Navy_CLEAN_PFAS_FOIA_request_covers.indd

NAVFAC
Naval Facilities Engineering Command

Off-Base Drinking Water Sample Results, Level 2 Laboratory Report, Level 4 Laboratory Report, Electronic Data Deliverable, Data Validation Report, and the Sample Location Figure, SDG J18849-1

Naval Air Station Oceana
Virginia Beach, Virginia

July 2019

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

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: 320-18849-1
Client Project/Site: NAS Oceana, VA - 9000 CTO-WE01

For:
CH2M Hill Constructors, Inc.
1100 NE Circle Blvd
Corvallis, Oregon 97330

Attn: Tiffany Hill

Authorized for release by:
5/31/2016 11:21:12 AM

Laura Turpen, Project Manager I
(916)374-4414
laura.turpen@testamericainc.com

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.

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Detection Summary 6
Client Sample Results 7
Isotope Dilution Summary 9
QC Sample Results 10
QC Association Summary 12
Lab Chronicle 13
Certification Summary 14
Method Summary 15
Sample Summary 16
Chain of Custody 17
Receipt Checklists 18

Definitions/Glossary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 320-18849-1

Laboratory: TestAmerica Sacramento

Narrative

CASE NARRATIVE

Client: CH2M Hill Constructors, Inc.

Project: NAS Oceana, VA - 9000 CTO-WE01

Report Number: 320-18849-1

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

TestAmerica West Sacramento attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the applicable methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

TestAmerica utilizes USEPA approved methods and DOD QSM, where applicable, in all analytical work. The samples presented in this report were analyzed for the parameter(s) listed on the analytical methods summary page in accordance with the method(s) indicated. A summary of QC data for these analyses is included at the back of the report.

All parameters for which TestAmerica West Sacramento has certification were evaluated to the QSM specified reporting convention or to the client specified format if different from QSM. Parameters not certified under QSM, if any, were evaluated to the detection limit (DL) and include qualified results where applicable.

The sample(s) that contain constituents flagged with U are undetected. The result associated with this flag is the limit of detection (LOD).

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

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

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 05/13/2016; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 2.9 C.

PFC

Samples OF-FB74-0516 (320-18849-1), OF-RW74-0516 (320-18849-2), OF-FB59-0516 (320-18849-3) and OF-RW59-0516 (320-18849-4) were analyzed for PFC in accordance with PFC. The samples were prepared on 05/17/2016 and analyzed on 05/26/2016 and 05/27/2016.

The level 1 standard from the ICAL is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5 amu, so detection of the analyte serves as verification that the assigned mass is within +/- 0.5 amu of the true value, which meets the DOD tune criterion. (ICV 320-111390/13 and ICV 320-111733/10)

Job ID: 320-18849-1 (Continued)

Laboratory: TestAmerica Sacramento (Continued)

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

Detection Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Client Sample ID: OF-FB74-0516 — Lab Sample ID: 320-18849-1

No Detections.

Client Sample ID: OF-RW74-0516 — Lab Sample ID: 320-18849-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	0.00076	J	0.0024	0.00072	ug/L	1		WS-LC-0025	Total/NA
Perfluorononanoic acid (PFNA)	0.0011	J	0.0024	0.00063	ug/L	1		WS-LC-0025	Total/NA

Client Sample ID: OF-FB59-0516 — Lab Sample ID: 320-18849-3

No Detections.

Client Sample ID: OF-RW59-0516 — Lab Sample ID: 320-18849-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	0.0046		0.0024	0.00077	ug/L	1		WS-LC-0025	Total/NA
Perfluorooctanoic acid (PFOA)	0.086	M	0.0024	0.00072	ug/L	1		WS-LC-0025	Total/NA
Perfluorononanoic acid (PFNA)	0.00066	J	0.0024	0.00063	ug/L	1		WS-LC-0025	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.011		0.0024	0.00088	ug/L	1		WS-LC-0025	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.30	M	0.0024	0.00083	ug/L	1		WS-LC-0025	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.55	M	0.0038	0.0012	ug/L	1		WS-LC-0025	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: OF-FB74-0516

Lab Sample ID: 320-18849-1

Date Collected: 05/11/16 14:08

Matrix: Water

Date Received: 05/13/16 09:35

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.00079	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.00074	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorononanoic acid (PFNA)	0.0020	U M	0.0025	0.00065	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.00091	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.00086	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorooctanesulfonic acid (PFOS)	0.0030	U	0.0040	0.0013	ug/L		05/17/16 11:08	05/26/16 17:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*111*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*
13C4 PFOS	*114*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*
13C5 PFNA	*111*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*
13C4 PFOA	*116*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*
13C4-PFHpA	*105*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*

Client Sample ID: OF-RW74-0516

Lab Sample ID: 320-18849-2

Date Collected: 05/11/16 14:17

Matrix: Water

Date Received: 05/13/16 09:35

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0019	U M	0.0024	0.00078	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorooctanoic acid (PFOA)	**0.00076**	**J**	0.0024	0.00072	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorononanoic acid (PFNA)	**0.0011**	**J**	0.0024	0.00063	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0024	0.00089	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0024	0.00084	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorooctanesulfonic acid (PFOS)	0.0029	U	0.0039	0.0012	ug/L		05/17/16 11:08	05/27/16 15:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*115*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*
13C4 PFOS	*118*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*
13C5 PFNA	*92*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*
13C4 PFOA	*96*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*
13C4-PFHpA	*93*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*

Client Sample ID: OF-FB59-0516

Lab Sample ID: 320-18849-3

Date Collected: 05/12/16 17:08

Matrix: Water

Date Received: 05/13/16 09:35

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.00079	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.00074	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorononanoic acid (PFNA)	0.0020	U M	0.0025	0.00065	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.00091	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.00086	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorooctanesulfonic acid (PFOS)	0.0030	U M	0.0040	0.0013	ug/L		05/17/16 11:08	05/27/16 16:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*
13C4 PFOS	*114*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*
13C5 PFNA	*100*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*
13C4 PFOA	*99*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*

Client Sample ID: OF-FB59-0516

Lab Sample ID: 320-18849-3

Date Collected: 05/12/16 17:08

Matrix: Water

Date Received: 05/13/16 09:35

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4-PFHpA	*96*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*

Client Sample ID: OF-RW59-0516

Lab Sample ID: 320-18849-4

Date Collected: 05/12/16 17:16

Matrix: Water

Date Received: 05/13/16 09:35

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	**0.0046**		0.0024	0.00077	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorooctanoic acid (PFOA)	**0.086**	**M**	0.0024	0.00072	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorononanoic acid (PFNA)	**0.00066**	**J**	0.0024	0.00063	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorobutanesulfonic acid (PFBS)	**0.011**		0.0024	0.00088	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorohexanesulfonic acid (PFHxS)	**0.30**	**M**	0.0024	0.00083	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorooctanesulfonic acid (PFOS)	**0.55**	**M**	0.0038	0.0012	ug/L		05/17/16 11:08	05/27/16 16:35	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	*78*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:35*	*1*
13C4 PFOS	*77*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:35*	*1*
13C5 PFNA	*72*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:35*	*1*
13C4 PFOA	*88*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:35*	*1*
13C4-PFHpA	*78*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:35*	*1*

Isotope Dilution Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	3O2 PFHx (25-150)	3C4 PFOS (25-150)	3C5 PFNA (25-150)	3C4 PFOA (25-150)	3C4-PFHp (25-150)			
320-18849-1	OF-FB74-0516	111	114	111	116	105			
320-18849-2	OF-RW74-0516	115	118	92	96	93			
320-18849-2 MS	OF-RW74-0516	103	106	77	81	85			
320-18849-2 MSD	OF-RW74-0516	89	95	65	68	75			
320-18849-3	OF-FB59-0516	102	114	100	99	96			
320-18849-4	OF-RW59-0516	78	77	72	88	78			
LCS 320-110230/2-A	Lab Control Sample	100	103	99	100	91			
MB 320-110230/1-A	Method Blank	113	119	112	116	104			

Surrogate Legend

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

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Lab Sample ID: MB 320-110230/1-A
Matrix: Water
Analysis Batch: 111390

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 110230

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.00080	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.00075	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorononanoic acid (PFNA)	0.0020	U	0.0025	0.00065	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.00092	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.00087	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorooctanesulfonic acid (PFOS)	0.0030	U	0.0040	0.0013	ug/L		05/17/16 11:08	05/26/16 17:07	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*113*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*
13C4 PFOS	*119*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*
13C5 PFNA	*112*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*
13C4 PFOA	*116*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*
13C4-PFHpA	*104*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*

Lab Sample ID: LCS 320-110230/2-A
Matrix: Water
Analysis Batch: 111390

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 110230

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroheptanoic acid (PFHpA)	0.0400	0.0433		ug/L		108	60 - 140
Perfluorooctanoic acid (PFOA)	0.0400	0.0418		ug/L		105	60 - 140
Perfluorononanoic acid (PFNA)	0.0400	0.0432		ug/L		108	60 - 140
Perfluorobutanesulfonic acid (PFBS)	0.0354	0.0336		ug/L		95	50 - 150
Perfluorohexanesulfonic acid (PFHxS)	0.0364	0.0337	M	ug/L		93	60 - 140
Perfluorooctanesulfonic acid (PFOS)	0.0371	0.0368	M	ug/L		99	60 - 140

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*100*		*25 - 150*
13C4 PFOS	*103*		*25 - 150*
13C5 PFNA	*99*		*25 - 150*
13C4 PFOA	*100*		*25 - 150*
13C4-PFHpA	*91*		*25 - 150*

Lab Sample ID: 320-18849-2 MS
Matrix: Water
Analysis Batch: 111733

Client Sample ID: OF-RW74-0516
Prep Type: Total/NA
Prep Batch: 110230

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroheptanoic acid (PFHpA)	0.0019	U M	0.0386	0.0378		ug/L		98	60 - 140
Perfluorooctanoic acid (PFOA)	0.00076	J	0.0386	0.0400		ug/L		102	60 - 140
Perfluorononanoic acid (PFNA)	0.0011	J	0.0386	0.0427		ug/L		108	60 - 140
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0341	0.0276		ug/L		81	50 - 150
Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0351	0.0355	M	ug/L		101	60 - 140
Perfluorooctanesulfonic acid (PFOS)	0.0029	U	0.0358	0.0419	M	ug/L		117	60 - 140

Isotope Dilution	MS %Recovery	MS Qualifier	Limits
18O2 PFHxS	*103*		*25 - 150*
13C4 PFOS	*106*		*25 - 150*
13C5 PFNA	*77*		*25 - 150*
13C4 PFOA	*81*		*25 - 150*
13C4-PFHpA	*85*		*25 - 150*

Lab Sample ID: 320-18849-2 MSD
Matrix: Water
Analysis Batch: 111733

Client Sample ID: OF-RW74-0516
Prep Type: Total/NA
Prep Batch: 110230

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	0.0019	U M	0.0389	0.0395		ug/L		101	60 - 140	4	30
Perfluorooctanoic acid (PFOA)	0.00076	J	0.0389	0.0396		ug/L		100	60 - 140	1	30
Perfluorononanoic acid (PFNA)	0.0011	J	0.0389	0.0421		ug/L		105	60 - 140	1	30
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0344	0.0329		ug/L		96	50 - 150	17	30
Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0354	0.0382	M	ug/L		108	60 - 140	7	30
Perfluorooctanesulfonic acid (PFOS)	0.0029	U	0.0361	0.0415	M	ug/L		115	60 - 140	1	30

Isotope Dilution	MSD %Recovery	MSD Qualifier	Limits
18O2 PFHxS	*89*		*25 - 150*
13C4 PFOS	*95*		*25 - 150*
13C5 PFNA	*65*		*25 - 150*
13C4 PFOA	*68*		*25 - 150*
13C4-PFHpA	*75*		*25 - 150*

QC Association Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

LCMS

Prep Batch: 110230

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18849-1	OF-FB74-0516	Total/NA	Water	3535	
320-18849-2	OF-RW74-0516	Total/NA	Water	3535	
320-18849-2 MS	OF-RW74-0516	Total/NA	Water	3535	
320-18849-2 MSD	OF-RW74-0516	Total/NA	Water	3535	
320-18849-3	OF-FB59-0516	Total/NA	Water	3535	
320-18849-4	OF-RW59-0516	Total/NA	Water	3535	
LCS 320-110230/2-A	Lab Control Sample	Total/NA	Water	3535	
MB 320-110230/1-A	Method Blank	Total/NA	Water	3535	

Analysis Batch: 111390

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18849-1	OF-FB74-0516	Total/NA	Water	WS-LC-0025	110230
LCS 320-110230/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025	110230
MB 320-110230/1-A	Method Blank	Total/NA	Water	WS-LC-0025	110230

Analysis Batch: 111733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18849-2	OF-RW74-0516	Total/NA	Water	WS-LC-0025	110230
320-18849-2 MS	OF-RW74-0516	Total/NA	Water	WS-LC-0025	110230
320-18849-2 MSD	OF-RW74-0516	Total/NA	Water	WS-LC-0025	110230
320-18849-3	OF-FB59-0516	Total/NA	Water	WS-LC-0025	110230
320-18849-4	OF-RW59-0516	Total/NA	Water	WS-LC-0025	110230

Lab Chronicle

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Client Sample ID: OF-FB74-0516
Date Collected: 05/11/16 14:08
Date Received: 05/13/16 09:35

Lab Sample ID: 320-18849-1
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			504.7 mL	1.00 mL	110230	05/17/16 11:08	SNE	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	504.7 mL	1.00 mL	111390	05/26/16 17:50	JRB	TAL SAC

Client Sample ID: OF-RW74-0516
Date Collected: 05/11/16 14:17
Date Received: 05/13/16 09:35

Lab Sample ID: 320-18849-2
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			516.9 mL	1.00 mL	110230	05/17/16 11:08	SNE	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	516.9 mL	1.00 mL	111733	05/27/16 15:10	JRB	TAL SAC

Client Sample ID: OF-FB59-0516
Date Collected: 05/12/16 17:08
Date Received: 05/13/16 09:35

Lab Sample ID: 320-18849-3
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			505.1 mL	1.00 mL	110230	05/17/16 11:08	SNE	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	505.1 mL	1.00 mL	111733	05/27/16 16:14	JRB	TAL SAC

Client Sample ID: OF-RW59-0516
Date Collected: 05/12/16 17:16
Date Received: 05/13/16 09:35

Lab Sample ID: 320-18849-4
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			521.6 mL	1.00 mL	110230	05/17/16 11:08	SNE	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	521.6 mL	1.00 mL	111733	05/27/16 16:35	JRB	TAL SAC

Laboratory References:

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

Certification Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Laboratory: TestAmerica Sacramento

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	01-31-17
Oregon	NELAP	10	4040	01-29-17

Laboratory: TestAmerica Denver

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-17
Oregon	NELAP	10	4025	01-09-17

Method Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

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

Protocol References:

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

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

Sample Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-18849-1	OF-FB74-0516	Water	05/11/16 14:08	05/13/16 09:35
320-18849-2	OF-RW74-0516	Water	05/11/16 14:17	05/13/16 09:35
320-18849-3	OF-FB59-0516	Water	05/12/16 17:08	05/13/16 09:35
320-18849-4	OF-RW59-0516	Water	05/12/16 17:16	05/13/16 09:35

Chain of Custody Record

WE01

Temperature on Receipt 29°C

Drinking Water? Yes ☒ No ☐

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client	Project Manager	Date	Chain of Custody Number
CH2M Hill	Bill Friedmann	05/12/16	286058
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
5701 Cleveland Street, Suite 200	757-671-6232		
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	
Virginia Beach / VA / 23462			
Project Name and Location (State)	**Carrier/Waybill Number**		
Fentress PFC Sampling WE01	FedEx		
Contract/Purchase Order/Quote No			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): PFCs
OF-FB74-0516	05/11/16	1408		X			2						2
OF-RW74-0516	↓	1417		X			2						2
OF-RW74-0516-MS		1417		X			2						2
OF-RW74-0516-SD		1417		X			2						2
OF-FB59-0516	05/12/16	1708		X			2						2
OF-RW59-0516	05/12/16	1716		X			2						2

Special Instructions/ Conditions of Receipt

320-18849 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
(A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By	05/12/16	18:15	1. Received By	05/13/16	0935
2. Relinquished By			2. Received By		
3. Relinquished By			3 Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Login Sample Receipt Checklist

Client: CH2M Hill Constructors, Inc.

Job Number: 320-18849-1

Login Number: 18849
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.	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?	N/A	
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	

ANALYTICAL REPORT

Job Number: 320-18849-1

Job Description: NAS Oceana, VA - 9000 CTO-WE01

For:
CH2M Hill Constructors, Inc.
1100 NE Circle Blvd
Corvallis, OR 97330

Attention: Tiffany Hill



Approved for release.
Laura Turpen
Project Manager I
5/31/2016 11:22 AM

Laura Turpen, Project Manager I
880 Riverside Parkway, West Sacramento, CA, 95605
(916)374-4414
laura.turpen@testamericainc.com
05/31/2016

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

The Lab Certification ID# is 4025.

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

Table of Contents

Cover Title Page 1

Data Summaries 4

Definitions 4

Case Narrative 5

Detection Summary 6

Client Sample Results 7

Default Detection Limits 9

Isotope Dilution Summary 10

QC Sample Results 11

QC Association 13

Chronicle 14

Certification Summary 15

Method Summary 16

Sample Summary 17

Manual Integration Summary 18

Reagent Traceability 21

COAs 43

Organic Sample Data 375

LCMS 375

Method PFC DOD 375

Method PFC DOD QC Summary 376

Method PFC DOD Sample Data 381

Standards Data 409

Method PFC DOD ICAL Data 409

Method PFC DOD CCAL Data 505

Raw QC Data 540

Table of Contents

Method PFC DOD Blank Data 540

Method PFC DOD LCS/LCSD Data 546

Method PFC DOD MS/MSD Data 556

Method PFC DOD Run Logs 578

Method PFC DOD Prep Data 581

Shipping and Receiving Documents 589

Client Chain of Custody 590

Sample Receipt Checklist 591

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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

CASE NARRATIVE

Client: CH2M Hill Constructors, Inc.

Project: NAS Oceana, VA - 9000 CTO-WE01

Report Number: 320-18849-1

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

TestAmerica West Sacramento attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the applicable methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

TestAmerica utilizes USEPA approved methods and DOD QSM, where applicable, in all analytical work. The samples presented in this report were analyzed for the parameter(s) listed on the analytical methods summary page in accordance with the method(s) indicated. A summary of QC data for these analyses is included at the back of the report.

All parameters for which TestAmerica West Sacramento has certification were evaluated to the QSM specified reporting convention or to the client specified format if different from QSM. Parameters not certified under QSM, if any, were evaluated to the detection limit (DL) and include qualified results where applicable.

The sample(s) that contain constituents flagged with U are undetected. The result associated with this flag is the limit of detection (LOD).

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

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

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 05/13/2016; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 2.9 C.

PFC

Samples OF-FB74-0516 (320-18849-1), OF-RW74-0516 (320-18849-2), OF-FB59-0516 (320-18849-3) and OF-RW59-0516 (320-18849-4) were analyzed for PFC in accordance with PFC. The samples were prepared on 05/17/2016 and analyzed on 05/26/2016 and 05/27/2016.

The level 1 standard from the ICAL is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5 amu, so detection of the analyte serves as verification that the assigned mass is within +/- 0.5 amu of the true value, which meets the DOD tune criterion. (ICV 320-111390/13 and ICV 320-111733/10)

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

Detection Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Client Sample ID: OF-FB74-0516 — Lab Sample ID: 320-18849-1

No Detections.

Client Sample ID: OF-RW74-0516 — Lab Sample ID: 320-18849-2

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	0.00076	J	0.0024	0.00072	ug/L	1		WS-LC-0025	Total/NA
Perfluorononanoic acid (PFNA)	0.0011	J	0.0024	0.00063	ug/L	1		WS-LC-0025	Total/NA

Client Sample ID: OF-FB59-0516 — Lab Sample ID: 320-18849-3

No Detections.

Client Sample ID: OF-RW59-0516 — Lab Sample ID: 320-18849-4

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluoroheptanoic acid (PFHpA)	0.0046		0.0024	0.00077	ug/L	1		WS-LC-0025	Total/NA
Perfluorooctanoic acid (PFOA)	0.086	M	0.0024	0.00072	ug/L	1		WS-LC-0025	Total/NA
Perfluorononanoic acid (PFNA)	0.00066	J	0.0024	0.00063	ug/L	1		WS-LC-0025	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.011		0.0024	0.00088	ug/L	1		WS-LC-0025	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	0.30	M	0.0024	0.00083	ug/L	1		WS-LC-0025	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.55	M	0.0038	0.0012	ug/L	1		WS-LC-0025	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: OF-FB74-0516

Lab Sample ID: 320-18849-1

Date Collected: 05/11/16 14:08

Matrix: Water

Date Received: 05/13/16 09:35

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.00079	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.00074	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorononanoic acid (PFNA)	0.0020	U M	0.0025	0.00065	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.00091	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.00086	ug/L		05/17/16 11:08	05/26/16 17:50	1
Perfluorooctanesulfonic acid (PFOS)	0.0030	U	0.0040	0.0013	ug/L		05/17/16 11:08	05/26/16 17:50	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*111*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*
13C4 PFOS	*114*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*
13C5 PFNA	*111*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*
13C4 PFOA	*116*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*
13C4-PFHpA	*105*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:50*	*1*

Client Sample ID: OF-RW74-0516

Lab Sample ID: 320-18849-2

Date Collected: 05/11/16 14:17

Matrix: Water

Date Received: 05/13/16 09:35

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0019	U M	0.0024	0.00078	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorooctanoic acid (PFOA)	**0.00076**	**J**	0.0024	0.00072	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorononanoic acid (PFNA)	**0.0011**	**J**	0.0024	0.00063	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0024	0.00089	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0024	0.00084	ug/L		05/17/16 11:08	05/27/16 15:10	1
Perfluorooctanesulfonic acid (PFOS)	0.0029	U	0.0039	0.0012	ug/L		05/17/16 11:08	05/27/16 15:10	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*115*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*
13C4 PFOS	*118*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*
13C5 PFNA	*92*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*
13C4 PFOA	*96*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*
13C4-PFHpA	*93*		*25 - 150*	*05/17/16 11:08*	*05/27/16 15:10*	*1*

Client Sample ID: OF-FB59-0516

Lab Sample ID: 320-18849-3

Date Collected: 05/12/16 17:08

Matrix: Water

Date Received: 05/13/16 09:35

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.00079	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.00074	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorononanoic acid (PFNA)	0.0020	U M	0.0025	0.00065	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.00091	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.00086	ug/L		05/17/16 11:08	05/27/16 16:14	1
Perfluorooctanesulfonic acid (PFOS)	0.0030	U M	0.0040	0.0013	ug/L		05/17/16 11:08	05/27/16 16:14	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*102*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*
13C4 PFOS	*114*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*
13C5 PFNA	*100*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*
13C4 PFOA	*99*		*25 - 150*	*05/17/16 11:08*	*05/27/16 16:14*	*1*

Client Sample ID: OF-FB59-0516

Lab Sample ID: 320-18849-3

Date Collected: 05/12/16 17:08
Matrix: Water
Date Received: 05/13/16 09:35

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4-PFHpA	96		25 - 150	05/17/16 11:08	05/27/16 16:14	1

Client Sample ID: OF-RW59-0516

Lab Sample ID: 320-18849-4

Date Collected: 05/12/16 17:16
Matrix: Water
Date Received: 05/13/16 09:35

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0046		0.0024	0.00077	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorooctanoic acid (PFOA)	0.086	M	0.0024	0.00072	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorononanoic acid (PFNA)	0.00066	J	0.0024	0.00063	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorobutanesulfonic acid (PFBS)	0.011		0.0024	0.00088	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorohexanesulfonic acid (PFHxS)	0.30	M	0.0024	0.00083	ug/L		05/17/16 11:08	05/27/16 16:35	1
Perfluorooctanesulfonic acid (PFOS)	0.55	M	0.0038	0.0012	ug/L		05/17/16 11:08	05/27/16 16:35	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
18O2 PFHxS	78		25 - 150	05/17/16 11:08	05/27/16 16:35	1
13C4 PFOS	77		25 - 150	05/17/16 11:08	05/27/16 16:35	1
13C5 PFNA	72		25 - 150	05/17/16 11:08	05/27/16 16:35	1
13C4 PFOA	88		25 - 150	05/17/16 11:08	05/27/16 16:35	1
13C4-PFHpA	78		25 - 150	05/17/16 11:08	05/27/16 16:35	1

Default Detection Limits

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Prep: 3535

Analyte	LOQ	DL	Units	Method
Perfluorobutanesulfonic acid (PFBS)	0.0025	0.00092	ug/L	WS-LC-0025
Perfluoroheptanoic acid (PFHpA)	0.0025	0.00080	ug/L	WS-LC-0025
Perfluorohexanesulfonic acid (PFHxS)	0.0025	0.00087	ug/L	WS-LC-0025
Perfluorononanoic acid (PFNA)	0.0025	0.00065	ug/L	WS-LC-0025
Perfluorooctanesulfonic acid (PFOS)	0.0040	0.0013	ug/L	WS-LC-0025
Perfluorooctanoic acid (PFOA)	0.0025	0.00075	ug/L	WS-LC-0025

Isotope Dilution Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		3O2 PFHx	3C4 PFOS	3C5 PFNA	3C4 PFOA	3C4-PFHp			
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)			
320-18849-1	OF-FB74-0516	111	114	111	116	105			
320-18849-2	OF-RW74-0516	115	118	92	96	93			
320-18849-2 MS	OF-RW74-0516	103	106	77	81	85			
320-18849-2 MSD	OF-RW74-0516	89	95	65	68	75			
320-18849-3	OF-FB59-0516	102	114	100	99	96			
320-18849-4	OF-RW59-0516	78	77	72	88	78			
LCS 320-110230/2-A	Lab Control Sample	100	103	99	100	91			
MB 320-110230/1-A	Method Blank	113	119	112	116	104			

Surrogate Legend

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

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Lab Sample ID: MB 320-110230/1-A
Matrix: Water
Analysis Batch: 111390

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 110230

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.00080	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.00075	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorononanoic acid (PFNA)	0.0020	U	0.0025	0.00065	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.00092	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.00087	ug/L		05/17/16 11:08	05/26/16 17:07	1
Perfluorooctanesulfonic acid (PFOS)	0.0030	U	0.0040	0.0013	ug/L		05/17/16 11:08	05/26/16 17:07	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*113*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*
13C4 PFOS	*119*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*
13C5 PFNA	*112*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*
13C4 PFOA	*116*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*
13C4-PFHpA	*104*		*25 - 150*	*05/17/16 11:08*	*05/26/16 17:07*	*1*

Lab Sample ID: LCS 320-110230/2-A
Matrix: Water
Analysis Batch: 111390

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 110230

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroheptanoic acid (PFHpA)	0.0400	0.0433		ug/L		108	60 - 140
Perfluorooctanoic acid (PFOA)	0.0400	0.0418		ug/L		105	60 - 140
Perfluorononanoic acid (PFNA)	0.0400	0.0432		ug/L		108	60 - 140
Perfluorobutanesulfonic acid (PFBS)	0.0354	0.0336		ug/L		95	50 - 150
Perfluorohexanesulfonic acid (PFHxS)	0.0364	0.0337	M	ug/L		93	60 - 140
Perfluorooctanesulfonic acid (PFOS)	0.0371	0.0368	M	ug/L		99	60 - 140

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
18O2 PFHxS	*100*		*25 - 150*
13C4 PFOS	*103*		*25 - 150*
13C5 PFNA	*99*		*25 - 150*
13C4 PFOA	*100*		*25 - 150*
13C4-PFHpA	*91*		*25 - 150*

Lab Sample ID: 320-18849-2 MS
Matrix: Water
Analysis Batch: 111733

Client Sample ID: OF-RW74-0516
Prep Type: Total/NA
Prep Batch: 110230

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroheptanoic acid (PFHpA)	0.0019	U M	0.0386	0.0378		ug/L		98	60 - 140
Perfluorooctanoic acid (PFOA)	0.00076	J	0.0386	0.0400		ug/L		102	60 - 140
Perfluorononanoic acid (PFNA)	0.0011	J	0.0386	0.0427		ug/L		108	60 - 140
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0341	0.0276		ug/L		81	50 - 150
Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0351	0.0355	M	ug/L		101	60 - 140
Perfluorooctanesulfonic acid (PFOS)	0.0029	U	0.0358	0.0419	M	ug/L		117	60 - 140

Isotope Dilution	MS %Recovery	MS Qualifier	Limits
18O2 PFHxS	*103*		*25 - 150*
13C4 PFOS	*106*		*25 - 150*
13C5 PFNA	*77*		*25 - 150*
13C4 PFOA	*81*		*25 - 150*
13C4-PFHpA	*85*		*25 - 150*

Lab Sample ID: 320-18849-2 MSD **Client Sample ID: OF-RW74-0516**

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

Analysis Batch: 111733 **Prep Batch: 110230**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanoic acid (PFHpA)	0.0019	U M	0.0389	0.0395		ug/L		101	60 - 140	4	30
Perfluorooctanoic acid (PFOA)	0.00076	J	0.0389	0.0396		ug/L		100	60 - 140	1	30
Perfluorononanoic acid (PFNA)	0.0011	J	0.0389	0.0421		ug/L		105	60 - 140	1	30
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0344	0.0329		ug/L		96	50 - 150	17	30
Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0354	0.0382	M	ug/L		108	60 - 140	7	30
Perfluorooctanesulfonic acid (PFOS)	0.0029	U	0.0361	0.0415	M	ug/L		115	60 - 140	1	30

Isotope Dilution	MSD %Recovery	MSD Qualifier	Limits
18O2 PFHxS	*89*		*25 - 150*
13C4 PFOS	*95*		*25 - 150*
13C5 PFNA	*65*		*25 - 150*
13C4 PFOA	*68*		*25 - 150*
13C4-PFHpA	*75*		*25 - 150*

LCMS

Prep Batch: 110230

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18849-1	OF-FB74-0516	Total/NA	Water	3535	
320-18849-2	OF-RW74-0516	Total/NA	Water	3535	
320-18849-2 MS	OF-RW74-0516	Total/NA	Water	3535	
320-18849-2 MSD	OF-RW74-0516	Total/NA	Water	3535	
320-18849-3	OF-FB59-0516	Total/NA	Water	3535	
320-18849-4	OF-RW59-0516	Total/NA	Water	3535	
LCS 320-110230/2-A	Lab Control Sample	Total/NA	Water	3535	
MB 320-110230/1-A	Method Blank	Total/NA	Water	3535	

Analysis Batch: 111390

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18849-1	OF-FB74-0516	Total/NA	Water	WS-LC-0025	110230
LCS 320-110230/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025	110230
MB 320-110230/1-A	Method Blank	Total/NA	Water	WS-LC-0025	110230

Analysis Batch: 111733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18849-2	OF-RW74-0516	Total/NA	Water	WS-LC-0025	110230
320-18849-2 MS	OF-RW74-0516	Total/NA	Water	WS-LC-0025	110230
320-18849-2 MSD	OF-RW74-0516	Total/NA	Water	WS-LC-0025	110230
320-18849-3	OF-FB59-0516	Total/NA	Water	WS-LC-0025	110230
320-18849-4	OF-RW59-0516	Total/NA	Water	WS-LC-0025	110230

Lab Chronicle

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Client Sample ID: OF-FB74-0516
Lab Sample ID: 320-18849-1
Date Collected: 05/11/16 14:08
Matrix: Water
Date Received: 05/13/16 09:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			110230	05/17/16 11:08	SNE	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	111390	05/26/16 17:50	JRB	TAL SAC

Client Sample ID: OF-RW74-0516
Lab Sample ID: 320-18849-2
Date Collected: 05/11/16 14:17
Matrix: Water
Date Received: 05/13/16 09:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			110230	05/17/16 11:08	SNE	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	111733	05/27/16 15:10	JRB	TAL SAC

Client Sample ID: OF-FB59-0516
Lab Sample ID: 320-18849-3
Date Collected: 05/12/16 17:08
Matrix: Water
Date Received: 05/13/16 09:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			110230	05/17/16 11:08	SNE	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	111733	05/27/16 16:14	JRB	TAL SAC

Client Sample ID: OF-RW59-0516
Lab Sample ID: 320-18849-4
Date Collected: 05/12/16 17:16
Matrix: Water
Date Received: 05/13/16 09:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			110230	05/17/16 11:08	SNE	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	111733	05/27/16 16:35	JRB	TAL SAC

Laboratory References:

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

Certification Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Laboratory: TestAmerica Sacramento

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	01-31-17
Oregon	NELAP	10	4040	01-29-17

Laboratory: TestAmerica Denver

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-17
Oregon	NELAP	10	4025	01-09-17

Method Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

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

Protocol References:

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

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

Sample Summary

Client: CH2M Hill Constructors, Inc.
Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18849-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-18849-1	OF-FB74-0516	Water	05/11/16 14:08	05/13/16 09:35
320-18849-2	OF-RW74-0516	Water	05/11/16 14:17	05/13/16 09:35
320-18849-3	OF-FB59-0516	Water	05/12/16 17:08	05/13/16 09:35
320-18849-4	OF-RW59-0516	Water	05/12/16 17:16	05/13/16 09:35

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Instrument ID: A4 Analysis Batch Number: 111390

Lab Sample ID: LCS 320-110230/2-A Client Sample ID:

Date Analyzed: 05/26/16 17:28 Lab File ID: 25MAY2016B4A_074.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanesulfonic acid (PFHxS)	9.41	Isomers	barnettj	05/27/16 10:26
Perfluorooctanesulfonic acid (PFOS)	11.45	Isomers	westendorfc	05/27/16 08:28

Lab Sample ID: 320-18849-1 Client Sample ID: OF-FB74-0516

Date Analyzed: 05/26/16 17:50 Lab File ID: 25MAY2016B4A_075.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorononanoic acid (PFNA)	11.47	Baseline	barnettj	05/27/16 09:48

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Instrument ID: A4 Analysis Batch Number: 111733

Lab Sample ID: 320-18849-2 Client Sample ID: OF-RW74-0516

Date Analyzed: 05/27/16 15:10 Lab File ID: 27MAY2016B4A_013.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluoroheptanoic acid (PFHpA)	9.37	Baseline	barnettj	05/31/16 09:42

Lab Sample ID: 320-18849-2 MS Client Sample ID: OF-RW74-0516 MS

Date Analyzed: 05/27/16 15:31 Lab File ID: 27MAY2016B4A_014.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanesulfonic acid (PFHxS)	9.39	Isomers	barnettj	05/31/16 09:43
Perfluorooctanesulfonic acid (PFOS)	11.44	Isomers	barnettj	05/31/16 09:43

Lab Sample ID: 320-18849-2 MSD Client Sample ID: OF-RW74-0516 MSD

Date Analyzed: 05/27/16 15:54 Lab File ID: 27MAY2016B4A_015.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanesulfonic acid (PFHxS)	9.40	Isomers	barnettj	05/31/16 10:30
Perfluorooctanesulfonic acid (PFOS)	11.44	Isomers	barnettj	05/31/16 09:45

Lab Sample ID: 320-18849-3 Client Sample ID: OF-FB59-0516

Date Analyzed: 05/27/16 16:14 Lab File ID: 27MAY2016B4A_016.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorooctanesulfonic acid (PFOS)	11.45	Missed Peak	barnettj	05/31/16 09:46
Perfluorononanoic acid (PFNA)	11.46	Baseline	barnettj	05/31/16 09:46

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Instrument ID: A4 Analysis Batch Number: 111733

Lab Sample ID: 320-18849-4 Client Sample ID: OF-RW59-0516

Date Analyzed: 05/27/16 16:35 Lab File ID: 27MAY2016B4A_017.d GC Column: Acquity ID: 2.1(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorohexanesulfonic acid (PFHxS)	9.40	Isomers	barnettj	05/31/16 09:48
Perfluorooctanoic acid (PFOA)	10.48	Isomers	barnettj	05/31/16 09:48
Perfluorooctanesulfonic acid (PFOS)	11.44	Isomers	barnettj	05/31/16 09:48

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
LCMPFCSU_00040	11/05/16	05/11/16	Methanol, Lot Baker 115935	10000 uL	LCM2PFHxDA_00005	200 uL	13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA_00005	200 uL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA_00005	200 uL	13C4-PFHpA	1 ug/mL
					LCM5PFPEA_00006	200 uL	13C5-PFPeA	1 ug/mL
					LCM8FOSA_00009	200 uL	13C8 FOSA	1 ug/mL
					LCMPFBA_00006	200 uL	13C4 PFBA	1 ug/mL
					LCMPFDA_00007	200 uL	13C2 PFDA	1 ug/mL
					LCMPFDoA_00006	200 uL	13C2 PFDoA	1 ug/mL
					LCMPFHxA_00008	200 uL	13C2 PFHxA	1 ug/mL
					LCMPFHxS_00006	200 uL	18O2 PFHxS	0.946 ug/mL
					LCMPFNA_00005	200 uL	13C5 PFNA	1 ug/mL
					LCMPFOA_00010	200 uL	13C4 PFOA	1 ug/mL
					LCMPFOS_00012	200 uL	13C4 PFOS	0.956 ug/mL
					LCMPFUdA_00007	200 uL	13C2 PFUnA	1 ug/mL
.LCM2PFHxDA_00005	01/07/21	Wellington Laboratories, Lot M2PFHxDA1112			(Purchased Reagent)		13C2-PFHxDA	50 ug/mL
.LCM2PFTeDA_00005	12/07/20	Wellington Laboratories, Lot M2PFTeDA1115			(Purchased Reagent)		13C2-PFTeDA	50 ug/mL
.LCM4PFHPA_00005	05/22/20	Wellington Laboratories, Lot M4PFHpA0515			(Purchased Reagent)		13C4-PFHpA	50 ug/mL
.LCM5PFPEA_00006	05/22/20	Wellington Laboratories, Lot M5PFPeA0515			(Purchased Reagent)		13C5-PFPeA	50 ug/mL
.LCM8FOSA_00009	12/22/17	Wellington Laboratories, Lot M8FOSA1215I			(Purchased Reagent)		13C8 FOSA	50 ug/mL
.LCMPFBA_00006	10/31/19	Wellington Laboratories, Lot MPFBA1014			(Purchased Reagent)		13C4 PFBA	50 ug/mL
.LCMPFDA_00007	08/19/20	Wellington Laboratories, Lot MPFDA0815			(Purchased Reagent)		13C2 PFDA	50 ug/mL
.LCMPFDoA_00006	07/17/19	Wellington Laboratories, Lot MPFDoA0714			(Purchased Reagent)		13C2 PFDoA	50 ug/mL
.LCMPFHxA_00008	04/09/20	Wellington Laboratories, Lot MPFHxA0415			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
.LCMPFHxS_00006	10/23/20	Wellington Laboratories, Lot MPFHxS1015			(Purchased Reagent)		18O2 PFHxS	47.3 ug/mL
.LCMPFNA_00005	04/13/19	Wellington Laboratories, Lot MPFNA0414			(Purchased Reagent)		13C5 PFNA	50 ug/mL
.LCMPFOA_00010	01/22/21	Wellington Laboratories, Lot MPFOA0116			(Purchased Reagent)		13C4 PFOA	50 ug/mL
.LCMPFOS_00012	01/22/21	Wellington Laboratories, Lot MPFOS0116			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LCMPFUdA_00007	10/31/19	Wellington Laboratories, Lot MPFUdA1014			(Purchased Reagent)		13C2 PFUnA	50 ug/mL
LCPFC-L1_00018	06/29/16	12/30/15	MeOH/H2O, Lot 90285	5 mL	LCMPFCSU_00024	250 uL	13C2-PFHxDA	50 ng/mL
							13C2-PFTeDA	50 ng/mL
							13C4-PFHpA	50 ng/mL
							13C5-PFPeA	50 ng/mL
							13C8 FOSA	50 ng/mL
							13C4 PFBA	50 ng/mL
							13C2 PFDA	50 ng/mL
							13C2 PFDoA	50 ng/mL
							13C2 PFHxA	50 ng/mL
							18O2 PFHxS	47.3 ng/mL
							13C5 PFNA	50 ng/mL
							13C4 PFOA	50 ng/mL
							13C4 PFOS	47.8 ng/mL
							13C2 PFUnA	50 ng/mL
					LCPFCSP_00040	25 uL	Perfluorobutyric acid	0.5 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	0.442 ng/mL
							Perfluorodecanoic acid	0.5 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

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

Reagent

LCM2PFHxDA_00002

Rec: 8/14/14 SKV

Scanned: 8/18/14 STV

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

WELLINGTON LABORATORIES

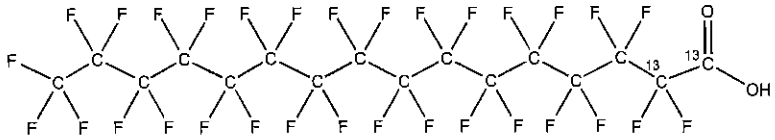
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: M2PFHxDA1112

STRUCTURE:

CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

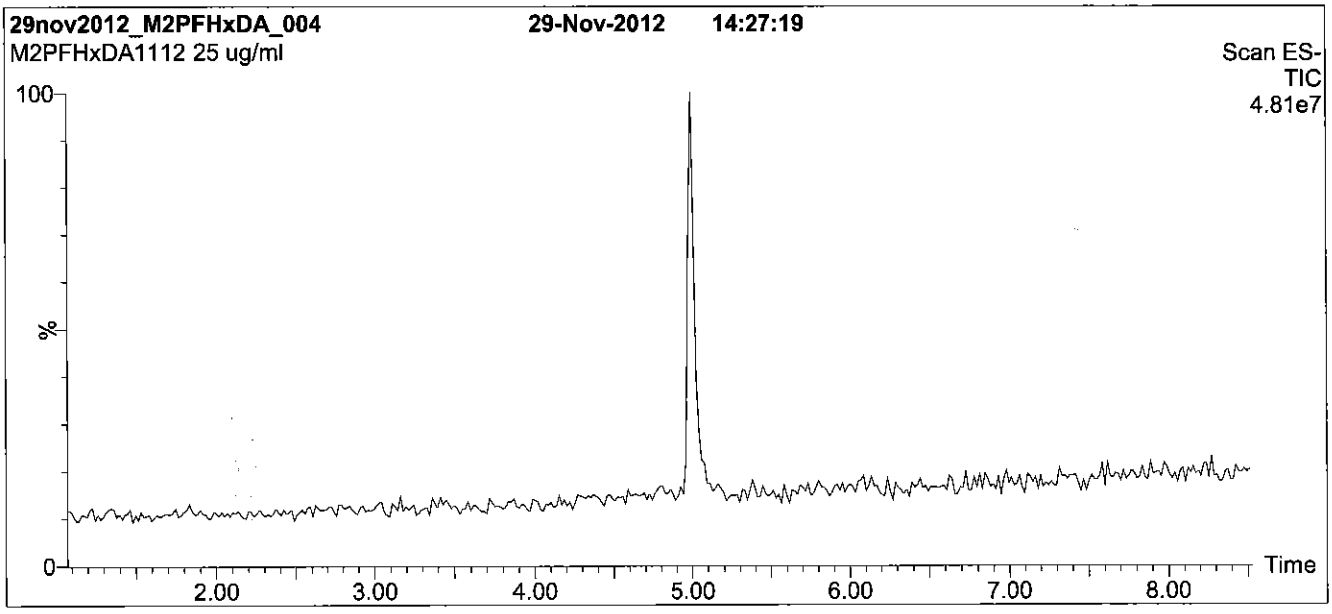
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

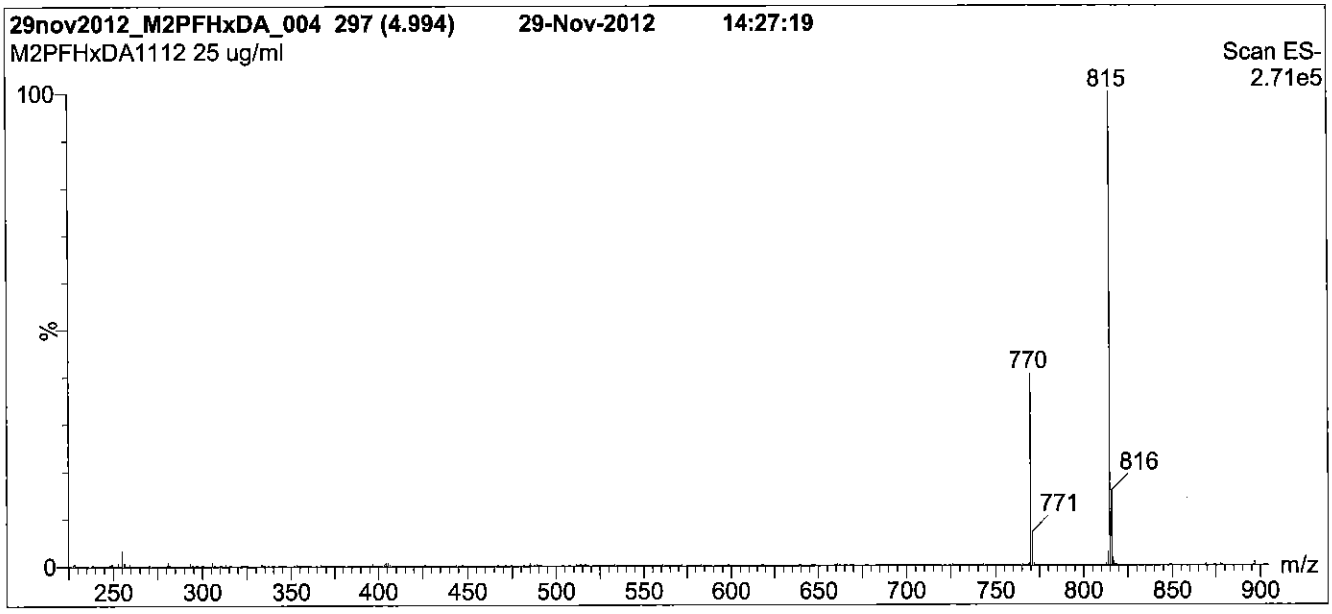
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

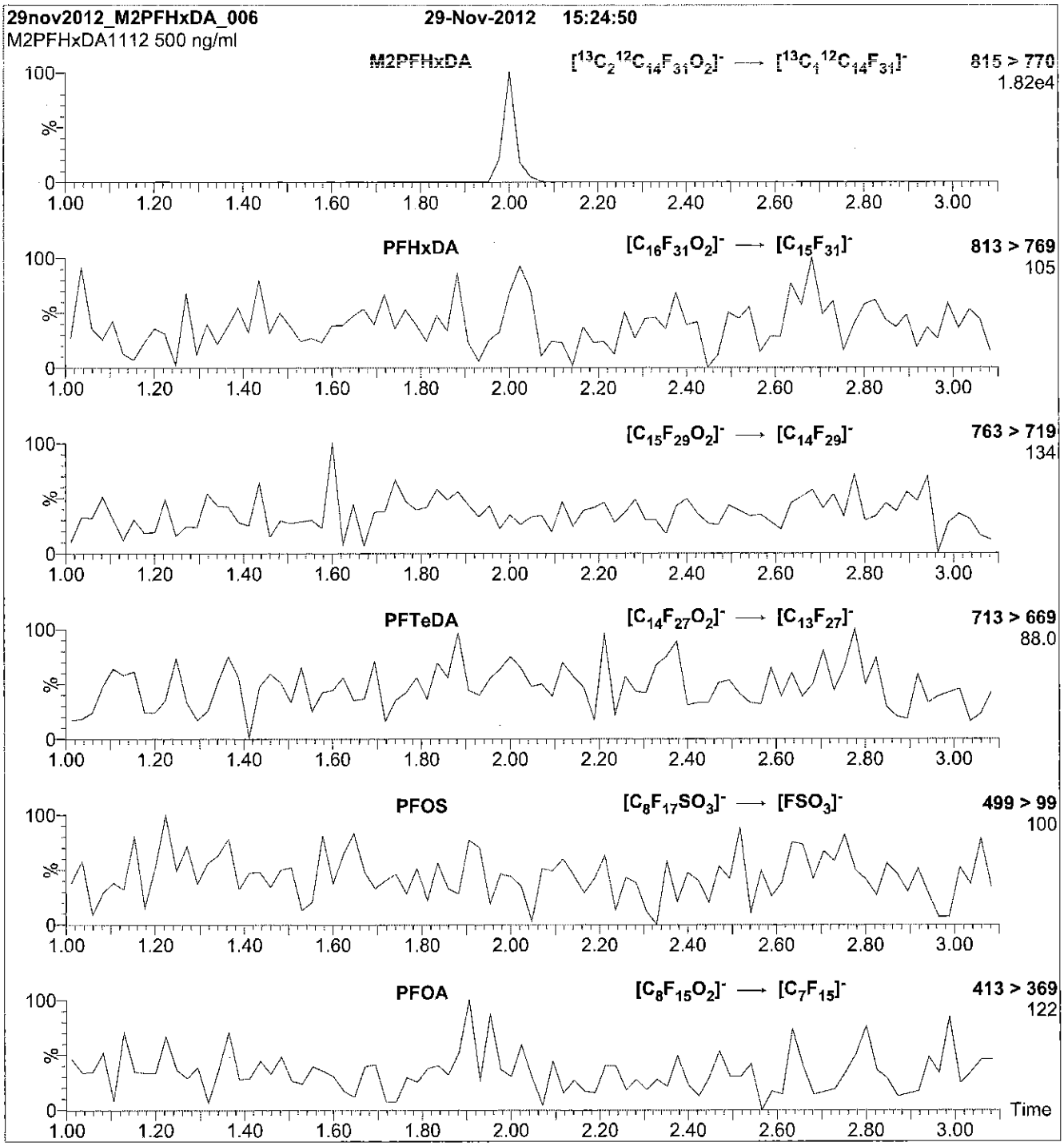
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 1200 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCM2PFHxDA_00003

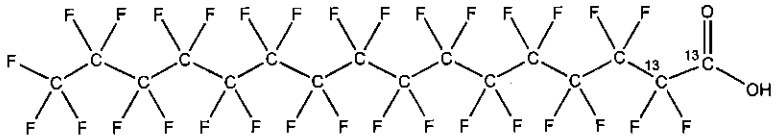
r: 12/9/15 SW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

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

STRUCTURE:
CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

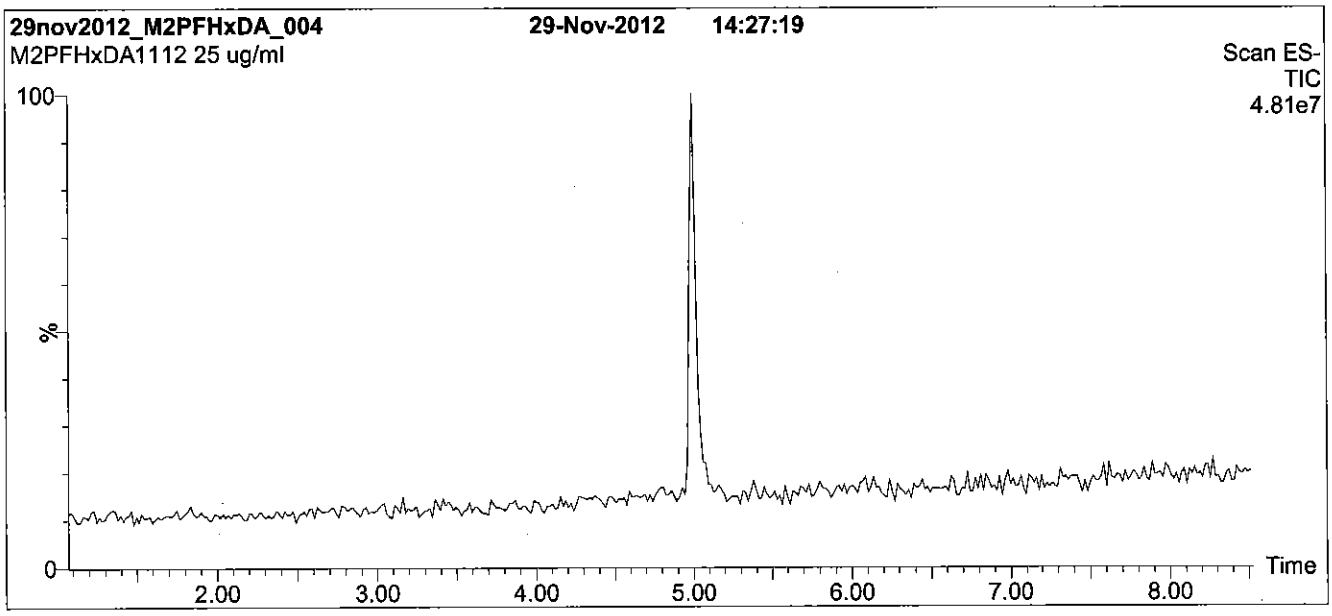
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

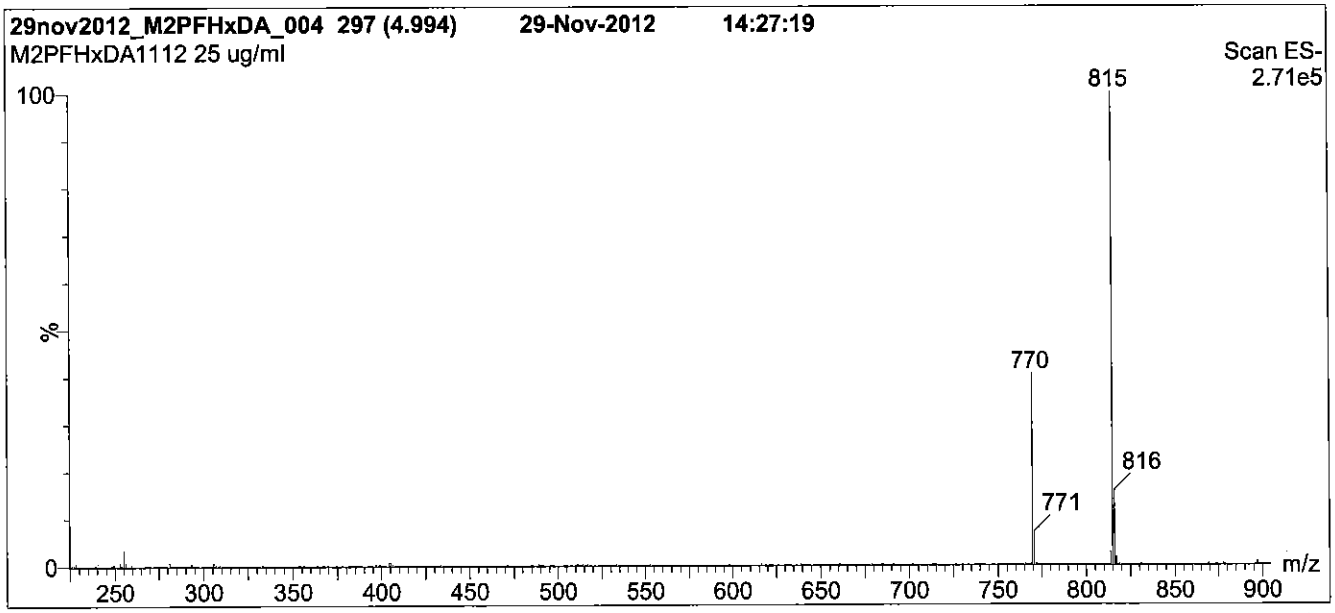
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

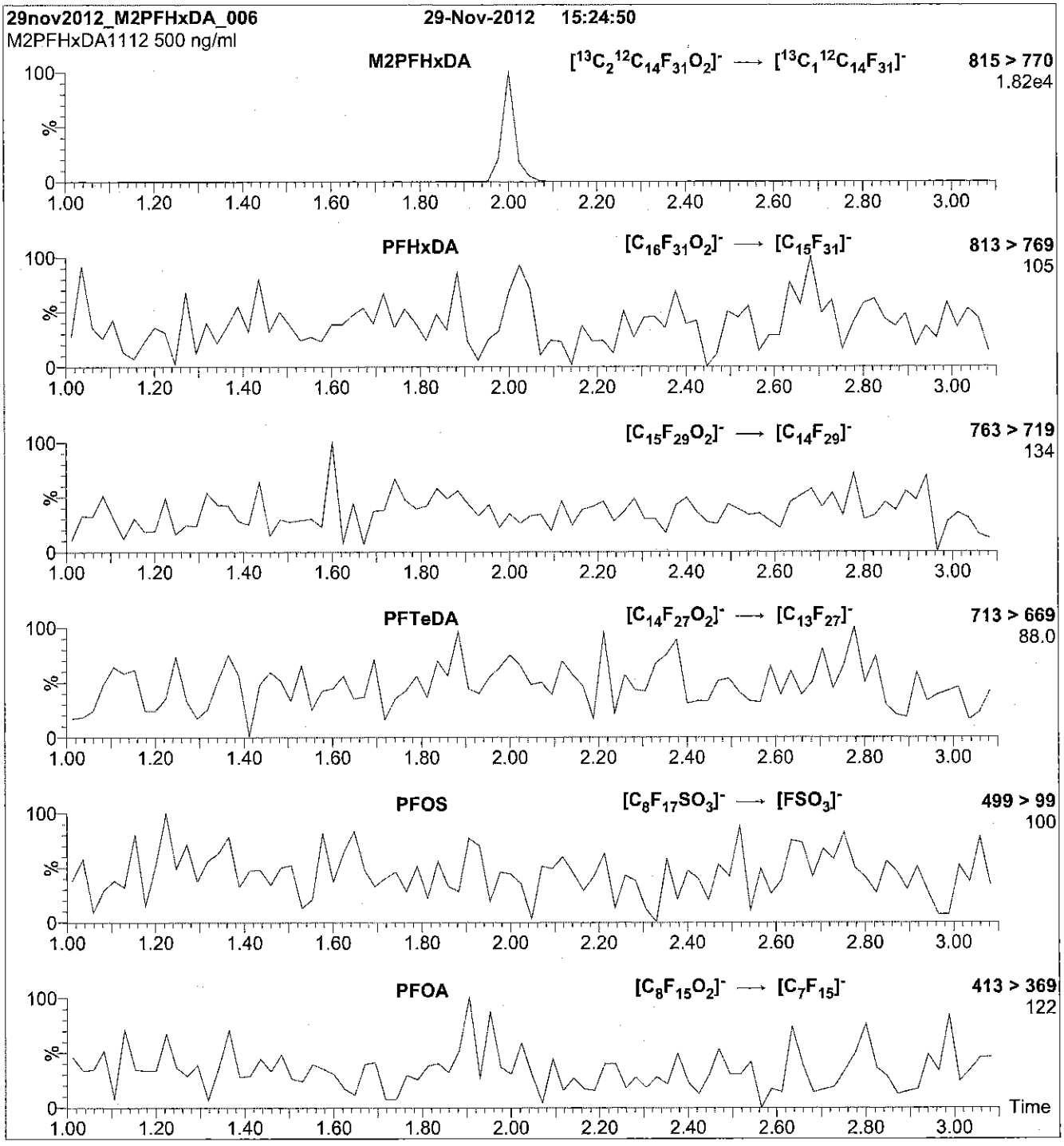
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 1200 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCM2PFHxDA_00005

609709
ID: LCM2PFHxDA_00005
Exp: 01/07/21 Prpd: CBW
13C2-PFHxDA at 50ug/mL

R 4/7/16 CBW

WELLINGTON LABORATORIES

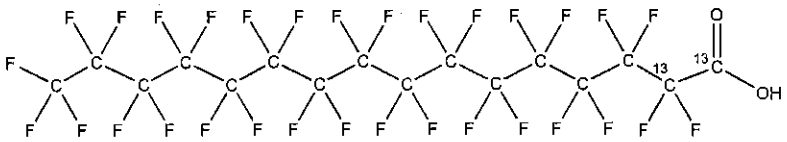
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: M2PFHxDA1112

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_2{}^{12}C_{14}HF_{31}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 816.11
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 01/07/2016
EXPIRY DATE: (mm/dd/yyyy) 01/07/2021
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

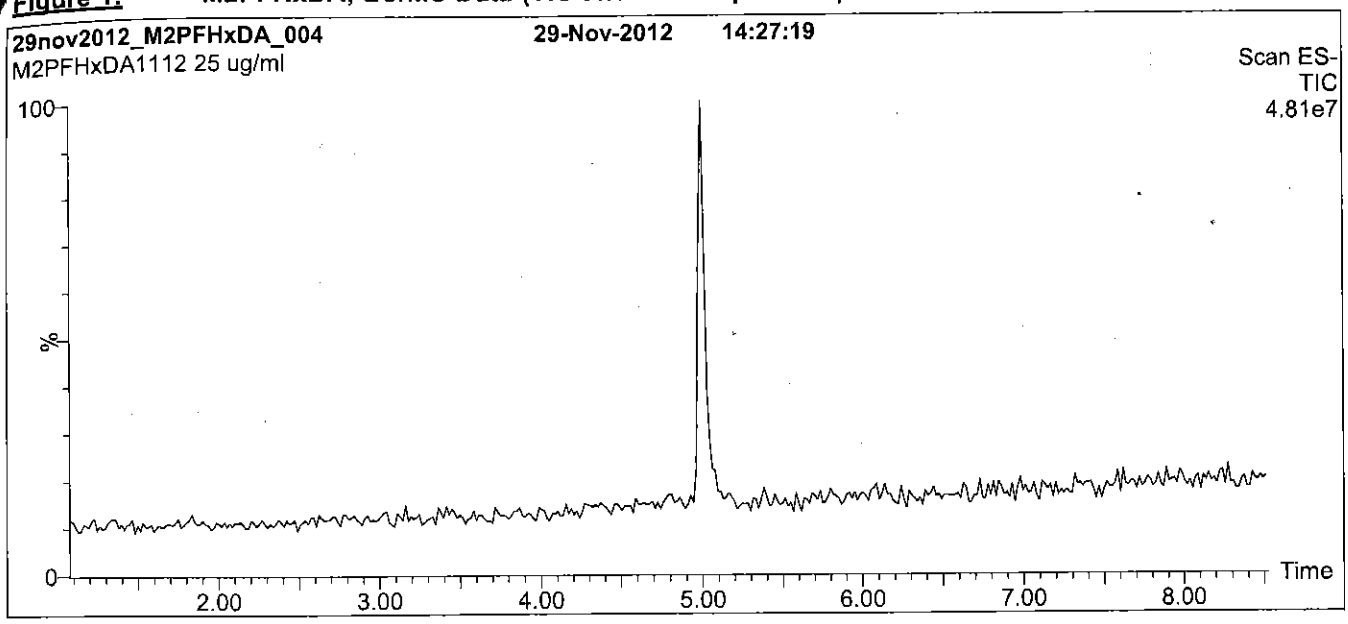
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

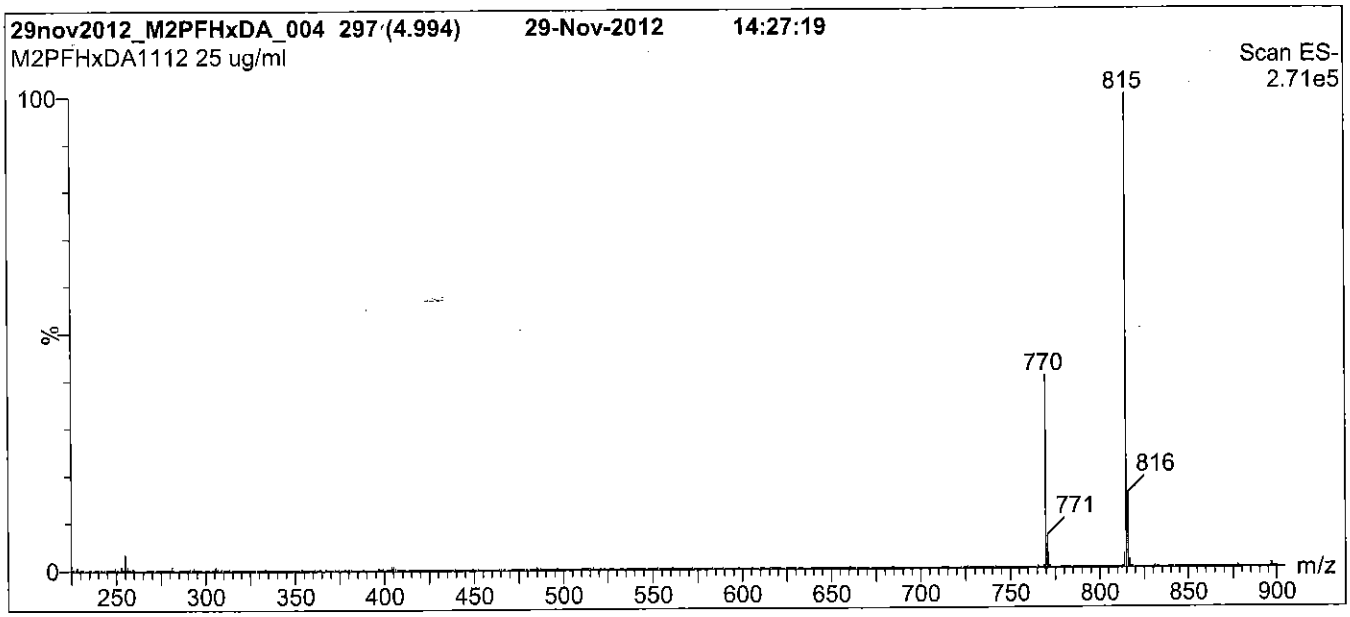
CALA Testing Accreditation No. A1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

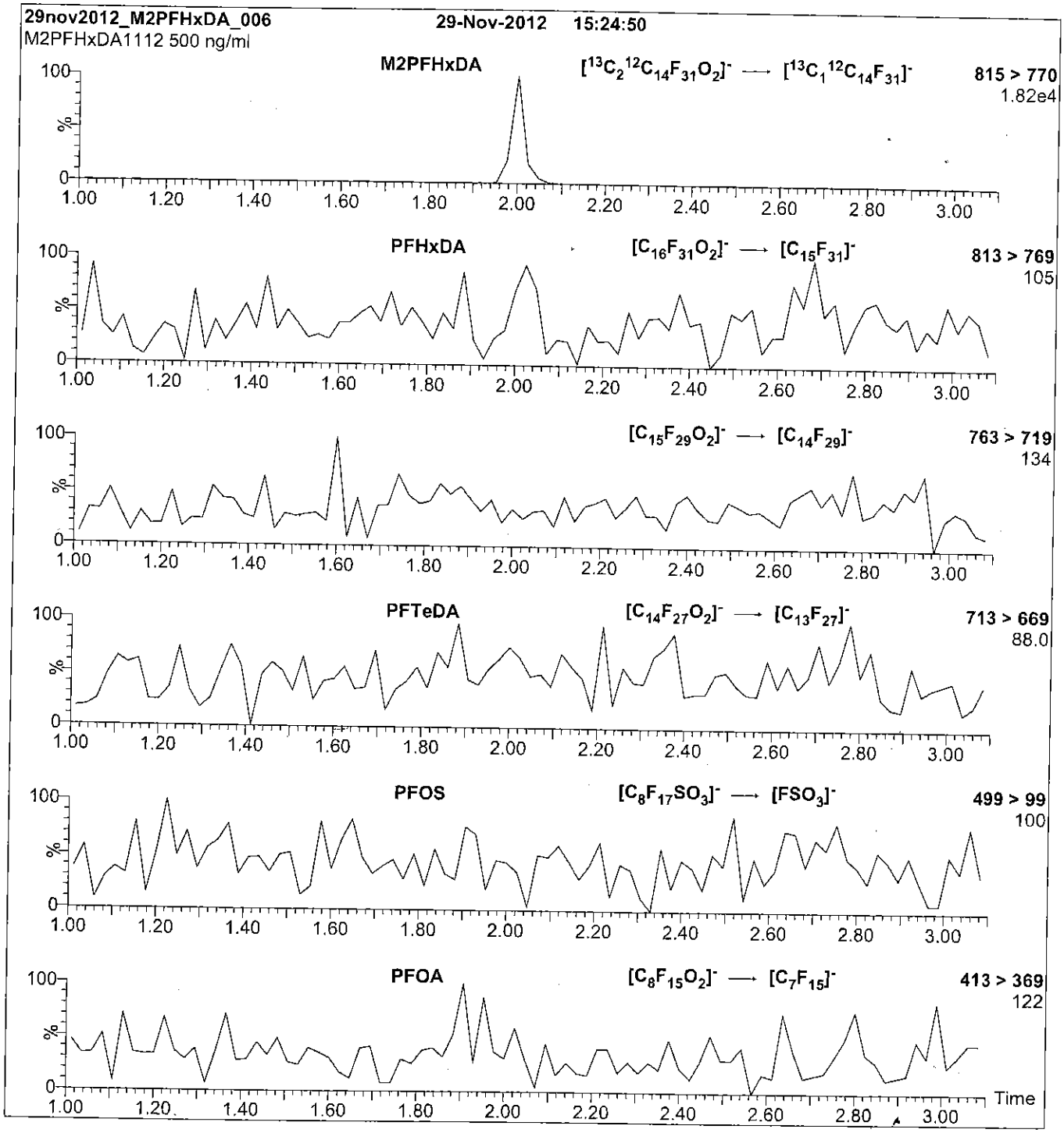
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 1200 amu)

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

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



Conditions for Figure 2:

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

MS Parameters

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

Reagent

LCM2PFTeDA_00003

r: 12/9/15 SEW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

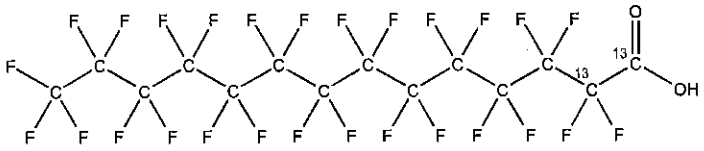
PRODUCT CODE: M2PFTeDA

LOT NUMBER: M2PFTeDA1112

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-$^{13}C_2$)

LAST TESTED: (mm/dd/yyyy) 11/29/2012

EXPIRY DATE: (mm/dd/yyyy) 11/29/2017

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim

Date: 04/01/2015 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

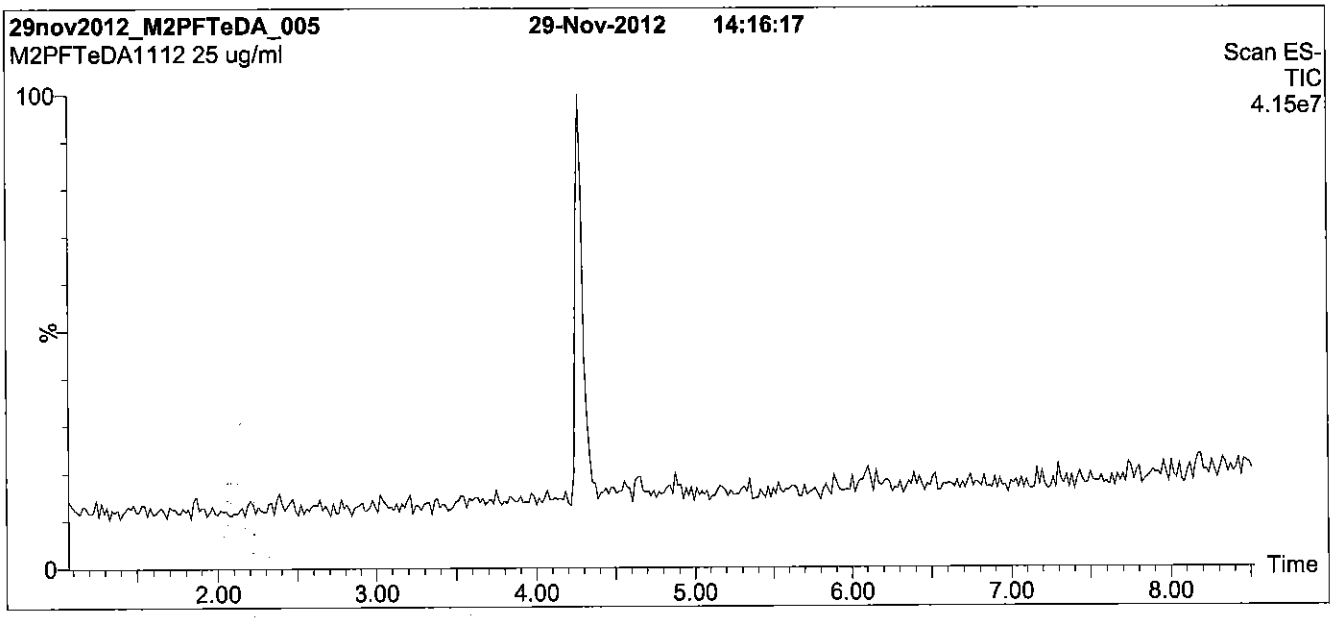
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

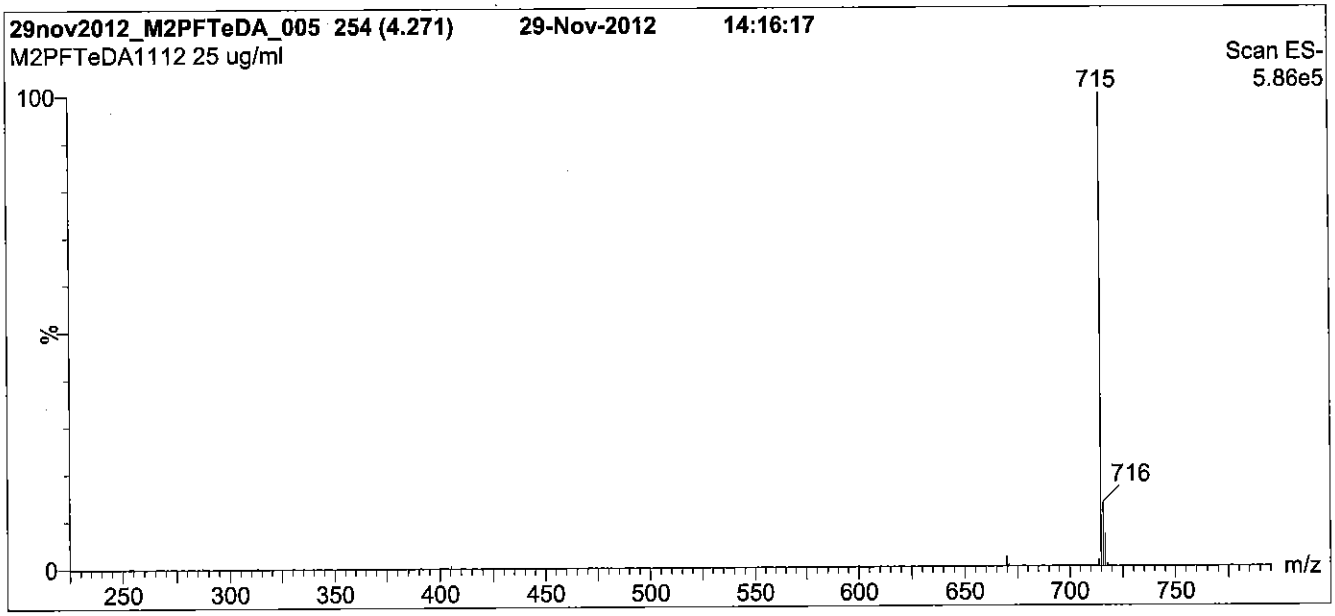
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

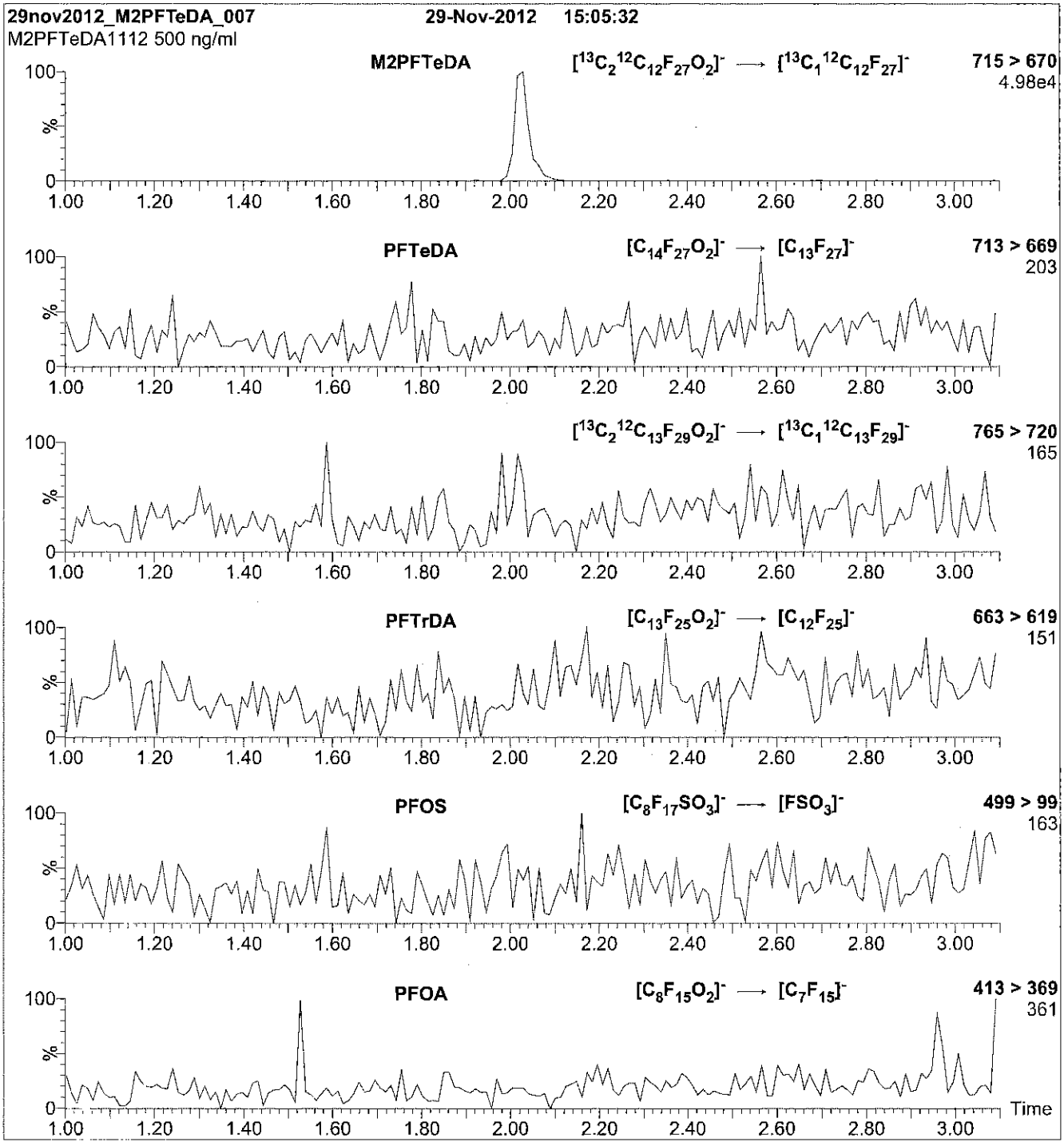
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 1200 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCM2PFTeDA_00005

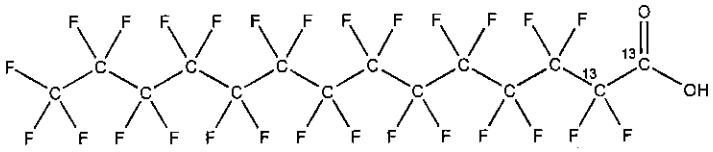
R: 4/7/16 CBW

609710
ID: LCM2PFTeDA_00005
Exp: 12/07/20 Prpd: CBW
13C2-PFTeDA at 50ug/mL

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: M2PFTeDA
LOT NUMBER: M2PFTeDA1115
COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]tetradecanoic acid
STRUCTURE:
CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

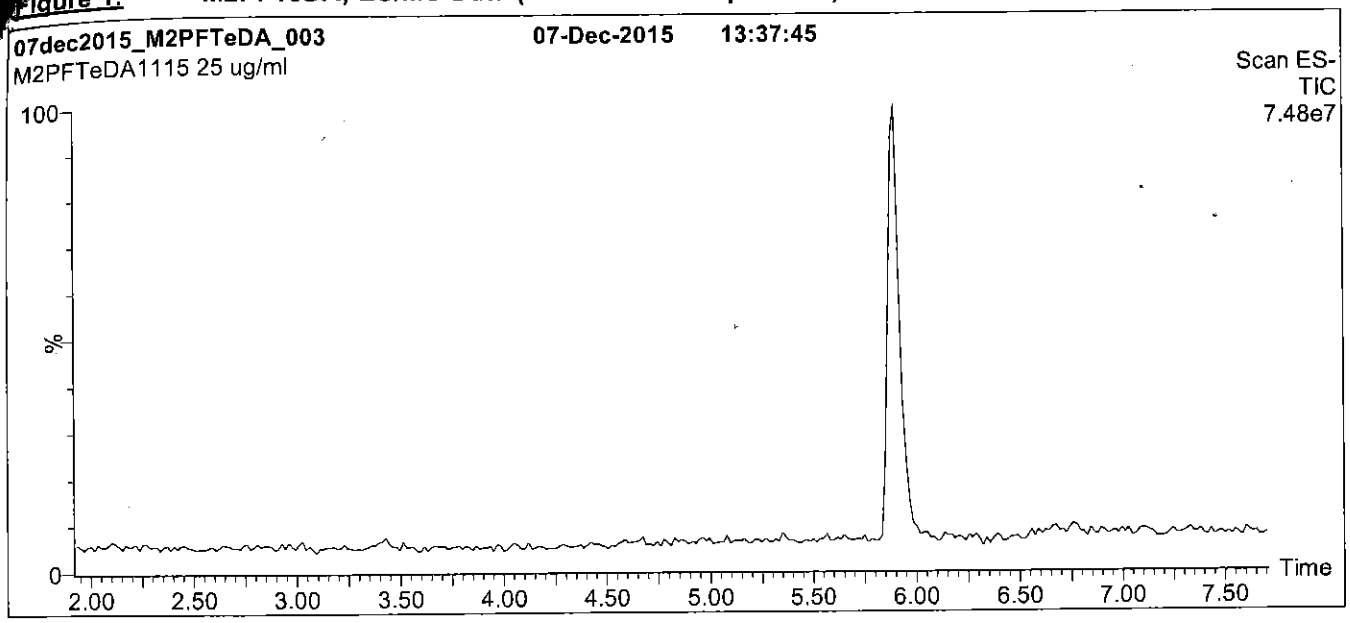
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

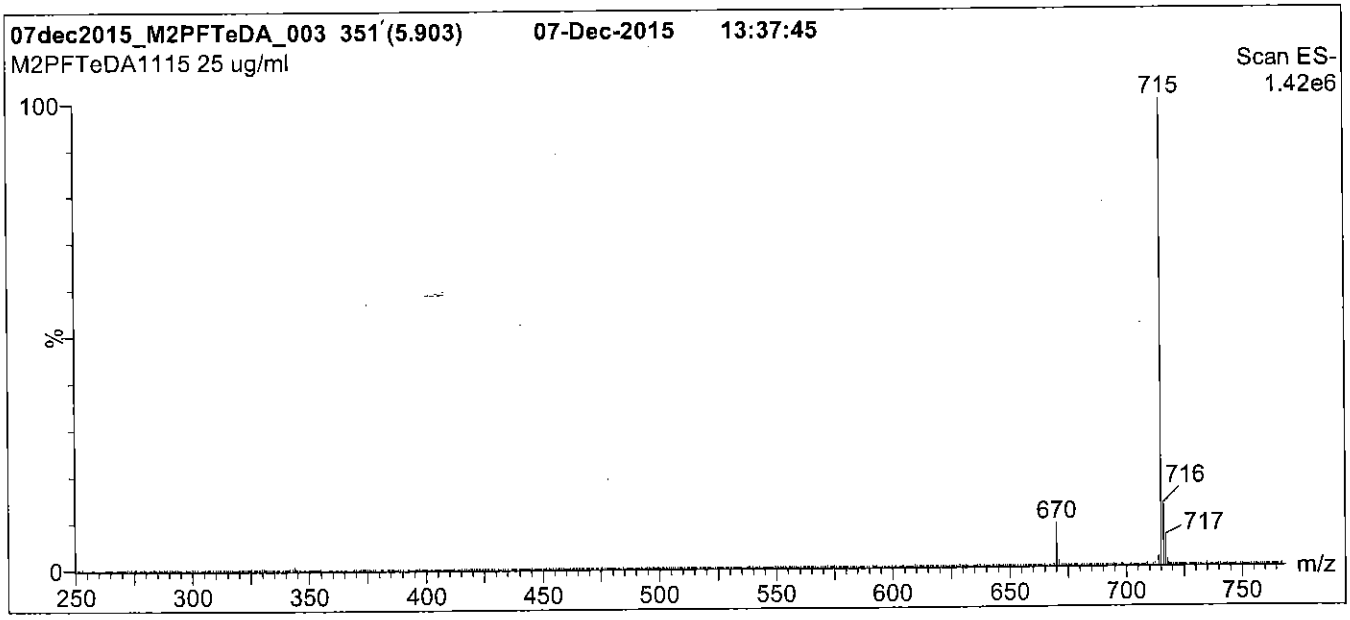
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17025 ISO 34 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

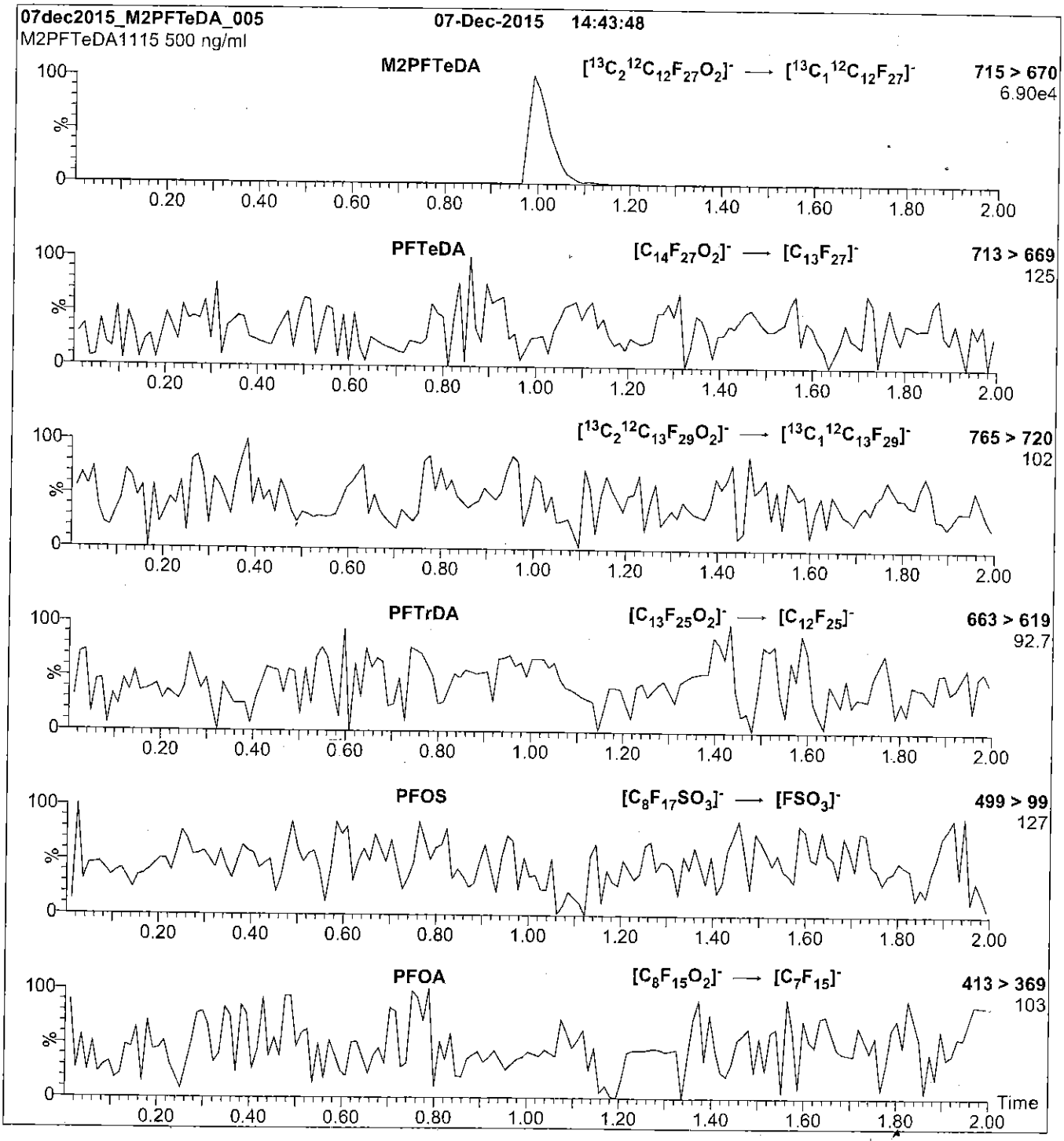
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 1250 amu)

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

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



Conditions for Figure 2:

Injection:	Direct loop injection 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) = 3.28e-3
Collision Energy (eV) = 14

Reagent

LCM4PFHPA_00003

r: 11/10/15 SRV

WELLINGTON LABORATORIES

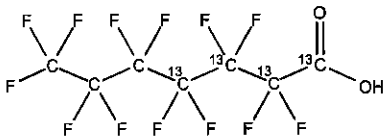
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: M4PFHpA0515

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_4{}^{12}C_3HF_{13}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 05/22/2015
EXPIRY DATE: (mm/dd/yyyy) 05/22/2020
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

MOLECULAR WEIGHT: 368.03
SOLVENT(S): Methanol
Water (<1%)

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

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.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

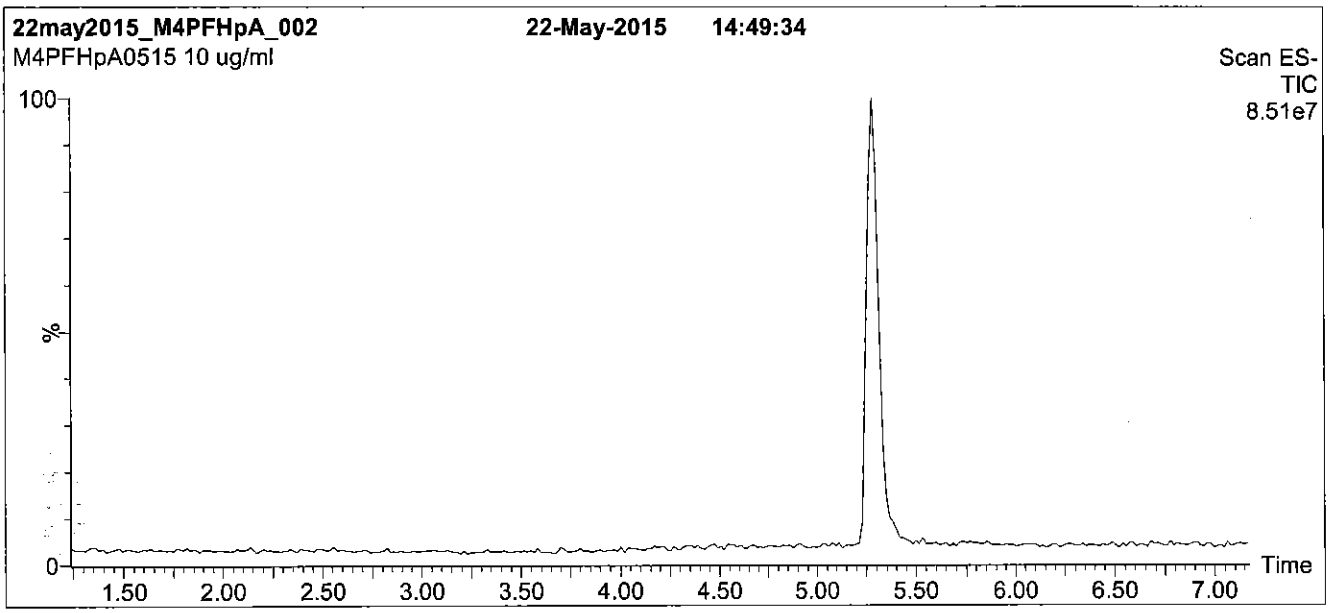
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

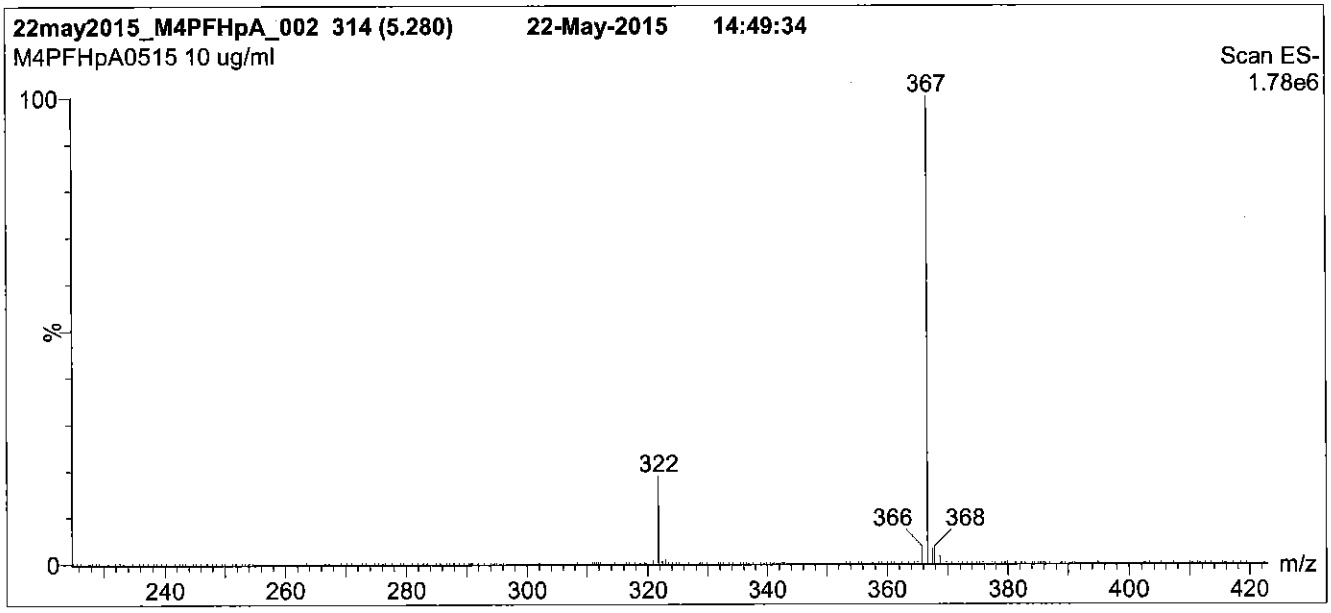
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

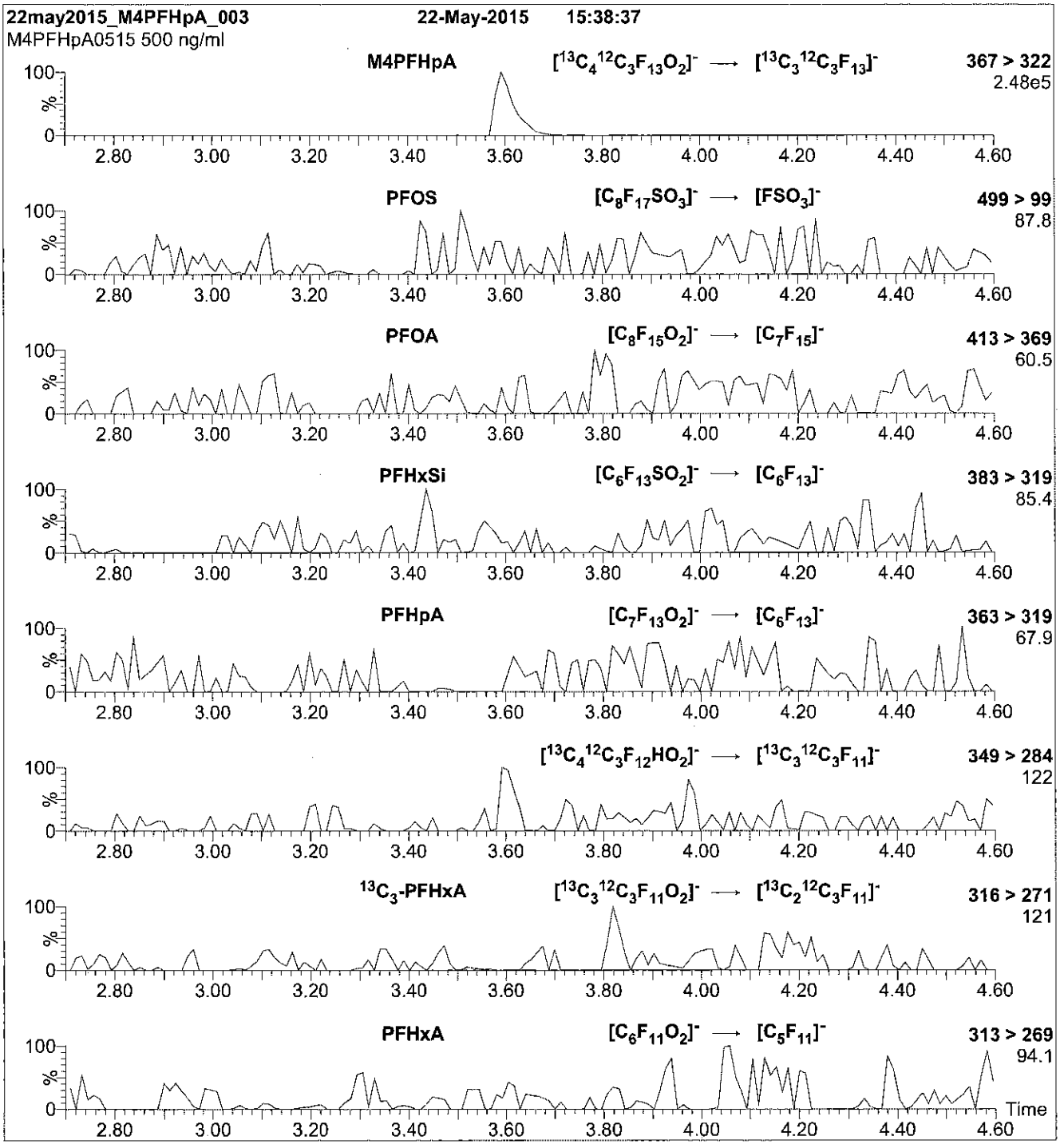
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCM4PFHPA_00005

R 4/7/16 CBW

609711
ID: LCM4PFHPA_00005
Exp: 05/22/20 Prpd: CBW
13C4-Perfluoroheptanoic a

WELLINGTON LABORATORIES

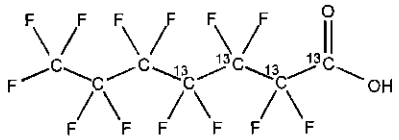
CERTIFICATE OF ANALYSIS DOCUMENTATION

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

LOT NUMBER: M4PFHpA0515

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_4{}^{12}C_3HF_{13}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 368.03
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 05/22/2015
EXPIRY DATE: (mm/dd/yyyy) 05/22/2020
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

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

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.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

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:

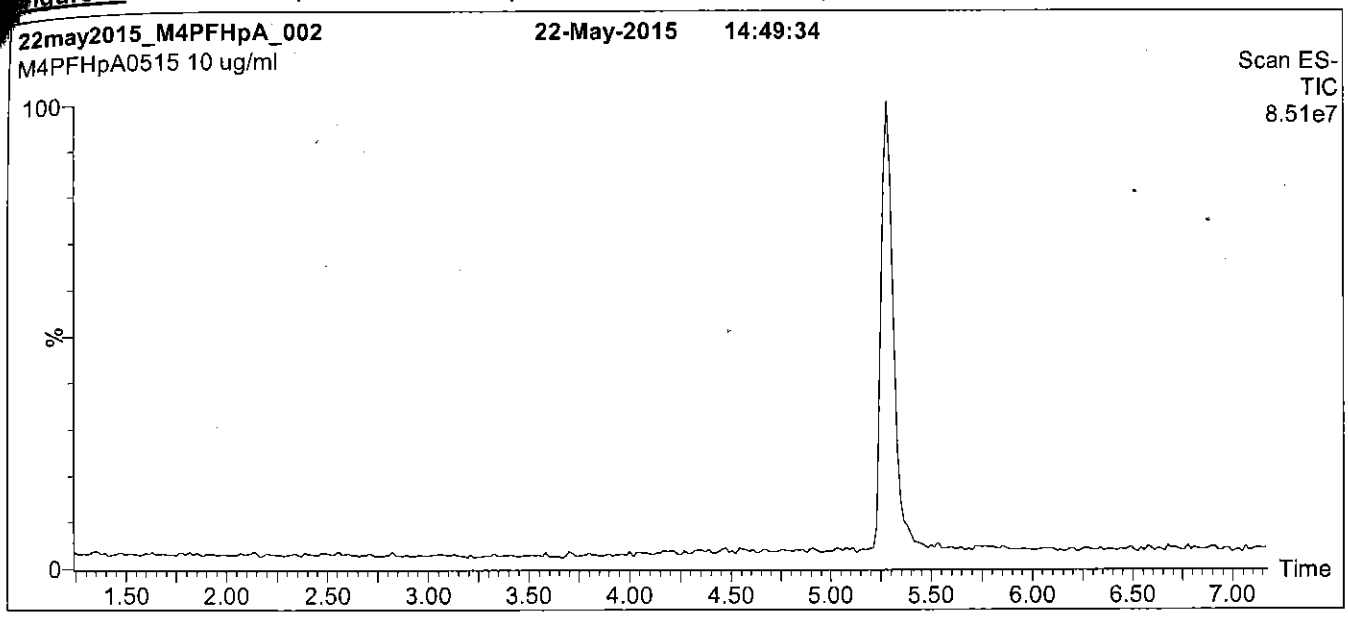
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

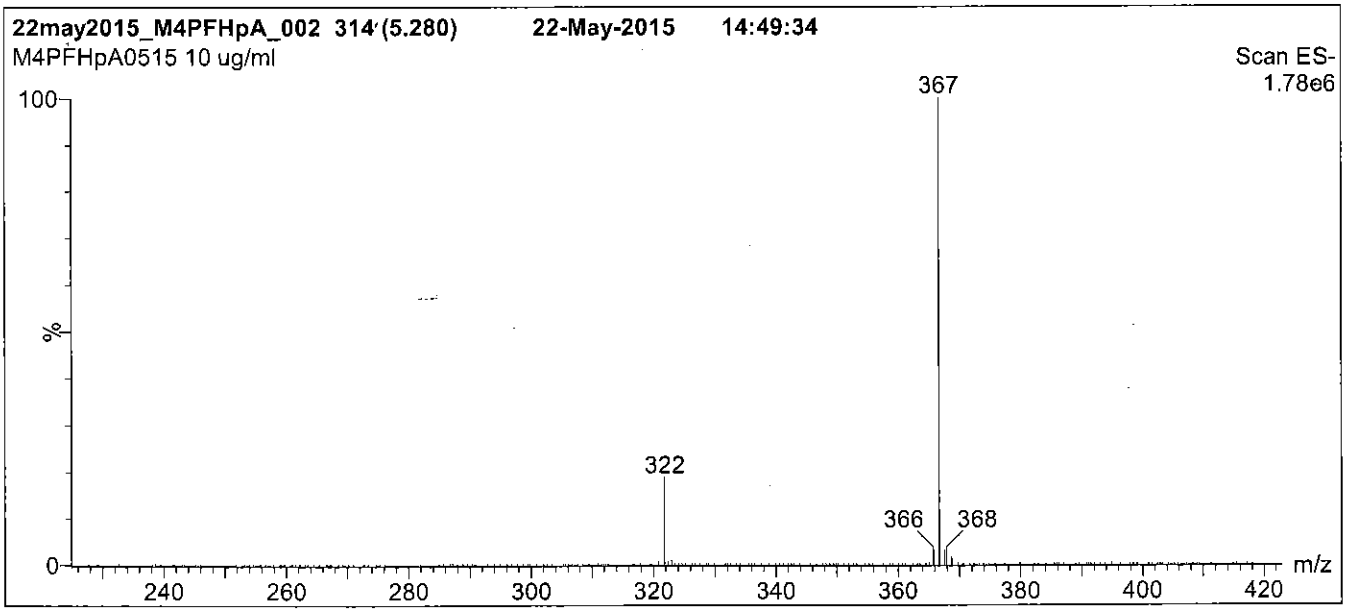
CALA

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

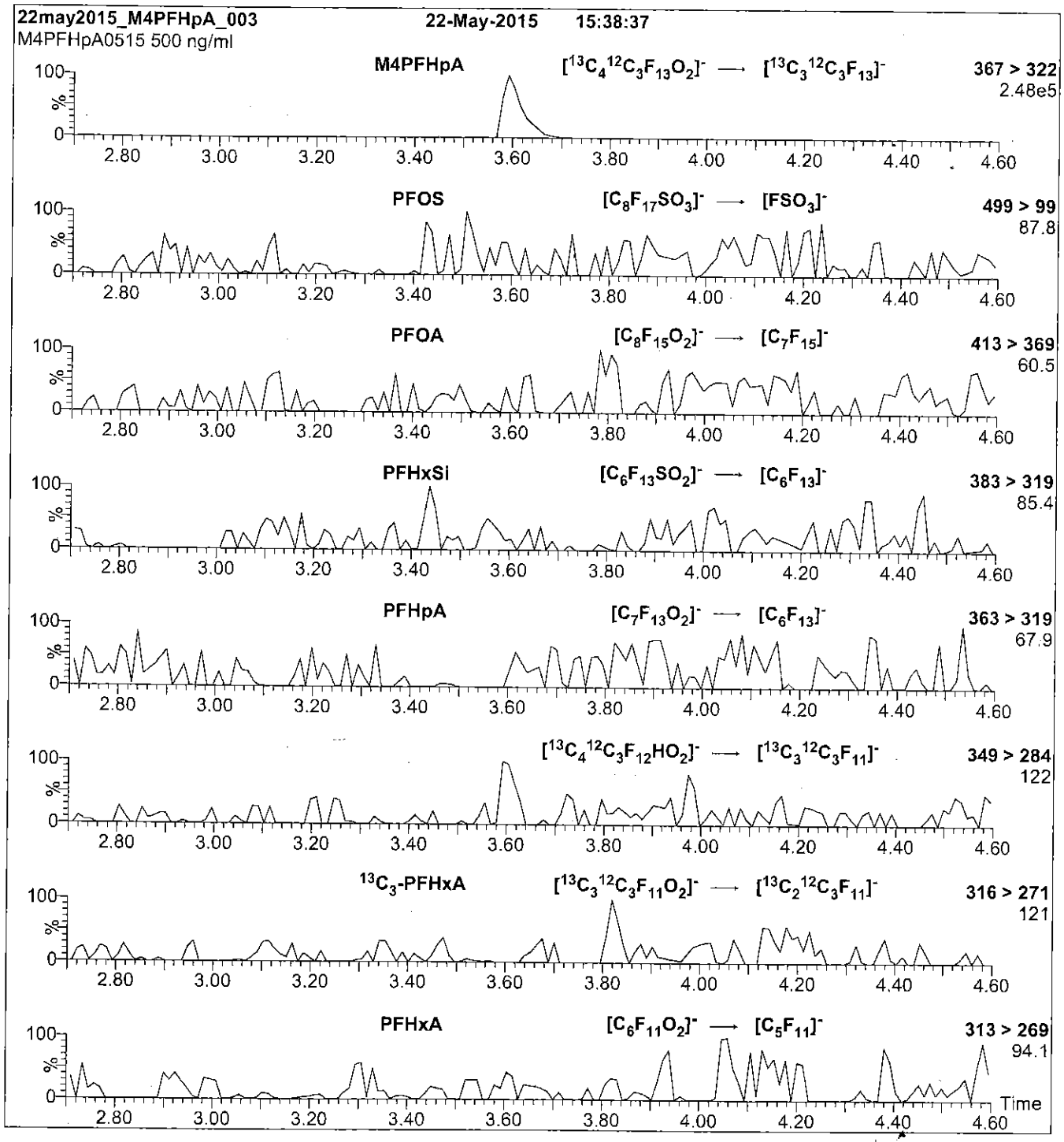
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCM5PFPEA_00004

V1 11/10/15 SM

WELLINGTON LABORATORIES

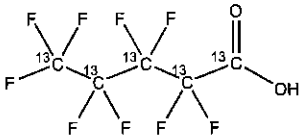
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: M5PFPeA0515

STRUCTURE:

CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

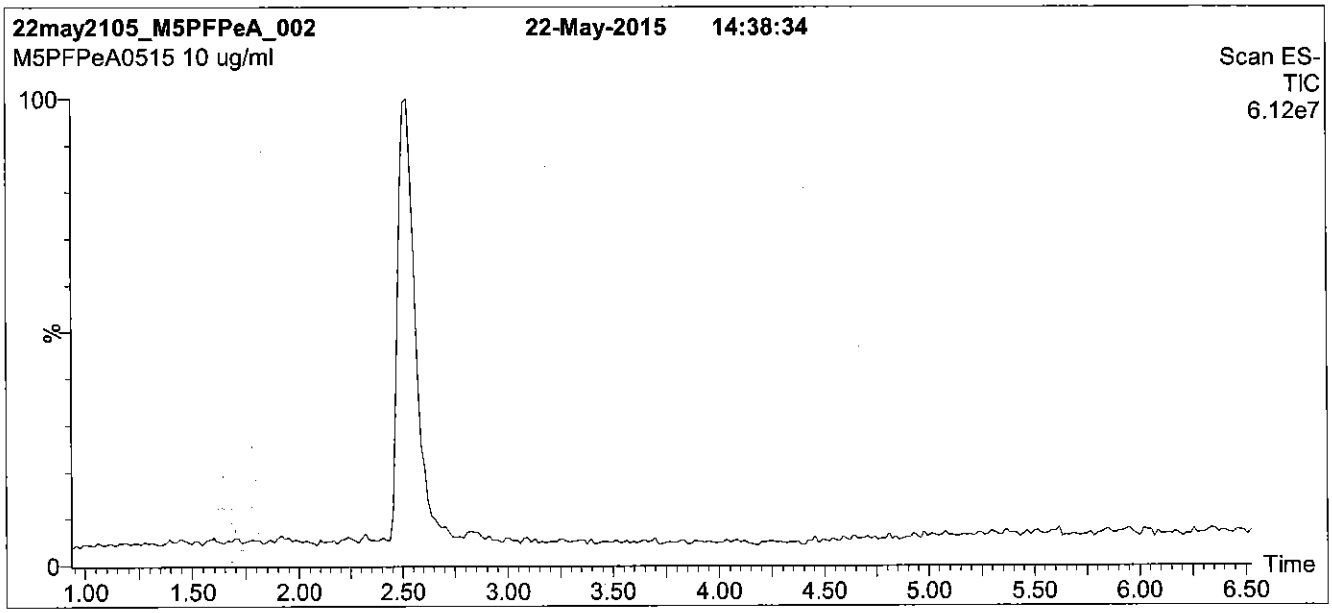
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

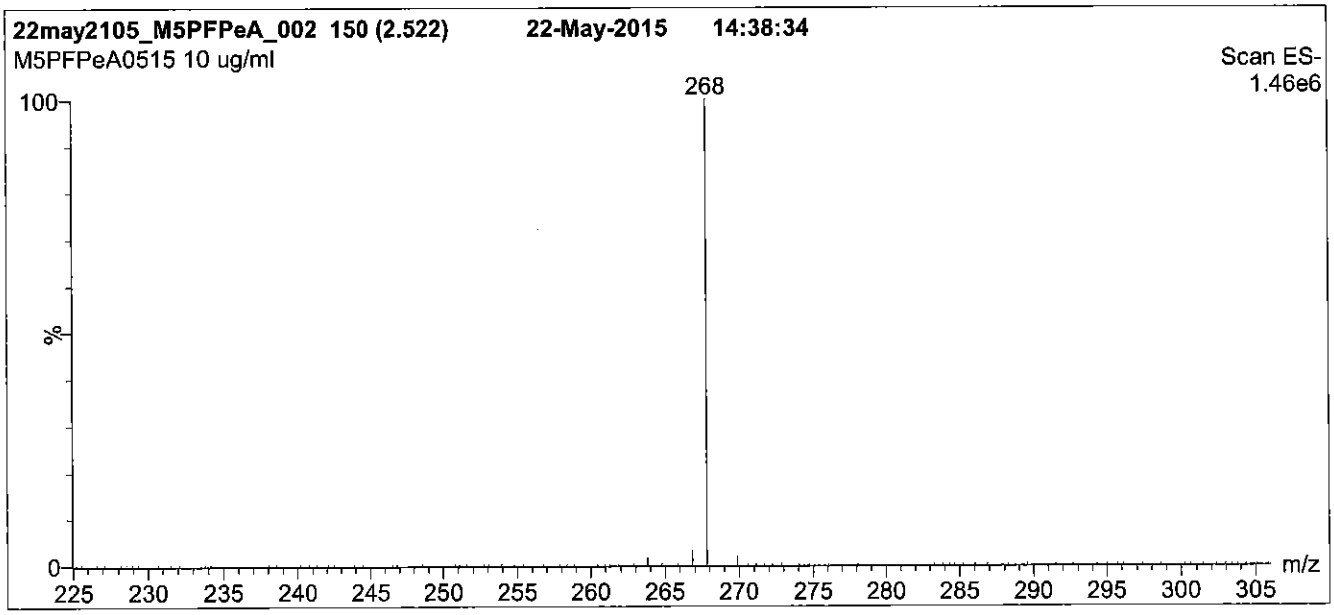
CALA Testing Accreditation No.: A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

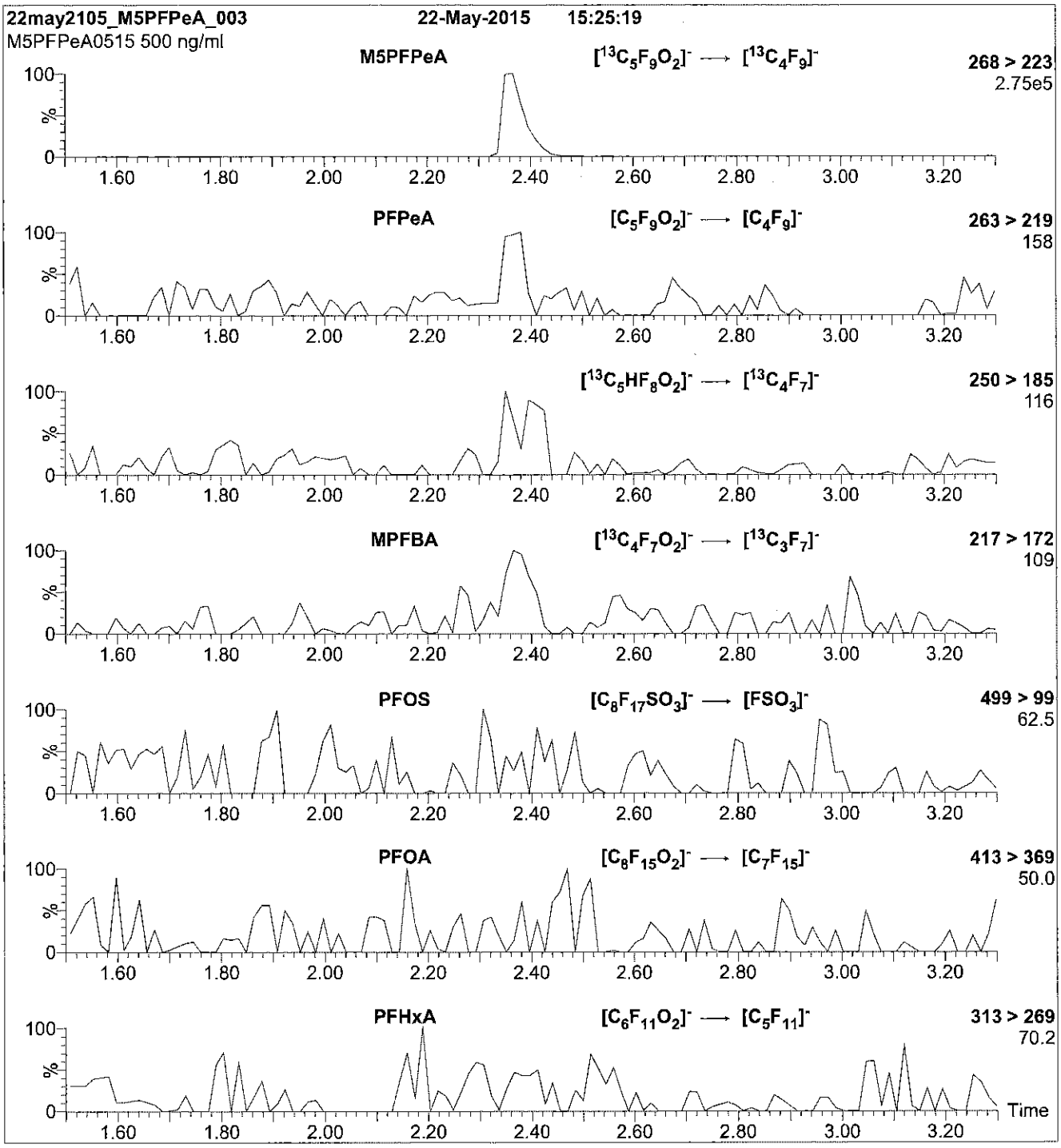
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCM5PFPEA_00006

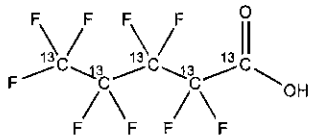
609706
ID: LCM5PFPEA_00006
Exp: 05/22/20 Prpd: CBW
13C5-Perfluoropentanoic a

