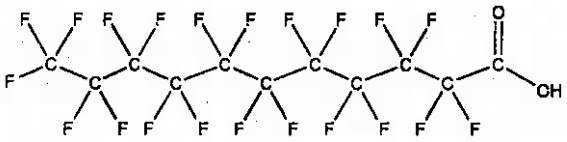
LCPFUdA_00007

r: 12/20/16 SK

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	PFUdA	**LOT NUMBER:**	PFUdA1016
COMPOUND:	Perfluoro-n-undecanoic acid		
STRUCTURE:		**CAS #:**	2058-94-8



MOLECULAR FORMULA:	$C_{11}HF_{21}O_2$	**MOLECULAR WEIGHT:**	564.09
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	10/18/2016		
EXPIRY DATE: (mm/dd/yyyy)	10/18/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

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Certified By: B.G. Chittim **Date:** 10/19/2016 (mm/dd/yyyy)

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

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

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

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

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

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

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EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

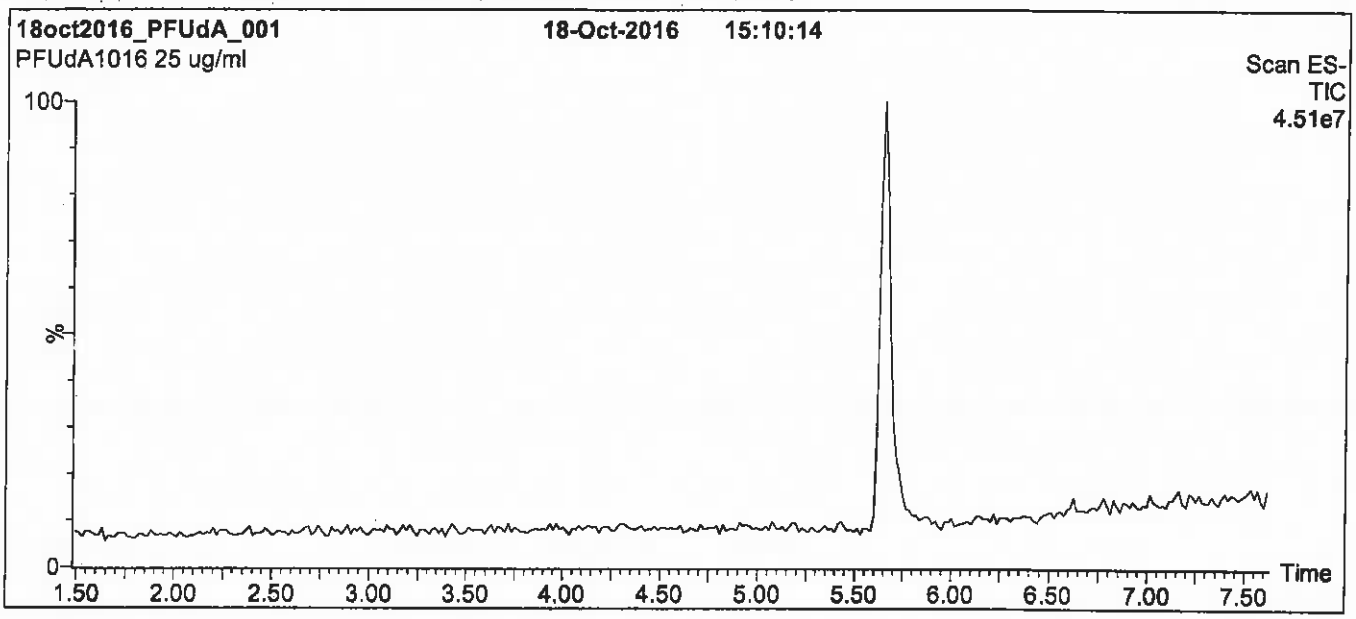
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

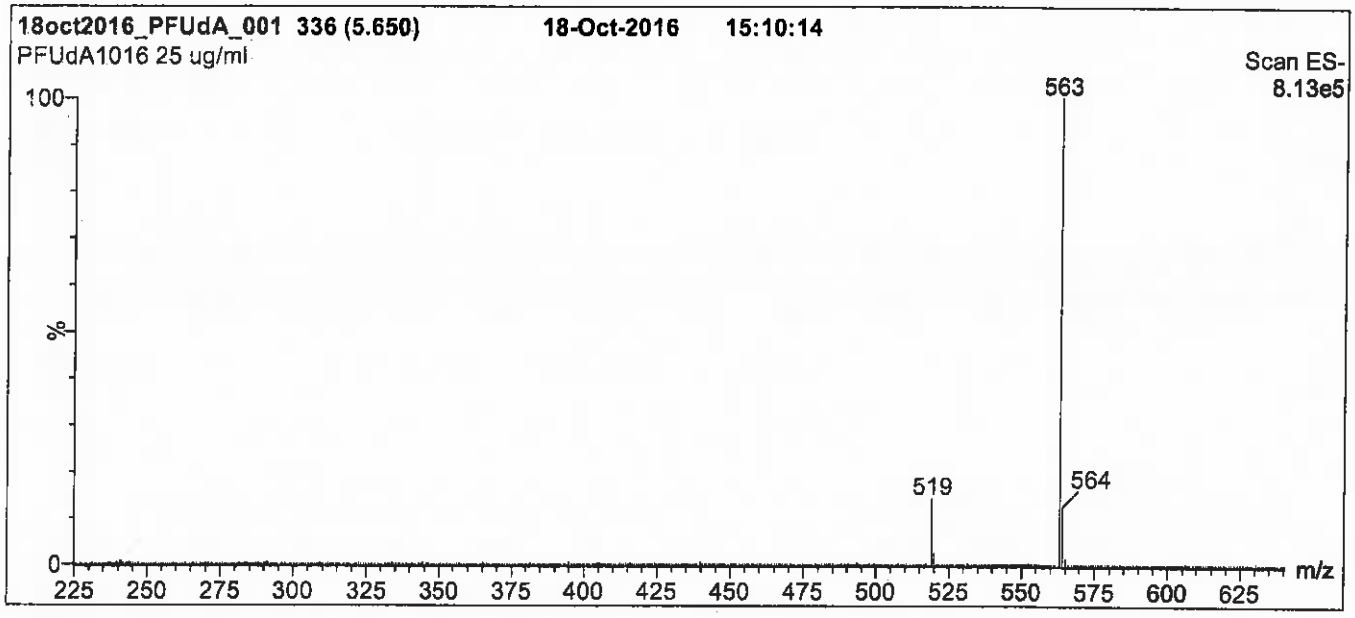
CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

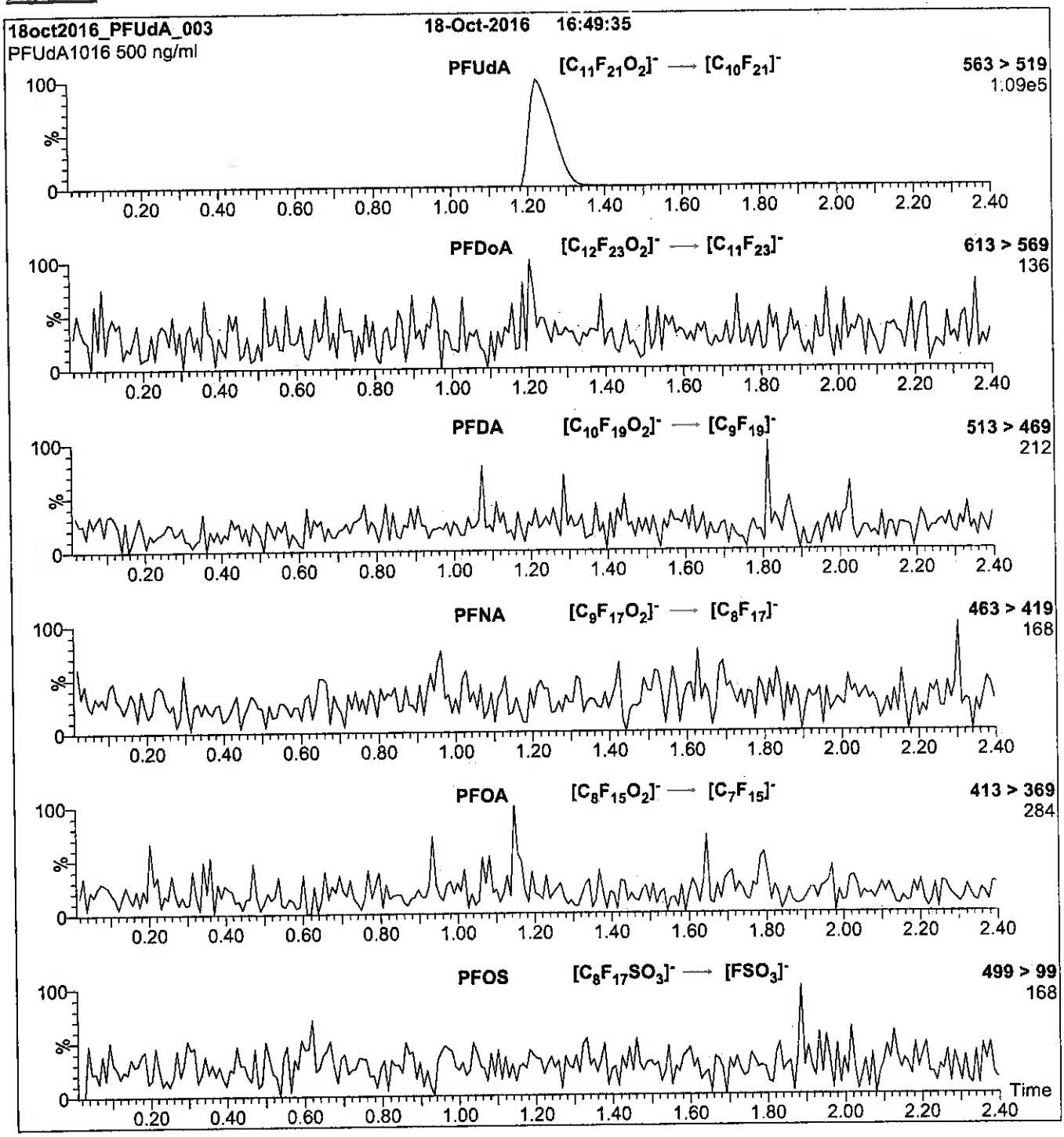
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Method PFC DOD

Fluorinated Hydrocarbons (LC/MS) by Method PFAS_DOD

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Solid Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFBS #	PFHpA #	PFHxS #	PFOA #	PFNA #
FH-17-01_SO0005	320-35310-10	88	89	90	95	95
FH-17-05_SO0005	320-35310-12	96	88	92	94	78

	QC LIMITS
PFBS = 13C3-PFBS	25-150
PFHpA = 13C4-PFHpA	25-150
PFHxS = 18O2 PFHxS	25-150
PFOA = 13C4 PFOA	25-150
PFNA = 13C5 PFNA	25-150

Column to be used to flag recovery values

FORM II 537 (modified)

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Solid Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFBS #	PFHpA #	PFHxS #	PFOA #	PFNA #	PFOS #
FH-17-03_SO0005	320-35310-3	100	93	94	101	100	101
FH-DUP02	320-35310-4	91	90	93	97	104	98
FH-17-04_SO0005	320-35310-6	88	94	92	96	99	101
FH-17-02_SO0005	320-35310-8	94	88	91	98	101	98
FH-17-08_SO0005	320-35310-14	86	84	85	101	103	92
FH-17-06_SO0005	320-35310-16	101	87	94	99	109	99
FH-17-07_SO0005	320-35310-19	89	84	96	100	105	98
FH-17-09_SO0005	320-35310-21	94	93	92	100	101	103
	MB 320-205574/1-A	101	101	100	97	108	105
	LCS 320-205574/2-A	95	103	104	103	100	106
FH-17-03_SO0005 MS	320-35310-3 MS	93	94	92	95	93	91
FH-17-03_SO0005 MSD	320-35310-3 MSD	92	92	97	101	99	100

	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 II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Solid Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFOS #
FH-17-01_SO0005 DL	320-35310-10 DL	105
FH-17-05_SO0005 DL	320-35310-12 DL	111

	QC LIMITS
PFOS = 13C4 PFOS	25-150

Column to be used to flag recovery values

FORM II 537 (modified)

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFBS #	PFHpA #	PFHxS #	PFOA #	PFNA #
FH-17-08_GW012218	320-35310-15	96	98	103	101	90

	QC LIMITS
PFBS = 13C3-PFBS	25-150
PFHpA = 13C4-PFHpA	25-150
PFHxS = 18O2 PFHxS	25-150
PFOA = 13C4 PFOA	25-150
PFNA = 13C5 PFNA	25-150

Column to be used to flag recovery values

FORM II 537 (modified)

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFBS #	PFHpA #	PFHxS #	PFOA #	PFNA #	PFOS #
FH-EB01	320-35310-5	97	103	105	104	111	112
FH-17-04_GW012218	320-35310-7	106	107	110	112	118	113
FH-17-02_GW012218	320-35310-9	98	107	104	110	114	112
FH-17-01_GW012218	320-35310-11	110	108	113	114	116	114
FH-17-05_GW012218	320-35310-13	98	104	103	106	118	113
FH-17-06_GW012318	320-35310-17	98	89	96	106	112	107
FH-FB01	320-35310-18	92	97	98	101	109	105
FH-17-07_GW012318	320-35310-20	104	109	106	115	119	118
	MB 320-205514/1-A	102	111	110	111	116	118
	LCS 320-205514/2-A	97	110	109	113	116	111
FH-17-04_GW012218 MS	320-35310-7 MS	127	123	126	126	130	122
FH-17-04_GW012218 MSD	320-35310-7 MSD	106	96	105	109	115	113

	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 II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFBS #	PFHpA #	PFOA #	PFNA #
FH-17-09_GW012318	320-35310-22	111	105	107	94

	QC LIMITS
PFBS = 13C3-PFBS	25-150
PFHpA = 13C4-PFHpA	25-150
PFOA = 13C4 PFOA	25-150
PFNA = 13C5 PFNA	25-150

Column to be used to flag recovery values

FORM II 537 (modified)

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFBS	#	PFHpA	#	PFOA	#	PFNA	#	PFOS	#
FH-17-03_GW012218	320-35310-1	106	M	105		104		113		115	
FH-DUP01	320-35310-2	97	M	98		109		117		112	

	QC LIMITS
PFBS = 13C3-PFBS	25-150
PFHpA = 13C4-PFHpA	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 II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFHxS #
FH-17-03_GW012218 DL	320-35310-1 DL	105
FH-DUP01 DL	320-35310-2 DL	108

	QC LIMITS
PFHxS = 18O2 PFHxS	25-150

Column to be used to flag recovery values

FORM II 537 (modified)

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFHxS #	PFOS #
FH-17-09_GW012318 DL	320-35310-22 DL	112	121

	QC LIMITS
PFHxS = 18O2 PFHxS	25-150
PFOS = 13C4 PFOS	25-150

Column to be used to flag recovery values

FORM II 537 (modified)

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFOS #
FH-17-08_GW012218 DL	320-35310-15 DL	117

	QC LIMITS
PFOS = 13C4 PFOS	25-150

Column to be used to flag recovery values

FORM II 537 (modified)

FORM III
LCMS LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 2018.01.25LLAAXZ_035.d

Lab ID: LCS 320-205514/2-A Client ID:

COMPOUND	SPIKE ADDED (ng/L)	LCS CONCENTRATION (ng/L)	LCS % REC	QC LIMITS REC	#
Perfluorobutanesulfonic acid (PFBS)	35.4	37.9	107	87-120	
Perfluorohexanesulfonic acid (PFHxS)	36.4	33.4	92	81-106	
Perfluoroheptanoic acid (PFHpA)	40.0	34.7	87	80-113	
Perfluorooctanoic acid (PFOA)	40.0	35.3	88	80-107	
Perfluorooctanesulfonic acid (PFOS)	37.1	34.7	93	82-112	
Perfluorononanoic acid (PFNA)	40.0	36.9	92	83-113	
18O2 PFHxS	94.6	103	109	25-150	
13C4-PFHpA	100	110	110	25-150	
13C4 PFOA	100	113	113	25-150	
13C4 PFOS	95.6	107	111	25-150	
13C5 PFNA	100	116	116	25-150	
13C3-PFBS	93.0	90.4	97	25-150	

Column to be used to flag recovery and RPD values

FORM III 537 (modified)

FORM III
LCMS LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Solid Level: Low Lab File ID: 2018.01.26LLA_028.d

Lab ID: LCS 320-205574/2-A Client ID:

COMPOUND	SPIKE ADDED (ug/Kg)	LCS CONCENTRATION (ug/Kg)	LCS % REC	QC LIMITS REC	#
Perfluorobutanesulfonic acid (PFBS)	1.77	1.82	103	73-142	
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.69	93	75-121	
Perfluoroheptanoic acid (PFHpA)	2.00	1.98	99	76-124	
Perfluorooctanoic acid (PFOA)	2.00	1.87	93	76-121	
Perfluorooctanesulfonic acid (PFOS)	1.86	1.73	93	69-131	
Perfluorononanoic acid (PFNA)	2.00	1.95	98	74-126	
18O2 PFHxS	4.73	4.93	104	25-150	
13C4-PFHpA	5.00	5.14	103	25-150	
13C4 PFOA	5.00	5.16	103	25-150	
13C4 PFOS	4.78	5.06	106	25-150	
13C5 PFNA	5.00	4.99	100	25-150	
13C3-PFBS	4.65	4.44	95	25-150	

Column to be used to flag recovery and RPD values

FORM III 537 (modified)

FORM III
LCMS MATRIX SPIKE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Solid Level: Low Lab File ID: 2018.01.26LLA_030.d

Lab ID: 320-35310-3 MS Client ID: FH-17-03_SO0005 MS

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC	QC LIMITS REC	#
Perfluorobutanesulfonic acid (PFBS)	1.90	0.11 U	1.92	101	73-142	
Perfluorohexanesulfonic acid (PFHxS)	1.95	0.055 J	1.92	95	75-121	
Perfluoroheptanoic acid (PFHpA)	2.15	0.28 J	2.20	89	76-124	
Perfluorooctanoic acid (PFOA)	2.15	0.24 J	2.21	92	76-121	
Perfluorooctanesulfonic acid (PFOS)	1.99	0.23 J	2.08	93	69-131	
Perfluorononanoic acid (PFNA)	2.15	0.058 J	2.15	98	74-126	
18O2 PFHxS	5.08	4.8	4.69	92	25-150	
13C4-PFHpA	5.37	5.0	5.05	94	25-150	
13C4 PFOA	5.37	5.4	5.11	95	25-150	
13C4 PFOS	5.13	5.2	4.68	91	25-150	
13C5 PFNA	5.37	5.4	5.01	93	25-150	
13C3-PFBS	4.99	5.0	4.63	93	25-150	

Column to be used to flag recovery and RPD values

FORM III 537 (modified)

FORM III
LCMS MATRIX SPIKE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 2018.01.25LLAAXZ_040.d

Lab ID: 320-35310-7 MS Client ID: FH-17-04_GW012218 MS

COMPOUND	SPIKE ADDED (ng/L)	SAMPLE CONCENTRATION (ng/L)	MS CONCENTRATION (ng/L)	MS % REC	QC LIMITS REC	#
Perfluorobutanesulfonic acid (PFBS)	55.9	21	76.3	99	87-120	
Perfluorohexanesulfonic acid (PFHxS)	57.5	230	263	53	81-106	4
Perfluoroheptanoic acid (PFHpA)	63.2	6.0	60.8	87	80-113	
Perfluorooctanoic acid (PFOA)	63.2	56	104	76	80-107	M J1
Perfluorooctanesulfonic acid (PFOS)	58.7	14	71.1	98	82-112	
Perfluorononanoic acid (PFNA)	63.2	3.0 U	57.9	92	83-113	
18O2 PFHxS	149	210	189	126	25-150	
13C4-PFHpA	158	210	194	123	25-150	
13C4 PFOA	158	220	200	126	25-150	
13C4 PFOS	151	220	184	122	25-150	
13C5 PFNA	158	240	205	130	25-150	
13C3-PFBS	147	200	187	127	25-150	

Column to be used to flag recovery and RPD values

FORM III 537 (modified)

FORM III
LCMS MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Solid Level: Low Lab File ID: 2018.01.26LLA_031.d

Lab ID: 320-35310-3 MSD Client ID: FH-17-03_SO0005 MSD

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC	% RPD	QC LIMITS RPD	QC LIMITS REC	#
Perfluorobutanesulfonic acid (PFBS)	1.89	1.91	101	0	30	73-142	
Perfluorohexanesulfonic acid (PFHxS)	1.94	1.76	88	9	30	75-121	
Perfluoroheptanoic acid (PFHpA)	2.13	2.20	90	0	30	76-124	
Perfluorooctanoic acid (PFOA)	2.13	2.11	87	5	30	76-121	
Perfluorooctanesulfonic acid (PFOS)	1.98	2.07	93	1	30	69-131	
Perfluorononanoic acid (PFNA)	2.13	2.10	96	3	30	74-126	
18O2 PFHxS	5.05	4.88	97			25-150	
13C4-PFHpA	5.33	4.89	92			25-150	
13C4 PFOA	5.33	5.40	101			25-150	
13C4 PFOS	5.10	5.11	100			25-150	
13C5 PFNA	5.33	5.26	99			25-150	
13C3-PFBS	4.96	4.58	92			25-150	

Column to be used to flag recovery and RPD values

FORM III 537 (modified)

FORM III
LCMS MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 2018.01.25LLAAXZ_041.d

Lab ID: 320-35310-7 MSD Client ID: FH-17-04_GW012218 MSD

COMPOUND	SPIKE ADDED (ng/L)	MSD CONCENTRATION (ng/L)	MSD % REC	% RPD	QC LIMITS RPD	QC LIMITS REC	#
Perfluorobutanesulfonic acid (PFBS)	41.5	60.9	97	22	30	87-120	M
Perfluorohexanesulfonic acid (PFHxS)	42.7	214	-44	21	30	81-106	4
Perfluoroheptanoic acid (PFHpA)	46.9	48.8	91	22	30	80-113	
Perfluorooctanoic acid (PFOA)	46.9	82.1	56	23	30	80-107	M J1
Perfluorooctanesulfonic acid (PFOS)	43.5	51.3	86	32	30	82-112	J1
Perfluorononanoic acid (PFNA)	46.9	40.8	87	35	30	83-113	J1
18O2 PFHxS	111	117	105			25-150	
13C4-PFHpA	117	113	96			25-150	
13C4 PFOA	117	127	109			25-150	
13C4 PFOS	112	127	113			25-150	
13C5 PFNA	117	135	115			25-150	
13C3-PFBS	109	115	106			25-150	

Column to be used to flag recovery and RPD values

FORM III 537 (modified)

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab File ID: 2018.01.25LLAAXZ_034.d Lab Sample ID: MB 320-205514/1-A

Matrix: Water Date Extracted: 01/25/2018 09:10

Instrument ID: A8_N Date Analyzed: 01/25/2018 21:56

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LCS 320-205514/2-A	2018.01.25L LAAXZ_035.d	01/25/2018 22:04
FH-17-03_GW012218	320-35310-1	2018.01.25L LAAXZ_036.d	01/25/2018 22:12
FH-DUP01	320-35310-2	2018.01.25L LAAXZ_037.d	01/25/2018 22:20
FH-EB01	320-35310-5	2018.01.25L LAAXZ_038.d	01/25/2018 22:27
FH-17-04_GW012218	320-35310-7	2018.01.25L LAAXZ_039.d	01/25/2018 22:35
FH-17-04_GW012218 MS	320-35310-7 MS	2018.01.25L LAAXZ_040.d	01/25/2018 22:43
FH-17-04_GW012218 MSD	320-35310-7 MSD	2018.01.25L LAAXZ_041.d	01/25/2018 22:51
FH-17-02_GW012218	320-35310-9	2018.01.25L LAAXZ_042.d	01/25/2018 22:59
FH-17-01_GW012218	320-35310-11	2018.01.25L LAAXZ_043.d	01/25/2018 23:07
FH-17-05_GW012218	320-35310-13	2018.01.25L LAAXZ_045.d	01/25/2018 23:22
FH-17-08_GW012218	320-35310-15	2018.01.25L LAAXZ_046.d	01/25/2018 23:30
FH-17-06_GW012318	320-35310-17	2018.01.25L LAAXZ_047.d	01/25/2018 23:38
FH-FB01	320-35310-18	2018.01.25L LAAXZ_048.d	01/25/2018 23:46
FH-17-07_GW012318	320-35310-20	2018.01.25L LAAXZ_049.d	01/25/2018 23:54
FH-17-09_GW012318	320-35310-22	2018.01.25L LAAXZ_050.d	01/26/2018 00:02
FH-17-03_GW012218 DL	320-35310-1 DL	2018.01.26L LA_068.d	01/26/2018 21:35
FH-DUP01 DL	320-35310-2 DL	2018.01.26L LA_069.d	01/26/2018 21:42
FH-17-08_GW012218 DL	320-35310-15 DL	2018.01.26L LA_070.d	01/26/2018 21:50
FH-17-09_GW012318 DL	320-35310-22 DL	2018.01.26L LA_071.d	01/26/2018 21:58

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab File ID: 2018.01.26LLA_027.d Lab Sample ID: MB 320-205574/1-A

Matrix: Solid Date Extracted: 01/25/2018 12:10

Instrument ID: A8_N Date Analyzed: 01/26/2018 16:14

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LCS 320-205574/2-A	2018.01.26LLA_028.d	01/26/2018 16:22
FH-17-03_SO0005	320-35310-3	2018.01.26LLA_029.d	01/26/2018 16:30
FH-17-03_SO0005 MS	320-35310-3 MS	2018.01.26LLA_030.d	01/26/2018 16:38
FH-17-03_SO0005 MSD	320-35310-3 MSD	2018.01.26LLA_031.d	01/26/2018 16:45
FH-DUP02	320-35310-4	2018.01.26LLA_032.d	01/26/2018 16:53
FH-17-04_SO0005	320-35310-6	2018.01.26LLA_033.d	01/26/2018 17:01
FH-17-02_SO0005	320-35310-8	2018.01.26LLA_034.d	01/26/2018 17:09
FH-17-01_SO0005	320-35310-10	2018.01.26LLA_035.d	01/26/2018 17:17
FH-17-05_SO0005	320-35310-12	2018.01.26LLA_036.d	01/26/2018 17:24
FH-17-08_SO0005	320-35310-14	2018.01.26LLA_038.d	01/26/2018 17:40
FH-17-06_SO0005	320-35310-16	2018.01.26LLA_039.d	01/26/2018 17:48
FH-17-07_SO0005	320-35310-19	2018.01.26LLA_040.d	01/26/2018 17:56
FH-17-09_SO0005	320-35310-21	2018.01.26LLA_041.d	01/26/2018 18:04
FH-17-01_SO0005 DL	320-35310-10 DL	2018.01.29LLAA_038.d	01/29/2018 16:28
FH-17-05_SO0005 DL	320-35310-12 DL	2018.01.29LLAA_039.d	01/29/2018 16:36

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-03_GW012218 Lab Sample ID: 320-35310-1

Matrix: Water Lab File ID: 2018.01.25LLAAXZ_036.d

Analysis Method: 537 (modified) Date Collected: 01/22/2018 09:15

Extraction Method: 3535 Date Extracted: 01/25/2018 09:10

Sample wt/vol: 161.4(mL) Date Analyzed: 01/25/2018 22:12

Con. Extract Vol.: 10.00(mL) Dilution Factor: 1

Injection Volume: 2(uL) GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205677 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	60	M	3.1	1.5	0.71
375-85-9	Perfluoroheptanoic acid (PFHpA)	19	M	3.1	2.3	0.94
335-67-1	Perfluorooctanoic acid (PFOA)	330	M	3.1	2.3	0.84
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	26		6.2	4.6	1.7
375-95-1	Perfluorononanoic acid (PFNA)	2.3	U M	3.1	2.3	0.81

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL01892	13C4-PFHpA	105		25-150
STL00990	13C4 PFOA	104		25-150
STL00991	13C4 PFOS	115		25-150
STL00995	13C5 PFNA	113		25-150
STL02337	13C3-PFBS	106	M	25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_036.d
Lims ID: 320-35310-B-1-A
Client ID: FH-17-03_GW012218
Sample Type: Client
Inject. Date: 25-Jan-2018 22:12:11 ALS Bottle#: 30 Worklist Smp#: 4
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-b-1-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:24:32

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										M
301.90 > 83.00	1.686	1.695	-0.009	0.644	92584	2.47		106	961	M
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.695	1.697	-0.002	1.005	2960549	0.9629			1214	M
298.90 > 99.00	1.695	1.697	-0.002	1.005	1210248		2.45(1.25-3.74)		1136	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.262	2.267	-0.005	0.863	4556506	2.63		105	27364	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.262	2.268	-0.006	1.000	617052	0.3081			476	M
363.00 > 169.00	2.262	2.268	-0.006	1.000	243430		2.53(1.13-3.40)		1407	
8 Perfluorohexanesulfonic acid										E
399.00 > 80.00	2.275	2.280	-0.005	1.000	24002549	9.44			15413	E
399.00 > 99.00	2.275	2.280	-0.005	1.000	7876315		3.05(1.50-4.49)		13537	
D 11 18O2 PFHxS										
403.00 > 84.00	2.275	2.282	-0.007	0.868	5401014	2.53		107	51575	
D 14 13C4 PFOA										
417.00 > 372.00	2.620	2.622	-0.002	1.000	4405987	2.59		104	48865	
* 62 13C2-PFOA										
415.00 > 370.00	2.620	2.622	-0.002		4722287	2.50			39099	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.620	2.623	-0.003	1.000	11155618	5.40			4906	M
413.00 > 169.00	2.620	2.623	-0.003	1.000	6996004		1.59(0.84-2.52)		16404	M
D 19 13C5 PFNA										
468.00 > 423.00	2.991	2.992	-0.001	1.142	3910816	2.84		113	36036	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.864	2.992	-0.128	0.957	737501	0.4251			890	
499.00 > 99.00	2.871	2.992	-0.121	0.960	102922		7.17(2.31-6.93)		415	
D 18 13C4 PFOS										
503.00 > 80.00	2.991	2.992	-0.001	1.142	3704157	2.74		115	15785	

QC Flag Legend

Processing Flags

E - Exceeded Maximum Amount

Review Flags

M - Manually Integrated

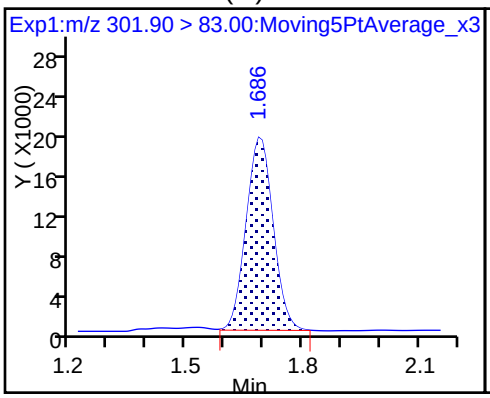
Report Date: 30-Jan-2018 10:22:38 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

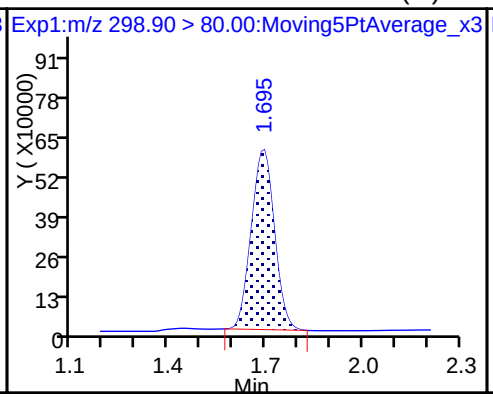
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_036.d

Injection Date:	25-Jan-2018 22:12:11	Instrument ID:	A8_N		
Lims ID:	320-35310-B-1-A	Lab Sample ID:	320-35310-1		
Client ID:	FH-17-03_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	30	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

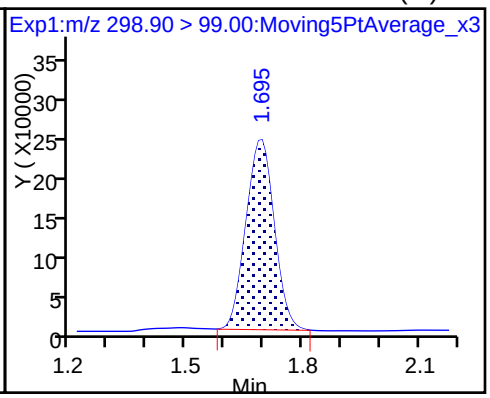
D 47 13C3-PFBS (M)



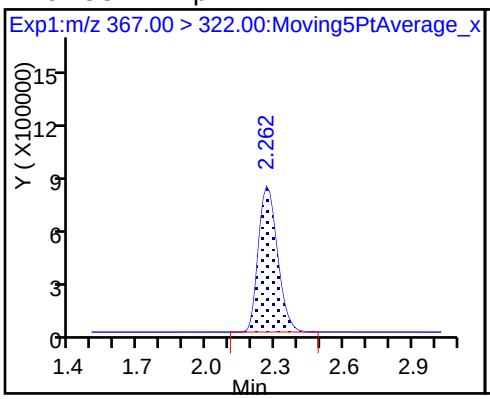
5 Perfluorobutanesulfonic acid (M)



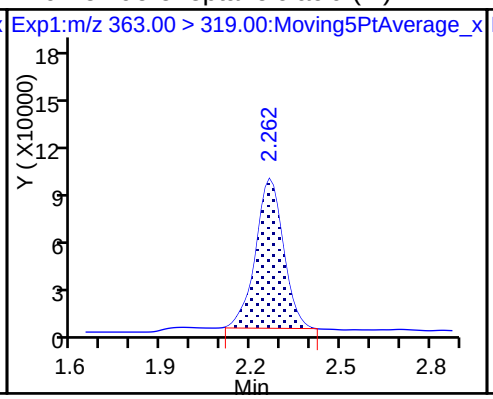
5 Perfluorobutanesulfonic acid (M)



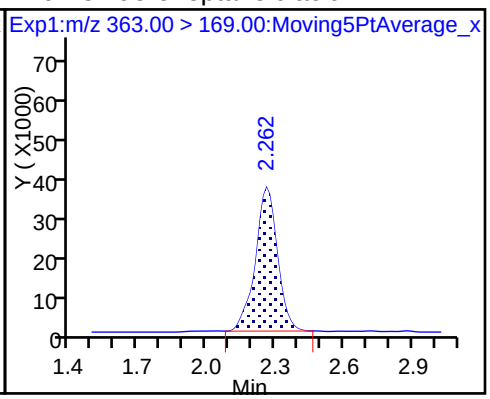
D 9 13C4-PFHpA



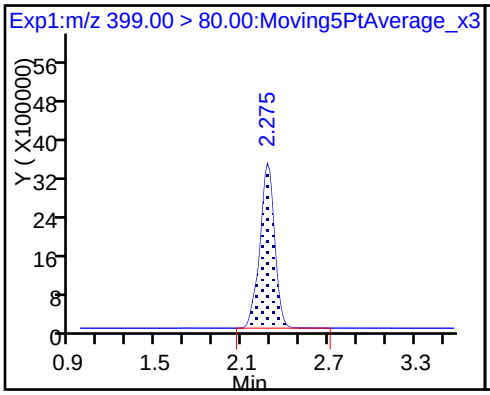
10 Perfluoroheptanoic acid (M)



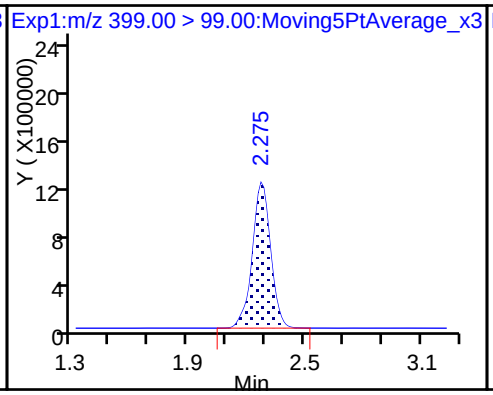
10 Perfluoroheptanoic acid



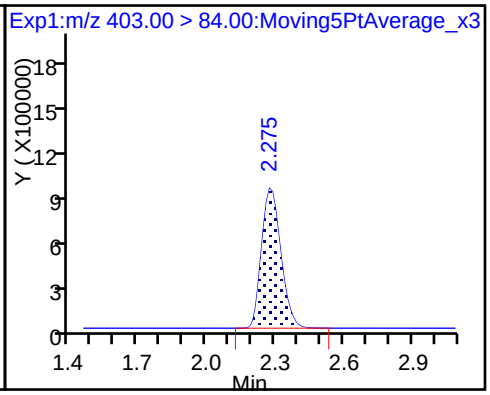
8 Perfluorohexanesulfonic acid



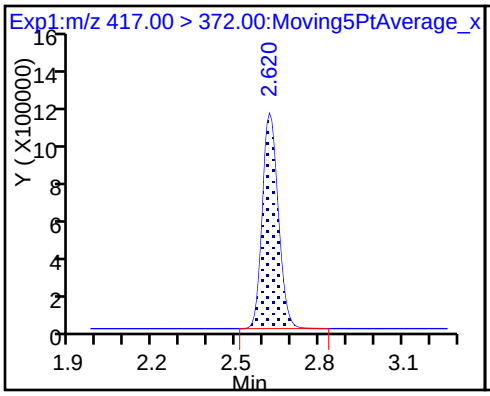
8 Perfluorohexanesulfonic acid



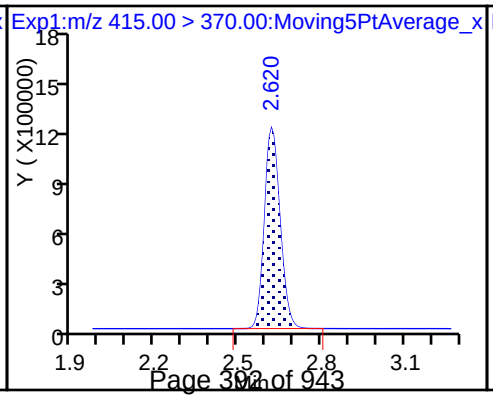
D 11 18O2 PFHxS



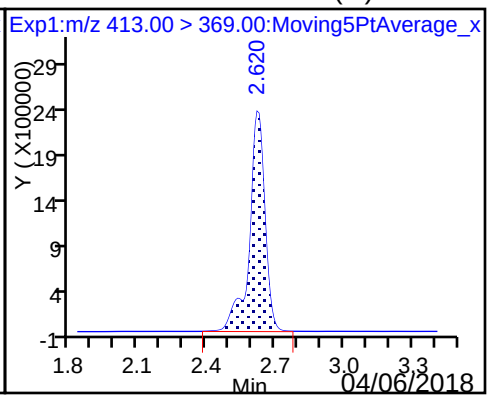
D 14 13C4 PFOA



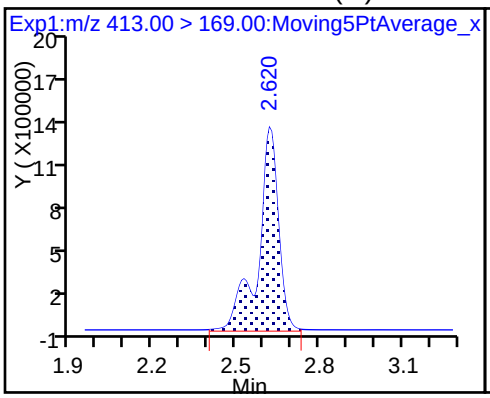
* 62 13C2-PFOA



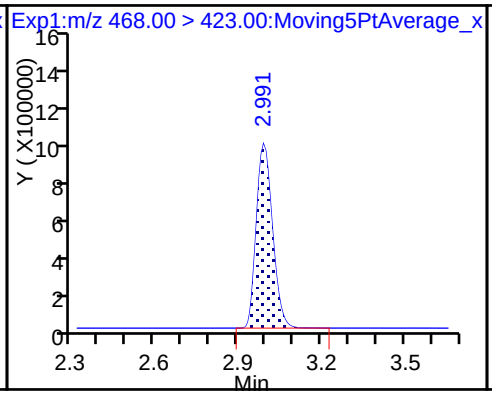
15 Perfluorooctanoic acid (M)



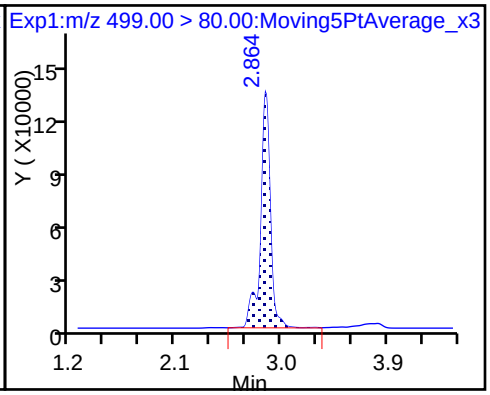
15 Perfluorooctanoic acid (M)



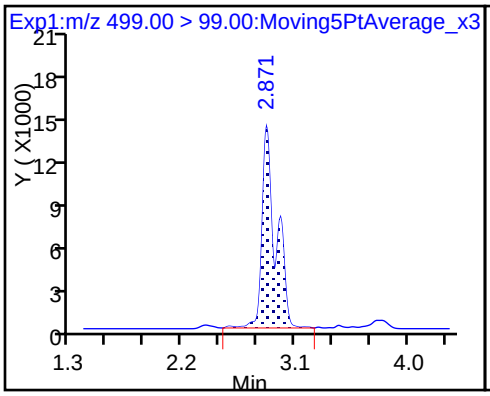
D 19 13C5 PFNA



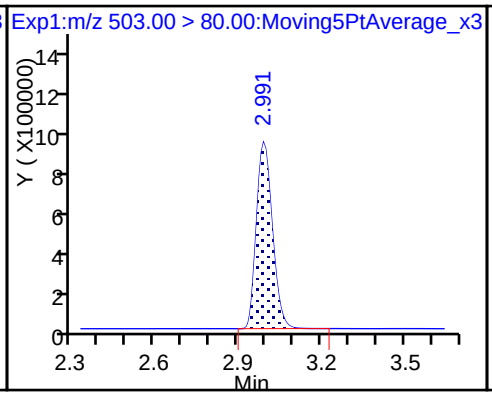
17 Perfluorooctane sulfonic acid



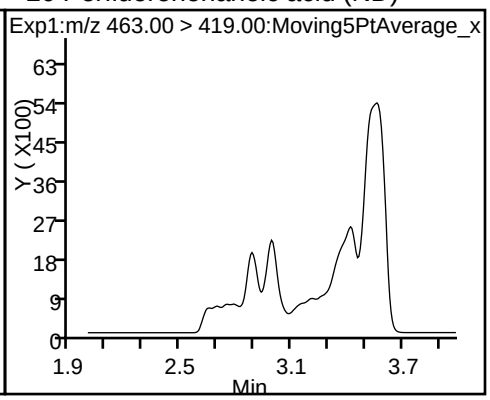
17 Perfluorooctane sulfonic acid



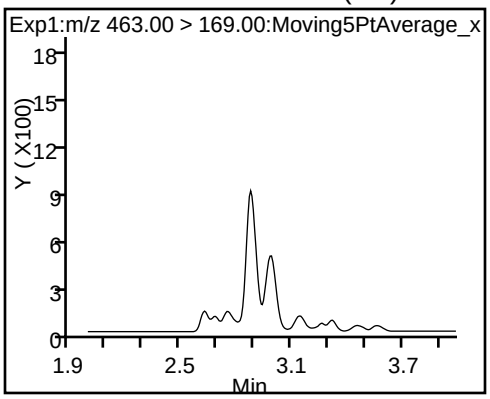
D 18 13C4 PFOS



20 Perfluorononanoic acid (ND)



20 Perfluorononanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

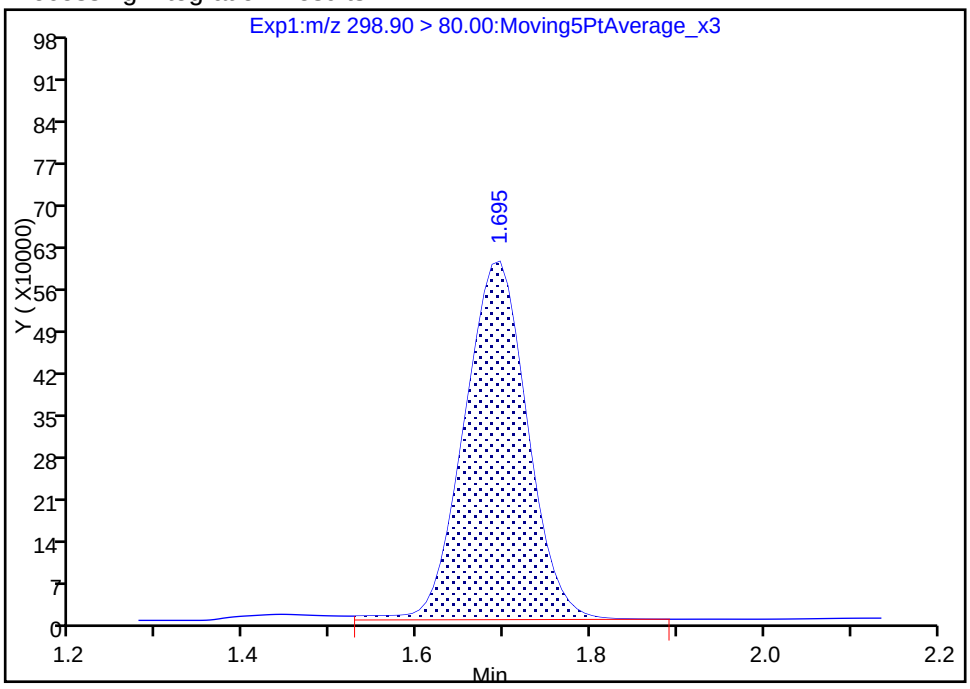
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_036.d				
Injection Date:	25-Jan-2018 22:12:11	Instrument ID:	A8_N		
Lims ID:	320-35310-B-1-A	Lab Sample ID:	320-35310-1		
Client ID:	FH-17-03_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	30	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

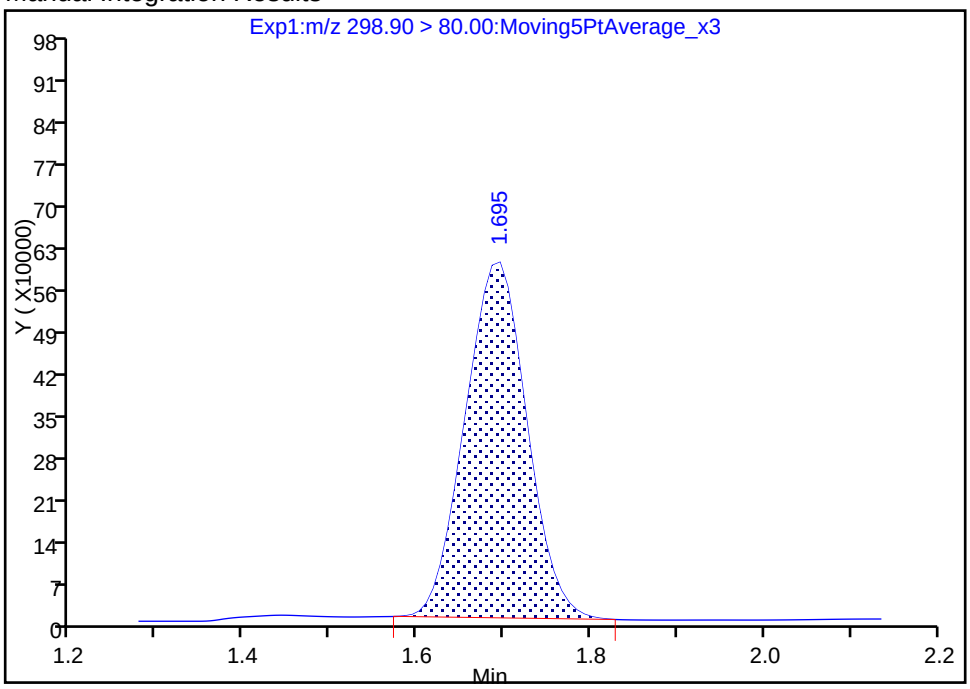
Processing Integration Results

RT: 1.70
Area: 3047084
Amount: 0.979236
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 2960549
Amount: 0.962874
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:22:49

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_036.d

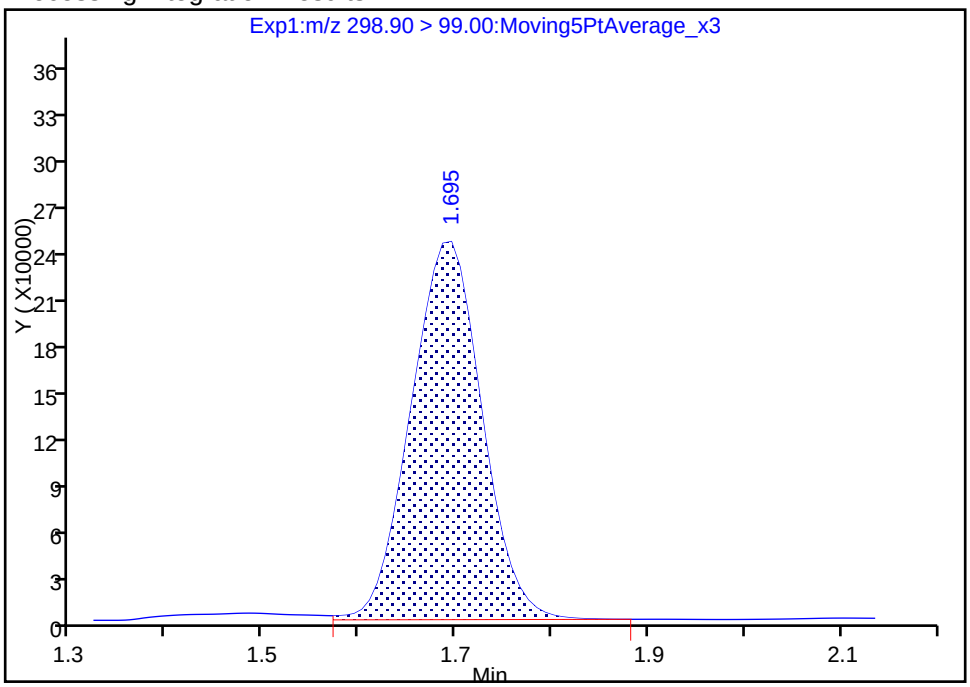
Injection Date:	25-Jan-2018 22:12:11	Instrument ID:	A8_N		
Lims ID:	320-35310-B-1-A	Lab Sample ID:	320-35310-1		
Client ID:	FH-17-03_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	30	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

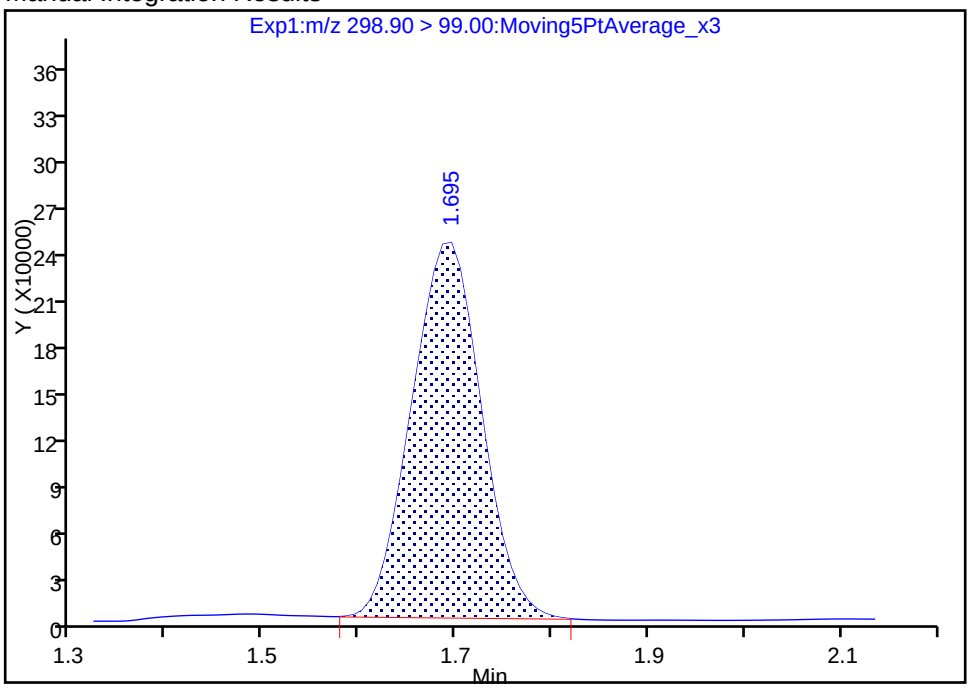
Processing Integration Results

RT: 1.70
Area: 1234651
Amount: 0.979236
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 1210248
Amount: 0.962874
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:23:01

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

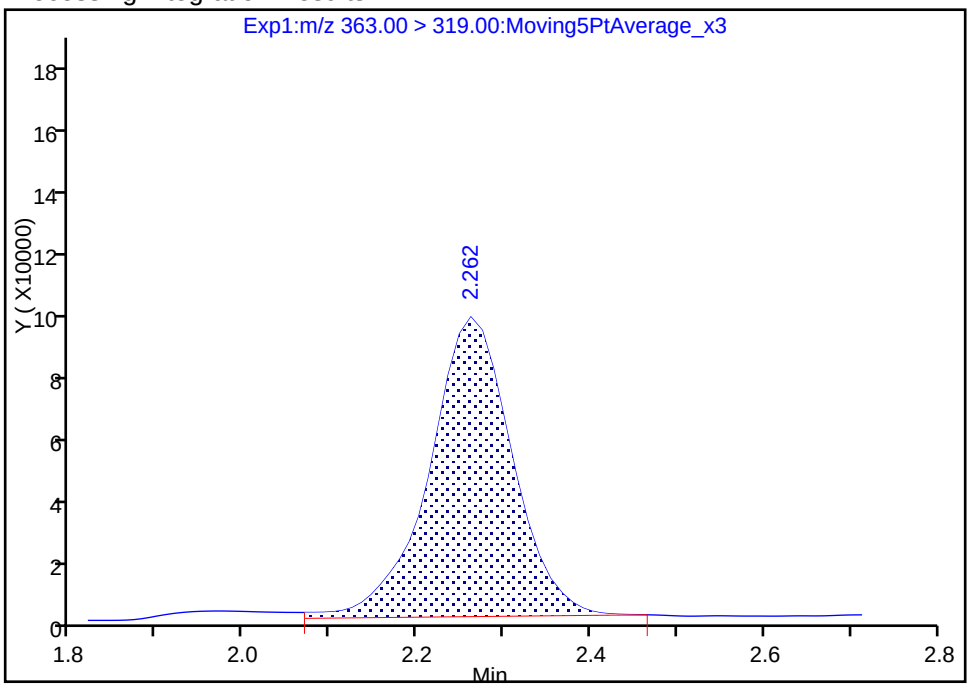
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_036.d				
Injection Date:	25-Jan-2018 22:12:11	Instrument ID:	A8_N		
Lims ID:	320-35310-B-1-A	Lab Sample ID:	320-35310-1		
Client ID:	FH-17-03_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	30	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

10 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

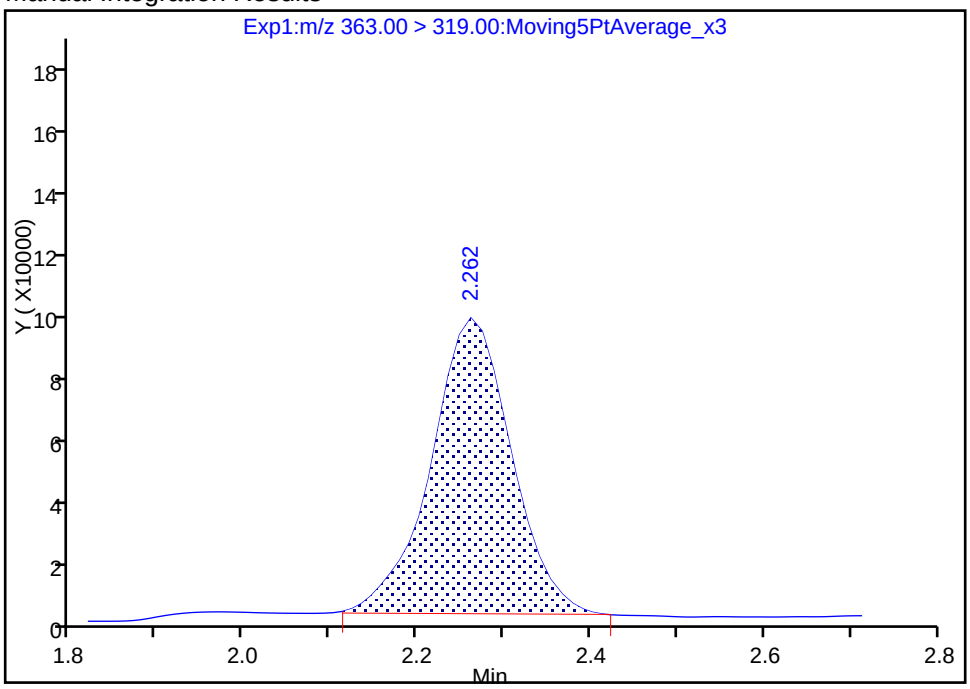
Processing Integration Results

RT: 2.26
Area: 644984
Amount: 0.321996
Amount Units: ng/ml



Manual Integration Results

RT: 2.26
Area: 617052
Amount: 0.308052
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:23:18

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

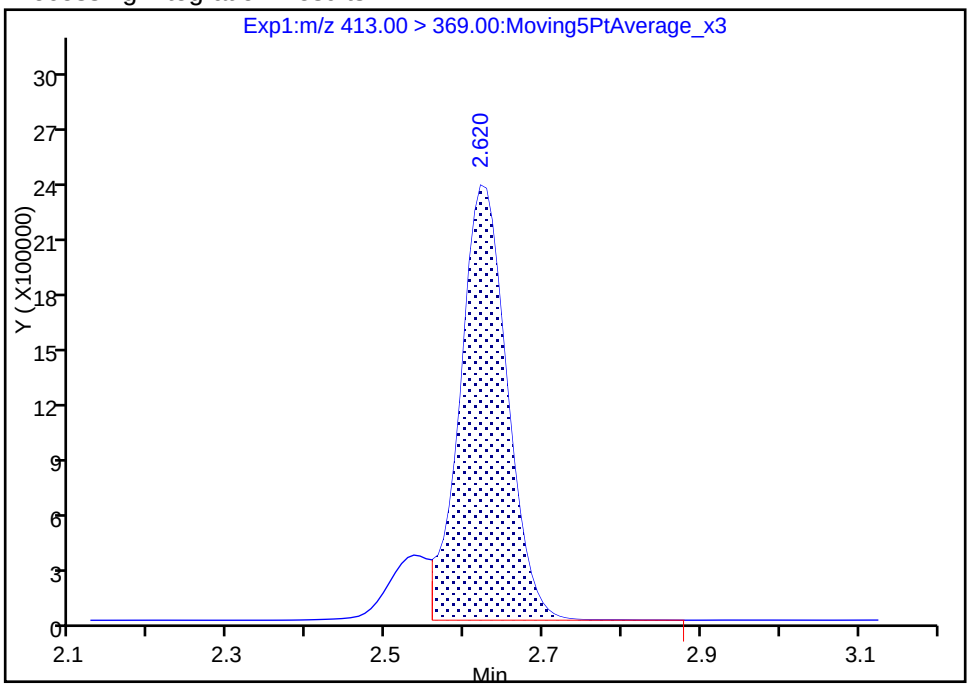
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_036.d				
Injection Date:	25-Jan-2018 22:12:11	Instrument ID:	A8_N		
Lims ID:	320-35310-B-1-A	Lab Sample ID:	320-35310-1		
Client ID:	FH-17-03_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	30	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

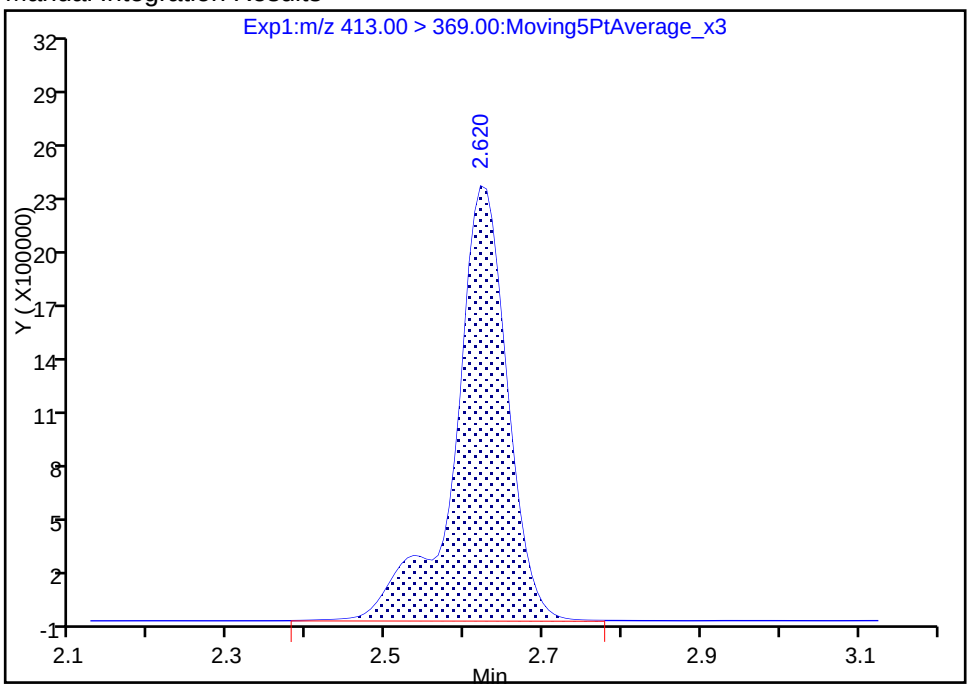
Processing Integration Results

RT: 2.62
Area: 9825983
Amount: 4.756763
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 11155618
Amount: 5.400440
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:23:44

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_036.d

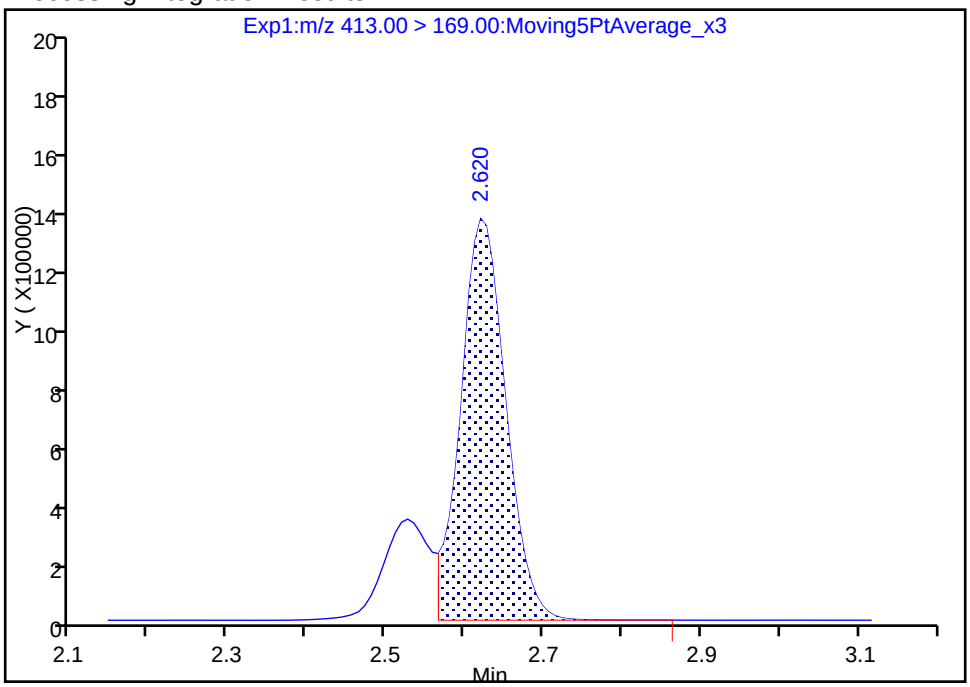
Injection Date:	25-Jan-2018 22:12:11	Instrument ID:	A8_N		
Lims ID:	320-35310-B-1-A	Lab Sample ID:	320-35310-1		
Client ID:	FH-17-03_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	30	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

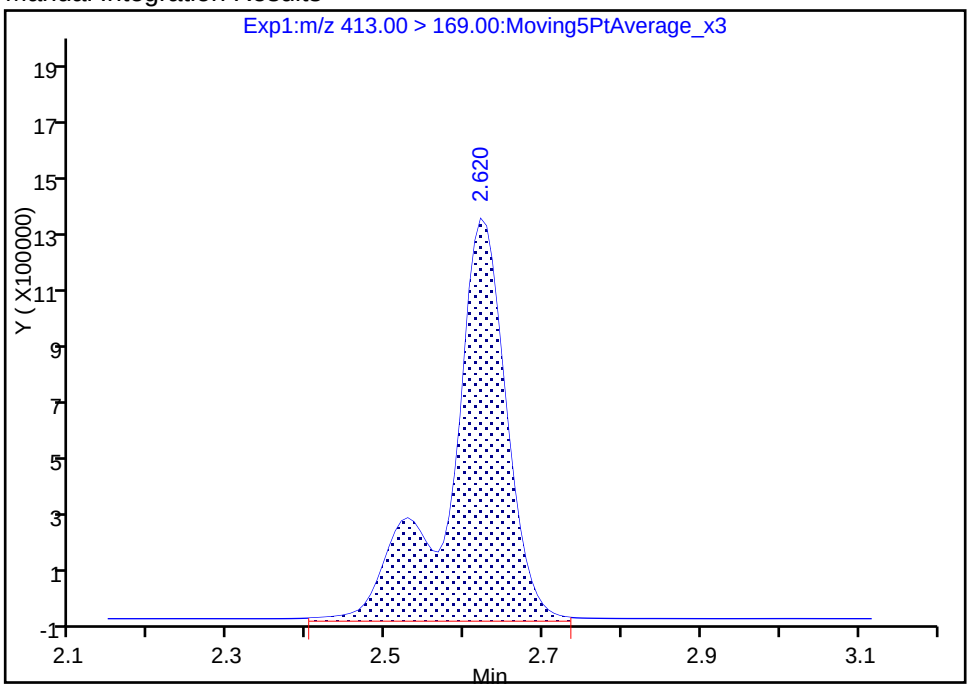
Processing Integration Results

RT: 2.62
Area: 5424779
Amount: 4.756763
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 6996004
Amount: 5.400440
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:23:53

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

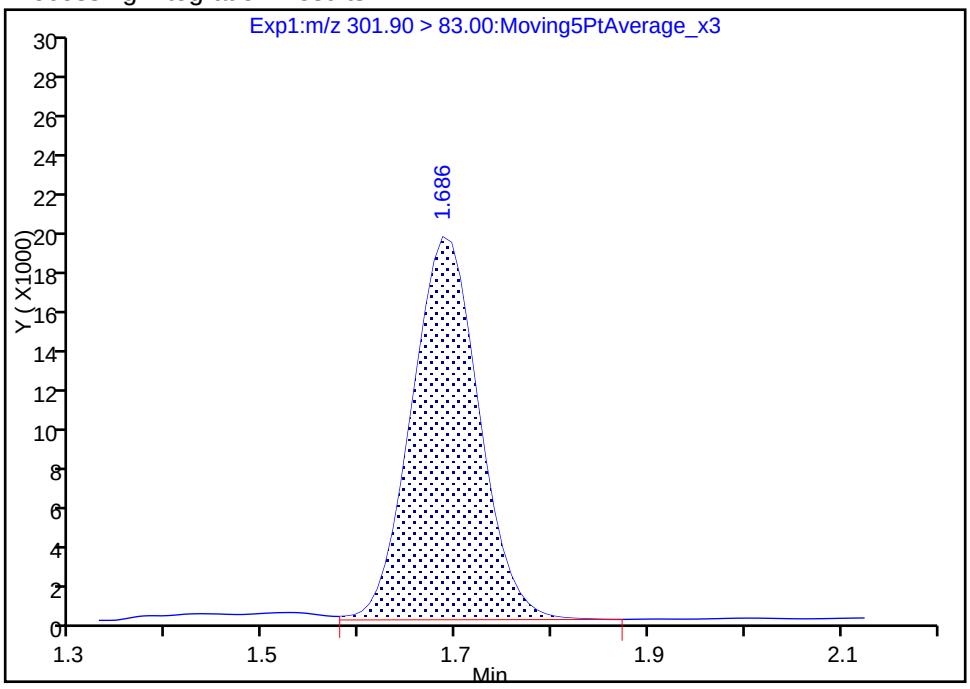
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_036.d				
Injection Date:	25-Jan-2018 22:12:11	Instrument ID:	A8_N		
Lims ID:	320-35310-B-1-A	Lab Sample ID:	320-35310-1		
Client ID:	FH-17-03_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	30	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

D 47 13C3-PFBS, CAS: STL02337

Signal: 1

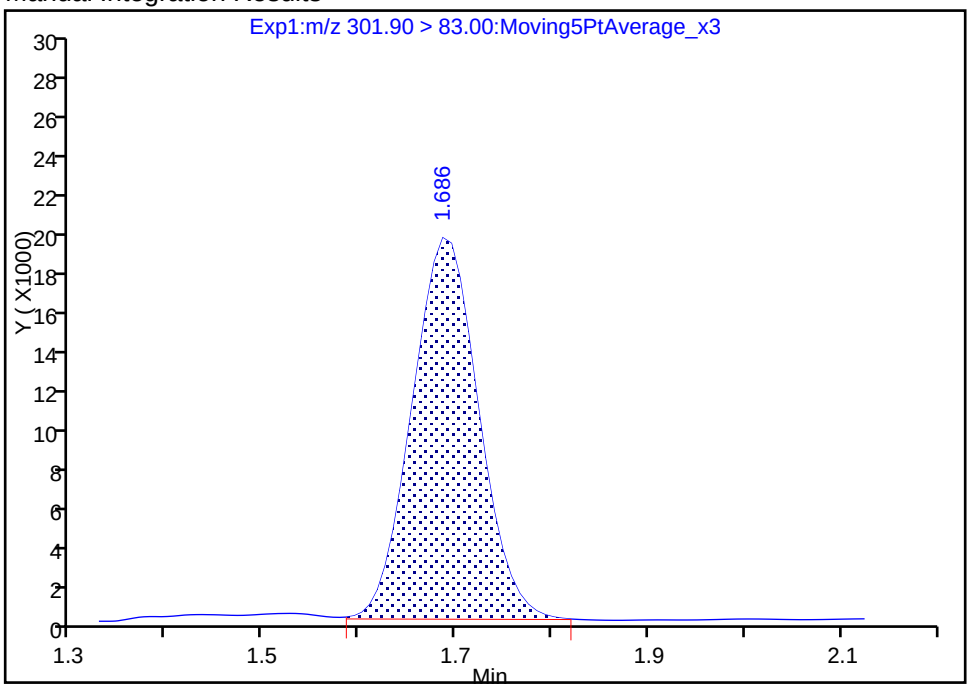
Processing Integration Results

RT: 1.69
Area: 93698
Amount: 2.502469
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 92584
Amount: 2.472717
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:25:41

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-03_GW012218 DL | Lab Sample ID: 320-35310-1 DL

Matrix: Water | Lab File ID: 2018.01.26LLA_068.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 09:15

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 161.4(mL) | Date Analyzed: 01/26/2018 21:35

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 5

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205928 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	670	D	15	7.7	2.9

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	105		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_068.d
Lims ID: 320-35310-B-1-A
Client ID: FH-17-03_GW012218
Sample Type: Client
Inject. Date: 26-Jan-2018 21:35:08 ALS Bottle#: 45 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 5.0000
Sample Info: 320-35310-b-1-a 5X
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:54:17 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: westendorfc Date: 30-Jan-2018 10:52:43

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.685	1.706	-0.021	0.644	19247	0.5042		108	346	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.694	1.706	-0.012	1.005	607386	0.1900			970	
298.90 > 99.00	1.694	1.706	-0.012	1.005	259118		2.34(1.25-3.74)		825	
D 9 13C4-PFHpA										
367.00 > 322.00	2.260	2.278	-0.018	0.863	946987	0.5353		107	9993	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.260	2.278	-0.018	1.000	136540	0.0656			175	
363.00 > 169.00	2.260	2.278	-0.018	1.000	47741		2.86(1.13-3.40)		304	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.273	2.291	-0.018	1.000	5547804	2.17			8850	
399.00 > 99.00	2.273	2.291	-0.018	1.000	1666953		3.33(1.50-4.49)		6495	
D 11 18O2 PFHxS										
403.00 > 84.00	2.273	2.291	-0.018	0.868	1086796	0.4989		105	16471	
D 14 13C4 PFOA										
417.00 > 372.00	2.618	2.635	-0.017	1.000	927216	0.5348		107	12101	
* 62 13C2-PFOA										
415.00 > 370.00	2.618	2.635	-0.017		962831	0.5000			13961	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.618	2.635	-0.017	1.000	2320064	1.07			1362	M
413.00 > 169.00	2.618	2.635	-0.017	1.000	1376022		1.69(0.84-2.52)		12964	M
D 18 13C4 PFOS										
503.00 > 80.00	2.989	3.007	-0.018	1.141	710102	0.5152		108	7587	
17 Perfluorooctane sulfonic acid										M
499.00 > 80.00	2.869	3.015	-0.146	0.960	143784	0.0865			284	
499.00 > 99.00	2.869	3.015	-0.146	0.960	22823		6.30(2.31-6.93)		109	M
D 19 13C5 PFNA										
468.00 > 423.00	2.989	3.015	-0.026	1.141	799746	0.5689		114	10816	

QC Flag Legend

Review Flags

M - Manually Integrated

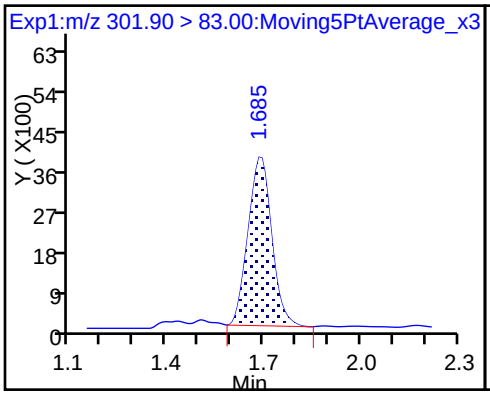
Report Date: 30-Jan-2018 10:54:21 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

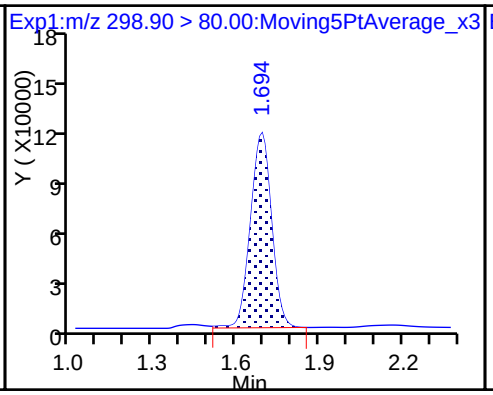
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_068.d

Injection Date:	26-Jan-2018 21:35:08	Instrument ID:	A8_N		
Lims ID:	320-35310-B-1-A	Lab Sample ID:	320-35310-1		
Client ID:	FH-17-03_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	45	Worklist Smp#:	3
Injection Vol:	2.0 ul	Dil. Factor:	5.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

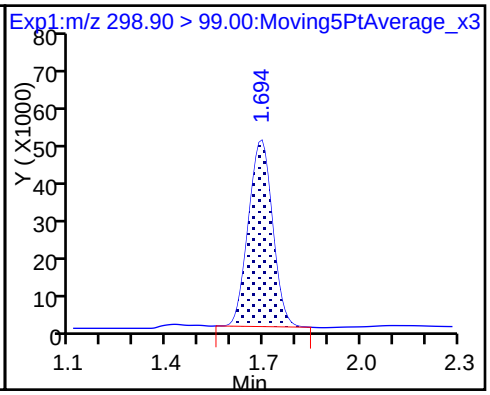
D 47 13C3-PFBS



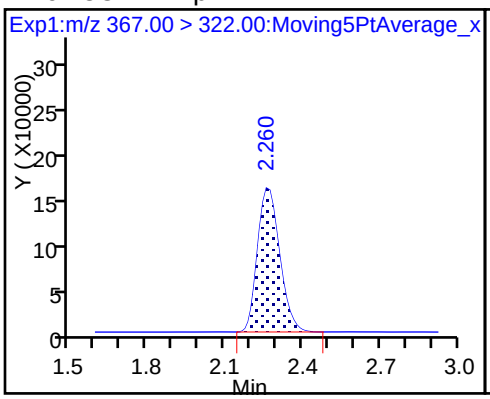
5 Perfluorobutanesulfonic acid



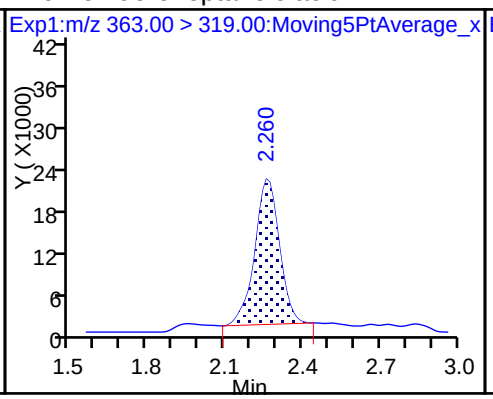
5 Perfluorobutanesulfonic acid



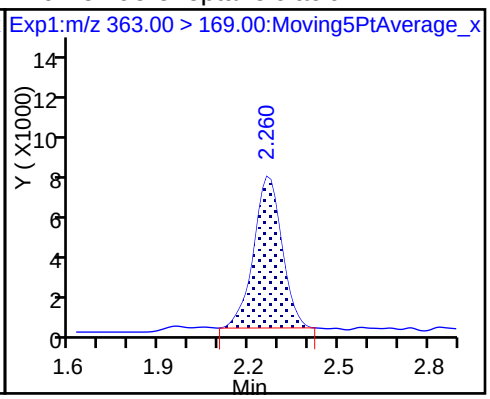
D 9 13C4-PFHpA



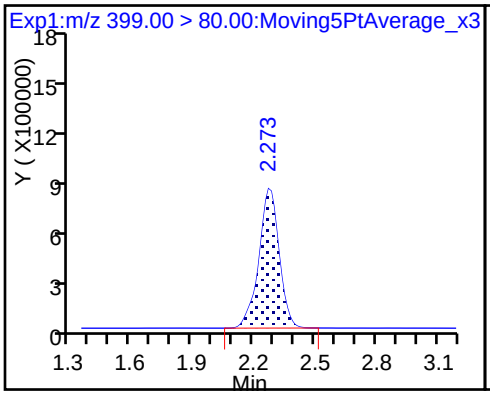
10 Perfluoroheptanoic acid



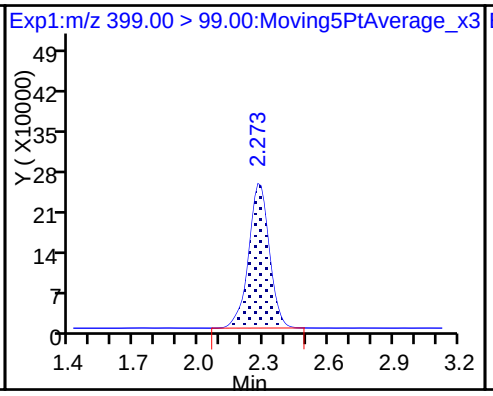
10 Perfluoroheptanoic acid



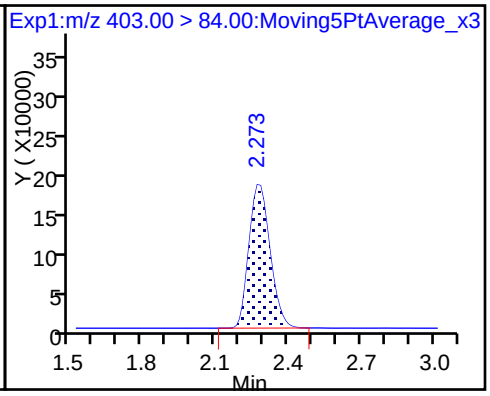
8 Perfluorohexanesulfonic acid



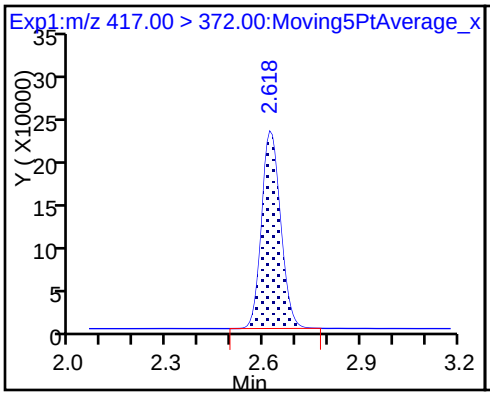
8 Perfluorohexanesulfonic acid



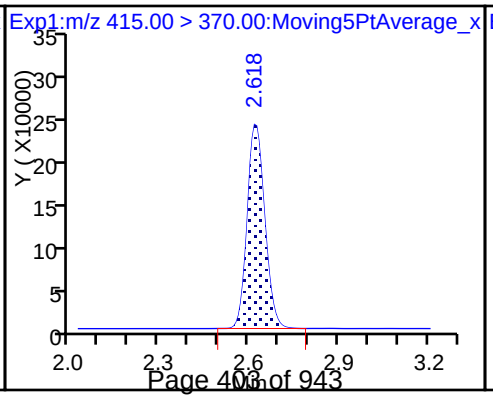
D 11 18O2 PFHxS



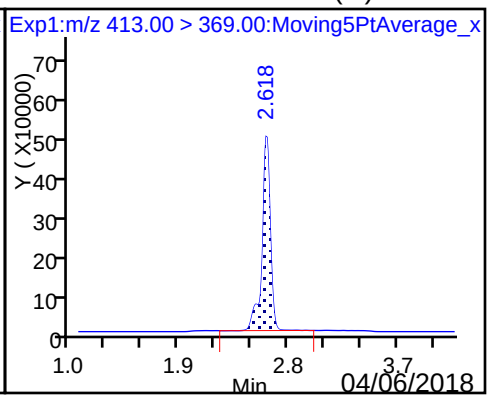
D 14 13C4 PFOA



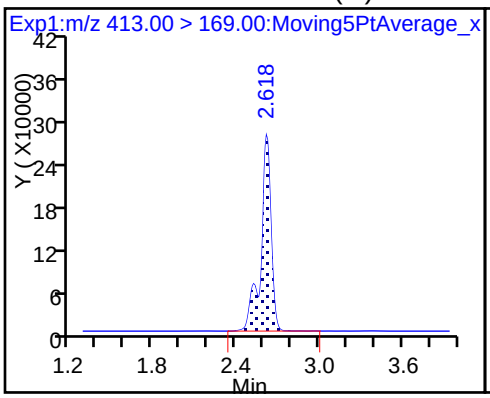
* 62 13C2-PFOA



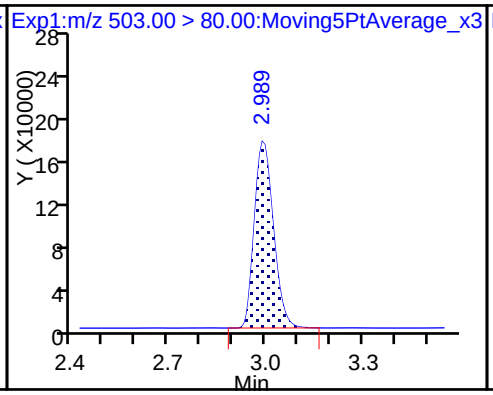
15 Perfluorooctanoic acid (M)



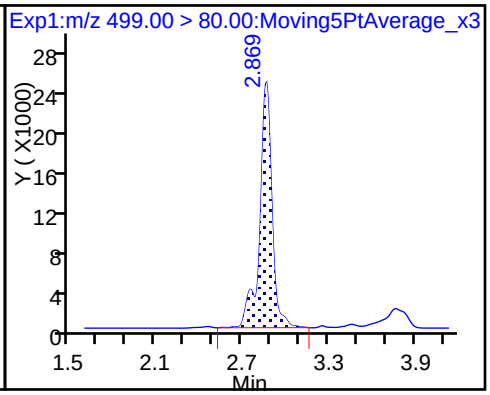
15 Perfluorooctanoic acid (M)



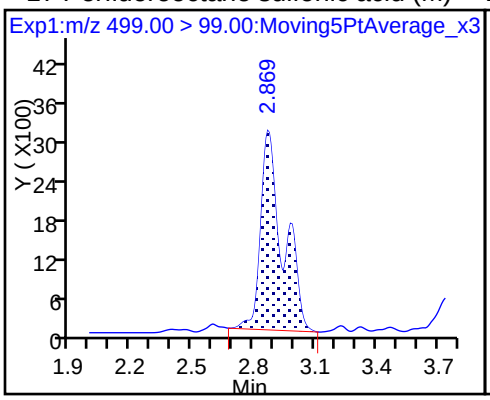
D 18 13C4 PFOS



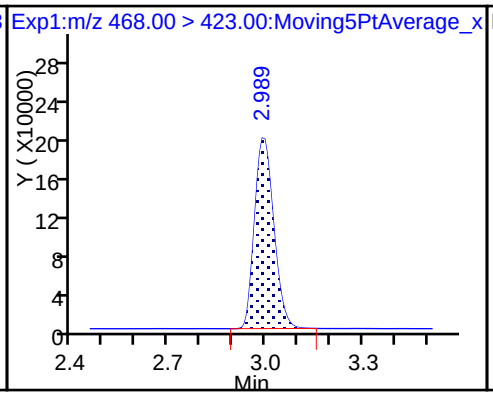
17 Perfluorooctane sulfonic acid



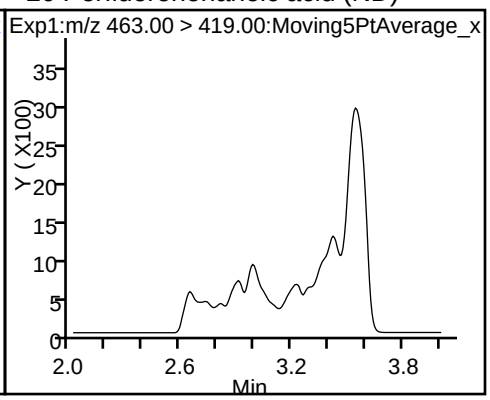
17 Perfluorooctane sulfonic acid (M)



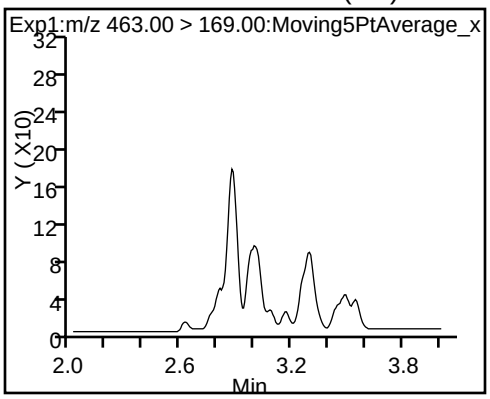
D 19 13C5 PFNA



20 Perfluorononanoic acid (ND)



20 Perfluorononanoic acid (ND)



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-DUP01 | Lab Sample ID: 320-35310-2

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_037.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 09:15

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 251.1(mL) | Date Analyzed: 01/25/2018 22:20

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	67	M	2.0	1.0	0.46
375-85-9	Perfluoroheptanoic acid (PFHpA)	18	M	2.0	1.5	0.61
335-67-1	Perfluorooctanoic acid (PFOA)	260	M	2.0	1.5	0.54
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	18		4.0	3.0	1.1
375-95-1	Perfluorononanoic acid (PFNA)	1.5	U	2.0	1.5	0.52

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL01892	13C4-PFHpA	98		25-150
STL00990	13C4 PFOA	109		25-150
STL00991	13C4 PFOS	112		25-150
STL00995	13C5 PFNA	117		25-150
STL02337	13C3-PFBS	97	M	25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_037.d
Lims ID: 320-35310-A-2-A
Client ID: FH-DUP01
Sample Type: Client
Inject. Date: 25-Jan-2018 22:20:03 ALS Bottle#: 31 Worklist Smp#: 5
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-2-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:27:45

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										M
301.90 > 83.00	1.703	1.695	0.008	0.649	87574	2.26		97.0	624	M
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.703	1.697	0.006	1.000	4873259	1.68			1057	M
298.90 > 99.00	1.703	1.697	0.006	1.000	1948738		2.50(1.25-3.74)		1125	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.272	2.267	0.005	0.866	4403783	2.45		97.9	33041	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.272	2.268	0.004	1.000	857775	0.4431			487	M
363.00 > 169.00	2.272	2.268	0.004	1.000	356068		2.41(1.13-3.40)		1651	
8 Perfluorohexanesulfonic acid										E
399.00 > 80.00	2.286	2.280	0.006	1.000	29461144	11.1			9118	E
399.00 > 99.00	2.286	2.280	0.006	1.000	10046414		2.93(1.50-4.49)		10560	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.871	5625131	2.54		107	44080	
D 14 13C4 PFOA										
417.00 > 372.00	2.625	2.622	0.003	1.000	4783275	2.71		109	46811	
* 62 13C2-PFOA										
415.00 > 370.00	2.625	2.622	0.003		4895634	2.50			48091	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.632	2.623	0.009	1.003	14560041	6.49			6439	M
413.00 > 169.00	2.632	2.623	0.009	1.003	8946710		1.63(0.84-2.52)		19534	M
D 19 13C5 PFNA										
468.00 > 423.00	3.004	2.992	0.012	1.144	4168451	2.92		117	39198	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.876	2.992	-0.116	0.960	784131	0.4467			795	
499.00 > 99.00	2.883	2.992	-0.109	0.962	105166		7.46(2.31-6.93)		307	
D 18 13C4 PFOS										
503.00 > 80.00	2.996	2.992	0.004	1.141	3748042	2.67		112	10698	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										R
463.00 > 419.00	3.004	2.992	0.012	1.000	13869	0.008058			11.5	R
463.00 > 169.00	3.004	2.992	0.012	1.000	1939		7.15(1.90-5.69)		21.8	

QC Flag Legend

Processing Flags

R - Failed Signal Ratio Test

E - Exceeded Maximum Amount

Review Flags

M - Manually Integrated

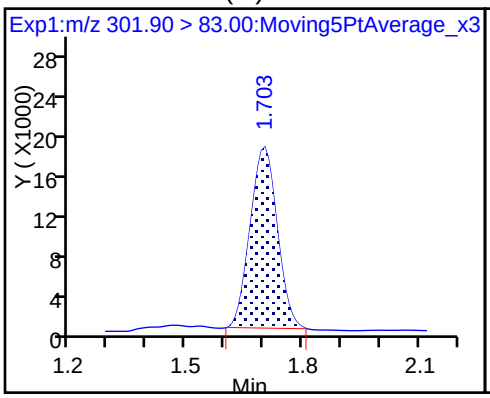
Report Date: 30-Jan-2018 10:22:39 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

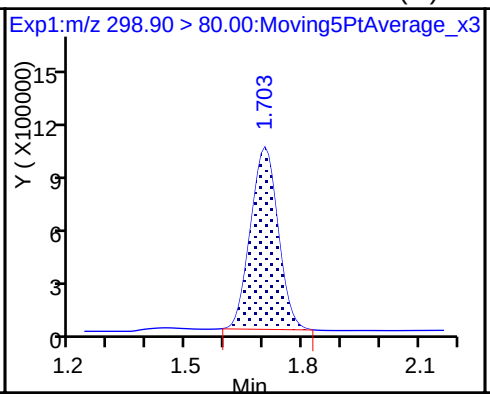
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_037.d

Injection Date:	25-Jan-2018 22:20:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-2-A	Lab Sample ID:	320-35310-2		
Client ID:	FH-DUP01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	31	Worklist Smp#:	5
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

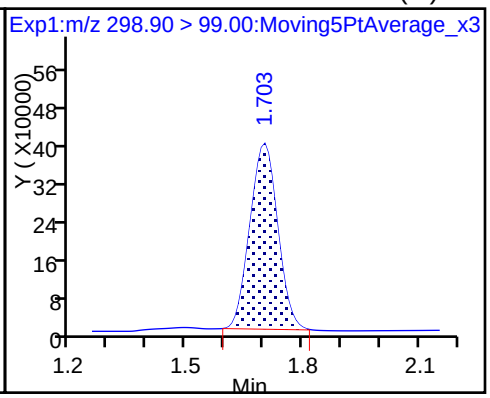
D 47 13C3-PFBS (M)



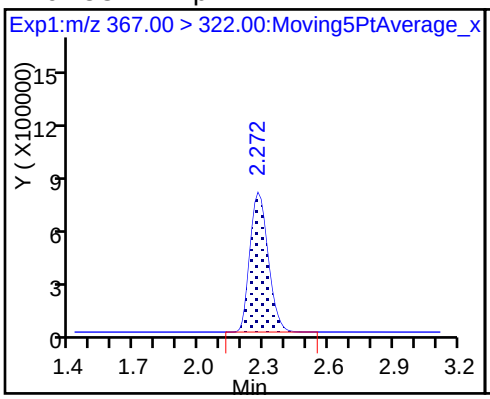
5 Perfluorobutanesulfonic acid (M)



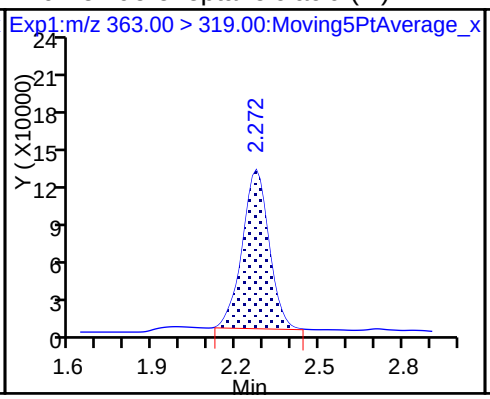
5 Perfluorobutanesulfonic acid (M)



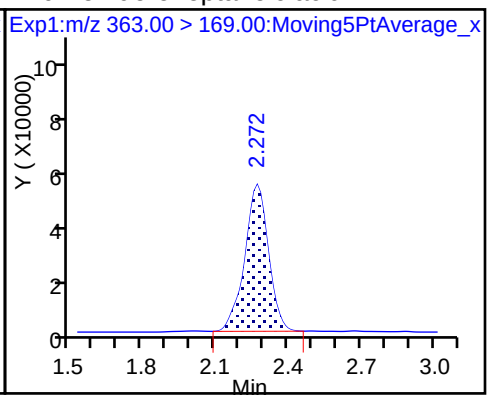
D 9 13C4-PFHpA



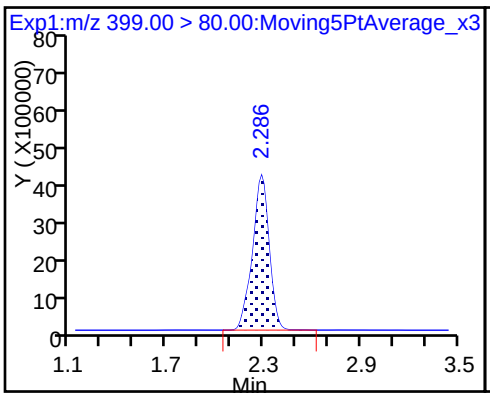
10 Perfluoroheptanoic acid (M)



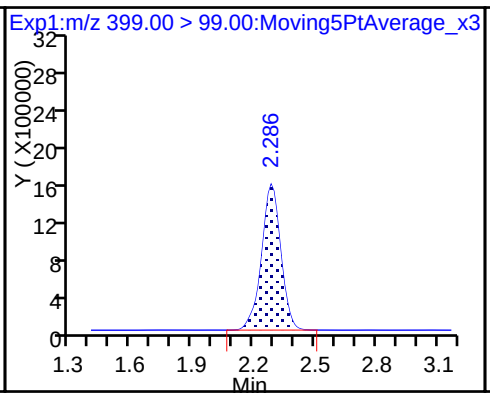
10 Perfluoroheptanoic acid



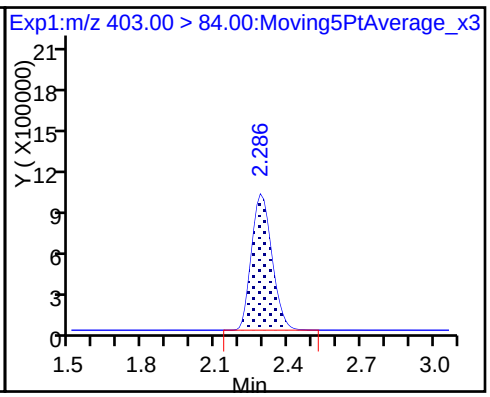
8 Perfluorohexanesulfonic acid



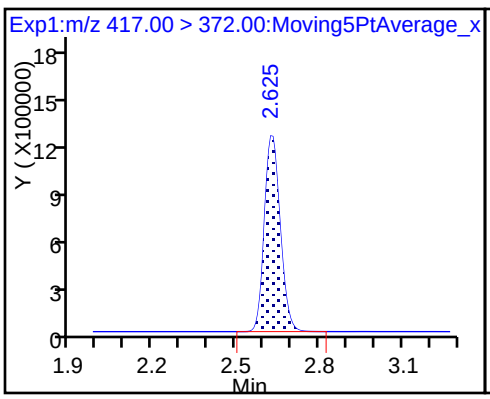
8 Perfluorohexanesulfonic acid



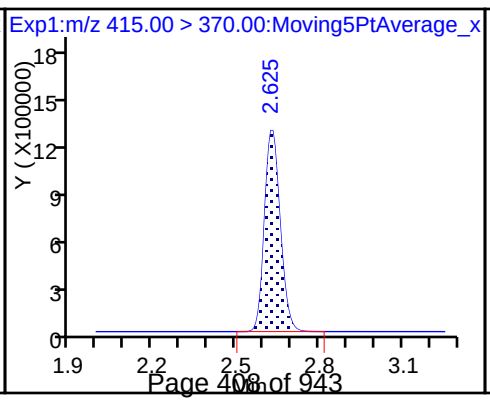
D 11 18O2 PFHxS



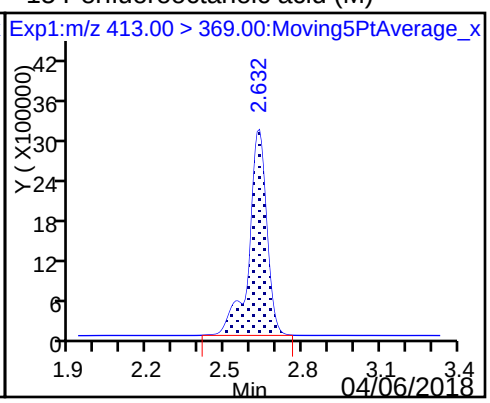
D 14 13C4 PFOA



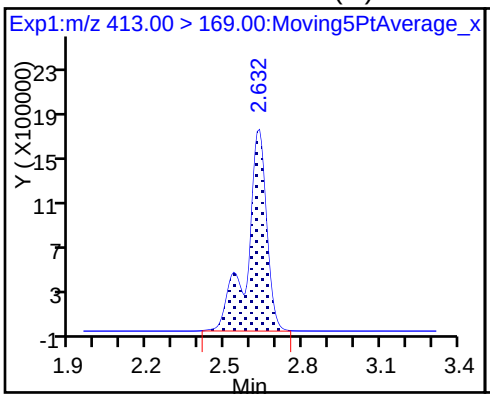
* 62 13C2-PFOA



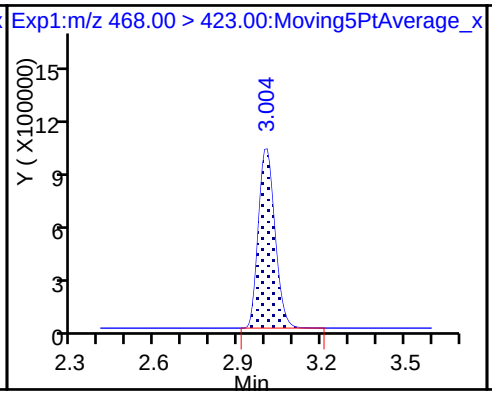
15 Perfluorooctanoic acid (M)



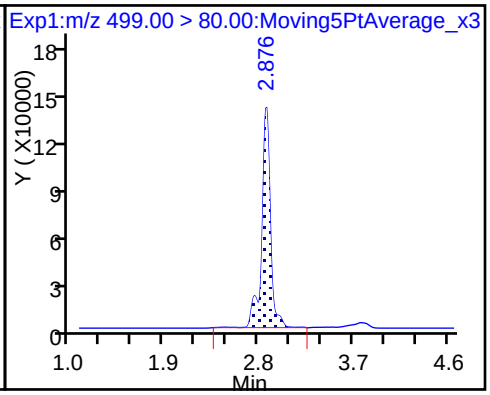
15 Perfluorooctanoic acid (M)



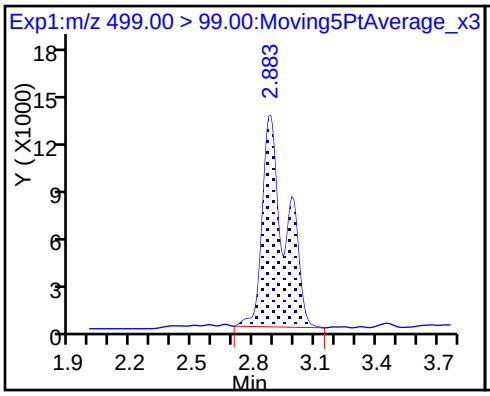
D 19 13C5 PFNA



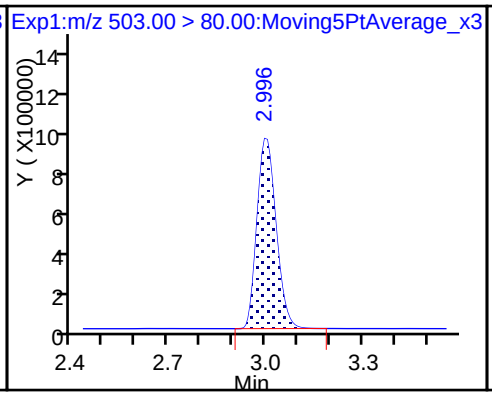
17 Perfluorooctane sulfonic acid



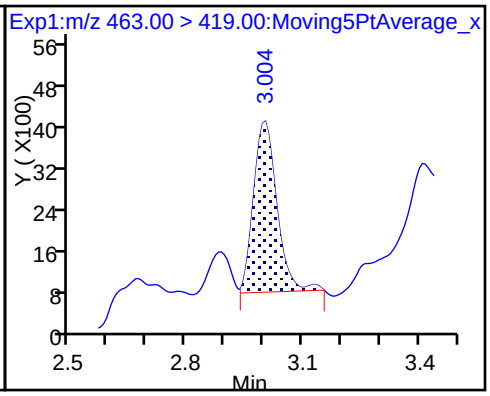
17 Perfluorooctane sulfonic acid



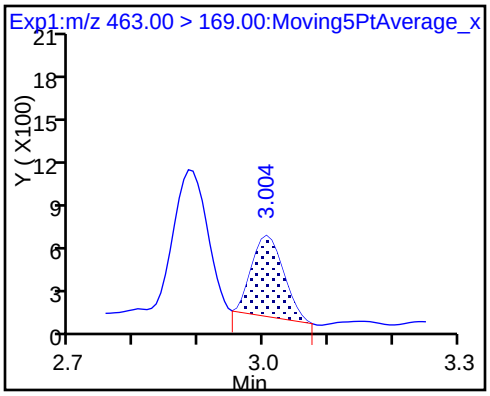
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

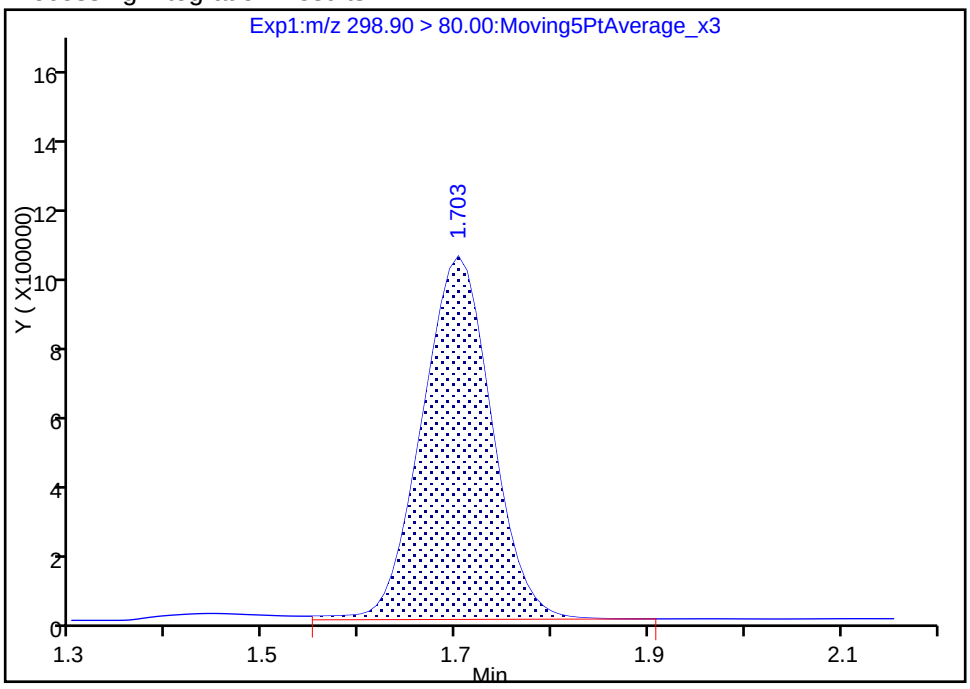
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_037.d				
Injection Date:	25-Jan-2018 22:20:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-2-A	Lab Sample ID:	320-35310-2		
Client ID:	FH-DUP01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	31	Worklist Smp#:	5
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

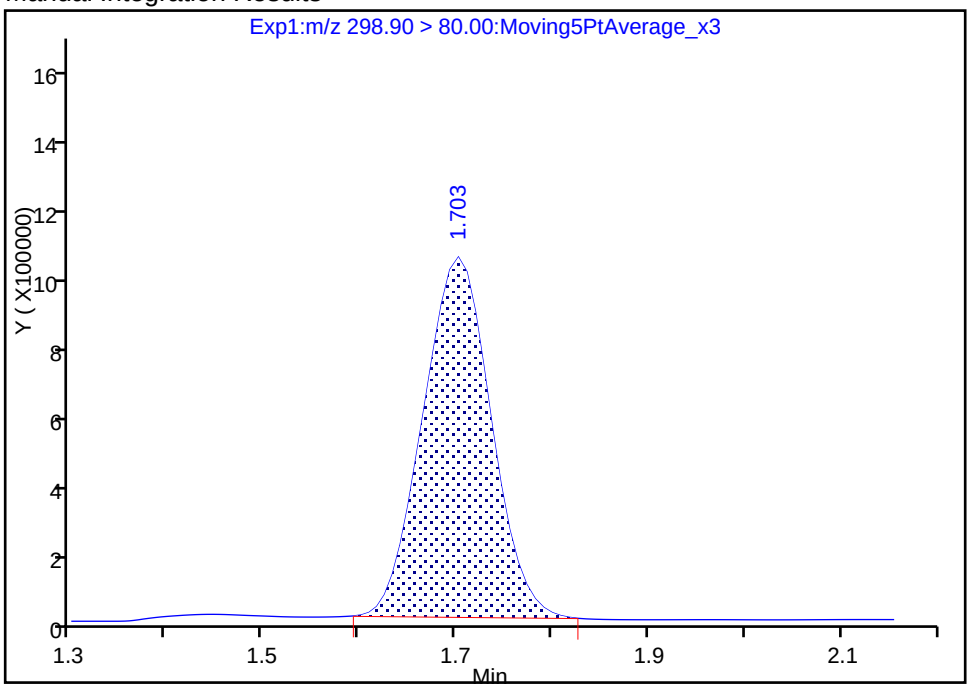
Processing Integration Results

RT: 1.70
Area: 5014259
Amount: 1.724110
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 4873259
Amount: 1.675628
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:26:20

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_037.d

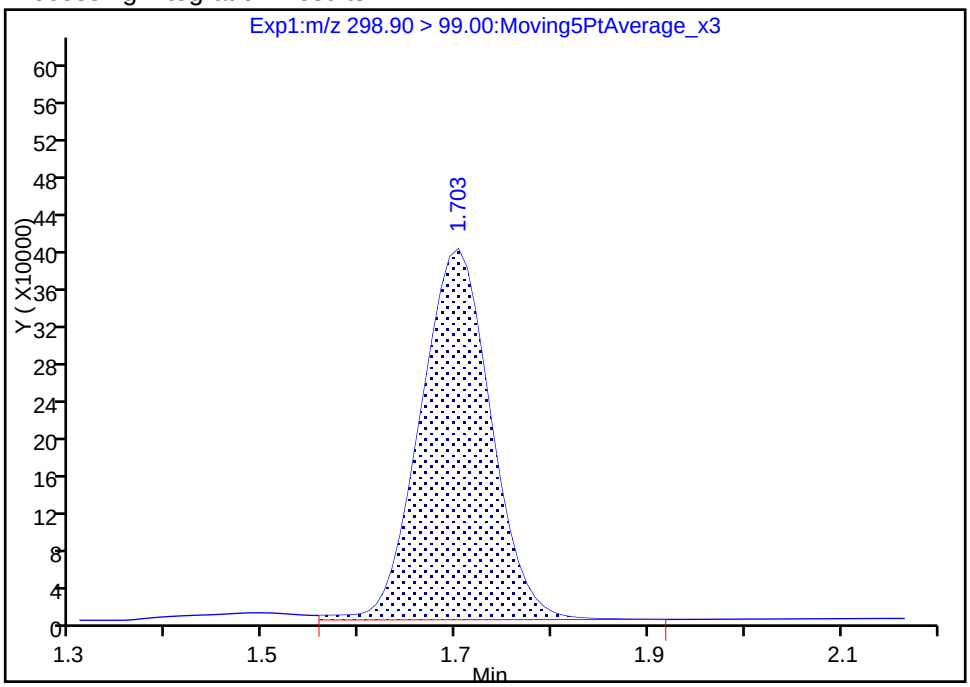
Injection Date:	25-Jan-2018 22:20:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-2-A	Lab Sample ID:	320-35310-2		
Client ID:	FH-DUP01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	31	Worklist Smp#:	5
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

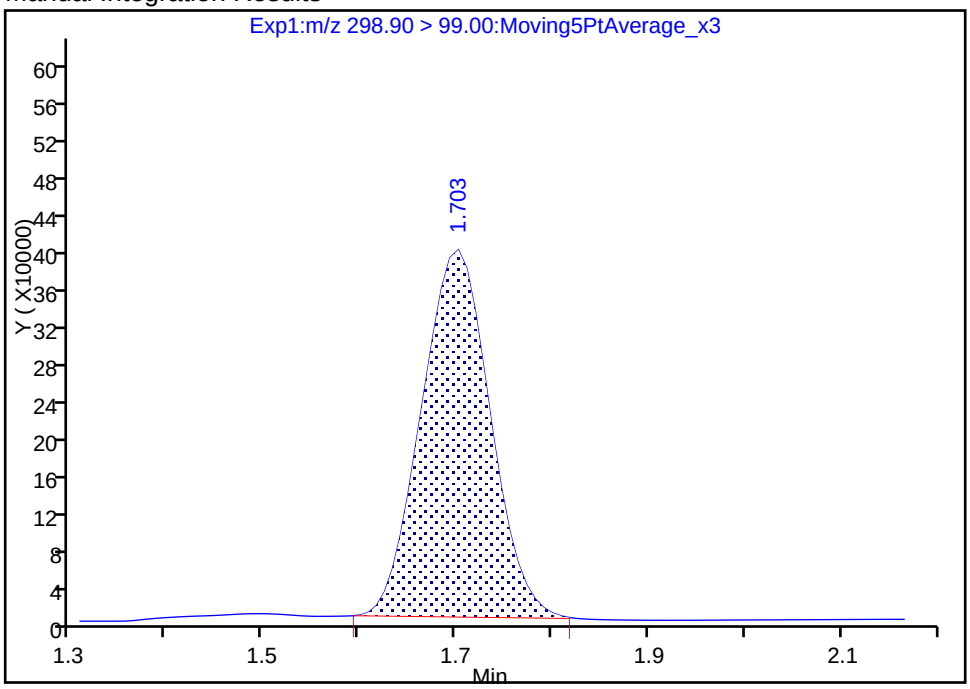
Processing Integration Results

RT: 1.70
Area: 2014506
Amount: 1.724110
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 1948738
Amount: 1.675628
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:26:29

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

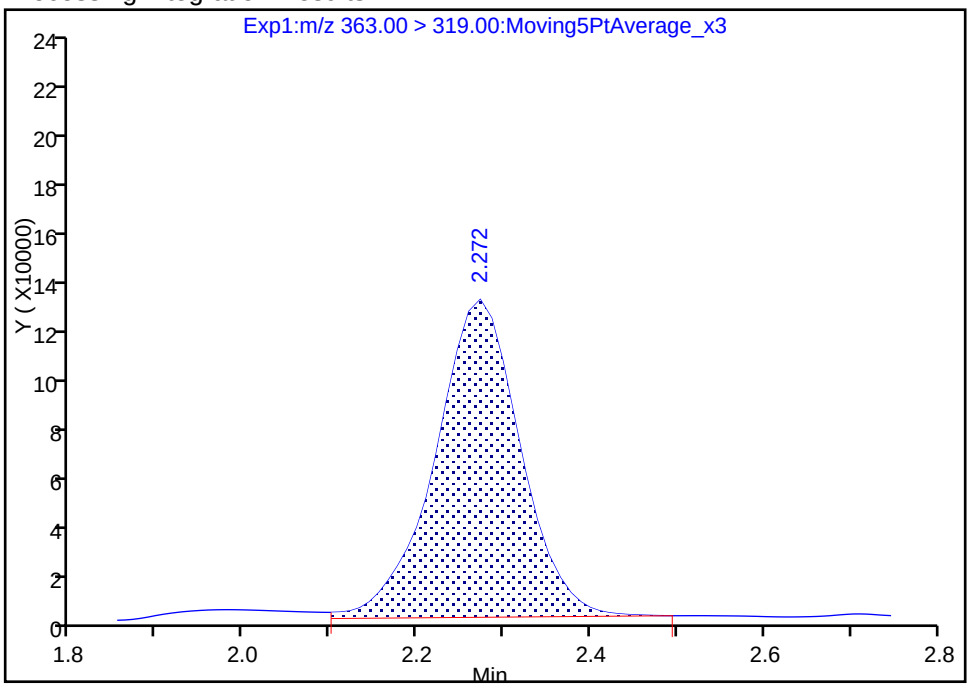
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_037.d				
Injection Date:	25-Jan-2018 22:20:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-2-A	Lab Sample ID:	320-35310-2		
Client ID:	FH-DUP01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	31	Worklist Smp#:	5
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

10 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

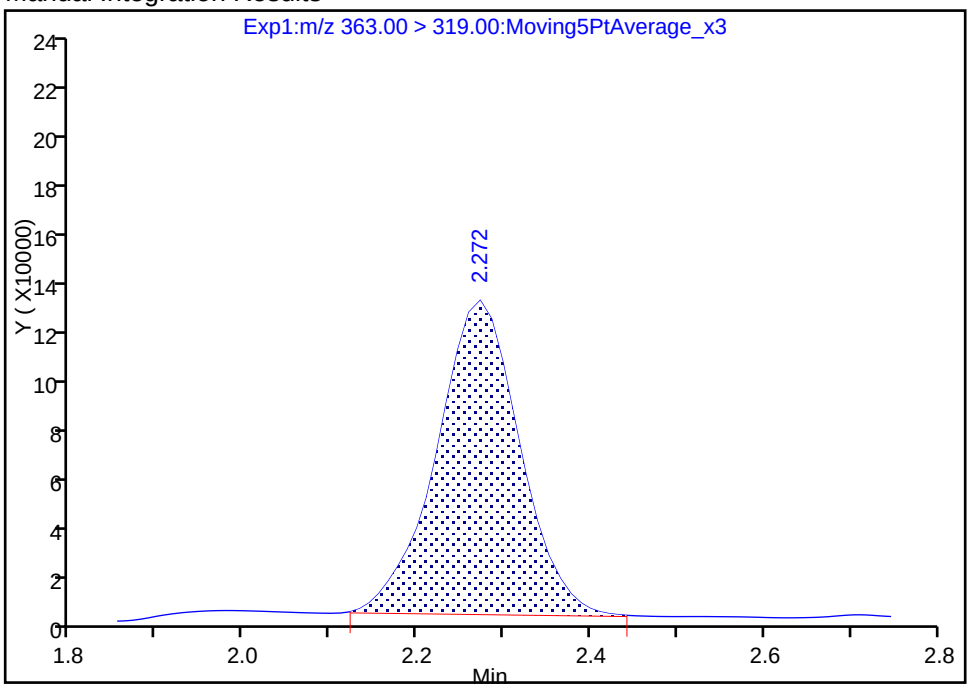
Processing Integration Results

RT: 2.27
Area: 888669
Amount: 0.459038
Amount Units: ng/ml



Manual Integration Results

RT: 2.27
Area: 857775
Amount: 0.443079
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:26:46

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

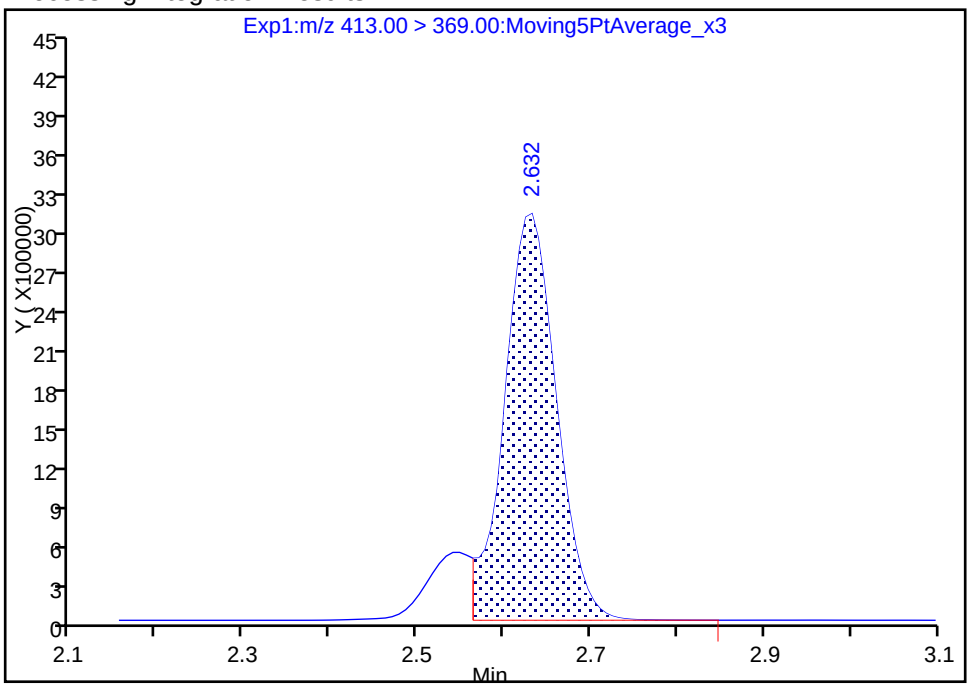
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_037.d				
Injection Date:	25-Jan-2018 22:20:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-2-A	Lab Sample ID:	320-35310-2		
Client ID:	FH-DUP01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	31	Worklist Smp#:	5
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

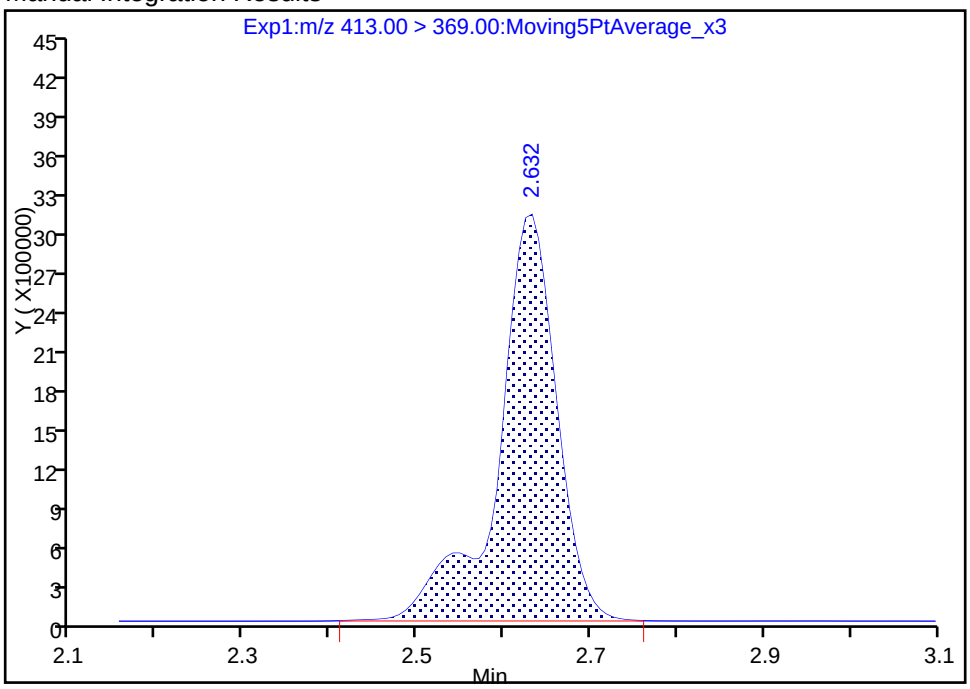
Processing Integration Results

RT: 2.63
Area: 12792460
Amount: 5.704367
Amount Units: ng/ml



Manual Integration Results

RT: 2.63
Area: 14560041
Amount: 6.492560
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:27:05

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

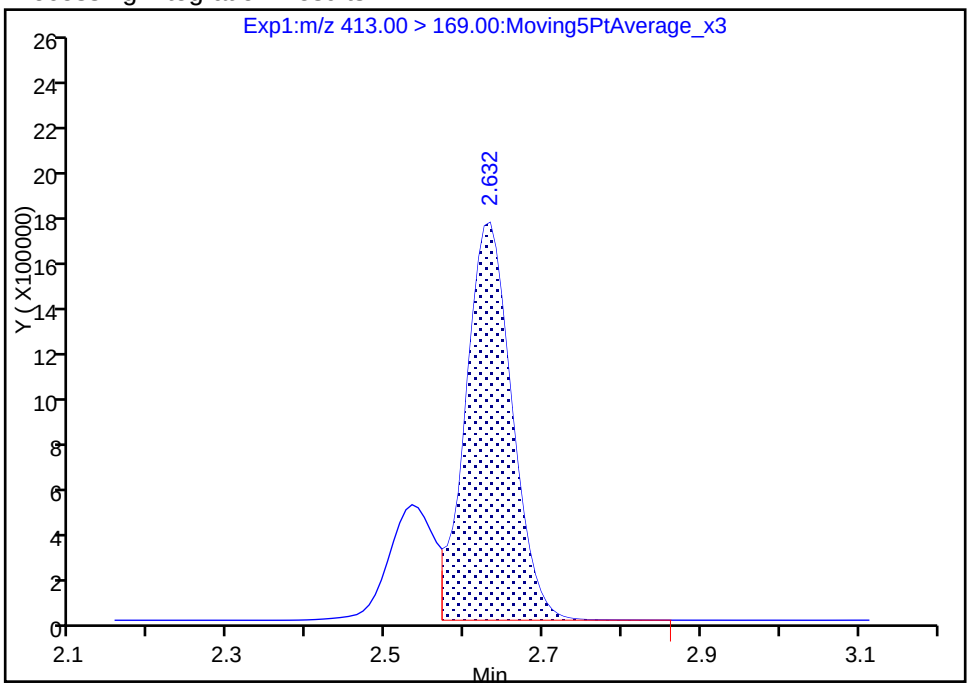
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_037.d				
Injection Date:	25-Jan-2018 22:20:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-2-A	Lab Sample ID:	320-35310-2		
Client ID:	FH-DUP01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	31	Worklist Smp#:	5
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

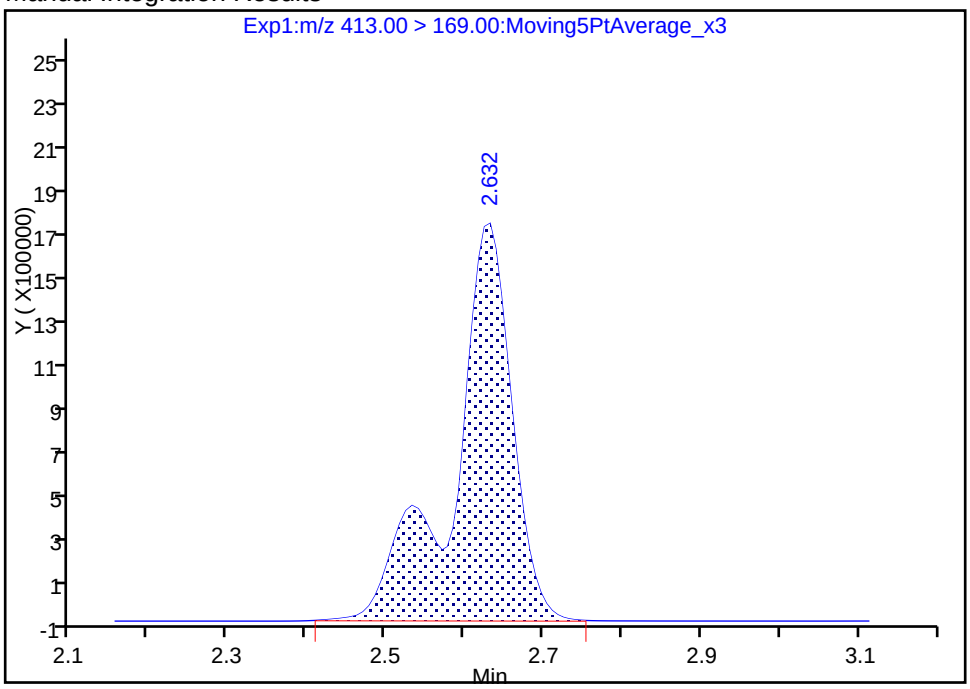
Processing Integration Results

RT: 2.63
Area: 6974066
Amount: 5.704367
Amount Units: ng/ml



Manual Integration Results

RT: 2.63
Area: 8946710
Amount: 6.492560
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:27:28

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

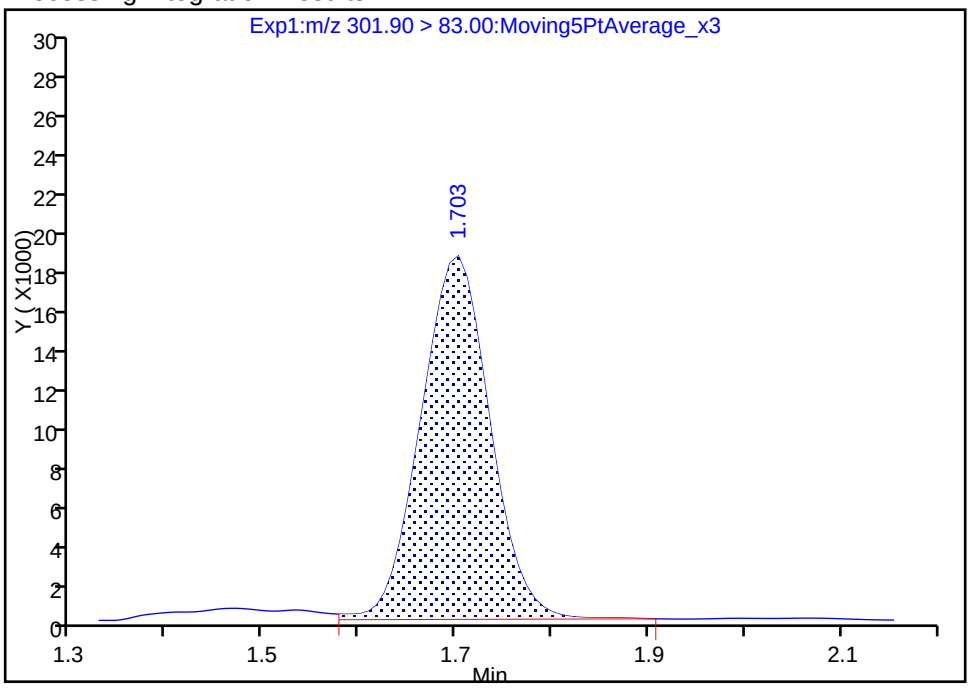
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_037.d				
Injection Date:	25-Jan-2018 22:20:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-2-A	Lab Sample ID:	320-35310-2		
Client ID:	FH-DUP01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	31	Worklist Smp#:	5
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

D 47 13C3-PFBS, CAS: STL02337

Signal: 1

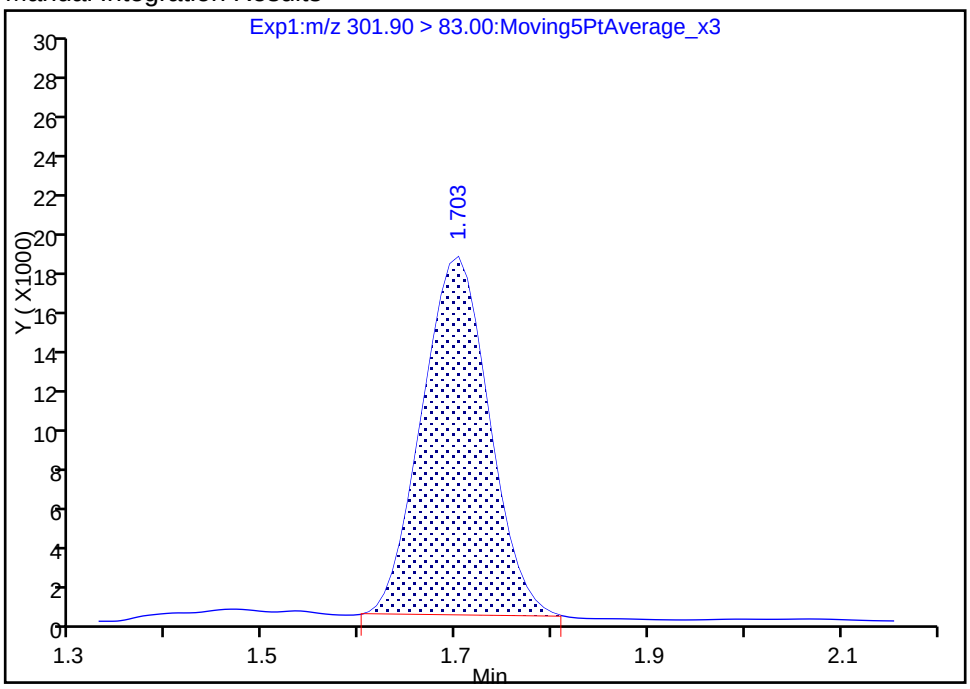
Processing Integration Results

RT: 1.70
Area: 91712
Amount: 2.362697
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 87574
Amount: 2.256093
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:26:01

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-DUP01 DL | Lab Sample ID: 320-35310-2 DL

Matrix: Water | Lab File ID: 2018.01.26LLA_069.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 09:15

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 251.1(mL) | Date Analyzed: 01/26/2018 21:42

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 5

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205928 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	540	D	10	5.0	1.9

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	108		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_069.d
Lims ID: 320-35310-A-2-A
Client ID: FH-DUP01
Sample Type: Client
Inject. Date: 26-Jan-2018 21:42:57 ALS Bottle#: 46 Worklist Smp#: 4
Injection Vol: 2.0 ul Dil. Factor: 5.0000
Sample Info: 320-35310-a-2-a 5X
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:54:25 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: westendorfc Date: 30-Jan-2018 10:53:01

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.690	1.706	-0.016	0.646	20679	0.5280		114	399	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.690	1.706	-0.016	1.000	1015880	0.2959			1046	
298.90 > 99.00	1.690	1.706	-0.016	1.000	432701		2.35(1.25-3.74)		797	
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.278	-0.012	0.866	953324	0.5252		105	8560	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.253	2.278	-0.025	0.994	189852	0.0906			228	
363.00 > 169.00	2.253	2.278	-0.025	0.994	70808		2.68(1.13-3.40)		527	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.280	2.291	-0.011	1.000	7191426	2.69			7647	
399.00 > 99.00	2.280	2.291	-0.011	1.000	2195249		3.28(1.50-4.49)		6840	
D 11 18O2 PFHxS										
403.00 > 84.00	2.280	2.291	-0.011	0.871	1136426	0.5085		108	21339	
D 14 13C4 PFOA										
417.00 > 372.00	2.617	2.635	-0.018	1.000	993311	0.5584		112	13135	
* 62 13C2-PFOA										
415.00 > 370.00	2.617	2.635	-0.018		987856	0.5000			12839	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.617	2.635	-0.018	1.000	3055658	1.31			1722	M
413.00 > 169.00	2.617	2.635	-0.018	1.000	1789337		1.71(0.84-2.52)		19287	M
D 18 13C4 PFOS										
503.00 > 80.00	2.987	3.007	-0.020	1.141	776975	0.5494		115	6610	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.860	3.015	-0.155	0.958	156751	0.0861			254	
499.00 > 99.00	2.867	3.015	-0.148	0.960	22809		6.87(2.31-6.93)		124	
D 19 13C5 PFNA										
468.00 > 423.00	2.987	3.015	-0.028	1.141	791919	0.5491		110	16206	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:56:13 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_069.d

Injection Date: 26-Jan-2018 21:42:57 Instrument ID: A8_N

Lims ID: 320-35310-A-2-A Lab Sample ID: 320-35310-2

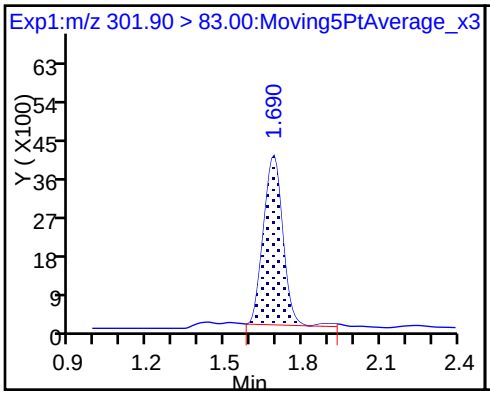
Client ID: FH-DUP01

Operator ID: SACINSTLCMS01 ALS Bottle#: 46 Worklist Smp#: 4

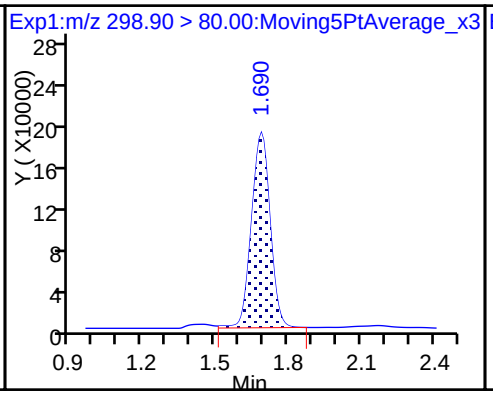
Injection Vol: 2.0 ul Dil. Factor: 5.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

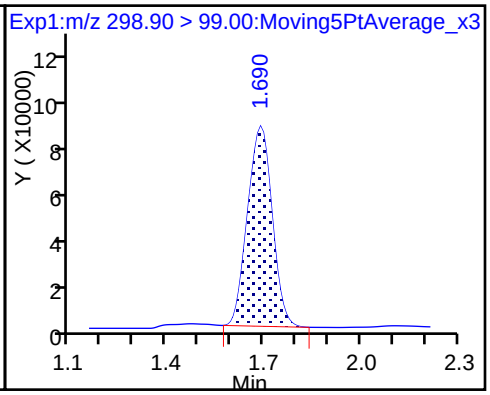
D 47 13C3-PFBS



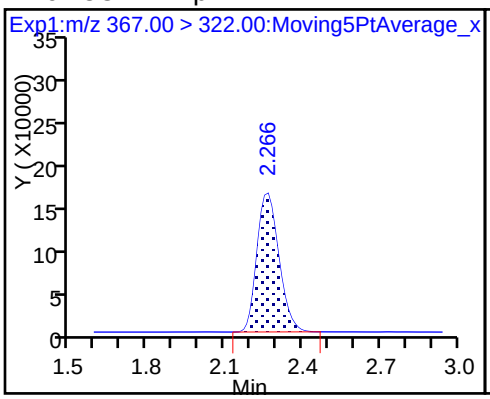
5 Perfluorobutanesulfonic acid



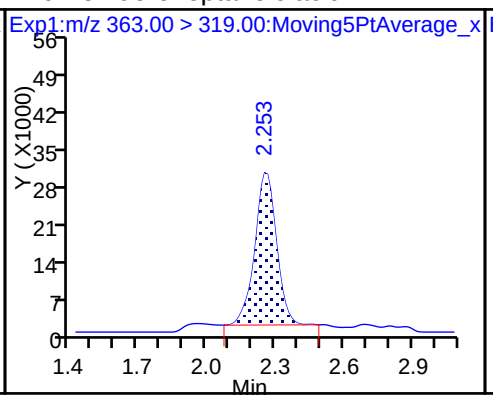
5 Perfluorobutanesulfonic acid



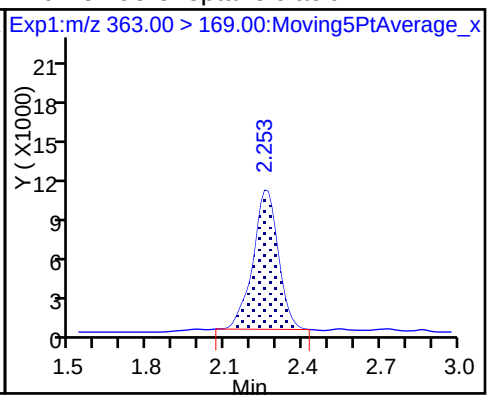
D 9 13C4-PFHpA



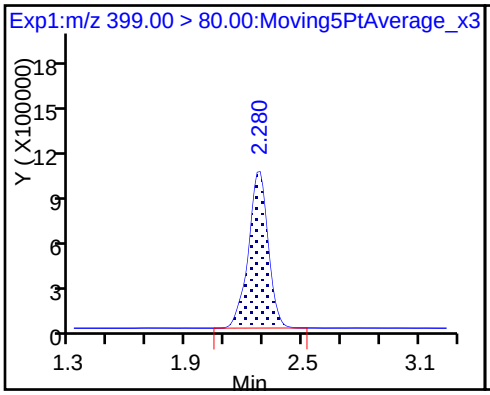
10 Perfluoroheptanoic acid



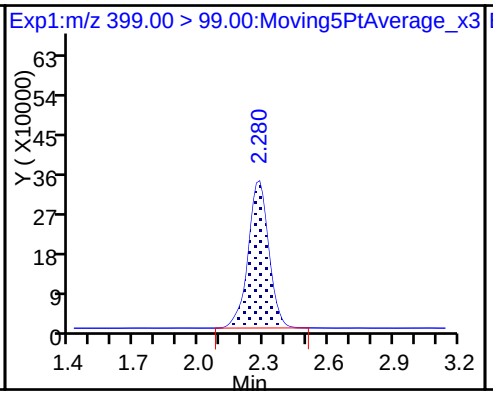
10 Perfluoroheptanoic acid



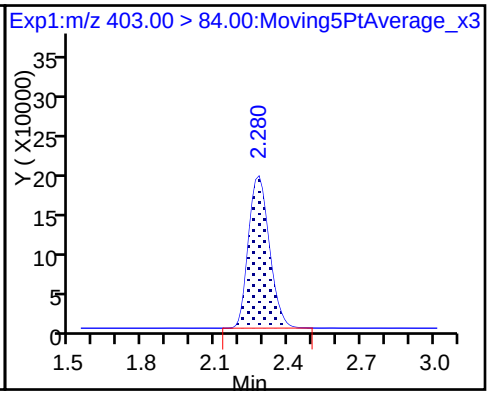
8 Perfluorohexanesulfonic acid



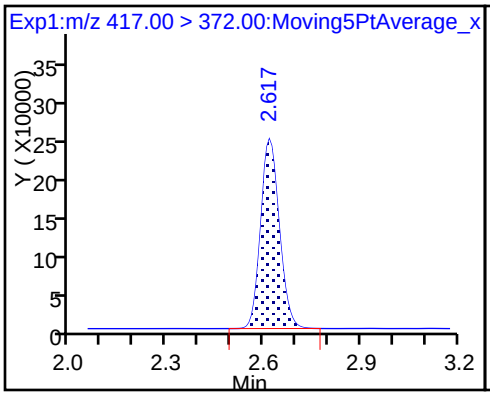
8 Perfluorohexanesulfonic acid



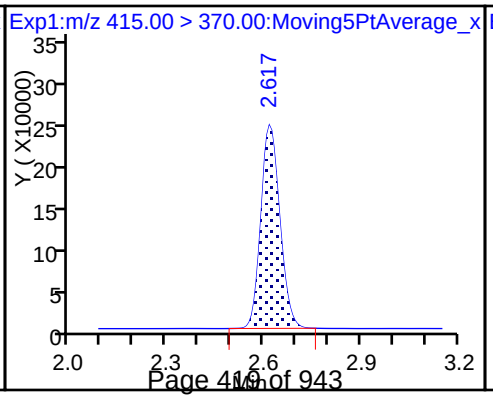
D 11 18O2 PFHxS



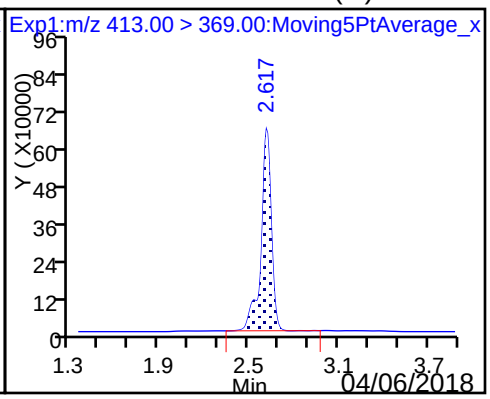
D 14 13C4 PFOA



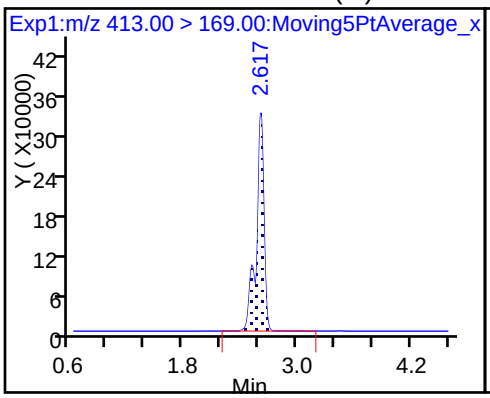
* 62 13C2-PFOA



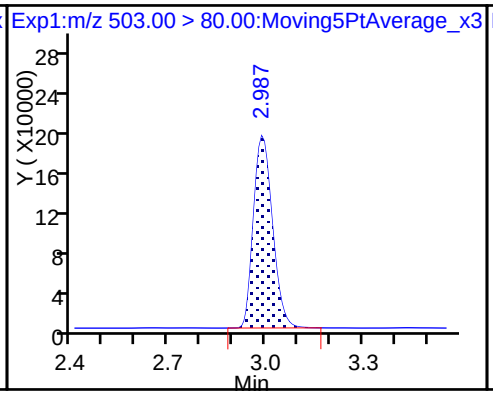
15 Perfluorooctanoic acid (M)



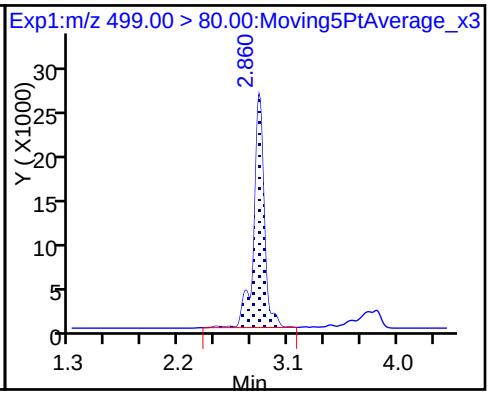
15 Perfluorooctanoic acid (M)



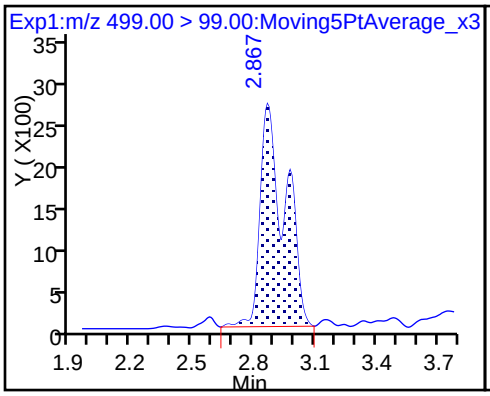
D 18 13C4 PFOS



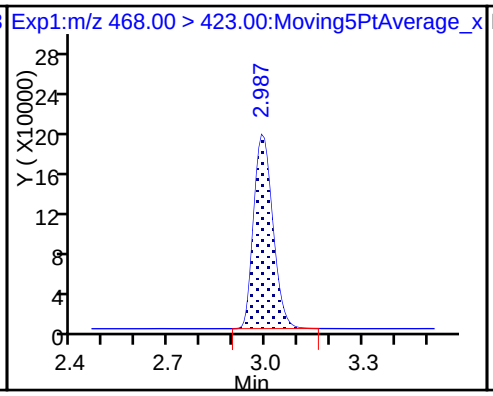
17 Perfluorooctane sulfonic acid



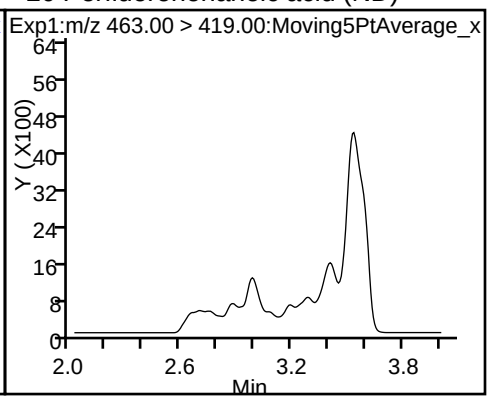
17 Perfluorooctane sulfonic acid



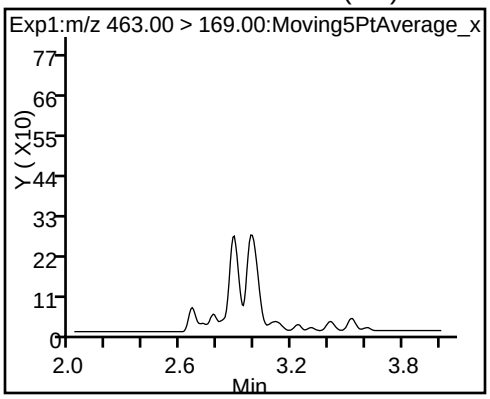
D 19 13C5 PFNA



20 Perfluorononanoic acid (ND)



20 Perfluorononanoic acid (ND)



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-03_SO0005 | Lab Sample ID: 320-35310-3

Matrix: Solid | Lab File ID: 2018.01.26LLA_029.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 09:20

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.04(g) | Date Analyzed: 01/26/2018 16:30

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 7.6 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.43	0.11	0.027
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.055	J	0.54	0.11	0.033
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.28	J	0.54	0.11	0.031
335-67-1	Perfluorooctanoic acid (PFOA)	0.24	J	0.54	0.21	0.092
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.23	J	1.1	0.54	0.21
375-95-1	Perfluorononanoic acid (PFNA)	0.058	J	0.54	0.11	0.039

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	94		25-150
STL01892	13C4-PFHpA	93		25-150
STL00990	13C4 PFOA	101		25-150
STL00991	13C4 PFOS	101		25-150
STL00995	13C5 PFNA	100		25-150
STL02337	13C3-PFBS	100		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_029.d
Lims ID: 320-35310-A-3-A
Client ID: FH-17-03_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 16:30:12 ALS Bottle#: 14 Worklist Smp#: 4
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-3-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 09:49:57 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 09:49:57

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	1.406	1.411	-0.005	0.535	6901468	2.24		89.7	19352	M
2 Perfluorobutyric acid										M
212.90 > 169.00	1.412	1.413	-0.001	1.004	388432	0.1506			37.2	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.659	1.659	0.0	0.632	4851021	2.66		106	55249	
4 Perfluoropentanoic acid										M
262.90 > 219.00	1.659	1.662	-0.003	1.000	283379	0.1240			112	M
D 47 13C3-PFBS										
301.90 > 83.00	1.694	1.695	-0.001	0.645	93881	2.33		100	750	
5 Perfluorobutanesulfonic acid										RM
298.90 > 80.00	1.685	1.697	-0.012	0.995	3553	0.001140			8.6	RM
298.90 > 99.00	1.667	1.697	-0.030	0.984	163		21.80(1.25-3.74)		0.1	M
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.676	1.903	-0.227	1.000	42438	0.0756			169	
D 60 M2-4:2FTS										
329.00 > 81.00	1.774	1.903	-0.129	0.676	13046	NC			18.8	
D 7 13C2 PFHxA										
315.00 > 270.00	1.939	1.939	0.0	0.738	5003735	2.55		102	47487	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.939	1.939	0.0	1.000	175555	0.0846			205	
313.00 > 119.00	1.939	1.939	0.0	1.000	18168		9.66(5.03-15.10)		199	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.866	4352579	2.33		93.1	35778	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.273	2.268	0.005	1.000	249355	0.1303			387	
363.00 > 169.00	2.273	2.268	0.005	1.000	100262		2.49(1.13-3.40)		738	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.286	2.280	0.006	1.000	62245	0.0258			256	
399.00 > 99.00	2.286	2.280	0.006	1.000	22615		2.75(1.50-4.49)		82.3	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.871	5133134	2.23		94.3	56145	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.604	2.596	0.008	1.002	33401	0.0289			571	
D 12 M2-6:2FTS										
429.00 > 81.00	2.598	2.597	0.001	0.990	1659307	4.80		202	14170	
D 14 13C4 PFOA										
417.00 > 372.00	2.626	2.622	0.004	1.000	4608186	2.51		101	46438	
* 62 13C2-PFOA										
415.00 > 370.00	2.626	2.622	0.004		5089128	2.50			45288	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.633	2.623	0.010	1.003	245292	0.1135			162	
413.00 > 169.00	2.626	2.623	0.003	1.000	124084		1.98(0.84-2.52)		1149	
D 19 13C5 PFNA										
468.00 > 423.00	2.997	2.992	0.005	1.141	3725372	2.51		100	34215	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.997	2.992	0.005	1.000	177425	0.1072			295	
499.00 > 99.00	3.005	2.992	0.013	1.003	36074		4.92(2.31-6.93)		119	
D 18 13C4 PFOS										
503.00 > 80.00	2.997	2.992	0.005	1.141	3533432	2.42		101	29675	
20 Perfluorononanoic acid										
463.00 > 419.00	3.005	2.992	0.013	1.003	41329	0.0269			96.4	
463.00 > 169.00	2.997	2.992	0.005	1.000	8098		5.10(1.90-5.69)		150	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.335	3.338	-0.003	1.000	3481	0.001834			69.7	
D 21 13C8 FOSA										
506.00 > 78.00	3.335	3.338	-0.003	1.270	4830530	2.36		94.3	23027	
D 26 M2-8:2FTS										
529.00 > 81.00	3.351	3.342	0.009	1.276	1636036	4.48		187	17488	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.351	3.342	0.009	1.000	4435	0.005335			170	
D 23 13C2 PFDA										
515.00 > 470.00	3.366	3.352	0.014	1.282	3528640	2.75		110	36468	
24 Perfluorodecanoic acid										R
513.00 > 469.00	3.366	3.353	0.013	1.000	25853	0.0189			56.3	R
513.00 > 169.00	3.358	3.353	0.005	0.998	3286		7.87(2.36-7.09)		80.9	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.518	3.507	0.011	1.340	2392008	3.73		149	15858	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.518	3.513	0.005	1.000	1951	0.001888			15.9	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.682	3.672	0.010	1.402	2132379	3.29		132	11678	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.699	3.678	0.021	1.002	20685	0.0194			75.8	
563.00 > 169.00	3.691	3.678	0.012	1.000	4282		4.83(0.00-0.00)		169	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 30 13C2 PFUnA										
565.00 > 520.00	3.691	3.679	0.011	1.406	2584951	2.65		106	40982	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.691	3.679	0.011	1.002	2714	0.003267			43.5	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.991	3.979	0.012	1.000	7960	0.006625			21.9	
613.00 > 169.00	3.999	3.979	0.020	1.002	1746		4.56(2.13-6.40)		80.0	
D 36 13C2 PFDoA										
615.00 > 570.00	3.991	3.979	0.012	1.520	2931473	2.77		111	37103	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.501	4.483	0.018	1.714	3570854	2.59		103	36471	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.923	4.902	0.021	1.875	5737346	2.33		93.2	17629	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.923	4.902	0.021	1.000	56303	0.006542			26.0	
813.00 > 169.00	4.923	4.902	0.021	1.000	9510		5.92(2.86-8.58)		229	

QC Flag Legend

Processing Flags

NC - Not Calibrated

R - Failed Signal Ratio Test

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 09:49:58 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_029.d

Injection Date: 26-Jan-2018 16:30:12 Instrument ID: A8_N

Lims ID: 320-35310-A-3-A Lab Sample ID: 320-35310-3

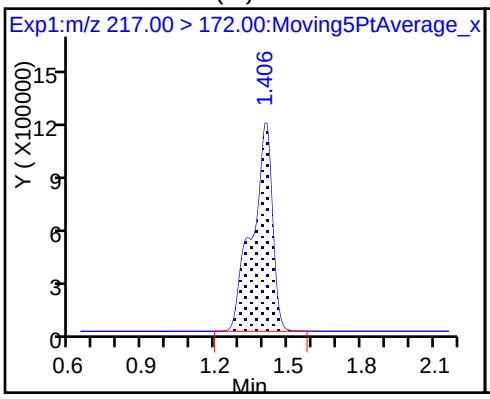
Client ID: FH-17-03_SO0005

Operator ID: SACINSTLCMS01 ALS Bottle#: 14 Worklist Smp#: 4

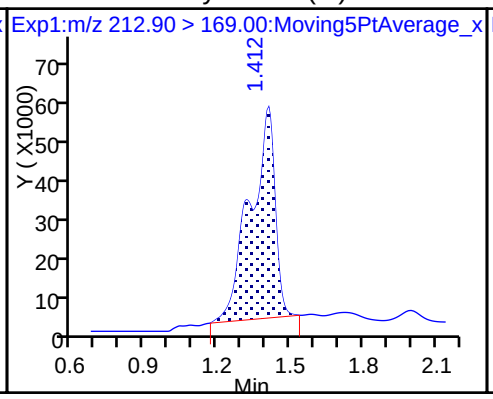
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

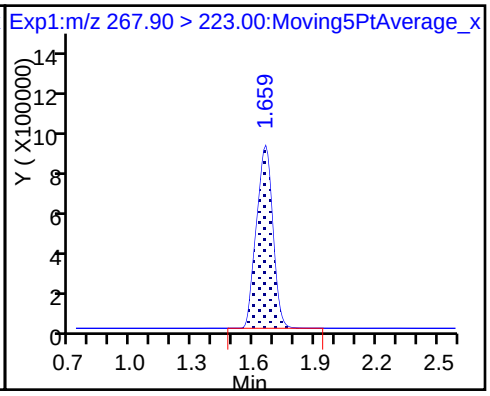
D 1 13C4 PFBA (M)



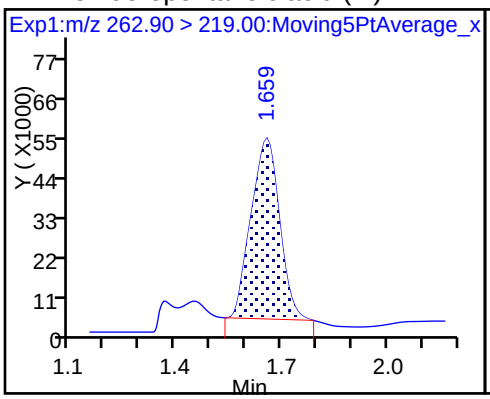
2 Perfluorobutyric acid (M)



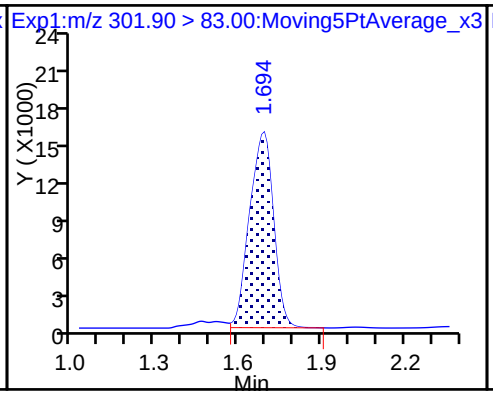
D 3 13C5-PFPeA



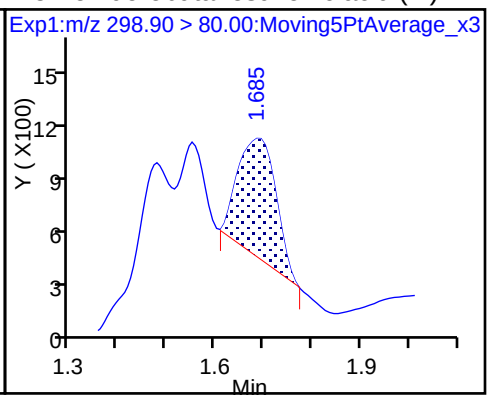
4 Perfluoropentanoic acid (M)



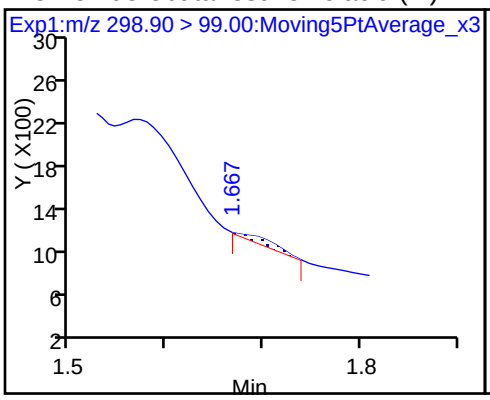
D 47 13C3-PFBS



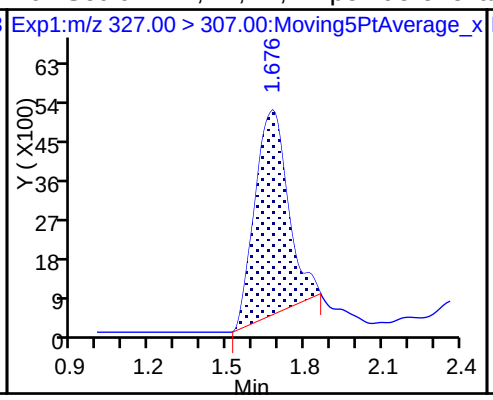
5 Perfluorobutanesulfonic acid (M)



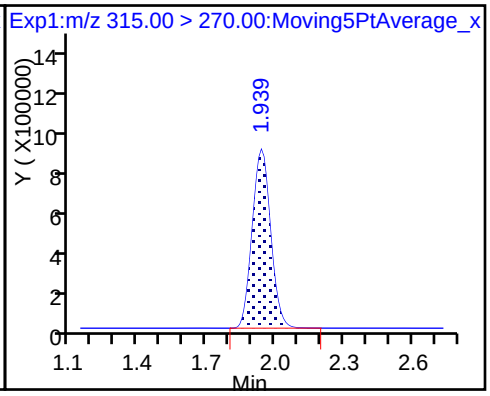
5 Perfluorobutanesulfonic acid (M)



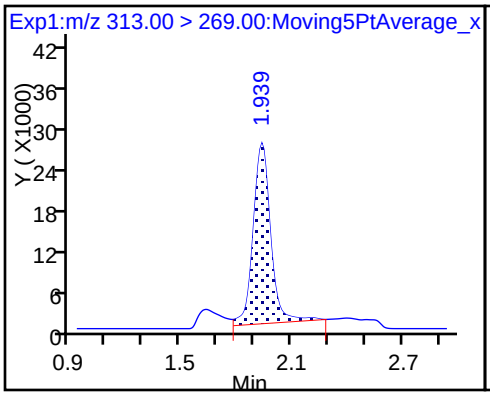
61 Sodium 1H,1H,2H,2H-perfluorohexa



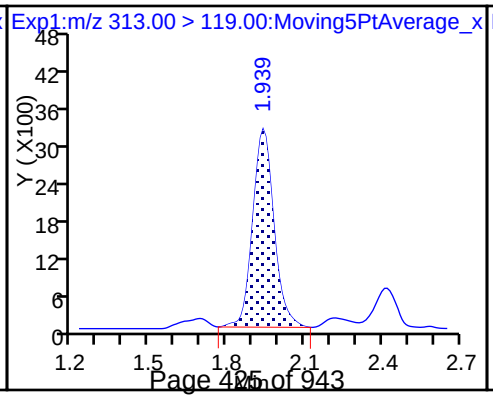
D 7 13C2 PFHxA



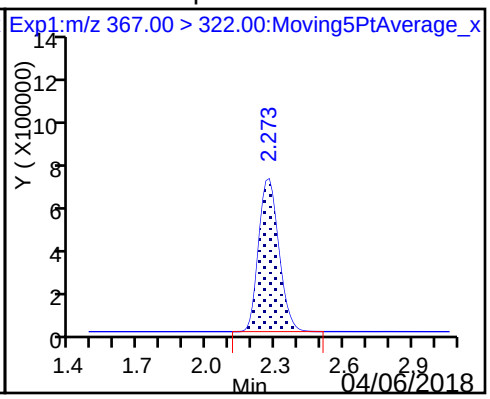
6 Perfluorohexanoic acid



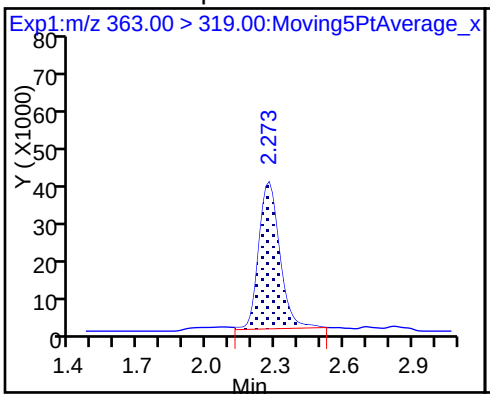
6 Perfluorohexanoic acid



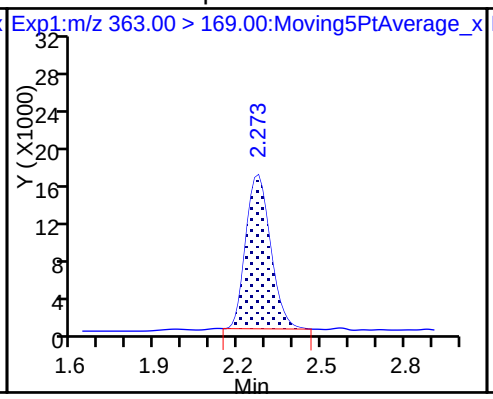
D 9 13C4-PFHpA



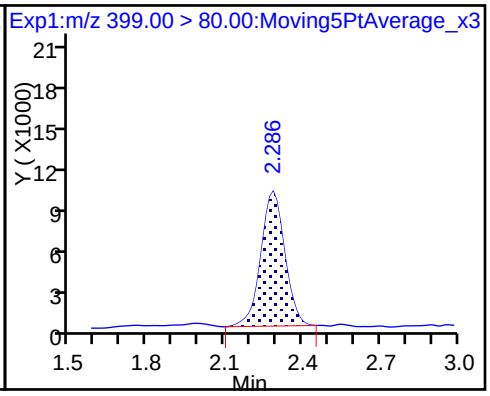
10 Perfluoroheptanoic acid



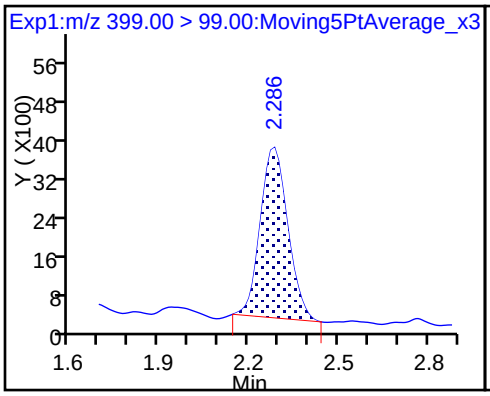
10 Perfluoroheptanoic acid



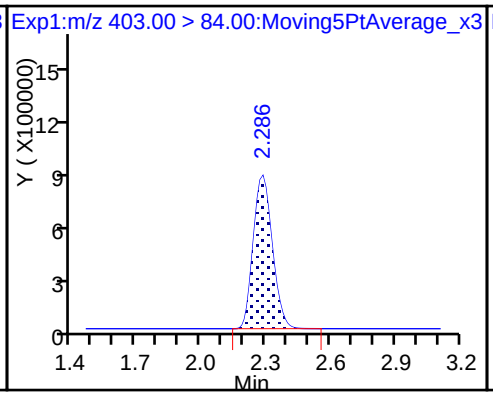
8 Perfluorohexanesulfonic acid



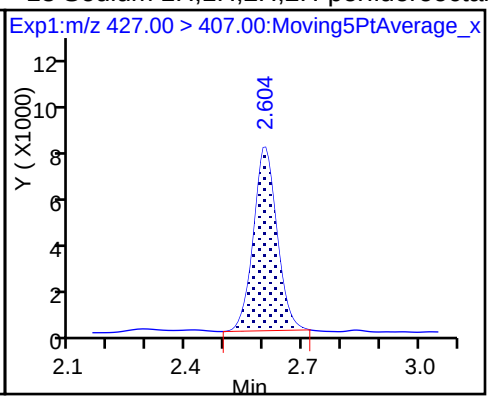
8 Perfluorohexanesulfonic acid



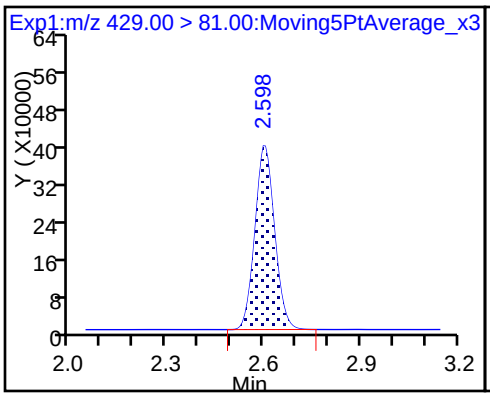
D 11 18O2 PFHxS



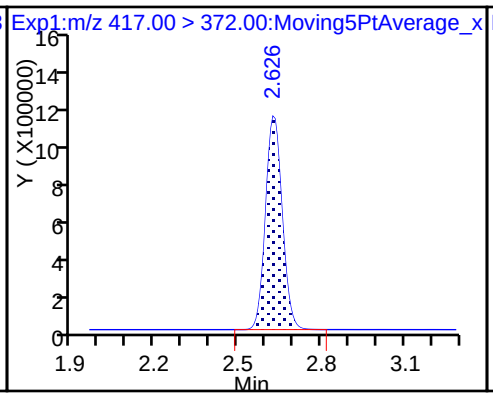
13 Sodium 1H,1H,2H,2H-perfluorooctane



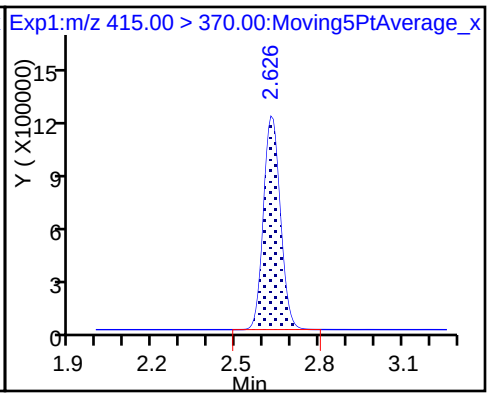
D 12 M2-6:2FTS



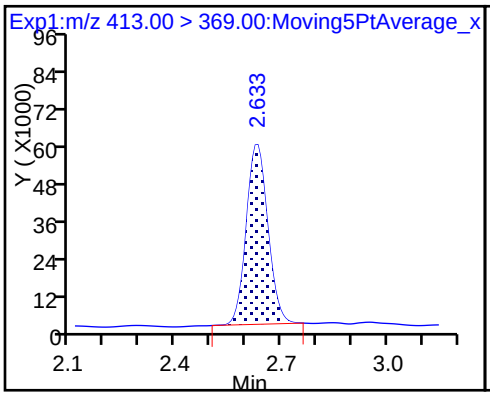
D 14 13C4 PFOA



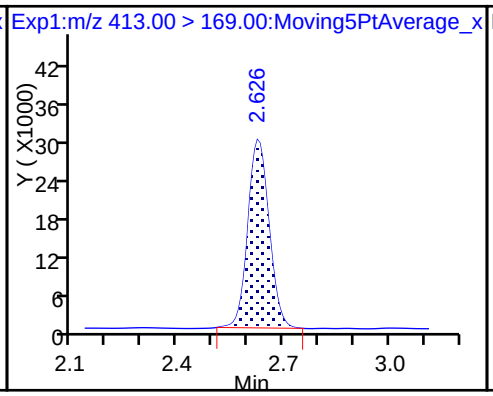
* 62 13C2-PFOA



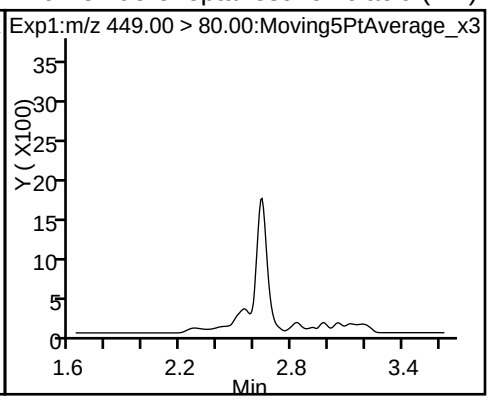
15 Perfluorooctanoic acid



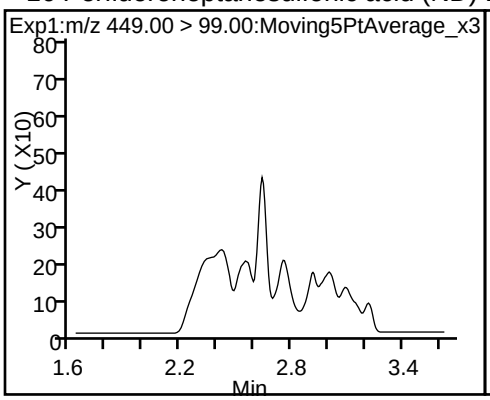
15 Perfluorooctanoic acid



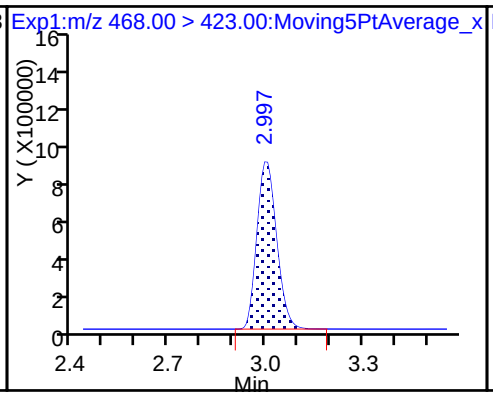
16 Perfluoroheptanesulfonic acid (ND)



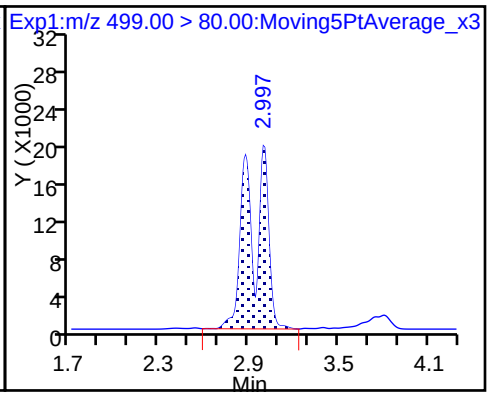
16 Perfluoroheptanesulfonic acid (ND)



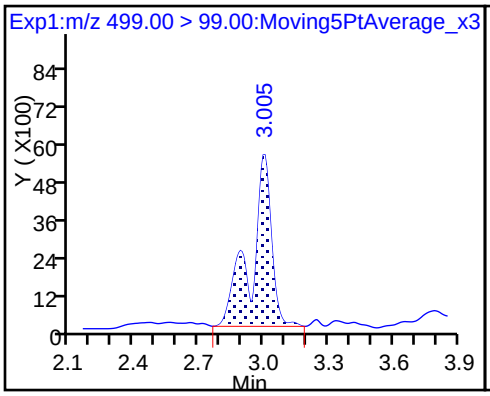
D 19 13C5 PFNA



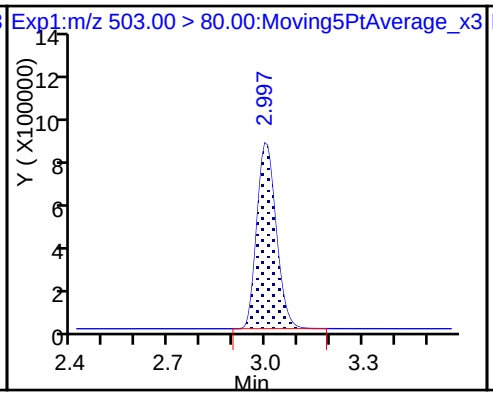
17 Perfluorooctane sulfonic acid



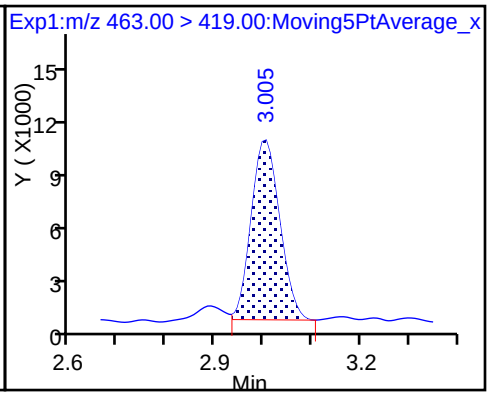
17 Perfluorooctane sulfonic acid



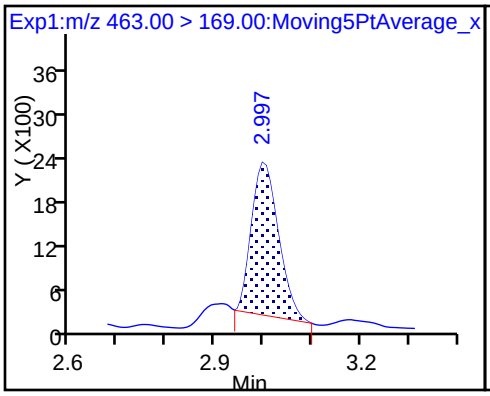
D 18 13C4 PFOS



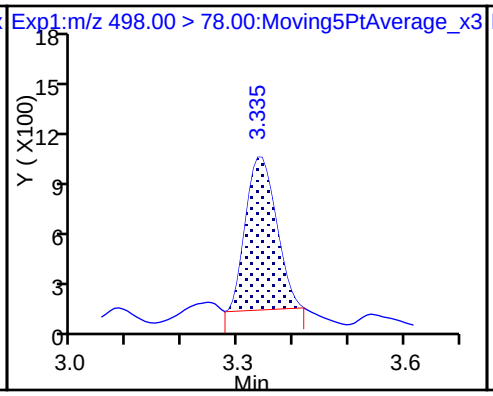
20 Perfluorononanoic acid



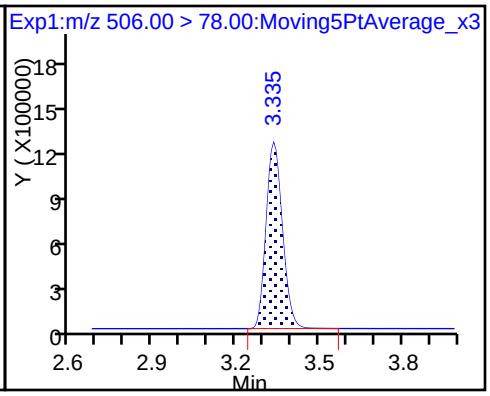
20 Perfluorononanoic acid



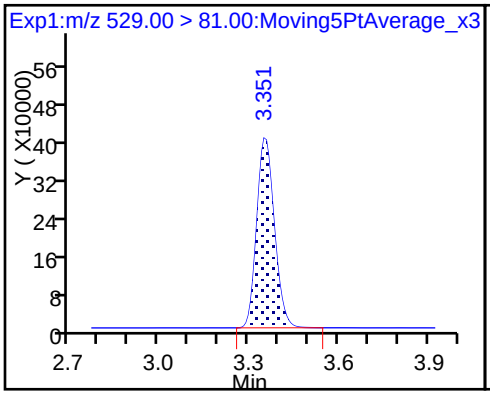
22 Perfluorooctane Sulfonamide



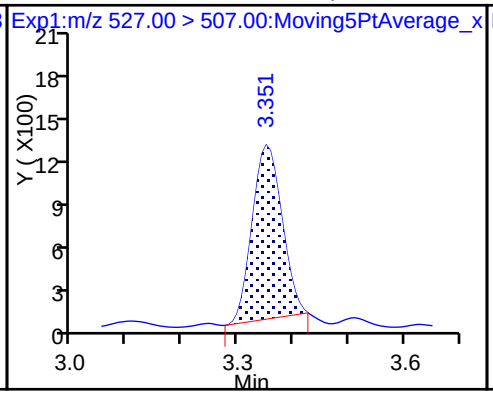
D 21 13C8 FOSA



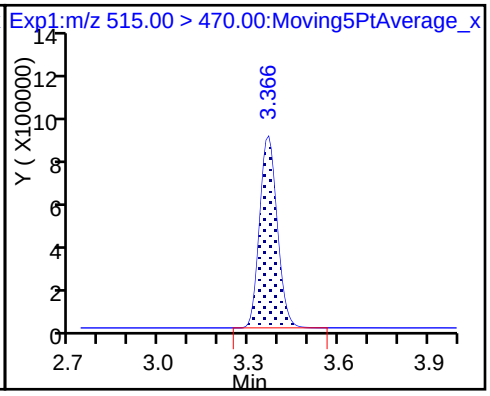
D 26 M2-8:2FTS



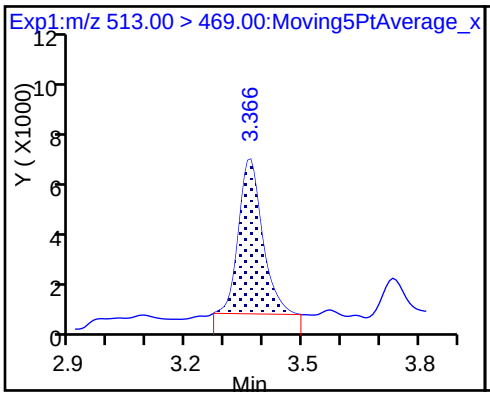
25 Sodium 1H,1H,2H,2H-perfluorodecane



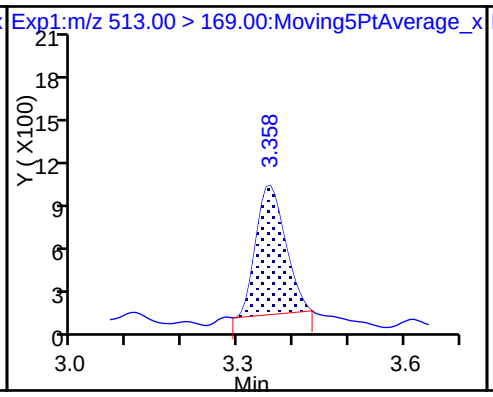
D 23 13C2 PFDA



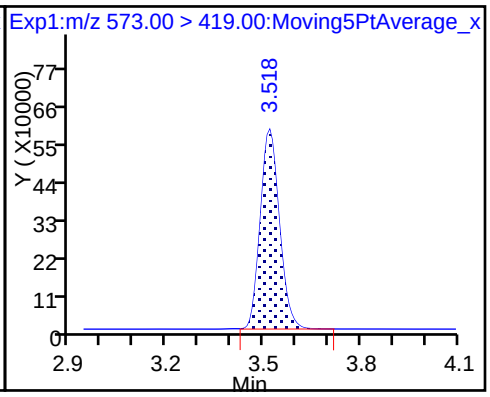
24 Perfluorodecanoic acid



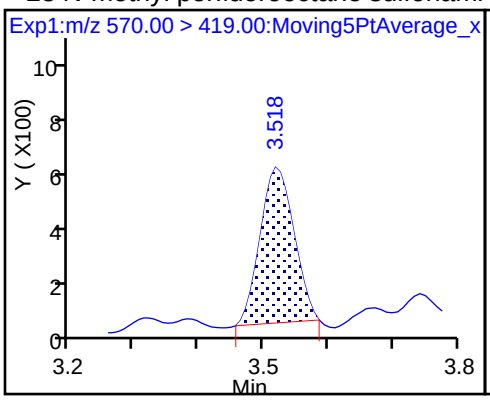
24 Perfluorodecanoic acid



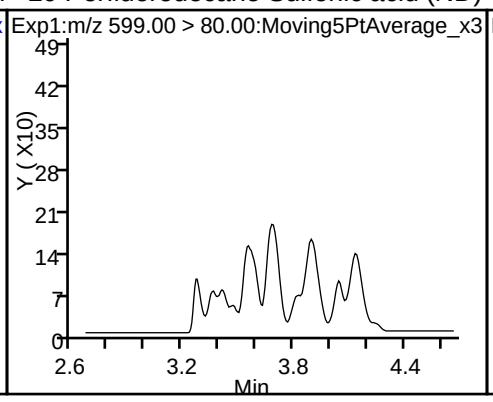
D 27 d3-NMeFOSAA



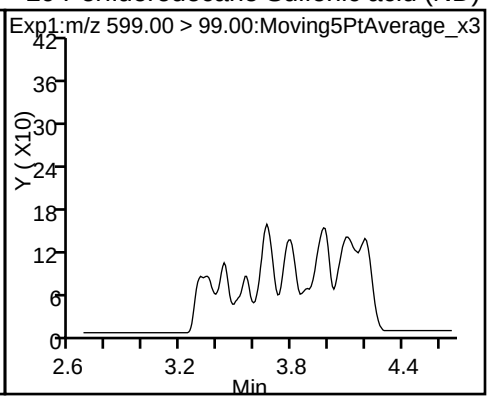
28 N-methyl perfluorooctane sulfonami



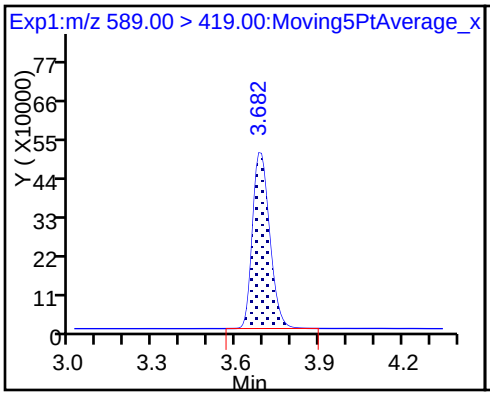
29 Perfluorodecane Sulfonic acid (ND)



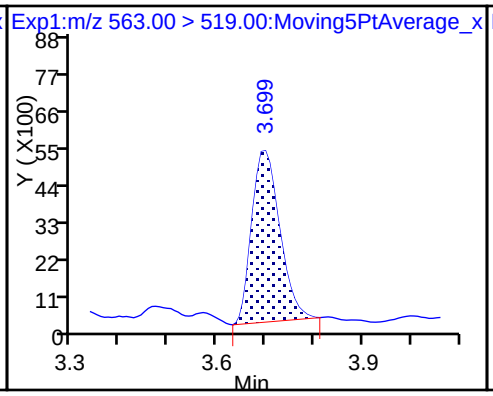
29 Perfluorodecane Sulfonic acid (ND)



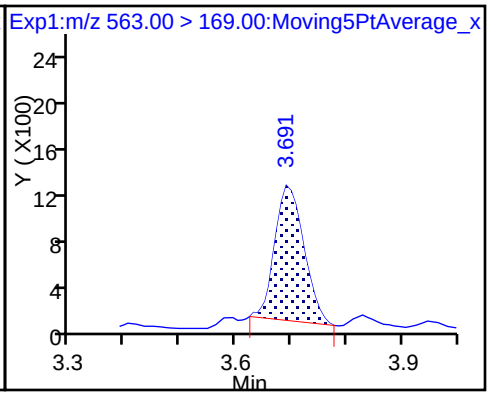
D 32 d5-NEtFOSAA



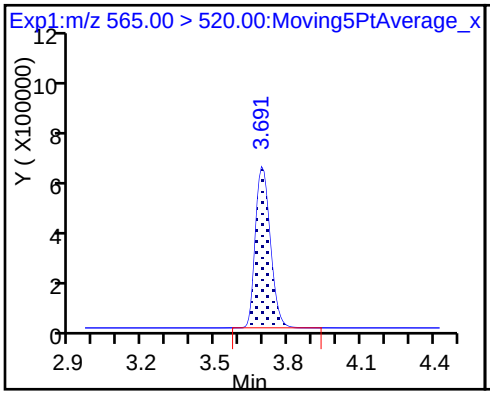
31 Perfluoroundecanoic acid



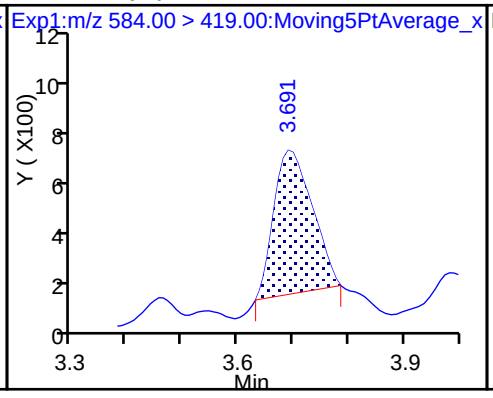
31 Perfluoroundecanoic acid



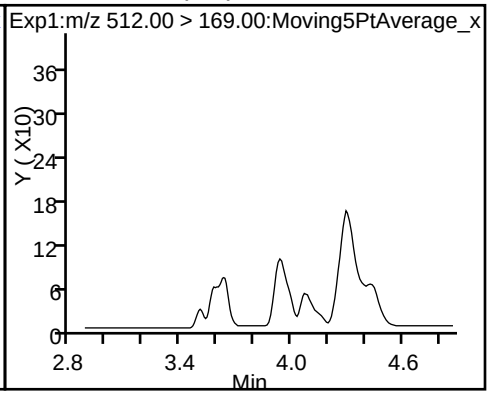
D 30 13C2 PFUnA



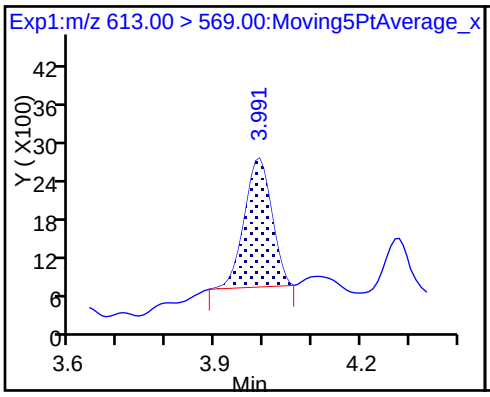
33 N-ethyl perfluorooctane sulfonamid



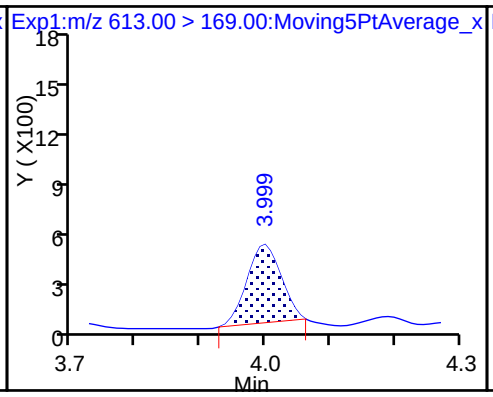
35 MeFOSA (ND)



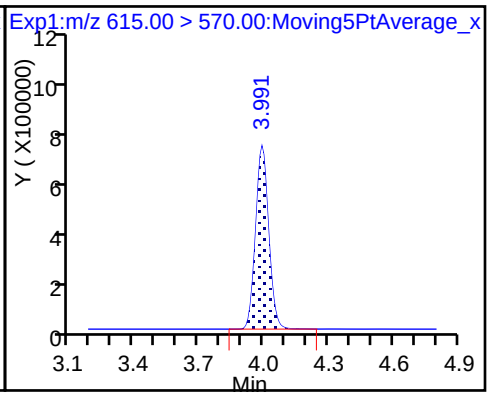
37 Perfluorododecanoic acid



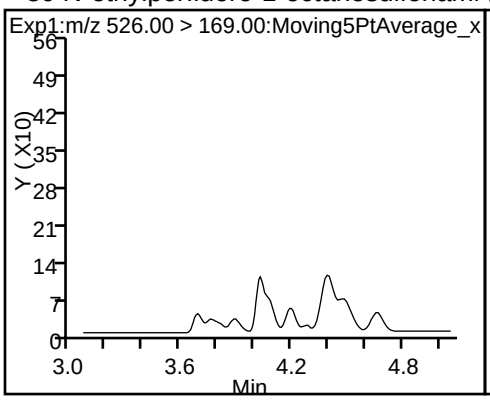
37 Perfluorododecanoic acid



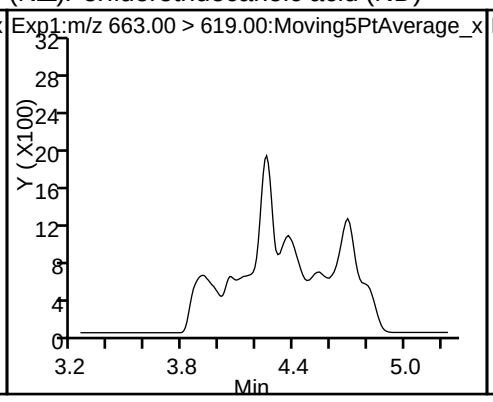
D 36 13C2 PFDoA



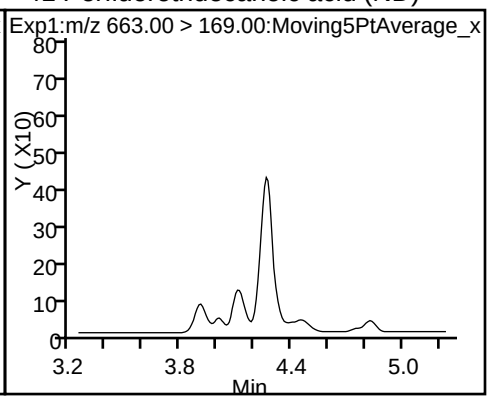
39 N-ethylperfluoro-1-octanesulfonami (ND)



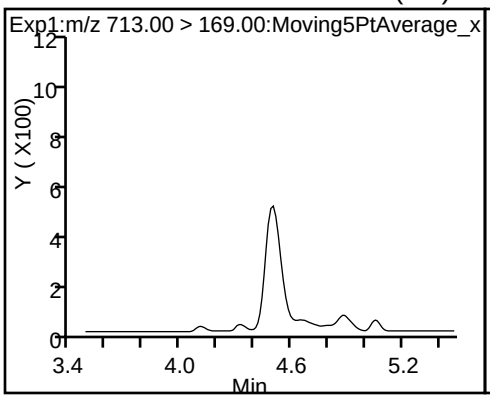
41 Perfluorotridecanoic acid (ND)



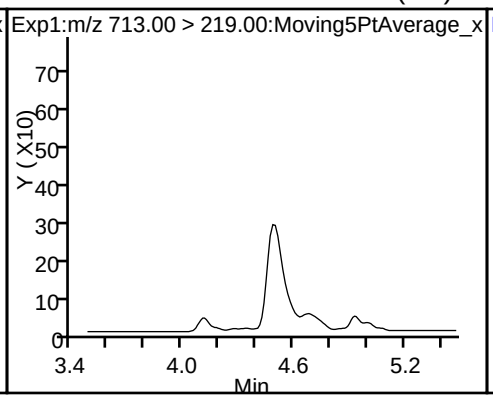
41 Perfluorotridecanoic acid (ND)



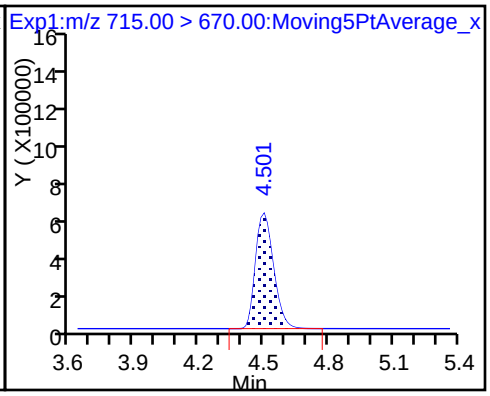
42 Perfluorotetradecanoic acid (ND)



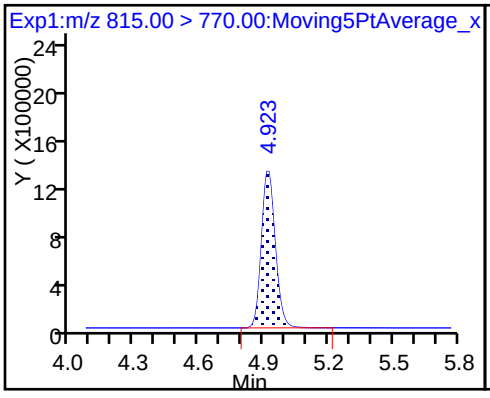
42 Perfluorotetradecanoic acid (ND)



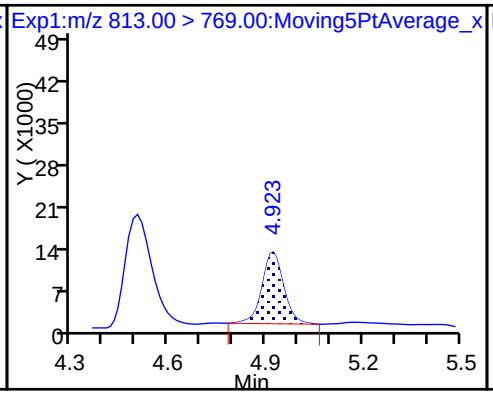
D 43 13C2-PFTeDA



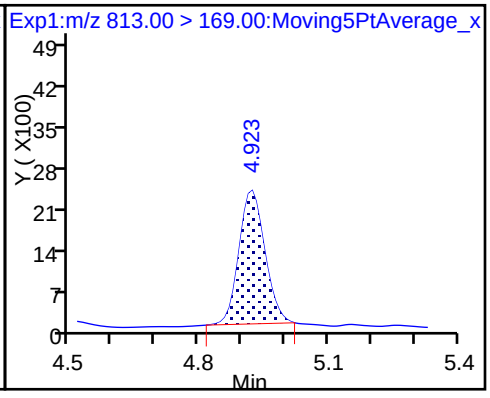
D 44 13C2-PFHxDA



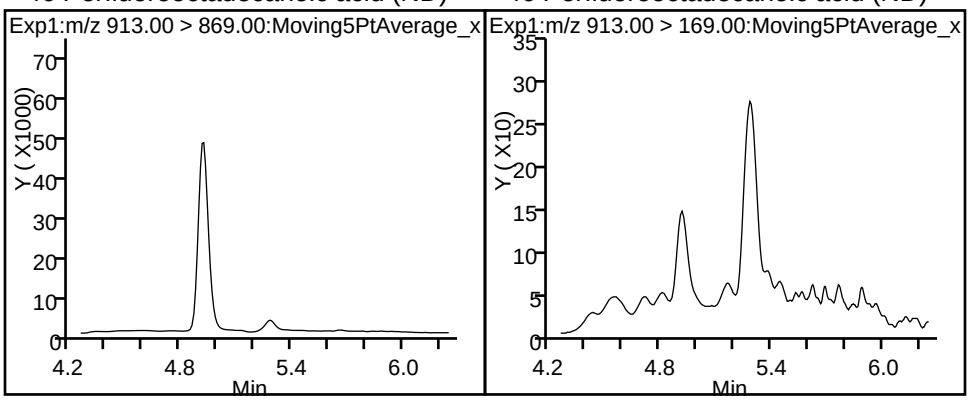
45 Perfluorohexadecanoic acid



45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid (ND) 46 Perfluorooctadecanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

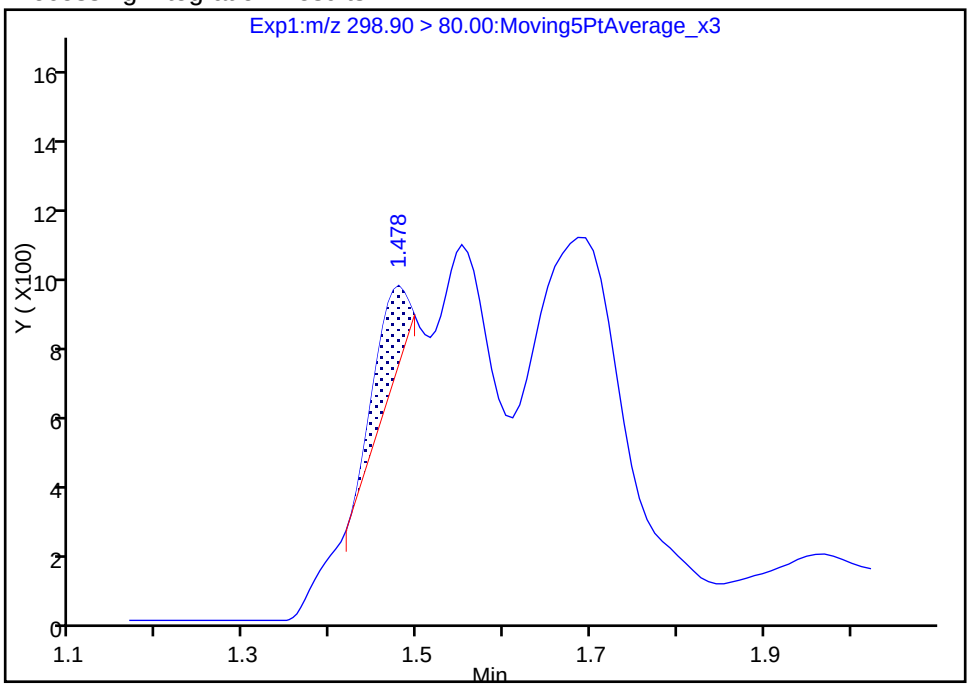
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_029.d				
Injection Date:	26-Jan-2018 16:30:12	Instrument ID:	A8_N		
Lims ID:	320-35310-A-3-A	Lab Sample ID:	320-35310-3		
Client ID:	FH-17-03_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	14	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

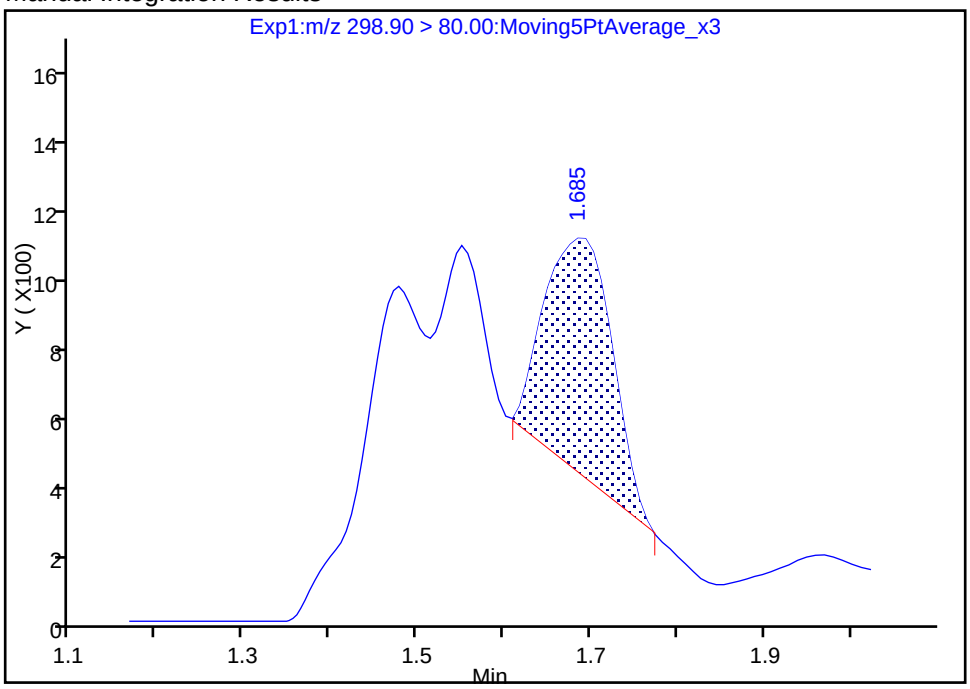
Processing Integration Results

RT: 1.48
Area: 649
Amount: 0.000208
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 3553
Amount: 0.001140
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 09:48:32

Audit Action: Manually Integrated Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_029.d

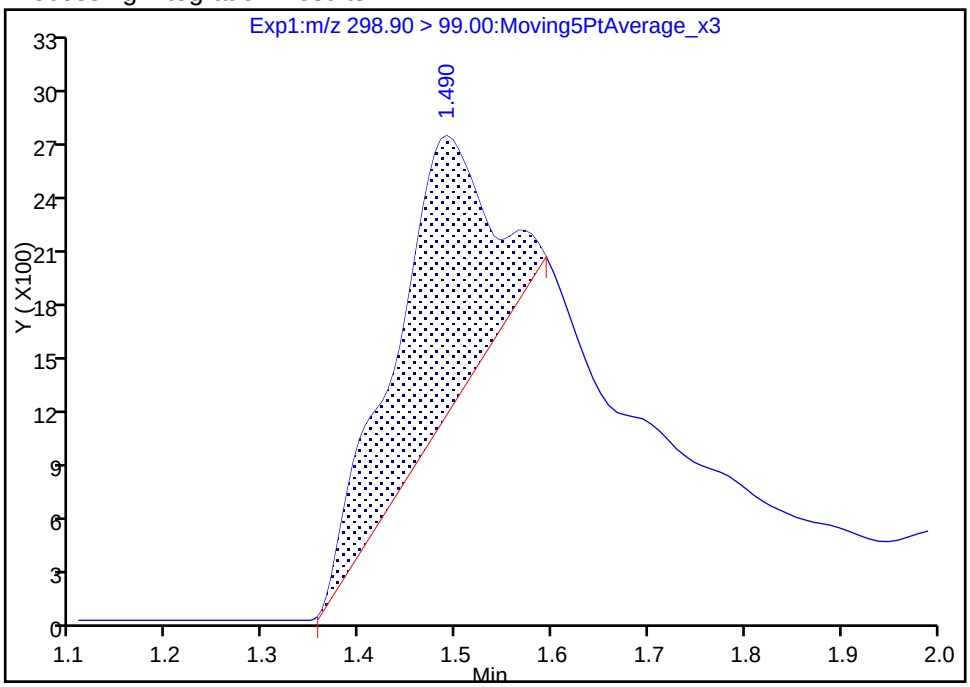
Injection Date:	26-Jan-2018 16:30:12	Instrument ID:	A8_N		
Lims ID:	320-35310-A-3-A	Lab Sample ID:	320-35310-3		
Client ID:	FH-17-03_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	14	Worklist Smp#:	4
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

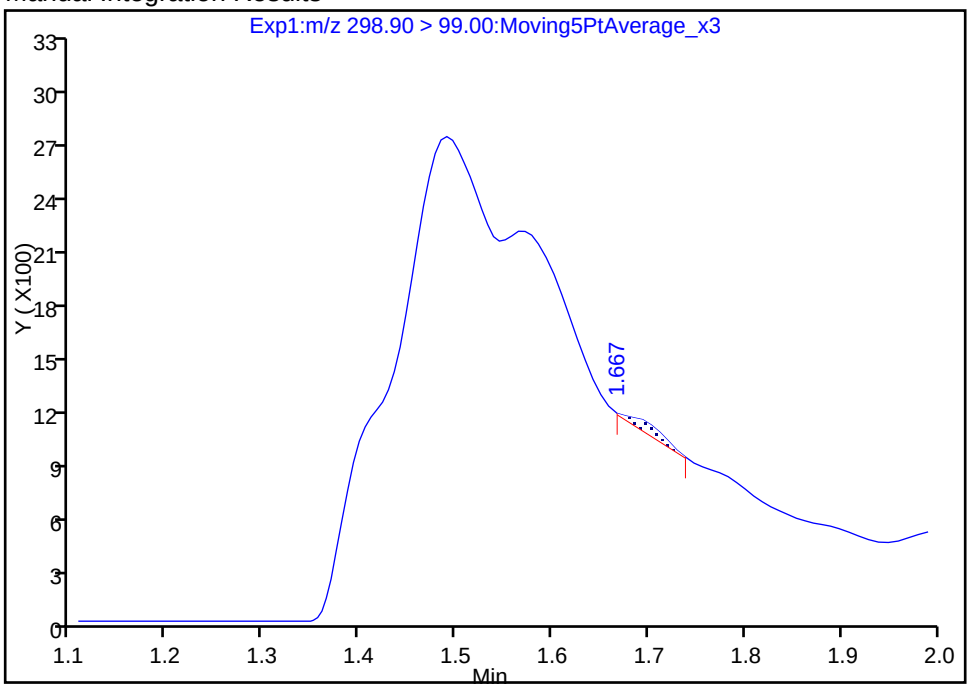
Processing Integration Results

RT: 1.49
Area: 10592
Amount: 0.000208
Amount Units: ng/ml



Manual Integration Results

RT: 1.67
Area: 163
Amount: 0.001140
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 09:48:40

Audit Action: Manually Integrated Audit Reason: Wrong peak

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-DUP02 | Lab Sample ID: 320-35310-4

Matrix: Solid | Lab File ID: 2018.01.26LLA_032.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 09:20

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.10(g) | Date Analyzed: 01/26/2018 16:53

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 8.0 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.43	0.11	0.027
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.064	J	0.53	0.11	0.033
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.28	J	0.53	0.11	0.031
335-67-1	Perfluorooctanoic acid (PFOA)	0.22	J	0.53	0.21	0.092
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.29	J	1.1	0.53	0.21
375-95-1	Perfluorononanoic acid (PFNA)	0.077	J	0.53	0.11	0.038

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	93		25-150
STL01892	13C4-PFHpA	90		25-150
STL00990	13C4 PFOA	97		25-150
STL00991	13C4 PFOS	98		25-150
STL00995	13C5 PFNA	104		25-150
STL02337	13C3-PFBS	91		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_032.d
Lims ID: 320-35310-A-4-A
Client ID: FH-DUP02
Sample Type: Client
Inject. Date: 26-Jan-2018 16:53:38 ALS Bottle#: 17 Worklist Smp#: 7
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-4-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 09:57:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 09:57:47

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.697	1.695	0.002	0.644	90110	2.12		91.4	356	
5 Perfluorobutanesulfonic acid										RM
298.90 > 80.00	1.697	1.697	0.0	1.000	5128	0.001714			9.7	RM
298.90 > 99.00	1.661	1.697	-0.036	0.979	183		28.02(1.25-3.74)		0.0	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.278	2.267	0.011	0.864	4425170	2.25		90.0	36627	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.278	2.268	0.010	1.000	256428	0.1318			294	
363.00 > 169.00	2.278	2.268	0.010	1.000	92860		2.76(1.13-3.40)		588	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.291	2.280	0.011	1.000	74446	0.0298			194	
399.00 > 99.00	2.291	2.280	0.011	1.000	25188		2.96(1.50-4.49)		57.0	
D 11 18O2 PFHxS										
403.00 > 84.00	2.291	2.282	0.009	0.869	5298313	2.19		92.6	51588	
D 14 13C4 PFOA										
417.00 > 372.00	2.635	2.622	0.013	1.000	4691157	2.44		97.4	43526	
* 62 13C2-PFOA										
415.00 > 370.00	2.635	2.622	0.013		5349332	2.50			48040	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.635	2.623	0.012	1.000	223415	0.1016			167	
413.00 > 169.00	2.635	2.623	0.012	1.000	125803		1.78(0.84-2.52)		1038	
D 19 13C5 PFNA										
468.00 > 423.00	3.007	2.992	0.015	1.141	4074807	2.61		104	37868	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.007	2.992	0.015	1.000	228429	0.1360			425	
499.00 > 99.00	3.007	2.992	0.015	1.000	48918		4.67(2.31-6.93)		155	
D 18 13C4 PFOS										
503.00 > 80.00	3.007	2.992	0.015	1.141	3584940	2.34		97.9	28313	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	3.007	2.992	0.015	1.000	61080	0.0363			110	
463.00 > 169.00	3.007	2.992	0.015	1.000	14559		4.20(1.90-5.69)		206	

QC Flag Legend

Processing Flags

R - Failed Signal Ratio Test

Review Flags

M - Manually Integrated

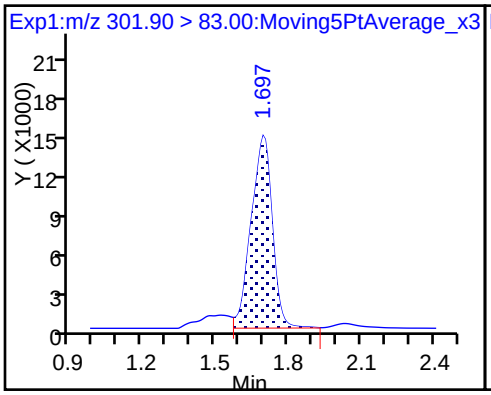
Report Date: 30-Jan-2018 09:57:47 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

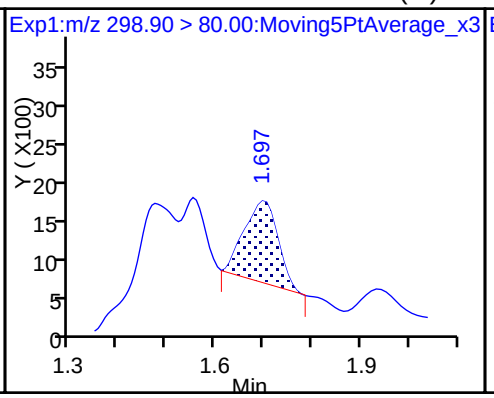
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_032.d

Injection Date:	26-Jan-2018 16:53:38	Instrument ID:	A8_N		
Lims ID:	320-35310-A-4-A	Lab Sample ID:	320-35310-4		
Client ID:	FH-DUP02				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	17	Worklist Smp#:	7
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

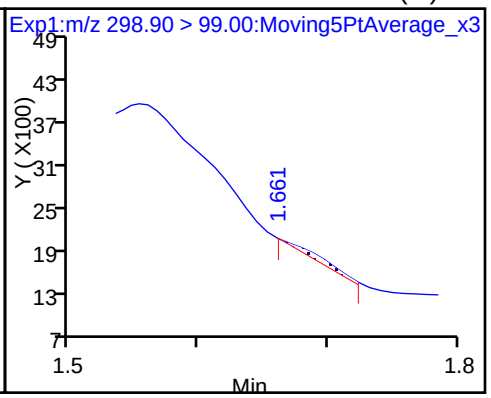
D 47 13C3-PFBS



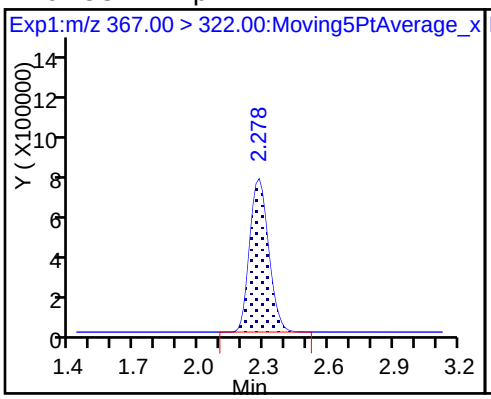
5 Perfluorobutanesulfonic acid (M)



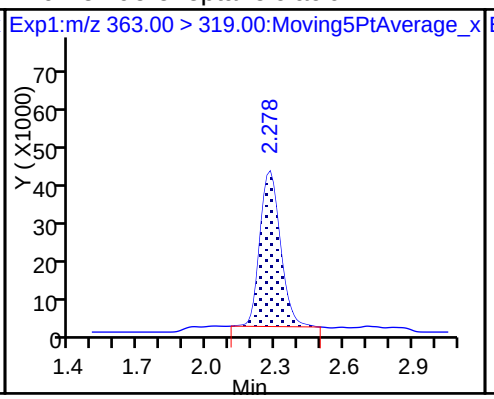
5 Perfluorobutanesulfonic acid (M)



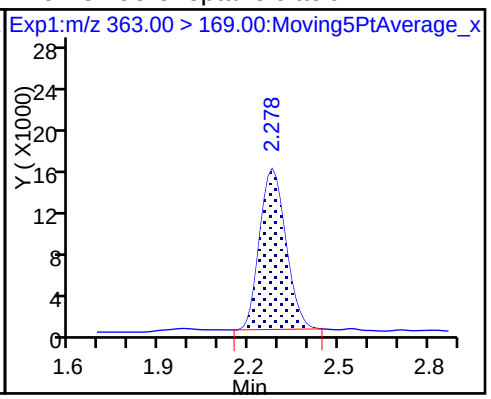
D 9 13C4-PFHpA



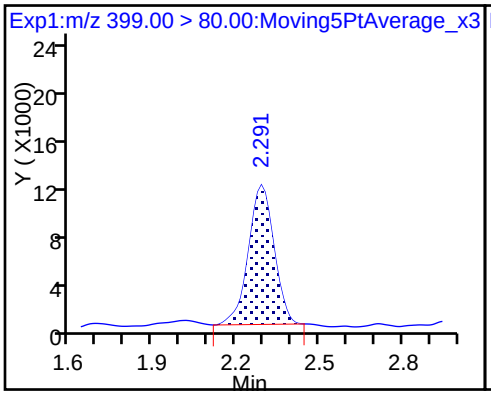
10 Perfluoroheptanoic acid



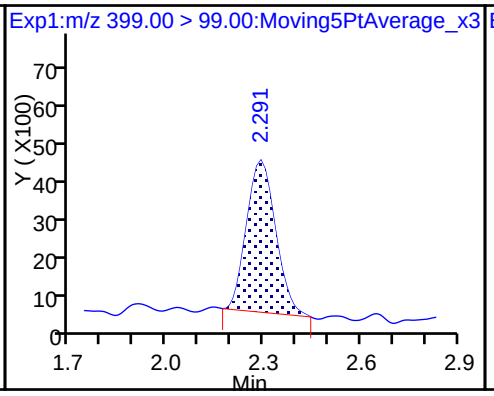
10 Perfluoroheptanoic acid



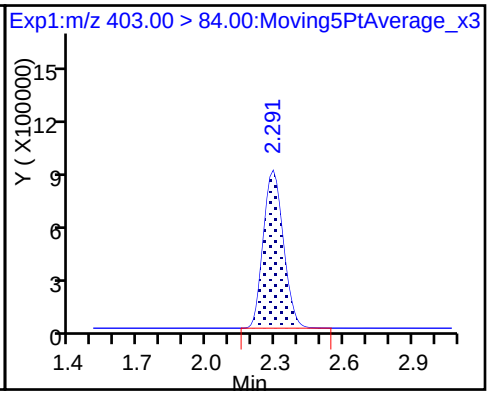
8 Perfluorohexanesulfonic acid



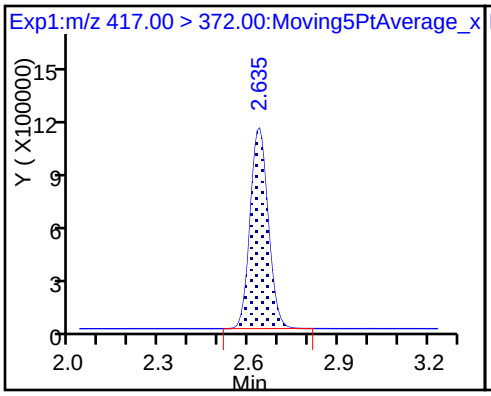
8 Perfluorohexanesulfonic acid



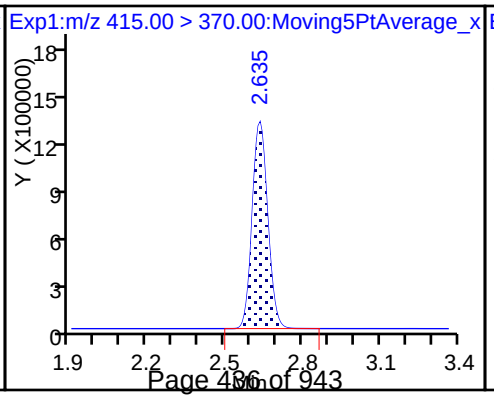
D 11 18O2 PFHxS



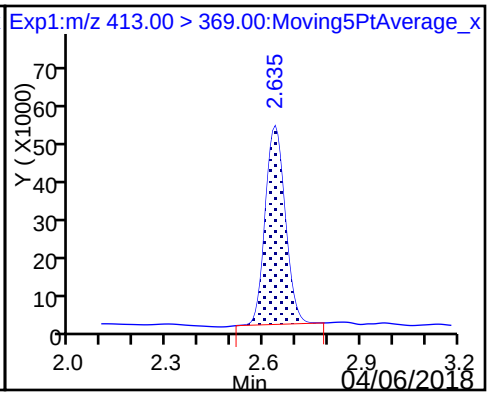
D 14 13C4 PFOA



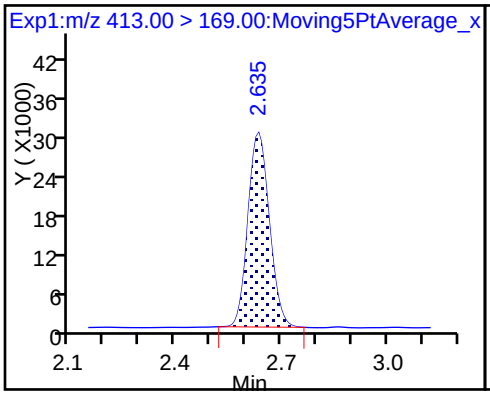
* 62 13C2-PFOA



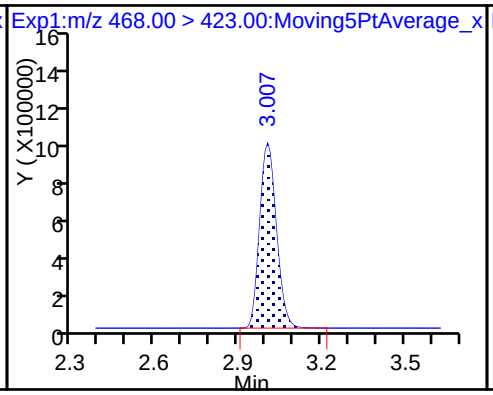
15 Perfluorooctanoic acid



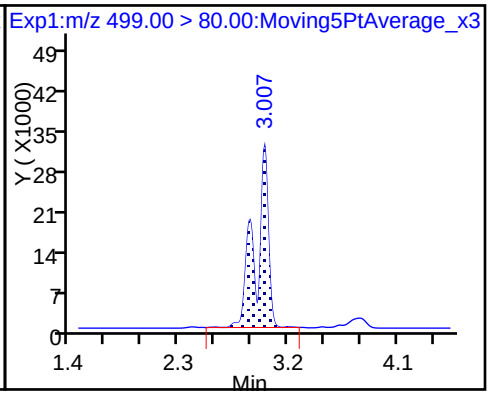
15 Perfluorooctanoic acid



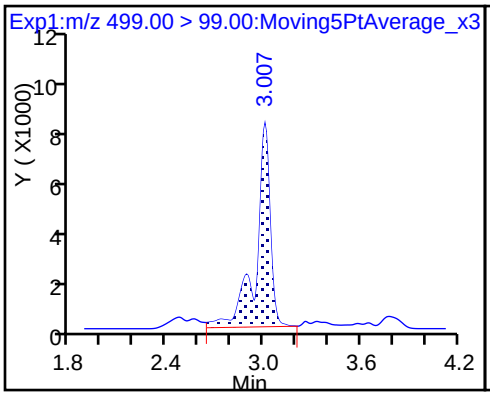
D 19 13C5 PFNA



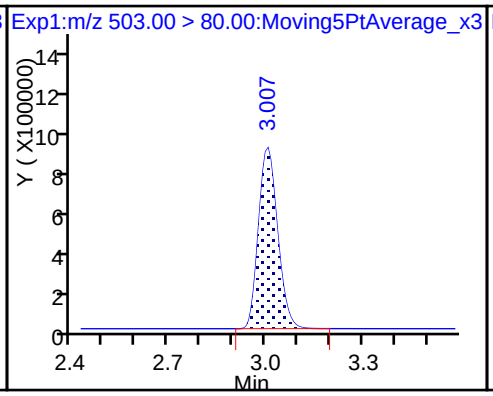
17 Perfluorooctane sulfonic acid



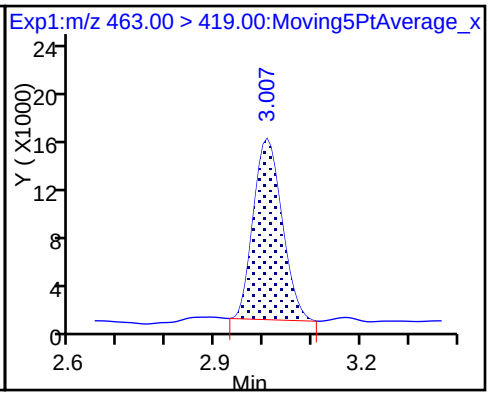
17 Perfluorooctane sulfonic acid



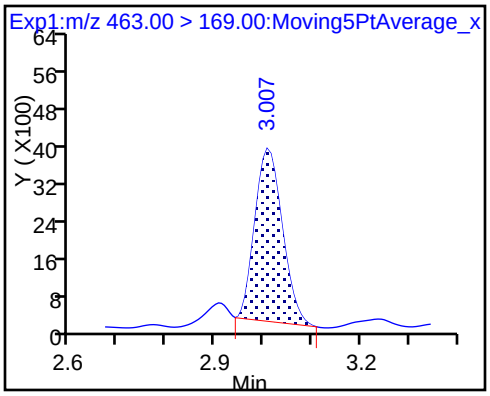
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

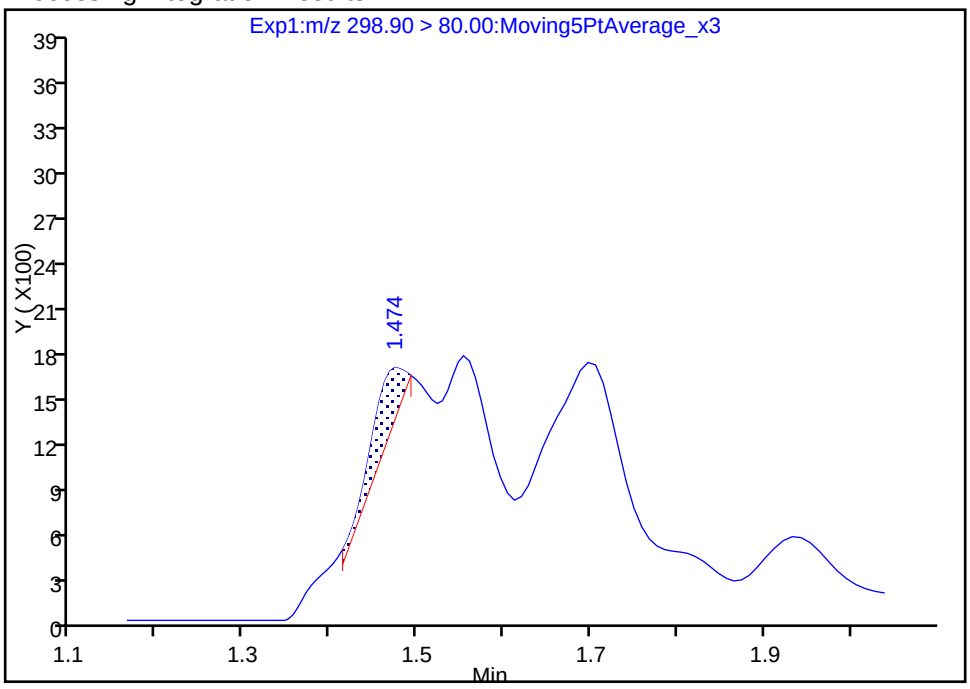
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_032.d				
Injection Date:	26-Jan-2018 16:53:38	Instrument ID:	A8_N		
Lims ID:	320-35310-A-4-A	Lab Sample ID:	320-35310-4		
Client ID:	FH-DUP02				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	17	Worklist Smp#:	7
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

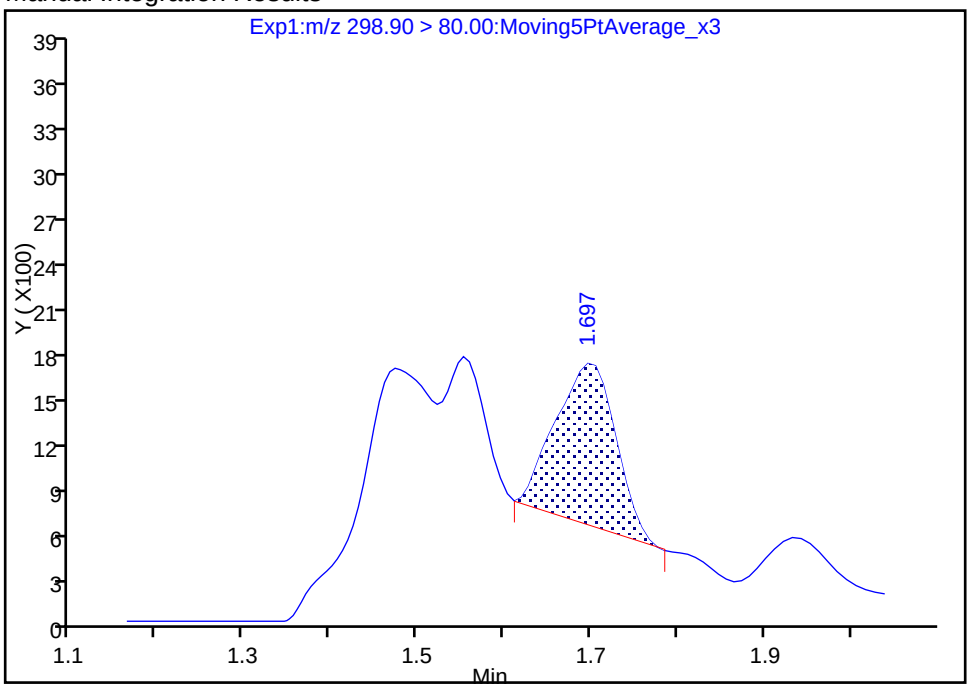
Processing Integration Results

RT: 1.47
Area: 1097
Amount: 0.000367
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 5128
Amount: 0.001714
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 09:57:03

Audit Action: Manually Integrated Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

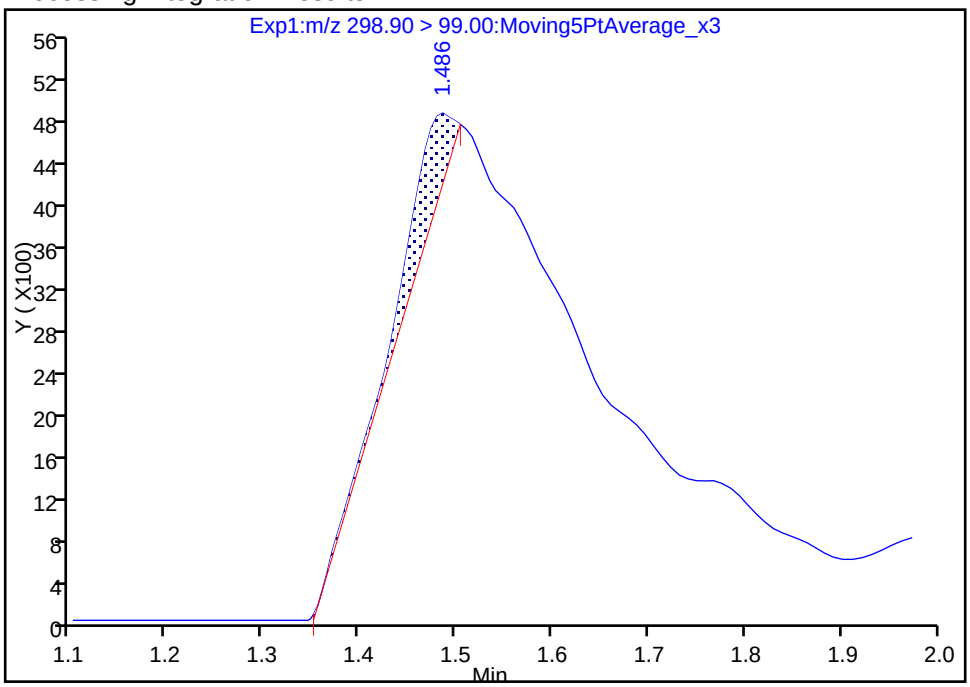
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_032.d				
Injection Date:	26-Jan-2018 16:53:38	Instrument ID:	A8_N		
Lims ID:	320-35310-A-4-A	Lab Sample ID:	320-35310-4		
Client ID:	FH-DUP02				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	17	Worklist Smp#:	7
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

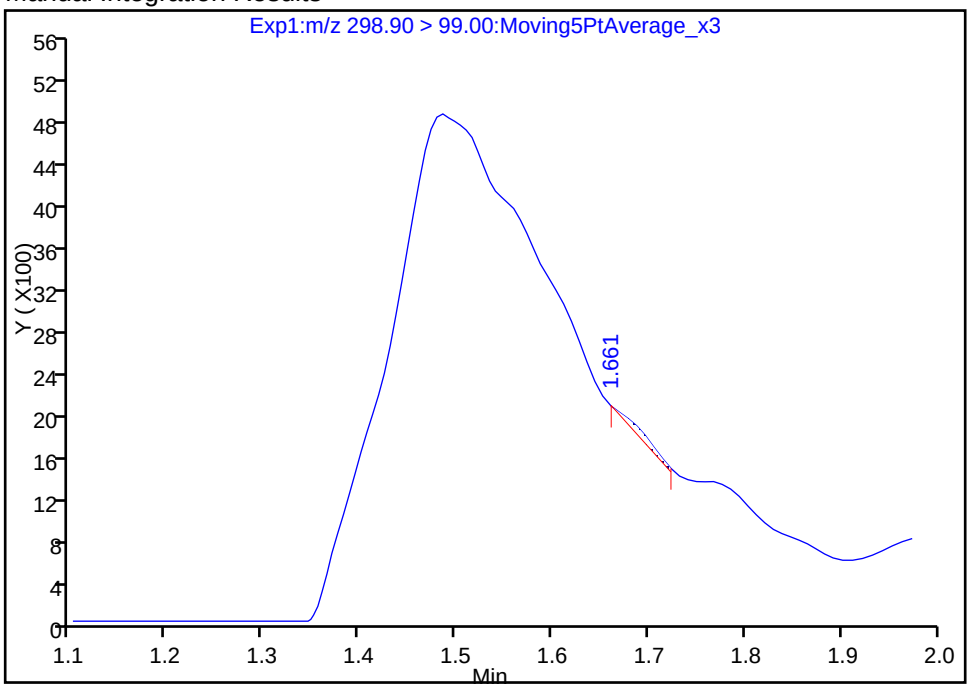
Processing Integration Results

RT: 1.49
Area: 2750
Amount: 0.000367
Amount Units: ng/ml



Manual Integration Results

RT: 1.66
Area: 183
Amount: 0.001714
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 09:57:10

Audit Action: Manually Integrated Audit Reason: Wrong peak

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-EB01 | Lab Sample ID: 320-35310-5

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_038.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 09:45

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 250(mL) | Date Analyzed: 01/25/2018 22:27

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	1.0	0.46
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	1.0	0.38
375-85-9	Perfluoroheptanoic acid (PFHpA)	1.5	U	2.0	1.5	0.61
335-67-1	Perfluorooctanoic acid (PFOA)	1.5	U	2.0	1.5	0.54
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	3.0	U	4.0	3.0	1.1
375-95-1	Perfluorononanoic acid (PFNA)	1.5	U	2.0	1.5	0.52

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	105		25-150
STL01892	13C4-PFHpA	103		25-150
STL00990	13C4 PFOA	104		25-150
STL00991	13C4 PFOS	112		25-150
STL00995	13C5 PFNA	111		25-150
STL02337	13C3-PFBS	97		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_038.d
Lims ID: 320-35310-A-5-A
Client ID: FH-EB01
Sample Type: Client
Inject. Date: 25-Jan-2018 22:27:55 ALS Bottle#: 32 Worklist Smp#: 6
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-5-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:28:24

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.688	1.695	-0.007	0.644	86640	2.25		96.9	2162	
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.267	-0.002	0.864	4608445	2.59		103	27571	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.278	2.280	-0.002	1.000	22370	0.008744			144	
399.00 > 99.00	2.278	2.280	-0.002	1.000	6439		3.47(1.50-4.49)		32.5	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.869	5434025	2.48		105	40555	
D 14 13C4 PFOA										
417.00 > 372.00	2.621	2.622	-0.001	1.000	4543881	2.60		104	38493	
* 62 13C2-PFOA										
415.00 > 370.00	2.621	2.622	-0.001		4848814	2.50			44348	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.621	2.623	-0.002	1.000	10795	0.005067			4.3	
413.00 > 169.00	2.614	2.623	-0.009	0.997	5212		2.07(0.84-2.52)		38.4	
D 19 13C5 PFNA										
468.00 > 423.00	2.990	2.992	-0.002	1.141	3940696	2.78		111	31587	
D 18 13C4 PFOS										
503.00 > 80.00	2.990	2.992	-0.002	1.141	3730595	2.69		112	29223	

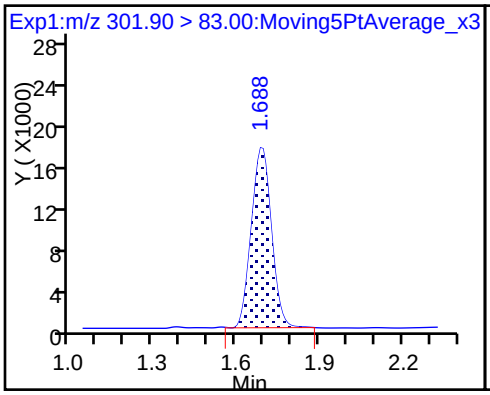
Report Date: 30-Jan-2018 10:22:40 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

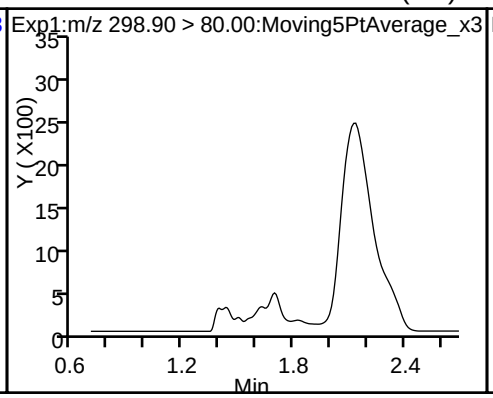
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_038.d

Injection Date:	25-Jan-2018 22:27:55	Instrument ID:	A8_N		
Lims ID:	320-35310-A-5-A	Lab Sample ID:	320-35310-5		
Client ID:	FH-EB01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	32	Worklist Smp#:	6
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

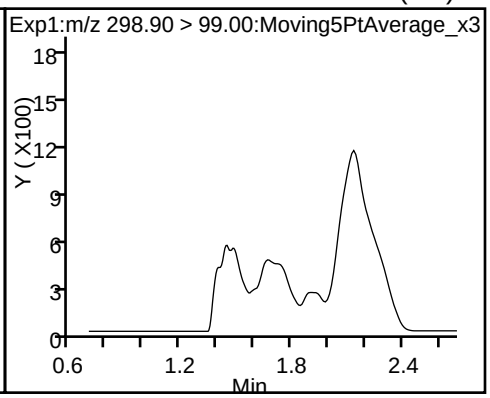
D 47 13C3-PFBS



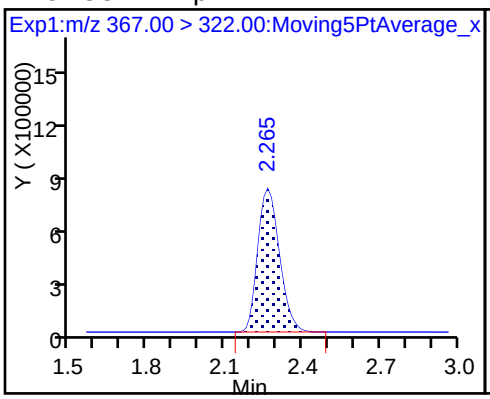
5 Perfluorobutanesulfonic acid (ND)



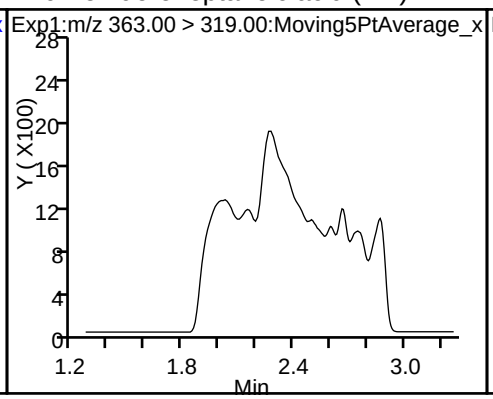
5 Perfluorobutanesulfonic acid (ND)



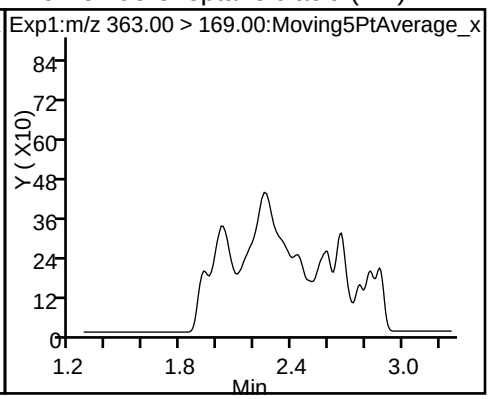
D 9 13C4-PFHpA



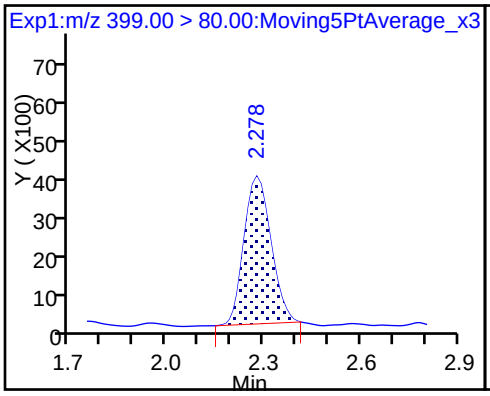
10 Perfluoroheptanoic acid (ND)



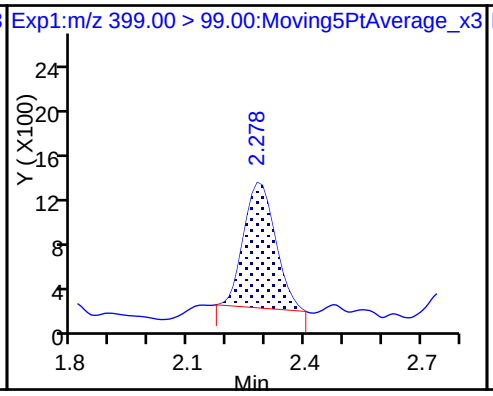
10 Perfluoroheptanoic acid (ND)



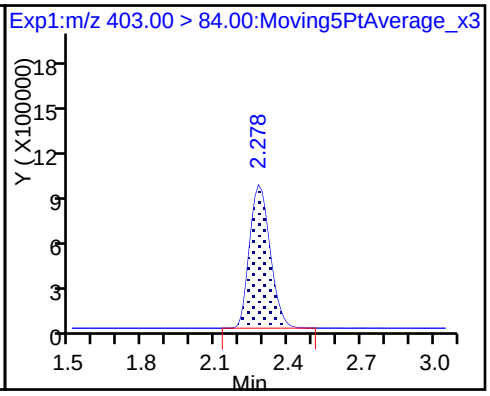
8 Perfluorohexanesulfonic acid



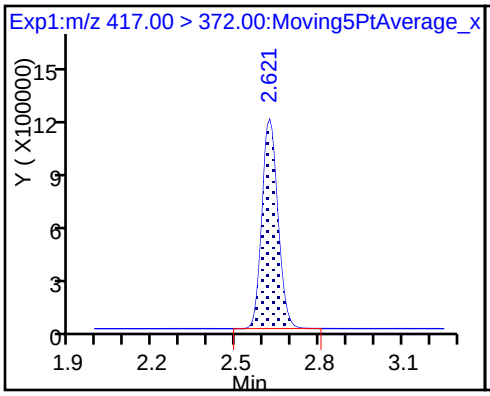
8 Perfluorohexanesulfonic acid



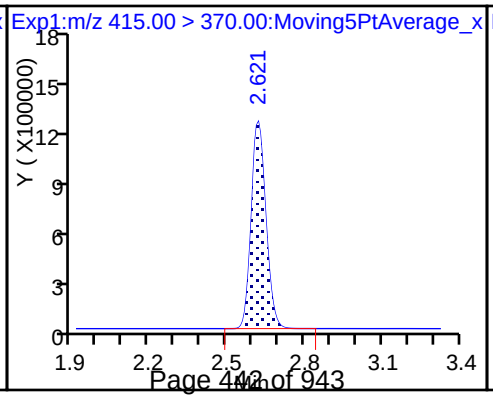
D 11 18O2 PFHxS



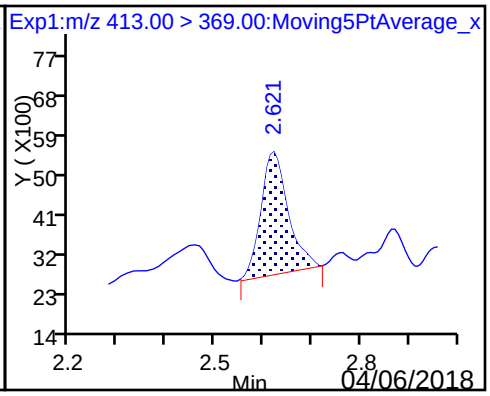
D 14 13C4 PFOA



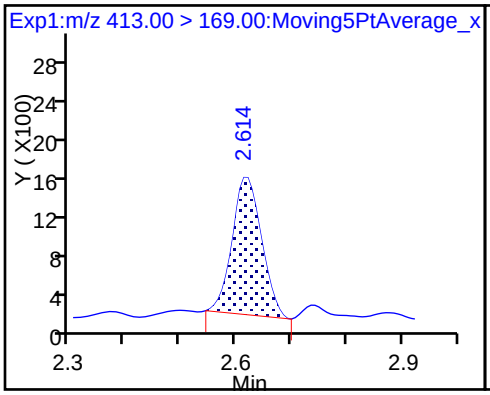
* 62 13C2-PFOA



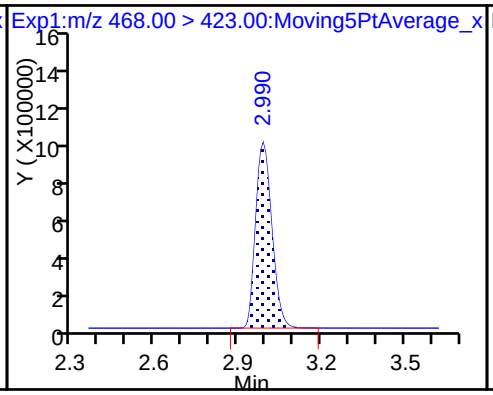
15 Perfluorooctanoic acid



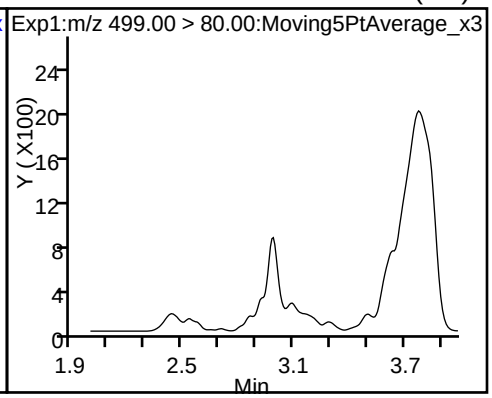
15 Perfluorooctanoic acid



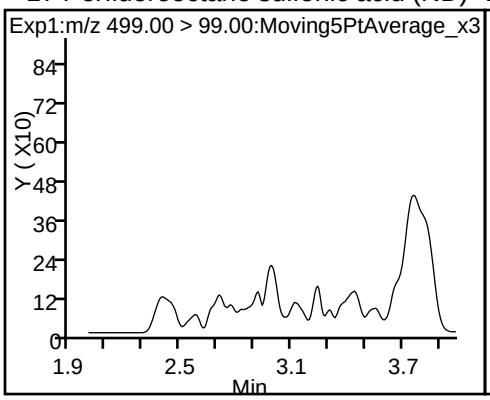
D 19 13C5 PFNA



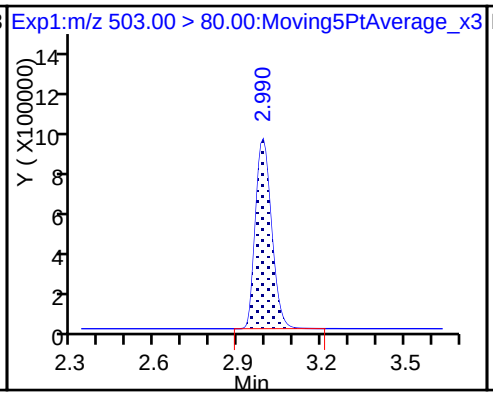
17 Perfluorooctane sulfonic acid (ND)



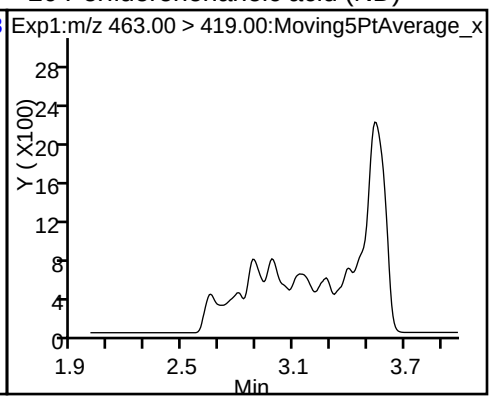
17 Perfluorooctane sulfonic acid (ND)



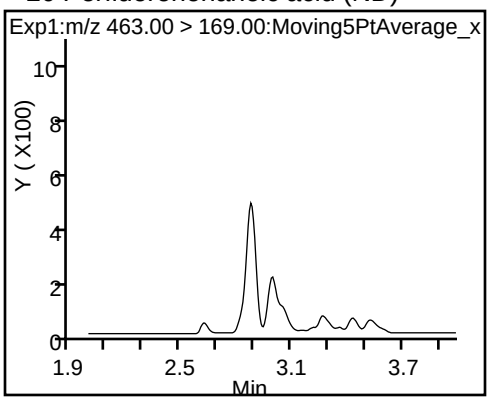
D 18 13C4 PFOS



20 Perfluorononanoic acid (ND)



20 Perfluorononanoic acid (ND)



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-04_SO0005 | Lab Sample ID: 320-35310-6

Matrix: Solid | Lab File ID: 2018.01.26LLA_033.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 10:20

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.07(g) | Date Analyzed: 01/26/2018 17:01

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 5.2 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.10	U	0.42	0.10	0.026
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.037	J	0.52	0.10	0.032
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.064	J	0.52	0.10	0.030
335-67-1	Perfluorooctanoic acid (PFOA)	0.16	J	0.52	0.21	0.089
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.71	J	1.0	0.52	0.21
375-95-1	Perfluorononanoic acid (PFNA)	0.17	J	0.52	0.10	0.037

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	92		25-150
STL01892	13C4-PFHpA	94		25-150
STL00990	13C4 PFOA	96		25-150
STL00991	13C4 PFOS	101		25-150
STL00995	13C5 PFNA	99		25-150
STL02337	13C3-PFBS	88		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_033.d
Lims ID: 320-35310-A-6-A
Client ID: FH-17-04_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 17:01:25 ALS Bottle#: 18 Worklist Smp#: 8
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-6-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:04:14 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 10:04:14

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.699	1.695	0.004	0.646	83695	2.05		88.1	1010	
D 9 13C4-PFHpA										
367.00 > 322.00	2.267	2.267	0.0	0.862	4452134	2.35		94.0	36340	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.267	2.268	-0.001	1.000	59903	0.0306			62.4	
363.00 > 169.00	2.280	2.268	0.012	1.006	22210		2.70(1.13-3.40)		163	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.280	2.280	0.0	0.994	42007	0.0176			121	
399.00 > 99.00	2.280	2.280	0.0	0.994	14274		2.94(1.50-4.49)		46.2	
D 11 18O2 PFHxS										
403.00 > 84.00	2.293	2.282	0.011	0.872	5064247	2.17		91.8	42948	
D 14 13C4 PFOA										
417.00 > 372.00	2.630	2.622	0.008	1.000	4477363	2.41		96.5	44454	
* 62 13C2-PFOA										
415.00 > 370.00	2.630	2.622	0.008		5154833	2.50			44621	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.630	2.623	0.007	1.000	160139	0.0763			82.7	
413.00 > 169.00	2.630	2.623	0.007	1.000	83891		1.91(0.84-2.52)		693	
D 19 13C5 PFNA										
468.00 > 423.00	3.001	2.992	0.009	1.141	3718123	2.47		98.8	32710	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.001	2.992	0.009	1.000	569604	0.3398			1470	
499.00 > 99.00	3.001	2.992	0.009	1.000	144380		3.95(2.31-6.93)		881	
D 18 13C4 PFOS										
503.00 > 80.00	3.001	2.992	0.009	1.141	3578481	2.42		101	24159	
20 Perfluorononanoic acid										
463.00 > 419.00	3.001	2.992	0.009	1.000	127164	0.0828			280	
463.00 > 169.00	3.001	2.992	0.009	1.000	31358		4.06(1.90-5.69)		557	

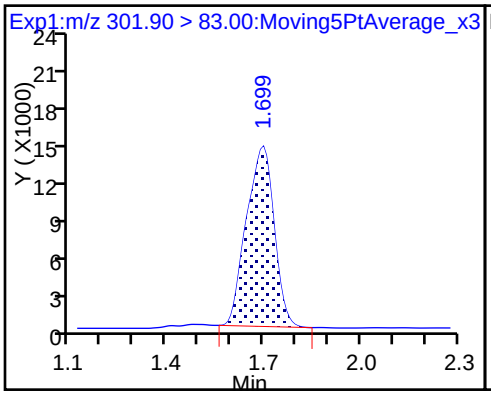
Report Date: 30-Jan-2018 10:04:15 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

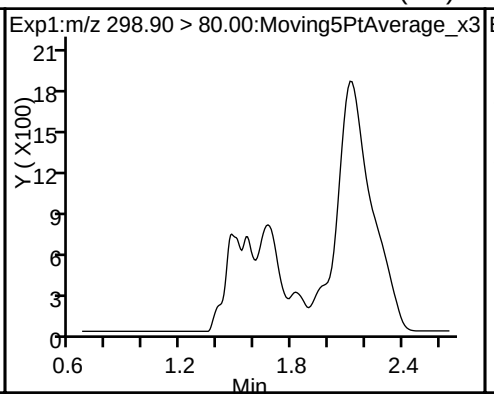
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_033.d

Injection Date:	26-Jan-2018 17:01:25	Instrument ID:	A8_N		
Lims ID:	320-35310-A-6-A	Lab Sample ID:	320-35310-6		
Client ID:	FH-17-04_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	18	Worklist Smp#:	8
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

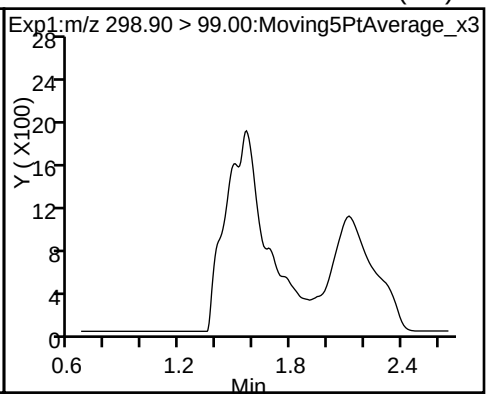
D 47 13C3-PFBS



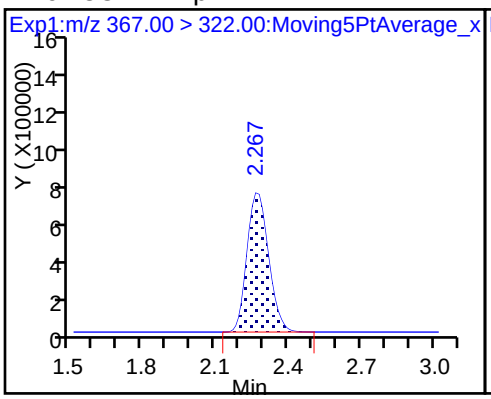
5 Perfluorobutanesulfonic acid (ND)



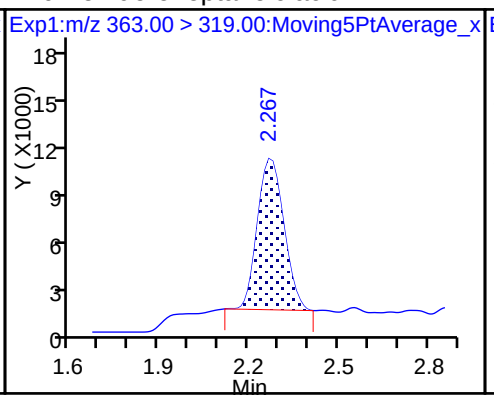
5 Perfluorobutanesulfonic acid (ND)



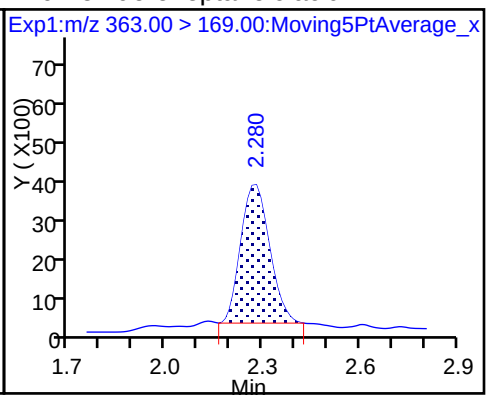
D 9 13C4-PFHpA



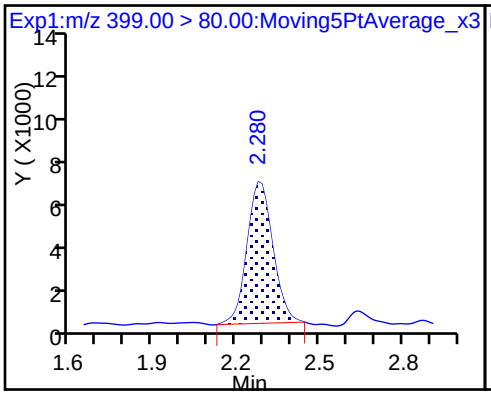
10 Perfluoroheptanoic acid



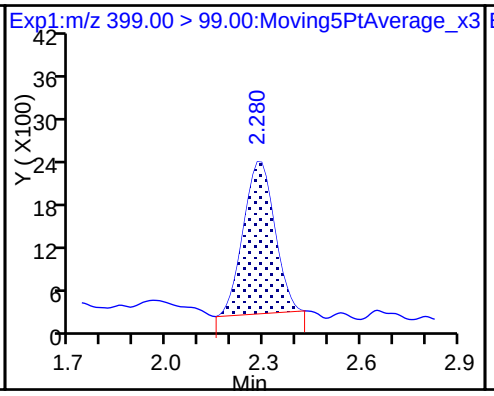
10 Perfluoroheptanoic acid



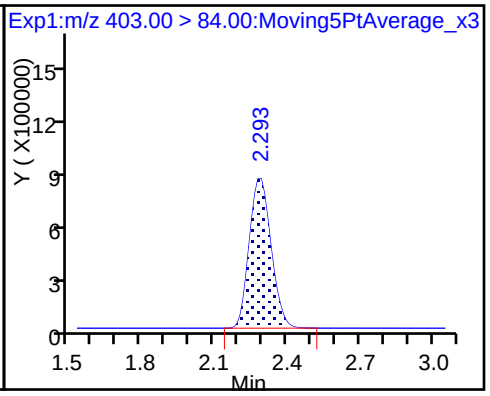
8 Perfluorohexanesulfonic acid



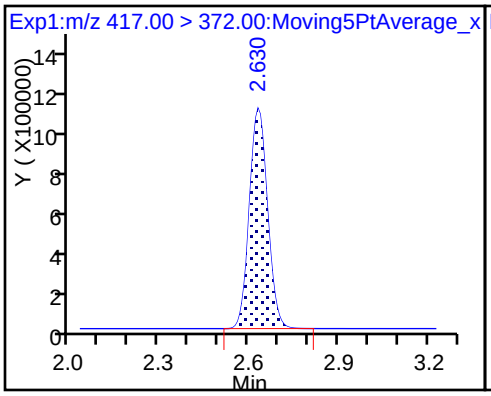
8 Perfluorohexanesulfonic acid



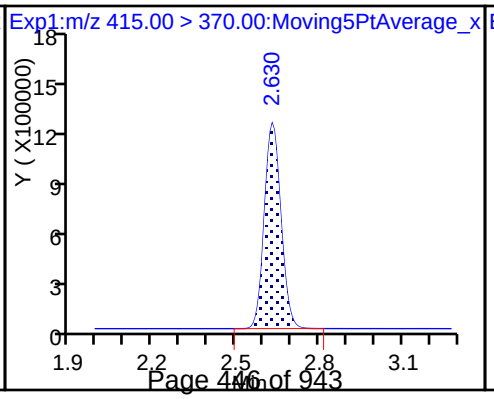
D 11 18O2 PFHxS



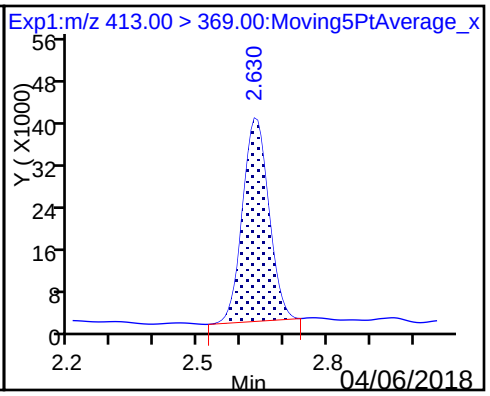
D 14 13C4 PFOA



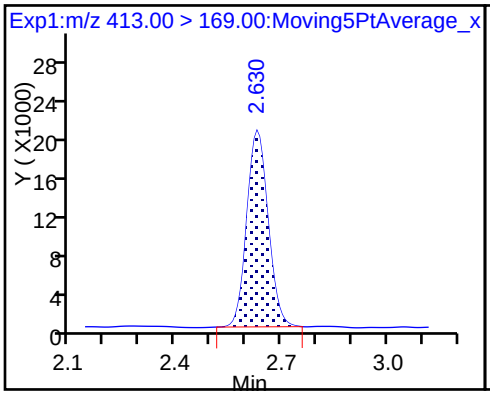
* 62 13C2-PFOA



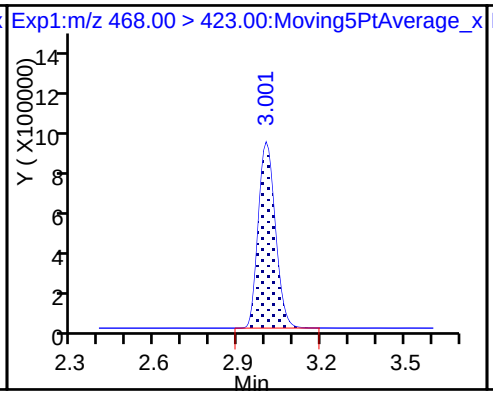
15 Perfluorooctanoic acid



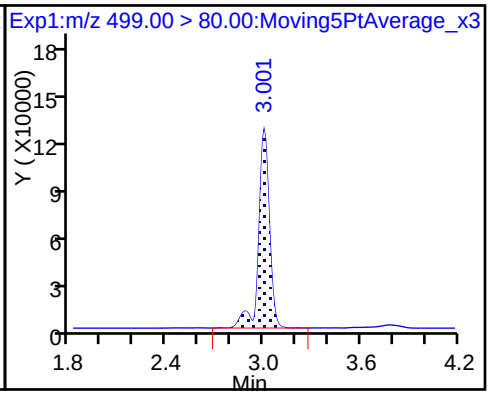
15 Perfluorooctanoic acid



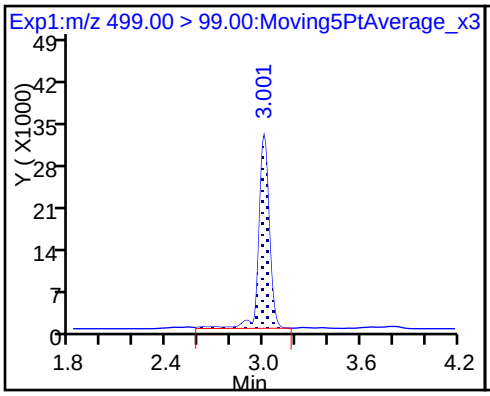
D 19 13C5 PFNA



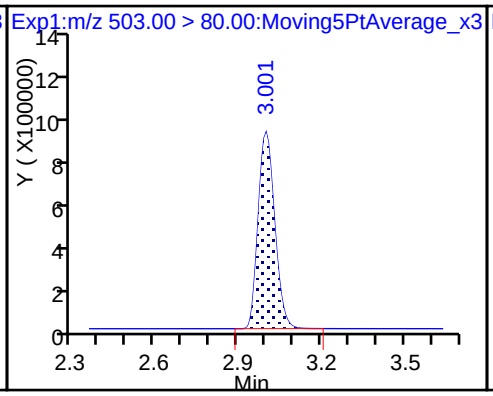
17 Perfluorooctane sulfonic acid



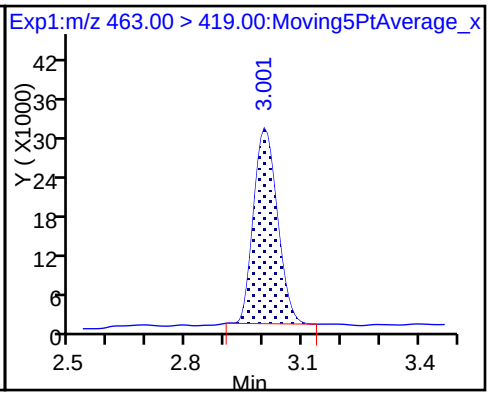
17 Perfluorooctane sulfonic acid



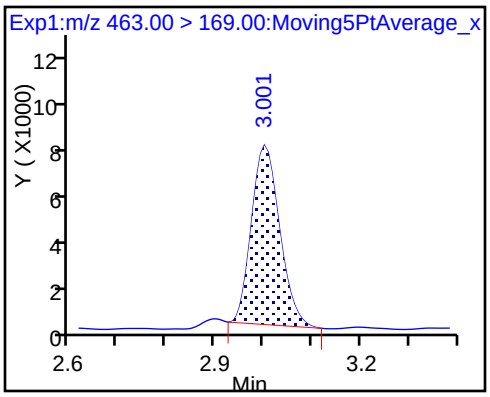
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-04_GW012218 | Lab Sample ID: 320-35310-7

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_039.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 10:30

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 125.5(mL) | Date Analyzed: 01/25/2018 22:35

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	21	M	4.0	2.0	0.92
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	230	J1	4.0	2.0	0.76
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.0	M	4.0	3.0	1.2
335-67-1	Perfluorooctanoic acid (PFOA)	56	M J1	4.0	3.0	1.1
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	14	J1	8.0	6.0	2.2
375-95-1	Perfluorononanoic acid (PFNA)	3.0	U J1	4.0	3.0	1.0

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	110		25-150
STL01892	13C4-PFHpA	107		25-150
STL00990	13C4 PFOA	112		25-150
STL00991	13C4 PFOS	113		25-150
STL00995	13C5 PFNA	118		25-150
STL02337	13C3-PFBS	106		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_039.d
Lims ID: 320-35310-A-7-A
Client ID: FH-17-04_GW012218
Sample Type: Client
Inject. Date: 25-Jan-2018 22:35:45 ALS Bottle#: 33 Worklist Smp#: 7
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-7-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:35:45

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	1.408	1.411	-0.003	0.537	6635069	2.44		97.8	21468	
2 Perfluorobutyric acid										M
212.90 > 169.00	1.414	1.413	0.001	1.004	124963	0.0504			11.8	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.654	1.659	-0.005	0.630	4726178	2.94		118	31915	
4 Perfluoropentanoic acid										M
262.90 > 219.00	1.654	1.662	-0.008	1.000	124824	0.0560			25.3	M
D 47 13C3-PFBS										
301.90 > 83.00	1.689	1.695	-0.006	0.644	87929	2.47		106	1277	
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.698	1.697	0.001	1.005	758127	0.2596			374	M
298.90 > 99.00	1.698	1.697	0.001	1.005	341465		2.22(1.25-3.74)		501	
D 7 13C2 PFHxA										
315.00 > 270.00	1.934	1.939	-0.005	0.737	4567532	2.64		106	37587	
6 Perfluorohexanoic acid										M
313.00 > 269.00	1.934	1.939	-0.005	1.000	626397	0.3308			420	M
313.00 > 119.00	1.934	1.939	-0.005	1.000	51955		12.06(5.03-15.10)		549	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.864	4393258	2.66		107	32505	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.266	2.268	-0.002	1.000	146250	0.0757			133	M
363.00 > 169.00	2.266	2.268	-0.002	1.000	55954		2.61(1.13-3.40)		373	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	7253468	2.92			7656	
399.00 > 99.00	2.279	2.280	-0.001	1.000	2158731		3.36(1.50-4.49)		5597	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.869	5284120	2.60		110	47318	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.602	2.596	0.006	1.000	12305	0.0163			321	
D 12 M2-6:2FTS										
429.00 > 81.00	2.602	2.597	0.005	0.992	1081967	3.55		149	9070	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.622	0.001	1.000	4507313	2.79		112	43078	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.622	0.001		4486612	2.50			46734	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.623	2.623	0.0	1.000	1476507	0.6987			569	M
413.00 > 169.00	2.623	2.623	0.0	1.000	931494		1.59(0.84-2.52)		5642	M
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.631	2.629	0.002	1.000	22542	0.0114			52.5	
449.00 > 99.00	2.631	2.629	0.002	1.000	7061		3.19(1.94-5.82)		60.3	
D 19 13C5 PFNA										
468.00 > 423.00	3.001	2.992	0.009	1.144	3874063	2.96		118	36475	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.874	2.992	-0.118	0.958	281548	0.1728			490	
499.00 > 99.00	2.881	2.992	-0.111	0.960	40005		7.04(2.31-6.93)		205	
D 18 13C4 PFOS										
503.00 > 80.00	3.001	2.992	0.009	1.144	3478690	2.71		113	20360	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.348	3.338	0.010	1.002	2197	0.001158			58.1	
D 21 13C8 FOSA										
506.00 > 78.00	3.340	3.338	0.002	1.273	4829369	2.67		107	25023	
D 26 M2-8:2FTS										
529.00 > 81.00	3.348	3.342	0.006	1.276	1117136	3.47		145	14708	
D 23 13C2 PFDA										
515.00 > 470.00	3.355	3.352	0.003	1.279	3294494	2.91		116	30601	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.515	3.507	0.008	1.340	1837402	3.25		130	13606	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.680	3.672	0.008	1.403	1847773	3.24		129	9046	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.688	3.678	0.010	1.002	6730	0.006523			26.4	
563.00 > 169.00	3.671	3.678	-0.007	0.998	1359		4.95(0.00-0.00)		95.6	
D 30 13C2 PFUnA										
565.00 > 520.00	3.680	3.679	0.001	1.403	2499023	2.91		116	28684	
D 36 13C2 PFDoA										
615.00 > 570.00	3.981	3.979	0.002	1.517	2704132	2.90		116	30333	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.486	4.483	0.003	1.710	3779649	3.10		124	27620	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.903	4.902	0.001	1.869	6105589	2.81		113	13052	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.903	4.902	0.001	1.000	53518	0.003776			33.0	
813.00 > 169.00	4.903	4.902	0.001	1.000	10122		5.29(2.86-8.58)		263	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:22:41 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_039.d

Injection Date: 25-Jan-2018 22:35:45 Instrument ID: A8_N

Lims ID: 320-35310-A-7-A Lab Sample ID: 320-35310-7

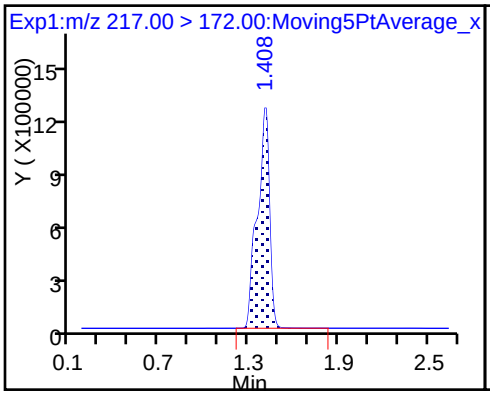
Client ID: FH-17-04_GW012218

Operator ID: SACINSTLCMS01 ALS Bottle#: 33 Worklist Smp#: 7

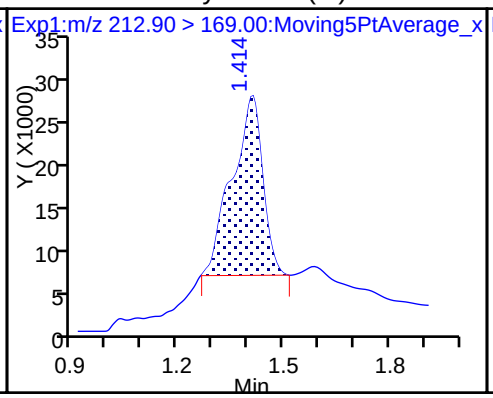
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

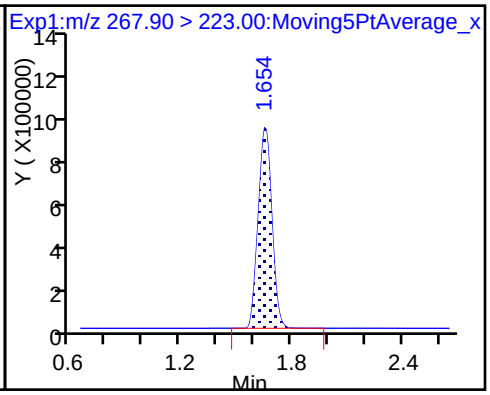
D 1 13C4 PFBA



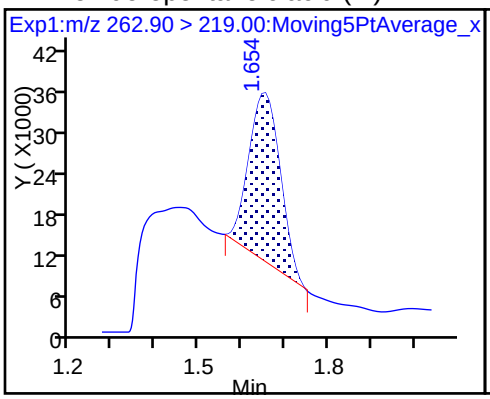
2 Perfluorobutyric acid (M)



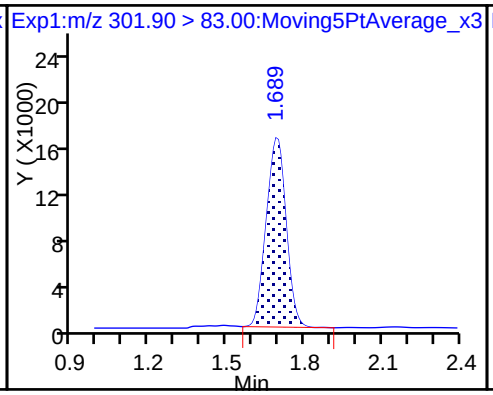
D 3 13C5-PFPeA



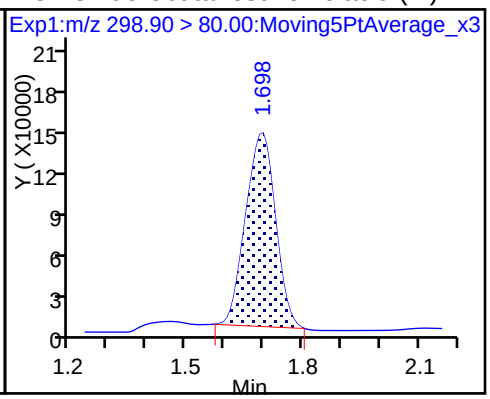
4 Perfluoropentanoic acid (M)



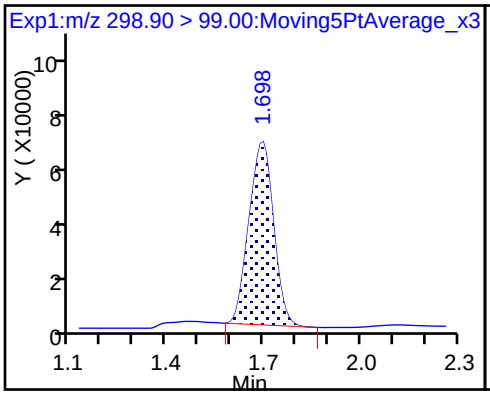
D 47 13C3-PFBS



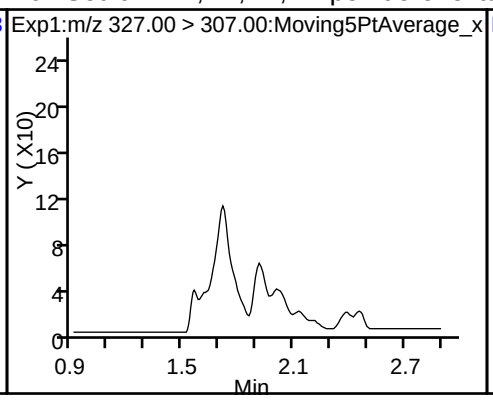
5 Perfluorobutanesulfonic acid (M)



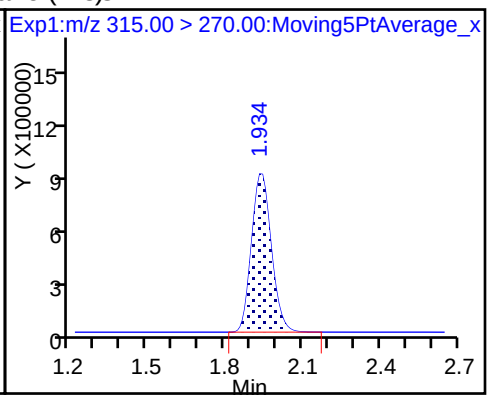
5 Perfluorobutanesulfonic acid



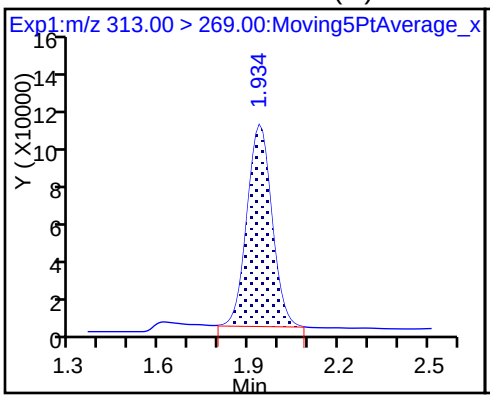
61 Sodium 1H,1H,2H,2H-perfluorohexane (MS)



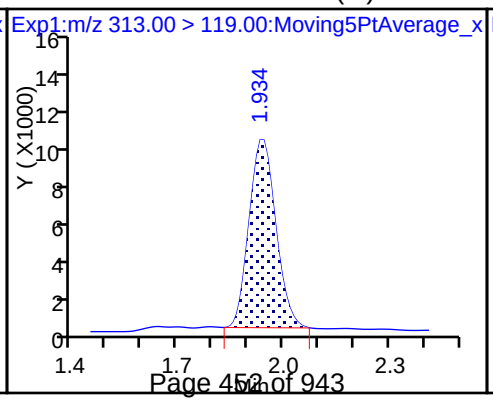
D 13C2 PFHxA



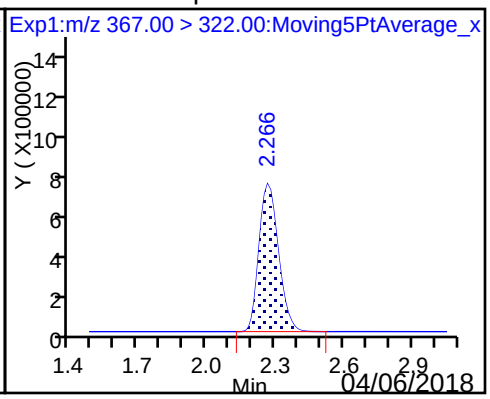
6 Perfluorohexanoic acid (M)



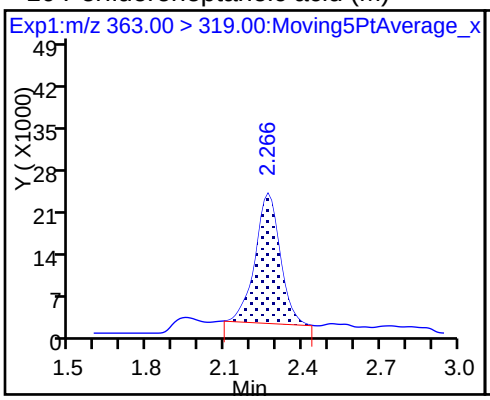
6 Perfluorohexanoic acid (M)



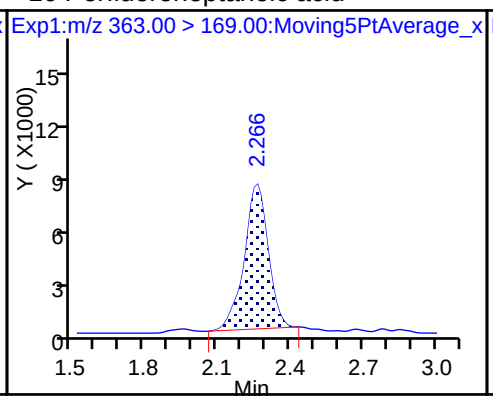
D 9 13C4-PFHpA



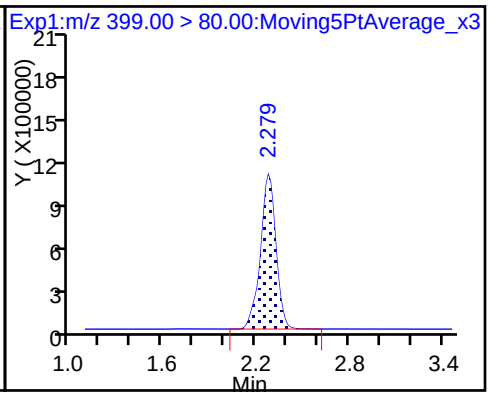
10 Perfluoroheptanoic acid (M)



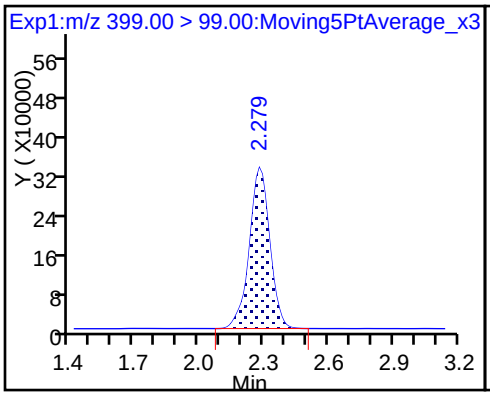
10 Perfluoroheptanoic acid



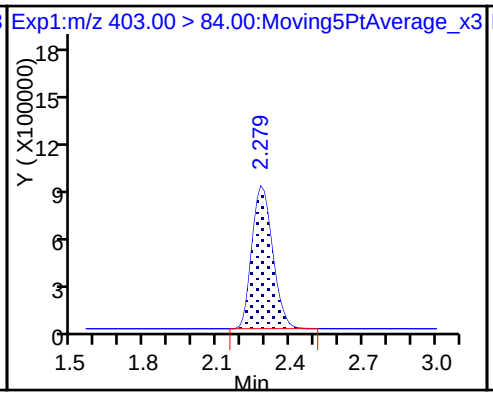
8 Perfluorohexanesulfonic acid



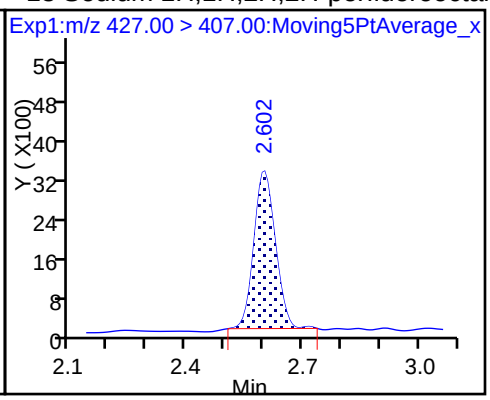
8 Perfluorohexanesulfonic acid



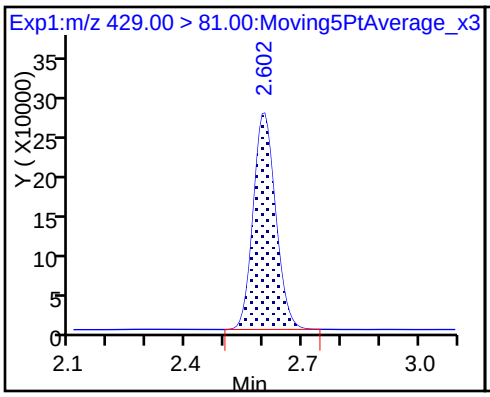
D 11 18O2 PFHxS



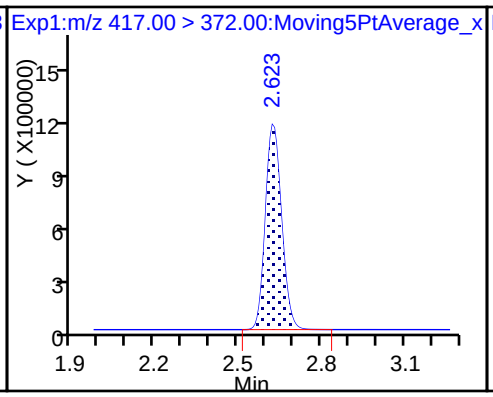
13 Sodium 1H,1H,2H,2H-perfluorooctane



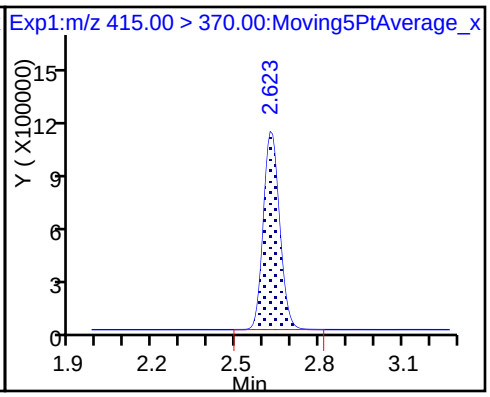
D 12 M2-6:2FTS



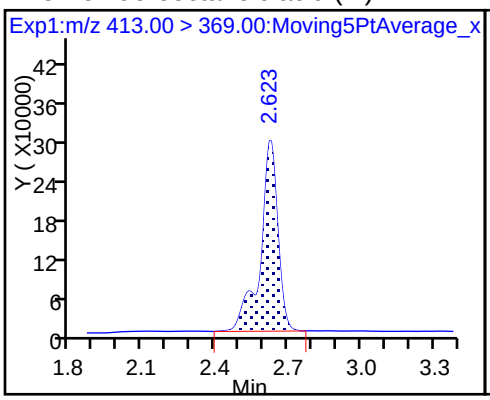
D 14 13C4 PFOA



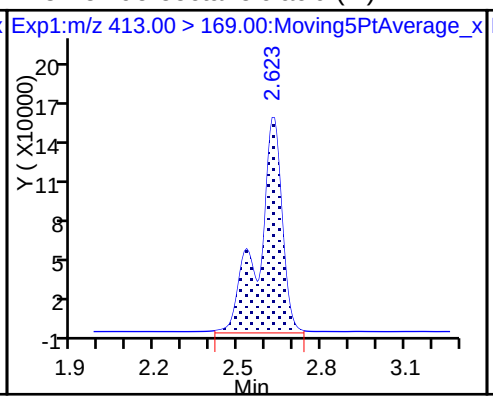
* 62 13C2-PFOA



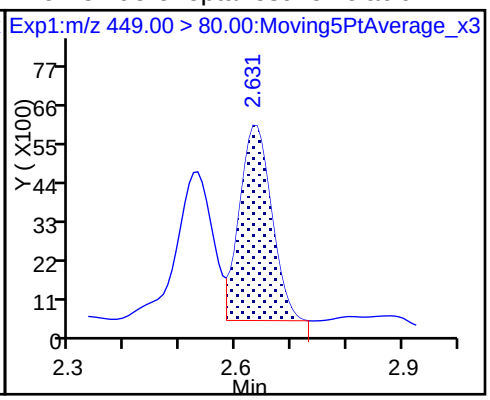
15 Perfluorooctanoic acid (M)



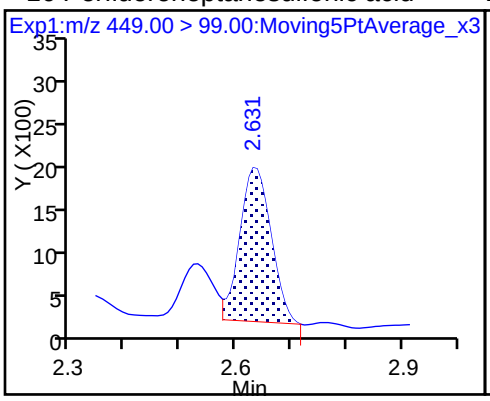
15 Perfluorooctanoic acid (M)



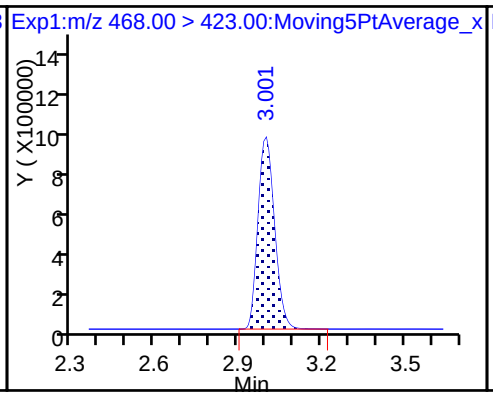
16 Perfluoroheptanesulfonic acid



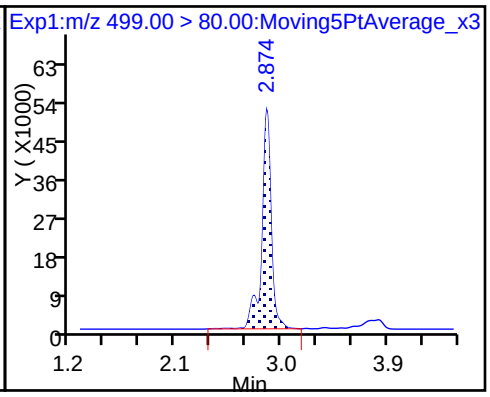
16 Perfluoroheptanesulfonic acid



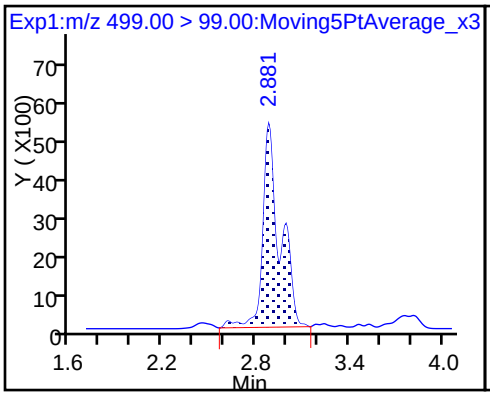
D 19 13C5 PFNA



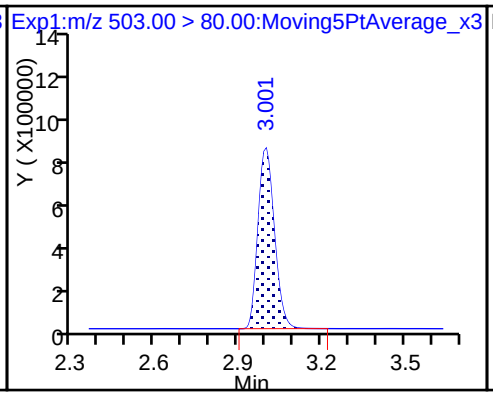
17 Perfluorooctane sulfonic acid



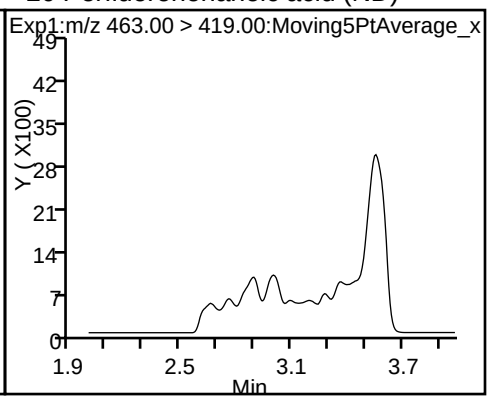
17 Perfluorooctane sulfonic acid



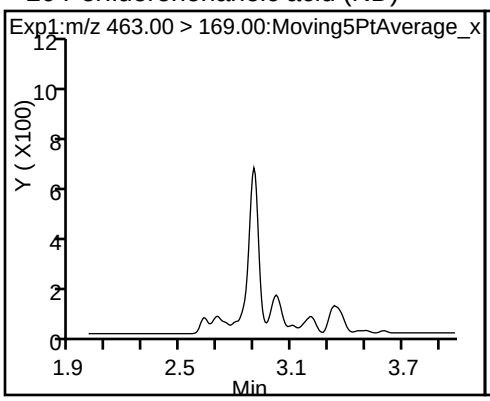
D 18 13C4 PFOS



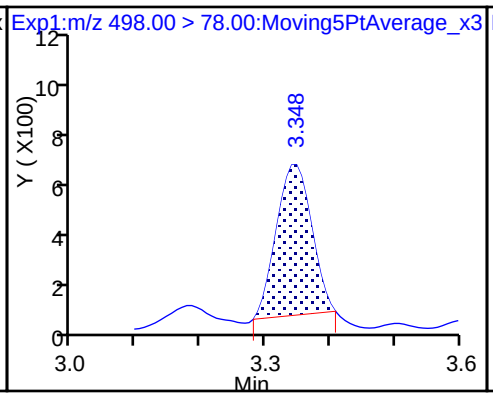
20 Perfluorononanoic acid (ND)



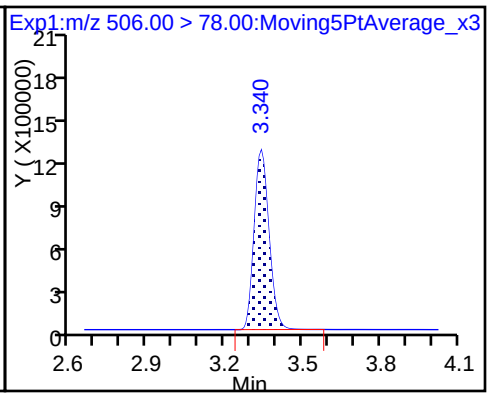
20 Perfluorononanoic acid (ND)



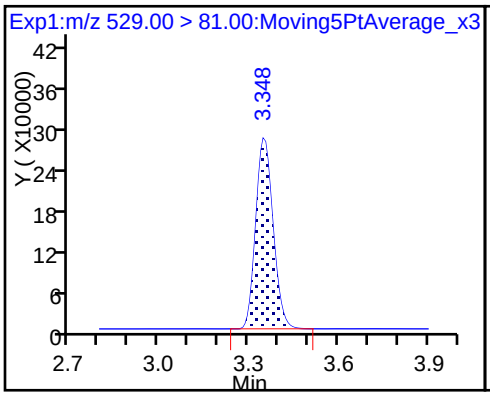
22 Perfluorooctane Sulfonamide



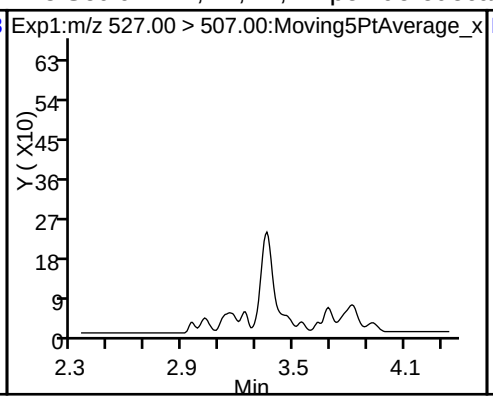
D 21 13C8 FOSA



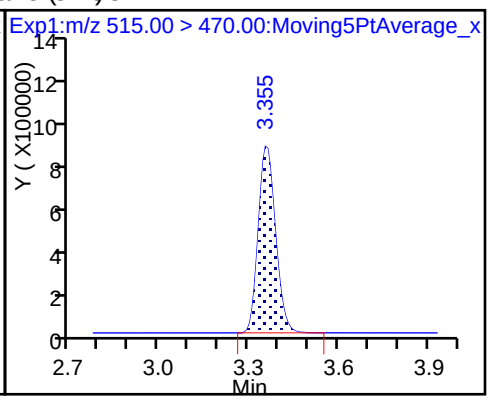
D 26 M2-8:2FTS



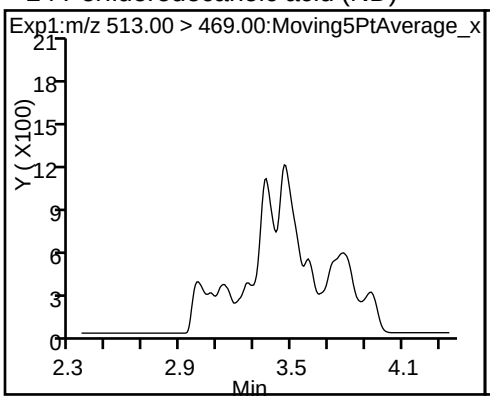
25 Sodium 1H,1H,2H,2H-perfluorodecane (ND)



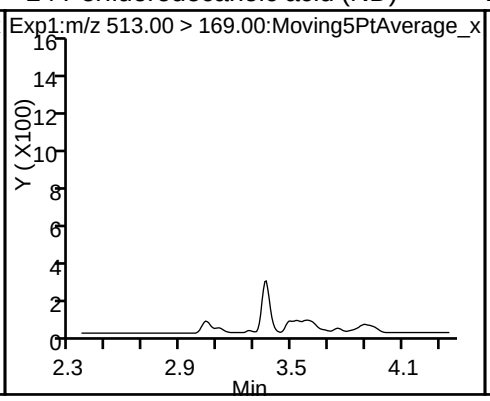
D 23 13C2 PFDA



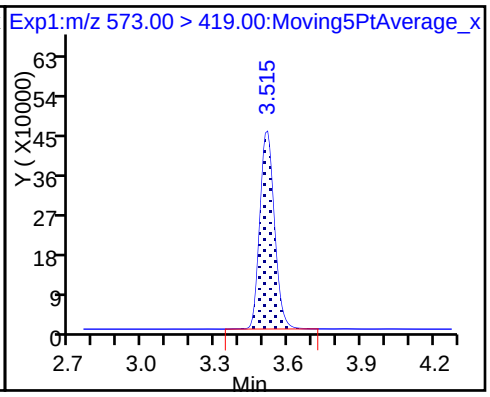
24 Perfluorodecanoic acid (ND)



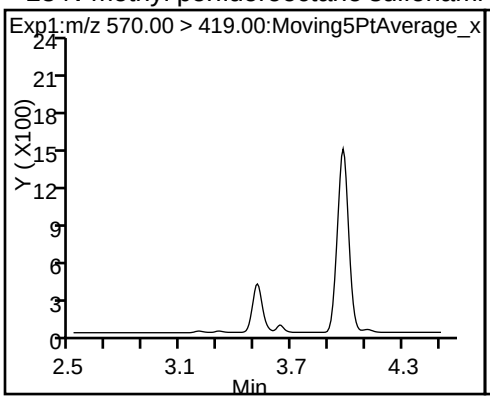
24 Perfluorodecanoic acid (ND)



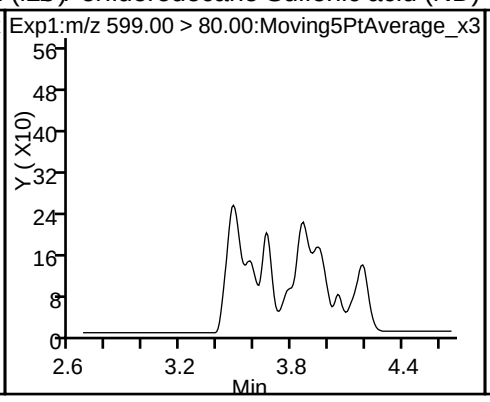
D 27 d3-NMeFOSAA



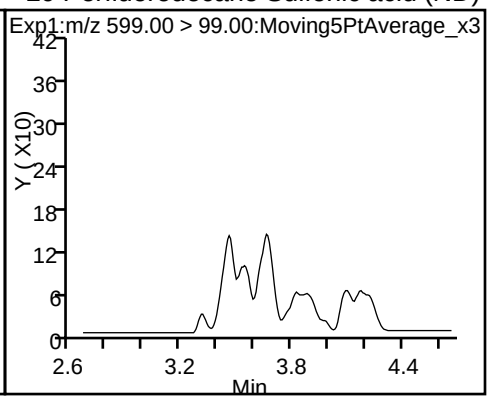
28 N-methyl perfluorooctane sulfonami (ND)



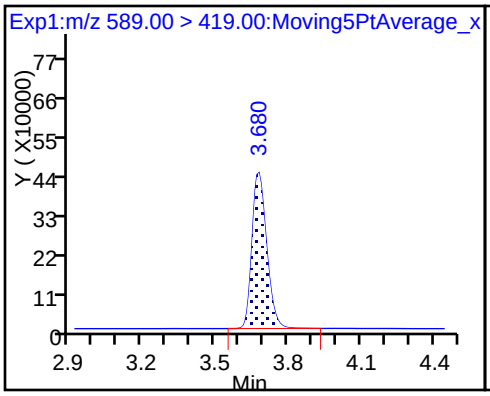
29 Perfluorodecane Sulfonic acid (ND)



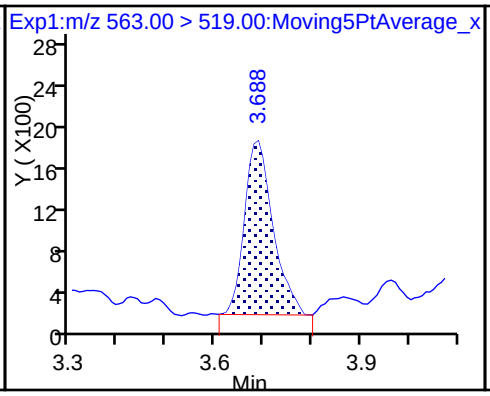
29 Perfluorodecane Sulfonic acid (ND)



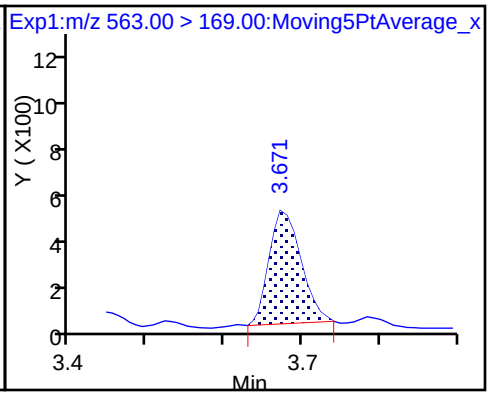
D 32 d5-NEtFOSAA



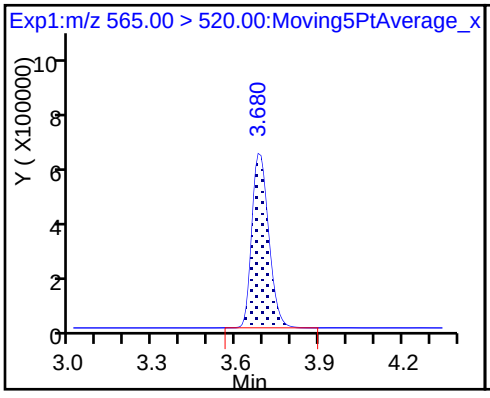
31 Perfluoroundecanoic acid



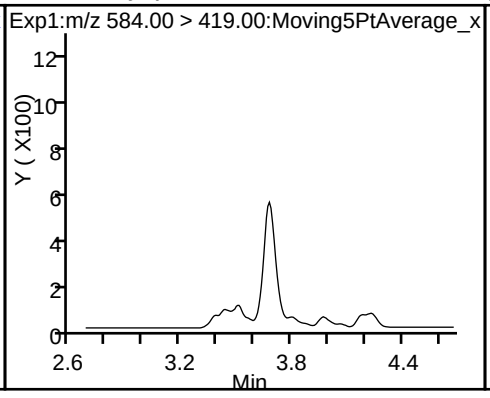
31 Perfluoroundecanoic acid



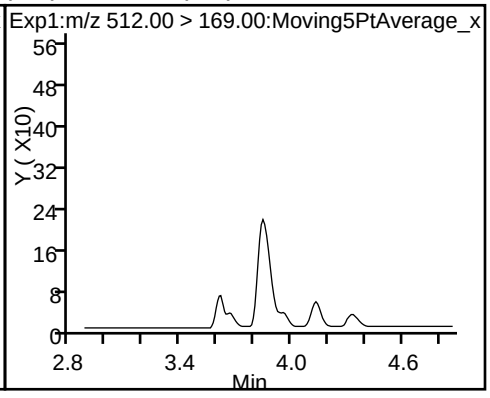
D 30 13C2 PFUnA



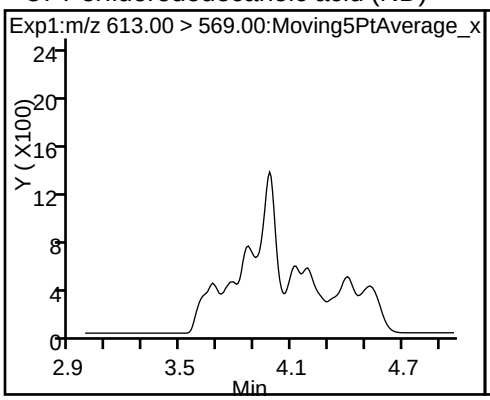
33 N-ethyl perfluorooctane sulfonamid (ND)



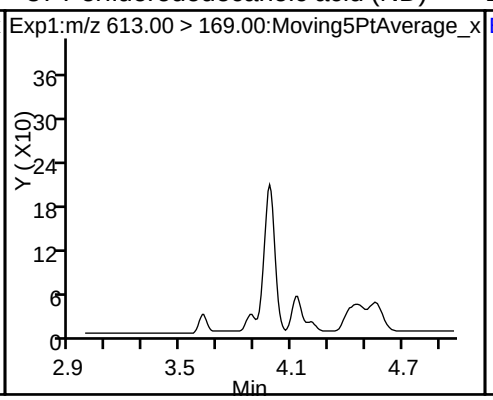
35 MeFOSA (ND)



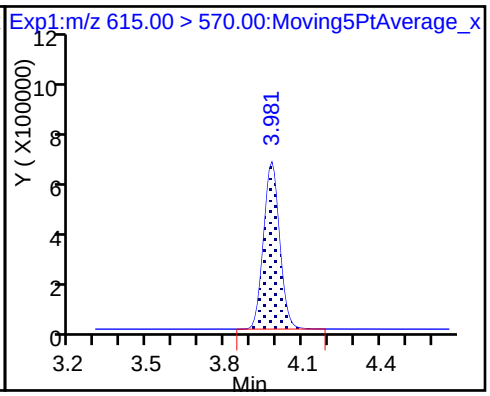
37 Perfluorododecanoic acid (ND)



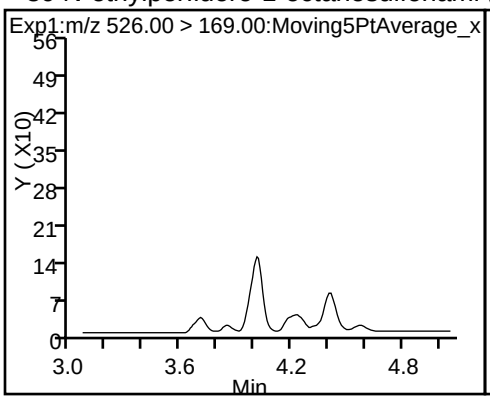
37 Perfluorododecanoic acid (ND)



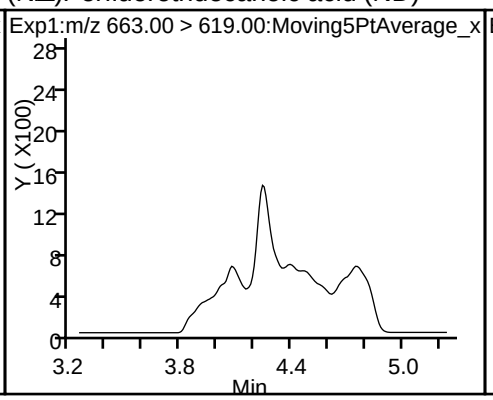
D 36 13C2 PFDoA



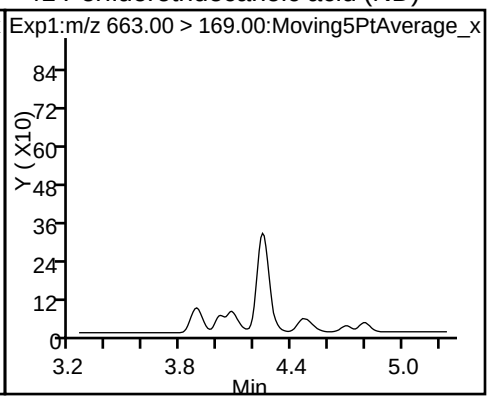
39 N-ethylperfluoro-1-octanesulfonami (ND)



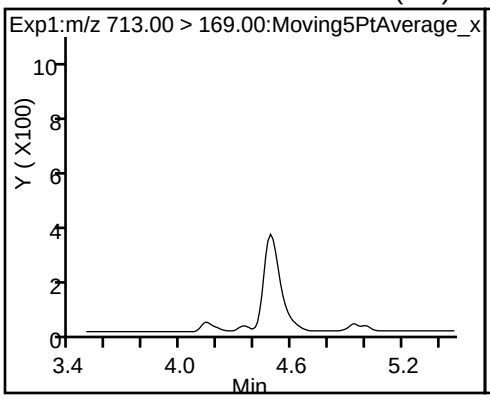
41 Perfluorotridecanoic acid (ND)



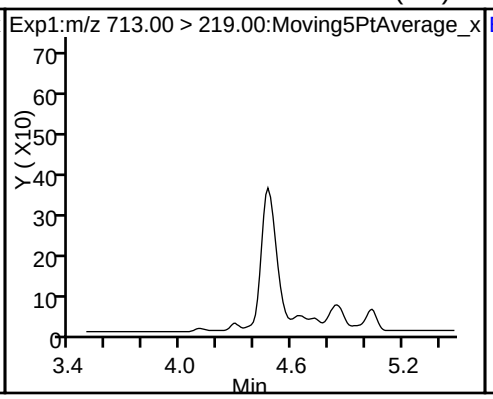
41 Perfluorotridecanoic acid (ND)



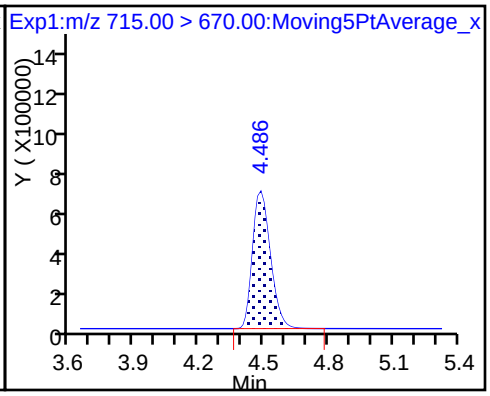
42 Perfluorotetradecanoic acid (ND)



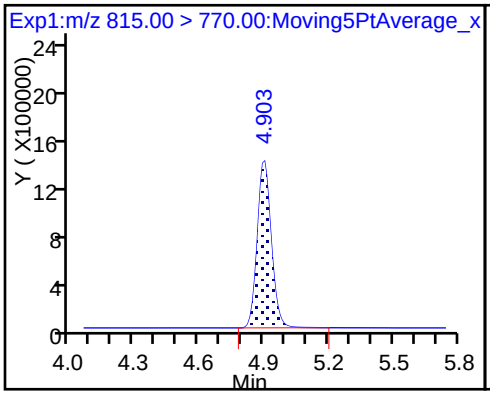
42 Perfluorotetradecanoic acid (ND)



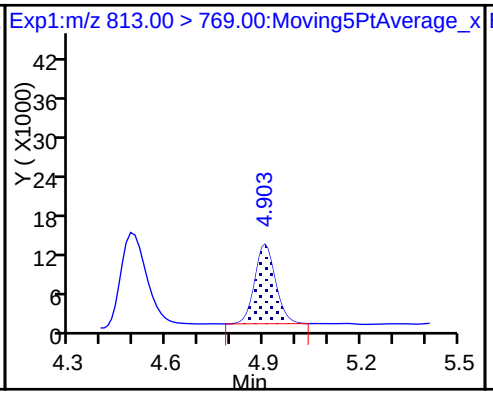
D 43 13C2-PFTeDA



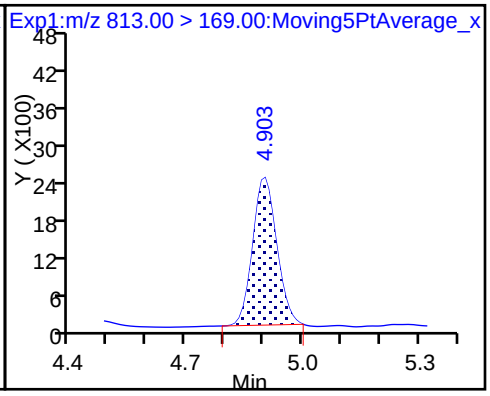
D 44 13C2-PFHxDA



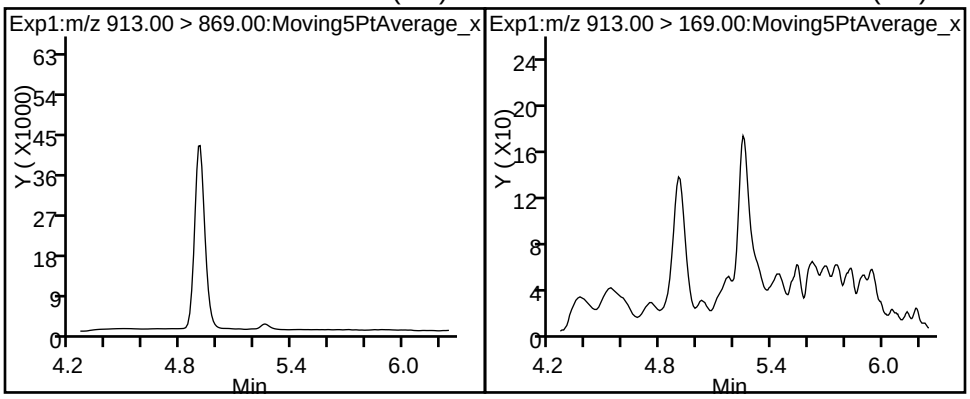
45 Perfluorohexadecanoic acid



45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid (ND) 46 Perfluorooctadecanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