R: 4/7/16 CBW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M5PFPeA	**LOT NUMBER:**	M5PFPeA0515
COMPOUND:	Perfluoro-n-[$^{13}C_5$]pentanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_5HF_9O_2$	**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)	05/22/2015		
EXPIRY DATE: (mm/dd/yyyy)	05/22/2020		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

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:

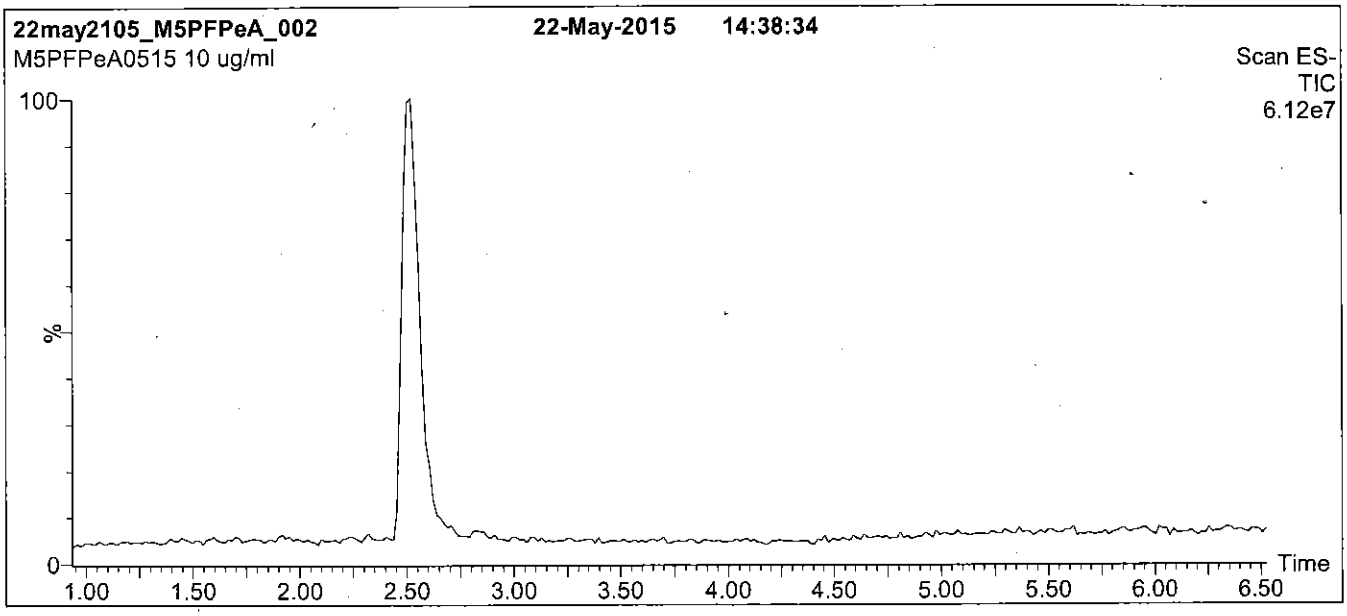
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

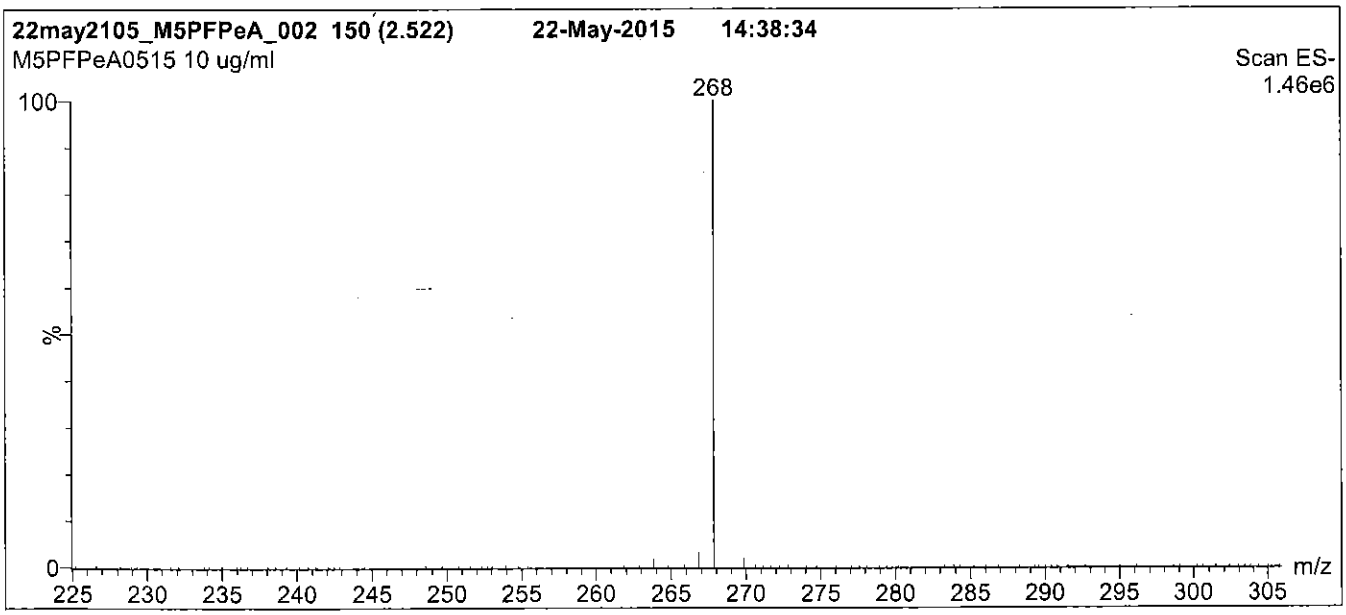
CALA

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

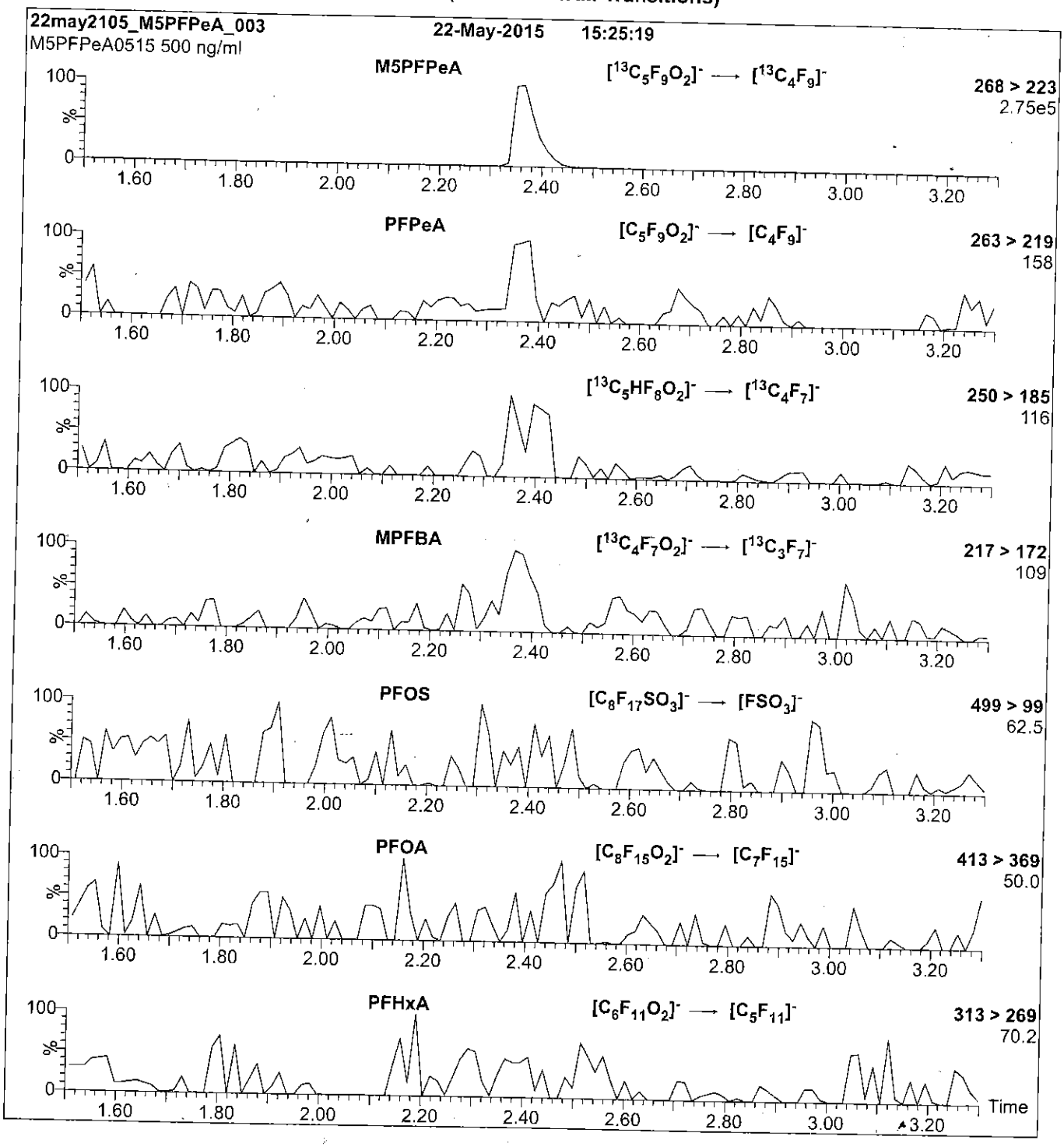
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

MS Parameters

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

Reagent

LCM8FOSA_00006

Rec: 9/15/15 SV

WELLINGTON LABORATORIES

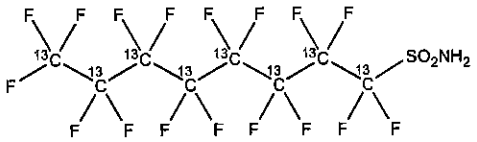
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: M8FOSA1214I

CAS #: Not available

STRUCTURE:



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

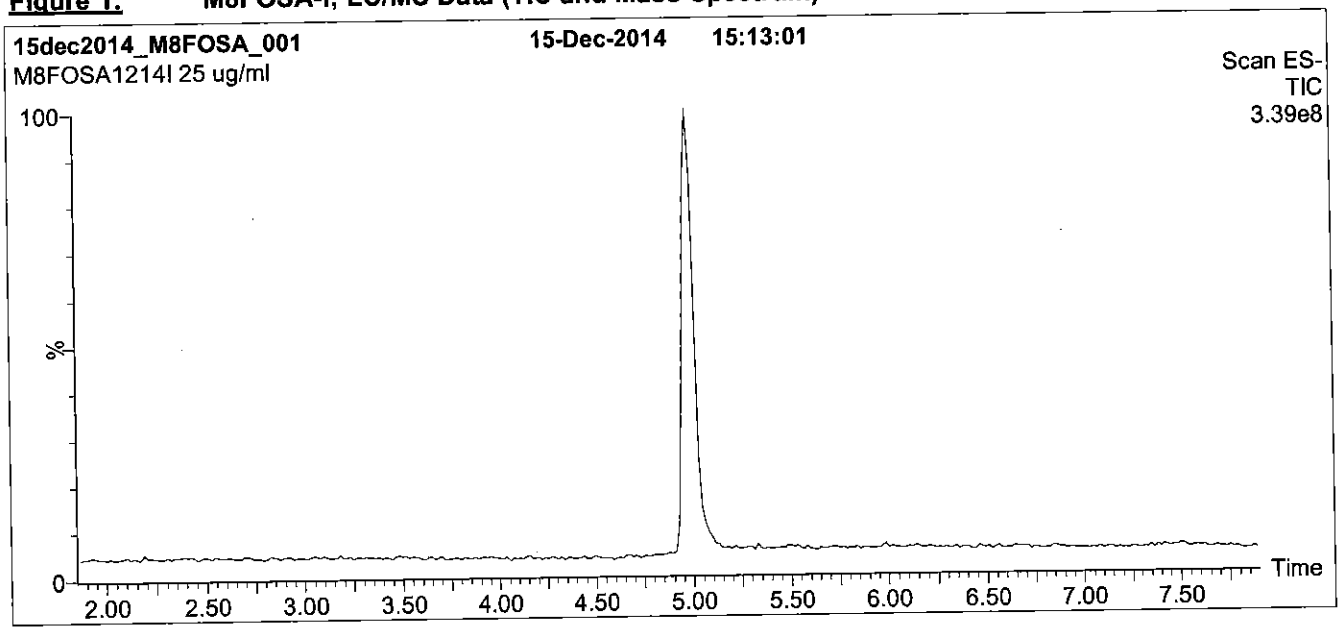
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

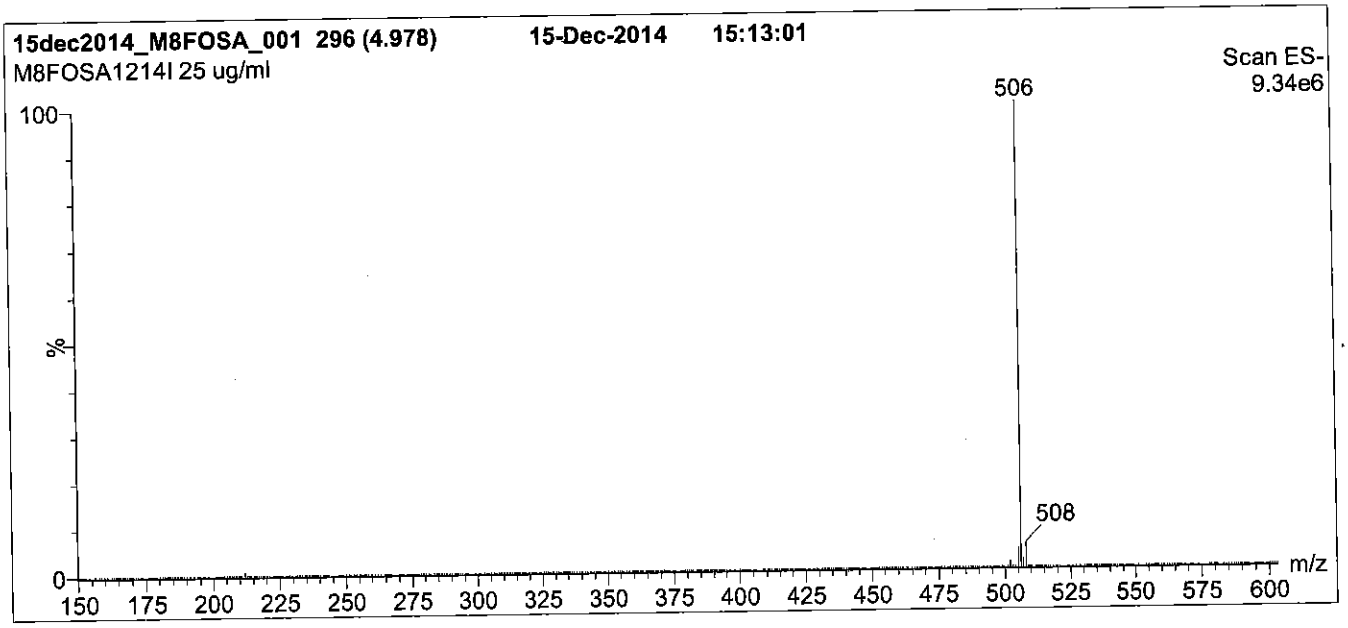
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 9001 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: **M8FOSA-I; LC/MS Data (TIC and Mass Spectrum)**





Condltions for Figure 1:

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

Chromatographic Conditions

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

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

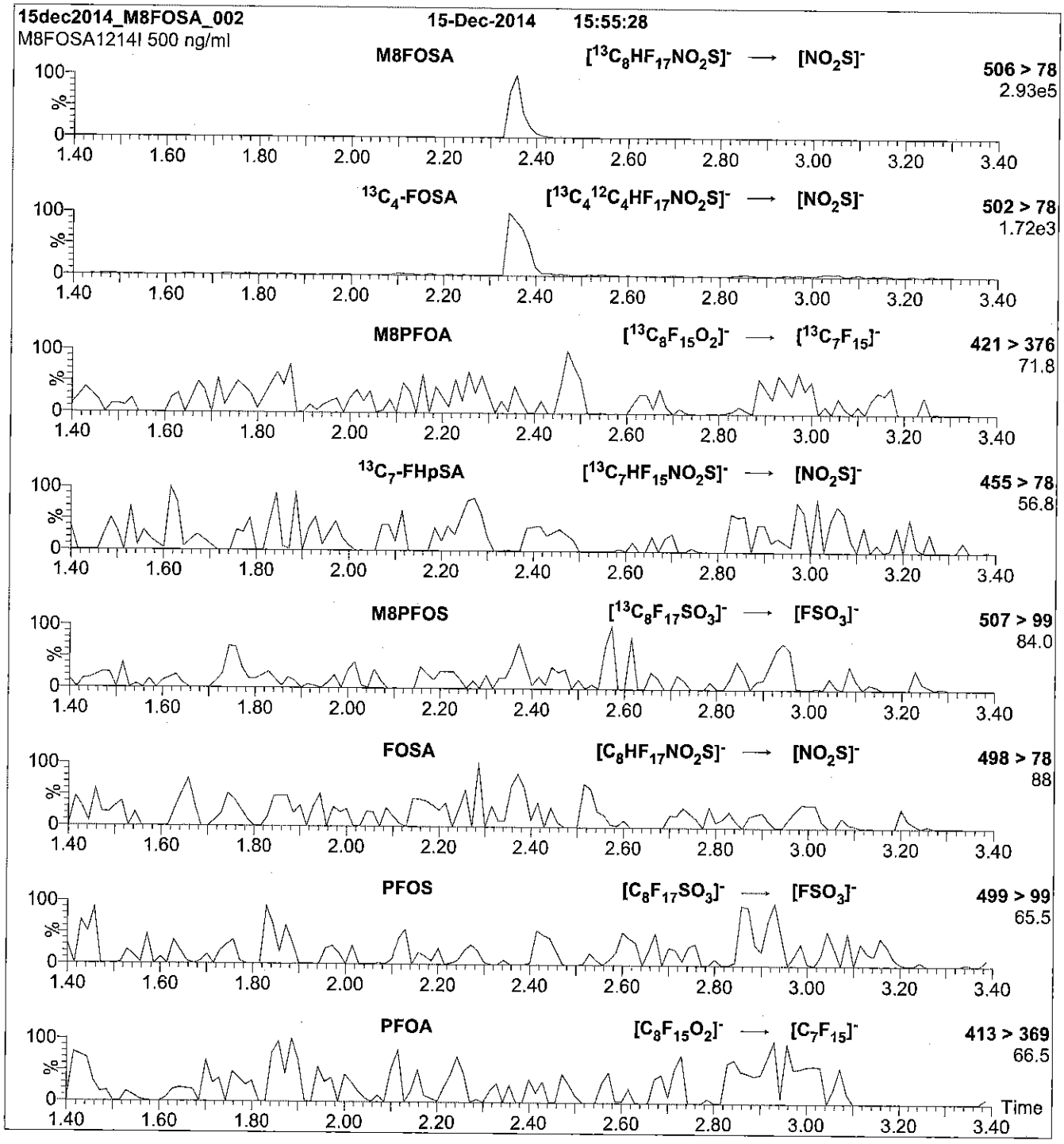
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCM8FOSA_00007

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

R: 1/25/16
S:

WELLINGTON LABORATORIES

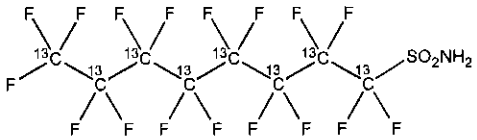
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: M8FOSA1214I

STRUCTURE:

CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

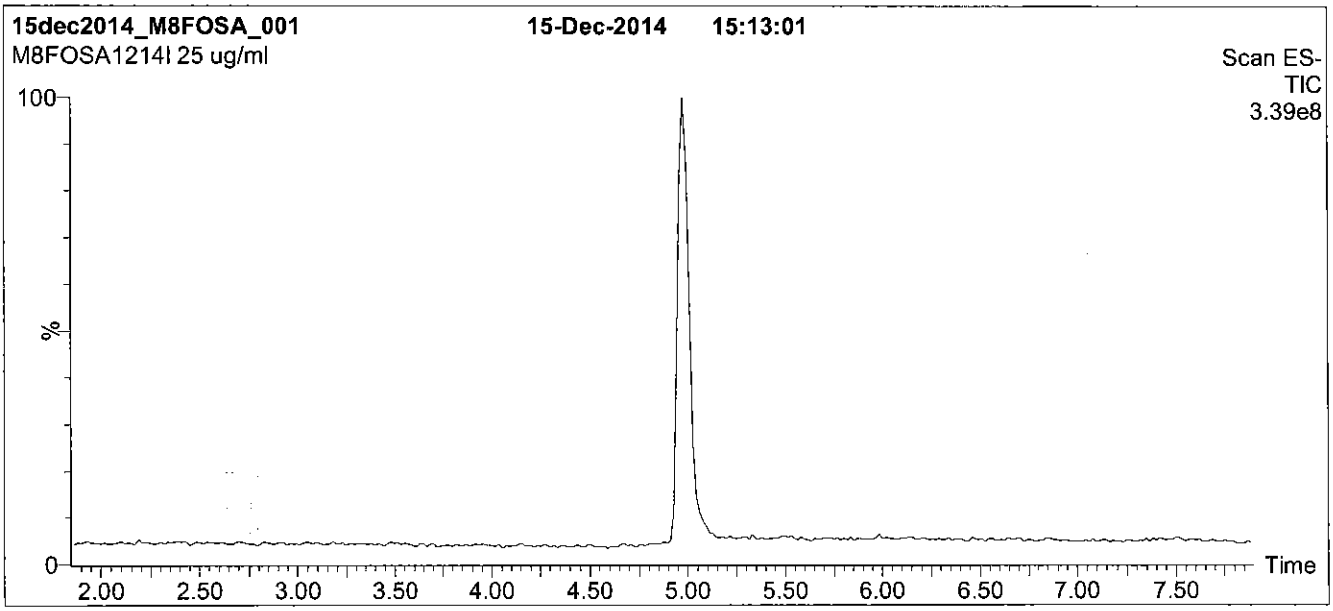
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

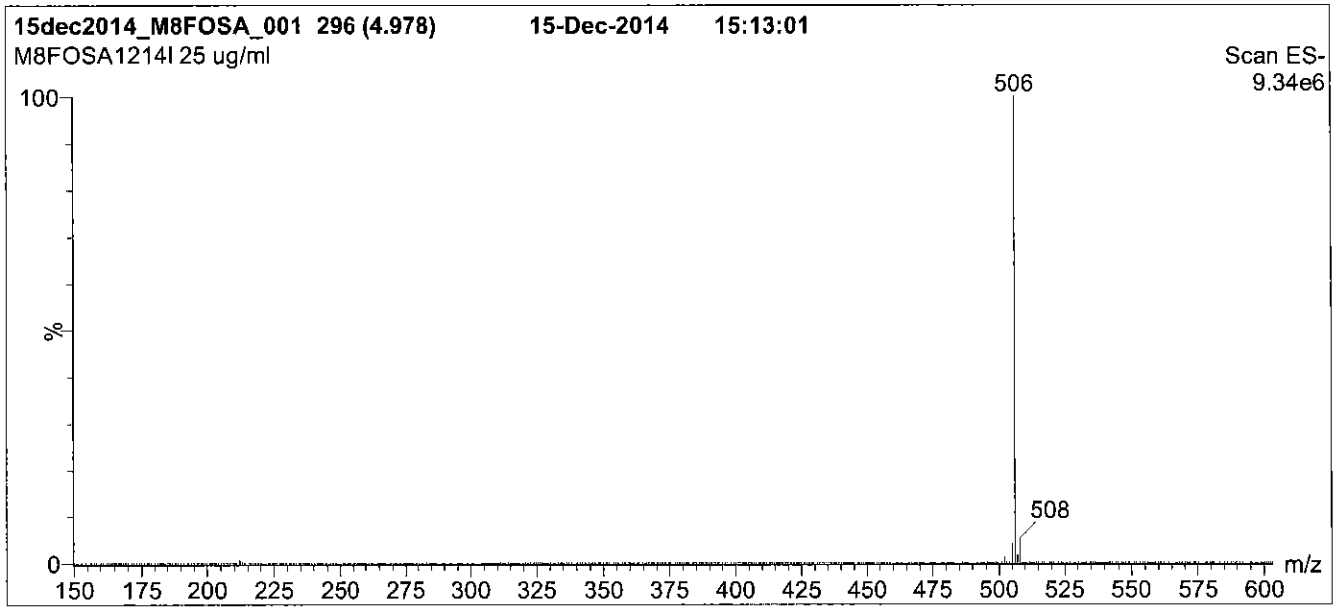
CALA Testing Accreditation No. A 1226

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

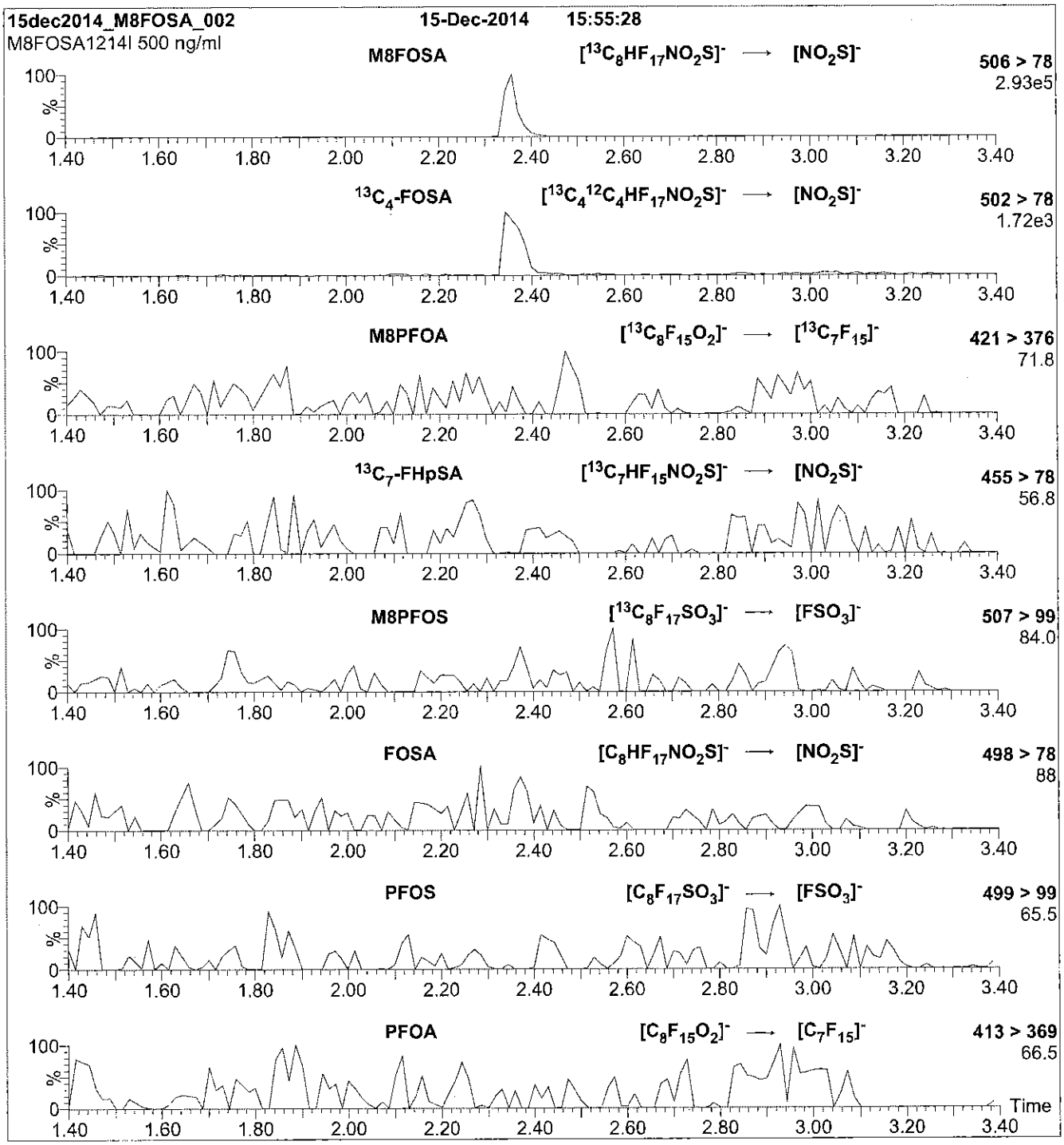
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCM8FOSA_00009

609714
ID: LCM8FOSA_00009
Exp: 12/22/17 Prpd: CBW
13C8-Perfluorooctanesulfo

R=4/7/16 CBW

WELLINGTON LABORATORIES

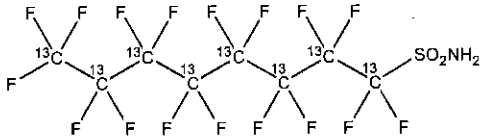
CERTIFICATE OF ANALYSIS DOCUMENTATION

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

LOT NUMBER: M8FOSA1215I

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_8H_2F_{17}NO_2S$	**MOLECULAR WEIGHT:**	507.09
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Isopropanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($^{13}C_8$)
LAST TESTED: (mm/dd/yyyy)	12/22/2015		
EXPIRY DATE: (mm/dd/yyyy)	12/22/2017		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 01/14/2016 (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,...x_n on which it depends is:

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

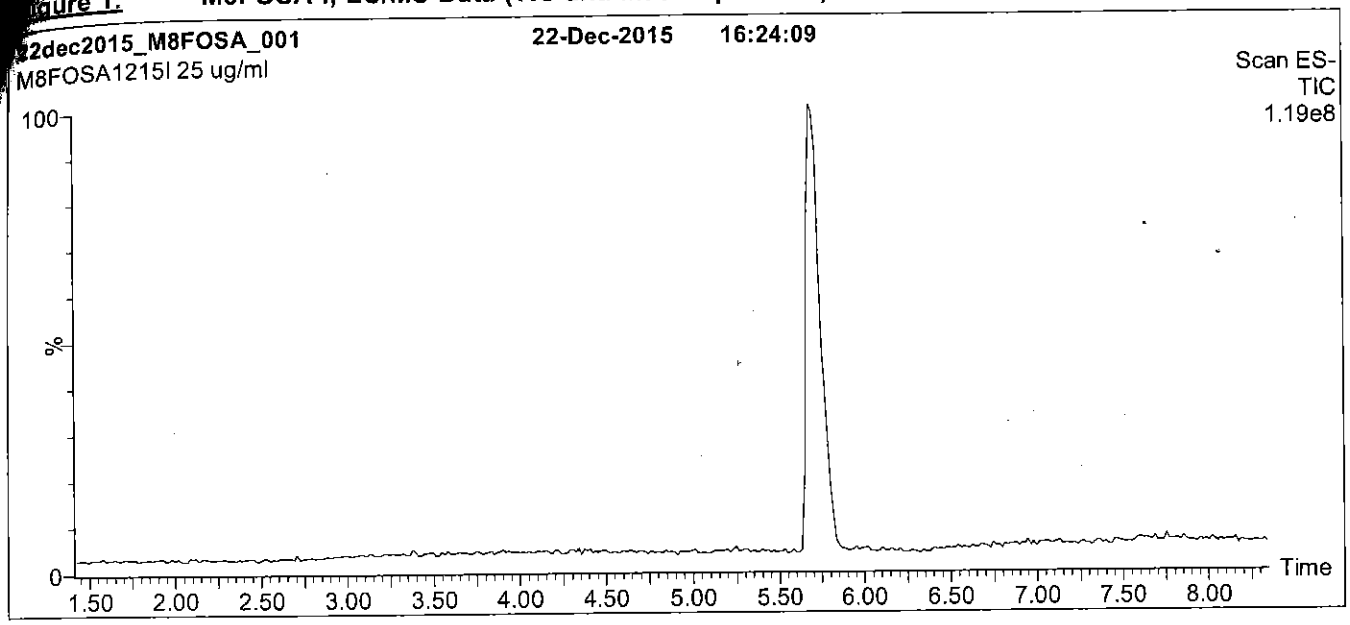
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

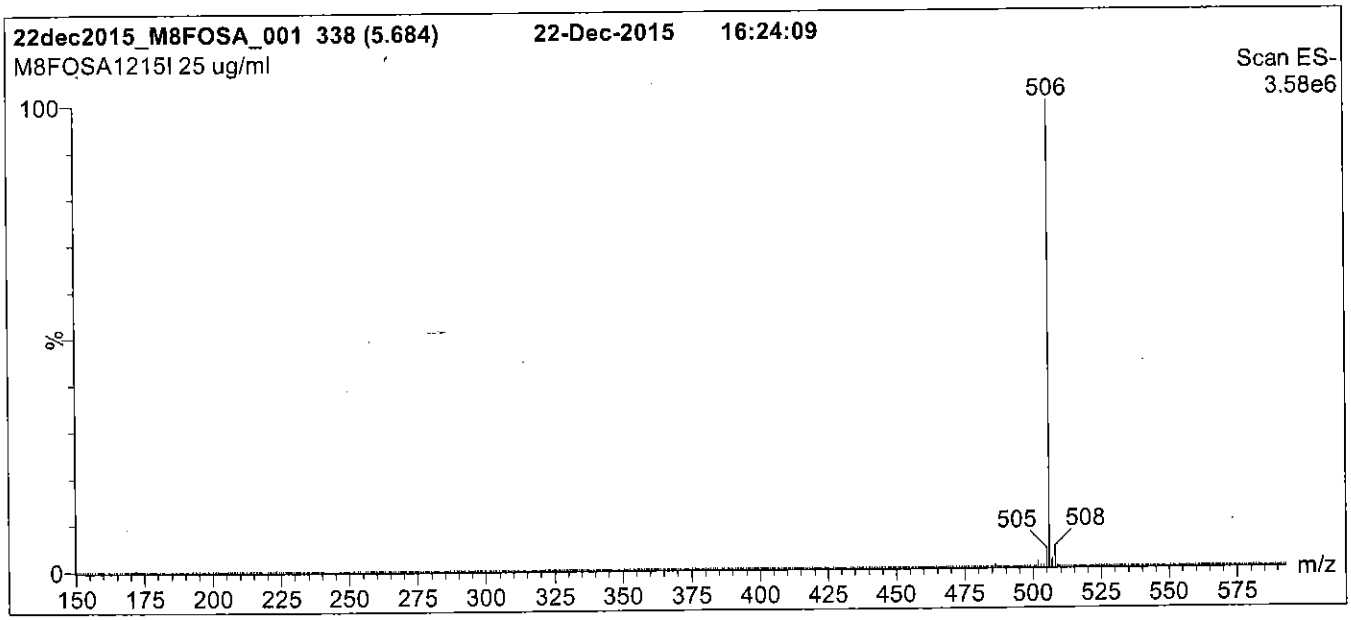
CALA Testing Accreditation No. A1226

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

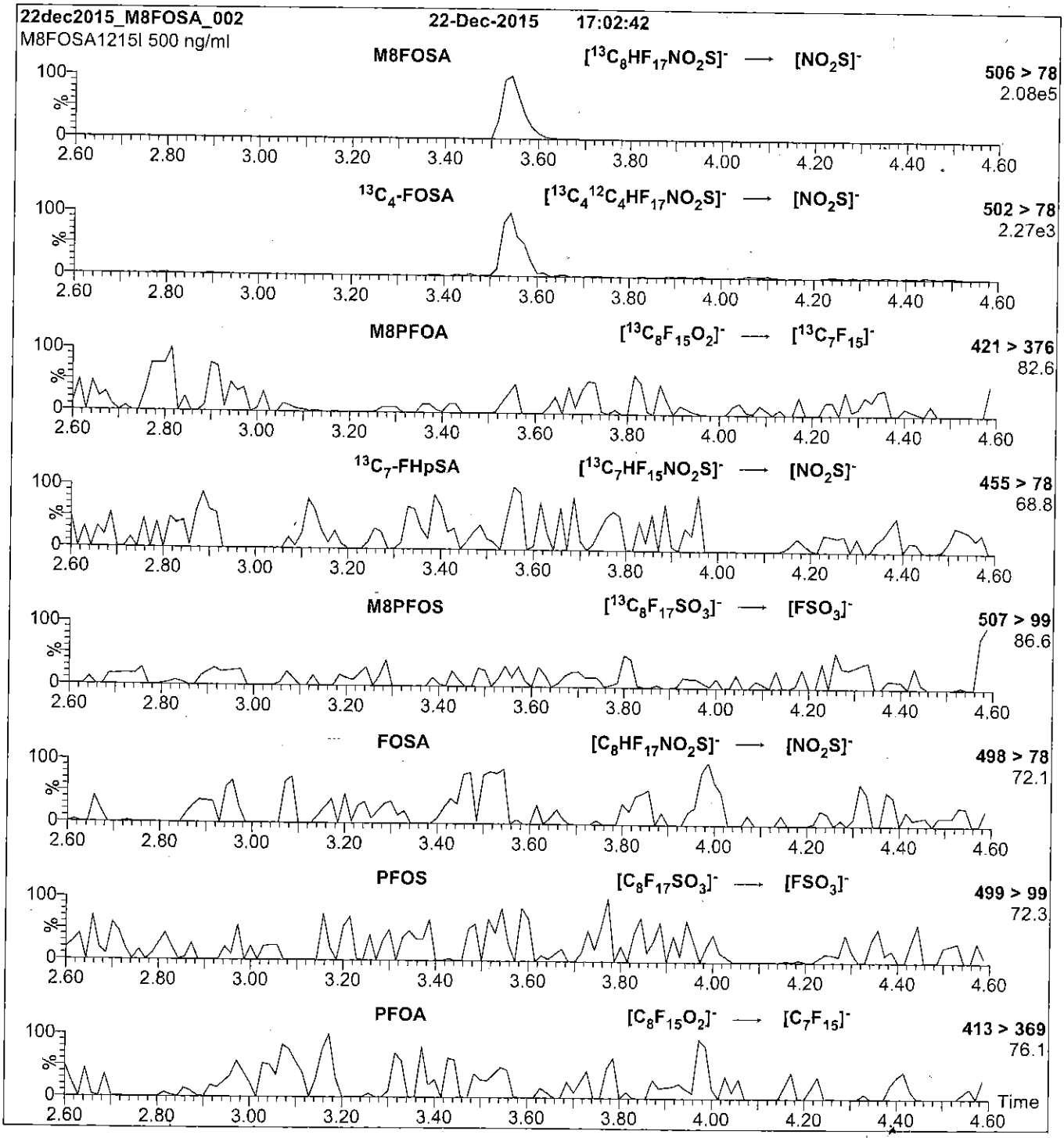
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFBA_00004

R: 12/9/15 SEJ

WELLINGTON LABORATORIES

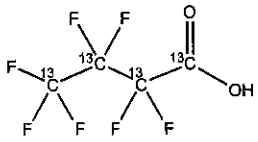
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFBA1014

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_4HF_7O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 218.01
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 10/31/2014
EXPIRY DATE: (mm/dd/yyyy) 10/31/2019
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

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.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

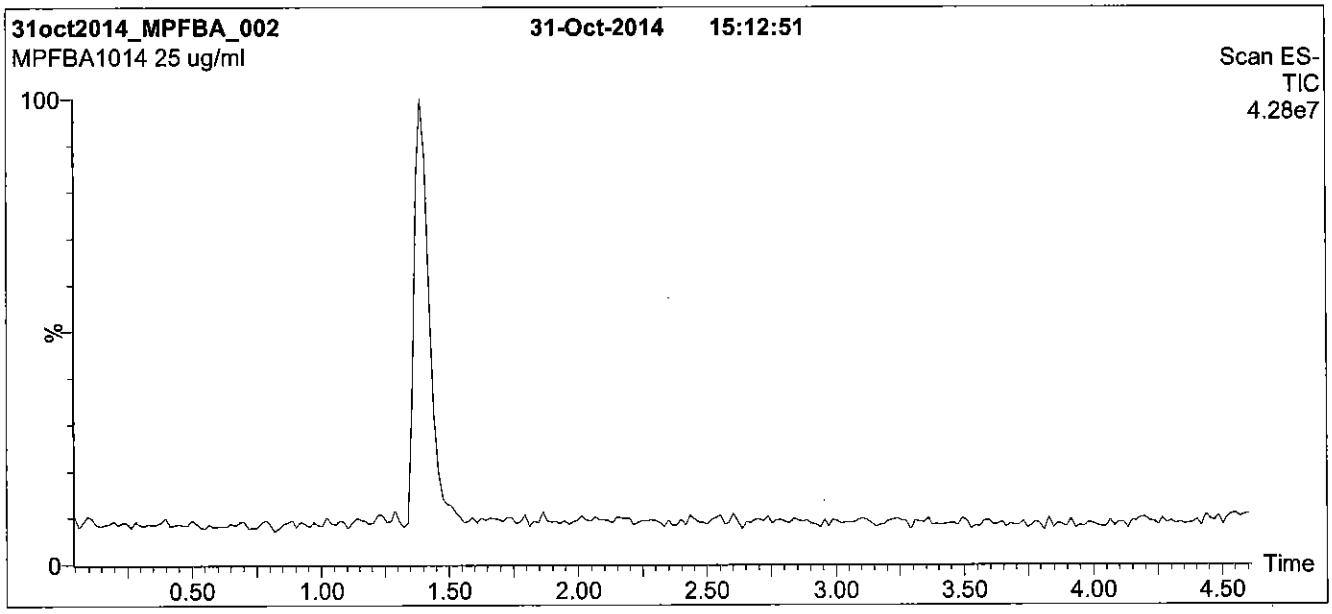
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

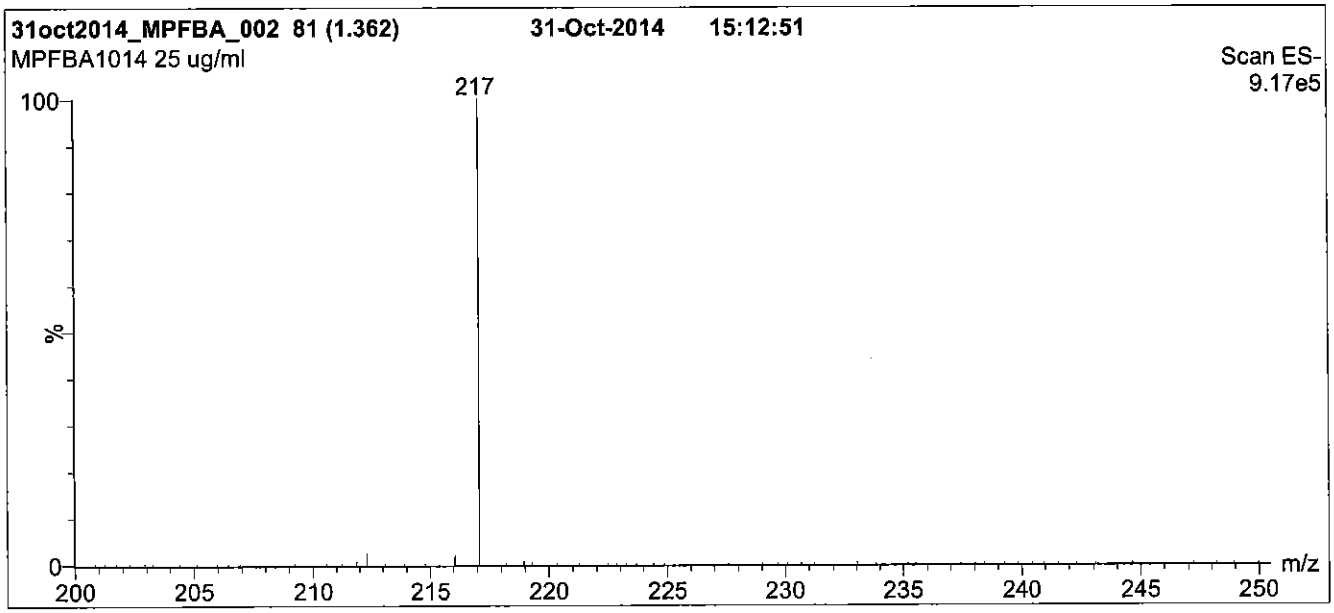
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED Reference Material Producer

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

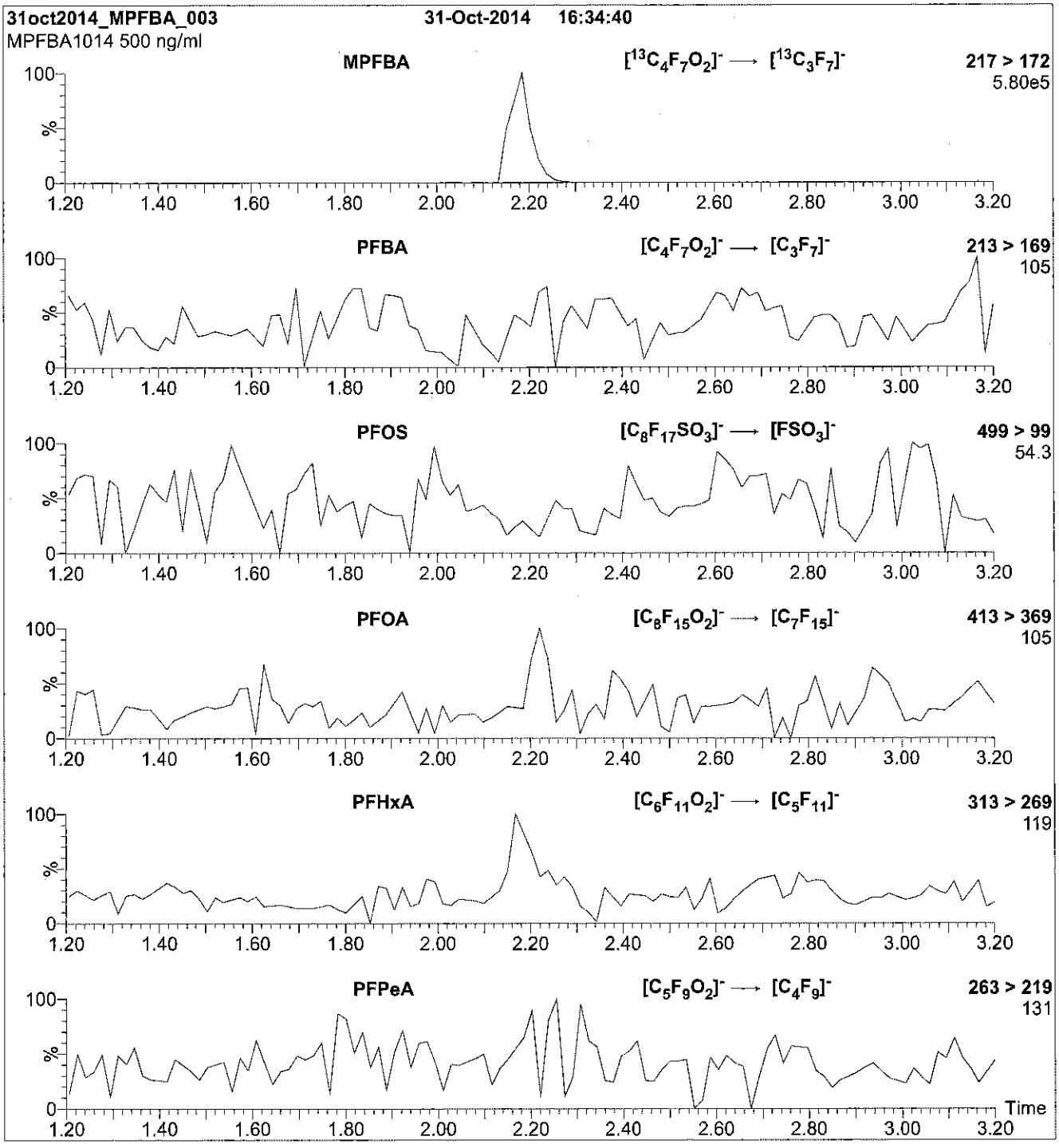
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (200 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFBA_00006

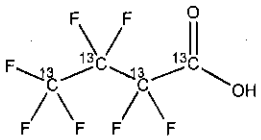
609707
ID: LCMPFBA_00006
Exp: 10/31/19 Prpd: CBW
13C4-Perfluorobutanoic ac

R: 4/7/16 CBW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	MPFBA	**LOT NUMBER:**	MPFBA1014
COMPOUND:	Perfluoro-n-[1,2,3,4-$^{13}C_4$]butanoic acid		
STRUCTURE:		**CAS #:**	Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

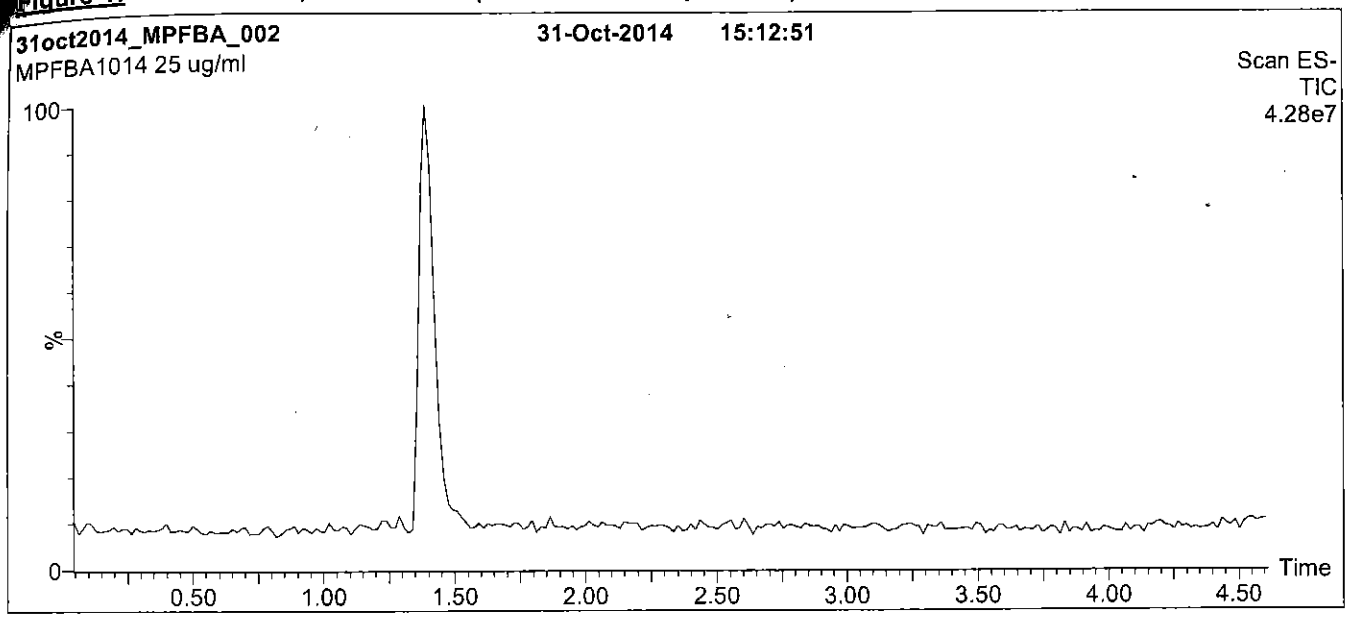
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

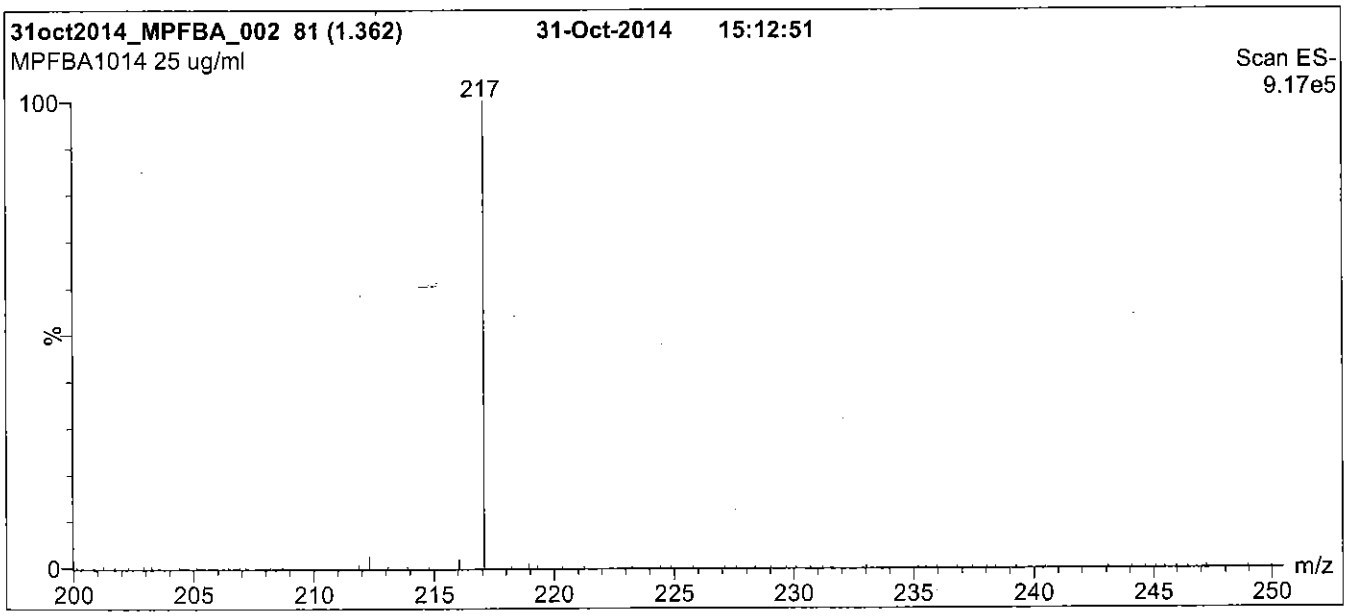
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

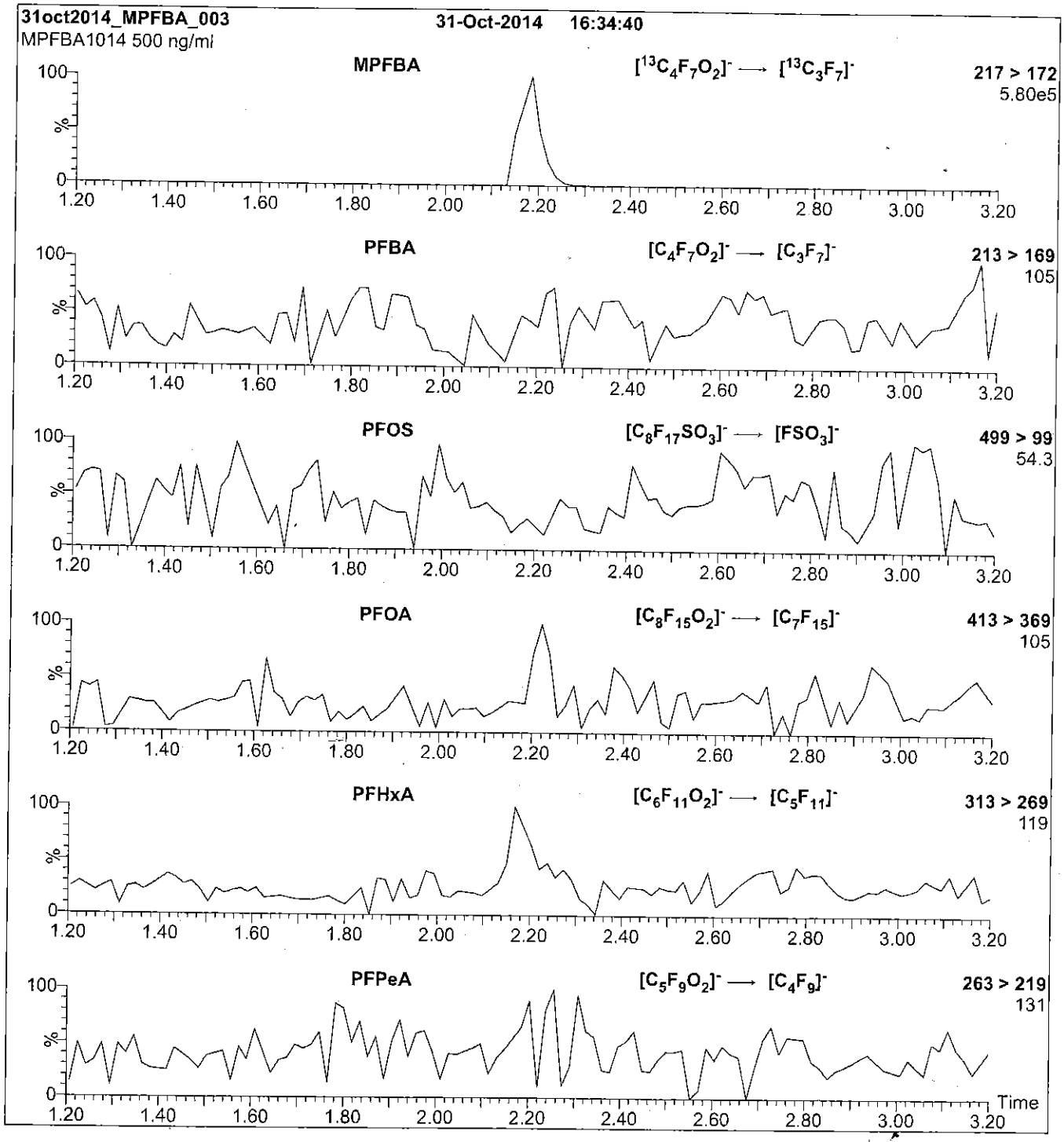
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (200 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFDA_00004

R: 10-20-2011 (was 2012)

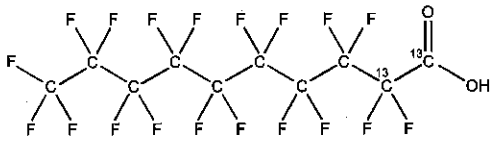
Rec. 10-20-2011

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

12LCMS0262
LCMPFDA_00001

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



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

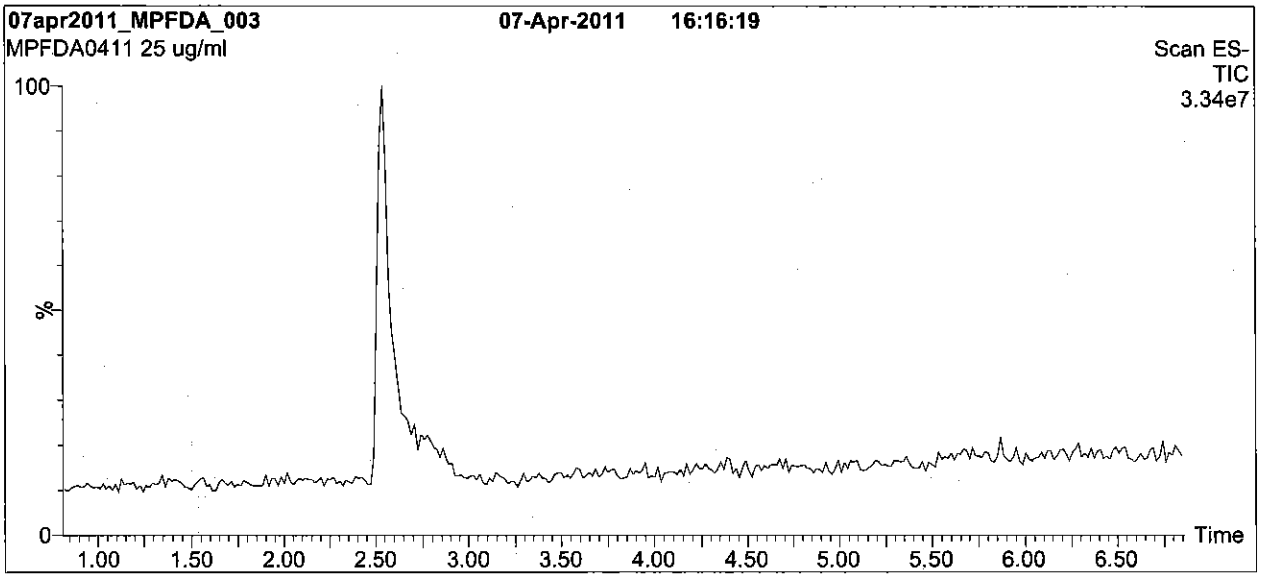
Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

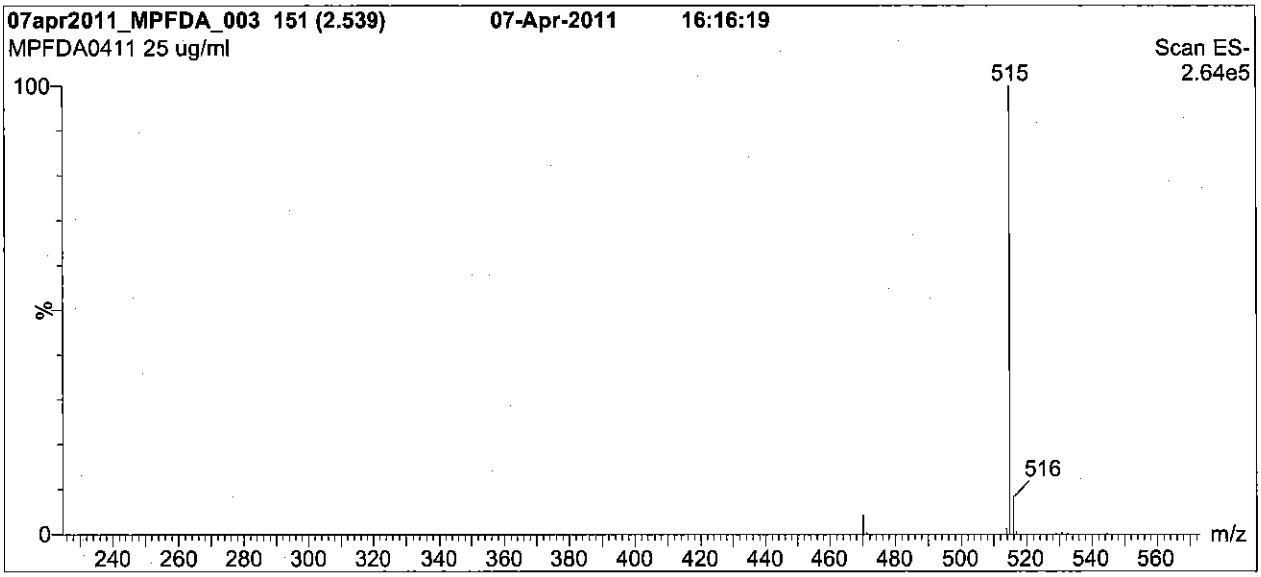
LIMITED WARRANTY:

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

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

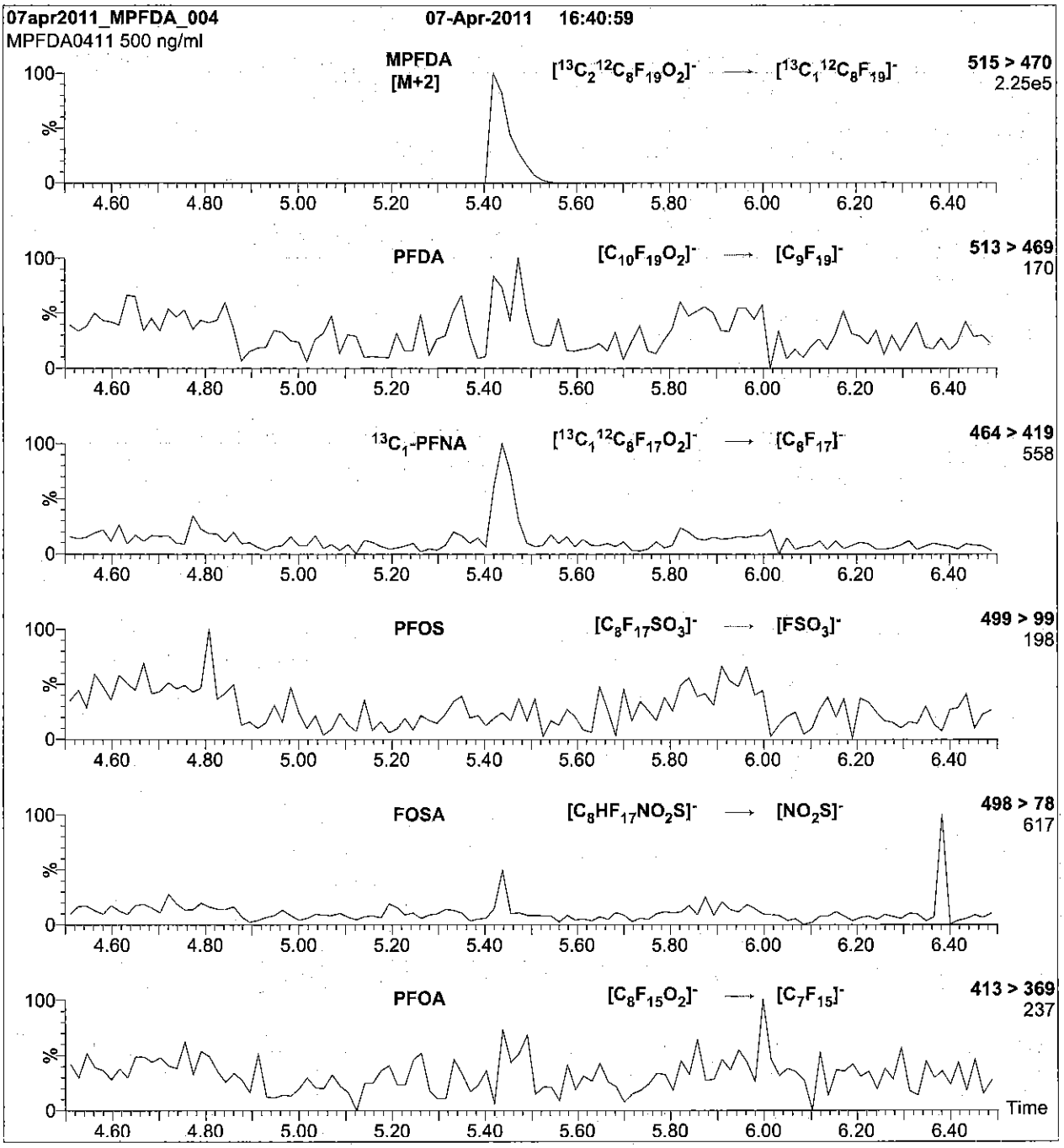
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

MS Parameters

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

Reagent

LCMPFDA_00005

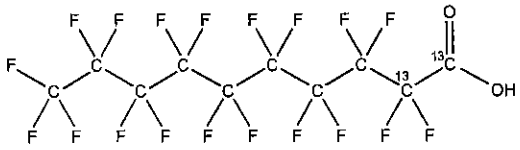
RL 4/15/15 SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFDA
LOT NUMBER: MPFDA0414
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) 04/13/2014
EXPIRY DATE: (mm/dd/yyyy) 04/13/2019
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

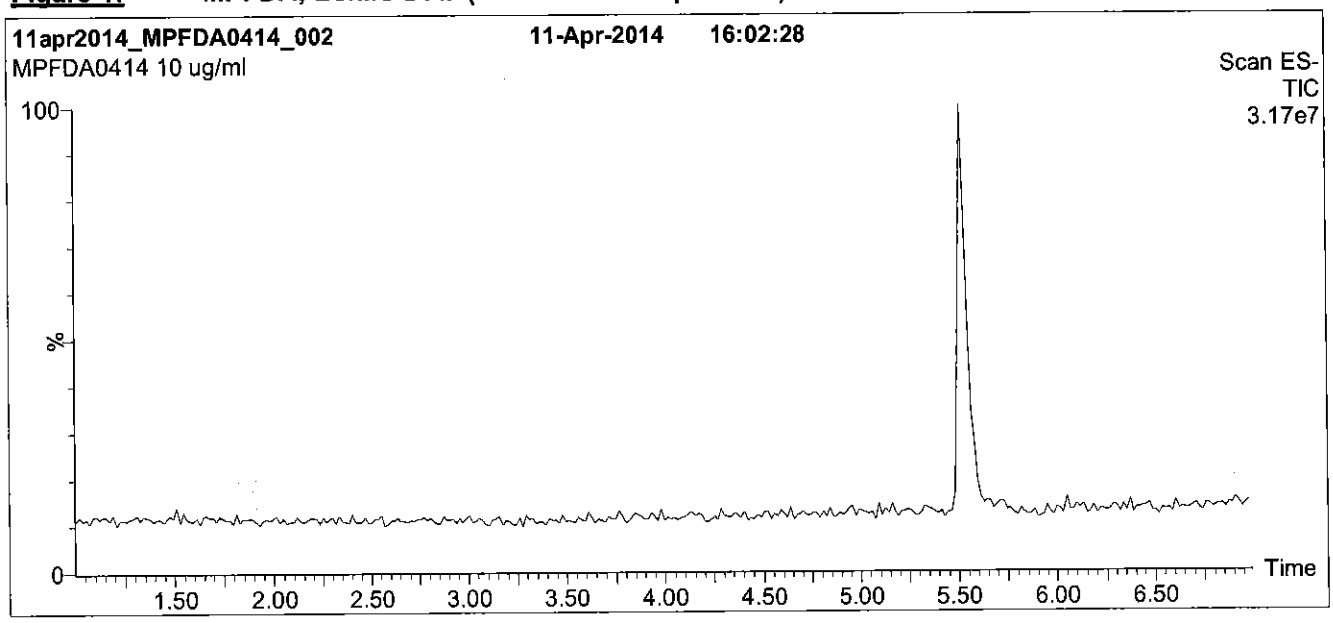
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

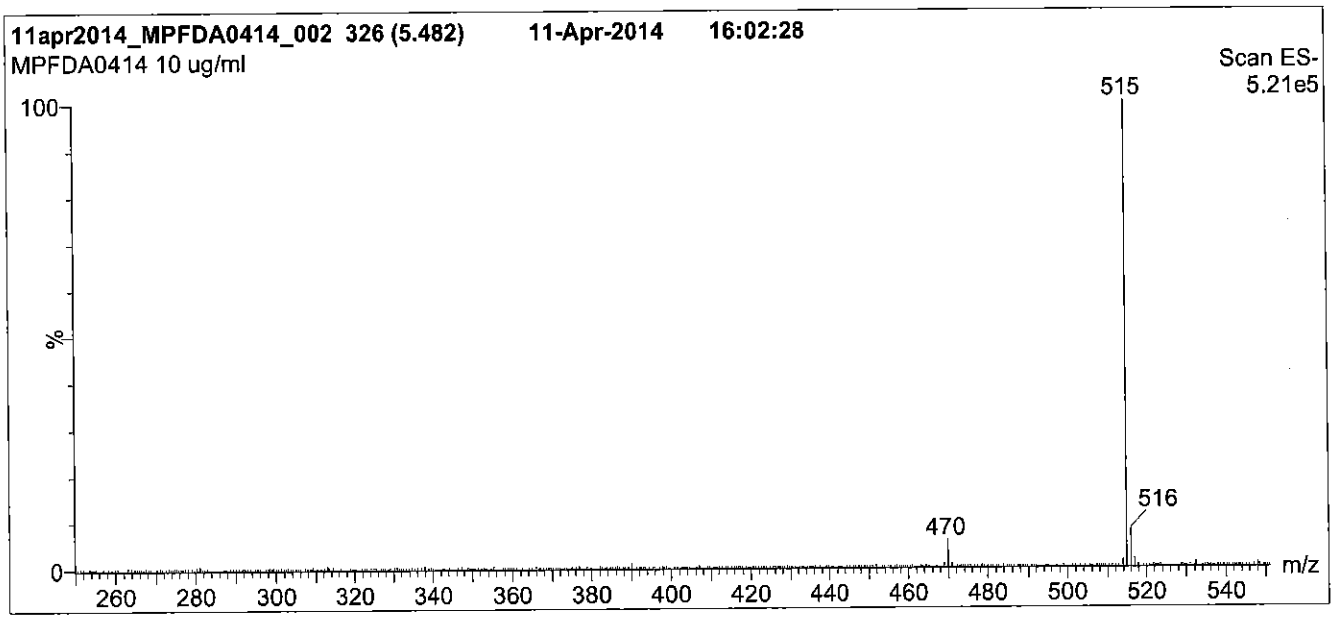
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

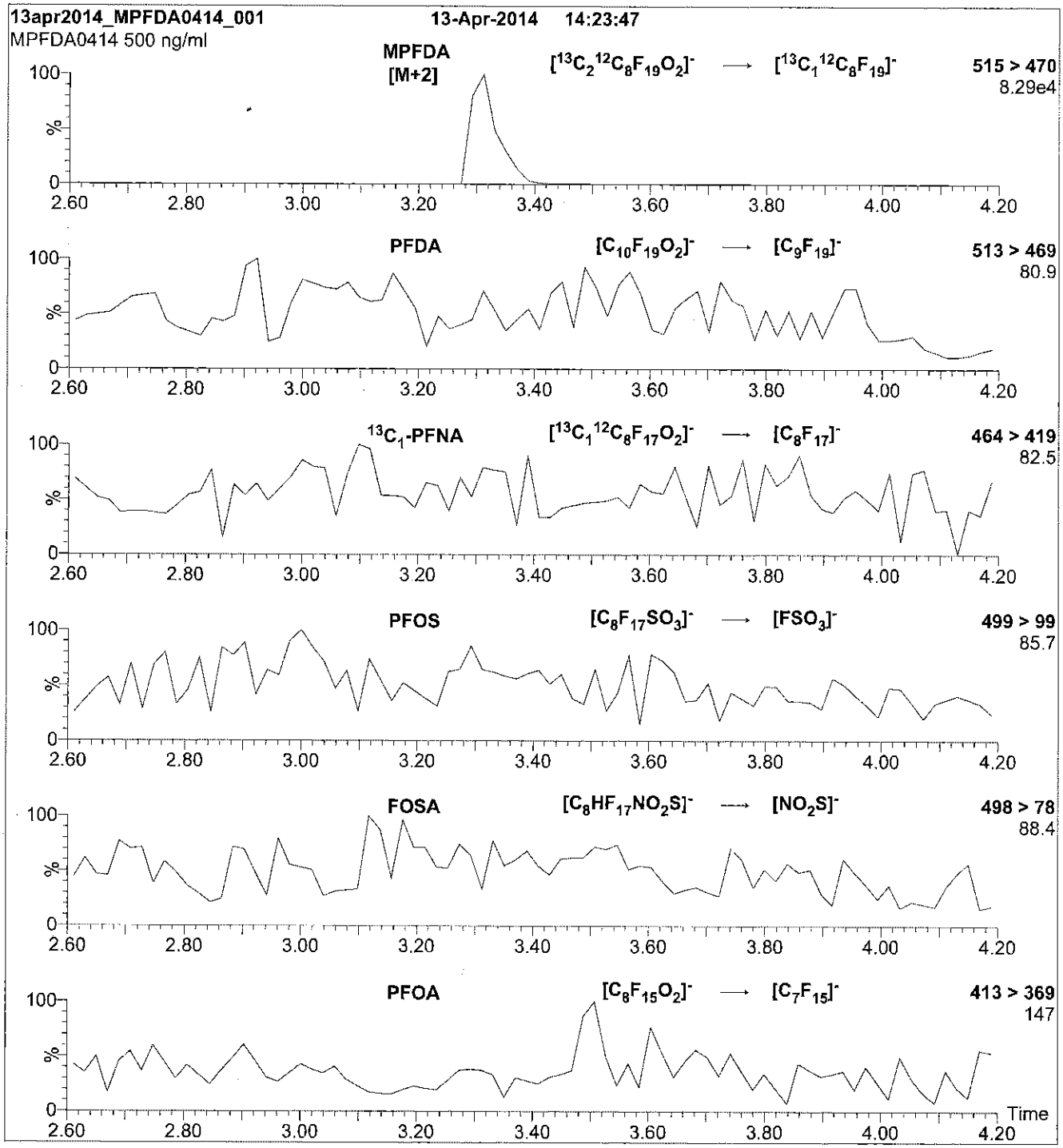
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

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

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



Conditions for Figure 2:

Injection:	Direct loop injection 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) = 3.31e-3
Collision Energy (eV) = 13

Reagent

LCMPFDA_00006

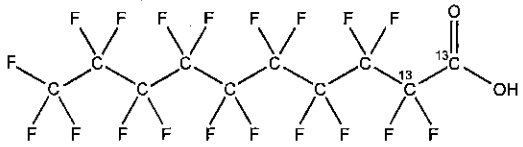
R: 2/25/16 CBW

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

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

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



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

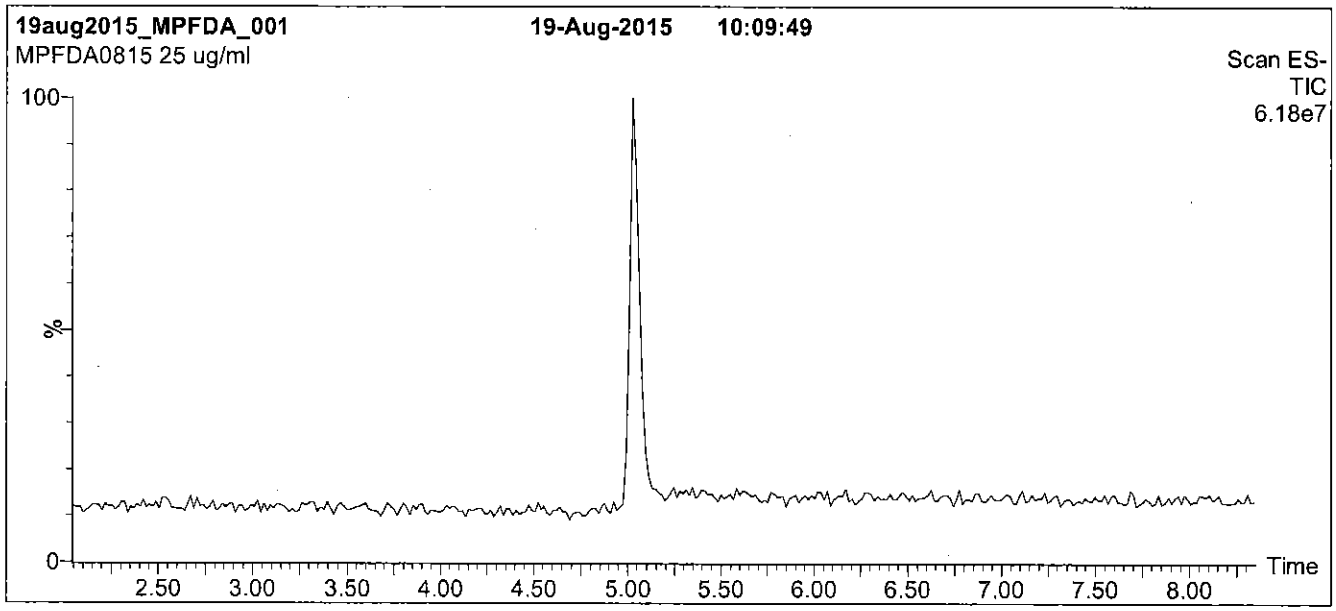
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

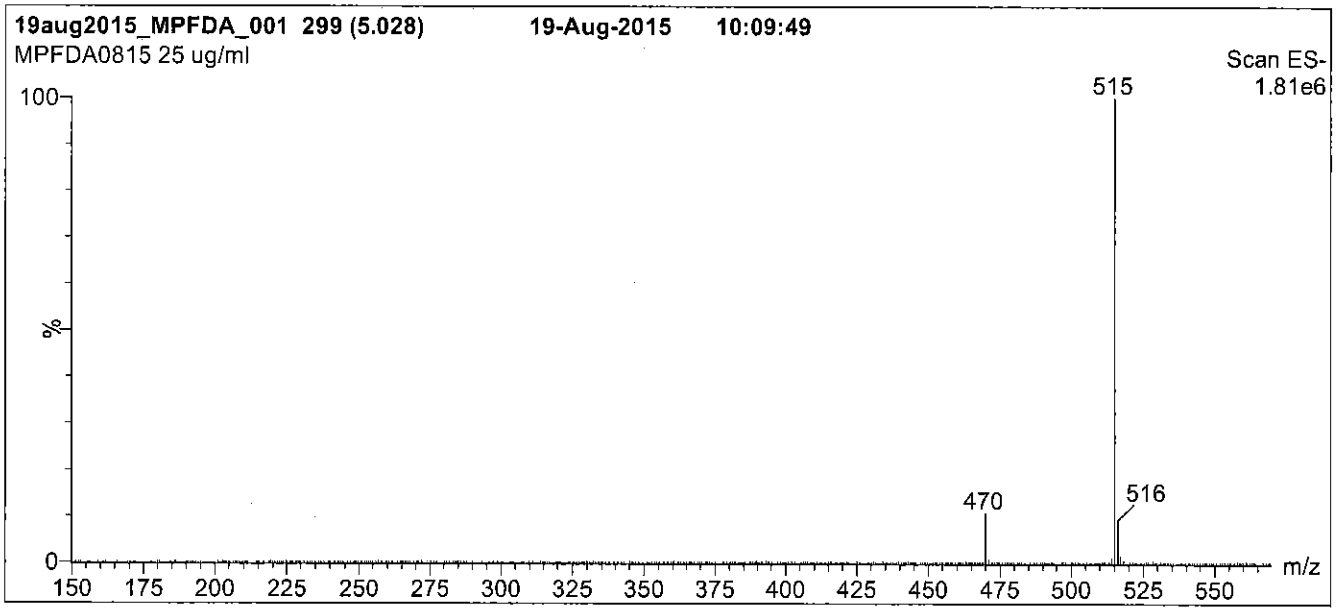
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

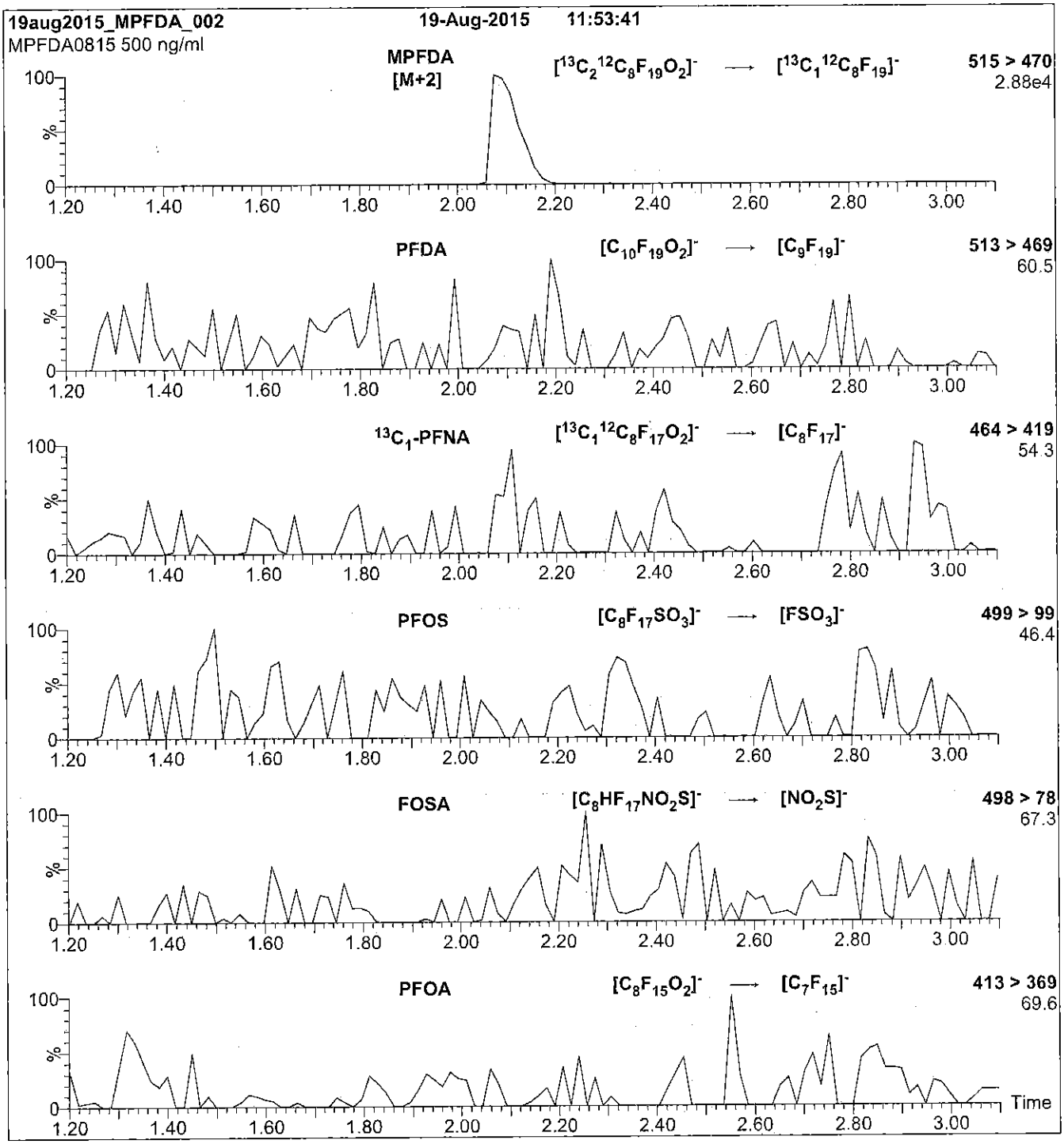
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFDA_00007

605232
ID: LCMPFDA_00007
Exp: 08/19/20 Prpd: CBW
13C2-Perfluorodecanoic a

Rec. 3/29/16 JRB ✓

WELLINGTON LABORATORIES

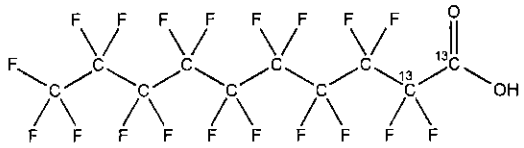
CERTIFICATE OF ANALYSIS DOCUMENTATION

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

LOT NUMBER: MPFDA0815

STRUCTURE:

CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

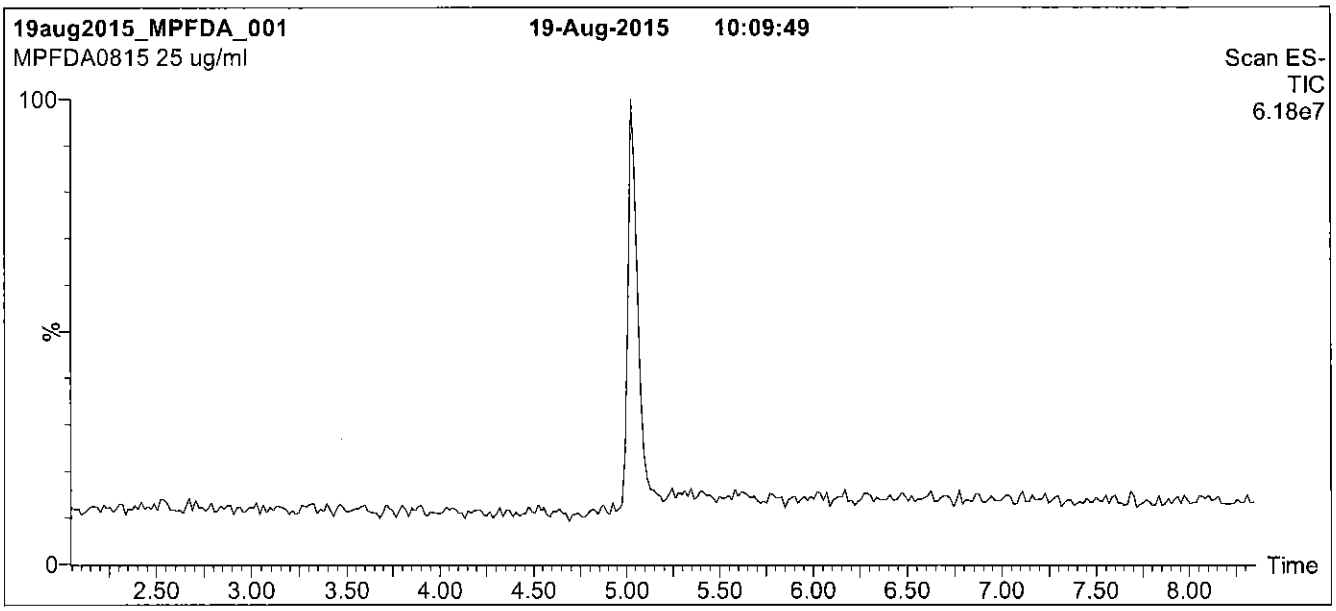
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

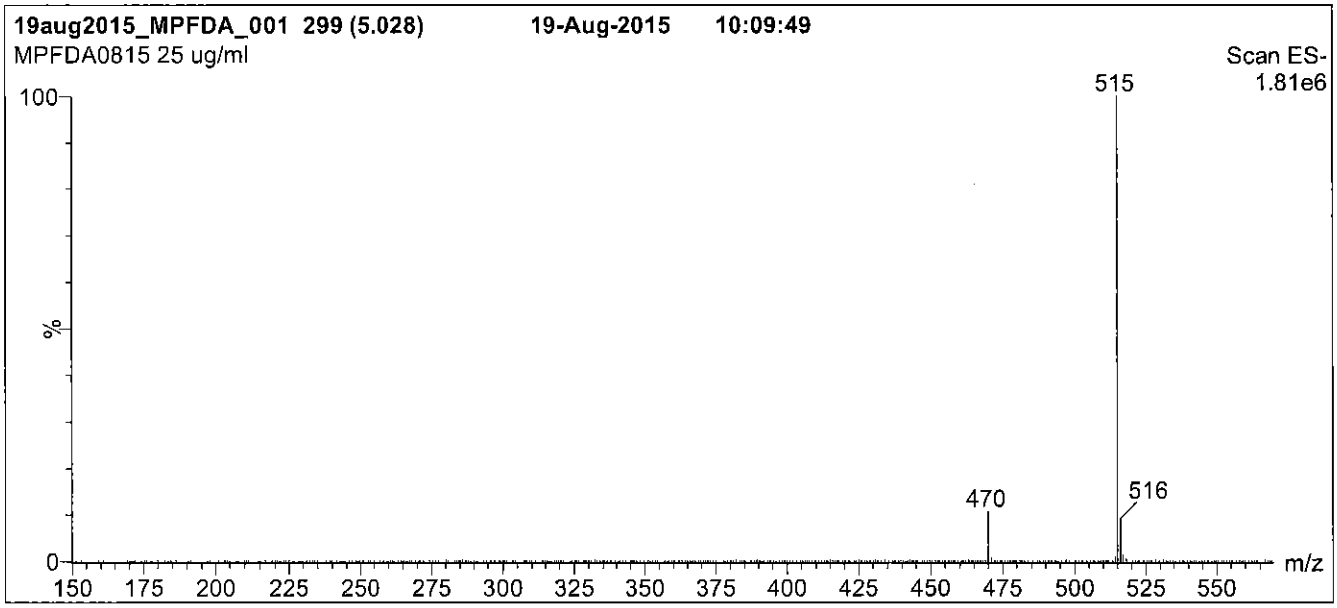
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17025 ISO 17034 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

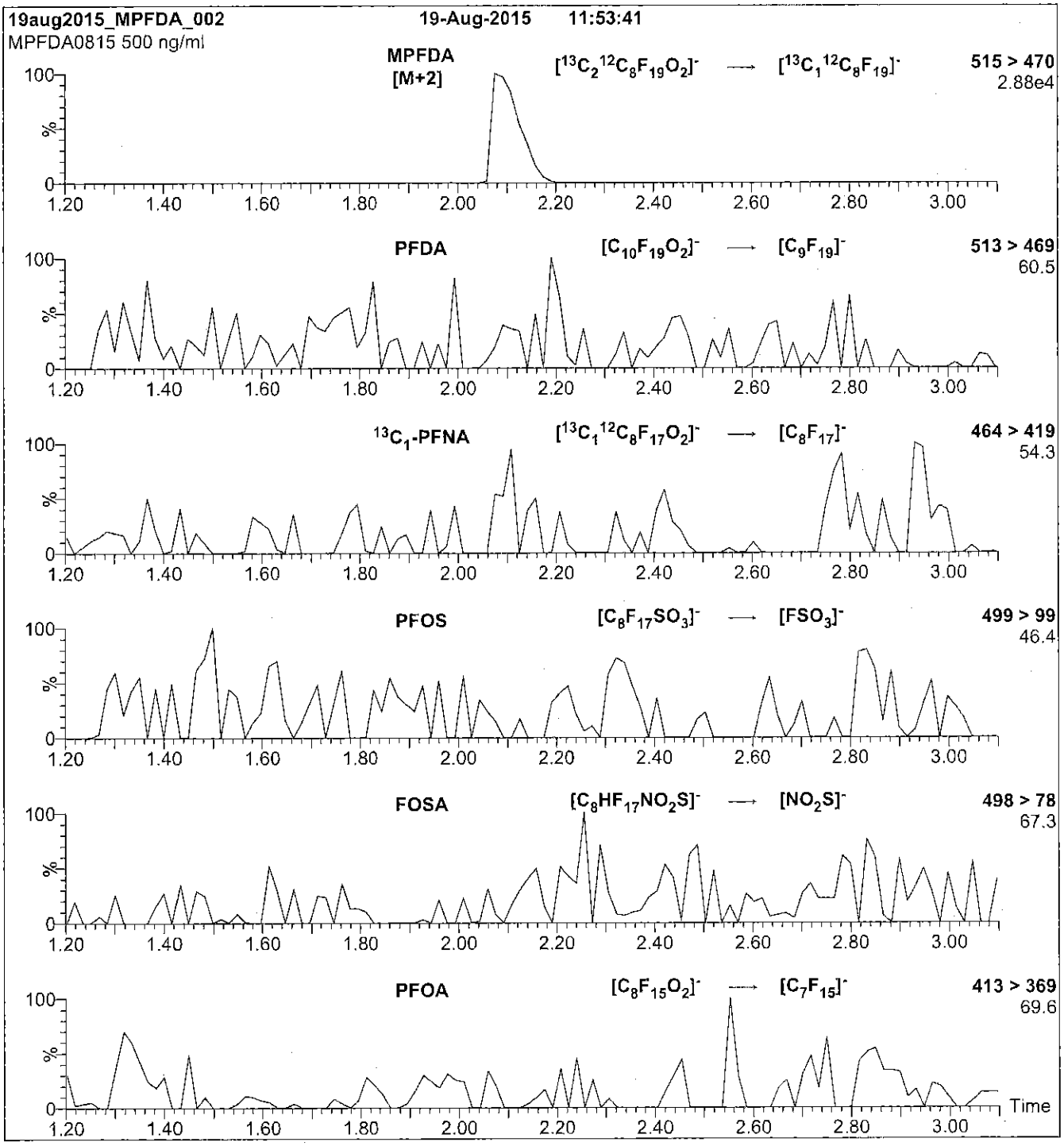
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFDoA_00003

P. 2/11/15 SRV

WELLINGTON LABORATORIES

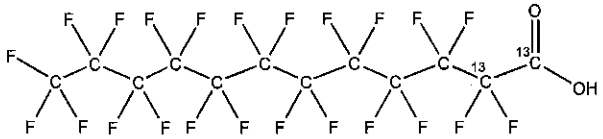
CERTIFICATE OF ANALYSIS DOCUMENTATION

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

LOT NUMBER: MPFDoA0714

STRUCTURE:

CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

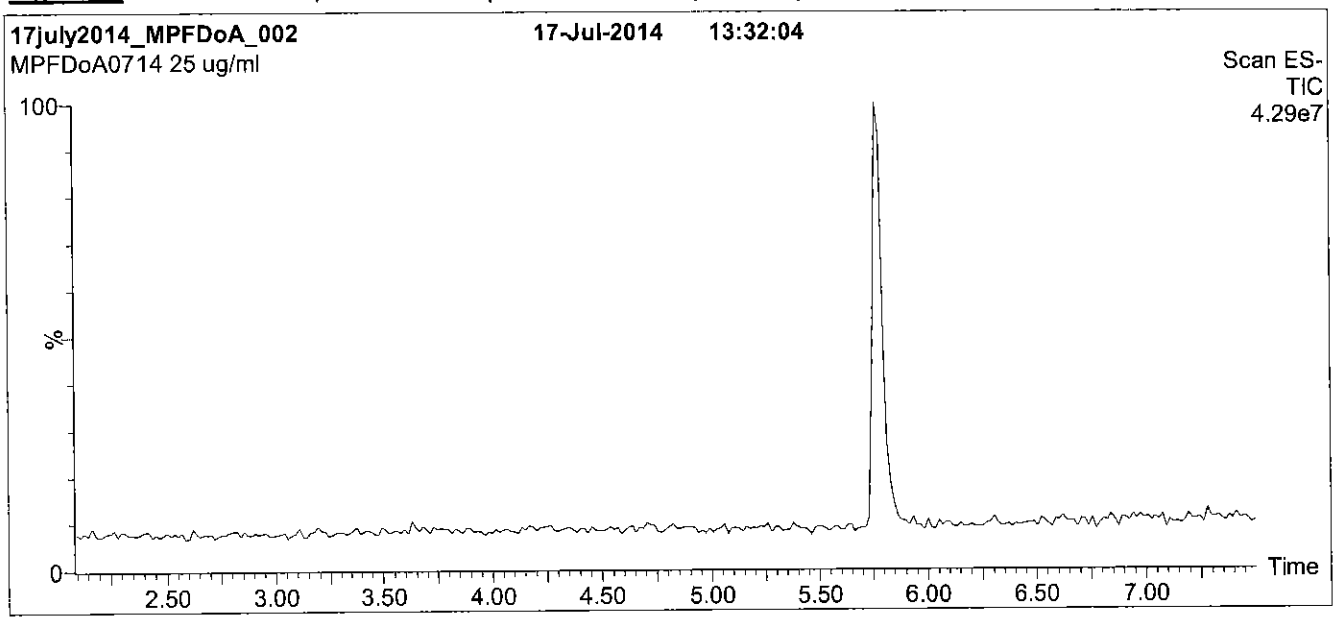
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

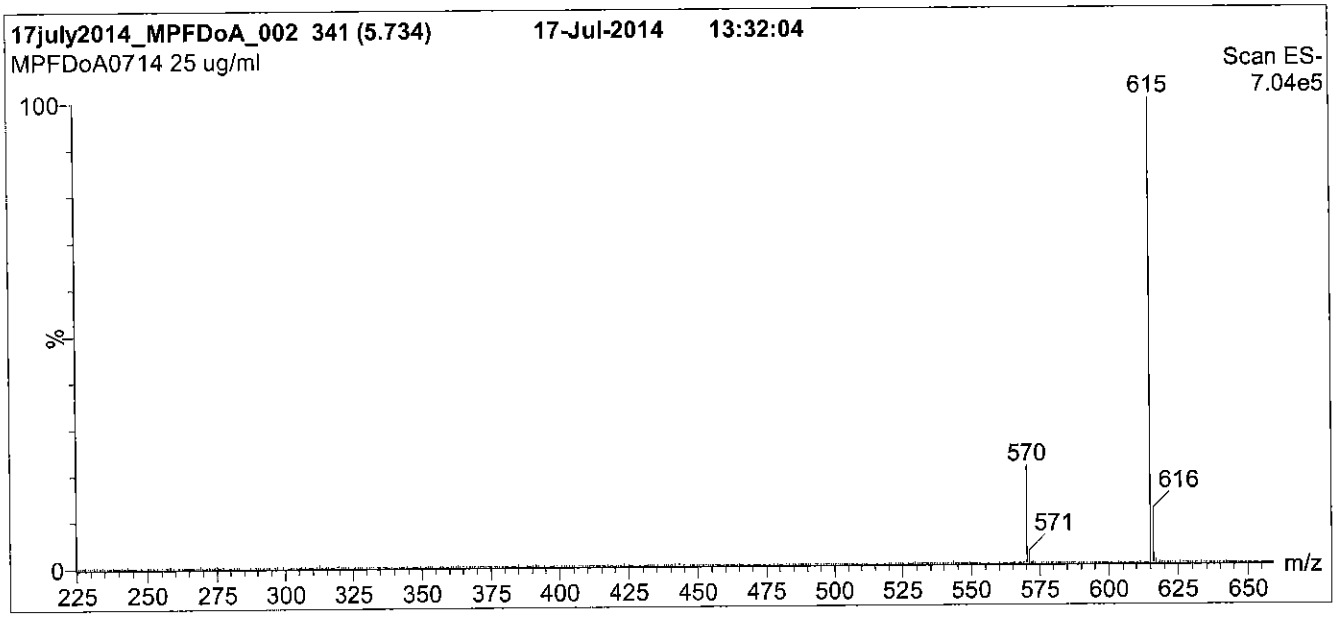
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

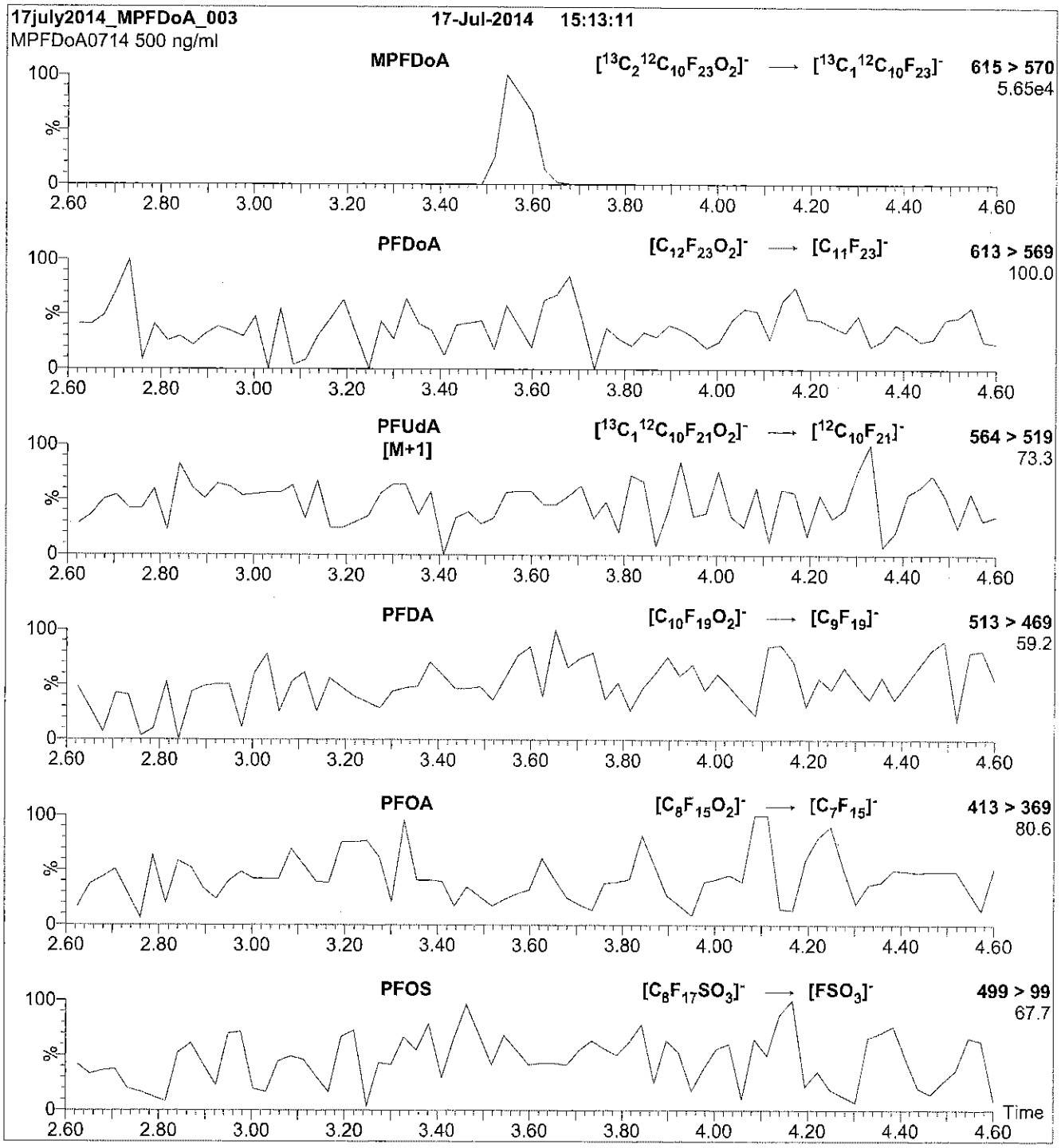
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 950 amu)

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

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



Conditions for Figure 2:

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

MS Parameters

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

Reagent

LCMPFDoA_00004

V : 14/10/15 JKV

WELLINGTON LABORATORIES

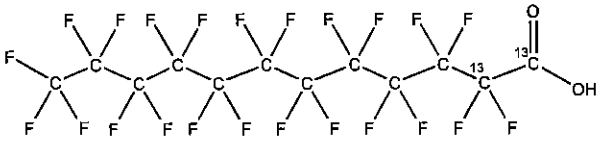
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFDoA0714

STRUCTURE:

CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

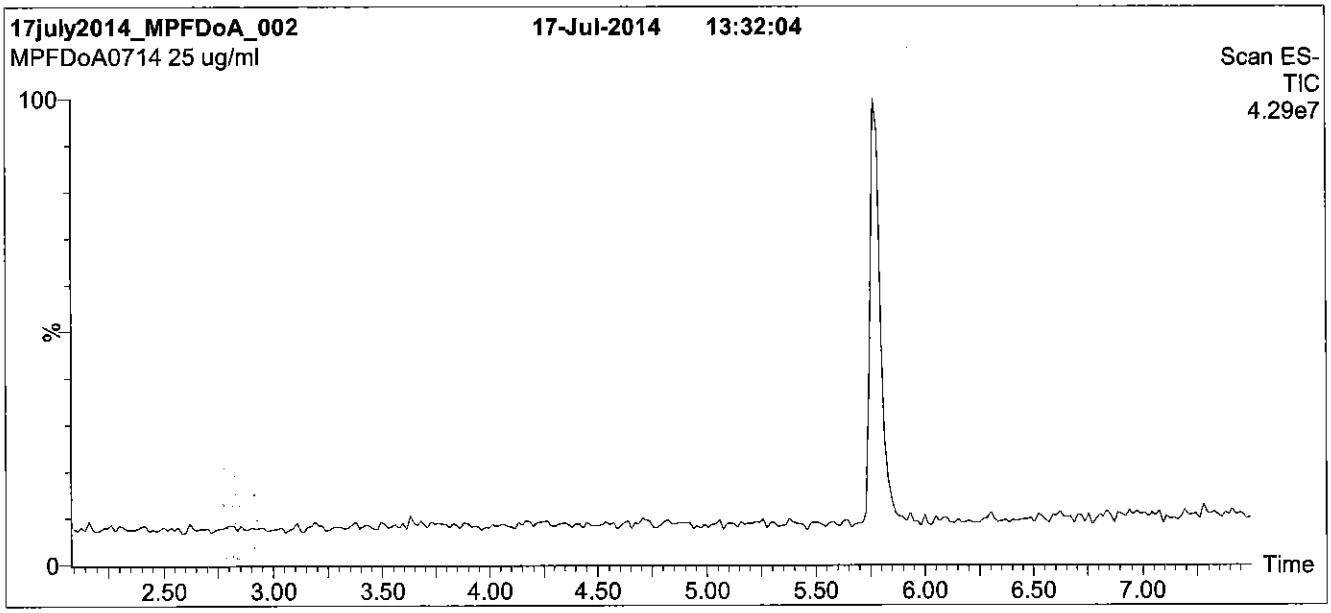
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

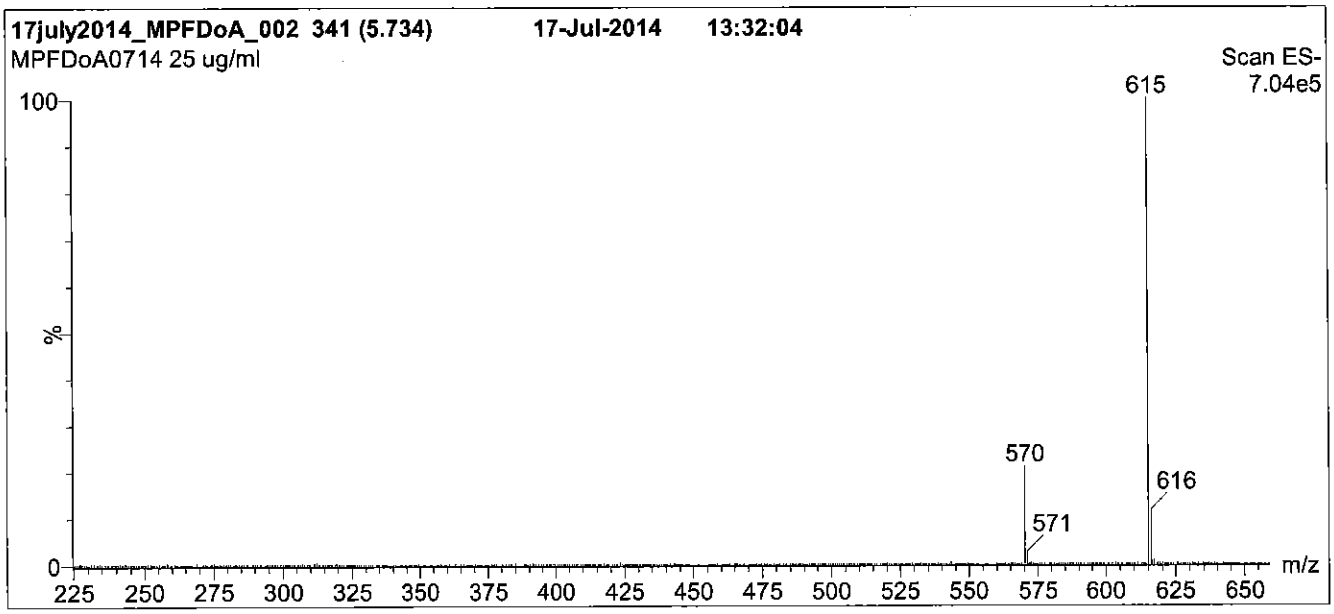
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

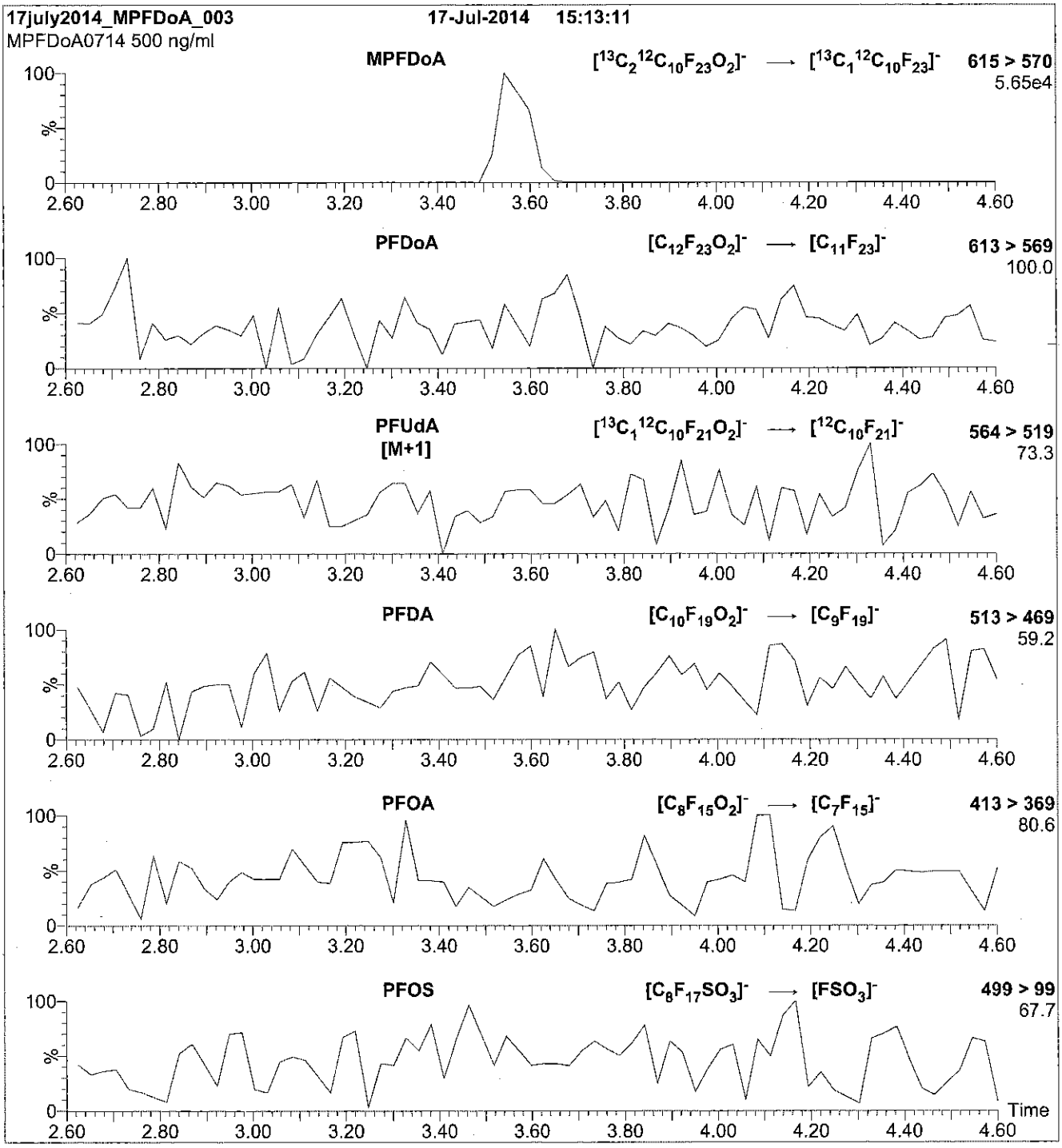
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 950 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFDoA_00006

609708
ID: LCMPFDoA_00006
Exp: 07/17/19 Prpd: CBW
13C2-Perfluorododecanoic

R: 4/7/16 CBW

WELLINGTON LABORATORIES

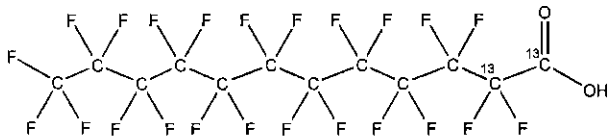
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFDoA0714

STRUCTURE:

CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

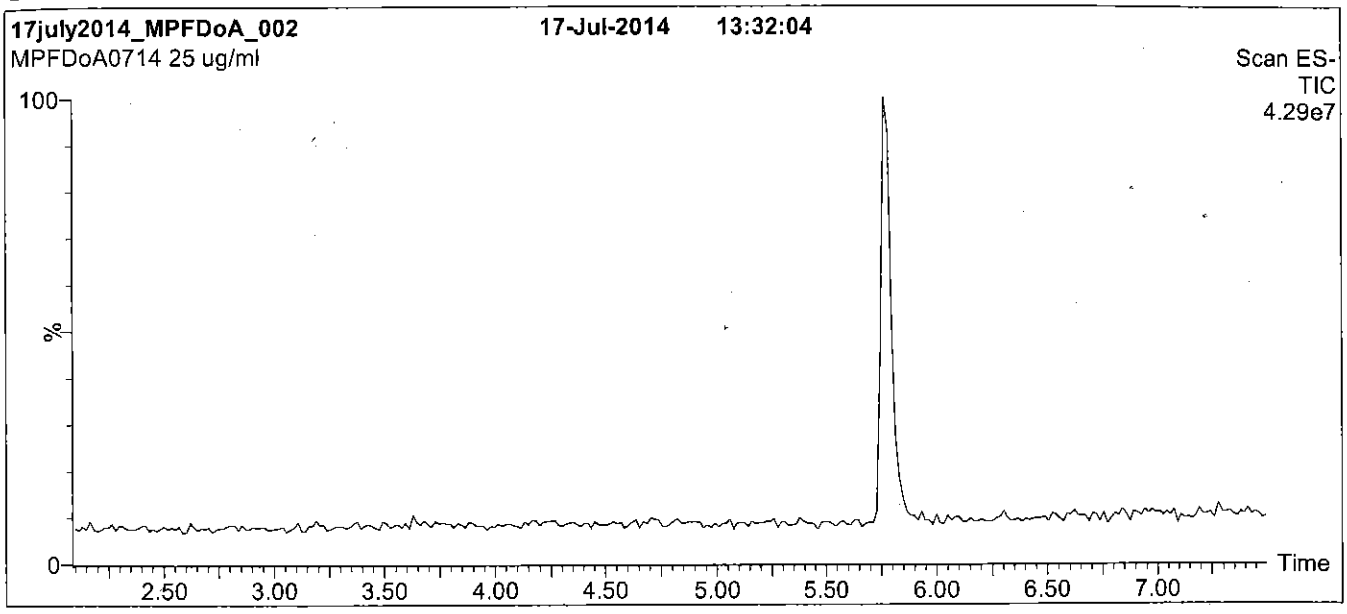
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

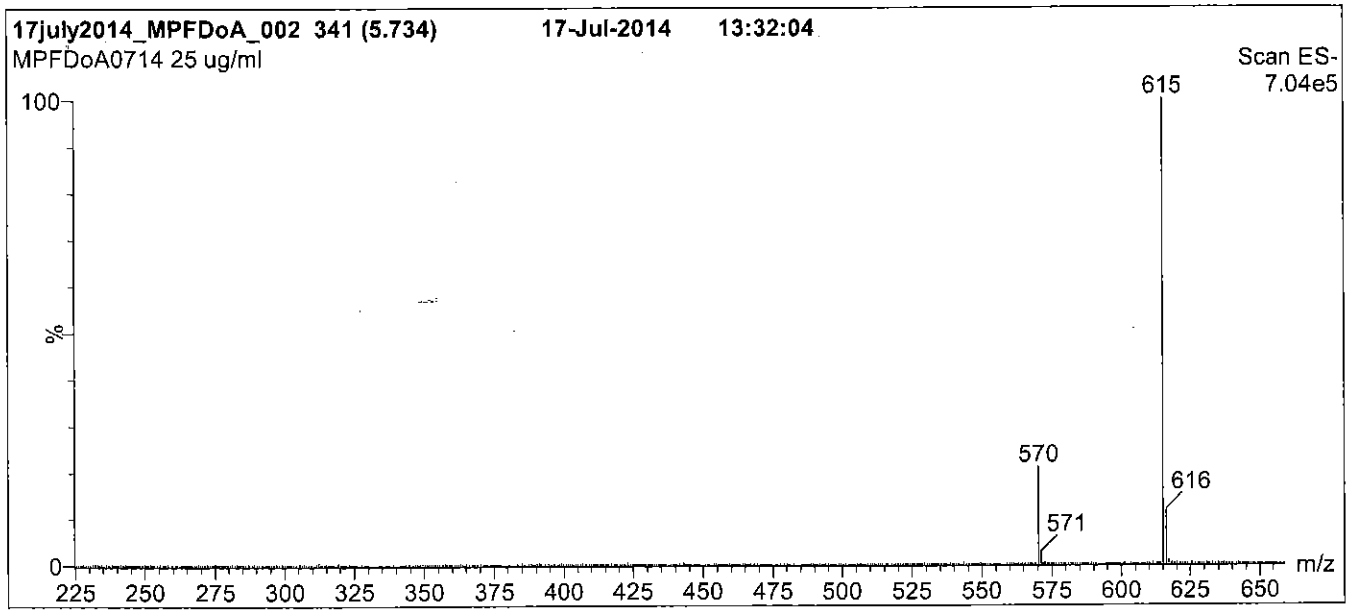
CALA Testing Accreditation Inc. A 1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

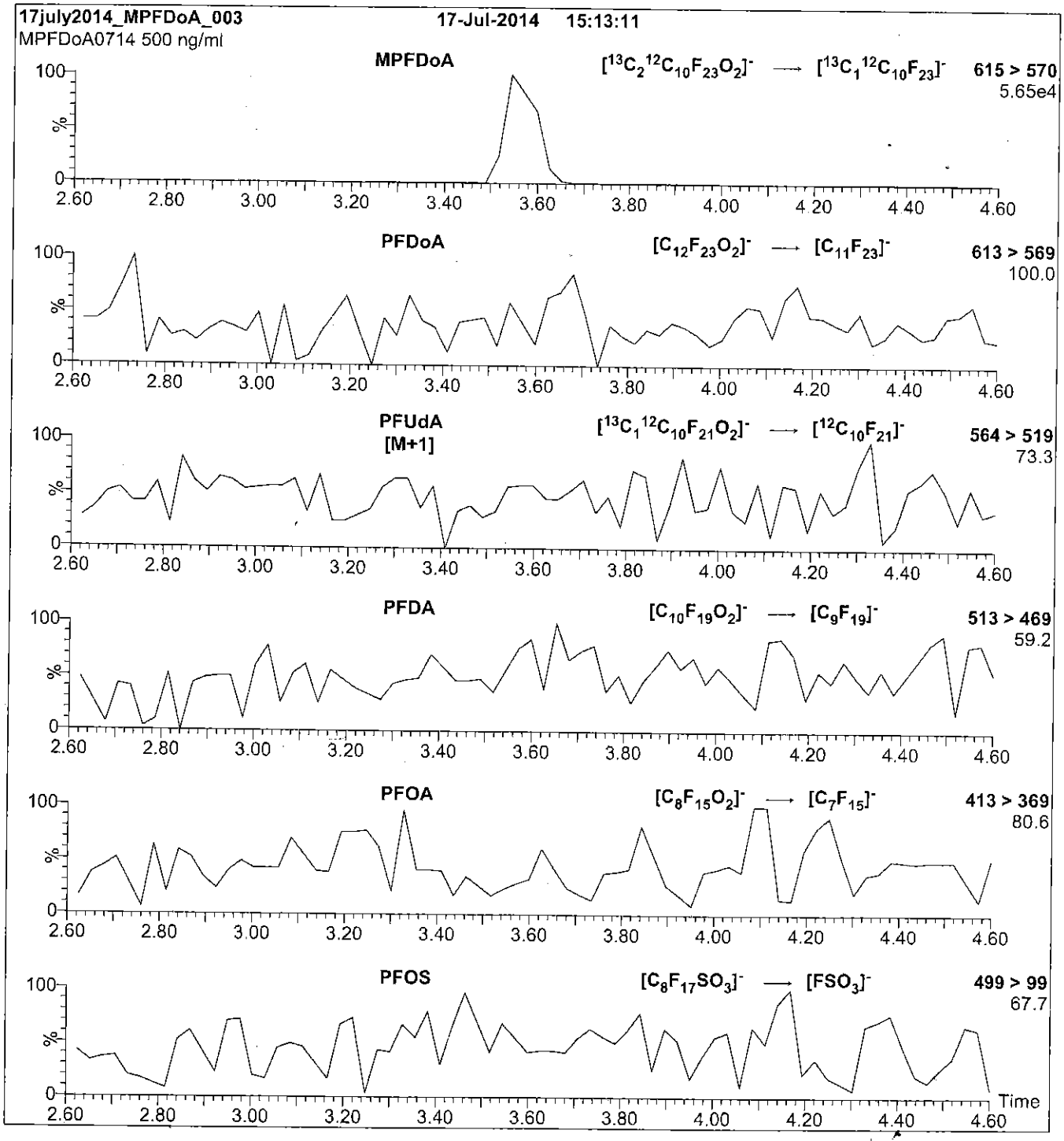
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 950 amu)

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

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



Condltions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFHxA_00006

P: 4/15/15 SKV

WELLINGTON LABORATORIES

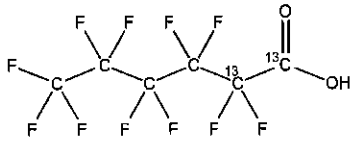
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFHxA0414

STRUCTURE:

CAS #: Not available



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

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

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

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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

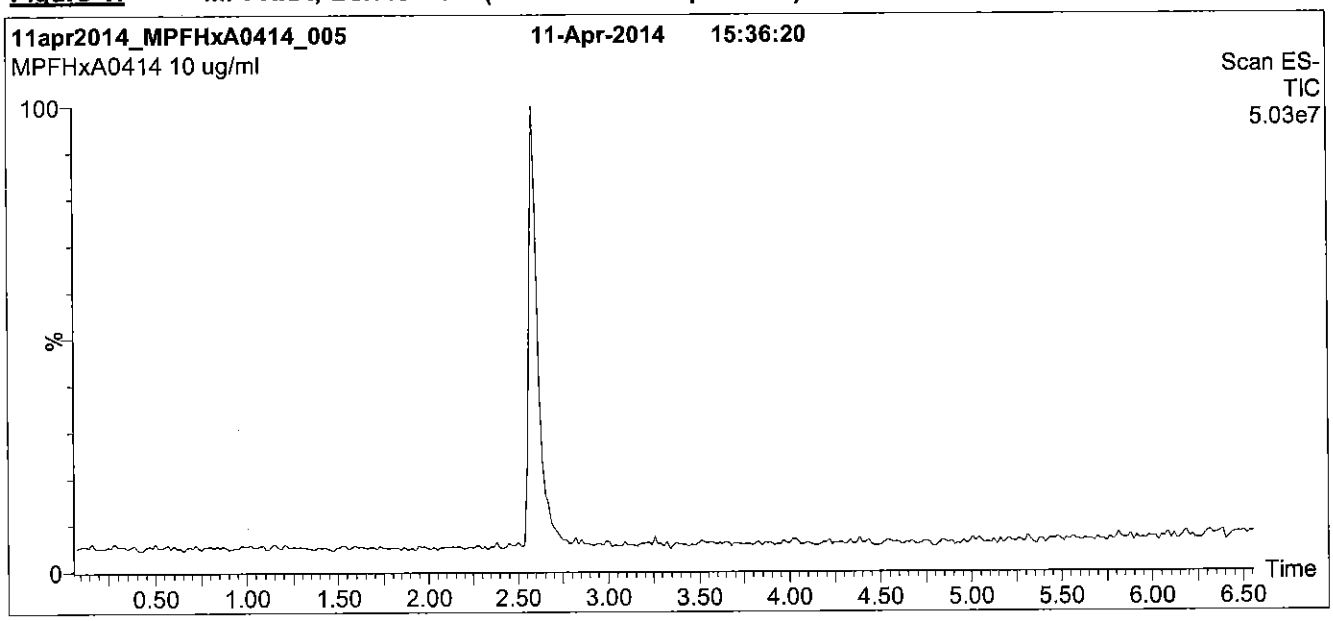
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

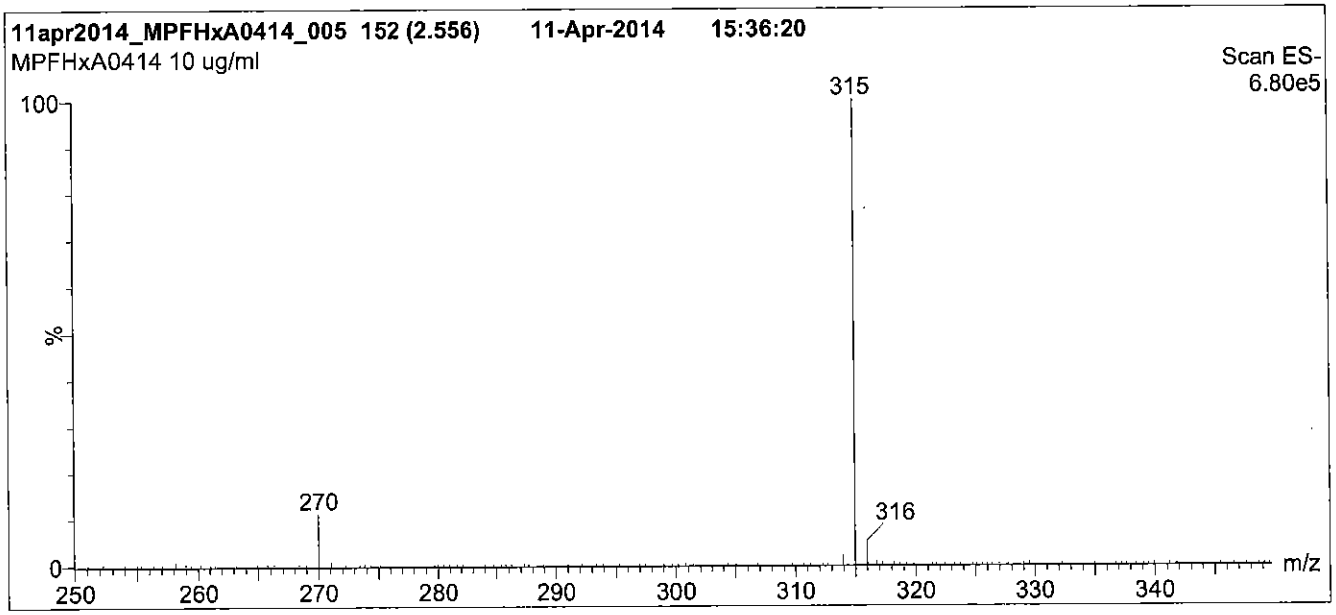
CALA Testing Accreditation No. A 0226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

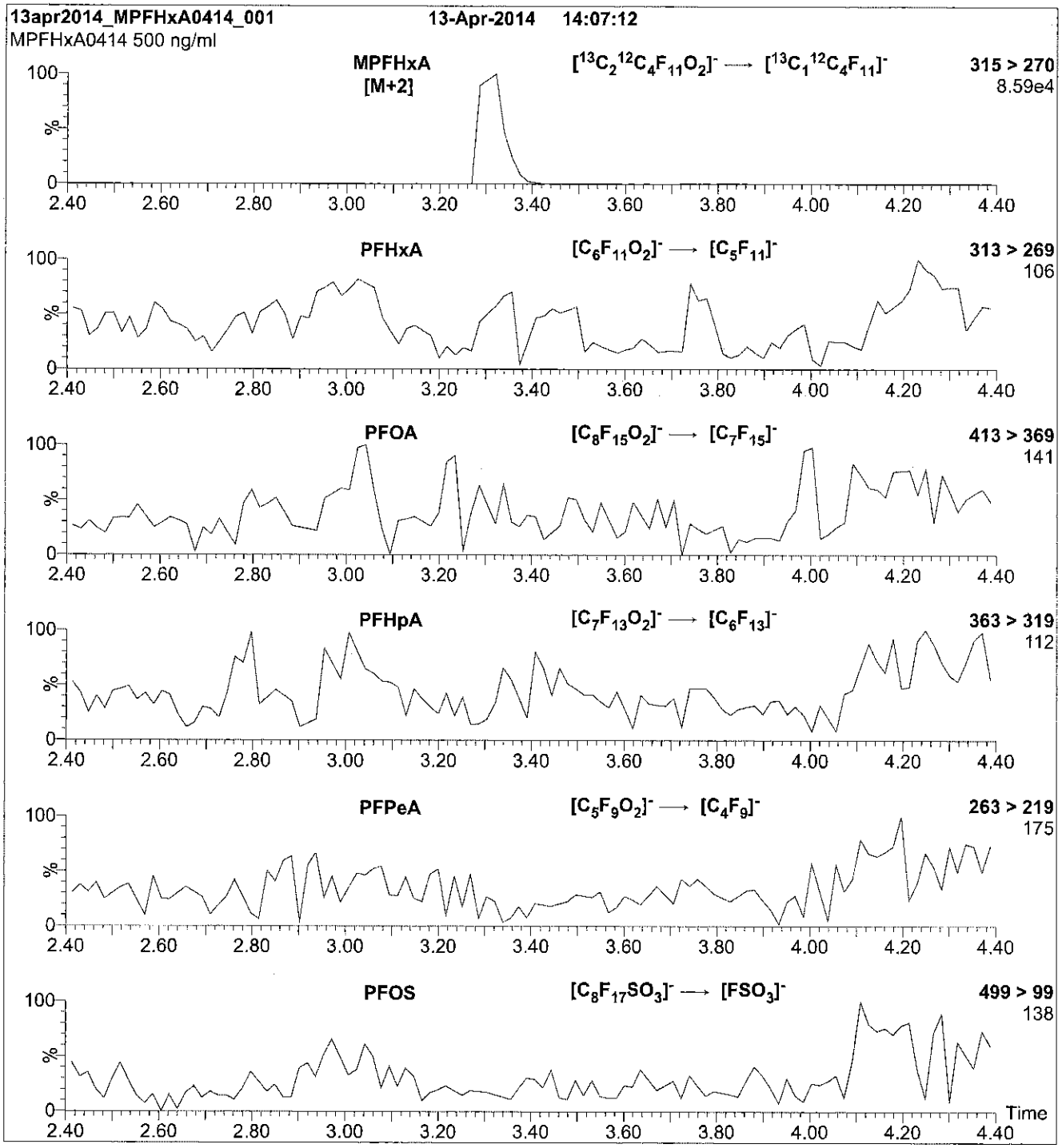
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFHxA_00007

R: 2/25/16 CBW

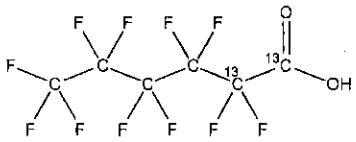
587893
ID: LCMPFHxA_00007
Exp:04/09/20 Prpd:CBW Opn:02/25/16
13C2-Perfluorohexanoic ac

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFHxA
LOT NUMBER: MPFHxA0415
COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]hexanoic acid

STRUCTURE:
CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

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:

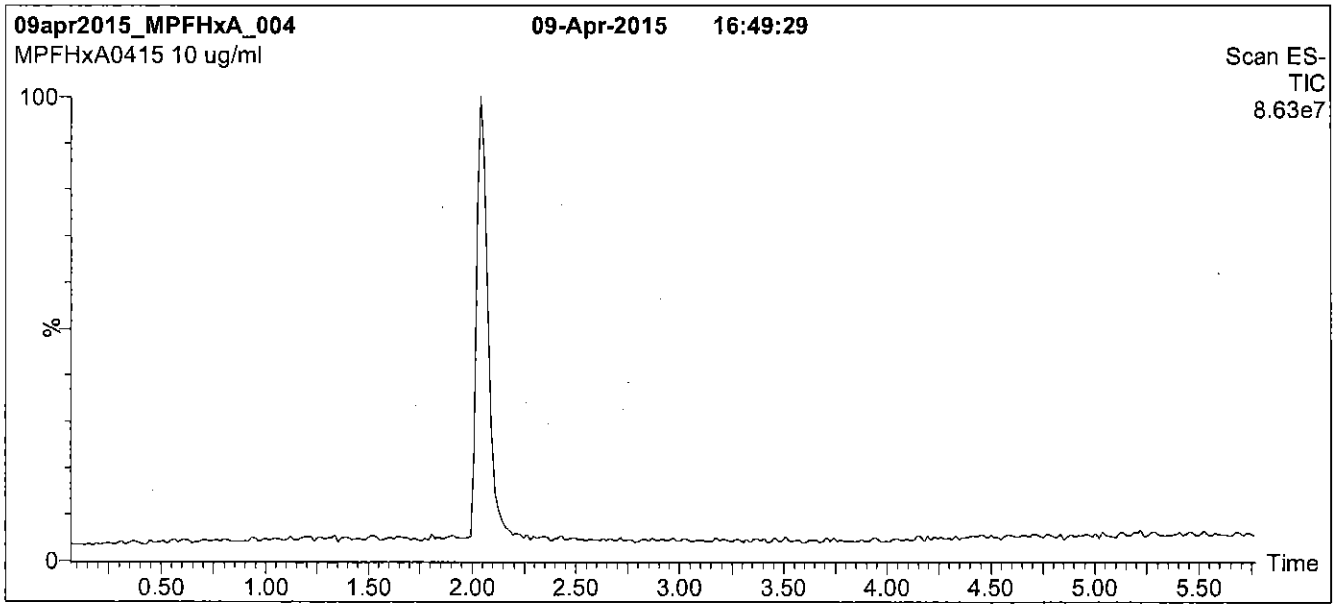
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

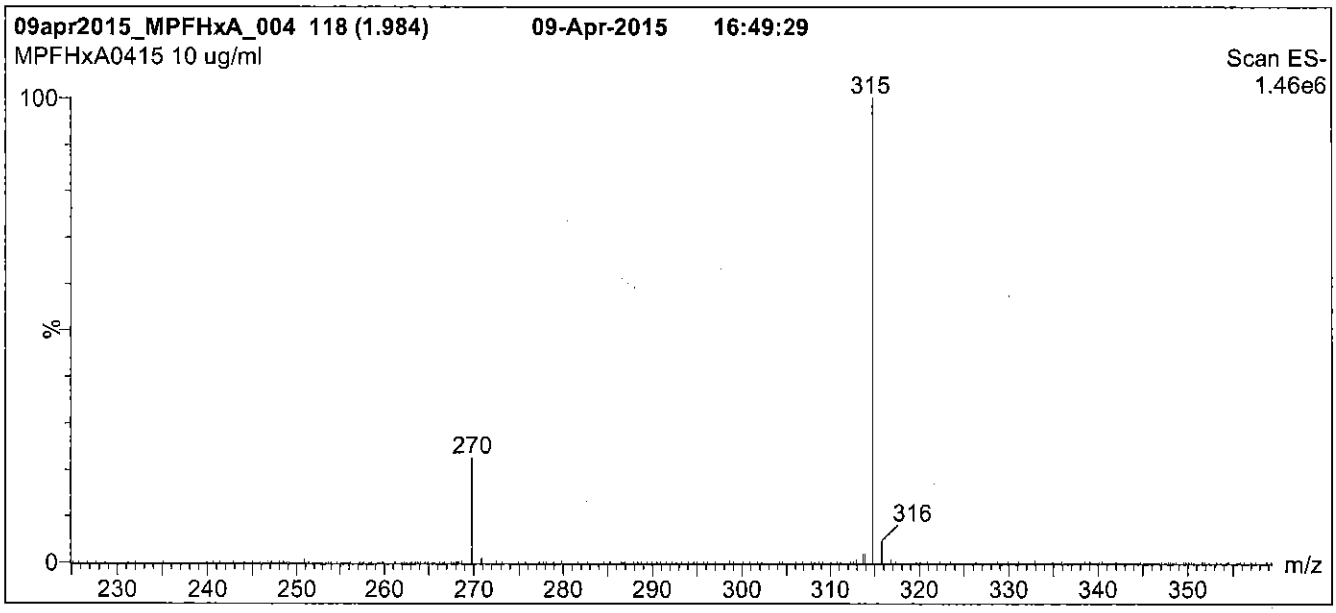
CALA

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

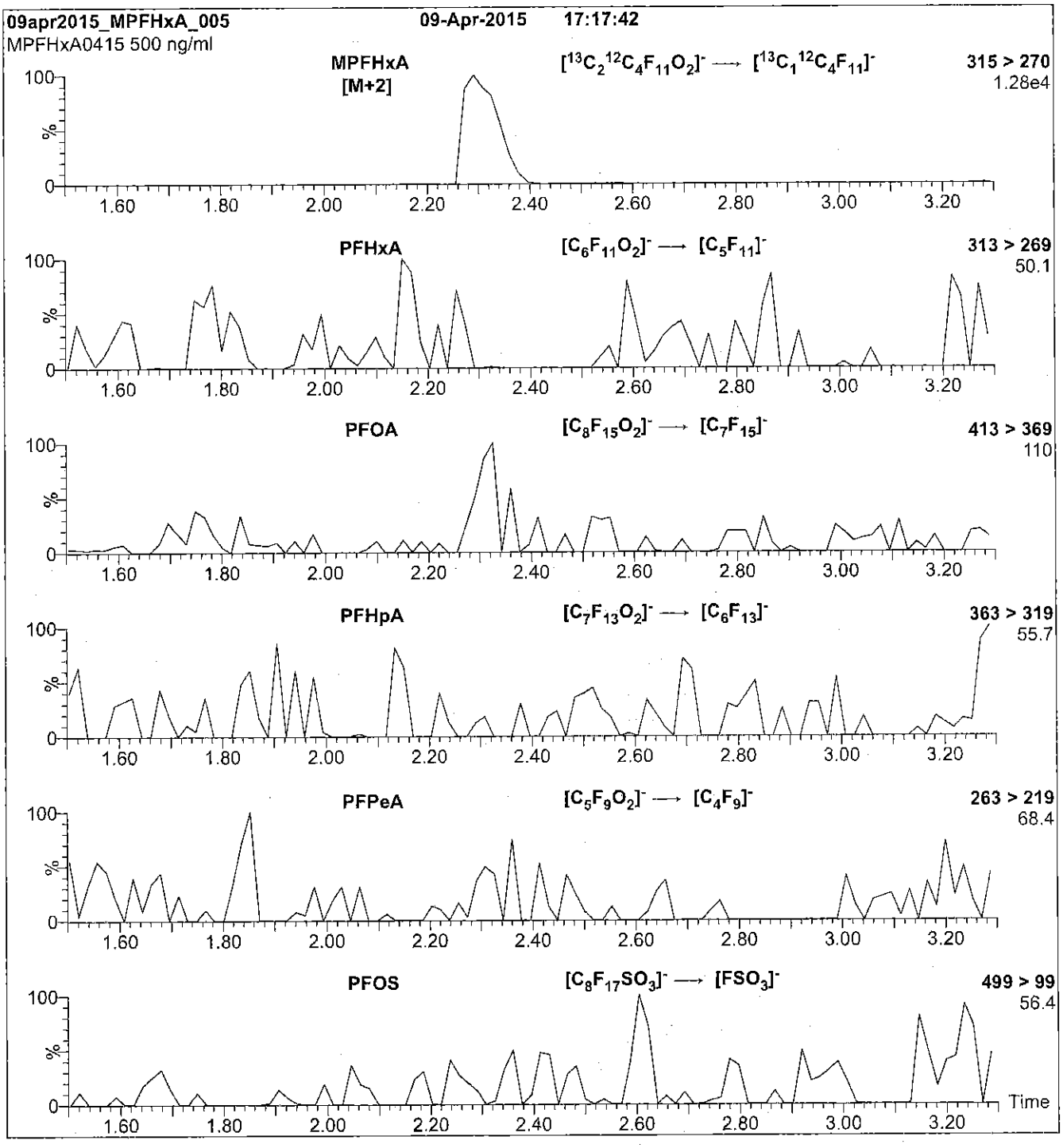
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFHxA_00008

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

Rec. 3/29/16 JRB ✓

WELLINGTON LABORATORIES

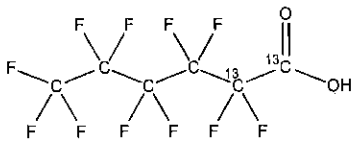
CERTIFICATE OF ANALYSIS DOCUMENTATION

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

LOT NUMBER: MPFHxA0415

STRUCTURE:

CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

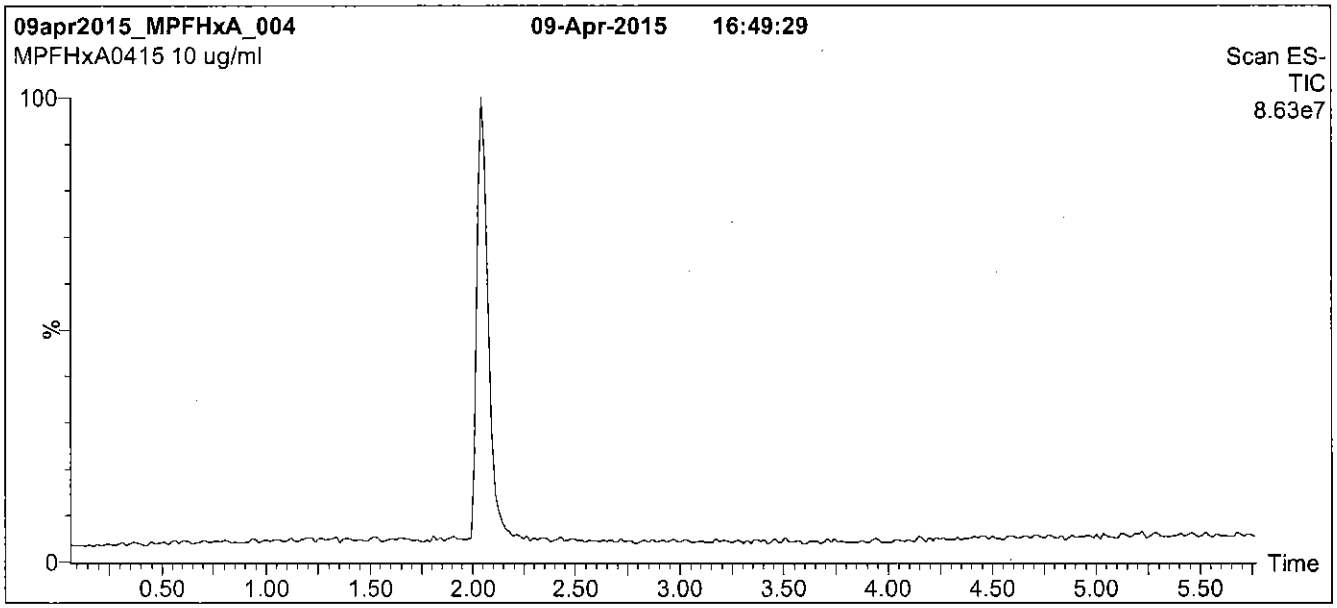
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

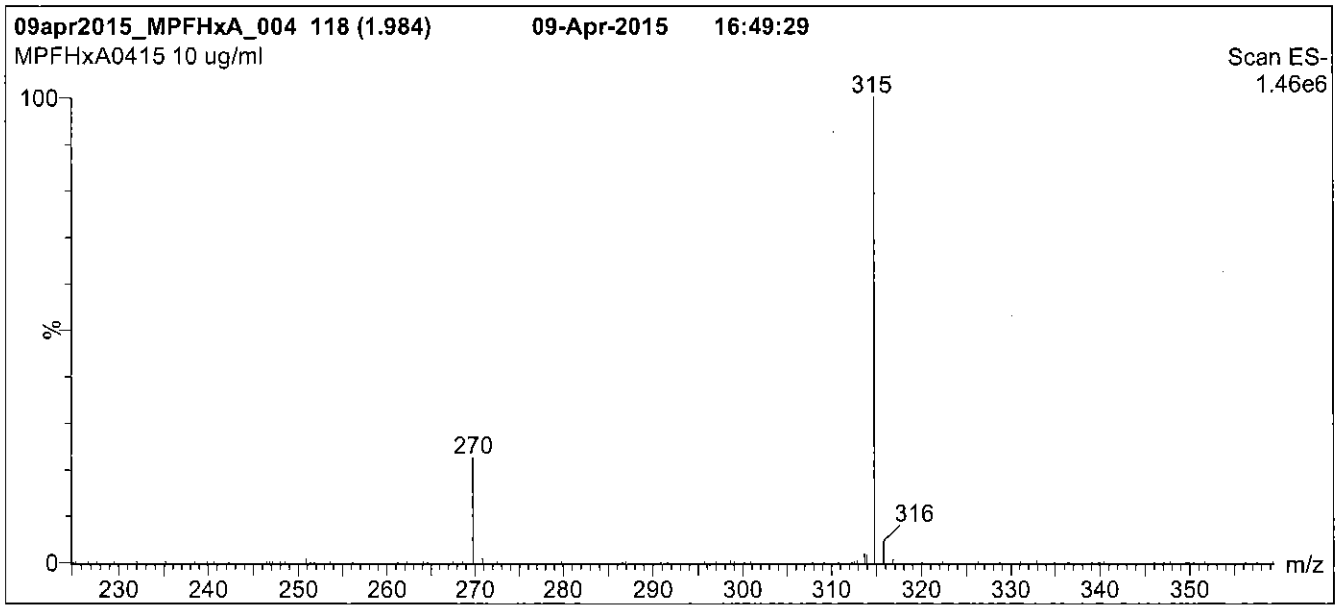
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

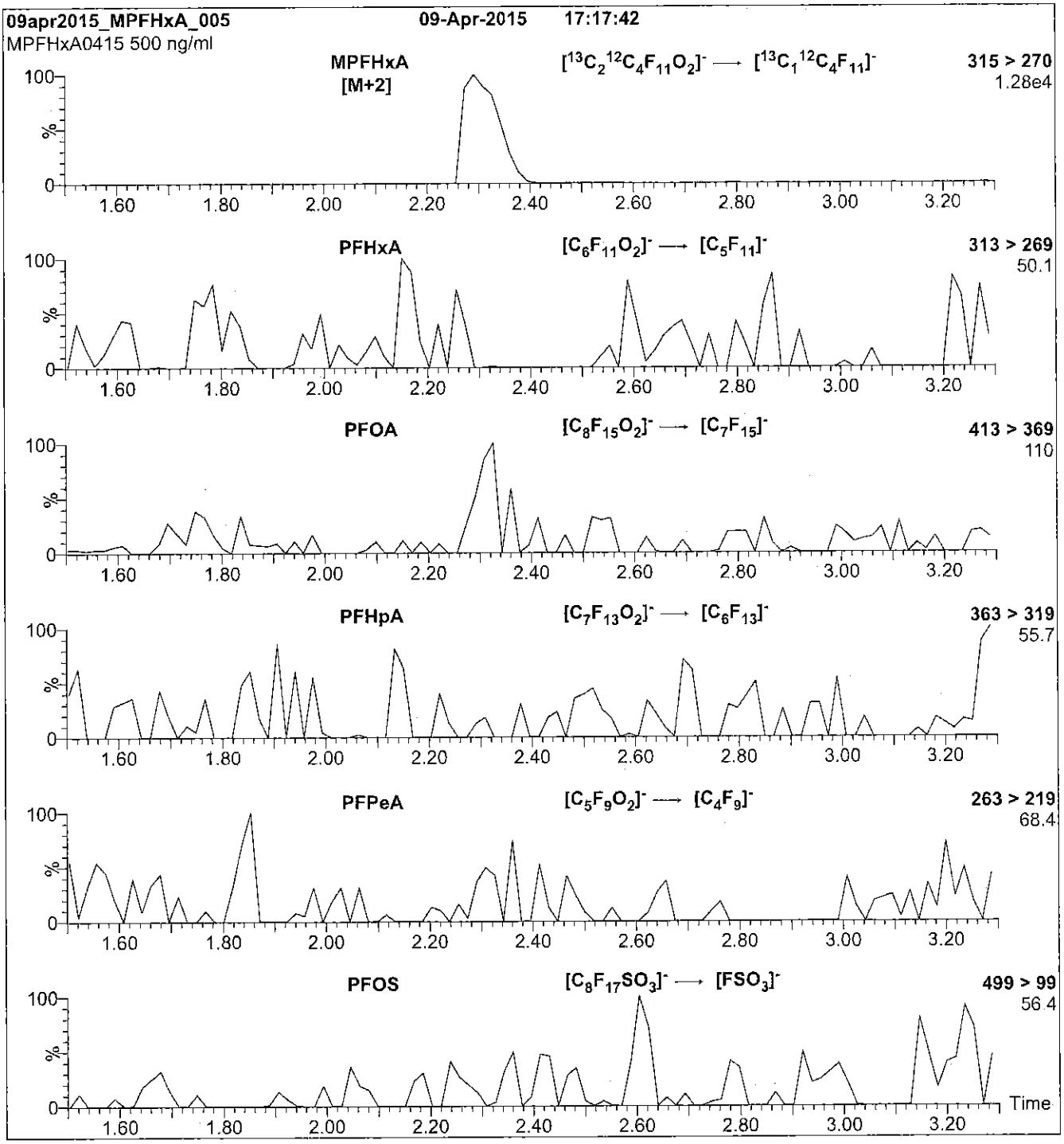
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

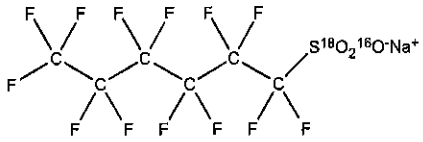
Reagent

LCMPFHxS_00004

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFHxS	**LOT NUMBER:**	MPFHxS0713
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)	07/25/2013		
EXPIRY DATE: (mm/dd/yyyy)	07/25/2018		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

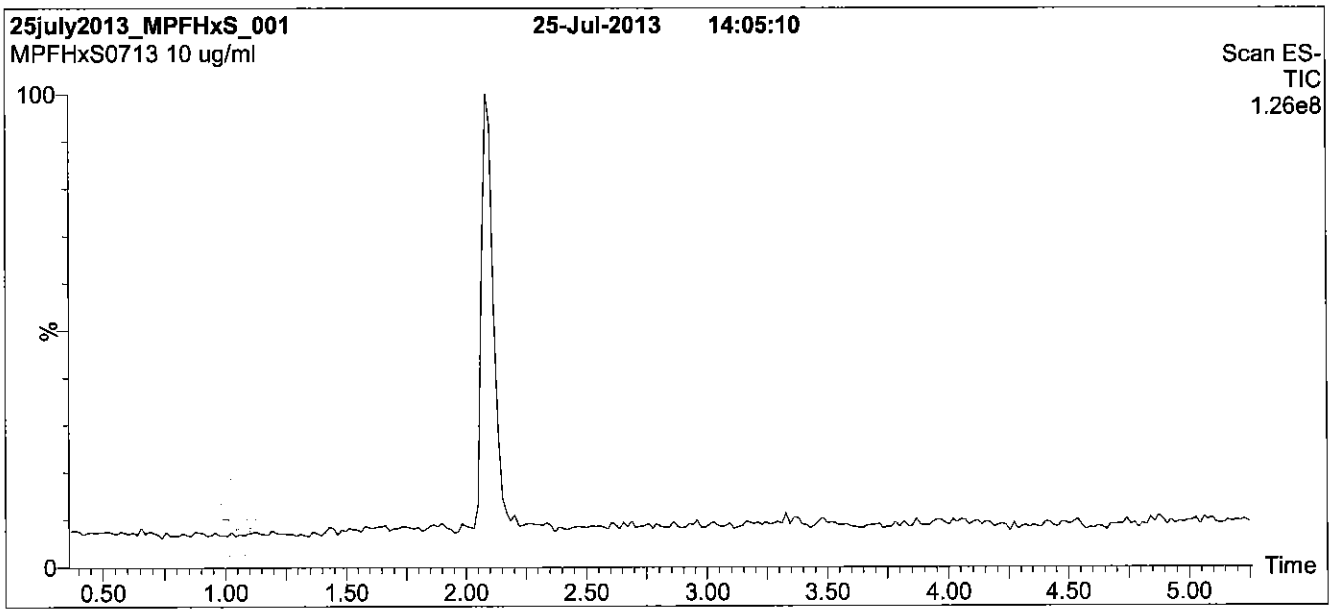
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

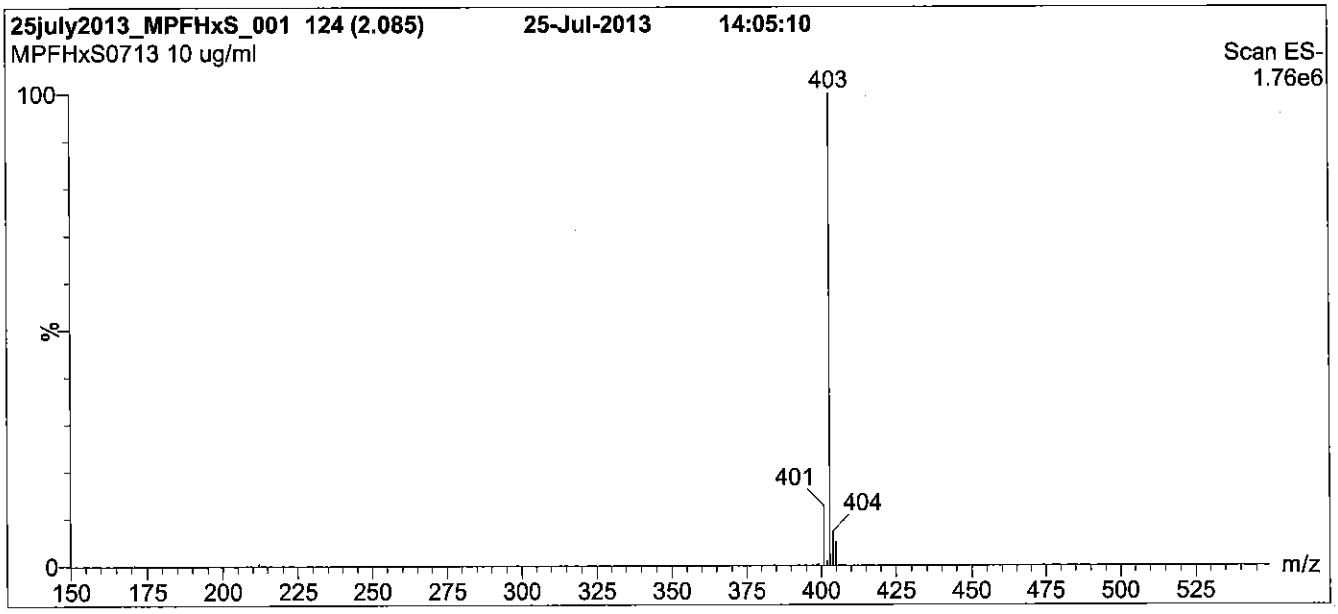
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

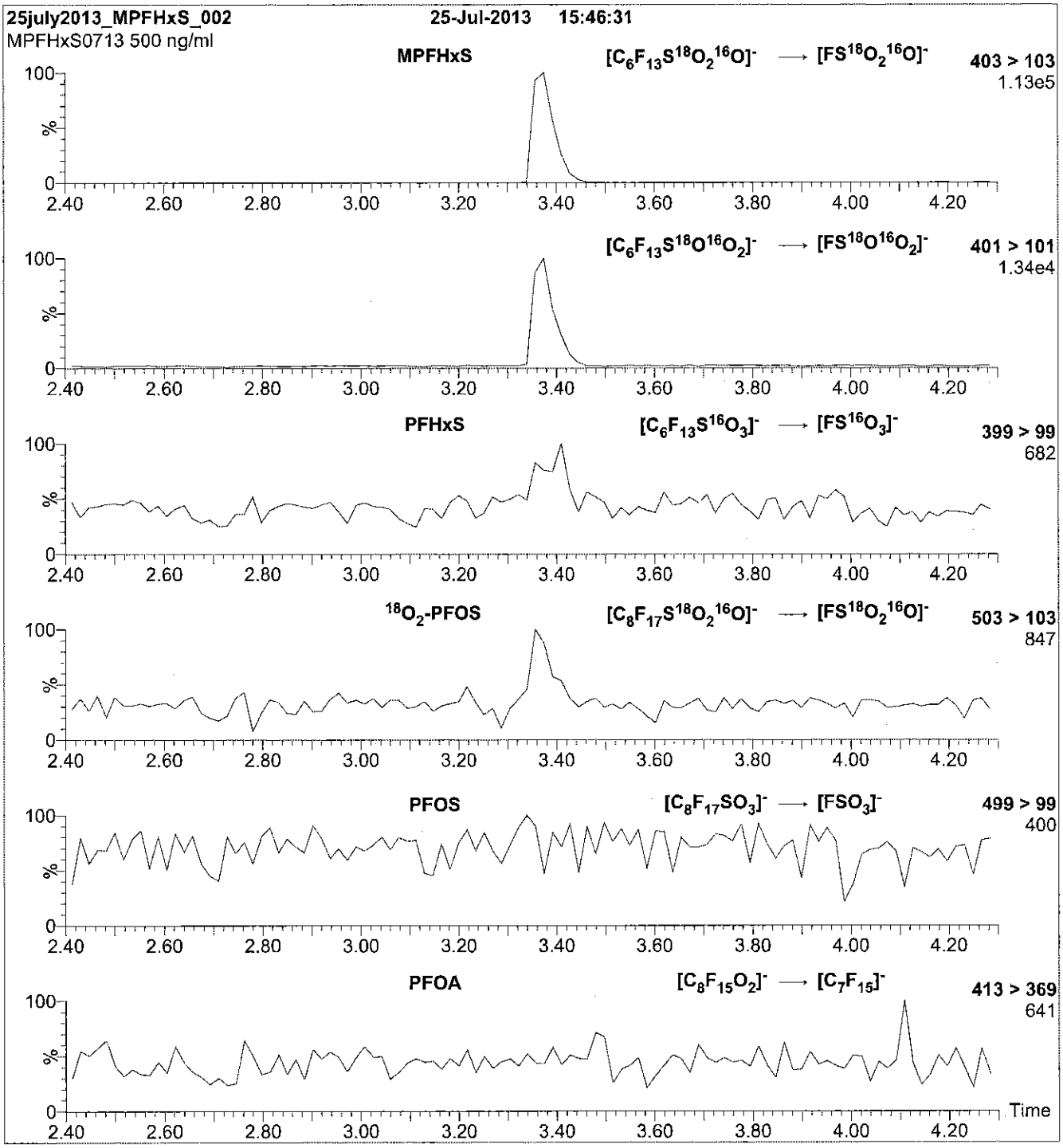
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFHxS_00006

609705
ID: LCMPFHxS_00006
Exp: 10/23/20 Prpd: CBW
18O2-Perfluorohexanesulfo

R: 4/7/16 CBW

WELLINGTON LABORATORIES

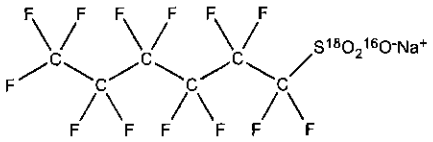
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFHxS1015

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$C_6F_{13}S^{18}O_2{}^{16}ONa$	**MOLECULAR WEIGHT:**	426.10
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt)	**SOLVENT(S):**	Methanol
	47.3 ± 2.4 µg/ml (MPFHxS anion)		
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	>94% ($^{18}O_2$)
LAST TESTED: (mm/dd/yyyy)	10/23/2015		
EXPIRY DATE: (mm/dd/yyyy)	10/23/2020		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
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 ($C_6F_{13}S^{18}O_3^-$) when both compounds are injected together. This difference may vary between instruments.
- Due to the isotopic purity of the starting material ($^{18}O_2$ >94%), MPFHxS contains ~ 0.3% of PFHxS. This value agrees with the theoretical percent relative abundance that is expected based on the stated isotopic purity.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

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:

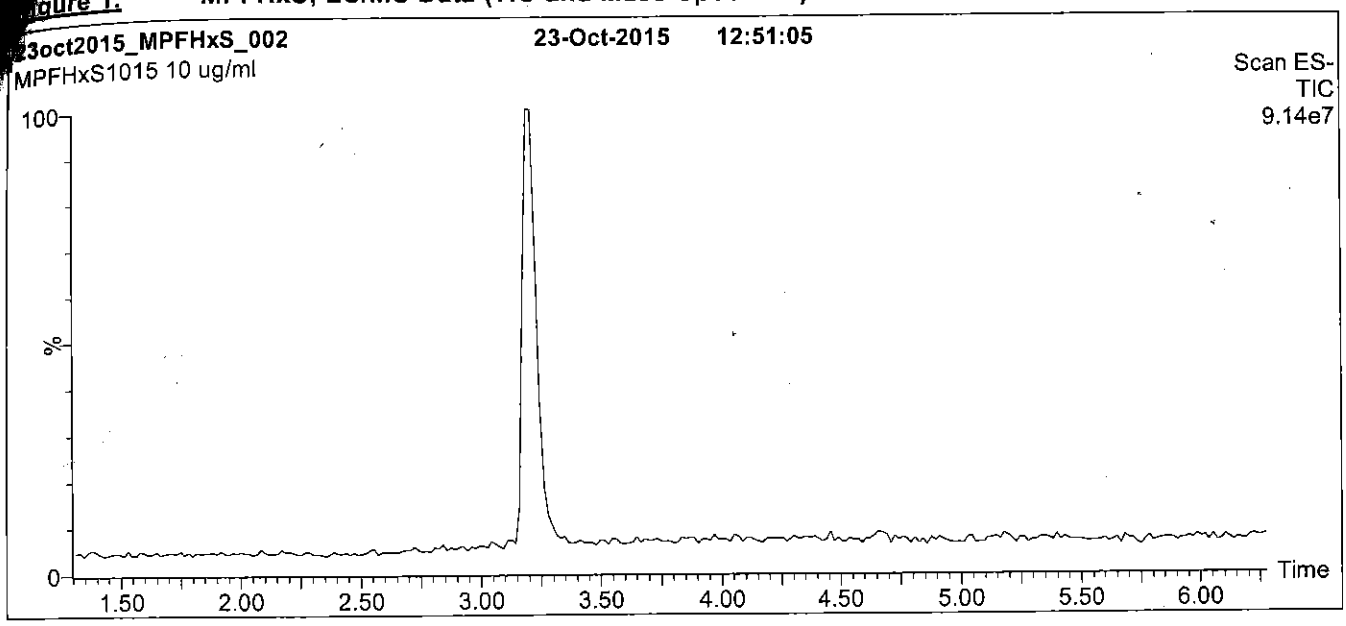
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

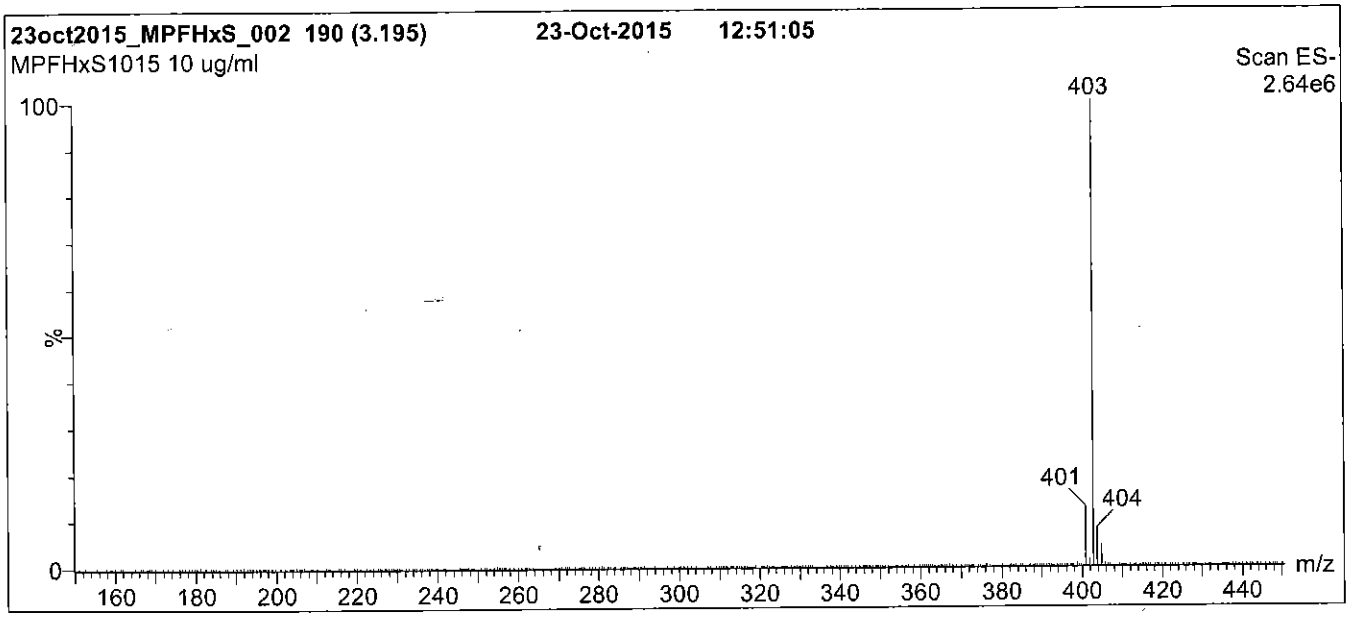
CALA

ANAB ACCREDITED ISO 17025 REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

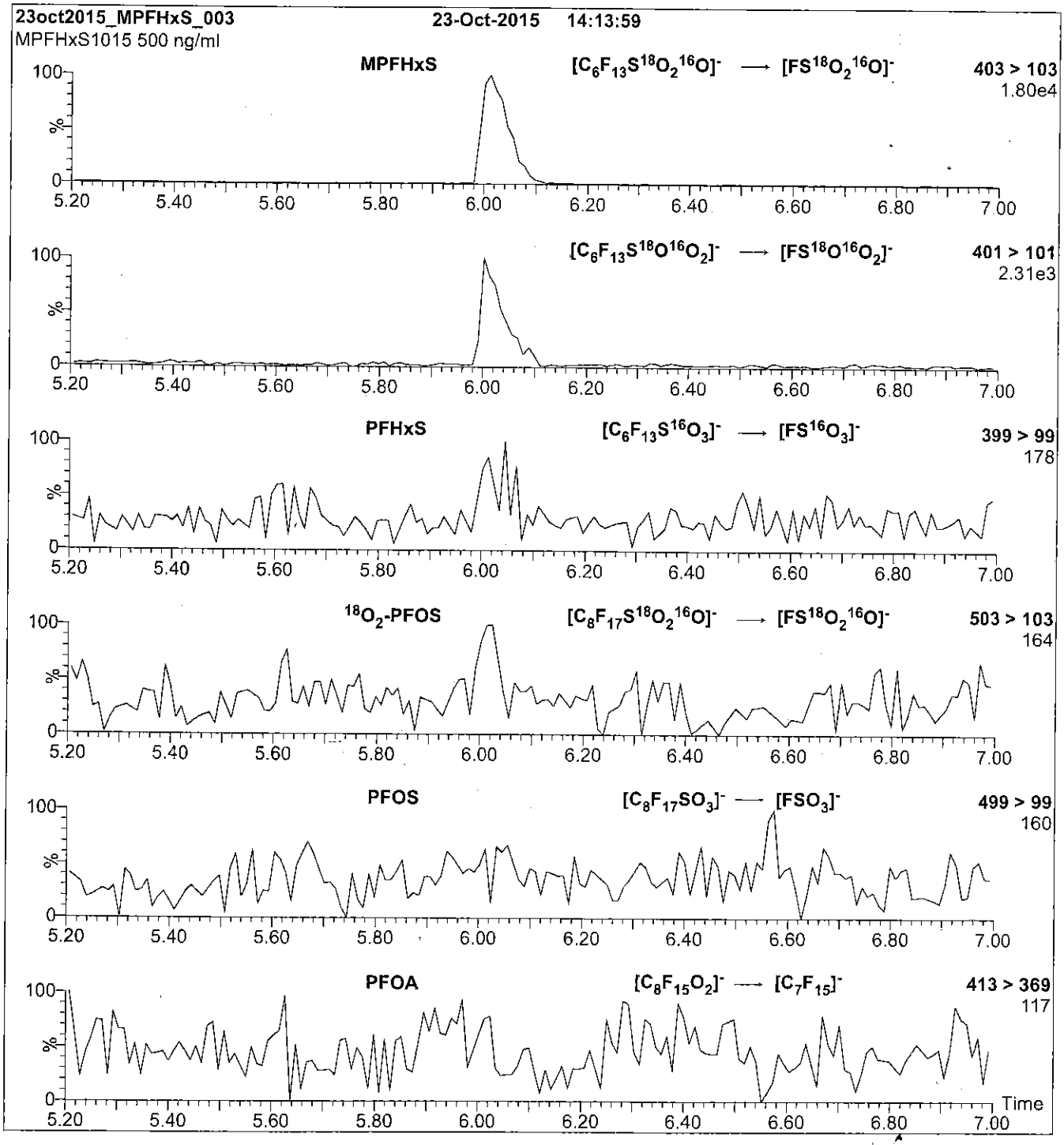
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

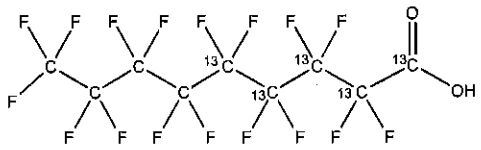
LCMPFNA_00003

V 2/11/15 SRV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

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



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

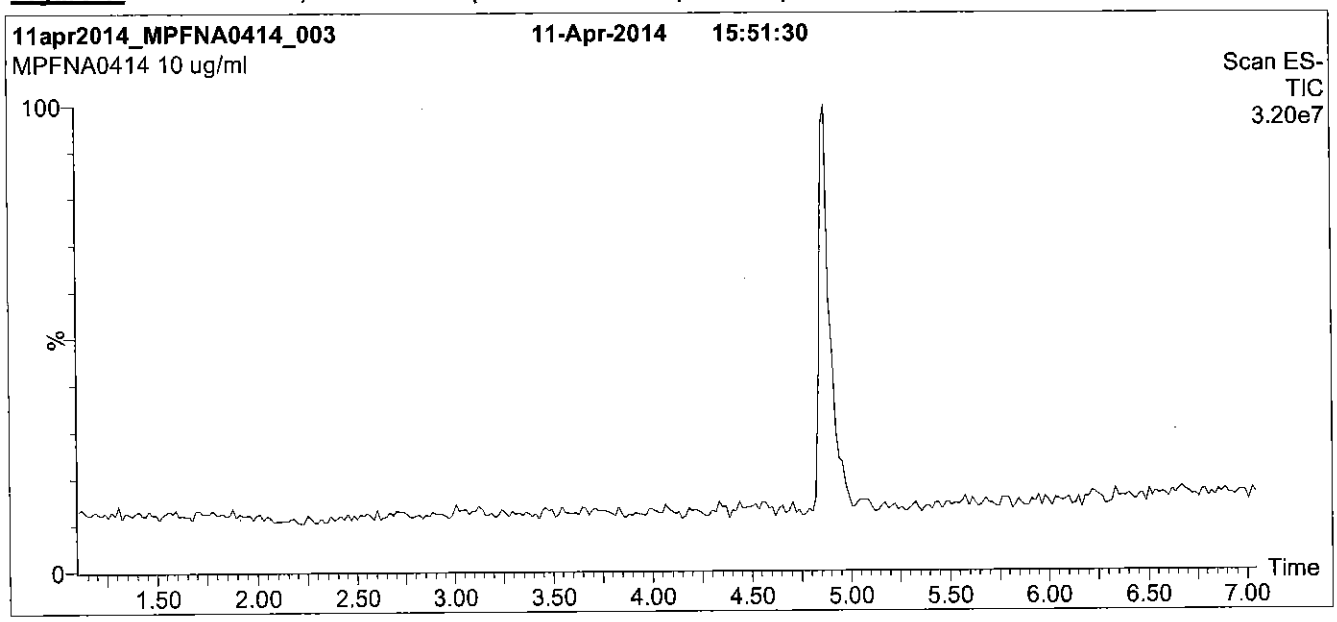
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

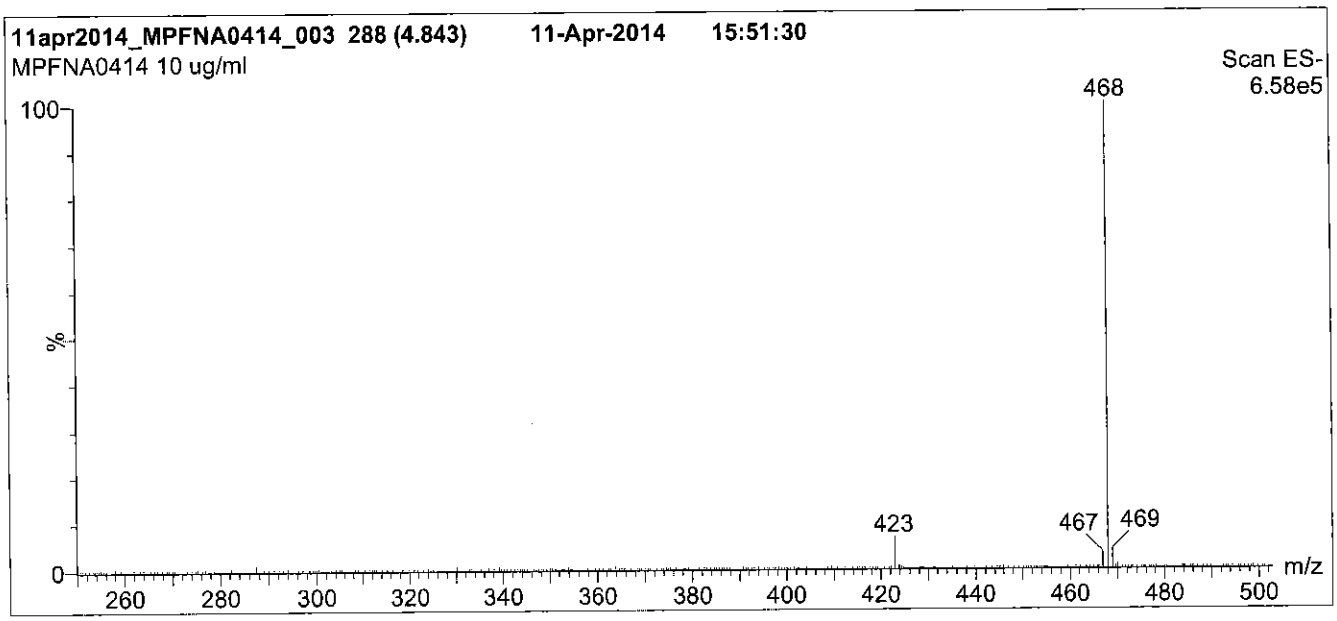
CALA Testing Accreditation No: A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

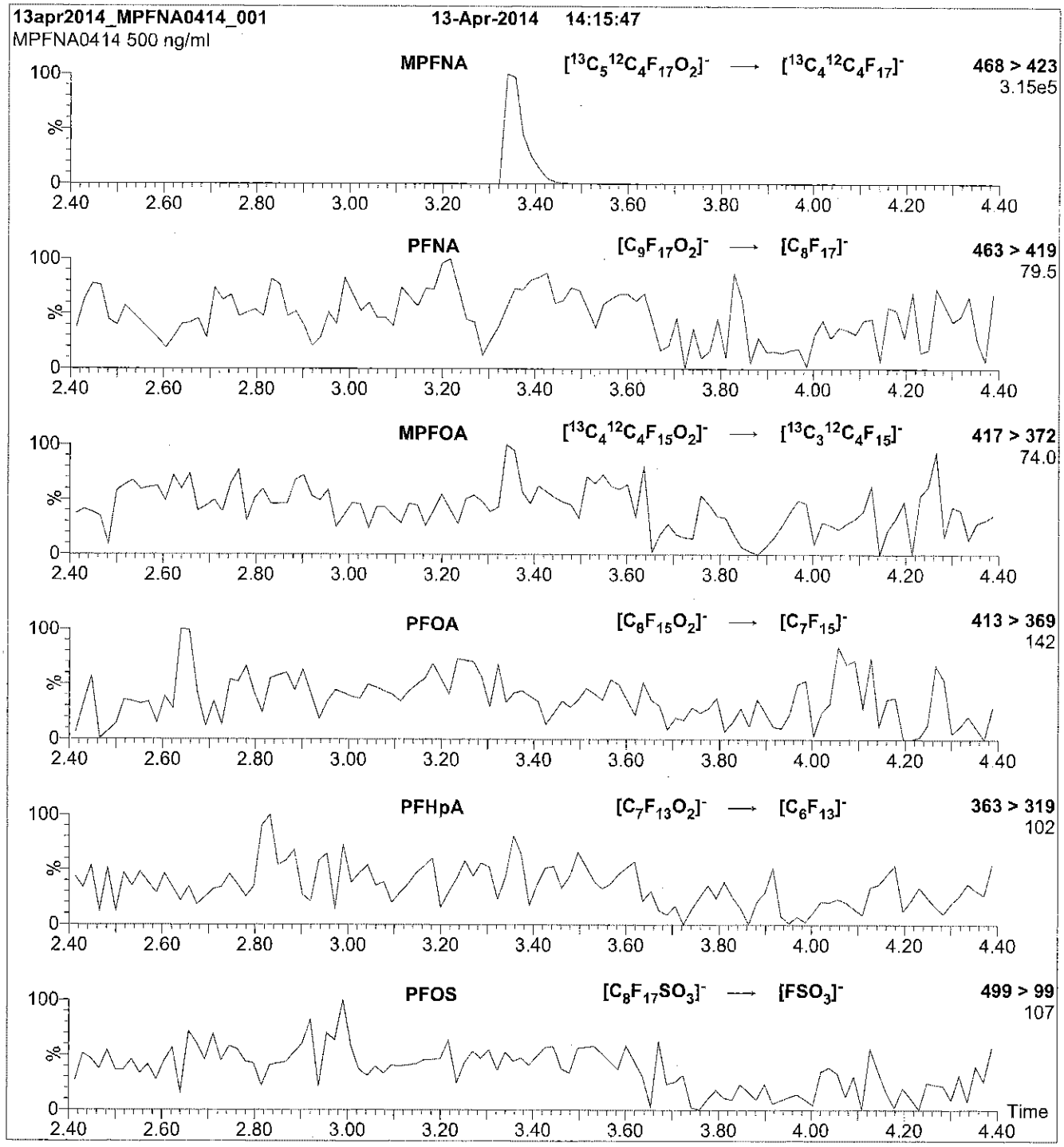
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

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

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



Conditions for Figure 2:

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

MS Parameters

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

Reagent

LCMPFNA_00004

R: 2/25/16 CBW

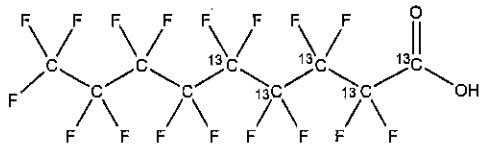
587894
ID: LCMPFNA_00004
Exp:04/13/19 Prpd:CBW Opn:02/25/15
13C5-Perfluornonanoic aci

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFNA
LOT NUMBER: MPFNA0414
COMPOUND: Perfluoro-n-[1,2,3,4,5-$^{13}C_5$]nonanoic acid

STRUCTURE:
CAS #: Not available



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...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:

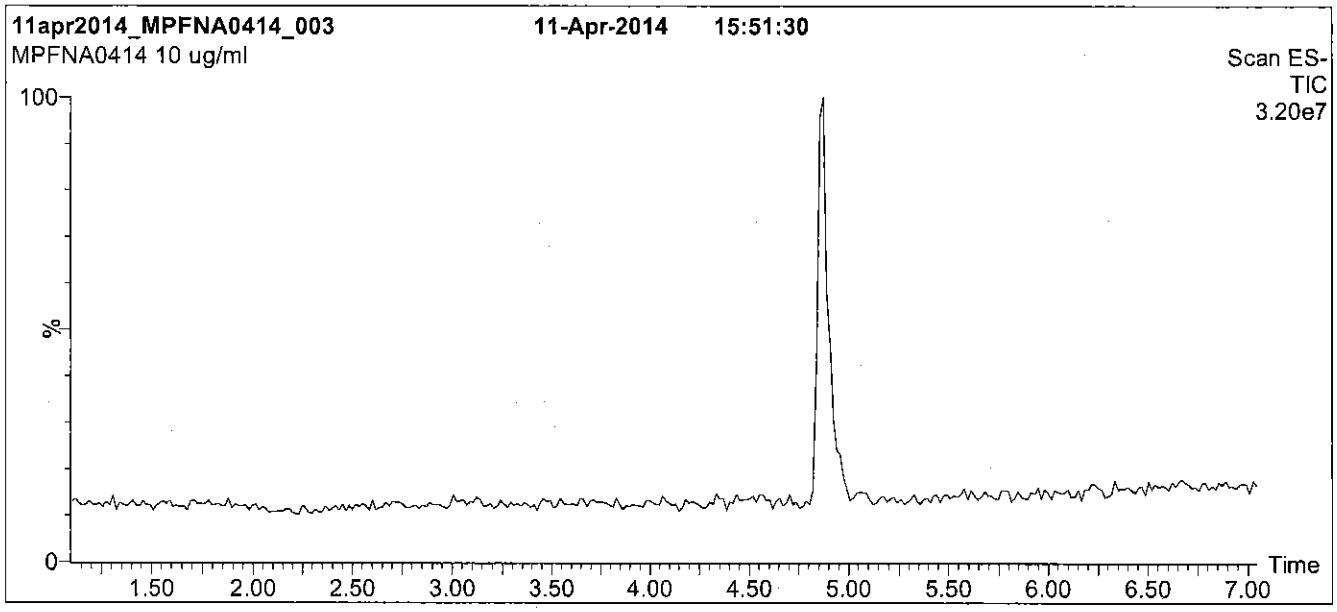
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

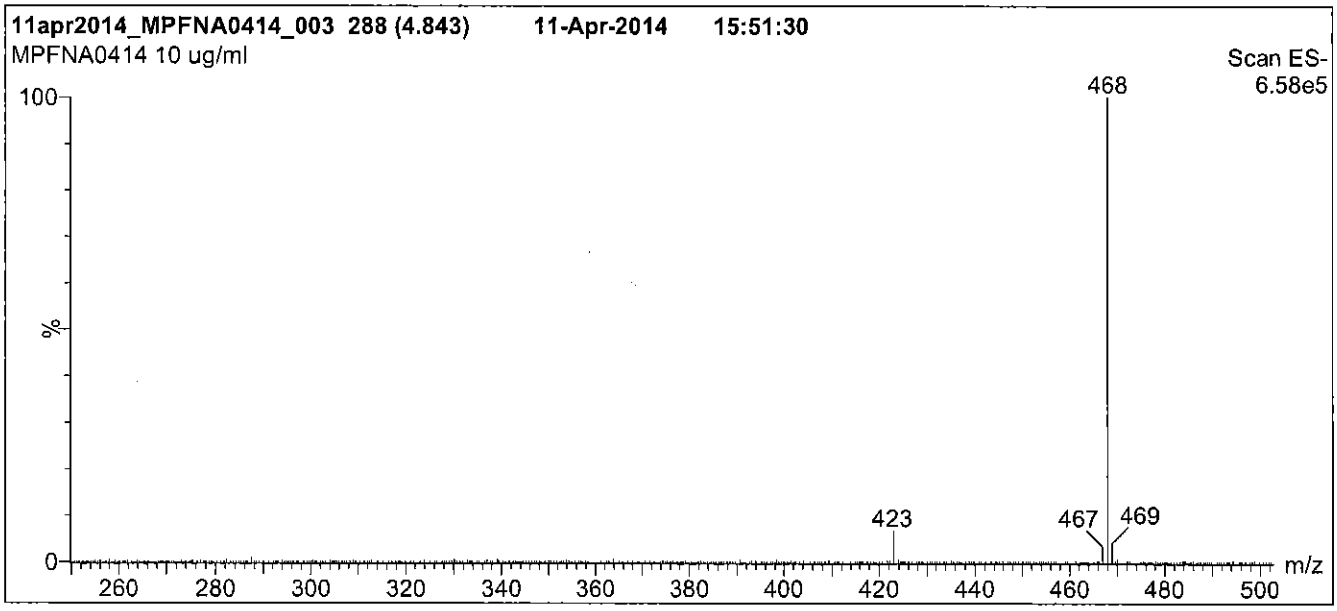
CALA

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

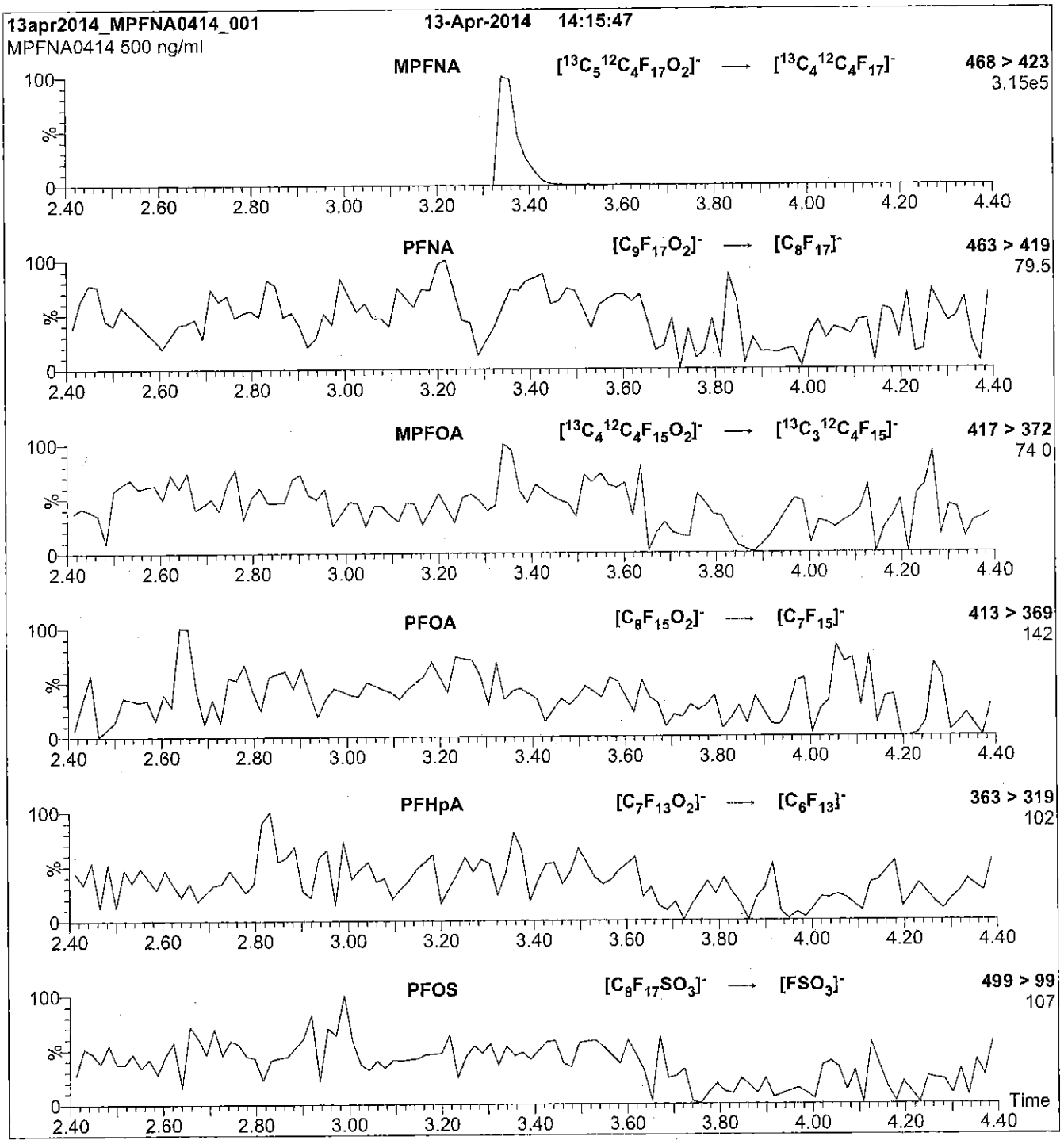
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFNA_00005

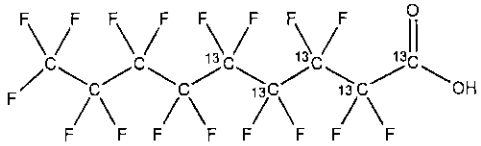
605245
ID: LCMPFNA_00005
Exp: 04/13/19 Prpd: CBW
13C5-Perfluornonanoic aci

Rec. 3/24/16 JeB V

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

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



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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

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

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

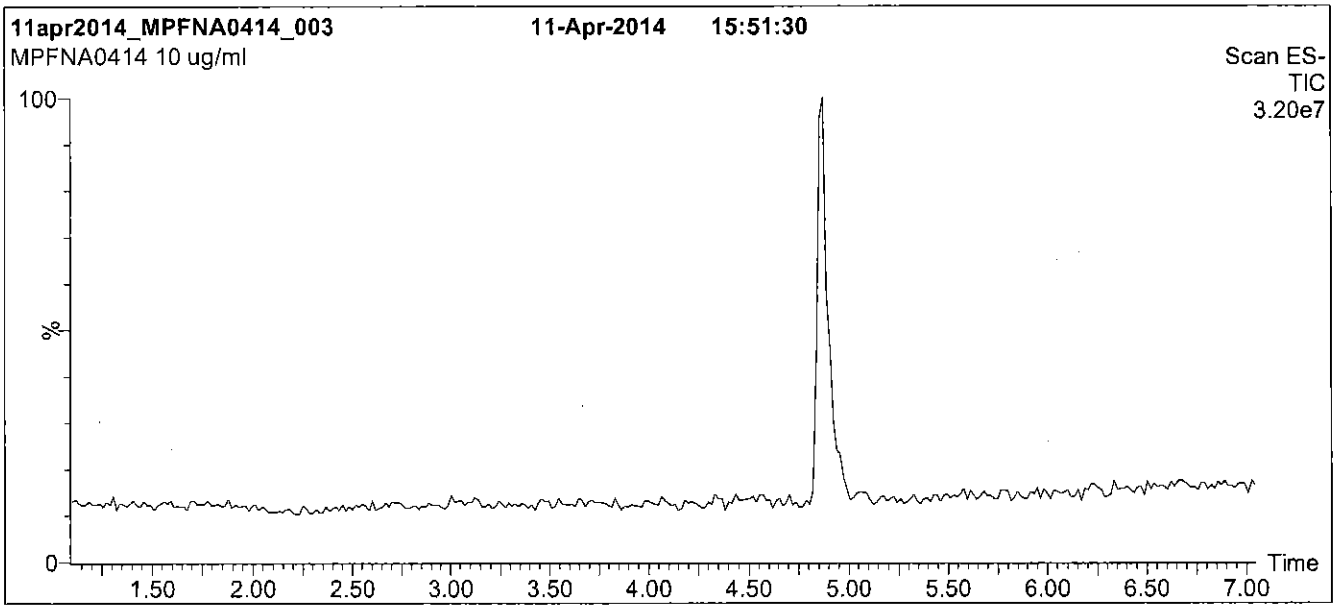
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

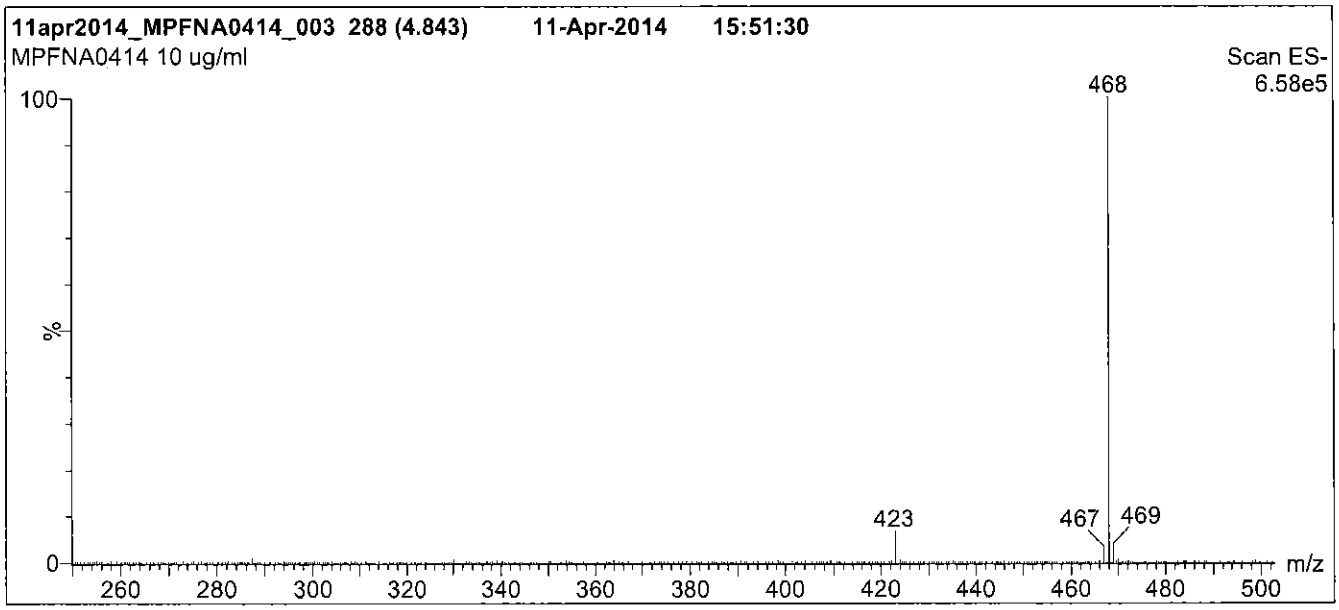
CALA Testing Accreditation No. A1226

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

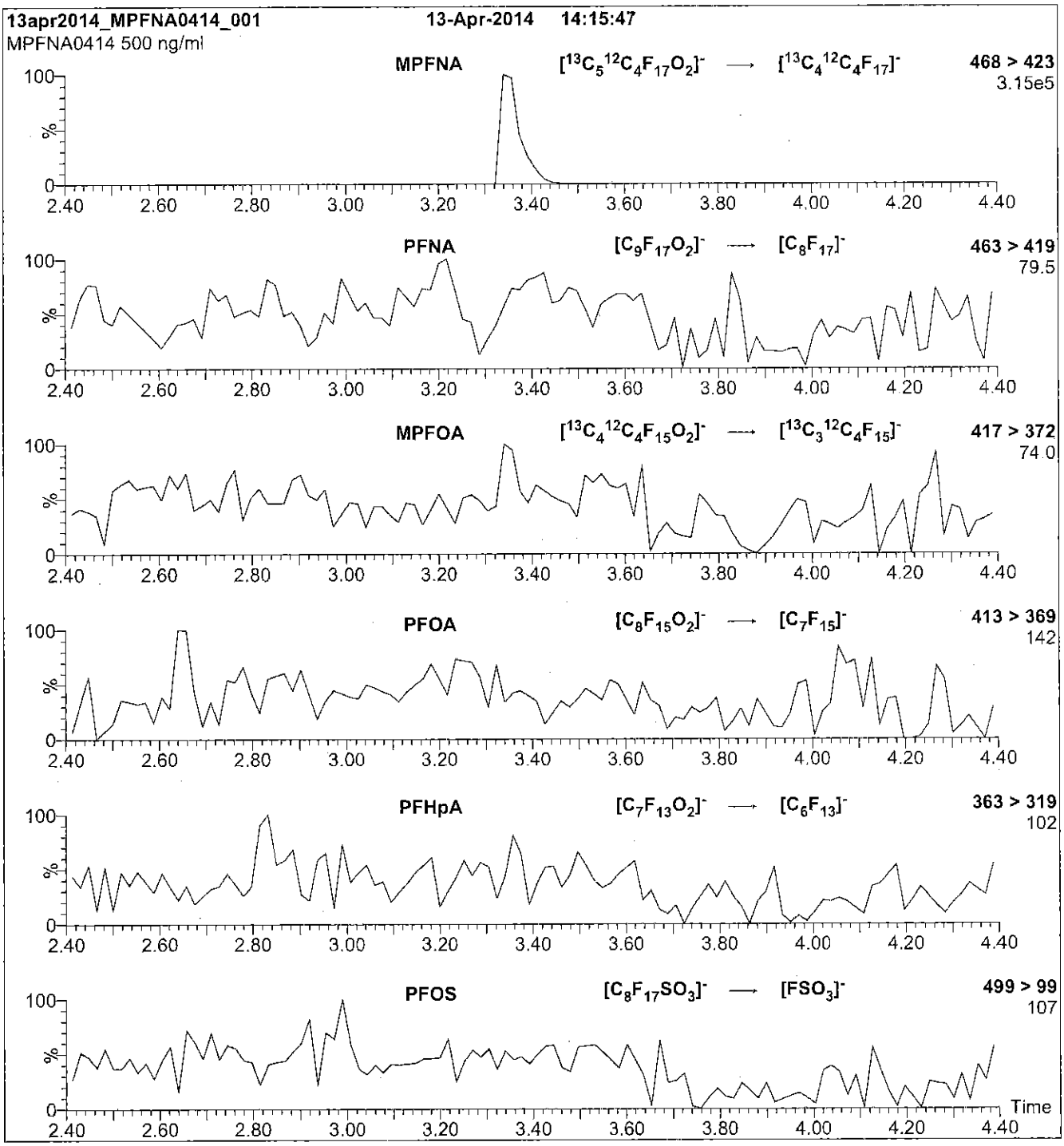
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

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

Reagent

LCMPFOA_00007

r: 9/15/15 8√

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

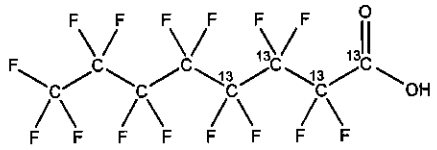
PRODUCT CODE: MPFOA

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

LOT NUMBER: MPFOA0415

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_4{}^{12}C_4HF_{15}O_2$

CONCENTRATION: 50 ± 2.5 µg/ml

CHEMICAL PURITY: >98%

LAST TESTED: (mm/dd/yyyy) 04/10/2015

EXPIRY DATE: (mm/dd/yyyy) 04/10/2020

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

MOLECULAR WEIGHT: 418.04

SOLVENT(S): Methanol
Water (<1%)

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

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim

Date: 04/10/2015 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

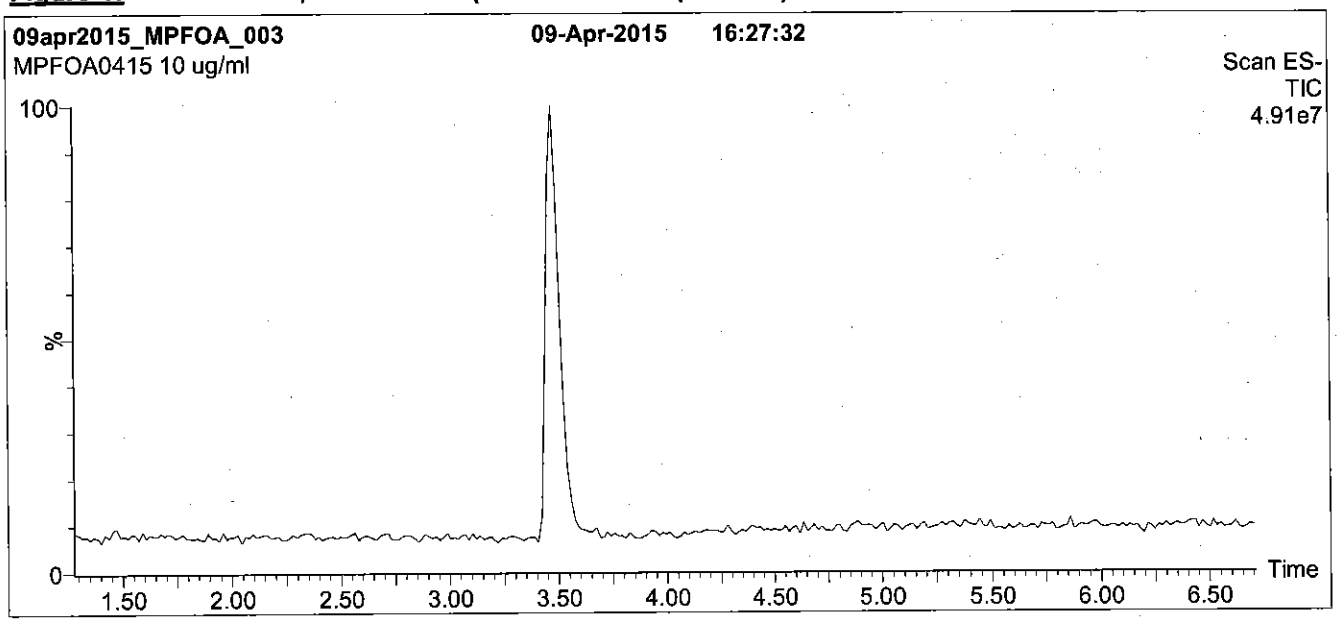
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

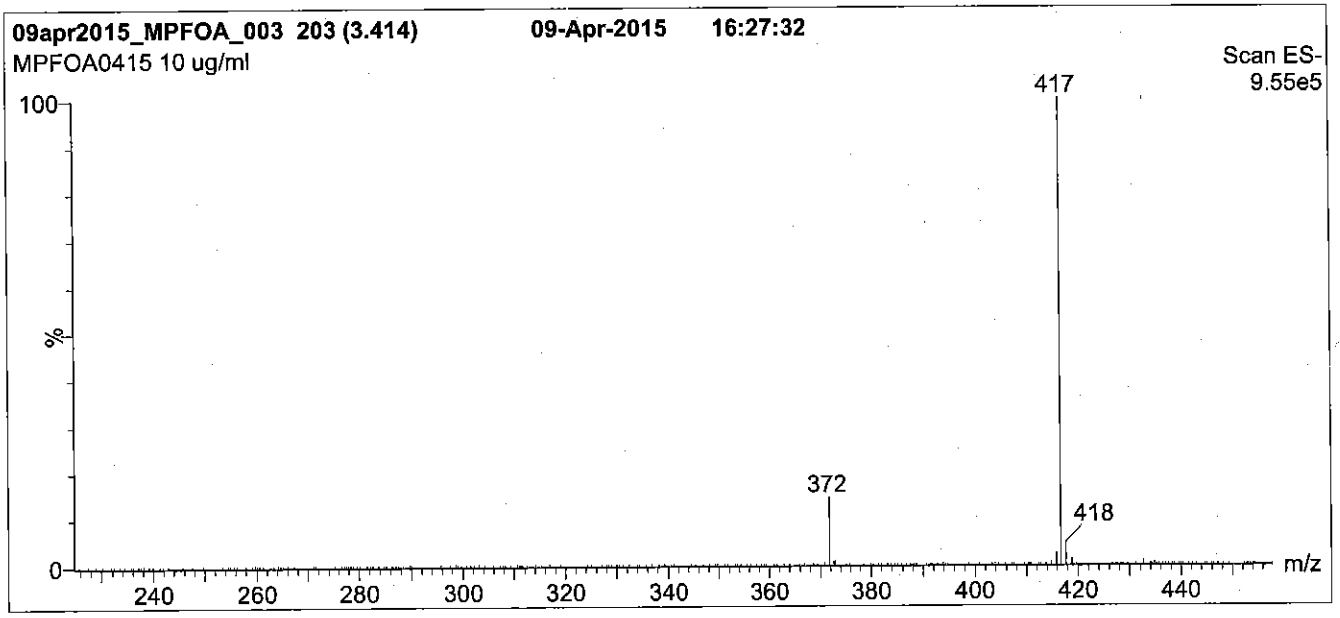
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO/IEC 17025 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: **MPFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

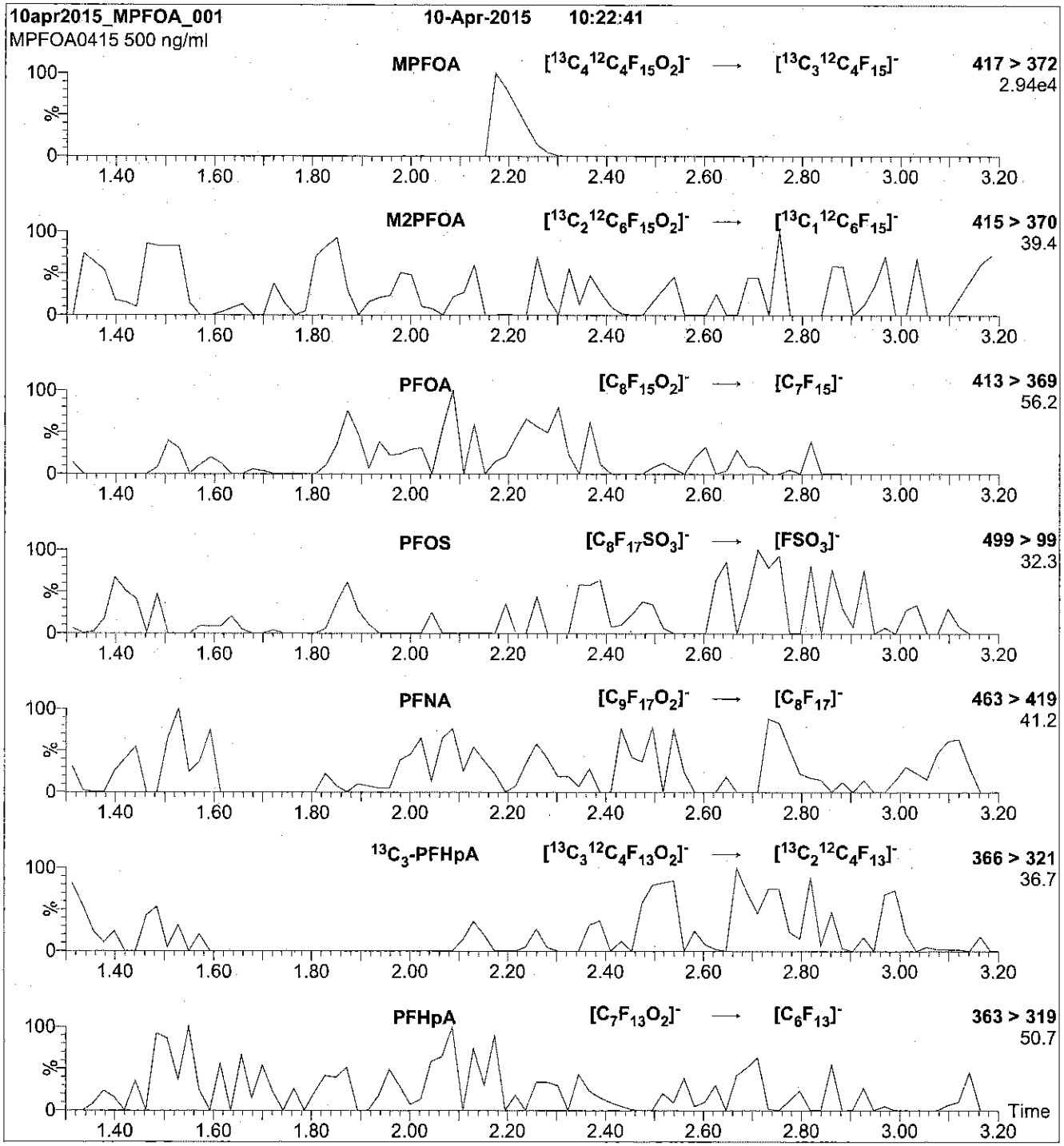
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFOA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.24e-3
Collision Energy (eV) = 11

Reagent

LCMPFOA_00008

572885
ID: LCMPFOA_00008
Exp 04/10/20 Prpd: CBW
13C4-Perfluorooctanoic ac

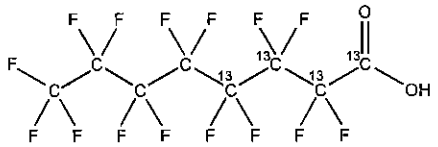
R: 1/25/16
S:

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFOA
LOT NUMBER: MPFOA0415
COMPOUND: Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanoic acid

STRUCTURE:
CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_4HF_{15}O_2$	**MOLECULAR WEIGHT:**	418.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2,3,4-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	04/10/2015		
EXPIRY DATE: (mm/dd/yyyy)	04/10/2020		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of native perfluoro-n-octanoic acid (PFOA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 04/10/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

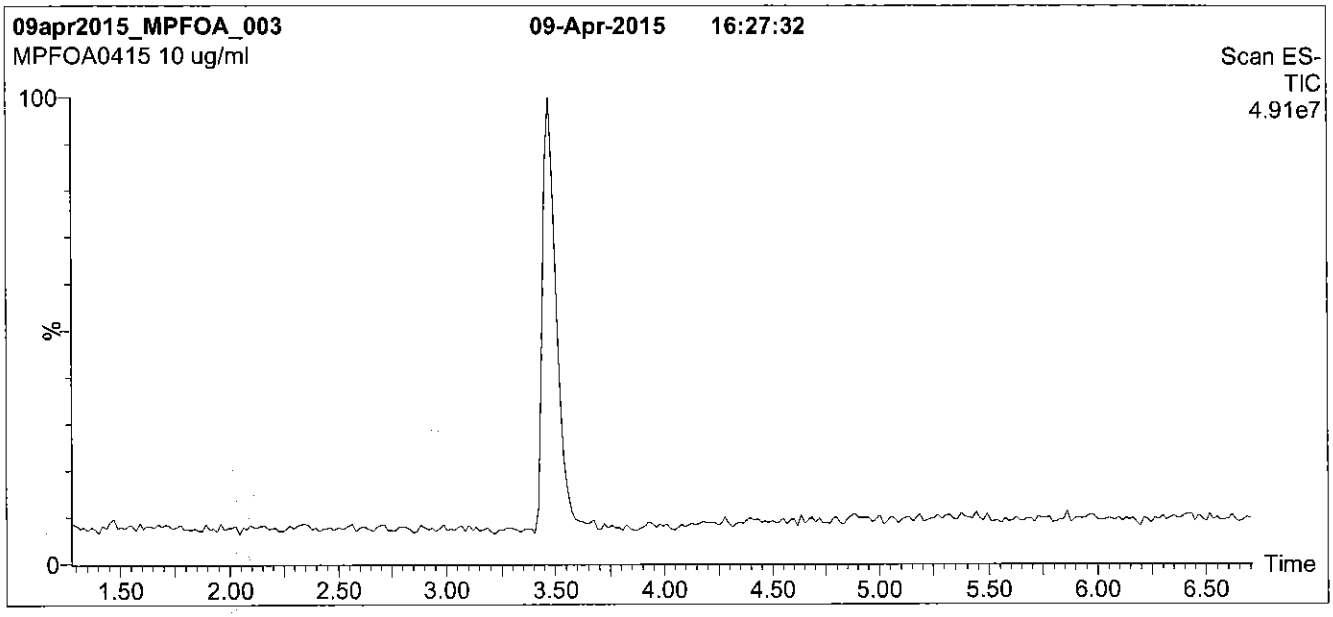
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

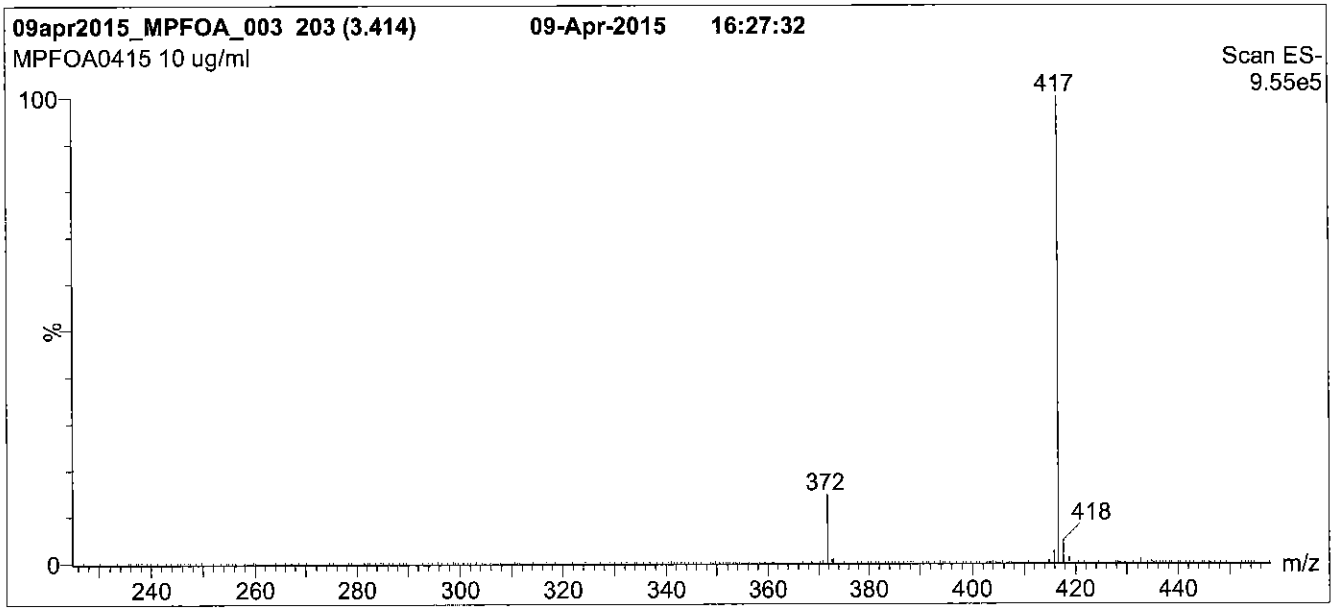
CALA

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **MPFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

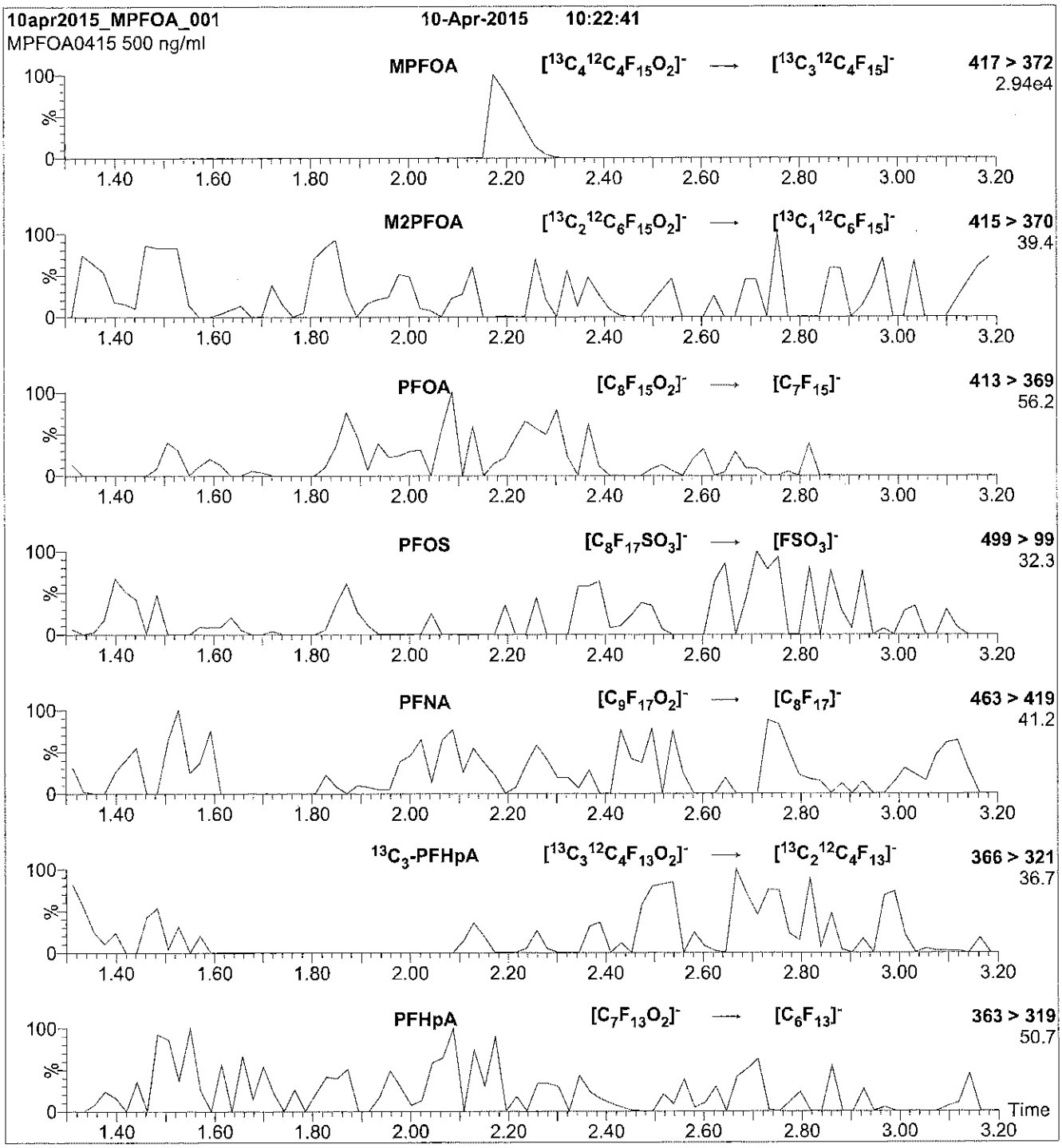
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFOA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.24e-3
Collision Energy (eV) = 11

Reagent

LCMPFOA_00010

609713
ID: LCMPFOA_00010
Exp: 01/22/21 Prpd: CBW
13C4-Perfluorooctanoic ac

R: 4/7/16 CBW

WELLINGTON LABORATORIES

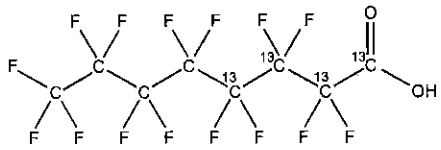
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFOA
COMPOUND: Perfluoro-n-[1,2,3,4-$^{13}C_4$]octanoic acid

LOT NUMBER: MPFOA0116

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $^{13}C_4{}^{12}C_4HF_{15}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 418.04
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 01/22/2016
EXPIRY DATE: (mm/dd/yyyy) 01/22/2021
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

ISOTOPIC PURITY: ≥99% ^{13}C ($1,2,3,4$-$^{13}C_4$)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of native perfluoro-n-octanoic acid (PFOA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 02/01/2016 (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:

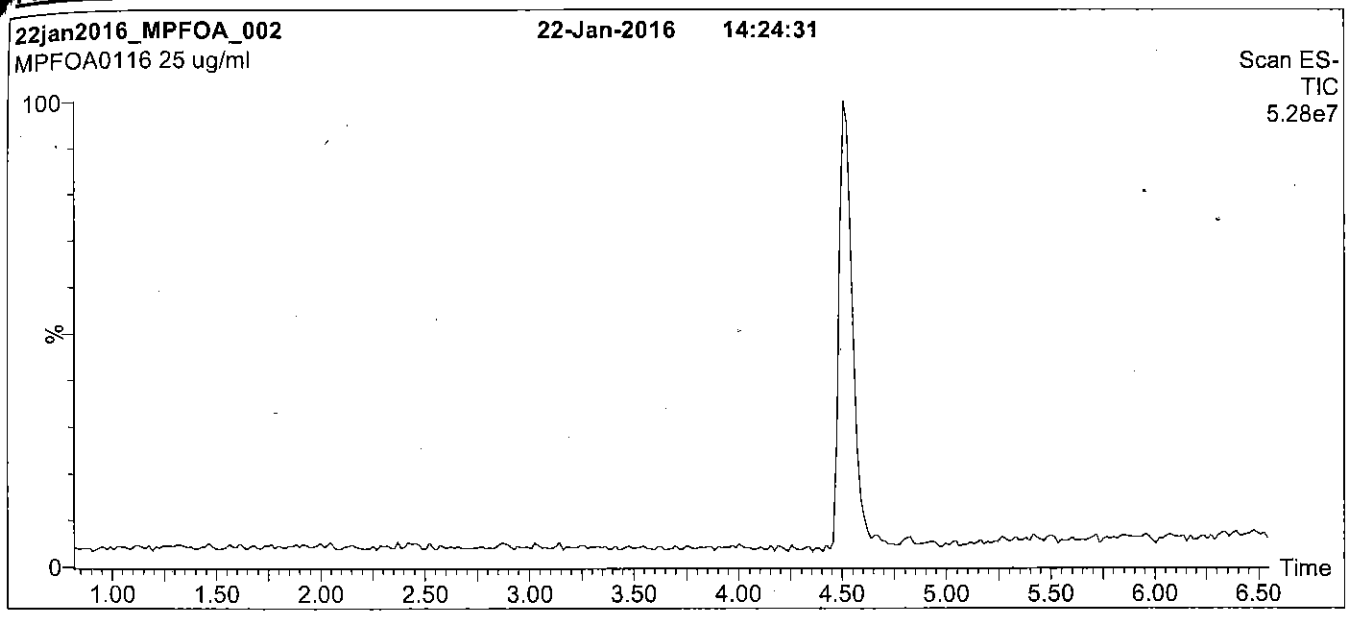
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

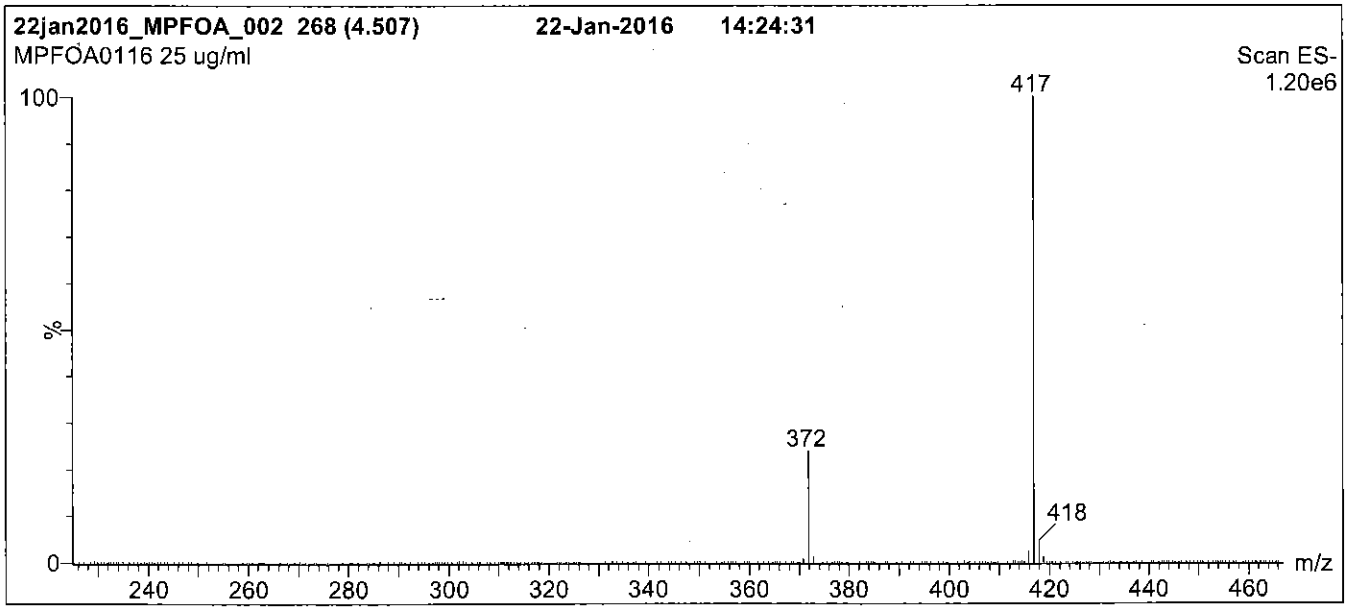
CALA Testing Accreditation No. A1226

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: **MPFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

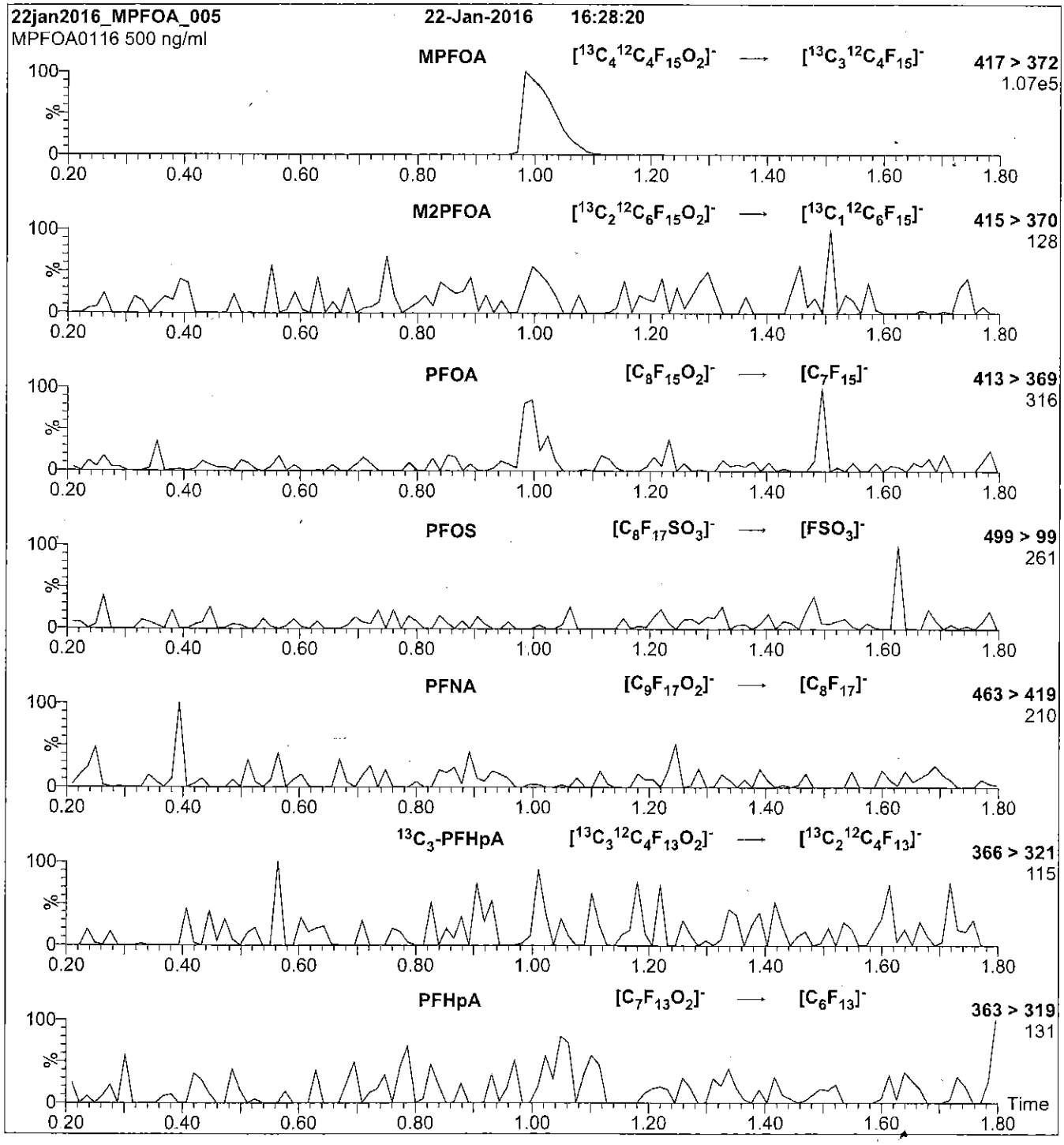
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
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) = 3.58e-3
Collision Energy (eV) = 10

Reagent

LCMPFOS_00009

V: 9/15/15 GV

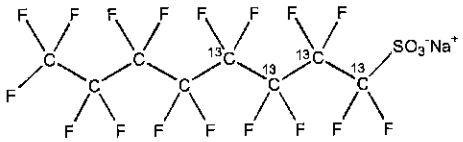
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFOS **LOT NUMBER:** MPFOS0515

COMPOUND: Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_4F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	526.08
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.8 ± 2.4 µg/ml (MPFOS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4$-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	05/15/2015		
EXPIRY DATE: (mm/dd/yyyy)	05/15/2020		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/28/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:27, Issued 2004-11-10
Revision#:3, Revised 2015-03-24

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

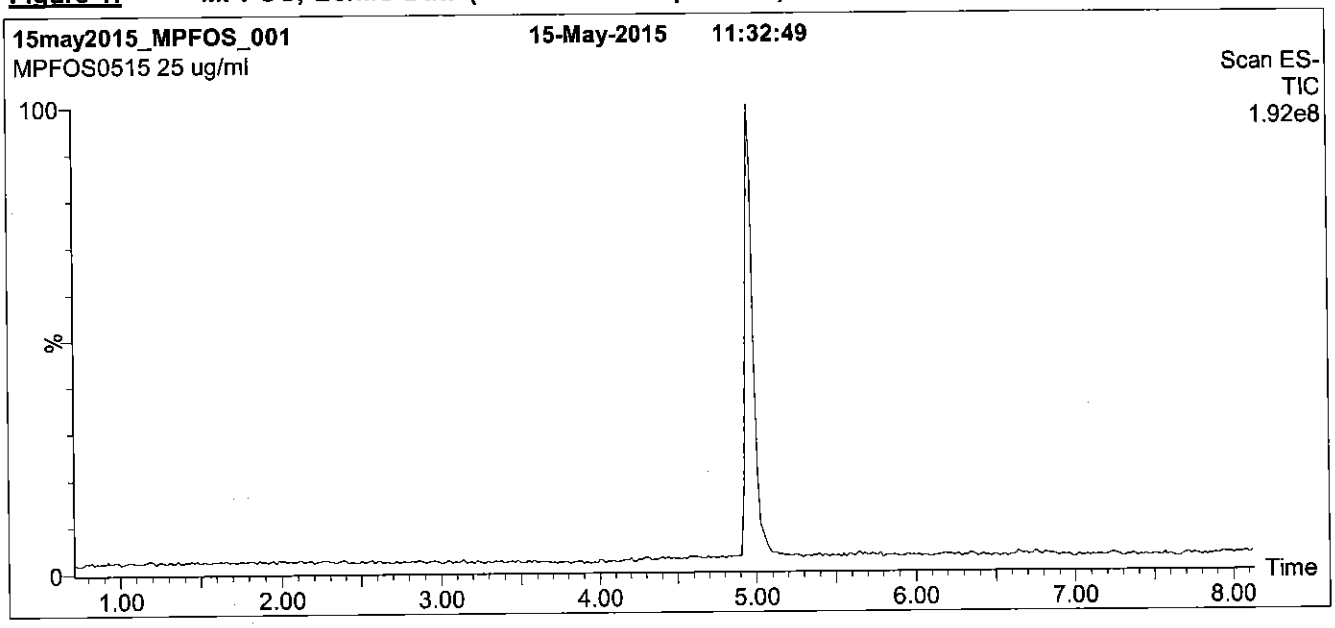
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

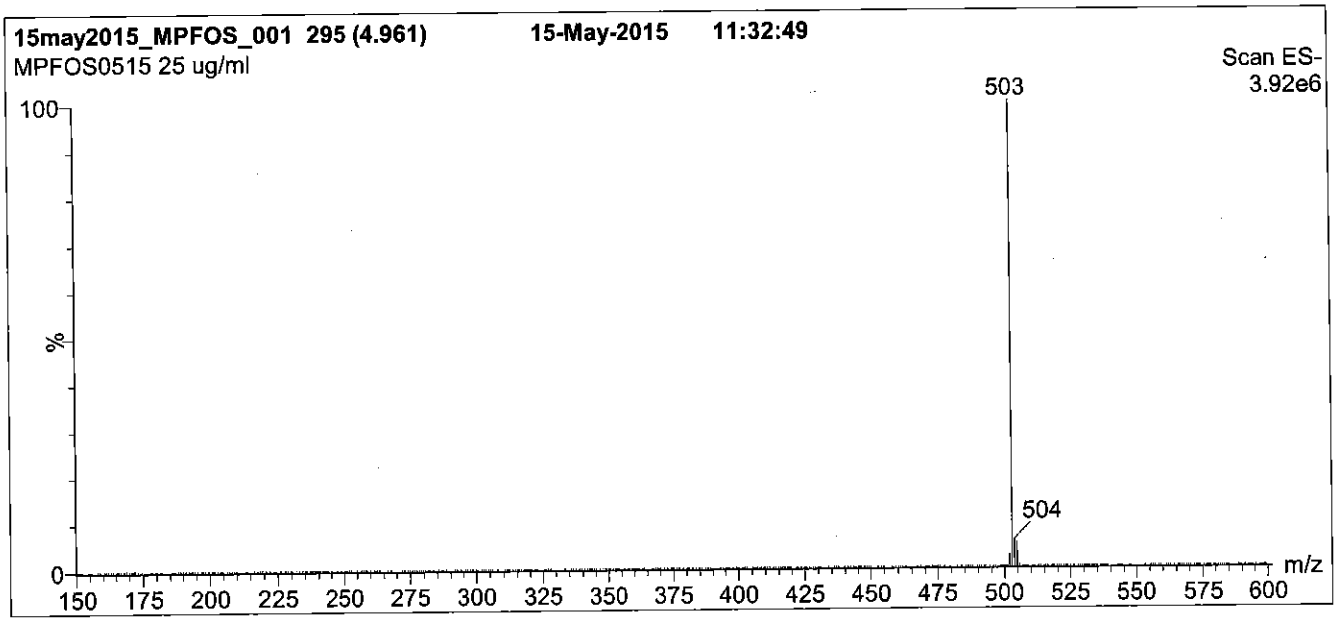
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED 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: **MPFOS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