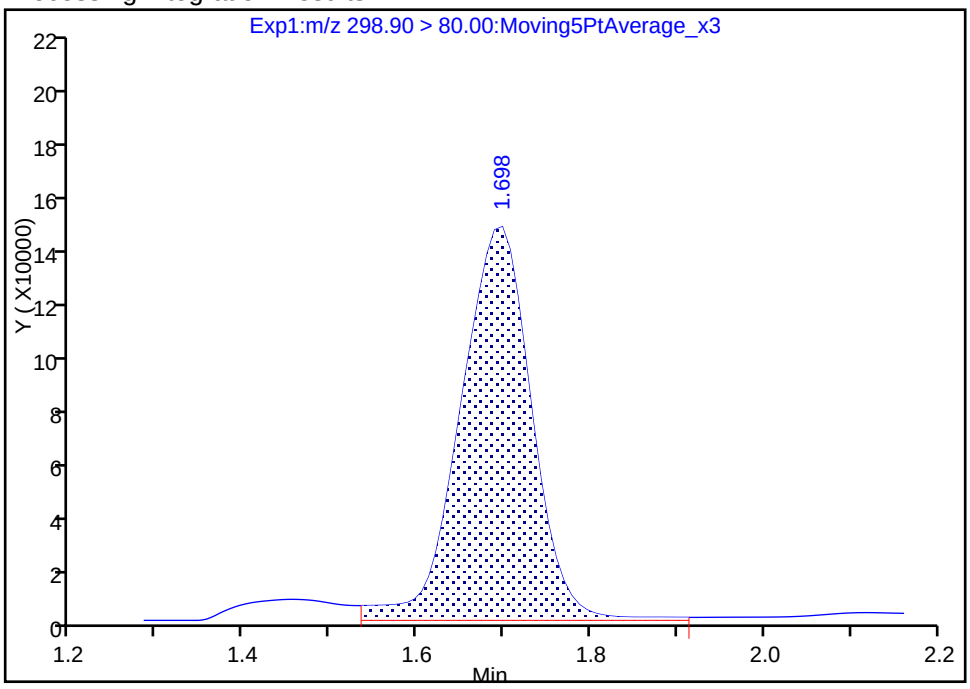
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_039.d				
Injection Date:	25-Jan-2018 22:35:45	Instrument ID:	A8_N		
Lims ID:	320-35310-A-7-A	Lab Sample ID:	320-35310-7		
Client ID:	FH-17-04_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	33	Worklist Smp#:	7
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

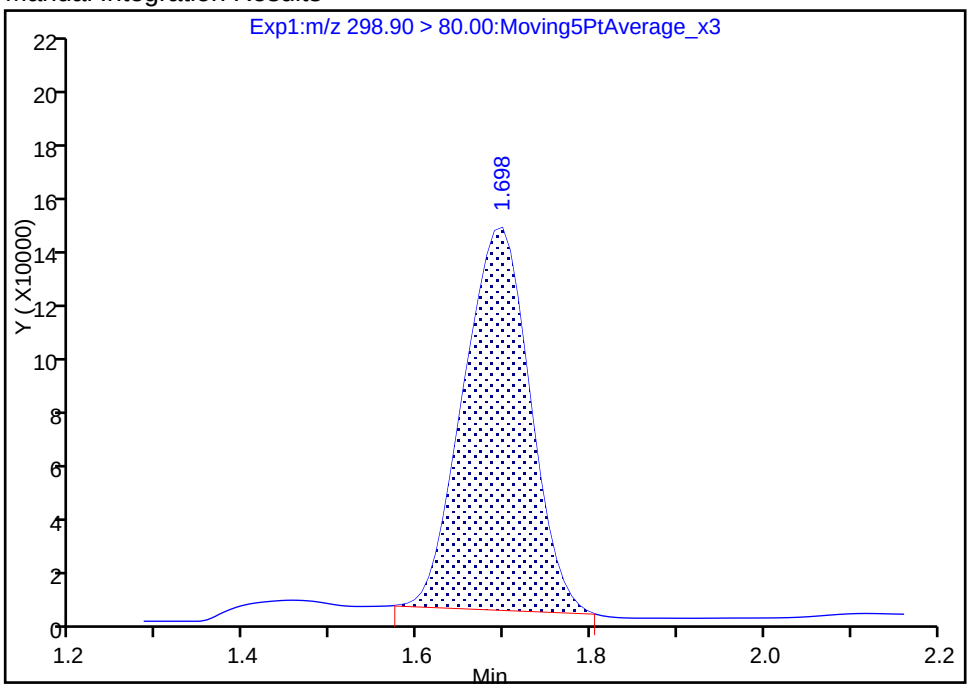
Processing Integration Results

RT: 1.70
Area: 836959
Amount: 0.286619
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 758127
Amount: 0.259623
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:34:21

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

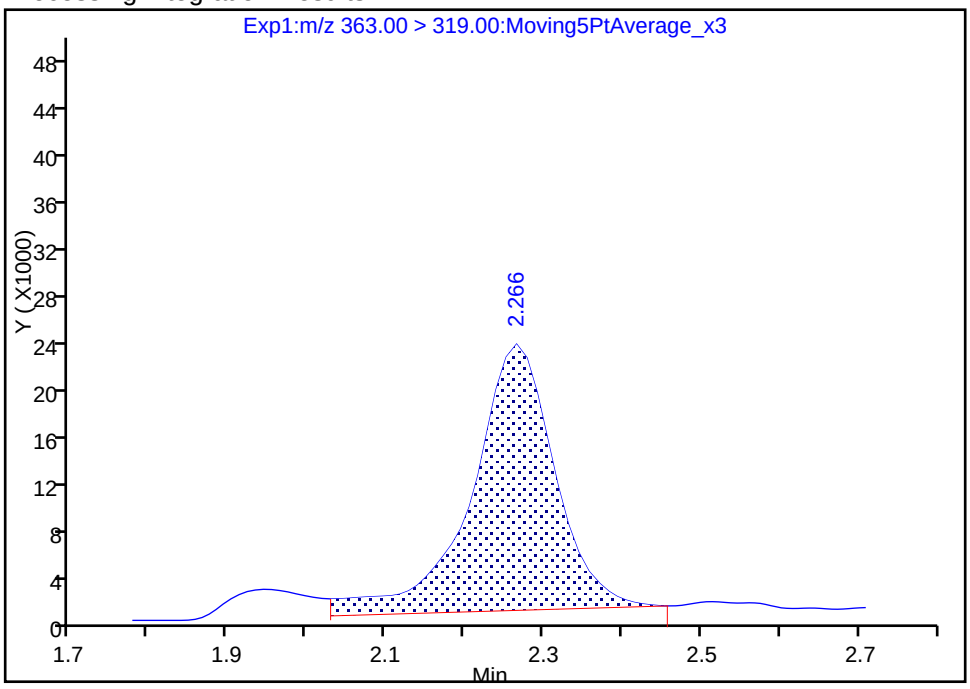
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_039.d				
Injection Date:	25-Jan-2018 22:35:45	Instrument ID:	A8_N		
Lims ID:	320-35310-A-7-A	Lab Sample ID:	320-35310-7		
Client ID:	FH-17-04_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	33	Worklist Smp#:	7
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

10 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

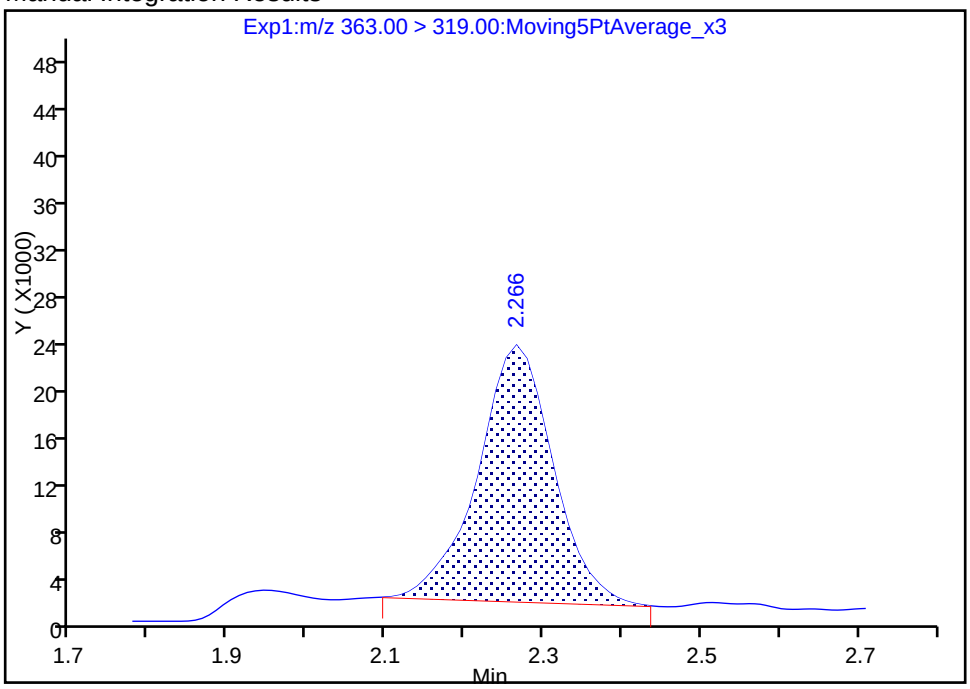
Processing Integration Results

RT: 2.27
Area: 168195
Amount: 0.087088
Amount Units: ng/ml



Manual Integration Results

RT: 2.27
Area: 146250
Amount: 0.075726
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:34:55

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

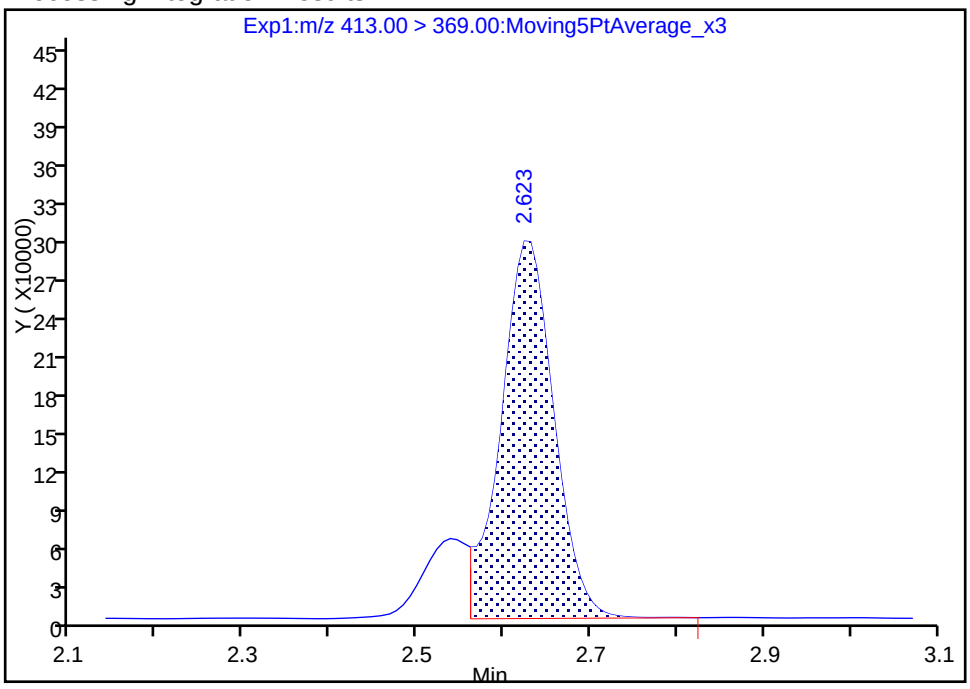
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_039.d				
Injection Date:	25-Jan-2018 22:35:45	Instrument ID:	A8_N		
Lims ID:	320-35310-A-7-A	Lab Sample ID:	320-35310-7		
Client ID:	FH-17-04_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	33	Worklist Smp#:	7
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

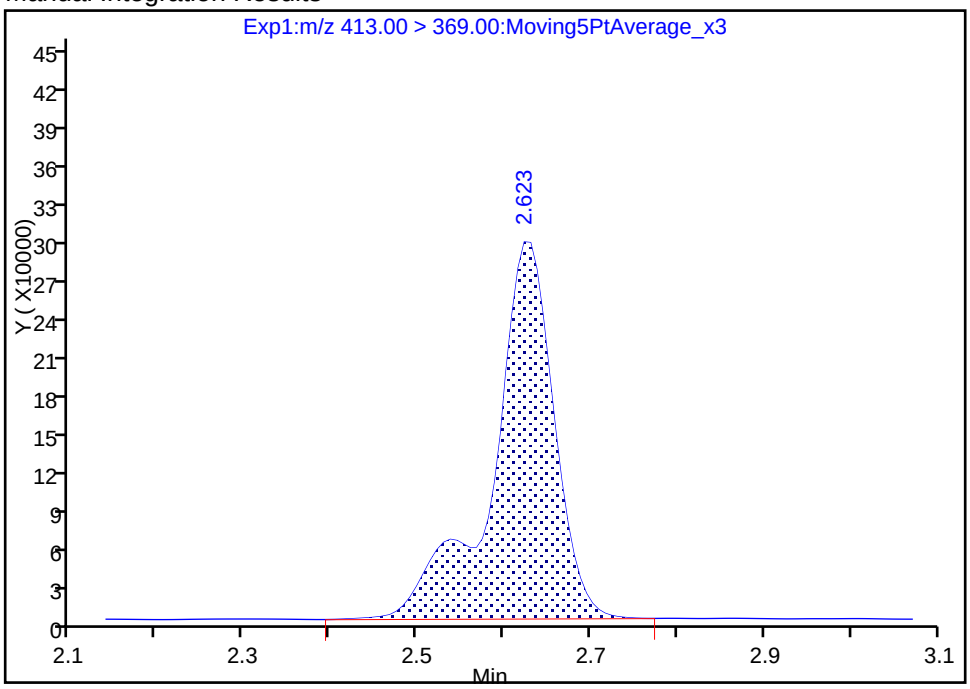
Processing Integration Results

RT: 2.62
Area: 1255529
Amount: 0.594139
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 1476507
Amount: 0.698709
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:35:16

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_039.d

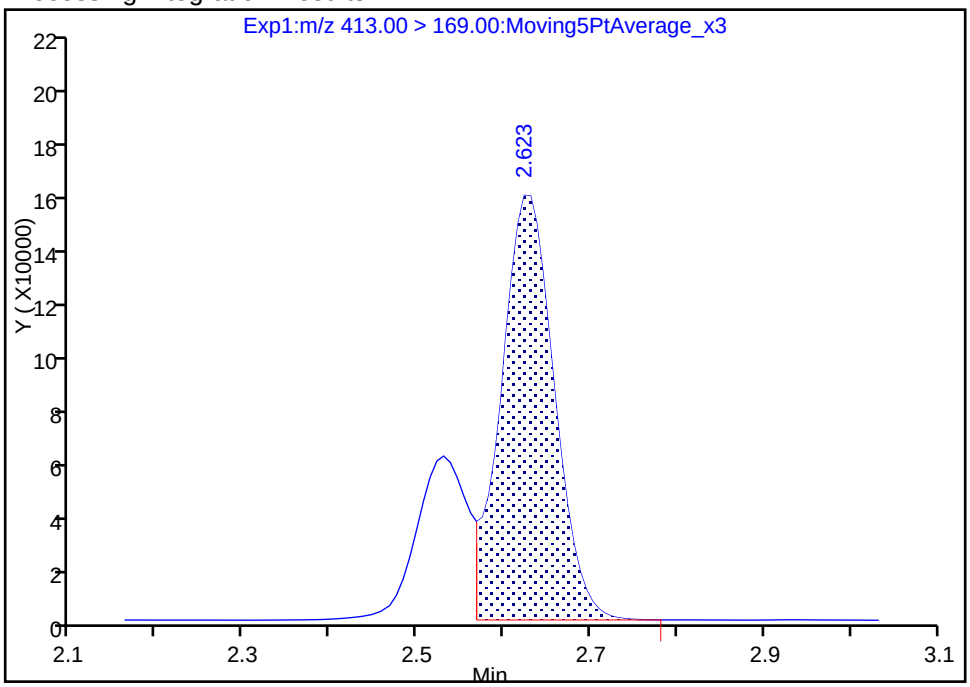
Injection Date:	25-Jan-2018 22:35:45	Instrument ID:	A8_N		
Lims ID:	320-35310-A-7-A	Lab Sample ID:	320-35310-7		
Client ID:	FH-17-04_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	33	Worklist Smp#:	7
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

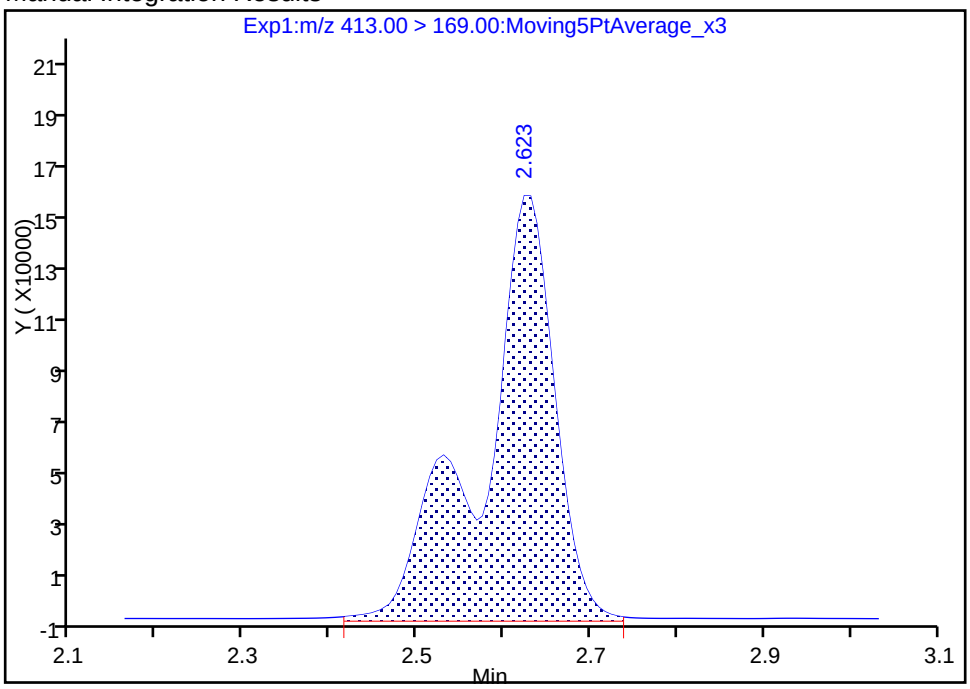
Processing Integration Results

RT: 2.62
Area: 666983
Amount: 0.594139
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 931494
Amount: 0.698709
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:35:22

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-02_SO0005 | Lab Sample ID: 320-35310-8

Matrix: Solid | Lab File ID: 2018.01.26LLA_034.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 11:15

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.07(g) | Date Analyzed: 01/26/2018 17:09

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 6.4 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.42	0.11	0.026
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.85		0.53	0.11	0.033
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.85		0.53	0.11	0.031
335-67-1	Perfluorooctanoic acid (PFOA)	0.92	M	0.53	0.21	0.091
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	18		1.1	0.53	0.21
375-95-1	Perfluorononanoic acid (PFNA)	2.0		0.53	0.11	0.038

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	91		25-150
STL01892	13C4-PFHpA	88		25-150
STL00990	13C4 PFOA	98		25-150
STL00991	13C4 PFOS	98		25-150
STL00995	13C5 PFNA	101		25-150
STL02337	13C3-PFBS	94		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_034.d
Lims ID: 320-35310-A-8-A
Client ID: FH-17-02_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 17:09:14 ALS Bottle#: 19 Worklist Smp#: 9
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-8-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:29:39 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 10:29:39

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.698	1.695	0.003	0.647	92750	2.19		94.2	596	
5 Perfluorobutanesulfonic acid										RM
298.90 > 80.00	1.698	1.697	0.001	1.000	14342	0.004656			22.1	RM
298.90 > 99.00	1.681	1.697	-0.016	0.990	2200		6.52(1.25-3.74)		2.6	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.864	4319794	2.20		88.1	33784	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.266	2.268	-0.002	1.000	770016	0.4055			603	
363.00 > 169.00	2.266	2.268	-0.002	1.000	289292		2.66(1.13-3.40)		1997	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	991707	0.4051			1721	
399.00 > 99.00	2.279	2.280	-0.001	1.000	314960		3.15(1.50-4.49)		669	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.869	5200227	2.15		91.0	44915	
D 14 13C4 PFOA										
417.00 > 372.00	2.624	2.622	0.002	1.000	4706620	2.45		97.9	38958	
* 62 13C2-PFOA										
415.00 > 370.00	2.624	2.622	0.002		5339282	2.50			44288	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.624	2.623	0.001	1.000	961376	0.4357			544	
413.00 > 169.00	2.624	2.623	0.001	1.000	532711		1.80(0.84-2.52)		3753	M
D 19 13C5 PFNA										
468.00 > 423.00	3.002	2.992	0.010	1.144	3954959	2.54		101	47498	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.002	2.992	0.010	1.003	14665305	8.73			17497	
499.00 > 99.00	3.002	2.992	0.010	1.003	3190949		4.60(2.31-6.93)		11361	
D 18 13C4 PFOS										
503.00 > 80.00	2.994	2.992	0.002	1.141	3587528	2.35		98.2	16661	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	3.002	2.992	0.010	1.000	1566079	0.9590			1948	
463.00 > 169.00	3.002	2.992	0.010	1.000	397803		3.94(1.90-5.69)		4530	

QC Flag Legend

Processing Flags

R - Failed Signal Ratio Test

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:29:40 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_034.d

Injection Date: 26-Jan-2018 17:09:14 Instrument ID: A8_N

Lims ID: 320-35310-A-8-A Lab Sample ID: 320-35310-8

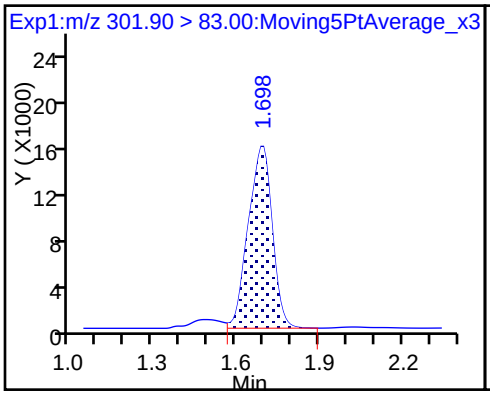
Client ID: FH-17-02_SO0005

Operator ID: SACINSTLCMS01 ALS Bottle#: 19 Worklist Smp#: 9

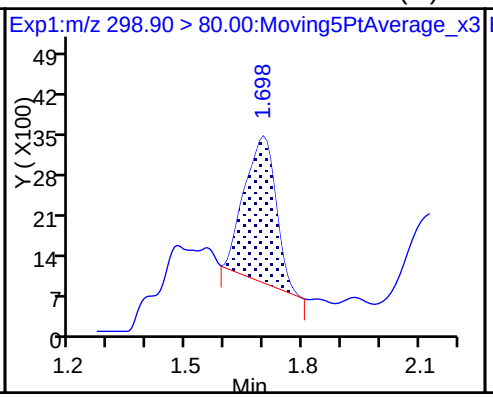
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

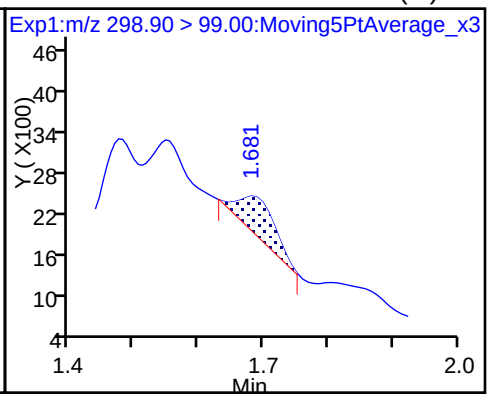
D 47 13C3-PFBS



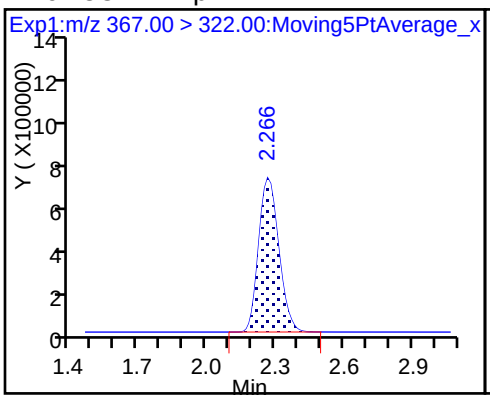
5 Perfluorobutanesulfonic acid (M)



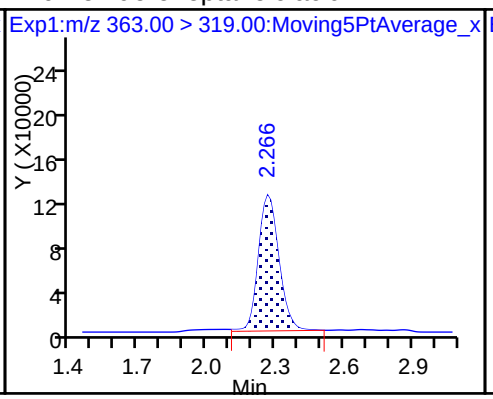
5 Perfluorobutanesulfonic acid (M)



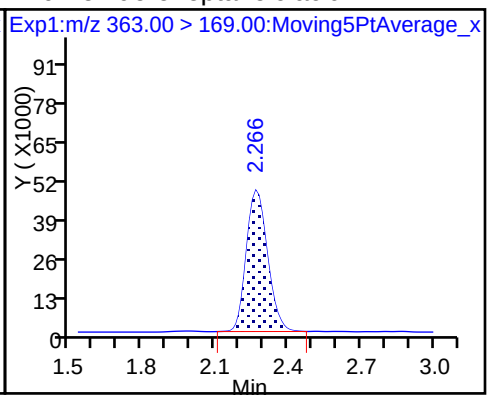
D 9 13C4-PFHpA



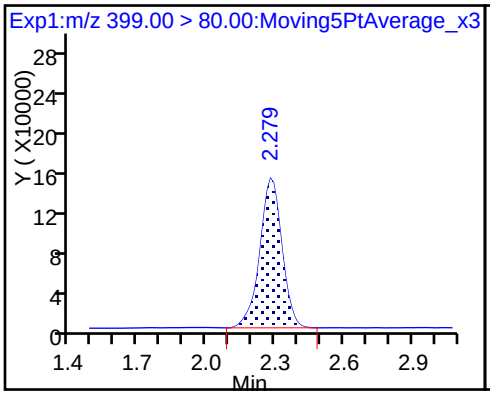
10 Perfluoroheptanoic acid



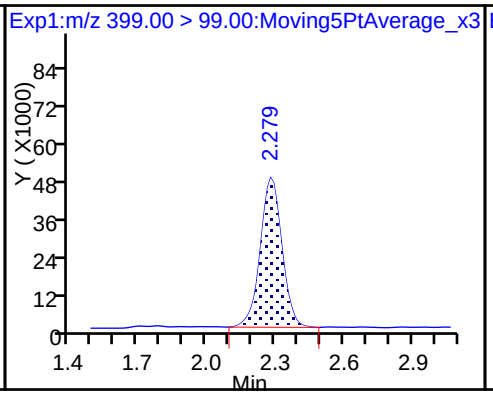
10 Perfluoroheptanoic acid



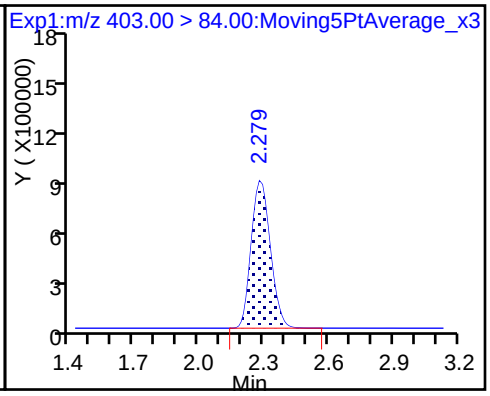
8 Perfluorohexanesulfonic acid



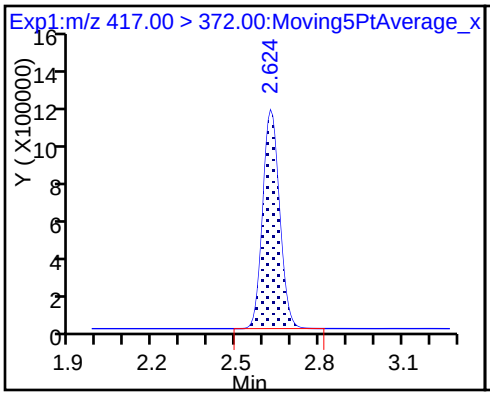
8 Perfluorohexanesulfonic acid



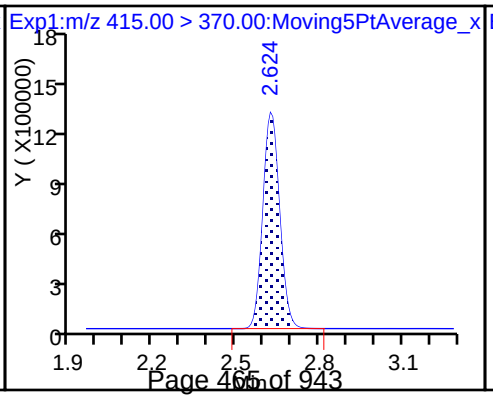
D 11 18O2 PFHxS



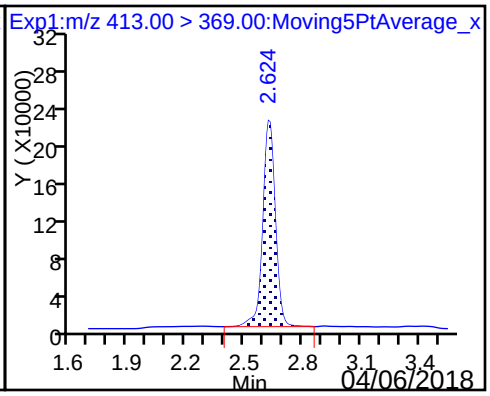
D 14 13C4 PFOA



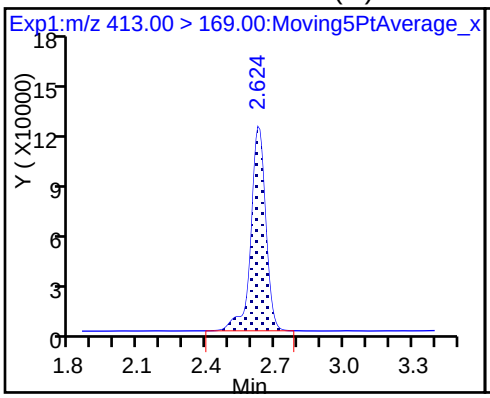
* 62 13C2-PFOA



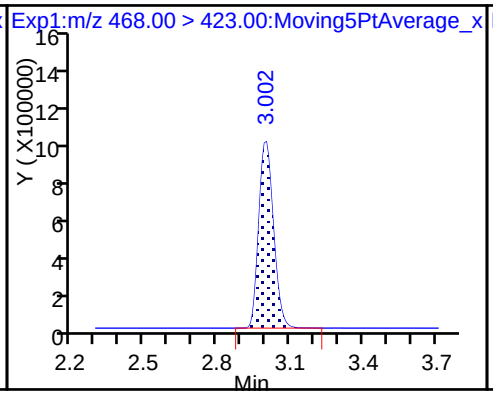
15 Perfluorooctanoic acid



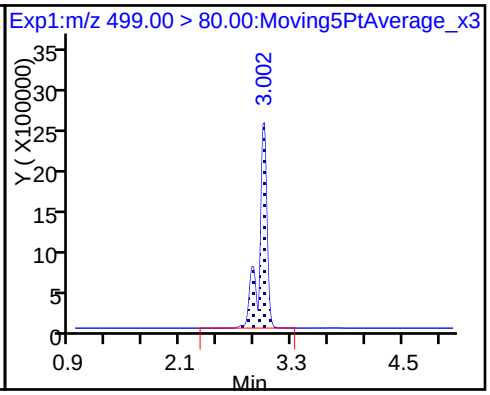
15 Perfluorooctanoic acid (M)



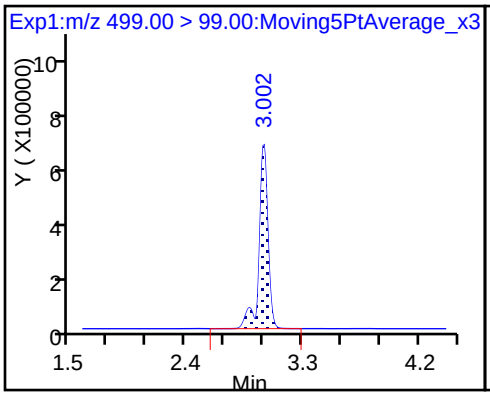
D 19 13C5 PFNA



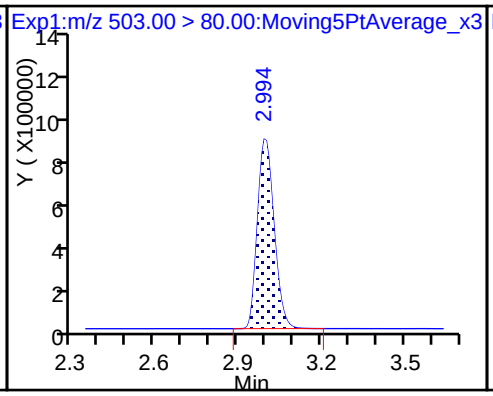
17 Perfluorooctane sulfonic acid



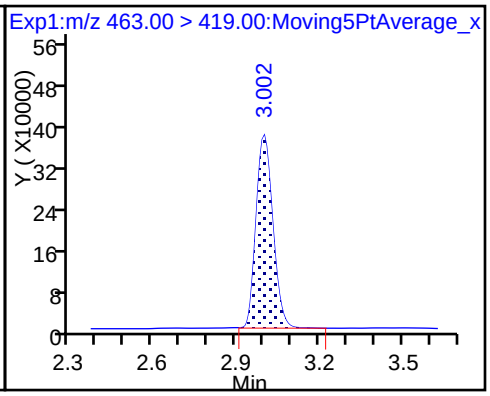
17 Perfluorooctane sulfonic acid



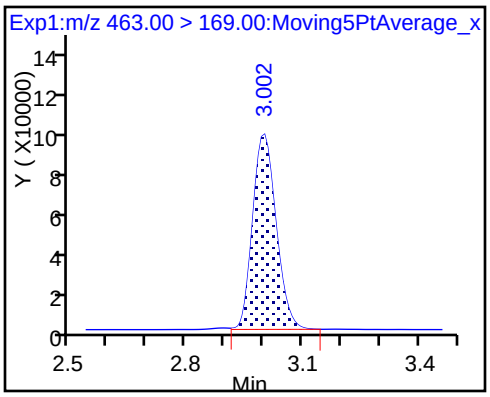
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

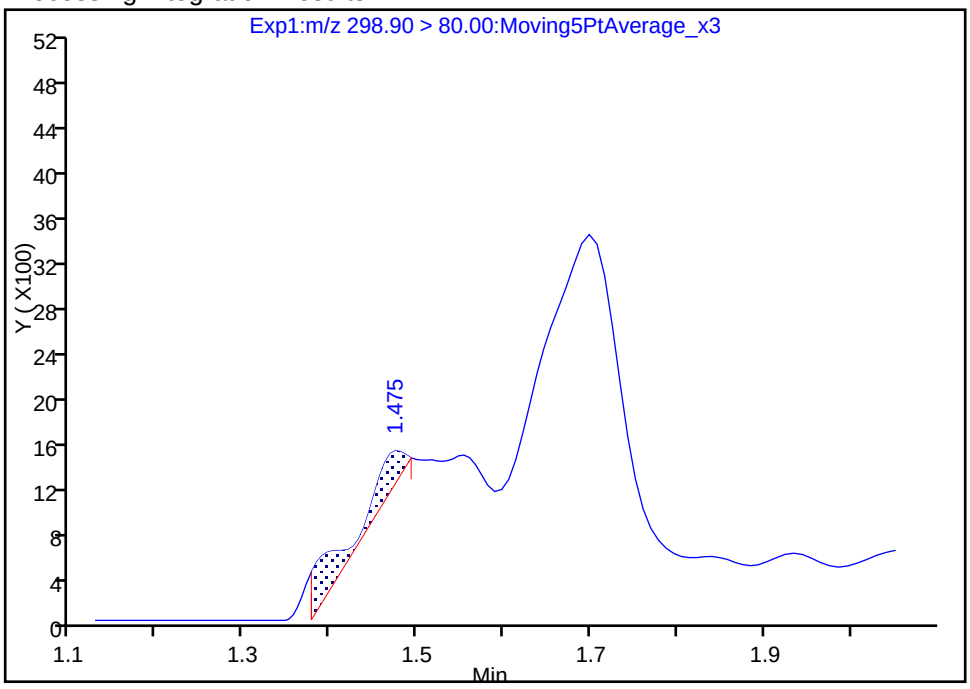
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_034.d				
Injection Date:	26-Jan-2018 17:09:14	Instrument ID:	A8_N		
Lims ID:	320-35310-A-8-A	Lab Sample ID:	320-35310-8		
Client ID:	FH-17-02_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	19	Worklist Smp#:	9
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

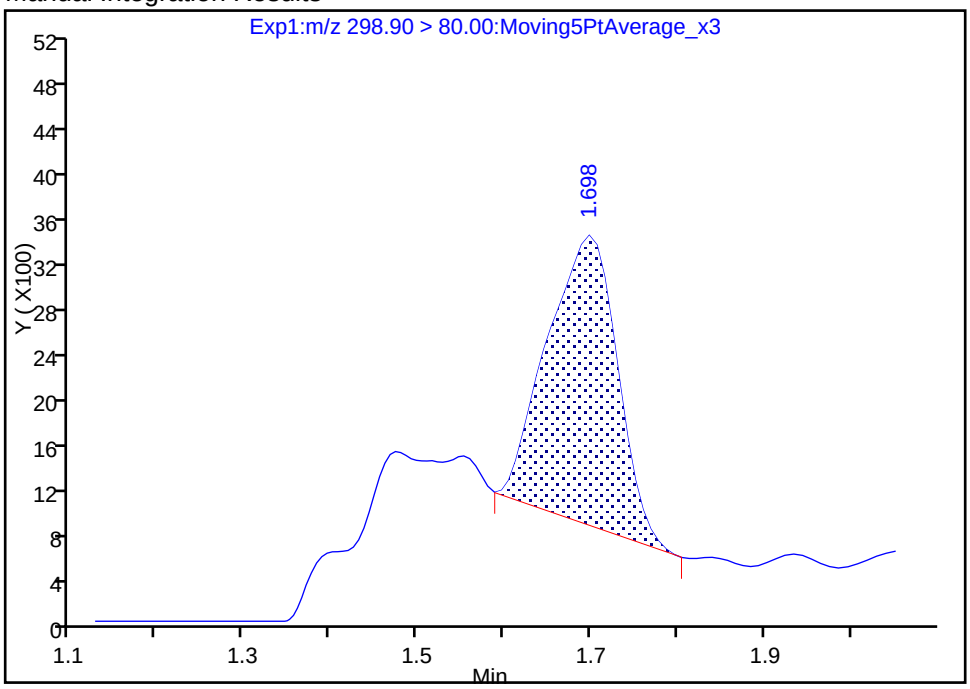
Processing Integration Results

RT: 1.47
Area: 1574
Amount: 0.000511
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 14342
Amount: 0.004656
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 10:22:27

Audit Action: Manually Integrated Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_034.d

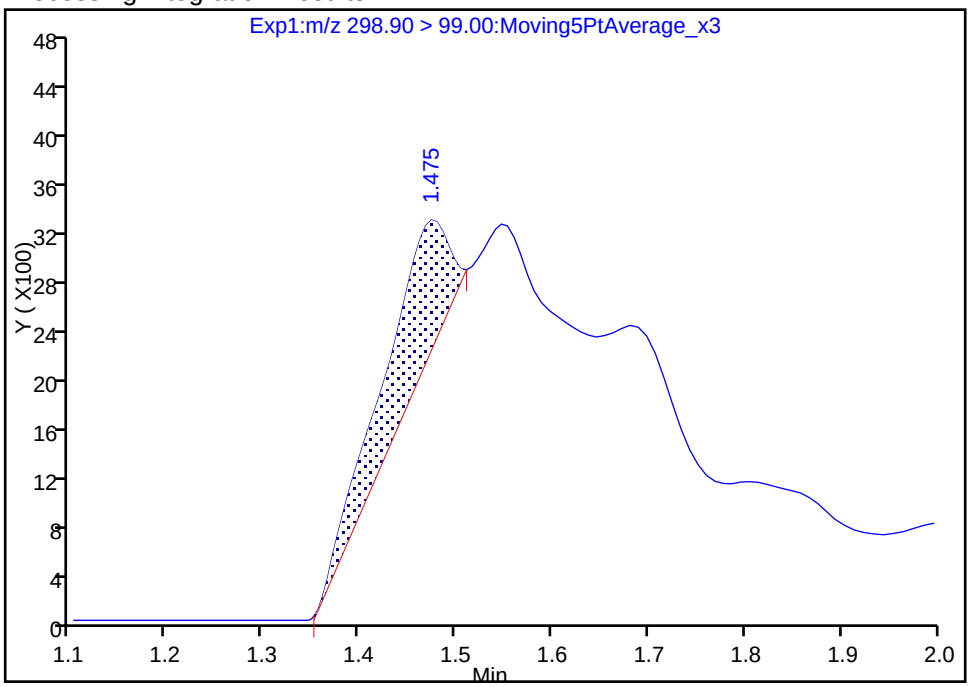
Injection Date:	26-Jan-2018 17:09:14	Instrument ID:	A8_N		
Lims ID:	320-35310-A-8-A	Lab Sample ID:	320-35310-8		
Client ID:	FH-17-02_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	19	Worklist Smp#:	9
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

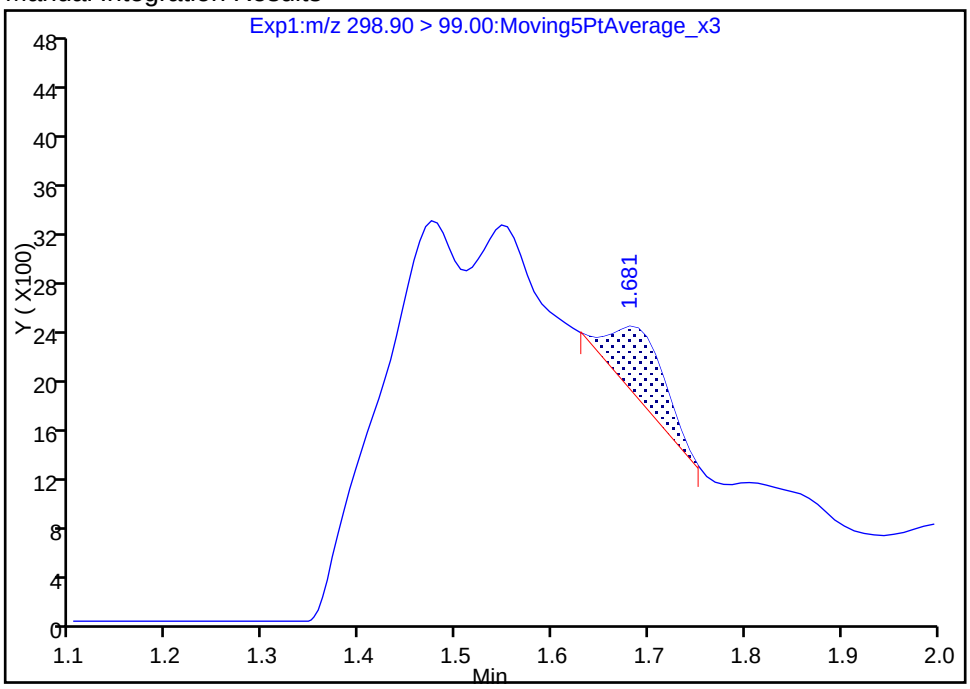
Processing Integration Results

RT: 1.47
Area: 5481
Amount: 0.000511
Amount Units: ng/ml



Manual Integration Results

RT: 1.68
Area: 2200
Amount: 0.004656
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 10:22:31

Audit Action: Manually Integrated Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

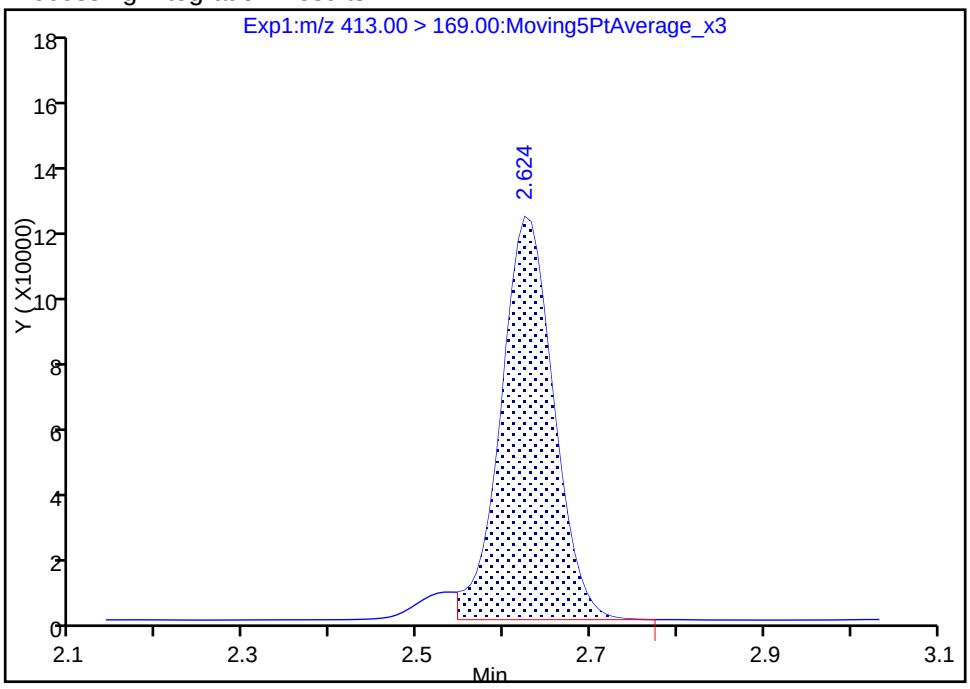
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_034.d				
Injection Date:	26-Jan-2018 17:09:14	Instrument ID:	A8_N		
Lims ID:	320-35310-A-8-A	Lab Sample ID:	320-35310-8		
Client ID:	FH-17-02_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	19	Worklist Smp#:	9
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

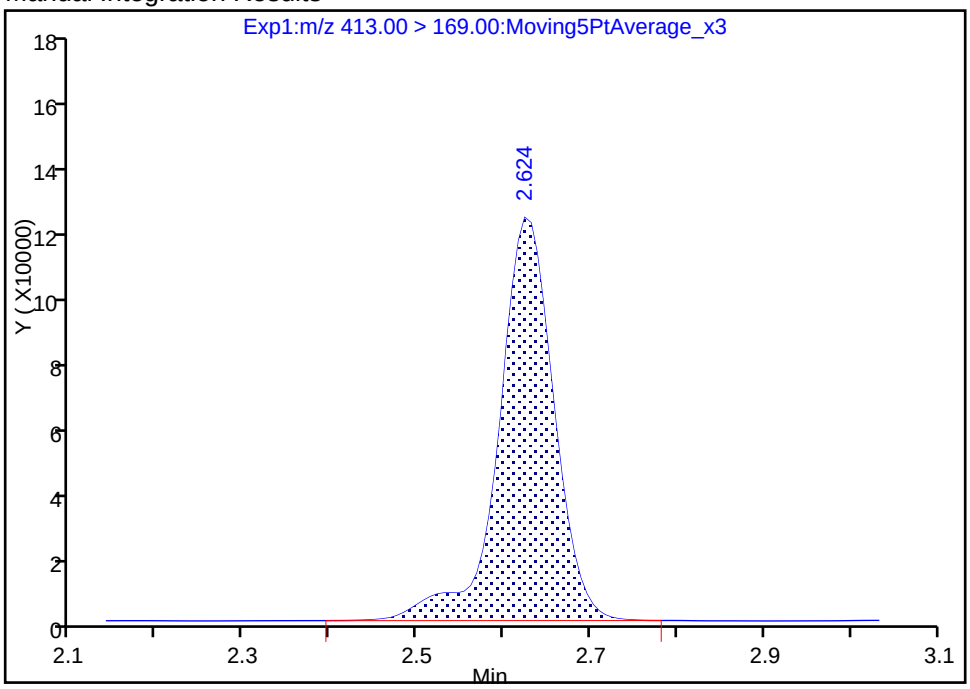
Processing Integration Results

RT: 2.62
Area: 506304
Amount: 0.435675
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 532711
Amount: 0.435675
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 10:22:55

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-02_GW012218 | Lab Sample ID: 320-35310-9

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_042.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 11:30

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 239.8(mL) | Date Analyzed: 01/25/2018 22:59

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	20	M	2.1	1.0	0.48
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	170		2.1	1.0	0.40
375-85-9	Perfluoroheptanoic acid (PFHpA)	4.0	M	2.1	1.6	0.64
335-67-1	Perfluorooctanoic acid (PFOA)	23	M	2.1	1.6	0.56
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	5.3		4.2	3.1	1.1
375-95-1	Perfluorononanoic acid (PFNA)	1.6	U	2.1	1.6	0.54

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	104		25-150
STL01892	13C4-PFHpA	107		25-150
STL00990	13C4 PFOA	110		25-150
STL00991	13C4 PFOS	112		25-150
STL00995	13C5 PFNA	114		25-150
STL02337	13C3-PFBS	98		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_042.d
Lims ID: 320-35310-A-9-A
Client ID: FH-17-02_GW012218
Sample Type: Client
Inject. Date: 25-Jan-2018 22:59:21 ALS Bottle#: 36 Worklist Smp#: 10
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-9-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 16:11:58

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.689	1.695	-0.006	0.644	87790	2.28		98.0	1824	
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.689	1.697	-0.008	1.000	1397656	0.4794			886	M
298.90 > 99.00	1.689	1.697	-0.008	1.000	593397		2.36(1.25-3.74)		875	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.864	4794941	2.68		107	39740	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.266	2.268	-0.002	1.000	201114	0.0954			204	M
363.00 > 169.00	2.266	2.268	-0.002	1.000	70894		2.84(1.13-3.40)		453	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	10163018	3.99			8506	
399.00 > 99.00	2.279	2.280	-0.001	1.000	3046334		3.34(1.50-4.49)		9008	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.869	5405681	2.46		104	49171	
D 14 13C4 PFOA										
417.00 > 372.00	2.617	2.622	-0.006	0.997	4815177	2.75		110	37043	
* 62 13C2-PFOA										
415.00 > 370.00	2.624	2.622	0.002		4859977	2.50			38701	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.624	2.623	0.001	1.003	1266835	0.5612			673	M
413.00 > 169.00	2.624	2.623	0.001	1.003	812262		1.56(0.84-2.52)		4507	M
D 19 13C5 PFNA										
468.00 > 423.00	2.994	2.992	0.002	1.141	4039578	2.85		114	40318	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.874	2.992	-0.118	0.960	222292	0.1273			231	
499.00 > 99.00	2.994	2.992	0.002	1.000	39095		5.69(2.31-6.93)		137	
D 18 13C4 PFOS										
503.00 > 80.00	2.994	2.992	0.002	1.141	3727822	2.68		112	17635	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	2.994	2.992	0.002	1.000	4510	0.002704			4.2	
463.00 > 169.00	2.986	2.992	-0.006	0.997	1511		2.98(1.90-5.69)		34.1	

QC Flag Legend

Review Flags

M - Manually Integrated

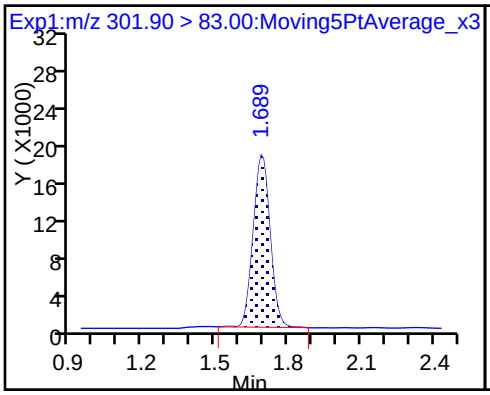
Report Date: 30-Jan-2018 10:22:45 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

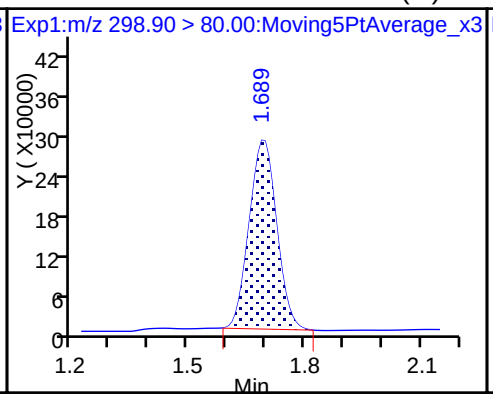
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_042.d

Injection Date:	25-Jan-2018 22:59:21	Instrument ID:	A8_N		
Lims ID:	320-35310-A-9-A	Lab Sample ID:	320-35310-9		
Client ID:	FH-17-02_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	36	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

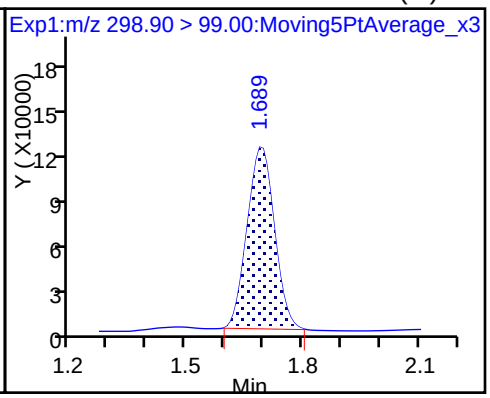
D 47 13C3-PFBS



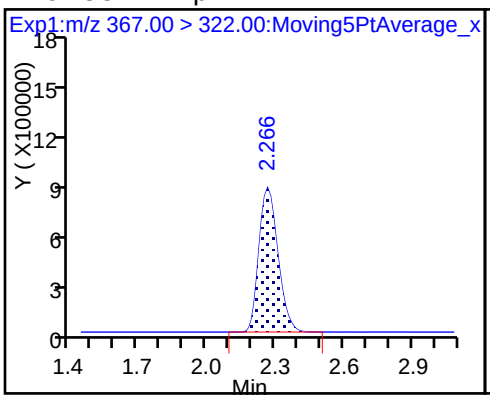
5 Perfluorobutanesulfonic acid (M)



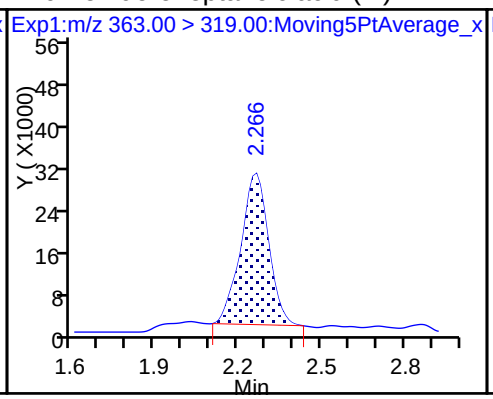
5 Perfluorobutanesulfonic acid (M)



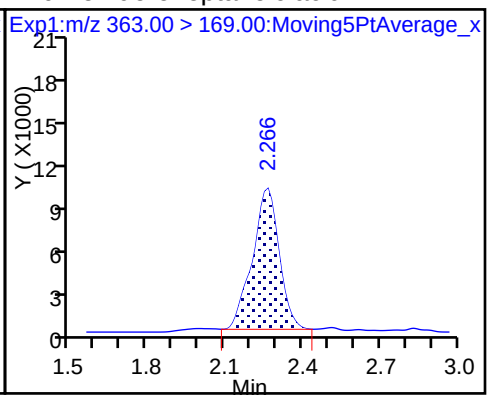
D 9 13C4-PFHpA



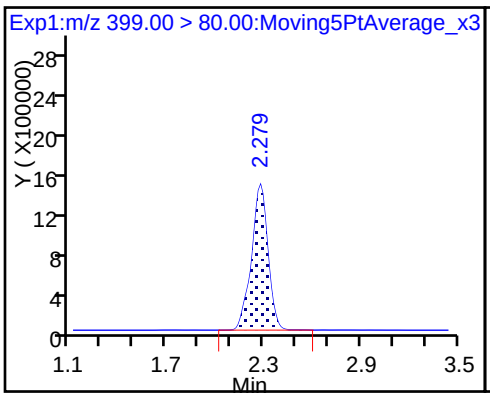
10 Perfluoroheptanoic acid (M)



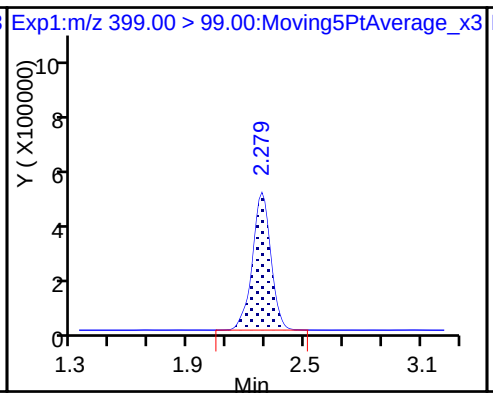
10 Perfluoroheptanoic acid



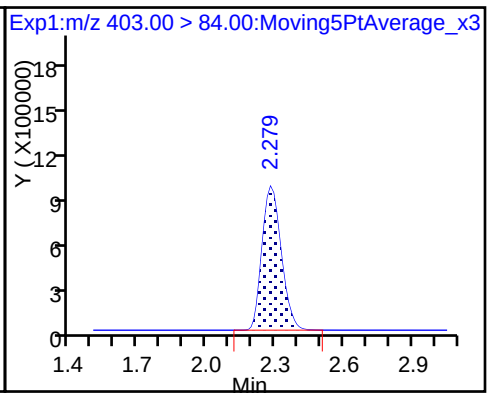
8 Perfluorohexanesulfonic acid



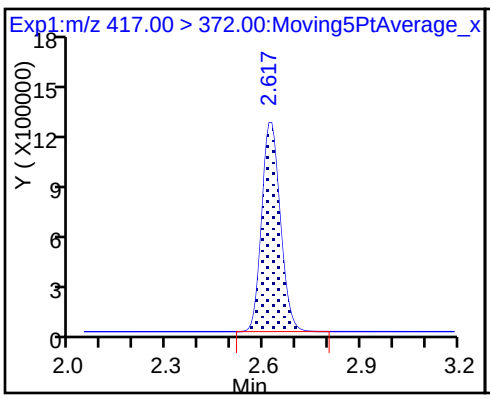
8 Perfluorohexanesulfonic acid



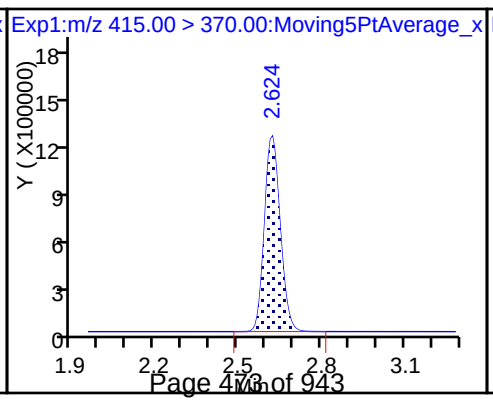
D 11 18O2 PFHxS



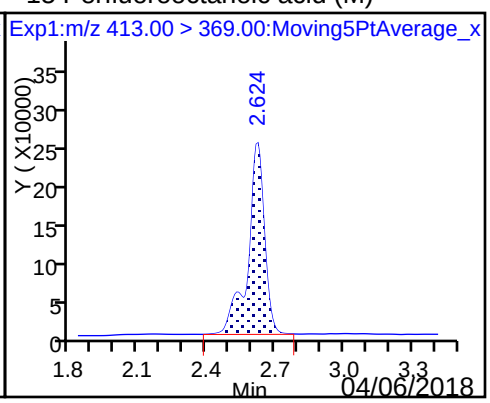
D 14 13C4 PFOA



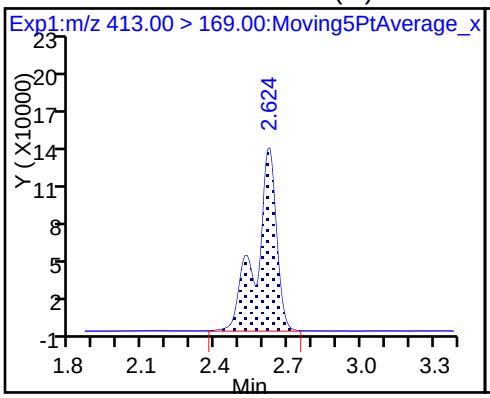
* 62 13C2-PFOA



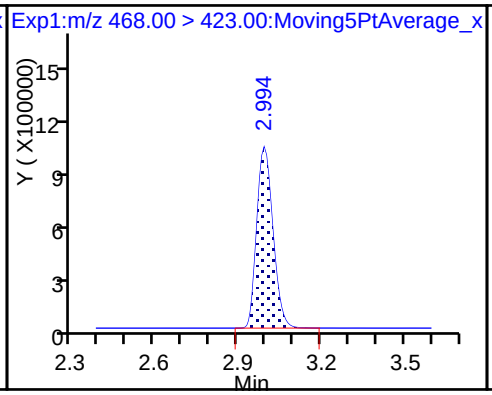
15 Perfluorooctanoic acid (M)



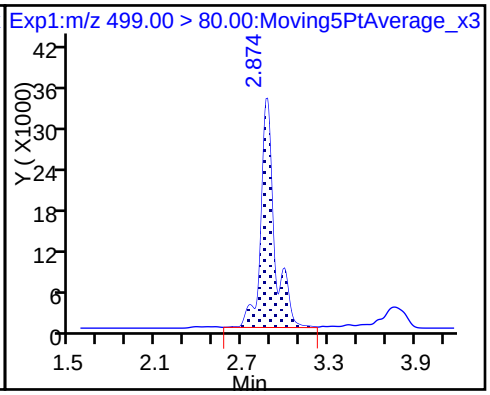
15 Perfluorooctanoic acid (M)



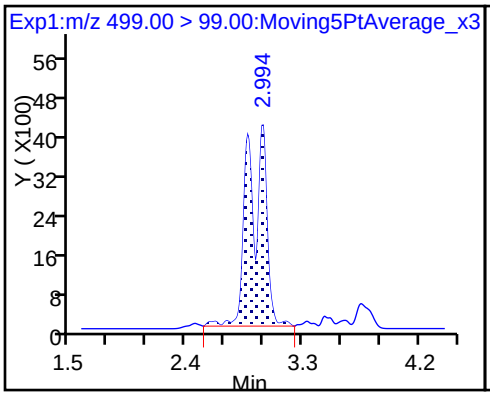
D 19 13C5 PFNA



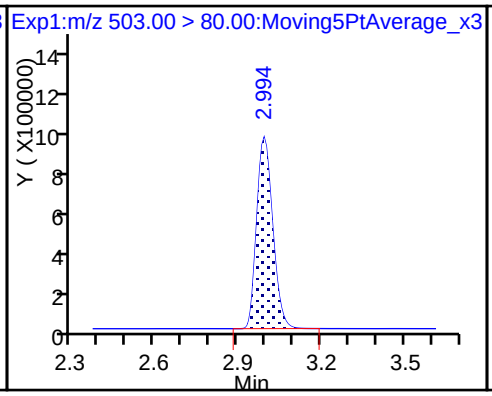
17 Perfluorooctane sulfonic acid



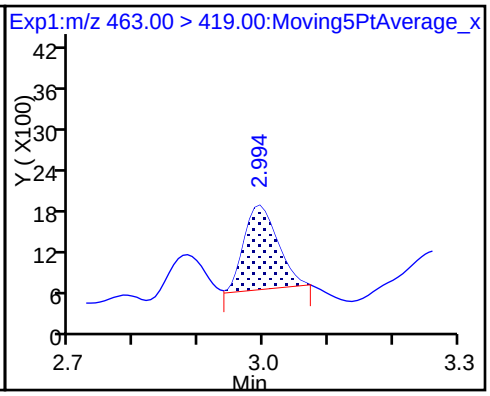
17 Perfluorooctane sulfonic acid



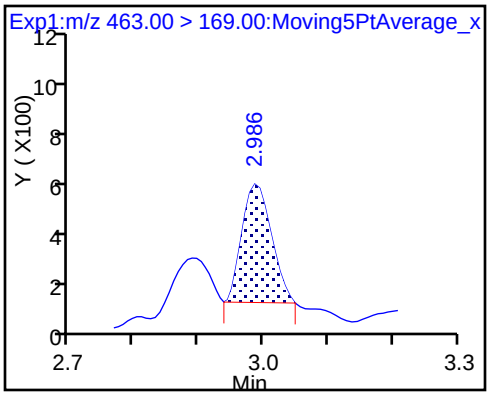
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

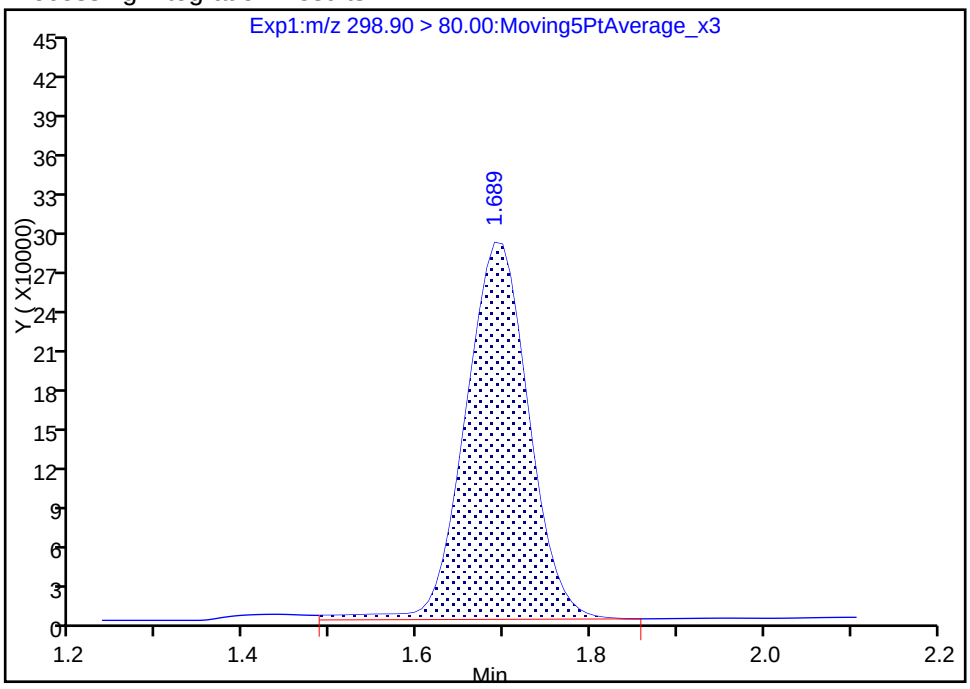
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_042.d				
Injection Date:	25-Jan-2018 22:59:21	Instrument ID:	A8_N		
Lims ID:	320-35310-A-9-A	Lab Sample ID:	320-35310-9		
Client ID:	FH-17-02_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	36	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

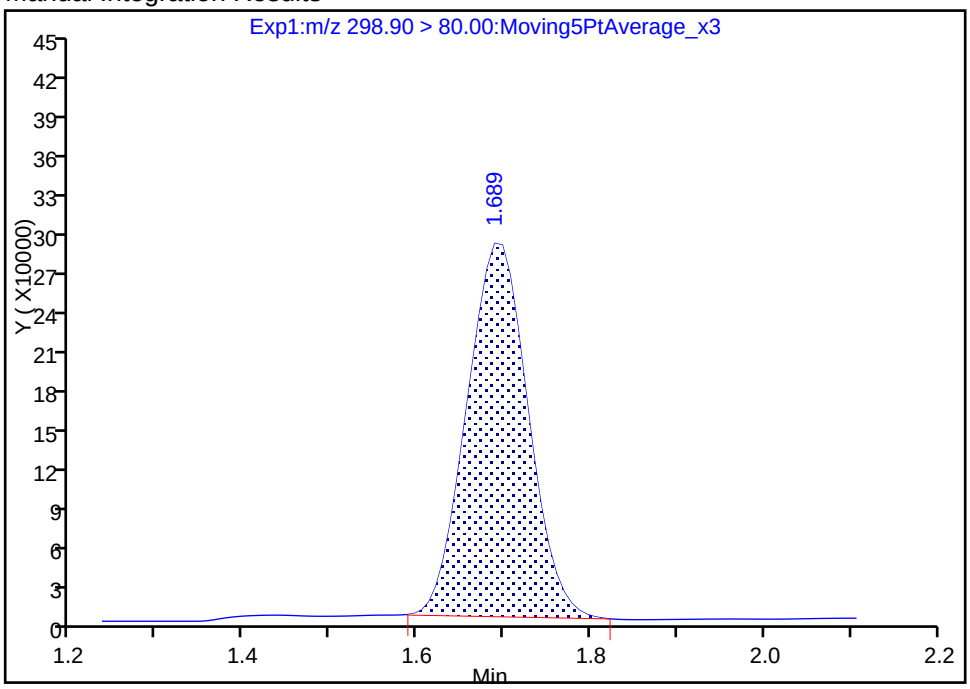
Processing Integration Results

RT: 1.69
Area: 1456215
Amount: 0.499475
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 1397656
Amount: 0.479390
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:10:21

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_042.d

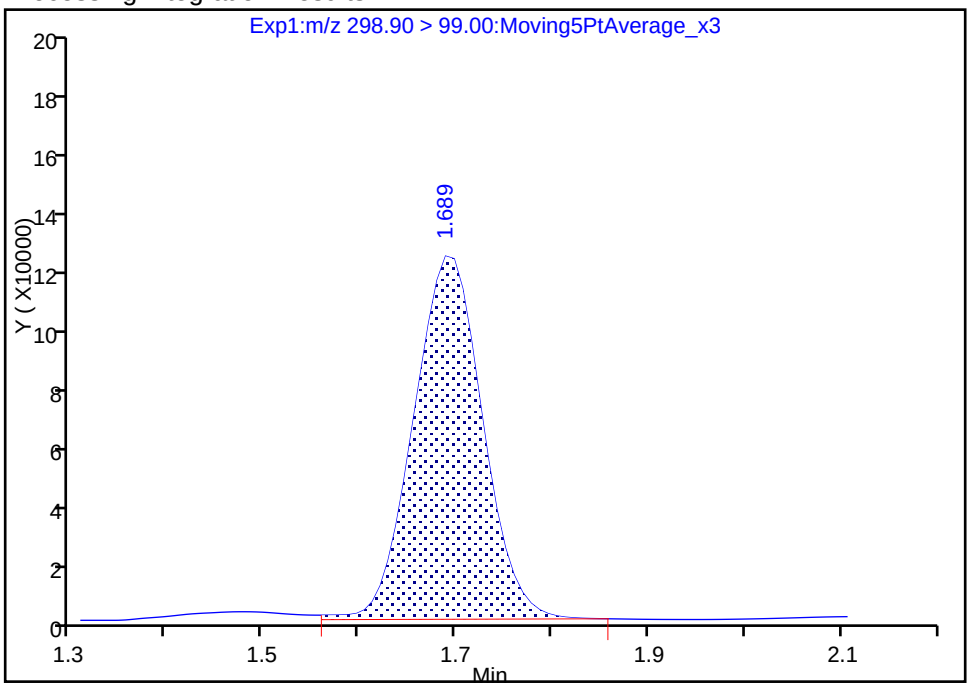
Injection Date:	25-Jan-2018 22:59:21	Instrument ID:	A8_N		
Lims ID:	320-35310-A-9-A	Lab Sample ID:	320-35310-9		
Client ID:	FH-17-02_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	36	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

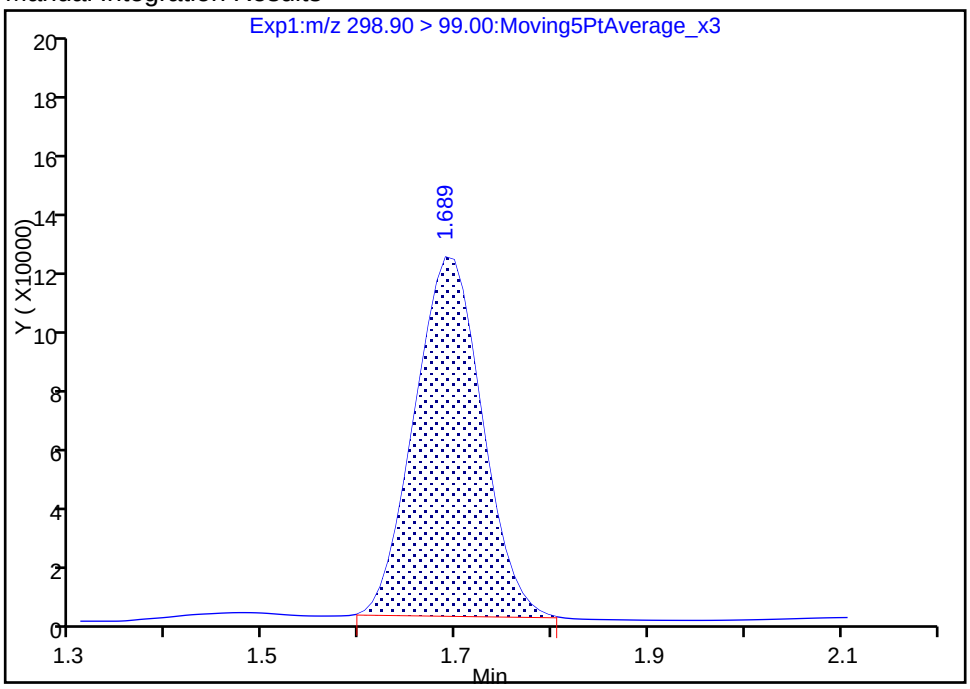
Processing Integration Results

RT: 1.69
Area: 613462
Amount: 0.499475
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 593397
Amount: 0.479390
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:10:32

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

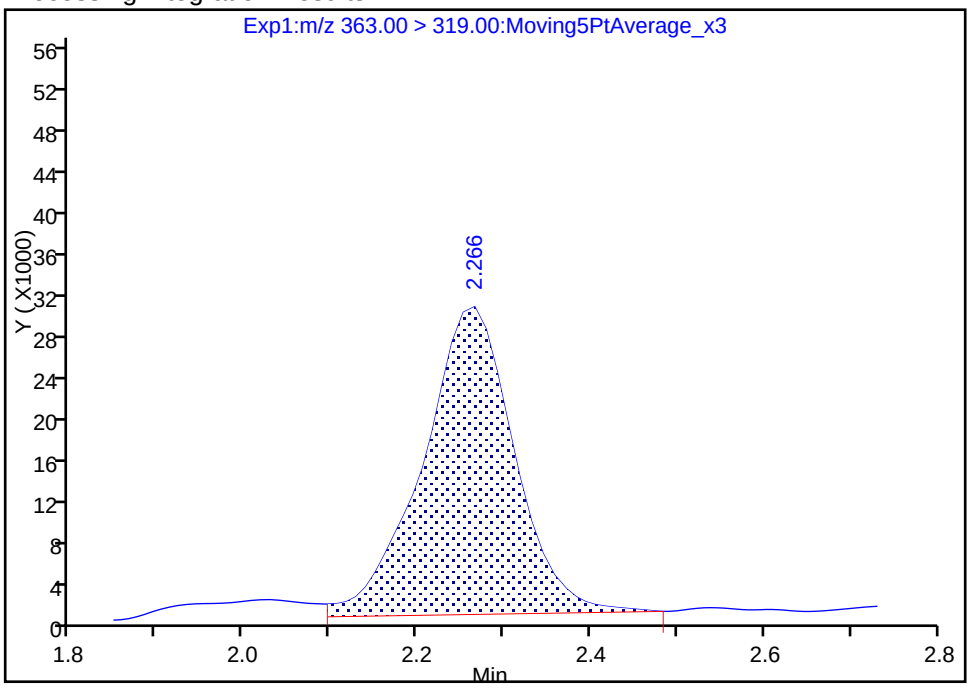
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_042.d				
Injection Date:	25-Jan-2018 22:59:21	Instrument ID:	A8_N		
Lims ID:	320-35310-A-9-A	Lab Sample ID:	320-35310-9		
Client ID:	FH-17-02_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	36	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

10 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

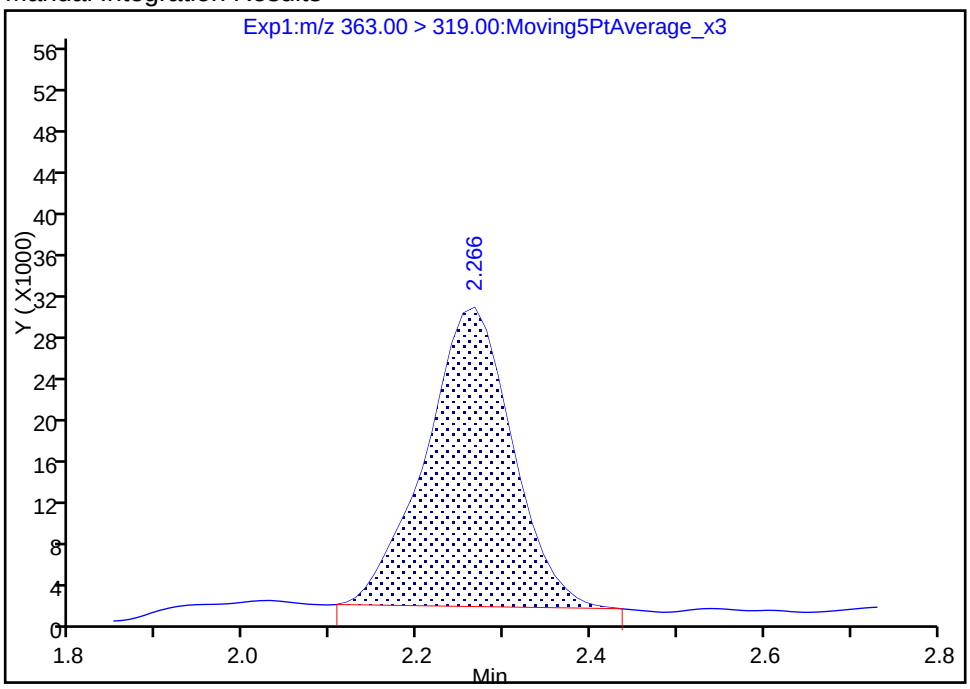
Processing Integration Results

RT: 2.27
Area: 219011
Amount: 0.103900
Amount Units: ng/ml



Manual Integration Results

RT: 2.27
Area: 201114
Amount: 0.095410
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:10:46

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

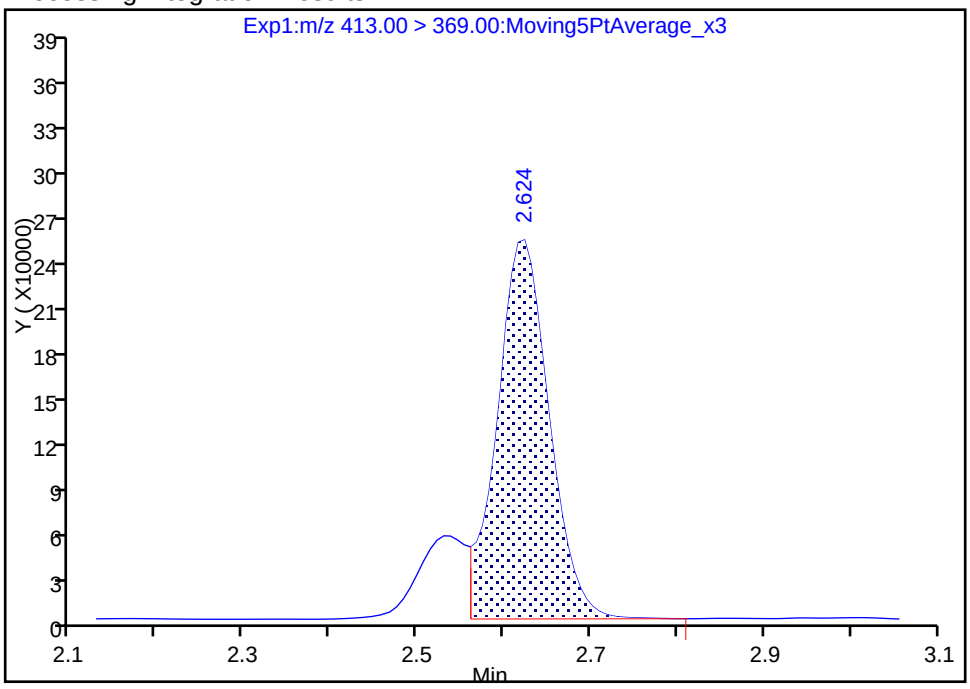
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_042.d				
Injection Date:	25-Jan-2018 22:59:21	Instrument ID:	A8_N		
Lims ID:	320-35310-A-9-A	Lab Sample ID:	320-35310-9		
Client ID:	FH-17-02_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	36	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

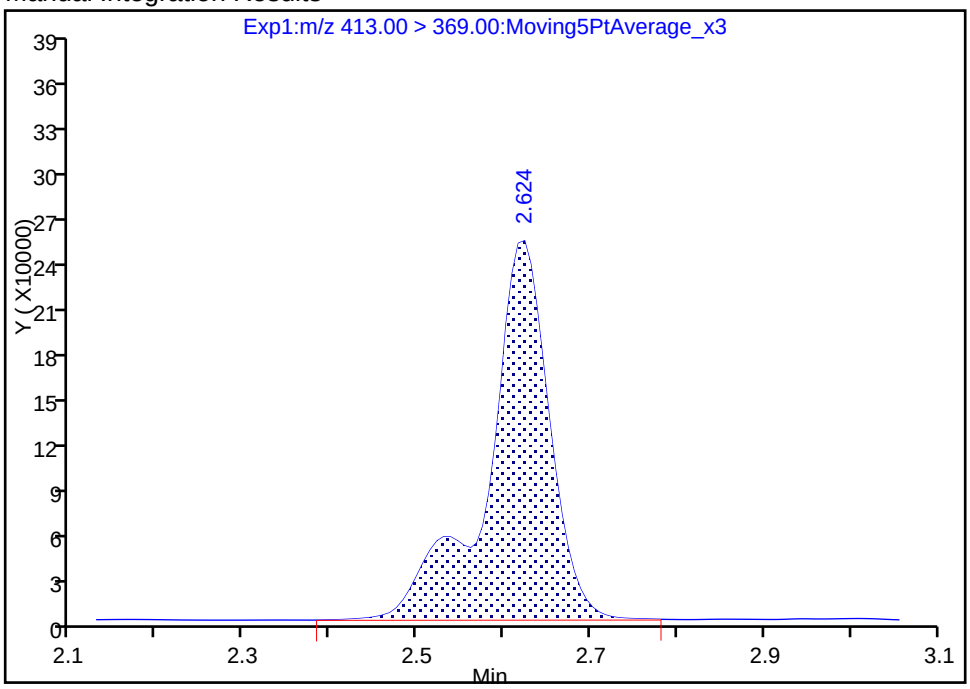
Processing Integration Results

RT: 2.62
Area: 1046777
Amount: 0.463682
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 1266835
Amount: 0.561160
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:11:11

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

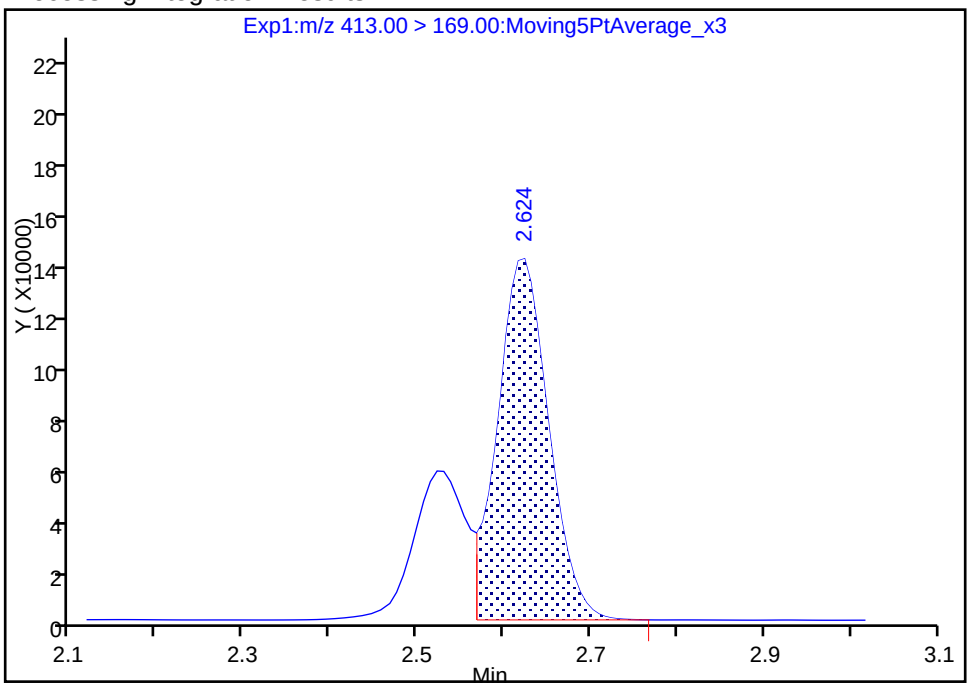
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_042.d				
Injection Date:	25-Jan-2018 22:59:21	Instrument ID:	A8_N		
Lims ID:	320-35310-A-9-A	Lab Sample ID:	320-35310-9		
Client ID:	FH-17-02_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	36	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

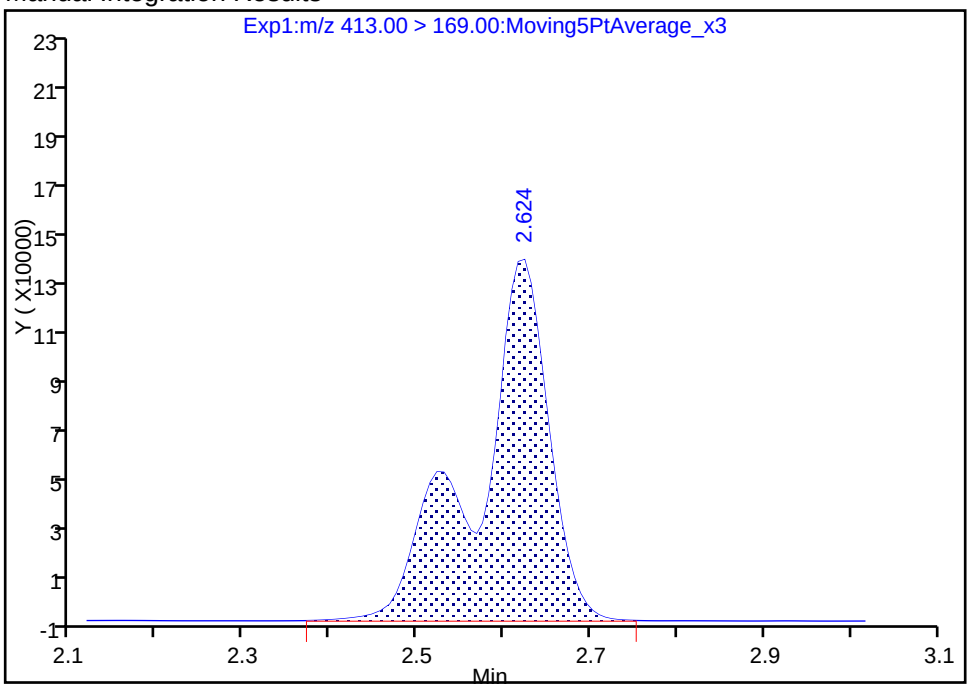
Processing Integration Results

RT: 2.62
Area: 567832
Amount: 0.463682
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 812262
Amount: 0.561160
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:11:31

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-01_SO0005 | Lab Sample ID: 320-35310-10

Matrix: Solid | Lab File ID: 2018.01.26LLA_035.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 12:20

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.01(g) | Date Analyzed: 01/26/2018 17:17

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 13.9 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.12	U M	0.46	0.12	0.029
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	2.5		0.58	0.12	0.036
375-85-9	Perfluoroheptanoic acid (PFHpA)	1.2		0.58	0.12	0.034
335-67-1	Perfluorooctanoic acid (PFOA)	5.3		0.58	0.23	0.10
375-95-1	Perfluorononanoic acid (PFNA)	10		0.58	0.12	0.042

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	90		25-150
STL01892	13C4-PFHpA	89		25-150
STL00990	13C4 PFOA	95		25-150
STL00995	13C5 PFNA	95		25-150
STL02337	13C3-PFBS	88		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_035.d
Lims ID: 320-35310-A-10-A
Client ID: FH-17-01_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 17:17:03 ALS Bottle#: 20 Worklist Smp#: 10
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-10-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:59:11 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 10:59:11

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.695	1.695	0.0	0.647	83179	2.04		87.7	635	
5 Perfluorobutanesulfonic acid										RM
298.90 > 80.00	1.687	1.697	-0.011	0.995	13237	0.004792			11.7	RM
298.90 > 99.00	1.695	1.697	-0.002	1.000	1492		8.87(1.25-3.74)		2.8	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.262	2.267	-0.005	0.863	4211939	2.23		89.1	31641	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.262	2.268	-0.006	1.000	923034	0.4985			247	
363.00 > 169.00	2.262	2.268	-0.006	1.000	327823		2.82(1.13-3.40)		1801	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.275	2.280	-0.005	1.000	2512965	1.08			1612	
399.00 > 99.00	2.275	2.280	-0.005	1.000	817060		3.08(1.50-4.49)		1833	
D 11 18O2 PFHxS										
403.00 > 84.00	2.275	2.282	-0.007	0.868	4956461	2.13		90.0	47640	
D 14 13C4 PFOA										
417.00 > 372.00	2.621	2.622	-0.002	1.000	4417786	2.38		95.4	35292	
* 62 13C2-PFOA										
415.00 > 370.00	2.621	2.622	-0.002		5145880	2.50			51408	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.621	2.623	-0.003	1.000	4731883	2.28			1072	
413.00 > 169.00	2.621	2.623	-0.003	1.000	2397022		1.97(0.84-2.52)		10136	
D 19 13C5 PFNA										
468.00 > 423.00	2.992	2.992	0.0	1.142	3564253	2.37		94.9	29015	
17 Perfluorooctane sulfonic acid										E
499.00 > 80.00	2.992	2.992	0.0	1.000	20234426	12.3			13189	E
499.00 > 99.00	2.992	2.992	0.0	1.000	4876978		4.15(2.31-6.93)		13956	
D 18 13C4 PFOS										
503.00 > 80.00	2.992	2.992	0.0	1.142	3517533	2.39		99.9	5735	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	2.992	2.992	0.0	1.000	6519016	4.43			4508	
463.00 > 169.00	2.999	2.992	0.007	1.003	1552011		4.20(1.90-5.69)		14188	

QC Flag Legend

Processing Flags

R - Failed Signal Ratio Test

E - Exceeded Maximum Amount

Review Flags

M - Manually Integrated

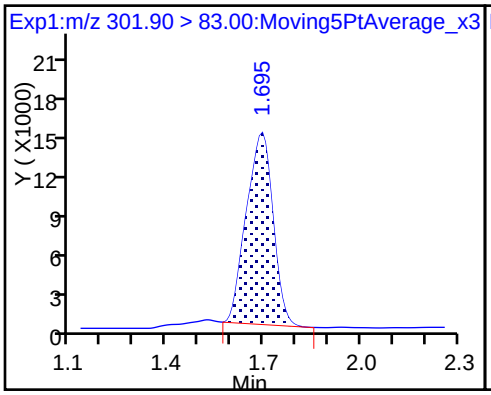
Report Date: 30-Jan-2018 10:59:12 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

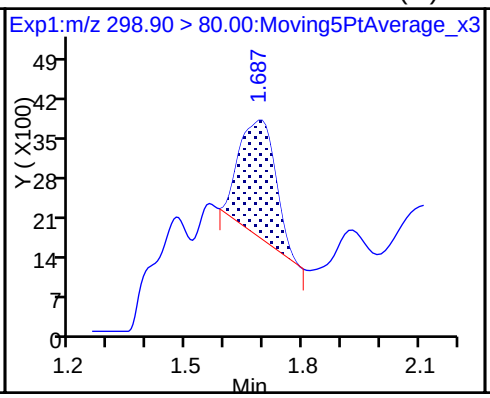
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_035.d

Injection Date:	26-Jan-2018 17:17:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-10-A	Lab Sample ID:	320-35310-10		
Client ID:	FH-17-01_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	20	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

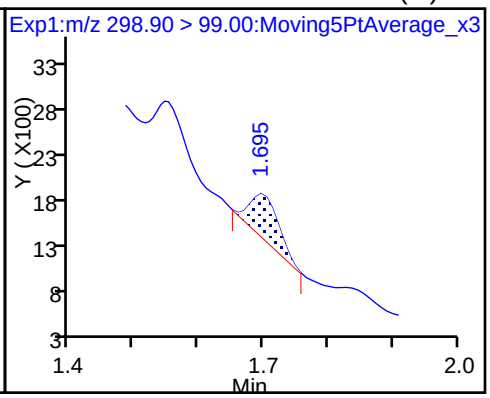
D 47 13C3-PFBS



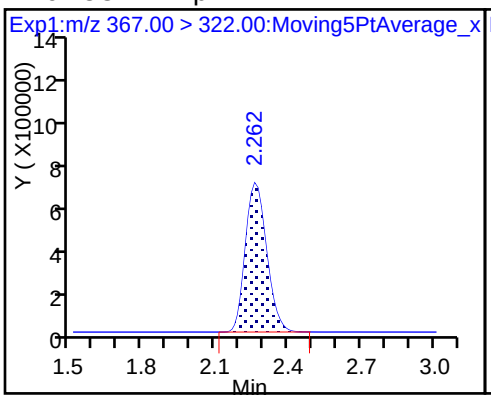
5 Perfluorobutanesulfonic acid (M)



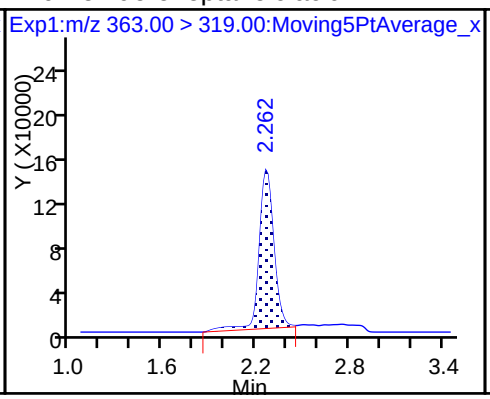
5 Perfluorobutanesulfonic acid (M)



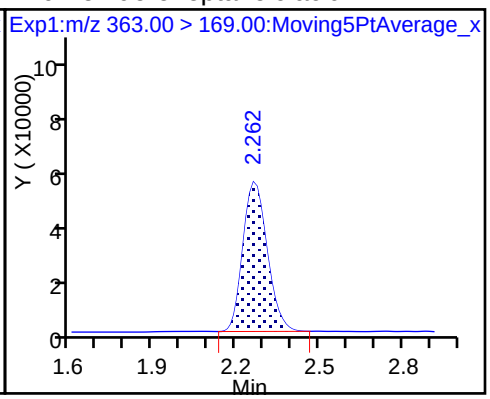
D 9 13C4-PFHpA



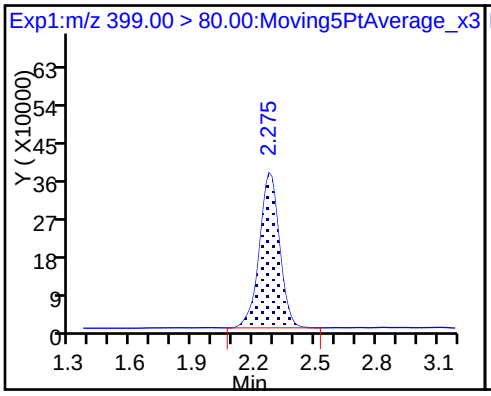
10 Perfluoroheptanoic acid



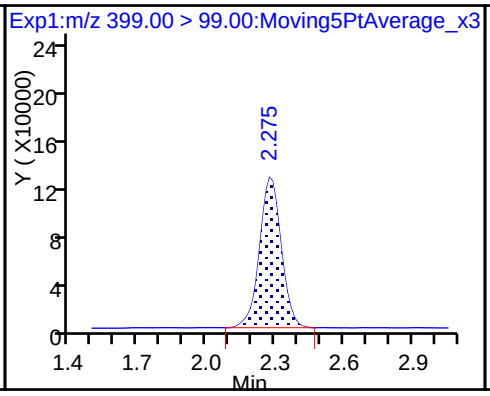
10 Perfluoroheptanoic acid



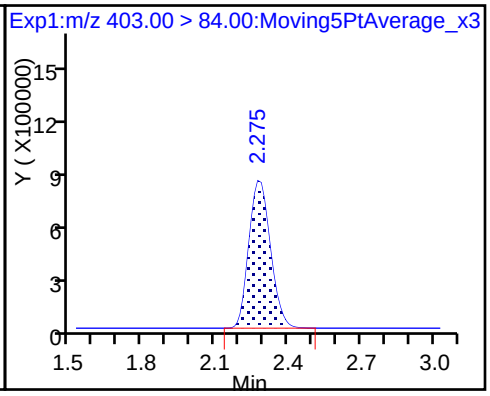
8 Perfluorohexanesulfonic acid



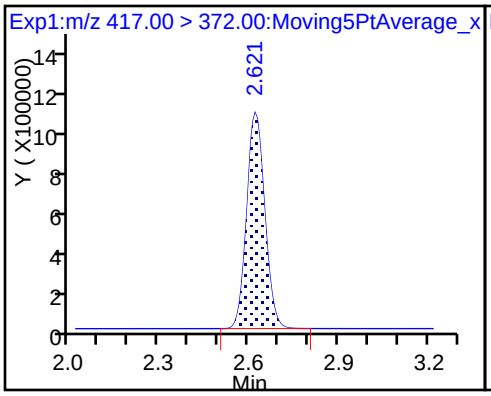
8 Perfluorohexanesulfonic acid



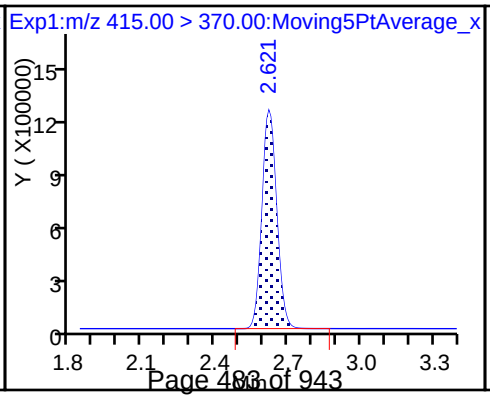
D 11 18O2 PFHxS



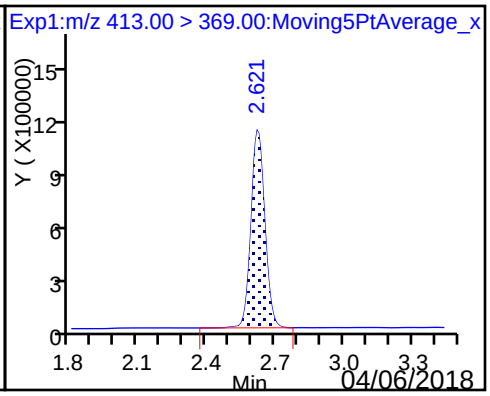
D 14 13C4 PFOA



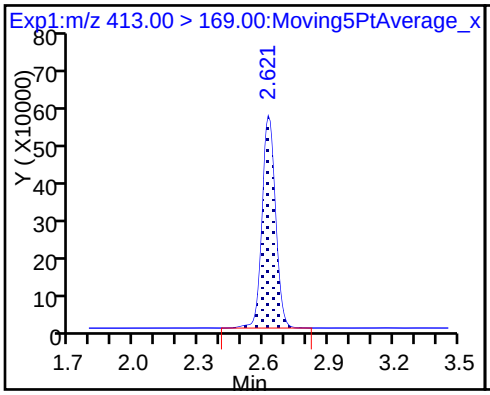
* 62 13C2-PFOA



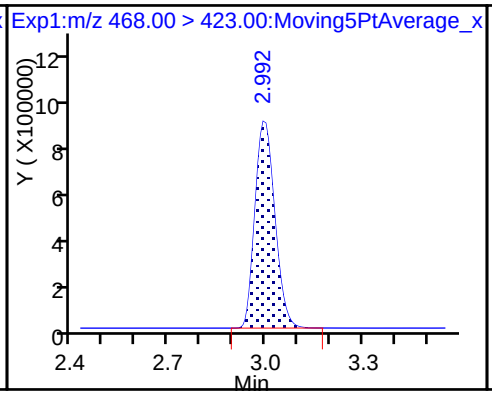
15 Perfluorooctanoic acid



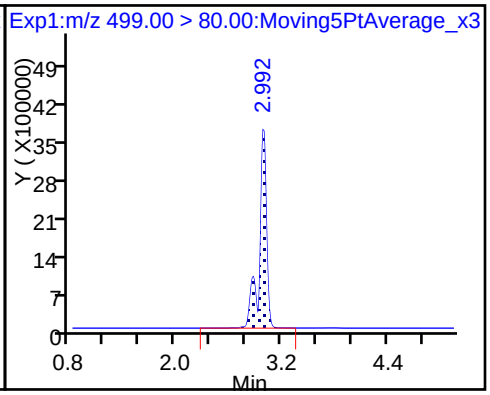
15 Perfluorooctanoic acid



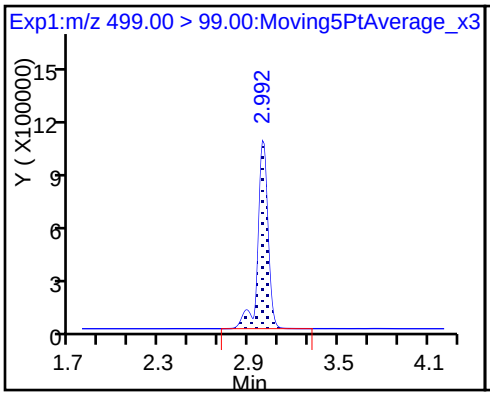
D 19 13C5 PFNA



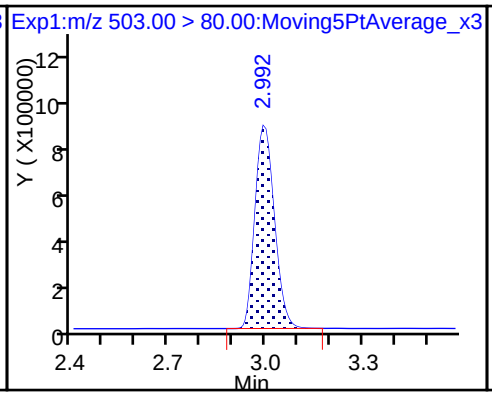
17 Perfluorooctane sulfonic acid



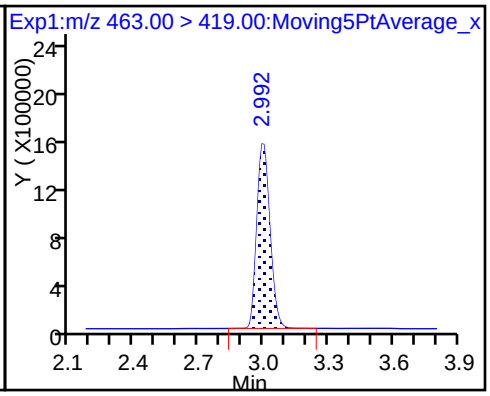
17 Perfluorooctane sulfonic acid



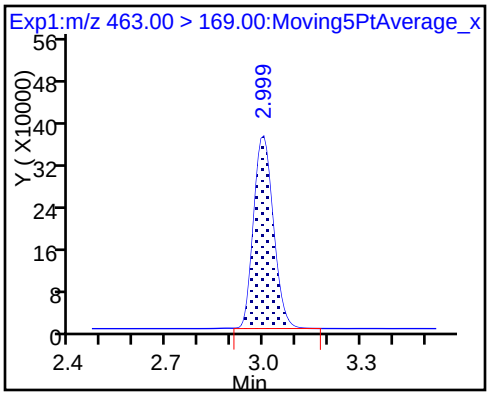
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

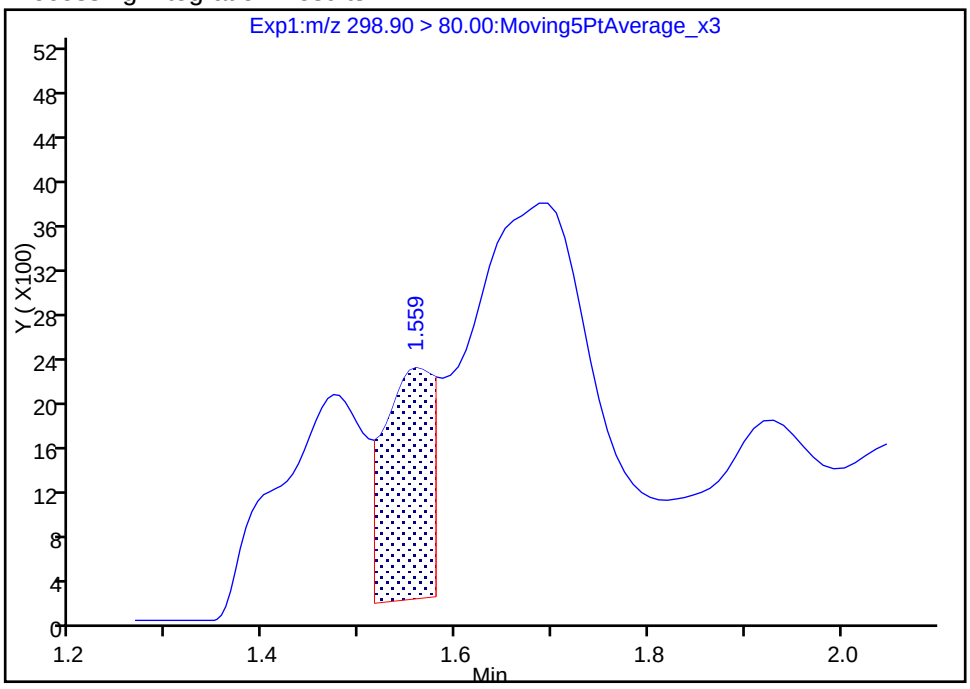
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_035.d				
Injection Date:	26-Jan-2018 17:17:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-10-A	Lab Sample ID:	320-35310-10		
Client ID:	FH-17-01_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	20	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

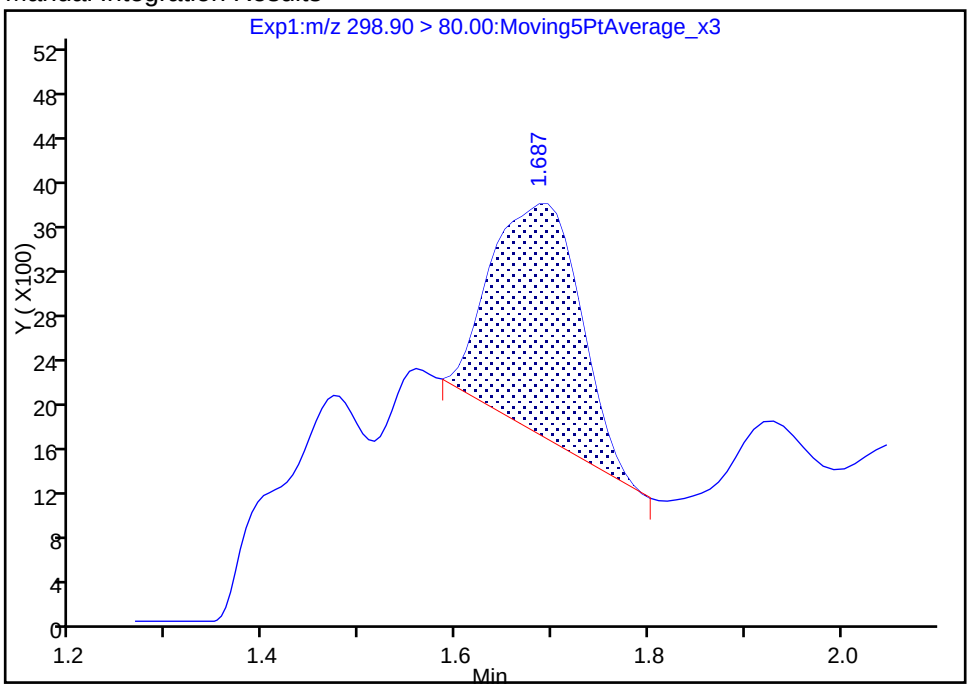
Processing Integration Results

RT: 1.56
Area: 7147
Amount: 0.002587
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 13237
Amount: 0.004792
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 10:53:06

Audit Action: Manually Integrated Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

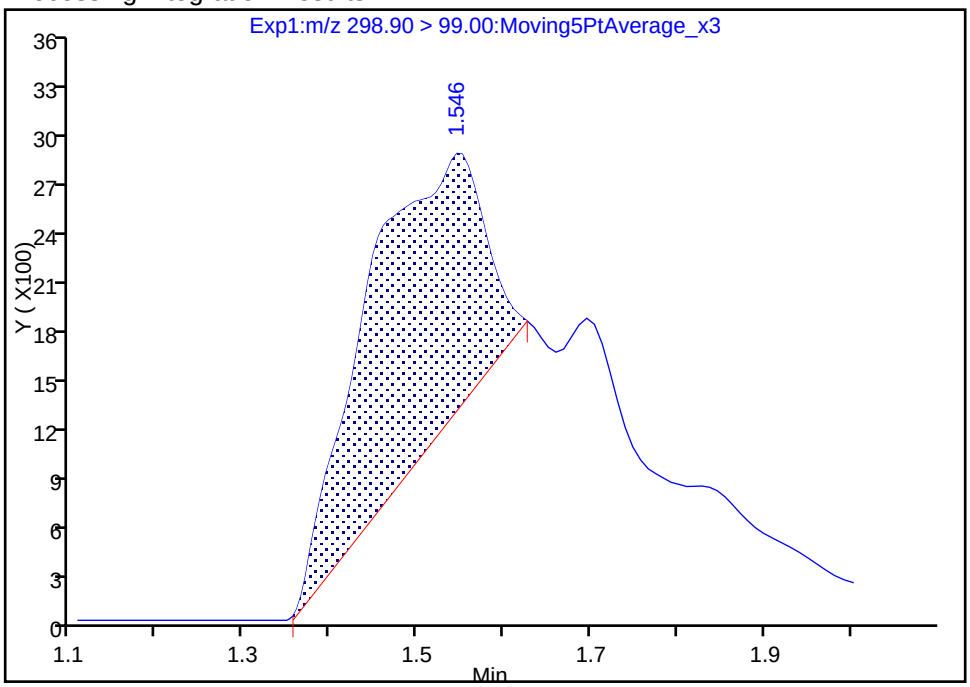
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_035.d				
Injection Date:	26-Jan-2018 17:17:03	Instrument ID:	A8_N		
Lims ID:	320-35310-A-10-A	Lab Sample ID:	320-35310-10		
Client ID:	FH-17-01_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	20	Worklist Smp#:	10
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

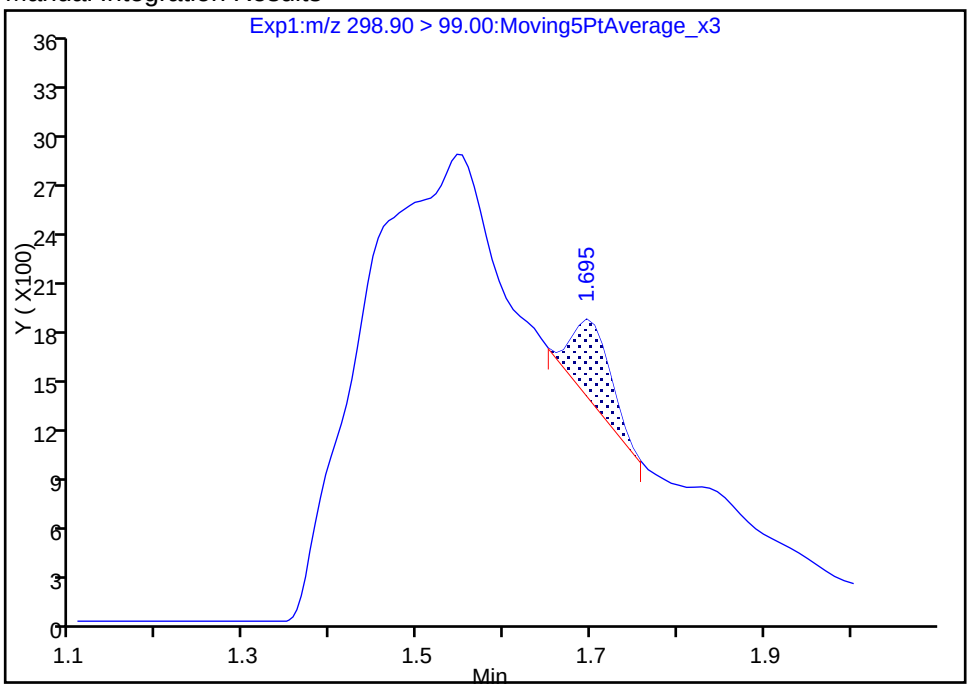
Processing Integration Results

RT: 1.55
Area: 16909
Amount: 0.002587
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 1492
Amount: 0.004792
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 10:53:13
Audit Action: Manually Integrated Audit Reason: Wrong peak

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-01_SO0005 DL | Lab Sample ID: 320-35310-10 DL

Matrix: Solid | Lab File ID: 2018.01.29LLAA_038.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 12:20

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.01(g) | Date Analyzed: 01/29/2018 16:28

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 10

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 13.9 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 206109 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	30	D	12	5.8	2.3

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00991	13C4 PFOS	105		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\2018.01.29LLAA_038.d
Lims ID: 320-35310-A-10-A
Client ID: FH-17-01_SO0005
Sample Type: Client
Inject. Date: 29-Jan-2018 16:28:49 ALS Bottle#: 25 Worklist Smp#: 2
Injection Vol: 2.0 ul Dil. Factor: 10.0000
Sample Info: 320-35310-A-10-A 10X
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 08:48:38 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 08:48:38

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.698	1.695	0.003	0.644	8418	0.2218		95.4	164	
D 9 13C4-PFHpA										
367.00 > 322.00	2.279	2.267	0.012	0.864	440758	0.2506		100	5360	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.279	2.268	0.011	1.000	93367	0.0482			86.1	
363.00 > 169.00	2.279	2.268	0.011	1.000	36607		2.55(1.13-3.40)		245	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.292	2.280	0.012	1.000	271179	0.1102			218	
399.00 > 99.00	2.292	2.280	0.012	1.000	78511		3.45(1.50-4.49)		119	
D 11 18O2 PFHxS										
403.00 > 84.00	2.292	2.282	0.010	0.869	522586	0.2413		102	11089	
D 14 13C4 PFOA										
417.00 > 372.00	2.638	2.622	0.016	1.000	458889	0.2662		106	5278	
* 62 13C2-PFOA										
415.00 > 370.00	2.638	2.622	0.016		478622	0.2500			6305	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.638	2.623	0.015	1.000	450508	0.2094			198	
413.00 > 169.00	2.638	2.623	0.015	1.000	237892		1.89(0.84-2.52)		1547	
D 19 13C5 PFNA										
468.00 > 423.00	3.009	2.992	0.017	1.141	378659	0.2710		108	6712	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.009	2.992	0.017	1.000	2095323	1.31			5577	
499.00 > 99.00	3.009	2.992	0.017	1.000	476883		4.39(2.31-6.93)		2385	
D 18 13C4 PFOS										
503.00 > 80.00	3.009	2.992	0.017	1.141	342273	0.2498		105	4008	
20 Perfluorononanoic acid										
463.00 > 419.00	3.009	2.992	0.017	1.000	625229	0.3999			1096	
463.00 > 169.00	3.009	2.992	0.017	1.000	162409		3.85(1.90-5.69)		3335	

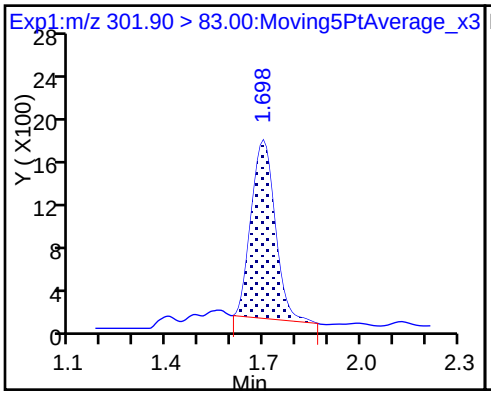
Report Date: 30-Jan-2018 08:48:38 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

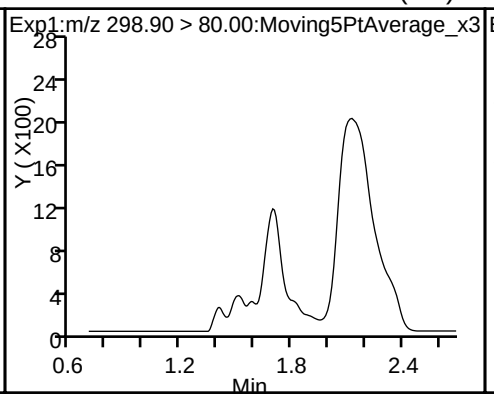
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\2018.01.29LLAA_038.d

Injection Date:	29-Jan-2018 16:28:49	Instrument ID:	A8_N		
Lims ID:	320-35310-A-10-A	Lab Sample ID:	320-35310-10		
Client ID:	FH-17-01_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	25	Worklist Smp#:	2
Injection Vol:	2.0 ul	Dil. Factor:	10.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

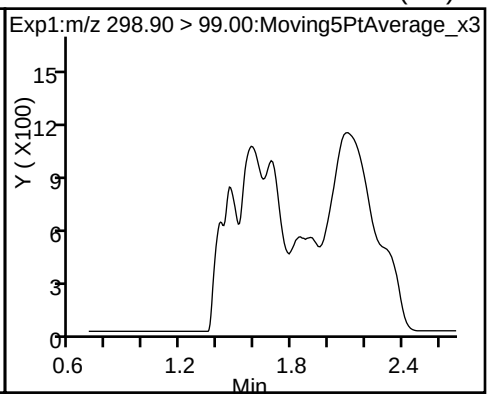
D 47 13C3-PFBS



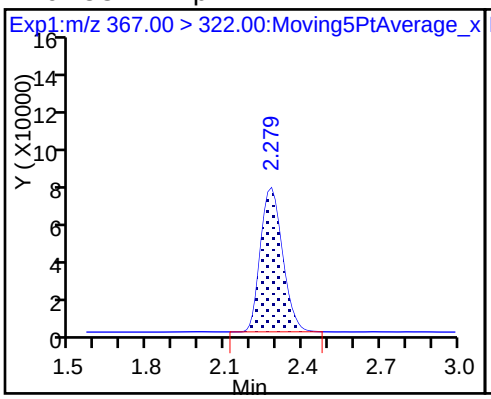
5 Perfluorobutanesulfonic acid (ND)



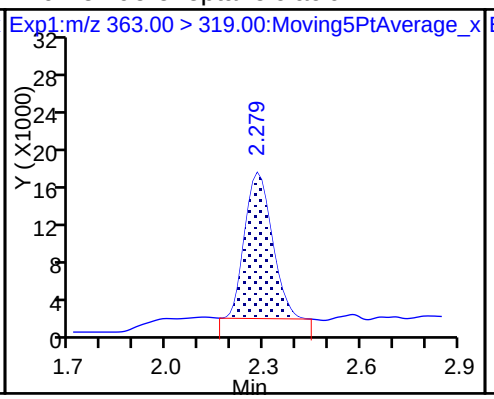
5 Perfluorobutanesulfonic acid (ND)



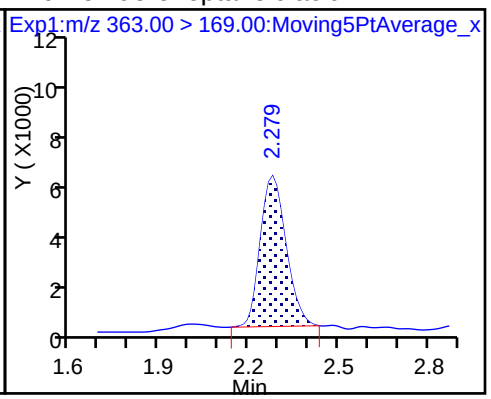
D 9 13C4-PFHpA



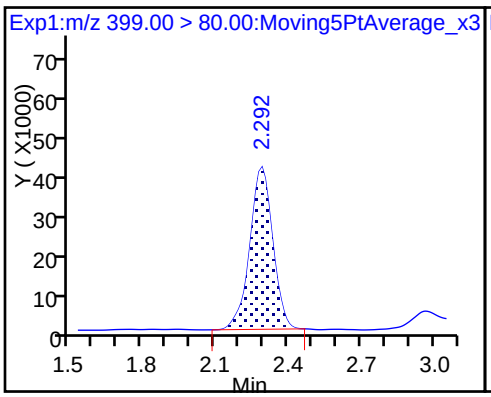
10 Perfluoroheptanoic acid



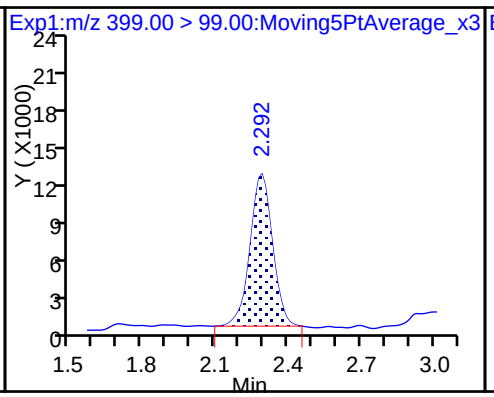
10 Perfluoroheptanoic acid



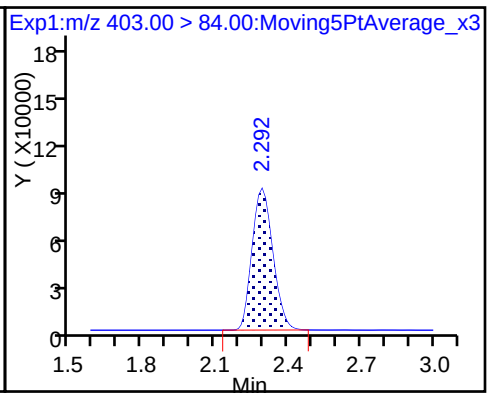
8 Perfluorohexanesulfonic acid



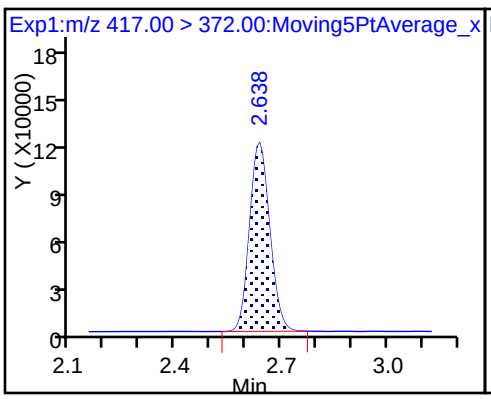
8 Perfluorohexanesulfonic acid



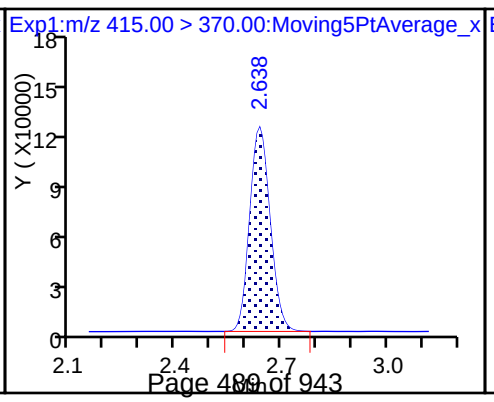
D 11 18O2 PFHxS



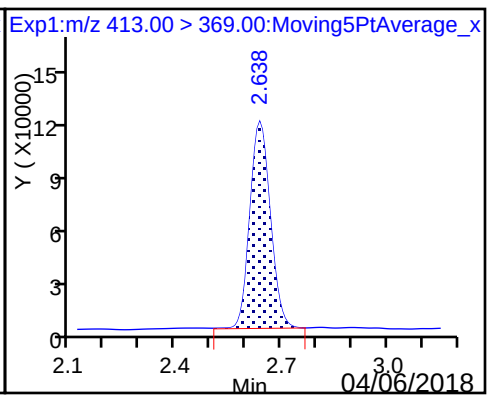
D 14 13C4 PFOA



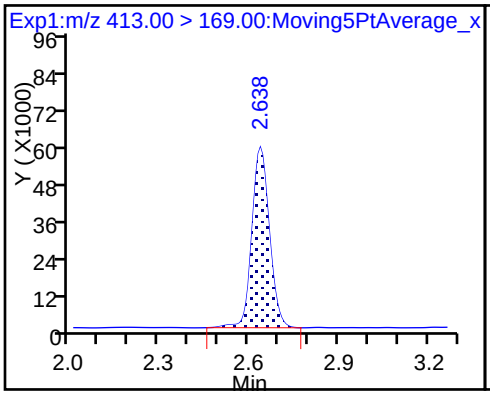
* 62 13C2-PFOA



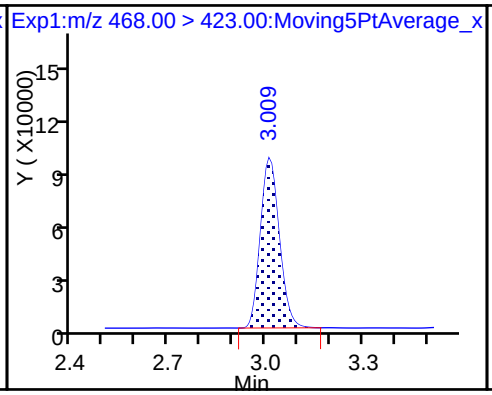
15 Perfluorooctanoic acid



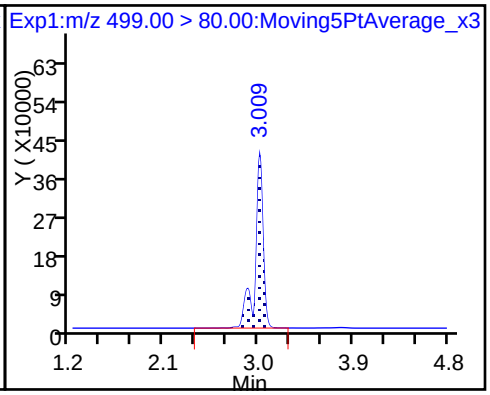
15 Perfluorooctanoic acid



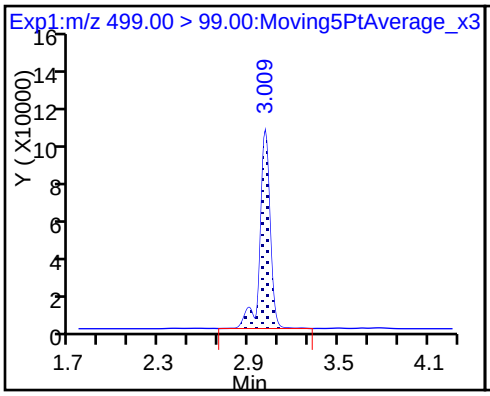
D 19 13C5 PFNA



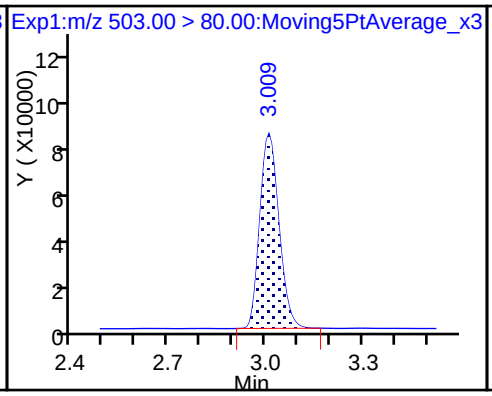
17 Perfluorooctane sulfonic acid



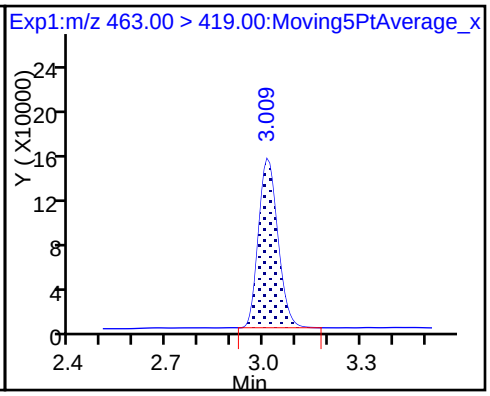
17 Perfluorooctane sulfonic acid



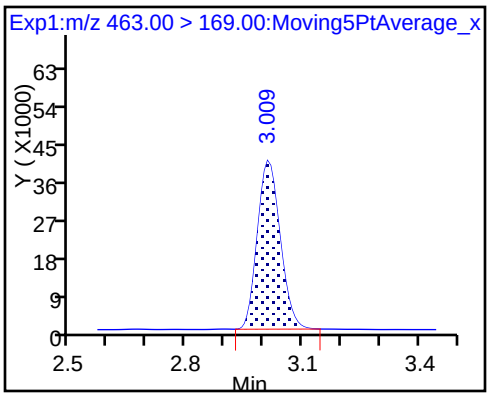
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-01_GW012218 | Lab Sample ID: 320-35310-11

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_043.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 12:30

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 204.9(mL) | Date Analyzed: 01/25/2018 23:07

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	7.7		2.4	1.2	0.56
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	110		2.4	1.2	0.46
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.1	J M	2.4	1.8	0.74
335-67-1	Perfluorooctanoic acid (PFOA)	9.2	M	2.4	1.8	0.66
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	3.7	U M	4.9	3.7	1.3
375-95-1	Perfluorononanoic acid (PFNA)	1.8	U	2.4	1.8	0.63

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	113		25-150
STL01892	13C4-PFHpA	108		25-150
STL00990	13C4 PFOA	114		25-150
STL00991	13C4 PFOS	114		25-150
STL00995	13C5 PFNA	116		25-150
STL02337	13C3-PFBS	110		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_043.d
Lims ID: 320-35310-A-11-A
Client ID: FH-17-01_GW012218
Sample Type: Client
Inject. Date: 25-Jan-2018 23:07:09 ALS Bottle#: 37 Worklist Smp#: 11
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-11-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 16:17:03

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.697	1.695	0.002	0.646	89715	2.55		110	1996	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.706	1.697	0.009	1.005	470187	0.1578			591	
298.90 > 99.00	1.697	1.697	0.0	1.000	198420		2.37(1.25-3.74)		475	
D 9 13C4-PFHpA										
367.00 > 322.00	2.278	2.267	0.011	0.867	4389020	2.69		108	34104	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.278	2.268	0.010	1.000	82950	0.0430			91.0	M
363.00 > 169.00	2.278	2.268	0.010	1.000	33599		2.47(1.13-3.40)		240	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.291	2.280	0.011	1.000	5525752	2.20			8416	
399.00 > 99.00	2.291	2.280	0.011	1.000	1664365		3.32(1.50-4.49)		4595	
D 11 18O2 PFHxS										
403.00 > 84.00	2.291	2.282	0.009	0.872	5344193	2.66		113	43834	
D 14 13C4 PFOA										
417.00 > 372.00	2.628	2.622	0.006	1.000	4538233	2.84		114	37268	
* 62 13C2-PFOA										
415.00 > 370.00	2.628	2.622	0.006		4438730	2.50			40347	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.628	2.623	0.005	1.000	399279	0.1877			160	M
413.00 > 169.00	2.628	2.623	0.005	1.000	254010		1.57(0.84-2.52)		1548	M
D 19 13C5 PFNA										
468.00 > 423.00	3.006	2.992	0.014	1.144	3767990	2.91		116	35131	
17 Perfluorooctane sulfonic acid										M
499.00 > 80.00	3.006	2.992	0.014	1.003	40417	0.0249			35.1	M
499.00 > 99.00	3.006	2.992	0.014	1.003	8139		4.97(2.31-6.93)		44.0	M
D 18 13C4 PFOS										
503.00 > 80.00	2.998	2.992	0.006	1.141	3471221	2.73		114	24257	

QC Flag Legend

Review Flags

M - Manually Integrated

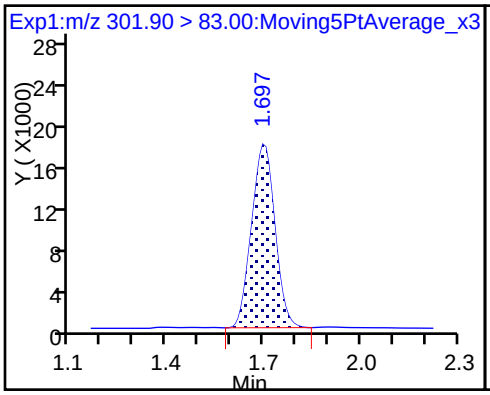
Report Date: 30-Jan-2018 10:22:46 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

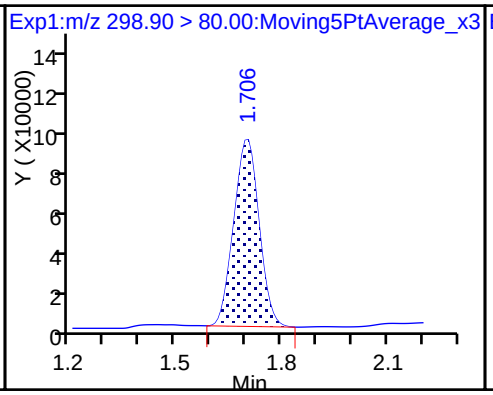
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_043.d

Injection Date:	25-Jan-2018 23:07:09	Instrument ID:	A8_N		
Lims ID:	320-35310-A-11-A	Lab Sample ID:	320-35310-11		
Client ID:	FH-17-01_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	37	Worklist Smp#:	11
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

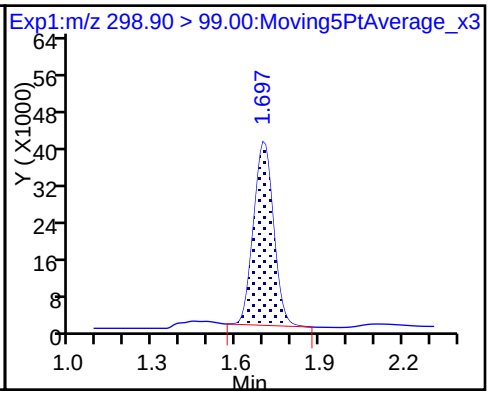
D 47 13C3-PFBS



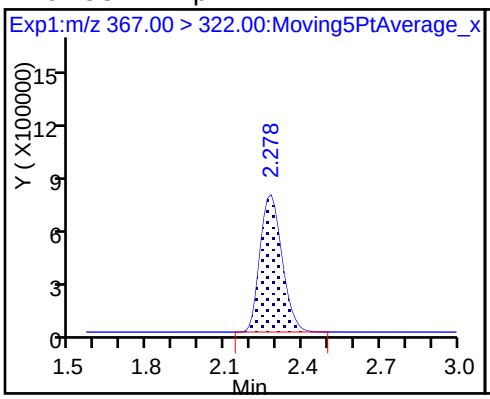
5 Perfluorobutanesulfonic acid



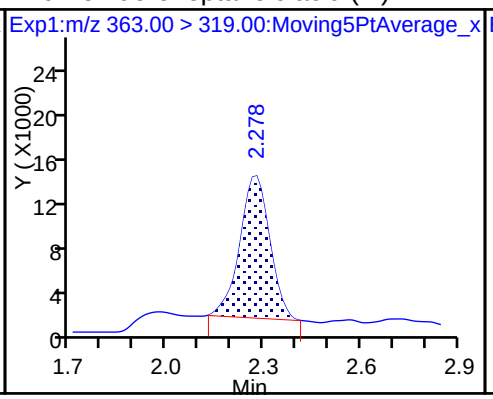
5 Perfluorobutanesulfonic acid



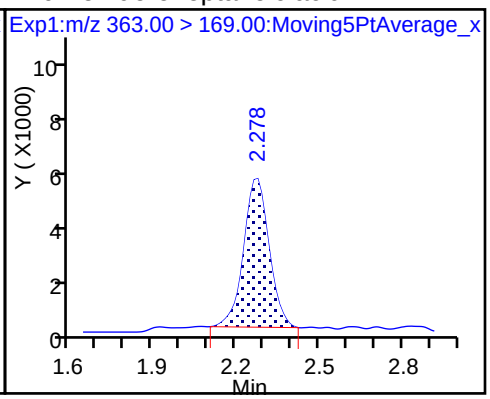
D 9 13C4-PFHpA



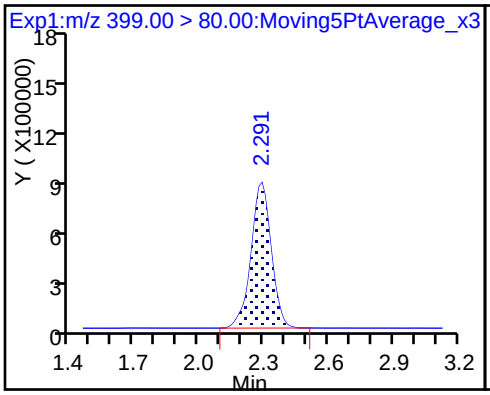
10 Perfluoroheptanoic acid (M)



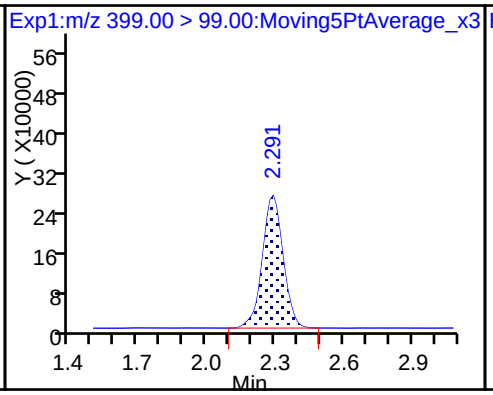
10 Perfluoroheptanoic acid



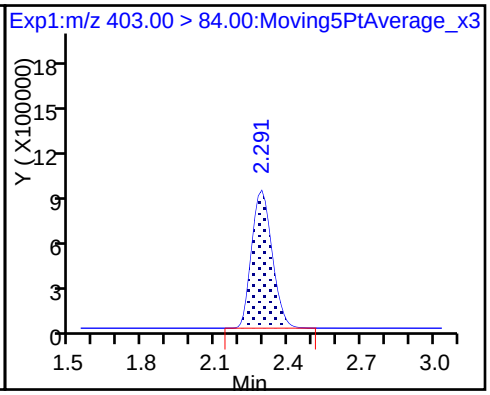
8 Perfluorohexanesulfonic acid



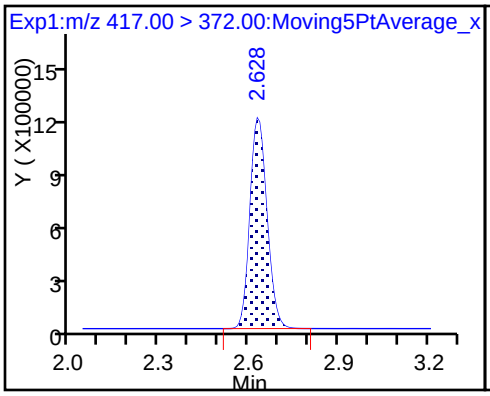
8 Perfluorohexanesulfonic acid



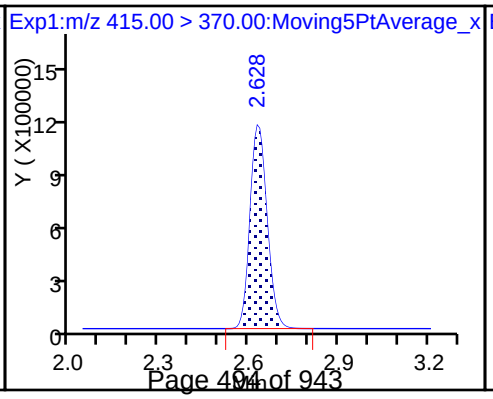
D 11 18O2 PFHxS



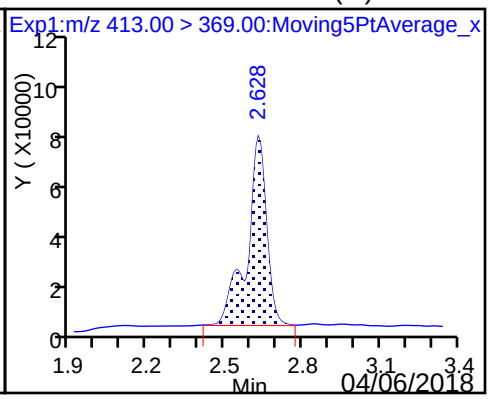
D 14 13C4 PFOA



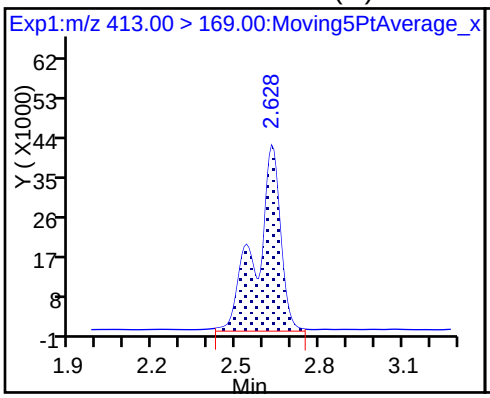
* 62 13C2-PFOA



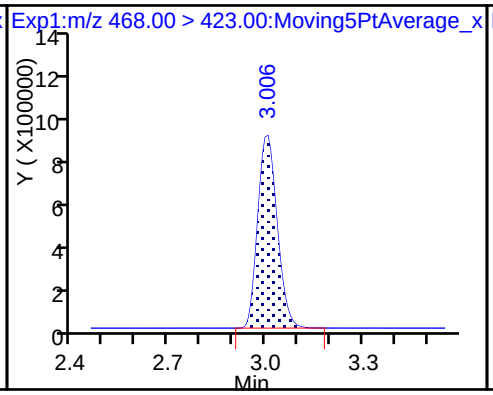
15 Perfluorooctanoic acid (M)



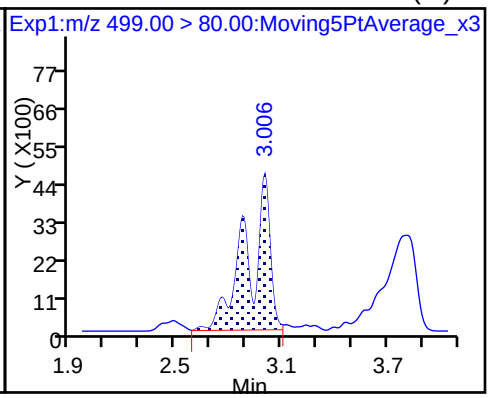
15 Perfluorooctanoic acid (M)



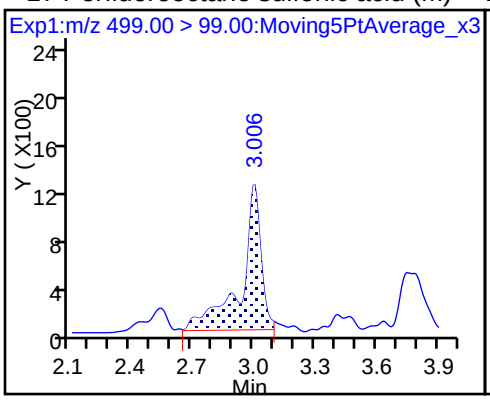
D 19 13C5 PFNA



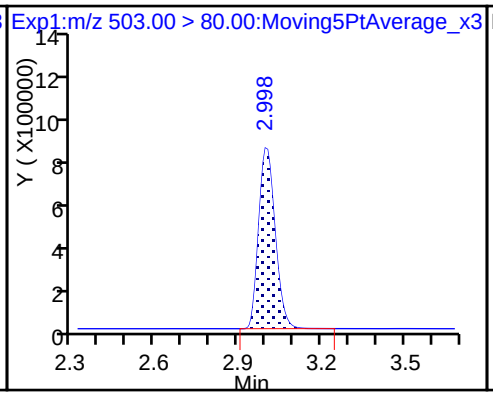
17 Perfluorooctane sulfonic acid (M)



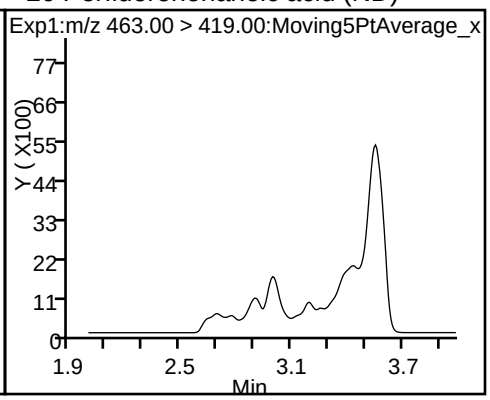
17 Perfluorooctane sulfonic acid (M)



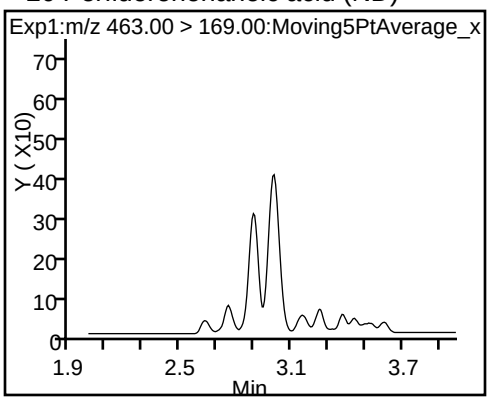
D 18 13C4 PFOS



20 Perfluorononanoic acid (ND)



20 Perfluorononanoic acid (ND)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

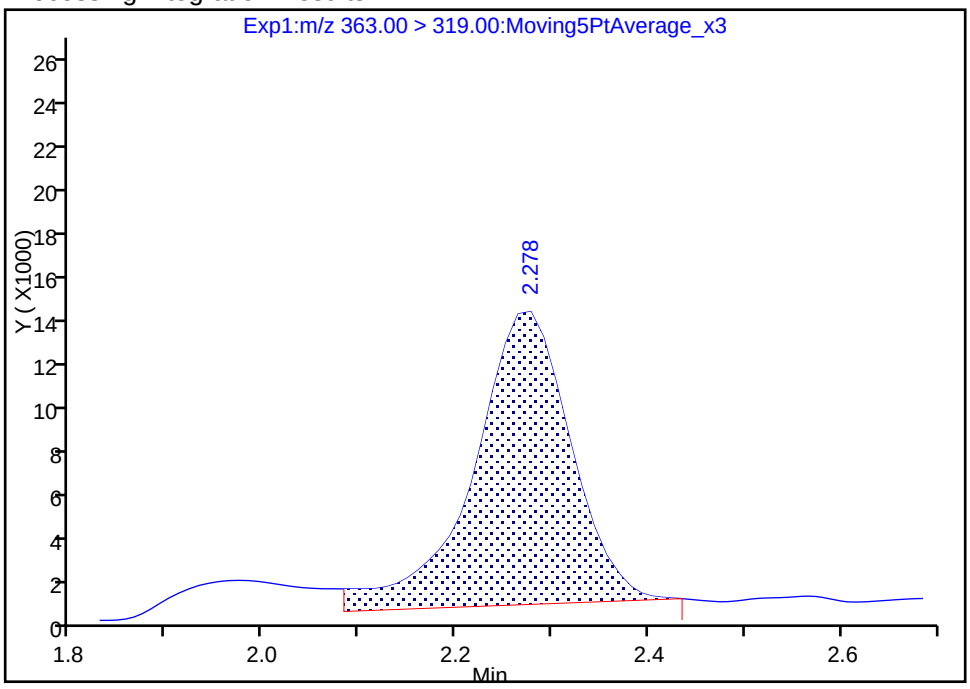
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_043.d				
Injection Date:	25-Jan-2018 23:07:09	Instrument ID:	A8_N		
Lims ID:	320-35310-A-11-A	Lab Sample ID:	320-35310-11		
Client ID:	FH-17-01_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	37	Worklist Smp#:	11
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

10 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

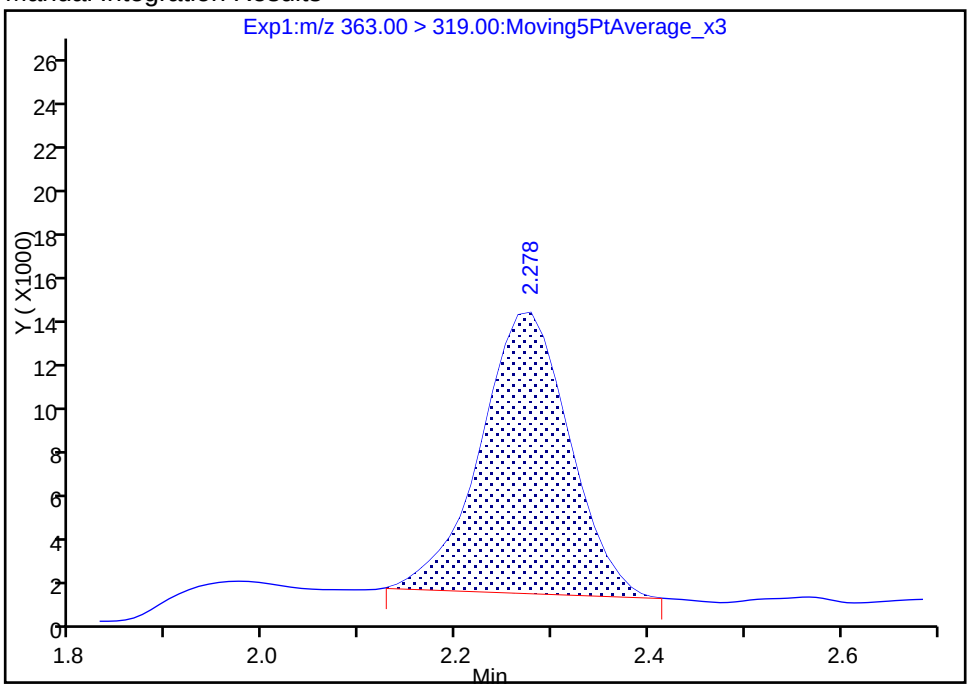
Processing Integration Results

RT: 2.28
Area: 95137
Amount: 0.049308
Amount Units: ng/ml



Manual Integration Results

RT: 2.28
Area: 82950
Amount: 0.042992
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:12:34

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

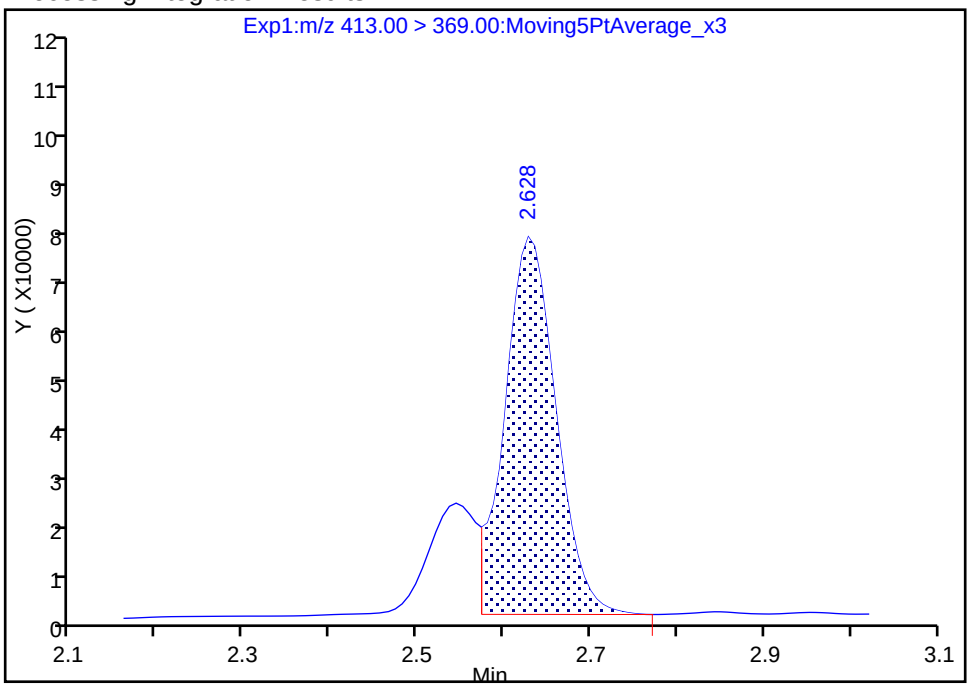
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_043.d				
Injection Date:	25-Jan-2018 23:07:09	Instrument ID:	A8_N		
Lims ID:	320-35310-A-11-A	Lab Sample ID:	320-35310-11		
Client ID:	FH-17-01_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	37	Worklist Smp#:	11
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

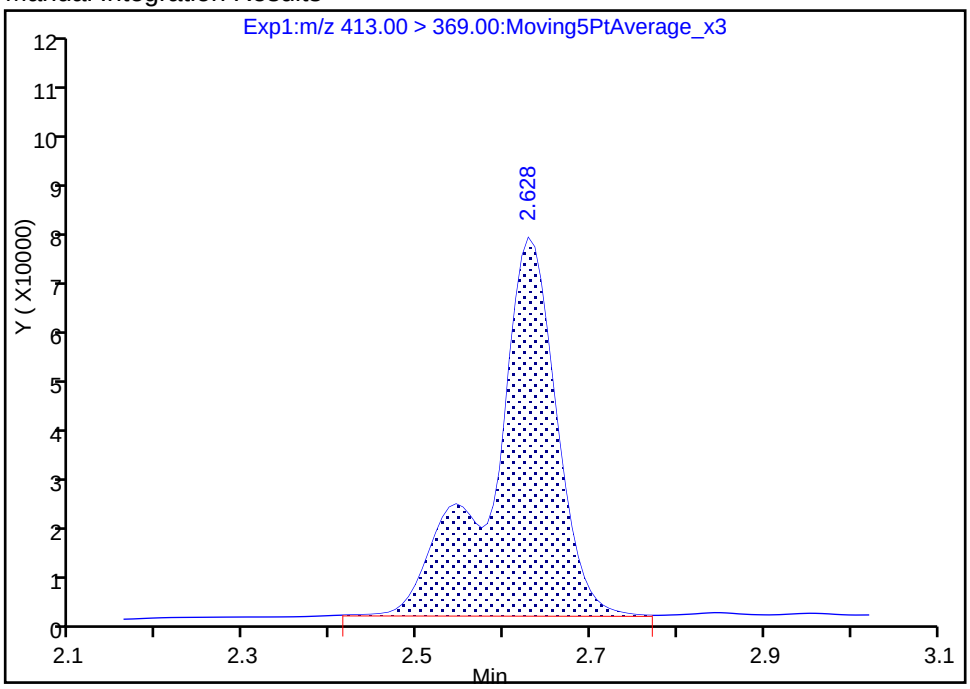
Processing Integration Results

RT: 2.63
Area: 310323
Amount: 0.145850
Amount Units: ng/ml



Manual Integration Results

RT: 2.63
Area: 399279
Amount: 0.187659
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:12:57

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_043.d

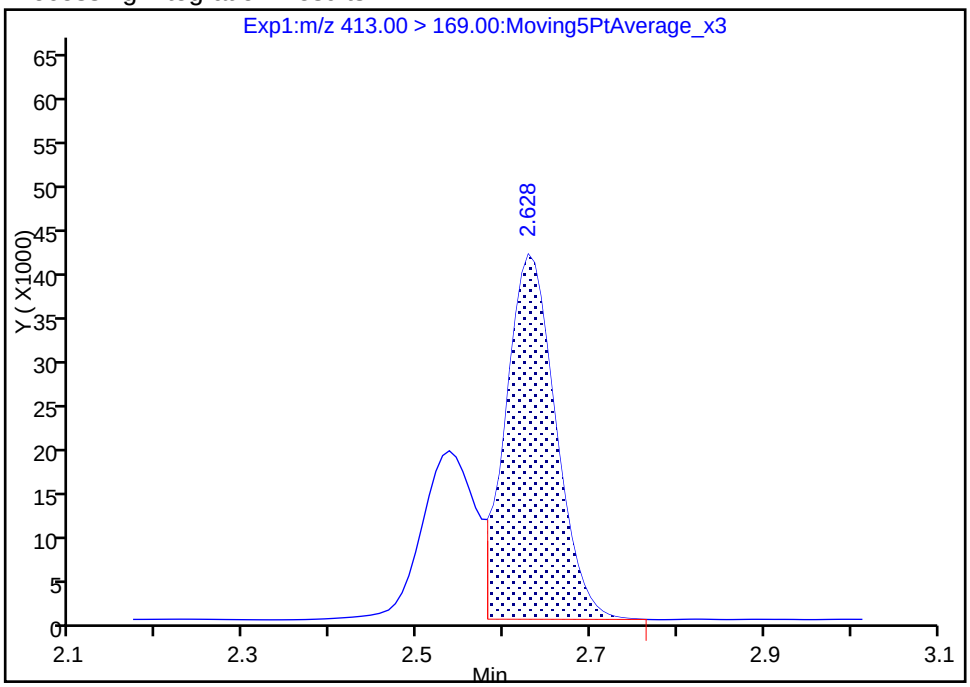
Injection Date:	25-Jan-2018 23:07:09	Instrument ID:	A8_N		
Lims ID:	320-35310-A-11-A	Lab Sample ID:	320-35310-11		
Client ID:	FH-17-01_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	37	Worklist Smp#:	11
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

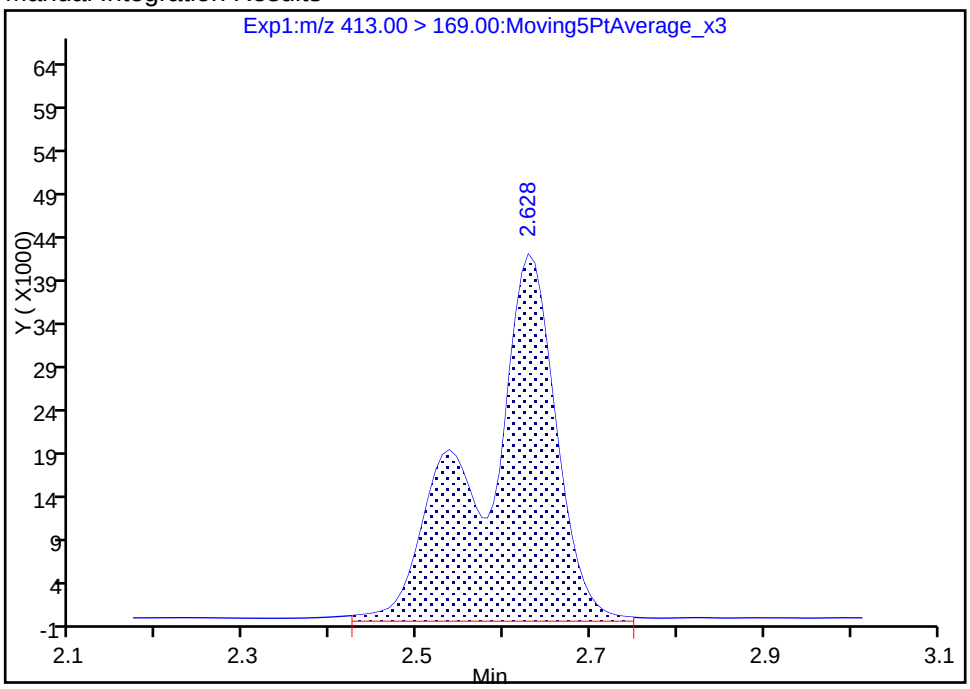
Processing Integration Results

RT: 2.63
Area: 164356
Amount: 0.145850
Amount Units: ng/ml



Manual Integration Results

RT: 2.63
Area: 254010
Amount: 0.187659
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:13:02

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

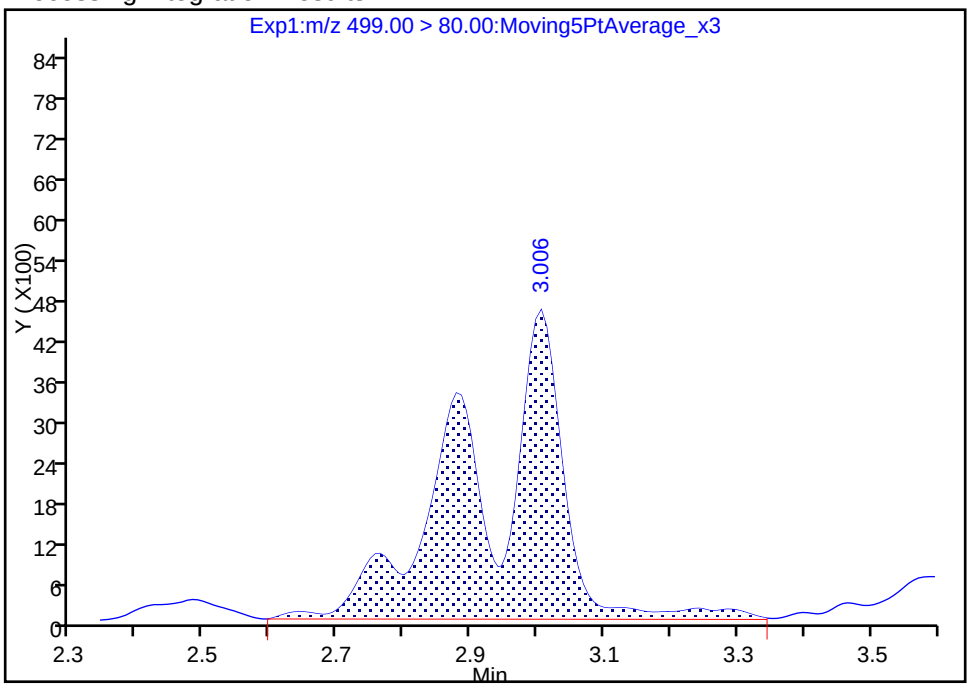
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_043.d				
Injection Date:	25-Jan-2018 23:07:09	Instrument ID:	A8_N		
Lims ID:	320-35310-A-11-A	Lab Sample ID:	320-35310-11		
Client ID:	FH-17-01_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	37	Worklist Smp#:	11
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

17 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

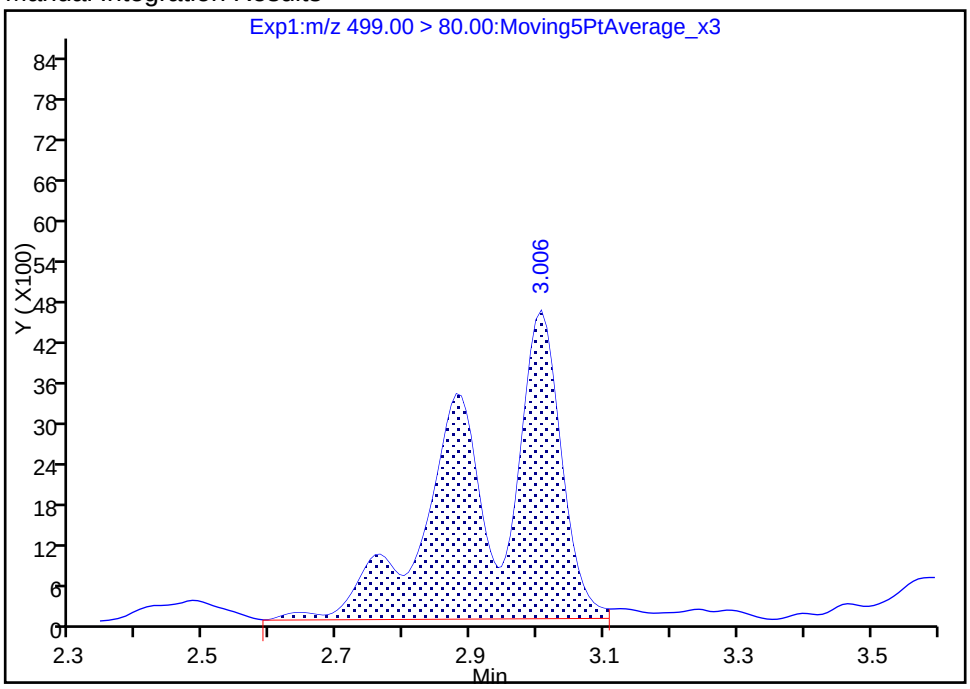
Processing Integration Results

RT: 3.01
Area: 42554
Amount: 0.026174
Amount Units: ng/ml



Manual Integration Results

RT: 3.01
Area: 40417
Amount: 0.024859
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:13:34

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

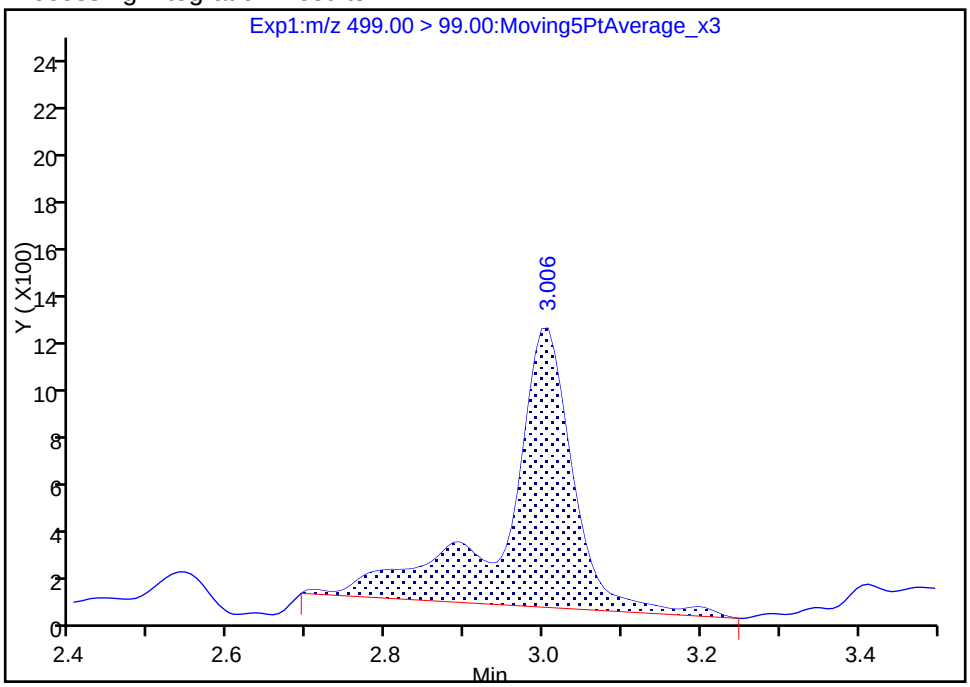
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_043.d				
Injection Date:	25-Jan-2018 23:07:09	Instrument ID:	A8_N		
Lims ID:	320-35310-A-11-A	Lab Sample ID:	320-35310-11		
Client ID:	FH-17-01_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	37	Worklist Smp#:	11
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

17 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

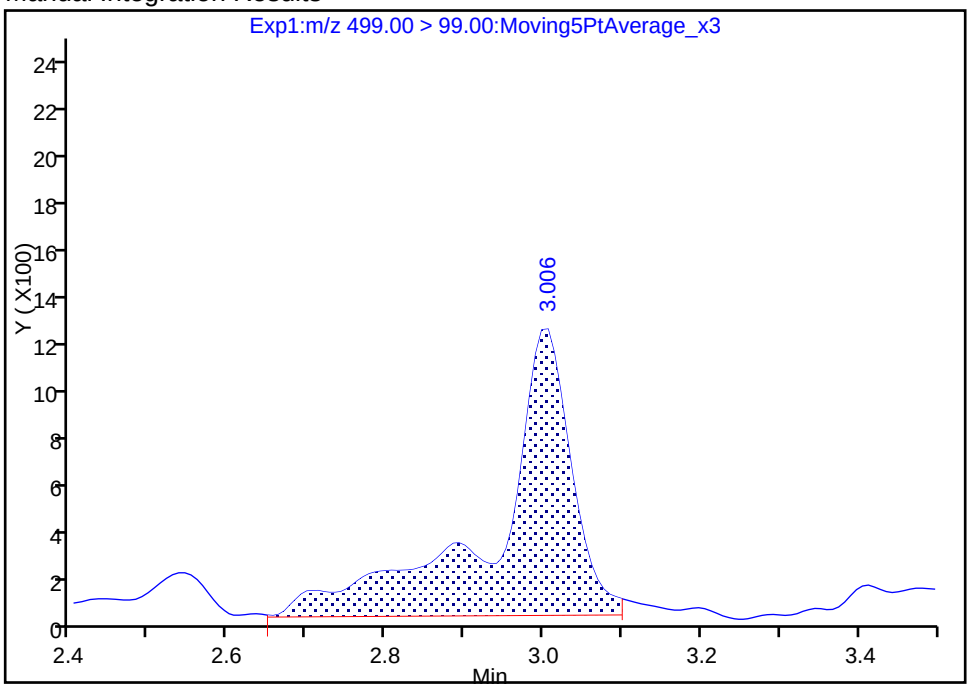
Processing Integration Results

RT: 3.01
Area: 7038
Amount: 0.026174
Amount Units: ng/ml



Manual Integration Results

RT: 3.01
Area: 8139
Amount: 0.024859
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:13:47

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-05_SO0005 | Lab Sample ID: 320-35310-12

Matrix: Solid | Lab File ID: 2018.01.26LLA_036.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 13:25

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.04(g) | Date Analyzed: 01/26/2018 17:24

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 10.0 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.11	0.028
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.5		0.55	0.11	0.034
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.32	J	0.55	0.11	0.032
335-67-1	Perfluorooctanoic acid (PFOA)	1.2		0.55	0.22	0.095
375-95-1	Perfluorononanoic acid (PFNA)	1.5		0.55	0.11	0.040

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	92		25-150
STL01892	13C4-PFHpA	88		25-150
STL00990	13C4 PFOA	94		25-150
STL00995	13C5 PFNA	78		25-150
STL02337	13C3-PFBS	96		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_036.d
Lims ID: 320-35310-A-12-A
Client ID: FH-17-05_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 17:24:53 ALS Bottle#: 21 Worklist Smp#: 11
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-12-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 11:01:10 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 11:01:10

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.699	1.695	0.004	0.646	95266	2.24		96.5	425	
5 Perfluorobutanesulfonic acid										RM
298.90 > 80.00	1.699	1.697	0.002	1.000	22025	0.006962			37.9	RM
298.90 > 99.00	1.672	1.697	-0.025	0.984	1358		16.22(1.25-3.74)		0.1	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.267	2.267	0.0	0.861	4346660	2.21		88.3	31082	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.267	2.268	-0.001	1.000	273897	0.1433			311	
363.00 > 169.00	2.267	2.268	-0.001	1.000	118306		2.32(1.13-3.40)		798	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.280	2.280	0.0	1.000	1714897	0.6894			4821	
399.00 > 99.00	2.280	2.280	0.0	1.000	581061		2.95(1.50-4.49)		1494	
D 11 18O2 PFHxS										
403.00 > 84.00	2.280	2.282	-0.002	0.866	5283448	2.18		92.2	47962	
D 14 13C4 PFOA										
417.00 > 372.00	2.631	2.622	0.009	1.000	4554036	2.36		94.4	38220	
* 62 13C2-PFOA										
415.00 > 370.00	2.631	2.622	0.009		5356695	2.50			41624	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.631	2.623	0.008	1.000	1159657	0.5431			890	
413.00 > 169.00	2.631	2.623	0.008	1.000	635755		1.82(0.84-2.52)		4257	
D 19 13C5 PFNA										
468.00 > 423.00	3.003	2.992	0.011	1.141	3036844	1.94		77.7	26847	
17 Perfluorooctane sulfonic acid										E
499.00 > 80.00	3.003	2.992	0.011	1.000	83001564	63.4			24056	E
499.00 > 99.00	3.003	2.992	0.011	1.000	26320693		3.15(2.31-6.93)		1310689	
D 18 13C4 PFOS										
503.00 > 80.00	3.003	2.992	0.011	1.141	2793266	1.82		76.2	15749	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	3.003	2.992	0.011	1.000	854607	0.6815			1194	
463.00 > 169.00	3.003	2.992	0.011	1.000	217855		3.92(1.90-5.69)		2516	

QC Flag Legend

Processing Flags

R - Failed Signal Ratio Test

E - Exceeded Maximum Amount

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 11:01:10 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_036.d

Injection Date: 26-Jan-2018 17:24:53 Instrument ID: A8_N

Lims ID: 320-35310-A-12-A Lab Sample ID: 320-35310-12

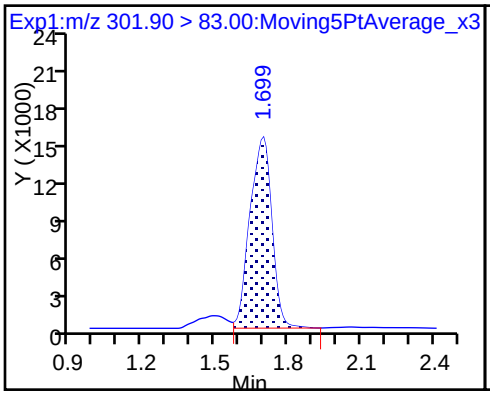
Client ID: FH-17-05_SO0005

Operator ID: SACINSTLCMS01 ALS Bottle#: 21 Worklist Smp#: 11

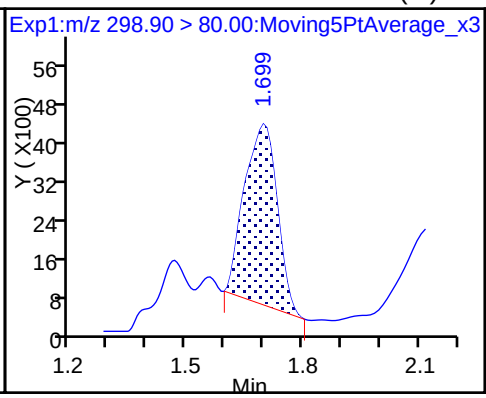
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

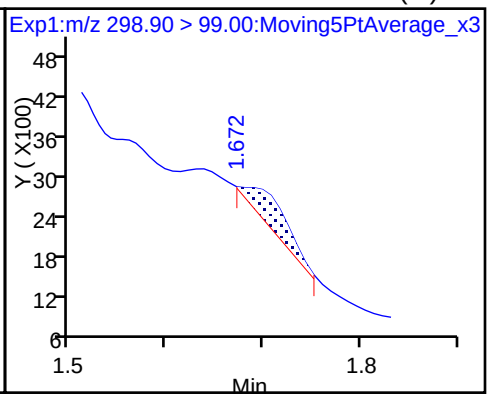
D 47 13C3-PFBS



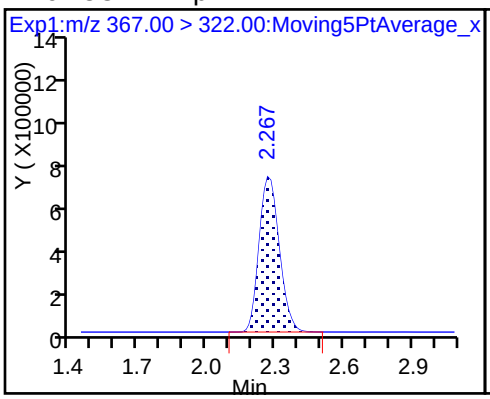
5 Perfluorobutanesulfonic acid (M)



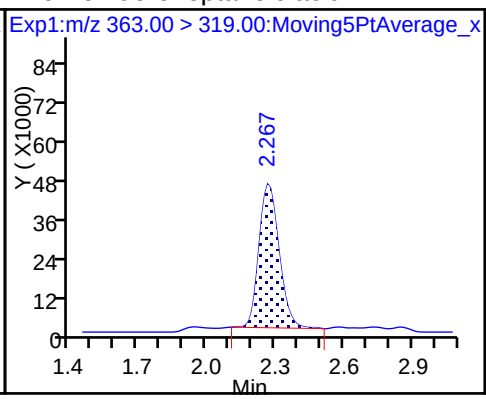
5 Perfluorobutanesulfonic acid (M)



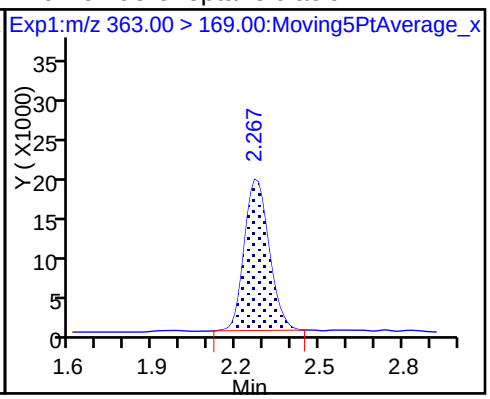
D 9 13C4-PFHpA



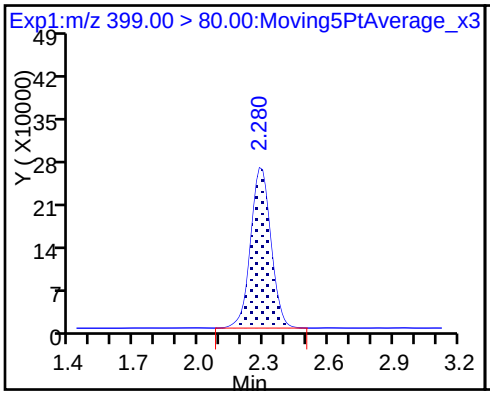
10 Perfluoroheptanoic acid



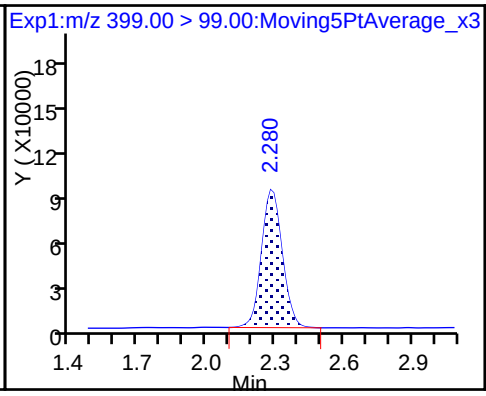
10 Perfluoroheptanoic acid



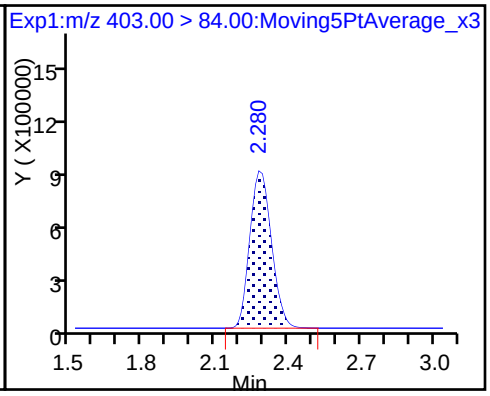
8 Perfluorohexanesulfonic acid



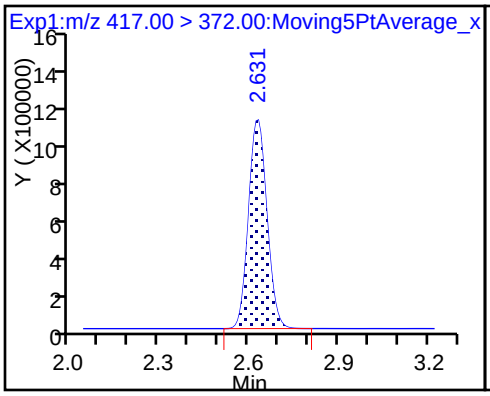
8 Perfluorohexanesulfonic acid



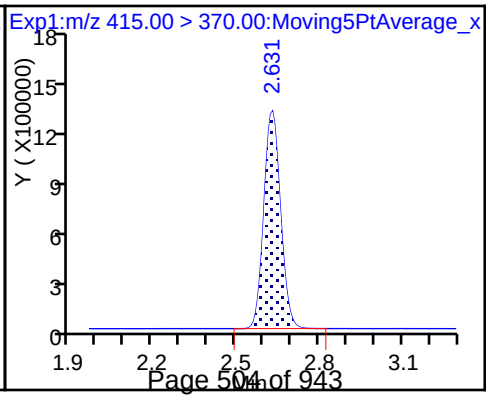
D 11 18O2 PFHxS



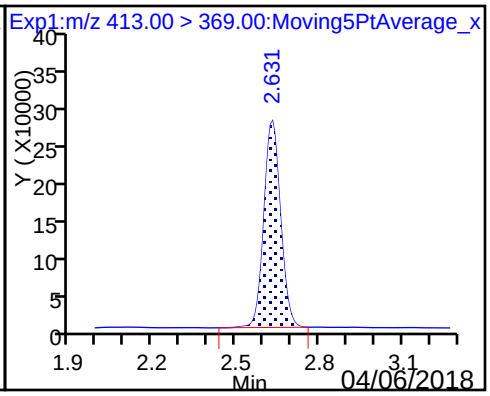
D 14 13C4 PFOA



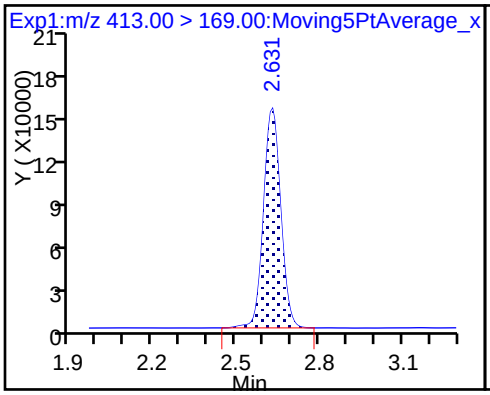
* 62 13C2-PFOA



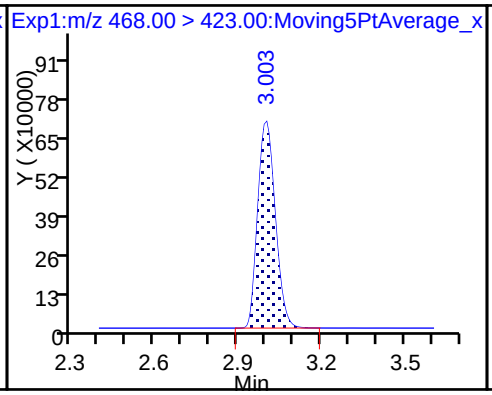
15 Perfluorooctanoic acid



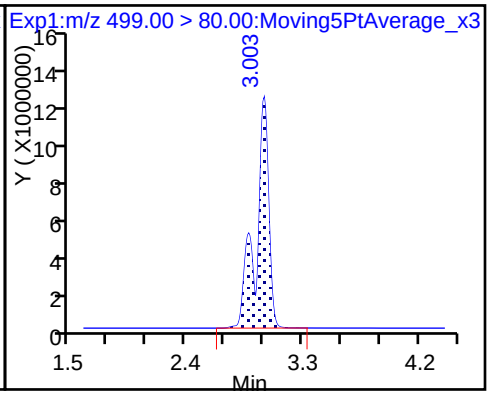
15 Perfluorooctanoic acid



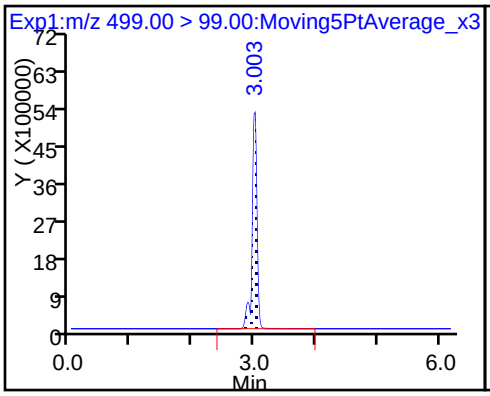
D 19 13C5 PFNA



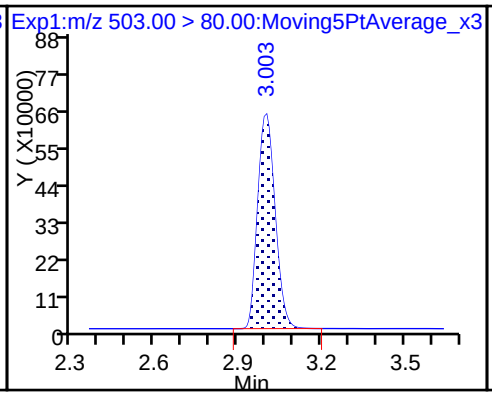
17 Perfluorooctane sulfonic acid



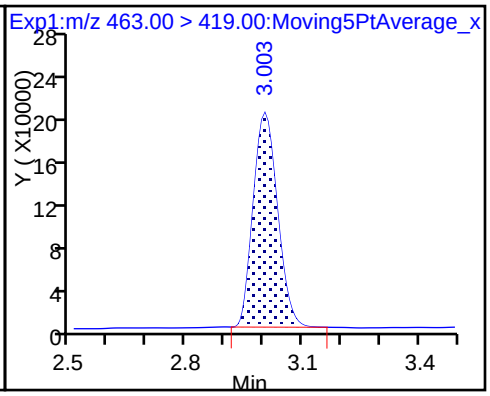
17 Perfluorooctane sulfonic acid



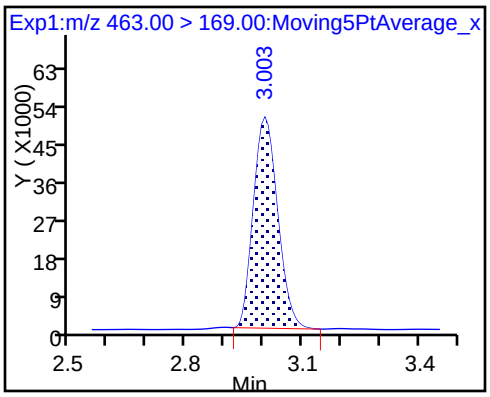
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

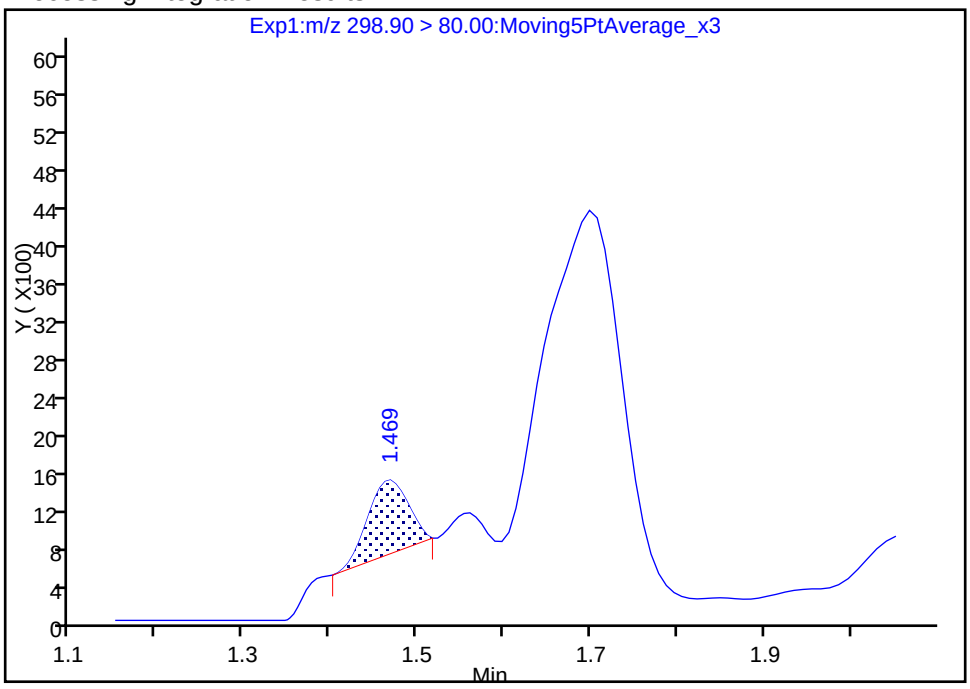
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_036.d				
Injection Date:	26-Jan-2018 17:24:53	Instrument ID:	A8_N		
Lims ID:	320-35310-A-12-A	Lab Sample ID:	320-35310-12		
Client ID:	FH-17-05_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	21	Worklist Smp#:	11
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

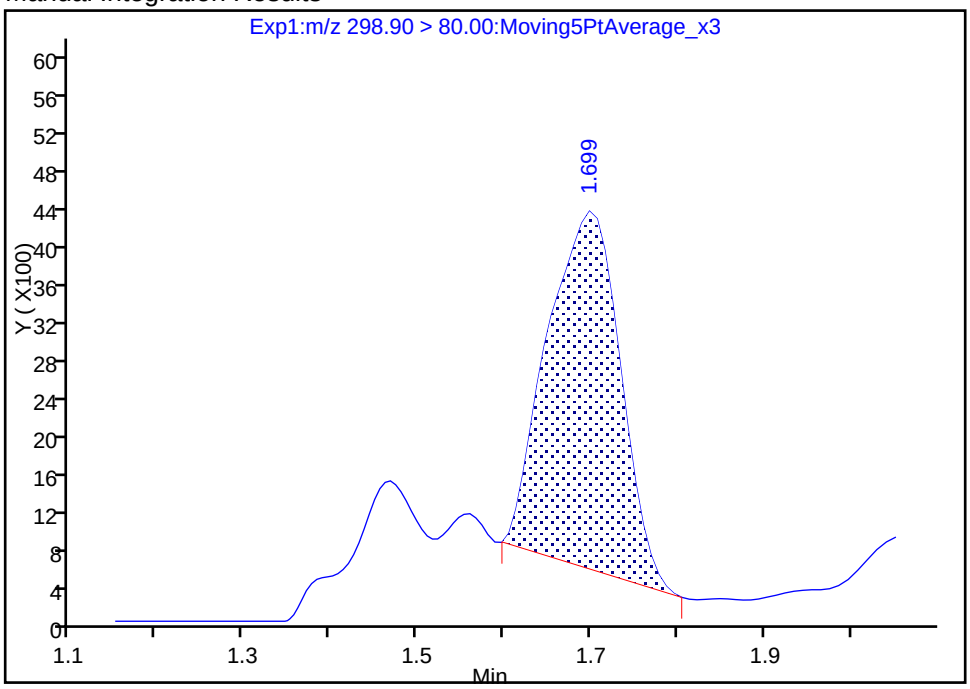
Processing Integration Results

RT: 1.47
Area: 2546
Amount: 0.000805
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 22025
Amount: 0.006962
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 11:00:31

Audit Action: Manually Integrated Audit Reason: Wrong peak

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_036.d

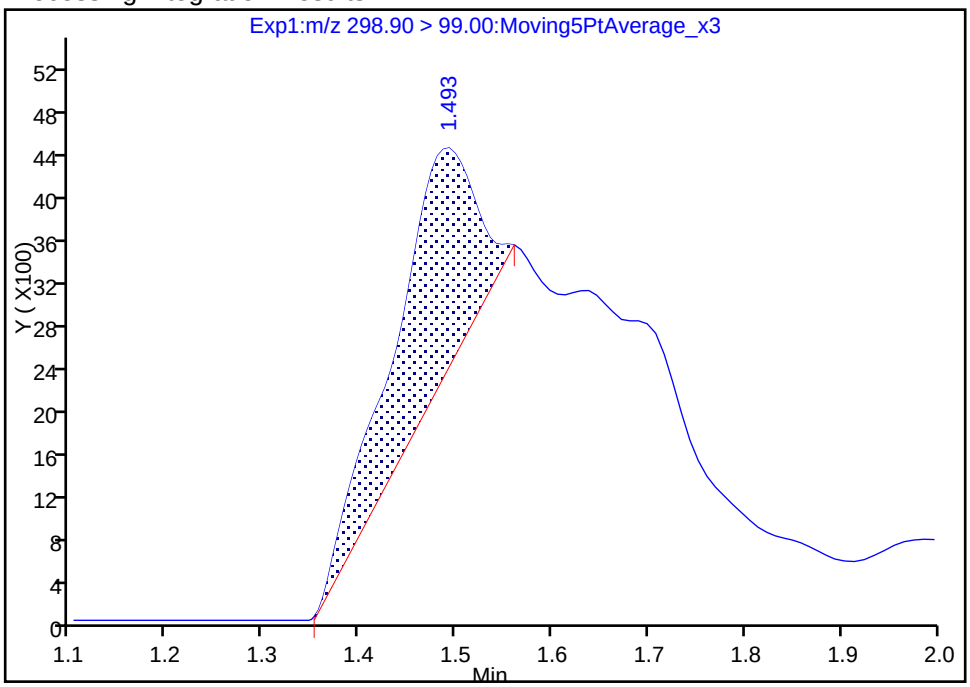
Injection Date:	26-Jan-2018 17:24:53	Instrument ID:	A8_N		
Lims ID:	320-35310-A-12-A	Lab Sample ID:	320-35310-12		
Client ID:	FH-17-05_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	21	Worklist Smp#:	11
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

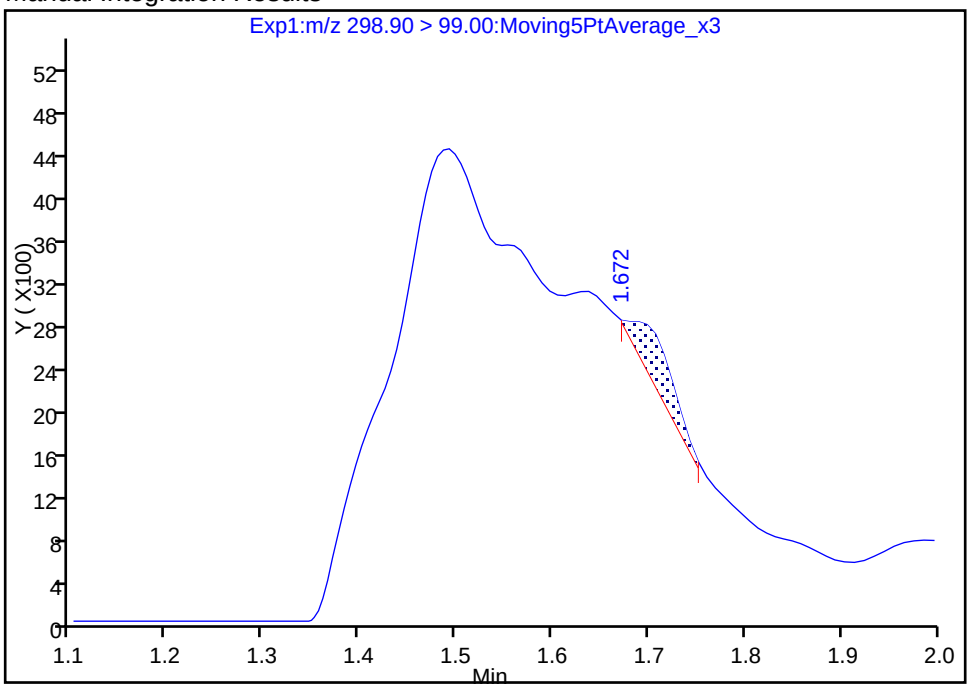
Processing Integration Results

RT: 1.49
Area: 12749
Amount: 0.000805
Amount Units: ng/ml



Manual Integration Results

RT: 1.67
Area: 1358
Amount: 0.006962
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 11:00:38

Audit Action: Manually Integrated Audit Reason: Wrong peak

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-05_SO0005 DL | Lab Sample ID: 320-35310-12 DL

Matrix: Solid | Lab File ID: 2018.01.29LLAA_039.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 13:25

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.04(g) | Date Analyzed: 01/29/2018 16:36

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 20

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 10.0 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 206109 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	200	D	22	11	4.4

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00991	13C4 PFOS	111		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\2018.01.29LLAA_039.d
Lims ID: 320-35310-A-12-A
Client ID: FH-17-05_SO0005
Sample Type: Client
Inject. Date: 29-Jan-2018 16:36:40 ALS Bottle#: 26 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 20.0000
Sample Info: 320-35310-A-12-A 20X
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 08:49:18 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 08:49:18

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.698	1.695	0.003	0.644	4648	0.1336		115	96.3	
D 9 13C4-PFHpA										
367.00 > 322.00	2.279	2.267	0.012	0.864	210609	0.1306		105	2574	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.279	2.268	0.011	1.000	16966	0.009162			23.7	
363.00 > 169.00	2.279	2.268	0.011	1.000	6356		2.67(1.13-3.40)		48.4	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.292	2.280	0.012	1.000	83654	0.0361			79.0	
399.00 > 99.00	2.292	2.280	0.012	1.000	26034		3.21(1.50-4.49)		39.8	
D 11 18O2 PFHxS										
403.00 > 84.00	2.292	2.282	0.010	0.869	245875	0.1239		105	6874	
D 14 13C4 PFOA										
417.00 > 372.00	2.638	2.622	0.016	1.000	222911	0.1411		113	3451	
* 62 13C2-PFOA										
415.00 > 370.00	2.638	2.622	0.016		219344	0.1250			3454	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.638	2.623	0.015	1.000	58012	0.0278			29.4	
413.00 > 169.00	2.638	2.623	0.015	1.000	26287		2.21(0.84-2.52)		208	
D 19 13C5 PFNA										
468.00 > 423.00	3.009	2.992	0.017	1.141	168201	0.1313		105	4033	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.009	2.992	0.017	1.000	6975610	4.49			15535	
499.00 > 99.00	3.009	2.992	0.017	1.000	1596554		4.37(2.31-6.93)		10426	
D 18 13C4 PFOS										
503.00 > 80.00	3.009	2.992	0.017	1.141	166024	0.1322		111	3375	
20 Perfluorononanoic acid										
463.00 > 419.00	3.009	2.992	0.017	1.000	50133	0.0361			108	
463.00 > 169.00	3.009	2.992	0.017	1.000	14130		3.55(1.90-5.69)		440	

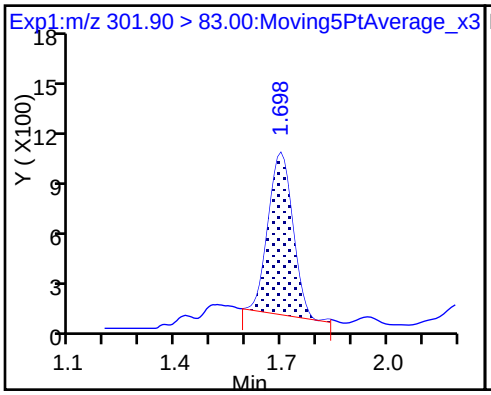
Report Date: 30-Jan-2018 08:49:19 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

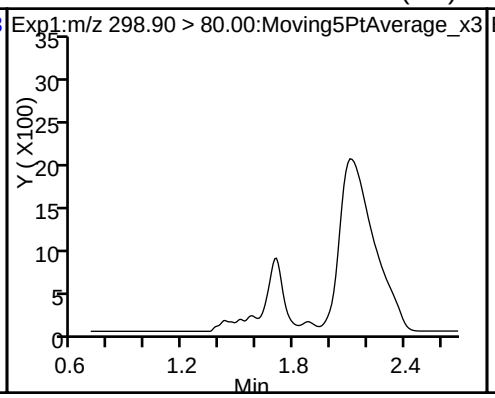
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\2018.01.29LLAA_039.d

Injection Date:	29-Jan-2018 16:36:40	Instrument ID:	A8_N		
Lims ID:	320-35310-A-12-A	Lab Sample ID:	320-35310-12		
Client ID:	FH-17-05_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	26	Worklist Smp#:	3
Injection Vol:	2.0 ul	Dil. Factor:	20.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

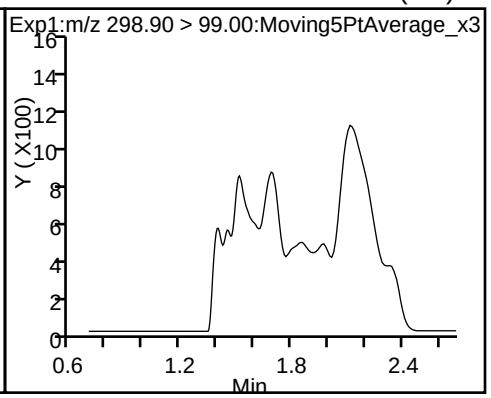
D 47 13C3-PFBS



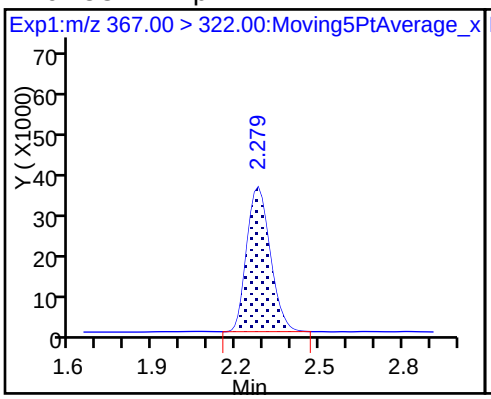
5 Perfluorobutanesulfonic acid (ND)



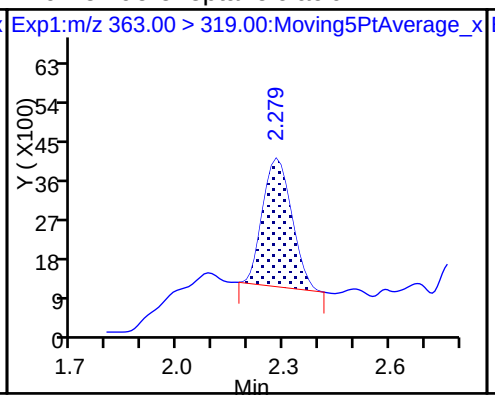
5 Perfluorobutanesulfonic acid (ND)



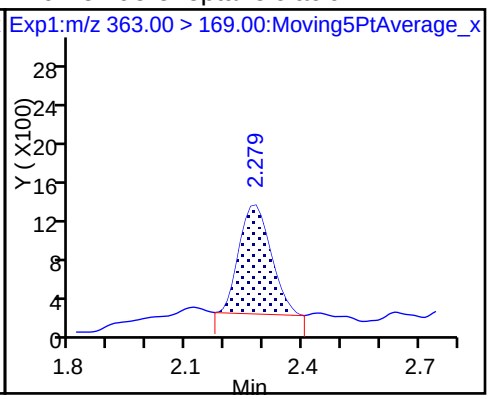
D 9 13C4-PFHpA



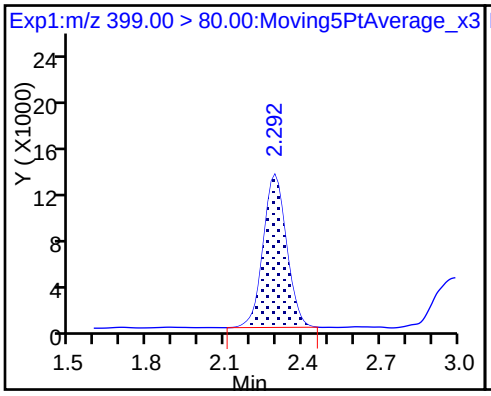
10 Perfluoroheptanoic acid



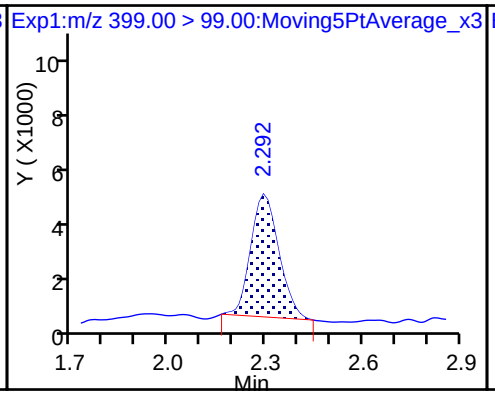
10 Perfluoroheptanoic acid



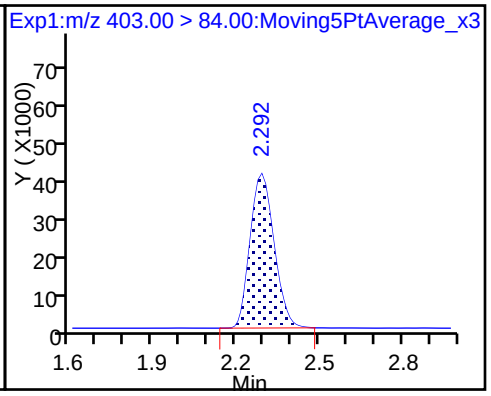
8 Perfluorohexanesulfonic acid



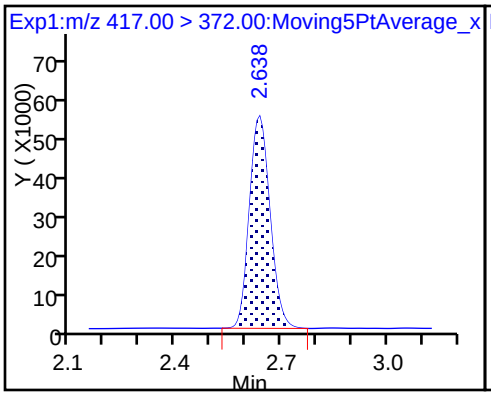
8 Perfluorohexanesulfonic acid



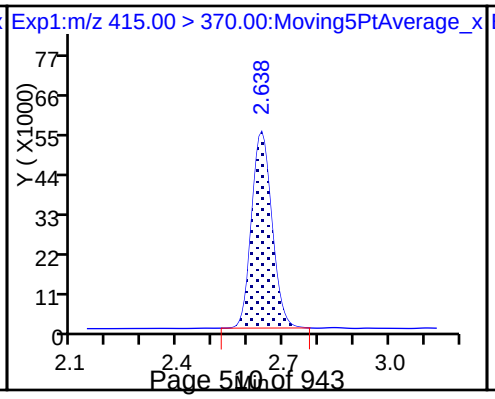
D 11 18O2 PFHxS



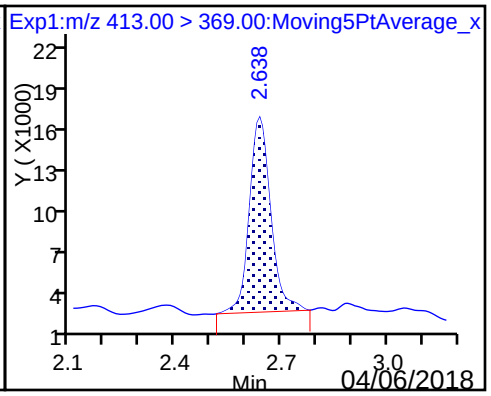
D 14 13C4 PFOA



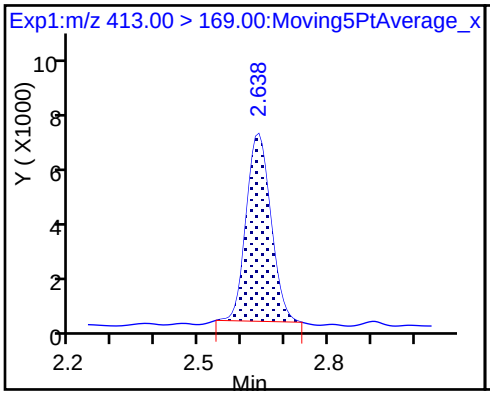
* 62 13C2-PFOA



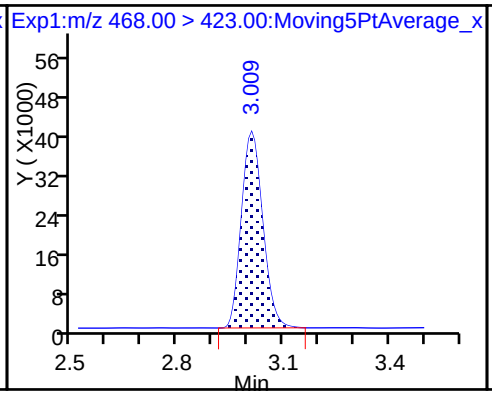
15 Perfluorooctanoic acid



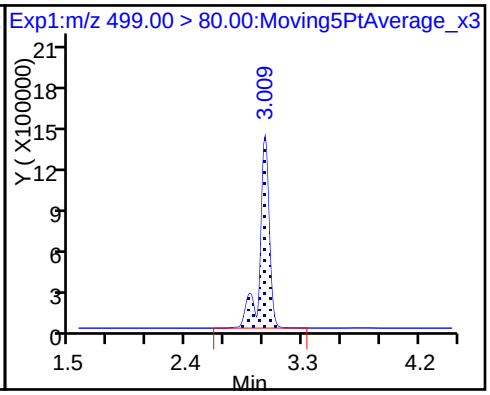
15 Perfluorooctanoic acid



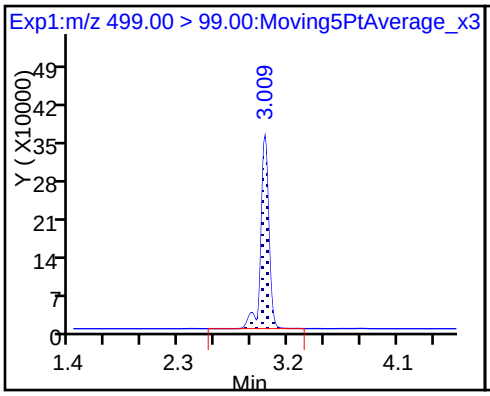
D 19 13C5 PFNA



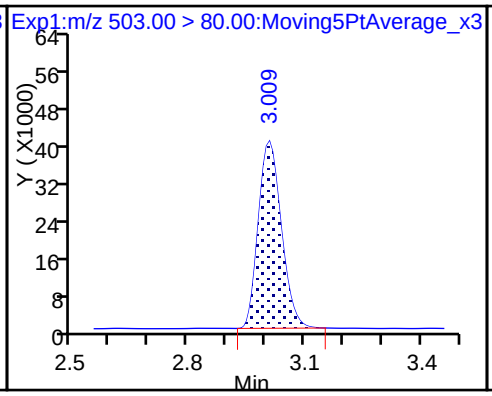
17 Perfluorooctane sulfonic acid



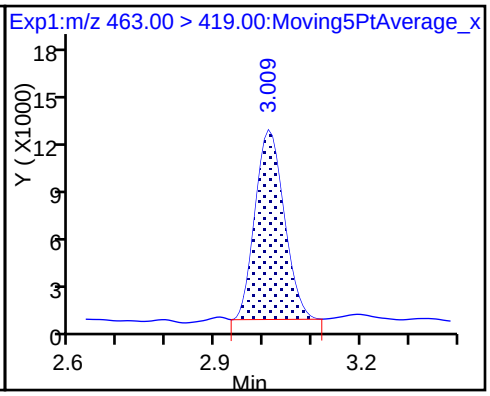
17 Perfluorooctane sulfonic acid



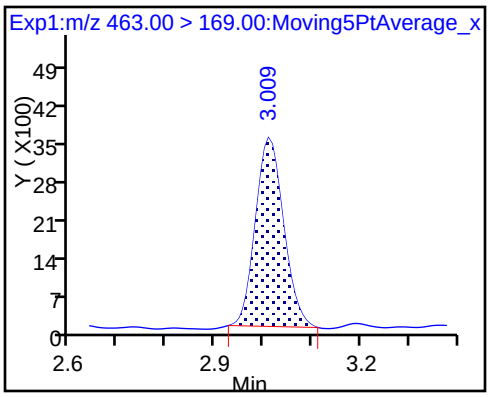
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-05_GW012218 | Lab Sample ID: 320-35310-13

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_045.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 13:45

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 252.3(mL) | Date Analyzed: 01/25/2018 23:22

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	9.5	M	2.0	0.99	0.46
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	140		2.0	0.99	0.38
375-85-9	Perfluoroheptanoic acid (PFHpA)	14		2.0	1.5	0.60
335-67-1	Perfluorooctanoic acid (PFOA)	34	M	2.0	1.5	0.54
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	46		4.0	3.0	1.1
375-95-1	Perfluorononanoic acid (PFNA)	1.2	J	2.0	1.5	0.52

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	103		25-150
STL01892	13C4-PFHpA	104		25-150
STL00990	13C4 PFOA	106		25-150
STL00991	13C4 PFOS	113		25-150
STL00995	13C5 PFNA	118		25-150
STL02337	13C3-PFBS	98		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_045.d
Lims ID: 320-35310-A-13-A
Client ID: FH-17-05_GW012218
Sample Type: Client
Inject. Date: 25-Jan-2018 23:22:46 ALS Bottle#: 38 Worklist Smp#: 13
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-13-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:39:44

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.697	1.695	0.002	0.647	87880	2.27		97.7	1111	
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.697	1.697	0.0	1.000	698511	0.2393			327	M
298.90 > 99.00	1.697	1.697	0.0	1.000	282607		2.47(1.25-3.74)		237	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.267	-0.002	0.864	4665512	2.60		104	32176	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.265	2.268	-0.003	1.000	725890	0.3539			852	
363.00 > 169.00	2.265	2.268	-0.003	1.000	286434		2.53(1.13-3.40)		1725	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.278	2.280	-0.002	1.000	8718522	3.44			1088	
399.00 > 99.00	2.278	2.280	-0.002	1.000	2277695		3.83(1.50-4.49)		4813	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.869	5381495	2.44		103	61598	
D 14 13C4 PFOA										
417.00 > 372.00	2.621	2.622	-0.001	1.000	4677511	2.66		106	38912	
* 62 13C2-PFOA										
415.00 > 370.00	2.621	2.622	-0.001		4881652	2.50			49864	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.621	2.623	-0.002	1.000	1908702	0.8704			1203	M
413.00 > 169.00	2.621	2.623	-0.002	1.000	1135871		1.68(0.84-2.52)		6238	M
D 19 13C5 PFNA										
468.00 > 423.00	3.000	2.992	0.008	1.145	4219000	2.96		118	43272	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.000	2.992	0.008	1.000	2060615	1.17			1770	
499.00 > 99.00	2.992	2.992	0.0	0.997	423030		4.87(2.31-6.93)		2209	
D 18 13C4 PFOS										
503.00 > 80.00	3.000	2.992	0.008	1.145	3768361	2.70		113	10332	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	3.000	2.992	0.008	1.000	51837	0.0298			44.2	
463.00 > 169.00	3.000	2.992	0.008	1.000	13120		3.95(1.90-5.69)		119	

QC Flag Legend

Review Flags

M - Manually Integrated

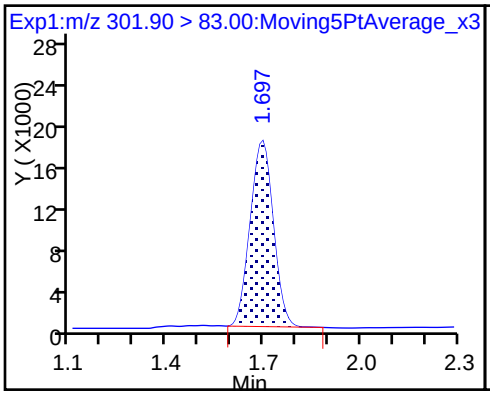
Report Date: 30-Jan-2018 10:22:49 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

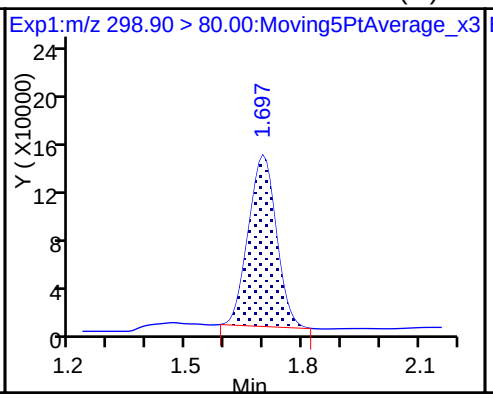
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_045.d

Injection Date:	25-Jan-2018 23:22:46	Instrument ID:	A8_N		
Lims ID:	320-35310-A-13-A	Lab Sample ID:	320-35310-13		
Client ID:	FH-17-05_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	38	Worklist Smp#:	13
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

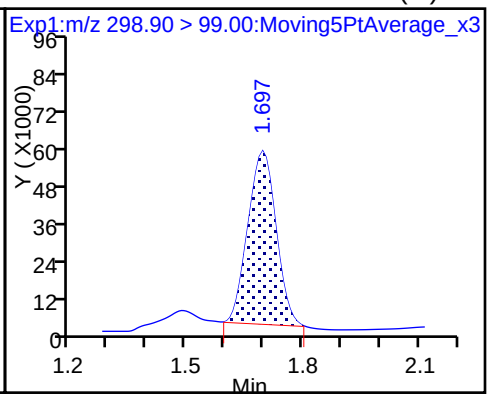
D 47 13C3-PFBS



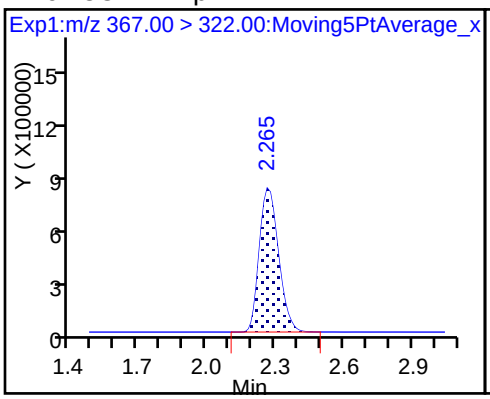
5 Perfluorobutanesulfonic acid (M)



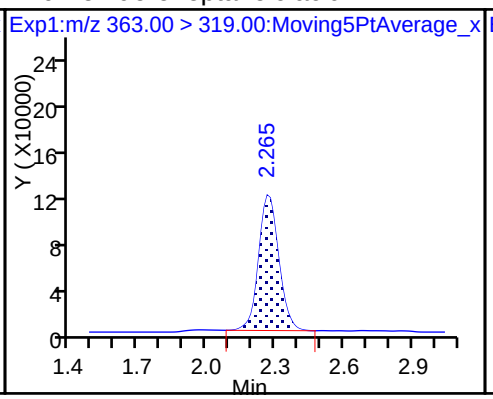
5 Perfluorobutanesulfonic acid (M)



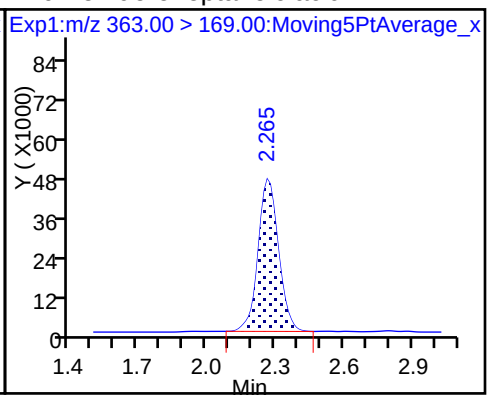
D 9 13C4-PFHpA



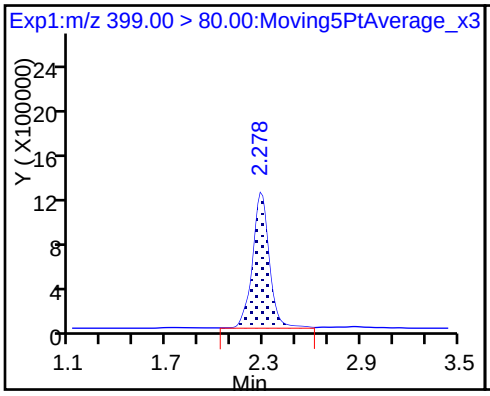
10 Perfluoroheptanoic acid



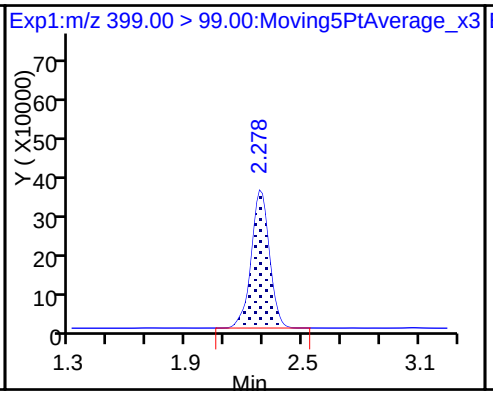
10 Perfluoroheptanoic acid



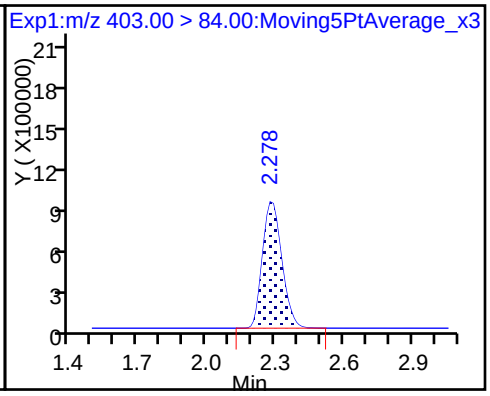
8 Perfluorohexanesulfonic acid



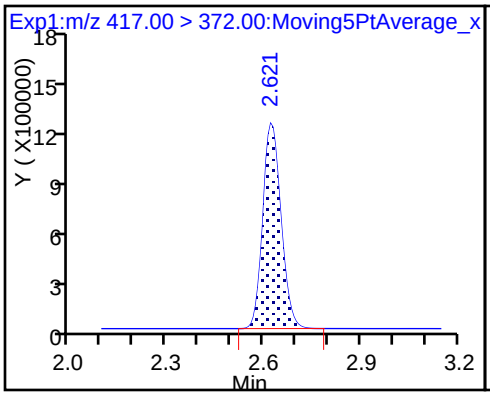
8 Perfluorohexanesulfonic acid



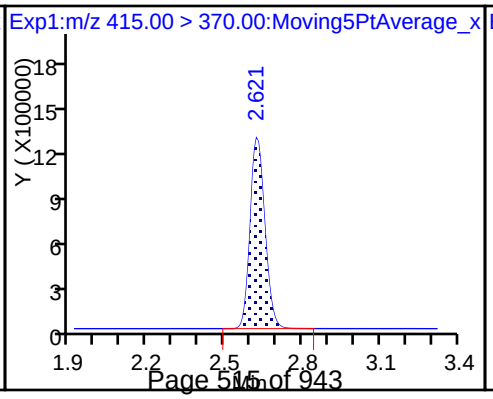
D 11 18O2 PFHxS



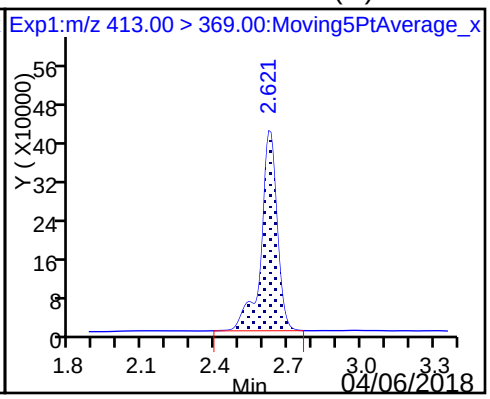
D 14 13C4 PFOA



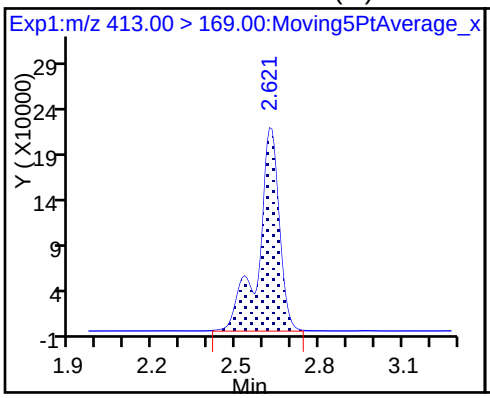
* 62 13C2-PFOA



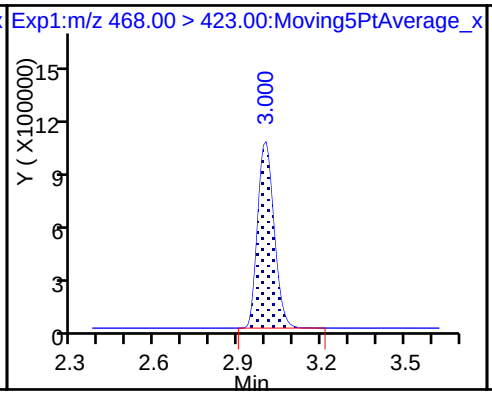
15 Perfluorooctanoic acid (M)



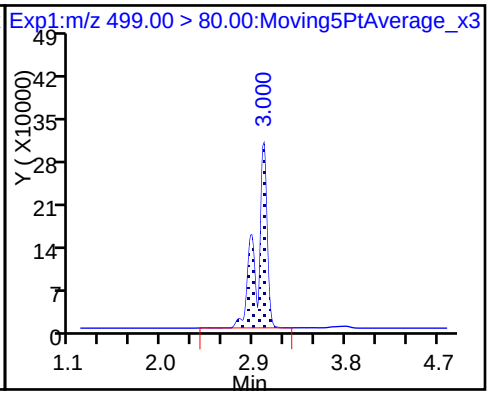
15 Perfluorooctanoic acid (M)



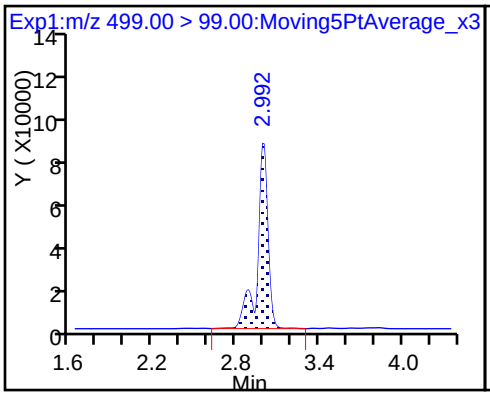
D 19 13C5 PFNA



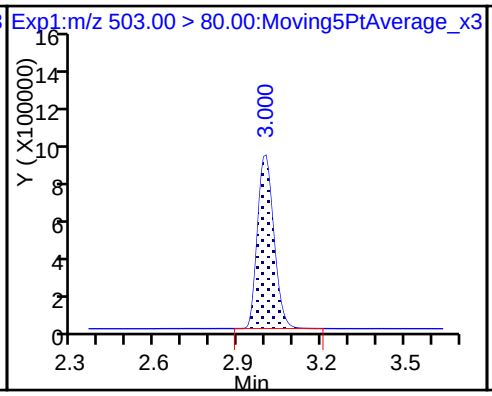
17 Perfluorooctane sulfonic acid



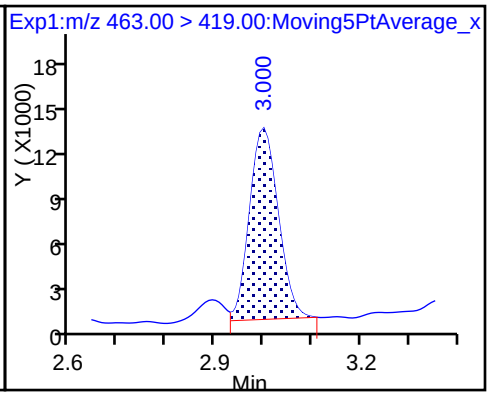
17 Perfluorooctane sulfonic acid



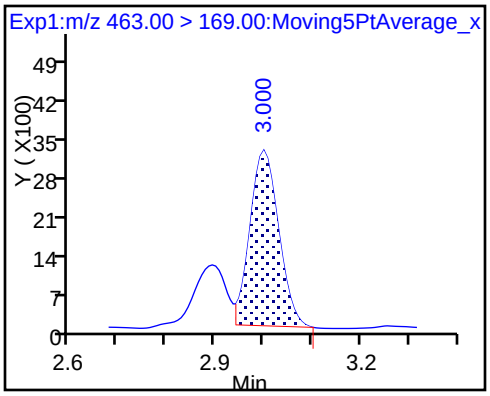
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

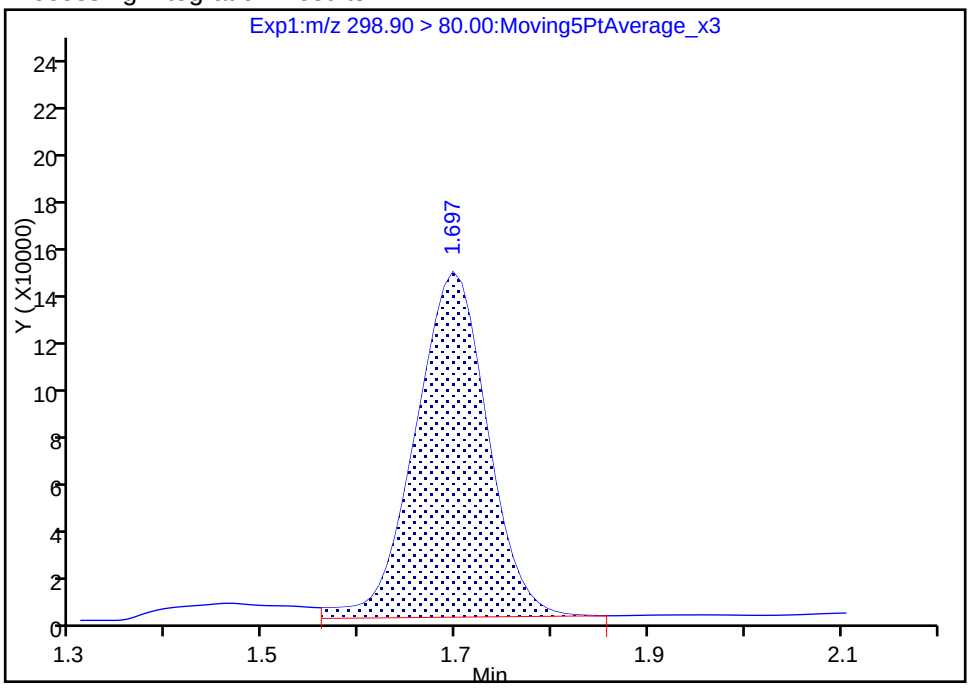
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_045.d				
Injection Date:	25-Jan-2018 23:22:46	Instrument ID:	A8_N		
Lims ID:	320-35310-A-13-A	Lab Sample ID:	320-35310-13		
Client ID:	FH-17-05_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	38	Worklist Smp#:	13
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

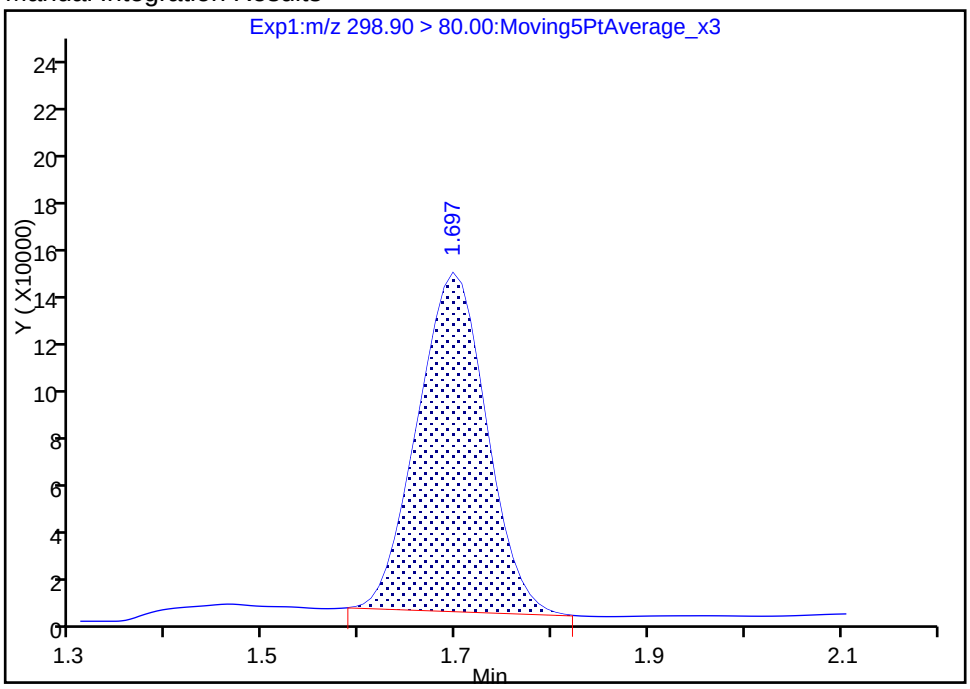
Processing Integration Results

RT: 1.70
Area: 741576
Amount: 0.254097
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 698511
Amount: 0.239341
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:17:24

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

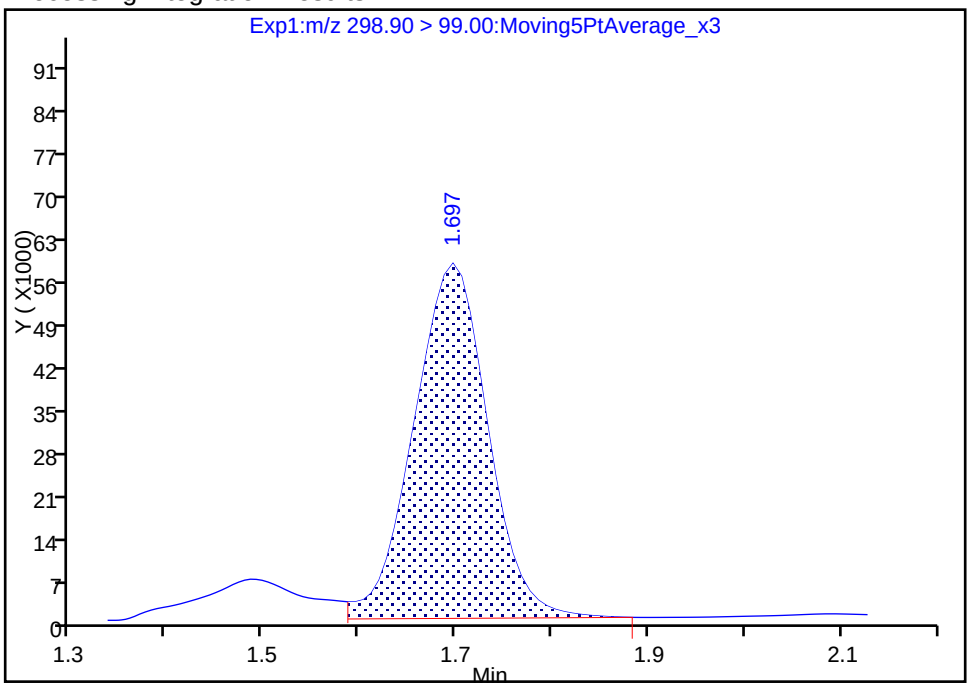
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_045.d				
Injection Date:	25-Jan-2018 23:22:46	Instrument ID:	A8_N		
Lims ID:	320-35310-A-13-A	Lab Sample ID:	320-35310-13		
Client ID:	FH-17-05_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	38	Worklist Smp#:	13
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

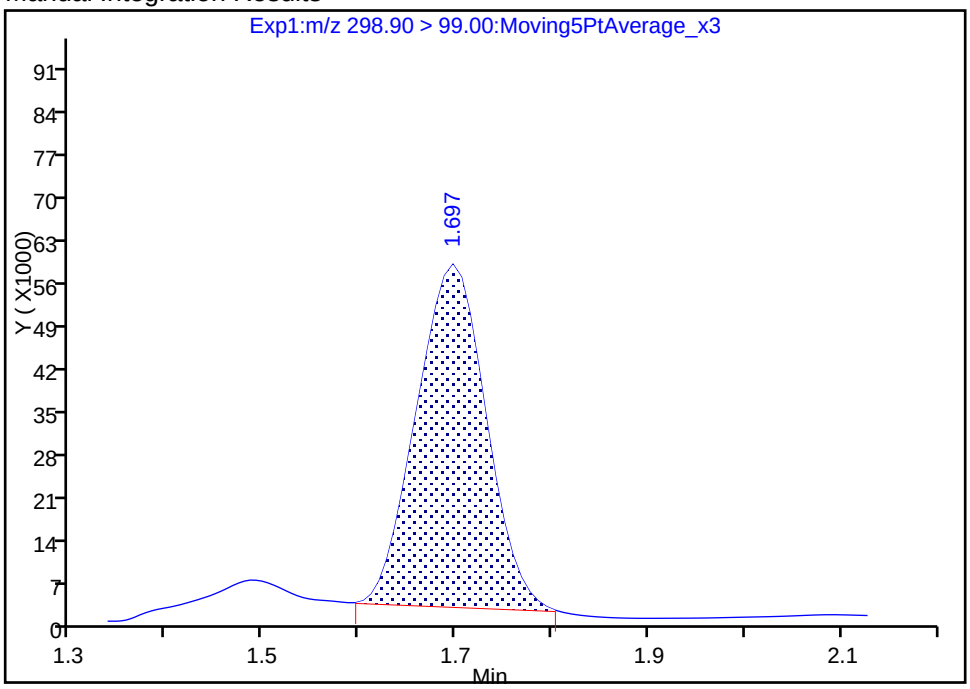
Processing Integration Results

RT: 1.70
Area: 309922
Amount: 0.254097
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 282607
Amount: 0.239341
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:17:34

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

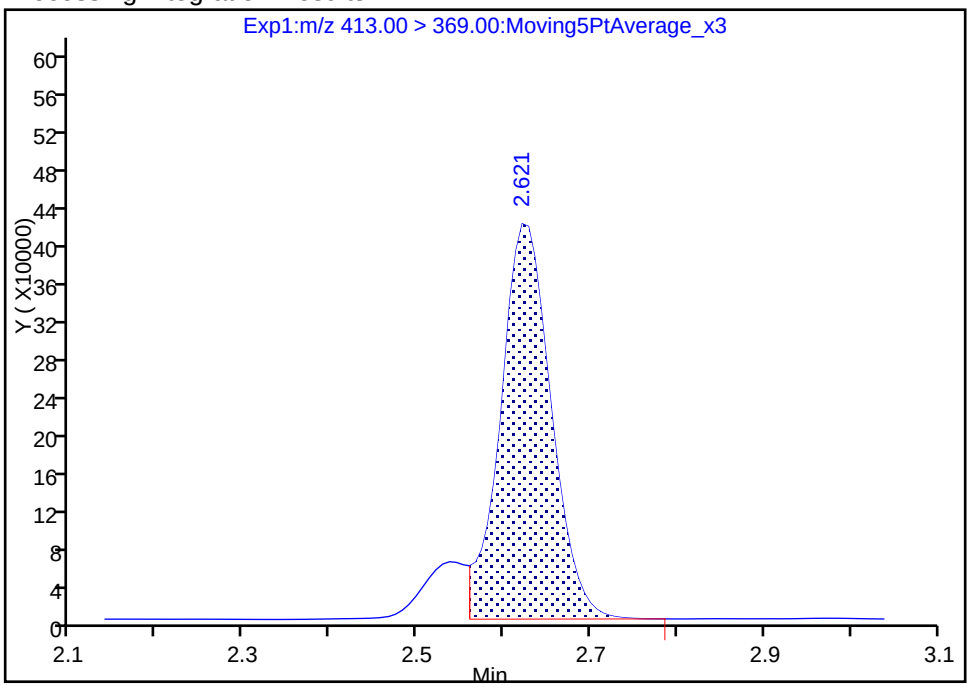
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_045.d				
Injection Date:	25-Jan-2018 23:22:46	Instrument ID:	A8_N		
Lims ID:	320-35310-A-13-A	Lab Sample ID:	320-35310-13		
Client ID:	FH-17-05_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	38	Worklist Smp#:	13
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

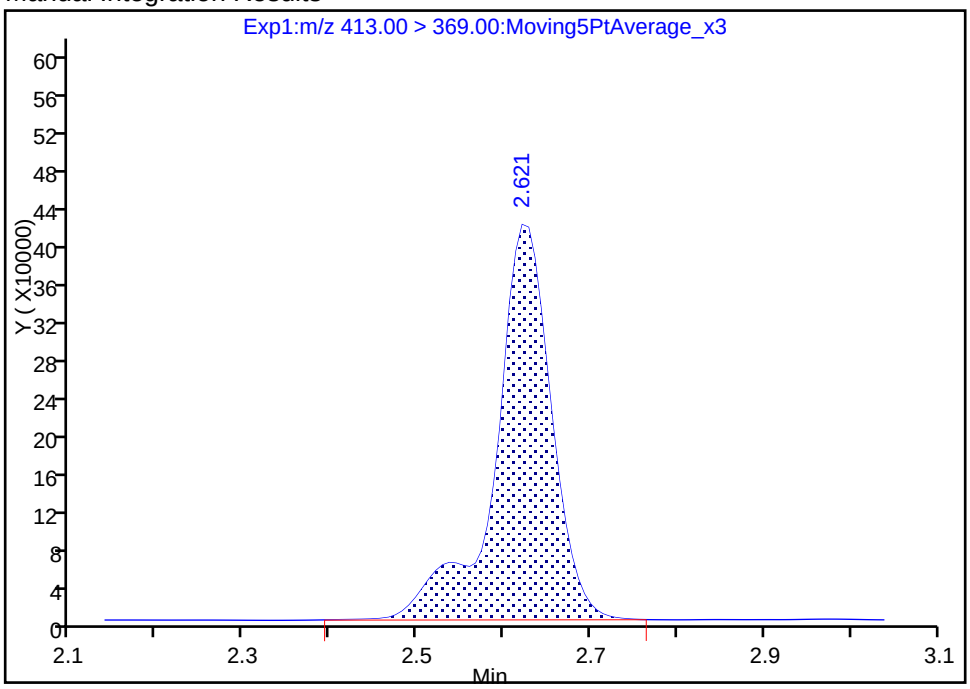
Processing Integration Results

RT: 2.62
Area: 1695548
Amount: 0.773168
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 1908702
Amount: 0.870366
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:18:05

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

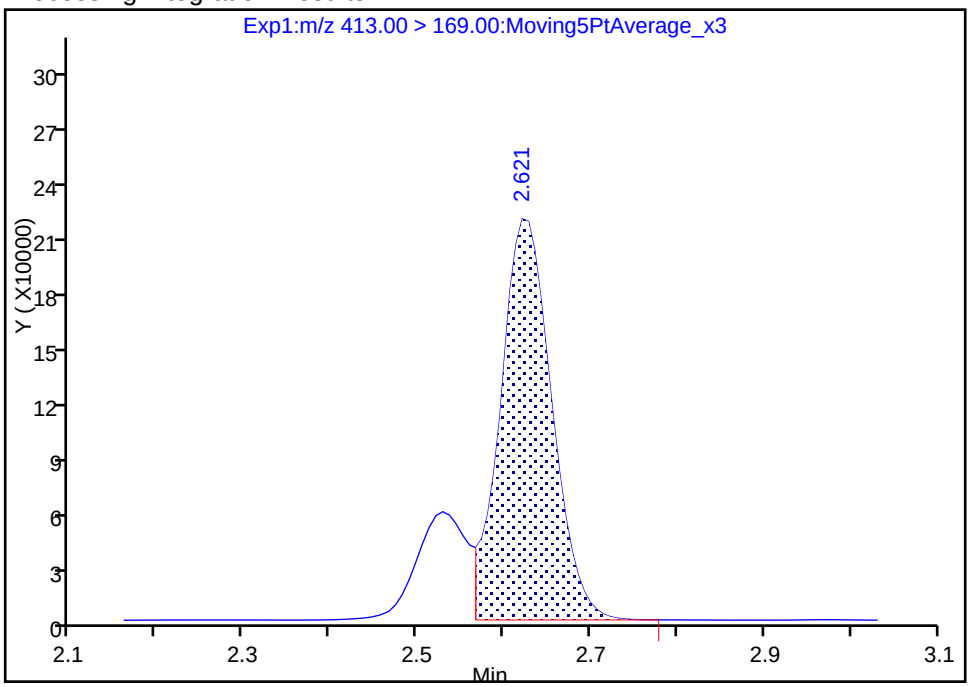
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_045.d				
Injection Date:	25-Jan-2018 23:22:46	Instrument ID:	A8_N		
Lims ID:	320-35310-A-13-A	Lab Sample ID:	320-35310-13		
Client ID:	FH-17-05_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	38	Worklist Smp#:	13
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

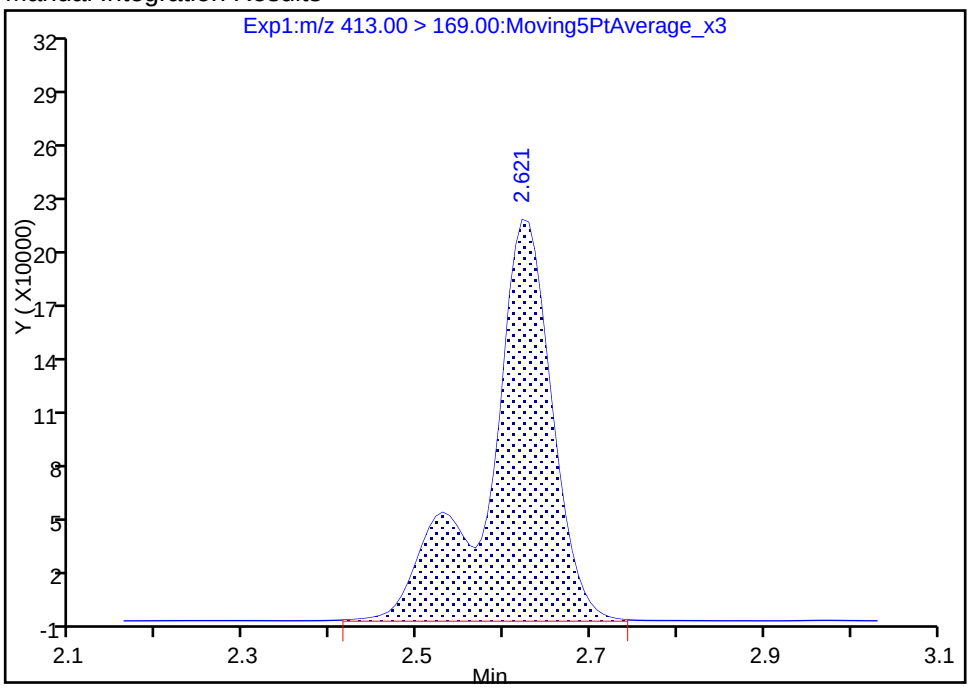
Processing Integration Results

RT: 2.62
Area: 893213
Amount: 0.773168
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 1135871
Amount: 0.870366
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:18:11

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-08_SO0005 | Lab Sample ID: 320-35310-14

Matrix: Solid | Lab File ID: 2018.01.26LLA_038.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 14:25

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.00(g) | Date Analyzed: 01/26/2018 17:40

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 7.5 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.11	U	0.43	0.11	0.027
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.10	J	0.54	0.11	0.034
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.12	J M	0.54	0.11	0.031
335-67-1	Perfluorooctanoic acid (PFOA)	0.21	J	0.54	0.22	0.093
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.5		1.1	0.54	0.22
375-95-1	Perfluorononanoic acid (PFNA)	0.35	J	0.54	0.11	0.039

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	85		25-150
STL01892	13C4-PFHpA	84		25-150
STL00990	13C4 PFOA	101		25-150
STL00991	13C4 PFOS	92		25-150
STL00995	13C5 PFNA	103		25-150
STL02337	13C3-PFBS	86		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_038.d
Lims ID: 320-35310-A-14-A
Client ID: FH-17-08_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 17:40:30 ALS Bottle#: 22 Worklist Smp#: 13
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-14-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 11:02:53 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 11:02:53

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.685	1.695	-0.010	0.644	86114	2.00		86.1	1327	
D 9 13C4-PFHpA										
367.00 > 322.00	2.260	2.267	-0.007	0.863	4201076	2.11		84.3	32844	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.260	2.268	-0.008	1.000	101097	0.0547			47.1	M
363.00 > 169.00	2.260	2.268	-0.008	1.000	37859		2.67(1.13-3.40)		185	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.273	2.280	-0.007	1.000	108647	0.0470			169	
399.00 > 99.00	2.273	2.280	-0.007	1.000	36785		2.95(1.50-4.49)		67.8	
D 11 18O2 PFHxS										
403.00 > 84.00	2.273	2.282	-0.009	0.868	4909296	2.00		84.6	42360	
D 14 13C4 PFOA										
417.00 > 372.00	2.619	2.622	-0.004	1.000	4923084	2.52		101	42845	
* 62 13C2-PFOA										
415.00 > 370.00	2.619	2.622	-0.004		5424467	2.50			40846	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.619	2.623	-0.005	1.000	221908	0.0961			97.3	
413.00 > 169.00	2.619	2.623	-0.005	1.000	110837		2.00(0.84-2.52)		642	
D 19 13C5 PFNA										
468.00 > 423.00	2.997	2.992	0.005	1.144	4082208	2.58		103	38232	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.997	2.992	0.005	1.003	1104125	0.6904			2399	
499.00 > 99.00	2.997	2.992	0.005	1.003	288504		3.83(2.31-6.93)		1064	
D 18 13C4 PFOS										
503.00 > 80.00	2.989	2.992	-0.003	1.141	3414573	2.20		92.0	22996	
20 Perfluorononanoic acid										
463.00 > 419.00	2.997	2.992	0.005	1.000	269728	0.1600			237	
463.00 > 169.00	2.997	2.992	0.005	1.000	62416		4.32(1.90-5.69)		699	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 11:02:53 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_038.d

Injection Date: 26-Jan-2018 17:40:30 Instrument ID: A8_N

Lims ID: 320-35310-A-14-A Lab Sample ID: 320-35310-14

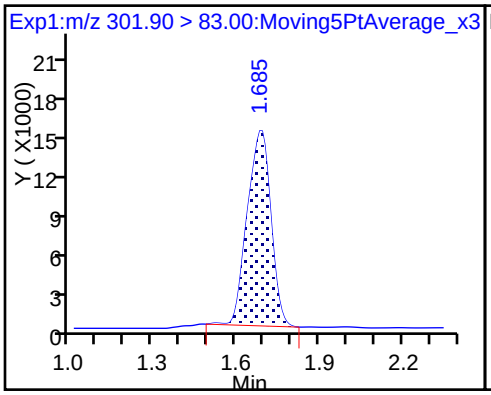
Client ID: FH-17-08_SO0005

Operator ID: SACINSTLCMS01 ALS Bottle#: 22 Worklist Smp#: 13

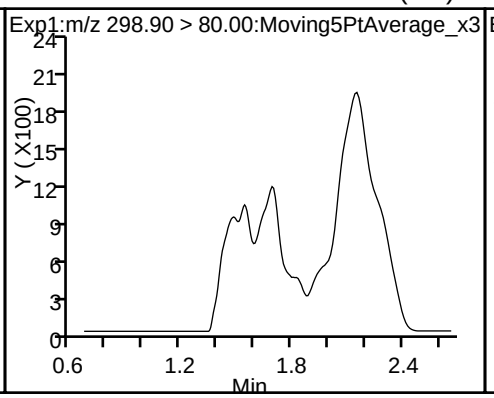
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

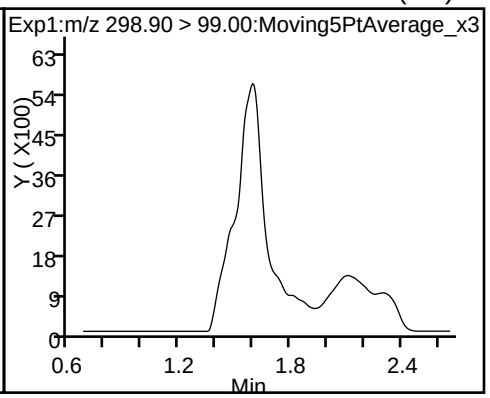
D 47 13C3-PFBS



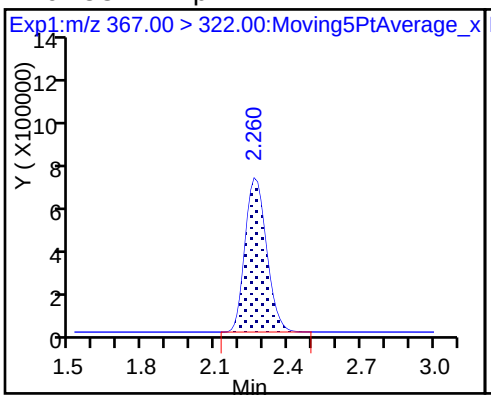
5 Perfluorobutanesulfonic acid (ND)



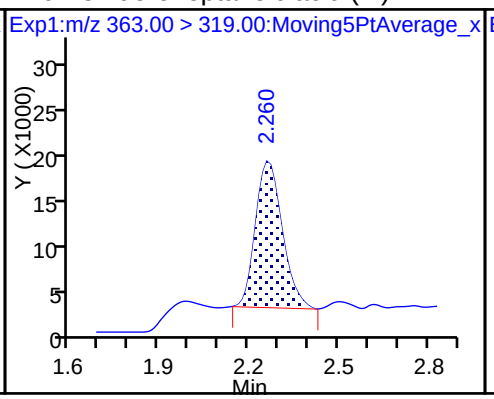
5 Perfluorobutanesulfonic acid (ND)



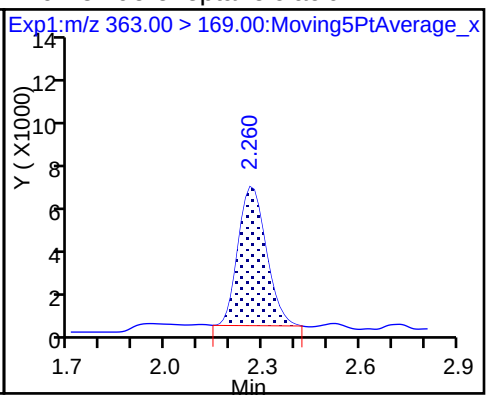
D 9 13C4-PFHpA



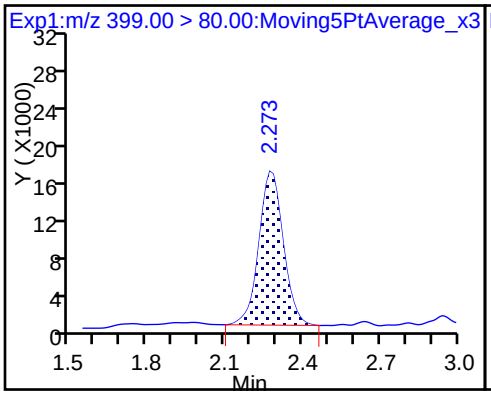
10 Perfluoroheptanoic acid (M)



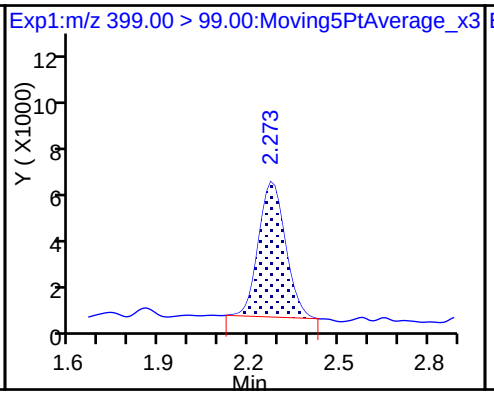
10 Perfluoroheptanoic acid



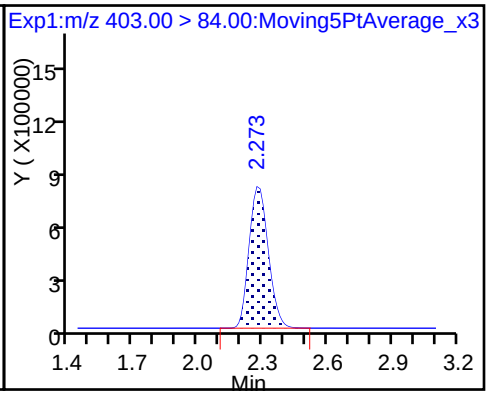
8 Perfluorohexanesulfonic acid



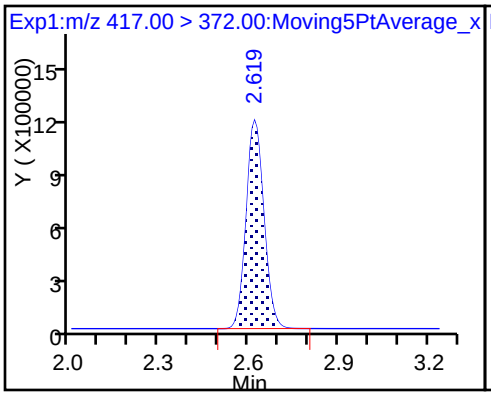
8 Perfluorohexanesulfonic acid



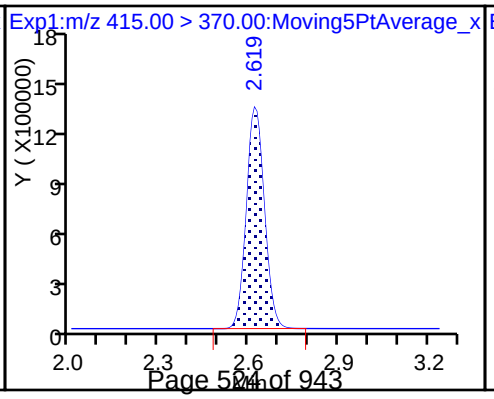
D 11 18O2 PFHxS



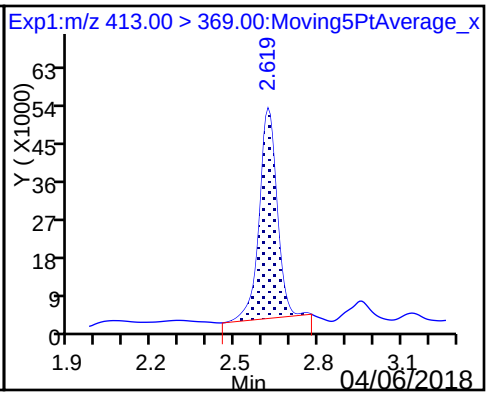
D 14 13C4 PFOA



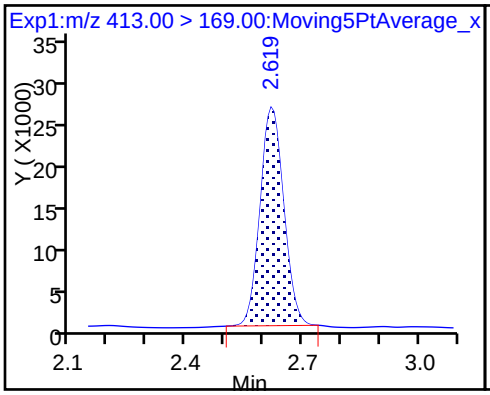
* 62 13C2-PFOA



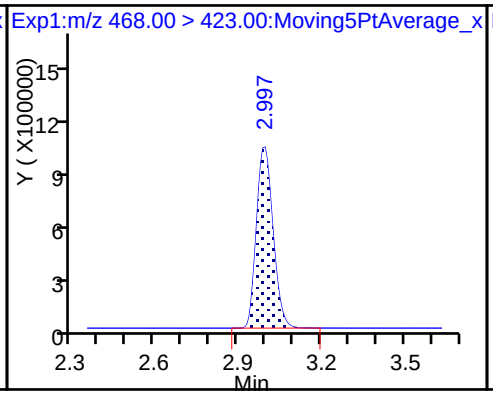
15 Perfluorooctanoic acid



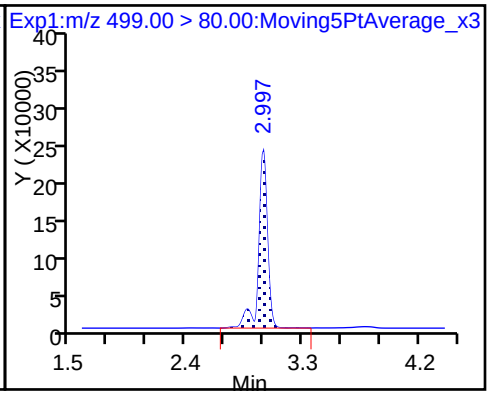
15 Perfluorooctanoic acid



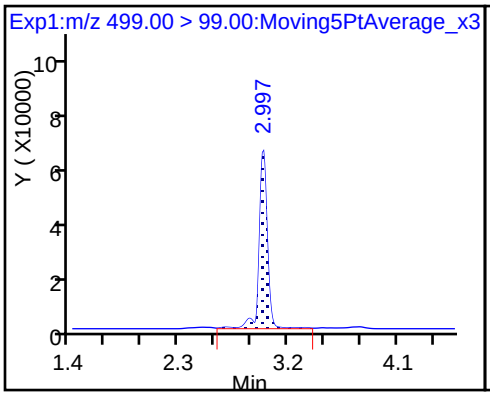
D 19 13C5 PFNA



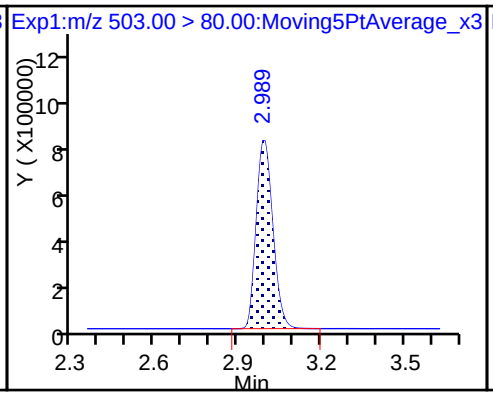
17 Perfluorooctane sulfonic acid



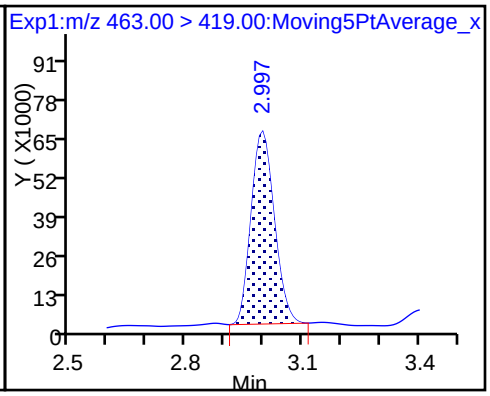
17 Perfluorooctane sulfonic acid



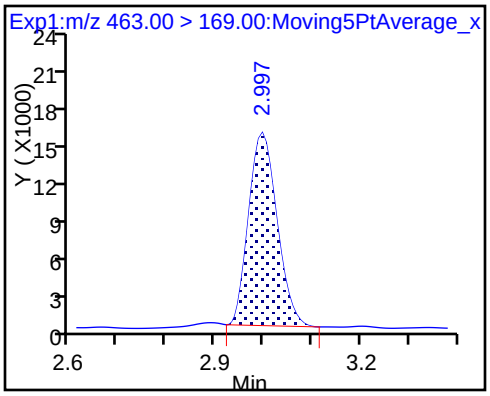
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

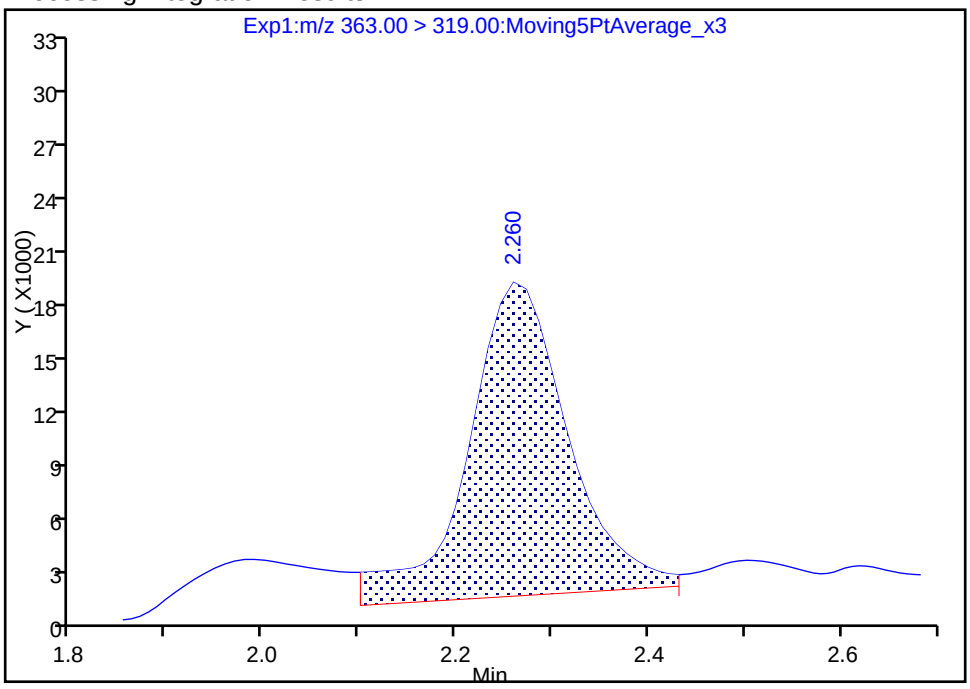
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_038.d				
Injection Date:	26-Jan-2018 17:40:30	Instrument ID:	A8_N		
Lims ID:	320-35310-A-14-A	Lab Sample ID:	320-35310-14		
Client ID:	FH-17-08_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	22	Worklist Smp#:	13
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

10 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

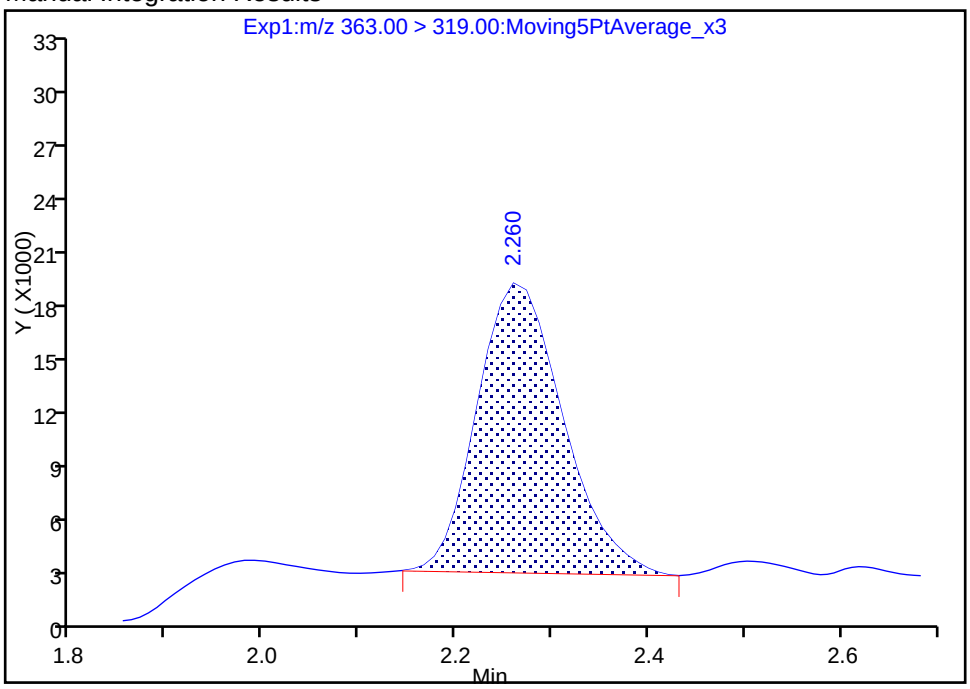
Processing Integration Results

RT: 2.26
Area: 127266
Amount: 0.068911
Amount Units: ng/ml



Manual Integration Results

RT: 2.26
Area: 101097
Amount: 0.054741
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 11:02:24

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-08_GW012218 | Lab Sample ID: 320-35310-15

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_046.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 14:35

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 247(mL) | Date Analyzed: 01/25/2018 23:30

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	4.3	M	2.0	1.0	0.47
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	49	M	2.0	1.0	0.38
375-85-9	Perfluoroheptanoic acid (PFHpA)	41		2.0	1.5	0.62
335-67-1	Perfluorooctanoic acid (PFOA)	21	M	2.0	1.5	0.55
375-95-1	Perfluorononanoic acid (PFNA)	45		2.0	1.5	0.53

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	103		25-150
STL01892	13C4-PFHpA	98		25-150
STL00990	13C4 PFOA	101		25-150
STL00995	13C5 PFNA	90		25-150
STL02337	13C3-PFBS	96		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_046.d
Lims ID: 320-35310-A-15-A
Client ID: FH-17-08_GW012218
Sample Type: Client
Inject. Date: 25-Jan-2018 23:30:35 ALS Bottle#: 39 Worklist Smp#: 14
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-15-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:43:03

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.688	1.695	-0.007	0.643	91202	2.23		96.1	939	
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.697	1.697	0.0	1.005	319670	0.1055			132	M
298.90 > 99.00	1.697	1.697	0.0	1.005	129926		2.46(1.25-3.74)		93.7	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.267	-0.002	0.863	4633199	2.45		97.9	36242	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.265	2.268	-0.003	1.000	2055583	1.01			2136	
363.00 > 169.00	2.265	2.268	-0.003	1.000	787136		2.61(1.13-3.40)		4989	
8 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.278	2.280	-0.002	1.000	3218577	1.20			525	M
399.00 > 99.00	2.278	2.280	-0.002	1.000	1004456		3.20(1.50-4.49)		1985	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.868	5686431	2.44		103	60778	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.622	0.001	1.000	4705637	2.54		101	41740	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.622	0.001		5149969	2.50			48394	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.623	2.623	0.0	1.000	1149947	0.5212			795	
413.00 > 169.00	2.623	2.623	0.0	1.000	666292		1.73(0.84-2.52)		4277	M
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.141	3375152	2.24		89.8	33589	
17 Perfluorooctane sulfonic acid										E
499.00 > 80.00	2.993	2.992	0.001	1.000	44205228	27.0			32524	E
499.00 > 99.00	2.993	2.992	0.001	1.000	13399648		3.30(2.31-6.93)		60968	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.141	3498453	2.37		99.3	11108	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	2.992	0.001	1.000	1541484	1.11			1170	
463.00 > 169.00	2.993	2.992	0.001	1.000	382668		4.03(1.90-5.69)		3281	

QC Flag Legend

Processing Flags

E - Exceeded Maximum Amount

Review Flags

M - Manually Integrated

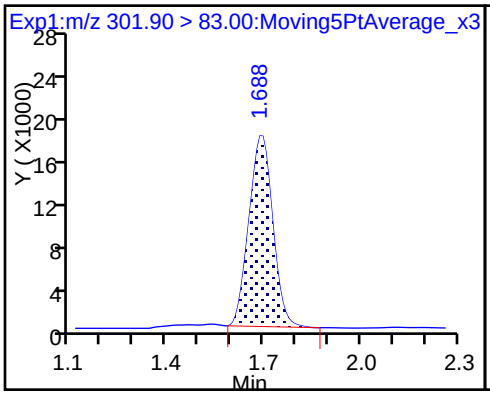
Report Date: 30-Jan-2018 10:22:50 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

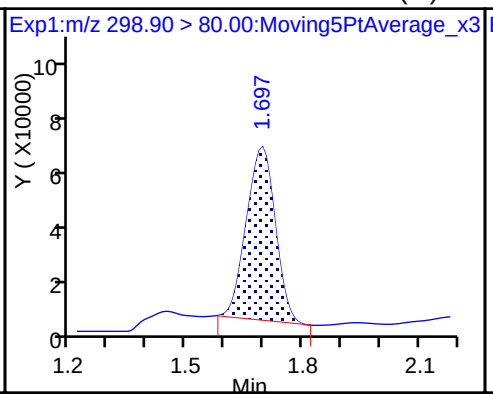
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_046.d

Injection Date:	25-Jan-2018 23:30:35	Instrument ID:	A8_N		
Lims ID:	320-35310-A-15-A	Lab Sample ID:	320-35310-15		
Client ID:	FH-17-08_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	39	Worklist Smp#:	14
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

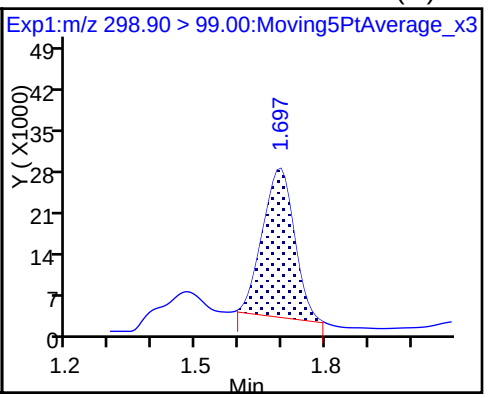
D 47 13C3-PFBS



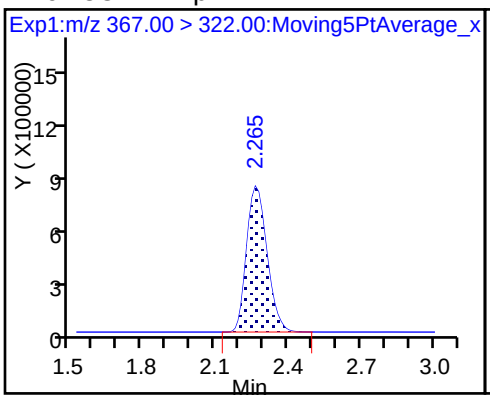
5 Perfluorobutanesulfonic acid (M)



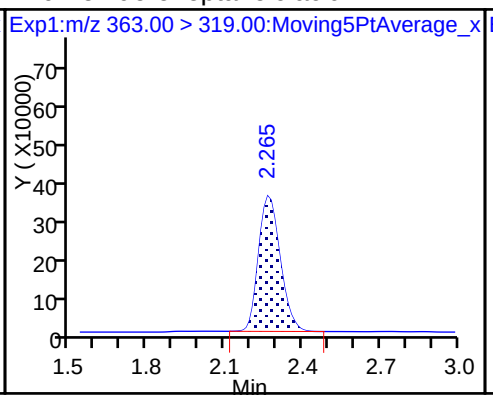
5 Perfluorobutanesulfonic acid (M)



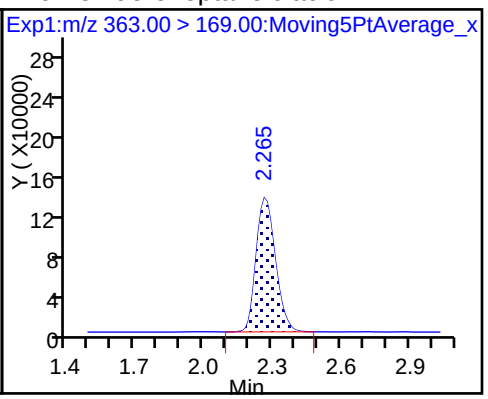
D 9 13C4-PFHpA



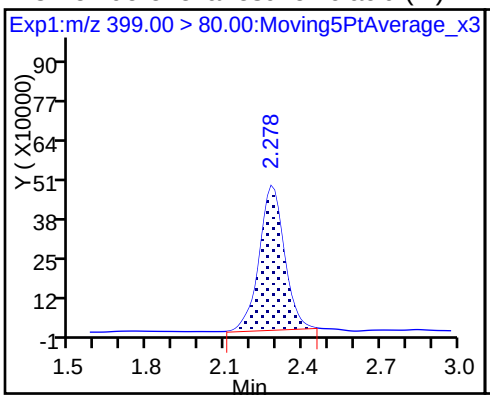
10 Perfluoroheptanoic acid



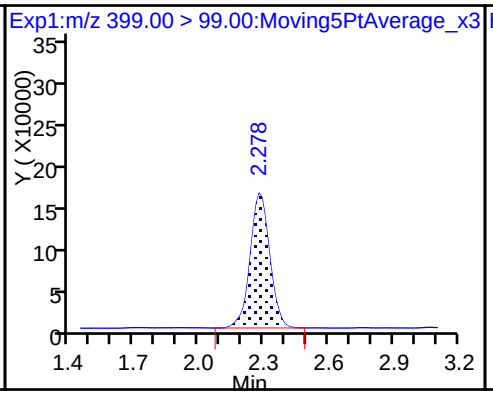
10 Perfluoroheptanoic acid



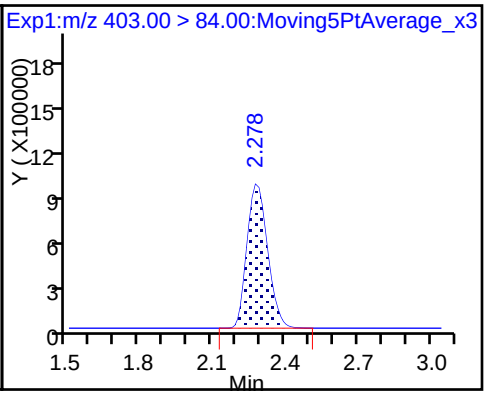
8 Perfluorohexanesulfonic acid (M)



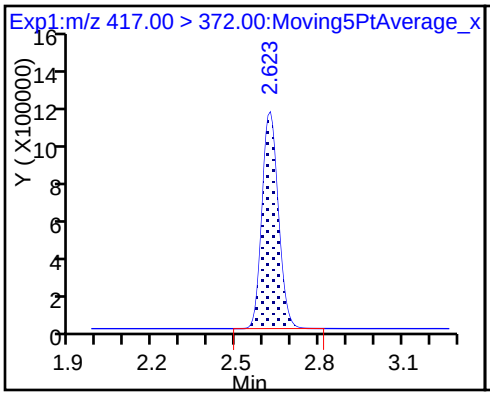
8 Perfluorohexanesulfonic acid



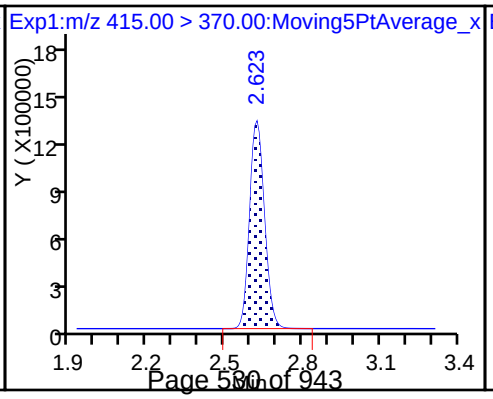
D 11 18O2 PFHxS



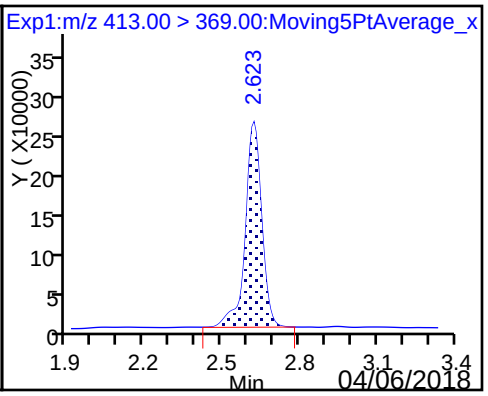
D 14 13C4 PFOA



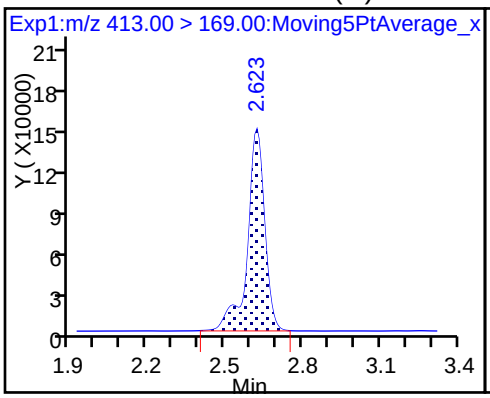
* 62 13C2-PFOA



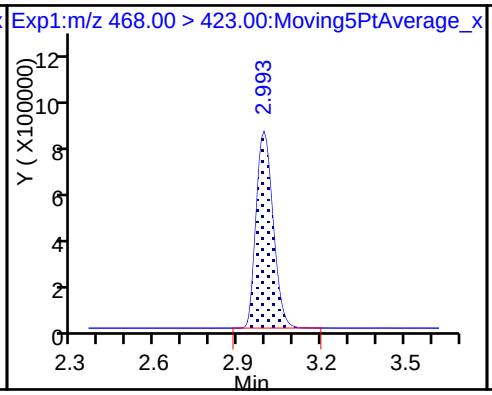
15 Perfluorooctanoic acid



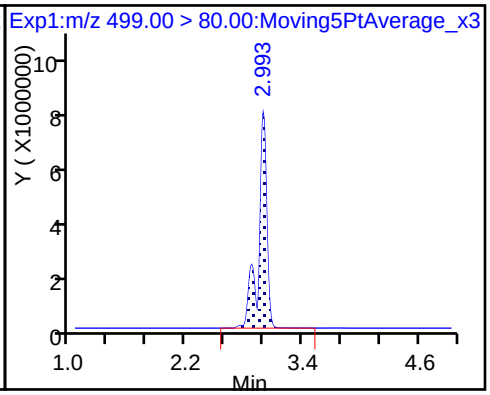
15 Perfluorooctanoic acid (M)



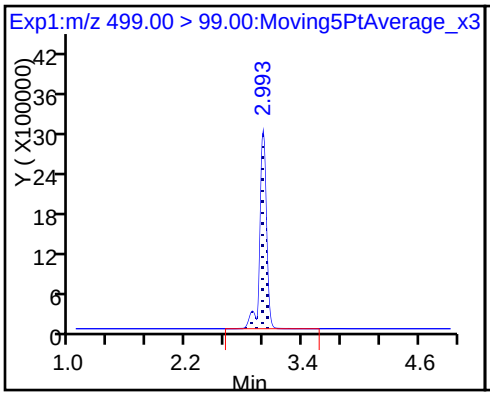
D 19 13C5 PFNA



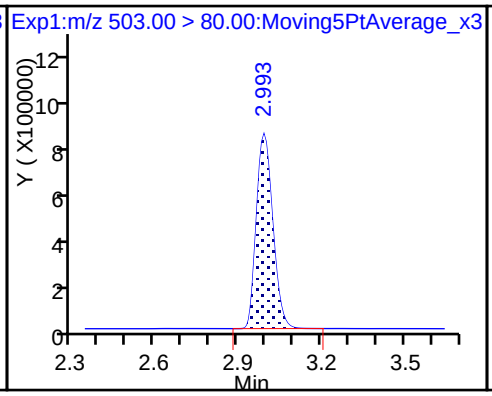
17 Perfluorooctane sulfonic acid



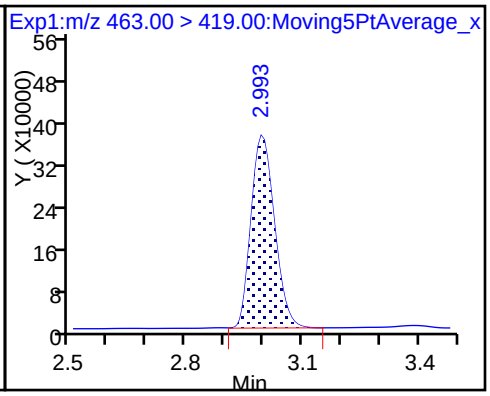
17 Perfluorooctane sulfonic acid



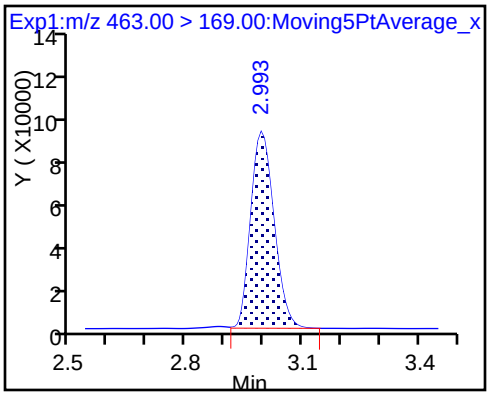
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

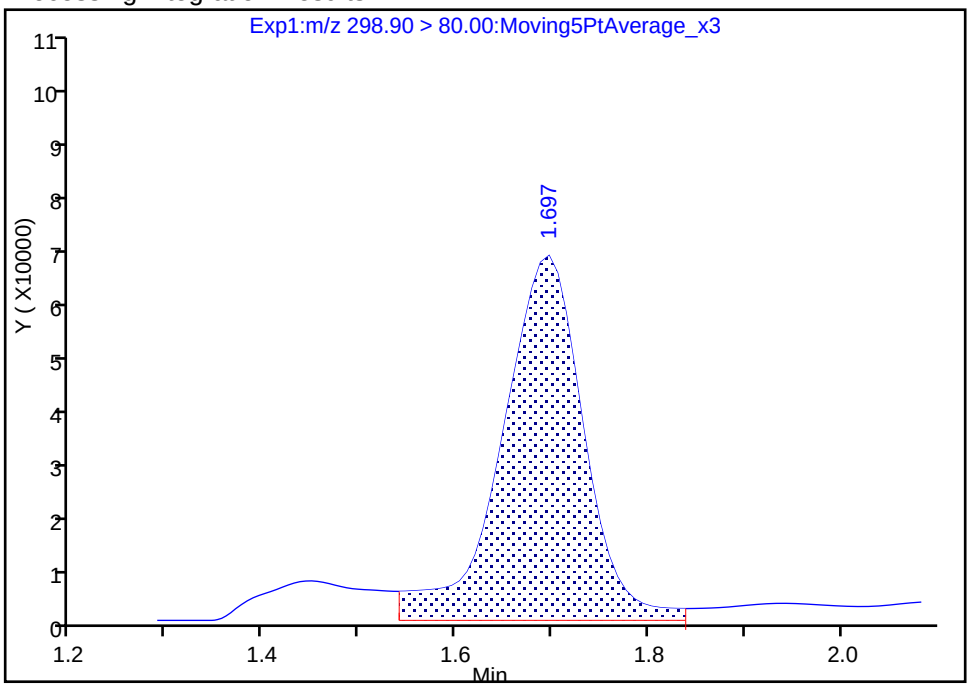
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_046.d				
Injection Date:	25-Jan-2018 23:30:35	Instrument ID:	A8_N		
Lims ID:	320-35310-A-15-A	Lab Sample ID:	320-35310-15		
Client ID:	FH-17-08_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	39	Worklist Smp#:	14
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

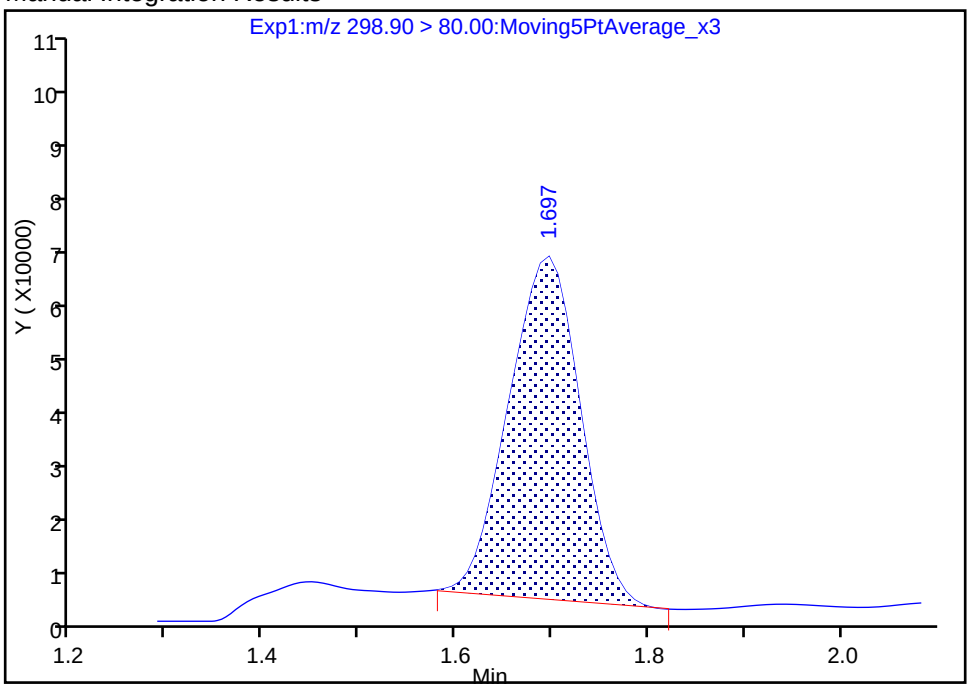
Processing Integration Results

RT: 1.70
Area: 390927
Amount: 0.129070
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 319670
Amount: 0.105543
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:19:05

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_046.d

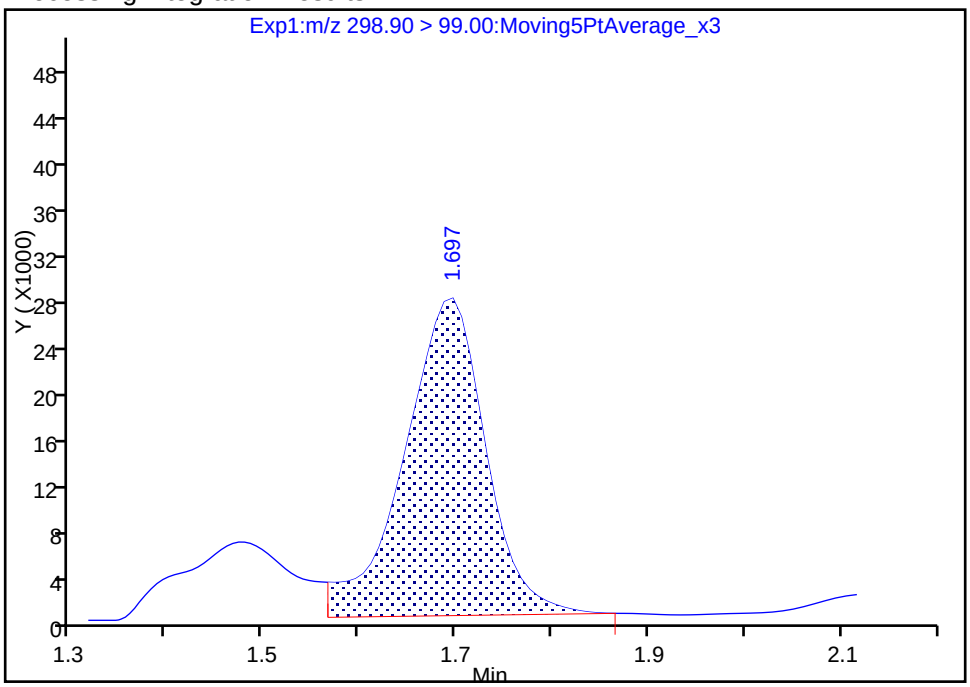
Injection Date:	25-Jan-2018 23:30:35	Instrument ID:	A8_N		
Lims ID:	320-35310-A-15-A	Lab Sample ID:	320-35310-15		
Client ID:	FH-17-08_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	39	Worklist Smp#:	14
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

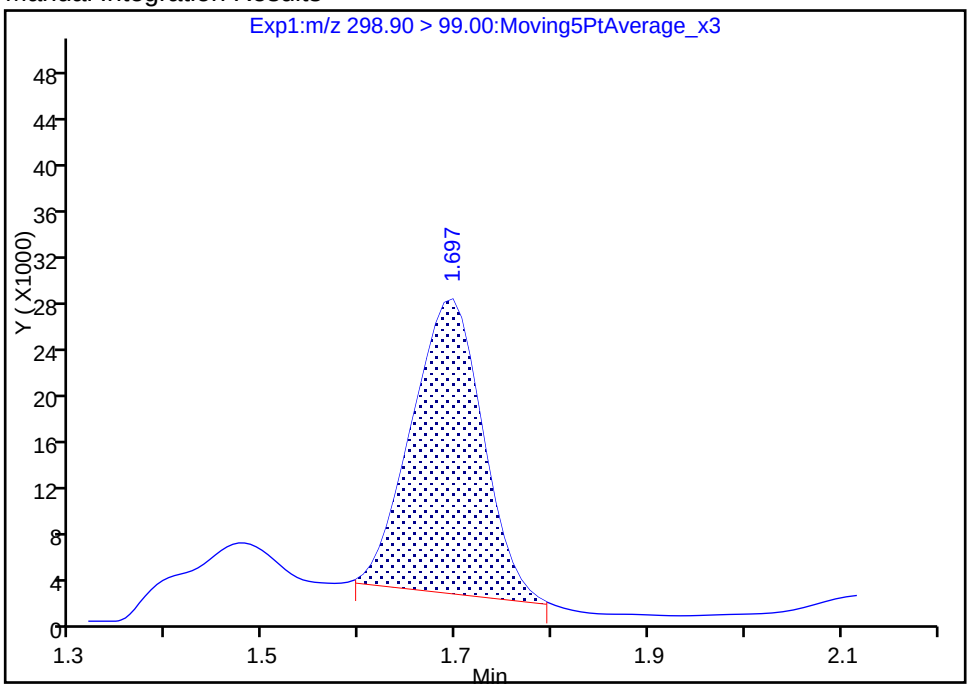
Processing Integration Results

RT: 1.70
Area: 160100
Amount: 0.129070
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 129926
Amount: 0.105543
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:19:17

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

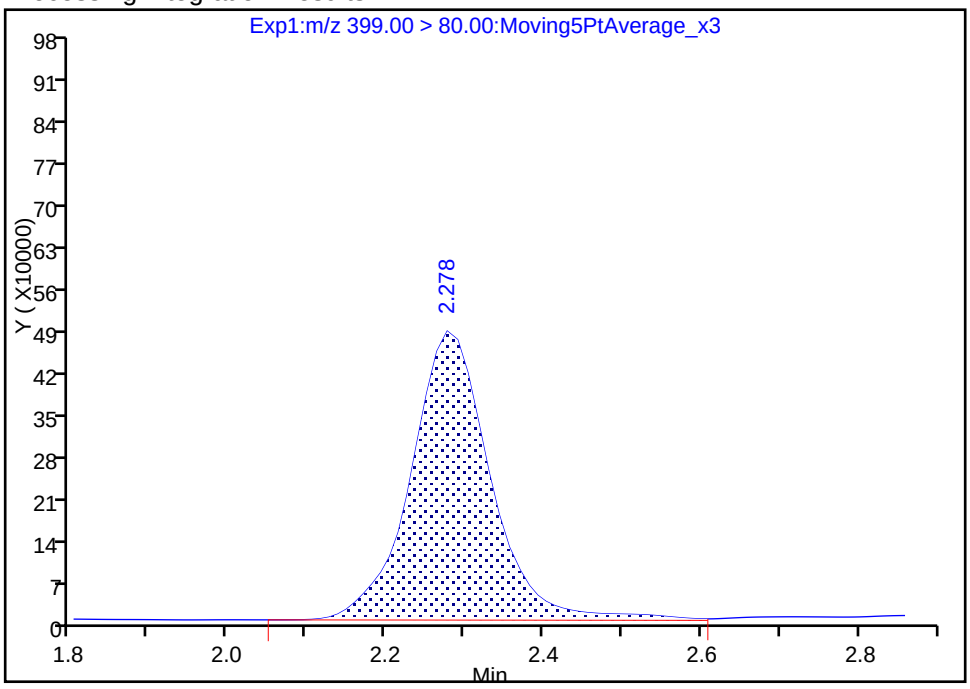
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_046.d				
Injection Date:	25-Jan-2018 23:30:35	Instrument ID:	A8_N		
Lims ID:	320-35310-A-15-A	Lab Sample ID:	320-35310-15		
Client ID:	FH-17-08_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	39	Worklist Smp#:	14
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

8 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

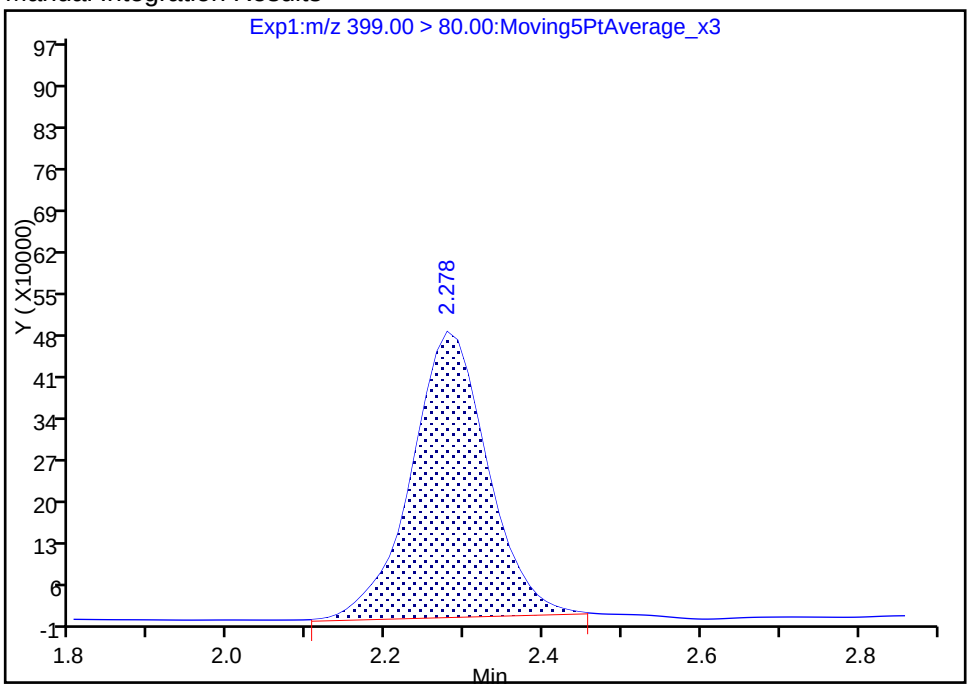
Processing Integration Results

RT: 2.28
Area: 3386759
Amount: 1.265011
Amount Units: ng/ml



Manual Integration Results

RT: 2.28
Area: 3218577
Amount: 1.202192
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:19:33

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

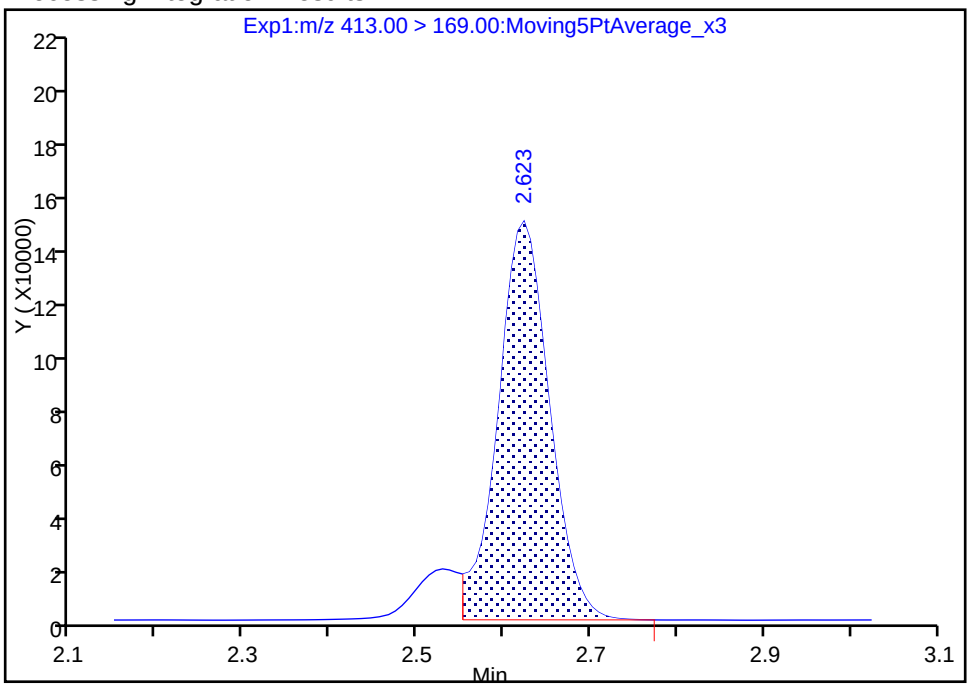
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_046.d				
Injection Date:	25-Jan-2018 23:30:35	Instrument ID:	A8_N		
Lims ID:	320-35310-A-15-A	Lab Sample ID:	320-35310-15		
Client ID:	FH-17-08_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	39	Worklist Smp#:	14
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

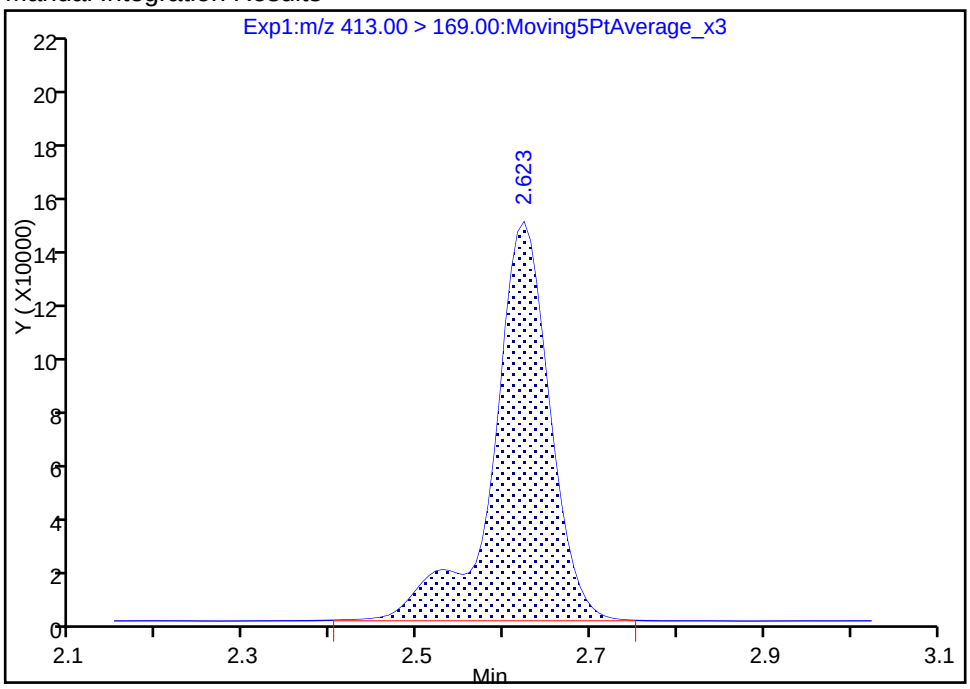
Processing Integration Results

RT: 2.62
Area: 598322
Amount: 0.521240
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 666292
Amount: 0.521240
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:19:56

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-08_GW012218 DL Lab Sample ID: 320-35310-15 DL

Matrix: Water Lab File ID: 2018.01.26LLA_070.d

Analysis Method: 537 (modified) Date Collected: 01/22/2018 14:35

Extraction Method: 3535 Date Extracted: 01/25/2018 09:10

Sample wt/vol: 247(mL) Date Analyzed: 01/26/2018 21:50

Con. Extract Vol.: 10.00(mL) Dilution Factor: 10

Injection Volume: 2(uL) GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 205928 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1500	D	40	30	11

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00991	13C4 PFOS	117		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_070.d
Lims ID: 320-35310-A-15-A
Client ID: FH-17-08_GW012218
Sample Type: Client
Inject. Date: 26-Jan-2018 21:50:46 ALS Bottle#: 47 Worklist Smp#: 5
Injection Vol: 2.0 ul Dil. Factor: 10.0000
Sample Info: 320-35310-a-15-a 10X
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:54:17 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: phomsophat Date: 29-Jan-2018 14:09:22

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.699	1.706	-0.008	0.649	9976	0.2708		116	308	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.690	1.706	-0.016	0.995	35261	0.0106			71.7	
298.90 > 99.00	1.690	1.706	-0.016	0.995	13765		2.56(1.25-3.74)		50.8	
D 9 13C4-PFHpA										
367.00 > 322.00	2.267	2.278	-0.012	0.866	479343	0.2808		112	5143	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.267	2.278	-0.012	1.000	199773	0.0948			288	M
363.00 > 169.00	2.267	2.278	-0.012	1.000	82864		2.41(1.13-3.40)		675	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.280	2.291	-0.011	1.000	356375	0.1375			573	
399.00 > 99.00	2.280	2.291	-0.011	1.000	102976		3.46(1.50-4.49)		696	
D 11 18O2 PFHxS										
403.00 > 84.00	2.280	2.291	-0.011	0.871	550571	0.2619		111	18723	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.635	-0.012	1.003	473649	0.2831		113	7921	
* 62 13C2-PFOA										
415.00 > 370.00	2.616	2.635	-0.019		464545	0.2500			6399	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.623	2.635	-0.012	1.000	117665	0.0530			52.2	
413.00 > 169.00	2.616	2.635	-0.019	0.997	61736		1.91(0.84-2.52)		590	M
D 18 13C4 PFOS										
503.00 > 80.00	2.993	3.007	-0.014	1.144	370560	0.2786		117	3400	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	3.015	-0.022	1.000	6267227	3.61			8810	
499.00 > 99.00	2.993	3.015	-0.022	1.000	1434640		4.37(2.31-6.93)		13657	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	3.015	-0.022	1.144	382212	0.2818		113	6201	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	3.015	-0.022	1.000	186346	0.1181			194	
463.00 > 169.00	2.993	3.015	-0.022	1.000	46829		3.98(1.90-5.69)		1292	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:54:22 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_070.d

Injection Date: 26-Jan-2018 21:50:46 Instrument ID: A8_N

Lims ID: 320-35310-A-15-A Lab Sample ID: 320-35310-15

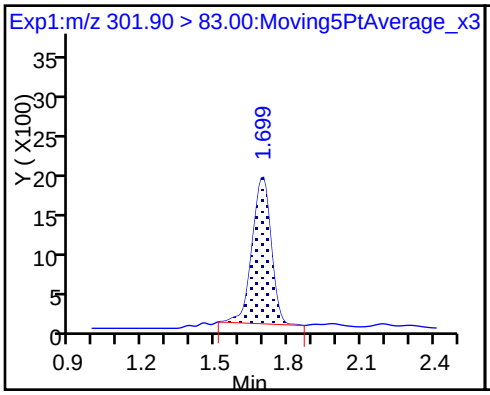
Client ID: FH-17-08_GW012218

Operator ID: SACINSTLCMS01 ALS Bottle#: 47 Worklist Smp#: 5

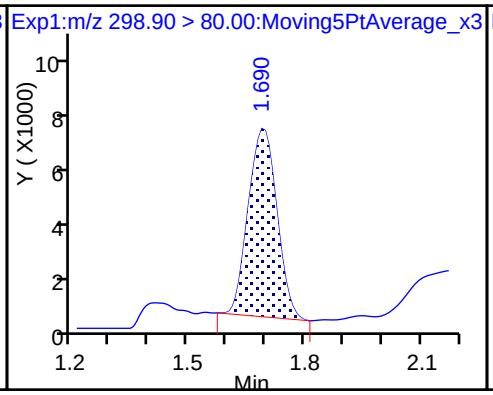
Injection Vol: 2.0 ul Dil. Factor: 10.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

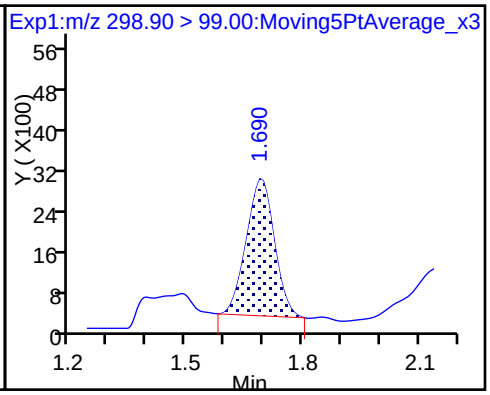
D 47 13C3-PFBS



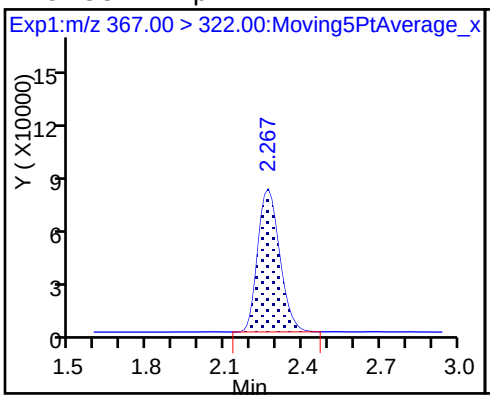
5 Perfluorobutanesulfonic acid



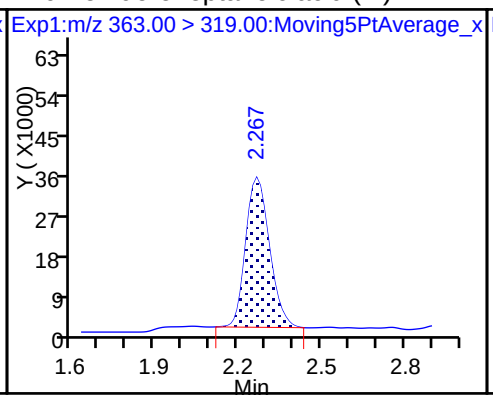
5 Perfluorobutanesulfonic acid



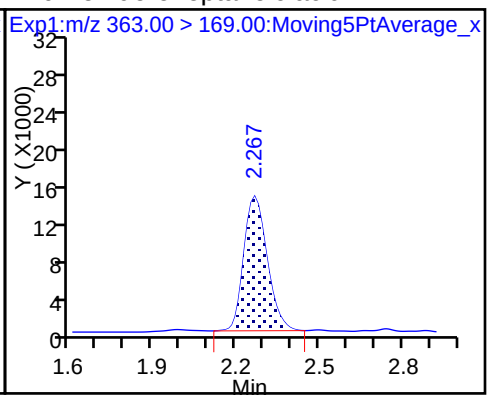
D 9 13C4-PFHpA



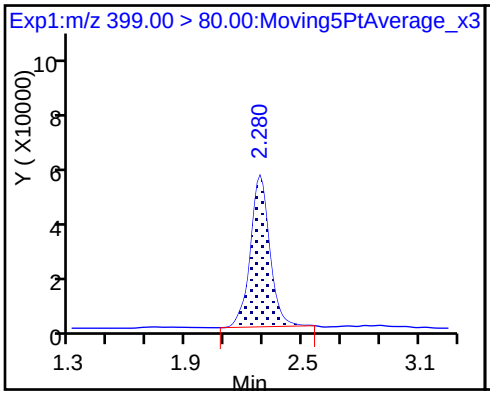
10 Perfluoroheptanoic acid (M)