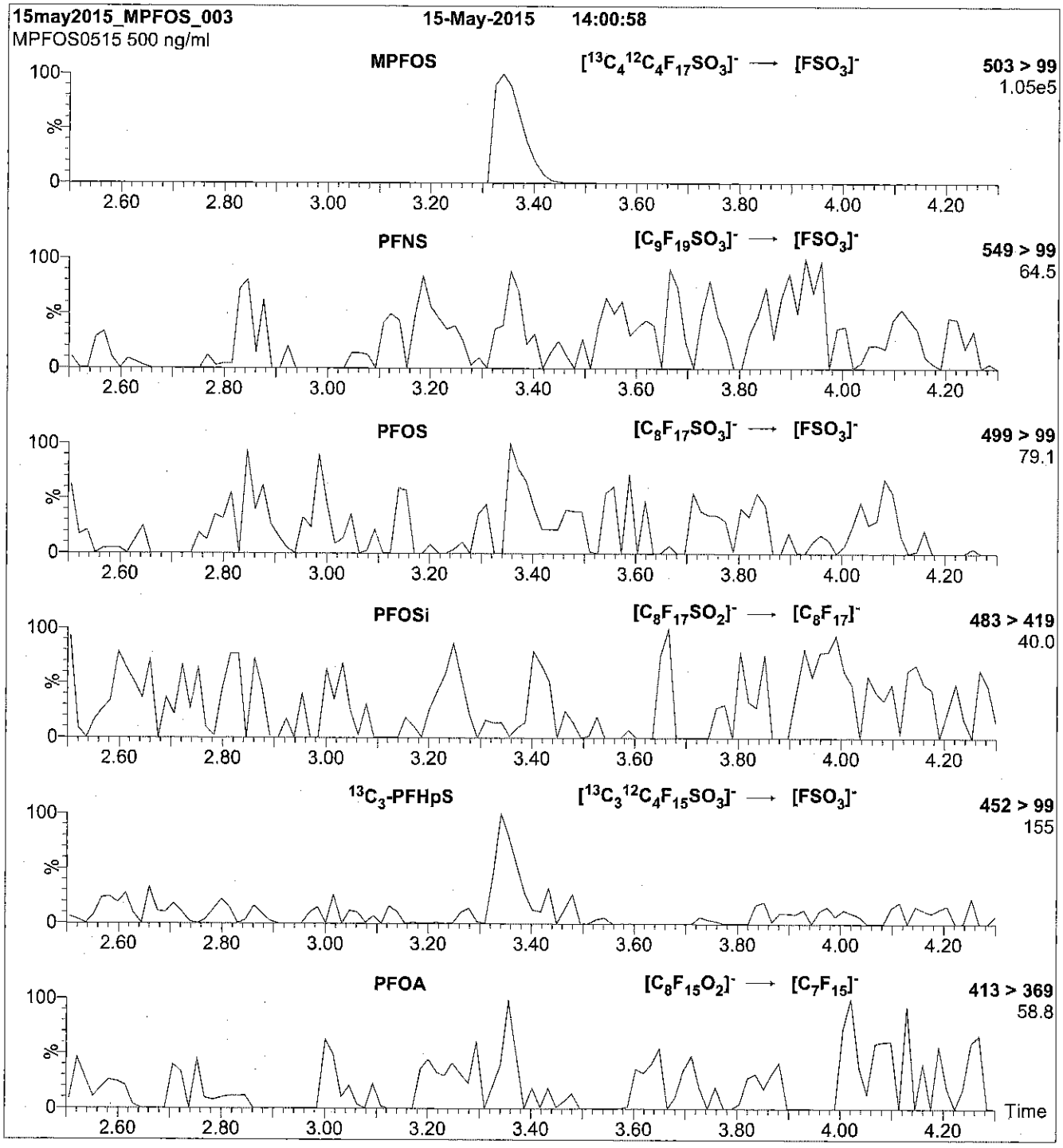
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFOS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFOS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 40

Reagent

LCMPFOS_00010

572886
ID: LCMPFOS_00010
Exp: 05/15/20 Prpd: CBW
13C4-Perfluorooctanesulfo

R: 1/25/16
S:

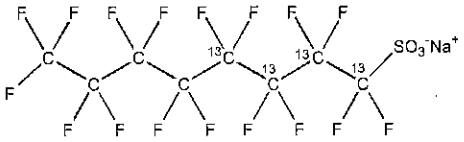
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFOS **LOT NUMBER:** MPFOS0515

COMPOUND: Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_4F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	526.08
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.8 ± 2.4 µg/ml (MPFOS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4$-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	05/15/2015		
EXPIRY DATE: (mm/dd/yyyy)	05/15/2020		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/28/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

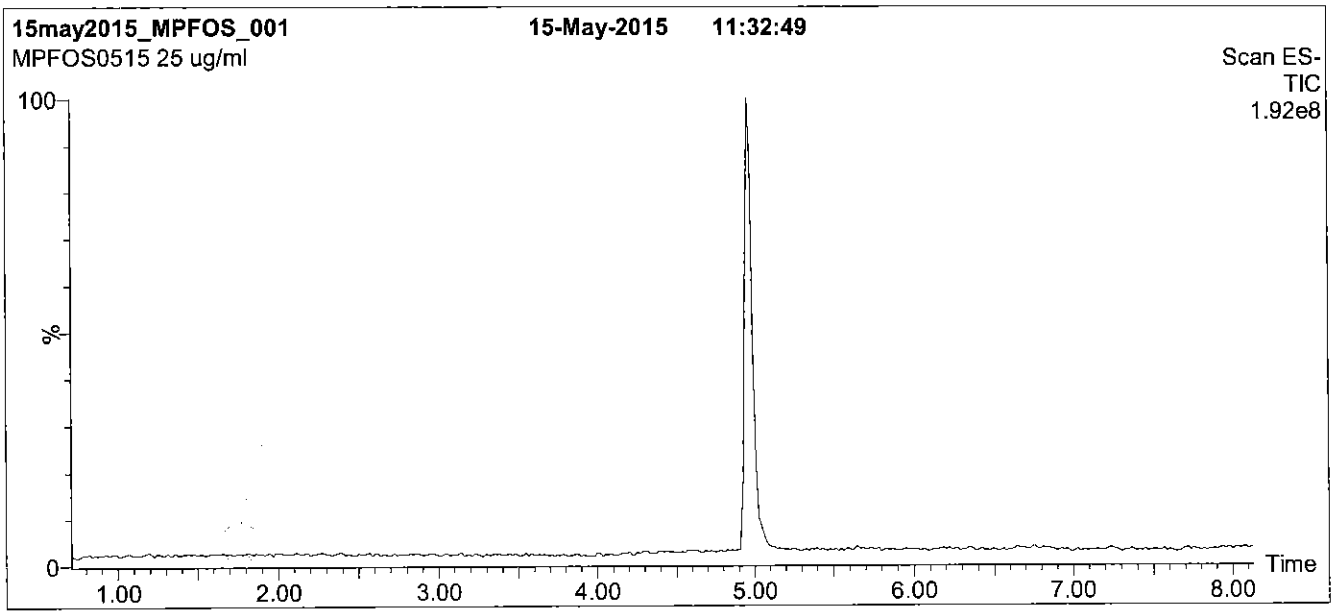
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

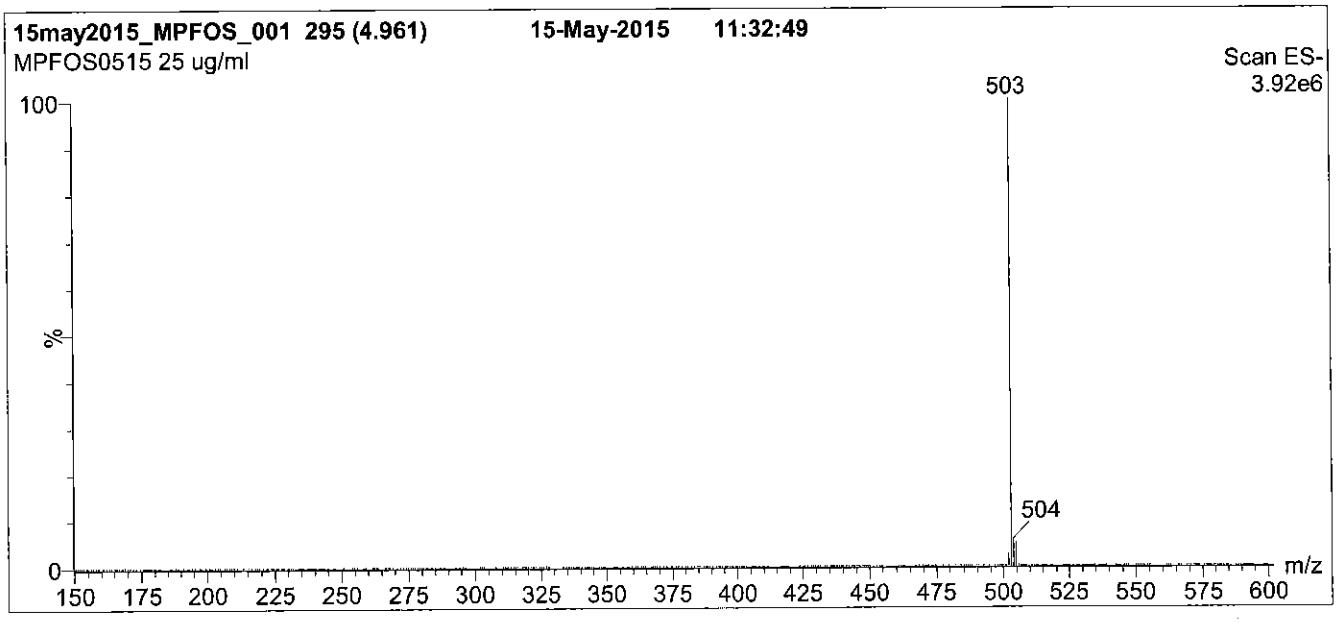
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **MPFOS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

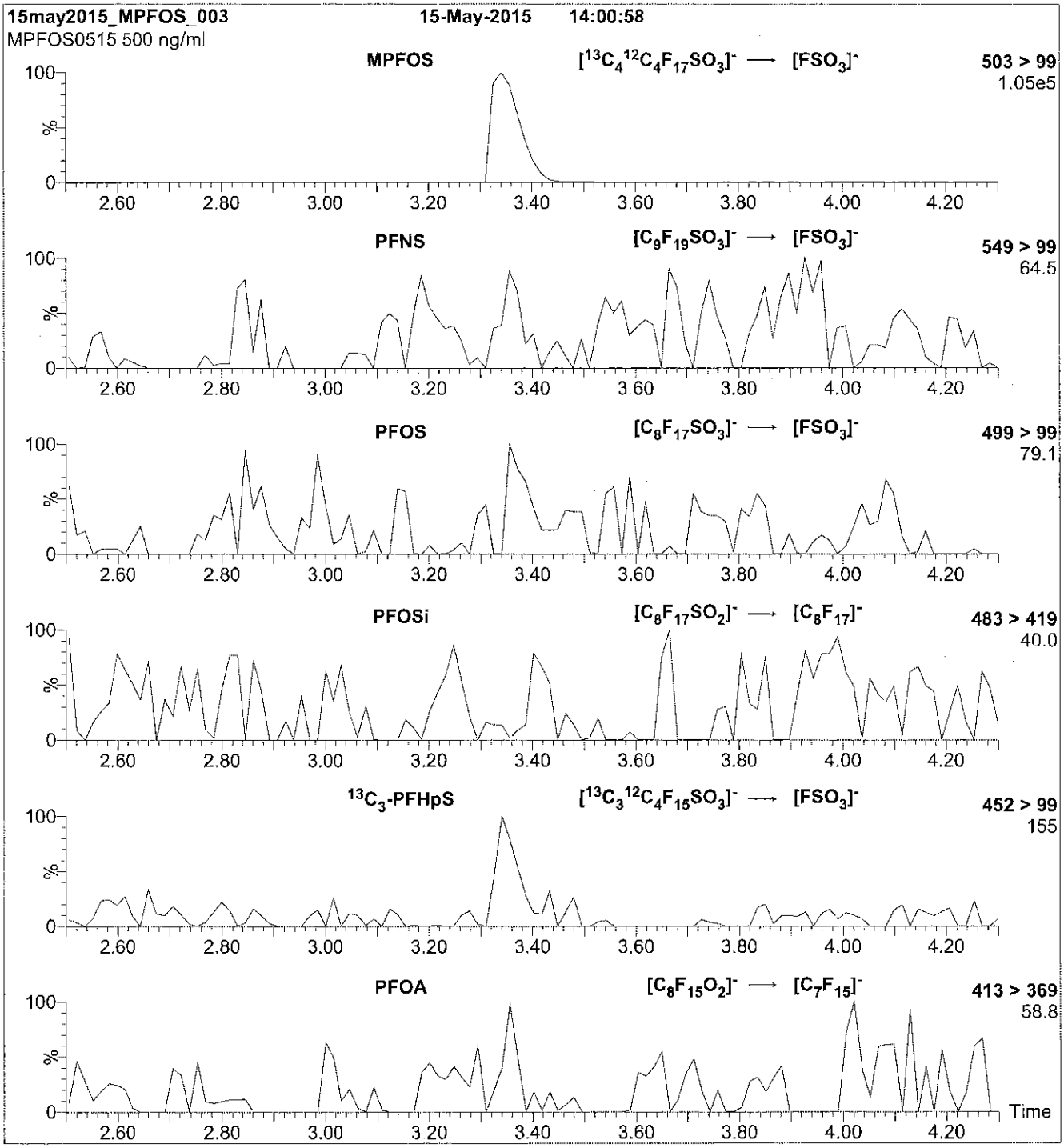
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFOS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFOS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 40

Reagent

LCMPFOS_00012

605227
ID: LCMPFOS_00012
Exp: 01/22/21 Prpd: CBW
13C4-Perfluorooctanesulfo

Rec. 3/29/16 JRB ✓

606228
ID: LCMPFOS_00013
Exp: 01/22/21 Prpd: CBW
13C4-Perfluorooctanesulfo

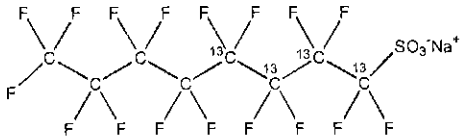
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFOS **LOT NUMBER:** MPFOS0116

COMPOUND: Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_4F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	526.08
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.8 ± 2.4 µg/ml (MPFOS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4\text{-}^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	01/22/2016		
EXPIRY DATE: (mm/dd/yyyy)	01/22/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 02/01/2016 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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:

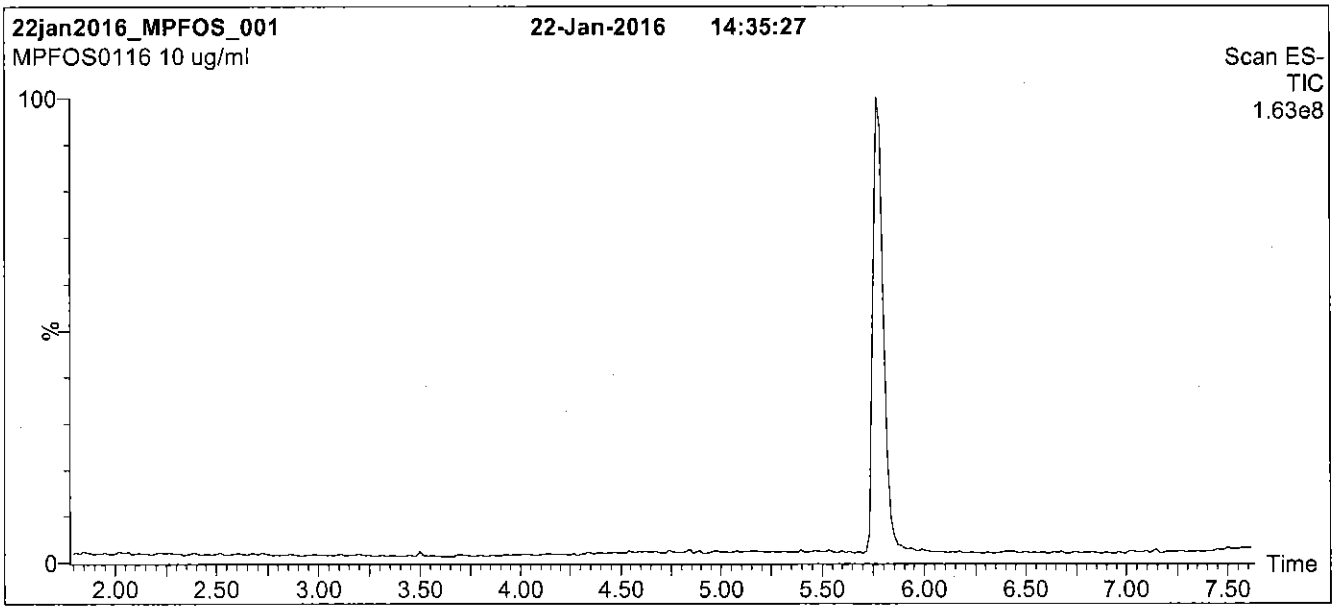
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

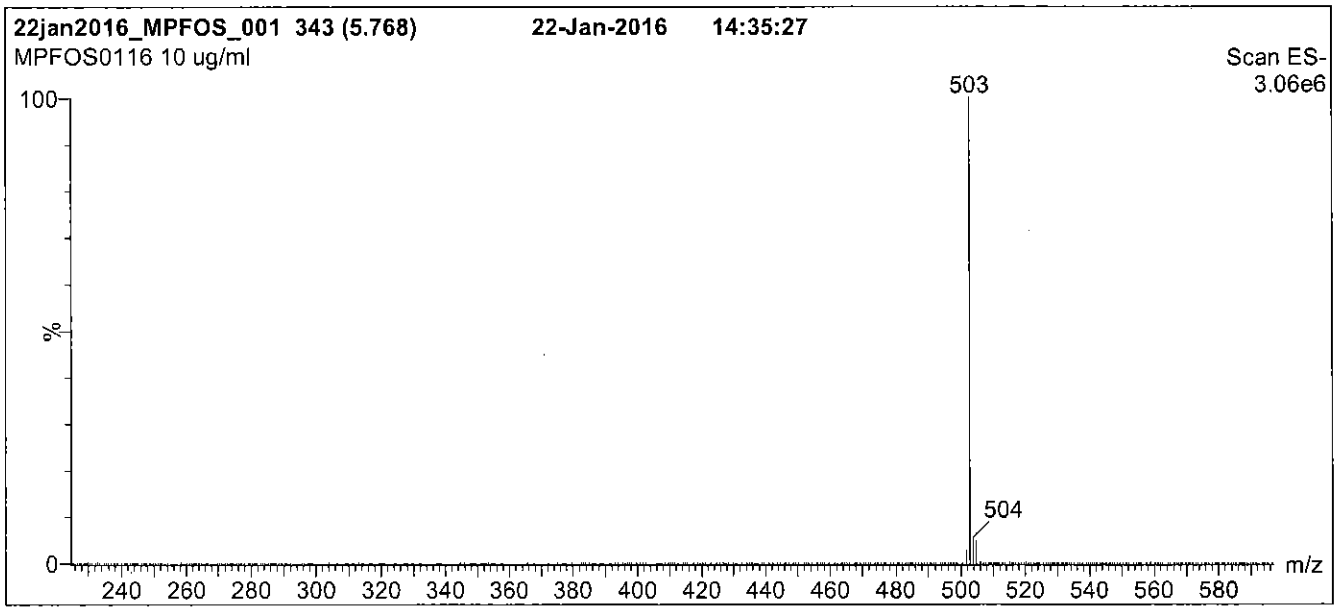
CALA

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: **MPFOS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

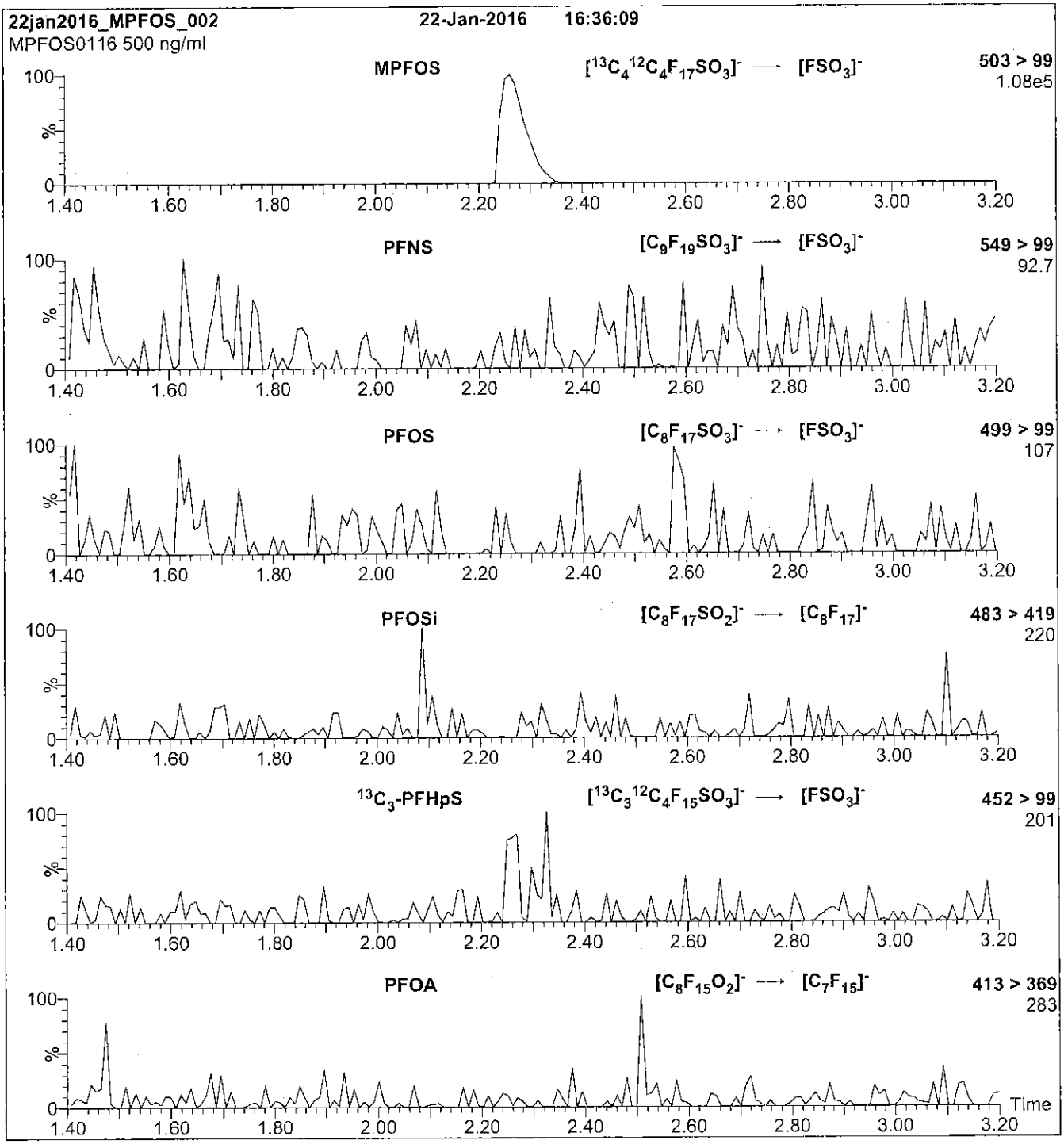
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFOS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFOS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.70e-3
Collision Energy (eV) = 40

Reagent

LCMPFUdA_00004

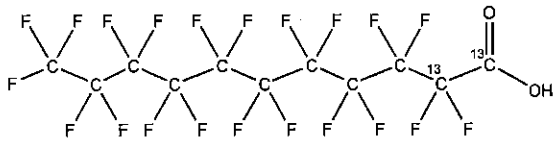
r:4/15/15 SKU

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFUdA
LOT NUMBER: MPFUdA1014
COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]undecanoic acid

STRUCTURE:
CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_9HF_{21}O_2$	**MOLECULAR WEIGHT:**	566.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2\text{-}^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	10/31/2014		
EXPIRY DATE: (mm/dd/yyyy)	10/31/2019		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Presence of 1-$^{13}C_1$-PFUdA (~1%; see Figure 2), 2-$^{13}C_1$-PFUdA (~1%), and PFUdA (~0.2%; see Figure 2) are due to the isotopic purity of the ^{13}C-precursor.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 11/03/2014 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

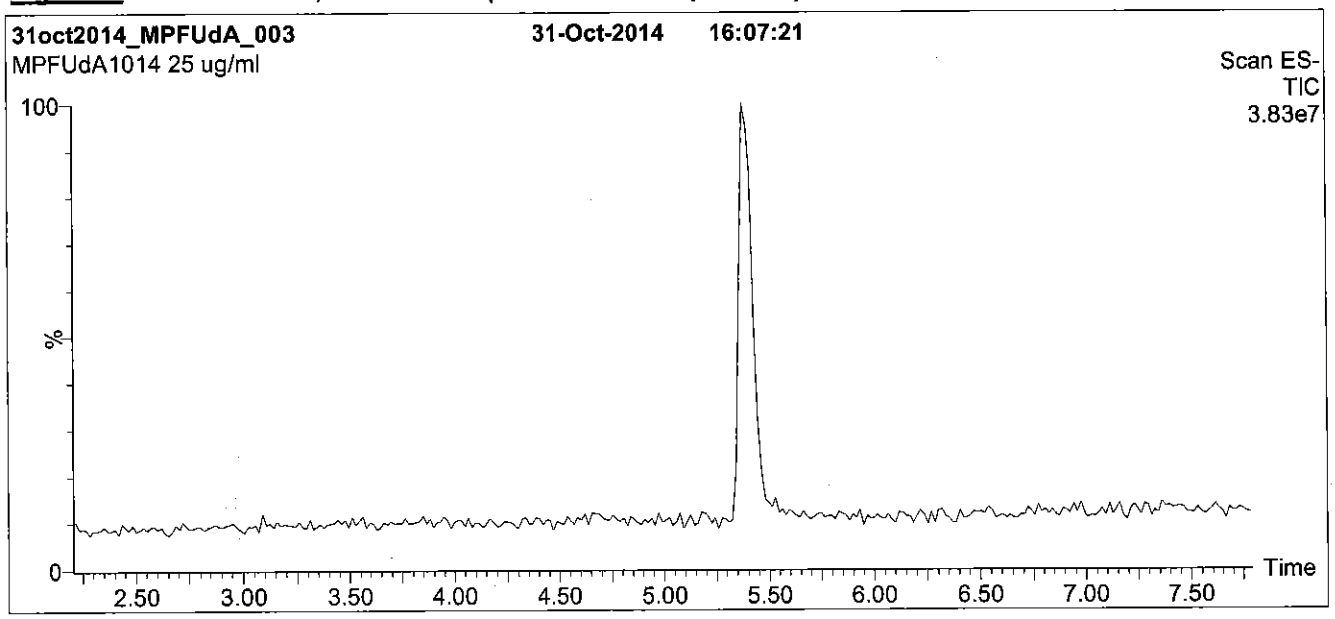
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

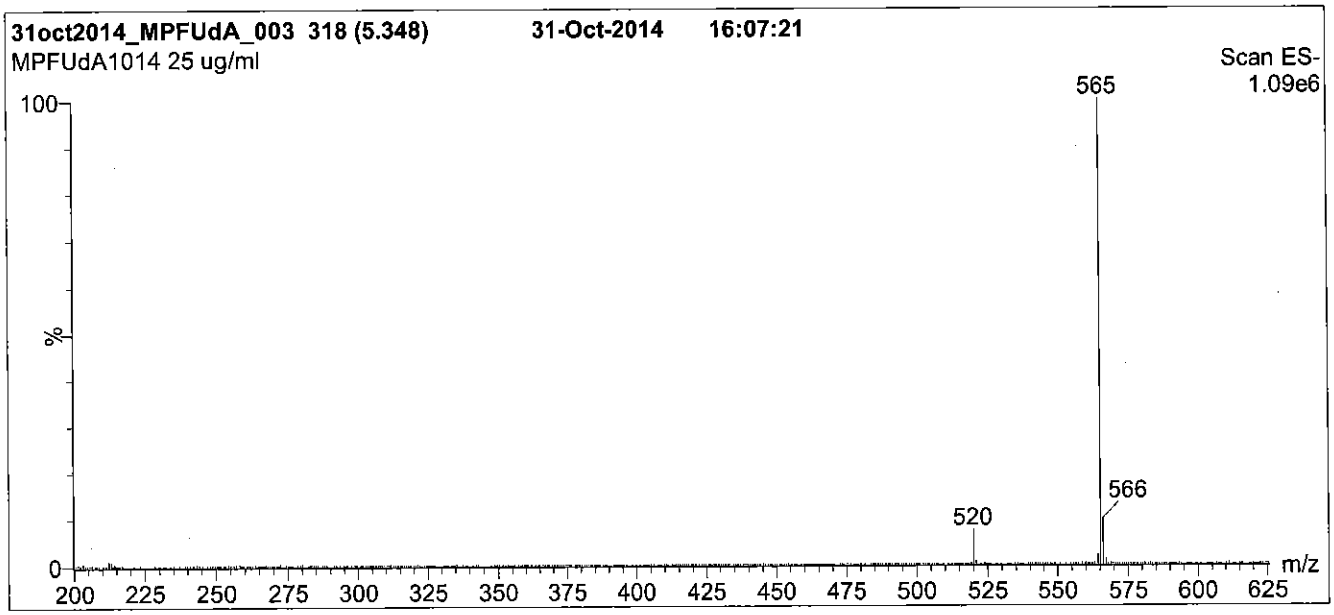
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **MPFUdA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

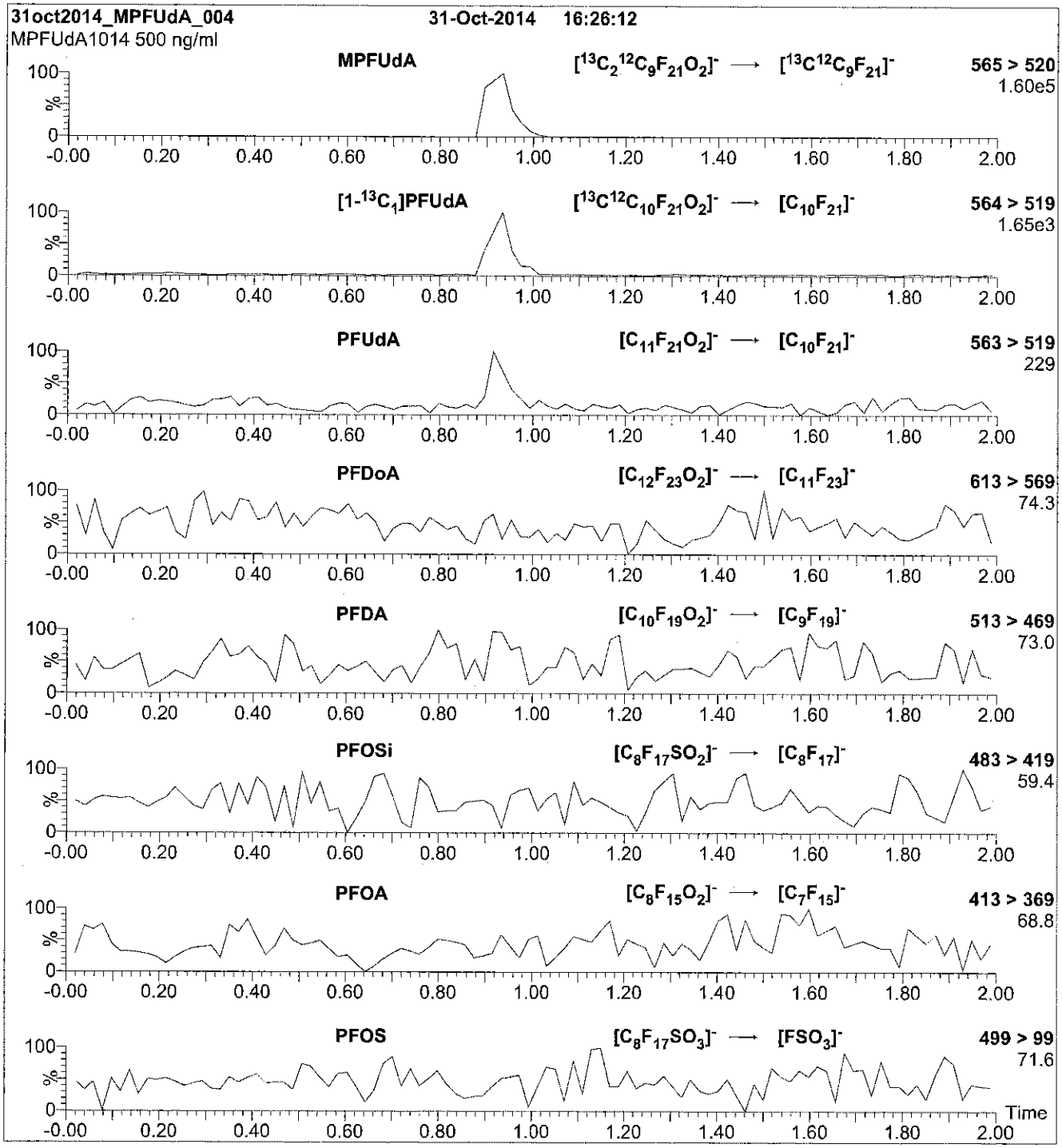
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFUdA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFUdA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

Reagent

LCMPFUdA_00005

R: 12/9/15 SEV

WELLINGTON LABORATORIES

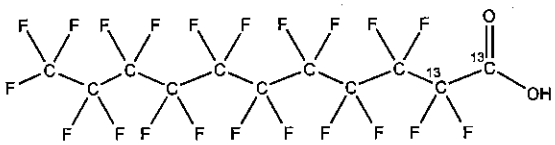
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFUdA
COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]undecanoic acid

LOT NUMBER: MPFUdA1014

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_9HF_{21}O_2$	**MOLECULAR WEIGHT:**	566.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2-$^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	10/31/2014		
EXPIRY DATE: (mm/dd/yyyy)	10/31/2019		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Presence of 1-$^{13}C_1$-PFUdA (~1%; see Figure 2), 2-$^{13}C_1$-PFUdA (~1%), and PFUdA (~0.2%; see Figure 2) are due to the isotopic purity of the ^{13}C-precursor.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 04/01/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

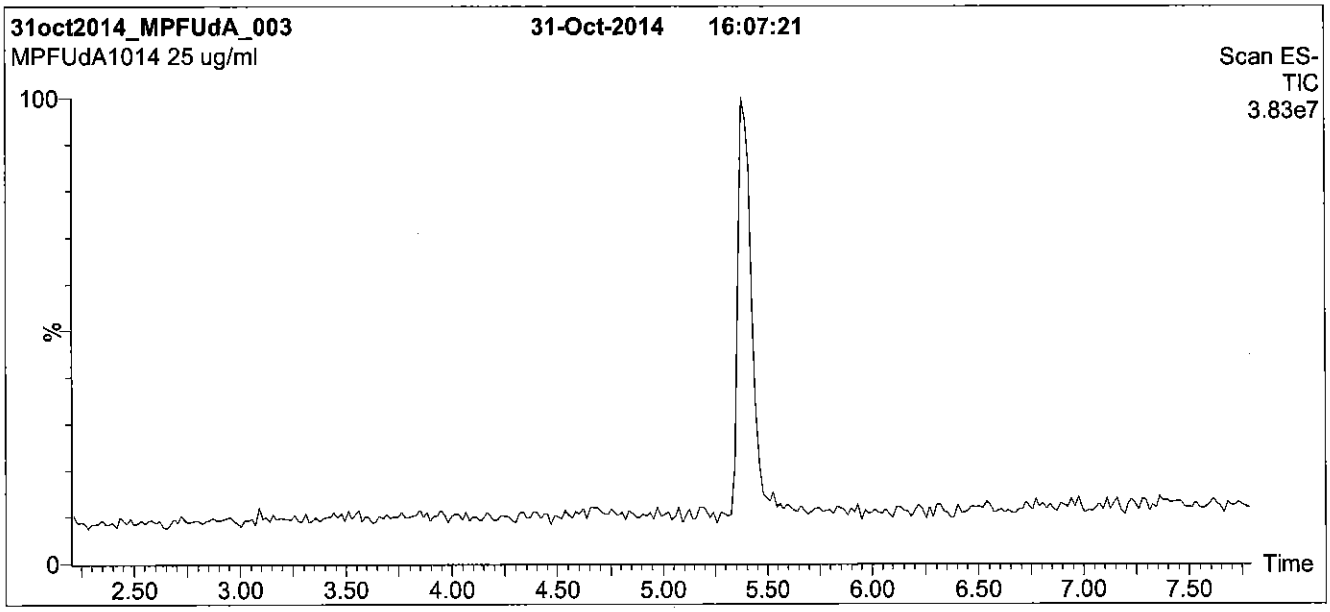
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

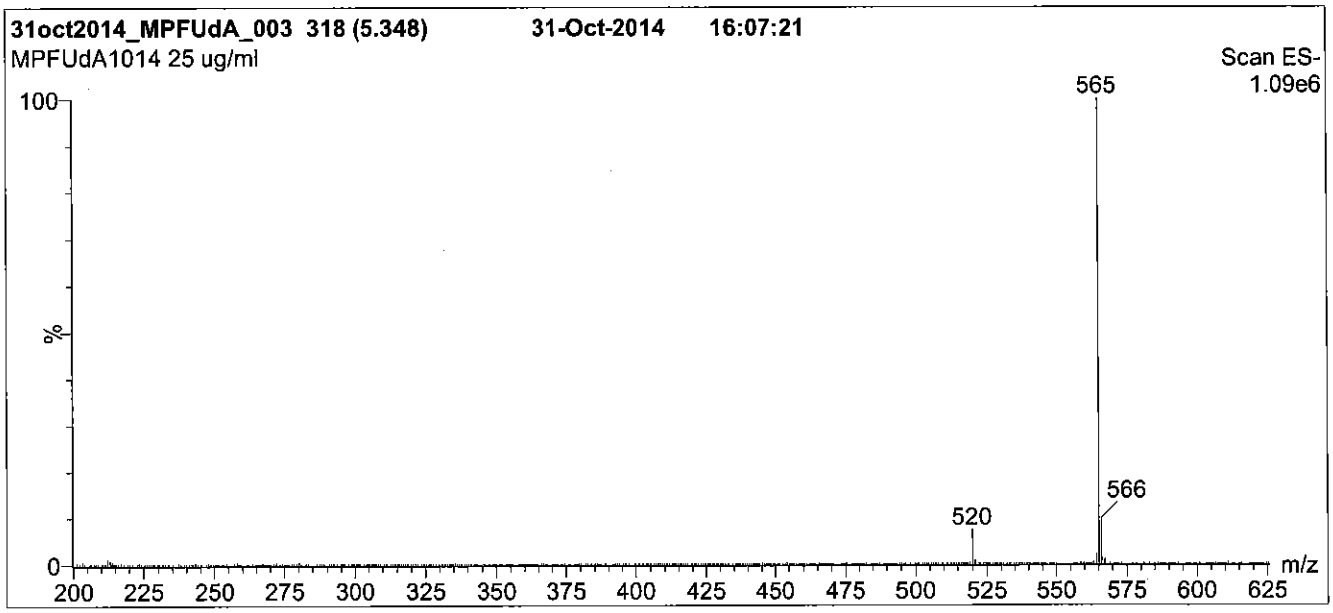
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED 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: **MPFUdA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

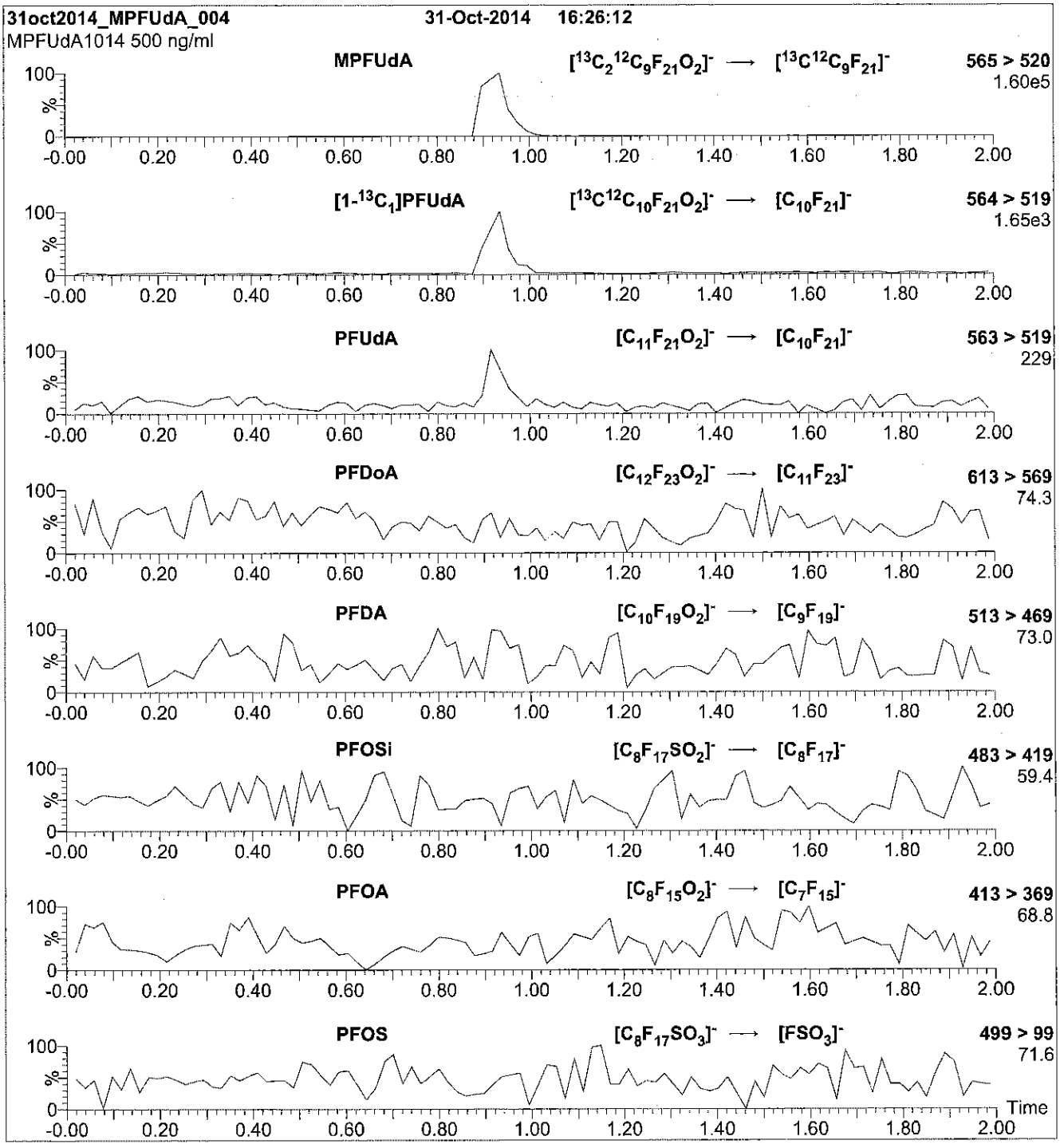
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFUdA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFUdA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

Reagent

LCMPFUdA_00007

609704
ID: LCMPFUdA_00007
Exp: 10/31/19 Prpd: CBW
13C2-Perfluoroundecanoic

R: 4/7/16 CBW

WELLINGTON LABORATORIES

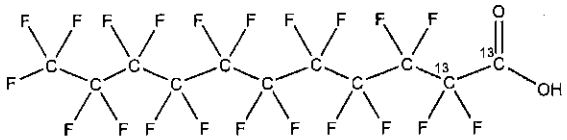
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFUdA
COMPOUND: Perfluoro-n-[1,2-$^{13}C_2$]undecanoic acid

LOT NUMBER: MPFUdA1014

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_8HF_{21}O_2$	**MOLECULAR WEIGHT:**	566.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2\text{-}^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	10/31/2014		
EXPIRY DATE: (mm/dd/yyyy)	10/31/2019		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

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:** 04/01/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

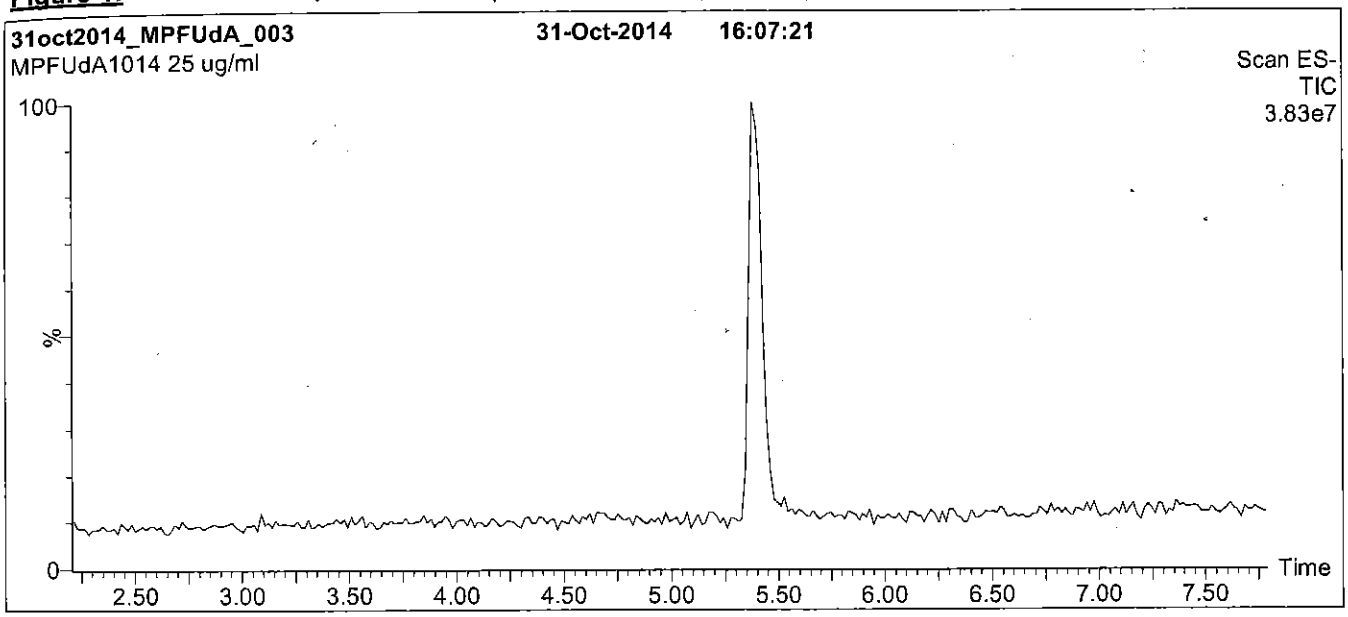
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

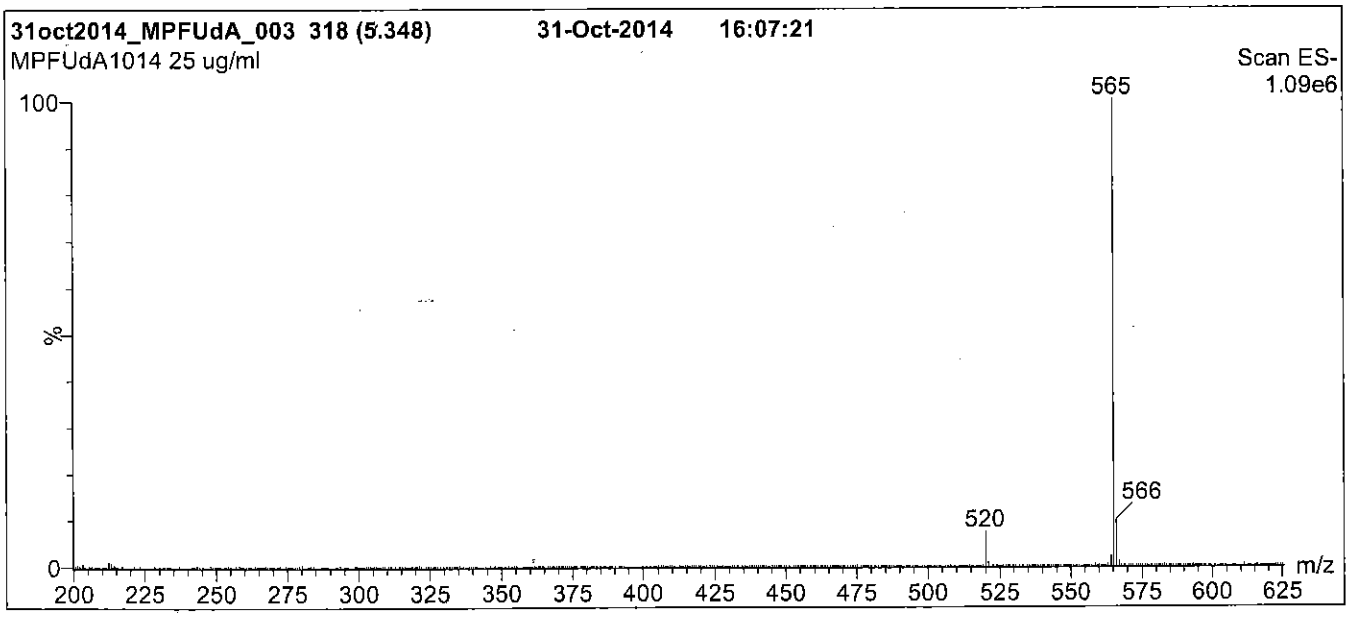
CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **MPFUdA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

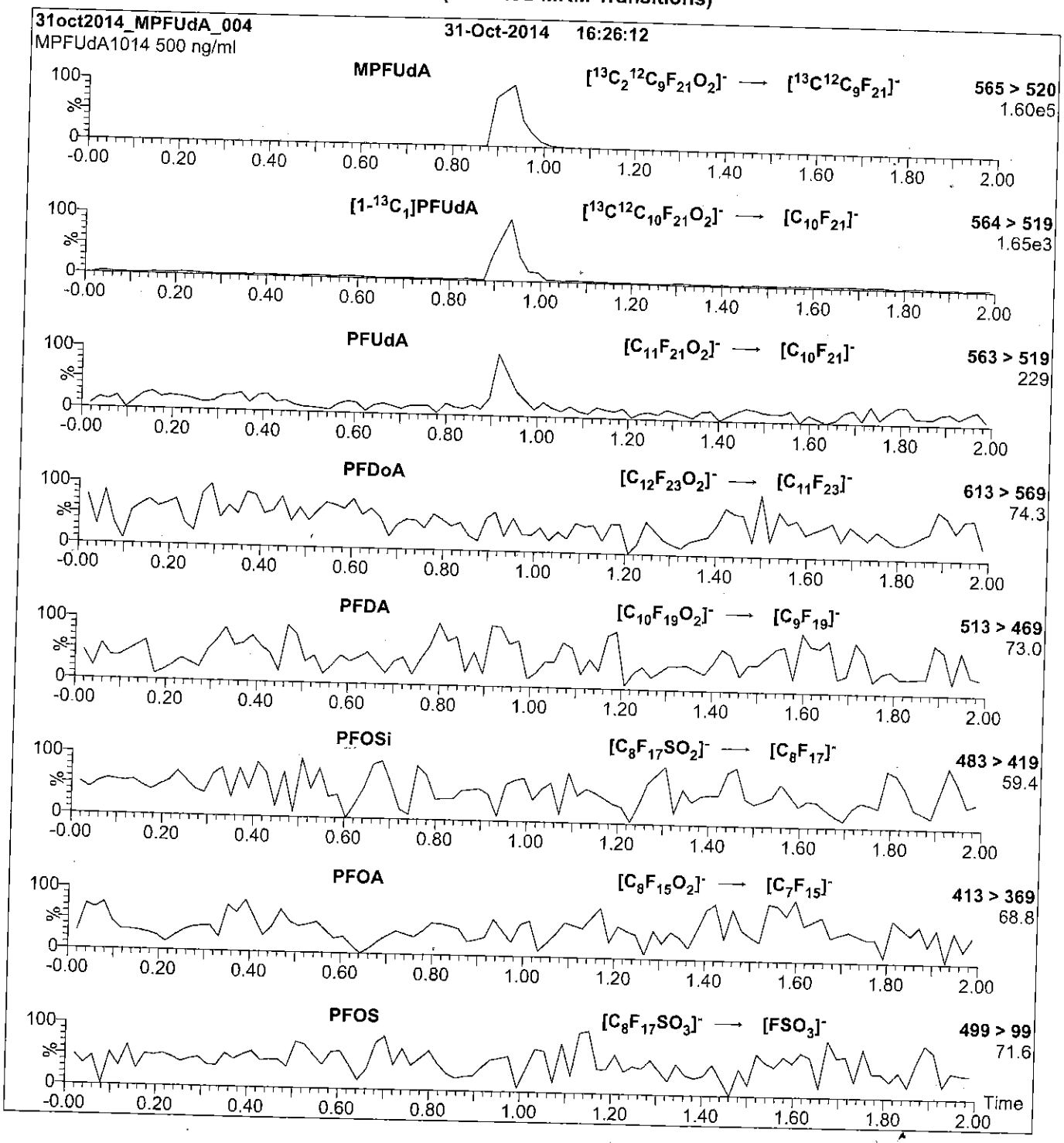
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

Figure 2: **MPFUdA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
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

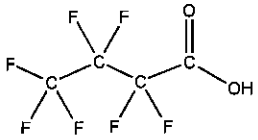
LCPFBA_00003

rec 7/15/14

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFBA	**LOT NUMBER:**	PFBA0313
COMPOUND:	Perfluoro-n-butanoic acid		
STRUCTURE:		**CAS #:**	375-22-4



MOLECULAR FORMULA:	$C_4HF_7O_2$	**MOLECULAR WEIGHT:**	214.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	03/05/2013		
EXPIRY DATE: (mm/dd/yyyy)	03/05/2018		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 03/06/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

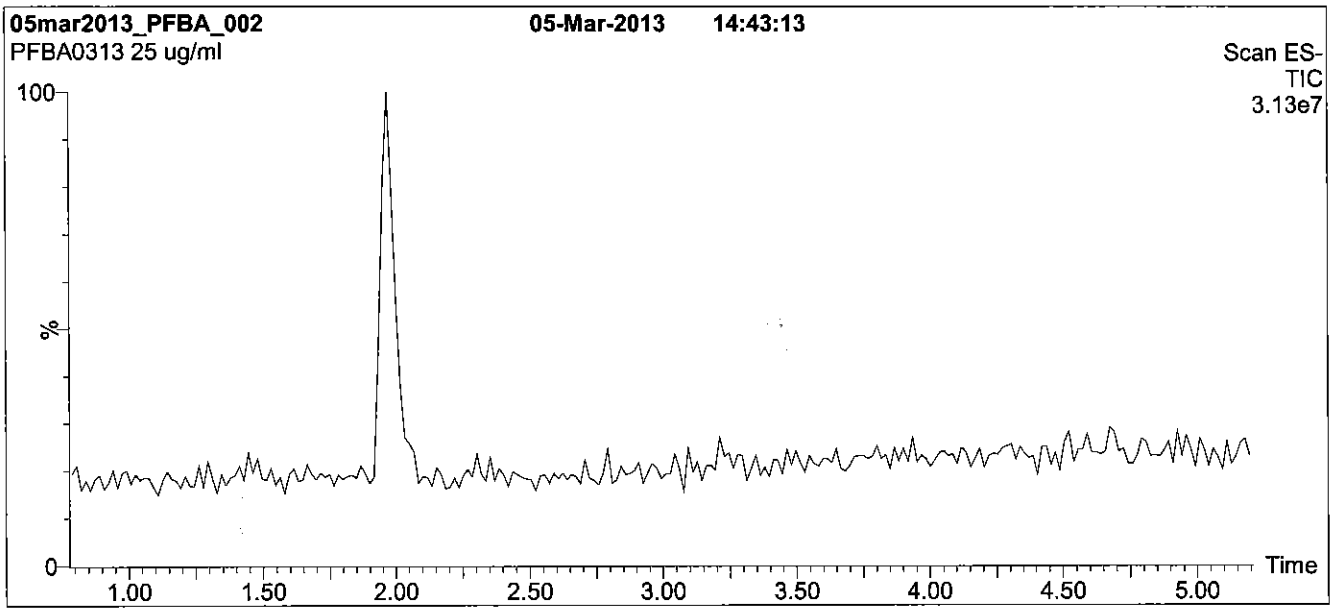
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

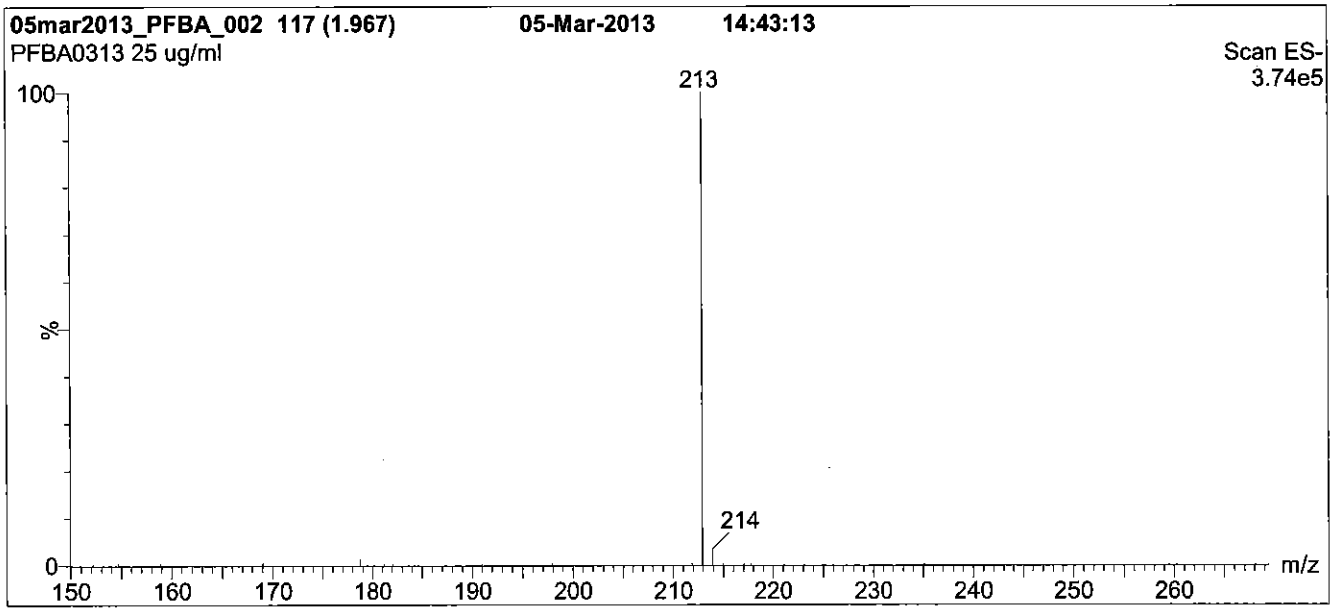
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFBA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 25% (80:20 MeOH:ACN) / 75% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

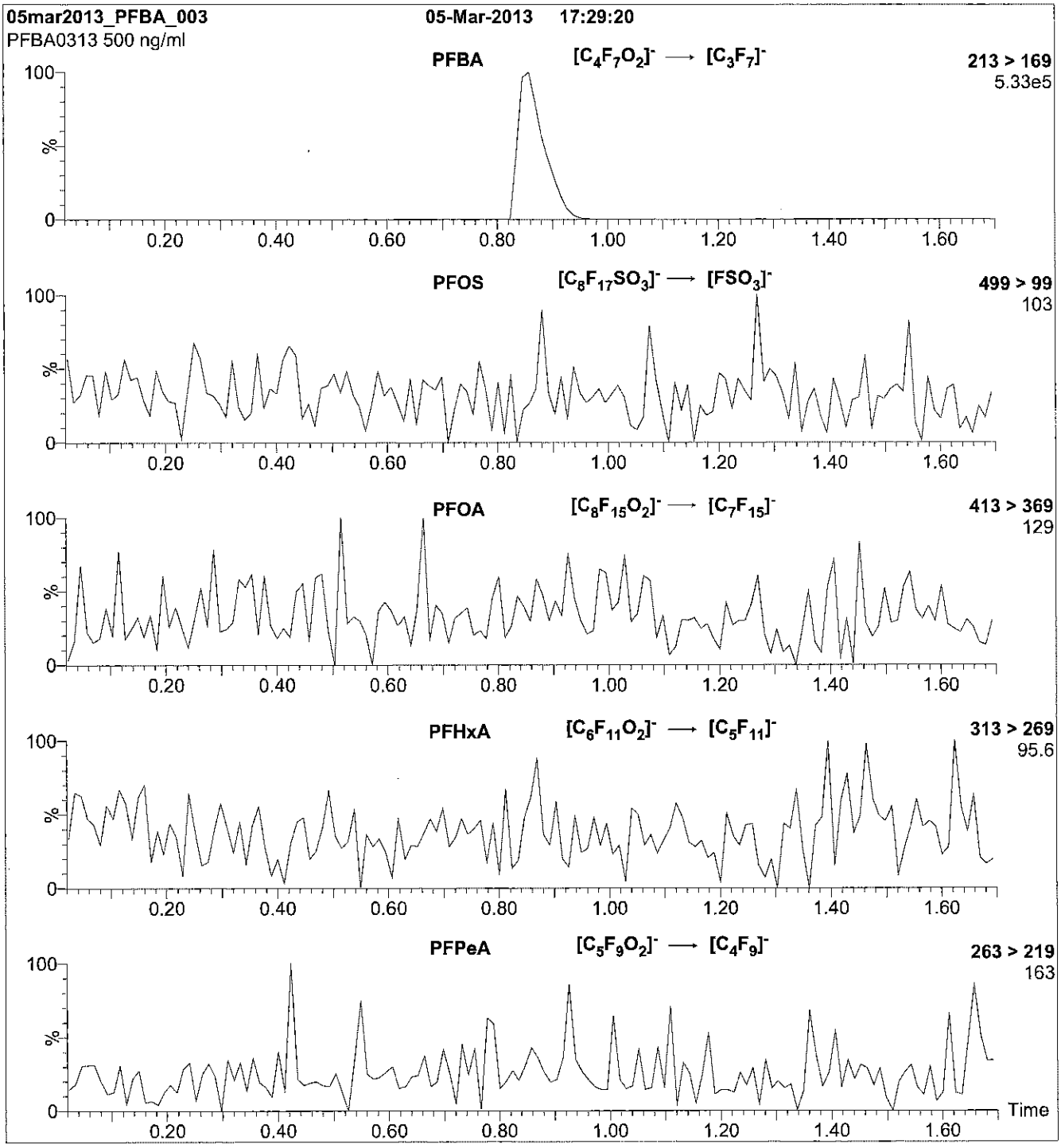
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 8.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFBA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFBA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.70e-3
Collision Energy (eV) = 10

Reagent

LCPFBA_00004

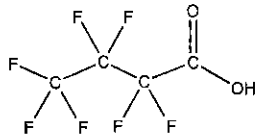
R: 2/25/16 CBW

587895
ID: LCPFBA_00004
Exp: 01/30/20 Prpd: CBW
PF-n-butanoic acid

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFBA	**LOT NUMBER:**	PFBA0115
COMPOUND:	Perfluoro-n-butanoic acid		
STRUCTURE:		**CAS #:**	375-22-4



MOLECULAR FORMULA:	$C_4HF_7O_2$	**MOLECULAR WEIGHT:**	214.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	01/30/2015		
EXPIRY DATE: (mm/dd/yyyy)	01/30/2020		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ B.G. Chittim **Date:** 03/25/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, ...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

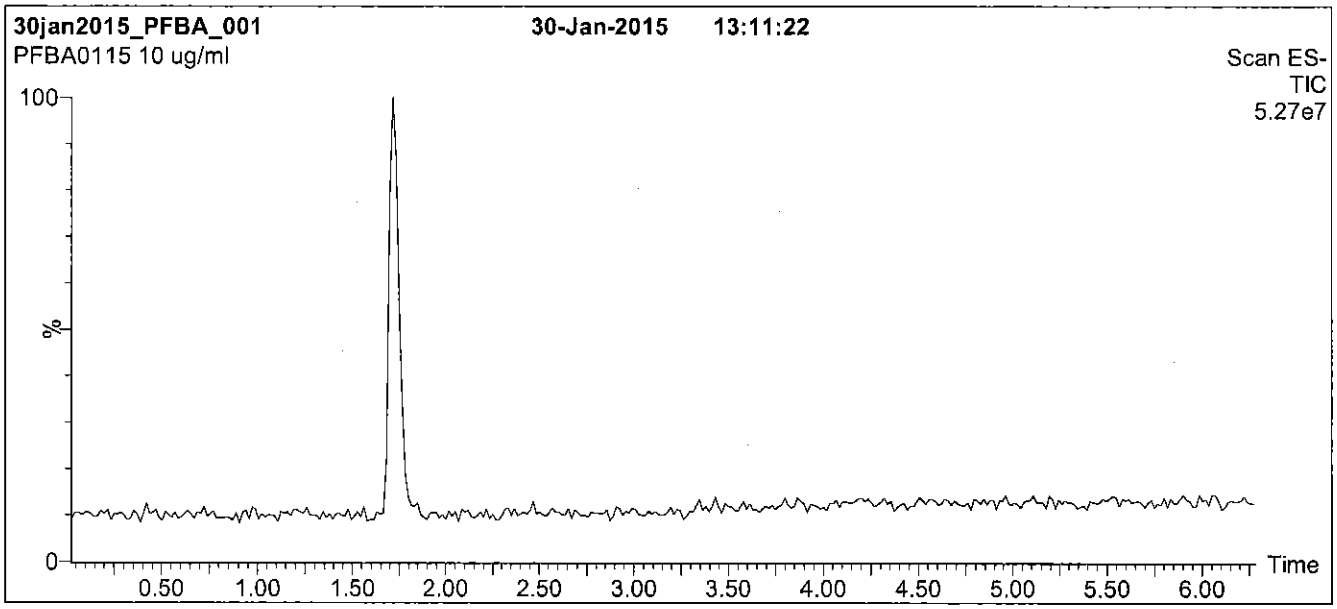
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

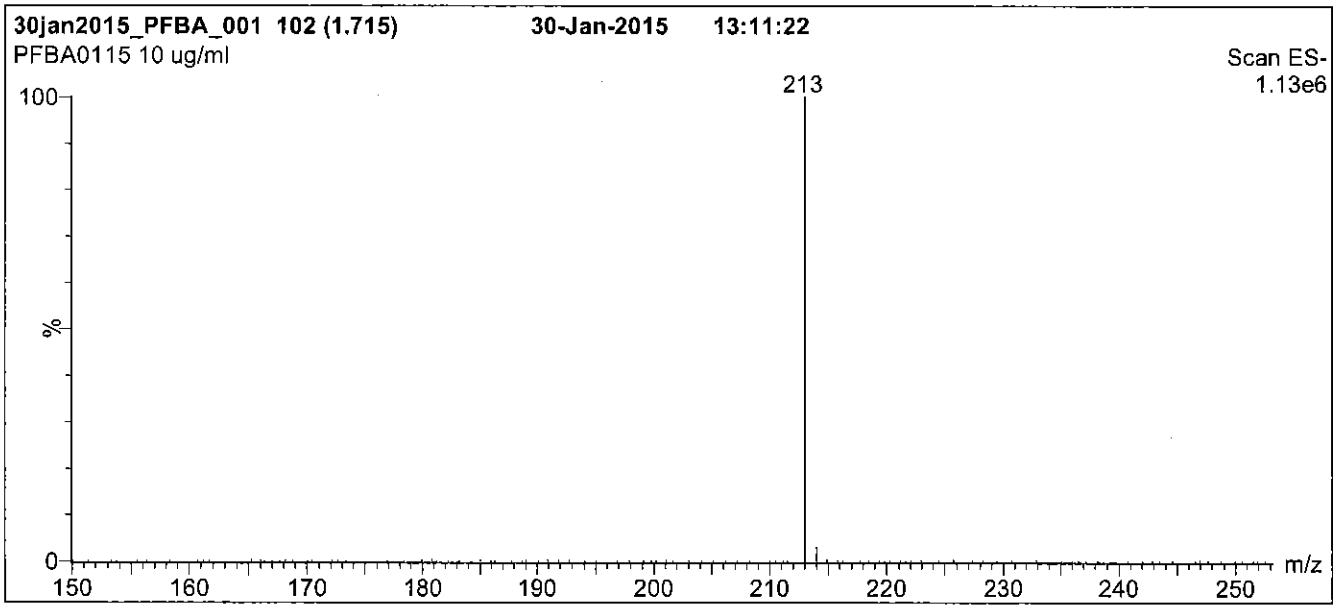
CALA Testing Accreditation No. A1226

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: **PFBA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1 min
before returning to initial conditions in 0.5 min.
Time: 10 min

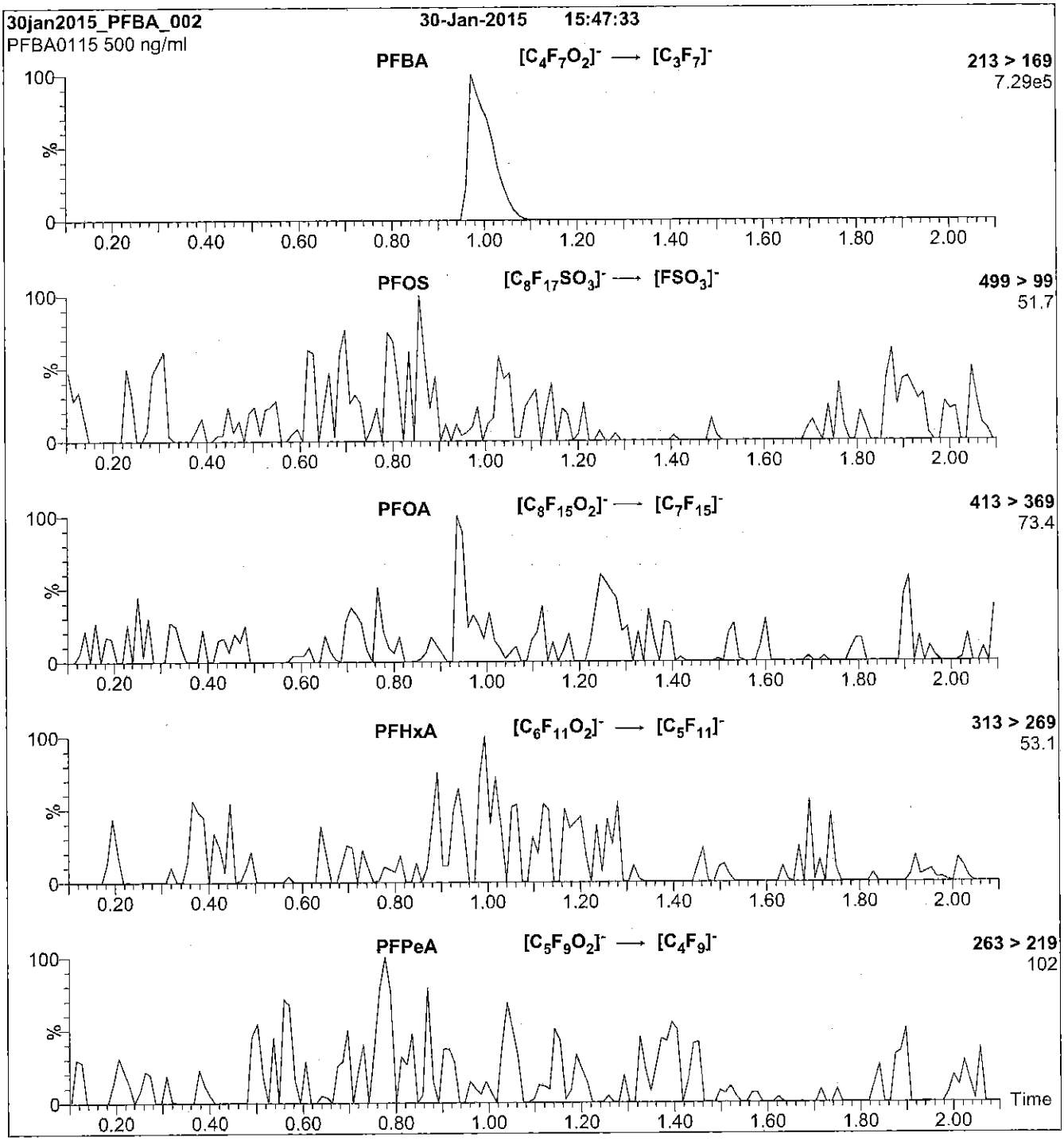
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 8.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFBA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFBA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 10

Reagent

LCPFBS_00003

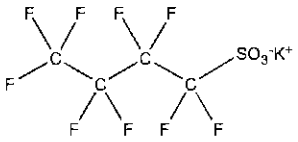
r. 2/11/15

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: L-PFBS
LOT NUMBER: LPFBS1014
COMPOUND: Potassium perfluoro-1-butanesulfonate

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) 10/09/2014
EXPIRY DATE: (mm/dd/yyyy) 10/09/2019
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 10/17/2014 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

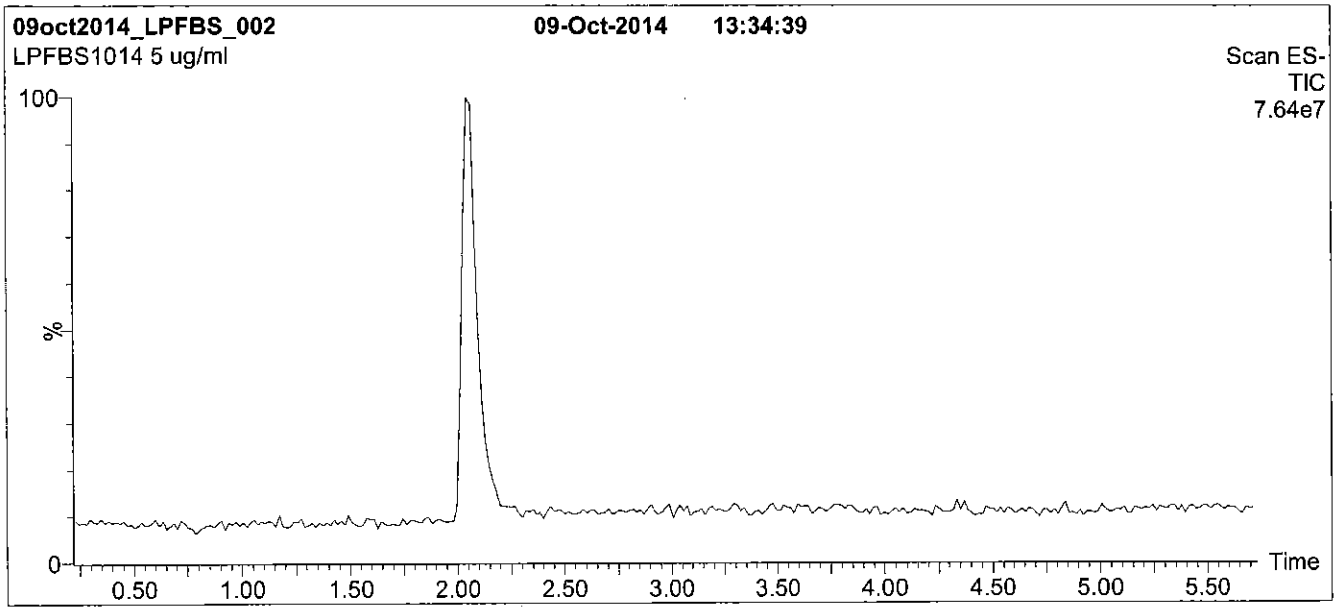
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

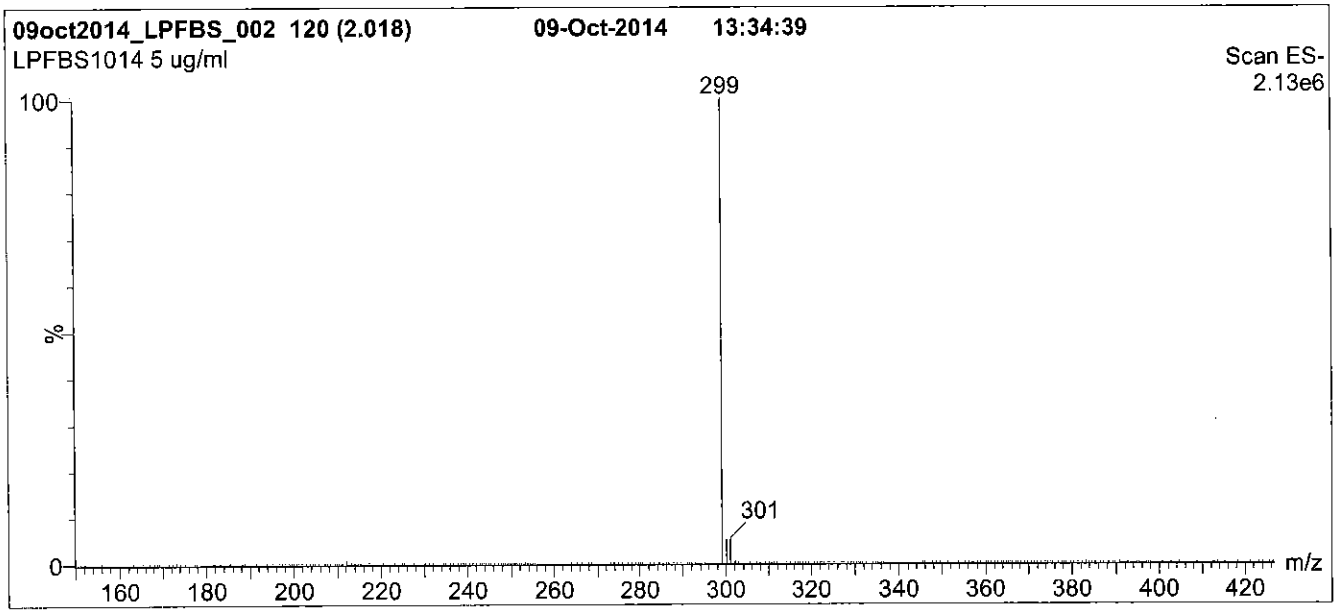
CALA Testing Accreditation No: A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **L-PFBS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

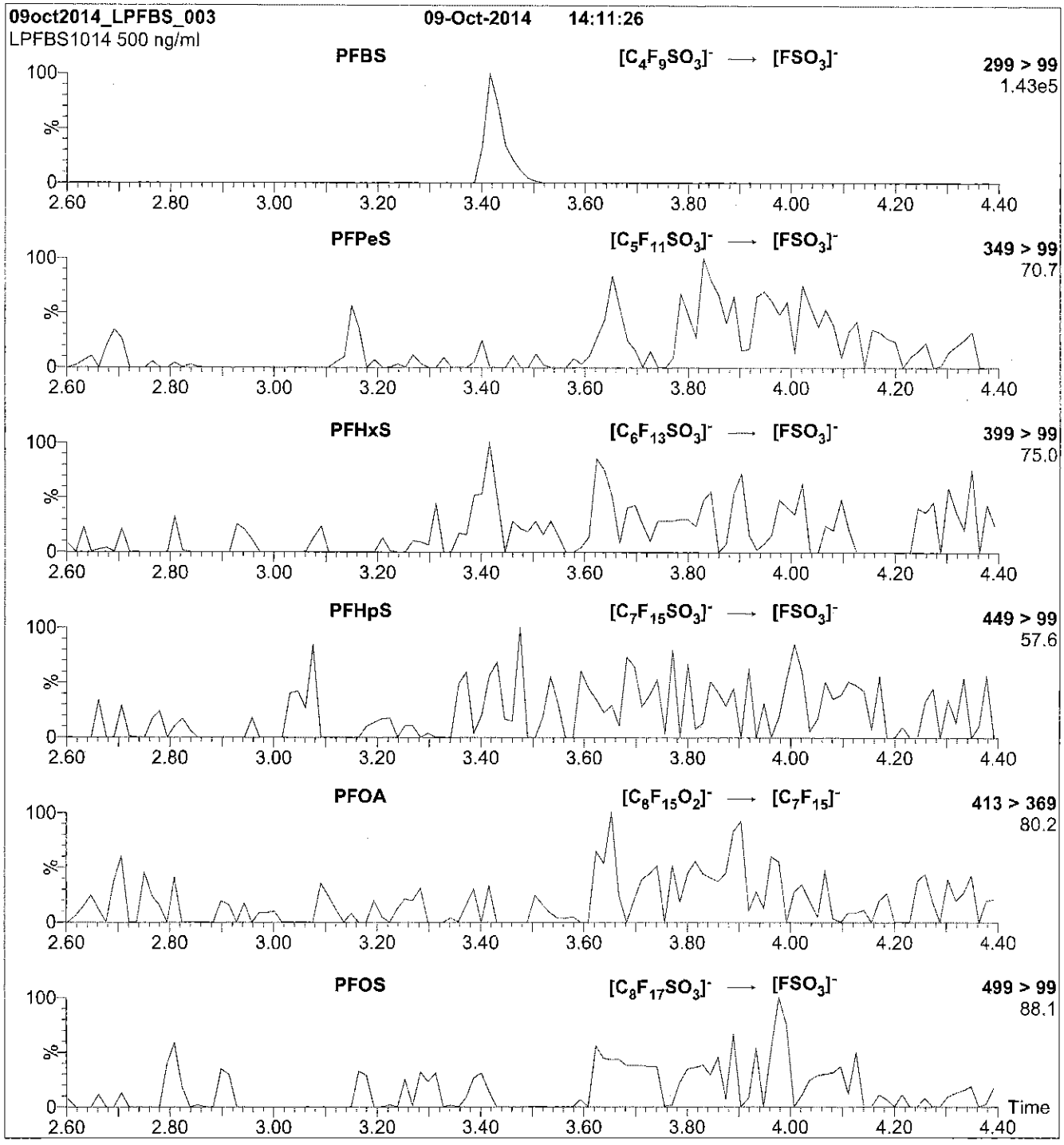
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFBS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection:	Direct loop injection 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) = 3.43e-3
Collision Energy (eV) = 25

Reagent

LCPFDA_00003

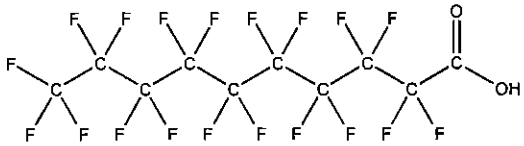
Rec 7/16/14

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFDA
COMPOUND: Perfluoro-n-decanoic acid
LOT NUMBER: PFDA0613

STRUCTURE:
CAS #: 335-76-2



MOLECULAR FORMULA: $C_{10}HF_{19}O_2$
MOLECULAR WEIGHT: 514.08
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 06/19/2013
EXPIRY DATE: (mm/dd/yyyy) 06/19/2018
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.4% PFNA and ~ 0.1% PFOA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 07/03/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

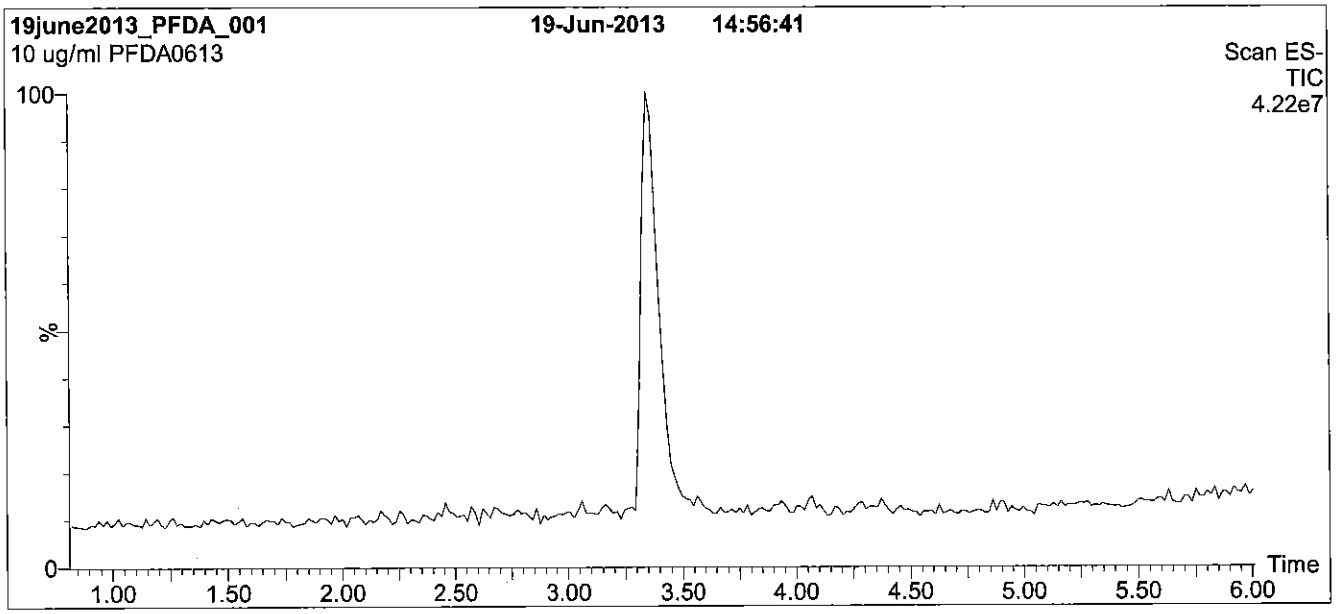
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

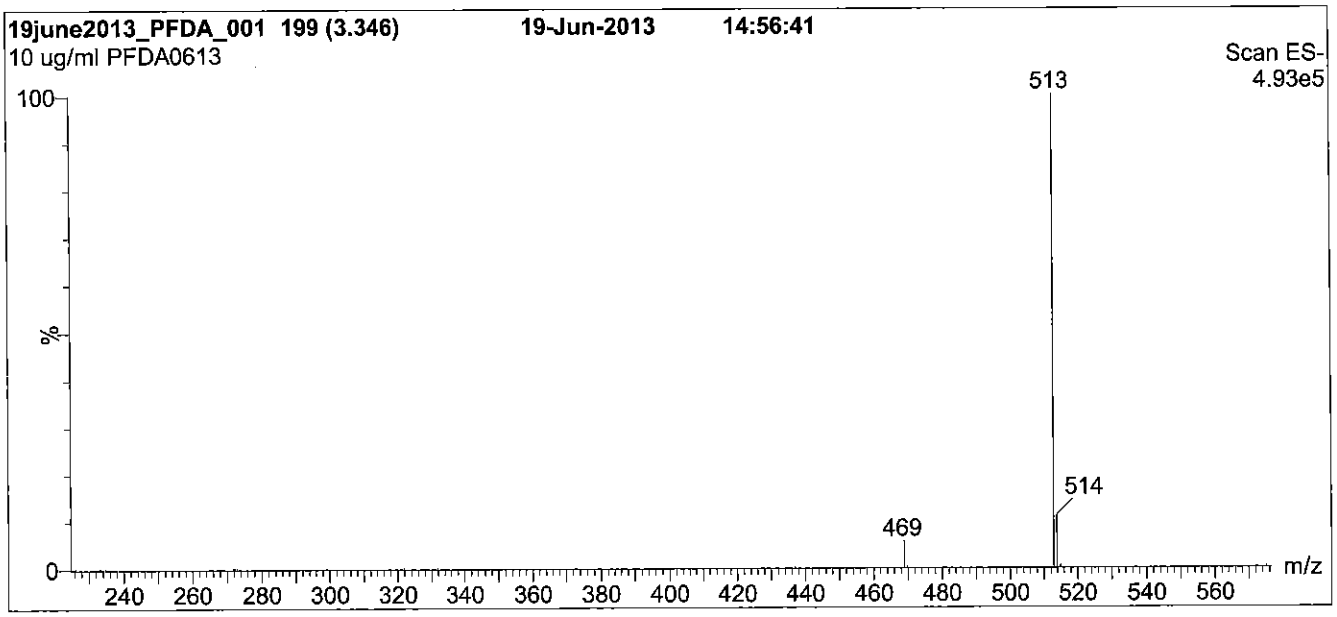
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

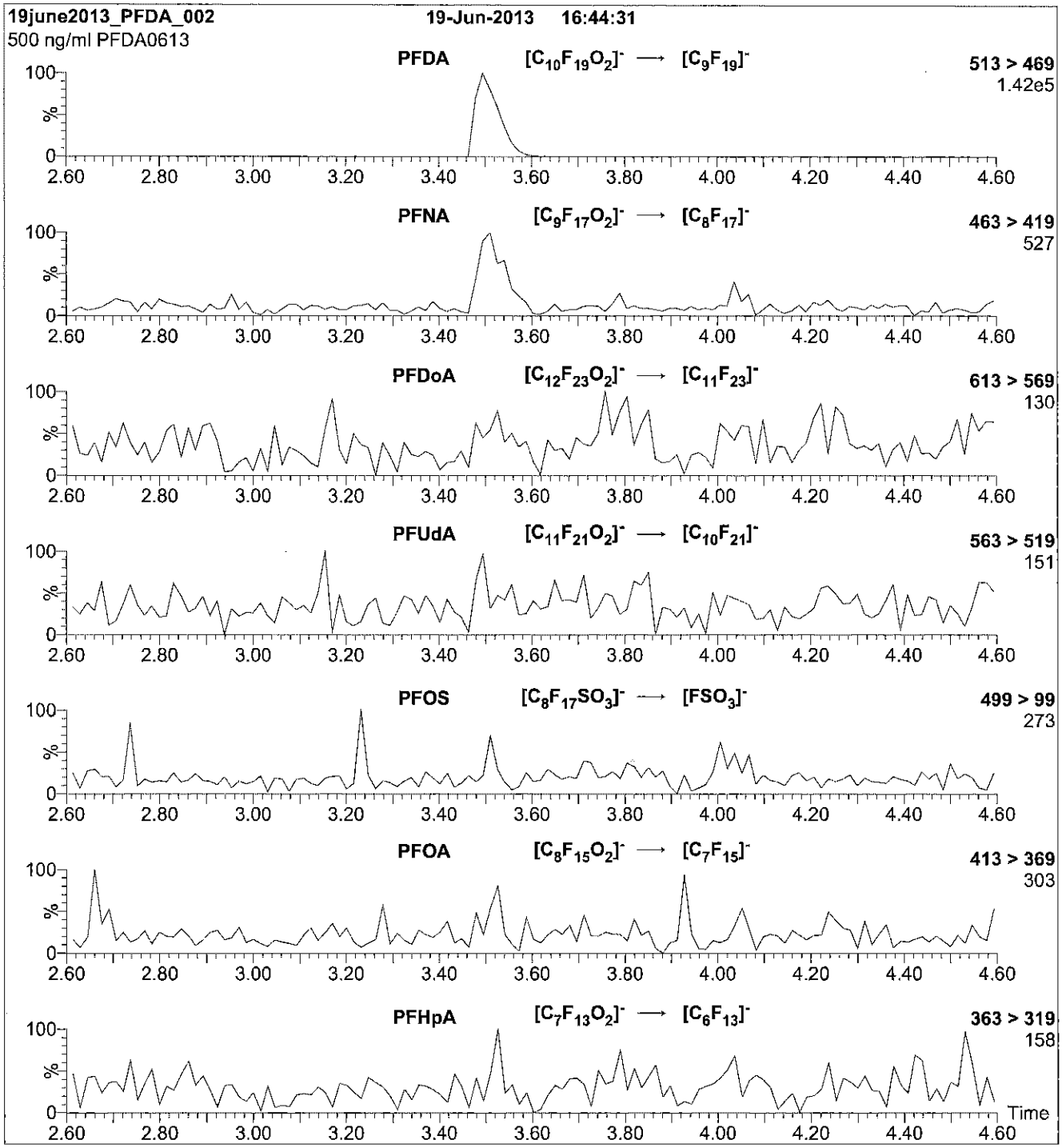
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFDA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.58e-3
Collision Energy (eV) = 13

Reagent

LCPFDA_00004

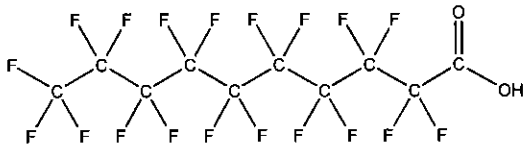
rec: 12/30/15 cw

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFDA
LOT NUMBER: PFDA0615
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) 07/02/2015
EXPIRY DATE: (mm/dd/yyyy) 07/02/2020
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.6% PFNA and ~ 0.3% PFOA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 07/24/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

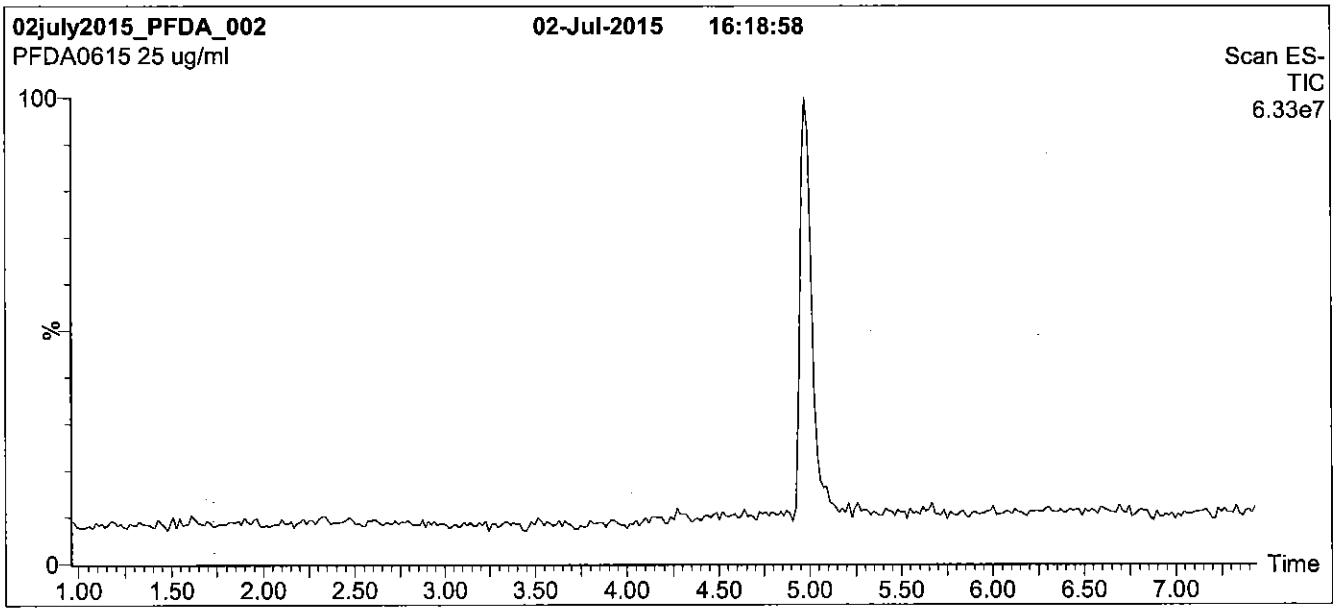
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

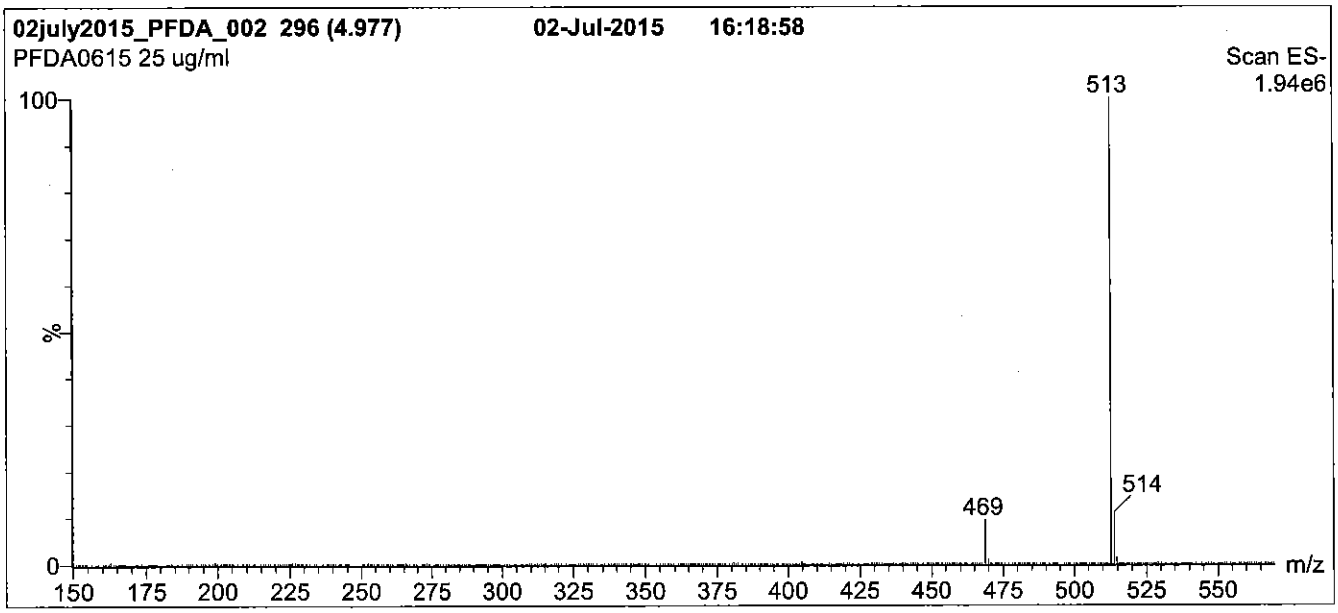
CALA

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

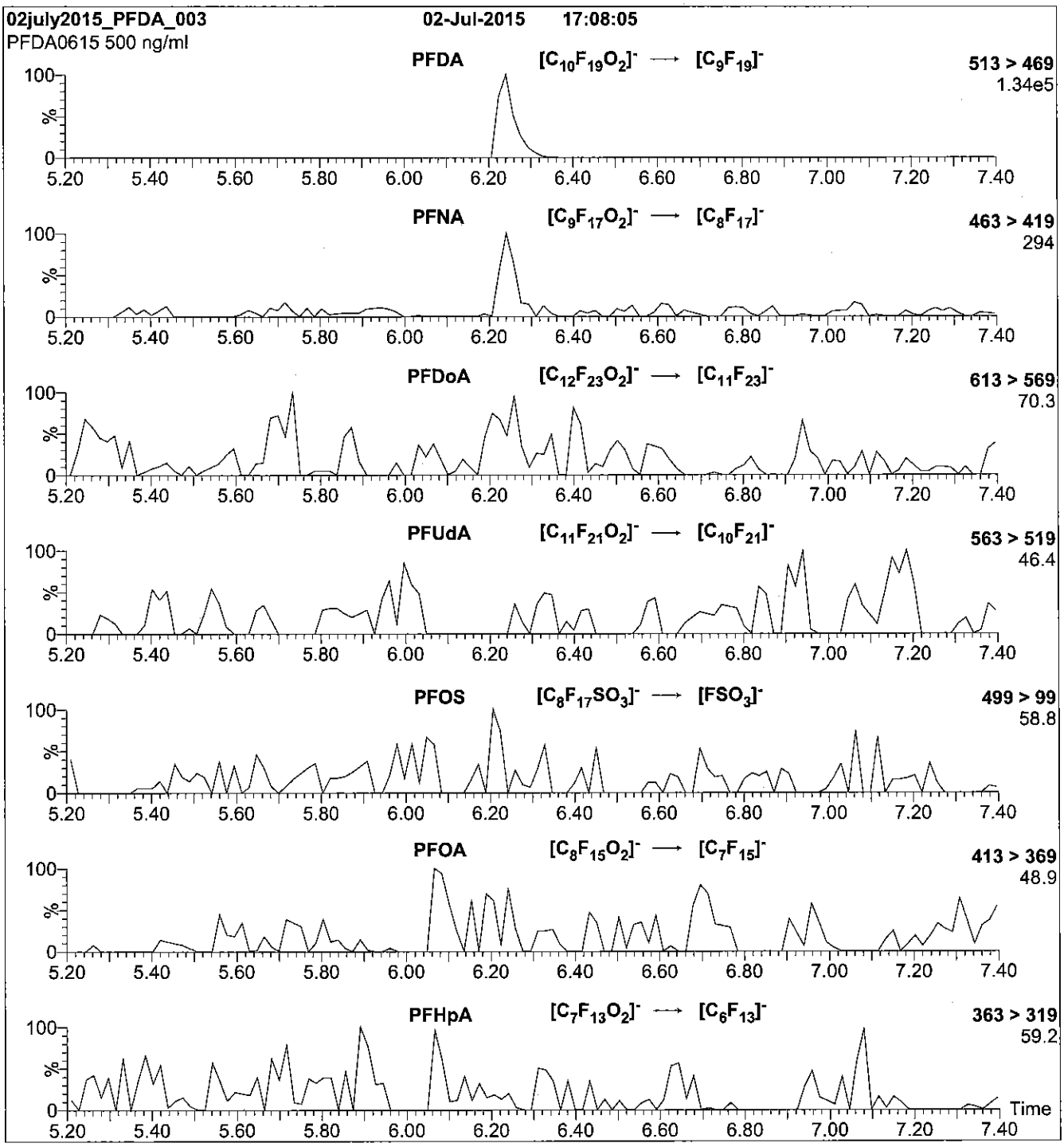
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFDA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.62e-3
Collision Energy (eV) = 13

Reagent

LCPFDoA_00003

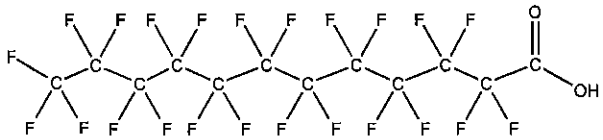
Rec 7/14/15

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFDoA
LOT NUMBER: PFDoA0113
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) 01/03/2013
EXPIRY DATE: (mm/dd/yyyy) 01/03/2018
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

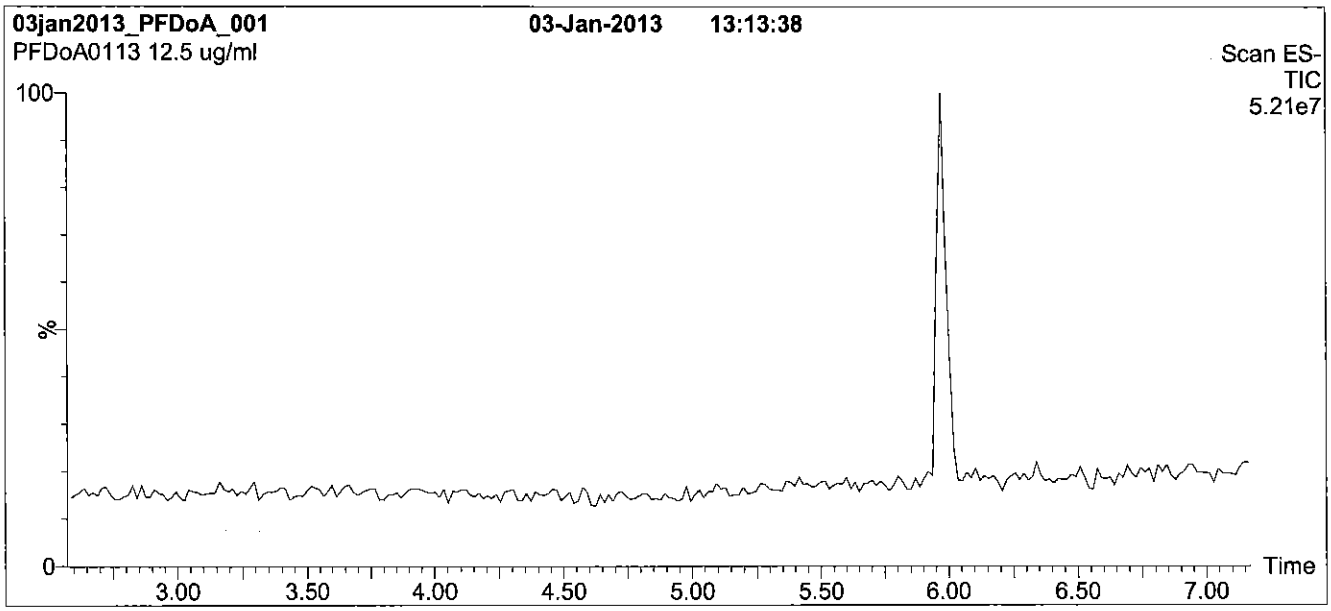
- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

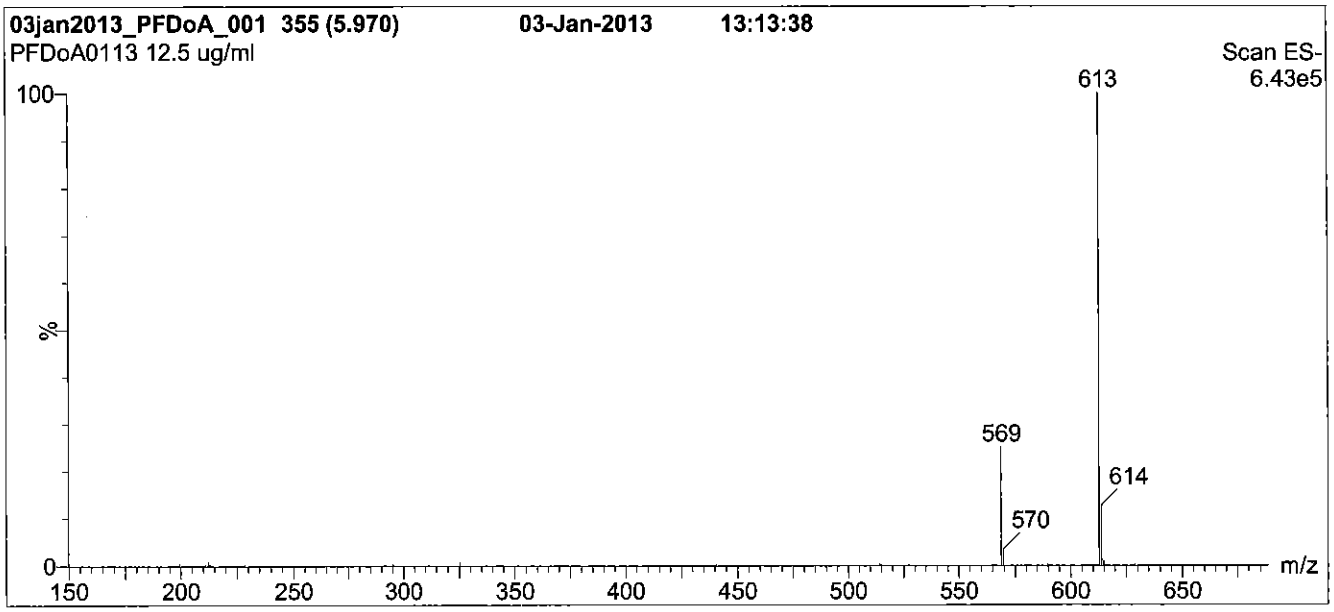
FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 02/01/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Figure 1: **PFDoA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min.
Return to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 20.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Reagent

LCPFDoA_00004

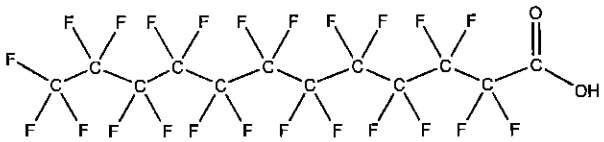
Rec: 12/30/15 cw

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFDoA
COMPOUND: Perfluoro-n-dodecanoic acid
LOT NUMBER: PFDoA0115

STRUCTURE:
CAS #: 307-55-1



MOLECULAR FORMULA: $C_{12}HF_{23}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml
MOLECULAR WEIGHT: 614.10
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 01/30/2015
EXPIRY DATE: (mm/dd/yyyy) 01/30/2020
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 03/25/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

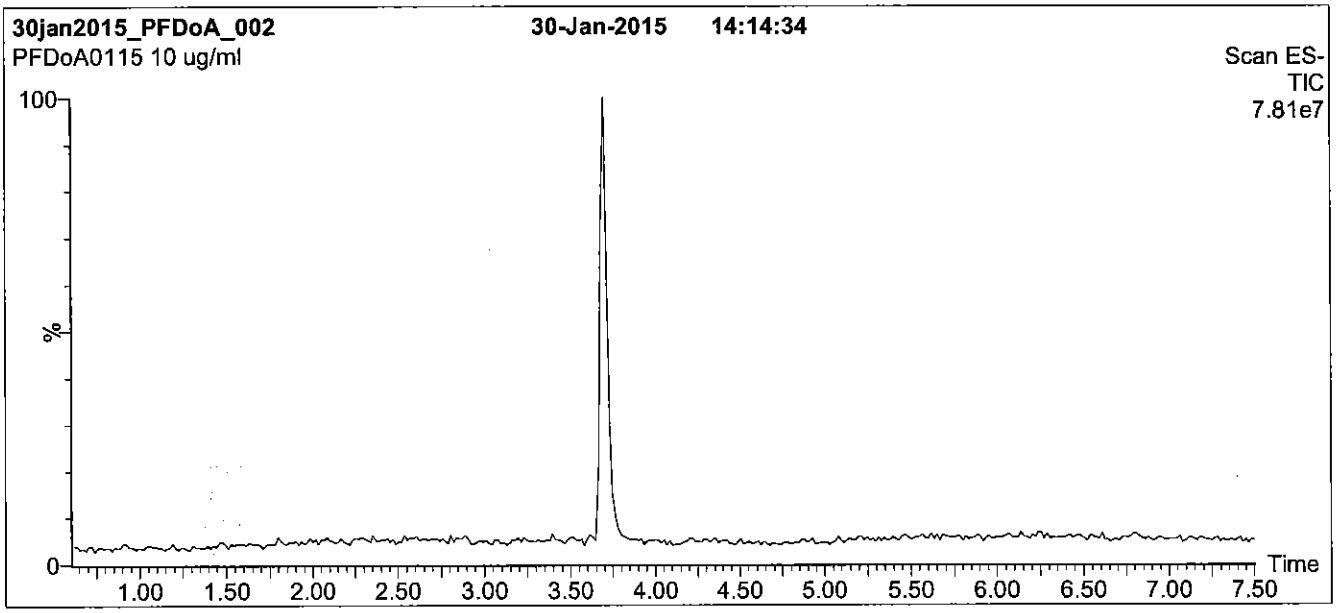
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

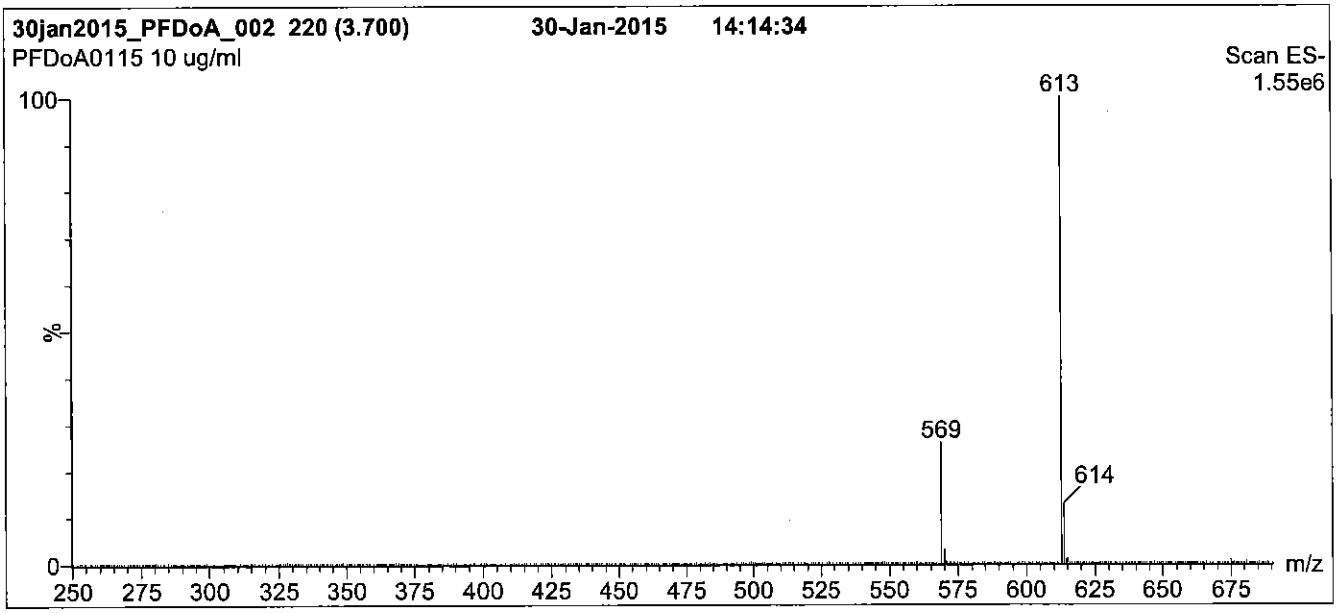
CALA Testing Accredited No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFDoA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

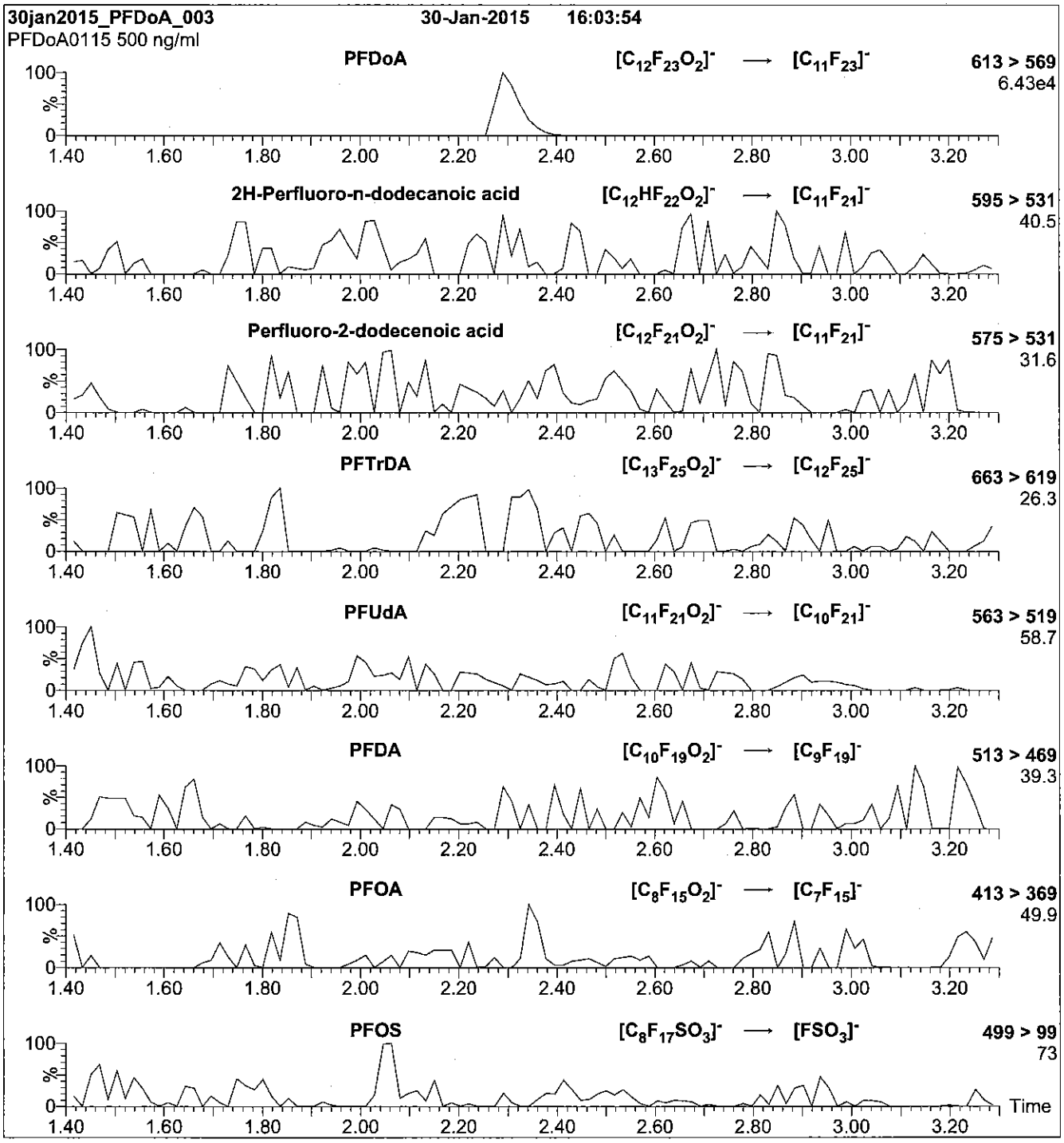
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 1000 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 20.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFDoA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFDoA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 13