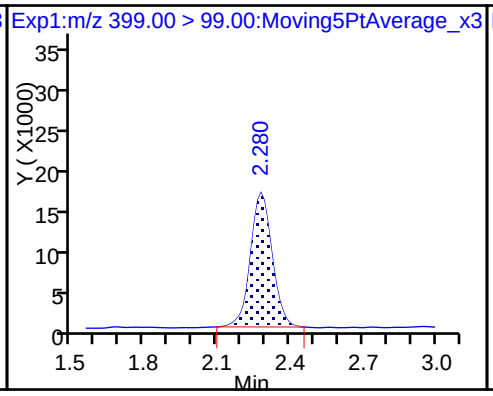
10 Perfluoroheptanoic acid



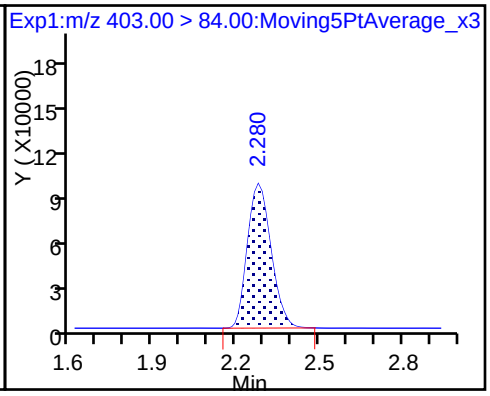
8 Perfluorohexanesulfonic acid



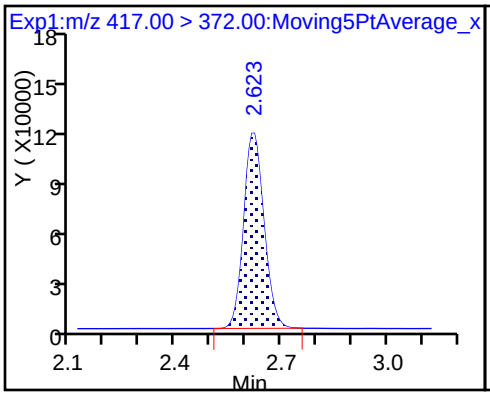
8 Perfluorohexanesulfonic acid



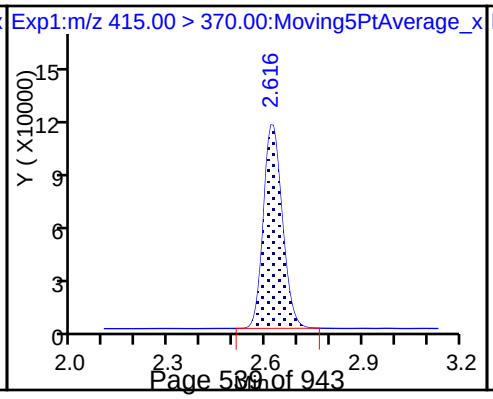
D 11 18O2 PFHxS



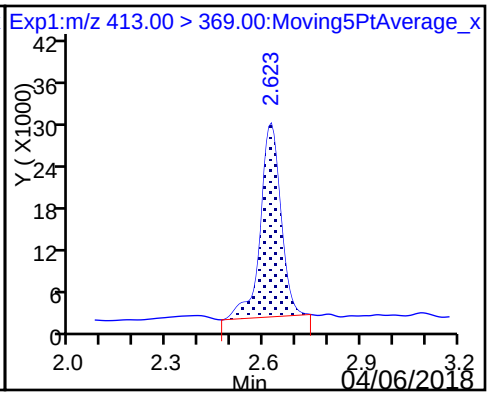
D 14 13C4 PFOA



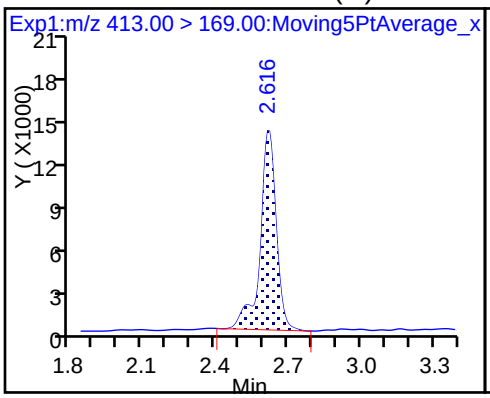
* 62 13C2-PFOA



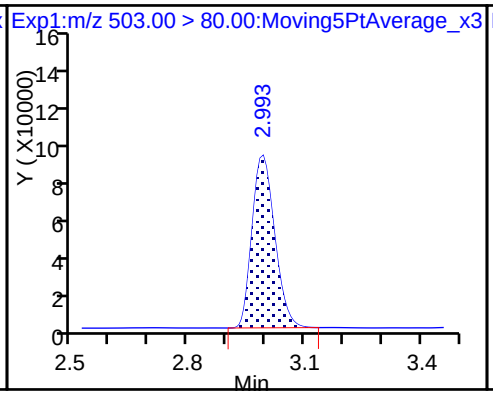
15 Perfluorooctanoic acid



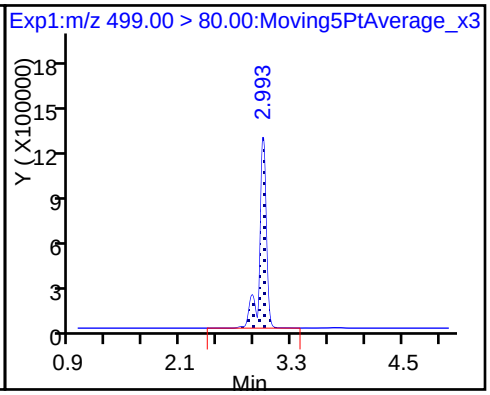
15 Perfluorooctanoic acid (M)



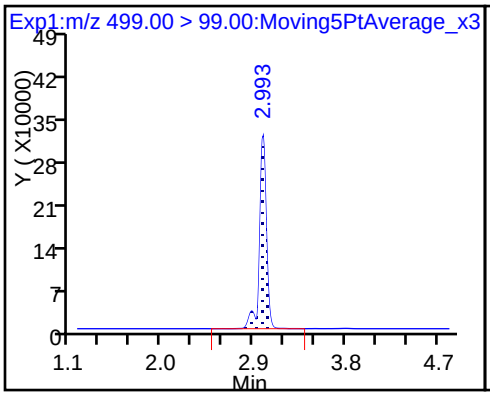
D 18 13C4 PFOS



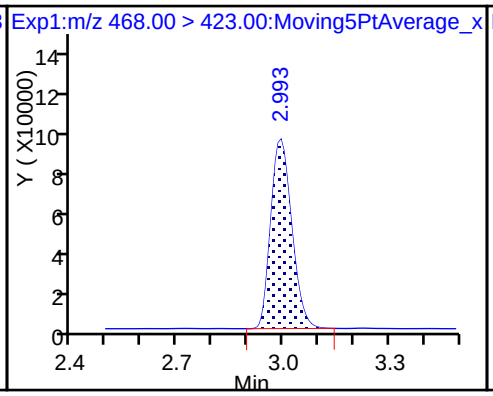
17 Perfluorooctane sulfonic acid



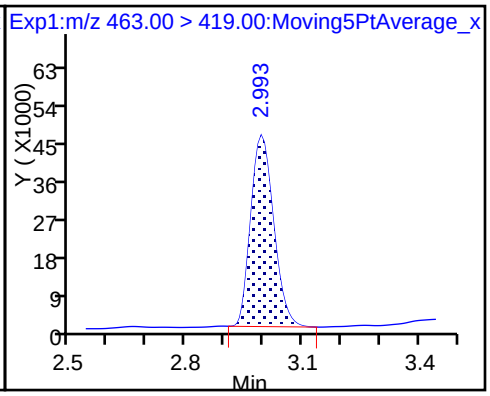
17 Perfluorooctane sulfonic acid



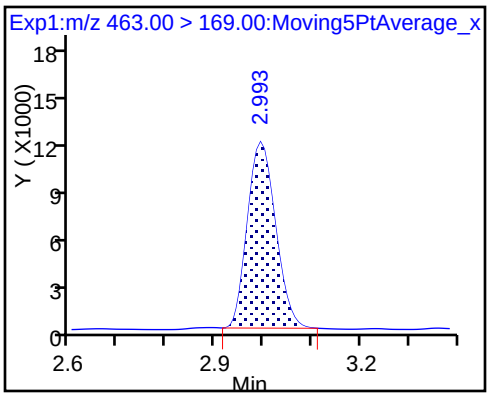
D 19 13C5 PFNA



20 Perfluorononanoic acid



20 Perfluorononanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-06_SO0005 | Lab Sample ID: 320-35310-16

Matrix: Solid | Lab File ID: 2018.01.26LLA_039.d

Analysis Method: 537 (modified) | Date Collected: 01/23/2018 09:15

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.02(g) | Date Analyzed: 01/26/2018 17:48

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 9.2 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.11	0.027
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.12	J	0.55	0.11	0.034
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.059	J	0.55	0.11	0.032
335-67-1	Perfluorooctanoic acid (PFOA)	0.24	J	0.55	0.22	0.094
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.2		1.1	0.55	0.22
375-95-1	Perfluorononanoic acid (PFNA)	0.059	J	0.55	0.11	0.040

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	94		25-150
STL01892	13C4-PFHpA	87		25-150
STL00990	13C4 PFOA	99		25-150
STL00991	13C4 PFOS	99		25-150
STL00995	13C5 PFNA	109		25-150
STL02337	13C3-PFBS	101		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_039.d
Lims ID: 320-35310-A-16-A
Client ID: FH-17-06_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 17:48:19 ALS Bottle#: 23 Worklist Smp#: 14
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-16-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 11:04:58 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 11:04:58

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.694	1.695	-0.001	0.645	95596	2.35		101	367	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.866	4100363	2.18		87.1	24589	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.273	2.268	0.005	1.000	48479	0.0269			31.0	
363.00 > 169.00	2.273	2.268	0.005	1.000	17914		2.71(1.13-3.40)		101	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.286	2.280	0.006	1.000	135628	0.0560			273	
399.00 > 99.00	2.273	2.280	-0.007	0.994	41761		3.25(1.50-4.49)		67.2	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.871	5143251	2.22		93.8	43936	
D 14 13C4 PFOA										
417.00 > 372.00	2.626	2.622	0.004	1.000	4545019	2.46		98.5	36295	
* 62 13C2-PFOA										
415.00 > 370.00	2.626	2.622	0.004		5123598	2.50			48915	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.626	2.623	0.003	1.000	233261	0.1095			169	
413.00 > 169.00	2.626	2.623	0.003	1.000	121806		1.92(0.84-2.52)		824	
D 19 13C5 PFNA										
468.00 > 423.00	2.997	2.992	0.005	1.141	4095338	2.74		109	41404	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.997	2.992	0.005	1.000	874787	0.5389			1555	
499.00 > 99.00	2.997	2.992	0.005	1.000	200221		4.37(2.31-6.93)		549	
D 18 13C4 PFOS										
503.00 > 80.00	2.997	2.992	0.005	1.141	3465872	2.36		98.9	19512	
20 Perfluorononanoic acid										
463.00 > 419.00	2.997	2.992	0.005	1.000	45590	0.0270			61.7	
463.00 > 169.00	3.005	2.992	0.013	1.003	10380		4.39(1.90-5.69)		138	

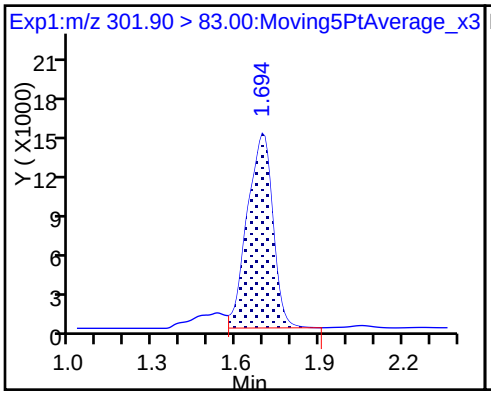
Report Date: 30-Jan-2018 11:04:58 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

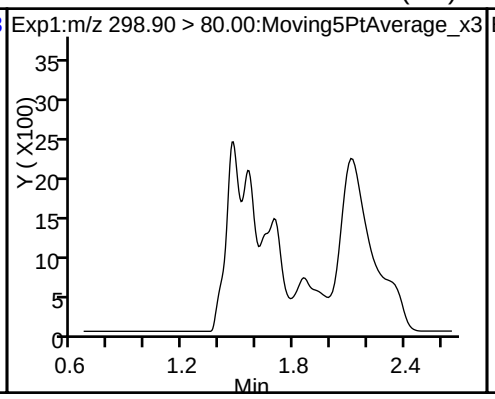
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_039.d

Injection Date:	26-Jan-2018 17:48:19	Instrument ID:	A8_N		
Lims ID:	320-35310-A-16-A	Lab Sample ID:	320-35310-16		
Client ID:	FH-17-06_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	23	Worklist Smp#:	14
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

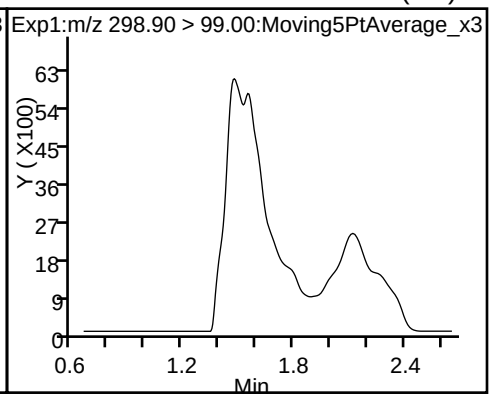
D 47 13C3-PFBS



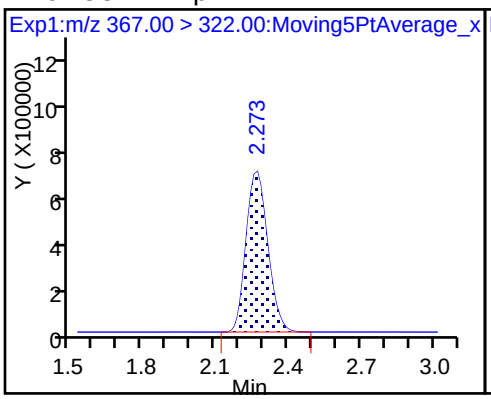
5 Perfluorobutanesulfonic acid (ND)



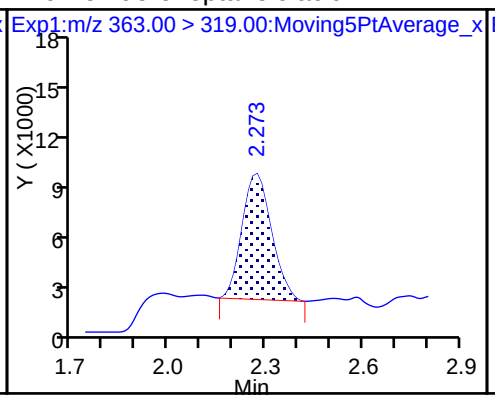
5 Perfluorobutanesulfonic acid (ND)



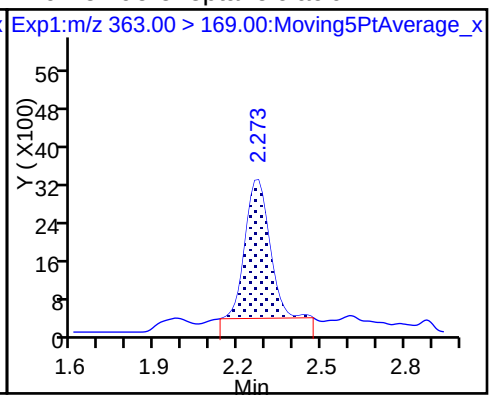
D 9 13C4-PFHpA



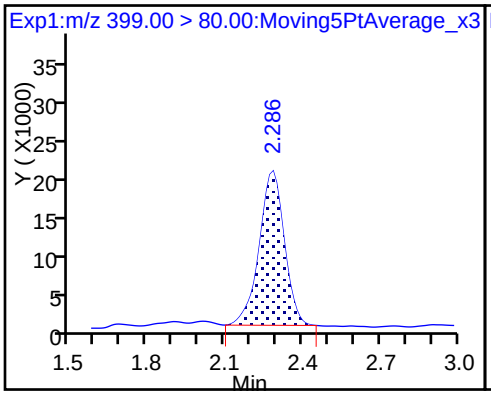
10 Perfluoroheptanoic acid



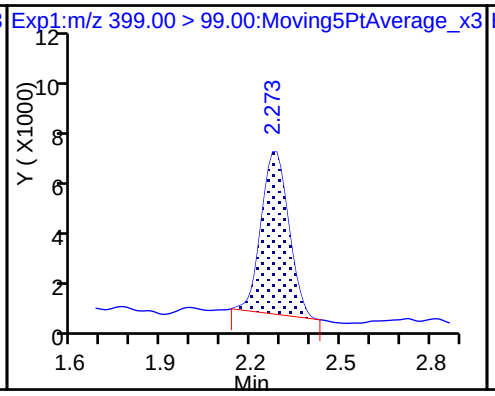
10 Perfluoroheptanoic acid



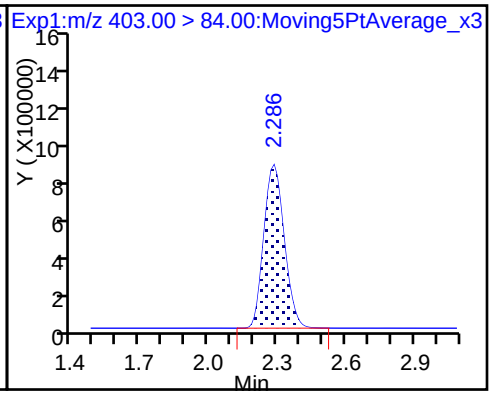
8 Perfluorohexanesulfonic acid



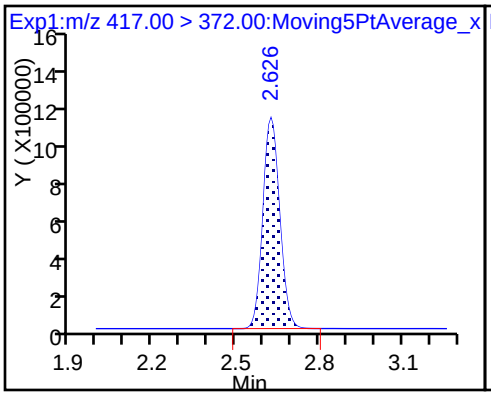
8 Perfluorohexanesulfonic acid



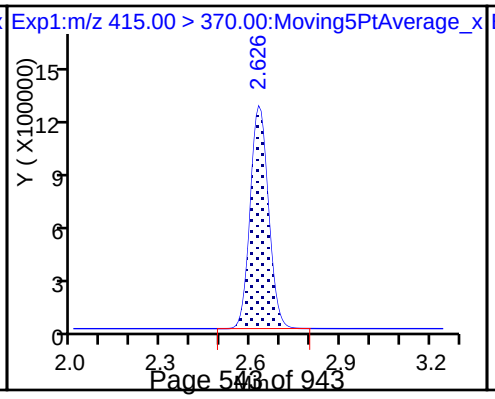
D 11 18O2 PFHxS



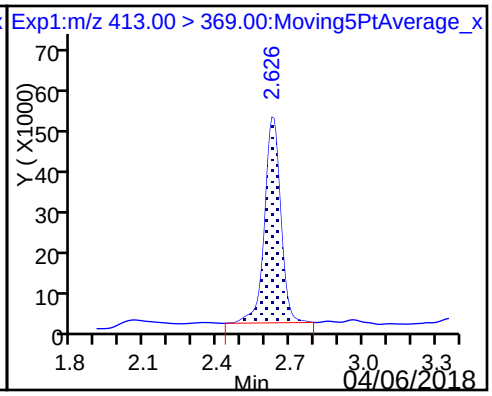
D 14 13C4 PFOA



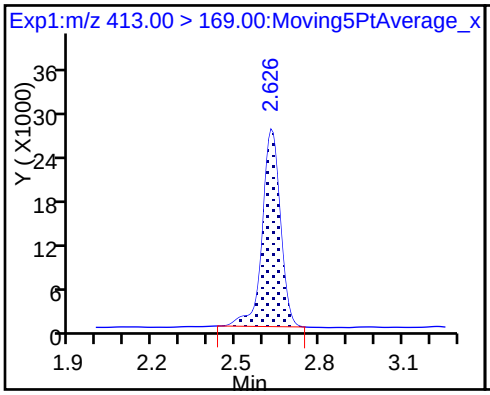
* 62 13C2-PFOA



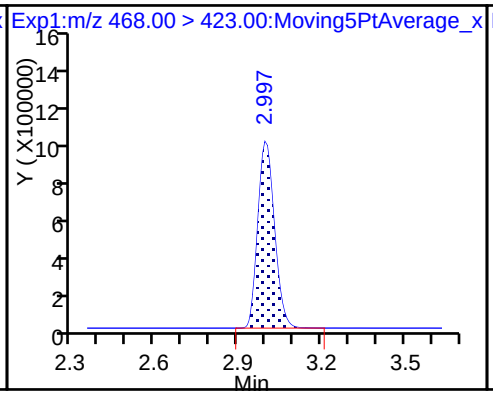
15 Perfluorooctanoic acid



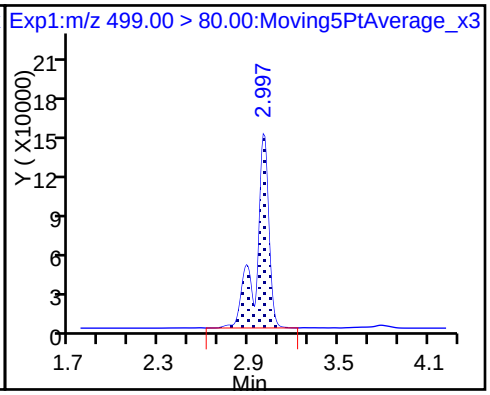
15 Perfluorooctanoic acid



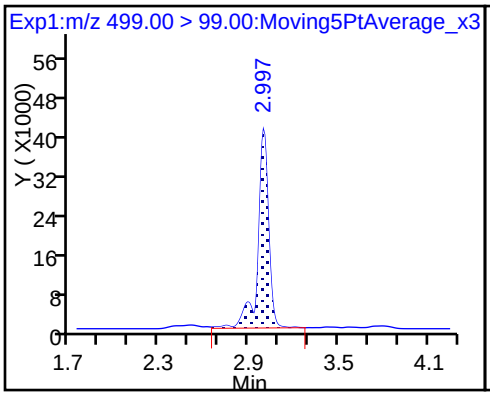
D 19 13C5 PFNA



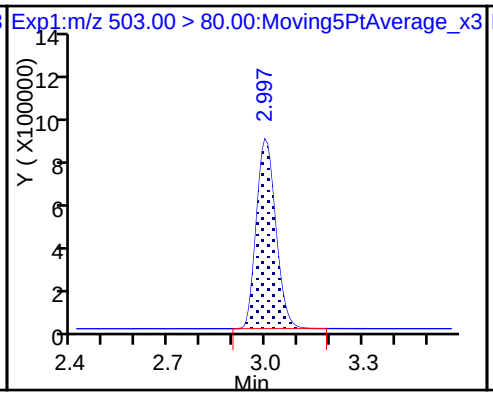
17 Perfluorooctane sulfonic acid



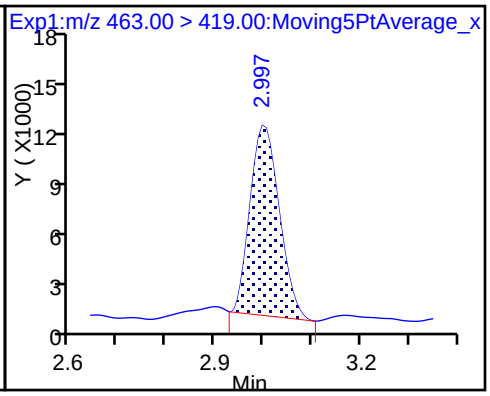
17 Perfluorooctane sulfonic acid



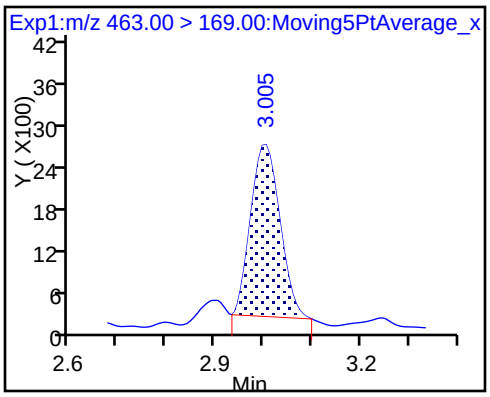
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-06_GW012318 | Lab Sample ID: 320-35310-17

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_047.d

Analysis Method: 537 (modified) | Date Collected: 01/23/2018 09:30

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 263(mL) | Date Analyzed: 01/25/2018 23:38

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	13	M	1.9	0.95	0.44
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	31	M	1.9	0.95	0.36
375-85-9	Perfluoroheptanoic acid (PFHpA)	9.1	M	1.9	1.4	0.58
335-67-1	Perfluorooctanoic acid (PFOA)	30	M	1.9	1.4	0.51
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	42		3.8	2.9	1.0
375-95-1	Perfluorononanoic acid (PFNA)	2.6		1.9	1.4	0.49

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	96		25-150
STL01892	13C4-PFHpA	89		25-150
STL00990	13C4 PFOA	106		25-150
STL00991	13C4 PFOS	107		25-150
STL00995	13C5 PFNA	112		25-150
STL02337	13C3-PFBS	98		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_047.d
Lims ID: 320-35310-A-17-A
Client ID: FH-17-06_GW012318
Sample Type: Client
Inject. Date: 25-Jan-2018 23:38:27 ALS Bottle#: 40 Worklist Smp#: 15
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-17-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 16:21:39

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.688	1.695	-0.007	0.646	93413	2.27		97.5	165	
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.688	1.697	-0.009	1.000	1063605	0.3429			187	M
298.90 > 99.00	1.688	1.697	-0.009	1.000	443668		2.40(1.25-3.74)		171	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.267	-0.002	0.866	4268914	2.24		89.4	27737	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.265	2.268	-0.003	1.000	450700	0.2402			130	M
363.00 > 169.00	2.265	2.268	-0.003	1.000	184088		2.45(1.13-3.40)		757	
8 Perfluorohexanesulfonic acid										M
399.00 > 80.00	2.278	2.280	-0.002	1.000	2044591	0.8157			143	M
399.00 > 99.00	2.278	2.280	-0.002	1.000	550664		3.71(1.50-4.49)		282	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.871	5323730	2.26		95.7	39278	
D 14 13C4 PFOA										
417.00 > 372.00	2.614	2.622	-0.008	1.000	4955146	2.65		106	37775	
* 62 13C2-PFOA										
415.00 > 370.00	2.614	2.622	-0.008		5196549	2.50			40918	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.614	2.623	-0.009	1.000	1843687	0.7936			702	
413.00 > 169.00	2.614	2.623	-0.009	1.000	1036591		1.78(0.84-2.52)		3089	M
D 19 13C5 PFNA										
468.00 > 423.00	2.992	2.992	0.0	1.145	4255310	2.80		112	36635	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.992	2.992	0.0	1.003	1981435	1.12			959	
499.00 > 99.00	2.984	2.992	-0.008	1.000	403255		4.91(2.31-6.93)		597	
D 18 13C4 PFOS										
503.00 > 80.00	2.984	2.992	-0.008	1.142	3790389	2.55		107	5130	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	2.992	2.992	0.0	1.000	119168	0.0678			93.9	
463.00 > 169.00	2.992	2.992	0.0	1.000	28582		4.17(1.90-5.69)		239	

QC Flag Legend

Review Flags

M - Manually Integrated

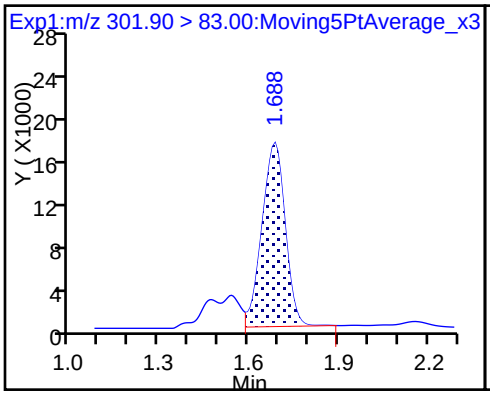
Report Date: 30-Jan-2018 10:22:51 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

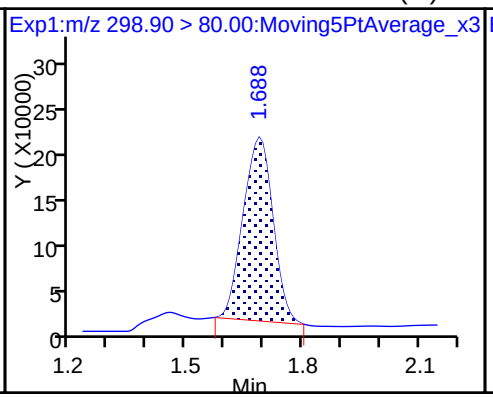
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_047.d

Injection Date:	25-Jan-2018 23:38:27	Instrument ID:	A8_N		
Lims ID:	320-35310-A-17-A	Lab Sample ID:	320-35310-17		
Client ID:	FH-17-06_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	40	Worklist Smp#:	15
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

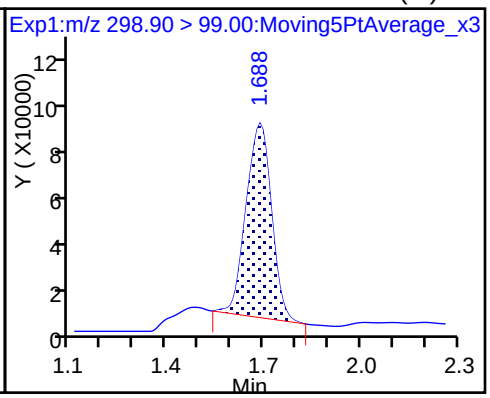
D 47 13C3-PFBS



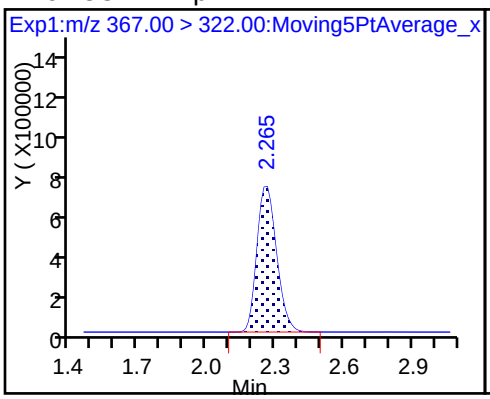
5 Perfluorobutanesulfonic acid (M)



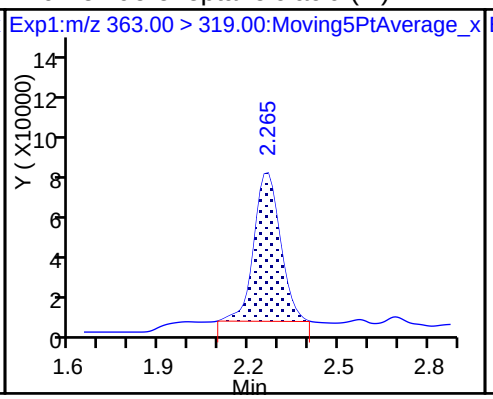
5 Perfluorobutanesulfonic acid (M)



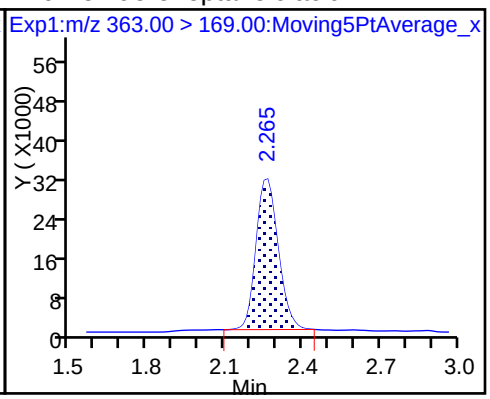
D 9 13C4-PFHpA



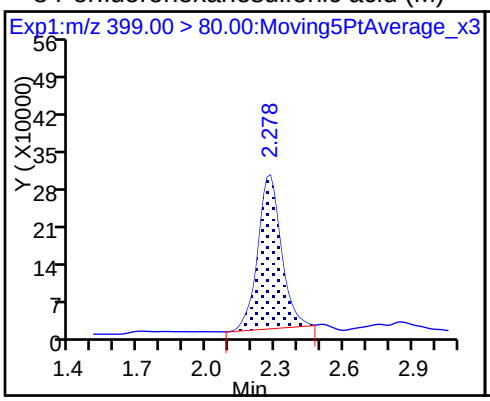
10 Perfluoroheptanoic acid (M)



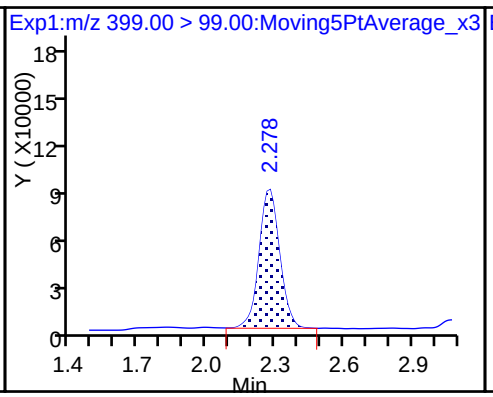
10 Perfluoroheptanoic acid



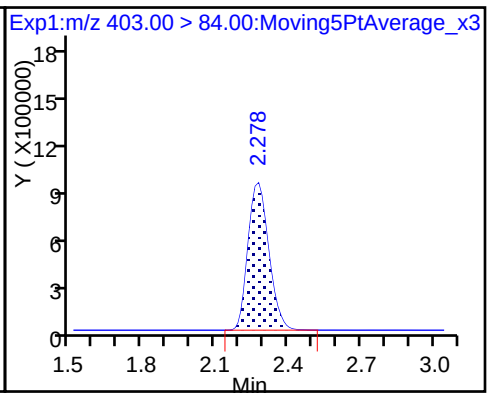
8 Perfluorohexanesulfonic acid (M)



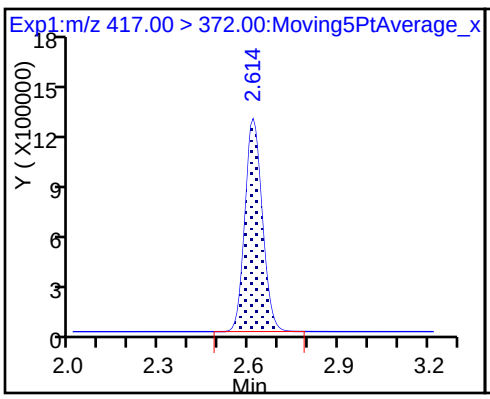
8 Perfluorohexanesulfonic acid



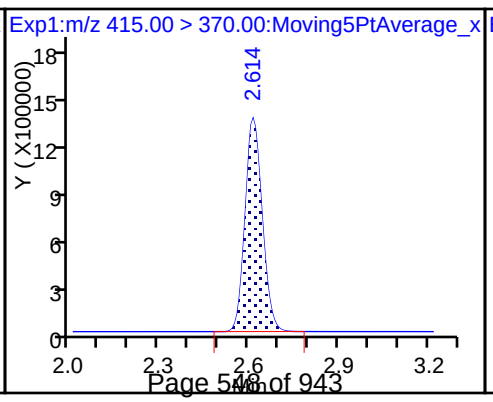
D 11 18O2 PFHxS



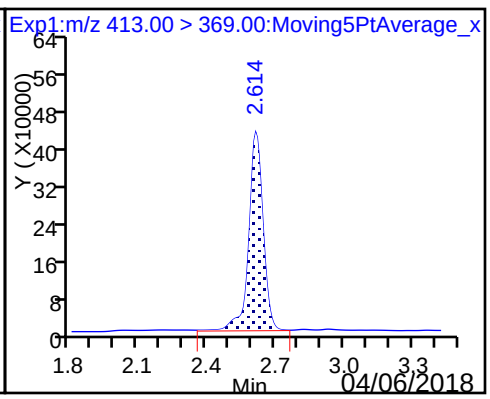
D 14 13C4 PFOA



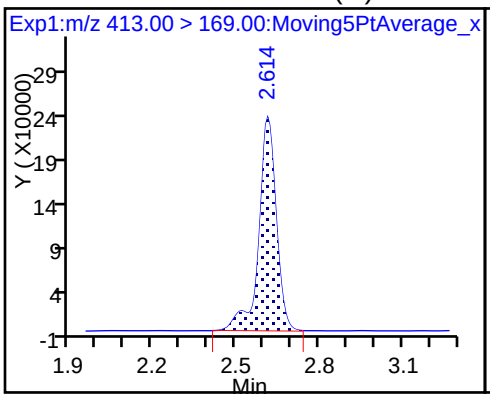
* 62 13C2-PFOA



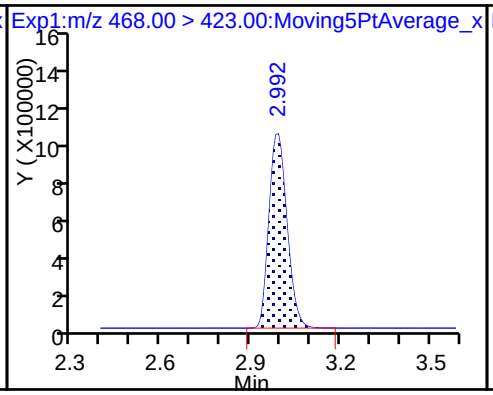
15 Perfluorooctanoic acid



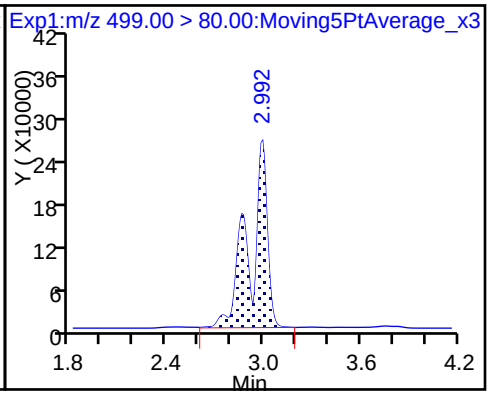
15 Perfluorooctanoic acid (M)



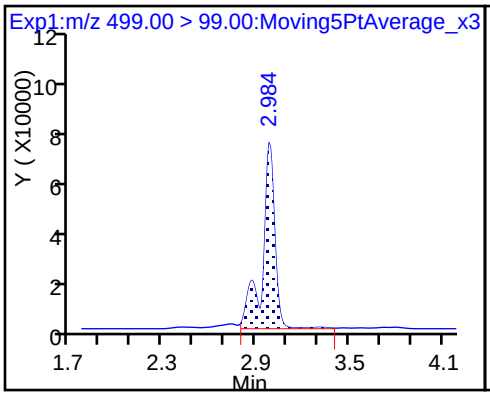
D 19 13C5 PFNA



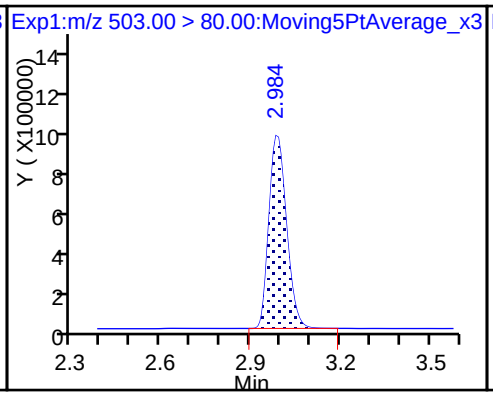
17 Perfluorooctane sulfonic acid



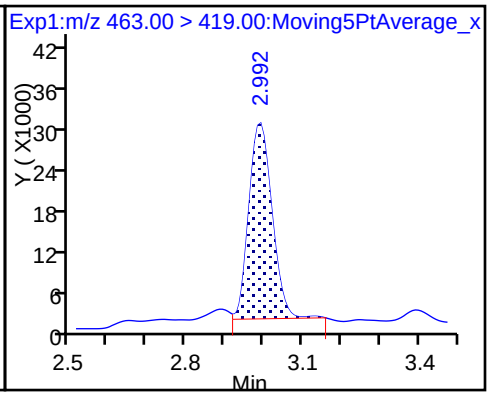
17 Perfluorooctane sulfonic acid



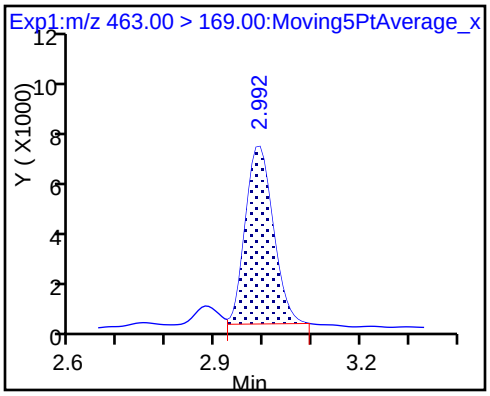
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

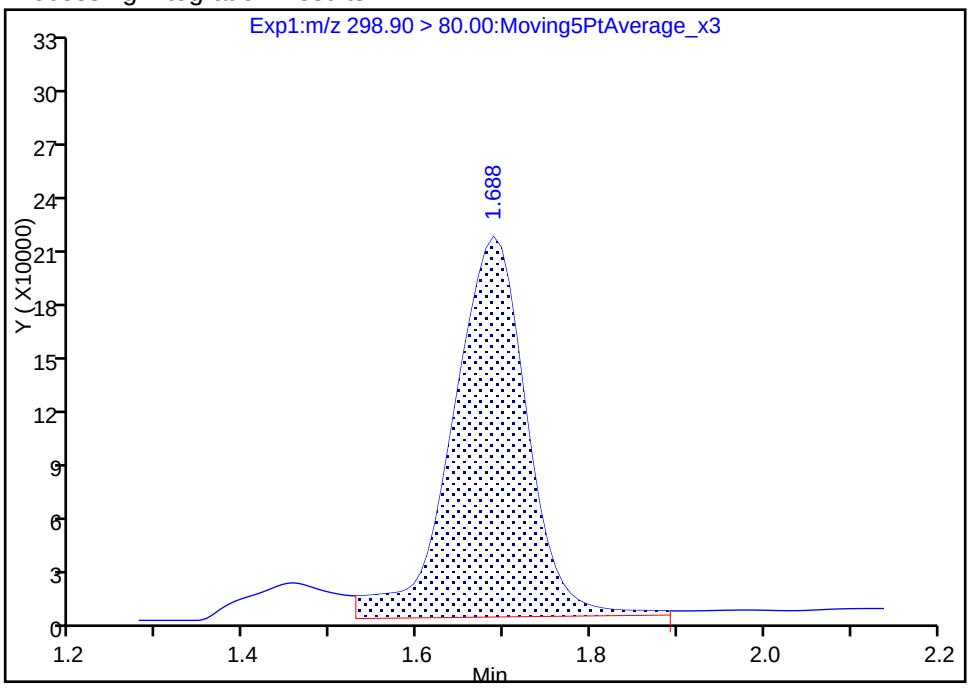
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_047.d				
Injection Date:	25-Jan-2018 23:38:27	Instrument ID:	A8_N		
Lims ID:	320-35310-A-17-A	Lab Sample ID:	320-35310-17		
Client ID:	FH-17-06_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	40	Worklist Smp#:	15
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

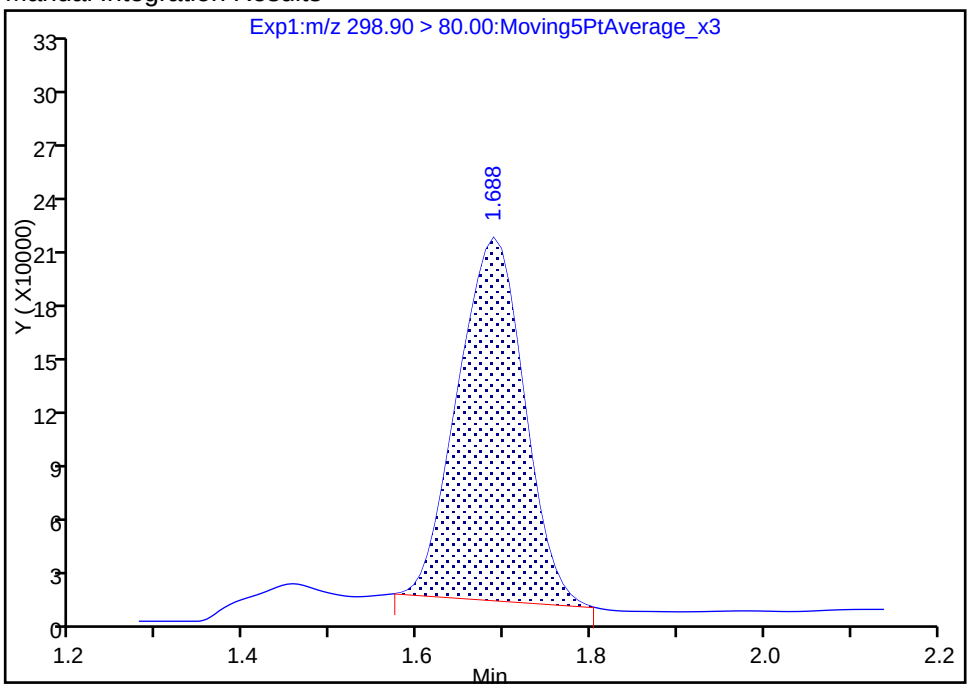
Processing Integration Results

RT: 1.69
Area: 1244429
Amount: 0.401140
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 1063605
Amount: 0.342852
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:20:33

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_047.d

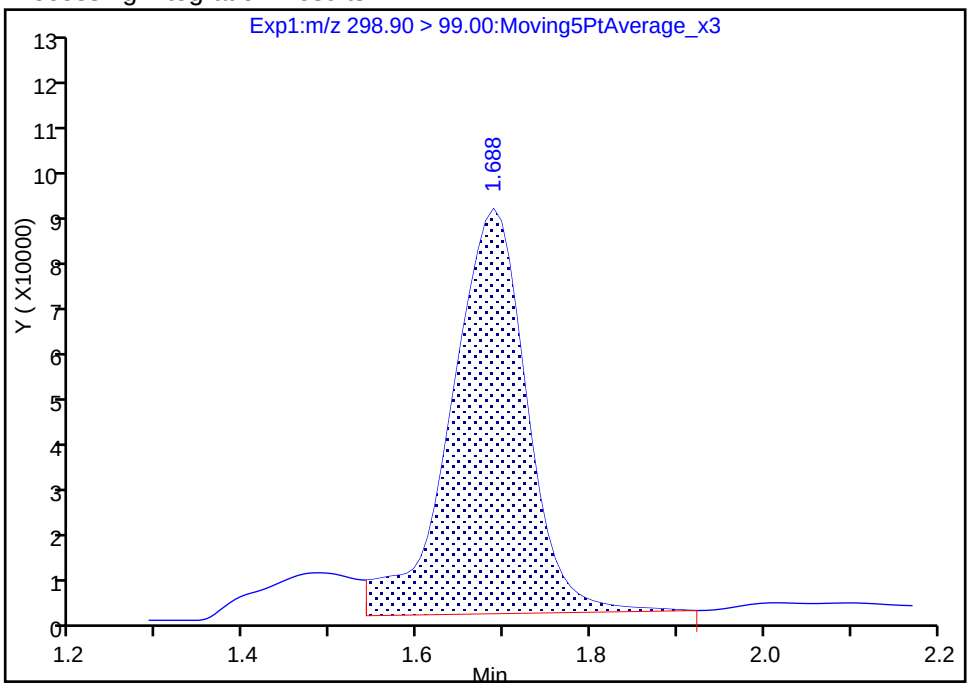
Injection Date:	25-Jan-2018 23:38:27	Instrument ID:	A8_N		
Lims ID:	320-35310-A-17-A	Lab Sample ID:	320-35310-17		
Client ID:	FH-17-06_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	40	Worklist Smp#:	15
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

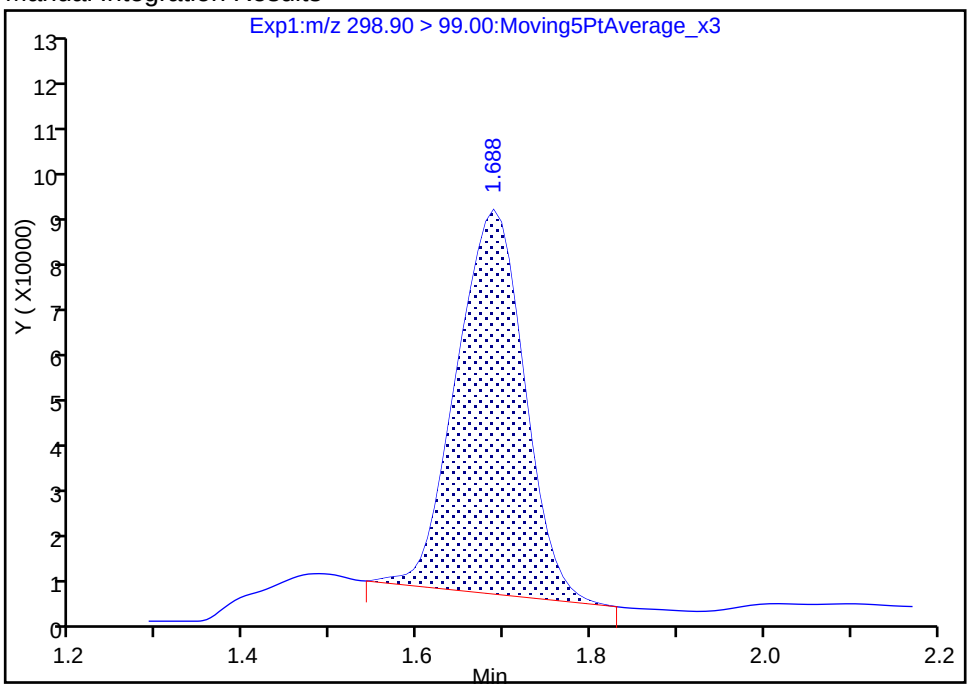
Processing Integration Results

RT: 1.69
Area: 523255
Amount: 0.401140
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 443668
Amount: 0.342852
Amount Units: ng/ml



Reviewer: westendorfc, 30-Jan-2018 10:21:41

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

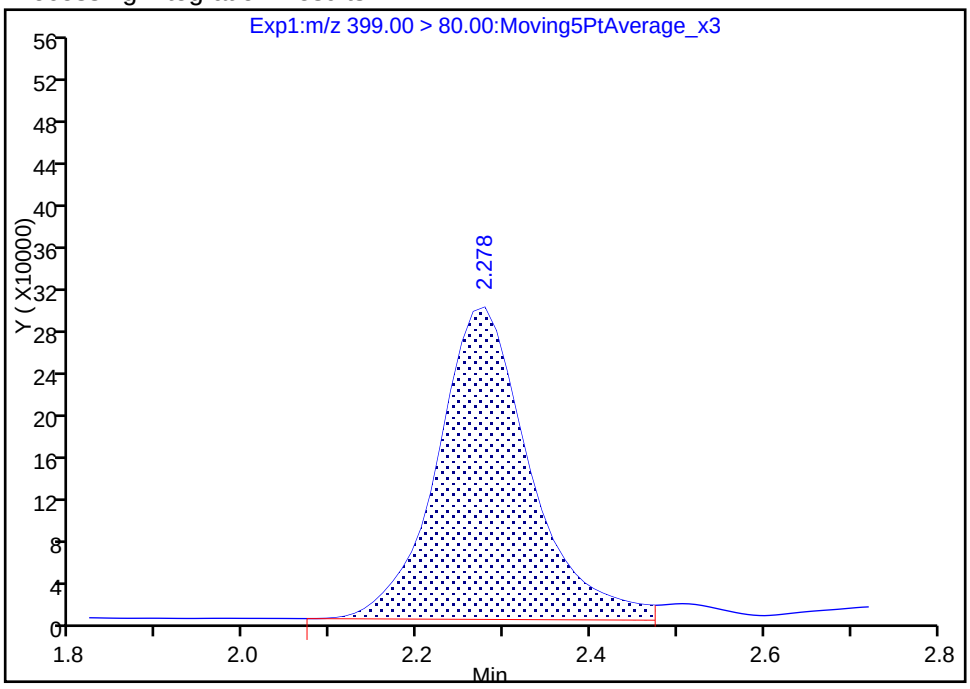
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_047.d				
Injection Date:	25-Jan-2018 23:38:27	Instrument ID:	A8_N		
Lims ID:	320-35310-A-17-A	Lab Sample ID:	320-35310-17		
Client ID:	FH-17-06_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	40	Worklist Smp#:	15
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

8 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

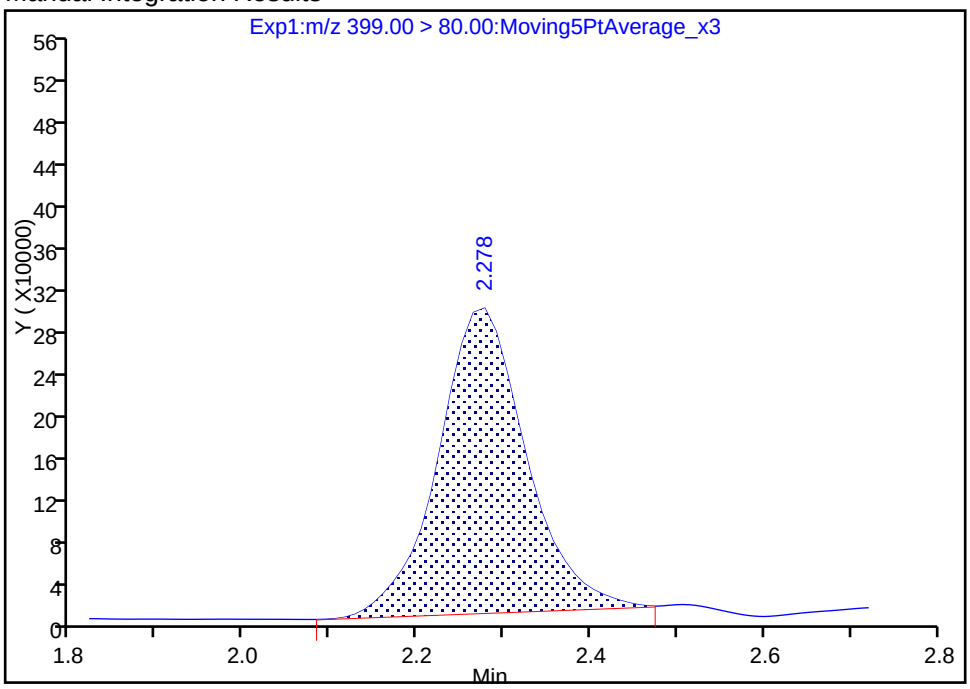
Processing Integration Results

RT: 2.28
Area: 2196405
Amount: 0.876287
Amount Units: ng/ml



Manual Integration Results

RT: 2.28
Area: 2044591
Amount: 0.815718
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:20:50

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

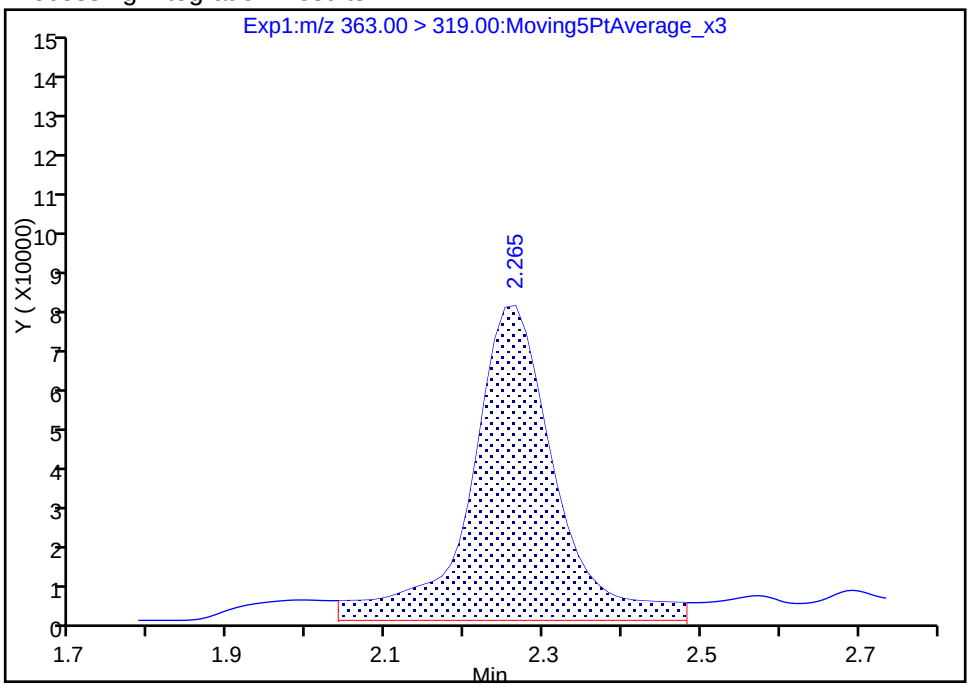
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_047.d				
Injection Date:	25-Jan-2018 23:38:27	Instrument ID:	A8_N		
Lims ID:	320-35310-A-17-A	Lab Sample ID:	320-35310-17		
Client ID:	FH-17-06_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	40	Worklist Smp#:	15
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

10 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

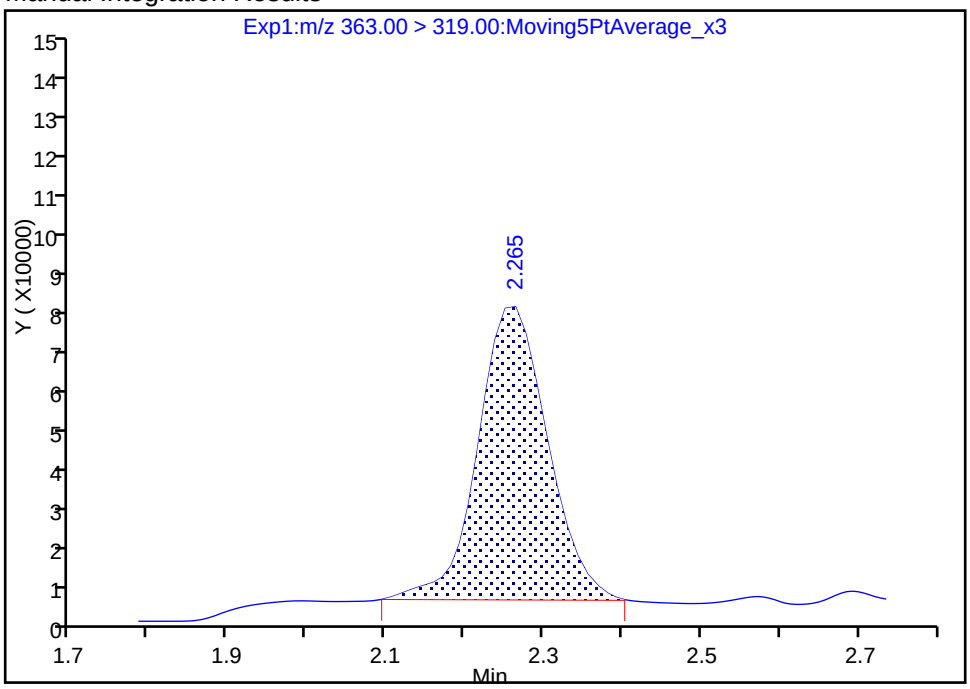
Processing Integration Results

RT: 2.26
Area: 588387
Amount: 0.313530
Amount Units: ng/ml



Manual Integration Results

RT: 2.26
Area: 450700
Amount: 0.240162
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:21:05

Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento

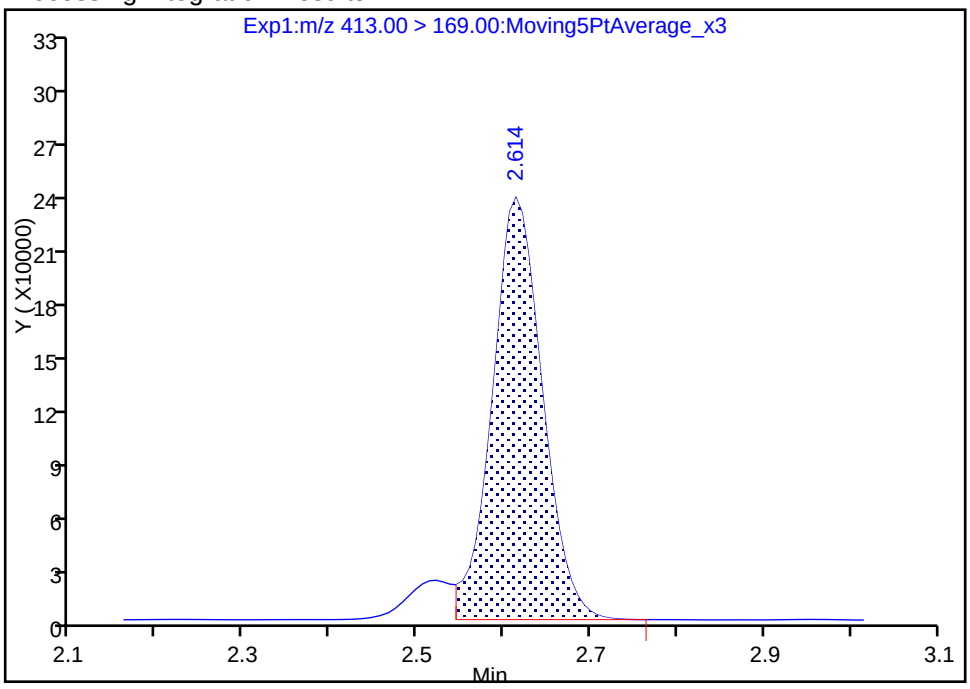
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_047.d				
Injection Date:	25-Jan-2018 23:38:27	Instrument ID:	A8_N		
Lims ID:	320-35310-A-17-A	Lab Sample ID:	320-35310-17		
Client ID:	FH-17-06_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	40	Worklist Smp#:	15
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

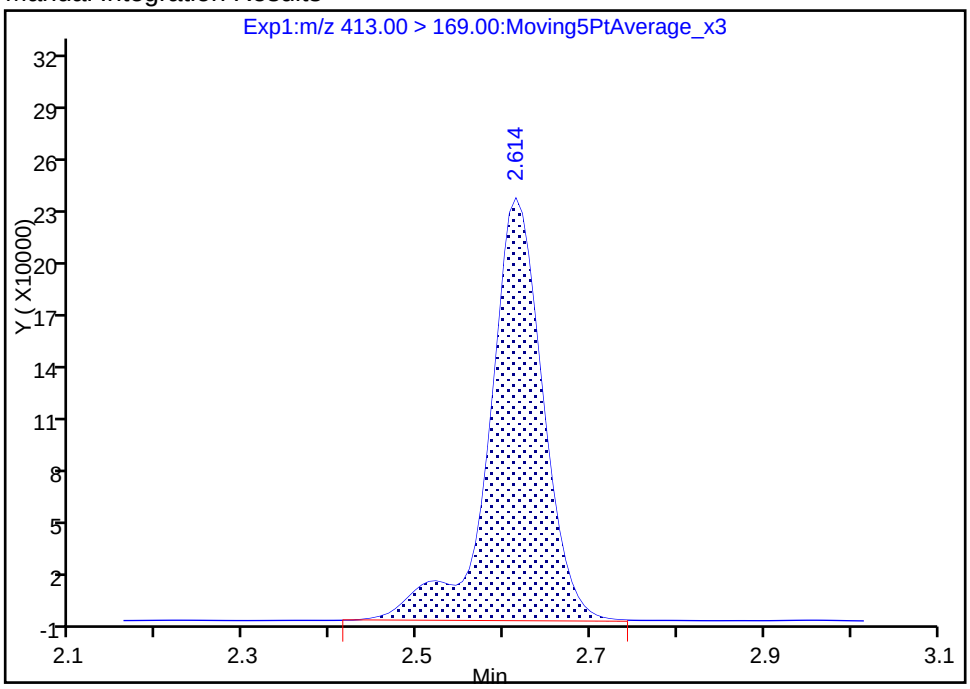
Processing Integration Results

RT: 2.61
Area: 955231
Amount: 0.793614
Amount Units: ng/ml



Manual Integration Results

RT: 2.61
Area: 1036591
Amount: 0.793614
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:21:27
Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-FB01 | Lab Sample ID: 320-35310-18

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_048.d

Analysis Method: 537 (modified) | Date Collected: 01/23/2018 09:45

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 257.5(mL) | Date Analyzed: 01/25/2018 23:46

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.97	U	1.9	0.97	0.45
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.97	U	1.9	0.97	0.37
375-85-9	Perfluoroheptanoic acid (PFHpA)	1.5	U	1.9	1.5	0.59
335-67-1	Perfluorooctanoic acid (PFOA)	1.5	U	1.9	1.5	0.52
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	2.9	U	3.9	2.9	1.1
375-95-1	Perfluorononanoic acid (PFNA)	1.5	U	1.9	1.5	0.50

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	98		25-150
STL01892	13C4-PFHpA	97		25-150
STL00990	13C4 PFOA	101		25-150
STL00991	13C4 PFOS	105		25-150
STL00995	13C5 PFNA	109		25-150
STL02337	13C3-PFBS	92		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_048.d
Lims ID: 320-35310-A-18-A
Client ID: FH-FB01
Sample Type: Client
Inject. Date: 25-Jan-2018 23:46:20 ALS Bottle#: 41 Worklist Smp#: 16
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-18-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 16:22:02

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.689	1.695	-0.006	0.646	84329	2.13		91.5	2375	
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.866	4450981	2.42		96.9	32994	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	16429	0.006643			108	
399.00 > 99.00	2.279	2.280	-0.001	1.000	5136		3.20(1.50-4.49)		11.9	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.871	5253098	2.32		98.2	42621	
D 14 13C4 PFOA										
417.00 > 372.00	2.616	2.622	-0.006	1.000	4556411	2.53		101	40292	
* 62 13C2-PFOA										
415.00 > 370.00	2.616	2.622	-0.006		4997852	2.50			41573	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.631	2.623	0.008	1.005	10037	0.004699			3.9	
413.00 > 169.00	2.616	2.623	-0.007	1.000	4000		2.51(0.84-2.52)		39.9	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.144	3978964	2.73		109	39303	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.144	3603318	2.52		105	25503	

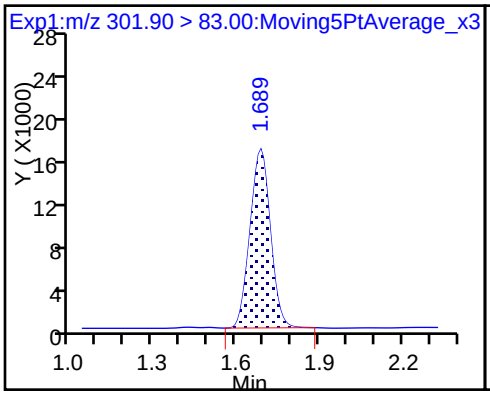
Report Date: 30-Jan-2018 10:22:52 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

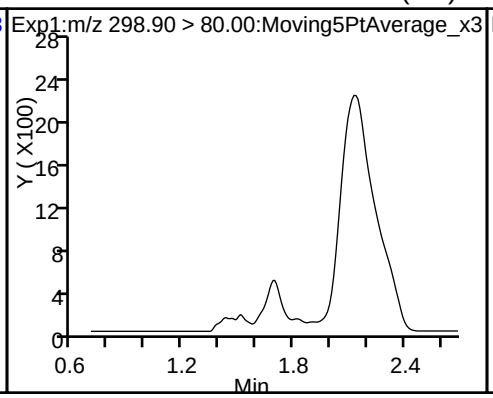
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_048.d

Injection Date:	25-Jan-2018 23:46:20	Instrument ID:	A8_N		
Lims ID:	320-35310-A-18-A	Lab Sample ID:	320-35310-18		
Client ID:	FH-FB01				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	41	Worklist Smp#:	16
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

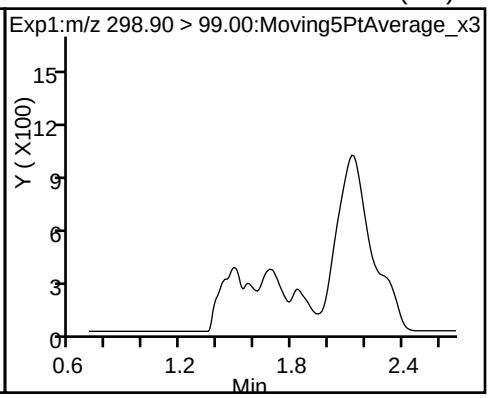
D 47 13C3-PFBS



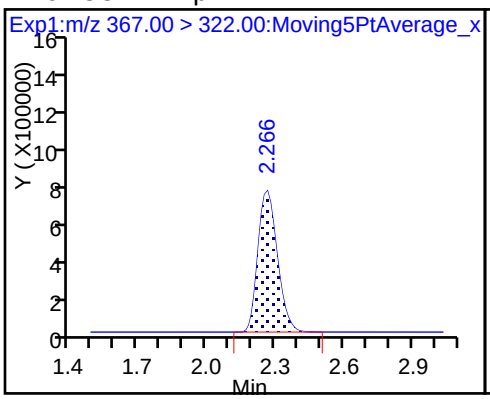
5 Perfluorobutanesulfonic acid (ND)



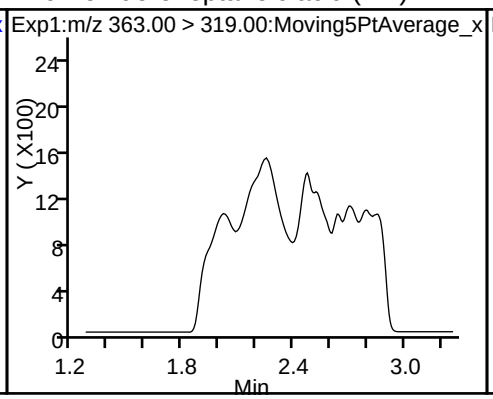
5 Perfluorobutanesulfonic acid (ND)



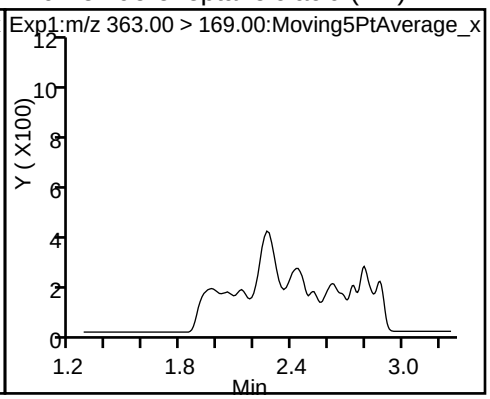
D 9 13C4-PFHpA



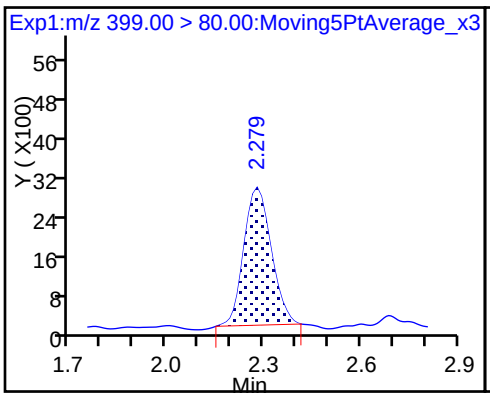
10 Perfluoroheptanoic acid (ND)



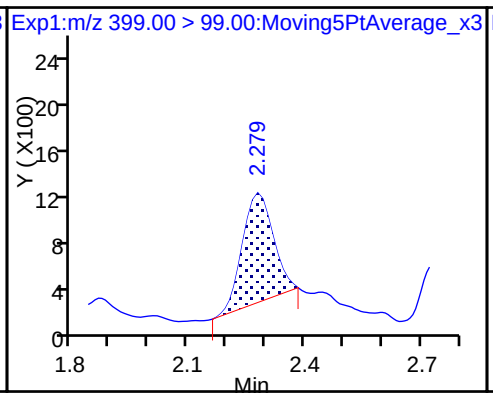
10 Perfluoroheptanoic acid (ND)



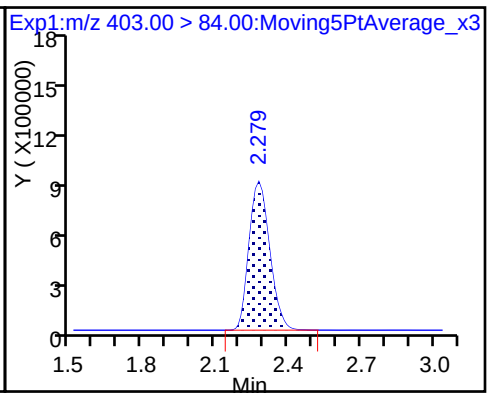
8 Perfluorohexanesulfonic acid



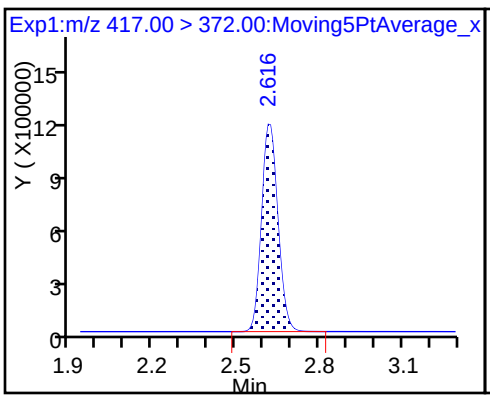
8 Perfluorohexanesulfonic acid



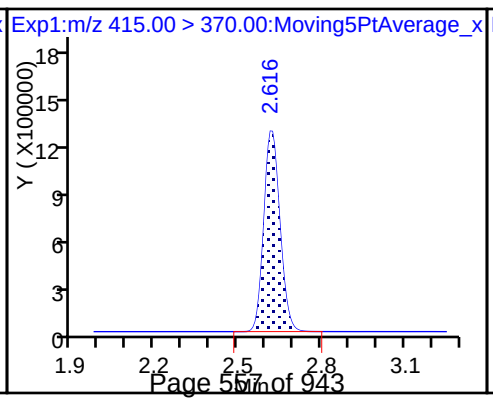
D 11 18O2 PFHxS



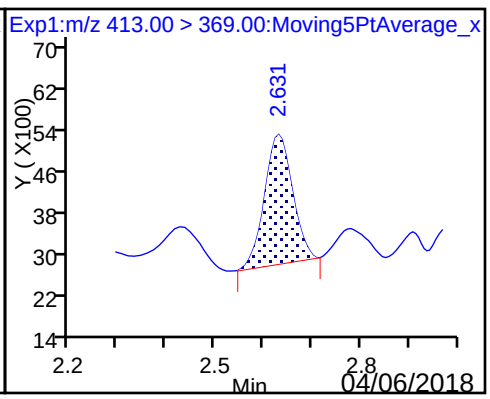
D 14 13C4 PFOA



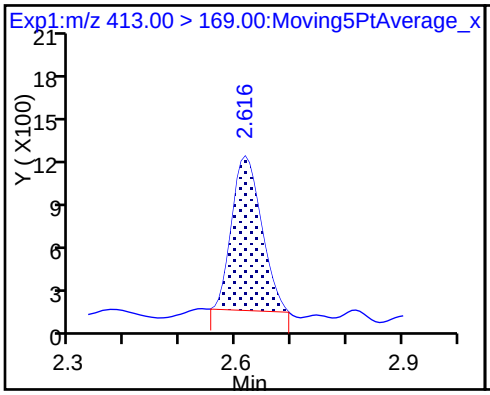
* 62 13C2-PFOA



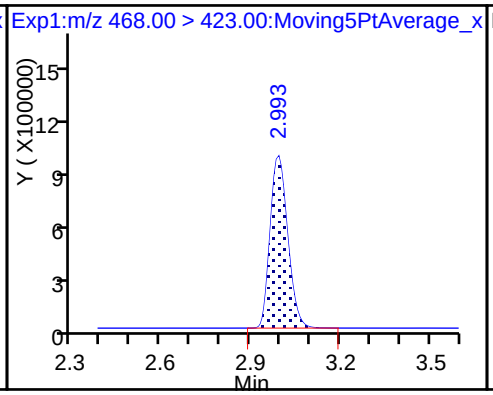
15 Perfluorooctanoic acid



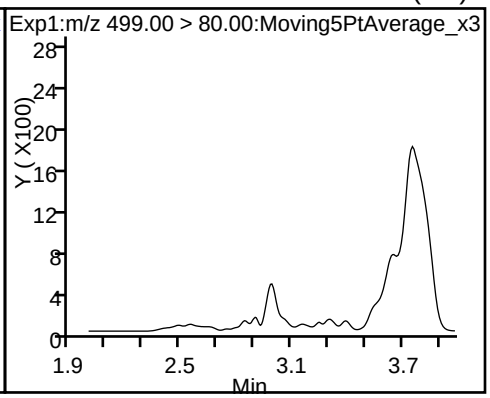
15 Perfluorooctanoic acid



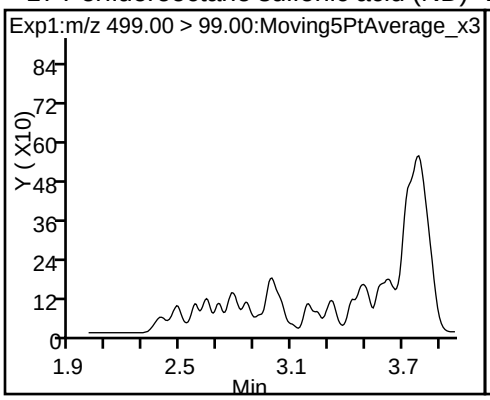
D 19 13C5 PFNA



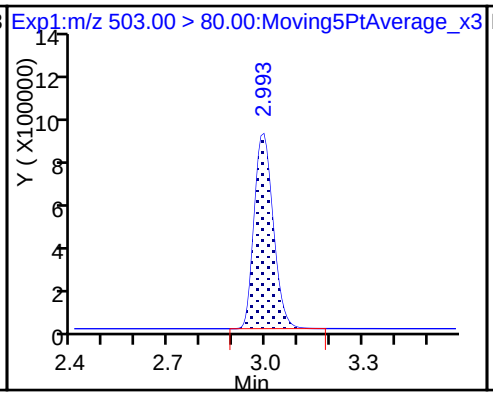
17 Perfluorooctane sulfonic acid (ND)



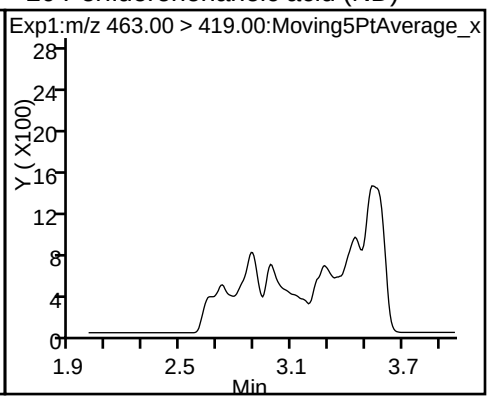
17 Perfluorooctane sulfonic acid (ND)



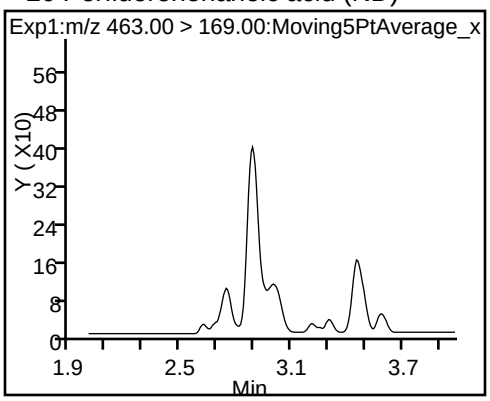
D 18 13C4 PFOS



20 Perfluorononanoic acid (ND)



20 Perfluorononanoic acid (ND)



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-07_SO0005 | Lab Sample ID: 320-35310-19

Matrix: Solid | Lab File ID: 2018.01.26LLA_040.d

Analysis Method: 537 (modified) | Date Collected: 01/23/2018 10:20

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.01(g) | Date Analyzed: 01/26/2018 17:56

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 8.3 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.11	0.027
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.11	U	0.54	0.11	0.034
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.11	U	0.54	0.11	0.032
335-67-1	Perfluorooctanoic acid (PFOA)	0.22	U	0.54	0.22	0.094
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.68	J	1.1	0.54	0.22
375-95-1	Perfluorononanoic acid (PFNA)	0.043	J	0.54	0.11	0.039

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	96		25-150
STL01892	13C4-PFHpA	84		25-150
STL00990	13C4 PFOA	100		25-150
STL00991	13C4 PFOS	98		25-150
STL00995	13C5 PFNA	105		25-150
STL02337	13C3-PFBS	89		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_040.d
Lims ID: 320-35310-A-19-A
Client ID: FH-17-07_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 17:56:09 ALS Bottle#: 24 Worklist Smp#: 15
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-19-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 11:05:42 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 11:05:42

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.694	1.695	-0.001	0.645	87506	2.08		89.4	521	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.866	4096080	2.10		83.9	28927	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.260	2.268	-0.008	0.994	22120	0.0123			18.1	
363.00 > 169.00	2.273	2.268	0.005	1.000	8055		2.75(1.13-3.40)		42.0	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.273	2.280	-0.007	0.994	35020	0.0136			79.4	
399.00 > 99.00	2.273	2.280	-0.007	0.994	12991		2.70(1.50-4.49)		26.0	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.871	5449900	2.27		95.9	49403	
D 14 13C4 PFOA										
417.00 > 372.00	2.626	2.622	0.004	1.000	4776323	2.50		99.9	44559	
* 62 13C2-PFOA										
415.00 > 370.00	2.626	2.622	0.004		5311280	2.50			37812	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.626	2.623	0.003	1.000	87851	0.0392			69.5	
413.00 > 169.00	2.626	2.623	0.003	1.000	47523		1.85(0.84-2.52)		299	
D 19 13C5 PFNA										
468.00 > 423.00	2.997	2.992	0.005	1.141	4060519	2.62		105	40573	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.997	2.992	0.005	1.000	523868	0.3130			1235	
499.00 > 99.00	2.997	2.992	0.005	1.000	124095		4.22(2.31-6.93)		435	
D 18 13C4 PFOS										
503.00 > 80.00	2.997	2.992	0.005	1.141	3573047	2.35		98.3	22874	
20 Perfluorononanoic acid										
463.00 > 419.00	3.005	2.992	0.013	1.003	32826	0.0196			50.8	
463.00 > 169.00	2.997	2.992	0.005	1.000	8351		3.93(1.90-5.69)		94.7	

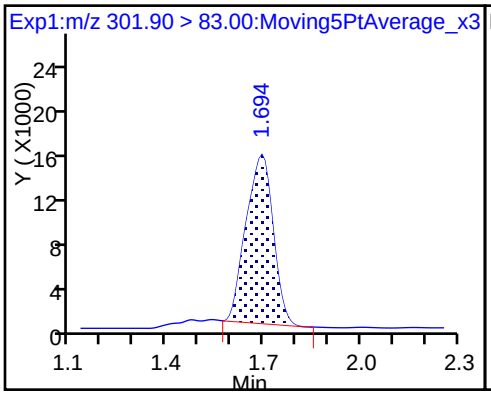
Report Date: 30-Jan-2018 11:05:43 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

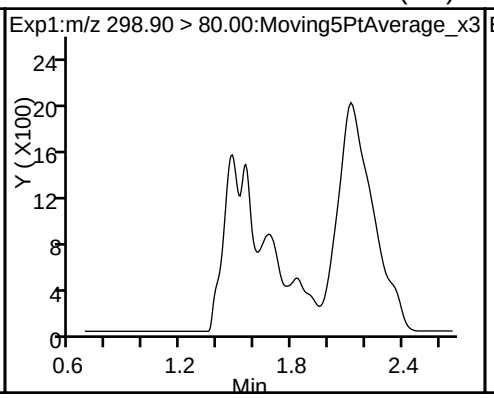
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_040.d

Injection Date:	26-Jan-2018 17:56:09	Instrument ID:	A8_N		
Lims ID:	320-35310-A-19-A	Lab Sample ID:	320-35310-19		
Client ID:	FH-17-07_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	24	Worklist Smp#:	15
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

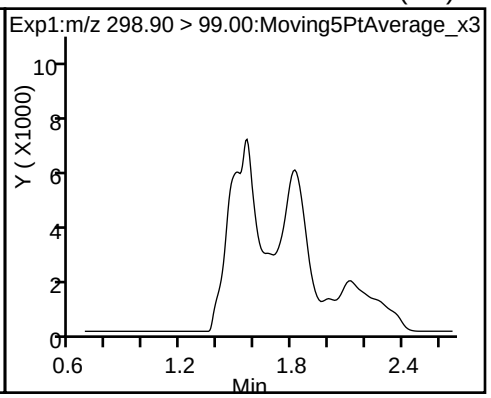
D 47 13C3-PFBS



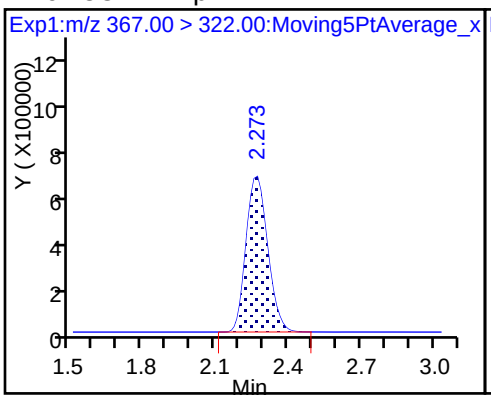
5 Perfluorobutanesulfonic acid (ND)



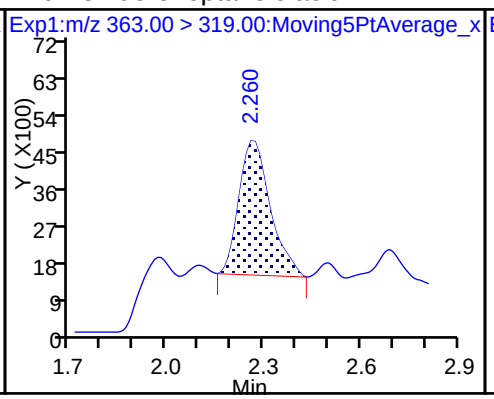
5 Perfluorobutanesulfonic acid (ND)



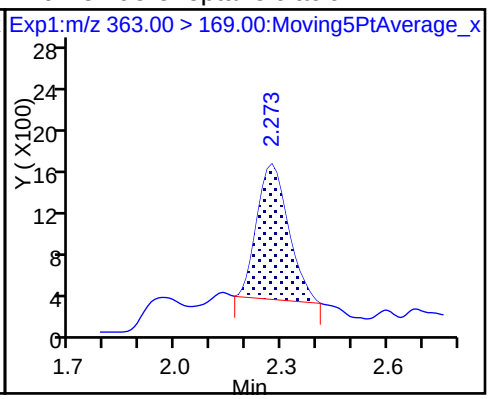
D 9 13C4-PFHpA



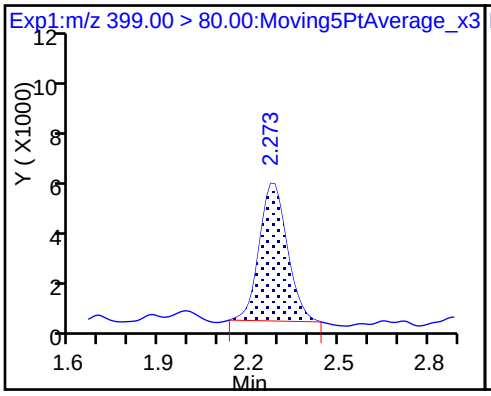
10 Perfluoroheptanoic acid



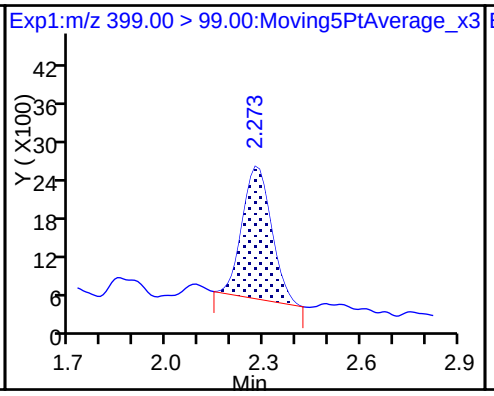
10 Perfluoroheptanoic acid



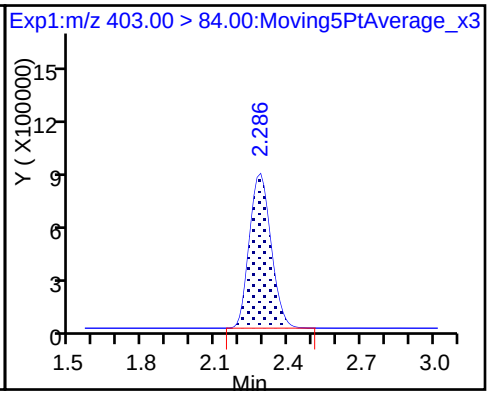
8 Perfluorohexanesulfonic acid



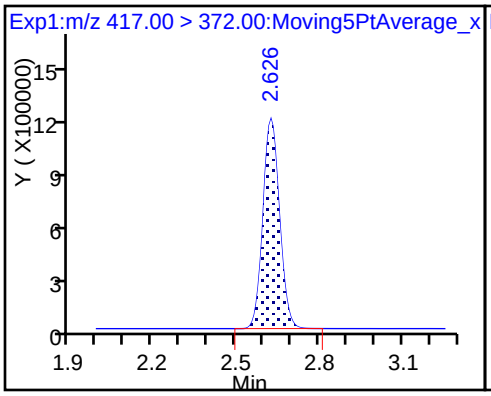
8 Perfluorohexanesulfonic acid



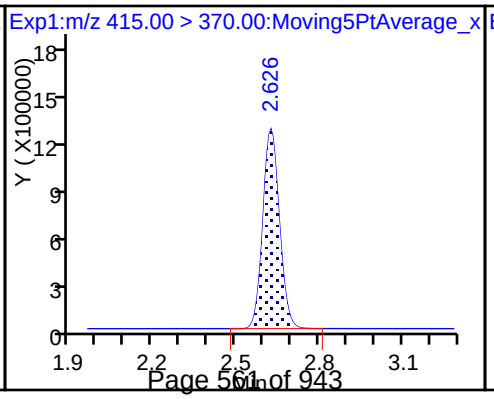
D 11 18O2 PFHxS



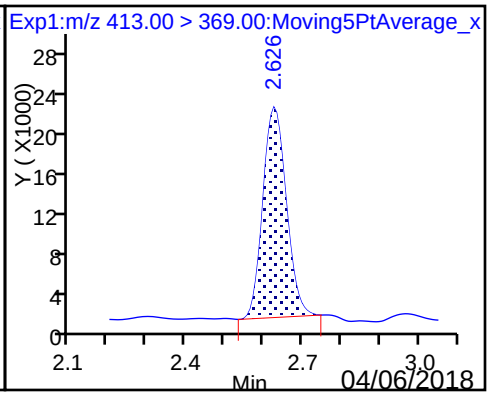
D 14 13C4 PFOA



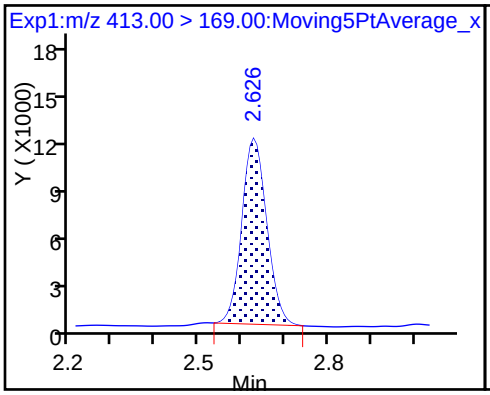
* 62 13C2-PFOA



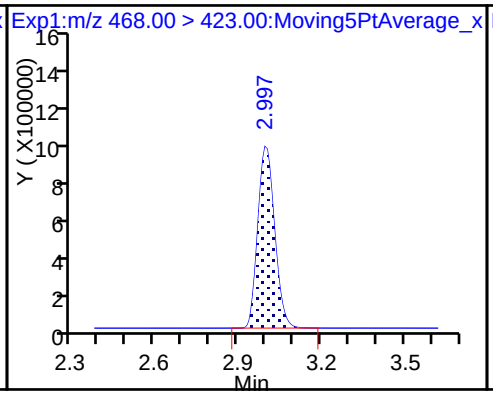
15 Perfluorooctanoic acid



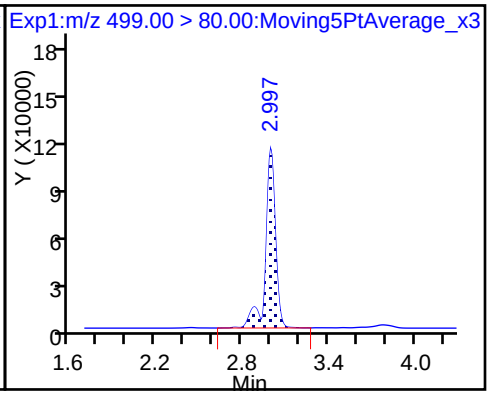
15 Perfluorooctanoic acid



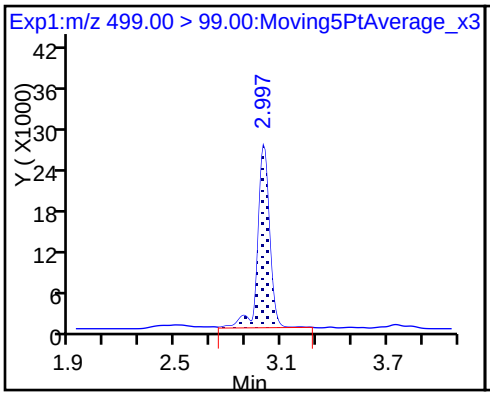
D 19 13C5 PFNA



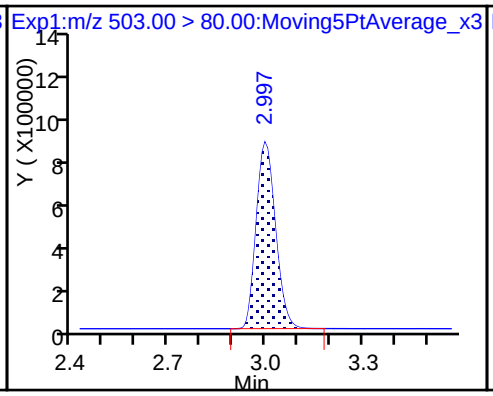
17 Perfluorooctane sulfonic acid



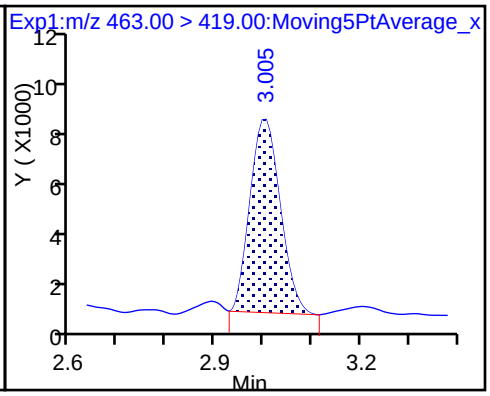
17 Perfluorooctane sulfonic acid



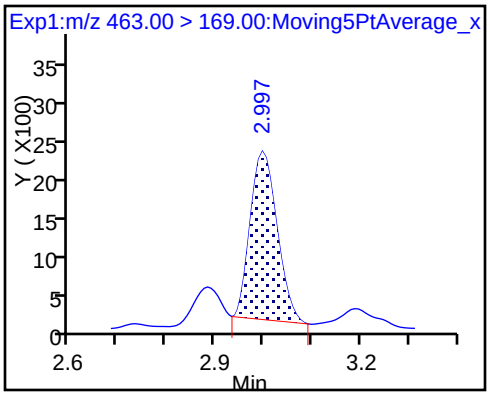
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-07_GW012318 | Lab Sample ID: 320-35310-20

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_049.d

Analysis Method: 537 (modified) | Date Collected: 01/23/2018 10:30

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 252(mL) | Date Analyzed: 01/25/2018 23:54

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	3.0	M	2.0	0.99	0.46
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	16		2.0	0.99	0.38
375-85-9	Perfluoroheptanoic acid (PFHpA)	4.1	M	2.0	1.5	0.61
335-67-1	Perfluorooctanoic acid (PFOA)	11	M	2.0	1.5	0.54
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	13		4.0	3.0	1.1
375-95-1	Perfluorononanoic acid (PFNA)	0.55	J	2.0	1.5	0.52

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	106		25-150
STL01892	13C4-PFHpA	109		25-150
STL00990	13C4 PFOA	115		25-150
STL00991	13C4 PFOS	118		25-150
STL00995	13C5 PFNA	119		25-150
STL02337	13C3-PFBS	104		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_049.d
Lims ID: 320-35310-A-20-A
Client ID: FH-17-07_GW012318
Sample Type: Client
Inject. Date: 25-Jan-2018 23:54:12 ALS Bottle#: 42 Worklist Smp#: 17
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-20-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 16:22:13

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.695	1.695	0.0	0.645	88192	2.42		104	624	
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.695	1.697	-0.002	1.000	221076	0.0755			94.9	M
298.90 > 99.00	1.695	1.697	-0.002	1.000	80411		2.75(1.25-3.74)		67.4	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.262	2.267	-0.005	0.861	4625327	2.73		109	28024	
10 Perfluoroheptanoic acid										M
363.00 > 319.00	2.262	2.268	-0.006	1.000	212056	0.1043			172	M
363.00 > 169.00	2.262	2.268	-0.006	1.000	82853		2.56(1.13-3.40)		534	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.288	2.280	0.008	1.000	972977	0.3961			280	
399.00 > 99.00	2.275	2.280	-0.005	0.994	272339		3.57(1.50-4.49)		393	
D 11 18O2 PFHxS										
403.00 > 84.00	2.288	2.282	0.006	0.871	5217878	2.50		106	42009	
D 14 13C4 PFOA										
417.00 > 372.00	2.628	2.622	0.006	1.000	4778257	2.88		115	50426	
* 62 13C2-PFOA										
415.00 > 370.00	2.628	2.622	0.006		4605601	2.50			38793	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.628	2.623	0.005	1.000	632346	0.2823			330	M
413.00 > 169.00	2.628	2.623	0.005	1.000	365088		1.73(0.84-2.52)		2160	M
D 19 13C5 PFNA										
468.00 > 423.00	3.000	2.992	0.008	1.142	3986058	2.96		119	31206	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.000	2.992	0.008	1.000	553960	0.3190			578	
499.00 > 99.00	3.000	2.992	0.008	1.000	119429		4.64(2.31-6.93)		597	
D 18 13C4 PFOS										
503.00 > 80.00	3.000	2.992	0.008	1.142	3707375	2.81		118	13868	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	3.000	2.992	0.008	1.000	22896	0.0139			18.5	
463.00 > 169.00	3.000	2.992	0.008	1.000	5866		3.90(1.90-5.69)		94.2	

QC Flag Legend

Review Flags

M - Manually Integrated

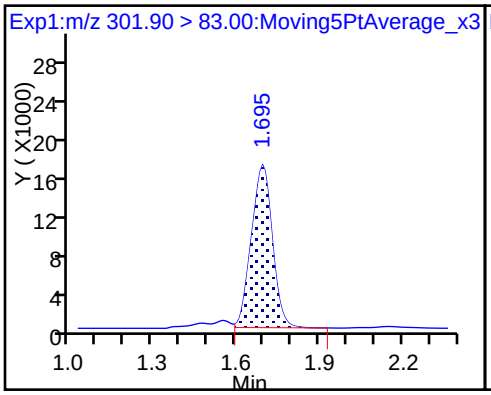
Report Date: 30-Jan-2018 10:22:53 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

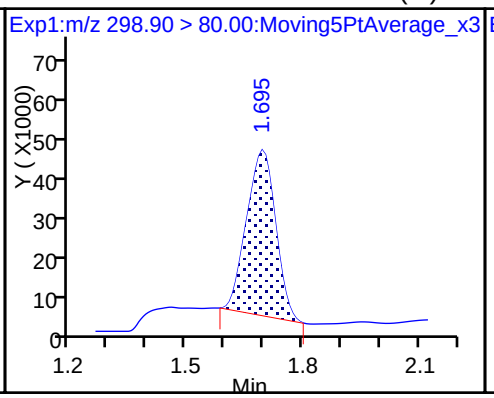
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_049.d

Injection Date:	25-Jan-2018 23:54:12	Instrument ID:	A8_N		
Lims ID:	320-35310-A-20-A	Lab Sample ID:	320-35310-20		
Client ID:	FH-17-07_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	42	Worklist Smp#:	17
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

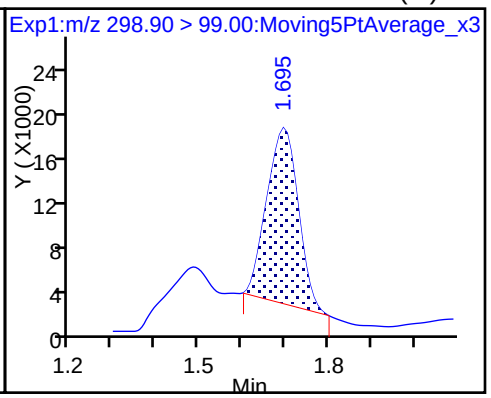
D 47 13C3-PFBS



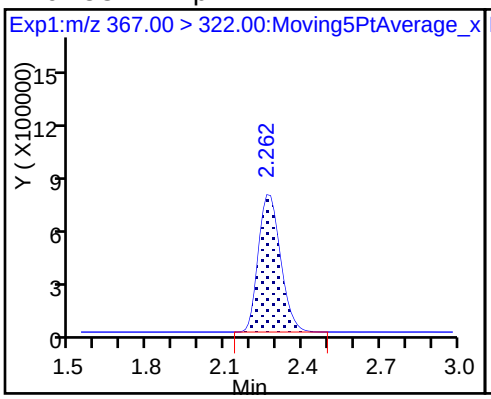
5 Perfluorobutanesulfonic acid (M)



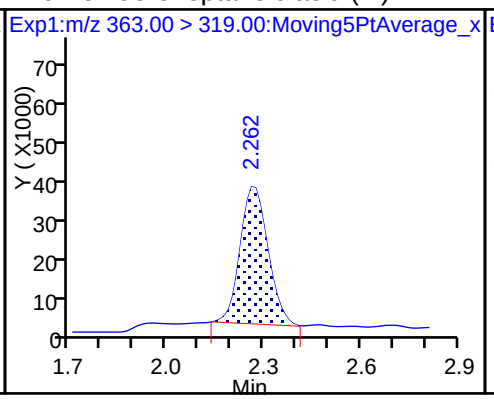
5 Perfluorobutanesulfonic acid (M)



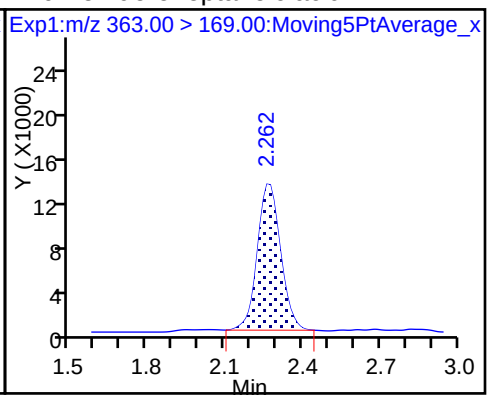
D 9 13C4-PFHpA



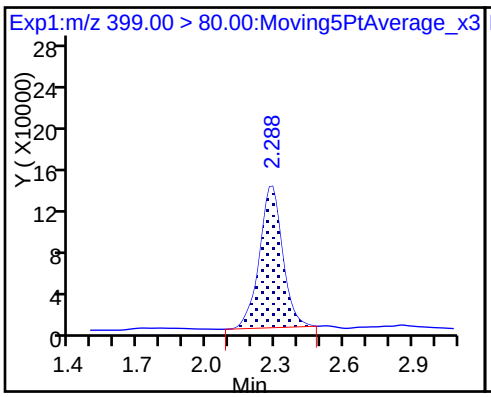
10 Perfluoroheptanoic acid (M)



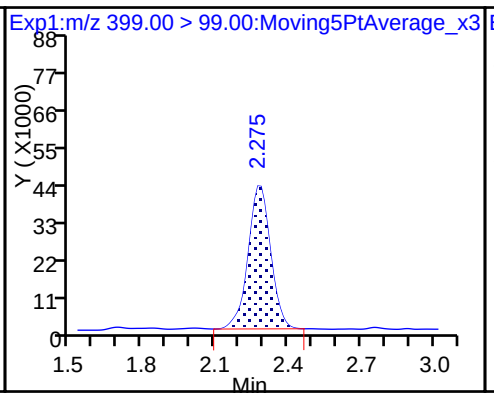
10 Perfluoroheptanoic acid



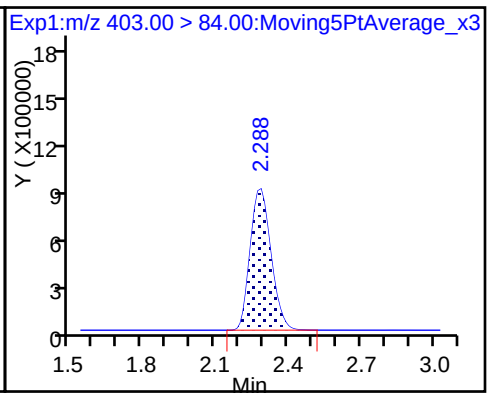
8 Perfluorohexanesulfonic acid



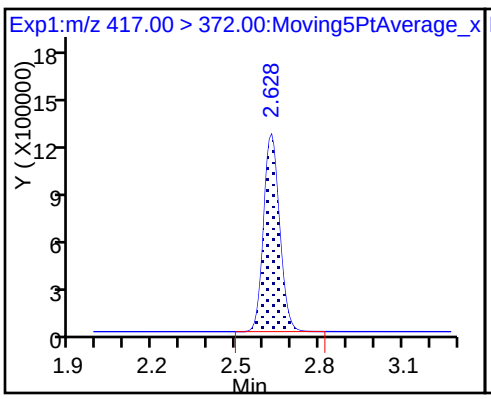
8 Perfluorohexanesulfonic acid



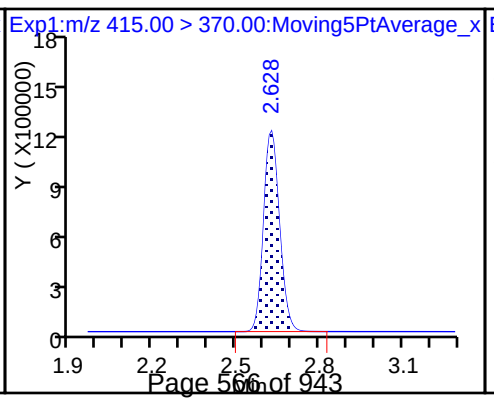
D 11 18O2 PFHxS



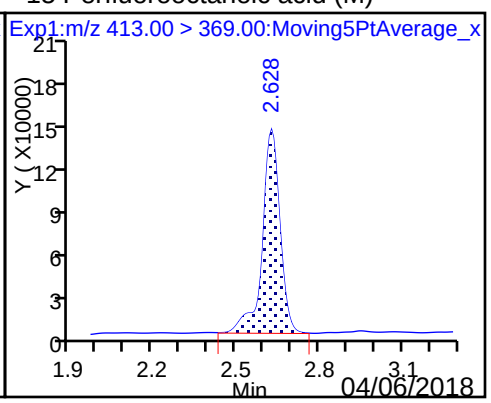
D 14 13C4 PFOA



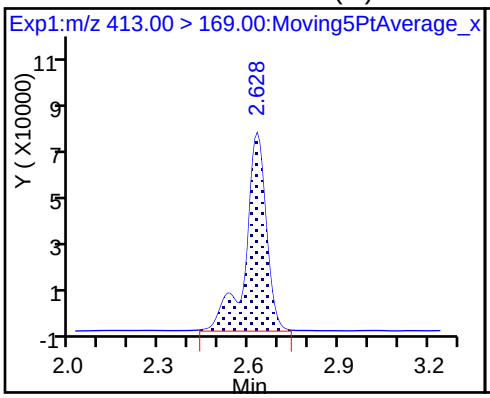
* 62 13C2-PFOA



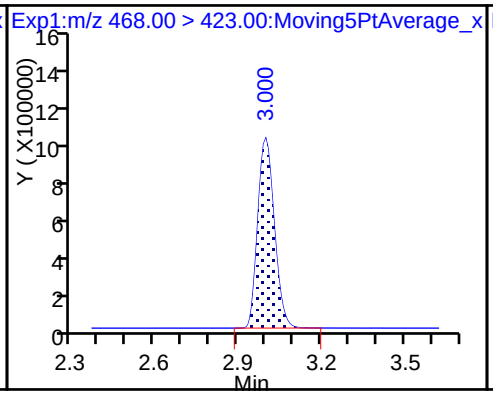
15 Perfluorooctanoic acid (M)



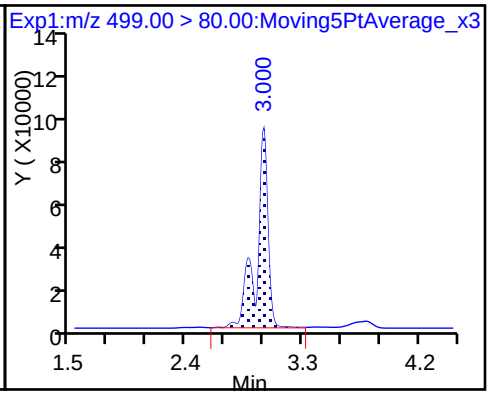
15 Perfluorooctanoic acid (M)



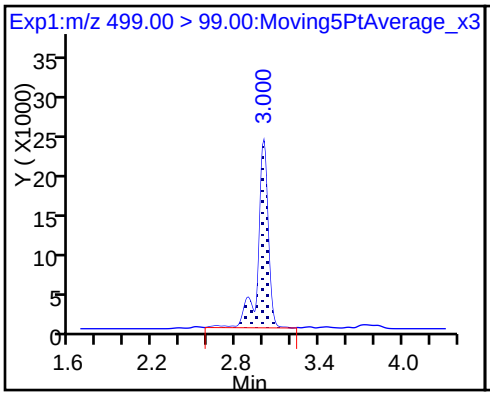
D 19 13C5 PFNA



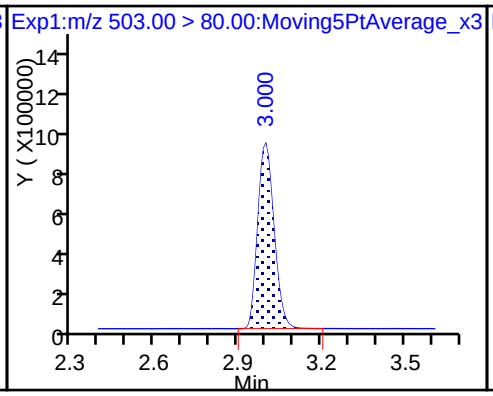
17 Perfluorooctane sulfonic acid



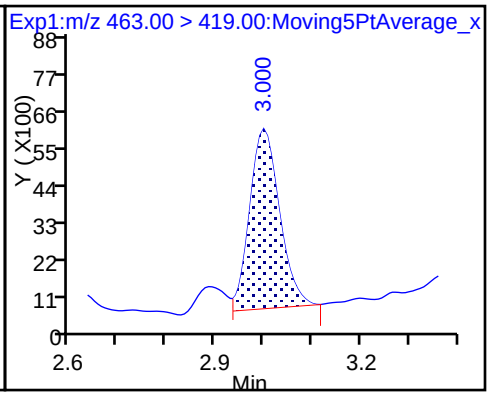
17 Perfluorooctane sulfonic acid



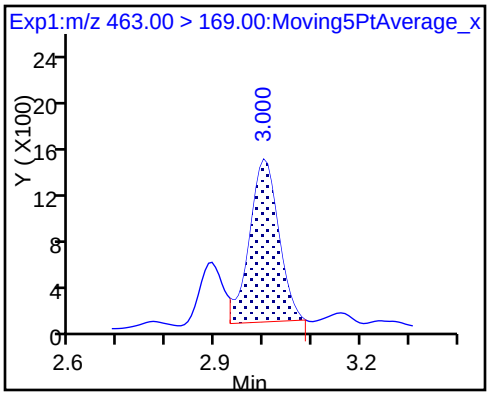
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

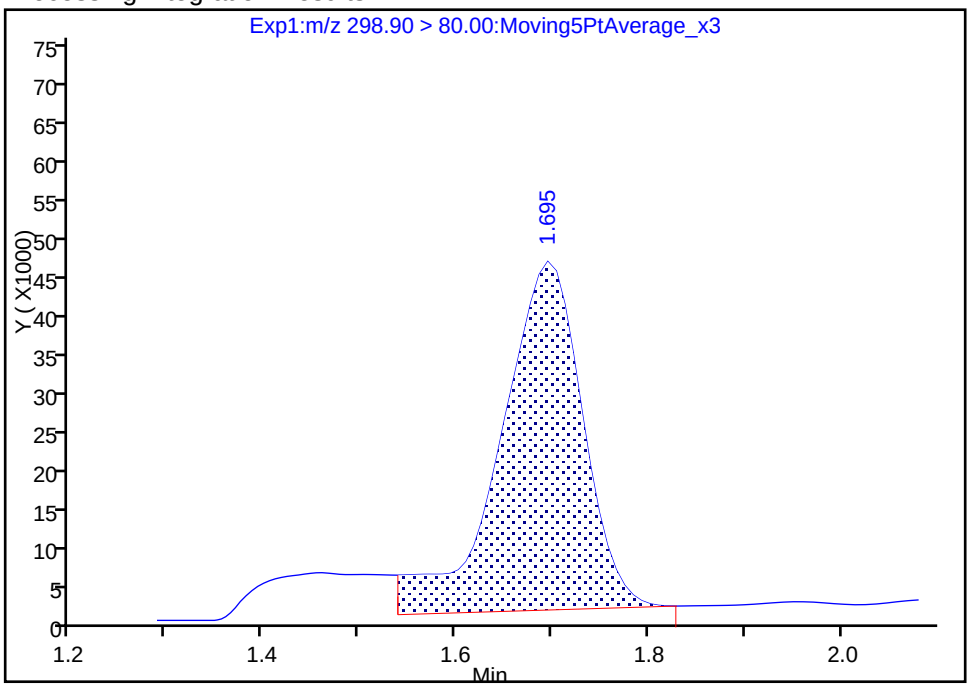
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_049.d				
Injection Date:	25-Jan-2018 23:54:12	Instrument ID:	A8_N		
Lims ID:	320-35310-A-20-A	Lab Sample ID:	320-35310-20		
Client ID:	FH-17-07_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	42	Worklist Smp#:	17
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

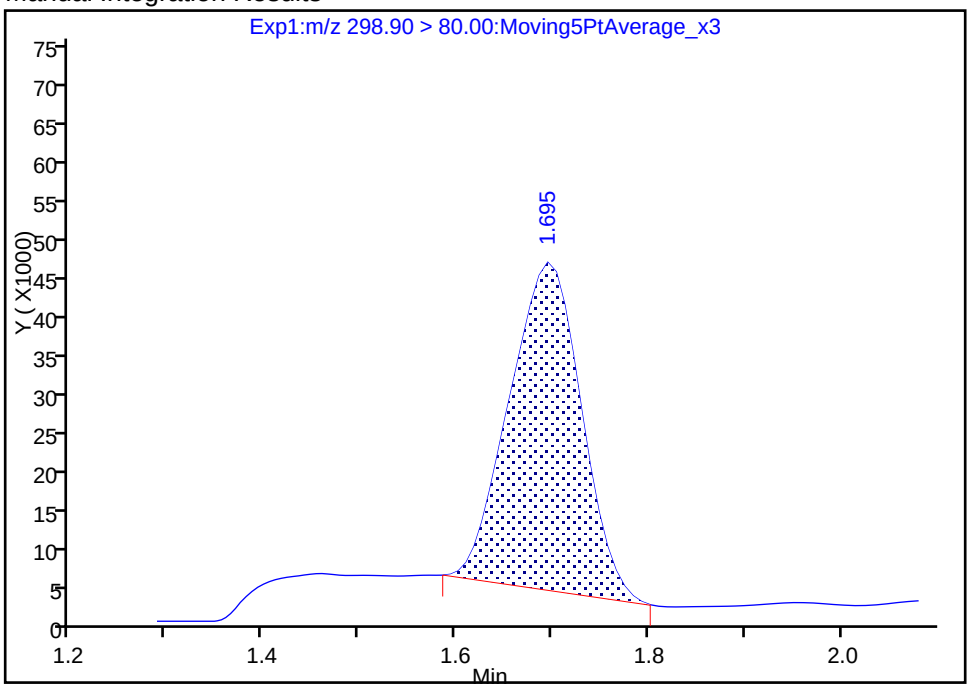
Processing Integration Results

RT: 1.70
Area: 270587
Amount: 0.092387
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 221076
Amount: 0.075482
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:22:40

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_049.d

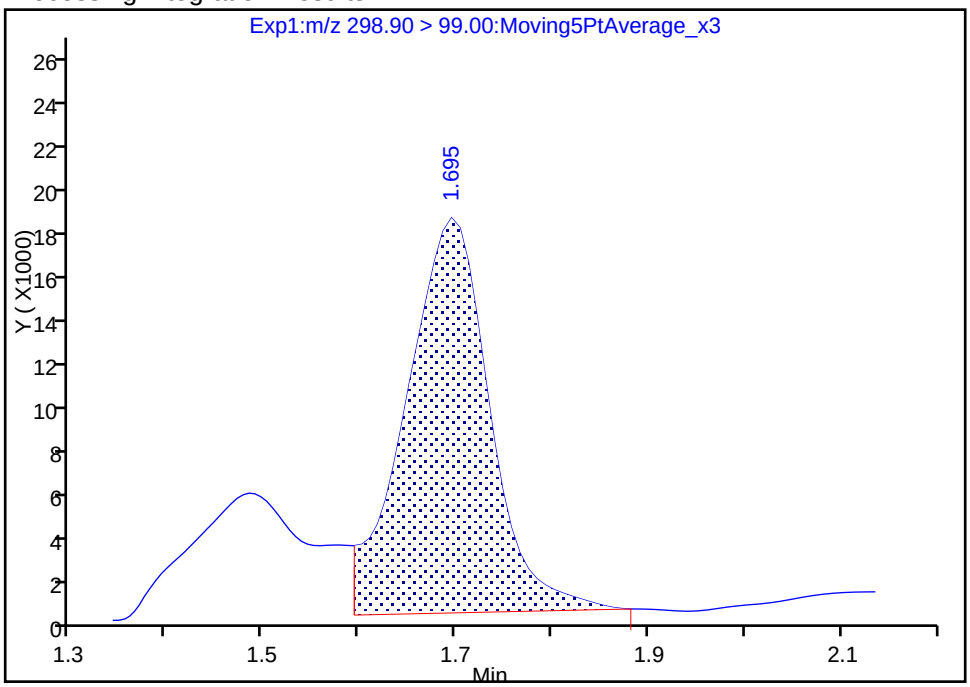
Injection Date:	25-Jan-2018 23:54:12	Instrument ID:	A8_N		
Lims ID:	320-35310-A-20-A	Lab Sample ID:	320-35310-20		
Client ID:	FH-17-07_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	42	Worklist Smp#:	17
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

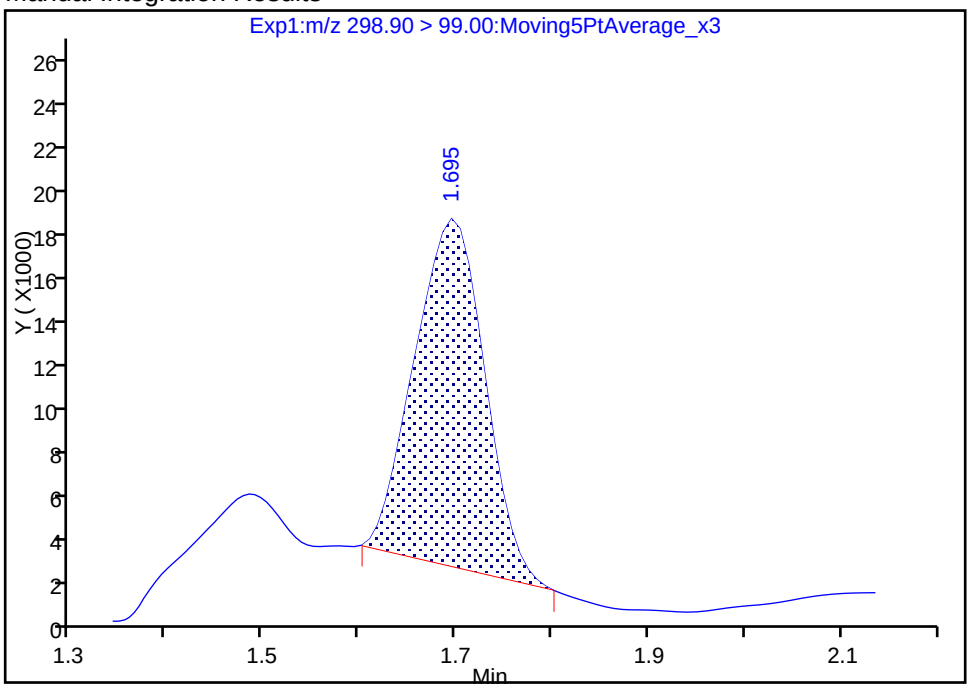
Processing Integration Results

RT: 1.70
Area: 108731
Amount: 0.092387
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
Area: 80411
Amount: 0.075482
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:22:46

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

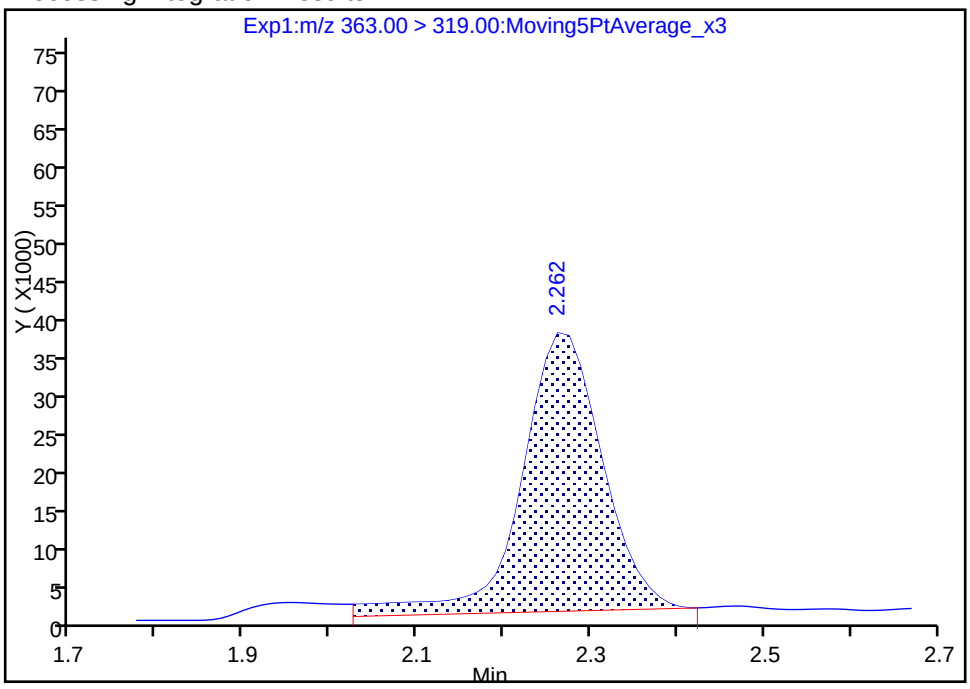
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_049.d				
Injection Date:	25-Jan-2018 23:54:12	Instrument ID:	A8_N		
Lims ID:	320-35310-A-20-A	Lab Sample ID:	320-35310-20		
Client ID:	FH-17-07_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	42	Worklist Smp#:	17
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

10 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

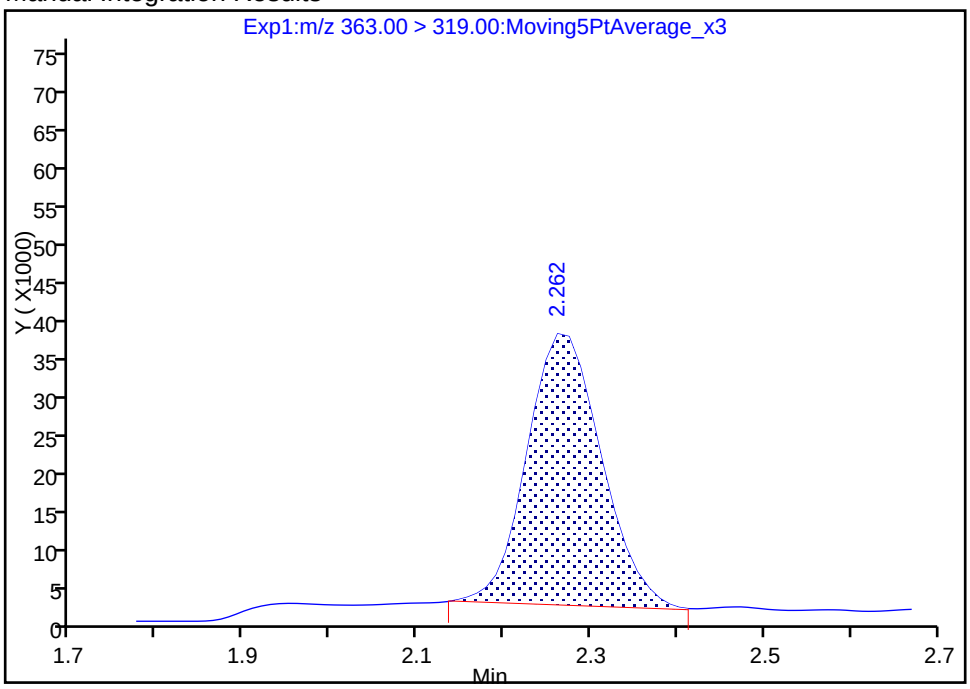
Processing Integration Results

RT: 2.26
Area: 237421
Amount: 0.116764
Amount Units: ng/ml



Manual Integration Results

RT: 2.26
Area: 212056
Amount: 0.104290
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:23:04

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

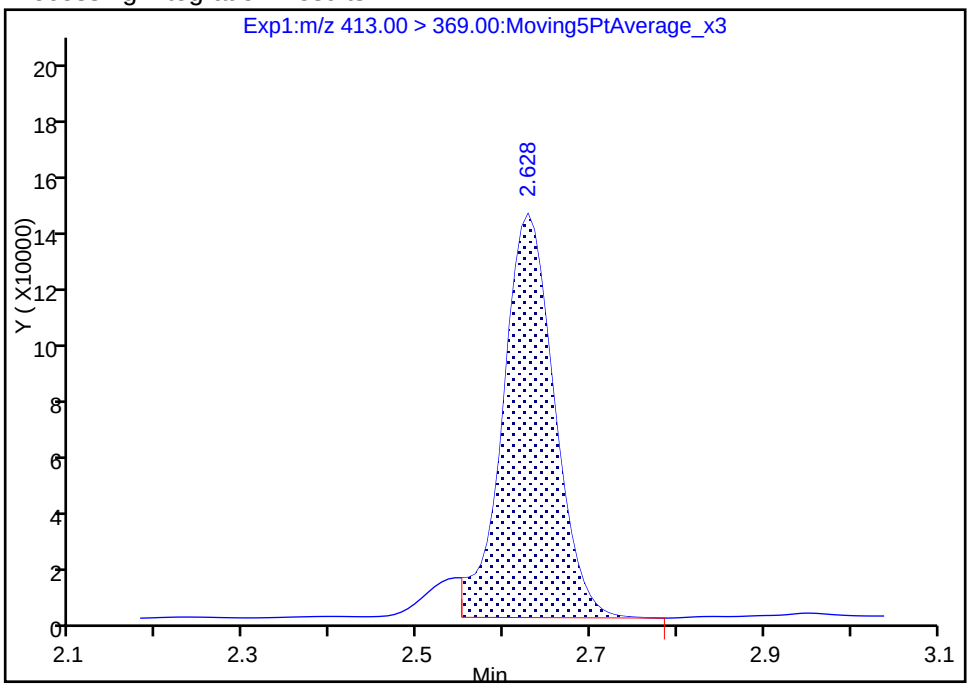
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_049.d				
Injection Date:	25-Jan-2018 23:54:12	Instrument ID:	A8_N		
Lims ID:	320-35310-A-20-A	Lab Sample ID:	320-35310-20		
Client ID:	FH-17-07_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	42	Worklist Smp#:	17
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

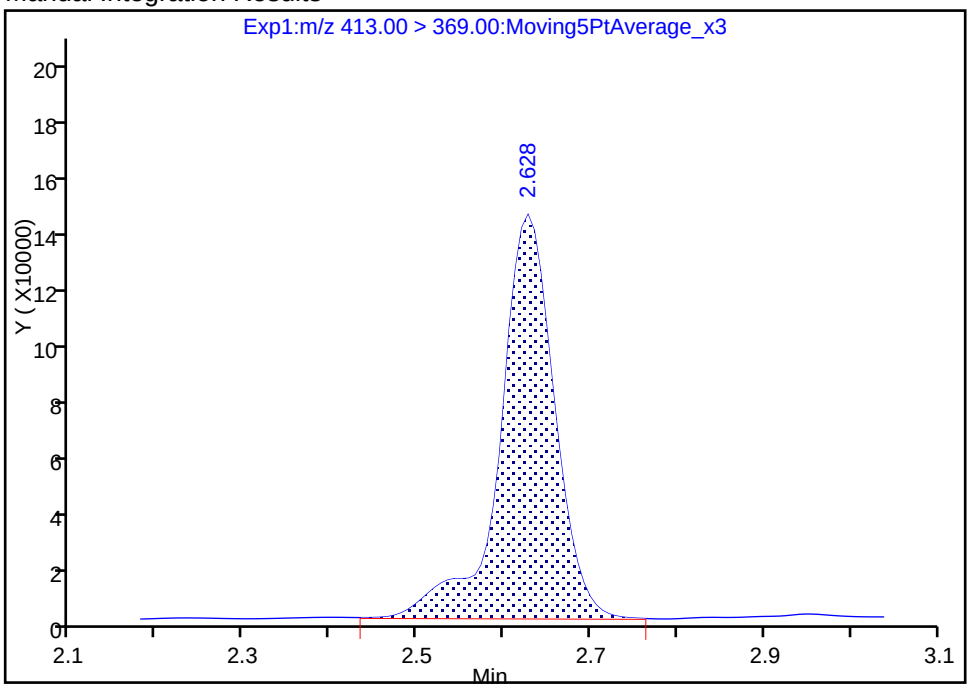
Processing Integration Results

RT: 2.63
Area: 589004
Amount: 0.262922
Amount Units: ng/ml



Manual Integration Results

RT: 2.63
Area: 632346
Amount: 0.282270
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:23:24

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_049.d

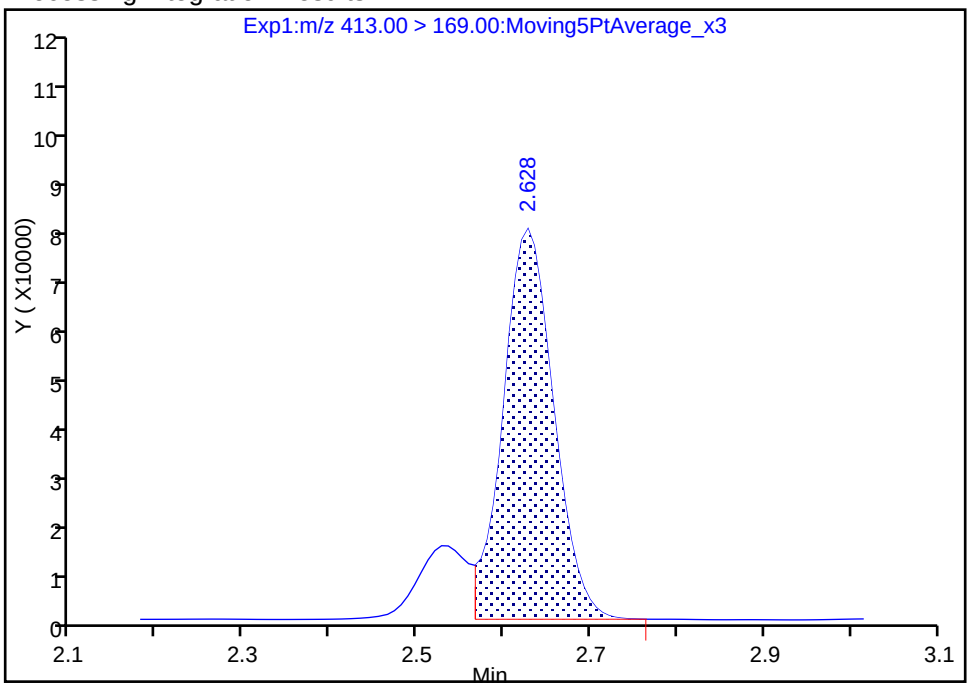
Injection Date:	25-Jan-2018 23:54:12	Instrument ID:	A8_N		
Lims ID:	320-35310-A-20-A	Lab Sample ID:	320-35310-20		
Client ID:	FH-17-07_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	42	Worklist Smp#:	17
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

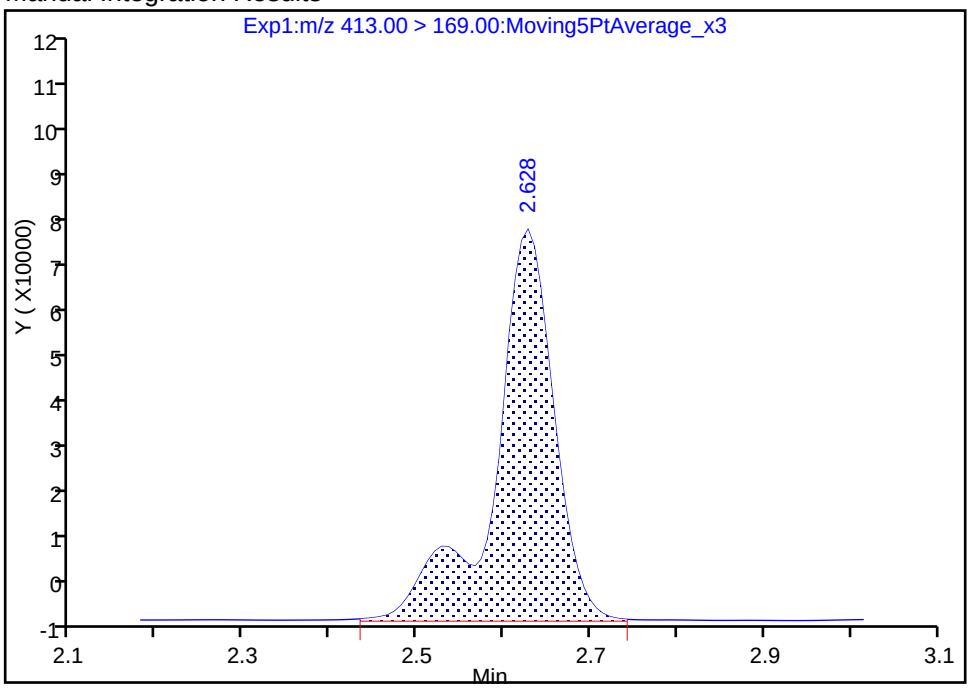
Processing Integration Results

RT: 2.63
Area: 304055
Amount: 0.262922
Amount Units: ng/ml



Manual Integration Results

RT: 2.63
Area: 365088
Amount: 0.282270
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 16:23:33

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-09_SO0005 | Lab Sample ID: 320-35310-21

Matrix: Solid | Lab File ID: 2018.01.26LLA_041.d

Analysis Method: 537 (modified) | Date Collected: 01/23/2018 11:50

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.05(g) | Date Analyzed: 01/26/2018 18:04

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 15.0 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.12	U	0.47	0.12	0.029
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.12	U	0.58	0.12	0.036
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.12	U	0.58	0.12	0.034
335-67-1	Perfluorooctanoic acid (PFOA)	0.23	U	0.58	0.23	0.10
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.58	U M	1.2	0.58	0.23
375-95-1	Perfluorononanoic acid (PFNA)	0.12	U	0.58	0.12	0.042

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	92		25-150
STL01892	13C4-PFHpA	93		25-150
STL00990	13C4 PFOA	100		25-150
STL00991	13C4 PFOS	103		25-150
STL00995	13C5 PFNA	101		25-150
STL02337	13C3-PFBS	94		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_041.d
Lims ID: 320-35310-A-21-A
Client ID: FH-17-09_SO0005
Sample Type: Client
Inject. Date: 26-Jan-2018 18:04:02 ALS Bottle#: 25 Worklist Smp#: 16
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-21-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 11:06:37 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 11:06:37

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.690	1.695	-0.005	0.642	89481	2.18		93.8	1022	
D 9 13C4-PFHpA										
367.00 > 322.00	2.267	2.267	0.0	0.862	4413345	2.32		92.8	33562	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.280	2.280	0.0	1.000	19005	0.007958			62.5	
399.00 > 99.00	2.280	2.280	0.0	1.000	5059		3.76(1.50-4.49)		17.0	
D 11 18O2 PFHxS										
403.00 > 84.00	2.280	2.282	-0.002	0.867	5072531	2.17		91.6	46514	
D 14 13C4 PFOA										
417.00 > 372.00	2.624	2.622	0.002	0.997	4646942	2.49		99.7	39410	
* 62 13C2-PFOA										
415.00 > 370.00	2.631	2.622	0.009		5175596	2.50			49834	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.631	2.623	0.008	1.003	15473	0.007102			8.6	
413.00 > 169.00	2.624	2.623	0.001	1.000	8327		1.86(0.84-2.52)		78.3	
D 19 13C5 PFNA										
468.00 > 423.00	3.002	2.992	0.010	1.141	3824680	2.53		101	37116	
17 Perfluorooctane sulfonic acid										M
499.00 > 80.00	3.002	2.992	0.010	1.000	31363	0.0184			74.1	
499.00 > 99.00	3.002	2.992	0.010	1.000	8103		3.87(2.31-6.93)		37.6	M
D 18 13C4 PFOS										
503.00 > 80.00	3.002	2.992	0.010	1.141	3641762	2.46		103	20528	
20 Perfluorononanoic acid										
463.00 > 419.00	3.002	2.992	0.010	1.000	17398	0.0110			32.3	
463.00 > 169.00	3.002	2.992	0.010	1.000	3301		5.27(1.90-5.69)		63.6	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 11:06:38 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_041.d

Injection Date: 26-Jan-2018 18:04:02 Instrument ID: A8_N

Lims ID: 320-35310-A-21-A Lab Sample ID: 320-35310-21

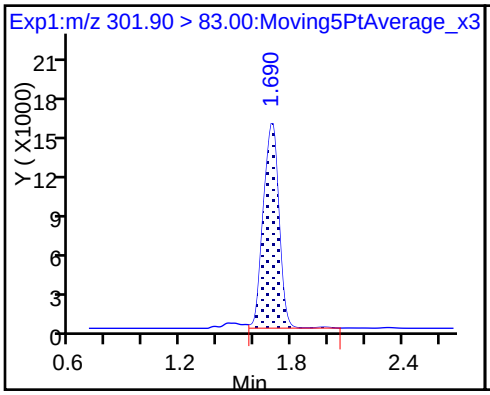
Client ID: FH-17-09_SO0005

Operator ID: SACINSTLCMS01 ALS Bottle#: 25 Worklist Smp#: 16

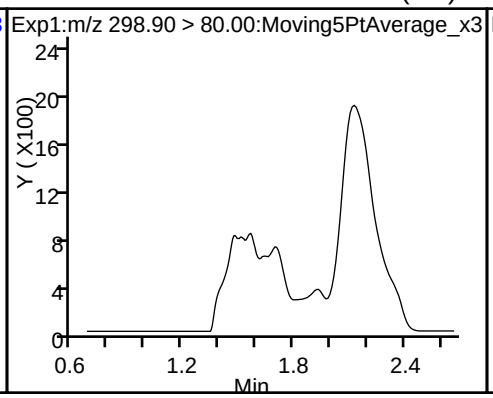
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

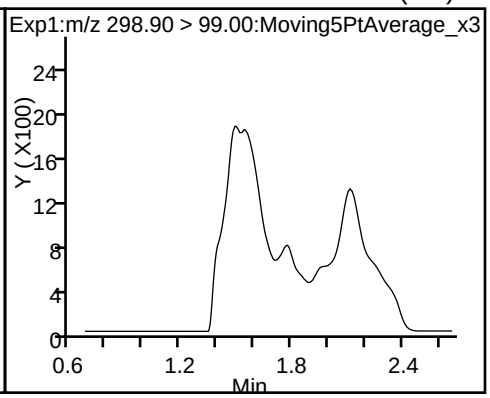
D 47 13C3-PFBS



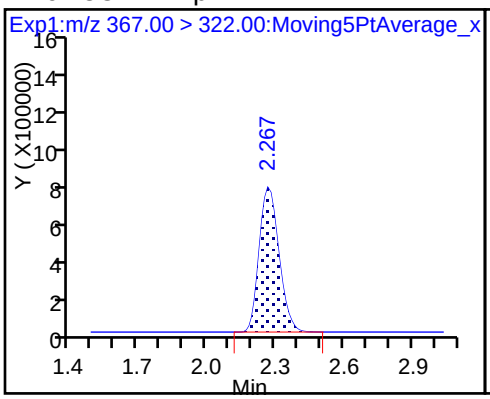
5 Perfluorobutanesulfonic acid (ND)



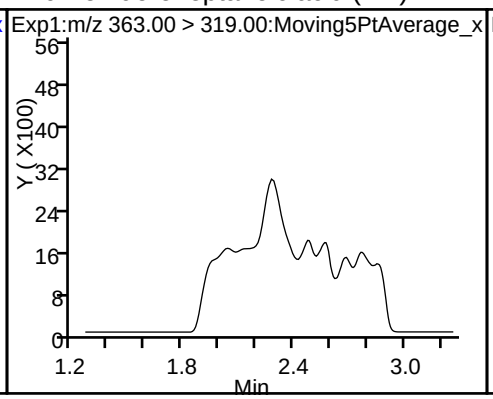
5 Perfluorobutanesulfonic acid (ND)



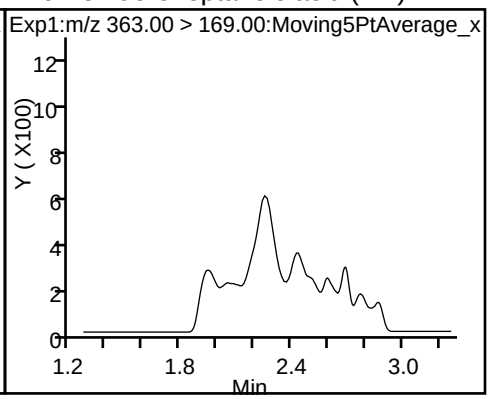
D 9 13C4-PFHpA



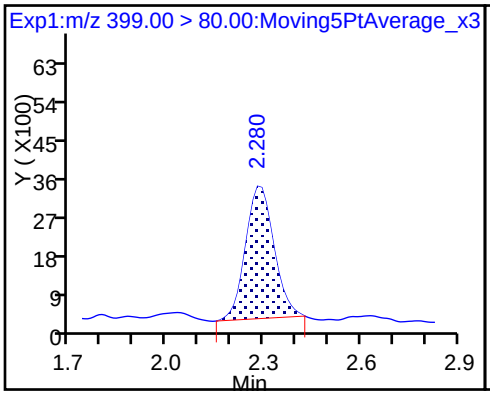
10 Perfluoroheptanoic acid (ND)



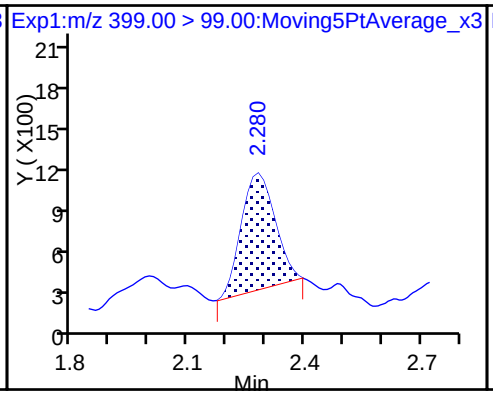
10 Perfluoroheptanoic acid (ND)



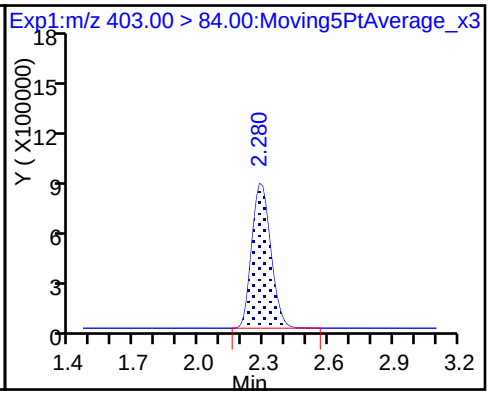
8 Perfluorohexanesulfonic acid



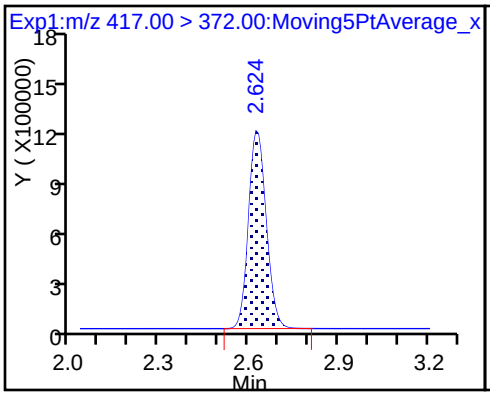
8 Perfluorohexanesulfonic acid



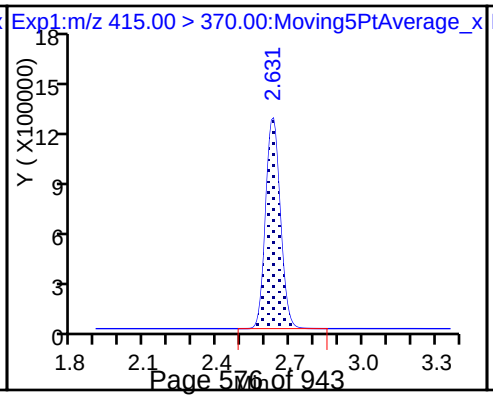
D 11 18O2 PFHxS



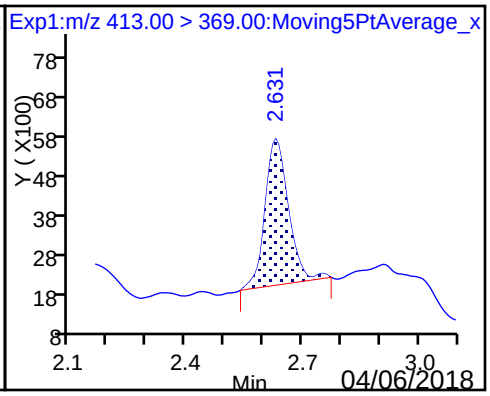
D 14 13C4 PFOA



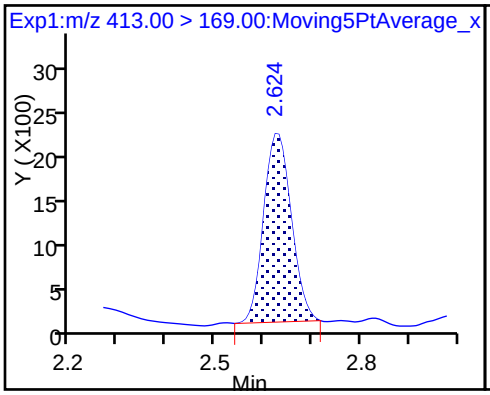
* 62 13C2-PFOA



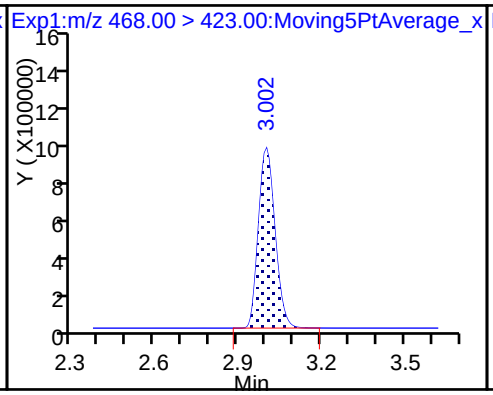
15 Perfluorooctanoic acid



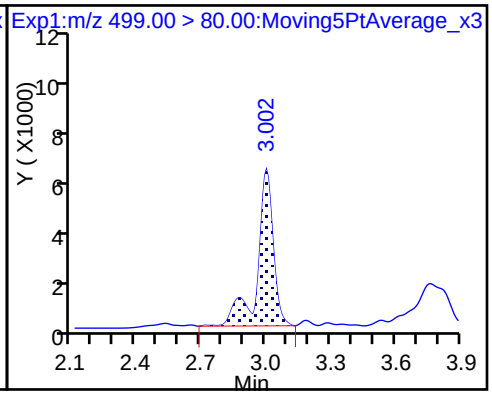
15 Perfluorooctanoic acid



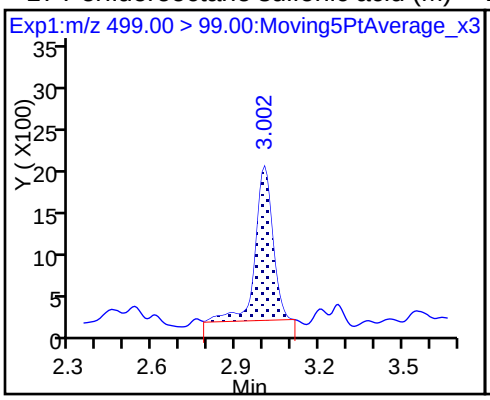
D 19 13C5 PFNA



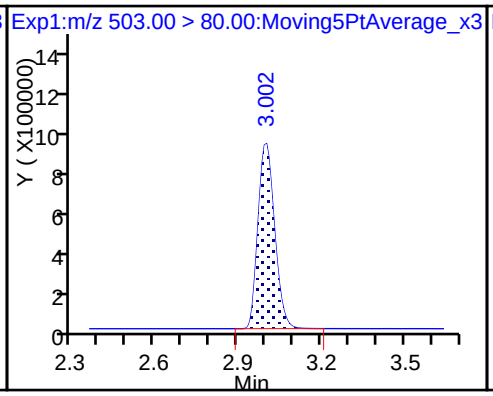
17 Perfluorooctane sulfonic acid



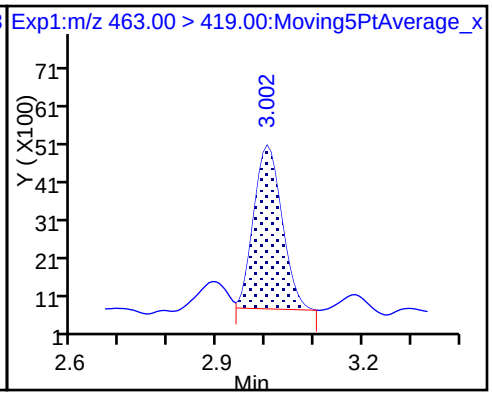
17 Perfluorooctane sulfonic acid (M)



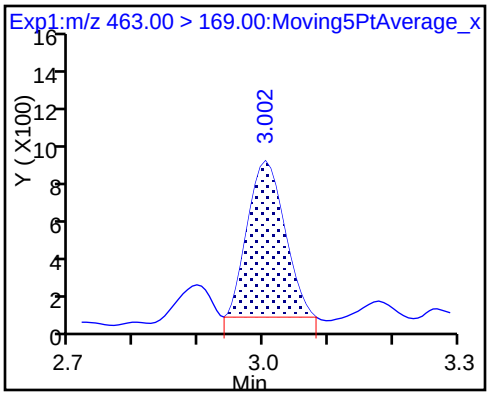
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

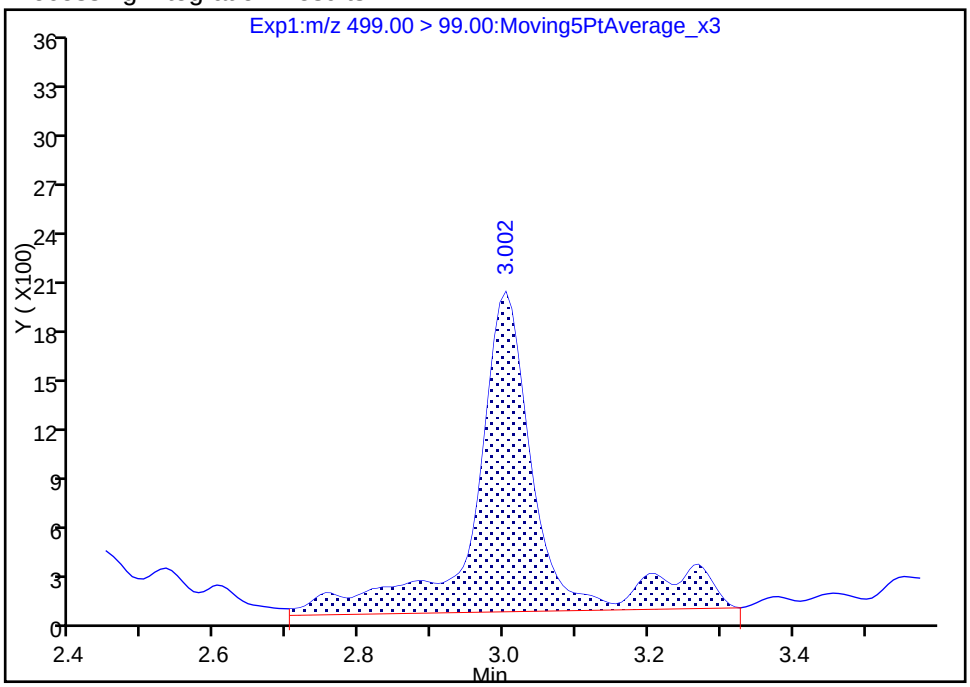
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_041.d				
Injection Date:	26-Jan-2018 18:04:02	Instrument ID:	A8_N		
Lims ID:	320-35310-A-21-A	Lab Sample ID:	320-35310-21		
Client ID:	FH-17-09_SO0005				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	25	Worklist Smp#:	16
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

17 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

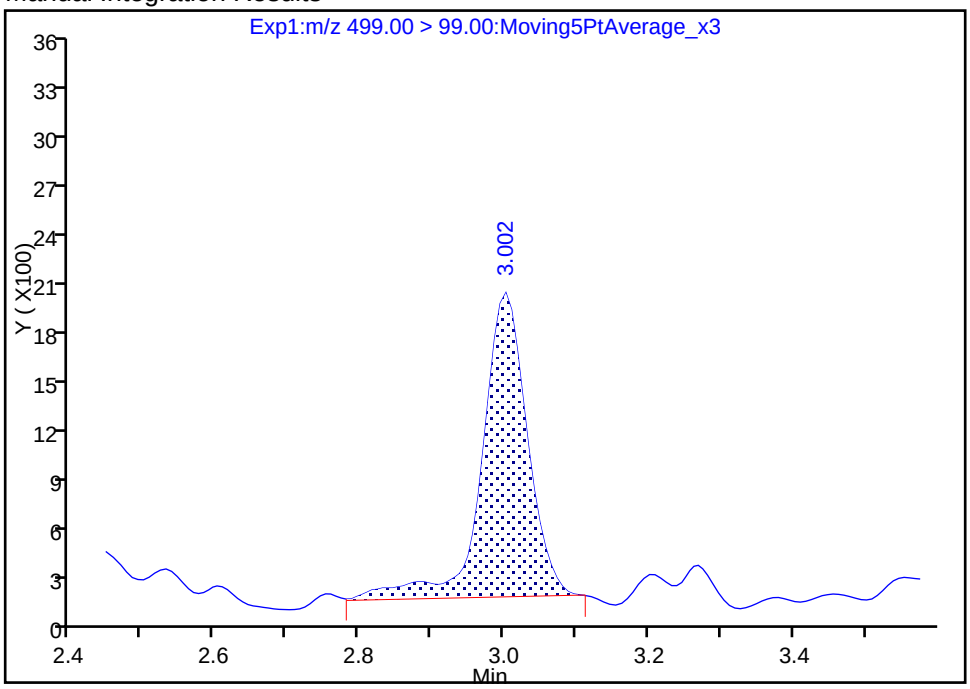
Processing Integration Results

RT: 3.00
Area: 12068
Amount: 0.018387
Amount Units: ng/ml



Manual Integration Results

RT: 3.00
Area: 8103
Amount: 0.018387
Amount Units: ng/ml



Reviewer: hannigana, 30-Jan-2018 11:06:13

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-09_GW012318 | Lab Sample ID: 320-35310-22

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_050.d

Analysis Method: 537 (modified) | Date Collected: 01/23/2018 11:45

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 256.6(mL) | Date Analyzed: 01/26/2018 00:02

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	18	M	1.9	0.97	0.45
375-85-9	Perfluoroheptanoic acid (PFHpA)	130		1.9	1.5	0.59
335-67-1	Perfluorooctanoic acid (PFOA)	160	M	1.9	1.5	0.53
375-95-1	Perfluorononanoic acid (PFNA)	19		1.9	1.5	0.51

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL01892	13C4-PFHpA	105		25-150
STL00990	13C4 PFOA	107		25-150
STL00995	13C5 PFNA	94		25-150
STL02337	13C3-PFBS	111		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_050.d
Lims ID: 320-35310-A-22-A
Client ID: FH-17-09_GW012318
Sample Type: Client
Inject. Date: 26-Jan-2018 00:02:04 ALS Bottle#: 43 Worklist Smp#: 18
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-22-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:53:07

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.689	1.695	-0.006	0.646	90398	2.57		111	1502	
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.689	1.697	-0.008	1.000	1369966	0.4563			1172	M
298.90 > 99.00	1.689	1.697	-0.008	1.000	575966		2.38(1.25-3.74)		924	M
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.866	4264000	2.62		105	31860	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.266	2.268	-0.002	1.000	6175643	3.29			7199	
363.00 > 169.00	2.266	2.268	-0.002	1.000	2351392		2.63(1.13-3.40)		15308	
8 Perfluorohexanesulfonic acid										E
399.00 > 80.00	2.279	2.280	-0.001	1.000	39234508	17.3			24643	E
399.00 > 99.00	2.279	2.280	-0.001	1.000	14309656		2.74(1.50-4.49)		26972	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.871	4817576	2.40		102	54826	
D 14 13C4 PFOA										
417.00 > 372.00	2.617	2.622	-0.005	1.000	4287816	2.69		107	42050	
* 62 13C2-PFOA										
415.00 > 370.00	2.617	2.622	-0.005		4433183	2.50			42582	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.617	2.623	-0.006	1.000	8069020	4.01			4054	
413.00 > 169.00	2.617	2.623	-0.006	1.000	4596689		1.76(0.84-2.52)		19482	M
D 19 13C5 PFNA										
468.00 > 423.00	2.986	2.992	-0.006	1.141	3051132	2.36		94.3	29227	
17 Perfluorooctane sulfonic acid										E
499.00 > 80.00	2.867	2.992	-0.125	0.960	111854142	80.5			15696	E
499.00 > 99.00	2.986	2.992	-0.006	1.000	28474914		3.93(2.31-6.93)		28855	
D 18 13C4 PFOS										
503.00 > 80.00	2.986	2.992	-0.006	1.141	2967590	2.34		97.8	14545	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	2.994	2.992	0.002	1.003	622582	0.4942			486	
463.00 > 169.00	2.986	2.992	-0.006	1.000	151638		4.11(1.90-5.69)		782	

QC Flag Legend

Processing Flags

E - Exceeded Maximum Amount

Review Flags

M - Manually Integrated

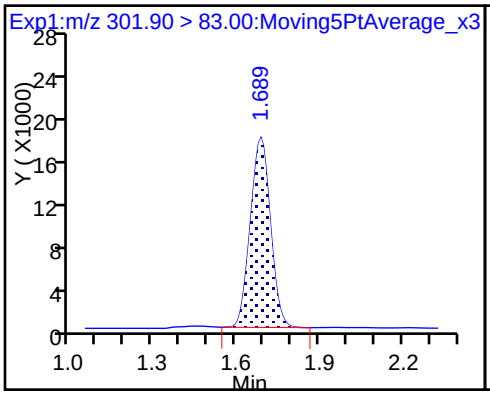
Report Date: 30-Jan-2018 10:22:55 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

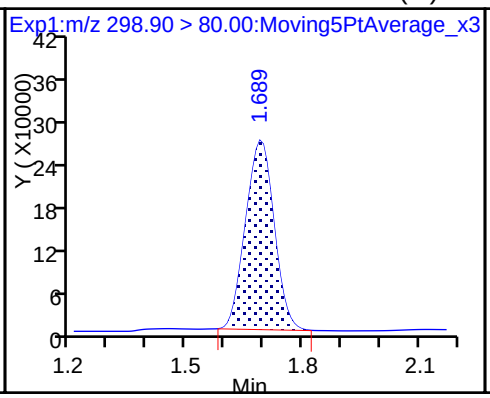
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_050.d

Injection Date:	26-Jan-2018 00:02:04	Instrument ID:	A8_N		
Lims ID:	320-35310-A-22-A	Lab Sample ID:	320-35310-22		
Client ID:	FH-17-09_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	43	Worklist Smp#:	18
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		

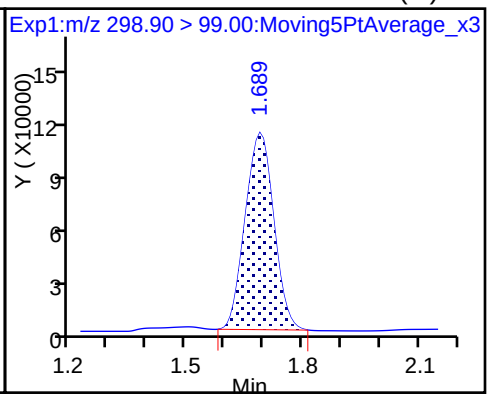
D 47 13C3-PFBS



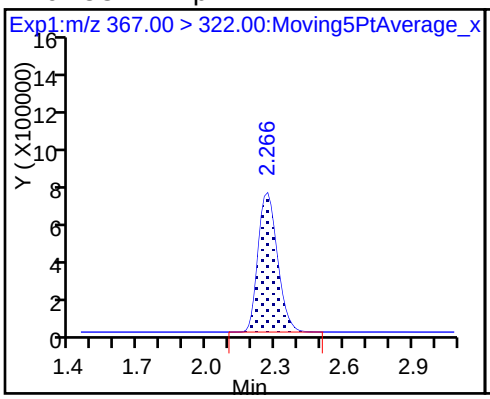
5 Perfluorobutanesulfonic acid (M)



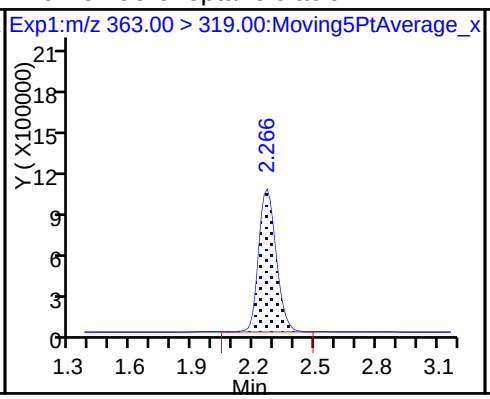
5 Perfluorobutanesulfonic acid (M)



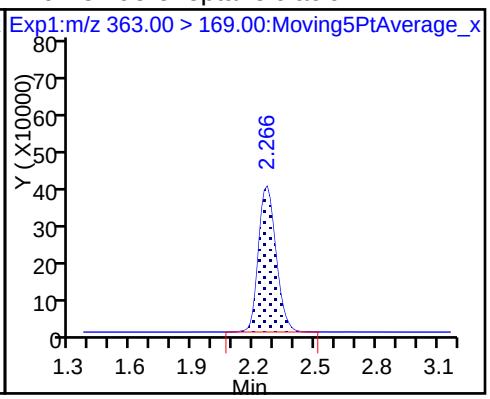
D 9 13C4-PFHpA



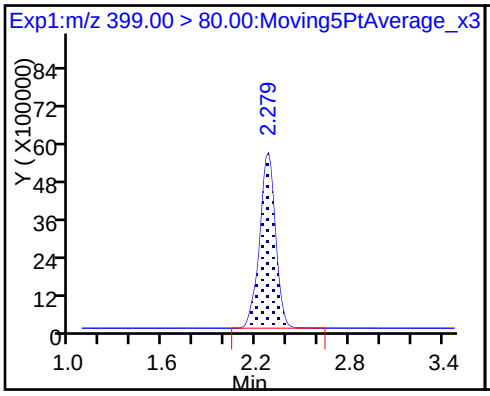
10 Perfluoroheptanoic acid



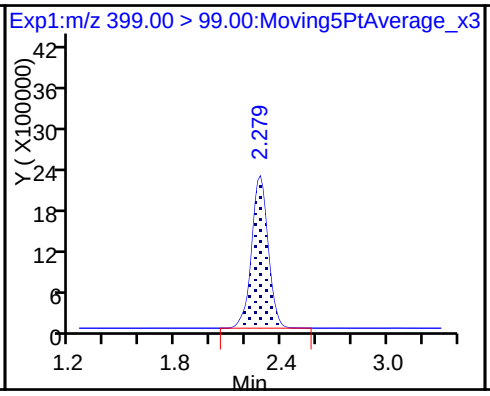
10 Perfluoroheptanoic acid



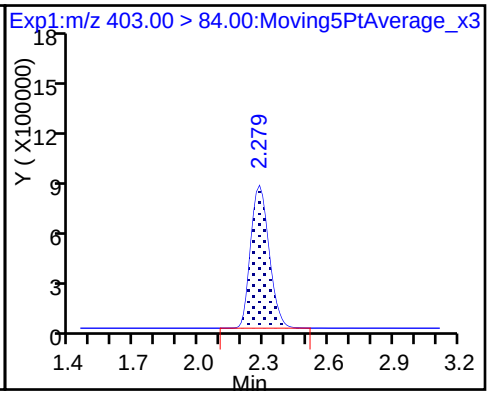
8 Perfluorohexanesulfonic acid



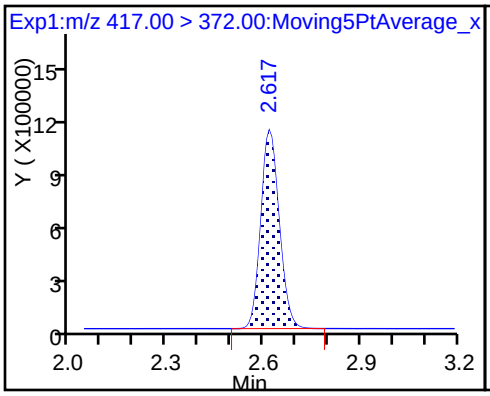
8 Perfluorohexanesulfonic acid



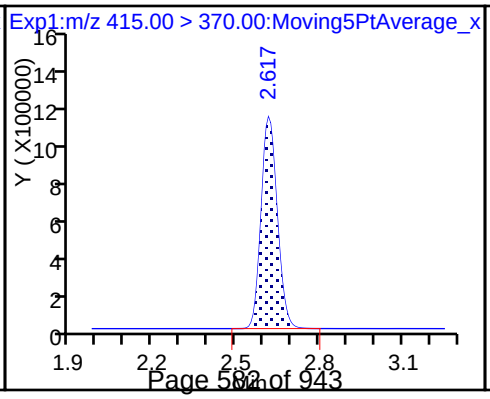
D 11 18O2 PFHxS



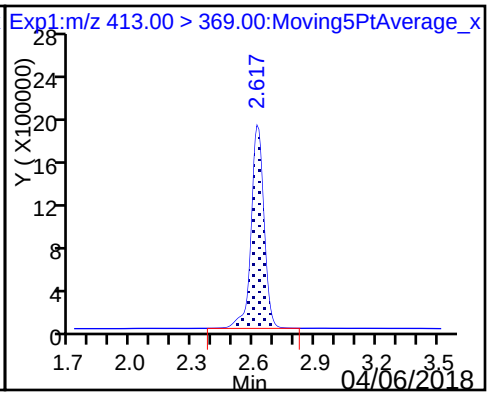
D 14 13C4 PFOA



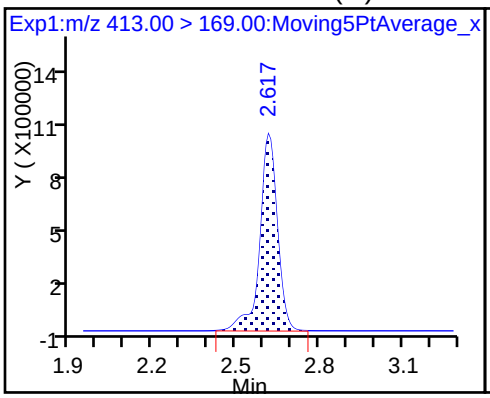
* 62 13C2-PFOA



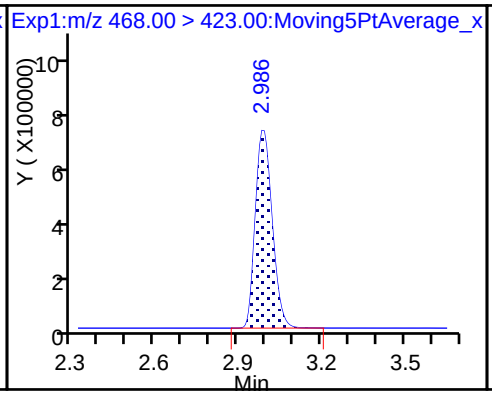
15 Perfluorooctanoic acid



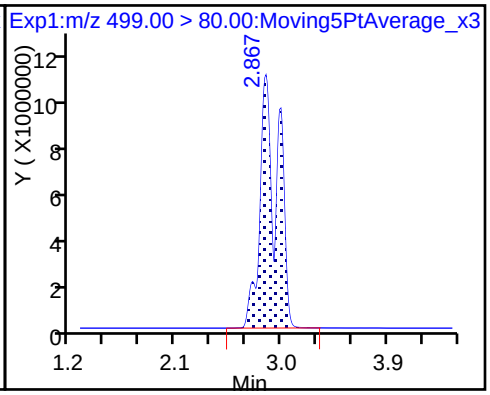
15 Perfluorooctanoic acid (M)



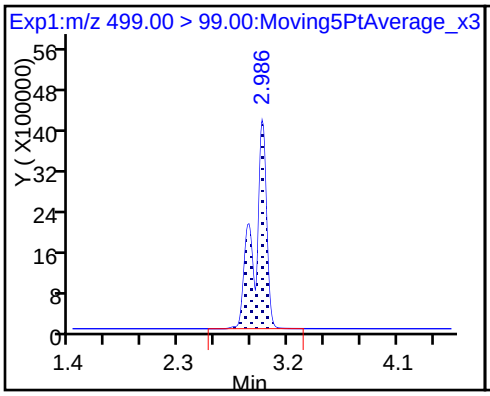
D 19 13C5 PFNA



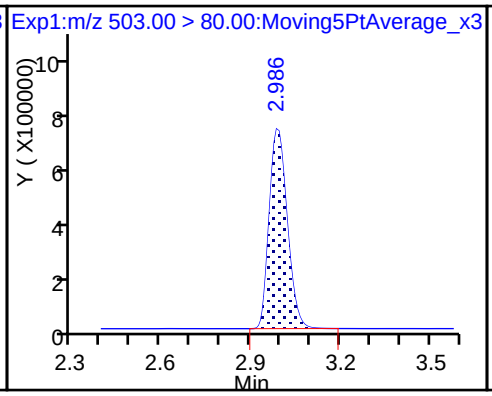
17 Perfluorooctane sulfonic acid



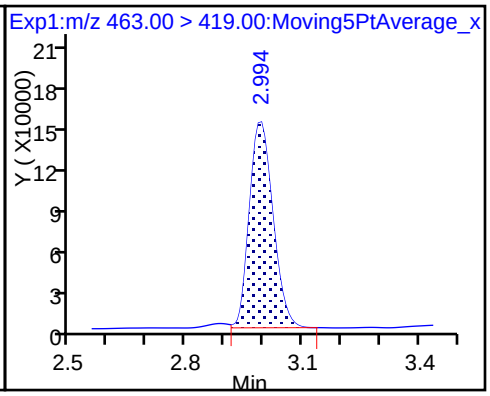
17 Perfluorooctane sulfonic acid



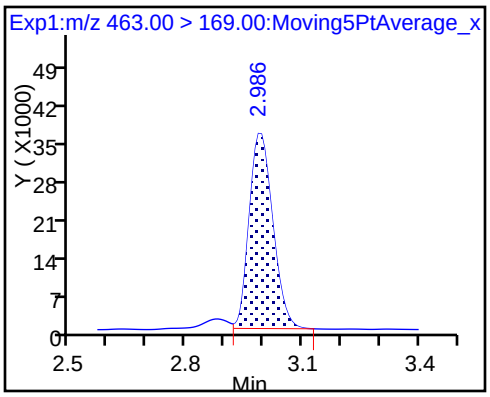
D 18 13C4 PFOS



20 Perfluorononanoic acid



20 Perfluorononanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

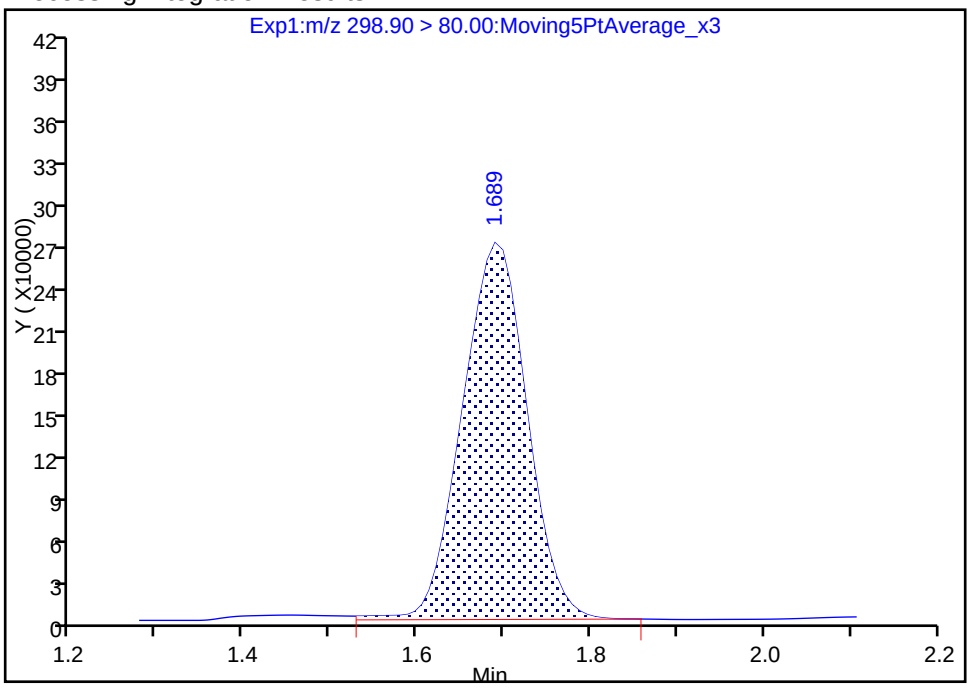
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_050.d				
Injection Date:	26-Jan-2018 00:02:04	Instrument ID:	A8_N		
Lims ID:	320-35310-A-22-A	Lab Sample ID:	320-35310-22		
Client ID:	FH-17-09_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	43	Worklist Smp#:	18
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

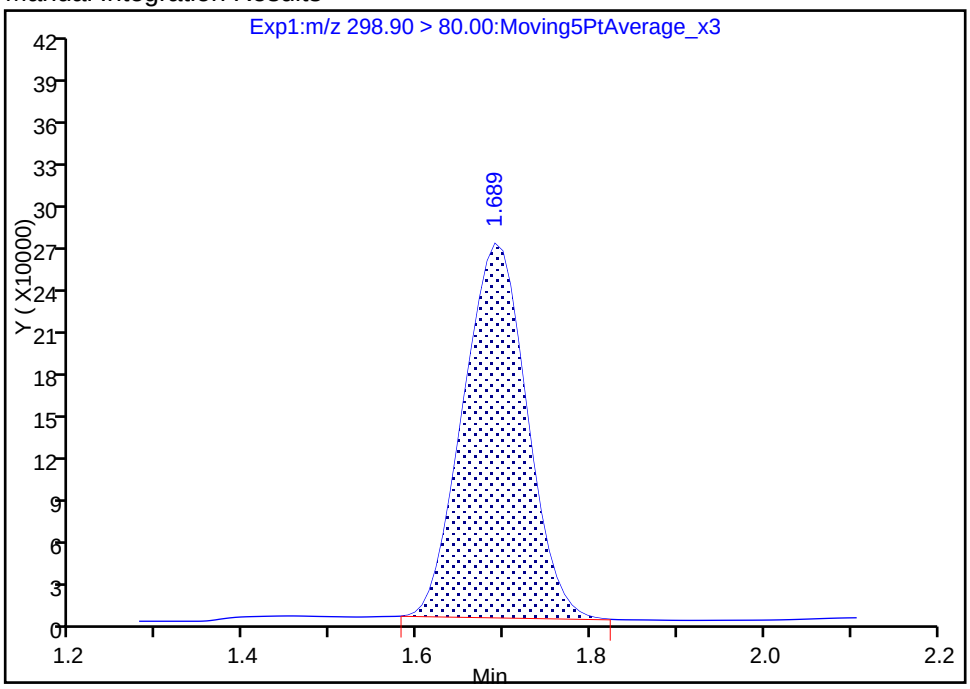
Processing Integration Results

RT: 1.69
Area: 1402573
Amount: 0.467197
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 1369966
Amount: 0.456336
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:46:12

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_050.d

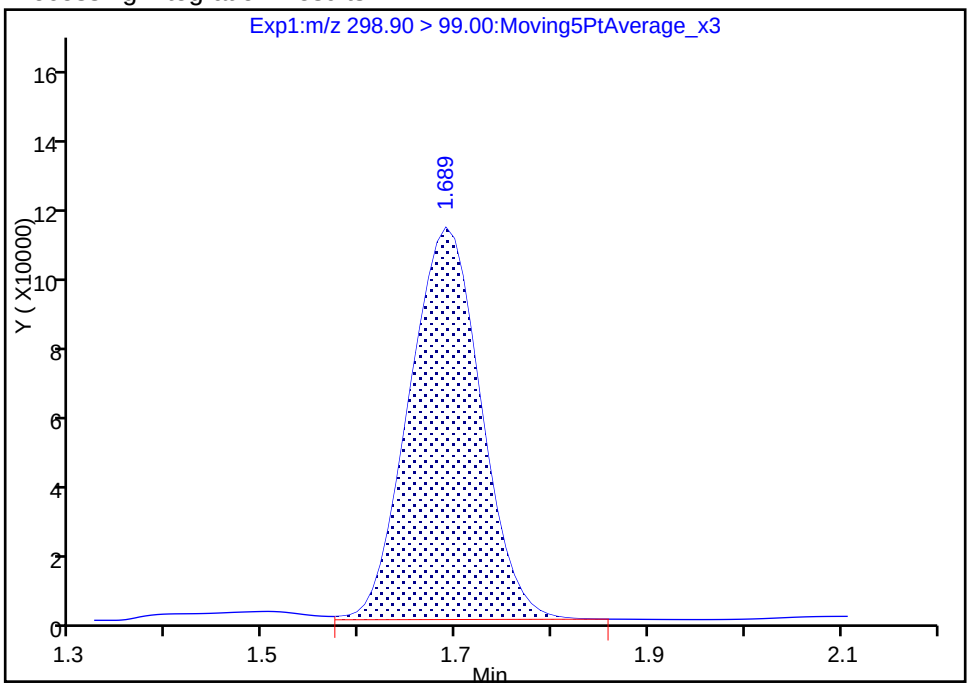
Injection Date:	26-Jan-2018 00:02:04	Instrument ID:	A8_N		
Lims ID:	320-35310-A-22-A	Lab Sample ID:	320-35310-22		
Client ID:	FH-17-09_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	43	Worklist Smp#:	18
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

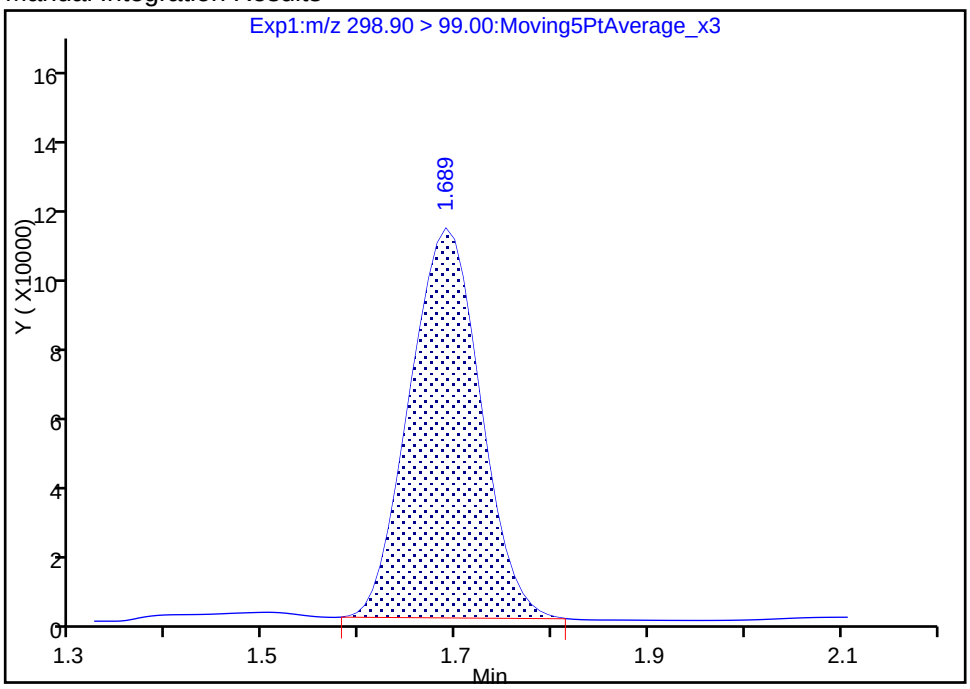
Processing Integration Results

RT: 1.69
Area: 586548
Amount: 0.467197
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 575966
Amount: 0.456336
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:46:20

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

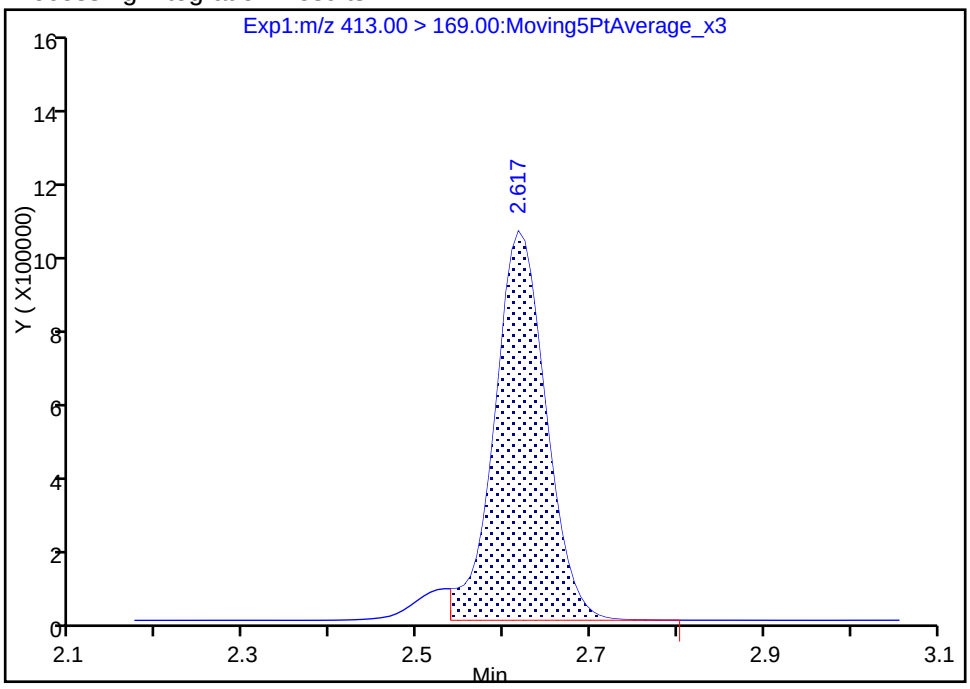
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_050.d				
Injection Date:	26-Jan-2018 00:02:04	Instrument ID:	A8_N		
Lims ID:	320-35310-A-22-A	Lab Sample ID:	320-35310-22		
Client ID:	FH-17-09_GW012318				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	43	Worklist Smp#:	18
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

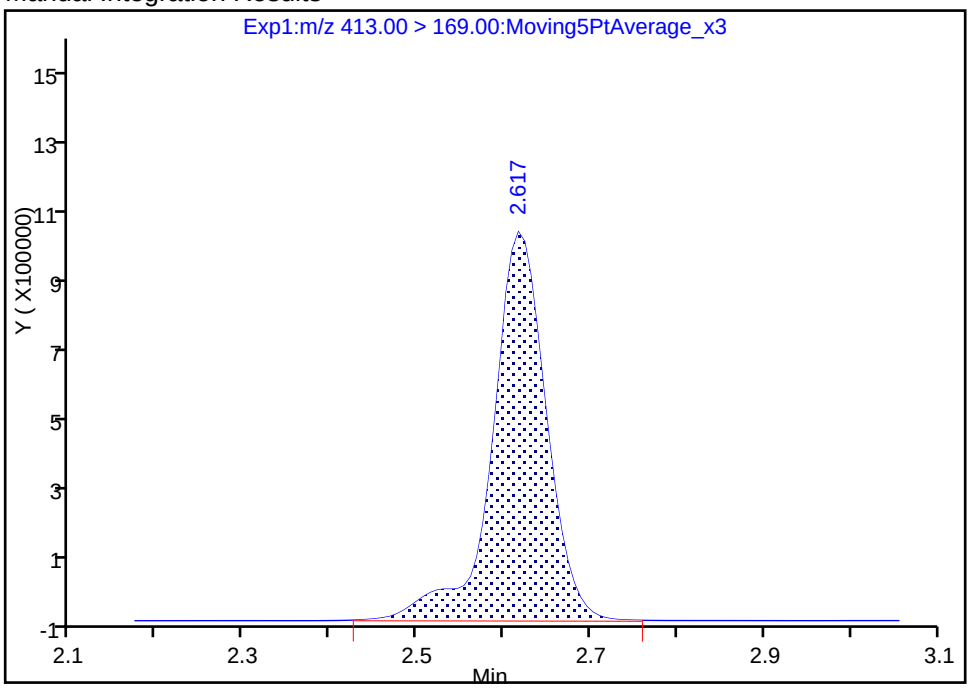
Processing Integration Results

RT: 2.62
Area: 4331849
Amount: 4.013871
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 4596689
Amount: 4.013871
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:46:50

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-09_GW012318 DL Lab Sample ID: 320-35310-22 DL

Matrix: Water Lab File ID: 2018.01.26LLA_071.d

Analysis Method: 537 (modified) Date Collected: 01/23/2018 11:45

Extraction Method: 3535 Date Extracted: 01/25/2018 09:10

Sample wt/vol: 256.6(mL) Date Analyzed: 01/26/2018 21:58

Con. Extract Vol.: 10.00(mL) Dilution Factor: 20

Injection Volume: 2(uL) GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 205928 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	780	D	39	19	7.4
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	4000	D	78	58	21

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	112		25-150
STL00991	13C4 PFOS	121		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_071.d
Lims ID: 320-35310-A-22-A
Client ID: FH-17-09_GW012318
Sample Type: Client
Inject. Date: 26-Jan-2018 21:58:34 ALS Bottle#: 48 Worklist Smp#: 6
Injection Vol: 2.0 ul Dil. Factor: 20.0000
Sample Info: 320-35310-a-22-a 20X
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:54:17 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: phomsophat Date: 29-Jan-2018 14:04:07

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 47 13C3-PFBS										
301.90 > 83.00	1.690	1.706	-0.016	0.644	4837	0.1298		112	139	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.699	1.706	-0.007	1.005	66083	0.0206			228	
298.90 > 99.00	1.699	1.706	-0.007	1.005	31711		2.08(1.25-3.74)		184	
D 9 13C4-PFHpA										
367.00 > 322.00	2.267	2.278	-0.011	0.864	237934	0.1378		110	2922	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.267	2.278	-0.011	1.000	349292	0.1670			526	
363.00 > 169.00	2.267	2.278	-0.011	1.000	135324		2.58(1.13-3.40)		1206	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.280	2.291	-0.011	1.000	2638439	1.00			9353	
399.00 > 99.00	2.280	2.291	-0.011	1.000	837465		3.15(1.50-4.49)		4740	
D 11 18O2 PFHxS										
403.00 > 84.00	2.280	2.291	-0.011	0.869	281423	0.1324		112	9576	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.635	-0.012	1.000	240216	0.1419		114	3807	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.635	-0.012		234950	0.1250			3878	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.623	2.635	-0.012	1.000	453326	0.2013			189	
413.00 > 169.00	2.623	2.635	-0.012	1.000	234082		1.94(0.84-2.52)		2692	M
D 18 13C4 PFOS										
503.00 > 80.00	2.993	3.007	-0.014	1.141	194281	0.1444		121	3463	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.867	3.015	-0.148	0.958	9412834	5.17			8894	
499.00 > 99.00	2.993	3.015	-0.022	1.000	1769991		5.32(2.31-6.93)		8383	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	3.015	-0.022	1.141	187970	0.1370		110	4660	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	3.015	-0.022	1.000	37247	0.0240			91.7	
463.00 > 169.00	2.993	3.015	-0.022	1.000	9129		4.08(1.90-5.69)		341	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:54:23 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_071.d

Injection Date: 26-Jan-2018 21:58:34 Instrument ID: A8_N

Lims ID: 320-35310-A-22-A Lab Sample ID: 320-35310-22

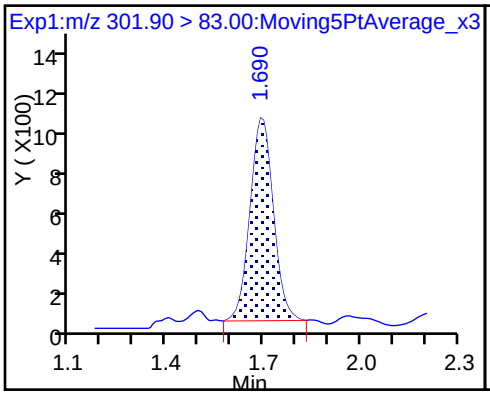
Client ID: FH-17-09_GW012318

Operator ID: SACINSTLCMS01 ALS Bottle#: 48 Worklist Smp#: 6

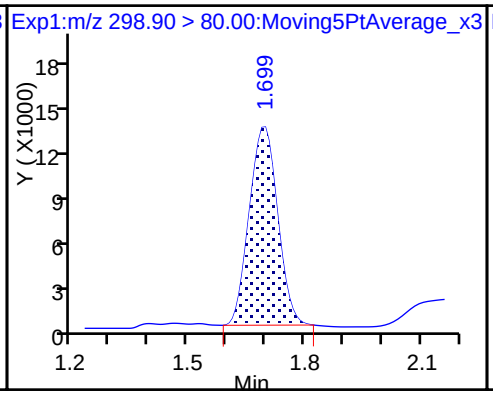
Injection Vol: 2.0 ul Dil. Factor: 20.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

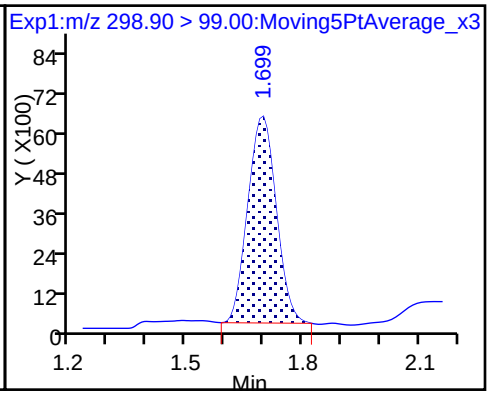
D 47 13C3-PFBS



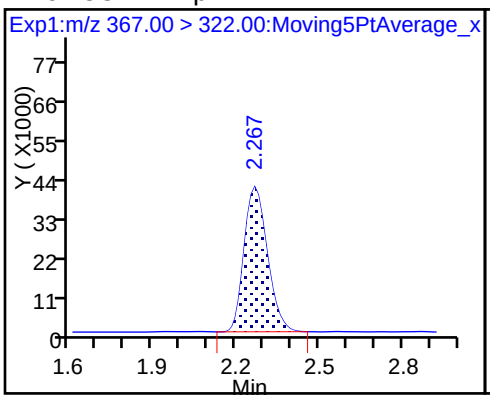
5 Perfluorobutanesulfonic acid



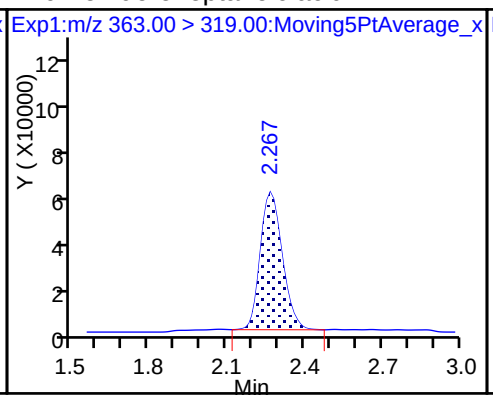
5 Perfluorobutanesulfonic acid



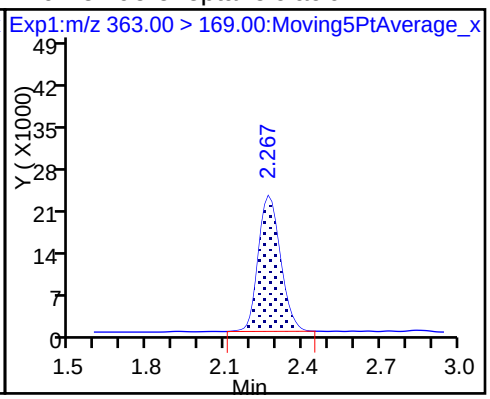
D 9 13C4-PFHpA



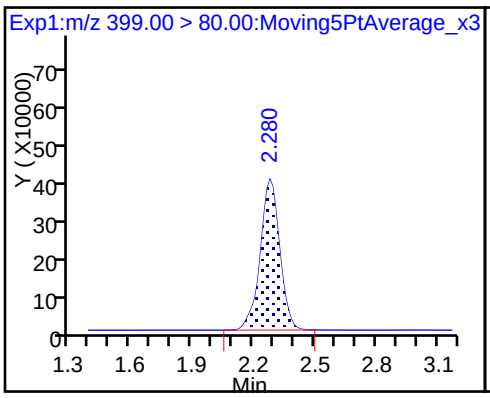
10 Perfluoroheptanoic acid



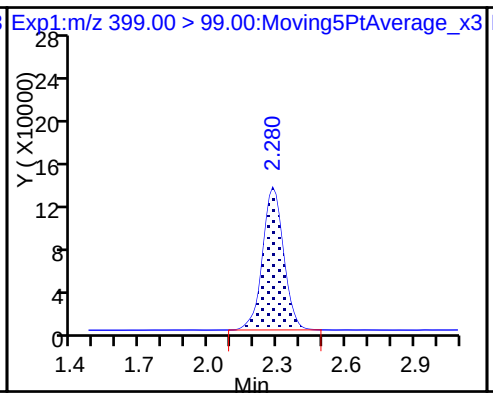
10 Perfluoroheptanoic acid



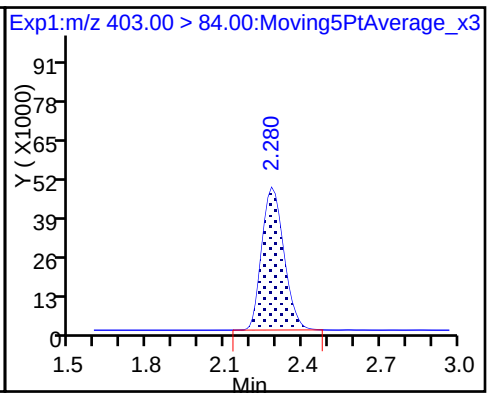
8 Perfluorohexanesulfonic acid



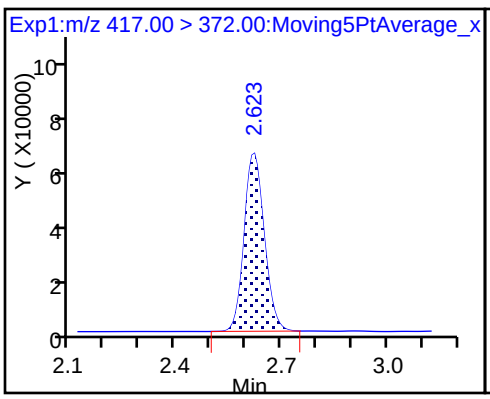
8 Perfluorohexanesulfonic acid



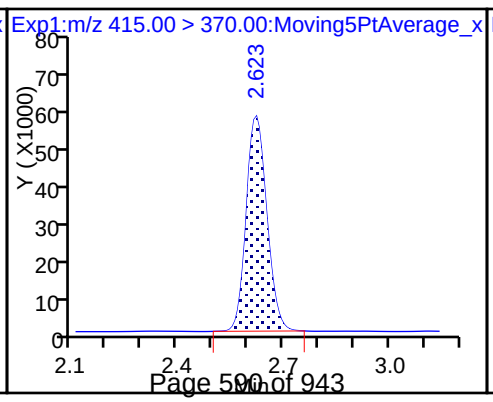
D 11 18O2 PFHxS



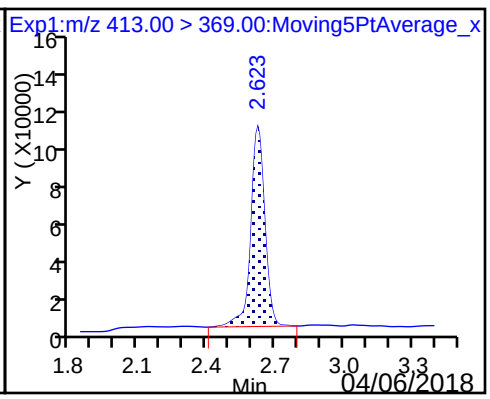
D 14 13C4 PFOA



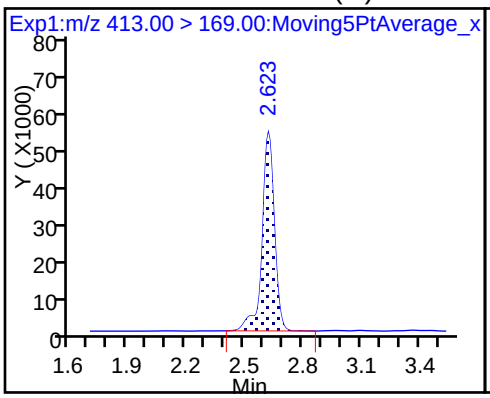
* 62 13C2-PFOA



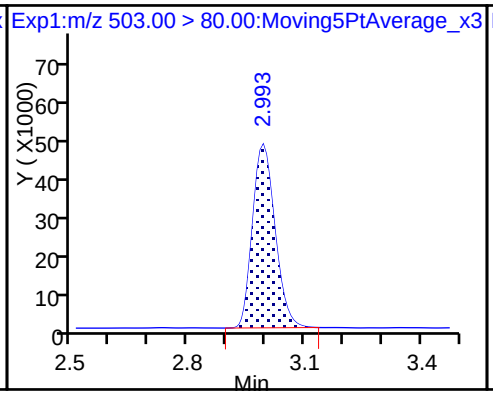
15 Perfluorooctanoic acid



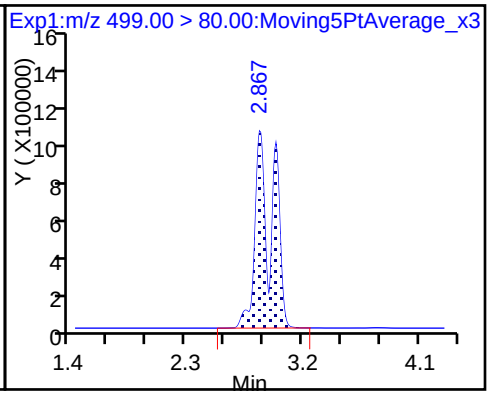
15 Perfluorooctanoic acid (M)



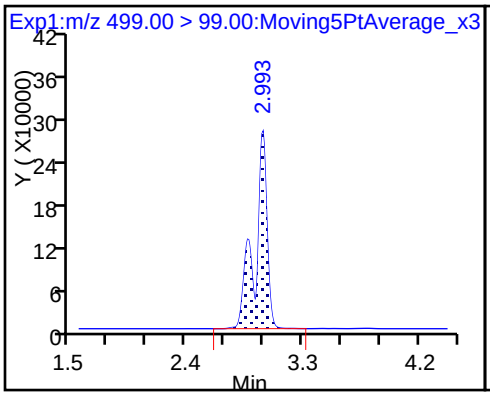
D 18 13C4 PFOS



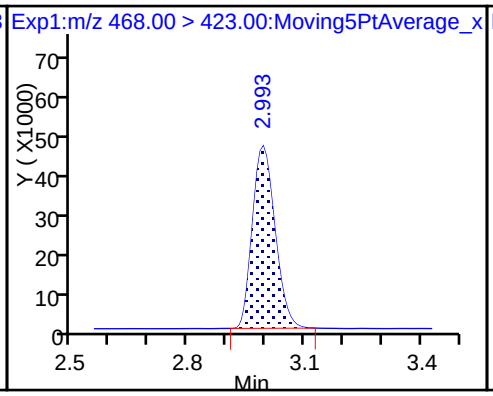
17 Perfluorooctane sulfonic acid



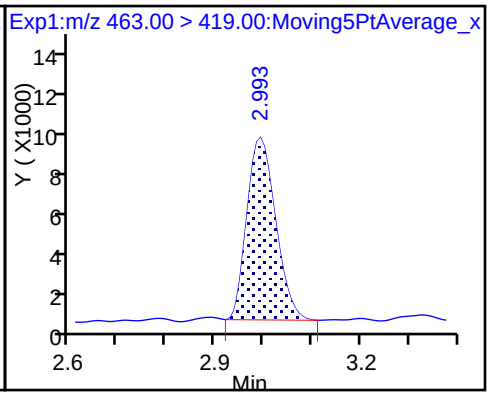
17 Perfluorooctane sulfonic acid



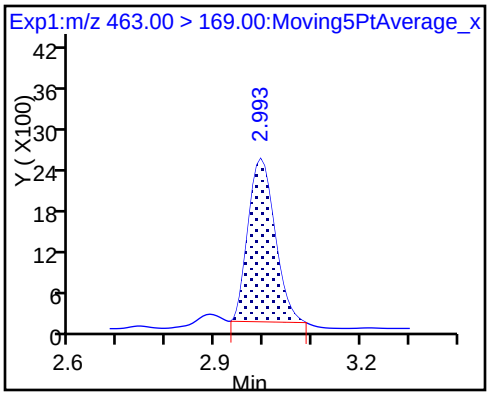
D 19 13C5 PFNA



20 Perfluorononanoic acid



20 Perfluorononanoic acid



FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1 Analy Batch No.: 204375

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/17/2018 14:19 Calibration End Date: 01/17/2018 15:06 Calibration ID: 37572

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-204375/2	2018.01.17CURVELLA_002.d
Level 2	IC 320-204375/3	2018.01.17CURVELLA_003.d
Level 3	IC 320-204375/4	2018.01.17CURVELLA_004.d
Level 4	IC 320-204375/5	2018.01.17CURVELLA_005.d
Level 5	IC 320-204375/6	2018.01.17CURVELLA_006.d
Level 6	IC 320-204375/7	2018.01.17CURVELLA_007.d
Level 7	IC 320-204375/8	2018.01.17CURVELLA_008.d

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)	0.9492 0.9454	0.9387 0.9305	0.9217	0.9121	0.9423	AveID		0.9343				1.4		35.0			
Perfluoropentanoic acid (PFPeA)	1.2629 1.1486	1.1820 1.1603	1.1793	1.1351	1.1782	AveID		1.1781				3.5		35.0			
Perfluorobutanesulfonic acid (PFBS)	77.125 80.005	75.338 74.458	80.939	77.763	74.861	AveID		77.213				3.3		50.0			
4:2 FTS	14.861 14.172	13.294 14.456	13.574	13.365	13.533	AveID		13.894				4.4		35.0			
Perfluorohexanoic acid (PFHxA)	1.1691 1.0364	1.0016 1.0049	1.0117	1.0418	0.9896	AveID		1.0365				5.9		35.0			
Perfluoroheptanoic acid (PFHpA)	1.0781 1.1040	1.1090 1.0717	1.2181	1.0322	1.0801	AveID		1.0990				5.3		35.0			
Perfluorohexanesulfonic acid (PFHxS)	1.2907 1.1001	1.1727 1.0631	1.0672	1.0113	1.0892	AveID		1.1135				8.3		35.0			
6:2FTS	1.8237 1.7817	1.5350 1.6869	1.5599	1.5572	1.6409	AveID		1.6551				6.9		35.0			
Perfluorooctanoic acid (PFOA)	1.3391 1.1097	1.2175 1.1351	1.1389	1.1301	1.1344	AveID		1.1721				6.9		35.0			
Perfluoroheptanesulfonic Acid (PFHpS)	1.2991 1.4080	1.3017 1.3785	1.3248	1.3329	1.4365	AveID		1.3545				4.0		50.0			
Perfluorononanoic acid (PFNA)	1.0065 1.0724	0.9779 1.0322	1.0085	1.0513	1.0771	AveID		1.0323				3.6		35.0			
Perfluorooctanesulfonic acid (PFOS)	1.1888 1.1074	1.1027 1.1406	1.0854	1.0789	1.1321	AveID		1.1194				3.4		35.0			
Perfluorooctane Sulfonamide (FOSA)	0.9734 1.0164	0.9422 0.9708	0.9781	0.9630	1.0326	AveID		0.9823				3.2		35.0			
8:2FTS	1.1123 1.2810	1.2494 1.2330	1.2204	1.1973	1.2254	AveID		1.2170				4.4		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.: 320-35310-1 Analy Batch No.: 204375

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/17/2018 14:19 Calibration End Date: 01/17/2018 15:06 Calibration ID: 37572

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								
Perfluorodecanoic acid (PFDA)	0.9958 1.0058	0.9255 0.9904	0.9962	0.9341	0.9440	AveID		0.9702				3.5		35.0			
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	1.1587 1.0920	1.0556 1.1156	1.0118	1.0520	1.0759	AveID		1.0802				4.4		35.0			
Perfluorodecanesulfonic acid (PFDS)	0.6602 0.6484	0.5989 0.6844	0.6566	0.6572	0.6784	AveID		0.6549				4.2		50.0			
Perfluoroundecanoic acid (PFUnA)	1.2159 0.9998	1.0169 1.0224	1.0056	0.9503	1.0142	AveID		1.0322				8.2		35.0			
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	0.9515 1.0073	0.9715 1.0104	0.9434	0.9222	1.0107	AveID		0.9739				3.7		35.0			
Perfluorododecanoic acid (PFDoA)	0.9260 1.0217	1.0424 1.0415	1.0407	1.0402	1.0605	AveID		1.0247				4.4		35.0			
Perfluorotridecanoic Acid (PFTriA)	1.3513 1.1017	1.1184 1.1380	1.0705	1.1935	1.1553	AveID		1.1612				8.0		50.0			
Perfluorotetradecanoic acid (PFTeA)	0.2670 0.2417	0.2330 0.2473	0.2354	0.2343	0.2495	AveID		0.2440				4.9		50.0			
Perfluoro-n-hexadecanoic acid (PFHxDA)	+++++ 0.9569	1.3189 0.9411	0.9976	0.9485	0.9929	L2ID	0.0183	0.9474							0.9990		0.9900
Perfluoro-n-octadecanoic acid (PFODA)	1.0044 1.1214	0.9618 1.0904	1.0301	1.0498	1.1172	AveID		1.0536				5.7		50.0			
13C4 PFBA	1.5259 1.5432	1.4941 1.5278	1.4952	1.4862	1.5144	Ave		1.5124				1.4		50.0			
13C5-PFPeA	0.8953 0.9232	0.9039 0.8803	0.8845	0.8952	0.8865	Ave		0.8956				1.6		50.0			
13C3-PFBS	0.0201 0.0200	0.0191 0.0199	0.0196	0.0193	0.0207	Ave		0.0198				2.7		50.0			
13C2 PFHxA	0.9582 0.9743	0.9588 0.9515	0.9851	0.9384	0.9878	Ave		0.9649				1.9		50.0			
13C4-PFHpA	0.9403 0.9242	0.9318 0.8808	0.9077	0.9173	0.9288	Ave		0.9187				2.1		50.0			
18O2 PFHxS	1.1706 1.1114	1.1402 1.1088	1.1523	1.1305	1.1042	Ave		1.1311				2.2		50.0			
M2-6:2FTS	0.1667 0.1660	0.1714 0.1654	0.1731	0.1738	0.1725	Ave		0.1699				2.1		50.0			
13C4 PFOA	0.9250 0.9076	0.8991 0.8635	0.9088	0.8785	0.9201	Ave		0.9004				2.5		50.0			
13C4 PFOS	0.7222 0.7287	0.7129 0.6942	0.7303	0.7109	0.7113	Ave		0.7158				1.7		50.0			
13C5 PFNA	0.7504 0.7333	0.7406 0.7157	0.7466	0.7136	0.7096	Ave		0.7300				2.3		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.: 320-35310-1 Analy Batch No.: 204375

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/17/2018 14:19 Calibration End Date: 01/17/2018 15:06 Calibration ID: 37572

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								
13C8 FOSA	1.0308 0.9887	1.0350 0.9639	1.0156	1.0178	0.9955	Ave		1.0067				2.5		50.0			
M2-8:2FTS	0.1862 0.1771	0.1796 0.1819	0.1811	0.1727	0.1782	Ave		0.1795				2.3		50.0			
13C2 PFDA	0.6444 0.6295	0.6287 0.6181	0.6279	0.6313	0.6343	Ave		0.6306				1.2		50.0			
d3-NMeFOSAA	0.3174 0.3180	0.3130 0.3163	0.3169	0.3149	0.3063	Ave		0.3147				1.3		50.0			
d5-NEtFOSAA	0.3461 0.3155	0.3243 0.2973	0.3232	0.3158	0.3054	Ave		0.3182				4.9		50.0			
13C2 PFUnA	0.4983 0.4862	0.4847 0.4512	0.4836	0.4728	0.4716	Ave		0.4783				3.1		50.0			
13C2 PFDoA	0.5470 0.5260	0.5388 0.4978	0.5263	0.4927	0.5060	Ave		0.5192				4.0		50.0			
13C2-PFTeDA	0.7322 0.6661	0.7412 0.6171	0.6868	0.6615	0.6446	Ave		0.6785				6.7		50.0			
13C2-PFHxDA	1.2777 1.1845	1.2965 1.0894	1.2016	1.2154	1.1984	Ave		1.2091				5.6		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
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1 Analy Batch No.: 204375

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/17/2018 14:19 Calibration End Date: 01/17/2018 15:06 Calibration ID: 37572

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-204375/2	2018.01.17CURVELLA_002.d
Level 2	IC 320-204375/3	2018.01.17CURVELLA_003.d
Level 3	IC 320-204375/4	2018.01.17CURVELLA_004.d
Level 4	IC 320-204375/5	2018.01.17CURVELLA_005.d
Level 5	IC 320-204375/6	2018.01.17CURVELLA_006.d
Level 6	IC 320-204375/7	2018.01.17CURVELLA_007.d
Level 7	IC 320-204375/8	2018.01.17CURVELLA_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	71970 13027499	134919 24898296	645094	2581287	6694565	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoropentanoic acid (PFPeA)		AveID	56184 9469006	102787 17890417	488305	1934955	4900043	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorobutanesulfonic acid (PFBS)		AveID	67976 12635108	122306 22970596	656362	2532634	6433939	0.0221 4.42	0.0442 8.84	0.221	0.884	2.21
4:2 FTS		AveID	13839 2364722	22803 4712009	116305	459884	1228862	0.0234 4.67	0.0467 9.34	0.234	0.934	2.34
Perfluorohexanoic acid (PFHxA)		AveID	55664 9016831	92376 16747455	466560	1861593	4586272	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoroheptanoic acid (PFHpA)		AveID	50371 9111535	99406 16533181	517603	1803022	4706368	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorohexanesulfonic acid (PFHxS)		AveID	68319 9935695	117059 18787887	523793	1981094	5134885	0.0228 4.55	0.0455 9.10	0.228	0.910	2.28
6:2FTS		AveID	14322 2504300	23999 4633505	119814	488565	1258940	0.0237 4.74	0.0474 9.48	0.237	0.948	2.37
Perfluorooctanoic acid (PFOA)		AveID	61549 8993265	105297 17167030	484462	1890626	4896648	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoroheptanesulfonic Acid (PFHpS)		AveID	44381 8721809	84987 15956747	431169	1717801	4563453	0.0238 4.76	0.0476 9.52	0.238	0.952	2.38
Perfluorononanoic acid (PFNA)		AveID	37531 7021740	69666 12938458	352431	1428679	3585870	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorooctanesulfonic acid (PFOS)		AveID	39589 6686934	70183 12870491	344328	1355316	3505745	0.0232 4.64	0.0464 9.28	0.232	0.928	2.32
Perfluorooctane Sulfonamide (FOSA)		AveID	49852 8973330	93805 16389523	464966	1866404	4822749	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
8:2FTS		AveID	9860 1941077	20684 3762460	99090	377296	981168	0.0240 4.79	0.0479 9.58	0.240	0.958	2.40
Perfluorodecanoic acid (PFDA)		AveID	31882 5653894	55975 10721843	292799	1122840	2809263	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.: 320-35310-1 Analy Batch No.: 204375

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/17/2018 14:19 Calibration End Date: 01/17/2018 15:06 Calibration ID: 37572

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
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)		AveID	18275 3100803	31785 6179313	150110	630879	1546077	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorodecanesulfonic acid (PFDS)		AveID	22837 4067427	39594 8022809	216397	857674	2182261	0.0241 4.82	0.0482 9.64	0.241	0.964	2.41
Perfluoroundecanoic acid (PFUnA)		AveID	30104 4341065	47415 8080078	227630	855685	2244135	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)		AveID	16362 2837873	30312 5261873	142743	554613	1447969	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorododecanoic acid (PFDoA)		AveID	25166 4798721	54026 9080911	256381	975905	2517800	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorotridecanoic Acid (PFTriA)		AveID	36726 5174158	57967 9922216	263708	1119808	2742788	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorotetradecanoic acid (PFTeA)		AveID	9714 1437735	16612 2672440	75670	295170	754490	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoro-n-hexadecanoic acid (PFHxDA)		L2ID	+++++ 10121041	164489 17956480	561148	2195395	5582637	+++++ 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluoro-n-octadecanoic acid (PFODA)		AveID	63769 11861271	119958 20806019	579412	2429777	6281608	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
13C4 PFBA	13PFOA	Ave	7581930 6889924	7186789 6689622	6999196	7075449	7104763	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C5-PFPeA	13PFOA	Ave	4448756 4122126	4347864 3854737	4140508	4261723	4159040	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C3-PFBS	13PFOA	Ave	92724 83073	85395 81139	85313	85658	90418	2.33 2.33	2.33 2.33	2.33	2.33	2.33
13C2 PFHxA	13PFOA	Ave	4761111 4349882	4611605 4166297	4611448	4467394	4634604	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C4-PFHpA	13PFOA	Ave	4672251 4126515	4481837 3856924	4249130	4367056	4357423	2.50 2.50	2.50 2.50	2.50	2.50	2.50
18O2 PFHxS	13PFOA	Ave	5502563 4694368	5188305 4592963	5102469	5091273	4900649	2.37 2.37	2.37 2.37	2.37	2.37	2.37
M2-6:2FTS	13PFOA	Ave	786962 704248	783363 688126	769728	786039	768843	2.38 2.38	2.38 2.38	2.38	2.38	2.38
13C4 PFOA	13PFOA	Ave	4596206 4052198	4324416 3781095	4253926	4182465	4316678	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C4 PFOS	13PFOA	Ave	3430582 3110246	3278250 2906103	3268191	3235344	3190243	2.39 2.39	2.39 2.39	2.39	2.39	2.39
13C5 PFNA	13PFOA	Ave	3728829 3273972	3562167 3133770	3494654	3397294	3329183	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C8 FOSA	13PFOA	Ave	5121669 4414446	4978224 4220474	4753896	4845519	4670673	2.50 2.50	2.50 2.50	2.50	2.50	2.50
M2-8:2FTS	13PFOA	Ave	886480 757639	827776 762870	811941	787775	800715	2.40 2.40	2.40 2.40	2.40	2.40	2.40

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1 Analy Batch No.: 204375

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/17/2018 14:19 Calibration End Date: 01/17/2018 15:06 Calibration ID: 37572

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 PFDA	13PF OA	Ave	3201735 2810507	3024128 2706406	2939305	3005224	2975947	2.50 2.50	2.50 2.50	2.50	2.50	2.50
d3-NMeFOSAA	13PF OA	Ave	1577189 1419745	1505517 1384778	1483575	1499251	1437020	2.50 2.50	2.50 2.50	2.50	2.50	2.50
d5-NEtFOSAA	13PF OA	Ave	1719534 1408625	1560100 1301953	1512999	1503508	1432688	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFUnA	13PF OA	Ave	2475898 2170924	2331330 1975688	2263551	2250985	2212774	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFDoA	13PF OA	Ave	2717793 2348326	2591482 2179814	2463501	2345552	2374065	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2-PFTeDA	13PF OA	Ave	3638245 2973878	3565275 2702115	3214801	3148987	3024149	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2-PFHxDA	13PF OA	Ave	6348846 5288590	6235993 4770244	5624728	5786263	5622608	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

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
READBACK PERCENT ERROR

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1 Analy Batch No.: 204375

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/17/2018 14:19 Calibration End Date: 01/17/2018 15:06 Calibration ID: 37572

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-204375/2	2018.01.17CURVELLA_002.d
Level 2	IC 320-204375/3	2018.01.17CURVELLA_003.d
Level 3	IC 320-204375/4	2018.01.17CURVELLA_004.d
Level 4	IC 320-204375/5	2018.01.17CURVELLA_005.d
Level 5	IC 320-204375/6	2018.01.17CURVELLA_006.d
Level 6	IC 320-204375/7	2018.01.17CURVELLA_007.d
Level 7	IC 320-204375/8	2018.01.17CURVELLA_008.d

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 # LVL 7 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #	LVL 6 #	LVL 1 LVL 7	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6
Perfluorobutanoic acid (PFBA)	-0.4	0.5	-1.3	-2.4	0.9	1.2	25	25	25	25	25	25
Perfluoropentanoic acid (PFPeA)	-1.5	0.3	0.1	-3.6	0.0	-2.5	25	25	25	25	25	25
Perfluorobutanesulfonic acid (PFBS)	-3.6	-2.4	4.8	0.7	-3.0	3.6	25	25	25	25	25	25
4:2 FTS	4.0	-4.3	-2.3	-3.8	-2.6	2.0	25	25	25	25	25	25
Perfluorohexanoic acid (PFHxA)	-3.0	-3.4	-2.4	0.5	-4.5	0.0	25	25	25	25	25	25
Perfluoroheptanoic acid (PFHpA)	-2.5	0.9	10.8	-6.1	-1.7	0.5	25	25	25	25	25	25
Perfluorohexanesulfonic acid (PFHxS)	-4.5	5.3	-4.2	-9.2	-2.2	-1.2	25	25	25	25	25	25
6:2FTS	1.9	-7.3	-5.8	-5.9	-0.9	7.7	25	25	25	25	25	25
Perfluorooctanoic acid (PFOA)	-3.2	3.9	-2.8	-3.6	-3.2	-5.3	25	25	25	25	25	25
Perfluoroheptanesulfonic Acid (PFHpS)	1.8	-3.9	-2.2	-1.6	6.1	3.9	25	25	25	25	25	25
Perfluorononanoic acid (PFNA)	0.0	-5.3	-2.3	1.8	4.3	3.9	25	25	25	25	25	25
Perfluorooctanesulfonic acid (PFOS)	1.9	-1.5	-3.0	-3.6	1.1	-1.1	25	25	25	25	25	25
Perfluorooctane Sulfonamide (FOSA)	-1.2	-4.1	-0.4	-2.0	5.1	3.5	25	25	25	25	25	25
8:2FTS	1.3	2.7	0.3	-1.6	0.7	5.3	25	25	25	25	25	25
Perfluorodecanoic acid (PFDA)	2.1	-4.6	2.7	-3.7	-2.7	3.7	25	25	25	25	25	25

FORM VI
LCMS BY ISOTOPIC DILUTION - INITIAL CALIBRATION DATA
READBACK PERCENT ERROR

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1 Analy Batch No.: 204375

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 01/17/2018 14:19 Calibration End Date: 01/17/2018 15:06 Calibration ID: 37572

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 # LVL 7 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #	LVL 6 #	LVL 1 LVL 7	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	3.3	-2.3	-6.3	-2.6	-0.4	1.1	25	25	25	25	25	25
Perfluorodecanesulfonic acid (PFDS)	4.5	-8.6	0.3	0.4	3.6	-1.0	25	25	25	25	25	25
Perfluoroundecanoic acid (PFUnA)	-0.9	-1.5	-2.6	-7.9	-1.7	-3.1	25	25	25	25	25	25
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	3.8	-0.2	-3.1	-5.3	3.8	3.4	25	25	25	25	25	25
Perfluorododecanoic acid (PFDoA)	1.6	1.7	1.6	1.5	3.5	-0.3	25	25	25	25	25	25
Perfluorotridecanoic Acid (PFTriA)	-2.0	-3.7	-7.8	2.8	-0.5	-5.1	25	25	25	25	25	25
Perfluorotetradecanoic acid (PFTeA)	1.3	-4.5	-3.5	-4.0	2.2	-0.9	25	25	25	25	25	25
Perfluoro-n-hexadecanoic acid (PFHxDA)	+++++ -0.9		-2.4	-1.8	4.0	0.6	25		25	25	25	25
Perfluoro-n-octadecanoic acid (PFODA)	3.5	-8.7	-2.2	-0.4	6.0	6.4	25	25	25	25	25	25

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_002.d
Lims ID: IC L1 Full
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 17-Jan-2018 14:19:28 ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L1-FULL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 18-Jan-2018 08:22:18 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK019

First Level Reviewer: hannigana Date: 17-Jan-2018 16:50:04

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	1.411	1.411	0.0	0.539	7581930	2.52		101	20935	
2 Perfluorobutyric acid										
212.90 > 169.00	1.411	1.413	-0.002	1.000	71970	0.0254		102	8.9	
D 3 13C5-PFPeA										
267.90 > 223.00	1.658	1.659	-0.001	0.633	4448756	2.50		100.0	60885	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.667	1.662	0.005	1.005	56184	0.0268		107	48.5	
D 47 13C3-PFBS										
301.90 > 83.00	1.694	1.695	-0.001	0.647	92724	2.35		101	3469	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.703	1.697	0.006	1.005	67976	0.0221		99.9	723	
298.90 > 99.00	1.694	1.697	-0.003	1.000	27737		2.45(1.25-3.74)	99.9	281	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.908	1.903	0.005	1.000	13839	0.0250		107	847	
D 60 M2-4:2FTS										
329.00 > 81.00	1.908	1.903	0.005	0.729	573139	NC			6642	
D 7 13C2 PFHxA										
315.00 > 270.00	1.939	1.939	0.0	0.740	4761111	2.48		99.3	38466	
6 Perfluorohexanoic acid										M
313.00 > 269.00	1.939	1.939	0.0	1.000	55664	0.0282		113	82.9	M
313.00 > 119.00	1.949	1.939	0.010	1.005	5323		10.46(5.03-15.10)	113	58.2	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.868	4672251	2.56		102	27332	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.273	2.268	0.005	1.000	50371	0.0245		98.1	90.2	
363.00 > 169.00	2.273	2.268	0.005	1.000	21592		2.33(1.13-3.40)	98.1	179	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.286	2.280	0.006	1.000	68319	0.0264		116	357	
399.00 > 99.00	2.286	2.280	0.006	1.000	22422		3.05(1.50-4.49)	116	177	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.873	5502563	2.45		103	34563	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.592	2.596	-0.004	0.998	14322	0.0261		110	230	
D 12 M2-6:2FTS										
429.00 > 81.00	2.598	2.597	0.001	0.992	786962	2.33		98.2	19002	
D 14 13C4 PFOA										
417.00 > 372.00	2.618	2.622	-0.004	1.000	4596206	2.57		103	25049	
* 62 13C2-PFOA										
415.00 > 370.00	2.618	2.622	-0.004		4968823	2.50			36344	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.625	2.623	0.002	1.003	61549	0.0286		114	46.8	
413.00 > 169.00	2.625	2.623	0.002	1.003	31497		1.95(0.84-2.52)	114	341	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.625	2.629	-0.004	1.000	44381	0.0228		95.9	1137	
449.00 > 99.00	2.633	2.629	0.004	1.003	10990		4.04(1.94-5.82)	95.9	376	
D 19 13C5 PFNA										
468.00 > 423.00	2.992	2.992	0.0	1.143	3728829	2.57		103	24545	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.992	2.992	0.0	1.000	39589	0.0246		106	15.5	
499.00 > 99.00	2.992	2.992	0.0	1.000	8998		4.40(2.31-6.93)	106	23.3	
D 18 13C4 PFOS										
503.00 > 80.00	2.992	2.992	0.0	1.143	3430582	2.41		101	27205	
20 Perfluorononanoic acid										
463.00 > 419.00	2.992	2.992	0.0	1.000	37531	0.0244		97.5	137	
463.00 > 169.00	2.992	2.992	0.0	1.000	7669		4.89(1.90-5.69)	97.5	183	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.338	3.338	0.0	1.000	49852	0.0248		99.1	1336	
D 21 13C8 FOSA										
506.00 > 78.00	3.338	3.338	0.0	1.275	5121669	2.56		102	26667	
D 26 M2-8:2FTS										
529.00 > 81.00	3.338	3.342	-0.004	1.275	886480	2.48		104	21540	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.338	3.342	-0.004	1.000	9860	0.0219		91.4	410	
D 23 13C2 PFDA										
515.00 > 470.00	3.354	3.352	0.002	1.281	3201735	2.55		102	24663	
24 Perfluorodecanoic acid										R
513.00 > 469.00	3.354	3.353	0.001	1.000	31882	0.0257		103	167	R
513.00 > 169.00	3.346	3.353	-0.007	0.998	4224		7.55(2.36-7.09)	103	193	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.506	3.507	-0.001	1.339	1577189	2.52		101	9864	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.513	3.513	0.0	1.002	18275	0.0268		107	176	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.670	3.666	0.004	1.000	22837	0.0243		101	815	
599.00 > 99.00	3.662	3.666	-0.004	0.998	7975		2.86(1.39-4.16)	101	416	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.670	3.672	-0.002	1.402	1719534	2.72		109	5328	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.677	3.678	-0.001	1.000	30104	0.0294		118	150	
563.00 > 169.00	3.686	3.678	0.008	1.002	5221		5.77(0.00-0.00)	118	226	
D 30 13C2 PFUnA										
565.00 > 520.00	3.677	3.679	-0.002	1.404	2475898	2.60		104	26904	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.677	3.679	-0.002	1.002	16362	0.0244		97.7	493	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.978	3.979	-0.001	1.000	25166	0.0226		90.4	107	
613.00 > 169.00	3.978	3.979	-0.001	1.000	7159		3.52(2.13-6.40)	90.4	279	
D 36 13C2 PFDoA										
615.00 > 570.00	3.978	3.979	-0.001	1.519	2717793	2.63		105	28326	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.240	4.242	-0.002	1.000	36726	0.0291		116	132	
663.00 > 169.00	4.240	4.242	-0.002	1.000	10674		3.44(1.25-3.76)	116	402	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.477	4.483	-0.006	1.000	9714	0.0274		109	295	
713.00 > 219.00	4.466	4.483	-0.017	0.997	5226		1.86(0.71-2.13)	109	161	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.477	4.483	-0.006	1.710	3638245	2.70		108	21362	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.898	4.902	-0.004	1.871	6348846	2.64		106	15507	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.898	4.902	-0.004	1.000	118972	0.0301		120	86.3	
813.00 > 169.00	4.898	4.902	-0.004	1.000	19372		6.14(2.86-8.58)	120	275	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.249	5.255	-0.006	1.000	63769	0.0238		95.3	20.1	
913.00 > 169.00	5.249	5.255	-0.006	1.000	7822		8.15(0.00-0.00)	95.3	41.5	

QC Flag Legend

Processing Flags

NC - Not Calibrated

R - Failed Signal Ratio Test

Review Flags

M - Manually Integrated

Reagents:

LCPFC_LL1_00003 Amount Added: 1.00 Units: mL

Report Date: 18-Jan-2018 08:22:18 Chrom Revision: 2.2 08-Dec-2017 11:41:26

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_002.d

Injection Date: 17-Jan-2018 14:19:28 Instrument ID: A8_N

Lims ID: IC L1 Full

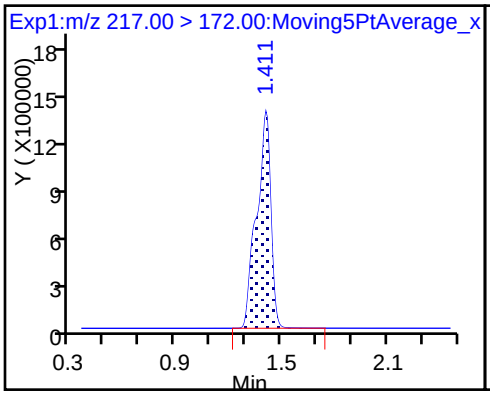
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 10 Worklist Smp#: 2

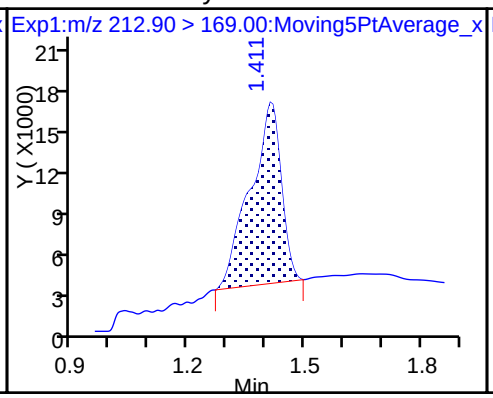
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

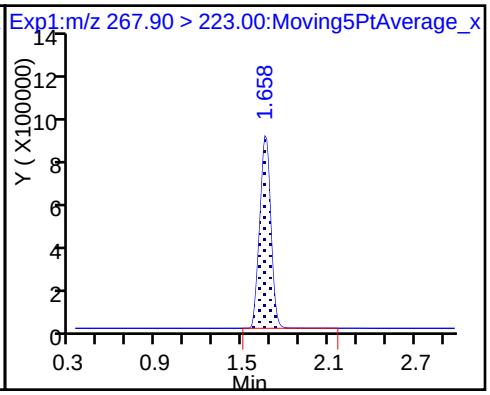
D 1 13C4 PFBA



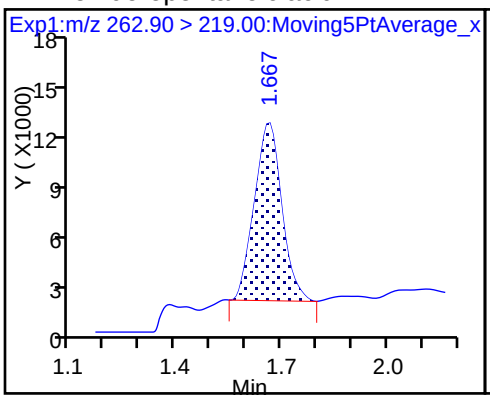
2 Perfluorobutyric acid



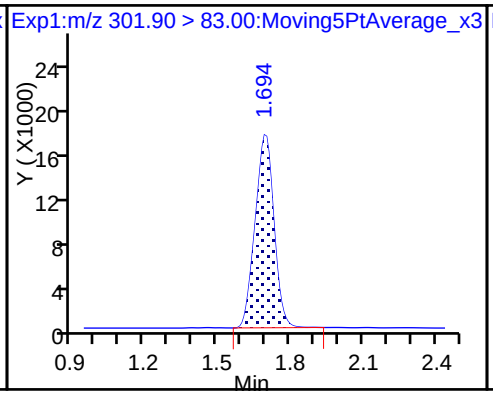
D 3 13C5-PFPeA



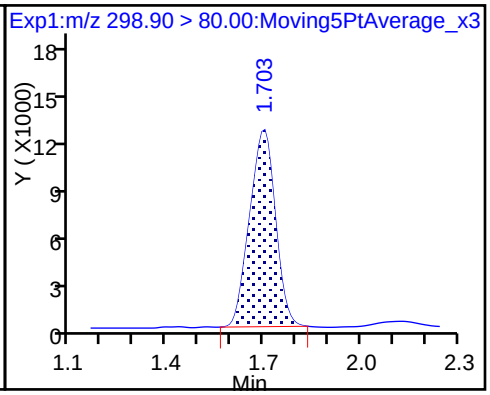
4 Perfluoropentanoic acid



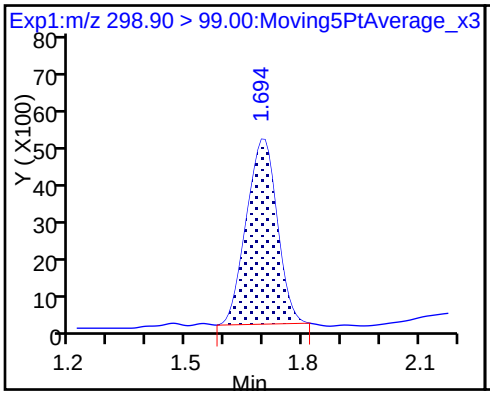
D 47 13C3-PFBS



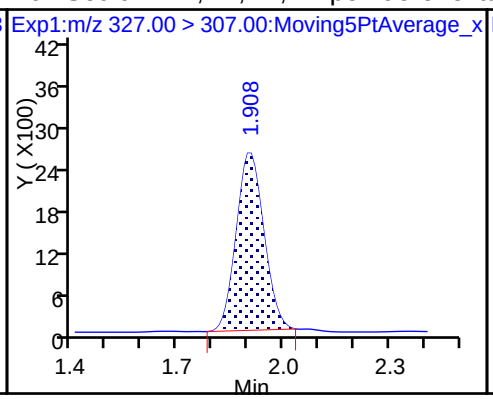
5 Perfluorobutanesulfonic acid



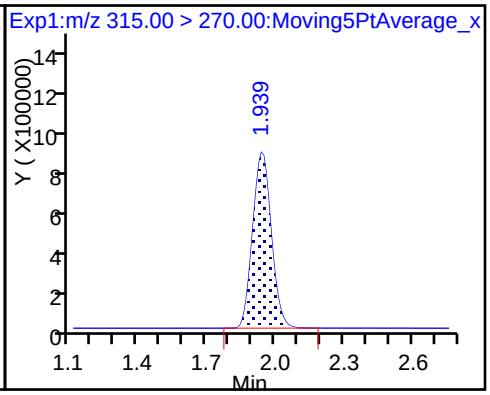
5 Perfluorobutanesulfonic acid



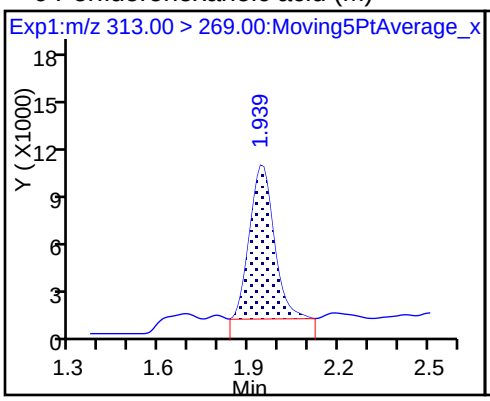
61 Sodium 1H,1H,2H,2H-perfluorohexa



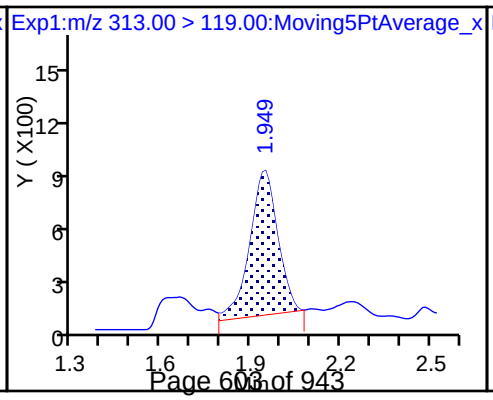
D 7 13C2 PFHxA



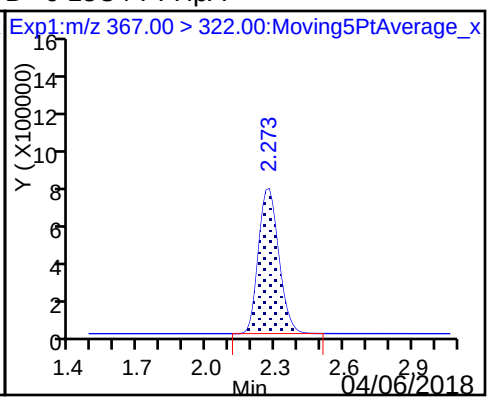
6 Perfluorohexanoic acid (M)



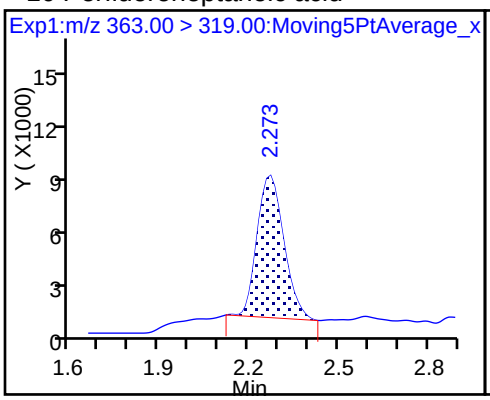
6 Perfluorohexanoic acid



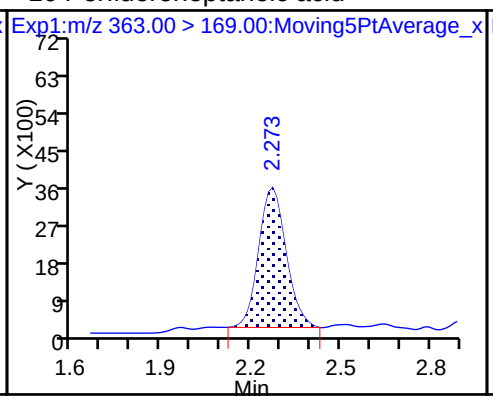
D 9 13C4-PFHpA



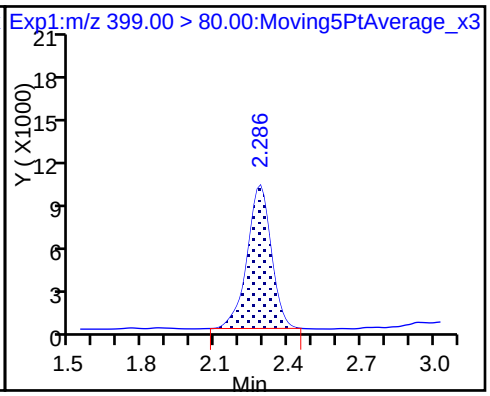
10 Perfluoroheptanoic acid



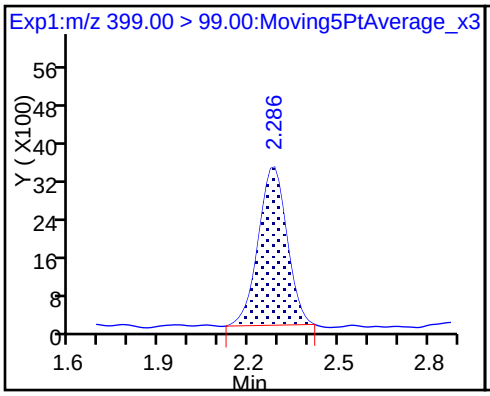
10 Perfluoroheptanoic acid



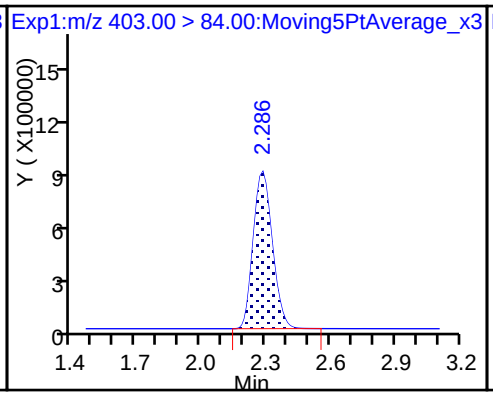
8 Perfluorohexanesulfonic acid



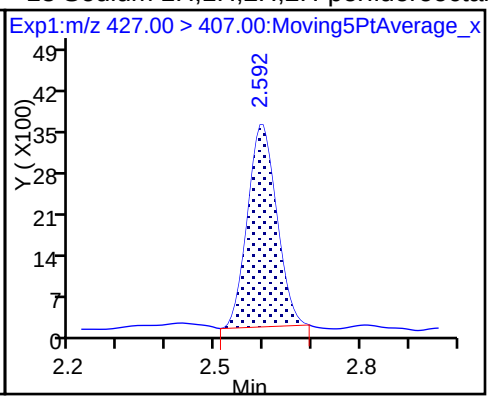
8 Perfluorohexanesulfonic acid



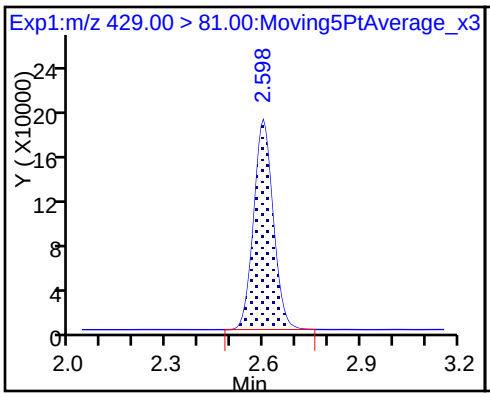
D 11 18O2 PFHxS



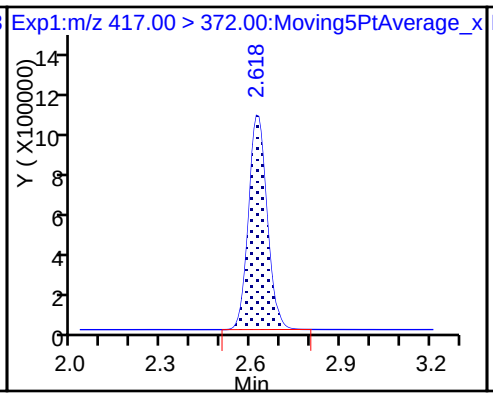
13 Sodium 1H,1H,2H,2H-perfluorooctane



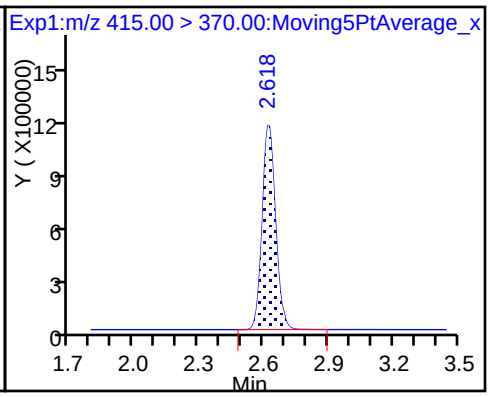
D 12 M2-6:2FTS



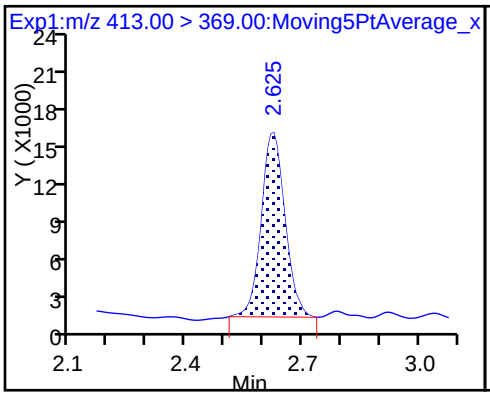
D 14 13C4 PFOA



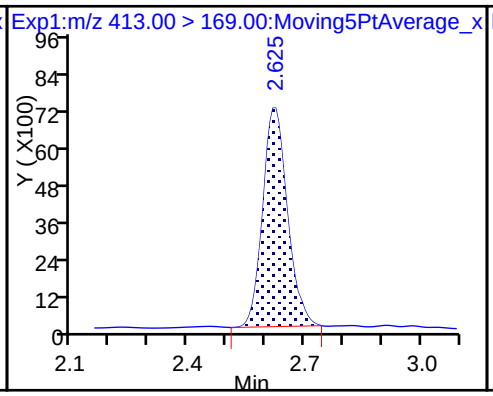
* 62 13C2-PFOA



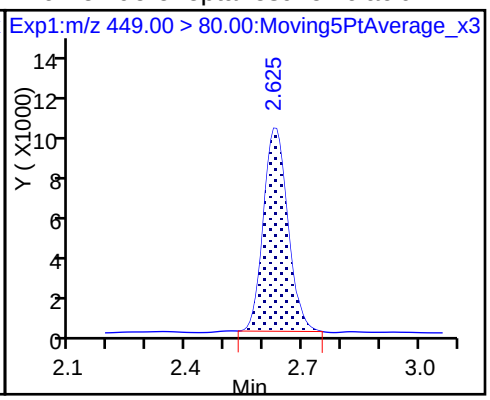
15 Perfluorooctanoic acid



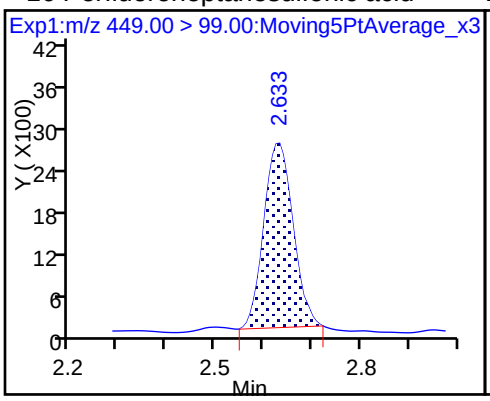
15 Perfluorooctanoic acid



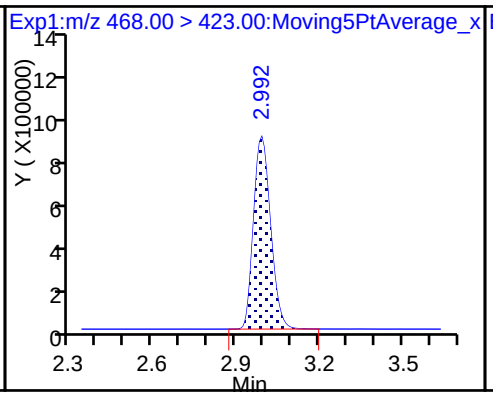
16 Perfluoroheptanesulfonic acid



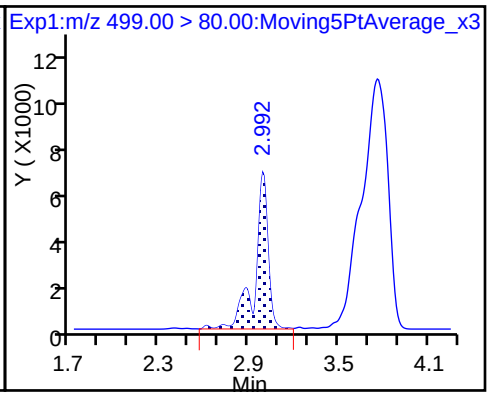
16 Perfluoroheptanesulfonic acid



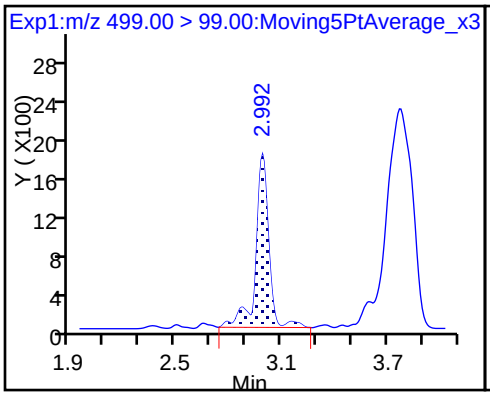
D 19 13C5 PFNA



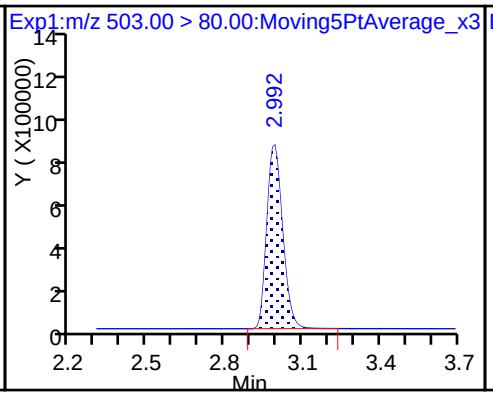
17 Perfluorooctane sulfonic acid



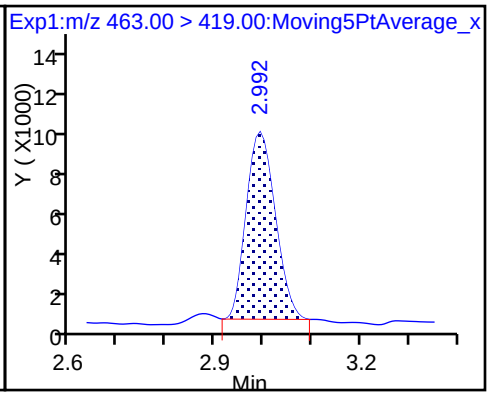
17 Perfluorooctane sulfonic acid



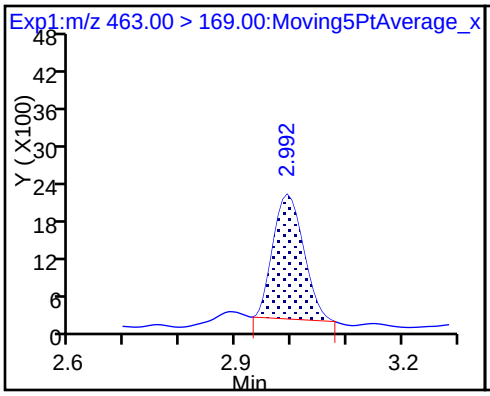
D 18 13C4 PFOS



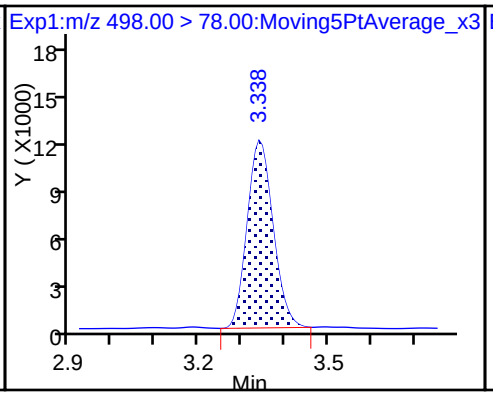
20 Perfluorononanoic acid



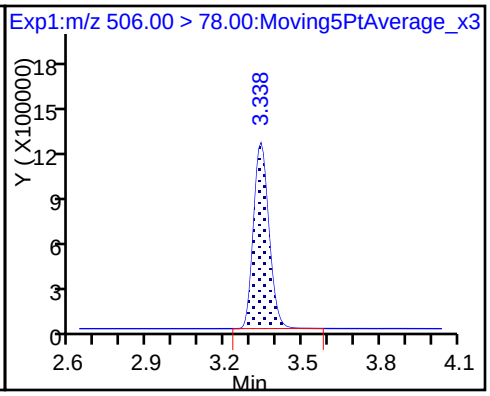
20 Perfluorononanoic acid



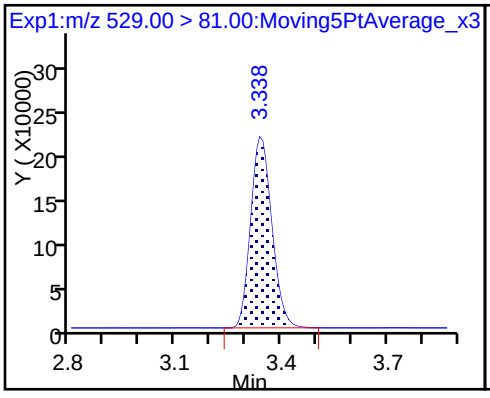
22 Perfluorooctane Sulfonamide



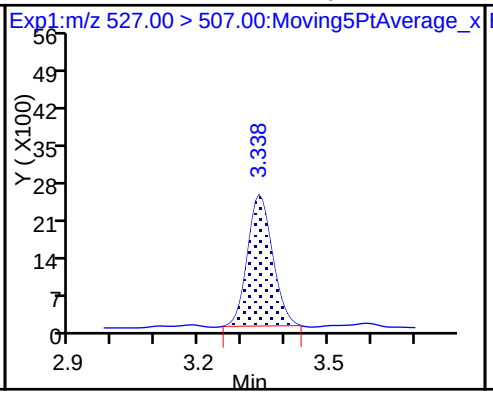
D 21 13C8 FOSA



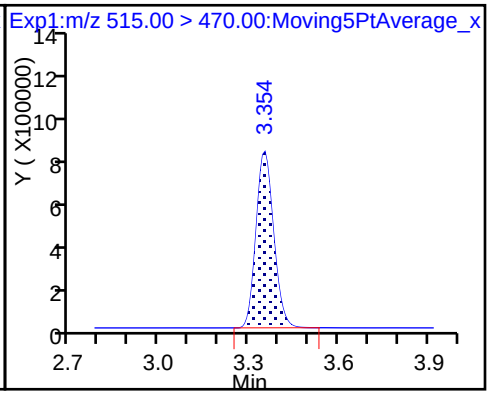
D 26 M2-8:2FTS



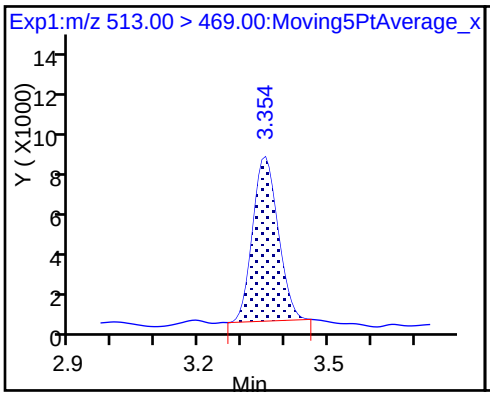
25 Sodium 1H,1H,2H,2H-perfluorodecane



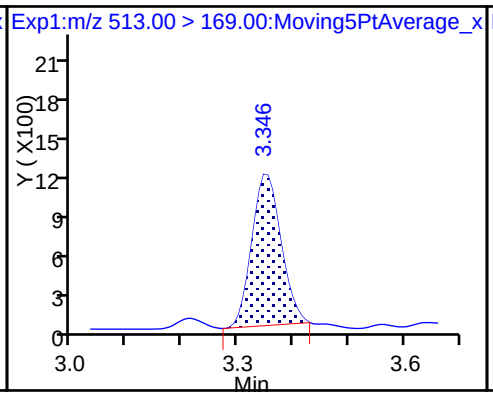
D 23 13C2 PFDA



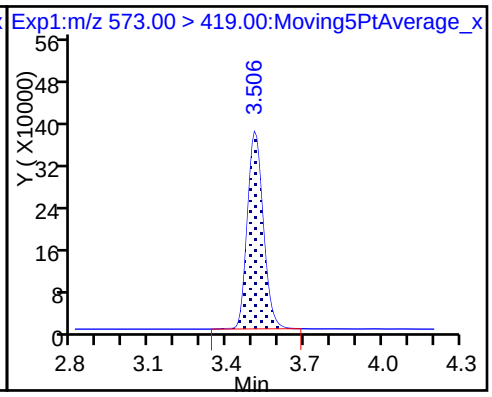
24 Perfluorodecanoic acid



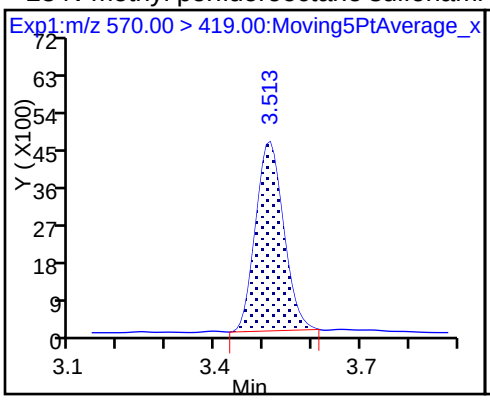
24 Perfluorodecanoic acid



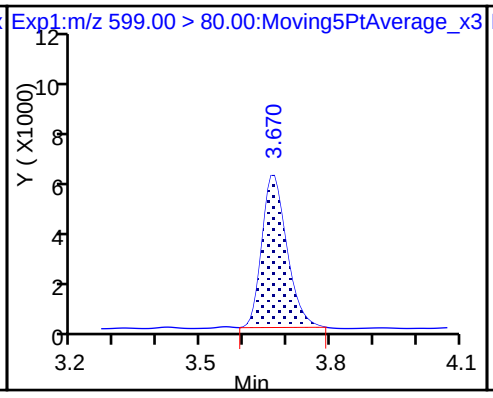
D 27 d3-NMeFOSAA



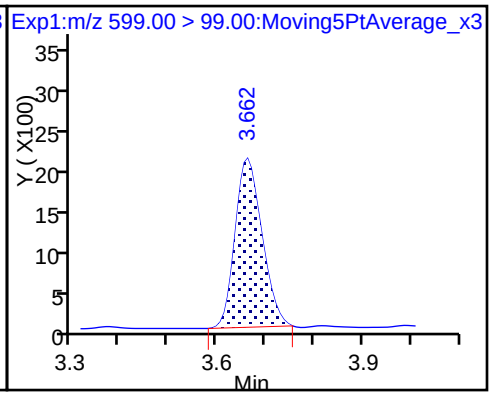
28 N-methyl perfluorooctane sulfonami



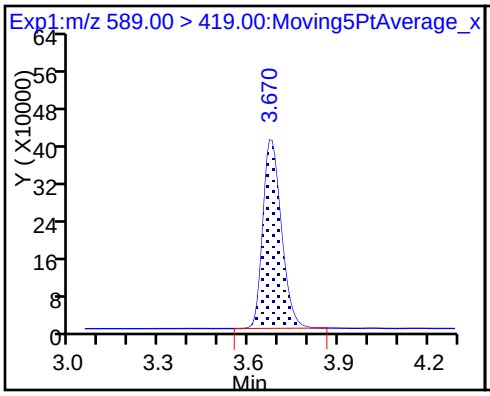
29 Perfluorodecane Sulfonic acid



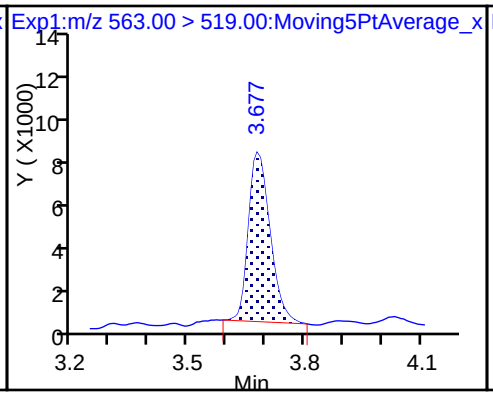
29 Perfluorodecane Sulfonic acid



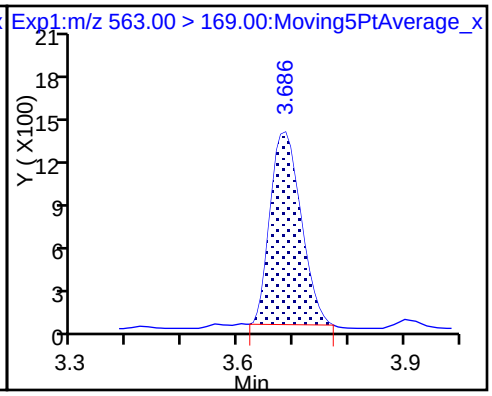
D 32 d5-NEtFOSAA



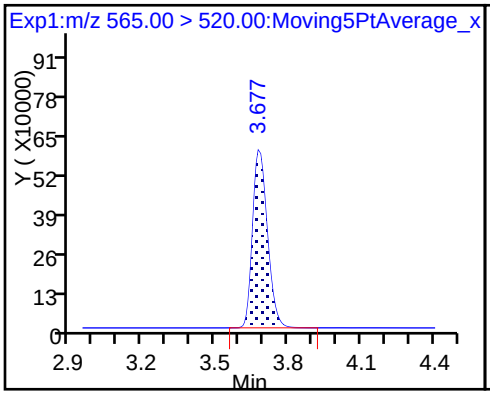
31 Perfluoroundecanoic acid



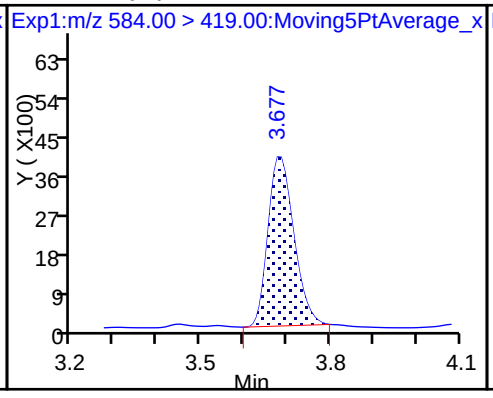
31 Perfluoroundecanoic acid



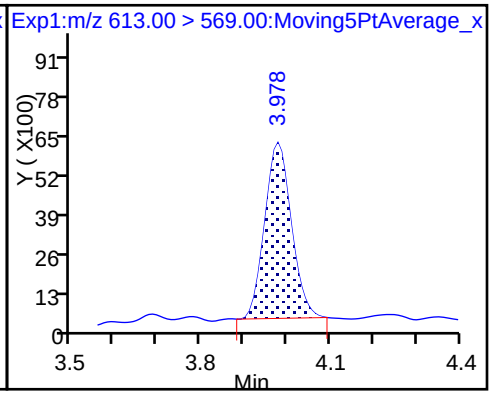
D 30 13C2 PFUnA



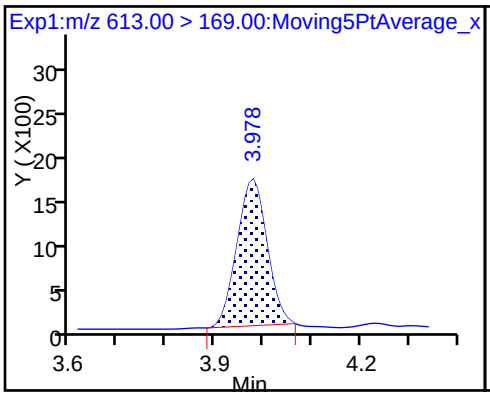
33 N-ethyl perfluorooctane sulfonamid



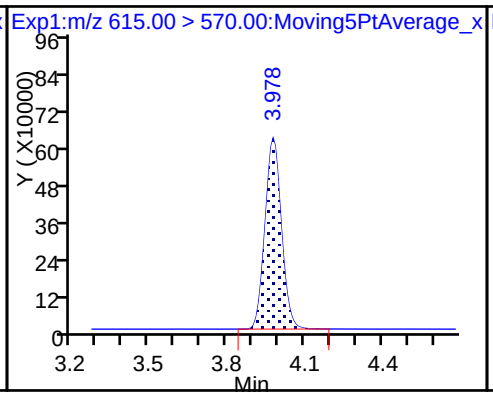
37 Perfluorododecanoic acid



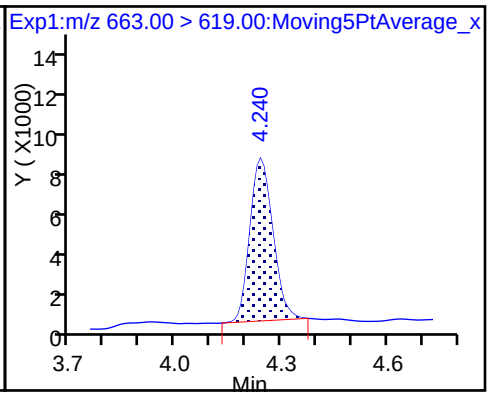
37 Perfluorododecanoic acid



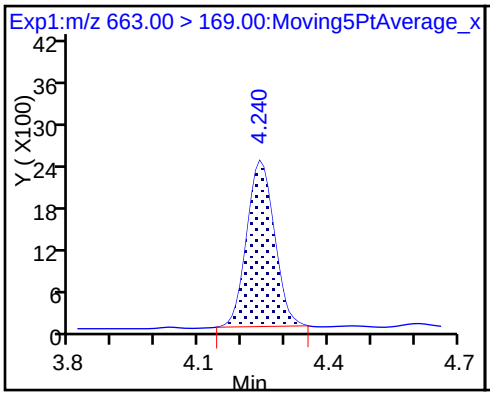
D 36 13C2 PFDoA



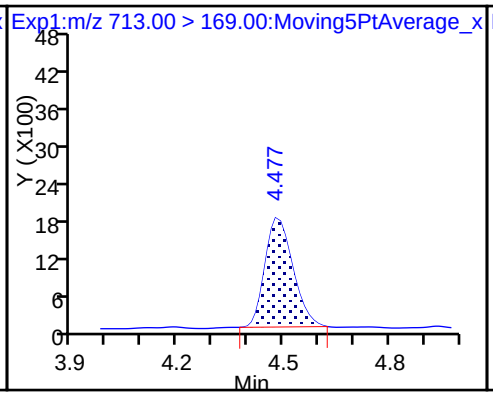
41 Perfluorotridecanoic acid



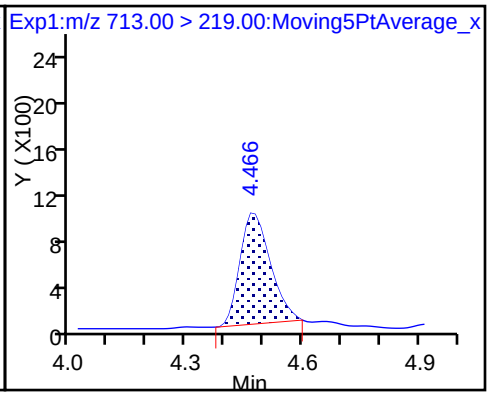
41 Perfluorotridecanoic acid



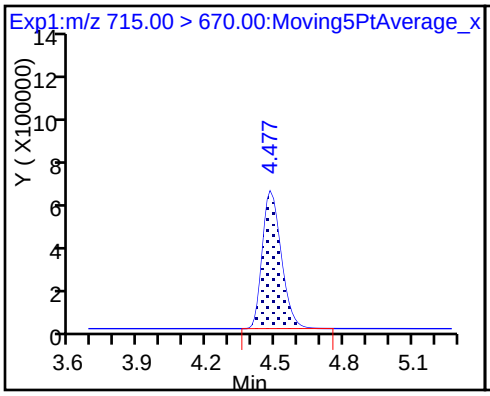
42 Perfluorotetradecanoic acid



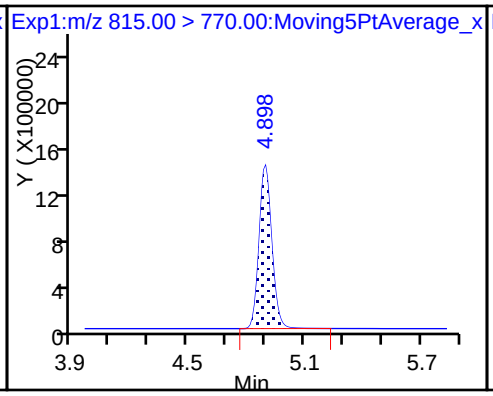
42 Perfluorotetradecanoic acid



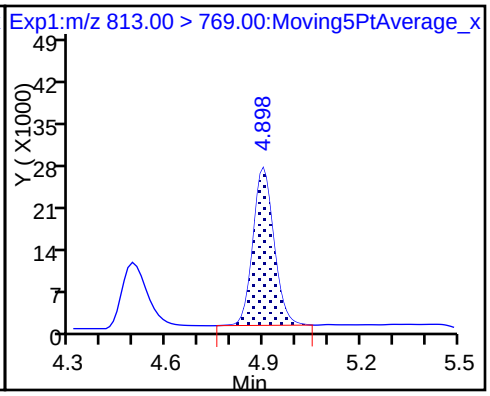
D 43 13C2-PFTeDA



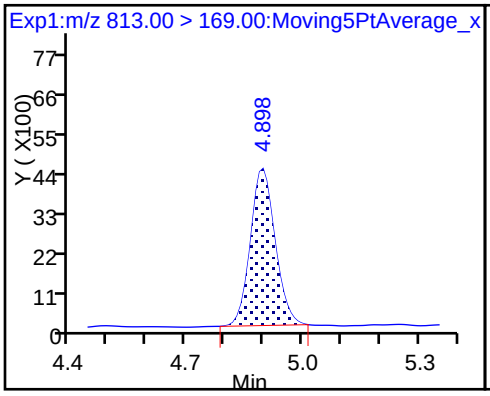
D 44 13C2-PFHxDA



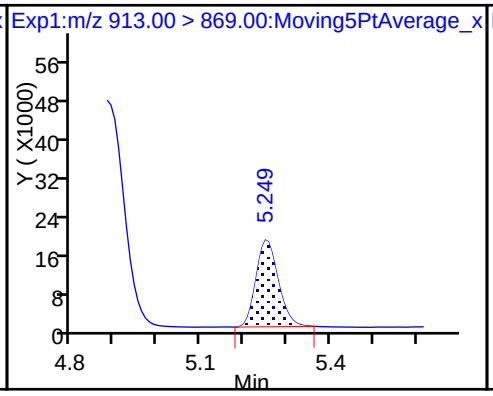
45 Perfluorohexadecanoic acid



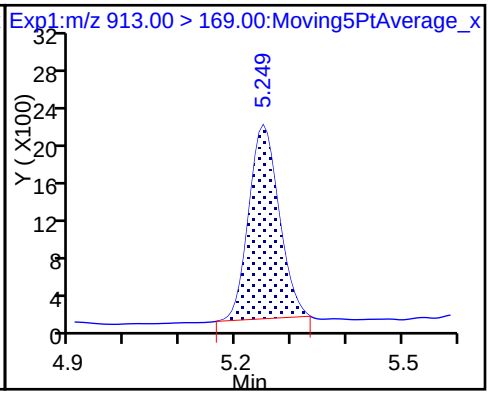
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



TestAmerica Sacramento

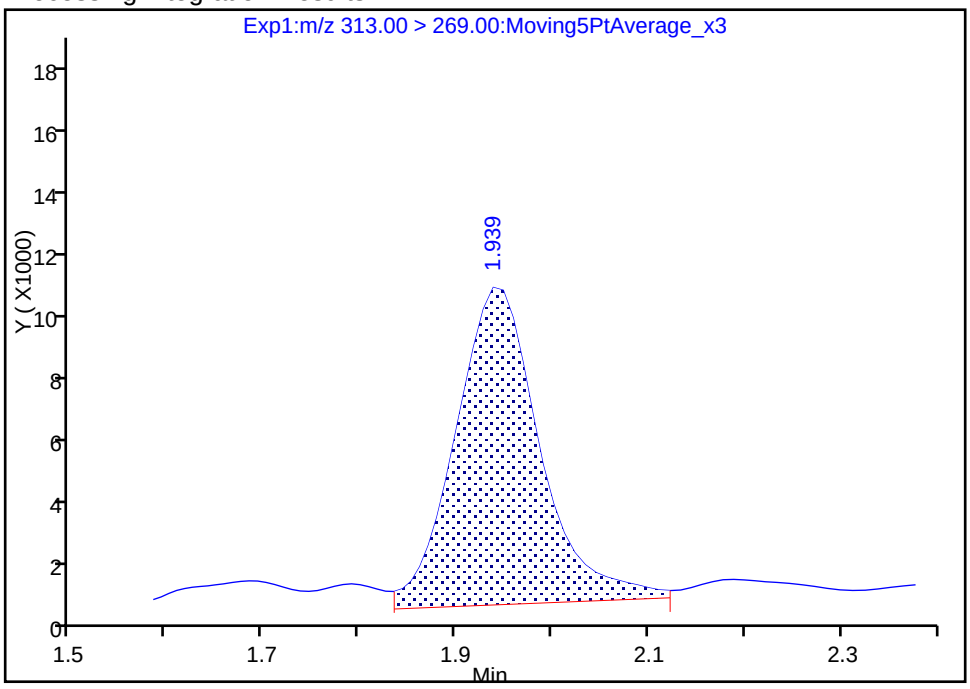
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_002.d
Injection Date: 17-Jan-2018 14:19:28 Instrument ID: A8_N
Lims ID: IC L1 Full
Client ID:
Operator ID: SACINSTLCMS01 ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Method: A8_N Limit Group: LC PFC_DOD ICAL
Column: Detector EXP1

6 Perfluorohexanoic acid, CAS: 307-24-4

Signal: 1

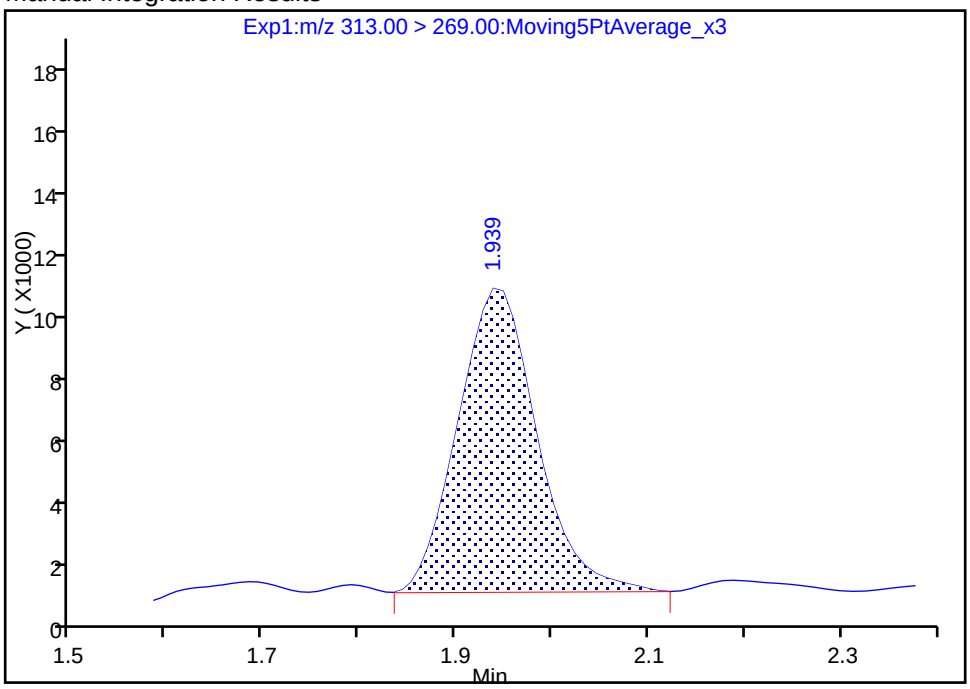
Processing Integration Results

RT: 1.94
Area: 62355
Amount: 0.030336
Amount Units: ng/ml



Manual Integration Results

RT: 1.94
Area: 55664
Amount: 0.028201
Amount Units: ng/ml



Reviewer: hannigana, 17-Jan-2018 16:49:22
Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_003.d
Lims ID: IC L2 Full
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 17-Jan-2018 14:27:16 ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L2-FULL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 18-Jan-2018 08:22:21 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK019

First Level Reviewer: hannigana Date: 17-Jan-2018 16:50:56

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	1.412	1.411	0.001	0.538	7186789	2.47		98.8	22574	
2 Perfluorobutyric acid										
212.90 > 169.00	1.412	1.413	-0.001	1.000	134919	0.0502		100	15.1	
D 3 13C5-PFPeA										
267.90 > 223.00	1.659	1.659	0.0	0.632	4347864	2.52		101	81847	
4 Perfluoropentanoic acid										M
262.90 > 219.00	1.659	1.662	-0.003	1.000	102787	0.0502		100	93.8	M
D 47 13C3-PFBS										
301.90 > 83.00	1.694	1.695	-0.001	0.645	85395	2.24		96.3	3100	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.694	1.697	-0.003	1.000	122306	0.0431		97.6	1035	
298.90 > 99.00	1.703	1.697	0.006	1.005	53280		2.30(1.25-3.74)	97.6	599	
D 60 M2-4:2FTS										
329.00 > 81.00	1.908	1.903	0.005	0.727	547524	NC			4977	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.908	1.903	0.005	1.000	22803	0.0447		95.7	1430	
6 Perfluorohexanoic acid										M
313.00 > 269.00	1.939	1.939	0.0	1.000	92376	0.0483		96.6	146	M
313.00 > 119.00	1.939	1.939	0.0	1.000	10049		9.19(5.03-15.10)	96.6	181	
D 7 13C2 PFHxA										
315.00 > 270.00	1.939	1.939	0.0	0.738	4611605	2.48		99.4	33760	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.866	4481837	2.54		101	24988	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.273	2.268	0.005	1.000	99406	0.0505		101	170	
363.00 > 169.00	2.273	2.268	0.005	1.000	36419		2.73(1.13-3.40)	101	307	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.286	2.280	0.006	1.000	117059	0.0479		105	672	
399.00 > 99.00	2.286	2.280	0.006	1.000	35478		3.30(1.50-4.49)	105	292	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.871	5188305	2.38		101	30938	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.598	2.596	0.002	1.000	23999	0.0440		92.7	384	
D 12 M2-6:2FTS										
429.00 > 81.00	2.598	2.597	0.001	0.990	783363	2.40		101	18764	
* 62 13C2-PFOA										
415.00 > 370.00	2.626	2.622	0.004		4809954	2.50			29656	
D 14 13C4 PFOA										
417.00 > 372.00	2.626	2.622	0.004	1.000	4324416	2.50		99.9	24697	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.626	2.623	0.003	1.000	105297	0.0519		104	82.6	
413.00 > 169.00	2.626	2.623	0.003	1.000	54228		1.94(0.84-2.52)	104	522	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.633	2.629	0.004	1.000	84987	0.0457		96.1	2230	
449.00 > 99.00	2.633	2.629	0.004	1.000	23208		3.66(1.94-5.82)	96.1	907	
D 18 13C4 PFOS										
503.00 > 80.00	2.989	2.992	-0.003	1.138	3278250	2.38		99.6	25618	
20 Perfluorononanoic acid										
463.00 > 419.00	2.989	2.992	-0.003	1.000	69666	0.0474		94.7	317	
463.00 > 169.00	2.989	2.992	-0.003	1.000	15857		4.39(1.90-5.69)	94.7	303	
D 19 13C5 PFNA										
468.00 > 423.00	2.989	2.992	-0.003	1.138	3562167	2.54		101	25415	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.989	2.992	-0.003	1.000	70183	0.0457		98.5	28.7	
499.00 > 99.00	2.989	2.992	-0.003	1.000	20217		3.47(2.31-6.93)	98.5	47.2	
D 21 13C8 FOSA										
506.00 > 78.00	3.335	3.338	-0.003	1.270	4978224	2.57		103	21232	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.335	3.338	-0.003	1.000	93805	0.0480		95.9	2916	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.343	3.342	0.001	1.000	20684	0.0492		103	857	
D 26 M2-8:2FTS										
529.00 > 81.00	3.343	3.342	0.001	1.273	827776	2.40		100	22220	
D 23 13C2 PFDA										
515.00 > 470.00	3.350	3.352	-0.002	1.276	3024128	2.49		99.7	26939	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.350	3.353	-0.003	1.000	55975	0.0477		95.4	299	
513.00 > 169.00	3.350	3.353	-0.003	1.000	10839		5.16(2.36-7.09)	95.4	473	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.510	3.507	0.003	1.337	1505517	2.49		99.5	9842	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.510	3.513	-0.003	1.000	31785	0.0489		97.7	294	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.666	3.666	0.0	1.000	39594	0.0441		91.4	1203	
599.00 > 99.00	3.659	3.666	-0.007	0.998	14282		2.77(1.39-4.16)	91.4	1217	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.673	3.672	0.001	1.399	1560100	2.55		102	4767	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.682	3.678	0.004	1.000	47415	0.0493		98.5	219	
563.00 > 169.00	3.682	3.678	0.004	1.000	11810		4.01(0.00-0.00)	98.5	439	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.682	3.679	0.003	1.002	30312	0.0499		99.8	886	
D 30 13C2 PFUnA										
565.00 > 520.00	3.682	3.679	0.003	1.402	2331330	2.53		101	22196	
D 36 13C2 PFDoA										
615.00 > 570.00	3.983	3.979	0.004	1.517	2591482	2.59		104	18542	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.983	3.979	0.004	1.000	54026	0.0509		102	233	
613.00 > 169.00	3.983	3.979	0.004	1.000	12483		4.33(2.13-6.40)	102	556	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.244	4.242	0.002	1.000	57967	0.0482		96.3	190	
663.00 > 169.00	4.244	4.242	0.002	1.000	16714		3.47(1.25-3.76)	96.3	633	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.487	4.483	0.004	1.709	3565275	2.73		109	16355	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.487	4.483	0.004	1.000	16612	0.0477		95.5	414	
713.00 > 219.00	4.473	4.483	-0.010	0.997	11965		1.39(0.71-2.13)	95.5	311	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.905	4.902	0.003	1.000	164489	0.0502		100	103	
813.00 > 169.00	4.905	4.902	0.003	1.000	28141		5.85(2.86-8.58)	100	527	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.905	4.902	0.003	1.868	6235993	2.68		107	13127	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.254	5.255	-0.001	1.000	119958	0.0456		91.3	35.9	
913.00 > 169.00	5.254	5.255	-0.001	1.000	14488		8.28(0.00-0.00)	91.3	91.9	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Reagents:

LCPFC_LL2_00003 Amount Added: 1.00 Units: mL

Report Date: 18-Jan-2018 08:22:21 Chrom Revision: 2.2 08-Dec-2017 11:41:26

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_003.d

Injection Date: 17-Jan-2018 14:27:16 Instrument ID: A8_N

Lims ID: IC L2 Full

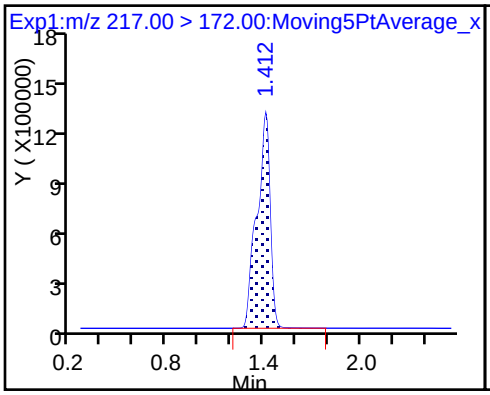
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 11 Worklist Smp#: 3

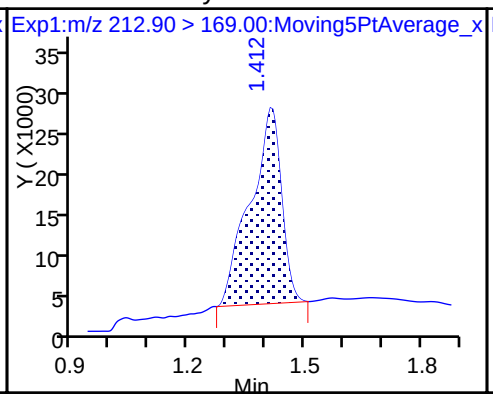
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

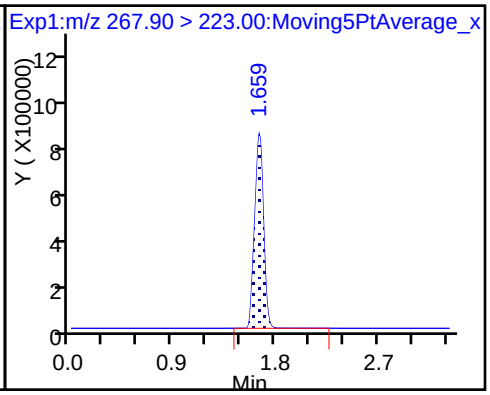
D 1 13C4 PFBA



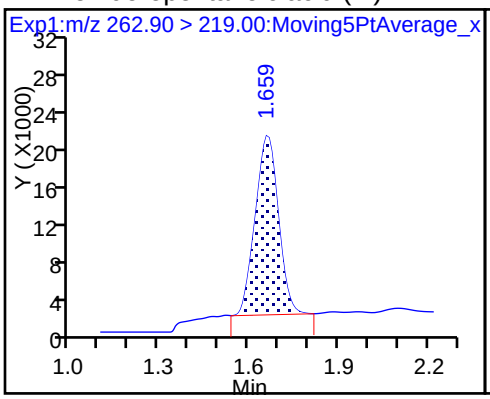
2 Perfluorobutyric acid



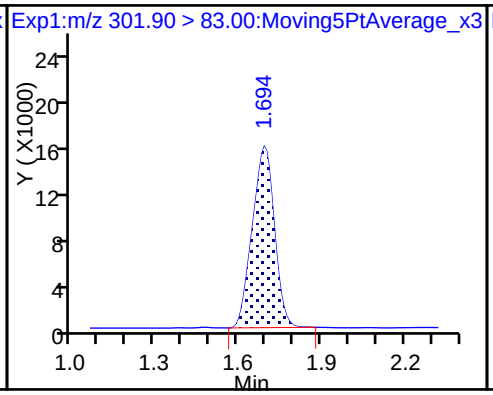
D 3 13C5-PFPeA



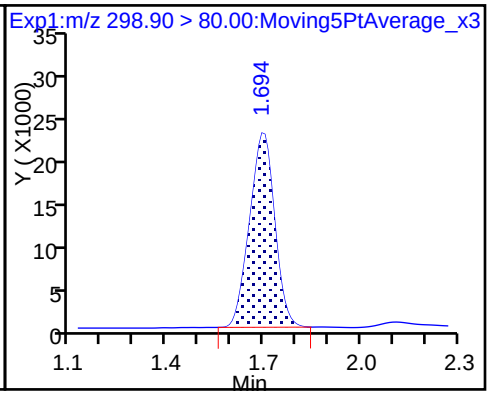
4 Perfluoropentanoic acid (M)



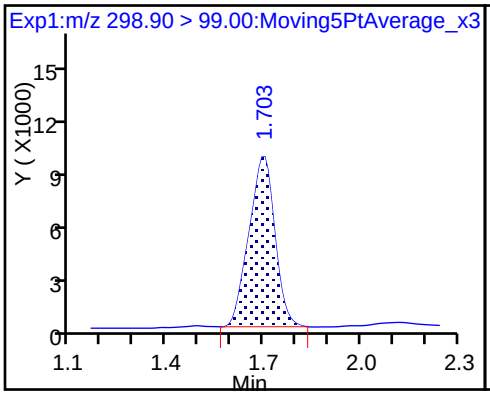
D 47 13C3-PFBS



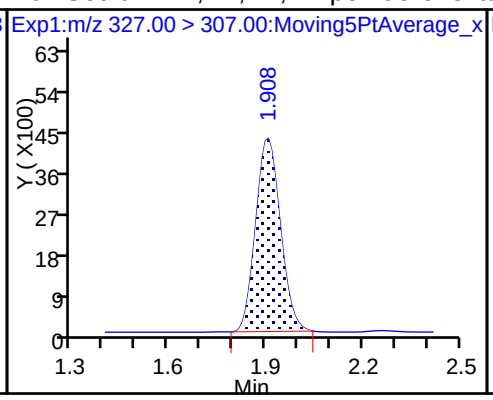
5 Perfluorobutanesulfonic acid



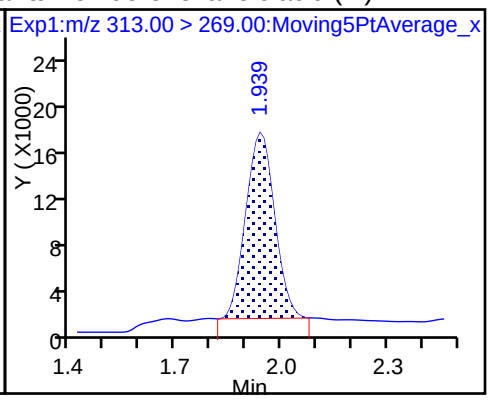
5 Perfluorobutanesulfonic acid



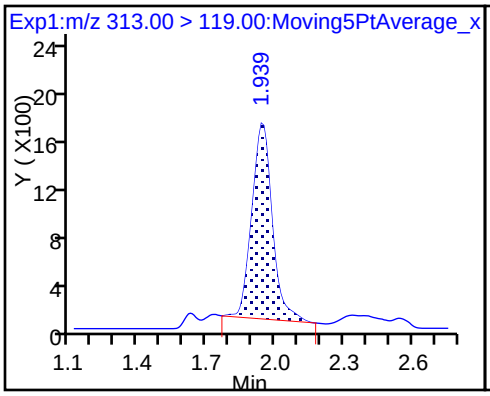
61 Sodium 1H,1H,2H,2H-perfluorohexane



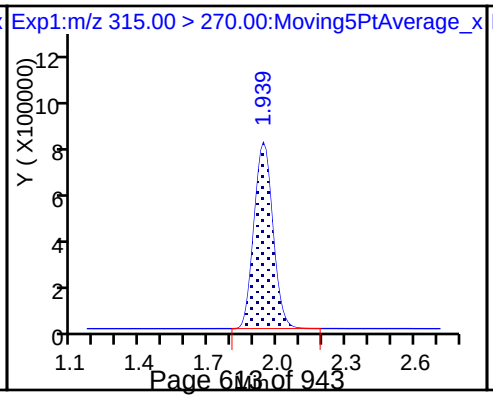
6 Perfluorohexanoic acid (M)



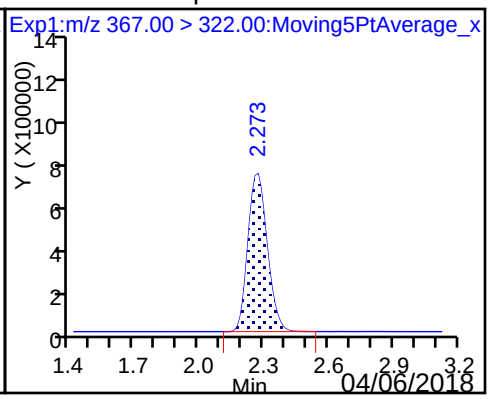
6 Perfluorohexanoic acid



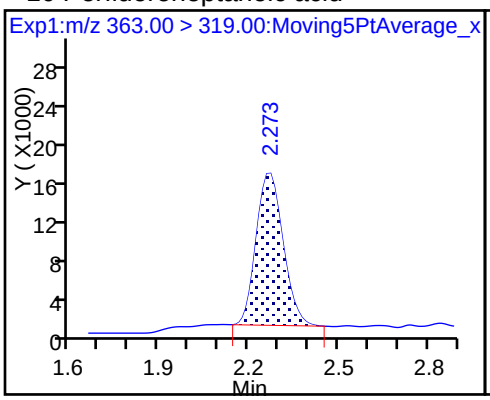
D 7 13C2 PFHxA



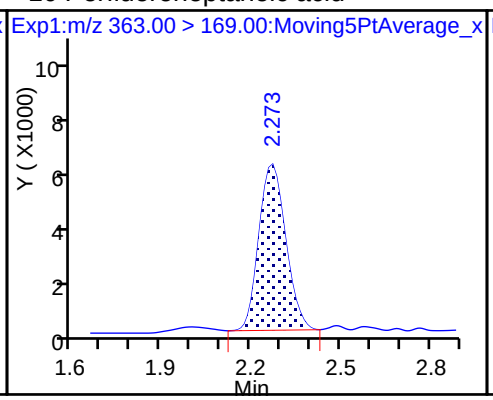
D 9 13C4-PFHpA



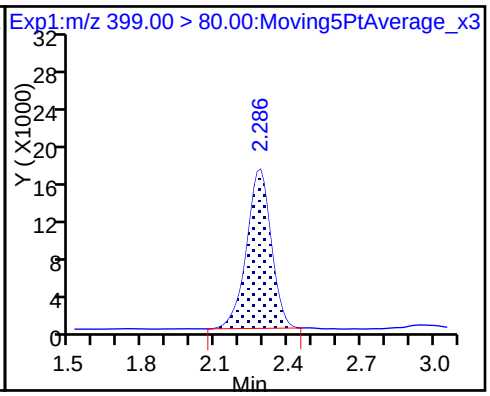
10 Perfluoroheptanoic acid



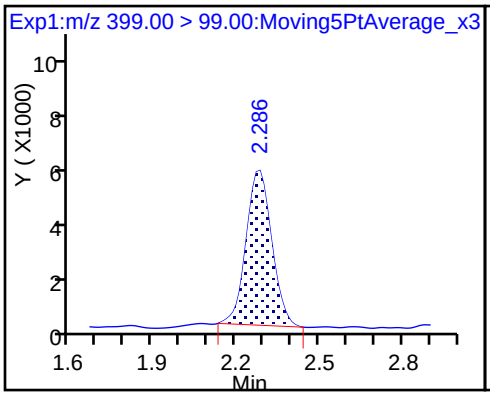
10 Perfluoroheptanoic acid



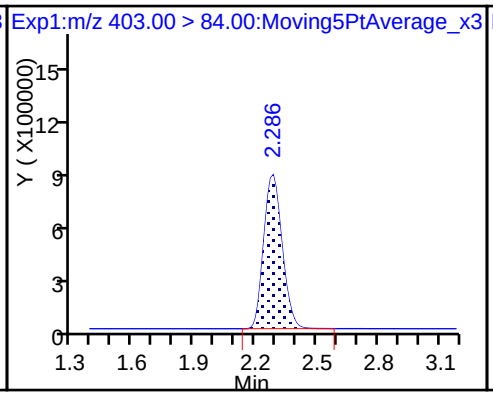
8 Perfluorohexanesulfonic acid



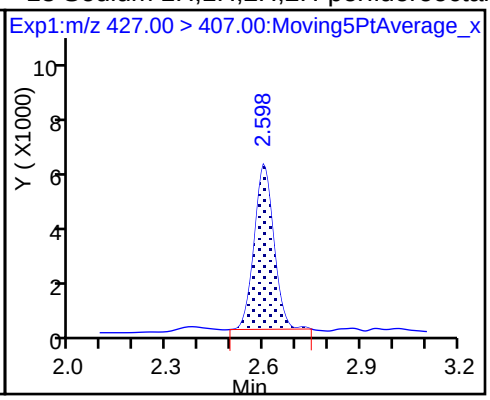
8 Perfluorohexanesulfonic acid



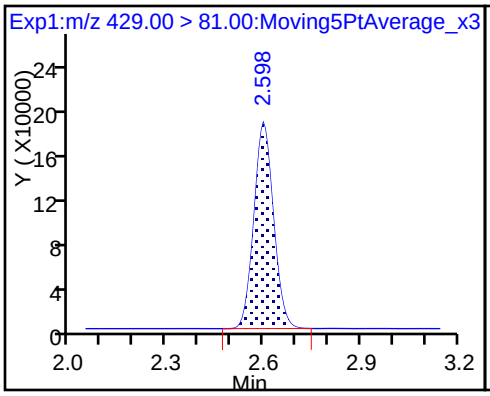
D 11 18O2 PFHxS



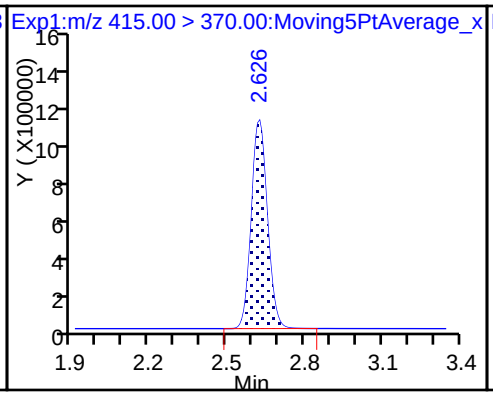
13 Sodium 1H,1H,2H,2H-perfluorooctane



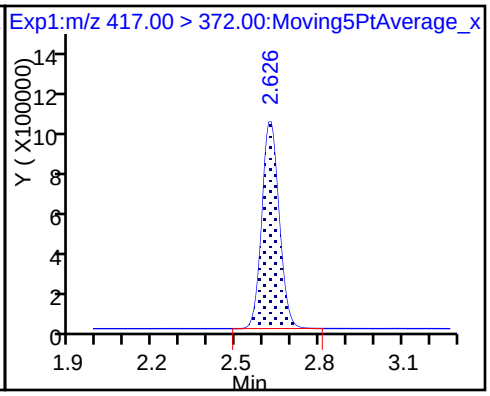
D 12 M2-6:2FTS



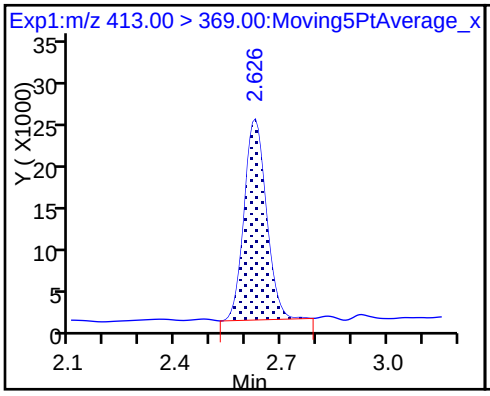
* 62 13C2-PFOA



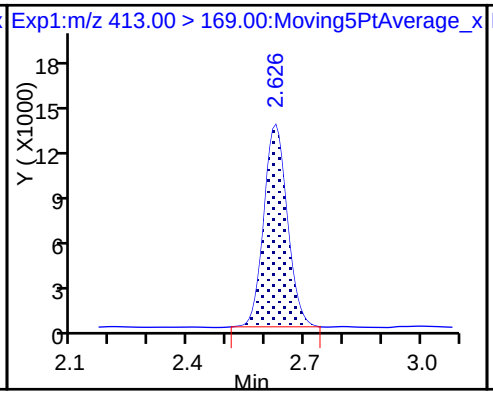
D 14 13C4 PFOA



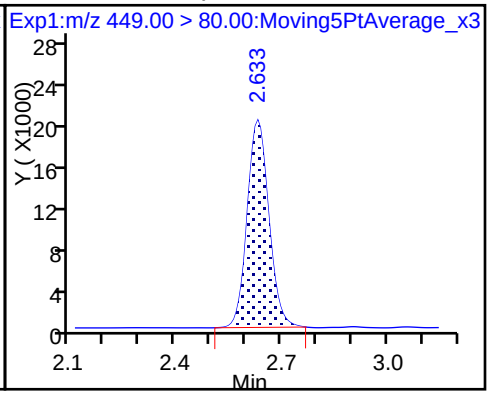
15 Perfluorooctanoic acid



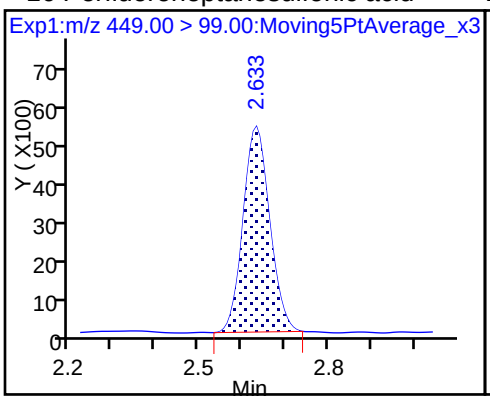
15 Perfluorooctanoic acid



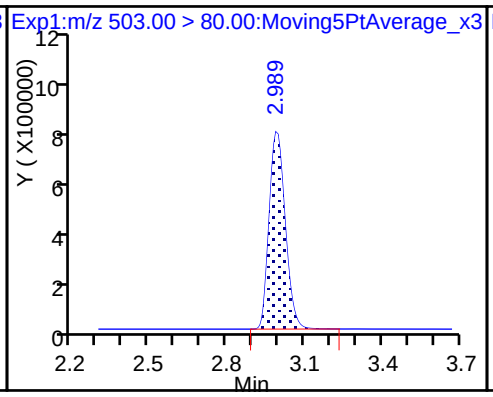
16 Perfluoroheptanesulfonic acid



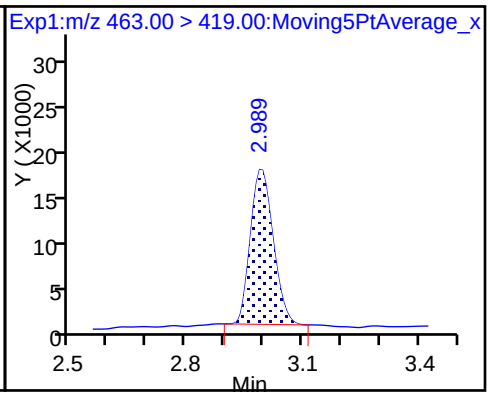
16 Perfluoroheptanesulfonic acid



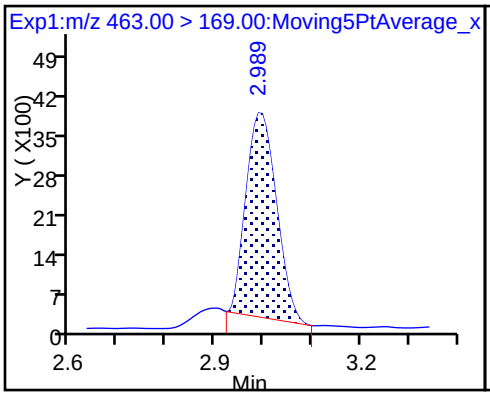
D 18 13C4 PFOS



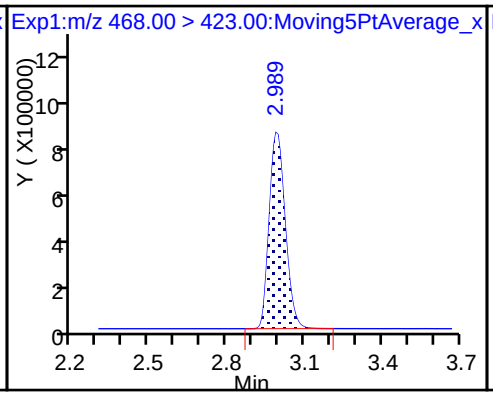
20 Perfluorononanoic acid



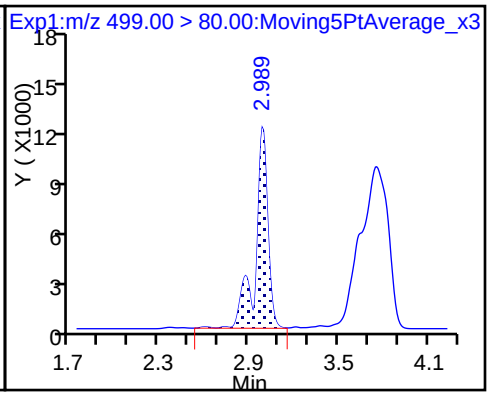
20 Perfluorononanoic acid



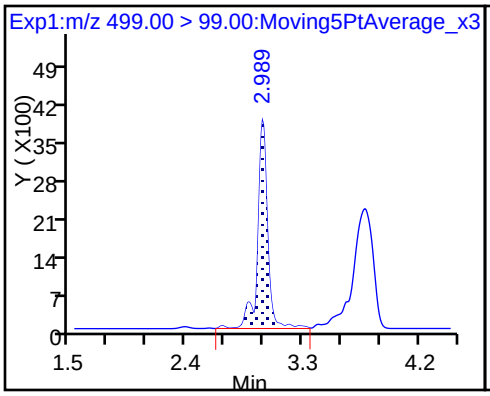
D 19 13C5 PFNA



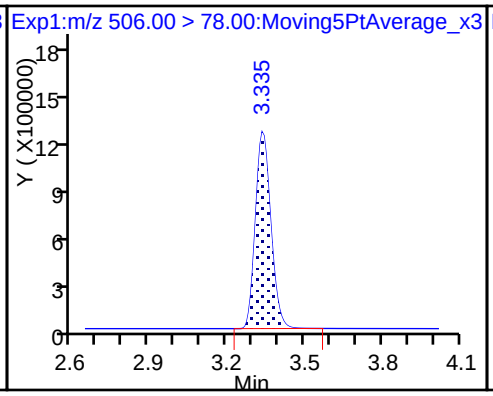
17 Perfluorooctane sulfonic acid



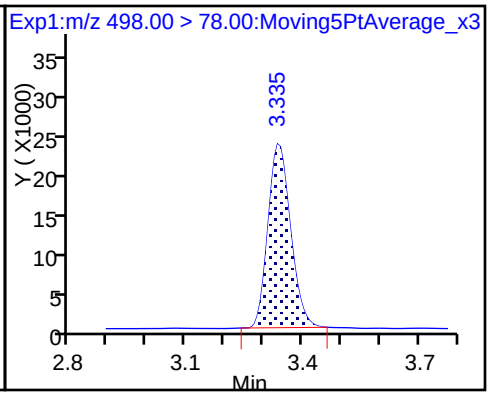
17 Perfluorooctane sulfonic acid



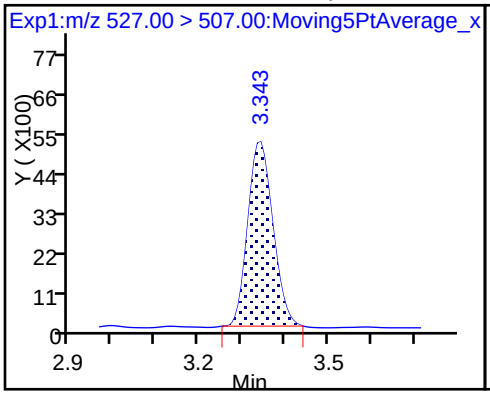
D 21 13C8 FOSA



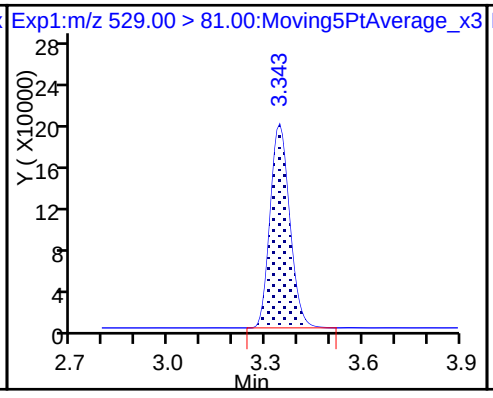
22 Perfluorooctane Sulfonamide



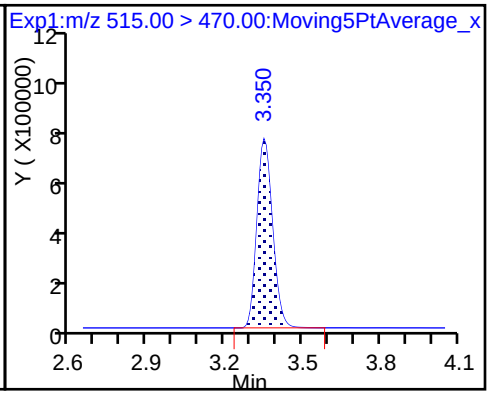
25 Sodium 1H,1H,2H,2H-perfluorodecane



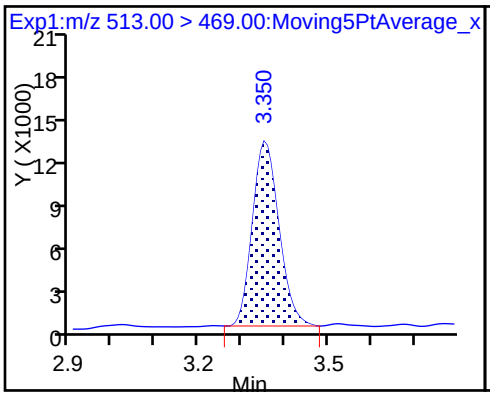
D 26 M2-8:2FTS



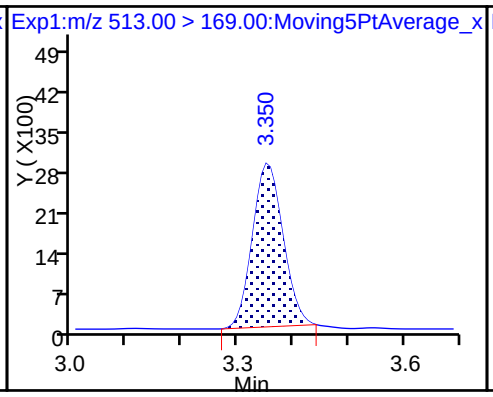
D 23 13C2 PFDA



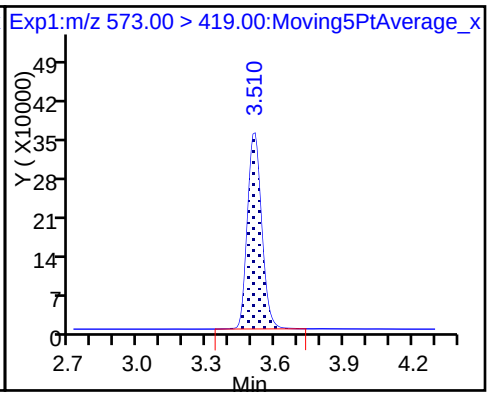
24 Perfluorodecanoic acid



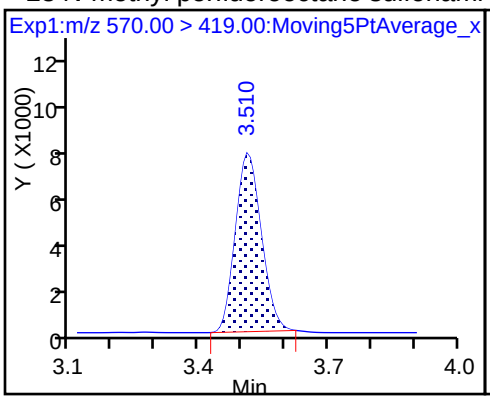
24 Perfluorodecanoic acid



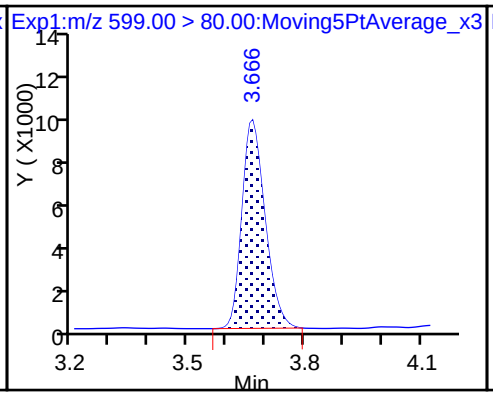
D 27 d3-NMeFOSAA



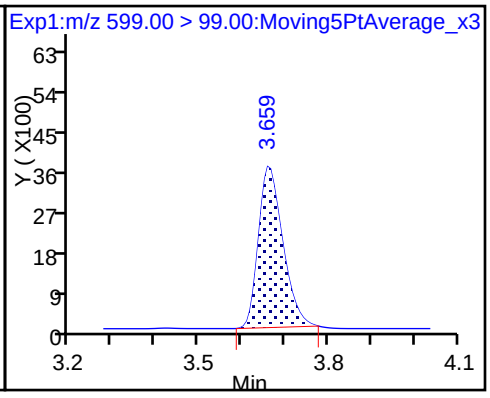
28 N-methyl perfluorooctane sulfonami



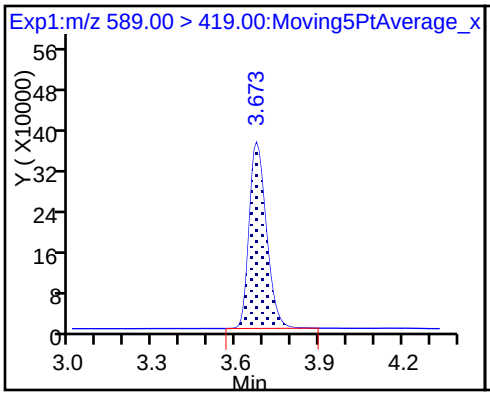
29 Perfluorodecane Sulfonic acid



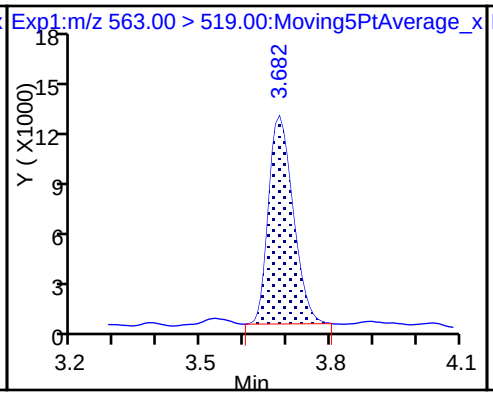
29 Perfluorodecane Sulfonic acid



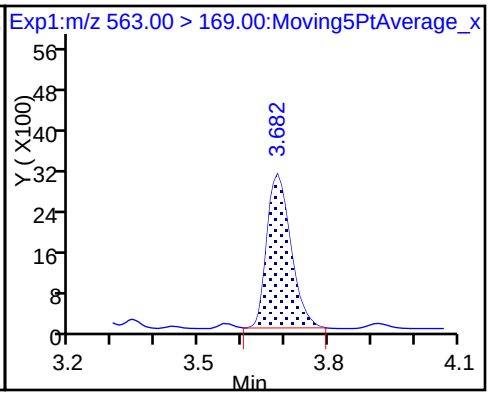
D 32 d5-NEtFOSAA



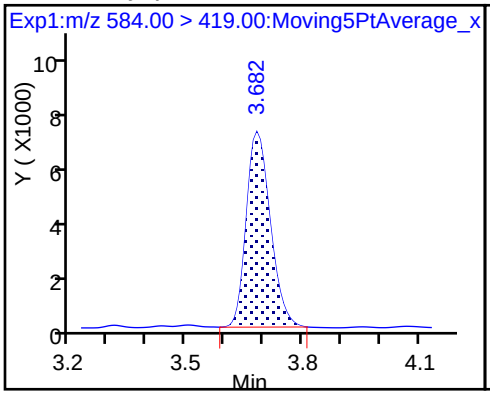
31 Perfluoroundecanoic acid



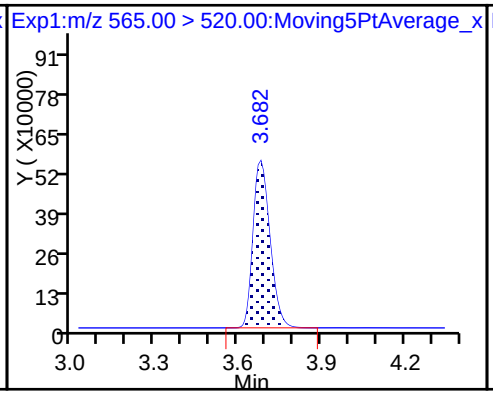
31 Perfluoroundecanoic acid



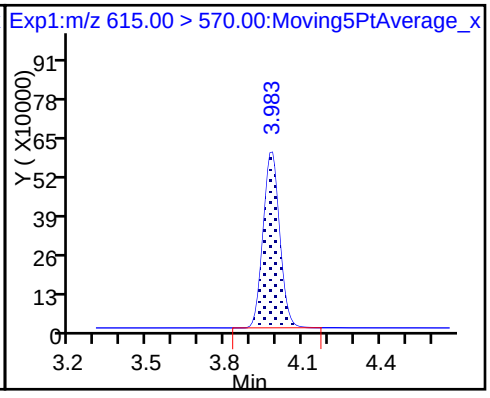
33 N-ethyl perfluorooctane sulfonamid



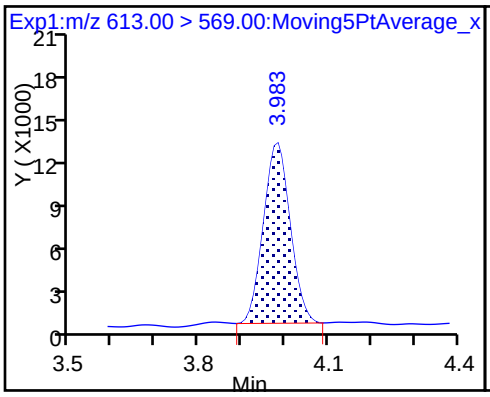
D 30 13C2 PFUnA



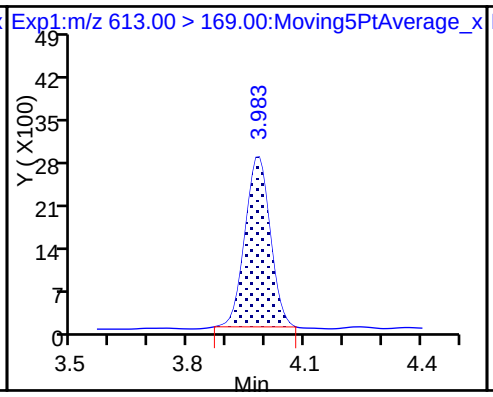
D 36 13C2 PFDoA



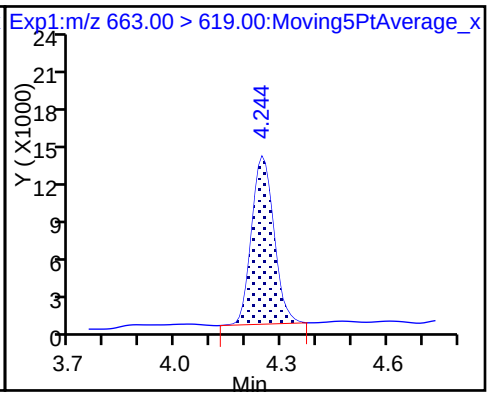
37 Perfluorododecanoic acid



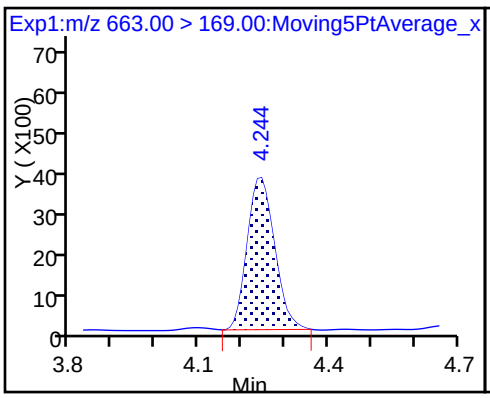
37 Perfluorododecanoic acid



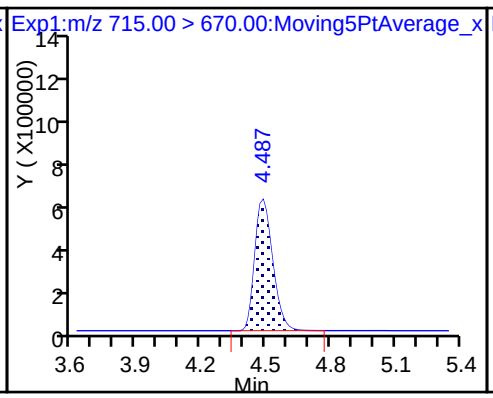
41 Perfluorotridecanoic acid



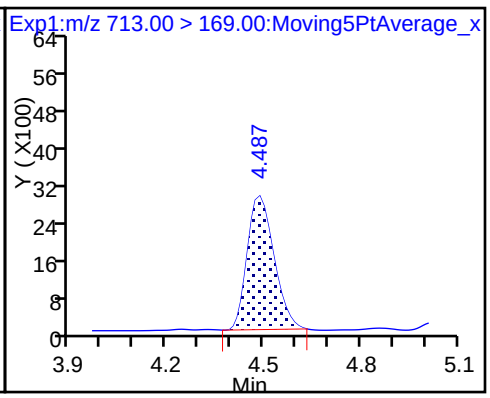
41 Perfluorotridecanoic acid



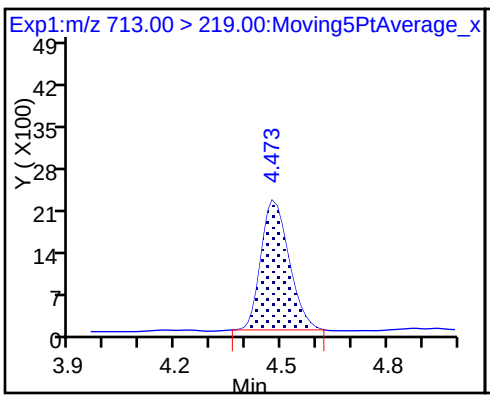
D 43 13C2-PFTeDA



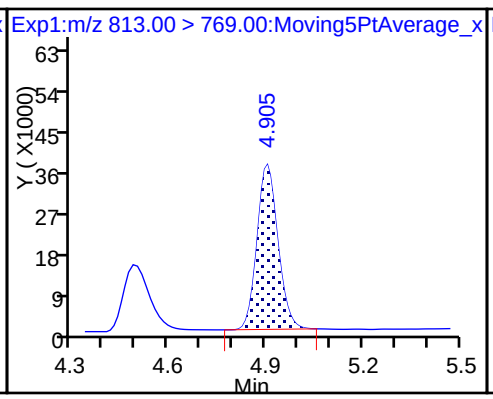
42 Perfluorotetradecanoic acid



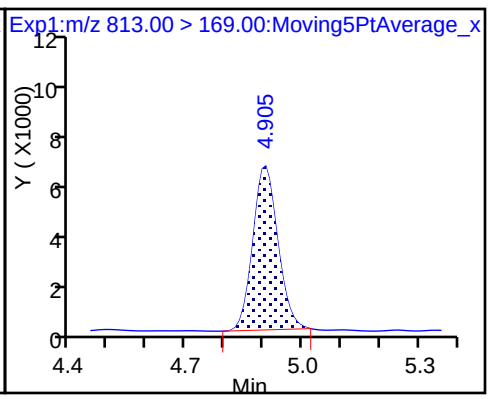
42 Perfluorotetradecanoic acid



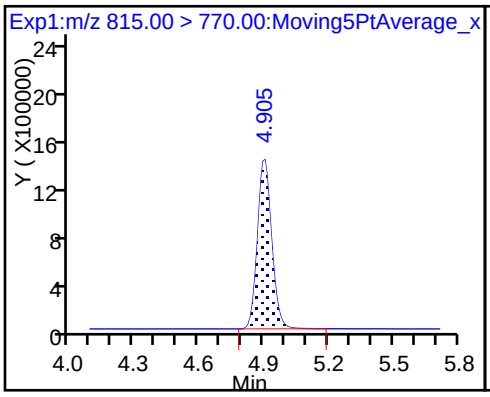
45 Perfluorohexadecanoic acid



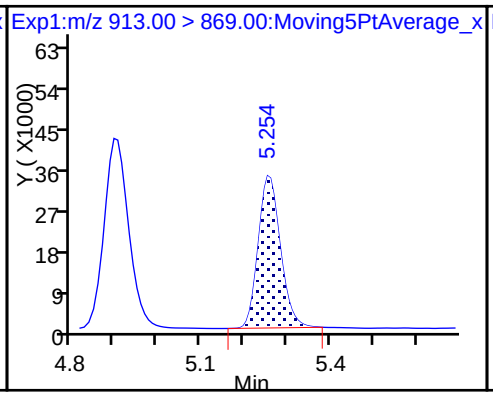
45 Perfluorohexadecanoic acid



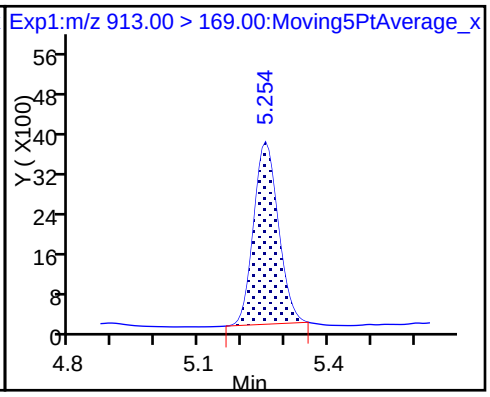
D 44 13C2-PFHxDA



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



TestAmerica Sacramento

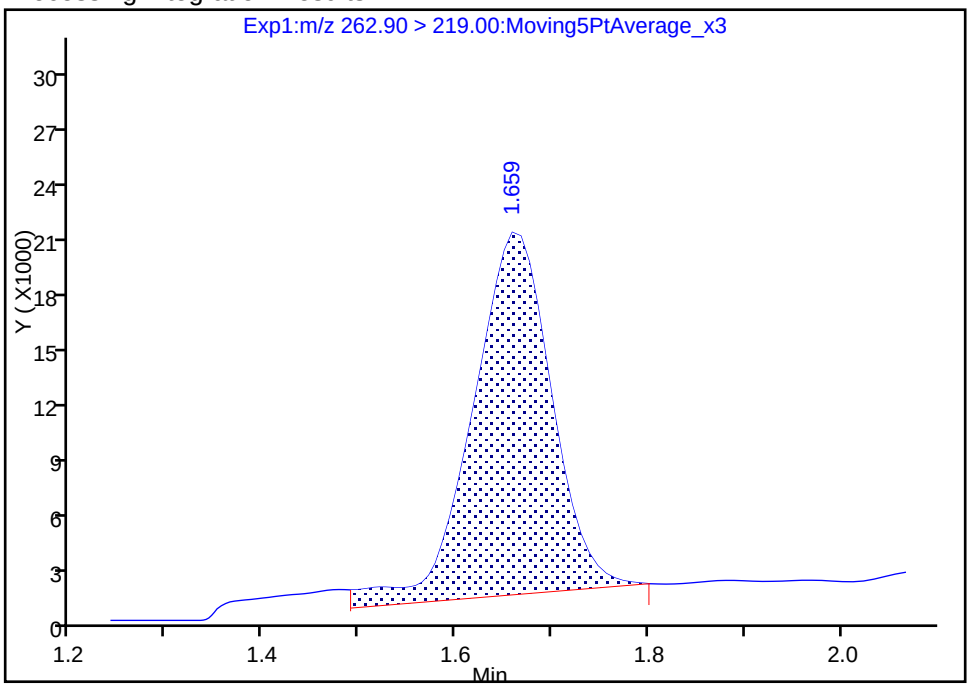
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_003.d
Injection Date: 17-Jan-2018 14:27:16 Instrument ID: A8_N
Lims ID: IC L2 Full
Client ID:
Operator ID: SACINSTLCMS01 ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Method: A8_N Limit Group: LC PFC_DOD ICAL
Column: Detector EXP1

4 Perfluoropentanoic acid, CAS: 2706-90-3

Signal: 1

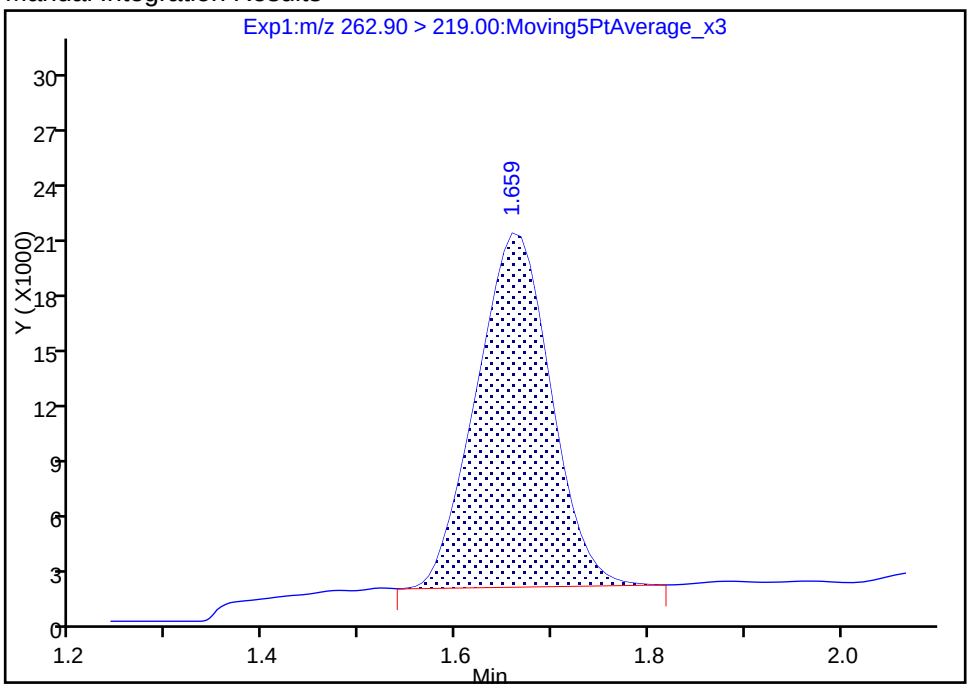
Processing Integration Results

RT: 1.66
Area: 112194
Amount: 0.054052
Amount Units: ng/ml



Manual Integration Results

RT: 1.66
Area: 102787
Amount: 0.050169
Amount Units: ng/ml



Reviewer: hannigana, 17-Jan-2018 16:50:27
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

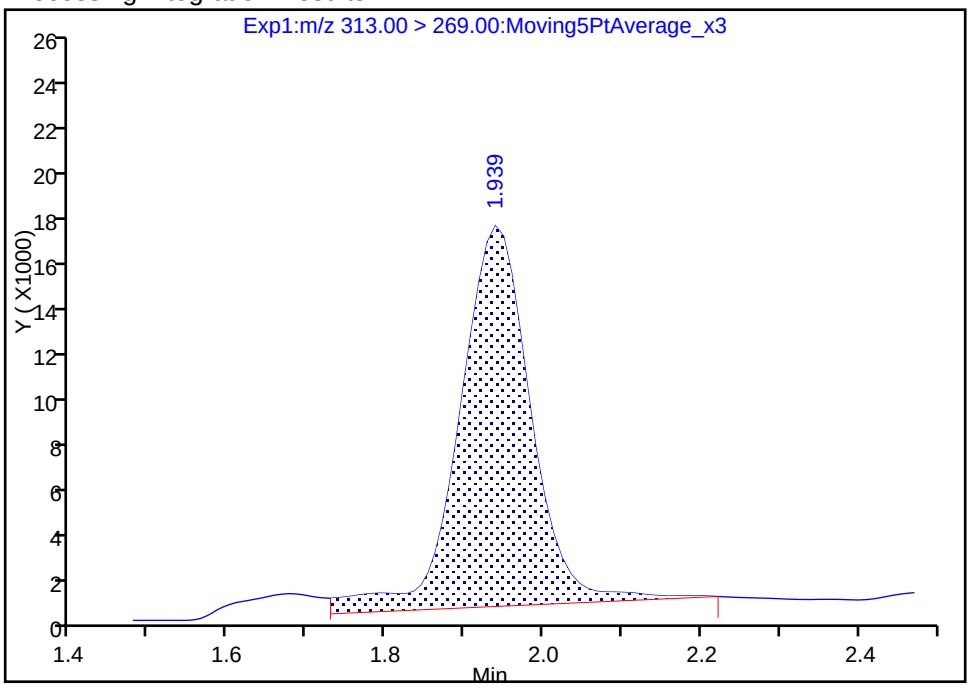
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_003.d
Injection Date: 17-Jan-2018 14:27:16 Instrument ID: A8_N
Lims ID: IC L2 Full
Client ID:
Operator ID: SACINSTLCMS01 ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Method: A8_N Limit Group: LC PFC_DOD ICAL
Column: Detector EXP1

6 Perfluorohexanoic acid, CAS: 307-24-4

Signal: 1

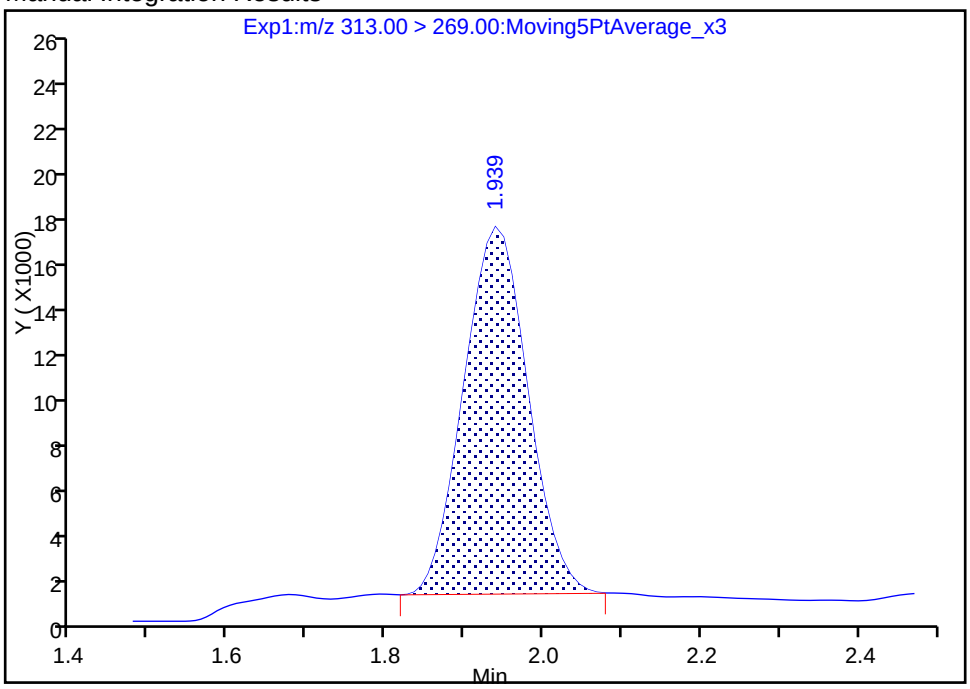
Processing Integration Results

RT: 1.94
Area: 107080
Amount: 0.054803
Amount Units: ng/ml



Manual Integration Results

RT: 1.94
Area: 92376
Amount: 0.048317
Amount Units: ng/ml



Reviewer: hannigana, 17-Jan-2018 16:50:39
Audit Action: Manually Integrated Audit Reason: Baseline

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_004.d
Lims ID: IC L3 Full
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 17-Jan-2018 14:35:05 ALS Bottle#: 12 Worklist Smp#: 4
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L3-FULL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 18-Jan-2018 08:22:24 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK019

First Level Reviewer: hannigana Date: 17-Jan-2018 16:51:20

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	1.413	1.411	0.002	0.539	6999196	2.47		98.9	21409	
2 Perfluorobutyric acid										
212.90 > 169.00	1.413	1.413	0.0	1.000	645094	0.2466		98.7	69.7	
D 3 13C5-PFPeA										
267.90 > 223.00	1.661	1.659	0.002	0.633	4140508	2.47		98.8	30360	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.661	1.662	-0.001	1.000	488305	0.2503		100	434	
D 47 13C3-PFBS										
301.90 > 83.00	1.697	1.695	0.002	0.647	85313	2.30		98.9	2557	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.697	1.697	0.0	1.000	656362	0.2317		105	5197	
298.90 > 99.00	1.697	1.697	0.0	1.000	266712		2.46(1.25-3.74)	105	2686	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.902	1.903	-0.001	1.000	116305	0.2281		97.7	6855	
D 60 M2-4:2FTS										
329.00 > 81.00	1.902	1.903	-0.001	0.725	530337	NC			5867	
D 7 13C2 PFHxA										
315.00 > 270.00	1.943	1.939	0.004	0.741	4611448	2.55		102	40346	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.943	1.939	0.004	1.000	466560	0.2440		97.6	991	
313.00 > 119.00	1.943	1.939	0.004	1.000	42394		11.01(5.03-15.10)	97.6	597	
D 9 13C4-PFHpA										
367.00 > 322.00	2.264	2.267	-0.003	0.863	4249130	2.47		98.8	31194	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.264	2.268	-0.004	1.000	517603	0.2771		111	847	
363.00 > 169.00	2.264	2.268	-0.004	1.000	193390		2.68(1.13-3.40)	111	1653	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.278	2.280	-0.002	1.000	523793	0.2180		95.8	2590	
399.00 > 99.00	2.278	2.280	-0.002	1.000	175428		2.99(1.50-4.49)	95.8	1962	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.868	5102469	2.41		102	28027	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.601	2.596	0.005	1.000	119814	0.2234		94.2	2001	
D 12 M2-6:2FTS										
429.00 > 81.00	2.601	2.597	0.004	0.992	769728	2.42		102	16698	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.622	0.001	1.000	4253926	2.52		101	25316	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.622	0.001		4681031	2.50			33089	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.623	2.623	0.0	1.000	484462	0.2429		97.2	373	
413.00 > 169.00	2.623	2.623	0.0	1.000	250575		1.93(0.84-2.52)	97.2	2345	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.630	2.629	0.001	1.000	431169	0.2328		97.8	7142	
449.00 > 99.00	2.630	2.629	0.001	1.000	127520		3.38(1.94-5.82)	97.8	3310	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.141	3494654	2.56		102	24262	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	2.992	0.001	1.000	344328	0.2249		97.0	139	
499.00 > 99.00	2.993	2.992	0.001	1.000	77366		4.45(2.31-6.93)	97.0	213	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.141	3268191	2.44		102	26597	
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	2.992	0.001	1.000	352431	0.2442		97.7	1227	
463.00 > 169.00	2.993	2.992	0.001	1.000	78627		4.48(1.90-5.69)	97.7	1695	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.340	3.338	0.002	1.000	464966	0.2489		99.6	6583	
D 21 13C8 FOSA										
506.00 > 78.00	3.340	3.338	0.002	1.273	4753896	2.52		101	24528	
D 26 M2-8:2FTS										
529.00 > 81.00	3.347	3.342	0.005	1.276	811941	2.42		101	16088	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.347	3.342	0.005	1.000	99090	0.2402		100	4021	
D 23 13C2 PFDA										
515.00 > 470.00	3.355	3.352	0.003	1.279	2939305	2.49		99.6	23157	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.355	3.353	0.002	1.000	292799	0.2567		103	1518	
513.00 > 169.00	3.355	3.353	0.002	1.000	47430		6.17(2.36-7.09)	103	1255	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.507	3.507	0.0	1.337	1483575	2.52		101	8558	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.514	3.513	0.001	1.002	150110	0.2342		93.7	1427	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.671	3.666	0.005	1.000	216397	0.2416		100	7571	
599.00 > 99.00	3.663	3.666	-0.003	0.998	71956		3.01(1.39-4.16)	100	2967	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.678	3.672	0.006	1.402	1512999	2.54		102	5661	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.678	3.678	0.0	1.000	227630	0.2436		97.4	1202	
563.00 > 169.00	3.687	3.678	0.009	1.002	47276		4.81(0.00-0.00)	97.4	2503	
D 30 13C2 PFUnA										
565.00 > 520.00	3.678	3.679	-0.001	1.402	2263551	2.53		101	20649	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.678	3.679	-0.001	1.000	142743	0.2422		96.9	3005	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.979	3.979	0.0	1.000	256381	0.2539		102	1243	
613.00 > 169.00	3.979	3.979	0.0	1.000	56420		4.54(2.13-6.40)	102	4395	
D 36 13C2 PFDoA										
615.00 > 570.00	3.979	3.979	0.0	1.517	2463501	2.53		101	26849	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.241	4.242	-0.001	1.000	263708	0.2305		92.2	792	
663.00 > 169.00	4.241	4.242	-0.001	1.000	87121		3.03(1.25-3.76)	92.2	2810	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.485	4.483	0.002	1.000	75670	0.2411		96.5	2188	
713.00 > 219.00	4.485	4.483	0.002	1.000	51317		1.47(0.71-2.13)	96.5	1498	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.485	4.483	0.002	1.710	3214801	2.53		101	15524	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.904	4.902	0.002	1.870	5624728	2.48		99.4	11541	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.904	4.902	0.002	1.000	561148	0.2439		97.6	334	
813.00 > 169.00	4.904	4.902	0.002	1.000	100487		5.58(2.86-8.58)	97.6	1611	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.253	5.255	-0.002	1.000	579412	0.2444		97.8	170	
913.00 > 169.00	5.246	5.255	-0.009	0.999	70347		8.24(0.00-0.00)	97.8	401	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL3_00003 Amount Added: 1.00 Units: mL

Report Date: 18-Jan-2018 08:22:24 Chrom Revision: 2.2 08-Dec-2017 11:41:26

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_004.d

Injection Date: 17-Jan-2018 14:35:05 Instrument ID: A8_N

Lims ID: IC L3 Full

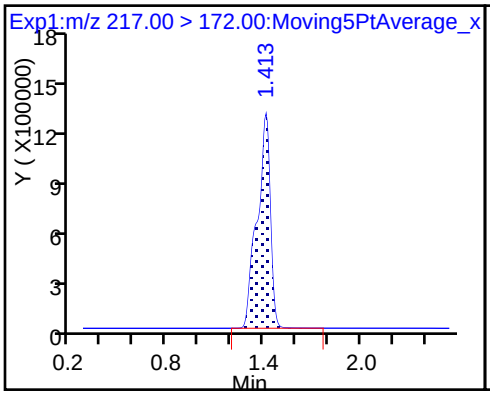
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 12 Worklist Smp#: 4

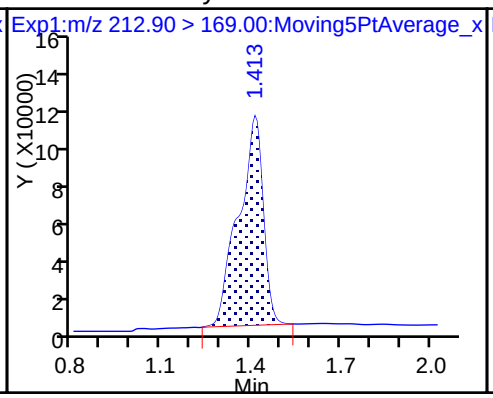
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

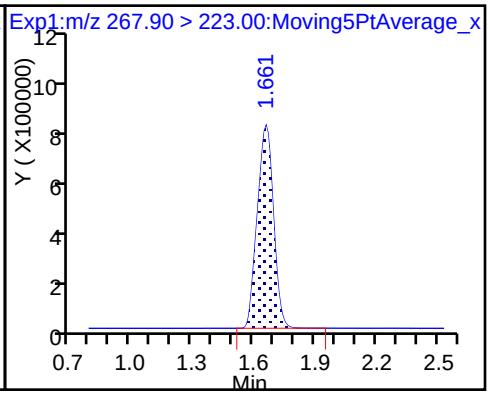
D 1 13C4 PFBA



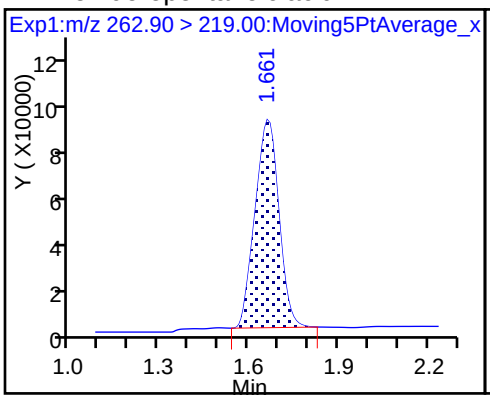
2 Perfluorobutyric acid



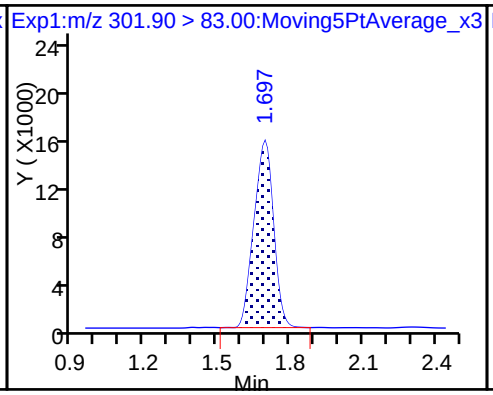
D 3 13C5-PFPeA



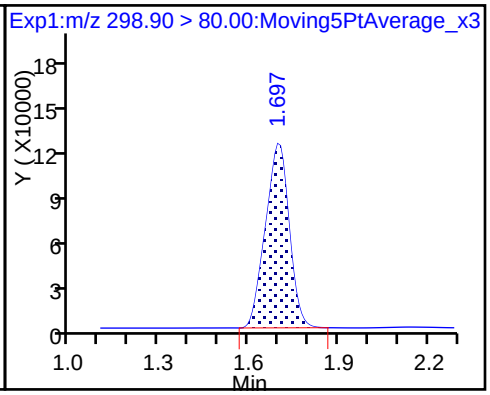
4 Perfluoropentanoic acid



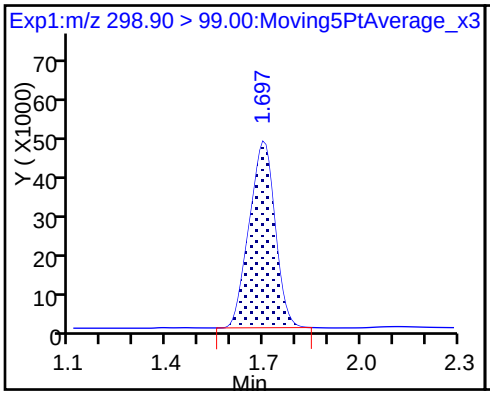
D 47 13C3-PFBS



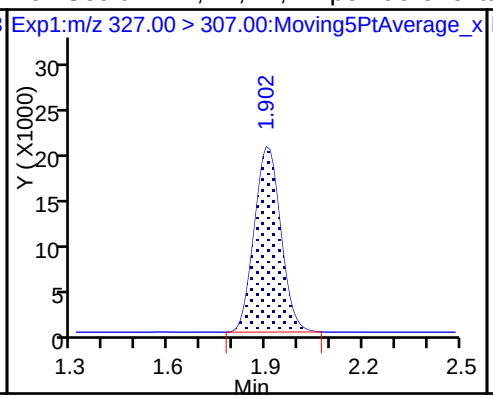
5 Perfluorobutanesulfonic acid



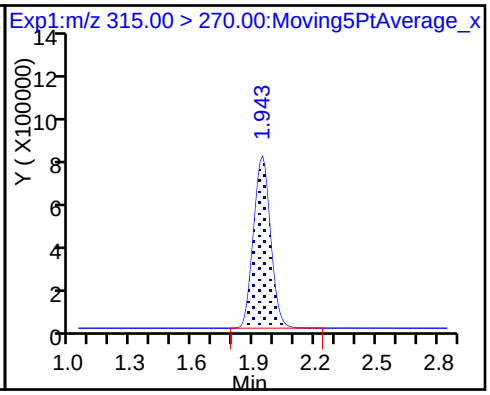
5 Perfluorobutanesulfonic acid



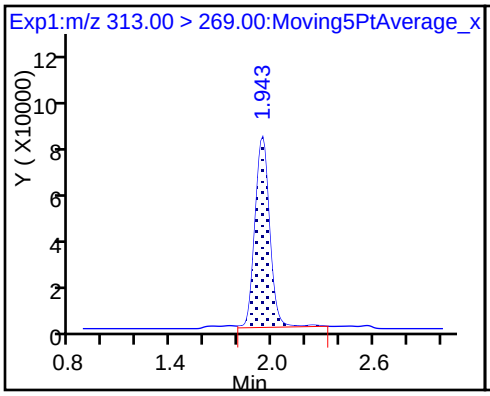
61 Sodium 1H,1H,2H,2H-perfluorohexa



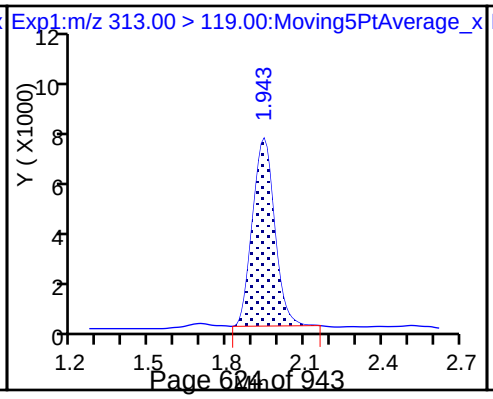
D 7 13C2 PFHxA



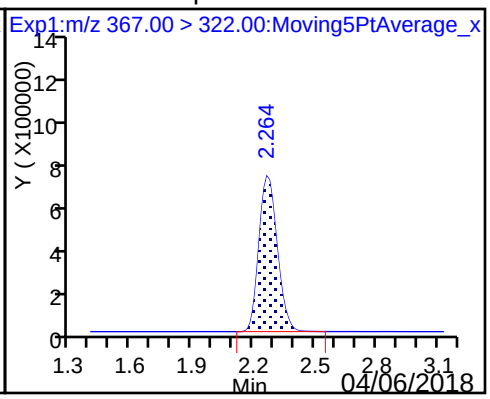
6 Perfluorohexanoic acid



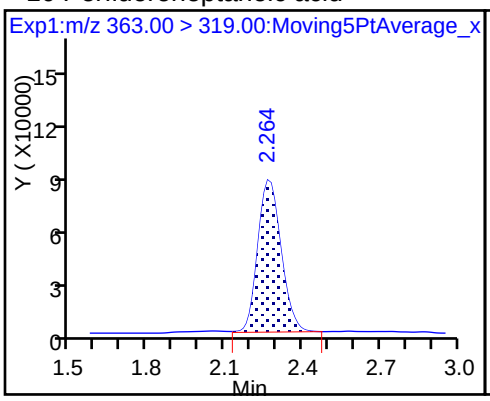
6 Perfluorohexanoic acid



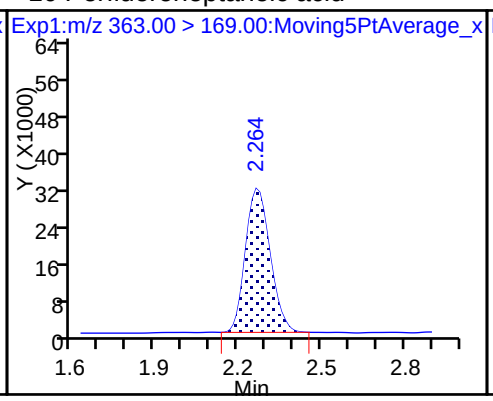
D 9 13C4-PFHpA



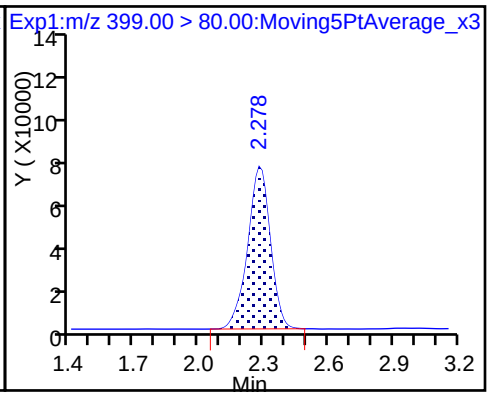
10 Perfluoroheptanoic acid



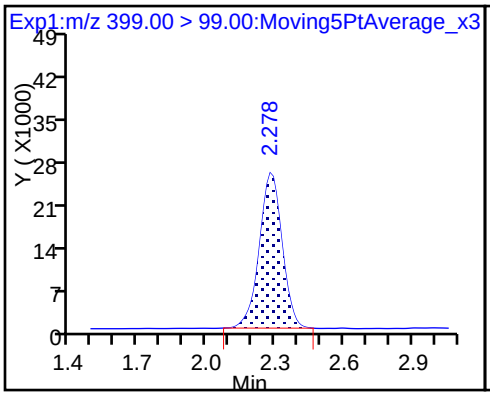
10 Perfluoroheptanoic acid



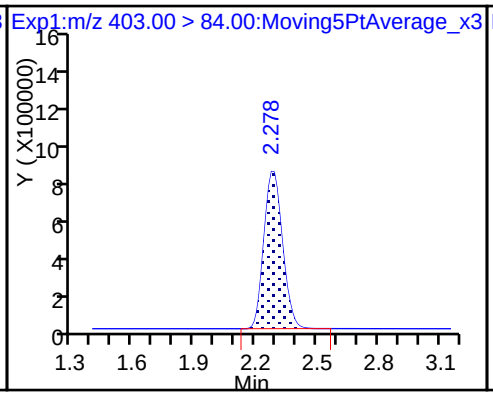
8 Perfluorohexanesulfonic acid



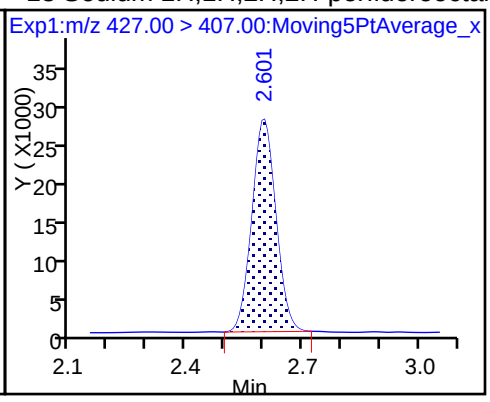
8 Perfluorohexanesulfonic acid



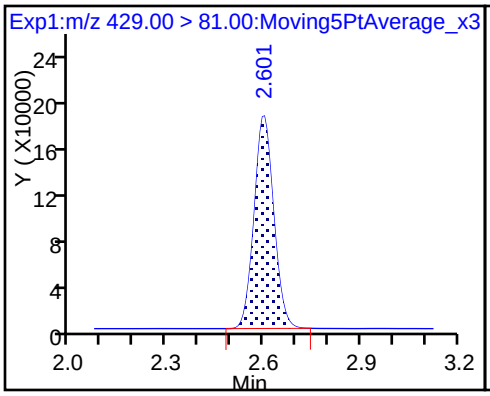
D 11 18O2 PFHxS



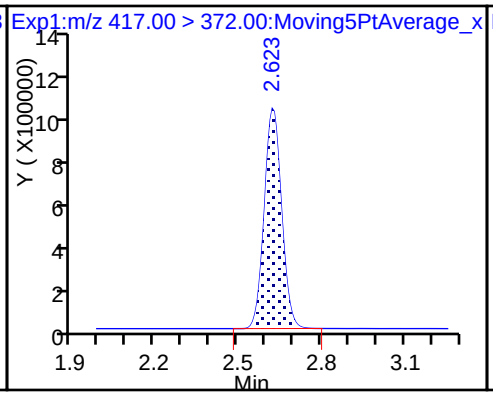
13 Sodium 1H,1H,2H,2H-perfluorooctane



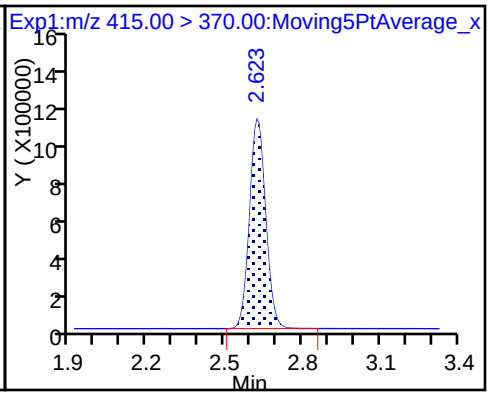
D 12 M2-6:2FTS



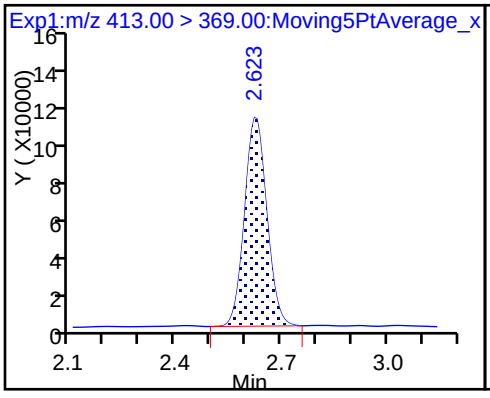
D 14 13C4 PFOA



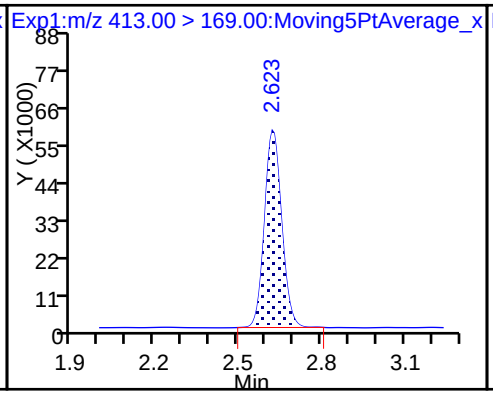
* 62 13C2-PFOA



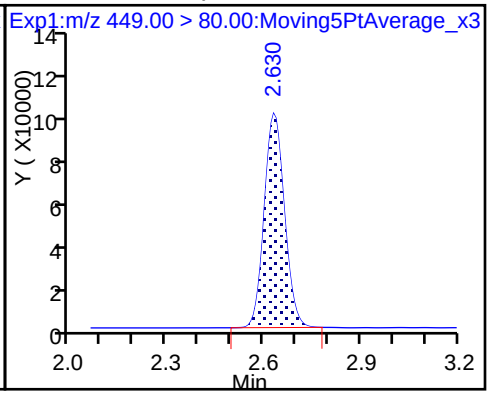
15 Perfluorooctanoic acid



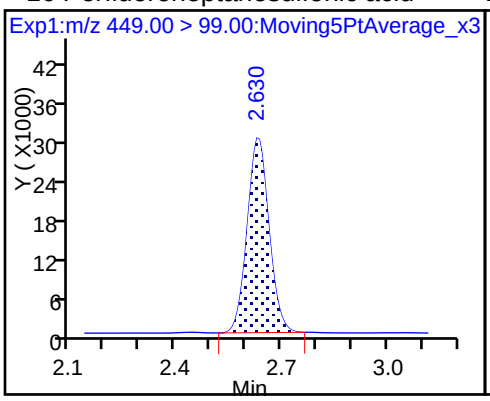
15 Perfluorooctanoic acid



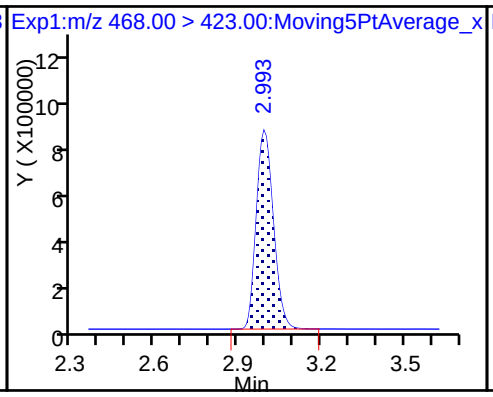
16 Perfluoroheptanesulfonic acid



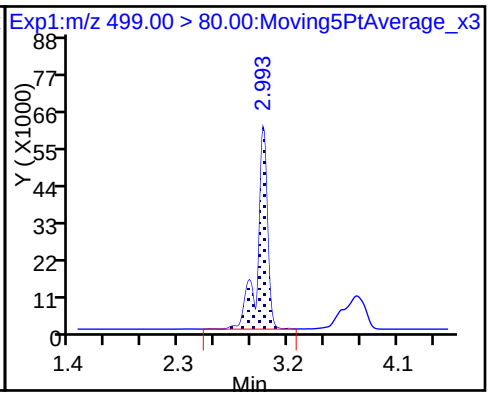
16 Perfluoroheptanesulfonic acid



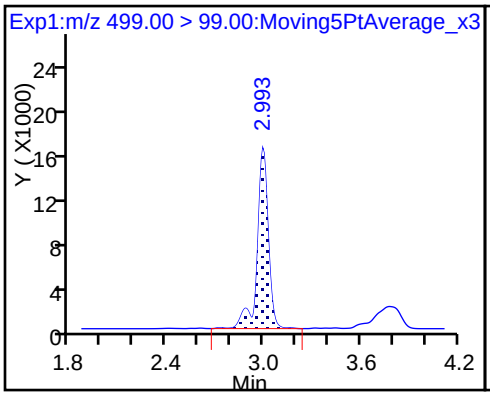
D 19 13C5 PFNA



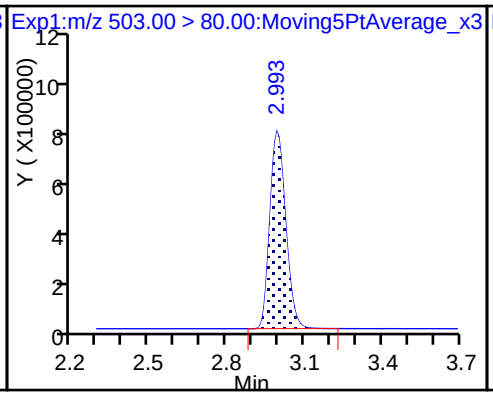
17 Perfluorooctane sulfonic acid



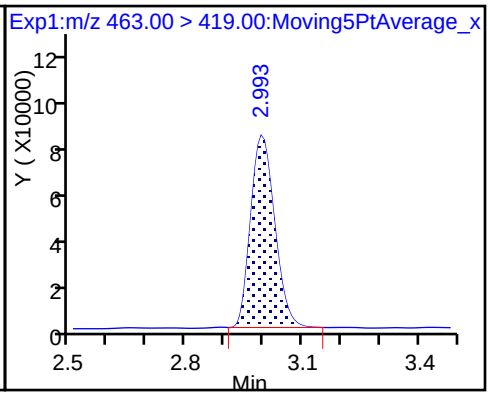
17 Perfluorooctane sulfonic acid



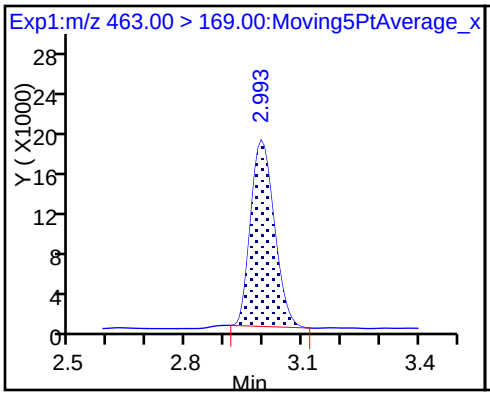
D 18 13C4 PFOS



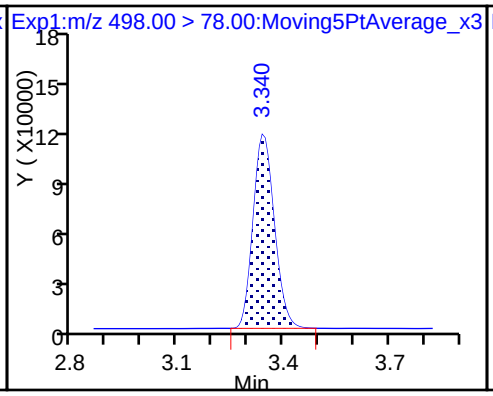
20 Perfluorononanoic acid



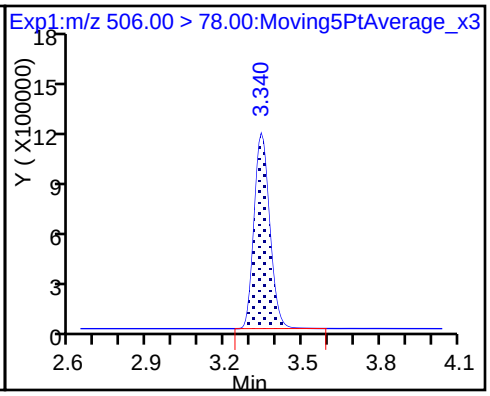
20 Perfluorononanoic acid



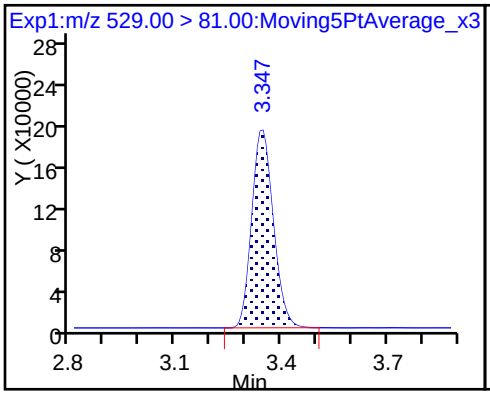
22 Perfluorooctane Sulfonamide



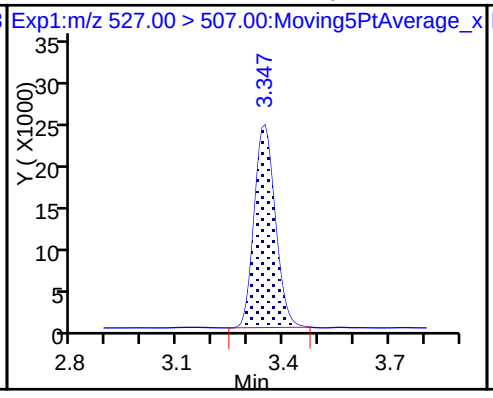
D 21 13C8 FOSA



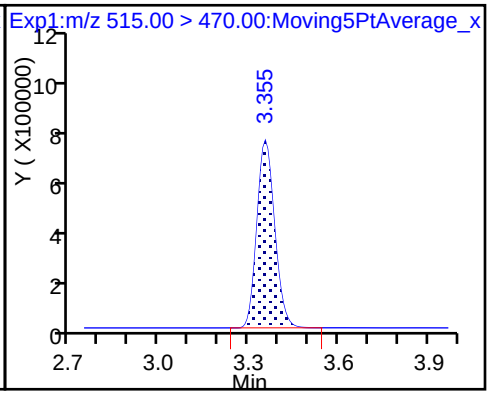
D 26 M2-8:2FTS



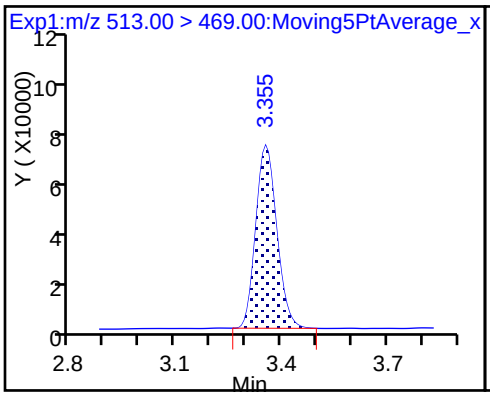
25 Sodium 1H,1H,2H,2H-perfluorodecane



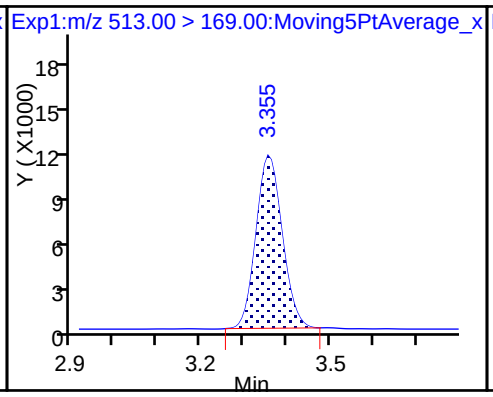
D 23 13C2 PFDA



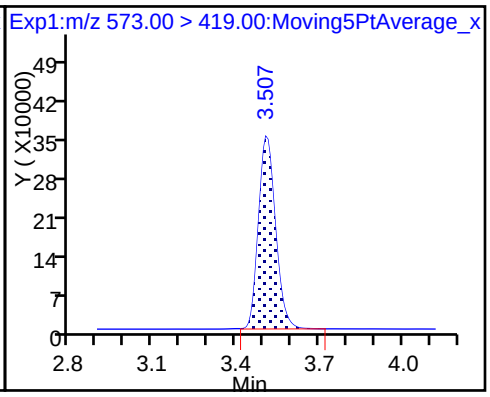
24 Perfluorodecanoic acid



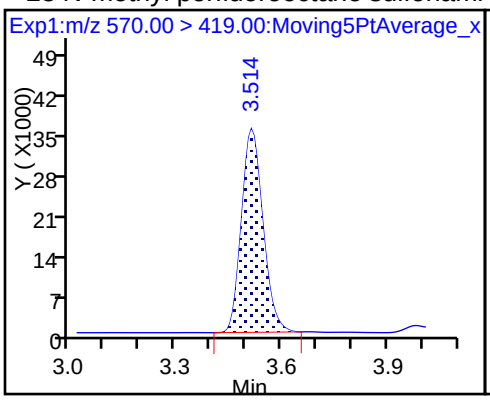
24 Perfluorodecanoic acid



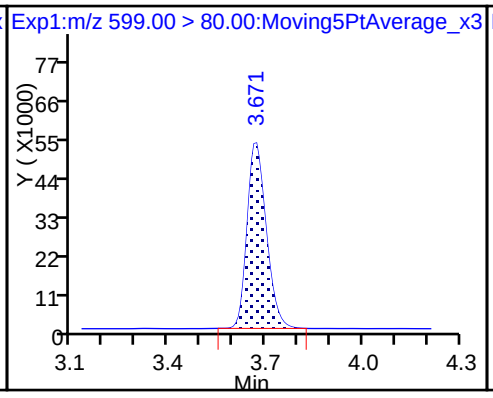
D 27 d3-NMeFOSAA



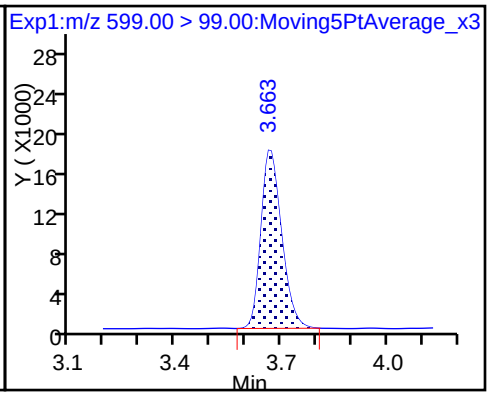
28 N-methyl perfluorooctane sulfonami



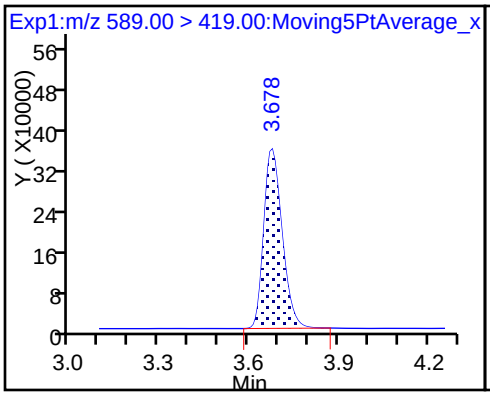
29 Perfluorodecane Sulfonic acid



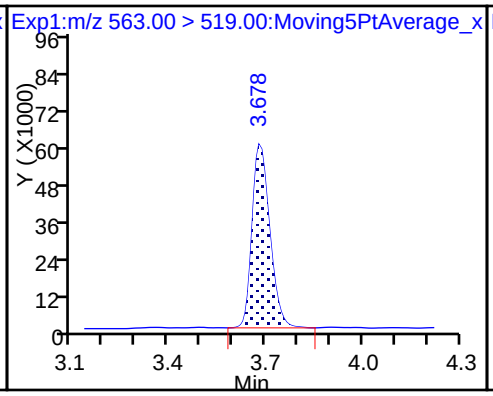
29 Perfluorodecane Sulfonic acid



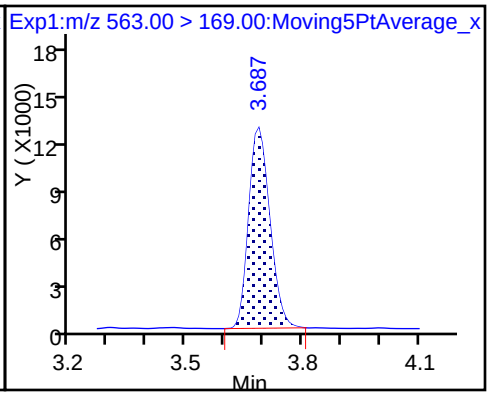
D 32 d5-NEtFOSAA



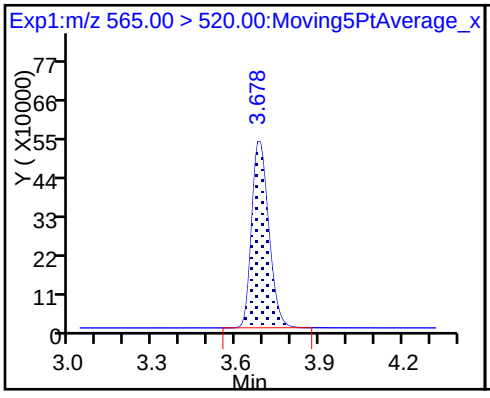
31 Perfluoroundecanoic acid



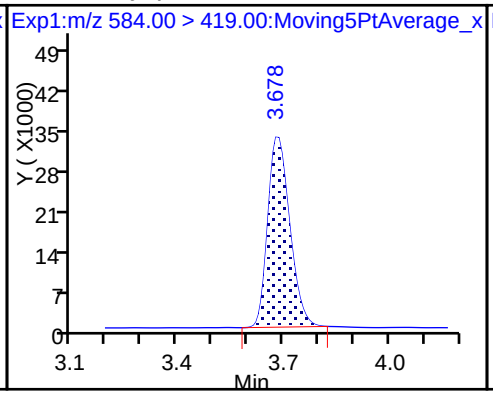
31 Perfluoroundecanoic acid



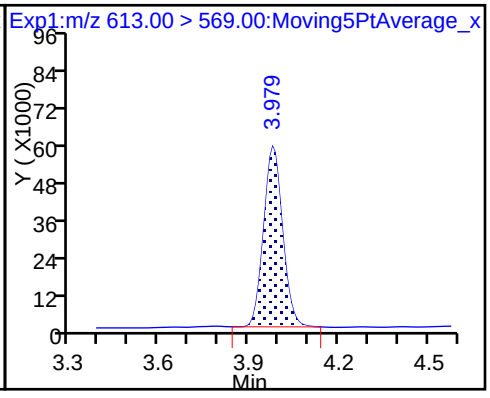
D 30 13C2 PFUnA



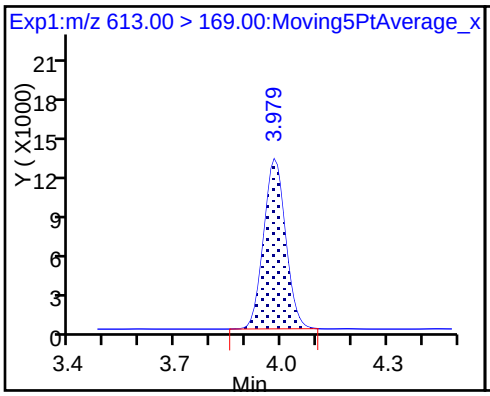
33 N-ethyl perfluorooctane sulfonamid



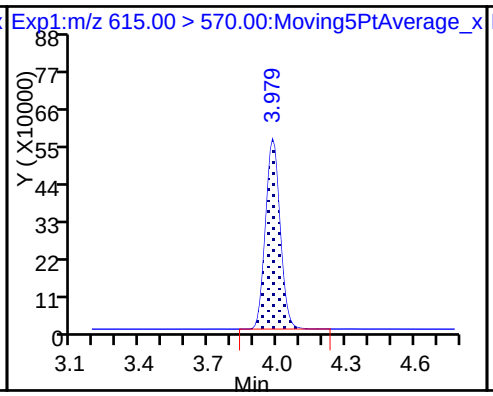
37 Perfluorododecanoic acid



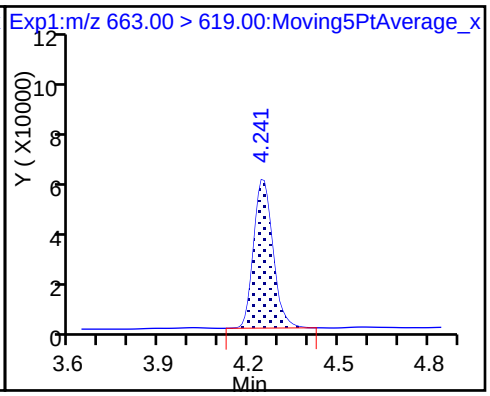
37 Perfluorododecanoic acid



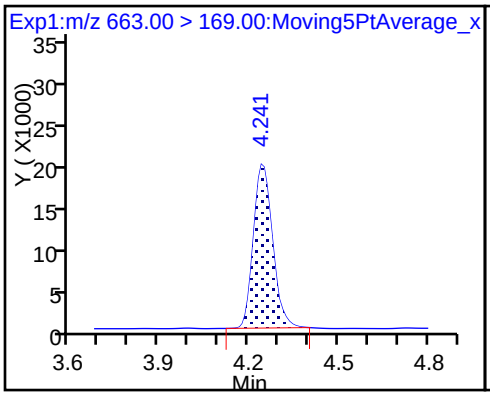
D 36 13C2 PFDoA



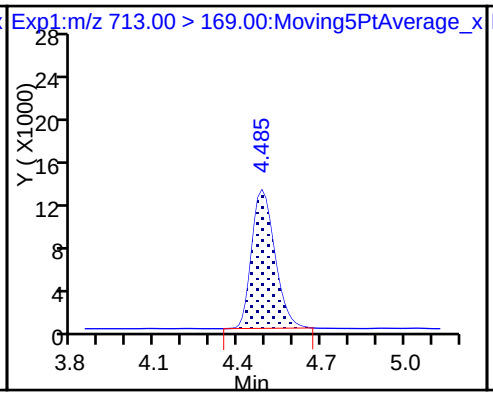
41 Perfluorotridecanoic acid



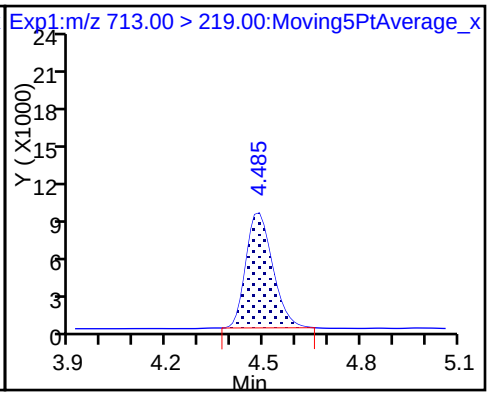
41 Perfluorotridecanoic acid



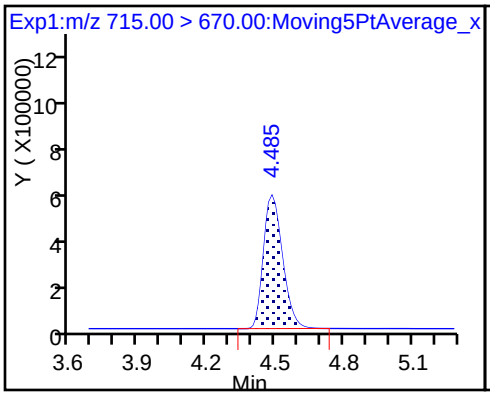
42 Perfluorotetradecanoic acid



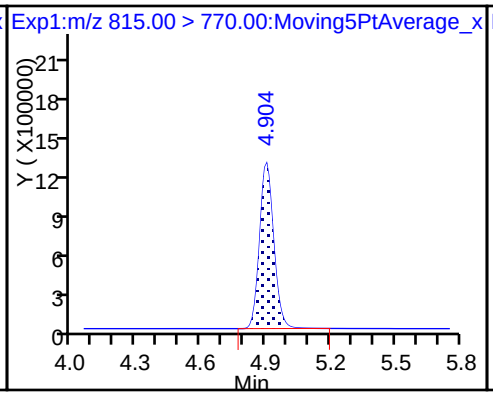
42 Perfluorotetradecanoic acid



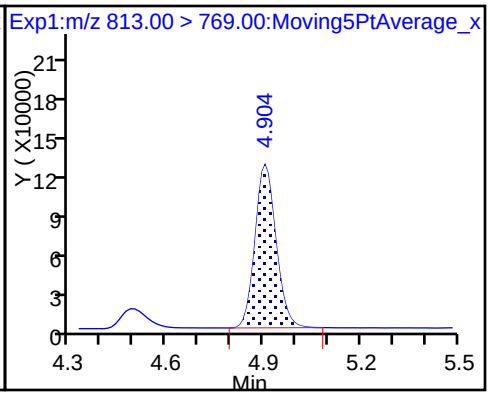
D 43 13C2-PFTeDA



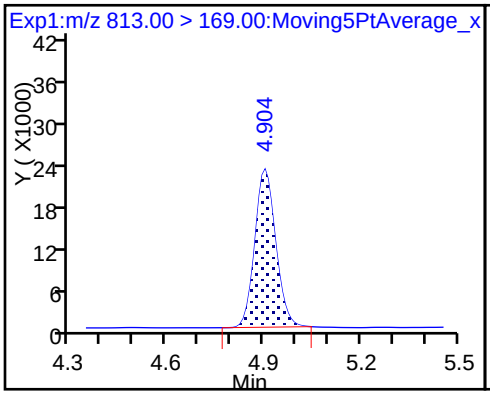
D 44 13C2-PFHxDA



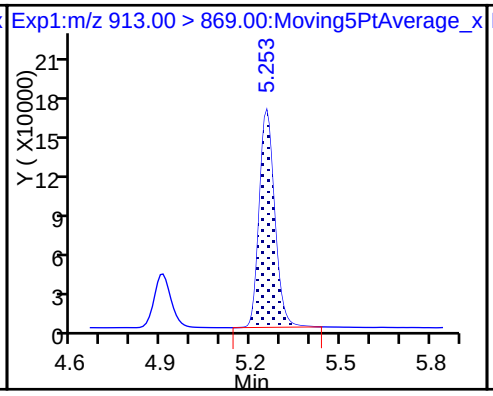
45 Perfluorohexadecanoic acid



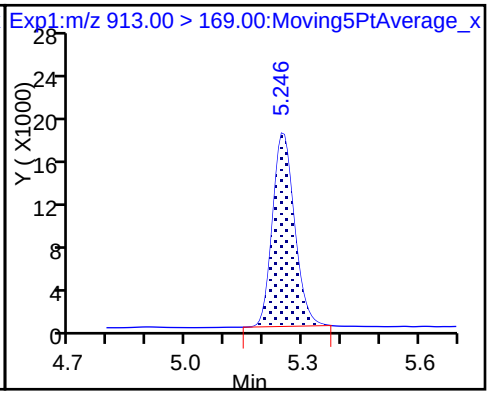
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_005.d
Lims ID: IC L4 Full
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 17-Jan-2018 14:42:53 ALS Bottle#: 13 Worklist Smp#: 5
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L4-FULL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 18-Jan-2018 08:22:27 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK019

First Level Reviewer: hannigana Date: 17-Jan-2018 16:51:59

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	1.411	1.411	0.0	0.538	7075449	2.46		98.3	22003	
2 Perfluorobutyric acid										
212.90 > 169.00	1.418	1.413	0.005	1.004	2581287	0.9762		97.6	317	
D 3 13C5-PFPeA										
267.90 > 223.00	1.658	1.659	-0.001	0.632	4261723	2.50		100.0	35794	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.667	1.662	0.005	1.005	1934955	0.9635		96.4	1826	
D 47 13C3-PFBS										
301.90 > 83.00	1.694	1.695	-0.001	0.645	85658	2.27		97.6	3903	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.703	1.697	0.006	1.005	2532634	0.8903		101	18418	
298.90 > 99.00	1.703	1.697	0.006	1.005	1089273		2.33(1.25-3.74)	101	10994	
D 60 M2-4:2FTS										
329.00 > 81.00	1.908	1.903	0.005	0.727	544574	NC			5492	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.908	1.903	0.005	1.000	459884	0.8984		96.2	20899	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.939	1.939	0.0	1.000	1861593	1.01		101	4714	
313.00 > 119.00	1.939	1.939	0.0	1.000	163514		11.38(5.03-15.10)	101	2185	
D 7 13C2 PFHxA										
315.00 > 270.00	1.939	1.939	0.0	0.738	4467394	2.43		97.3	35572	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.866	4367056	2.50		99.8	24480	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.273	2.268	0.005	1.000	1803022	0.9392		93.9	3372	
363.00 > 169.00	2.273	2.268	0.005	1.000	733365		2.46(1.13-3.40)	93.9	5388	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.286	2.280	0.006	1.000	1981094	0.8265		90.8	6767	
399.00 > 99.00	2.286	2.280	0.006	1.000	683021		2.90(1.50-4.49)	90.8	4324	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.871	5091273	2.36		99.9	25595	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.598	2.596	0.002	1.000	488565	0.8919		94.1	11772	
D 12 M2-6:2FTS										
429.00 > 81.00	2.598	2.597	0.001	0.990	786039	2.43		102	21117	
* 62 13C2-PFOA										
415.00 > 370.00	2.625	2.622	0.003		4760693	2.50			29372	
D 14 13C4 PFOA										
417.00 > 372.00	2.625	2.622	0.003	1.000	4182465	2.44		97.6	33554	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.625	2.623	0.002	1.000	1890626	0.9642		96.4	1371	
413.00 > 169.00	2.625	2.623	0.002	1.000	990720		1.91(0.84-2.52)	96.4	7524	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.633	2.629	0.004	1.000	1717801	0.9369		98.4	15386	
449.00 > 99.00	2.633	2.629	0.004	1.000	474373		3.62(1.94-5.82)	98.4	9136	
D 18 13C4 PFOS										
503.00 > 80.00	2.996	2.992	0.004	1.141	3235344	2.37		99.3	23758	
20 Perfluorononanoic acid										
463.00 > 419.00	2.996	2.992	0.004	1.000	1428679	1.02		102	4853	
463.00 > 169.00	2.996	2.992	0.004	1.000	339665		4.21(1.90-5.69)	102	7289	
D 19 13C5 PFNA										
468.00 > 423.00	2.996	2.992	0.004	1.141	3397294	2.44		97.8	23997	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.996	2.992	0.004	1.000	1355316	0.8944		96.4	530	
499.00 > 99.00	2.996	2.992	0.004	1.000	299471		4.53(2.31-6.93)	96.4	769	
D 21 13C8 FOSA										
506.00 > 78.00	3.343	3.338	0.005	1.273	4845519	2.53		101	28675	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.343	3.338	0.005	1.000	1866404	0.9803		98.0	14587	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.343	3.342	0.001	1.000	377296	0.9426		98.4	9990	
D 26 M2-8:2FTS										
529.00 > 81.00	3.343	3.342	0.001	1.273	787775	2.30		96.2	21130	
D 23 13C2 PFDA										
515.00 > 470.00	3.358	3.352	0.006	1.279	3005224	2.50		100	31282	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.358	3.353	0.005	1.000	1122840	0.9627		96.3	5520	
513.00 > 169.00	3.358	3.353	0.005	1.000	202609		5.54(2.36-7.09)	96.3	1737	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.510	3.507	0.003	1.337	1499251	2.50		100	11909	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.518	3.513	0.005	1.002	630879	0.9739		97.4	3748	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.665	3.666	-0.001	1.000	857674	0.9675		100	18976	
599.00 > 99.00	3.665	3.666	-0.001	1.000	292568		2.93(1.39-4.16)	100	10167	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.673	3.672	0.001	1.399	1503508	2.48		99.2	5023	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.682	3.678	0.004	1.000	855685	0.9207		92.1	3773	
563.00 > 169.00	3.682	3.678	0.004	1.000	187060		4.57(0.00-0.00)	92.1	9908	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.682	3.679	0.003	1.002	554613	0.9470		94.7	6060	
D 30 13C2 PFUnA										
565.00 > 520.00	3.682	3.679	0.003	1.402	2250985	2.47		98.8	31522	
D 36 13C2 PFDoA										
615.00 > 570.00	3.983	3.979	0.004	1.517	2345552	2.37		94.9	23548	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.983	3.979	0.004	1.000	975905	1.02		102	4517	
613.00 > 169.00	3.983	3.979	0.004	1.000	233684		4.18(2.13-6.40)	102	10727	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.244	4.242	0.002	1.000	1119808	1.03		103	4585	
663.00 > 169.00	4.244	4.242	0.002	1.000	344544		3.25(1.25-3.76)	103	12891	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.487	4.483	0.004	1.709	3148987	2.44		97.5	16074	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.487	4.483	0.004	1.000	295170	0.9603		96.0	5686	
713.00 > 219.00	4.473	4.483	-0.010	0.997	198743		1.49(0.71-2.13)	96.0	5800	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.904	4.902	0.002	1.000	2195395	0.9818		98.2	1281	
813.00 > 169.00	4.904	4.902	0.002	1.000	373694		5.87(2.86-8.58)	98.2	3967	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.904	4.902	0.002	1.868	5786263	2.51		101	11016	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.261	5.255	0.006	1.000	2429777	1.00		99.6	587	
913.00 > 169.00	5.261	5.255	0.006	1.000	304165		7.99(0.00-0.00)	99.6	1267	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL4_00003 Amount Added: 1.00 Units: mL

Report Date: 18-Jan-2018 08:22:27 Chrom Revision: 2.2 08-Dec-2017 11:41:26

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_005.d

Injection Date: 17-Jan-2018 14:42:53 Instrument ID: A8_N

Lims ID: IC L4 Full

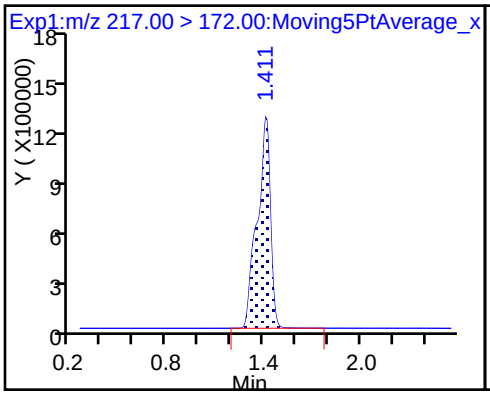
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 13 Worklist Smp#: 5

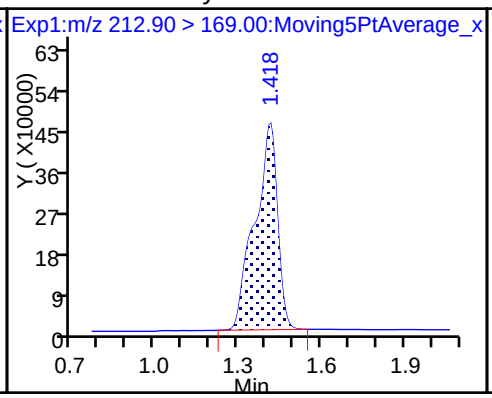
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

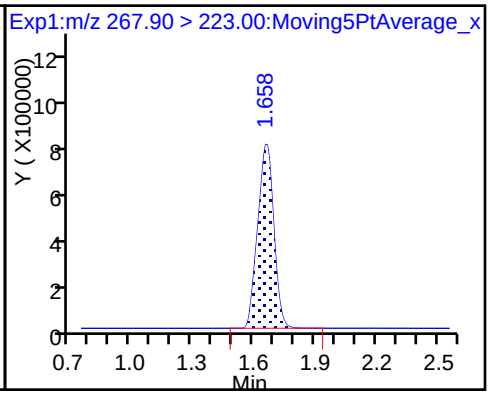
D 1 13C4 PFBA



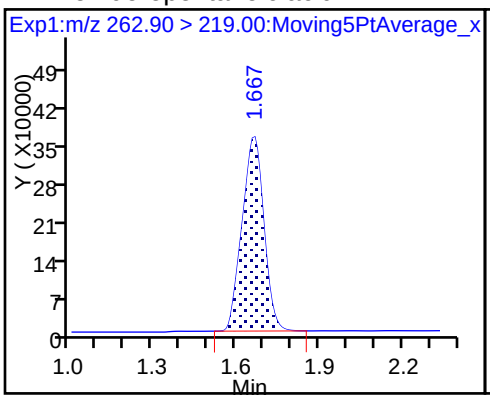
2 Perfluorobutyric acid



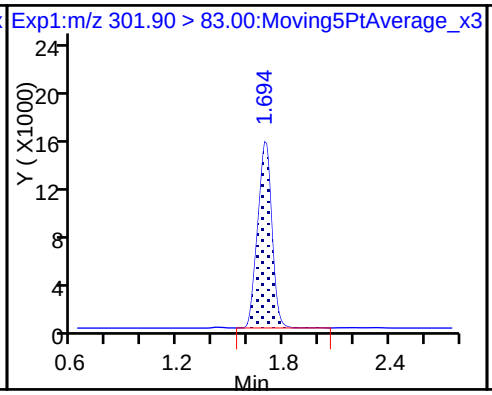
D 3 13C5-PFPeA



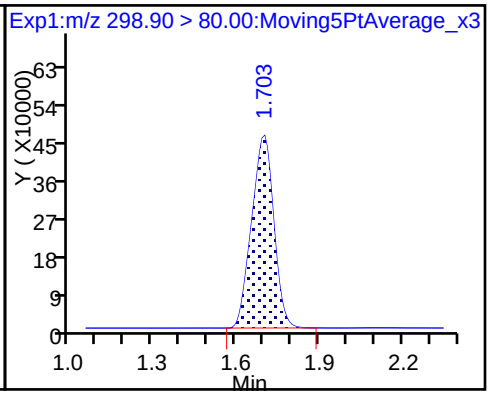
4 Perfluoropentanoic acid



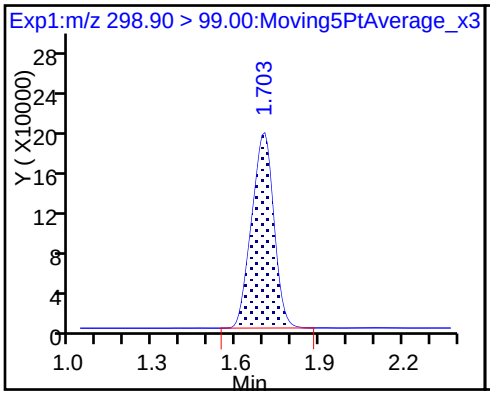
D 47 13C3-PFBS



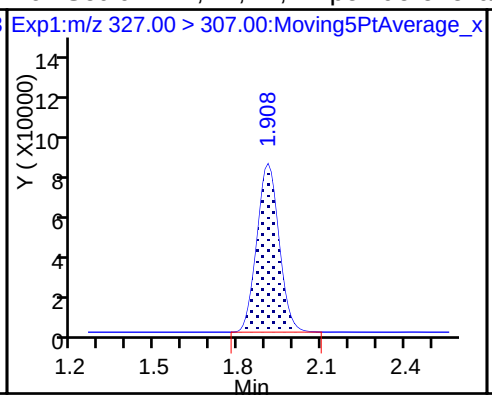
5 Perfluorobutanesulfonic acid



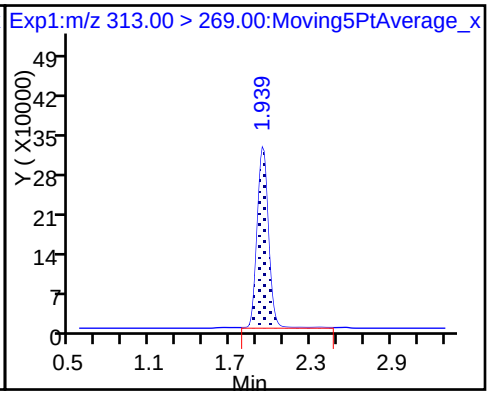
5 Perfluorobutanesulfonic acid



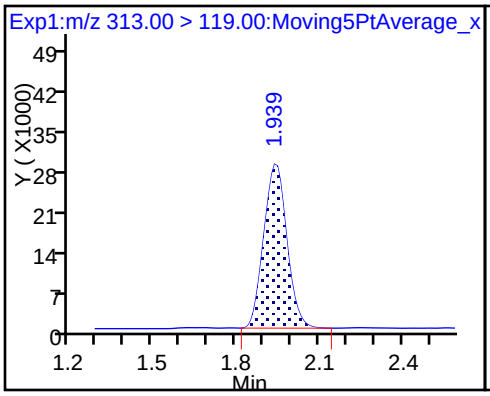
61 Sodium 1H,1H,2H,2H-perfluorohexane



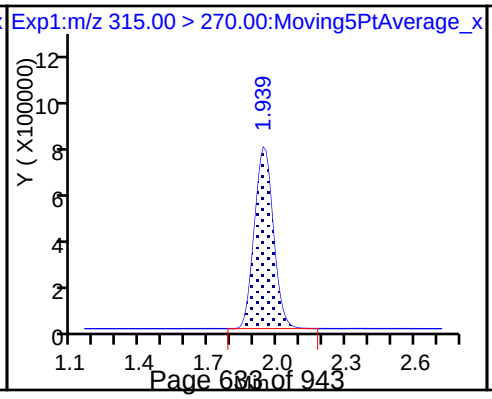
6 Perfluorohexanoic acid



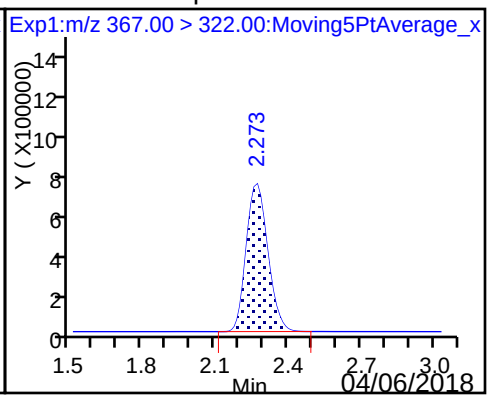
6 Perfluorohexanoic acid



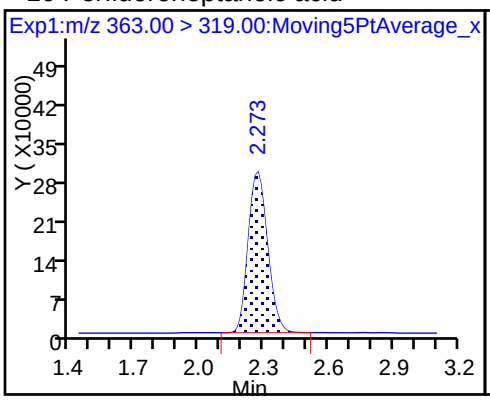
D 7 13C2 PFHxA



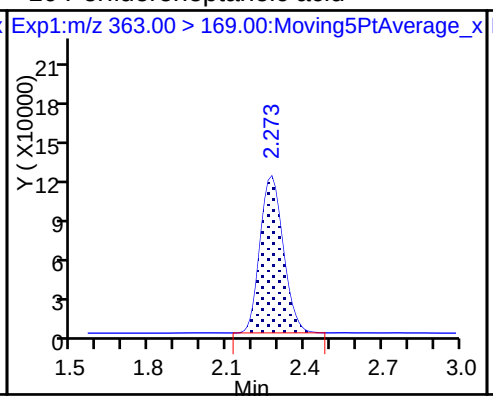
D 9 13C4-PFHpA



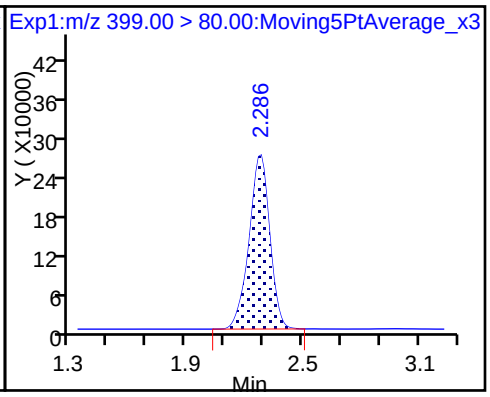
10 Perfluoroheptanoic acid



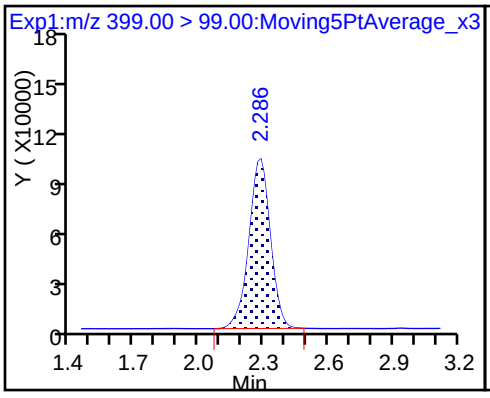
10 Perfluoroheptanoic acid



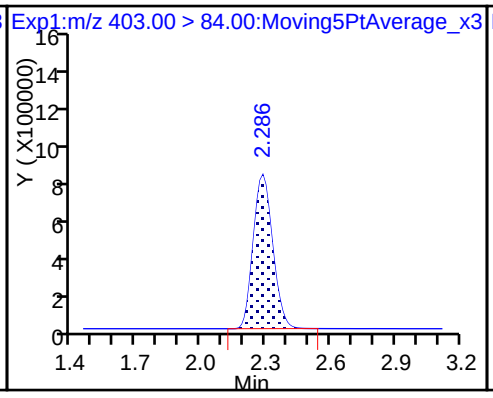
8 Perfluorohexanesulfonic acid



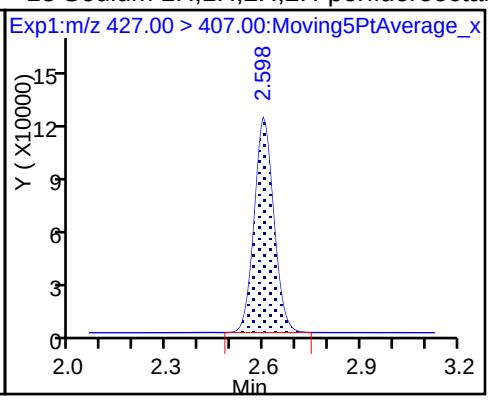
8 Perfluorohexanesulfonic acid



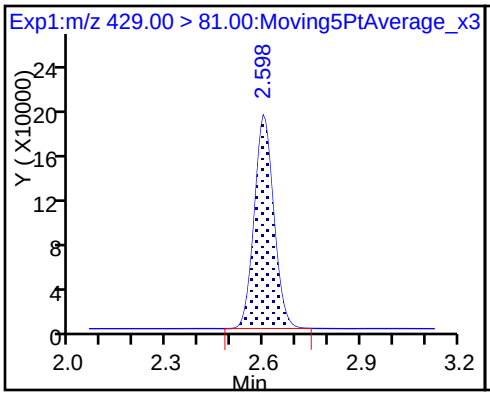
D 11 18O2 PFHxS



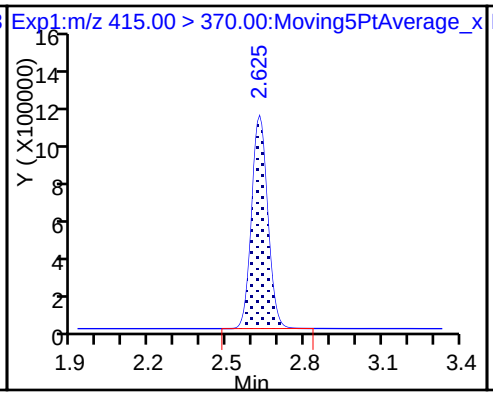
13 Sodium 1H,1H,2H,2H-perfluorooctane



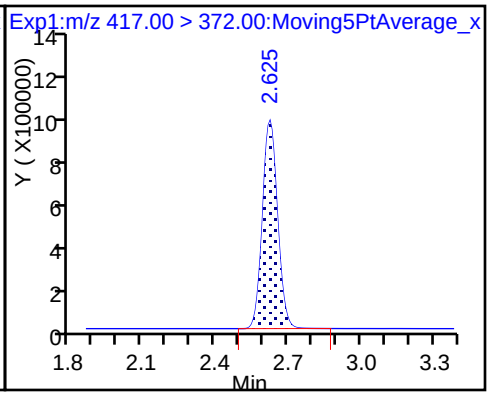
D 12 M2-6:2FTS



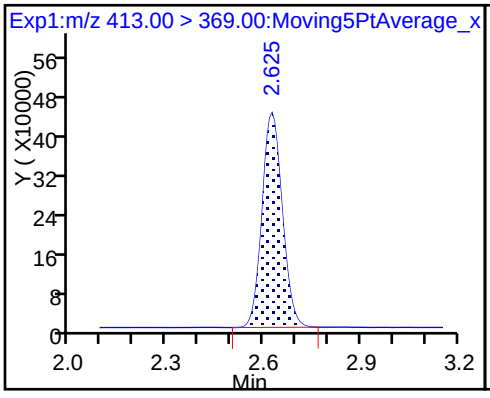
* 62 13C2-PFOA



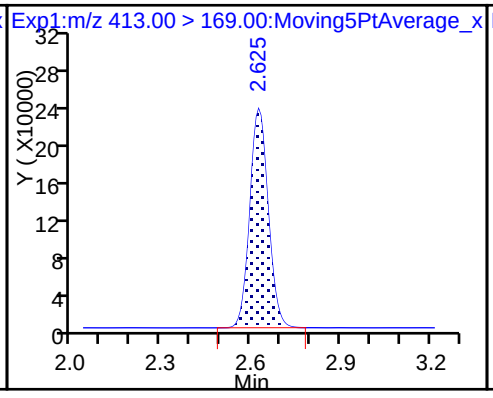
D 14 13C4 PFOA



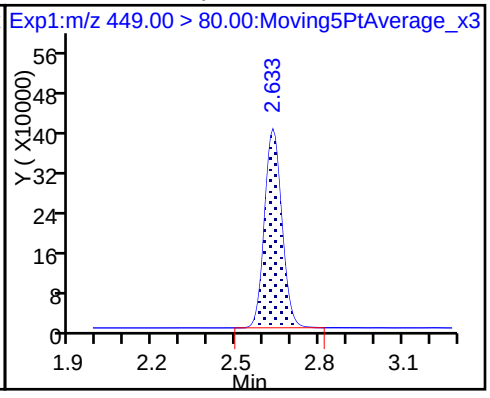
15 Perfluorooctanoic acid



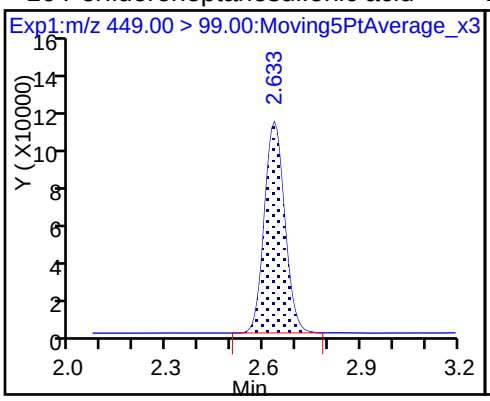
15 Perfluorooctanoic acid



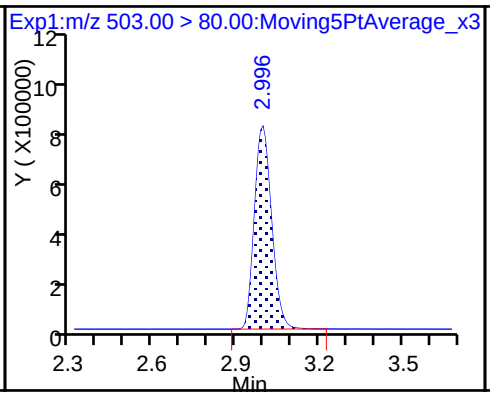
16 Perfluoroheptanesulfonic acid



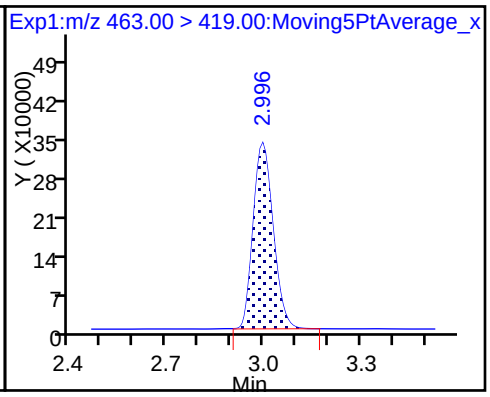
16 Perfluoroheptanesulfonic acid



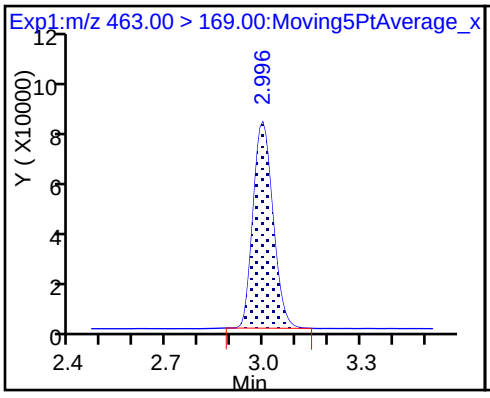
D 18 13C4 PFOS



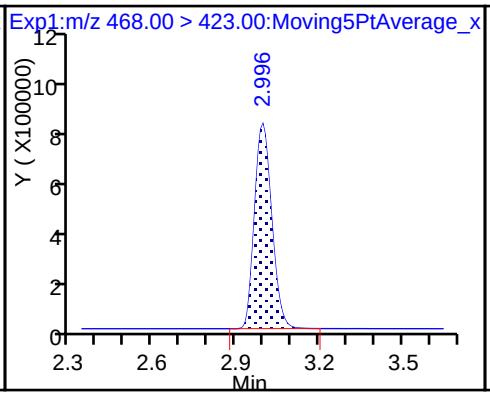
20 Perfluorononanoic acid



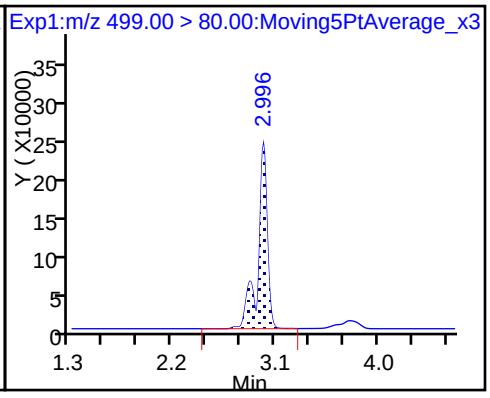
20 Perfluorononanoic acid



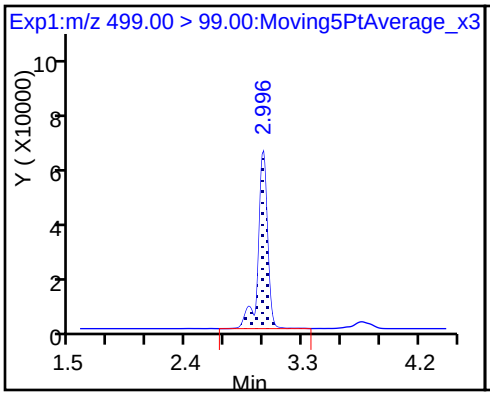
D 19 13C5 PFNA



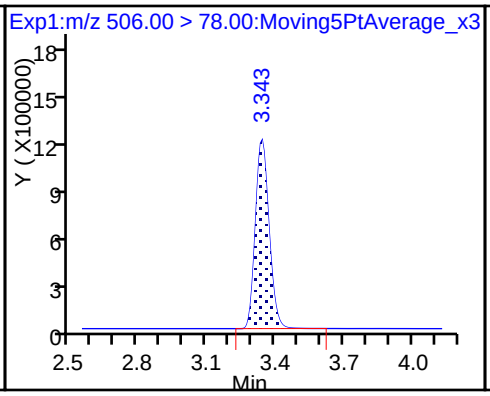
17 Perfluorooctane sulfonic acid



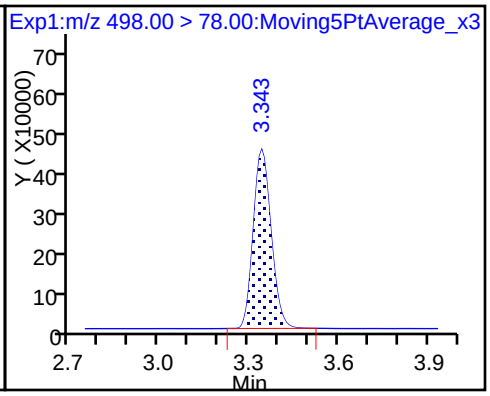
17 Perfluorooctane sulfonic acid



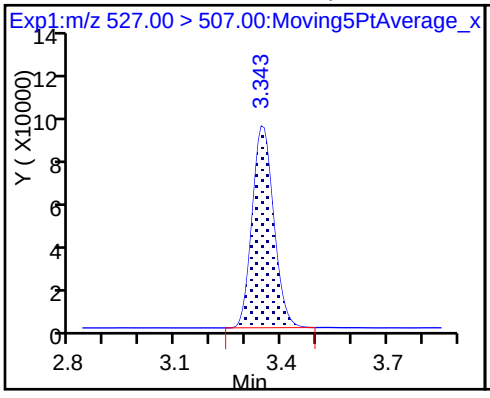
D 21 13C8 FOSA



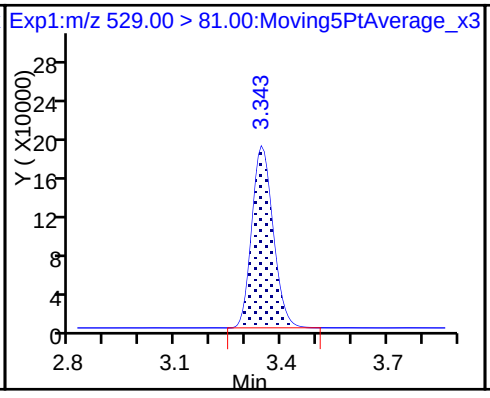
22 Perfluorooctane Sulfonamide



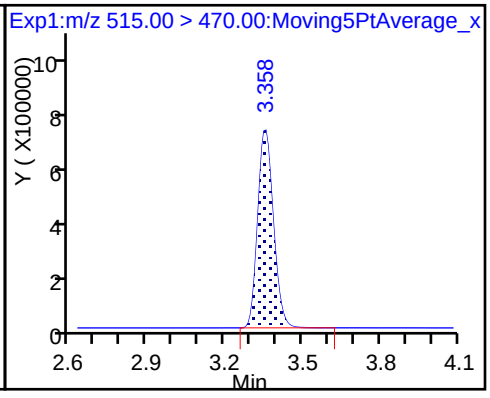
25 Sodium 1H,1H,2H,2H-perfluorodecane



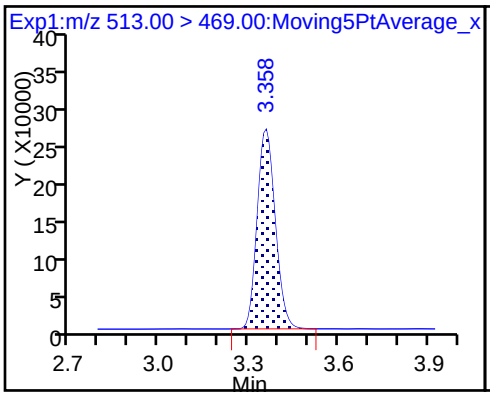
D 26 M2-8:2FTS



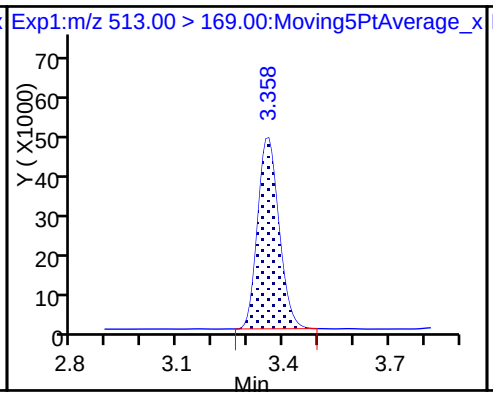
D 23 13C2 PFDA



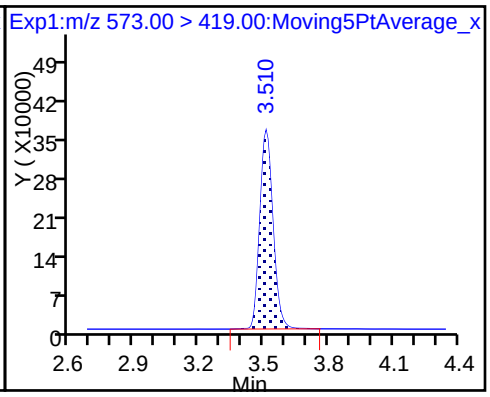
24 Perfluorodecanoic acid



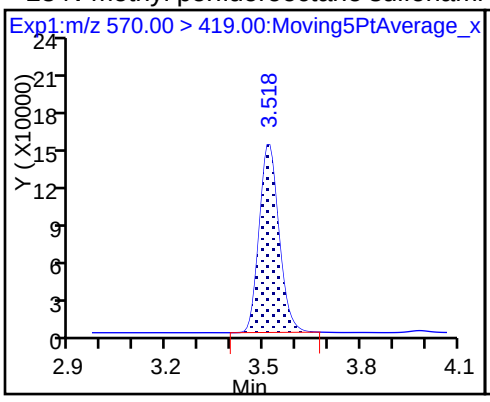
24 Perfluorodecanoic acid



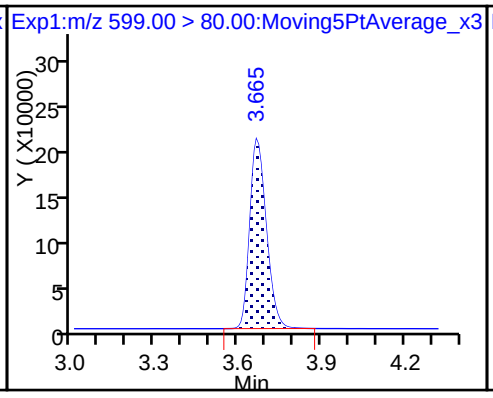
D 27 d3-NMeFOSAA



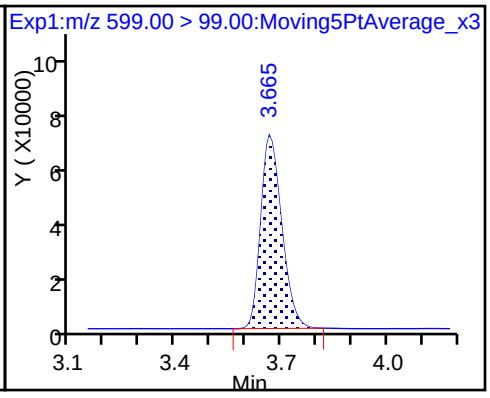
28 N-methyl perfluorooctane sulfonami



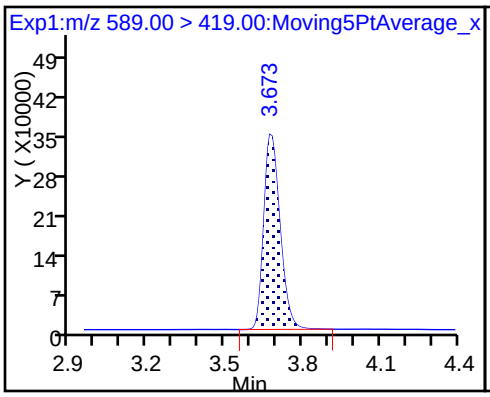
29 Perfluorodecane Sulfonic acid



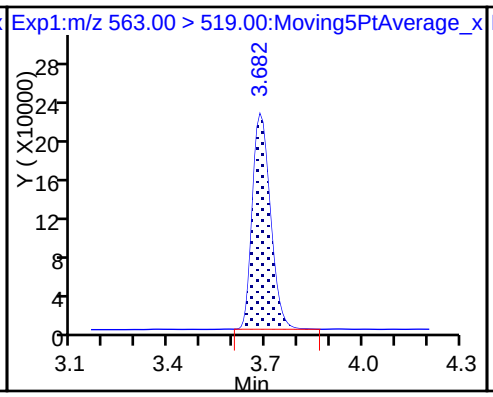
29 Perfluorodecane Sulfonic acid



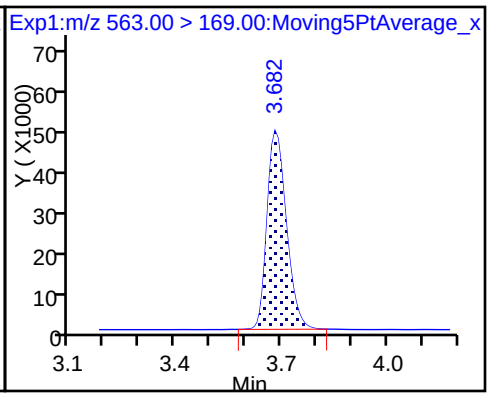
D 32 d5-NEtFOSAA



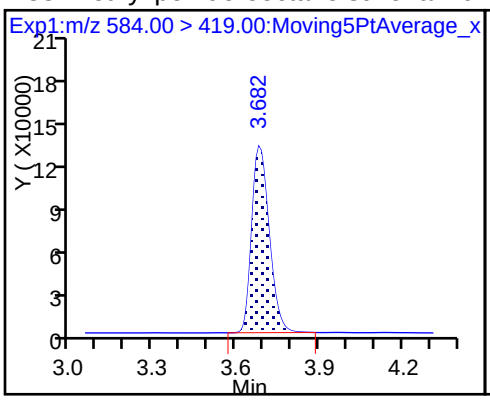
31 Perfluoroundecanoic acid



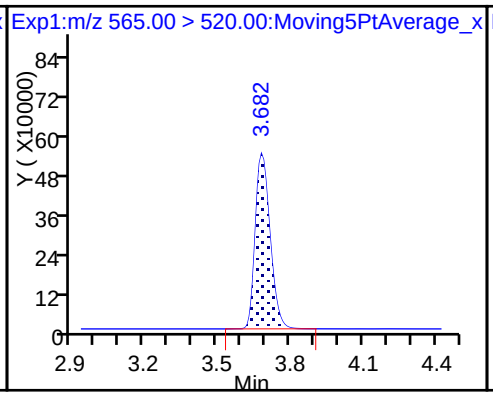
31 Perfluoroundecanoic acid



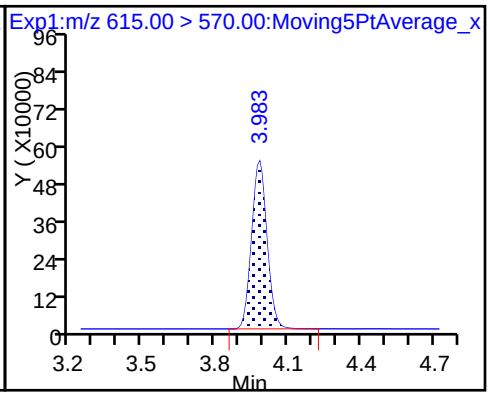
33 N-ethyl perfluorooctane sulfonamid



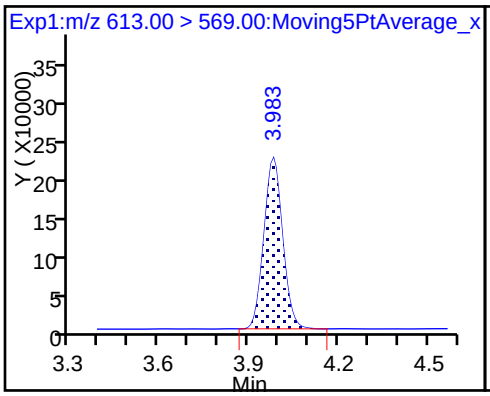
D 30 13C2 PFUnA



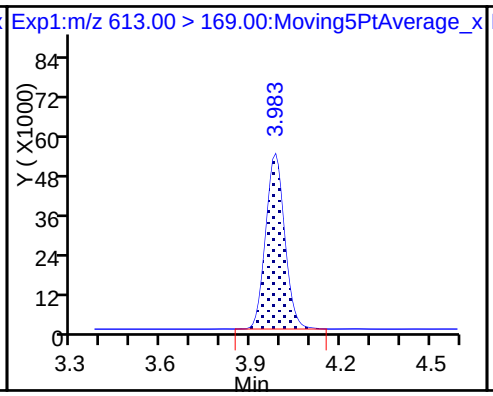
D 36 13C2 PFDoA



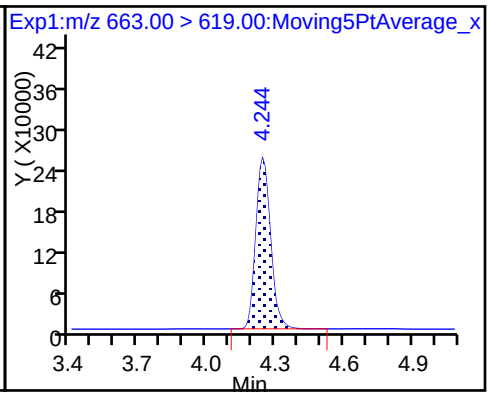
37 Perfluorododecanoic acid



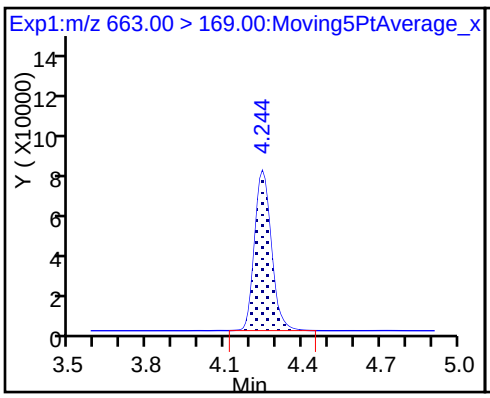
37 Perfluorododecanoic acid



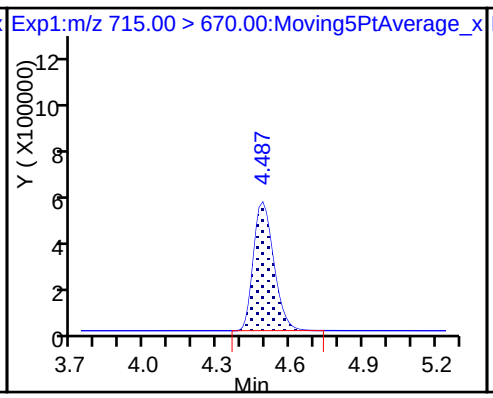
41 Perfluorotridecanoic acid



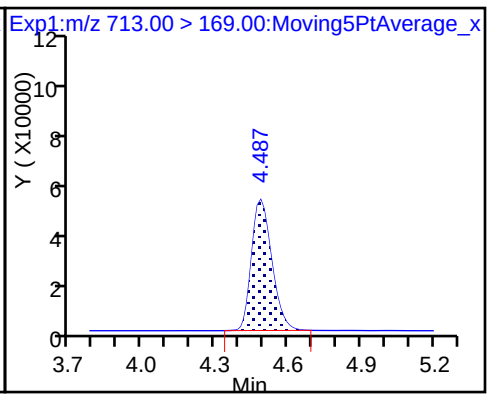
41 Perfluorotridecanoic acid



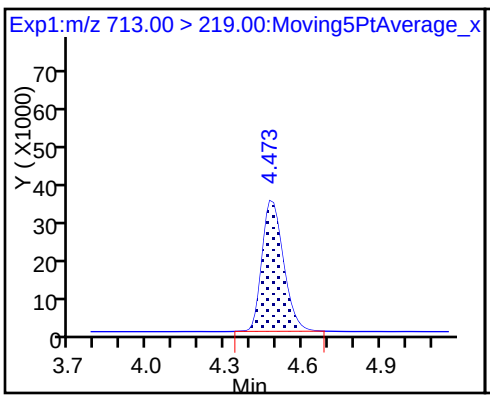
D 43 13C2-PFTeDA



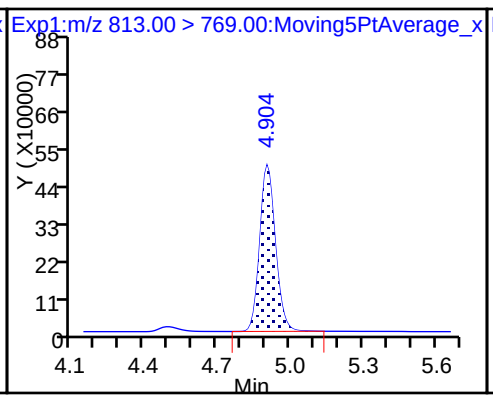
42 Perfluorotetradecanoic acid



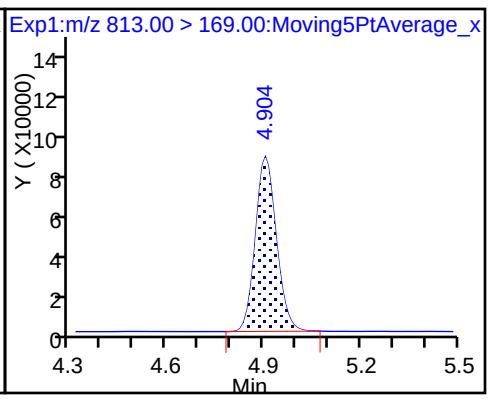
42 Perfluorotetradecanoic acid



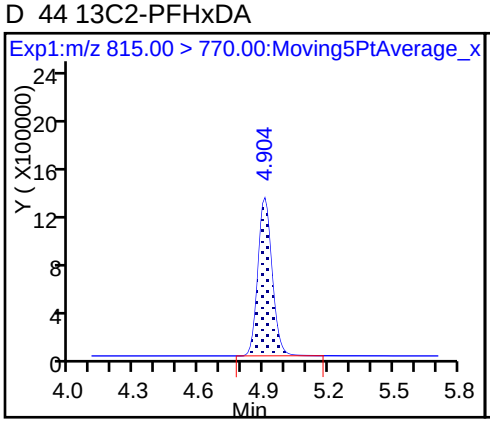
45 Perfluorohexadecanoic acid



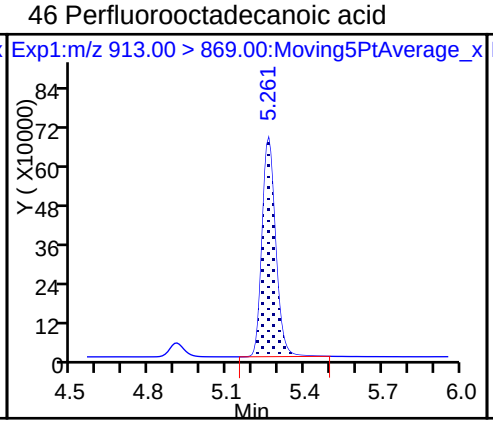
45 Perfluorohexadecanoic acid



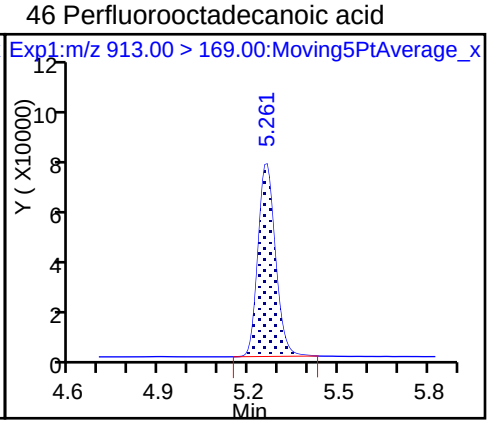
D 44 13C2-PFHxDA



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_006.d
Lims ID: IC L5 Full
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 17-Jan-2018 14:50:40 ALS Bottle#: 14 Worklist Smp#: 6
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L5-FULL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 18-Jan-2018 08:22:30 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK019

First Level Reviewer: hannigana Date: 17-Jan-2018 16:52:24

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	1.407	1.411	-0.004	0.537	7104763	2.50		100	23372	
2 Perfluorobutyric acid										
212.90 > 169.00	1.413	1.413	0.0	1.004	6694565	2.52		101	716	
D 3 13C5-PFPeA										
267.90 > 223.00	1.661	1.659	0.002	0.633	4159040	2.47		99.0	36968	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.661	1.662	-0.001	1.000	4900043	2.50		100	4378	
D 47 13C3-PFBS										
301.90 > 83.00	1.697	1.695	0.002	0.647	90418	2.43		105	4203	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.697	1.697	0.0	1.000	6433939	2.14		97.0	38054	
298.90 > 99.00	1.697	1.697	0.0	1.000	2753698		2.34(1.25-3.74)	97.0	24045	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.902	1.903	-0.001	1.000	1228862	2.27		97.4	44672	
D 60 M2-4:2FTS										
329.00 > 81.00	1.902	1.903	-0.001	0.725	545775	NC			5185	
D 7 13C2 PFHxA										
315.00 > 270.00	1.943	1.939	0.004	0.741	4634604	2.56		102	36923	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.943	1.939	0.004	1.000	4586272	2.39		95.5	9351	
313.00 > 119.00	1.943	1.939	0.004	1.000	427468		10.73(5.03-15.10)	95.5	6848	
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.267	-0.002	0.863	4357423	2.53		101	24387	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.265	2.268	-0.003	1.000	4706368	2.46		98.3	7569	
363.00 > 169.00	2.265	2.268	-0.003	1.000	1827469		2.58(1.13-3.40)	98.3	12368	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.278	2.280	-0.002	1.000	5134885	2.23		97.8	11137	
399.00 > 99.00	2.278	2.280	-0.002	1.000	1689075		3.04(1.50-4.49)	97.8	7428	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.868	4900649	2.31		97.6	24542	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.596	0.0	1.000	1258940	2.35		99.1	18472	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.990	768843	2.41		102	14965	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.622	0.001	1.000	4316678	2.55		102	28740	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.622	0.001		4691625	2.50			34097	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.623	2.623	0.0	1.000	4896648	2.42		96.8	3583	
413.00 > 169.00	2.623	2.623	0.0	1.000	2496697		1.96(0.84-2.52)	96.8	14913	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.630	2.629	0.001	1.000	4563453	2.52		106	39180	
449.00 > 99.00	2.630	2.629	0.001	1.000	1192536		3.83(1.94-5.82)	106	17356	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.141	3329183	2.43		97.2	19465	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	2.992	0.001	1.000	3505745	2.35		101	1395	
499.00 > 99.00	2.993	2.992	0.001	1.000	755117		4.64(2.31-6.93)	101	1932	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.141	3190243	2.37		99.4	20975	
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	2.992	0.001	1.000	3585870	2.61		104	11368	
463.00 > 169.00	2.993	2.992	0.001	1.000	848001		4.23(1.90-5.69)	104	11677	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.340	3.338	0.002	1.000	4822749	2.63		105	31460	
D 21 13C8 FOSA										
506.00 > 78.00	3.340	3.338	0.002	1.273	4670673	2.47		98.9	22093	
D 26 M2-8:2FTS										
529.00 > 81.00	3.340	3.342	-0.002	1.273	800715	2.38		99.2	12843	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.340	3.342	-0.002	1.000	981168	2.41		101	23396	
D 23 13C2 PFDA										
515.00 > 470.00	3.347	3.352	-0.005	1.276	2975947	2.51		101	26544	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.355	3.353	0.002	1.002	2809263	2.43		97.3	11645	
513.00 > 169.00	3.355	3.353	0.002	1.002	499275		5.63(2.36-7.09)	97.3	1687	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.507	3.507	0.0	1.337	1437020	2.43		97.3	9404	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.514	3.513	0.001	1.002	1546077	2.49		99.6	7151	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.663	3.666	-0.003	1.000	2182261	2.50		104	24456	
599.00 > 99.00	3.663	3.666	-0.003	1.000	732660		2.98(1.39-4.16)	104	20219	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.672	-0.001	1.399	1432688	2.40		96.0	5320	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.678	3.678	0.0	1.000	2244135	2.46		98.3	10302	
563.00 > 169.00	3.678	3.678	0.0	1.000	454077		4.94(0.00-0.00)	98.3	15259	
D 30 13C2 PFUnA										
565.00 > 520.00	3.678	3.679	-0.001	1.402	2212774	2.46		98.6	20353	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.678	3.679	-0.001	1.002	1447969	2.59		104	7749	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.979	3.979	0.0	1.000	2517800	2.59		103	11349	
613.00 > 169.00	3.979	3.979	0.0	1.000	619932		4.06(2.13-6.40)	103	20447	
D 36 13C2 PFDoA										
615.00 > 570.00	3.979	3.979	0.0	1.517	2374065	2.44		97.5	19498	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.241	4.242	-0.001	1.000	2742788	2.49		99.5	8424	
663.00 > 169.00	4.241	4.242	-0.001	1.000	872619		3.14(1.25-3.76)	99.5	16274	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.485	4.483	0.002	1.000	754490	2.56		102	12988	
713.00 > 219.00	4.471	4.483	-0.012	0.997	517531		1.46(0.71-2.13)	102	12896	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.485	4.483	0.002	1.710	3024149	2.38		95.0	17363	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.903	4.902	0.001	1.869	5622608	2.48		99.1	13087	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.903	4.902	0.001	1.000	5582637	2.60		104	2992	
813.00 > 169.00	4.903	4.902	0.001	1.000	920324		6.07(2.86-8.58)	104	5818	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.259	5.255	0.004	1.000	6281608	2.65		106	1238	
913.00 > 169.00	5.252	5.255	-0.003	0.999	778273		8.07(0.00-0.00)	106	1952	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL5_00003 Amount Added: 1.00 Units: mL

Report Date: 18-Jan-2018 08:22:30 Chrom Revision: 2.2 08-Dec-2017 11:41:26

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_006.d

Injection Date: 17-Jan-2018 14:50:40 Instrument ID: A8_N

Lims ID: IC L5 Full

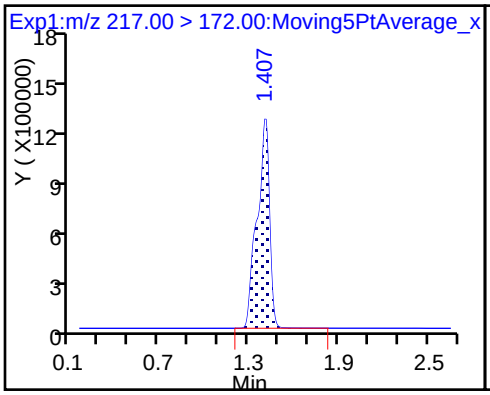
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 14 Worklist Smp#: 6

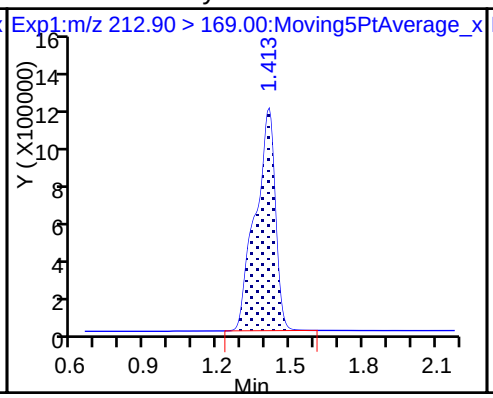
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

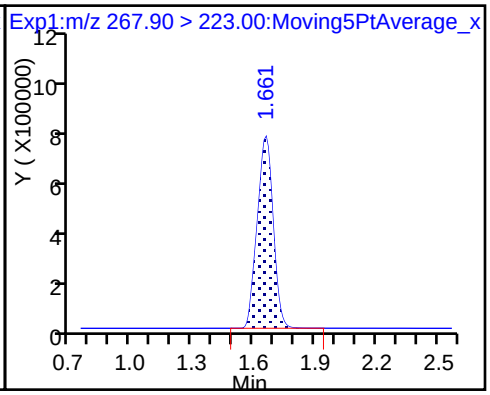
D 1 13C4 PFBA



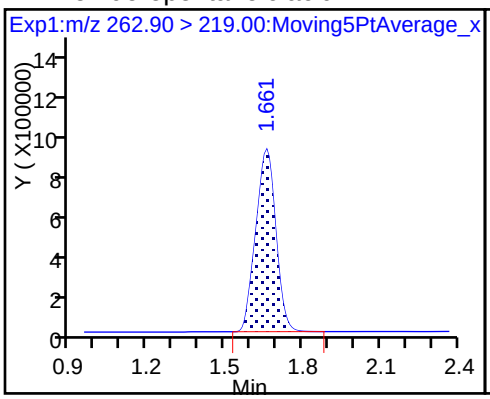
2 Perfluorobutyric acid



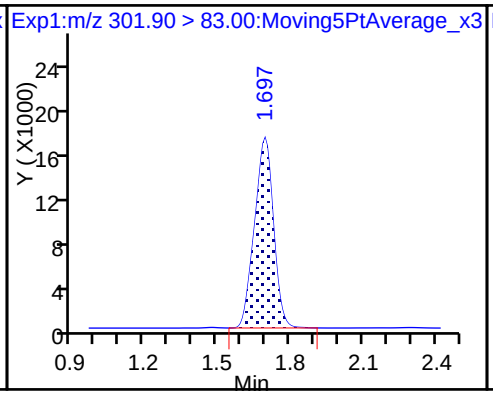
D 3 13C5-PFPeA



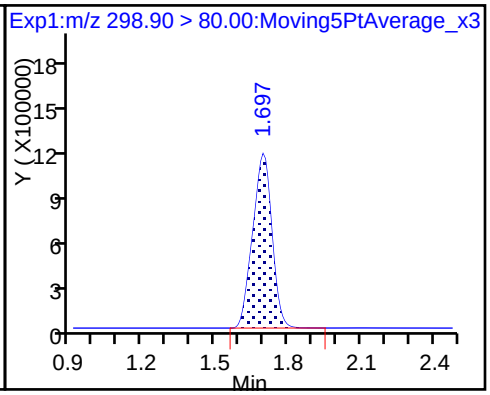
4 Perfluoropentanoic acid



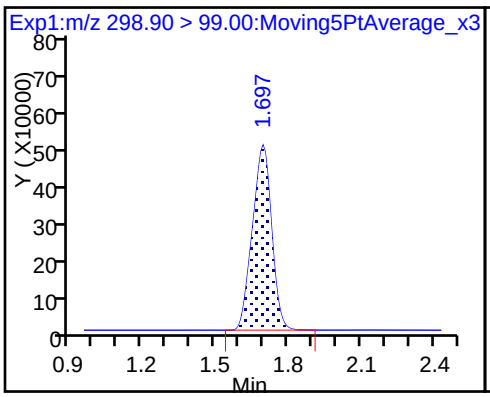
D 47 13C3-PFBS



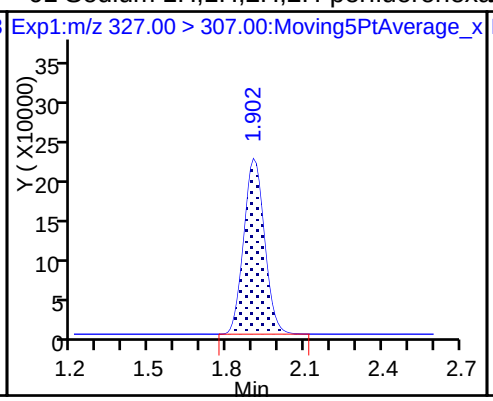
5 Perfluorobutanesulfonic acid



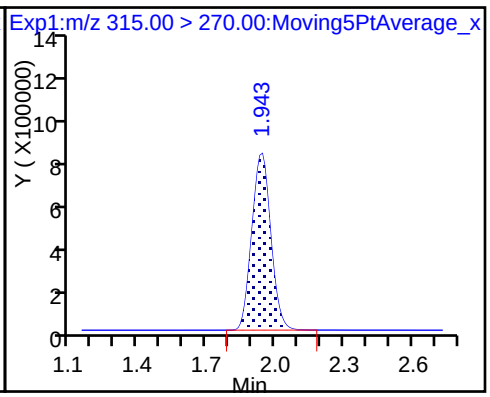
5 Perfluorobutanesulfonic acid



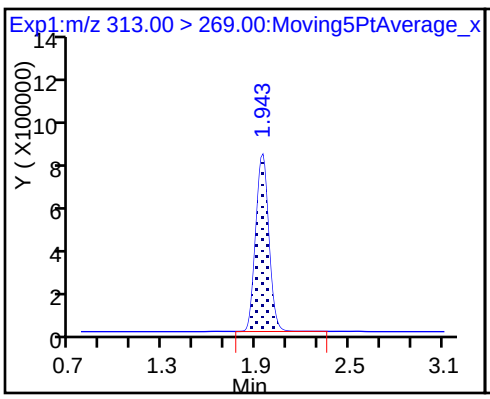
61 Sodium 1H,1H,2H,2H-perfluorohexa



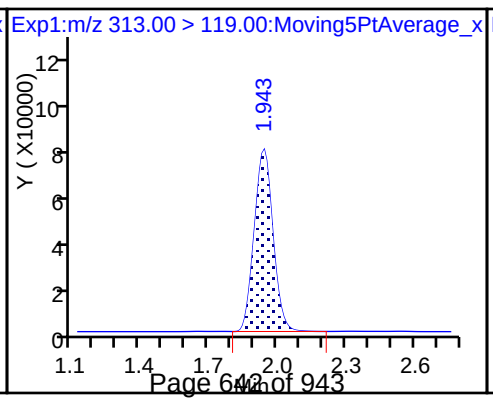
D 7 13C2 PFHxA



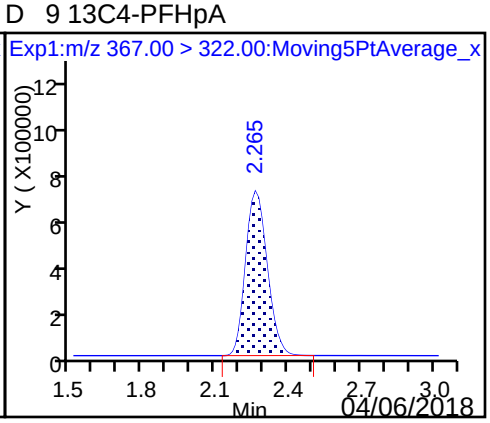
6 Perfluorohexanoic acid



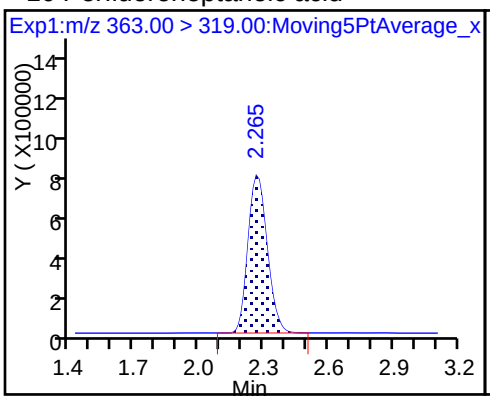
6 Perfluorohexanoic acid



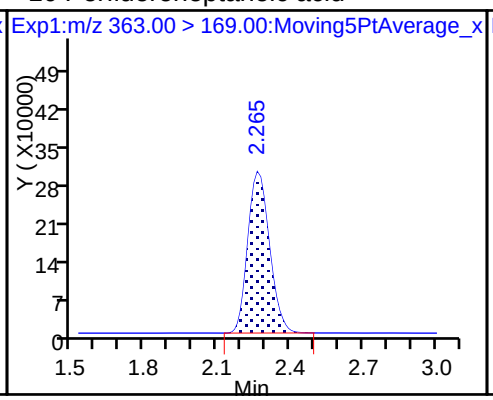
D 9 13C4-PFHpA



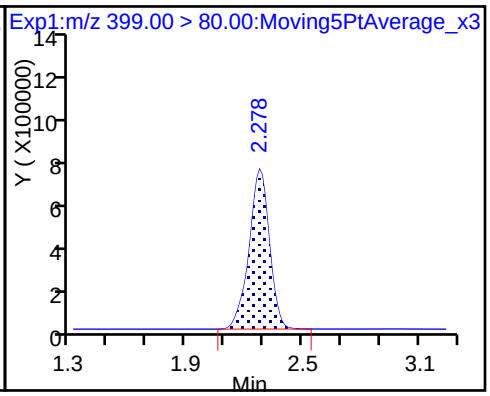
10 Perfluoroheptanoic acid



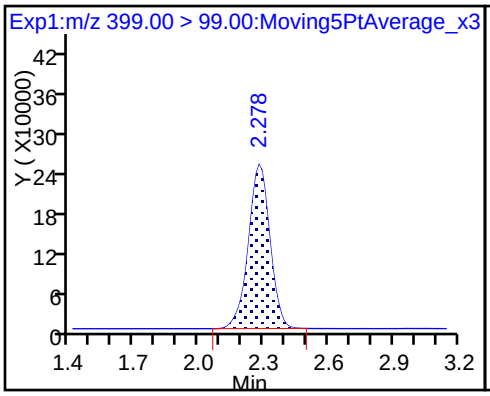
10 Perfluoroheptanoic acid



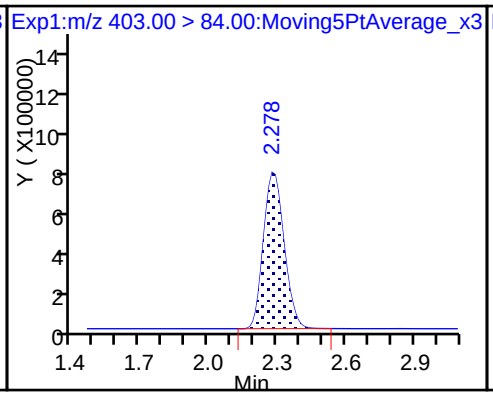
8 Perfluorohexanesulfonic acid



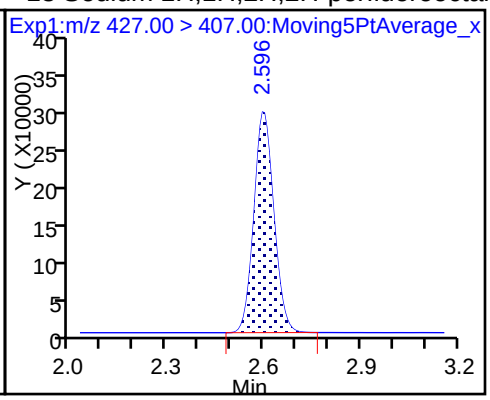
8 Perfluorohexanesulfonic acid



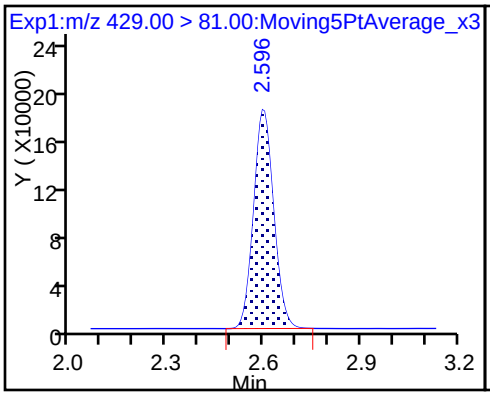
D 11 18O2 PFHxS



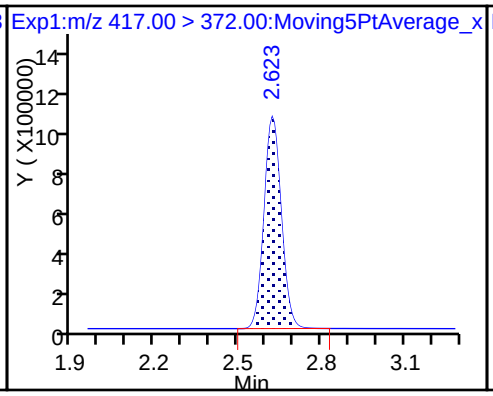
13 Sodium 1H,1H,2H,2H-perfluorooctane



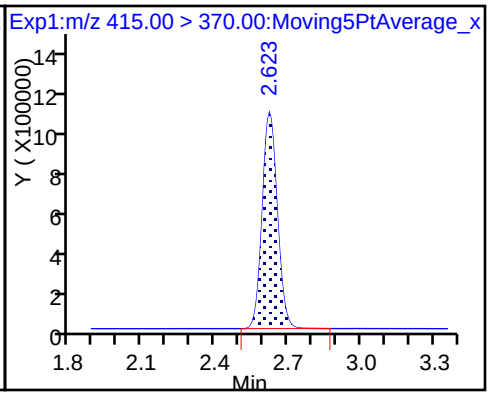
D 12 M2-6:2FTS



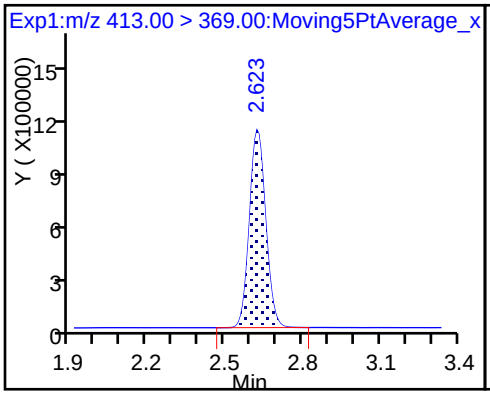
D 14 13C4 PFOA



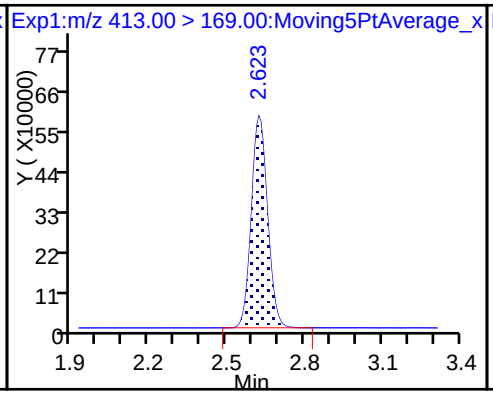
* 62 13C2-PFOA



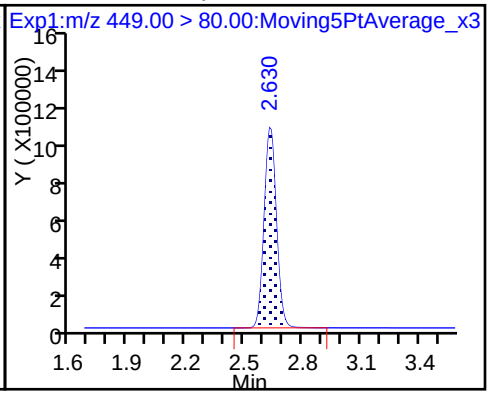
15 Perfluorooctanoic acid



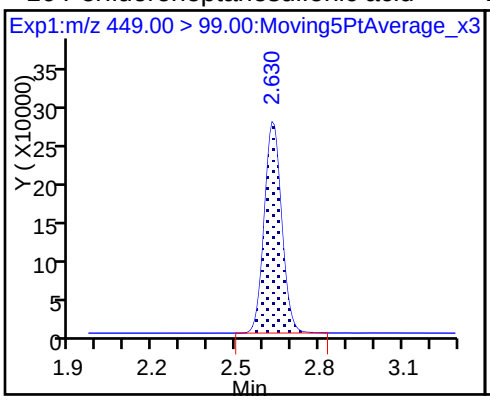
15 Perfluorooctanoic acid



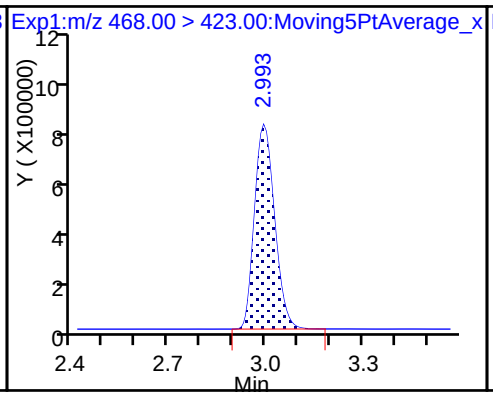
16 Perfluoroheptanesulfonic acid



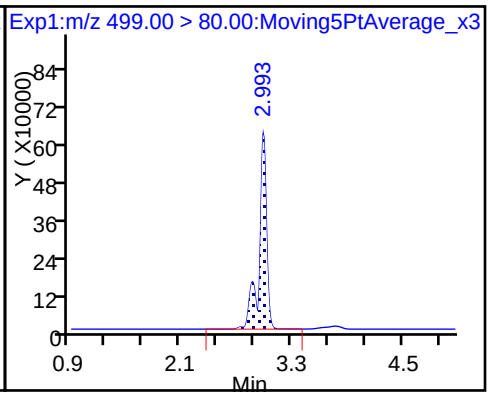
16 Perfluoroheptanesulfonic acid



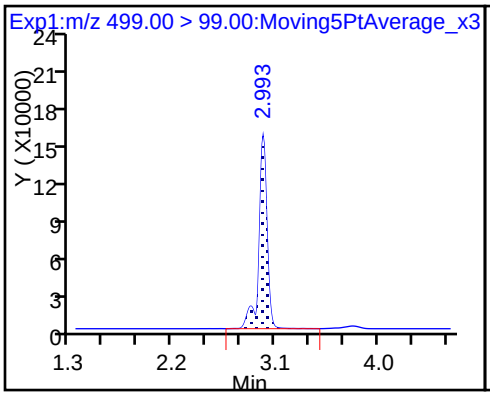
D 19 13C5 PFNA



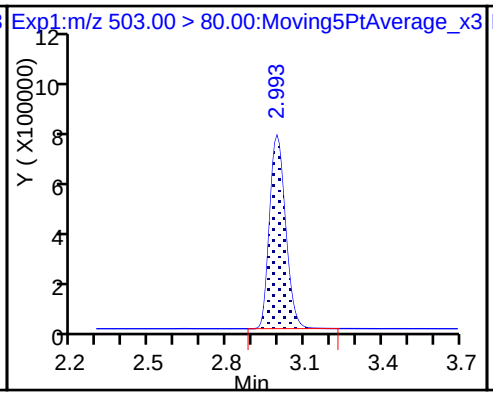
17 Perfluorooctane sulfonic acid



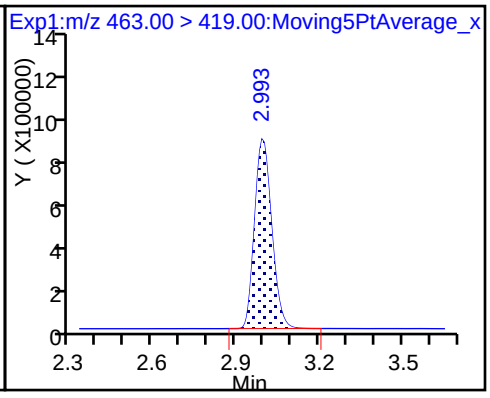
17 Perfluorooctane sulfonic acid



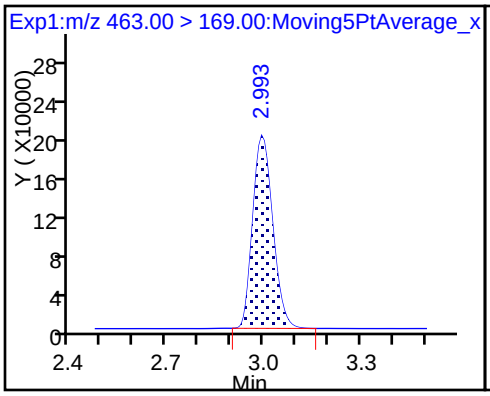
D 18 13C4 PFOS



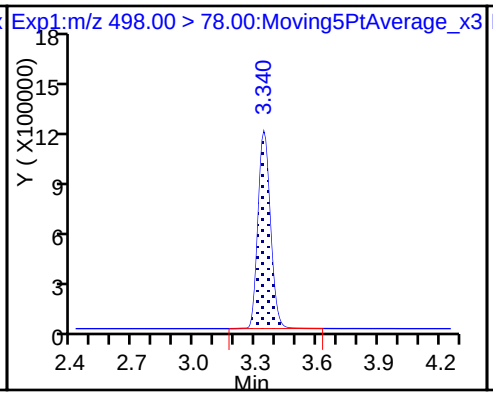
20 Perfluorononanoic acid



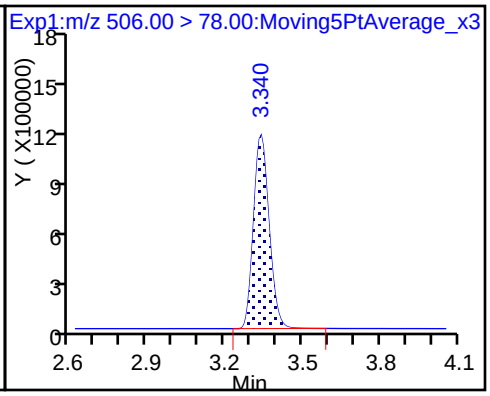
20 Perfluorononanoic acid



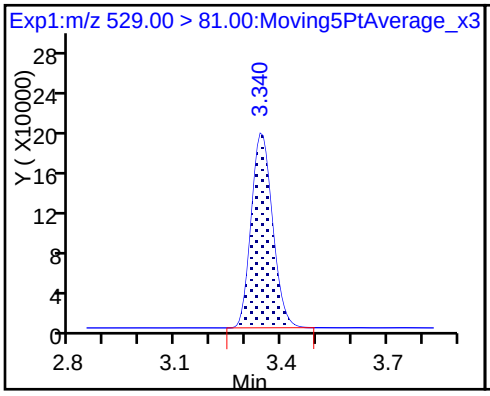
22 Perfluorooctane Sulfonamide



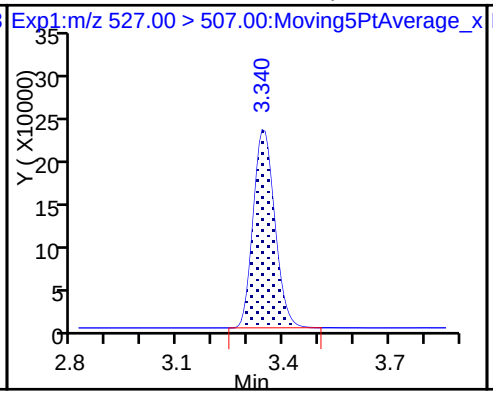
D 21 13C8 FOSA



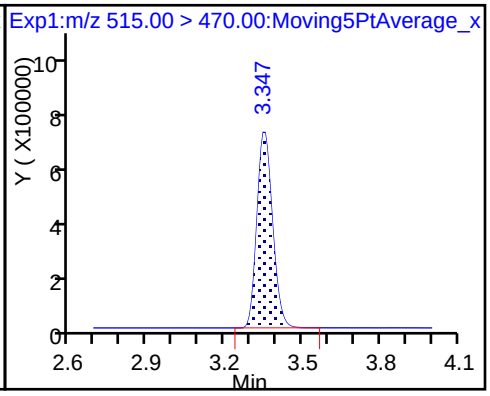
D 26 M2-8:2FTS



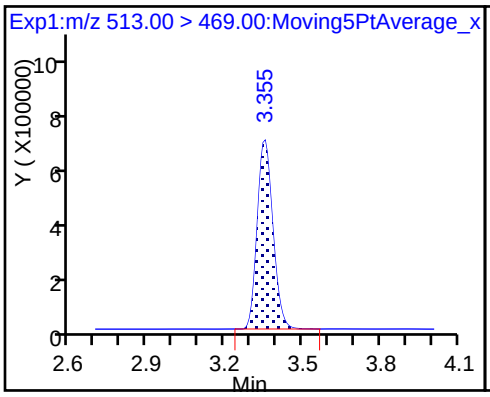
25 Sodium 1H,1H,2H,2H-perfluorodecane



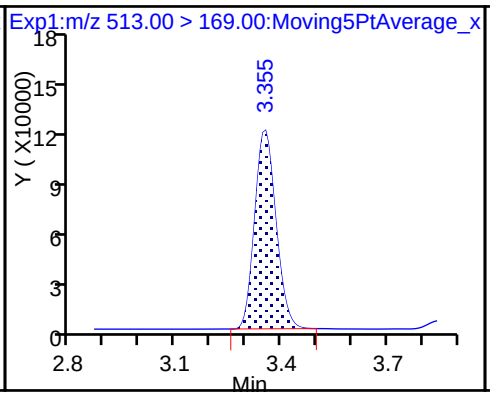
D 23 13C2 PFDA



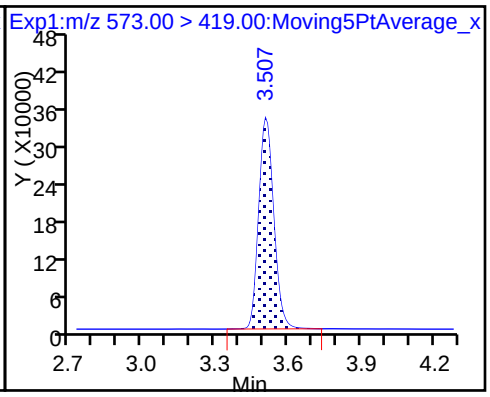
24 Perfluorodecanoic acid



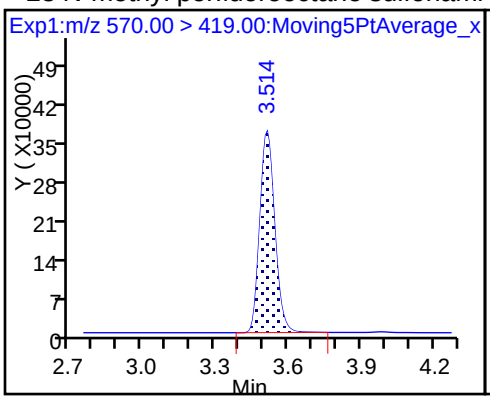
24 Perfluorodecanoic acid



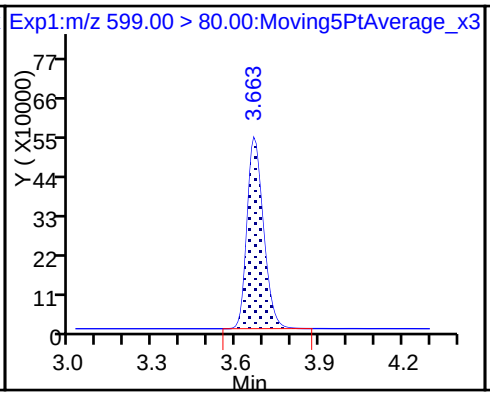
D 27 d3-NMeFOSAA



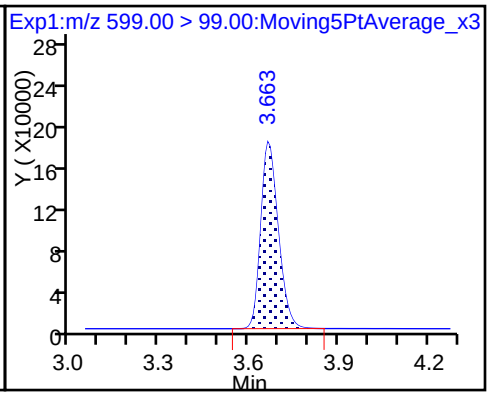
28 N-methyl perfluorooctane sulfonami



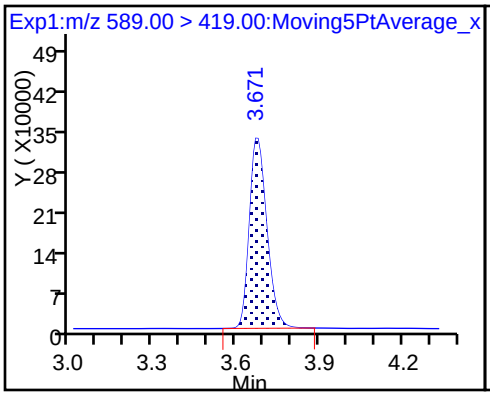
29 Perfluorodecane Sulfonic acid



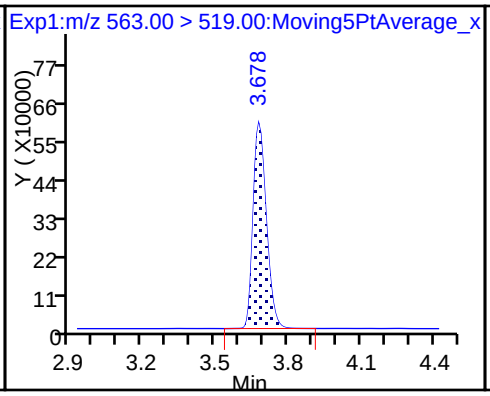
29 Perfluorodecane Sulfonic acid



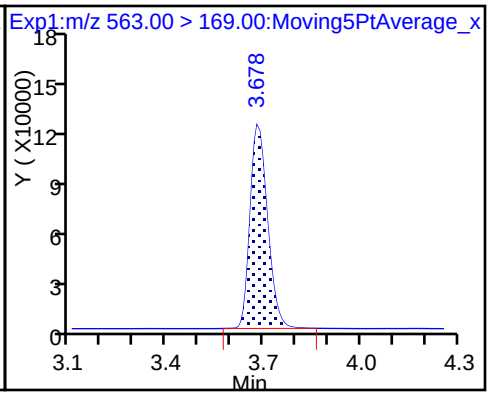
D 32 d5-NEtFOSAA



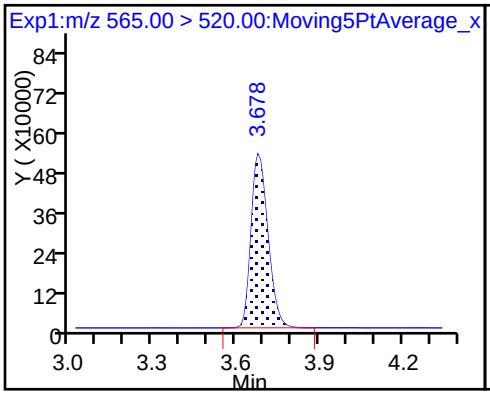
31 Perfluoroundecanoic acid



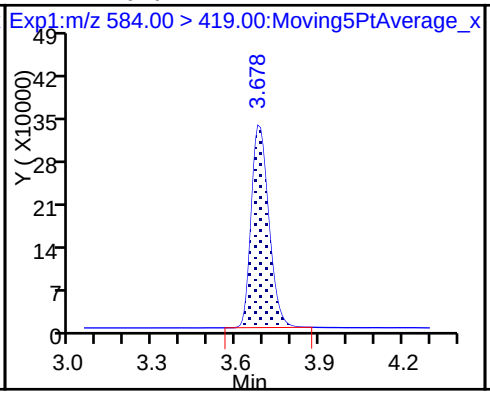
31 Perfluoroundecanoic acid



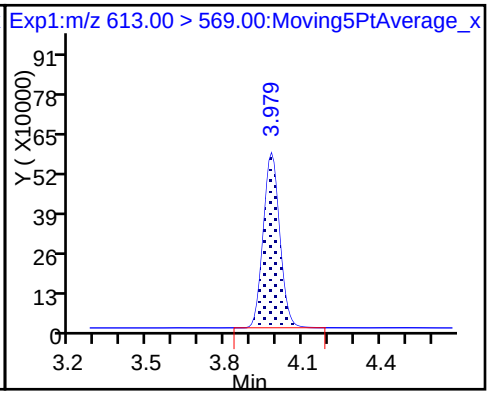
D 30 13C2 PFUnA



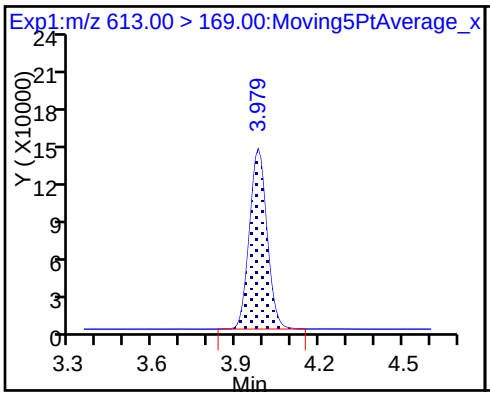
33 N-ethyl perfluorooctane sulfonamid



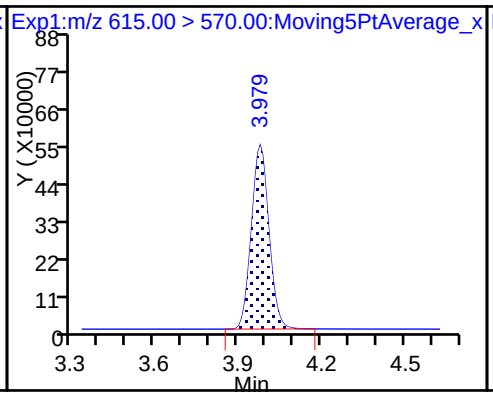
37 Perfluorododecanoic acid



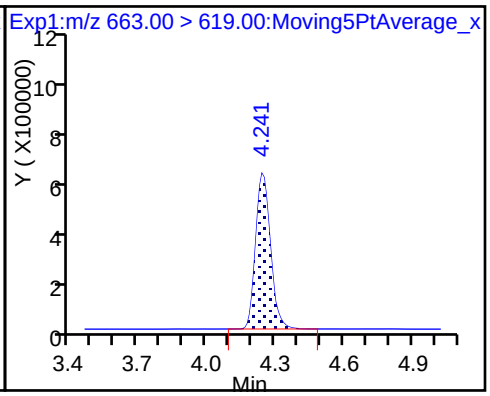
37 Perfluorododecanoic acid



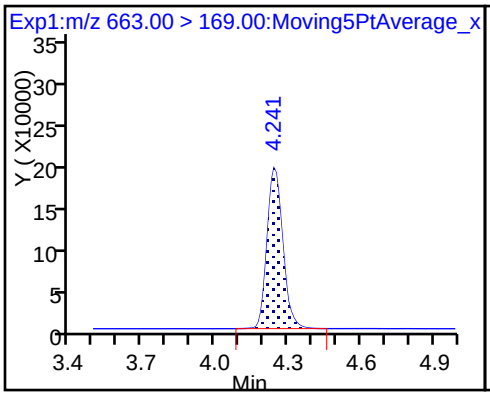
D 36 13C2 PFDoA



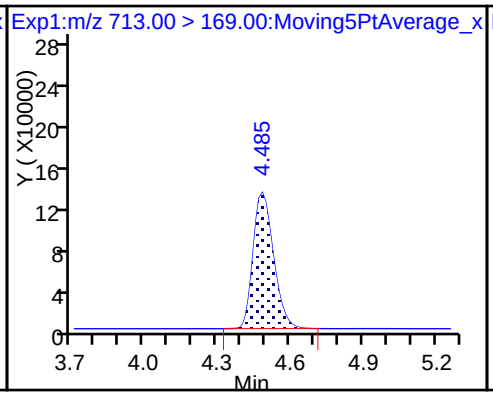
41 Perfluorotridecanoic acid



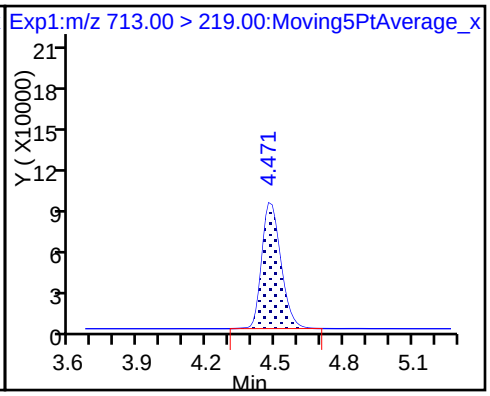
41 Perfluorotridecanoic acid



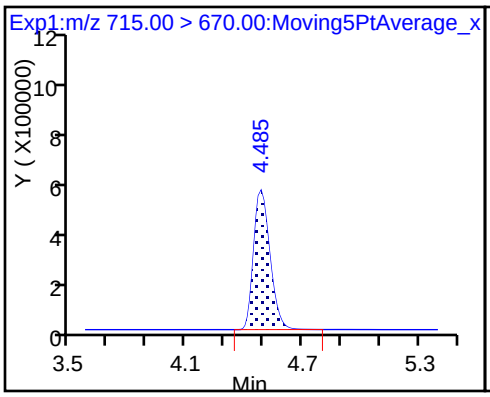
42 Perfluorotetradecanoic acid



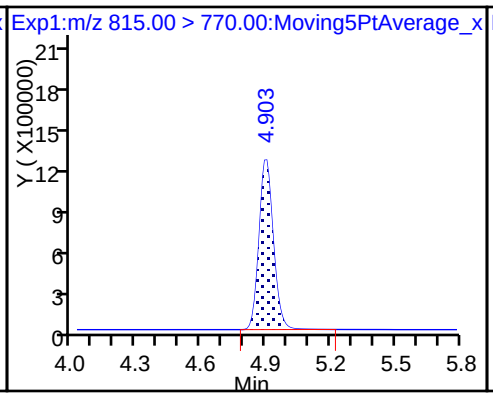
42 Perfluorotetradecanoic acid



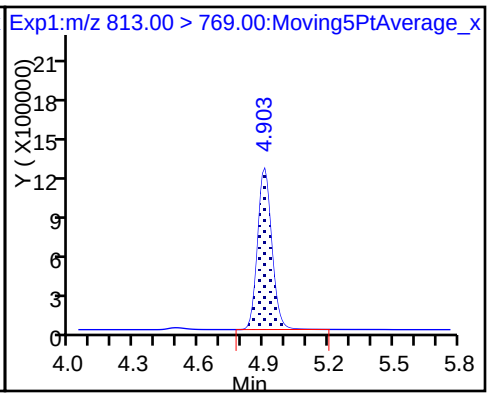
D 43 13C2-PFTeDA



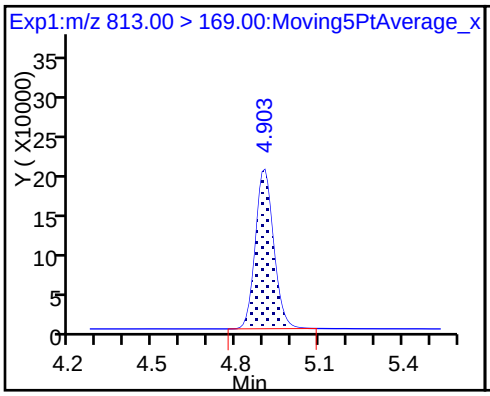
D 44 13C2-PFHxDA



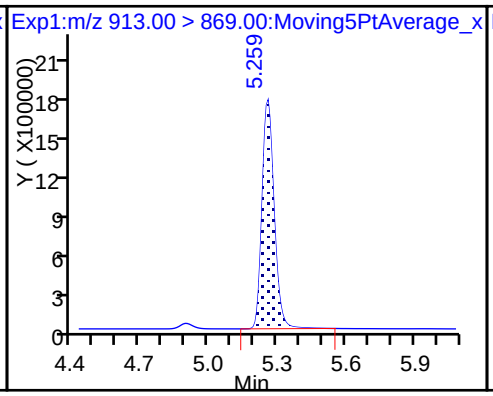
45 Perfluorohexadecanoic acid



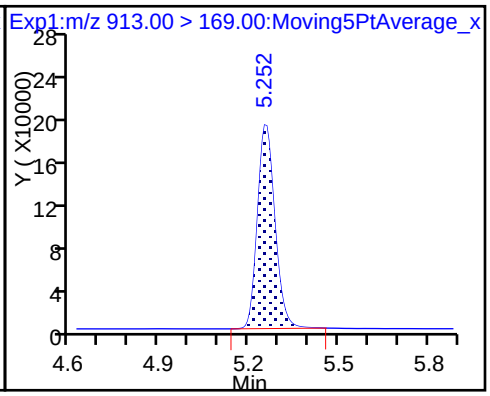
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_007.d
Lims ID: IC L6 Full
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 17-Jan-2018 14:58:30 ALS Bottle#: 15 Worklist Smp#: 7
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L6-FULL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 18-Jan-2018 08:22:33 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK019

First Level Reviewer: hannigana Date: 17-Jan-2018 16:52:45

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	1.408	1.411	-0.003	0.538	6889924	2.55		102	24860	
2 Perfluorobutyric acid										
212.90 > 169.00	1.408	1.413	-0.005	1.000	13027499	5.06		101	1333	
D 3 13C5-PFPeA										
267.90 > 223.00	1.654	1.659	-0.005	0.632	4122126	2.58		103	37017	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.654	1.662	-0.008	1.000	9469006	4.87		97.5	8856	
D 47 13C3-PFBS										
301.90 > 83.00	1.689	1.695	-0.006	0.646	83073	2.35		101	3063	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.689	1.697	-0.008	1.000	12635108	4.58		104	67166	
298.90 > 99.00	1.689	1.697	-0.008	1.000	5216403		2.42(1.25-3.74)	104	38944	
D 60 M2-4:2FTS										
329.00 > 81.00	1.893	1.903	-0.010	0.724	532209	NC			5682	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.893	1.903	-0.010	1.000	2364722	4.76		102	71307	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.934	1.939	-0.005	1.000	9016831	5.00		100	14315	
313.00 > 119.00	1.934	1.939	-0.005	1.000	798066		11.30(5.03-15.10)	100	11593	
D 7 13C2 PFHxA										
315.00 > 270.00	1.934	1.939	-0.005	0.739	4349882	2.52		101	38212	
D 9 13C4-PFHpA										
367.00 > 322.00	2.253	2.267	-0.014	0.861	4126515	2.52		101	26743	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.266	2.268	-0.002	1.006	9111535	5.02		100	12281	
363.00 > 169.00	2.266	2.268	-0.002	1.006	3471916		2.62(1.13-3.40)	100	17588	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.266	2.280	-0.014	0.994	9935695	4.50		98.8	14608	
399.00 > 99.00	2.279	2.280	-0.001	1.000	3253974		3.05(1.50-4.49)	98.8	12936	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.871	4694368	2.32		98.3	28847	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.589	2.596	-0.007	1.000	2504300	5.10		108	26755	
D 12 M2-6:2FTS										
429.00 > 81.00	2.589	2.597	-0.008	0.990	704248	2.32		97.7	16529	
* 62 13C2-PFOA										
415.00 > 370.00	2.616	2.622	-0.006		4464823	2.50			30070	
D 14 13C4 PFOA										
417.00 > 372.00	2.616	2.622	-0.006	1.000	4052198	2.52		101	28726	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.616	2.623	-0.007	1.000	8993265	4.73		94.7	6194	
413.00 > 169.00	2.616	2.623	-0.007	1.000	4880817		1.84(0.84-2.52)	94.7	18906	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.624	2.629	-0.005	1.000	8721809	4.95		104	25354	
449.00 > 99.00	2.624	2.629	-0.005	1.000	2290639		3.81(1.94-5.82)	104	21828	
D 18 13C4 PFOS										
503.00 > 80.00	2.986	2.992	-0.006	1.141	3110246	2.43		102	18449	
20 Perfluorononanoic acid										
463.00 > 419.00	2.986	2.992	-0.006	1.000	7021740	5.19		104	19758	
463.00 > 169.00	2.986	2.992	-0.006	1.000	1682836		4.17(1.90-5.69)	104	21808	
D 19 13C5 PFNA										
468.00 > 423.00	2.986	2.992	-0.006	1.141	3273972	2.51		100	27377	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.986	2.992	-0.006	1.000	6686934	4.59		98.9	2518	
499.00 > 99.00	2.986	2.992	-0.006	1.000	1482649		4.51(2.31-6.93)	98.9	3691	
D 21 13C8 FOSA										
506.00 > 78.00	3.333	3.338	-0.005	1.274	4414446	2.46		98.2	16915	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.333	3.338	-0.005	1.000	8973330	5.17		103	25588	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.340	3.342	-0.002	1.000	1941077	5.04		105	31201	
D 26 M2-8:2FTS										
529.00 > 81.00	3.340	3.342	-0.002	1.277	757639	2.36		98.7	14043	
D 23 13C2 PFDA										
515.00 > 470.00	3.348	3.352	-0.004	1.280	2810507	2.50		99.8	24290	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.348	3.353	-0.005	1.000	5653894	5.18		104	20649	
513.00 > 169.00	3.348	3.353	-0.005	1.000	970543		5.83(2.36-7.09)	104	1919	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.500	3.507	-0.007	1.338	1419745	2.53		101	8194	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.507	3.513	-0.006	1.002	3100803	5.05		101	11526	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.664	3.666	-0.002	1.000	4067427	4.77		99.0	30816	
599.00 > 99.00	3.657	3.666	-0.009	0.998	1370708		2.97(1.39-4.16)	99.0	20723	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.672	-0.001	1.403	1408625	2.48		99.1	5938	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.671	3.678	-0.007	0.998	4341065	4.84		96.9	15505	
563.00 > 169.00	3.680	3.678	0.002	1.000	889588		4.88(0.00-0.00)	96.9	13858	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.680	3.679	0.001	1.002	2837873	5.17		103	11626	
D 30 13C2 PFUnA										
565.00 > 520.00	3.680	3.679	0.001	1.406	2170924	2.54		102	19601	
D 36 13C2 PFDoA										
615.00 > 570.00	3.972	3.979	-0.007	1.518	2348326	2.53		101	28264	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.972	3.979	-0.007	1.000	4798721	4.99		99.7	23913	
613.00 > 169.00	3.972	3.979	-0.007	1.000	1181505		4.06(2.13-6.40)	99.7	19366	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.242	4.242	0.0	1.000	5174158	4.74		94.9	17194	
663.00 > 169.00	4.242	4.242	0.0	1.000	1578141		3.28(1.25-3.76)	94.9	31724	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.472	4.483	-0.011	1.709	2973878	2.45		98.2	17211	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.472	4.483	-0.011	1.000	1437735	4.95		99.1	17780	
713.00 > 219.00	4.472	4.483	-0.011	1.000	975811		1.47(0.71-2.13)	99.1	21440	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.894	4.902	-0.008	1.000	10121041	5.03		101	6096	
813.00 > 169.00	4.894	4.902	-0.008	1.000	1702289		5.95(2.86-8.58)	101	9837	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.894	4.902	-0.008	1.871	5288590	2.45		98.0	10188	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.252	5.255	-0.003	1.000	11861271	5.32		106	1851	
913.00 > 169.00	5.245	5.255	-0.010	0.999	1442835		8.22(0.00-0.00)	106	2232	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL6_00004 Amount Added: 1.00 Units: mL

Report Date: 18-Jan-2018 08:22:33 Chrom Revision: 2.2 08-Dec-2017 11:41:26

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_007.d

Injection Date: 17-Jan-2018 14:58:30 Instrument ID: A8_N

Lims ID: IC L6 Full

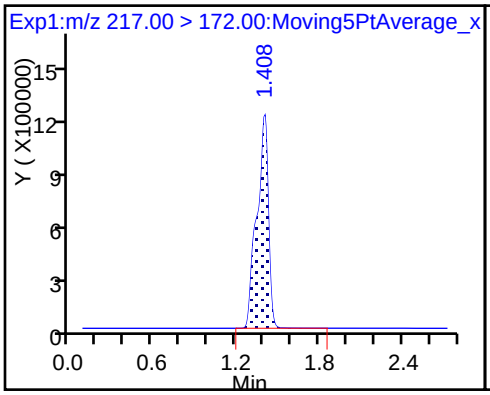
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 15 Worklist Smp#: 7

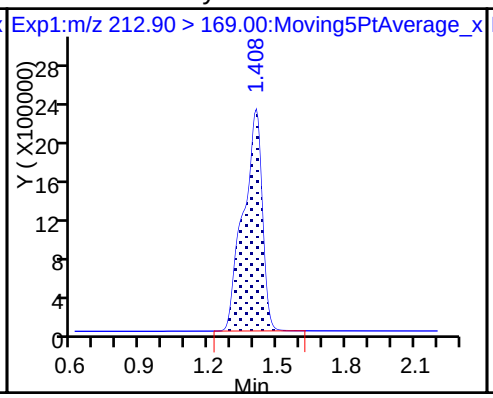
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

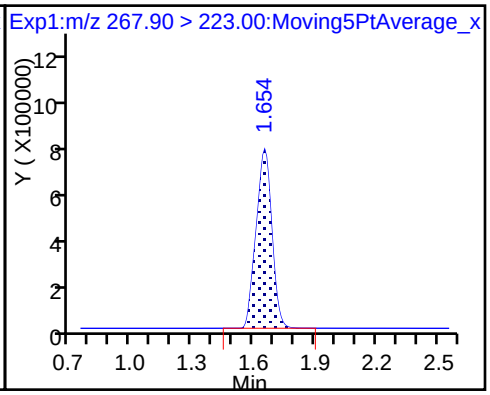
D 1 13C4 PFBA



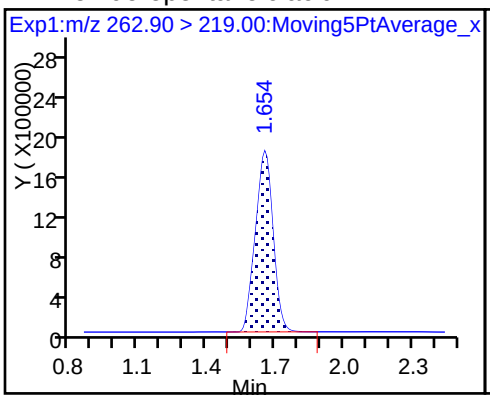
2 Perfluorobutyric acid



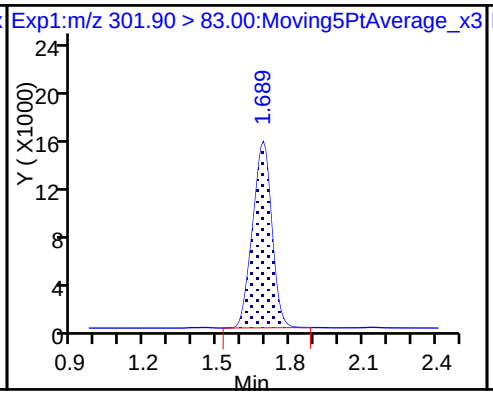
D 3 13C5-PFPeA



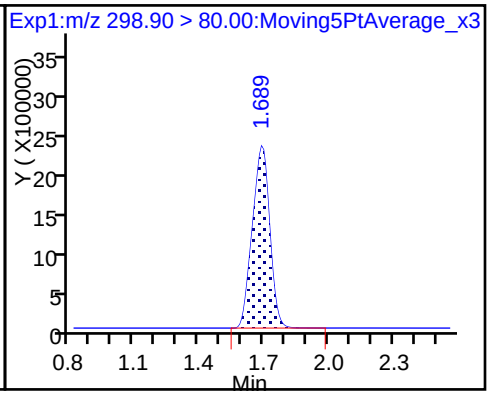
4 Perfluoropentanoic acid



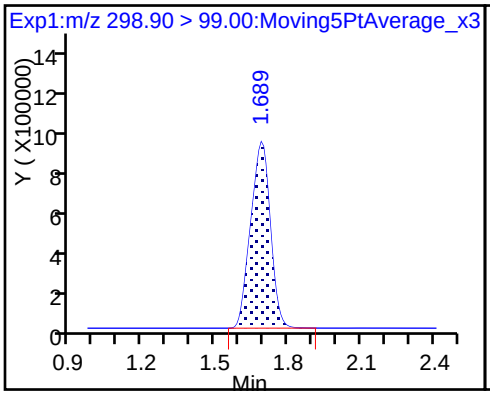
D 47 13C3-PFBS



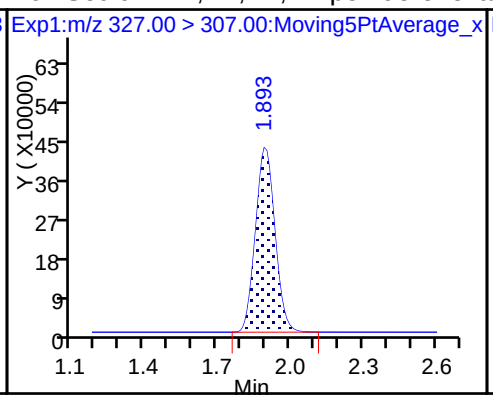
5 Perfluorobutanesulfonic acid



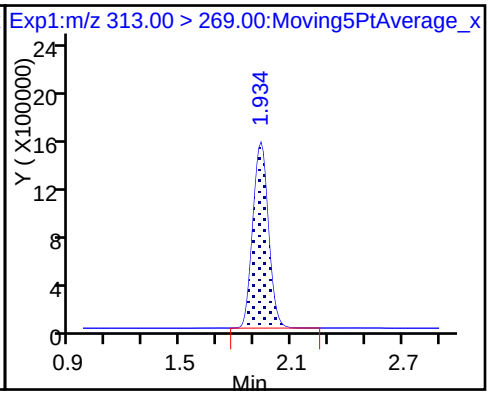
5 Perfluorobutanesulfonic acid



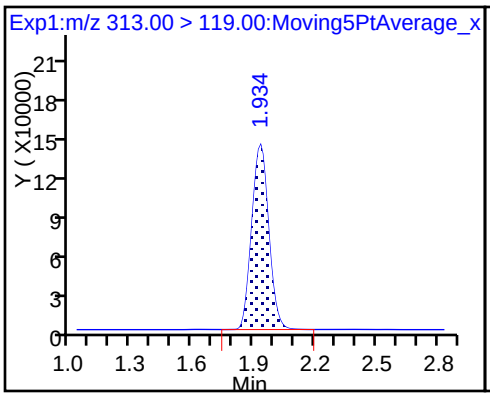
61 Sodium 1H,1H,2H,2H-perfluorohexane



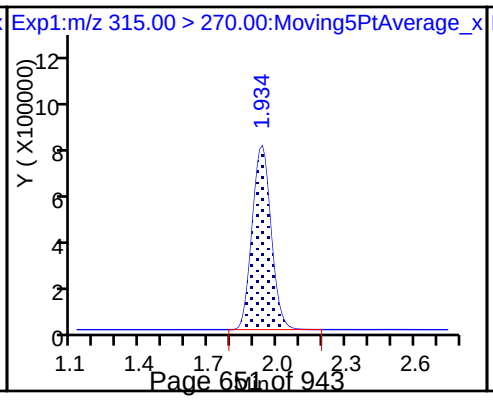
6 Perfluorohexanoic acid



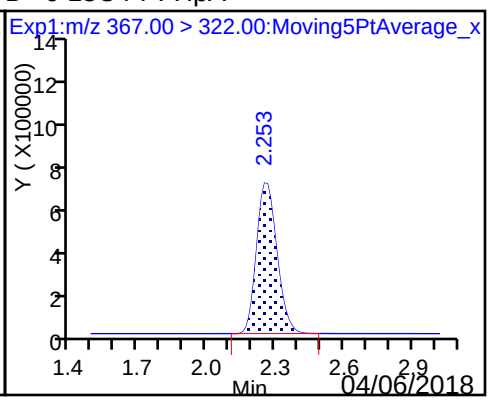
6 Perfluorohexanoic acid



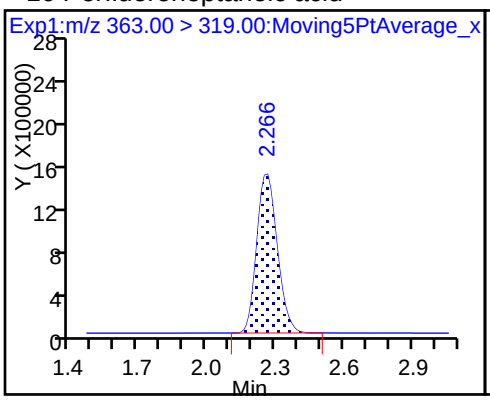
D 7 13C2 PFHxA



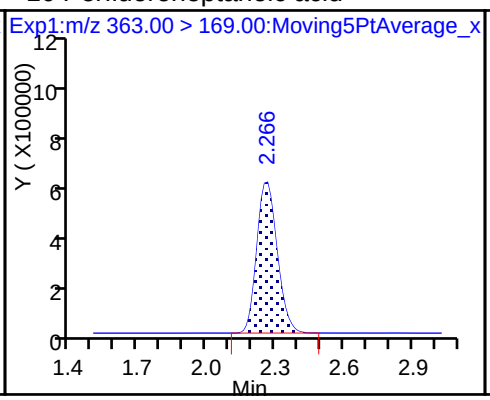
D 9 13C4-PFHpA



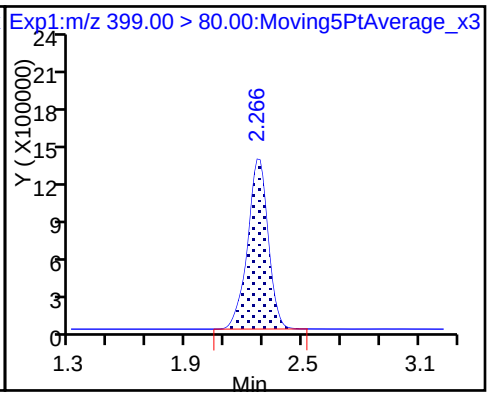
10 Perfluoroheptanoic acid



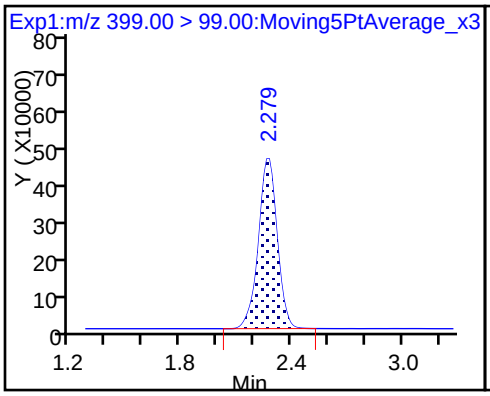
10 Perfluoroheptanoic acid



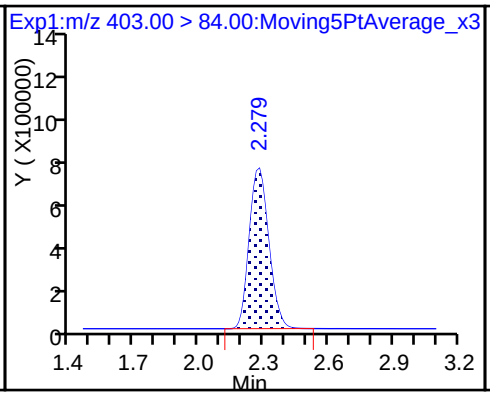
8 Perfluorohexanesulfonic acid



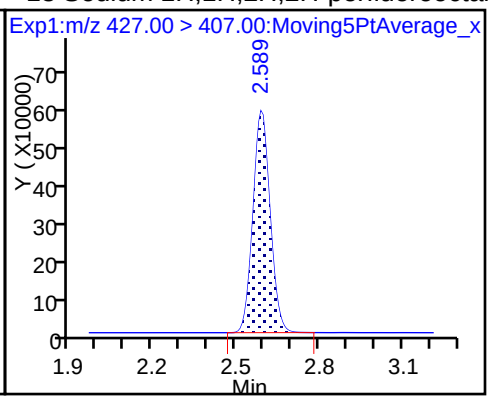
8 Perfluorohexanesulfonic acid



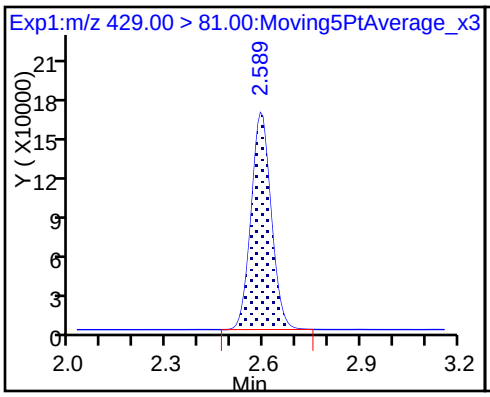
D 11 18O2 PFHxS



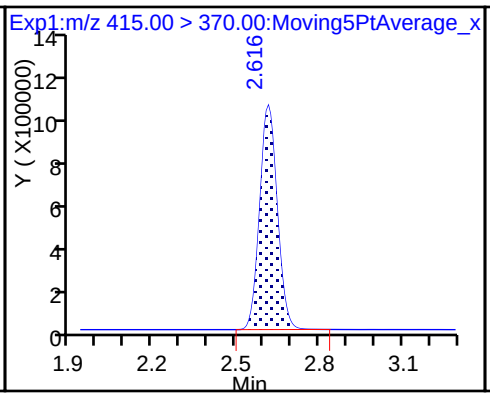
13 Sodium 1H,1H,2H,2H-perfluorooctane



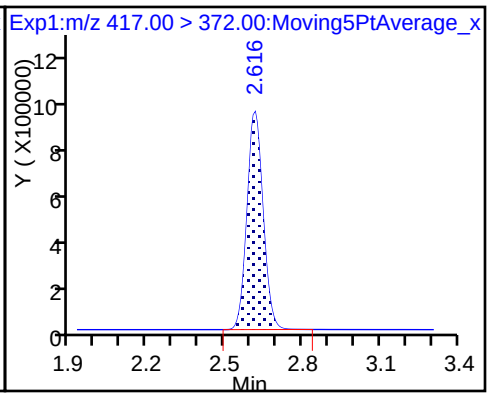
D 12 M2-6:2FTS



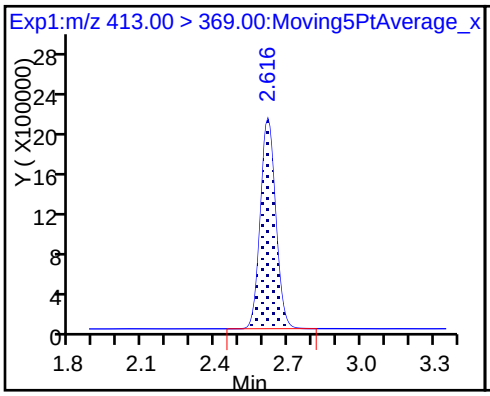
* 62 13C2-PFOA



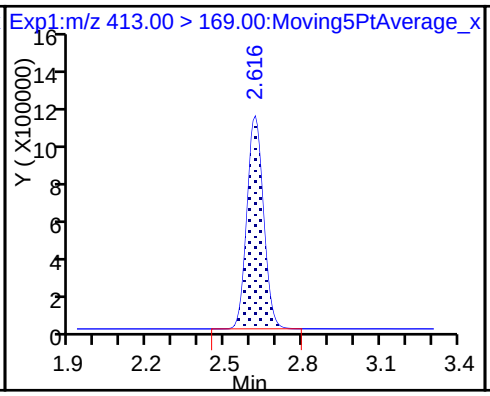
D 14 13C4 PFOA



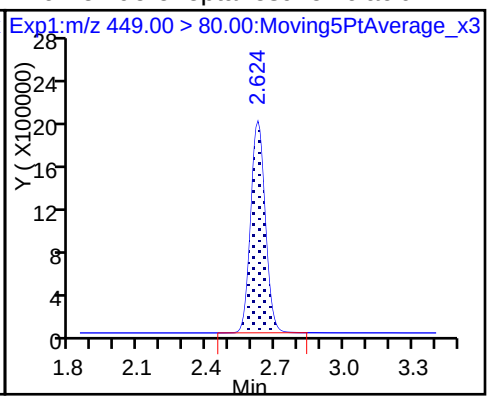
15 Perfluorooctanoic acid



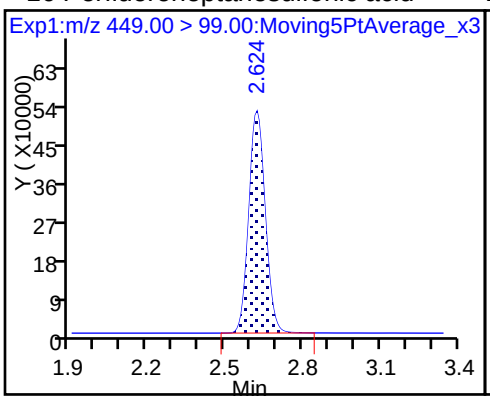
15 Perfluorooctanoic acid



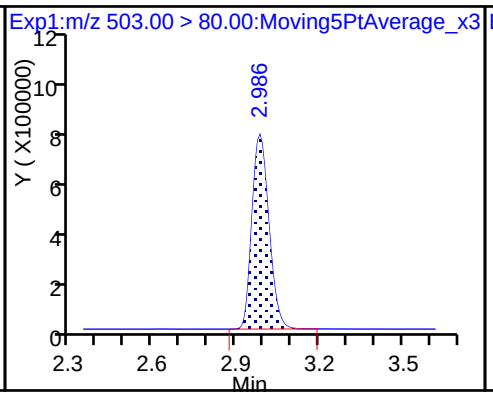
16 Perfluoroheptanesulfonic acid



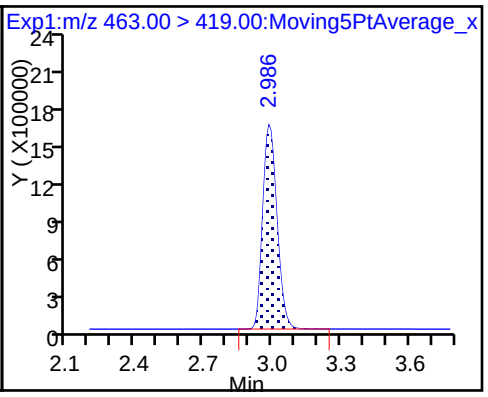
16 Perfluoroheptanesulfonic acid



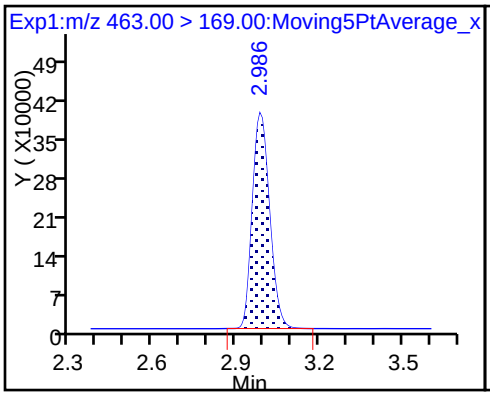
D 18 13C4 PFOS



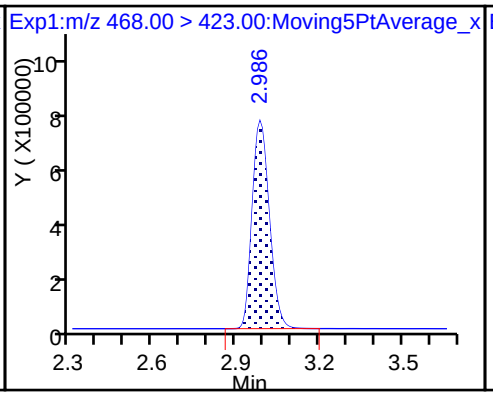
20 Perfluorononanoic acid



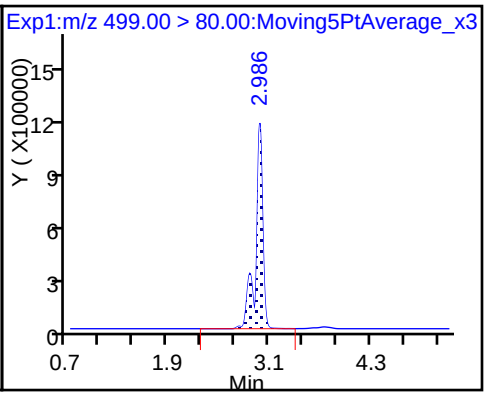
20 Perfluorononanoic acid



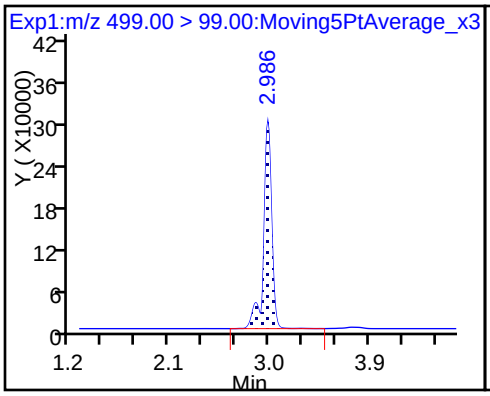
D 19 13C5 PFNA



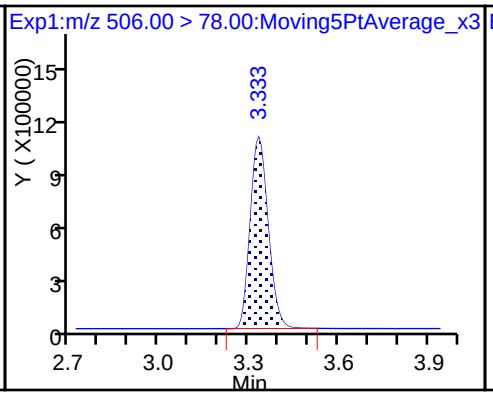
17 Perfluorooctane sulfonic acid



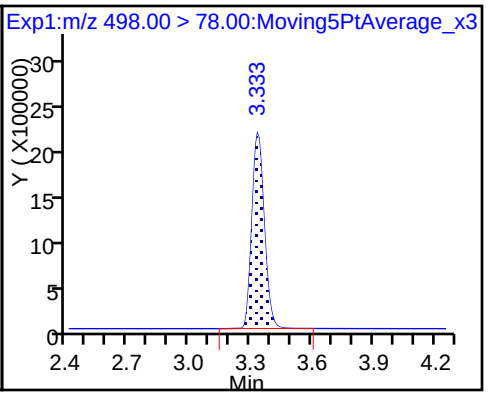
17 Perfluorooctane sulfonic acid



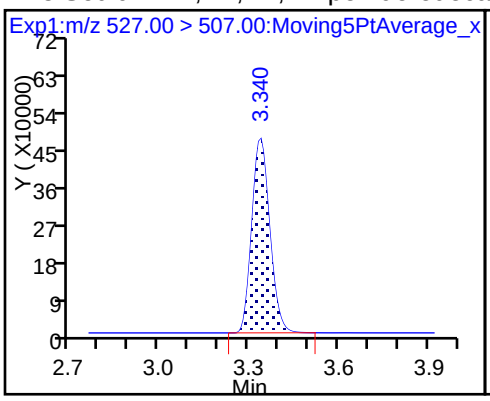
D 21 13C8 FOSA



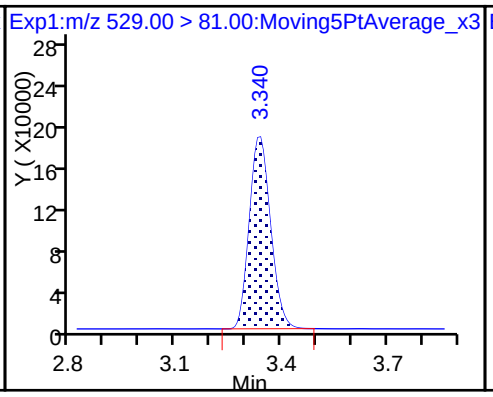
22 Perfluorooctane Sulfonamide



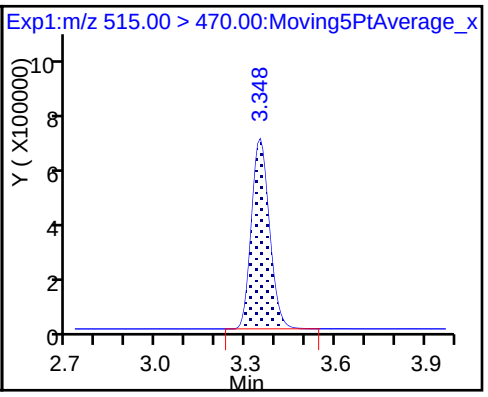
25 Sodium 1H,1H,2H,2H-perfluorodecane



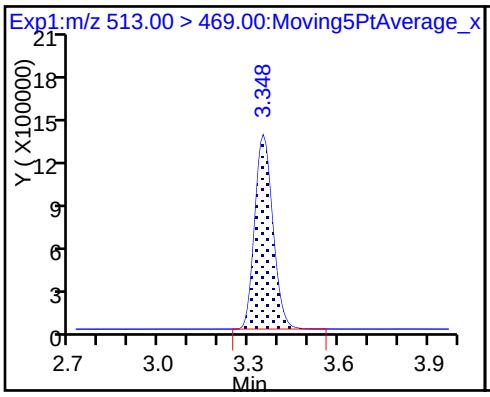
D 26 M2-8:2FTS



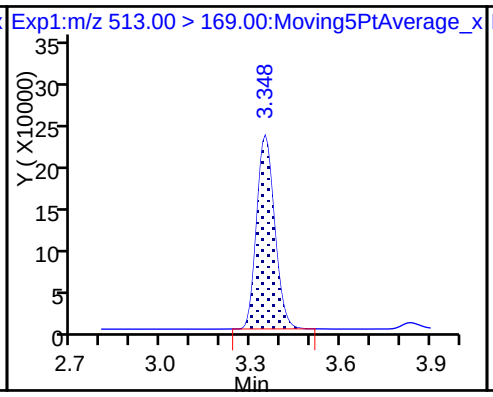
D 23 13C2 PFDA



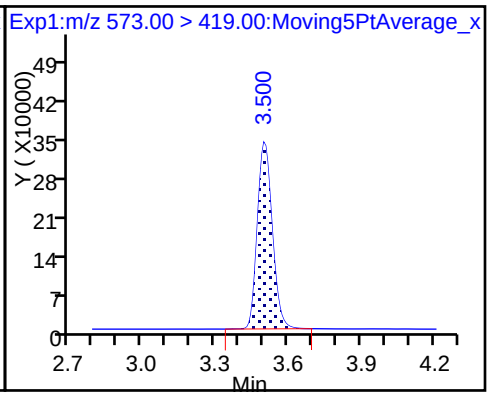
24 Perfluorodecanoic acid



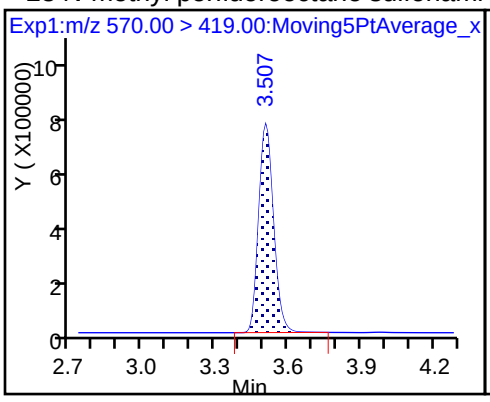
24 Perfluorodecanoic acid



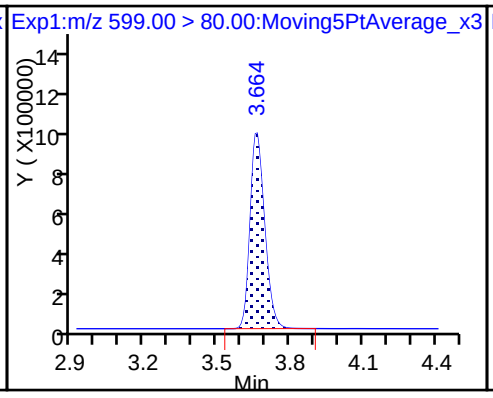
D 27 d3-NMeFOSAA



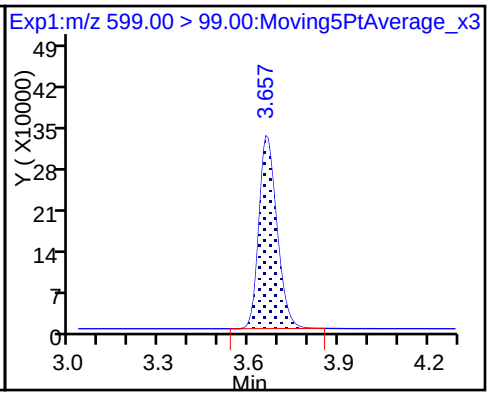
28 N-methyl perfluorooctane sulfonami



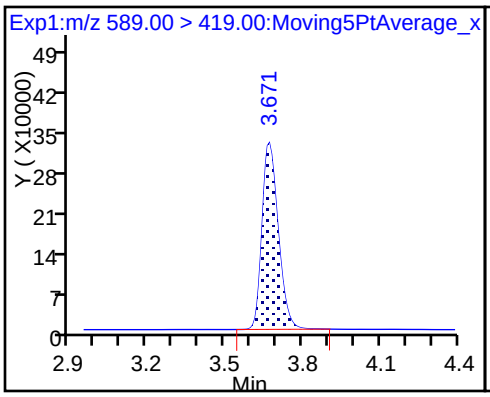
29 Perfluorodecane Sulfonic acid



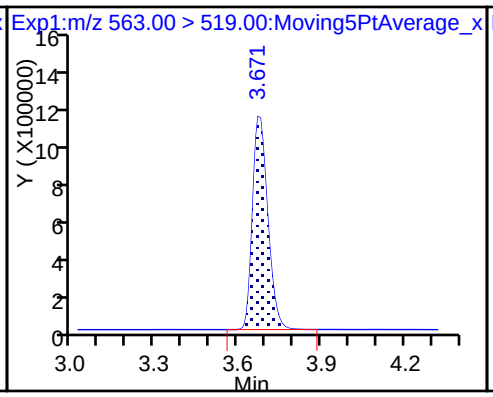
29 Perfluorodecane Sulfonic acid



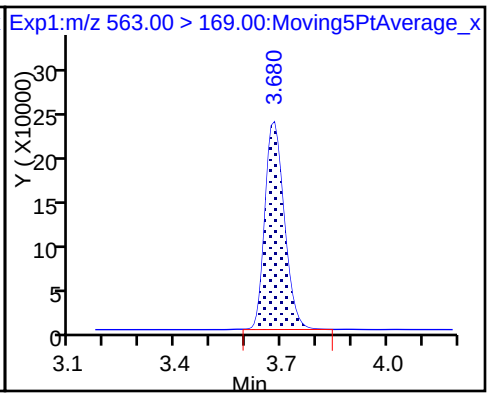
D 32 d5-NEtFOSAA



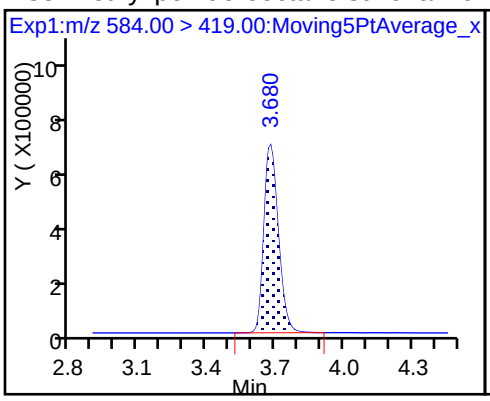
31 Perfluoroundecanoic acid



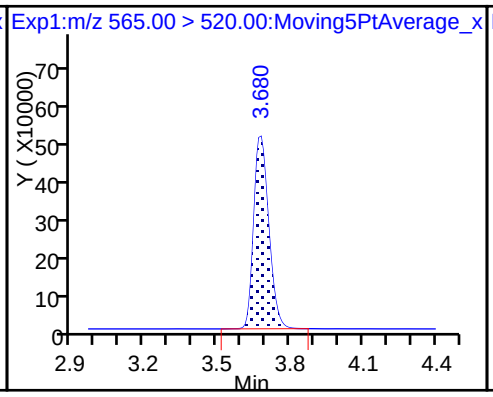
31 Perfluoroundecanoic acid



33 N-ethyl perfluorooctane sulfonamid



D 30 13C2 PFUnA



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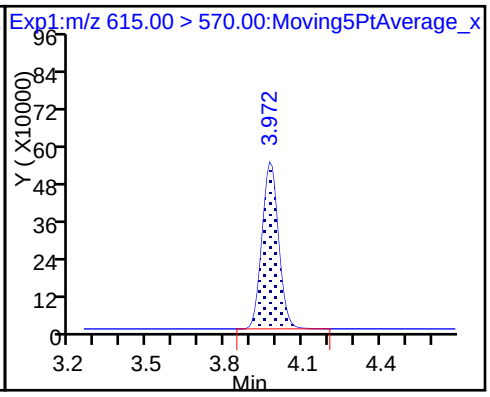
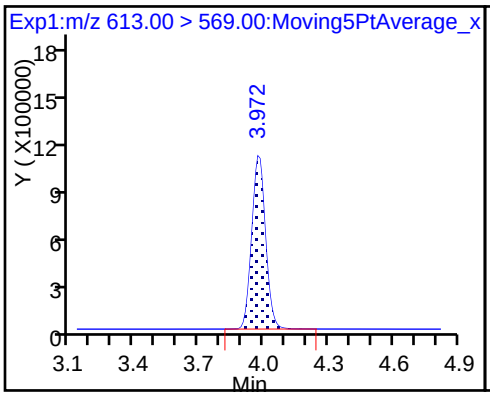
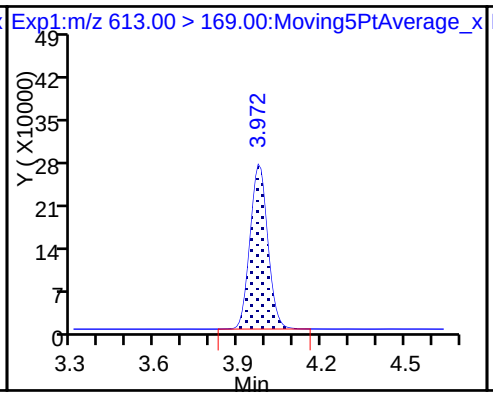


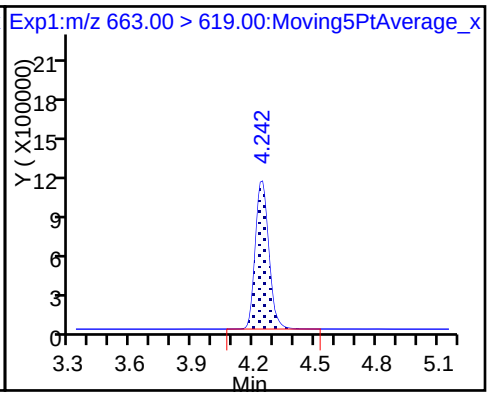
37 Perfluorododecanoic acid



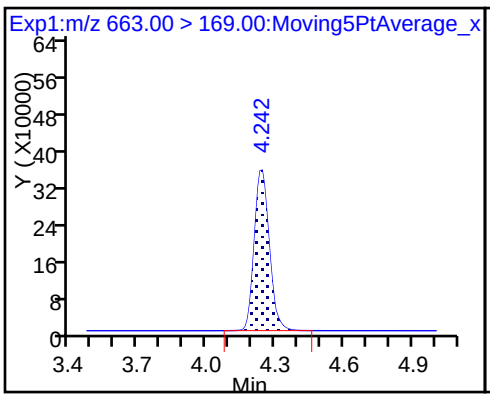
37 Perfluorododecanoic acid



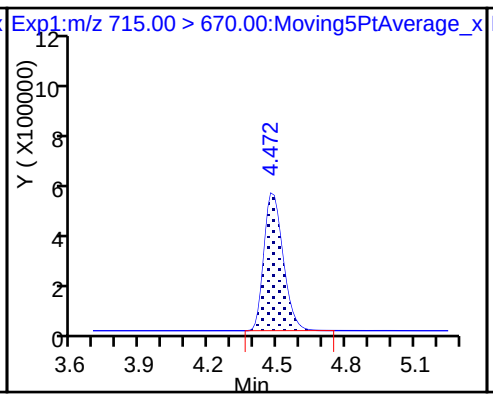
41 Perfluorotridecanoic acid



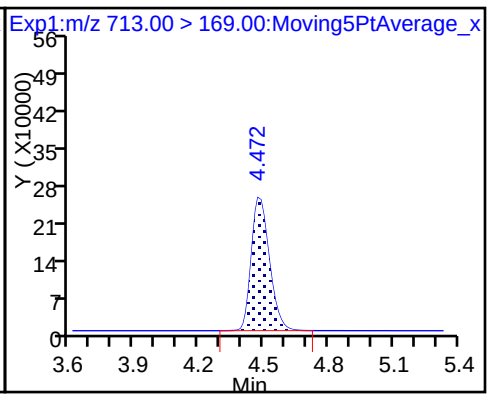
41 Perfluorotridecanoic acid



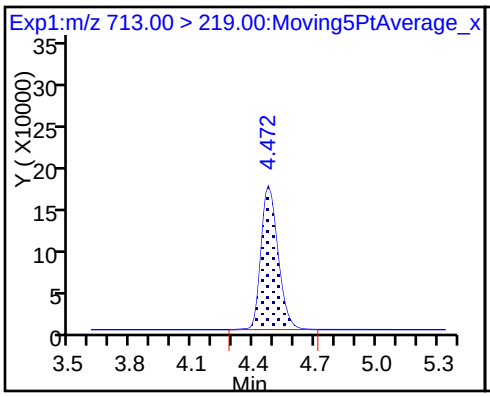
D 43 13C2-PFTeDA



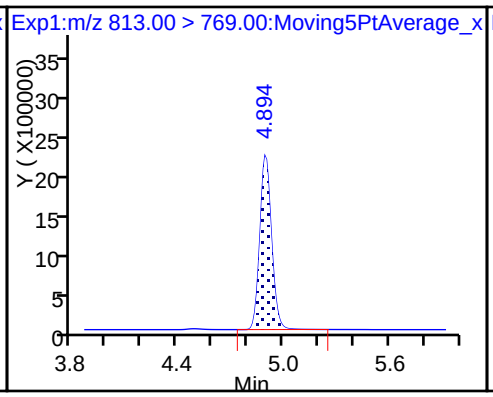
42 Perfluorotetradecanoic acid



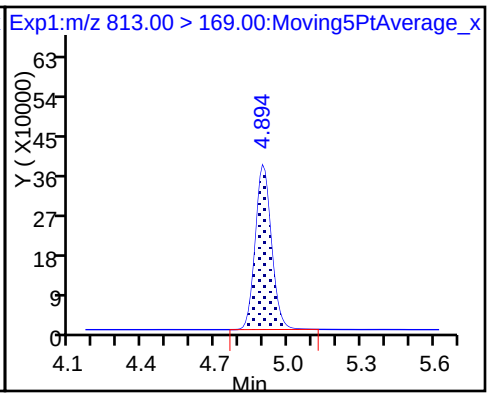
42 Perfluorotetradecanoic acid



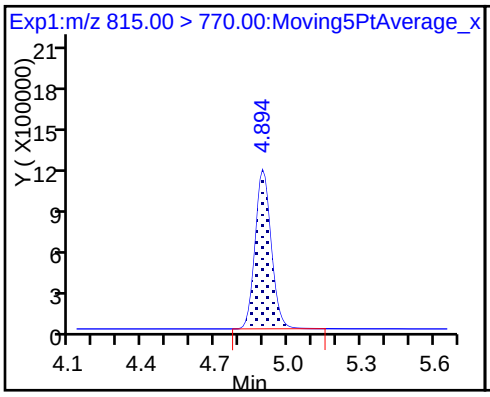
45 Perfluorohexadecanoic acid



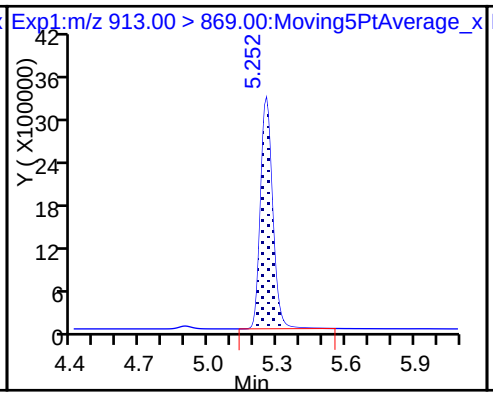
45 Perfluorohexadecanoic acid



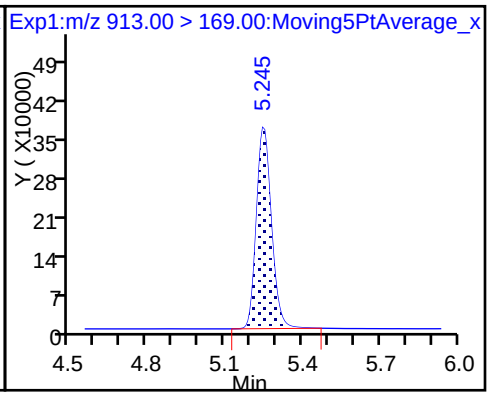
D 44 13C2-PFHxDA



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d
Lims ID: IC L7 Full
Client ID:
Sample Type: IC Calib Level: 7
Inject. Date: 17-Jan-2018 15:06:20 ALS Bottle#: 16 Worklist Smp#: 8
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L7-FULL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 18-Jan-2018 08:22:36 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK019

First Level Reviewer: hannigana Date: 17-Jan-2018 16:53:09

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	1.414	1.411	0.003	0.539	6689622	2.53		101	25243	
2 Perfluorobutyric acid										
212.90 > 169.00	1.414	1.413	0.001	1.000	24898296	9.96		99.6	2914	
D 3 13C5-PFPeA										
267.90 > 223.00	1.663	1.659	0.004	0.634	3854737	2.46		98.3	39369	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.663	1.662	0.001	1.000	17890417	9.85		98.5	15819	
D 47 13C3-PFBS										
301.90 > 83.00	1.698	1.695	0.003	0.647	81139	2.34		101	2879	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.698	1.697	0.001	1.000	22970596	8.52		96.4	91802	
298.90 > 99.00	1.698	1.697	0.001	1.000	10302278		2.23(1.25-3.74)	96.4	71598	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.903	1.903	0.0	1.000	4712009	9.72		104	105462	
D 60 M2-4:2FTS										
329.00 > 81.00	1.903	1.903	0.0	0.725	503558	NC			7017	
D 7 13C2 PFHxA										
315.00 > 270.00	1.934	1.939	-0.005	0.737	4166297	2.47		98.6	28614	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.934	1.939	-0.005	1.000	16747455	9.70		97.0	32785	
313.00 > 119.00	1.945	1.939	0.006	1.005	1577842		10.61(5.03-15.10)	97.0	24719	
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.864	3856924	2.40		95.9	28210	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.266	2.268	-0.002	1.000	16533181	9.75		97.5	24994	
363.00 > 169.00	2.266	2.268	-0.002	1.000	6765479		2.44(1.13-3.40)	97.5	26540	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	18787887	8.69		95.5	22477	
399.00 > 99.00	2.279	2.280	-0.001	1.000	6654127		2.82(1.50-4.49)	95.5	17895	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.869	4592963	2.32		98.0	23679	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.596	0.0	1.000	4633505	9.66		102	36218	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.990	688126	2.31		97.4	16159	
D 14 13C4 PFOA										
417.00 > 372.00	2.624	2.622	0.002	1.000	3781095	2.40		95.9	27005	
* 62 13C2-PFOA										
415.00 > 370.00	2.624	2.622	0.002		4378689	2.50			31205	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.624	2.623	0.001	1.000	17167030	9.68		96.8	11755	
413.00 > 169.00	2.624	2.623	0.001	1.000	9348745		1.84(0.84-2.52)	96.8	27736	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.631	2.629	0.002	1.000	15956747	9.69		102	37702	
449.00 > 99.00	2.631	2.629	0.002	1.000	4445483		3.59(1.94-5.82)	102	31035	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.141	3133770	2.45		98.0	25028	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	2.992	0.001	1.000	12870491	9.46		102	4516	
499.00 > 99.00	2.993	2.992	0.001	1.000	2908185		4.43(2.31-6.93)	102	6965	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.141	2906103	2.32		97.0	17739	
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	2.992	0.001	1.000	12938458	10.0		100	24000	
463.00 > 169.00	2.993	2.992	0.001	1.000	3160977		4.09(1.90-5.69)	100	28300	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.340	3.338	0.002	1.000	16389523	9.88		98.8	56175	
D 21 13C8 FOSA										
506.00 > 78.00	3.340	3.338	0.002	1.273	4220474	2.39		95.7	28811	
D 26 M2-8:2FTS										
529.00 > 81.00	3.340	3.342	-0.002	1.273	762870	2.43		101	15297	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.340	3.342	-0.002	1.000	3762460	9.71		101	32197	
D 23 13C2 PFDA										
515.00 > 470.00	3.355	3.352	0.003	1.279	2706406	2.45		98.0	21712	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.355	3.353	0.002	1.000	10721843	10.2		102	25870	
513.00 > 169.00	3.355	3.353	0.002	1.000	1943855		5.52(2.36-7.09)	102	1786	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.507	3.507	0.0	1.337	1384778	2.51		100	9371	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.515	3.513	0.002	1.002	6179313	10.3		103	14700	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.664	3.666	-0.002	1.000	8022809	10.1		105	36965	
599.00 > 99.00	3.664	3.666	-0.002	1.000	2594517		3.09(1.39-4.16)	105	24126	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.672	-0.001	1.399	1301953	2.34		93.4	3892	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.680	3.678	0.002	1.000	8080078	9.91		99.1	27169	
563.00 > 169.00	3.680	3.678	0.002	1.000	1670202		4.84(0.00-0.00)	99.1	30795	
D 30 13C2 PFUnA										
565.00 > 520.00	3.680	3.679	0.001	1.403	1975688	2.36		94.3	17015	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.680	3.679	0.001	1.002	5261873	10.4		104	12712	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.981	3.979	0.002	1.000	9080911	10.2		102	31434	
613.00 > 169.00	3.981	3.979	0.002	1.000	2315217		3.92(2.13-6.40)	102	31384	
D 36 13C2 PFDoA										
615.00 > 570.00	3.981	3.979	0.002	1.517	2179814	2.40		95.9	17254	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.242	4.242	0.0	1.000	9922216	9.80		98.0	37825	
663.00 > 169.00	4.242	4.242	0.0	1.000	3182480		3.12(1.25-3.76)	98.0	41814	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.486	4.483	0.003	1.000	2672440	10.1		101	22980	
713.00 > 219.00	4.472	4.483	-0.011	0.997	1833873		1.46(0.71-2.13)	101	21207	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.486	4.483	0.003	1.710	2702115	2.27		91.0	11943	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.903	4.902	0.001	1.869	4770244	2.25		90.1	13892	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.903	4.902	0.001	1.000	17956480	9.91		99.1	9344	
813.00 > 169.00	4.903	4.902	0.001	1.000	3254432		5.52(2.86-8.58)	99.1	11679	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.260	5.255	0.005	1.000	20806019	10.3		103	3261	
913.00 > 169.00	5.252	5.255	-0.003	0.999	2748135		7.57(0.00-0.00)	103	2966	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL7_00003 Amount Added: 1.00 Units: mL

Report Date: 18-Jan-2018 08:22:36 Chrom Revision: 2.2 08-Dec-2017 11:41:26

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Injection Date: 17-Jan-2018 15:06:20 Instrument ID: A8_N

Lims ID: IC L7 Full

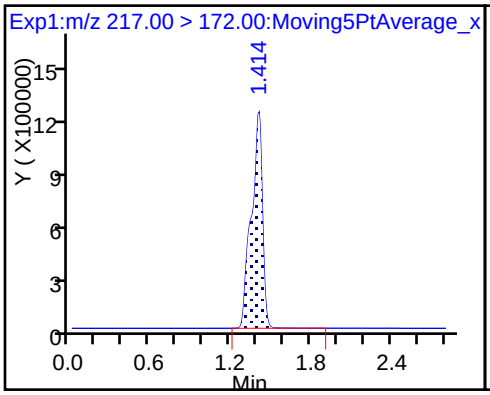
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 16 Worklist Smp#: 8

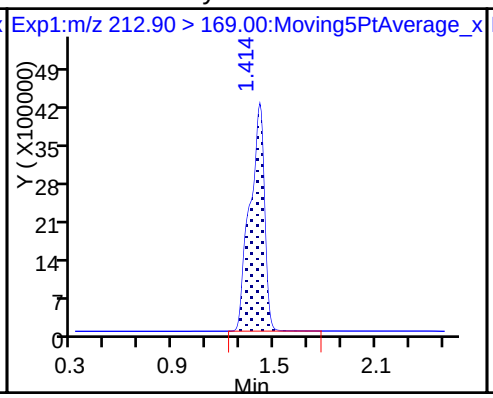
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

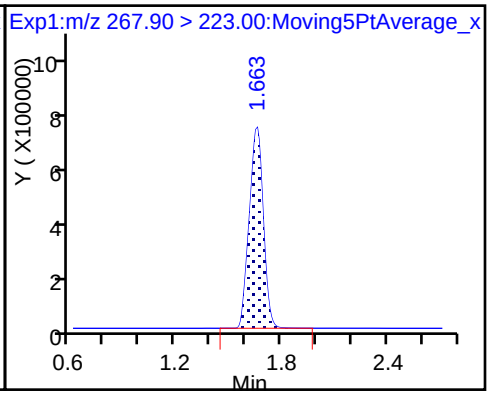
D 1 13C4 PFBA



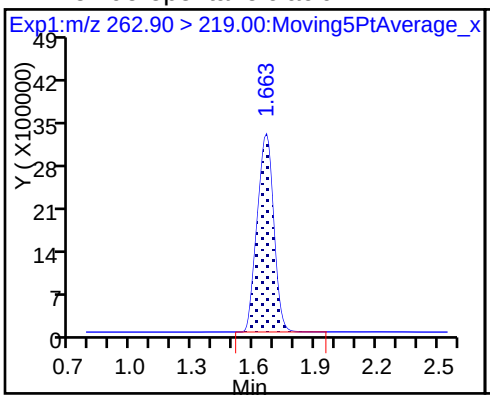
2 Perfluorobutyric acid



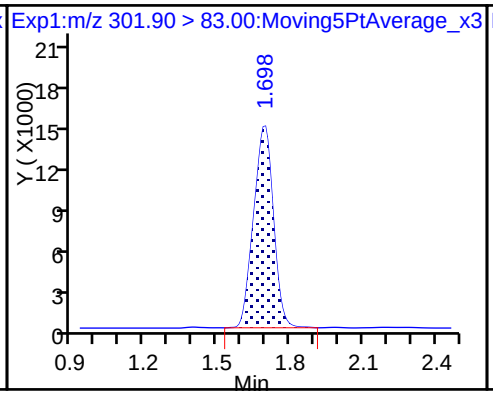
D 3 13C5-PFPeA



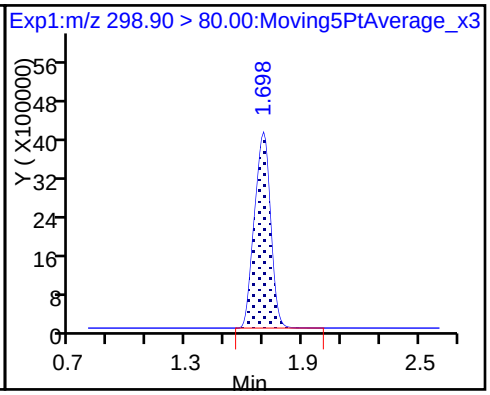
4 Perfluoropentanoic acid



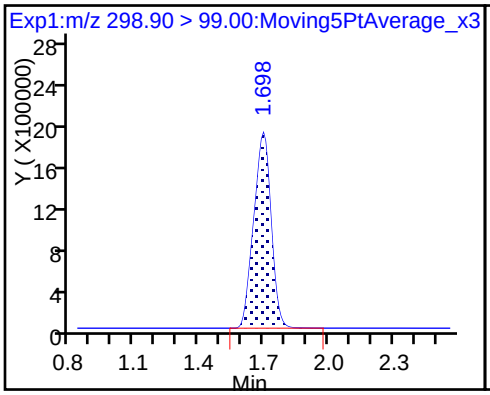
D 47 13C3-PFBS



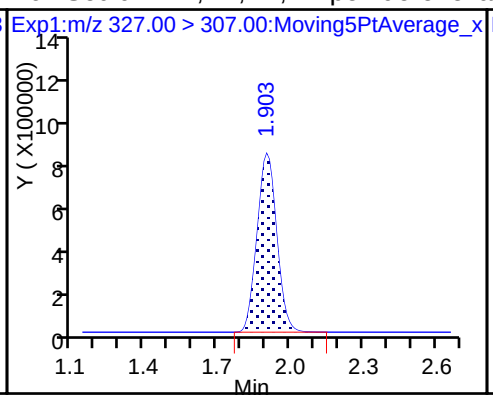
5 Perfluorobutanesulfonic acid



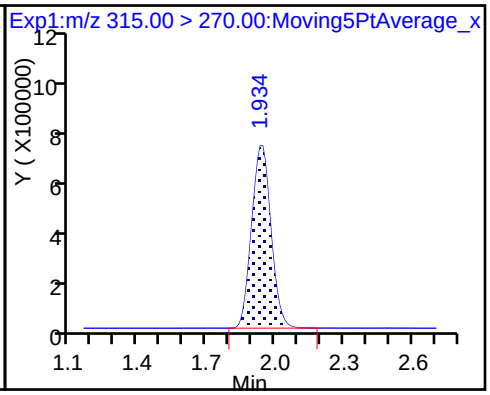
5 Perfluorobutanesulfonic acid



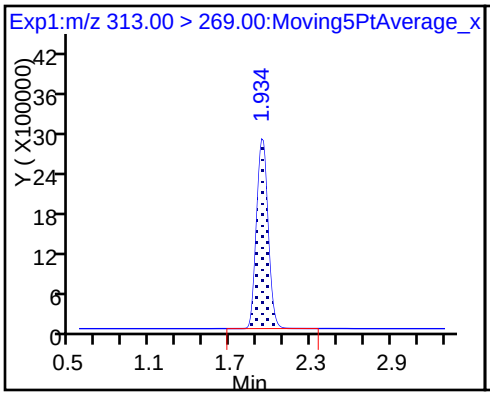
61 Sodium 1H,1H,2H,2H-perfluorohexa



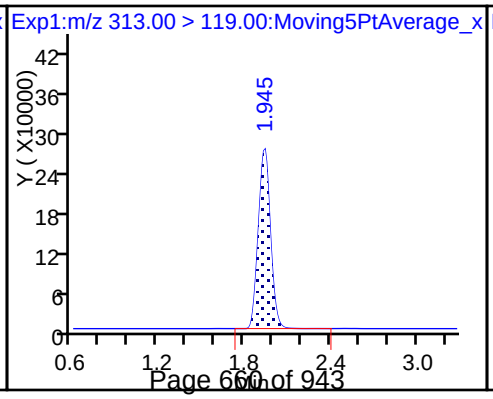
D 7 13C2 PFHxA



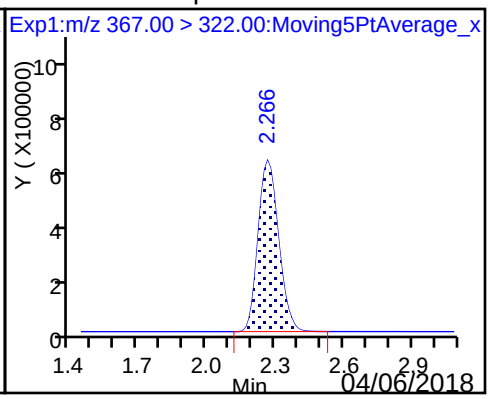
6 Perfluorohexanoic acid



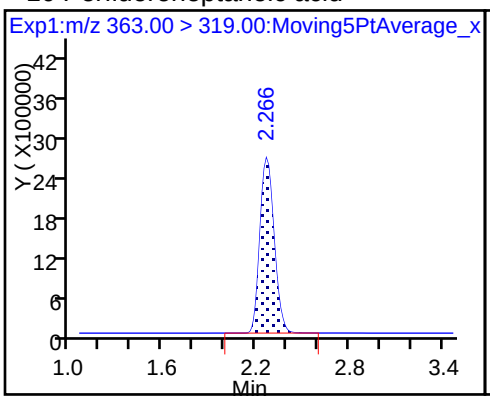
6 Perfluorohexanoic acid



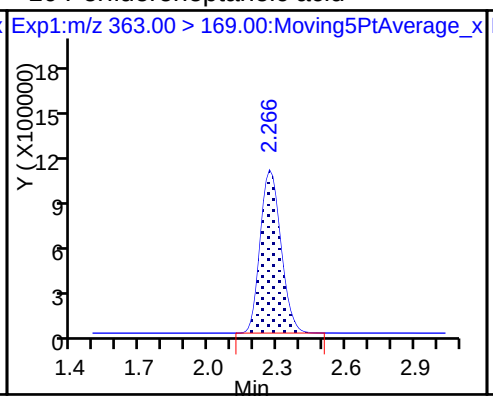
D 9 13C4-PFHpA



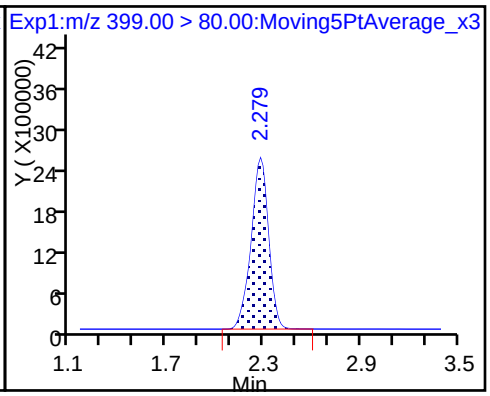
10 Perfluoroheptanoic acid



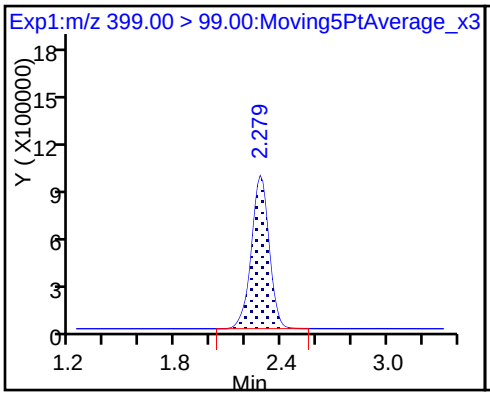
10 Perfluoroheptanoic acid



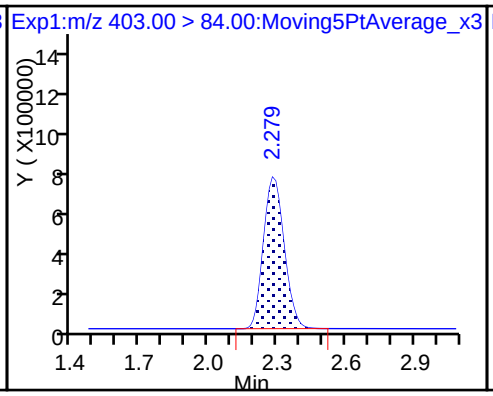
8 Perfluorohexanesulfonic acid



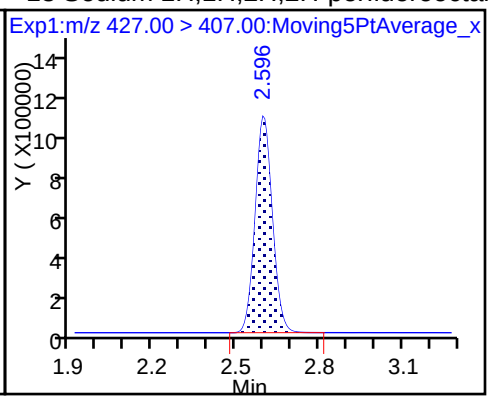
8 Perfluorohexanesulfonic acid



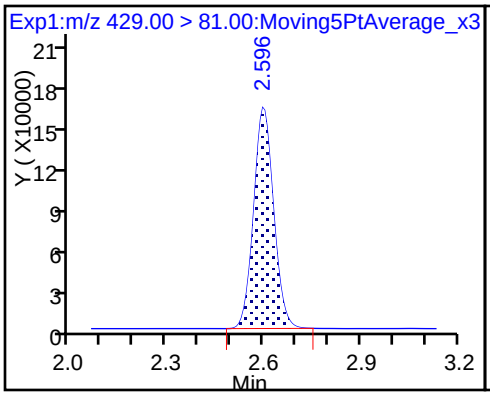
D 11 18O2 PFHxS



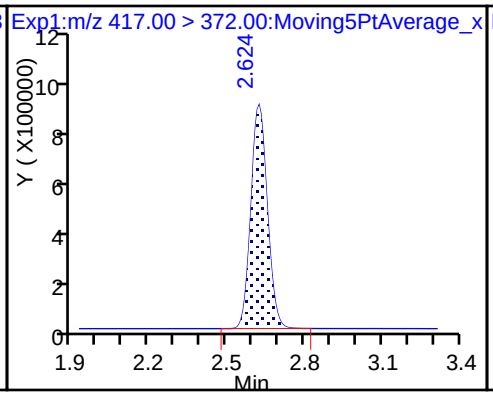
13 Sodium 1H,1H,2H,2H-perfluorooctane



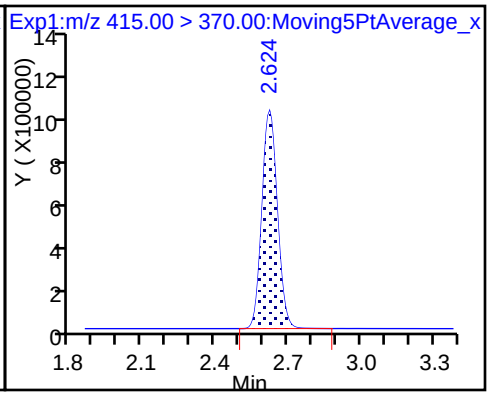
D 12 M2-6:2FTS



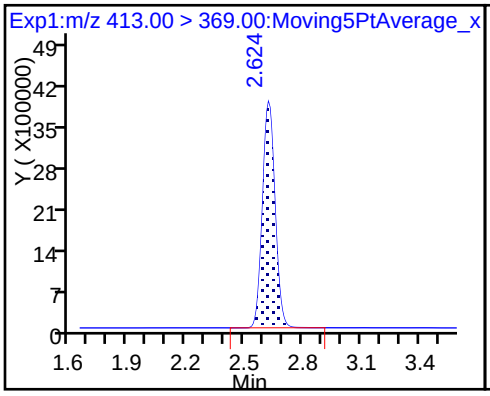
D 14 13C4 PFOA



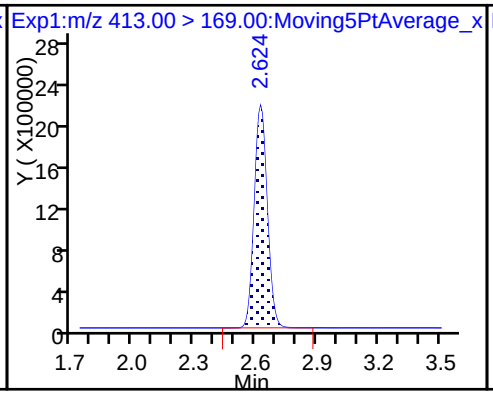
* 62 13C2-PFOA



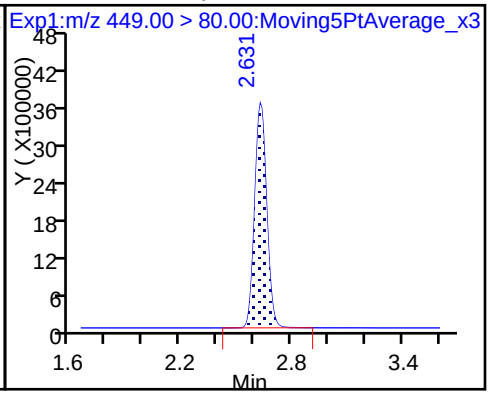
15 Perfluorooctanoic acid



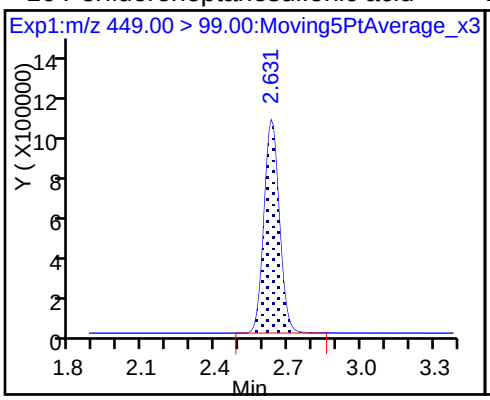
15 Perfluorooctanoic acid



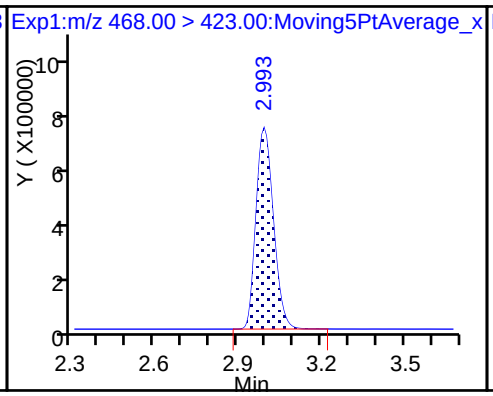
16 Perfluoroheptanesulfonic acid



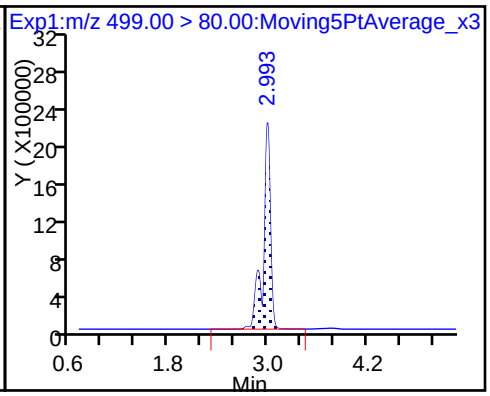
16 Perfluoroheptanesulfonic acid



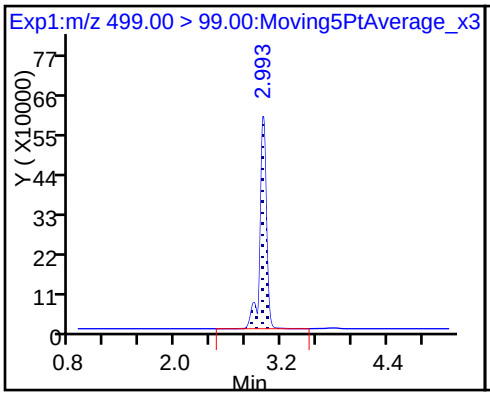
D 19 13C5 PFNA



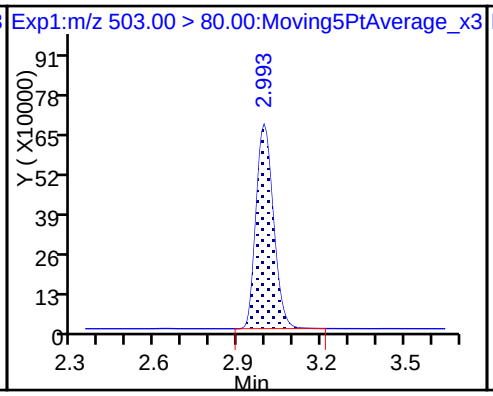
17 Perfluorooctane sulfonic acid



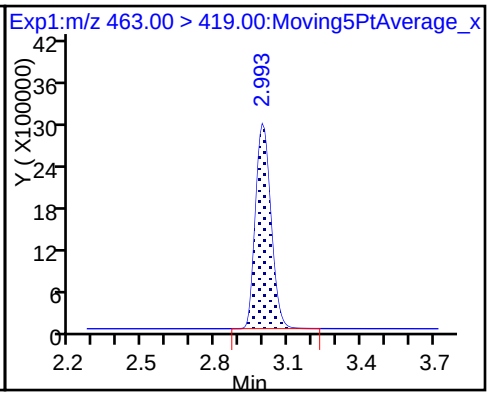
17 Perfluorooctane sulfonic acid



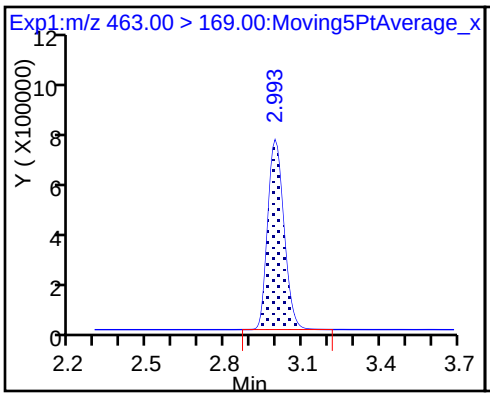
D 18 13C4 PFOS



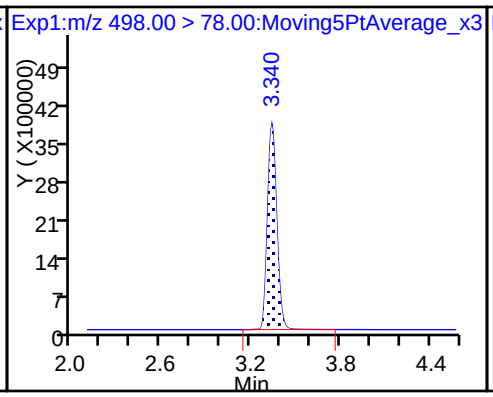
20 Perfluorononanoic acid



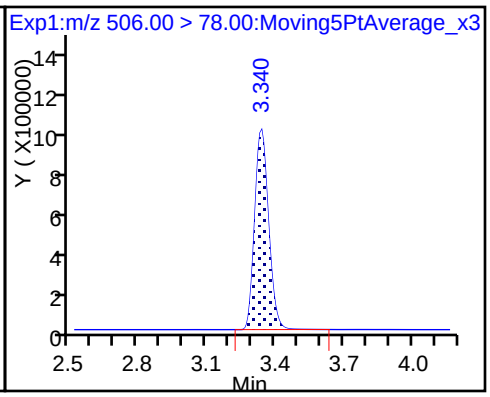
20 Perfluorononanoic acid



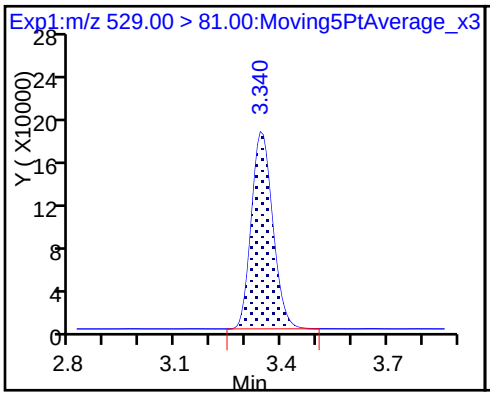
22 Perfluorooctane Sulfonamide



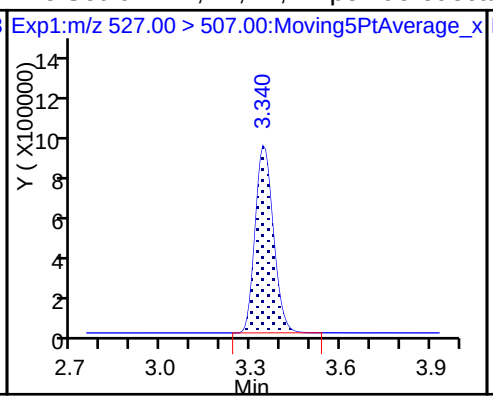
D 21 13C8 FOSA



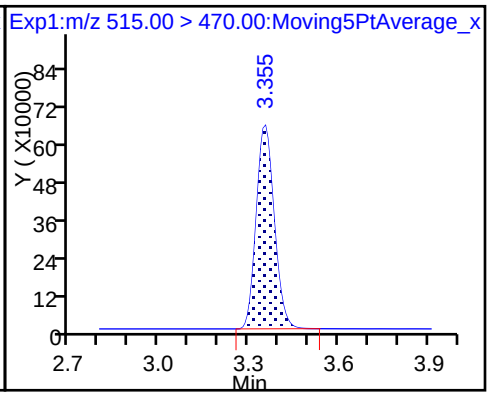
D 26 M2-8:2FTS



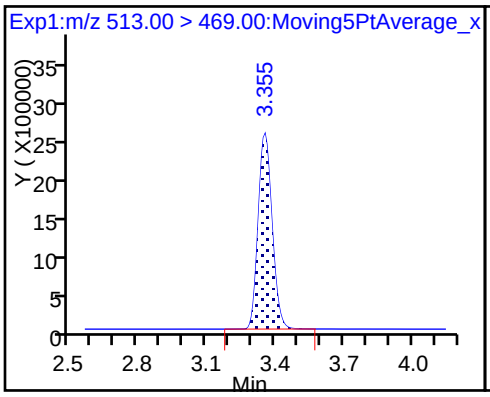
25 Sodium 1H,1H,2H,2H-perfluorodecane



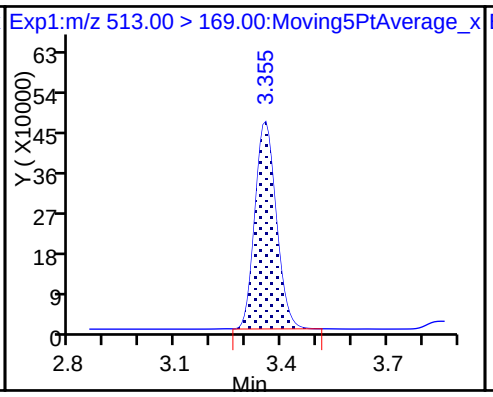
D 23 13C2 PFDA



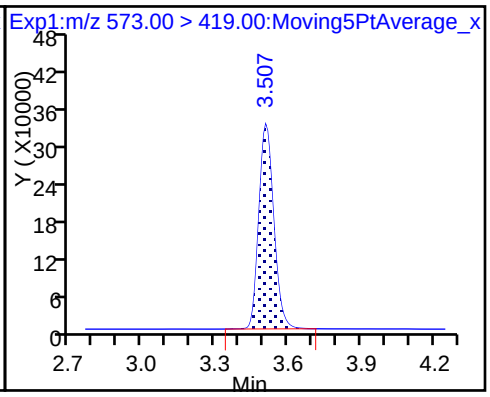
24 Perfluorodecanoic acid



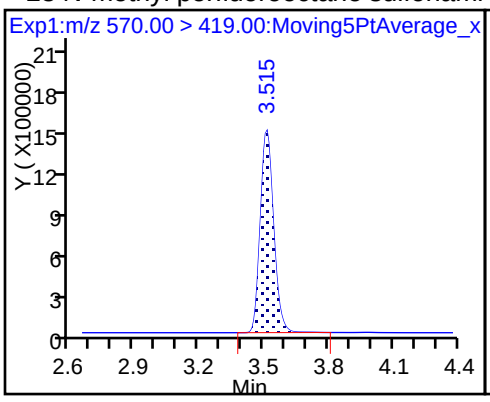
24 Perfluorodecanoic acid



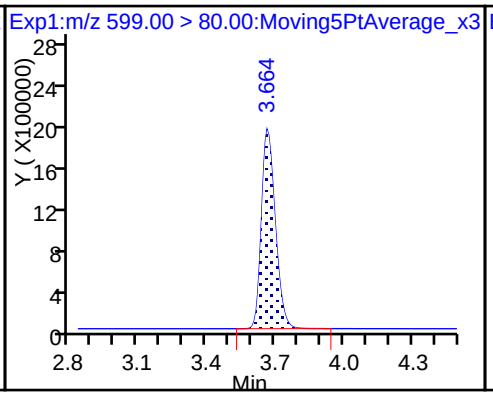
D 27 d3-NMeFOSAA



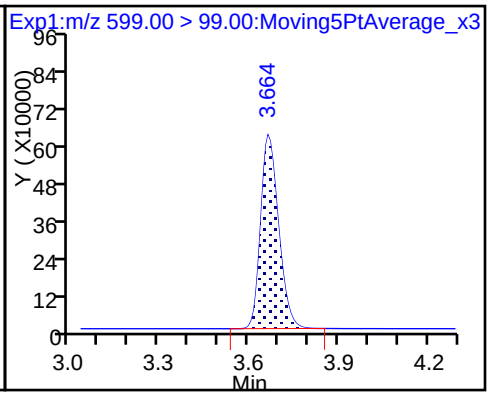
28 N-methyl perfluorooctane sulfonami



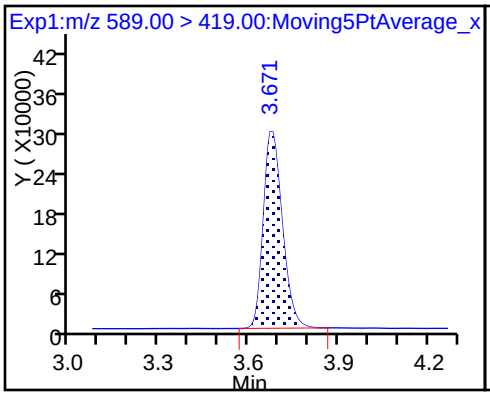
29 Perfluorodecane Sulfonic acid



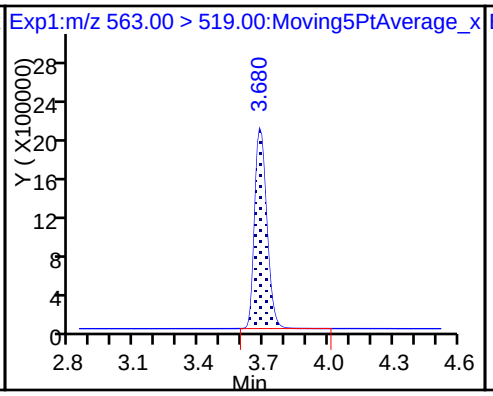
29 Perfluorodecane Sulfonic acid



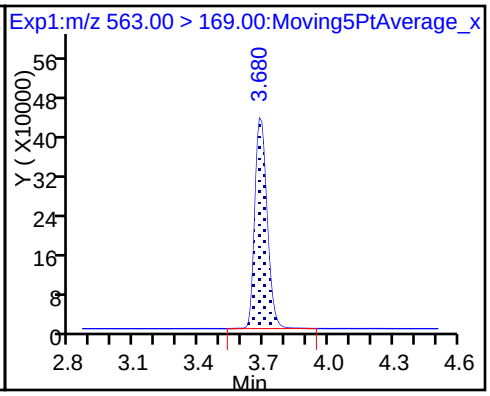
D 32 d5-NEtFOSAA



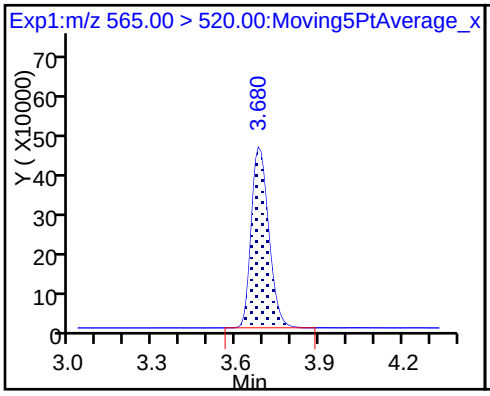
31 Perfluoroundecanoic acid



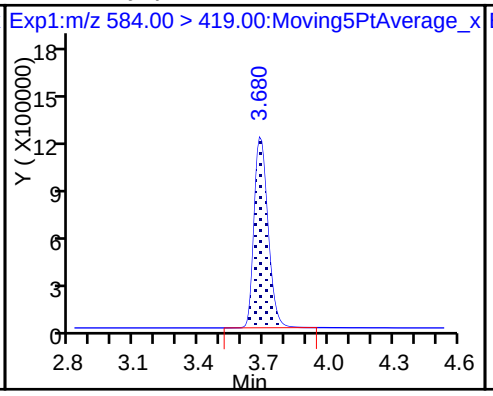
31 Perfluoroundecanoic acid



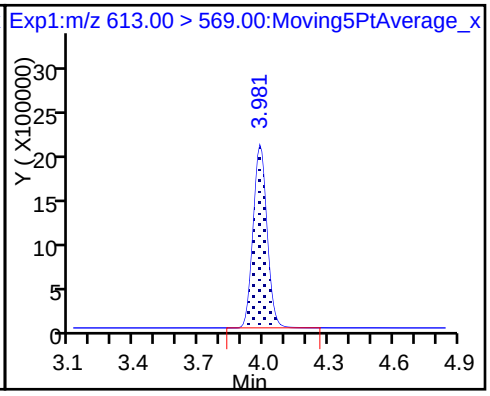
D 30 13C2 PFUnA



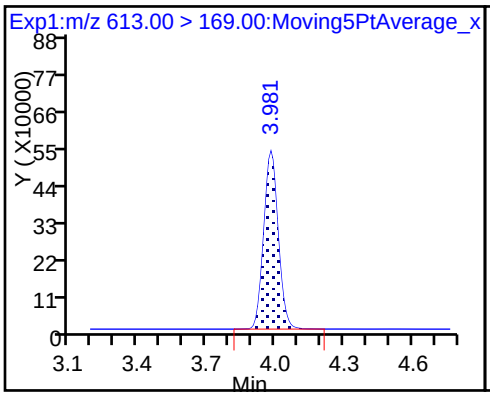
33 N-ethyl perfluorooctane sulfonamid



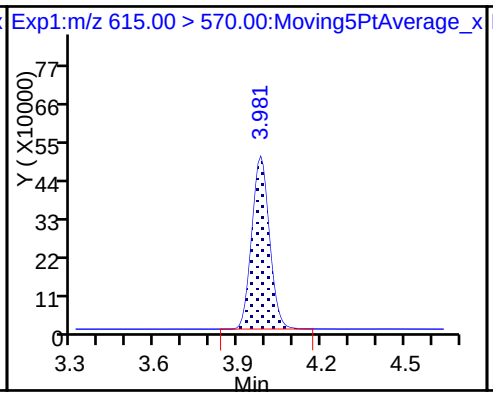
37 Perfluorododecanoic acid



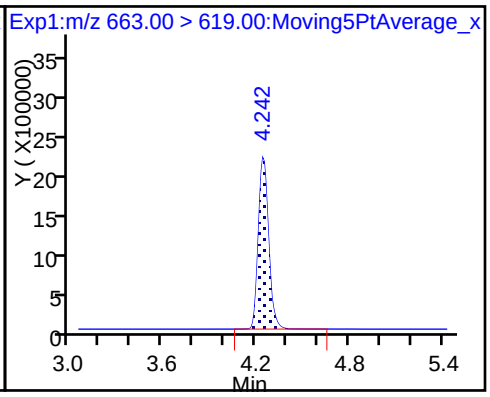
37 Perfluorododecanoic acid



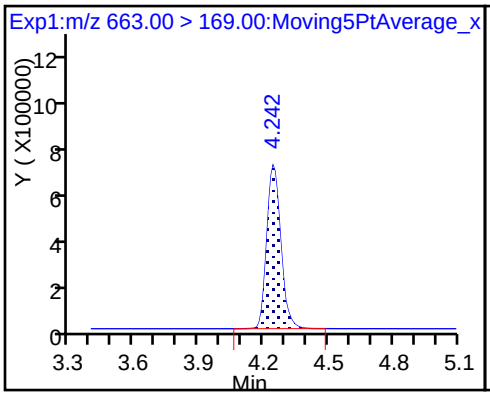
D 36 13C2 PFDoA



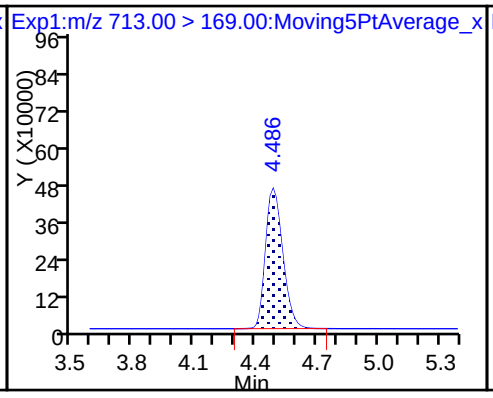
41 Perfluorotridecanoic acid



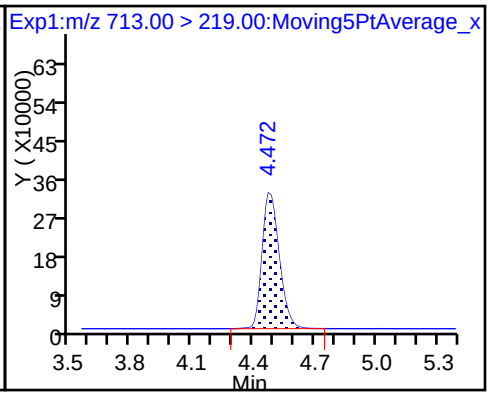
41 Perfluorotridecanoic acid



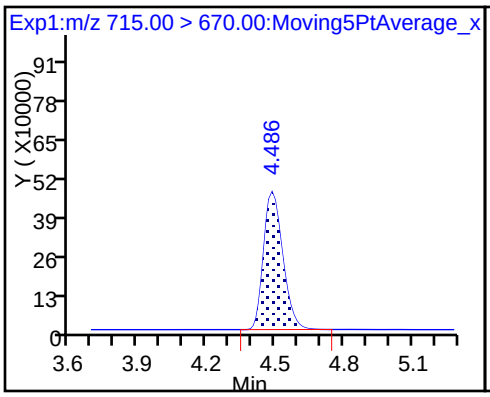
42 Perfluorotetradecanoic acid



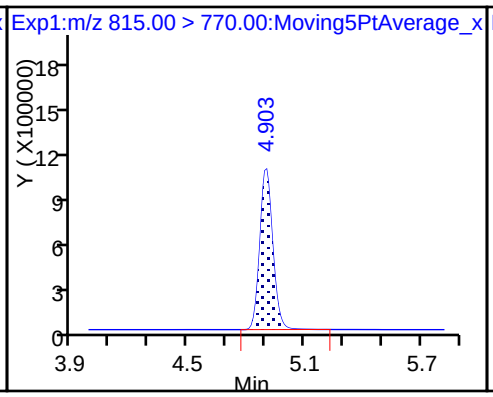
42 Perfluorotetradecanoic acid



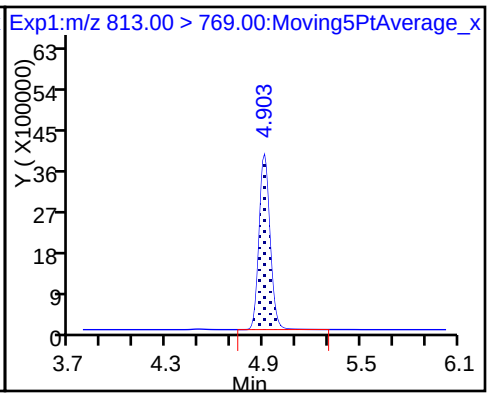
D 43 13C2-PFTeDA



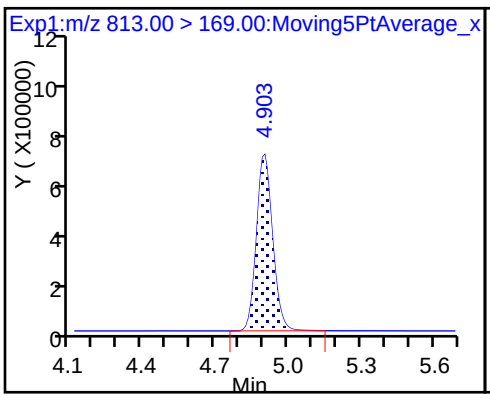
D 44 13C2-PFHxDA



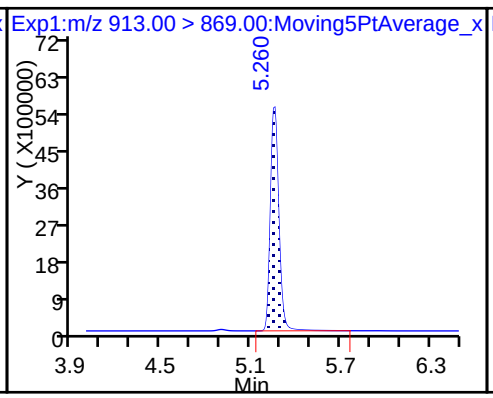
45 Perfluorohexadecanoic acid



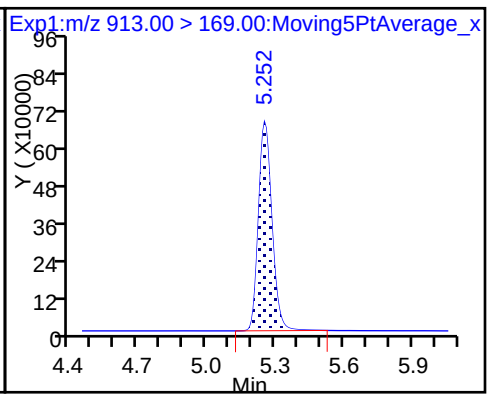
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: ICV 320-204375/10 Calibration Date: 01/17/2018 15:22

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.17CURVELLA_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	0.9343	0.9126		2.44	2.50	-2.3	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.142		2.42	2.50	-3.0	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	77.17		2.21	2.21	-0.0	25.0
4:2 FTS	AveID	13.89	13.58		2.28	2.34	-2.3	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	0.9860		2.38	2.50	-4.9	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.048		2.38	2.50	-4.7	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.050		2.15	2.28	-5.7	25.0
6:2FTS	AveID	1.655	1.696		2.43	2.38	2.4	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.068		2.28	2.50	-8.9	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.417		2.48	2.38	4.6	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	0.9807		2.38	2.50	-5.0	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.080		2.23	2.31	-3.5	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	0.9902		2.52	2.50	0.8	25.0
8:2FTS	AveID	1.217	1.281		2.53	2.40	5.2	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9547		2.46	2.50	-1.6	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.060		2.45	2.50	-1.9	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6815		2.51	2.41	4.1	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9448		2.29	2.50	-8.5	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9541		2.45	2.50	-2.0	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.024		2.50	2.50	-0.1	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.075		2.31	2.50	-7.4	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2434		2.49	2.50	-0.3	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.8997		2.35	2.50	-5.8	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.176		2.79	2.50	11.6	25.0
13C4 PFBA	Ave	1.512	1.595		2.64	2.50	5.4	50.0
13C5-PFPeA	Ave	0.8956	0.9288		2.59	2.50	3.7	50.0
13C3-PFBS	Ave	0.0198	0.0205		2.40	2.33	3.3	50.0
13C2 PFHxA	Ave	0.9649	1.003		2.60	2.50	3.9	50.0
13C4-PFHpA	Ave	0.9187	0.9576		2.61	2.50	4.2	50.0
18O2 PFHxS	Ave	1.131	1.197		2.50	2.37	5.8	50.0
M2-6:2FTS	Ave	0.1699	0.1786		2.50	2.38	5.1	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: ICV 320-204375/10 Calibration Date: 01/17/2018 15:22

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.17CURVELLA_010.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.9552		2.65	2.50	6.1	50.0
13C4 PFOS	Ave	0.7158	0.7476		2.50	2.39	4.4	50.0
13C5 PFNA	Ave	0.7300	0.7759		2.66	2.50	6.3	50.0
13C8 FOSA	Ave	1.007	1.031		2.56	2.50	2.4	50.0
M2-8:2FTS	Ave	0.1795	0.1774		2.37	2.40	-1.2	50.0
13C2 PFDA	Ave	0.6306	0.6405		2.54	2.50	1.6	50.0
d3-NMeFOSAA	Ave	0.3147	0.3234		2.57	2.50	2.8	50.0
13C2 PFUnA	Ave	0.4783	0.5040		2.63	2.50	5.4	50.0
d5-NEtFOSAA	Ave	0.3182	0.3385		2.66	2.50	6.4	50.0
13C2 PFDoA	Ave	0.5192	0.5336		2.57	2.50	2.8	50.0
13C2-PFTeDA	Ave	0.6785	0.6646		2.45	2.50	-2.0	50.0
13C2-PFHxDA	Ave	1.209	1.217		2.52	2.50	0.7	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_010.d
Lims ID: ICV Full
Client ID:
Sample Type: ICV
Inject. Date: 17-Jan-2018 15:22:01 ALS Bottle#: 18 Worklist Smp#: 10
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: ICV
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist:

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 18-Jan-2018 08:23:30 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK019

First Level Reviewer: hannigana Date: 17-Jan-2018 16:51:39

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	1.414	1.411	0.003	0.540	7421777	2.64		105	23515	
2 Perfluorobutyric acid										
212.90 > 169.00	1.414	1.413	0.001	1.000	6773367	2.44			794	
D 3 13C5-PFPeA										
267.90 > 223.00	1.663	1.659	0.004	0.635	4322669	2.59		104	113476	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.663	1.662	0.001	1.000	4938303	2.42			4287	
D 47 13C3-PFBS										
301.90 > 83.00	1.698	1.695	0.003	0.649	88661	2.40		103	2674	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.698	1.697	0.001	1.000	6510885	2.21			47787	
298.90 > 99.00	1.698	1.697	0.001	1.000	2658603		2.45(1.25-3.74)		20037	
D 60 M2-4:2FTS										
329.00 > 81.00	1.903	1.903	0.0	0.727	555125	NC			6666	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.903	1.903	0.0	1.000	1210129	2.28			43190	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.944	1.939	0.005	1.000	4601877	2.38			10910	
313.00 > 119.00	1.944	1.939	0.005	1.000	426995		10.78(5.03-15.10)		6641	
D 7 13C2 PFHxA										
315.00 > 270.00	1.944	1.939	0.005	0.743	4667197	2.60		104	38991	
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.866	4456653	2.61		104	25881	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.266	2.268	-0.002	1.000	4669591	2.38			10337	
363.00 > 169.00	2.266	2.268	-0.002	1.000	1879500		2.48(1.13-3.40)		13339	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	5333976	2.15			12311	
399.00 > 99.00	2.279	2.280	-0.001	1.000	1743366		3.06(1.50-4.49)		8734	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.871	5269906	2.50		106	31626	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.596	0.0	1.000	1338935	2.43			18477	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.992	789680	2.50		105	18411	
* 62 13C2-PFOA										
415.00 > 370.00	2.616	2.622	-0.006		4654102	2.50			23149	
D 14 13C4 PFOA										
417.00 > 372.00	2.616	2.622	-0.006	1.000	4445719	2.65		106	34079	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.616	2.623	-0.007	1.000	4746472	2.28			3473	
413.00 > 169.00	2.616	2.623	-0.007	1.000	2488390		1.91(0.84-2.52)		11918	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.624	2.629	-0.005	1.000	4682456	2.48			25730	
449.00 > 99.00	2.624	2.629	-0.005	1.000	1243527		3.77(1.94-5.82)		18997	
D 18 13C4 PFOS										
503.00 > 80.00	2.986	2.992	-0.006	1.141	3326395	2.50		104	21730	
20 Perfluorononanoic acid										
463.00 > 419.00	2.986	2.992	-0.006	1.000	3541195	2.38			11503	
463.00 > 169.00	2.986	2.992	-0.006	1.000	857998		4.13(1.90-5.69)		14234	
D 19 13C5 PFNA										
468.00 > 423.00	2.986	2.992	-0.006	1.141	3610875	2.66		106	30265	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.986	2.992	-0.006	1.000	3478480	2.23			1303	
499.00 > 99.00	2.986	2.992	-0.006	1.000	776619		4.48(2.31-6.93)		1713	
D 21 13C8 FOSA										
506.00 > 78.00	3.333	3.338	-0.005	1.274	4798887	2.56		102	18825	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.333	3.338	-0.005	1.000	4751952	2.52			20022	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.340	3.342	-0.002	1.000	1015315	2.53			30248	
D 26 M2-8:2FTS										
529.00 > 81.00	3.340	3.342	-0.002	1.277	791062	2.37		98.8	19021	
D 23 13C2 PFDA										
515.00 > 470.00	3.348	3.352	-0.004	1.279	2981067	2.54		102	25621	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.348	3.353	-0.005	1.000	2846152	2.46			9690	
513.00 > 169.00	3.348	3.353	-0.005	1.000	478669		5.95(2.36-7.09)		11554	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.500	3.507	-0.007	1.338	1505033	2.57		103	10745	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.507	3.513	-0.006	1.002	1594621	2.45			6933	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.664	3.666	-0.002	1.000	2288360	2.51			17426	
599.00 > 99.00	3.657	3.666	-0.009	0.998	746470		3.07(1.39-4.16)		13014	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.672	-0.001	1.403	1575202	2.66		106	6109	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.671	3.678	-0.007	1.000	2216145	2.29			8195	
563.00 > 169.00	3.680	3.678	0.002	1.002	476831		4.65(0.00-0.00)		10543	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.680	3.679	0.001	1.002	1502830	2.45			13272	
D 30 13C2 PFUnA										
565.00 > 520.00	3.671	3.679	-0.008	1.403	2345720	2.63		105	21260	
D 36 13C2 PFDoA										
615.00 > 570.00	3.972	3.979	-0.007	1.518	2483513	2.57		103	22479	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.981	3.979	0.002	1.002	2542144	2.50			11937	
613.00 > 169.00	3.972	3.979	-0.007	1.000	627983		4.05(2.13-6.40)		12905	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.242	4.242	0.0	1.000	2670293	2.31			9715	
663.00 > 169.00	4.242	4.242	0.0	1.000	815601		3.27(1.25-3.76)		15155	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.486	4.483	0.003	1.715	3093191	2.45		98.0	15682	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.486	4.483	0.003	1.000	752735	2.49			10868	
713.00 > 219.00	4.472	4.483	-0.011	0.997	479119		1.57(0.71-2.13)		10469	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.903	4.902	0.001	1.000	5096341	2.35			2824	
813.00 > 169.00	4.903	4.902	0.001	1.000	877298		5.81(2.86-8.58)		6676	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.903	4.902	0.001	1.874	5664702	2.52		101	13090	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.252	5.255	-0.003	1.000	6663291	2.79			1323	
913.00 > 169.00	5.252	5.255	-0.003	1.000	773529		8.61(0.00-0.00)		1859	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFCIC_FULL_00009 Amount Added: 1.00 Units: mL

Report Date: 18-Jan-2018 08:23:31 Chrom Revision: 2.2 08-Dec-2017 11:41:26

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_010.d

Injection Date: 17-Jan-2018 15:22:01 Instrument ID: A8_N

Lims ID: ICV Full

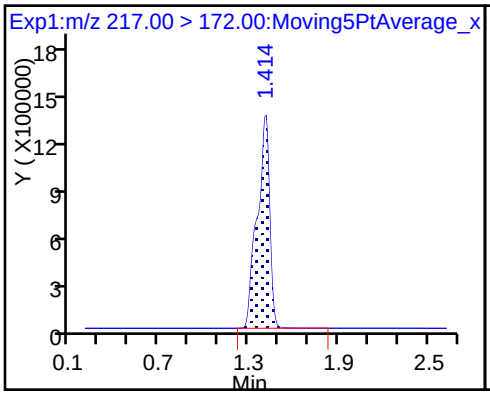
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 18 Worklist Smp#: 10

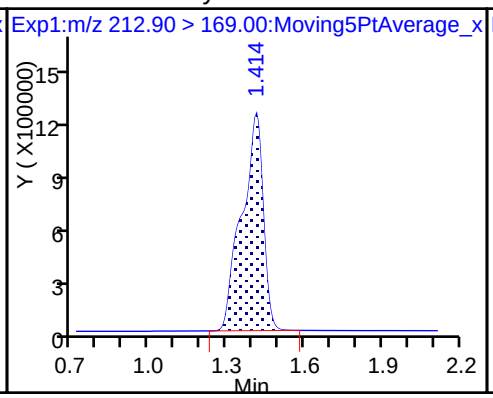
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

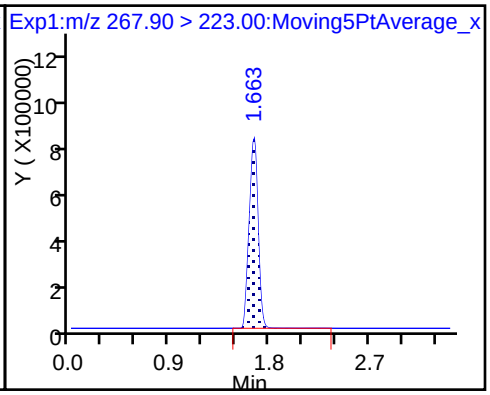
D 1 13C4 PFBA



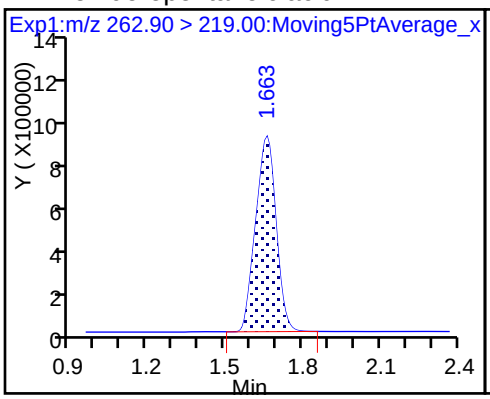
2 Perfluorobutyric acid



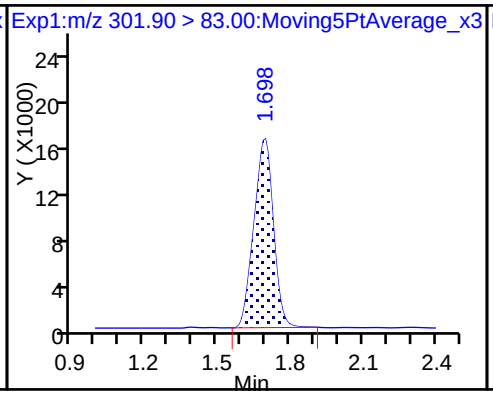
D 3 13C5-PFPeA



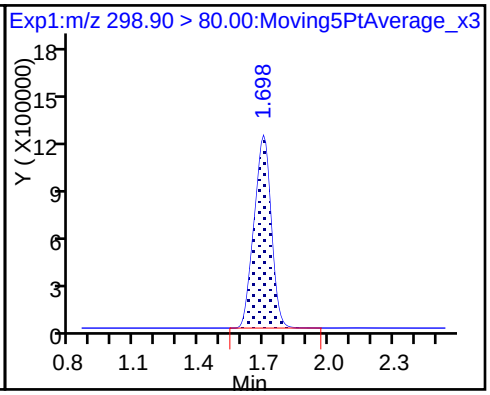
4 Perfluoropentanoic acid



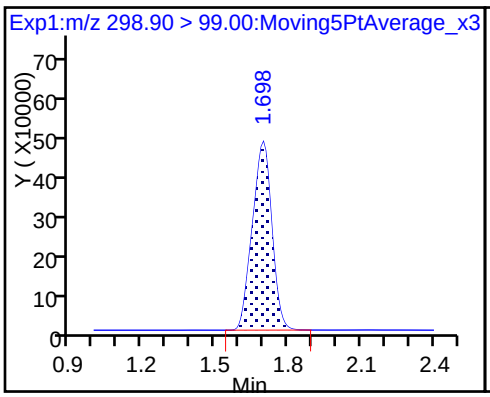
D 47 13C3-PFBS



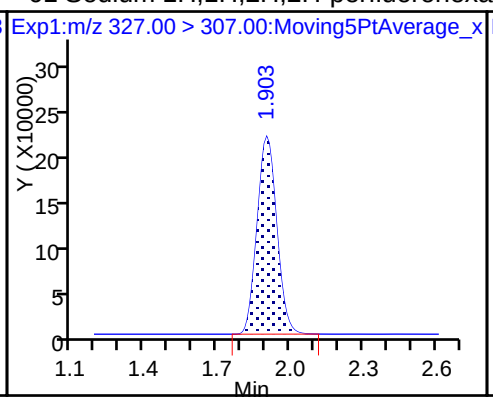
5 Perfluorobutanesulfonic acid



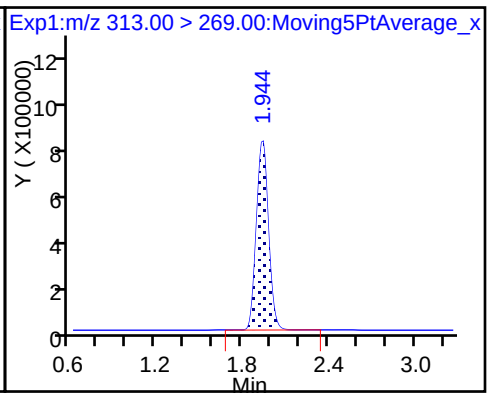
5 Perfluorobutanesulfonic acid



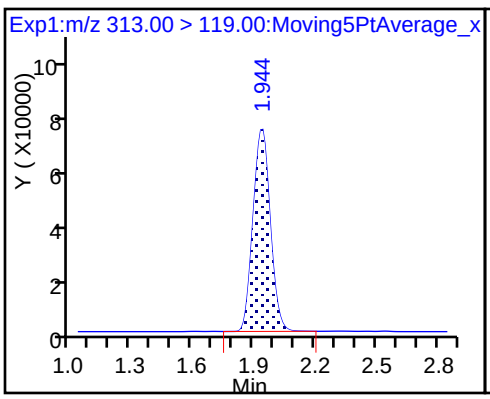
61 Sodium 1H,1H,2H,2H-perfluorohexane



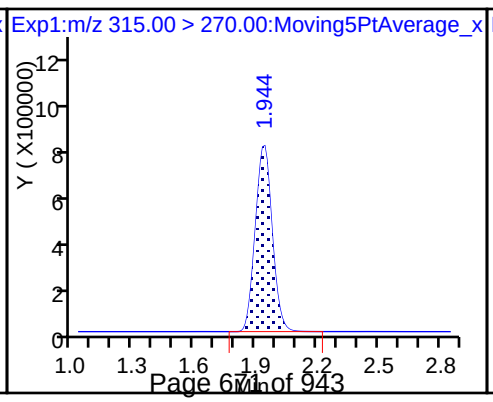
6 Perfluorohexanoic acid



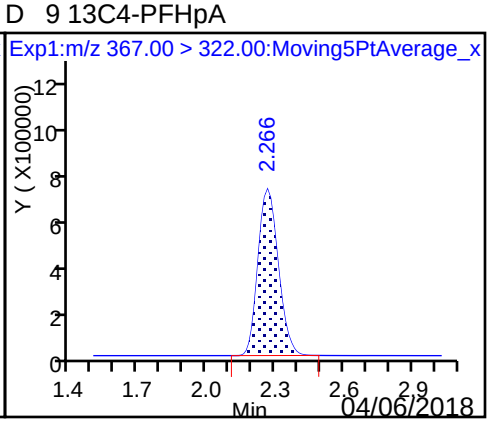
6 Perfluorohexanoic acid



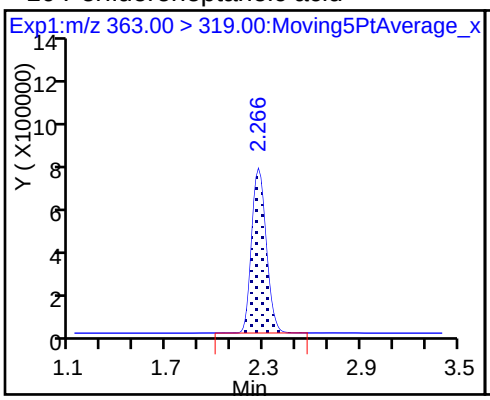
D 7 13C2 PFHxA



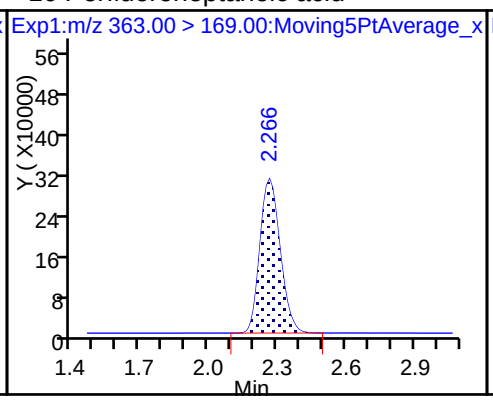
D 9 13C4-PFHpA



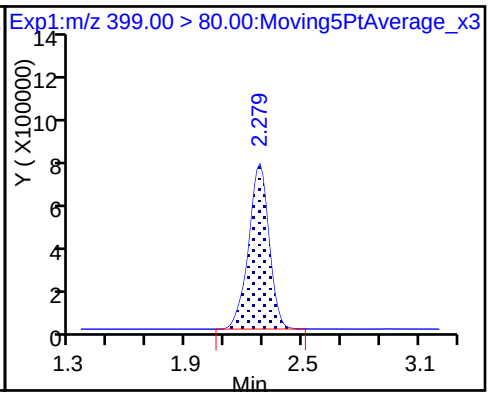
10 Perfluoroheptanoic acid



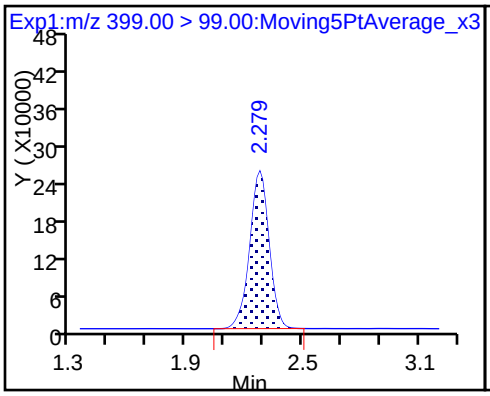
10 Perfluoroheptanoic acid



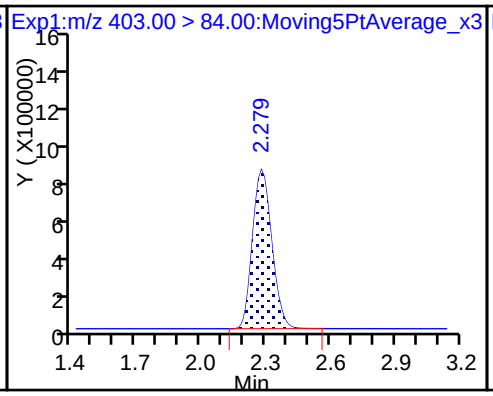
8 Perfluorohexanesulfonic acid



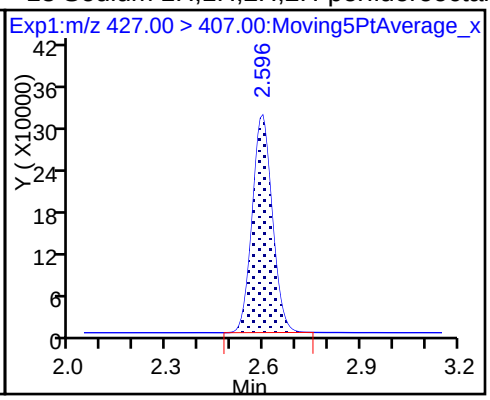
8 Perfluorohexanesulfonic acid



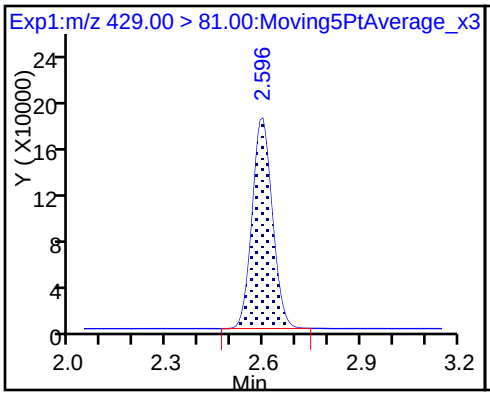
D 11 18O2 PFHxS



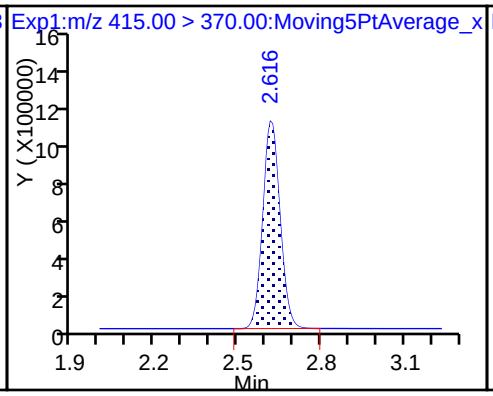
13 Sodium 1H,1H,2H,2H-perfluorooctane



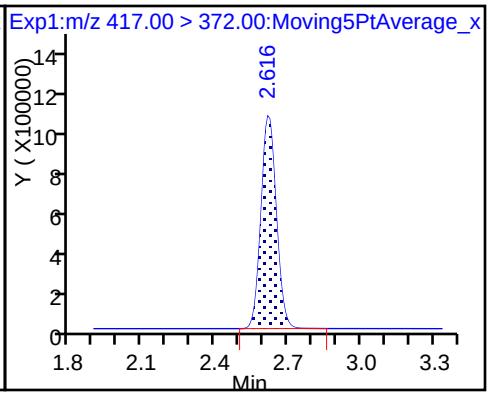
D 12 M2-6:2FTS



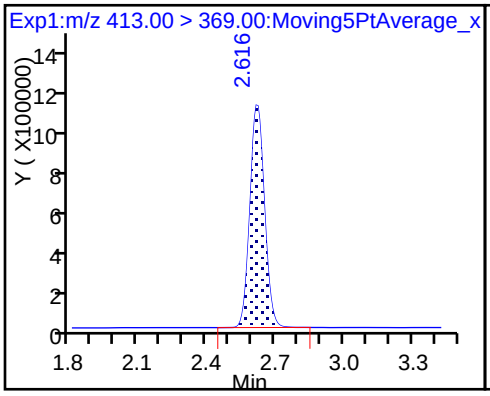
* 62 13C2-PFOA



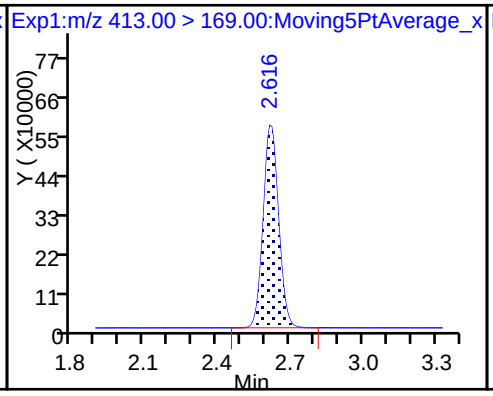
D 14 13C4 PFOA



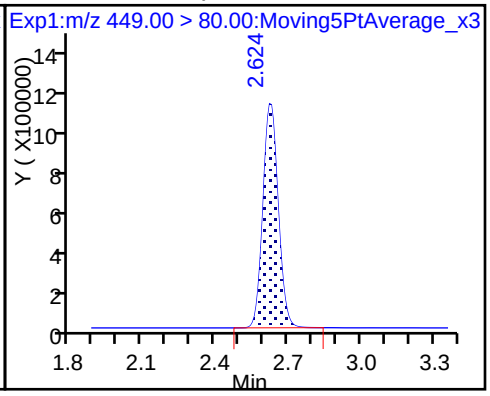
15 Perfluorooctanoic acid



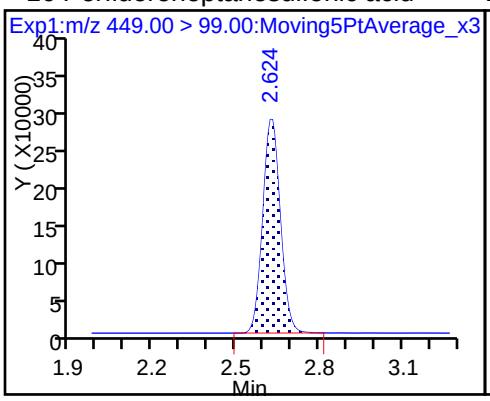
15 Perfluorooctanoic acid



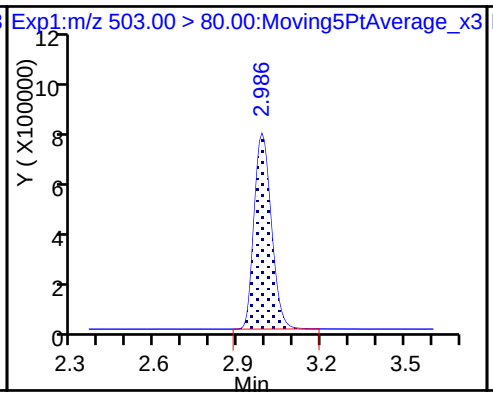
16 Perfluoroheptanesulfonic acid



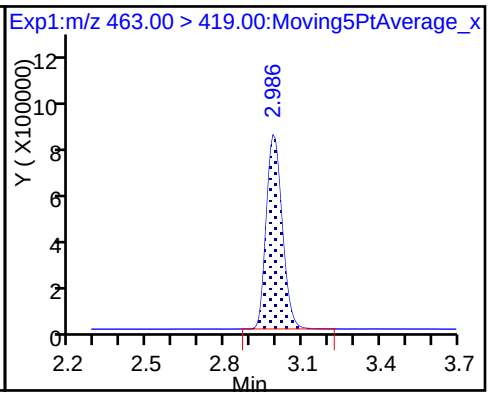
16 Perfluoroheptanesulfonic acid



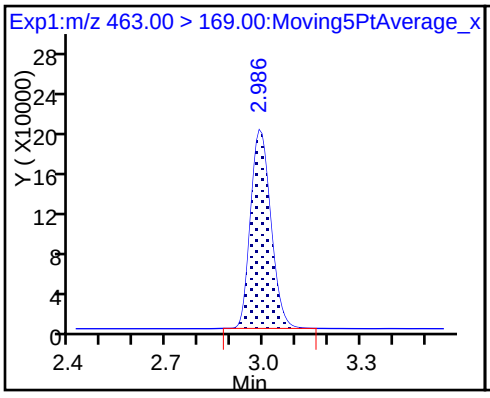
D 18 13C4 PFOS



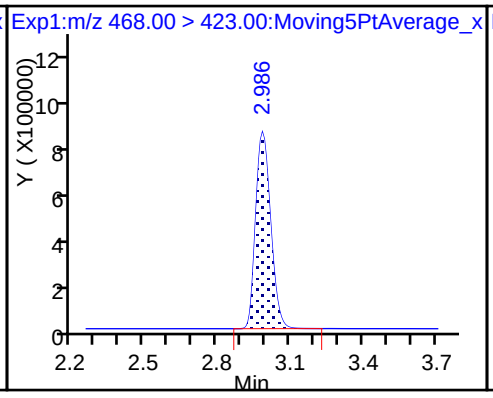
20 Perfluorononanoic acid



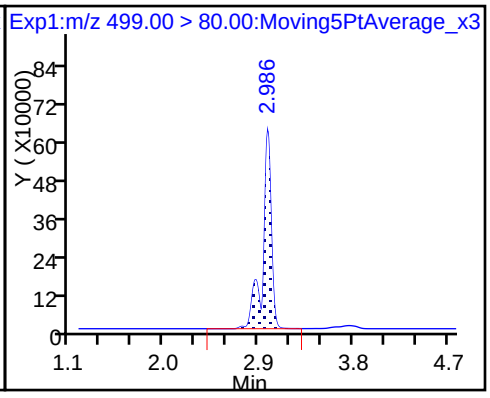
20 Perfluorononanoic acid



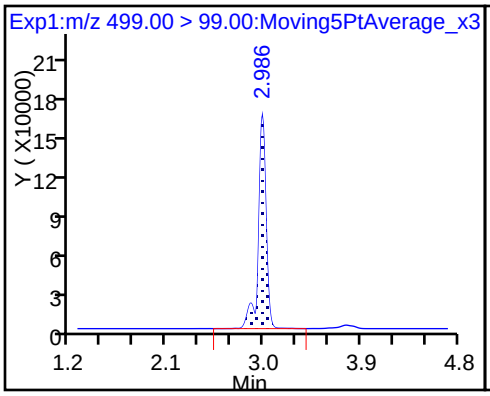
D 19 13C5 PFNA



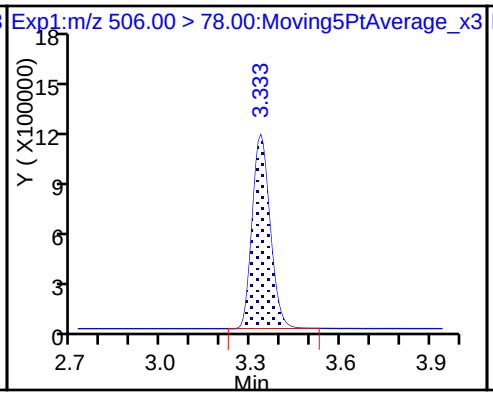
17 Perfluorooctane sulfonic acid



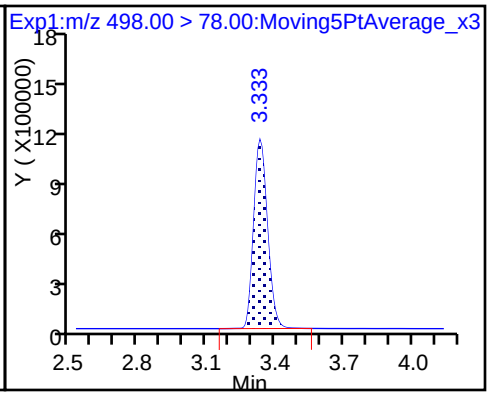
17 Perfluorooctane sulfonic acid



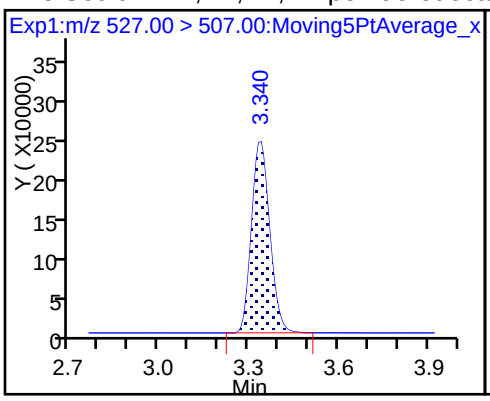
D 21 13C8 FOSA



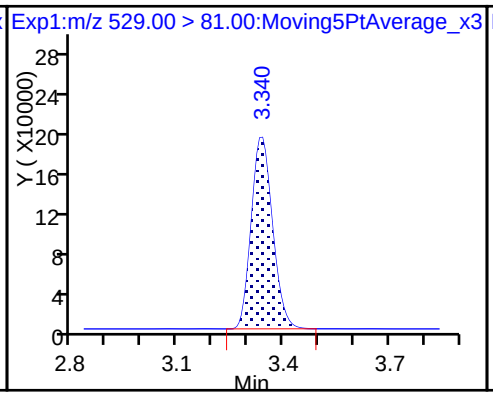
22 Perfluorooctane Sulfonamide



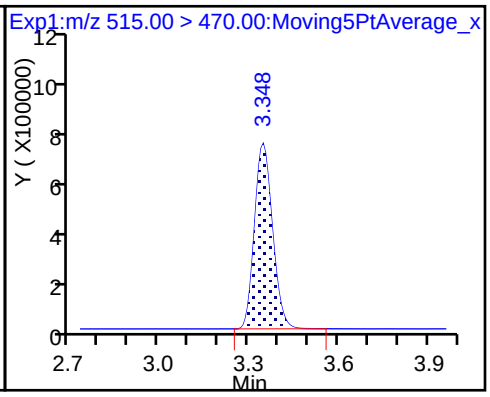
25 Sodium 1H,1H,2H,2H-perfluorodecane



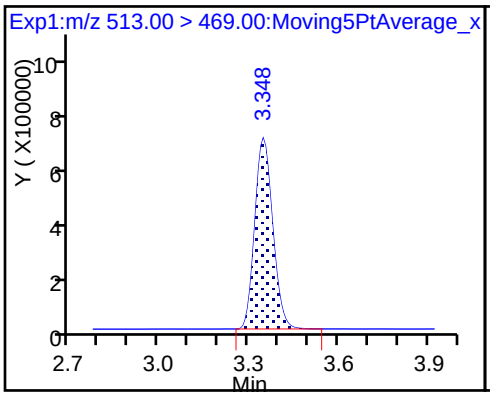
D 26 M2-8:2FTS



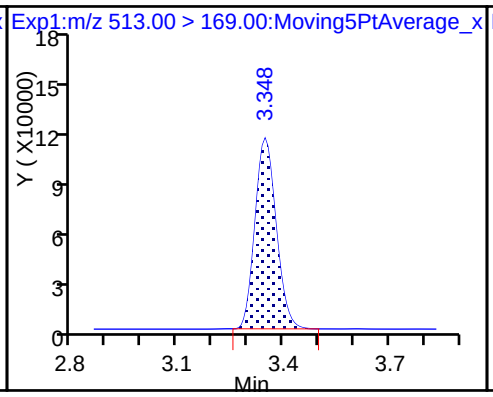
D 23 13C2 PFDA



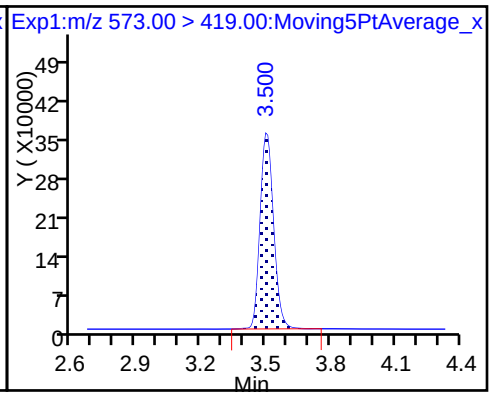
24 Perfluorodecanoic acid



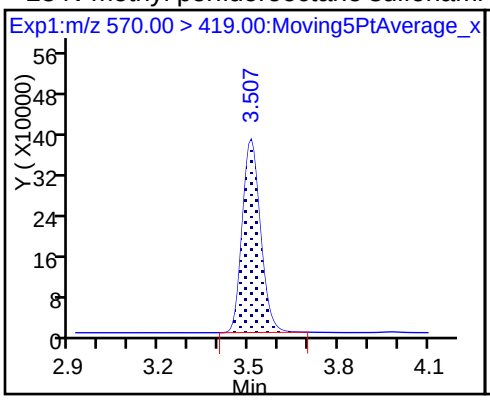
24 Perfluorodecanoic acid



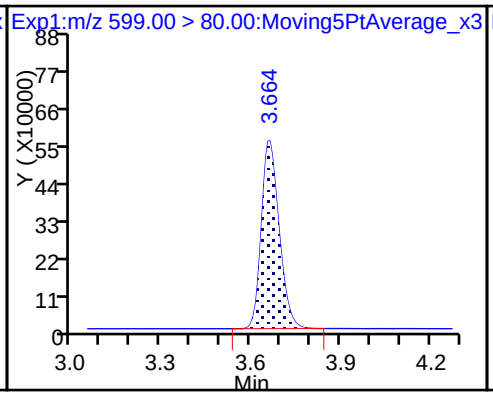
D 27 d3-NMeFOSAA



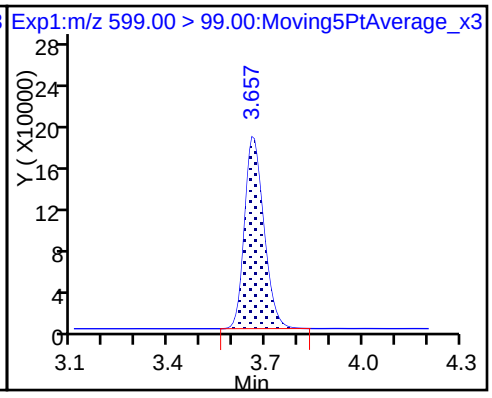
28 N-methyl perfluorooctane sulfonami



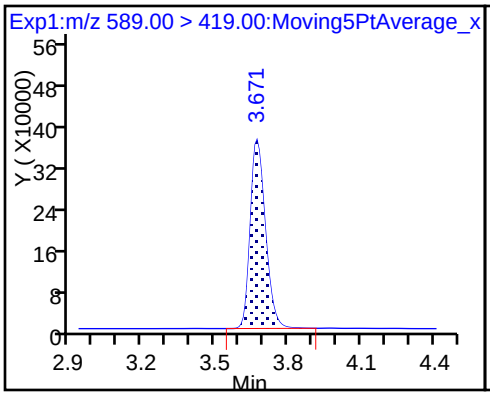
29 Perfluorodecane Sulfonic acid



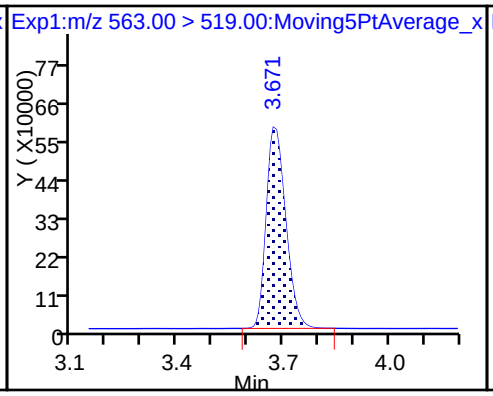
29 Perfluorodecane Sulfonic acid



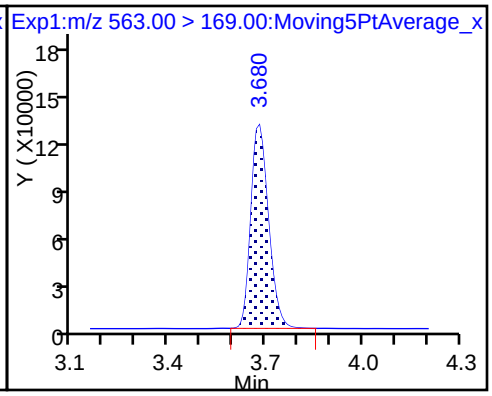
D 32 d5-NEtFOSAA



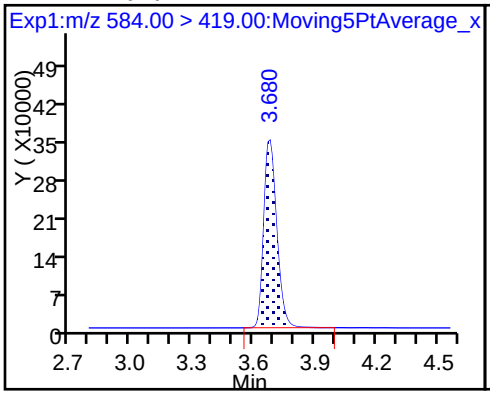
31 Perfluoroundecanoic acid



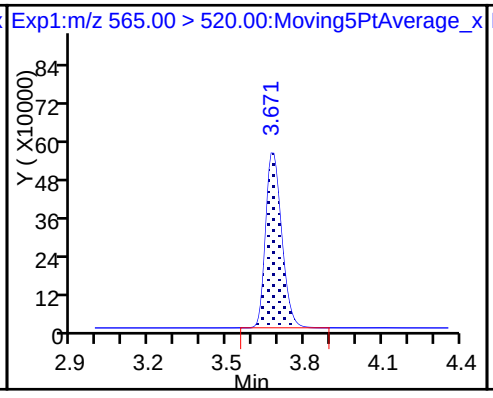
31 Perfluoroundecanoic acid



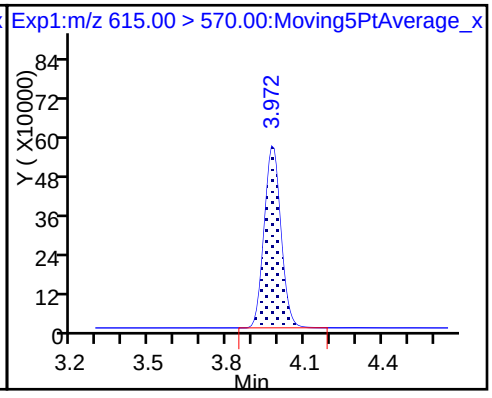
33 N-ethyl perfluorooctane sulfonamid



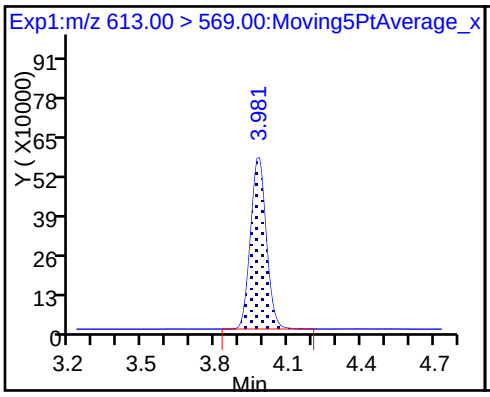
D 30 13C2 PFUnA



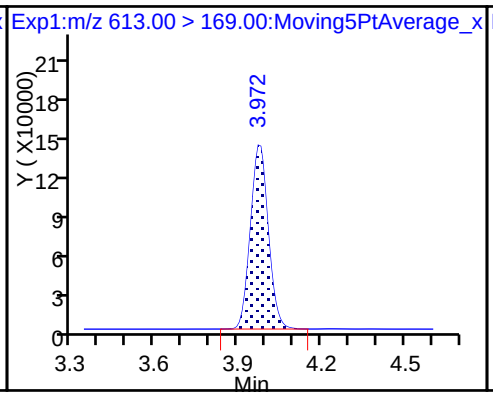
D 36 13C2 PFDoA



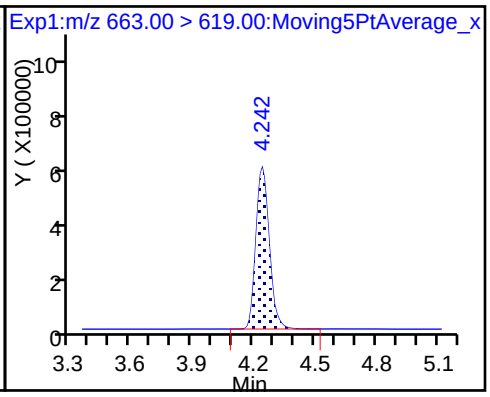
37 Perfluorododecanoic acid



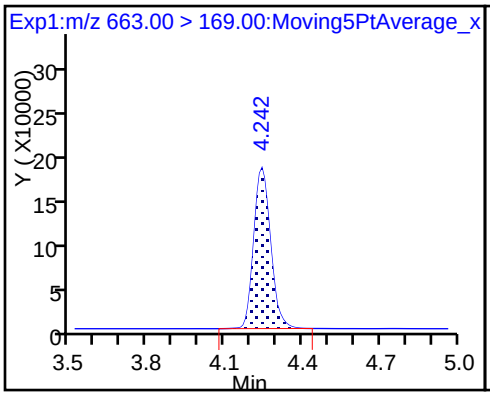
37 Perfluorododecanoic acid



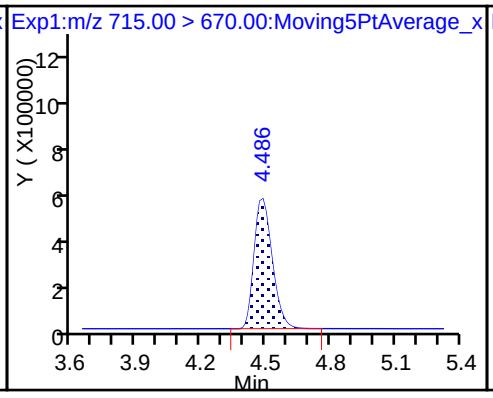
41 Perfluorotridecanoic acid



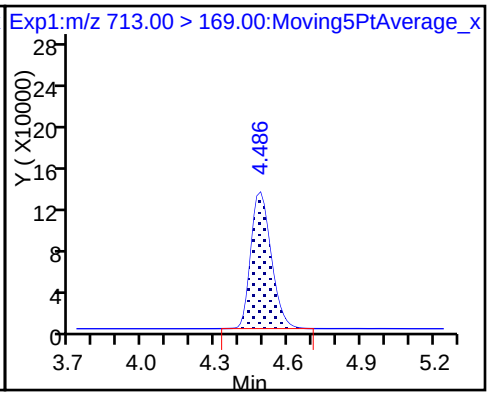
41 Perfluorotridecanoic acid



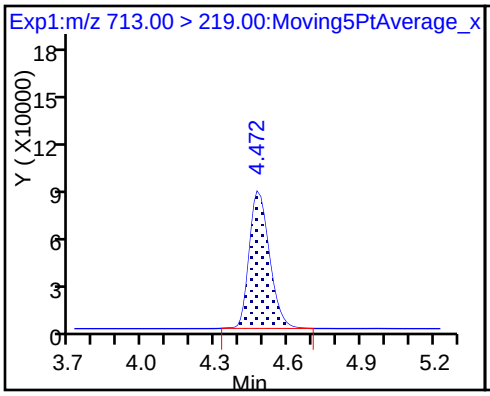
D 43 13C2-PFTeDA



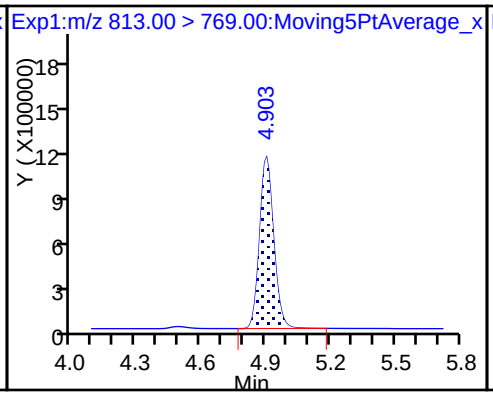
42 Perfluorotetradecanoic acid



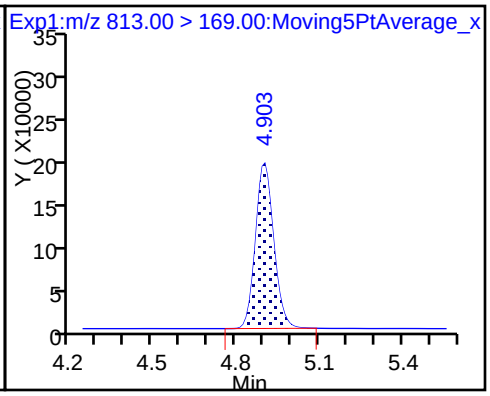
42 Perfluorotetradecanoic acid



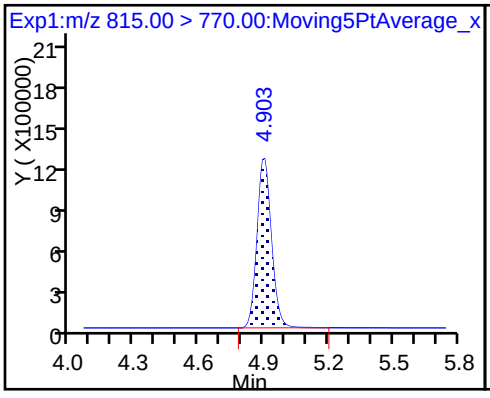
45 Perfluorohexadecanoic acid



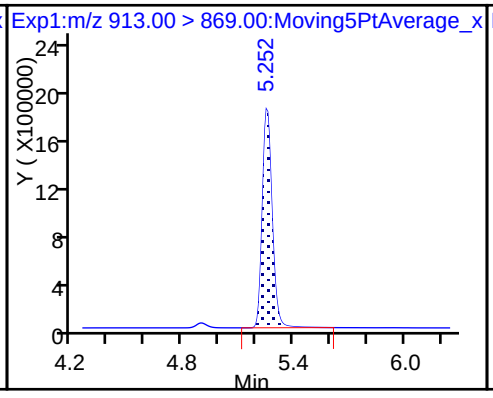
45 Perfluorohexadecanoic acid



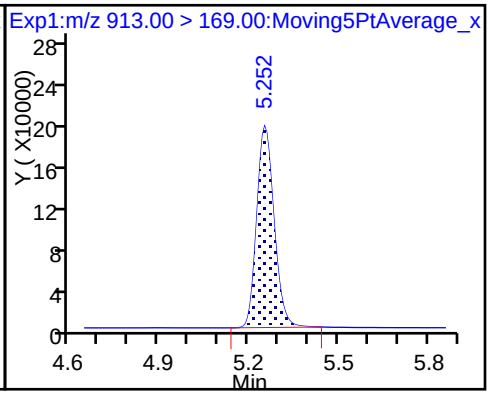
D 44 13C2-PFHxDA



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCVL 320-205637/1 Calibration Date: 01/25/2018 10:13