Reagent

LCPFDoS_00003

r. 2/11/15 8V

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

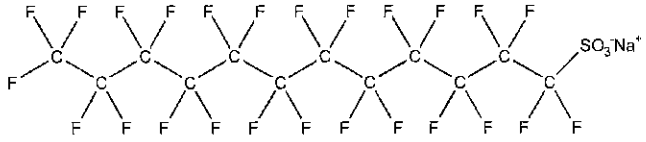
PRODUCT CODE: L-PFDoS

LOT NUMBER: LPFDoS1011

COMPOUND: Sodium perfluoro-1-dodecanesulfonate

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $C_{12}F_{25}SO_3Na$

MOLECULAR WEIGHT: 722.14

CONCENTRATION: 50.0 ± 2.5 µg/ml (Na salt)
48.4 ± 2.4 µg/ml (PFDoS anion)

SOLVENT(S): Methanol

CHEMICAL PURITY: >98%

LAST TESTED: (mm/dd/yyyy) 10/06/2011

EXPIRY DATE: (mm/dd/yyyy) 10/06/2016

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.3% of sodium perfluoro-1-tetradecanesulfonate and ~ 0.8% of perfluoro-n-dodecanoic acid (PFDoA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim

Date: 01/15/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

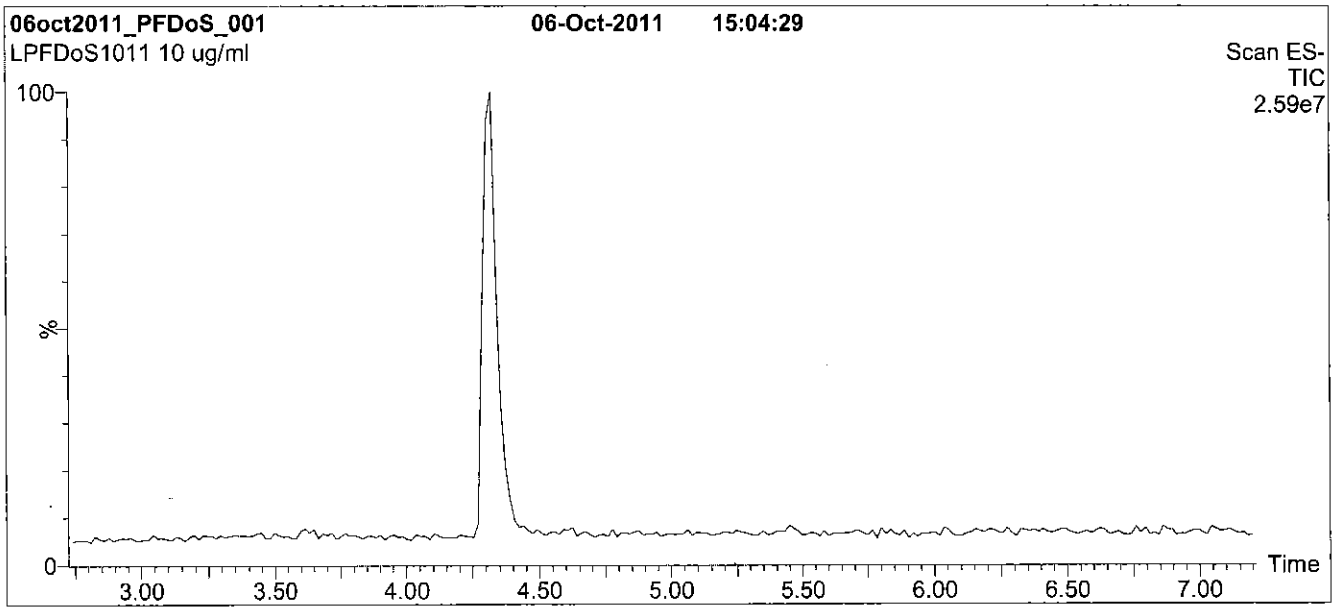
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

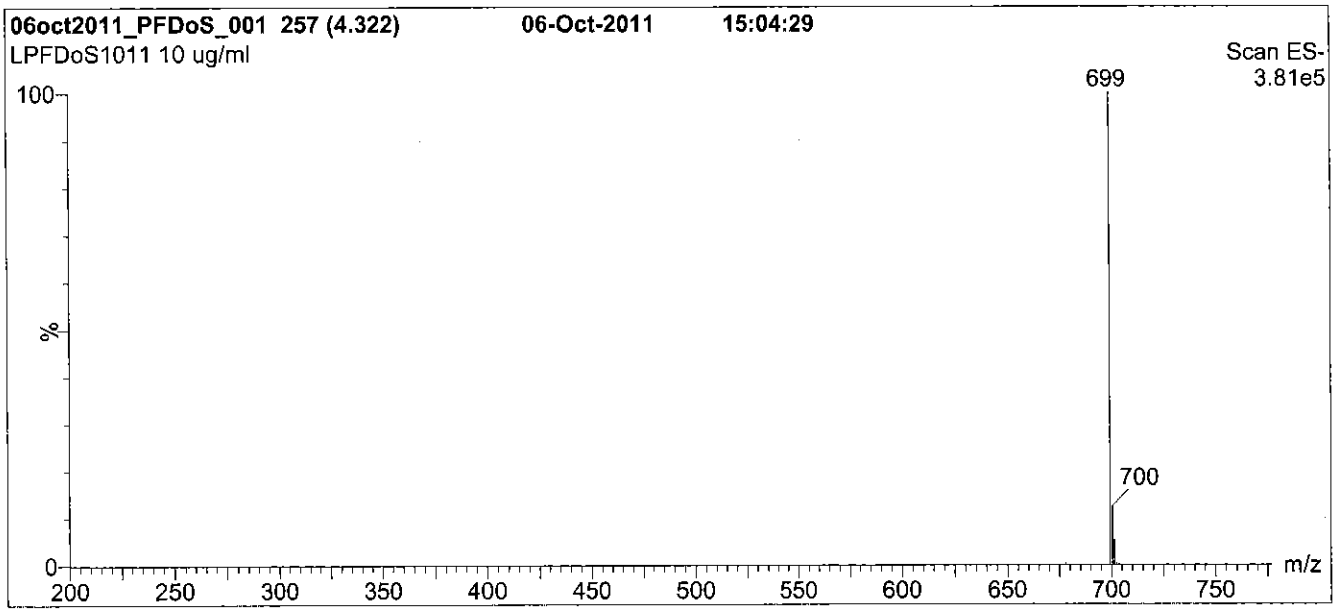
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **L-PFDoS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 65% (80:20 MeOH:ACN) / 35% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

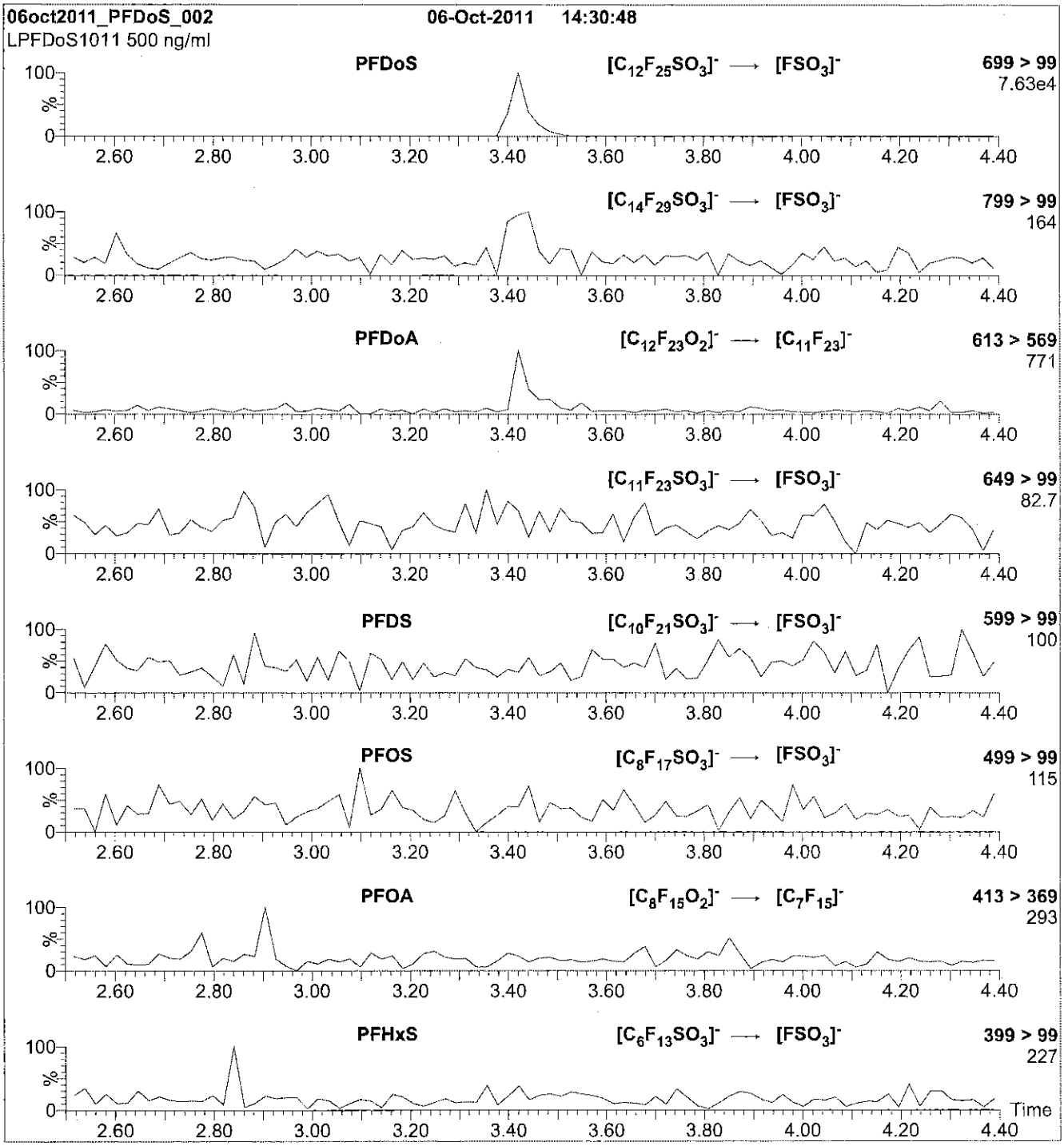
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (200 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 80.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFDoS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFDoS)

Mobile phase: Isocratic 65% (80:20 MeOH:ACN) / 35% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 50

Reagent

LCPFDS_00003

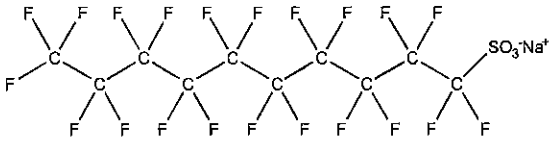
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: L-PFDS
LOT NUMBER: LPFDS0913
COMPOUND: Sodium perfluoro-1-decanesulfonate

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$C_{10}F_{21}SO_3Na$	**MOLECULAR WEIGHT:**	622.13
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 48.2 ± 2.4 µg/ml (PFDS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	09/13/2013		
EXPIRY DATE: (mm/dd/yyyy)	09/13/2018		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 09/23/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

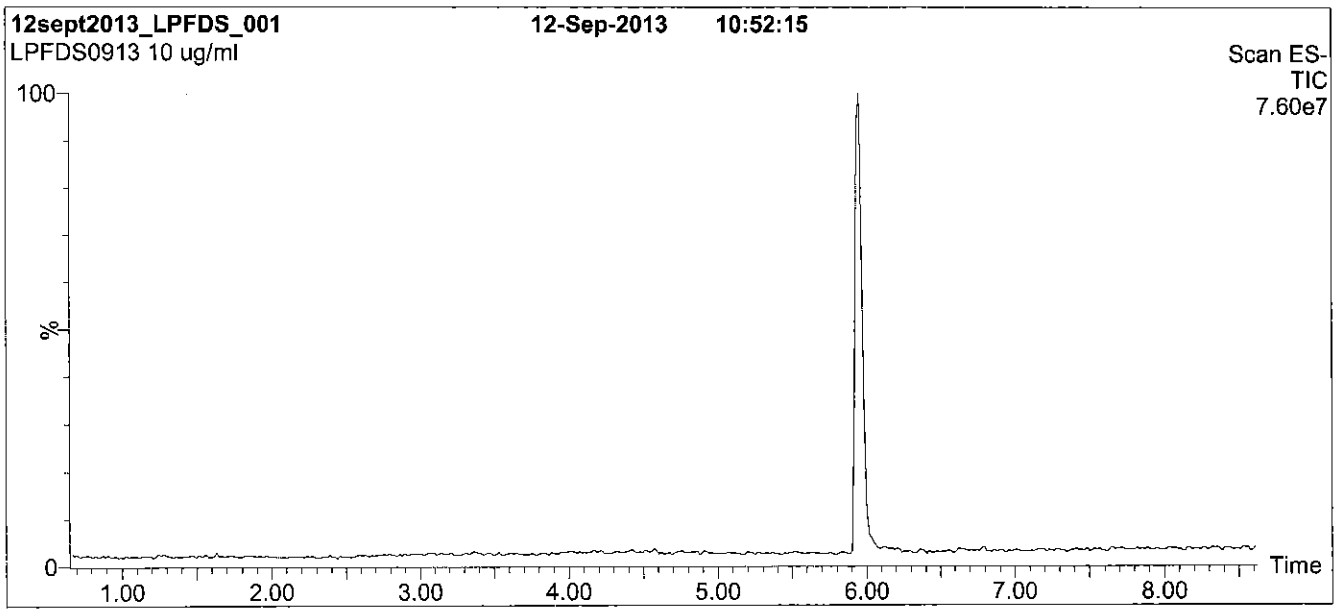
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

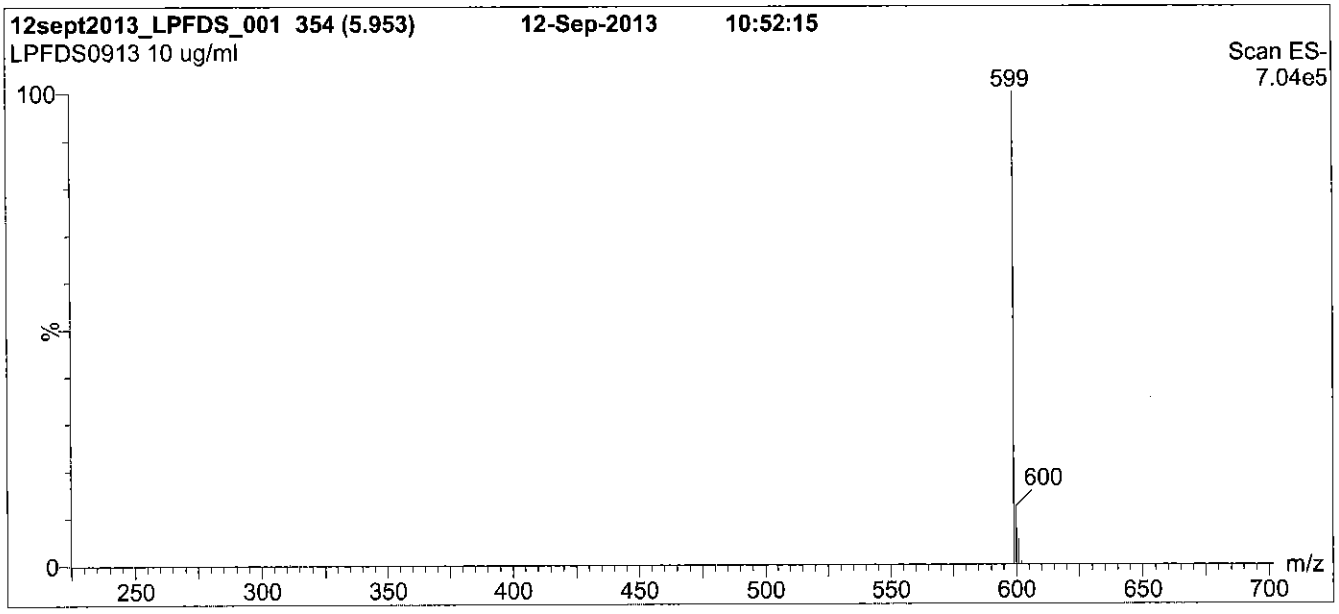
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **L-PFDS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 11 min

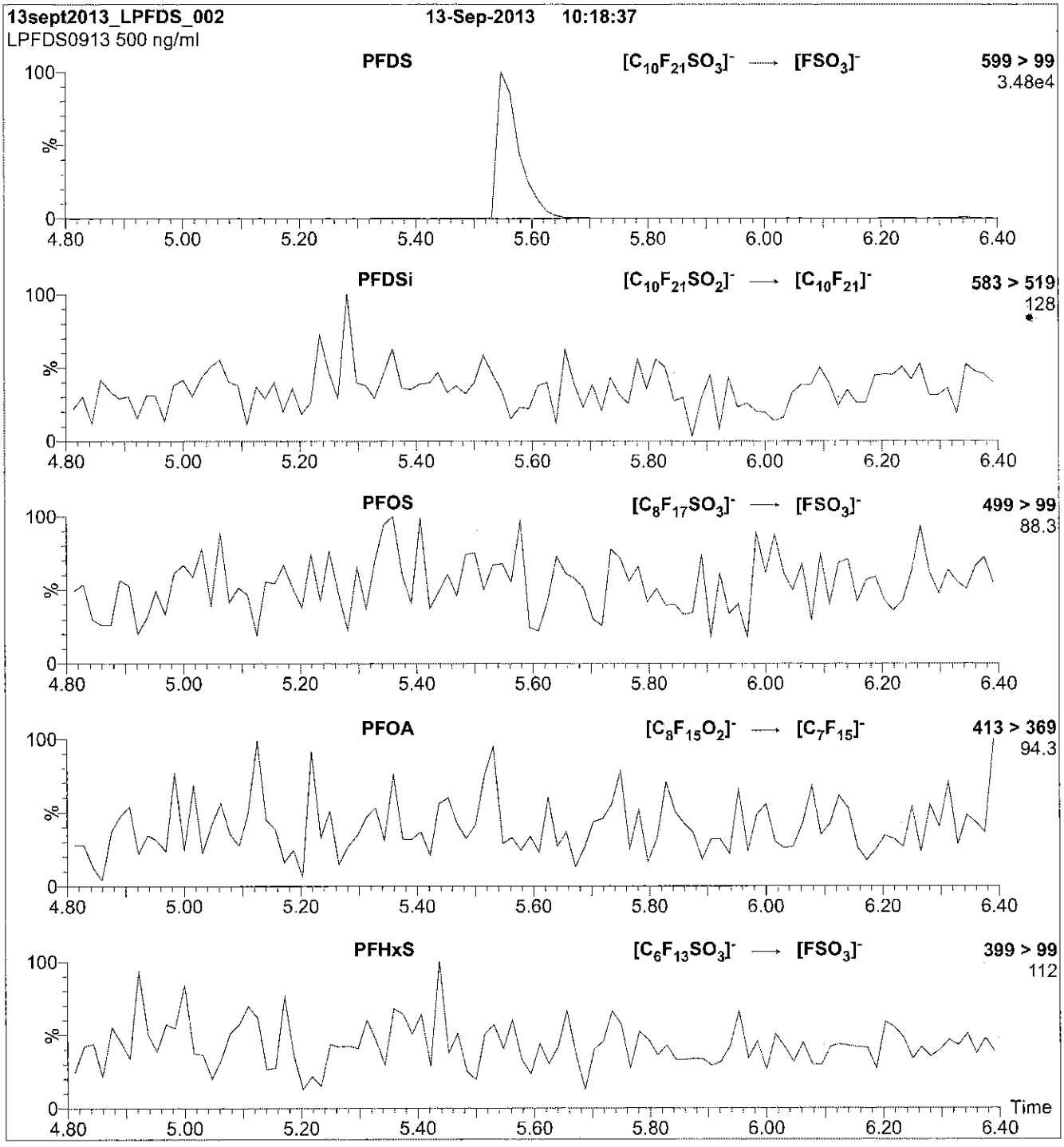
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 70.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 650

Figure 2: **L-PFDS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFDS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.78e-3
Collision Energy (eV) = 50

Reagent

LCPFHpA_00004

WELLINGTON LABORATORIES

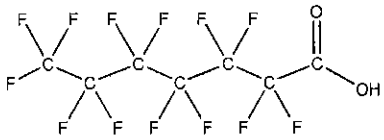
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFHpA
COMPOUND: Perfluoro-n-heptanoic acid

LOT NUMBER: PFHpA0514

STRUCTURE:

CAS #: 375-85-9



MOLECULAR FORMULA: $C_7HF_{13}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 364.06
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 05/09/2014
EXPIRY DATE: (mm/dd/yyyy) 05/09/2019
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/22/2014 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

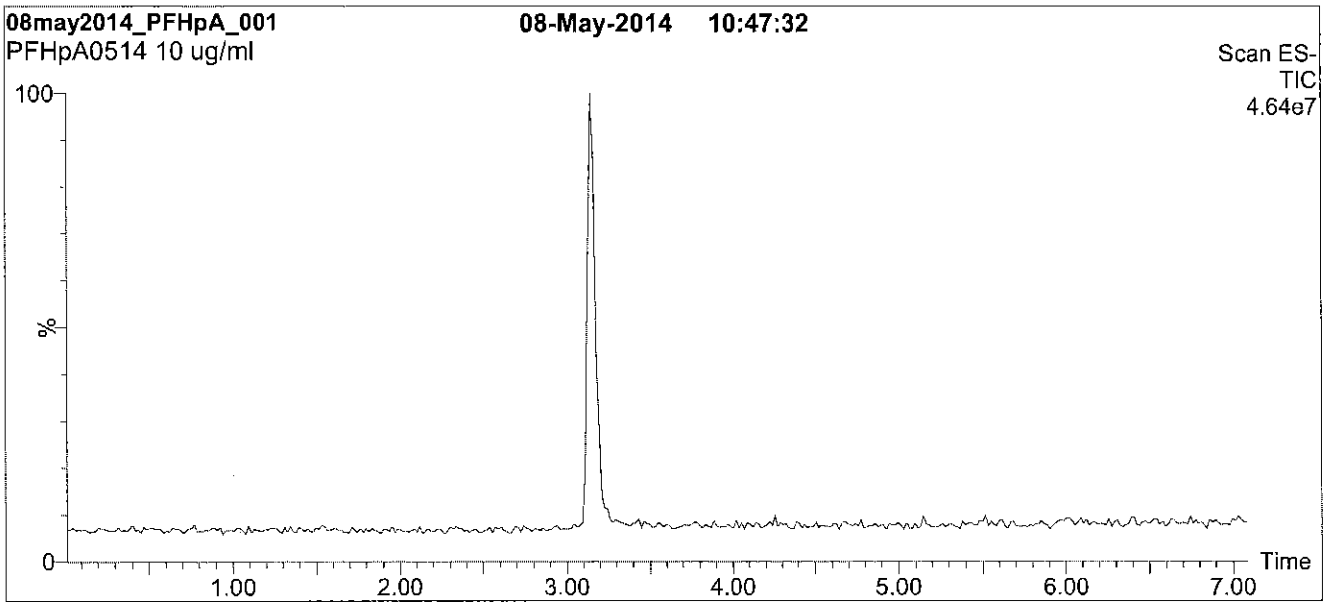
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

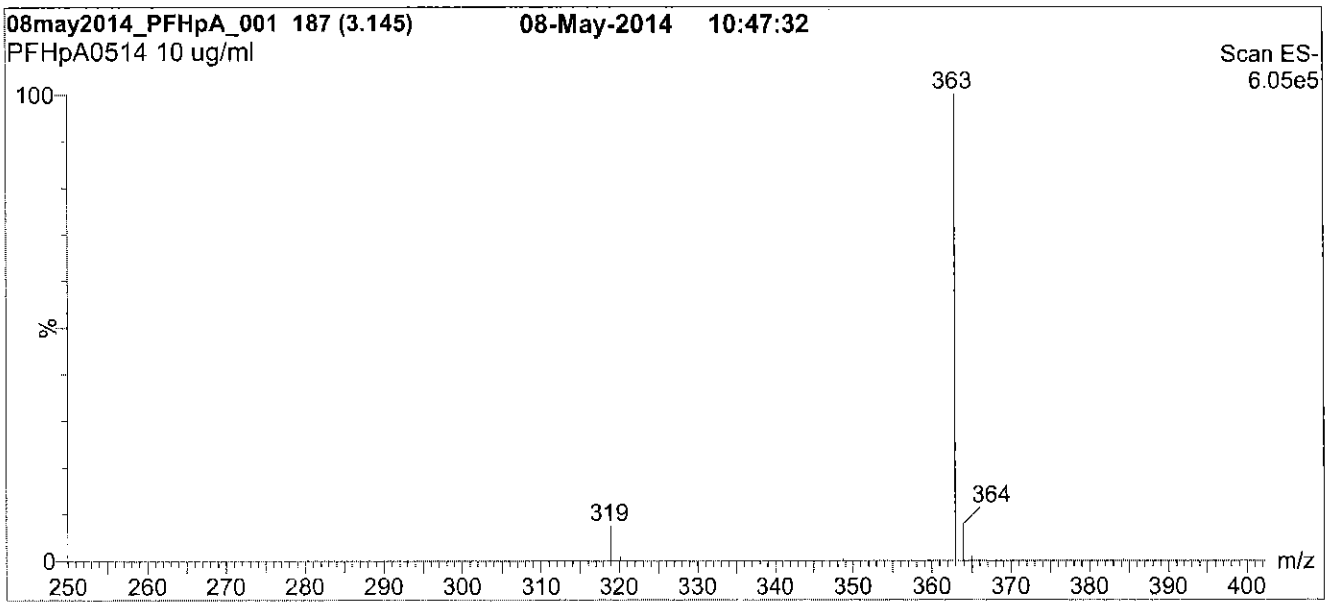
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFHpA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH C_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

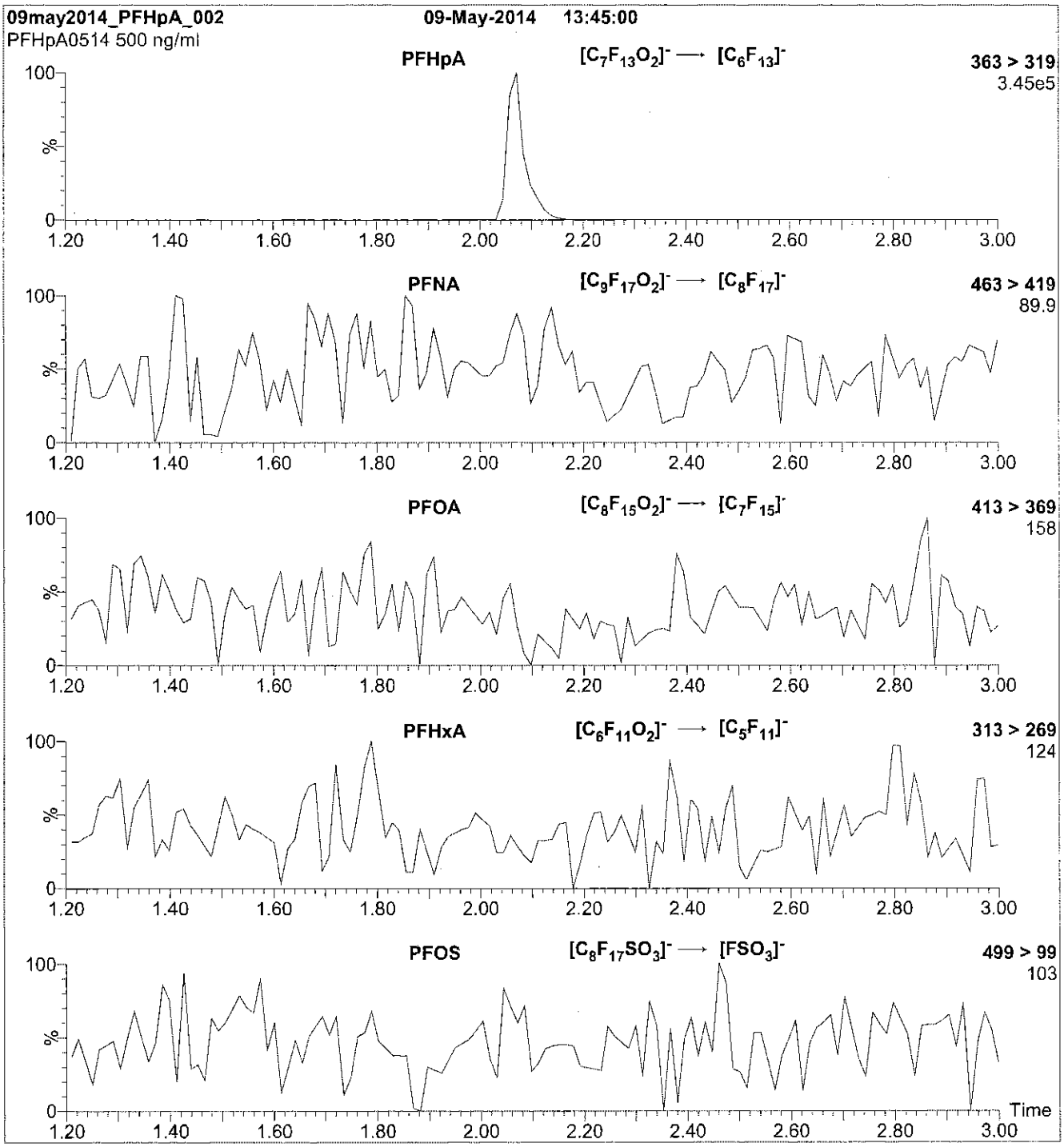
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFHpA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFHpA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.24e-3
Collision Energy (eV) = 11

Reagent

LCPFHpS_00005

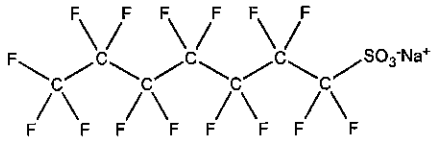
R: 4/15/15 SK

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: L-PFHpS
COMPOUND: Sodium perfluoro-1-heptanesulfonate
LOT NUMBER: LPFHpS0114

STRUCTURE:
CAS #: Not available



MOLECULAR FORMULA:	$C_7F_{15}SO_3Na$	**MOLECULAR WEIGHT:**	472.10
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.6 ± 2.4 µg/ml (PFHpS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	01/28/2014		
EXPIRY DATE: (mm/dd/yyyy)	01/28/2019		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.1% of L-PFHxS ($C_6F_{13}SO_3Na$) and ~ 0.2% of L-PFOS ($C_8F_{17}SO_3Na$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 03/27/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

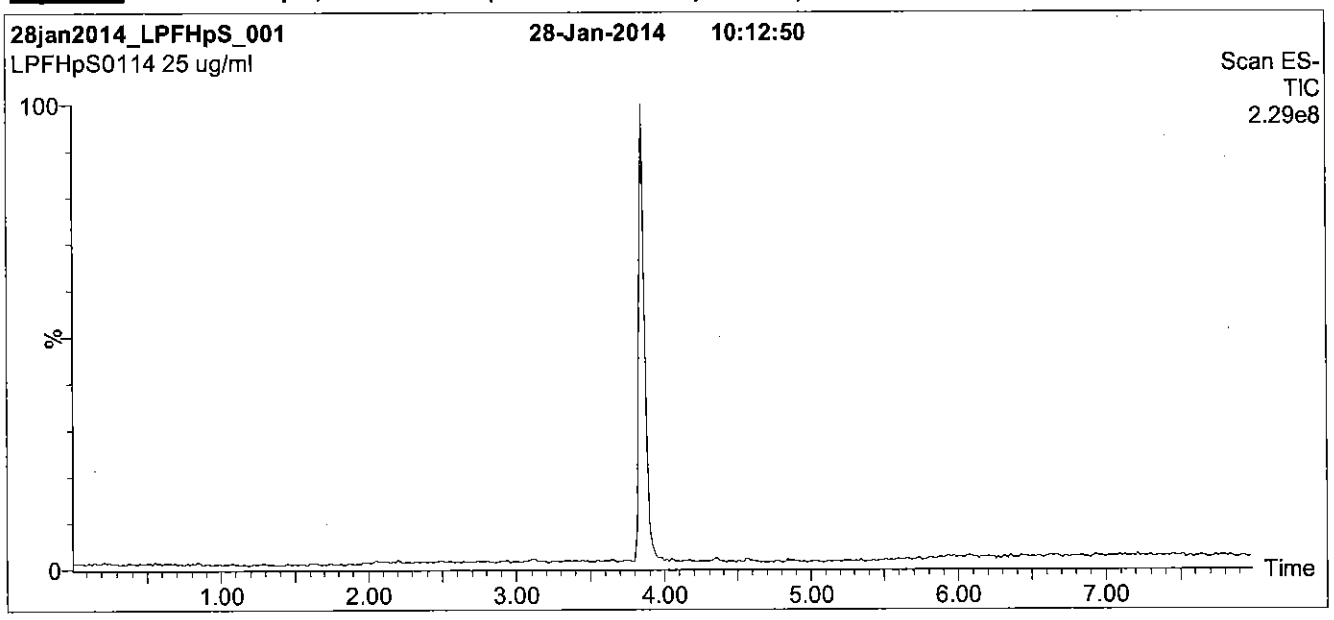
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

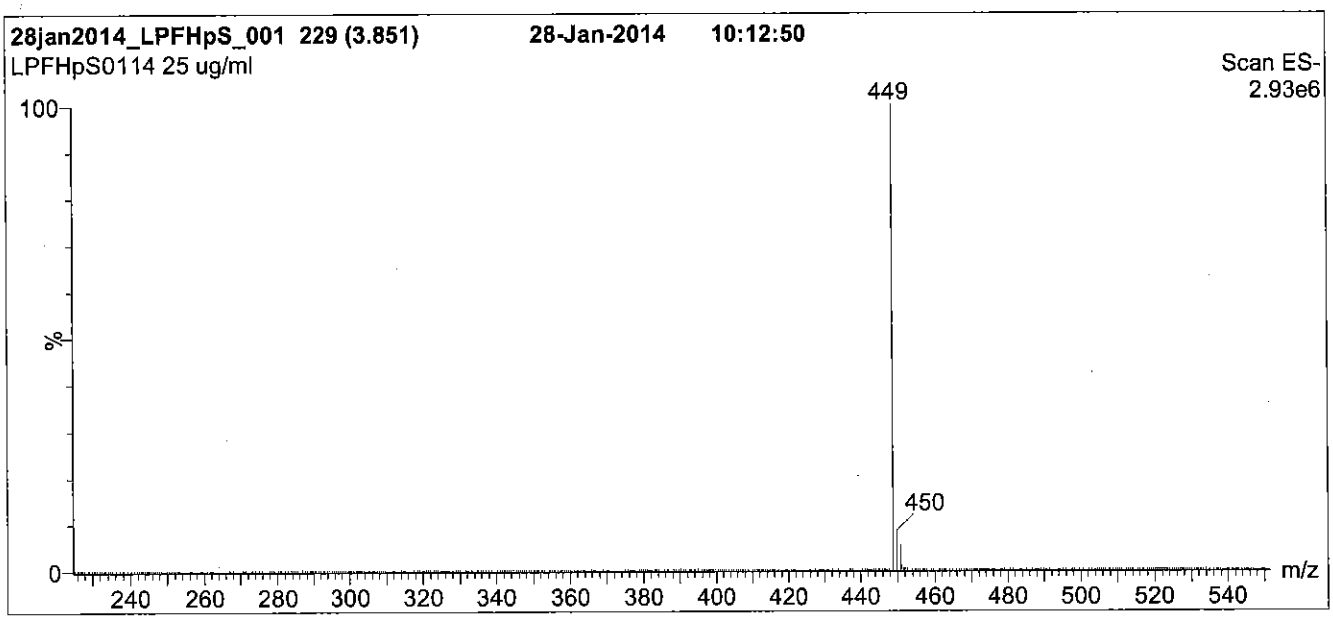
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17025 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 7 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

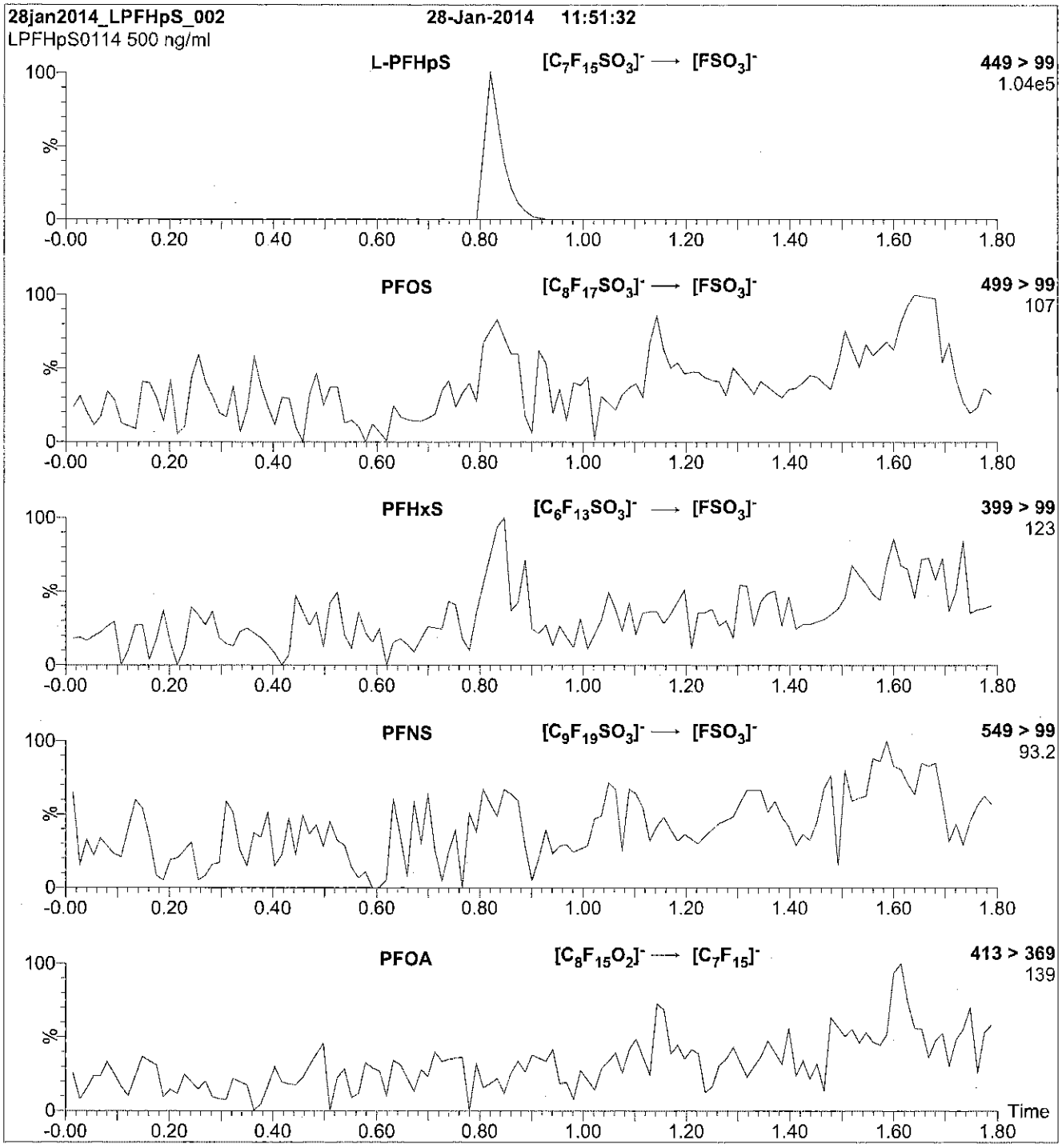
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFHpS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFHpS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.66e-3
Collision Energy (eV) = 35

Reagent

LCPFHxA_00003

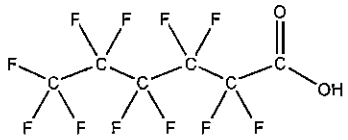
V: 2/11/15 SW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: PFHxA
COMPOUND: Perfluoro-n-hexanoic acid
LOT NUMBER: PFHxA0514

STRUCTURE:
CAS #: 307-24-4



MOLECULAR FORMULA: $C_6HF_{11}O_2$
MOLECULAR WEIGHT: 314.05
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 05/09/2014
EXPIRY DATE: (mm/dd/yyyy) 05/09/2019
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/22/2014 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

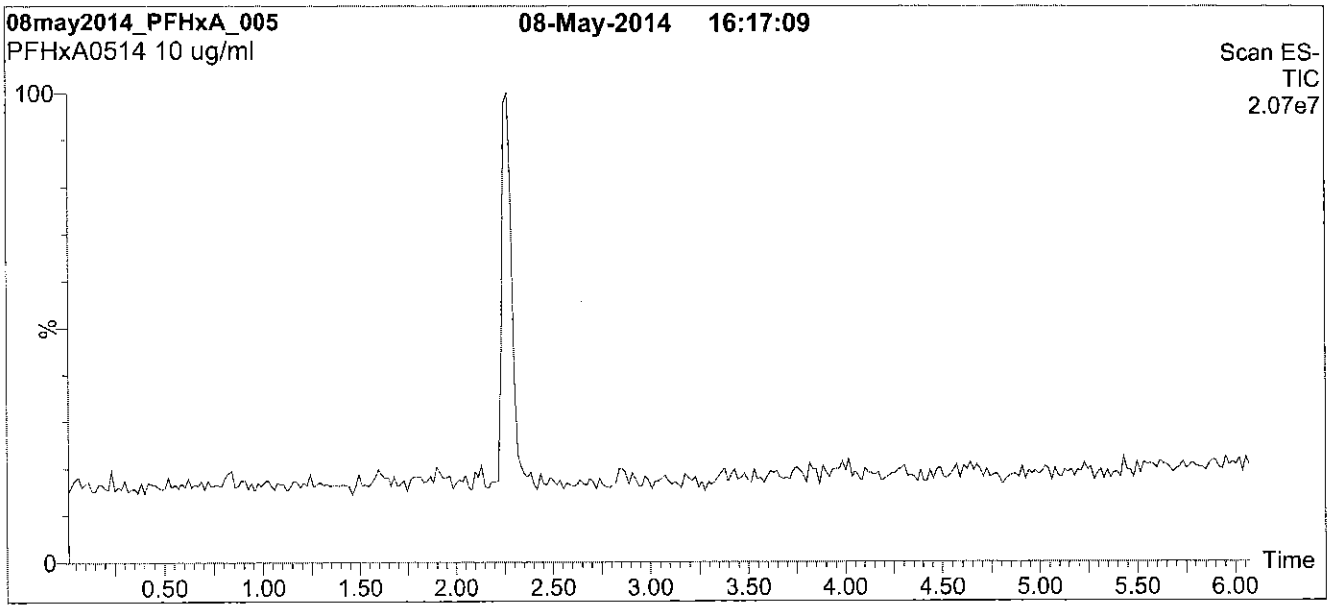
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

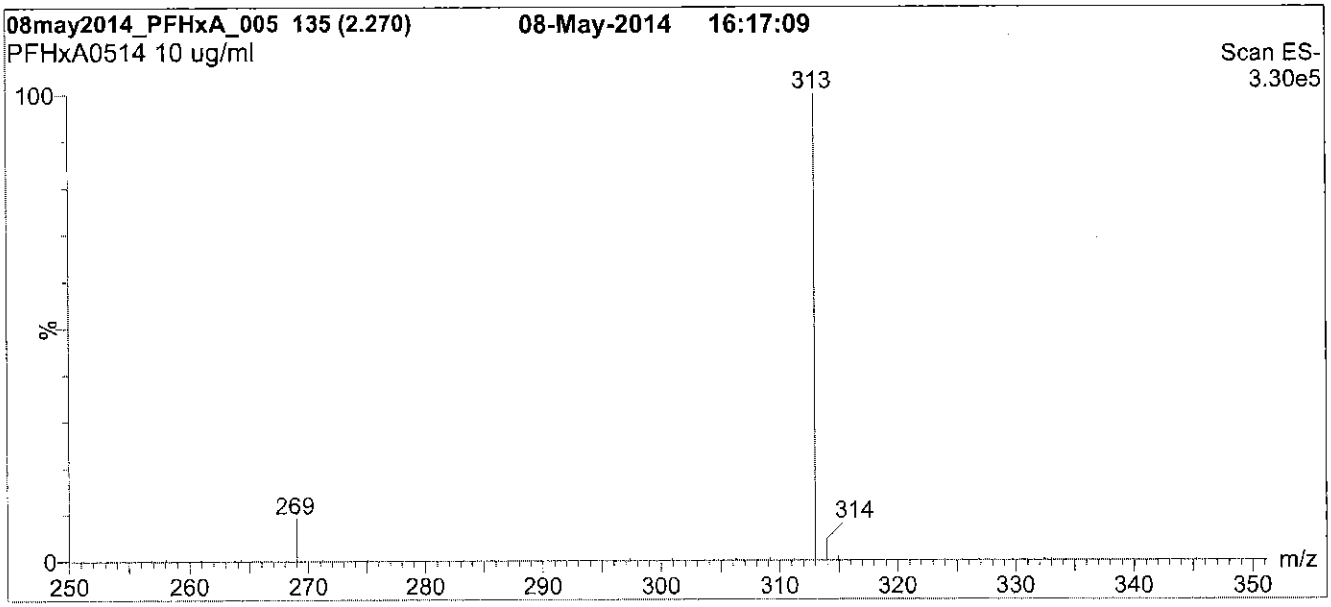
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFHxA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH C_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

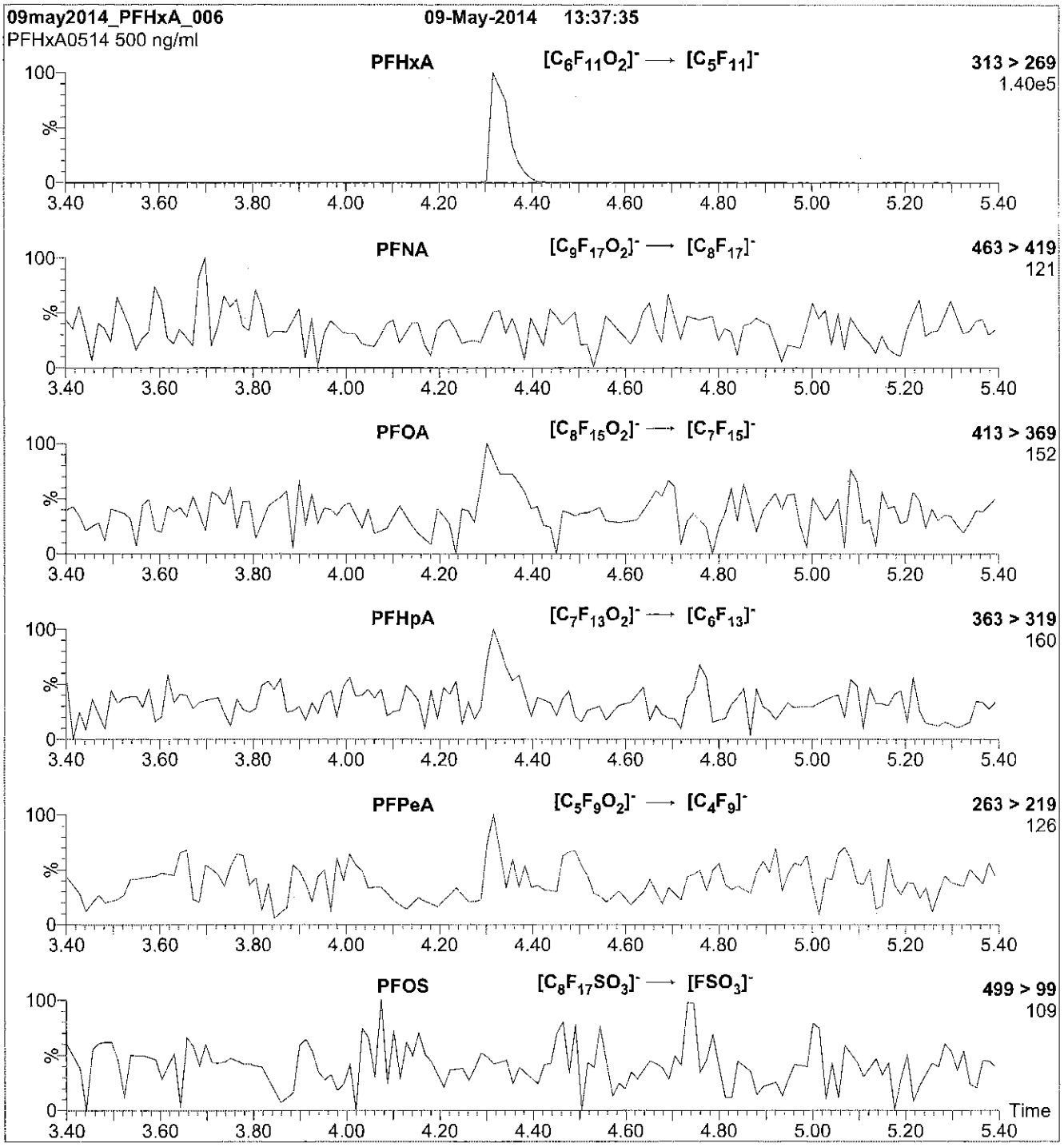
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFHxA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFHxA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.24e-3
Collision Energy (eV) = 10

Reagent

LCPFHxS-br_00001

566007
ID: LCPFHxS-br_00001
Exp: 07/03/20 Prpd: CBW
Potassium Perfluorohexane

P: 12/9/15 SW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

br-PFHxSK

**Potassium Perfluorohexanesulfonate
Solution/Mixture of Linear and
Branched Isomers**

PRODUCT CODE:	br-PFHxSK
LOT NUMBER:	brPFHxSK0615
CONCENTRATION:	50.0 ± 2.5 µg/ml (total potassium salt)
	45.5 ± 2.3 µg/ml (total PFHxS anion)
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	06/29/2015
LAST TESTED: (mm/dd/yyyy)	07/03/2015
EXPIRY DATE: (mm/dd/yyyy)	07/03/2020
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

The chemical purity has been determined to be ≥98% perfluorohexanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the identified isomeric components are given in Table A.

DOCUMENTATION/ DATA ATTACHED:

Table A: Isomeric Components and Percent Composition by ^{19}F-NMR
Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.5% of perfluoro-1-pentanesulfonate and ~ 0.2% of perfluoro-1-octanesulfonate.
- CAS#: 3871-99-6 (for linear isomer; potassium salt).

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 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

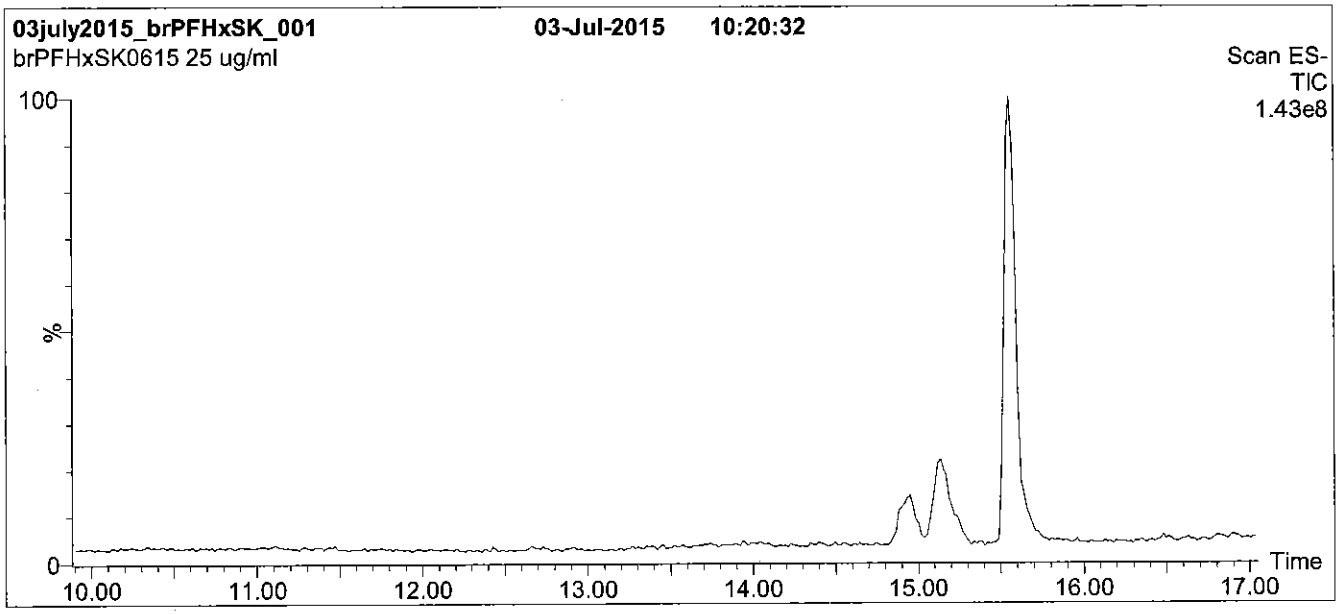
Table A: **br-PFHxSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

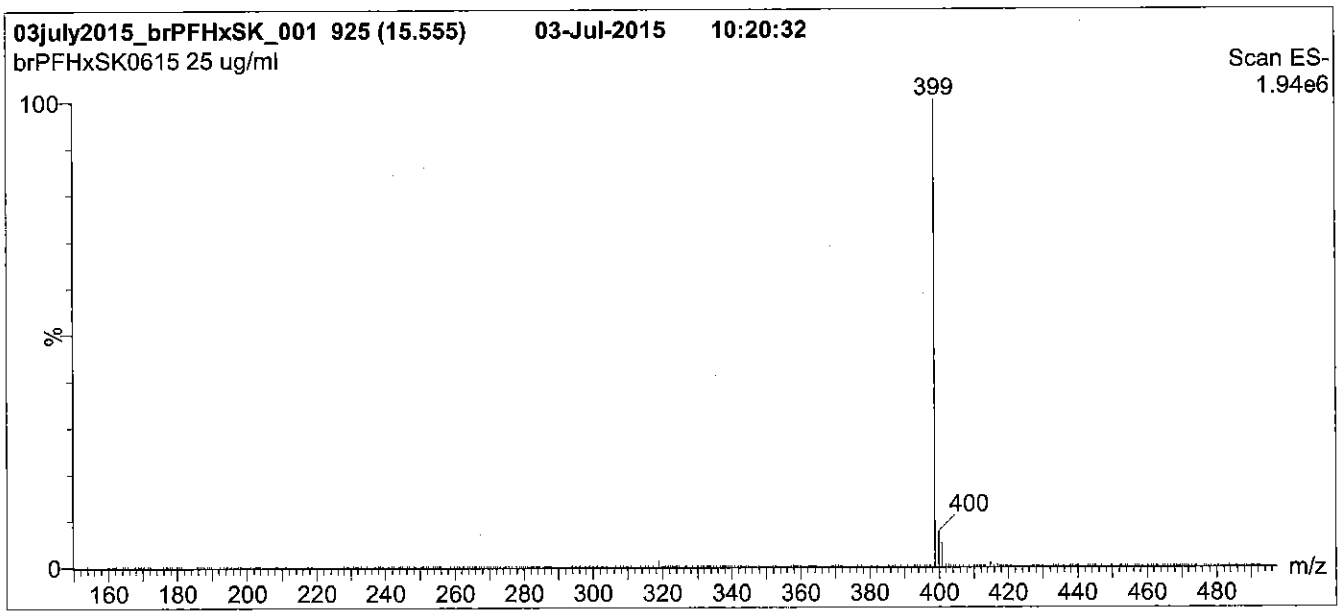
Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	Potassium perfluoro-1-hexanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	2.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	1.4
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	5.0
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	8.9
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	$CF_3C(CF_3)CF_2CF_2SO_3^-K^+$	0.2
7	Other Unidentified Isomers		0.5

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

Certified By: _____ **Date:** 07/15/2015
B.G. Chittim (mm/dd/yyyy)

Figure 1: **br-PFHxSK; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 20% (80:20 MeOH:ACN) / 80% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 50% organic over 14 min. Ramp to 90% organic over 3 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 20 min

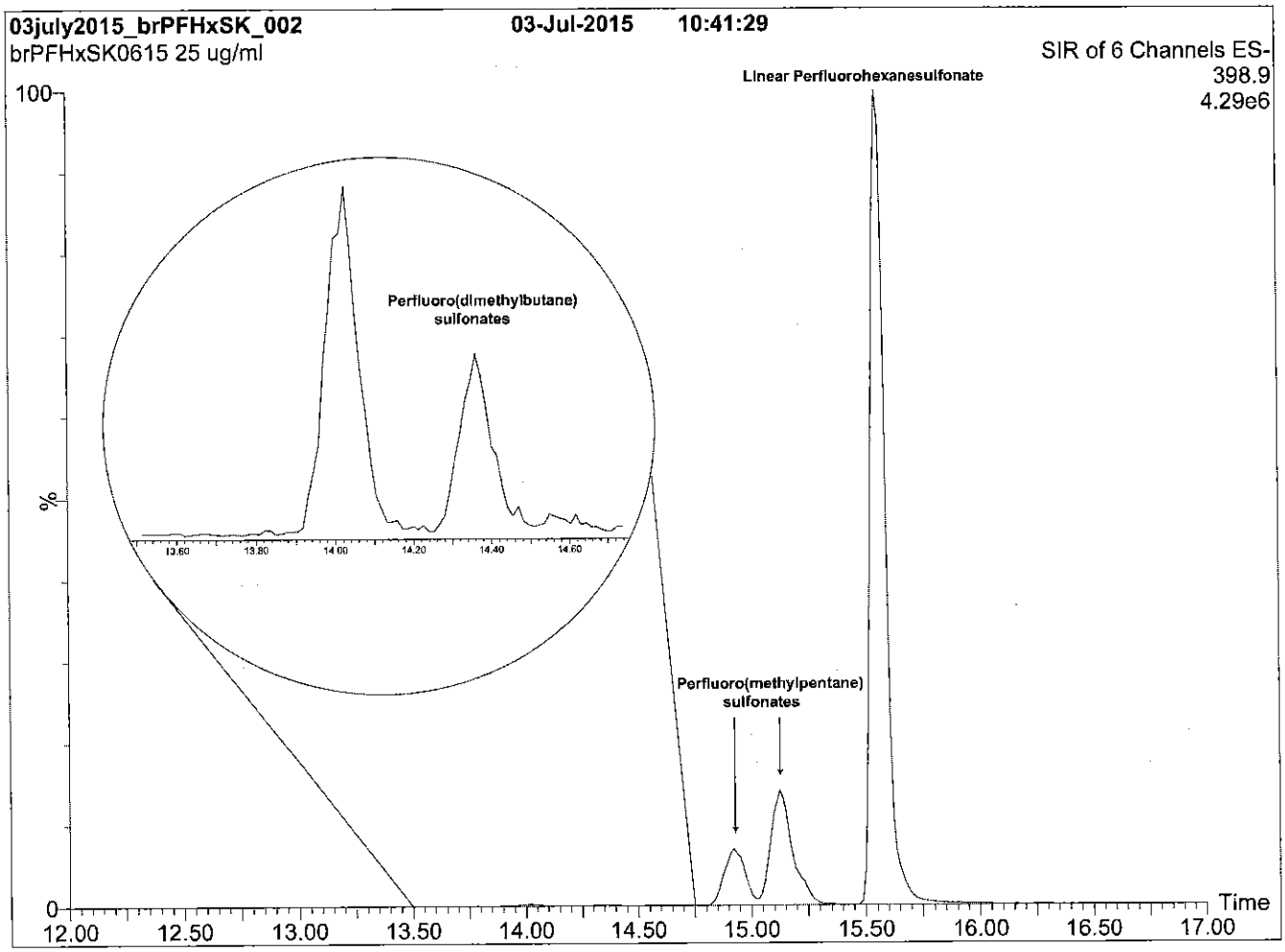
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 50.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 2: **br-PFHxSK; LC/MS Data**



Conditions for Figure 2:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 20% (80:20 MeOH:ACN) / 80% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 50% organic over 14 min. Ramp to
90% organic over 3 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 20 min

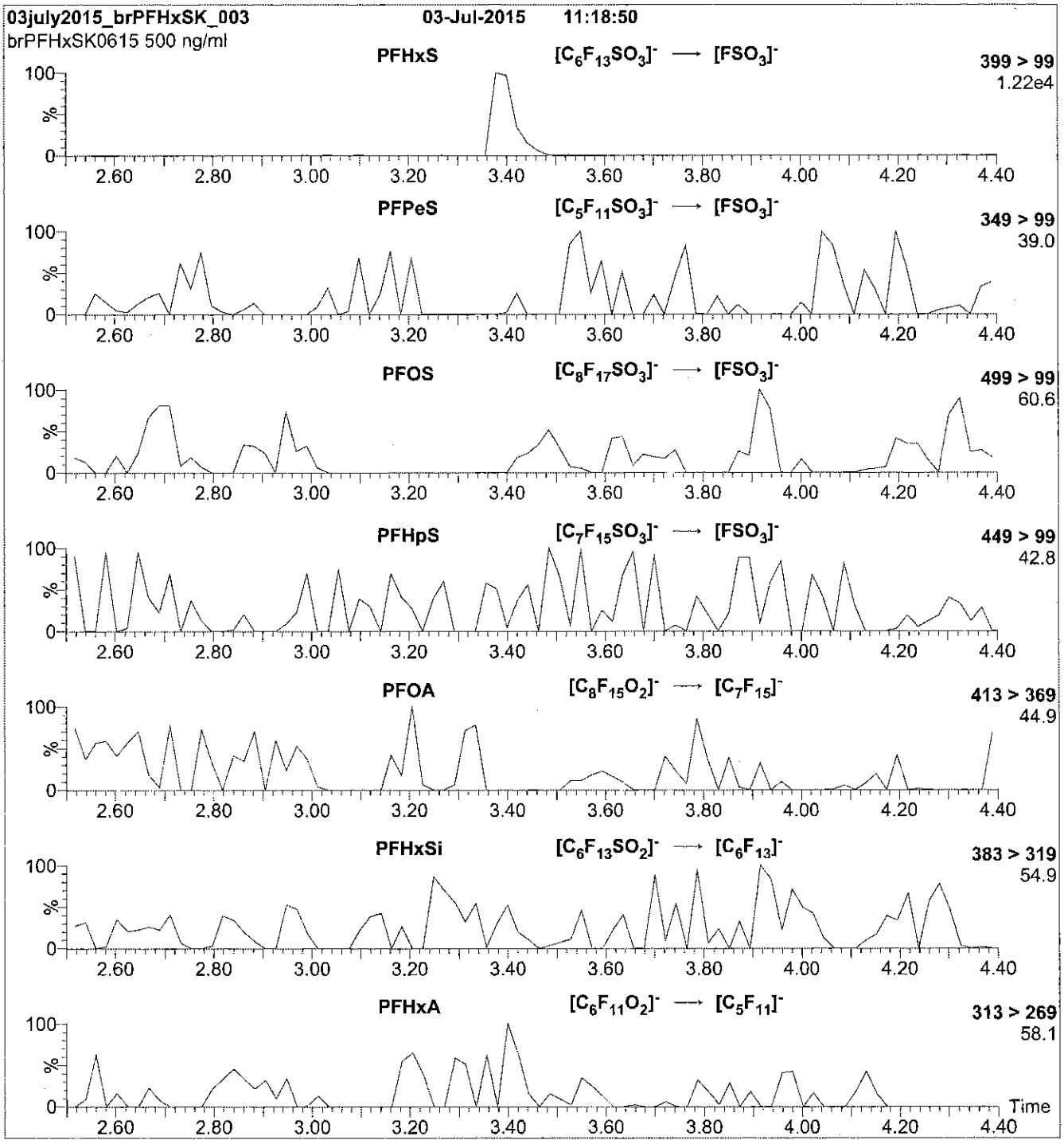
Flow: 300 µl/min

MS Parameters

Experiment: SIR (6 channels)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 50.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 3: **br-PFHxSK; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 3:

Injection: Direct loop injection
10 µl (500 ng/ml br-PFHxSK)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 30

Reagent

LCPFNA_00004

P: 3/27/15 SN
S:

WELLINGTON LABORATORIES

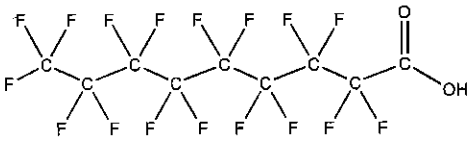
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFNA
COMPOUND: Perfluoro-n-nonanoic acid

LOT NUMBER: PFNA0514

STRUCTURE:

CAS #: 375-95-1



MOLECULAR FORMULA: $C_9HF_{17}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 464.08
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 05/09/2014
EXPIRY DATE: (mm/dd/yyyy) 05/09/2019
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of perfluoro-n-octanoic acid (PFOA) and < 0.1% of perfluoro-n-heptanoic acid (PFHpA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 05/22/2014 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

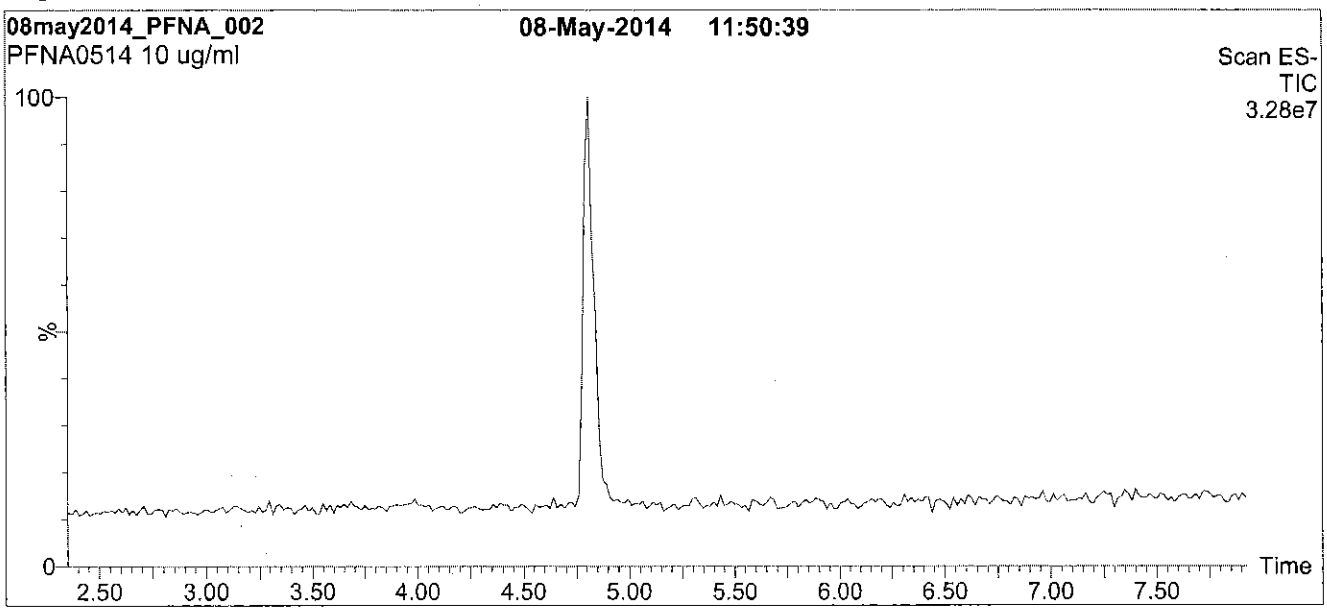
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

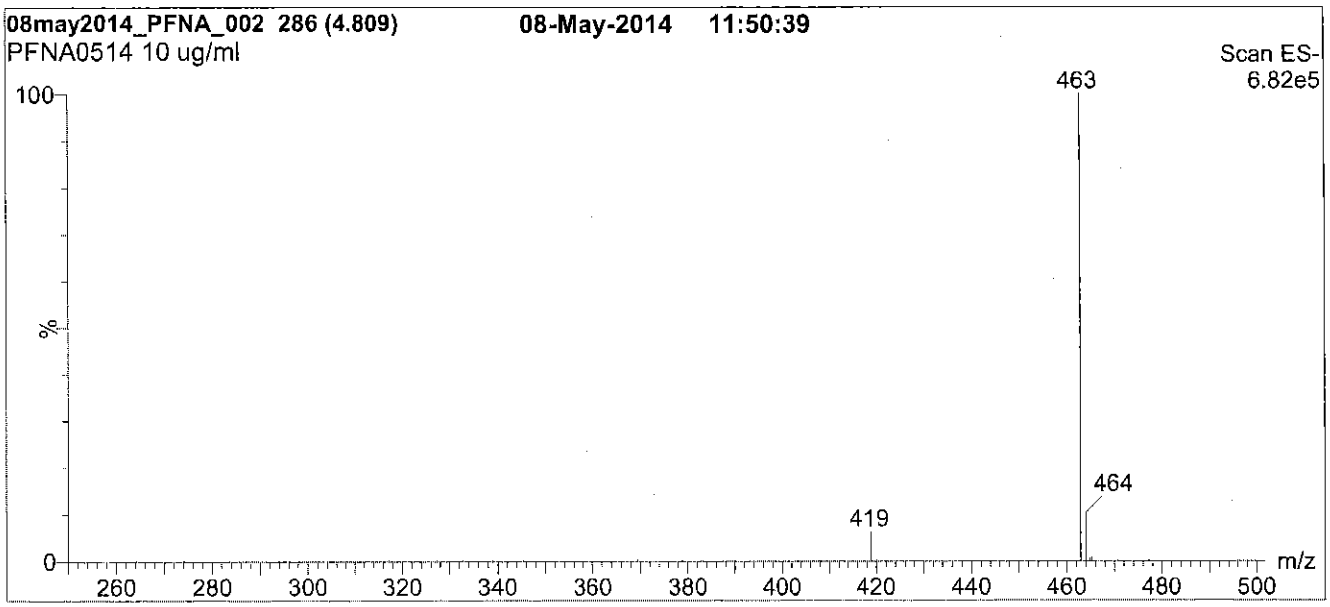
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFNA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH C_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

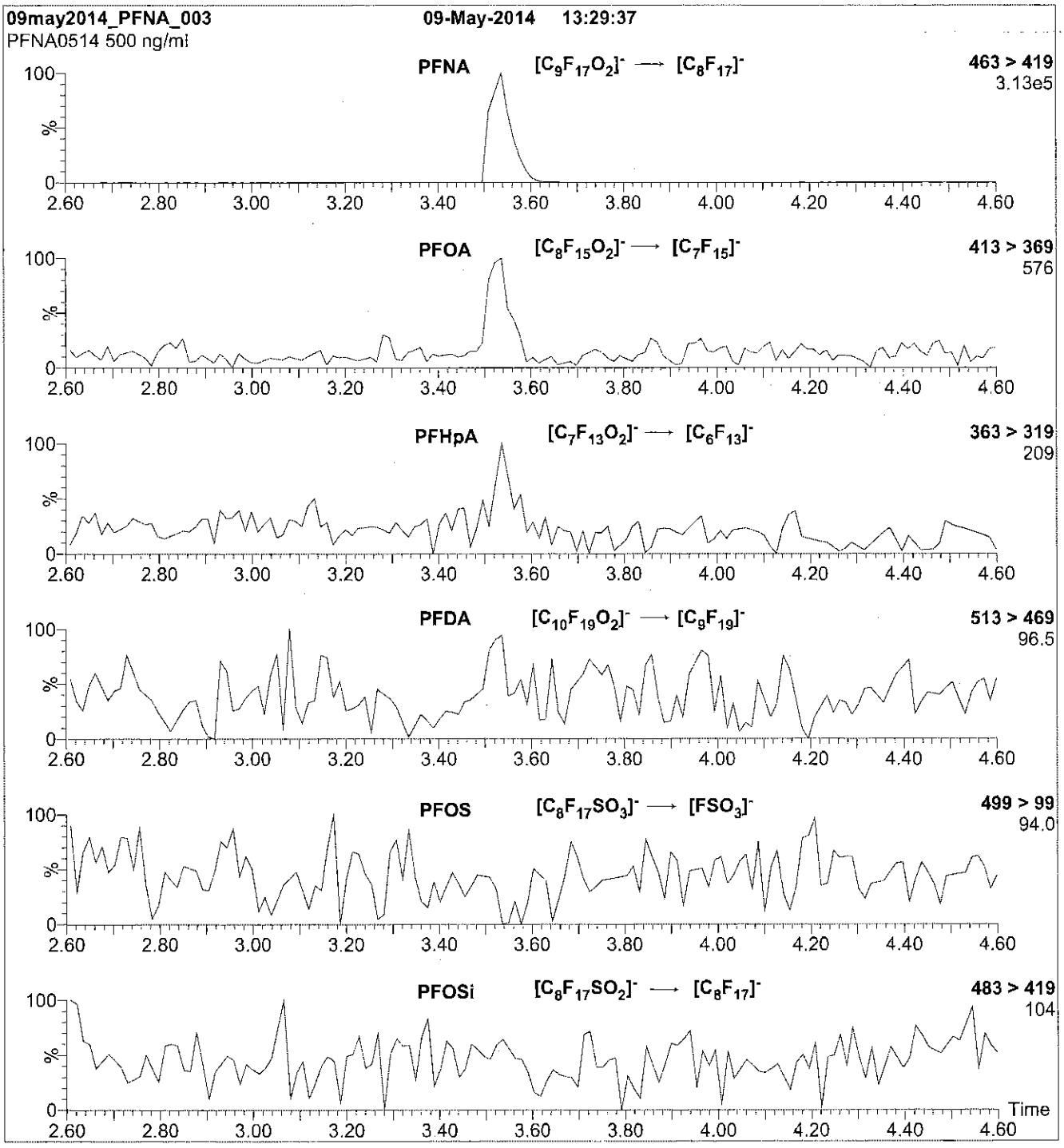
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFNA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFNA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.17e-3
Collision Energy (eV) = 11

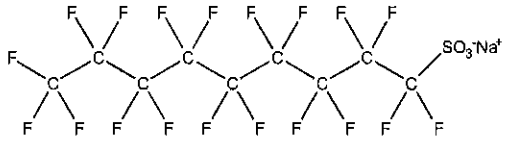
Reagent

LCPFNS_00002

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	L-PFNS	**LOT NUMBER:**	LPFNS0712
COMPOUND:	Sodium perfluoro-1-nonanesulfonate		
STRUCTURE:		**CAS #:**	98789-57-2



MOLECULAR FORMULA:	$C_9F_{19}SO_3Na$	**MOLECULAR WEIGHT:**	572.12
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 48.0 ± 2.4 µg/ml (PFNS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	07/04/2012		
EXPIRY DATE: (mm/dd/yyyy)	07/04/2017		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 01/15/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

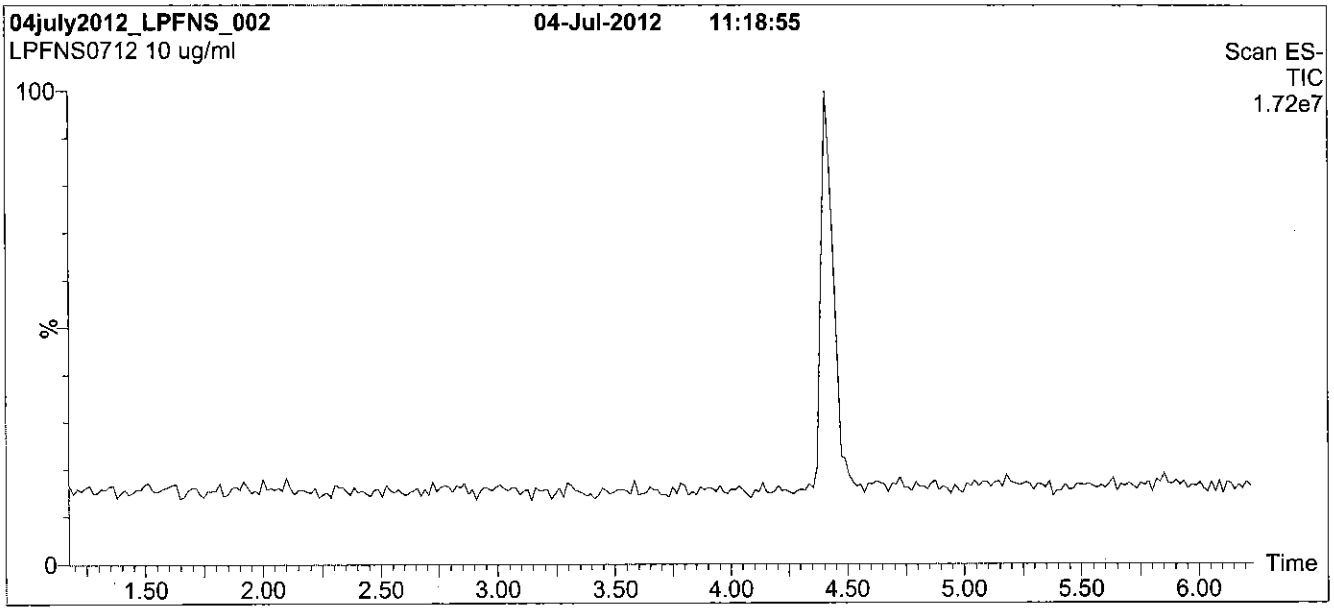
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

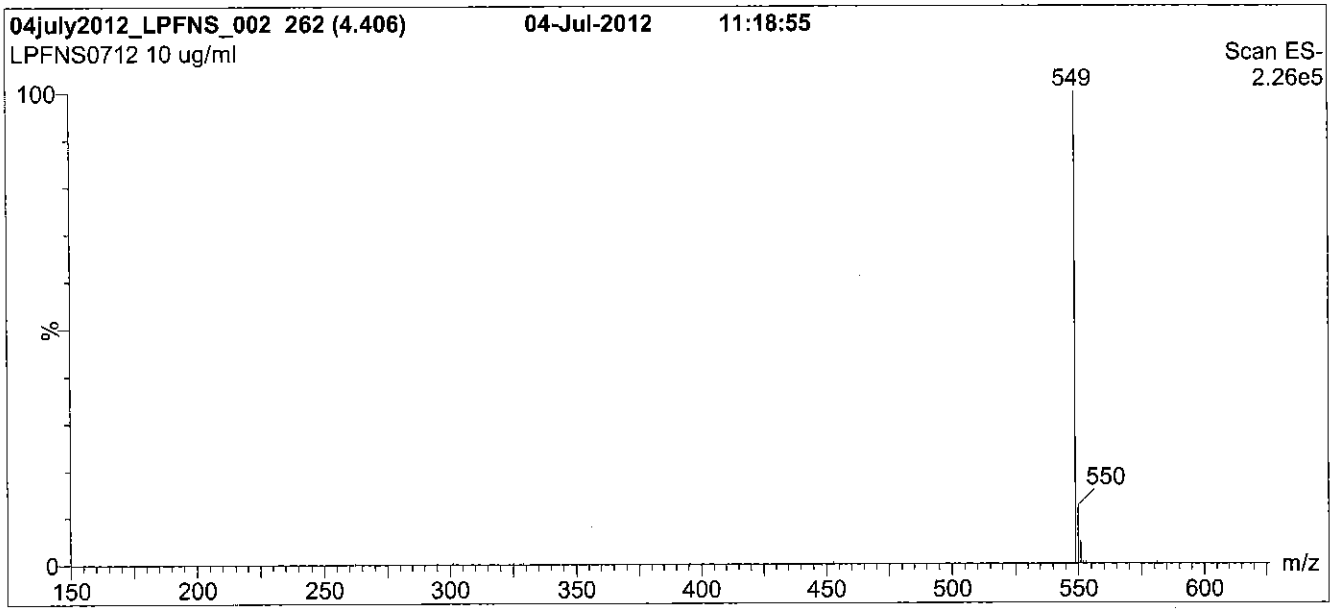
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **L-PFNS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

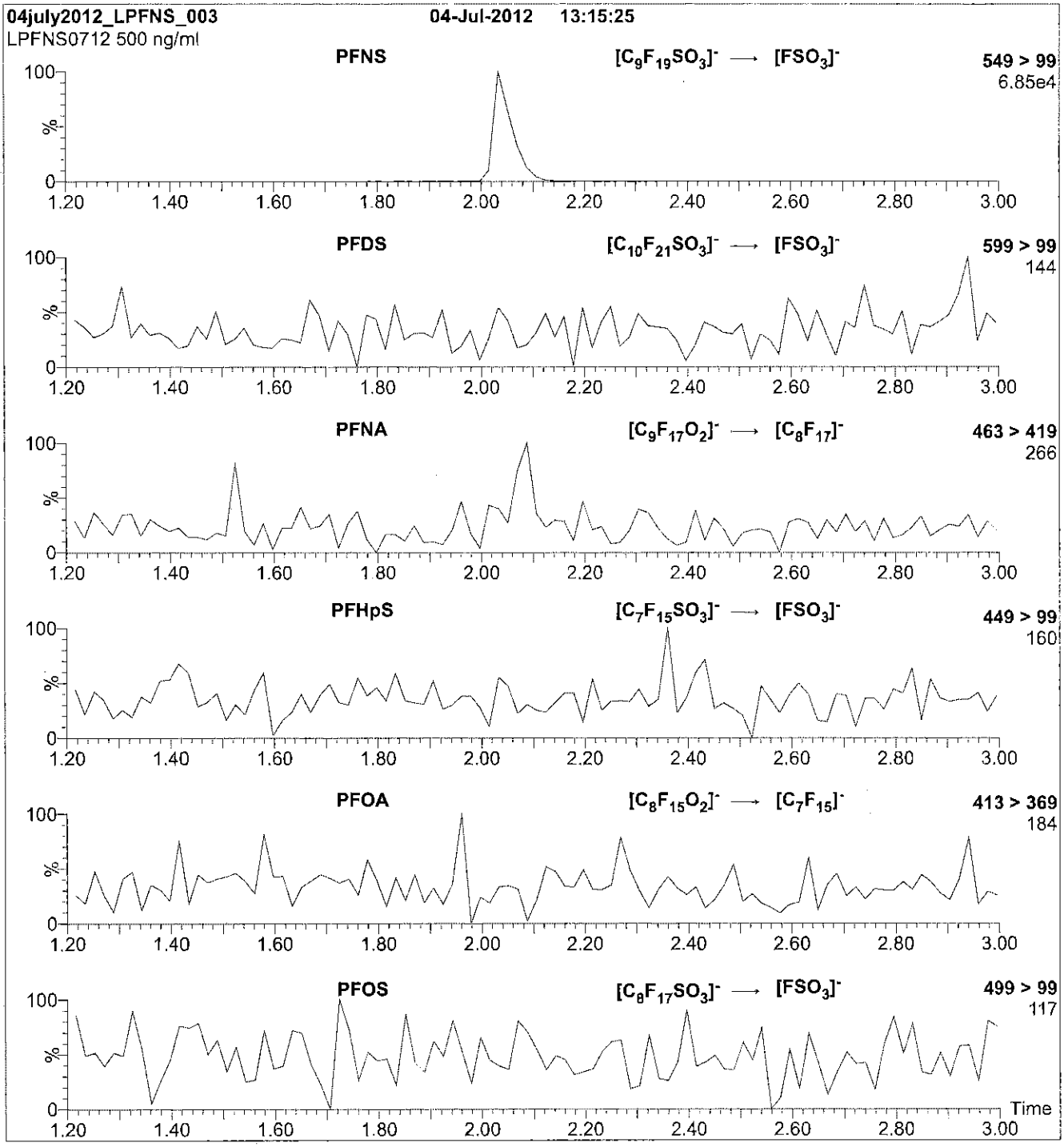
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 65.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFNS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFNS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 45

Reagent

LCPFOA_00004

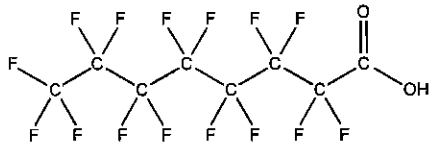
Rec 7/15/14

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFOA
COMPOUND: Perfluoro-n-octanoic acid
LOT NUMBER: PFOA1013

STRUCTURE:
CAS #: 335-67-1



MOLECULAR FORMULA: $C_8HF_{15}O_2$
MOLECULAR WEIGHT: 414.07
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 10/11/2013
EXPIRY DATE: (mm/dd/yyyy) 10/11/2018
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 10/18/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

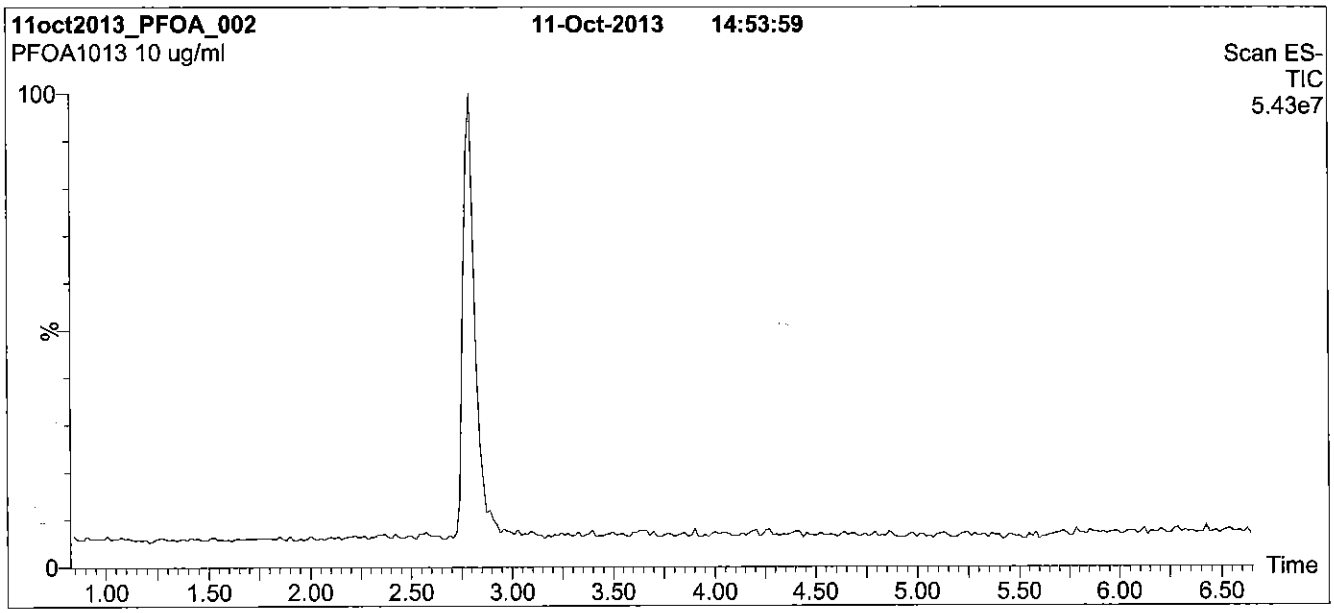
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

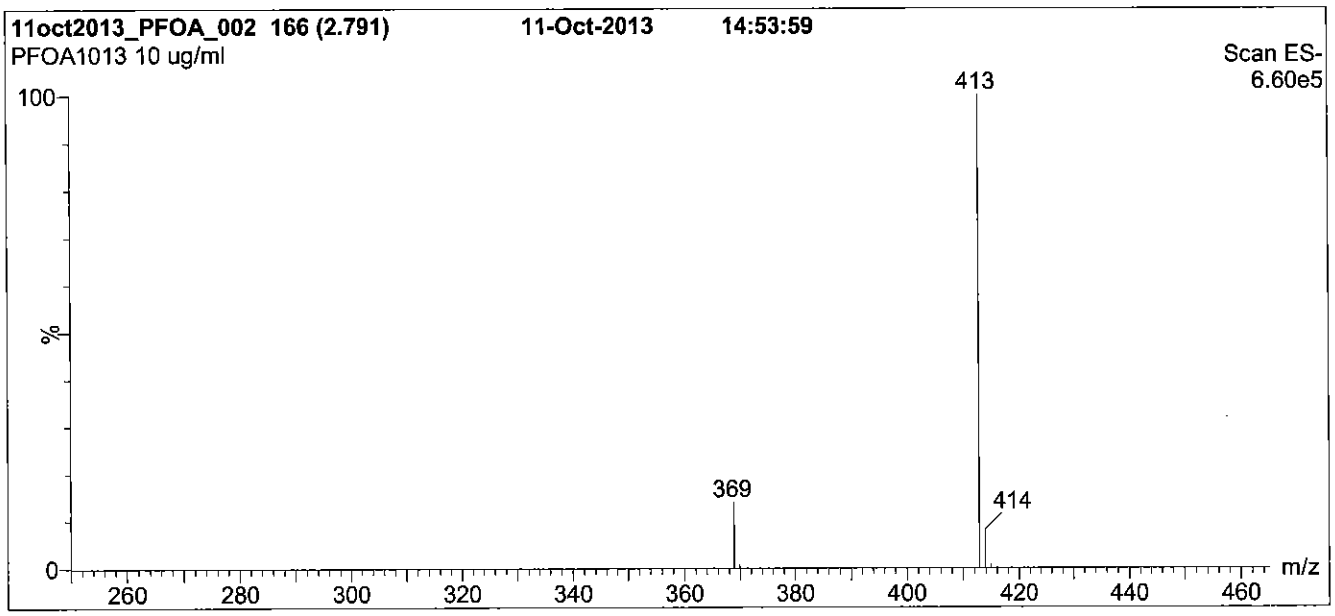
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for
1 min before returning to initial conditions in 0.5 min.
Time: 10 min

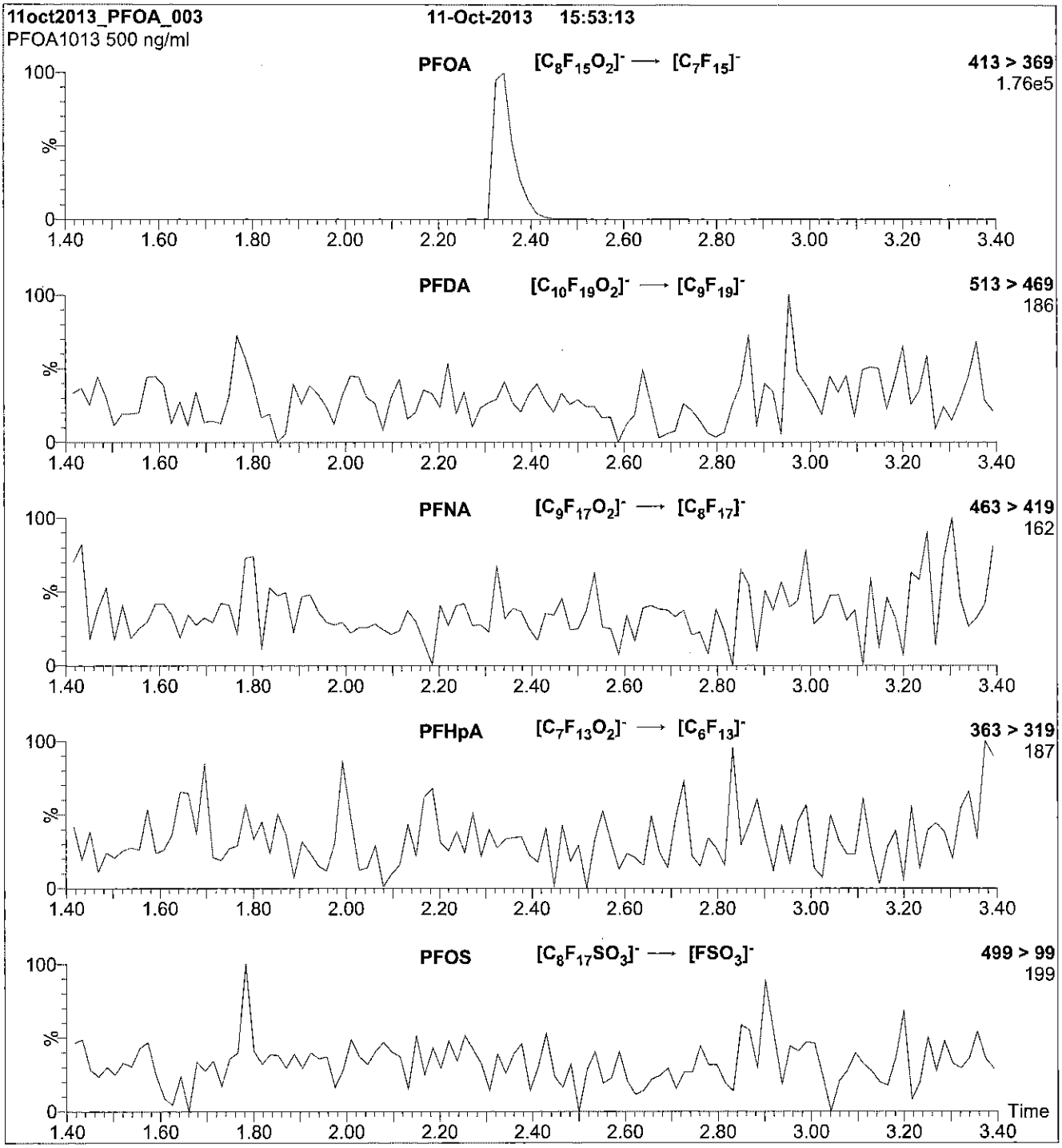
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection:	Direct loop injection 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) = 3.28e-3
Collision Energy (eV) = 11

Reagent

LCPFOA_00005

Rec 4/30/15 CW

WELLINGTON LABORATORIES

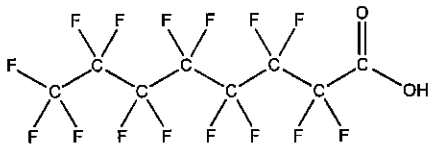
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFOA
COMPOUND: Perfluoro-n-octanoic acid

LOT NUMBER: PFOA1115

STRUCTURE:

CAS #: 335-67-1



MOLECULAR FORMULA: $C_8HF_{15}O_2$
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 414.07
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 11/06/2015
EXPIRY DATE: (mm/dd/yyyy) 11/06/2020
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 11/11/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

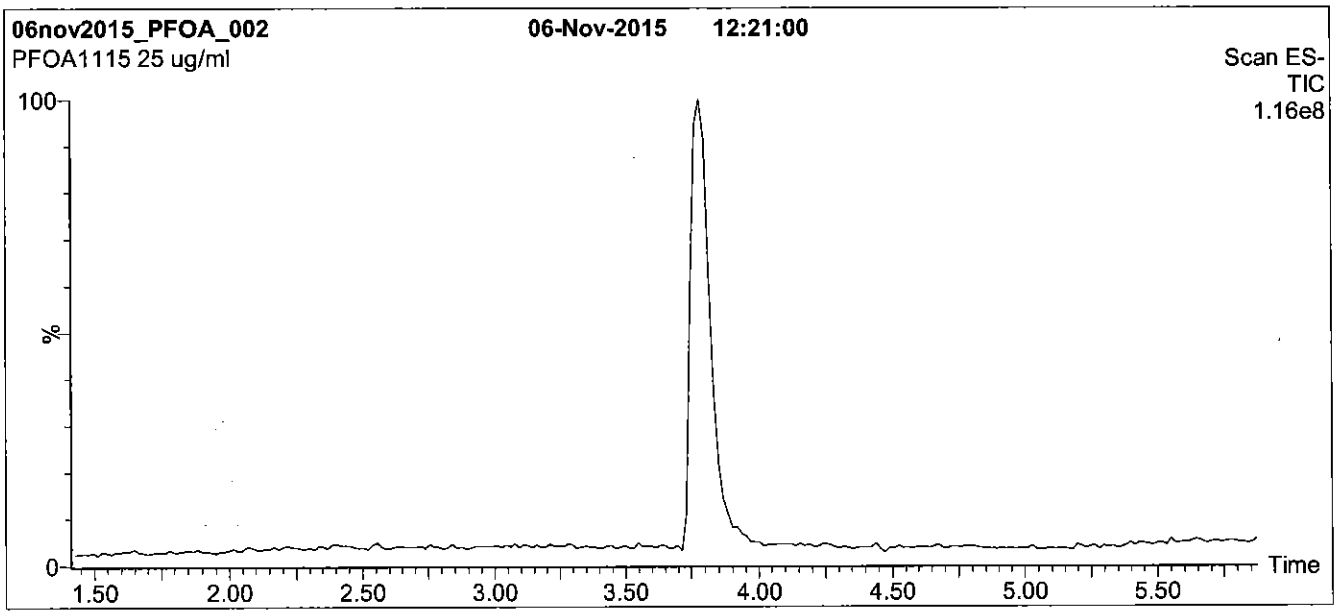
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

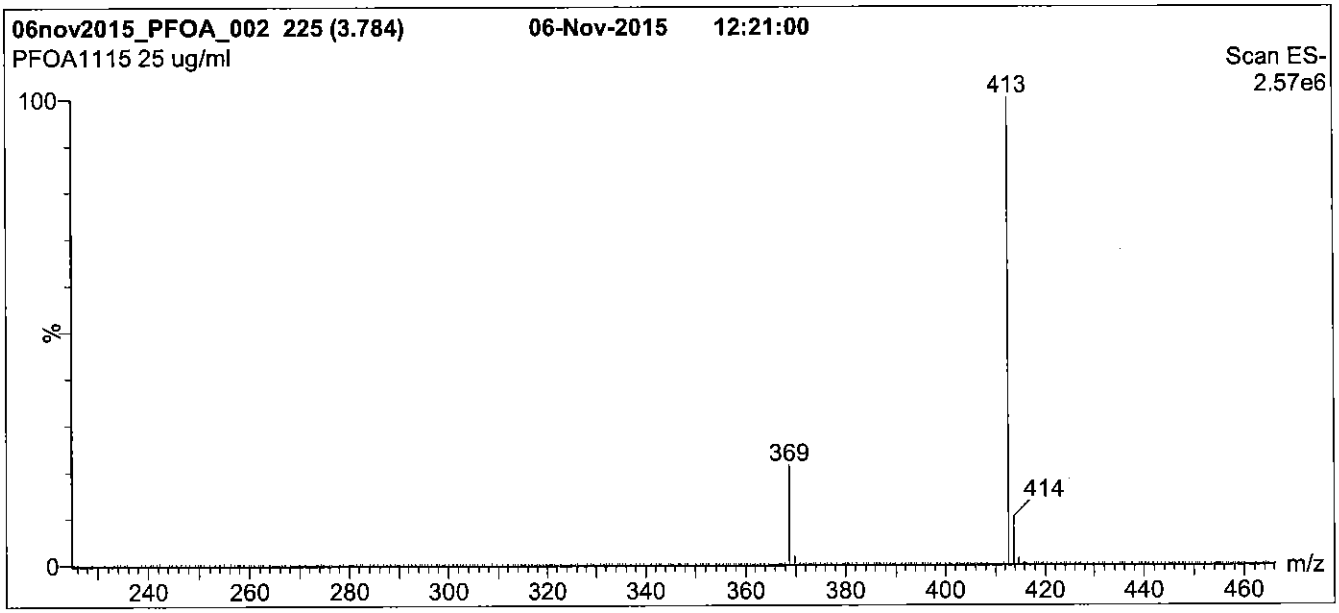
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17025 ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
2 min before returning to initial conditions in 0.5 min.
Time: 10 min

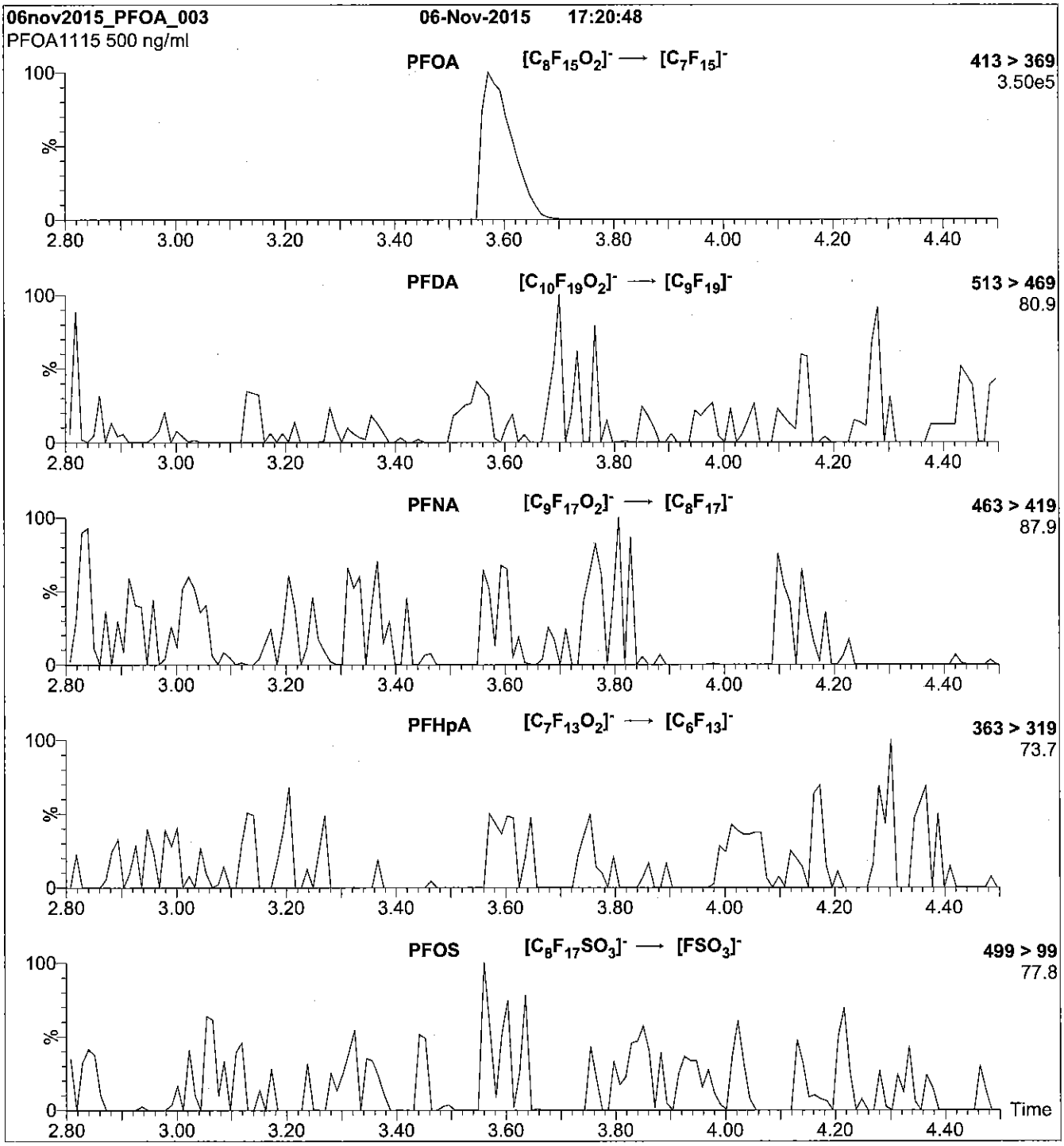
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
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) = 3.17e-3
Collision Energy (eV) = 10

Reagent

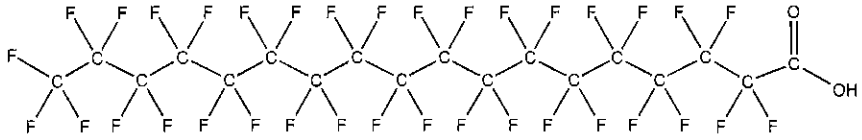
LCPFODA_00004

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: PFODA
COMPOUND: Perfluoro-n-octadecanoic acid
LOT NUMBER: PFODA0807

STRUCTURE:
CAS #: 16517-11-6



MOLECULAR FORMULA: $C_{18}HF_{35}O_2$
MOLECULAR WEIGHT: 914.15
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (4%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 04/25/2014
EXPIRY DATE: (mm/dd/yyyy) 04/25/2017
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 04/28/2014 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

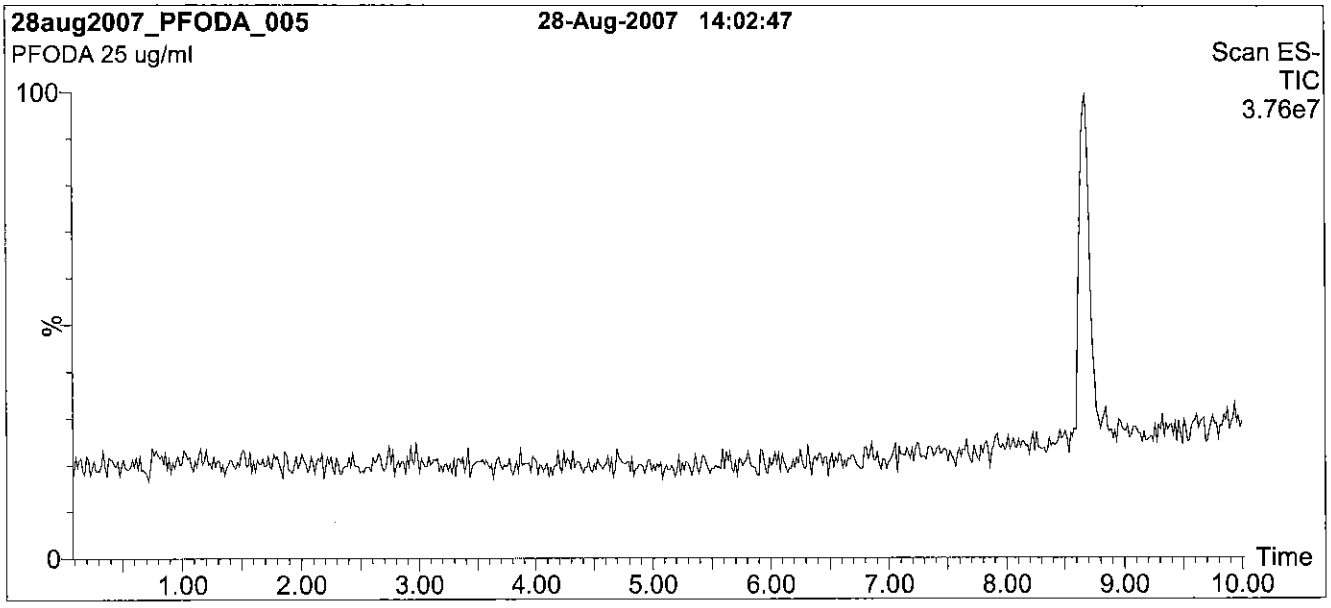
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

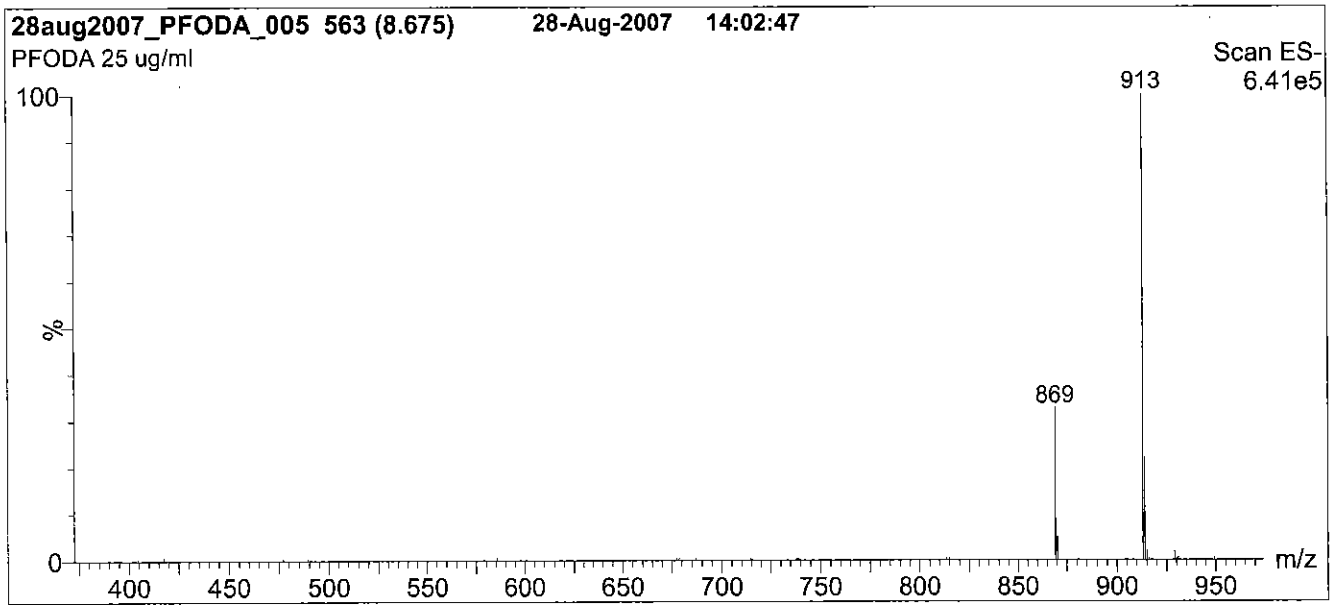
CALA Testing Accredited Méthodes No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFODA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 75% (80:20 MeOH:ACN) / 25% H_2O
(both with 10 mM NH_4OAc buffer)
Hold 5 min. Ramp to 100% organic over 6 min.
Hold 3 min before returning to initial conditions.
Time: 16 min

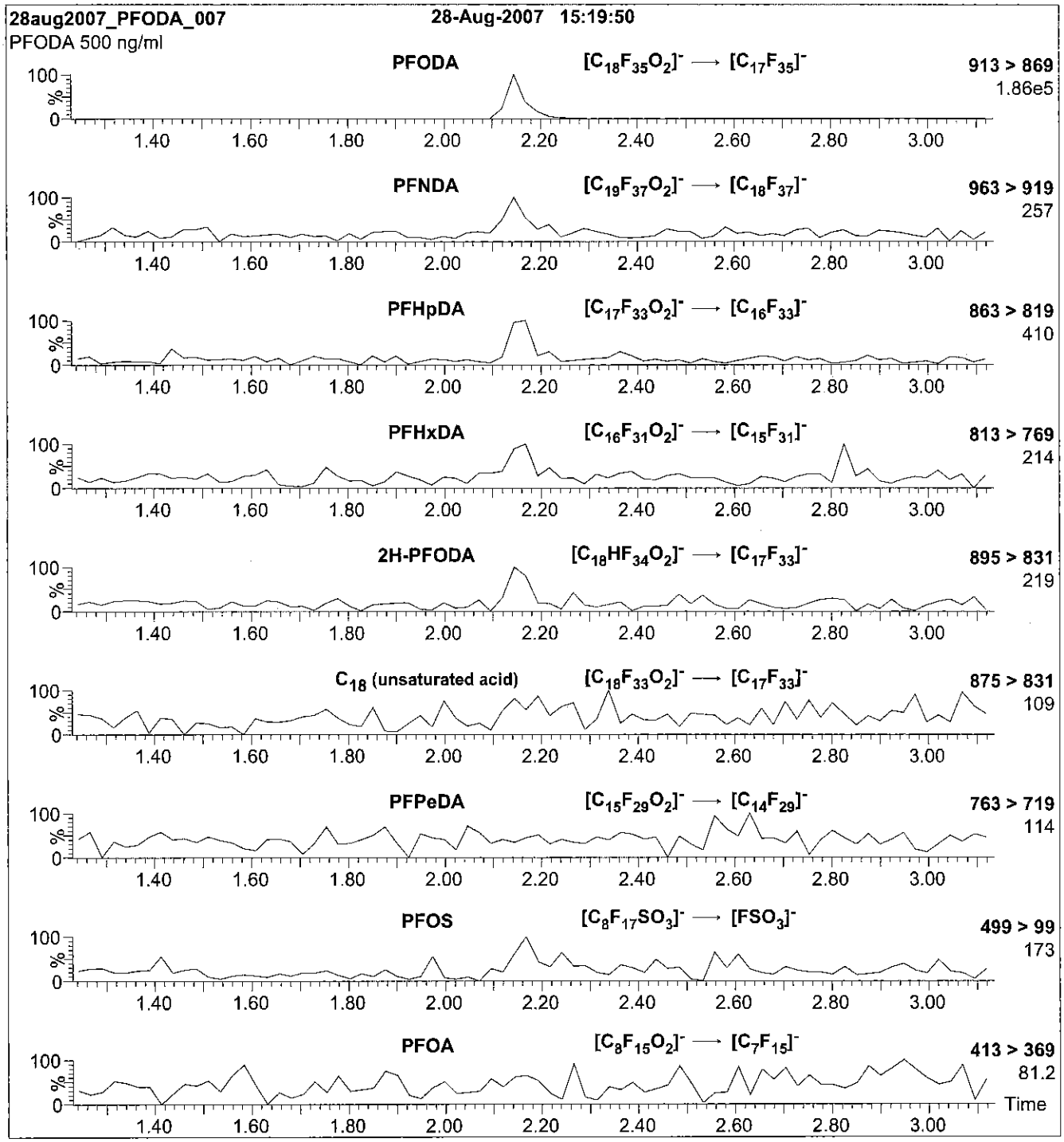
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 1100 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 25.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 650

Figure 2: **PFODA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFODA)

Mobile phase: Isocratic 75% (80:20 MeOH:ACN) / 25% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.58e-3
Collision Energy (eV) = 15

Reagent

LCPFOS-br_00001

566008
ID: LCPFOS-br_00001
Exp: 10/14/20 Pipd: CBW
Potassium Perfluorooctane

P: 12/9/15 SW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

br-PFOSK

**Potassium Perfluorooctanesulfonate
Solution/Mixture of Linear and
Branched Isomers**

PRODUCT CODE:	br-PFOSK
LOT NUMBER:	brPFOSK1015
CONCENTRATION:	50 ± 2.5 µg/ml (total potassium salt)
	46.4 ± 2.3 µg/ml (total PFOS anion)
SOLVENT(S):	Methanol
DATE PREPARED: (mm/dd/yyyy)	10/13/2015
LAST TESTED: (mm/dd/yyyy)	10/14/2015
EXPIRY DATE: (mm/dd/yyyy)	10/14/2020
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

The chemical purity has been determined to be ≥98% perfluorooctanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the isomeric components are given in Table A.

DOCUMENTATION/ DATA ATTACHED:

Table A: Isomeric Components and Percent Composition by ^{19}F-NMR
Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data (SIR)
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- A 5-point calibration curve was generated using linear PFOS (potassium salt) and mass-labelled PFOS as an internal standard to enable quantitation of br-PFOSK using isotopic dilution.
- CAS#: 2795-39-3 (for linear isomer; potassium salt).

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.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A 1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

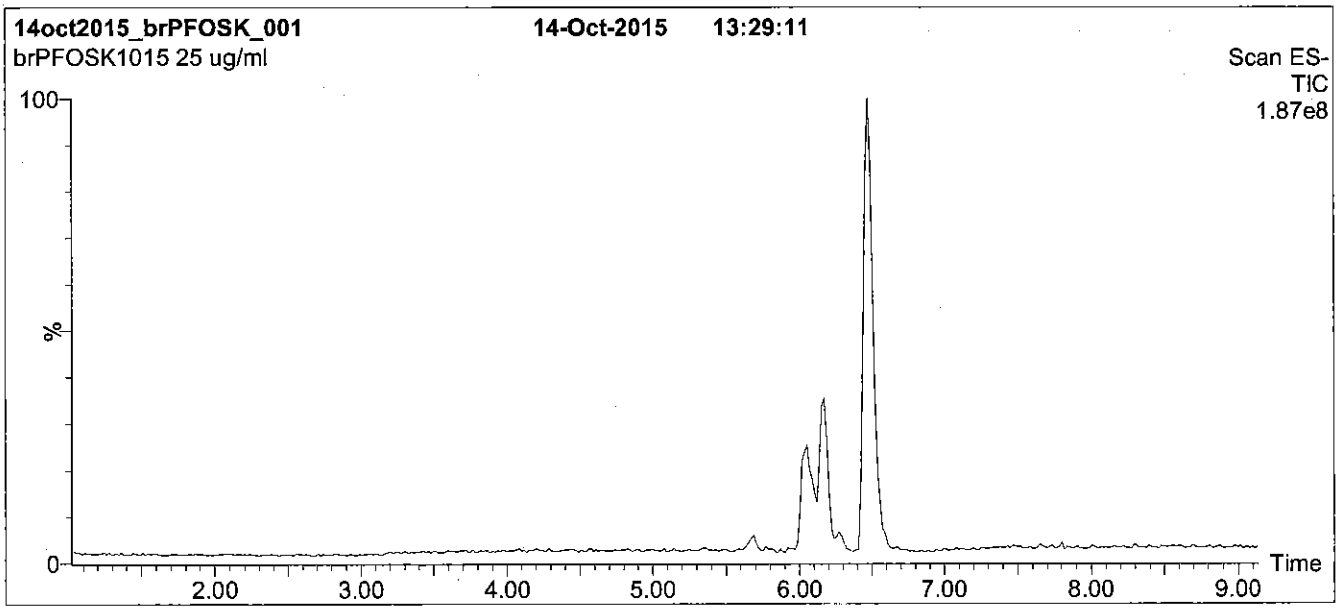
Table A: **br-PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

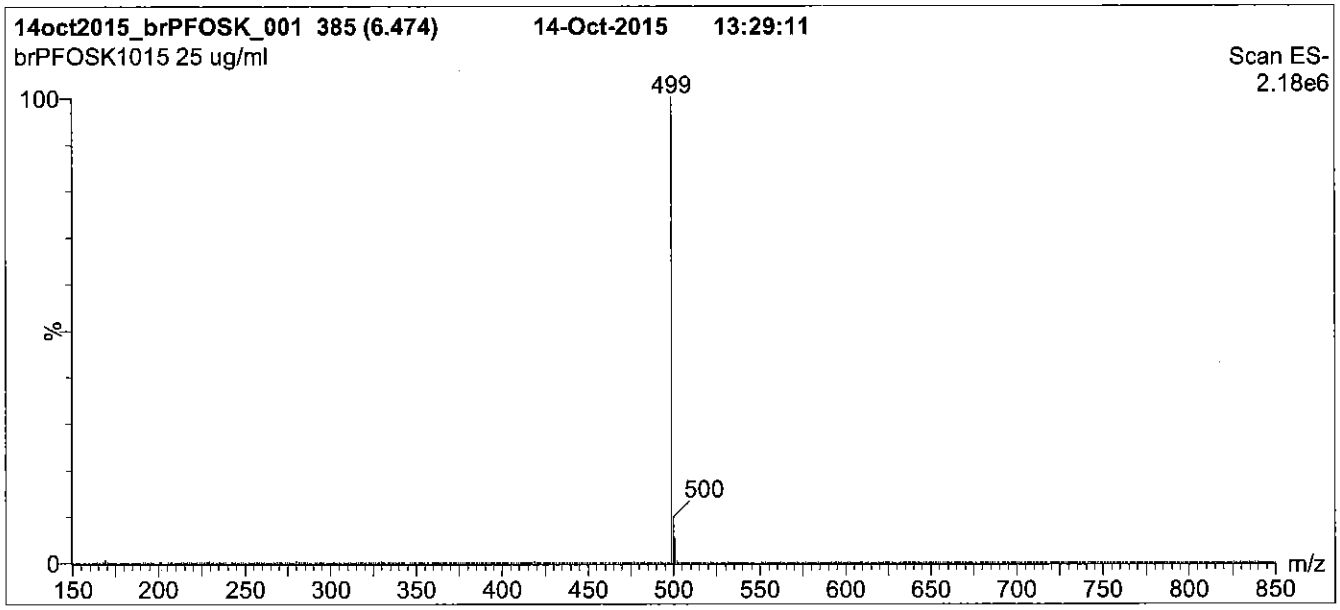
Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	1.2
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	0.6
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	1.9
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	2.2
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	4.5
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	10.0
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3-C(CF_3)_2CF_2CF_2CF_2SO_3^-K^+$	0.2
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF_2-C(CF_3)_2-CF_2CF_2CF_2SO_3^-K^+$	0.03
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3-CF(CF_3)-CF(CF_3)-CF_2CF_2CF_2SO_3^-K^+$	0.4
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3-CF(CF_3)-CF_2-CF(CF_3)-CF_2CF_2SO_3^-K^+$	0.07

* Percent of total perfluorooctanesulfonate isomers only. Isomers are labelled in Figure 2.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

Certified By: _____ **Date:** 10/15/2015
(mm/dd/yyyy)
B.G. Chittim

Figure 1: **br-PFOSK; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 12 min and hold for 2 min.
Return to initial conditions over 0.5 min.
Time: 16 min

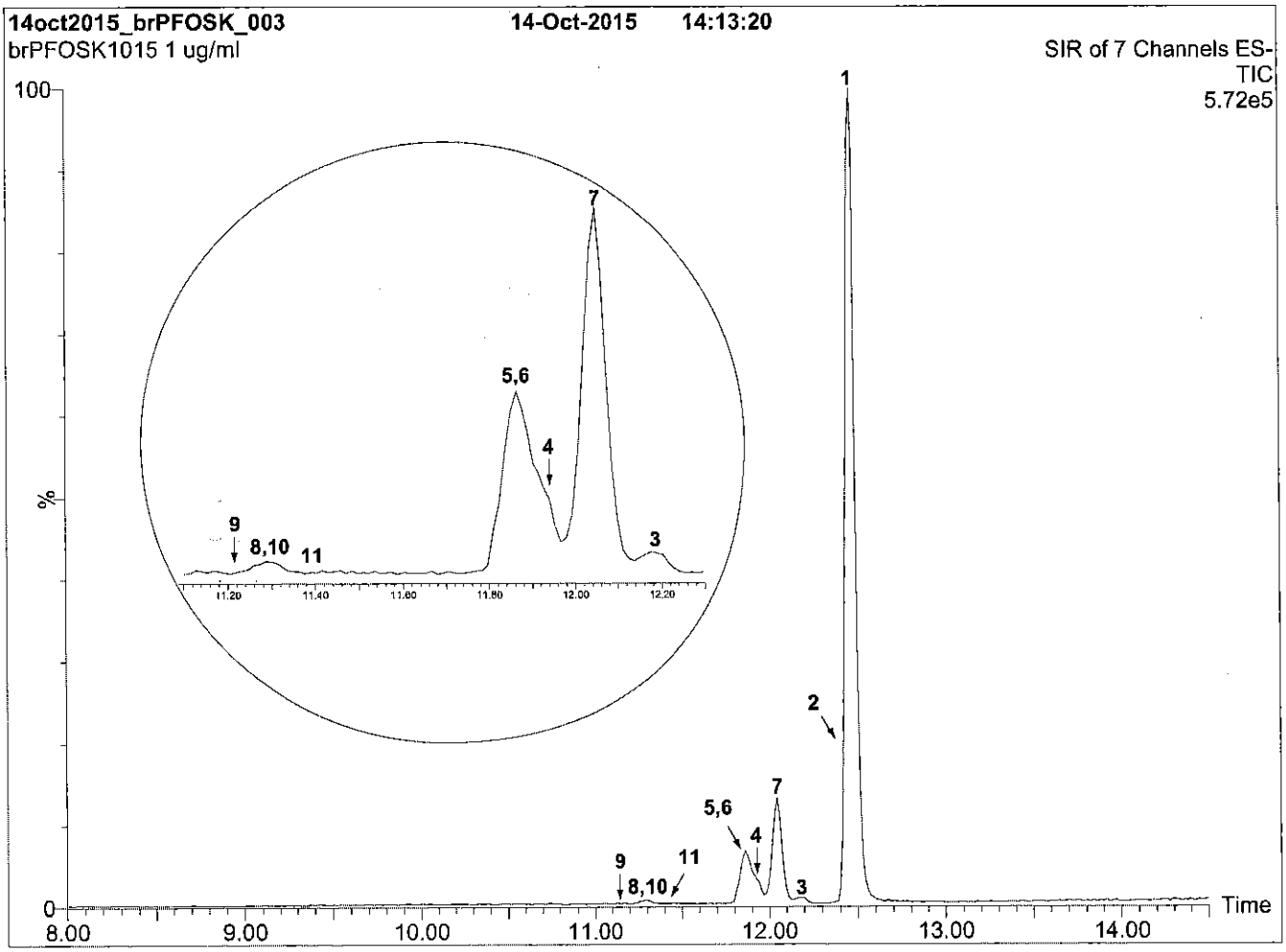
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **br-PFOSK; LC/MS Data (SIR)**



Conditions for Figure 2:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP_{18} (1.7 µm, 2.1 x 100 mm)

Injection: 1.0 µg/ml of br-PFOSK

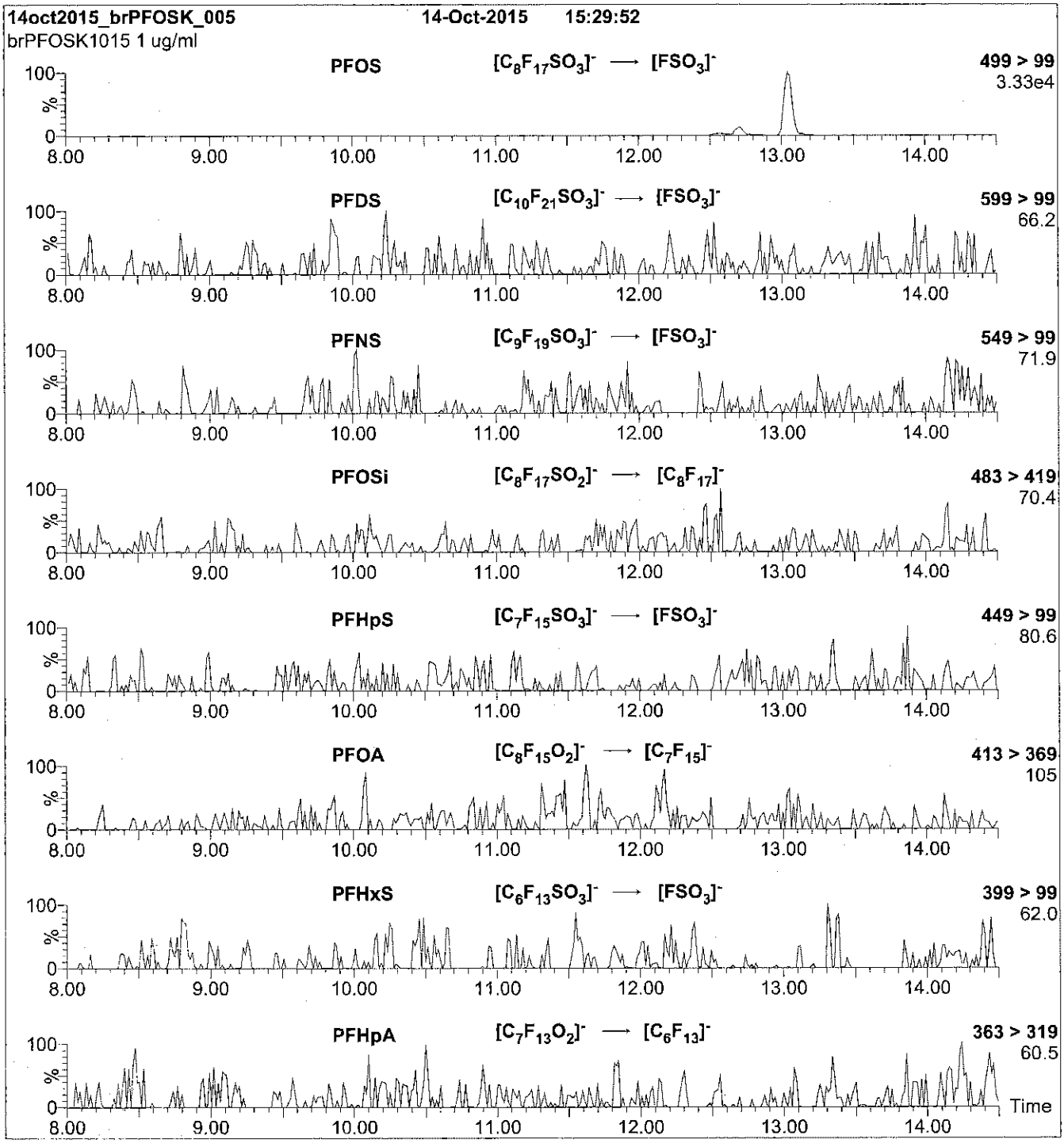
Mobile Phase: Gradient
45% (80:20 MeOH:ACN) / 55% H_2O (both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 15 min and hold for 3 min.
Return to initial conditions over 1 min.
Time: 20 min

Flow: 300 µl/min

MS Conditions:

SIR (ES^-)
Source = 110 °C
Desolvation = 325 °C
Cone Voltage = 60V

Figure 3: **br-PFOSK; LC/MS/MS Data (Selected MRM Transitions)**



Condltions for Figure 3:

Injection: On-column

Mobile phase: Same as Figure 2

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.06e-3
Collision Energy (eV) = 11-50 (variable)

Reagent

LCPFOS_00004

C. 3/17/15 SV

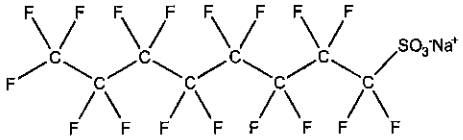
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: L-PFOS
LOT NUMBER: LPFOS0614
COMPOUND: Sodium perfluoro-1-octanesulfonate

STRUCTURE:

CAS #: 4021-47-0



MOLECULAR FORMULA:	$C_8F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	522.11
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.8 ± 2.4 µg/ml (PFOS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	06/20/2014		
EXPIRY DATE: (mm/dd/yyyy)	06/20/2019		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 10/27/2014
B.G. Chittim (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

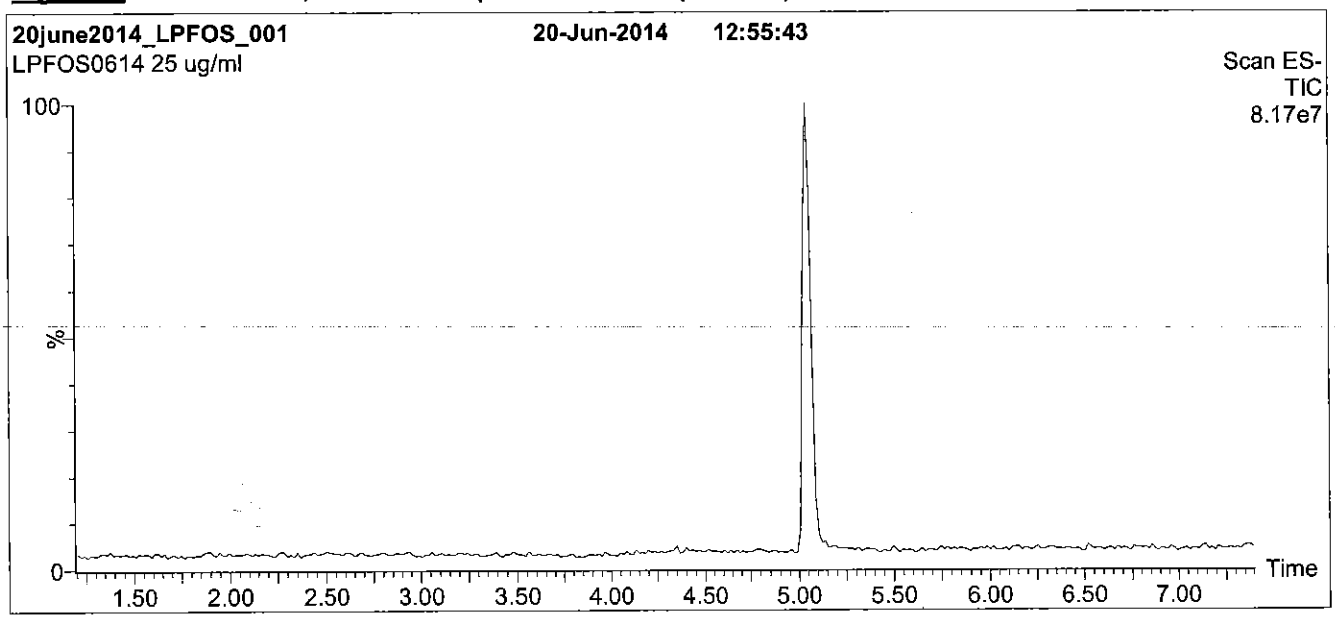
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

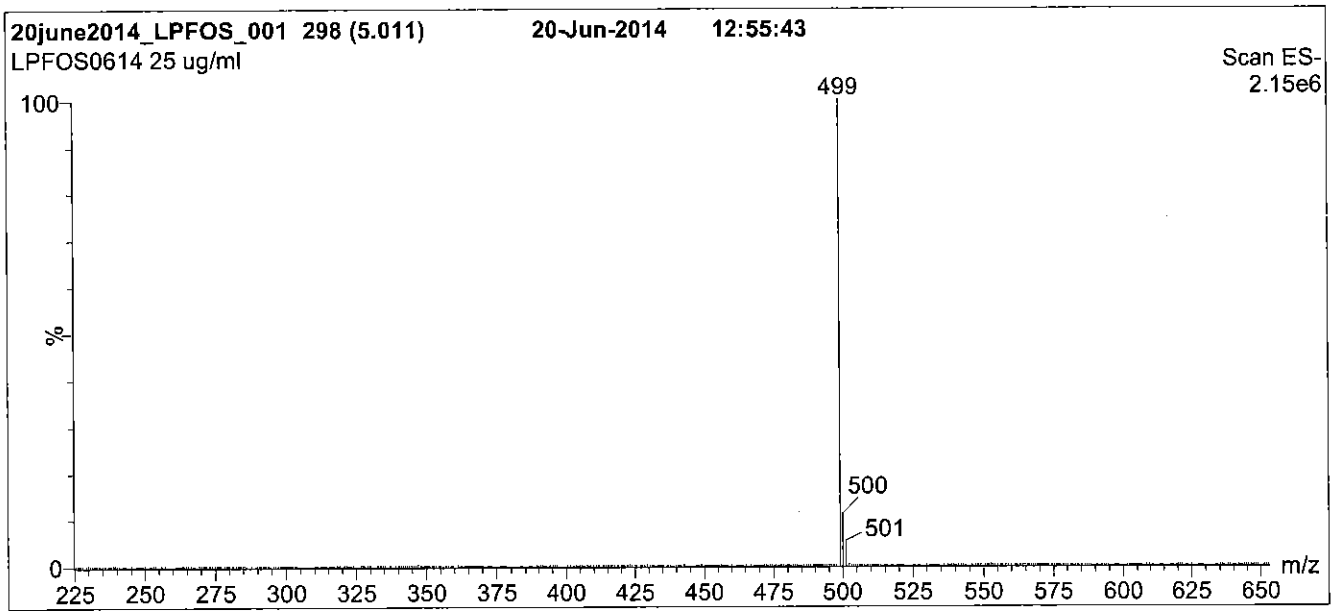
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **L-PFOS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

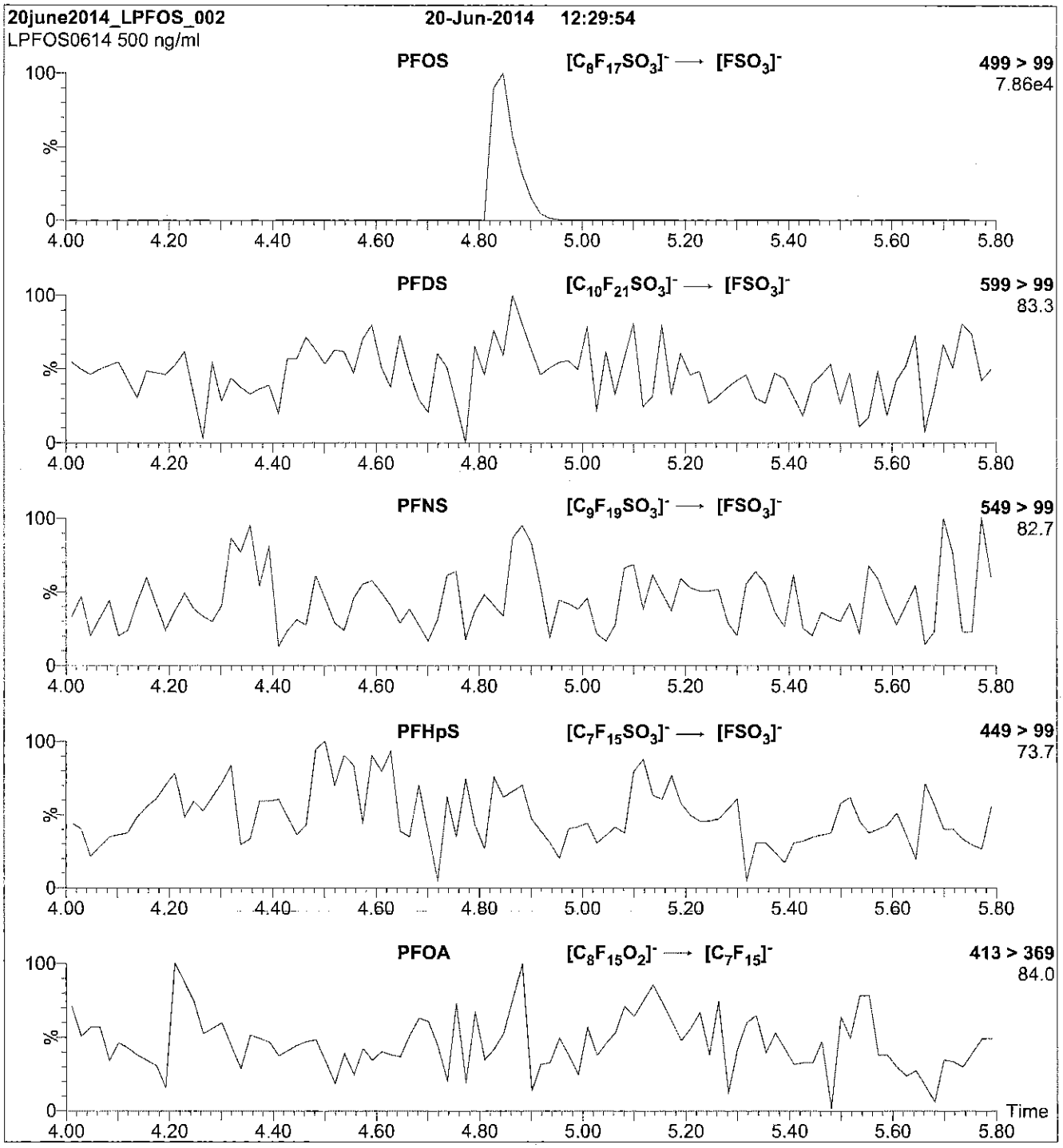
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFOS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFOS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 40

Reagent

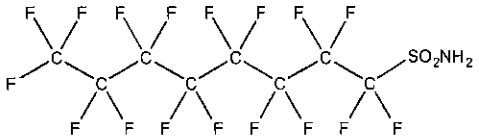
LCPFOSA_00005

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: FOSA-I
COMPOUND: Perfluoro-1-octanesulfonamide
LOT NUMBER: FOSA0714I

STRUCTURE:
CAS #: 754-91-6



MOLECULAR FORMULA:	$C_8H_2F_{17}NO_2S$	**MOLECULAR WEIGHT:**	499.14
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Isopropanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	07/31/2014		
EXPIRY DATE: (mm/dd/yyyy)	Stability studies ongoing		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 08/05/2014 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

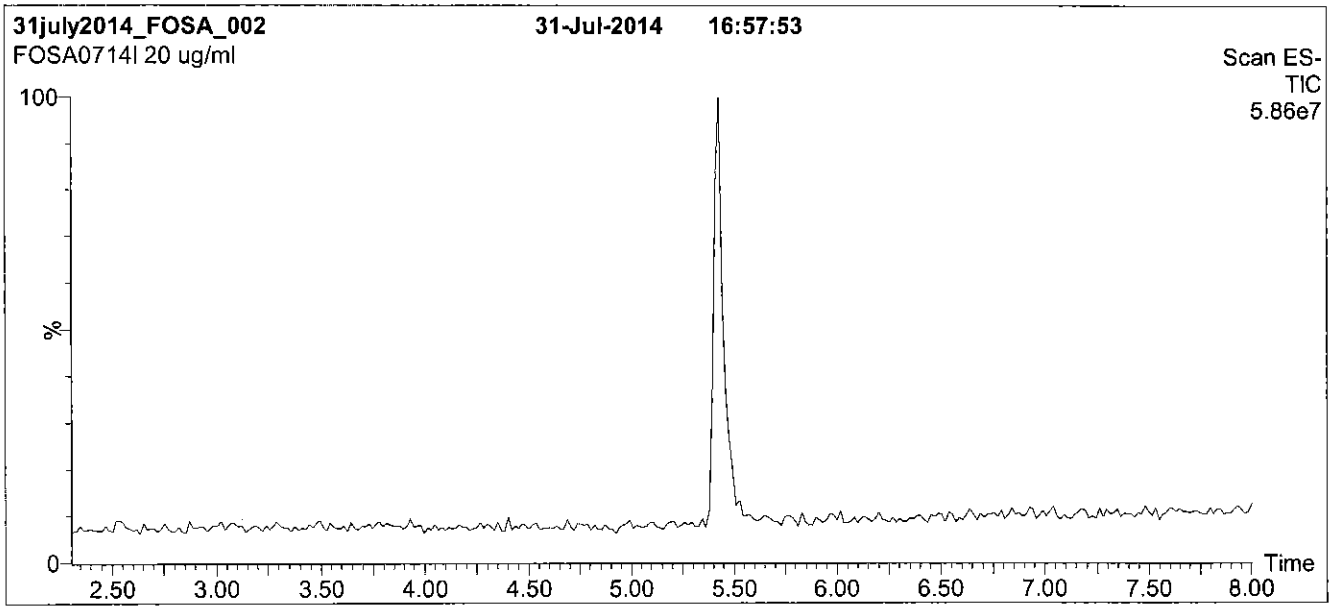
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

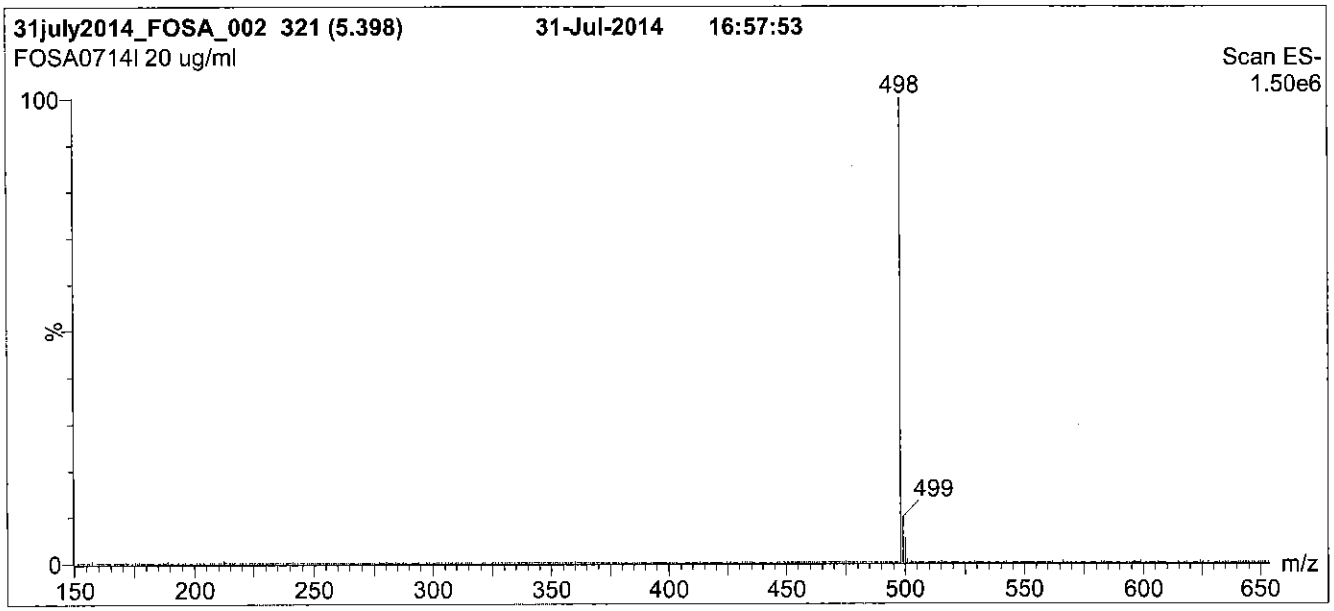
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **FOSA-I; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH C_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

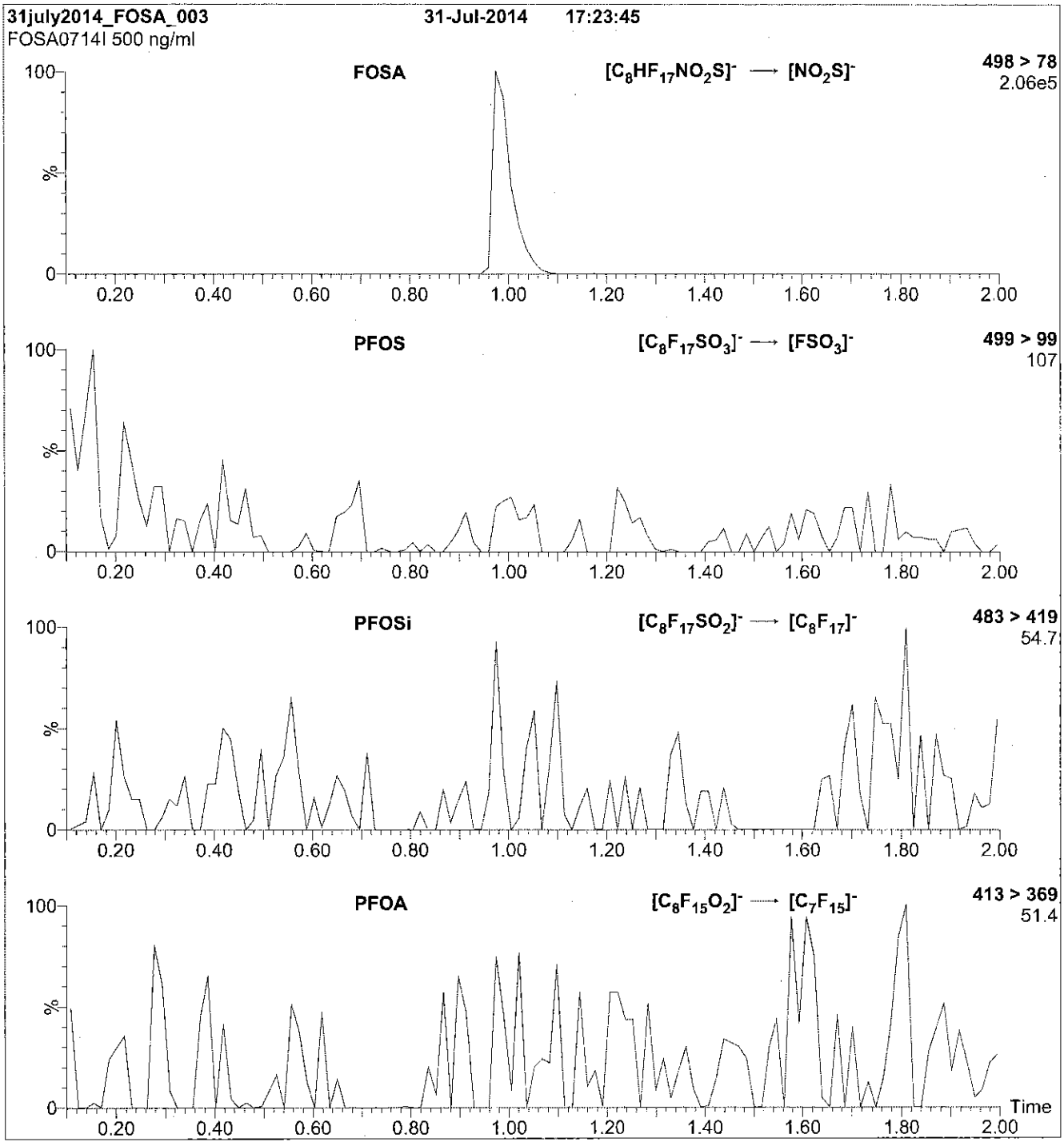
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 950 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **FOSA-I; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml FOSA-I)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.58e-3
Collision Energy (eV) = 30

Reagent

LCPFOSA_00006

Rec 12/30/15 CW

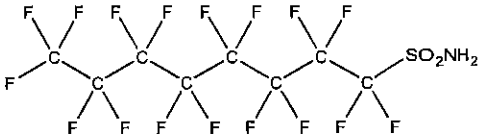
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: FOSA-I
COMPOUND: Perfluoro-1-octanesulfonamide
LOT NUMBER: FOSA0815I

STRUCTURE:

CAS #: 754-91-6



MOLECULAR FORMULA:	$C_8H_2F_{17}NO_2S$	**MOLECULAR WEIGHT:**	499.14
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Isopropanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	09/02/2015		
EXPIRY DATE: (mm/dd/yyyy)	09/02/2017		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 09/11/2015 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

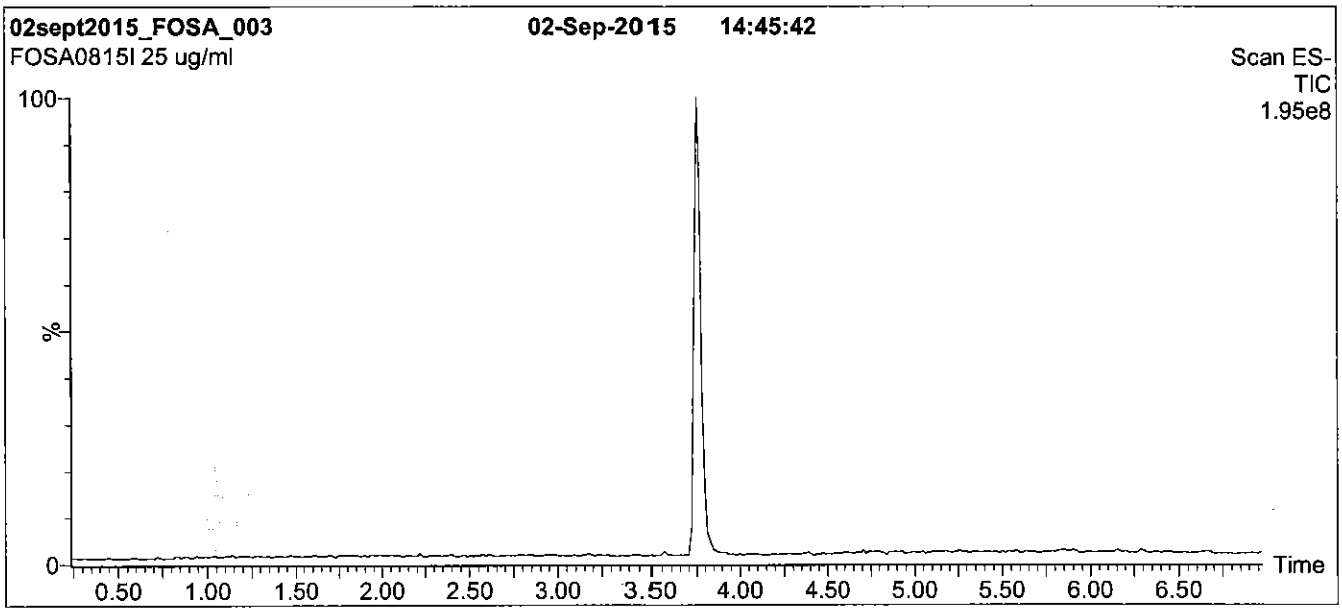
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

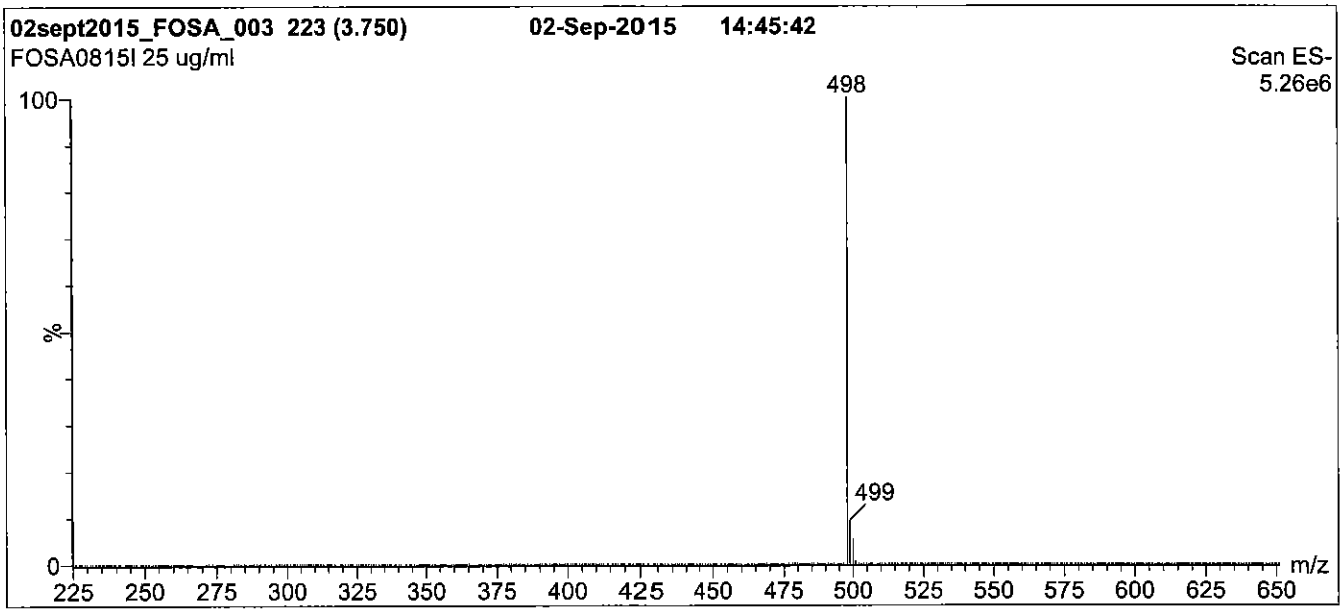
CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **FOSA-I; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

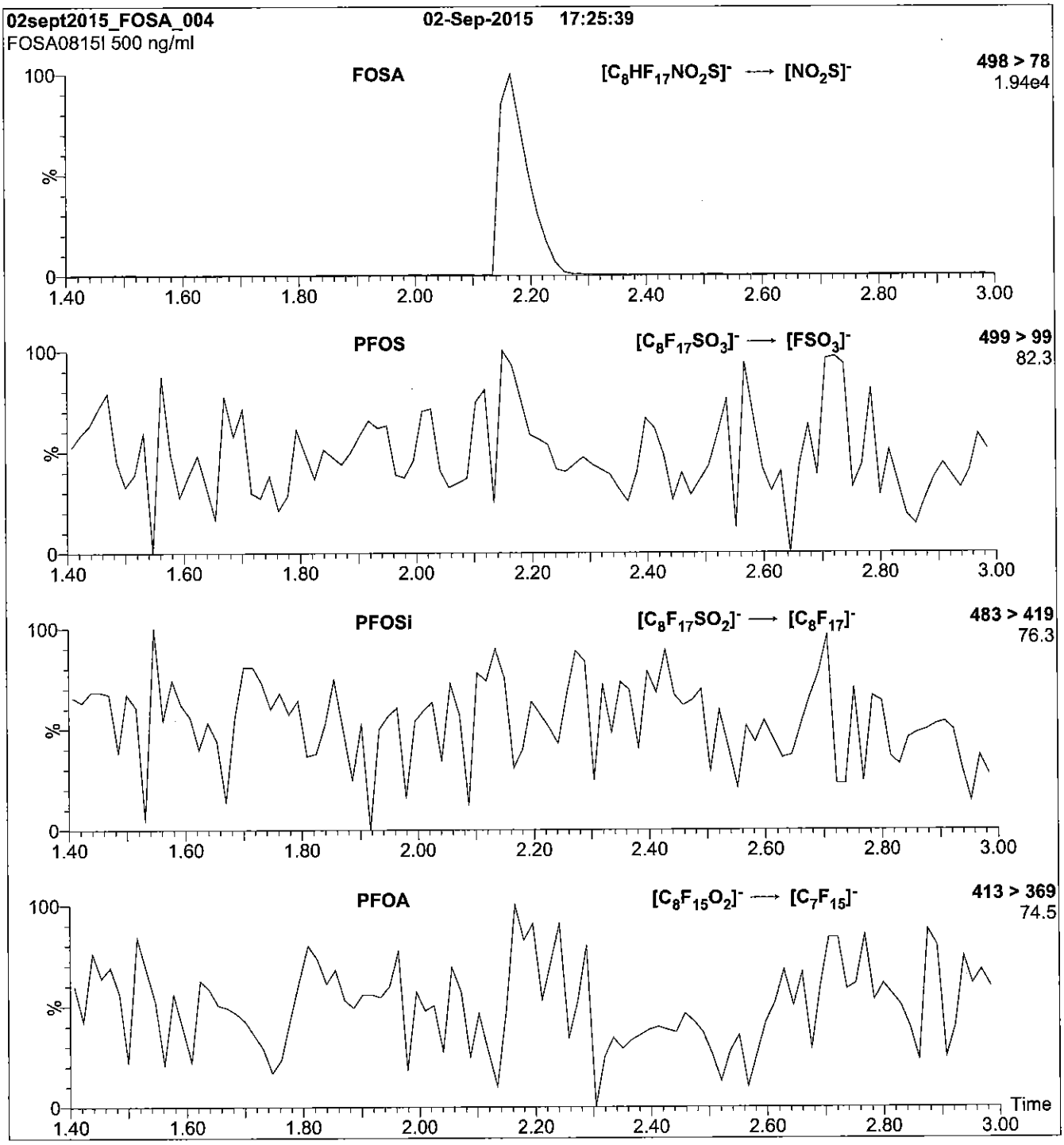
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.50
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **FOSA-I; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml FOSA-I)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3
Collision Energy (eV) = 30

Reagent

LCPFPeA_00003

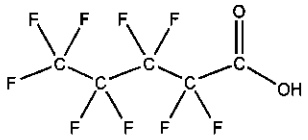
Rec 7/15/14

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFPeA
COMPOUND: Perfluoro-n-pentanoic acid
LOT NUMBER: PFPeA0113

STRUCTURE:
CAS #: 2706-90-3



MOLECULAR FORMULA: $C_5HF_9O_2$
MOLECULAR WEIGHT: 264.05
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 01/03/2013
EXPIRY DATE: (mm/dd/yyyy) 01/03/2018
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.3% of Perfluoro-n-heptanoic acid (PFHpA) and ~ 0.2% of $C_5H_2F_8O_2$ (hydrido - derivative) as measured by ^{19}F NMR.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 01/14/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

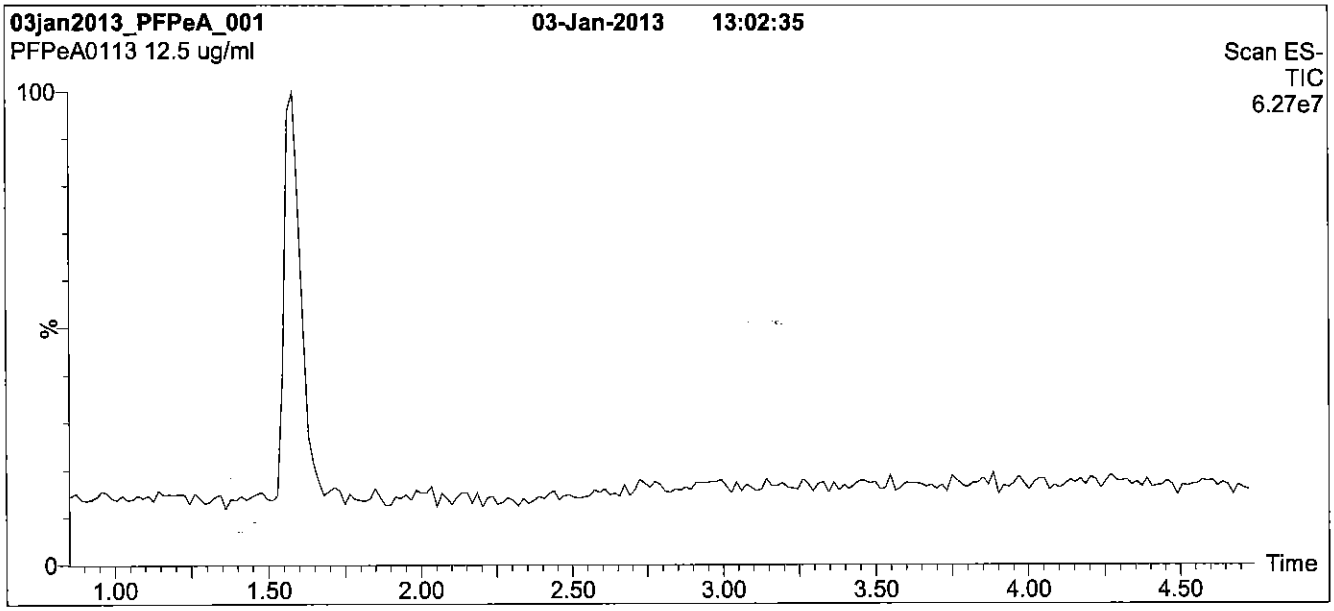
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

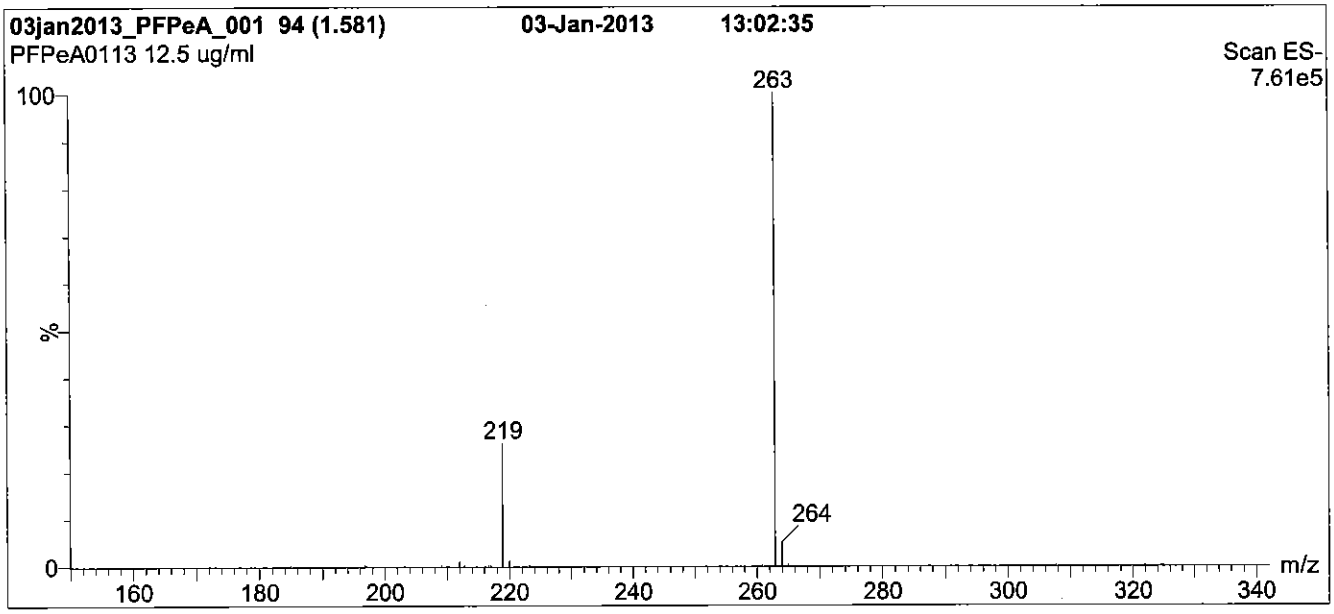
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFPeA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions in 0.5 min.
Time: 10 min

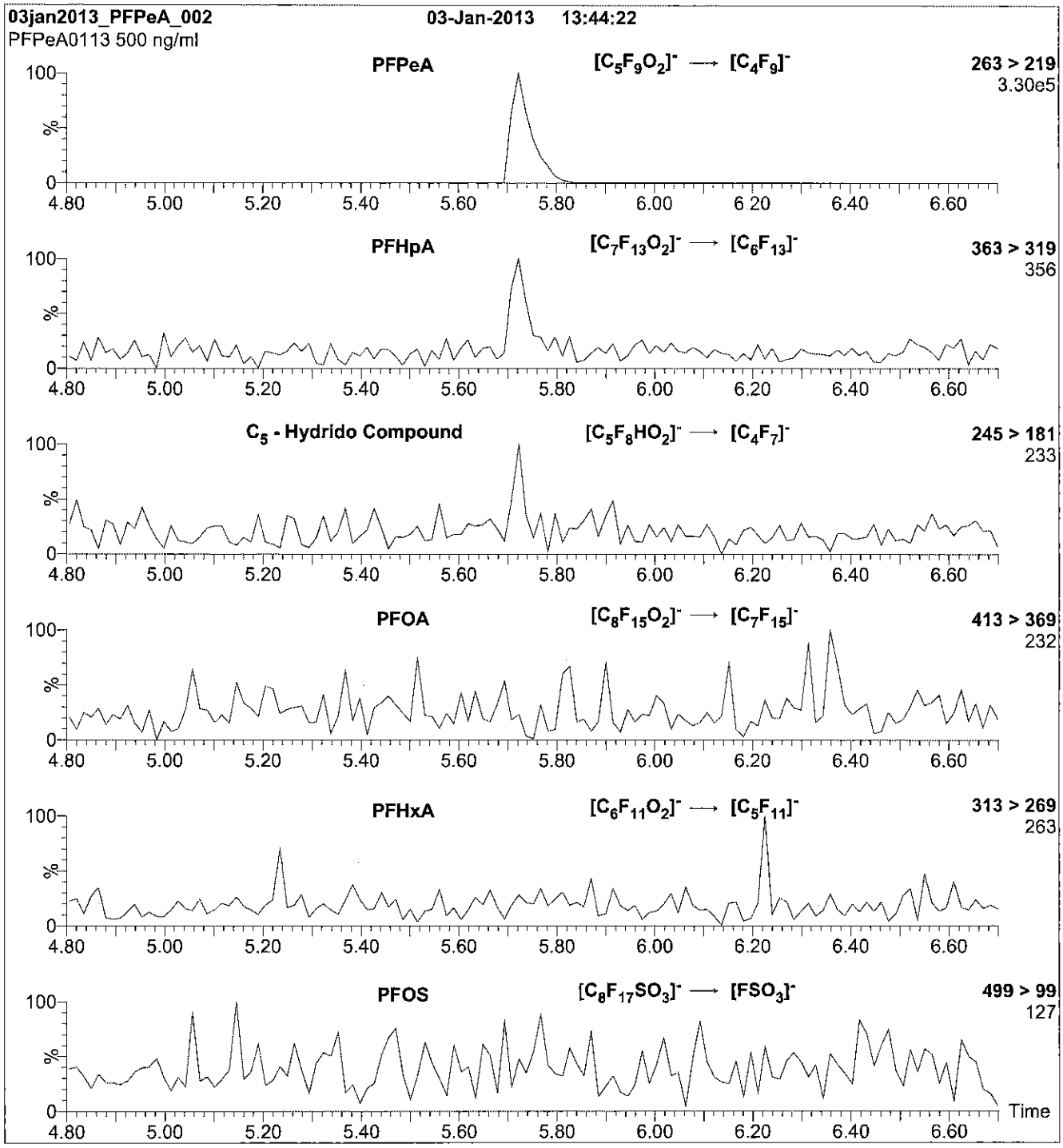
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFPeA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFPeA)

Mobile phase: Isocratic 70% (80:20 MeOH:ACN) / 30% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 9

Reagent

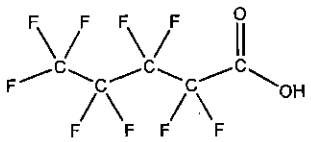
LCPFPeA_00004

Rec: 12/30/15 aw

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFPeA	**LOT NUMBER:**	PFPeA0115
COMPOUND:	Perfluoro-n-pentanoic acid		
STRUCTURE:		**CAS #:**	2706-90-3



MOLECULAR FORMULA:	$C_5HF_9O_2$	**MOLECULAR WEIGHT:**	264.05
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	01/30/2015		
EXPIRY DATE: (mm/dd/yyyy)	01/30/2020		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.3% of Perfluoro-n-heptanoic acid (PFHpA) and ~ 0.2% of $C_5H_2F_8O_2$ (hydrido - derivative) as measured by ^{19}F NMR.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 03/26/2015 (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:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

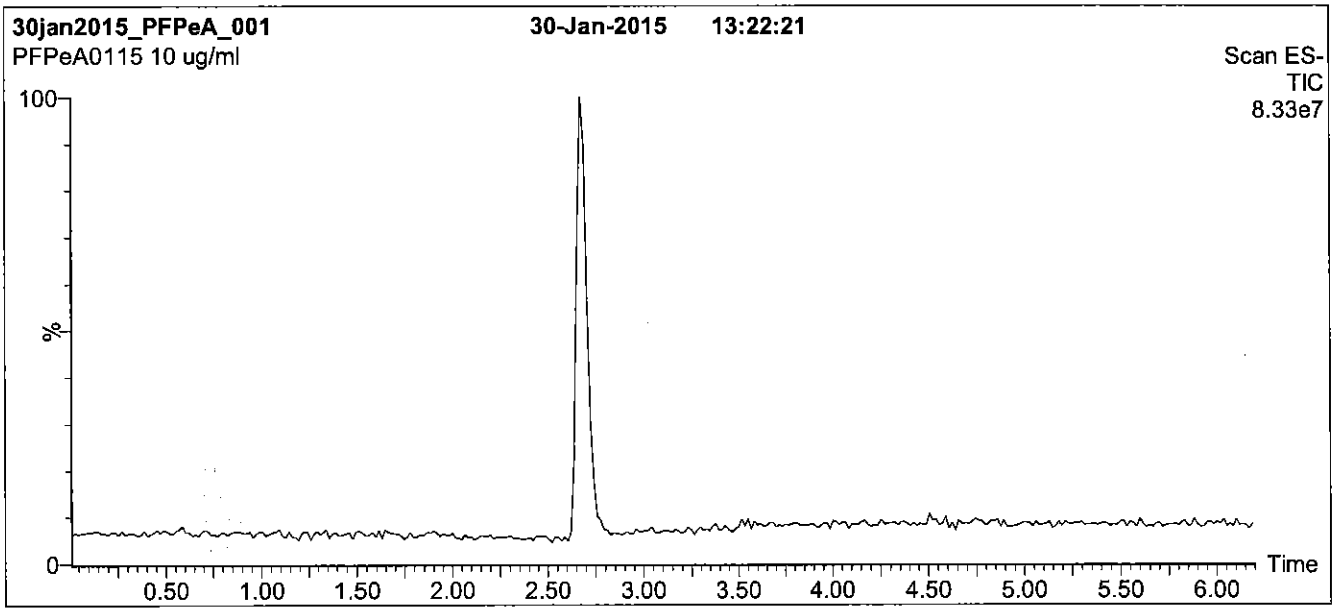
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

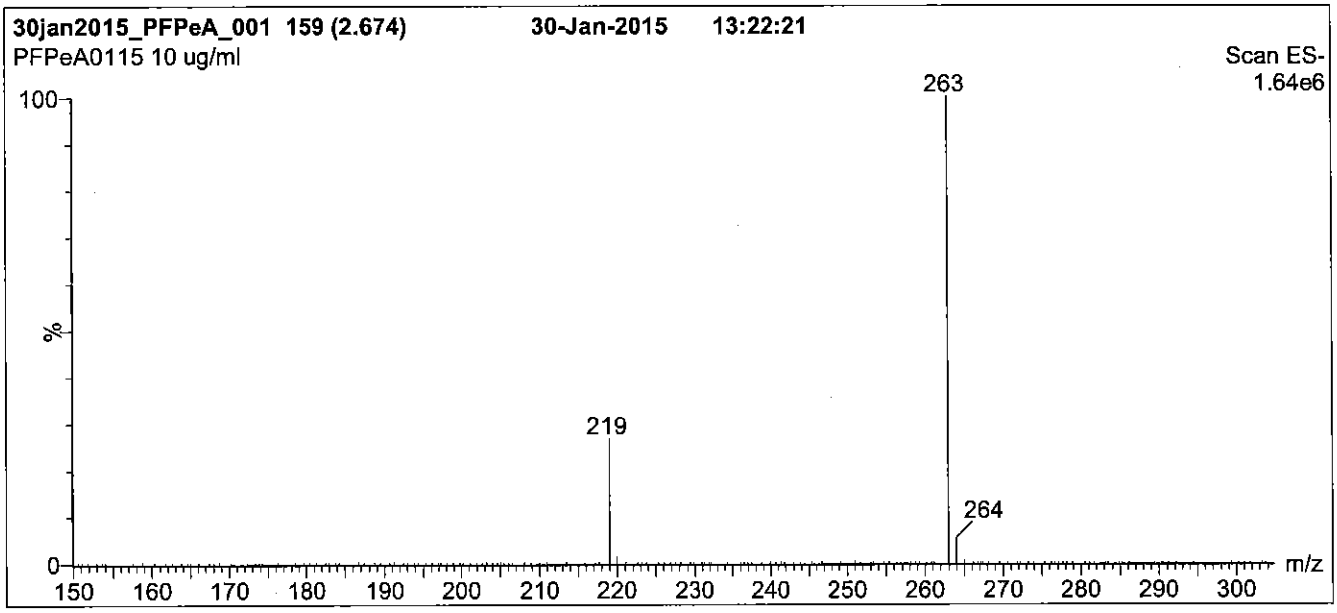
CALA Testing Accreditation No. 1226

ANAB ACCREDITED ISO 17025 / ISO 17034 REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFPeA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1 min before returning to initial conditions in 0.5 min.
Time: 10 min

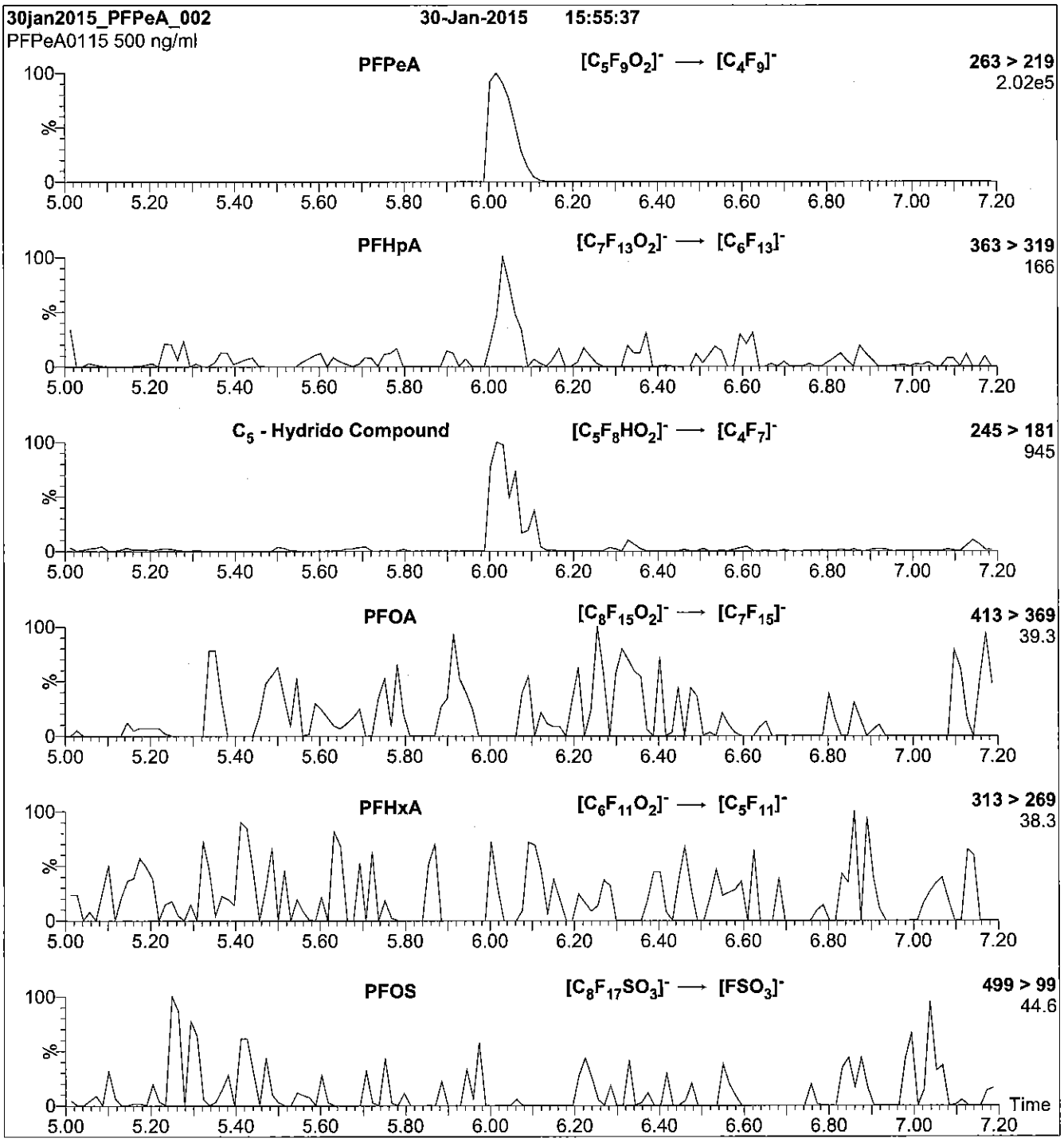
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFPeA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFPeA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3
Collision Energy (eV) = 9

Reagent

LCPFPeS_00002

R 2/11/15 W

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

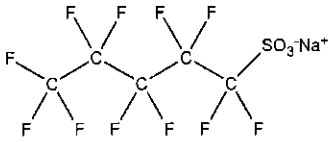
PRODUCT CODE: L-PFPeS

LOT NUMBER: LPFPeS0712

COMPOUND: Sodium perfluoro-1-pentanesulfonate

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: $C_5F_{11}SO_3Na$

MOLECULAR WEIGHT: 372.09

CONCENTRATION: 50.0 ± 2.5 µg/ml (Na salt)
46.9 ± 2.3 µg/ml (PFPeS anion)

SOLVENT(S): Methanol

CHEMICAL PURITY: >98%

LAST TESTED: (mm/dd/yyyy) 07/04/2012

EXPIRY DATE: (mm/dd/yyyy) 07/04/2017

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim

Date: 01/15/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

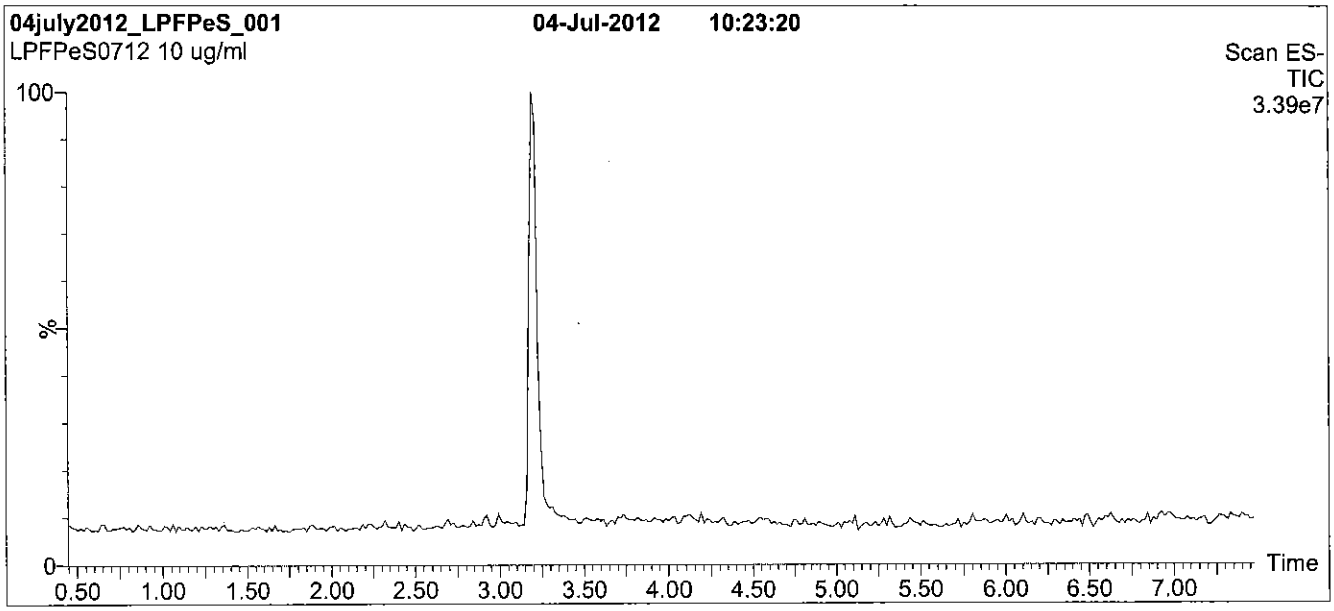
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

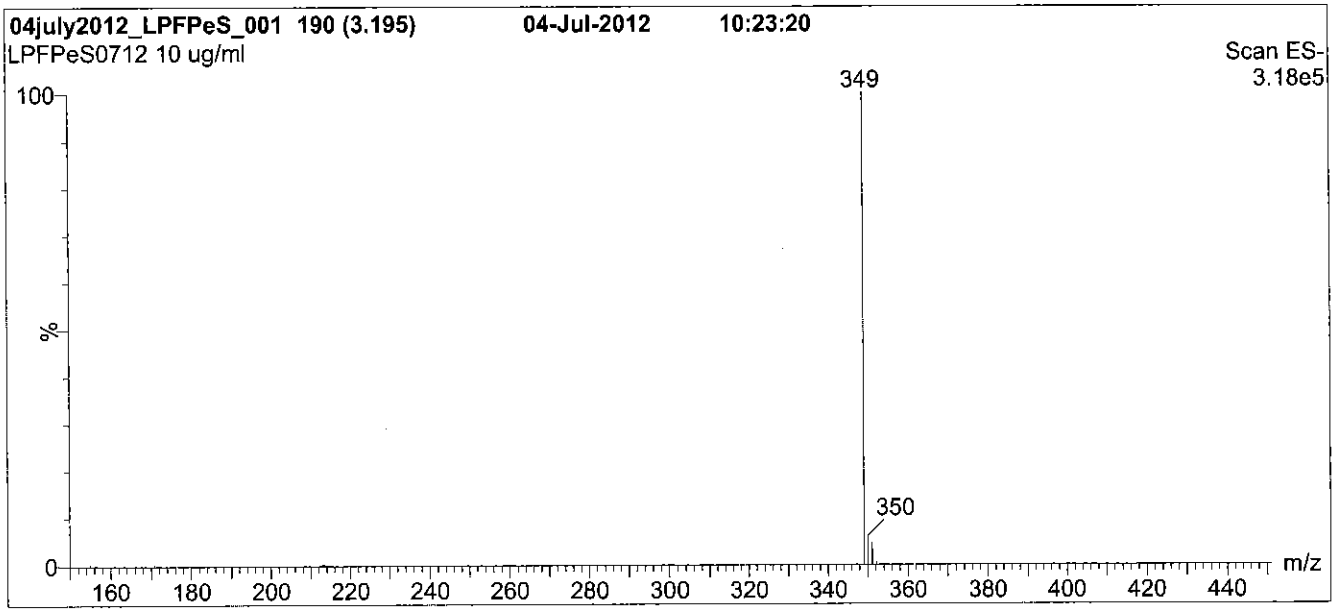
CALA Testing Accreditation No. A 1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **L-PFPeS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions over 0.5 min.
Time: 10 min

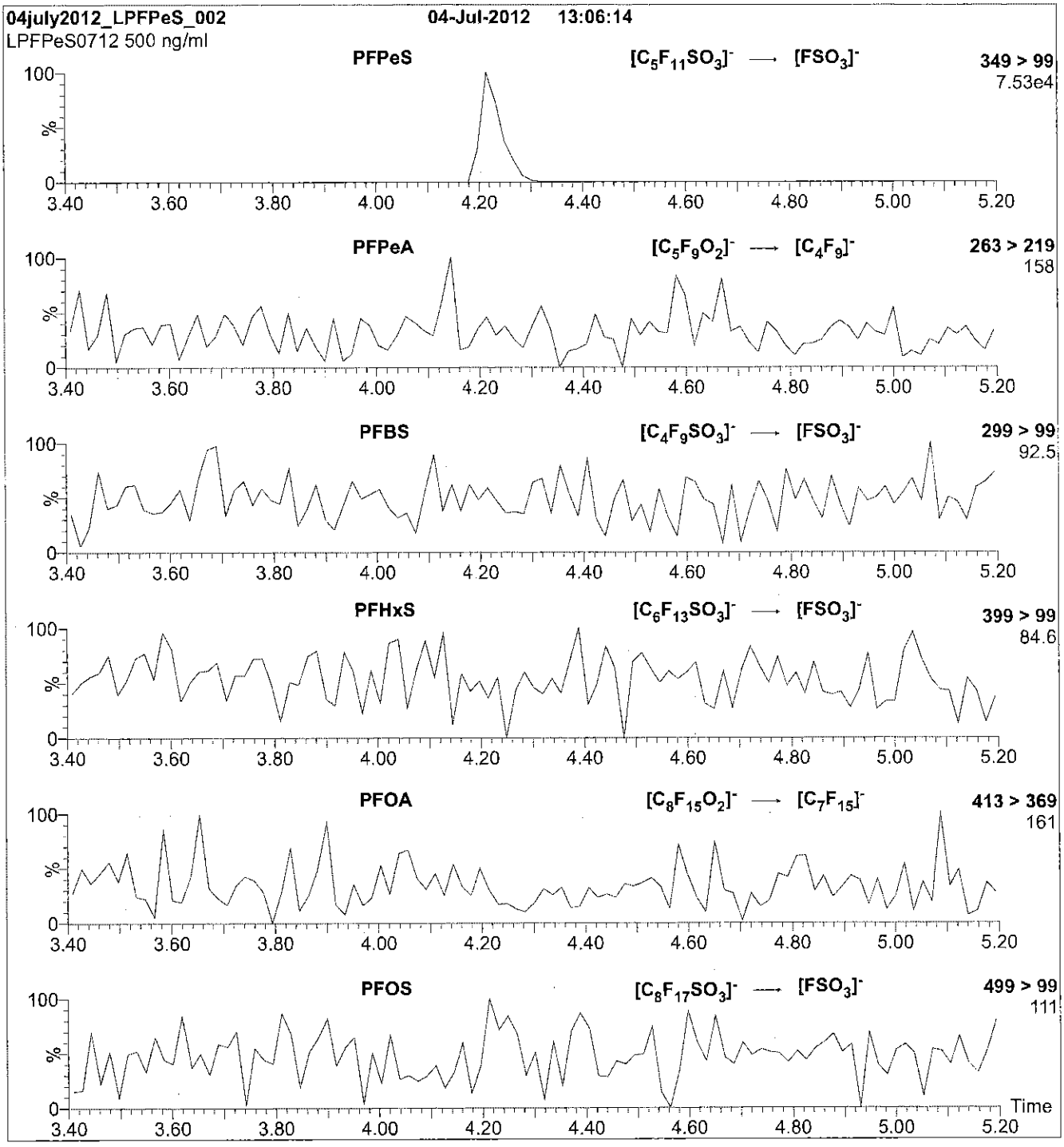
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 50.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 2: **L-PFPeS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFPeS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.66e-3
Collision Energy (eV) = 30

Reagent

LCPFTeDA_00003

V: 2/11/15 SRV

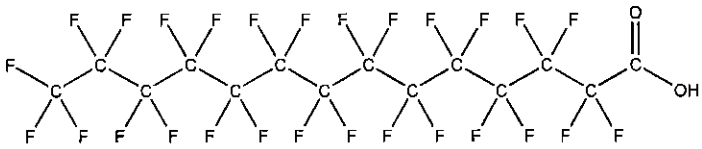
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFTeDA
LOT NUMBER: PFTeDA0613
COMPOUND: Perfluoro-n-tetradecanoic acid

STRUCTURE:

CAS #: 376-06-7



MOLECULAR FORMULA: $C_{14}HF_{27}O_2$
MOLECULAR WEIGHT: 714.11
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 06/19/2013
EXPIRY DATE: (mm/dd/yyyy) 06/19/2018
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.2% of PFDoA ($C_{12}HF_{23}O_2$) and ~ 0.2% of PFPeDA ($C_{15}HF_{29}O_2$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 07/17/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, \ldots x_n$ on which it depends is:

$$u_c(y(x_1, x_2, \ldots x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

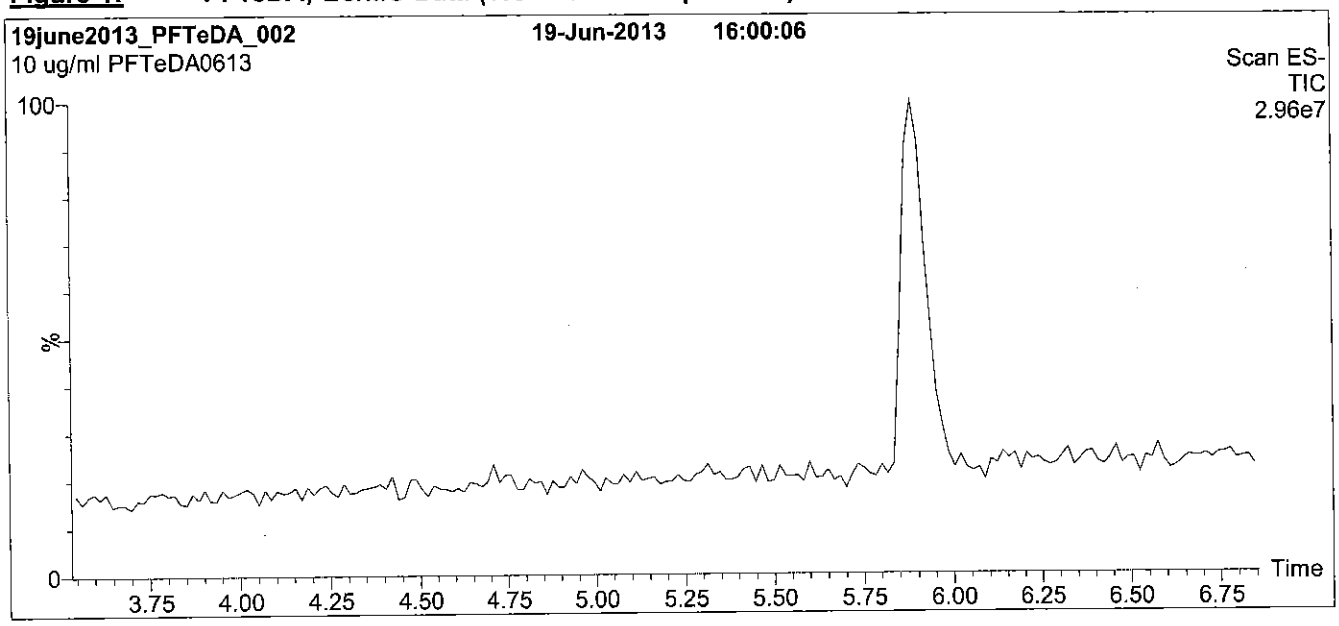
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

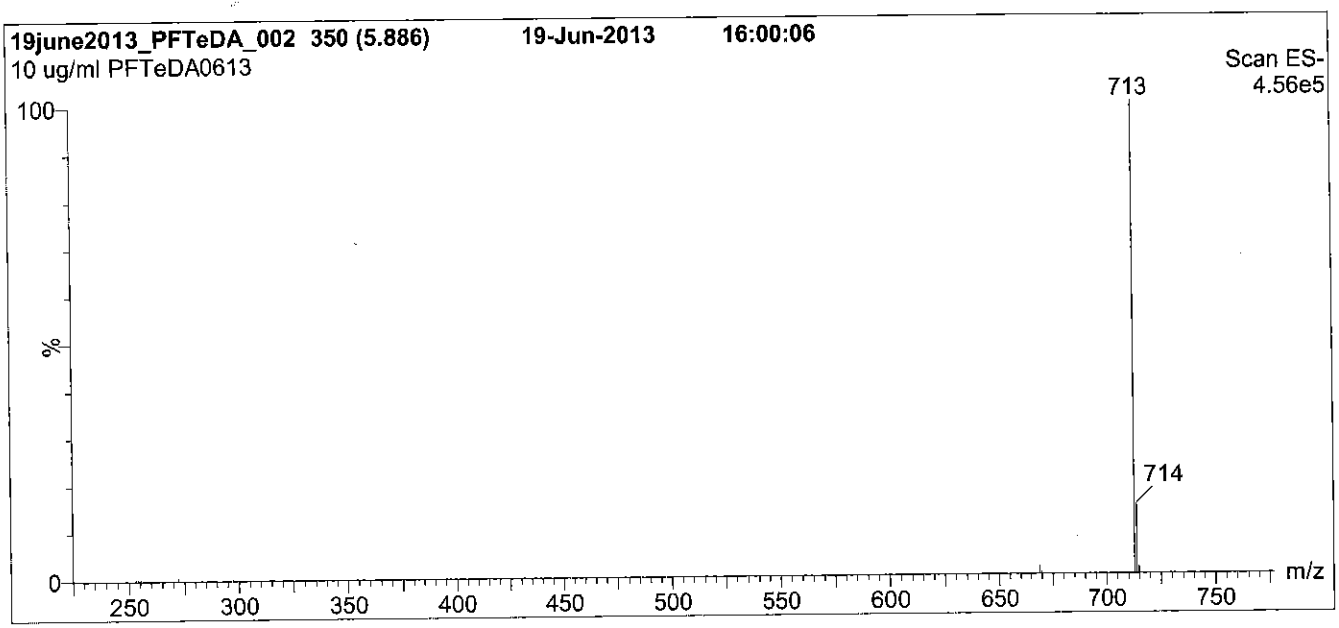
CALA Testing Accredited Laboratory No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

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: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.50 min.
Time: 10 min

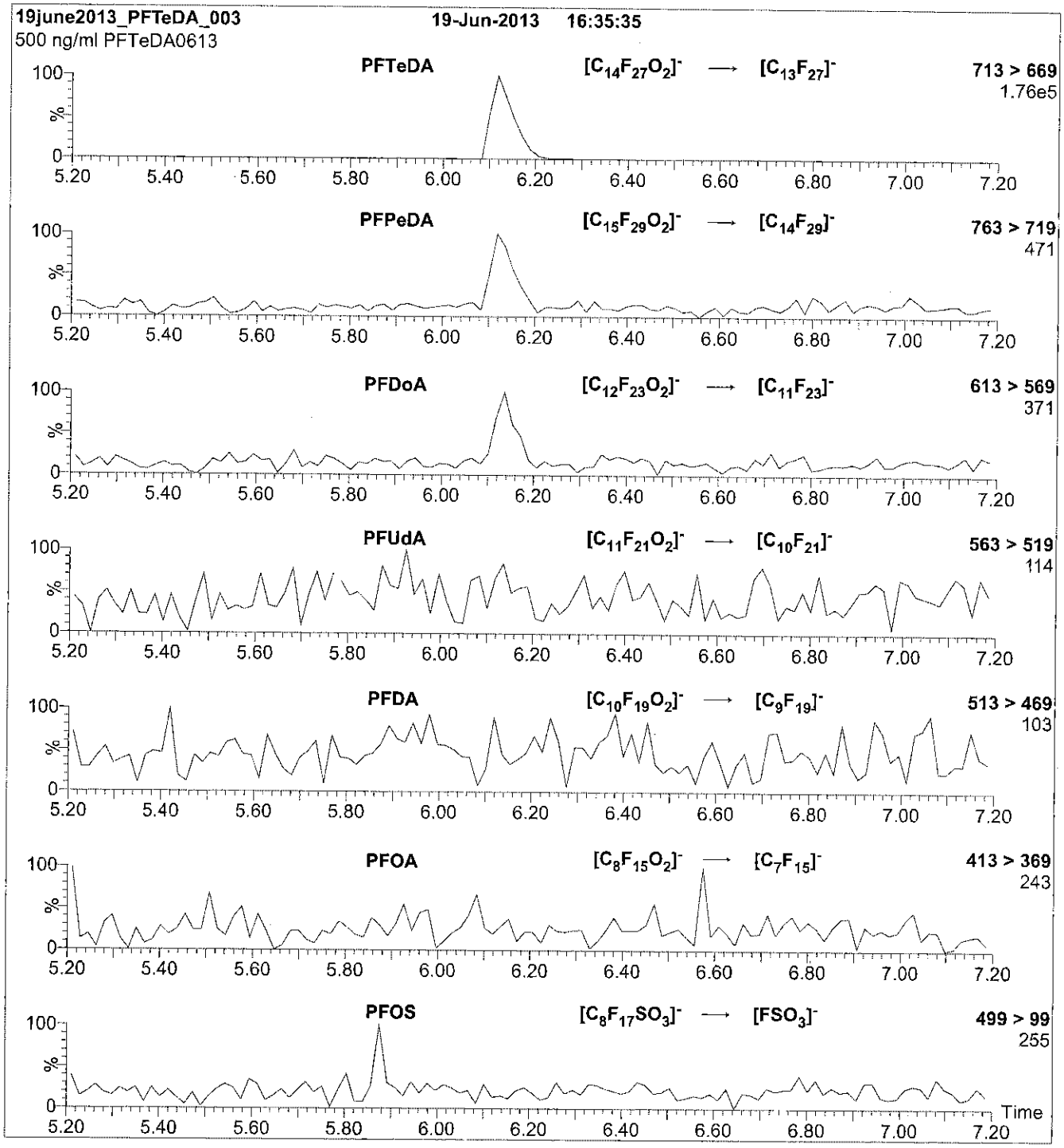
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFTeDA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFTeDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 14

Reagent

LCPFTrDA_00003

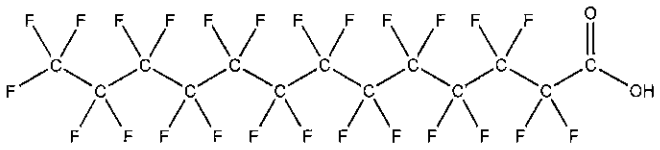
V. 2/11/15 CTN

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFTrDA
LOT NUMBER: PFTrDA1213
COMPOUND: Perfluoro-n-tridecanoic acid

STRUCTURE:
CAS #: 72629-94-8



MOLECULAR FORMULA: $C_{13}HF_{25}O_2$
MOLECULAR WEIGHT: 664.11
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 12/10/2013
EXPIRY DATE: (mm/dd/yyyy) 12/10/2018
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of PFUdA ($C_{11}HF_{21}O_2$), ~ 0.4% of PFDoA ($C_{12}HF_{23}O_2$), and ~ 0.1% of PFTeDA ($C_{14}HF_{27}O_2$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 12/11/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters x_1, x_2,...x_n on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

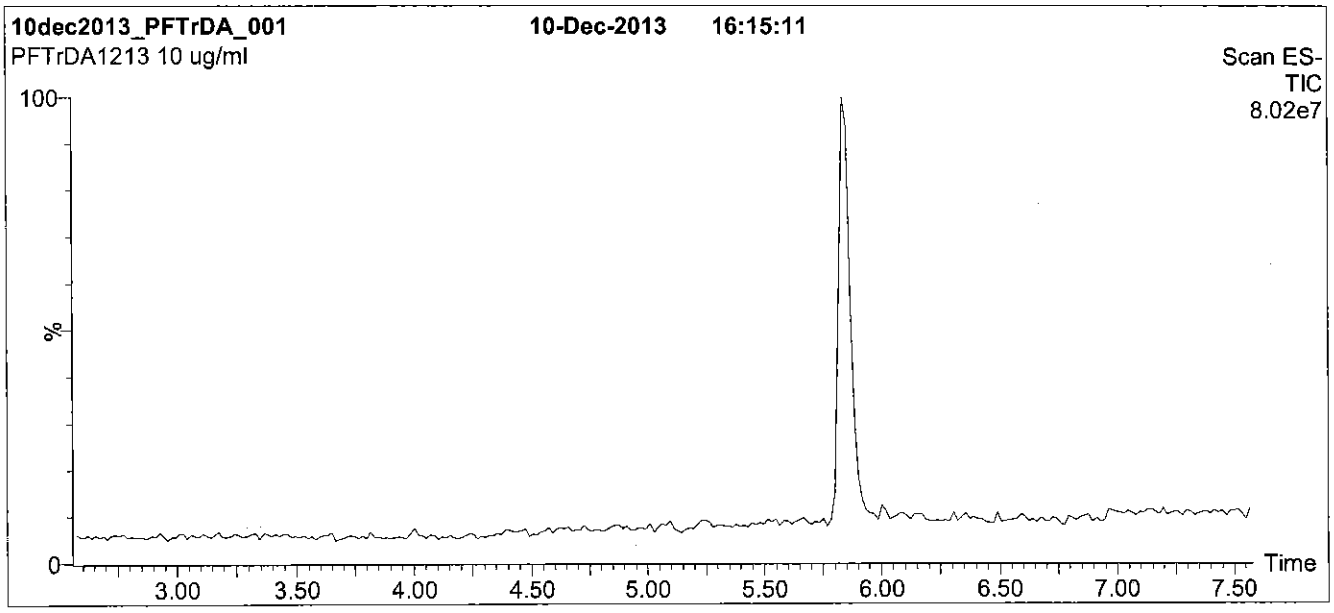
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

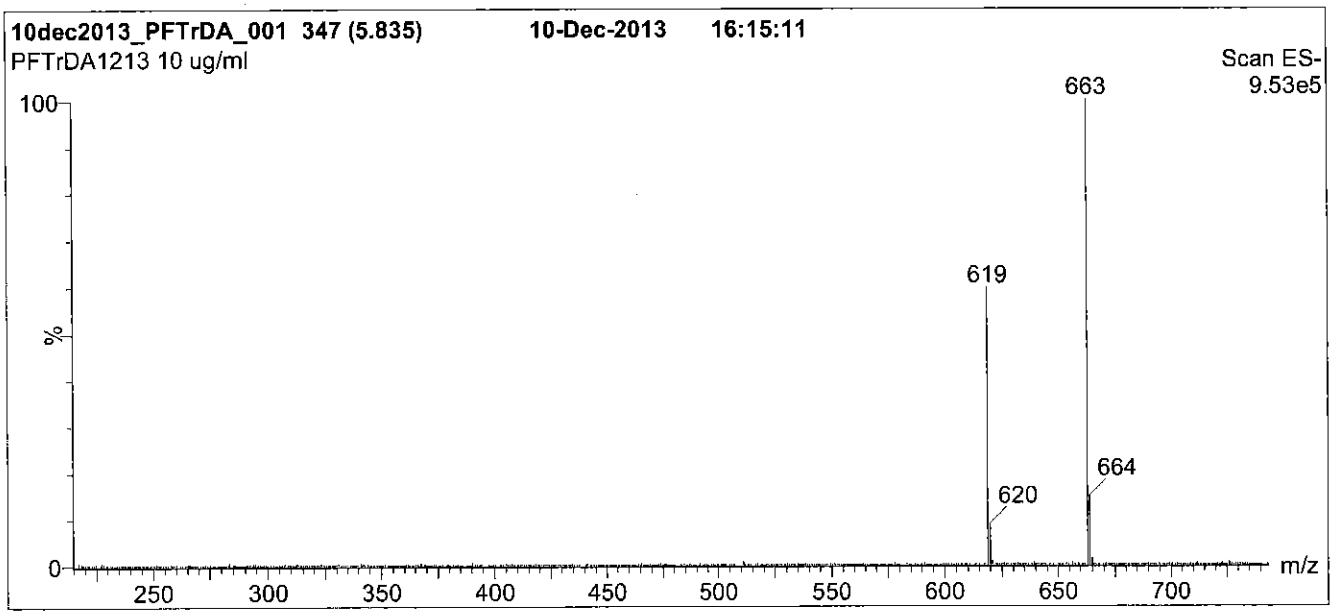
CALA Testing

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFTrDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

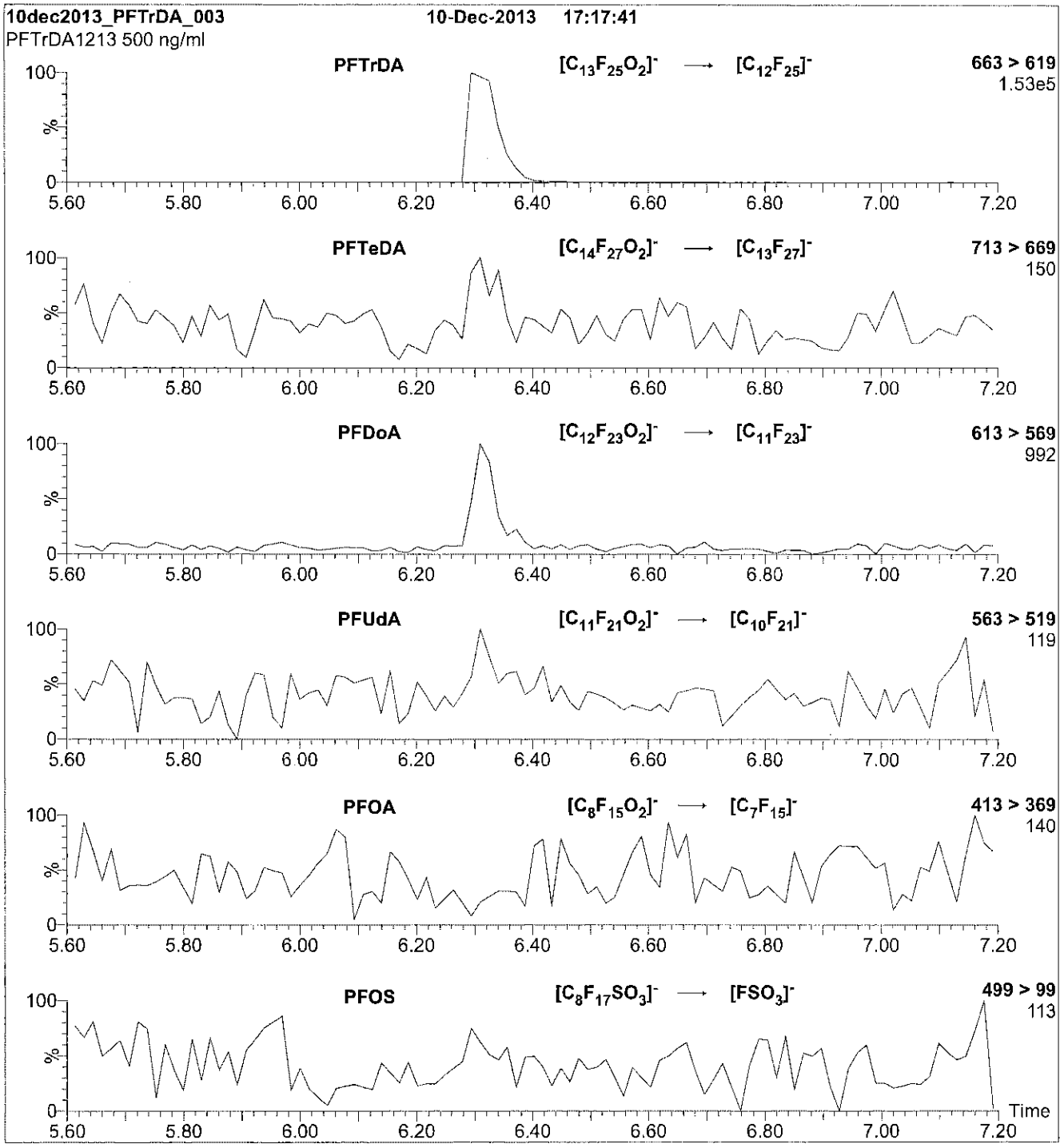
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (215 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 22.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 650

Figure 2: **PFTrDA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFTrDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 15

Reagent

LCPFUdA_00003

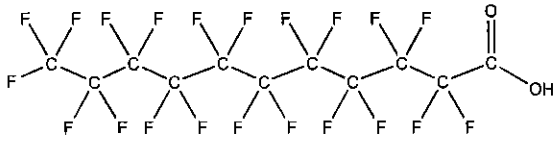
R. 2/11/15 SFV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFUdA
COMPOUND: Perfluoro-n-undecanoic acid
LOT NUMBER: PFUdA0613

STRUCTURE:
CAS #: 2058-94-8



MOLECULAR FORMULA: $C_{11}HF_{21}O_2$
MOLECULAR WEIGHT: 564.09
CONCENTRATION: 50 ± 2.5 µg/ml
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 06/19/2013
EXPIRY DATE: (mm/dd/yyyy) 06/19/2018
RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 07/03/2013 (mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, ...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

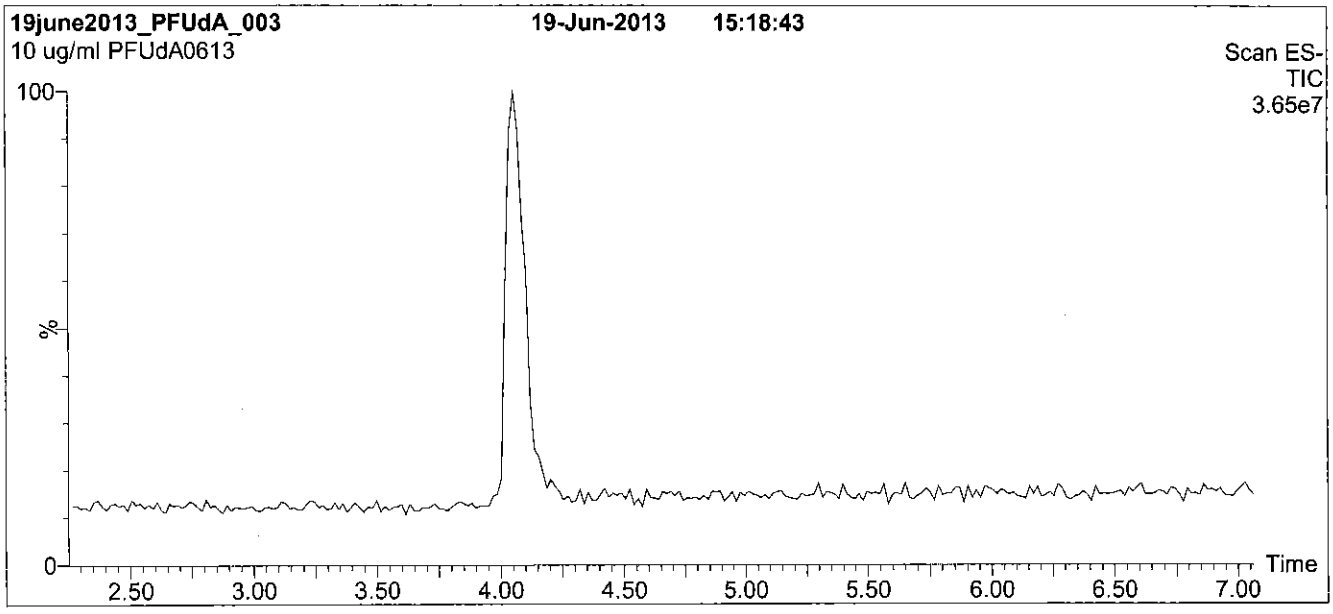
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

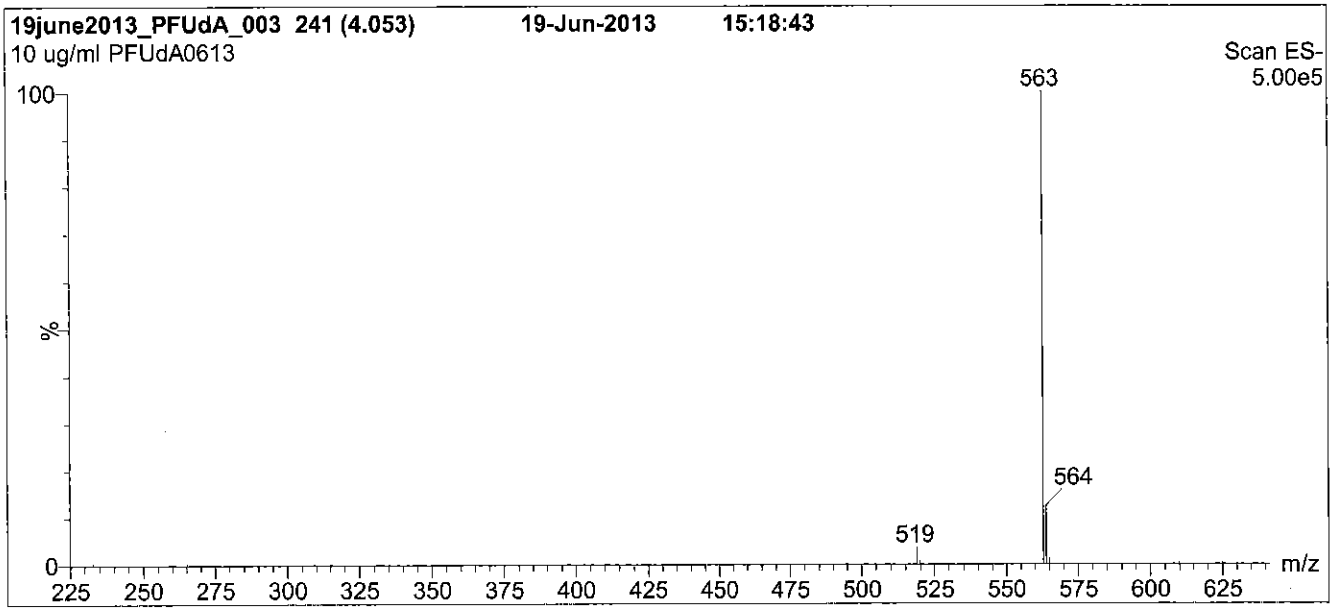
CALA Testing Accreditation No. A1226

ACLASS ACCREDITED REFERENCE MATERIAL PRODUCER

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: **PFUdA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Micromass Quattro *micro* API MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

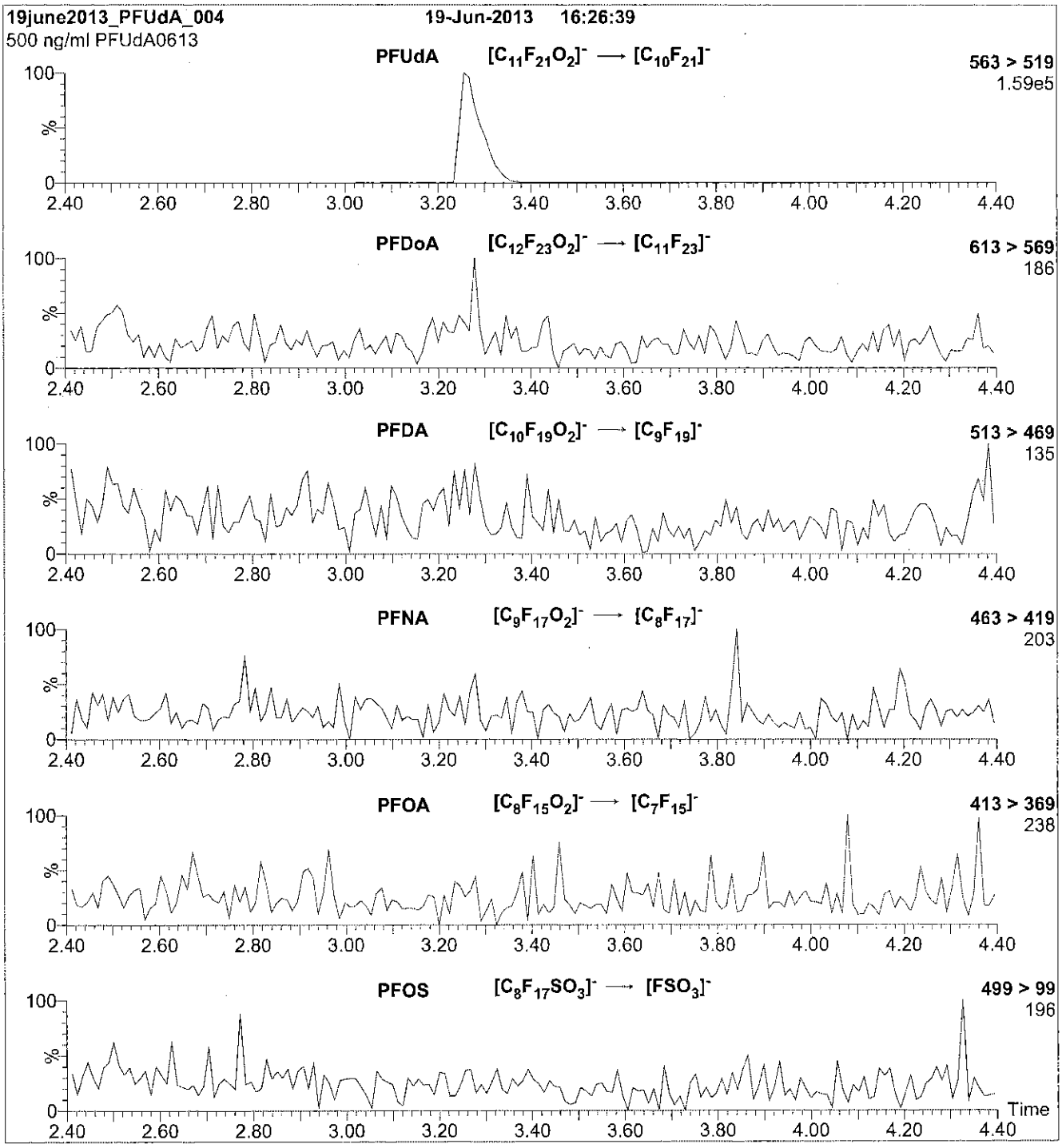
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 65
Desolvation Gas Flow (l/hr) = 750

Figure 2: **PFUdA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml PFUdA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O
(both with 10 mM NH_4OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 11

Method PFC DOD

Perfluronated Hydrocarbons (LC/MS) by Method PFC_DOD

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): Acquity ID: 2.1 (mm)

Client Sample ID	Lab Sample ID	13CHpA #	PFHxS #	PFOA #	PFOS #	PFNA #
OF-FB74-0516	320-18849-1	105	111	116	114	111
OF-RW74-0516	320-18849-2	93	115	96	118	92
OF-FB59-0516	320-18849-3	96	102	99	114	100
OF-RW59-0516	320-18849-4	78	78	88	77	72
	MB 320-110230/1-A	104	113	116	119	112
	LCS 320-110230/2-A	91	100	100	103	99
OF-RW74-0516 MS	320-18849-2 MS	85	103	81	106	77
OF-RW74-0516 MSD	320-18849-2 MSD	75	89	68	95	65

	QC LIMITS
13CHpA = 13C4-PFHpA	25-150
PFHxS = 18O2 PFHxS	25-150
PFOA = 13C4 PFOA	25-150
PFOS = 13C4 PFOS	25-150
PFNA = 13C5 PFNA	25-150

Column to be used to flag recovery values

FORM II WS-LC-0025

FORM III
LCMS LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 25MAY2016B4A_074.d

Lab ID: LCS 320-110230/2-A Client ID:

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC	QC LIMITS REC	#
Perfluoroheptanoic acid (PFHpA)	0.0400	0.0433	108	60-140	
Perfluorooctanoic acid (PFOA)	0.0400	0.0418	105	60-140	
Perfluorononanoic acid (PFNA)	0.0400	0.0432	108	60-140	
Perfluorobutanesulfonic acid (PFBS)	0.0354	0.0336	95	50-150	
Perfluorohexanesulfonic acid (PFHxS)	0.0364	0.0337	93	60-140	M
Perfluorooctanesulfonic acid (PFOS)	0.0371	0.0368	99	60-140	M
18O2 PFHxS	0.0946	0.0950	100	25-150	
13C4 PFOS	0.0956	0.0982	103	25-150	
13C5 PFNA	0.100	0.0985	99	25-150	
13C4 PFOA	0.100	0.0998	100	25-150	
13C4-PFHpA	0.100	0.0908	91	25-150	

Column to be used to flag recovery and RPD values

FORM III WS-LC-0025

FORM III
LCMS MATRIX SPIKE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 27MAY2016B4A_014.d

Lab ID: 320-18849-2 MS Client ID: OF-RW74-0516 MS

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC	QC LIMITS REC	#
Perfluoroheptanoic acid (PFHpA)	0.0386	0.0019 U	0.0378	98	60-140	
Perfluorooctanoic acid (PFOA)	0.0386	0.00076 J	0.0400	102	60-140	
Perfluorononanoic acid (PFNA)	0.0386	0.0011 J	0.0427	108	60-140	
Perfluorobutanesulfonic acid (PFBS)	0.0341	0.0019 U	0.0276	81	50-150	
Perfluorohexanesulfonic acid (PFHxS)	0.0351	0.0019 U	0.0355	101	60-140	M
Perfluorooctanesulfonic acid (PFOS)	0.0358	0.0029 U	0.0419	117	60-140	M
18O2 PFHxS	0.0912	0.11	0.0943	103	25-150	
13C4 PFOS	0.0921	0.11	0.0978	106	25-150	
13C5 PFNA	0.0964	0.089	0.0747	77	25-150	
13C4 PFOA	0.0964	0.093	0.0777	81	25-150	
13C4-PFHpA	0.0964	0.090	0.0819	85	25-150	

Column to be used to flag recovery and RPD values

FORM III WS-LC-0025

FORM III
LCMS MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 27MAY2016B4A_015.d

Lab ID: 320-18849-2 MSD Client ID: OF-RW74-0516 MSD

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC	% RPD	QC LIMITS RPD	QC LIMITS REC	#
Perfluoroheptanoic acid (PFHpA)	0.0389	0.0395	101	4	30	60-140	
Perfluorooctanoic acid (PFOA)	0.0389	0.0396	100	1	30	60-140	
Perfluorononanoic acid (PFNA)	0.0389	0.0421	105	1	30	60-140	
Perfluorobutanesulfonic acid (PFBS)	0.0344	0.0329	96	17	30	50-150	
Perfluorohexanesulfonic acid (PFHxS)	0.0354	0.0382	108	7	30	60-140	M
Perfluorooctanesulfonic acid (PFOS)	0.0361	0.0415	115	1	30	60-140	M
18O2 PFHxS	0.0921	0.0822	89			25-150	
13C4 PFOS	0.0931	0.0888	95			25-150	
13C5 PFNA	0.0974	0.0636	65			25-150	
13C4 PFOA	0.0974	0.0664	68			25-150	
13C4-PFHpA	0.0974	0.0725	75			25-150	

Column to be used to flag recovery and RPD values

FORM III WS-LC-0025

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Lab File ID: 25MAY2016B4A_073.d Lab Sample ID: MB 320-110230/1-A

Matrix: Water Date Extracted: 05/17/2016 11:08

Instrument ID: A4 Date Analyzed: 05/26/2016 17:07

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LCS 320-110230/2-A	25MAY2016B4A_074.d	05/26/2016 17:28
OF-FB74-0516	320-18849-1	25MAY2016B4A_075.d	05/26/2016 17:50
OF-RW74-0516	320-18849-2	27MAY2016B4A_013.d	05/27/2016 15:10
OF-RW74-0516 MS	320-18849-2 MS	27MAY2016B4A_014.d	05/27/2016 15:31
OF-RW74-0516 MSD	320-18849-2 MSD	27MAY2016B4A_015.d	05/27/2016 15:54
OF-FB59-0516	320-18849-3	27MAY2016B4A_016.d	05/27/2016 16:14
OF-RW59-0516	320-18849-4	27MAY2016B4A_017.d	05/27/2016 16:35

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18849-1

SDG No.:

Client Sample ID: OF-FB74-0516 | Lab Sample ID: 320-18849-1

Matrix: Water | Lab File ID: 25MAY2016B4A_075.d

Analysis Method: WS-LC-0025 | Date Collected: 05/11/2016 14:08

Extraction Method: 3535 | Date Extracted: 05/17/2016 11:08

Sample wt/vol: 504.7(mL) | Date Analyzed: 05/26/2016 17:50

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 111390 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.0020	0.00079
335-67-1	Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.0020	0.00074
375-95-1	Perfluorononanoic acid (PFNA)	0.0020	U M	0.0025	0.0020	0.00065
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.0020	0.00091
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.0020	0.00086
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0030	U	0.0040	0.0030	0.0013

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	111		25-150
STL00991	13C4 PFOS	114		25-150
STL00995	13C5 PFNA	111		25-150
STL00990	13C4 PFOA	116		25-150
STL01892	13C4-PFHpA	105		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_075.d
Lims ID: 320-18849-B-1-A
Client ID: OF-FB74-0516
Sample Type: Client
Inject. Date: 26-May-2016 17:50:03 ALS Bottle#: 45 Worklist Smp#: 75
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: 320-18849-b-1-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:57:28 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 27-May-2016 09:48:35

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 8 13C4-PFHpA										
366.6 > 321.6	9.372	9.387	-0.015		4499128	52.6		105	5978	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.412	9.421	-0.009	1.000	9289	0.1652				
D 11 18O2 PFHxS										
402.5 > 83.6	9.404	9.422	-0.018		1556349	52.4		111	4513	
D 12 13C4 PFOA										
416.5 > 371.6	10.493	10.503	-0.010		5172746	58.0		116	8432	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.493	10.504	-0.011	1.000	6752	0.0732			14.8	
D 16 13C4 PFOS										
502.4 > 79.7	11.451	11.465	-0.014		367967	54.5		114	1835	
D 17 13C5 PFNA										
467.5 > 422.6	11.471	11.484	-0.013		4343554	55.4		111	10683	
18 Perfluorononanoic acid										M
462.5 > 418.6	11.471	11.486	-0.015	1.000	8470	0.0774			18.3	M

QC Flag Legend

Review Flags
M - Manually Integrated

Report Date: 27-May-2016 09:57:58 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_075.d

Injection Date: 26-May-2016 17:50:03 Instrument ID: A4

Lims ID: 320-18849-B-1-A Lab Sample ID: 320-18849-1

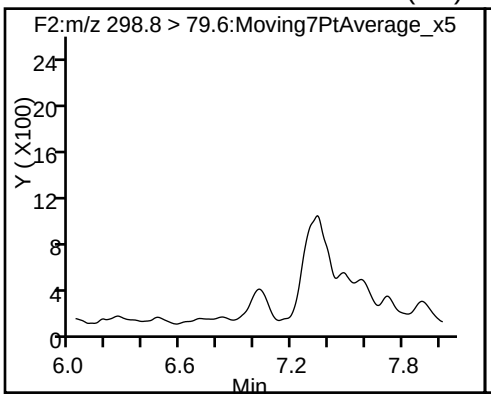
Client ID: OF-FB74-0516

Operator ID: JRB ALS Bottle#: 45 Worklist Smp#: 75

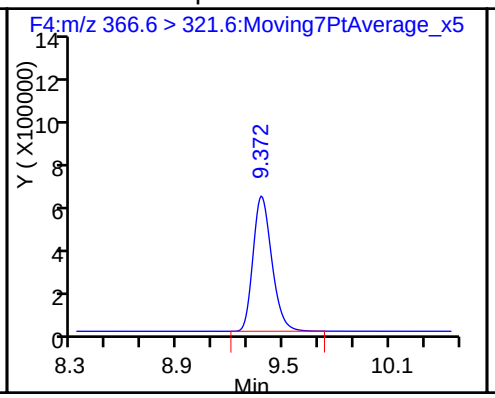
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

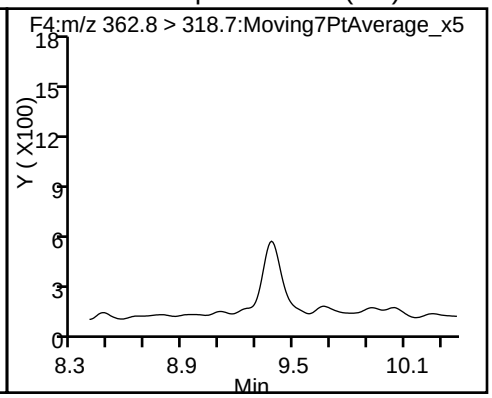
51 Perfluorobutanesulfonic acid (ND)



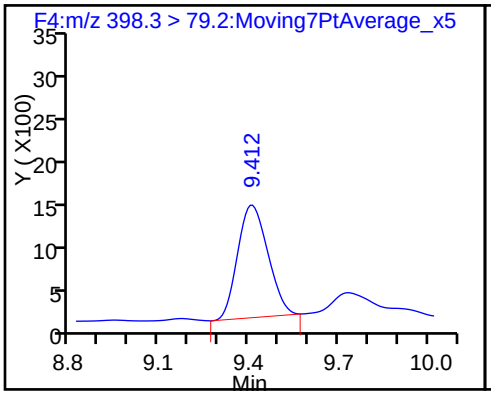
D 8 13C4-PFHpA



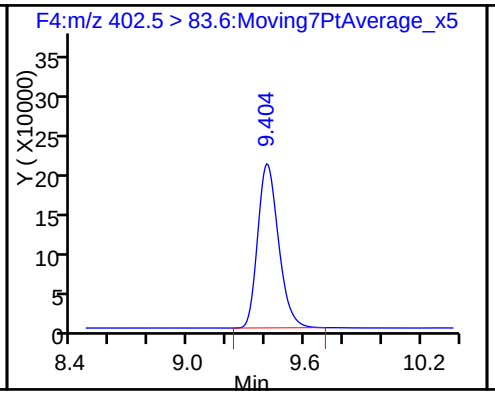
9 Perfluoroheptanoic acid (ND)



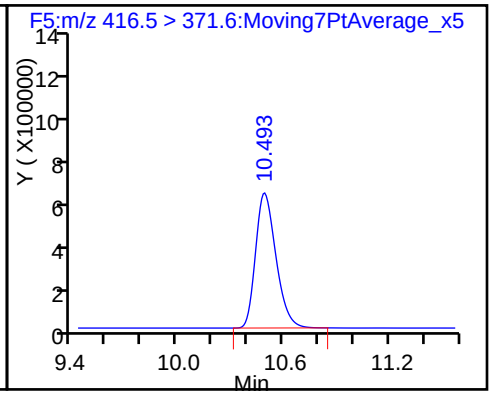
58 Perfluorohexanesulfonic acid



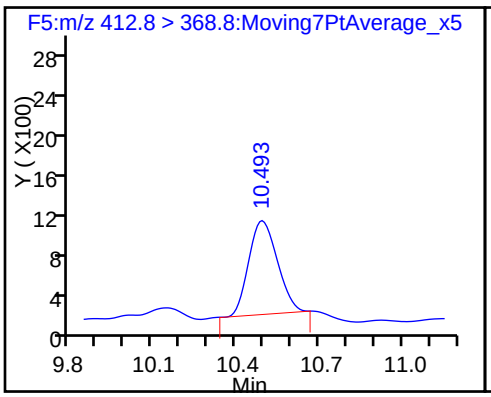
D 11 18O2 PFHxS



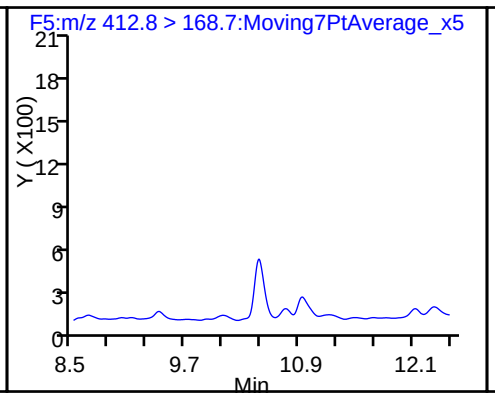
D 12 13C4 PFOA



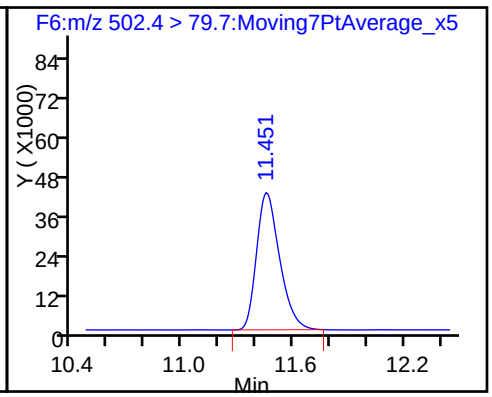
13 Perfluorooctanoic acid



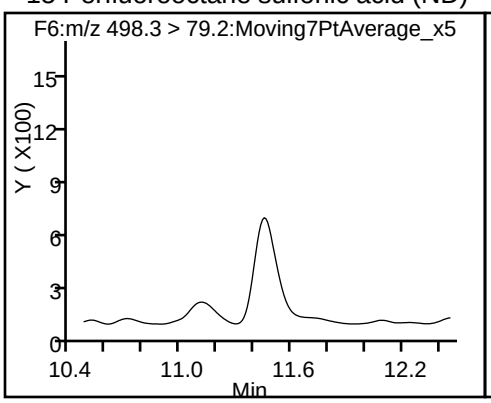
13 Perfluorooctanoic acid



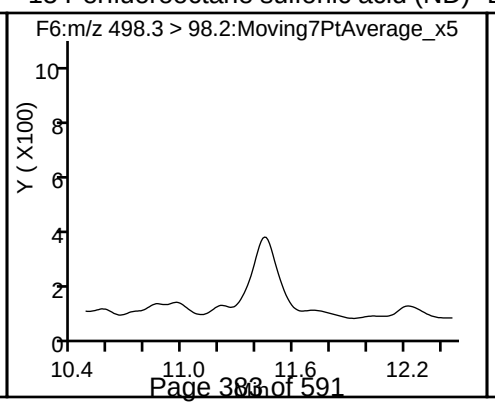
D 16 13C4 PFOS



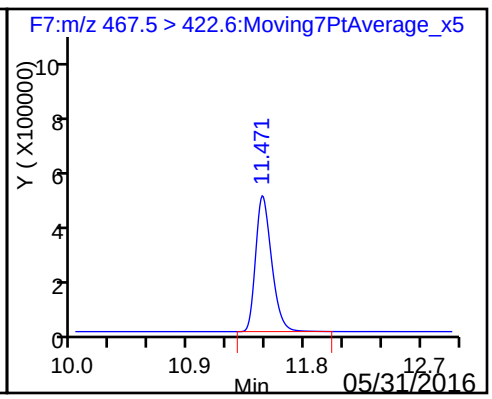
15 Perfluorooctane sulfonic acid (ND)



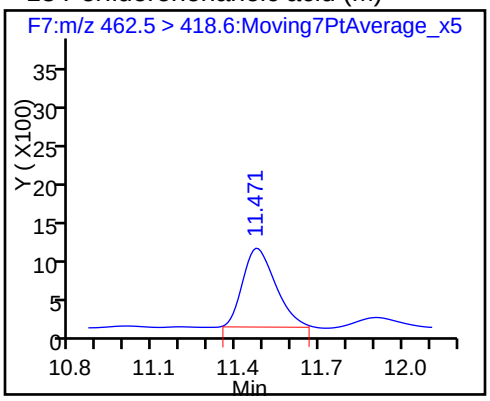
15 Perfluorooctane sulfonic acid (ND)