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.25LLAA_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	0.9343	0.8860		0.0474	0.0500	-5.2	50.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.201		0.0510	0.0500	1.9	50.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	72.52		0.0415	0.0442	-6.1	50.0
4:2 FTS	AveID	13.89	14.82		0.498	0.467	6.6	50.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	1.053		0.0508	0.0500	1.6	50.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	0.9814		0.0446	0.0500	-10.7	50.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.124		0.0459	0.0455	1.0	50.0
6:2FTS	AveID	1.655	1.640		0.470	0.474	-0.9	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.180		0.0504	0.0500	0.7	50.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.354		0.0476	0.0476	-0.0	50.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.113		0.0461	0.0464	-0.6	50.0
Perfluorononanoic acid (PFNA)	AveID	1.032	0.9803		0.0475	0.0500	-5.0	50.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	0.8933		0.0455	0.0500	-9.1	50.0
8:2FTS	AveID	1.217	1.114		0.438	0.479	-8.5	50.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9366		0.0483	0.0500	-3.5	50.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	0.9014		0.417	0.500	-16.6	50.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6515		0.0479	0.0482	-0.5	50.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.8352		0.429	0.500	-14.2	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.8912		0.0432	0.0500	-13.7	50.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.020		0.0498	0.0500	-0.5	50.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.257		0.0541	0.0500	8.2	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2395		0.0491	0.0500	-1.9	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		1.303		0.0494	0.0500	-1.1	50.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	0.9569		0.0454	0.0500	-9.2	50.0
13C4 PFBA	Ave	1.512	1.491		2.46	2.50	-1.4	50.0
13C5-PFPeA	Ave	0.8956	0.8920		2.49	2.50	-0.4	50.0
13C3-PFBS	Ave	0.0198	0.0196		2.30	2.33	-1.3	50.0
13C2 PFHxA	Ave	0.9649	0.9696		2.51	2.50	0.5	50.0
13C4-PFHpA	Ave	0.9187	0.9522		2.59	2.50	3.6	50.0
18O2 PFHxS	Ave	1.131	1.148		2.40	2.37	1.5	50.0
M2-6:2FTS	Ave	0.1699	0.2072		2.90	2.38	22.0	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCVL 320-205637/1 Calibration Date: 01/25/2018 10:13

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.25LLAA_006.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.9100		2.53	2.50	1.1	50.0
13C4 PFOS	Ave	0.7158	0.7273		2.43	2.39	1.6	50.0
13C5 PFNA	Ave	0.7300	0.7590		2.60	2.50	4.0	50.0
13C8 FOSA	Ave	1.007	1.027		2.55	2.50	2.0	50.0
M2-8:2FTS	Ave	0.1795	0.2165		2.89	2.40	20.6	50.0
13C2 PFDA	Ave	0.6306	0.6582		2.61	2.50	4.4	50.0
d3-NMeFOSAA	Ave	0.3147	0.3575		2.84	2.50	13.6	50.0
d5-NEtFOSAA	Ave	0.3182	0.3514		2.76	2.50	10.4	50.0
13C2 PFUnA	Ave	0.4783	0.5129		2.68	2.50	7.2	50.0
13C2 PFDoA	Ave	0.5192	0.5296		2.55	2.50	2.0	50.0
13C2-PFTeDA	Ave	0.6785	0.6446		2.38	2.50	-5.0	50.0
13C2-PFHxDA	Ave	1.209	1.136		2.35	2.50	-6.0	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180125-53340.b\2018.01.25LLAA_006.d
Lims ID: CCVL
Client ID:
Sample Type: CCVL
Inject. Date: 25-Jan-2018 10:13:29 ALS Bottle#: 21 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCVL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180125-53340.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 25-Jan-2018 14:42:44 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK023

First Level Reviewer: roycea Date: 25-Jan-2018 14:42:34

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	1.412	1.411	0.001	0.538	7584828	2.46		98.6	23627	
2 Perfluorobutyric acid										M
212.90 > 169.00	1.412	1.413	-0.001	1.000	134407	0.0474		94.8	18.7	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.659	1.659	0.0	0.632	4539017	2.49		99.6	38989	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.659	1.662	-0.003	1.000	108996	0.0510		102	66.3	
D 47 13C3-PFBS										
301.90 > 83.00	1.694	1.695	-0.001	0.645	92605	2.30		98.7	2903	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.703	1.697	0.006	1.005	127672	0.0415		93.9	394	
298.90 > 99.00	1.694	1.697	-0.003	1.000	53276		2.40(1.25-3.74)		235	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.908	1.903	0.005	1.000	275612	0.4980		107	12757	
D 60 M2-4:2FTS										
329.00 > 81.00	1.908	1.903	0.005	0.727	637758	NC			6783	
D 7 13C2 PFHxA										
315.00 > 270.00	1.939	1.939	0.0	0.738	4933688	2.51		100	45964	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.949	1.939	0.010	1.005	103898	0.0508		102	217	
313.00 > 119.00	1.949	1.939	0.010	1.005	9953		10.44(5.03-15.10)		179	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.866	4845095	2.59		104	26582	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.273	2.268	0.005	1.000	95100	0.0446		89.3	125	
363.00 > 169.00	2.273	2.268	0.005	1.000	44306		2.15(1.13-3.40)		294	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.286	2.280	0.006	1.000	119488	0.0459		101	1057	
399.00 > 99.00	2.286	2.280	0.006	1.000	42592		2.81(1.50-4.49)		251	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.871	5524730	2.40		101	23064	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.604	2.596	0.008	1.000	327836	0.4697		99.1	10935	
D 12 M2-6:2FTS										
429.00 > 81.00	2.604	2.597	0.007	0.992	1001604	2.90		122	21797	
D 14 13C4 PFOA										
417.00 > 372.00	2.626	2.622	0.004	1.000	4630666	2.53		101	27201	
* 62 13C2-PFOA										
415.00 > 370.00	2.626	2.622	0.004		5088447	2.50			33406	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.626	2.623	0.003	1.000	109327	0.0504		101	46.8	
413.00 > 169.00	2.626	2.623	0.003	1.000	53179		2.06(0.84-2.52)		492	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.633	2.629	0.004	1.000	95413	0.0476		100.0	2272	
449.00 > 99.00	2.640	2.629	0.011	1.003	25879		3.69(1.94-5.82)		569	
D 19 13C5 PFNA										
468.00 > 423.00	2.997	2.992	0.005	1.141	3862309	2.60		104	29418	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.997	2.992	0.005	1.000	76431	0.0461		99.4	204	
499.00 > 99.00	3.005	2.992	0.012	1.003	17012		4.49(2.31-6.93)		136	
D 18 13C4 PFOS										
503.00 > 80.00	2.997	2.992	0.005	1.141	3538147	2.43		102	21416	
20 Perfluorononanoic acid										
463.00 > 419.00	3.005	2.992	0.012	1.003	75724	0.0475		95.0	189	
463.00 > 169.00	3.005	2.992	0.012	1.003	19492		3.88(1.90-5.69)		390	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.343	3.338	0.005	1.002	93357	0.0455		90.9	2301	
D 21 13C8 FOSA										
506.00 > 78.00	3.335	3.338	-0.003	1.270	5225276	2.55		102	20728	
D 26 M2-8:2FTS										
529.00 > 81.00	3.350	3.342	0.008	1.276	1055447	2.89		121	15314	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.350	3.342	0.008	1.000	235120	0.4384		91.5	5748	
D 23 13C2 PFDA										
515.00 > 470.00	3.358	3.352	0.006	1.279	3349138	2.61		104	21688	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.366	3.353	0.013	1.002	62738	0.0483		96.5	330	
513.00 > 169.00	3.358	3.353	0.005	1.000	12145		5.17(2.36-7.09)		498	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.518	3.507	0.011	1.340	1819199	2.84		114	9852	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.518	3.513	0.005	1.000	327972	0.4172		83.4	2227	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.673	3.666	0.007	1.000	46485	0.0479		99.5	1431	
599.00 > 99.00	3.673	3.666	0.007	1.000	14949		3.11(1.39-4.16)		758	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.682	3.672	0.010	1.402	1787898	2.76		110	8457	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.690	3.678	0.012	1.000	46519	0.0432		86.3	171	
563.00 > 169.00	3.699	3.678	0.021	1.002	11565		4.02(0.00-0.00)		556	
D 30 13C2 PFUnA										
565.00 > 520.00	3.690	3.679	0.011	1.406	2609788	2.68		107	28303	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.690	3.679	0.011	1.002	298666	0.4288		85.8	3681	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.991	3.979	0.012	1.000	54966	0.0498		99.5	204	
613.00 > 169.00	3.991	3.979	0.012	1.000	10804		5.09(2.13-6.40)		645	
D 36 13C2 PFDoA										
615.00 > 570.00	3.991	3.979	0.012	1.520	2694701	2.55		102	21263	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.253	4.242	0.011	1.000	67741	0.0541		108	165	
663.00 > 169.00	4.253	4.242	0.011	1.000	20140		3.36(1.25-3.76)		941	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.487	4.483	0.004	1.000	15712	0.0491		98.1	544	
713.00 > 219.00	4.487	4.483	0.004	1.000	8985		1.75(0.71-2.13)		395	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.487	4.483	0.004	1.709	3280121	2.38		95.0	20978	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.905	4.902	0.003	1.868	5780476	2.35		94.0	18237	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.913	4.902	0.011	1.002	150689	0.0494		98.9	82.2	
813.00 > 169.00	4.905	4.902	0.003	1.000	26736		5.64(2.86-8.58)		866	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.268	5.255	0.013	1.000	110628	0.0454		90.8	29.1	
913.00 > 169.00	5.268	5.255	0.013	1.000	13926		7.94(0.00-0.00)		245	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Reagents:

LCPFC_CCVL_00002 Amount Added: 1.00 Units: mL

Report Date: 25-Jan-2018 14:42:45 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180125-53340.b\2018.01.25LLAA_006.d

Injection Date: 25-Jan-2018 10:13:29 Instrument ID: A8_N

Lims ID: CCVL

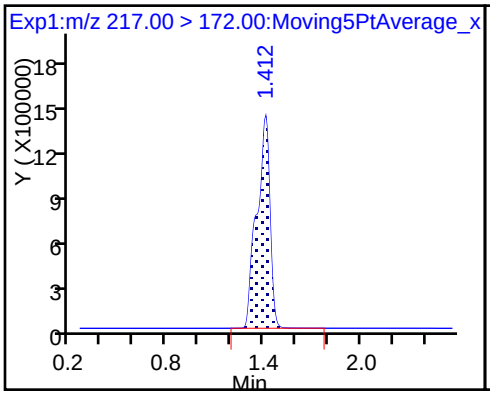
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 21 Worklist Smp#: 1

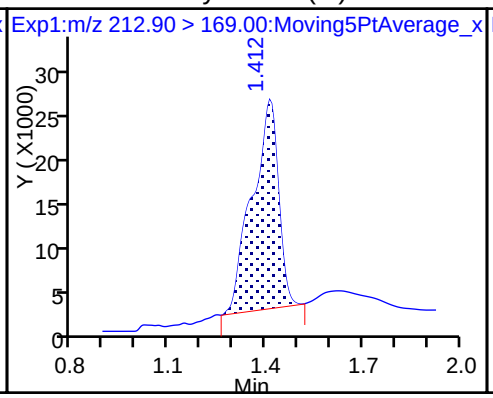
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

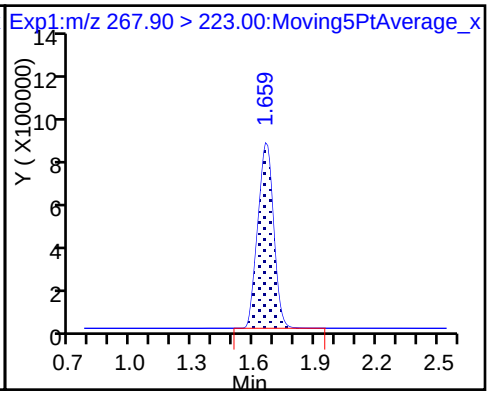
D 1 13C4 PFBA



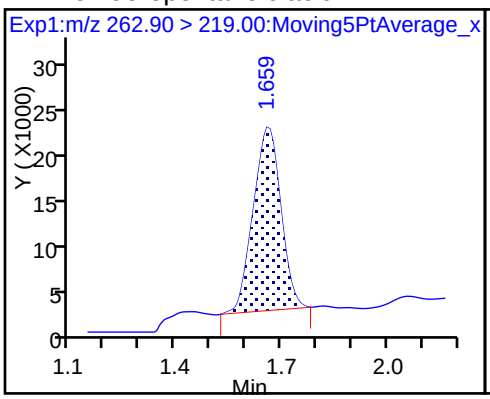
2 Perfluorobutyric acid (M)



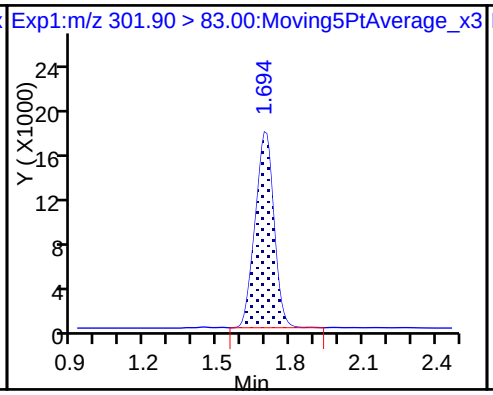
D 3 13C5-PFPeA



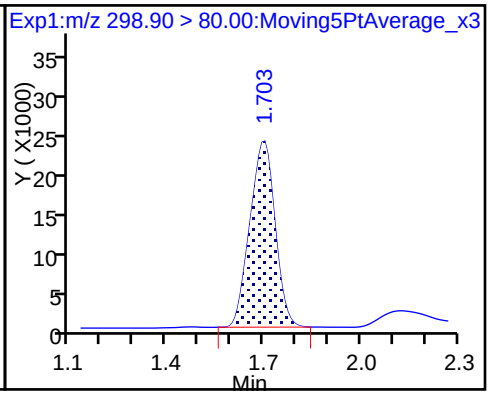
4 Perfluoropentanoic acid



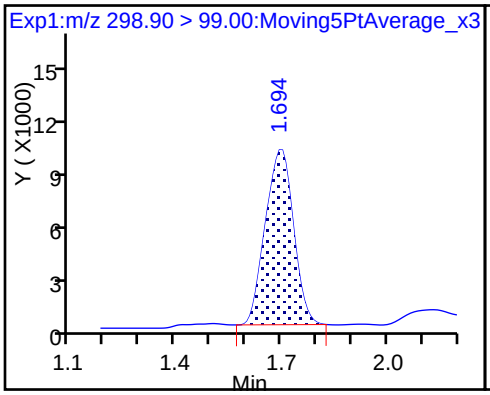
D 47 13C3-PFBS



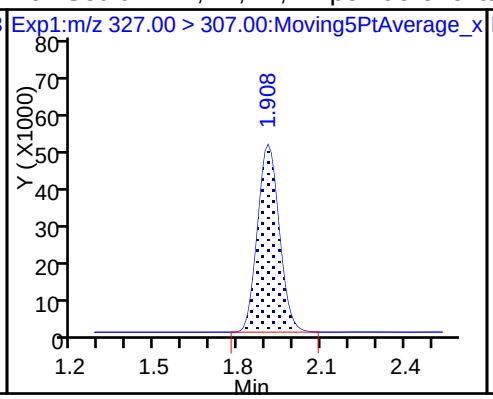
5 Perfluorobutanesulfonic acid



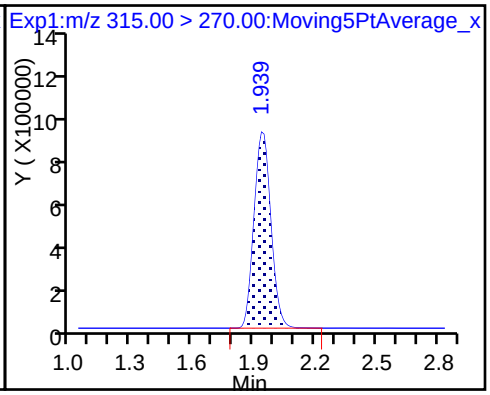
5 Perfluorobutanesulfonic acid



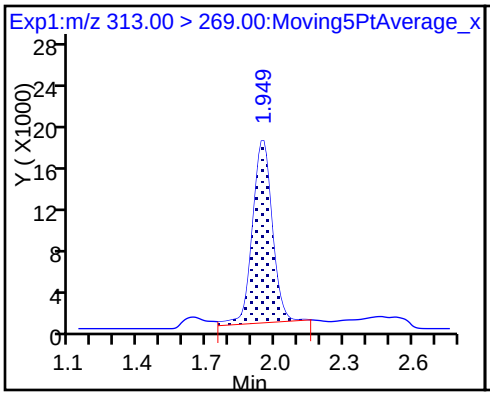
61 Sodium 1H,1H,2H,2H-perfluorohexa



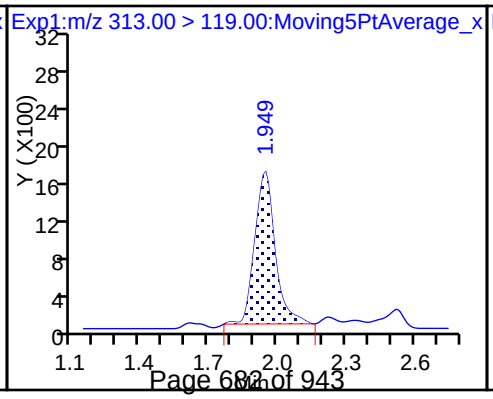
D 7 13C2 PFHxA



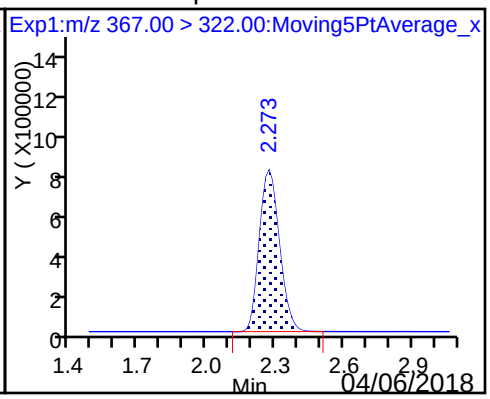
6 Perfluorohexanoic acid



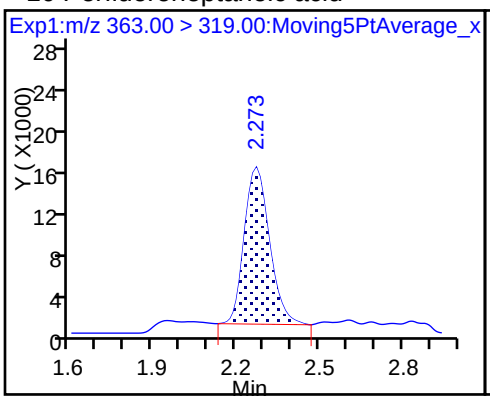
6 Perfluorohexanoic acid



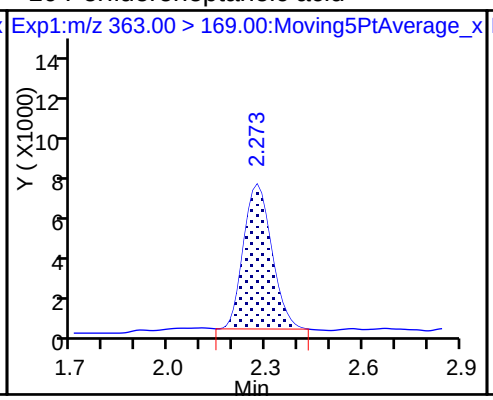
D 9 13C4-PFHpA



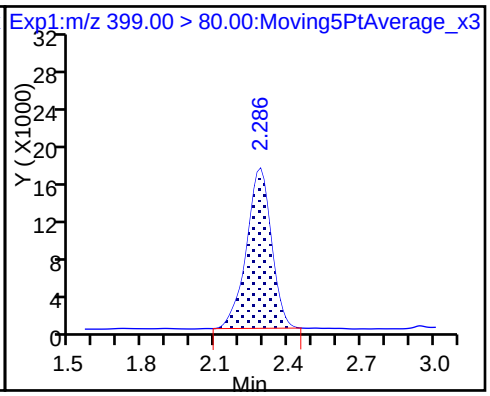
10 Perfluoroheptanoic acid



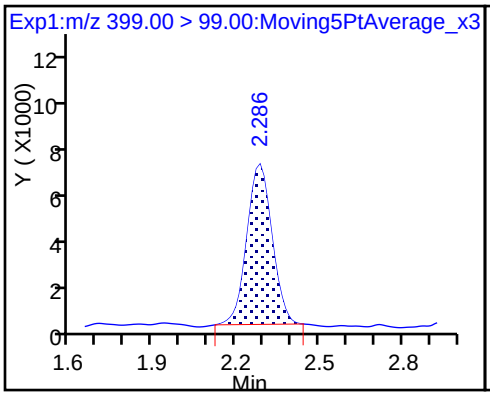
10 Perfluoroheptanoic acid



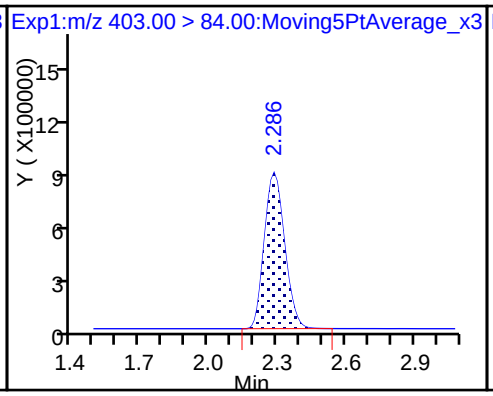
8 Perfluorohexanesulfonic acid



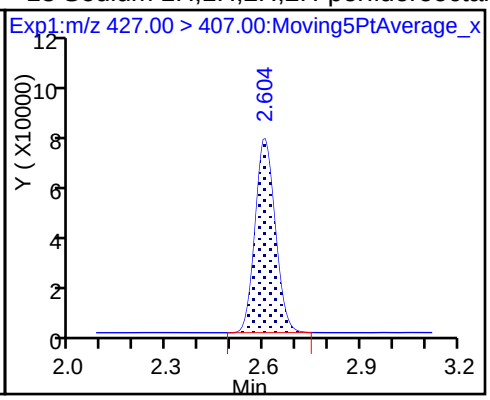
8 Perfluorohexanesulfonic acid



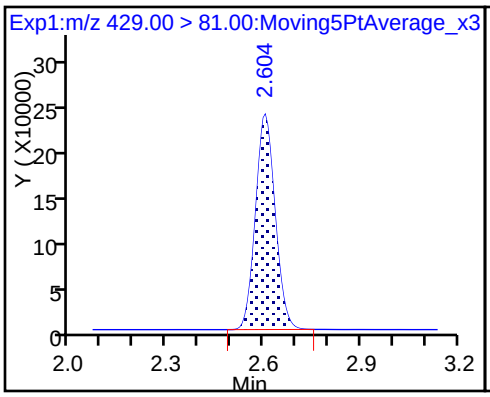
D 11 18O2 PFHxS



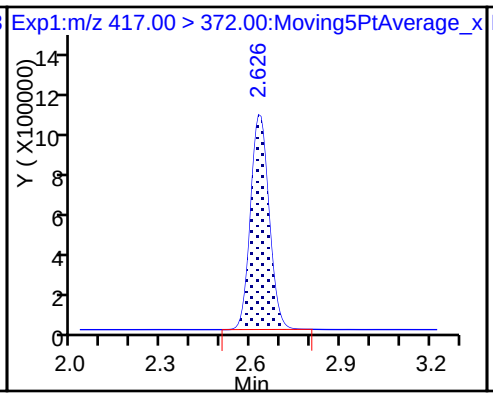
13 Sodium 1H,1H,2H,2H-perfluorooctane



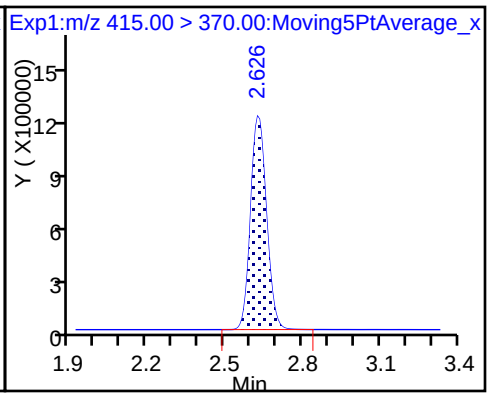
D 12 M2-6:2FTS



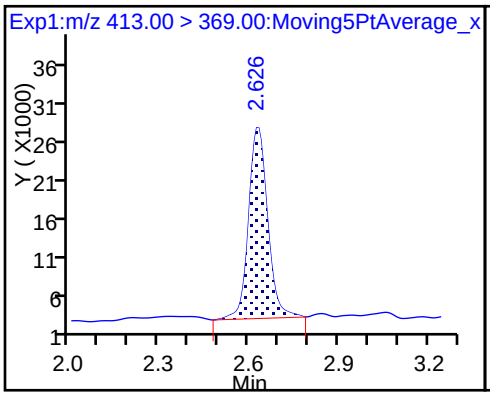
D 14 13C4 PFOA



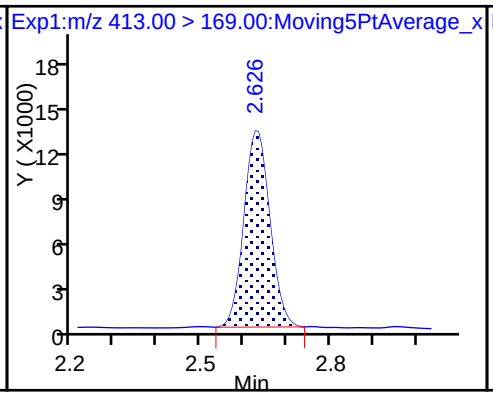
* 62 13C2-PFOA



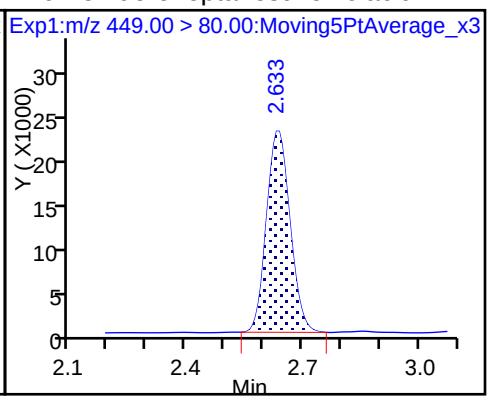
15 Perfluorooctanoic acid



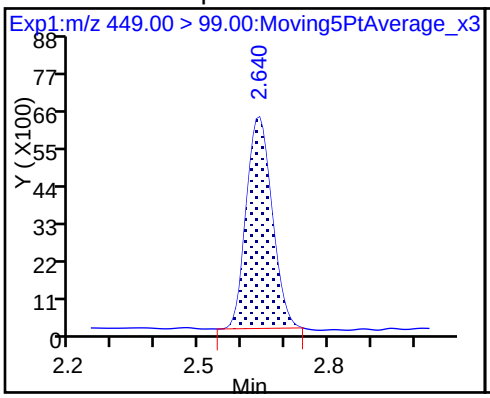
15 Perfluorooctanoic acid



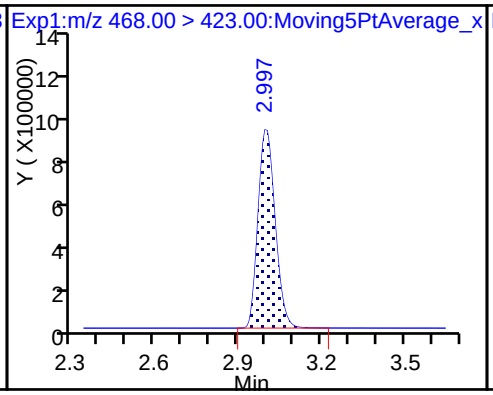
16 Perfluoroheptanesulfonic acid



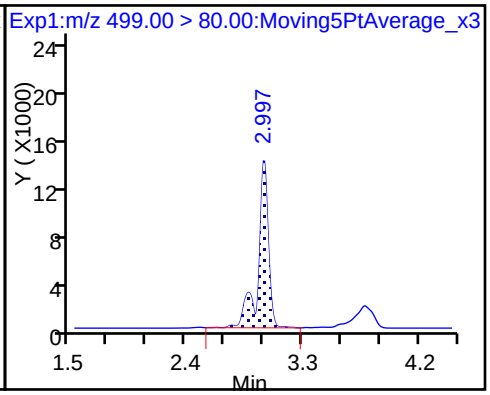
16 Perfluoroheptanesulfonic acid



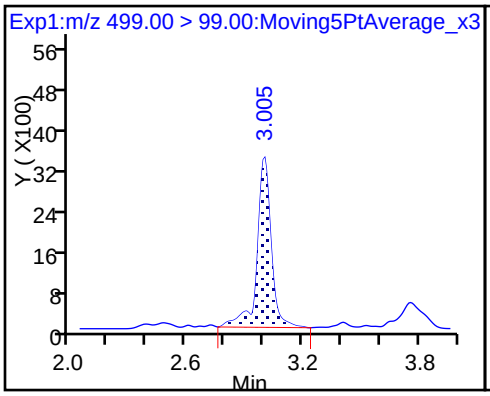
D 19 13C5 PFNA



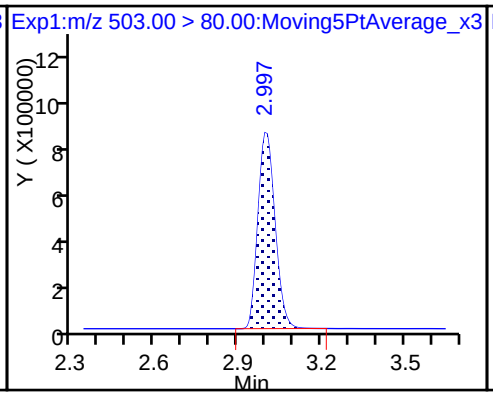
17 Perfluorooctane sulfonic acid



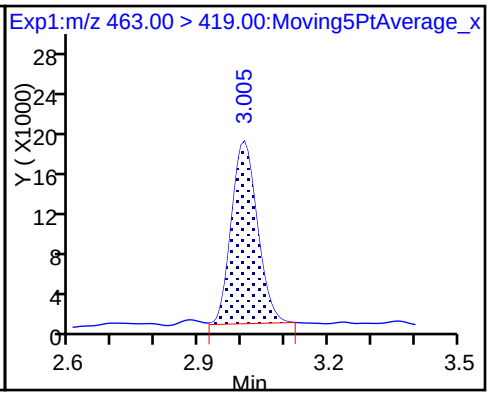
17 Perfluorooctane sulfonic acid



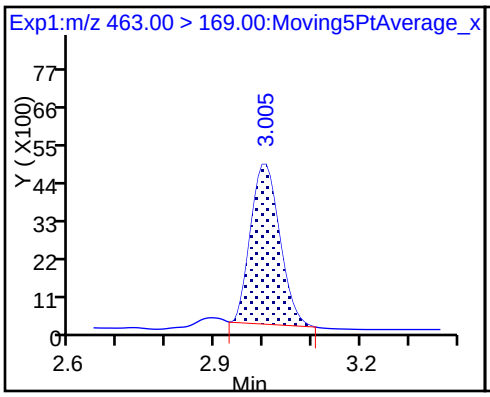
D 18 13C4 PFOS



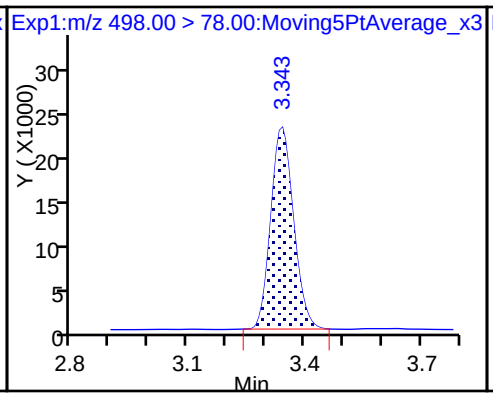
20 Perfluorononanoic acid



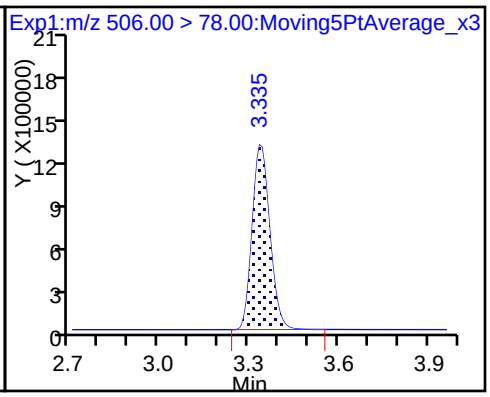
20 Perfluorononanoic acid



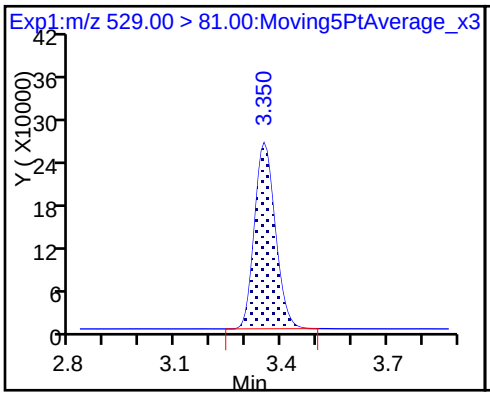
22 Perfluorooctane Sulfonamide



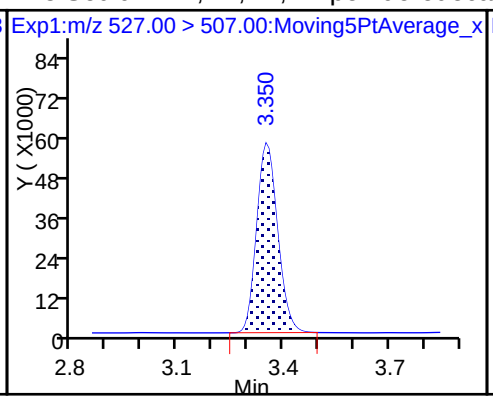
D 21 13C8 FOSA



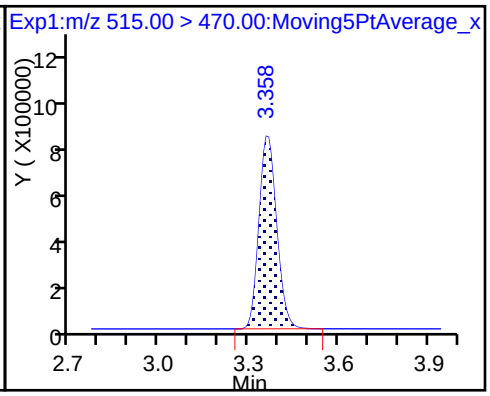
D 26 M2-8:2FTS



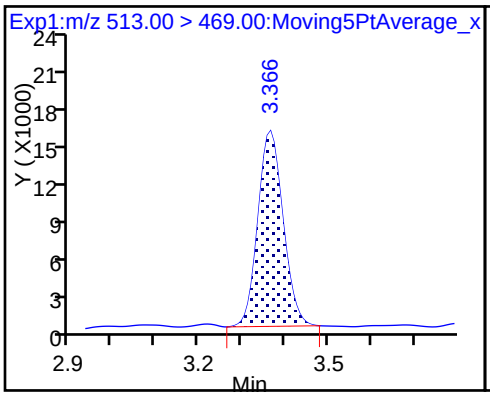
25 Sodium 1H,1H,2H,2H-perfluorodecane



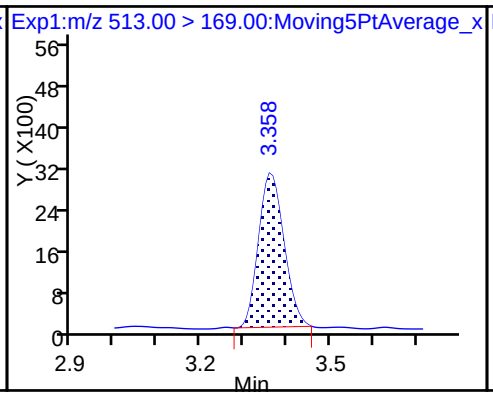
D 23 13C2 PFDA



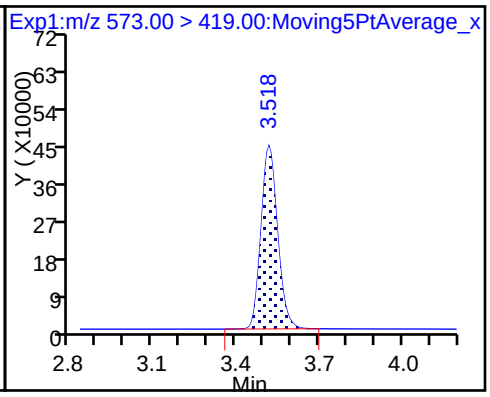
24 Perfluorodecanoic acid



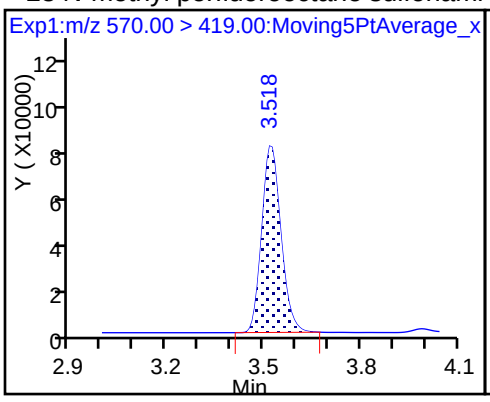
24 Perfluorodecanoic acid



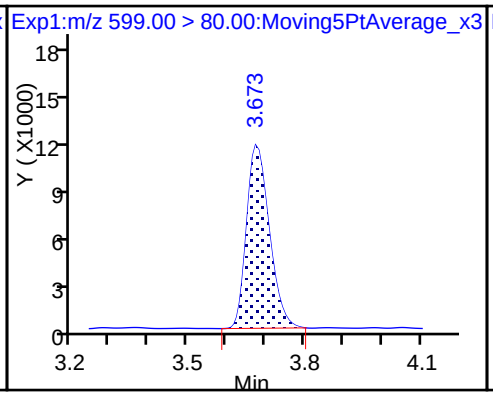
D 27 d3-NMeFOSAA



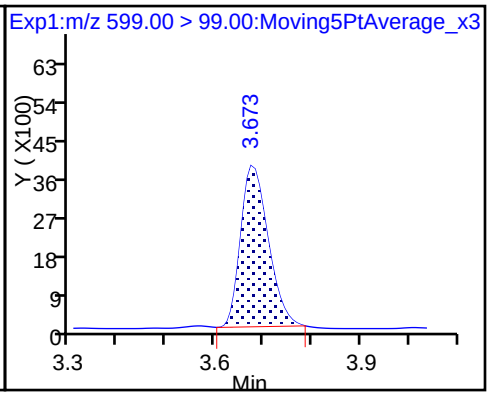
28 N-methyl perfluorooctane sulfonami



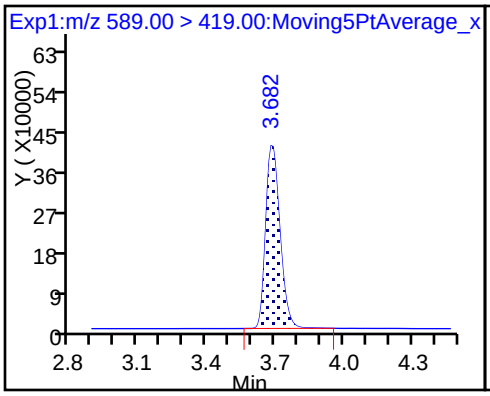
29 Perfluorodecane Sulfonic acid



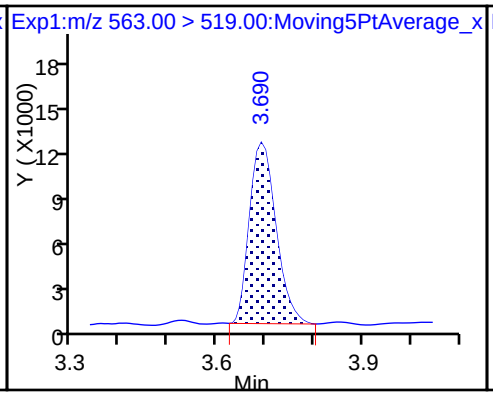
29 Perfluorodecane Sulfonic acid



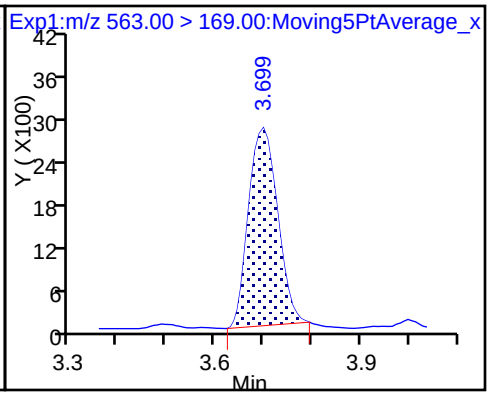
D 32 d5-NEtFOSAA



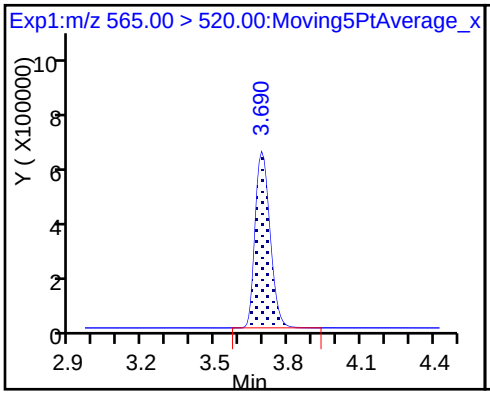
31 Perfluoroundecanoic acid



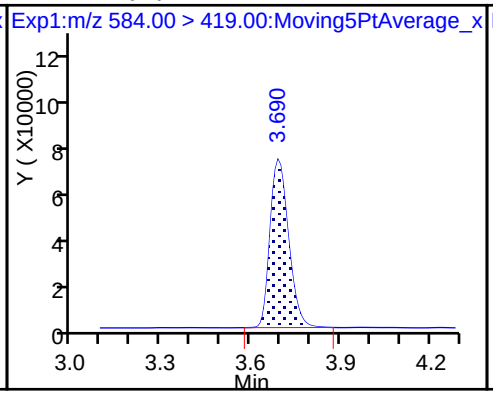
31 Perfluoroundecanoic acid



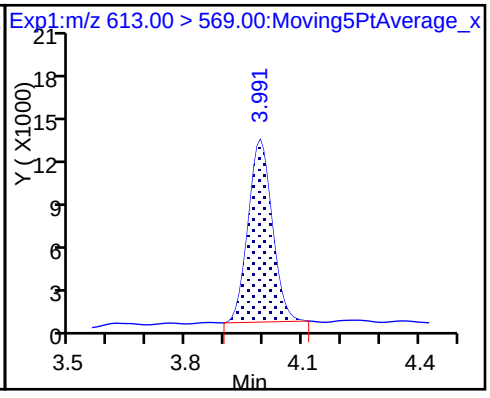
D 30 13C2 PFUnA



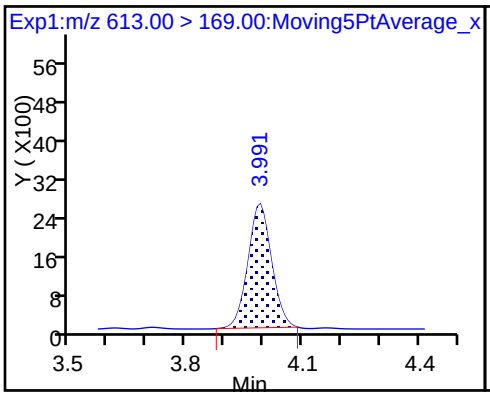
33 N-ethyl perfluorooctane sulfonamid



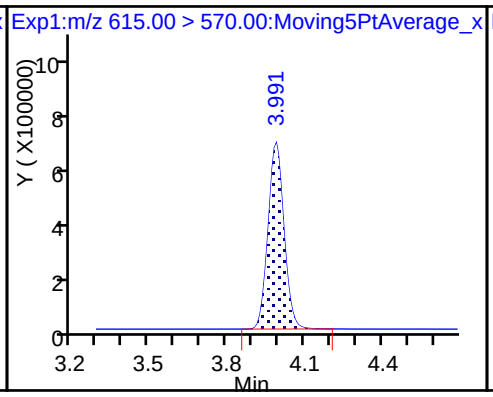
37 Perfluorododecanoic acid



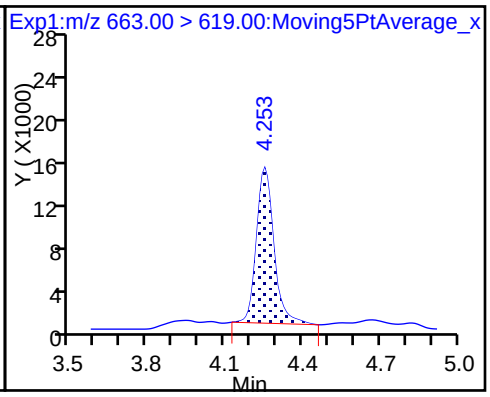
37 Perfluorododecanoic acid



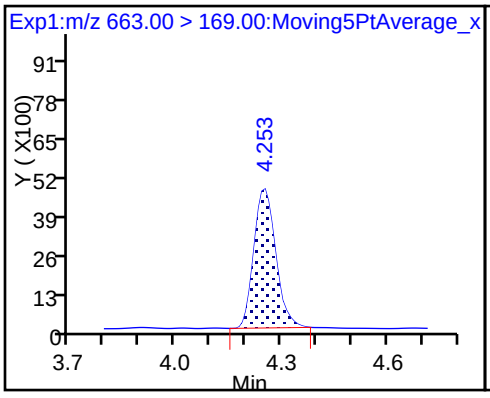
D 36 13C2 PFDoA



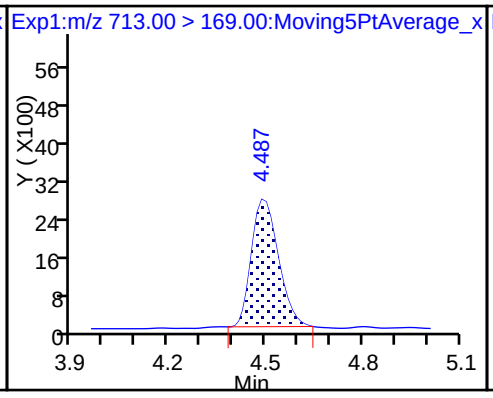
41 Perfluorotridecanoic acid



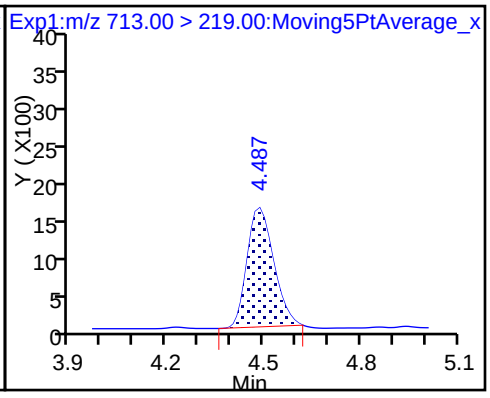
41 Perfluorotridecanoic acid



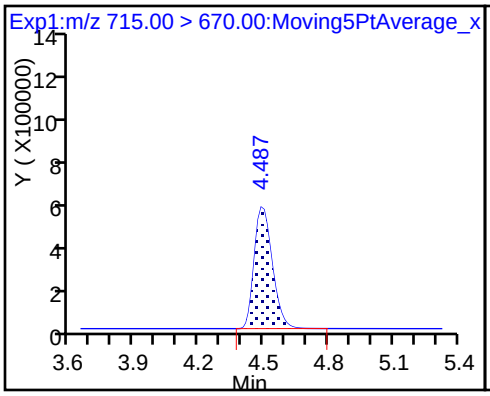
42 Perfluorotetradecanoic acid



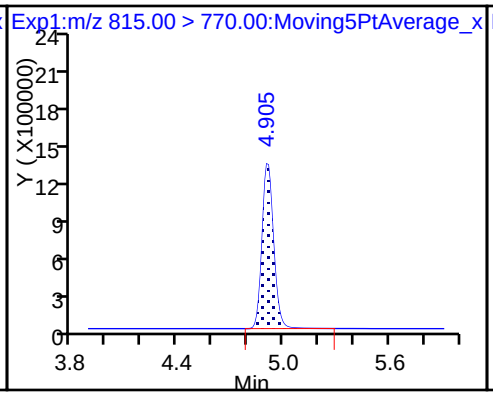
42 Perfluorotetradecanoic acid



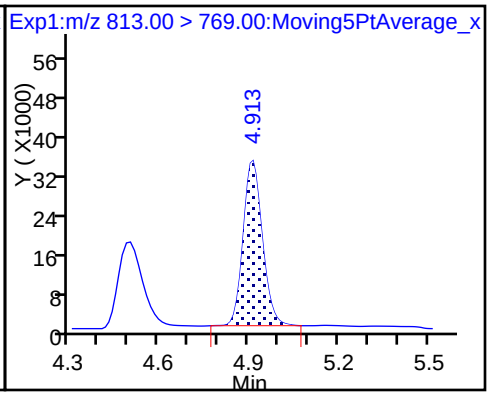
D 43 13C2-PFTeDA



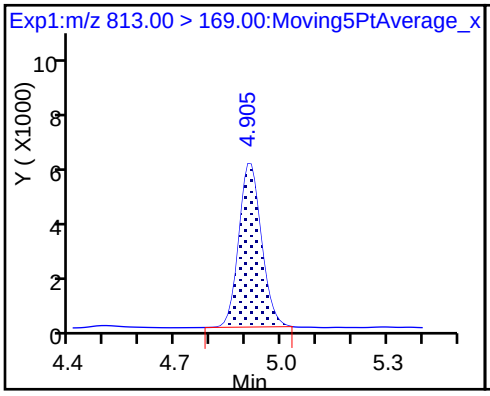
D 44 13C2-PFHxDA



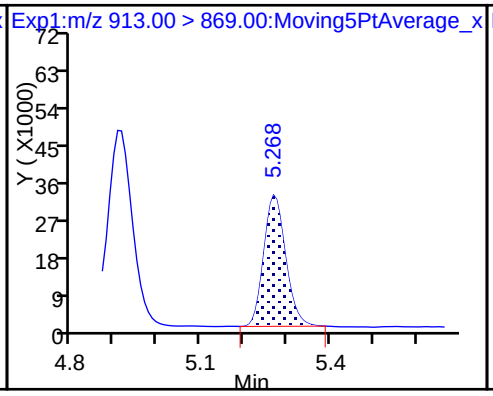
45 Perfluorohexadecanoic acid



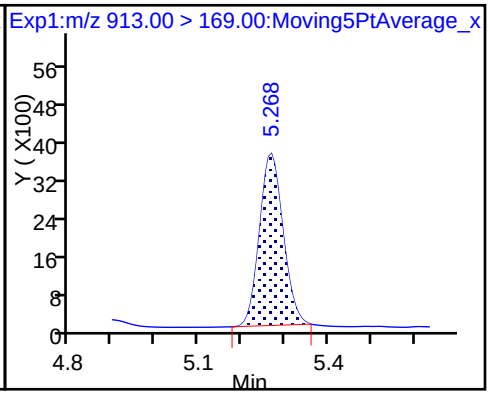
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

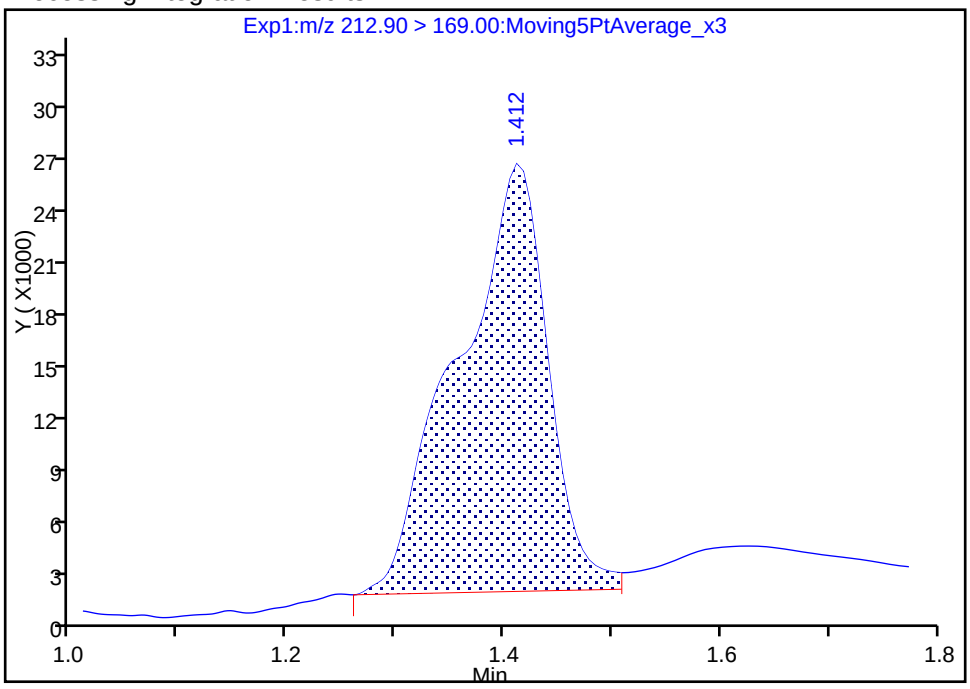
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180125-53340.b\2018.01.25LLAA_006.d
Injection Date: 25-Jan-2018 10:13:29 Instrument ID: A8_N
Lims ID: CCVL
Client ID:
Operator ID: SACINSTLCMS01 ALS Bottle#: 21 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Method: A8_N Limit Group: LC PFC_DOD ICAL
Column: Detector EXP1

2 Perfluorobutyric acid, CAS: 375-22-4

Signal: 1

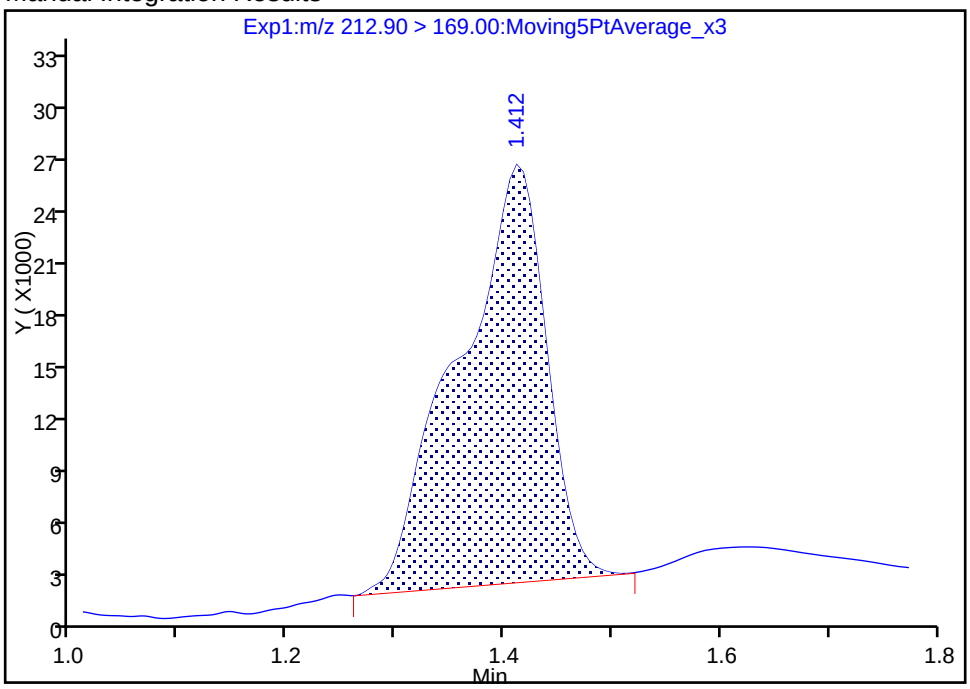
Processing Integration Results

RT: 1.41
Area: 140975
Amount: 0.049736
Amount Units: ng/ml



Manual Integration Results

RT: 1.41
Area: 134407
Amount: 0.047419
Amount Units: ng/ml



Reviewer: roycea, 25-Jan-2018 14:41:47
Audit Action: Manually Integrated Audit Reason: Baseline

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205677/1 Calibration Date: 01/25/2018 21:48

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.25LLAAXZ_033.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9343	0.9437		2.53	2.50	1.0	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.176		2.50	2.50	-0.2	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	81.45		2.33	2.21	5.5	25.0
4:2 FTS	AveID	13.89	17.40		2.92	2.34	25.2*	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	1.051		2.53	2.50	1.4	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.082		2.46	2.50	-1.5	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.078		2.20	2.28	-3.2	25.0
6:2FTS	AveID	1.655	1.682		2.41	2.37	1.6	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.098		2.34	2.50	-6.3	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.373		2.41	2.38	1.4	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.023		2.48	2.50	-0.9	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.119		2.32	2.32	-0.0	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	1.045		2.66	2.50	6.3	25.0
8:2FTS	AveID	1.217	1.323		2.60	2.40	8.7	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9879		2.55	2.50	1.8	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.132		2.62	2.50	4.8	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.7127		2.62	2.41	8.8	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9650		2.48	2.50	-0.9	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9555		2.31	2.50	-7.4	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.089		2.66	2.50	6.3	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.205		2.59	2.50	3.8	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2651		2.72	2.50	8.7	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9492		2.49	2.50	-0.6	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.013		2.40	2.50	-3.9	25.0
13C4 PFBA	Ave	1.512	1.432		2.37	2.50	-5.3	50.0
13C5-PFPeA	Ave	0.8956	0.8733		2.44	2.50	-2.5	50.0
13C3-PFBS	Ave	0.0198	0.0188		2.20	2.33	-5.2	50.0
13C2 PFHxA	Ave	0.9649	0.9122		2.36	2.50	-5.5	50.0
13C4-PFHpA	Ave	0.9187	0.9203		2.50	2.50	0.2	50.0
18O2 PFHxS	Ave	1.131	1.134		2.37	2.37	0.3	50.0
M2-6:2FTS	Ave	0.1699	0.1963		2.74	2.38	15.6	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205677/1 Calibration Date: 01/25/2018 21:48

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.25LLAAXZ_033.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.9103		2.53	2.50	1.1	50.0
13C4 PFOS	Ave	0.7158	0.7378		2.46	2.39	3.1	50.0
13C5 PFNA	Ave	0.7300	0.7397		2.53	2.50	1.3	50.0
13C8 FOSA	Ave	1.007	1.035		2.57	2.50	2.8	50.0
M2-8:2FTS	Ave	0.1795	0.2122		2.83	2.40	18.2	50.0
13C2 PFDA	Ave	0.6306	0.6528		2.59	2.50	3.5	50.0
d3-NMeFOSAA	Ave	0.3147	0.3653		2.90	2.50	16.1	50.0
d5-NEtFOSAA	Ave	0.3182	0.3872		3.04	2.50	21.7	50.0
13C2 PFUnA	Ave	0.4783	0.5394		2.82	2.50	12.8	50.0
13C2 PFDoA	Ave	0.5192	0.5902		2.84	2.50	13.7	50.0
13C2-PFTeDA	Ave	0.6785	0.7556		2.78	2.50	11.4	50.0
13C2-PFHxDA	Ave	1.209	1.290		2.67	2.50	6.7	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_033.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 25-Jan-2018 21:48:39 ALS Bottle#: 14 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:29:34

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	1.411	1.411	0.0	0.539	6399407	2.37		94.7	20724	
2 Perfluorobutyric acid										
212.90 > 169.00	1.411	1.413	-0.002	1.000	6039214	2.53		101	981	
D 3 13C5-PFPeA										
267.90 > 223.00	1.657	1.659	-0.002	0.633	3902648	2.44		97.5	43277	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.657	1.662	-0.005	1.000	4588496	2.50		99.8	3180	
D 47 13C3-PFBS										
301.90 > 83.00	1.692	1.695	-0.003	0.647	78129	2.20		94.8	2334	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.692	1.697	-0.005	1.000	6048911	2.33		105	16212	
298.90 > 99.00	1.692	1.697	-0.005	1.000	2575018		2.35(1.25-3.74)		11515	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.906	1.903	0.003	1.000	1365236	2.92		125	35168	
D 60 M2-4:2FTS										
329.00 > 81.00	1.906	1.903	0.003	0.729	606293	NC			5914	
D 7 13C2 PFHxA										
315.00 > 270.00	1.937	1.939	-0.002	0.740	4076544	2.36		94.5	34576	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.937	1.939	-0.002	1.000	4283131	2.53		101	11225	
313.00 > 119.00	1.937	1.939	-0.002	1.000	381931		11.21(5.03-15.10)		4883	
D 9 13C4-PFHpA										
367.00 > 322.00	2.257	2.267	-0.010	0.863	4112993	2.50		100	21046	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.270	2.268	0.002	1.006	4451762	2.46		98.5	5692	
363.00 > 169.00	2.270	2.268	0.002	1.006	1625569		2.74(1.13-3.40)		9838	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.270	2.280	-0.010	0.994	4973050	2.20		96.8	12992	
399.00 > 99.00	2.270	2.280	-0.010	0.994	1669654		2.98(1.50-4.49)		6271	
D 11 18O2 PFHxS										
403.00 > 84.00	2.284	2.282	0.002	0.873	4794395	2.37		100	31344	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.596	0.0	1.000	1398814	2.41		102	22515	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.992	833348	2.74		116	17969	
D 14 13C4 PFOA										
417.00 > 372.00	2.616	2.622	-0.006	1.000	4068069	2.53		101	29194	
* 62 13C2-PFOA										
415.00 > 370.00	2.616	2.622	-0.006		4469106	2.50			27802	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.624	2.623	0.001	1.003	4466861	2.34		93.7	1888	
413.00 > 169.00	2.624	2.623	0.001	1.003	2401838		1.86(0.84-2.52)		13428	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.631	2.629	0.002	1.000	4311149	2.41		101	22123	
449.00 > 99.00	2.631	2.629	0.002	1.000	1187185		3.63(1.94-5.82)		11627	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.144	3305944	2.53		101	22460	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	2.992	0.001	1.000	3423127	2.32		99.9	5853	
499.00 > 99.00	2.993	2.992	0.001	1.000	769407		4.45(2.31-6.93)		4703	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.144	3152329	2.46		103	17966	
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	2.992	0.001	1.000	3383025	2.48		99.1	7805	
463.00 > 169.00	2.993	2.992	0.001	1.000	832635		4.06(1.90-5.69)		12523	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.333	3.338	-0.005	1.000	4831500	2.66		106	19116	
D 21 13C8 FOSA										
506.00 > 78.00	3.333	3.338	-0.005	1.274	4625590	2.57		103	19432	
D 26 M2-8:2FTS										
529.00 > 81.00	3.340	3.342	-0.002	1.277	908693	2.83		118	12354	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.340	3.342	-0.002	1.000	1202316	2.60		109	18361	
D 23 13C2 PFDA										
515.00 > 470.00	3.348	3.352	-0.004	1.280	2917525	2.59		104	31369	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.348	3.353	-0.005	1.000	2882347	2.55		102	10124	
513.00 > 169.00	3.348	3.353	-0.005	1.000	520593		5.54(2.36-7.09)		1672	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.507	3.507	0.0	1.341	1632447	2.90		116	11725	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.507	3.513	-0.006	1.000	1847822	2.62		105	9422	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.664	3.666	-0.002	1.000	2265294	2.62		109	24829	
599.00 > 99.00	3.664	3.666	-0.002	1.000	779602		2.91(1.39-4.16)		17725	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.672	-0.001	1.403	1730470	3.04		122	7533	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.680	3.678	0.002	1.000	2303119	2.31		92.6	6429	
563.00 > 169.00	3.680	3.678	0.002	1.000	496229		4.64(0.00-0.00)		12064	
D 30 13C2 PFUnA										
565.00 > 520.00	3.680	3.679	0.001	1.406	2410416	2.82		113	25414	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.680	3.679	0.001	1.002	1669937	2.48		99.1	11853	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.981	3.979	0.002	1.000	2872633	2.66		106	8670	
613.00 > 169.00	3.981	3.979	0.002	1.000	674952		4.26(2.13-6.40)		15667	
D 36 13C2 PFDoA										
615.00 > 570.00	3.981	3.979	0.002	1.522	2637753	2.84		114	22618	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.242	4.242	0.0	1.000	3177994	2.59		104	7857	
663.00 > 169.00	4.242	4.242	0.0	1.000	996281		3.19(1.25-3.76)		20575	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.486	4.483	0.003	1.000	895341	2.72		109	11230	
713.00 > 219.00	4.472	4.483	-0.011	0.997	607382		1.47(0.71-2.13)		13395	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.486	4.483	0.003	1.715	3376875	2.78		111	21868	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.903	4.902	0.001	1.874	5765361	2.67		107	16917	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.903	4.902	0.001	1.000	5472737	2.49		99.4	3162	
813.00 > 169.00	4.903	4.902	0.001	1.000	995187		5.50(2.86-8.58)		6480	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.260	5.255	0.005	1.000	5837415	2.40		96.1	1506	
913.00 > 169.00	5.260	5.255	0.005	1.000	733980		7.95(0.00-0.00)		1819	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL5_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 10:22:34 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_033.d

Injection Date: 25-Jan-2018 21:48:39 Instrument ID: A8_N

Lims ID: CCV L5

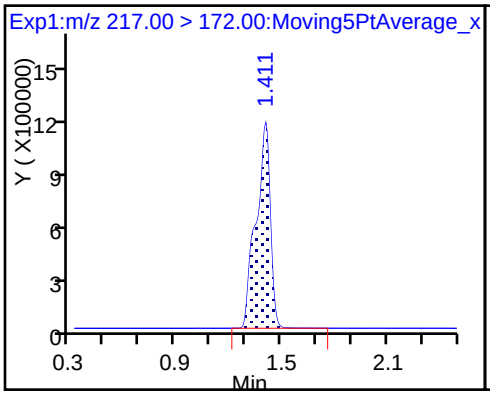
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 14 Worklist Smp#: 1

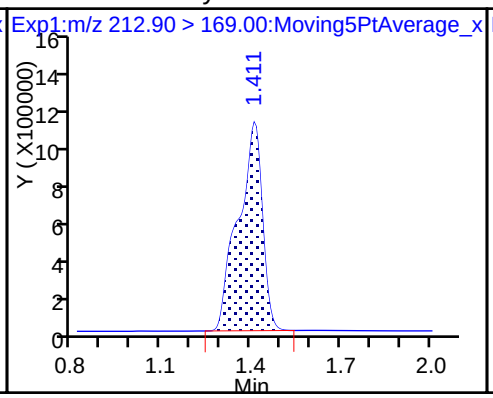
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

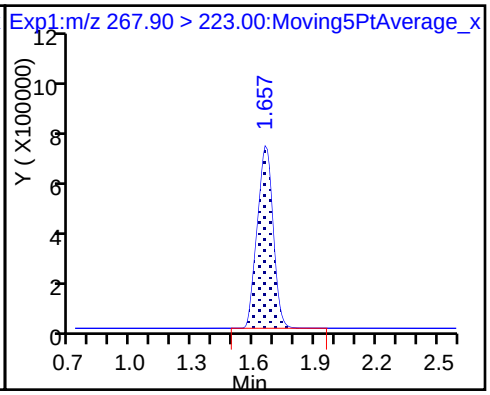
D 1 13C4 PFBA



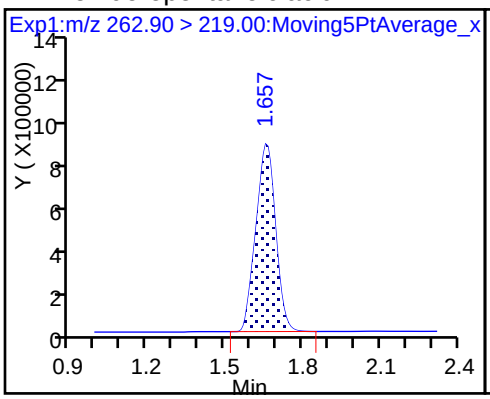
2 Perfluorobutyric acid



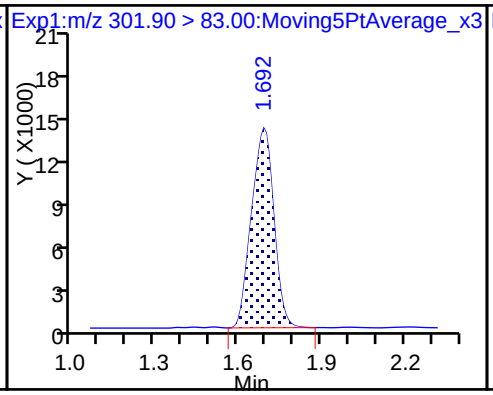
D 3 13C5-PFPeA



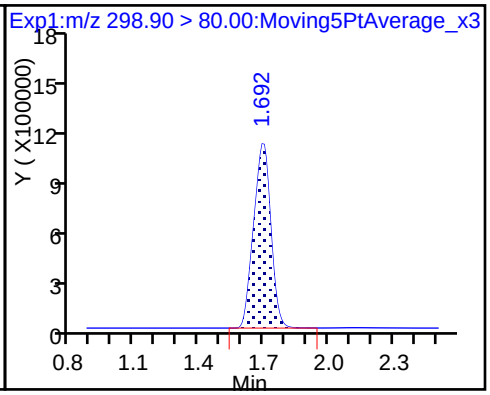
4 Perfluoropentanoic acid



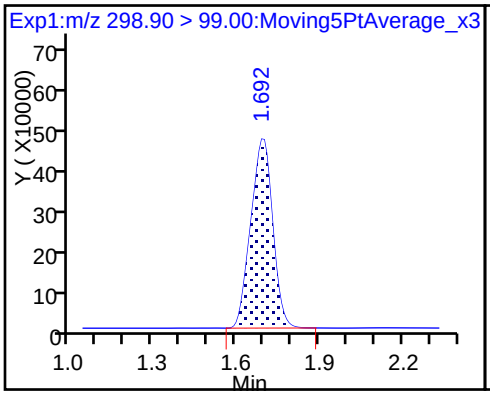
D 47 13C3-PFBS



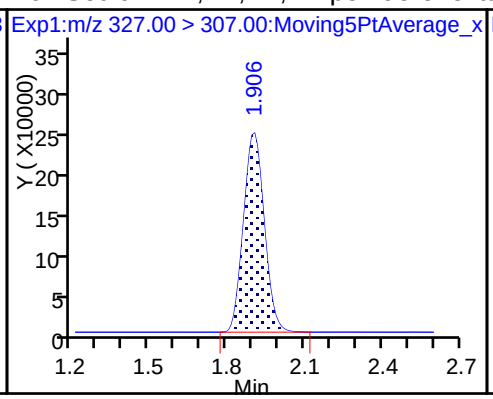
5 Perfluorobutanesulfonic acid



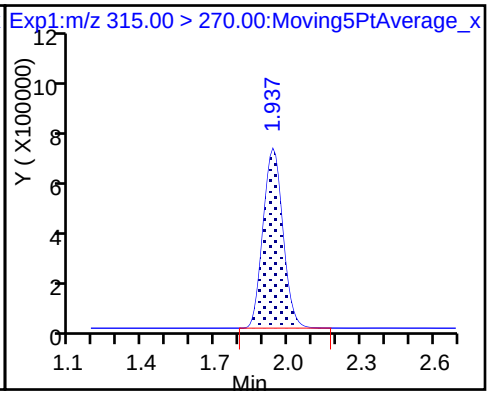
5 Perfluorobutanesulfonic acid



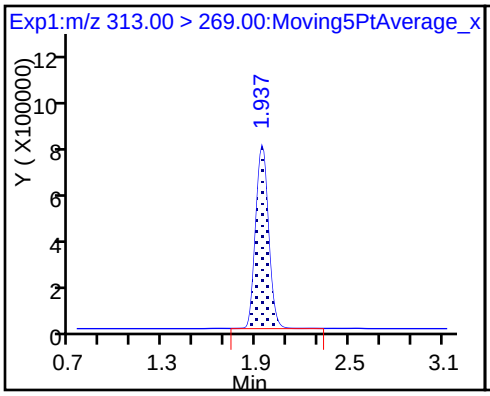
61 Sodium 1H,1H,2H,2H-perfluorohexa



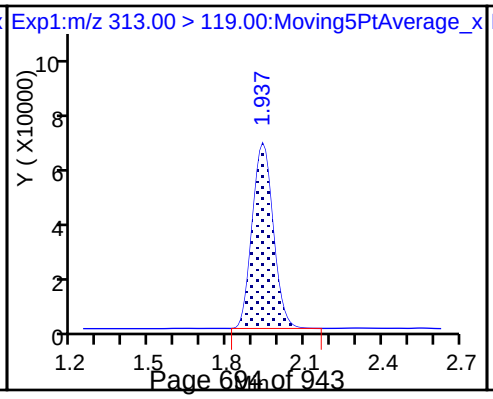
D 7 13C2 PFHxA



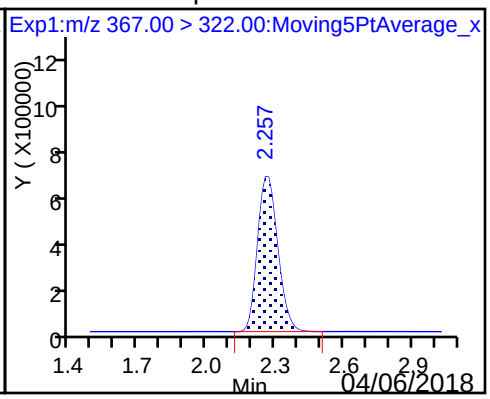
6 Perfluorohexanoic acid



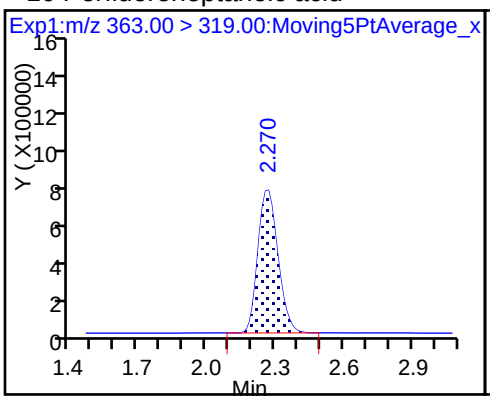
6 Perfluorohexanoic acid



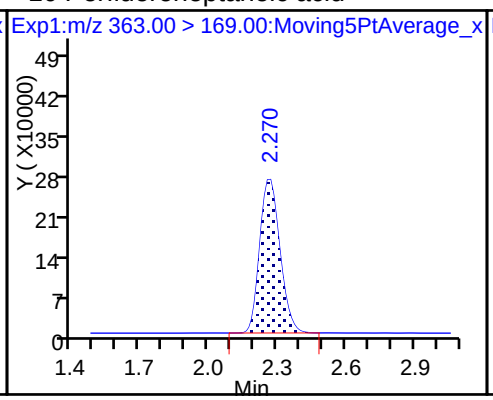
D 9 13C4-PFHpA



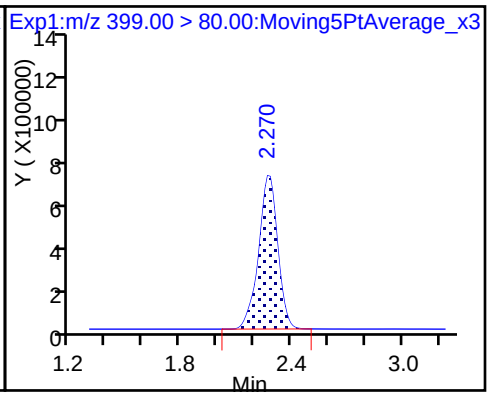
10 Perfluoroheptanoic acid



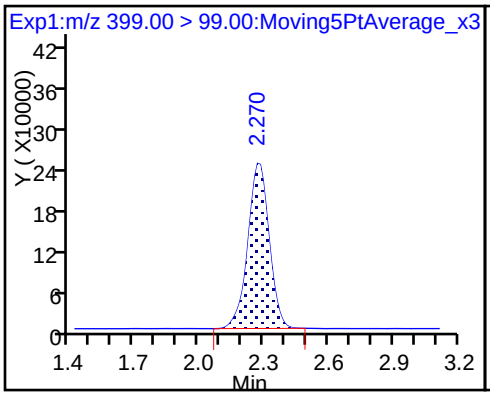
10 Perfluoroheptanoic acid



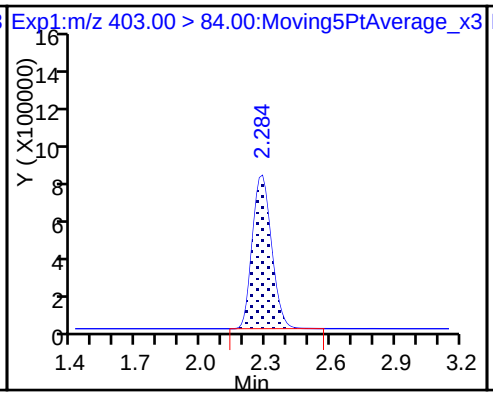
8 Perfluorohexanesulfonic acid



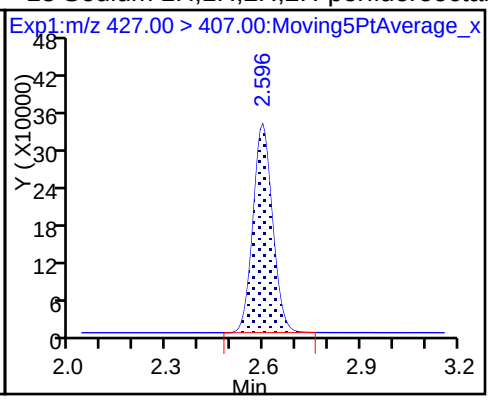
8 Perfluorohexanesulfonic acid



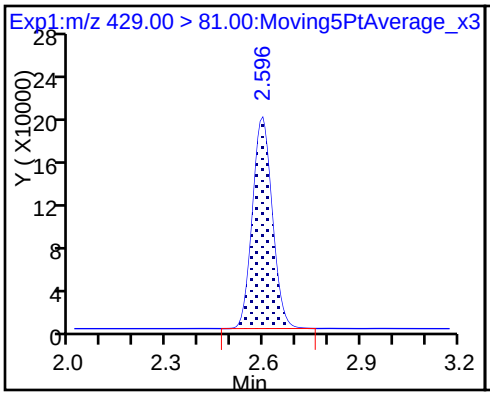
D 11 18O2 PFHxS



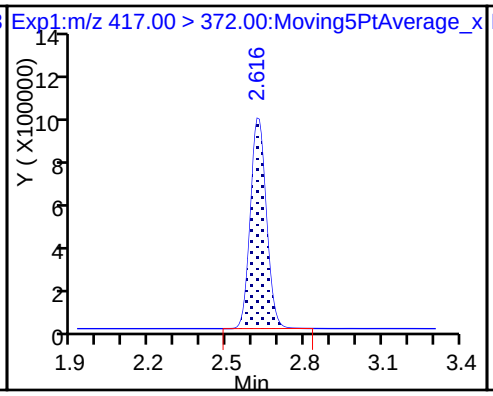
13 Sodium 1H,1H,2H,2H-perfluorooctane



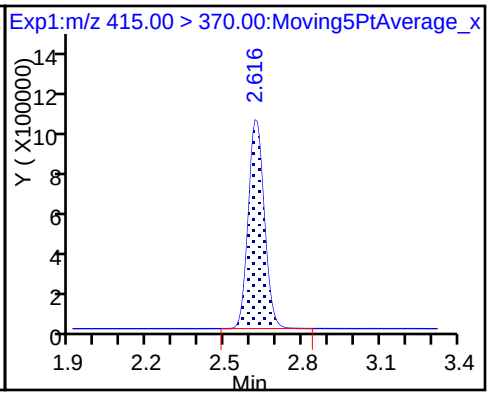
D 12 M2-6:2FTS



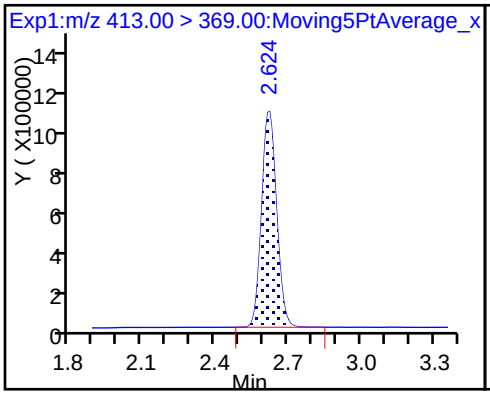
D 14 13C4 PFOA



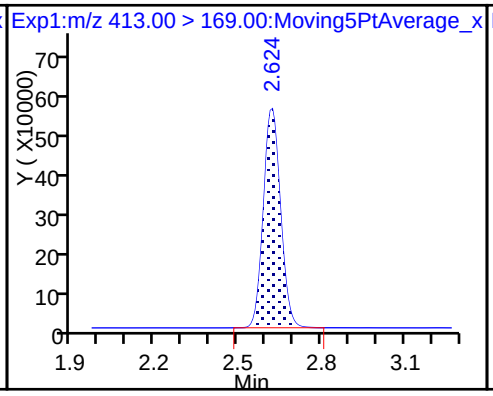
* 62 13C2-PFOA



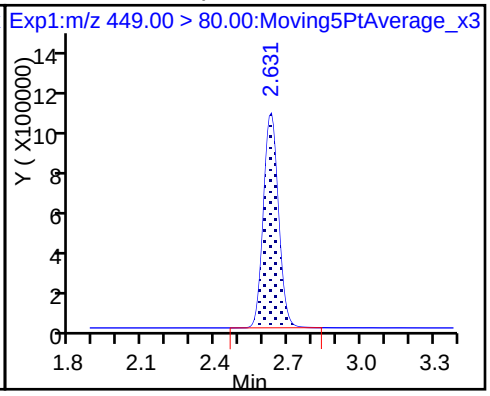
15 Perfluorooctanoic acid



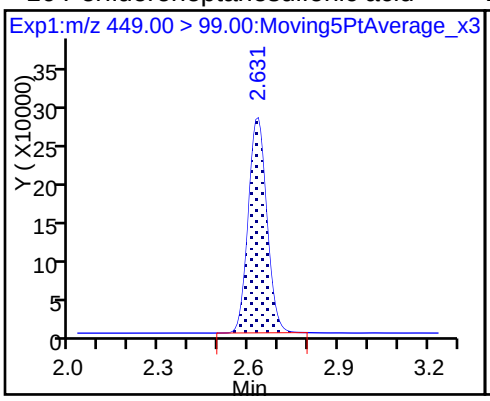
15 Perfluorooctanoic acid



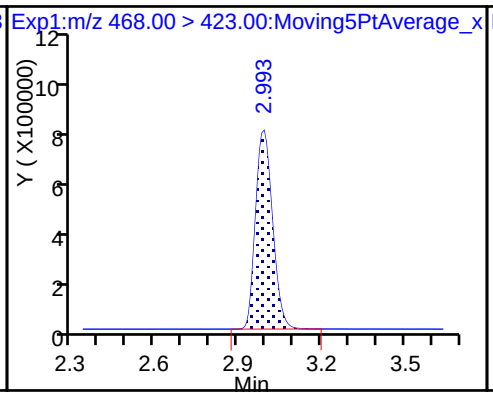
16 Perfluoroheptanesulfonic acid



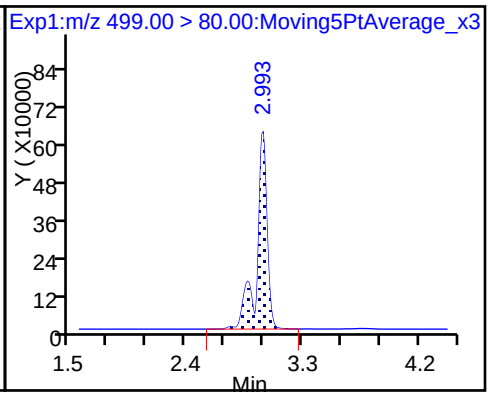
16 Perfluoroheptanesulfonic acid



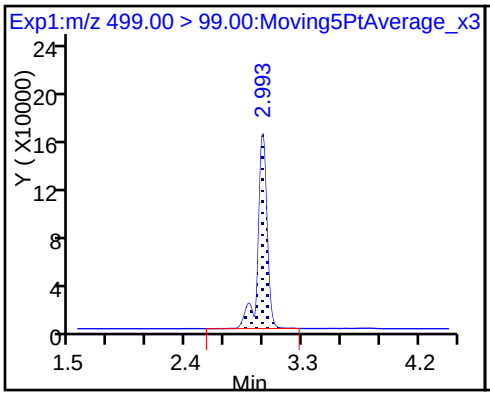
D 19 13C5 PFNA



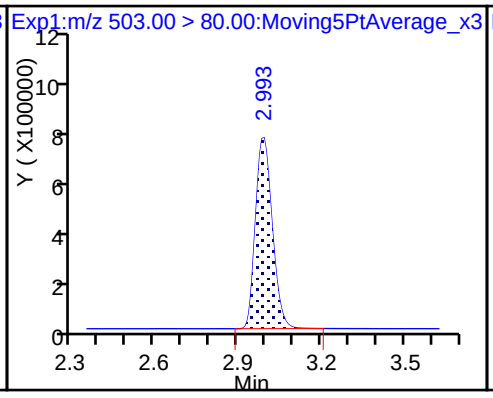
17 Perfluorooctane sulfonic acid



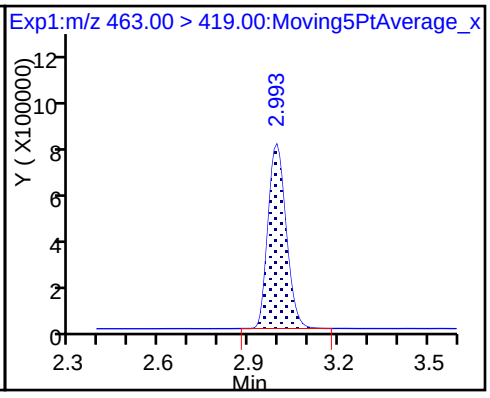
17 Perfluorooctane sulfonic acid



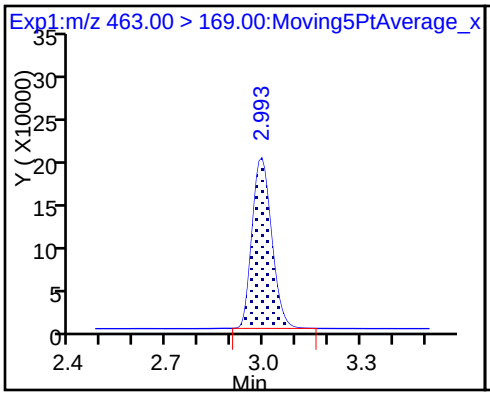
D 18 13C4 PFOS



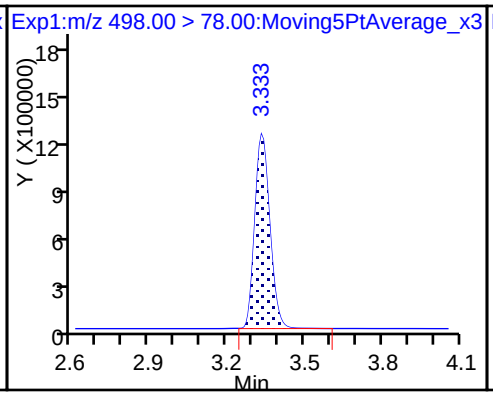
20 Perfluorononanoic acid



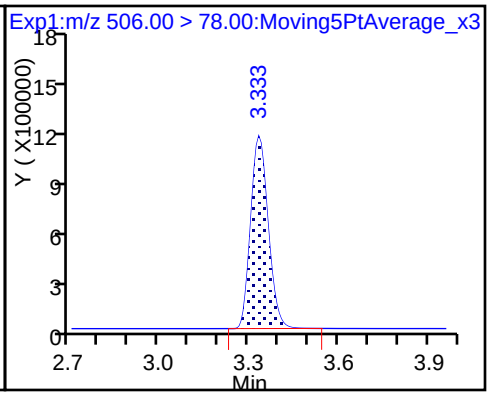
20 Perfluorononanoic acid



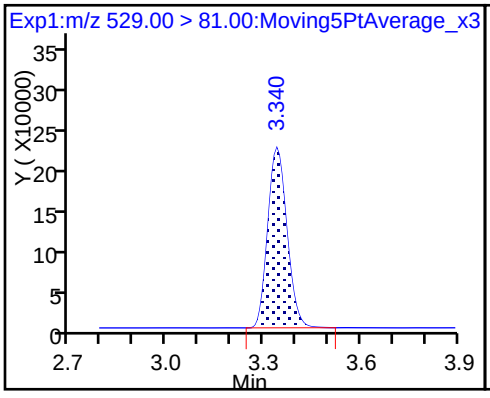
22 Perfluorooctane Sulfonamide



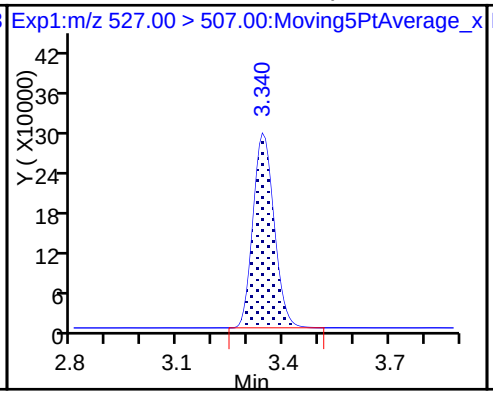
D 21 13C8 FOSA



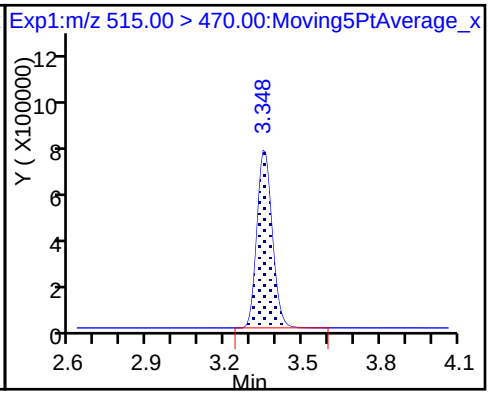
D 26 M2-8:2FTS



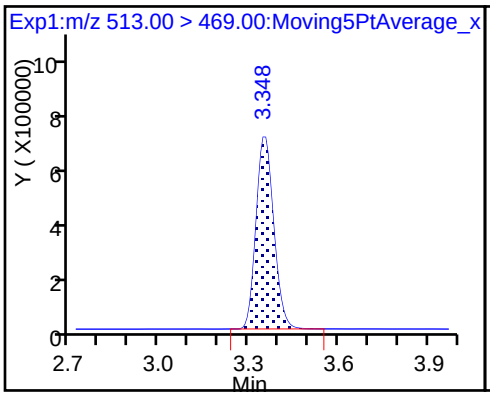
25 Sodium 1H,1H,2H,2H-perfluorodecane



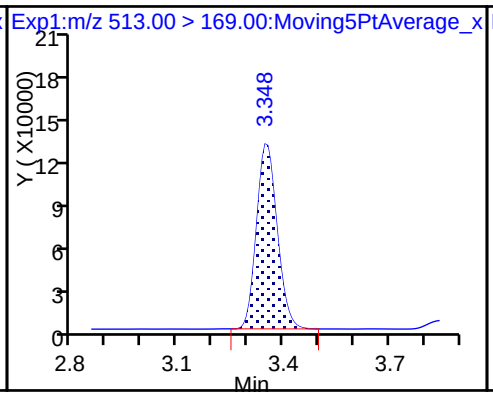
D 23 13C2 PFDA



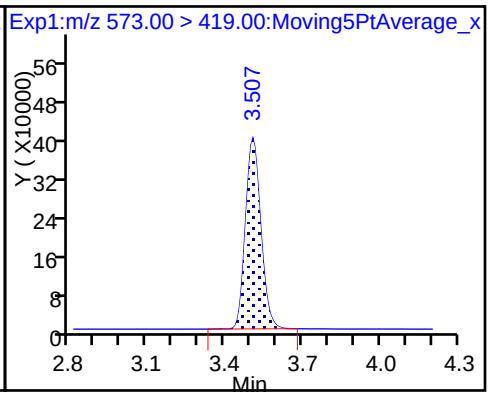
24 Perfluorodecanoic acid



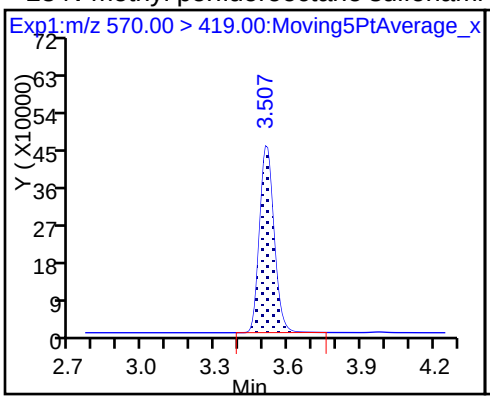
24 Perfluorodecanoic acid



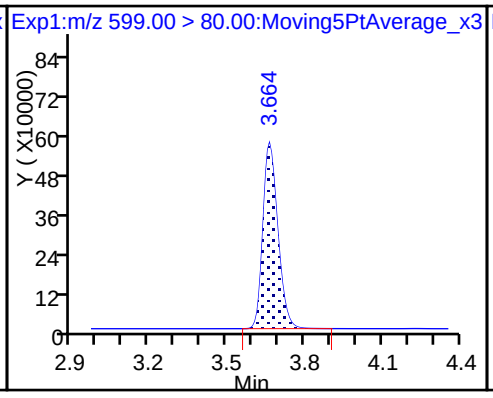
D 27 d3-NMeFOSAA



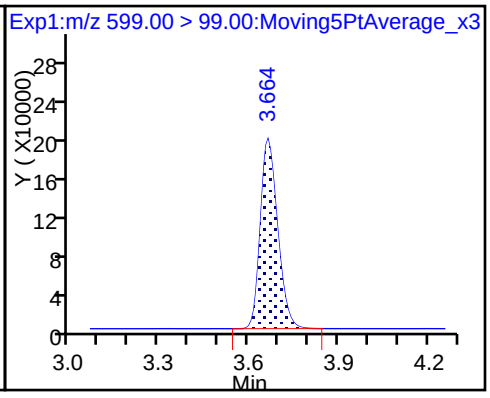
28 N-methyl perfluorooctane sulfonami



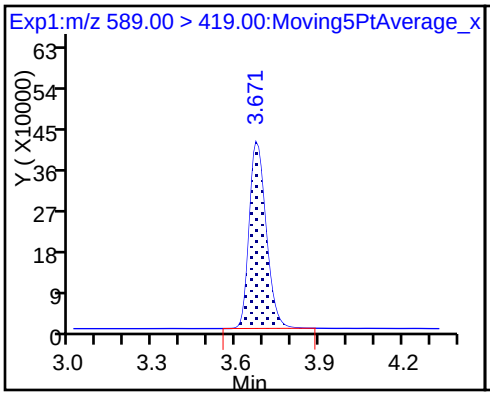
29 Perfluorodecane Sulfonic acid



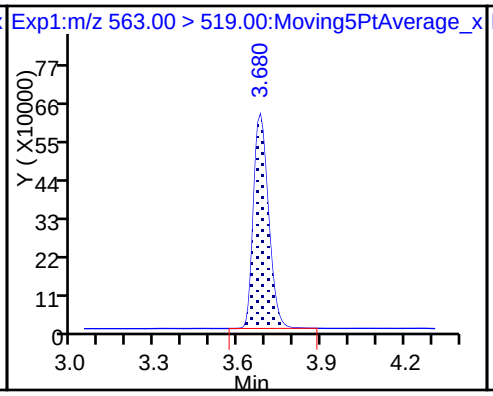
29 Perfluorodecane Sulfonic acid



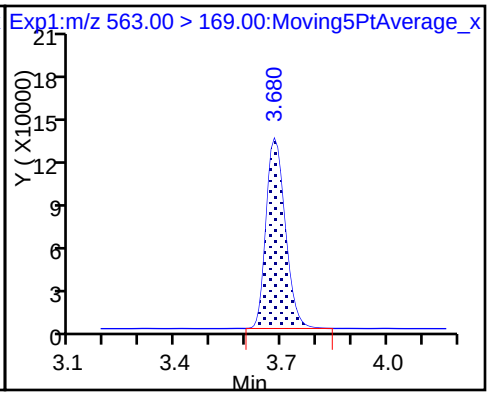
D 32 d5-NEtFOSAA



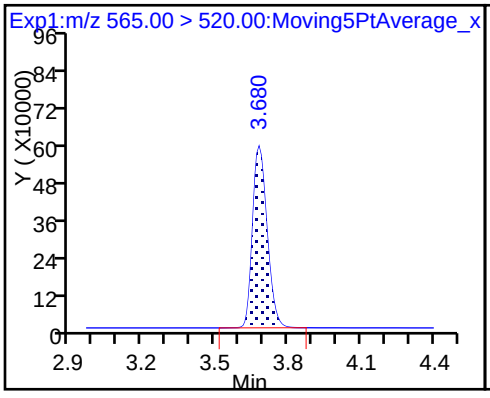
31 Perfluoroundecanoic acid



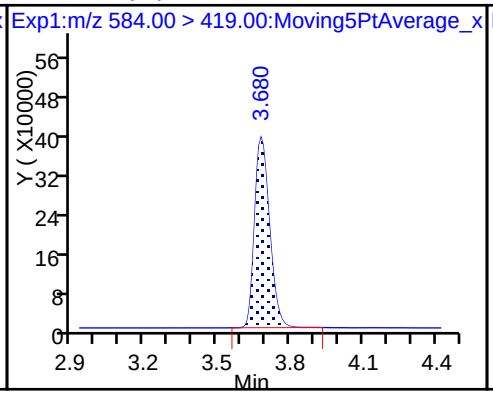
31 Perfluoroundecanoic acid



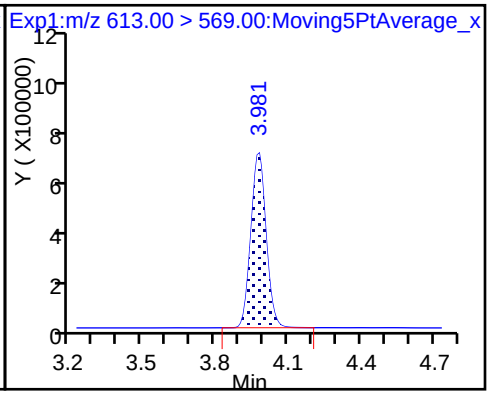
D 30 13C2 PFUnA



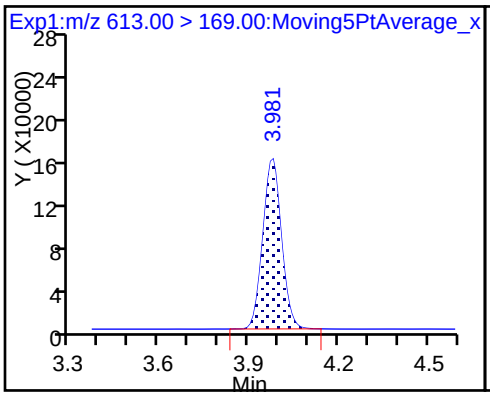
33 N-ethyl perfluorooctane sulfonamid



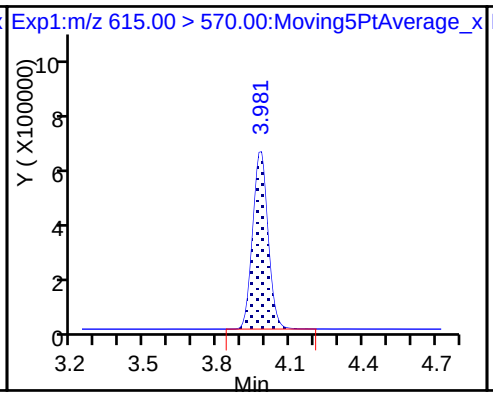
37 Perfluorododecanoic acid



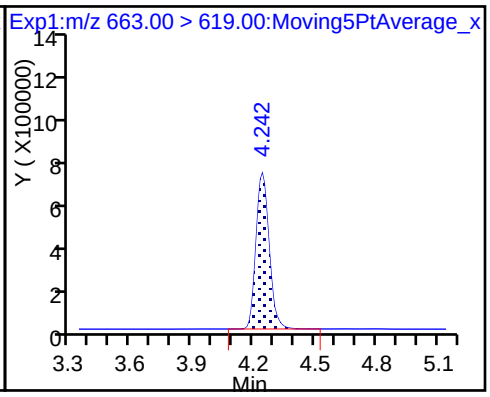
37 Perfluorododecanoic acid



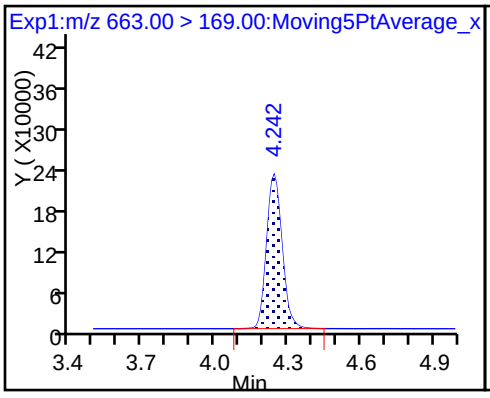
D 36 13C2 PFDoA



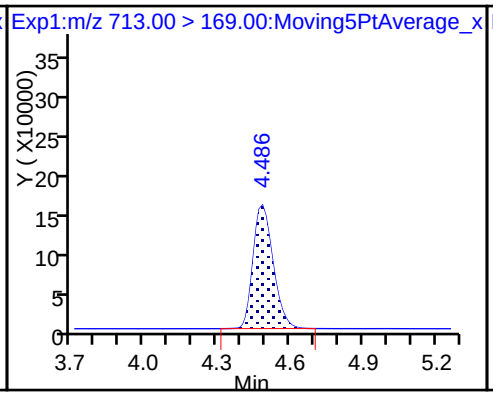
41 Perfluorotridecanoic acid



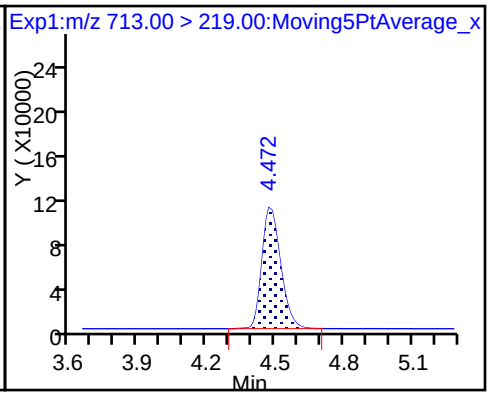
41 Perfluorotridecanoic acid



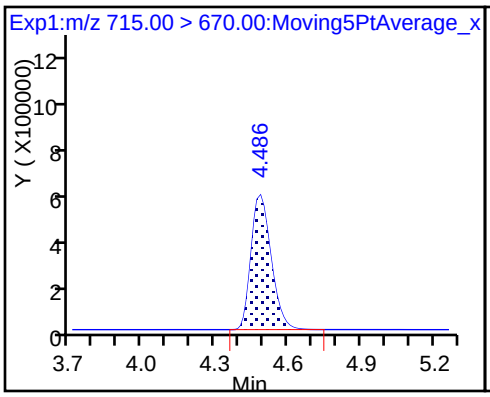
42 Perfluorotetradecanoic acid



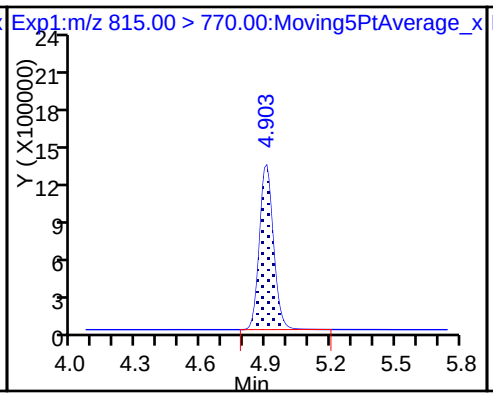
42 Perfluorotetradecanoic acid



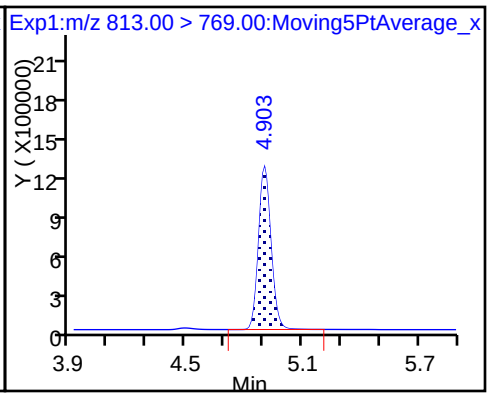
D 43 13C2-PFTeDA



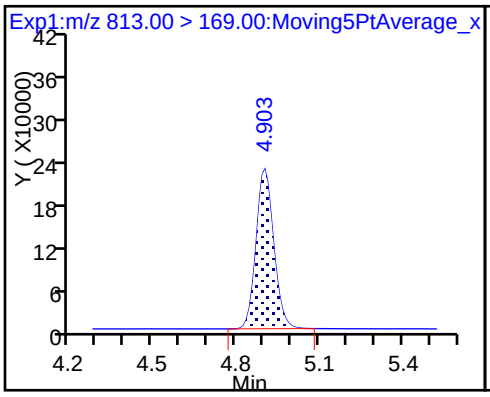
D 44 13C2-PFHxDA



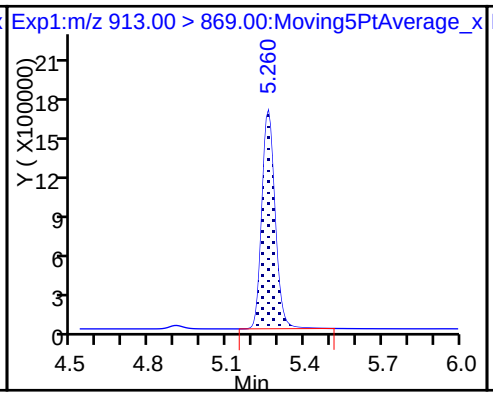
45 Perfluorohexadecanoic acid



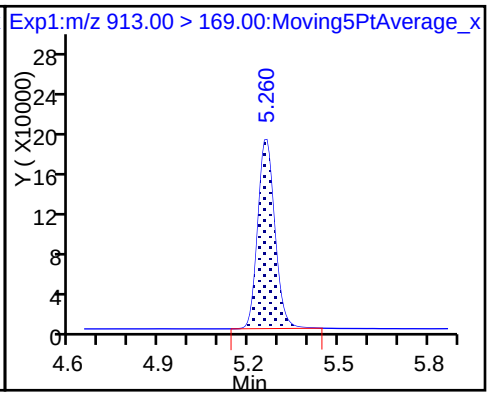
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205677/12 Calibration Date: 01/25/2018 23:14

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.25LLAAXZ_044.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9343	0.9182		0.983	1.00	-1.7	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.139		0.966	1.00	-3.4	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	78.48		0.899	0.884	1.6	25.0
4:2 FTS	AveID	13.89	17.14		1.15	0.934	23.3	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	0.9718		0.938	1.00	-6.2	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.020		0.928	1.00	-7.2	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.061		0.867	0.910	-4.7	25.0
6:2FTS	AveID	1.655	1.728		0.990	0.948	4.4	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.163		0.992	1.00	-0.8	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.383		0.972	0.952	2.1	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.009		0.977	1.00	-2.3	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.086		0.901	0.928	-2.9	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	0.9807		0.998	1.00	-0.2	25.0
8:2FTS	AveID	1.217	1.210		0.953	0.958	-0.5	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9704		1.00	1.00	0.0	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.045		0.968	1.00	-3.2	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6990		1.03	0.964	6.7	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9271		0.952	1.00	-4.8	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9817		0.951	1.00	-4.9	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.027		1.00	1.00	0.2	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.111		0.957	1.00	-4.3	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2540		1.04	1.00	4.1	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9520		0.985	1.00	-1.5	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.082		1.03	1.00	2.7	25.0
13C4 PFBA	Ave	1.512	1.402		2.32	2.50	-7.3	50.0
13C5-PFPeA	Ave	0.8956	0.8482		2.37	2.50	-5.3	50.0
13C3-PFBS	Ave	0.0198	0.0185		2.17	2.33	-6.5	50.0
13C2 PFHxA	Ave	0.9649	0.9365		2.43	2.50	-2.9	50.0
13C4-PFHpA	Ave	0.9187	0.8949		2.44	2.50	-2.6	50.0
18O2 PFHxS	Ave	1.131	1.108		2.32	2.37	-2.0	50.0
M2-6:2FTS	Ave	0.1699	0.1973		2.76	2.38	16.2	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205677/12 Calibration Date: 01/25/2018 23:14

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.25LLAAXZ_044.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.8525		2.37	2.50	-5.3	50.0
13C4 PFOS	Ave	0.7158	0.7102		2.37	2.39	-0.8	50.0
13C5 PFNA	Ave	0.7300	0.7269		2.49	2.50	-0.4	50.0
13C8 FOSA	Ave	1.007	1.034		2.57	2.50	2.7	50.0
M2-8:2FTS	Ave	0.1795	0.2118		2.83	2.40	18.0	50.0
13C2 PFDA	Ave	0.6306	0.6178		2.45	2.50	-2.0	50.0
d3-NMeFOSAA	Ave	0.3147	0.3480		2.76	2.50	10.6	50.0
d5-NEtFOSAA	Ave	0.3182	0.3575		2.81	2.50	12.3	50.0
13C2 PFUnA	Ave	0.4783	0.4941		2.58	2.50	3.3	50.0
13C2 PFDoA	Ave	0.5192	0.5231		2.52	2.50	0.7	50.0
13C2-PFTeDA	Ave	0.6785	0.6540		2.41	2.50	-3.6	50.0
13C2-PFHxDA	Ave	1.209	1.188		2.46	2.50	-1.7	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_044.d
Lims ID: CCV L4
Client ID:
Sample Type: CCV
Inject. Date: 25-Jan-2018 23:14:58 ALS Bottle#: 13 Worklist Smp#: 12
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:28:58

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	1.413	1.411	0.002	0.539	6564284	2.32		92.7	21831	
2 Perfluorobutyric acid										
212.90 > 169.00	1.413	1.413	0.0	1.000	2410803	0.9828		98.3	334	
D 3 13C5-PFPeA										
267.90 > 223.00	1.661	1.659	0.002	0.633	3971795	2.37		94.7	37561	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.661	1.662	-0.001	1.000	1808781	0.9664		96.6	1384	
D 47 13C3-PFBS										
301.90 > 83.00	1.697	1.695	0.002	0.647	80689	2.17		93.5	2488	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.697	1.697	0.0	1.000	2407702	0.8985		102	7270	
298.90 > 99.00	1.697	1.697	0.0	1.000	1021669		2.36(1.25-3.74)		4719	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.902	1.903	-0.001	1.000	555435	1.15		123	34070	
D 60 M2-4:2FTS										
329.00 > 81.00	1.902	1.903	-0.001	0.725	601372	NC			5585	
D 7 13C2 PFHxA										
315.00 > 270.00	1.943	1.939	0.004	0.741	4384976	2.43		97.1	33985	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.943	1.939	0.004	1.000	1704520	0.9376		93.8	3761	
313.00 > 119.00	1.943	1.939	0.004	1.000	164816		10.34(5.03-15.10)		2937	
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.267	-0.002	0.863	4190463	2.44		97.4	31561	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.265	2.268	-0.003	1.000	1710343	0.9284		92.8	2199	
363.00 > 169.00	2.265	2.268	-0.003	1.000	715279		2.39(1.13-3.40)		5096	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.278	2.280	-0.002	1.000	2004882	0.8675		95.3	8932	
399.00 > 99.00	2.278	2.280	-0.002	1.000	677245		2.96(1.50-4.49)		3121	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.868	4908831	2.32		98.0	25052	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.601	2.596	0.005	1.002	605204	0.9895		104	13124	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.990	877679	2.76		116	16095	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.622	0.001	1.000	3991791	2.37		94.7	35401	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.622	0.001		4682508	2.50			34091	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.623	2.623	0.0	1.000	1856545	0.99		99.2	697	
413.00 > 169.00	2.623	2.623	0.0	1.000	944528		1.97(0.84-2.52)		6941	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.630	2.629	0.001	1.000	1751197	0.9720		102	17301	
449.00 > 99.00	2.630	2.629	0.001	1.000	482250		3.63(1.94-5.82)		6034	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.141	3403753	2.49		99.6	27714	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	2.992	0.001	1.000	1341090	0.9007		97.1	3170	
499.00 > 99.00	2.993	2.992	0.001	1.000	303995		4.41(2.31-6.93)		2450	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.141	3178949	2.37		99.2	18100	
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	2.992	0.001	1.000	1373491	0.9773		97.7	3660	
463.00 > 169.00	2.993	2.992	0.001	1.000	342251		4.01(1.90-5.69)		6369	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.340	3.338	0.002	1.000	1899751	1.00		99.8	12697	
D 21 13C8 FOSA										
506.00 > 78.00	3.340	3.338	0.002	1.273	4842668	2.57		103	19233	
D 26 M2-8:2FTS										
529.00 > 81.00	3.347	3.342	0.005	1.276	950112	2.83		118	15573	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.347	3.342	0.005	1.000	459978	0.9528		99.5	8107	
D 23 13C2 PFDA										
515.00 > 470.00	3.355	3.352	0.003	1.279	2893053	2.45		98.0	20304	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.355	3.353	0.002	1.000	1122971	1.00		100	4613	
513.00 > 169.00	3.355	3.353	0.002	1.000	204616		5.49(2.36-7.09)		1583	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.514	3.507	0.007	1.340	1629599	2.76		111	10424	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.514	3.513	0.001	1.000	681389	0.9677		96.8	4373	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.671	3.666	0.005	1.000	896280	1.03		107	16140	
599.00 > 99.00	3.671	3.666	0.005	1.000	298065		3.01(1.39-4.16)		6765	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.678	3.672	0.006	1.402	1674110	2.81		112	6782	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.687	3.678	0.009	1.000	908605	0.9511		95.1	3533	
563.00 > 169.00	3.687	3.678	0.009	1.000	188827		4.81(0.00-0.00)		5585	
D 30 13C2 PFUnA										
565.00 > 520.00	3.687	3.679	0.008	1.406	2313822	2.58		103	23217	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.687	3.679	0.008	1.002	620843	0.9520		95.2	5807	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.979	3.979	0.0	1.000	1005653	1.00		100	4065	
613.00 > 169.00	3.979	3.979	0.0	1.000	235878		4.26(2.13-6.40)		9280	
D 36 13C2 PFDoA										
615.00 > 570.00	3.979	3.979	0.0	1.517	2449236	2.52		101	18457	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.241	4.242	-0.001	1.000	1088761	0.9570		95.7	4088	
663.00 > 169.00	4.241	4.242	-0.001	1.000	344301		3.16(1.25-3.76)		8674	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.485	4.483	0.002	1.000	311103	1.04		104	7802	
713.00 > 219.00	4.471	4.483	-0.012	0.997	210982		1.47(0.71-2.13)		6243	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.485	4.483	0.002	1.710	3062155	2.41		96.4	19816	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.903	4.902	0.001	1.869	5562736	2.46		98.3	14982	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.903	4.902	0.001	1.000	2118257	0.9854		98.5	1252	
813.00 > 169.00	4.903	4.902	0.001	1.000	380768		5.56(2.86-8.58)		5025	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.253	5.255	-0.002	1.000	2407809	1.03		103	643	
913.00 > 169.00	5.253	5.255	-0.002	1.000	301106		8.00(0.00-0.00)		1524	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL4_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 10:22:48 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_044.d

Injection Date: 25-Jan-2018 23:14:58 Instrument ID: A8_N

Lims ID: CCV L4

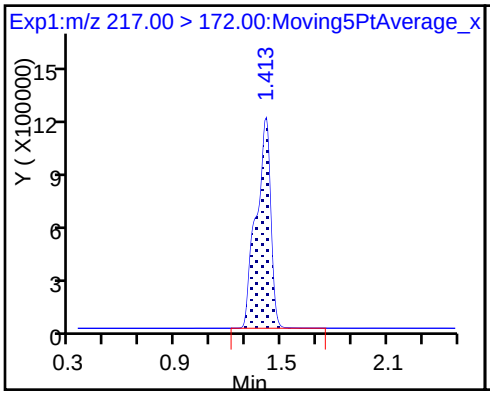
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 13 Worklist Smp#: 12

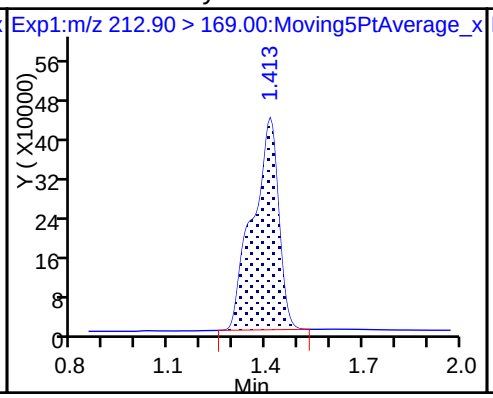
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

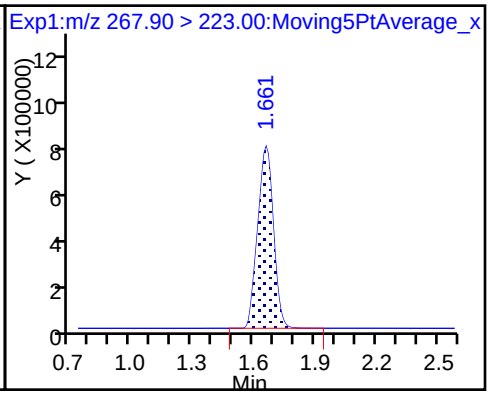
D 1 13C4 PFBA



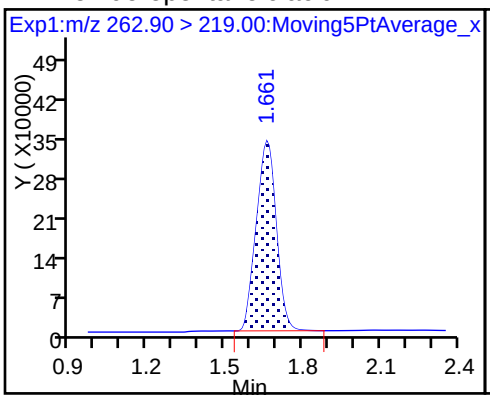
2 Perfluorobutyric acid



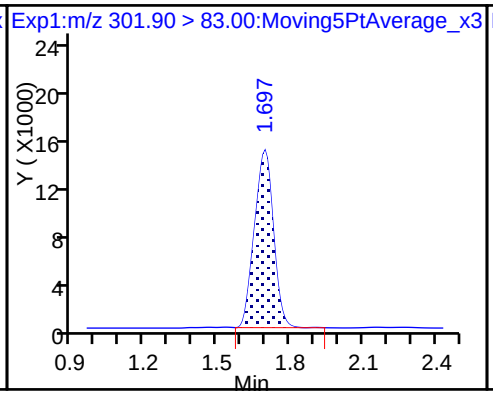
D 3 13C5-PFPeA



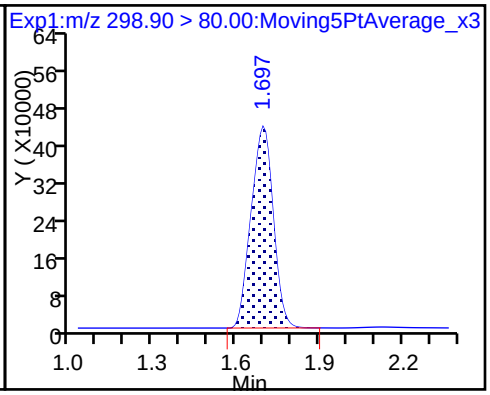
4 Perfluoropentanoic acid



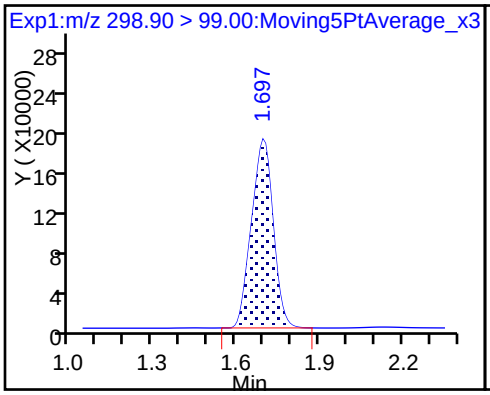
D 47 13C3-PFBS



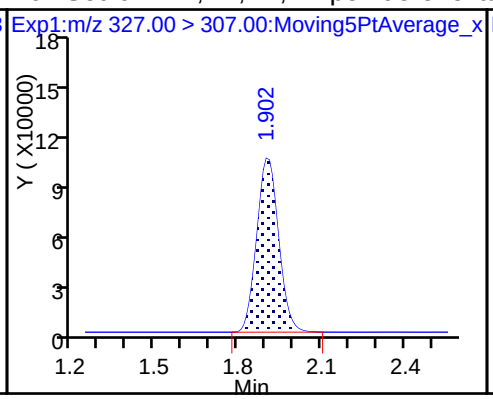
5 Perfluorobutanesulfonic acid



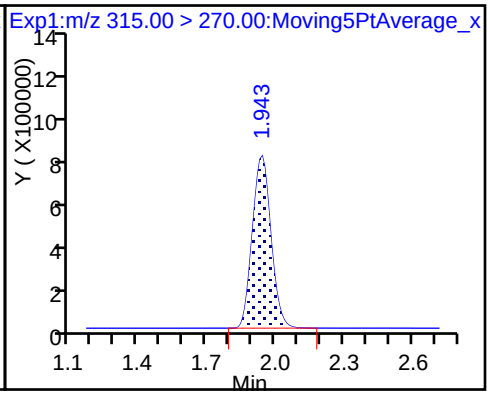
5 Perfluorobutanesulfonic acid



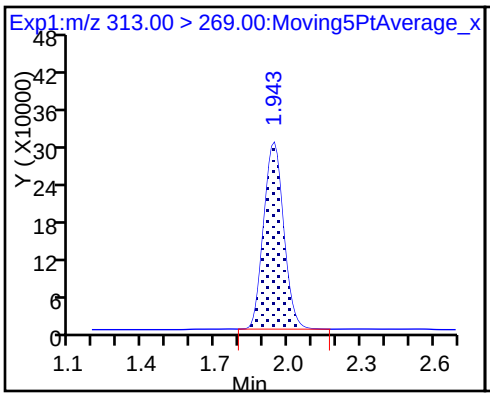
61 Sodium 1H,1H,2H,2H-perfluorohexa



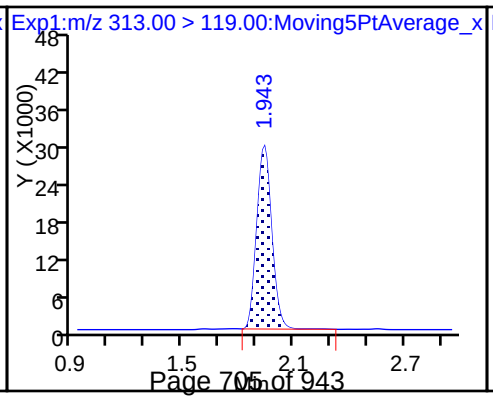
D 7 13C2 PFHxA



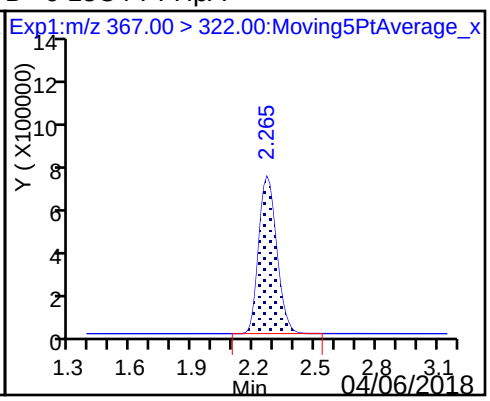
6 Perfluorohexanoic acid



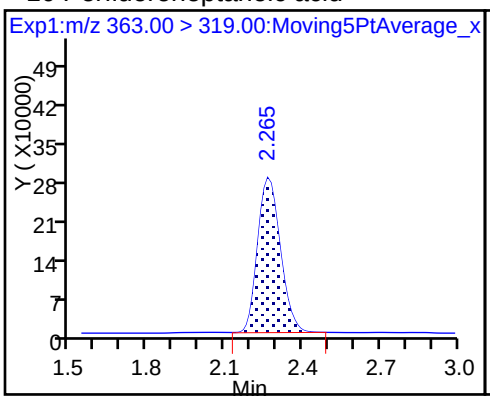
6 Perfluorohexanoic acid



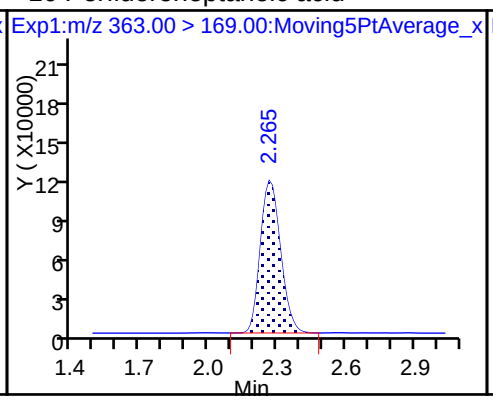
D 9 13C4-PFHpA



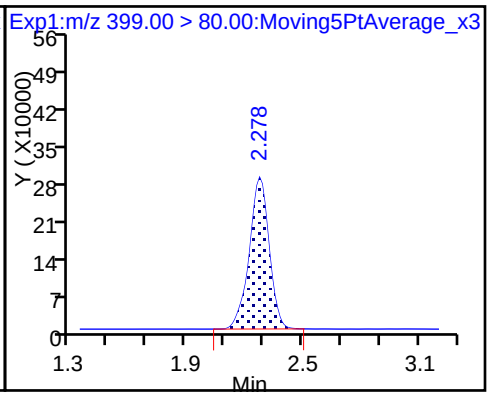
10 Perfluoroheptanoic acid



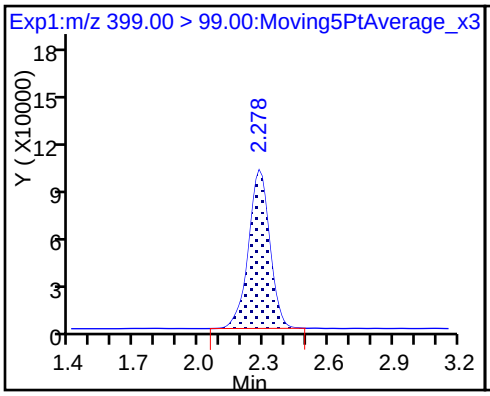
10 Perfluoroheptanoic acid



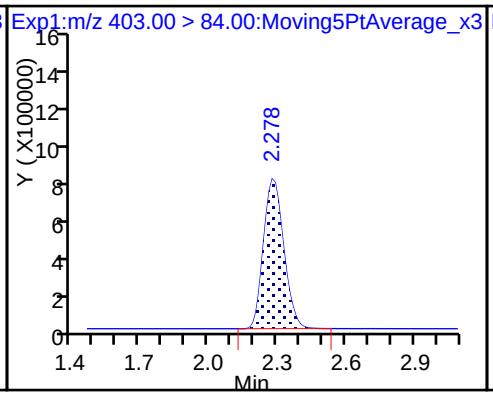
8 Perfluorohexanesulfonic acid



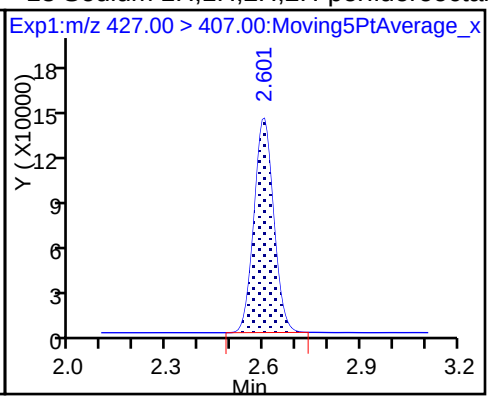
8 Perfluorohexanesulfonic acid



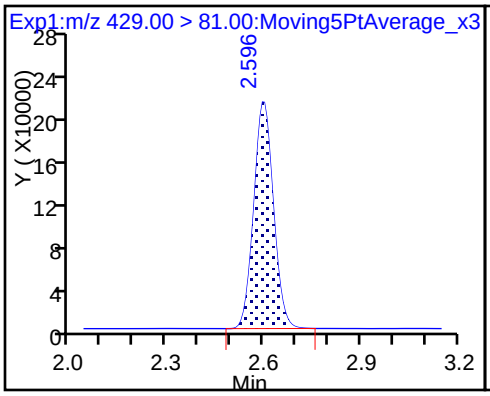
D 11 18O2 PFHxS



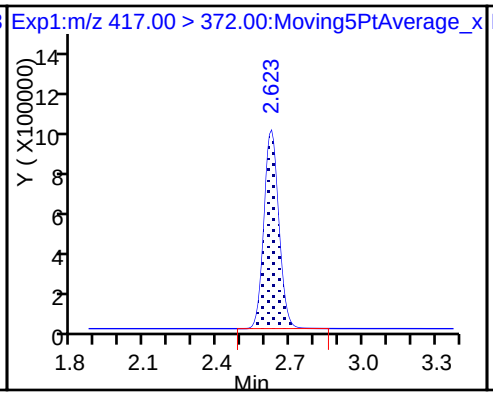
13 Sodium 1H,1H,2H,2H-perfluorooctane



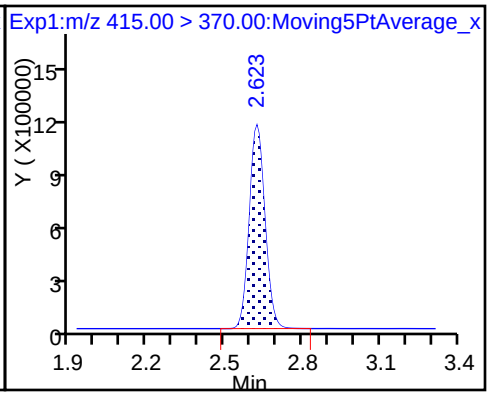
D 12 M2-6:2FTS



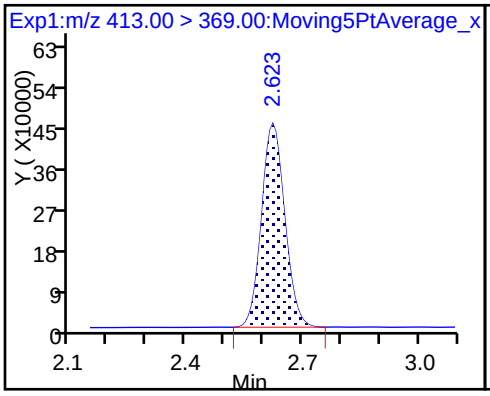
D 14 13C4 PFOA



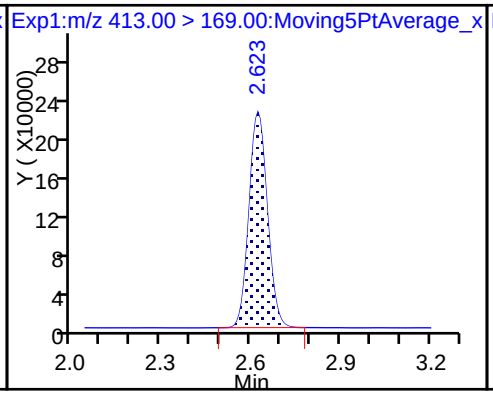
* 62 13C2-PFOA



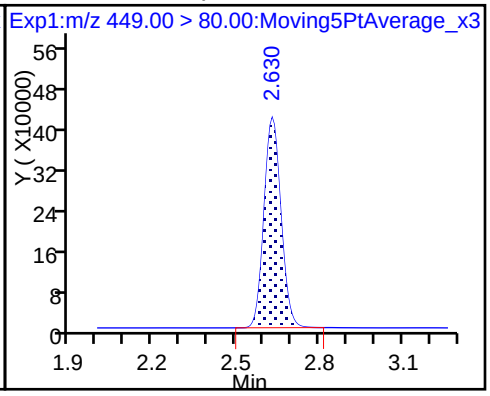
15 Perfluorooctanoic acid



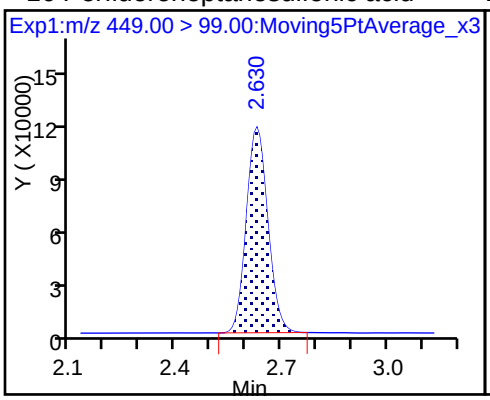
15 Perfluorooctanoic acid



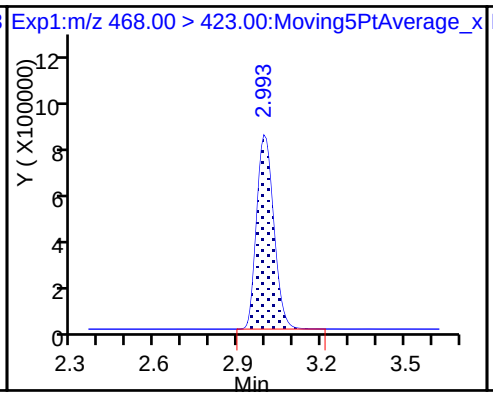
16 Perfluoroheptanesulfonic acid



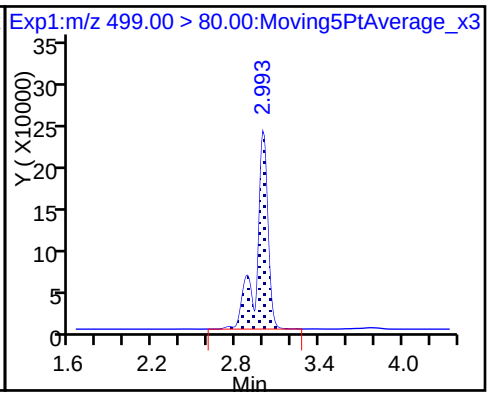
16 Perfluoroheptanesulfonic acid



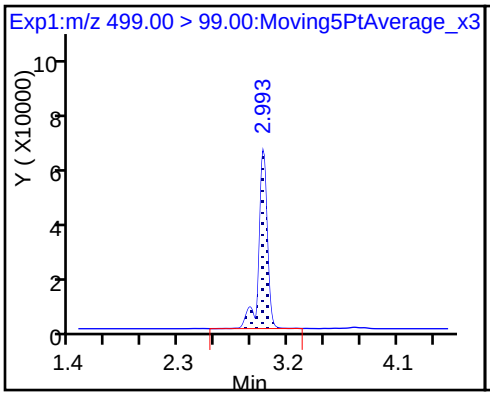
D 19 13C5 PFNA



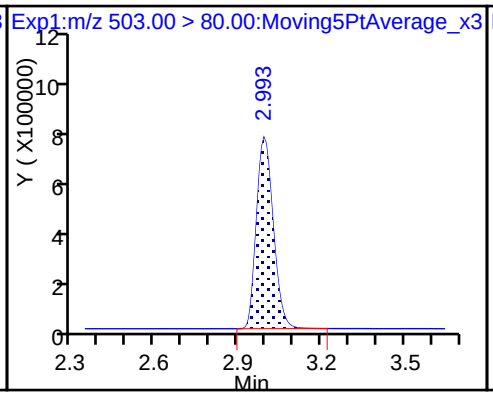
17 Perfluorooctane sulfonic acid



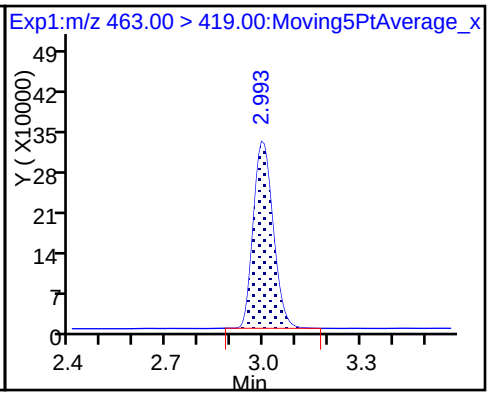
17 Perfluorooctane sulfonic acid



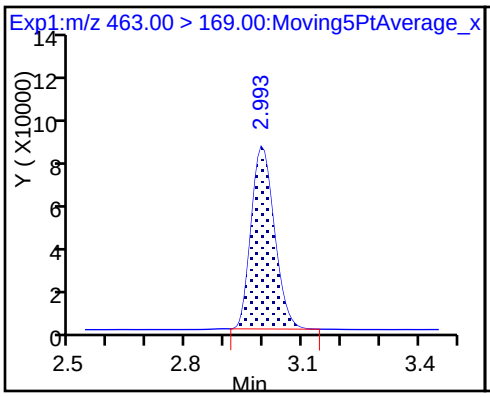
D 18 13C4 PFOS



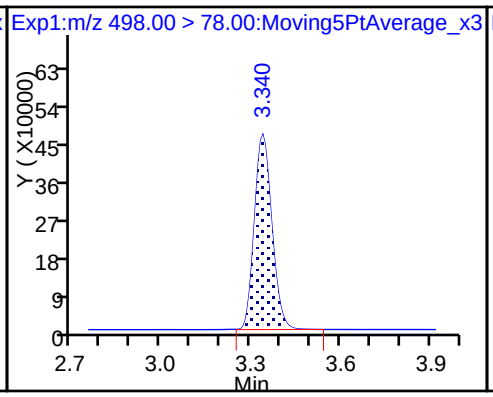
20 Perfluorononanoic acid



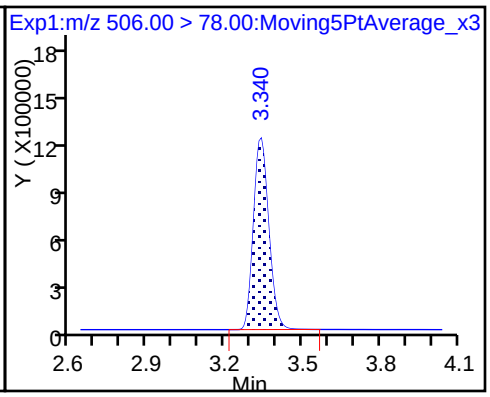
20 Perfluorononanoic acid



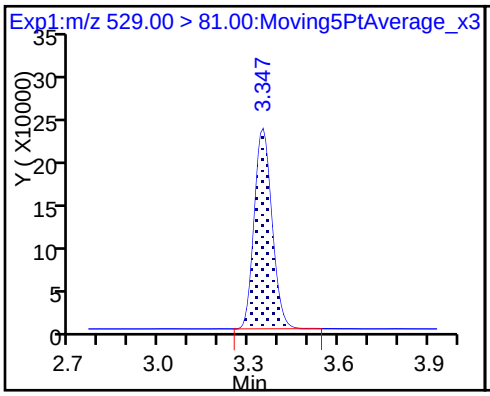
22 Perfluorooctane Sulfonamide



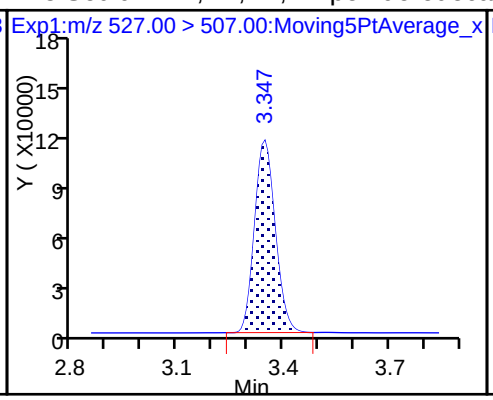
D 21 13C8 FOSA



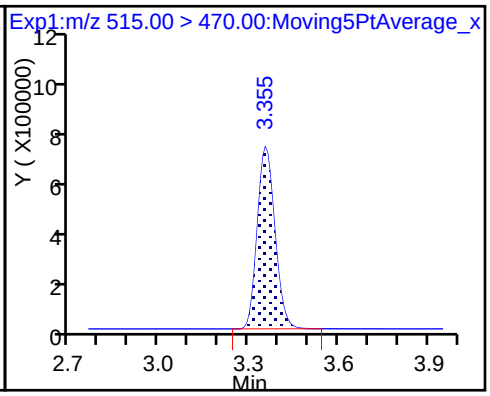
D 26 M2-8:2FTS



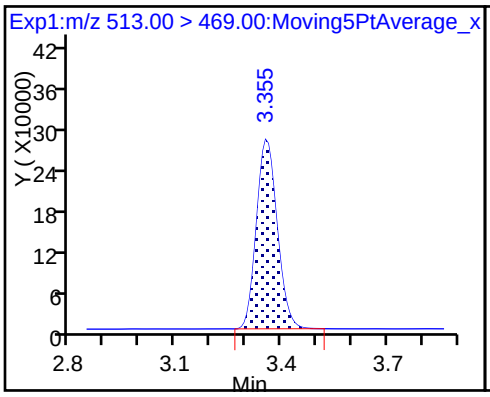
25 Sodium 1H,1H,2H,2H-perfluorodecane



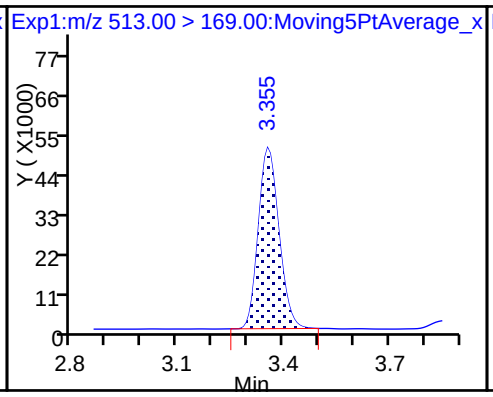
D 23 13C2 PFDA



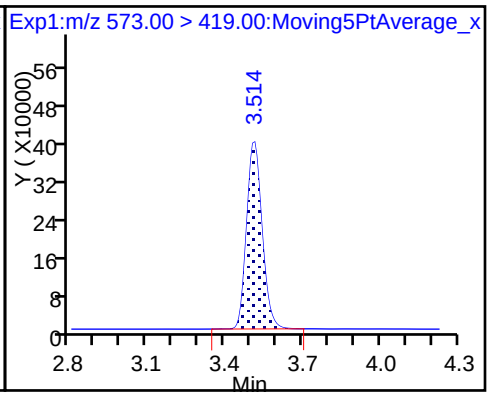
24 Perfluorodecanoic acid



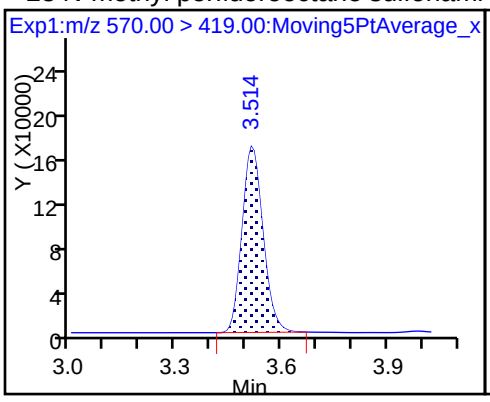
24 Perfluorodecanoic acid



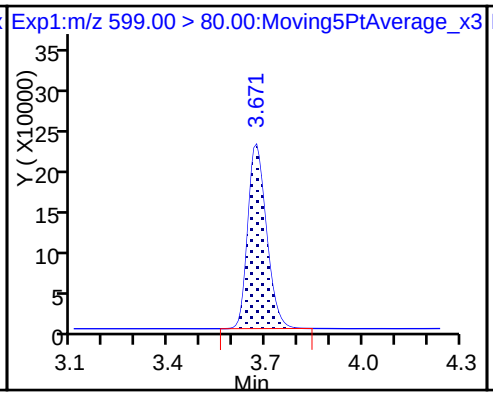
D 27 d3-NMeFOSAA



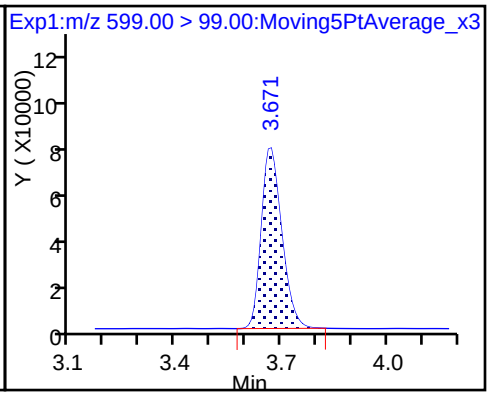
28 N-methyl perfluorooctane sulfonami



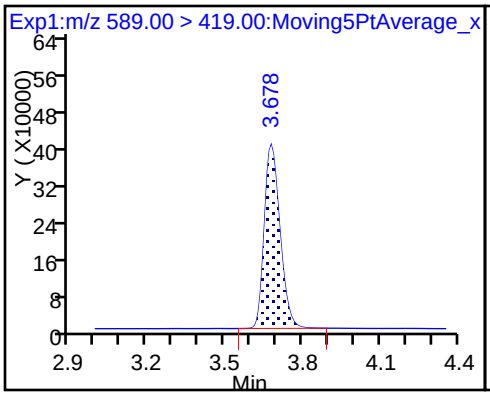
29 Perfluorodecane Sulfonic acid



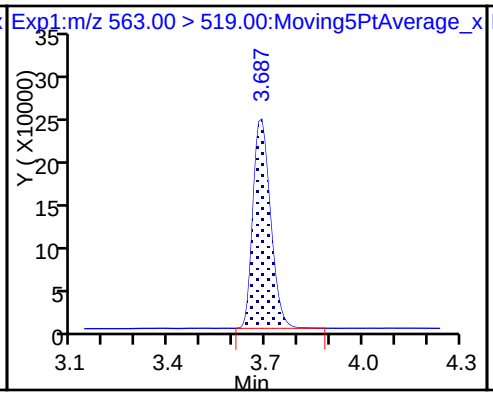
29 Perfluorodecane Sulfonic acid



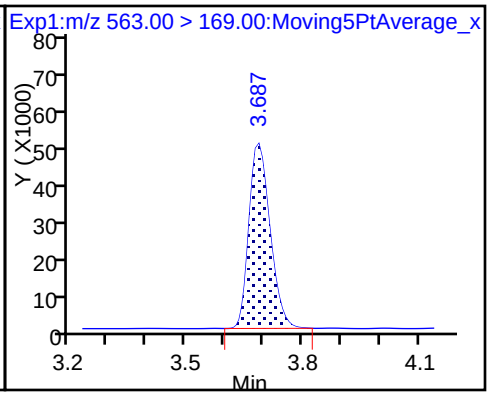
D 32 d5-NEtFOSAA



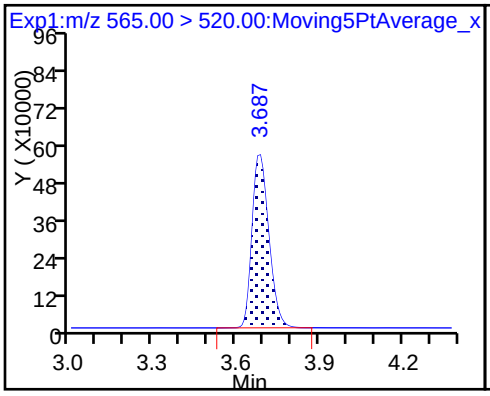
31 Perfluoroundecanoic acid



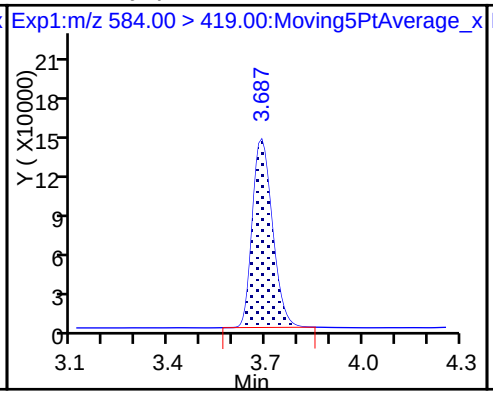
31 Perfluoroundecanoic acid



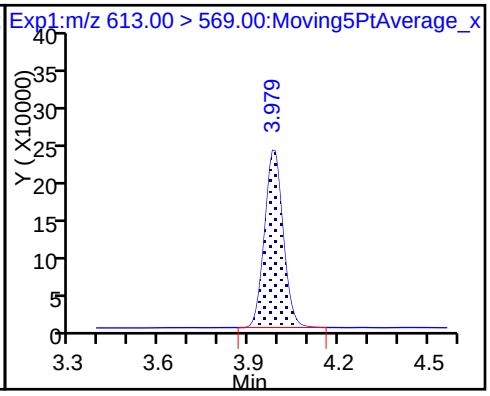
D 30 13C2 PFUnA



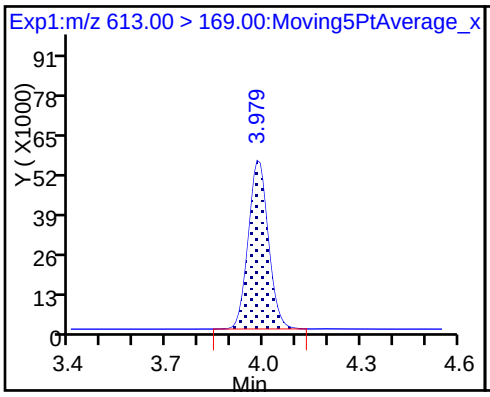
33 N-ethyl perfluorooctane sulfonamid



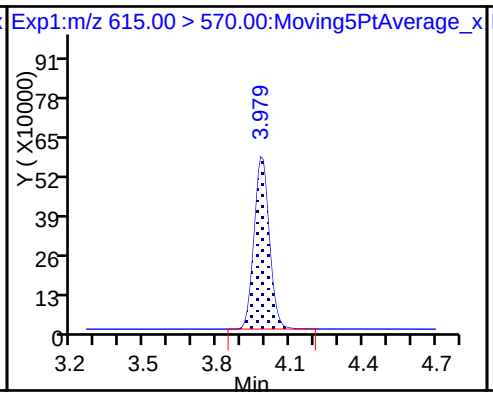
37 Perfluorododecanoic acid



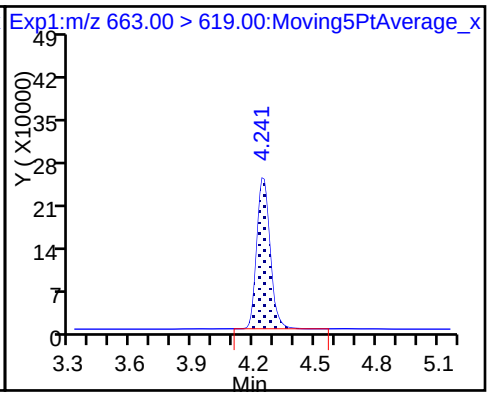
37 Perfluorododecanoic acid



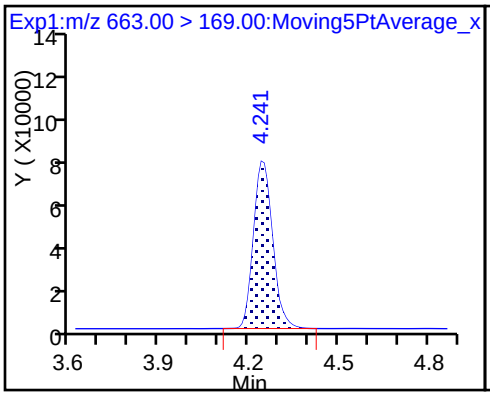
D 36 13C2 PFDoA



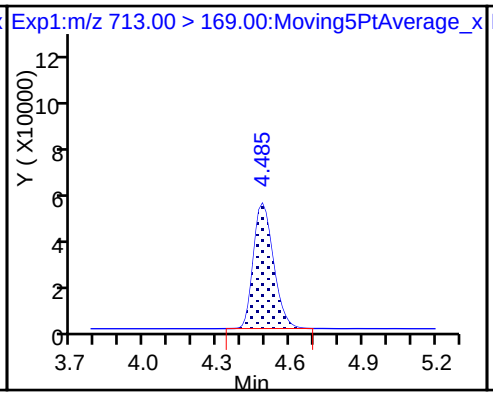
41 Perfluorotridecanoic acid



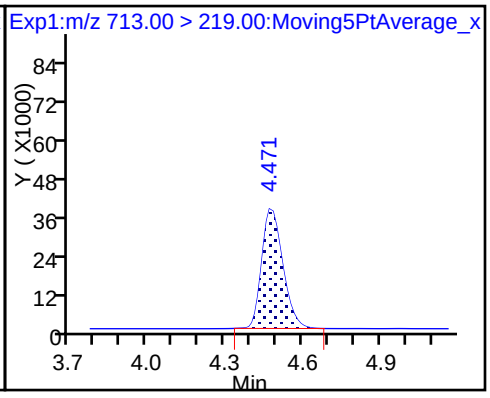
41 Perfluorotridecanoic acid



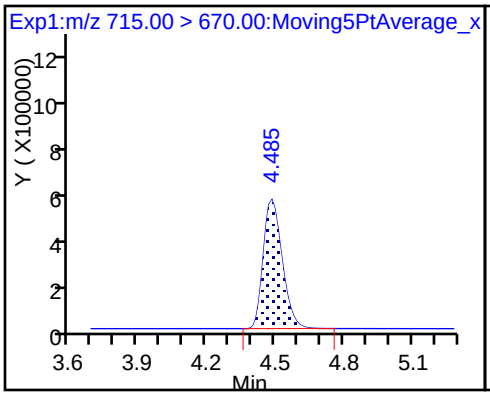
42 Perfluorotetradecanoic acid



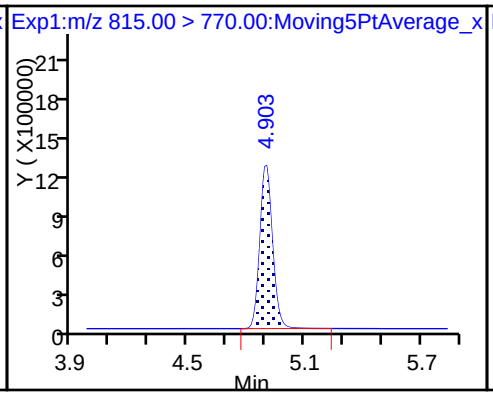
42 Perfluorotetradecanoic acid



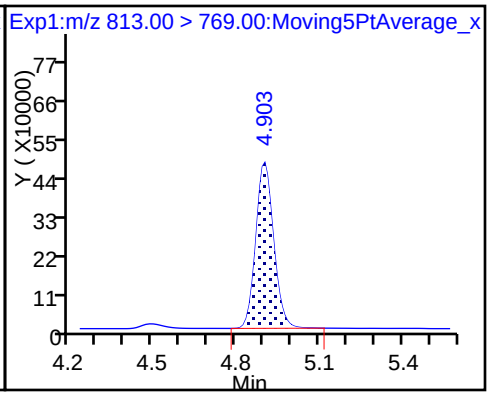
D 43 13C2-PFTeDA



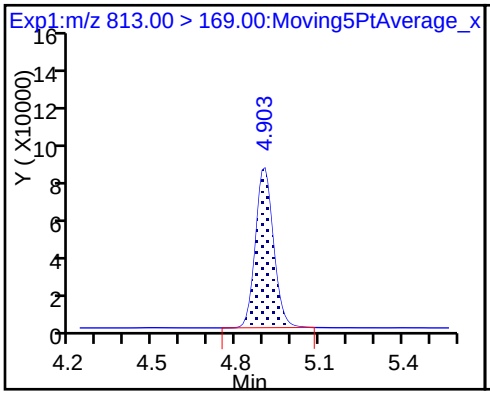
D 44 13C2-PFHxDA



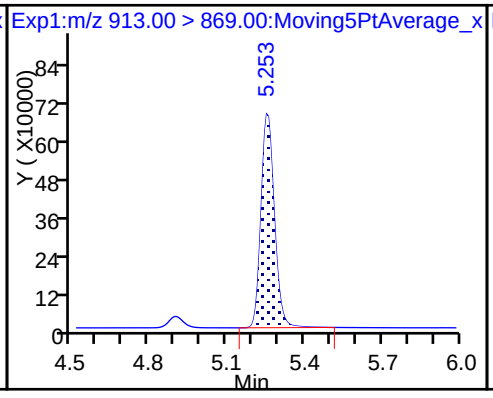
45 Perfluorohexadecanoic acid



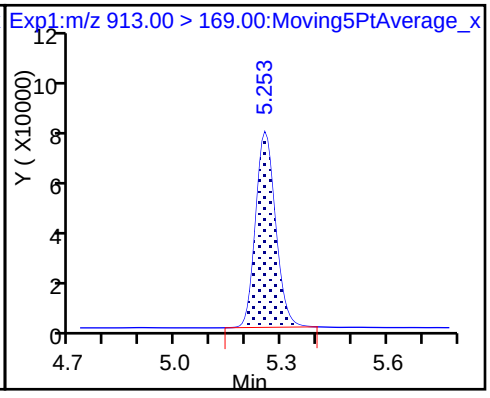
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205677/19 Calibration Date: 01/26/2018 00:09

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.25LLAAXZ_051.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9343	0.9412		2.52	2.50	0.7	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.184		2.51	2.50	0.5	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	78.94		2.26	2.21	2.2	25.0
4:2 FTS	AveID	13.89	16.66		2.80	2.34	19.9	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	1.032		2.49	2.50	-0.5	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.106		2.52	2.50	0.7	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.021		2.09	2.28	-8.3	25.0
6:2FTS	AveID	1.655	1.613		2.31	2.37	-2.5	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.116		2.38	2.50	-4.8	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.341		2.36	2.38	-1.0	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.068		2.59	2.50	3.5	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.089		2.26	2.32	-2.7	25.0
8:2FTS	AveID	1.217	1.339		2.64	2.40	10.0	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	1.005		2.56	2.50	2.3	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9897		2.55	2.50	2.0	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.050		2.43	2.50	-2.8	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6919		2.55	2.41	5.6	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9628		2.47	2.50	-1.1	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	1.015		2.46	2.50	-1.7	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.065		2.60	2.50	3.9	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.217		2.62	2.50	4.8	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2479		2.54	2.50	1.6	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9626		2.52	2.50	0.8	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.083		2.57	2.50	2.8	25.0
13C4 PFBA	Ave	1.512	1.492		2.47	2.50	-1.4	50.0
13C5-PFPeA	Ave	0.8956	0.9055		2.53	2.50	1.1	50.0
13C3-PFBS	Ave	0.0198	0.0197		2.32	2.33	-0.4	50.0
13C2 PFHxA	Ave	0.9649	0.9655		2.50	2.50	0.0	50.0
13C4-PFHpA	Ave	0.9187	0.9432		2.57	2.50	2.7	50.0
18O2 PFHxS	Ave	1.131	1.227		2.57	2.37	8.5	50.0
M2-6:2FTS	Ave	0.1699	0.2127		2.97	2.38	25.2	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205677/19 Calibration Date: 01/26/2018 00:09

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.25LLAAXZ_051.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.9339		2.59	2.50	3.7	50.0
13C4 PFOS	Ave	0.7158	0.7789		2.60	2.39	8.8	50.0
13C5 PFNA	Ave	0.7300	0.7631		2.61	2.50	4.5	50.0
13C8 FOSA	Ave	1.007	1.069		2.65	2.50	6.2	50.0
M2-8:2FTS	Ave	0.1795	0.2136		2.85	2.40	18.9	50.0
13C2 PFDA	Ave	0.6306	0.6751		2.68	2.50	7.1	50.0
d3-NMeFOSAA	Ave	0.3147	0.3735		2.97	2.50	18.7	50.0
d5-NEtFOSAA	Ave	0.3182	0.3836		3.01	2.50	20.5	50.0
13C2 PFUnA	Ave	0.4783	0.5244		2.74	2.50	9.6	50.0
13C2 PFDoA	Ave	0.5192	0.5351		2.58	2.50	3.1	50.0
13C2-PFTeDA	Ave	0.6785	0.7231		2.66	2.50	6.6	50.0
13C2-PFHxDA	Ave	1.209	1.250		2.58	2.50	3.4	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_051.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 26-Jan-2018 00:09:55 ALS Bottle#: 14 Worklist Smp#: 19
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:55 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:29:14

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	1.408	1.411	-0.003	0.538	6430790	2.47		98.6	24167	
2 Perfluorobutyric acid										
212.90 > 169.00	1.408	1.413	-0.005	1.000	6052938	2.52		101	989	
D 3 13C5-PFPeA										
267.90 > 223.00	1.654	1.659	-0.005	0.632	3904019	2.53		101	38962	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.654	1.662	-0.008	1.000	4624044	2.51		101	3524	
D 47 13C3-PFBS										
301.90 > 83.00	1.689	1.695	-0.006	0.646	79153	2.32		99.6	2906	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.689	1.697	-0.008	1.000	5939288	2.26		102	17120	
298.90 > 99.00	1.689	1.697	-0.008	1.000	2571478		2.31(1.25-3.74)		10963	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.903	1.903	0.0	1.000	1324193	2.80		120	49001	
D 60 M2-4:2FTS										
329.00 > 81.00	1.893	1.903	-0.010	0.724	581417	NC			5625	
D 7 13C2 PFHxA										
315.00 > 270.00	1.934	1.939	-0.005	0.739	4162650	2.50		100	31100	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.934	1.939	-0.005	1.000	4294181	2.49		99.5	12837	
313.00 > 119.00	1.934	1.939	-0.005	1.000	402426		10.67(5.03-15.10)		6573	
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.866	4066553	2.57		103	24746	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.266	2.268	-0.002	1.000	4498543	2.52		101	5701	
363.00 > 169.00	2.266	2.268	-0.002	1.000	1739107		2.59(1.13-3.40)		9829	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	4915361	2.09		91.7	11507	
399.00 > 99.00	2.279	2.280	-0.001	1.000	1647319		2.98(1.50-4.49)		7072	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.871	5005635	2.57		108	23348	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.596	0.0	1.000	1402205	2.31		97.5	28000	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.992	870994	2.97		125	17416	
D 14 13C4 PFOA										
417.00 > 372.00	2.617	2.622	-0.005	1.000	4026690	2.59		104	28127	
* 62 13C2-PFOA										
415.00 > 370.00	2.617	2.622	-0.005		4311575	2.50			24652	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.617	2.623	-0.006	1.000	4493943	2.38		95.2	1745	
413.00 > 169.00	2.617	2.623	-0.006	1.000	2422367		1.86(0.84-2.52)		13073	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.624	2.629	-0.005	1.000	4288745	2.36		99.0	19252	
449.00 > 99.00	2.624	2.629	-0.005	1.000	1140157		3.76(1.94-5.82)		12218	
D 19 13C5 PFNA										
468.00 > 423.00	2.986	2.992	-0.006	1.141	3290170	2.61		105	22050	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.986	2.992	-0.006	1.000	3395348	2.26		97.3	5439	
499.00 > 99.00	2.986	2.992	-0.006	1.000	757653		4.48(2.31-6.93)		5240	
D 18 13C4 PFOS										
503.00 > 80.00	2.986	2.992	-0.006	1.141	3210586	2.60		109	17943	
20 Perfluorononanoic acid										
463.00 > 419.00	2.986	2.992	-0.006	1.000	3515266	2.59		104	7738	
463.00 > 169.00	2.986	2.992	-0.006	1.000	853774		4.12(1.90-5.69)		12845	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.334	3.338	-0.004	1.002	4630853	2.56		102	17204	
D 21 13C8 FOSA										
506.00 > 78.00	3.327	3.338	-0.011	1.271	4609773	2.65		106	15540	
D 26 M2-8:2FTS										
529.00 > 81.00	3.342	3.342	0.0	1.277	882071	2.85		119	14195	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.334	3.342	-0.008	0.998	1181306	2.64		110	18073	
D 23 13C2 PFDA										
515.00 > 470.00	3.349	3.352	-0.003	1.280	2910934	2.68		107	21122	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.349	3.353	-0.004	1.000	2880815	2.55		102	12302	
513.00 > 169.00	3.349	3.353	-0.004	1.000	504975		5.70(2.36-7.09)		1732	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.502	3.507	-0.005	1.338	1610393	2.97		119	13361	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.509	3.513	-0.004	1.002	1690358	2.43		97.2	7951	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.659	3.666	-0.007	1.000	2239833	2.55		106	26695	
599.00 > 99.00	3.659	3.666	-0.007	1.000	755040		2.97(1.39-4.16)		15667	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.665	3.672	-0.007	1.401	1653907	3.01		121	7127	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.673	3.678	-0.005	1.000	2294774	2.46		98.3	9009	
563.00 > 169.00	3.673	3.678	-0.005	1.000	458536		5.00(0.00-0.00)		13991	
D 30 13C2 PFUnA										
565.00 > 520.00	3.673	3.679	-0.006	1.404	2261161	2.74		110	19639	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.673	3.679	-0.006	1.002	1592423	2.47		98.9	11608	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.974	3.979	-0.005	1.000	2455878	2.60		104	8631	
613.00 > 169.00	3.974	3.979	-0.005	1.000	606710		4.05(2.13-6.40)		14123	
D 36 13C2 PFDoA										
615.00 > 570.00	3.974	3.979	-0.005	1.519	2307036	2.58		103	19621	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.235	4.242	-0.007	1.000	2807084	2.62		105	8004	
663.00 > 169.00	4.235	4.242	-0.007	1.000	840444		3.34(1.25-3.76)		21149	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.473	4.483	-0.010	1.000	772860	2.54		102	12422	
713.00 > 219.00	4.473	4.483	-0.010	1.000	507489		1.52(0.71-2.13)		15031	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.473	4.483	-0.010	1.709	3117546	2.66		107	18566	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.896	4.902	-0.006	1.871	5389711	2.58		103	19030	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.896	4.902	-0.006	1.000	5187880	2.52		101	3432	
813.00 > 169.00	4.896	4.902	-0.006	1.000	891533		5.82(2.86-8.58)		6666	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.254	5.255	-0.001	1.000	5835474	2.57		103	1369	
913.00 > 169.00	5.247	5.255	-0.008	0.999	714787		8.16(0.00-0.00)		2085	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL5_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 10:22:56 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_051.d

Injection Date: 26-Jan-2018 00:09:55 Instrument ID: A8_N

Lims ID: CCV L5

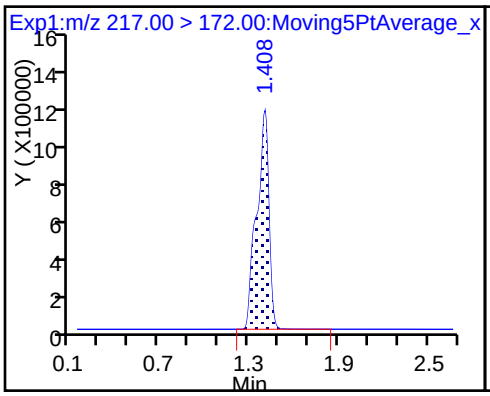
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 14 Worklist Smp#: 19

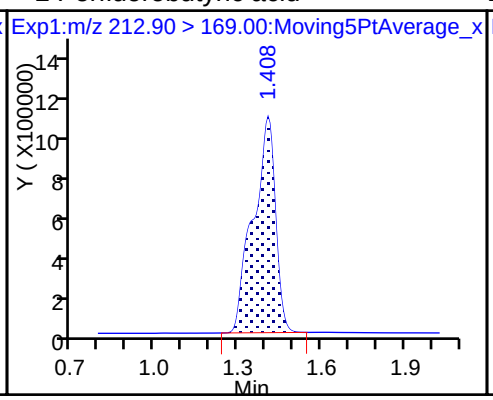
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

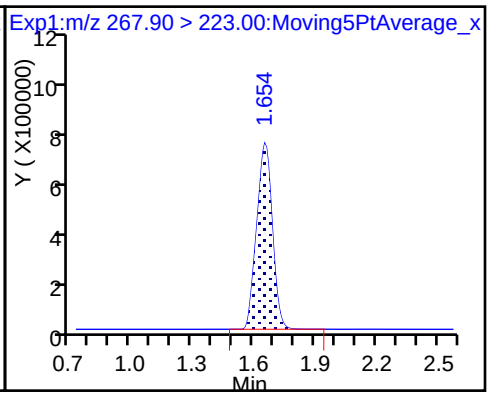
D 1 13C4 PFBA



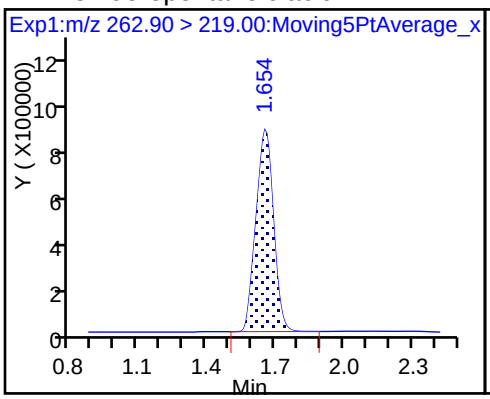
2 Perfluorobutyric acid



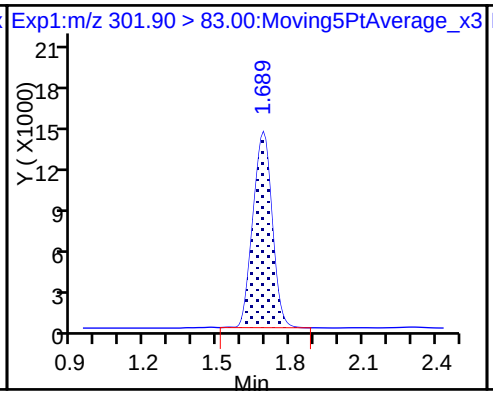
D 3 13C5-PFPeA



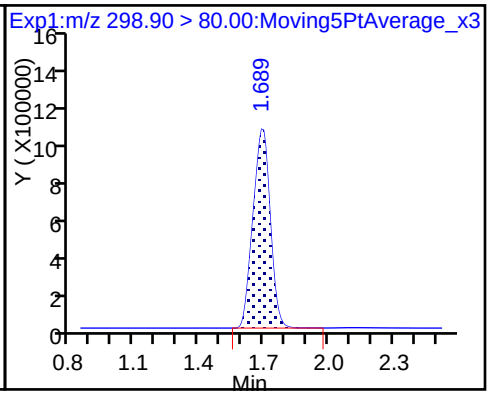
4 Perfluoropentanoic acid



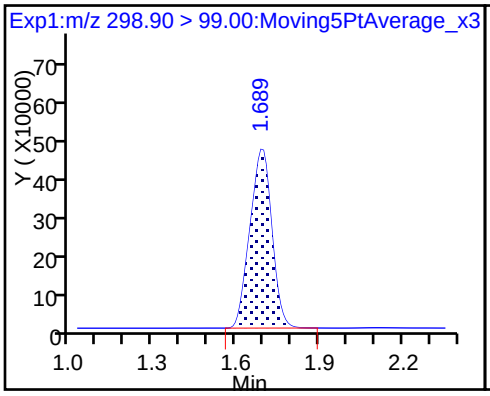
D 47 13C3-PFBS



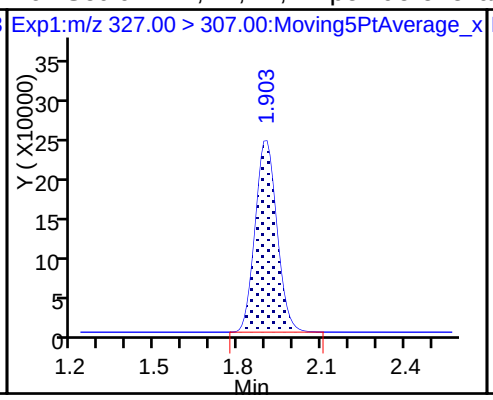
5 Perfluorobutanesulfonic acid



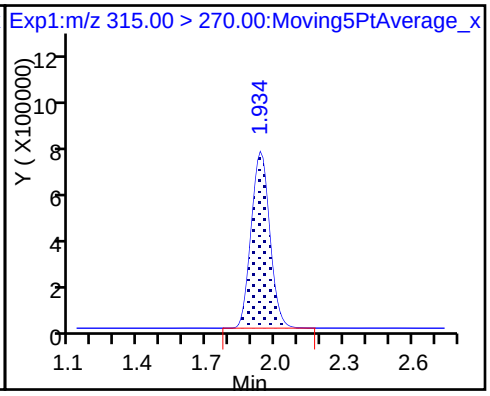
5 Perfluorobutanesulfonic acid



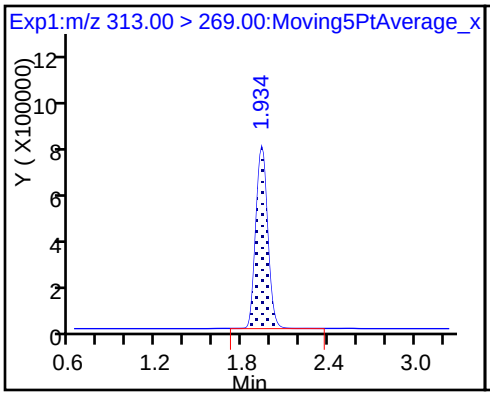
61 Sodium 1H,1H,2H,2H-perfluorohexa



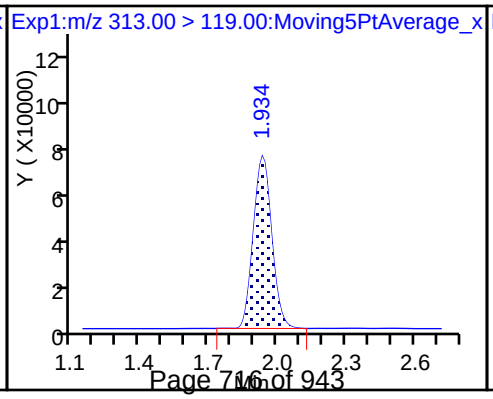
D 7 13C2 PFHxA



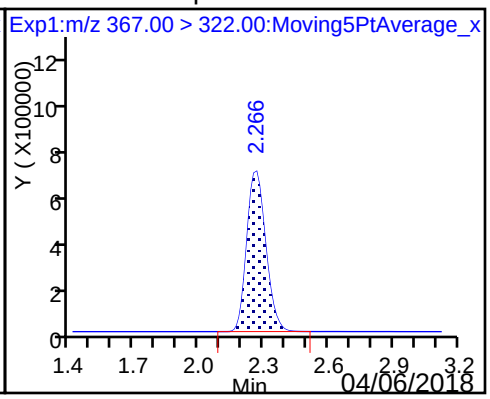
6 Perfluorohexanoic acid



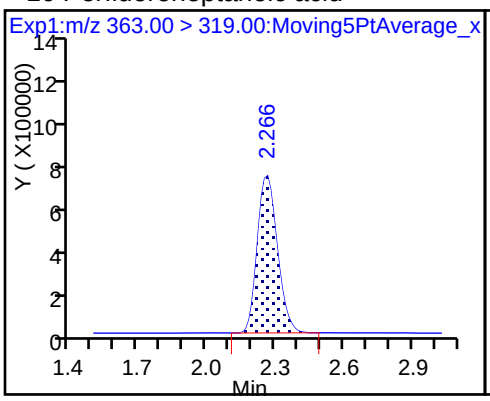
6 Perfluorohexanoic acid



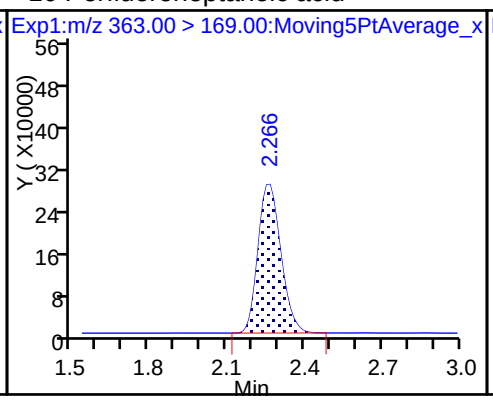
D 9 13C4-PFHpA



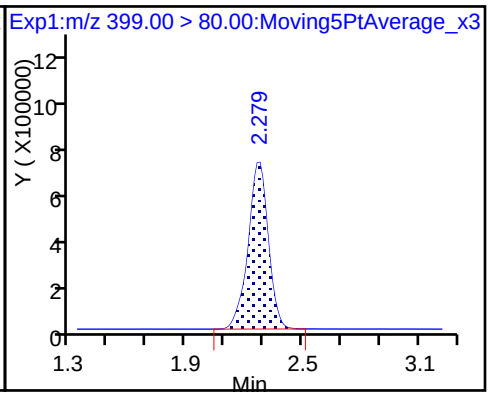
10 Perfluoroheptanoic acid



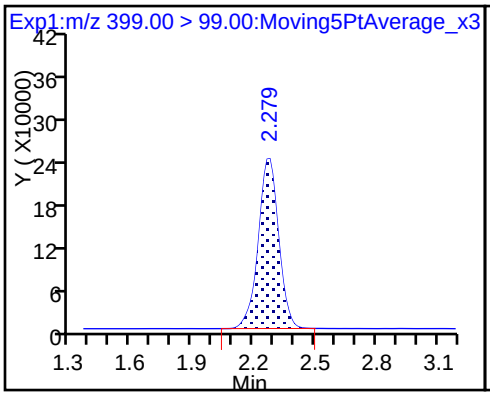
10 Perfluoroheptanoic acid



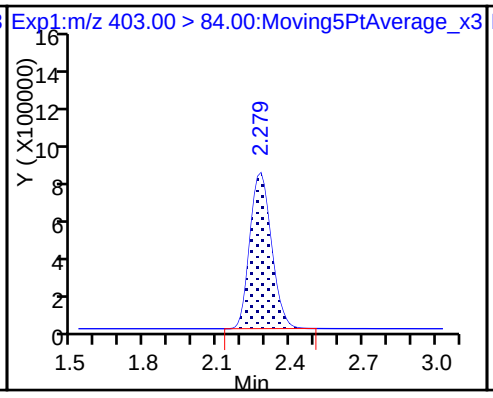
8 Perfluorohexanesulfonic acid



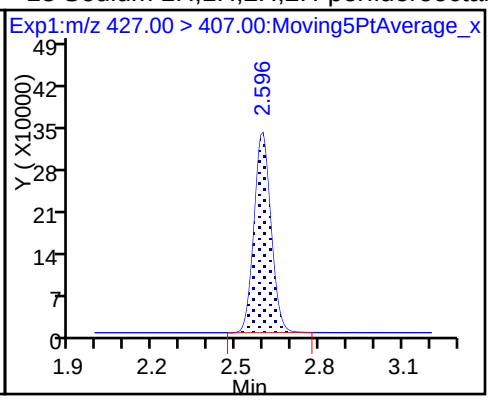
8 Perfluorohexanesulfonic acid



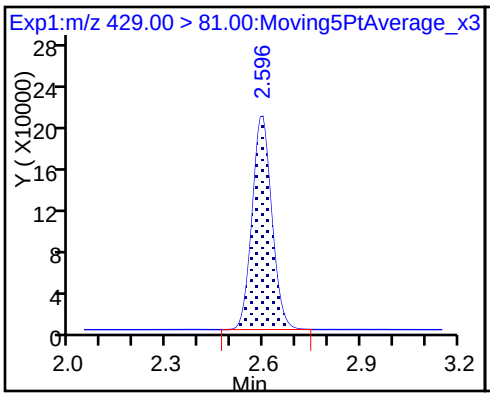
D 11 18O2 PFHxS



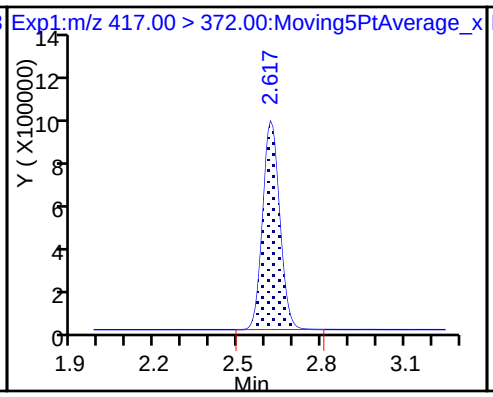
13 Sodium 1H,1H,2H,2H-perfluorooctane



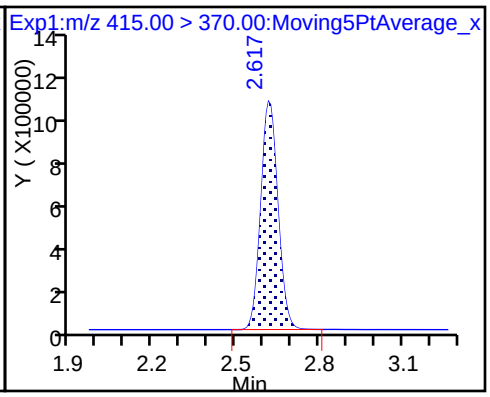
D 12 M2-6:2FTS



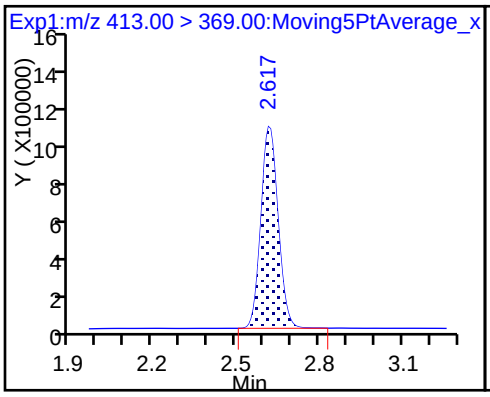
D 14 13C4 PFOA



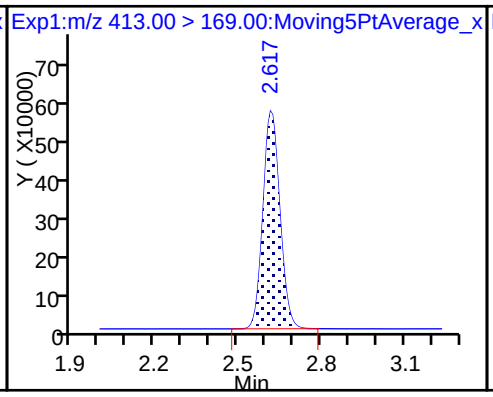
* 62 13C2-PFOA



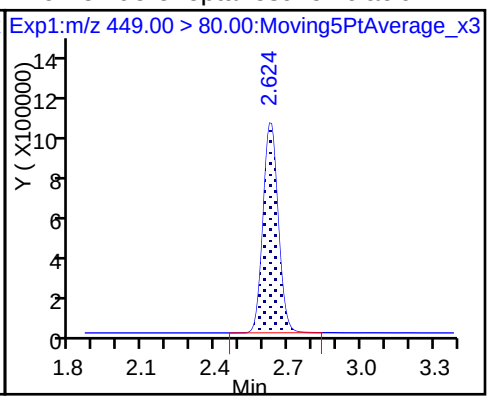
15 Perfluorooctanoic acid



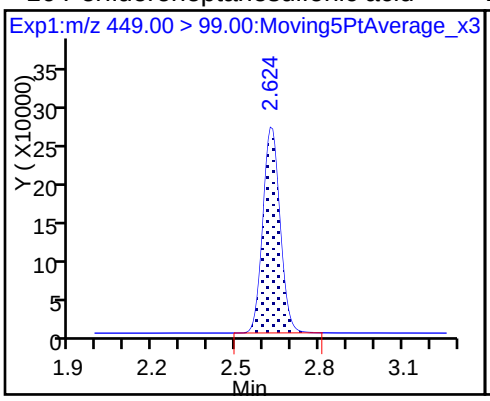
15 Perfluorooctanoic acid



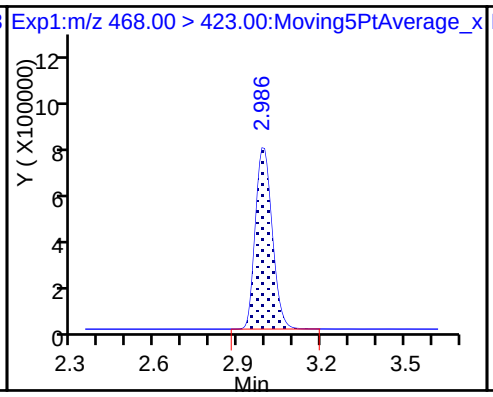
16 Perfluoroheptanesulfonic acid



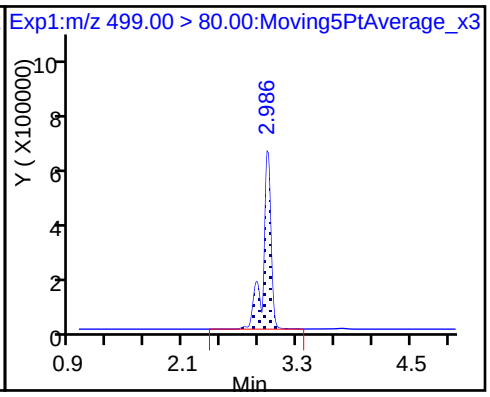
16 Perfluoroheptanesulfonic acid



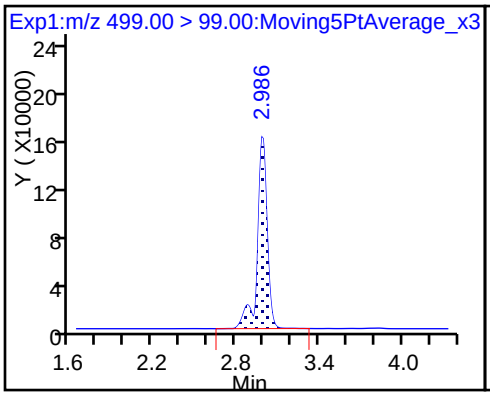
D 19 13C5 PFNA



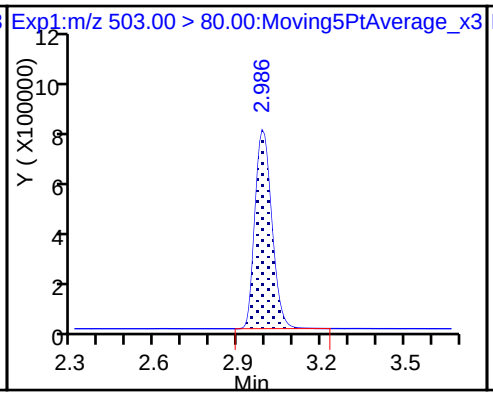
17 Perfluorooctane sulfonic acid



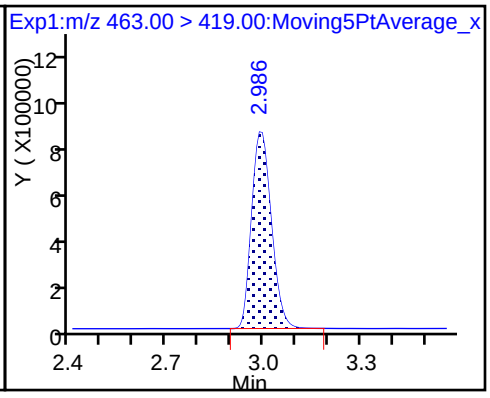
17 Perfluorooctane sulfonic acid



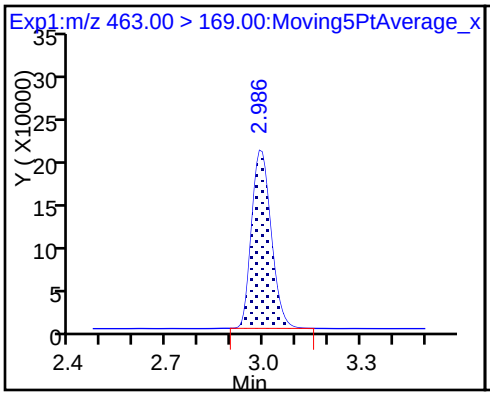
D 18 13C4 PFOS



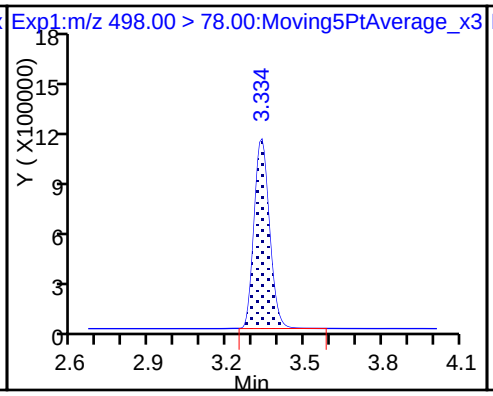
20 Perfluorononanoic acid



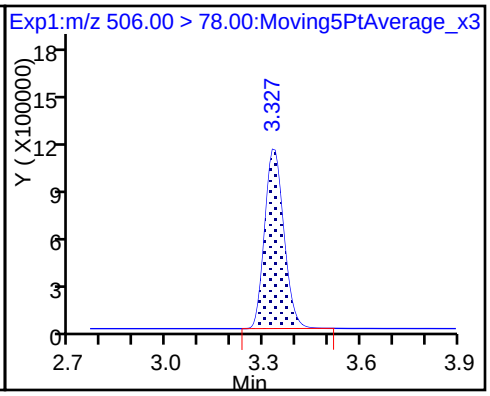
20 Perfluorononanoic acid



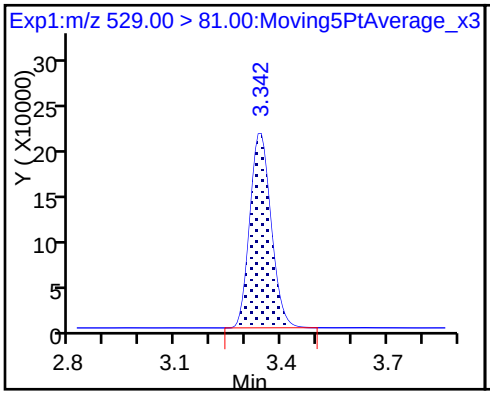
22 Perfluorooctane Sulfonamide



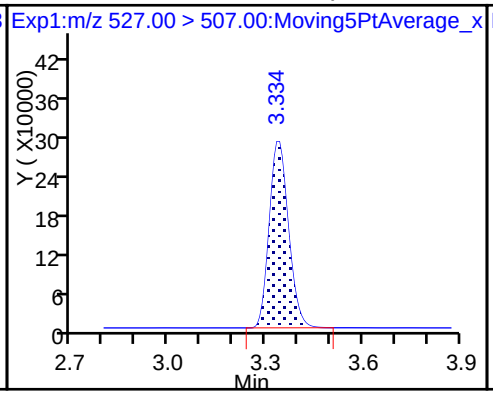
D 21 13C8 FOSA



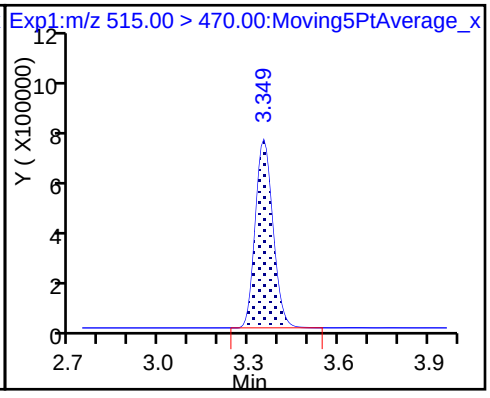
D 26 M2-8:2FTS



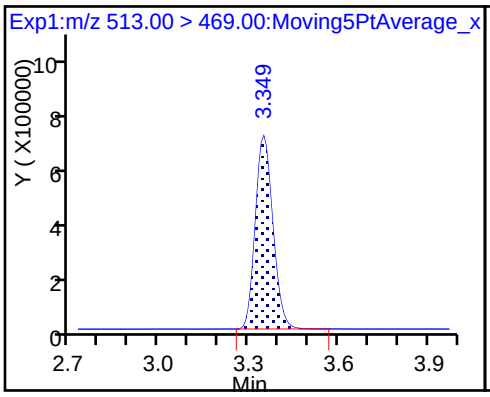
25 Sodium 1H,1H,2H,2H-perfluorodecane



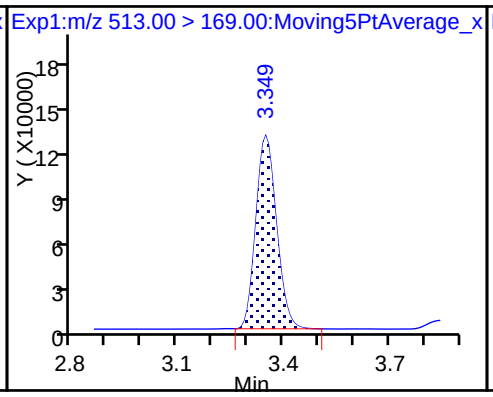
D 23 13C2 PFDA



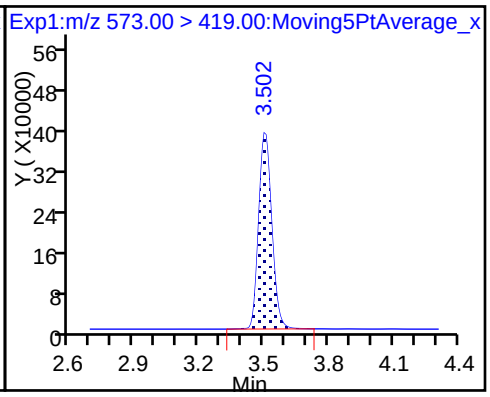
24 Perfluorodecanoic acid



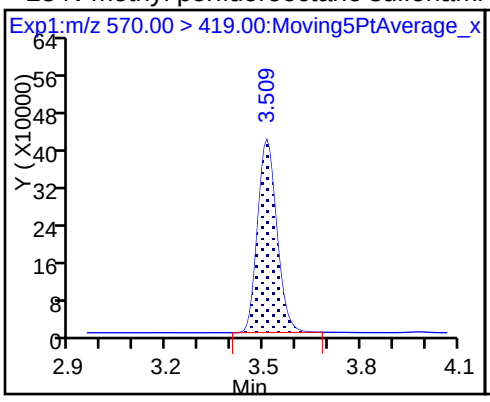
24 Perfluorodecanoic acid



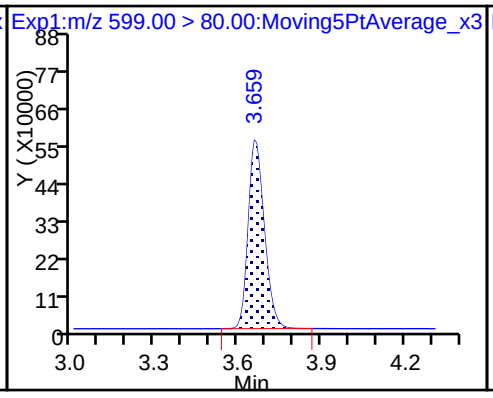
D 27 d3-NMeFOSAA



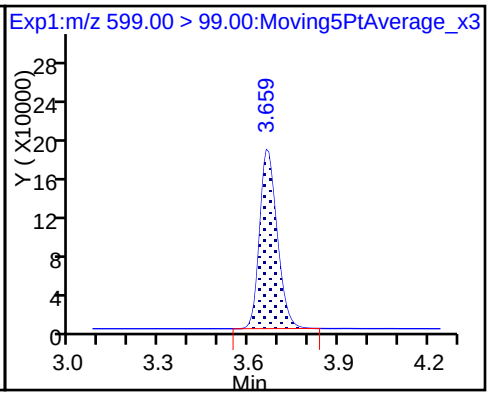
28 N-methyl perfluorooctane sulfonami



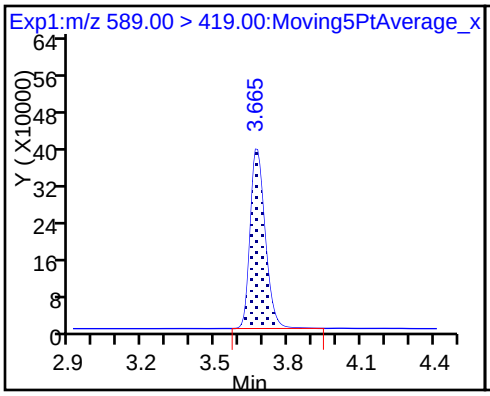
29 Perfluorodecane Sulfonic acid



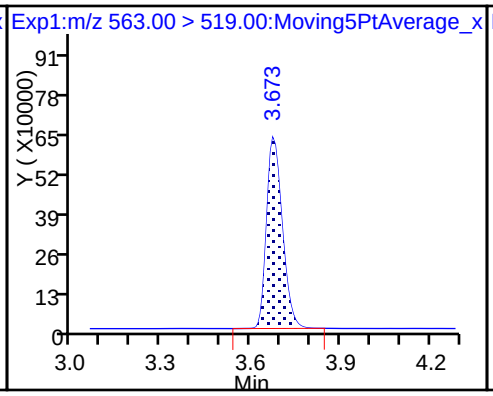
29 Perfluorodecane Sulfonic acid



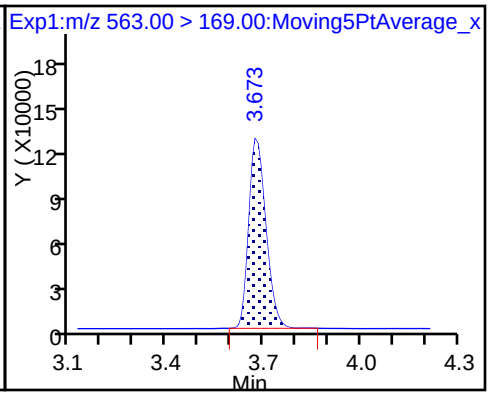
D 32 d5-NEtFOSAA



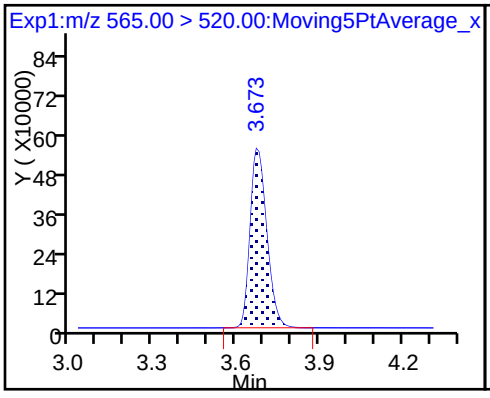
31 Perfluoroundecanoic acid



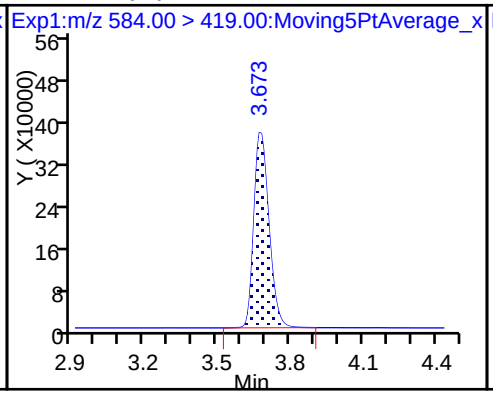
31 Perfluoroundecanoic acid



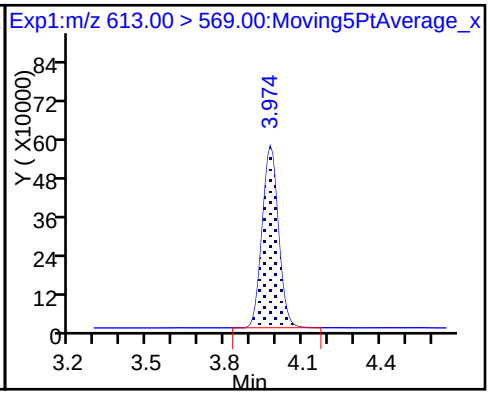
D 30 13C2 PFUnA



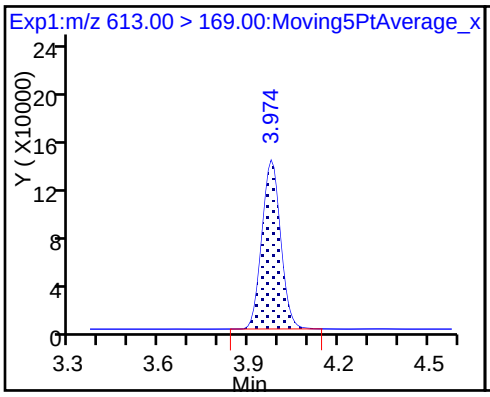
33 N-ethyl perfluorooctane sulfonamid



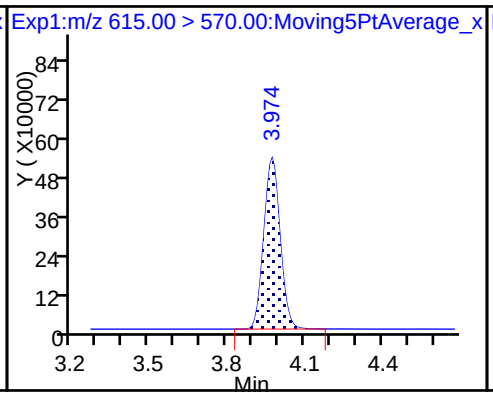
37 Perfluorododecanoic acid



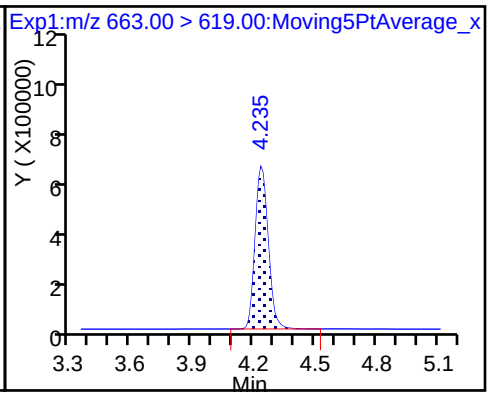
37 Perfluorododecanoic acid



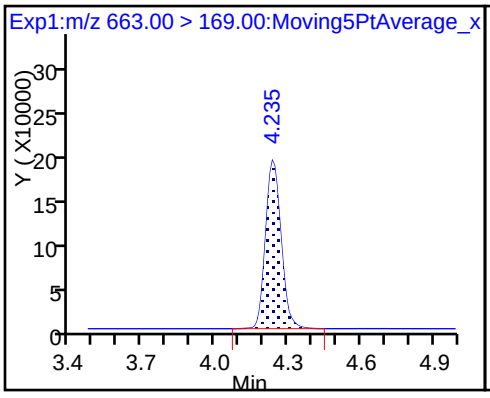
D 36 13C2 PFDoA



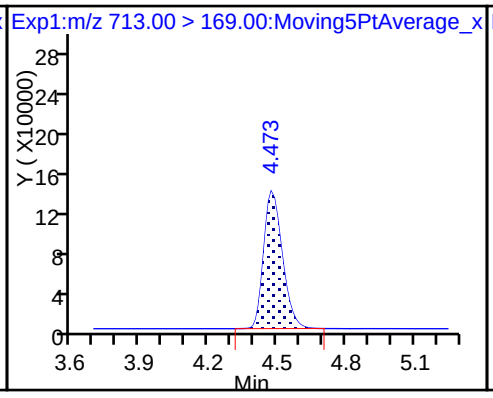
41 Perfluorotridecanoic acid



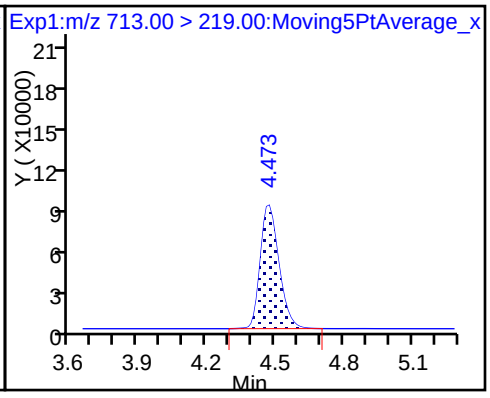
41 Perfluorotridecanoic acid



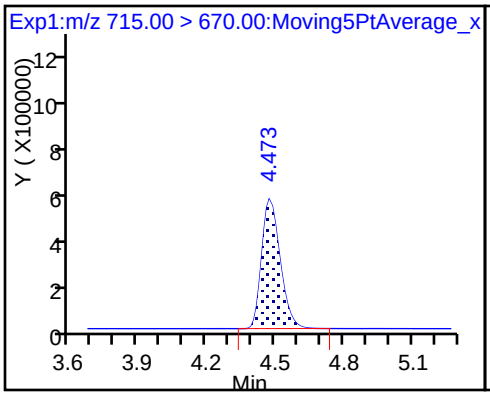
42 Perfluorotetradecanoic acid



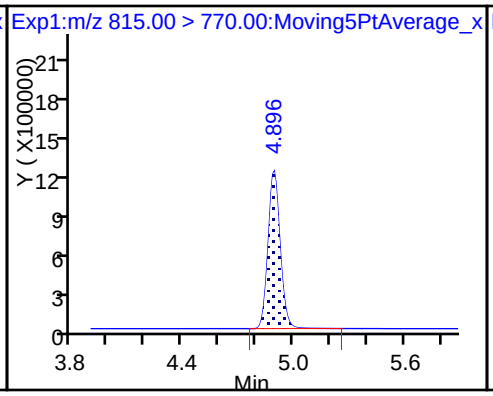
42 Perfluorotetradecanoic acid



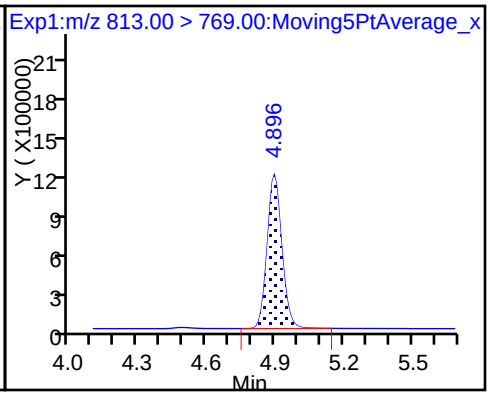
D 43 13C2-PFTeDA



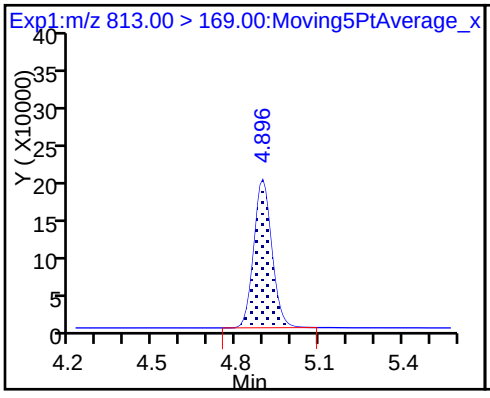
D 44 13C2-PFHxDA



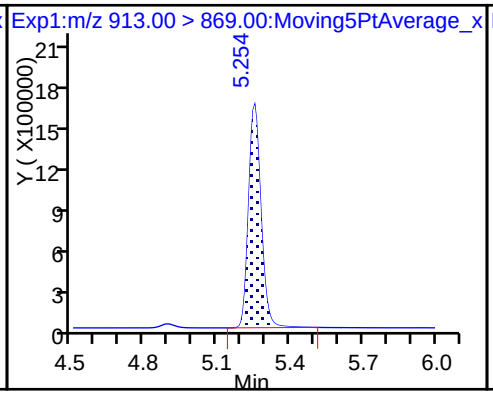
45 Perfluorohexadecanoic acid



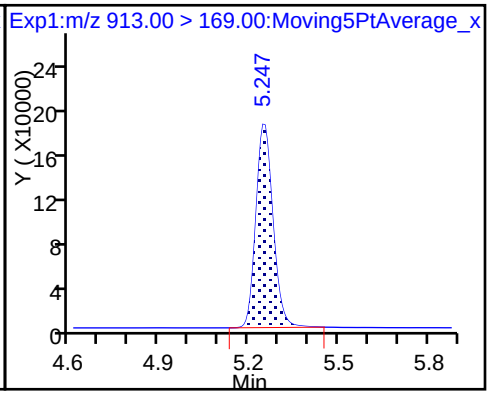
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCVL 320-205751/2 Calibration Date: 01/26/2018 11:47

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_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	0.9343	0.8671		0.0464	0.0500	-7.2	50.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.096		0.0465	0.0500	-7.0	50.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	69.39		0.0397	0.0442	-10.1	50.0
4:2 FTS	AveID	13.89	13.01		0.437	0.467	-6.4	50.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	0.996		0.0481	0.0500	-3.9	50.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.116		0.0508	0.0500	1.5	50.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.163		0.0475	0.0455	4.4	50.0
6:2FTS	AveID	1.655	1.571		0.450	0.474	-5.1	50.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.256		0.0441	0.0476	-7.3	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.096		0.0467	0.0500	-6.5	50.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.070		0.0443	0.0464	-4.4	50.0
Perfluorononanoic acid (PFNA)	AveID	1.032	0.9533		0.0462	0.0500	-7.6	50.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	0.8811		0.0448	0.0500	-10.3	50.0
8:2FTS	AveID	1.217	1.119		0.440	0.479	-8.1	50.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9581		0.0494	0.0500	-1.2	50.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	0.9345		0.433	0.500	-13.5	50.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6244		0.0460	0.0482	-4.7	50.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9086		0.466	0.500	-6.7	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9047		0.0438	0.0500	-12.4	50.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.084		0.0529	0.0500	5.8	50.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.040		0.0448	0.0500	-10.4	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2407		0.0493	0.0500	-1.4	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		1.341		0.0514	0.0500	2.8	50.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.012		0.0480	0.0500	-4.0	50.0
13C4 PFBA	Ave	1.512	1.534		2.54	2.50	1.4	50.0
13C5-PFPeA	Ave	0.8956	0.8965		2.50	2.50	0.1	50.0
13C3-PFBS	Ave	0.0198	0.0211		2.47	2.33	6.2	50.0
13C2 PFHxA	Ave	0.9649	0.9940		2.58	2.50	3.0	50.0
13C4-PFHpA	Ave	0.9187	0.9642		2.62	2.50	5.0	50.0
18O2 PFHxS	Ave	1.131	1.185		2.48	2.37	4.8	50.0
M2-6:2FTS	Ave	0.1699	0.1919		2.68	2.38	13.0	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCVL 320-205751/2 Calibration Date: 01/26/2018 11:47

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_005.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.9482		2.63	2.50	5.3	50.0
13C4 PFOS	Ave	0.7158	0.7807		2.61	2.39	9.1	50.0
13C5 PFNA	Ave	0.7300	0.7679		2.63	2.50	5.2	50.0
13C8 FOSA	Ave	1.007	1.067		2.65	2.50	5.9	50.0
M2-8:2FTS	Ave	0.1795	0.2086		2.78	2.40	16.2	50.0
13C2 PFDA	Ave	0.6306	0.6670		2.64	2.50	5.8	50.0
d3-NMeFOSAA	Ave	0.3147	0.3751		2.98	2.50	19.2	50.0
13C2 PFUnA	Ave	0.4783	0.5328		2.78	2.50	11.4	50.0
d5-NEtFOSAA	Ave	0.3182	0.3808		2.99	2.50	19.7	50.0
13C2 PFDoA	Ave	0.5192	0.5359		2.58	2.50	3.2	50.0
13C2-PFTeDA	Ave	0.6785	0.6749		2.49	2.50	-0.5	50.0
13C2-PFHxDA	Ave	1.209	1.148		2.37	2.50	-5.0	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53378.b\2018.01.26LLA_005.d
Lims ID: CCVL
Client ID:
Sample Type: CCVL
Inject. Date: 26-Jan-2018 11:47:40 ALS Bottle#: 21 Worklist Smp#: 2
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCVL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53378.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 26-Jan-2018 13:50:22 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK048

First Level Reviewer: hannigana Date: 26-Jan-2018 13:39:53

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	1.420	1.411	0.009	0.534	7416702	2.54		101	20369	
2 Perfluorobutyric acid										
212.90 > 169.00	1.420	1.413	0.007	1.000	128627	0.0464		92.8	22.6	
D 3 13C5-PFPeA										
267.90 > 223.00	1.679	1.659	0.020	0.632	4334988	2.50		100	48913	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.679	1.662	0.017	1.000	94982	0.0465		93.0	70.5	
D 47 13C3-PFBS										
301.90 > 83.00	1.715	1.695	0.020	0.645	94675	2.47		106	2991	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.715	1.697	0.018	1.000	124891	0.0397		89.9	492	
298.90 > 99.00	1.715	1.697	0.018	1.000	52807		2.37(1.25-3.74)		341	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.923	1.903	0.020	1.000	247364	0.4372		93.6	15112	
D 60 M2-4:2FTS										
329.00 > 81.00	1.923	1.903	0.020	0.723	634921	NC			5320	
D 7 13C2 PFHxA										
315.00 > 270.00	1.964	1.939	0.025	0.739	4806252	2.58		103	39758	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.964	1.939	0.025	1.000	95755	0.0481		96.1	226	
313.00 > 119.00	1.964	1.939	0.025	1.000	8665		11.05(5.03-15.10)		155	
D 9 13C4-PFHpA										
367.00 > 322.00	2.291	2.267	0.024	0.862	4662235	2.62		105	28501	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.291	2.268	0.023	1.000	104059	0.0508		102	178	
363.00 > 169.00	2.304	2.268	0.036	1.006	36922		2.82(1.13-3.40)		231	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.304	2.280	0.024	0.994	121320	0.0475		104	1044	
399.00 > 99.00	2.317	2.280	0.037	1.000	43148		2.81(1.50-4.49)		299	
D 11 18O2 PFHxS										
403.00 > 84.00	2.317	2.282	0.035	0.872	5422374	2.48		105	27799	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.637	2.596	0.041	1.003	276388	0.4499		94.9	8330	
D 12 M2-6:2FTS										
429.00 > 81.00	2.630	2.597	0.033	0.989	881481	2.68		113	17796	
D 14 13C4 PFOA										
417.00 > 372.00	2.658	2.622	0.036	1.000	4584764	2.63		105	31072	
* 62 13C2-PFOA										
415.00 > 370.00	2.658	2.622	0.036		4835381	2.50			36029	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.665	2.623	0.042	1.003	100461	0.0467		93.5	47.9	
413.00 > 169.00	2.658	2.623	0.035	1.000	52487		1.91(0.84-2.52)		591	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.665	2.629	0.036	1.000	90238	0.0441		92.7	1851	
449.00 > 99.00	2.665	2.629	0.036	1.000	26656		3.39(1.94-5.82)		543	
D 19 13C5 PFNA										
468.00 > 423.00	3.032	2.992	0.040	1.141	3712909	2.63		105	23640	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.032	2.992	0.040	1.000	74946	0.0443		95.6	269	
499.00 > 99.00	3.032	2.992	0.040	1.000	17420		4.30(2.31-6.93)		233	
D 18 13C4 PFOS										
503.00 > 80.00	3.032	2.992	0.040	1.141	3608775	2.61		109	19013	
20 Perfluorononanoic acid										
463.00 > 419.00	3.040	2.992	0.048	1.003	70791	0.0462		92.4	210	
463.00 > 169.00	3.032	2.992	0.040	1.000	16844		4.20(1.90-5.69)		348	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.347	3.338	0.009	1.000	90881	0.0448		89.7	2250	
D 21 13C8 FOSA										
506.00 > 78.00	3.347	3.338	0.009	1.259	5157214	2.65		106	21160	
D 26 M2-8:2FTS										
529.00 > 81.00	3.385	3.342	0.043	1.273	966136	2.78		116	19648	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.392	3.342	0.050	1.002	216158	0.4403		91.9	5907	
D 23 13C2 PFDA										
515.00 > 470.00	3.400	3.352	0.048	1.279	3224995	2.64		106	40094	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.400	3.353	0.047	1.000	61799	0.0494		98.8	292	
513.00 > 169.00	3.400	3.353	0.047	1.000	9808		6.30(2.36-7.09)		326	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.558	3.507	0.051	1.339	1813742	2.98		119	13728	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.558	3.513	0.045	1.000	338972	0.4325		86.5	2717	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.713	3.666	0.047	1.000	45441	0.0460		95.3	1495	
599.00 > 99.00	3.713	3.666	0.047	1.000	13241		3.43(1.39-4.16)		506	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.730	3.672	0.058	1.403	1841411	2.99		120	7444	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.738	3.678	0.060	1.002	46616	0.0438		87.6	230	
563.00 > 169.00	3.730	3.678	0.052	1.000	11985		3.89(0.00-0.00)		499	
D 30 13C2 PFUnA										
565.00 > 520.00	3.730	3.679	0.051	1.403	2576409	2.78		111	19242	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.730	3.679	0.051	1.000	334616	0.4665		93.3	5383	
37 Perfluorododecanoic acid										
613.00 > 569.00	4.035	3.979	0.056	1.000	56185	0.0529		106	269	
613.00 > 169.00	4.035	3.979	0.056	1.000	13434		4.18(2.13-6.40)		610	
D 36 13C2 PFDoA										
615.00 > 570.00	4.035	3.979	0.056	1.518	2591429	2.58		103	23357	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.301	4.242	0.059	1.000	53907	0.0448		89.6	150	
663.00 > 169.00	4.301	4.242	0.059	1.000	20926		2.58(1.25-3.76)		743	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.553	4.483	0.070	1.000	15711	0.0493		98.6	664	
713.00 > 219.00	4.540	4.483	0.057	0.997	11312		1.39(0.71-2.13)		490	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.553	4.483	0.070	1.713	3263586	2.49		99.5	18371	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.975	4.902	0.073	1.871	5551806	2.37		95.0	17854	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.975	4.902	0.073	1.000	148862	0.0514		103	87.9	
813.00 > 169.00	4.975	4.902	0.073	1.000	25833		5.76(2.86-8.58)		740	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.351	5.255	0.096	1.000	112340	0.0480		96.0	35.2	
913.00 > 169.00	5.351	5.255	0.096	1.000	14775		7.60(0.00-0.00)		215	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_CCVL_00002 Amount Added: 1.00 Units: mL

Report Date: 26-Jan-2018 13:50:23 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53378.b\2018.01.26LLA_005.d

Injection Date: 26-Jan-2018 11:47:40 Instrument ID: A8_N

Lims ID: CCVL

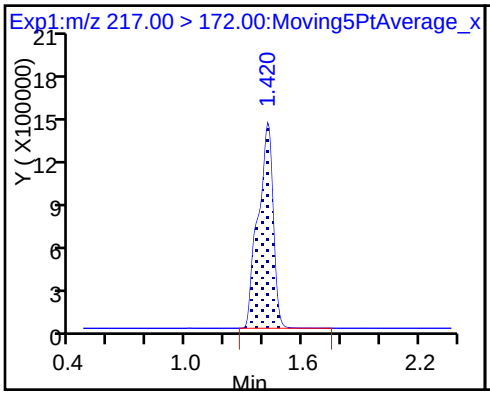
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 21 Worklist Smp#: 2

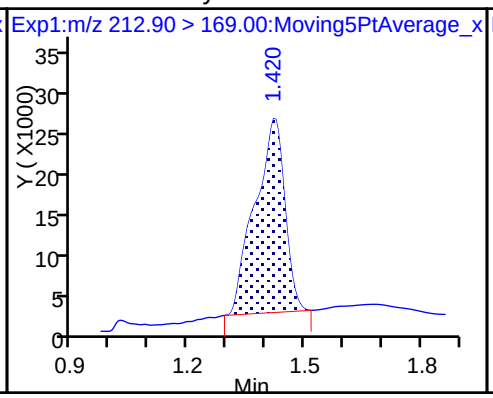
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

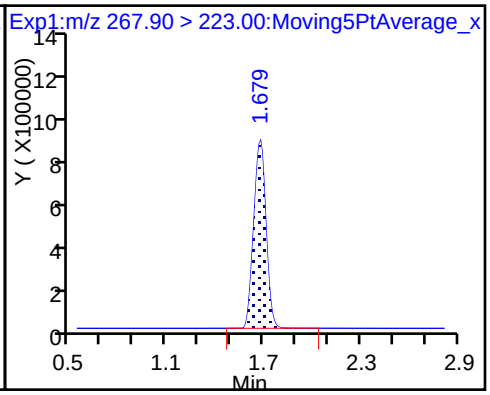
D 1 13C4 PFBA



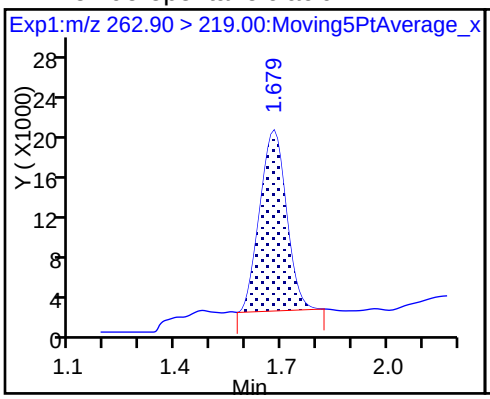
2 Perfluorobutyric acid



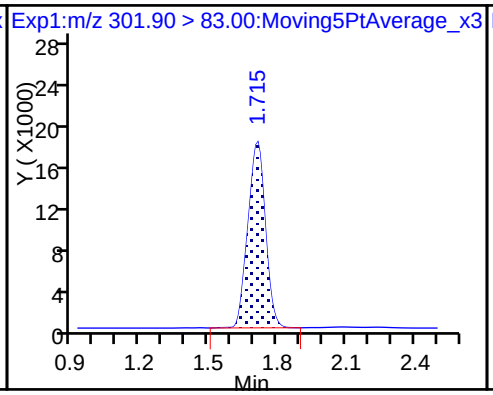
D 3 13C5-PFPeA



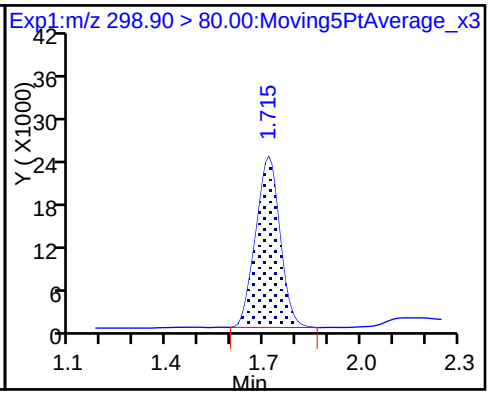
4 Perfluoropentanoic acid



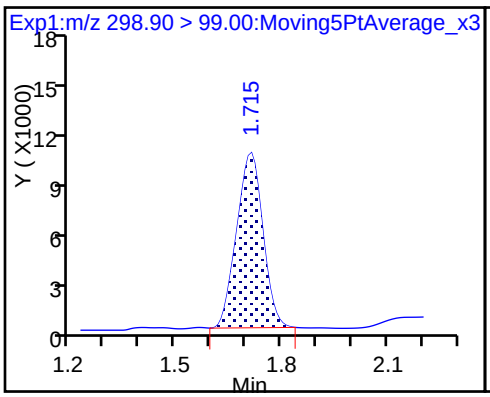
D 47 13C3-PFBS



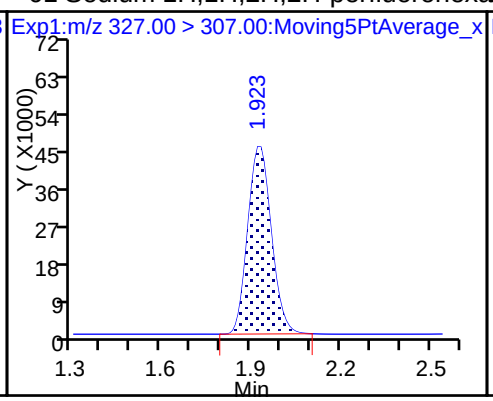
5 Perfluorobutanesulfonic acid



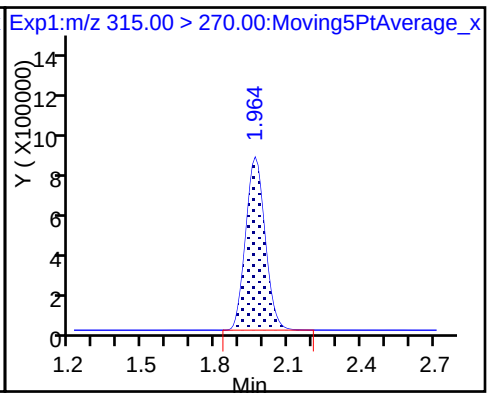
5 Perfluorobutanesulfonic acid



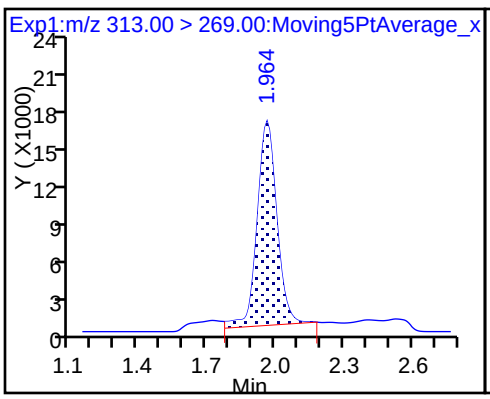
61 Sodium 1H,1H,2H,2H-perfluorohexa



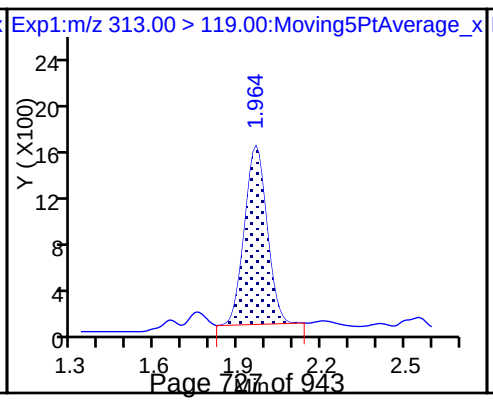
D 7 13C2 PFHxA



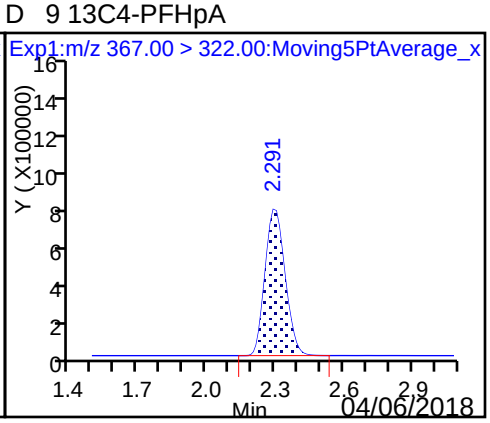
6 Perfluorohexanoic acid



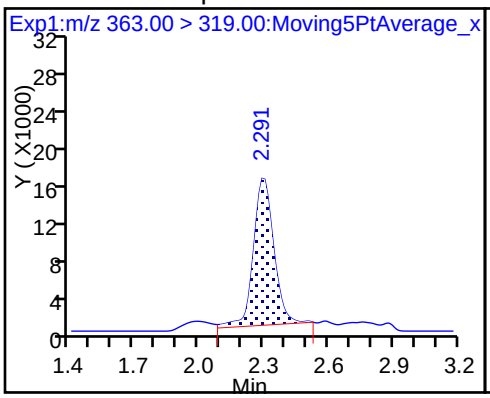
6 Perfluorohexanoic acid



D 9 13C4-PFHpA



10 Perfluoroheptanoic acid



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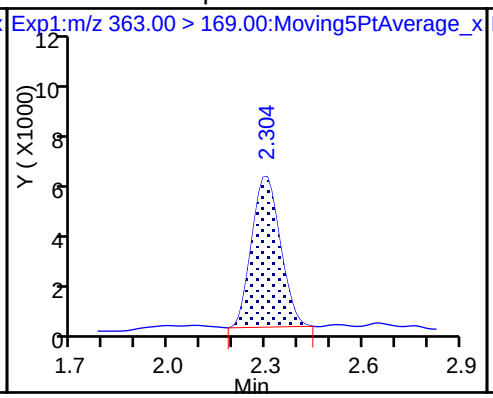
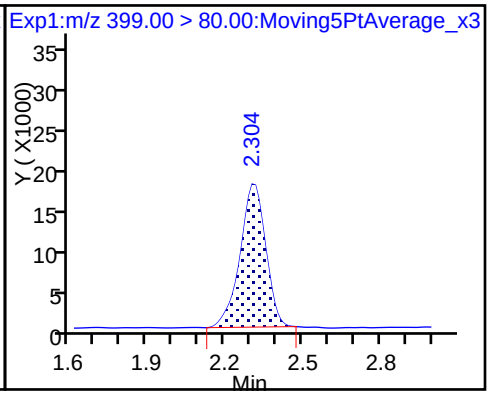
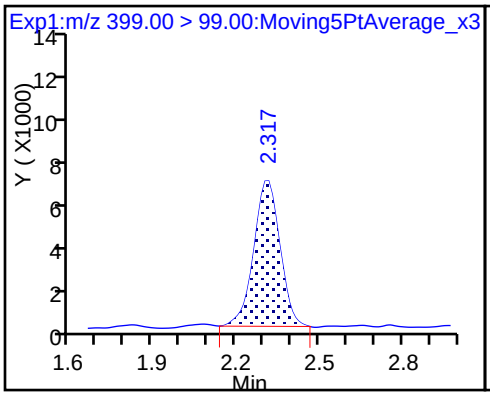


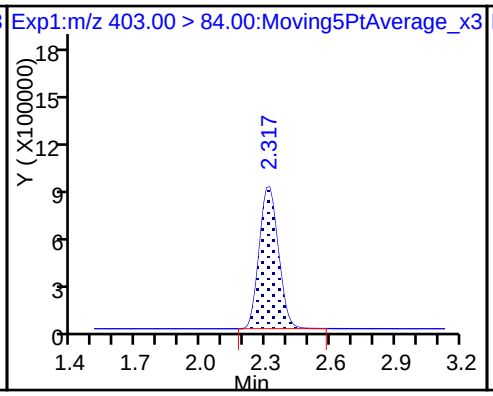
8 Perfluorohexanesulfonic acid



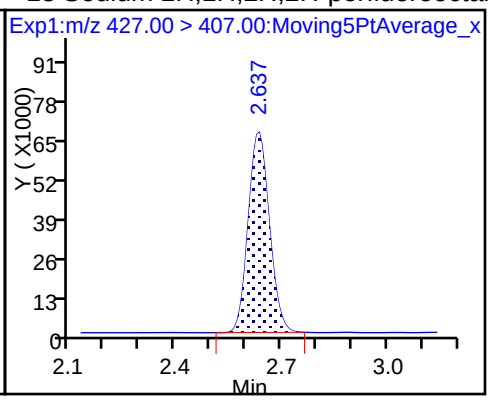
8 Perfluorohexanesulfonic acid



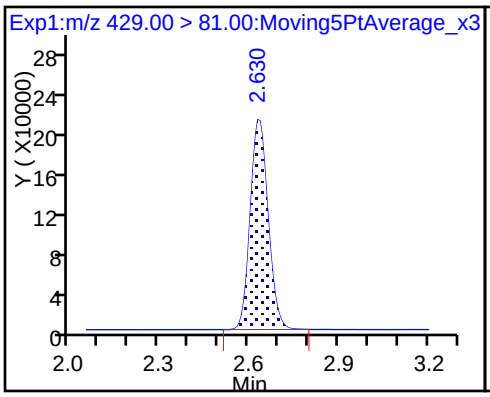
D 11 18O2 PFHxS



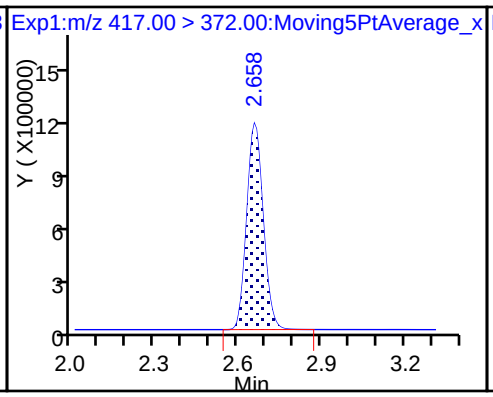
13 Sodium 1H,1H,2H,2H-perfluorooctane



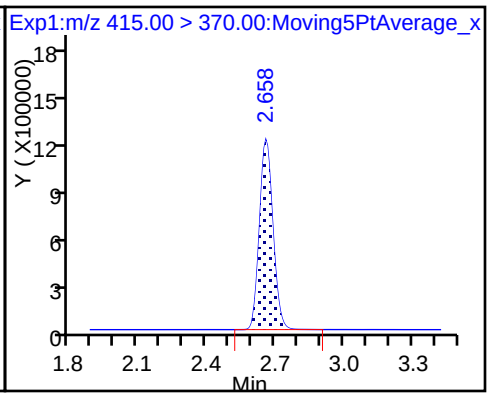
D 12 M2-6:2FTS



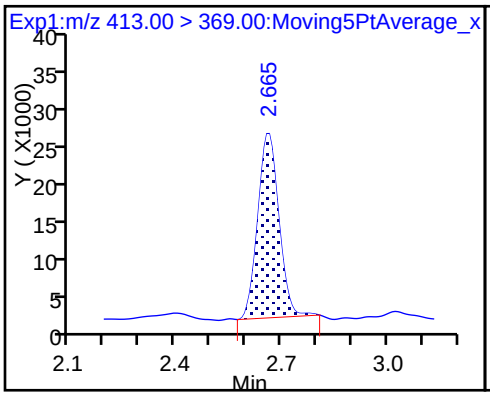
D 14 13C4 PFOA



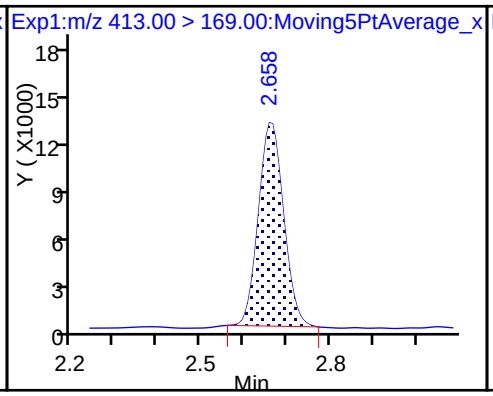
* 62 13C2-PFOA



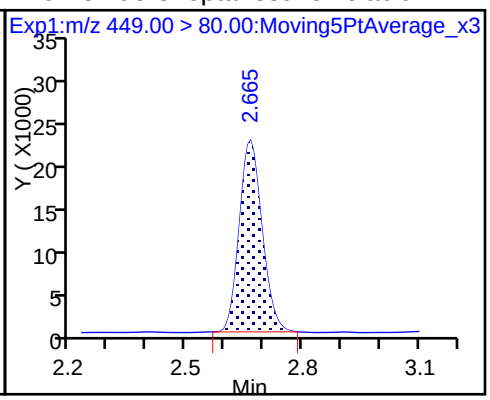
15 Perfluorooctanoic acid



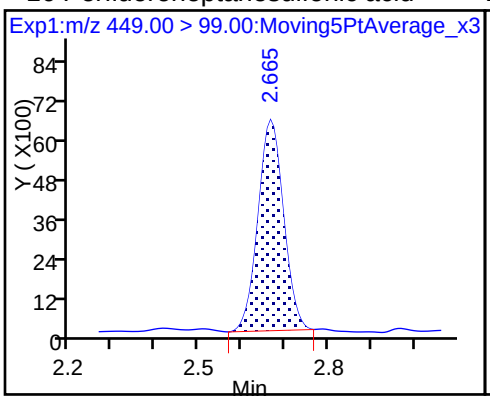
15 Perfluorooctanoic acid



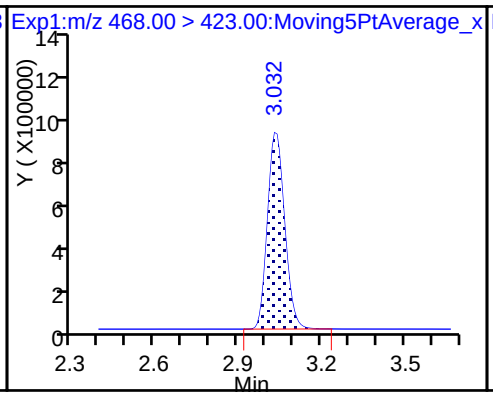
16 Perfluoroheptanesulfonic acid



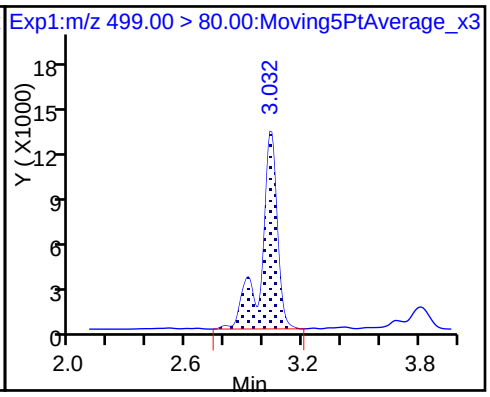
16 Perfluoroheptanesulfonic acid



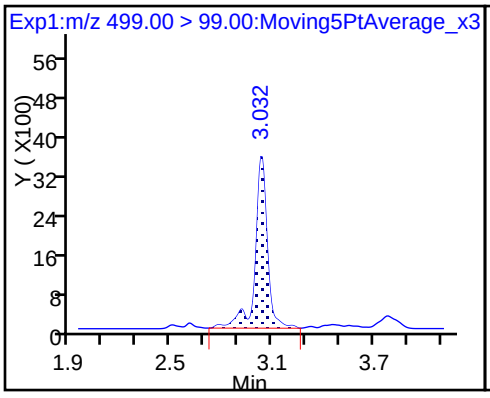
D 19 13C5 PFNA



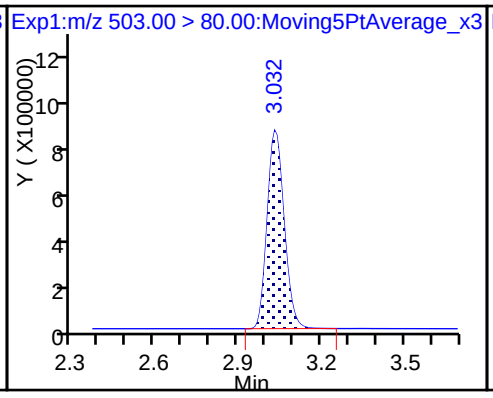
17 Perfluorooctane sulfonic acid



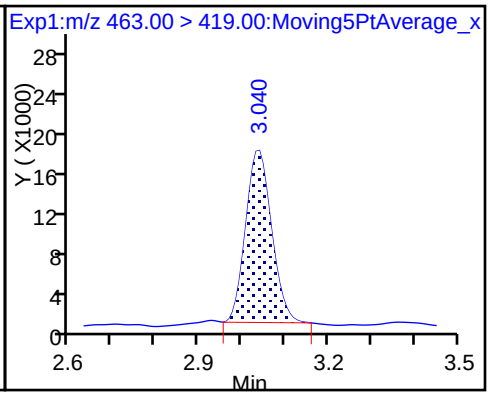
17 Perfluorooctane sulfonic acid



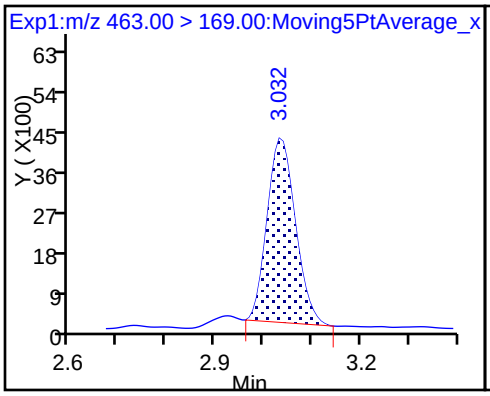
D 18 13C4 PFOS



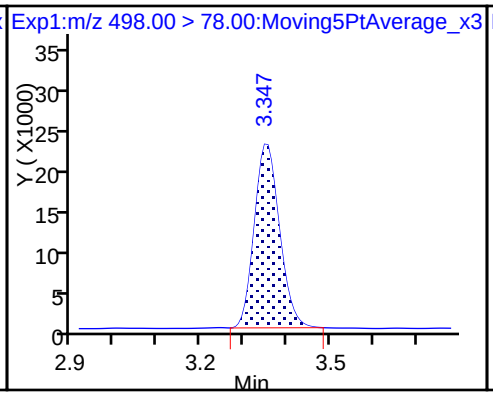
20 Perfluorononanoic acid



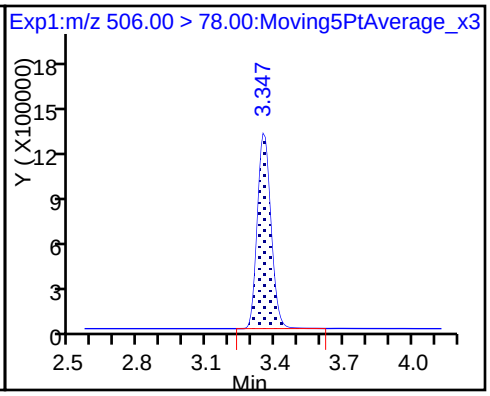
20 Perfluorononanoic acid



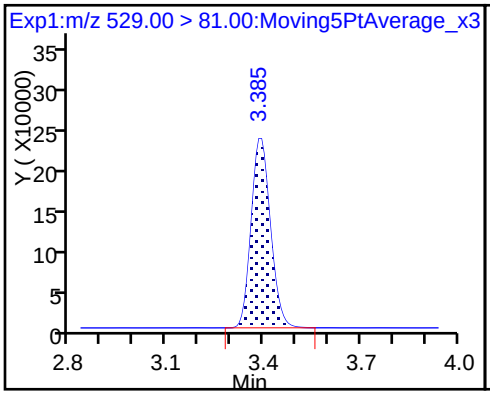
22 Perfluorooctane Sulfonamide



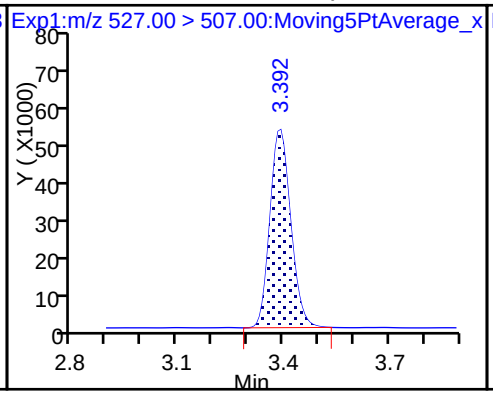
D 21 13C8 FOSA



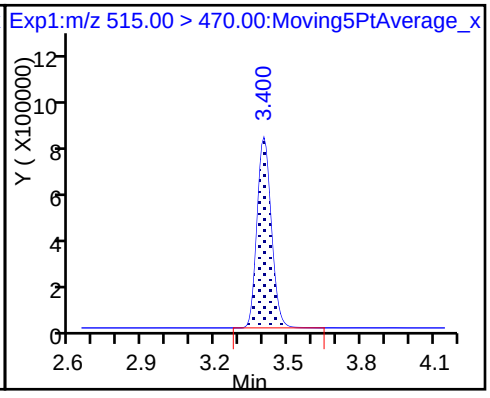
D 26 M2-8:2FTS



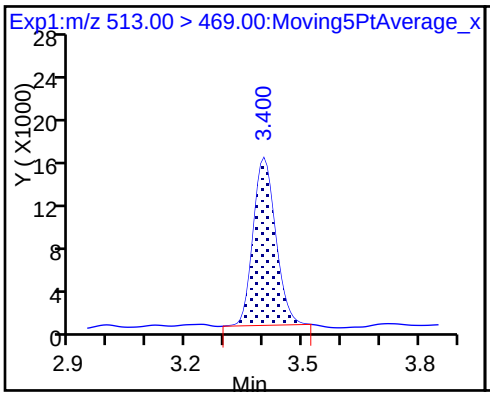
25 Sodium 1H,1H,2H,2H-perfluorodecane



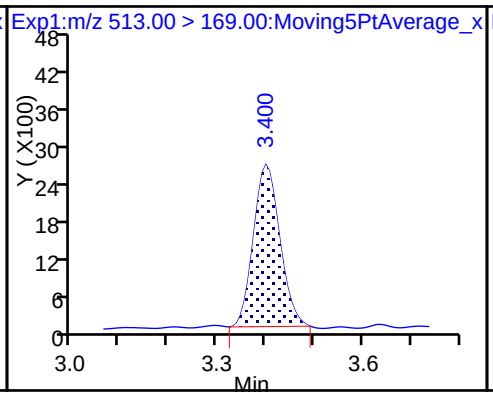
D 23 13C2 PFDA



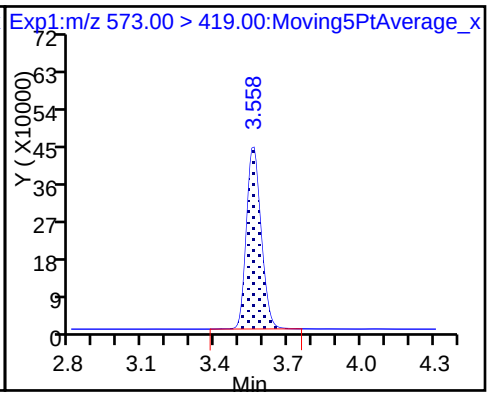
24 Perfluorodecanoic acid



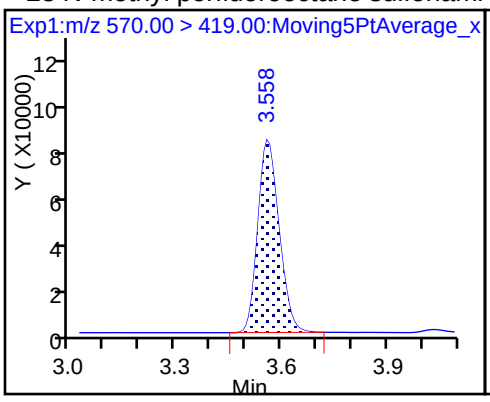
24 Perfluorodecanoic acid



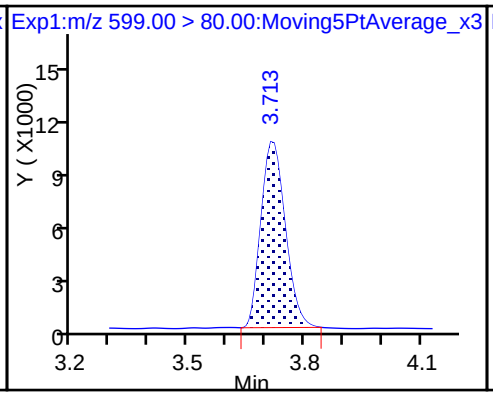
D 27 d3-NMeFOSAA



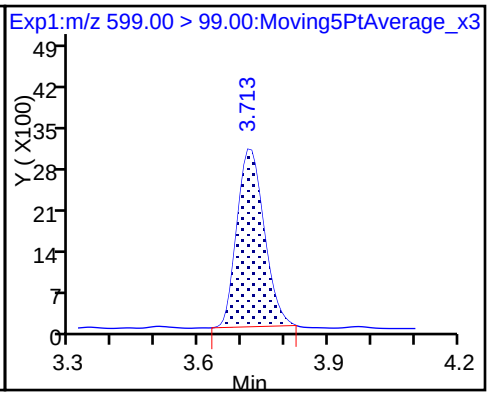
28 N-methyl perfluorooctane sulfonami



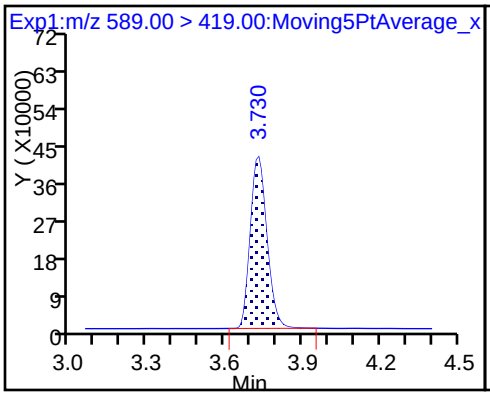
29 Perfluorodecane Sulfonic acid



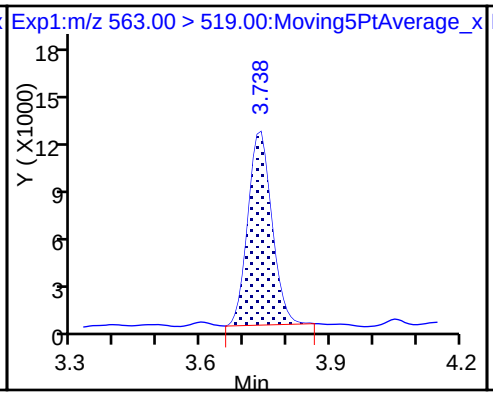
29 Perfluorodecane Sulfonic acid



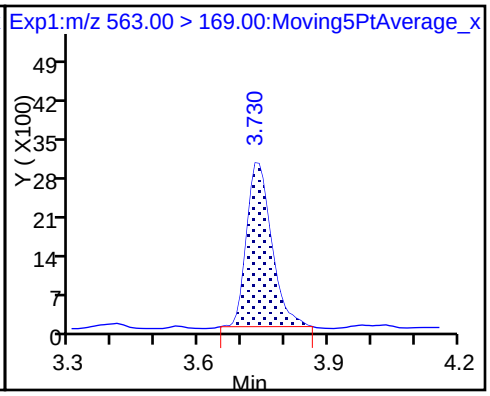
D 32 d5-NEtFOSAA



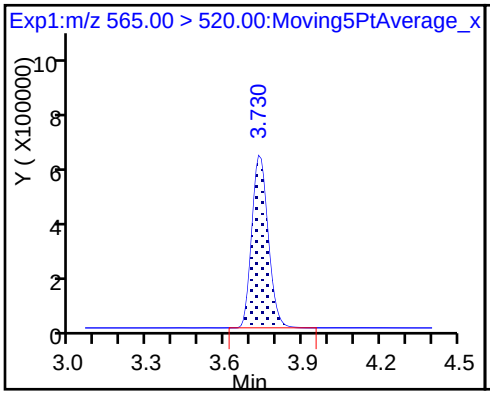
31 Perfluoroundecanoic acid



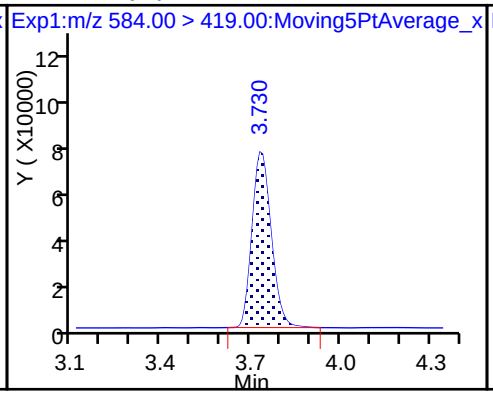
31 Perfluoroundecanoic acid



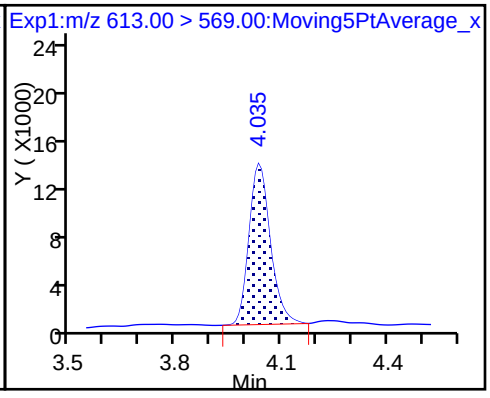
D 30 13C2 PFUnA



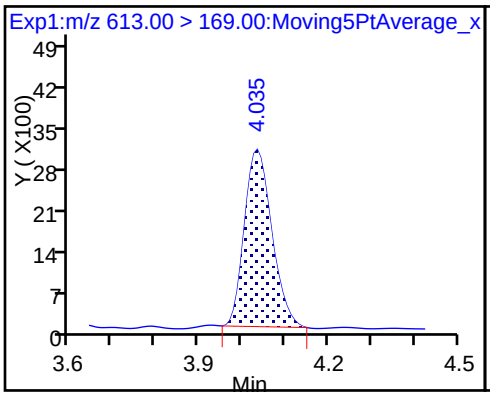
33 N-ethyl perfluorooctane sulfonamid



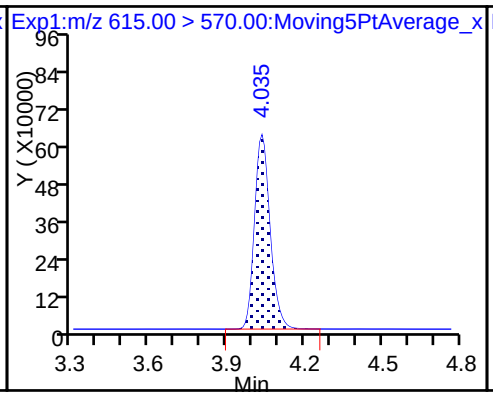
37 Perfluorododecanoic acid



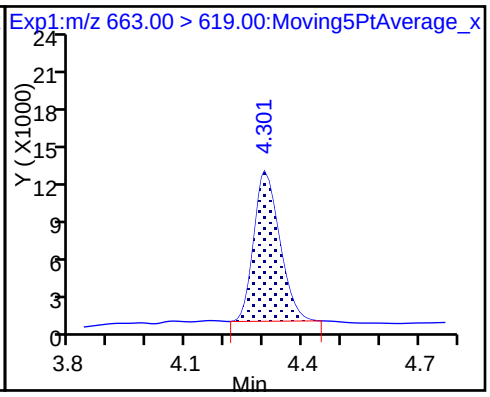
37 Perfluorododecanoic acid



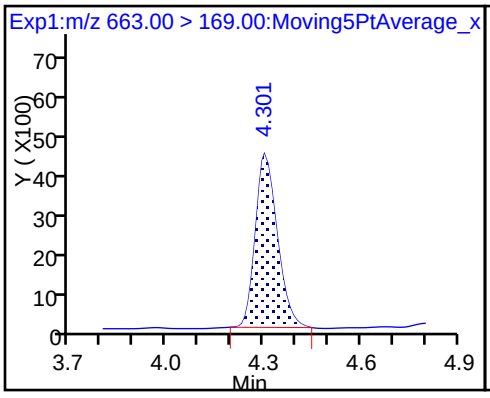
D 36 13C2 PFDoA



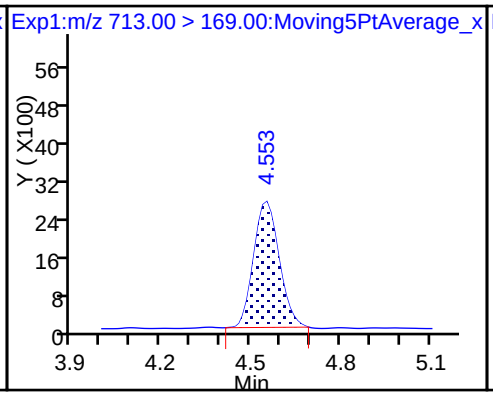
41 Perfluorotridecanoic acid



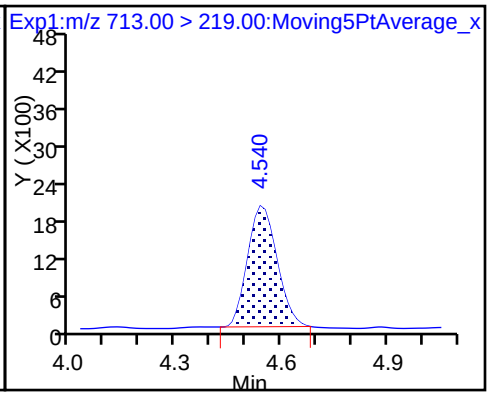
41 Perfluorotridecanoic acid



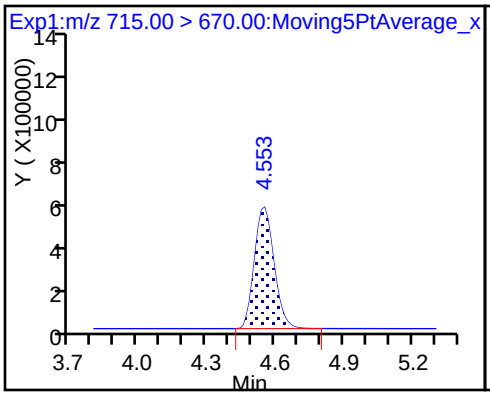
42 Perfluorotetradecanoic acid



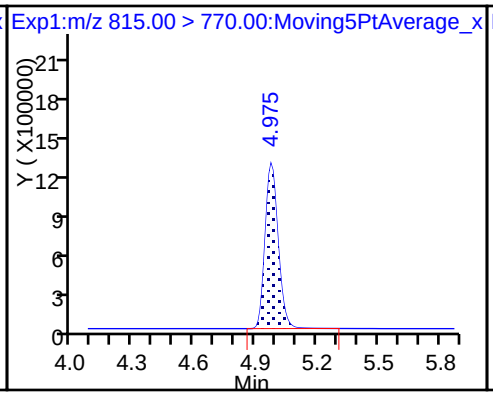
42 Perfluorotetradecanoic acid



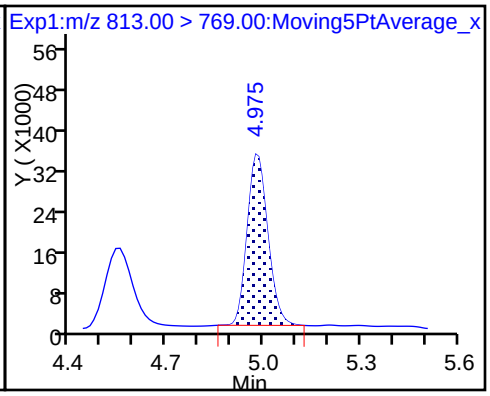
D 43 13C2-PFTeDA



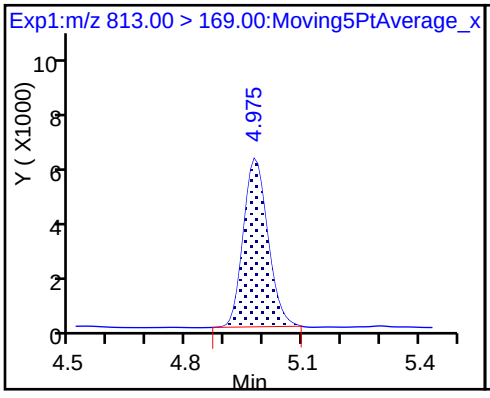
D 44 13C2-PFHxDA



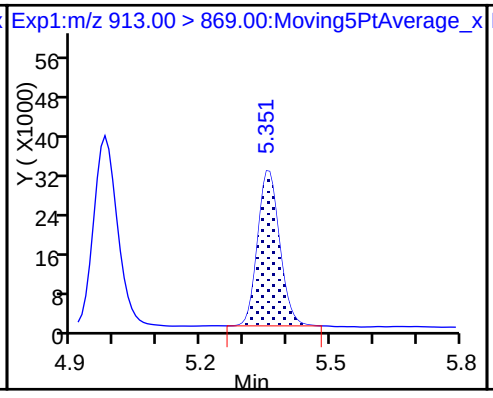
45 Perfluorohexadecanoic acid



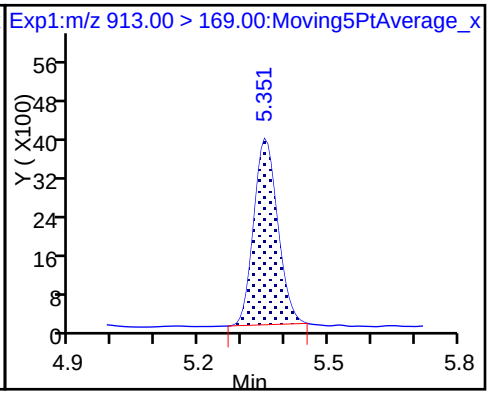
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205921/1 Calibration Date: 01/26/2018 16:06

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_026.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9343	0.9462		2.53	2.50	1.3	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.142		2.42	2.50	-3.1	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	78.59		2.25	2.21	1.8	25.0
4:2 FTS	AveID	13.89	15.23		2.56	2.34	9.6	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	1.007		2.43	2.50	-2.8	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.143		2.60	2.50	4.0	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.069		2.18	2.28	-4.0	25.0
6:2FTS	AveID	1.655	1.680		2.41	2.37	1.5	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.152		2.46	2.50	-1.7	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.427		2.51	2.38	5.4	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.081		2.62	2.50	4.8	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.110		2.30	2.32	-0.8	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	1.011		2.57	2.50	2.9	25.0
8:2FTS	AveID	1.217	1.227		2.41	2.40	0.8	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	1.005		2.59	2.50	3.5	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.048		2.43	2.50	-3.0	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6366		2.34	2.41	-2.8	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9713		2.49	2.50	-0.3	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9488		2.30	2.50	-8.1	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.072		2.62	2.50	4.6	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.165		2.51	2.50	0.3	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2450		2.51	2.50	0.4	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		1.003		2.63	2.50	5.1	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.108		2.63	2.50	5.2	25.0
13C4 PFBA	Ave	1.512	1.435		2.37	2.50	-5.1	50.0
13C5-PFPeA	Ave	0.8956	0.8524		2.38	2.50	-4.8	50.0
13C3-PFBS	Ave	0.0198	0.0197		2.31	2.33	-0.8	50.0
13C2 PFHxA	Ave	0.9649	0.9279		2.40	2.50	-3.8	50.0
13C4-PFHpA	Ave	0.9187	0.8440		2.30	2.50	-8.1	50.0
18O2 PFHxS	Ave	1.131	1.093		2.28	2.37	-3.4	50.0
M2-6:2FTS	Ave	0.1699	0.2015		2.82	2.38	18.6	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205921/1 Calibration Date: 01/26/2018 16:06

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_026.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.8591		2.39	2.50	-4.6	50.0
13C4 PFOS	Ave	0.7158	0.7224		2.41	2.39	0.9	50.0
13C5 PFNA	Ave	0.7300	0.6865		2.35	2.50	-6.0	50.0
13C8 FOSA	Ave	1.007	0.9868		2.45	2.50	-2.0	50.0
M2-8:2FTS	Ave	0.1795	0.2129		2.84	2.40	18.6	50.0
13C2 PFDA	Ave	0.6306	0.6042		2.40	2.50	-4.2	50.0
d3-NMeFOSAA	Ave	0.3147	0.3684		2.93	2.50	17.1	50.0
d5-NEtFOSAA	Ave	0.3182	0.3507		2.76	2.50	10.2	50.0
13C2 PFUnA	Ave	0.4783	0.4611		2.41	2.50	-3.6	50.0
13C2 PFDoA	Ave	0.5192	0.4846		2.33	2.50	-6.7	50.0
13C2-PFTeDA	Ave	0.6785	0.6098		2.25	2.50	-10.1	50.0
13C2-PFHxDA	Ave	1.209	1.052		2.18	2.50	-13.0	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_026.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 26-Jan-2018 16:06:47 ALS Bottle#: 31 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 09:44:28 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 09:44:28

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	1.414	1.411	0.003	0.536	6856965	2.37		94.9	26004	
2 Perfluorobutyric acid										
212.90 > 169.00	1.420	1.413	0.007	1.004	6487931	2.53		101	1209	
D 3 13C5-PFPeA										
267.90 > 223.00	1.662	1.659	0.003	0.630	4073382	2.38		95.2	69209	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.671	1.662	0.009	1.005	4652150	2.42		96.9	3665	
D 47 13C3-PFBS										
301.90 > 83.00	1.707	1.695	0.012	0.647	87385	2.31		99.2	3208	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.707	1.697	0.010	1.000	6528179	2.25		102	22190	
298.90 > 99.00	1.707	1.697	0.010	1.000	2702223		2.42(1.25-3.74)		15774	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.913	1.903	0.010	1.000	1336291	2.56		110	40362	
D 60 M2-4:2FTS										
329.00 > 81.00	1.913	1.903	0.010	0.725	610811	NC			5939	
D 7 13C2 PFHxA										
315.00 > 270.00	1.955	1.939	0.016	0.741	4434558	2.40		96.2	43993	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.955	1.939	0.016	1.000	4465963	2.43		97.2	11506	
313.00 > 119.00	1.955	1.939	0.016	1.000	423682		10.54(5.03-15.10)		9442	
D 9 13C4-PFHpA										
367.00 > 322.00	2.279	2.267	0.012	0.864	4033325	2.30		91.9	27616	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.279	2.268	0.011	1.000	4611747	2.60		104	6241	
363.00 > 169.00	2.279	2.268	0.011	1.000	1768501		2.61(1.13-3.40)		15375	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.292	2.280	0.012	1.000	5081788	2.18		96.0	12646	
399.00 > 99.00	2.292	2.280	0.012	1.000	1737906		2.92(1.50-4.49)		9433	
D 11 18O2 PFHxS										
403.00 > 84.00	2.292	2.282	0.010	0.869	4940746	2.28		96.6	21757	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.609	2.596	0.013	0.997	1534021	2.41		102	24430	
D 12 M2-6:2FTS										
429.00 > 81.00	2.616	2.597	0.019	0.992	914875	2.82		119	16908	
D 14 13C4 PFOA										
417.00 > 372.00	2.638	2.622	0.016	1.000	4105766	2.39		95.4	28307	
* 62 13C2-PFOA										
415.00 > 370.00	2.638	2.622	0.016		4779024	2.50			33886	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.638	2.623	0.015	1.000	4731384	2.46		98.3	1833	
413.00 > 169.00	2.638	2.623	0.015	1.000	2522021		1.88(0.84-2.52)		15841	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.645	2.629	0.016	1.000	4690394	2.51		105	28311	
449.00 > 99.00	2.645	2.629	0.016	1.000	1254785		3.74(1.94-5.82)		11591	
D 19 13C5 PFNA										
468.00 > 423.00	3.009	2.992	0.017	1.141	3280798	2.35		94.0	21427	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.009	2.992	0.017	1.000	3555855	2.30		99.2	7595	
499.00 > 99.00	3.009	2.992	0.017	1.000	779355		4.56(2.31-6.93)		9280	
D 18 13C4 PFOS										
503.00 > 80.00	3.009	2.992	0.017	1.141	3300440	2.41		101	18214	
20 Perfluorononanoic acid										
463.00 > 419.00	3.009	2.992	0.017	1.000	3547781	2.62		105	8945	
463.00 > 169.00	3.009	2.992	0.017	1.000	889252		3.99(1.90-5.69)		13130	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.348	3.338	0.010	1.000	4768783	2.57		103	15423	
D 21 13C8 FOSA										
506.00 > 78.00	3.348	3.338	0.010	1.269	4715948	2.45		98.0	20430	
D 26 M2-8:2FTS										
529.00 > 81.00	3.363	3.342	0.021	1.275	974924	2.84		119	17381	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.363	3.342	0.021	1.000	1196147	2.41		101	20832	
D 23 13C2 PFDA										
515.00 > 470.00	3.370	3.352	0.018	1.278	2887672	2.40		95.8	24446	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.370	3.353	0.017	1.000	2900755	2.59		104	9547	
513.00 > 169.00	3.370	3.353	0.017	1.000	526239		5.51(2.36-7.09)		1986	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.530	3.507	0.023	1.338	1760578	2.93		117	10456	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.530	3.513	0.017	1.000	1845112	2.43		97.0	8636	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.689	3.666	0.023	1.000	2118626	2.34		97.2	25283	
599.00 > 99.00	3.689	3.666	0.023	1.000	763280		2.78(1.39-4.16)		20354	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.697	3.672	0.025	1.402	1676051	2.76		110	6922	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.706	3.678	0.028	1.000	2090802	2.30		91.9	7246	
563.00 > 169.00	3.706	3.678	0.028	1.000	454305		4.60(0.00-0.00)		11002	
D 30 13C2 PFUnA										
565.00 > 520.00	3.706	3.679	0.027	1.405	2203544	2.41		96.4	25663	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.706	3.679	0.027	1.002	1627967	2.49		99.7	16771	
37 Perfluorododecanoic acid										
613.00 > 569.00	4.005	3.979	0.026	1.002	2482437	2.62		105	8747	
613.00 > 169.00	3.997	3.979	0.018	1.000	598010		4.15(2.13-6.40)		16126	
D 36 13C2 PFDoA										
615.00 > 570.00	3.997	3.979	0.018	1.515	2315725	2.33		93.3	24222	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.261	4.242	0.019	1.000	2697046	2.51		100	7643	
663.00 > 169.00	4.261	4.242	0.019	1.000	860400		3.13(1.25-3.76)		37853	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.513	4.483	0.030	1.000	714009	2.51		100	17267	
713.00 > 219.00	4.500	4.483	0.017	0.997	503077		1.42(0.71-2.13)		12455	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.513	4.483	0.030	1.711	2914010	2.25		89.9	23573	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.922	4.902	0.020	1.866	5029022	2.18		87.0	15500	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.922	4.902	0.020	1.000	5042976	2.63		105	2545	
813.00 > 169.00	4.922	4.902	0.020	1.000	871928		5.78(2.86-8.58)		6235	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.288	5.255	0.033	1.000	5572882	2.63		105	1045	
913.00 > 169.00	5.281	5.255	0.026	0.999	693006		8.04(0.00-0.00)		2002	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL5_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 09:44:29 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_026.d

Injection Date: 26-Jan-2018 16:06:47 Instrument ID: A8_N

Lims ID: CCV L5

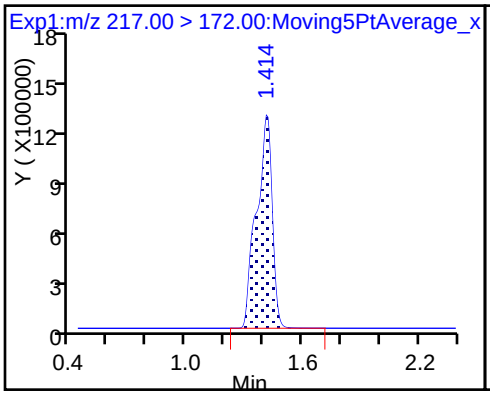
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 31 Worklist Smp#: 1

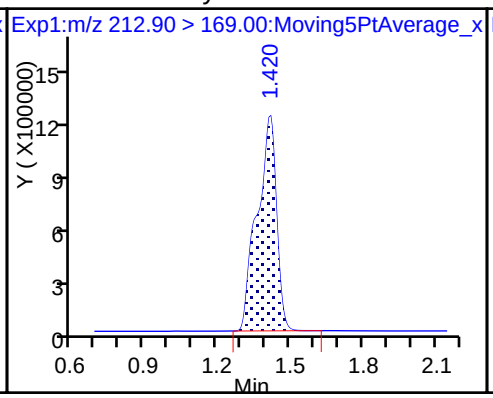
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

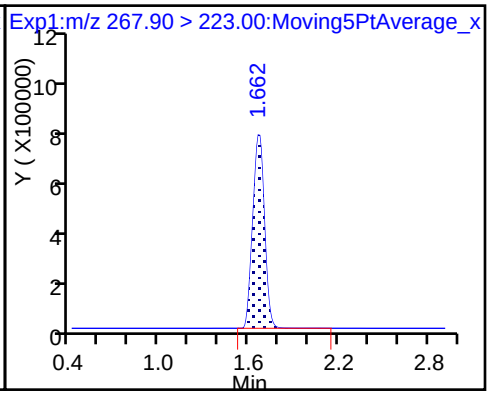
D 1 13C4 PFBA



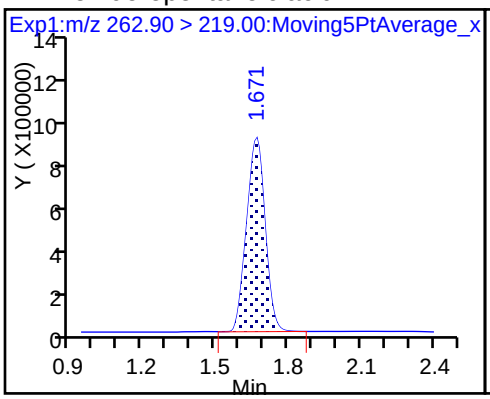
2 Perfluorobutyric acid



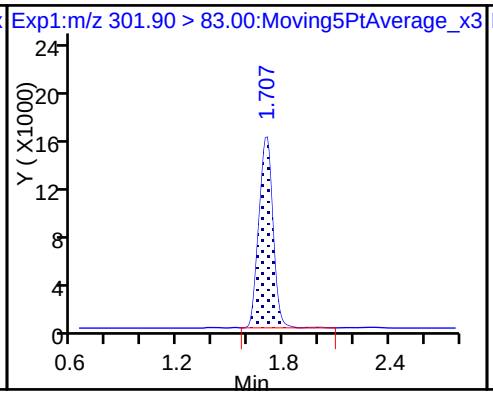
D 3 13C5-PFPeA



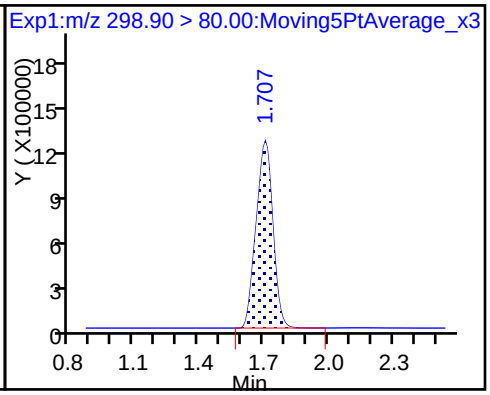
4 Perfluoropentanoic acid



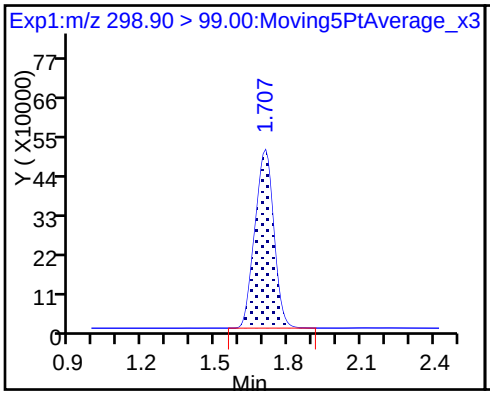
D 47 13C3-PFBS



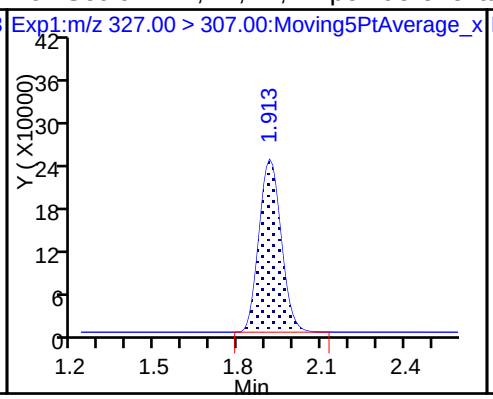
5 Perfluorobutanesulfonic acid



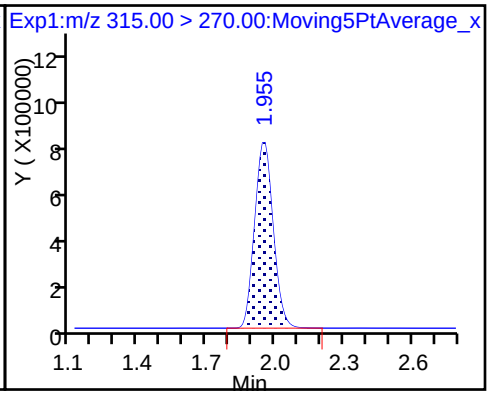
5 Perfluorobutanesulfonic acid



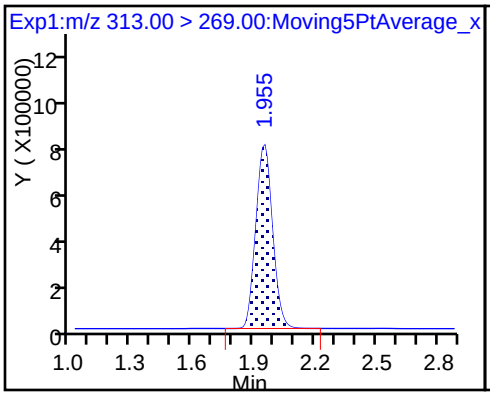
61 Sodium 1H,1H,2H,2H-perfluorohexa



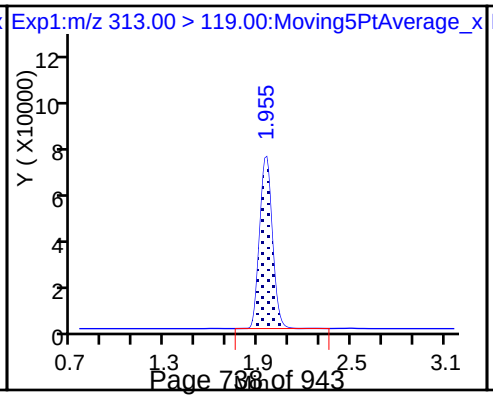
D 7 13C2 PFHxA



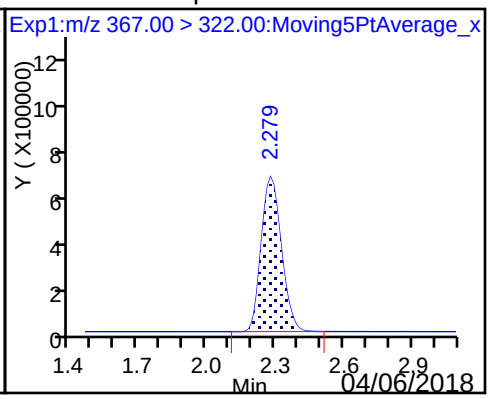
6 Perfluorohexanoic acid



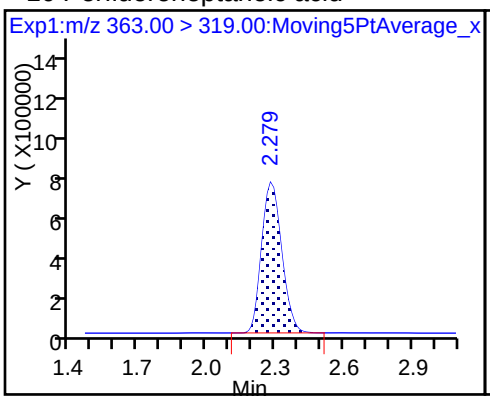
6 Perfluorohexanoic acid



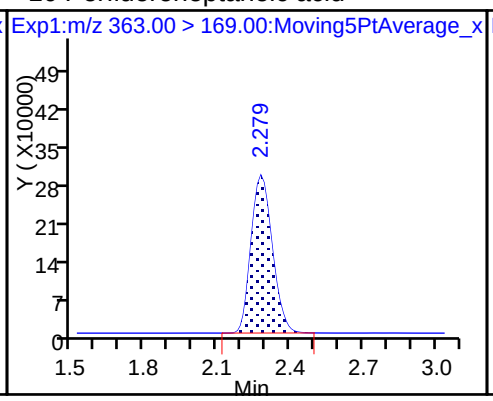
D 9 13C4-PFHpA



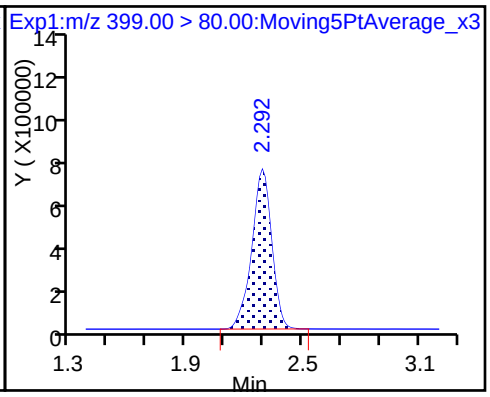
10 Perfluoroheptanoic acid



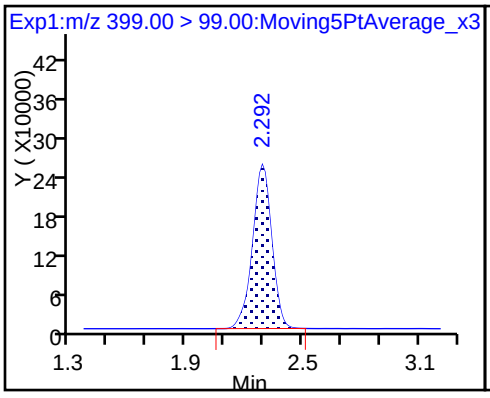
10 Perfluoroheptanoic acid



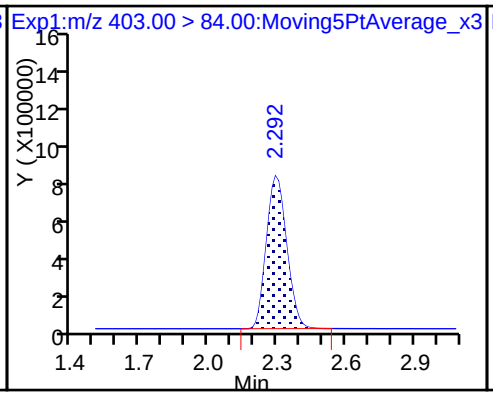
8 Perfluorohexanesulfonic acid



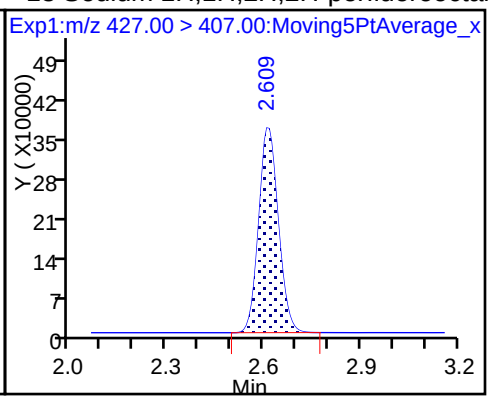
8 Perfluorohexanesulfonic acid



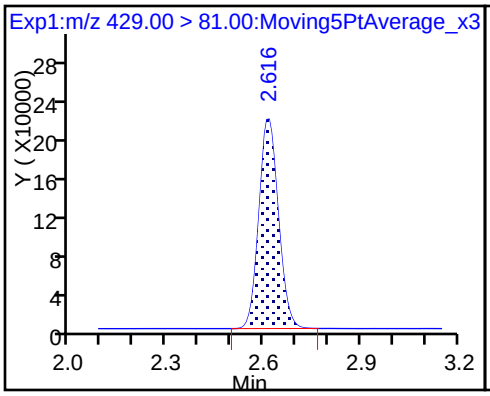
D 11 18O2 PFHxS



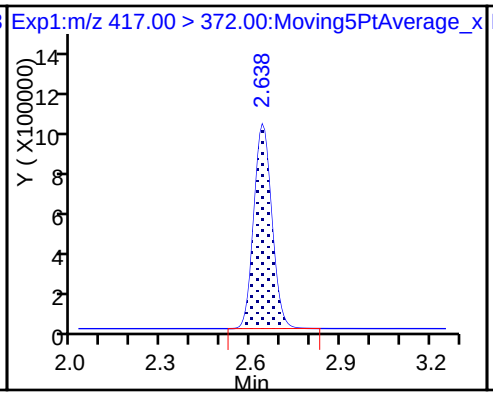
13 Sodium 1H,1H,2H,2H-perfluorooctane



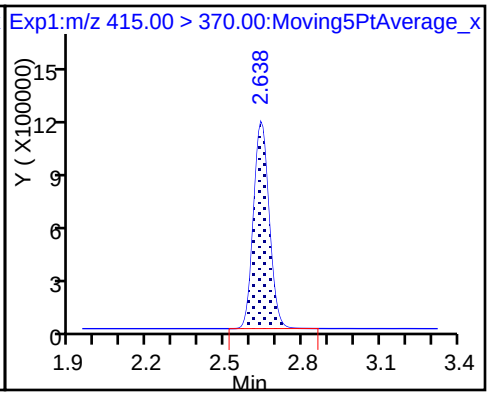
D 12 M2-6:2FTS



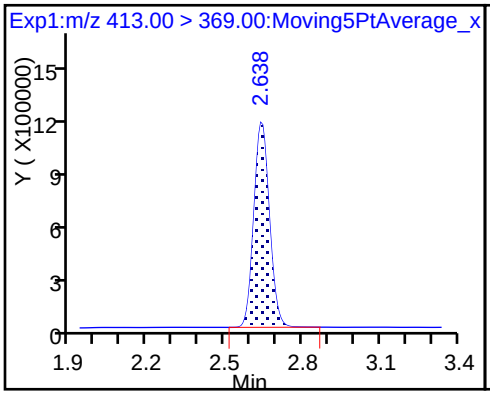
D 14 13C4 PFOA



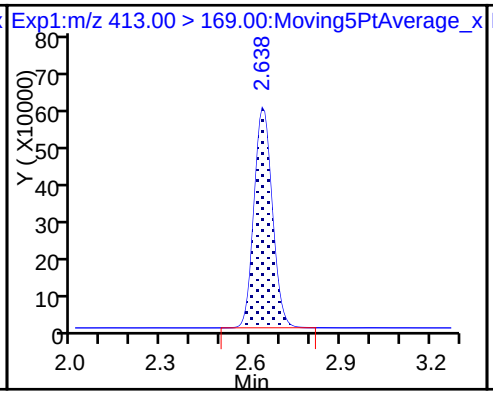
* 62 13C2-PFOA



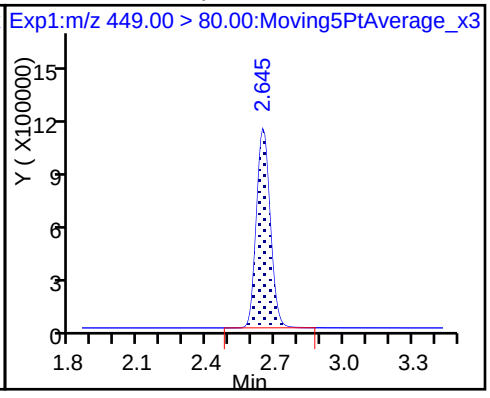
15 Perfluorooctanoic acid



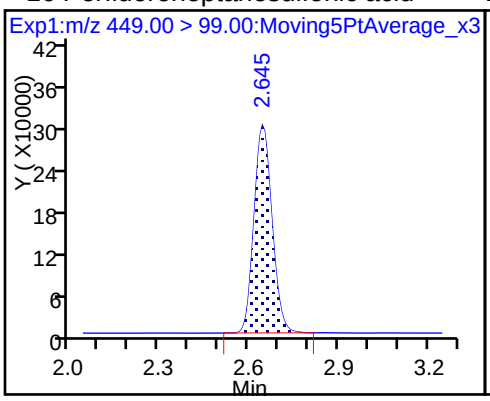
15 Perfluorooctanoic acid



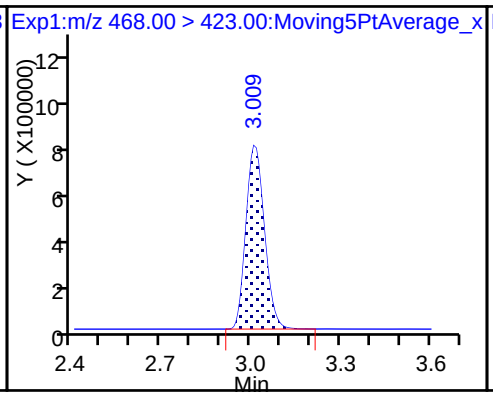
16 Perfluoroheptanesulfonic acid



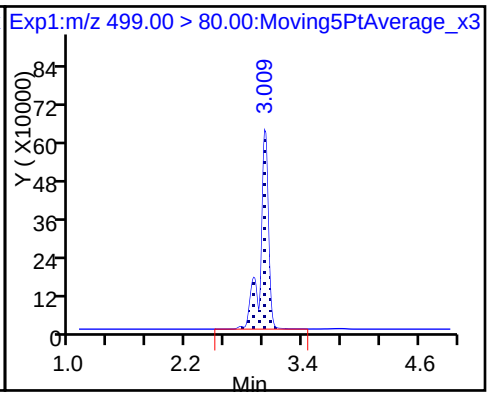
16 Perfluoroheptanesulfonic acid



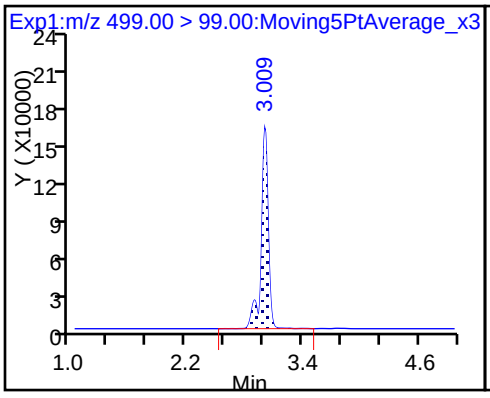
D 19 13C5 PFNA



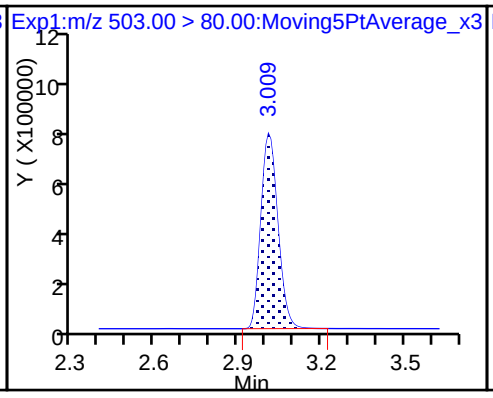
17 Perfluorooctane sulfonic acid



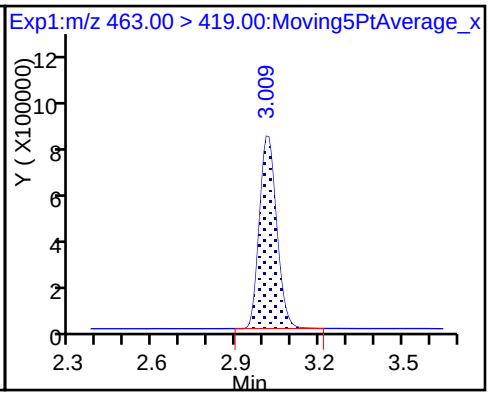
17 Perfluorooctane sulfonic acid



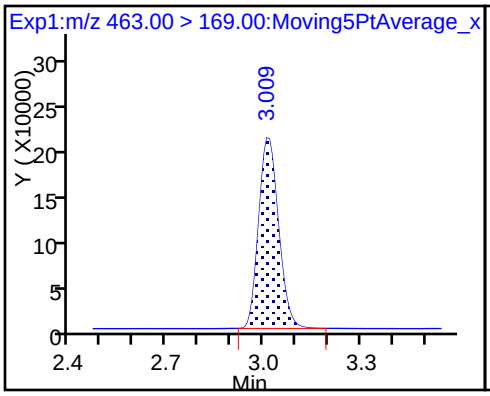
D 18 13C4 PFOS



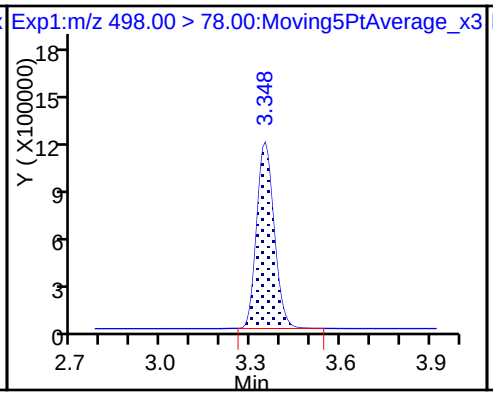
20 Perfluorononanoic acid



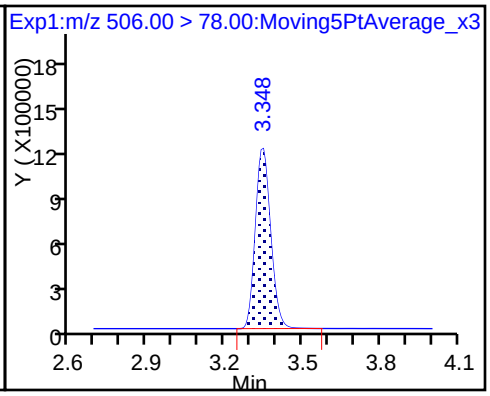
20 Perfluorononanoic acid



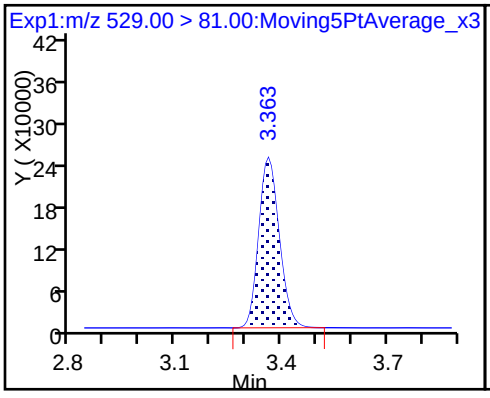
22 Perfluorooctane Sulfonamide



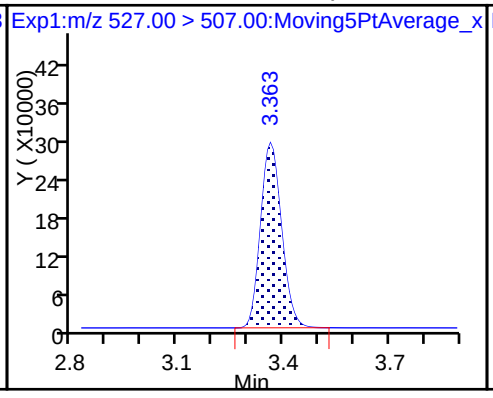
D 21 13C8 FOSA



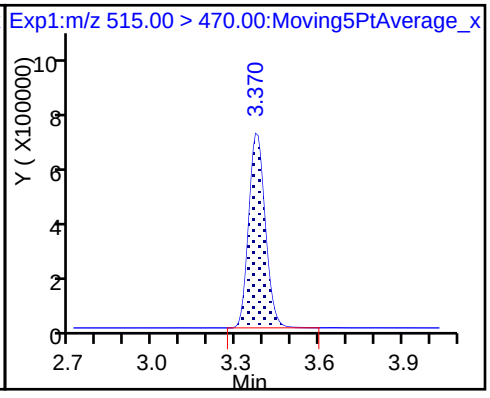
D 26 M2-8:2FTS



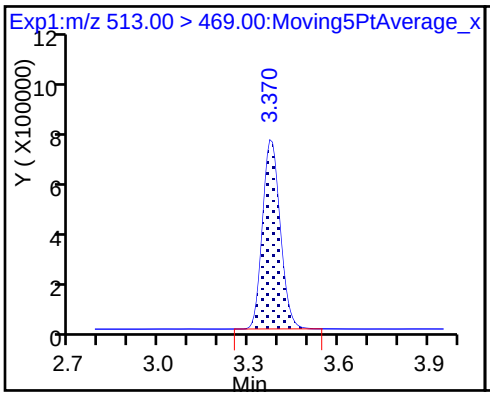
25 Sodium 1H,1H,2H,2H-perfluorodecane



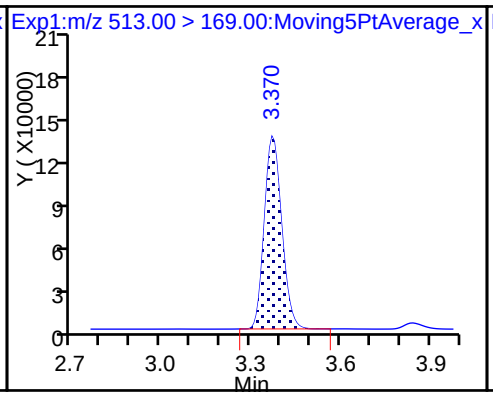
D 23 13C2 PFDA



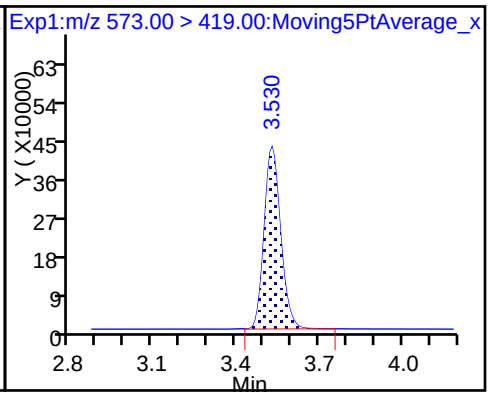
24 Perfluorodecanoic acid



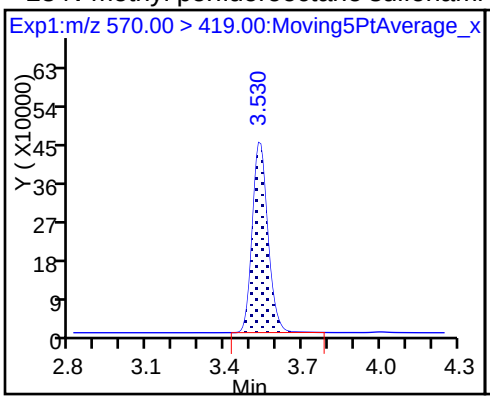
24 Perfluorodecanoic acid



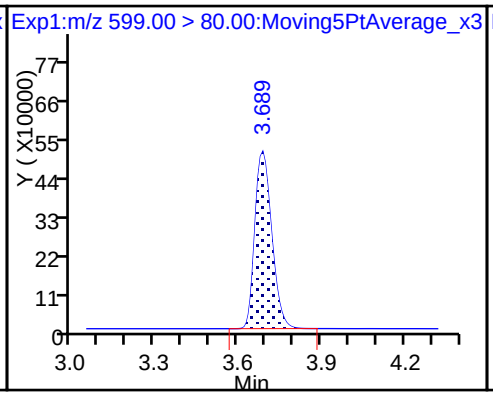
D 27 d3-NMeFOSAA



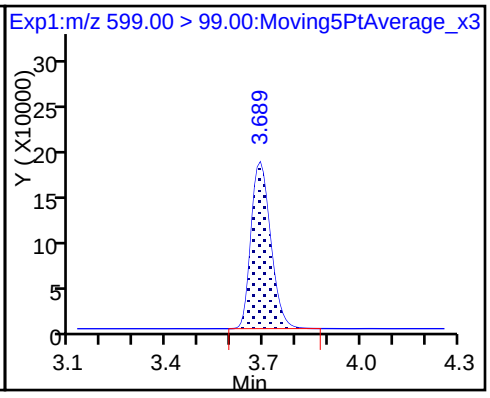
28 N-methyl perfluorooctane sulfonami



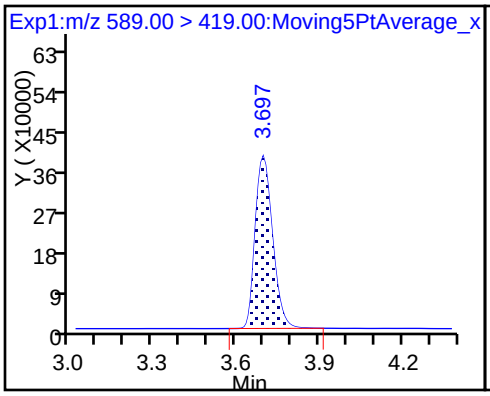
29 Perfluorodecane Sulfonic acid



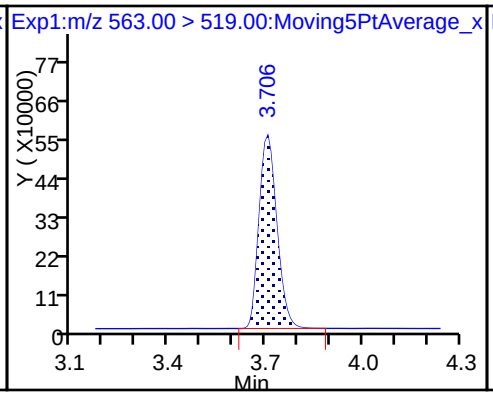
29 Perfluorodecane Sulfonic acid



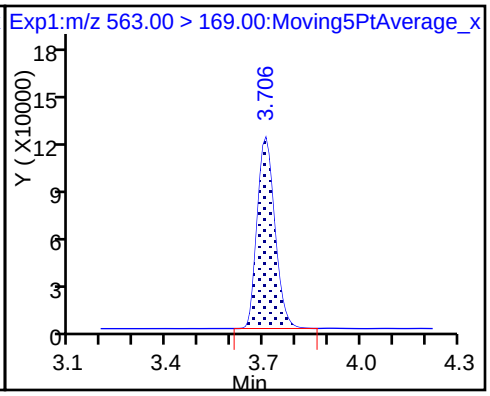
D 32 d5-NEtFOSAA



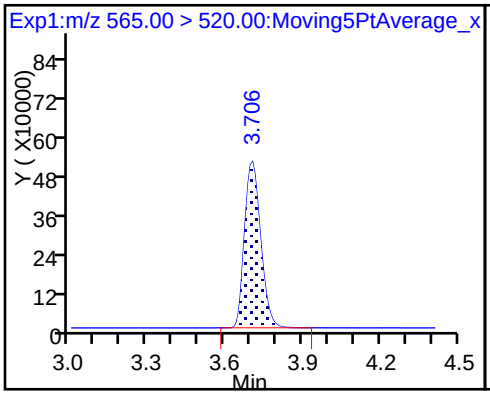
31 Perfluoroundecanoic acid



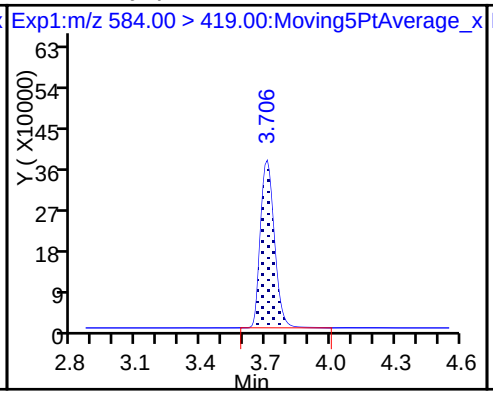
31 Perfluoroundecanoic acid



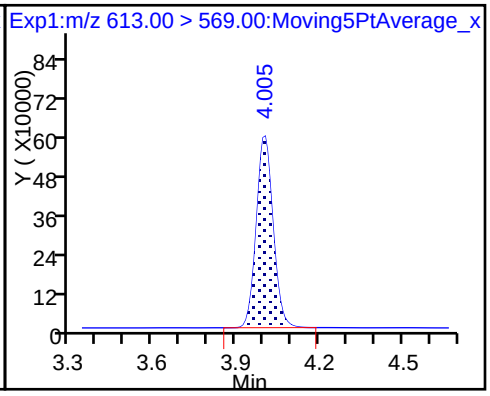
D 30 13C2 PFUnA



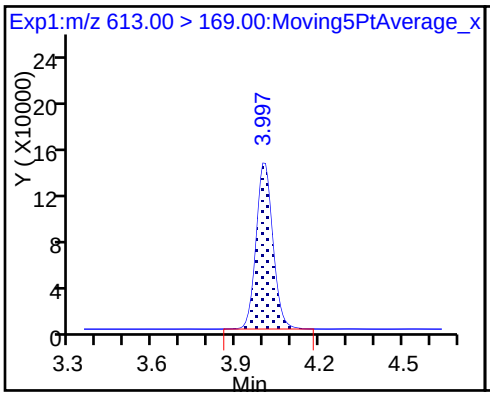
33 N-ethyl perfluorooctane sulfonamid



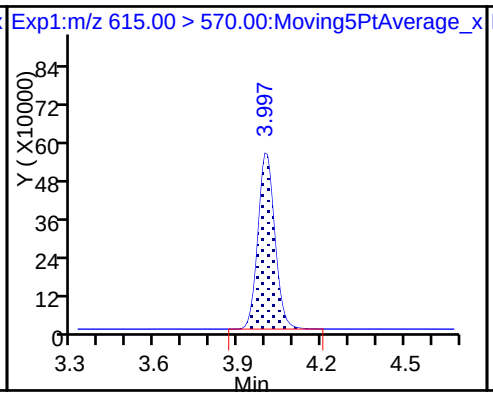
37 Perfluorododecanoic acid



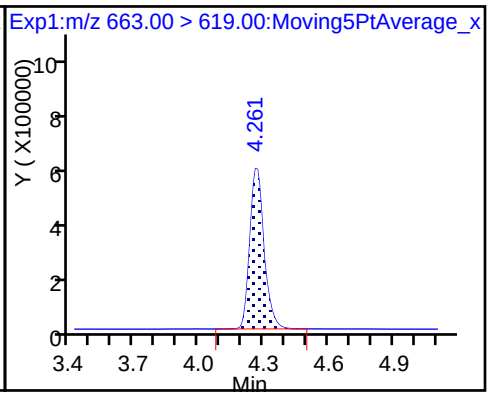
37 Perfluorododecanoic acid



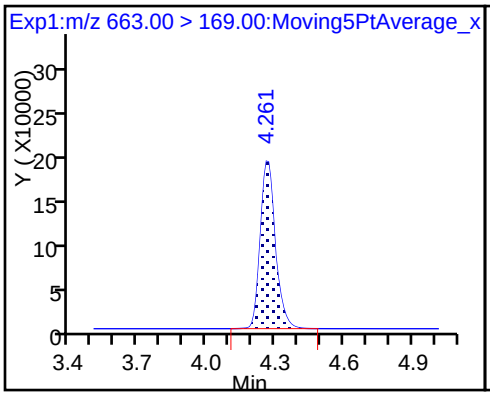
D 36 13C2 PFDoA



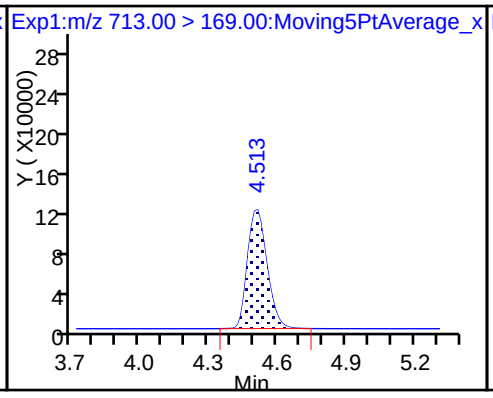
41 Perfluorotridecanoic acid



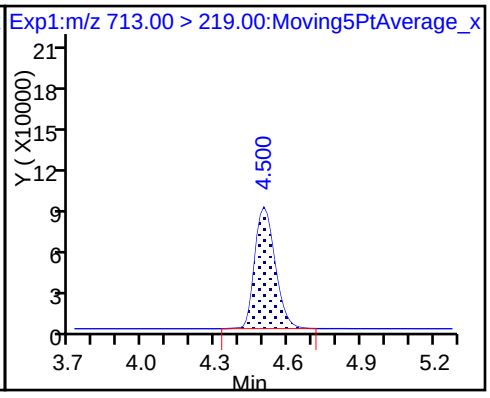
41 Perfluorotridecanoic acid



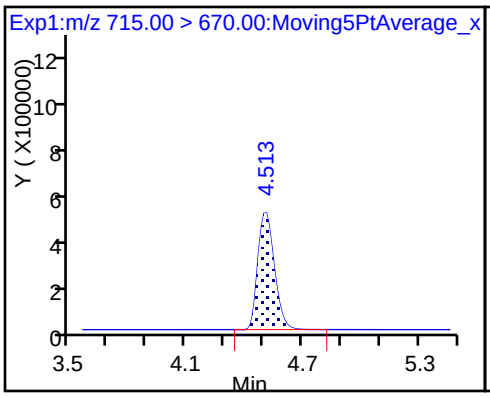
42 Perfluorotetradecanoic acid



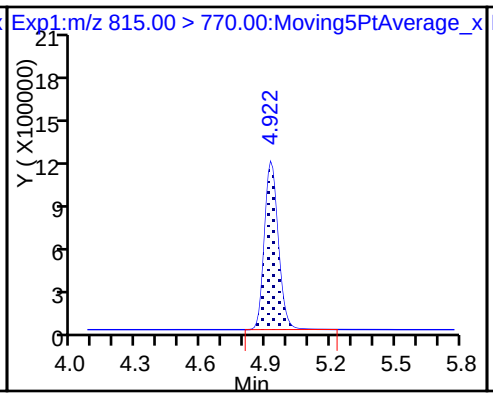
42 Perfluorotetradecanoic acid



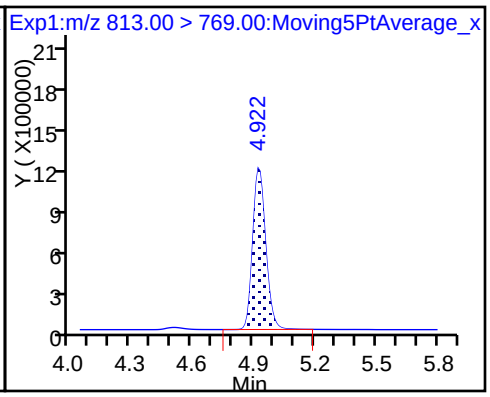
D 43 13C2-PFTeDA



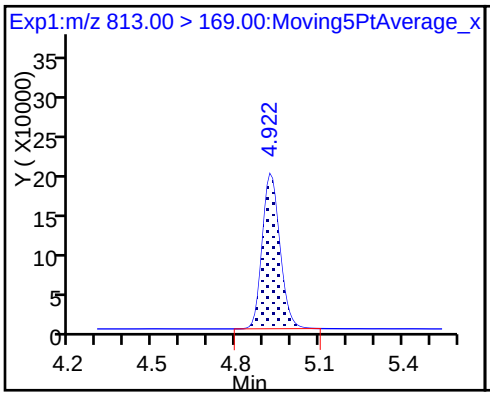
D 44 13C2-PFHxDA



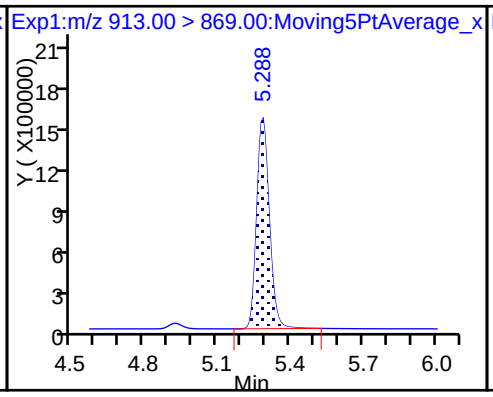
45 Perfluorohexadecanoic acid



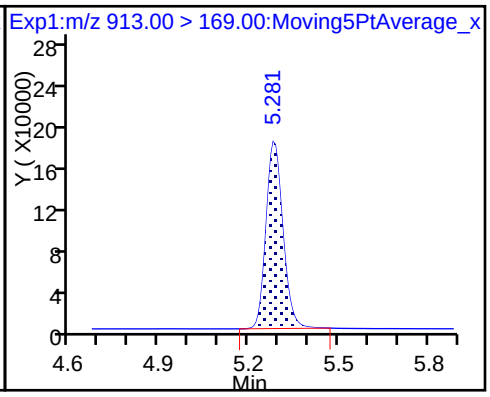
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205921/12 Calibration Date: 01/26/2018 17:32