D 17 13C5 PFNA



18 Perfluorononanoic acid (M)



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

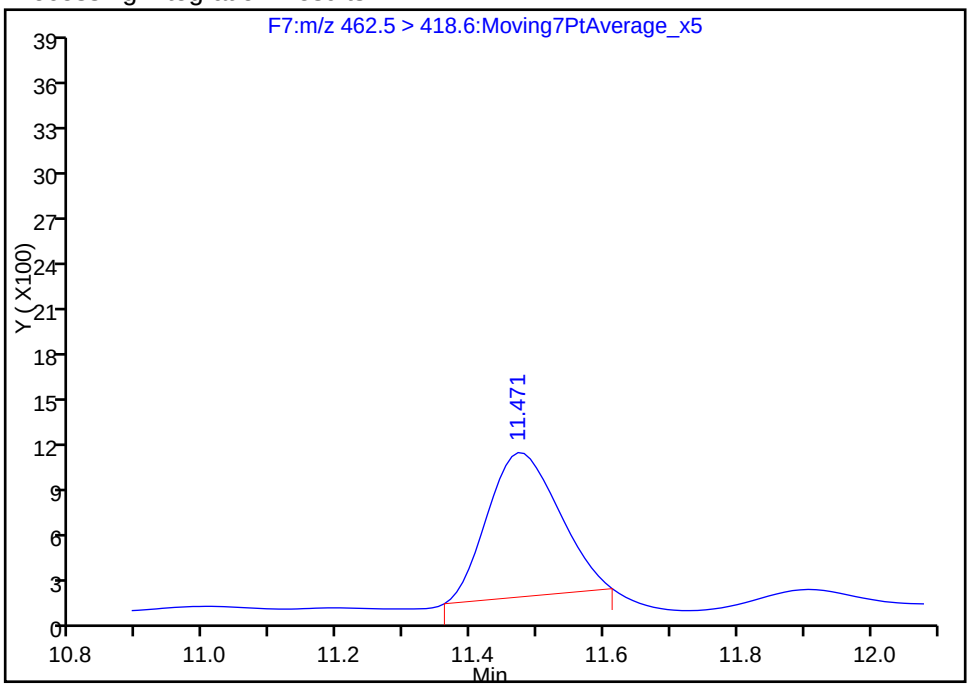
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_075.d				
Injection Date:	26-May-2016 17:50:03	Instrument ID:	A4		
Lims ID:	320-18849-B-1-A	Lab Sample ID:	320-18849-1		
Client ID:	OF-FB74-0516				
Operator ID:	JRB	ALS Bottle#:	45	Worklist Smp#:	75
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F7:MRM		

18 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

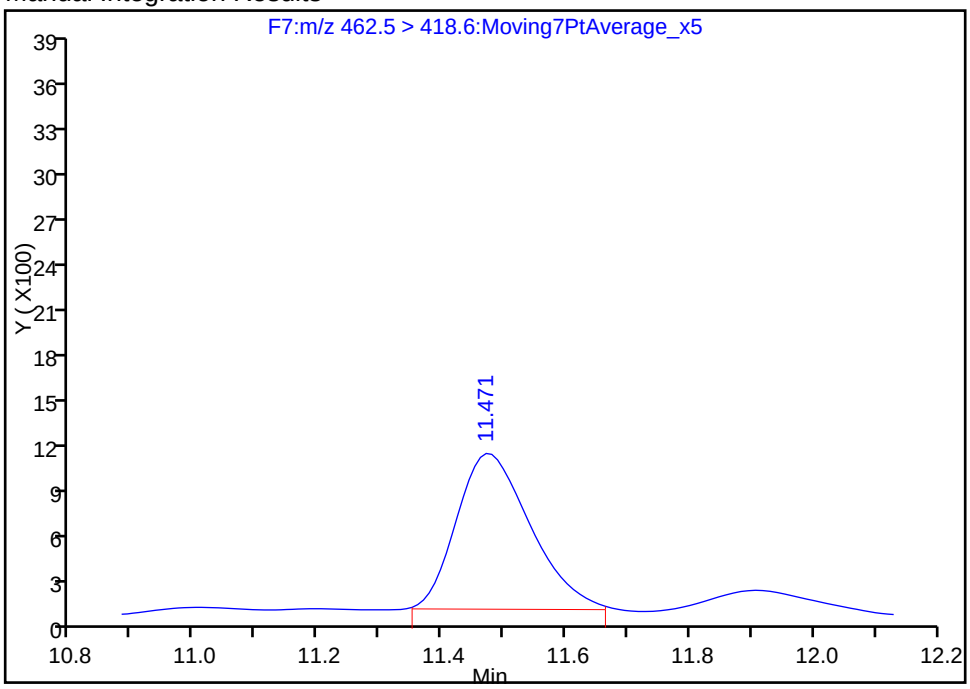
Processing Integration Results

RT: 11.47
Area: 7044
Amount: 0.064073
Amount Units: ng/ml



Manual Integration Results

RT: 11.47
Area: 8470
Amount: 0.077411
Amount Units: ng/ml



Reviewer: barnettj, 27-May-2016 09:48:35

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18849-1

SDG No.:

Client Sample ID: OF-RW74-0516 | Lab Sample ID: 320-18849-2

Matrix: Water | Lab File ID: 27MAY2016B4A_013.d

Analysis Method: WS-LC-0025 | Date Collected: 05/11/2016 14:17

Extraction Method: 3535 | Date Extracted: 05/17/2016 11:08

Sample wt/vol: 516.9(mL) | Date Analyzed: 05/27/2016 15:10

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 111733 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0019	U M	0.0024	0.0019	0.00078
335-67-1	Perfluorooctanoic acid (PFOA)	0.00076	J	0.0024	0.0019	0.00072
375-95-1	Perfluorononanoic acid (PFNA)	0.0011	J	0.0024	0.0019	0.00063
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0024	0.0019	0.00089
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0024	0.0019	0.00084
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0029	U	0.0039	0.0029	0.0012

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	115		25-150
STL00991	13C4 PFOS	118		25-150
STL00995	13C5 PFNA	92		25-150
STL00990	13C4 PFOA	96		25-150
STL01892	13C4-PFHpA	93		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_013.d
Lims ID: 320-18849-B-2-A
Client ID: OF-RW74-0516
Sample Type: Client
Inject. Date: 27-May-2016 15:10:59 ALS Bottle#: 46 Worklist Smp#: 13
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: 320-18849-b-2-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:51:28 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 31-May-2016 09:42:19

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.001	7.011	-0.010	1.000	5446	0.1979				
9 Perfluoroheptanoic acid										M
362.8 > 318.7	9.372	9.365	0.007	1.000	10678	0.2544			3.8	M
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		3907778	46.5		93.1	6210	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1652313	54.5		115	3694	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.396	9.401	-0.005	1.000	16941	0.3081				
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		4619296	48.2		96.4	5847	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.474	10.485	-0.011	1.000	13362	0.3946			4.9	
412.8 > 168.7	10.482	10.485	-0.003	1.001	4455		3.00(0.00-0.00)		16.3	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		351410	56.2		118	653	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.440	11.443	-0.003	1.000	40311	0.5401			86.5	
498.3 > 98.2	11.440	11.443	-0.003	1.000	24761		1.63(0.00-0.00)		29.1	
18 Perfluorononanoic acid										
462.5 > 418.6	11.459	11.462	-0.003	1.000	48193	0.5467			22.2	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		3742965	46.0		92.1	5912	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 31-May-2016 09:51:53 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_013.d

Injection Date: 27-May-2016 15:10:59 Instrument ID: A4

Lims ID: 320-18849-B-2-A Lab Sample ID: 320-18849-2

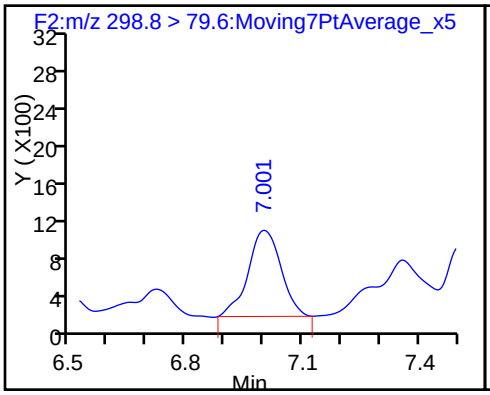
Client ID: OF-RW74-0516

Operator ID: JRB ALS Bottle#: 46 Worklist Smp#: 13

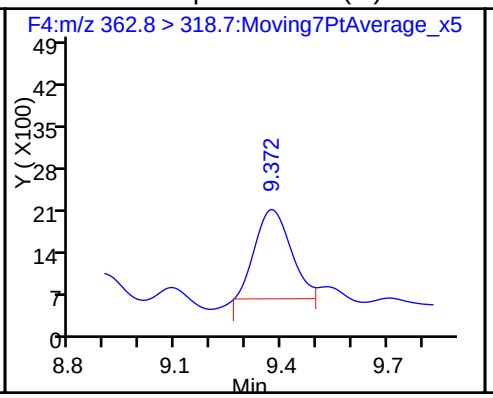
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

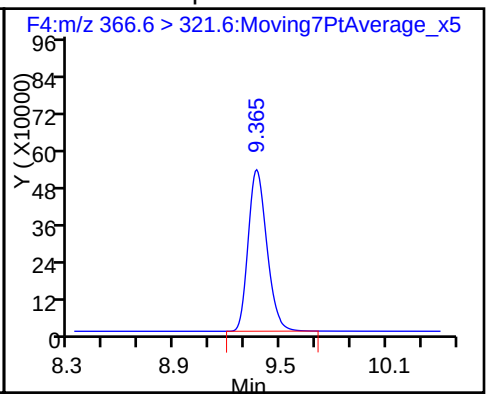
51 Perfluorobutanesulfonic acid



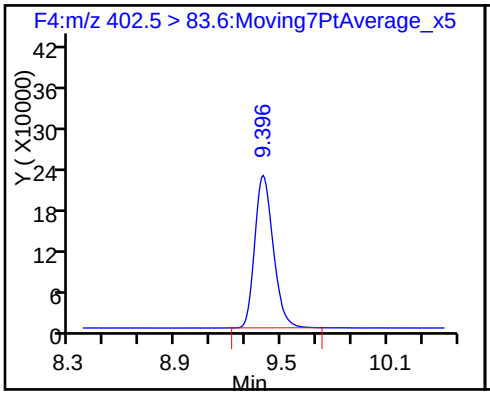
9 Perfluoroheptanoic acid (M)



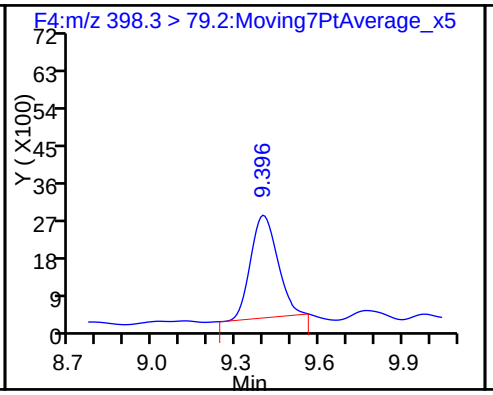
D 8 13C4-PFHpA



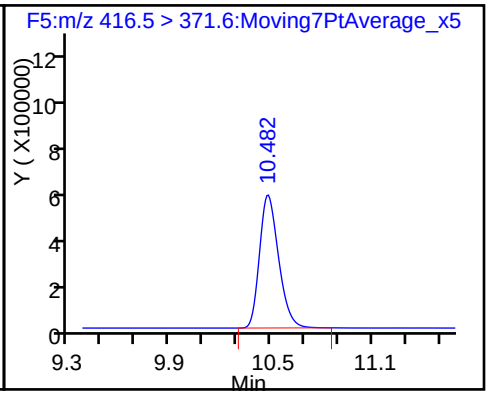
D 11 18O2 PFHxS



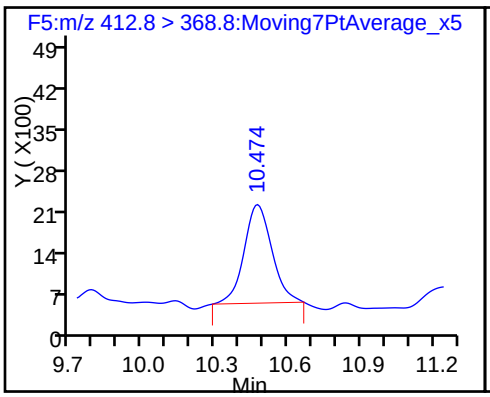
58 Perfluorohexanesulfonic acid



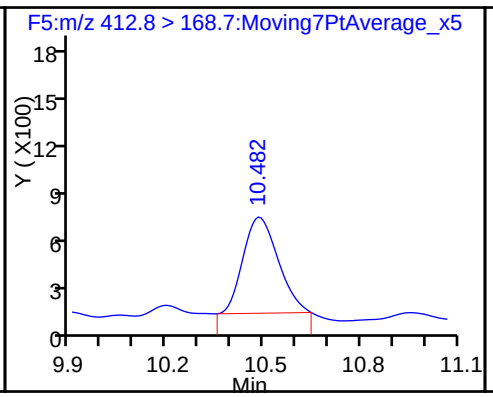
D 12 13C4 PFOA



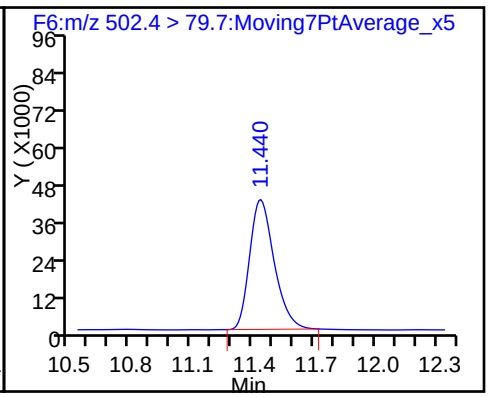
13 Perfluorooctanoic acid



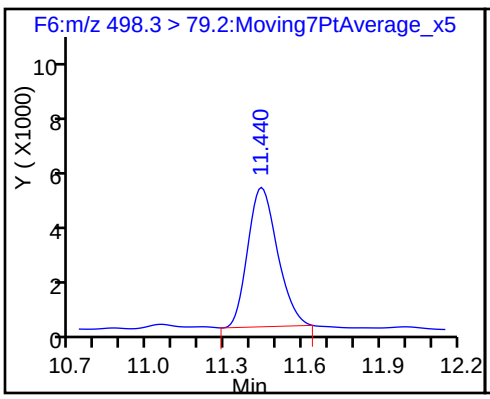
13 Perfluorooctanoic acid



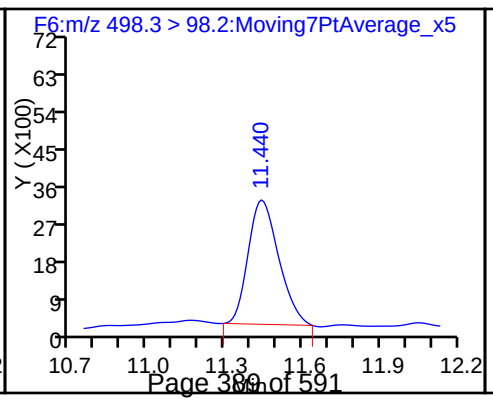
D 16 13C4 PFOS



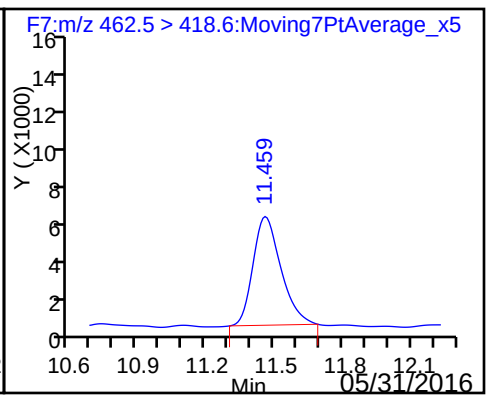
15 Perfluorooctane sulfonic acid



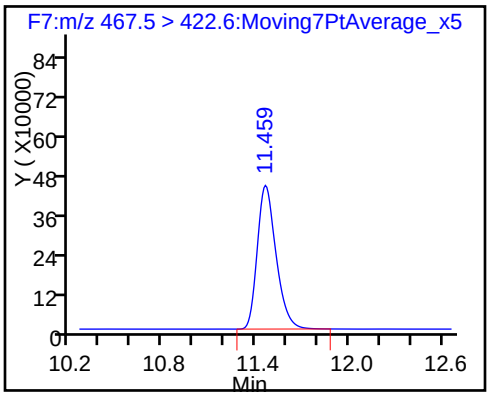
15 Perfluorooctane sulfonic acid



18 Perfluorononanoic acid



D 17 13C5 PFNA



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

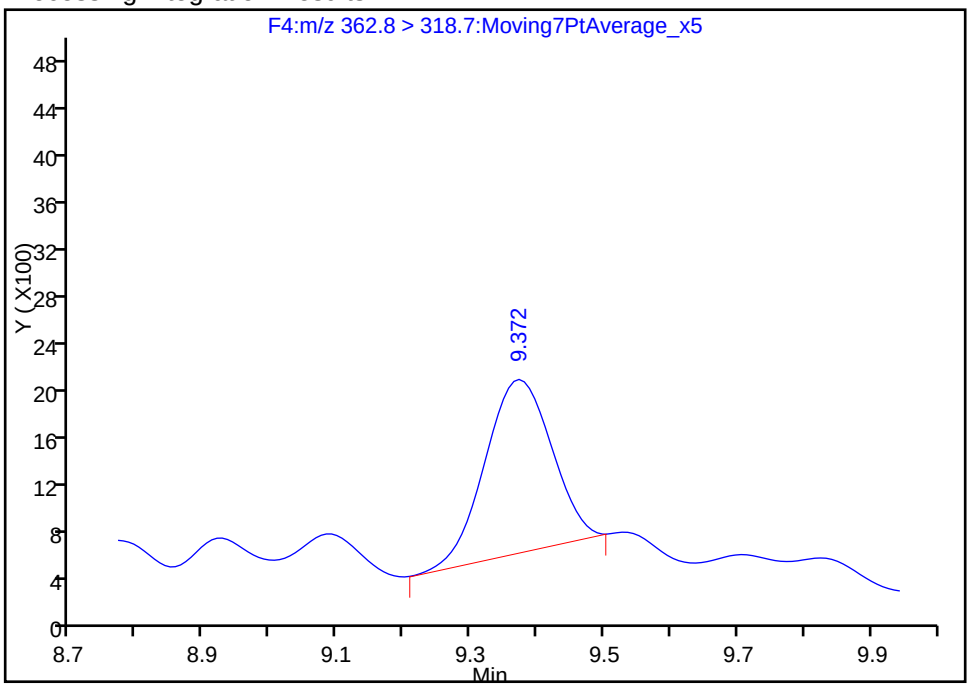
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_013.d				
Injection Date:	27-May-2016 15:10:59	Instrument ID:	A4		
Lims ID:	320-18849-B-2-A	Lab Sample ID:	320-18849-2		
Client ID:	OF-RW74-0516				
Operator ID:	JRB	ALS Bottle#:	46	Worklist Smp#:	13
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F4:MRM		

9 Perfluoroheptanoic acid, CAS: 375-85-9

Signal: 1

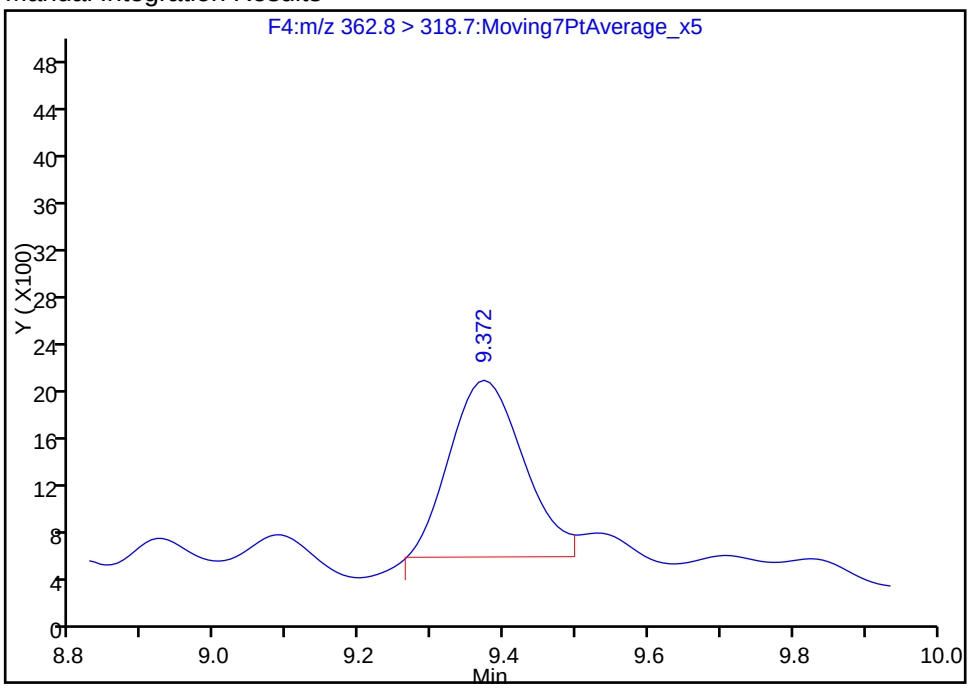
Processing Integration Results

RT: 9.37
Area: 10292
Amount: 0.245162
Amount Units: ng/ml



Manual Integration Results

RT: 9.37
Area: 10678
Amount: 0.254356
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:42:19

Audit Action: Manually Integrated Audit Reason: Baseline

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18849-1

SDG No.:

Client Sample ID: OF-FB59-0516 | Lab Sample ID: 320-18849-3

Matrix: Water | Lab File ID: 27MAY2016B4A_016.d

Analysis Method: WS-LC-0025 | Date Collected: 05/12/2016 17:08

Extraction Method: 3535 | Date Extracted: 05/17/2016 11:08

Sample wt/vol: 505.1(mL) | Date Analyzed: 05/27/2016 16:14

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 111733 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.0020	0.00079
335-67-1	Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.0020	0.00074
375-95-1	Perfluorononanoic acid (PFNA)	0.0020	U M	0.0025	0.0020	0.00065
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.0020	0.00091
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.0020	0.00086
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0030	U M	0.0040	0.0030	0.0013

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	102		25-150
STL00991	13C4 PFOS	114		25-150
STL00995	13C5 PFNA	100		25-150
STL00990	13C4 PFOA	99		25-150
STL01892	13C4-PFHpA	96		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_016.d
Lims ID: 320-18849-A-3-A
Client ID: OF-FB59-0516
Sample Type: Client
Inject. Date: 27-May-2016 16:14:43 ALS Bottle#: 25 Worklist Smp#: 16
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: 320-18849-a-3-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:51:28 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 31-May-2016 09:46:56

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		4049496	48.2		96.4	8649	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1456275	48.0		102	4213	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.396	9.401	-0.005	1.000	13031	0.2689				
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		4745474	49.5		99.0	6413	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.474	10.485	-0.011	1.000	5943	0.2154			10.4	
412.8 > 168.7	10.491	10.485	0.006	1.002	4126		1.44(0.00-0.00)		16.4	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		339276	54.3		114	1086	
15 Perfluorooctane sulfonic acid										M
498.3 > 79.2	11.449	11.443	0.006	1.000	7168	0.1700			21.6	M
498.3 > 98.2	11.440	11.443	-0.003	0.999	8350		0.86(0.00-0.00)		22.6	M
18 Perfluorononanoic acid										M
462.5 > 418.6	11.459	11.462	-0.003	1.000	6918	0.1062			13.5	M
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		4083637	50.2		100	8792	

QC Flag Legend

Review Flags
M - Manually Integrated

Report Date: 31-May-2016 09:52:13 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_016.d

Injection Date: 27-May-2016 16:14:43 Instrument ID: A4

Lims ID: 320-18849-A-3-A Lab Sample ID: 320-18849-3

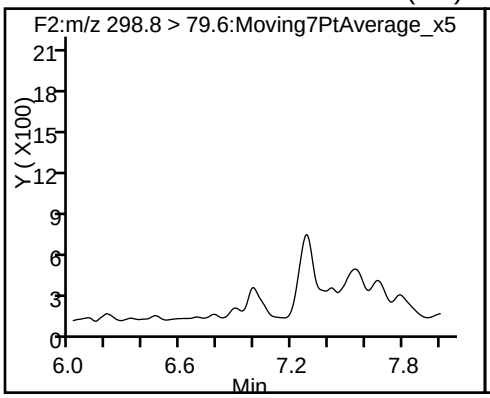
Client ID: OF-FB59-0516

Operator ID: JRB ALS Bottle#: 25 Worklist Smp#: 16

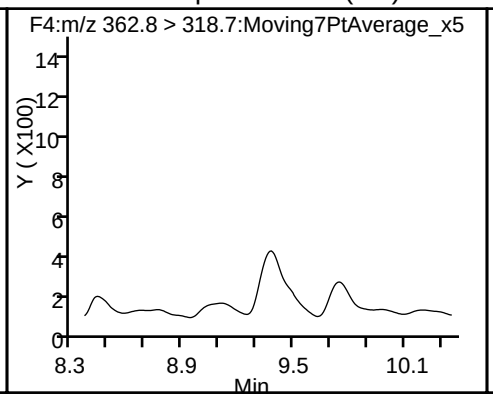
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

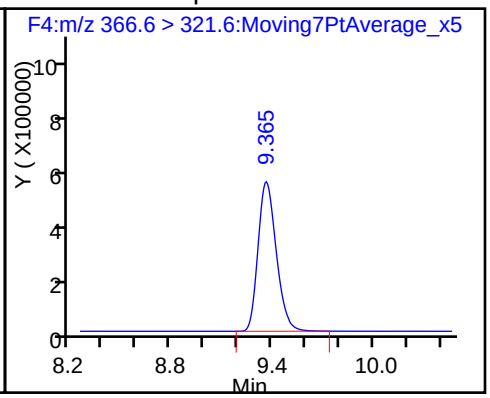
51 Perfluorobutanesulfonic acid (ND)



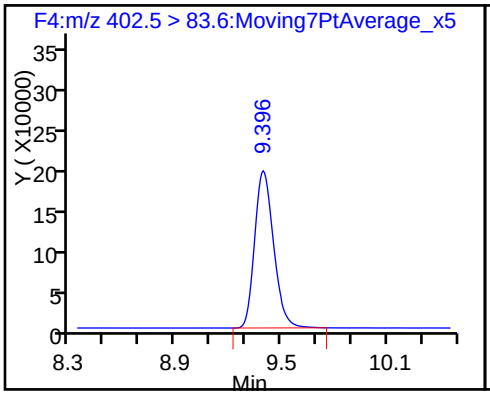
9 Perfluoroheptanoic acid (ND)



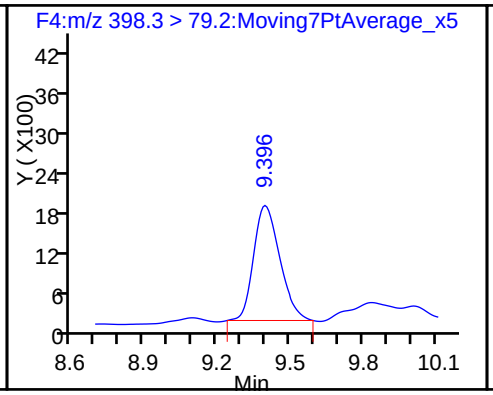
D 8 13C4-PFHpA



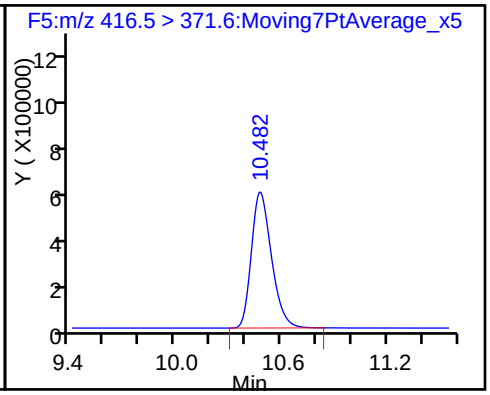
D 11 18O2 PFHxS



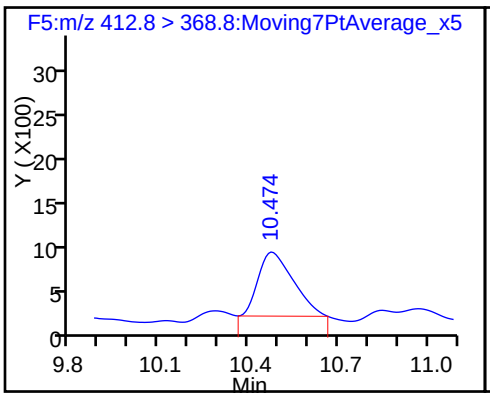
58 Perfluorohexanesulfonic acid



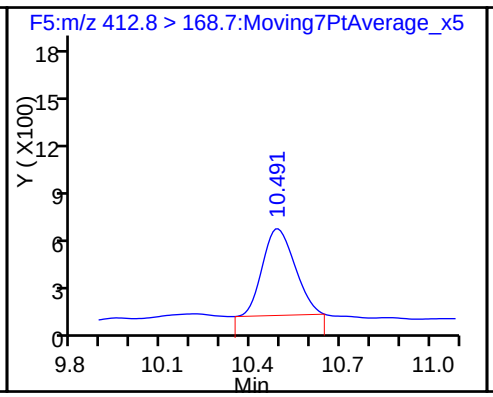
D 12 13C4 PFOA



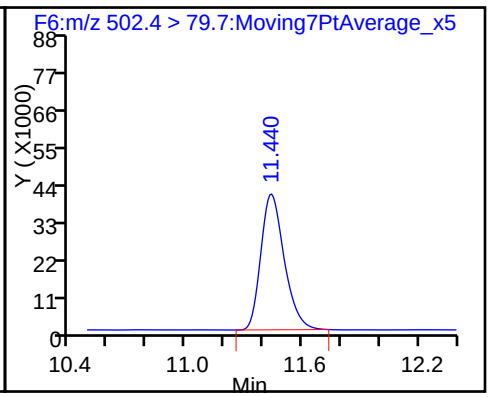
13 Perfluorooctanoic acid



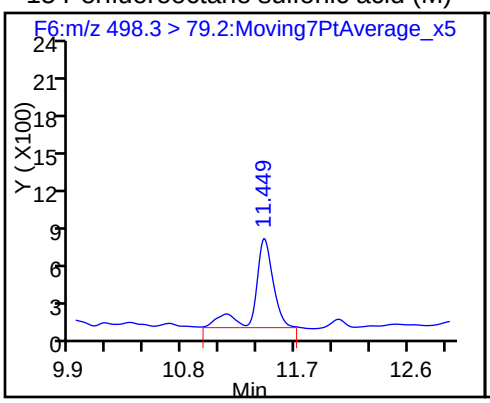
13 Perfluorooctanoic acid



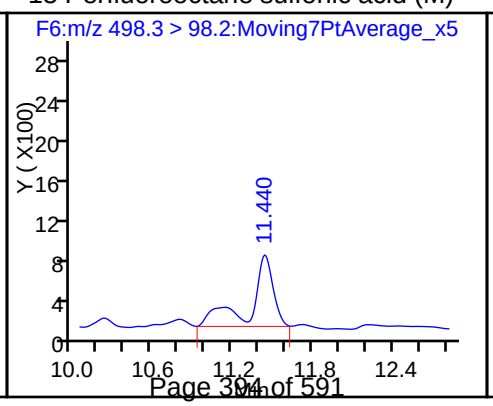
D 16 13C4 PFOS



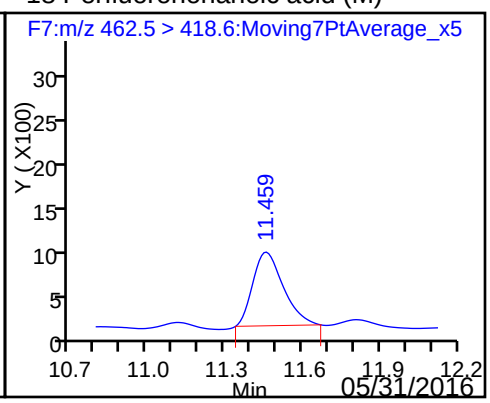
15 Perfluorooctane sulfonic acid (M)



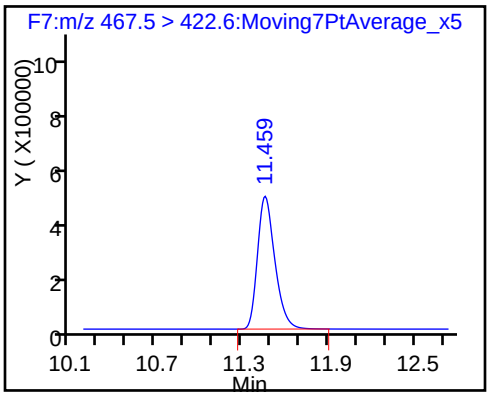
15 Perfluorooctane sulfonic acid (M)



18 Perfluorononanoic acid (M)



D 17 13C5 PFNA



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

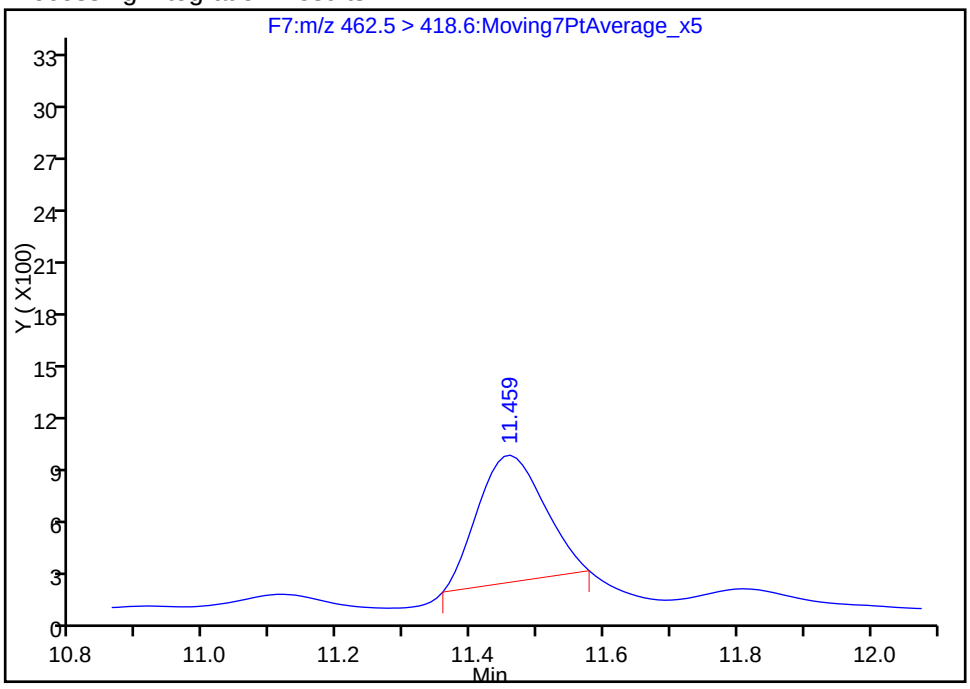
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_016.d				
Injection Date:	27-May-2016 16:14:43	Instrument ID:	A4		
Lims ID:	320-18849-A-3-A	Lab Sample ID:	320-18849-3		
Client ID:	OF-FB59-0516				
Operator ID:	JRB	ALS Bottle#:	25	Worklist Smp#:	16
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F7:MRM		

18 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

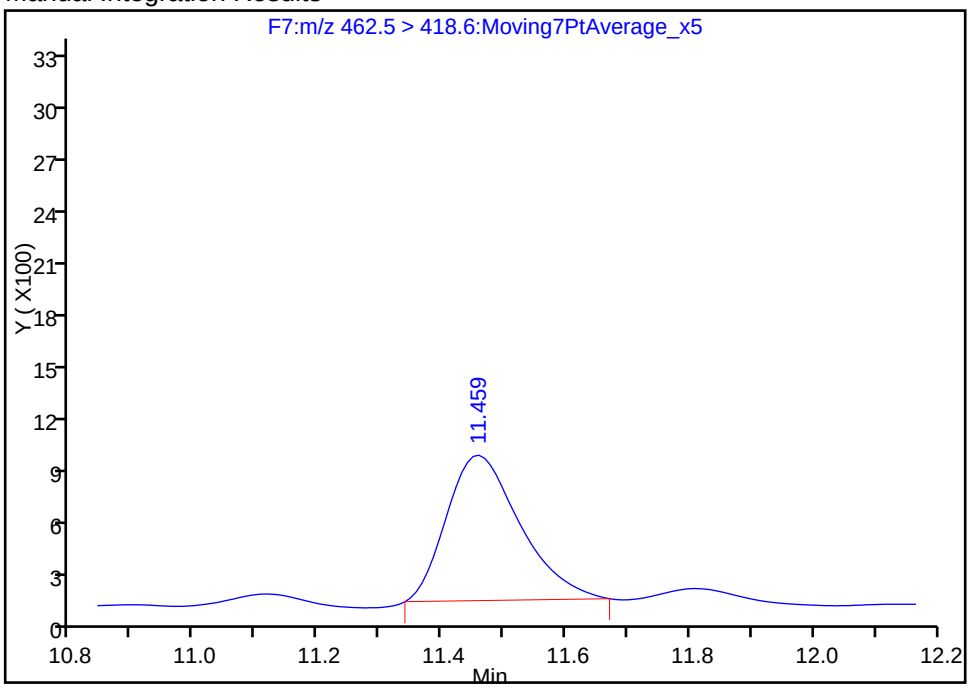
Processing Integration Results

RT: 11.46
Area: 5062
Amount: 0.088334
Amount Units: ng/ml



Manual Integration Results

RT: 11.46
Area: 6918
Amount: 0.106239
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:46:56

Audit Action: Manually Integrated Audit Reason: Baseline

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

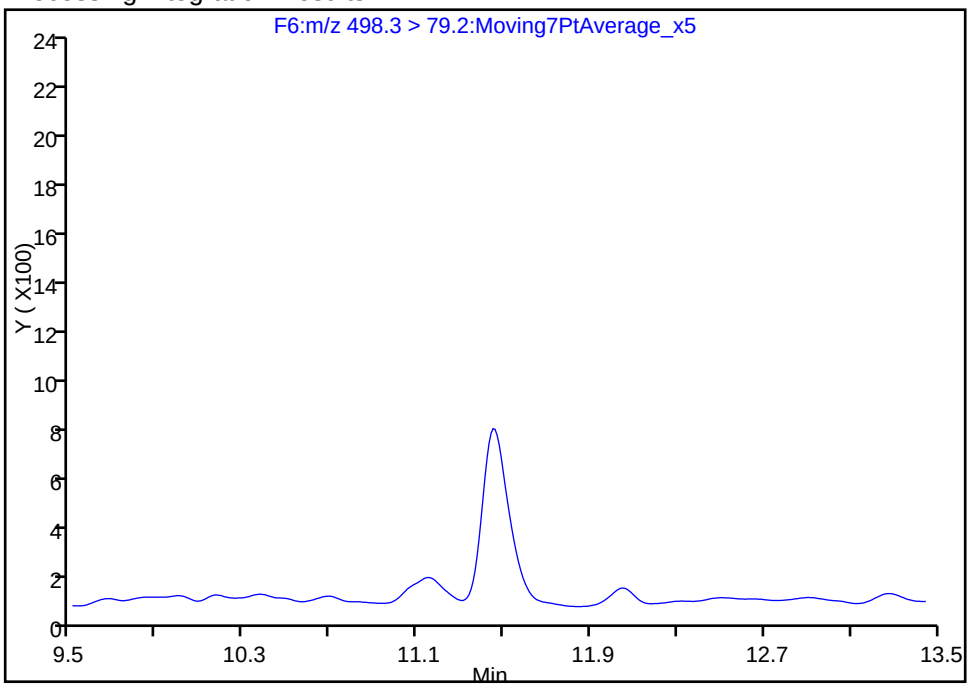
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_016.d				
Injection Date:	27-May-2016 16:14:43	Instrument ID:	A4		
Lims ID:	320-18849-A-3-A	Lab Sample ID:	320-18849-3		
Client ID:	OF-FB59-0516				
Operator ID:	JRB	ALS Bottle#:	25	Worklist Smp#:	16
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F6:MRM		

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

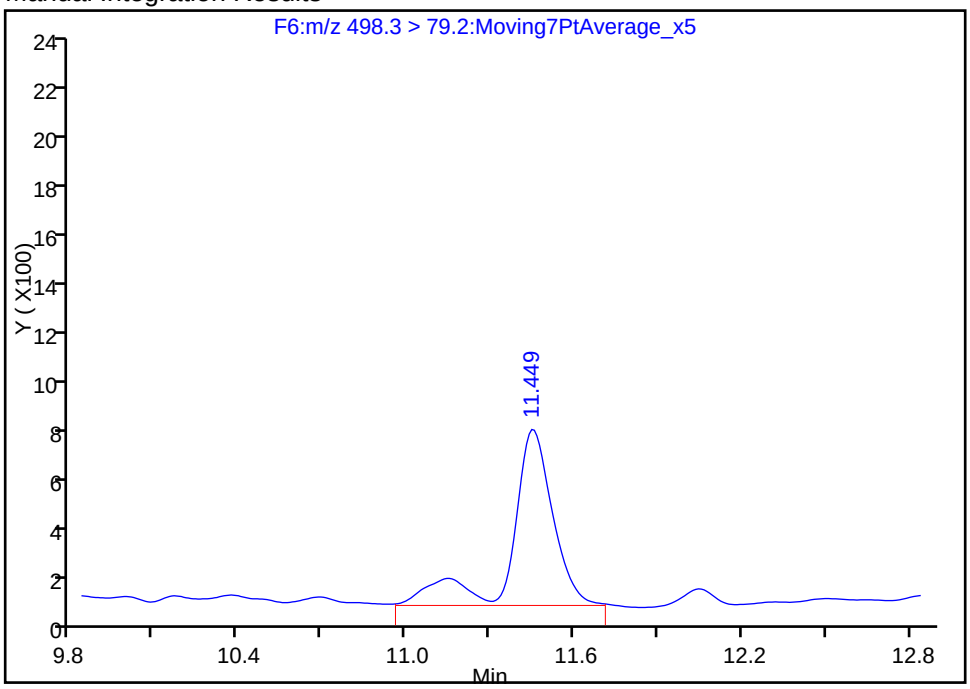
Processing Integration Results

Not Detected
Expected RT: 11.44



Manual Integration Results

RT: 11.45
Area: 7168
Amount: 0.170020
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:46:56
Audit Action: Manually Integrated Audit Reason: Missed Peak

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_016.d

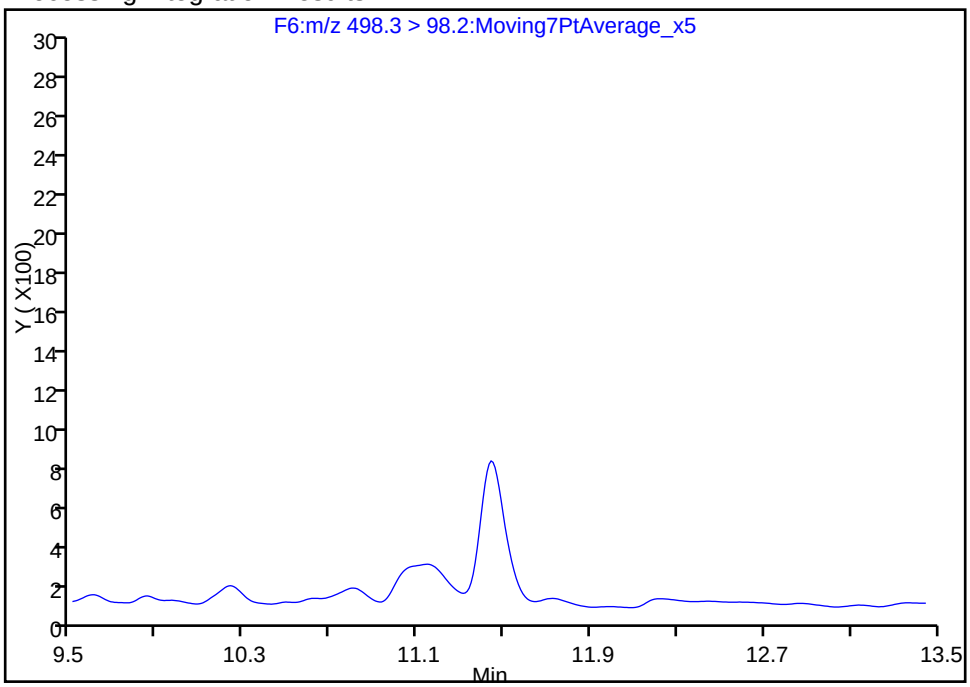
Injection Date:	27-May-2016 16:14:43	Instrument ID:	A4		
Lims ID:	320-18849-A-3-A	Lab Sample ID:	320-18849-3		
Client ID:	OF-FB59-0516				
Operator ID:	JRB	ALS Bottle#:	25	Worklist Smp#:	16
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F6:MRM		

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

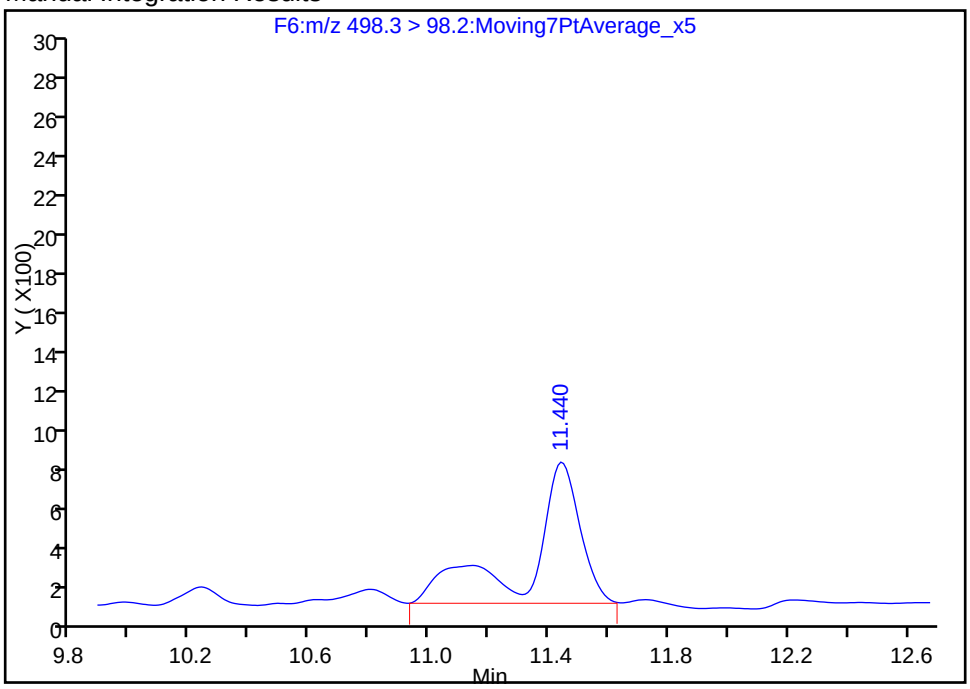
Not Detected
Expected RT: 11.44

Processing Integration Results



Manual Integration Results

RT: 11.44
Area: 8350
Amount: 0.170020
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:46:56
Audit Action: Manually Integrated Audit Reason: Missed Peak

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18849-1

SDG No.:

Client Sample ID: OF-RW59-0516 | Lab Sample ID: 320-18849-4

Matrix: Water | Lab File ID: 27MAY2016B4A_017.d

Analysis Method: WS-LC-0025 | Date Collected: 05/12/2016 17:16

Extraction Method: 3535 | Date Extracted: 05/17/2016 11:08

Sample wt/vol: 521.6(mL) | Date Analyzed: 05/27/2016 16:35

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 111733 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0046		0.0024	0.0019	0.00077
335-67-1	Perfluorooctanoic acid (PFOA)	0.086	M	0.0024	0.0019	0.00072
375-95-1	Perfluorononanoic acid (PFNA)	0.00066	J	0.0024	0.0019	0.00063
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.011		0.0024	0.0019	0.00088
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.30	M	0.0024	0.0019	0.00083
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.55	M	0.0038	0.0029	0.0012

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	78		25-150
STL00991	13C4 PFOS	77		25-150
STL00995	13C5 PFNA	72		25-150
STL00990	13C4 PFOA	88		25-150
STL01892	13C4-PFHpA	78		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_017.d
Lims ID: 320-18849-B-4-A
Client ID: OF-RW59-0516
Sample Type: Client
Inject. Date: 27-May-2016 16:35:53 ALS Bottle#: 26 Worklist Smp#: 17
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: 320-18849-b-4-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:51:28 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 31-May-2016 09:48:46

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.005	7.011	-0.006	1.000	91441	5.85				
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	84492	2.40			29.2	
D 8 13C4-PFHpA										
366.6 > 321.6	9.357	9.366	-0.009		3282154	39.1		78.2	6383	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1112028	36.7		77.5	2234	
58 Perfluorohexanesulfonic acid										M
398.3 > 79.2	9.396	9.401	-0.005	1.000	5710261	154.3				M
D 12 13C4 PFOA										
416.5 > 371.6	10.483	10.483	0.0		4227665	44.1		88.2	6227	
13 Perfluorooctanoic acid										M
412.8 > 368.8	10.475	10.485	-0.010	1.000	1739594	45.0			674	M
412.8 > 168.7	10.483	10.485	-0.002	1.001	613092		2.84(0.00-0.00)		1077	M
D 16 13C4 PFOS										
502.4 > 79.7	11.441	11.441	0.0		228734	36.6		76.6	436	
15 Perfluorooctane sulfonic acid										M
498.3 > 79.2	11.441	11.443	-0.002	1.000	16512305	285.6			4133	M
498.3 > 98.2	11.441	11.443	-0.002	1.000	8406100		1.96(0.00-0.00)		2222	M
18 Perfluorononanoic acid										
462.5 > 418.6	11.460	11.462	-0.002	1.000	22419	0.3431			16.8	
D 17 13C5 PFNA										
467.5 > 422.6	11.460	11.462	-0.002		2908850	35.8		71.6	4635	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 31-May-2016 09:52:19 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_017.d

Injection Date: 27-May-2016 16:35:53 Instrument ID: A4

Lims ID: 320-18849-B-4-A Lab Sample ID: 320-18849-4

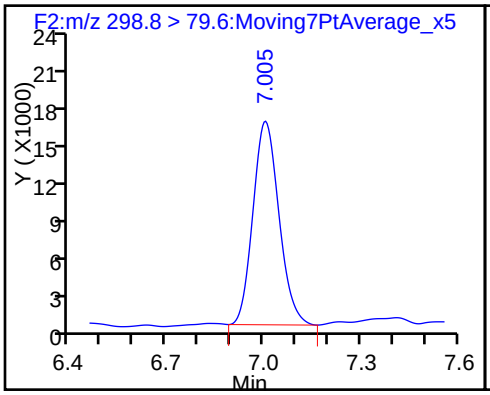
Client ID: OF-RW59-0516

Operator ID: JRB ALS Bottle#: 26 Worklist Smp#: 17

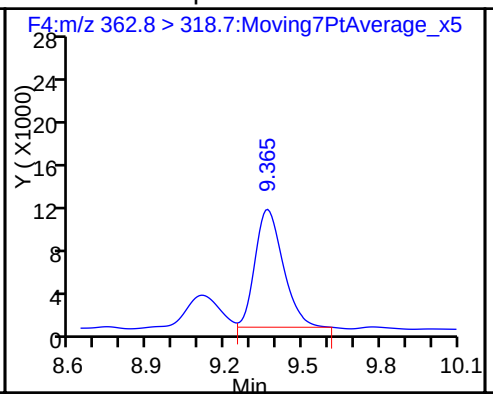
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

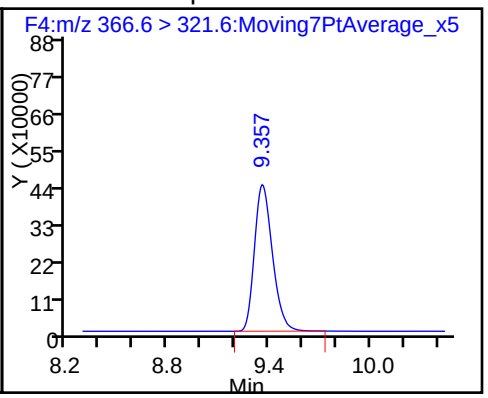
51 Perfluorobutanesulfonic acid



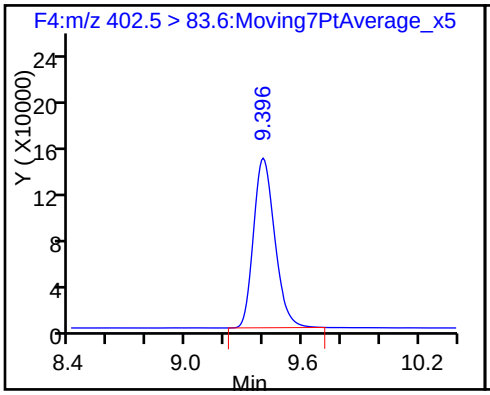
9 Perfluoroheptanoic acid



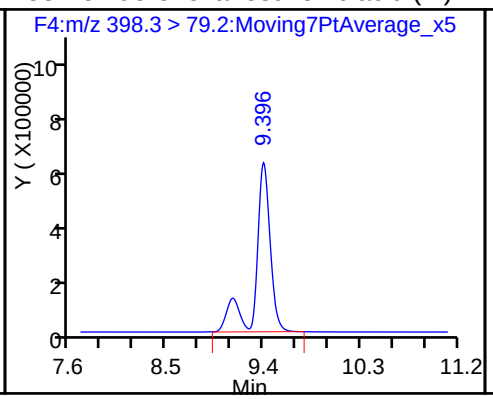
D 8 13C4-PFHpA



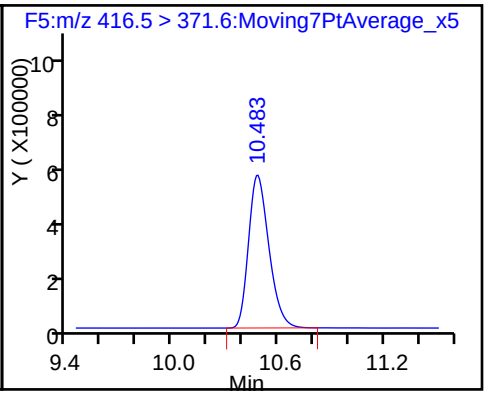
D 11 18O2 PFHxS



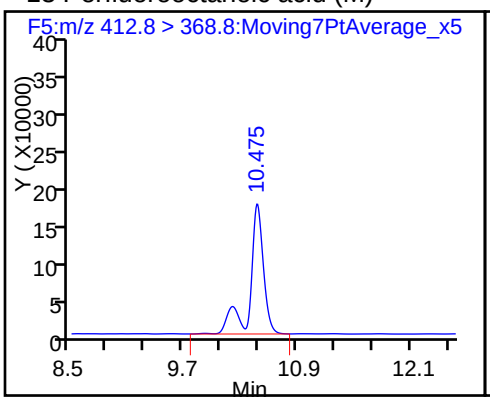
58 Perfluorohexanesulfonic acid (M)



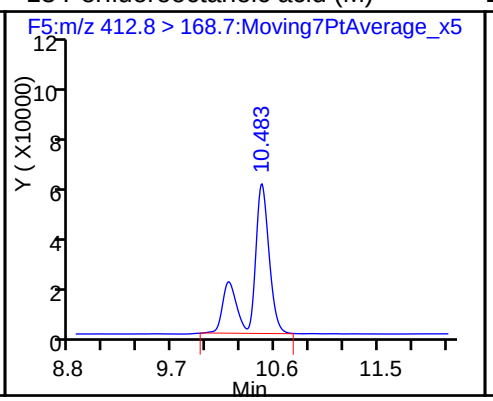
D 12 13C4 PFOA



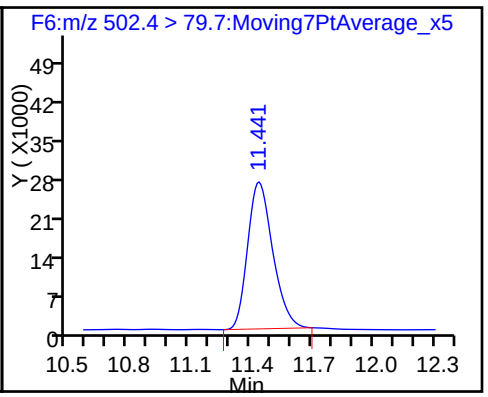
13 Perfluorooctanoic acid (M)



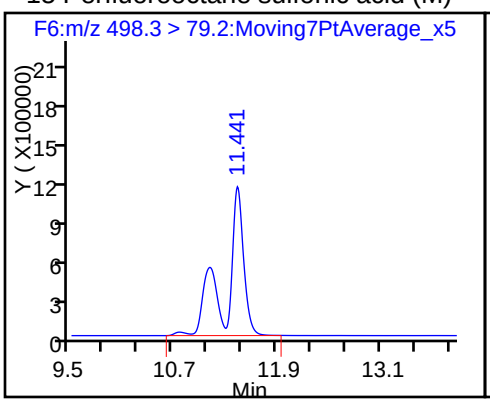
13 Perfluorooctanoic acid (M)



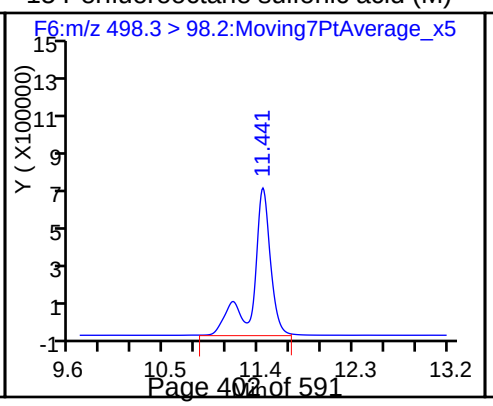
D 16 13C4 PFOS



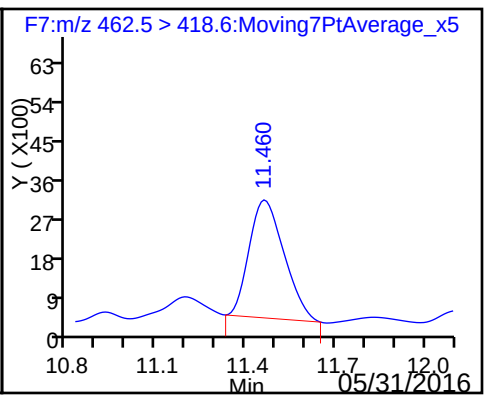
15 Perfluorooctane sulfonic acid (M)



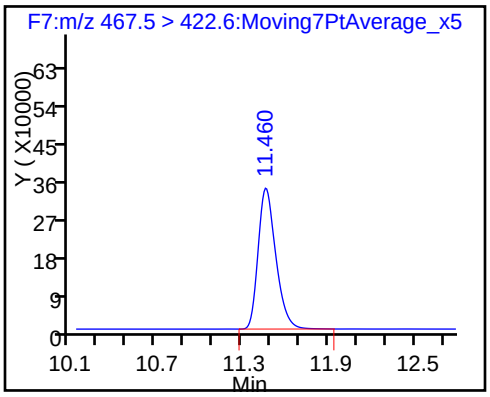
15 Perfluorooctane sulfonic acid (M)



18 Perfluorononanoic acid



D 17 13C5 PFNA



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

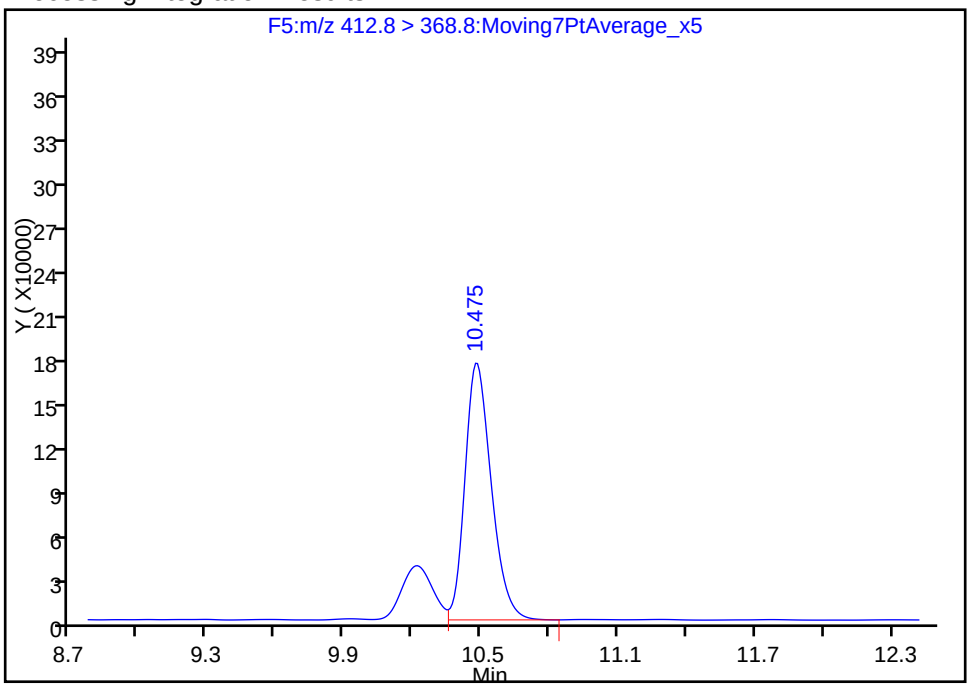
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_017.d				
Injection Date:	27-May-2016 16:35:53	Instrument ID:	A4		
Lims ID:	320-18849-B-4-A	Lab Sample ID:	320-18849-4		
Client ID:	OF-RW59-0516				
Operator ID:	JRB	ALS Bottle#:	26	Worklist Smp#:	17
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F5:MRM		

13 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

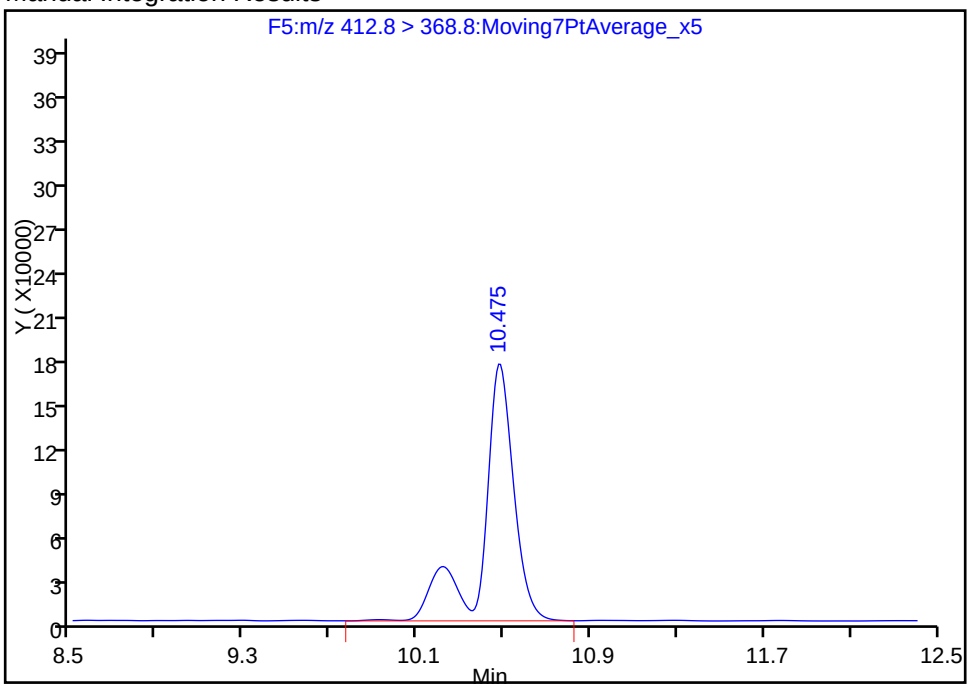
Processing Integration Results

RT: 10.47
Area: 1387131
Amount: 35.920461
Amount Units: ng/ml



Manual Integration Results

RT: 10.47
Area: 1739594
Amount: 45.027700
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:48:46

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

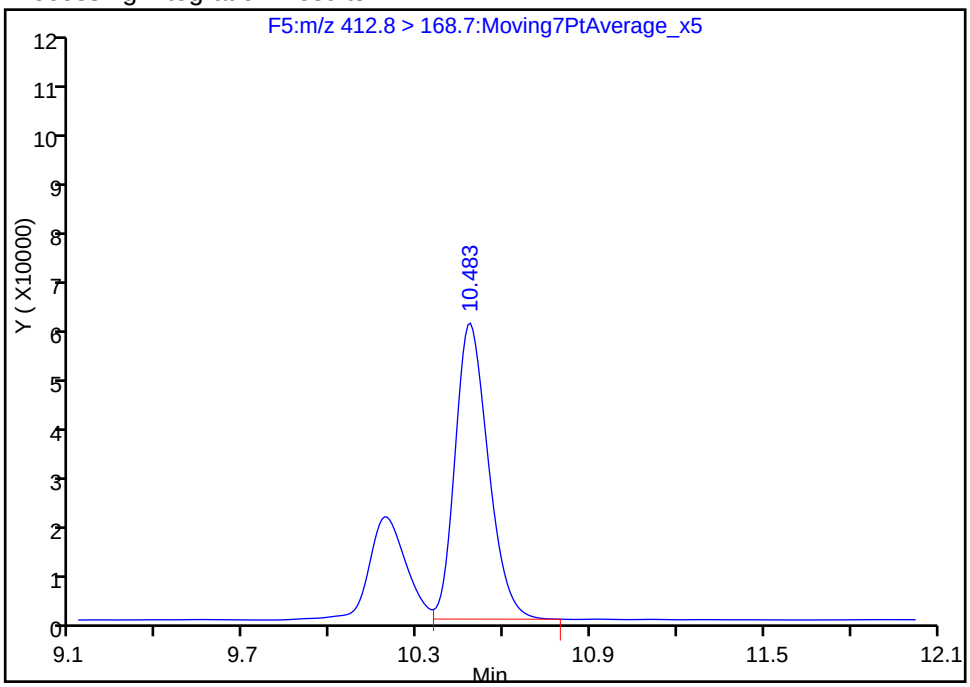
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_017.d				
Injection Date:	27-May-2016 16:35:53	Instrument ID:	A4		
Lims ID:	320-18849-B-4-A	Lab Sample ID:	320-18849-4		
Client ID:	OF-RW59-0516				
Operator ID:	JRB	ALS Bottle#:	26	Worklist Smp#:	17
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F5:MRM		

13 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

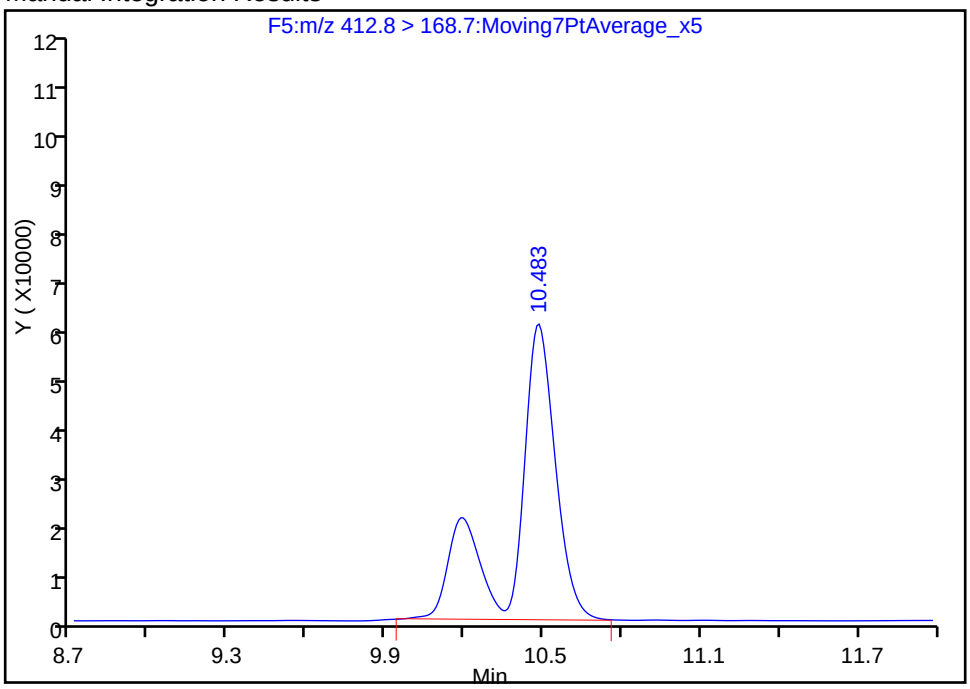
Processing Integration Results

RT: 10.48
Area: 447792
Amount: 35.920461
Amount Units: ng/ml



Manual Integration Results

RT: 10.48
Area: 613092
Amount: 45.027700
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:48:46

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

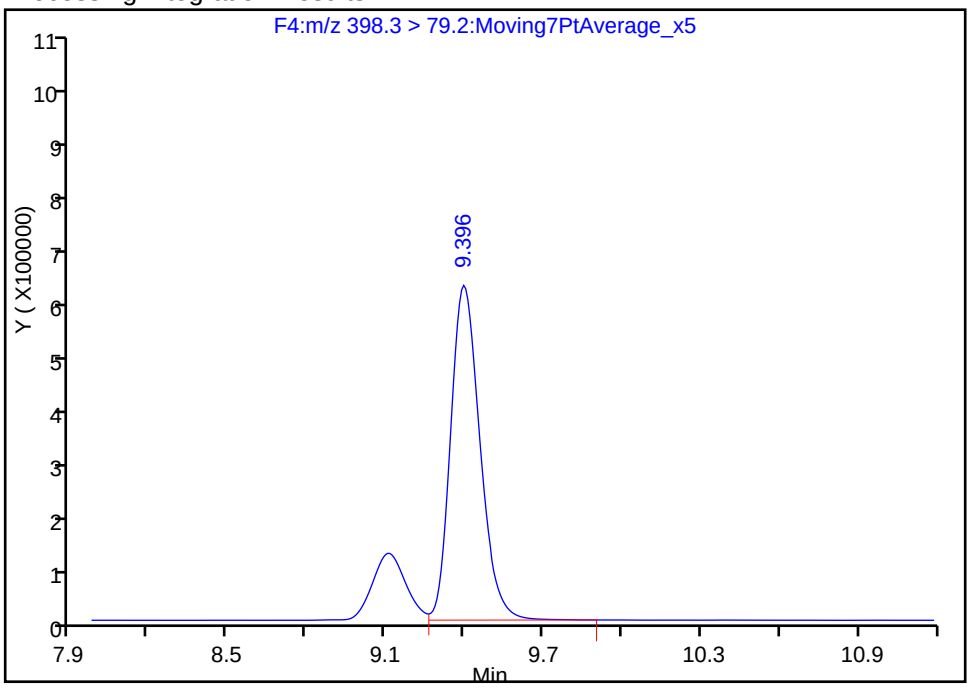
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_017.d				
Injection Date:	27-May-2016 16:35:53	Instrument ID:	A4		
Lims ID:	320-18849-B-4-A	Lab Sample ID:	320-18849-4		
Client ID:	OF-RW59-0516				
Operator ID:	JRB	ALS Bottle#:	26	Worklist Smp#:	17
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F4:MRM		

58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

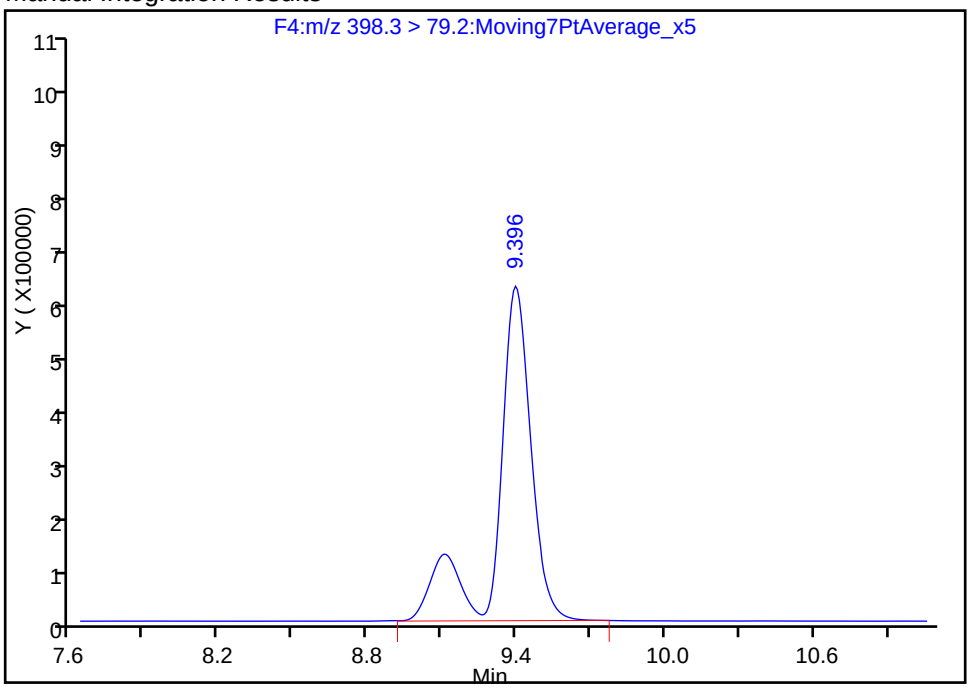
Processing Integration Results

RT: 9.40
Area: 4680038
Amount: 126.4672
Amount Units: ng/ml



Manual Integration Results

RT: 9.40
Area: 5710261
Amount: 154.3066
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:48:46

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

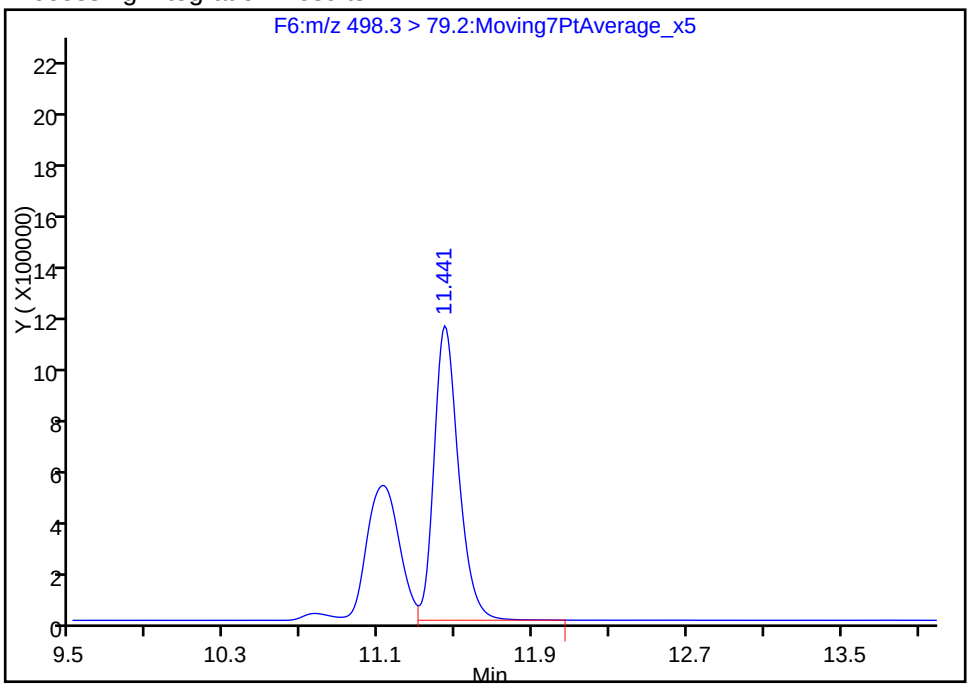
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_017.d				
Injection Date:	27-May-2016 16:35:53	Instrument ID:	A4		
Lims ID:	320-18849-B-4-A	Lab Sample ID:	320-18849-4		
Client ID:	OF-RW59-0516				
Operator ID:	JRB	ALS Bottle#:	26	Worklist Smp#:	17
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F6:MRM		

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

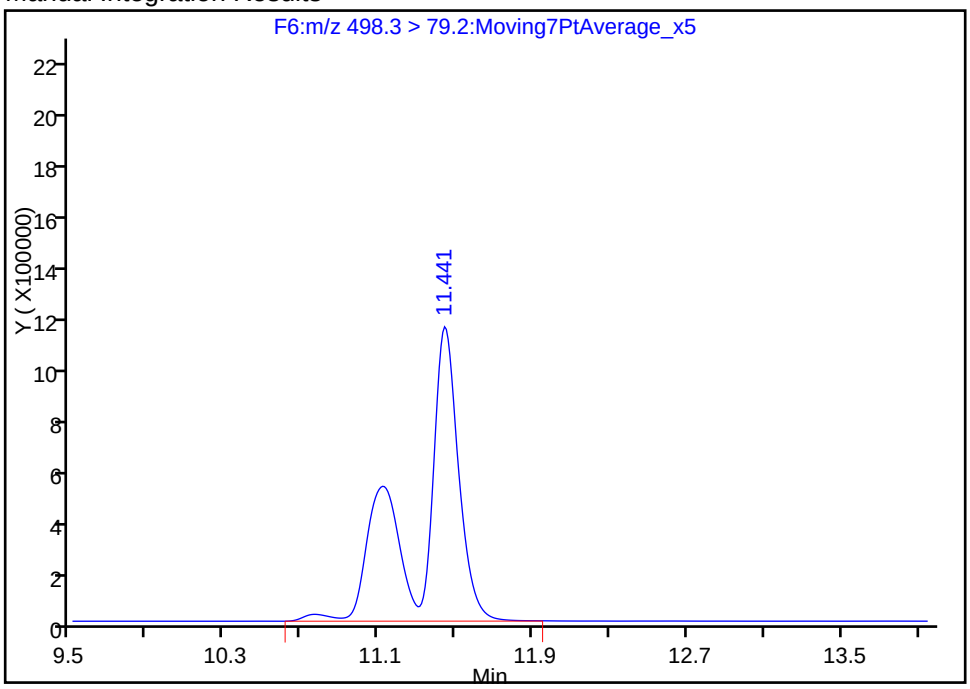
Processing Integration Results

RT: 11.44
Area: 10120347
Amount: 175.0752
Amount Units: ng/ml



Manual Integration Results

RT: 11.44
Area: 16512305
Amount: 285.5971
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:48:46

Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_017.d

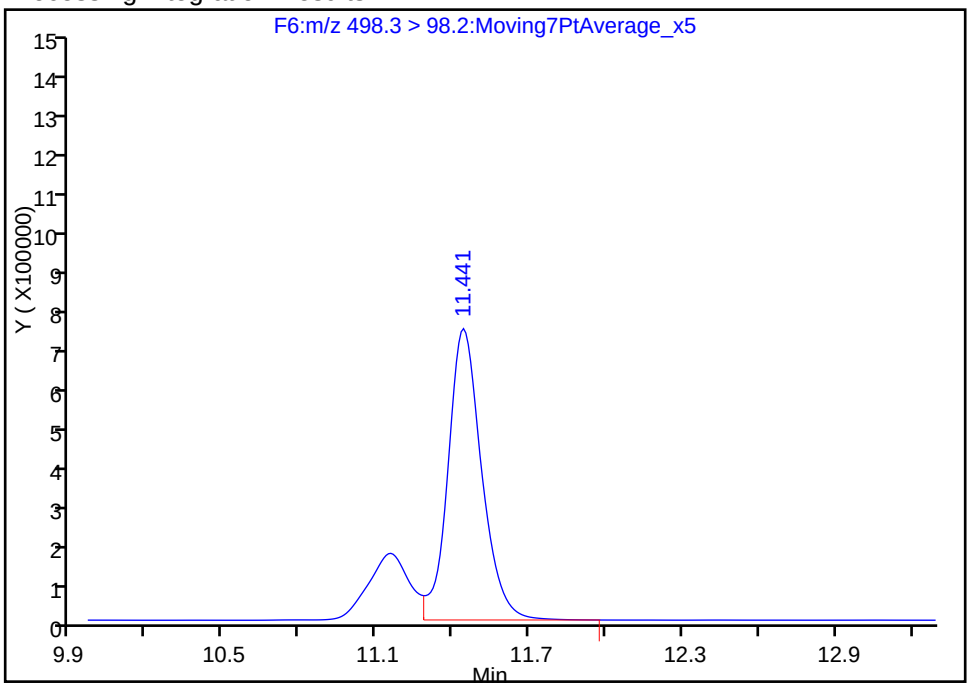
Injection Date:	27-May-2016 16:35:53	Instrument ID:	A4		
Lims ID:	320-18849-B-4-A	Lab Sample ID:	320-18849-4		
Client ID:	OF-RW59-0516				
Operator ID:	JRB	ALS Bottle#:	26	Worklist Smp#:	17
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F6:MRM		

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

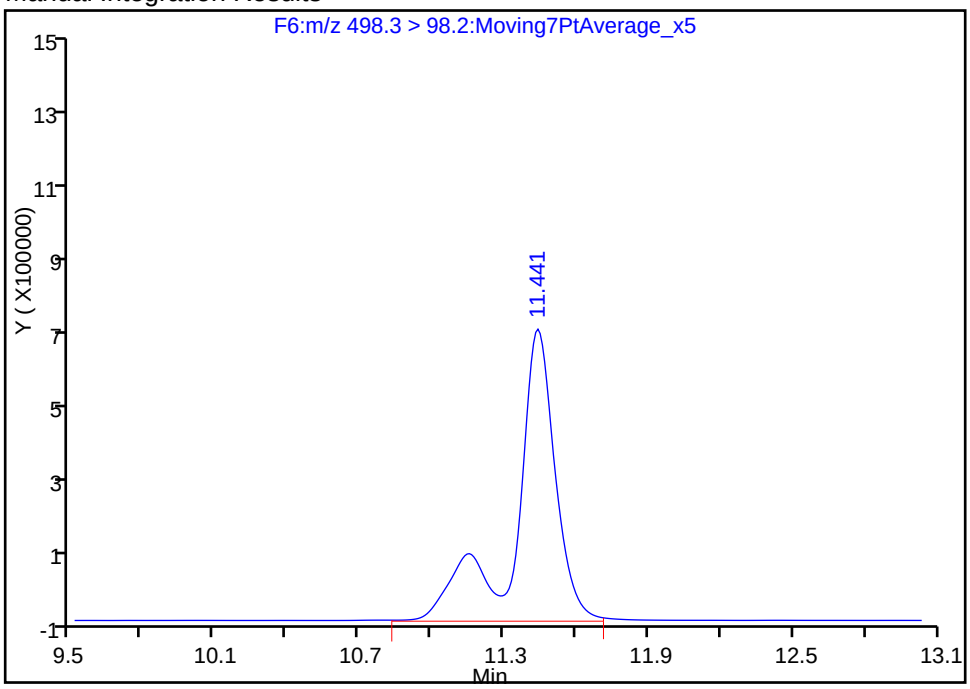
Processing Integration Results

RT: 11.44
Area: 6505406
Amount: 175.0752
Amount Units: ng/ml



Manual Integration Results

RT: 11.44
Area: 8406100
Amount: 285.5971
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:48:46

Audit Action: Manually Integrated Audit Reason: Isomers

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111390

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/25/2016 16:55 Calibration End Date: 05/25/2016 19:01 Calibration ID: 21647

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111390/5	25MAY2016B4A_005.d
Level 2	STD 320-111390/6	25MAY2016B4A_006.d
Level 3	STD 320-111390/7	25MAY2016B4A_007.d
Level 4	STD 320-111390/8	25MAY2016B4A_008.d
Level 5	STD 320-111390/9	25MAY2016B4A_009.d
Level 6	STD 320-111390/10	25MAY2016B4A_010.d
Level 7	STD 320-111390/11	25MAY2016B4A_011.d

ANALYTE	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6	LVL 7				RT WINDOW	AVG RT
Perfluorobutanoic acid (PFBA)	5.803	5.797	5.797	5.797	5.800	5.797	5.800				5.548 - 6.048	5.799
Perfluoropentanoic acid (PFPeA)	6.913	6.909	6.913	6.909	6.909	6.909	6.909				6.660 - 7.160	6.910
Perfluorobutanesulfonic acid (PFBS)	+++++	7.028	7.024	7.024	7.024	7.024	7.024				6.774 - 7.274	7.025
Perfluorohexanoic acid (PFHxA)	+++++	8.155	8.160	8.155	8.155	8.155	8.155				7.907 - 8.407	8.156
Perfluoroheptanoic acid (PFHpA)	+++++	9.380	9.388	9.388	9.388	9.388	9.388				9.138 - 9.638	9.387
Perfluorohexanesulfonic acid (PFHxS)	9.419	9.419	9.419	9.419	9.419	9.427	9.419				9.171 - 9.671	9.420
Perfluorooctanoic acid (PFOA)	10.509	10.499	10.502	10.502	10.509	10.509	10.502				10.254 - 10.754	10.505
Perfluoroheptanesulfonic Acid (PFHpS)	+++++	10.508	10.502	10.511	10.509	10.509	10.511				10.258 - 10.758	10.508
Perfluorooctanesulfonic acid (PFOS)	+++++	11.467	11.461	11.470	11.468	11.467	11.461				11.216 - 11.716	11.466
Perfluorononanoic acid (PFNA)	11.487	11.487	11.480	11.480	11.488	11.487	11.489				11.236 - 11.736	11.485
Perfluorodecanoic acid (PFDA)	12.324	12.324	12.327	12.327	12.325	12.324	12.328				12.075 - 12.575	12.326
Perfluorooctane Sulfonamide (FOSA)	12.896	12.896	12.888	12.888	12.897	12.896	12.888				12.643 - 13.143	12.893
Perfluorodecanesulfonic acid (PFDS)	12.999	12.999	12.991	12.991	13.000	12.999	12.991				12.746 - 13.246	12.996
Perfluoroundecanoic acid (PFUnA)	13.041	13.041	13.044	13.044	13.042	13.041	13.045				12.792 - 13.292	13.043
Perfluorododecanoic acid (PFDoA)	13.650	13.650	13.644	13.644	13.639	13.650	13.644				13.396 - 13.896	13.646
Perfluorotridecanoic Acid (PFTriA)	14.171	14.161	14.154	14.164	14.161	14.161	14.165				13.912 - 14.412	14.162
Perfluorotetradecanoic acid (PFTeA)	14.607	14.598	14.592	14.602	14.599	14.598	14.602				14.350 - 14.850	14.600
Perfluoro-n-hexadecanoic acid (PFHxDA)	15.257	15.257	15.252	15.252	15.258	15.257	15.252				15.005 - 15.505	15.255
Perfluoro-n-octandecanoic acid (PFODA)	15.595	15.595	15.591	15.591	15.595	15.595	15.591				15.343 - 15.843	15.593
13C4 PFBA	5.800	5.797	5.797	5.800	5.797	5.800	5.800				5.548 - 6.048	5.799
13C5-PFPeA	6.913	6.904	6.909	6.904	6.904	6.909	6.904				6.657 - 7.157	6.907
13C2 PFHxA	+++++	8.155	8.160	8.155	8.155	8.155	8.155				7.906 - 8.406	8.156
13C4-PFHpA	9.388	9.388	9.388	9.388	9.388	9.388	9.380				9.137 - 9.637	9.387
18O2 PFHxS	9.427	9.419	9.419	9.419	9.419	9.419	+++++				9.172 - 9.672	9.420
13C4 PFOA	10.509	10.499	10.502	10.502	10.500	10.509	+++++				10.253 - 10.753	10.504
13C4 PFOS	11.467	11.467	11.461	11.461	11.468	11.467	+++++				11.215 - 11.715	11.465
13C5 PFNA	11.487	11.487	11.480	11.480	11.488	11.487	11.480				11.234 - 11.734	11.484
13C2 PFDA	12.324	12.324	12.327	12.327	12.325	12.324	12.328				12.075 - 12.575	12.326
13C8 FOSA	12.896	12.896	12.888	12.888	12.897	12.896	12.888				12.643 - 13.143	12.893
13C2 PFUnA	13.051	13.041	13.044	13.044	13.042	13.041	13.045				12.794 - 13.294	13.044
13C2 PFDoA	13.650	13.650	13.644	13.644	13.639	13.650	13.644				13.396 - 13.896	13.646
13C2-PFTeDA	14.607	14.598	14.602	14.602	14.599	14.598	14.602				14.351 - 14.851	14.601
13C2-PFHxDA	15.257	15.257	15.252	15.252	15.258	15.257	15.252				15.005 - 15.505	15.255

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111390

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/25/2016 16:55 Calibration End Date: 05/25/2016 19:01 Calibration ID: 21647

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111390/5	25MAY2016B4A_005.d
Level 2	STD 320-111390/6	25MAY2016B4A_006.d
Level 3	STD 320-111390/7	25MAY2016B4A_007.d
Level 4	STD 320-111390/8	25MAY2016B4A_008.d
Level 5	STD 320-111390/9	25MAY2016B4A_009.d
Level 6	STD 320-111390/10	25MAY2016B4A_010.d
Level 7	STD 320-111390/11	25MAY2016B4A_011.d

ANALYTE	CF				CURVE TYPE	COEFFICIENT			#	MIN CF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 5	LVL 2 LVL 6	LVL 3 LVL 7	LVL 4		B	M1	M2								
13C4 PFBA	90426 90489	93702 69083	88967 67191	91832	Ave		84527.2857				13.4		50.0			
13C5-PFPeA	84075 80131	88112 67366	79827 57639	79829	Ave		76711.2743				13.7		50.0			
13C2 PFHxA	+++++ 88726	93214 75852	88217 63360	88780	Ave		83024.8300				13.6		50.0			
13C4-PFHpA	97016 88518	97521 72637	93069 62582	87045	Ave		85483.7314				15.4		50.0			
18O2 PFHxS	32114 28446	33843 21871	32545 +++++	29259	Ave		29679.5173				14.6		50.0			
13C4 PFOA	95358 86472	101177 69215	94622 +++++	88014	Ave		89142.7267				12.5		50.0			
13C4 PFOS	7547.6 5997.7	8261.6 4238.7	7254.1 +++++	7192.7	Ave		6748.72734				21.2		50.0			
13C5 PFNA	83768 81444	90726 67996	85184 58045	81914	Ave		78439.4543				14.5		50.0			
13C2 PFDA	113865 98334	116442 88286	113382 70925	98189	Ave		99917.5000				16.5		50.0			
13C8 FOSA	106708 97856	108315 81051	106014 70011	105710	Ave		96523.5914				15.6		50.0			
13C2 PFUnA	110798 106166	120213 84367	108832 72975	106384	Ave		101390.671				16.3		50.0			
13C2 PFDoA	114960 108533	119900 92813	108605 81295	111530	Ave		105376.626				12.8		50.0			
13C2-PFTeDA	77742 85231	80236 68244	76604 63739	79461	Ave		75893.7886				9.8		50.0			
13C2-PFHxDA	29325 32507	32299 26911	29981 23318	29654	Ave		29142.1229				11.0		50.0			

Note: The m1 coefficient is the same as Ave CF for an Ave curve type.

FORM VI

CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111390

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/25/2016 16:55 Calibration End Date: 05/25/2016 19:01 Calibration ID: 21647

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)	51562 48110	54589 47389	59528	53593	62013	AveID		0.6418				9.4		35.0			
Perfluoropentanoic acid (PFPeA)	45950 33549	45680 27499	41742	38810	40556	AveID		0.5079				4.7		35.0			
Perfluorobutanesulfonic acid (PFBS)	+++++ 16828	30042 13573	22359	20369	22386	L2ID	0.1268	0.7293							0.9950		0.9900
Perfluorohexanoic acid (PFHxA)	+++++ 33959	48716 28459	44253	36069	41599	L1ID	0.0815	0.4487							0.9990		0.9900
Perfluoroheptanoic acid (PFHpA)	+++++ 36889	66614 30989	45999	38114	44933	L2ID	0.1974	0.4789							0.9950		0.9900
Perfluorohexanesulfonic acid (PFHxS)	56469 37411	62875 32107	53633	44230	49600	AveID		1.7087				6.3		35.0			
Perfluorooctanoic acid (PFOA)	45998 31110	50890 26141	45904	37002	41392	L1ID	0.0322	0.4522							1.0000		0.9900
Perfluoroheptanesulfonic Acid (PFHpS)	+++++ 34336	56642 27018	54720	45924	46998	L2ID	-0.926	7.7628							0.9900		0.9900
Perfluorooctanesulfonic acid (PFOS)	+++++ 57319	76877 45376	83720	70811	77490	L1ID	-9.247	13.993							0.9960		0.9900
Perfluorononanoic acid (PFNA)	95262 82019	129381 70717	108058	93343	99857	L2ID	0.0022	1.2307							0.9920		0.9900
Perfluorodecanoic acid (PFDA)	94072 93997	117054 78340	119534	106142	111497	AveID		1.0385				9.8		35.0			
Perfluorooctane Sulfonamide (FOSA)	104638 92535	113427 78543	117605	105216	106590	AveID		1.0693				5.9		35.0			
Perfluorodecanesulfonic acid (PFDS)	32002 17577	33342 13614	34233	27101	25265	AveID		4.2089				6.9		50.0			
Perfluoroundecanoic acid (PFUnA)	145968 103214	132732 84787	128944	115402	125000	AveID		1.1791				6.6		35.0			
Perfluorododecanoic acid (PFDoA)	95024 88677	96089 74116	109637	95821	110823	AveID		0.9121				9.6		35.0			
Perfluorotridecanoic Acid (PFTriA)	77272 69226	90621 59609	88571	75800	84755	AveID		1.0254				8.3		50.0			
Perfluorotetradecanoic acid (PFTeA)	67818 31192	48934 28663	38993	35082	38993	AveID		0.5424				28.9		50.0			
Perfluoro-n-hexadecanoic acid (PFHxDA)	188072 70899	147266 62857	85884	71378	89377	L2ID	1.9284	2.5720							0.9960		0.9900
Perfluoro-n-octandecanoic acid (PFODA)	66886 54974	71437 53503	66638	59423	78676	AveID		2.2110				6.6		50.0			

Note: The m1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111390

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/25/2016 16:55 Calibration End Date: 05/25/2016 19:01 Calibration ID: 21647

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111390/5	25MAY2016B4A_005.d
Level 2	STD 320-111390/6	25MAY2016B4A_006.d
Level 3	STD 320-111390/7	25MAY2016B4A_007.d
Level 4	STD 320-111390/8	25MAY2016B4A_008.d
Level 5	STD 320-111390/9	25MAY2016B4A_009.d
Level 6	STD 320-111390/10	25MAY2016B4A_010.d
Level 7	STD 320-111390/11	25MAY2016B4A_011.d

ANALYTE	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
		LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
13C4 PFBA	Ave	4521321 3454161	4685114 3359557	4448328	4591623	4524446	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C5-PFPeA	Ave	4203739 3368310	4405611 2881925	3991347	3991474	4006540	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFHxA	Ave	+++++ 3792575	4660722 3168006	4410855	4438990	4436301	+++++ 50.0	50.0 50.0	50.0	50.0	50.0
13C4-PFHpA	Ave	4850779 3631838	4876027 3129112	4653428	4352241	4425881	50.0 50.0	50.0 50.0	50.0	50.0	50.0
18O2 PFHxS	Ave	1518975 1034483	1600780 +++++	1539364	1383940	1345505	47.3 47.3	47.3 +++++	47.3	47.3	47.3
13C4 PFOA	Ave	4767875 3460734	5058838 +++++	4731111	4400676	4323584	50.0 50.0	50.0 +++++	50.0	50.0	50.0
13C4 PFOS	Ave	360775 202612	394903 +++++	346744	343813	286688	47.8 47.8	47.8 +++++	47.8	47.8	47.8
13C5 PFNA	Ave	4188406 3399779	4536292 2902258	4259193	4095685	4072196	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFDA	Ave	5693238 4414285	5822117 3546229	5669119	4909456	4916681	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C8 FOSA	Ave	5335389 4052543	5415770 3500532	5300712	5285513	4892798	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFUnA	Ave	5539892 4218333	6010665 3648730	5441575	5319223	5308317	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFDoA	Ave	5748006 4640667	5994993 4064771	5430267	5576489	5426626	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2-PFTeDA	Ave	3887106 3412182	4011816 3186926	3830217	3973031	4261548	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2-PFHxDA	Ave	1466248 1345541	1614964 1165903	1499037	1482695	1625355	50.0 50.0	50.0 50.0	50.0	50.0	50.0

Curve Type Legend:
Ave = Average

RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111390

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/25/2016 16:55 Calibration End Date: 05/25/2016 19:01 Calibration ID: 21647

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111390/5	25MAY2016B4A_005.d
Level 2	STD 320-111390/6	25MAY2016B4A_006.d
Level 3	STD 320-111390/7	25MAY2016B4A_007.d
Level 4	STD 320-111390/8	25MAY2016B4A_008.d
Level 5	STD 320-111390/9	25MAY2016B4A_009.d
Level 6	STD 320-111390/10	25MAY2016B4A_010.d
Level 7	STD 320-111390/11	25MAY2016B4A_011.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	25781 9621902	54589 18955715	297640	1071850	3100647	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoropentanoic acid (PFPeA)		AveID	22975 6709860	45680 10999657	208712	776204	2027795	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorobutanesulfonic acid (PFBS)		L2ID	+++++ 2975252	26557 4799473	98828	360125	989482	+++++ 177	0.884 354	4.42	17.7	44.2
Perfluorohexanoic acid (PFHxA)		L1ID	+++++ 6791811	48716 11383764	221266	721387	2079954	+++++ 200	1.00 400	5.00	20.0	50.0
Perfluoroheptanoic acid (PFHpA)		L2ID	+++++ 7377792	66614 12395409	229994	762273	2246637	+++++ 200	1.00 400	5.00	20.0	50.0
Perfluorohexanesulfonic acid (PFHxS)		AveID	26710 7078226	59480 12149225	253682	836825	2346082	0.473 189	0.946 378	4.73	18.9	47.3
Perfluorooctanoic acid (PFOA)		L1ID	22999 6221982	50890 10456476	229522	740049	2069583	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoroheptanesulfonic Acid (PFHpS)		L2ID	+++++ 6537635	53923 10288308	260465	874389	2237092	+++++ 190	0.952 381	4.76	19.0	47.6
Perfluorooctanesulfonic acid (PFOS)		L1ID	+++++ 10959354	73494 17351697	400180	1353901	3704007	+++++ 191	0.956 382	4.78	19.1	47.8
Perfluorononanoic acid (PFNA)		L2ID	47631 16403896	129381 28286865	540290	1866863	4992828	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorodecanoic acid (PFDA)		AveID	47036 18799359	117054 31336025	597671	2122830	5574851	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorooctane Sulfonamide (FOSA)		AveID	52319 18507083	113427 31417050	588024	2104314	5329485	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorodecanesulfonic acid (PFDS)		AveID	15425 3388769	32142 5249459	165005	522503	1217760	0.482 193	0.964 386	4.82	19.3	48.2
Perfluoroundecanoic acid (PFUnA)		AveID	72984 20642853	132732 33914731	644718	2308031	6249999	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorododecanoic acid (PFDoA)		AveID	47512 17735307	96089 29646208	548185	1916429	5541148	0.500 200	1.00 400	5.00	20.0	50.0

FORM VI

RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111390

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/25/2016 16:55 Calibration End Date: 05/25/2016 19:01 Calibration ID: 21647

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
Perfluorotridecanoic Acid (PFTriA)		AveID	38636 13845210	90621 23843779	442855	1515996	4237745	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorotetradecanoic acid (PFTeA)		AveID	33909 6238413	48934 11465072	194966	701642	1949635	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)		L2ID	94036 14179794	147266 25142674	429422	1427552	4468853	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoro-n-octandecanoic acid (PFODA)		AveID	33443 10994803	71437 21401177	333192	1188460	3933807	0.500 200	1.00 400	5.00	20.0	50.0

Curve Type Legend:

AveID = Average isotope dilution
L1ID = Linear 1/conc IsoDil
L2ID = Linear 1/conc^2 IsoDil

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_005.d
Lims ID: Std L1
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 25-May-2016 16:55:09 ALS Bottle#: 10 Worklist Smp#: 5
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L1
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:59:50 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 25-May-2016 18:27:24

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.803	5.798	0.005	1.000	25781	0.4442		88.8	118	
D 1 13C4 PFBA										
216.7 > 171.5	5.800	5.798	0.002		4521321	53.5		107	18338	
D 3 13C5-PFPeA										
267.6 > 222.7	6.913	6.907	0.006		4203739	54.8		110	8232	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.913	6.910	0.003	1.000	22975	0.5380		108	10.9	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.024	7.024	0.0	1.000	12833	NC			25.4	
298.8 > 98.6	7.024	7.024	0.0	1.000	6418		2.00(0.00-0.00)		13.3	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.024	7.024	0.0	1.000	12833	0.3740		84.6		
D 6 13C2 PFHxA										
314.6 > 269.7	8.160	8.156	0.004		4611872	55.5		111	8247	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.165	8.157	0.008	1.000	26685	0.4632		92.6	135	
D 8 13C4-PFHpA										
366.6 > 321.6	9.388	9.387	0.001		4850779	56.7		113	7959	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.396	9.388	0.008	1.000	24242	0.1095		21.9	110	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.419	9.421	-0.002	1.000	26710	NC			46.3	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.419	9.421	-0.002	1.000	26710	0.4868		103		
D 11 18O2 PFHxS										
402.5 > 83.6	9.427	9.422	0.005		1518975	51.2		108	4592	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.509	10.503	0.006		4767875	53.5		107	4857	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.509	10.504	0.005	1.000	22999	0.4622		92.4	50.6	
412.8 > 168.7	10.499	10.504	-0.005	0.999	7461		3.08(0.00-0.00)	92.4	25.8	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.509	10.508	0.001	1.000	24080	0.5303		111		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.509	10.508	0.001	1.000	24080	NC			168	
D 16 13C4 PFOS										
502.4 > 79.7	11.467	11.465	0.002		360775	53.5		112	1493	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.467	11.466	0.001	1.000	32668	0.9702		203	158	
498.3 > 98.2	11.467	11.466	0.001	1.000	16176		2.02(0.00-0.00)	203	34.3	
D 17 13C5 PFNA										
467.5 > 422.6	11.487	11.484	0.003		4188406	53.4		107	8199	
18 Perfluorononanoic acid										
462.5 > 418.6	11.487	11.486	0.001	1.000	47631	0.4602		92.0	117	
D 19 13C2 PFDA										
514.4 > 469.5	12.324	12.325	-0.001		5693238	57.0		114	10082	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.324	12.325	-0.001	1.000	47036	0.3978		79.6	120	
D 23 13C8 FOSA										
505.4 > 77.6	12.896	12.893	0.003		5335389	55.3		111	4000	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.896	12.893	0.003	1.000	52319	0.4585		91.7	145	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.999	12.996	0.003	1.000	15425	NC			57.5	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.999	12.996	0.003	1.000	15425	0.4856		101		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.041	13.042	-0.001	1.000	72984	0.5587		112	82.7	
D 26 13C2 PFUnA										
564.3 > 519.5	13.051	13.044	0.007		5539892	54.6		109	6729	
D 28 13C2 PFDoA										
614.4 > 569.4	13.650	13.646	0.004		5748006	54.5		109	4148	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.650	13.646	0.004	1.000	47512	0.4531		90.6	33.7	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.171	14.162	0.009	1.000	38636	0.4847		96.9	27.5	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.607	14.600	0.007	1.000	33909	0.8041		161	33.0	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.607	14.601	0.006		3887106	51.2		102	3337	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.257	15.255	0.002		1466248	50.3		101	3594	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.257	15.255	0.002	1.000	94036	0.4970		99.4	26.5	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.595	15.593	0.002	1.000	33443	0.5158		103	49.6	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L1_00018 Amount Added: 1.00 Units: mL

Report Date: 27-May-2016 09:59:51 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_005.d

Injection Date: 25-May-2016 16:55:09 Instrument ID: A4

Lims ID: Std L1

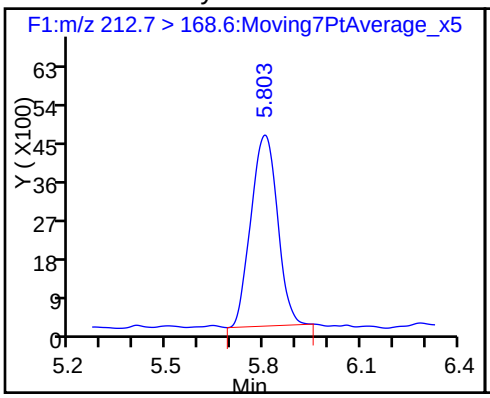
Client ID:

Operator ID: JRB ALS Bottle#: 10 Worklist Smp#: 5

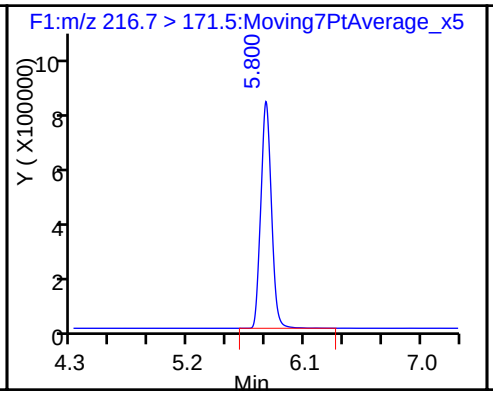
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

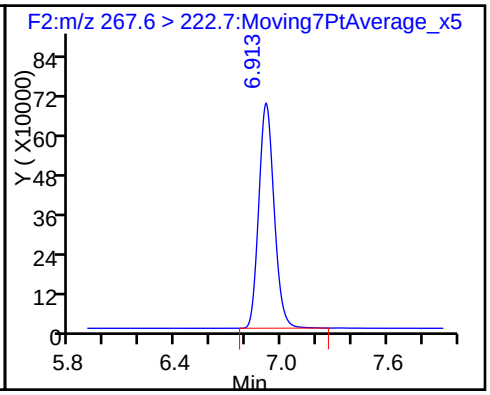
2 Perfluorobutyric acid



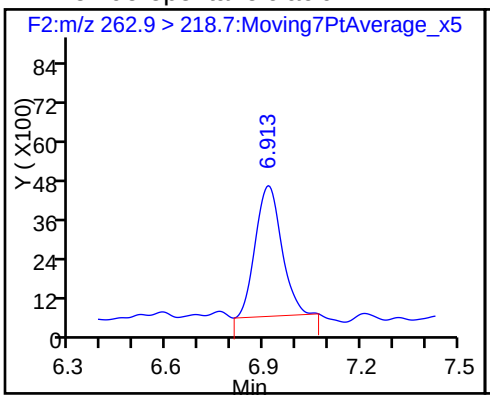
D 1 13C4 PFBA



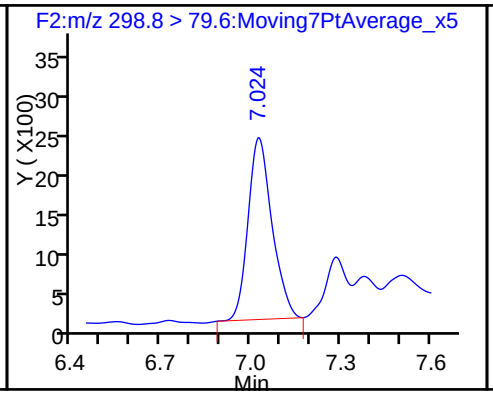
D 3 13C5-PFPeA



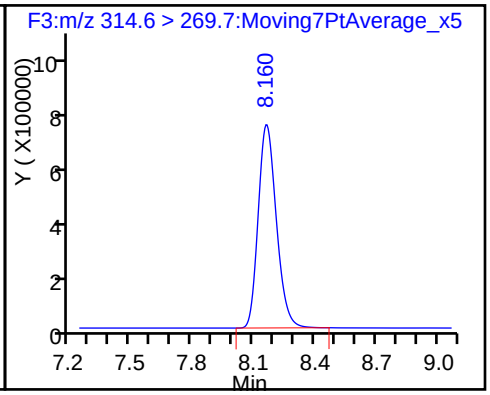
4 Perfluoropentanoic acid



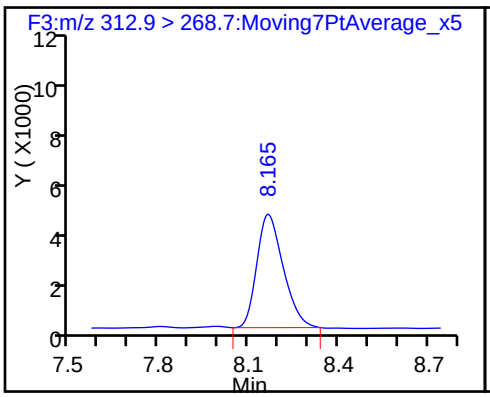
51 Perfluorobutanesulfonic acid



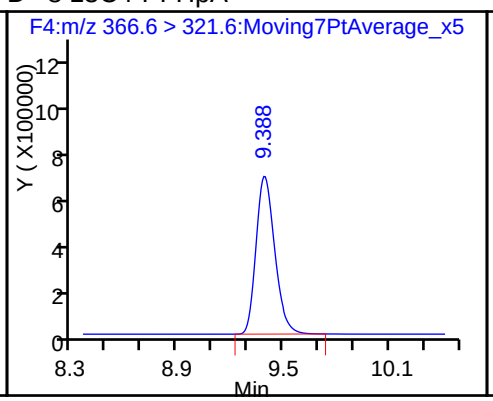
D 6 13C2 PFHxA



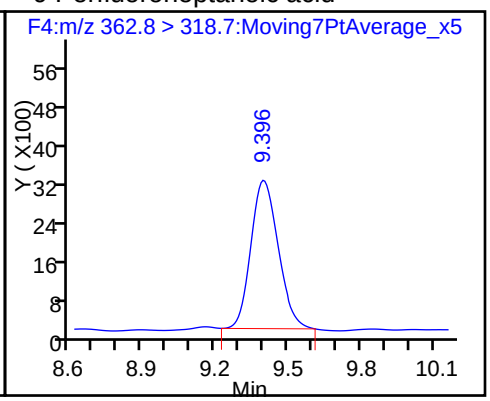
7 Perfluorohexanoic acid



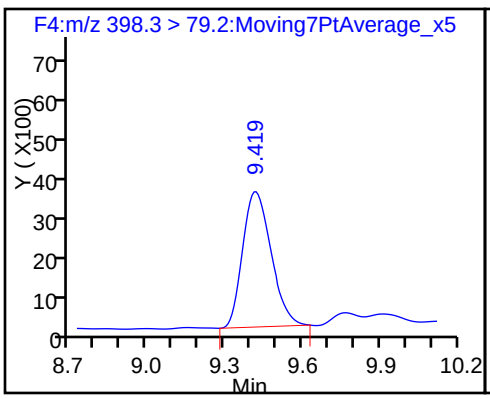
D 8 13C4-PFHpA



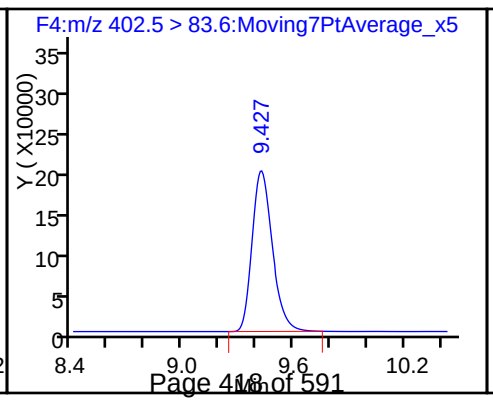
9 Perfluoroheptanoic acid



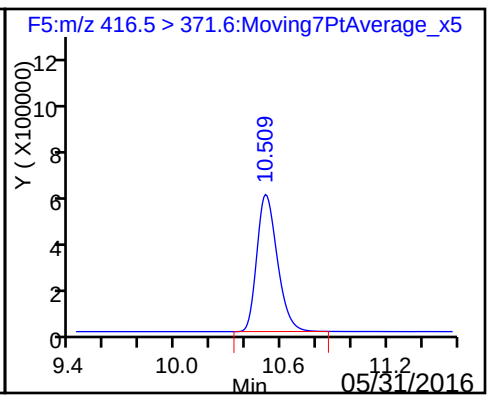
58 Perfluorohexanesulfonic acid



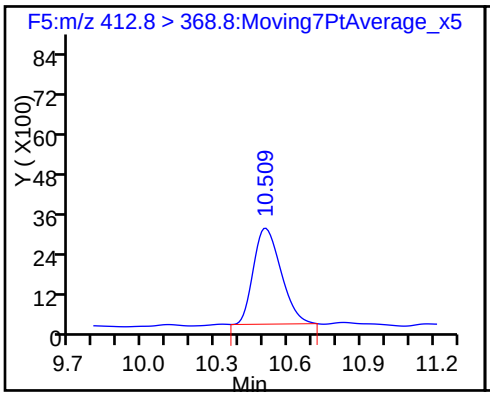
D 11 18O2 PFHxS



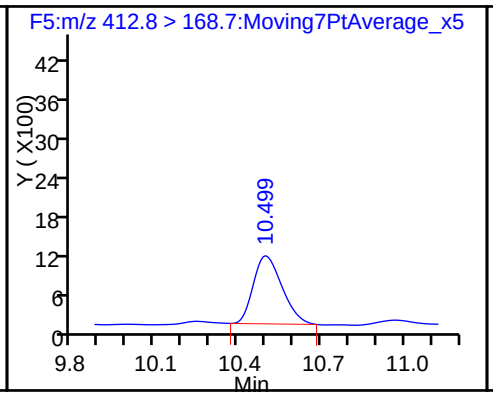
D 12 13C4 PFOA



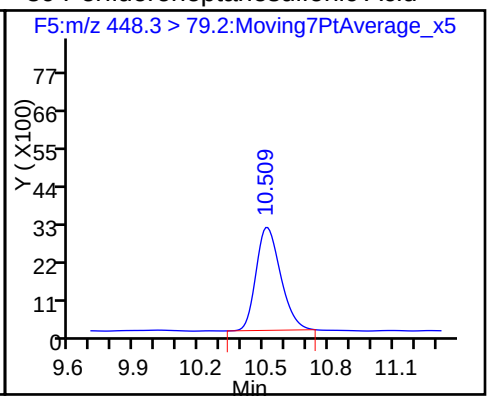
13 Perfluorooctanoic acid



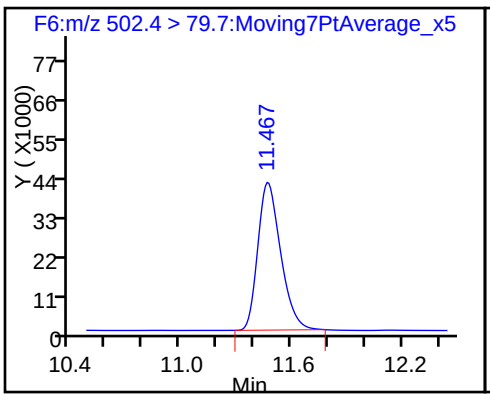
13 Perfluorooctanoic acid



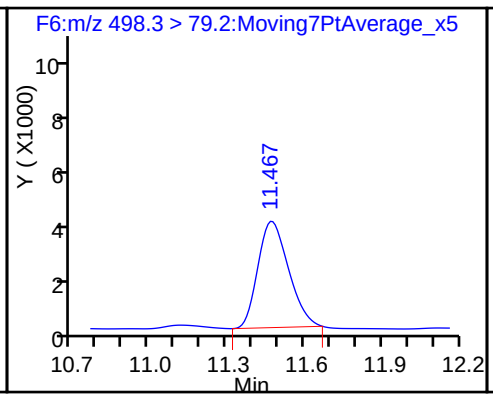
39 Perfluoroheptanesulfonic Acid



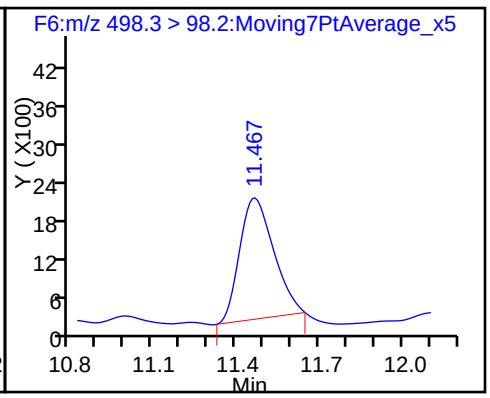
D 16 13C4 PFOS



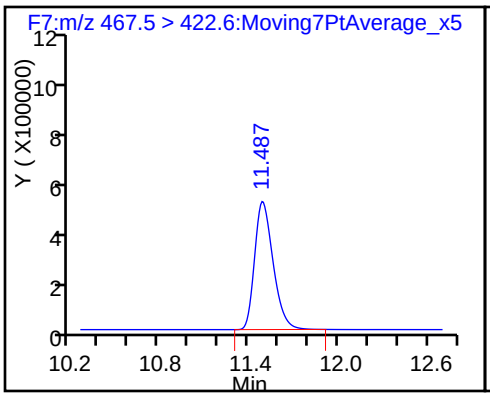
15 Perfluorooctane sulfonic acid



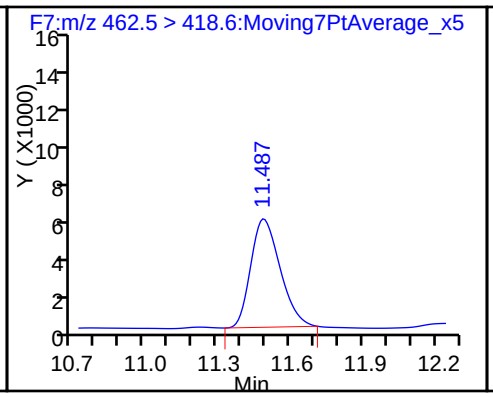
15 Perfluorooctane sulfonic acid



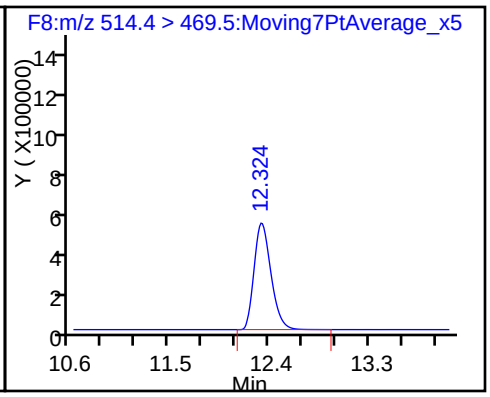
D 17 13C5 PFNA



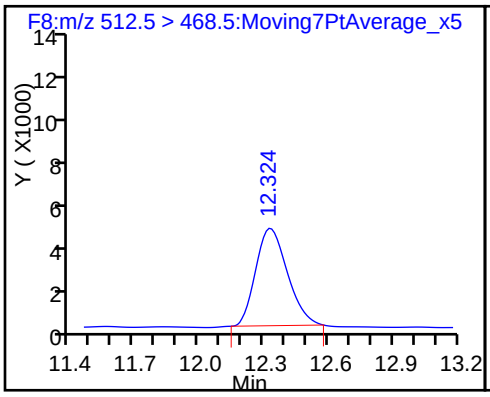
18 Perfluorononanoic acid



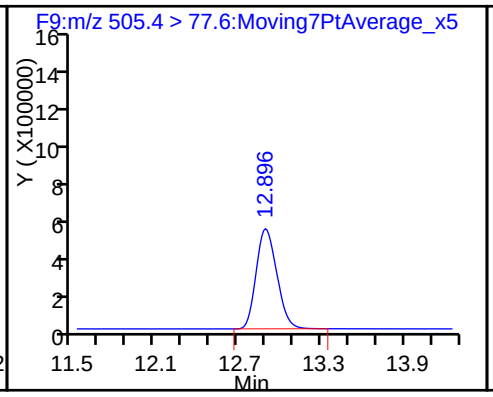
D 19 13C2 PFDA



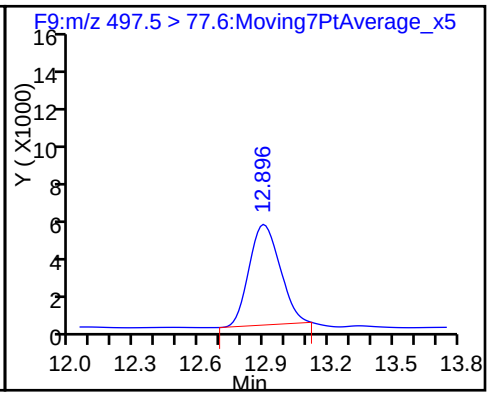
20 Perfluorodecanoic acid



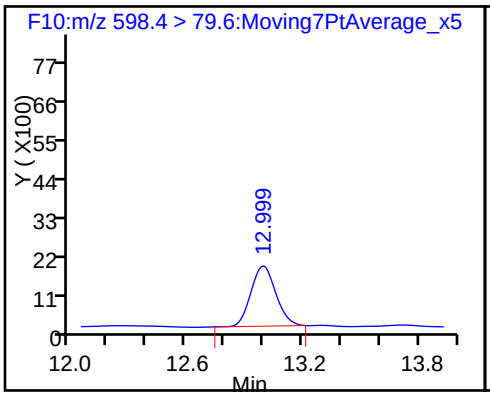
D 23 13C8 FOSA



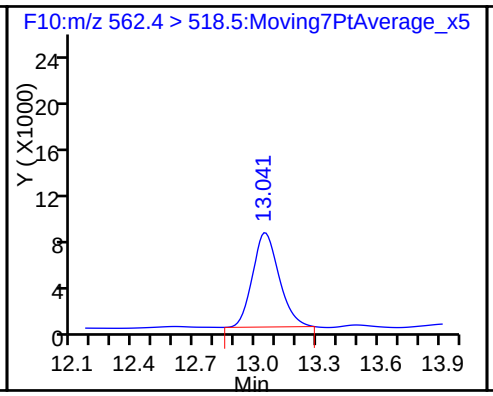
24 Perfluorooctane Sulfonamide



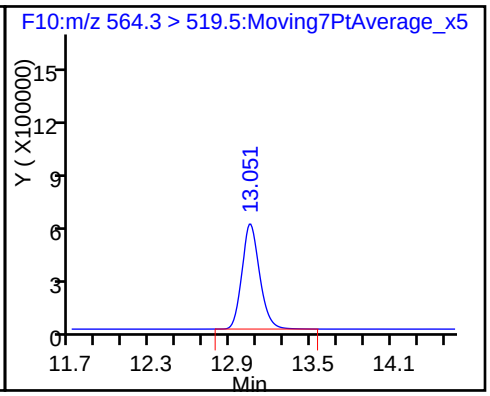
49 Perfluorodecane Sulfonic acid



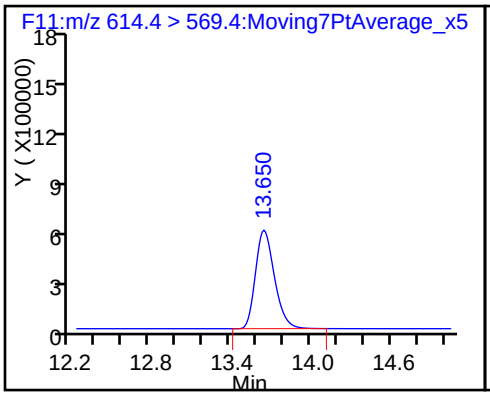
27 Perfluoroundecanoic acid



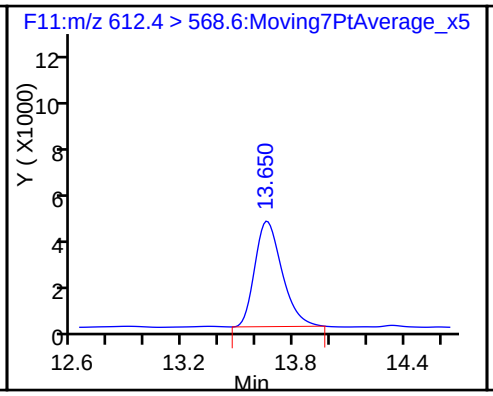
D 26 13C2 PFUnA



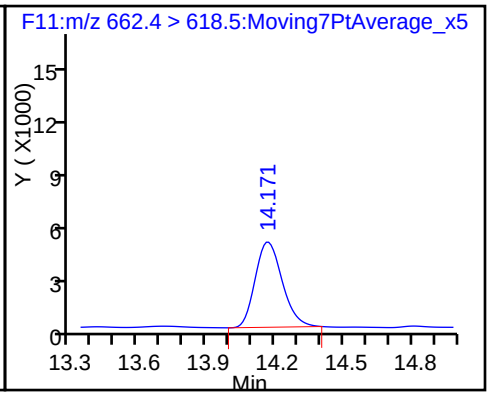
D 28 13C2 PFDoA



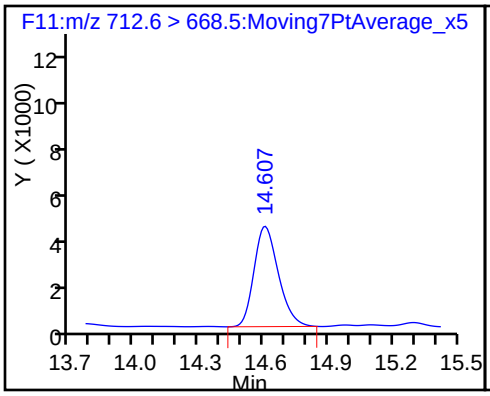
29 Perfluorododecanoic acid



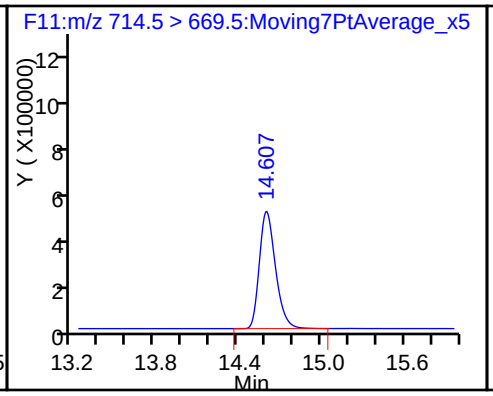
30 Perfluorotridecanoic acid



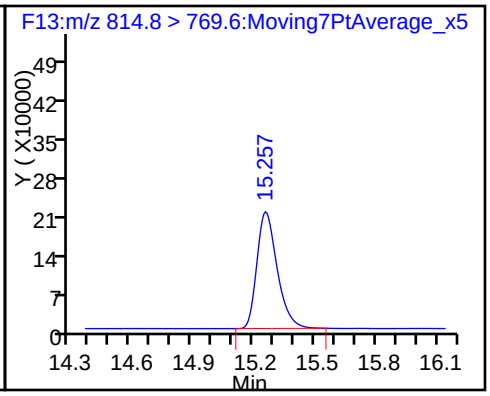
32 Perfluorotetradecanoic acid



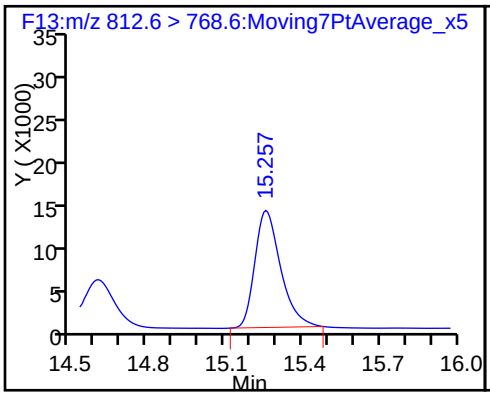
D 33 13C2-PFTeDA



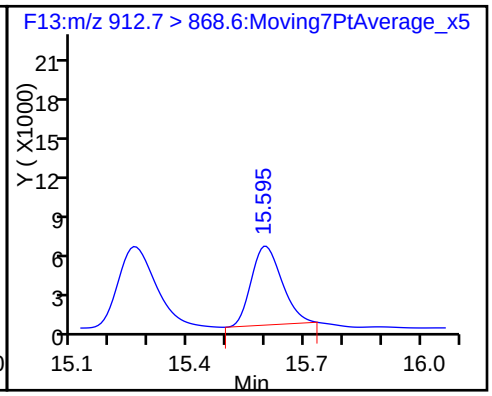
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_006.d
Lims ID: Std L2
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 25-May-2016 17:15:50 ALS Bottle#: 11 Worklist Smp#: 6
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L2
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:59:52 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 25-May-2016 18:13:00