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_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	0.9343	0.9157		0.980	1.00	-2.0	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.108		0.940	1.00	-6.0	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	81.36		0.931	0.884	5.4	25.0
4:2 FTS	AveID	13.89	17.53		1.18	0.934	26.2*	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	1.003		0.968	1.00	-3.2	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.064		0.968	1.00	-3.2	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.033		0.844	0.910	-7.2	25.0
6:2FTS	AveID	1.655	2.011		1.15	0.948	21.5	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.071		0.914	1.00	-8.6	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.269		0.892	0.952	-6.3	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.026		0.994	1.00	-0.6	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.032		0.855	0.928	-7.8	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	0.9639		0.981	1.00	-1.9	25.0
8:2FTS	AveID	1.217	1.160		0.913	0.958	-4.7	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9686		0.998	1.00	-0.2	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.118		1.03	1.00	3.5	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6044		0.890	0.964	-7.7	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9737		1.00	1.00	-0.0	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.8831		0.856	1.00	-14.4	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.014		0.990	1.00	-1.0	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.140		0.981	1.00	-1.9	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2570		1.05	1.00	5.3	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9295		0.962	1.00	-3.8	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	0.997		0.946	1.00	-5.4	25.0
13C4 PFBA	Ave	1.512	1.448		2.39	2.50	-4.3	50.0
13C5-PFPeA	Ave	0.8956	0.8705		2.43	2.50	-2.8	50.0
13C3-PFBS	Ave	0.0198	0.0184		2.16	2.33	-7.0	50.0
13C2 PFHxA	Ave	0.9649	0.9055		2.35	2.50	-6.2	50.0
13C4-PFHpA	Ave	0.9187	0.8964		2.44	2.50	-2.4	50.0
18O2 PFHxS	Ave	1.131	1.135		2.37	2.37	0.3	50.0
M2-6:2FTS	Ave	0.1699	0.2045		2.86	2.38	20.4	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205921/12 Calibration Date: 01/26/2018 17:32

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_037.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.8785		2.44	2.50	-2.4	50.0
13C4 PFOS	Ave	0.7158	0.7844		2.62	2.39	9.6	50.0
13C5 PFNA	Ave	0.7300	0.7209		2.47	2.50	-1.2	50.0
13C8 FOSA	Ave	1.007	1.031		2.56	2.50	2.4	50.0
M2-8:2FTS	Ave	0.1795	0.2379		3.17	2.40	32.5	50.0
13C2 PFDA	Ave	0.6306	0.6373		2.53	2.50	1.1	50.0
d3-NMeFOSAA	Ave	0.3147	0.3539		2.81	2.50	12.5	50.0
13C2 PFUnA	Ave	0.4783	0.5076		2.65	2.50	6.1	50.0
d5-NEtFOSAA	Ave	0.3182	0.3708		2.91	2.50	16.5	50.0
13C2 PFDoA	Ave	0.5192	0.5581		2.69	2.50	7.5	50.0
13C2-PFTeDA	Ave	0.6785	0.7101		2.62	2.50	4.7	50.0
13C2-PFHxDA	Ave	1.209	1.234		2.55	2.50	2.1	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_037.d
Lims ID: CCV L4
Client ID:
Sample Type: CCV
Inject. Date: 26-Jan-2018 17:32:43 ALS Bottle#: 30 Worklist Smp#: 12
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 11:01:58 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 11:01:58

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	1.418	1.411	0.007	0.538	6924416	2.39		95.7	24446	
2 Perfluorobutyric acid										
212.90 > 169.00	1.418	1.413	0.005	1.000	2536355	0.9802		98.0	471	
D 3 13C5-PFPeA										
267.90 > 223.00	1.667	1.659	0.008	0.633	4163168	2.43		97.2	43582	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.667	1.662	0.005	1.000	1844409	0.9402		94.0	1320	
D 47 13C3-PFBS										
301.90 > 83.00	1.703	1.695	0.008	0.647	81987	2.16		93.0	2515	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.703	1.697	0.006	1.000	2536226	0.9315		105	8429	
298.90 > 99.00	1.703	1.697	0.006	1.000	1073954		2.36(1.25-3.74)		6460	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.908	1.903	0.005	1.000	577483	1.18		126	34759	
D 60 M2-4:2FTS										
329.00 > 81.00	1.908	1.903	0.005	0.725	663083	NC			7693	
D 7 13C2 PFHxA										
315.00 > 270.00	1.949	1.939	0.010	0.740	4330720	2.35		93.8	40969	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.949	1.939	0.010	1.000	1737878	0.9679		96.8	4449	
313.00 > 119.00	1.949	1.939	0.010	1.000	163503		10.63(5.03-15.10)		2897	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.863	4286807	2.44		97.6	35310	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.273	2.268	0.005	1.000	1824360	0.9681		96.8	2711	
363.00 > 169.00	2.273	2.268	0.005	1.000	681091		2.68(1.13-3.40)		5025	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.286	2.280	0.006	1.000	2040618	0.8443		92.8	9274	
399.00 > 99.00	2.286	2.280	0.006	1.000	730387		2.79(1.50-4.49)		4145	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.868	5133442	2.37		100	26139	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.604	2.596	0.008	1.000	745924	1.15		122	15233	
D 12 M2-6:2FTS										
429.00 > 81.00	2.604	2.597	0.007	0.989	929246	2.86		120	22398	
D 14 13C4 PFOA										
417.00 > 372.00	2.633	2.622	0.011	1.000	4201546	2.44		97.6	32839	
* 62 13C2-PFOA										
415.00 > 370.00	2.633	2.622	0.011		4782536	2.50			29786	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.633	2.623	0.010	1.000	1800470	0.9140		91.4	653	
413.00 > 169.00	2.633	2.623	0.010	1.000	994946		1.81(0.84-2.52)		6802	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.640	2.629	0.011	1.000	1812185	0.8916		93.7	16152	
449.00 > 99.00	2.640	2.629	0.011	1.000	491060		3.69(1.94-5.82)		7934	
D 19 13C5 PFNA										
468.00 > 423.00	3.005	2.992	0.013	1.141	3447931	2.47		98.8	25705	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.005	2.992	0.013	1.000	1436611	0.8553		92.2	2965	
499.00 > 99.00	3.005	2.992	0.013	1.000	323227		4.44(2.31-6.93)		2579	
D 18 13C4 PFOS										
503.00 > 80.00	3.005	2.992	0.013	1.141	3586295	2.62		110	22309	
20 Perfluorononanoic acid										
463.00 > 419.00	3.005	2.992	0.013	1.000	1415478	0.99		99.4	4157	
463.00 > 169.00	3.005	2.992	0.013	1.000	354438		3.99(1.90-5.69)		7128	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.343	3.338	0.005	1.000	1901321	0.9813		98.1	18934	
D 21 13C8 FOSA										
506.00 > 78.00	3.343	3.338	0.005	1.270	4931270	2.56		102	24552	
D 26 M2-8:2FTS										
529.00 > 81.00	3.351	3.342	0.009	1.273	1089793	3.17		132	16707	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.351	3.342	0.009	1.000	505724	0.9133		95.3	7316	
D 23 13C2 PFDA										
515.00 > 470.00	3.366	3.352	0.014	1.278	3048073	2.53		101	24403	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.366	3.353	0.013	1.000	1180992	1.00		99.8	4457	
513.00 > 169.00	3.366	3.353	0.013	1.000	209946		5.63(2.36-7.09)		1500	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.518	3.507	0.011	1.336	1692488	2.81		112	11680	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.526	3.513	0.013	1.002	756598	1.03		103	4163	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.682	3.666	0.016	1.000	874326	0.8897		92.3	14061	
599.00 > 99.00	3.682	3.666	0.016	1.000	314186		2.78(1.39-4.16)		8449	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.691	3.672	0.019	1.402	1773535	2.91		117	9095	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.699	3.678	0.021	1.002	857439	0.8555		85.6	3032	
563.00 > 169.00	3.699	3.678	0.021	1.002	201921		4.25(0.00-0.00)		10642	
D 30 13C2 PFUnA										
565.00 > 520.00	3.691	3.679	0.012	1.402	2427497	2.65		106	23874	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.699	3.679	0.020	1.002	690774	1.00		100.0	7233	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.991	3.979	0.012	1.000	1082889	0.9898		99.0	3885	
613.00 > 169.00	3.991	3.979	0.012	1.000	272774		3.97(2.13-6.40)		7240	
D 36 13C2 PFDoA										
615.00 > 570.00	3.991	3.979	0.012	1.516	2669035	2.69		107	20636	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.263	4.242	0.021	1.000	1216753	0.9814		98.1	3231	
663.00 > 169.00	4.254	4.242	0.012	0.998	381197		3.19(1.25-3.76)		10719	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.501	4.483	0.018	1.000	349124	1.05		105	7538	
713.00 > 219.00	4.488	4.483	0.005	0.997	241931		1.44(0.71-2.13)		5988	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.501	4.483	0.018	1.710	3396230	2.62		105	20208	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.923	4.902	0.021	1.870	5903631	2.55		102	15892	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.923	4.902	0.021	1.000	2194849	0.9617		96.2	1004	
813.00 > 169.00	4.923	4.902	0.021	1.000	386016		5.69(2.86-8.58)		4643	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.276	5.255	0.021	1.000	2354276	0.9462		94.6	727	
913.00 > 169.00	5.276	5.255	0.021	1.000	298039		7.90(0.00-0.00)		1363	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL4_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 11:01:59 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_037.d

Injection Date: 26-Jan-2018 17:32:43 Instrument ID: A8_N

Lims ID: CCV L4

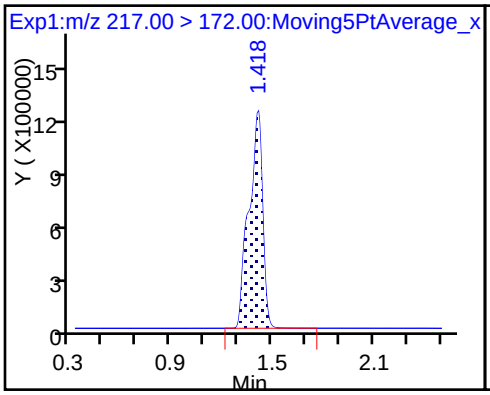
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 30 Worklist Smp#: 12

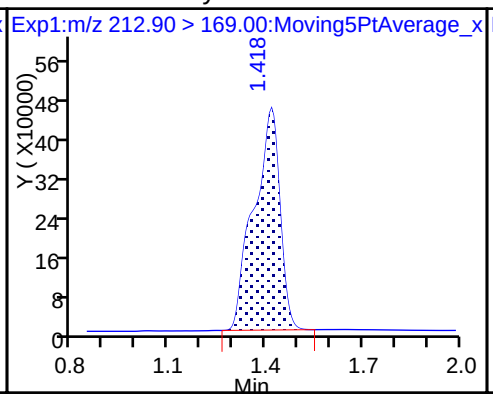
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

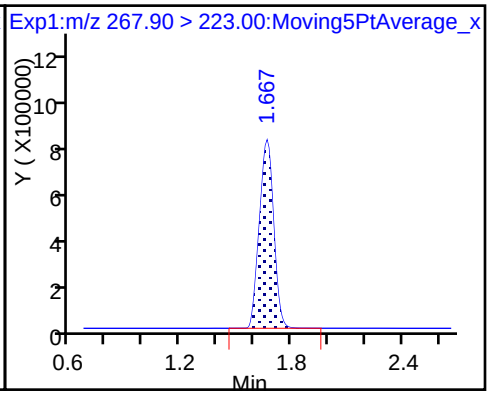
D 1 13C4 PFBA



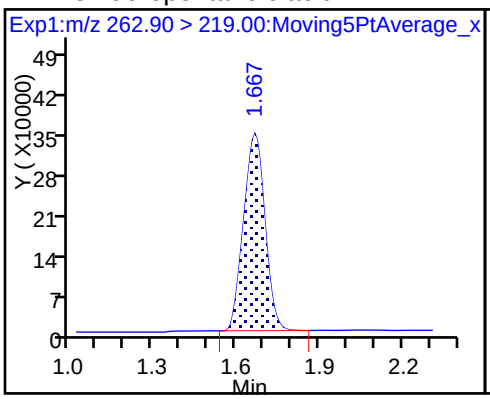
2 Perfluorobutyric acid



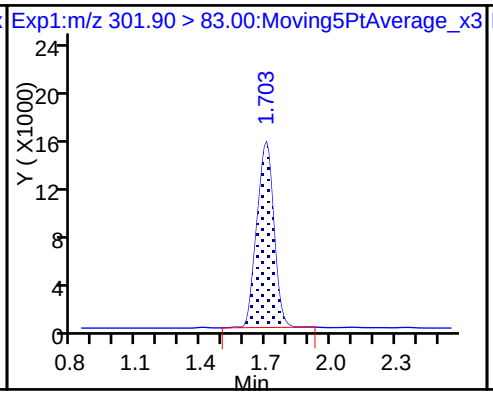
D 3 13C5-PFPeA



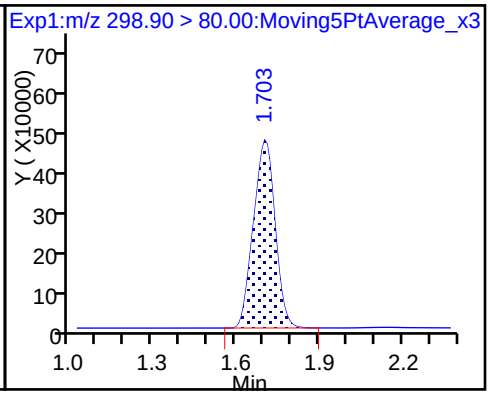
4 Perfluoropentanoic acid



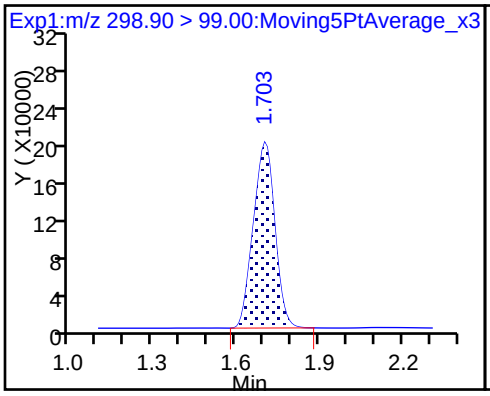
D 47 13C3-PFBS



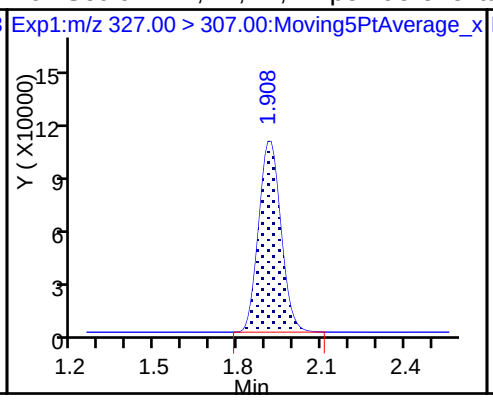
5 Perfluorobutanesulfonic acid



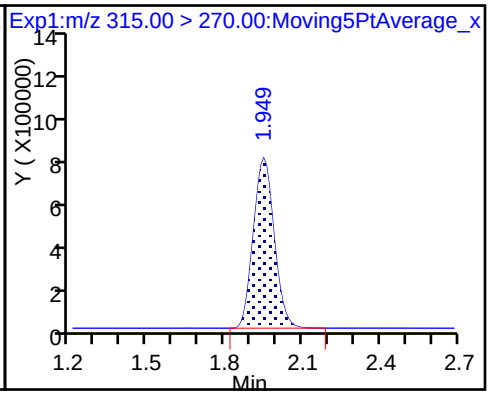
5 Perfluorobutanesulfonic acid



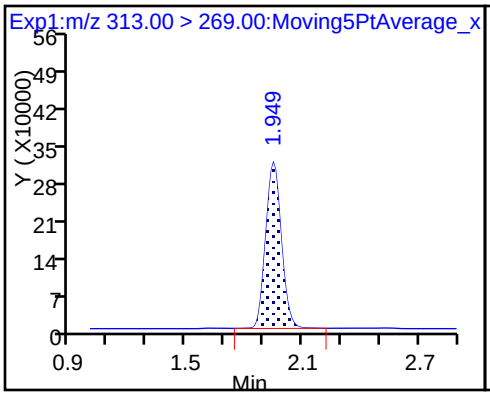
61 Sodium 1H,1H,2H,2H-perfluorohexa



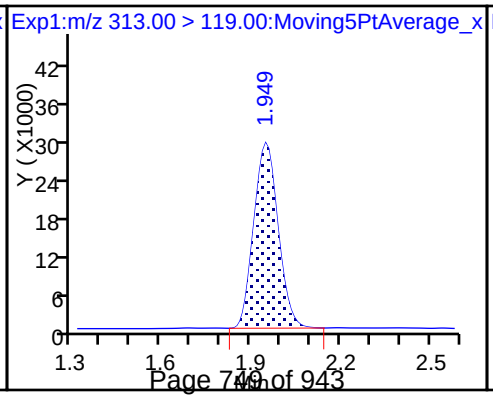
D 7 13C2 PFHxA



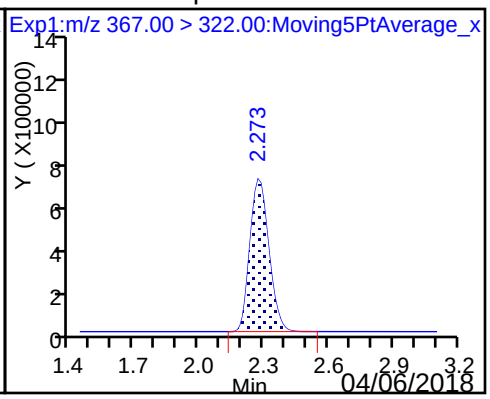
6 Perfluorohexanoic acid



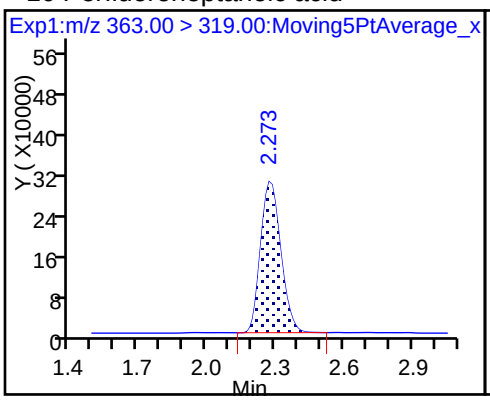
6 Perfluorohexanoic acid



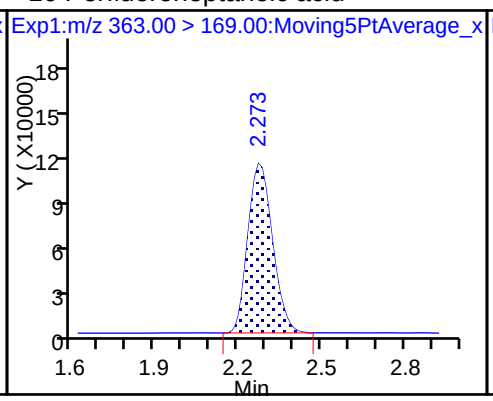
D 9 13C4-PFHpA



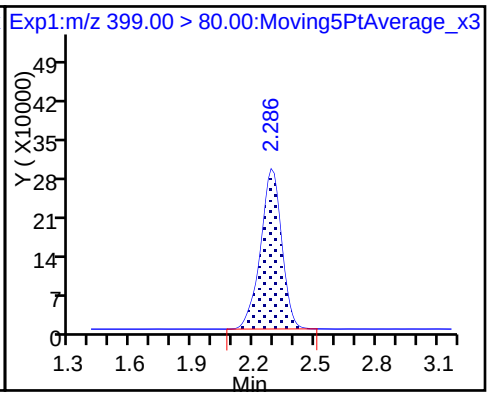
10 Perfluoroheptanoic acid



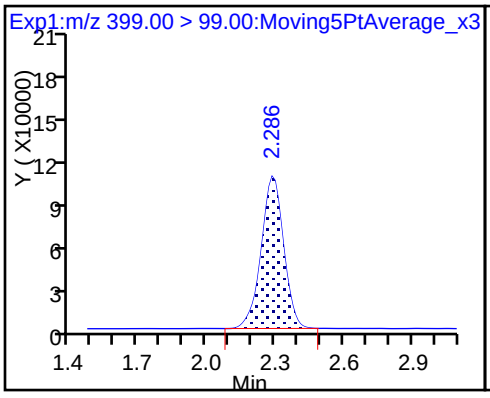
10 Perfluoroheptanoic acid



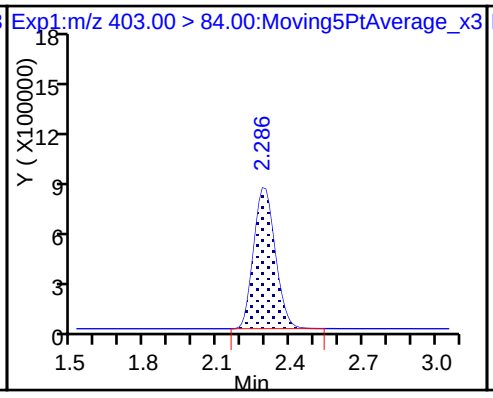
8 Perfluorohexanesulfonic acid



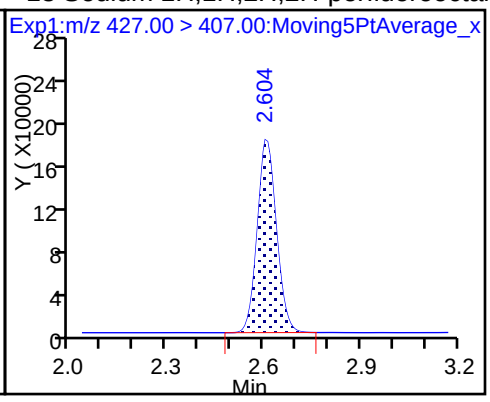
8 Perfluorohexanesulfonic acid



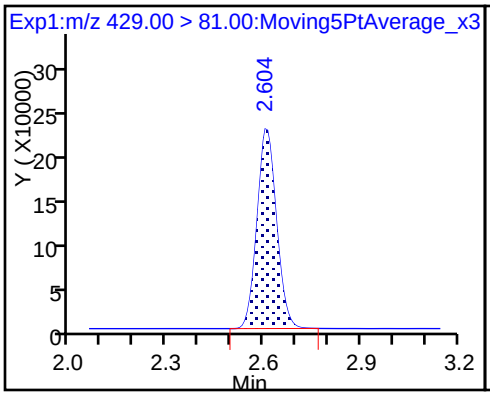
D 11 18O2 PFHxS



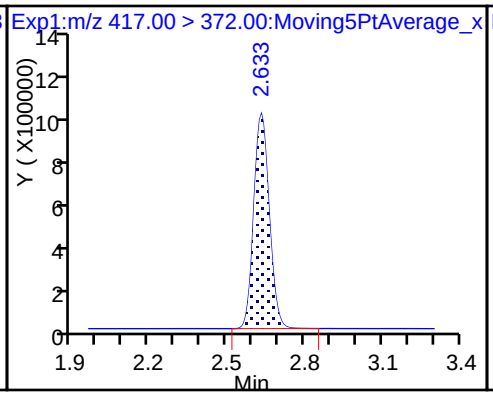
13 Sodium 1H,1H,2H,2H-perfluorooctane



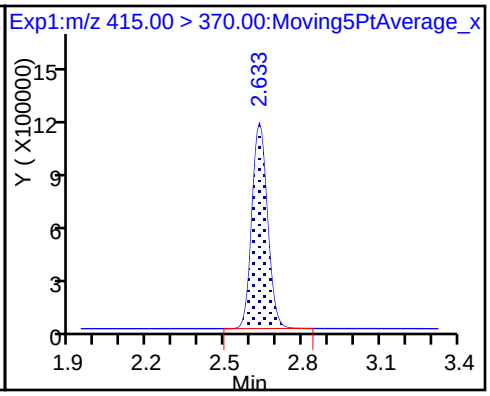
D 12 M2-6:2FTS



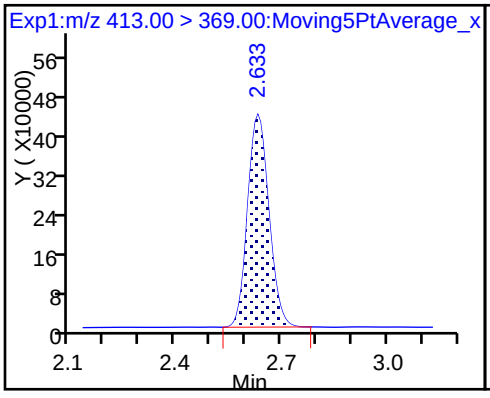
D 14 13C4 PFOA



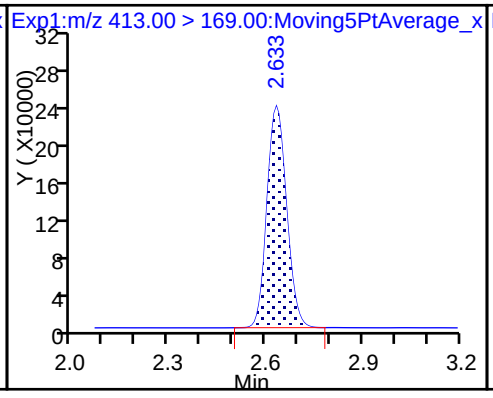
* 62 13C2-PFOA



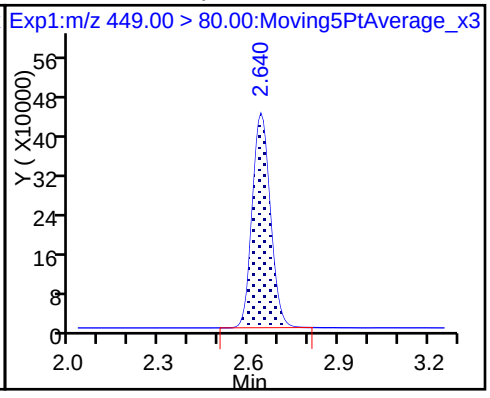
15 Perfluorooctanoic acid



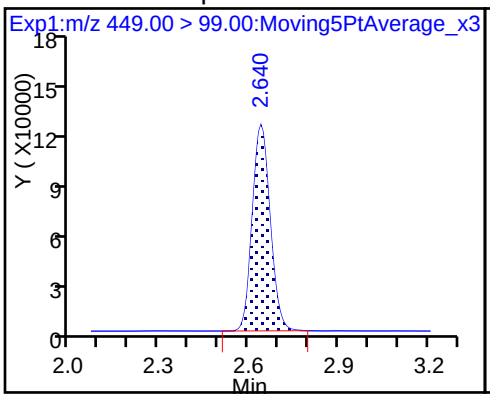
15 Perfluorooctanoic acid



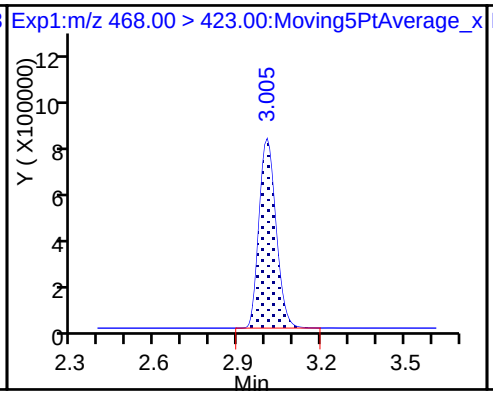
16 Perfluoroheptanesulfonic acid



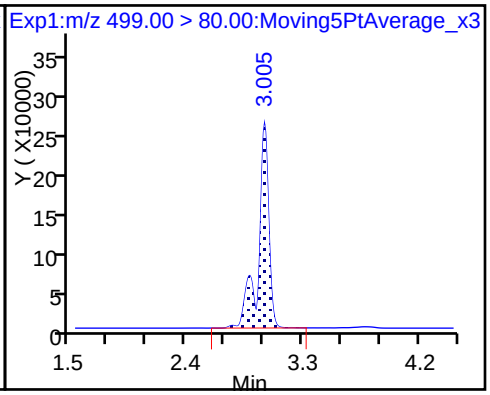
16 Perfluoroheptanesulfonic acid



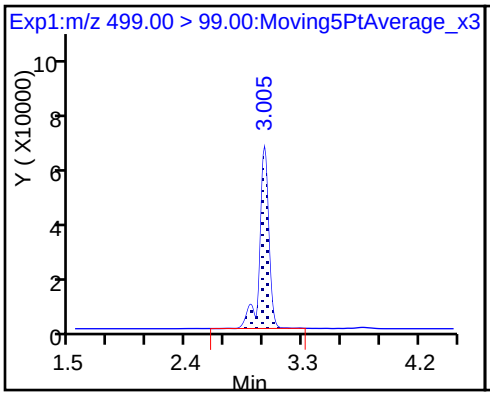
D 19 13C5 PFNA



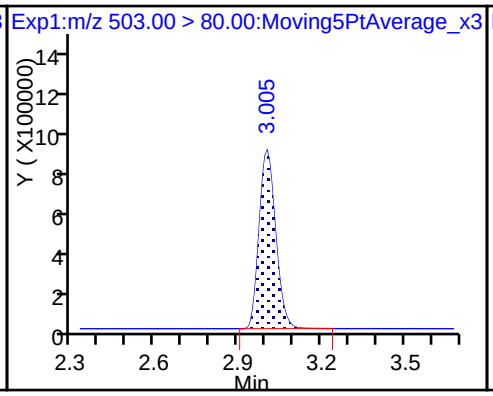
17 Perfluorooctane sulfonic acid



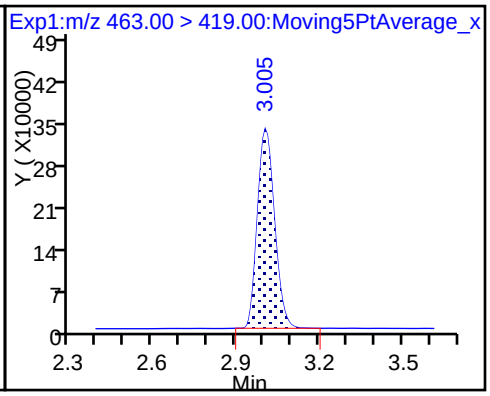
17 Perfluorooctane sulfonic acid



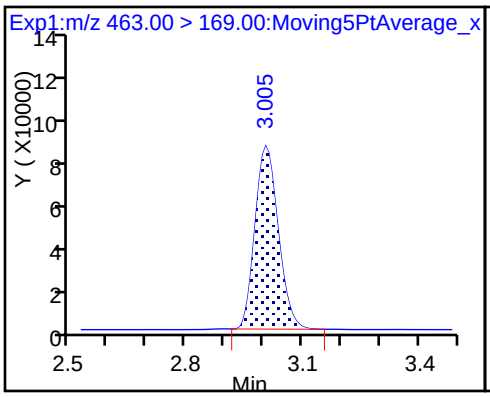
D 18 13C4 PFOS



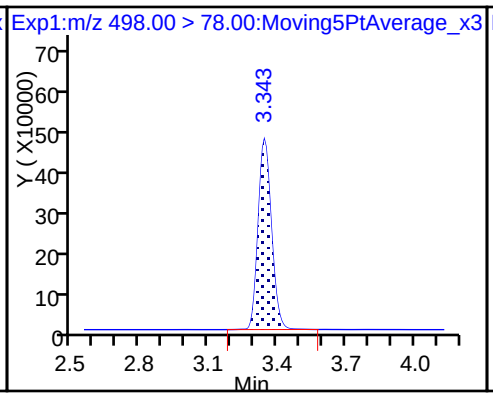
20 Perfluorononanoic acid



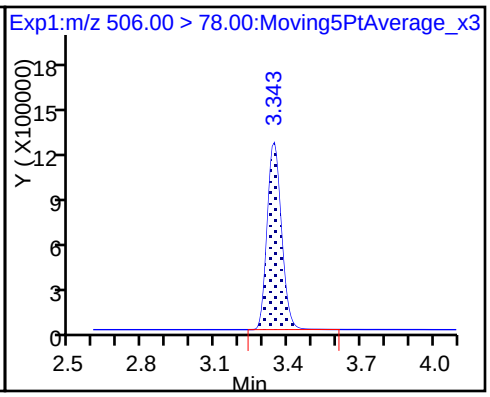
20 Perfluorononanoic acid



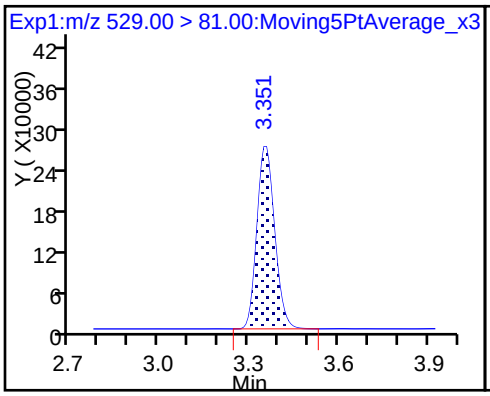
22 Perfluorooctane Sulfonamide



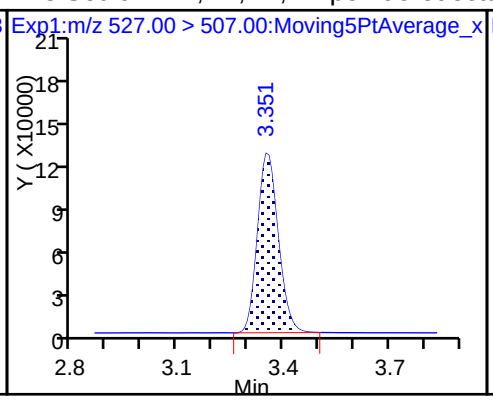
D 21 13C8 FOSA



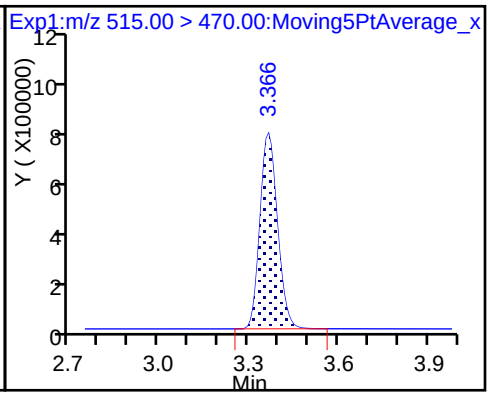
D 26 M2-8:2FTS



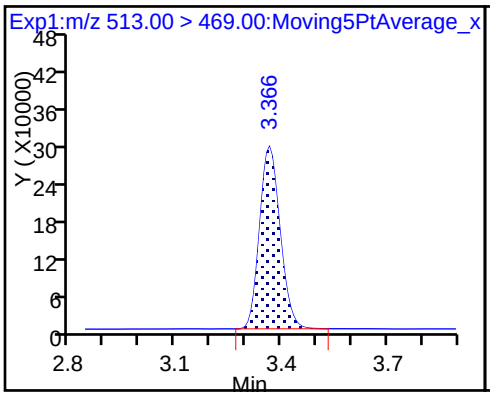
25 Sodium 1H,1H,2H,2H-perfluorodecane



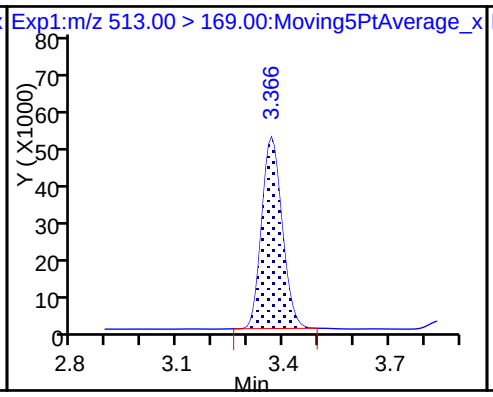
D 23 13C2 PFDA



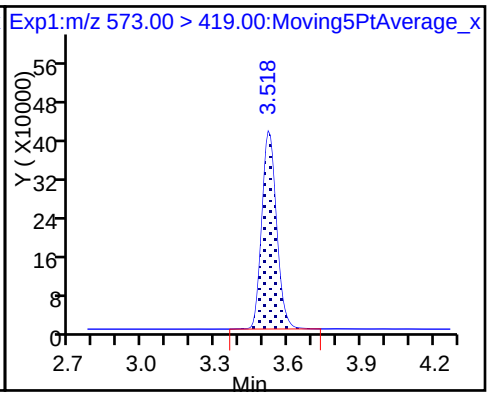
24 Perfluorodecanoic acid



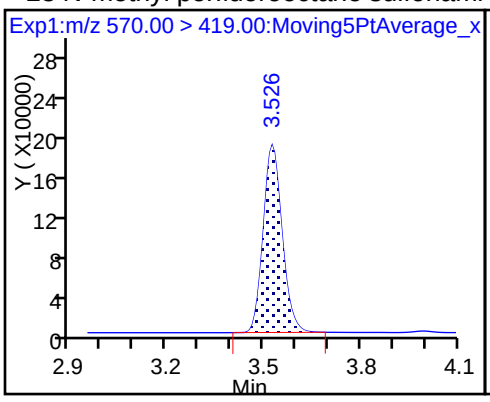
24 Perfluorodecanoic acid



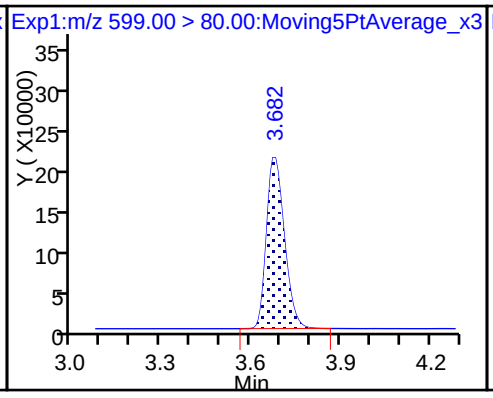
D 27 d3-NMeFOSAA



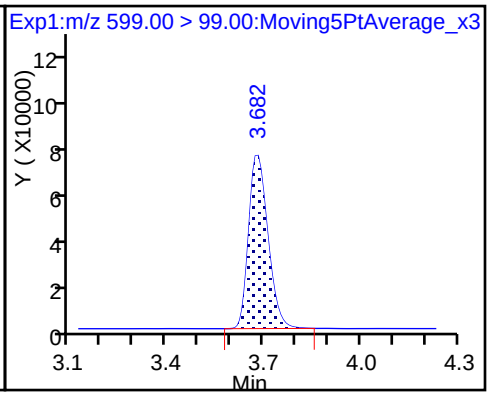
28 N-methyl perfluorooctane sulfonami



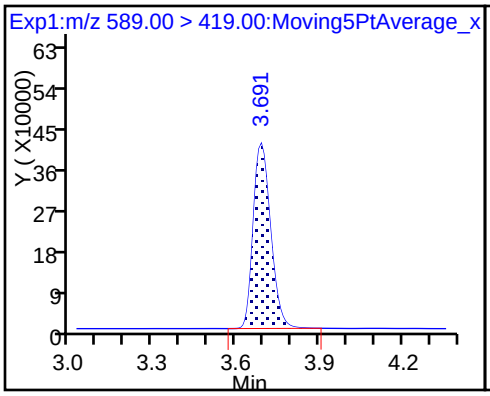
29 Perfluorodecane Sulfonic acid



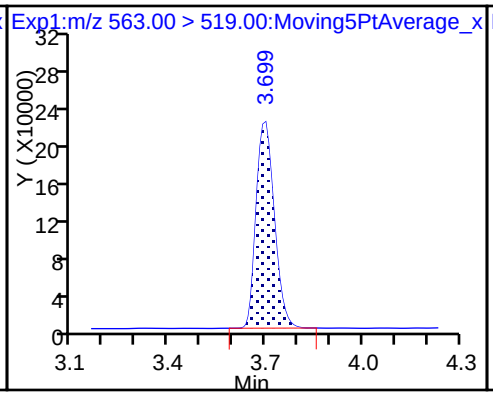
29 Perfluorodecane Sulfonic acid



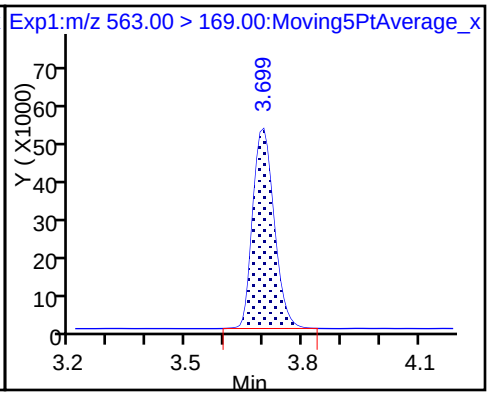
D 32 d5-NEtFOSAA



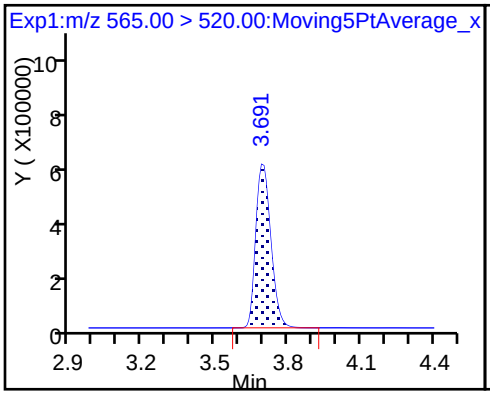
31 Perfluoroundecanoic acid



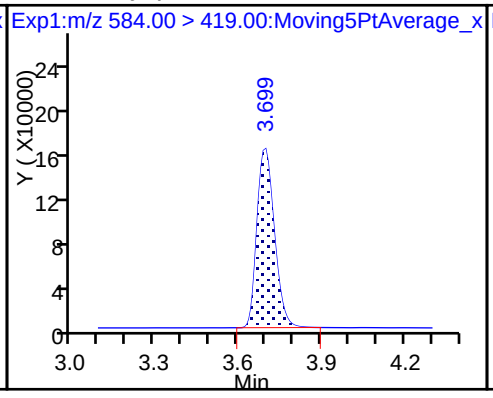
31 Perfluoroundecanoic acid



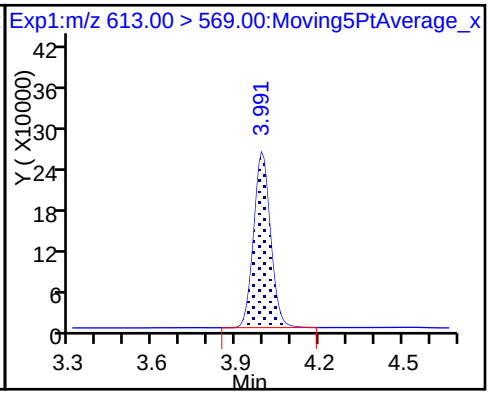
D 30 13C2 PFUnA



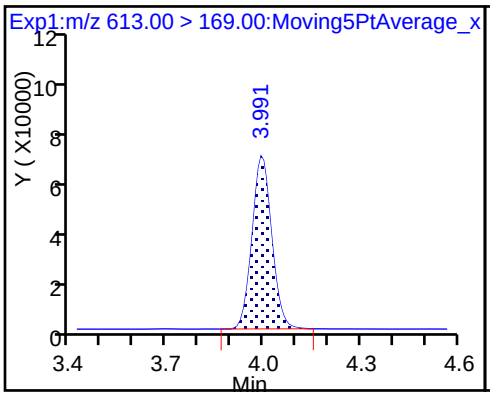
33 N-ethyl perfluorooctane sulfonamid



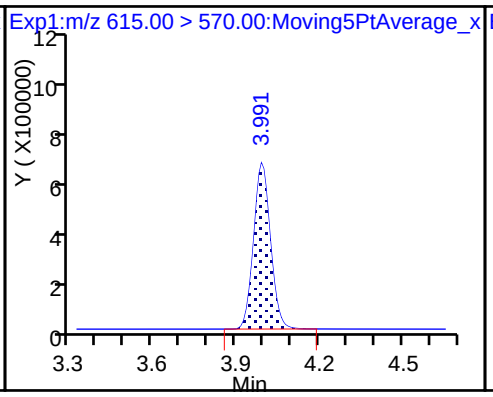
37 Perfluorododecanoic acid



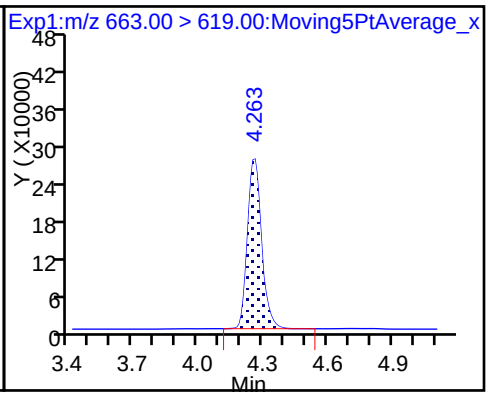
37 Perfluorododecanoic acid



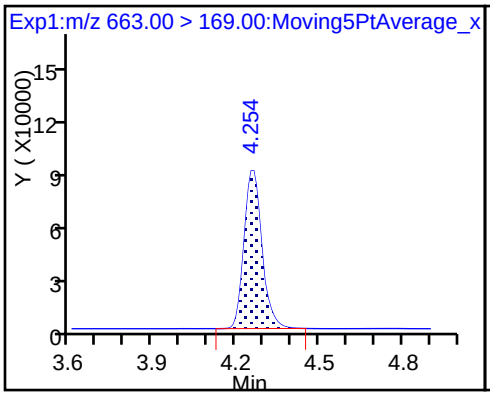
D 36 13C2 PFDoA



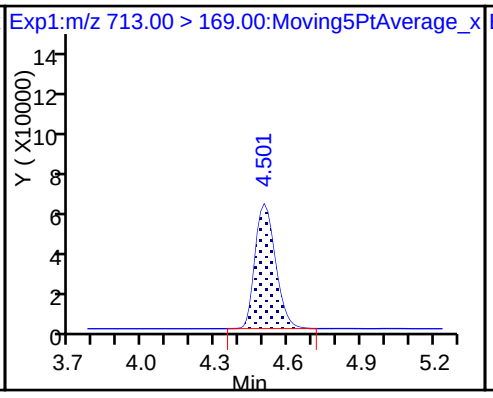
41 Perfluorotridecanoic acid



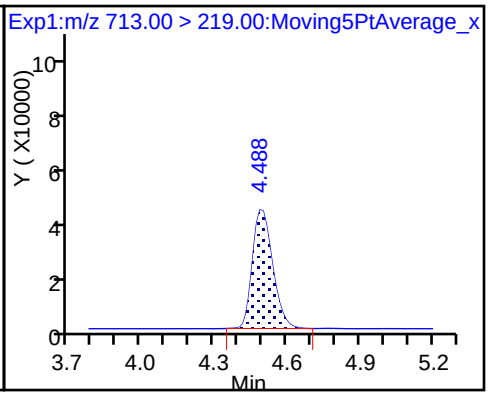
41 Perfluorotridecanoic acid



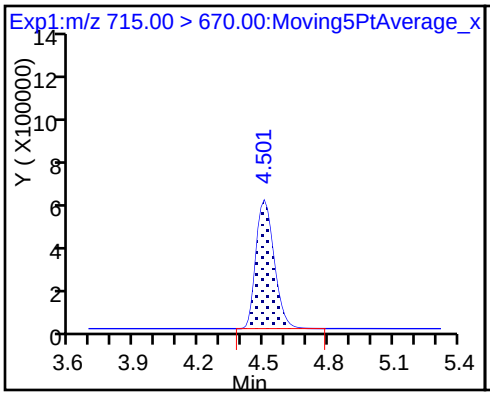
42 Perfluorotetradecanoic acid



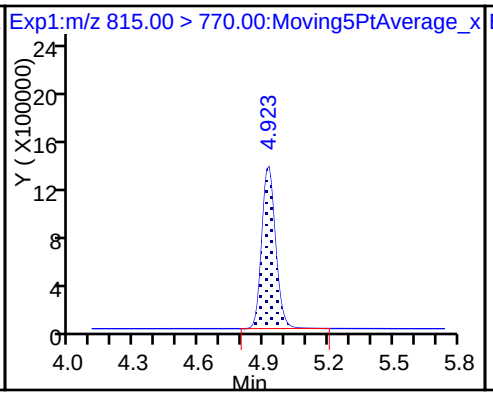
42 Perfluorotetradecanoic acid



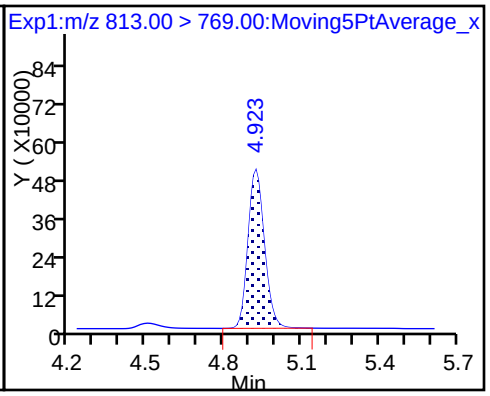
D 43 13C2-PFTeDA



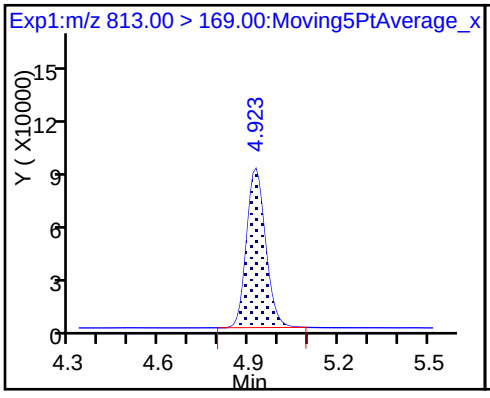
D 44 13C2-PFHxDA



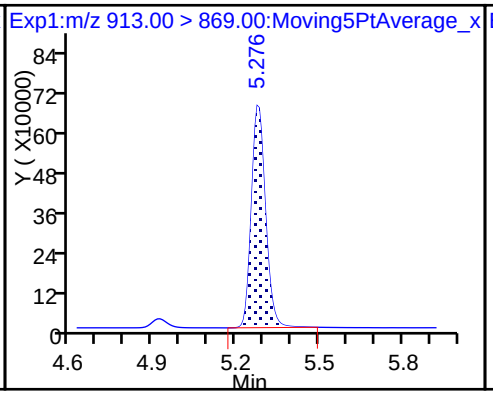
45 Perfluorohexadecanoic acid



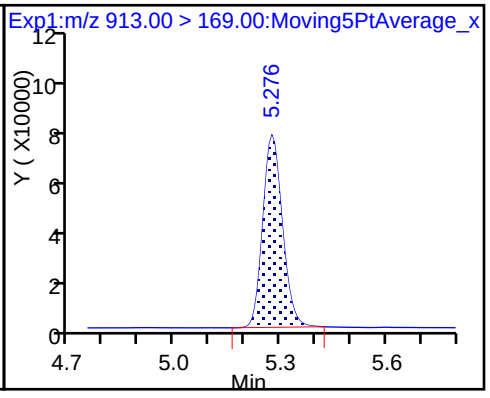
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205921/17 Calibration Date: 01/26/2018 18:11

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_042.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9343	0.9326		2.50	2.50	-0.2	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.161		2.46	2.50	-1.4	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	80.76		2.31	2.21	4.6	25.0
4:2 FTS	AveID	13.89	18.00		3.03	2.34	29.6*	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	1.040		2.51	2.50	0.4	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.121		2.55	2.50	2.0	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.061		2.17	2.28	-4.7	25.0
6:2FTS	AveID	1.655	1.808		2.59	2.37	9.2	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.141		2.43	2.50	-2.7	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.344		2.36	2.38	-0.8	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.082		2.24	2.32	-3.3	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.080		2.62	2.50	4.6	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	0.996		2.54	2.50	1.4	25.0
8:2FTS	AveID	1.217	1.299		2.56	2.40	6.8	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9844		2.54	2.50	1.5	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.067		2.47	2.50	-1.3	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6375		2.35	2.41	-2.7	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9887		2.54	2.50	1.5	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9376		2.27	2.50	-9.2	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.114		2.72	2.50	8.7	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.211		2.61	2.50	4.2	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2391		2.45	2.50	-2.0	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9602		2.51	2.50	0.6	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.055		2.50	2.50	0.1	25.0
13C4 PFBA	Ave	1.512	1.467		2.43	2.50	-3.0	50.0
13C5-PFPeA	Ave	0.8956	0.8718		2.43	2.50	-2.7	50.0
13C3-PFBS	Ave	0.0198	0.0192		2.25	2.33	-3.1	50.0
13C2 PFHxA	Ave	0.9649	0.9258		2.40	2.50	-4.0	50.0
13C4-PFHpA	Ave	0.9187	0.8761		2.38	2.50	-4.6	50.0
18O2 PFHxS	Ave	1.131	1.157		2.42	2.37	2.3	50.0
M2-6:2FTS	Ave	0.1699	0.1983		2.77	2.38	16.7	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205921/17 Calibration Date: 01/26/2018 18:11

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_042.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.8870		2.46	2.50	-1.5	50.0
13C4 PFOS	Ave	0.7158	0.7761		2.59	2.39	8.4	50.0
13C5 PFNA	Ave	0.7300	0.7180		2.46	2.50	-1.6	50.0
13C8 FOSA	Ave	1.007	1.028		2.55	2.50	2.2	50.0
M2-8:2FTS	Ave	0.1795	0.2172		2.90	2.40	21.0	50.0
13C2 PFDA	Ave	0.6306	0.6333		2.51	2.50	0.4	50.0
d3-NMeFOSAA	Ave	0.3147	0.3668		2.91	2.50	16.5	50.0
13C2 PFUnA	Ave	0.4783	0.4962		2.59	2.50	3.7	50.0
d5-NEtFOSAA	Ave	0.3182	0.3483		2.74	2.50	9.4	50.0
13C2 PFDoA	Ave	0.5192	0.5030		2.42	2.50	-3.1	50.0
13C2-PFTeDA	Ave	0.6785	0.6526		2.40	2.50	-3.8	50.0
13C2-PFHxDA	Ave	1.209	1.158		2.39	2.50	-4.2	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_042.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 26-Jan-2018 18:11:53 ALS Bottle#: 31 Worklist Smp#: 17
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 11:07:49 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 11:07:49

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	1.418	1.411	0.007	0.538	6954229	2.43		97.0	24615	
2 Perfluorobutyric acid										
212.90 > 169.00	1.418	1.413	0.005	1.000	6485692	2.50		99.8	1180	
D 3 13C5-PFPeA										
267.90 > 223.00	1.667	1.659	0.008	0.633	4132022	2.43		97.3	52416	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.667	1.662	0.005	1.000	4797816	2.46		98.6	3592	
D 47 13C3-PFBS										
301.90 > 83.00	1.703	1.695	0.008	0.647	84625	2.25		96.9	3099	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.703	1.697	0.006	1.000	6495938	2.31		105	21891	
298.90 > 99.00	1.703	1.697	0.006	1.000	2675584		2.43(1.25-3.74)		14891	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.908	1.903	0.005	1.000	1530113	3.03		130	56747	
D 60 M2-4:2FTS										
329.00 > 81.00	1.908	1.903	0.005	0.725	616310	NC			4694	
D 7 13C2 PFHxA										
315.00 > 270.00	1.949	1.939	0.010	0.740	4388049	2.40		96.0	39187	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.949	1.939	0.010	1.000	4564924	2.51		100	13629	
313.00 > 119.00	1.949	1.939	0.010	1.000	413459		11.04(5.03-15.10)		7340	
D 9 13C4-PFHpA										
367.00 > 322.00	2.273	2.267	0.006	0.863	4152477	2.38		95.4	26349	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.273	2.268	0.005	1.000	4656401	2.55		102	7244	
363.00 > 169.00	2.273	2.268	0.005	1.000	1791172		2.60(1.13-3.40)		13383	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.286	2.280	0.006	1.000	5294721	2.17		95.3	15827	
399.00 > 99.00	2.286	2.280	0.006	1.000	1833893		2.89(1.50-4.49)		8231	
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.868	5189051	2.42		102	30272	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.604	2.596	0.008	1.000	1610778	2.59		109	19560	
D 12 M2-6:2FTS										
429.00 > 81.00	2.604	2.597	0.007	0.989	892903	2.77		117	19743	
D 14 13C4 PFOA										
417.00 > 372.00	2.626	2.622	0.004	0.997	4203866	2.46		98.5	28133	
* 62 13C2-PFOA										
415.00 > 370.00	2.633	2.622	0.011		4739602	2.50			29037	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.633	2.623	0.010	1.003	4795589	2.43		97.3	1932	
413.00 > 169.00	2.633	2.623	0.010	1.003	2566634		1.87(0.84-2.52)		16519	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.640	2.629	0.011	1.000	4707457	2.36		99.2	29988	
449.00 > 99.00	2.633	2.629	0.004	0.997	1264615		3.72(1.94-5.82)		12586	
D 19 13C5 PFNA										
468.00 > 423.00	3.005	2.992	0.013	1.141	3403136	2.46		98.4	28797	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.997	2.992	0.005	1.000	3693784	2.24		96.7	8299	
499.00 > 99.00	2.997	2.992	0.005	1.000	802662		4.60(2.31-6.93)		6692	
D 18 13C4 PFOS										
503.00 > 80.00	2.997	2.992	0.005	1.138	3516747	2.59		108	20569	
20 Perfluorononanoic acid										
463.00 > 419.00	3.005	2.992	0.013	1.000	3676272	2.62		105	8545	
463.00 > 169.00	3.005	2.992	0.013	1.000	920170		4.00(1.90-5.69)		12159	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.343	3.338	0.005	1.000	4856385	2.54		101	17221	
D 21 13C8 FOSA										
506.00 > 78.00	3.343	3.338	0.005	1.270	4874264	2.55		102	18701	
D 26 M2-8:2FTS										
529.00 > 81.00	3.351	3.342	0.009	1.273	986138	2.90		121	21989	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.351	3.342	0.009	1.000	1281173	2.56		107	15052	
D 23 13C2 PFDA										
515.00 > 470.00	3.358	3.352	0.006	1.275	3001675	2.51		100	25415	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.366	3.353	0.013	1.002	2954817	2.54		101	12736	
513.00 > 169.00	3.366	3.353	0.013	1.002	537147		5.50(2.36-7.09)		2184	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.518	3.507	0.011	1.336	1738228	2.91		117	14688	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.526	3.513	0.013	1.002	1854069	2.47		98.7	7480	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.673	3.666	0.007	1.000	2260565	2.35		97.3	24098	
599.00 > 99.00	3.673	3.666	0.007	1.000	784318		2.88(1.39-4.16)		17538	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.691	3.672	0.019	1.402	1650579	2.74		109	8264	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.691	3.678	0.013	1.000	2204995	2.27		90.8	8093	
563.00 > 169.00	3.691	3.678	0.013	1.000	506971		4.35(0.00-0.00)		9878	
D 30 13C2 PFUnA										
565.00 > 520.00	3.691	3.679	0.012	1.402	2351863	2.59		104	28012	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.691	3.679	0.012	1.000	1631934	2.54		102	10509	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.991	3.979	0.012	1.000	2655268	2.72		109	11459	
613.00 > 169.00	3.991	3.979	0.012	1.000	648228		4.10(2.13-6.40)		11851	
D 36 13C2 PFDoA										
615.00 > 570.00	3.991	3.979	0.012	1.516	2383803	2.42		96.9	19531	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.254	4.242	0.012	1.000	2885691	2.61		104	7075	
663.00 > 169.00	4.254	4.242	0.012	1.000	937162		3.08(1.25-3.76)		19335	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.501	4.483	0.018	1.000	739607	2.45		98.0	11541	
713.00 > 219.00	4.488	4.483	0.005	0.997	550332		1.34(0.71-2.13)		11996	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.501	4.483	0.018	1.710	3092882	2.40		96.2	21377	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.914	4.902	0.012	1.866	5489583	2.39		95.8	17851	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.923	4.902	0.021	1.002	5271241	2.51		101	2638	
813.00 > 169.00	4.923	4.902	0.021	1.002	912273		5.78(2.86-8.58)		8882	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.275	5.255	0.020	1.000	5789748	2.50		100	1302	
913.00 > 169.00	5.275	5.255	0.020	1.000	737993		7.85(0.00-0.00)		2175	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL5_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 11:07:50 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_042.d

Injection Date: 26-Jan-2018 18:11:53 Instrument ID: A8_N

Lims ID: CCV L5

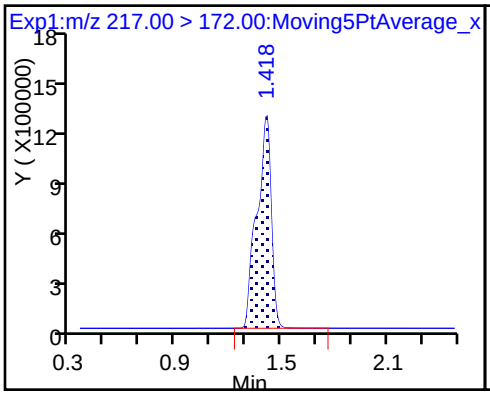
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 31 Worklist Smp#: 17

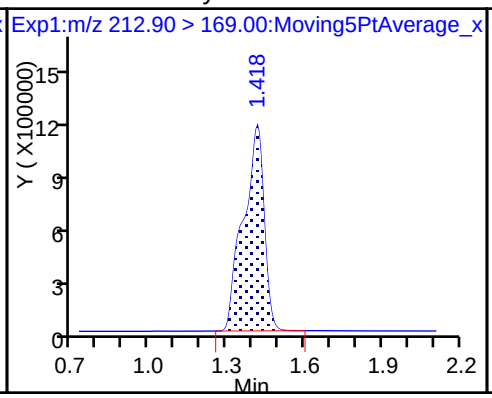
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

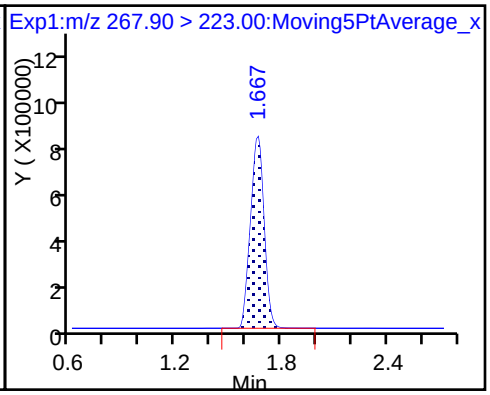
D 1 13C4 PFBA



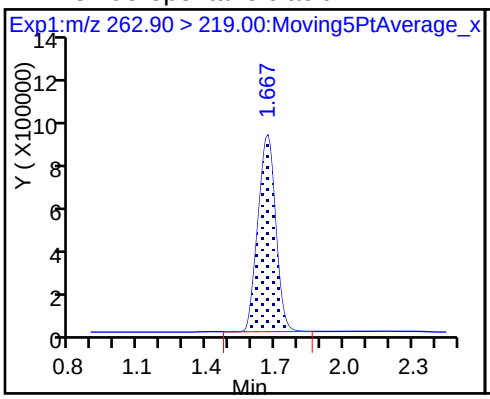
2 Perfluorobutyric acid



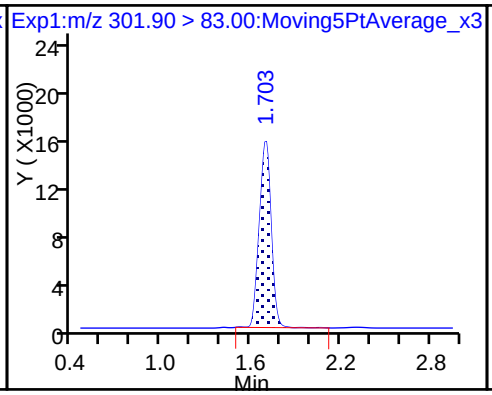
D 3 13C5-PFPeA



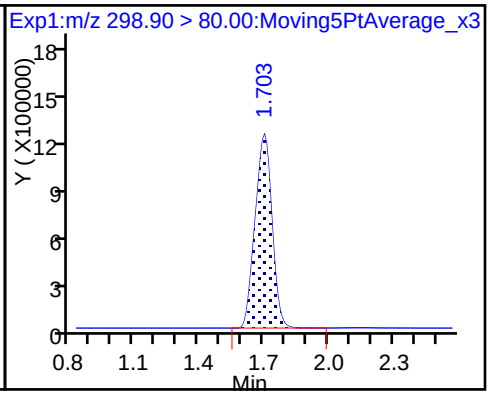
4 Perfluoropentanoic acid



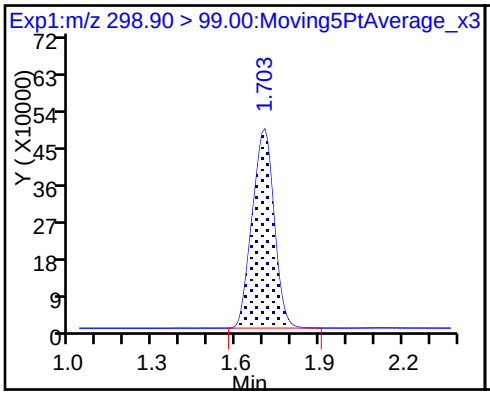
D 47 13C3-PFBS



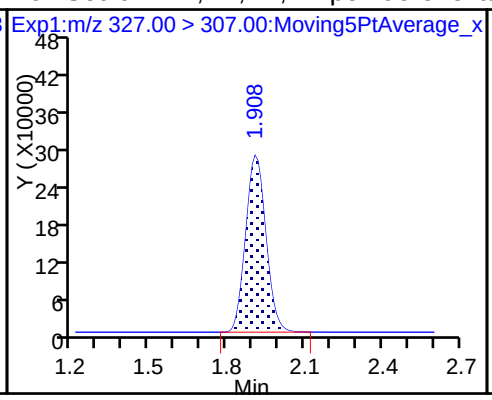
5 Perfluorobutanesulfonic acid



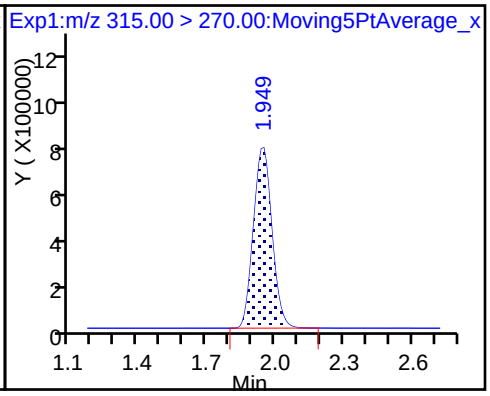
5 Perfluorobutanesulfonic acid



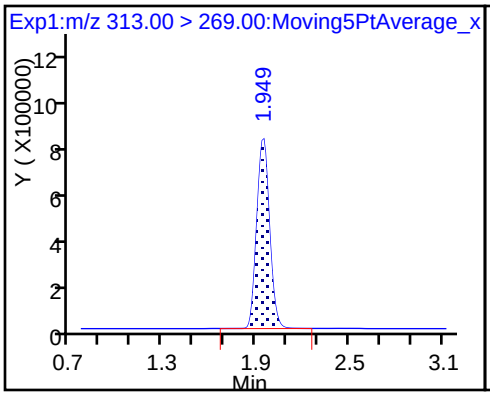
61 Sodium 1H,1H,2H,2H-perfluorohexa



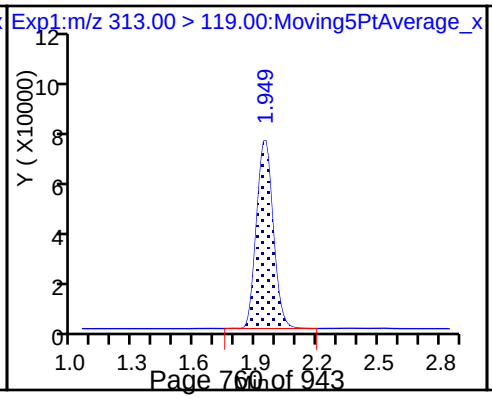
D 7 13C2 PFHxA



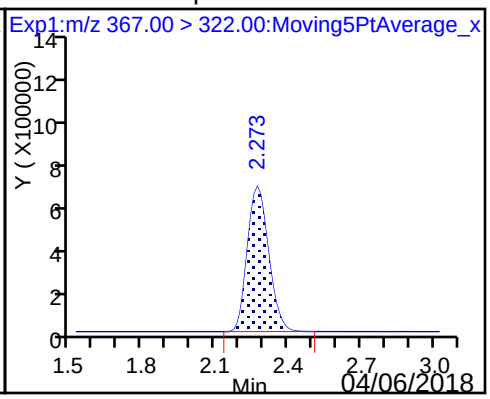
6 Perfluorohexanoic acid



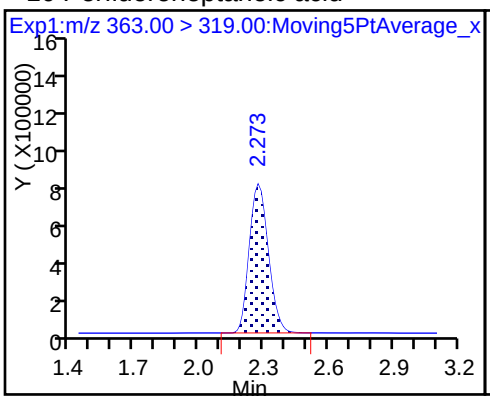
6 Perfluorohexanoic acid



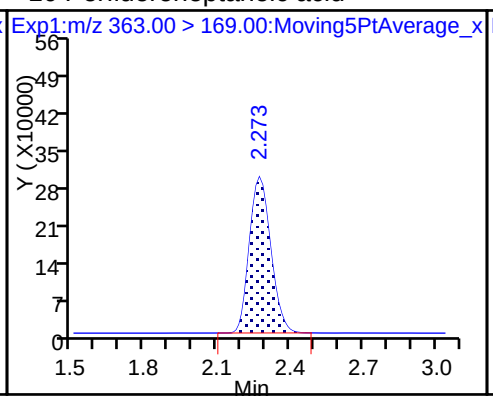
D 9 13C4-PFHpA



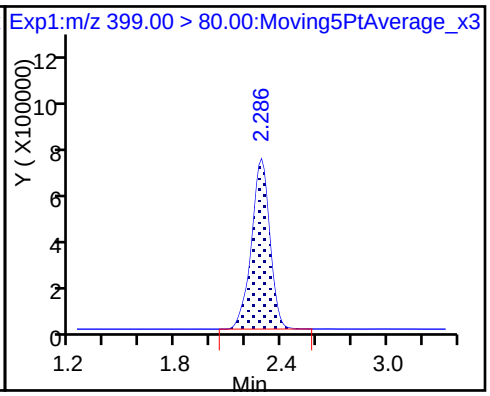
10 Perfluoroheptanoic acid



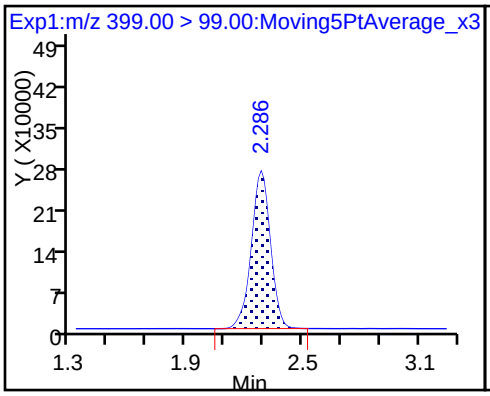
10 Perfluoroheptanoic acid



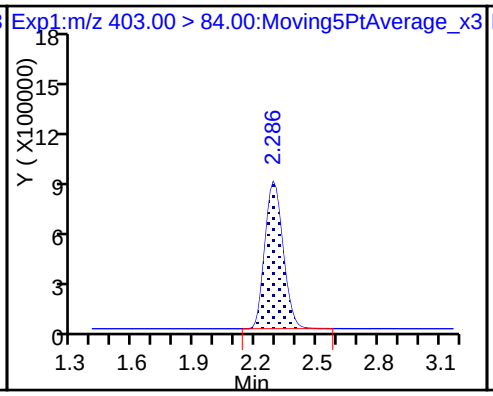
8 Perfluorohexanesulfonic acid



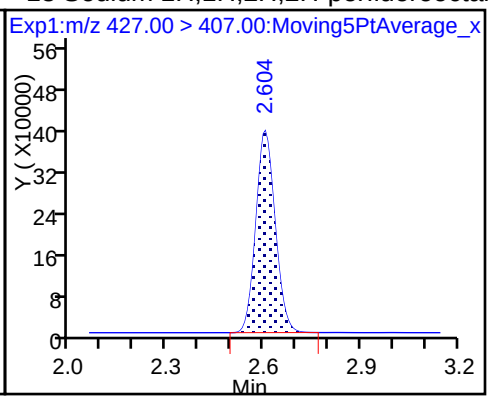
8 Perfluorohexanesulfonic acid



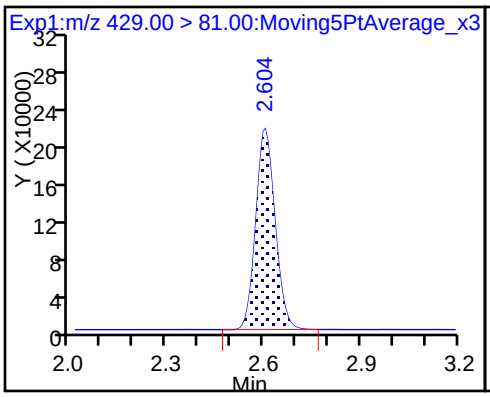
D 11 18O2 PFHxS



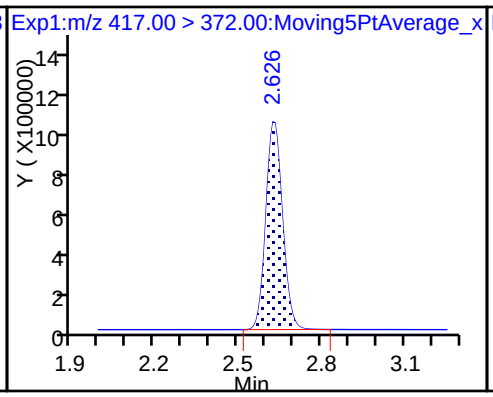
13 Sodium 1H,1H,2H,2H-perfluorooctane



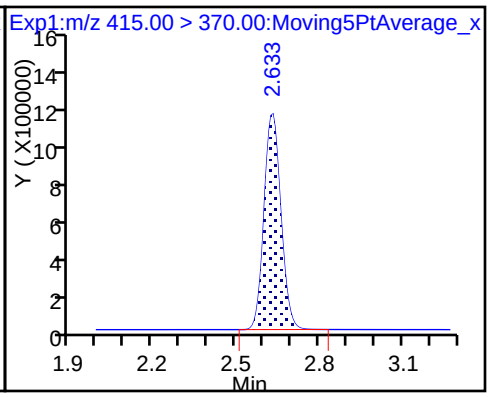
D 12 M2-6:2FTS



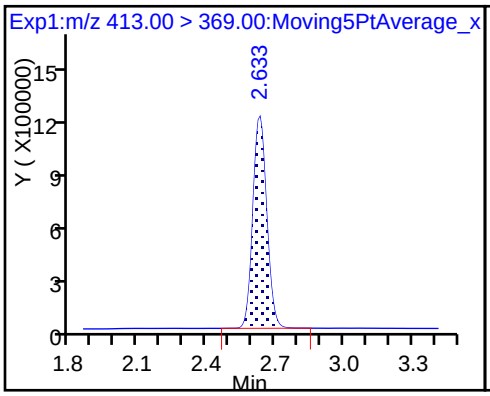
D 14 13C4 PFOA



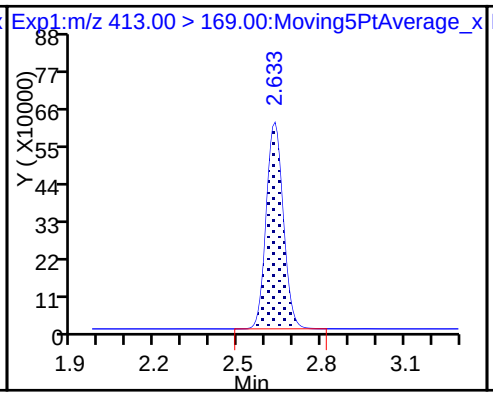
* 62 13C2-PFOA



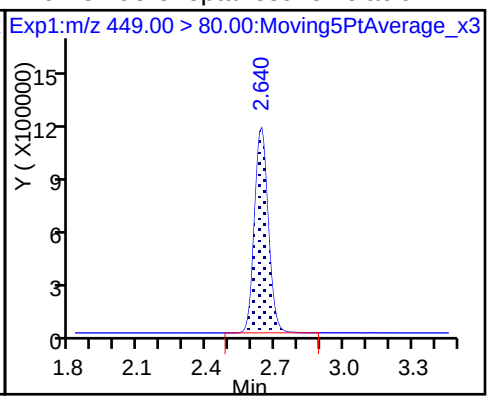
15 Perfluorooctanoic acid



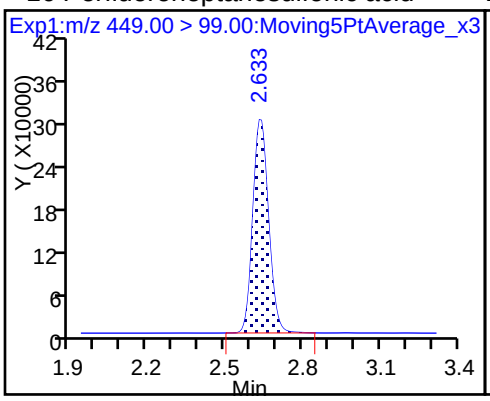
15 Perfluorooctanoic acid



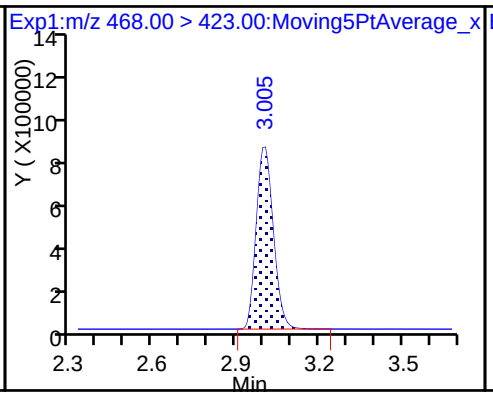
16 Perfluoroheptanesulfonic acid



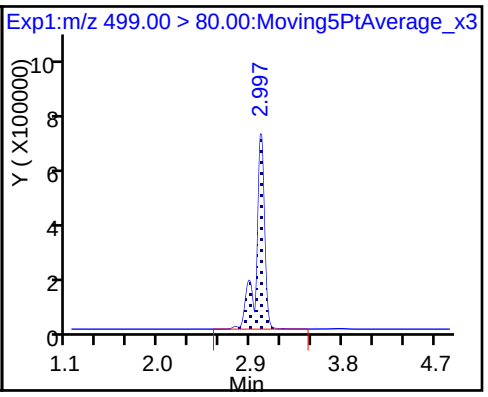
16 Perfluoroheptanesulfonic acid



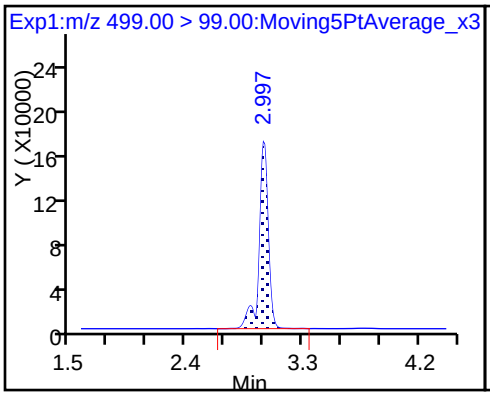
D 19 13C5 PFNA



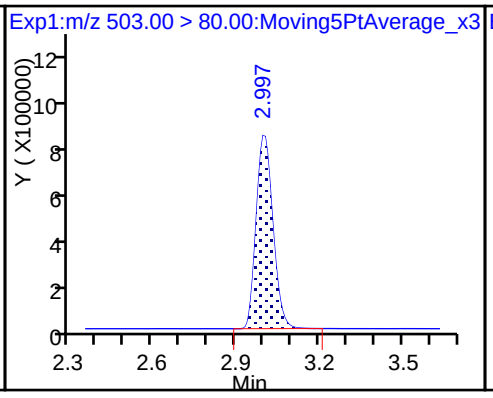
17 Perfluorooctane sulfonic acid



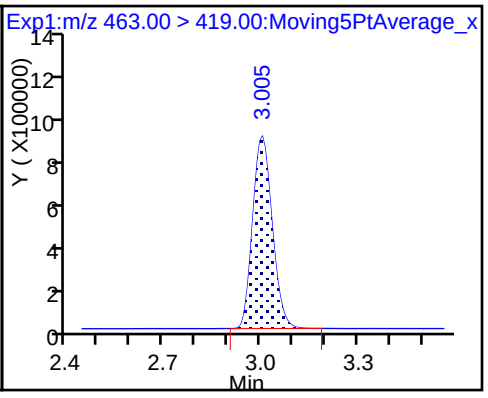
17 Perfluorooctane sulfonic acid



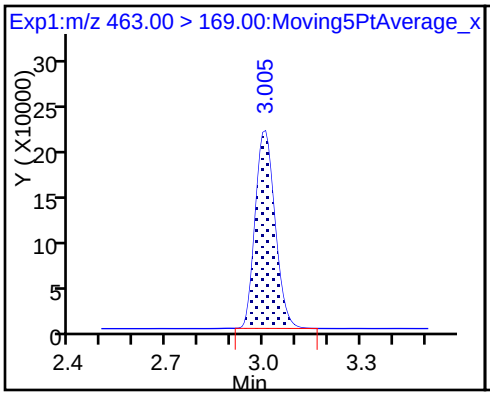
D 18 13C4 PFOS



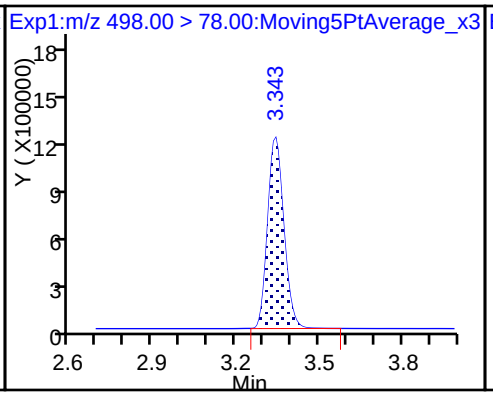
20 Perfluorononanoic acid



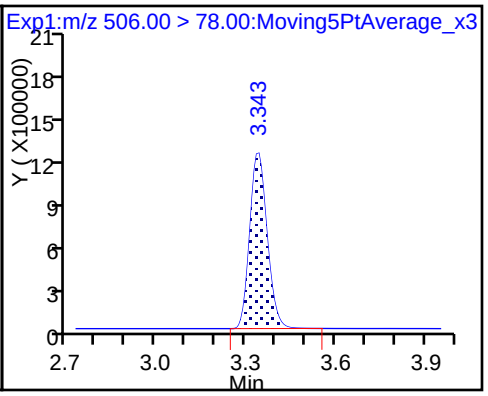
20 Perfluorononanoic acid



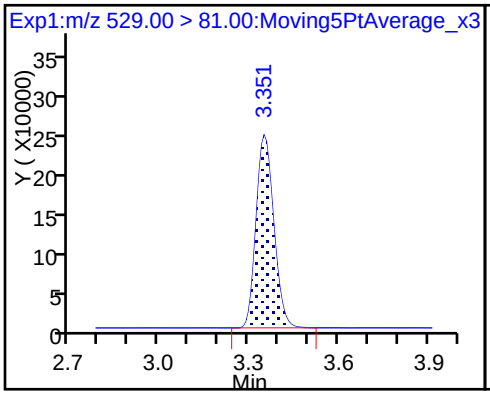
22 Perfluorooctane Sulfonamide



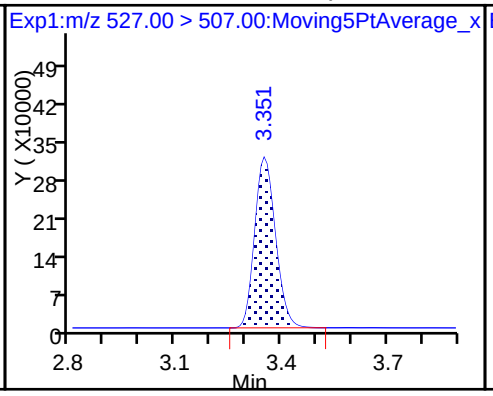
D 21 13C8 FOSA



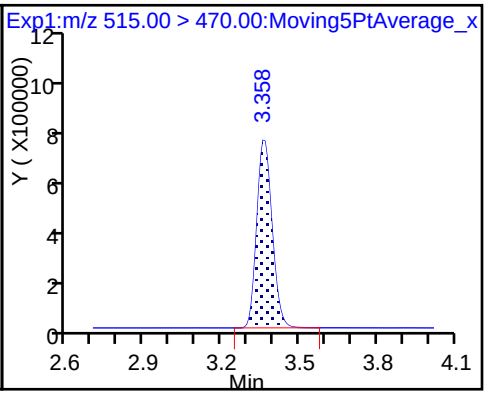
D 26 M2-8:2FTS



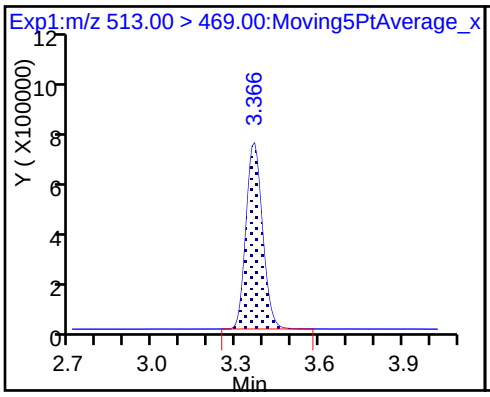
25 Sodium 1H,1H,2H,2H-perfluorodecane



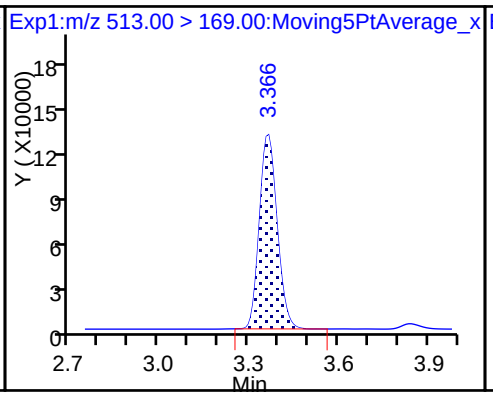
D 23 13C2 PFDA



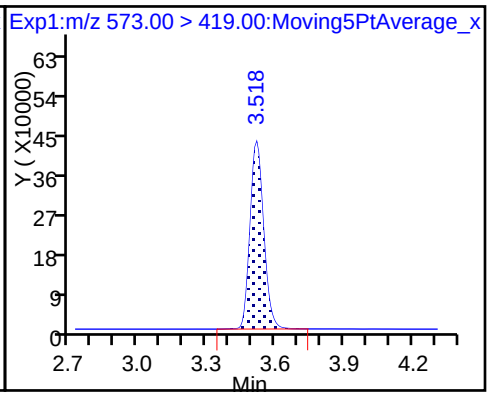
24 Perfluorodecanoic acid



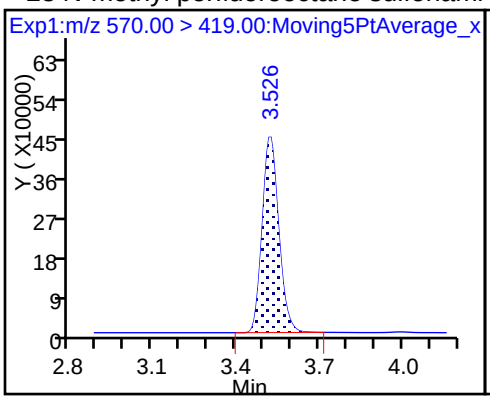
24 Perfluorodecanoic acid



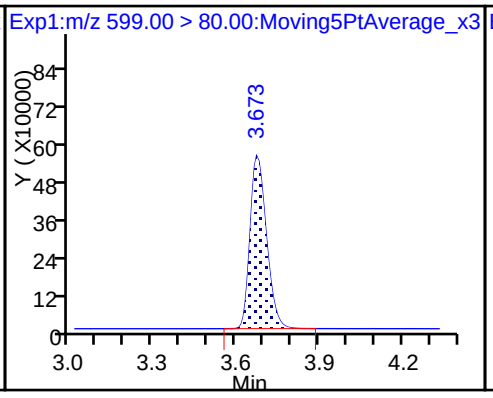
D 27 d3-NMeFOSAA



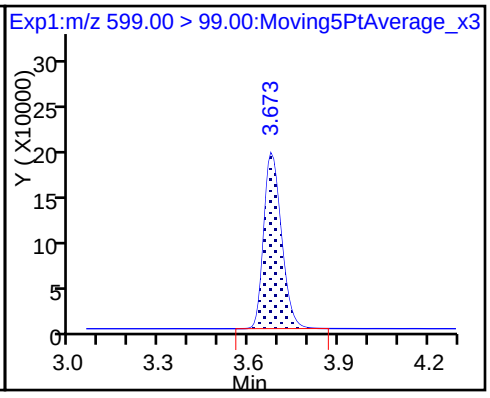
28 N-methyl perfluorooctane sulfonami



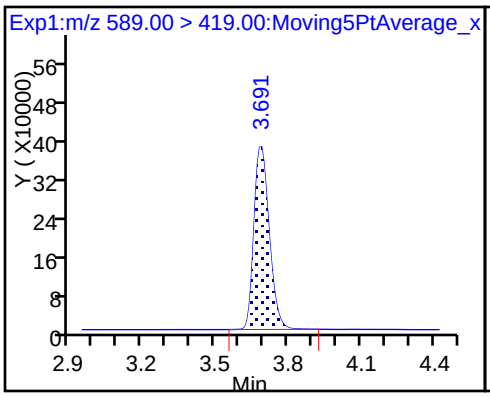
29 Perfluorodecane Sulfonic acid



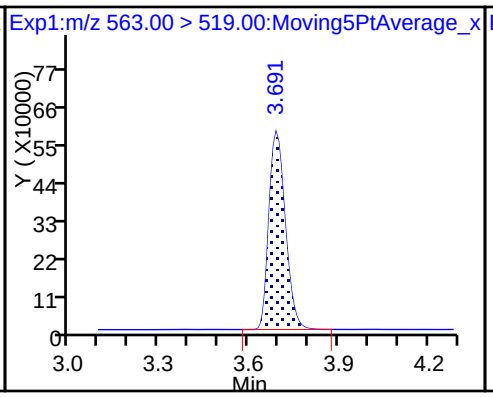
29 Perfluorodecane Sulfonic acid



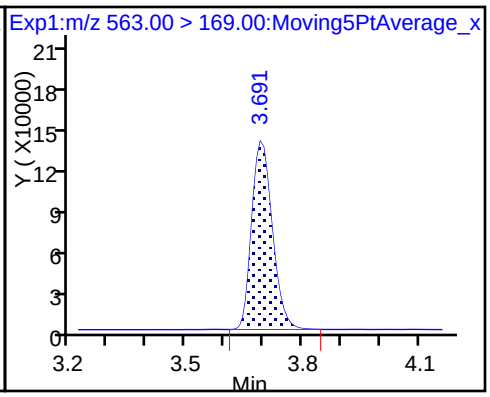
D 32 d5-NEtFOSAA



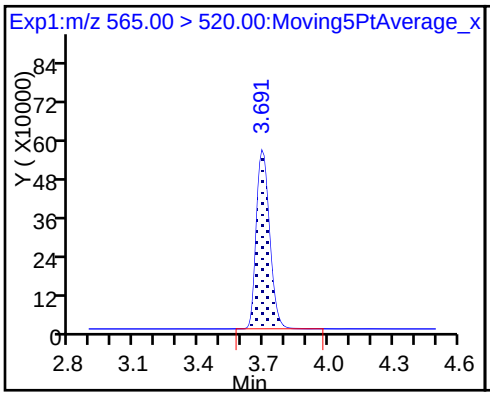
31 Perfluoroundecanoic acid



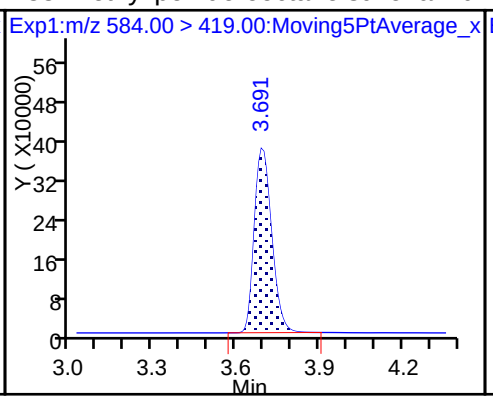
31 Perfluoroundecanoic acid



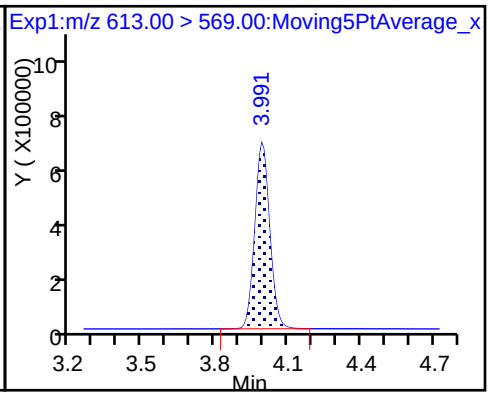
D 30 13C2 PFUnA



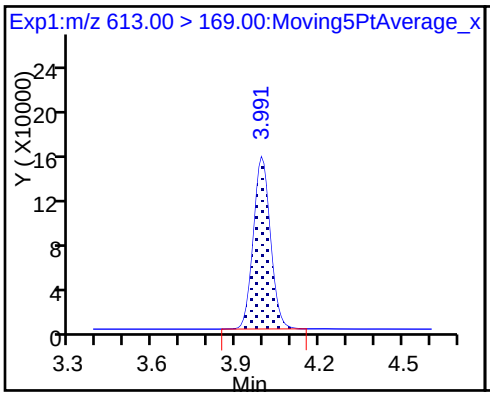
33 N-ethyl perfluorooctane sulfonamid



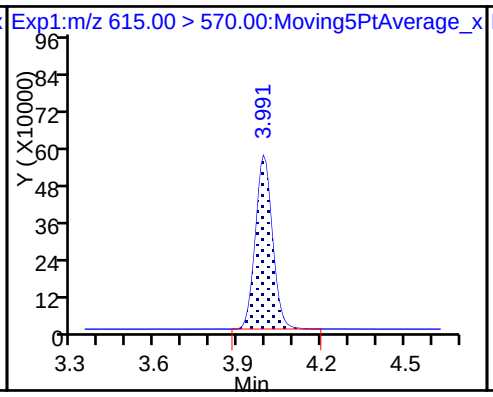
37 Perfluorododecanoic acid



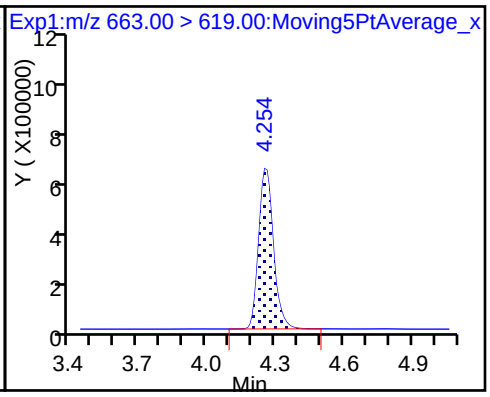
37 Perfluorododecanoic acid



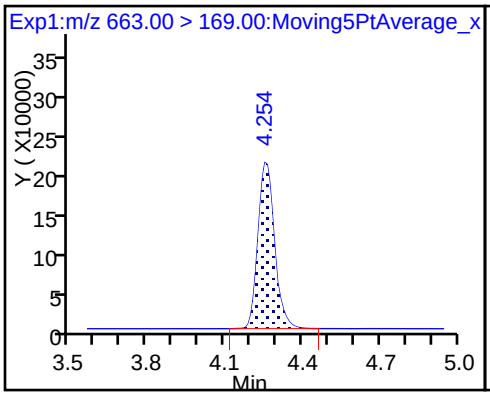
D 36 13C2 PFDoA



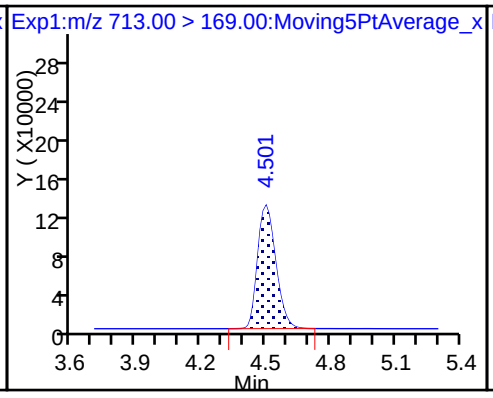
41 Perfluorotridecanoic acid



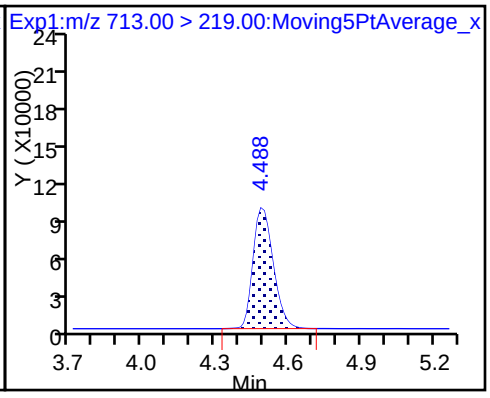
41 Perfluorotridecanoic acid



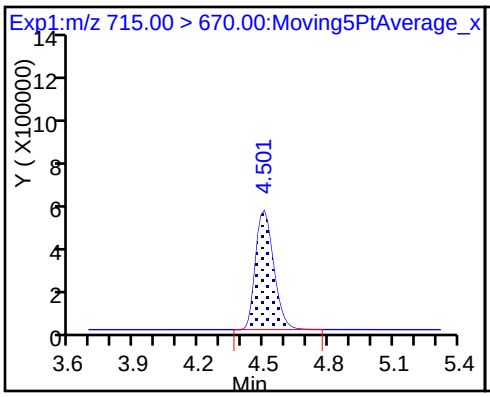
42 Perfluorotetradecanoic acid



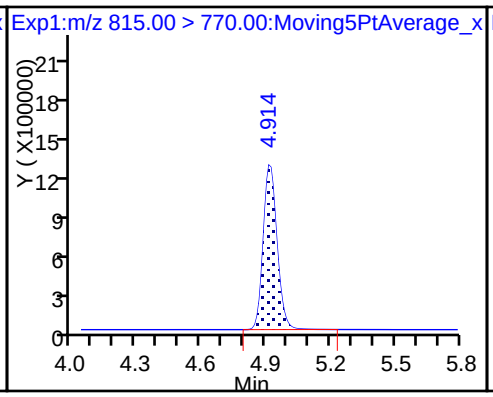
42 Perfluorotetradecanoic acid



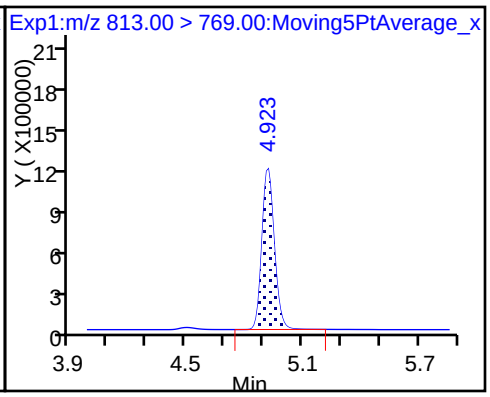
D 43 13C2-PFTeDA



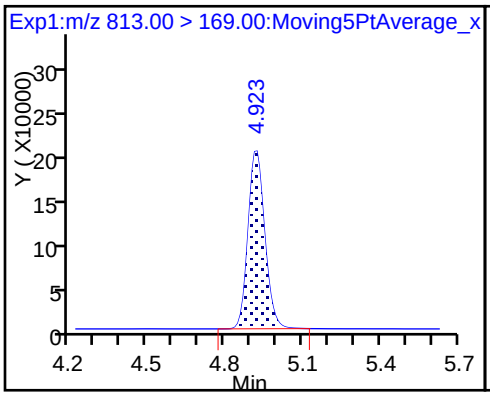
D 44 13C2-PFHxDA



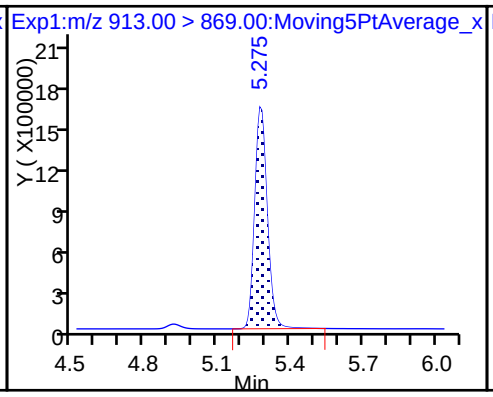
45 Perfluorohexadecanoic acid



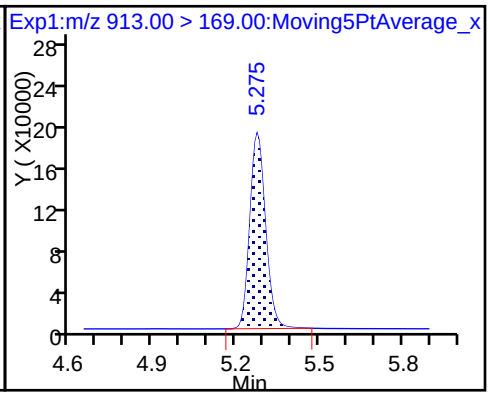
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205928/1 Calibration Date: 01/26/2018 21:19

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_066.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9343	0.9158		0.980	1.00	-2.0	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.126		0.956	1.00	-4.4	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	80.87		0.926	0.884	4.7	25.0
4:2 FTS	AveID	13.89	16.49		1.11	0.934	18.7	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	0.9902		0.955	1.00	-4.5	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.033		0.940	1.00	-6.0	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.013		0.828	0.910	-9.1	25.0
6:2FTS	AveID	1.655	2.210		1.27	0.948	33.5*	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.086		0.926	1.00	-7.4	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.317		0.926	0.952	-2.8	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.007		0.976	1.00	-2.4	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.037		0.860	0.928	-7.3	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	0.9555		0.973	1.00	-2.7	25.0
8:2FTS	AveID	1.217	1.261		0.992	0.958	3.6	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9330		0.962	1.00	-3.8	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.043		0.965	1.00	-3.5	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6411		0.944	0.964	-2.1	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9239		0.949	1.00	-5.1	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9547		0.925	1.00	-7.5	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.034		1.01	1.00	0.9	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.108		0.954	1.00	-4.6	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2430		0.996	1.00	-0.4	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9464		0.980	1.00	-2.0	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	0.997		0.946	1.00	-5.4	25.0
13C4 PFBA	Ave	1.512	1.440		2.38	2.50	-4.8	50.0
13C5-PFPeA	Ave	0.8956	0.8502		2.37	2.50	-5.1	50.0
13C3-PFBS	Ave	0.0198	0.0185		2.17	2.33	-6.5	50.0
13C2 PFHxA	Ave	0.9649	0.9265		2.40	2.50	-4.0	50.0
13C4-PFHpA	Ave	0.9187	0.9164		2.49	2.50	-0.3	50.0
18O2 PFHxS	Ave	1.131	1.163		2.43	2.37	2.8	50.0
M2-6:2FTS	Ave	0.1699	0.2007		2.81	2.38	18.1	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205928/1 Calibration Date: 01/26/2018 21:19

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_066.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.8904		2.47	2.50	-1.1	50.0
13C4 PFOS	Ave	0.7158	0.7535		2.52	2.39	5.3	50.0
13C5 PFNA	Ave	0.7300	0.7267		2.49	2.50	-0.5	50.0
13C8 FOSA	Ave	1.007	1.033		2.57	2.50	2.6	50.0
M2-8:2FTS	Ave	0.1795	0.2097		2.80	2.40	16.8	50.0
13C2 PFDA	Ave	0.6306	0.6233		2.47	2.50	-1.2	50.0
d3-NMeFOSAA	Ave	0.3147	0.3579		2.84	2.50	13.7	50.0
d5-NEtFOSAA	Ave	0.3182	0.3631		2.85	2.50	14.1	50.0
13C2 PFUnA	Ave	0.4783	0.4971		2.60	2.50	3.9	50.0
13C2 PFDoA	Ave	0.5192	0.5059		2.44	2.50	-2.6	50.0
13C2-PFTeDA	Ave	0.6785	0.6174		2.27	2.50	-9.0	50.0
13C2-PFHxDA	Ave	1.209	1.132		2.34	2.50	-6.4	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_066.d
Lims ID: CCV L4
Client ID:
Sample Type: CCV
Inject. Date: 26-Jan-2018 21:19:31 ALS Bottle#: 30 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:54:17 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

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	1.414	1.414	0.0	0.539	6847723	2.38		95.2	23714	
2 Perfluorobutyric acid										
212.90 > 169.00	1.414	1.414	0.0	1.000	2508483	0.9803		98.0	422	
D 3 13C5-PFPeA										
267.90 > 223.00	1.663	1.661	0.002	0.634	4041969	2.37		94.9	38003	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.663	1.670	-0.007	1.000	1820393	0.9558		95.6	1254	
D 47 13C3-PFBS										
301.90 > 83.00	1.698	1.706	-0.008	0.648	81952	2.17		93.5	2133	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.698	1.706	-0.008	1.000	2519912	0.9259		105	8692	
298.90 > 99.00	1.698	1.706	-0.008	1.000	1033268		2.44(1.25-3.74)		5957	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.904	1.912	-0.008	1.000	543028	1.11		119	24740	
D 60 M2-4:2FTS										
329.00 > 81.00	1.904	1.912	-0.008	0.726	618321	NC			5638	
D 7 13C2 PFHxA										
315.00 > 270.00	1.945	1.943	0.002	0.741	4404848	2.40		96.0	41783	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.945	1.953	-0.008	1.000	1744629	0.9554		95.5	5506	
313.00 > 119.00	1.945	1.953	-0.008	1.000	179371		9.73(5.03-15.10)		3998	
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.278	-0.012	0.864	4356807	2.49		99.7	28977	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.266	2.278	-0.012	1.000	1800856	0.9403		94.0	2804	
363.00 > 169.00	2.266	2.278	-0.012	1.000	695555		2.59(1.13-3.40)		5455	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.280	2.291	-0.011	1.000	2038250	0.8276		90.9	8285	
399.00 > 99.00	2.280	2.291	-0.011	1.000	687397		2.97(1.50-4.49)		3899	
D 11 18O2 PFHxS										
403.00 > 84.00	2.280	2.291	-0.011	0.869	5230819	2.43		103	26869	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.614	-0.018	1.000	799604	1.27		134	15023	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.614	-0.018	0.990	906408	2.81		118	18427	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.635	-0.012	1.000	4233108	2.47		98.9	33986	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.635	-0.012		4754358	2.50			32893	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.623	2.635	-0.012	1.000	1838178	0.9262		92.6	694	
413.00 > 169.00	2.623	2.635	-0.012	1.000	985360		1.87(0.84-2.52)		7206	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.630	2.643	-0.013	1.000	1796313	0.9255		97.2	12599	
449.00 > 99.00	2.630	2.643	-0.013	1.000	490738		3.66(1.94-5.82)		6976	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	3.007	-0.014	1.141	3424678	2.52		105	17956	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	3.015	-0.022	1.000	1379513	0.8600		92.7	3407	
499.00 > 99.00	2.993	3.015	-0.022	1.000	326193		4.23(2.31-6.93)		2623	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	3.015	-0.022	1.141	3454878	2.49		99.5	22253	
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	3.015	-0.022	1.000	1391831	0.9757		97.6	4475	
463.00 > 169.00	2.993	3.015	-0.022	1.000	330878		4.21(1.90-5.69)		6655	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.332	3.346	-0.014	1.000	1877845	0.9727		97.3	11486	
D 21 13C8 FOSA										
506.00 > 78.00	3.332	3.346	-0.014	1.270	4913254	2.57		103	20772	
D 26 M2-8:2FTS										
529.00 > 81.00	3.340	3.361	-0.021	1.273	955147	2.80		117	16704	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.340	3.361	-0.021	1.000	481683	0.99		104	8478	
D 23 13C2 PFDA										
515.00 > 470.00	3.347	3.376	-0.029	1.276	2963535	2.47		98.8	22959	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.355	3.376	-0.021	1.002	1105936	0.9616		96.2	4381	
513.00 > 169.00	3.355	3.376	-0.021	1.002	206403		5.36(2.36-7.09)		1600	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.507	3.527	-0.020	1.337	1701647	2.84		114	12588	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.514	3.535	-0.021	1.002	709601	0.9651		96.5	4719	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.663	3.685	-0.022	1.000	885538	0.9437		97.9	17075	
599.00 > 99.00	3.663	3.685	-0.022	1.000	304239		2.91(1.39-4.16)		12541	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.694	-0.023	1.400	1726135	2.85		114	7193	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.680	3.703	-0.023	1.000	902509	0.9250		92.5	3492	
563.00 > 169.00	3.680	3.703	-0.023	1.000	193379		4.67(0.00-0.00)		10145	
D 30 13C2 PFUnA										
565.00 > 520.00	3.680	3.703	-0.023	1.403	2363284	2.60		104	24767	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.680	3.703	-0.023	1.002	637928	0.9487		94.9	6460	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.981	4.002	-0.021	1.000	995181	1.01		101	4846	
613.00 > 169.00	3.981	4.002	-0.021	1.000	240756		4.13(2.13-6.40)		11389	
D 36 13C2 PFDoA										
615.00 > 570.00	3.981	4.002	-0.021	1.518	2405369	2.44		97.4	17791	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.242	4.267	-0.025	1.000	1065814	0.9539		95.4	3188	
663.00 > 169.00	4.242	4.267	-0.025	1.000	336610		3.17(1.25-3.76)		10888	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.486	4.505	-0.019	1.000	285332	1.00		99.6	8255	
713.00 > 219.00	4.486	4.505	-0.019	1.000	191047		1.49(0.71-2.13)		4759	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.486	4.505	-0.019	1.710	2935244	2.27		91.0	20504	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.903	4.934	-0.031	1.869	5379572	2.34		93.6	14712	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.903	4.934	-0.031	1.000	2036475	0.9795		98.0	1221	
813.00 > 169.00	4.903	4.934	-0.031	1.000	361028		5.64(2.86-8.58)		5122	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.260	5.291	-0.031	1.000	2144373	0.9458		94.6	619	
913.00 > 169.00	5.260	5.291	-0.031	1.000	276656		7.75(0.00-0.00)		1408	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL4_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 10:54:19 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_066.d

Injection Date: 26-Jan-2018 21:19:31 Instrument ID: A8_N

Lims ID: CCV L4

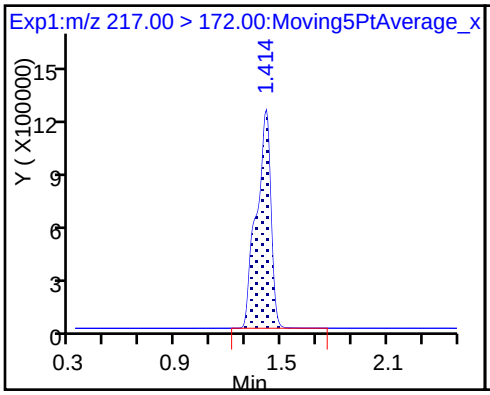
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 30 Worklist Smp#: 1

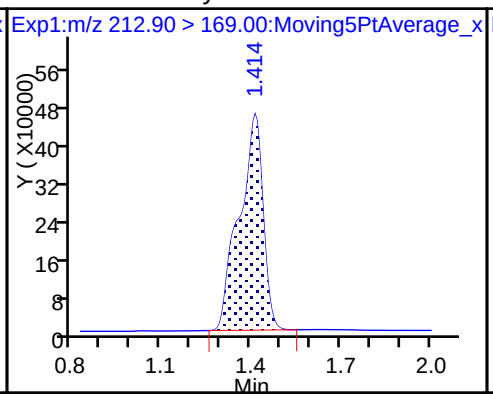
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

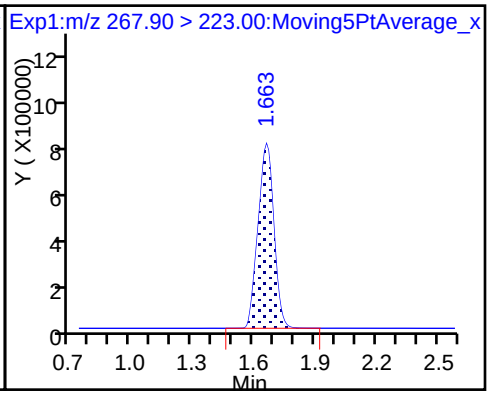
D 1 13C4 PFBA



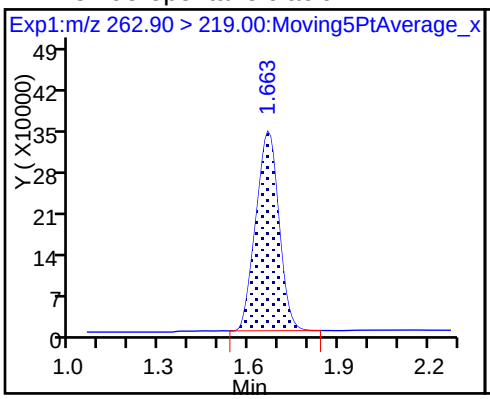
2 Perfluorobutyric acid



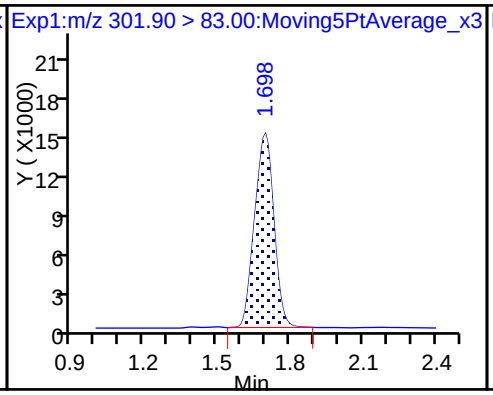
D 3 13C5-PFPeA



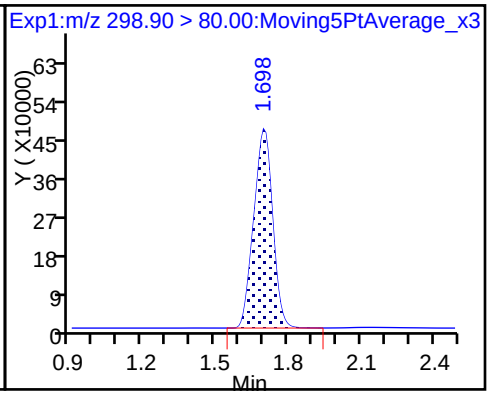
4 Perfluoropentanoic acid



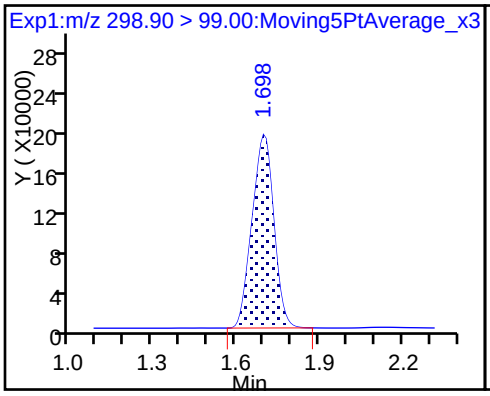
D 47 13C3-PFBS



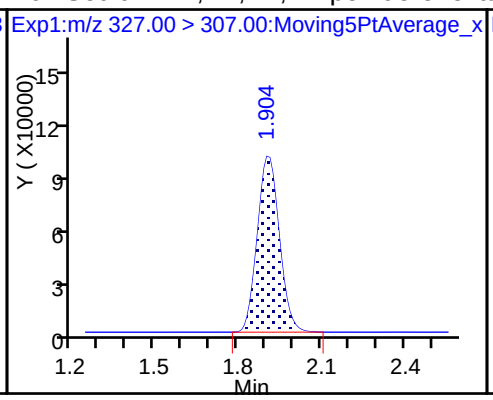
5 Perfluorobutanesulfonic acid



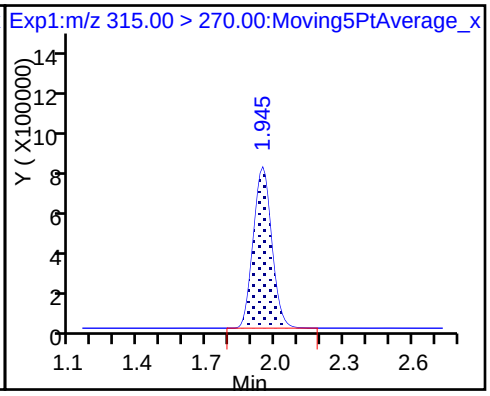
5 Perfluorobutanesulfonic acid



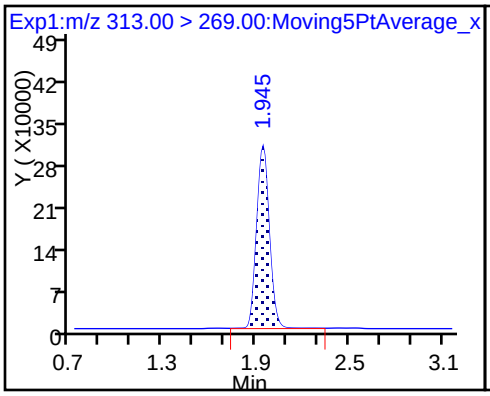
61 Sodium 1H,1H,2H,2H-perfluorohexa



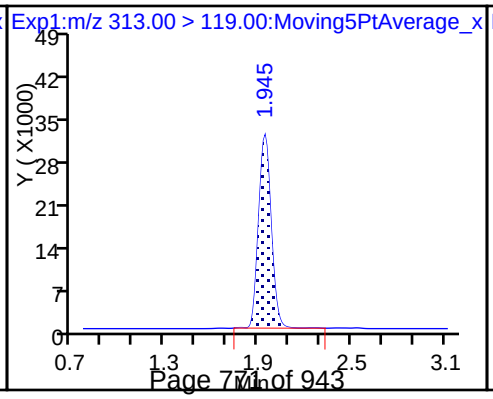
D 7 13C2 PFHxA



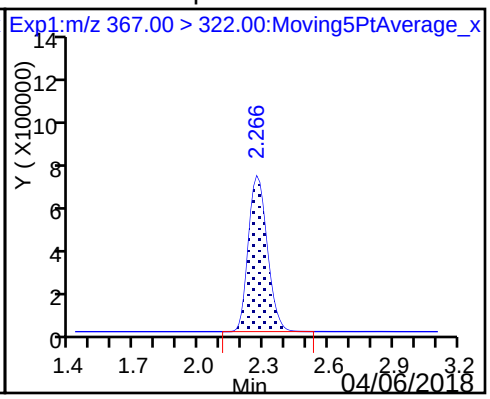
6 Perfluorohexanoic acid



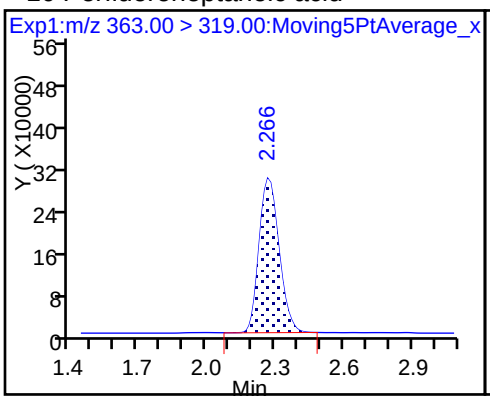
6 Perfluorohexanoic acid



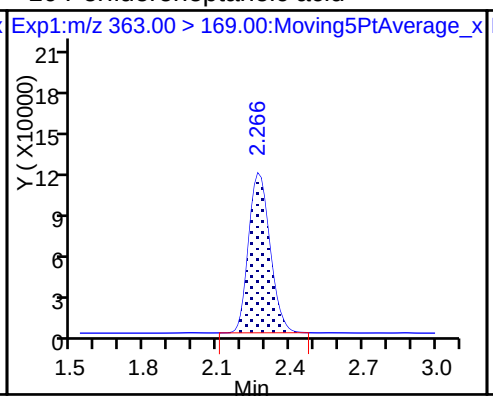
D 9 13C4-PFHpA



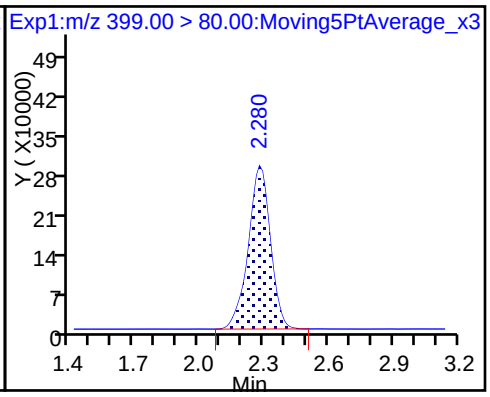
10 Perfluoroheptanoic acid



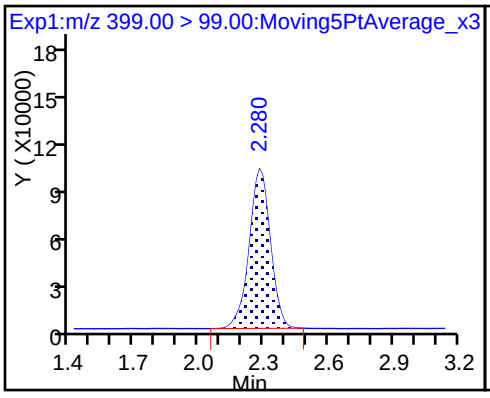
10 Perfluoroheptanoic acid



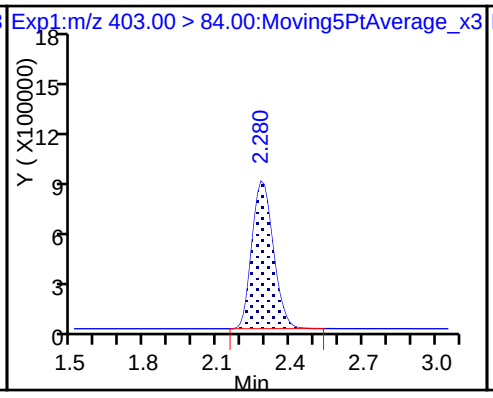
8 Perfluorohexanesulfonic acid



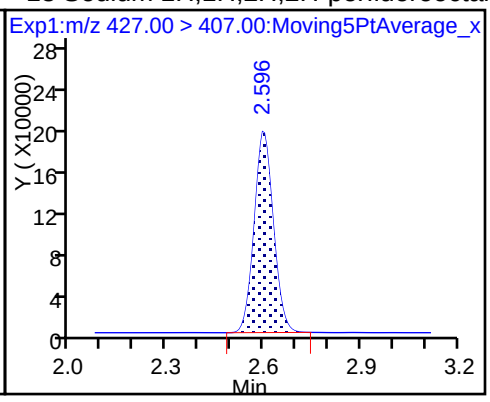
8 Perfluorohexanesulfonic acid



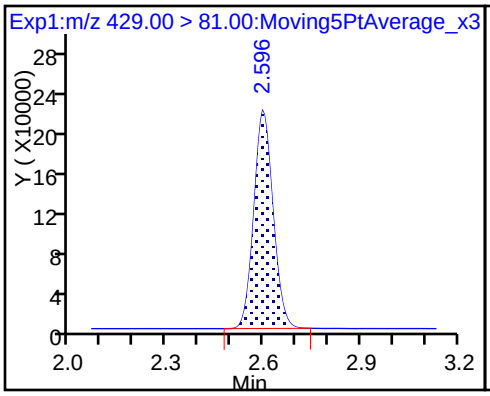
D 11 18O2 PFHxS



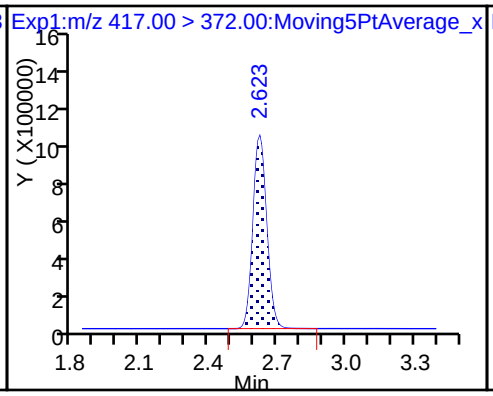
13 Sodium 1H,1H,2H,2H-perfluorooctane



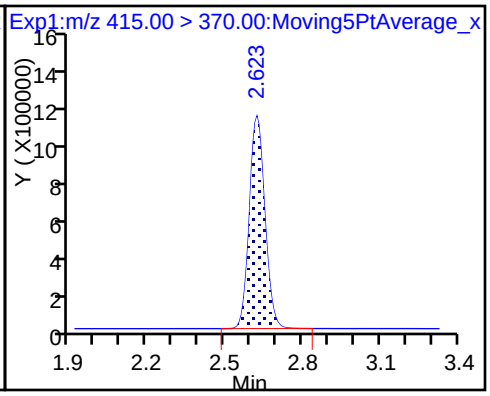
D 12 M2-6:2FTS



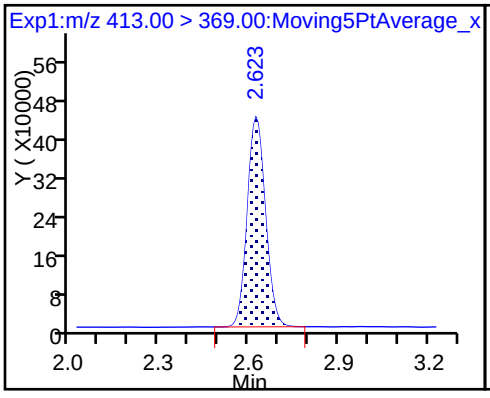
D 14 13C4 PFOA



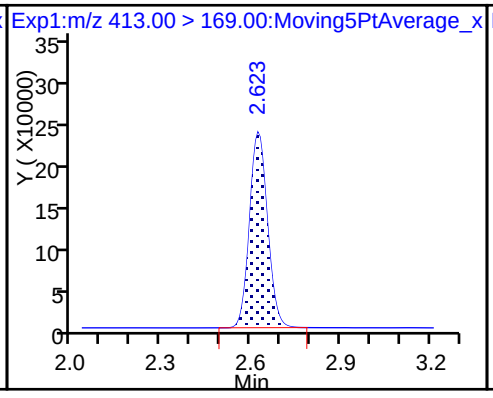
* 62 13C2-PFOA



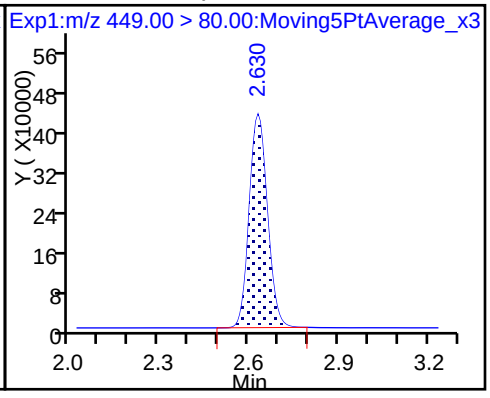
15 Perfluorooctanoic acid



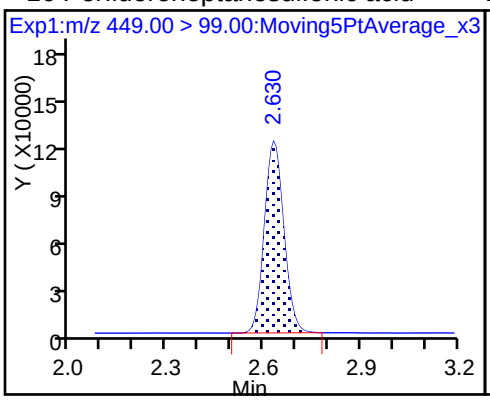
15 Perfluorooctanoic acid



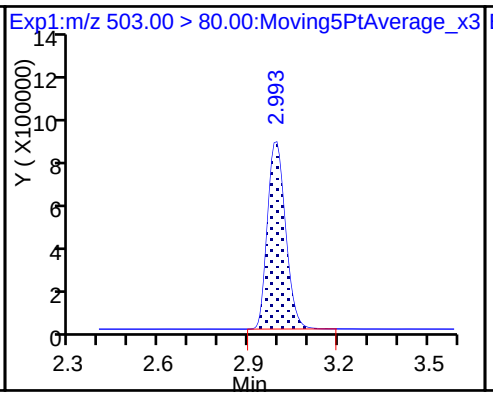
16 Perfluoroheptanesulfonic acid



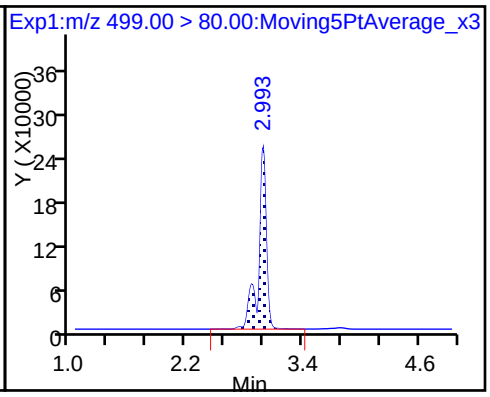
16 Perfluoroheptanesulfonic acid



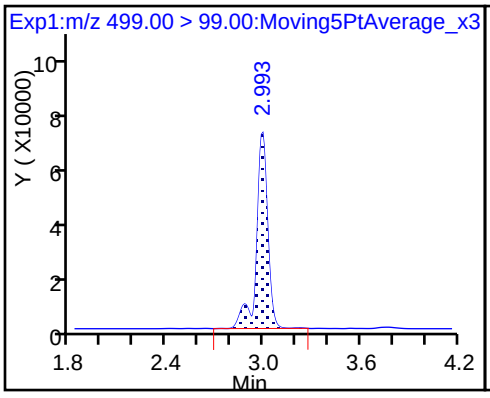
D 18 13C4 PFOS



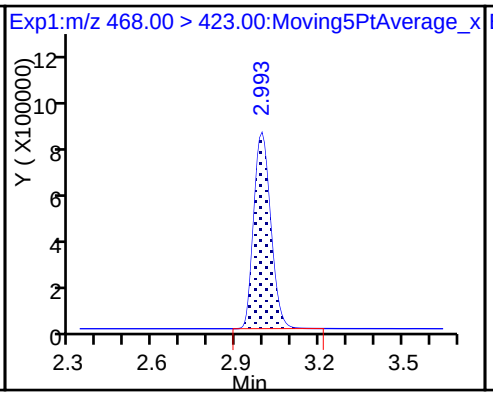
17 Perfluorooctane sulfonic acid



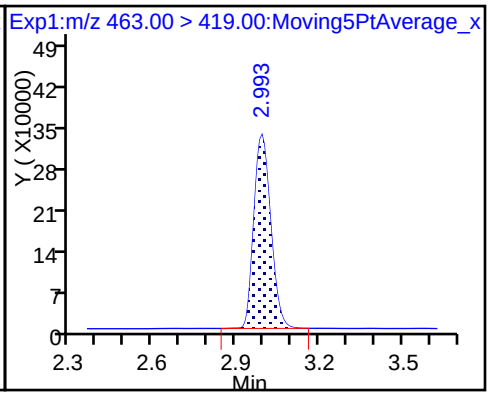
17 Perfluorooctane sulfonic acid



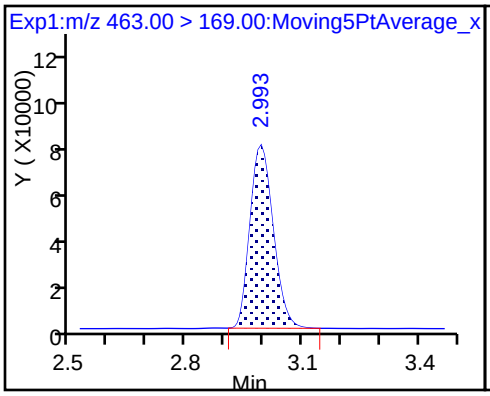
D 19 13C5 PFNA



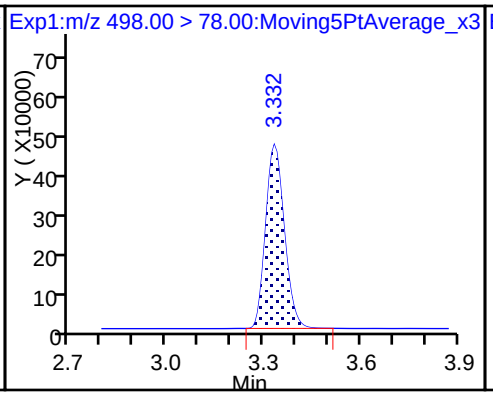
20 Perfluorononanoic acid



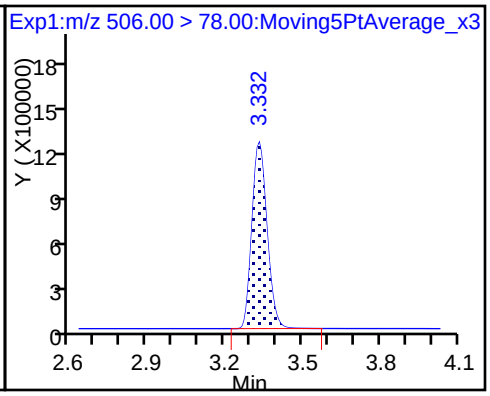
20 Perfluorononanoic acid



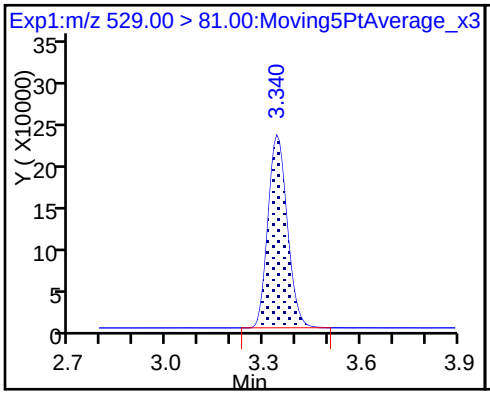
22 Perfluorooctane Sulfonamide



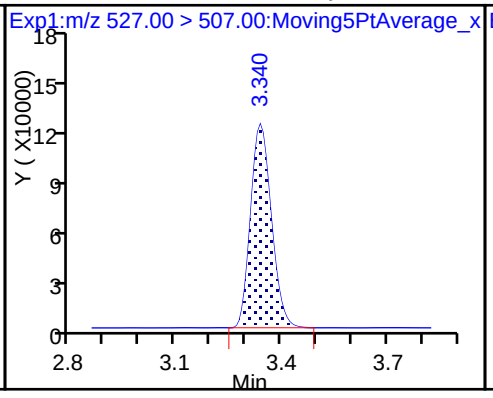
D 21 13C8 FOSA



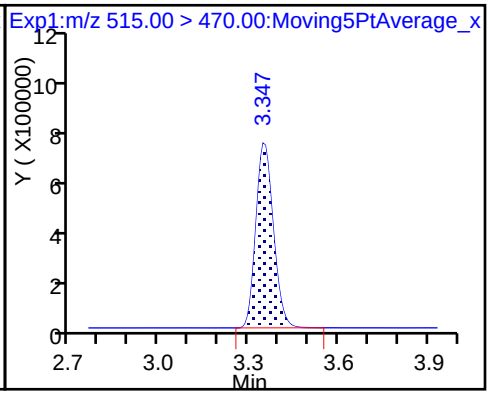
D 26 M2-8:2FTS



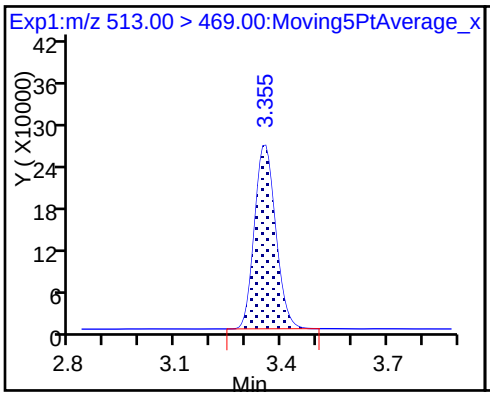
25 Sodium 1H,1H,2H,2H-perfluorodecane



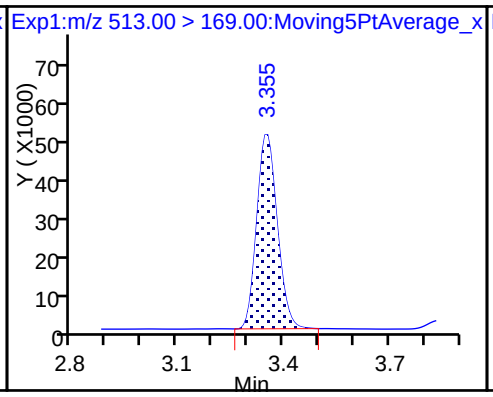
D 23 13C2 PFDA



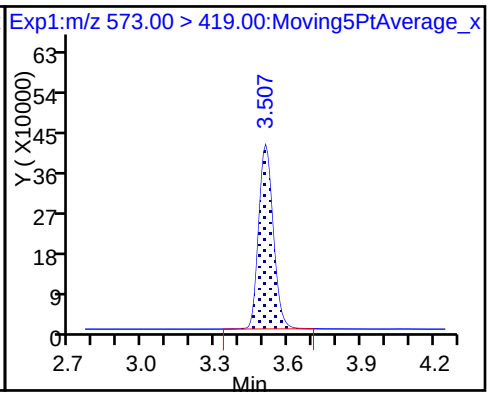
24 Perfluorodecanoic acid



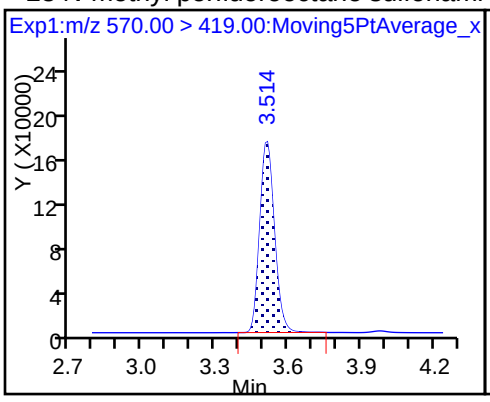
24 Perfluorodecanoic acid



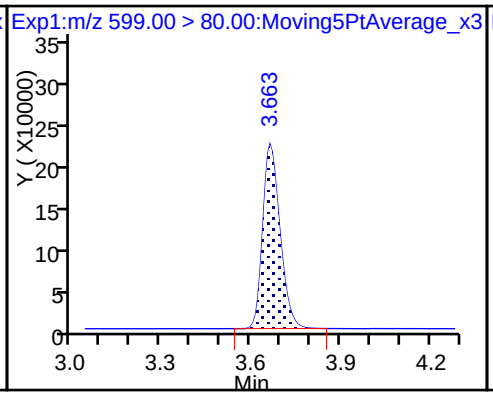
D 27 d3-NMeFOSAA



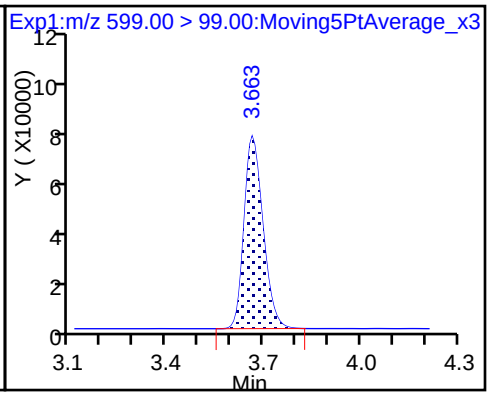
28 N-methyl perfluorooctane sulfonami



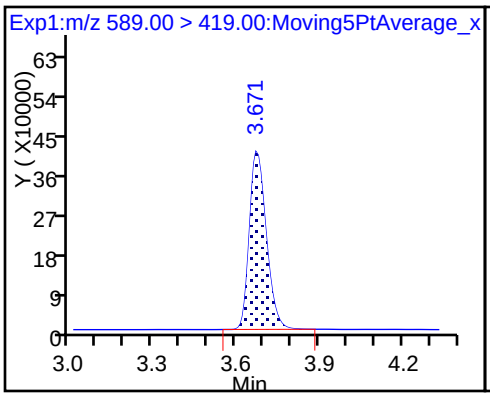
29 Perfluorodecane Sulfonic acid



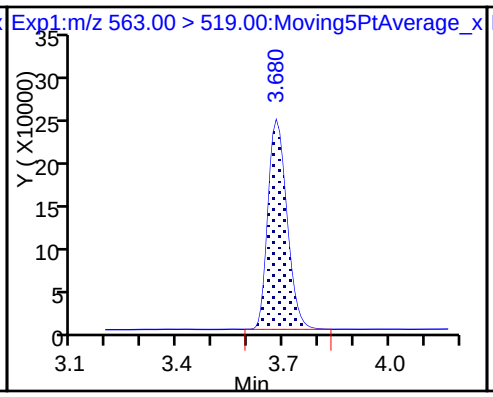
29 Perfluorodecane Sulfonic acid



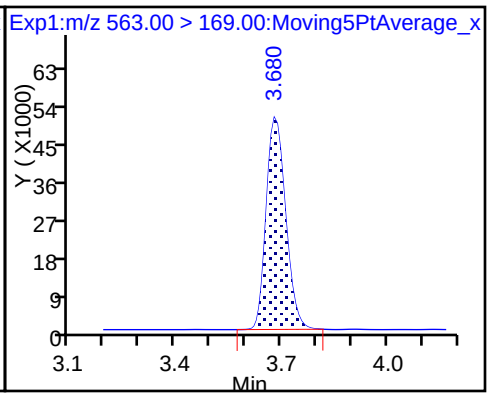
D 32 d5-NEtFOSAA



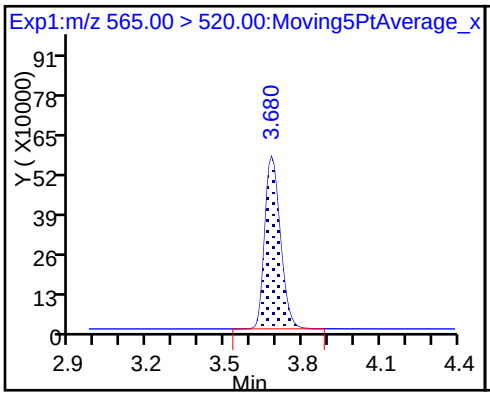
31 Perfluoroundecanoic acid



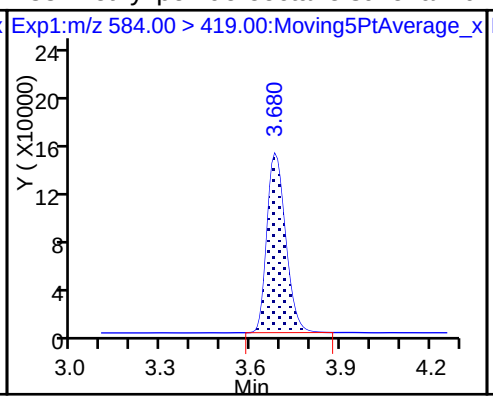
31 Perfluoroundecanoic acid



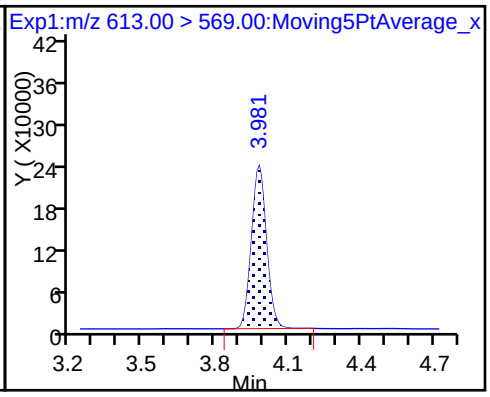
D 30 13C2 PFUnA



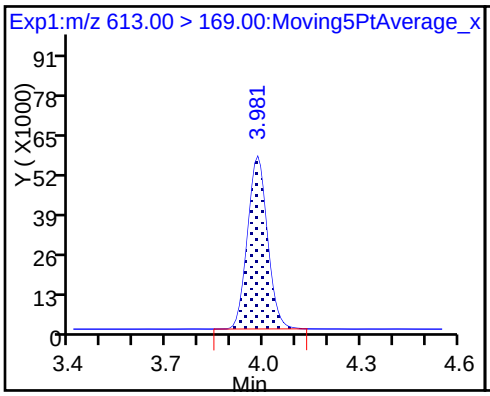
33 N-ethyl perfluorooctane sulfonamid



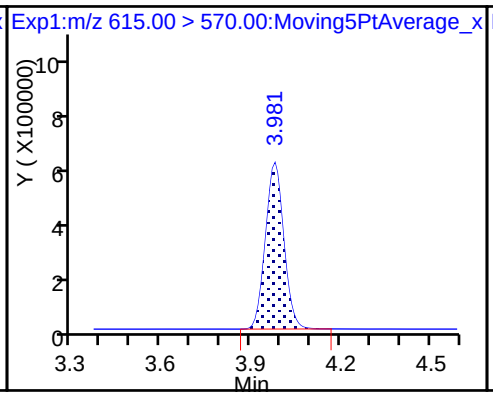
37 Perfluorododecanoic acid



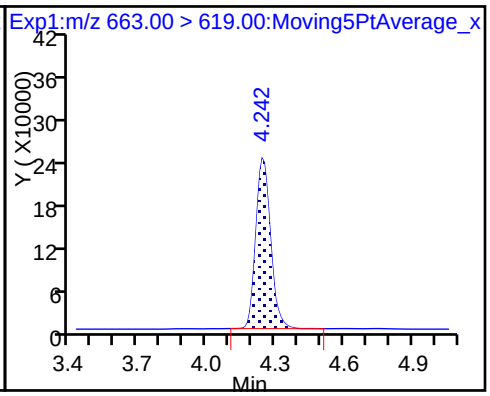
37 Perfluorododecanoic acid



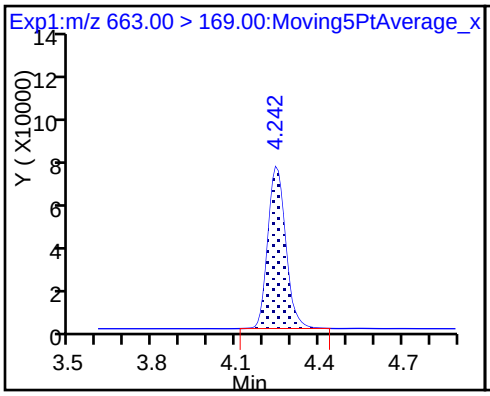
D 36 13C2 PFDoA



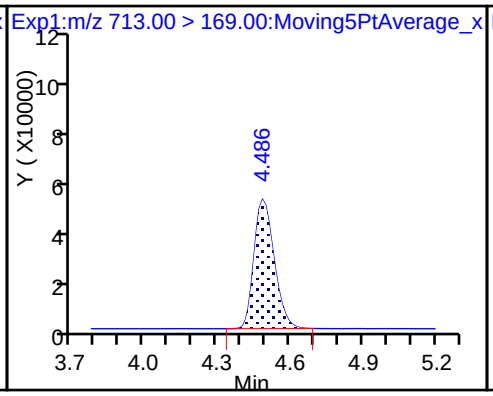
41 Perfluorotridecanoic acid



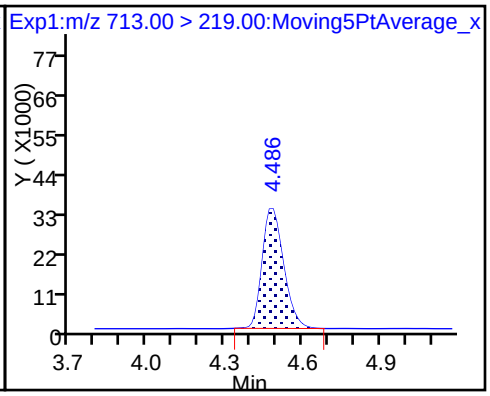
41 Perfluorotridecanoic acid



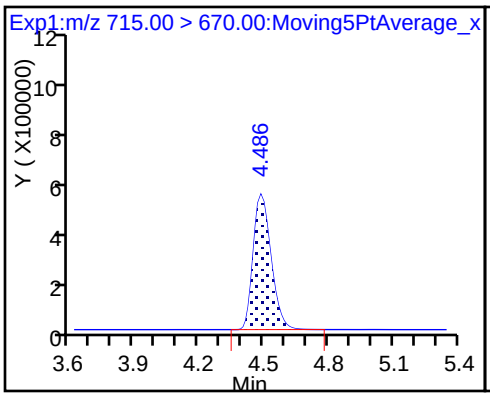
42 Perfluorotetradecanoic acid



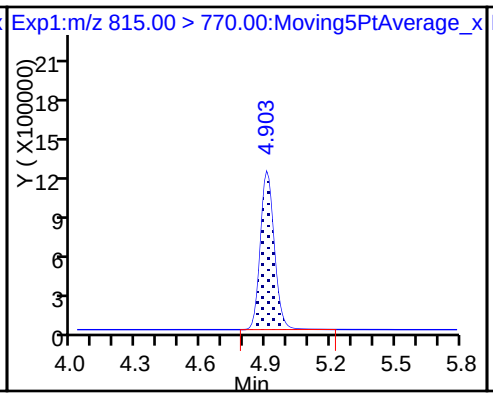
42 Perfluorotetradecanoic acid



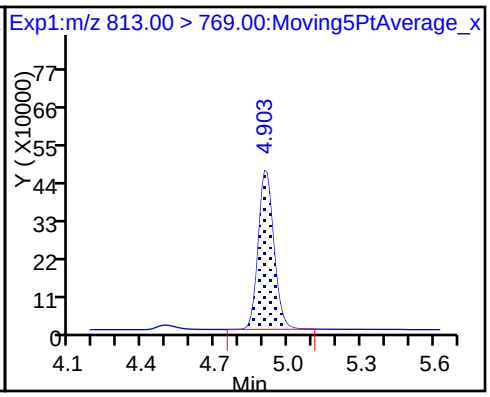
D 43 13C2-PFTeDA



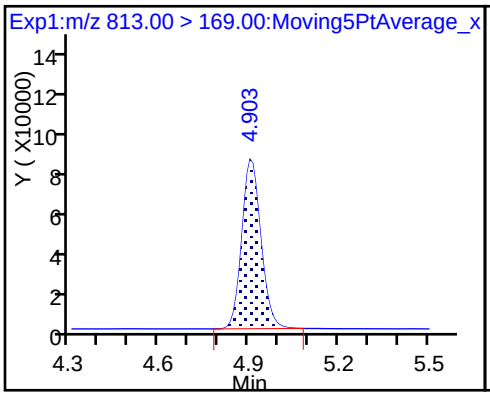
D 44 13C2-PFHxDA



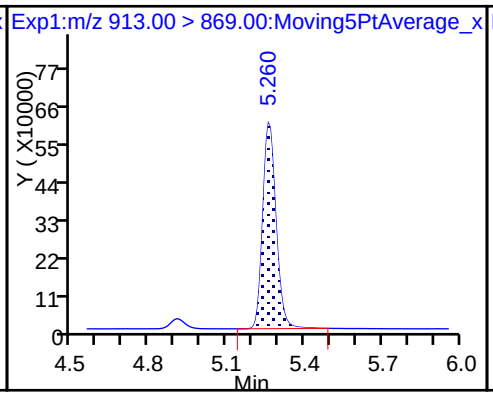
45 Perfluorohexadecanoic acid



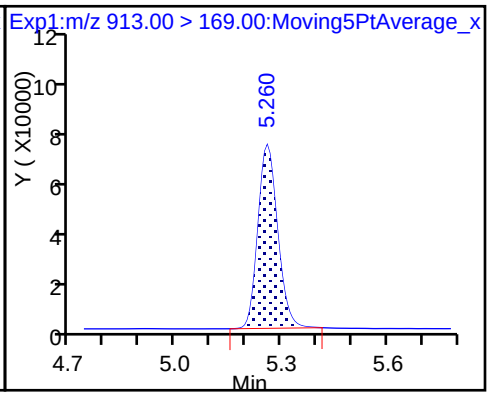
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205928/8 Calibration Date: 01/26/2018 22:14

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_073.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9343	0.9445		2.53	2.50	1.1	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.179		2.50	2.50	0.0	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	78.68		2.25	2.21	1.9	25.0
4:2 FTS	AveID	13.89	15.98		2.69	2.34	15.0	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	1.034		2.49	2.50	-0.3	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.060		2.41	2.50	-3.5	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.071		2.19	2.28	-3.8	25.0
6:2FTS	AveID	1.655	1.770		2.53	2.37	6.9	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.101		2.35	2.50	-6.1	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.375		2.42	2.38	1.5	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.065		2.58	2.50	3.1	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.114		2.31	2.32	-0.5	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	1.033		2.63	2.50	5.2	25.0
8:2FTS	AveID	1.217	1.219		2.40	2.40	0.2	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9781		2.52	2.50	0.8	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.104		2.56	2.50	2.2	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6702		2.47	2.41	2.3	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9719		2.49	2.50	-0.2	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	1.076		2.61	2.50	4.2	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.055		2.57	2.50	2.9	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.159		2.49	2.50	-0.2	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2705		2.77	2.50	10.9	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9397		2.46	2.50	-1.6	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.027		2.44	2.50	-2.5	25.0
13C4 PFBA	Ave	1.512	1.491		2.46	2.50	-1.4	50.0
13C5-PFPeA	Ave	0.8956	0.9020		2.52	2.50	0.7	50.0
13C3-PFBS	Ave	0.0198	0.0202		2.37	2.33	2.0	50.0
13C2 PFHxA	Ave	0.9649	0.9643		2.50	2.50	-0.0	50.0
13C4-PFHpA	Ave	0.9187	0.9306		2.53	2.50	1.3	50.0
18O2 PFHxS	Ave	1.131	1.169		2.44	2.37	3.4	50.0
M2-6:2FTS	Ave	0.1699	0.1985		2.78	2.38	16.8	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-205928/8 Calibration Date: 01/26/2018 22:14

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.26LLA_073.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.9230		2.56	2.50	2.5	50.0
13C4 PFOS	Ave	0.7158	0.7758		2.59	2.39	8.4	50.0
13C5 PFNA	Ave	0.7300	0.7545		2.58	2.50	3.4	50.0
13C8 FOSA	Ave	1.007	1.017		2.53	2.50	1.0	50.0
M2-8:2FTS	Ave	0.1795	0.2269		3.03	2.40	26.4	50.0
13C2 PFDA	Ave	0.6306	0.6579		2.61	2.50	4.3	50.0
d3-NMeFOSAA	Ave	0.3147	0.3621		2.88	2.50	15.1	50.0
d5-NEtFOSAA	Ave	0.3182	0.3799		2.98	2.50	19.4	50.0
13C2 PFUnA	Ave	0.4783	0.4990		2.61	2.50	4.3	50.0
13C2 PFDoA	Ave	0.5192	0.5091		2.45	2.50	-1.9	50.0
13C2-PFTeDA	Ave	0.6785	0.6127		2.26	2.50	-9.7	50.0
13C2-PFHxDA	Ave	1.209	1.165		2.41	2.50	-3.6	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_073.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 26-Jan-2018 22:14:11 ALS Bottle#: 31 Worklist Smp#: 8
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:54:25 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: westendorfc Date: 30-Jan-2018 10:54:11

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	1.408	1.414	-0.006	0.537	6855316	2.46		98.6	25904	
2 Perfluorobutyric acid										
212.90 > 169.00	1.408	1.414	-0.006	1.000	6474747	2.53		101	998	
D 3 13C5-PFPeA										
267.90 > 223.00	1.653	1.661	-0.008	0.630	4146520	2.52		101	78599	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.661	1.670	-0.009	1.005	4888908	2.50		100	4135	
D 47 13C3-PFBS										
301.90 > 83.00	1.688	1.706	-0.018	0.644	86412	2.37		102	2648	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.697	1.706	-0.009	1.005	6462503	2.25		102	23971	
298.90 > 99.00	1.697	1.706	-0.009	1.005	2754853		2.35(1.25-3.74)		14489	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.902	1.912	-0.010	1.000	1386928	2.69		115	42662	
D 60 M2-4:2FTS										
329.00 > 81.00	1.902	1.912	-0.010	0.725	617700	NC			5702	
D 7 13C2 PFHxA										
315.00 > 270.00	1.933	1.943	-0.010	0.737	4432799	2.50		99.9	52645	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.933	1.953	-0.020	1.000	4581802	2.49		99.7	11469	
313.00 > 119.00	1.933	1.953	-0.020	1.000	411944		11.12(5.03-15.10)		6053	
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.278	-0.013	0.864	4278025	2.53		101	25237	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.265	2.278	-0.013	1.000	4536563	2.41		96.5	6341	
363.00 > 169.00	2.265	2.278	-0.013	1.000	1833276		2.47(1.13-3.40)		11655	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.278	2.291	-0.013	1.000	5239253	2.19		96.2	12508	
399.00 > 99.00	2.278	2.291	-0.013	1.000	1768261		2.96(1.50-4.49)		9332	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.291	-0.013	0.869	5084467	2.44		103	20816	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.595	2.614	-0.019	1.000	1531065	2.53		107	24721	
D 12 M2-6:2FTS										
429.00 > 81.00	2.595	2.614	-0.019	0.990	866808	2.78		117	16244	
D 14 13C4 PFOA										
417.00 > 372.00	2.615	2.635	-0.020	0.997	4242921	2.56		103	22689	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.635	-0.012		4597135	2.50			33028	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.623	2.635	-0.012	1.003	4671046	2.35		93.9	1966	
413.00 > 169.00	2.623	2.635	-0.012	1.003	2566187		1.82(0.84-2.52)		14140	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.630	2.643	-0.013	1.000	4667176	2.42		101	25832	
449.00 > 99.00	2.630	2.643	-0.013	1.000	1314225		3.55(1.94-5.82)		11216	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	3.007	-0.014	1.141	3409583	2.59		108	17463	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	3.015	-0.022	1.000	3687301	2.31		99.5	8146	
499.00 > 99.00	2.993	3.015	-0.022	1.000	813208		4.53(2.31-6.93)		6088	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	3.015	-0.022	1.141	3468737	2.58		103	30708	
20 Perfluorononanoic acid										
463.00 > 419.00	2.993	3.015	-0.022	1.000	3692842	2.58		103	10315	
463.00 > 169.00	2.993	3.015	-0.022	1.000	887487		4.16(1.90-5.69)		12612	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.332	3.346	-0.014	1.000	4832000	2.63		105	19640	
D 21 13C8 FOSA										
506.00 > 78.00	3.332	3.346	-0.014	1.270	4676482	2.53		101	18663	
D 26 M2-8:2FTS										
529.00 > 81.00	3.340	3.361	-0.021	1.273	999243	3.03		126	14588	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.340	3.361	-0.021	1.000	1217897	2.40		100	15824	
D 23 13C2 PFDA										
515.00 > 470.00	3.347	3.376	-0.029	1.276	3024558	2.61		104	26531	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.347	3.376	-0.029	1.000	2958433	2.52		101	10285	
513.00 > 169.00	3.355	3.376	-0.021	1.002	526655		5.62(2.36-7.09)		1739	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.507	3.527	-0.020	1.337	1664628	2.88		115	14385	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.514	3.535	-0.021	1.002	1838508	2.56		102	10298	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.663	3.685	-0.022	1.000	2304304	2.47		102	29051	
599.00 > 99.00	3.663	3.685	-0.022	1.000	774369		2.98(1.39-4.16)		12834	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.694	-0.023	1.400	1746596	2.98		119	8859	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.678	3.703	-0.025	1.000	2467627	2.61		104	12819	
563.00 > 169.00	3.678	3.703	-0.025	1.000	499480		4.94(0.00-0.00)		13584	
D 30 13C2 PFUnA										
565.00 > 520.00	3.678	3.703	-0.025	1.402	2293824	2.61		104	27797	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.678	3.703	-0.025	1.002	1697456	2.49		99.8	12210	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.979	4.002	-0.023	1.000	2468844	2.57		103	12450	
613.00 > 169.00	3.979	4.002	-0.023	1.000	613307		4.03(2.13-6.40)		12820	
D 36 13C2 PFDoA										
615.00 > 570.00	3.979	4.002	-0.023	1.517	2340509	2.45		98.1	20817	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.241	4.267	-0.026	1.000	2712403	2.49		99.8	7597	
663.00 > 169.00	4.241	4.267	-0.026	1.000	863832		3.14(1.25-3.76)		19554	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.486	4.505	-0.019	1.000	761999	2.77		111	14762	
713.00 > 219.00	4.471	4.505	-0.034	0.997	494730		1.54(0.71-2.13)		10940	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.486	4.505	-0.019	1.710	2816567	2.26		90.3	19563	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.904	4.934	-0.030	1.870	5355514	2.41		96.4	15240	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.904	4.934	-0.030	1.000	5032629	2.46		98.4	3321	
813.00 > 169.00	4.904	4.934	-0.030	1.000	906976		5.55(2.86-8.58)		7308	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.253	5.291	-0.038	1.000	5500841	2.44		97.5	1367	
913.00 > 169.00	5.253	5.291	-0.038	1.000	701295		7.84(0.00-0.00)		2348	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL5_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 10:54:26 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53421.b\2018.01.26LLA_073.d

Injection Date: 26-Jan-2018 22:14:11 Instrument ID: A8_N

Lims ID: CCV L5

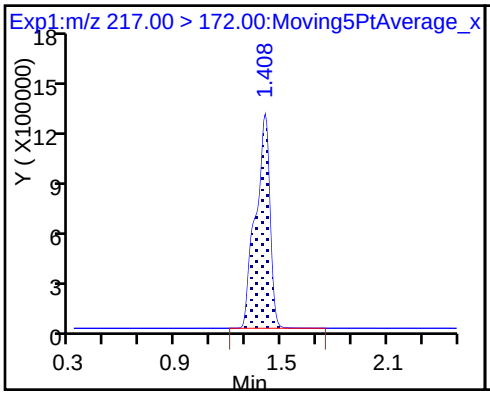
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 31 Worklist Smp#: 8

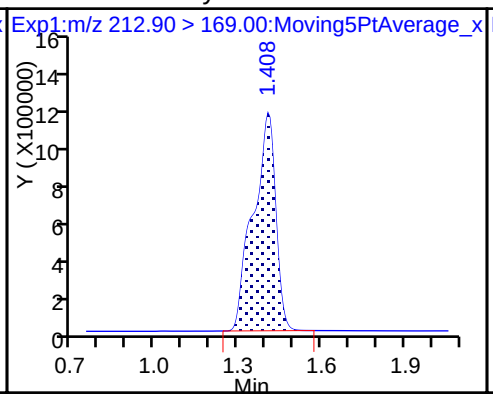
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

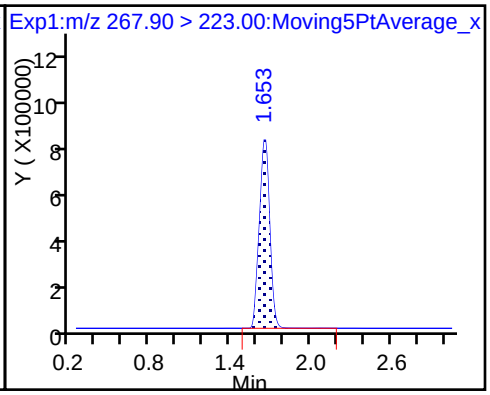
D 1 13C4 PFBA



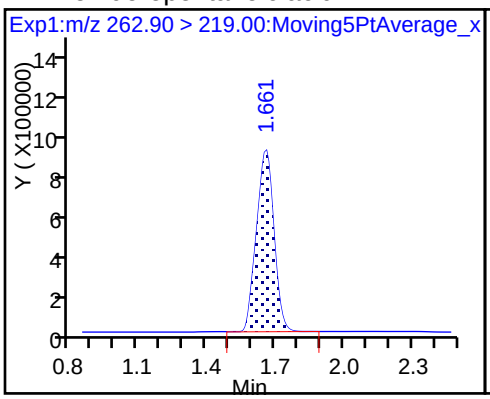
2 Perfluorobutyric acid



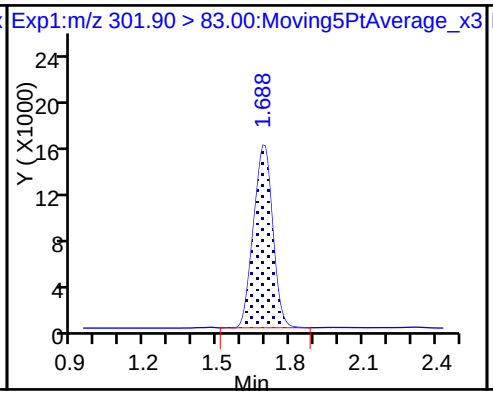
D 3 13C5-PFPeA



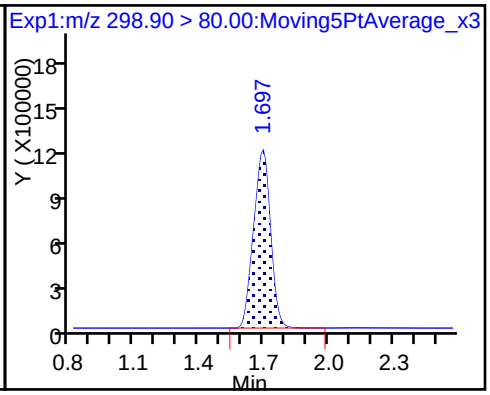
4 Perfluoropentanoic acid



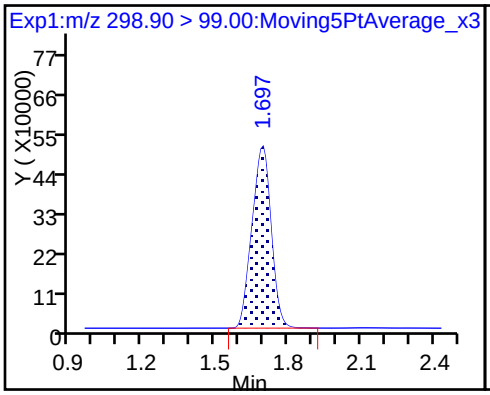
D 47 13C3-PFBS



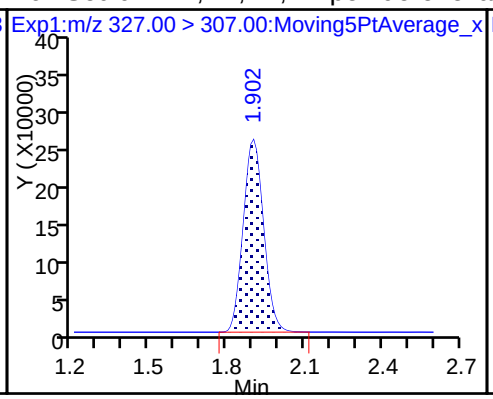
5 Perfluorobutanesulfonic acid



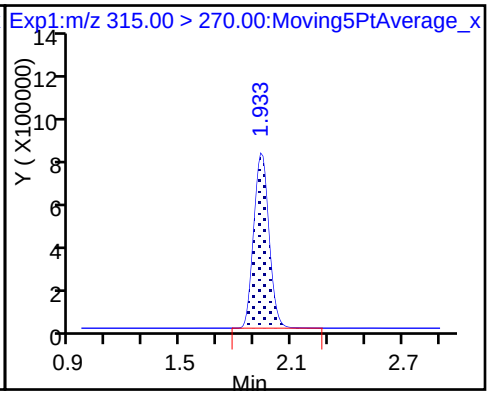
5 Perfluorobutanesulfonic acid



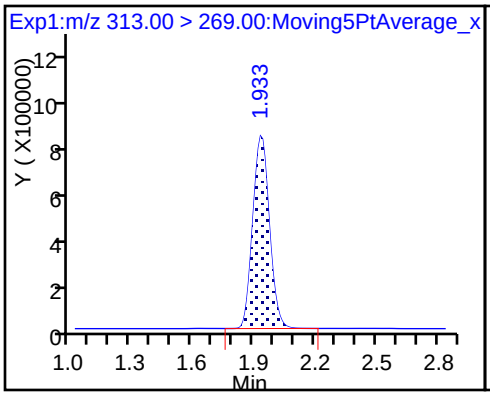
61 Sodium 1H,1H,2H,2H-perfluorohexa



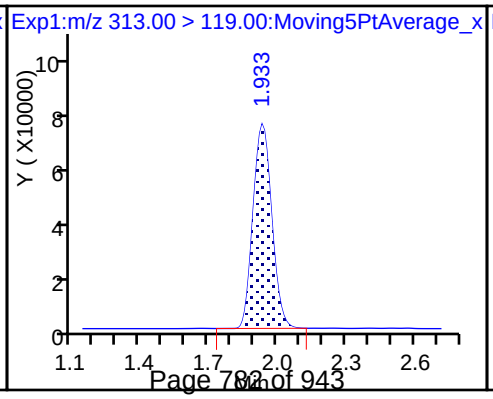
D 7 13C2 PFHxA



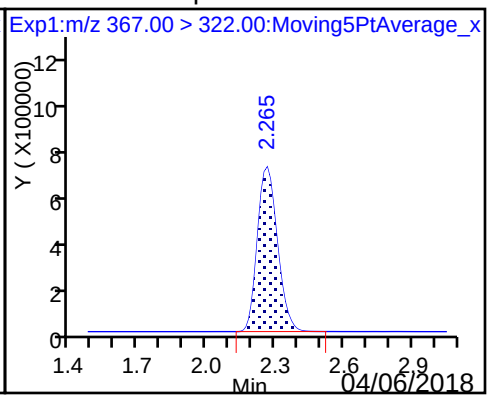
6 Perfluorohexanoic acid



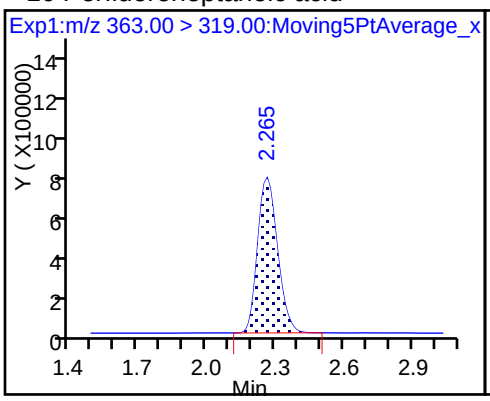
6 Perfluorohexanoic acid



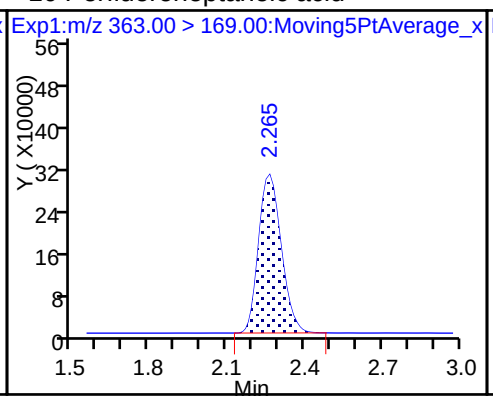
D 9 13C4-PFHpA



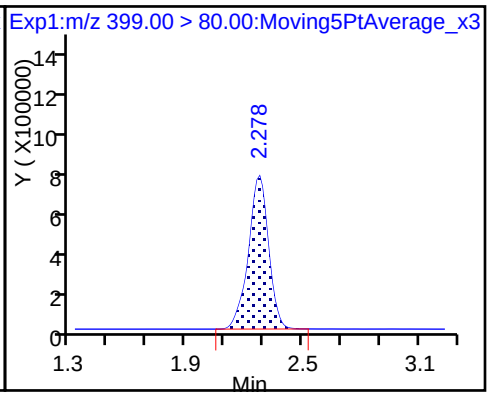
10 Perfluoroheptanoic acid



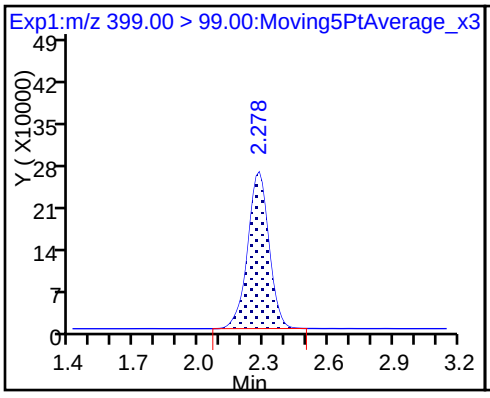
10 Perfluoroheptanoic acid



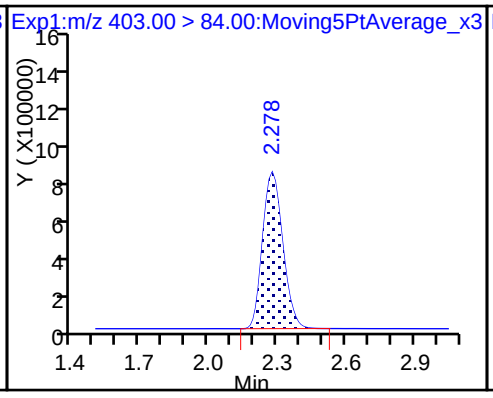
8 Perfluorohexanesulfonic acid



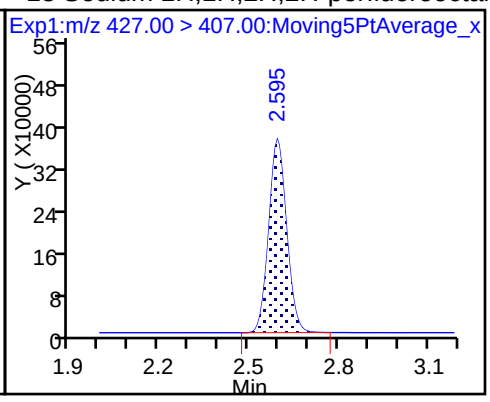
8 Perfluorohexanesulfonic acid



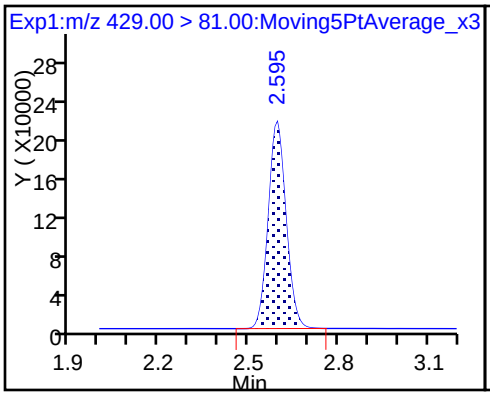
D 11 18O2 PFHxS



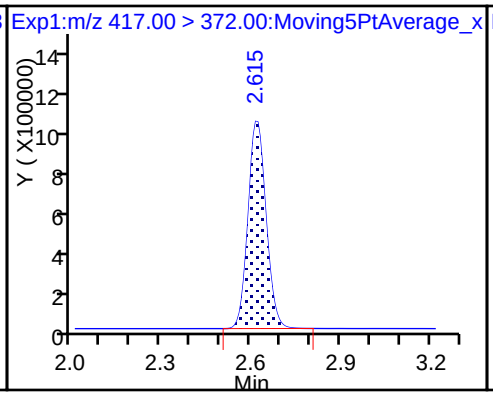
13 Sodium 1H,1H,2H,2H-perfluorooctane



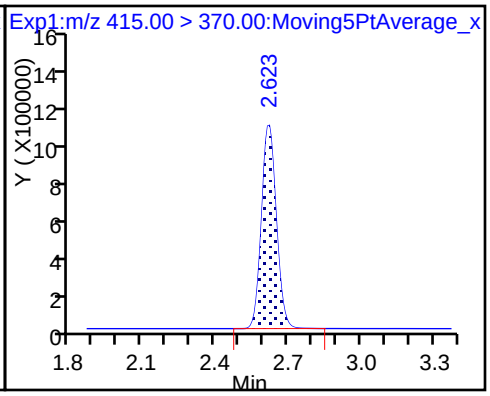
D 12 M2-6:2FTS



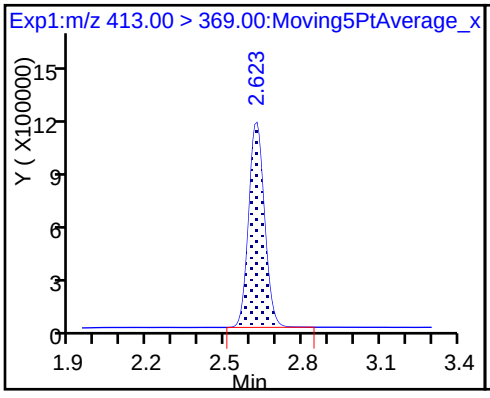
D 14 13C4 PFOA



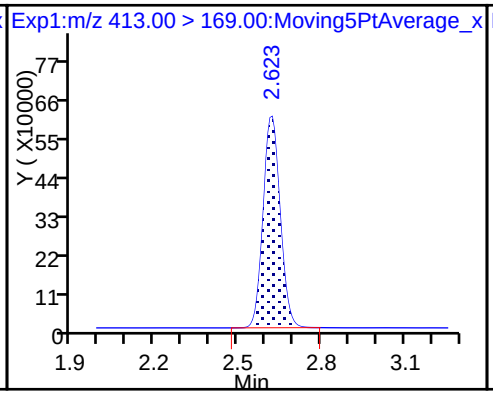
* 62 13C2-PFOA



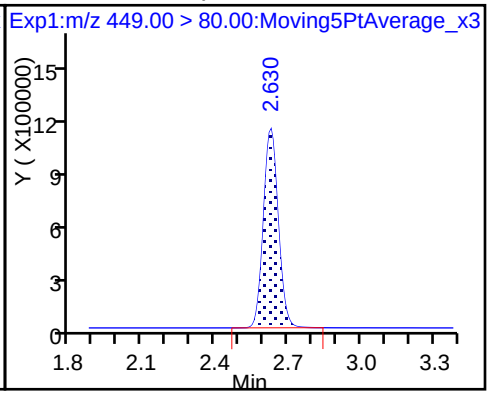
15 Perfluorooctanoic acid



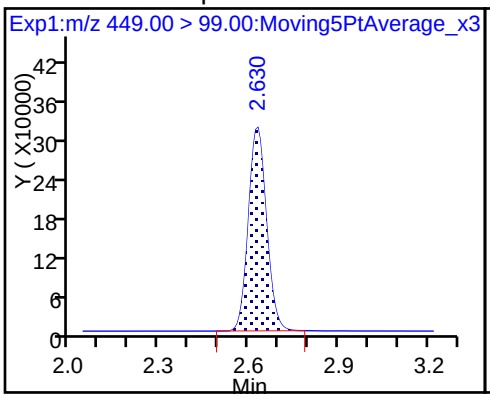
15 Perfluorooctanoic acid



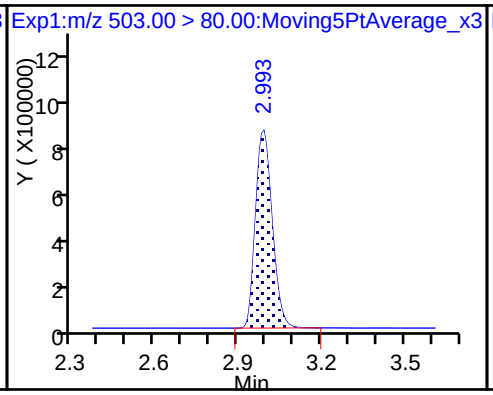
16 Perfluoroheptanesulfonic acid



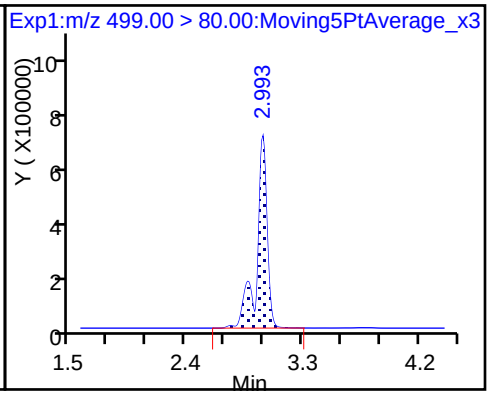
16 Perfluoroheptanesulfonic acid



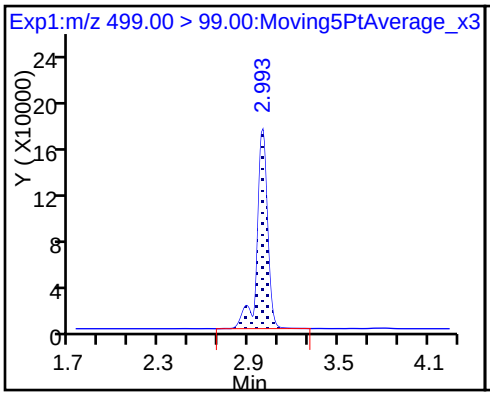
D 18 13C4 PFOS



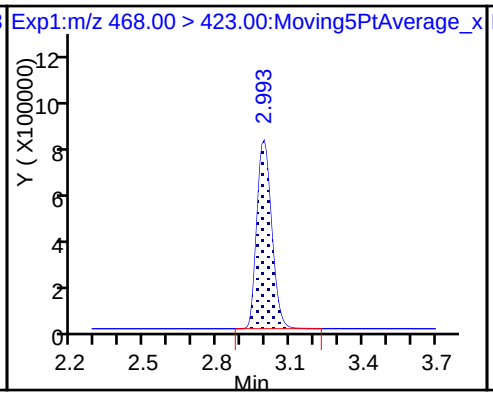
17 Perfluorooctane sulfonic acid



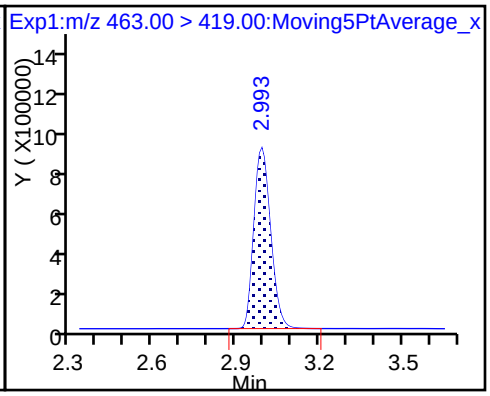
17 Perfluorooctane sulfonic acid



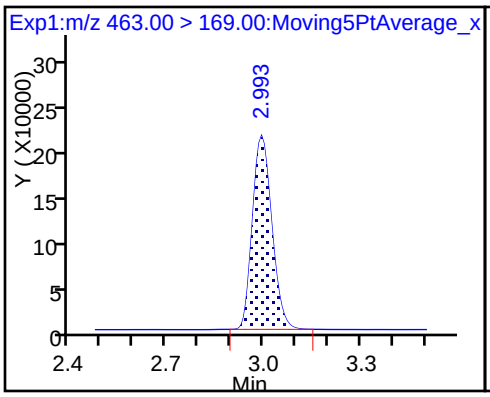
D 19 13C5 PFNA



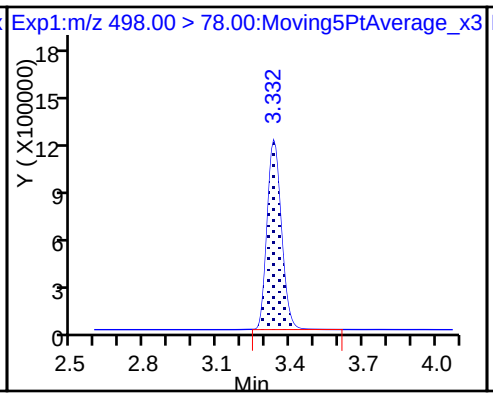
20 Perfluorononanoic acid



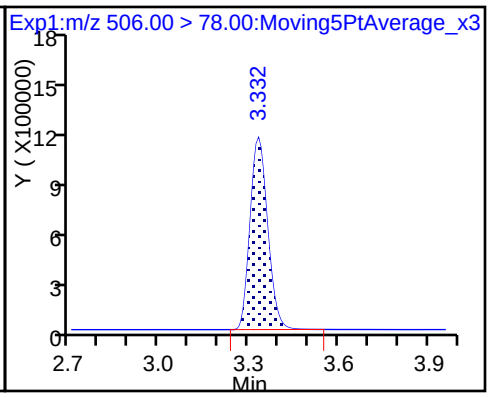
20 Perfluorononanoic acid



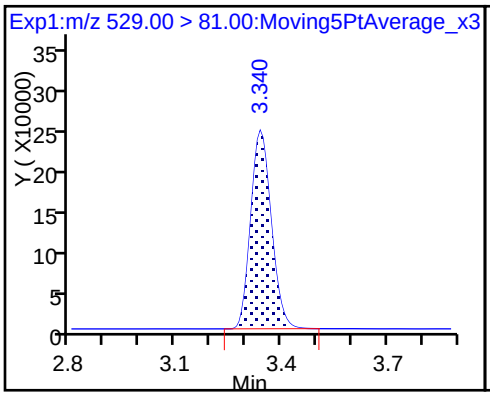
22 Perfluorooctane Sulfonamide



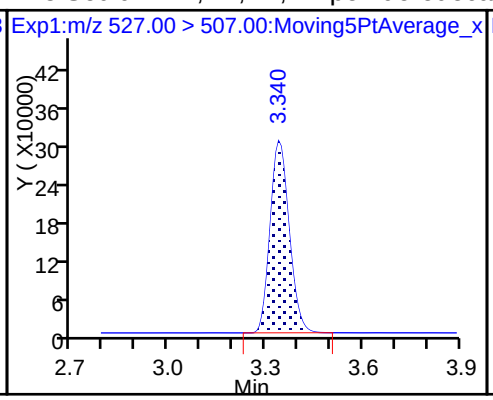
D 21 13C8 FOSA



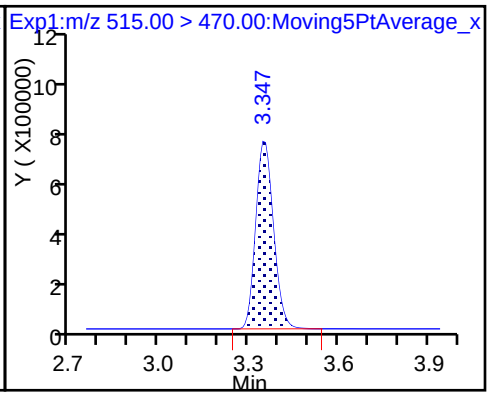
D 26 M2-8:2FTS



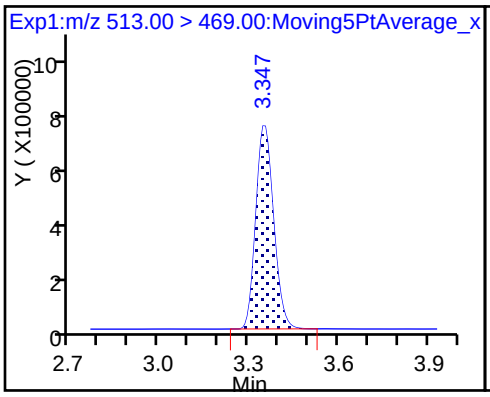
25 Sodium 1H,1H,2H,2H-perfluorodecane



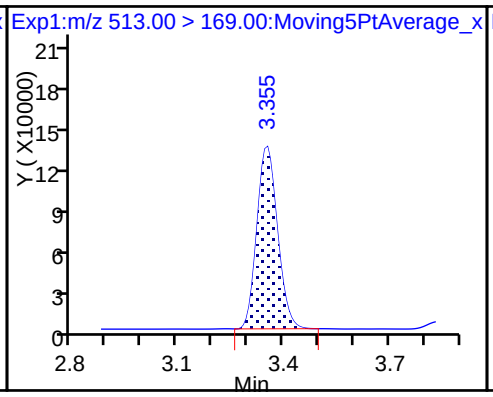
D 23 13C2 PFDA



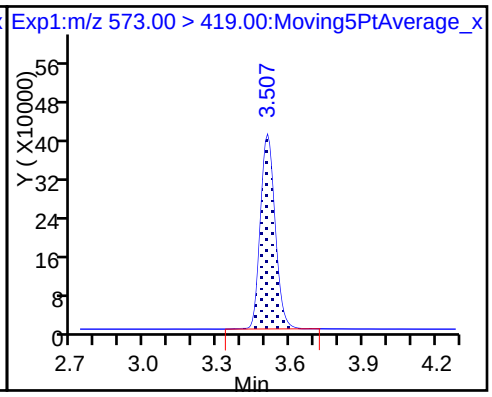
24 Perfluorodecanoic acid



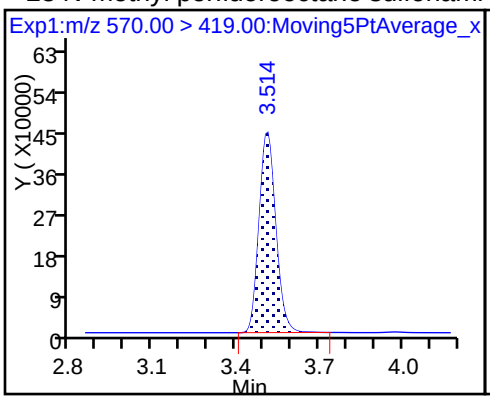
24 Perfluorodecanoic acid



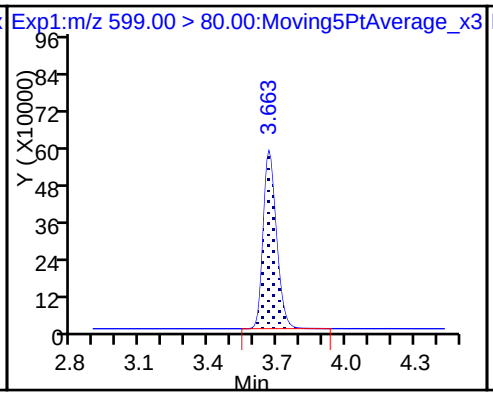
D 27 d3-NMeFOSAA



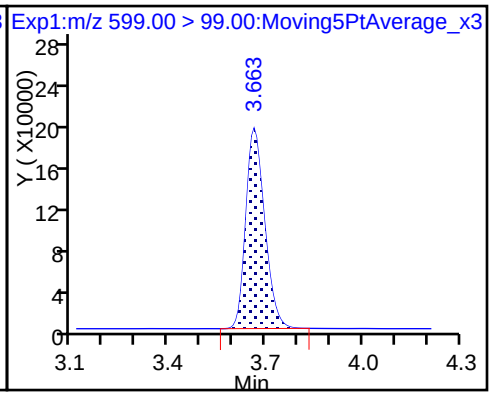
28 N-methyl perfluorooctane sulfonami



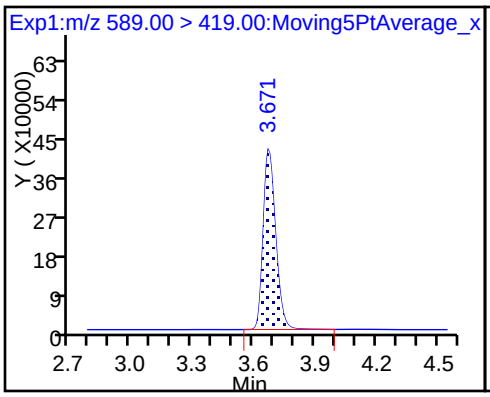
29 Perfluorodecane Sulfonic acid



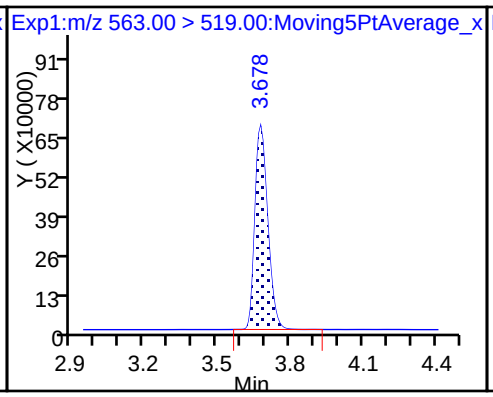
29 Perfluorodecane Sulfonic acid



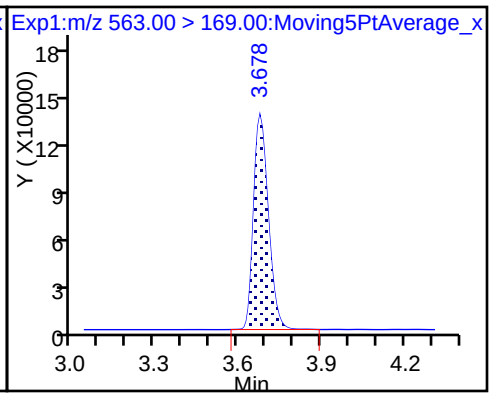
D 32 d5-NEtFOSAA



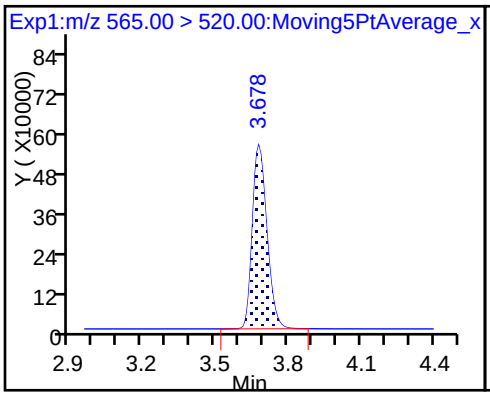
31 Perfluoroundecanoic acid



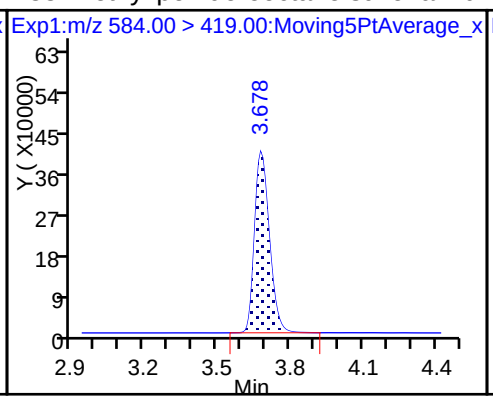
31 Perfluoroundecanoic acid



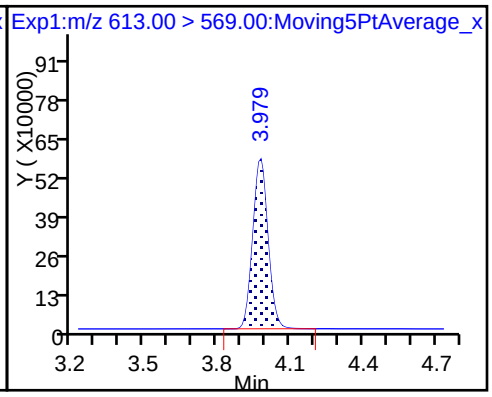
D 30 13C2 PFUnA



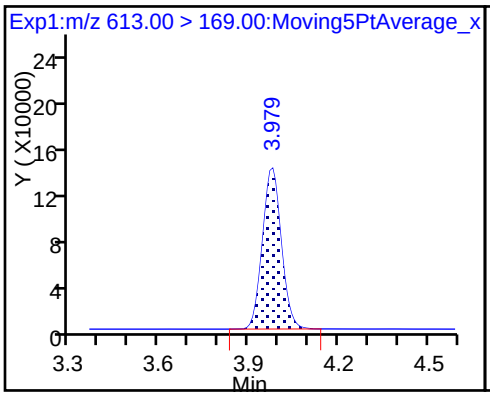
33 N-ethyl perfluorooctane sulfonamid



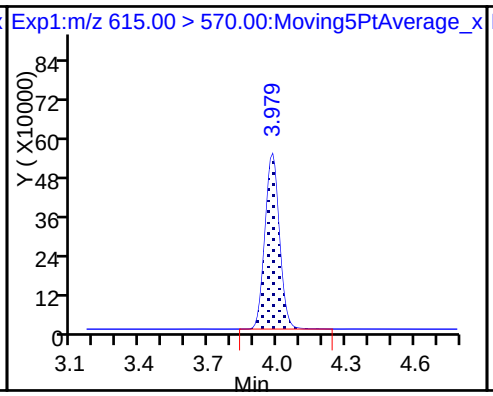
37 Perfluorododecanoic acid



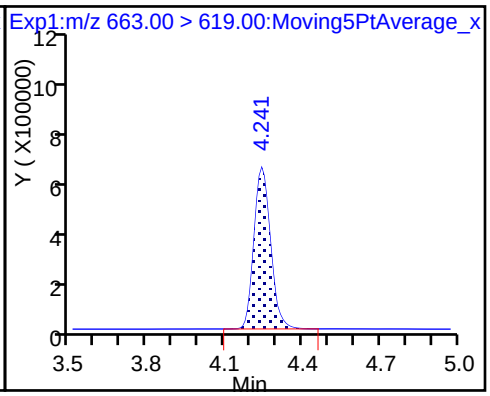
37 Perfluorododecanoic acid



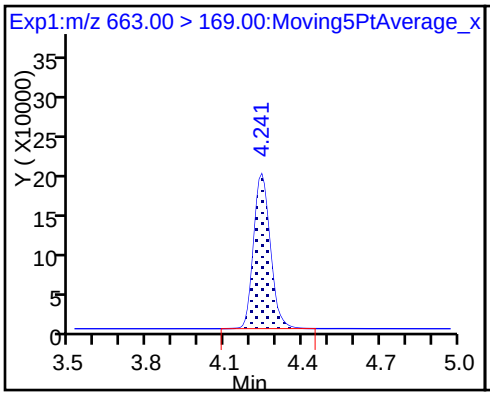
D 36 13C2 PFDoA



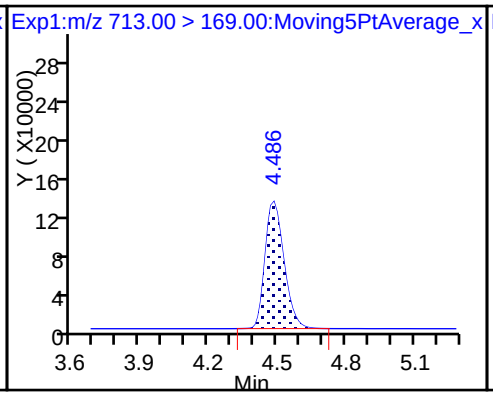
41 Perfluorotridecanoic acid



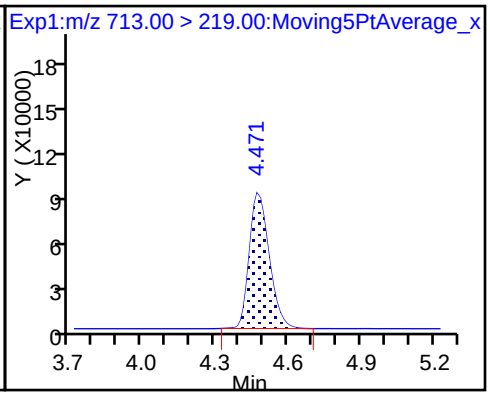
41 Perfluorotridecanoic acid



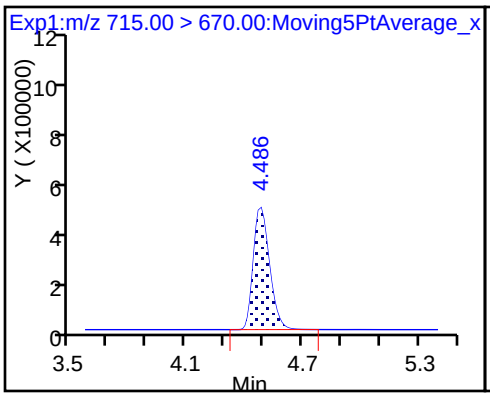
42 Perfluorotetradecanoic acid



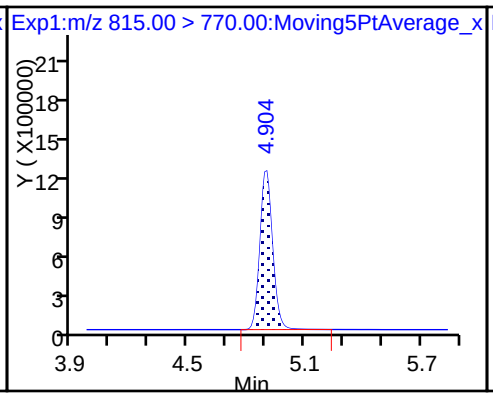
42 Perfluorotetradecanoic acid



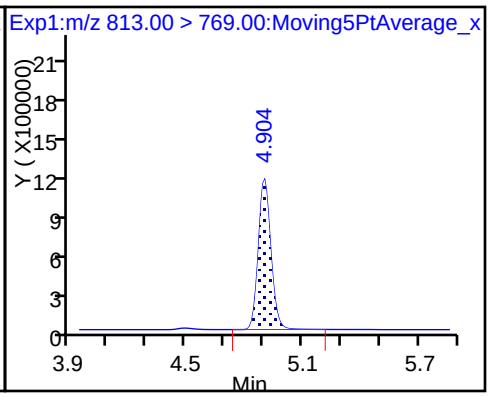
D 43 13C2-PFTeDA



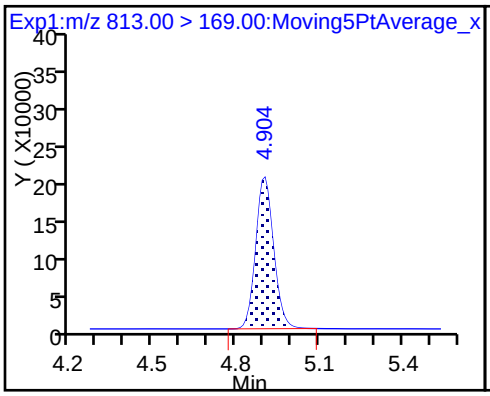
D 44 13C2-PFHxDA



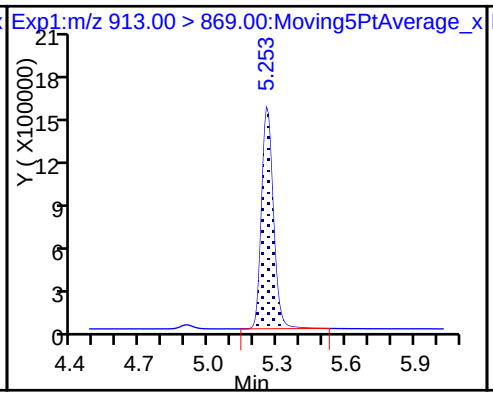
45 Perfluorohexadecanoic acid



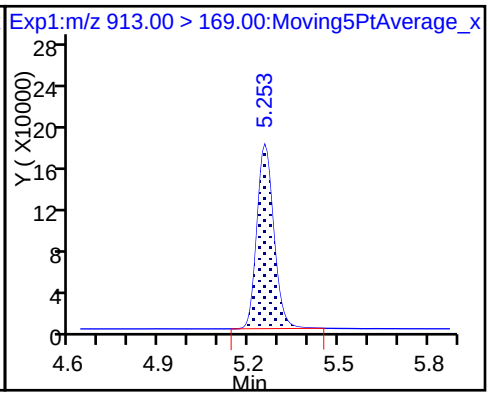
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCVL 320-206057/1 Calibration Date: 01/29/2018 11:29

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.29LLA_003.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.9343	0.8767		0.0469	0.0500	-6.2	50.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.209		0.0513	0.0500	2.6	50.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	75.29		0.0431	0.0442	-2.5	50.0
4:2 FTS	AveID	13.89	13.31		0.448	0.467	-4.2	50.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	0.9819		0.0474	0.0500	-5.3	50.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.087		0.0495	0.0500	-1.1	50.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.159		0.0474	0.0455	4.1	50.0
6:2FTS	AveID	1.655	1.582		0.453	0.474	-4.4	50.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.103		0.0471	0.0500	-5.9	50.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.201		0.0422	0.0476	-11.3	50.0
Perfluorononanoic acid (PFNA)	AveID	1.032	0.9528		0.0461	0.0500	-7.7	50.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.009		0.0418	0.0464	-9.9	50.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	0.9153		0.0466	0.0500	-6.8	50.0
8:2FTS	AveID	1.217	1.164		0.458	0.479	-4.3	50.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9223		0.0475	0.0500	-4.9	50.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	0.9292		0.430	0.500	-14.0	50.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6342		0.0467	0.0482	-3.2	50.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.8457		0.434	0.500	-13.2	50.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9093		0.0440	0.0500	-11.9	50.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	0.995		0.0486	0.0500	-2.9	50.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.297		0.0559	0.0500	11.7	50.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2011		0.0412	0.0500	-17.6	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		1.249		0.0465	0.0500	-6.9	50.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.020		0.0484	0.0500	-3.1	50.0
13C4 PFBA	Ave	1.512	1.545		2.55	2.50	2.1	50.0
13C5-PFPeA	Ave	0.8956	0.9112		2.54	2.50	1.7	50.0
13C3-PFBS	Ave	0.0198	0.0211		2.47	2.33	6.3	50.0
13C2 PFHxA	Ave	0.9649	0.9847		2.55	2.50	2.1	50.0
13C4-PFHpA	Ave	0.9187	0.9392		2.56	2.50	2.2	50.0
18O2 PFHxS	Ave	1.131	1.204		2.52	2.37	6.4	50.0
M2-6:2FTS	Ave	0.1699	0.2071		2.90	2.38	21.9	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCVL 320-206057/1 Calibration Date: 01/29/2018 11:29

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.29LLA_003.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.8986		2.50	2.50	-0.2	50.0
13C4 PFOS	Ave	0.7158	0.8080		2.70	2.39	12.9	50.0
13C5 PFNA	Ave	0.7300	0.7595		2.60	2.50	4.0	50.0
13C8 FOSA	Ave	1.007	1.108		2.75	2.50	10.1	50.0
M2-8:2FTS	Ave	0.1795	0.2067		2.76	2.40	15.1	50.0
13C2 PFDA	Ave	0.6306	0.6437		2.55	2.50	2.1	50.0
d3-NMeFOSAA	Ave	0.3147	0.3306		2.63	2.50	5.1	50.0
d5-NEtFOSAA	Ave	0.3182	0.3306		2.60	2.50	3.9	50.0
13C2 PFUnA	Ave	0.4783	0.5251		2.74	2.50	9.8	50.0
13C2 PFDoA	Ave	0.5192	0.5327		2.56	2.50	2.6	50.0
13C2-PFTeDA	Ave	0.6785	0.6447		2.38	2.50	-5.0	50.0
13C2-PFHxDA	Ave	1.209	1.197		2.48	2.50	-1.0	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53458.b\2018.01.29LLA_003.d
Lims ID: CCVL
Client ID:
Sample Type: CCVL
Inject. Date: 29-Jan-2018 11:29:17 ALS Bottle#: 21 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCVL
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53458.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 29-Jan-2018 15:55:33 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK023

First Level Reviewer: roycea Date: 29-Jan-2018 15:55:27

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	1.411	1.411	0.0	0.535	7302760	2.55		102	23014	
2 Perfluorobutyric acid										M
212.90 > 169.00	1.411	1.413	-0.002	1.000	128044	0.0469		93.8	11.6	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.667	1.659	0.008	0.632	4307724	2.54		102	41053	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.667	1.662	0.005	1.000	104136	0.0513		103	54.9	
D 47 13C3-PFBS										
301.90 > 83.00	1.703	1.695	0.008	0.645	92602	2.47		106	2181	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.703	1.697	0.006	1.000	132535	0.0431		97.5	424	
298.90 > 99.00	1.703	1.697	0.006	1.000	52581		2.52(1.25-3.74)		170	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.918	1.903	0.015	1.000	247648	0.4475		95.8	9293	
D 60 M2-4:2FTS										
329.00 > 81.00	1.918	1.903	0.015	0.727	615547	NC			5656	
D 7 13C2 PFHxA										
315.00 > 270.00	1.949	1.939	0.010	0.738	4655162	2.55		102	33649	
6 Perfluorohexanoic acid										M
313.00 > 269.00	1.949	1.939	0.010	1.000	91417	0.0474		94.7	155	M
313.00 > 119.00	1.949	1.939	0.010	1.000	9087		10.06(5.03-15.10)		160	
D 9 13C4-PFHpA										
367.00 > 322.00	2.286	2.267	0.019	0.866	4439693	2.56		102	30188	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.286	2.268	0.018	1.000	96520	0.0495		98.9	132	
363.00 > 169.00	2.286	2.268	0.018	1.000	36354		2.66(1.13-3.40)		271	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.299	2.280	0.019	1.000	120076	0.0474		104	98.9	
399.00 > 99.00	2.299	2.280	0.019	1.000	38927		3.08(1.50-4.49)		56.5	
D 11 18O2 PFHxS										
403.00 > 84.00	2.299	2.282	0.017	0.871	5384138	2.52		106	30329	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.611	2.596	0.015	1.000	293610	0.4530		95.6	11903	
D 12 M2-6:2FTS										
429.00 > 81.00	2.611	2.597	0.014	0.989	930187	2.90		122	15076	
D 14 13C4 PFOA										
417.00 > 372.00	2.640	2.622	0.018	1.000	4248145	2.50		99.8	25788	
* 62 13C2-PFOA										
415.00 > 370.00	2.640	2.622	0.018		4727314	2.50			31655	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.640	2.623	0.017	1.000	93749	0.0471		94.1	49.9	
413.00 > 169.00	2.640	2.623	0.017	1.000	50538		1.86(0.84-2.52)		324	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.647	2.629	0.018	1.000	87333	0.0422		88.7	1935	
449.00 > 99.00	2.647	2.629	0.018	1.000	21534		4.06(1.94-5.82)		215	
D 19 13C5 PFNA										
468.00 > 423.00	3.012	2.992	0.020	1.141	3590468	2.60		104	26869	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.012	2.992	0.020	1.000	71535	0.0418		90.1	283	
499.00 > 99.00	3.012	2.992	0.020	1.000	18228		3.92(2.31-6.93)		106	
D 18 13C4 PFOS										
503.00 > 80.00	3.012	2.992	0.020	1.141	3651762	2.70		113	29977	
20 Perfluorononanoic acid										
463.00 > 419.00	3.012	2.992	0.020	1.000	68418	0.0461		92.3	163	
463.00 > 169.00	3.012	2.992	0.020	1.000	16350		4.18(1.90-5.69)		333	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.343	3.338	0.005	1.002	95900	0.0466		93.2	2620	
D 21 13C8 FOSA										
506.00 > 78.00	3.335	3.338	-0.003	1.263	5238491	2.75		110	23960	
D 26 M2-8:2FTS										
529.00 > 81.00	3.366	3.342	0.024	1.275	936079	2.76		115	14543	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.366	3.342	0.024	1.000	217928	0.4582		95.7	4864	
D 23 13C2 PFDA										
515.00 > 470.00	3.381	3.352	0.029	1.281	3042756	2.55		102	18253	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.373	3.353	0.020	0.998	56129	0.0475		95.1	253	
513.00 > 169.00	3.373	3.353	0.020	0.998	11448		4.90(2.36-7.09)		321	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.533	3.507	0.026	1.338	1562860	2.63		105	16590	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.540	3.513	0.027	1.002	290426	0.4301		86.0	2420	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.690	3.666	0.024	1.000	46703	0.0467		96.8	2255	
599.00 > 99.00	3.690	3.666	0.024	1.000	14423		3.24(1.39-4.16)		533	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.699	3.672	0.027	1.401	1562694	2.60		104	7576	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.708	3.678	0.030	1.000	45147	0.0440		88.1	175	
563.00 > 169.00	3.716	3.678	0.038	1.002	9228		4.89(0.00-0.00)		511	
D 30 13C2 PFUnA										
565.00 > 520.00	3.708	3.679	0.029	1.405	2482496	2.74		110	22611	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.708	3.679	0.029	1.002	264311	0.4342		86.8	4617	
37 Perfluorododecanoic acid										
613.00 > 569.00	4.006	3.979	0.027	1.000	50115	0.0486		97.1	195	
613.00 > 169.00	4.006	3.979	0.027	1.000	14336		3.50(2.13-6.40)		688	
D 36 13C2 PFDoA										
615.00 > 570.00	4.006	3.979	0.027	1.518	2518296	2.56		103	25603	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.280	4.242	0.038	1.000	65339	0.0559		112	229	
663.00 > 169.00	4.272	4.242	0.030	0.998	18674		3.50(1.25-3.76)		831	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.528	4.483	0.045	1.003	12260	0.0412		82.4	416	
713.00 > 219.00	4.514	4.483	0.031	1.000	9174		1.34(0.71-2.13)		392	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.514	4.483	0.031	1.710	3047639	2.38		95.0	18562	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.941	4.902	0.039	1.872	5659783	2.48		99.0	17293	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.949	4.902	0.047	1.002	141328	0.0465		93.1	79.2	
813.00 > 169.00	4.949	4.902	0.047	1.002	24206		5.84(2.86-8.58)		690	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.318	5.255	0.063	1.000	115512	0.0484		96.9	32.5	
913.00 > 169.00	5.318	5.255	0.063	1.000	14774		7.82(0.00-0.00)		256	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Reagents:

LCPFC_CCVL_00002 Amount Added: 1.00 Units: mL

Report Date: 29-Jan-2018 15:55:34 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53458.b\2018.01.29LLA_003.d

Injection Date: 29-Jan-2018 11:29:17 Instrument ID: A8_N

Lims ID: CCVL

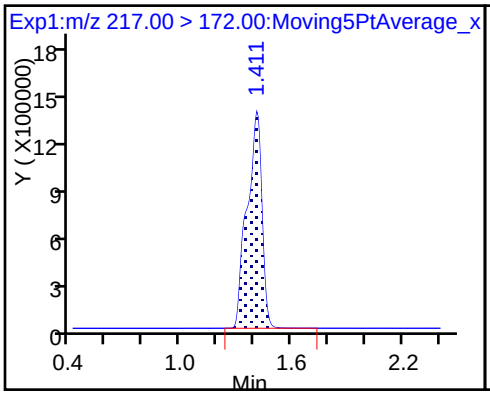
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 21 Worklist Smp#: 1

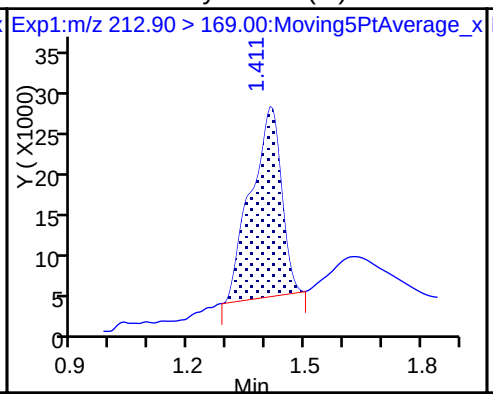
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

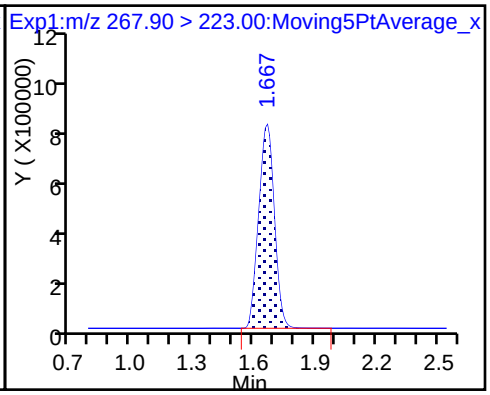
D 1 13C4 PFBA



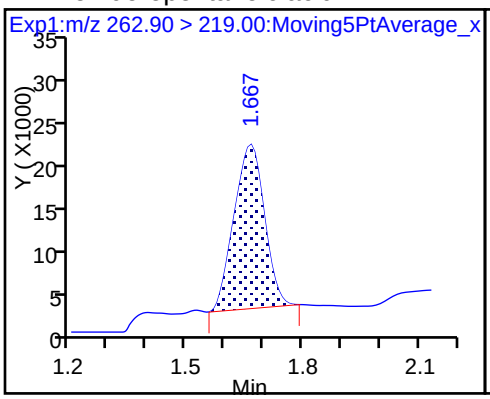
2 Perfluorobutyric acid (M)



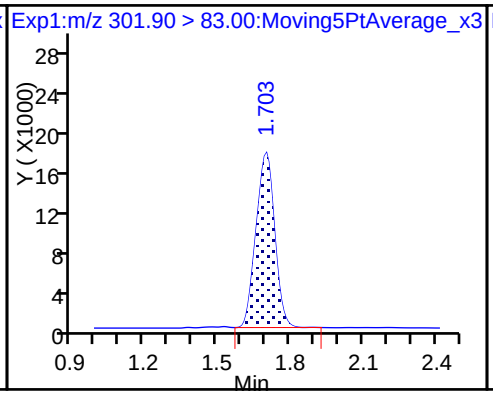
D 3 13C5-PFPeA



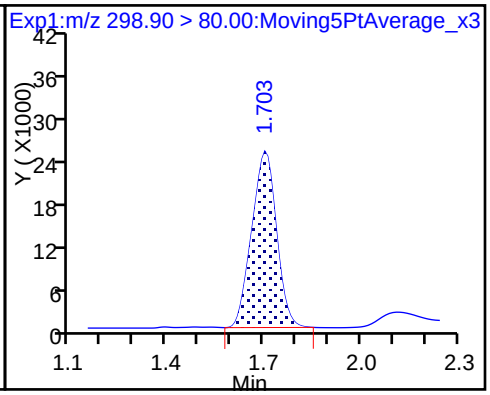
4 Perfluoropentanoic acid



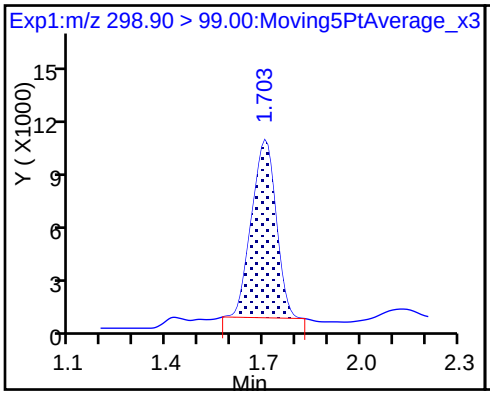
D 47 13C3-PFBS



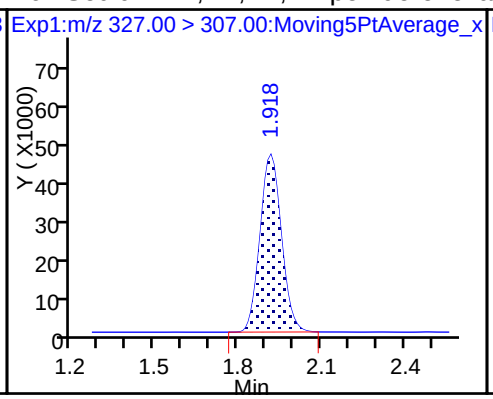
5 Perfluorobutanesulfonic acid



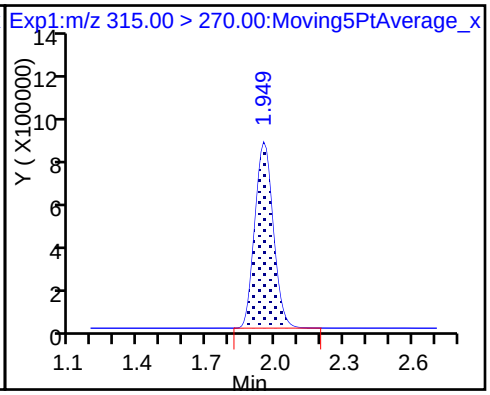
5 Perfluorobutanesulfonic acid



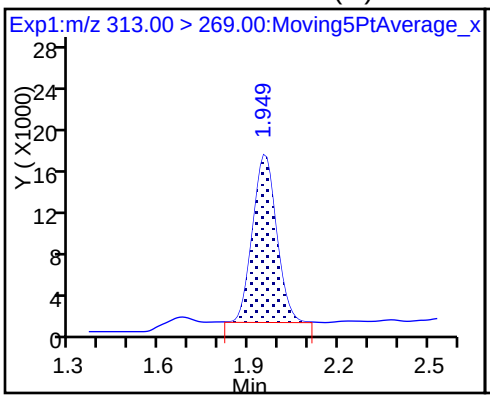
61 Sodium 1H,1H,2H,2H-perfluorohexa



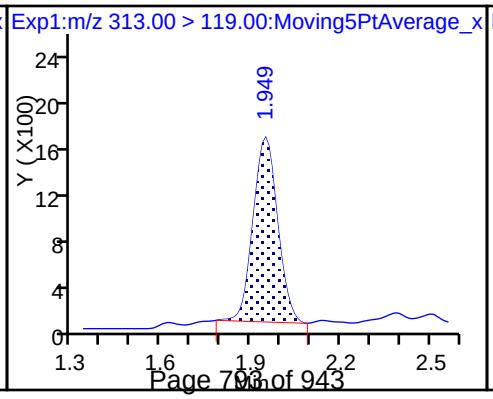
D 7 13C2 PFHxA



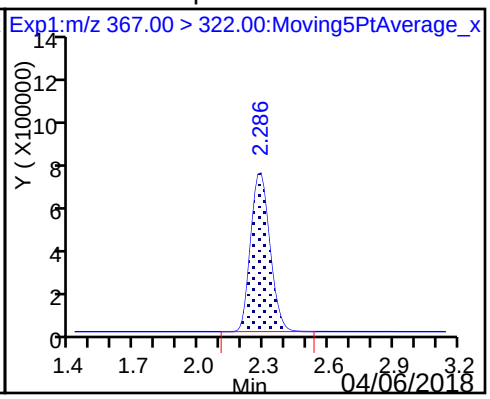
6 Perfluorohexanoic acid (M)



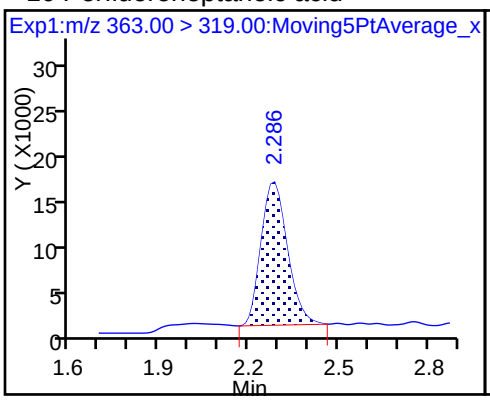
6 Perfluorohexanoic acid



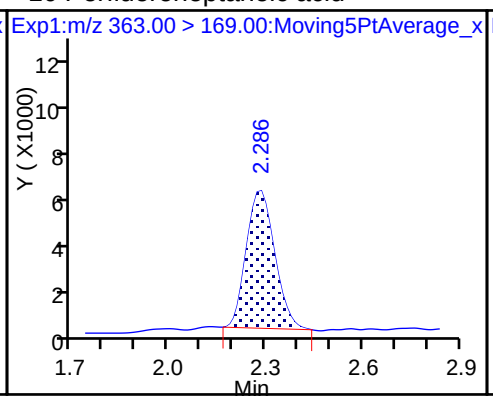
D 9 13C4-PFHpA



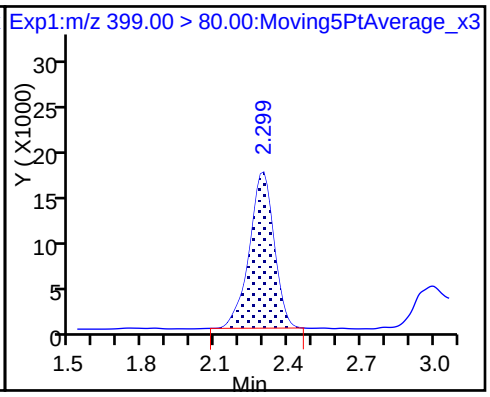
10 Perfluoroheptanoic acid



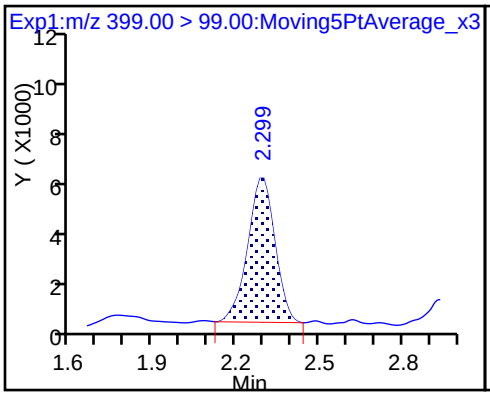
10 Perfluoroheptanoic acid



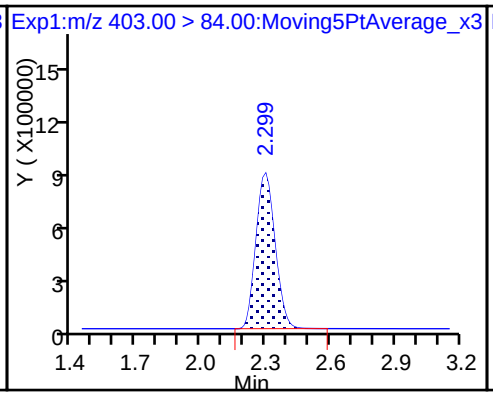
8 Perfluorohexanesulfonic acid



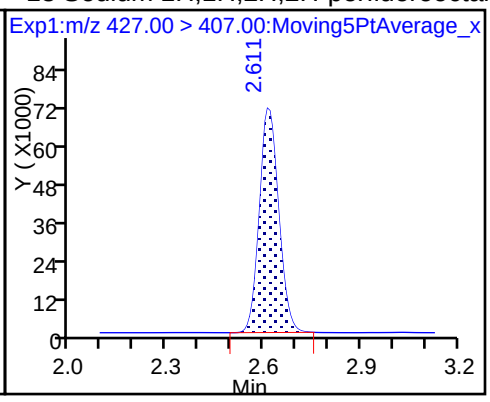
8 Perfluorohexanesulfonic acid



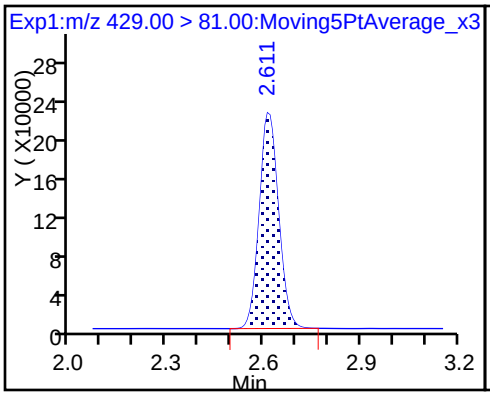
D 11 18O2 PFHxS



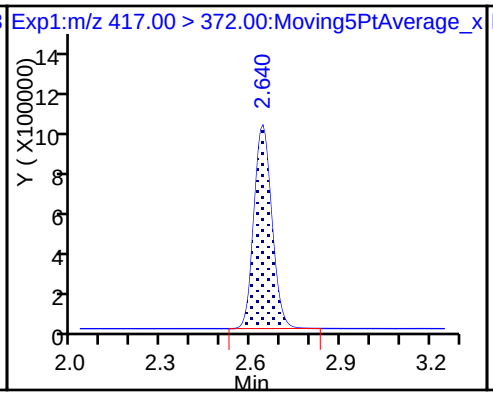
13 Sodium 1H,1H,2H,2H-perfluorooctane



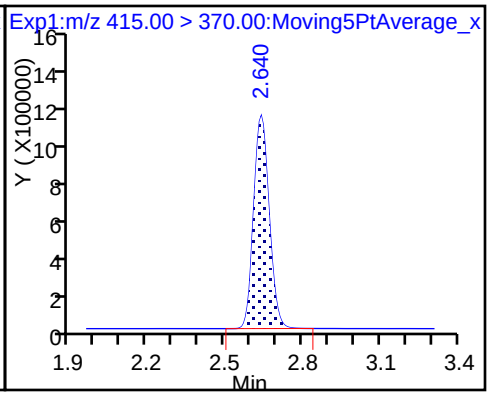
D 12 M2-6:2FTS



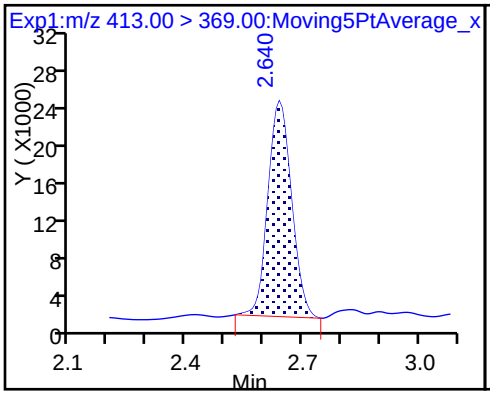
D 14 13C4 PFOA



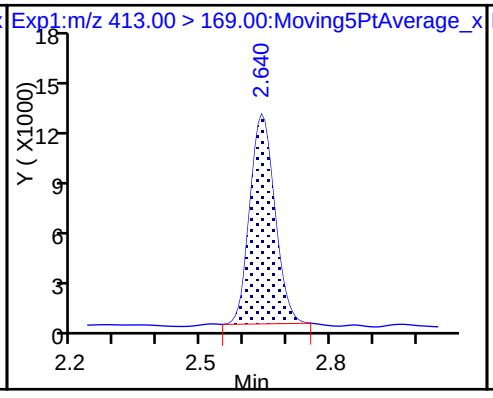
* 62 13C2-PFOA



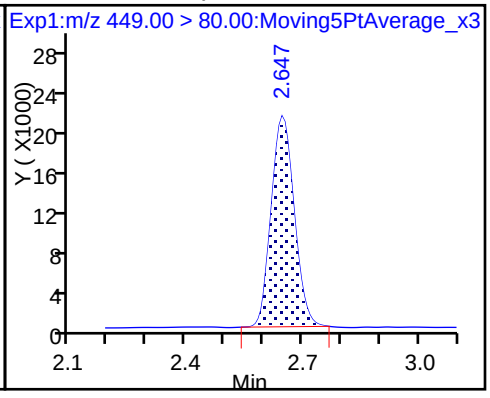
15 Perfluorooctanoic acid



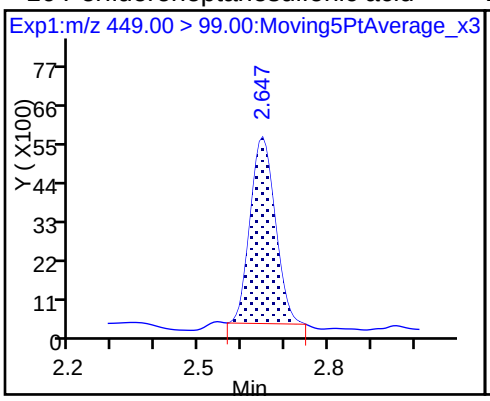
15 Perfluorooctanoic acid



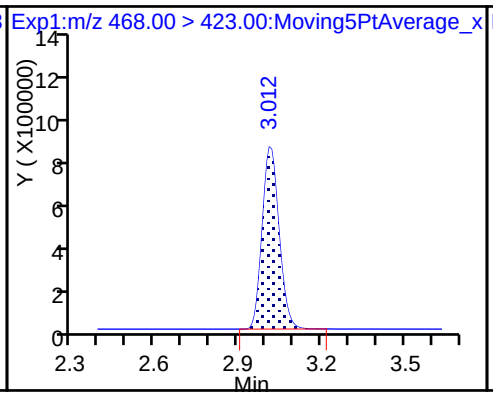
16 Perfluoroheptanesulfonic acid



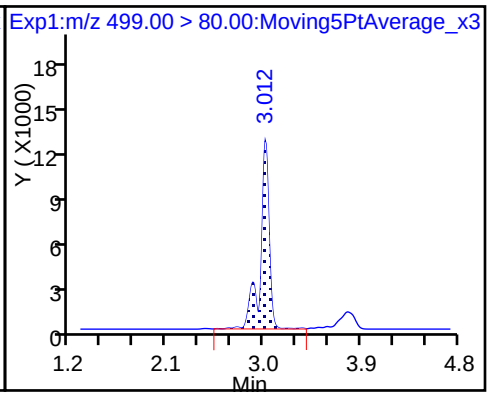
16 Perfluoroheptanesulfonic acid



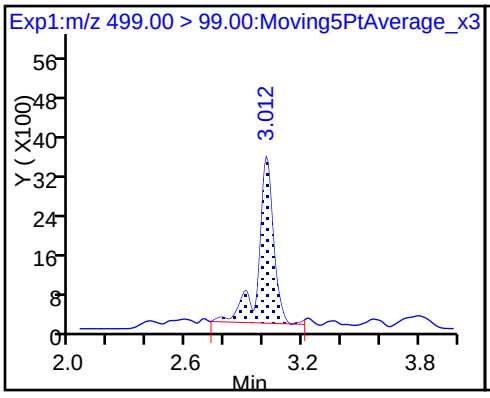
D 19 13C5 PFNA



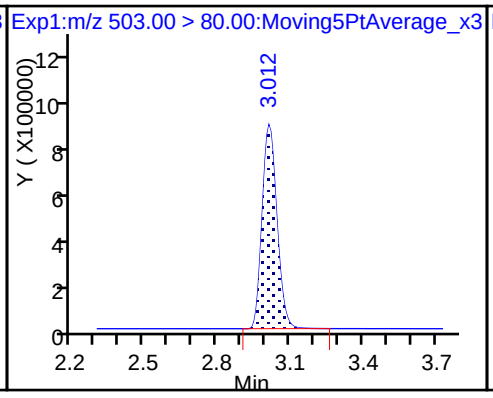
17 Perfluorooctane sulfonic acid



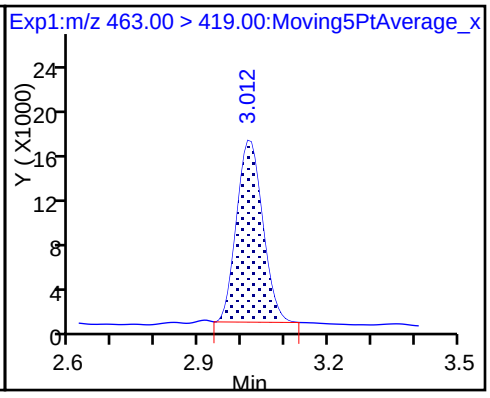
17 Perfluorooctane sulfonic acid



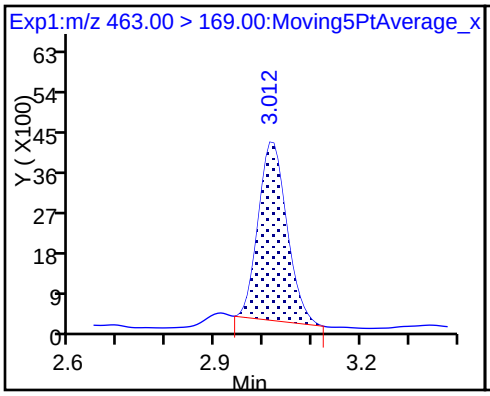
D 18 13C4 PFOS



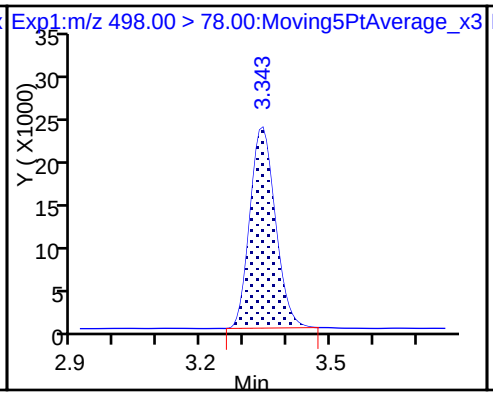
20 Perfluorononanoic acid



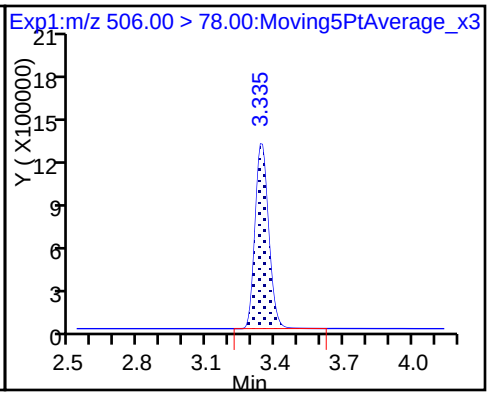
20 Perfluorononanoic acid



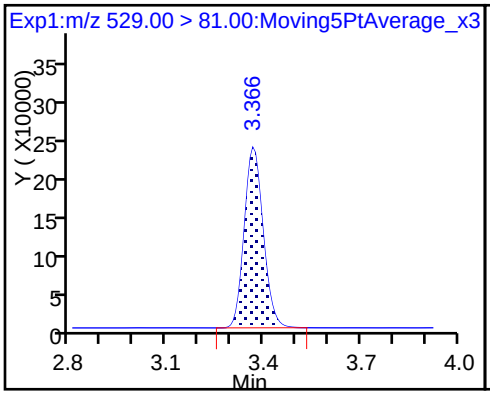
22 Perfluorooctane Sulfonamide



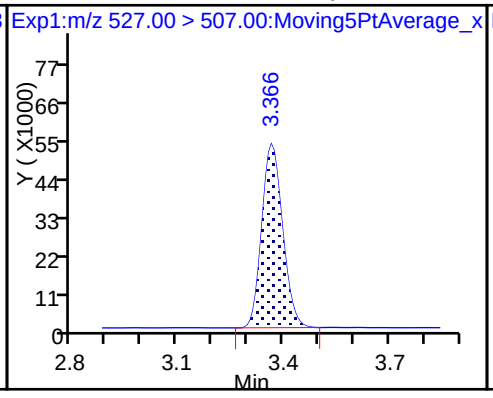
D 21 13C8 FOSA



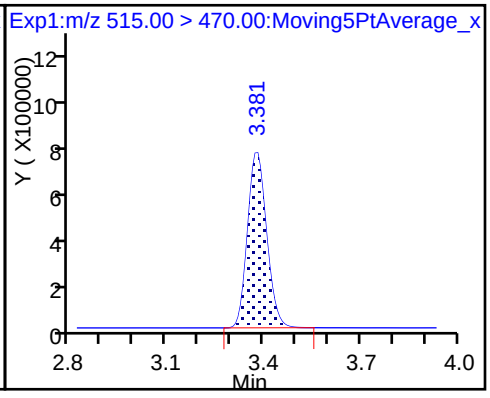
D 26 M2-8:2FTS



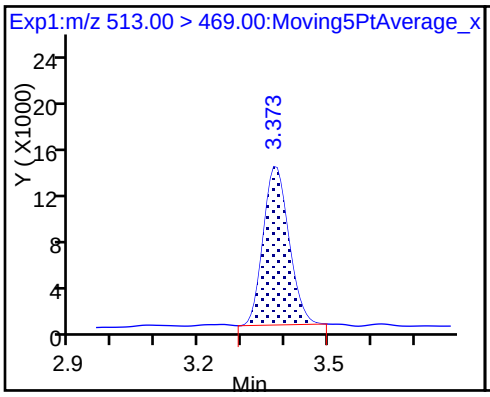
25 Sodium 1H,1H,2H,2H-perfluorodecane



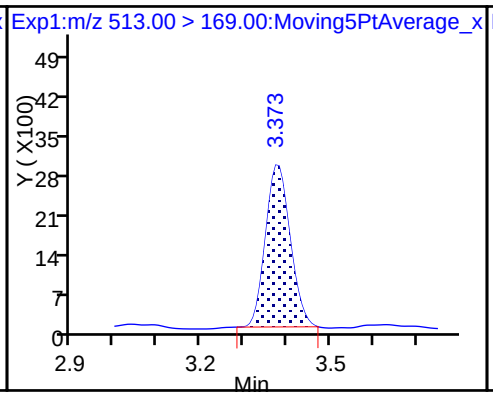
D 23 13C2 PFDA



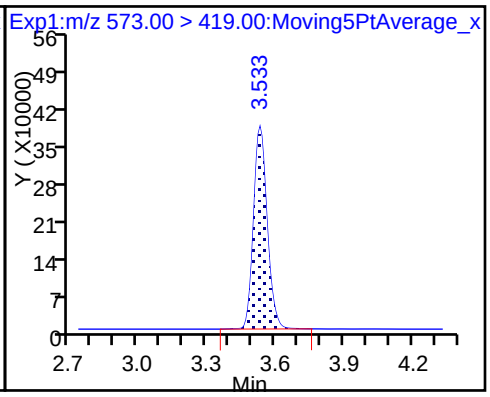
24 Perfluorodecanoic acid



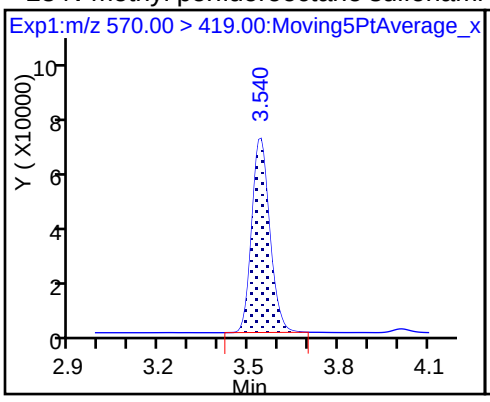
24 Perfluorodecanoic acid



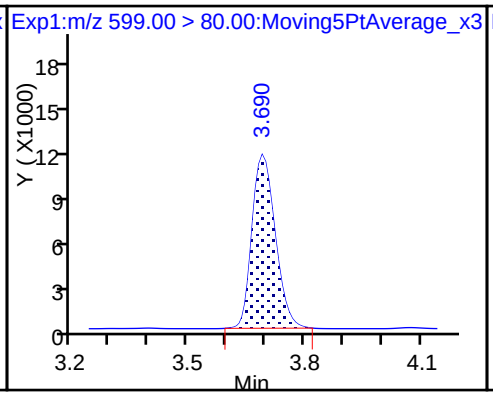
D 27 d3-NMeFOSAA



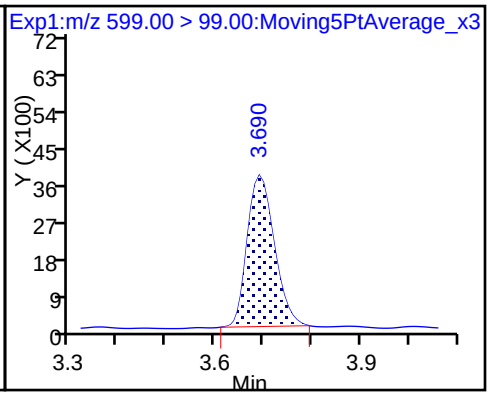
28 N-methyl perfluorooctane sulfonami



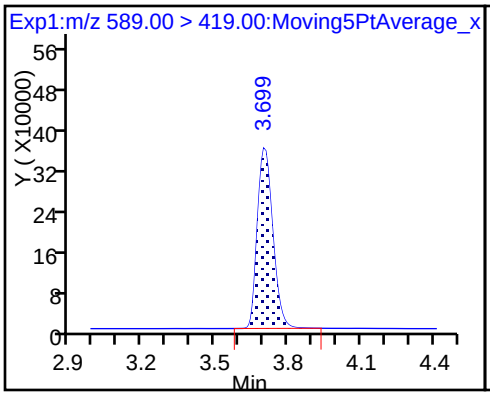
29 Perfluorodecane Sulfonic acid



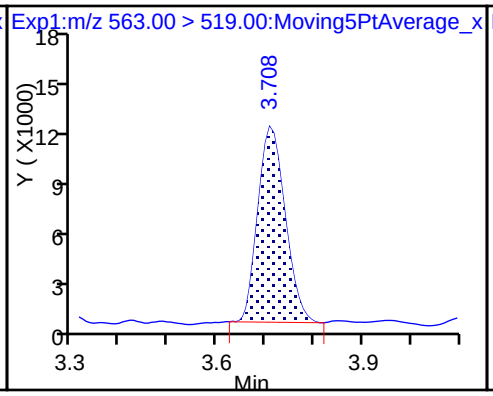
29 Perfluorodecane Sulfonic acid



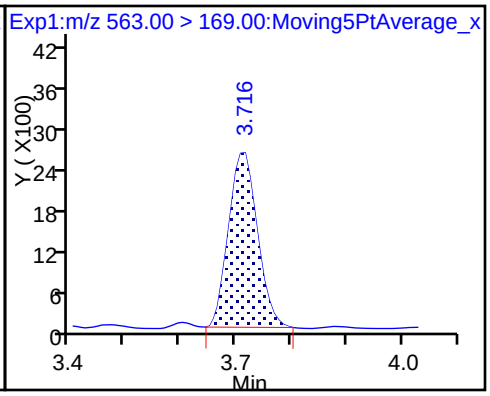
D 32 d5-NEtFOSAA



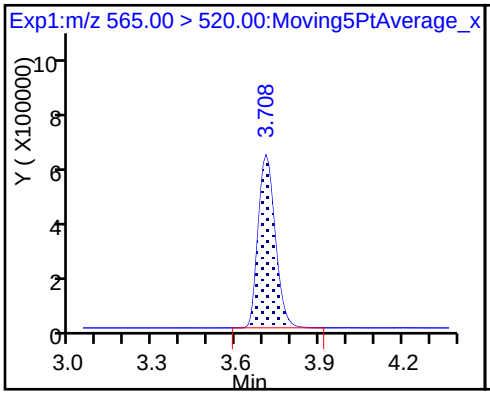
31 Perfluoroundecanoic acid



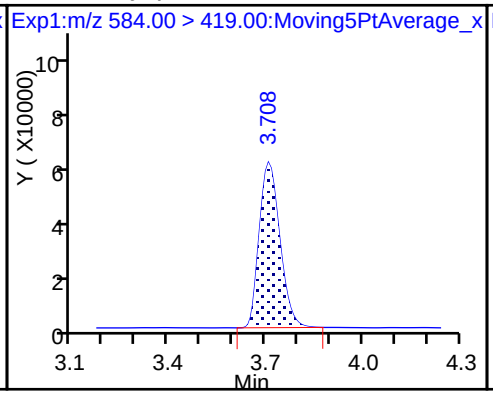
31 Perfluoroundecanoic acid



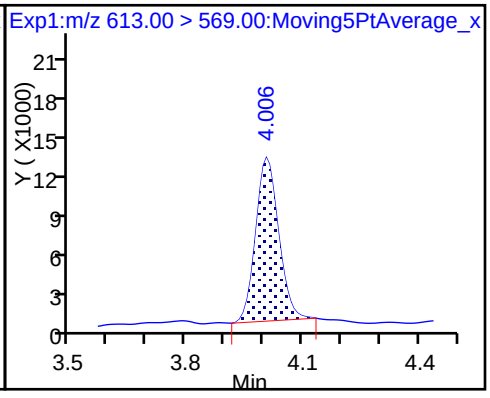
D 30 13C2 PFUnA



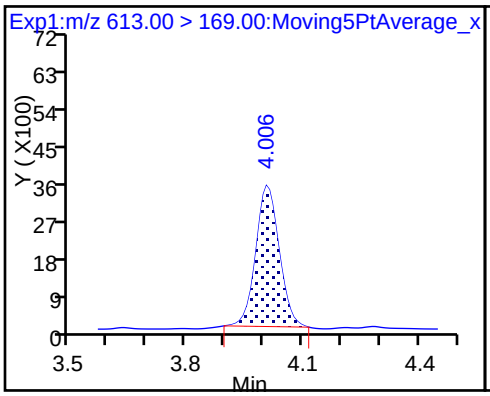
33 N-ethyl perfluorooctane sulfonamid



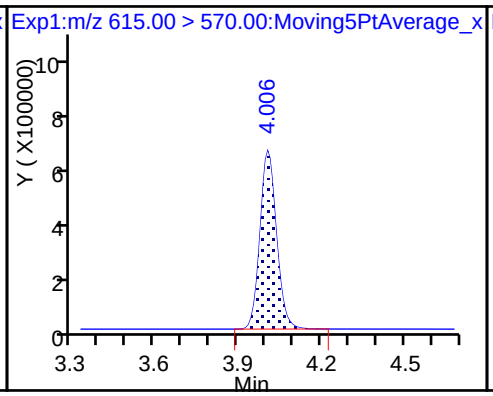
37 Perfluorododecanoic acid



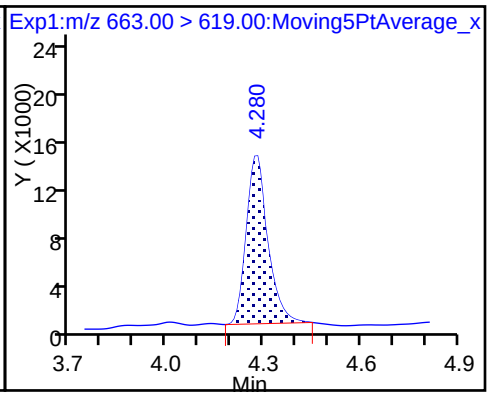
37 Perfluorododecanoic acid



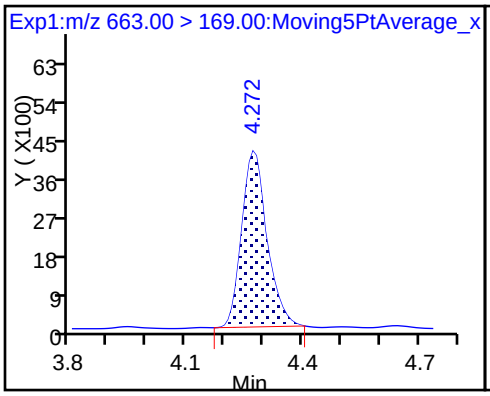
D 36 13C2 PFDoA



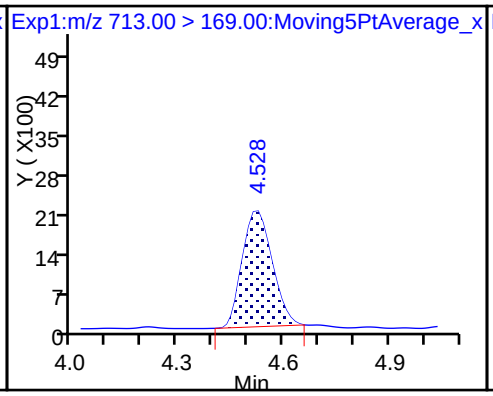
41 Perfluorotridecanoic acid



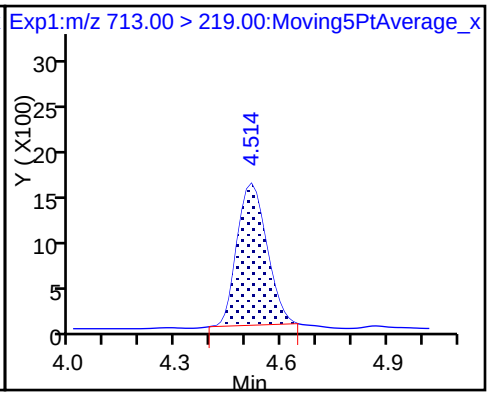
41 Perfluorotridecanoic acid



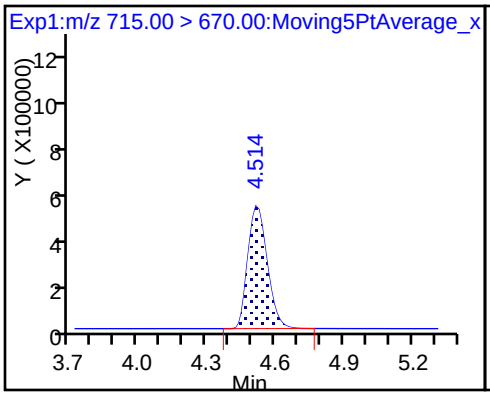
42 Perfluorotetradecanoic acid



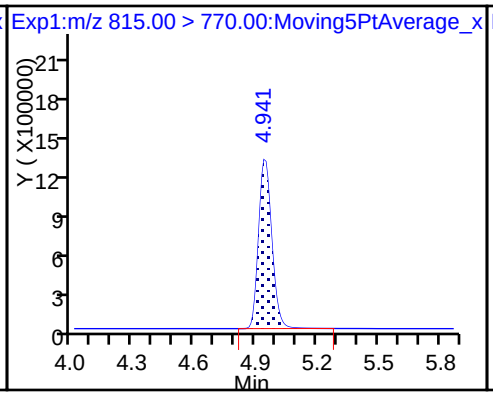
42 Perfluorotetradecanoic acid



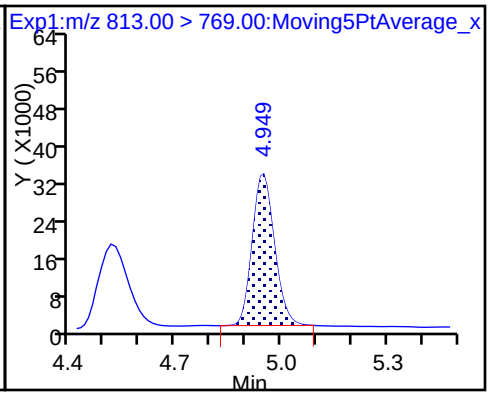
D 43 13C2-PFTeDA



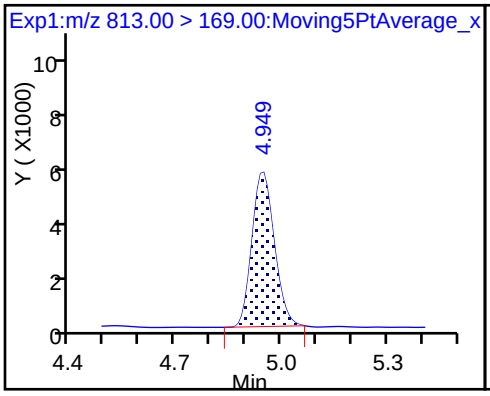
D 44 13C2-PFHxDA



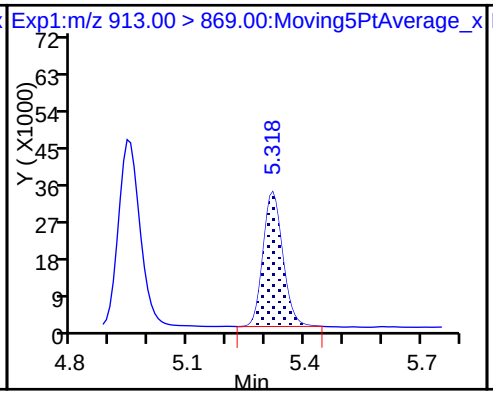
45 Perfluorohexadecanoic acid



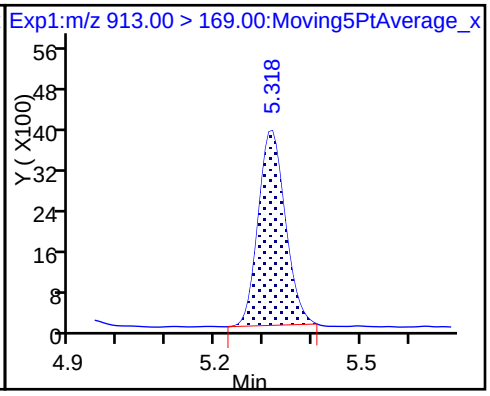
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

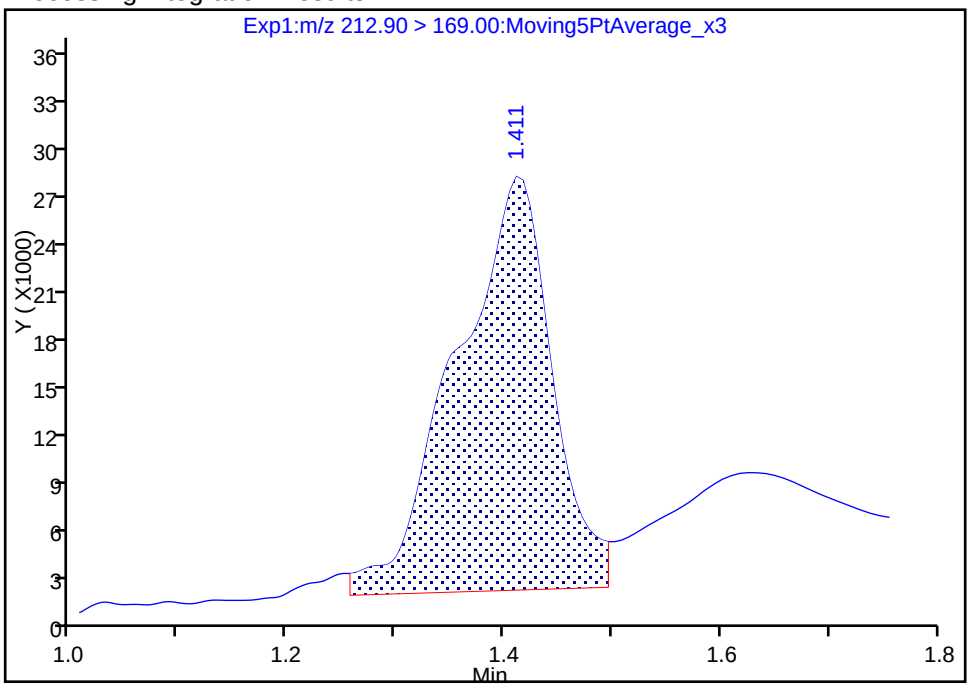
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53458.b\2018.01.29LLA_003.d
Injection Date: 29-Jan-2018 11:29:17 Instrument ID: A8_N
Lims ID: CCVL
Client ID:
Operator ID: SACINSTLCMS01 ALS Bottle#: 21 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Method: A8_N Limit Group: LC PFC_DOD ICAL
Column: Detector EXP1

2 Perfluorobutyric acid, CAS: 375-22-4

Signal: 1

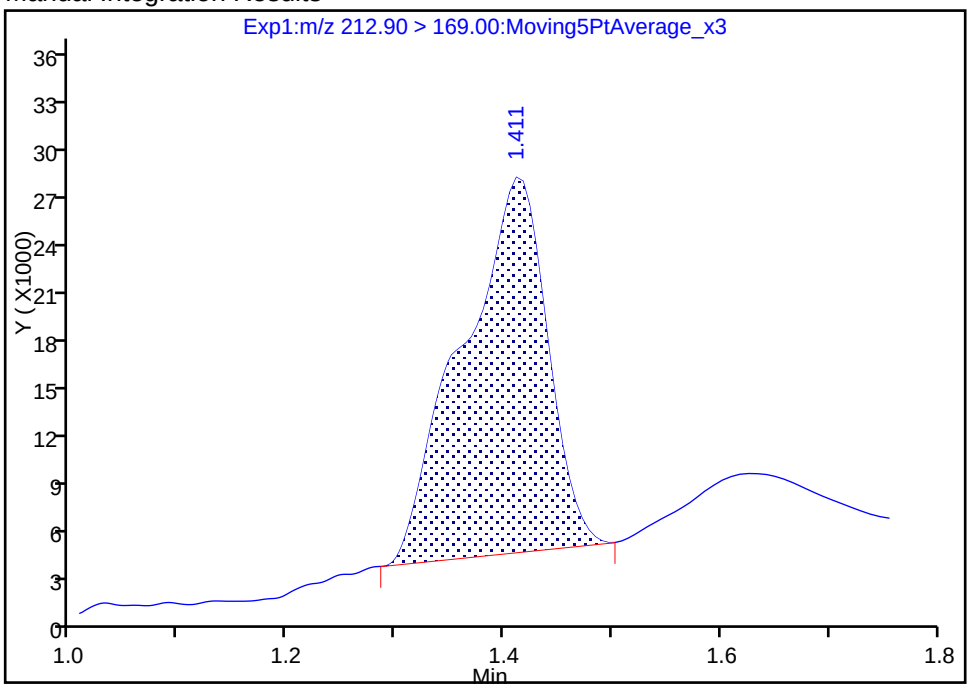
Processing Integration Results

RT: 1.41
Area: 159756
Amount: 0.058539
Amount Units: ng/ml



Manual Integration Results

RT: 1.41
Area: 128044
Amount: 0.046919
Amount Units: ng/ml



Reviewer: roycea, 29-Jan-2018 15:54:37
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

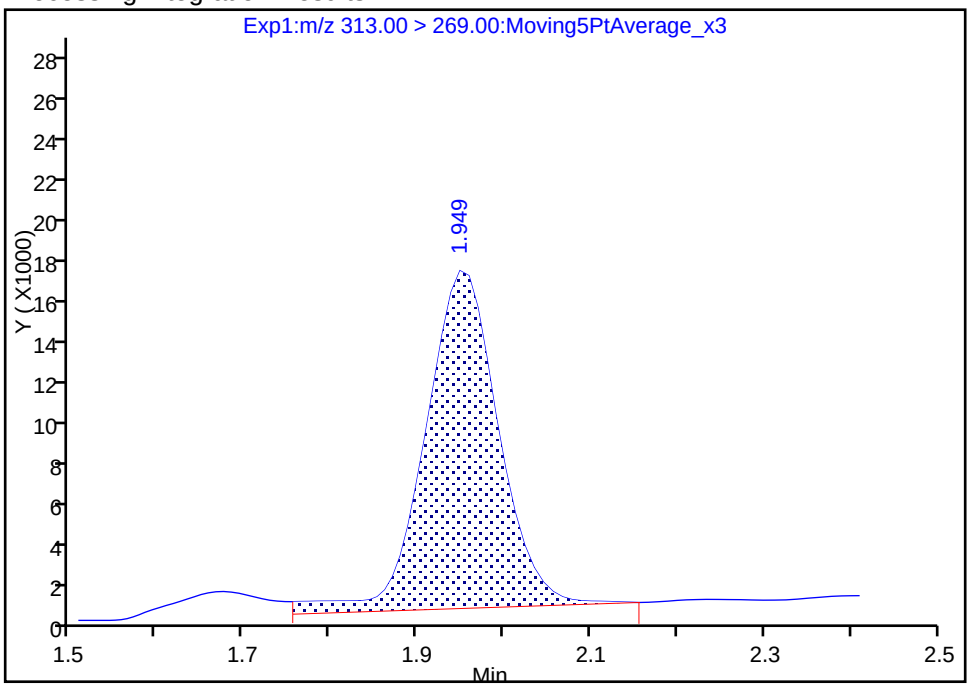
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53458.b\2018.01.29LLA_003.d
Injection Date: 29-Jan-2018 11:29:17 Instrument ID: A8_N
Lims ID: CCVL
Client ID:
Operator ID: SACINSTLCMS01 ALS Bottle#: 21 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Method: A8_N Limit Group: LC PFC_DOD ICAL
Column: Detector EXP1

6 Perfluorohexanoic acid, CAS: 307-24-4

Signal: 1

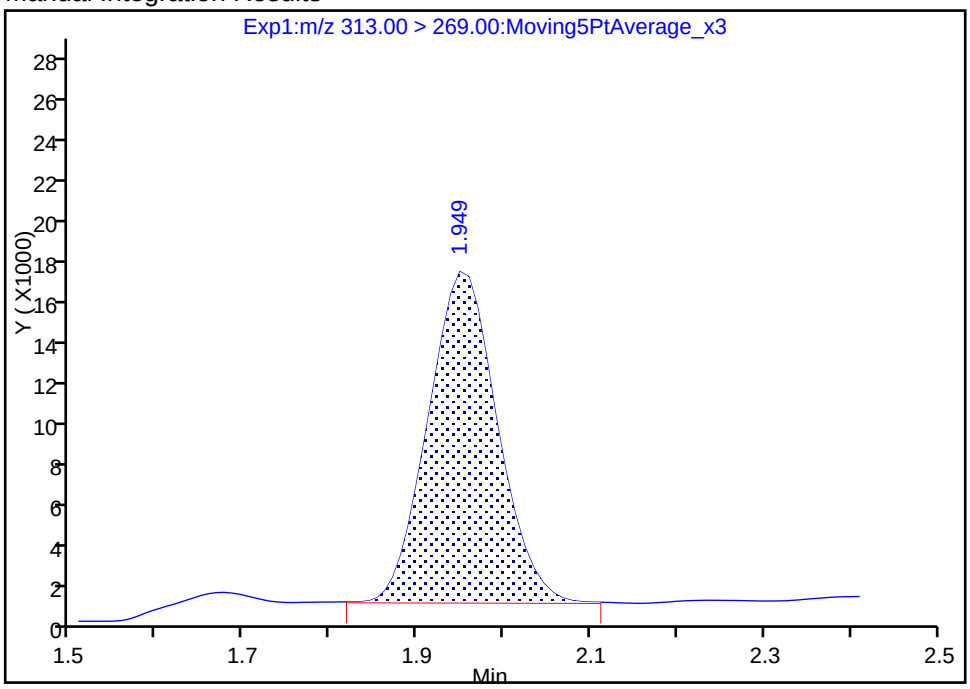
Processing Integration Results

RT: 1.95
Area: 98859
Amount: 0.051224
Amount Units: ng/ml



Manual Integration Results

RT: 1.95
Area: 91417
Amount: 0.047368
Amount Units: ng/ml



Reviewer: roycea, 29-Jan-2018 15:54:48
Audit Action: Manually Integrated Audit Reason: Baseline

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-206109/1 Calibration Date: 01/29/2018 16:20

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.29LLAA_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	0.9343	0.9378		1.00	1.00	0.4	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.142		0.970	1.00	-3.0	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	78.01		0.893	0.884	1.0	25.0
4:2 FTS	AveID	13.89	16.76		1.13	0.934	20.6	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	0.9671		0.933	1.00	-6.7	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.055		0.960	1.00	-4.0	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.131		0.924	0.910	1.6	25.0
6:2FTS	AveID	1.655	1.530		0.876	0.948	-7.6	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.080		0.922	1.00	-7.8	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.308		0.919	0.952	-3.4	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.068		1.03	1.00	3.5	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.073		0.890	0.928	-4.1	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	1.000		1.02	1.00	1.8	25.0
8:2FTS	AveID	1.217	1.185		0.932	0.958	-2.7	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	1.001		1.03	1.00	3.2	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.057		0.979	1.00	-2.1	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.6299		0.927	0.964	-3.8	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.9507		0.976	1.00	-2.4	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9028		0.875	1.00	-12.5	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	0.9640		0.941	1.00	-5.9	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.045		0.900	1.00	-10.0	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2491		1.02	1.00	2.1	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9597		0.994	1.00	-0.6	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.108		1.05	1.00	5.2	25.0
13C4 PFBA	Ave	1.512	1.506		2.49	2.50	-0.4	50.0
13C5-PFPeA	Ave	0.8956	0.8944		2.50	2.50	-0.1	50.0
13C3-PFBS	Ave	0.0198	0.0199		2.34	2.33	0.5	50.0
13C2 PFHxA	Ave	0.9649	0.9705		2.51	2.50	0.6	50.0
13C4-PFHpA	Ave	0.9187	0.9417		2.56	2.50	2.5	50.0
18O2 PFHxS	Ave	1.131	1.155		2.42	2.37	2.1	50.0
M2-6:2FTS	Ave	0.1699	0.1998		2.79	2.38	17.6	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-206109/1 Calibration Date: 01/29/2018 16:20

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.29LLAA_037.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.9314		2.59	2.50	3.4	50.0
13C4 PFOS	Ave	0.7158	0.7780		2.60	2.39	8.7	50.0
13C5 PFNA	Ave	0.7300	0.7383		2.53	2.50	1.1	50.0
13C8 FOSA	Ave	1.007	1.069		2.65	2.50	6.2	50.0
M2-8:2FTS	Ave	0.1795	0.2171		2.90	2.40	20.9	50.0
13C2 PFDA	Ave	0.6306	0.6250		2.48	2.50	-0.9	50.0
d3-NMeFOSAA	Ave	0.3147	0.3335		2.65	2.50	6.0	50.0
d5-NEtFOSAA	Ave	0.3182	0.3291		2.59	2.50	3.4	50.0
13C2 PFUnA	Ave	0.4783	0.5062		2.65	2.50	5.8	50.0
13C2 PFDoA	Ave	0.5192	0.5529		2.66	2.50	6.5	50.0
13C2-PFTeDA	Ave	0.6785	0.6662		2.45	2.50	-1.8	50.0
13C2-PFHxDA	Ave	1.209	1.152		2.38	2.50	-4.7	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\2018.01.29LLAA_037.d
Lims ID: CCV L4
Client ID:
Sample Type: CCV
Inject. Date: 29-Jan-2018 16:20:58 ALS Bottle#: 13 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L4
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 08:47:24 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 08:47:24

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	1.414	1.411	0.003	0.535	6793624	2.49		99.6	20351	
2 Perfluorobutyric acid										
212.90 > 169.00	1.414	1.413	0.001	1.000	2548382	1.00		100	275	
D 3 13C5-PFPeA										
267.90 > 223.00	1.670	1.659	0.011	0.632	4033421	2.50		99.9	30208	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.670	1.662	0.008	1.000	1843009	0.9697		97.0	1097	
D 47 13C3-PFBS										
301.90 > 83.00	1.697	1.695	0.002	0.642	83588	2.34		101	1682	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.706	1.697	0.009	1.005	2479355	0.8932		101	6826	
298.90 > 99.00	1.706	1.697	0.009	1.005	1067790		2.32(1.25-3.74)		3172	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.912	1.903	0.009	1.000	562723	1.13		121	26331	
D 60 M2-4:2FTS										
329.00 > 81.00	1.912	1.903	0.009	0.723	649755	NC			5415	
D 7 13C2 PFHxA										
315.00 > 270.00	1.953	1.939	0.014	0.739	4376993	2.51		101	32883	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.953	1.939	0.014	1.000	1693217	0.9331		93.3	2740	
313.00 > 119.00	1.953	1.939	0.014	1.000	155806		10.87(5.03-15.10)		2775	
D 9 13C4-PFHpA										
367.00 > 322.00	2.278	2.267	0.011	0.862	4246891	2.56		103	23936	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.278	2.268	0.010	1.000	1792573	0.9602		96.0	2904	
363.00 > 169.00	2.278	2.268	0.010	1.000	652302		2.75(1.13-3.40)		3937	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.291	2.280	0.011	1.000	2145196	0.9244		102	1512	
399.00 > 99.00	2.291	2.280	0.011	1.000	675135		3.18(1.50-4.49)		847	
D 11 18O2 PFHxS										
403.00 > 84.00	2.291	2.282	0.009	0.867	4928748	2.42		102	24351	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.615	2.596	0.019	1.000	522651	0.8762		92.4	8975	
D 12 M2-6:2FTS										
429.00 > 81.00	2.615	2.597	0.018	0.989	855926	2.79		118	15932	
D 14 13C4 PFOA										
417.00 > 372.00	2.644	2.622	0.022	1.000	4200282	2.59		103	35686	
* 62 13C2-PFOA										
415.00 > 370.00	2.644	2.622	0.022		4509871	2.50			33682	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.644	2.623	0.021	1.000	1815332	0.9218		92.2	808	
413.00 > 169.00	2.644	2.623	0.021	1.000	951708		1.91(0.84-2.52)		4460	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.651	2.629	0.022	1.000	1747528	0.9192		96.6	14868	
449.00 > 99.00	2.651	2.629	0.022	1.000	491715		3.55(1.94-5.82)		3776	
D 19 13C5 PFNA										
468.00 > 423.00	3.016	2.992	0.024	1.141	3329443	2.53		101	21289	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.016	2.992	0.024	1.000	1398062	0.8899		95.9	3908	
499.00 > 99.00	3.016	2.992	0.024	1.000	317546		4.40(2.31-6.93)		1625	
D 18 13C4 PFOS										
503.00 > 80.00	3.016	2.992	0.024	1.141	3354374	2.60		109	17500	
20 Perfluorononanoic acid										
463.00 > 419.00	3.016	2.992	0.024	1.000	1422547	1.03		103	3413	
463.00 > 169.00	3.016	2.992	0.024	1.000	334752		4.25(1.90-5.69)		7813	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.346	3.338	0.008	1.000	1928103	1.02		102	12346	
D 21 13C8 FOSA										
506.00 > 78.00	3.346	3.338	0.008	1.266	4821415	2.65		106	24605	
D 26 M2-8:2FTS										
529.00 > 81.00	3.361	3.342	0.019	1.271	938016	2.90		121	14492	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.361	3.342	0.019	1.000	444439	0.9325		97.3	9835	
D 23 13C2 PFDA										
515.00 > 470.00	3.376	3.352	0.024	1.277	2818683	2.48		99.1	26651	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.376	3.353	0.023	1.000	1128639	1.03		103	5313	
513.00 > 169.00	3.376	3.353	0.023	1.000	203029		5.56(2.36-7.09)		1499	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.528	3.507	0.021	1.334	1503966	2.65		106	11099	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.535	3.513	0.022	1.002	635995	0.9787		97.9	4058	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.686	3.666	0.020	1.000	852249	0.9272		96.2	15666	
599.00 > 99.00	3.686	3.666	0.020	1.000	300280		2.84(1.39-4.16)		7245	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.694	3.672	0.022	1.397	1484208	2.59		103	8080	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.703	3.678	0.025	1.000	824409	0.8746		87.5	3350	
563.00 > 169.00	3.703	3.678	0.025	1.000	183584		4.49(0.00-0.00)		4394	
D 30 13C2 PFUnA										
565.00 > 520.00	3.703	3.679	0.024	1.401	2282982	2.65		106	17964	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.703	3.679	0.024	1.002	564420	0.9762		97.6	8055	
37 Perfluorododecanoic acid										
613.00 > 569.00	4.002	3.979	0.023	1.000	961503	0.9408		94.1	3951	
613.00 > 169.00	4.002	3.979	0.023	1.000	266235		3.61(2.13-6.40)		7258	
D 36 13C2 PFDoA										
615.00 > 570.00	4.002	3.979	0.023	1.514	2493452	2.66		106	22584	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.268	4.242	0.026	1.000	1042502	0.9001		90.0	3406	
663.00 > 169.00	4.268	4.242	0.026	1.000	343612		3.03(1.25-3.76)		9811	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.505	4.483	0.022	1.000	299392	1.02		102	7305	
713.00 > 219.00	4.505	4.483	0.022	1.000	200689		1.49(0.71-2.13)		5787	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.505	4.483	0.022	1.704	3004437	2.45		98.2	22393	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.925	4.902	0.023	1.863	5197086	2.38		95.3	14917	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.934	4.902	0.032	1.002	1995119	0.99		99.4	1115	
813.00 > 169.00	4.925	4.902	0.023	1.000	340698		5.86(2.86-8.58)		3377	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.284	5.255	0.029	1.000	2304244	1.05		105	546	
913.00 > 169.00	5.284	5.255	0.029	1.000	284237		8.11(0.00-0.00)		1612	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL4_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 08:47:25 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\2018.01.29LLAA_037.d

Injection Date: 29-Jan-2018 16:20:58 Instrument ID: A8_N

Lims ID: CCV L4

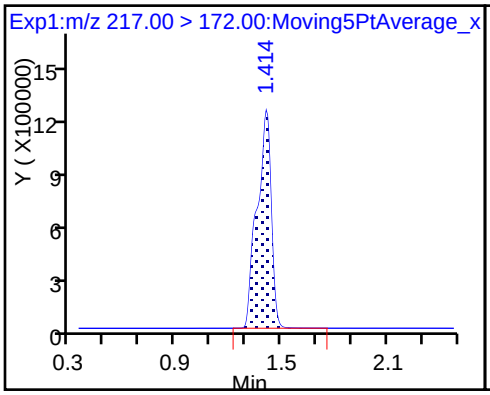
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 13 Worklist Smp#: 1

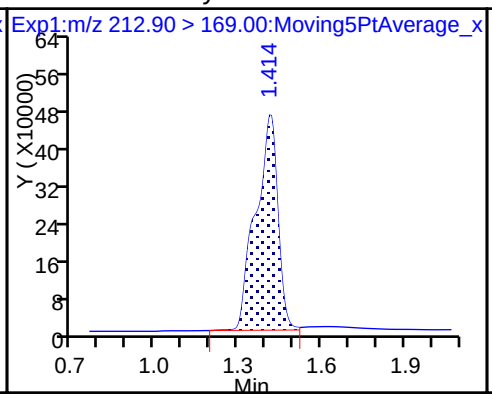
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

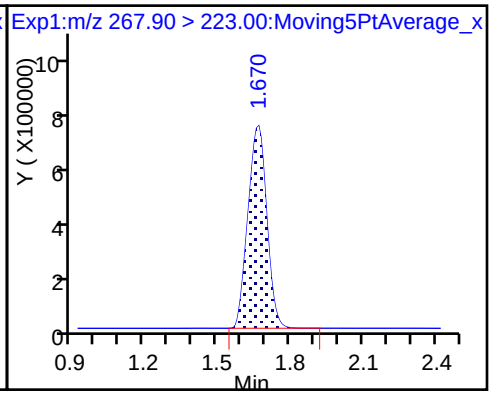
D 1 13C4 PFBA



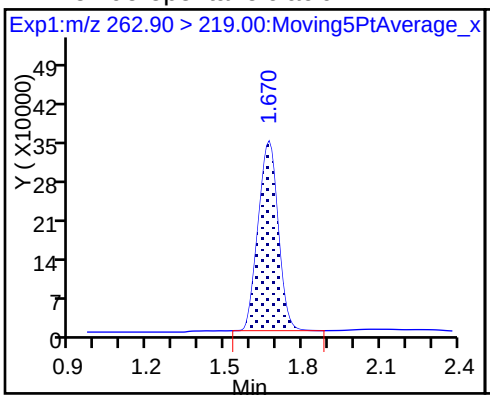
2 Perfluorobutyric acid



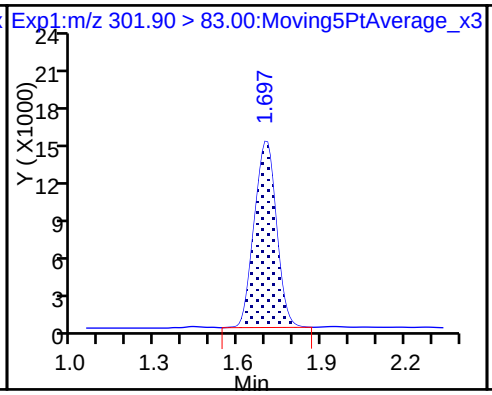
D 3 13C5-PFPeA



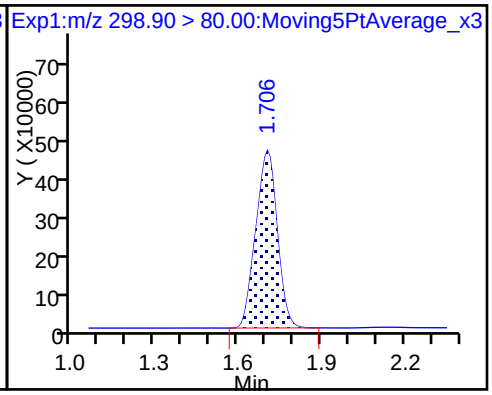
4 Perfluoropentanoic acid



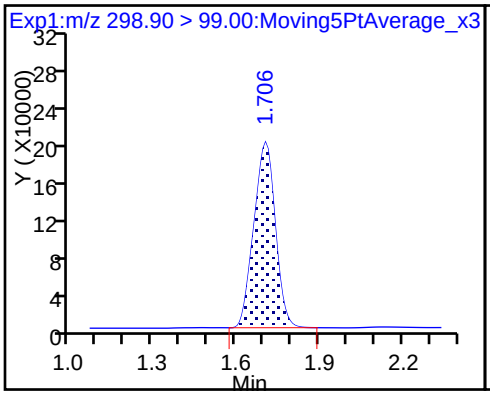
D 47 13C3-PFBS



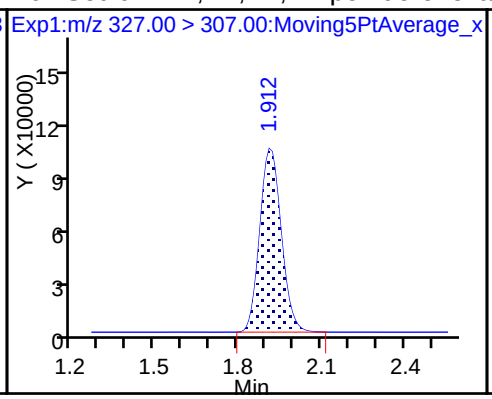
5 Perfluorobutanesulfonic acid



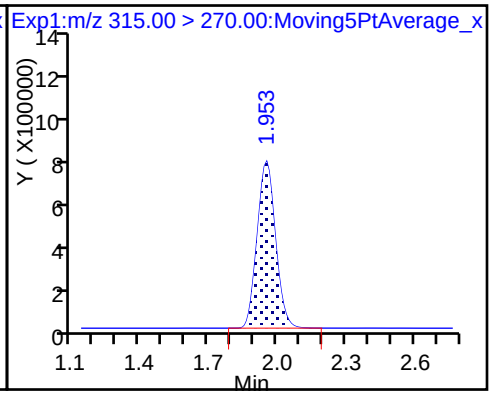
5 Perfluorobutanesulfonic acid



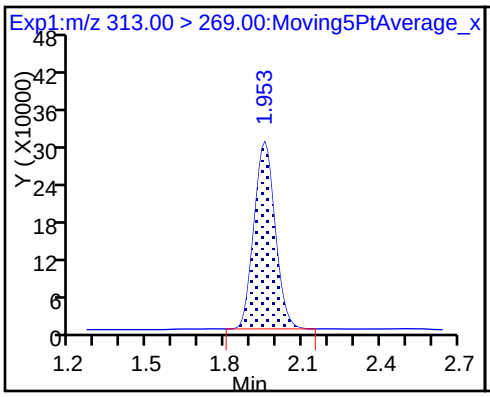
61 Sodium 1H,1H,2H,2H-perfluorohexa



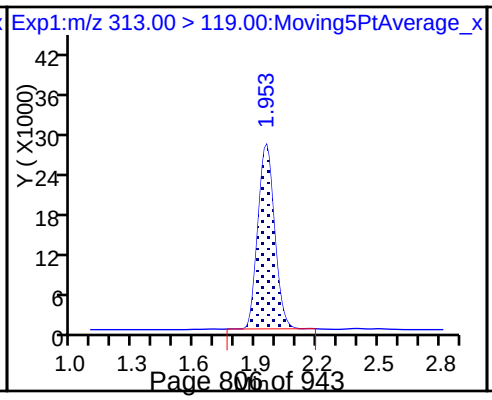
D 7 13C2 PFHxA



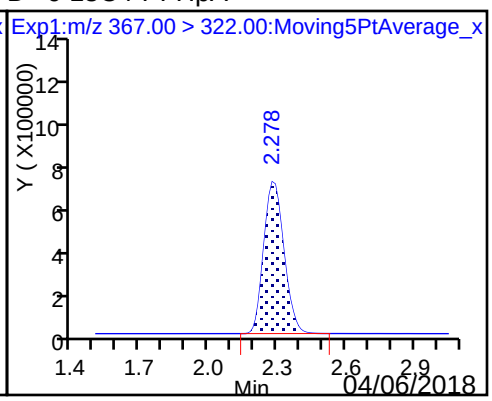
6 Perfluorohexanoic acid



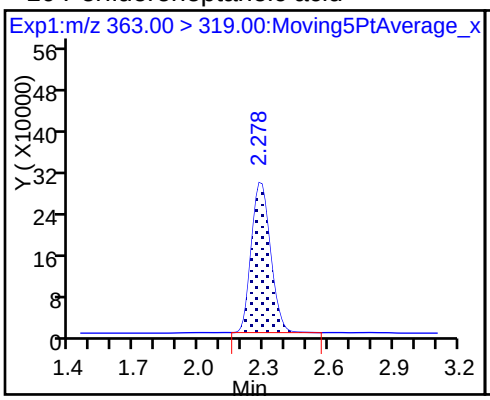
6 Perfluorohexanoic acid



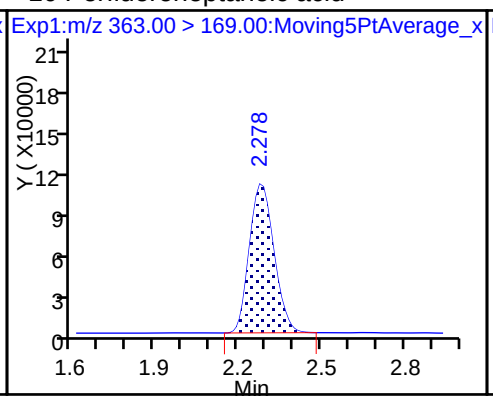
D 9 13C4-PFHpA



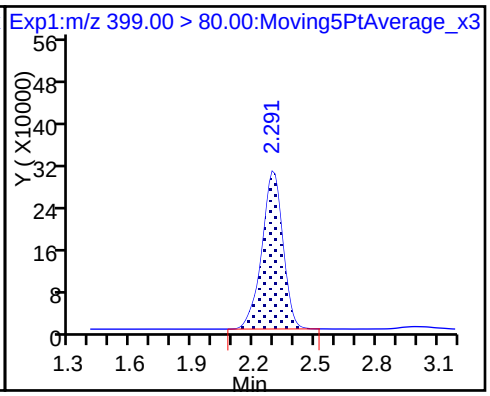
10 Perfluoroheptanoic acid



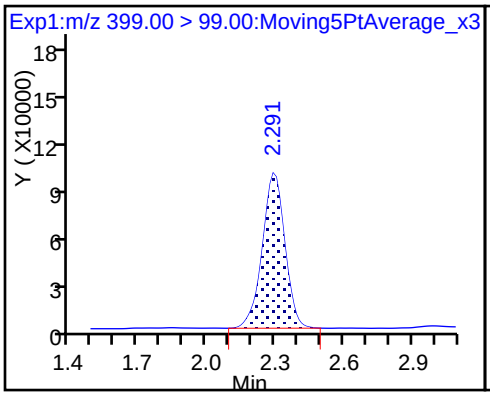
10 Perfluoroheptanoic acid



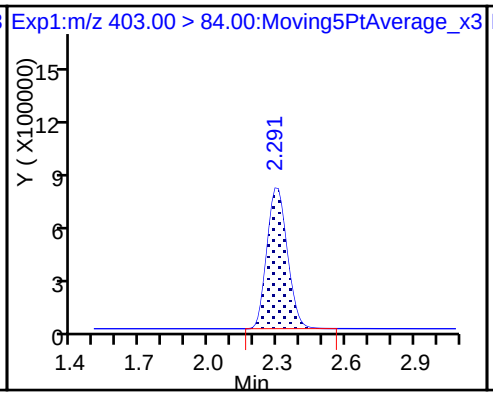
8 Perfluorohexanesulfonic acid



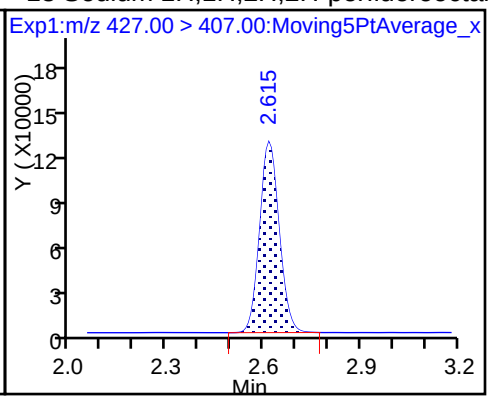
8 Perfluorohexanesulfonic acid



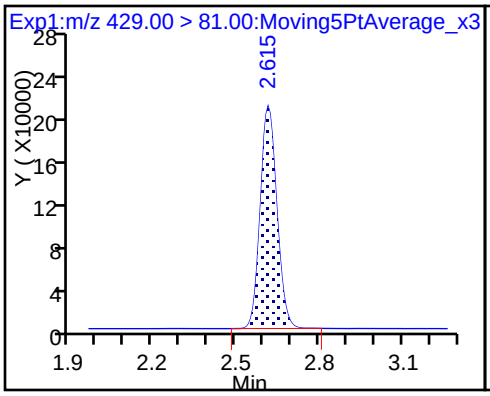
D 11 18O2 PFHxS



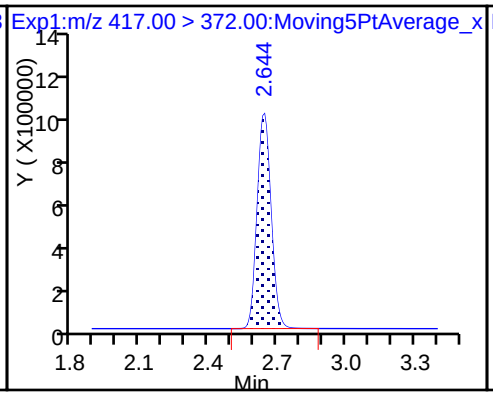
13 Sodium 1H,1H,2H,2H-perfluorooctane



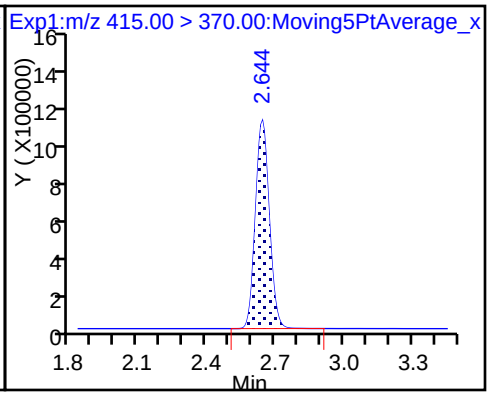
D 12 M2-6:2FTS



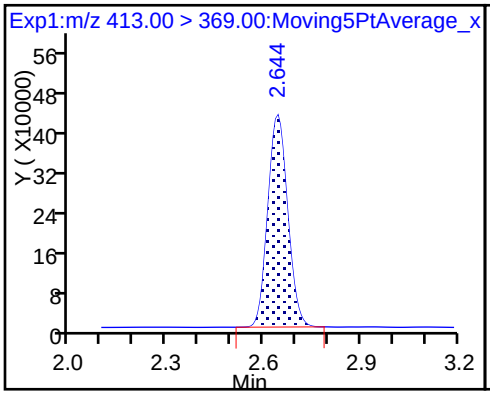
D 14 13C4 PFOA



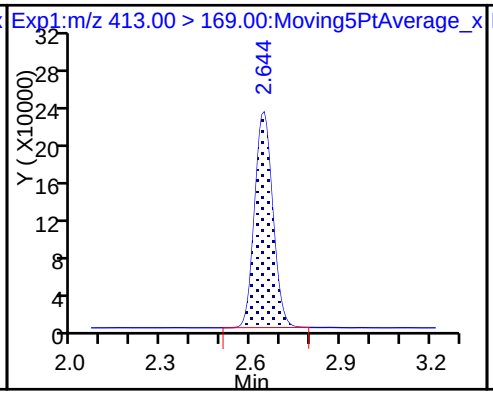
* 62 13C2-PFOA



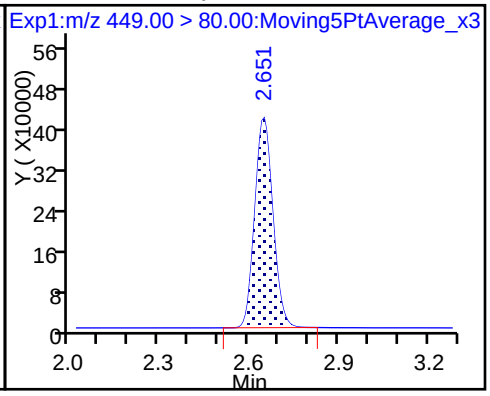
15 Perfluorooctanoic acid



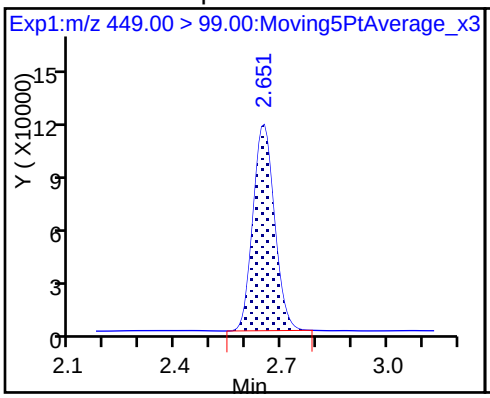
15 Perfluorooctanoic acid



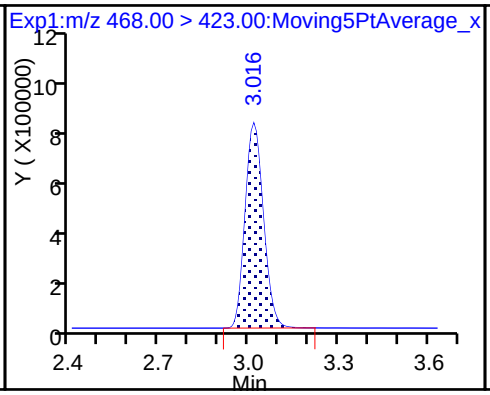
16 Perfluoroheptanesulfonic acid



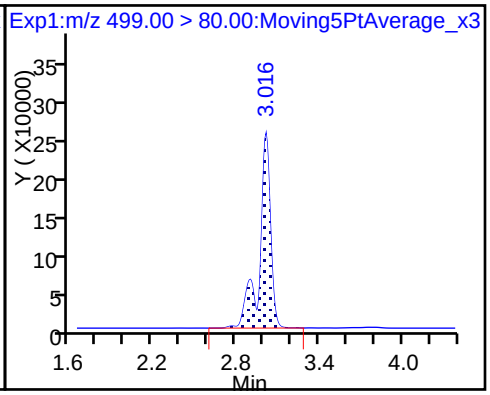
16 Perfluoroheptanesulfonic acid



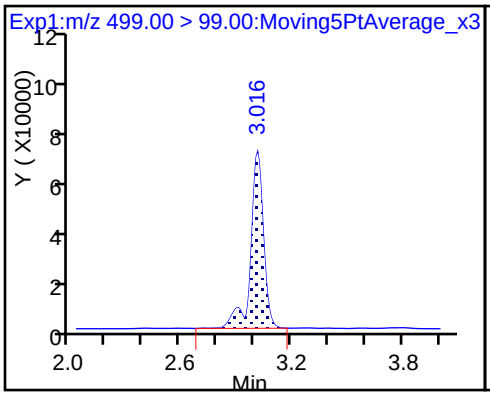
D 19 13C5 PFNA



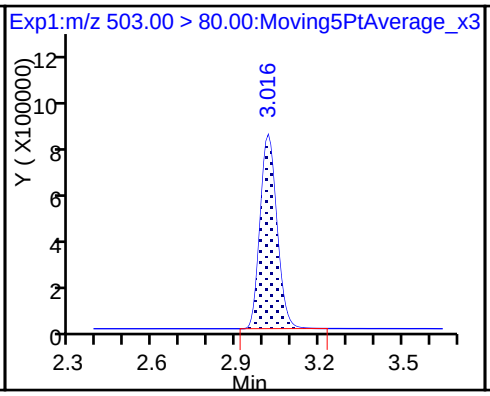
17 Perfluorooctane sulfonic acid



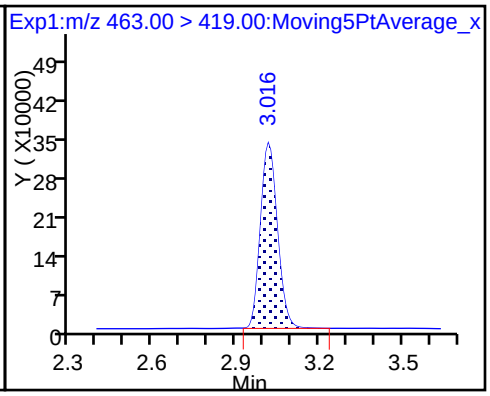
17 Perfluorooctane sulfonic acid



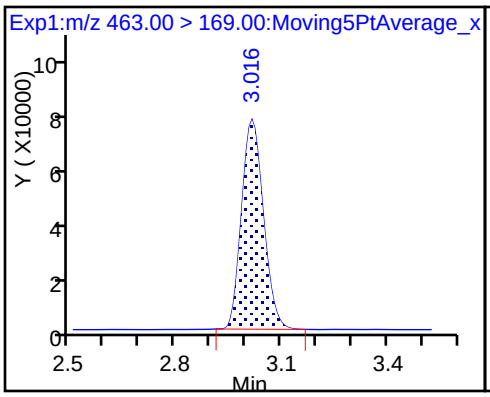
D 18 13C4 PFOS



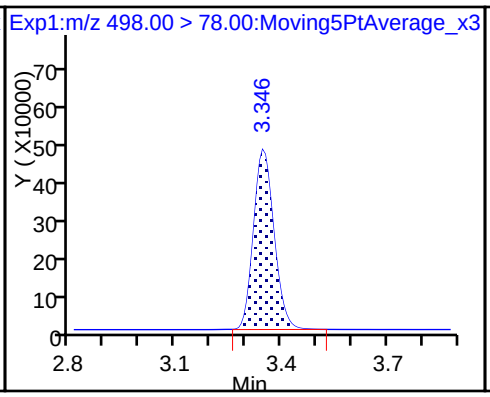
20 Perfluorononanoic acid



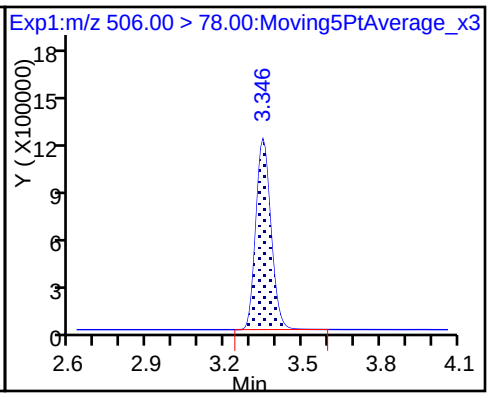
20 Perfluorononanoic acid



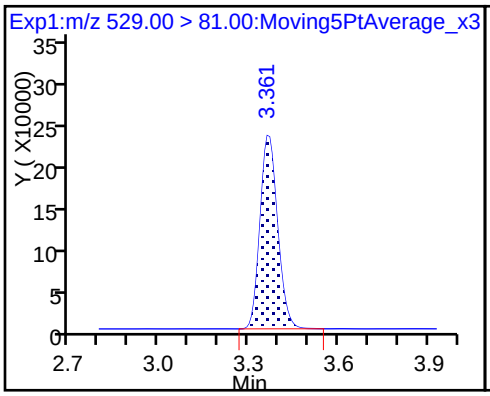
22 Perfluorooctane Sulfonamide



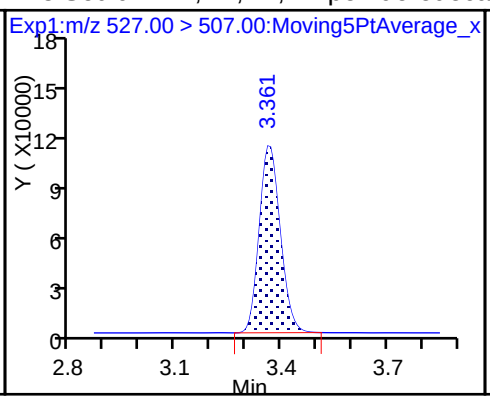
D 21 13C8 FOSA



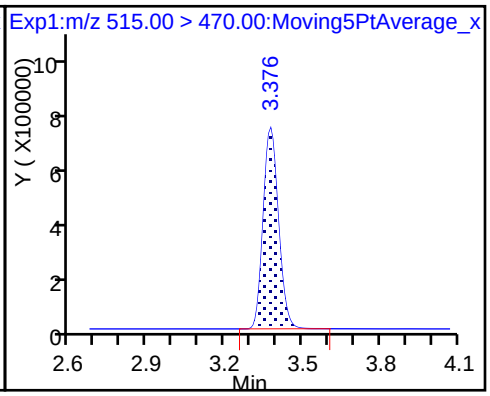
D 26 M2-8:2FTS



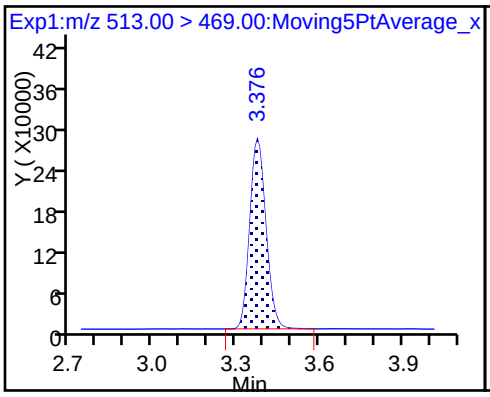
25 Sodium 1H,1H,2H,2H-perfluorodecane



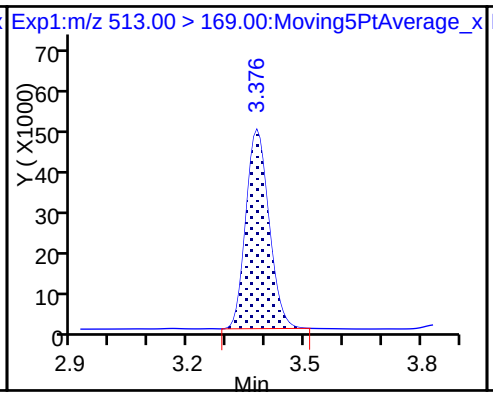
D 23 13C2 PFDA



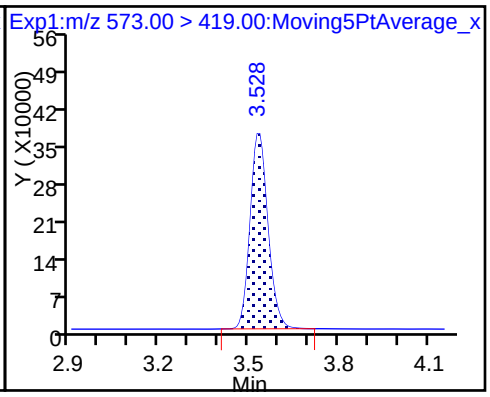
24 Perfluorodecanoic acid



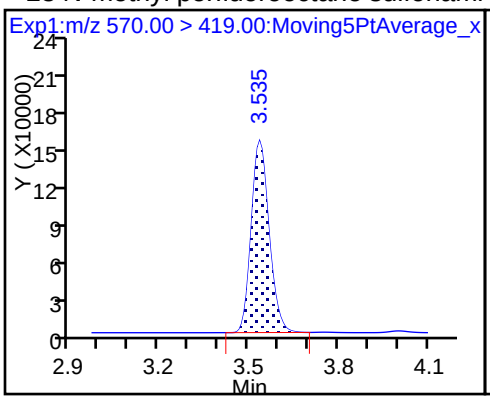
24 Perfluorodecanoic acid



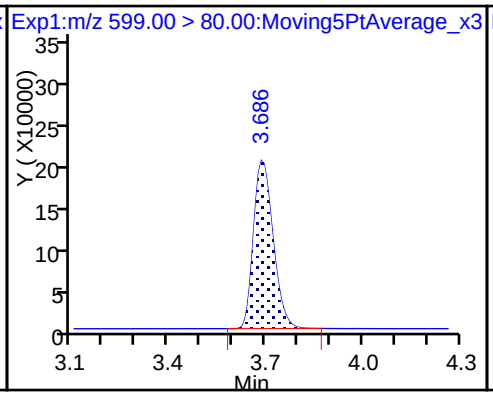
D 27 d3-NMeFOSAA



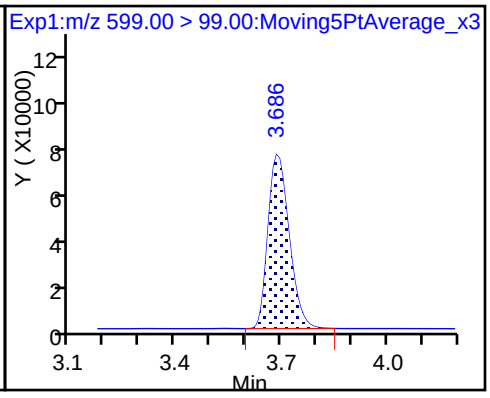
28 N-methyl perfluorooctane sulfonami



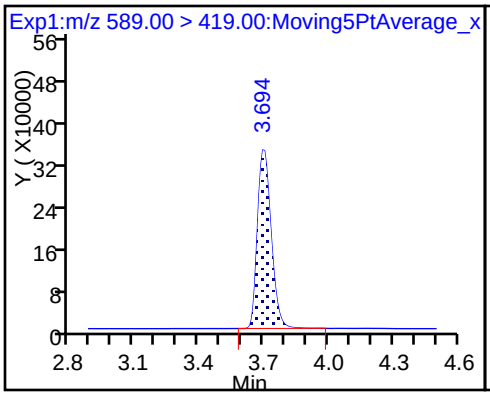
29 Perfluorodecane Sulfonic acid



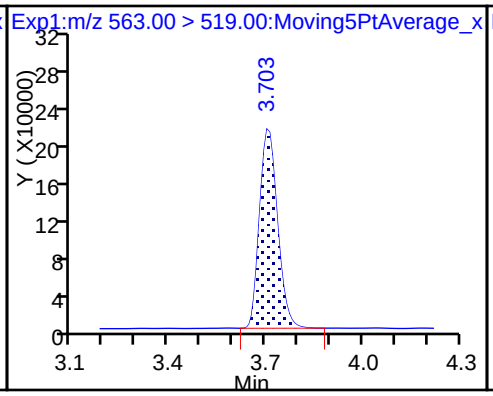
29 Perfluorodecane Sulfonic acid



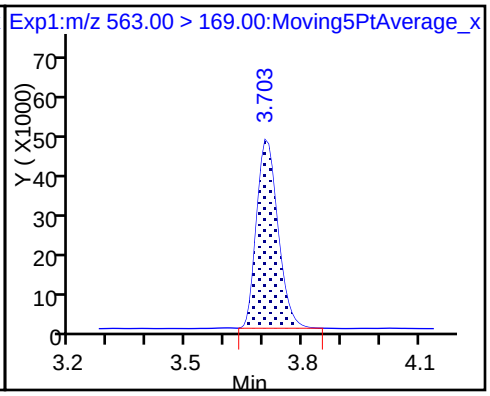
D 32 d5-NEtFOSAA



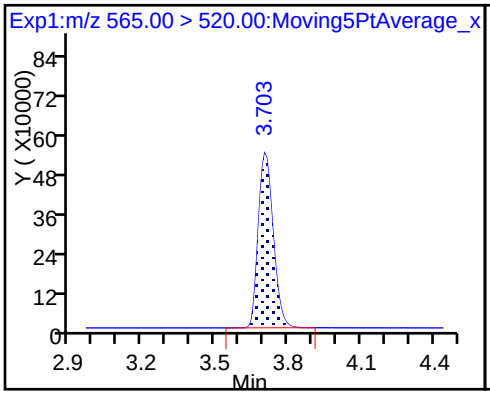
31 Perfluoroundecanoic acid



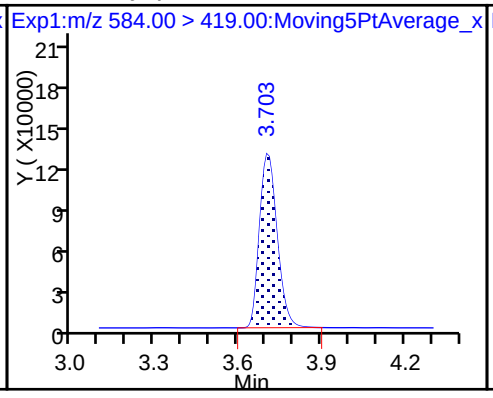
31 Perfluoroundecanoic acid



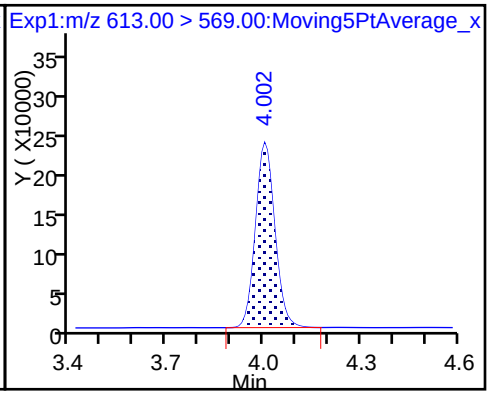
D 30 13C2 PFUnA



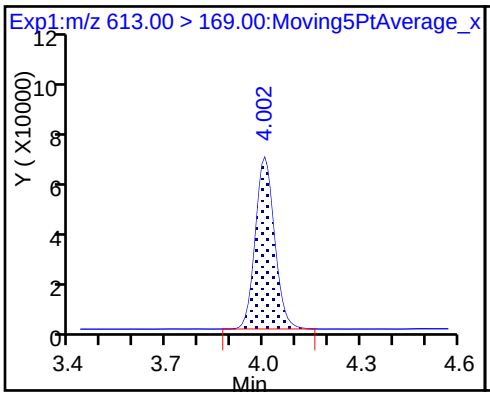
33 N-ethyl perfluorooctane sulfonamid



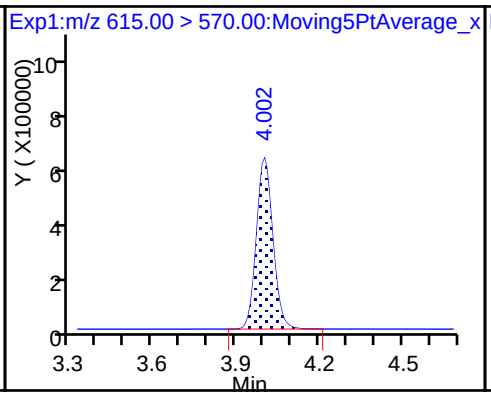
37 Perfluorododecanoic acid



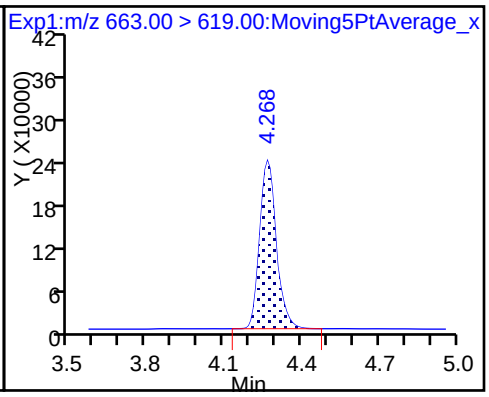
37 Perfluorododecanoic acid



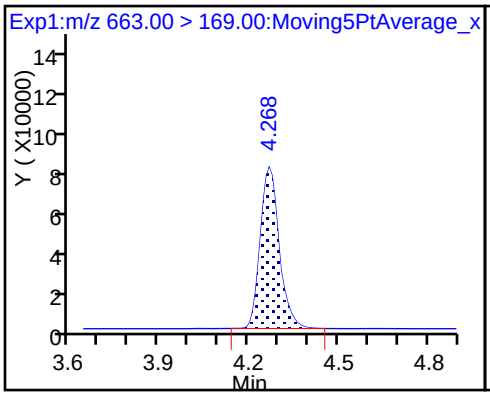
D 36 13C2 PFDoA



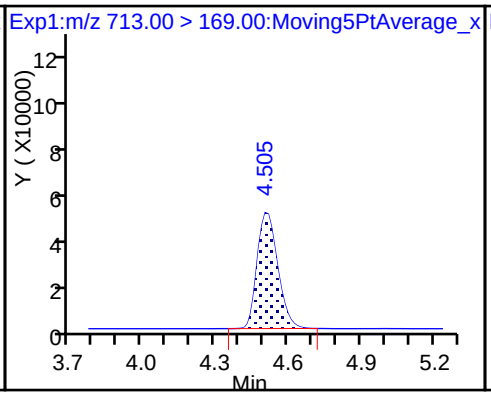
41 Perfluorotridecanoic acid



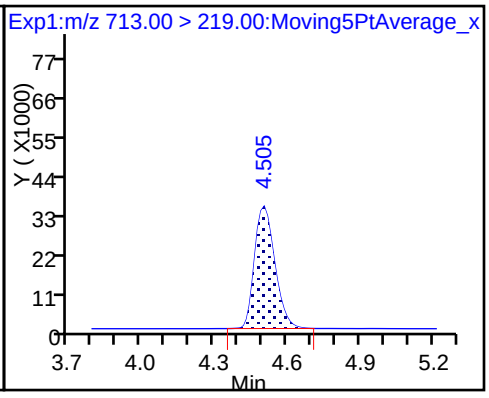
41 Perfluorotridecanoic acid



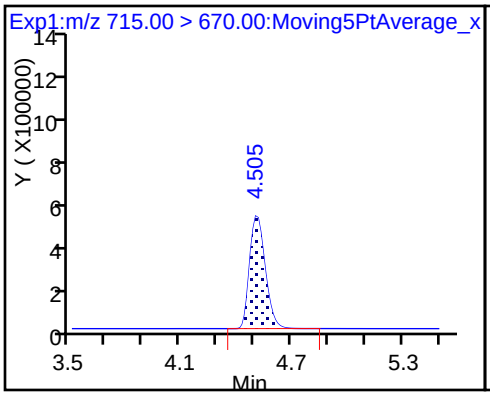
42 Perfluorotetradecanoic acid



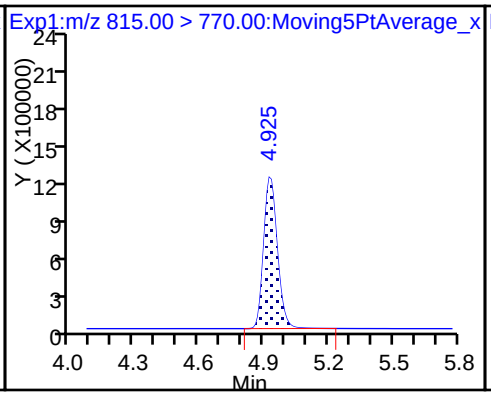
42 Perfluorotetradecanoic acid



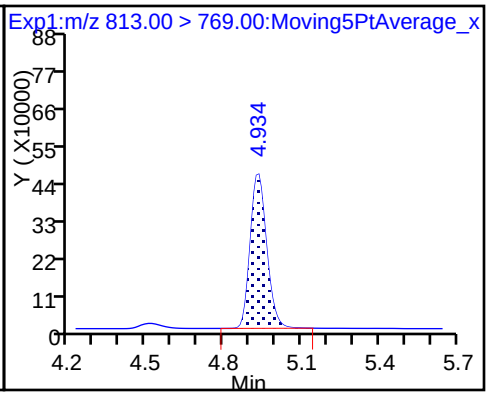
D 43 13C2-PFTeDA



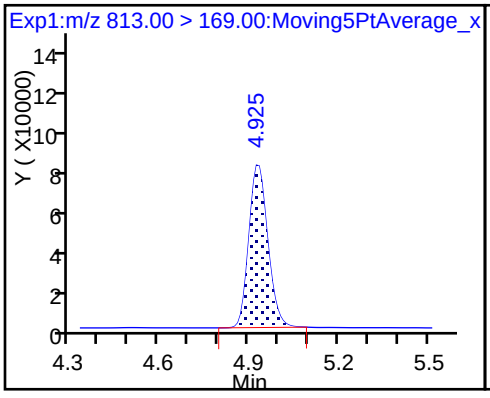
D 44 13C2-PFHxDA



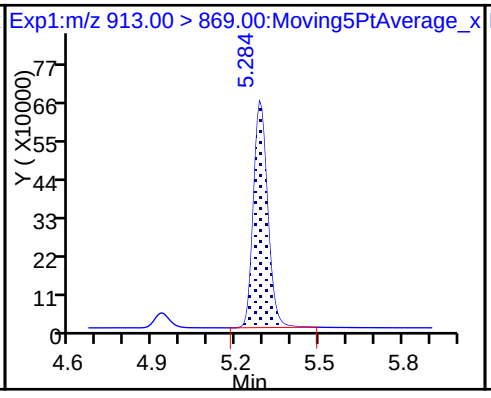
45 Perfluorohexadecanoic acid



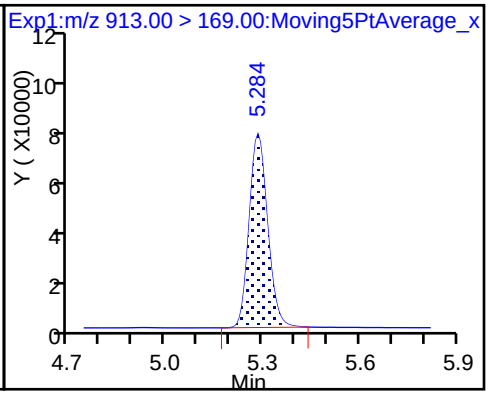
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-206109/4 Calibration Date: 01/29/2018 16:44

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.29LLAA_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	0.9343	0.9413		2.52	2.50	0.8	25.0
Perfluoropentanoic acid (PFPeA)	AveID	1.178	1.148		2.44	2.50	-2.6	25.0
Perfluorobutanesulfonic acid (PFBS)	AveID	77.21	78.91		2.26	2.21	2.2	25.0
4:2 FTS	AveID	13.89	16.06		2.70	2.34	15.6	25.0
Perfluorohexanoic acid (PFHxA)	AveID	1.036	0.996		2.40	2.50	-3.9	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	1.099	1.086		2.47	2.50	-1.2	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.113	1.102		2.25	2.28	-1.0	25.0
6:2FTS	AveID	1.655	1.863		2.67	2.37	12.6	25.0
Perfluorooctanoic acid (PFOA)	AveID	1.172	1.146		2.44	2.50	-2.2	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	AveID	1.354	1.441		2.53	2.38	6.4	25.0
Perfluorononanoic acid (PFNA)	AveID	1.032	1.062		2.57	2.50	2.9	25.0
Perfluorooctanesulfonic acid (PFOS)	AveID	1.119	1.147		2.38	2.32	2.5	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	0.9823	1.029		2.62	2.50	4.8	25.0
8:2FTS	AveID	1.217	1.305		2.57	2.40	7.2	25.0
Perfluorodecanoic acid (PFDA)	AveID	0.9702	0.9726		2.51	2.50	0.2	25.0
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	AveID	1.080	1.092		2.53	2.50	1.0	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	0.6549	0.7024		2.58	2.41	7.3	25.0
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	AveID	0.9739	0.8813		2.26	2.50	-9.5	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.032	0.9026		2.19	2.50	-12.6	25.0
Perfluorododecanoic acid (PFDoA)	AveID	1.025	1.064		2.60	2.50	3.8	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.161	1.201		2.59	2.50	3.4	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.2440	0.2572		2.63	2.50	5.4	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		0.9661		2.53	2.50	1.2	25.0
Perfluoro-n-octadecanoic acid (PFODA)	AveID	1.054	1.152		2.73	2.50	9.4	25.0
13C4 PFBA	Ave	1.512	1.513		2.50	2.50	0.0	50.0
13C5-PFPeA	Ave	0.8956	0.8963		2.50	2.50	0.0	50.0
13C3-PFBS	Ave	0.0198	0.0205		2.41	2.33	3.5	50.0
13C2 PFHxA	Ave	0.9649	0.9674		2.51	2.50	0.3	50.0
13C4-PFHpA	Ave	0.9187	0.9115		2.48	2.50	-0.8	50.0
18O2 PFHxS	Ave	1.131	1.119		2.34	2.37	-1.0	50.0
M2-6:2FTS	Ave	0.1699	0.1884		2.63	2.38	10.9	50.0

FORM VII 537 (modified)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Lab Sample ID: CCV 320-206109/4 Calibration Date: 01/29/2018 16:44

Instrument ID: A8_N Calib Start Date: 01/17/2018 14:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 01/17/2018 15:06

Lab File ID: 2018.01.29LLAA_040.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
13C4 PFOA	Ave	0.9004	0.8845		2.46	2.50	-1.8	50.0
13C4 PFOS	Ave	0.7158	0.7392		2.47	2.39	3.3	50.0
13C5 PFNA	Ave	0.7300	0.7521		2.58	2.50	3.0	50.0
13C8 FOSA	Ave	1.007	1.036		2.57	2.50	2.9	50.0
M2-8:2FTS	Ave	0.1795	0.2015		2.69	2.40	12.2	50.0
13C2 PFDA	Ave	0.6306	0.6451		2.56	2.50	2.3	50.0
d3-NMeFOSAA	Ave	0.3147	0.3179		2.53	2.50	1.0	50.0
d5-NEtFOSAA	Ave	0.3182	0.3332		2.62	2.50	4.7	50.0
13C2 PFUnA	Ave	0.4783	0.4828		2.52	2.50	0.9	50.0
13C2 PFDoA	Ave	0.5192	0.5069		2.44	2.50	-2.4	50.0
13C2-PFTeDA	Ave	0.6785	0.6466		2.38	2.50	-4.7	50.0
13C2-PFHxDA	Ave	1.209	1.159		2.40	2.50	-4.2	50.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\2018.01.29LLAA_040.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 29-Jan-2018 16:44:31 ALS Bottle#: 14 Worklist Smp#: 4
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-A8_N*sub30

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 08:50:27 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 08:50:27

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	1.414	1.411	0.003	0.536	6878127	2.50		100	25093	
2 Perfluorobutyric acid										
212.90 > 169.00	1.414	1.413	0.001	1.000	6474272	2.52		101	777	
D 3 13C5-PFPeA										
267.90 > 223.00	1.663	1.659	0.004	0.630	4074149	2.50		100	45293	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.663	1.662	0.001	1.000	4676071	2.44		97.4	2764	
D 47 13C3-PFBS										
301.90 > 83.00	1.698	1.695	0.003	0.644	86716	2.41		103	2017	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.698	1.697	0.001	1.000	6504202	2.26		102	17888	
298.90 > 99.00	1.698	1.697	0.001	1.000	2678319		2.43(1.25-3.74)		9282	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.914	1.903	0.011	1.000	1398781	2.70		116	51197	
D 60 M2-4:2FTS										
329.00 > 81.00	1.914	1.903	0.011	0.725	597954	NC			4780	
D 7 13C2 PFHxA										
315.00 > 270.00	1.945	1.939	0.006	0.737	4397121	2.51		100	39297	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.945	1.939	0.006	1.000	4378784	2.40		96.1	9099	
313.00 > 119.00	1.945	1.939	0.006	1.000	406138		10.78(5.03-15.10)		7205	
D 9 13C4-PFHpA										
367.00 > 322.00	2.280	2.267	0.013	0.864	4143262	2.48		99.2	25170	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.280	2.268	0.012	1.000	4498964	2.47		98.8	6894	
363.00 > 169.00	2.280	2.268	0.012	1.000	1785070		2.52(1.13-3.40)		10145	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.293	2.280	0.013	1.000	5101184	2.25		99.0	3536	
399.00 > 99.00	2.293	2.280	0.013	1.000	1672638		3.05(1.50-4.49)		2287	
D 11 18O2 PFHxS										
403.00 > 84.00	2.293	2.282	0.011	0.869	4813079	2.34		99.0	26264	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.610	2.596	0.014	1.000	1512923	2.67		113	22715	
D 12 M2-6:2FTS										
429.00 > 81.00	2.610	2.597	0.013	0.989	813726	2.63		111	16430	
D 14 13C4 PFOA										
417.00 > 372.00	2.631	2.622	0.009	0.997	4020382	2.46		98.2	23739	
* 62 13C2-PFOA										
415.00 > 370.00	2.638	2.622	0.016		4545461	2.50			23980	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.638	2.623	0.015	1.003	4606542	2.44		97.8	2233	
413.00 > 169.00	2.638	2.623	0.015	1.003	2453218		1.88(0.84-2.52)		11321	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.645	2.629	0.016	1.000	4608780	2.53		106	32336	
449.00 > 99.00	2.645	2.629	0.016	1.000	1247849		3.69(1.94-5.82)		8490	
D 19 13C5 PFNA										
468.00 > 423.00	3.010	2.992	0.018	1.141	3418782	2.58		103	24631	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.010	2.992	0.018	1.000	3577506	2.38		102	7111	
499.00 > 99.00	3.010	2.992	0.018	1.000	797017		4.49(2.31-6.93)		4392	
D 18 13C4 PFOS										
503.00 > 80.00	3.010	2.992	0.018	1.141	3212266	2.47		103	17200	
20 Perfluorononanoic acid										
463.00 > 419.00	3.010	2.992	0.018	1.000	3631392	2.57		103	8085	
463.00 > 169.00	3.010	2.992	0.018	1.000	846062		4.29(1.90-5.69)		12586	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.342	3.338	0.004	1.000	4844880	2.62		105	17399	
D 21 13C8 FOSA										
506.00 > 78.00	3.342	3.338	0.004	1.267	4707376	2.57		103	23361	
D 26 M2-8:2FTS										
529.00 > 81.00	3.357	3.342	0.015	1.272	877299	2.69		112	12232	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.357	3.342	0.015	1.000	1144699	2.57		107	21487	
D 23 13C2 PFDA										
515.00 > 470.00	3.372	3.352	0.020	1.278	2932189	2.56		102	20813	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.372	3.353	0.019	1.000	2851948	2.51		100	9826	
513.00 > 169.00	3.372	3.353	0.019	1.000	500373		5.70(2.36-7.09)		1583	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.524	3.507	0.017	1.336	1444767	2.53		101	13485	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.531	3.513	0.018	1.002	1576999	2.53		101	8013	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.682	3.666	0.016	1.000	2275120	2.58		107	25454	
599.00 > 99.00	3.682	3.666	0.016	1.000	734249		3.10(1.39-4.16)		9426	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.690	3.672	0.018	1.399	1514352	2.62		105	7059	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.699	3.678	0.021	1.000	1980764	2.19		87.4	6872	
563.00 > 169.00	3.699	3.678	0.021	1.000	478501		4.14(0.00-0.00)		12804	
D 30 13C2 PFUnA										
565.00 > 520.00	3.699	3.679	0.020	1.402	2194476	2.52		101	24713	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.699	3.679	0.020	1.002	1334660	2.26		90.5	12350	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.991	3.979	0.012	1.000	2450712	2.60		104	8367	
613.00 > 169.00	3.991	3.979	0.012	1.000	618393		3.96(2.13-6.40)		14757	
D 36 13C2 PFDoA										
615.00 > 570.00	3.991	3.979	0.012	1.513	2303969	2.44		97.6	26160	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.263	4.242	0.021	1.000	2767511	2.59		103	8919	
663.00 > 169.00	4.263	4.242	0.021	1.000	899022		3.08(1.25-3.76)		25131	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.501	4.483	0.018	1.000	755819	2.63		105	13099	
713.00 > 219.00	4.487	4.483	0.004	0.997	515912		1.47(0.71-2.13)		8886	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.501	4.483	0.018	1.706	2938960	2.38		95.3	26748	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.923	4.902	0.021	1.866	5266235	2.40		95.8	18447	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.923	4.902	0.021	1.000	5087763	2.53		101	2608	
813.00 > 169.00	4.923	4.902	0.021	1.000	898051		5.67(2.86-8.58)		6616	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.282	5.255	0.027	1.000	6067489	2.73		109	1353	
913.00 > 169.00	5.282	5.255	0.027	1.000	752505		8.06(0.00-0.00)		2290	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC_LL5_00003 Amount Added: 1.00 Units: mL

Report Date: 30-Jan-2018 08:50:28 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b\2018.01.29LLAA_040.d

Injection Date: 29-Jan-2018 16:44:31 Instrument ID: A8_N

Lims ID: CCV L5

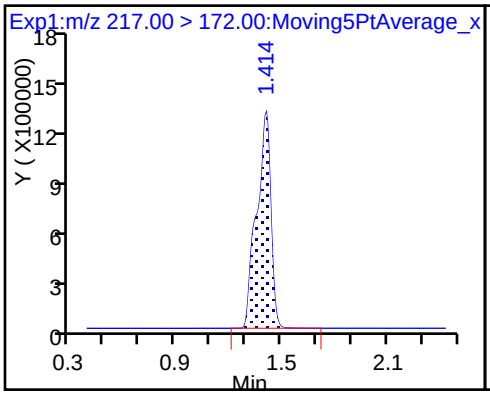
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 14 Worklist Smp#: 4

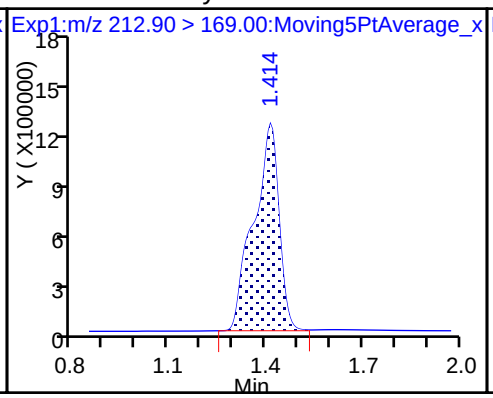
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

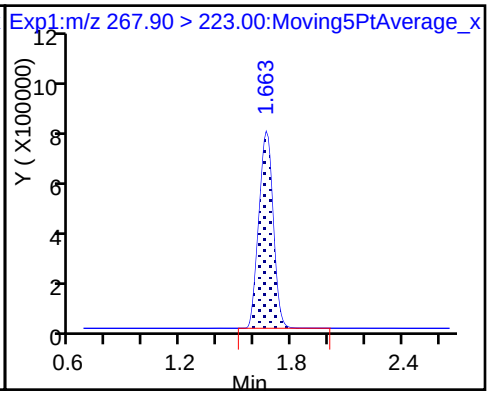
D 1 13C4 PFBA



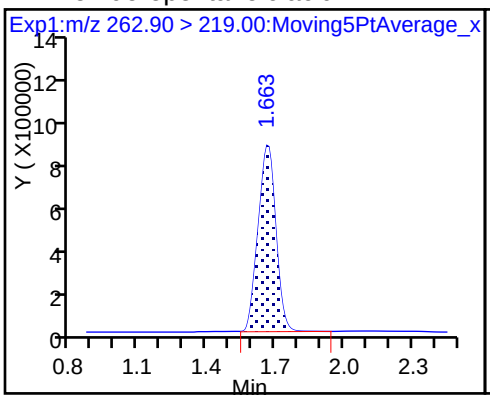
2 Perfluorobutyric acid



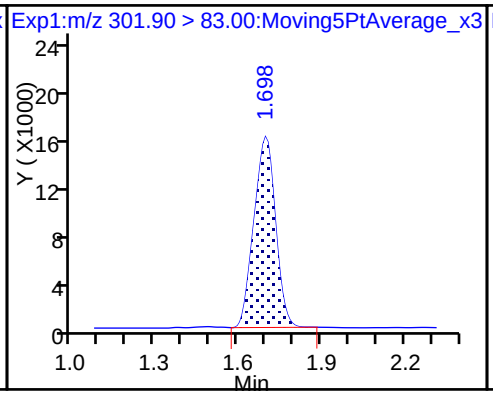
D 3 13C5-PFPeA



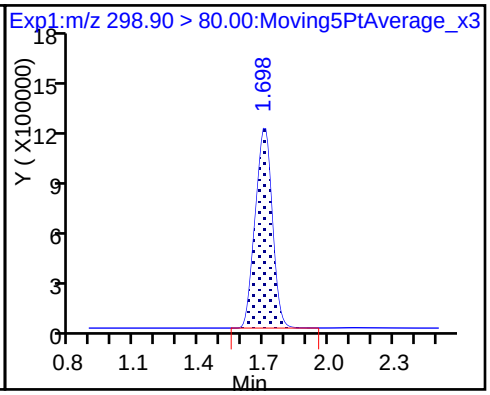
4 Perfluoropentanoic acid



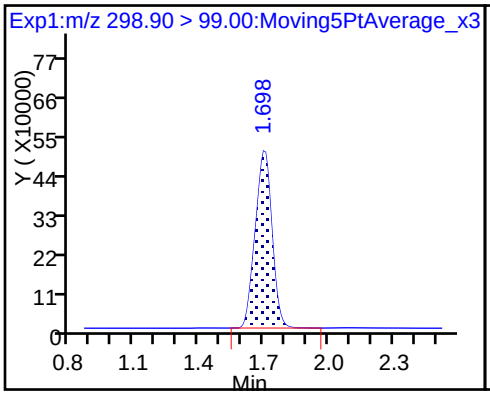
D 47 13C3-PFBS



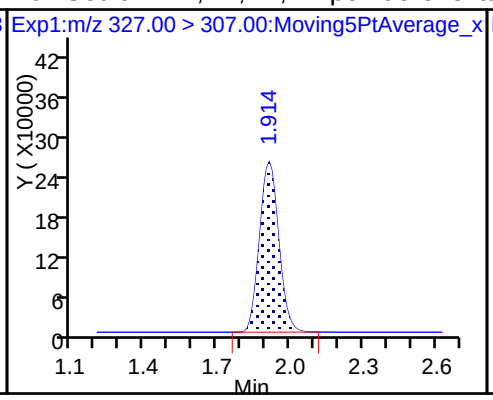
5 Perfluorobutanesulfonic acid



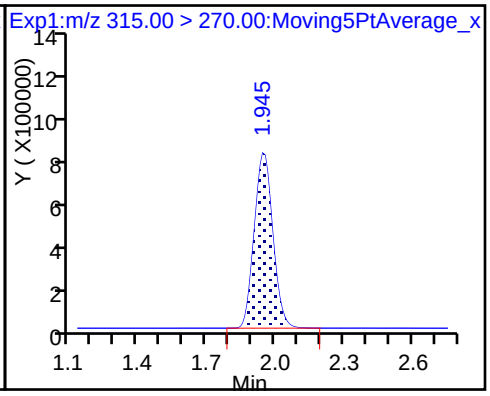
5 Perfluorobutanesulfonic acid



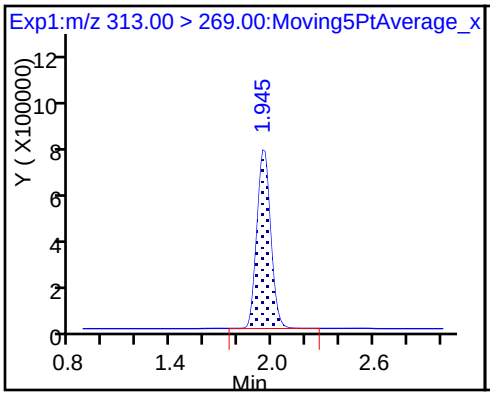
61 Sodium 1H,1H,2H,2H-perfluorohexa



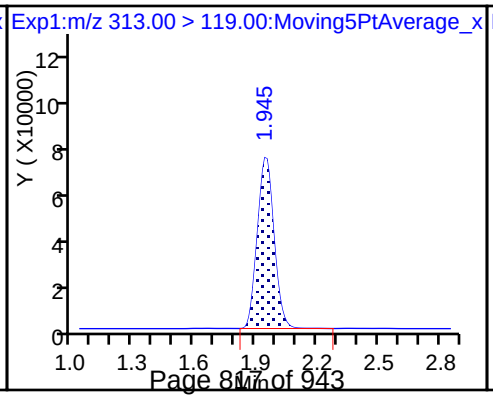
D 7 13C2 PFHxA



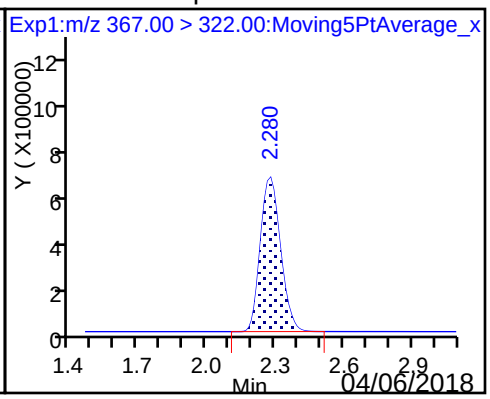
6 Perfluorohexanoic acid



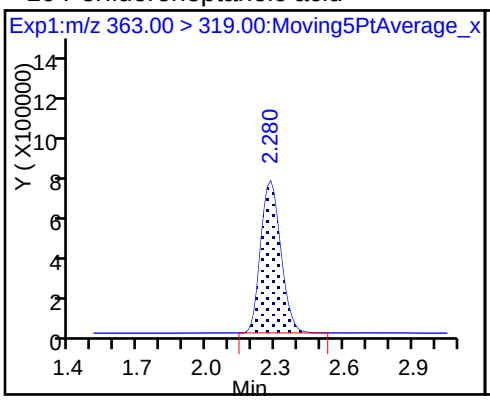
6 Perfluorohexanoic acid



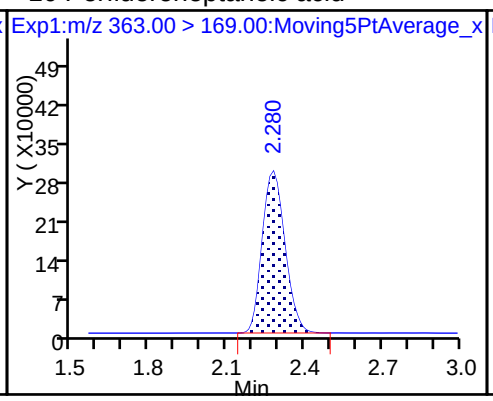
D 9 13C4-PFHpA



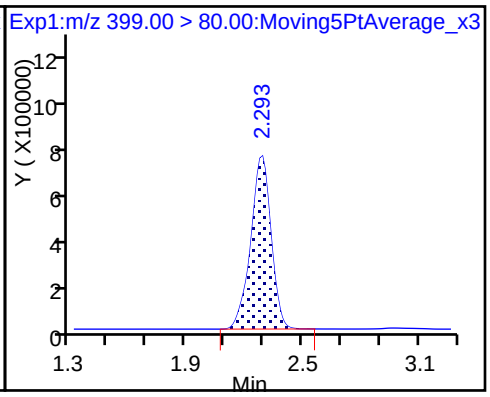
10 Perfluoroheptanoic acid



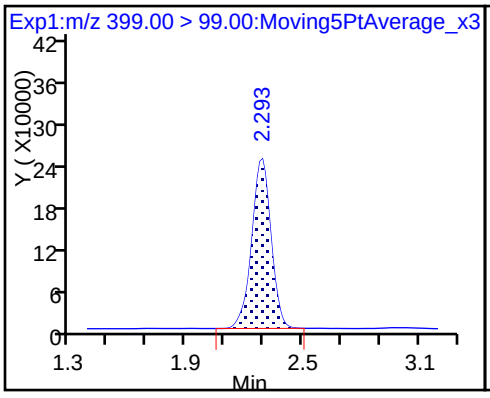
10 Perfluoroheptanoic acid



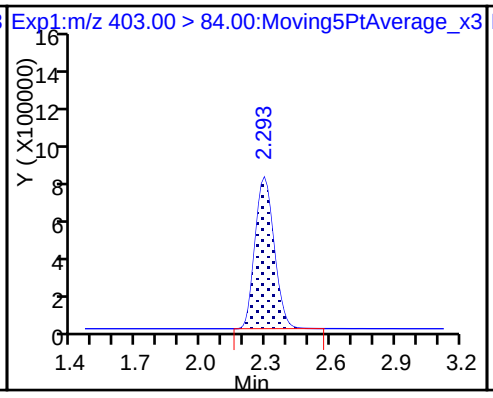
8 Perfluorohexanesulfonic acid



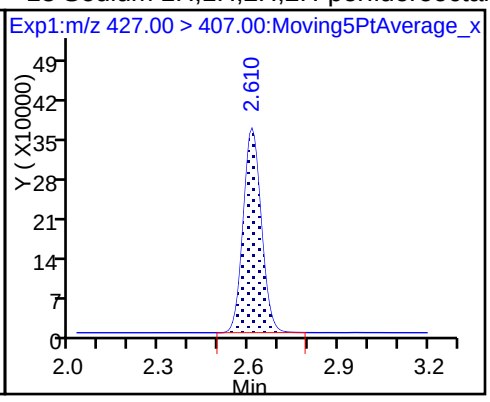
8 Perfluorohexanesulfonic acid



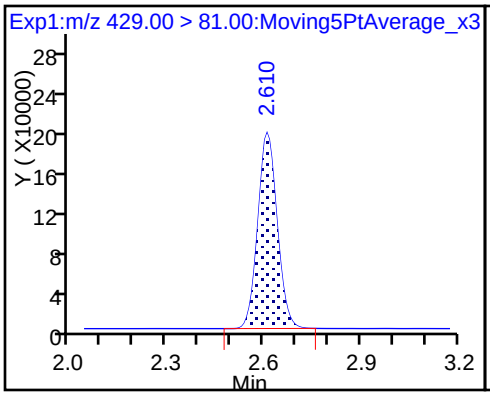
D 11 18O2 PFHxS



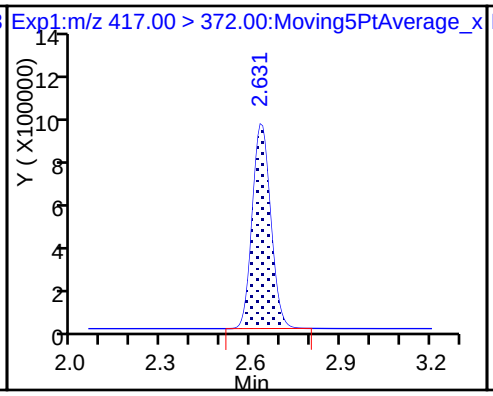
13 Sodium 1H,1H,2H,2H-perfluorooctane



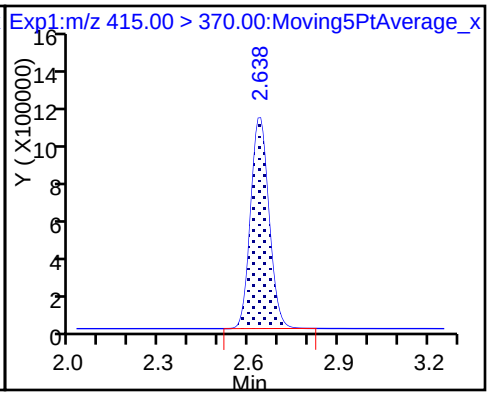
D 12 M2-6:2FTS



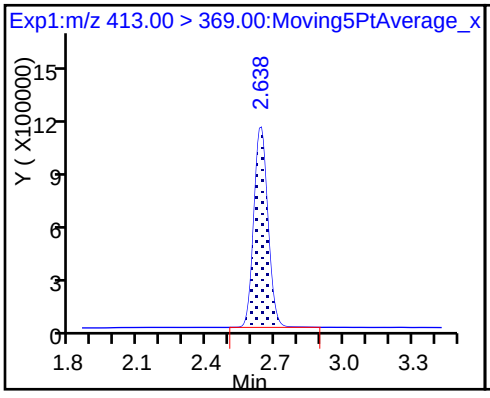
D 14 13C4 PFOA



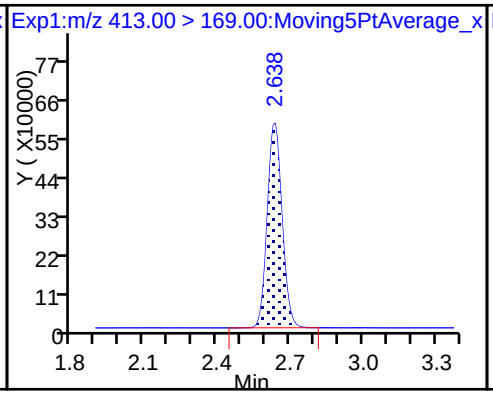
* 62 13C2-PFOA



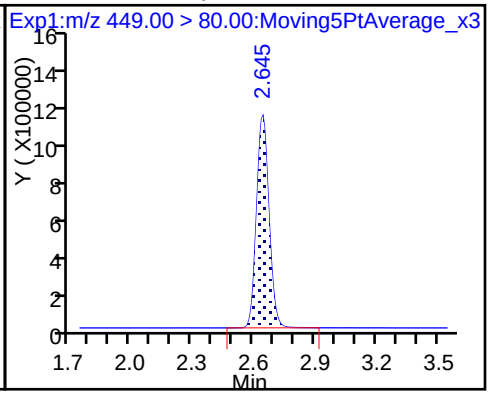
15 Perfluorooctanoic acid



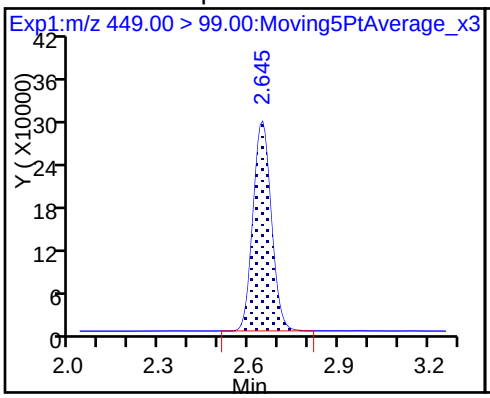
15 Perfluorooctanoic acid



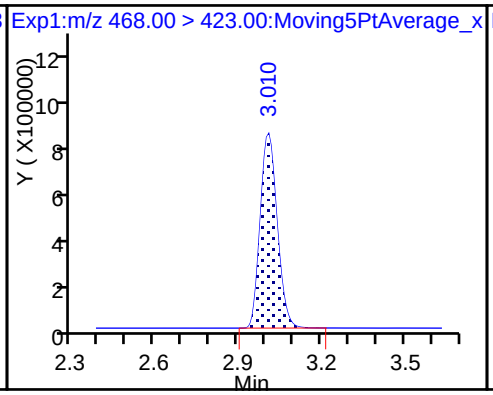
16 Perfluoroheptanesulfonic acid



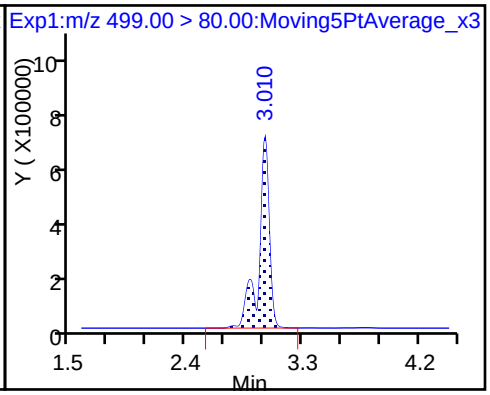
16 Perfluoroheptanesulfonic acid



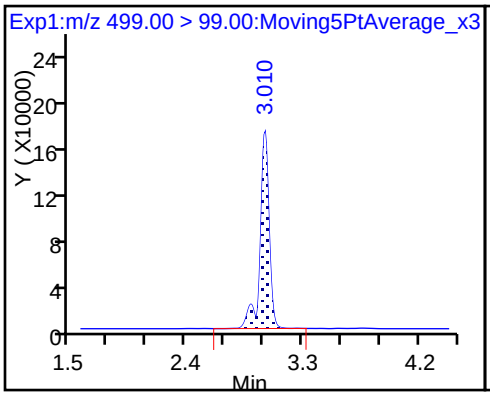
D 19 13C5 PFNA



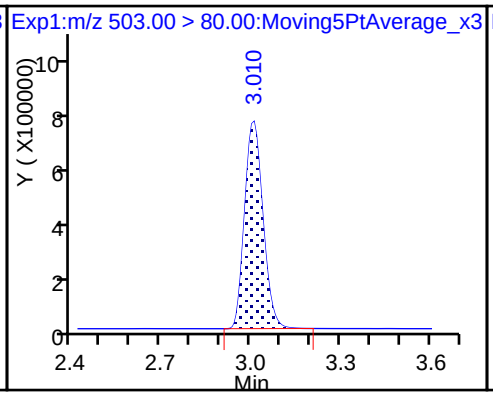
17 Perfluorooctane sulfonic acid



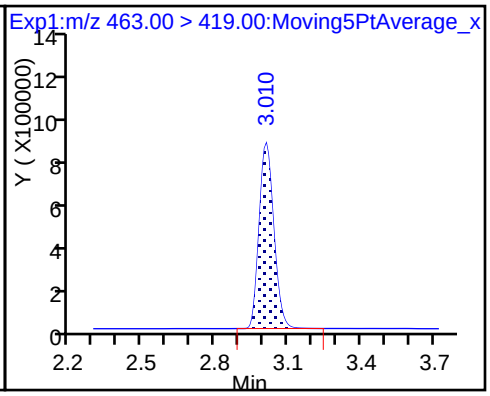
17 Perfluorooctane sulfonic acid



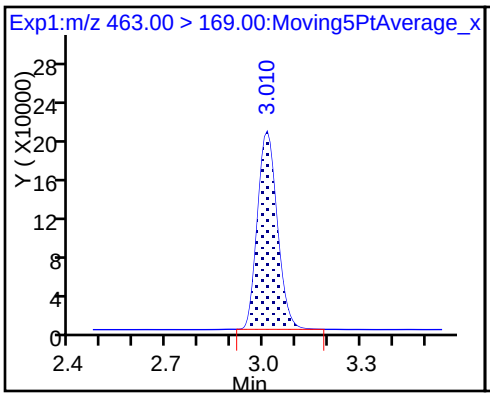
D 18 13C4 PFOS



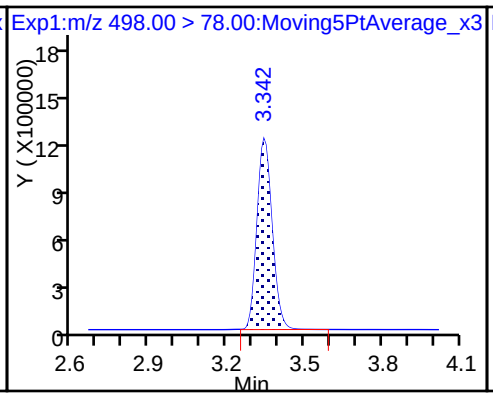
20 Perfluorononanoic acid



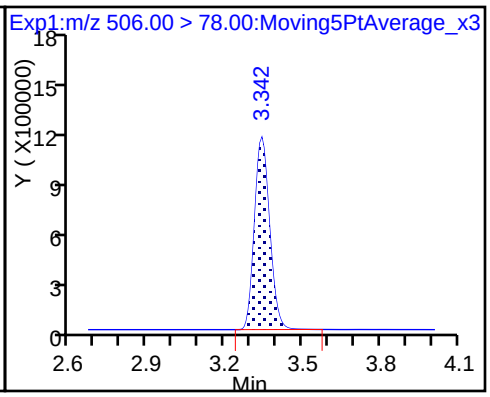
20 Perfluorononanoic acid



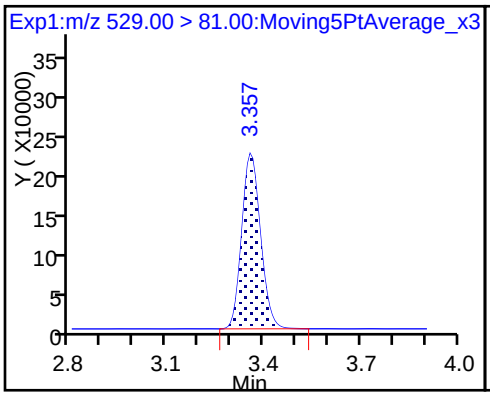
22 Perfluorooctane Sulfonamide



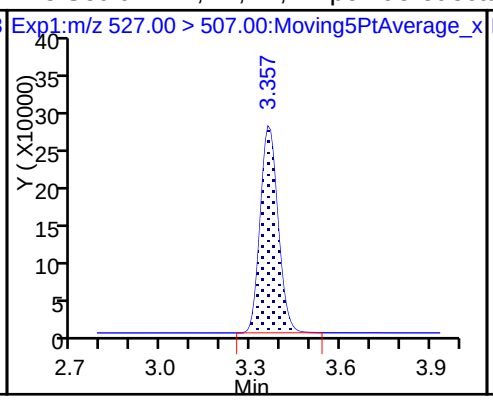
D 21 13C8 FOSA



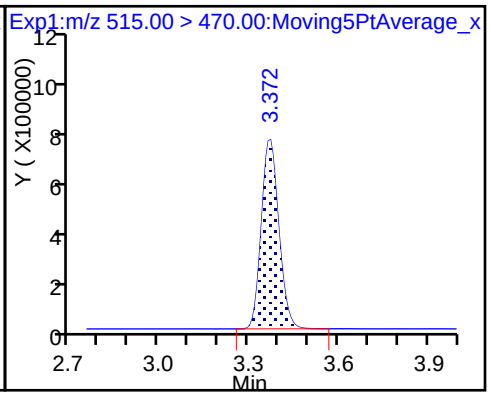
D 26 M2-8:2FTS



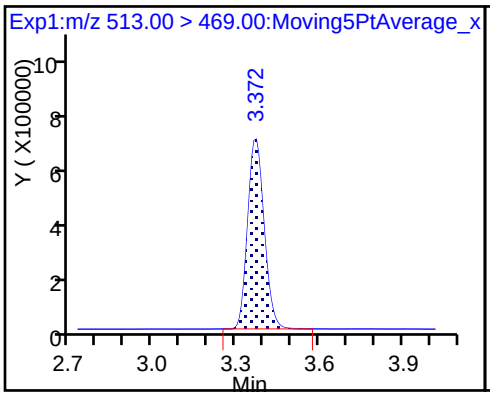
25 Sodium 1H,1H,2H,2H-perfluorodecane



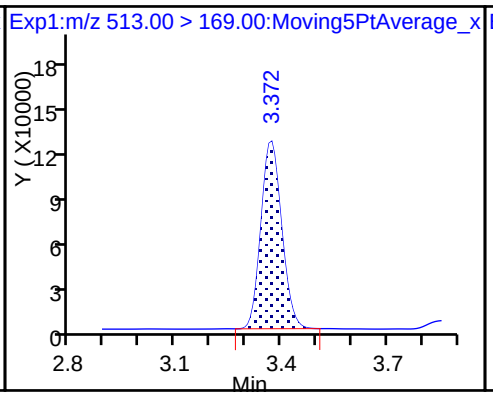
D 23 13C2 PFDA



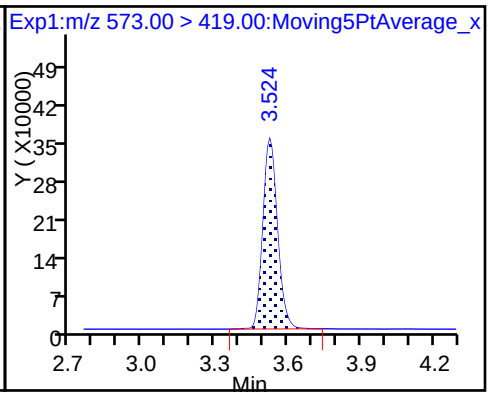
24 Perfluorodecanoic acid



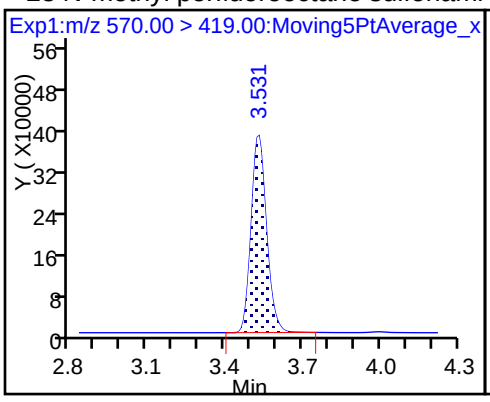
24 Perfluorodecanoic acid



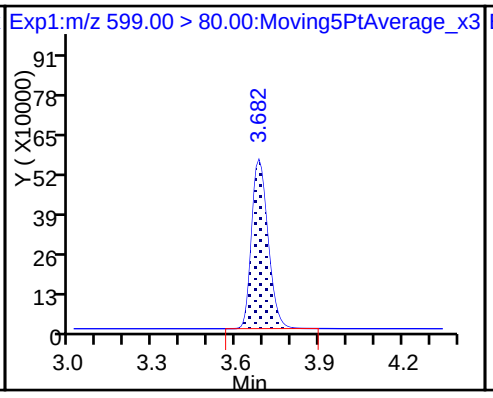
D 27 d3-NMeFOSAA



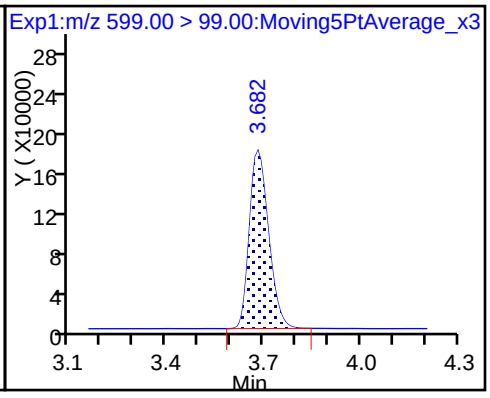
28 N-methyl perfluorooctane sulfonami



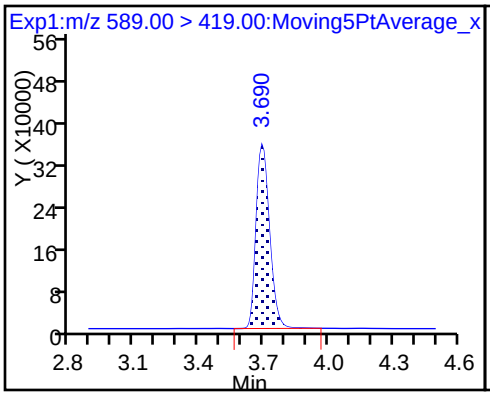
29 Perfluorodecane Sulfonic acid



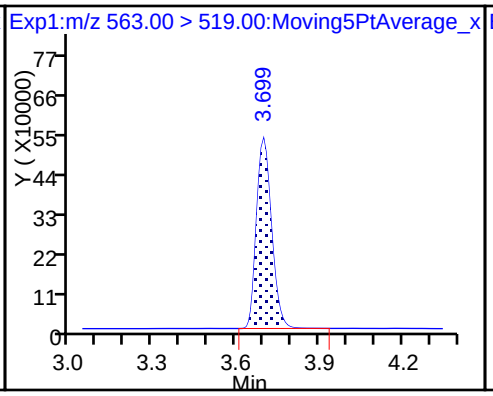
29 Perfluorodecane Sulfonic acid



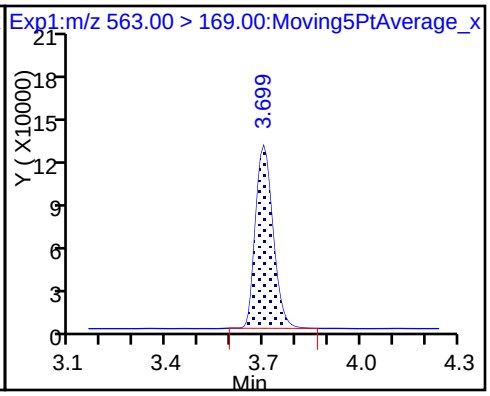
D 32 d5-NEtFOSAA



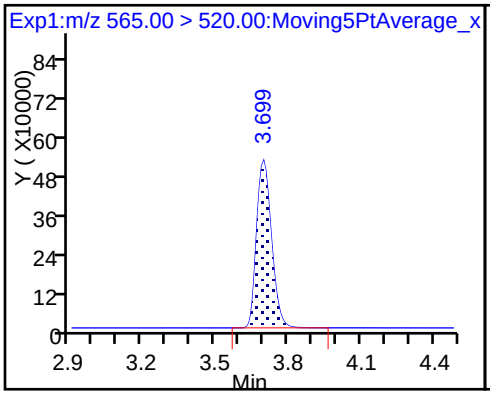
31 Perfluoroundecanoic acid



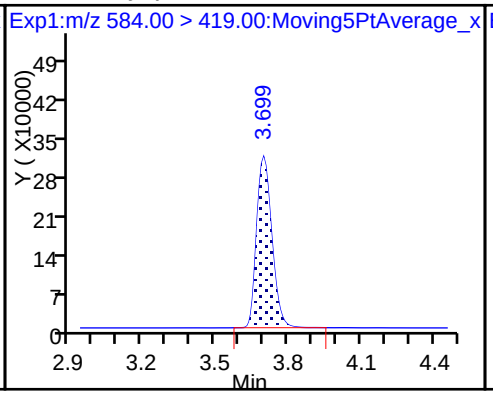
31 Perfluoroundecanoic acid



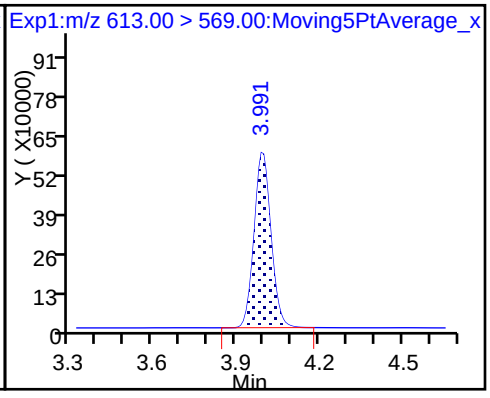
D 30 13C2 PFUnA



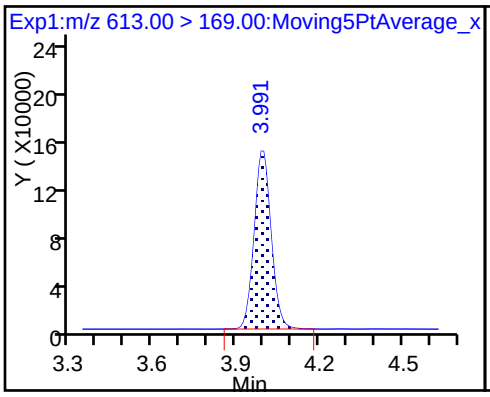
33 N-ethyl perfluorooctane sulfonamid



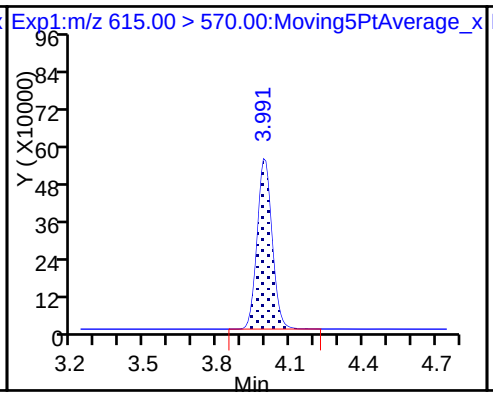
37 Perfluorododecanoic acid



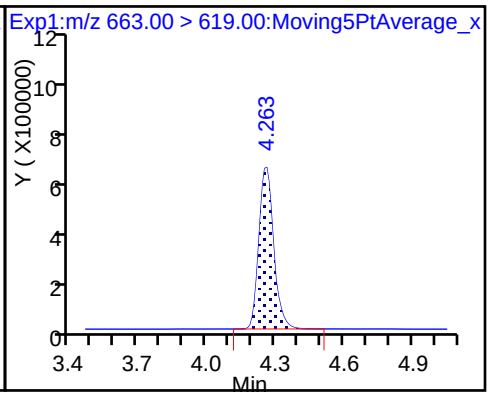
37 Perfluorododecanoic acid



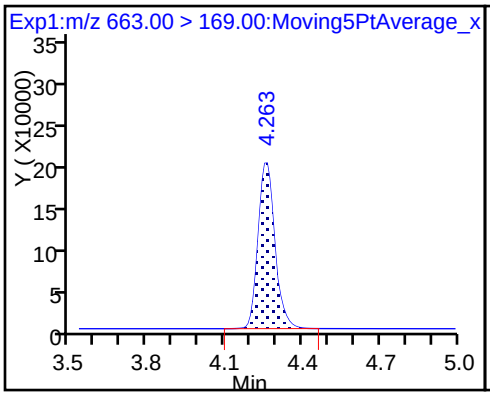
D 36 13C2 PFDoA



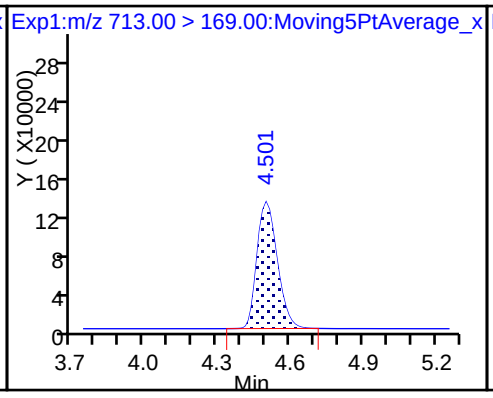
41 Perfluorotridecanoic acid



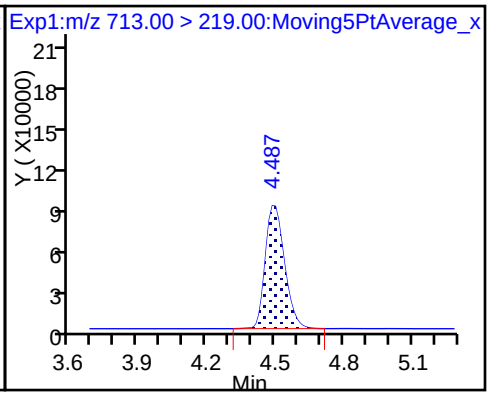
41 Perfluorotridecanoic acid



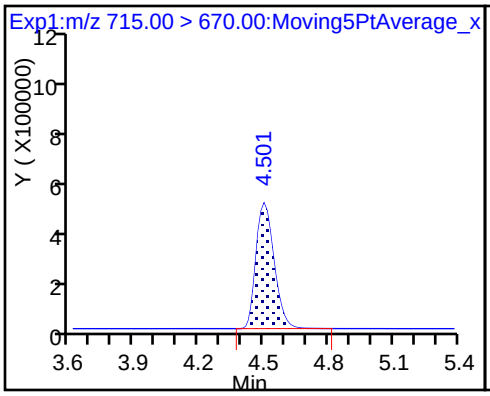
42 Perfluorotetradecanoic acid



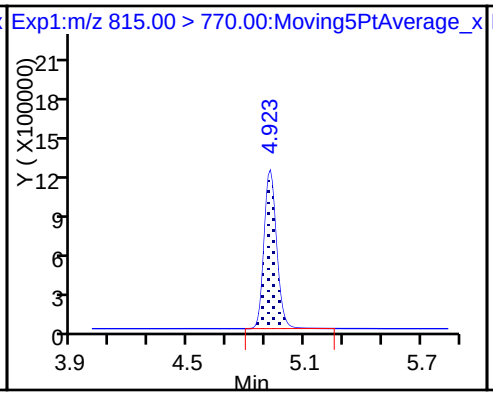
42 Perfluorotetradecanoic acid



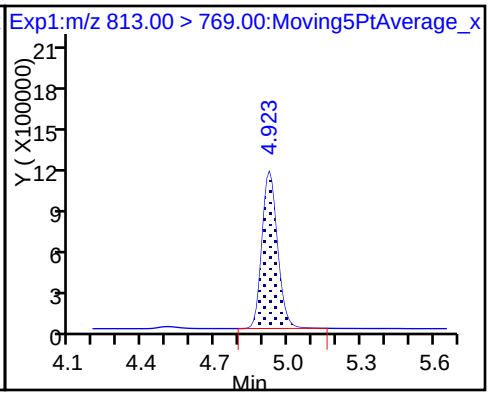
D 43 13C2-PFTeDA



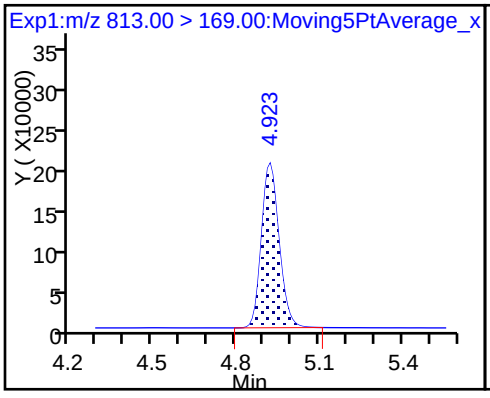
D 44 13C2-PFHxDA



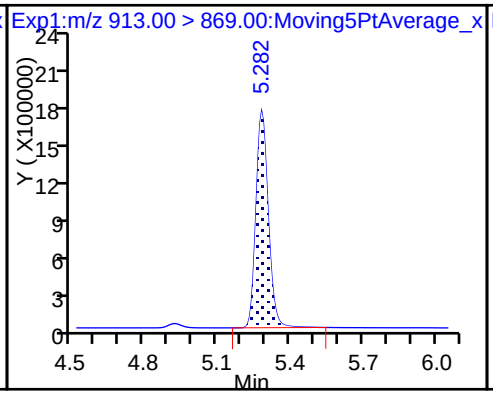
45 Perfluorohexadecanoic acid



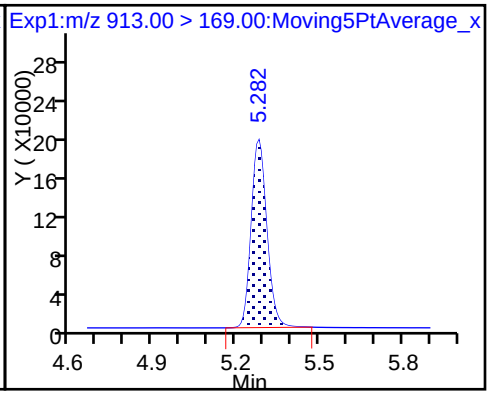
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-205514/1-A

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_034.d

Analysis Method: 537 (modified) | Date Collected:

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 250.00(mL) | Date Analyzed: 01/25/2018 21:56

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	1.0	0.46
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	1.0	0.38
375-85-9	Perfluoroheptanoic acid (PFHpA)	1.5	U	2.0	1.5	0.61
335-67-1	Perfluorooctanoic acid (PFOA)	1.5	U	2.0	1.5	0.54
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	3.0	U	4.0	3.0	1.1
375-95-1	Perfluorononanoic acid (PFNA)	1.5	U	2.0	1.5	0.52

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	110		25-150
STL01892	13C4-PFHpA	111		25-150
STL00990	13C4 PFOA	111		25-150
STL00991	13C4 PFOS	118		25-150
STL00995	13C5 PFNA	116		25-150
STL02337	13C3-PFBS	102		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_034.d
Lims ID: MB 320-205514/1-A
Client ID:
Sample Type: MB
Inject. Date: 25-Jan-2018 21:56:26 ALS Bottle#: 28 Worklist Smp#: 2
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-205514/1-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:30:46

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	1.407	1.411	-0.004	0.538	7454133	2.69		108	15025	M
2 Perfluorobutyric acid										M
212.90 > 169.00	1.407	1.413	-0.006	1.000	26319	0.009448			3.7	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.654	1.659	-0.005	0.632	4449981	2.71		109	52430	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.654	1.662	-0.008	1.000	6761	0.003224			4.6	
D 47 13C3-PFBS										
301.90 > 83.00	1.689	1.695	-0.006	0.646	86161	2.37		102	2431	
D 7 13C2 PFHxA										
315.00 > 270.00	1.934	1.939	-0.005	0.739	4869107	2.76		110	46868	
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.866	4674131	2.78		111	36663	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	17186	0.006800			164	
399.00 > 99.00	2.279	2.280	-0.001	1.000	6685		2.57(1.50-4.49)		37.4	
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.871	5368048	2.59		110	39964	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.596	0.0	1.000	9056	0.0131			215	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.992	990967	3.19		134	17887	
D 14 13C4 PFOA										
417.00 > 372.00	2.616	2.622	-0.006	1.000	4569850	2.77		111	36010	
* 62 13C2-PFOA										
415.00 > 370.00	2.616	2.622	-0.006		4575566	2.50			32401	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
15 Perfluorooctanoic acid										
413.00 > 369.00	2.616	2.623	-0.007	1.000	10904	0.005089			4.0	
413.00 > 169.00	2.623	2.623	0.0	1.003	5474		1.99(0.84-2.52)		50.9	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.144	3866667	2.89		116	35136	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.144	3683879	2.81		118	27602	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.332	3.338	-0.006	1.000	4583	0.002455			91.7	
D 21 13C8 FOSA										
506.00 > 78.00	3.332	3.338	-0.006	1.274	4750378	2.58		103	20874	
D 26 M2-8:2FTS										
529.00 > 81.00	3.340	3.342	-0.002	1.277	1183042	3.60		150	23112	
D 23 13C2 PFDA										
515.00 > 470.00	3.355	3.352	0.003	1.282	3405693	2.95		118	28374	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.507	3.507	0.0	1.340	1925990	3.34		134	13245	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.507	3.513	-0.006	1.000	5179	0.006223			36.2	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.672	-0.001	1.403	1925588	3.31		132	9100	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.671	3.678	-0.007	0.998	6795	0.006241			23.1	
563.00 > 169.00	3.680	3.678	0.002	1.000	1776		3.83(0.00-0.00)		100	
D 30 13C2 PFUnA										
565.00 > 520.00	3.680	3.679	0.001	1.406	2636928	3.01		120	32164	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.680	3.679	0.001	1.002	5961	0.007947			117	
35 MeFOSA										
512.00 > 169.00	3.835	3.875	-0.040		1643	NR			71.3	
D 36 13C2 PFDoA										
615.00 > 570.00	3.972	3.979	-0.007	1.518	2914325	3.07		123	29401	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.472	4.483	-0.011	1.709	3954435	3.18		127	26061	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.895	4.902	-0.007	1.871	6049595	2.73		109	20290	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.895	4.902	-0.007	1.000	57316	0.005647			39.1	
813.00 > 169.00	4.895	4.902	-0.007	1.000	11030		5.20(2.86-8.58)		192	

QC Flag Legend

Processing Flags

NR - Missing Quant Standard

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:22:36 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_034.d

Injection Date: 25-Jan-2018 21:56:26 Instrument ID: A8_N

Lims ID: MB 320-205514/1-A

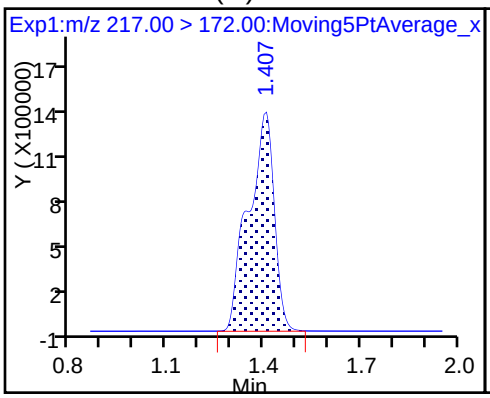
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 28 Worklist Smp#: 2

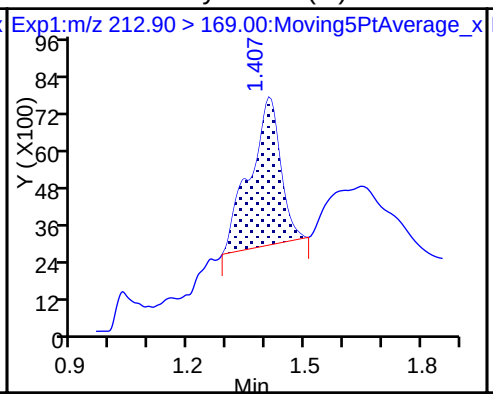
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

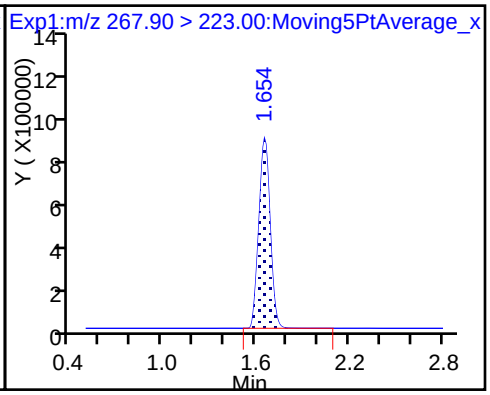
D 1 13C4 PFBA (M)



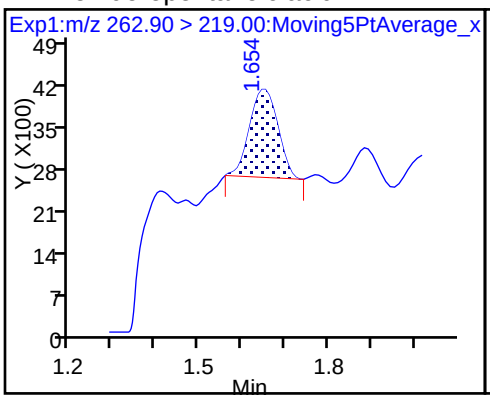
2 Perfluorobutyric acid (M)



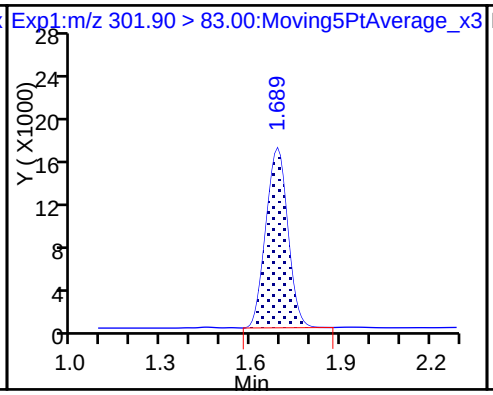
D 3 13C5-PFPeA



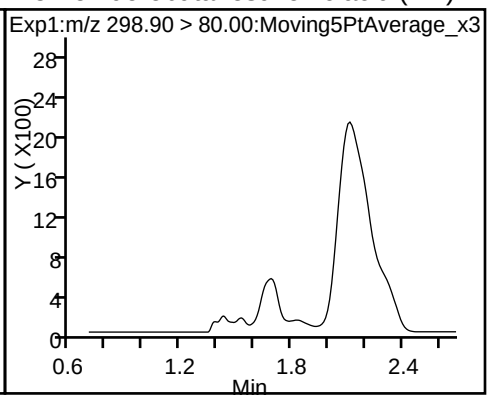
4 Perfluoropentanoic acid



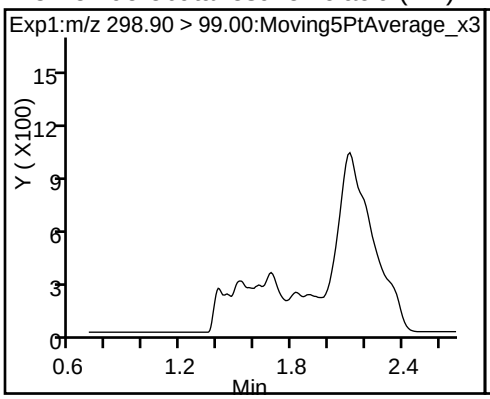
D 47 13C3-PFBS



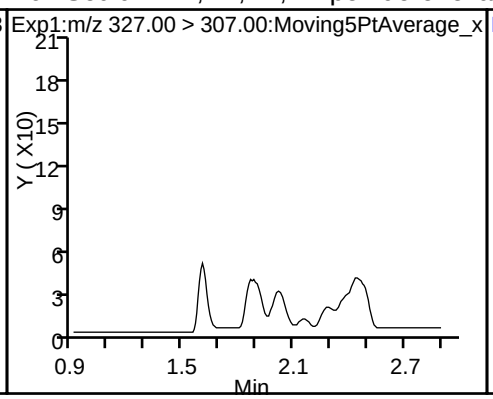
5 Perfluorobutanesulfonic acid (ND)



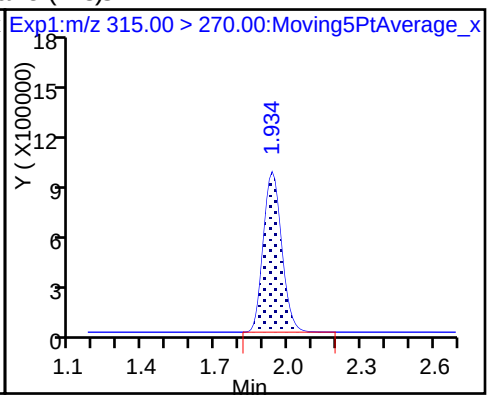
5 Perfluorobutanesulfonic acid (ND)



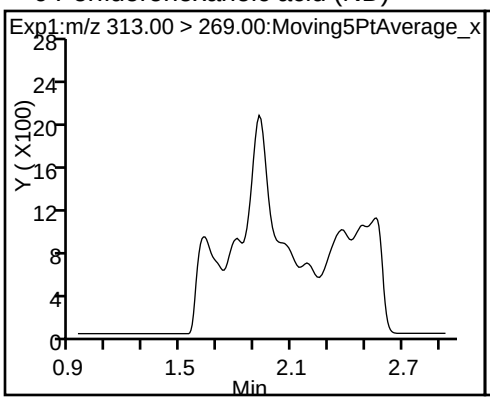
61 Sodium 1H,1H,2H,2H-perfluorohexane (ND)



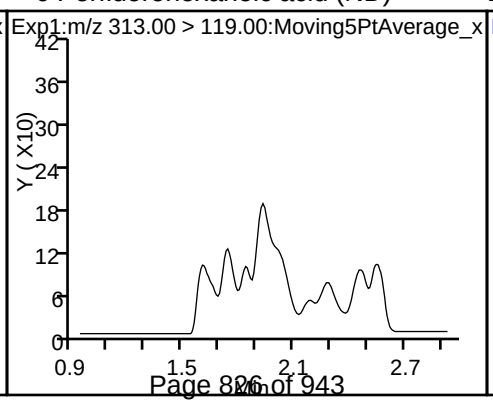
D 13C2 PFHxA



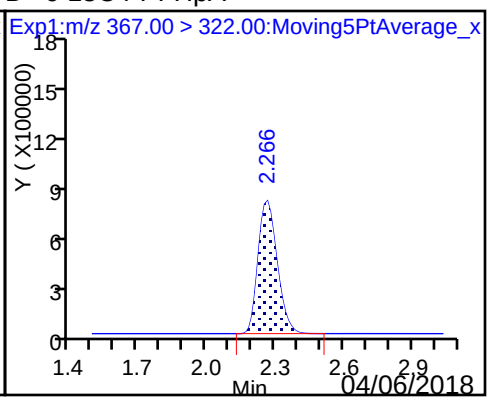
6 Perfluorohexanoic acid (ND)



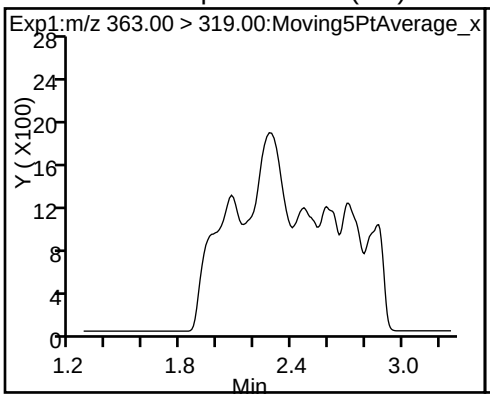
6 Perfluorohexanoic acid (ND)



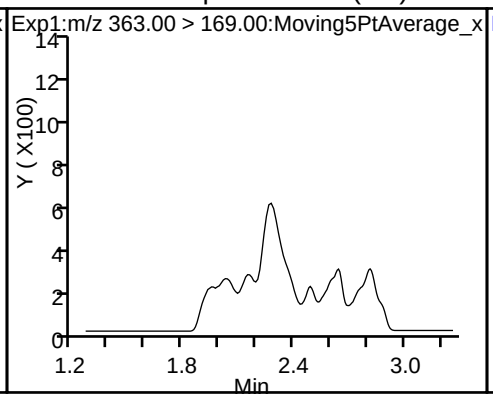
D 9 13C4-PFHpA



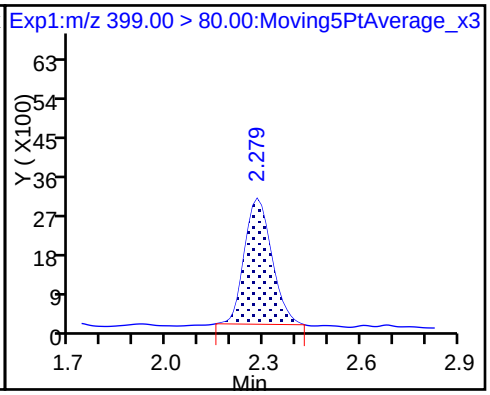
10 Perfluoroheptanoic acid (ND)



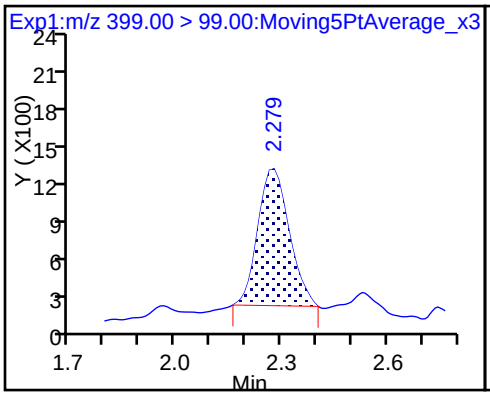
10 Perfluoroheptanoic acid (ND)



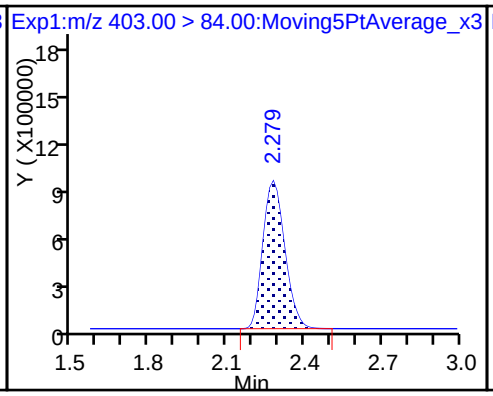
8 Perfluorohexanesulfonic acid



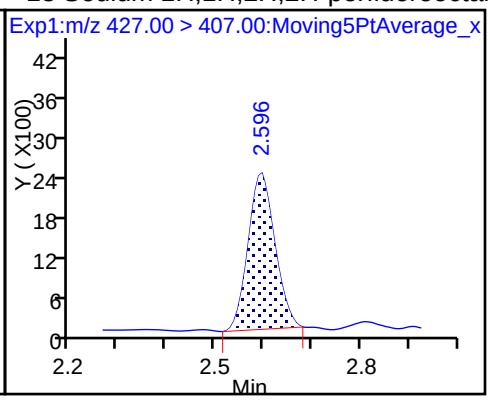
8 Perfluorohexanesulfonic acid



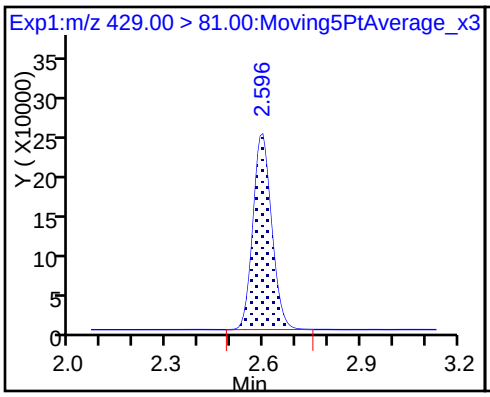
D 11 18O2 PFHxS



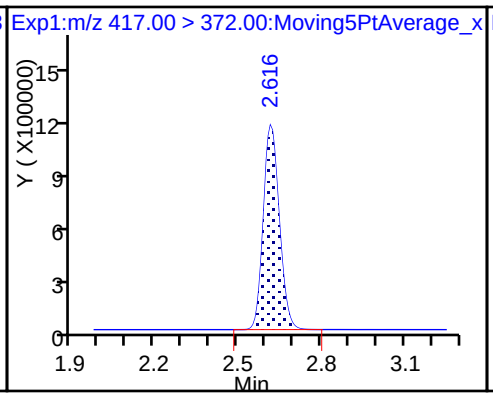
13 Sodium 1H,1H,2H,2H-perfluorooctane



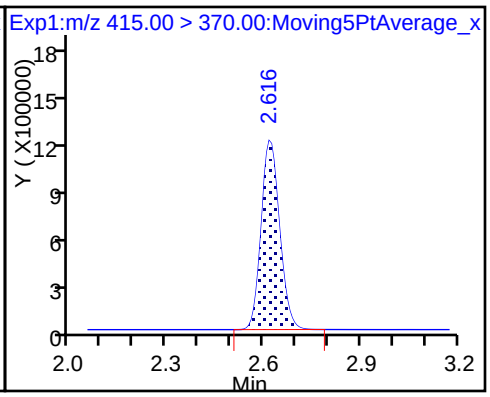
D 12 M2-6:2FTS



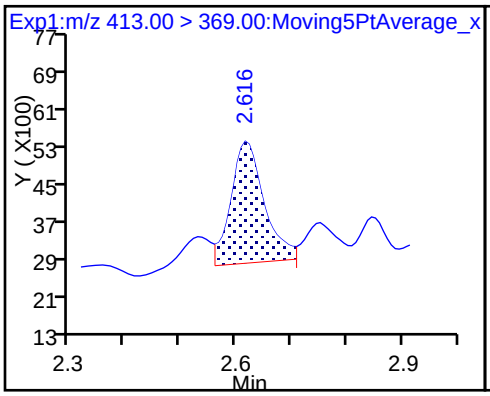
D 14 13C4 PFOA



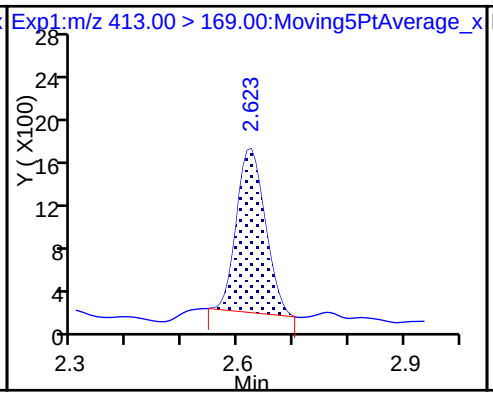
* 62 13C2-PFOA



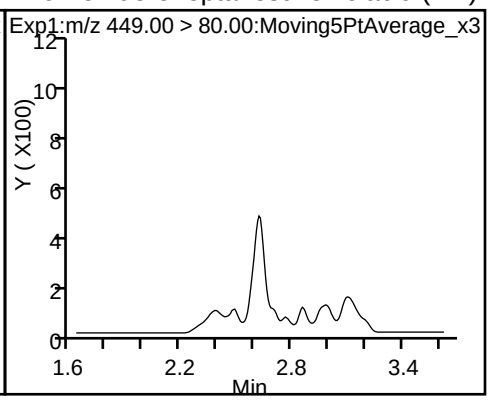
15 Perfluorooctanoic acid



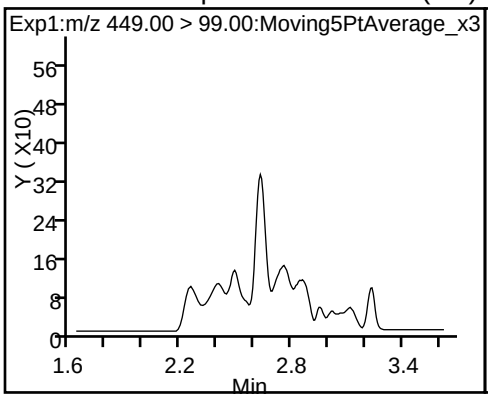
15 Perfluorooctanoic acid



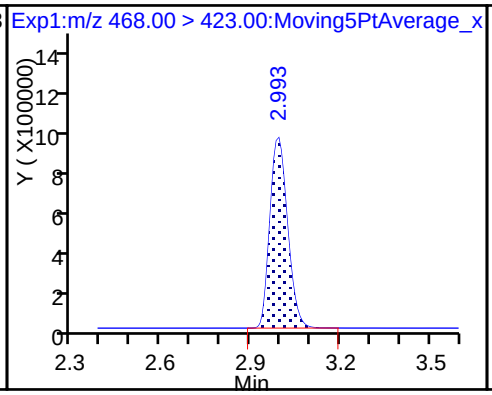
16 Perfluoroheptanesulfonic acid (ND)



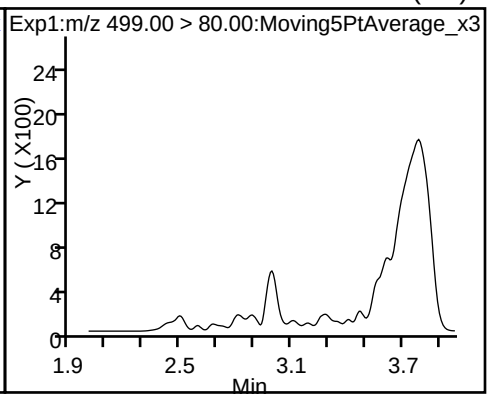
16 Perfluoroheptanesulfonic acid (ND)



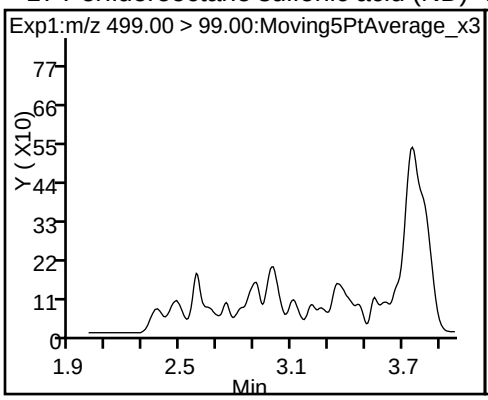
D 19 13C5 PFNA



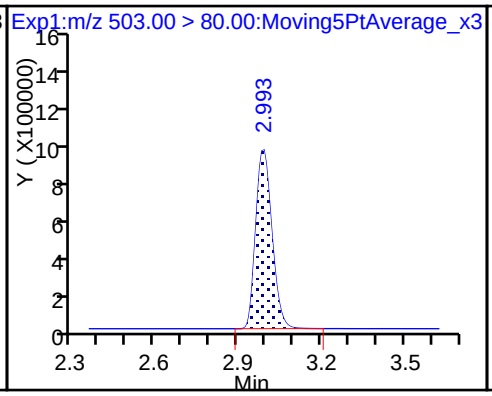
17 Perfluorooctane sulfonic acid (ND)



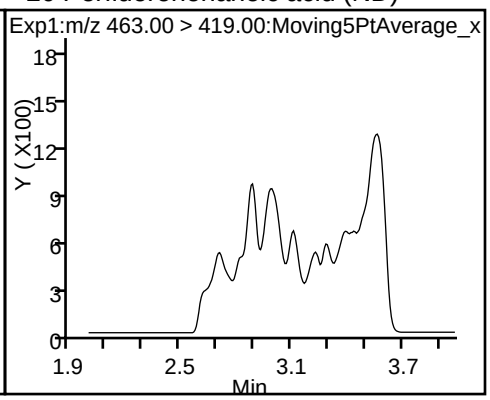
17 Perfluorooctane sulfonic acid (ND)



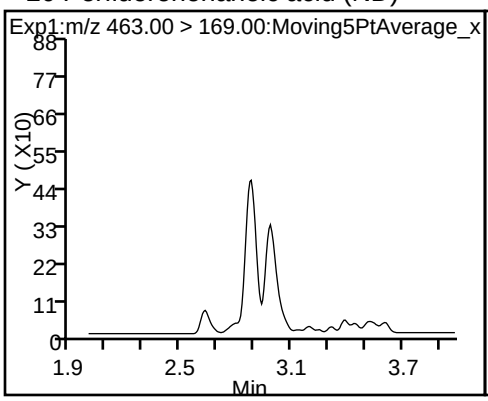
D 18 13C4 PFOS



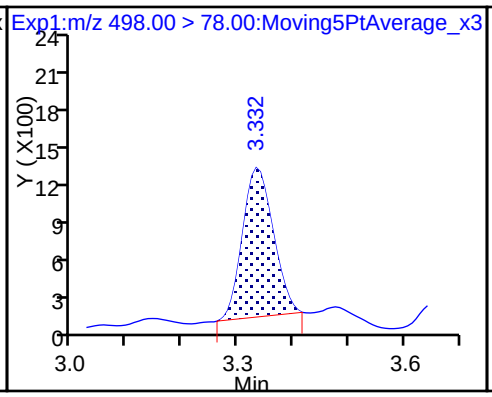
20 Perfluorononanoic acid (ND)



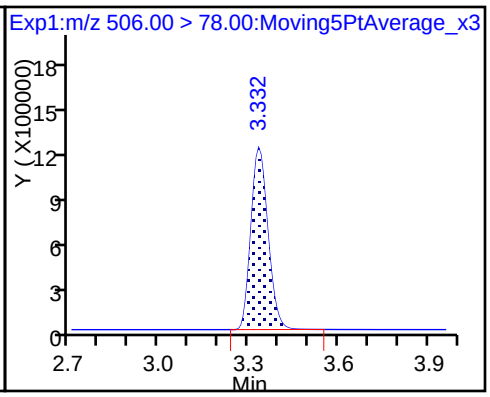
20 Perfluorononanoic acid (ND)



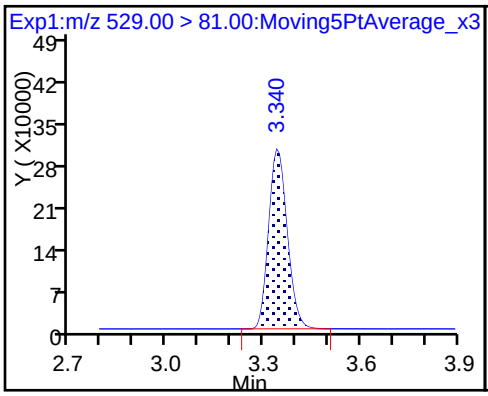
22 Perfluorooctane Sulfonamide



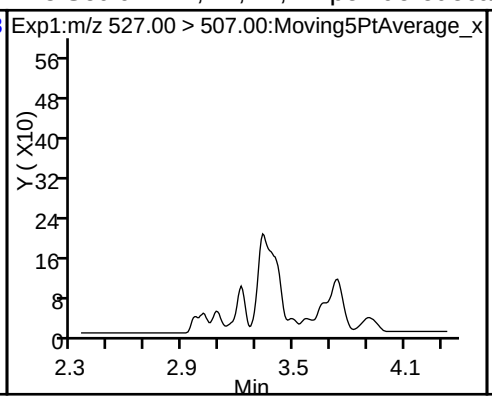
D 21 13C8 FOSA



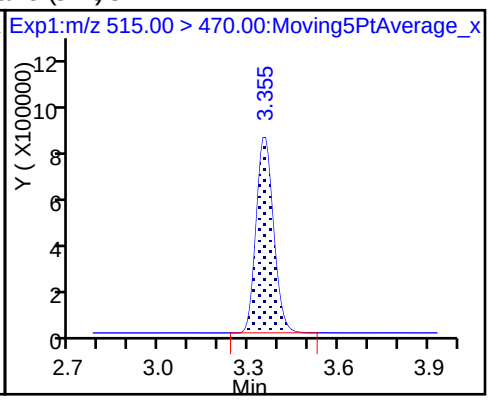
D 26 M2-8:2FTS



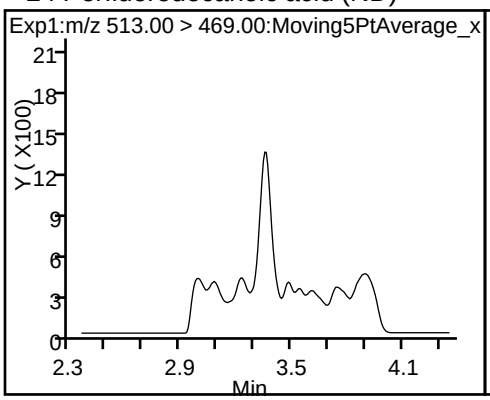
25 Sodium 1H,1H,2H,2H-perfluorodecane



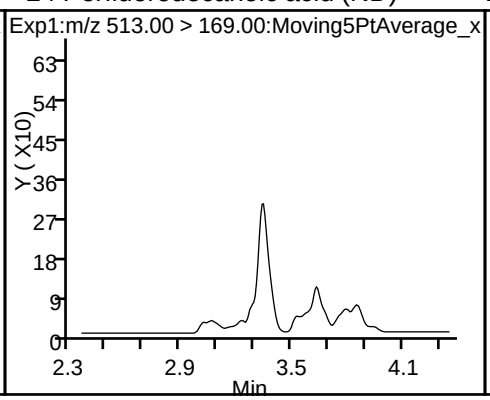
D 23 13C2 PFDA



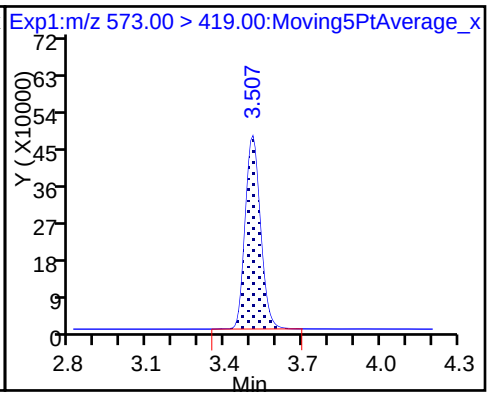
24 Perfluorodecanoic acid (ND)



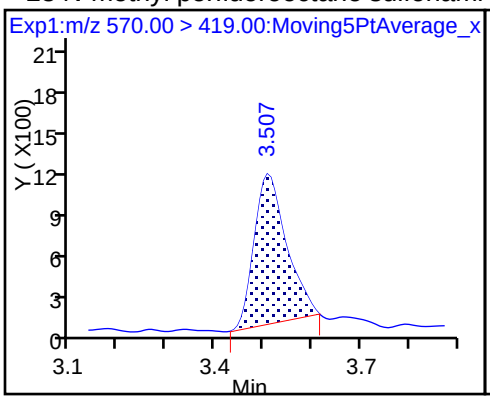
24 Perfluorodecanoic acid (ND)



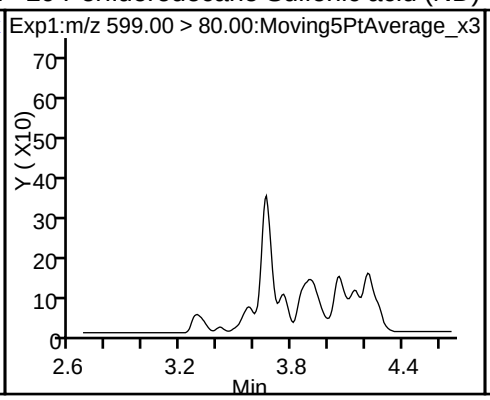
D 27 d3-NMeFOSAA



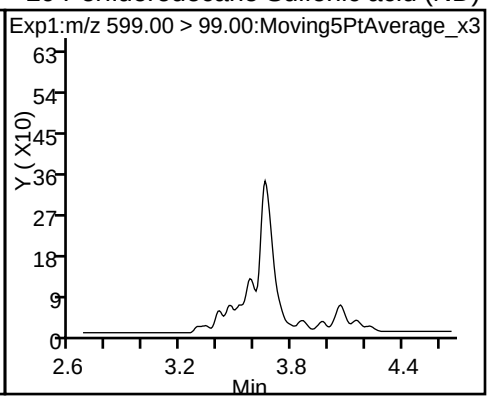
28 N-methyl perfluorooctane sulfonami



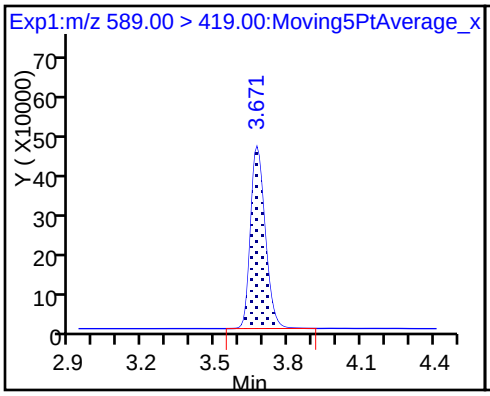
29 Perfluorodecane Sulfonic acid (ND)



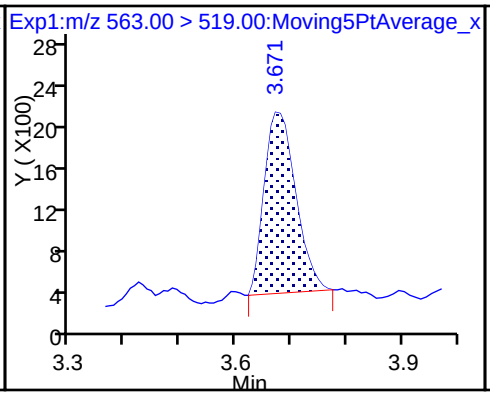
29 Perfluorodecane Sulfonic acid (ND)



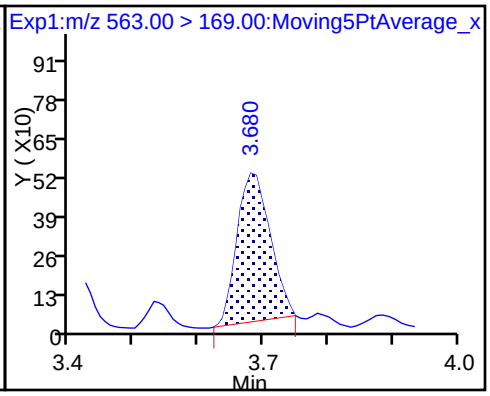
D 32 d5-NEtFOSAA



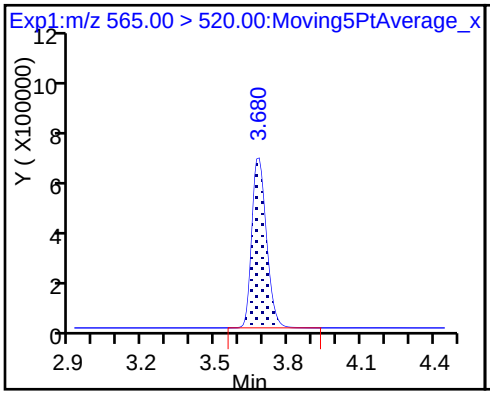
31 Perfluoroundecanoic acid



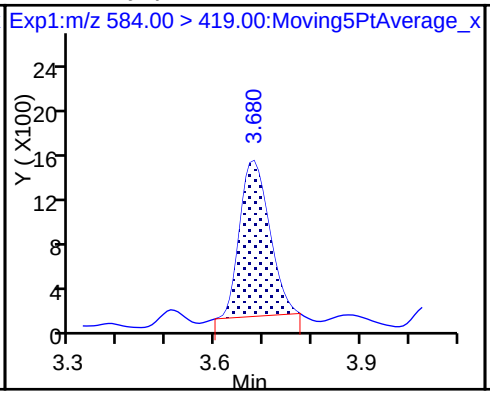
31 Perfluoroundecanoic acid



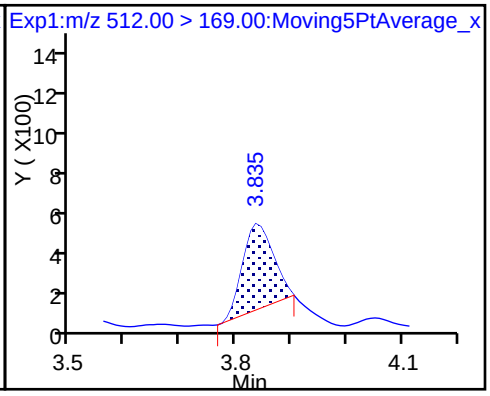
D 30 13C2 PFUnA



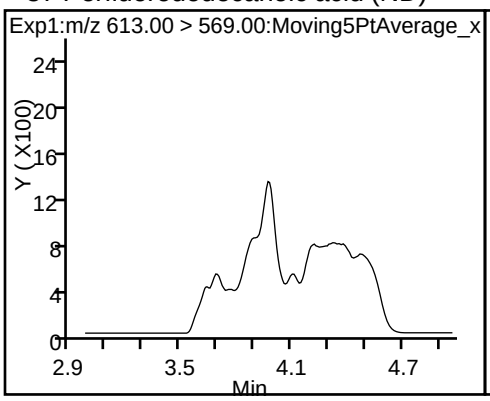
33 N-ethyl perfluorooctane sulfonamid



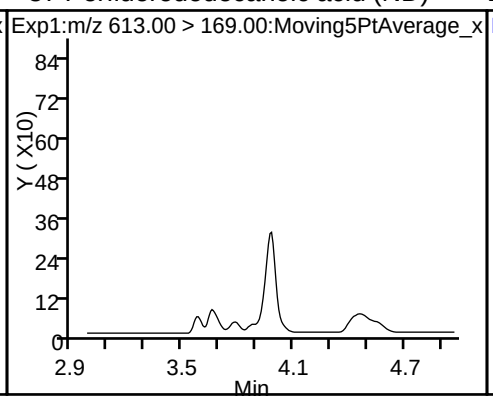
35 MeFOSA



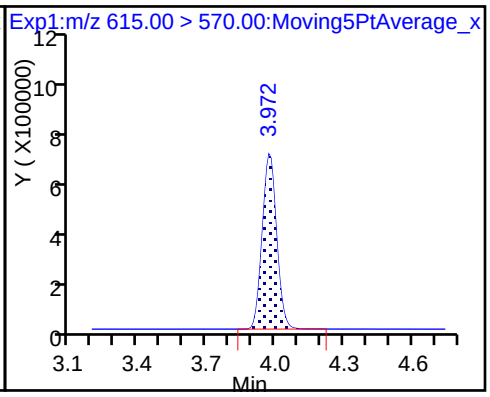
37 Perfluorododecanoic acid (ND)



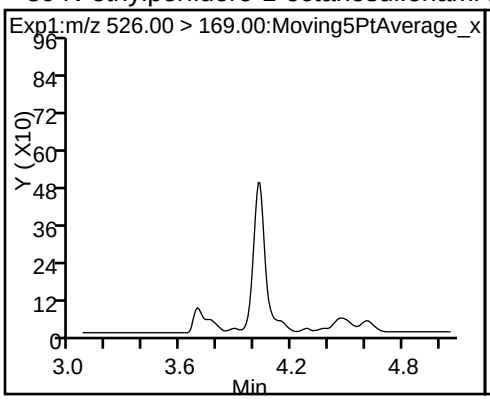
37 Perfluorododecanoic acid (ND)



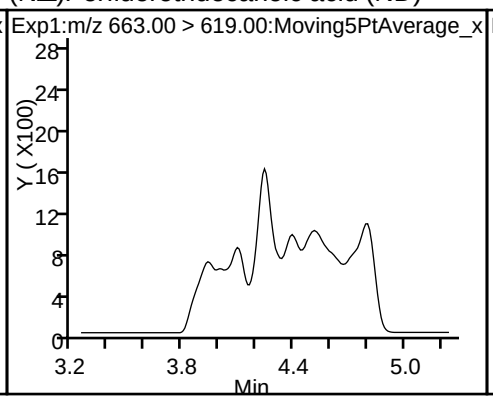
D 36 13C2 PFDoA



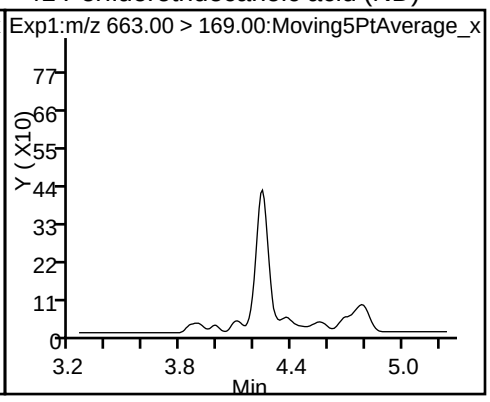
39 N-ethylperfluoro-1-octanesulfonami (ND)



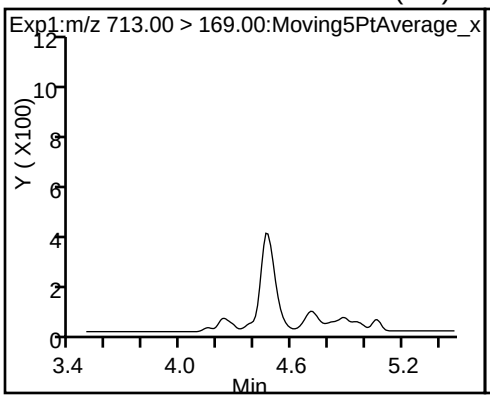
41 Perfluorotridecanoic acid (ND)



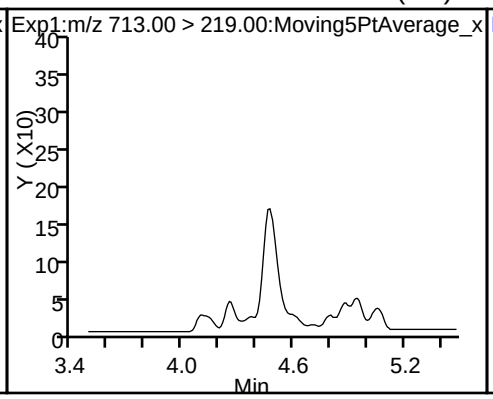
41 Perfluorotridecanoic acid (ND)



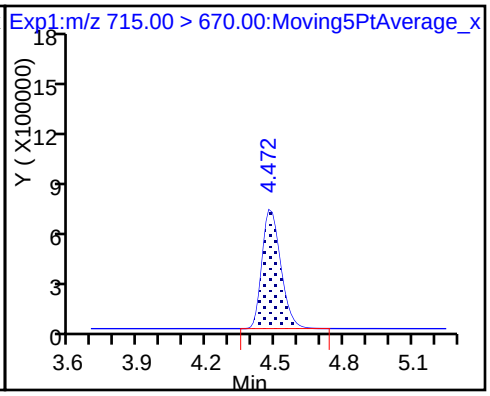
42 Perfluorotetradecanoic acid (ND)



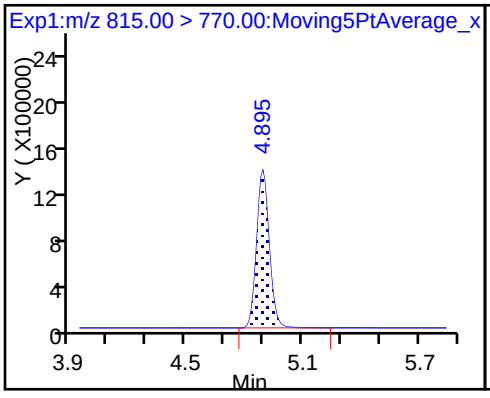
42 Perfluorotetradecanoic acid (ND)



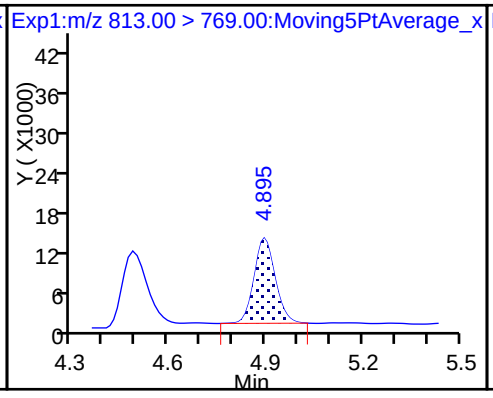
D 43 13C2-PFTeDA



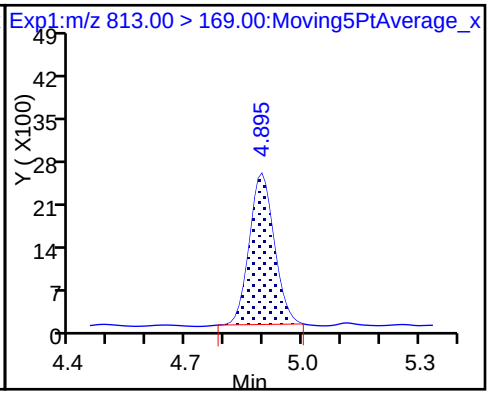
D 44 13C2-PFHxDA



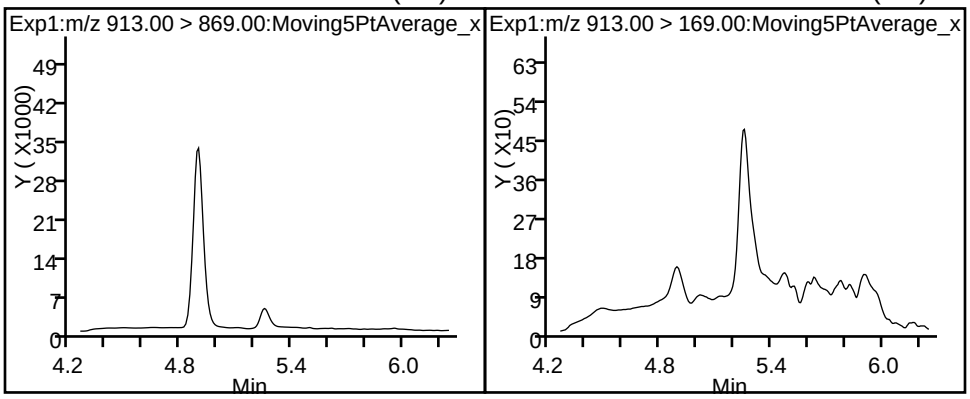
45 Perfluorohexadecanoic acid



45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid (ND) 46 Perfluorooctadecanoic acid (ND)



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-205574/1-A

Matrix: Solid | Lab File ID: 2018.01.26LLA_027.d

Analysis Method: 537 (modified) | Date Collected:

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.00(g) | Date Analyzed: 01/26/2018 16:14

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.10	U	0.40	0.10	0.025
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.10	U	0.50	0.10	0.031
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.10	U	0.50	0.10	0.029
335-67-1	Perfluorooctanoic acid (PFOA)	0.20	U	0.50	0.20	0.086
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.50	U	1.0	0.50	0.20
375-95-1	Perfluorononanoic acid (PFNA)	0.10	U	0.50	0.10	0.036

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	100		25-150
STL01892	13C4-PFHpA	101		25-150
STL00990	13C4 PFOA	97		25-150
STL00991	13C4 PFOS	105		25-150
STL00995	13C5 PFNA	108		25-150
STL02337	13C3-PFBS	101		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_027.d
Lims ID: MB 320-205574/1-A
Client ID:
Sample Type: MB
Inject. Date: 26-Jan-2018 16:14:35 ALS Bottle#: 12 Worklist Smp#: 2
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-205574/1-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 09:45:58 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 09:45:58

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	1.408	1.411	-0.003	0.532	6833014	2.36		94.5	21406	M
2 Perfluorobutyric acid										M
212.90 > 169.00	1.414	1.413	0.001	1.004	31249	0.0122			3.5	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.663	1.659	0.004	0.629	4124102	2.41		96.3	80713	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.672	1.662	0.010	1.005	9034	0.004649			5.6	
D 47 13C3-PFBS										
301.90 > 83.00	1.699	1.695	0.004	0.642	89020	2.35		101	2592	
D 7 13C2 PFHxA										
315.00 > 270.00	1.945	1.939	0.006	0.736	4500240	2.44		97.5	48174	
D 9 13C4-PFHpA										
367.00 > 322.00	2.280	2.267	0.013	0.862	4454851	2.54		101	33149	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.293	2.280	0.013	1.000	17337	0.007193			125	
399.00 > 99.00	2.293	2.280	0.013	1.000	4926		3.52(1.50-4.49)		33.0	
D 11 18O2 PFHxS										
403.00 > 84.00	2.293	2.282	0.011	0.867	5119413	2.37		100	41831	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.616	2.596	0.020	1.000	18826	0.0287			574	
D 12 M2-6:2FTS										
429.00 > 81.00	2.616	2.597	0.019	0.989	941233	2.90		122	14972	
D 14 13C4 PFOA										
417.00 > 372.00	2.645	2.622	0.023	1.000	4187501	2.43		97.3	38766	
* 62 13C2-PFOA										
415.00 > 370.00	2.645	2.622	0.023		4781946	2.50			36012	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
15 Perfluorooctanoic acid										
413.00 > 369.00	2.645	2.623	0.022	1.000	7810	0.003978			3.2	
413.00 > 169.00	2.638	2.623	0.015	0.997	5606		1.39(0.84-2.52)		52.1	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.132	3787191	2.71		108	45863	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.132	3431962	2.51		105	34168	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.274	3.338	-0.064	1.000	2266	0.001218			51.5	
D 21 13C8 FOSA										
506.00 > 78.00	3.274	3.338	-0.064	1.238	4733358	2.46		98.3	25671	
D 26 M2-8:2FTS										
529.00 > 81.00	3.295	3.342	-0.047	1.246	1047135	3.05		127	20551	
D 23 13C2 PFDA										
515.00 > 470.00	3.302	3.352	-0.050	1.249	3023804	2.51		100	26465	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.461	3.507	-0.046	1.309	1774690	2.95		118	16632	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.468	3.513	-0.045	1.002	4933	0.006433			34.2	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.636	3.672	-0.036	1.375	1881192	3.09		124	10057	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.643	3.678	-0.035	1.002	9354	0.009008			46.6	
563.00 > 169.00	3.643	3.678	-0.035	1.002	1732		5.40(0.00-0.00)		157	
D 30 13C2 PFUnA										
565.00 > 520.00	3.636	3.679	-0.043	1.375	2514981	2.75		110	39203	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.636	3.679	-0.043	1.000	7718	0.0105			153	
D 36 13C2 PFDoA										
615.00 > 570.00	3.955	3.979	-0.024	1.495	2285761	2.30		92.1	24095	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.486	4.483	0.003	1.696	3393336	2.61		105	22851	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.912	4.902	0.010	1.857	5525460	2.39		95.6	13039	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.912	4.902	0.010	1.000	53257	0.006080			34.4	
813.00 > 169.00	4.912	4.902	0.010	1.000	9453		5.63(2.86-8.58)		199	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 09:45:59 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_027.d

Injection Date: 26-Jan-2018 16:14:35 Instrument ID: A8_N

Lims ID: MB 320-205574/1-A

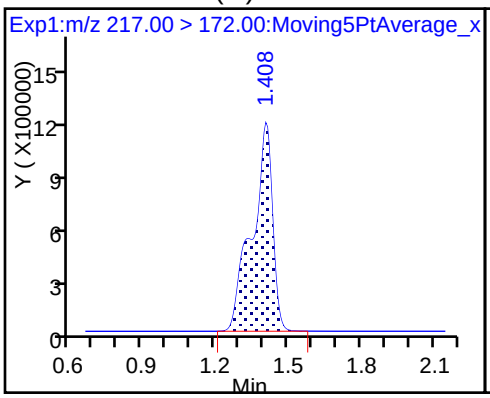
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 12 Worklist Smp#: 2

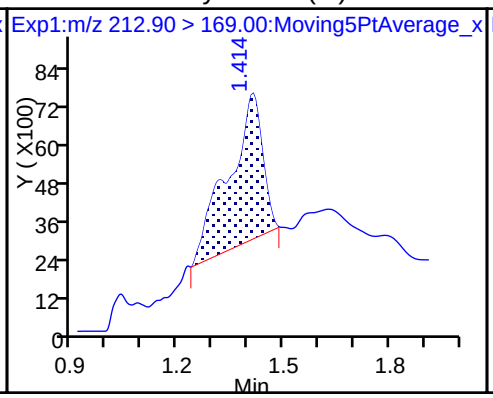
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

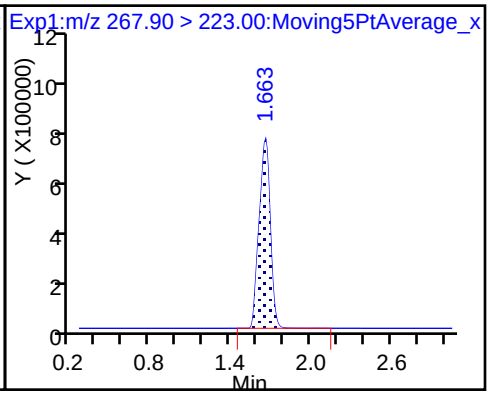
D 1 13C4 PFBA (M)



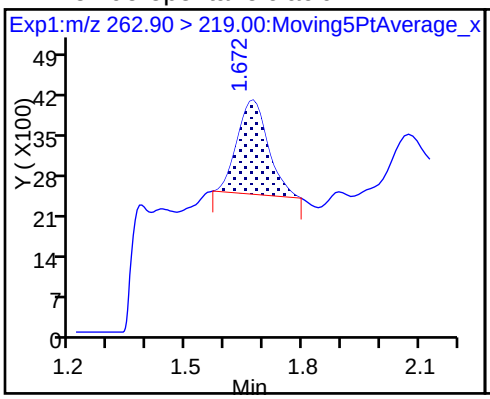
2 Perfluorobutyric acid (M)



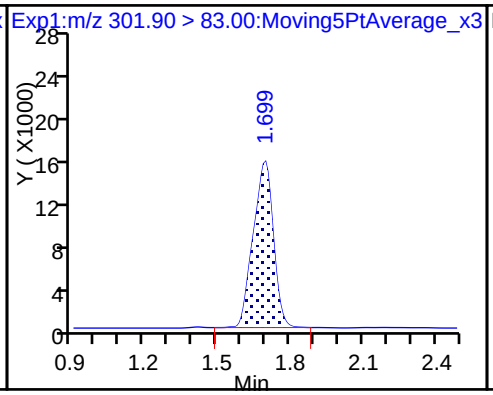
D 3 13C5-PFPeA



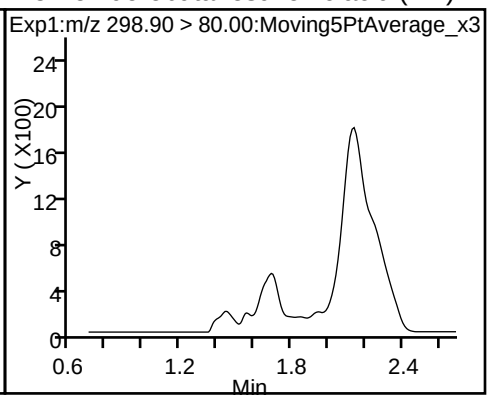
4 Perfluoropentanoic acid



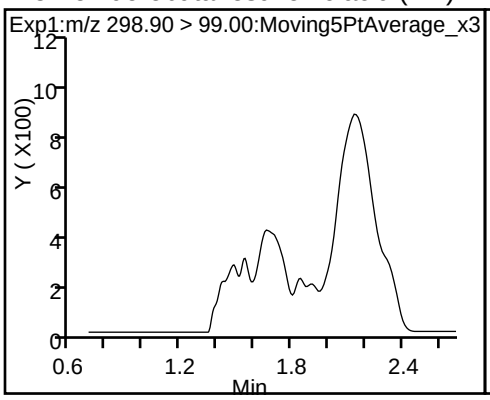
D 47 13C3-PFBS



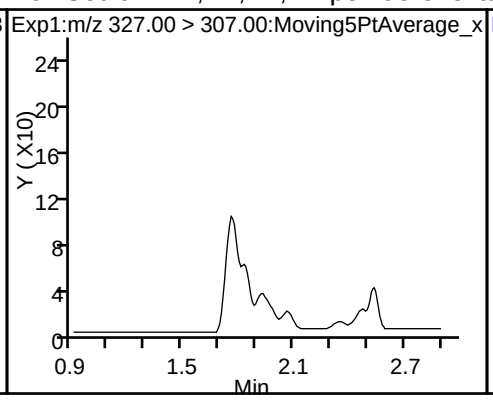
5 Perfluorobutanesulfonic acid (ND)



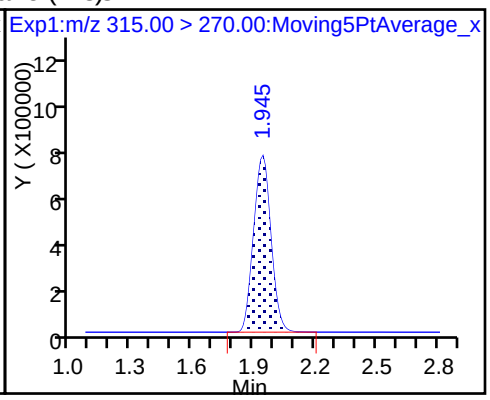
5 Perfluorobutanesulfonic acid (ND)



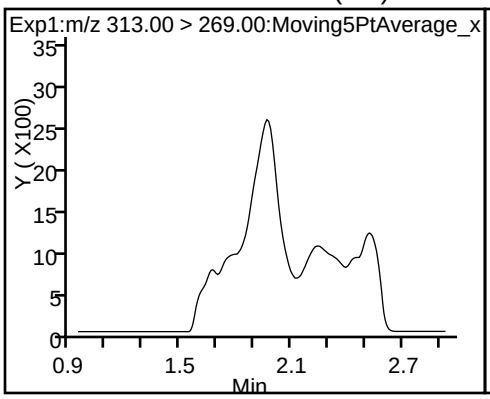
61 Sodium 1H,1H,2H,2H-perfluorohexane (ND)



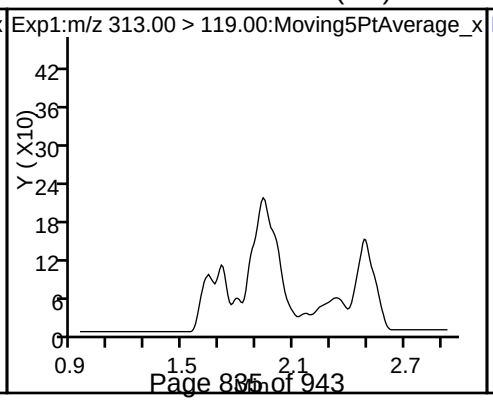
D 13C2 PFHxA



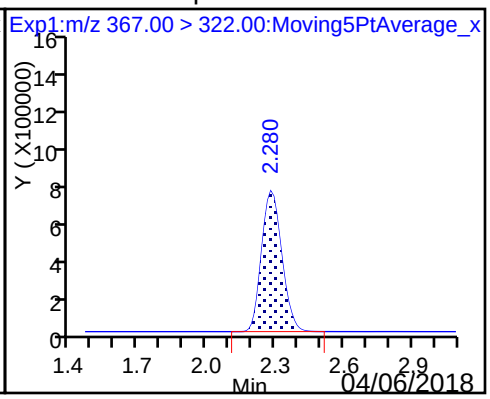
6 Perfluorohexanoic acid (ND)



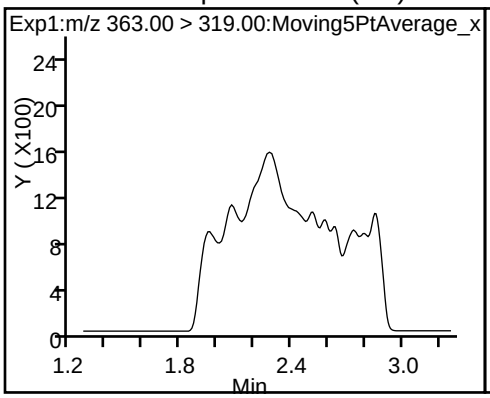
6 Perfluorohexanoic acid (ND)



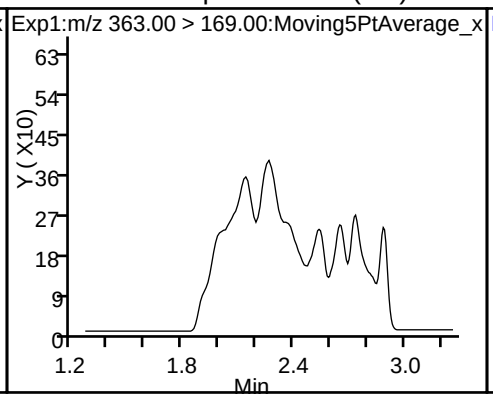
D 9 13C4-PFHpA



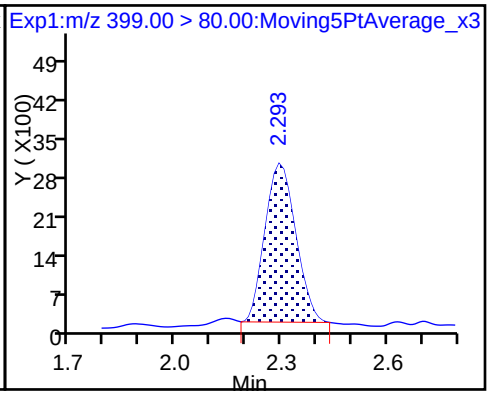
10 Perfluoroheptanoic acid (ND)



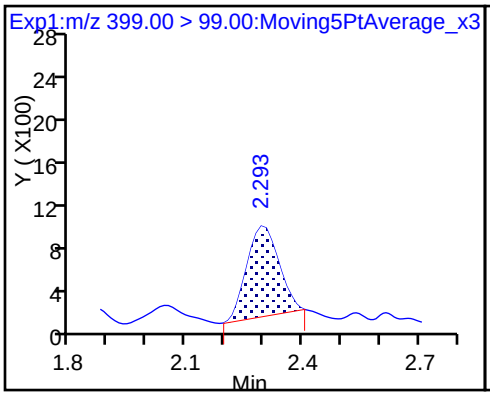
10 Perfluoroheptanoic acid (ND)



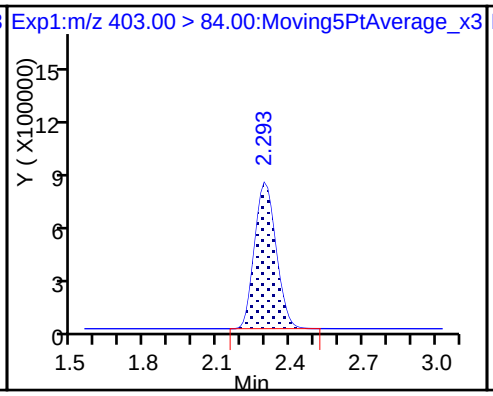
8 Perfluorohexanesulfonic acid



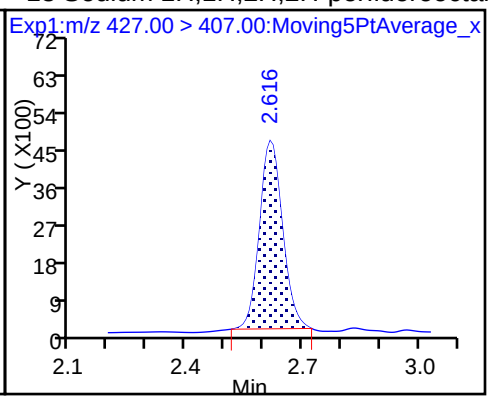
8 Perfluorohexanesulfonic acid



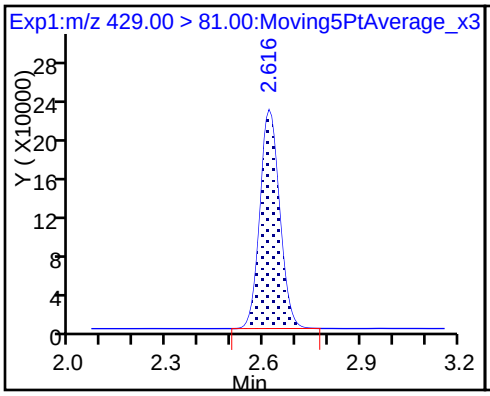
D 11 18O2 PFHxS



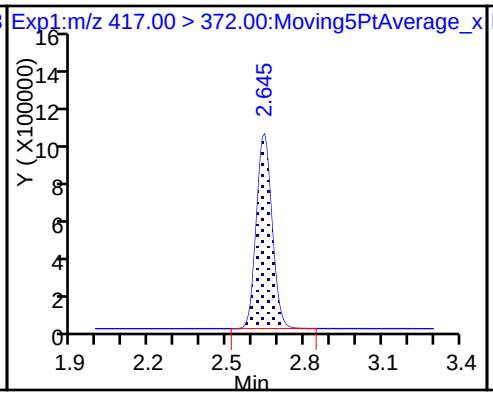
13 Sodium 1H,1H,2H,2H-perfluorooctane



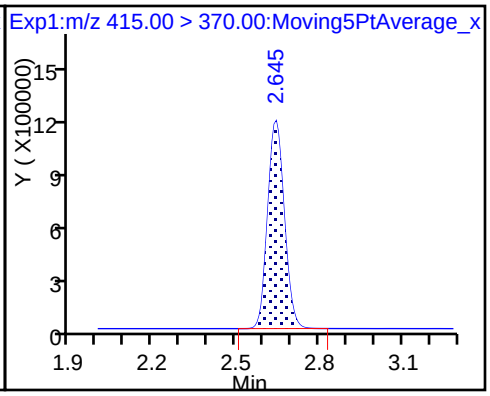
D 12 M2-6:2FTS



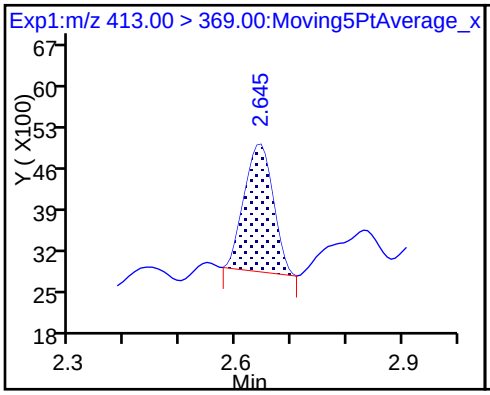
D 14 13C4 PFOA



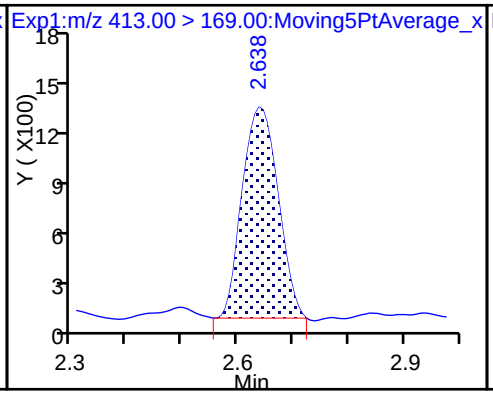
* 62 13C2-PFOA



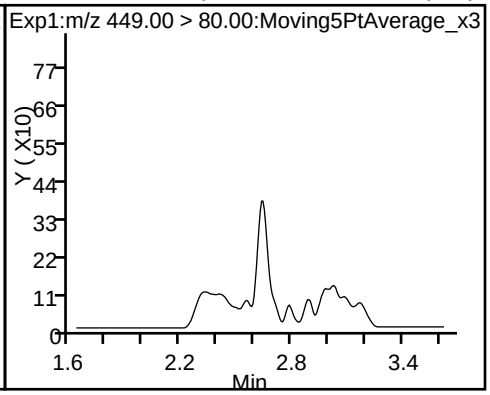
15 Perfluorooctanoic acid



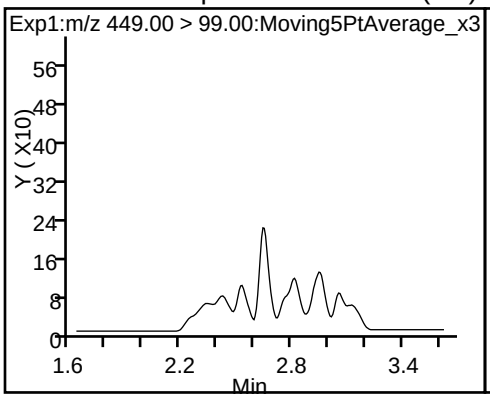
15 Perfluorooctanoic acid



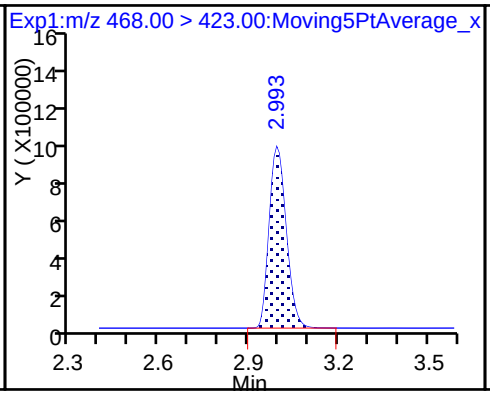
16 Perfluoroheptanesulfonic acid (ND)



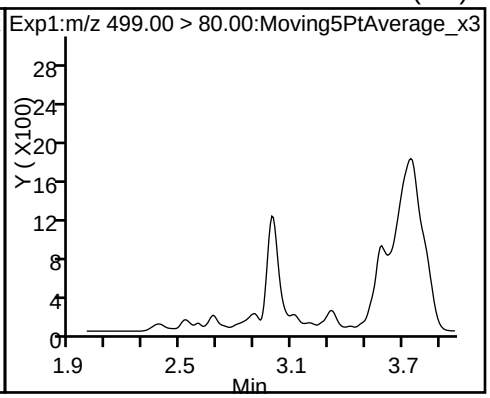
16 Perfluoroheptanesulfonic acid (ND)



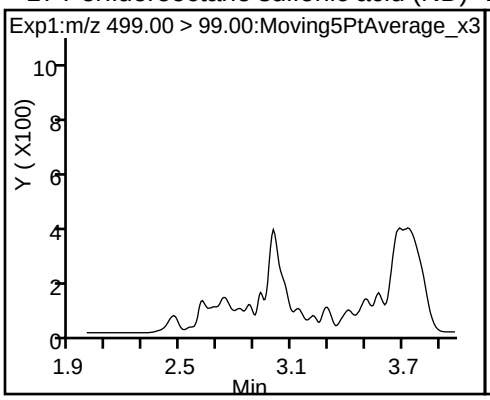
D 19 13C5 PFNA



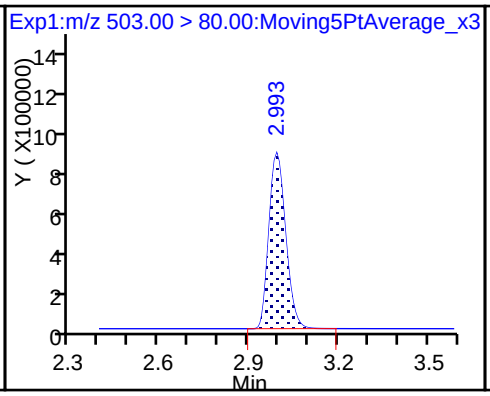
17 Perfluorooctane sulfonic acid (ND)



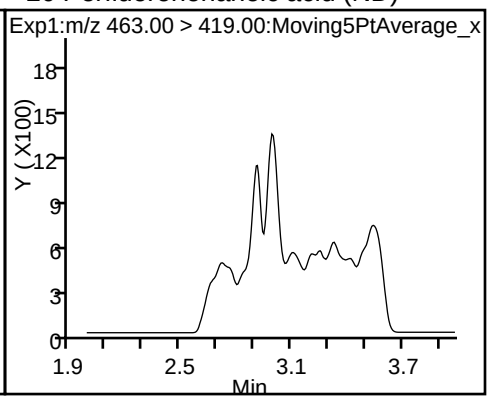
17 Perfluorooctane sulfonic acid (ND)



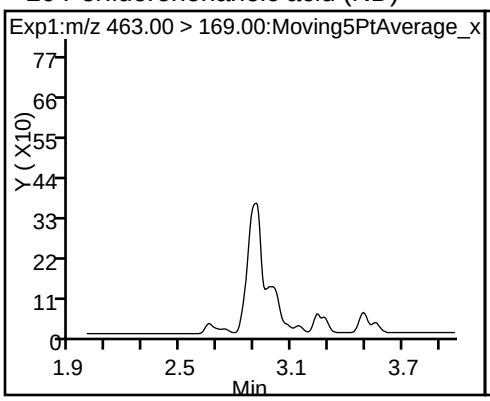
D 18 13C4 PFOS



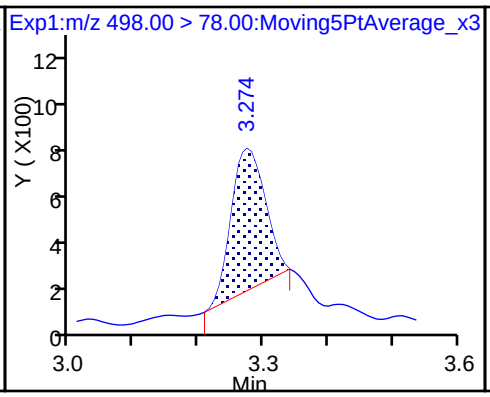
20 Perfluorononanoic acid (ND)



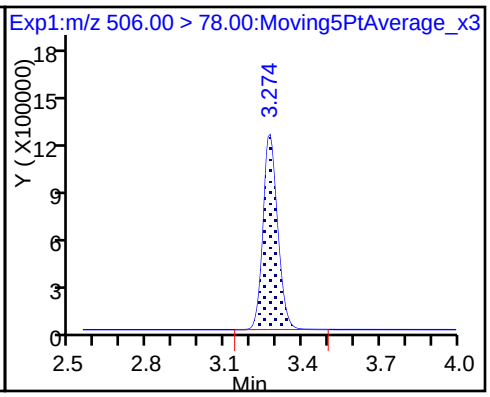
20 Perfluorononanoic acid (ND)



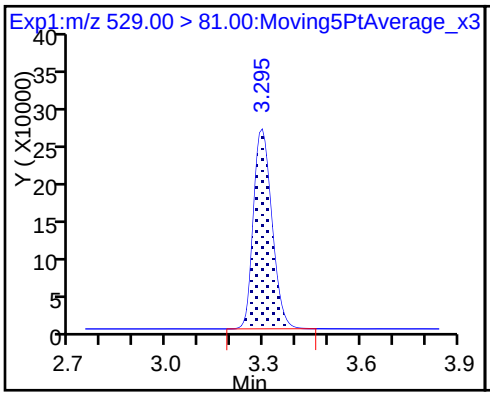
22 Perfluorooctane Sulfonamide



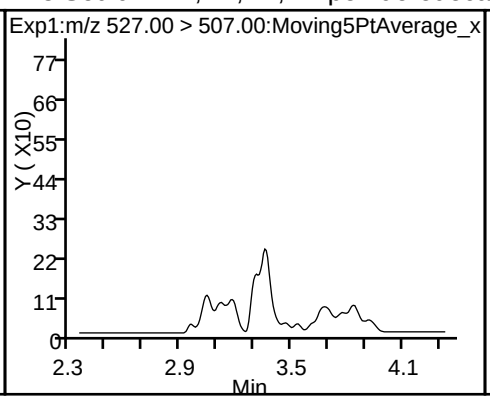
D 21 13C8 FOSA



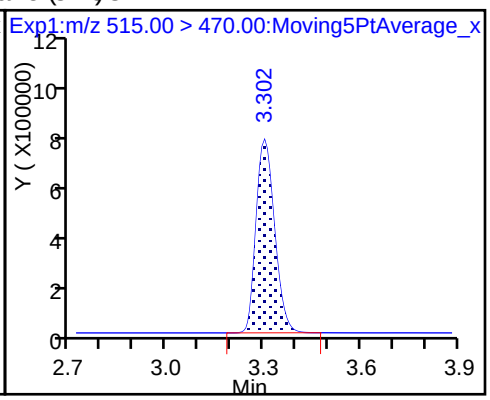
D 26 M2-8:2FTS



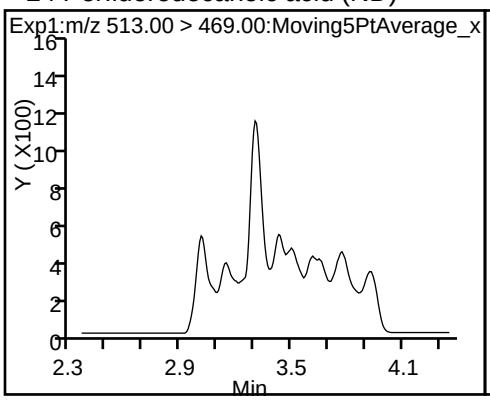
25 Sodium 1H,1H,2H,2H-perfluorodecane



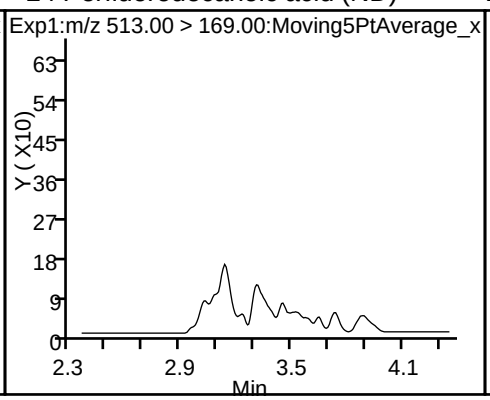
D 23 13C2 PFDA



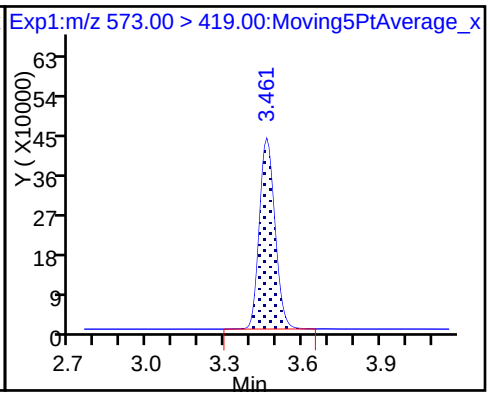
24 Perfluorodecanoic acid (ND)



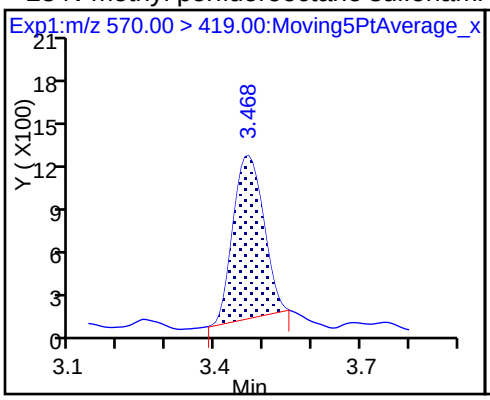
24 Perfluorodecanoic acid (ND)



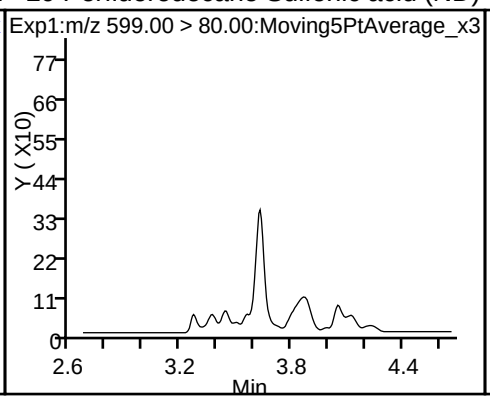
D 27 d3-NMeFOSAA



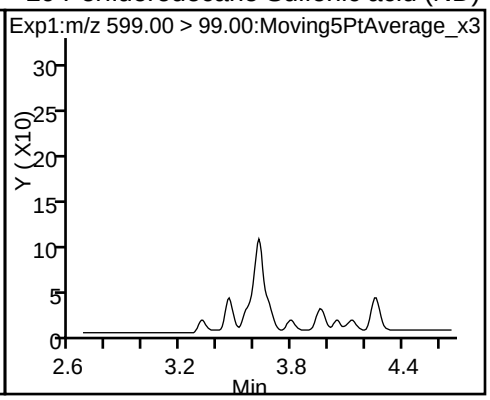
28 N-methyl perfluorooctane sulfonami



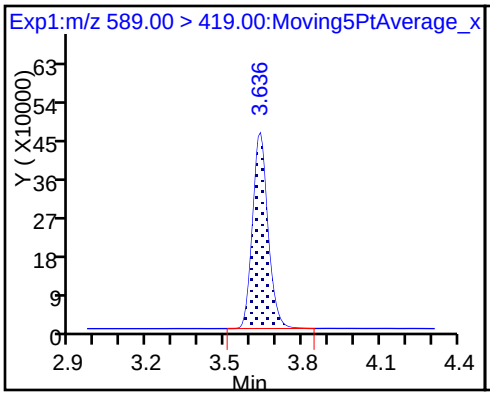
29 Perfluorodecane Sulfonic acid (ND)



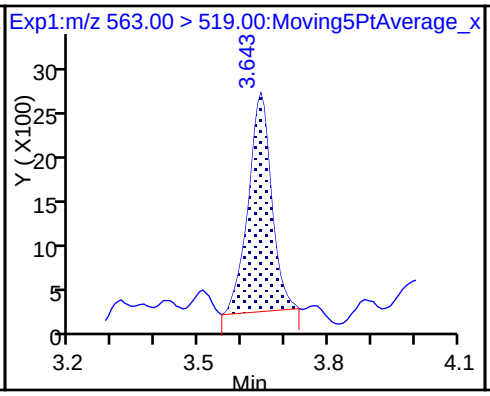
29 Perfluorodecane Sulfonic acid (ND)



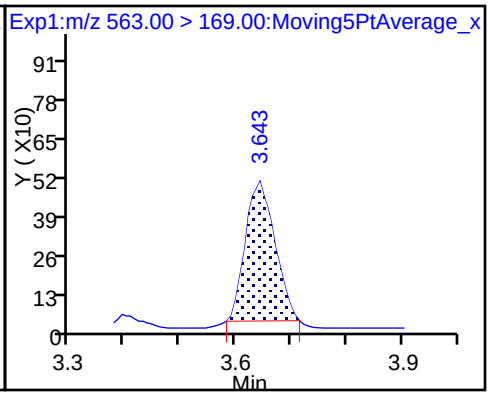
D 32 d5-NEtFOSAA



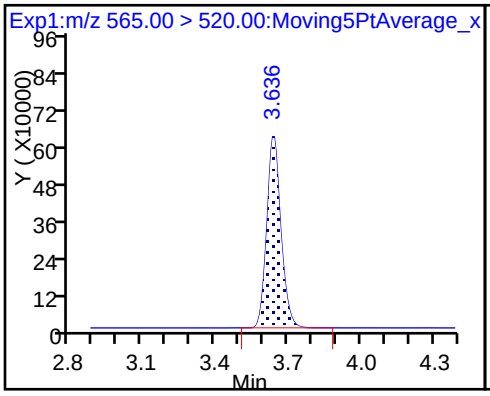
31 Perfluoroundecanoic acid



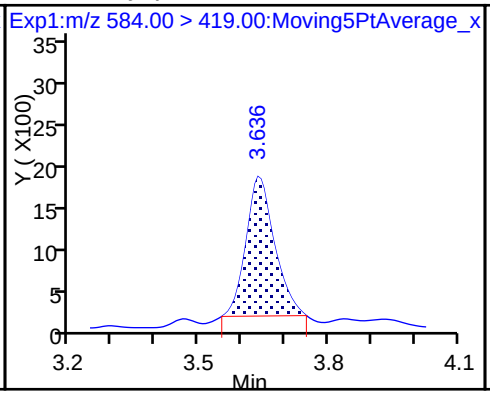
31 Perfluoroundecanoic acid



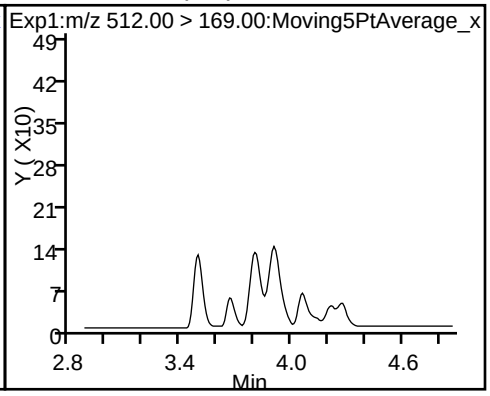
D 30 13C2 PFUnA



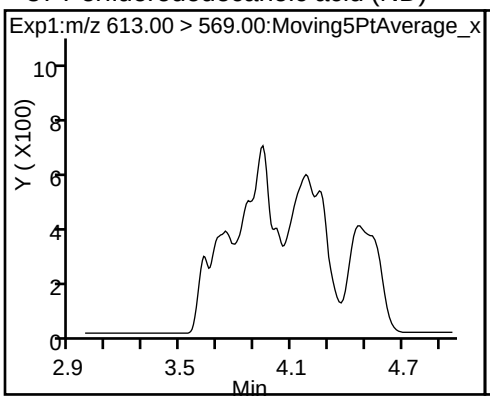
33 N-ethyl perfluorooctane sulfonamid



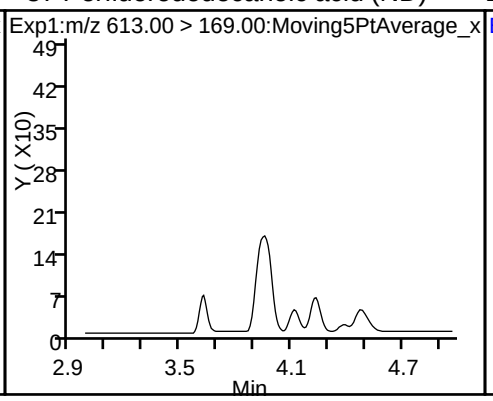
35 MeFOSA (ND)



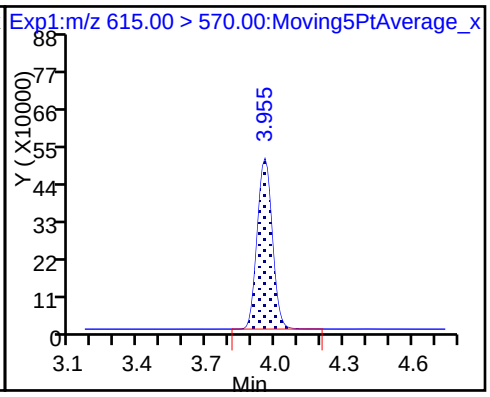
37 Perfluorododecanoic acid (ND)



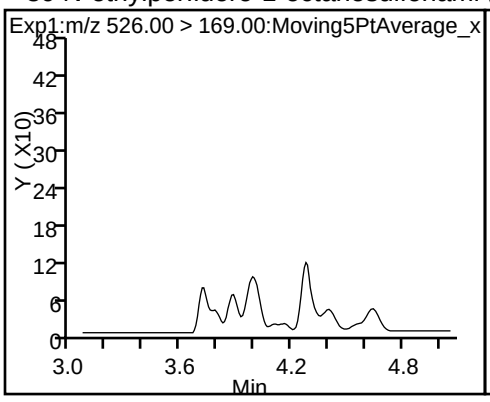
37 Perfluorododecanoic acid (ND)



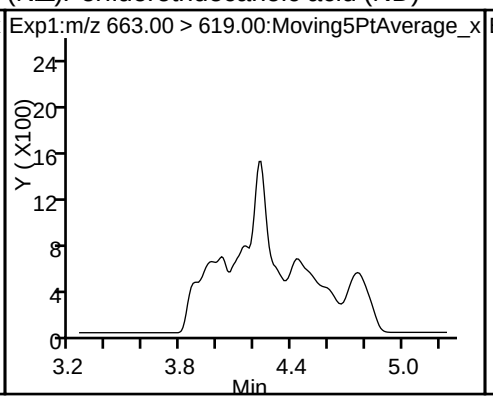
D 36 13C2 PFDoA



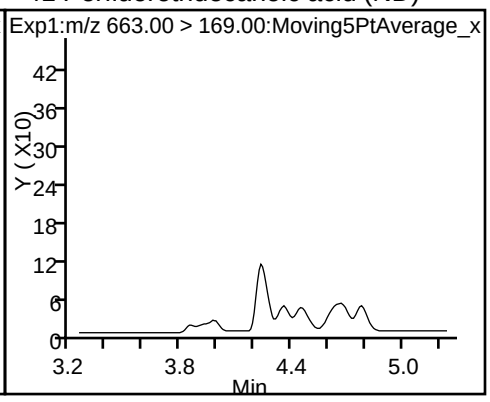
39 N-ethylperfluoro-1-octanesulfonami (ND)



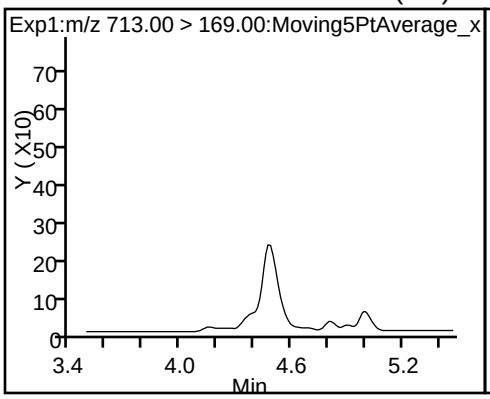
41 Perfluorotridecanoic acid (ND)



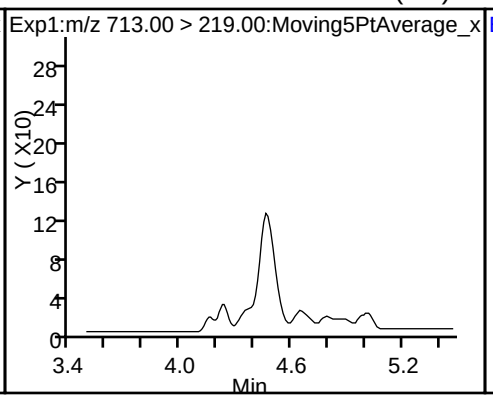
41 Perfluorotridecanoic acid (ND)



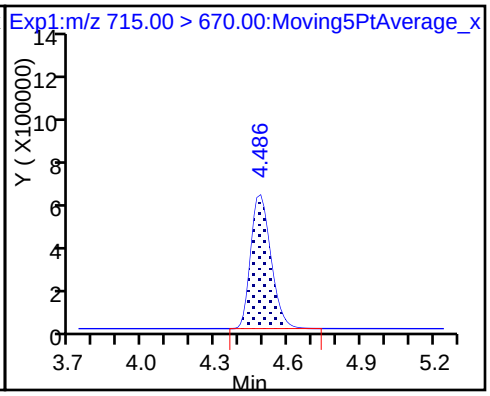
42 Perfluorotetradecanoic acid (ND)



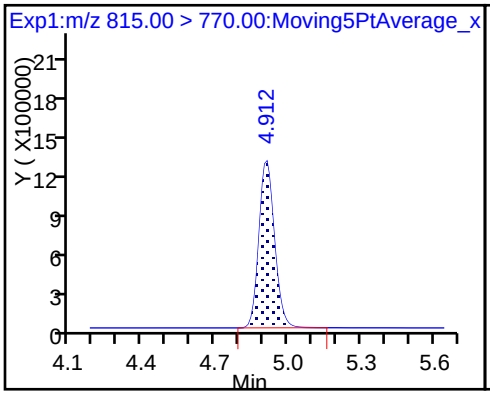
42 Perfluorotetradecanoic acid (ND)



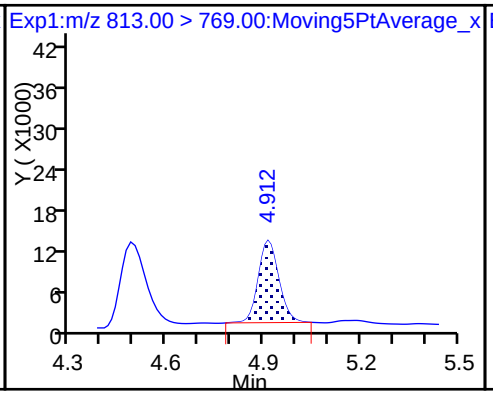
D 43 13C2-PFTeDA



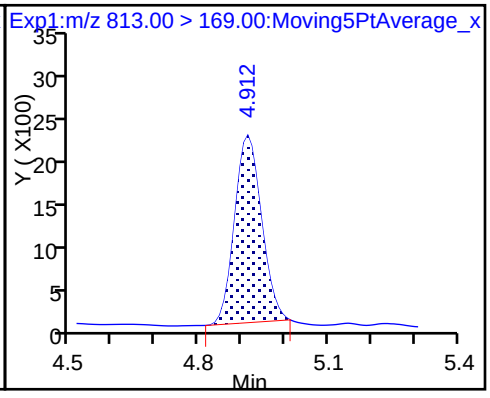
D 44 13C2-PFHxDA



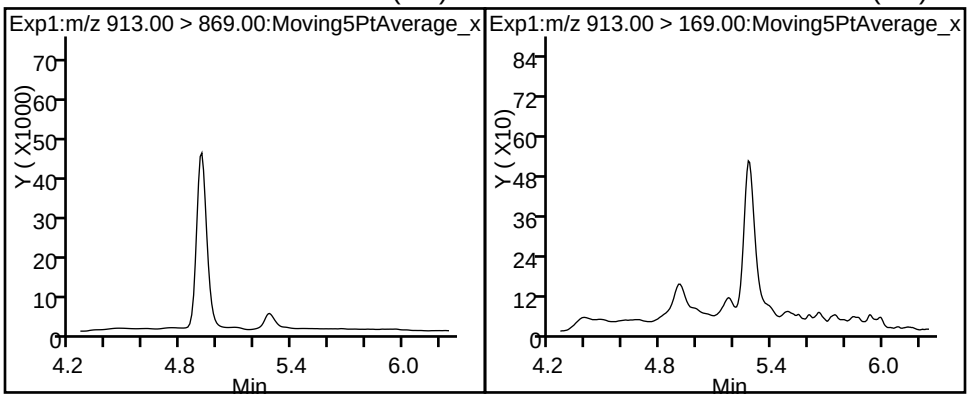
45 Perfluorohexadecanoic acid



45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid (ND) 46 Perfluorooctadecanoic acid (ND)



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: | Lab Sample ID: LCS 320-205514/2-A

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_035.d

Analysis Method: 537 (modified) | Date Collected:

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 250.00(mL) | Date Analyzed: 01/25/2018 22:04

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	37.9		2.0	1.0	0.46
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	33.4		2.0	1.0	0.38
375-85-9	Perfluoroheptanoic acid (PFHpA)	34.7		2.0	1.5	0.61
335-67-1	Perfluorooctanoic acid (PFOA)	35.3		2.0	1.5	0.54
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	34.7		4.0	3.0	1.1
375-95-1	Perfluorononanoic acid (PFNA)	36.9		2.0	1.5	0.52

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	109		25-150
STL01892	13C4-PFHpA	110		25-150
STL00990	13C4 PFOA	113		25-150
STL00991	13C4 PFOS	111		25-150
STL00995	13C5 PFNA	116		25-150
STL02337	13C3-PFBS	97		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_035.d
Lims ID: LCS 320-205514/2-A
Client ID:
Sample Type: LCS
Inject. Date: 25-Jan-2018 22:04:19 ALS Bottle#: 29 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: lcs 320-205514/2-a
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:32:23

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	1.408	1.411	-0.003	0.537	7325862	2.68		107	21074	
2 Perfluorobutyric acid										M
212.90 > 169.00	1.408	1.413	-0.005	1.000	2574364	0.9403		94.0	363	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.654	1.659	-0.005	0.630	4304614	2.66		106	45402	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.654	1.662	-0.008	1.000	1834534	0.9044		90.4	1279	
D 47 13C3-PFBS										
301.90 > 83.00	1.689	1.695	-0.006	0.644	81084	2.26		97.2	2312	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.698	1.697	0.001	1.005	2548368	0.9464		107	8294	
298.90 > 99.00	1.698	1.697	0.001	1.005	1047380		2.43(1.25-3.74)		5228	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.903	1.903	0.0	1.000	584334	1.21		129	29166	
D 7 13C2 PFHxA										
315.00 > 270.00	1.934	1.939	-0.005	0.737	4735353	2.71		108	41385	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.934	1.939	-0.005	1.000	1748490	0.8906		89.1	4902	
313.00 > 119.00	1.934	1.939	-0.005	1.000	164629		10.62(5.03-15.10)		3921	
D 9 13C4-PFHpA										
367.00 > 322.00	2.266	2.267	-0.001	0.864	4559964	2.74		110	35717	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.266	2.268	-0.002	1.000	1741309	0.8687		86.9	2611	
363.00 > 169.00	2.266	2.268	-0.002	1.000	737986		2.36(1.13-3.40)		5074	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.279	2.280	-0.001	1.000	2064809	0.8346		91.7	11687	
399.00 > 99.00	2.279	2.280	-0.001	1.000	696839		2.96(1.50-4.49)		3715	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 11 18O2 PFHxS										
403.00 > 84.00	2.279	2.282	-0.003	0.869	5254825	2.57		109	42858	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.596	0.0	1.000	596463	0.8625		91.0	16837	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.990	992349	3.23		136	23102	
D 14 13C4 PFOA										
417.00 > 372.00	2.624	2.622	0.002	1.000	4610865	2.83		113	39945	
* 62 13C2-PFOA										
415.00 > 370.00	2.624	2.622	0.002		4524528	2.50			47624	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.624	2.623	0.001	1.000	1905893	0.8816		88.2	793	
413.00 > 169.00	2.624	2.623	0.001	1.000	982843		1.94(0.84-2.52)		8068	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.631	2.629	0.002	1.000	1828392	0.9347		98.2	24705	
449.00 > 99.00	2.631	2.629	0.002	1.000	491995		3.72(1.94-5.82)		7741	
D 19 13C5 PFNA										
468.00 > 423.00	2.994	2.992	0.002	1.141	3824814	2.90		116	36261	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.994	2.992	0.002	1.000	1402567	0.8676		93.5	2839	
499.00 > 99.00	2.994	2.992	0.002	1.000	330176		4.25(2.31-6.93)		2671	
D 18 13C4 PFOS										
503.00 > 80.00	2.994	2.992	0.002	1.141	3451699	2.66		111	24108	
20 Perfluorononanoic acid										
463.00 > 419.00	2.994	2.992	0.002	1.000	1456705	0.9224		92.2	3644	
463.00 > 169.00	2.994	2.992	0.002	1.000	350446		4.16(1.90-5.69)		6155	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.334	3.338	-0.004	1.000	1786230	0.9588		95.9	14097	
D 21 13C8 FOSA										
506.00 > 78.00	3.334	3.338	-0.004	1.271	4741332	2.60		104	21786	
D 26 M2-8:2FTS										
529.00 > 81.00	3.341	3.342	-0.001	1.274	1095964	3.37		141	17056	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.341	3.342	-0.001	1.000	536570	0.9635		101	11141	
D 23 13C2 PFDA										
515.00 > 470.00	3.349	3.352	-0.003	1.276	3345479	2.93		117	31174	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.357	3.353	0.003	1.002	1269261	0.9776		97.8	5329	
513.00 > 169.00	3.349	3.353	-0.004	1.000	223141		5.69(2.36-7.09)		2132	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.509	3.507	0.001	1.337	1721097	3.02		121	9509	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.509	3.513	-0.005	1.000	671737	0.9033		90.3	4386	
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.665	3.666	-0.001	1.000	899773	0.9513		98.7	10341	
599.00 > 99.00	3.658	3.666	-0.008	0.998	305155		2.95(1.39-4.16)		8590	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.672	3.672	0.0	1.400	1733830	3.01		120	9788	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.672	3.678	-0.006	1.000	897157	0.9079		90.8	3184	
563.00 > 169.00	3.681	3.678	0.003	1.002	183179		4.90(0.00-0.00)		6394	
D 30 13C2 PFUnA										
565.00 > 520.00	3.672	3.679	-0.007	1.400	2393297	2.76		111	30486	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.681	3.679	0.002	1.002	611985	0.9061		90.6	7225	
35 MeFOSA										
512.00 > 169.00	3.837	3.875	-0.038		393229	NR		0.0	2774	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.974	3.979	-0.005	1.000	1031774	0.9543		95.4	3203	
613.00 > 169.00	3.974	3.979	-0.005	1.000	266680		3.87(2.13-6.40)		6847	
D 36 13C2 PFDoA										
615.00 > 570.00	3.974	3.979	-0.005	1.515	2637656	2.81		112	21064	
39 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.029	4.066	-0.037		279730	NR		0.0	1416	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.244	4.242	0.002	1.000	1242605	1.01		101	2873	
663.00 > 169.00	4.244	4.242	0.002	1.000	383763		3.24(1.25-3.76)		12461	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.473	4.483	-0.010	1.000	370836	1.06		106	6516	
713.00 > 219.00	4.473	4.483	-0.010	1.000	248058		1.49(0.71-2.13)		6373	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.473	4.483	-0.010	1.705	3594434	2.93		117	21901	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.896	4.902	-0.006	1.866	5821399	2.66		106	15905	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.896	4.902	-0.006	1.000	2156352	0.9581		95.8	1382	
813.00 > 169.00	4.896	4.902	-0.006	1.000	369653		5.83(2.86-8.58)		4134	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.254	5.255	-0.001	1.000	2388592	0.9736		97.4	662	
913.00 > 169.00	5.254	5.255	-0.001	1.000	298039		8.01(0.00-0.00)		1218	

QC Flag Legend

Processing Flags

NR - Missing Quant Standard

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:22:37 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_035.d

Injection Date: 25-Jan-2018 22:04:19 Instrument ID: A8_N

Lims ID: LCS 320-205514/2-A

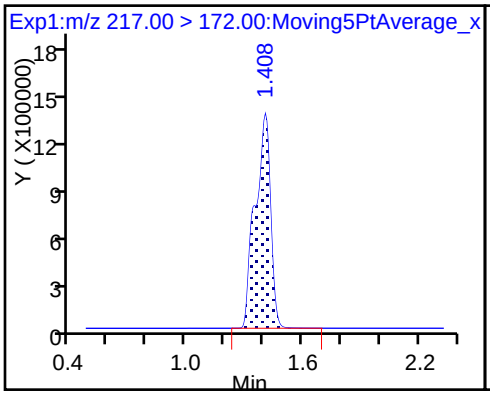
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 29 Worklist Smp#: 3

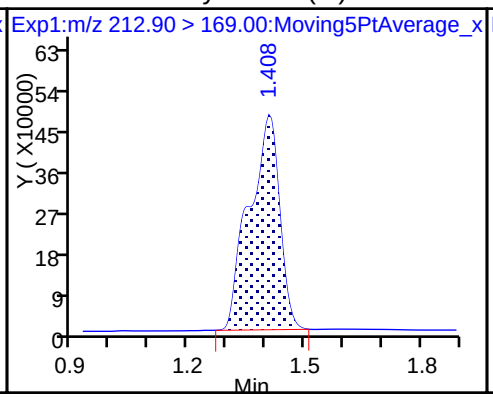
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

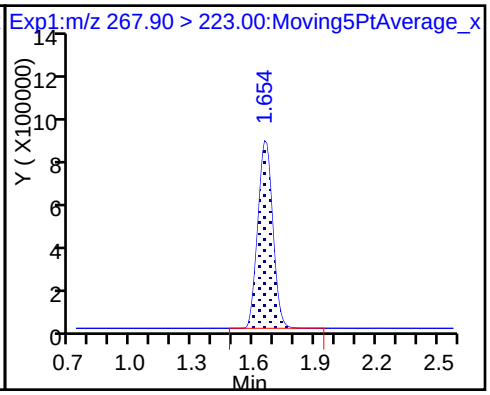
D 1 13C4 PFBA



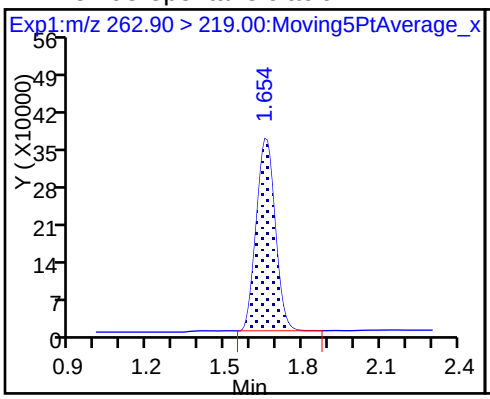
2 Perfluorobutyric acid (M)



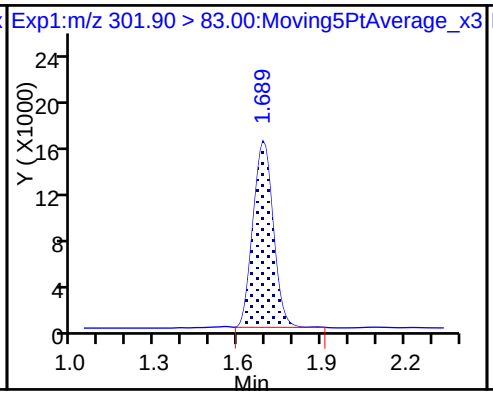
D 3 13C5-PFPeA



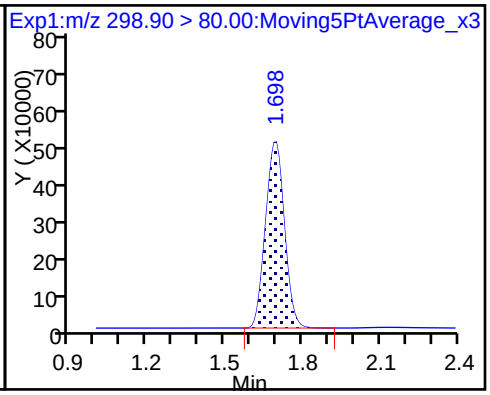
4 Perfluoropentanoic acid



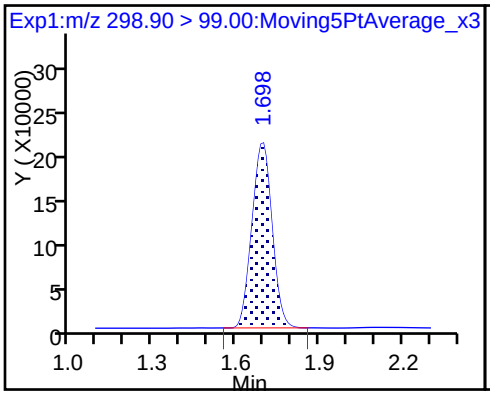
D 47 13C3-PFBS



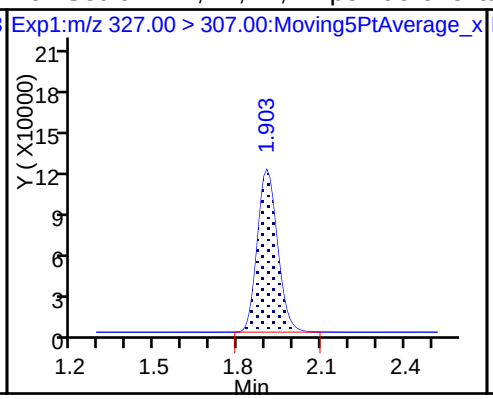
5 Perfluorobutanesulfonic acid



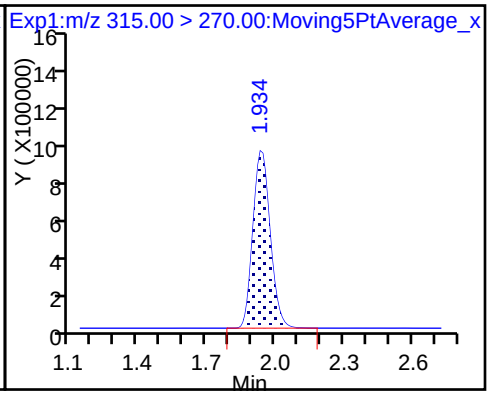
5 Perfluorobutanesulfonic acid



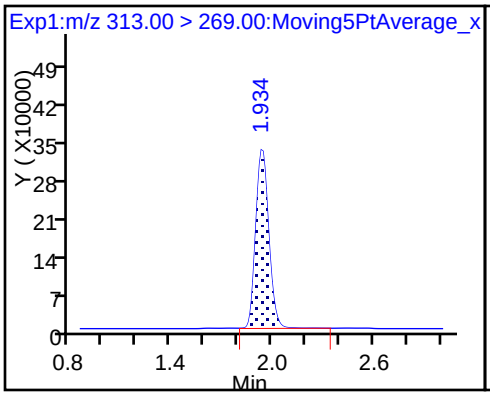
61 Sodium 1H,1H,2H,2H-perfluorohexa



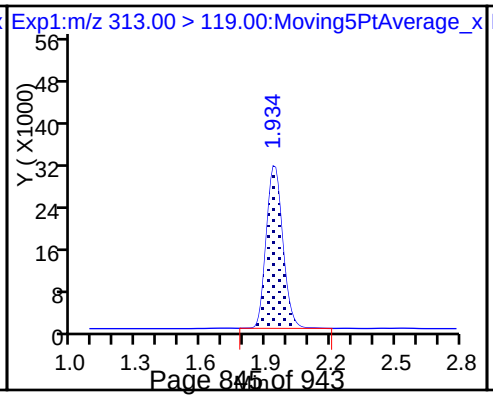
D 7 13C2 PFHxA



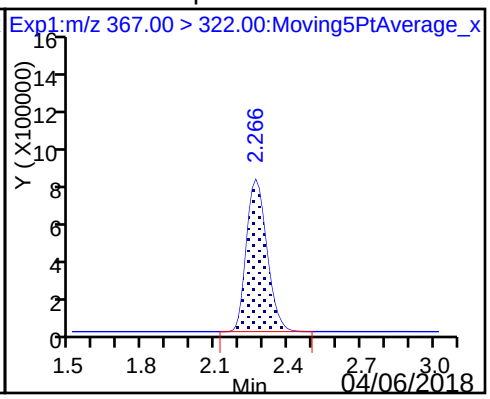
6 Perfluorohexanoic acid



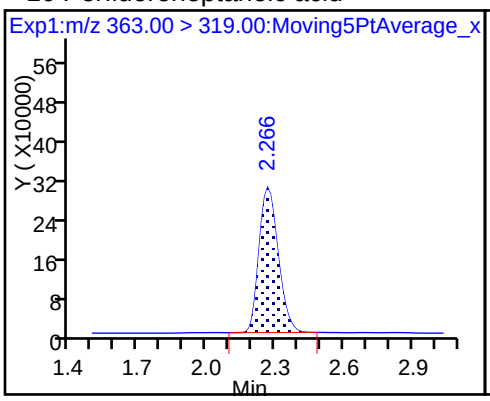
6 Perfluorohexanoic acid



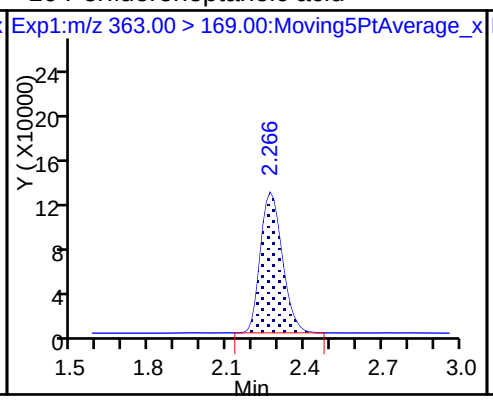
D 9 13C4-PFHpA



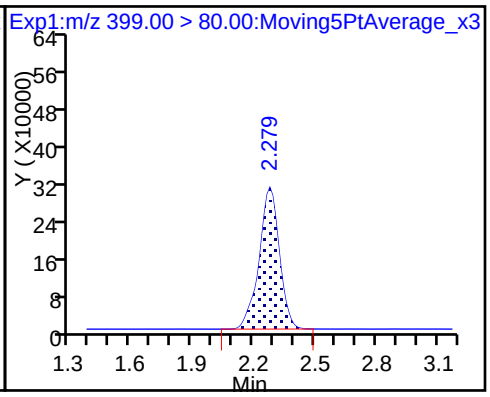
10 Perfluoroheptanoic acid



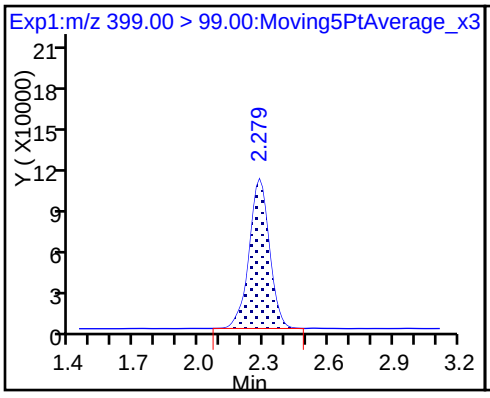
10 Perfluoroheptanoic acid



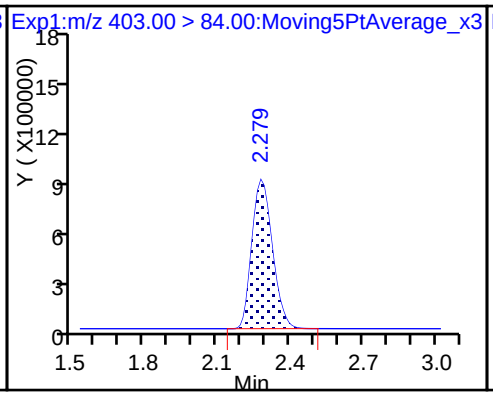
8 Perfluorohexanesulfonic acid



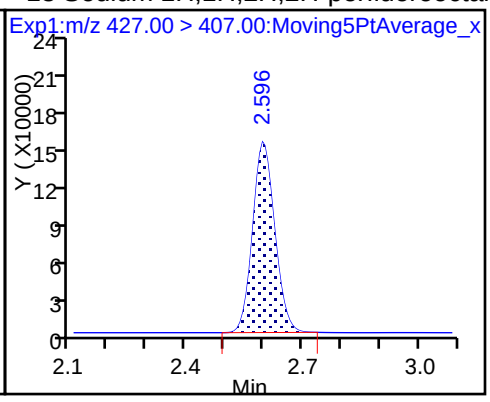
8 Perfluorohexanesulfonic acid



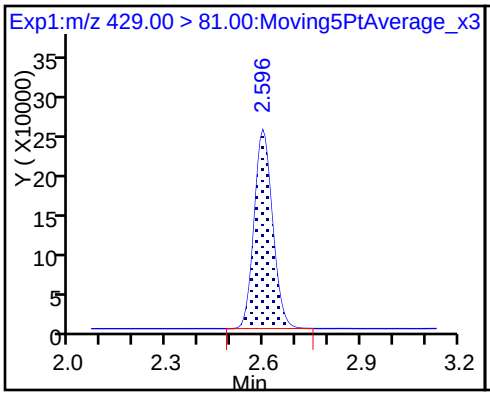
D 11 18O2 PFHxS



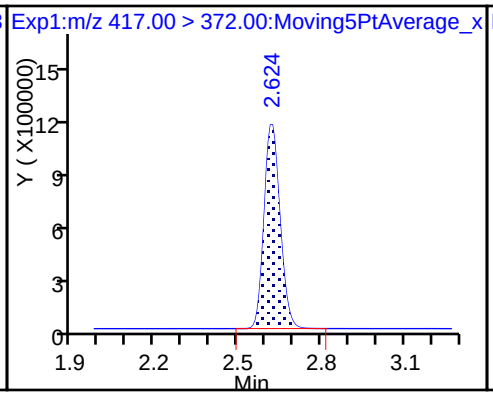
13 Sodium 1H,1H,2H,2H-perfluorooctane



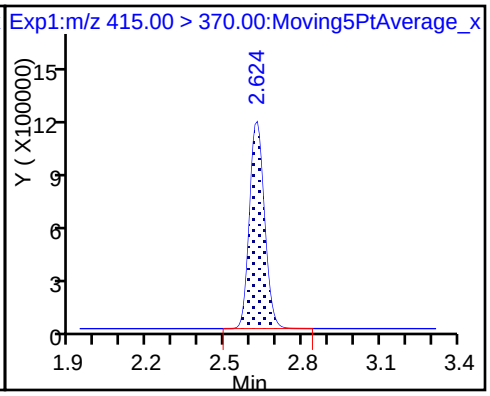
D 12 M2-6:2FTS



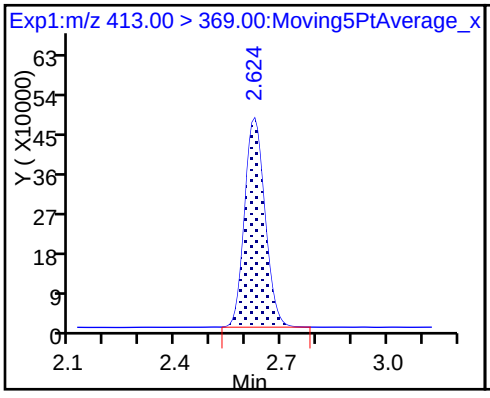
D 14 13C4 PFOA



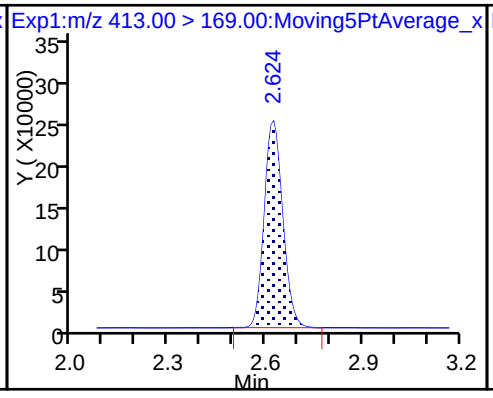
* 62 13C2-PFOA



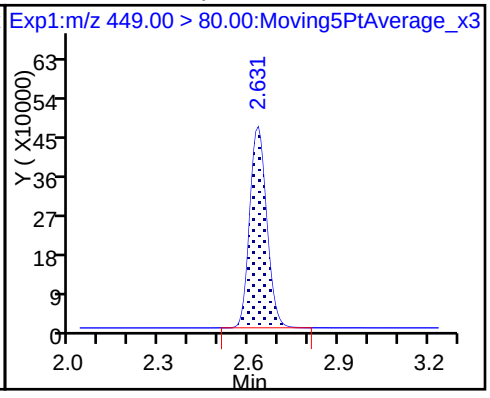
15 Perfluorooctanoic acid



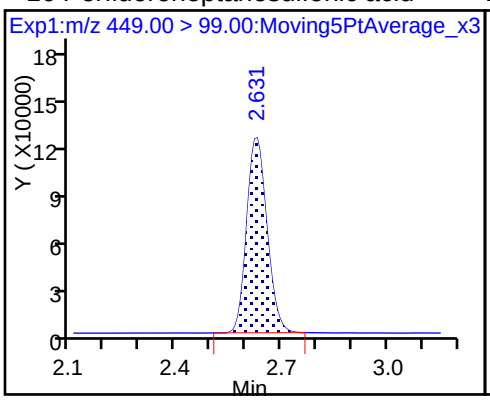
15 Perfluorooctanoic acid



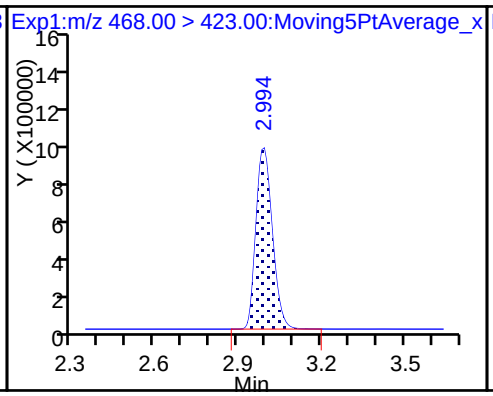
16 Perfluoroheptanesulfonic acid



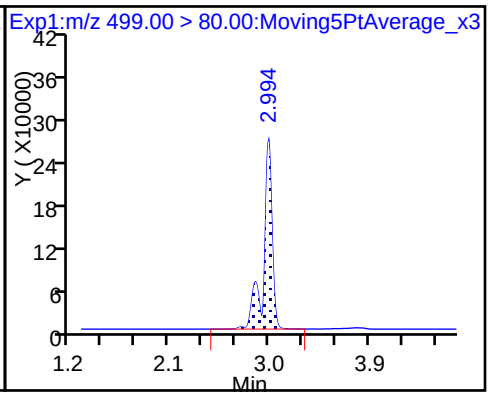
16 Perfluoroheptanesulfonic acid



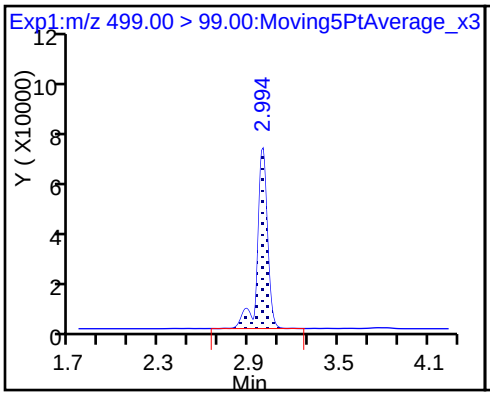
D 19 13C5 PFNA



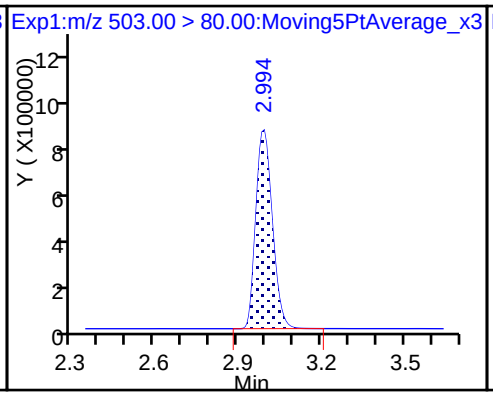
17 Perfluorooctane sulfonic acid



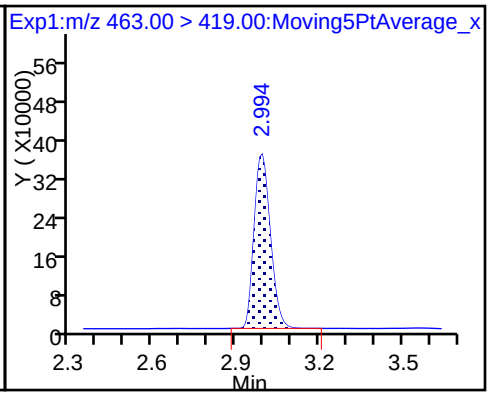
17 Perfluorooctane sulfonic acid



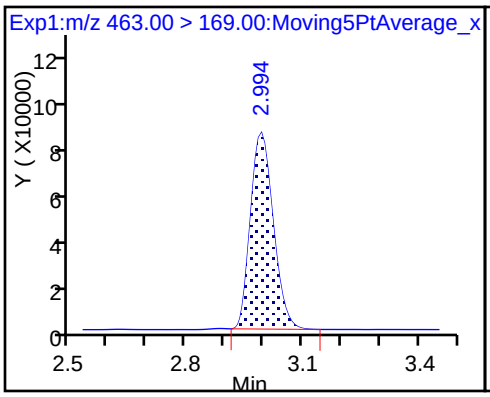
D 18 13C4 PFOS



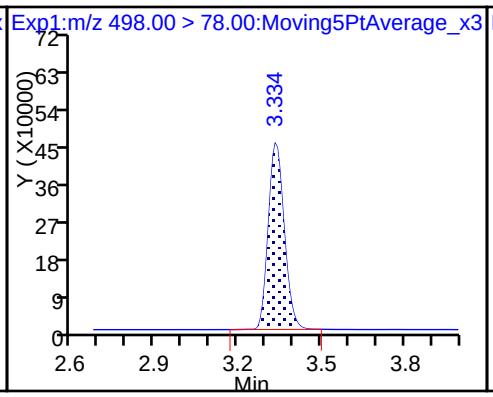
20 Perfluorononanoic acid



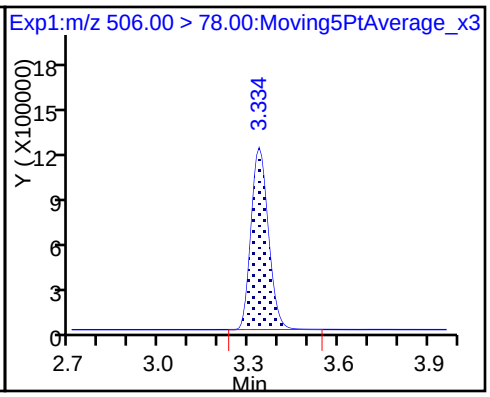
20 Perfluorononanoic acid



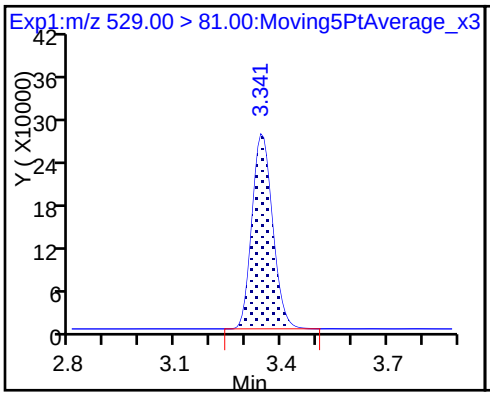
22 Perfluorooctane Sulfonamide



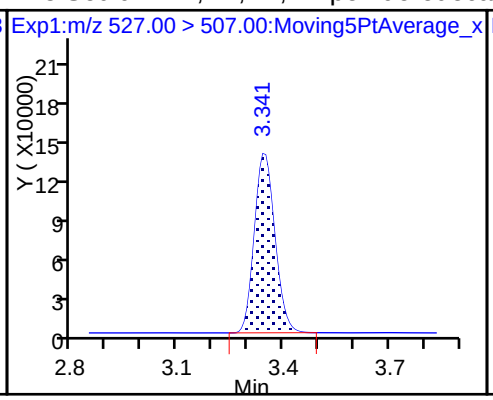
D 21 13C8 FOSA



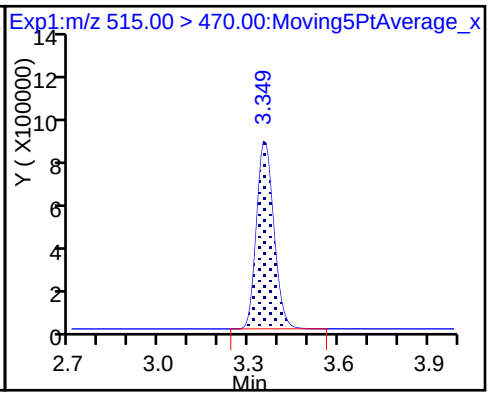
D 26 M2-8:2FTS



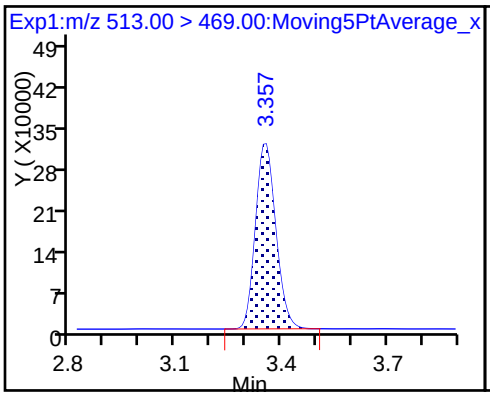
25 Sodium 1H,1H,2H,2H-perfluorodecane



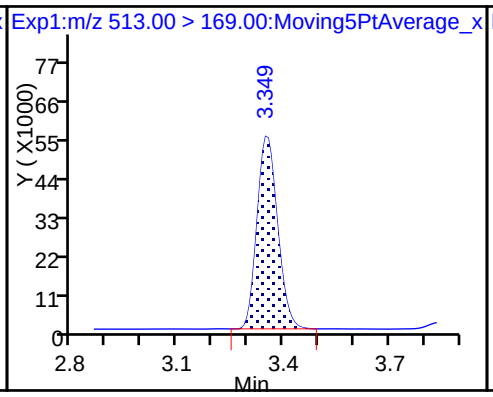
D 23 13C2 PFDA



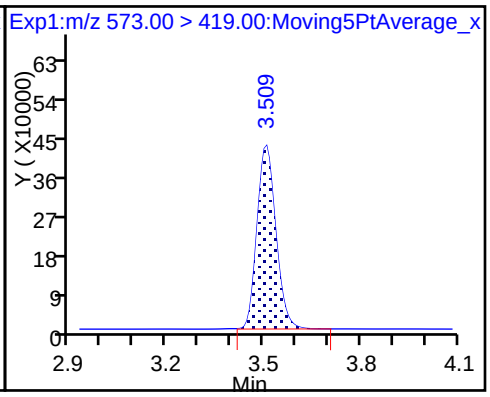
24 Perfluorodecanoic acid



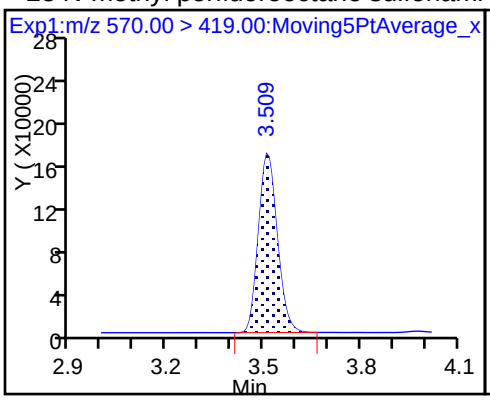
24 Perfluorodecanoic acid



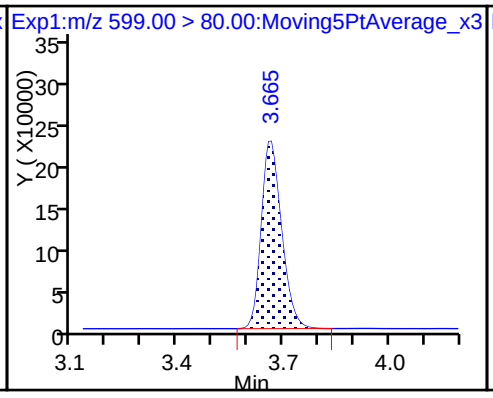
D 27 d3-NMeFOSAA



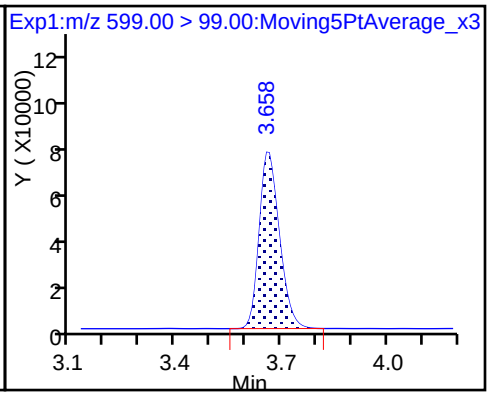
28 N-methyl perfluorooctane sulfonami



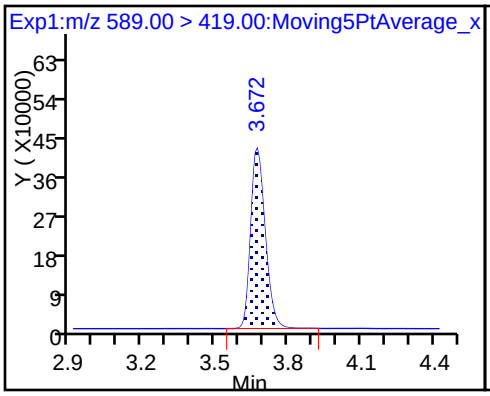
29 Perfluorodecane Sulfonic acid



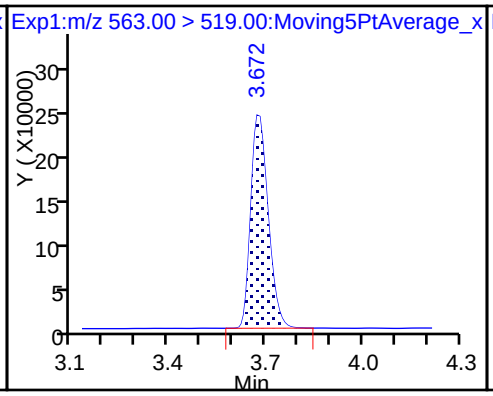
29 Perfluorodecane Sulfonic acid



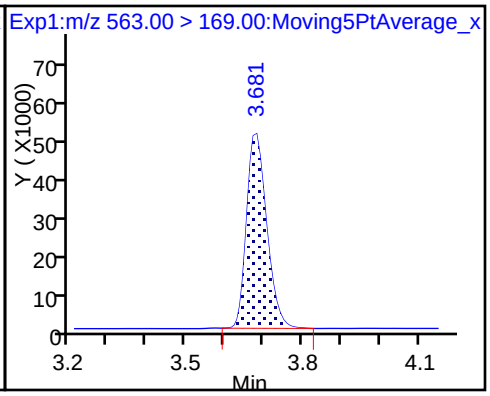
D 32 d5-NEtFOSAA



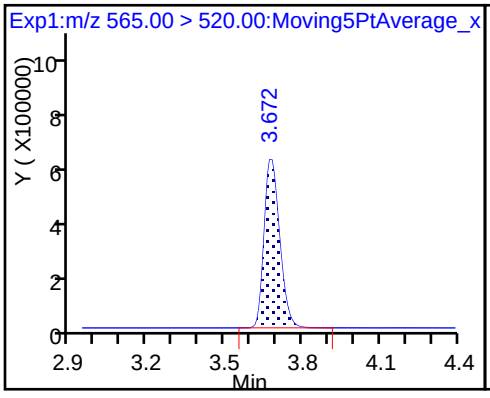
31 Perfluoroundecanoic acid



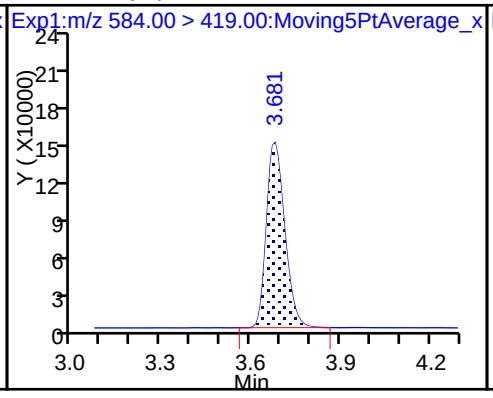
31 Perfluoroundecanoic acid



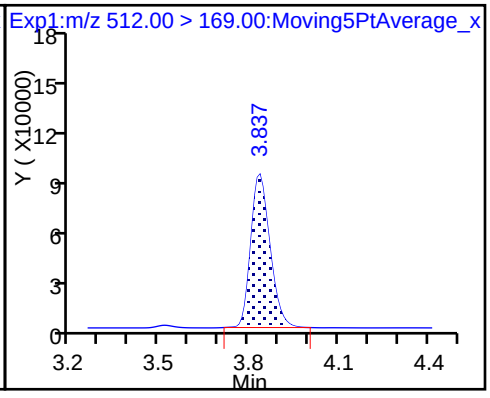
D 30 13C2 PFUnA



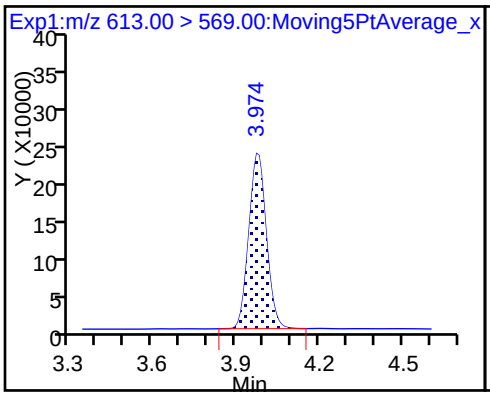
33 N-ethyl perfluorooctane sulfonamid



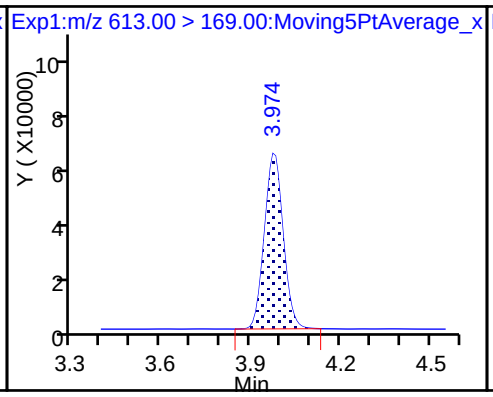
35 MeFOSA



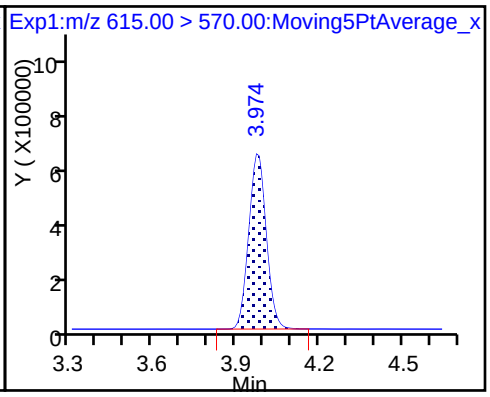
37 Perfluorododecanoic acid



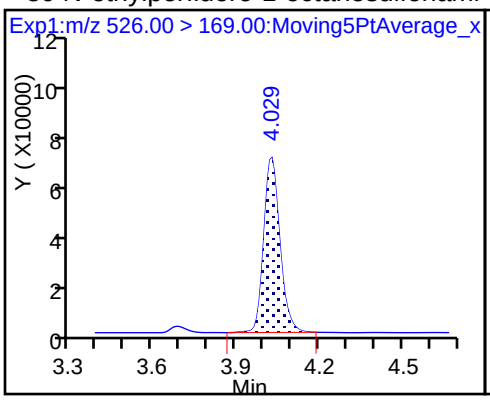
37 Perfluorododecanoic acid



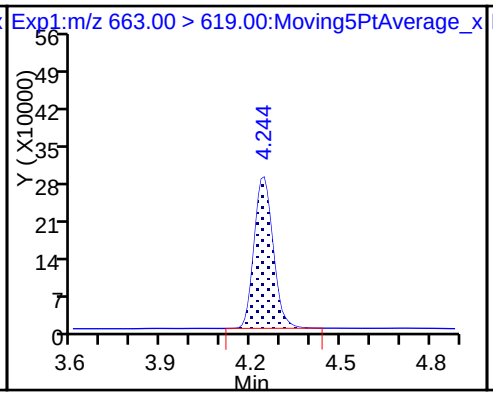
D 36 13C2 PFDoA



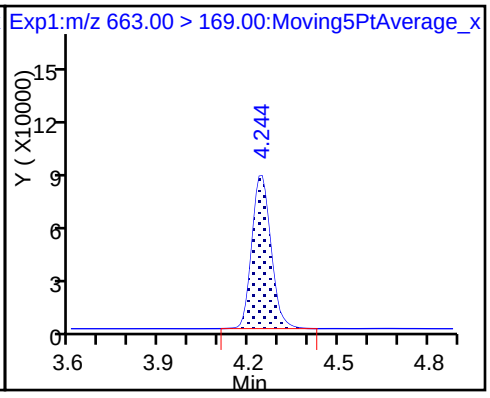
39 N-ethylperfluoro-1-octanesulfonami



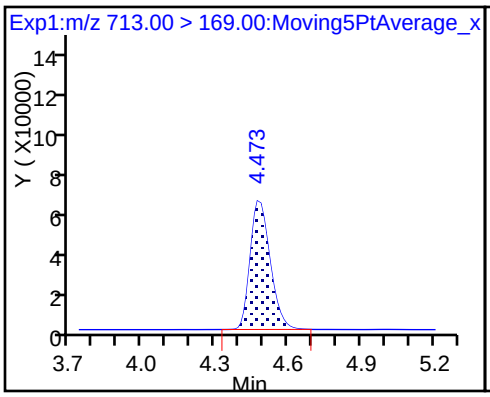
41 Perfluorotridecanoic acid



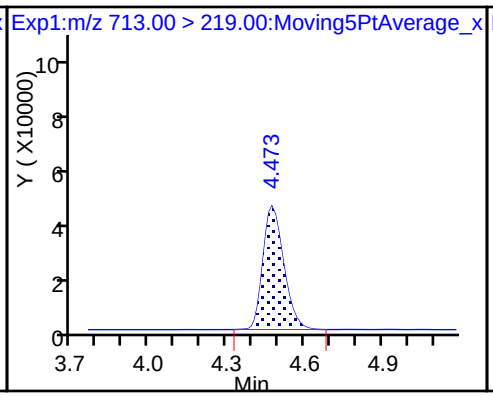
41 Perfluorotridecanoic acid



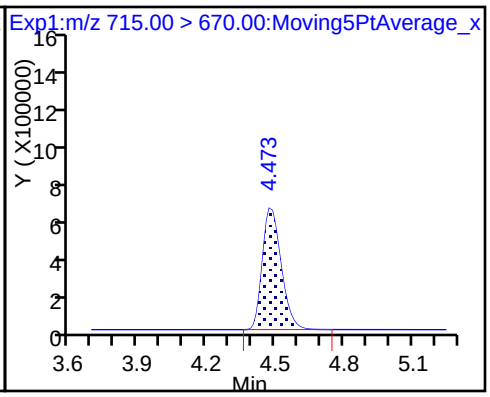
42 Perfluorotetradecanoic acid



42 Perfluorotetradecanoic acid



D 43 13C2-PFTeDA



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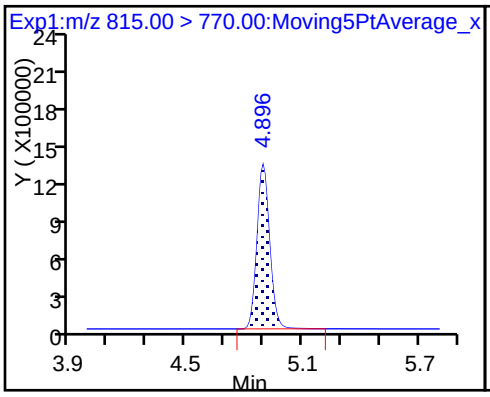
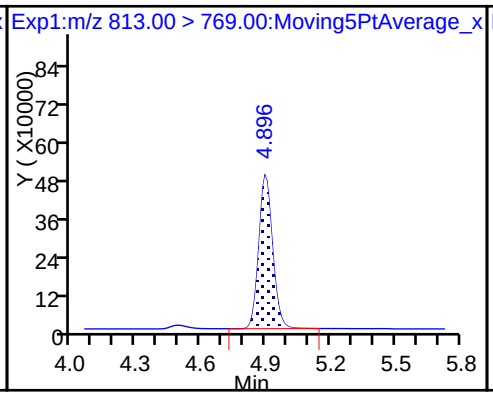
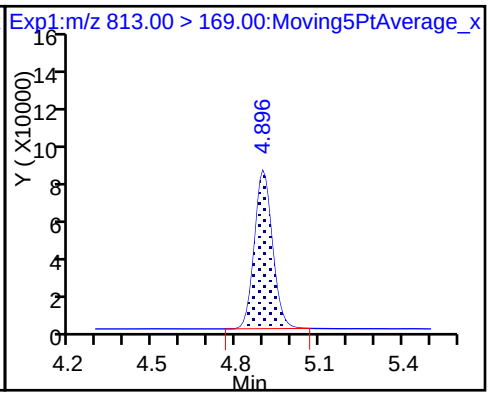


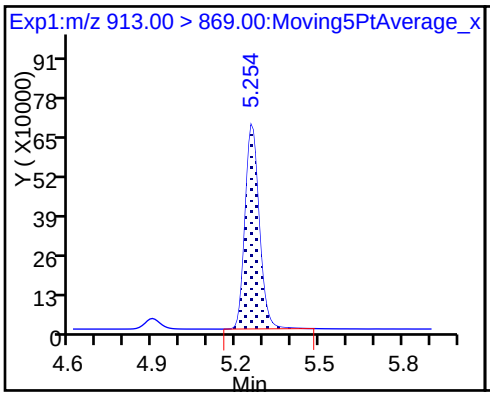
45 Perfluorohexadecanoic acid



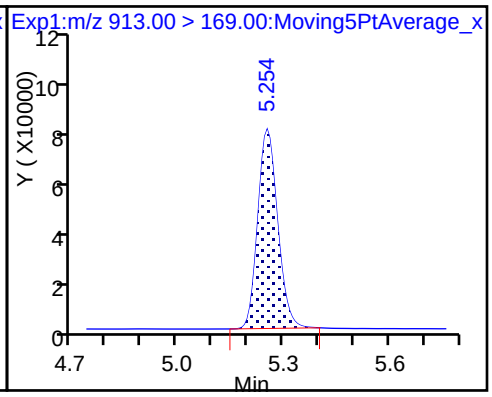
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: | Lab Sample ID: LCS 320-205574/2-A

Matrix: Solid | Lab File ID: 2018.01.26LLA_028.d

Analysis Method: 537 (modified) | Date Collected:

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.00(g) | Date Analyzed: 01/26/2018 16:22

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.82		0.40	0.10	0.025
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.69		0.50	0.10	0.031
375-85-9	Perfluoroheptanoic acid (PFHpA)	1.98		0.50	0.10	0.029
335-67-1	Perfluorooctanoic acid (PFOA)	1.87		0.50	0.20	0.086
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.73		1.0	0.50	0.20
375-95-1	Perfluorononanoic acid (PFNA)	1.95		0.50	0.10	0.036

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	104		25-150
STL01892	13C4-PFHpA	103		25-150
STL00990	13C4 PFOA	103		25-150
STL00991	13C4 PFOS	106		25-150
STL00995	13C5 PFNA	100		25-150
STL02337	13C3-PFBS	95		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_028.d
Lims ID: LCS 320-205574/2-A
Client ID:
Sample Type: LCS
Inject. Date: 26-Jan-2018 16:22:23 ALS Bottle#: 13 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: lcs 320-205574/2-a
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 09:47:21 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 09:47:21

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	1.411	1.411	0.0	0.536	6927604	2.40		95.8	18528	M
2 Perfluorobutyric acid										M
212.90 > 169.00	1.411	1.413	-0.002	1.000	2564710	0.99		99.1	323	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.657	1.659	-0.002	0.630	4179288	2.44		97.6	46332	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.666	1.662	0.004	1.005	1900604	0.9651		96.5	1335	
D 47 13C3-PFBS										
301.90 > 83.00	1.693	1.695	-0.002	0.643	84043	2.22		95.4	2098	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.702	1.697	0.005	1.005	2541707	0.9107		103	8884	
298.90 > 99.00	1.702	1.697	0.005	1.005	1076498		2.36(1.25-3.74)		5542	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.907	1.903	0.004	1.000	569121	1.13		121	25251	
D 7 13C2 PFHxA										
315.00 > 270.00	1.948	1.939	0.009	0.740	4477648	2.43		97.1	51243	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.948	1.939	0.009	1.000	1743724	0.9393		93.9	4210	
313.00 > 119.00	1.948	1.939	0.009	1.000	169404		10.29(5.03-15.10)		2970	
D 9 13C4-PFHpA										
367.00 > 322.00	2.271	2.267	0.004	0.863	4513160	2.57		103	36887	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.271	2.268	0.003	1.000	1966714	0.99		99.1	3002	
363.00 > 169.00	2.271	2.268	0.003	1.000	758775		2.59(1.13-3.40)		5646	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.284	2.280	0.004	1.000	2122840	0.8452		92.9	10705	
399.00 > 99.00	2.284	2.280	0.004	1.000	709844		2.99(1.50-4.49)		4369	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 11 18O2 PFHxS										
403.00 > 84.00	2.284	2.282	0.002	0.868	5334659	2.47		104	41535	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.603	2.596	0.007	1.000	644026	0.9346		98.6	12937	
D 12 M2-6:2FTS										
429.00 > 81.00	2.603	2.597	0.006	0.989	988881	3.05		128	26819	
D 14 13C4 PFOA										
417.00 > 372.00	2.631	2.622	0.009	1.000	4439903	2.58		103	43680	
* 62 13C2-PFOA										
415.00 > 370.00	2.631	2.622	0.009		4779494	2.50			54654	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.631	2.623	0.008	1.000	1941948	0.9329		93.3	734	
413.00 > 169.00	2.631	2.623	0.008	1.000	1016786		1.91(0.84-2.52)		8628	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.638	2.629	0.009	1.000	1808360	0.9212		96.8	22542	
449.00 > 99.00	2.638	2.629	0.009	1.000	500533		3.61(1.94-5.82)		7821	
D 19 13C5 PFNA										
468.00 > 423.00	3.002	2.992	0.010	1.141	3479948	2.49		99.7	30344	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.002	2.992	0.010	1.000	1400187	0.8631		93.0	3896	
499.00 > 99.00	3.002	2.992	0.010	1.000	297397		4.71(2.31-6.93)		2519	
D 18 13C4 PFOS										
503.00 > 80.00	3.002	2.992	0.010	1.141	3463851	2.53		106	33680	
20 Perfluorononanoic acid										
463.00 > 419.00	3.002	2.992	0.010	1.000	1403684	0.9769		97.7	4313	
463.00 > 169.00	3.002	2.992	0.010	1.000	345152		4.07(1.90-5.69)		6872	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.342	3.338	0.004	1.002	1823688	1.01		101	12397	
D 21 13C8 FOSA										
506.00 > 78.00	3.335	3.338	-0.003	1.267	4587987	2.38		95.3	21389	
D 26 M2-8:2FTS										
529.00 > 81.00	3.357	3.342	0.015	1.276	1050882	3.06		128	21805	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.357	3.342	0.015	1.000	506738	0.9490		99.1	11256	
D 23 13C2 PFDA										
515.00 > 470.00	3.365	3.352	0.013	1.279	2992134	2.48		99.3	29405	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.365	3.353	0.012	1.000	1235462	1.06		106	5709	
513.00 > 169.00	3.365	3.353	0.012	1.000	220899		5.59(2.36-7.09)		2492	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.517	3.507	0.010	1.337	1848542	3.07		123	21294	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.524	3.513	0.011	1.002	756406	0.9470		94.7	4765	
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.682	3.666	0.016	1.000	898237	0.9464		98.2	13827	
599.00 > 99.00	3.682	3.666	0.016	1.000	294116		3.05(1.39-4.16)		7169	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.691	3.672	0.019	1.403	1805564	2.97		119	10345	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.699	3.678	0.021	1.000	843828	0.8654		86.5	3417	
563.00 > 169.00	3.699	3.678	0.021	1.000	191640		4.40(0.00-0.00)		7291	
D 30 13C2 PFUnA										
565.00 > 520.00	3.699	3.679	0.020	1.406	2361697	2.58		103	25396	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.699	3.679	0.020	1.002	647944	0.9212		92.1	7544	
35 MeFOSA										
512.00 > 169.00	3.838	3.875	-0.037		445528	NR		0.0	2046	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.991	3.979	0.012	1.000	1061951	1.00		99.7	5378	
613.00 > 169.00	3.991	3.979	0.012	1.000	285649		3.72(2.13-6.40)		11392	
D 36 13C2 PFDoA										
615.00 > 570.00	3.991	3.979	0.012	1.517	2598581	2.62		105	31102	
39 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.030	4.066	-0.036		355320	NR		0.0	1695	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.263	4.242	0.021	1.000	1108195	0.9181		91.8	3509	
663.00 > 169.00	4.254	4.242	0.012	0.998	359973		3.08(1.25-3.76)		15909	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.501	4.483	0.018	1.000	333426	1.01		101	14404	
713.00 > 219.00	4.501	4.483	0.018	1.000	253064		1.32(0.71-2.13)		8692	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.501	4.483	0.018	1.711	3397827	2.62		105	25576	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.923	4.902	0.021	1.871	5506135	2.38		95.3	18665	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.923	4.902	0.021	1.000	2024953	0.9511		95.1	1090	
813.00 > 169.00	4.923	4.902	0.021	1.000	363877		5.56(2.86-8.58)		4623	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.282	5.255	0.027	1.000	2490510	1.07		107	579	
913.00 > 169.00	5.275	5.255	0.020	0.999	310489		8.02(0.00-0.00)		1764	

QC Flag Legend

Processing Flags

NR - Missing Quant Standard

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 09:47:21 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_028.d

Injection Date: 26-Jan-2018 16:22:23 Instrument ID: A8_N

Lims ID: LCS 320-205574/2-A

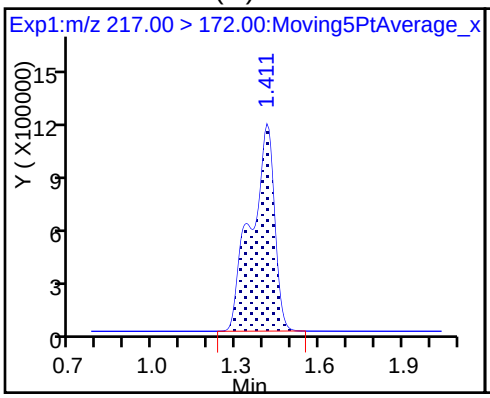
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 13 Worklist Smp#: 3

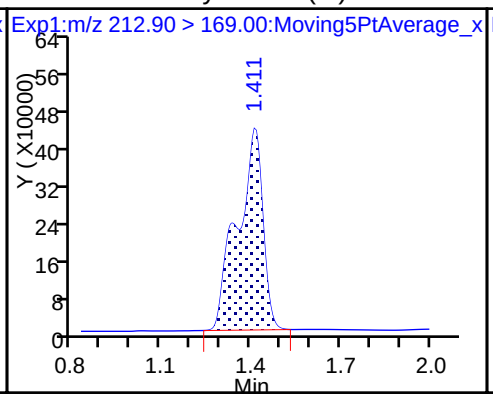
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

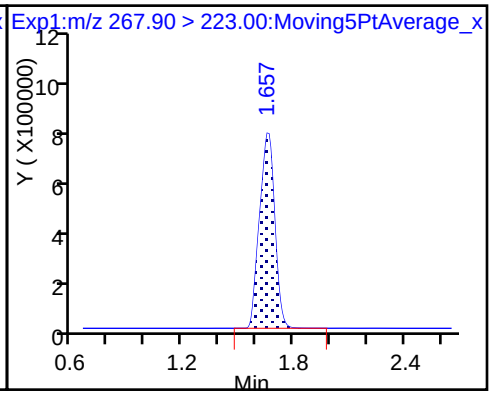
D 1 13C4 PFBA (M)



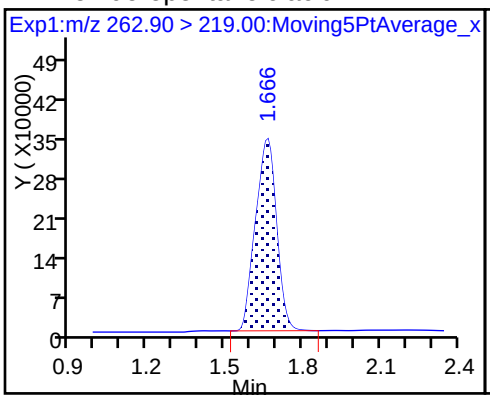
2 Perfluorobutyric acid (M)



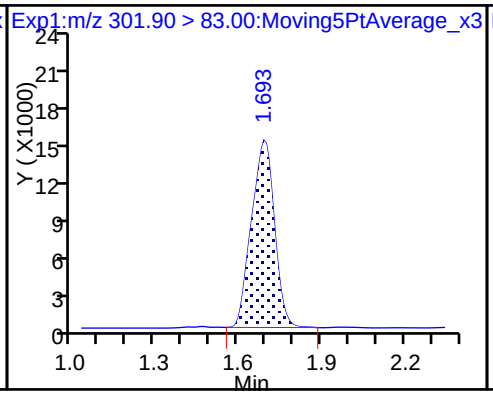
D 3 13C5-PFPeA



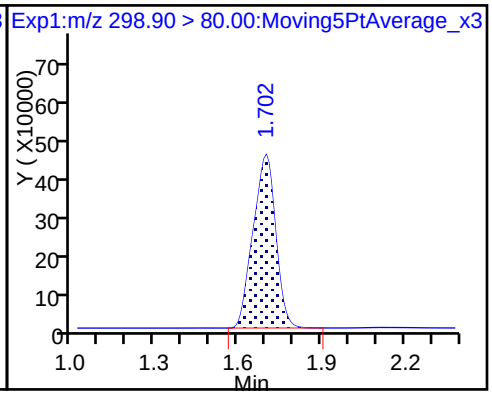
4 Perfluoropentanoic acid



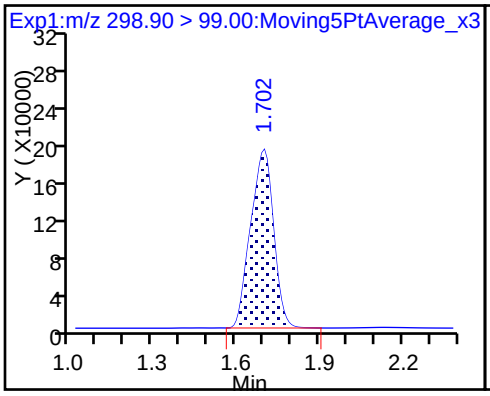
D 47 13C3-PFBS



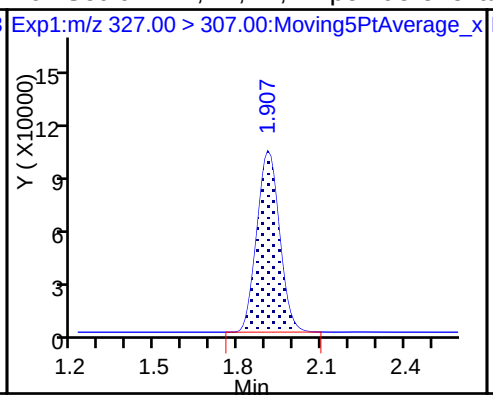
5 Perfluorobutanesulfonic acid



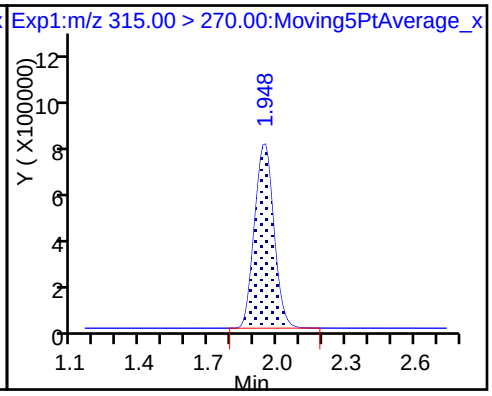
5 Perfluorobutanesulfonic acid



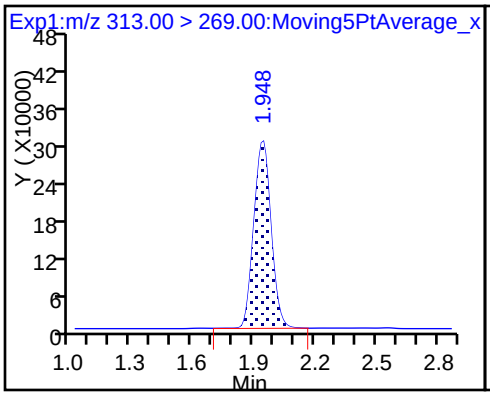
61 Sodium 1H,1H,2H,2H-perfluorohexa



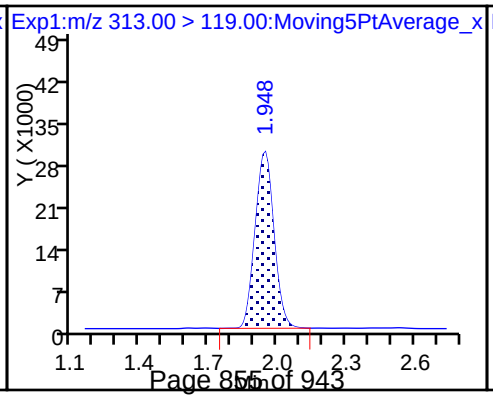
D 7 13C2 PFHxA



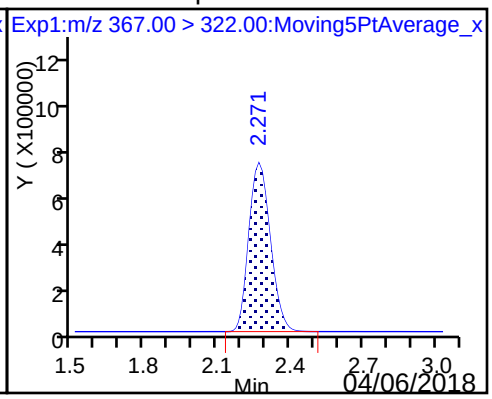
6 Perfluorohexanoic acid



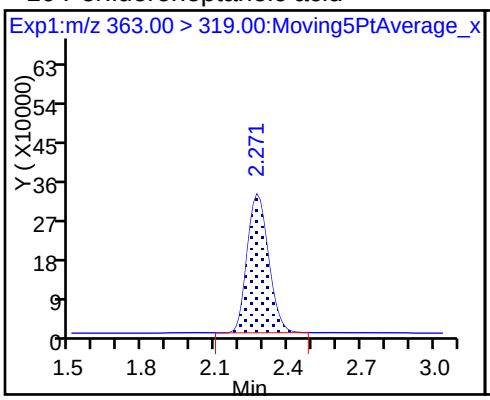
6 Perfluorohexanoic acid



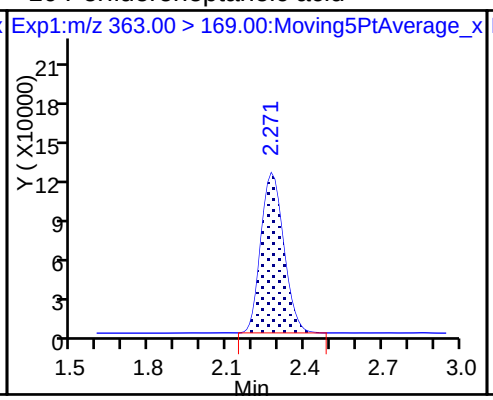
D 9 13C4-PFHpA



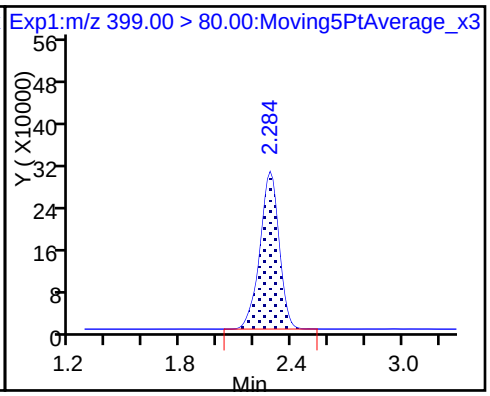
10 Perfluoroheptanoic acid



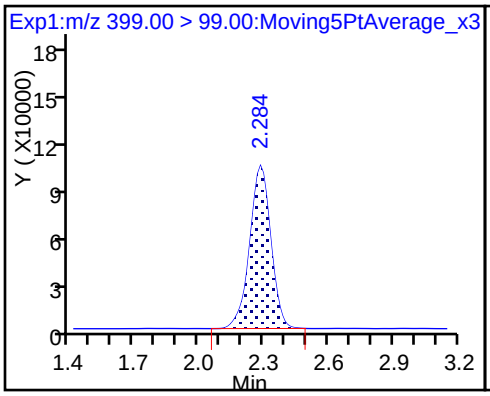
10 Perfluoroheptanoic acid



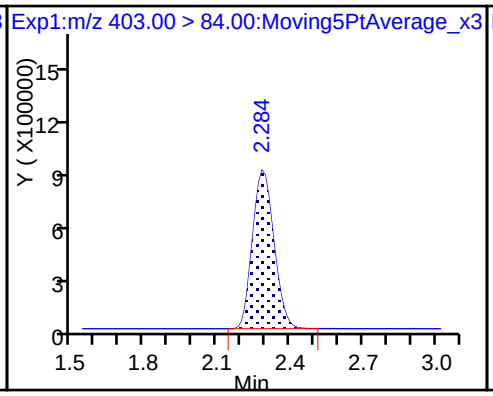
8 Perfluorohexanesulfonic acid



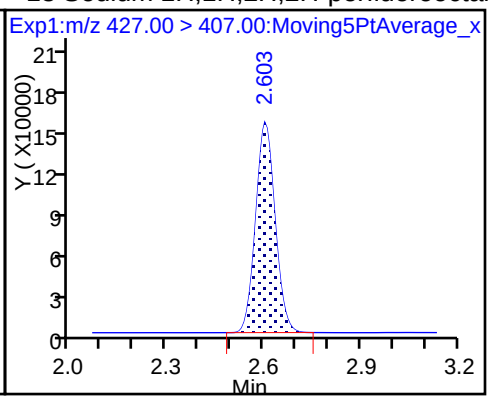
8 Perfluorohexanesulfonic acid



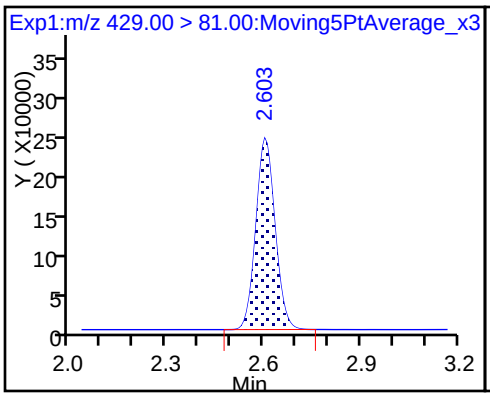
D 11 18O2 PFHxS



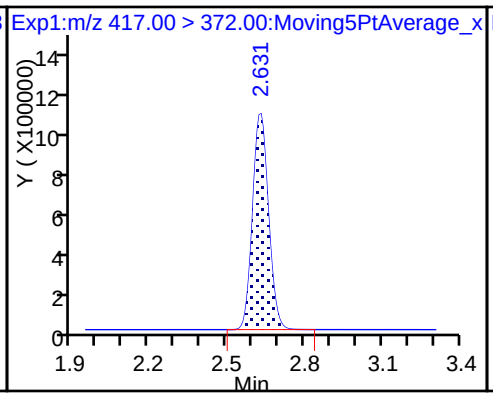
13 Sodium 1H,1H,2H,2H-perfluorooctane



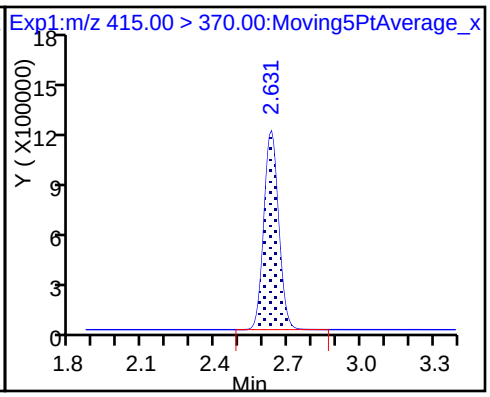
D 12 M2-6:2FTS



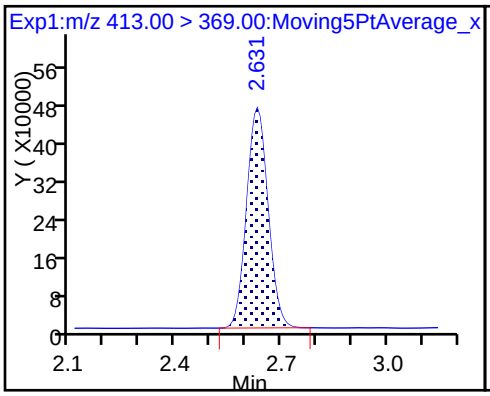
D 14 13C4 PFOA



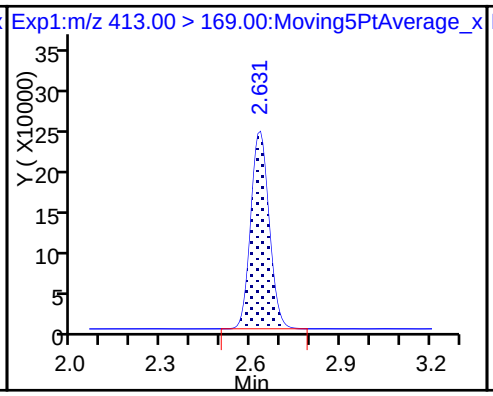
* 62 13C2-PFOA



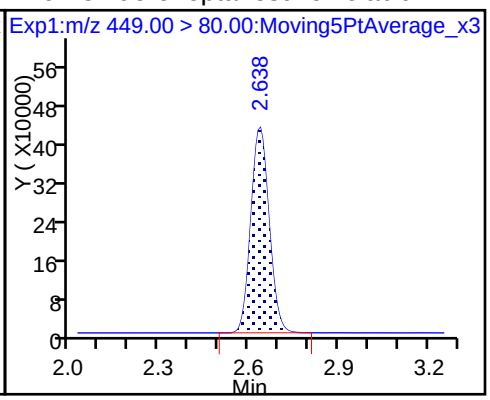
15 Perfluorooctanoic acid



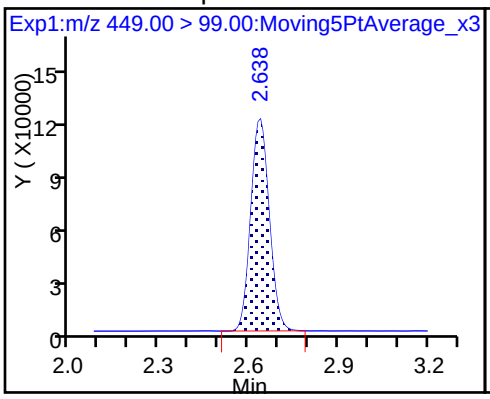
15 Perfluorooctanoic acid



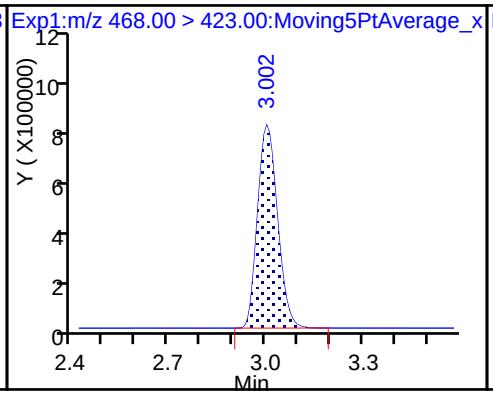
16 Perfluoroheptanesulfonic acid



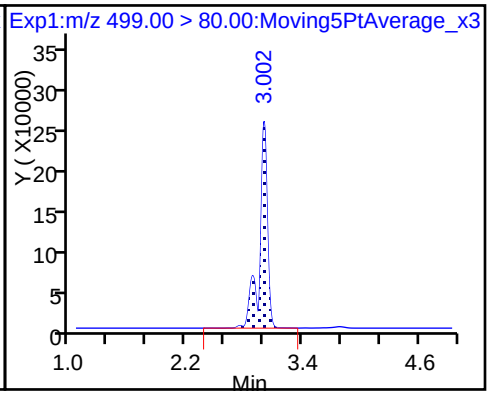
16 Perfluoroheptanesulfonic acid



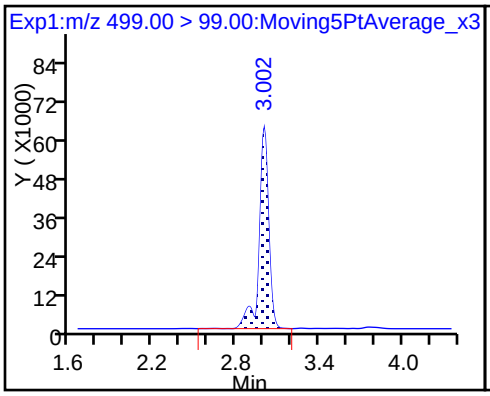
D 19 13C5 PFNA



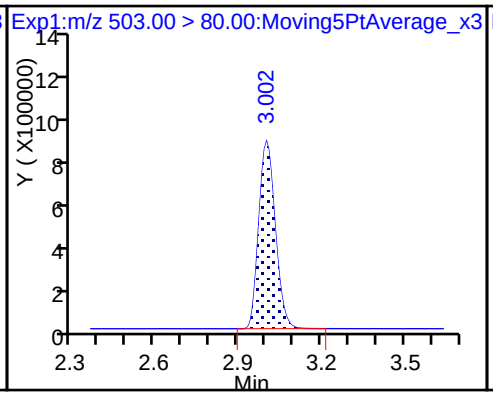
17 Perfluorooctane sulfonic acid



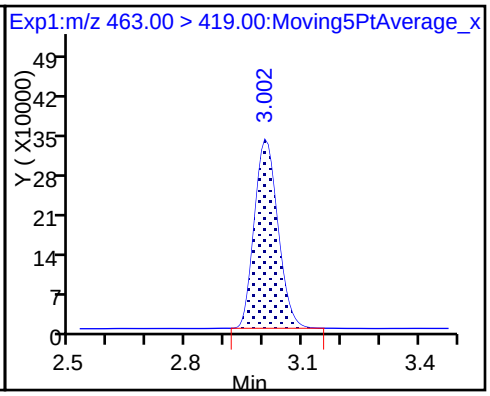
17 Perfluorooctane sulfonic acid



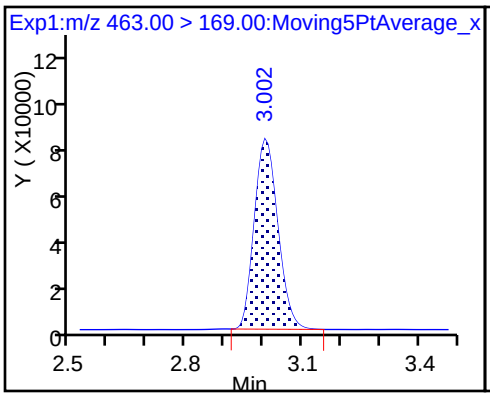
D 18 13C4 PFOS



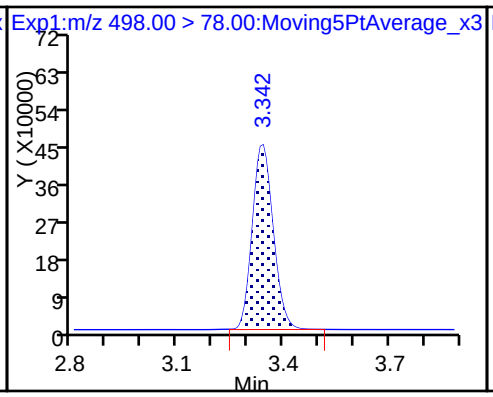
20 Perfluorononanoic acid



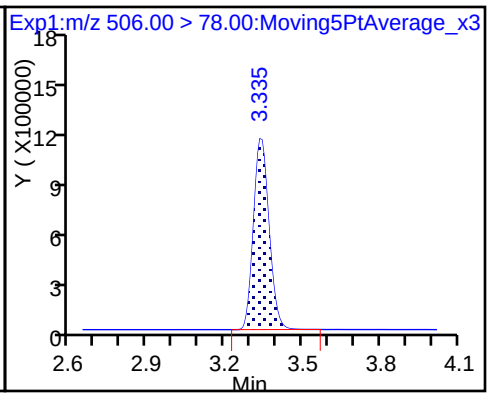
20 Perfluorononanoic acid



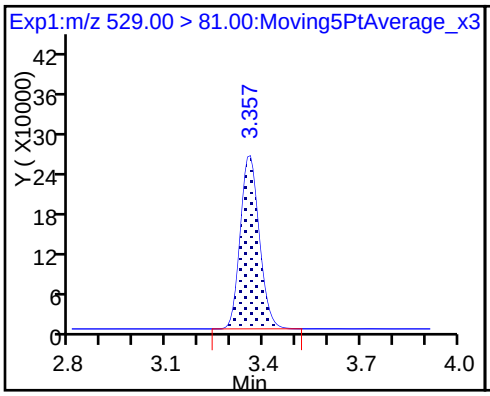
22 Perfluorooctane Sulfonamide



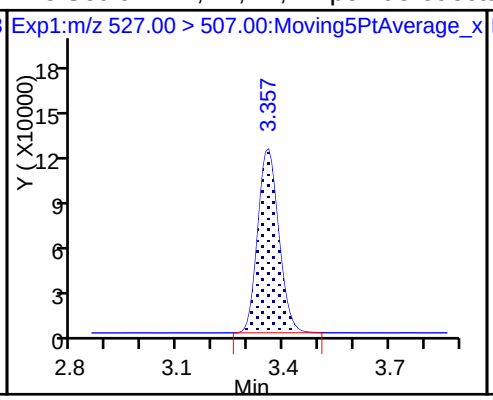
D 21 13C8 FOSA



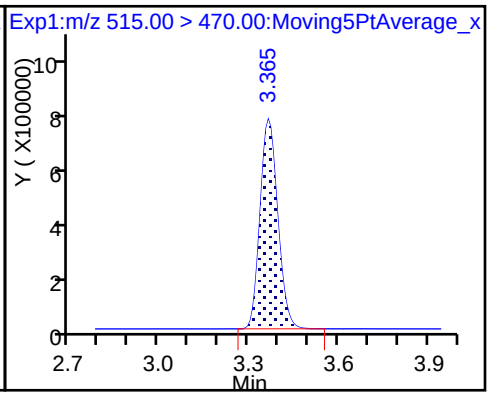
D 26 M2-8:2FTS



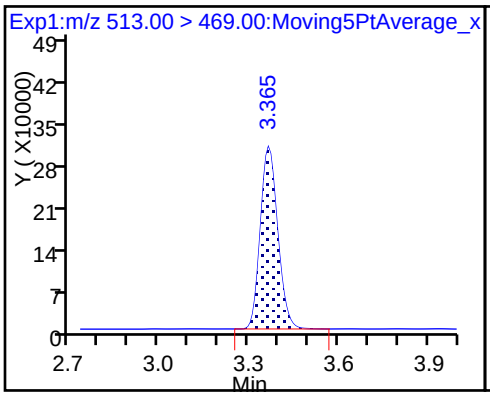
25 Sodium 1H,1H,2H,2H-perfluorodecane



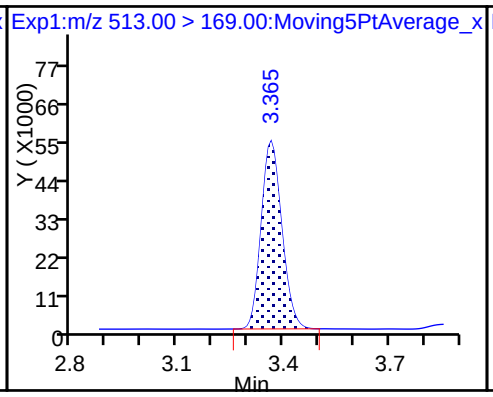
D 23 13C2 PFDA



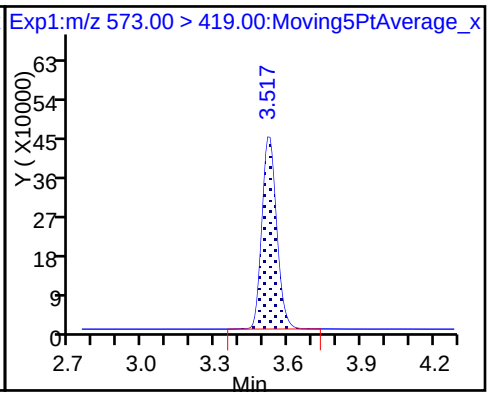
24 Perfluorodecanoic acid



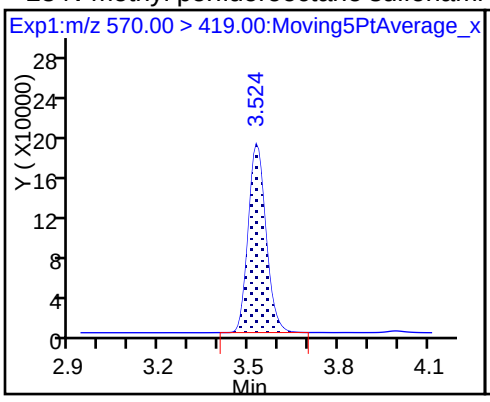
24 Perfluorodecanoic acid



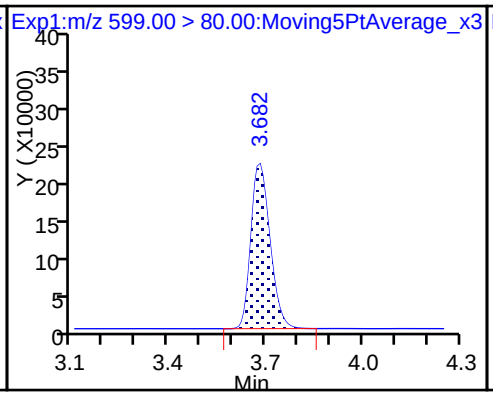
D 27 d3-NMeFOSAA



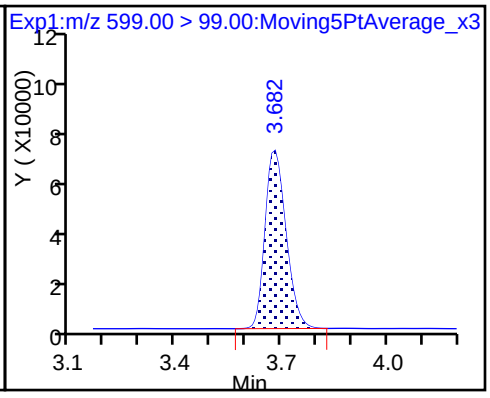
28 N-methyl perfluorooctane sulfonami



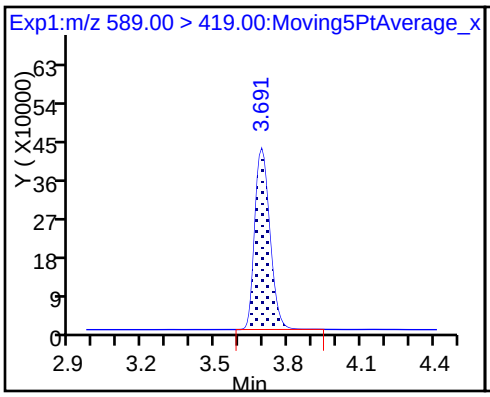
29 Perfluorodecane Sulfonic acid



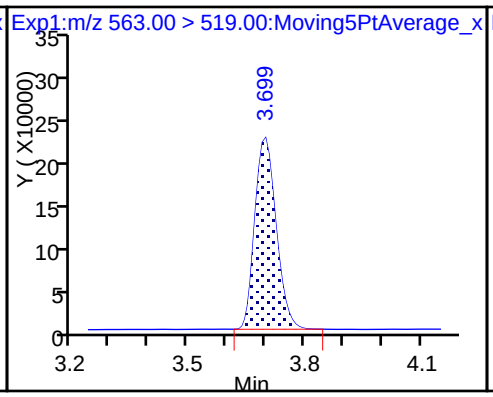
29 Perfluorodecane Sulfonic acid



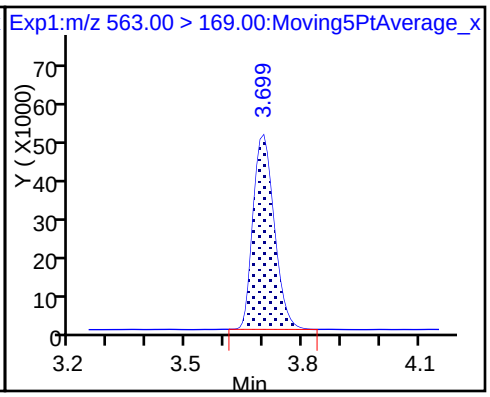
D 32 d5-NEtFOSAA



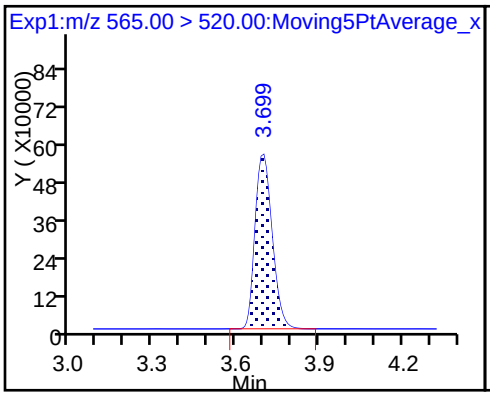
31 Perfluoroundecanoic acid



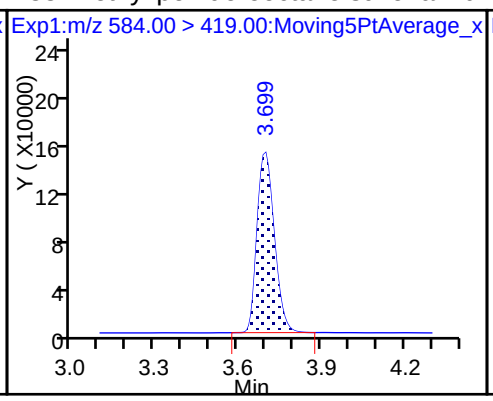
31 Perfluoroundecanoic acid



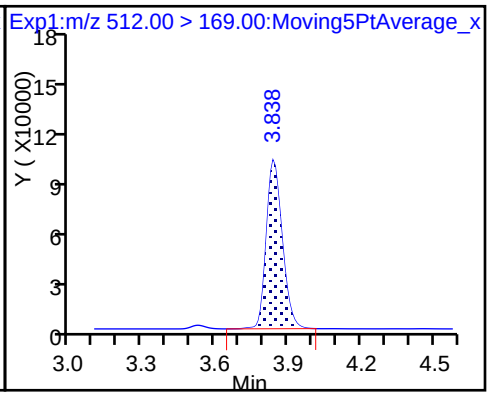
D 30 13C2 PFUnA



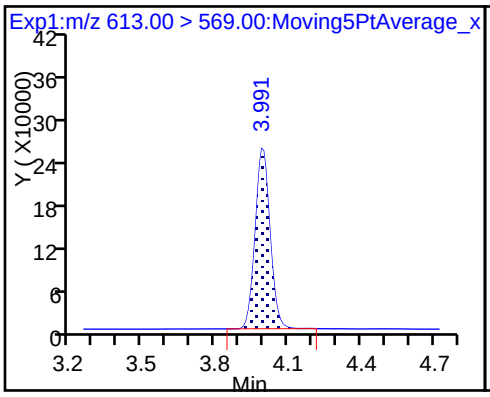
33 N-ethyl perfluorooctane sulfonamid



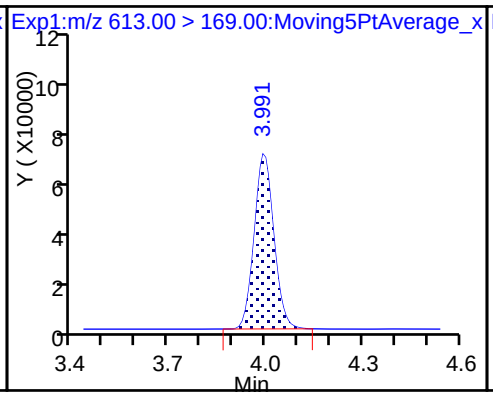
35 MeFOSA



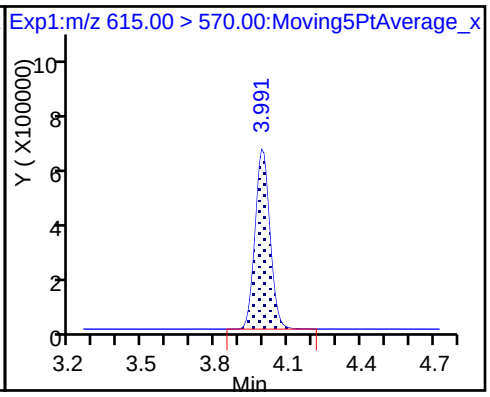
37 Perfluorododecanoic acid



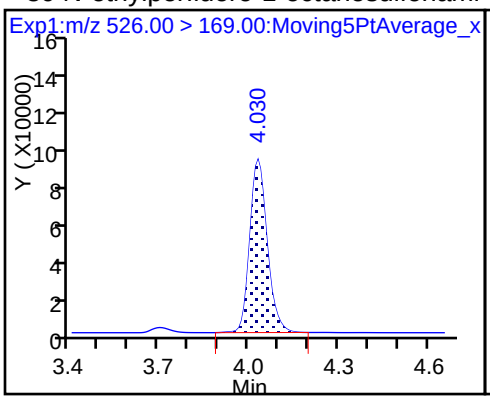
37 Perfluorododecanoic acid



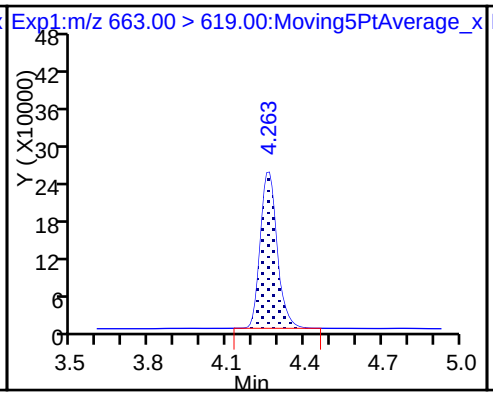
D 36 13C2 PFDoA



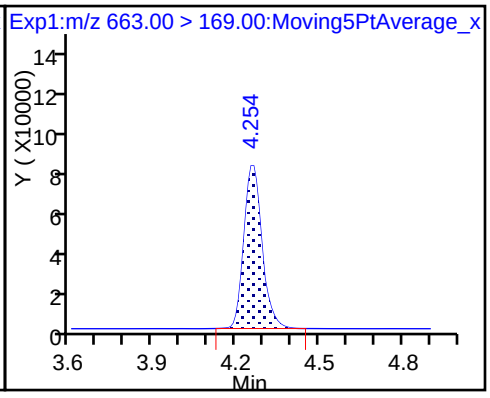
39 N-ethylperfluoro-1-octanesulfonami



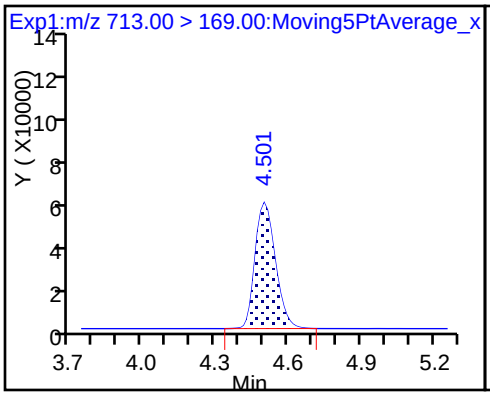
41 Perfluorotridecanoic acid



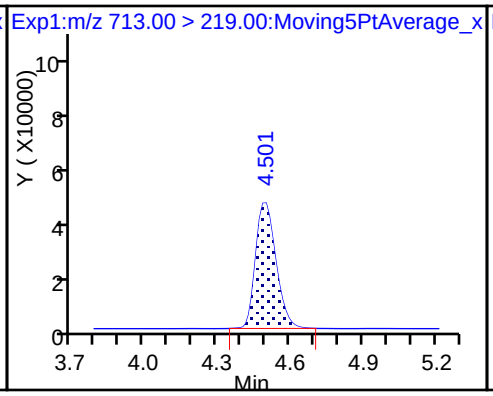
41 Perfluorotridecanoic acid



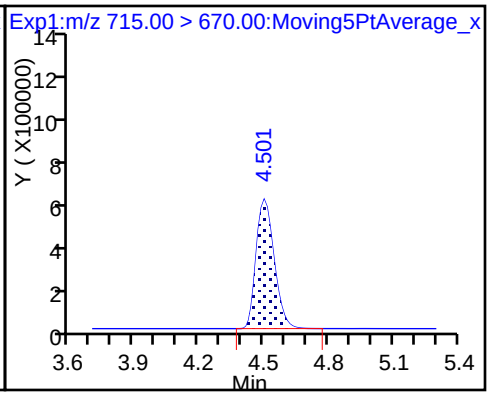
42 Perfluorotetradecanoic acid



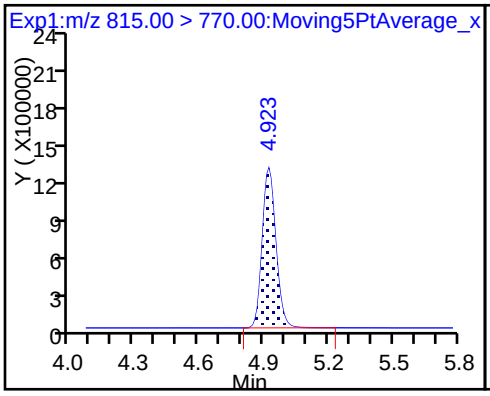
42 Perfluorotetradecanoic acid



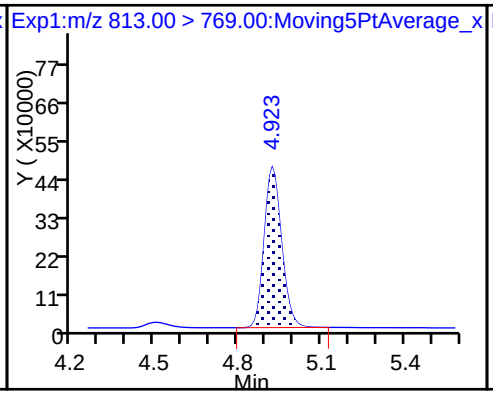
D 43 13C2-PFTeDA



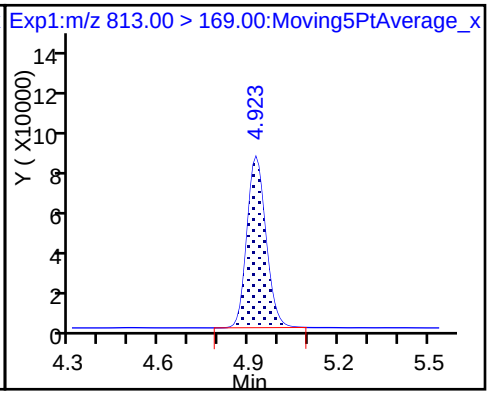
D 44 13C2-PFHxDA



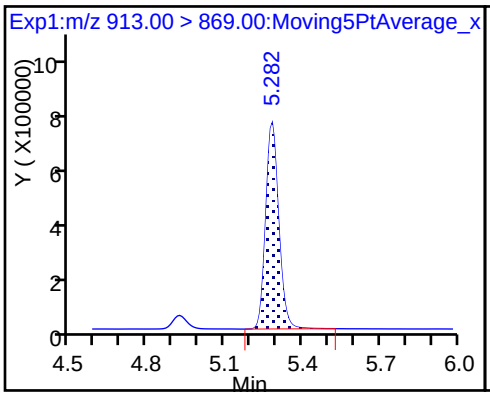
45 Perfluorohexadecanoic acid



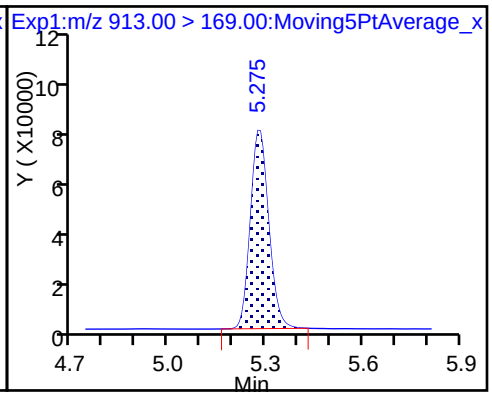
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-03_SO0005 MS | Lab Sample ID: 320-35310-3 MS

Matrix: Solid | Lab File ID: 2018.01.26LLA_030.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 09:20

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.04(g) | Date Analyzed: 01/26/2018 16:38

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 7.6 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.92		0.43	0.11	0.027
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.92		0.54	0.11	0.033
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.20		0.54	0.11	0.031
335-67-1	Perfluorooctanoic acid (PFOA)	2.21		0.54	0.21	0.092
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	2.08		1.1	0.54	0.21
375-95-1	Perfluorononanoic acid (PFNA)	2.15		0.54	0.11	0.039

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	92		25-150
STL01892	13C4-PFHpA	94		25-150
STL00990	13C4 PFOA	95		25-150
STL00991	13C4 PFOS	91		25-150
STL00995	13C5 PFNA	93		25-150
STL02337	13C3-PFBS	93		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_030.d
Lims ID: 320-35310-A-3-B MS
Client ID:
Sample Type: MS
Inject. Date: 26-Jan-2018 16:38:00 ALS Bottle#: 15 Worklist Smp#: 5
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-3-b ms
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 09:57:47 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 09:58:12

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	1.408	1.411	-0.003	0.535	6669424	2.22		88.6	20612	M
2 Perfluorobutyric acid										M
212.90 > 169.00	1.408	1.413	-0.005	1.000	2740003	1.10		110	332	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.654	1.659	-0.005	0.629	4593495	2.58		103	46133	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.654	1.662	-0.008	1.000	2275297	1.05		105	1189	
D 47 13C3-PFBS										
301.90 > 83.00	1.690	1.695	-0.005	0.642	85016	2.16		92.7	731	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.699	1.697	0.002	1.005	2522090	0.8933		101	6706	
298.90 > 99.00	1.699	1.697	0.002	1.005	1088205		2.32(1.25-3.74)		2196	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.904	1.903	0.001	1.000	1648057	3.24		347	2630	
D 60 M2-4:2FTS										
329.00 > 81.00	1.778	1.903	-0.125	0.676	11786	NC			17.9	
D 7 13C2 PFHxA										
315.00 > 270.00	1.945	1.939	0.006	0.739	4680360	2.44		97.5	41722	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.945	1.939	0.006	1.000	1943038	1.00		100	2557	
313.00 > 119.00	1.945	1.939	0.006	1.000	171794		11.31(5.03-15.10)		2764	
D 9 13C4-PFHpA										
367.00 > 322.00	2.267	2.267	0.0	0.862	4305193	2.35		94.2	35733	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.267	2.268	-0.001	1.000	1939412	1.02		102	2914	
363.00 > 169.00	2.267	2.268	-0.001	1.000	790998		2.45(1.13-3.40)		5486	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.280	2.280	0.0	1.000	2068568	0.8925		98.1	8260	
399.00 > 99.00	2.280	2.280	0.0	1.000	657562		3.15(1.50-4.49)		2351	
D 11 18O2 PFHxS										
403.00 > 84.00	2.280	2.282	-0.002	0.867	4923060	2.19		92.5	47615	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.602	2.596	0.006	1.000	803626	0.9792		103	13887	
D 12 M2-6:2FTS										
429.00 > 81.00	2.602	2.597	0.005	0.989	1177704	3.48		147	11383	
D 14 13C4 PFOA										
417.00 > 372.00	2.630	2.622	0.008	1.000	4268574	2.38		95.3	42957	
* 62 13C2-PFOA										
415.00 > 370.00	2.630	2.622	0.008		4975537	2.50			52475	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.630	2.623	0.007	1.000	2060902	1.03		103	1306	
413.00 > 169.00	2.630	2.623	0.007	1.000	1092279		1.89(0.84-2.52)		8239	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.637	2.629	0.008	1.000	1682344	0.9565		100	18647	
449.00 > 99.00	2.637	2.629	0.008	1.000	456585		3.68(1.94-5.82)		5845	
D 19 13C5 PFNA										
468.00 > 423.00	3.001	2.992	0.009	1.141	3392932	2.34		93.4	33334	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.001	2.992	0.009	1.000	1409601	0.9697		104	3240	
499.00 > 99.00	3.001	2.992	0.009	1.000	316391		4.46(2.31-6.93)		2138	
D 18 13C4 PFOS										
503.00 > 80.00	3.001	2.992	0.009	1.141	3103553	2.18		91.2	24761	
20 Perfluorononanoic acid										
463.00 > 419.00	3.001	2.992	0.009	1.000	1404516	1.00		100	3591	
463.00 > 169.00	3.001	2.992	0.009	1.000	333769		4.21(1.90-5.69)		4726	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.340	3.338	0.002	1.000	1671798	0.9880		98.8	12256	
D 21 13C8 FOSA										
506.00 > 78.00	3.340	3.338	0.002	1.270	4306559	2.15		86.0	29201	
D 26 M2-8:2FTS										
529.00 > 81.00	3.363	3.342	0.021	1.278	1370829	3.84		160	16460	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.355	3.342	0.013	0.998	702210	1.01		105	17528	
D 23 13C2 PFDA										
515.00 > 470.00	3.363	3.352	0.011	1.278	3278521	2.61		104	43536	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.370	3.353	0.017	1.002	1206459	0.9482		94.8	2896	
513.00 > 169.00	3.370	3.353	0.017	1.002	224158		5.38(2.36-7.09)		2809	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.522	3.507	0.015	1.339	2092591	3.34		134	25747	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.522	3.513	0.009	1.000	810605	0.8965		89.6	5531	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.680	3.666	0.014	1.000	832067	0.9784		101	13676	
599.00 > 99.00	3.680	3.666	0.014	1.000	278204		2.99(1.39-4.16)		6837	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.689	3.672	0.017	1.402	1892897	2.99		120	10168	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.697	3.678	0.019	1.000	839756	0.8455		84.5	2836	
563.00 > 169.00	3.697	3.678	0.019	1.000	180625		4.65(0.00-0.00)		11935	
D 30 13C2 PFUnA										
565.00 > 520.00	3.697	3.679	0.018	1.406	2405680	2.53		101	40606	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.697	3.679	0.018	1.002	667492	0.9052		90.5	9013	
35 MeFOSA										
512.00 > 169.00	3.836	3.875	-0.039		278986	NR		0.0	1328	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.989	3.979	0.010	1.000	1131740	1.09		109	3619	
613.00 > 169.00	3.989	3.979	0.010	1.000	270724		4.18(2.13-6.40)		9354	
D 36 13C2 PFDoA										
615.00 > 570.00	3.989	3.979	0.010	1.517	2543521	2.46		98.5	32022	
39 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.028	4.066	-0.038		277995	NR		0.0	1424	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.252	4.242	0.010	1.000	1251629	1.06		106	3663	
663.00 > 169.00	4.252	4.242	0.010	1.000	386302		3.24(1.25-3.76)		17415	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.500	4.483	0.017	1.000	331747	1.00		100	6412	
713.00 > 219.00	4.486	4.483	0.003	0.997	238129		1.39(0.71-2.13)		8408	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.500	4.483	0.017	1.711	3393034	2.51		101	24455	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.913	4.902	0.011	1.868	5290834	2.20		87.9	14799	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.913	4.902	0.011	1.000	2008220	0.9822		98.2	960	
813.00 > 169.00	4.913	4.902	0.011	1.000	358953		5.59(2.86-8.58)		4789	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.274	5.255	0.019	1.000	2280334	1.02		102	517	
913.00 > 169.00	5.274	5.255	0.019	1.000	286644		7.96(0.00-0.00)		1481	

QC Flag Legend

Processing Flags

NR - Missing Quant Standard

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 09:58:12 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_030.d

Injection Date: 26-Jan-2018 16:38:00 Instrument ID: A8_N

Lims ID: 320-35310-A-3-B MS

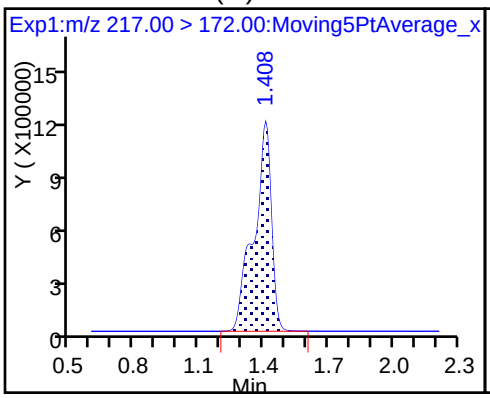
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 15 Worklist Smp#: 5

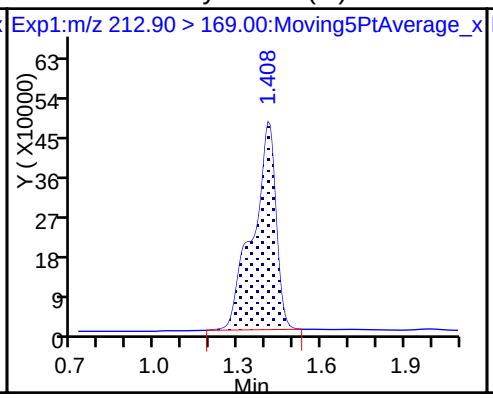
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

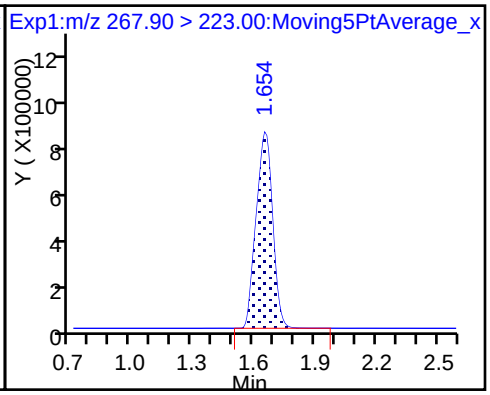
D 1 13C4 PFBA (M)



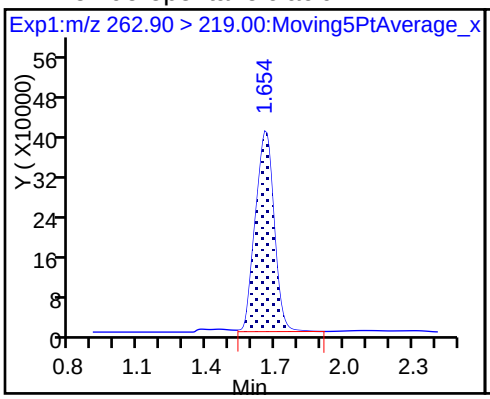
2 Perfluorobutyric acid (M)



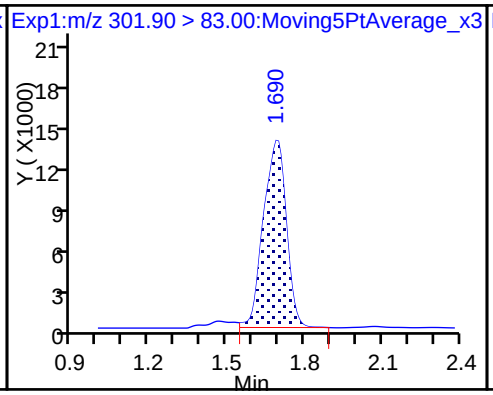
D 3 13C5-PFPeA



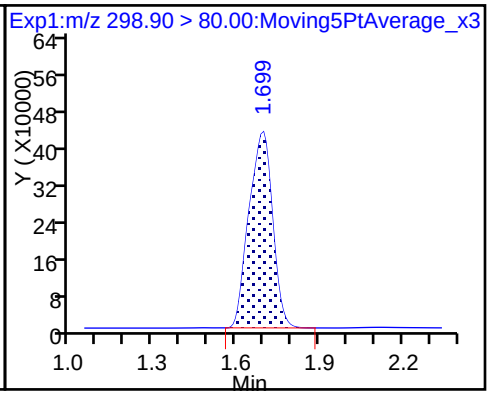
4 Perfluoropentanoic acid



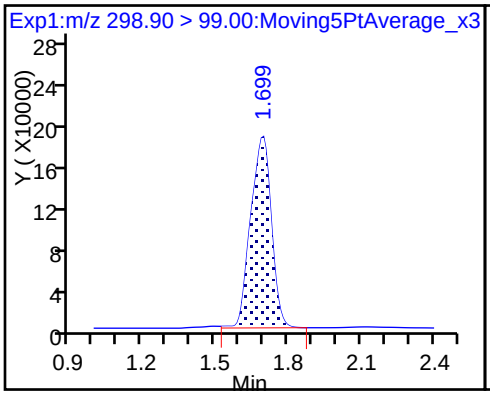
D 47 13C3-PFBS



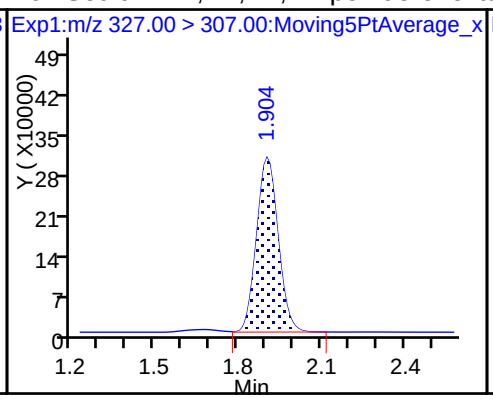
5 Perfluorobutanesulfonic acid



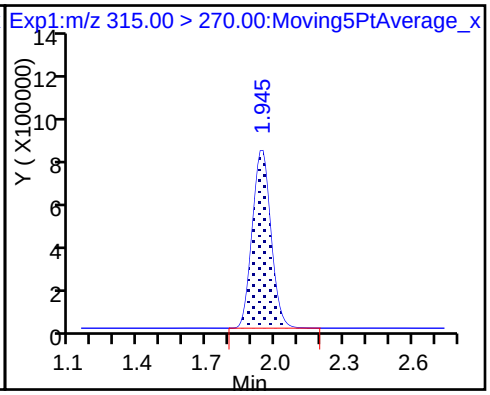
5 Perfluorobutanesulfonic acid



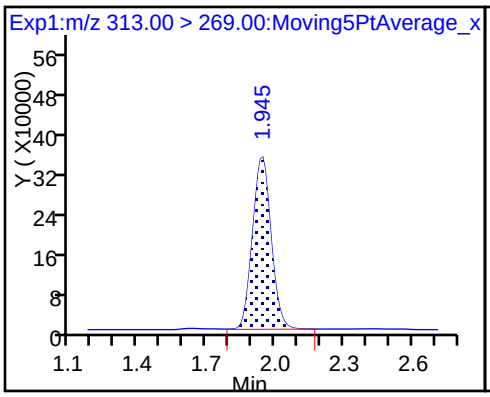
61 Sodium 1H,1H,2H,2H-perfluorohexa



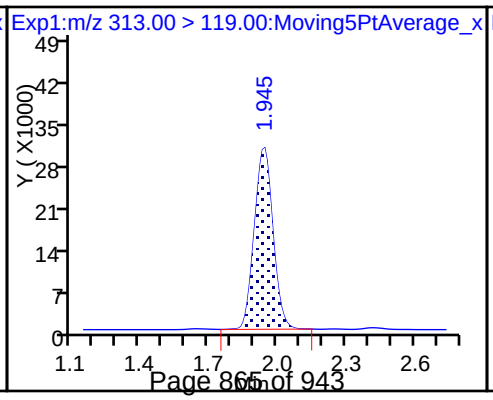
D 7 13C2 PFHxA



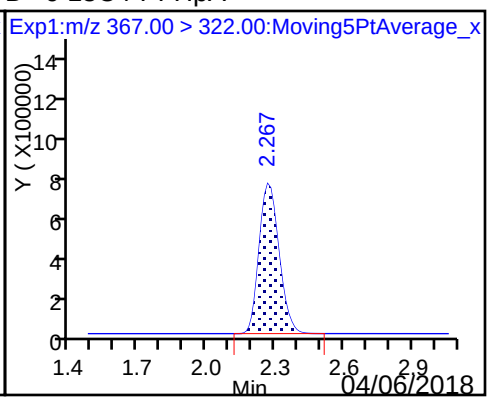
6 Perfluorohexanoic acid



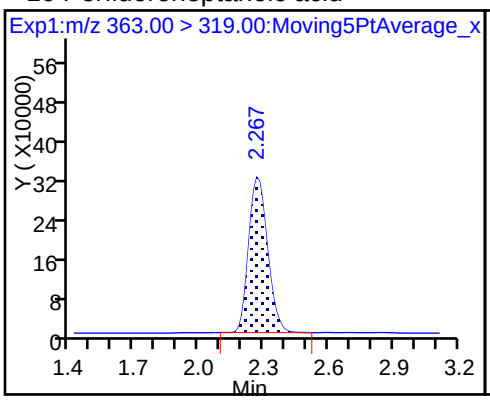
6 Perfluorohexanoic acid



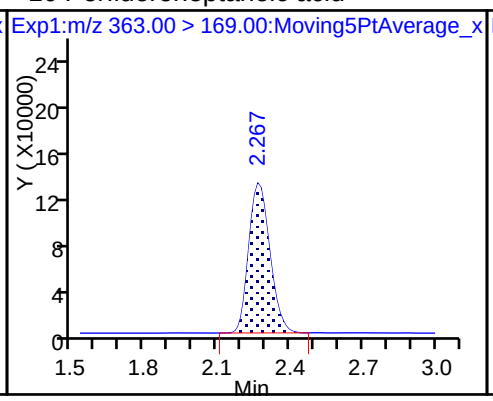
D 9 13C4-PFHpA



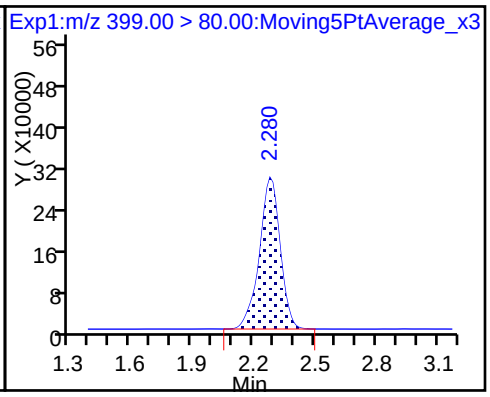
10 Perfluoroheptanoic acid



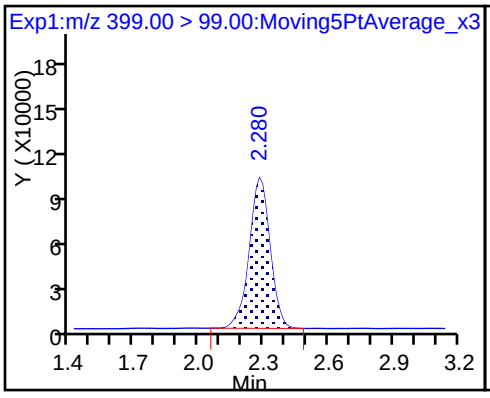
10 Perfluoroheptanoic acid



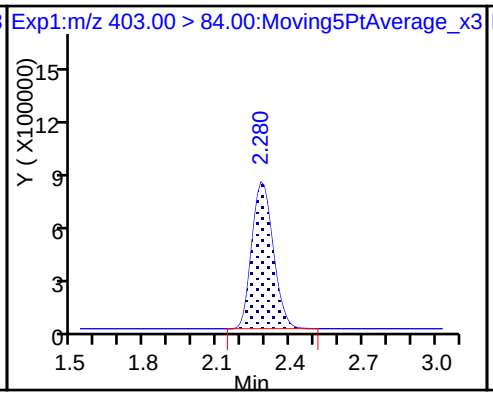
8 Perfluorohexanesulfonic acid



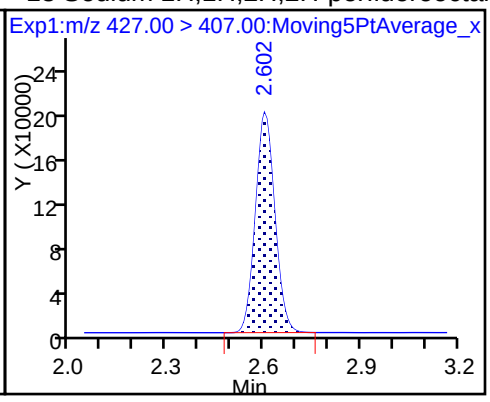
8 Perfluorohexanesulfonic acid



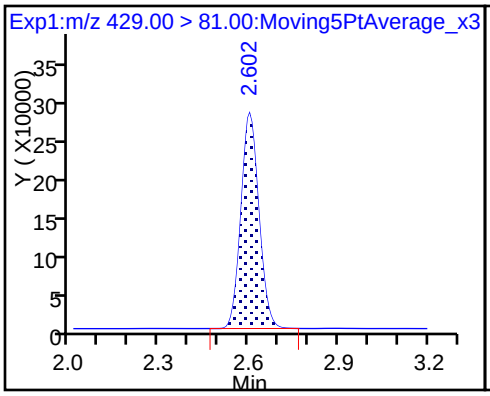
D 11 18O2 PFHxS



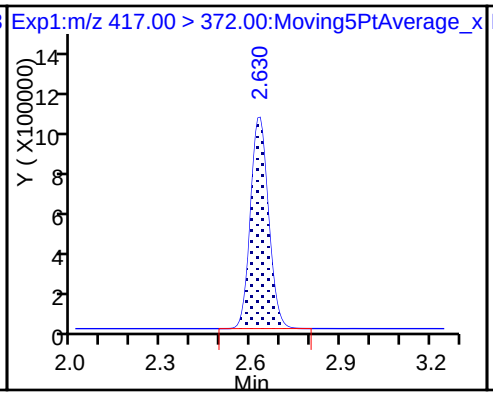
13 Sodium 1H,1H,2H,2H-perfluorooctane



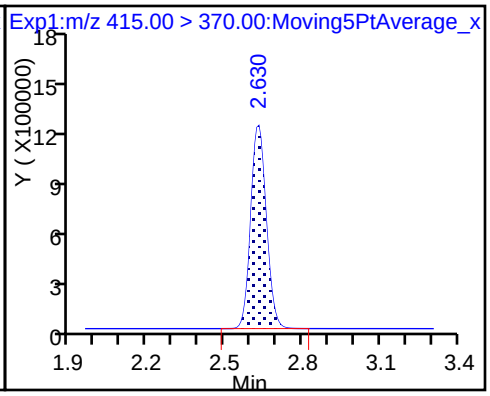
D 12 M2-6:2FTS



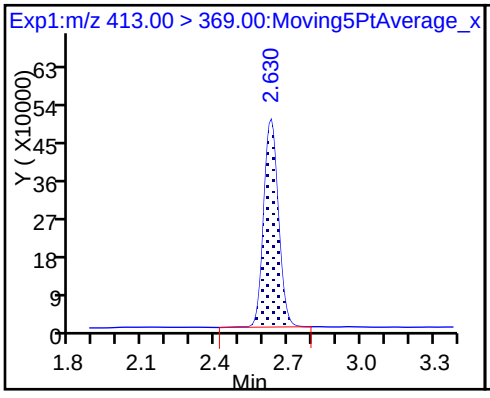
D 14 13C4 PFOA



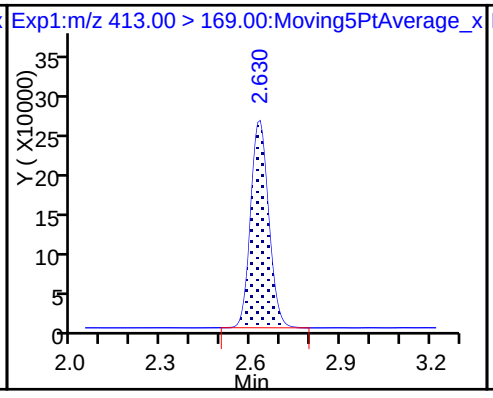
* 62 13C2-PFOA



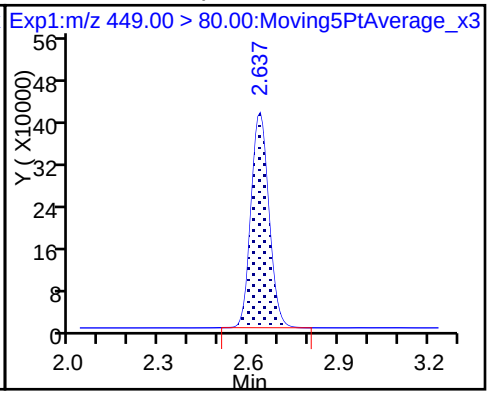
15 Perfluorooctanoic acid



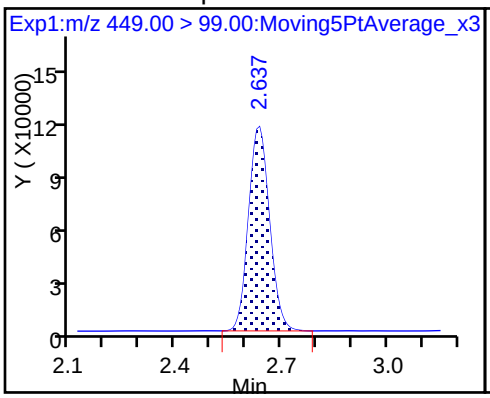
15 Perfluorooctanoic acid



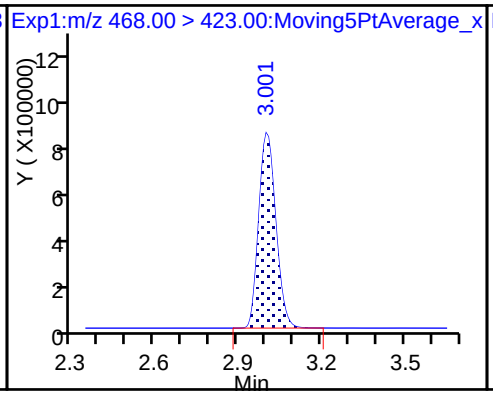
16 Perfluoroheptanesulfonic acid



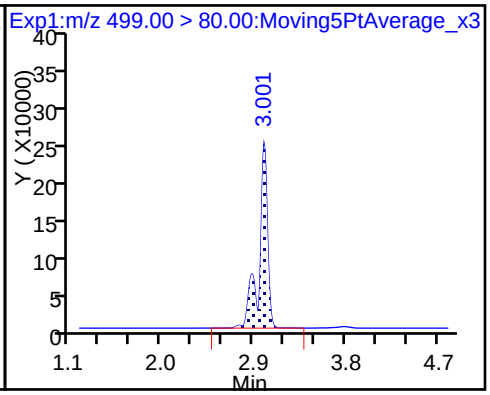
16 Perfluoroheptanesulfonic acid



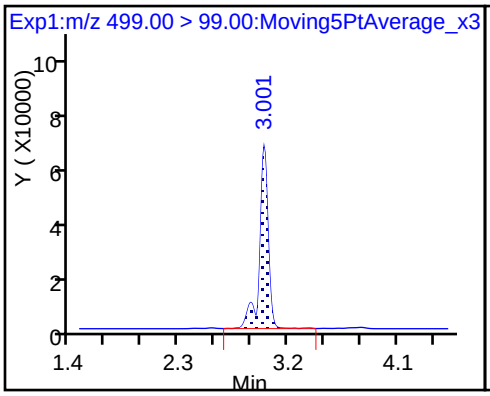
D 19 13C5 PFNA



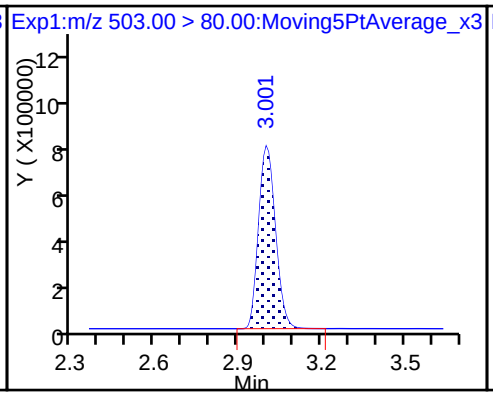
17 Perfluorooctane sulfonic acid



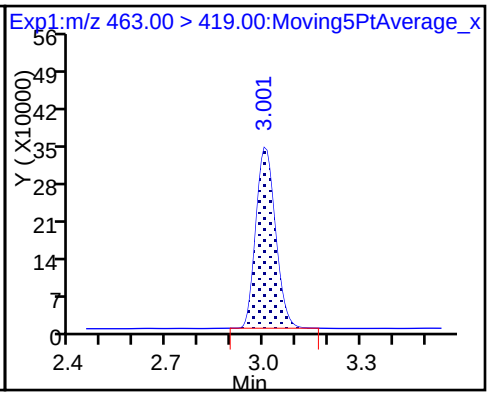
17 Perfluorooctane sulfonic acid



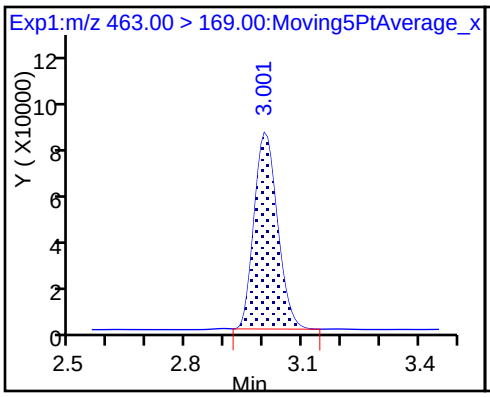
D 18 13C4 PFOS



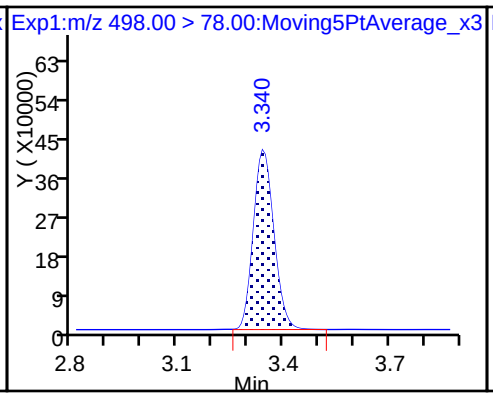
20 Perfluorononanoic acid



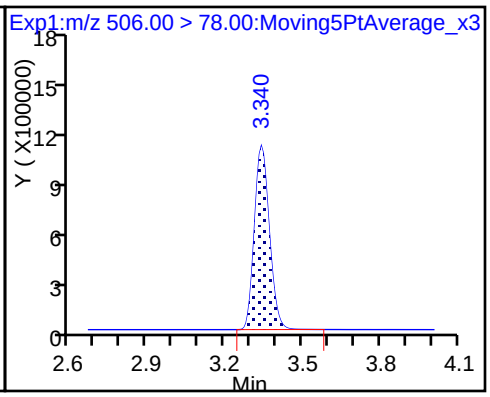
20 Perfluorononanoic acid



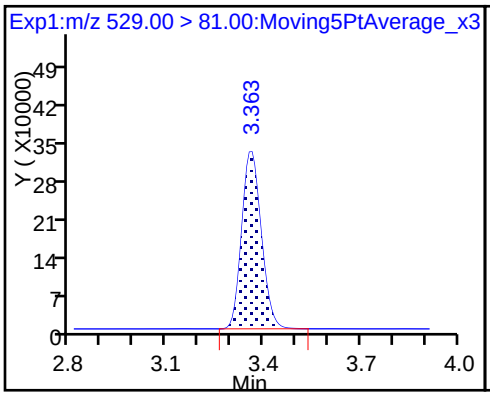
22 Perfluorooctane Sulfonamide



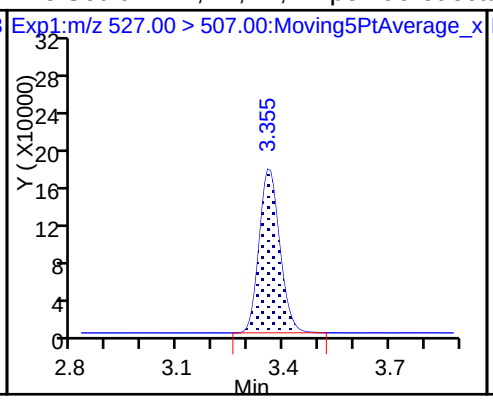
D 21 13C8 FOSA



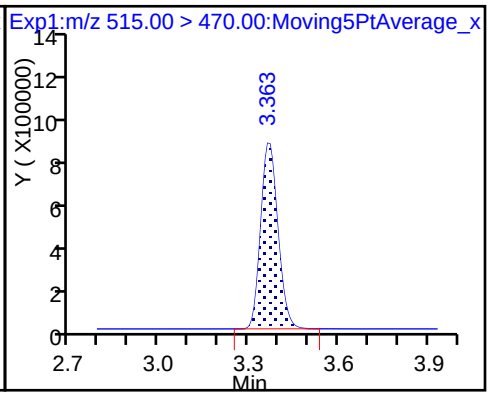
D 26 M2-8:2FTS



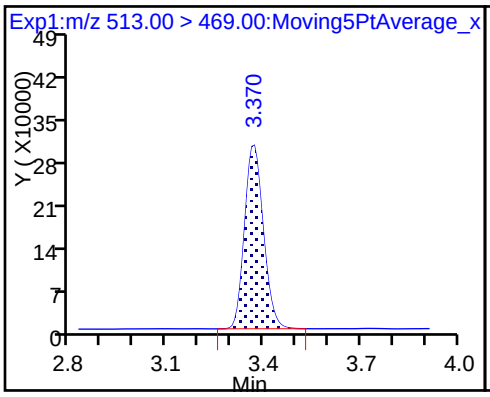
25 Sodium 1H,1H,2H,2H-perfluorodecane



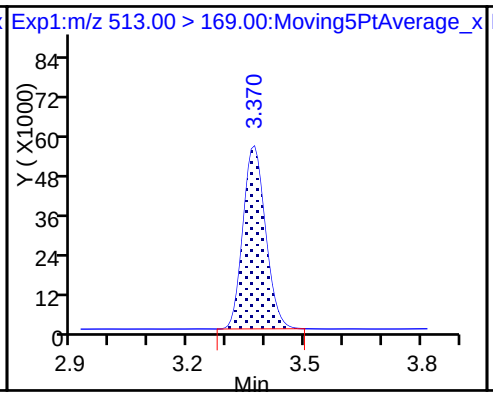
D 23 13C2 PFDA



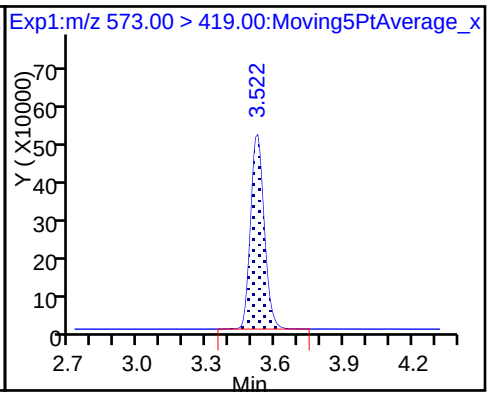
24 Perfluorodecanoic acid



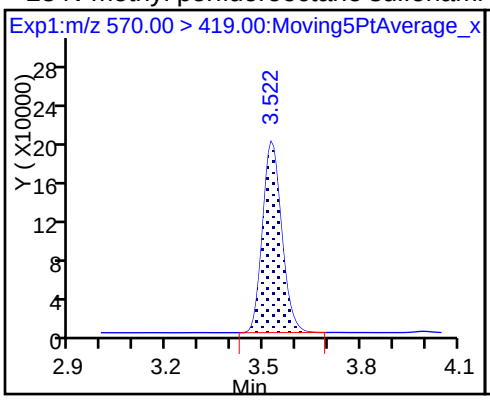
24 Perfluorodecanoic acid



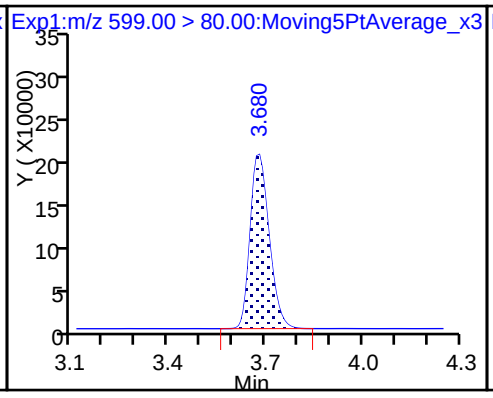
D 27 d3-NMeFOSAA



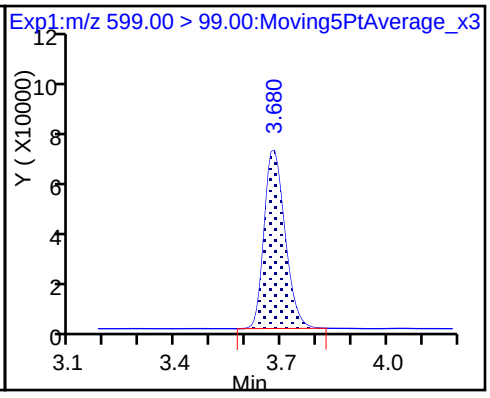
28 N-methyl perfluorooctane sulfonami



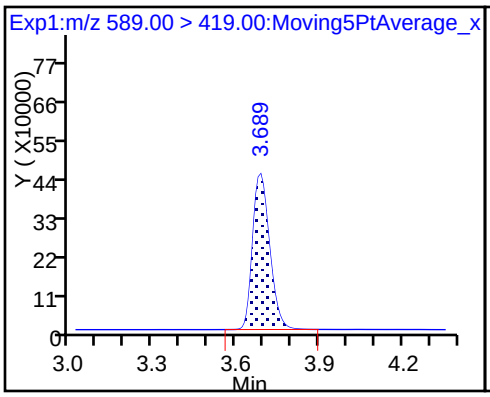
29 Perfluorodecane Sulfonic acid



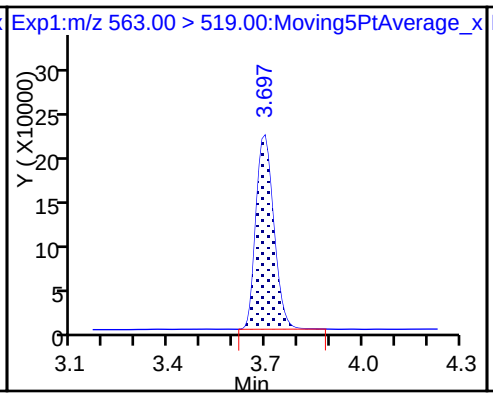
29 Perfluorodecane Sulfonic acid



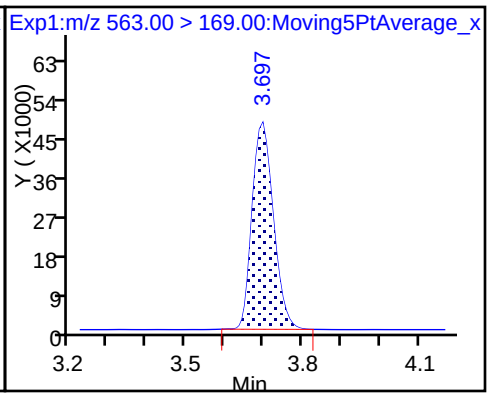
D 32 d5-NEtFOSAA



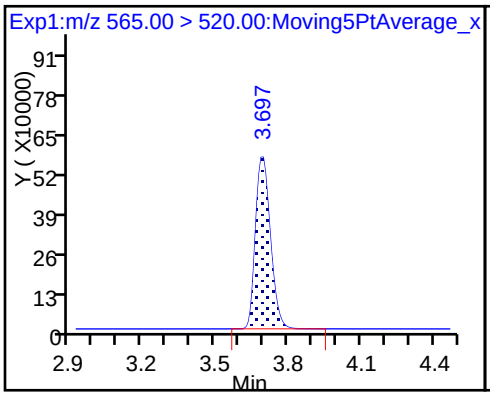
31 Perfluoroundecanoic acid



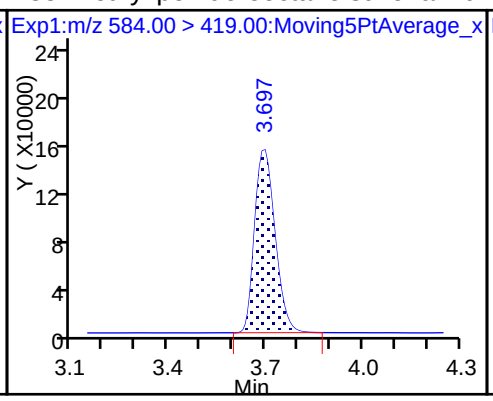
31 Perfluoroundecanoic acid



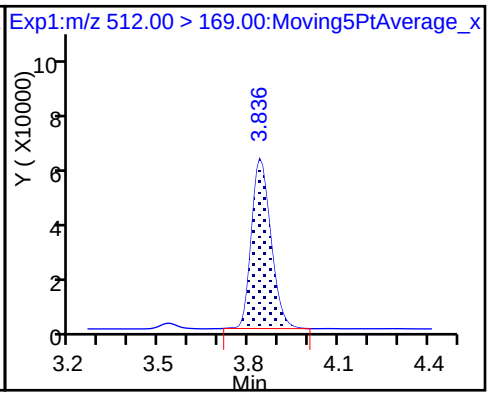
D 30 13C2 PFUnA



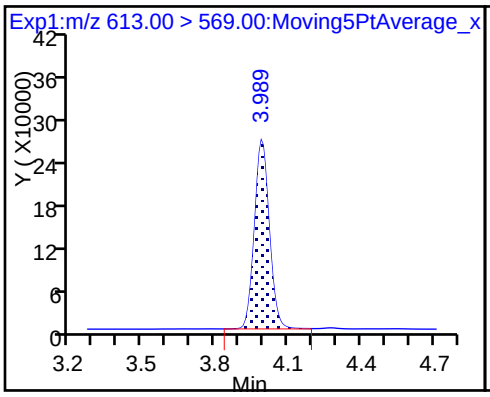
33 N-ethyl perfluorooctane sulfonamid



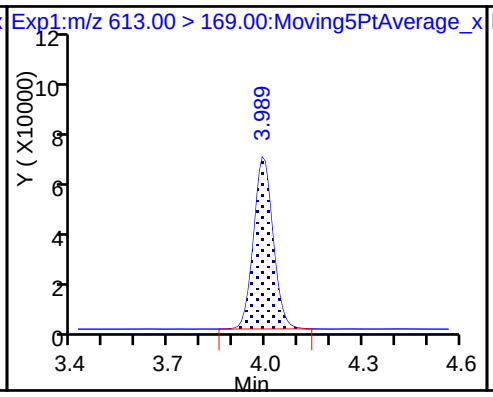
35 MeFOSA



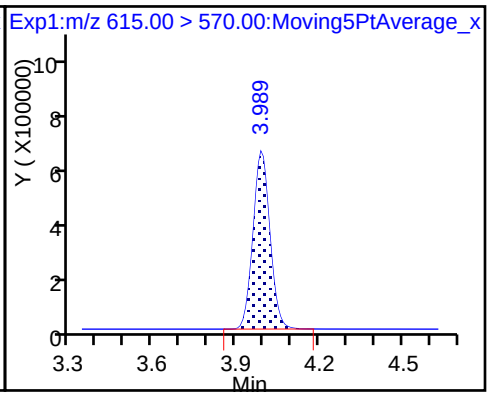
37 Perfluorododecanoic acid



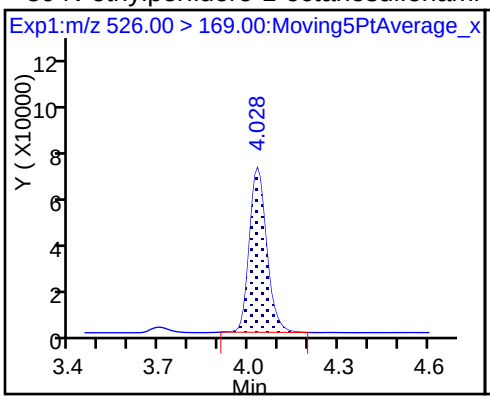
37 Perfluorododecanoic acid



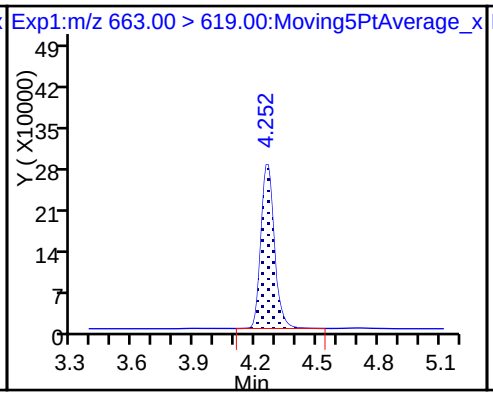
D 36 13C2 PFDoA



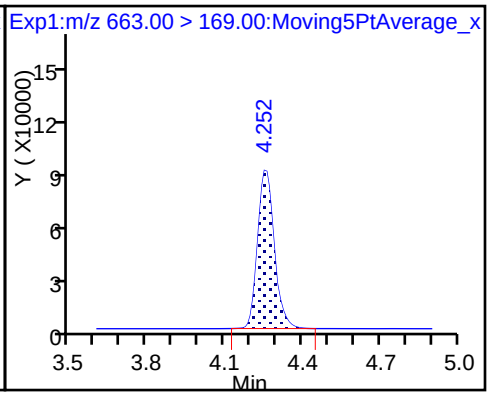
39 N-ethylperfluoro-1-octanesulfonami



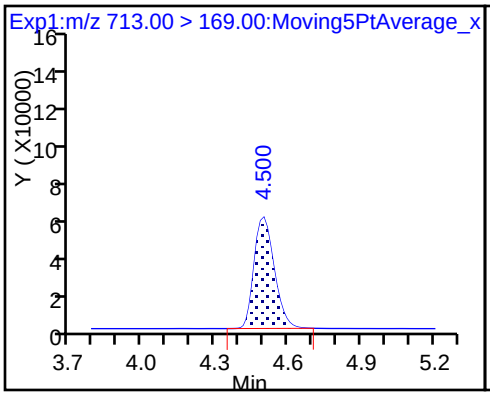
41 Perfluorotridecanoic acid



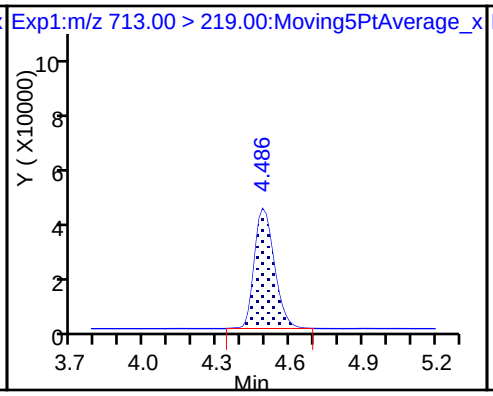
41 Perfluorotridecanoic acid



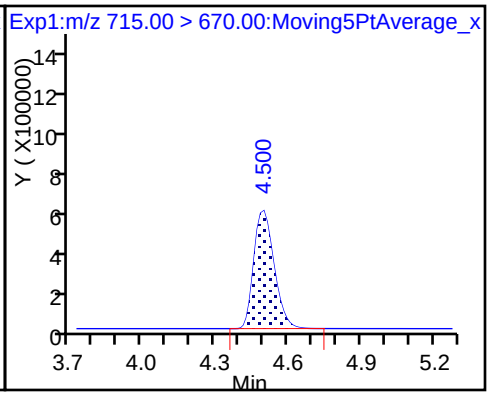
42 Perfluorotetradecanoic acid



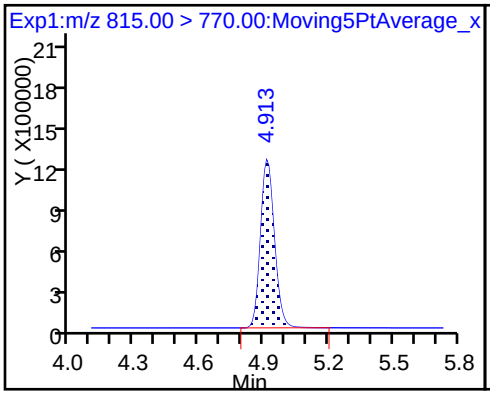
42 Perfluorotetradecanoic acid



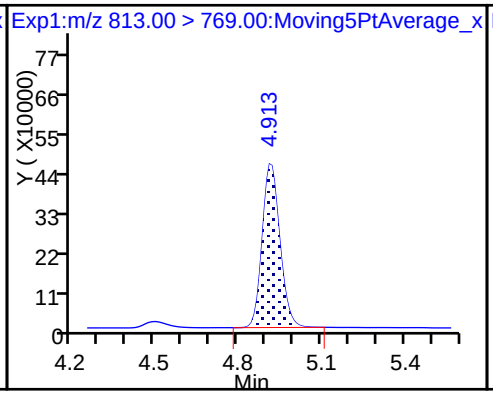
D 43 13C2-PFTeDA



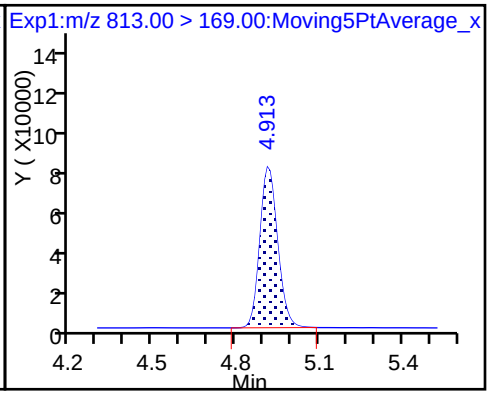
D 44 13C2-PFHxDA



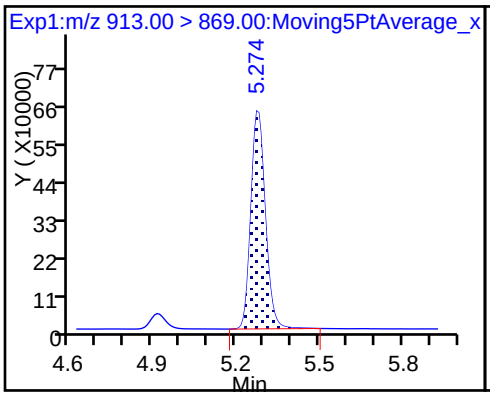
45 Perfluorohexadecanoic acid



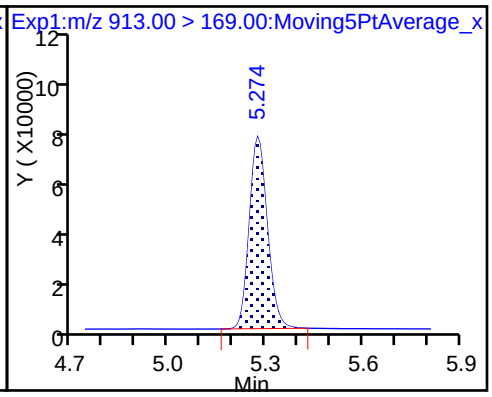
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-04_GW012218 MS | Lab Sample ID: 320-35310-7 MS

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_040.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 10:30

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 158.2(mL) | Date Analyzed: 01/25/2018 22:43

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	76.3		3.2	1.6	0.73
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	263	4	3.2	1.6	0.60
375-85-9	Perfluoroheptanoic acid (PFHpA)	60.8		3.2	2.4	0.96
335-67-1	Perfluorooctanoic acid (PFOA)	104	M J1	3.2	2.4	0.85
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	71.1		6.3	4.7	1.7
375-95-1	Perfluorononanoic acid (PFNA)	57.9		3.2	2.4	0.82

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	126		25-150
STL01892	13C4-PFHpA	123		25-150
STL00990	13C4 PFOA	126		25-150
STL00991	13C4 PFOS	122		25-150
STL00995	13C5 PFNA	130		25-150
STL02337	13C3-PFBS	127		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_040.d
Lims ID: 320-35310-A-7-B MS
Client ID: FH-17-04_GW012218
Sample Type: MS
Inject. Date: 25-Jan-2018 22:43:37 ALS Bottle#: 34 Worklist Smp#: 8
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-7-b ms
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:37:11

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	1.405	1.411	-0.006	0.535	6096002	2.71		108	18503	
2 Perfluorobutyric acid										M
212.90 > 169.00	1.405	1.413	-0.008	1.000	2198015	0.9649		96.5	199	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.658	1.659	-0.001	0.632	4524083	3.40		136	35703	
4 Perfluoropentanoic acid										M
262.90 > 219.00	1.658	1.662	-0.004	1.000	2023354	0.9491		94.9	379	M
D 47 13C3-PFBS										
301.90 > 83.00	1.694	1.695	-0.001	0.645	87062	2.95		127	1007	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.694	1.697	-0.003	1.000	3488620	1.21		136	1510	
298.90 > 99.00	1.694	1.697	-0.003	1.000	1410728		2.47(1.25-3.74)		1775	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.898	1.903	-0.005	1.000	702459	1.35		145	16965	
D 7 13C2 PFHxA										
315.00 > 270.00	1.939	1.939	0.0	0.739	4459452	3.11		124	38346	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.939	1.939	0.0	1.000	2475549	1.34		134	1979	
313.00 > 119.00	1.939	1.939	0.0	1.000	206832		11.97(5.03-15.10)		2079	
D 9 13C4-PFHpA										
367.00 > 322.00	2.260	2.267	-0.007	0.861	4198230	3.07		123	32326	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.260	2.268	-0.008	1.000	1774391	0.9614		96.1	1661	
363.00 > 169.00	2.260	2.268	-0.008	1.000	735961		2.41(1.13-3.40)		4420	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.273	2.280	-0.007	0.994	9825144	4.16		457	7365	
399.00 > 99.00	2.273	2.280	-0.007	0.994	3051996		3.22(1.50-4.49)		6282	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 11 18O2 PFHxS										
403.00 > 84.00	2.286	2.282	0.004	0.871	5019394	2.98		126	42333	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.598	2.596	0.002	1.000	638402	0.9752		103	14579	
D 12 M2-6:2FTS										
429.00 > 81.00	2.598	2.597	0.001	0.990	939448	3.72		157	6993	
D 14 13C4 PFOA										
417.00 > 372.00	2.618	2.622	-0.004	0.997	4232802	3.16		126	42072	
* 62 13C2-PFOA										
415.00 > 370.00	2.626	2.622	0.004		3717511	2.50			34222	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.626	2.623	0.003	1.003	3256332	1.64		164	1545	
413.00 > 169.00	2.618	2.623	-0.005	1.000	1913838		1.70(0.84-2.52)		10400	M
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.633	2.629	0.004	1.000	1712204	0.9750		102	4537	
449.00 > 99.00	2.633	2.629	0.004	1.000	472361		3.62(1.94-5.82)		5203	
D 19 13C5 PFNA										
468.00 > 423.00	2.997	2.992	0.005	1.141	3517553	3.24		130	28560	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.997	2.992	0.005	1.000	1632882	1.13		121	1768	
499.00 > 99.00	2.997	2.992	0.005	1.000	338025		4.83(2.31-6.93)		1724	
D 18 13C4 PFOS										
503.00 > 80.00	2.997	2.992	0.005	1.141	3098736	2.91		122	15792	
20 Perfluorononanoic acid										
463.00 > 419.00	2.997	2.992	0.005	1.000	1330360	0.9160		91.6	1783	
463.00 > 169.00	2.997	2.992	0.005	1.000	338227		3.93(1.90-5.69)		5907	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.335	3.338	-0.003	1.000	1661400	0.9279		92.8	12727	
D 21 13C8 FOSA										
506.00 > 78.00	3.335	3.338	-0.003	1.270	4556952	3.04		122	25026	
D 26 M2-8:2FTS										
529.00 > 81.00	3.343	3.342	0.001	1.273	1059784	3.97		166	13402	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.343	3.342	0.001	1.000	506158	0.9399		98.1	10555	
D 23 13C2 PFDA										
515.00 > 470.00	3.350	3.352	-0.002	1.276	3250135	3.47		139	34330	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.350	3.353	-0.003	1.000	1202212	0.9531		95.3	4868	
513.00 > 169.00	3.350	3.353	-0.003	1.000	221304		5.43(2.36-7.09)		4007	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.510	3.507	0.003	1.337	1737750	3.71		149	12063	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.510	3.513	-0.003	1.000	702182	0.9352		93.5	4221	
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.659	3.666	-0.007	1.000	838540	0.9876		102	10554	
599.00 > 99.00	3.659	3.666	-0.007	1.000	286274		2.93(1.39-4.16)		6009	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.673	3.672	0.001	1.399	1696191	3.58		143	6731	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.682	3.678	0.004	1.002	848012	0.9016		90.2	2621	
563.00 > 169.00	3.682	3.678	0.004	1.002	180875		4.69(0.00-0.00)		8171	
D 30 13C2 PFUnA										
565.00 > 520.00	3.673	3.679	-0.006	1.399	2278191	3.20		128	25326	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.682	3.679	0.003	1.002	566532	0.8574		85.7	7820	
35 MeFOSA										
512.00 > 169.00	3.829	3.875	-0.046		236012	NR		0.0	1408	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.974	3.979	-0.005	1.000	1029997	0.9534		95.3	4193	
613.00 > 169.00	3.974	3.979	-0.005	1.000	258800		3.98(2.13-6.40)		9946	
D 36 13C2 PFDoA										
615.00 > 570.00	3.974	3.979	-0.005	1.514	2635747	3.41		137	23600	
39 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.022	4.066	-0.044		162286	NR		0.0	999	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.235	4.242	-0.007	1.000	1127025	0.9206		92.1	4182	
663.00 > 169.00	4.235	4.242	-0.007	1.000	355006		3.17(1.25-3.76)		16138	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.487	4.483	0.004	1.000	329689	0.9641		96.4	8194	
713.00 > 219.00	4.473	4.483	-0.010	0.997	227453		1.45(0.71-2.13)		6777	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.487	4.483	0.004	1.709	3503334	3.47		139	26563	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.905	4.902	0.003	1.868	5861403	3.26		130	13945	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.905	4.902	0.003	1.000	2015535	0.8880		88.8	1280	
813.00 > 169.00	4.905	4.902	0.003	1.000	362486		5.56(2.86-8.58)		4107	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.254	5.255	-0.001	1.000	2206132	0.8931		89.3	576	
913.00 > 169.00	5.254	5.255	-0.001	1.000	284440		7.76(0.00-0.00)		1229	

QC Flag Legend

Processing Flags

NR - Missing Quant Standard

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:22:43 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_040.d

Injection Date: 25-Jan-2018 22:43:37 Instrument ID: A8_N

Lims ID: 320-35310-A-7-B MS

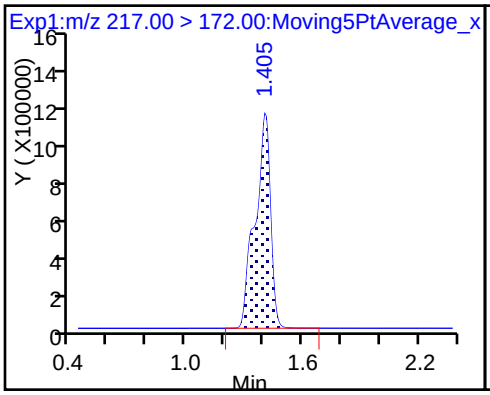
Client ID: FH-17-04_GW012218

Operator ID: SACINSTLCMS01 ALS Bottle#: 34 Worklist Smp#: 8

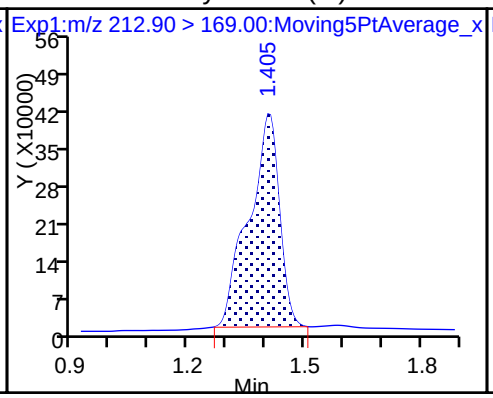
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

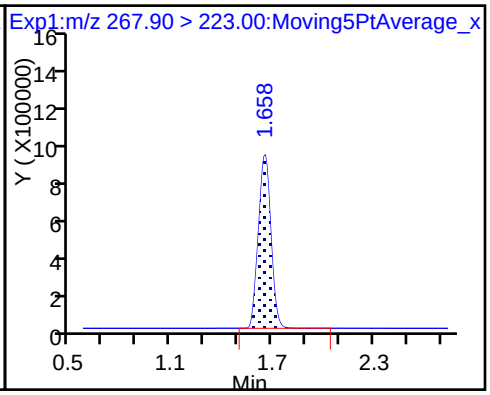
D 1 13C4 PFBA



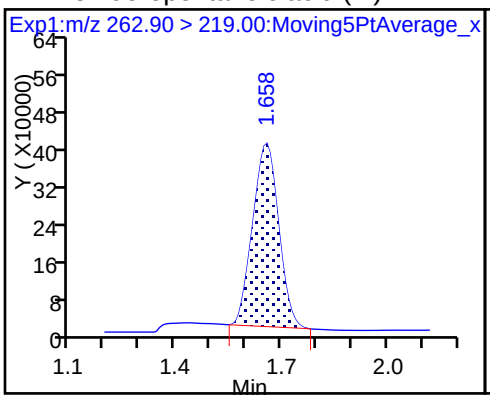
2 Perfluorobutyric acid (M)



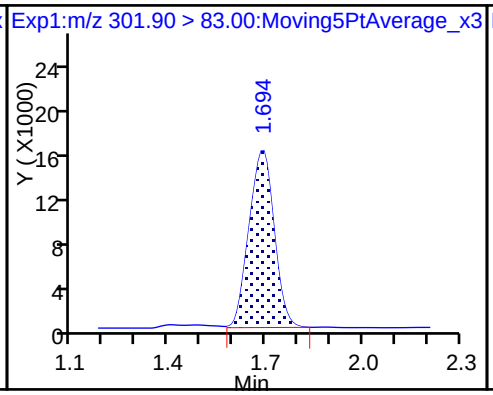
D 3 13C5-PFPeA



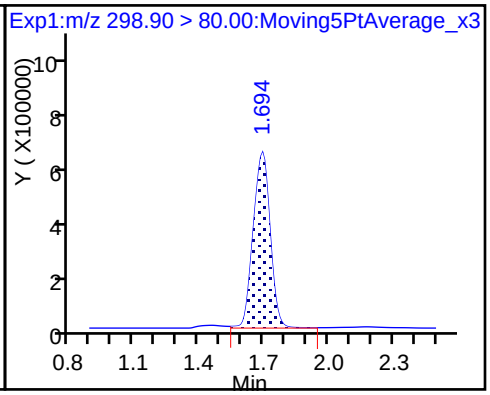
4 Perfluoropentanoic acid (M)



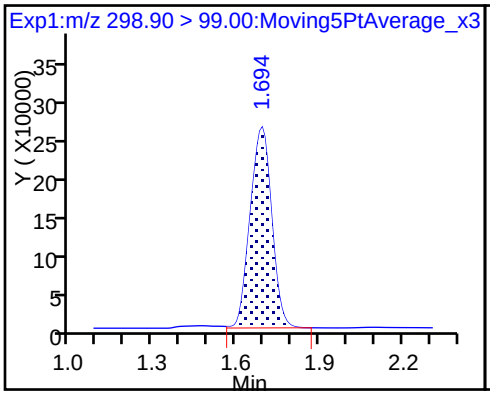
D 47 13C3-PFBS



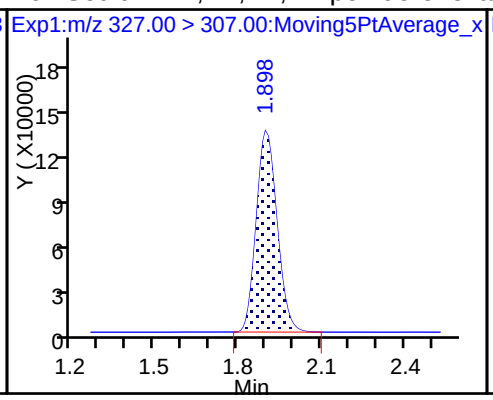
5 Perfluorobutanesulfonic acid



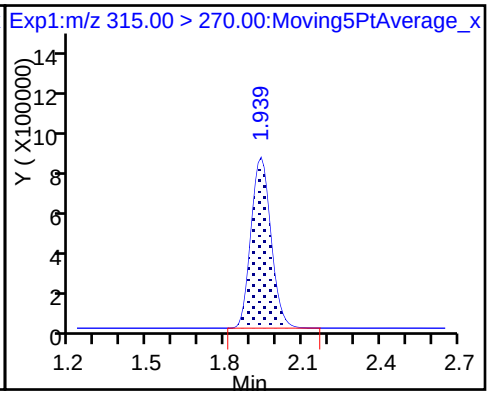
5 Perfluorobutanesulfonic acid



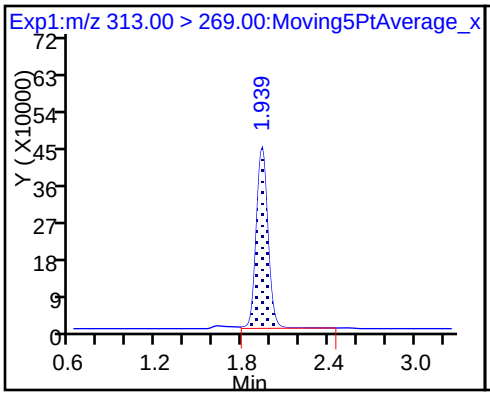
61 Sodium 1H,1H,2H,2H-perfluorohexa



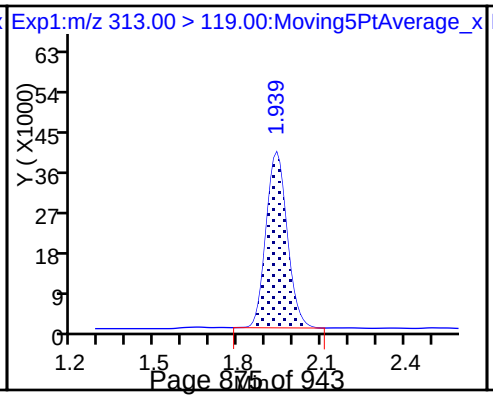
D 7 13C2 PFHxA



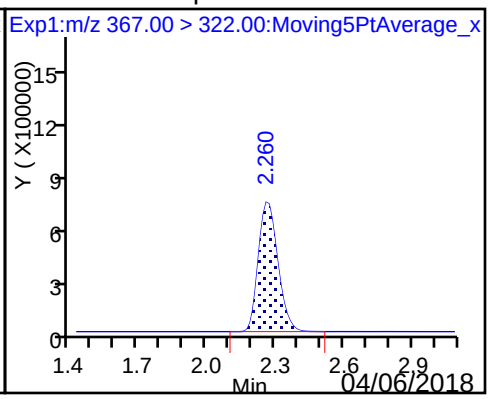
6 Perfluorohexanoic acid



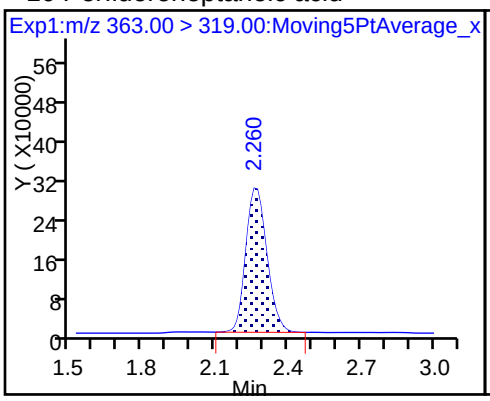
6 Perfluorohexanoic acid



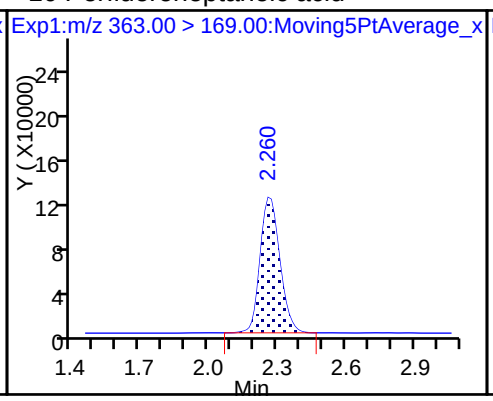
D 9 13C4-PFHpA



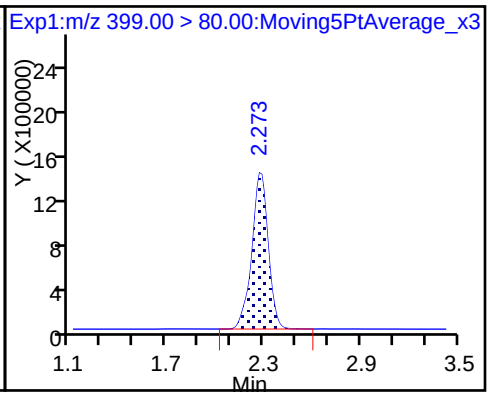
10 Perfluoroheptanoic acid



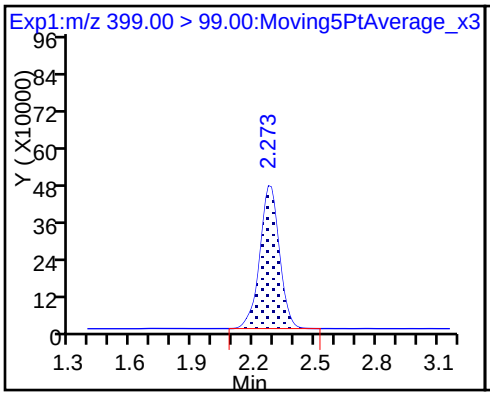
10 Perfluoroheptanoic acid



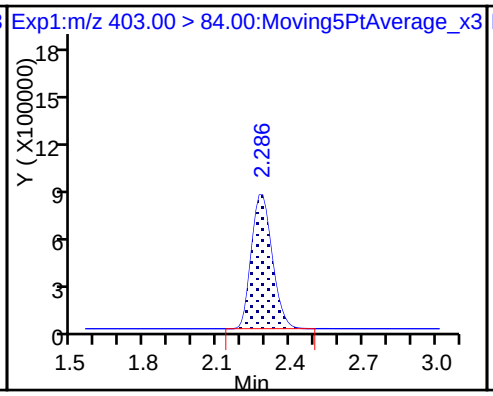
8 Perfluorohexanesulfonic acid



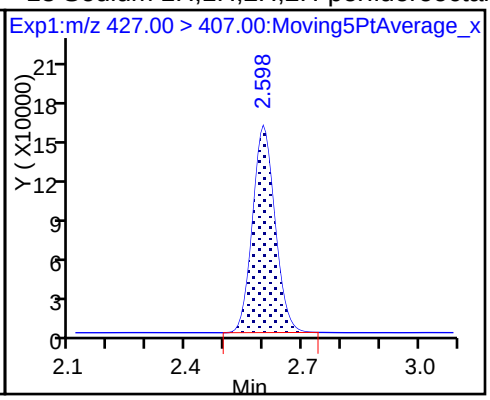
8 Perfluorohexanesulfonic acid



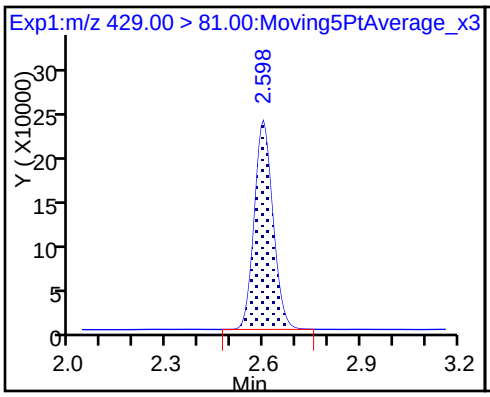
D 11 18O2 PFHxS



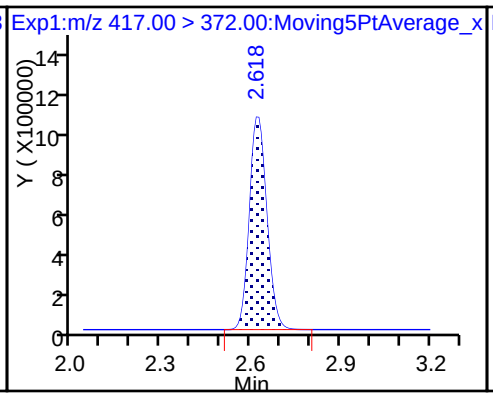
13 Sodium 1H,1H,2H,2H-perfluorooctane



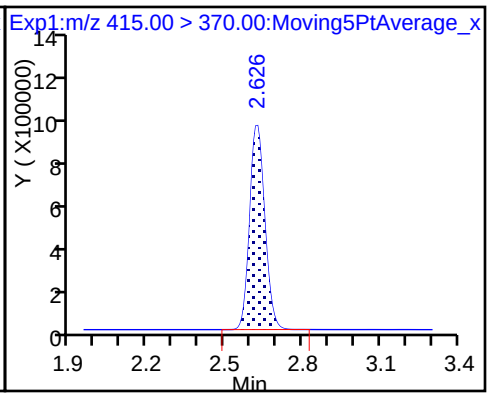
D 12 M2-6:2FTS



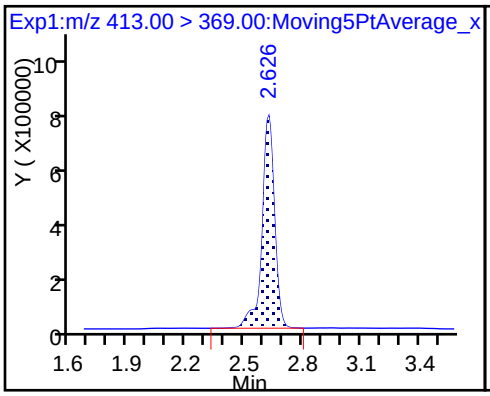
D 14 13C4 PFOA



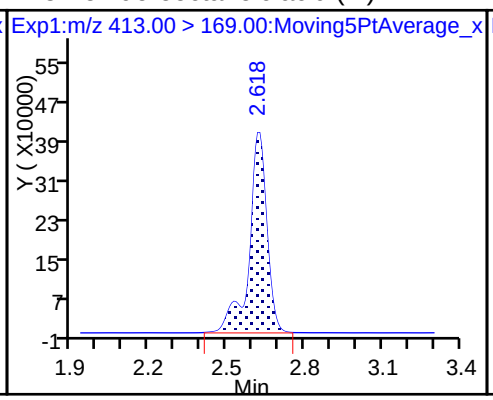
* 62 13C2-PFOA



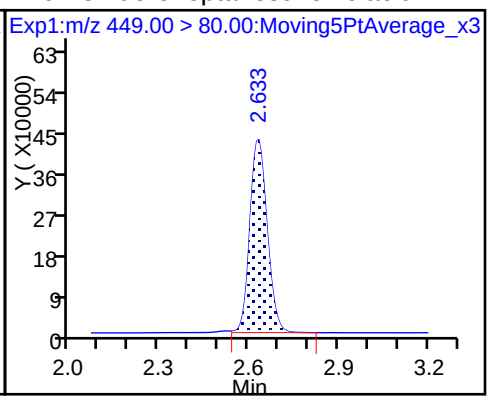
15 Perfluorooctanoic acid



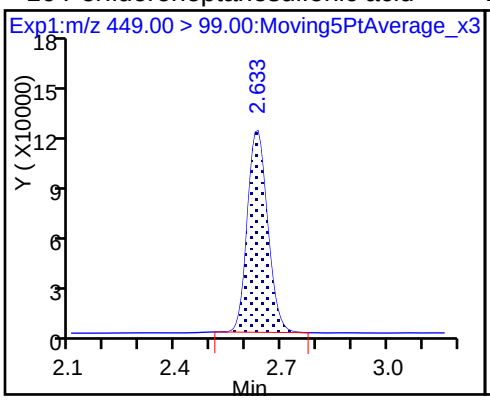
15 Perfluorooctanoic acid (M)



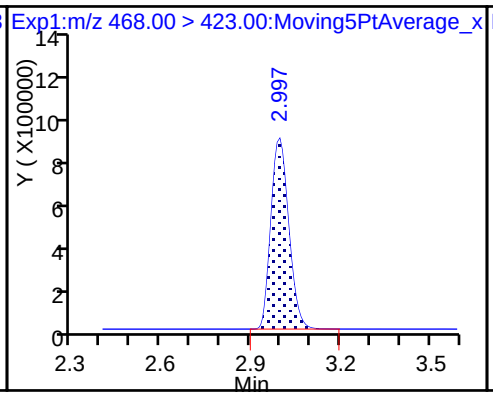
16 Perfluoroheptanesulfonic acid



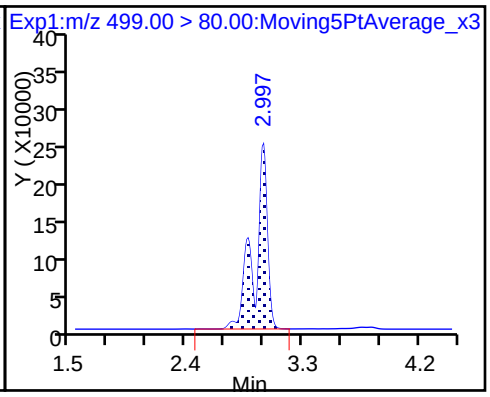
16 Perfluoroheptanesulfonic acid



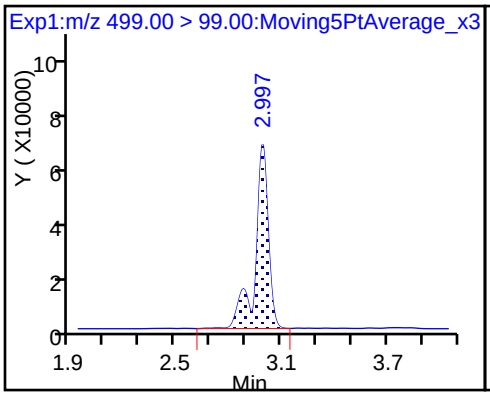
D 19 13C5 PFNA



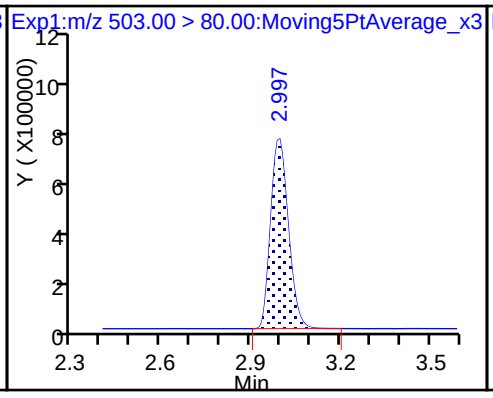
17 Perfluorooctane sulfonic acid



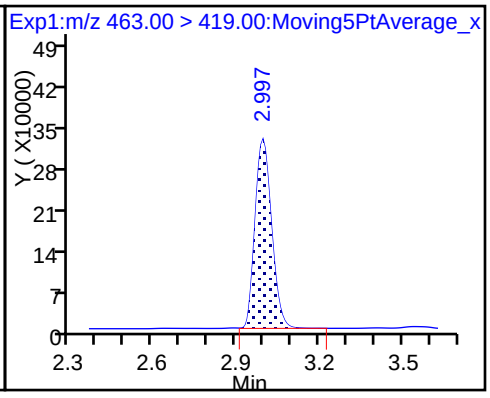
17 Perfluorooctane sulfonic acid



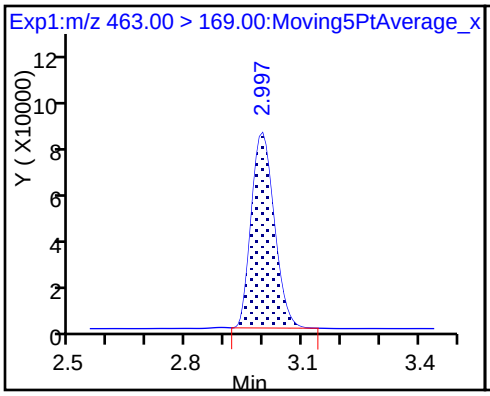
D 18 13C4 PFOS



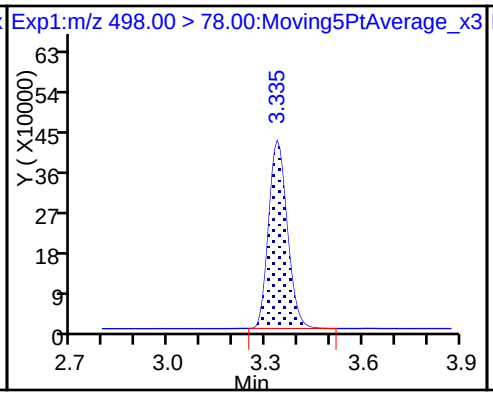
20 Perfluorononanoic acid



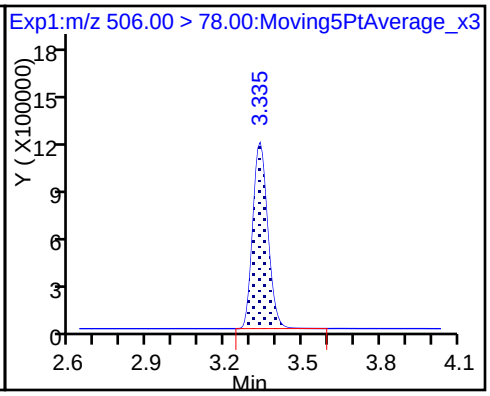
20 Perfluorononanoic acid



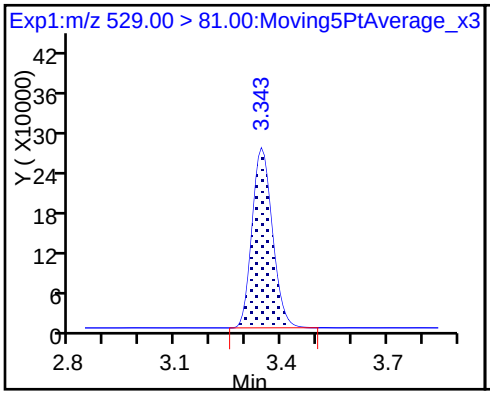
22 Perfluorooctane Sulfonamide



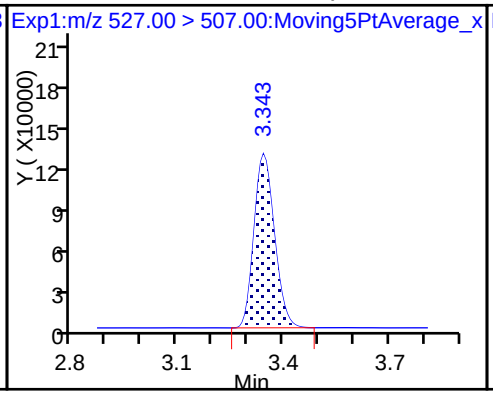
D 21 13C8 FOSA



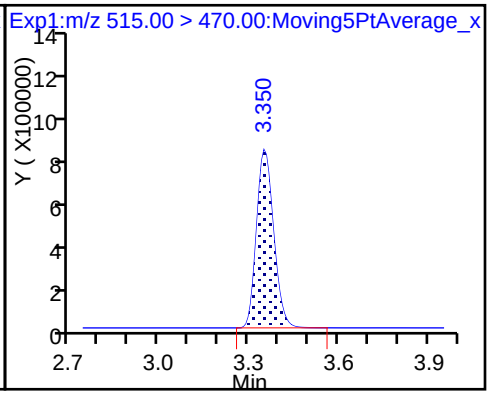
D 26 M2-8:2FTS



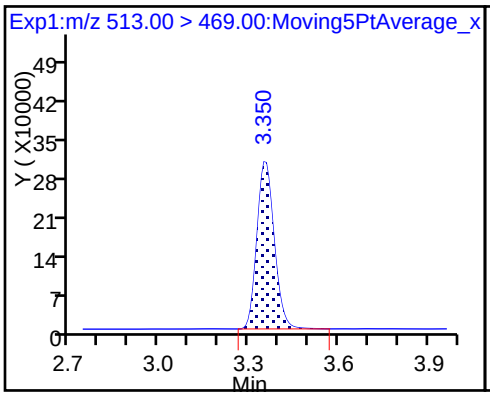
25 Sodium 1H,1H,2H,2H-perfluorodecane



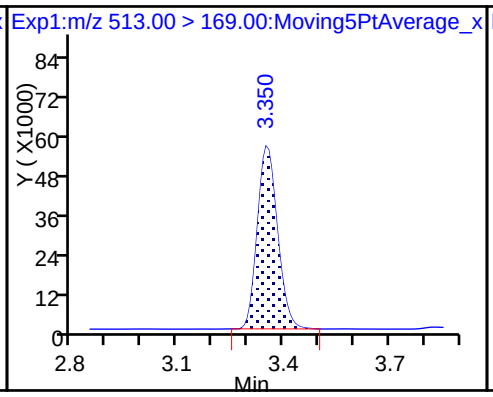
D 23 13C2 PFDA



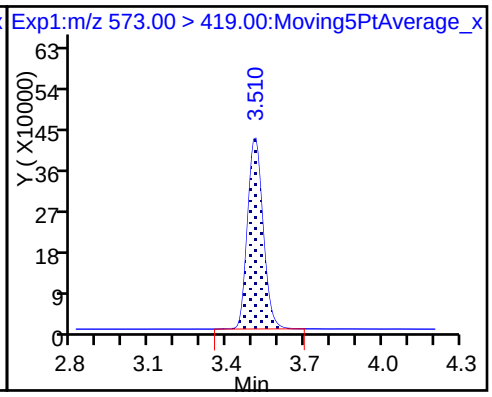
24 Perfluorodecanoic acid



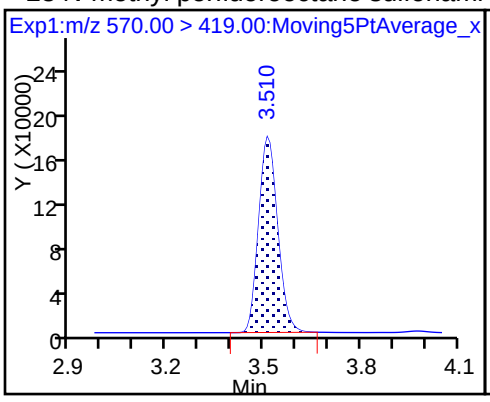
24 Perfluorodecanoic acid



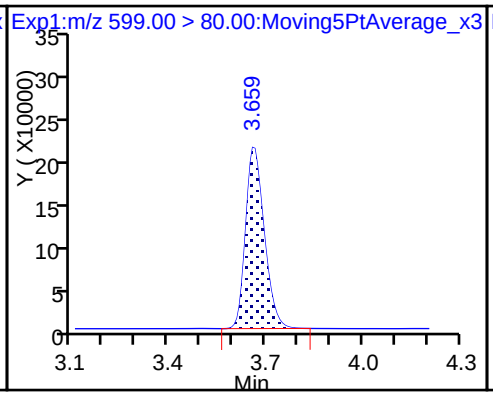
D 27 d3-NMeFOSAA



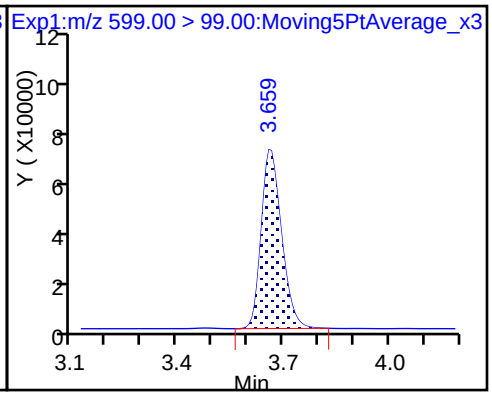
28 N-methyl perfluorooctane sulfonami



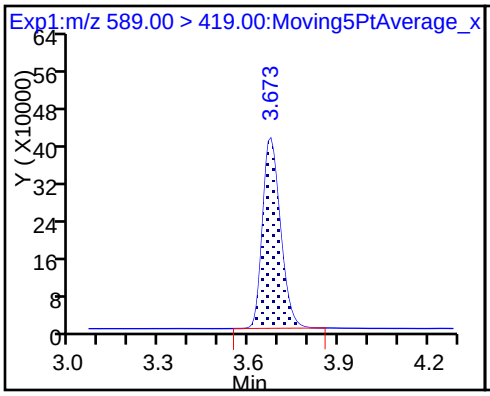
29 Perfluorodecane Sulfonic acid



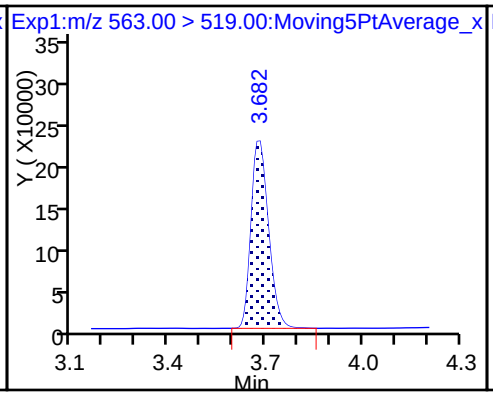
29 Perfluorodecane Sulfonic acid



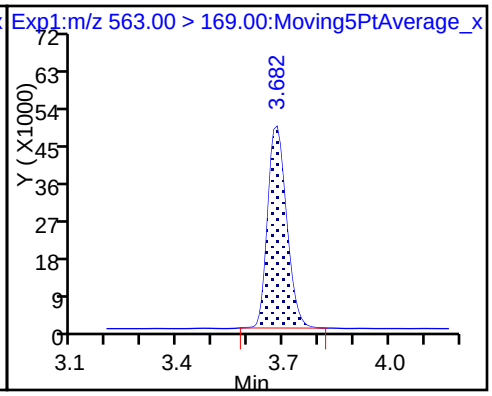
D 32 d5-NEtFOSAA



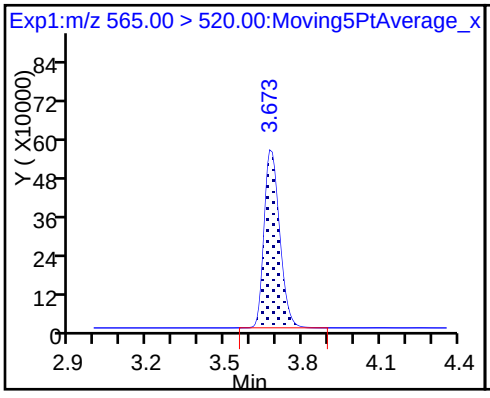
31 Perfluoroundecanoic acid



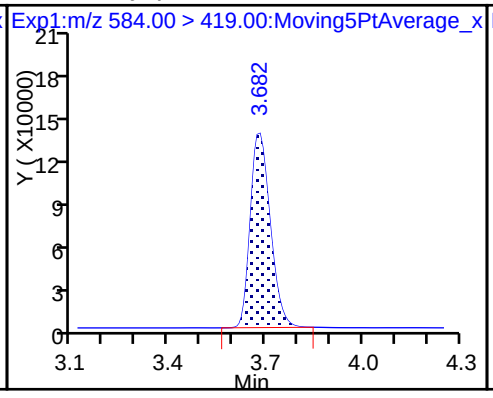
31 Perfluoroundecanoic acid



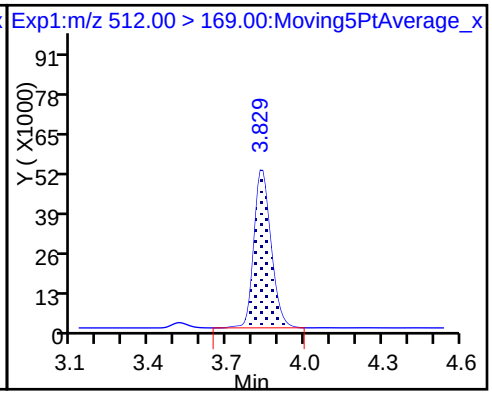
D 30 13C2 PFUnA



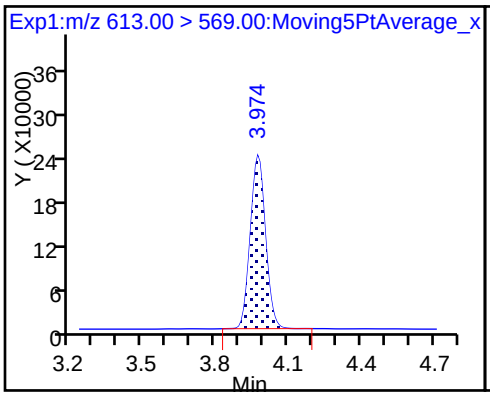
33 N-ethyl perfluorooctane sulfonamid



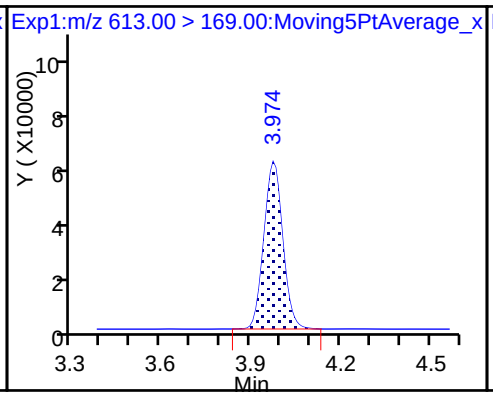
35 MeFOSA



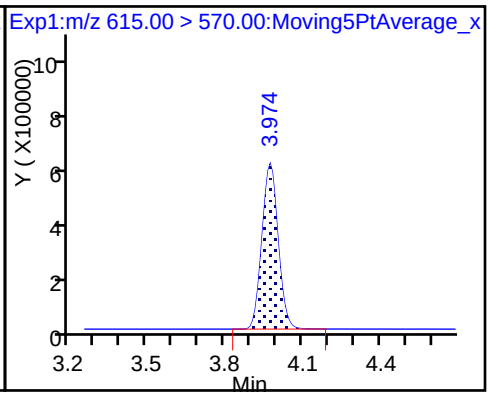
37 Perfluorododecanoic acid



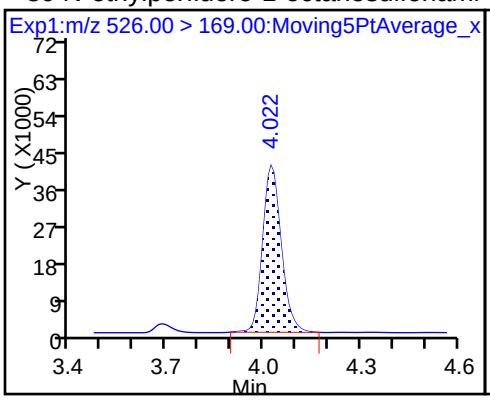
37 Perfluorododecanoic acid



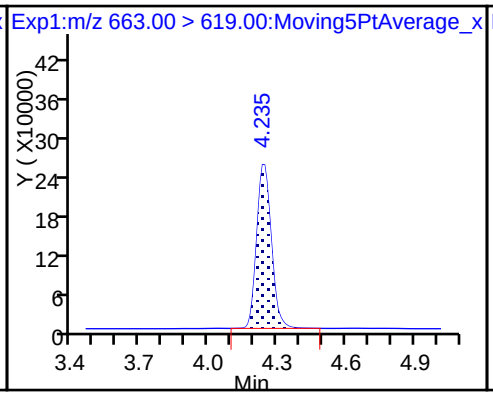
D 36 13C2 PFDoA



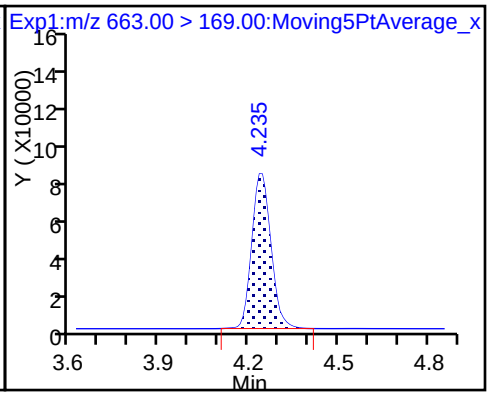
39 N-ethylperfluoro-1-octanesulfonami



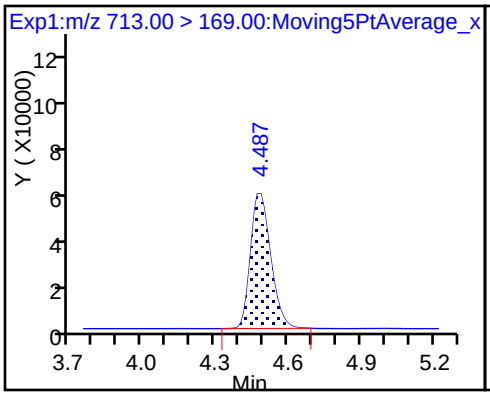
41 Perfluorotridecanoic acid



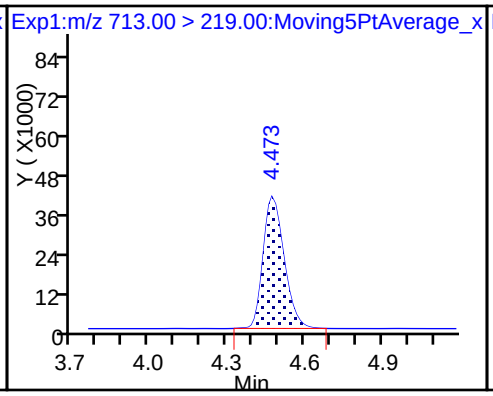
41 Perfluorotridecanoic acid



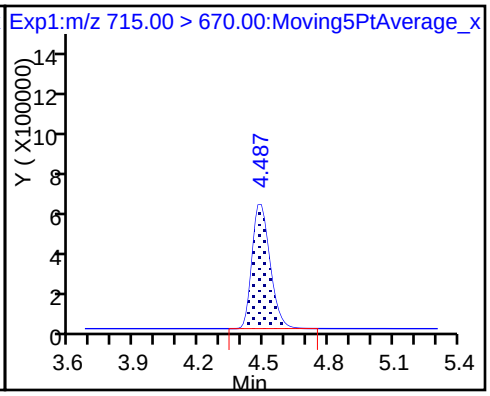
42 Perfluorotetradecanoic acid



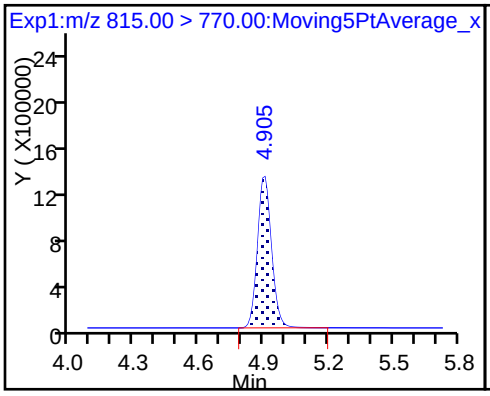
42 Perfluorotetradecanoic acid



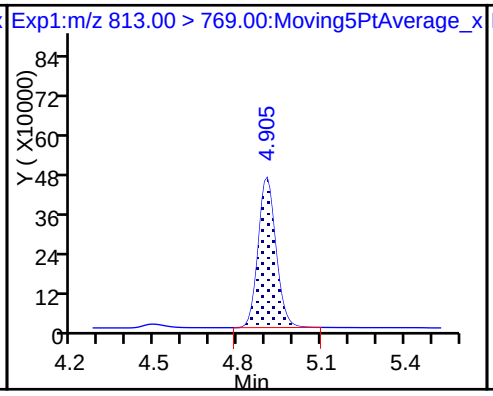
D 43 13C2-PFTeDA



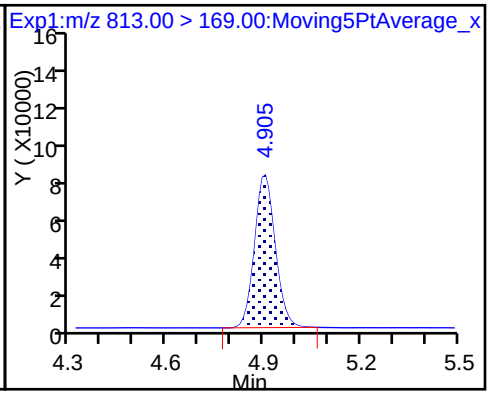
D 44 13C2-PFHxDA



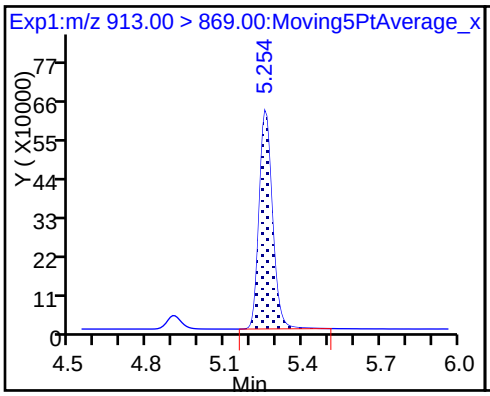
45 Perfluorohexadecanoic acid



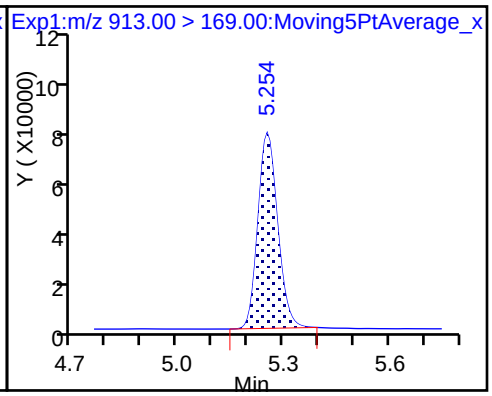
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

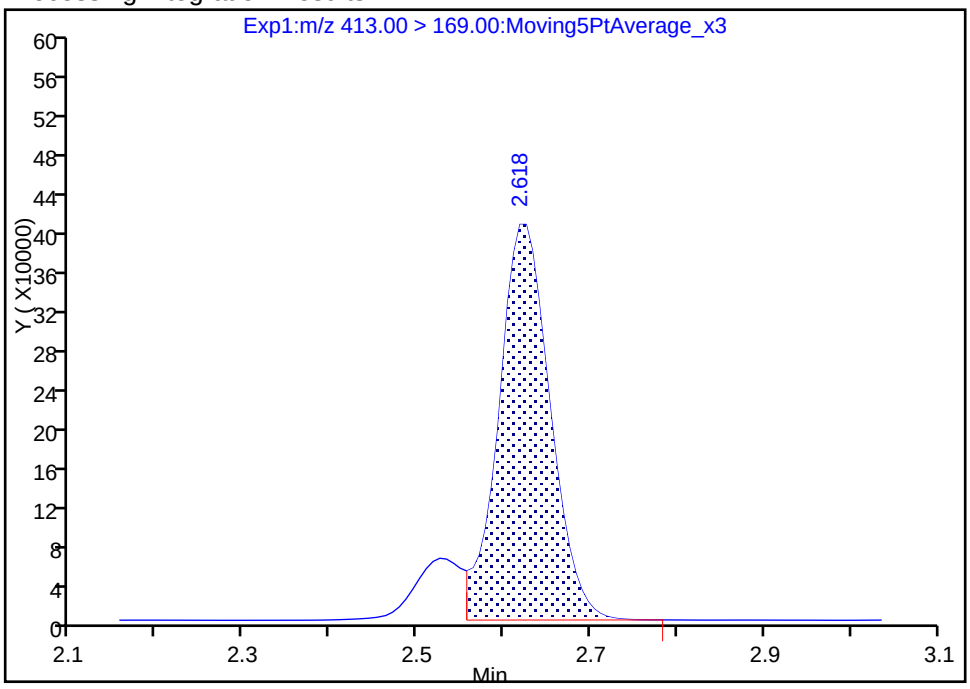
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_040.d				
Injection Date:	25-Jan-2018 22:43:37	Instrument ID:	A8_N		
Lims ID:	320-35310-A-7-B MS				
Client ID:	FH-17-04_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	34	Worklist Smp#:	8
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

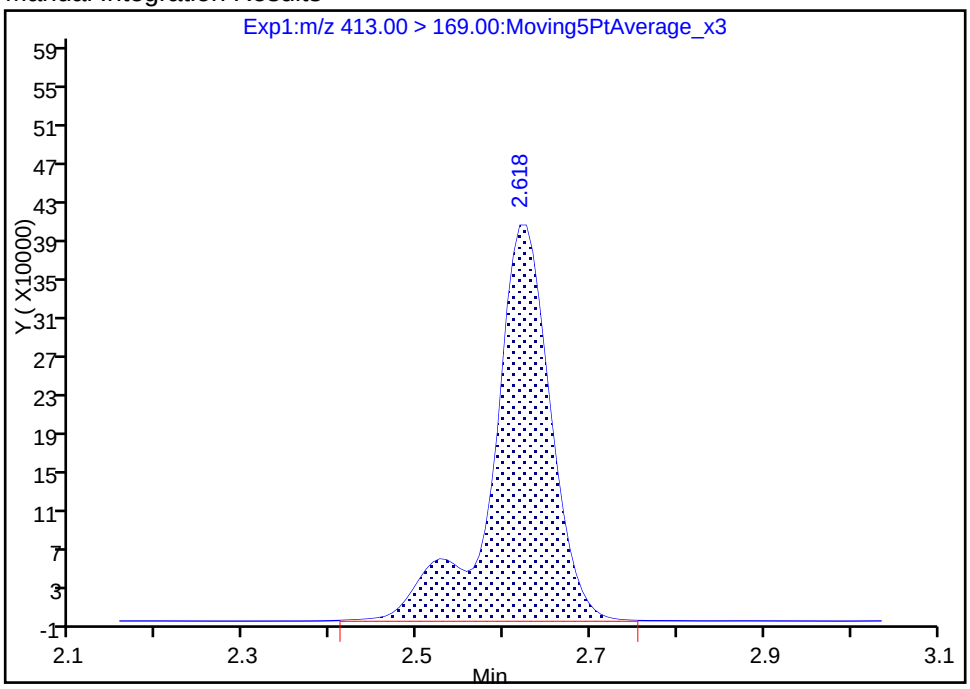
Processing Integration Results

RT: 2.62
Area: 1668367
Amount: 1.640890
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 1913838
Amount: 1.640890
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:36:48

Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-03_SO0005 MSD | Lab Sample ID: 320-35310-3 MSD

Matrix: Solid | Lab File ID: 2018.01.26LLA_031.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 09:20

Extraction Method: SHAKE | Date Extracted: 01/25/2018 12:10

Sample wt/vol: 5.07(g) | Date Analyzed: 01/26/2018 16:45

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: 7.6 | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205921 | Units: ug/Kg

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.91		0.43	0.11	0.027
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.76		0.53	0.11	0.033
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.20		0.53	0.11	0.031
335-67-1	Perfluorooctanoic acid (PFOA)	2.11		0.53	0.21	0.092
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	2.07		1.1	0.53	0.21
375-95-1	Perfluorononanoic acid (PFNA)	2.10		0.53	0.11	0.038

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	97		25-150
STL01892	13C4-PFHpA	92		25-150
STL00990	13C4 PFOA	101		25-150
STL00991	13C4 PFOS	100		25-150
STL00995	13C5 PFNA	99		25-150
STL02337	13C3-PFBS	92		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_031.d
Lims ID: 320-35310-A-3-C MSD
Client ID:
Sample Type: MSD
Inject. Date: 26-Jan-2018 16:45:49 ALS Bottle#: 16 Worklist Smp#: 6
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-3-c msd
Misc. Info.: Plate: 1 Rack: 3
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 09:59:11 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK053

First Level Reviewer: hannigana Date: 30-Jan-2018 09:59:11

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	1.408	1.411	-0.003	0.535	6798523	2.14		85.8	18701	M
2 Perfluorobutyric acid										M
212.90 > 169.00	1.414	1.413	0.001	1.004	2865594	1.13		113	306	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.661	1.659	0.002	0.632	4561832	2.43		97.2	59609	
4 Perfluoropentanoic acid										
262.90 > 219.00	1.661	1.662	-0.001	1.000	2400186	1.12		112	882	
D 47 13C3-PFBS										
301.90 > 83.00	1.697	1.695	0.002	0.645	89270	2.15		92.4	519	
5 Perfluorobutanesulfonic acid										
298.90 > 80.00	1.697	1.697	0.0	1.000	2659756	0.8972		101	6631	
298.90 > 99.00	1.697	1.697	0.0	1.000	1085405		2.45(1.25-3.74)		1208	
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.912	1.903	0.009	1.000	1849765	3.47		371	2127	
D 60 M2-4:2FTS										
329.00 > 81.00	1.777	1.903	-0.126	0.676	12135	NC			17.9	
D 7 13C2 PFHxA										
315.00 > 270.00	1.943	1.939	0.004	0.739	4775530	2.36		94.4	45370	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.943	1.939	0.004	1.000	2031118	1.03		103	1997	
313.00 > 119.00	1.943	1.939	0.004	1.000	190616		10.66(5.03-15.10)		1274	
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.267	-0.002	0.861	4411000	2.29		91.6	38580	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.265	2.268	-0.003	1.000	2002782	1.03		103	2774	
363.00 > 169.00	2.265	2.268	-0.003	1.000	743424		2.69(1.13-3.40)		4379	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.278	2.280	-0.002	1.000	2101364	0.8232		90.5	5228	
399.00 > 99.00	2.278	2.280	-0.002	1.000	695371		3.02(1.50-4.49)		1709	
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.866	5421650	2.29		96.7	47044	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.601	2.596	0.005	1.000	1270261	0.8949		94.4	14943	
D 12 M2-6:2FTS										
429.00 > 81.00	2.601	2.597	0.004	0.989	2036789	5.72		241	15156	
D 14 13C4 PFOA										
417.00 > 372.00	2.630	2.622	0.008	1.000	4780442	2.53		101	41599	
* 62 13C2-PFOA										
415.00 > 370.00	2.630	2.622	0.008		5241592	2.50			45401	
15 Perfluorooctanoic acid										
413.00 > 369.00	2.630	2.623	0.007	1.000	2213926	0.9878		98.8	2022	
413.00 > 169.00	2.630	2.623	0.007	1.000	1209137		1.83(0.84-2.52)		9201	
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.637	2.629	0.008	1.000	1928912	0.9477		99.5	14824	
449.00 > 99.00	2.637	2.629	0.008	1.000	527572		3.66(1.94-5.82)		4565	
D 19 13C5 PFNA										
468.00 > 423.00	3.000	2.992	0.008	1.141	3775238	2.47		98.7	31438	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	3.000	2.992	0.008	1.000	1629601	0.9688		104	3773	
499.00 > 99.00	3.000	2.992	0.008	1.000	357320		4.56(2.31-6.93)		1492	
D 18 13C4 PFOS										
503.00 > 80.00	3.000	2.992	0.008	1.141	3591481	2.39		100	24586	
20 Perfluorononanoic acid										
463.00 > 419.00	3.000	2.992	0.008	1.000	1533191	0.9836		98.4	3346	
463.00 > 169.00	3.000	2.992	0.008	1.000	389519		3.94(1.90-5.69)		5260	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.339	3.338	0.001	1.002	1980553	0.99		99.3	11420	
D 21 13C8 FOSA										
506.00 > 78.00	3.332	3.338	-0.006	1.267	5076796	2.41		96.2	25789	
D 26 M2-8:2FTS										
529.00 > 81.00	3.355	3.342	0.013	1.276	2214532	5.88		246	15700	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.355	3.342	0.013	1.000	991673	0.8813		92.0	24196	
D 23 13C2 PFDA										
515.00 > 470.00	3.362	3.352	0.010	1.279	3686672	2.79		112	42259	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.362	3.353	0.009	1.000	1436858	1.00		100	2834	
513.00 > 169.00	3.362	3.353	0.009	1.000	256327		5.61(2.36-7.09)		2588	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.514	3.507	0.007	1.336	2757615	4.18		167	27567	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.521	3.513	0.008	1.002	1041056	0.8737		87.4	6457	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.671	3.666	0.004	1.000	914191	0.9290		96.4	11971	
599.00 > 99.00	3.671	3.666	0.004	1.000	313644		2.91(1.39-4.16)		4363	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.678	3.672	0.006	1.399	2325772	3.49		139	17038	
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.687	3.678	0.009	1.000	1065170	0.9469		94.7	3732	
563.00 > 169.00	3.687	3.678	0.009	1.000	225591		4.72(0.00-0.00)		7541	
D 30 13C2 PFUnA										
565.00 > 520.00	3.687	3.679	0.008	1.402	2724610	2.72		109	46909	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.687	3.679	0.008	1.002	827246	0.9131		91.3	11353	
35 MeFOSA										
512.00 > 169.00	3.834	3.875	-0.041		372165	NR		0.0	1518	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.988	3.979	0.009	1.000	1230478	0.9861		98.6	2960	
613.00 > 169.00	3.988	3.979	0.009	1.000	333304		3.69(2.13-6.40)		13213	
D 36 13C2 PFDoA										
615.00 > 570.00	3.988	3.979	0.009	1.516	3044273	2.80		112	38374	
39 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.027	4.066	-0.039		342554	NR		0.0	1271	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.250	4.242	0.008	1.000	1337022	0.9455		94.6	3871	
663.00 > 169.00	4.250	4.242	0.008	1.000	451326		2.96(1.25-3.76)		14741	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.499	4.483	0.016	1.000	392436	1.07		107	6162	
713.00 > 219.00	4.485	4.483	0.002	0.997	246594		1.59(0.71-2.13)		7208	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.499	4.483	0.016	1.711	3753106	2.64		106	29492	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.921	4.902	0.019	1.872	6253589	2.47		98.7	19035	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.921	4.902	0.019	1.000	2251515	0.9307		93.1	1146	
813.00 > 169.00	4.921	4.902	0.019	1.000	402349		5.60(2.86-8.58)		4625	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.281	5.255	0.026	1.000	2533899	0.9614		96.1	602	
913.00 > 169.00	5.281	5.255	0.026	1.000	314170		8.07(0.00-0.00)		1656	

QC Flag Legend

Processing Flags

NR - Missing Quant Standard

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 09:59:11 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b\2018.01.26LLA_031.d

Injection Date: 26-Jan-2018 16:45:49 Instrument ID: A8_N

Lims ID: 320-35310-A-3-C MSD

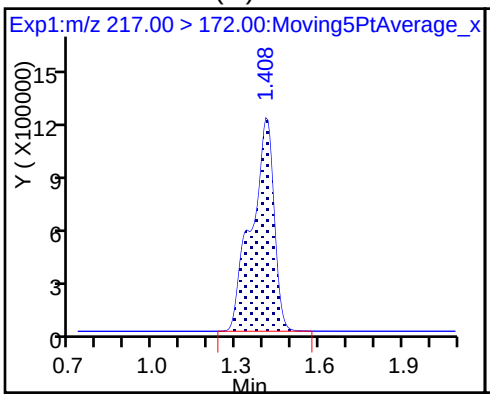
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 16 Worklist Smp#: 6

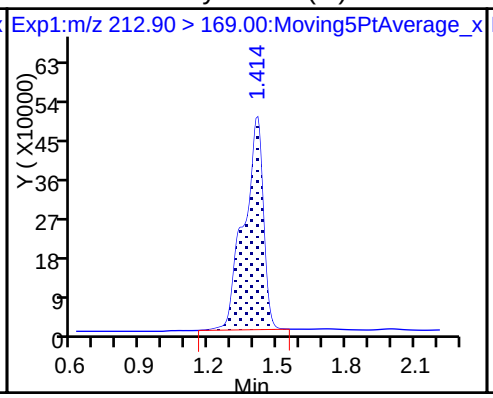
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

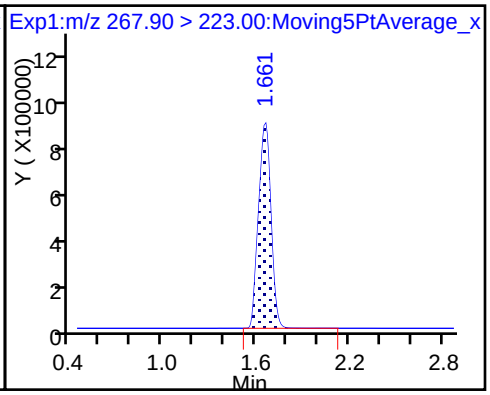
D 1 13C4 PFBA (M)



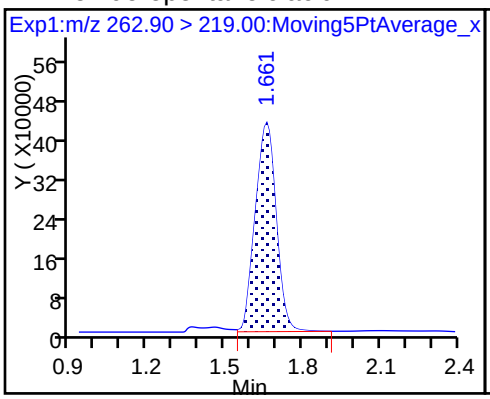
2 Perfluorobutyric acid (M)



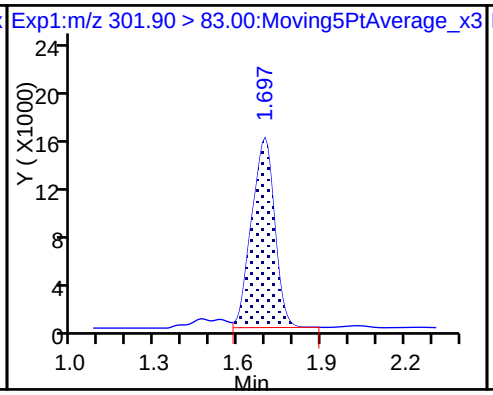
D 3 13C5-PFPeA



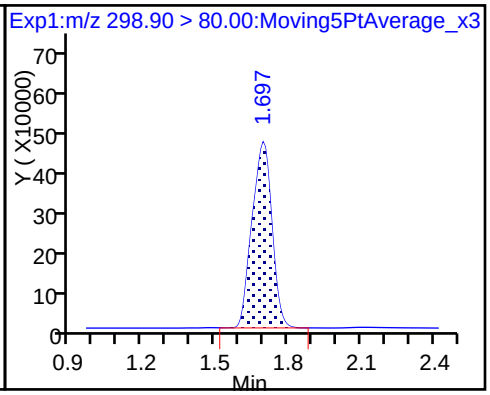
4 Perfluoropentanoic acid



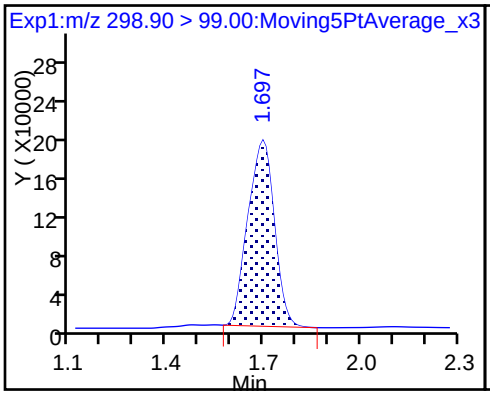
D 47 13C3-PFBS



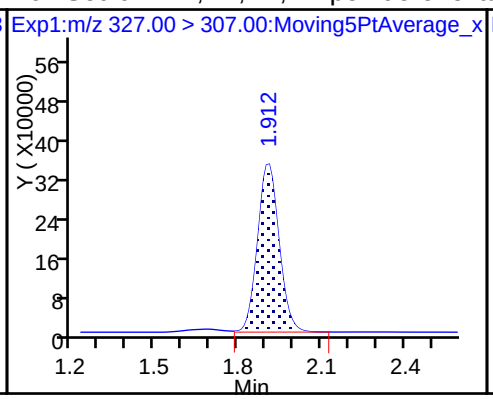
5 Perfluorobutanesulfonic acid



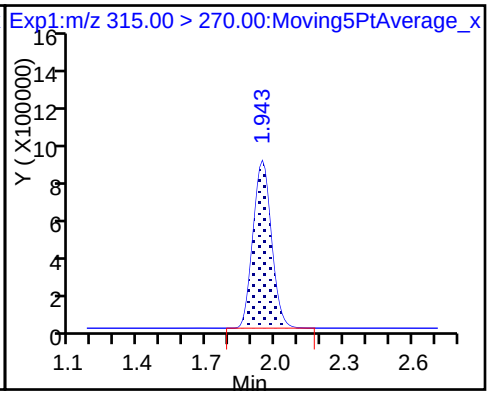
5 Perfluorobutanesulfonic acid



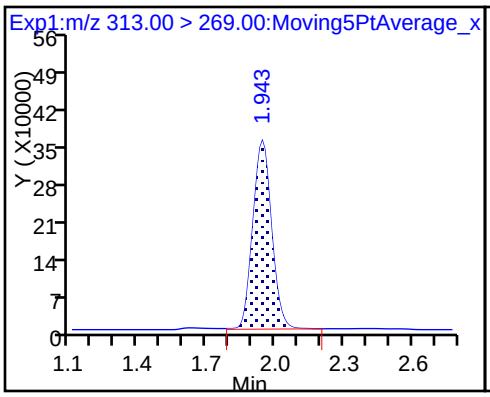
61 Sodium 1H,1H,2H,2H-perfluorohexa



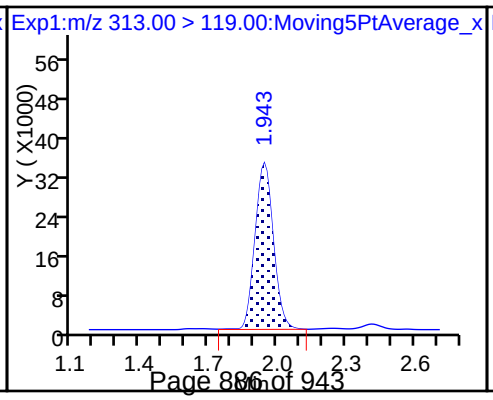
D 7 13C2 PFHxA



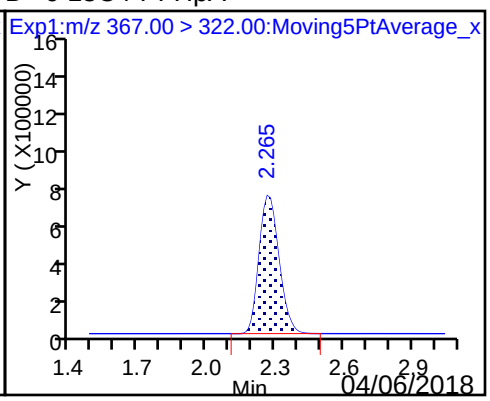
6 Perfluorohexanoic acid



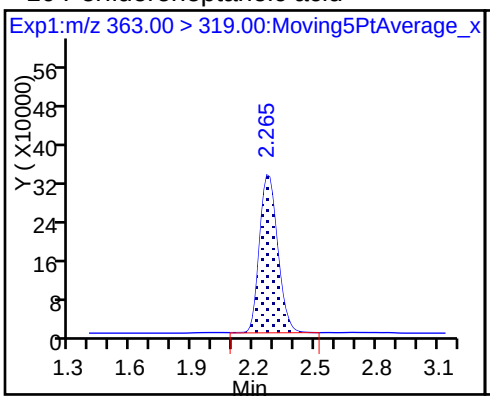
6 Perfluorohexanoic acid



D 9 13C4-PFHpA



10 Perfluoroheptanoic acid



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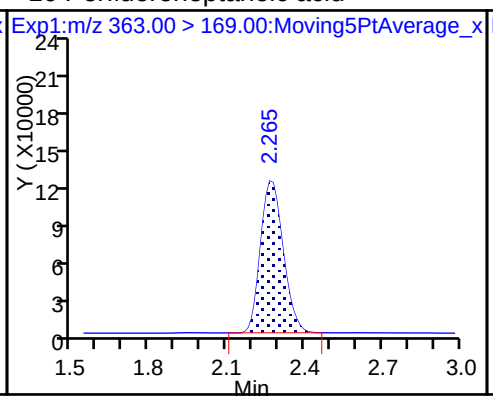
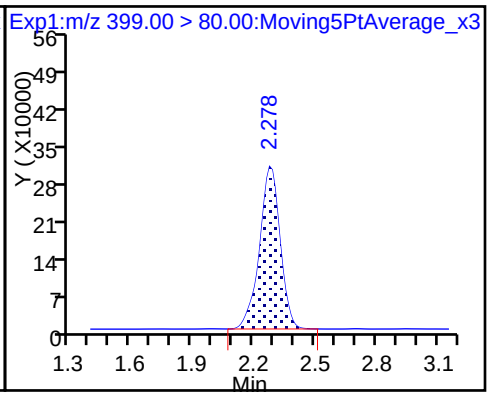
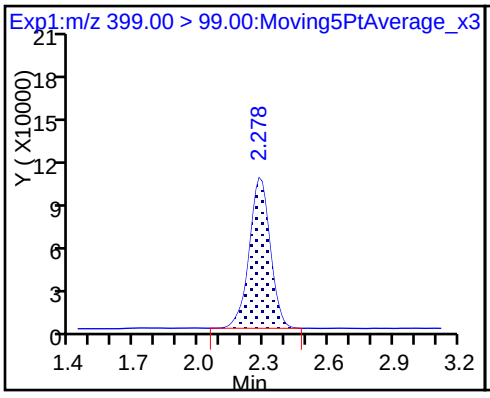


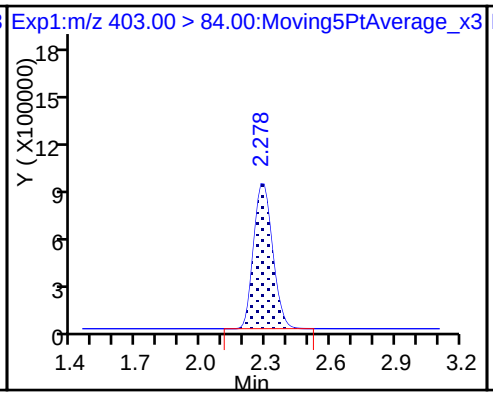
8 Perfluorohexanesulfonic acid



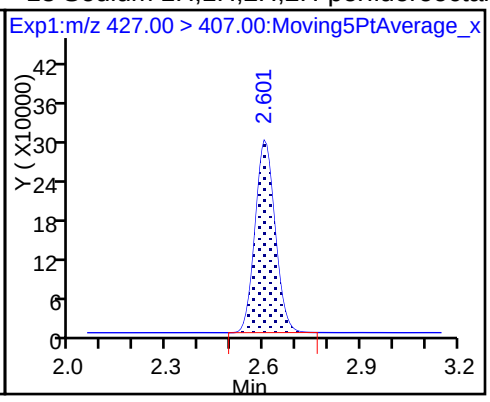
8 Perfluorohexanesulfonic acid



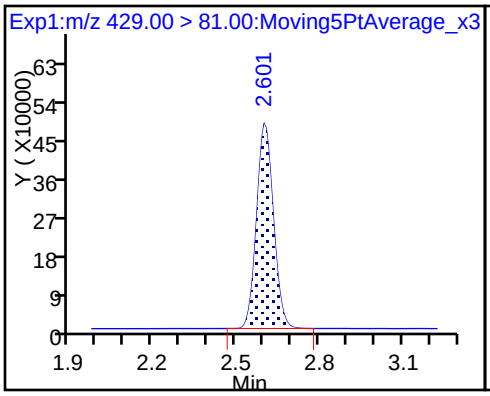
D 11 18O2 PFHxS



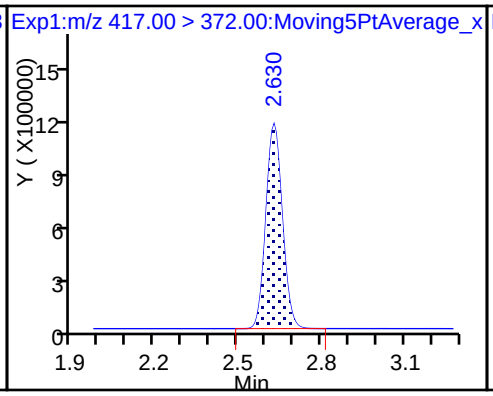
13 Sodium 1H,1H,2H,2H-perfluorooctane



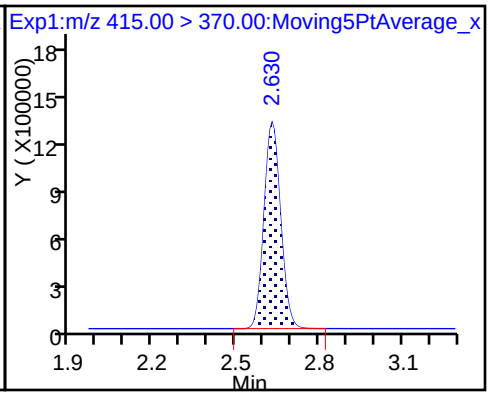
D 12 M2-6:2FTS



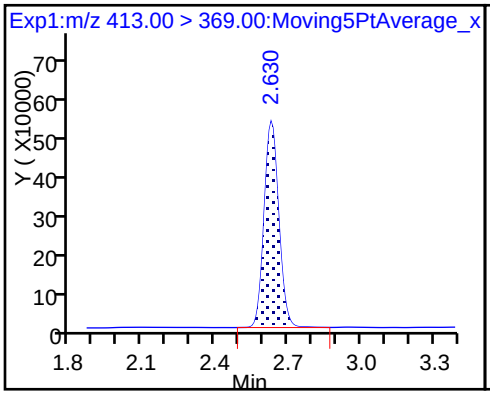
D 14 13C4 PFOA



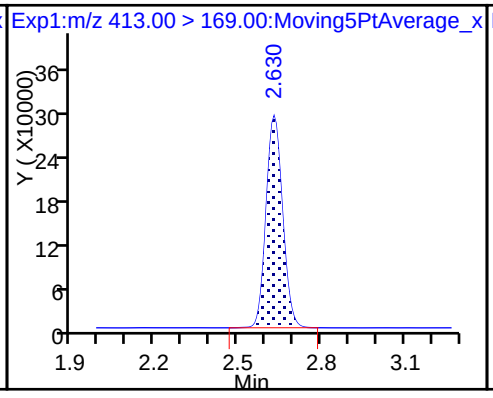
* 62 13C2-PFOA



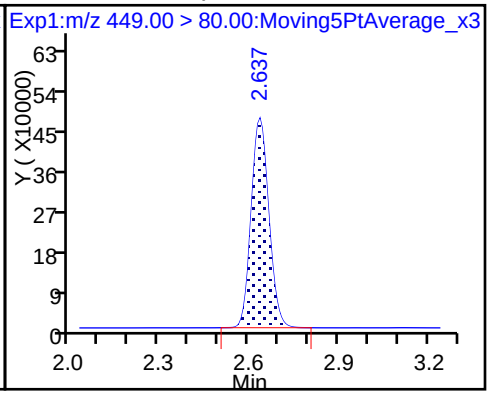
15 Perfluorooctanoic acid



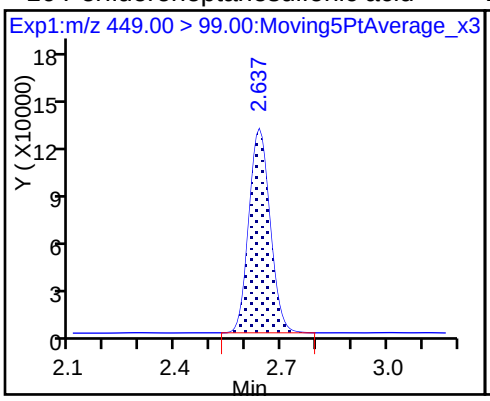
15 Perfluorooctanoic acid



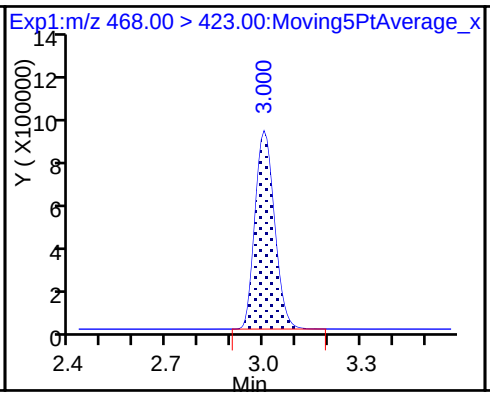
16 Perfluoroheptanesulfonic acid



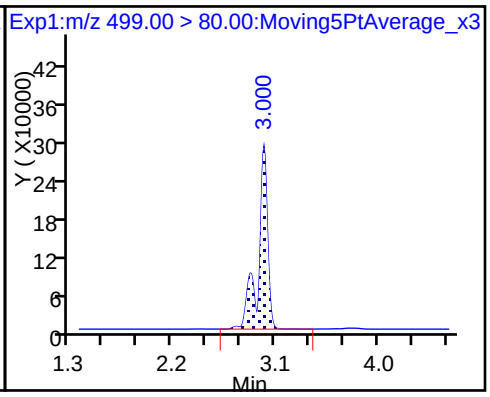
16 Perfluoroheptanesulfonic acid



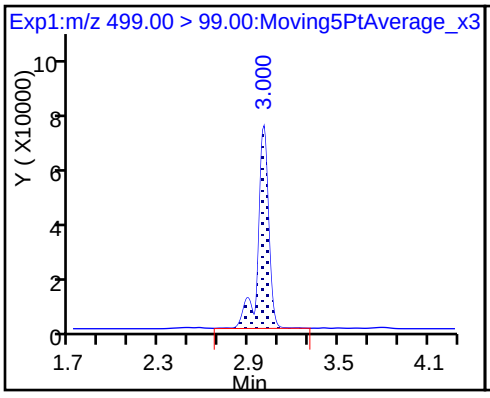
D 19 13C5 PFNA



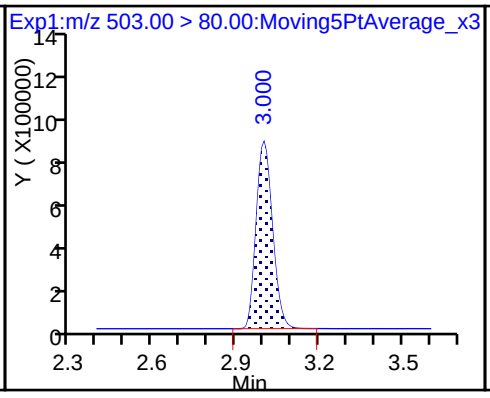
17 Perfluorooctane sulfonic acid



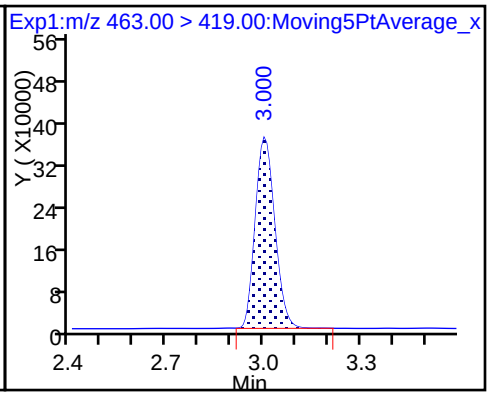
17 Perfluorooctane sulfonic acid



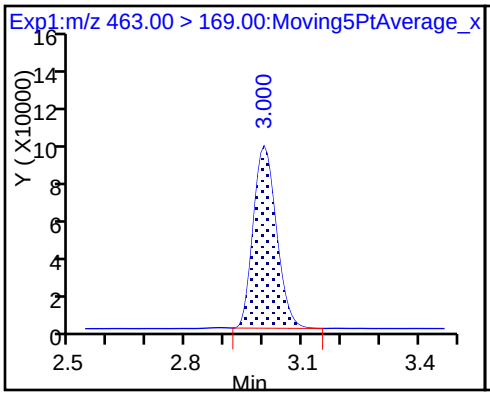
D 18 13C4 PFOS



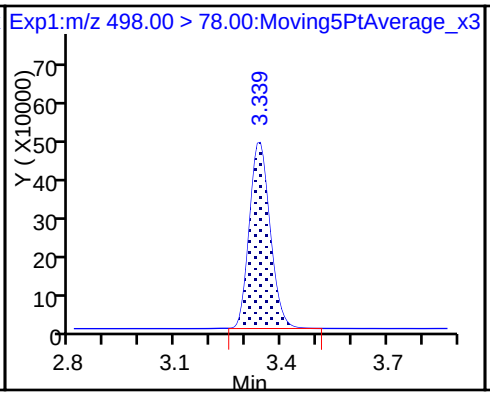
20 Perfluorononanoic acid



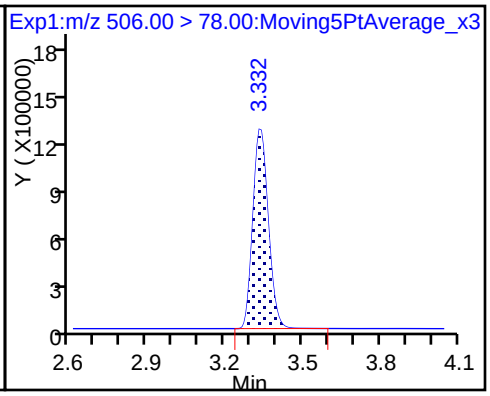
20 Perfluorononanoic acid



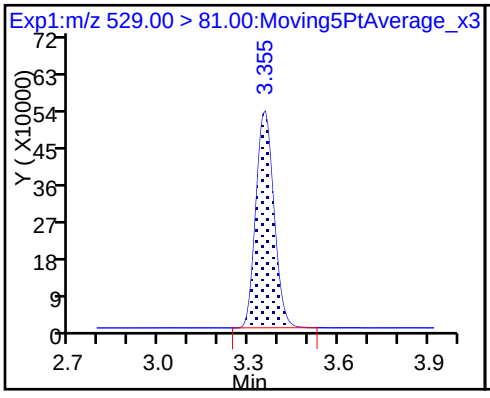
22 Perfluorooctane Sulfonamide



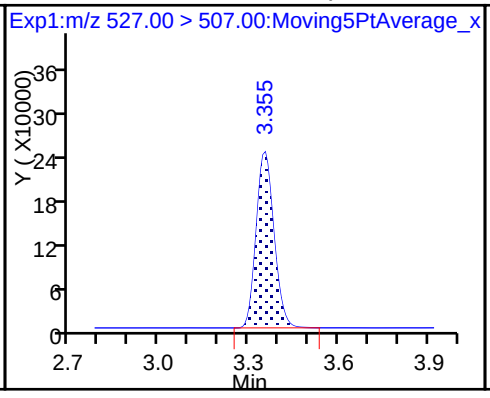
D 21 13C8 FOSA



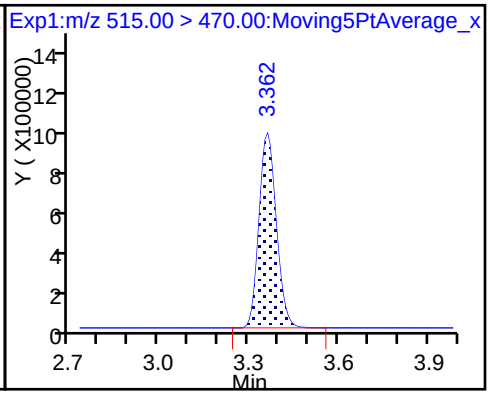
D 26 M2-8:2FTS



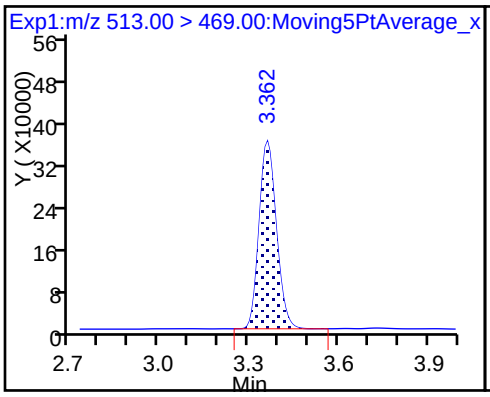
25 Sodium 1H,1H,2H,2H-perfluorodecane



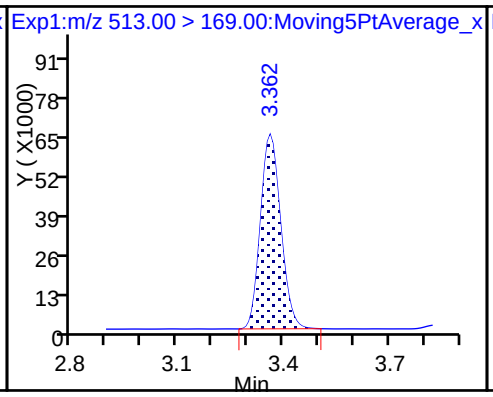
D 23 13C2 PFDA



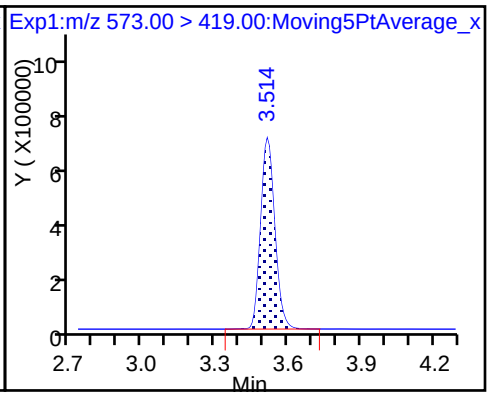
24 Perfluorodecanoic acid



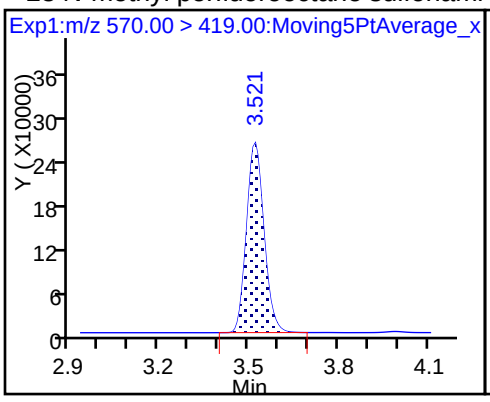
24 Perfluorodecanoic acid



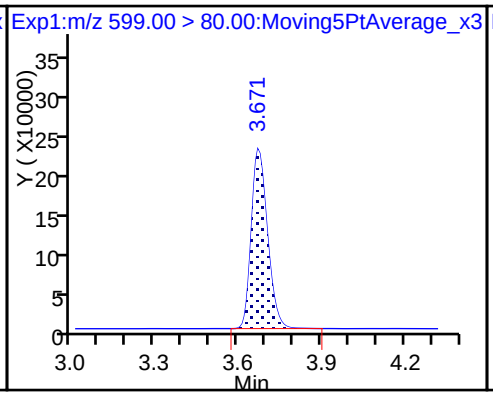
D 27 d3-NMeFOSAA



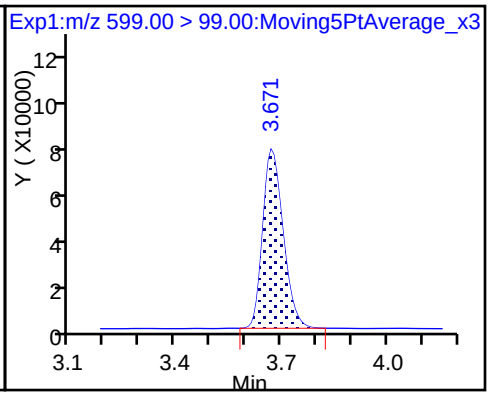
28 N-methyl perfluorooctane sulfonami



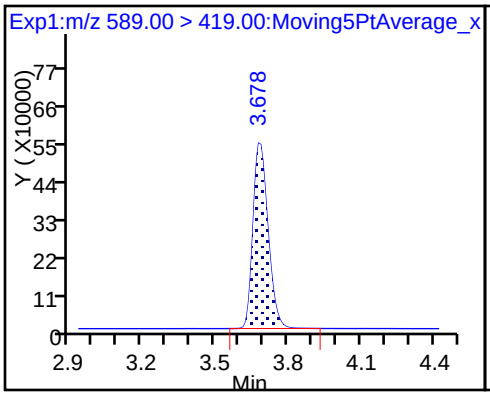
29 Perfluorodecane Sulfonic acid



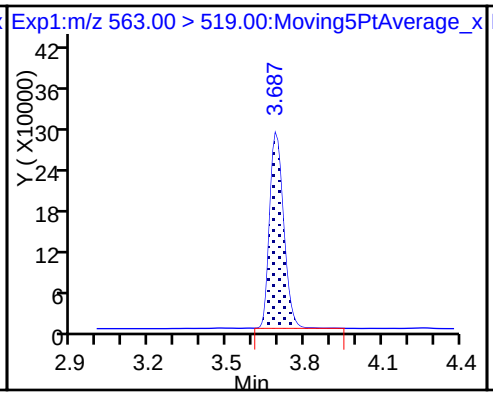
29 Perfluorodecane Sulfonic acid



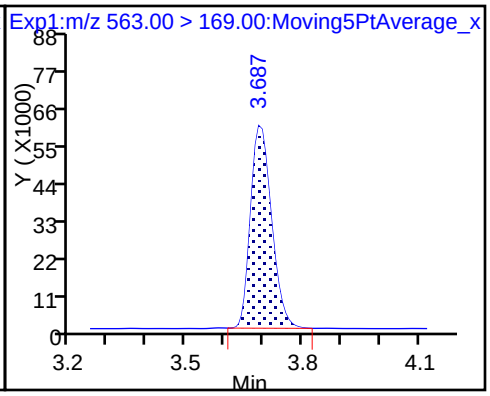
D 32 d5-NEtFOSAA



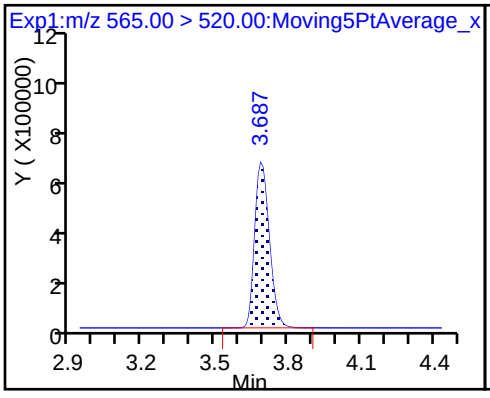
31 Perfluoroundecanoic acid



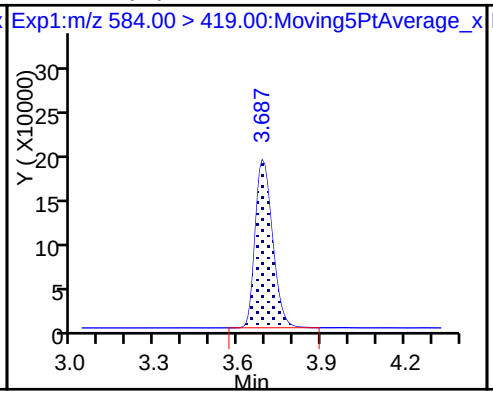
31 Perfluoroundecanoic acid



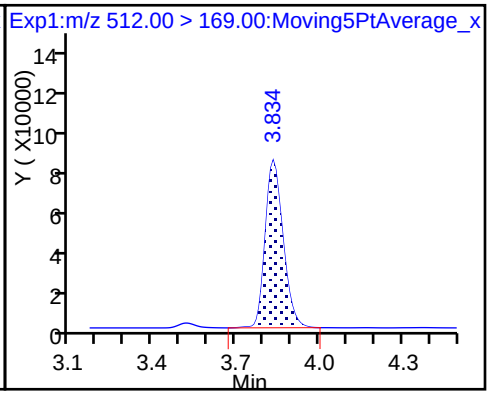
D 30 13C2 PFUnA



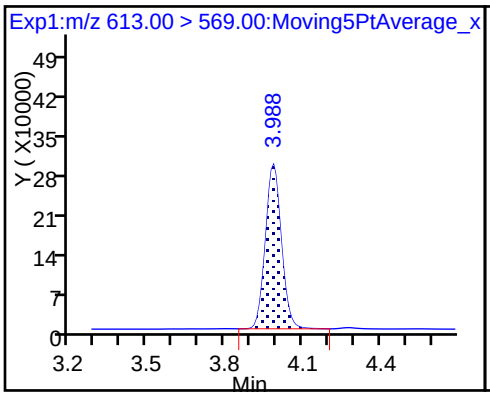
33 N-ethyl perfluorooctane sulfonamid



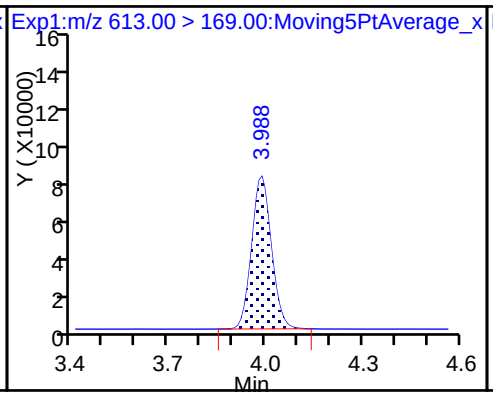
35 MeFOSA



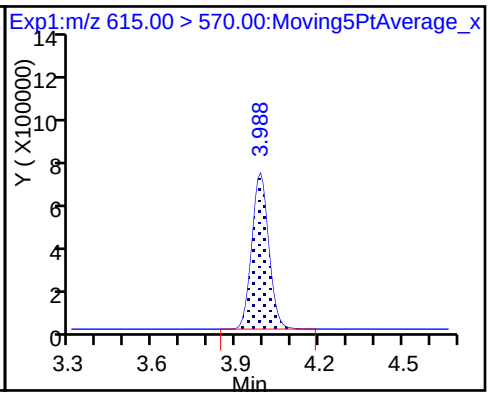
37 Perfluorododecanoic acid



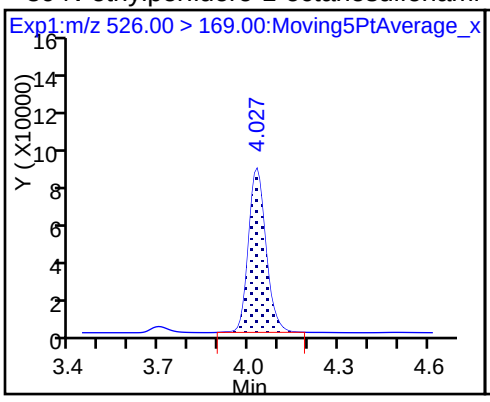
37 Perfluorododecanoic acid



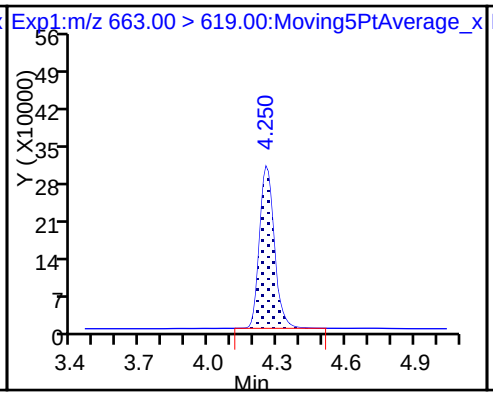
D 36 13C2 PFDoA



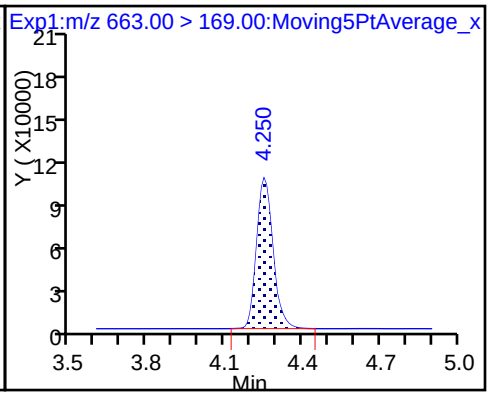
39 N-ethylperfluoro-1-octanesulfonami



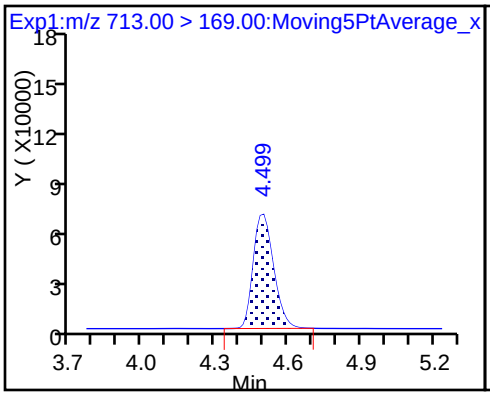
41 Perfluorotridecanoic acid



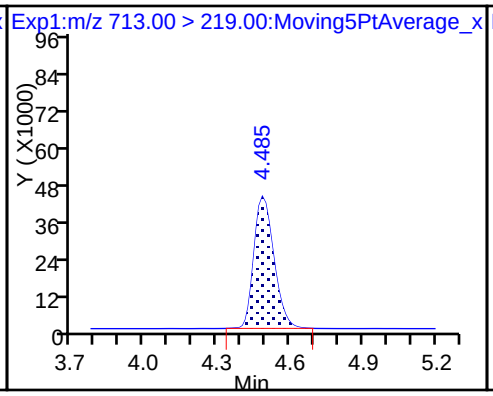
41 Perfluorotridecanoic acid



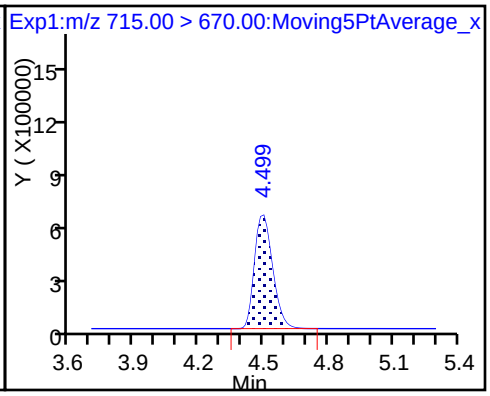
42 Perfluorotetradecanoic acid



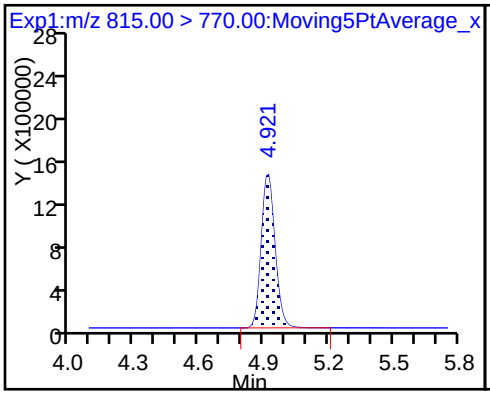
42 Perfluorotetradecanoic acid



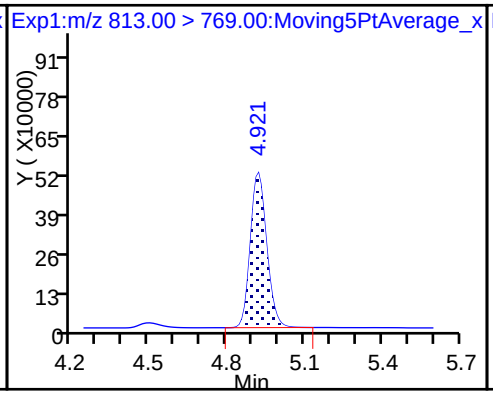
D 43 13C2-PFTeDA



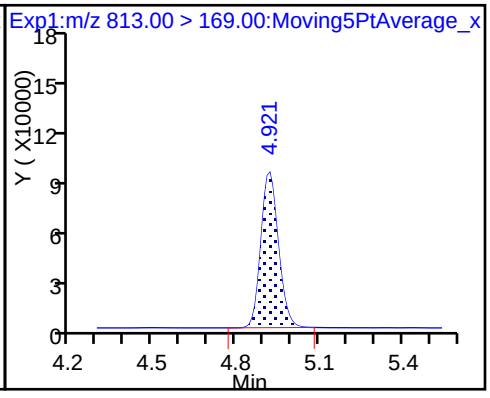
D 44 13C2-PFHxDA



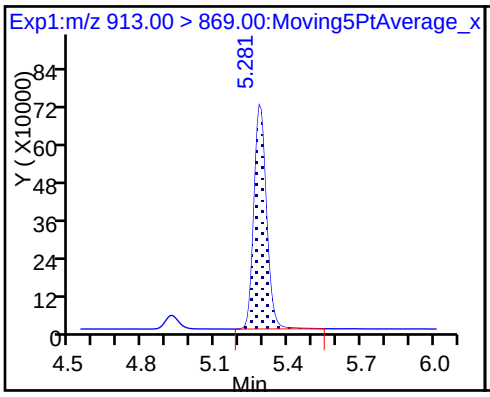
45 Perfluorohexadecanoic acid



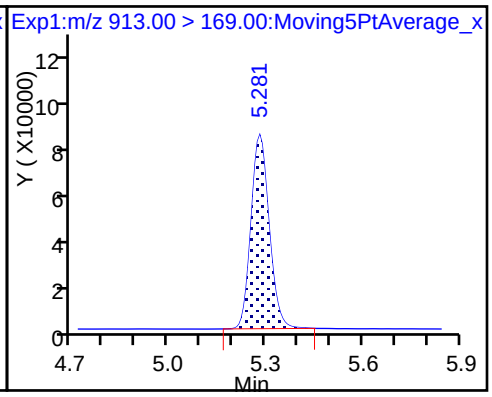
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-35310-1

SDG No.:

Client Sample ID: FH-17-04_GW012218 MSD | Lab Sample ID: 320-35310-7 MSD

Matrix: Water | Lab File ID: 2018.01.25LLAAXZ_041.d

Analysis Method: 537 (modified) | Date Collected: 01/22/2018 10:30

Extraction Method: 3535 | Date Extracted: 01/25/2018 09:10

Sample wt/vol: 213.2(mL) | Date Analyzed: 01/25/2018 22:51

Con. Extract Vol.: 10.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 205677 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-73-5	Perfluorobutanesulfonic acid (PFBS)	60.9	M	2.3	1.2	0.54
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	214	4	2.3	1.2	0.45
375-85-9	Perfluoroheptanoic acid (PFHpA)	48.8		2.3	1.8	0.72
335-67-1	Perfluorooctanoic acid (PFOA)	82.1	M J1	2.3	1.8	0.63
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	51.3	J1	4.7	3.5	1.3
375-95-1	Perfluorononanoic acid (PFNA)	40.8	J1	2.3	1.8	0.61

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	105		25-150
STL01892	13C4-PFHpA	96		25-150
STL00990	13C4 PFOA	109		25-150
STL00991	13C4 PFOS	113		25-150
STL00995	13C5 PFNA	115		25-150
STL02337	13C3-PFBS	106		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_041.d
Lims ID: 320-35310-A-7-C MSD
Client ID: FH-17-04_GW012218
Sample Type: MSD
Inject. Date: 25-Jan-2018 22:51:29 ALS Bottle#: 35 Worklist Smp#: 9
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-35310-a-7-c msd
Misc. Info.: Plate: 1 Rack: 6
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\A8_N.m
Limit Group: LC PFC_DOD ICAL
Last Update: 30-Jan-2018 10:22:34 Calib Date: 17-Jan-2018 15:06:20
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180117-53019.b\2018.01.17CURVELLA_008.d

Column 1 : Det: EXP1
Process Host: XAWRK015

First Level Reviewer: barnettj Date: 26-Jan-2018 14:39:18

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	1.407	1.411	-0.004	0.537	6064864	2.16		86.4	26844	
2 Perfluorobutyric acid										M
212.90 > 169.00	1.407	1.413	-0.006	1.000	2288550	1.01		101	136	M
D 3 13C5-PFPeA										
267.90 > 223.00	1.652	1.659	-0.007	0.630	4641673	2.79		112	36710	
4 Perfluoropentanoic acid										M
262.90 > 219.00	1.652	1.662	-0.010	1.000	2071061	0.9469		94.7	315	M
D 47 13C3-PFBS										
301.90 > 83.00	1.688	1.695	-0.007	0.643	90346	2.45		106	926	
5 Perfluorobutanesulfonic acid										M
298.90 > 80.00	1.697	1.697	0.0	1.005	3896789	1.30		147	912	M
298.90 > 99.00	1.688	1.697	-0.009	1.000	1542224		2.53(1.25-3.74)		1229	M
61 Sodium 1H,1H,2H,2H-perfluorohexane										
327.00 > 307.00	1.902	1.903	-0.001	1.000	806721	1.49		160	13579	
D 7 13C2 PFHxA										
315.00 > 270.00	1.933	1.939	-0.006	0.737	4670909	2.61		104	47599	
6 Perfluorohexanoic acid										
313.00 > 269.00	1.933	1.939	-0.006	1.000	2716562	1.40		140	1744	
313.00 > 119.00	1.933	1.939	-0.006	1.000	235323		11.54(5.03-15.10)		2202	
D 9 13C4-PFHpA										
367.00 > 322.00	2.265	2.267	-0.002	0.863	4111848	2.41		96.4	37355	
10 Perfluoroheptanoic acid										
363.00 > 319.00	2.265	2.268	-0.003	1.000	1882232	1.04		104	1846	
363.00 > 169.00	2.265	2.268	-0.003	1.000	790499		2.38(1.13-3.40)		4804	
8 Perfluorohexanesulfonic acid										
399.00 > 80.00	2.278	2.280	-0.002	1.000	11215841	4.55		500	3571	
399.00 > 99.00	2.278	2.280	-0.002	1.000	3565806		3.15(1.50-4.49)		6142	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 11 18O2 PFHxS										
403.00 > 84.00	2.278	2.282	-0.004	0.868	5232748	2.49		105	42843	
13 Sodium 1H,1H,2H,2H-perfluorooctane										
427.00 > 407.00	2.596	2.596	0.0	1.000	736890	0.8747		92.3	14437	
D 12 M2-6:2FTS										
429.00 > 81.00	2.596	2.597	-0.001	0.990	1208962	3.83		161	3748	
D 14 13C4 PFOA										
417.00 > 372.00	2.623	2.622	0.001	1.000	4537027	2.71		109	48147	
* 62 13C2-PFOA										
415.00 > 370.00	2.623	2.622	0.001		4643675	2.50			36670	
15 Perfluorooctanoic acid										M
413.00 > 369.00	2.623	2.623	0.0	1.000	3723023	1.75		175	1796	M
413.00 > 169.00	2.623	2.623	0.0	1.000	2185992		1.70(0.84-2.52)		10287	M
16 Perfluoroheptanesulfonic acid										
449.00 > 80.00	2.630	2.629	0.001	1.000	1831899	0.9001		94.6	2243	
449.00 > 99.00	2.630	2.629	0.001	1.000	517313		3.54(1.94-5.82)		3282	
D 19 13C5 PFNA										
468.00 > 423.00	2.993	2.992	0.001	1.141	3912175	2.89		115	40092	
17 Perfluorooctane sulfonic acid										
499.00 > 80.00	2.993	2.992	0.001	1.000	1838241	1.09		118	1554	
499.00 > 99.00	2.993	2.992	0.001	1.000	386796		4.75(2.31-6.93)		2443	
D 18 13C4 PFOS										
503.00 > 80.00	2.993	2.992	0.001	1.141	3590957	2.70		113	13081	
20 Perfluorononanoic acid										
463.00 > 419.00	3.001	2.992	0.009	1.003	1404288	0.8693		86.9	1303	
463.00 > 169.00	2.993	2.992	0.001	1.000	349558		4.02(1.90-5.69)		4728	
22 Perfluorooctane Sulfonamide										
498.00 > 78.00	3.340	3.338	0.002	1.000	1801129	0.9341		93.4	12261	
D 21 13C8 FOSA										
506.00 > 78.00	3.340	3.338	0.002	1.273	4907158	2.62		105	28800	
D 26 M2-8:2FTS										
529.00 > 81.00	3.347	3.342	0.005	1.276	1193956	3.58		149	13180	
25 Sodium 1H,1H,2H,2H-perfluorodecane										
527.00 > 507.00	3.347	3.342	0.005	1.000	540752	0.8913		93.0	11249	
D 23 13C2 PFDA										
515.00 > 470.00	3.355	3.352	0.003	1.279	3570090	3.05		122	33586	
24 Perfluorodecanoic acid										
513.00 > 469.00	3.355	3.353	0.002	1.000	1269436	0.9162		91.6	4910	
513.00 > 169.00	3.355	3.353	0.002	1.000	226900		5.59(2.36-7.09)		2885	
D 27 d3-NMeFOSAA										
573.00 > 419.00	3.514	3.507	0.007	1.340	1917245	3.28		131	17169	
28 N-methyl perfluorooctane sulfonami										
570.00 > 419.00	3.514	3.513	0.001	1.000	778196	0.9394		93.9	5063	
29 Perfluorodecane Sulfonic acid										
599.00 > 80.00	3.663	3.666	-0.003	1.000	884519	0.8989		93.3	6570	
599.00 > 99.00	3.663	3.666	-0.003	1.000	303823		2.91(1.39-4.16)		3649	
D 32 d5-NEtFOSAA										
589.00 > 419.00	3.671	3.672	-0.001	1.399	1801386	3.05		122	9916	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
31 Perfluoroundecanoic acid										
563.00 > 519.00	3.679	3.678	0.001	1.000	904178	0.8754		87.5	3025	
563.00 > 169.00	3.679	3.678	0.001	1.000	192016		4.71(0.00-0.00)		3180	
D 30 13C2 PFUnA										
565.00 > 520.00	3.679	3.679	0.0	1.403	2501599	2.82		113	25268	
33 N-ethyl perfluorooctane sulfonamid										
584.00 > 419.00	3.679	3.679	0.0	1.002	639144	0.9108		91.1	7329	
35 MeFOSA										
512.00 > 169.00	3.835	3.875	-0.040		258701	NR		0.0	1195	
37 Perfluorododecanoic acid										
613.00 > 569.00	3.981	3.979	0.002	1.002	1163357	0.9397		94.0	3503	
613.00 > 169.00	3.981	3.979	0.002	1.002	287949		4.04(2.13-6.40)		8383	
D 36 13C2 PFDoA										
615.00 > 570.00	3.972	3.979	-0.007	1.514	3020261	3.13		125	30632	
39 N-ethylperfluoro-1-octanesulfonami										
526.00 > 169.00	4.028	4.066	-0.038		159847	NR		0.0	985	
41 Perfluorotridecanoic acid										
663.00 > 619.00	4.242	4.242	0.0	1.000	1227012	0.8746		87.5	4823	
663.00 > 169.00	4.242	4.242	0.0	1.000	404276		3.04(1.25-3.76)		15449	
42 Perfluorotetradecanoic acid										
713.00 > 169.00	4.472	4.483	-0.011	1.000	357627	1.01		101	10347	
713.00 > 219.00	4.472	4.483	-0.011	1.000	241911		1.48(0.71-2.13)		7209	
D 43 13C2-PFTeDA										
715.00 > 670.00	4.472	4.483	-0.011	1.705	3637793	2.89		115	22735	
D 44 13C2-PFHxDA										
815.00 > 770.00	4.895	4.902	-0.007	1.866	5961810	2.65		106	11750	
45 Perfluorohexadecanoic acid										
813.00 > 769.00	4.895	4.902	-0.007	1.000	2085335	0.9036		90.4	1316	
813.00 > 169.00	4.895	4.902	-0.007	1.000	365895		5.70(2.86-8.58)		5131	
46 Perfluorooctadecanoic acid										
913.00 > 869.00	5.253	5.255	-0.002	1.000	2428627	0.9666		96.7	595	
913.00 > 169.00	5.253	5.255	-0.002	1.000	301795		8.05(0.00-0.00)		1335	

QC Flag Legend

Processing Flags

NR - Missing Quant Standard

Review Flags

M - Manually Integrated

Report Date: 30-Jan-2018 10:22:44 Chrom Revision: 2.2 24-Jan-2018 15:37:30

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_041.d

Injection Date: 25-Jan-2018 22:51:29 Instrument ID: A8_N

Lims ID: 320-35310-A-7-C MSD

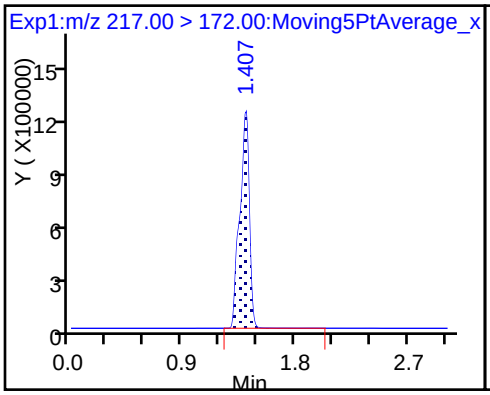
Client ID: FH-17-04_GW012218

Operator ID: SACINSTLCMS01 ALS Bottle#: 35 Worklist Smp#: 9

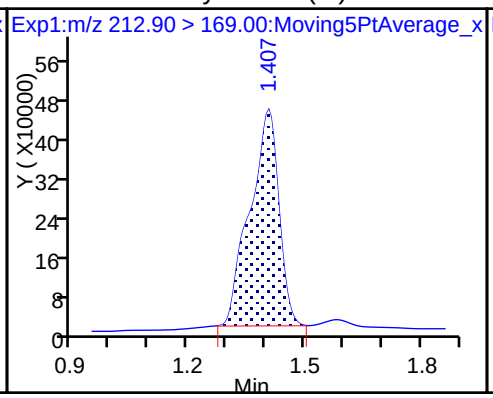
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: A8_N Limit Group: LC PFC_DOD ICAL

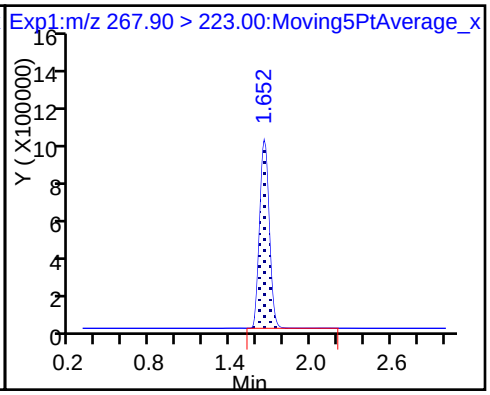
D 1 13C4 PFBA



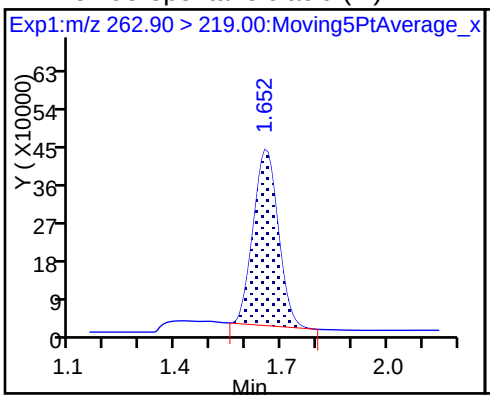
2 Perfluorobutyric acid (M)



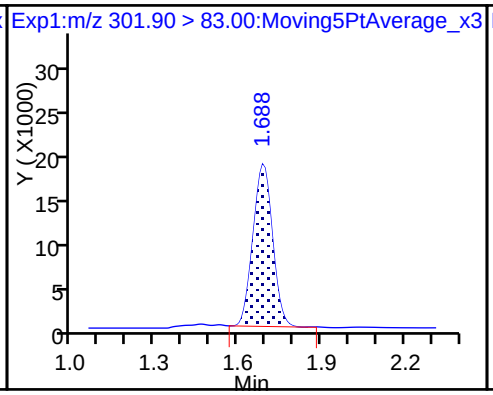
D 3 13C5-PFPeA



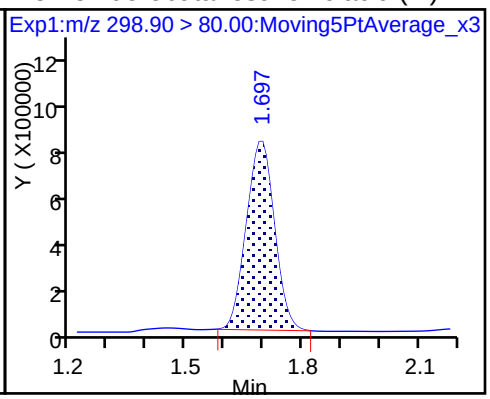
4 Perfluoropentanoic acid (M)



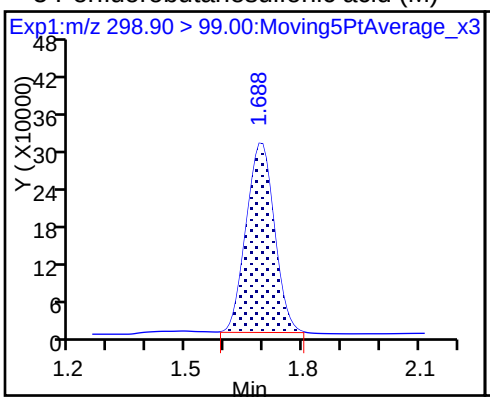
D 47 13C3-PFBS



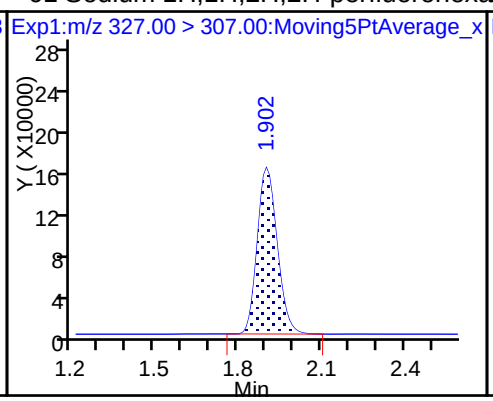
5 Perfluorobutanesulfonic acid (M)



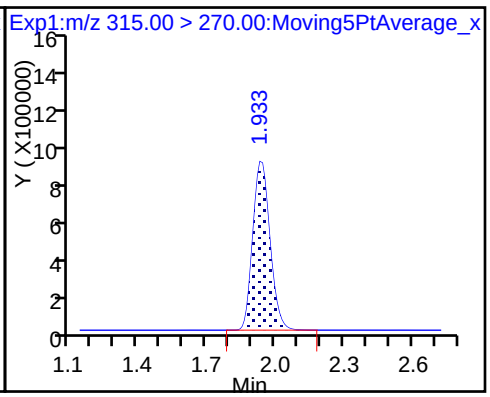
5 Perfluorobutanesulfonic acid (M)



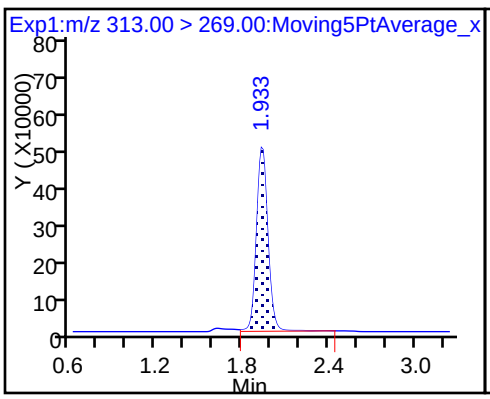
61 Sodium 1H,1H,2H,2H-perfluorohexa



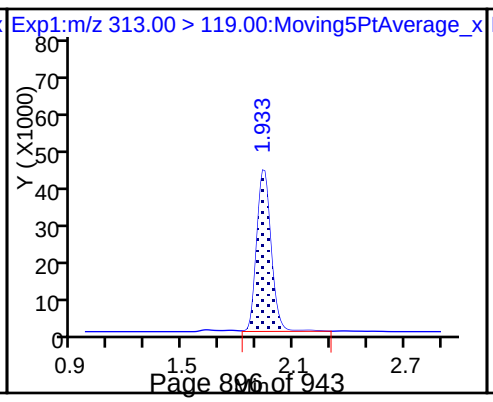
D 7 13C2 PFHxA



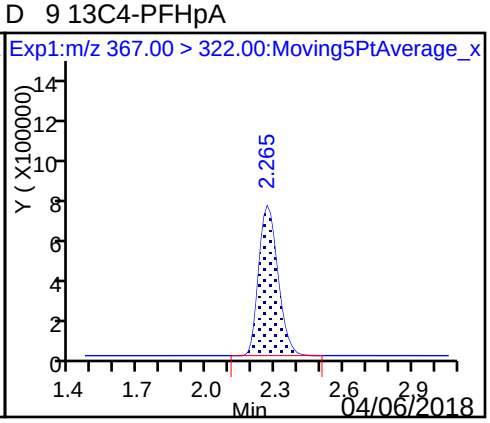
6 Perfluorohexanoic acid



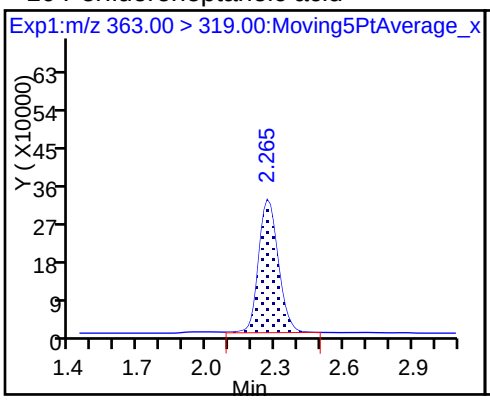
6 Perfluorohexanoic acid



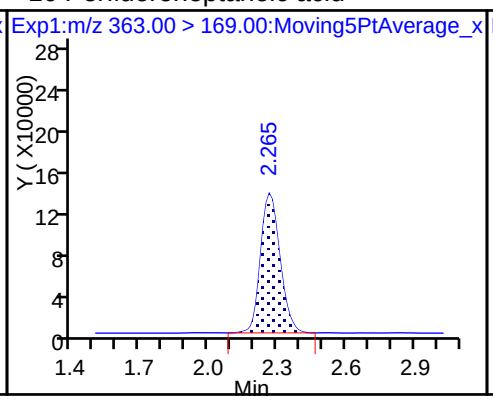
D 9 13C4-PFHpA



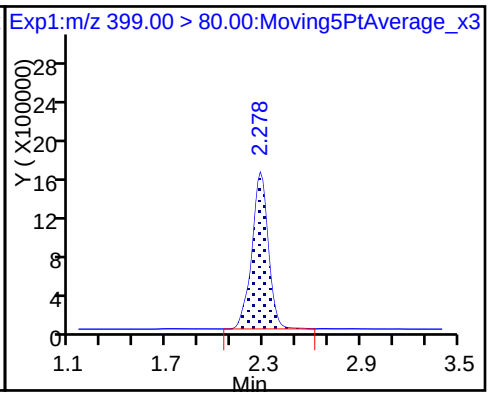
10 Perfluoroheptanoic acid



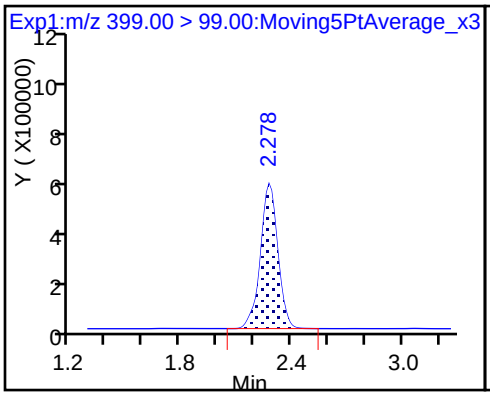
10 Perfluoroheptanoic acid



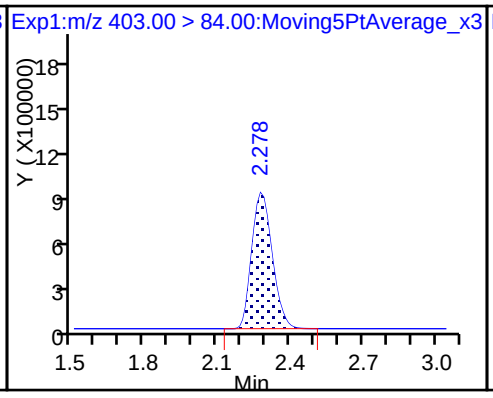
8 Perfluorohexanesulfonic acid



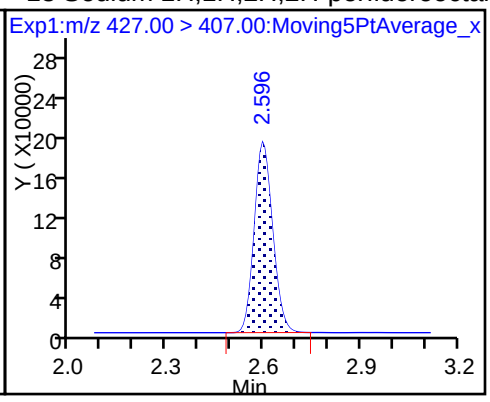
8 Perfluorohexanesulfonic acid



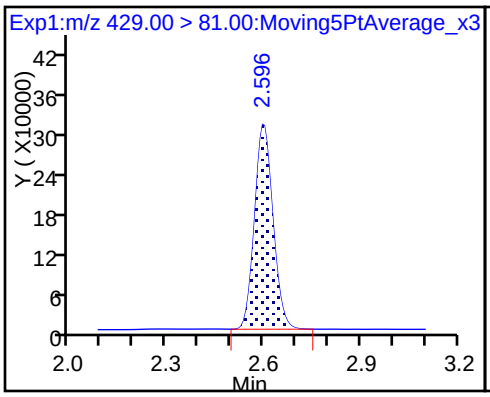
D 11 18O2 PFHxS



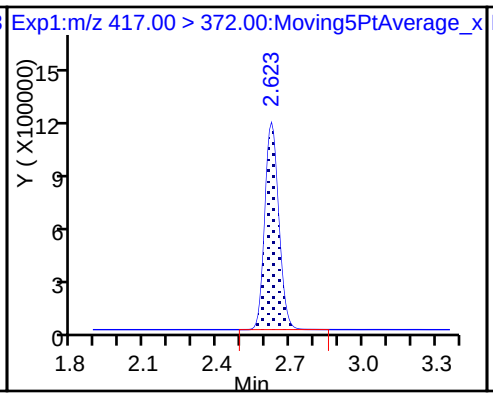
13 Sodium 1H,1H,2H,2H-perfluorooctane



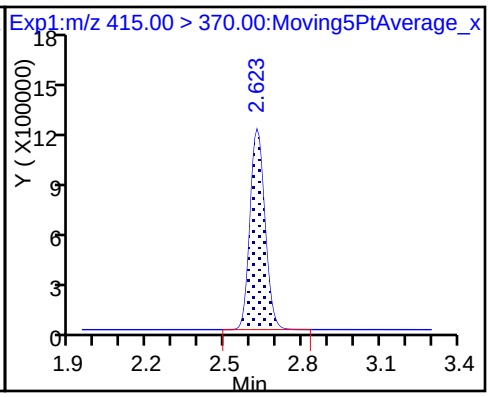
D 12 M2-6:2FTS



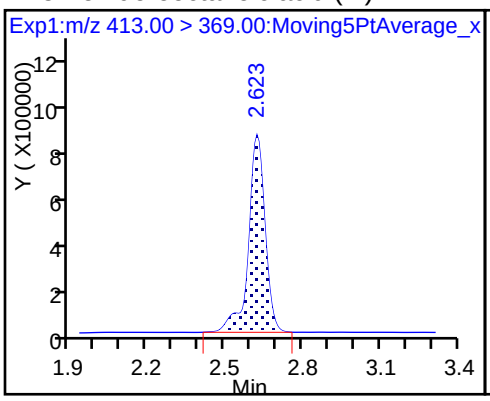
D 14 13C4 PFOA



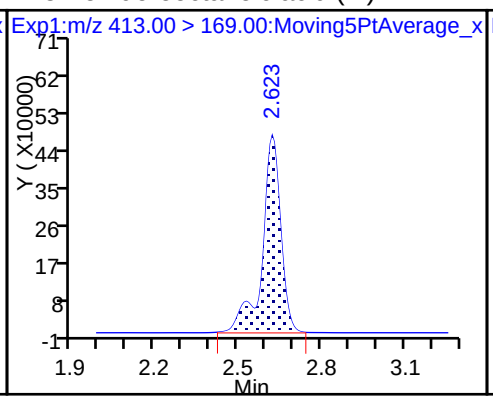
* 62 13C2-PFOA



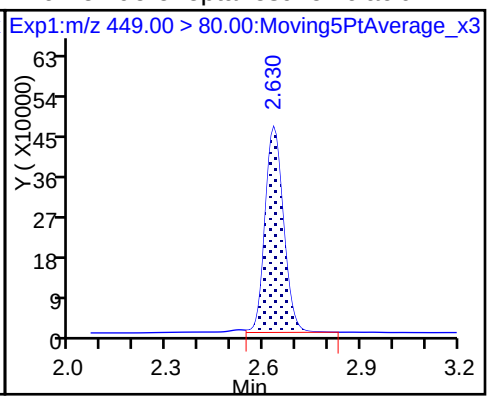
15 Perfluorooctanoic acid (M)



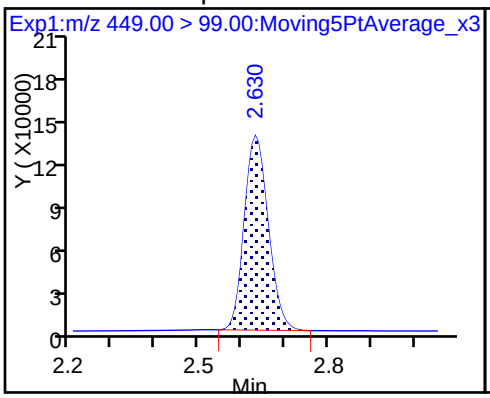
15 Perfluorooctanoic acid (M)



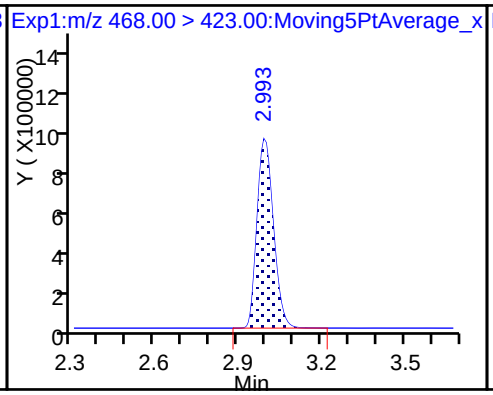
16 Perfluoroheptanesulfonic acid



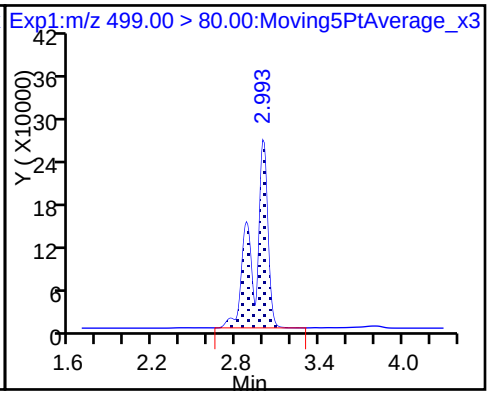
16 Perfluoroheptanesulfonic acid



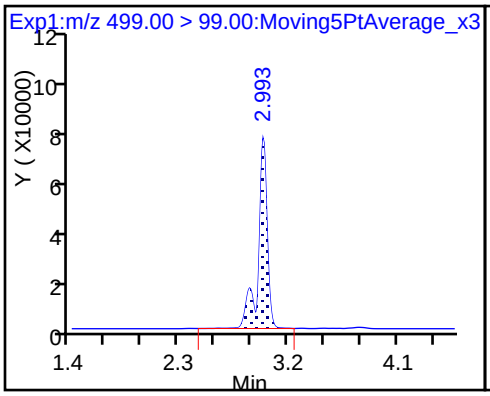
D 19 13C5 PFNA



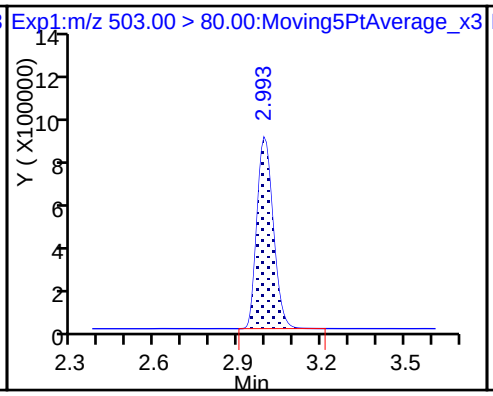
17 Perfluorooctane sulfonic acid



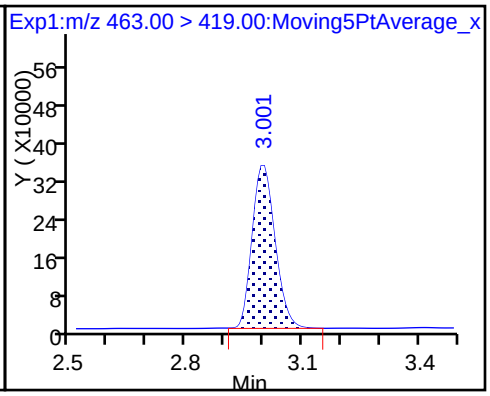
17 Perfluorooctane sulfonic acid



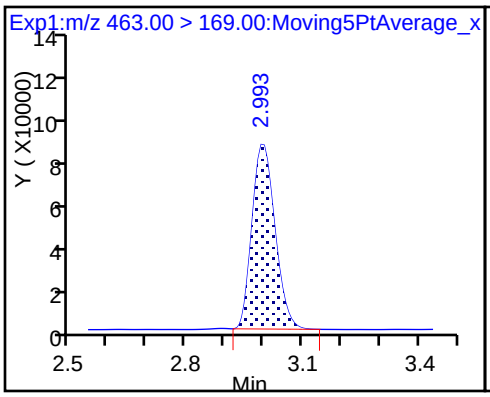
D 18 13C4 PFOS



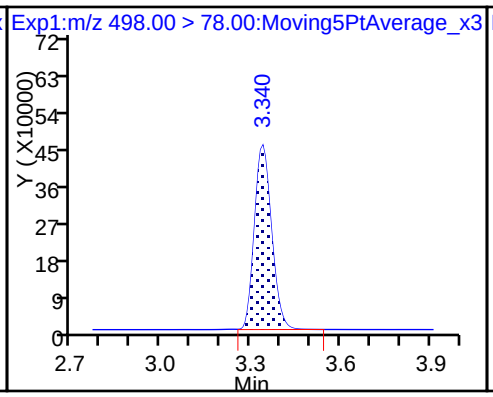
20 Perfluorononanoic acid



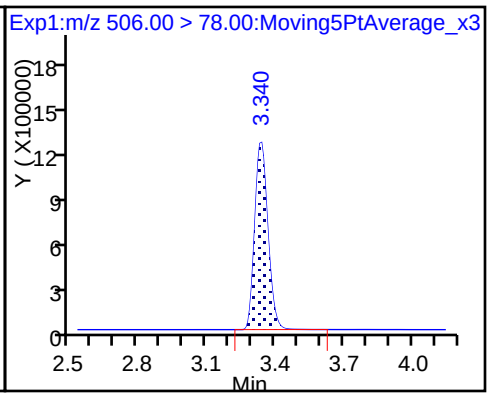
20 Perfluorononanoic acid



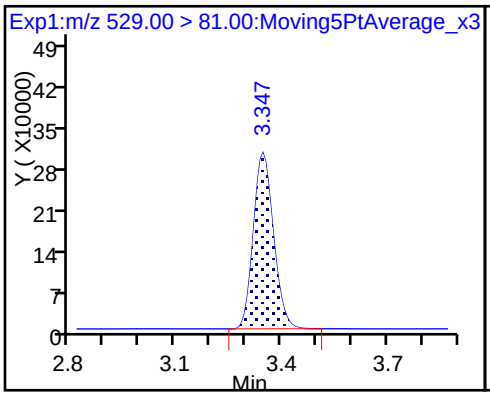
22 Perfluorooctane Sulfonamide



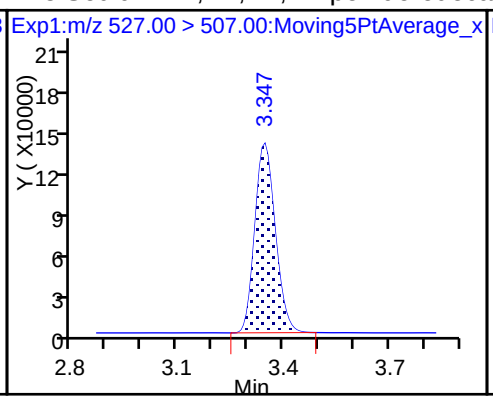
D 21 13C8 FOSA



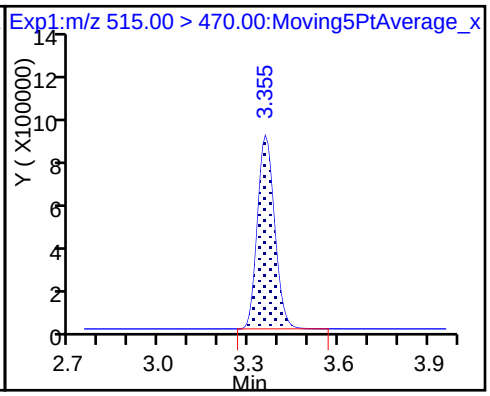
D 26 M2-8:2FTS



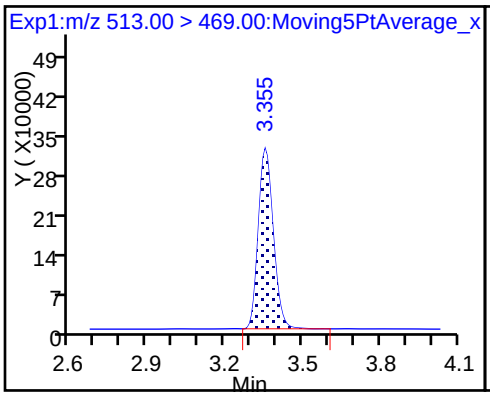
25 Sodium 1H,1H,2H,2H-perfluorodecane



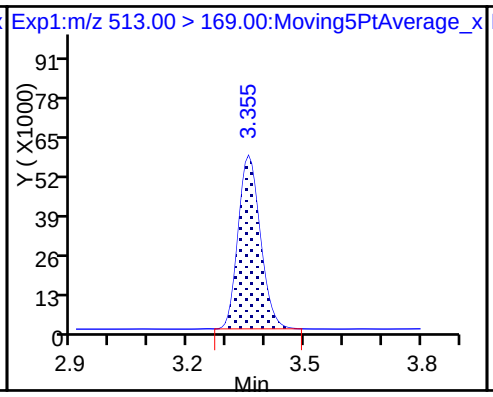
D 23 13C2 PFDA



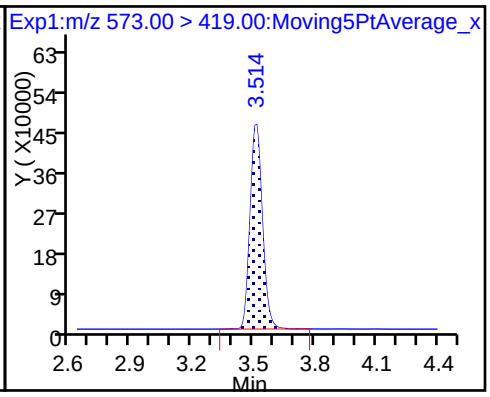
24 Perfluorodecanoic acid



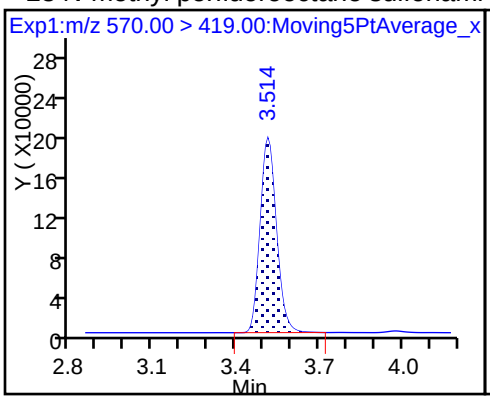
24 Perfluorodecanoic acid



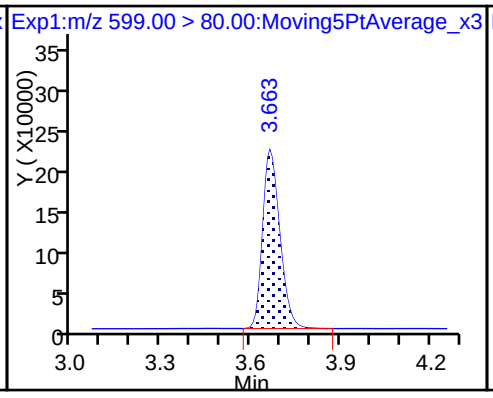
D 27 d3-NMeFOSAA



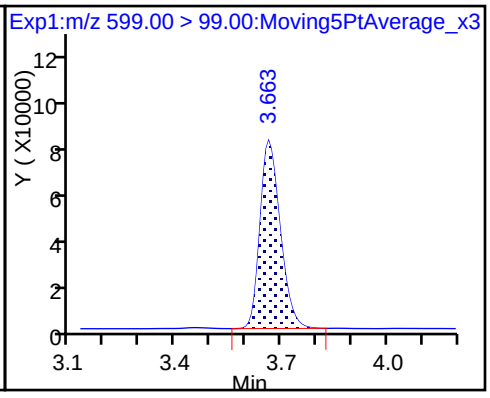
28 N-methyl perfluorooctane sulfonami



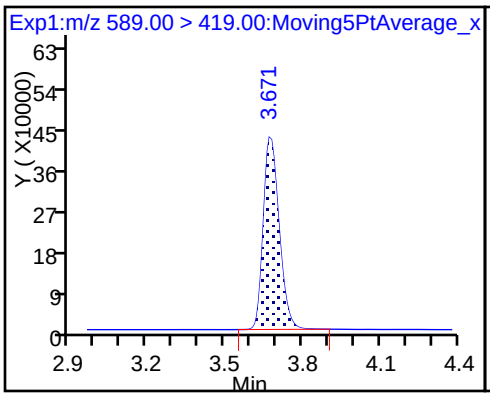
29 Perfluorodecane Sulfonic acid



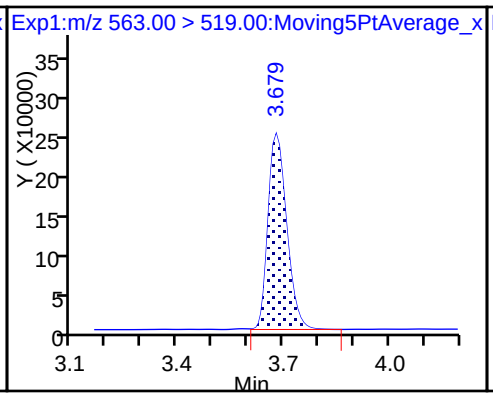
29 Perfluorodecane Sulfonic acid



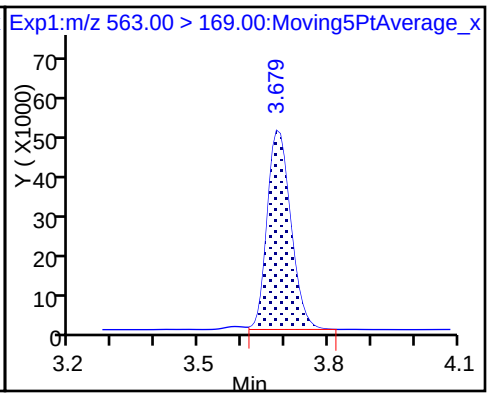
D 32 d5-NEtFOSAA



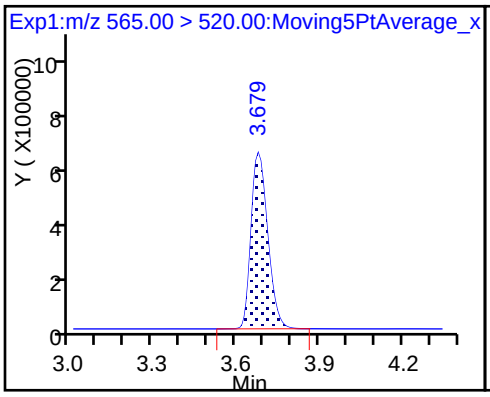
31 Perfluoroundecanoic acid



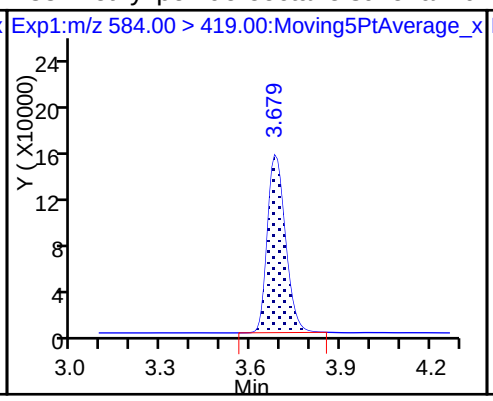
31 Perfluoroundecanoic acid



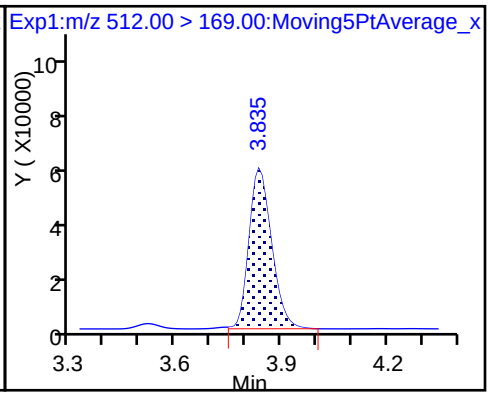
D 30 13C2 PFUnA



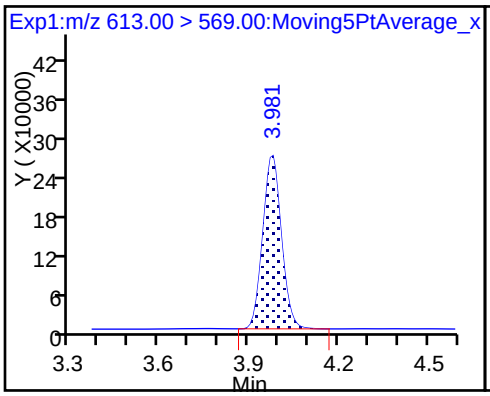
33 N-ethyl perfluorooctane sulfonamid



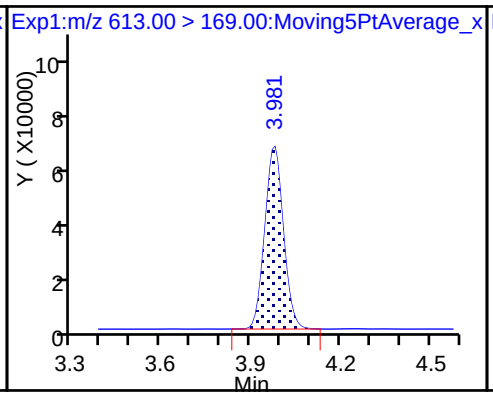
35 MeFOSA



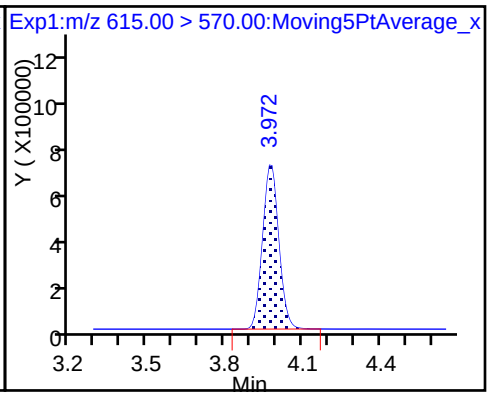
37 Perfluorododecanoic acid



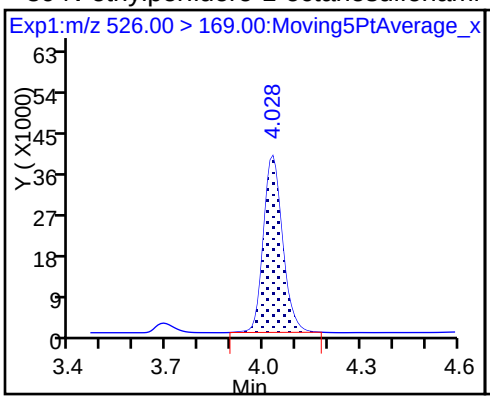
37 Perfluorododecanoic acid



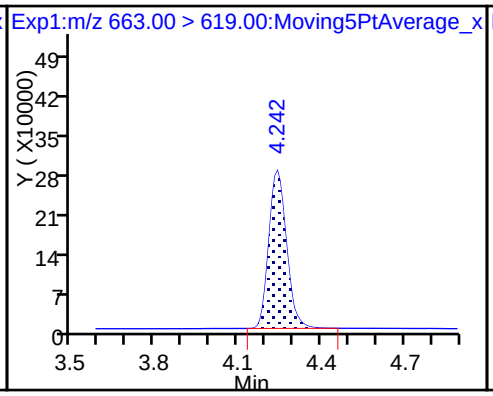
D 36 13C2 PFDoA



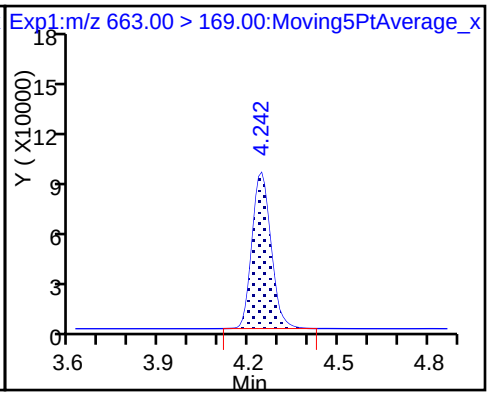
39 N-ethylperfluoro-1-octanesulfonami



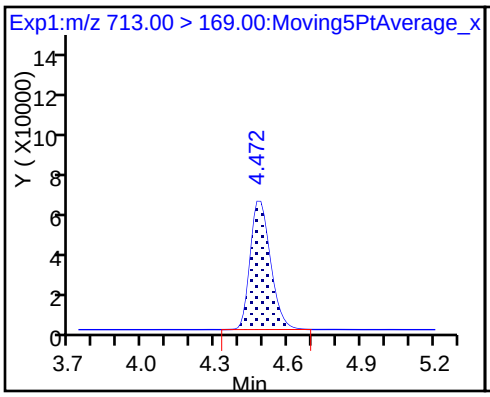
41 Perfluorotridecanoic acid



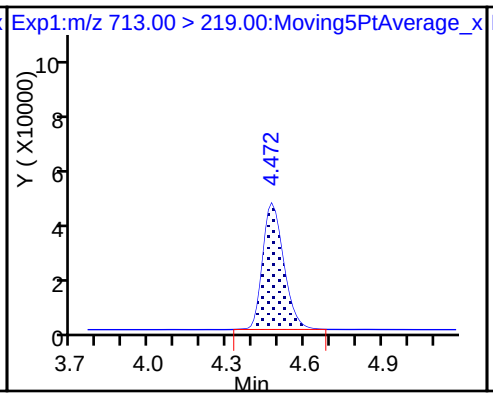
41 Perfluorotridecanoic acid



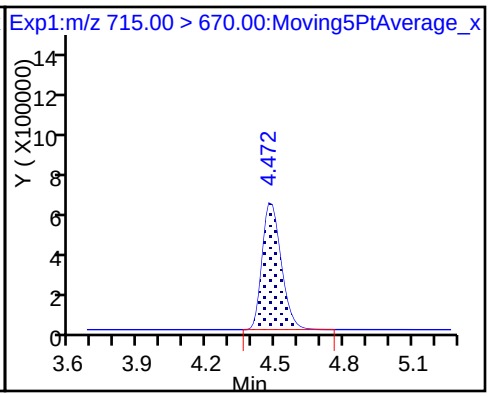
42 Perfluorotetradecanoic acid



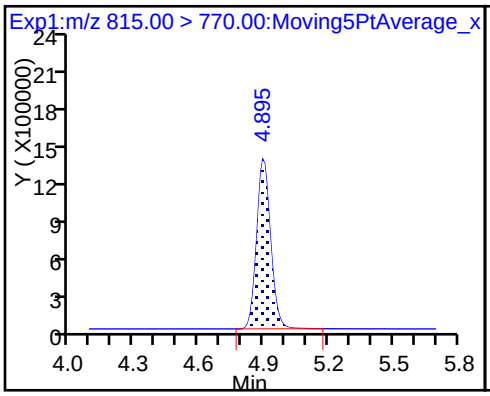
42 Perfluorotetradecanoic acid



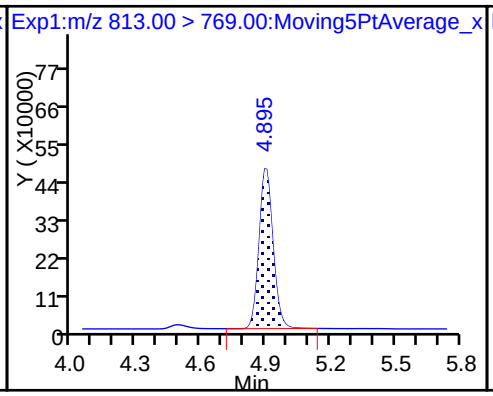
D 43 13C2-PFTeDA



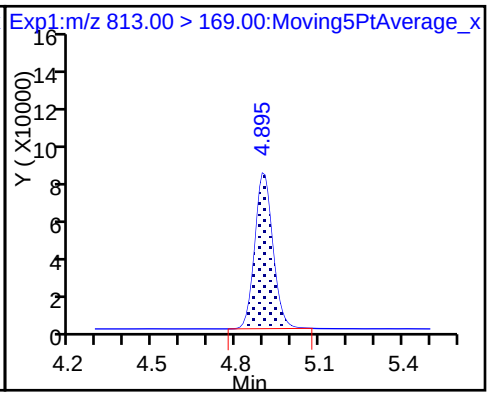
D 44 13C2-PFHxDA



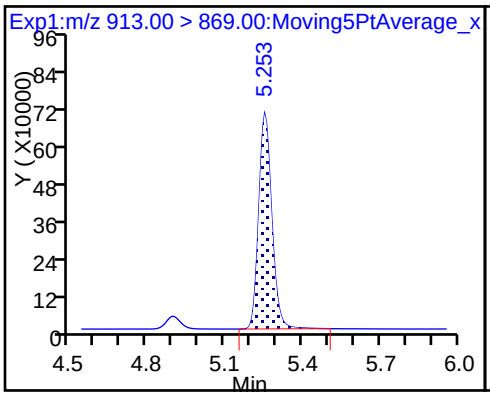
45 Perfluorohexadecanoic acid



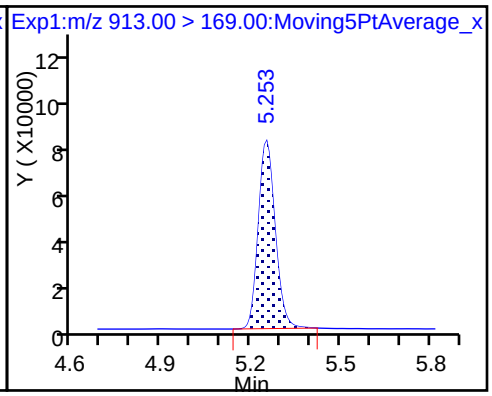
45 Perfluorohexadecanoic acid



46 Perfluorooctadecanoic acid



46 Perfluorooctadecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

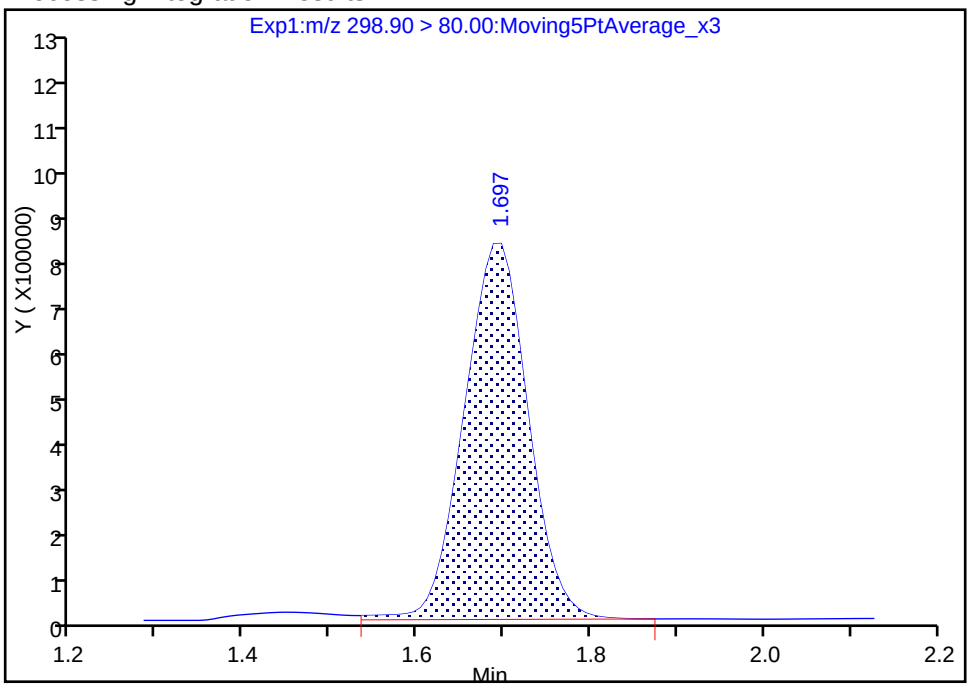
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_041.d				
Injection Date:	25-Jan-2018 22:51:29	Instrument ID:	A8_N		
Lims ID:	320-35310-A-7-C MSD				
Client ID:	FH-17-04_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	35	Worklist Smp#:	9
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 1

Processing Integration Results

RT: 1.70
Area: 4015985
Amount: 1.338494
Amount Units: ng/ml



Manual Integration Results

RT: 1.70
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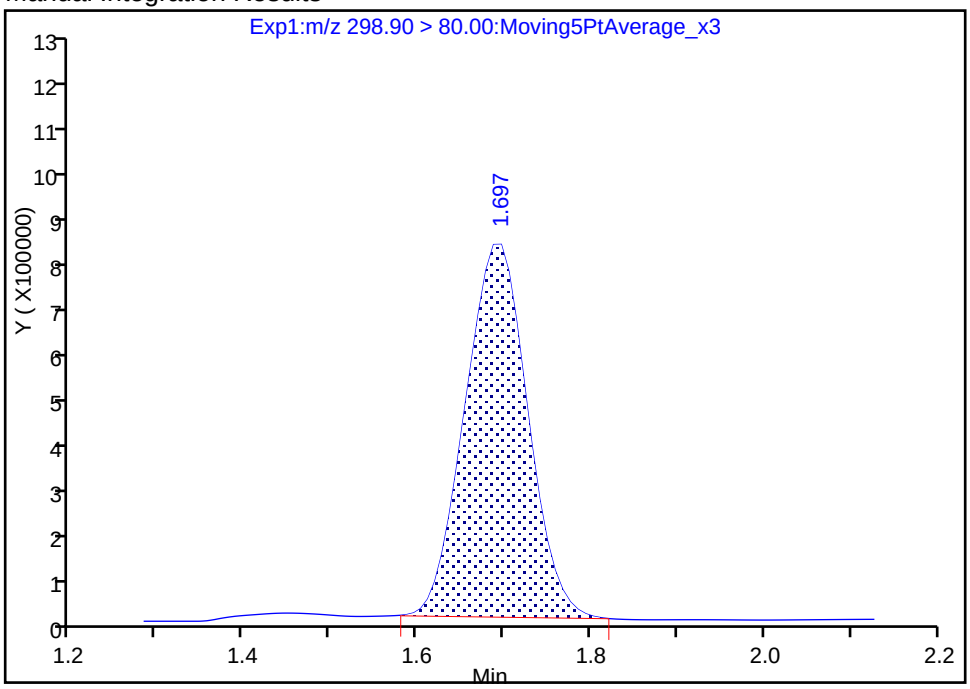
Amount: 1.298767
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:38:00

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

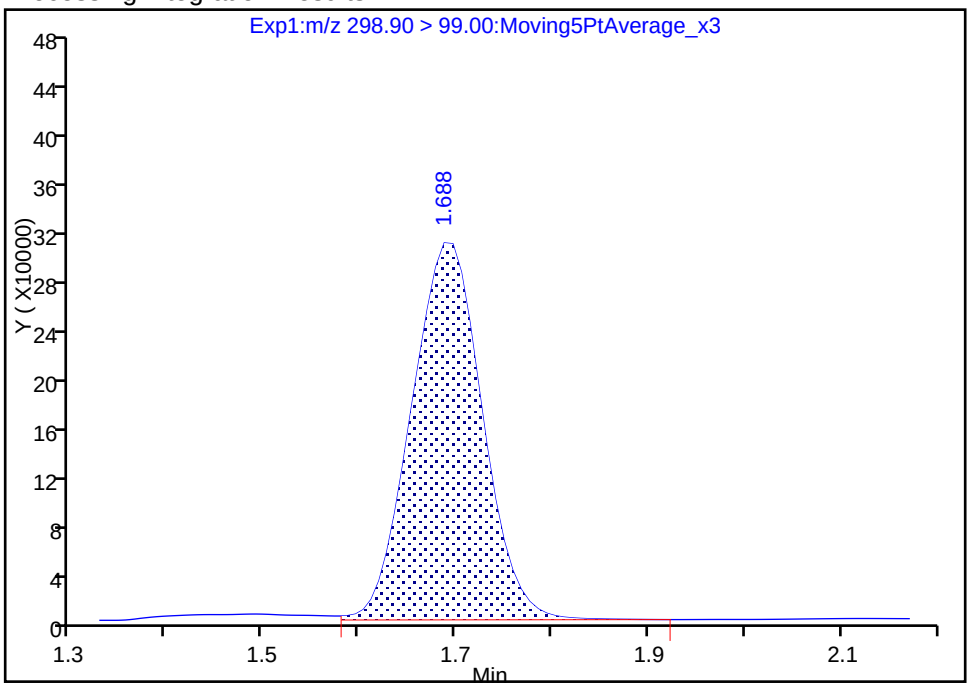
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_041.d
Injection Date: 25-Jan-2018 22:51:29 Instrument ID: A8_N
Lims ID: 320-35310-A-7-C MSD
Client ID: FH-17-04_GW012218
Operator ID: SACINSTLCMS01 ALS Bottle#: 35 Worklist Smp#: 9
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Method: A8_N Limit Group: LC PFC_DOD ICAL
Column: Detector EXP1

5 Perfluorobutanesulfonic acid, CAS: 375-73-5

Signal: 2

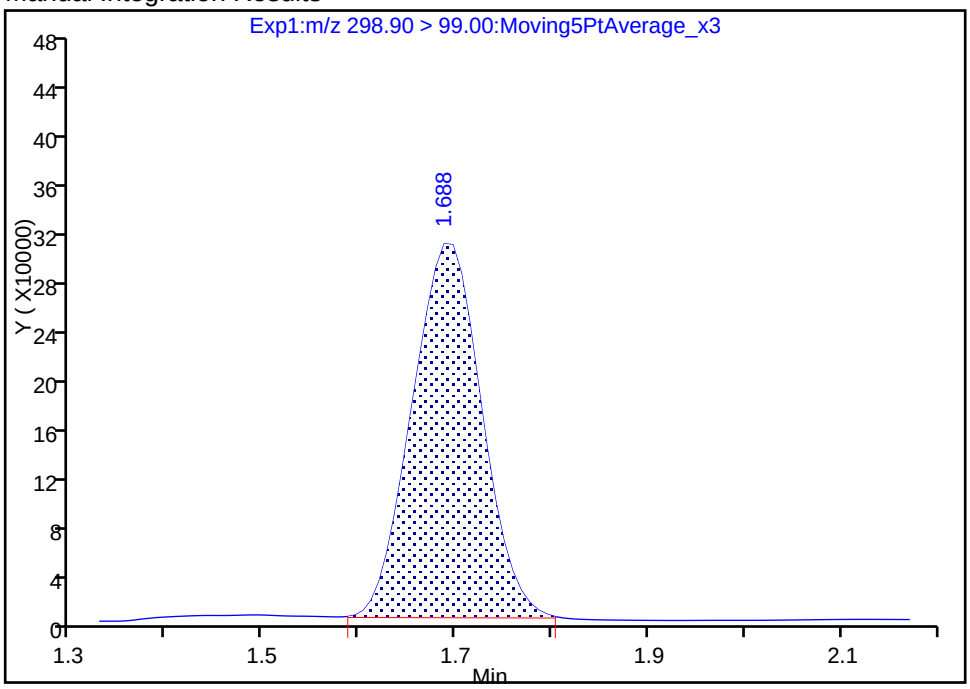
Processing Integration Results

RT: 1.69
Area: 1580402
Amount: 1.338494
Amount Units: ng/ml



Manual Integration Results

RT: 1.69
Area: 1542224
Amount: 1.298767
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:38:11
Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

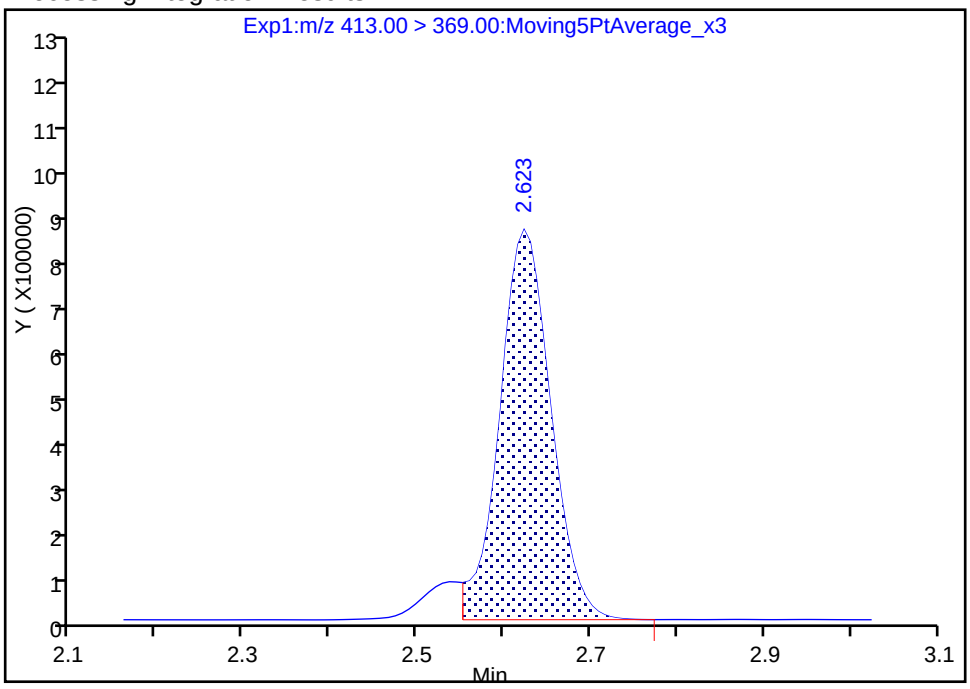
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_041.d				
Injection Date:	25-Jan-2018 22:51:29	Instrument ID:	A8_N		
Lims ID:	320-35310-A-7-C MSD				
Client ID:	FH-17-04_GW012218				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	35	Worklist Smp#:	9
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	A8_N	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	EXP1		

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

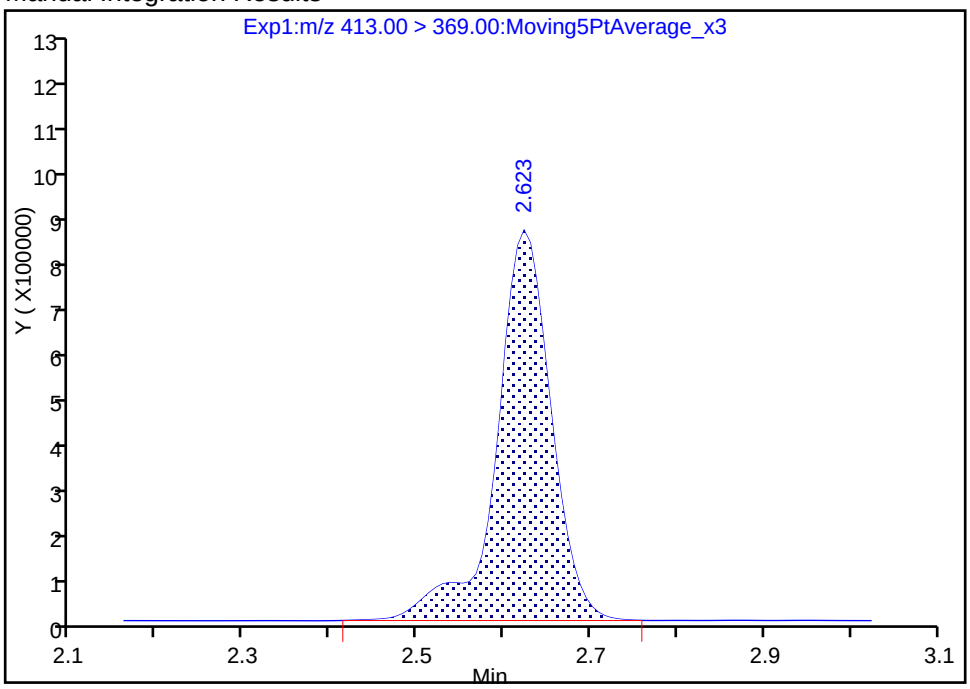
Processing Integration Results

RT: 2.62
Area: 3464750
Amount: 1.628843
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 3723023
Amount: 1.750262
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:38:41

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

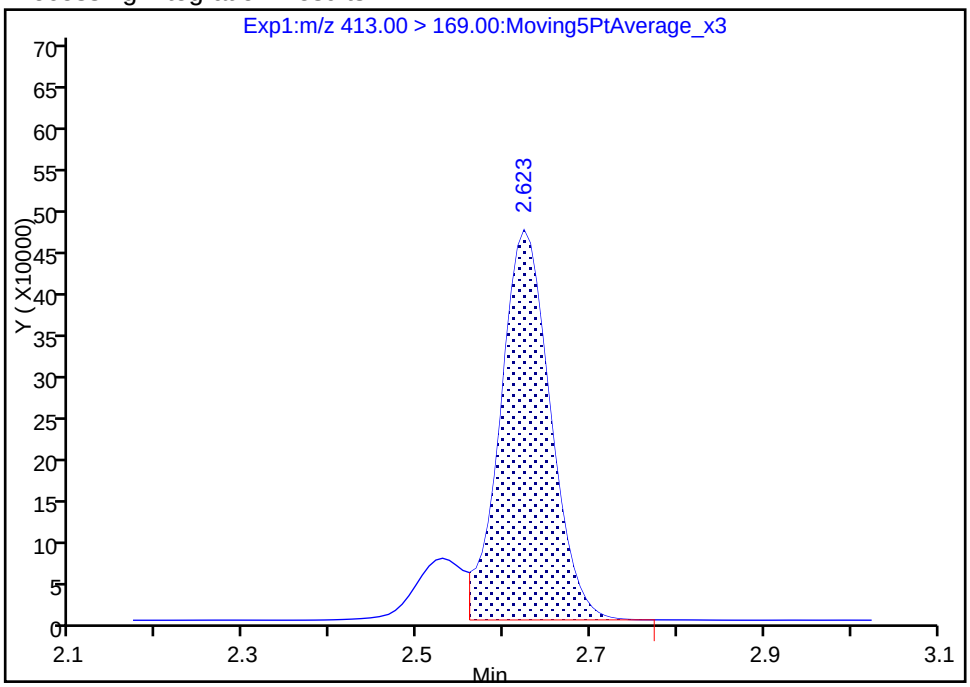
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53352.b\2018.01.25LLAAXZ_041.d
Injection Date: 25-Jan-2018 22:51:29 Instrument ID: A8_N
Lims ID: 320-35310-A-7-C MSD
Client ID: FH-17-04_GW012218
Operator ID: SACINSTLCMS01 ALS Bottle#: 35 Worklist Smp#: 9
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Method: A8_N Limit Group: LC PFC_DOD ICAL
Column: Detector EXP1

15 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

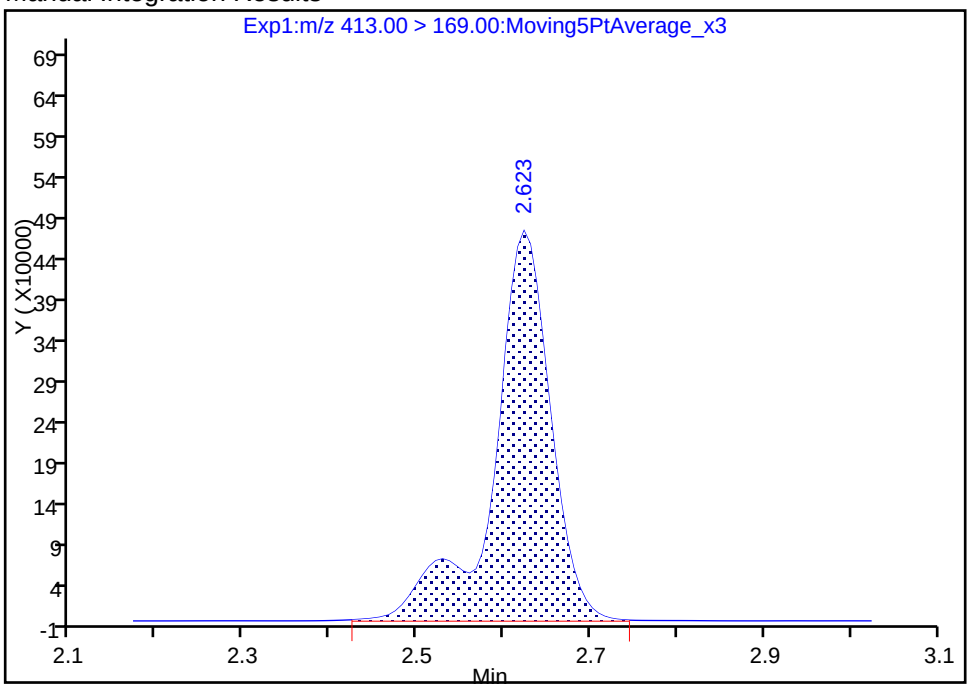
Processing Integration Results

RT: 2.62
Area: 1884854
Amount: 1.628843
Amount Units: ng/ml



Manual Integration Results

RT: 2.62
Area: 2185992
Amount: 1.750262
Amount Units: ng/ml



Reviewer: barnettj, 26-Jan-2018 14:38:56
Audit Action: Manually Integrated Audit Reason: Isomers

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Start Date: 01/17/2018 14:19

Analysis Batch Number: 204375 End Date: 01/17/2018 15:22

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-204375/2		01/17/2018 14:19	1	2018.01.17CURVE LLA 002.d	GeminiC18 3x100 3(mm)
IC 320-204375/3		01/17/2018 14:27	1	2018.01.17CURVE LLA 003.d	GeminiC18 3x100 3(mm)
IC 320-204375/4		01/17/2018 14:35	1	2018.01.17CURVE LLA 004.d	GeminiC18 3x100 3(mm)
IC 320-204375/5		01/17/2018 14:42	1	2018.01.17CURVE LLA 005.d	GeminiC18 3x100 3(mm)
IC 320-204375/6		01/17/2018 14:50	1	2018.01.17CURVE LLA 006.d	GeminiC18 3x100 3(mm)
IC 320-204375/7		01/17/2018 14:58	1	2018.01.17CURVE LLA 007.d	GeminiC18 3x100 3(mm)
IC 320-204375/8		01/17/2018 15:06	1	2018.01.17CURVE LLA 008.d	GeminiC18 3x100 3(mm)
ICB 320-204375/9		01/17/2018 15:14	1		GeminiC18 3x100 3(mm)
ICV 320-204375/10		01/17/2018 15:22	1	2018.01.17CURVE LLA_010.d	GeminiC18 3x100 3(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Start Date: 01/25/2018 10:13

Analysis Batch Number: 205637 End Date: 01/25/2018 11:39

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-205637/1		01/25/2018 10:13	1	2018.01.25LLAA_006.d	GeminiC18 3x100 3(mm)
CCV 320-205637/2		01/25/2018 10:21	1		GeminiC18 3x100 3(mm)
ZZZZZ		01/25/2018 10:29	1		GeminiC18 3x100 3(mm)
CCV 320-205637/12		01/25/2018 11:39	1		GeminiC18 3x100 3(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Start Date: 01/25/2018 21:48

Analysis Batch Number: 205677 End Date: 01/26/2018 00:09

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-205677/1		01/25/2018 21:48	1	2018.01.25LLAAXZ 033.d	GeminiC18 3x100 3(mm)
MB 320-205514/1-A		01/25/2018 21:56	1	2018.01.25LLAAXZ 034.d	GeminiC18 3x100 3(mm)
LCS 320-205514/2-A		01/25/2018 22:04	1	2018.01.25LLAAXZ 035.d	GeminiC18 3x100 3(mm)
320-35310-1		01/25/2018 22:12	1	2018.01.25LLAAXZ 036.d	GeminiC18 3x100 3(mm)
320-35310-2		01/25/2018 22:20	1	2018.01.25LLAAXZ 037.d	GeminiC18 3x100 3(mm)
320-35310-5		01/25/2018 22:27	1	2018.01.25LLAAXZ 038.d	GeminiC18 3x100 3(mm)
320-35310-7		01/25/2018 22:35	1	2018.01.25LLAAXZ 039.d	GeminiC18 3x100 3(mm)
320-35310-7 MS		01/25/2018 22:43	1	2018.01.25LLAAXZ 040.d	GeminiC18 3x100 3(mm)
320-35310-7 MSD		01/25/2018 22:51	1	2018.01.25LLAAXZ 041.d	GeminiC18 3x100 3(mm)
320-35310-9		01/25/2018 22:59	1	2018.01.25LLAAXZ 042.d	GeminiC18 3x100 3(mm)
320-35310-11		01/25/2018 23:07	1	2018.01.25LLAAXZ 043.d	GeminiC18 3x100 3(mm)
CCV 320-205677/12		01/25/2018 23:14	1	2018.01.25LLAAXZ 044.d	GeminiC18 3x100 3(mm)
320-35310-13		01/25/2018 23:22	1	2018.01.25LLAAXZ 045.d	GeminiC18 3x100 3(mm)
320-35310-15		01/25/2018 23:30	1	2018.01.25LLAAXZ 046.d	GeminiC18 3x100 3(mm)
320-35310-17		01/25/2018 23:38	1	2018.01.25LLAAXZ 047.d	GeminiC18 3x100 3(mm)
320-35310-18		01/25/2018 23:46	1	2018.01.25LLAAXZ 048.d	GeminiC18 3x100 3(mm)
320-35310-20		01/25/2018 23:54	1	2018.01.25LLAAXZ 049.d	GeminiC18 3x100 3(mm)
320-35310-22		01/26/2018 00:02	1	2018.01.25LLAAXZ 050.d	GeminiC18 3x100 3(mm)
CCV 320-205677/19		01/26/2018 00:09	1	2018.01.25LLAAXZ 051.d	GeminiC18 3x100 3(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Start Date: 01/26/2018 11:47

Analysis Batch Number: 205751 End Date: 01/26/2018 12:58

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-205751/2		01/26/2018 11:47	1	2018.01.26LLA_005.d	GeminiC18 3x100 3(mm)
CCV 320-205751/3		01/26/2018 11:55	1		GeminiC18 3x100 3(mm)
CCV 320-205751/11		01/26/2018 12:58	1		GeminiC18 3x100 3(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Start Date: 01/26/2018 16:06

Analysis Batch Number: 205921 End Date: 01/26/2018 18:11

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-205921/1		01/26/2018 16:06	1	2018.01.26LLA_026.d	GeminiC18 3x100 3(mm)
MB 320-205574/1-A		01/26/2018 16:14	1	2018.01.26LLA_027.d	GeminiC18 3x100 3(mm)
LCS 320-205574/2-A		01/26/2018 16:22	1	2018.01.26LLA_028.d	GeminiC18 3x100 3(mm)
320-35310-3		01/26/2018 16:30	1	2018.01.26LLA_029.d	GeminiC18 3x100 3(mm)
320-35310-3 MS		01/26/2018 16:38	1	2018.01.26LLA_030.d	GeminiC18 3x100 3(mm)
320-35310-3 MSD		01/26/2018 16:45	1	2018.01.26LLA_031.d	GeminiC18 3x100 3(mm)
320-35310-4		01/26/2018 16:53	1	2018.01.26LLA_032.d	GeminiC18 3x100 3(mm)
320-35310-6		01/26/2018 17:01	1	2018.01.26LLA_033.d	GeminiC18 3x100 3(mm)
320-35310-8		01/26/2018 17:09	1	2018.01.26LLA_034.d	GeminiC18 3x100 3(mm)
320-35310-10		01/26/2018 17:17	1	2018.01.26LLA_035.d	GeminiC18 3x100 3(mm)
320-35310-12		01/26/2018 17:24	1	2018.01.26LLA_036.d	GeminiC18 3x100 3(mm)
CCV 320-205921/12		01/26/2018 17:32	1	2018.01.26LLA_037.d	GeminiC18 3x100 3(mm)
320-35310-14		01/26/2018 17:40	1	2018.01.26LLA_038.d	GeminiC18 3x100 3(mm)
320-35310-16		01/26/2018 17:48	1	2018.01.26LLA_039.d	GeminiC18 3x100 3(mm)
320-35310-19		01/26/2018 17:56	1	2018.01.26LLA_040.d	GeminiC18 3x100 3(mm)
320-35310-21		01/26/2018 18:04	1	2018.01.26LLA_041.d	GeminiC18 3x100 3(mm)
CCV 320-205921/17		01/26/2018 18:11	1	2018.01.26LLA_042.d	GeminiC18 3x100 3(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Start Date: 01/26/2018 21:19

Analysis Batch Number: 205928 End Date: 01/26/2018 22:14

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-205928/1		01/26/2018 21:19	1	2018.01.26LLA_066.d	GeminiC18 3x100 3(mm)
ZZZZZ		01/26/2018 21:27	1		GeminiC18 3x100 3(mm)
320-35310-1 DL		01/26/2018 21:35	5	2018.01.26LLA_068.d	GeminiC18 3x100 3(mm)
320-35310-2 DL		01/26/2018 21:42	5	2018.01.26LLA_069.d	GeminiC18 3x100 3(mm)
320-35310-15 DL		01/26/2018 21:50	10	2018.01.26LLA_070.d	GeminiC18 3x100 3(mm)
320-35310-22 DL		01/26/2018 21:58	20	2018.01.26LLA_071.d	GeminiC18 3x100 3(mm)
ZZZZZ		01/26/2018 22:06	1		GeminiC18 3x100 3(mm)
CCV 320-205928/8		01/26/2018 22:14	1	2018.01.26LLA_073.d	GeminiC18 3x100 3(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Start Date: 01/29/2018 11:29

Analysis Batch Number: 206057 End Date: 01/29/2018 12:31

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-206057/1		01/29/2018 11:29	1	2018.01.29LLA_003.d	GeminiC18 3x100 3(mm)
CCV 320-206057/2		01/29/2018 11:37	1		GeminiC18 3x100 3(mm)
ZZZZZ		01/29/2018 11:52	1		GeminiC18 3x100 3(mm)
ZZZZZ		01/29/2018 12:00	1		GeminiC18 3x100 3(mm)
ZZZZZ		01/29/2018 12:08	1		GeminiC18 3x100 3(mm)
ZZZZZ		01/29/2018 12:16	1		GeminiC18 3x100 3(mm)
ZZZZZ		01/29/2018 12:24	1		GeminiC18 3x100 3(mm)
CCV 320-206057/9		01/29/2018 12:31	1		GeminiC18 3x100 3(mm)

537 (modified)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: A8_N Start Date: 01/29/2018 16:20

Analysis Batch Number: 206109 End Date: 01/29/2018 16:44

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-206109/1		01/29/2018 16:20	1	2018.01.29LLAA_037.d	GeminiC18 3x100 3(mm)
320-35310-10 DL		01/29/2018 16:28	10	2018.01.29LLAA_038.d	GeminiC18 3x100 3(mm)
320-35310-12 DL		01/29/2018 16:36	20	2018.01.29LLAA_039.d	GeminiC18 3x100 3(mm)
CCV 320-206109/4		01/29/2018 16:44	1	2018.01.29LLAA_040.d	GeminiC18 3x100 3(mm)

537 (modified)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

West Sacramento

HPLC/LCMS Data Review Checklist

Job Number(s): 320-35310 Work List ID(s): 53418, 53474

Extraction Batch: 205574 Analysis Batch(es): 205921, 206109

Delivery Rank 4 Due Date: 1/31/2018

A Calibration/Instrument Run QC	1st Level	2nd Level	N/A
1. ICAL locked in Chrom and TALS? ICAL Batch# 204375	✓	✓	
2. ICAL, CCV Frequency & Criteria met.	✓	✓	
• $RF_{average}$ criteria appropriate for the method.	✓	✓	
• Linear Regression criteria appropriate if required ($r \geq 0.995$).	✓	✓	
• Quadratic fit criteria appropriate if required ($r^2 \geq 0.990$).			✓
• For Linear Regression and Quadratic fit – Does the y-intercept support ½ the reporting limit as described in CA-Q-S-005?	✓	✓	
• All curve points show calculated concentrations.	✓	✓	
3. Peaks correctly ID'd by data system.	✓	✓	
5. Tune check frequency & criteria met and Tune check report attached.	✓	✓	
B QA/QC			
1. Are all QC samples properly linked in TALS?	✓	✓	
2. Method blank, LCS/LCSD and MS/SD frequencies met.	✓	✓	
3. LCS/LCSD and MB data are within control limits. If not, NCM is present.	✓	✓	
4. Are MS/MSD recoveries and RPD within control limits?	✓	✓	
5. Holding Times were met for prep and analytical.	✓	✓	
6. IS/Surrogate recoveries meet criteria or properly noted.	✓	✓	
C Sample Analysis			
1. Was correct analysis performed and were project instructions followed?	✓	✓	
2. If required, are compounds within RT windows?	✓	✓	
3. If required, are positive hits confirmed and >40% RPD flagged?			✓
4. Manual Integrations reviewed and appropriate.	✓	✓	
5. All analytes correctly reported. (Primary, secondary, acceptable status)	✓	✓	
6. Correct reporting limits used. (based on client request, prep factors, and dilutions)	✓	✓	
D Documentation			
1. Are all non-conformances documented/attached? NCM#	✓	✓	
2. Do results make sense (e.g. dilutions, etc.)?	✓	✓	
3. Have all flags been reviewed for appropriateness?	✓	✓	
4. For level 3 and 4 reports, have forms and raw data been reviewed?		✓	
5. Was QC Checker run for this job?	✓	✓	

**Upon completion of this checklist, the reviewer must scan and attach the checklist to the TALS job.*

1st Level (Analyst): ABH Date: 1/30/2018

2nd Level Reviewer: Murray Date: 1/30/2018

TestAmerica Laboratories
Worklist QC Batch Report

Worklist Name: 26JAN2018NCD_PFC Worklist Number: 53418
Instrument Name: A8_N Chrom Method: A8_N CCVL : 205751
Data Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b
QC Batching: Disabled Limit Group Batching: Enabled

QC Batch: 1	LC PFC ICAL Raw Batch: 205920	LC PFC_DOD ICAL Raw Batch: 205921
# 1 CCV L5	# 1 CCV L5	# 1 CCV L5
# 2 MB 320-205574/1-A		# 2 MB 320-205574/1-A
# 3 LCS 320-205574/2-A		# 3 LCS 320-205574/2-A
# 4 320-35310-A-3-A		# 4 320-35310-A-3-A
# 5 320-35310-A-3-B MS		# 5 320-35310-A-3-B MS
# 6 320-35310-A-3-C MSD		# 6 320-35310-A-3-C MSD
# 7 320-35310-A-4-A		# 7 320-35310-A-4-A
# 8 320-35310-A-6-A		# 8 320-35310-A-6-A
# 9 320-35310-A-8-A		# 9 320-35310-A-8-A
#10 320-35310-A-10-A		#10 320-35310-A-10-A
#11 320-35310-A-12-A		#11 320-35310-A-12-A
#12 CCV L4	#12 CCV L4	#12 CCV L4
#13 320-35310-A-14-A		#13 320-35310-A-14-A
#14 320-35310-A-16-A		#14 320-35310-A-16-A
#15 320-35310-A-19-A		#15 320-35310-A-19-A
#16 320-35310-A-21-A		#16 320-35310-A-21-A
#17 CCV L5	#17 CCV L5	#17 CCV L5

TestAmerica Laboratories
Worklist QC Batch Report

Worklist Name: 29JAN2018NCD_PFC Worklist Number: 53474
Instrument Name: A8_N Chrom Method: A8_N
Data Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b
QC Batching: Disabled Limit Group Batching: Enabled

CCV : 206057

QC Batch: 1	LC PFC ICAL Raw Batch: 206108	LC PFC_DOD ICAL Raw Batch: 206109
# 1 CCV L4	# 1 CCV L4	# 1 CCV L4
# 2 320-35310-A-10-A		# 2 320-35310-A-10-A
# 3 320-35310-A-12-A		# 3 320-35310-A-12-A
# 4 CCV L5	# 4 CCV L5	# 4 CCV L5

TestAmerica Laboratories
Worklist Run Log Report

Worklist Name: 26JAN2018NCA_PFC Worklist Num: 53378
Instrument: A8_N Method: A8_N
Batch Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180126-53378.b
Anaylysis Type: SemiVOA Creator: Hannigan, Alyssa B
Inj Volume: 2.00 Inj Vol Units: ul

Lab ID	Worklist ID	Sample Type	Inj Date/Time	File Name	Vial	Dil Factor	Client ID	Fract
RB	320-0053378-001	RB	26-Jan-2018 11:39:49	2018.01.26LLA_004.d	54	1.0		sv
CCVL	320-0053378-002	CCVL	26-Jan-2018 11:47:40	2018.01.26LLA_005.d	21	1.0		sv
CCV L4	320-0053378-003	CCV	26-Jan-2018 11:55:31	2018.01.26LLA_006.d	30	1.0		sv
RB	320-0053378-004	RB	26-Jan-2018 12:03:24	2018.01.26LLA_007.d	20	1.0		sv
320-35169-A-1-A	320-0053378-005	Client	26-Jan-2018 12:11:16	2018.01.26LLA_008.d	1	100.	SAMP 1 ODS	sv
320-35169-A-2-A	320-0053378-006	Client	26-Jan-2018 12:19:05	2018.01.26LLA_009.d	2	100.	SAMP 2 ODS	sv
320-35169-A-1-A	320-0053378-007	Client	26-Jan-2018 12:26:54	2018.01.26LLA_010.d	3	10.0	SAMP 1 ODS	sv
RB	320-0053378-008	RB	26-Jan-2018 12:34:43	2018.01.26LLA_011.d	54	1.0		sv
320-35169-A-2-A	320-0053378-009	Client	26-Jan-2018 12:42:31	2018.01.26LLA_012.d	4	10.0	SAMP 2 ODS	sv
RB	320-0053378-010	RB	26-Jan-2018 12:50:22	2018.01.26LLA_013.d	54	1.0		sv
CCV L5	320-0053378-011	CCV	26-Jan-2018 12:58:12	2018.01.26LLA_014.d	31	1.0		sv

TestAmerica Laboratories
Worklist Run Log Report

Worklist Name: 26JAN2018NCD_PFC Worklist Num: 53418
Instrument: A8_N Method: A8_N
Batch Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53418.b
Anaylysis Type: SemiVOA Creator: Royce, Amani A
Inj Volume: 2.00 Inj Vol Units: ul

Lab ID	Worklist ID	Sample Type	Inj Date/Time	File Name	Vial	Dil Factor	Client ID	Fract
CCV L5	320-0053418-001	CCV	26-Jan-2018 16:06:47	2018.01.26LLA_026.d	31	1.0		sv
MB 320-205574/1-A	320-0053418-002	MB	26-Jan-2018 16:14:35	2018.01.26LLA_027.d	12	1.0		sv
LCS 320-205574/2-A	320-0053418-003	LCS	26-Jan-2018 16:22:23	2018.01.26LLA_028.d	13	1.0		sv
320-35310-A-3-A	320-0053418-004	Client	26-Jan-2018 16:30:12	2018.01.26LLA_029.d	14	1.0	FH-17-03_SO0005	sv
320-35310-A-3-B MS	320-0053418-005	MS	26-Jan-2018 16:38:00	2018.01.26LLA_030.d	15	1.0		sv
320-35310-A-3-C MSD	320-0053418-006	MSD	26-Jan-2018 16:45:49	2018.01.26LLA_031.d	16	1.0		sv
320-35310-A-4-A	320-0053418-007	Client	26-Jan-2018 16:53:38	2018.01.26LLA_032.d	17	1.0	FH-DUP02	sv
320-35310-A-6-A	320-0053418-008	Client	26-Jan-2018 17:01:25	2018.01.26LLA_033.d	18	1.0	FH-17-04_SO0005	sv
320-35310-A-8-A	320-0053418-009	Client	26-Jan-2018 17:09:14	2018.01.26LLA_034.d	19	1.0	FH-17-02_SO0005	sv
320-35310-A-10-A	320-0053418-010	Client	26-Jan-2018 17:17:03	2018.01.26LLA_035.d	20	1.0	FH-17-01_SO0005	sv
320-35310-A-12-A	320-0053418-011	Client	26-Jan-2018 17:24:53	2018.01.26LLA_036.d	21	1.0	FH-17-05_SO0005	sv
CCV L4	320-0053418-012	CCV	26-Jan-2018 17:32:43	2018.01.26LLA_037.d	30	1.0		sv
320-35310-A-14-A	320-0053418-013	Client	26-Jan-2018 17:40:30	2018.01.26LLA_038.d	22	1.0	FH-17-08_SO0005	sv
320-35310-A-16-A	320-0053418-014	Client	26-Jan-2018 17:48:19	2018.01.26LLA_039.d	23	1.0	FH-17-06_SO0005	sv
320-35310-A-19-A	320-0053418-015	Client	26-Jan-2018 17:56:09	2018.01.26LLA_040.d	24	1.0	FH-17-07_SO0005	sv
320-35310-A-21-A	320-0053418-016	Client	26-Jan-2018 18:04:02	2018.01.26LLA_041.d	25	1.0	FH-17-09_SO0005	sv
CCV L5	320-0053418-017	CCV	26-Jan-2018 18:11:53	2018.01.26LLA_042.d	31	1.0		sv

TestAmerica Laboratories
Worklist Run Log Report

Worklist Name: 29JAN2018NCA_PFC Worklist Num: 53458
Instrument: A8_N Method: A8_N
Batch Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180129-53458.b
Anaylysis Type: SemiVOA Creator: Royce, Amani A
Inj Volume: 2.00 Inj Vol Units: ul

Lab ID	Worklist ID	Sample Type	Inj Date/Time	File Name	Vial	Dil Factor	Client ID	Fract
CCVL	320-0053458-001	CCVL	29-Jan-2018 11:29:17	2018.01.29LLA_003.d	21	1.0		sv
CCV L4	320-0053458-002	CCV	29-Jan-2018 11:37:05	2018.01.29LLA_004.d	13	1.0		sv
RB	320-0053458-003	RB	29-Jan-2018 11:44:55	2018.01.29LLA_005.d	20	1.0		sv
MB 320-205579/1-A	320-0053458-004	MB	29-Jan-2018 11:52:43	2018.01.29LLA_025.d	17	1.0		sv
LCS 320-205579/2-A	320-0053458-005	LCS	29-Jan-2018 12:00:32	2018.01.29LLA_026.d	18	1.0		sv
LCSD 320-205579/3-A	320-0053458-006	LCSD	29-Jan-2018 12:08:23	2018.01.29LLA_027.d	19	1.0		sv
320-35041-B-1-A	320-0053458-007	Client	29-Jan-2018 12:16:15	2018.01.29LLA_028.d	20	1.0	XJM-94-07X-Dec17	sv
320-35041-B-2-A	320-0053458-008	Client	29-Jan-2018 12:24:08	2018.01.29LLA_029.d	21	1.0	HA-3B-Dec17	sv
CCV L5	320-0053458-009	CCV	29-Jan-2018 12:31:58	2018.01.29LLA_030.d	14	1.0		sv

TestAmerica Laboratories
Worklist Run Log Report

Worklist Name: 29JAN2018NCD_PFC Worklist Num: 53474
Instrument: A8_N Method: A8_N
Batch Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180130-53474.b
Anaylysis Type: SemiVOA Creator: Hannigan, Alyssa B
Inj Volume: 2.00 Inj Vol Units: ul

Lab ID	Worklist ID	Sample Type	Inj Date/Time	File Name	Vial	Dil Factor	Client ID	Fract
CCV L4	320-0053474-001	CCV	29-Jan-2018 16:20:58	2018.01.29LLAA_037.d	13	1.0		sv
320-35310-A-10-A	320-0053474-002	Client	29-Jan-2018 16:28:49	2018.01.29LLAA_038.d	25	10.0	FH-17-01_SO0005	sv
320-35310-A-12-A	320-0053474-003	Client	29-Jan-2018 16:36:40	2018.01.29LLAA_039.d	26	20.0	FH-17-05_SO0005	sv
CCV L5	320-0053474-004	CCV	29-Jan-2018 16:44:31	2018.01.29LLAA_040.d	14	1.0		sv

4 day Rush!

Solid SW-846-3500 Analysis Sheet

(To Accompany Samples to Instruments)

60
AS 1/26/18
AS 1/29/18

Batch Number: 320-205574

Analyst: Arauz, Horacio J

Batch Open: 1/25/2018 12:09:00PM

Method Code: 320-Shake_Bath_14D-320

Batch End: 1/26/2018 2:20:00PM

Shake Extraction with Ultrasonic Bath Extraction

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	Initial Amount	Final Amount	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	MB-320-205574/1 N/A	N/A	5.00 g	10.00 mL	N/A	N/A	N/A		MB 320-205574/1-A
2	LCS-320-205574/2 N/A	N/A	5.00 g	10.00 mL	N/A	N/A	N/A		LCS 320-205574/2-A
3	320-35310-A-3 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.04 g	10.00 mL	1/30/18	4_Day_RUSH	4	~~10X~~ ABH 1/30/17	320-35310-A-3-A
4	320-35310-A-3-MS (PFC_IDA_DOD5)	N/A (320-35310-1)	5.04 g	10.00 mL	1/30/18	4_Day_RUSH	4	~~10X~~ ABH 1/30/17	320-35310-A-3-B MS
5	320-35310-A-3-MSD (PFC_IDA_DOD5)	N/A (320-35310-1)	5.07 g	10.00 mL	1/30/18	4_Day_RUSH	4	10X ABH 1/30/17	320-35310-A-3-C MSD
6	320-35310-A-4 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.10 g	10.00 mL	1/30/18	4_Day_RUSH	4		320-35310-A-4-A
7	320-35310-A-6 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.07 g	10.00 mL	1/30/18	4_Day_RUSH	4		320-35310-A-6-A
8	320-35310-A-8 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.07 g	10.00 mL	1/30/18	4_Day_RUSH	4		320-35310-A-8-A
9	320-35310-A-10 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.01 g	10.00 mL	1/30/18	4_Day_RUSH	4	10X	320-35310-A-10-A
10	320-35310-A-12 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.04 g	10.00 mL	1/30/18	4_Day_RUSH	4	20X	320-35310-A-12-A
11	320-35310-A-14 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.00 g	10.00 mL	1/30/18	4_Day_RUSH	4		320-35310-A-14-A
12	320-35310-A-16 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.02 g	10.00 mL	1/30/18	4_Day_RUSH	4		320-35310-A-16-A
13	320-35310-A-19 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.01 g	10.00 mL	1/30/18	4_Day_RUSH	4		320-35310-A-19-A
14	320-35310-A-21 (PFC_IDA_DOD5)	N/A (320-35310-1)	5.05 g	10.00 mL	1/30/18	4_Day_RUSH	4		320-35310-A-21-A

04/06/2018

Solid SW-846-3500 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-205574 | Analyst: Arauz, Horacio J | Batch Open: 1/25/2018 12:09:00PM

Method Code: 320-Shake_Bath_14D-320 | Batch End:

Batch Notes

Balance ID	QA-070
Blank Sand Lot #	162639
Filter ID	NA
Millipore Water Dispense Date	1-11-18
Analyst ID - Reagent Drop Witness	TWL
SPE Cartridge ID	017537320A
SPE Cartridge Type	WAX 150mg
Hexane ID	1095478
Methanol ID	1137504
Ammonium Hydroxide/MeOH ID	1136395
Sodium Hydroxide ID	1135676
Methanolic Potassium Hydroxide ID	1140631
Manifold ID	~~12~~ 5 (4326 1-126-18)
Interference check solution ID	NA
Acetic Acid ID	965732
pH Indicator ID	2517
Analyst ID - IS Reagent Drop	HJA
Analyst ID - IS Reagent Drop Witness	TWL
Internal Standard ID#	1140900
Analyst ID - Concentration	HJA

Solid SW-846-3500 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-205574 Analyst: Arauz, Horacio J Batch Open: 1/25/2018 12:09:00PM

Method Code: 320-Shake_Bath_14D-320 Batch End:

Analyst ID - Aliquot Step	HJA
Analyst ID - Final Volume Step	HJA
Batch Comment	Sample labels match client IDs HJA

Comments

320-35310-A-3	Method Comments: Samples from a base
320-35310-A-3~MS	Method Comments: Samples from a base
320-35310-A-3~MSD	Method Comments: Samples from a base
320-35310-A-4	Method Comments: Samples from a base
320-35310-A-6	Method Comments: Samples from a base
320-35310-A-8	Method Comments: Samples from a base
320-35310-A-10	Method Comments: Samples from a base
320-35310-A-12	Method Comments: Samples from a base
320-35310-A-14	Method Comments: Samples from a base
320-35310-A-16	Method Comments: Samples from a base
320-35310-A-19	Method Comments: Samples from a base
320-35310-A-21	Method Comments: Samples from a base

Solid SW-846-3500 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-205574 Analyst: Arauz, Horacio J Batch Open: 1/25/2018 12:09:00PM

Method Code: 320-Shake_Bath_14D-320 Batch End:

Reagent Additions Worksheet

Lab ID	Reagent Code	Amount Added	Final Amount	By	Witness
MB 320-205574/1	LCMPFC_ALL_SU_00039	500 uL	10.00 mL	HJA 1-25-18	JMC 1-25-18
LCS 320-205574/2	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
LCS 320-205574/2	LCPFCSP_00118	500 uL	10.00 mL		
320-35310-A-3	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-3 MS	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-3 MS	LCPFCSP_00118	500 uL	10.00 mL		
320-35310-A-3 MSD	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-3 MSD	LCPFCSP_00118	500 uL	10.00 mL		
320-35310-A-4	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-6	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-8	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-10	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-12	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-14	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-16	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-19	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		
320-35310-A-21	LCMPFC_ALL_SU_00039	500 uL	10.00 mL		

Solid SW-846-3500 Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-205574 Analyst: Arauz, Horacio J Batch Open: 1/25/2018 12:09:00PM

Method Code: 320-Shake_Bath_14D-320 Batch End:

Other Reagents:

Reagent	Amount/Units	Lot#:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Sacramento
Preparation Data Review Checklist

Preparation Batch Number(s) 320-205574 Test PFC-L

Earliest Holding Time 2-5-18

Batch Information	1st Level Reviewer	2nd Level Reviewer
Date and time accurate and entered into TALS correctly	✓	✓
All necessary batch information complete and entered into TALS correctly	✓	✓
BD, FV, and AL initials are transcribed into the batch comment	✓	✓
Sample List Tab	**1st Level Reviewer**	**2nd Level Reviewer**
Samples identified to the correct method	✓	✓
Holding time violation NCM filed	NA	NA
MS/MSD or MS/DU NCM filed	NA	NA
NCM for any anomalies filed	NA	NA
All NCMs include method code, matrix, and prep batch	NA	NA
Method/sample/login/QAS checked and correct	✓	✓
Batch contains no more than 20 live samples	✓	✓
Worksheet Tab	**1st Level Reviewer**	**2nd Level Reviewer**
All samples properly preserved	✓	✓
Weights in anticipated range and not targeted	✓	✓
All additional test requirements performed, documented, and uploaded to TALS correctly (e.g. final amount, initial amount, turbidity, and CI Check)	✓	✓
The pH is transcribed properly in TALS	NA	NA
All additional information is transcribed into TALS and is correct and raw data is attached	✓	✓
Comments/Observations are transcribed correctly in TALS	✓	✓
Reagents Tab	**1st Level Reviewer**	**2nd Level Reviewer**
All necessary reagents not expired and checked into TALS	✓	✓
All spike amounts correct and added to necessary samples and QC	✓	✓
Internal Standard is added to the reagents	✓	✓
All units are correctly transcribed into TALS	✓	✓

1st Level Reviewer: HJA Date: 1-26-18

2nd Level Reviewer: VPM Date: 1/26/18

Comments:

TestAmerica
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Test America – Sacramento

Sample Dilution Record

Method ID PFC - 1DA **Lot #** N/A

Analyst (Print Name) Alyssa Hannigan **Analyst Initials** ABH

Date 1/29/2018

Job #	Sample #	Original F.V. (uL)	Aliquot (uL)	Dilution F.V. (uL)	Dilution Factor
320-35310	10	10,000	30	300	10
↓	12	↓	15	300	20

ABH 1/29/2018

Comments:

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Batch Number: 205514 Batch Start Date: 01/25/18 09:10 Batch Analyst: Santos, Jonathan

Batch Method: 3535 Batch End Date: 01/25/18 13:35

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	LCMPFC_ALL_SU 00040	LCPFC-IS 00027
MB 320-205514/1		3535, 537 (modified)				250.00 mL	10.00 mL	500 uL	500 uL
LCS 320-205514/2		3535, 537 (modified)				250.00 mL	10.00 mL	500 uL	500 uL
320-35310-B-1	FH-17-03_GW012218	3535, 537 (modified)	T	187.77 g	26.35 g	161.4 mL	10.00 mL	500 uL	500 uL
320-35310-A-2	FH-DUP01	3535, 537 (modified)	T	277.74 g	26.64 g	251.1 mL	10.00 mL	500 uL	500 uL
320-35310-A-5	FH-EB01	3535, 537 (modified)	T	277.40 g	27.43 g	250 mL	10.00 mL	500 uL	500 uL
320-35310-A-7	FH-17-04_GW012218	3535, 537 (modified)	T	151.76 g	26.28 g	125.5 mL	10.00 mL	500 uL	500 uL
320-35310-A-7 MS	FH-17-04_GW012218	3535, 537 (modified)	T	184.62 g	26.41 g	158.2 mL	10.00 mL	500 uL	500 uL
320-35310-A-7 MSD	FH-17-04_GW012218	3535, 537 (modified)	T	240.02 g	26.82 g	213.2 mL	10.00 mL	500 uL	500 uL
320-35310-A-9	FH-17-02_GW012218	3535, 537 (modified)	T	266.70 g	26.92 g	239.8 mL	10.00 mL	500 uL	500 uL
320-35310-A-11	FH-17-01_GW012218	3535, 537 (modified)	T	231.48 g	26.59 g	204.9 mL	10.00 mL	500 uL	500 uL
320-35310-A-13	FH-17-05_GW012218	3535, 537 (modified)	T	278.82 g	26.53 g	252.3 mL	10.00 mL	500 uL	500 uL
320-35310-A-15	FH-17-08_GW012218	3535, 537 (modified)	T	273.78 g	26.77 g	247 mL	10.00 mL	500 uL	500 uL
320-35310-A-17	FH-17-06_GW012318	3535, 537 (modified)	T	289.21 g	26.25 g	263 mL	10.00 mL	500 uL	500 uL
320-35310-A-18	FH-FB01	3535, 537 (modified)	T	285.59 g	28.09 g	257.5 mL	10.00 mL	500 uL	500 uL
320-35310-A-20	FH-17-07_GW012318	3535, 537 (modified)	T	278.49 g	26.45 g	252 mL	10.00 mL	500 uL	500 uL
320-35310-A-22	FH-17-09_GW012318	3535, 537 (modified)	T	282.93 g	26.30 g	256.6 mL	10.00 mL	500 uL	500 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LCPFCSP 00119					
MB 320-205514/1		3535, 537 (modified)							
LCS 320-205514/2		3535, 537 (modified)		500 uL					
320-35310-B-1	FH-17-03_GW012218	3535, 537 (modified)	T						

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.: 320-35310-1

SDG No.:

Batch Number: 205514 Batch Start Date: 01/25/18 09:10 Batch Analyst: Santos, Jonathan

Batch Method: 3535 Batch End Date: 01/25/18 13:35

Lab Sample ID	Client Sample ID	Method Chain	Basis	LCPFCSP 00119					
320-35310-A-2	FH-DUP01	3535, 537 (modified)	T						
320-35310-A-5	FH-EB01	3535, 537 (modified)	T						
320-35310-A-7	FH-17-04_GW012218	3535, 537 (modified)	T						
320-35310-A-7 MS	FH-17-04_GW012218	3535, 537 (modified)	T	500 uL					
320-35310-A-7 MSD	FH-17-04_GW012218	3535, 537 (modified)	T	500 uL					
320-35310-A-9	FH-17-02_GW012218	3535, 537 (modified)	T						
320-35310-A-11	FH-17-01_GW012218	3535, 537 (modified)	T						
320-35310-A-13	FH-17-05_GW012218	3535, 537 (modified)	T						
320-35310-A-15	FH-17-08_GW012218	3535, 537 (modified)	T						
320-35310-A-17	FH-17-06_GW012318	3535, 537 (modified)	T						
320-35310-A-18	FH-FB01	3535, 537 (modified)	T						
320-35310-A-20	FH-17-07_GW012318	3535, 537 (modified)	T						
320-35310-A-22	FH-17-09_GW012318	3535, 537 (modified)	T						

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.: 320-35310-1

SDG No.:

Batch Number: 205514 Batch Start Date: 01/25/18 09:10 Batch Analyst: Santos, Jonathan

Batch Method: 3535 Batch End Date: 01/25/18 13:35

Batch Notes	
Analyst ID - Aliquot Step	JNS
Balance ID	QA-070
Batch Comment	Client ID's checked: JNS 1/25/18
Analyst ID - Final Volume Step	JNS
H2O ID	1/19/18
Hexane ID	1095479
Internal Standard ID#	1140901
Manifold ID	2, 8
Methanol ID	1127849
Sodium Hydroxide ID	1132905
Pipette ID	N32728F
Analyst ID - Reagent Drop	HJA
Analyst ID - IS Reagent Drop	VPM
Analyst ID - IS Reagent Drop Witness	JNS
Analyst ID - SU Reagent Drop	HJA
Analyst ID - SU Reagent Drop Witness	JNS
Solvent Lot #	1136394
Solvent Name	0.3% NH4OH/MeOH
SOP Number	WS-LC-0025
SPE Cartridge Type	WAX 500mg
Solid Phase Extraction Disk ID	003337172A

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.: 320-35310-1

SDG No.:

Batch Number: 205574 Batch Start Date: 01/25/18 12:09 Batch Analyst: Arauz, Horacio J

Batch Method: SHAKE Batch End Date: 01/26/18 14:20

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	LCMPFC_ALL_SU 00039	LCPFC-IS 00026	LCPFCSP 00118	
MB 320-205574/1		SHAKE, 537 (modified)		5.00 g	10.00 mL	500 uL	500 uL		
LCS 320-205574/2		SHAKE, 537 (modified)		5.00 g	10.00 mL	500 uL	500 uL	500 uL	
320-35310-A-3	FH-17-03_SO0005	SHAKE, 537 (modified)	T	5.04 g	10.00 mL	500 uL	500 uL		
320-35310-A-3 MS	FH-17-03_SO0005	SHAKE, 537 (modified)	T	5.04 g	10.00 mL	500 uL	500 uL	500 uL	
320-35310-A-3 MSD	FH-17-03_SO0005	SHAKE, 537 (modified)	T	5.07 g	10.00 mL	500 uL	500 uL	500 uL	
320-35310-A-4	FH-DUP02	SHAKE, 537 (modified)	T	5.10 g	10.00 mL	500 uL	500 uL		
320-35310-A-6	FH-17-04_SO0005	SHAKE, 537 (modified)	T	5.07 g	10.00 mL	500 uL	500 uL		
320-35310-A-8	FH-17-02_SO0005	SHAKE, 537 (modified)	T	5.07 g	10.00 mL	500 uL	500 uL		
320-35310-A-10	FH-17-01_SO0005	SHAKE, 537 (modified)	T	5.01 g	10.00 mL	500 uL	500 uL		
320-35310-A-12	FH-17-05_SO0005	SHAKE, 537 (modified)	T	5.04 g	10.00 mL	500 uL	500 uL		
320-35310-A-14	FH-17-08_SO0005	SHAKE, 537 (modified)	T	5.00 g	10.00 mL	500 uL	500 uL		
320-35310-A-16	FH-17-06_SO0005	SHAKE, 537 (modified)	T	5.02 g	10.00 mL	500 uL	500 uL		
320-35310-A-19	FH-17-07_SO0005	SHAKE, 537 (modified)	T	5.01 g	10.00 mL	500 uL	500 uL		
320-35310-A-21	FH-17-09_SO0005	SHAKE, 537 (modified)	T	5.05 g	10.00 mL	500 uL	500 uL		

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.: 320-35310-1

SDG No.:

Batch Number: 205574 Batch Start Date: 01/25/18 12:09 Batch Analyst: Arauz, Horacio J

Batch Method: SHAKE Batch End Date: 01/26/18 14:20

Batch Notes	
Acetic Acid ID	965732
Analyst ID - Aliquot Step	HJA
Balance ID	QA-070
Batch Comment	Sample labels match client IDs HJA
Analyst ID - Concentration	HJA
Analyst ID - Final Volume Step	HJA
Hexane ID	1095478
Internal Standard ID#	1140900
Manifold ID	5
Methanol ID	1137504
Methanolic Potassium Hydroxide ID	1140631
Millipore Water Dispense Date	1-11-18
Sodium Hydroxide ID	1135676
Ammonium Hydroxide/MeOH ID	1136395
pH Indicator ID	2517
Analyst ID - Reagent Drop Witness	TWL
Analyst ID - IS Reagent Drop	HJA
Analyst ID - IS Reagent Drop Witness	TWL
Blank Sand Lot #	162639
SPE Cartridge Lot ID	017537320A
SPE Cartridge Type	WAX 150mg

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.

GENERAL CHEMISTRY

COVER PAGE
GENERAL CHEMISTRY

Lab Name: TestAmerica Sacramento Job Number: 320-35310-1

SDG No.:

Project: PFAS, Fort Devens, Rapid Response

Client Sample ID	Lab Sample ID
FH-17-03_SO0005	320-35310-3
FH-DUP02	320-35310-4
FH-17-04_SO0005	320-35310-6
FH-17-02_SO0005	320-35310-8
FH-17-01_SO0005	320-35310-10
FH-17-05_SO0005	320-35310-12
FH-17-08_SO0005	320-35310-14
FH-17-06_SO0005	320-35310-16
FH-17-07_SO0005	320-35310-19
FH-17-09_SO0005	320-35310-21

Comments:

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Sacramento Job Number: 320-35310-1

SDG Number:

Matrix: Solid Instrument ID: NOEQUIP

Method: D 2216 DL Date: 01/01/2017 12:44

Analyte	Wavelength/ Mass	LOQ (%)	DL (%)
Percent Moisture		0.1	0.1
Percent Solids		0.1	0.1

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Sacramento Job Number: 320-35310-1

SDG Number:

Matrix: Solid Instrument ID: NOEQUIP

Method: D 2216 XMDL Date: 01/01/2017 12:46

Analyte	Wavelength/ Mass	XRL (%)	XMDL (%)
Percent Moisture		0.1	0.1
Percent Solids		0.1	0.1

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Instrument ID: NOEQUIP Analysis Method: D 2216

Start Date: 01/25/2018 16:04 End Date: 01/25/2018 16:04

Lab Sample Id	D/F	Type	Time	Analytes																									
				% Sol	Moist																								
320-35310-3	1	T	16:04	X	X																								
320-35310-3 DU	1	T	16:04	X	X																								
320-35310-4	1	T	16:04	X	X																								
320-35310-6	1	T	16:04	X	X																								
320-35310-8	1	T	16:04	X	X																								
320-35310-10	1	T	16:04	X	X																								
320-35310-12	1	T	16:04	X	X																								
320-35310-14	1	T	16:04	X	X																								
320-35310-16	1	T	16:04	X	X																								
320-35310-19	1	T	16:04	X	X																								
320-35310-21	1	T	16:04	X	X																								
ZZZZZZ			16:04																										
ZZZZZZ			16:04																										
ZZZZZZ			16:04																										

Prep Types:
T = Total/NA

FORM XIII-IN

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-35310-1

SDG No.:

Batch Number: 205642 Batch Start Date: 01/25/18 16:04 Batch Analyst: Sabala, Stephanee S

Batch Method: D 2216 Batch End Date: 01/26/18 08:51

Lab Sample ID	Client Sample ID	Method Chain	Basis	DISH#	DishWeight	SampleMassWet	SampleMassDry		
320-35310-A-3	FH-17-03_SO0005	D 2216	T	1	1.02 g	7.36 g	6.88 g		
320-35310-A-3 DU	FH-17-03_SO0005	D 2216	T	2	1.04 g	8.11 g	7.60 g		
320-35310-A-4	FH-DUP02	D 2216	T	3	1.04 g	8.83 g	8.21 g		
320-35310-A-6	FH-17-04_SO0005	D 2216	T	4	1.04 g	6.81 g	6.51 g		
320-35310-A-8	FH-17-02_SO0005	D 2216	T	5	1.02 g	8.53 g	8.05 g		
320-35310-A-10	FH-17-01_SO0005	D 2216	T	6	1.06 g	7.52 g	6.62 g		
320-35310-A-12	FH-17-05_SO0005	D 2216	T	7	1.05 g	9.75 g	8.88 g		
320-35310-A-14	FH-17-08_SO0005	D 2216	T	8	1.01 g	8.35 g	7.80 g		
320-35310-A-16	FH-17-06_SO0005	D 2216	T	9	1.03 g	8.72 g	8.01 g		
320-35310-A-19	FH-17-07_SO0005	D 2216	T	10	1.02 g	8.40 g	7.79 g		
320-35310-A-21	FH-17-09_SO0005	D 2216	T	11	1.01 g	12.85 g	11.07 g		

Batch Notes	
Balance ID	QA-068 No Unit
Date and Time Samples in Desiccator	01/26/18 @ 08:10
Date and Time Samples out of Desiccator	01/26/18 @ 08:51
Date samples were placed in the oven	01/25/18
Oven Temp In	116 Degrees C
Time samples were place in the oven	16:04
Date samples were removed from oven	01/26/18
Oven Temp Out	116 Degrees C
Time Samples were removed from oven	08:10
Oven ID	Soil Prep #2
Thermometer ID	151969607

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.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Sacramento
Preparation Data Review Checklist

Preparation Batch Number(s): 2056042 Test: % MOISTURE

Earliest Holding Time: NA ; 320-3510, 35297 ; 660-84924, 84925

Sample List Tab	1st Level Reviewer	2nd Level Reviewer
Samples identified to the correct method	✓	✓
All necessary NCMs filed (including holding time)	✓	✓
Method/sample/login/QAS checked and correct	✓	✓
Worksheet Tab	**1st Level Reviewer**	**2nd Level Reviewer**
All samples properly preserved	✓	✓
Weights in anticipated range and not targeted	✓	✓
All additional test requirements performed, documented, and uploaded to TALS correctly (e.g. final amount, initial amount, turbidity, and Cl Check)	NA	✓
The pH is transcribed correctly in TALS	NA	✓
All additional information transcribed into TALS is correct and raw data is attached	NA	✓
Comments are transcribed correctly in TALS		
Reagents Tab	**1st Level Reviewer**	**2nd Level Reviewer**
All necessary reagents not expired and entered into TALS	NA	✓
All spike amounts correct and added to necessary samples and QC	NA	✓
Batch Information	**1st Level Reviewer**	**2nd Level Reviewer**
Date and time accurate and entered into TALS correctly	✓	✓
All necessary 'batch information' complete and entered into TALS correctly	✓	✓

1st Level Reviewer: TLS Date: 01/26/18

2nd Level Reviewer: [signature] Date: 1/26/18

Comments:

Shipping and Receiving Documents

TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone (916) 373-5600 Fax (916) 372-1059

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Mike Argue	Lab PM: Kellmann, Jill	Carrier Tracking No(s):	COC No: 320-19356-4419.3
Client Contact: Ms. Meg Watson	Phone: 603-656-5403	E-Mail: jill.kellmann@testamericainc.com		Page: MA Page ~~3 of 3~~ 1 of 2
Company: Bristol Env. Remediation Services LLC				Job #:
Address: 720 Corporate Circle #D	Due Date Requested:			
City: Golden	TAT Requested (days): 10			
State, Zip: CO, 80401-5626				
Phone: 907-563-0013(Tel) 720 459 7110	PO #: 34170085-002			
Email: mwatson@bristol-companies.com	WO #:			
Project Name: PFAS, Fort Devens, Rapid Response	Project #: 32009599			
Site:	SSOW#:			

Analysis Requested

320-35310 Chain of Custody

Preservation Codes:

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)

Other:

Sample Identification	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)	Modified Method 537	Total Number	Special Instructions/Note:
			Preservation Code:				I		
FH-17-Ø3_GWØ12218	1/22/18	0915	G	Water	N	N	X	2	
FH-DUPØ1		0915		Water	N	N	X	2	
FH-17-Ø3_SOØØØ5		0920		~~SOIL~~ ~~Water~~ TM	N	N	X	1	
FH-DUPØ2		0920		~~SOIL~~ ~~Water~~ TM	N	N	X	1	
~~FH-17-Ø3_SOØØØ5~~ MA EBØ1		0945		Water	N	N	X	2	
FH-17-Ø4_SOØØØ5		1020		~~SOIL~~ ~~Water~~ TM	N	N	X	1	
FH-17-Ø4_GWØ12218		1030		Water	N	N	X	6	MS/MSD
FH-17-Ø2_SOØØØ5		1115		SOIL	N	N	X	1	
FH-17-Ø2_GWØ12218		1130		WATER	N	N	X	2	
FH-17-Ø1_SOØØØ5		1220		SOIL	N	N	X	1	
FH-17-Ø1_GWØ12218	↓	1230	↓	WATER	N	N	X	2	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Michael Argue	1/23/18 1255			1/23/18 1255	TA
Relinquished by	Date/Time	Company	Received by	Date/Time	Company
	1/24/18 1600	TA		1/24/18 905	TA SAC
Relinquished by	Date/Time	Company	Received by	Date/Time	Company

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 1, 3.2

Ver: 08/04/2016

04/06/2018

TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone (916) 373-5600 Fax (916) 372-1059

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Mike Argue	Lab PM: Kellmann, Jill	Carrier Tracking No(s):	COC No: 320-19356-4419.2
Client Contact: Ms. Meg Watson	Phone: 603-656-5403	E-Mail: jill.kellmann@testamericainc.com		Page: Page 2 of ~~2~~ 2
Company: Bristol Env Remediation Services LLC				Job #:
Address: 720 Corporate Circle #D	Due Date Requested:			
City: Golden	TAT Requested (days): 10			
State, Zip: CO, 80401-5626				
Phone: 907-563-0013(Tel)	PO #: 34170085-002			
Email: mwatson@bristol-companies.com	WO #:			
Project Name: PFAS, Fort Devens, Rapid Response	Project #: 32009599			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

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)

Other:

Sample Identification	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)	Modified Method 537	Total Number of containers	Special Instructions/Note:
			Preservation Code:				I		
FH-17-Ø5_SOØØØ5	1/22/18	1325	G	Solid	N	N	X	1	
FH-17-Ø5_GWØ12218		1345		~~Solid~~ Water MH	N	N	X	2	
FH-17-Ø8_SOØØØ5		1425		Solid	N	N	X	1	
FH-17-Ø8_GWØ12218		1435		Water	N	N	X	2	
FH-17-Ø6_SOØØØ5	1/23/18	0915	G	~~Solid~~ Water MH	N	N	X	1	
FH-17-Ø6_GWØ12318		0930		Water	N	N	X	2	
FH-FBØ1		0945		Water	N	N	X	2	
FH-17-Ø7_SOØØØ5		1020		~~Solid~~ Water MH	N	N	X	1	
FH-17-Ø7_GWØ12318		1030		Water	N	N	X	2	
FH-17-Ø9_SOØØØ5		1150		~~Solid~~ Water MH	N	N	X	1	
FH-17-Ø9_GWØ12318		1145		Water	N	N	X	2	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: Michael Argue	Date/Time: 1/23/18 1255	Company	Received by:	Date/Time: 1/23/18 12:55	Company TA
Relinquished by:	Date/Time: 1/23/18 1600	Company TA	Received by:	Date/Time: 1/24/18 905	Company TA-Sac
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 1.1, 3.7

Ver: 08/04/2016

04/06/2018

Login Sample Receipt Checklist

Client: Bristol Env. Remediation Services LLC

Job Number: 320-35310-1

Login Number: 35310

List Source: TestAmerica Sacramento

List Number: 1

Creator: Aguayo, Alonso

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Tel: (916)373-5600

TestAmerica Job ID: 320-35310-1
Client Project/Site: PFAS, Fort Devens, Rapid Response
Revision: 1

For:
Bristol Env. Remediation Services LLC
720 Corporate Circle #D
Golden, Colorado 80401-5626

Attn: Ms. Meg Watson

Authorized for release by:
4/6/2018 1:14:47 PM

Jill Kellmann, Manager of Project Management
(916)374-4402
jill.kellmann@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Qualifiers

LCMS

Qualifier	Qualifier Description
M	Manual integrated compound.
U	Undetected at the Limit of Detection.
D	The reported value is from a dilution.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J1	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

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)

Job ID: 320-35310-1

Laboratory: TestAmerica Sacramento

Narrative

Revision - April 6, 2018
Report revised to remove J1 flag from PFHpA on sample FH-17-04_GW012218 (320-35310-7) which was incorrectly applied in the original report.

Receipt
The samples were received on 1/24/2018 9:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 2 coolers at receipt time were 1.1º C and 3.2º C.

LCMS
Method(s) 537 (modified): The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

Method(s) 537 (modified): Due to the high concentration of Perfluorohexanesulfonic acid (PFHxS), the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 320-205514 and analytical batch 320-205677 could not be evaluated for accuracy and precision for this analyte. The associated laboratory control sample (LCS) met acceptance criteria.

Method(s) 537 (modified): The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 320-205514 and analytical batch 320-205677 were outside control limits for Perfluorooctanoic acid (PFOA). Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method(s) 537 (modified): The matrix spike / matrix spike duplicate (MS/MSD) precision for preparation batch 320-205514 and analytical batch 320-205677 was outside control limits for Perfluorooctanesulfonic acid (PFOS) and Perfluorononanoic acid (PFNA). Sample matrix interference is suspected.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
Method(s) 3535: Due to excessive amount of sediment present in the original sample bottle, the aqueous portion of the following samples were decanted to new polypropylene bottles prior to spiking and extraction: FH-17-03_GW012218 (320-35310-1), FH-DUP01 (320-35310-2), FH-17-04_GW012218 (320-35310-7), FH-17-04_GW012218 (320-35310-7[MS]), FH-17-04_GW012218 (320-35310-7[MSD]), FH-17-02_GW012218 (320-35310-9), FH-17-01_GW012218 (320-35310-11), FH-17-05_GW012218 (320-35310-13), FH-17-08_GW012218 (320-35310-15), FH-17-06_GW012318 (320-35310-17), FH-17-07_GW012318 (320-35310-20) and FH-17-09_GW012318 (320-35310-22). The samples are associated with preparation batch 320-205514.

Method(s) 3535: The aqueous portion of the following samples was decanted prior to spiking and extraction due to excess sediment present in the samples. As a result, reduced volume was available for extraction. The reporting limits (RLs) have been adjusted proportionately. FH-17-03_GW012218 (320-35310-1), FH-17-04_GW012218 (320-35310-7), FH-17-04_GW012218 (320-35310-7[MS]), FH-17-04_GW012218 (320-35310-7[MSD]) and FH-17-01_GW012218 (320-35310-11). Samples are associated with preparation batch 320-205514

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-03_GW012218 — Lab Sample ID: 320-35310-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	60	M	3.1	0.71	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	19	M	3.1	0.94	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	330	M	3.1	0.84	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	26		6.2	1.7	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	670	D	15	2.9	ng/L	5		537 (modified)	Total/NA

Client Sample ID: FH-DUP01 — Lab Sample ID: 320-35310-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	67	M	2.0	0.46	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	18	M	2.0	0.61	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	260	M	2.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		4.0	1.1	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	540	D	10	1.9	ng/L	5		537 (modified)	Total/NA

Client Sample ID: FH-17-03_SO0005 — Lab Sample ID: 320-35310-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.055	J	0.54	0.033	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.28	J	0.54	0.031	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.24	J	0.54	0.092	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.23	J	1.1	0.21	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.058	J	0.54	0.039	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-DUP02 — Lab Sample ID: 320-35310-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.064	J	0.53	0.033	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.28	J	0.53	0.031	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.22	J	0.53	0.092	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.29	J	1.1	0.21	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.077	J	0.53	0.038	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-EB01 — Lab Sample ID: 320-35310-5

No Detections.

Client Sample ID: FH-17-04_SO0005 — Lab Sample ID: 320-35310-6

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.037	J	0.52	0.032	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.064	J	0.52	0.030	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.16	J	0.52	0.089	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.71	J	1.0	0.21	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.17	J	0.52	0.037	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-04_GW012218 — Lab Sample ID: 320-35310-7

This Detection Summary does not include radiochemical test results.

Client Sample ID: FH-17-04_GW012218 (Continued) — Lab Sample ID: 320-35310-7

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	21	M	4.0	0.92	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	230	J1	4.0	0.76	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.0	M	4.0	1.2	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	56	M J1	4.0	1.1	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	14	J1	8.0	2.2	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-02_SO0005 — Lab Sample ID: 320-35310-8

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.85		0.53	0.033	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.85		0.53	0.031	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.92	M	0.53	0.091	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	18		1.1	0.21	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	2.0		0.53	0.038	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-02_GW012218 — Lab Sample ID: 320-35310-9

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	20	M	2.1	0.48	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	170		2.1	0.40	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.0	M	2.1	0.64	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	23	M	2.1	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	5.3		4.2	1.1	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-01_SO0005 — Lab Sample ID: 320-35310-10

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	2.5		0.58	0.036	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1.2		0.58	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	5.3		0.58	0.10	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	10		0.58	0.042	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	30	D	12	2.3	ug/Kg	10	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-01_GW012218 — Lab Sample ID: 320-35310-11

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	7.7		2.4	0.56	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	110		2.4	0.46	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	2.1	J M	2.4	0.74	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	9.2	M	2.4	0.66	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-05_SO0005 — Lab Sample ID: 320-35310-12

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	1.5		0.55	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.32	J	0.55	0.032	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	1.2		0.55	0.095	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.5		0.55	0.040	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	200	D	22	4.4	ug/Kg	20	☼	537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-05_GW012218 — Lab Sample ID: 320-35310-13

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	9.5	M	2.0	0.46	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	140		2.0	0.38	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	14		2.0	0.60	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	34	M	2.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	46		4.0	1.1	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.52	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-08_SO0005 — Lab Sample ID: 320-35310-14

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.10	J	0.54	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.12	J M	0.54	0.031	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.21	J	0.54	0.093	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.5		1.1	0.22	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.35	J	0.54	0.039	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-08_GW012218 — Lab Sample ID: 320-35310-15

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	4.3	M	2.0	0.47	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	49	M	2.0	0.38	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	41		2.0	0.62	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	21	M	2.0	0.55	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	45		2.0	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	1500	D	40	11	ng/L	10		537 (modified)	Total/NA

Client Sample ID: FH-17-06_SO0005 — Lab Sample ID: 320-35310-16

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.12	J	0.55	0.034	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.059	J	0.55	0.032	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	0.24	J	0.55	0.094	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	1.2		1.1	0.22	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.059	J	0.55	0.040	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-06_GW012318 — Lab Sample ID: 320-35310-17

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	13	M	1.9	0.44	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	31	M	1.9	0.36	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	9.1	M	1.9	0.58	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	30	M	1.9	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	42		3.8	1.0	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	2.6		1.9	0.49	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-FB01 — Lab Sample ID: 320-35310-18

No Detections.

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-07_SO0005 — Lab Sample ID: 320-35310-19

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	0.68	J	1.1	0.22	ug/Kg	1	☼	537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.043	J	0.54	0.039	ug/Kg	1	☼	537 (modified)	Total/NA

Client Sample ID: FH-17-07_GW012318 — Lab Sample ID: 320-35310-20

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	3.0	M	2.0	0.46	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	16		2.0	0.38	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	4.1	M	2.0	0.61	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	11	M	2.0	0.54	ng/L	1		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	13		4.0	1.1	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	0.55	J	2.0	0.52	ng/L	1		537 (modified)	Total/NA

Client Sample ID: FH-17-09_SO0005 — Lab Sample ID: 320-35310-21

No Detections.

Client Sample ID: FH-17-09_GW012318 — Lab Sample ID: 320-35310-22

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanesulfonic acid (PFBS)	18	M	1.9	0.45	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	130		1.9	0.59	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	160	M	1.9	0.53	ng/L	1		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	19		1.9	0.51	ng/L	1		537 (modified)	Total/NA
Perfluorohexanesulfonic acid (PFHxS) - DL	780	D	39	7.4	ng/L	20		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS) - DL	4000	D	78	21	ng/L	20		537 (modified)	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: FH-17-03_GW012218

Lab Sample ID: 320-35310-1
Date Collected: 01/22/18 09:15
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	60	M	3.1	0.71	ng/L		01/25/18 09:10	01/25/18 22:12	1
Perfluoroheptanoic acid (PFHpA)	19	M	3.1	0.94	ng/L		01/25/18 09:10	01/25/18 22:12	1
Perfluorooctanoic acid (PFOA)	330	M	3.1	0.84	ng/L		01/25/18 09:10	01/25/18 22:12	1
Perfluorooctanesulfonic acid (PFOS)	26		6.2	1.7	ng/L		01/25/18 09:10	01/25/18 22:12	1
Perfluorononanoic acid (PFNA)	2.3	U M	3.1	0.81	ng/L		01/25/18 09:10	01/25/18 22:12	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4-PFHpA	*105*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*
13C4 PFOA	*104*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*
13C4 PFOS	*115*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*
13C5 PFNA	*113*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*
13C3-PFBS	*106*	*M*	*25 - 150*	*01/25/18 09:10*	*01/25/18 22:12*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	670	D	15	2.9	ng/L		01/25/18 09:10	01/26/18 21:35	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:35*	*5*

Client Sample ID: FH-DUP01

Lab Sample ID: 320-35310-2
Date Collected: 01/22/18 09:15
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	67	M	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 22:20	1
Perfluoroheptanoic acid (PFHpA)	18	M	2.0	0.61	ng/L		01/25/18 09:10	01/25/18 22:20	1
Perfluorooctanoic acid (PFOA)	260	M	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 22:20	1
Perfluorooctanesulfonic acid (PFOS)	18		4.0	1.1	ng/L		01/25/18 09:10	01/25/18 22:20	1
Perfluorononanoic acid (PFNA)	1.5	U	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 22:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4-PFHpA	*98*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*
13C4 PFOA	*109*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*
13C4 PFOS	*112*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*
13C5 PFNA	*117*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*
13C3-PFBS	*97*	*M*	*25 - 150*	*01/25/18 09:10*	*01/25/18 22:20*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	540	D	10	1.9	ng/L		01/25/18 09:10	01/26/18 21:42	5

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*108*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:42*	*5*

Client Sample ID: FH-17-03_SO0005

Lab Sample ID: 320-35310-3
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.4

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.43	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluorohexanesulfonic acid (PFHxS)	**0.055**	**J**	0.54	0.033	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluoroheptanoic acid (PFHpA)	**0.28**	**J**	0.54	0.031	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluorooctanoic acid (PFOA)	**0.24**	**J**	0.54	0.092	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluorooctanesulfonic acid (PFOS)	**0.23**	**J**	1.1	0.21	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1
Perfluorononanoic acid (PFNA)	**0.058**	**J**	0.54	0.039	ug/Kg	☼	01/25/18 12:10	01/26/18 16:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C4-PFHpA	*93*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C4 PFOA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C4 PFOS	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C5 PFNA	*100*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*
13C3-PFBS	*100*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:30*	*1*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**7.6**		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	**92.4**		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-DUP02

Lab Sample ID: 320-35310-4
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.0

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.43	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluorohexanesulfonic acid (PFHxS)	**0.064**	**J**	0.53	0.033	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluoroheptanoic acid (PFHpA)	**0.28**	**J**	0.53	0.031	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluorooctanoic acid (PFOA)	**0.22**	**J**	0.53	0.092	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluorooctanesulfonic acid (PFOS)	**0.29**	**J**	1.1	0.21	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1
Perfluorononanoic acid (PFNA)	**0.077**	**J**	0.53	0.038	ug/Kg	☼	01/25/18 12:10	01/26/18 16:53	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*93*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C4-PFHpA	*90*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C4 PFOA	*97*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C5 PFNA	*104*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*
13C3-PFBS	*91*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:53*	*1*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**8.0**		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	**92.0**		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-EB01

Lab Sample ID: 320-35310-5
Date Collected: 01/22/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.38	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluoroheptanoic acid (PFHpA)	1.5	U	2.0	0.61	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluorooctanoic acid (PFOA)	1.5	U	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluorooctanesulfonic acid (PFOS)	3.0	U	4.0	1.1	ng/L		01/25/18 09:10	01/25/18 22:27	1
Perfluorononanoic acid (PFNA)	1.5	U	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 22:27	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*105*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:27*	*1*
13C4-PFHpA	*103*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:27*	*1*
13C4 PFOA	*104*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:27*	*1*
13C4 PFOS	*112*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:27*	*1*
13C5 PFNA	*111*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:27*	*1*
13C3-PFBS	*97*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:27*	*1*

Client Sample ID: FH-17-04_SO0005

Lab Sample ID: 320-35310-6
Date Collected: 01/22/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 94.8

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.10	U	0.42	0.026	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluorohexanesulfonic acid (PFHxS)	**0.037**	**J**	0.52	0.032	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluoroheptanoic acid (PFHpA)	**0.064**	**J**	0.52	0.030	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluorooctanoic acid (PFOA)	**0.16**	**J**	0.52	0.089	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluorooctanesulfonic acid (PFOS)	**0.71**	**J**	1.0	0.21	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1
Perfluorononanoic acid (PFNA)	**0.17**	**J**	0.52	0.037	ug/Kg	☼	01/25/18 12:10	01/26/18 17:01	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*92*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:01*	*1*
13C4-PFHpA	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:01*	*1*
13C4 PFOA	*96*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:01*	*1*
13C4 PFOS	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:01*	*1*
13C5 PFNA	*99*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:01*	*1*
13C3-PFBS	*88*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:01*	*1*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**5.2**		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	**94.8**		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-17-04_GW012218

Lab Sample ID: 320-35310-7
Date Collected: 01/22/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**21**	**M**	4.0	0.92	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluorohexanesulfonic acid (PFHxS)	**230**	**J1**	4.0	0.76	ng/L		01/25/18 09:10	01/25/18 22:35	1

Client Sample ID: FH-17-04_GW012218

Lab Sample ID: 320-35310-7
Date Collected: 01/22/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	6.0	M	4.0	1.2	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluorooctanoic acid (PFOA)	56	M J1	4.0	1.1	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluorooctanesulfonic acid (PFOS)	14	J1	8.0	2.2	ng/L		01/25/18 09:10	01/25/18 22:35	1
Perfluorononanoic acid (PFNA)	3.0	U J1	4.0	1.0	ng/L		01/25/18 09:10	01/25/18 22:35	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:35*	*1*
13C4-PFHpA	*107*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:35*	*1*
13C4 PFOA	*112*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:35*	*1*
13C4 PFOS	*113*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:35*	*1*
13C5 PFNA	*118*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:35*	*1*
13C3-PFBS	*106*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:35*	*1*

Client Sample ID: FH-17-02_SO0005

Lab Sample ID: 320-35310-8
Date Collected: 01/22/18 11:15
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 93.6

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.42	0.026	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluorohexanesulfonic acid (PFHxS)	0.85		0.53	0.033	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluoroheptanoic acid (PFHpA)	0.85		0.53	0.031	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluorooctanoic acid (PFOA)	0.92	M	0.53	0.091	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluorooctanesulfonic acid (PFOS)	18		1.1	0.21	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1
Perfluorononanoic acid (PFNA)	2.0		0.53	0.038	ug/Kg	☼	01/25/18 12:10	01/26/18 17:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*91*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C4-PFHpA	*88*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C4 PFOA	*98*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C4 PFOS	*98*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C5 PFNA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*
13C3-PFBS	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:09*	*1*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	6.4		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	93.6		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-17-02_GW012218

Lab Sample ID: 320-35310-9
Date Collected: 01/22/18 11:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	20	M	2.1	0.48	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluorohexanesulfonic acid (PFHxS)	170		2.1	0.40	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluoroheptanoic acid (PFHpA)	4.0	M	2.1	0.64	ng/L		01/25/18 09:10	01/25/18 22:59	1

Client Sample ID: FH-17-02_GW012218

Lab Sample ID: 320-35310-9
Date Collected: 01/22/18 11:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid (PFOA)	**23**	**M**	2.1	0.56	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluorooctanesulfonic acid (PFOS)	**5.3**		4.2	1.1	ng/L		01/25/18 09:10	01/25/18 22:59	1
Perfluorononanoic acid (PFNA)	1.6	U	2.1	0.54	ng/L		01/25/18 09:10	01/25/18 22:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*104*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C4-PFHpA	*107*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C4 PFOA	*110*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C4 PFOS	*112*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C5 PFNA	*114*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*
13C3-PFBS	*98*		*25 - 150*	*01/25/18 09:10*	*01/25/18 22:59*	*1*

Client Sample ID: FH-17-01_SO0005

Lab Sample ID: 320-35310-10
Date Collected: 01/22/18 12:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 86.1

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.12	U M	0.46	0.029	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1
Perfluorohexanesulfonic acid (PFHxS)	**2.5**		0.58	0.036	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1
Perfluoroheptanoic acid (PFHpA)	**1.2**		0.58	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1
Perfluorooctanoic acid (PFOA)	**5.3**		0.58	0.10	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1
Perfluorononanoic acid (PFNA)	**10**		0.58	0.042	ug/Kg	☼	01/25/18 12:10	01/26/18 17:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*90*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:17*	*1*
13C4-PFHpA	*89*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:17*	*1*
13C4 PFOA	*95*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:17*	*1*
13C5 PFNA	*95*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:17*	*1*
13C3-PFBS	*88*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:17*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**30**	**D**	12	2.3	ug/Kg	☼	01/25/18 12:10	01/29/18 16:28	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*105*		*25 - 150*	*01/25/18 12:10*	*01/29/18 16:28*	*10*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**13.9**		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	**86.1**		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-17-01_GW012218

Lab Sample ID: 320-35310-11
Date Collected: 01/22/18 12:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**7.7**		2.4	0.56	ng/L		01/25/18 09:10	01/25/18 23:07	1

Client Sample ID: FH-17-01_GW012218

Lab Sample ID: 320-35310-11

Date Collected: 01/22/18 12:30

Matrix: Water

Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	**110**		2.4	0.46	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluoroheptanoic acid (PFHpA)	**2.1**	**J M**	2.4	0.74	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluorooctanoic acid (PFOA)	**9.2**	**M**	2.4	0.66	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluorooctanesulfonic acid (PFOS)	3.7	U M	4.9	1.3	ng/L		01/25/18 09:10	01/25/18 23:07	1
Perfluorononanoic acid (PFNA)	1.8	U	2.4	0.63	ng/L		01/25/18 09:10	01/25/18 23:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*113*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:07*	*1*
13C4-PFHpA	*108*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:07*	*1*
13C4 PFOA	*114*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:07*	*1*
13C4 PFOS	*114*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:07*	*1*
13C5 PFNA	*116*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:07*	*1*
13C3-PFBS	*110*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:07*	*1*

Client Sample ID: FH-17-05_SO0005

Lab Sample ID: 320-35310-12

Date Collected: 01/22/18 13:25

Matrix: Solid

Date Received: 01/24/18 09:55

Percent Solids: 90.0

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.028	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1
Perfluorohexanesulfonic acid (PFHxS)	**1.5**		0.55	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1
Perfluoroheptanoic acid (PFHpA)	**0.32**	**J**	0.55	0.032	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1
Perfluorooctanoic acid (PFOA)	**1.2**		0.55	0.095	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1
Perfluorononanoic acid (PFNA)	**1.5**		0.55	0.040	ug/Kg	☼	01/25/18 12:10	01/26/18 17:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*92*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:24*	*1*
13C4-PFHpA	*88*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:24*	*1*
13C4 PFOA	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:24*	*1*
13C5 PFNA	*78*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:24*	*1*
13C3-PFBS	*96*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:24*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**200**	**D**	22	4.4	ug/Kg	☼	01/25/18 12:10	01/29/18 16:36	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*111*		*25 - 150*	*01/25/18 12:10*	*01/29/18 16:36*	*20*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**10.0**		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	**90.0**		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-17-05_GW012218

Lab Sample ID: 320-35310-13
Date Collected: 01/22/18 13:45
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	9.5	M	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluorohexanesulfonic acid (PFHxS)	140		2.0	0.38	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluoroheptanoic acid (PFHpA)	14		2.0	0.60	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluorooctanoic acid (PFOA)	34	M	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluorooctanesulfonic acid (PFOS)	46		4.0	1.1	ng/L		01/25/18 09:10	01/25/18 23:22	1
Perfluorononanoic acid (PFNA)	1.2	J	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 23:22	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:22*	*1*
13C4-PFHpA	*104*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:22*	*1*
13C4 PFOA	*106*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:22*	*1*
13C4 PFOS	*113*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:22*	*1*
13C5 PFNA	*118*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:22*	*1*
13C3-PFBS	*98*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:22*	*1*

Client Sample ID: FH-17-08_SO0005

Lab Sample ID: 320-35310-14
Date Collected: 01/22/18 14:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.5

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U	0.43	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluorohexanesulfonic acid (PFHxS)	0.10	J	0.54	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluoroheptanoic acid (PFHpA)	0.12	J M	0.54	0.031	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluorooctanoic acid (PFOA)	0.21	J	0.54	0.093	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluorooctanesulfonic acid (PFOS)	1.5		1.1	0.22	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1
Perfluorononanoic acid (PFNA)	0.35	J	0.54	0.039	ug/Kg	☼	01/25/18 12:10	01/26/18 17:40	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*85*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:40*	*1*
13C4-PFHpA	*84*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:40*	*1*
13C4 PFOA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:40*	*1*
13C4 PFOS	*92*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:40*	*1*
13C5 PFNA	*103*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:40*	*1*
13C3-PFBS	*86*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:40*	*1*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	7.5		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	92.5		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-17-08_GW012218

Lab Sample ID: 320-35310-15
Date Collected: 01/22/18 14:35
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	4.3	M	2.0	0.47	ng/L		01/25/18 09:10	01/25/18 23:30	1
Perfluorohexanesulfonic acid (PFHxS)	49	M	2.0	0.38	ng/L		01/25/18 09:10	01/25/18 23:30	1
Perfluoroheptanoic acid (PFHpA)	41		2.0	0.62	ng/L		01/25/18 09:10	01/25/18 23:30	1
Perfluorooctanoic acid (PFOA)	21	M	2.0	0.55	ng/L		01/25/18 09:10	01/25/18 23:30	1
Perfluorononanoic acid (PFNA)	45		2.0	0.53	ng/L		01/25/18 09:10	01/25/18 23:30	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*103*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:30*	*1*
13C4-PFHpA	*98*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:30*	*1*
13C4 PFOA	*101*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:30*	*1*
13C5 PFNA	*90*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:30*	*1*
13C3-PFBS	*96*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:30*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	1500	D	40	11	ng/L		01/25/18 09:10	01/26/18 21:50	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*117*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:50*	*10*

Client Sample ID: FH-17-06_SO0005

Lab Sample ID: 320-35310-16
Date Collected: 01/23/18 09:15
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.8

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluorohexanesulfonic acid (PFHxS)	0.12	J	0.55	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluoroheptanoic acid (PFHpA)	0.059	J	0.55	0.032	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluorooctanoic acid (PFOA)	0.24	J	0.55	0.094	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluorooctanesulfonic acid (PFOS)	1.2		1.1	0.22	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1
Perfluorononanoic acid (PFNA)	0.059	J	0.55	0.040	ug/Kg	☼	01/25/18 12:10	01/26/18 17:48	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:48*	*1*
13C4-PFHpA	*87*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:48*	*1*
13C4 PFOA	*99*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:48*	*1*
13C4 PFOS	*99*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:48*	*1*
13C5 PFNA	*109*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:48*	*1*
13C3-PFBS	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 17:48*	*1*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	9.2		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	90.8		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-17-06_GW012318

Lab Sample ID: 320-35310-17
Date Collected: 01/23/18 09:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	**13**	**M**	1.9	0.44	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluorohexanesulfonic acid (PFHxS)	**31**	**M**	1.9	0.36	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluoroheptanoic acid (PFHpA)	**9.1**	**M**	1.9	0.58	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluorooctanoic acid (PFOA)	**30**	**M**	1.9	0.51	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluorooctanesulfonic acid (PFOS)	**42**		3.8	1.0	ng/L		01/25/18 09:10	01/25/18 23:38	1
Perfluorononanoic acid (PFNA)	**2.6**		1.9	0.49	ng/L		01/25/18 09:10	01/25/18 23:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*96*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:38*	*1*
13C4-PFHpA	*89*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:38*	*1*
13C4 PFOA	*106*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:38*	*1*
13C4 PFOS	*107*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:38*	*1*
13C5 PFNA	*112*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:38*	*1*
13C3-PFBS	*98*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:38*	*1*

Client Sample ID: FH-FB01

Lab Sample ID: 320-35310-18
Date Collected: 01/23/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.97	U	1.9	0.45	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluorohexanesulfonic acid (PFHxS)	0.97	U	1.9	0.37	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluoroheptanoic acid (PFHpA)	1.5	U	1.9	0.59	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluorooctanoic acid (PFOA)	1.5	U	1.9	0.52	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluorooctanesulfonic acid (PFOS)	2.9	U	3.9	1.1	ng/L		01/25/18 09:10	01/25/18 23:46	1
Perfluorononanoic acid (PFNA)	1.5	U	1.9	0.50	ng/L		01/25/18 09:10	01/25/18 23:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*98*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:46*	*1*
13C4-PFHpA	*97*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:46*	*1*
13C4 PFOA	*101*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:46*	*1*
13C4 PFOS	*105*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:46*	*1*
13C5 PFNA	*109*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:46*	*1*
13C3-PFBS	*92*		*25 - 150*	*01/25/18 09:10*	*01/25/18 23:46*	*1*

Client Sample ID: FH-17-07_SO0005

Lab Sample ID: 320-35310-19
Date Collected: 01/23/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 91.7

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	0.44	0.027	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluorohexanesulfonic acid (PFHxS)	0.11	U	0.54	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluoroheptanoic acid (PFHpA)	0.11	U	0.54	0.032	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluorooctanoic acid (PFOA)	0.22	U	0.54	0.094	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluorooctanesulfonic acid (PFOS)	**0.68**	**J**	1.1	0.22	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1
Perfluorononanoic acid (PFNA)	**0.043**	**J**	0.54	0.039	ug/Kg	☼	01/25/18 12:10	01/26/18 17:56	1

Client Sample ID: FH-17-07_SO0005

Lab Sample ID: 320-35310-19

Date Collected: 01/23/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 91.7

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	96		25 - 150	01/25/18 12:10	01/26/18 17:56	1
13C4-PFHpA	84		25 - 150	01/25/18 12:10	01/26/18 17:56	1
13C4 PFOA	100		25 - 150	01/25/18 12:10	01/26/18 17:56	1
13C4 PFOS	98		25 - 150	01/25/18 12:10	01/26/18 17:56	1
13C5 PFNA	105		25 - 150	01/25/18 12:10	01/26/18 17:56	1
13C3-PFBS	89		25 - 150	01/25/18 12:10	01/26/18 17:56	1

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	8.3		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	91.7		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-17-07_GW012318

Lab Sample ID: 320-35310-20

Date Collected: 01/23/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	3.0	M	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluorohexanesulfonic acid (PFHxS)	16		2.0	0.38	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluoroheptanoic acid (PFHpA)	4.1	M	2.0	0.61	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluorooctanoic acid (PFOA)	11	M	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluorooctanesulfonic acid (PFOS)	13		4.0	1.1	ng/L		01/25/18 09:10	01/25/18 23:54	1
Perfluorononanoic acid (PFNA)	0.55	J	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 23:54	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	106		25 - 150	01/25/18 09:10	01/25/18 23:54	1
13C4-PFHpA	109		25 - 150	01/25/18 09:10	01/25/18 23:54	1
13C4 PFOA	115		25 - 150	01/25/18 09:10	01/25/18 23:54	1
13C4 PFOS	118		25 - 150	01/25/18 09:10	01/25/18 23:54	1
13C5 PFNA	119		25 - 150	01/25/18 09:10	01/25/18 23:54	1
13C3-PFBS	104		25 - 150	01/25/18 09:10	01/25/18 23:54	1

Client Sample ID: FH-17-09_SO0005

Lab Sample ID: 320-35310-21

Date Collected: 01/23/18 11:50
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 85.0

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.12	U	0.47	0.029	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluorohexanesulfonic acid (PFHxS)	0.12	U	0.58	0.036	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluoroheptanoic acid (PFHpA)	0.12	U	0.58	0.034	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluorooctanoic acid (PFOA)	0.23	U	0.58	0.10	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluorooctanesulfonic acid (PFOS)	0.58	U M	1.2	0.23	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1
Perfluorononanoic acid (PFNA)	0.12	U	0.58	0.042	ug/Kg	☼	01/25/18 12:10	01/26/18 18:04	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	92		25 - 150	01/25/18 12:10	01/26/18 18:04	1
13C4-PFHpA	93		25 - 150	01/25/18 12:10	01/26/18 18:04	1
13C4 PFOA	100		25 - 150	01/25/18 12:10	01/26/18 18:04	1

Client Sample ID: FH-17-09_SO0005

Lab Sample ID: 320-35310-21
Date Collected: 01/23/18 11:50
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 85.0

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFOS	*103*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*
13C5 PFNA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*
13C3-PFBS	*94*		*25 - 150*	*01/25/18 12:10*	*01/26/18 18:04*	*1*

General Chemistry

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	15.0		0.1	0.1	%			01/25/18 16:04	1
Percent Solids	85.0		0.1	0.1	%			01/25/18 16:04	1

Client Sample ID: FH-17-09_GW012318

Lab Sample ID: 320-35310-22
Date Collected: 01/23/18 11:45
Matrix: Water
Date Received: 01/24/18 09:55

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	18	M	1.9	0.45	ng/L		01/25/18 09:10	01/26/18 00:02	1
Perfluoroheptanoic acid (PFHpA)	130		1.9	0.59	ng/L		01/25/18 09:10	01/26/18 00:02	1
Perfluorooctanoic acid (PFOA)	160	M	1.9	0.53	ng/L		01/25/18 09:10	01/26/18 00:02	1
Perfluorononanoic acid (PFNA)	19		1.9	0.51	ng/L		01/25/18 09:10	01/26/18 00:02	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4-PFHpA	*105*		*25 - 150*	*01/25/18 09:10*	*01/26/18 00:02*	*1*
13C4 PFOA	*107*		*25 - 150*	*01/25/18 09:10*	*01/26/18 00:02*	*1*
13C5 PFNA	*94*		*25 - 150*	*01/25/18 09:10*	*01/26/18 00:02*	*1*
13C3-PFBS	*111*		*25 - 150*	*01/25/18 09:10*	*01/26/18 00:02*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances - DL

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexanesulfonic acid (PFHxS)	780	D	39	7.4	ng/L		01/25/18 09:10	01/26/18 21:58	20
Perfluorooctanesulfonic acid (PFOS)	4000	D	78	21	ng/L		01/25/18 09:10	01/26/18 21:58	20

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*112*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:58*	*20*
13C4 PFOS	*121*		*25 - 150*	*01/25/18 09:10*	*01/26/18 21:58*	*20*

Isotope Dilution Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Solid **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)	3C3-PFBS (25-150)
320-35310-3	FH-17-03_SO0005	94	93	101	101	100	100
320-35310-3 MS	FH-17-03_SO0005	92	94	95	91	93	93
320-35310-3 MSD	FH-17-03_SO0005	97	92	101	100	99	92
320-35310-4	FH-DUP02	93	90	97	98	104	91
320-35310-6	FH-17-04_SO0005	92	94	96	101	99	88
320-35310-8	FH-17-02_SO0005	91	88	98	98	101	94
320-35310-10	FH-17-01_SO0005	90	89	95		95	88
320-35310-10 - DL	FH-17-01_SO0005				105		
320-35310-12	FH-17-05_SO0005	92	88	94		78	96
320-35310-12 - DL	FH-17-05_SO0005				111		
320-35310-14	FH-17-08_SO0005	85	84	101	92	103	86
320-35310-16	FH-17-06_SO0005	94	87	99	99	109	101
320-35310-19	FH-17-07_SO0005	96	84	100	98	105	89
320-35310-21	FH-17-09_SO0005	92	93	100	103	101	94
LCS 320-205574/2-A	Lab Control Sample	104	103	103	106	100	95
MB 320-205574/1-A	Method Blank	100	101	97	105	108	101

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA
13C3-PFBS = 13C3-PFBS

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Water **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)					
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)	3C3-PFBS (25-150)
320-35310-1	FH-17-03_GW012218		105	104	115	113	106 M
320-35310-1 - DL	FH-17-03_GW012218	105					
320-35310-2	FH-DUP01		98	109	112	117	97 M
320-35310-2 - DL	FH-DUP01	108					
320-35310-5	FH-EB01	105	103	104	112	111	97
320-35310-7	FH-17-04_GW012218	110	107	112	113	118	106
320-35310-7 MS	FH-17-04_GW012218	126	123	126	122	130	127
320-35310-7 MSD	FH-17-04_GW012218	105	96	109	113	115	106
320-35310-9	FH-17-02_GW012218	104	107	110	112	114	98
320-35310-11	FH-17-01_GW012218	113	108	114	114	116	110
320-35310-13	FH-17-05_GW012218	103	104	106	113	118	98
320-35310-15	FH-17-08_GW012218	103	98	101		90	96
320-35310-15 - DL	FH-17-08_GW012218				117		
320-35310-17	FH-17-06_GW012318	96	89	106	107	112	98
320-35310-18	FH-FB01	98	97	101	105	109	92
320-35310-20	FH-17-07_GW012318	106	109	115	118	119	104
320-35310-22	FH-17-09_GW012318		105	107		94	111
320-35310-22 - DL	FH-17-09_GW012318	112			121		

Isotope Dilution Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Matrix: Water **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFHxS (25-150)	PFHpA (25-150)	PFOA (25-150)	PFOS (25-150)	PFNA (25-150)	3C3-PFBS (25-150)		
LCS 320-205514/2-A	Lab Control Sample	109	110	113	111	116	97		
MB 320-205514/1-A	Method Blank	110	111	111	118	116	102		

Surrogate Legend

PFHxS = 18O2 PFHxS
PFHpA = 13C4-PFHpA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFNA = 13C5 PFNA
13C3-PFBS = 13C3-PFBS

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-205514/1-A
Matrix: Water
Analysis Batch: 205677

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 205514

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	1.0	U	2.0	0.46	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluorohexanesulfonic acid (PFHxS)	1.0	U	2.0	0.38	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluoroheptanoic acid (PFHpA)	1.5	U	2.0	0.61	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluorooctanoic acid (PFOA)	1.5	U	2.0	0.54	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluorooctanesulfonic acid (PFOS)	3.0	U	4.0	1.1	ng/L		01/25/18 09:10	01/25/18 21:56	1
Perfluorononanoic acid (PFNA)	1.5	U	2.0	0.52	ng/L		01/25/18 09:10	01/25/18 21:56	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*110*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C4-PFHpA	*111*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C4 PFOA	*111*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C4 PFOS	*118*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C5 PFNA	*116*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*
13C3-PFBS	*102*		*25 - 150*	*01/25/18 09:10*	*01/25/18 21:56*	*1*

Lab Sample ID: LCS 320-205514/2-A
Matrix: Water
Analysis Batch: 205677

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 205514

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	35.4	37.9		ng/L		107	87 - 120
Perfluorohexanesulfonic acid (PFHxS)	36.4	33.4		ng/L		92	81 - 106
Perfluoroheptanoic acid (PFHpA)	40.0	34.7		ng/L		87	80 - 113
Perfluorooctanoic acid (PFOA)	40.0	35.3		ng/L		88	80 - 107
Perfluorooctanesulfonic acid (PFOS)	37.1	34.7		ng/L		93	82 - 112
Perfluorononanoic acid (PFNA)	40.0	36.9		ng/L		92	83 - 113

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*109*		*25 - 150*
13C4-PFHpA	*110*		*25 - 150*
13C4 PFOA	*113*		*25 - 150*
13C4 PFOS	*111*		*25 - 150*
13C5 PFNA	*116*		*25 - 150*
13C3-PFBS	*97*		*25 - 150*

Lab Sample ID: 320-35310-7 MS
Matrix: Water
Analysis Batch: 205677

Client Sample ID: FH-17-04_GW012218
Prep Type: Total/NA
Prep Batch: 205514

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	21	M	55.9	76.3		ng/L		99	87 - 120
Perfluorohexanesulfonic acid (PFHxS)	230	J1	57.5	263	4	ng/L		53	81 - 106
Perfluoroheptanoic acid (PFHpA)	6.0	M	63.2	60.8		ng/L		87	80 - 113
Perfluorooctanoic acid (PFOA)	56	M J1	63.2	104	M J1	ng/L		76	80 - 107

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: 320-35310-7 MS
Matrix: Water
Analysis Batch: 205677

Client Sample ID: FH-17-04_GW012218
Prep Type: Total/NA
Prep Batch: 205514

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorooctanesulfonic acid (PFOS)	14	J1	58.7	71.1		ng/L		98	82 - 112
Perfluorononanoic acid (PFNA)	3.0	U J1	63.2	57.9		ng/L		92	83 - 113

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
18O2 PFHxS	*126*		*25 - 150*
13C4-PFHpA	*123*		*25 - 150*
13C4 PFOA	*126*		*25 - 150*
13C4 PFOS	*122*		*25 - 150*
13C5 PFNA	*130*		*25 - 150*
13C3-PFBS	*127*		*25 - 150*

Lab Sample ID: 320-35310-7 MSD
Matrix: Water
Analysis Batch: 205677

Client Sample ID: FH-17-04_GW012218
Prep Type: Total/NA
Prep Batch: 205514

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	21	M	41.5	60.9	M	ng/L		97	87 - 120	22	30
Perfluorohexanesulfonic acid (PFHxS)	230	J1	42.7	214	4	ng/L		-44	81 - 106	21	30
Perfluoroheptanoic acid (PFHpA)	6.0	M	46.9	48.8		ng/L		91	80 - 113	22	30
Perfluorooctanoic acid (PFOA)	56	M J1	46.9	82.1	M J1	ng/L		56	80 - 107	23	30
Perfluorooctanesulfonic acid (PFOS)	14	J1	43.5	51.3	J1	ng/L		86	82 - 112	32	30
Perfluorononanoic acid (PFNA)	3.0	U J1	46.9	40.8	J1	ng/L		87	83 - 113	35	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
18O2 PFHxS	*105*		*25 - 150*
13C4-PFHpA	*96*		*25 - 150*
13C4 PFOA	*109*		*25 - 150*
13C4 PFOS	*113*		*25 - 150*
13C5 PFNA	*115*		*25 - 150*
13C3-PFBS	*106*		*25 - 150*

Lab Sample ID: MB 320-205574/1-A
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 205574

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanesulfonic acid (PFBS)	0.10	U	0.40	0.025	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluorohexanesulfonic acid (PFHxS)	0.10	U	0.50	0.031	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluoroheptanoic acid (PFHpA)	0.10	U	0.50	0.029	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluorooctanoic acid (PFOA)	0.20	U	0.50	0.086	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluorooctanesulfonic acid (PFOS)	0.50	U	1.0	0.20	ug/Kg		01/25/18 12:10	01/26/18 16:14	1
Perfluorononanoic acid (PFNA)	0.10	U	0.50	0.036	ug/Kg		01/25/18 12:10	01/26/18 16:14	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*100*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:14*	*1*
13C4-PFHpA	*101*		*25 - 150*	*01/25/18 12:10*	*01/26/18 16:14*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 320-205574/1-A
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 205574

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFOA	97		25 - 150	01/25/18 12:10	01/26/18 16:14	1
13C4 PFOS	105		25 - 150	01/25/18 12:10	01/26/18 16:14	1
13C5 PFNA	108		25 - 150	01/25/18 12:10	01/26/18 16:14	1
13C3-PFBS	101		25 - 150	01/25/18 12:10	01/26/18 16:14	1

Lab Sample ID: LCS 320-205574/2-A
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 205574

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	1.77	1.82		ug/Kg		103	73 - 142
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.69		ug/Kg		93	75 - 121
Perfluoroheptanoic acid (PFHpA)	2.00	1.98		ug/Kg		99	76 - 124
Perfluorooctanoic acid (PFOA)	2.00	1.87		ug/Kg		93	76 - 121
Perfluorooctanesulfonic acid (PFOS)	1.86	1.73		ug/Kg		93	69 - 131
Perfluorononanoic acid (PFNA)	2.00	1.95		ug/Kg		98	74 - 126

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
18O2 PFHxS	104		25 - 150
13C4-PFHpA	103		25 - 150
13C4 PFOA	103		25 - 150
13C4 PFOS	106		25 - 150
13C5 PFNA	100		25 - 150
13C3-PFBS	95		25 - 150

Lab Sample ID: 320-35310-3 MS
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: FH-17-03_SO0005
Prep Type: Total/NA
Prep Batch: 205574

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	1.90	1.92		ug/Kg	☼	101	73 - 142
Perfluorohexanesulfonic acid (PFHxS)	0.055	J	1.95	1.92		ug/Kg	☼	95	75 - 121
Perfluoroheptanoic acid (PFHpA)	0.28	J	2.15	2.20		ug/Kg	☼	89	76 - 124
Perfluorooctanoic acid (PFOA)	0.24	J	2.15	2.21		ug/Kg	☼	92	76 - 121
Perfluorooctanesulfonic acid (PFOS)	0.23	J	1.99	2.08		ug/Kg	☼	93	69 - 131
Perfluorononanoic acid (PFNA)	0.058	J	2.15	2.15		ug/Kg	☼	98	74 - 126

Isotope Dilution	MS %Recovery	MS Qualifier	Limits
18O2 PFHxS	92		25 - 150
13C4-PFHpA	94		25 - 150
13C4 PFOA	95		25 - 150
13C4 PFOS	91		25 - 150
13C5 PFNA	93		25 - 150
13C3-PFBS	93		25 - 150

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: 320-35310-3 MSD
Matrix: Solid
Analysis Batch: 205921

Client Sample ID: FH-17-03_SO0005
Prep Type: Total/NA
Prep Batch: 205574

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorobutanesulfonic acid (PFBS)	0.11	U M	1.89	1.91		ug/Kg	☼	101	73 - 142	0	30
Perfluorohexanesulfonic acid (PFHxS)	0.055	J	1.94	1.76		ug/Kg	☼	88	75 - 121	9	30
Perfluoroheptanoic acid (PFHpA)	0.28	J	2.13	2.20		ug/Kg	☼	90	76 - 124	0	30
Perfluorooctanoic acid (PFOA)	0.24	J	2.13	2.11		ug/Kg	☼	87	76 - 121	5	30
Perfluorooctanesulfonic acid (PFOS)	0.23	J	1.98	2.07		ug/Kg	☼	93	69 - 131	1	30
Perfluorononanoic acid (PFNA)	0.058	J	2.13	2.10		ug/Kg	☼	96	74 - 126	3	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
18O2 PFHxS	*97*		*25 - 150*
13C4-PFHpA	*92*		*25 - 150*
13C4 PFOA	*101*		*25 - 150*
13C4 PFOS	*100*		*25 - 150*
13C5 PFNA	*99*		*25 - 150*
13C3-PFBS	*92*		*25 - 150*

Method: D 2216 - Percent Moisture

Lab Sample ID: 320-35310-3 DU
Matrix: Solid
Analysis Batch: 205642

Client Sample ID: FH-17-03_SO0005
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Moisture	7.6		7.2		%		5	20
Percent Solids	92.4		92.8		%		0.4	20

LCMS

Prep Batch: 205514

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-1 - DL	FH-17-03_GW012218	Total/NA	Water	3535	
320-35310-1	FH-17-03_GW012218	Total/NA	Water	3535	
320-35310-2 - DL	FH-DUP01	Total/NA	Water	3535	
320-35310-2	FH-DUP01	Total/NA	Water	3535	
320-35310-5	FH-EB01	Total/NA	Water	3535	
320-35310-7	FH-17-04_GW012218	Total/NA	Water	3535	
320-35310-9	FH-17-02_GW012218	Total/NA	Water	3535	
320-35310-11	FH-17-01_GW012218	Total/NA	Water	3535	
320-35310-13	FH-17-05_GW012218	Total/NA	Water	3535	
320-35310-15 - DL	FH-17-08_GW012218	Total/NA	Water	3535	
320-35310-15	FH-17-08_GW012218	Total/NA	Water	3535	
320-35310-17	FH-17-06_GW012318	Total/NA	Water	3535	
320-35310-18	FH-FB01	Total/NA	Water	3535	
320-35310-20	FH-17-07_GW012318	Total/NA	Water	3535	
320-35310-22 - DL	FH-17-09_GW012318	Total/NA	Water	3535	
320-35310-22	FH-17-09_GW012318	Total/NA	Water	3535	
MB 320-205514/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-205514/2-A	Lab Control Sample	Total/NA	Water	3535	
320-35310-7 MS	FH-17-04_GW012218	Total/NA	Water	3535	
320-35310-7 MSD	FH-17-04_GW012218	Total/NA	Water	3535	

Prep Batch: 205574

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-3	FH-17-03_SO0005	Total/NA	Solid	SHAKE	
320-35310-4	FH-DUP02	Total/NA	Solid	SHAKE	
320-35310-6	FH-17-04_SO0005	Total/NA	Solid	SHAKE	
320-35310-8	FH-17-02_SO0005	Total/NA	Solid	SHAKE	
320-35310-10	FH-17-01_SO0005	Total/NA	Solid	SHAKE	
320-35310-10 - DL	FH-17-01_SO0005	Total/NA	Solid	SHAKE	
320-35310-12 - DL	FH-17-05_SO0005	Total/NA	Solid	SHAKE	
320-35310-12	FH-17-05_SO0005	Total/NA	Solid	SHAKE	
320-35310-14	FH-17-08_SO0005	Total/NA	Solid	SHAKE	
320-35310-16	FH-17-06_SO0005	Total/NA	Solid	SHAKE	
320-35310-19	FH-17-07_SO0005	Total/NA	Solid	SHAKE	
320-35310-21	FH-17-09_SO0005	Total/NA	Solid	SHAKE	
MB 320-205574/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-205574/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
320-35310-3 MS	FH-17-03_SO0005	Total/NA	Solid	SHAKE	
320-35310-3 MSD	FH-17-03_SO0005	Total/NA	Solid	SHAKE	

Analysis Batch: 205677

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-1	FH-17-03_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-2	FH-DUP01	Total/NA	Water	537 (modified)	205514
320-35310-5	FH-EB01	Total/NA	Water	537 (modified)	205514
320-35310-7	FH-17-04_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-9	FH-17-02_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-11	FH-17-01_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-13	FH-17-05_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-15	FH-17-08_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-17	FH-17-06_GW012318	Total/NA	Water	537 (modified)	205514

LCMS (Continued)

Analysis Batch: 205677 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-18	FH-FB01	Total/NA	Water	537 (modified)	205514
320-35310-20	FH-17-07_GW012318	Total/NA	Water	537 (modified)	205514
320-35310-22	FH-17-09_GW012318	Total/NA	Water	537 (modified)	205514
MB 320-205514/1-A	Method Blank	Total/NA	Water	537 (modified)	205514
LCS 320-205514/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	205514
320-35310-7 MS	FH-17-04_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-7 MSD	FH-17-04_GW012218	Total/NA	Water	537 (modified)	205514

Analysis Batch: 205921

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-3	FH-17-03_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-4	FH-DUP02	Total/NA	Solid	537 (modified)	205574
320-35310-6	FH-17-04_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-8	FH-17-02_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-10	FH-17-01_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-12	FH-17-05_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-14	FH-17-08_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-16	FH-17-06_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-19	FH-17-07_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-21	FH-17-09_SO0005	Total/NA	Solid	537 (modified)	205574
MB 320-205574/1-A	Method Blank	Total/NA	Solid	537 (modified)	205574
LCS 320-205574/2-A	Lab Control Sample	Total/NA	Solid	537 (modified)	205574
320-35310-3 MS	FH-17-03_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-3 MSD	FH-17-03_SO0005	Total/NA	Solid	537 (modified)	205574

Analysis Batch: 205928

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-1 - DL	FH-17-03_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-2 - DL	FH-DUP01	Total/NA	Water	537 (modified)	205514
320-35310-15 - DL	FH-17-08_GW012218	Total/NA	Water	537 (modified)	205514
320-35310-22 - DL	FH-17-09_GW012318	Total/NA	Water	537 (modified)	205514

Analysis Batch: 206109

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-10 - DL	FH-17-01_SO0005	Total/NA	Solid	537 (modified)	205574
320-35310-12 - DL	FH-17-05_SO0005	Total/NA	Solid	537 (modified)	205574

General Chemistry

Analysis Batch: 205642

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-3	FH-17-03_SO0005	Total/NA	Solid	D 2216	
320-35310-4	FH-DUP02	Total/NA	Solid	D 2216	
320-35310-6	FH-17-04_SO0005	Total/NA	Solid	D 2216	
320-35310-8	FH-17-02_SO0005	Total/NA	Solid	D 2216	
320-35310-10	FH-17-01_SO0005	Total/NA	Solid	D 2216	
320-35310-12	FH-17-05_SO0005	Total/NA	Solid	D 2216	
320-35310-14	FH-17-08_SO0005	Total/NA	Solid	D 2216	
320-35310-16	FH-17-06_SO0005	Total/NA	Solid	D 2216	
320-35310-19	FH-17-07_SO0005	Total/NA	Solid	D 2216	

General Chemistry (Continued)

Analysis Batch: 205642 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-35310-21	FH-17-09_SO0005	Total/NA	Solid	D 2216	
320-35310-3 DU	FH-17-03_SO0005	Total/NA	Solid	D 2216	

Lab Chronicle

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-03_GW012218
Lab Sample ID: 320-35310-1
Date Collected: 01/22/18 09:15
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			161.4 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 22:12	CBW	TAL SAC
Total/NA	Prep	3535	DL		161.4 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	5			205928	01/26/18 21:35	CBW	TAL SAC

Client Sample ID: FH-DUP01
Lab Sample ID: 320-35310-2
Date Collected: 01/22/18 09:15
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			251.1 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 22:20	CBW	TAL SAC
Total/NA	Prep	3535	DL		251.1 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	5			205928	01/26/18 21:42	CBW	TAL SAC

Client Sample ID: FH-17-03_SO0005
Lab Sample ID: 320-35310-3
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-03_SO0005
Lab Sample ID: 320-35310-3
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.04 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 16:30	ABH	TAL SAC

Client Sample ID: FH-DUP02
Lab Sample ID: 320-35310-4
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-DUP02
Lab Sample ID: 320-35310-4
Date Collected: 01/22/18 09:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.10 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 16:53	ABH	TAL SAC

Client Sample ID: FH-EB01
Lab Sample ID: 320-35310-5
Date Collected: 01/22/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			250 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 22:27	CBW	TAL SAC

Client Sample ID: FH-17-04_SO0005
Lab Sample ID: 320-35310-6
Date Collected: 01/22/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-04_SO0005
Lab Sample ID: 320-35310-6
Date Collected: 01/22/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 94.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.07 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 17:01	ABH	TAL SAC

Client Sample ID: FH-17-04_GW012218
Lab Sample ID: 320-35310-7
Date Collected: 01/22/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			125.5 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 22:35	CBW	TAL SAC

Client Sample ID: FH-17-02_SO0005
Lab Sample ID: 320-35310-8
Date Collected: 01/22/18 11:15
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Lab Chronicle

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-02_SO0005
Date Collected: 01/22/18 11:15
Date Received: 01/24/18 09:55

Lab Sample ID: 320-35310-8
Matrix: Solid
Percent Solids: 93.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.07 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 17:09	ABH	TAL SAC

Client Sample ID: FH-17-02_GW012218
Date Collected: 01/22/18 11:30
Date Received: 01/24/18 09:55

Lab Sample ID: 320-35310-9
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			239.8 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 22:59	CBW	TAL SAC

Client Sample ID: FH-17-01_SO0005
Date Collected: 01/22/18 12:20
Date Received: 01/24/18 09:55

Lab Sample ID: 320-35310-10
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-01_SO0005
Date Collected: 01/22/18 12:20
Date Received: 01/24/18 09:55

Lab Sample ID: 320-35310-10
Matrix: Solid
Percent Solids: 86.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.01 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 17:17	ABH	TAL SAC
Total/NA	Prep	SHAKE	DL		5.01 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10			206109	01/29/18 16:28	ABH	TAL SAC

Client Sample ID: FH-17-01_GW012218
Date Collected: 01/22/18 12:30
Date Received: 01/24/18 09:55

Lab Sample ID: 320-35310-11
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			204.9 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 23:07	CBW	TAL SAC

Client Sample ID: FH-17-05_SO0005
Date Collected: 01/22/18 13:25
Date Received: 01/24/18 09:55

Lab Sample ID: 320-35310-12
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Lab Chronicle

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-05_SO0005

Lab Sample ID: 320-35310-12
Date Collected: 01/22/18 13:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.04 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 17:24	ABH	TAL SAC
Total/NA	Prep	SHAKE	DL		5.04 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)	DL	20			206109	01/29/18 16:36	ABH	TAL SAC

Client Sample ID: FH-17-05_GW012218

Lab Sample ID: 320-35310-13
Date Collected: 01/22/18 13:45
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			252.3 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 23:22	CBW	TAL SAC

Client Sample ID: FH-17-08_SO0005

Lab Sample ID: 320-35310-14
Date Collected: 01/22/18 14:25
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-08_SO0005

Lab Sample ID: 320-35310-14
Date Collected: 01/22/18 14:25
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 92.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.00 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 17:40	ABH	TAL SAC

Client Sample ID: FH-17-08_GW012218

Lab Sample ID: 320-35310-15
Date Collected: 01/22/18 14:35
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			247 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 23:30	CBW	TAL SAC
Total/NA	Prep	3535	DL		247 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	10			205928	01/26/18 21:50	CBW	TAL SAC

Client Sample ID: FH-17-06_SO0005
Lab Sample ID: 320-35310-16
Date Collected: 01/23/18 09:15
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-06_SO0005
Lab Sample ID: 320-35310-16
Date Collected: 01/23/18 09:15
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 90.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.02 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 17:48	ABH	TAL SAC

Client Sample ID: FH-17-06_GW012318
Lab Sample ID: 320-35310-17
Date Collected: 01/23/18 09:30
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			263 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 23:38	CBW	TAL SAC

Client Sample ID: FH-FB01
Lab Sample ID: 320-35310-18
Date Collected: 01/23/18 09:45
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			257.5 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 23:46	CBW	TAL SAC

Client Sample ID: FH-17-07_SO0005
Lab Sample ID: 320-35310-19
Date Collected: 01/23/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-07_SO0005
Lab Sample ID: 320-35310-19
Date Collected: 01/23/18 10:20
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 91.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.01 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 17:56	ABH	TAL SAC

Lab Chronicle

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Client Sample ID: FH-17-07_GW012318

Lab Sample ID: 320-35310-20
Date Collected: 01/23/18 10:30
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			252 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/25/18 23:54	CBW	TAL SAC

Client Sample ID: FH-17-09_SO0005

Lab Sample ID: 320-35310-21
Date Collected: 01/23/18 11:50
Matrix: Solid
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1			205642	01/25/18 16:04	SSS	TAL SAC

Client Sample ID: FH-17-09_SO0005

Lab Sample ID: 320-35310-21
Date Collected: 01/23/18 11:50
Matrix: Solid
Date Received: 01/24/18 09:55
Percent Solids: 85.0

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			5.05 g	10.00 mL	205574	01/25/18 12:10	HJA	TAL SAC
Total/NA	Analysis	537 (modified)		1			205921	01/26/18 18:04	ABH	TAL SAC

Client Sample ID: FH-17-09_GW012318

Lab Sample ID: 320-35310-22
Date Collected: 01/23/18 11:45
Matrix: Water
Date Received: 01/24/18 09:55

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			256.6 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)		1			205677	01/26/18 00:02	CBW	TAL SAC
Total/NA	Prep	3535	DL		256.6 mL	10.00 mL	205514	01/25/18 09:10	J1S	TAL SAC
Total/NA	Analysis	537 (modified)	DL	20			205928	01/26/18 21:58	CBW	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Accreditation/Certification Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

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
Arizona	State Program	9	AZ0708	08-11-18
Arkansas DEQ	State Program	6	88-0691	06-17-18
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-18
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-18
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
L-A-B	DoD ELAP		L2468	01-20-21
Louisiana	NELAP	6	30612	06-30-18
Maine	State Program	1	CA0004	04-14-18 *
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-18
New Hampshire	NELAP	1	2997	04-18-18
New Jersey	NELAP	2	CA005	06-30-18
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	05-31-18
US Fish & Wildlife	Federal		LE148388-0	07-31-18
USDA	Federal		P330-11-00436	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-18
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.

Method Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
D 2216	Percent Moisture	ASTM	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Sample Summary

Client: Bristol Env. Remediation Services LLC
Project/Site: PFAS, Fort Devens, Rapid Response

TestAmerica Job ID: 320-35310-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-35310-1	FH-17-03_GW012218	Water	01/22/18 09:15	01/24/18 09:55
320-35310-2	FH-DUP01	Water	01/22/18 09:15	01/24/18 09:55
320-35310-3	FH-17-03_SO0005	Solid	01/22/18 09:20	01/24/18 09:55
320-35310-4	FH-DUP02	Solid	01/22/18 09:20	01/24/18 09:55
320-35310-5	FH-EB01	Water	01/22/18 09:45	01/24/18 09:55
320-35310-6	FH-17-04_SO0005	Solid	01/22/18 10:20	01/24/18 09:55
320-35310-7	FH-17-04_GW012218	Water	01/22/18 10:30	01/24/18 09:55
320-35310-8	FH-17-02_SO0005	Solid	01/22/18 11:15	01/24/18 09:55
320-35310-9	FH-17-02_GW012218	Water	01/22/18 11:30	01/24/18 09:55
320-35310-10	FH-17-01_SO0005	Solid	01/22/18 12:20	01/24/18 09:55
320-35310-11	FH-17-01_GW012218	Water	01/22/18 12:30	01/24/18 09:55
320-35310-12	FH-17-05_SO0005	Solid	01/22/18 13:25	01/24/18 09:55
320-35310-13	FH-17-05_GW012218	Water	01/22/18 13:45	01/24/18 09:55
320-35310-14	FH-17-08_SO0005	Solid	01/22/18 14:25	01/24/18 09:55
320-35310-15	FH-17-08_GW012218	Water	01/22/18 14:35	01/24/18 09:55
320-35310-16	FH-17-06_SO0005	Solid	01/23/18 09:15	01/24/18 09:55
320-35310-17	FH-17-06_GW012318	Water	01/23/18 09:30	01/24/18 09:55
320-35310-18	FH-FB01	Water	01/23/18 09:45	01/24/18 09:55
320-35310-19	FH-17-07_SO0005	Solid	01/23/18 10:20	01/24/18 09:55
320-35310-20	FH-17-07_GW012318	Water	01/23/18 10:30	01/24/18 09:55
320-35310-21	FH-17-09_SO0005	Solid	01/23/18 11:50	01/24/18 09:55
320-35310-22	FH-17-09_GW012318	Water	01/23/18 11:45	01/24/18 09:55

TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone (916) 373-5600 Fax (916) 372-1059

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Mike Argue	Lab PM: Kellmann, Jill	Carrier Tracking No(s):	COC No: 320-19356-4419.3
Client Contact: Ms. Meg Watson	Phone: 603-656-5403	E-Mail: jill.kellmann@testamericainc.com		Page: ~~Page 3 of 3~~ 1 of 2
Company: Bristol Env. Remediation Services LLC				Job #:
Address: 720 Corporate Circle #D	Due Date Requested:			
City: Golden	TAT Requested (days): 10			
State, Zip: CO, 80401-5626				
Phone: 907-563-0013(Tel) 720 459 7110	PO #: 34170085-002			
Email: mwatson@bristol-companies.com	WO #:			
Project Name: PFAS, Fort Devens, Rapid Response	Project #: 32009599			
Site:	SSOW#:			

Analysis Requested

320-35310 Chain of Custody

Preservation Codes:

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)

Other:

Sample Identification	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)	Modified Method 537	Total Number	Special Instructions/Note:
			Preservation Code:				I		
FH-17-Ø3_GWØ12218	1/22/18	0915	G	Water	N	N	X	2	
FH-DUPØ1		0915		Water	N	N	X	2	
FH-17-Ø3_SOØØØ5		0920		~~Soil Water~~ TM	N	N	X	1	
FH-DUPØ2		0920		~~Soil Water~~ TM	N	N	X	1	
~~FH-17-Ø3-MS-SOØØØ5~~ EBØ1		0945		Water	N	N	X	2	
FH-17-Ø4_SOØØØ5		1020		~~Soil Water~~ TM	N	N	X	1	
FH-17-Ø4_GWØ12218		1030		Water	N	N	X	6	MS/MSD
FH-17-Ø2_SOØØØ5		1115		SOIL	N	N	X	1	
FH-17-Ø2_GWØ12218		1130		WATER	N	N	X	2	
FH-17-Ø1_SOØØØ5		1220		SOIL	N	N	X	1	
FH-17-Ø1_GWØ12218	↓	1230	↓	WATER	N	N	X	2	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Michael Argue	1/23/18 1255			1/23/18 1255	TA
Relinquished by	Date/Time	Company	Received by	Date/Time	Company
	1/23/18 1600	TA		1/24/18 905	TA SAC
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:	1, 3.2

Ver: 08/04/2016

TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone (916) 373-5600 Fax (916) 372-1059

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Mike Argue	Lab PM: Kellmann, Jill	Carrier Tracking No(s):	COC No: 320-19356-4419.2
Client Contact: Ms. Meg Watson	Phone: 603-656-5403	E-Mail: jill.kellmann@testamericainc.com		Page: Page 2 of ~~3~~ 2
Company: Bristol Env Remediation Services LLC				Job #:

Address: 720 Corporate Circle #D	Due Date Requested:	Analysis Requested	Preservation Codes:
City: Golden	TAT Requested (days): 10		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: CO, 80401-5626			
Phone: 907-563-0013(Tel)	PO #: 34170085-002		
Email: mwatson@bristol-companies.com	WO #:		Other:
Project Name: PFAS, Fort Devens, Rapid Response	Project #: 32009599		
Site:	SSOW#:		

Sample Identification	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)	Modified Method 537	Total Number of containers	Special Instructions/Note:
			Preservation Code:				I		
FH-17-Ø5_SOØØØ5	1/22/18	1325	G	Solid	N	N	X	1	
FH-17-Ø5_GWØ12218		1345		~~Solid~~ Water MM	N	N	X	2	
FH-17-Ø8_SOØØØ5		1425		Solid	N	N	X	1	
FH-17-Ø8_GWØ12218		1435		Water	N	N	X	2	
FH-17-Ø6_SOØØØ5	1/23/18	0915	G	~~Solid~~ Water MM	N	N	X	1	
FH-17-Ø6_GWØ12318		0930		Water	N	N	X	2	
FH-FBØ1		0945		Water	N	N	X	2	
FH-17-Ø7_SOØØØ5		1020		~~Solid~~ Water MM	N	N	X	1	
FH-17-Ø7_GWØ12318		1030		Water	N	N	X	2	
FH-17-Ø9_SOØØØ5		1150		~~Solid~~ Water MM	N	N	X	1	
FH-17-Ø9_GWØ12318		1145		Water	N	N	X	2	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by: Michael Argue	Date/Time: 1/23/18 1255	Company	Received by:	Date/Time: 1/23/18 1255	Company TA
Relinquished by:	Date/Time: 1/23/18 1610	Company TA	Received by:	Date/Time: 1/24/18 955	Company TA-Sac
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 1.1, 3.7

Ver: 08/04/2016

Login Sample Receipt Checklist

Client: Bristol Env. Remediation Services LLC

Job Number: 320-35310-1

Login Number: 35310

List Source: TestAmerica Sacramento

List Number: 1

Creator: Aguayo, Alonso

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Appendix G

Validation Report

(Provided on CD)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Bristol Environmental Remediation Services, LLC
720 Corporate Circle, Suite D
Golden, CO 80401-5626
Attn: Megan Watson

February 21, 2018

SUBJECT: Fort Devens, Data Validation

Dear Ms. Watson,

Enclosed is the final validation report for the fraction listed below. This SDG was received on February 5, 2018. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #40370:

SDG #	Fraction
320-35310-1	Perfluorinated Hydrocarbons

The data validation was performed under Level IV validation guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- U.S. Department of Defense Quality Systems Manual for Environmental Laboratories, Version 5.1, 2017
- USEPA, National Functional Guidelines for Organic Superfund Methods Data Review, January 2017

Please feel free to contact us if you have any questions.

Sincerely,

Christina Rink

Christina Rink
Project Manager/Chemist

943 pages-ADV One week TAT Attachment 1

SEDD Level IV

LDC #40370 (Bristol - Golden, CO / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PFAs (537M)																													
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	320-35310-1	02/05/18	02/20/18	12	10																												

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Fort Devens

LDC Report Date: February 16, 2018

Parameters: Perfluorinated Hydrocarbons

Validation Level: Level IV

Laboratory: TestAmerica, Inc.

Sample Delivery Group (SDG): 320-35310-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
FH-17-03_GW012218	320-35310-1	Water	01/22/18
FH-DUP01	320-35310-2	Water	01/22/18
FH-17-03_SO0005	320-35310-3	Soil	01/22/18
FH-DUP02	320-35310-4	Soil	01/22/18
FH-EB01	320-35310-5	Water	01/22/18
FH-17-04_SO0005	320-35310-6	Soil	01/22/18
FH-17-04_GW012218	320-35310-7	Water	01/22/18
FH-17-02_SO0005	320-35310-8	Soil	01/22/18
FH-17-02_GW012218	320-35310-9	Water	01/22/18
FH-17-01_SO0005	320-35310-10	Soil	01/22/18
FH-17-01_GW012218	320-35310-11	Water	01/22/18
FH-17-05_SO0005	320-35310-12	Soil	01/22/18
FH-17-05_GW012218	320-35310-13	Water	01/22/18
FH-17-08_SO0005	320-35310-14	Soil	01/22/18
FH-17-08_GW012218	320-35310-15	Water	01/22/18
FH-17-06_SO0005	320-35310-16	Soil	01/23/18
FH-17-06_GW012318	320-35310-17	Water	01/23/18
FH-FB01	320-35310-18	Water	01/23/18
FH-17-07_SO0005	320-35310-19	Soil	01/23/18
FH-17-07_GW012318	320-35310-20	Water	01/23/18
FH-17-09_SO0005	320-35310-21	Soil	01/23/18
FH-17-09_GW012318	320-35310-22	Water	01/23/18
FH-17-03_SO0005MS	320-35310-3MS	Soil	01/22/18
FH-17-03_SO0005MSD	320-35310-3MSD	Soil	01/22/18
FH-17-04_GW012218MS	320-35310-7MS	Water	01/22/18
FH-17-04_GW012218MSD	320-35310-7MSD	Water	01/22/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluorinated Hydrocarbons by Environmental Protection Agency (EPA) Method 537 Modified

All sample results were subjected to Level IV data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 25.0% for all compounds.

For each calibration point, the percent differences (%D) of its true value were less than or equal to 25.0% for all compounds.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 25.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 25.0% for all compounds.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample FH-EB01 was identified as an equipment blank. No contaminants were found.

Sample FH-FB01 was identified as a field blank. No contaminants were found.

VII. Surrogates

Surrogates were not required by the method.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
FH-17-04_GW012218MS/MSD (FH-17-04_GW012218)	Perluorooctanoic acid	-	56 (60-140)	J (all detects)	A

For FH-17-04_GW012218MS/MSD, no data were qualified for Perfluorobutanesulfonic acid percent recoveries (%R) outside the QC limits since the parent sample results were greater than 4X the spike concentration.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
FH-17-04_GW012218MS/MSD (FH-17-04_GW012218)	Perfluorooctanesulfonic acid	32 (≤30)	J (all detects)	A
FH-17-04_GW012218MS/MSD (FH-17-04_GW012218)	Perfluorononanoic acid	35 (≤30)	NA	-

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples FH-17-03_GW012218 and FH-DUP01 and samples FH-17-03_SO0005 and FH-DUP02 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/L)		RPD (Limits)
	FH-17-03_GW012218	FH-DUP01	
Perfluorobutanesulfonic acid	60	67	11 (≤30)
Perfluoroheptaneoic acid	19	18	5 (≤30)
Perfluorooctanoic acid	330	260	24 (≤30)

Compound	Concentration (ng/L)		RPD (Limits)
	FH-17-03_GW012218	FH-DUP01	
Perfluorooctanesulfonic acid	26	18	36 (≤30)
Perfluorohexanesulfonic acid	670	540	21 (≤30)

Compound	Concentration (ug/Kg)		RPD (Limits)
	FH-17-03_SO0005	FH-DUP02	
Perfluorohexanesulfonic acid	0.055	0.064	15 (≤30)
Perfluoroheptanoic acid	0.28	0.28	0 (≤30)
Perfluorooctanoic acid	0.24	0.22	9 (≤30)
Perfluorooctanesulfonic acid	0.23	0.29	23 (≤30)
Perfluorononanoic acid	0.058	0.077	28 (≤30)

XI. Internal Standards

All internal standard recoveries (%R) were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria.

XIII. Target Compound Identifications

All target compound identifications met validation criteria.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to MS/MSD %R and RPD, data were qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Fort Devens
Perfluorinated Hydrocarbons - Data Qualification Summary - SDG 320-35310-1

Sample	Compound	Flag	A or P	Reason
FH-17-04_GW012218	Perluorooctanoic acid	J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
FH-17-04_GW012218	Perfluorooctanesulfonic acid	J (all detects)	A	Matrix spike/Matrix spike duplicate (RPD)

Fort Devens
Perfluorinated Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 320-35310-1

No Sample Data Qualified in this SDG

Fort Devens
Perfluorinated Hydrocarbons - Field Blank Data Qualification Summary - SDG 320-35310-1

No Sample Data Qualified in this SDG

LDC #: 40370A96 **VALIDATION COMPLETENESS WORKSHEET** Date: 2/11/18
SDG #: 320-35310-1 Level IV Page: 1 of 2
Laboratory: Test America, Inc. Reviewer: Q
2nd Reviewer: a

METHOD: LCMS Perfluorinated Hydrocarbons (EPA Method 537 Modified)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	LC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	RSD≤25%. True%D≤25%. ICV≤25%
IV.	Continuing calibration	A	CCV≤25%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	EB=5. FB=18
VII.	Surrogate spikes	N	Not Lipid
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	SW	D=1+2. 3+4
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	
XIII.	Target compound identification	A	
XIV.	System performance	A	
XV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	FH-17-03_GW012218	320-35310-1	Water	01/22/18
2	FH-DUP01	320-35310-2	Water	01/22/18
3	FH-17-03_SO0005	320-35310-3	Soil	01/22/18
4	FH-DUP02	320-35310-4	Soil	01/22/18
5	FH-EB01	320-35310-5	Water	01/22/18
6	FH-17-04_SO0005	320-35310-6	Soil	01/22/18
7	FH-17-04_GW012218	320-35310-7	Water	01/22/18
8	FH-17-02_SO0005	320-35310-8	Soil	01/22/18
9	FH-17-02_GW012218	320-35310-9	Water	01/22/18
10	FH-17-01_SO0005	320-35310-10	Soil	01/22/18
11	FH-17-01_GW012218	320-35310-11	Water	01/22/18
12	FH-17-05_SO0005	320-35310-12	Soil	01/22/18
13	FH-17-05_GW012218	320-35310-13	Water	01/22/18

LDC #: 40370A96 **VALIDATION COMPLETENESS WORKSHEET** Date: 2/11/18
SDG #: 320-35310-1 Level IV Page: 2 of 2
Laboratory: Test America, Inc. Reviewer:
2nd Reviewer:

METHOD: LCMS Perfluorinated Hydrocarbons (EPA Method 537 Modified)

	Client ID	Lab ID	Matrix	Date
14	FH-17-08_SO0005	320-35310-14	Soil	01/22/18
15	FH-17-08_GW012218	320-35310-15	Water	01/22/18
16	FH-17-06_SO0005	320-35310-16	Soil	01/23/18
17	FH-17-06_GW012318	320-35310-17	Water	01/23/18
18	FH-FB01	320-35310-18	Water	01/23/18
19	FH-17-07_SO0005	320-35310-19	Soil	01/23/18
20	FH-17-07_GW012318	320-35310-20	Water	01/23/18
21	FH-17-09_SO0005	320-35310-21	Soil	01/23/18
22	FH-17-09_GW012318	320-35310-22	Water	01/23/18
23	FH-17-03_SO0005MS	320-35310-3MS	Soil	01/22/18
24	FH-17-03_SO0005MSD	320-35310-3MSD	Soil	01/22/18
25	FH-17-04_GW012218MS	320-35310-7MS	Water	01/22/18
26	FH-17-04_GW012218MSD	320-35310-7MSD	Water	01/22/18
27				
28				
29				
30				
31				

Notes:

LDC #: 46370A96

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: 0

Method: LCMS (EPA Method 537)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 25 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of ≥ 0.990?	✓			
Were all analytes within 70-130% or percent differences (%D) ≤ 25 30% of their true value for each calibration standard	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 25 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 25 30%?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target compounds detected in the field blanks?		✓		
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 40370A96

VALIDATION FINDINGS CHECKLIST

Reviewer: 9
2nd Reviewer: 2

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target compounds detected in the field duplicates?.	✓			
XI. Internal standards				
Were internal standard area counts within ± 50% of the associated calibration standard?	✓			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

TARGET COMPOUND WORKSHEET

METHOD: PFOS/PFOAs

A. Perfluorohexanoic acid (PFHxA)				
B. Perfluoroheptanoic acid (PFHpA)				
C. Perfluorooctanoic acid (PFOA)				
D. Perfluorononanoic acid (PFNA)				
E. Perfluorodecanoic acid (PFDA)				
F. Perfluoroundecanoic acid (PFUnA)				
G. Perfluorododecanoic acid (PFDoA)				
H. Perfluorotridecanoic acid (PFTriA)				
I. Perfluorotetradecanoic acid (PFTeA)				
J. Perfluorobutanesulfonic acid (PFBS)				
K. Perfluorohexanesulfonic acid (PFHxS)				
L. Perfluoroheptanesulfonic acid (PFHpS)				
M. Perfluorooctanesulfonic acid (PFOS)				
N.Perfluorodecanesulfonic acid (PFDS)				
O. Perfluorooctane Sulfonamide (FOSA)				
P. Perfluorobutanoic acid (PFBA)				
Q. Perfluoropentanoic acis (PFPeA)				
R. 6:2FTS				
S. 8:2FTS				

LDC #: ~~42376A96~~

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates/Duplicates

Page: 6 of 1
Reviewer: Q
2nd Reviewer: Q

METHOD: LC/MS PFOS/PFOAs (EPA Method 537M)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) or duplicate sample analyzed for each matrix in this SDG?
Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?
Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?
Y N N/A Were all duplicate sample relative percent differences (RPD) or differences within QC limits?

#	Date	MS/MSD/DUP ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		25/26	J	~~53~~	44 (50-150)		7 (dets)	No Qual (J+UJ/A)
			C		56 (60-140)			UJ/A
			M			32 (30)		J det/A Det → ND
			D			35 (30)		

LDC#: 40370A96

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: PFCs (Method 537 mod)

Compound	Concentration (ng/L)		(≤30) RPD	Qual
	1	2		
J	60	67	11	
B	19	18	5	
C	330	260	24	
M	26	18	36	
K	670	540	21	

Compound	Concentration (ug/Kg)		(≤30) RPD	Qual
	3	4		
K	0.055	0.064	15	
B	0.28	0.28	0	
C	0.24	0.22	9	
M	0.23	0.29	23	
D	0.058	0.077	28	

LDC #: 40370A96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: 9
2nd Reviewer: C

METHOD: GC ✓ HPLC VOA

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

A = Area of compound,
C = Concentration of compound,
S = Standard deviation of the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (1.0 std)	Recalculated CF (1.0 std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	1/17/18	TOA	1.130	1.130	1.172	1.172	6.9	6.9
2									
3									
4									

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 40370A96

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 9

METHOD: GC ✓ HPLC N/A

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. CF - CF)/ave. CF
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	CCV 21:48	1/25/18	~~PFOA~~	1.1T=1	1.098	1.098	6.3	6.3
2	CCV 23:14	1/25/18	~~PFOA~~	1.1T=1	1.163	1.163	0.8	0.8
3	CCV 16:06	1/26/18	~~PFOA~~	1.1T=1	1.152	1.152	1.T	1.T
	CCV 16:20		~~PFOA~~	1.1T=1	1.080	1.080	T.8	T.8
4	CCV 1T:32	1/26/18	~~PFOA~~	1.1T=1	1.07T	1.07T	8.6	8.6
	CCV 21:19		~~PFOA~~	1.1T=1	1.086	1.086	T.4	T.4

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 40370A9C

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 9
2nd Reviewer: 2

METHOD: ___ GC √ HPLC MS

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked sample concentration SA = Spike added SC = Sample concentration

RPD =(({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike MSD = Matrix spike duplicate

MS/MSD samples: 23/24

Compound	Spike Added (MS)		Sample Conc. (MS)	Spike Sample Concentration (MS)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
PFOA	2.15	2.13	0.24	2.21	2.11	92	92	87	88	5	5

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 10396

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: 9
2nd Reviewer: a

METHOD: __ GC ✓ HPLC MS

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

RPD = I SSCLCS - SSCLCSD I * 2/(SSCLCS + SSCLCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
LCS = Laboratory control sample percent recovery
SC = Concentration
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 320-20551A

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)										
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										
PFOA	40.0	NA	35.3	NA	88	88				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 40370A96

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ___ GC ✓ HPLC [illegible]

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

A= Area or height of the compound to be measured
Fv= Final Volume of extract
Df= Dilution Factor
RF= Average response factor of the compound In the initial calibration
Vs= Initial volume of the sample
Ws= Initial weight of the sample
%S= Percent Solid

Example:

Sample ID. 1 Compound Name PFOA

Concentration = $\frac{(11155618)(2.5)(10000)(1)}{(4405987)(1.1721)(161.4)}$

= 334.6 ng/L

#	Sample ID	Compound	Reported Concentrations (ng/L)	Recalculated Results Concentrations ( )	Qualifications
	1	PFOA	330		

omments: _____

SAMPCALew.wpd

Appendix H

Regulatory Comments and USACE Responses

Army Responses to MassDEP Comments on
Army's Draft Site Inspection (SI) Report Addendum
for Per- and Polyfluoroalkyl Substances (PFAS) at
Area of Contamination (AOC) 76 - Devens Fire Department, April 12, 2018

MassDEP Comment Date: 5/25/18

Comment No. 1:

Section 2.2, Final Sentence: "Willow Branch River", locally known as Willow Brook, is located approximately 600 feet east of the fire station. Please confirm/correct text as appropriate.

Response No. 1:

Text has been revised to indicate that the Willow Branch River is located east of the fire station.

Comment No. 2:

Section 7.0: MassDEP agrees with the recommendations listed here. In addition, MassDEP recommends that surface water and sediment samples be collected from Willow Brook to determine if PFAS-contaminated groundwater extends to the brook. Assessment of Willow Brook is necessary because the brook conveys water to the immediate vicinity of the MacPherson well, and therefore is a potentially complete pathway between the site and the well.

Response No. 2:

The Army has added a bullet: "Assess potential discharge of groundwater to Willow Brook by collecting a few surface water/sediment samples downgradient of known PFAS contamination."

Comment No. 3:

Tables 2 and 3: Data listed for locations FH-17-06, 07, and 08 appear to be inconsistent with the data provided in Appendix D. Please confirm/correct as appropriate.

Response No. 3:

Sample ID's in Tables 2 and 3 were revised to correctly align with their corresponding data.

Comment No. 4:

Table 2: Assuming the groundwater elevations listed here are accurate to 0.1 foot as indicated (and corrected based on previous comment), MassDEP recommends that the elevations be posted on a map and contoured to provide a preliminary extimate of horizontal groundwater flow directions.

Response No. 4:

The Army is not planning to post groundwater contours on maps. Based on comments received on the SI report, which has been finalized, there was some concern with modifying historical data with

water levels from direct push borings. Consequently, the Army removed those maps from the report. The Army plans to develop groundwater contour maps as part of the RI investigation based on a more comprehensive synoptic gauging event(s) using water levels from monitoring wells that are to be installed and existing wells at the AOCs.

Army Responses to EPA Comments on the
Draft Site Inspection (SI) Report Addendum for Per- and Polyfluoroalkyl Substances (PFAS) at Area of Contamination (AOC) 76 – Devens Fire Department
Former Fort Devens Army Installation, Devens, MA
April 12, 2018

USEPA Comment Date: 6/4/18 (Version 2)

General Comments

1. To more accurately describe the information contained therein (i.e. more information about the overall extent of PFAS in groundwater, please amend the title of the document to "Site Inspection (SI) Addendum for Additional Per- and Polyfluoroalkyl Substances (PFAS) Sampling at Area of Contamination (AOC) 76 – Devens Fire Department and Long-Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL)."

   Response: The title has been amended as requested.

2. As discussed at recent Devens BCT meetings, EPA requests that the "Final Technical Memorandum – Additional PFAS Sampling of Long-Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL) to Support Development of the PFAS Remedial Investigation (RI)" be included in Appendix B.

   Response: The final LTM Technical Memorandum will be added as an Appendix.

Page-Specific Comments

1. Page iv, Table of Contents, List of Appendices – Consistent with General Comment 2 above, please change the title of Appendix B to "Technical Memorandum – Additional PFAS Sampling of Long-Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL) to Support Development of the PFAS Remedial Investigation (RI)". In addition, please ensure that Tables 1-6 and Figures 1–8, currently in Appendix B, get included in the final Technical Memorandum, if/where appropriate.

   Response: The list of appendices in the Table of Contents has been updated as requested. The requested tables and figures will be included in Appendix B.

2. Page 1, Section 1.0, ¶ 3 – Please amend the last two sentences to read, "A copy of the "Technical Memorandum – Additional PFAS Sampling of Long-Term Monitoring (LTM) Wells at AOCs 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL) to Support Development of the PFAS Remedial Investigation (RI)" is provided in Appendix B."

   Response: The text has been amended as requested.

3. Page 3, Section 1.4, last ¶ – The statement "PFOS and PFOA were detected in the well at 62 and 69 ng/L, respectively" is unclear. Since the prior sentence refers to December 2017 results, it's implied that the Army intended to refer to December 2017 results as well. However, potable well data provided in the Draft Final SI Report (dated May 9, 2018)

shows that PFOS was detected at 40 ng/L and PFOA detected at 22 ng/L (with those two compounds summing to 62 ng/L) in the December 2017 sample. Please revise.

Response: Text was revised to indicate correct PFOS and PFOA concentrations for December 2017 in the MacPherson Well.

In addition, please provide, within the SI Report Addendum, a data table showing all PFAS results for the three municipal wells (Walker, Patterson, and MacPherson) that Army discusses as having the potential to be impacted by the Devens Fire Station source area.

Response: Table 1A was added to include PFAS data from public supply wells. Data from the Walker, Patterson, and MacPherson Wells are included on that table.

4. Page 8, Section 6.0, last ¶ - Please amend the sentence to read, "Based on the results of supplemental PFAS sampling activities and the confirmed presence of PFOS and PFOA in soils (AOC 76) and groundwater (AOCs 76, 57, 43G, 43J, 32, 43A, 50 and Shepley's Hill Landfill (SHL)), it is recommended that these AOCs be included in the Remedial Investigation (RI) Work Plan for the Former Fort Devens. Specifically, it is recommended that the RI focus on the following:"

   Response: The text was amended as requested.

5. Page 8, Section 6.0, bulleted list – Please amend the list to include a generic description of RI activities planned for each of AOCs identified in the previous comment.

   Response: The RI activities planned for each of the AOCs are being developed for ongoing PFAS investigation activities. As a result, a generic description of RI activities for each AOC is premature for inclusion in this SI Report and is therefore not included. No text revisions were made.

6. Table 1 – Well 8 in Ayer is shown as "Active" on this table. Although this well is currently pumping, a note should be included to discuss that the well is offline (i.e., extracted water not being distributed). In addition, the MacPherson well is shown as "Active", but should be listed as "Inactive". Please address.

   Response: Table 1 has been revised as requested.

7. Figure 1 – Please amend Figure 1 to show the locations of all AOCs addressed in the SI Addendum.

   Response: Figure 1 has been revised to show the locations of all AOCs addressed in the SI Addendum.

From: Keating, Carol [mailto:Keating.Carol@epa.gov]
Sent: Tuesday, July 24, 2018 4:50 PM
To: Kane, Christopher G. <C.Kane@WestonSolutions.com>; david.chaffin@state.ma.us; Julie Corenzwit (julia.corenzwit@verizon.net) <julia.corenzwit@verizon.net>; Laurie Nehring <nehring_laurie@msn.com>; Richard Doherty (rdoherty@ecr-consulting.com) <rdoherty@ecr-consulting.com>; ROstrowski@Massdevelopment.com; jmoore@massdevelopment.com; mwetzel@ayer.ma.us; boh@ayer.ma.us; tbragan@harvard.ma.us; selectmen@shirley-ma.gov; 'keith.j.driscoll.nfg@mail.mil' <keith.j.driscoll.nfg@mail.mil>
Cc: robert.j.simeone.civ@mail.mil; Reddy, Penelope W CIV (US) (PENELOPE.W.REDDY@usace.army.mil) <PENELOPE.W.REDDY@usace.army.mil>; Ellender, Matthew B CIV USARMY CENWO (US) <Matthew.B.Ellender@usace.army.mil>; James Ropp (jropp@Komangs.com) <jropp@Komangs.com>; Close, Doug (dclose@bristol-companies.com) <dclose@bristol-companies.com>; Watson, Meg (mwatson@bristol-companies.com) <mwatson@bristol-companies.com>; Frizzell, Josh <Josh.Frizzell@WestonSolutions.com>
Subject: RE: W9128F-14-D-0009-TO 0027 Draft Final SI Addendum for Additional Per- and Polyfluoroalkyl Substances (PFAS) at AOC 76 and LTM Sampling at Former Fort Devens Army Installation, Devens, MA

EPA has reviewed the above-referenced document and offers the following comments:

1. SI Addendum, page 9, 2nd bullet – While the MacPherson well is temporarily off-line (in response to MassDEP's March 1, 2018 letter), it should be included in the assessment of potentially impacted supply wells associated with AOC 76.

2. SI Addendum, page 9, 3rd bullet – While the current scope of Army's proposed sampling program may be limited to a "few" surface water/sediment samples [downgradient of known PFAS contamination], results from the initial sampling round may necessitate the collection of additional surface water and/or sediment samples.

3. SI Addendum & Tech Memo, Section 7.0, Conclusions and Section 4.0, Summary (respectively) – Both documents conclude with a comparison of PFAS concentrations to EPA's LHA of 70 ng/L and recommendations for further evaluation in the PFAS RI. Please note, however, that the purpose of the PFAS SI was to simply confirm or deny the presence of PFAS in each of the areas sampled. As such, the comparison of PFOA and PFOS detections to the EPA LHA is moot since all areas with PFAS detections, regardless of the specific concentration detected, will be carried through to the PFAS RI.

Please prepare and issue the final document, including all tables, figures and appendices.

Thanks,

Carol A. Keating
U.S. EPA Region 1
5 Post Office Square

From: Chaffin, David (DEP) [mailto:david.chaffin@state.ma.us]
Sent: Wednesday, July 25, 2018 9:52 AM
To: Robert Simeone (robert.j.simeone.civ@mail.mil) <robert.j.simeone.civ@mail.mil>; Reddy, Penelope W CIV (US) (PENELOPE.W.REDDY@usace.army.mil) <PENELOPE.W.REDDY@usace.army.mil>; Kane, Christopher G. <C.Kane@WestonSolutions.com>
Cc: Keating, Carol (Keating.Carol@epa.gov) <Keating.Carol@epa.gov>; ROstrowski@Massdevelopment.com; Julie Corenzwit (julie.corenzwit@verizon.net) <julie.corenzwit@verizon.net>; Laurie Nehring (nehring_laurie@msn.com) <nehring_laurie@msn.com>; Richard Doherty (ecr10@verizon.net) <ecr10@verizon.net>
Subject: PFAS Site Inspection Addendum

For Use In Intra-Agency Policy Deliberations

_____

MassDEP accepts the revised *Site Inspection (SI) Addendum for Additional Per- and Polyfluoroalkyl Substances (PFAS)…*, received July 10, 2018, without comment.

_____

David Chaffin
Massachusetts Department of Environmental Protection
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Visit our web site: mass.gov/dep

Army Responses to EPA Comments on the
Draft Final Site Inspection (SI) Report Addendum for Per- and Polyfluoroalkyl Substances (PFAS) at Area of Contamination (AOC) 76 – Devens Fire Department
Former Fort Devens Army Installation, Devens, MA
July 9, 2018

USEPA Comment Date: 7/24/18

Comments

EPA has reviewed the above-referenced document and offers the following comments:

1. SI Addendum, page 9, 2nd bullet – While the MacPherson well is temporarily off-line (in response to MassDEP's March 1, 2018 letter), it should be included in the assessment of potentially impacted supply wells associated with AOC 76.

   Revision: Page 9, 2nd bullet has been revised as follows: "Assess potential impacts to supply wells in the vicinity of the AOC 76. The water supply well downgradient of AOC 76, the MacPherson Well, has been shut down. However, potential impacts to this supply well should also be assessed. The well survey should confirm that no pathways exist with other water supply wells."

2. SI Addendum, page 9, 3rd bullet – While the current scope of Army's proposed sampling program may be limited to a "few" surface water/sediment samples [downgradient of known PFAS contamination], results from the initial sampling round may necessitate the collection of additional surface water and/or sediment samples.

   Revision: Page 9, 3rd bullet has been revised. Reference to "a few" has been removed from the text.

3. SI Addendum & Tech Memo, Section 7.0, Conclusions and Section 4.0, Summary (respectively) – Both documents conclude with a comparison of PFAS concentrations to EPA's LHA of 70 ng/L and recommendations for further evaluation in the PFAS RI. Please note, however, that the purpose of the PFAS SI was to simply confirm or deny the presence of PFAS in each of the areas sampled. As such, the comparison of PFOA and PFOS detections to the EPA LHA is moot since all areas with PFAS detections, regardless of the specific concentration detected, will be carried through to the PFAS RI.

   Revision: The overall purpose of the SI, i.e., "determine the presence or absence of PFAS in soil and GW" is noted in multiple sections of the document (Section 1.0-Introduction, Section 3.2-Soil Borings, Section 3.3-GW Sampling from Temporary Points, and Section 7.0-Conclusions. References to the LHA's in the conconclusion while moot are provided for information purposes. See revisions below:

“The SI Addendum was conducted to evaluate the potential presence or absence of PFAS compounds in soil and groundwater at AOC 76. The groundwater results of the investigation indicate that six of the nine groundwater samples collected for the SI Addendum have PFAS concentrations and either exceed the LHA for PFOS and PFOA or the combined concentrations of PFOA and PFOS. The LHA for PFOS was exceeded at locations FH-17-08 and FH-17-09 with concentrations of 1,500 and 4,000 ng/L, respectively. The LHA for PFOA was exceeded at FH-17-03 and FH-17-09 with concentrations of 330 and 160 ng/L, respectively. At boring locations FH-17-04, FH-17-05 and FH-17-06, the LHA was exceeded due to the total concentrations of PFOS and PFOA (sum concentrations of 70, 80 and 72 ng/L, respectively). Of the locations sampled, the highest PFAS concentrations in groundwater were detected in the groundwater sample collected from within the stormwater detention basin northeast of the Devens Fire Station at sample location FH-17-09 (combined PFOS and PFOA concentration of 4,160 ng/L).”