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.797	5.798	-0.001	1.000	54589	0.9078		90.8	227	
D 1 13C4 PFBA										
216.7 > 171.5	5.797	5.798	-0.001		4685114	55.4		111	14887	
D 3 13C5-PFPeA										
267.6 > 222.7	6.904	6.907	-0.003		4405611	57.4		115	10143	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.909	6.910	-0.001	1.000	45680	1.02		102	19.5	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.028	7.024	0.004	1.000	26557	NC			53.3	
298.8 > 98.6	7.028	7.024	0.004	1.000	15186		1.75(0.00-0.00)		31.9	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.028	7.024	0.004	1.000	26557	0.9021		102		
D 6 13C2 PFHxA										
314.6 > 269.7	8.155	8.156	-0.001		4660722	56.1		112	9898	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.155	8.157	-0.002	1.000	48716	0.9832		98.3	270	
D 8 13C4-PFHpA										
366.6 > 321.6	9.388	9.387	0.001		4876027	57.0		114	6073	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.380	9.388	-0.008	1.000	66614	1.01		101	307	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.419	9.421	-0.002	1.000	59480	NC			114	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.419	9.421	-0.002	1.000	59480	1.03		109		
D 11 18O2 PFHxS										
402.5 > 83.6	9.419	9.422	-0.003		1600780	53.9		114	3799	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.499	10.503	-0.004		5058838	56.7		113	5920	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.499	10.504	-0.005	1.000	50890	1.04		104	84.7	
412.8 > 168.7	10.508	10.504	0.004	1.001	19193		2.65(0.00-0.00)	104	61.2	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.508	10.508	0.0	1.000	53923	0.9601		101		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.508	10.508	0.0	1.000	53923	NC			359	
D 16 13C4 PFOS										
502.4 > 79.7	11.467	11.465	0.002		394903	58.5		122	1542	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.467	11.466	0.001	1.000	73494	1.30		136	215	
498.3 > 98.2	11.467	11.466	0.001	1.000	46925		1.57(0.00-0.00)	136	89.2	
D 17 13C5 PFNA										
467.5 > 422.6	11.487	11.484	0.003		4536292	57.8		116	5606	
18 Perfluorononanoic acid										
462.5 > 418.6	11.487	11.486	0.001	1.000	129381	1.16		116	367	
D 19 13C2 PFDA										
514.4 > 469.5	12.324	12.325	-0.001		5822117	58.3		117	8557	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.324	12.325	-0.001	1.000	117054	0.9679		96.8	254	
D 23 13C8 FOSA										
505.4 > 77.6	12.896	12.893	0.003		5415770	56.1		112	4768	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.896	12.893	0.003	1.000	113427	0.9793		97.9	292	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.999	12.996	0.003	1.000	32142	NC			119	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.999	12.996	0.003	1.000	32142	0.9244		95.9		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.041	13.042	-0.001	1.000	132732	0.9364		93.6	203	
D 26 13C2 PFUnA										
564.3 > 519.5	13.041	13.044	-0.003		6010665	59.3		119	7574	
D 28 13C2 PFDoA										
614.4 > 569.4	13.650	13.646	0.004		5994993	56.9		114	3402	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.650	13.646	0.004	1.000	96089	0.8786		87.9	51.4	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.161	14.162	-0.001	1.000	90621	1.10		110	55.8	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.598	14.600	-0.002	1.000	48934	1.12		112	50.3	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.598	14.601	-0.003		4011816	52.9		106	3196	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.257	15.255	0.002		1614964	55.4		111	2889	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.257	15.255	0.002	1.000	147266	1.02		102	40.2	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.595	15.593	0.002	1.000	71437	1.00		100	103	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L2_00018 Amount Added: 1.00 Units: mL

Report Date: 27-May-2016 09:59:53 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_006.d

Injection Date: 25-May-2016 17:15:50 Instrument ID: A4

Lims ID: Std L2

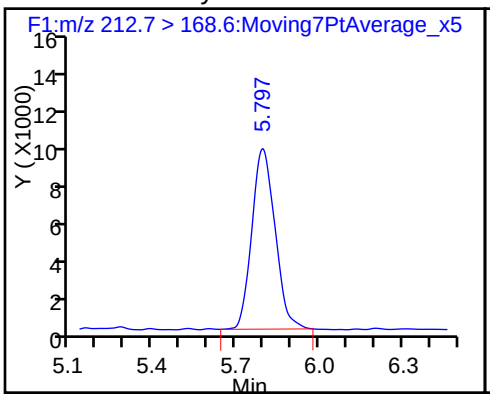
Client ID:

Operator ID: JRB ALS Bottle#: 11 Worklist Smp#: 6

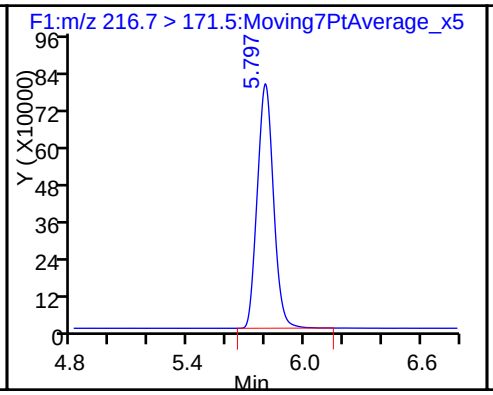
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

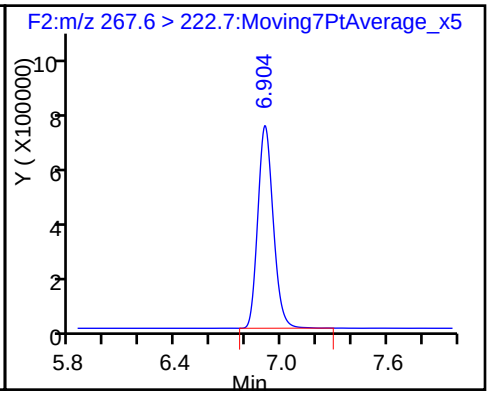
2 Perfluorobutyric acid



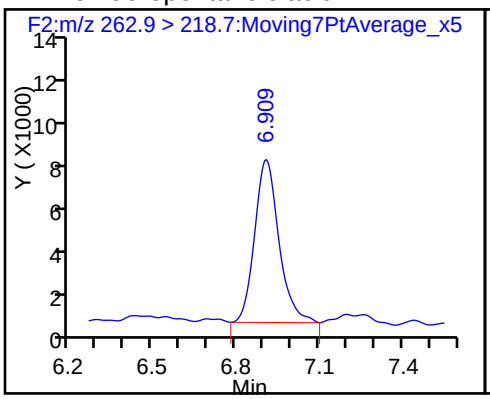
D 1 13C4 PFBA



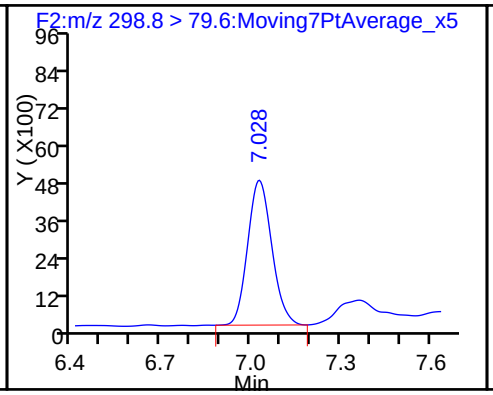
D 3 13C5-PFPeA



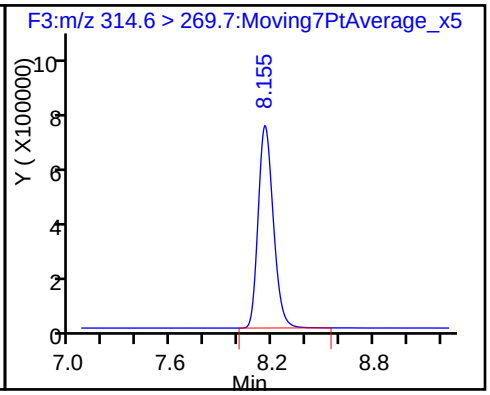
4 Perfluoropentanoic acid



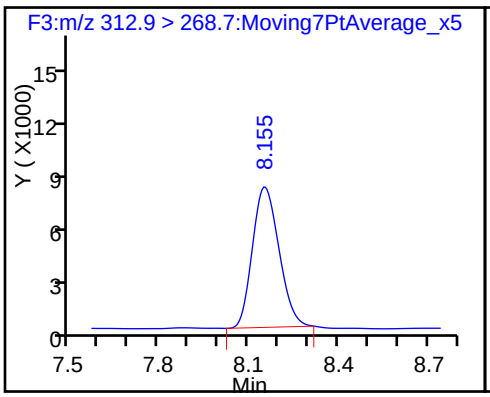
51 Perfluorobutanesulfonic acid



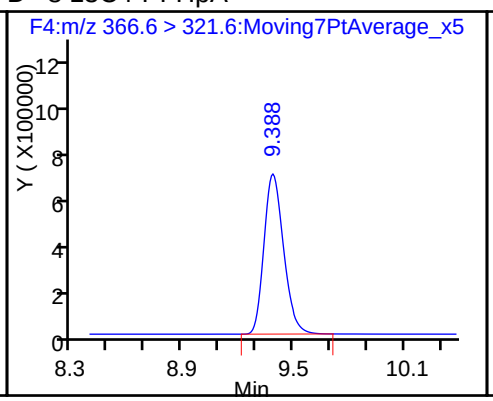
D 6 13C2 PFHxA



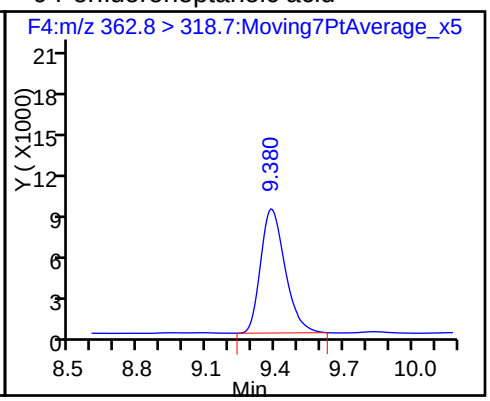
7 Perfluorohexanoic acid



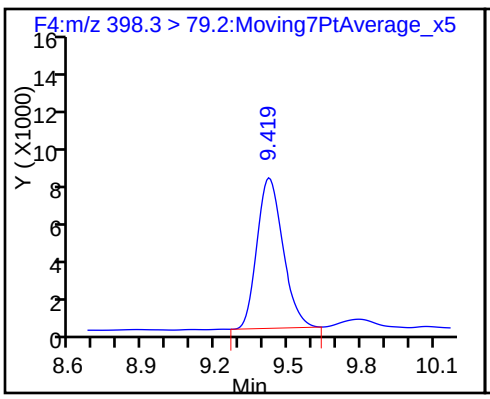
D 8 13C4-PFHpA



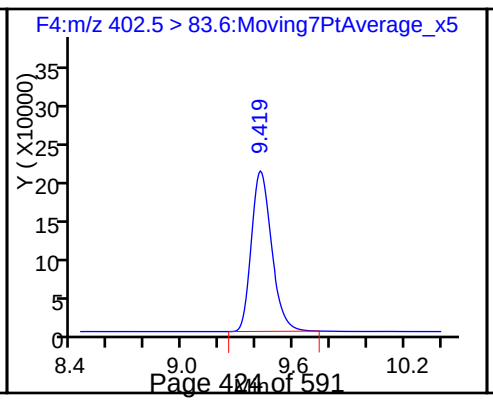
9 Perfluoroheptanoic acid



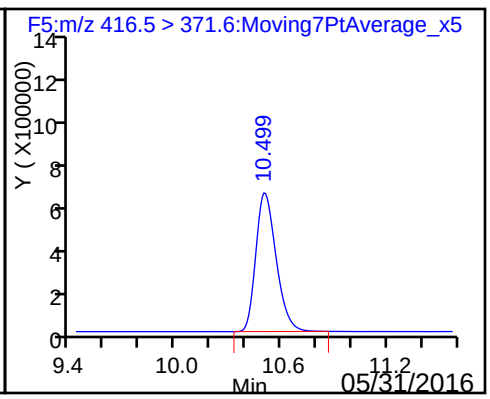
58 Perfluorohexanesulfonic acid



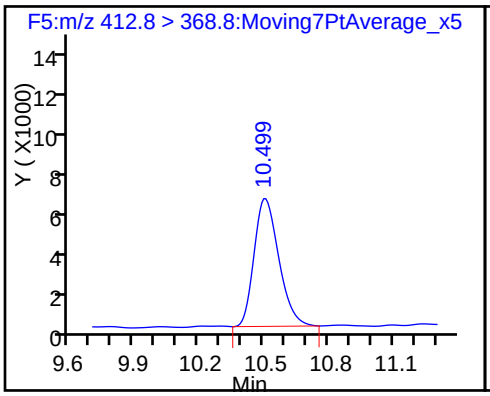
D 11 18O2 PFHxS



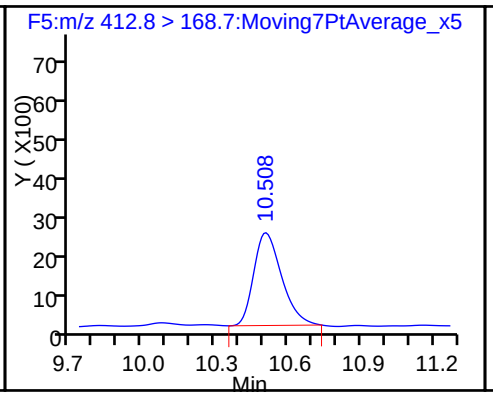
D 12 13C4 PFOA



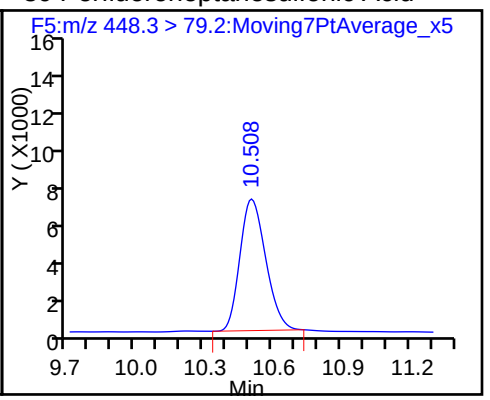
13 Perfluorooctanoic acid



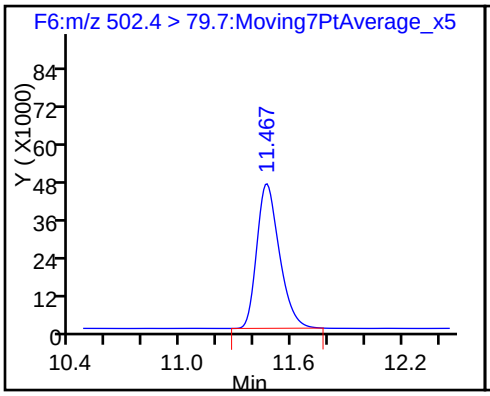
13 Perfluorooctanoic acid



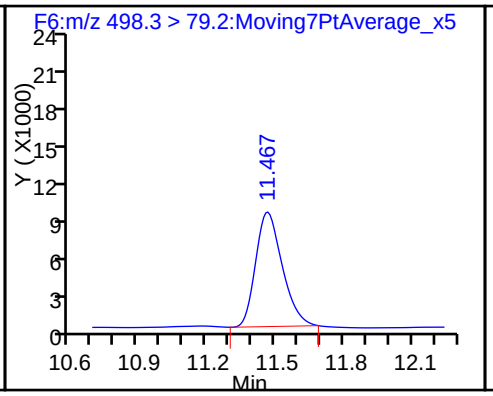
39 Perfluoroheptanesulfonic Acid



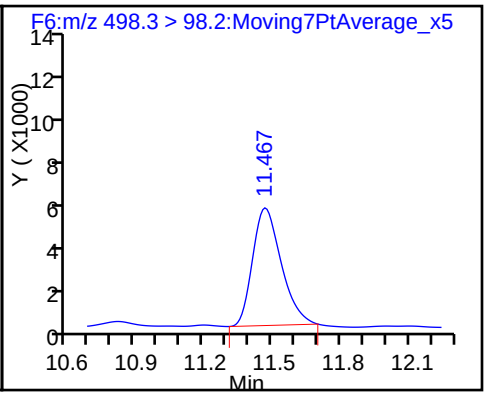
D 16 13C4 PFOS



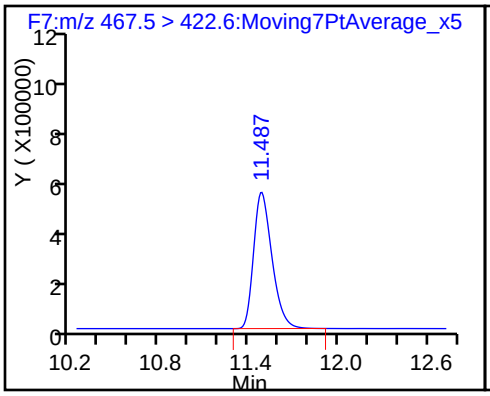
15 Perfluorooctane sulfonic acid



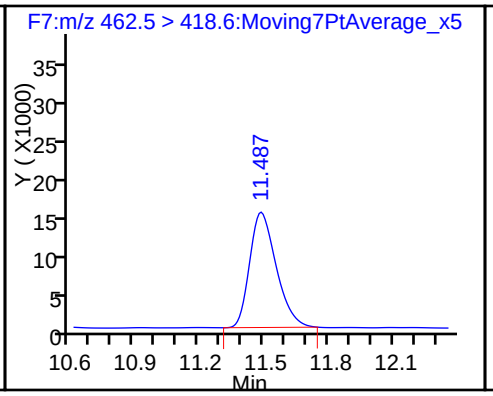
15 Perfluorooctane sulfonic acid



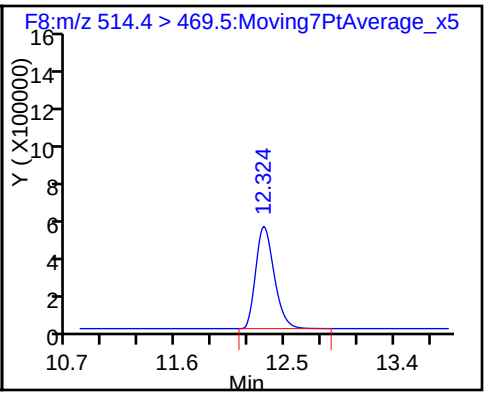
D 17 13C5 PFNA



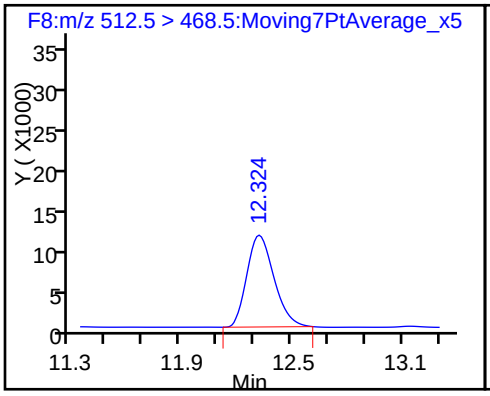
18 Perfluorononanoic acid



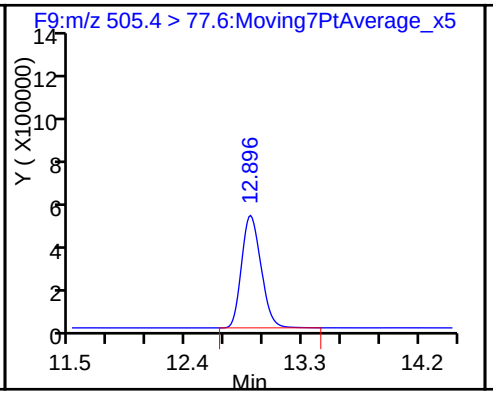
D 19 13C2 PFDA



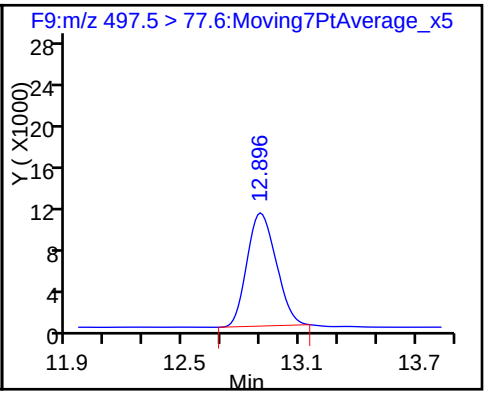
20 Perfluorodecanoic acid



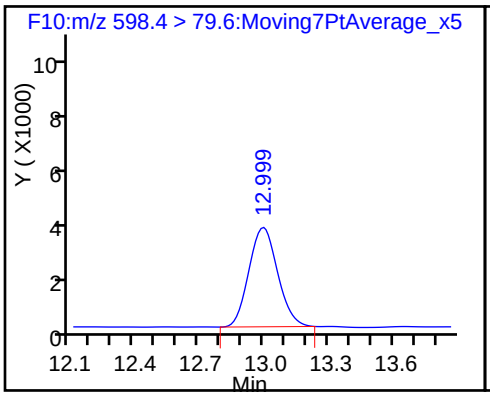
D 23 13C8 FOSA



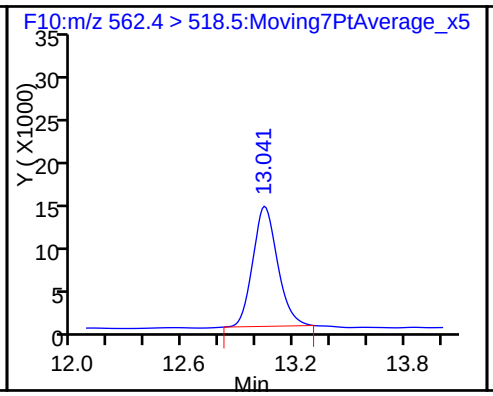
24 Perfluorooctane Sulfonamide



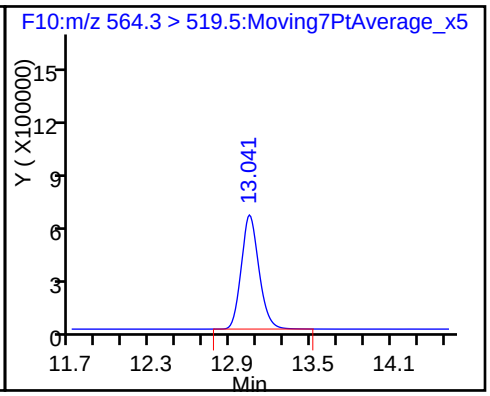
49 Perfluorodecane Sulfonic acid



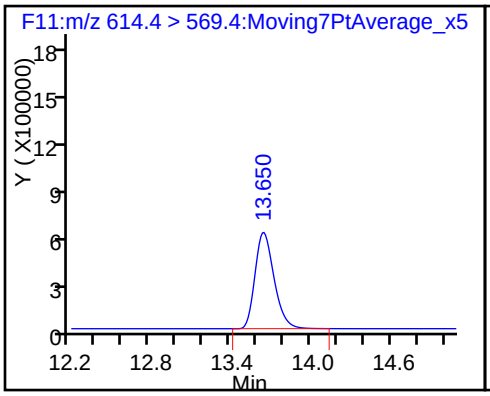
27 Perfluoroundecanoic acid



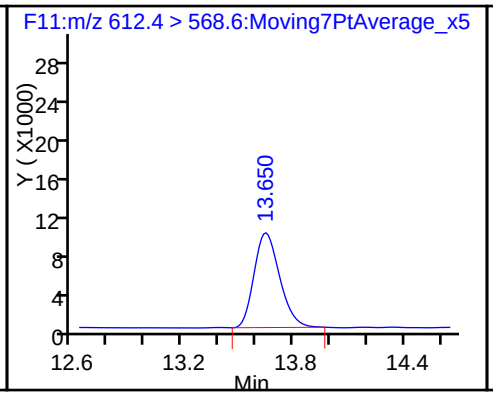
D 26 13C2 PFUnA



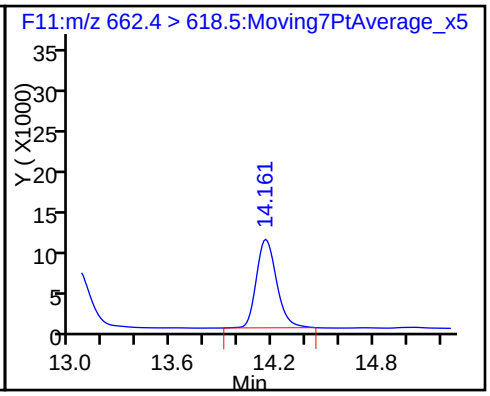
D 28 13C2 PFDoA



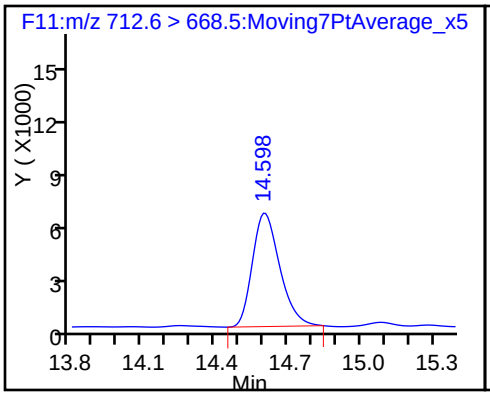
29 Perfluorododecanoic acid



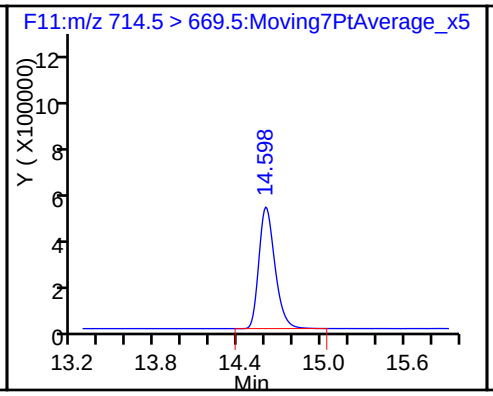
30 Perfluorotridecanoic acid



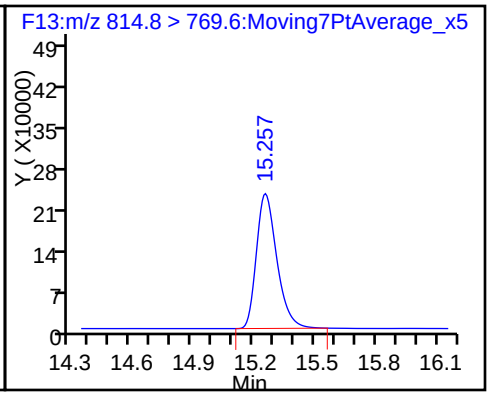
32 Perfluorotetradecanoic acid



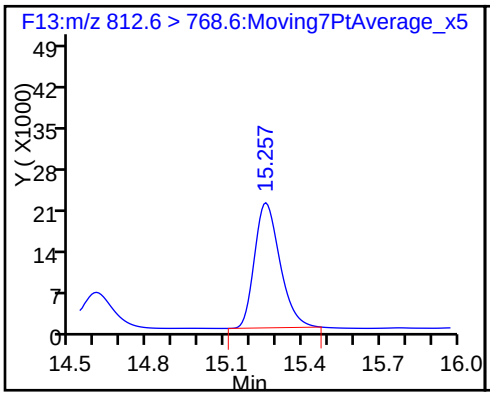
D 33 13C2-PFTeDA



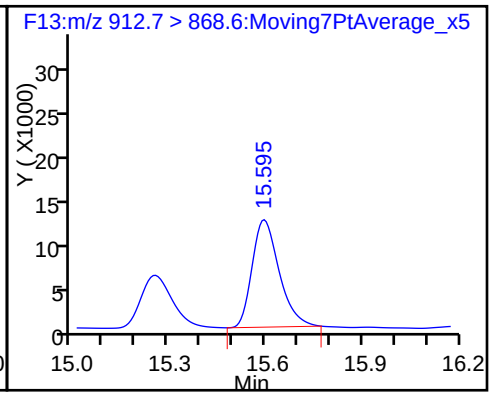
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_007.d
Lims ID: Std L3
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 25-May-2016 17:36:58 ALS Bottle#: 12 Worklist Smp#: 7
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L3
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:59:54 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 27-May-2016 09:55:50

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.797	5.798	-0.001	1.000	297640	5.21		104	1398	
D 1 13C4 PFBA										
216.7 > 171.5	5.797	5.798	-0.001		4448328	52.6		105	16101	
D 3 13C5-PFPeA										
267.6 > 222.7	6.909	6.907	0.002		3991347	52.0		104	6618	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.913	6.910	0.003	1.000	208712	5.15		103	94.5	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.024	7.024	0.0	1.000	98828	NC			240	
298.8 > 98.6	7.024	7.024	0.0	1.000	65179		1.52(0.00-0.00)		142	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.024	7.024	0.0	1.000	98828	3.99		90.3		
D 6 13C2 PFHxA										
314.6 > 269.7	8.160	8.156	0.004		4410855	53.1		106	9884	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.160	8.157	0.003	1.000	221266	5.41		108	858	
D 8 13C4-PFHpA										
366.6 > 321.6	9.388	9.387	0.001		4653428	54.4		109	7627	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.388	9.388	0.0	1.000	229994	4.75		95.0	663	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.419	9.421	-0.002	1.000	253682	NC			474	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.419	9.421	-0.002	1.000	253682	4.56		96.4		
D 11 18O2 PFHxS										
402.5 > 83.6	9.419	9.422	-0.003		1539364	51.9		110	4335	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.502	10.503	-0.001		4731111	53.1		106	8520	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.502	10.504	-0.002	1.000	229522	5.29		106	435	
412.8 > 168.7	10.511	10.504	0.007	1.001	76842		2.99(0.00-0.00)	106	335	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.502	10.508	-0.006	1.000	260465	4.74		99.7		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.502	10.508	-0.006	1.000	260465	NC			1116	
D 16 13C4 PFOS										
502.4 > 79.7	11.461	11.465	-0.004		346744	51.4		107	1150	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.461	11.466	-0.005	1.000	400180	4.60		96.3	1500	
498.3 > 98.2	11.470	11.466	0.004	1.001	222000		1.80(0.00-0.00)	96.3	444	
D 17 13C5 PFNA										
467.5 > 422.6	11.480	11.484	-0.004		4259193	54.3		109	7438	
18 Perfluorononanoic acid										
462.5 > 418.6	11.480	11.486	-0.006	1.000	540290	5.15		103	1060	
D 19 13C2 PFDA										
514.4 > 469.5	12.327	12.325	0.002		5669119	56.7		113	5615	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.327	12.325	0.002	1.000	597671	5.08		102	1438	
D 23 13C8 FOSA										
505.4 > 77.6	12.888	12.893	-0.005		5300712	54.9		110	4612	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.888	12.893	-0.005	1.000	588024	5.19		104	1148	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.991	12.996	-0.005	1.000	165005	NC			776	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.991	12.996	-0.005	1.000	165005	5.40		112		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.044	13.042	0.002	1.000	644718	5.02		100	788	
D 26 13C2 PFUnA										
564.3 > 519.5	13.044	13.044	0.0		5441575	53.7		107	5474	
D 28 13C2 PFDoA										
614.4 > 569.4	13.644	13.646	-0.002		5430267	51.5		103	3396	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.644	13.646	-0.002	1.000	548185	5.53		111	336	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.154	14.162	-0.008	1.000	442855	5.64		113	232	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.592	14.600	-0.008	1.000	194966	4.69		93.8	149	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.602	14.601	0.001		3830217	50.5		101	2935	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.252	15.255	-0.003		1499037	51.4		103	3014	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.252	15.255	-0.003	1.000	429422	4.82		96.4	104	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.591	15.593	-0.002	1.000	333192	5.03		101	456	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L3_00016 Amount Added: 1.00 Units: mL

Report Date: 27-May-2016 09:59:54 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_007.d

Injection Date: 25-May-2016 17:36:58 Instrument ID: A4

Lims ID: Std L3

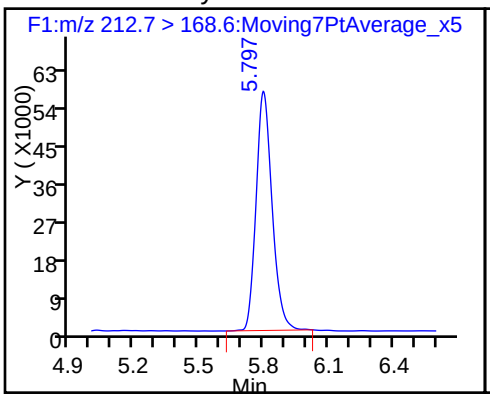
Client ID:

Operator ID: JRB ALS Bottle#: 12 Worklist Smp#: 7

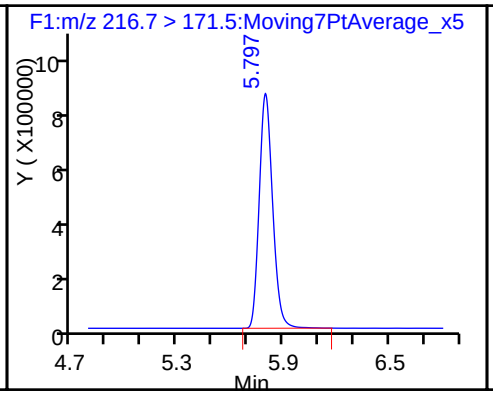
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

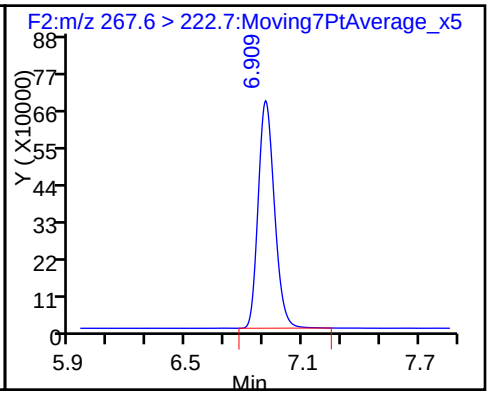
2 Perfluorobutyric acid



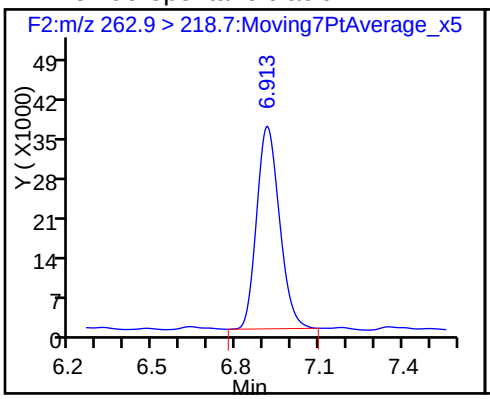
D 1 13C4 PFBA



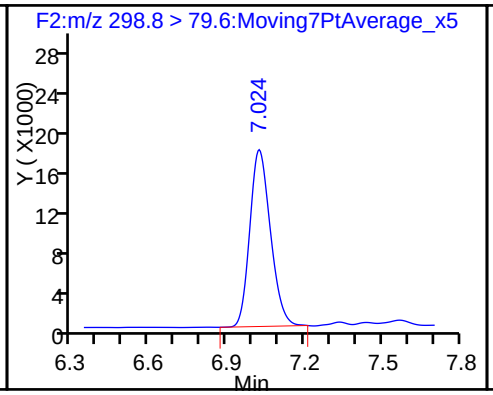
D 3 13C5-PFPeA



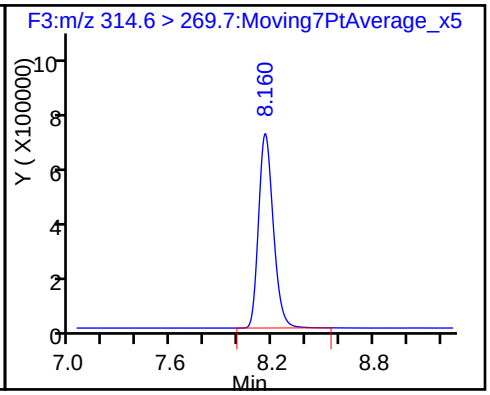
4 Perfluoropentanoic acid



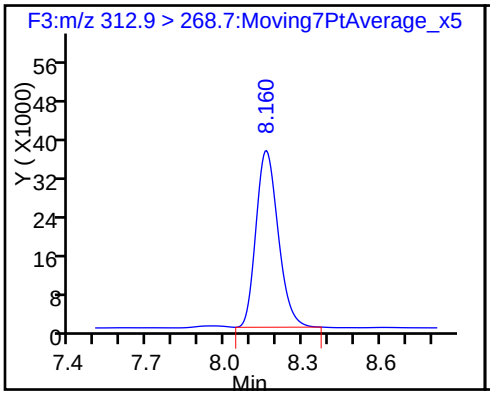
51 Perfluorobutanesulfonic acid



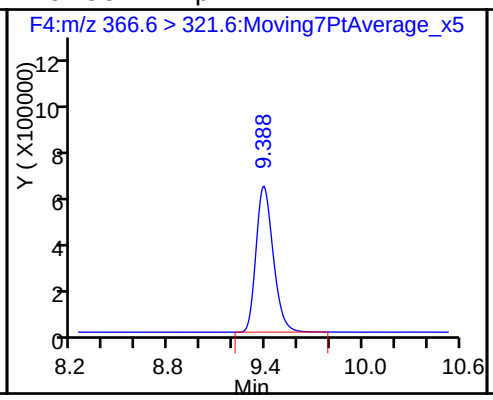
D 6 13C2 PFHxA



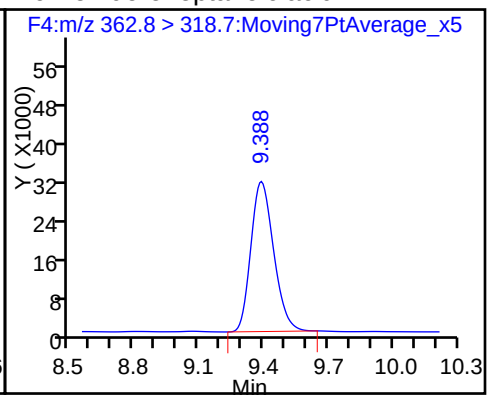
7 Perfluorohexanoic acid



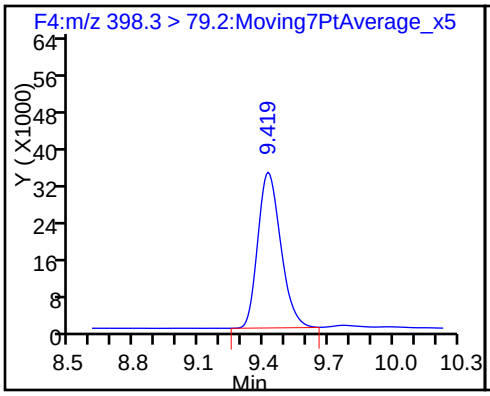
D 8 13C4-PFHpA



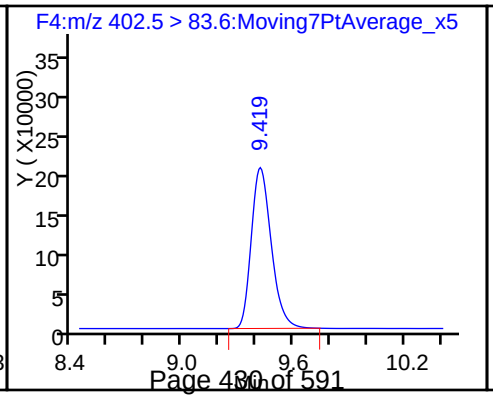
9 Perfluoroheptanoic acid



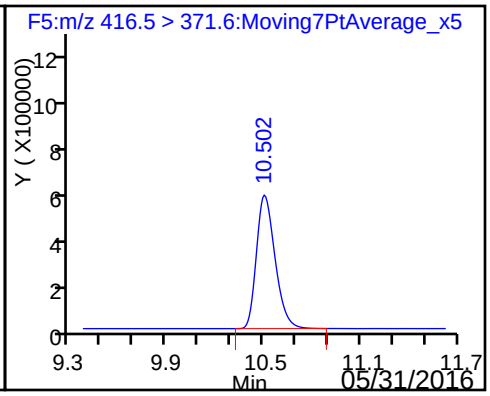
58 Perfluorohexanesulfonic acid



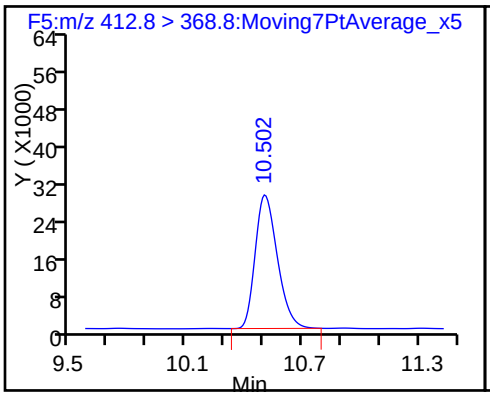
D 11 18O2 PFHxS



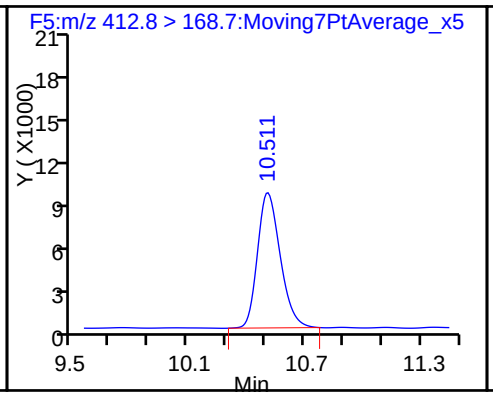
D 12 13C4 PFOA



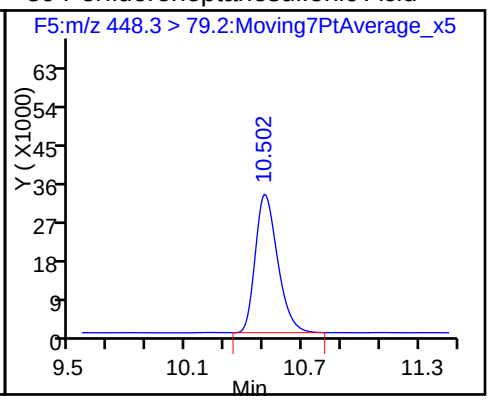
13 Perfluorooctanoic acid



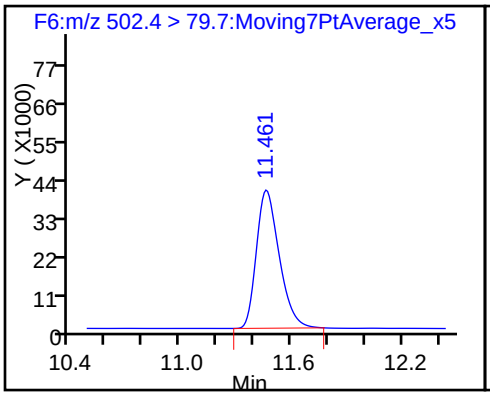
13 Perfluorooctanoic acid



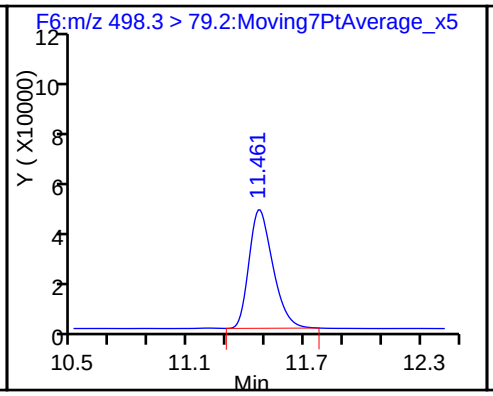
39 Perfluoroheptanesulfonic Acid



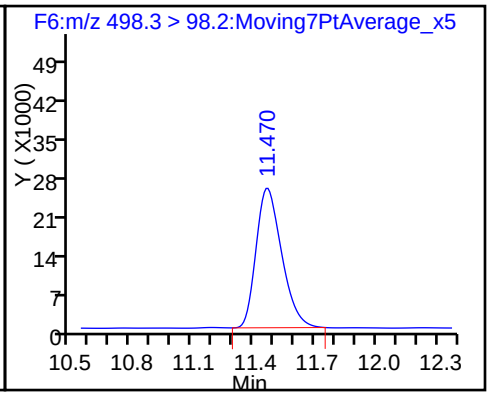
D 16 13C4 PFOS



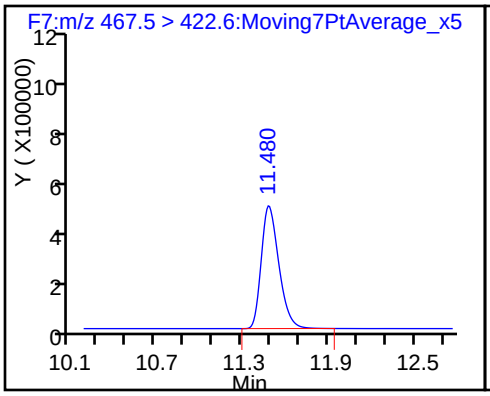
15 Perfluorooctane sulfonic acid



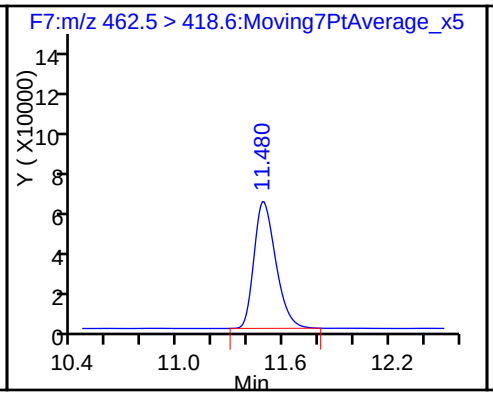
15 Perfluorooctane sulfonic acid



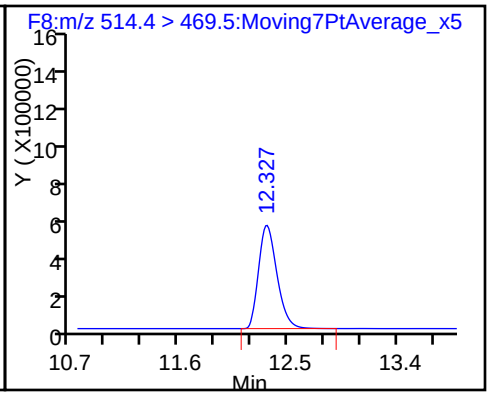
D 17 13C5 PFNA



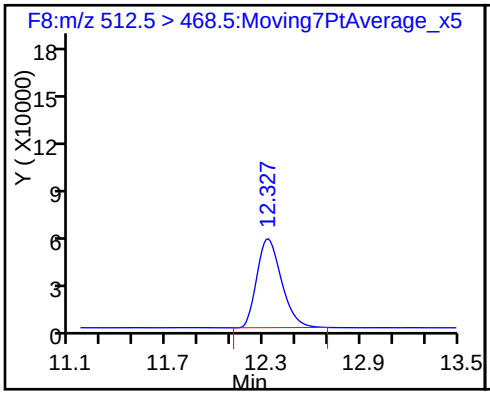
18 Perfluorononanoic acid



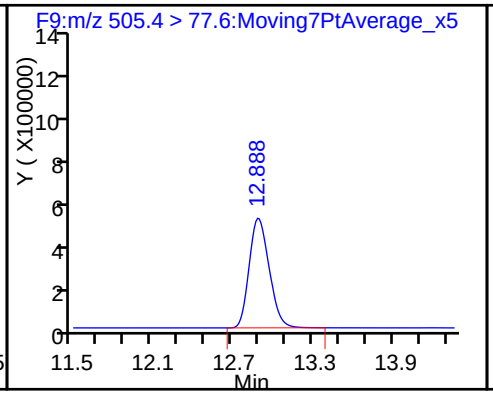
D 19 13C2 PFDA



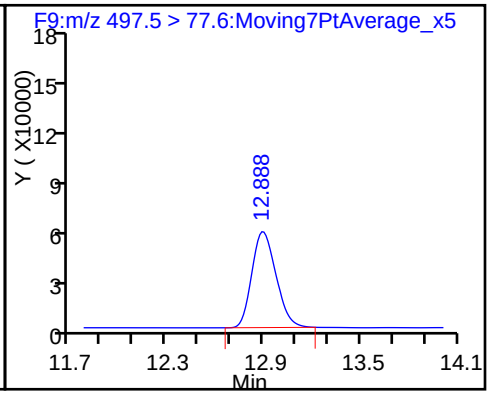
20 Perfluorodecanoic acid



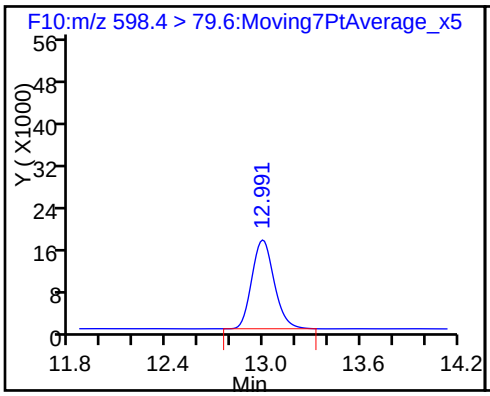
D 23 13C8 FOSA



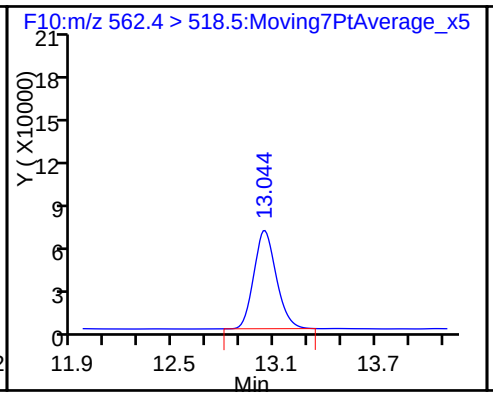
24 Perfluorooctane Sulfonamide



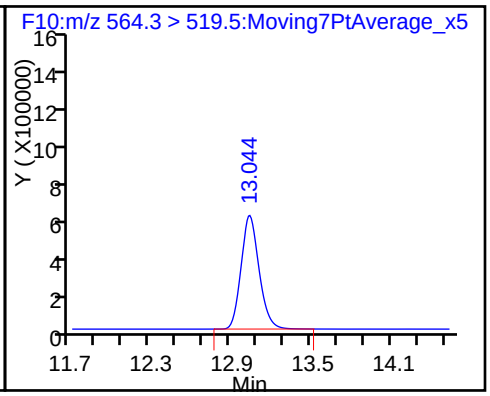
49 Perfluorodecane Sulfonic acid



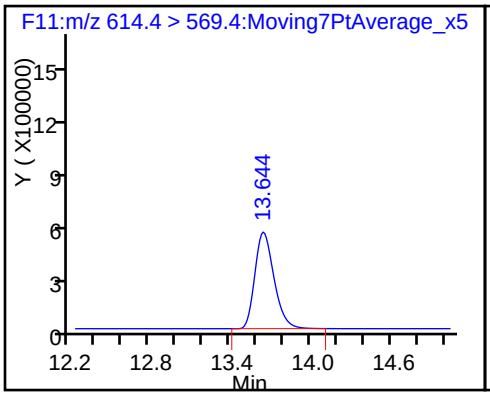
27 Perfluoroundecanoic acid



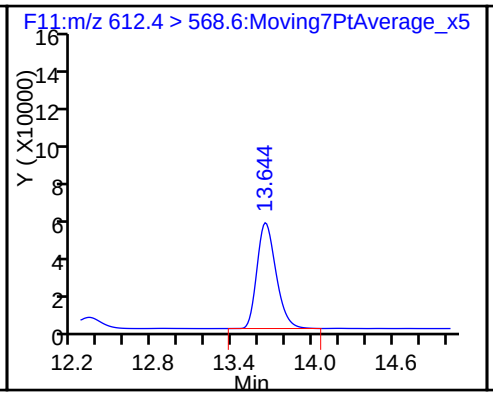
D 26 13C2 PFUnA



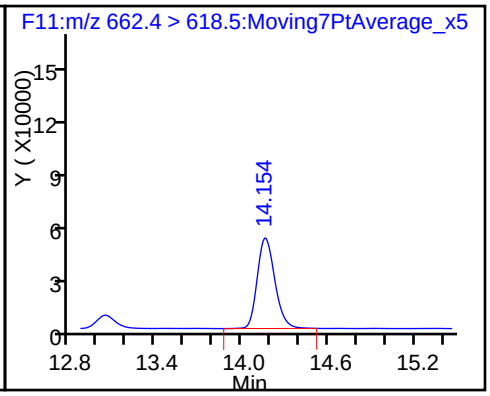
D 28 13C2 PFDoA



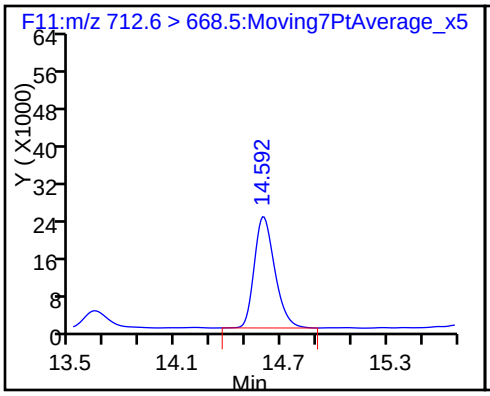
29 Perfluorododecanoic acid



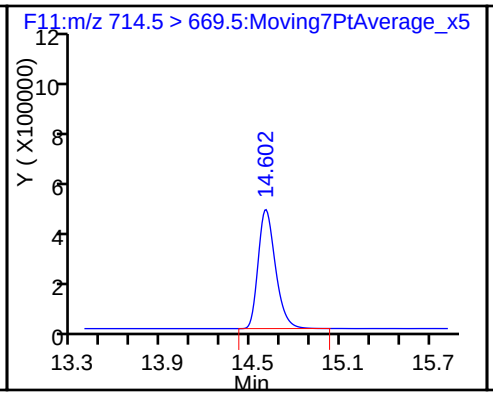
30 Perfluorotridecanoic acid



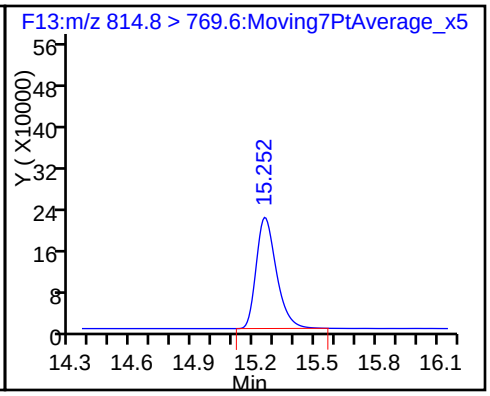
32 Perfluorotetradecanoic acid



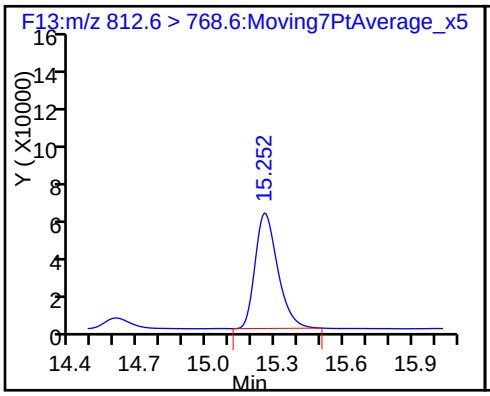
D 33 13C2-PFTeDA



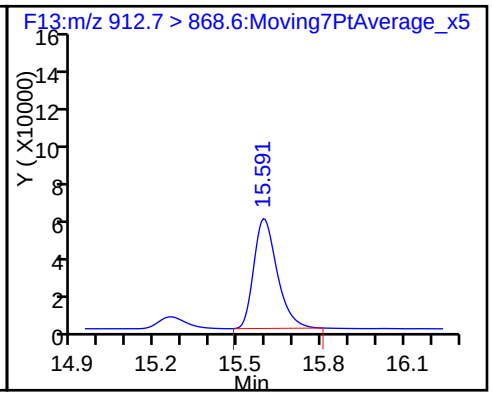
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_008.d
Lims ID: Std L4
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 25-May-2016 17:58:10 ALS Bottle#: 13 Worklist Smp#: 8
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L4
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:59:55 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 25-May-2016 19:09:55

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.797	5.798	-0.001	1.000	1071850	18.2		90.9	3903	
D 1 13C4 PFBA										
216.7 > 171.5	5.800	5.798	0.002		4591623	54.3		109	17146	
D 3 13C5-PFPeA										
267.6 > 222.7	6.904	6.907	-0.003		3991474	52.0		104	7812	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.909	6.910	-0.001	1.000	776204	19.1		95.7	360	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.024	7.024	0.0	1.000	360125	NC			703	
298.8 > 98.6	7.024	7.024	0.0	1.000	244125		1.48(0.00-0.00)		548	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.024	7.024	0.0	1.000	360125	16.7		94.5		
D 6 13C2 PFHxA										
314.6 > 269.7	8.155	8.156	-0.001		4438990	53.5		107	7931	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.155	8.157	-0.002	1.000	721387	17.9		89.6	1491	
D 8 13C4-PFHpA										
366.6 > 321.6	9.388	9.387	0.001		4352241	50.9		102	7598	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.388	9.388	0.0	1.000	762273	17.9		89.4	2345	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.419	9.421	-0.002	1.000	836825	NC			1573	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.419	9.421	-0.002	1.000	836825	16.7		88.5		
D 11 18O2 PFHxS										
402.5 > 83.6	9.419	9.422	-0.003		1383940	46.6		98.6	2880	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.502	10.503	-0.001		4400676	49.4		98.7	8204	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.502	10.504	-0.002	1.000	740049	18.5		92.6	1413	
412.8 > 168.7	10.502	10.504	-0.002	1.000	254003		2.91(0.00-0.00)	92.6	1124	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.511	10.508	0.003	1.000	874389	15.8		82.9		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.511	10.508	0.003	1.000	874389	NC			1812	
D 16 13C4 PFOS										
502.4 > 79.7	11.461	11.465	-0.004		343813	50.9		107	1367	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.470	11.466	0.004	1.000	1353901	14.1		73.8	2350	
498.3 > 98.2	11.461	11.466	-0.005	0.999	818357		1.65(0.00-0.00)	73.8	1126	
D 17 13C5 PFNA										
467.5 > 422.6	11.480	11.484	-0.004		4095685	52.2		104	5733	
18 Perfluorononanoic acid										
462.5 > 418.6	11.480	11.486	-0.006	1.000	1866863	18.5		92.6	3372	
D 19 13C2 PFDA										
514.4 > 469.5	12.327	12.325	0.002		4909456	49.1		98.3	6069	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.327	12.325	0.002	1.000	2122830	20.8		104	2631	
D 23 13C8 FOSA										
505.4 > 77.6	12.888	12.893	-0.005		5285513	54.8		110	5392	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.888	12.893	-0.005	1.000	2104314	18.6		93.1	2345	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.991	12.996	-0.005	1.000	522503	NC			1398	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.991	12.996	-0.005	1.000	522503	17.3		89.5		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.044	13.042	0.002	1.000	2308031	18.4		92.0	2547	
D 26 13C2 PFUnA										
564.3 > 519.5	13.044	13.044	0.0		5319223	52.5		105	6022	
D 28 13C2 PFDoA										
614.4 > 569.4	13.644	13.646	-0.002		5576489	52.9		106	2954	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.644	13.646	-0.002	1.000	1916429	18.8		94.2	936	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.164	14.162	0.002	1.000	1515996	18.6		93.0	875	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.602	14.600	0.002	1.000	701642	16.3		81.4	530	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.602	14.601	0.001		3973031	52.3		105	2966	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.252	15.255	-0.003		1482695	50.9		102	2650	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.252	15.255	-0.003	1.000	1427552	18.0		89.8	327	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.591	15.593	-0.002	1.000	1188460	18.1		90.6	1236	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L4_00018 Amount Added: 1.00 Units: mL

Report Date: 27-May-2016 09:59:56 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_008.d

Injection Date: 25-May-2016 17:58:10 Instrument ID: A4

Lims ID: Std L4

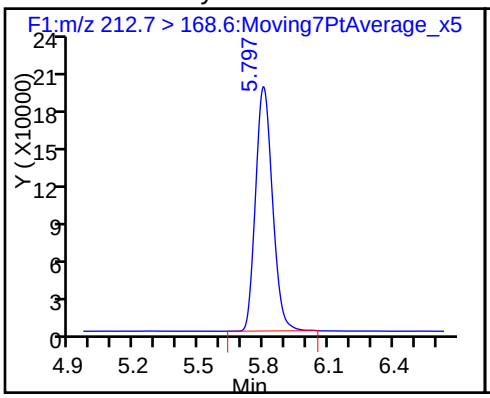
Client ID:

Operator ID: JRB ALS Bottle#: 13 Worklist Smp#: 8

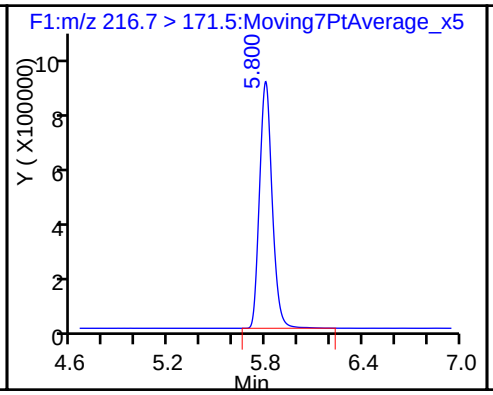
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

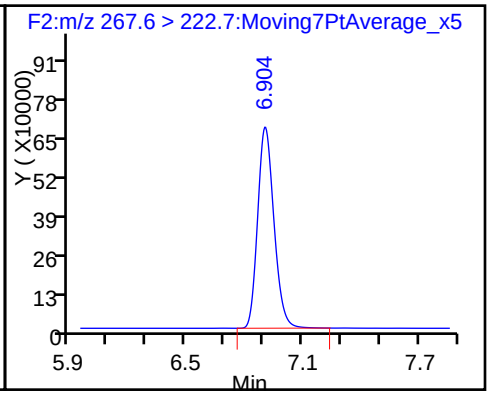
2 Perfluorobutyric acid



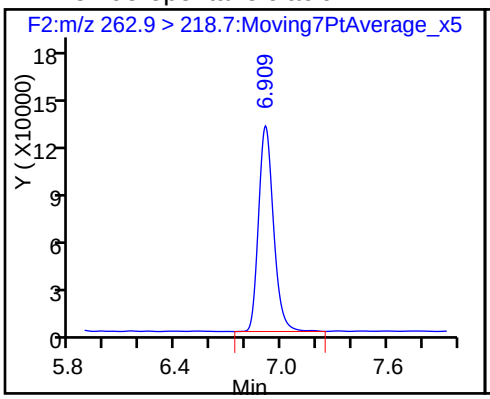
D 1 13C4 PFBA



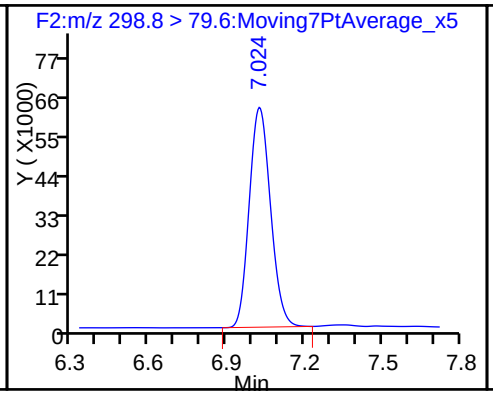
D 3 13C5-PFPeA



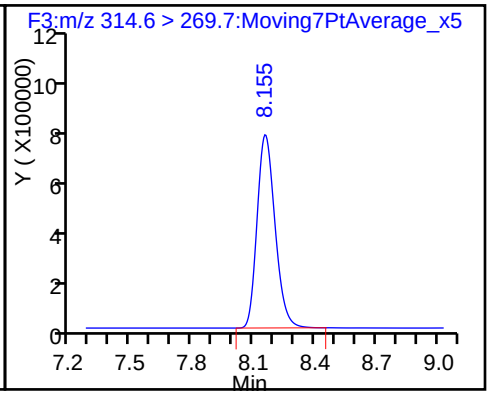
4 Perfluoropentanoic acid



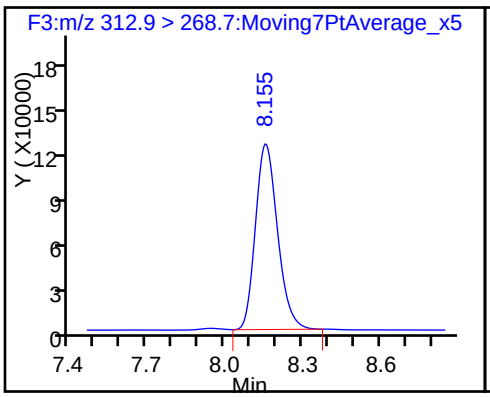
51 Perfluorobutanesulfonic acid



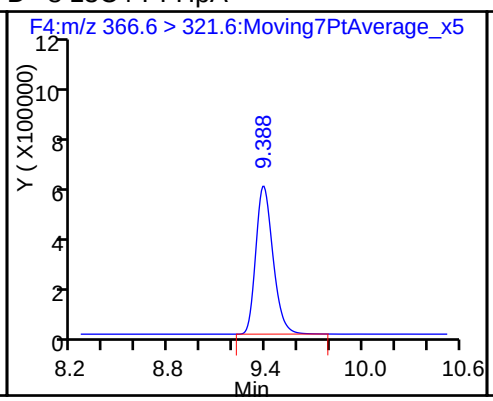
D 6 13C2 PFHxA



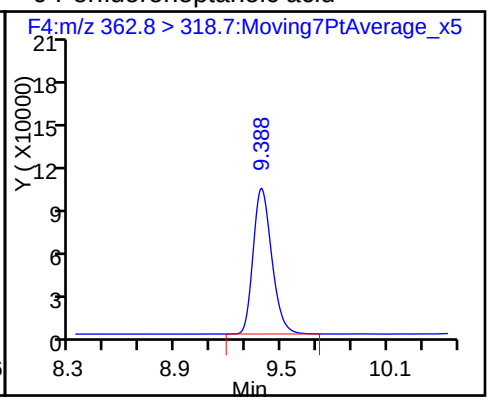
7 Perfluorohexanoic acid



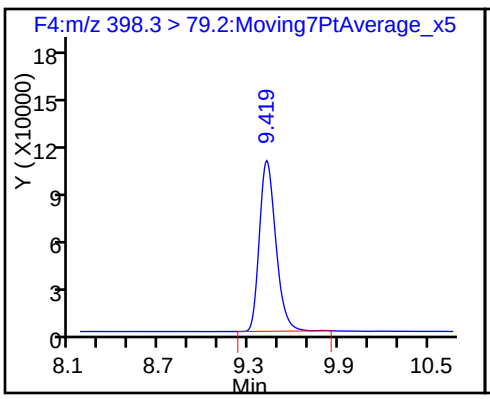
D 8 13C4-PFHpA



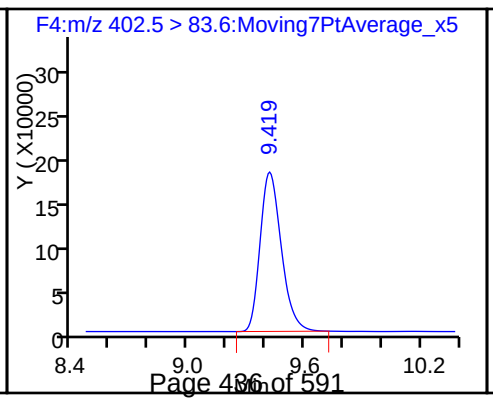
9 Perfluoroheptanoic acid



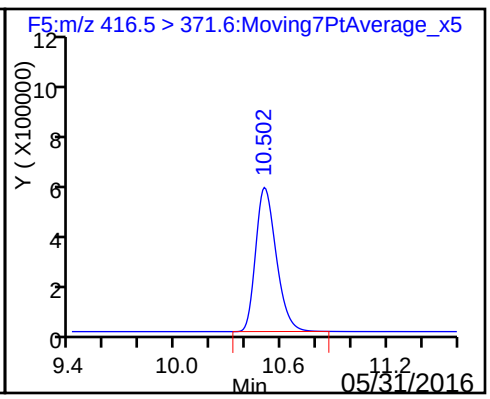
58 Perfluorohexanesulfonic acid



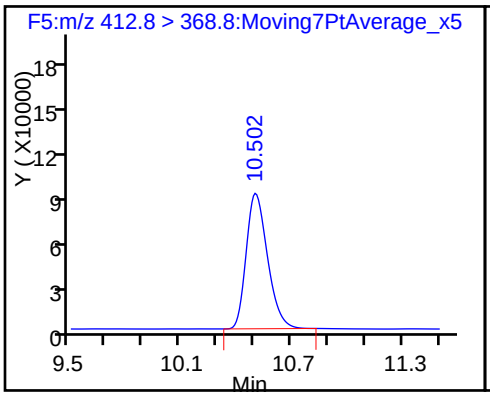
D 11 18O2 PFHxS



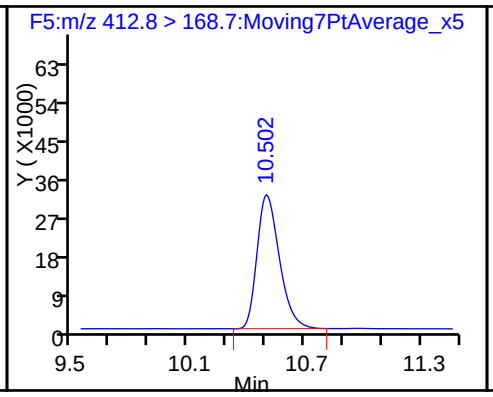
D 12 13C4 PFOA



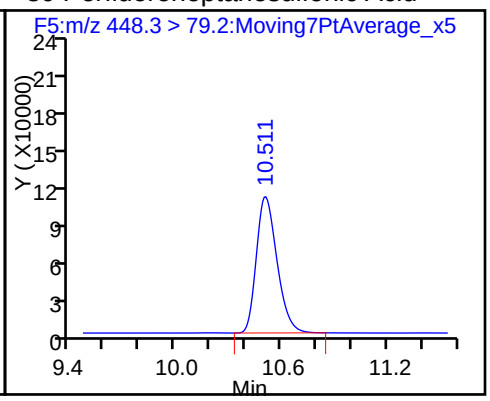
13 Perfluorooctanoic acid



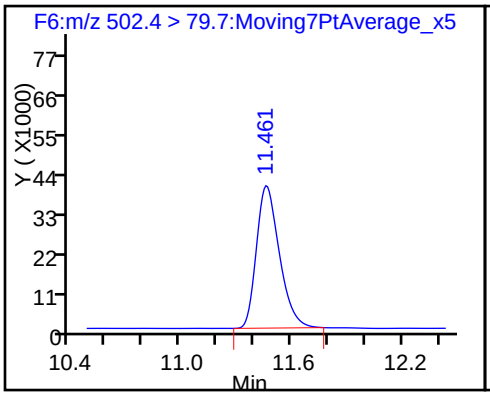
13 Perfluorooctanoic acid



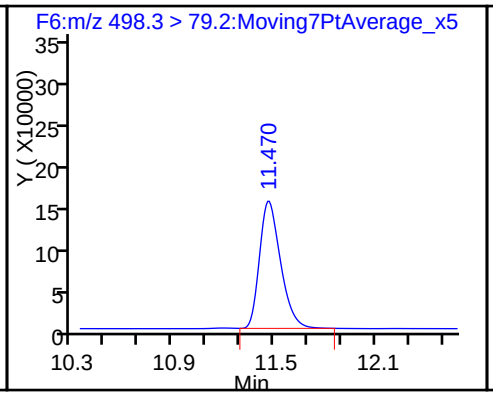
39 Perfluoroheptanesulfonic Acid



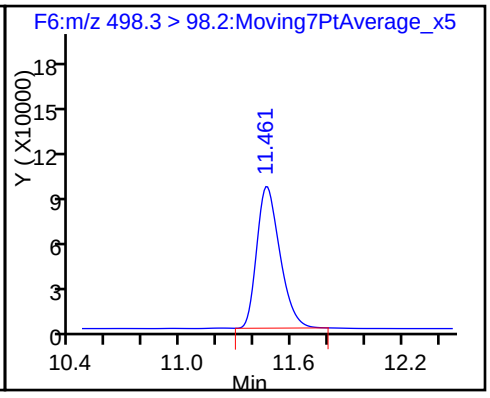
D 16 13C4 PFOS



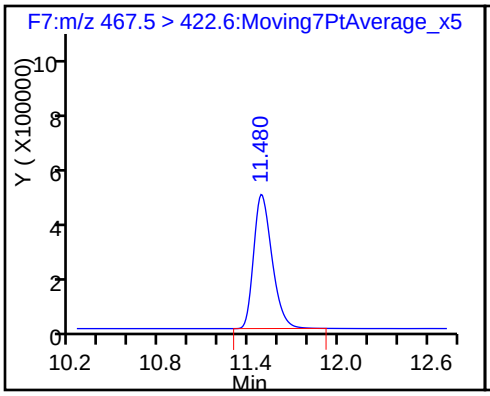
15 Perfluorooctane sulfonic acid



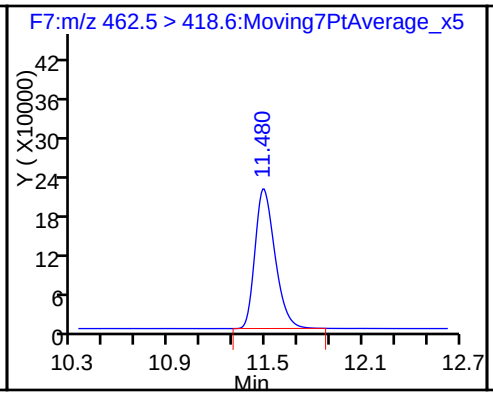
15 Perfluorooctane sulfonic acid



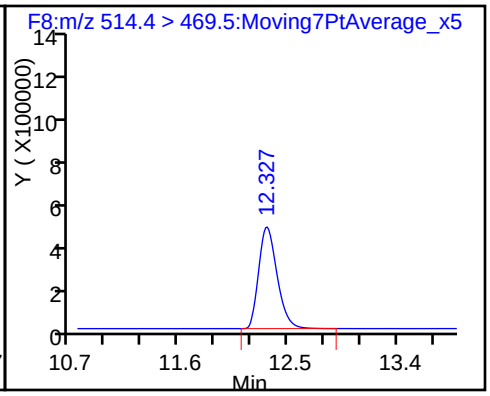
D 17 13C5 PFNA



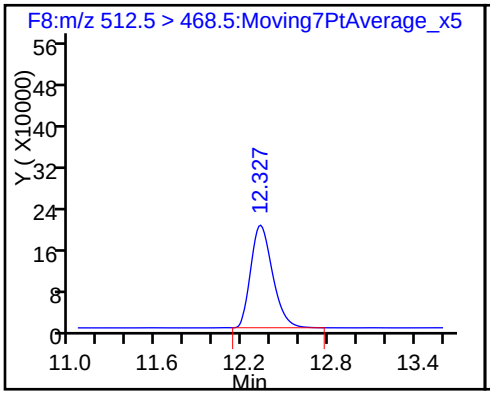
18 Perfluorononanoic acid



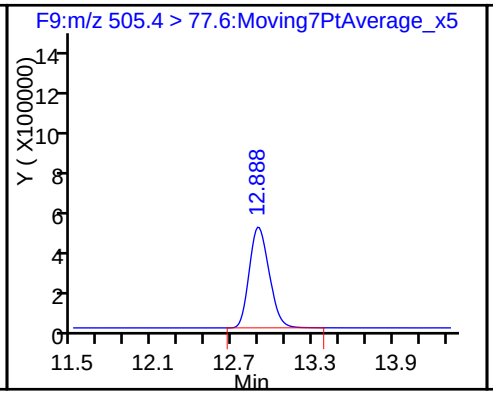
D 19 13C2 PFDA



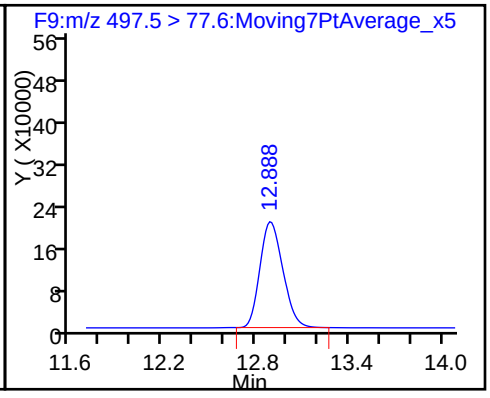
20 Perfluorodecanoic acid



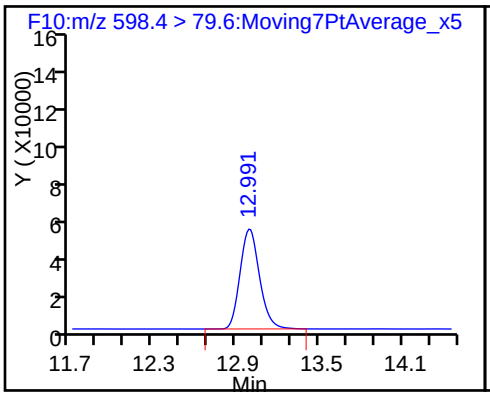
D 23 13C8 FOSA



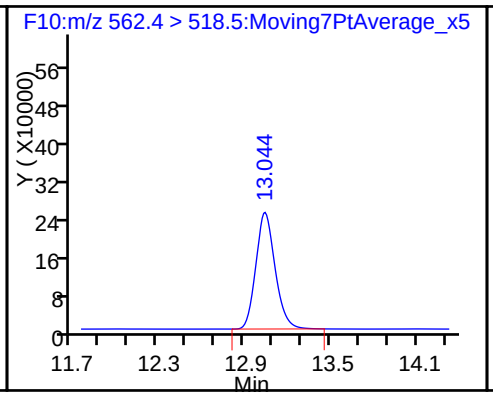
24 Perfluorooctane Sulfonamide



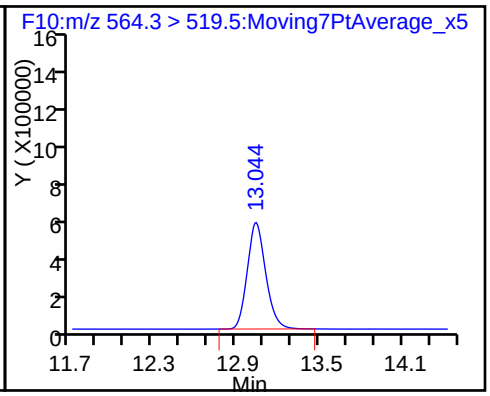
49 Perfluorodecane Sulfonic acid



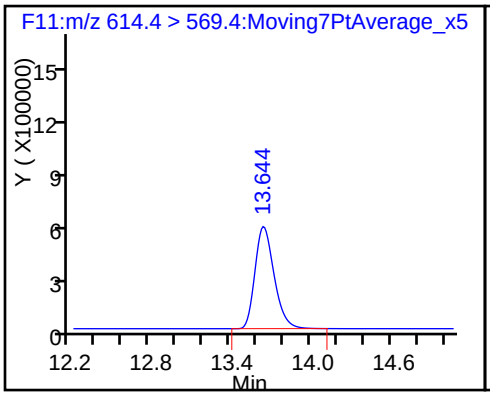
27 Perfluoroundecanoic acid



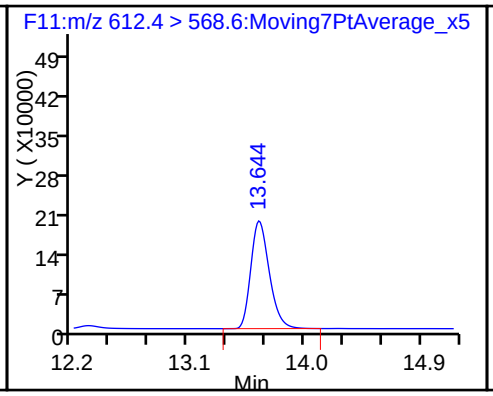
D 26 13C2 PFUnA



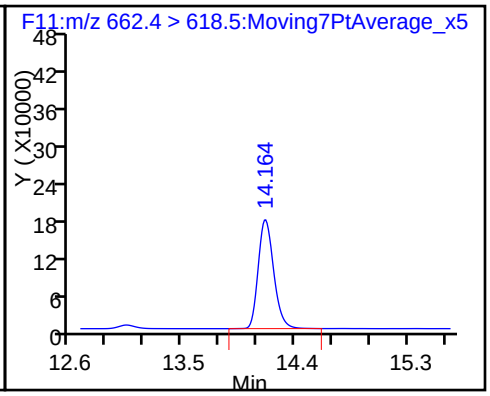
D 28 13C2 PFDoA



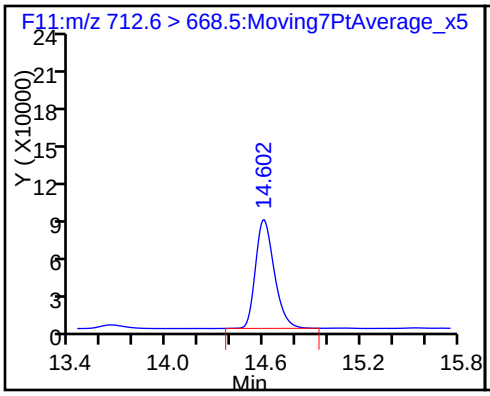
29 Perfluorododecanoic acid



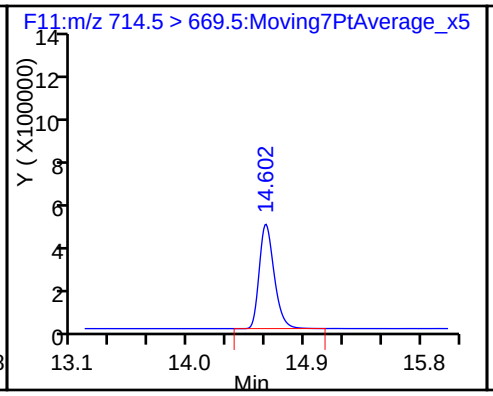
30 Perfluorotridecanoic acid



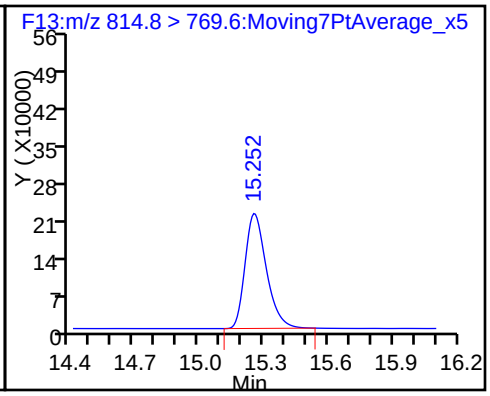
32 Perfluorotetradecanoic acid



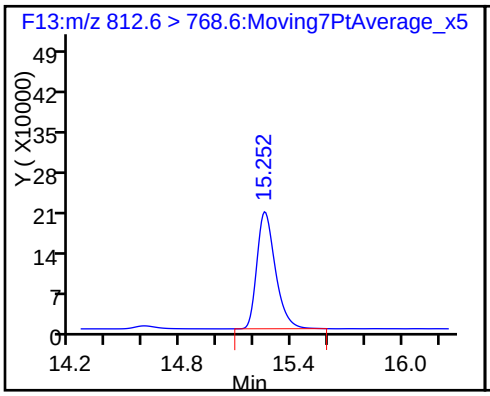
D 33 13C2-PFTeDA



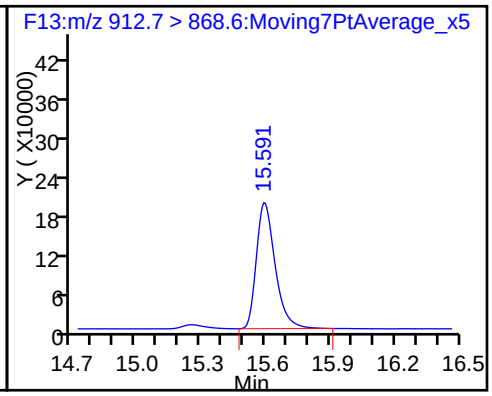
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_009.d
Lims ID: Std L5
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 25-May-2016 18:19:21 ALS Bottle#: 14 Worklist Smp#: 9
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L5
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:59:57 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 25-May-2016 20:09:50

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.800	5.798	0.002	1.000	3100647	53.4		107	9264	
D 1 13C4 PFBA										
216.7 > 171.5	5.797	5.798	-0.001		4524446	53.5		107	13463	
D 3 13C5-PFPeA										
267.6 > 222.7	6.904	6.907	-0.003		4006540	52.2		104	6534	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.909	6.910	-0.001	1.000	2027795	49.8		99.7	813	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.024	7.024	0.0	1.000	989482	NC			1707	
298.8 > 98.6	7.024	7.024	0.0	1.000	595561		1.66(0.00-0.00)		1061	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.024	7.024	0.0	1.000	989482	47.5		108		
D 6 13C2 PFHxA										
314.6 > 269.7	8.155	8.156	-0.001		4436301	53.4		107	10982	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.155	8.157	-0.002	1.000	2079954	52.1		104	2188	
D 8 13C4-PFHpA										
366.6 > 321.6	9.388	9.387	0.001		4425881	51.8		104	6353	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.388	9.388	0.0	1.000	2246637	52.6		105	4886	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.419	9.421	-0.002	1.000	2346082	NC			3698	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.419	9.421	-0.002	1.000	2346082	48.3		102		
D 11 18O2 PFHxS										
402.5 > 83.6	9.419	9.422	-0.003		1345505	45.3		95.8	2598	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.500	10.503	-0.003		4323584	48.5		97.0	5641	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.509	10.504	0.005	1.000	2069583	52.9		106	2106	
412.8 > 168.7	10.509	10.504	0.005	1.000	659359		3.14(0.00-0.00)	106	1960	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.509	10.508	0.001	1.000	2237092	48.2		101		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.509	10.508	0.001	1.000	2237092	NC			4297	
D 16 13C4 PFOS										
502.4 > 79.7	11.468	11.465	0.003		286688	42.5		88.9	983	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.468	11.466	0.002	1.000	3704007	44.8		93.7	3220	
498.3 > 98.2	11.468	11.466	0.002	1.000	2172713		1.70(0.00-0.00)	93.7	3206	
D 17 13C5 PFNA										
467.5 > 422.6	11.488	11.484	0.004		4072196	51.9		104	6079	
18 Perfluorononanoic acid										
462.5 > 418.6	11.488	11.486	0.002	1.000	4992828	49.8		99.6	4565	
D 19 13C2 PFDA										
514.4 > 469.5	12.325	12.325	0.0		4916681	49.2		98.4	5079	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.325	12.325	0.0	1.000	5574851	54.6		109	4682	
D 23 13C8 FOSA										
505.4 > 77.6	12.897	12.893	0.004		4892798	50.7		101	3472	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.897	12.893	0.004	1.000	5329485	50.9		102	3524	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	13.000	12.996	0.004	1.000	1217760	NC			3026	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	13.000	12.996	0.004	1.000	1217760	48.2		100		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.042	13.042	0.0	1.000	6249999	49.9		99.9	4164	
D 26 13C2 PFUnA										
564.3 > 519.5	13.042	13.044	-0.002		5308317	52.4		105	5567	
D 28 13C2 PFDoA										
614.4 > 569.4	13.639	13.646	-0.007		5426626	51.5		103	3060	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.639	13.646	-0.007	1.000	5541148	56.0		112	2330	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.161	14.162	-0.001	1.000	4237745	48.5		97.0	1792	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.599	14.600	-0.001	1.000	1949635	42.2		84.3	1207	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.599	14.601	-0.002		4261548	56.2		112	3742	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.258	15.255	0.003		1625355	55.8		112	3319	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.258	15.255	0.003	1.000	4468853	52.7		105	828	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.595	15.593	0.002	1.000	3933807	54.7		109	2837	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 27-May-2016 09:59:58 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_009.d

Injection Date: 25-May-2016 18:19:21 Instrument ID: A4

Lims ID: Std L5

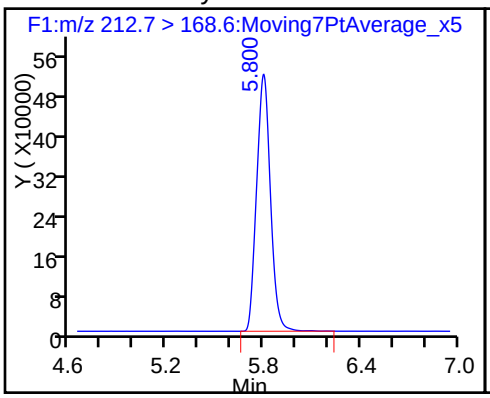
Client ID:

Operator ID: JRB ALS Bottle#: 14 Worklist Smp#: 9

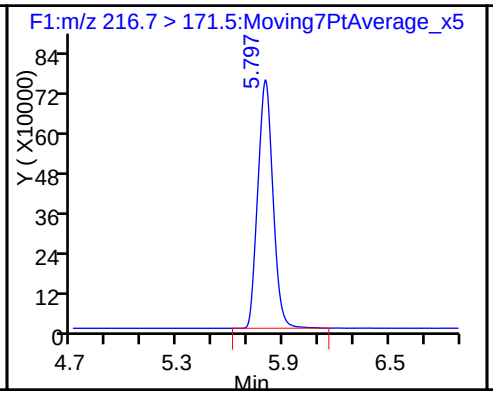
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

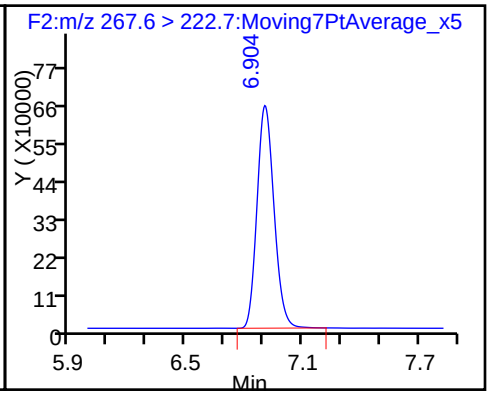
2 Perfluorobutyric acid



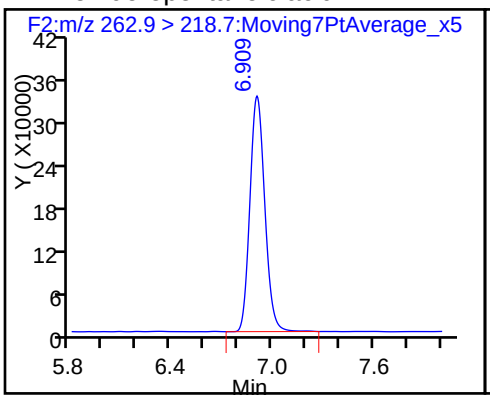
D 1 13C4 PFBA



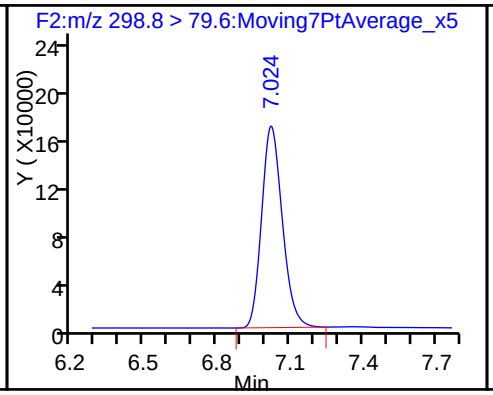
D 3 13C5-PFPeA



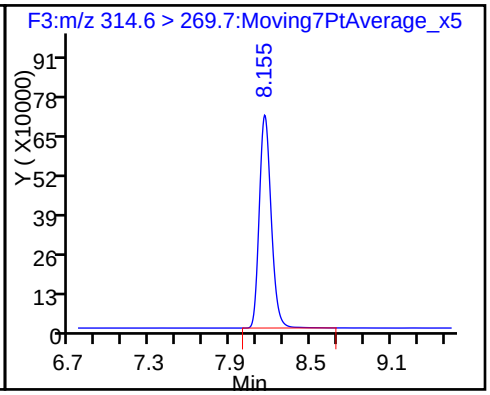
4 Perfluoropentanoic acid



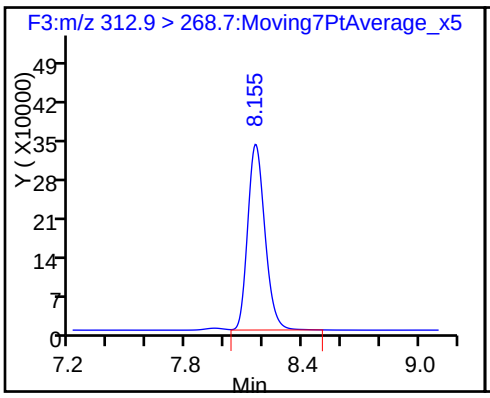
51 Perfluorobutanesulfonic acid



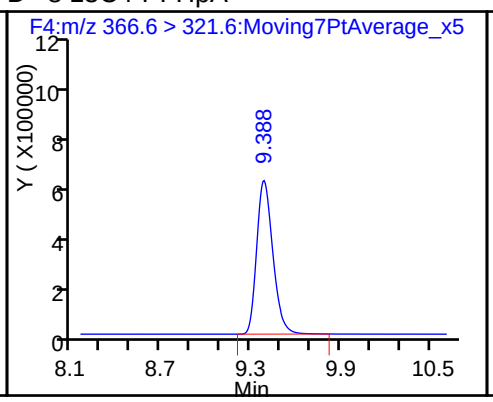
D 6 13C2 PFHxA



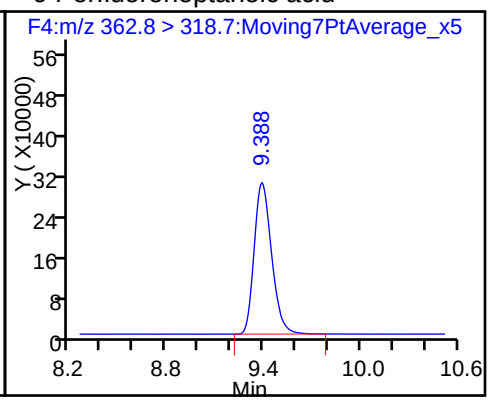
7 Perfluorohexanoic acid



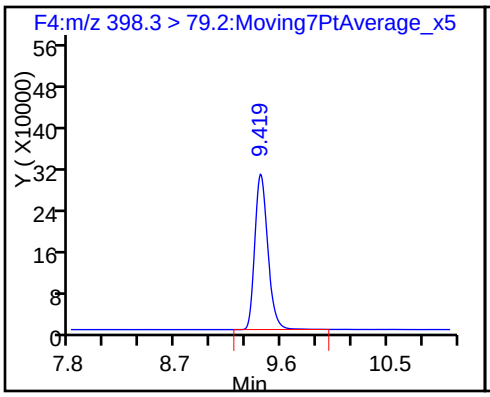
D 8 13C4-PFHpA



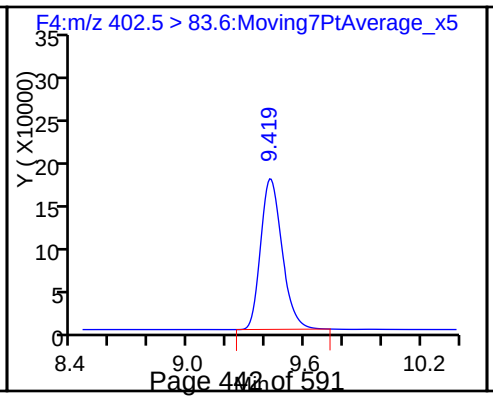
9 Perfluoroheptanoic acid



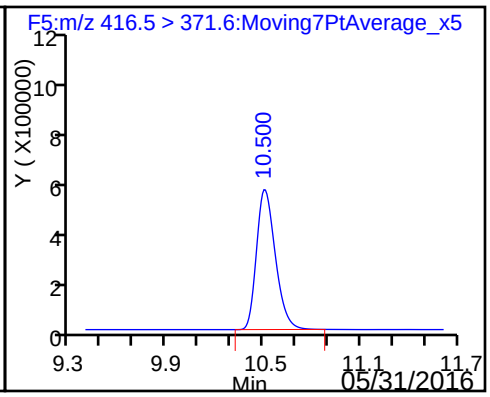
58 Perfluorohexanesulfonic acid



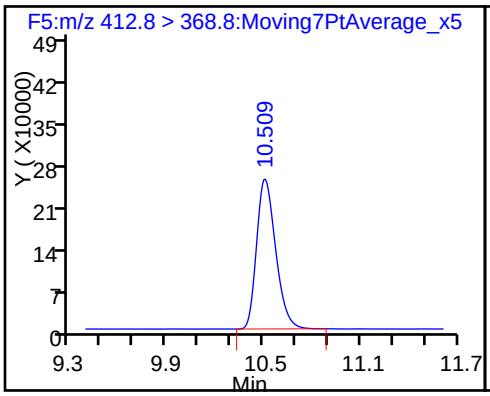
D 11 18O2 PFHxS



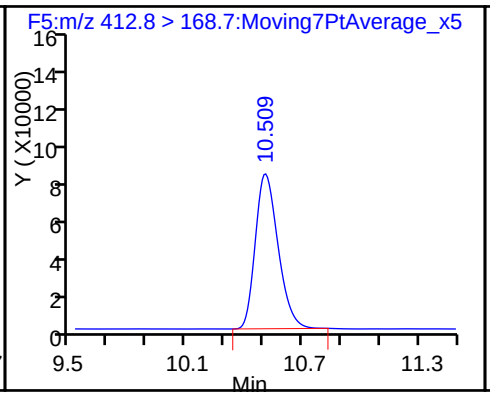
D 12 13C4 PFOA



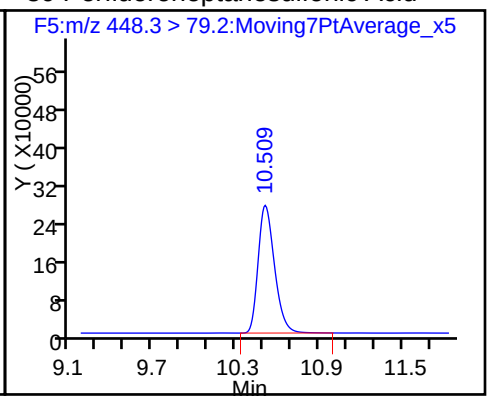
13 Perfluorooctanoic acid



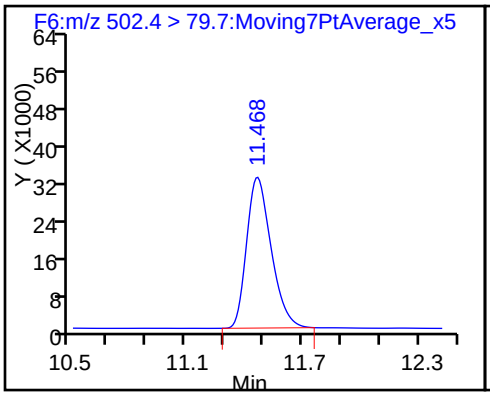
13 Perfluorooctanoic acid



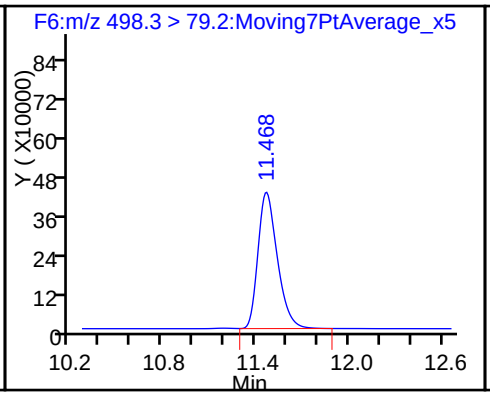
39 Perfluoroheptanesulfonic Acid



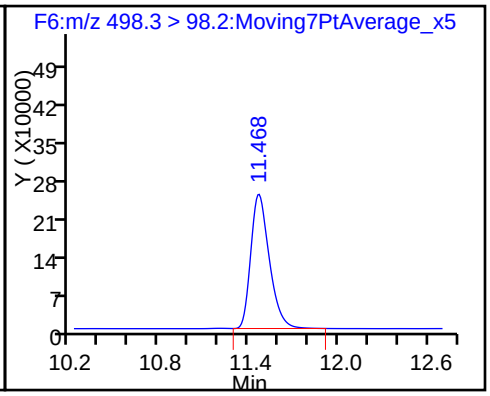
D 16 13C4 PFOS



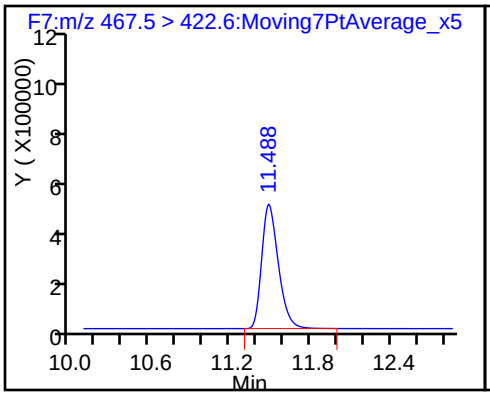
15 Perfluorooctane sulfonic acid



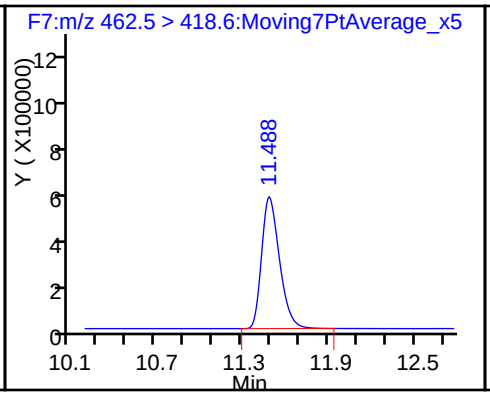
15 Perfluorooctane sulfonic acid



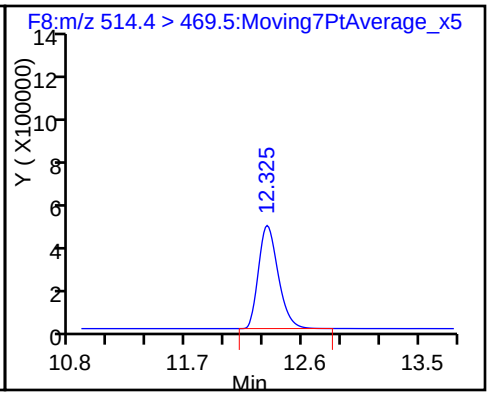
D 17 13C5 PFNA



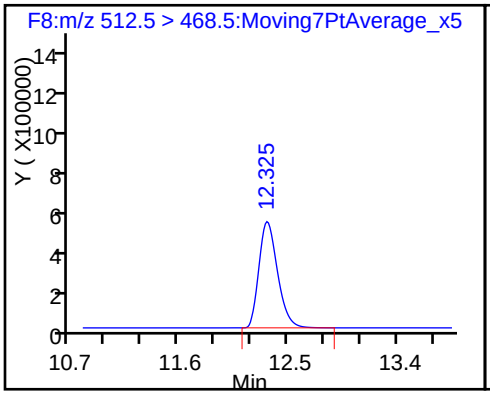
18 Perfluorononanoic acid



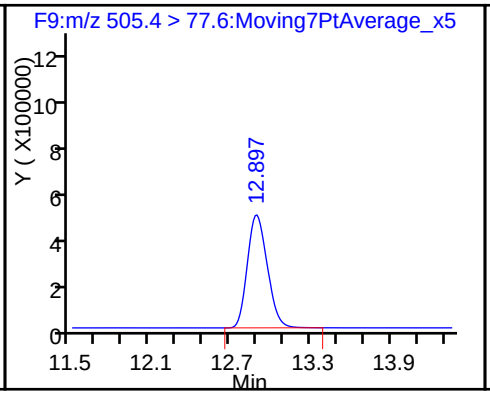
D 19 13C2 PFDA



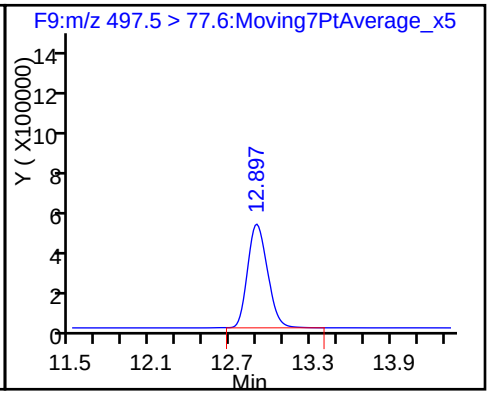
20 Perfluorodecanoic acid



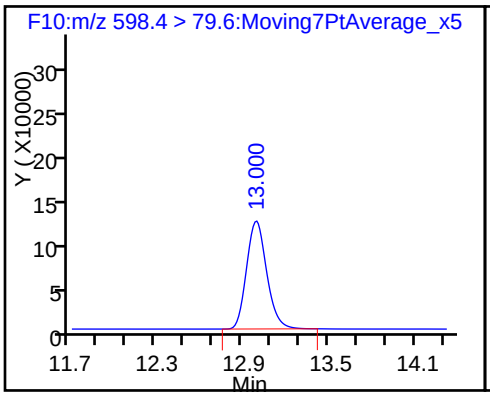
D 23 13C8 FOSA



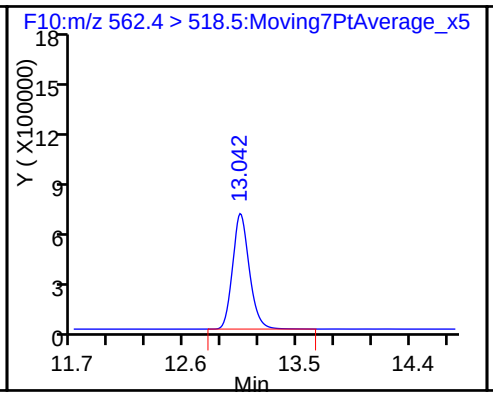
24 Perfluorooctane Sulfonamide



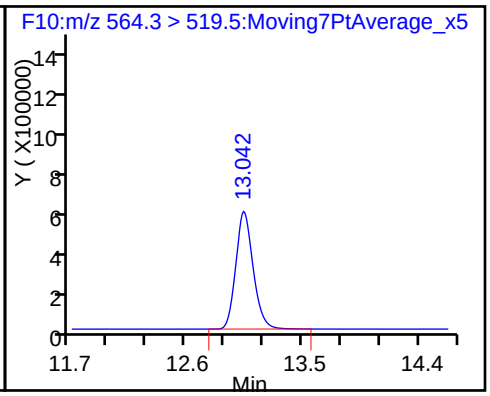
49 Perfluorodecane Sulfonic acid



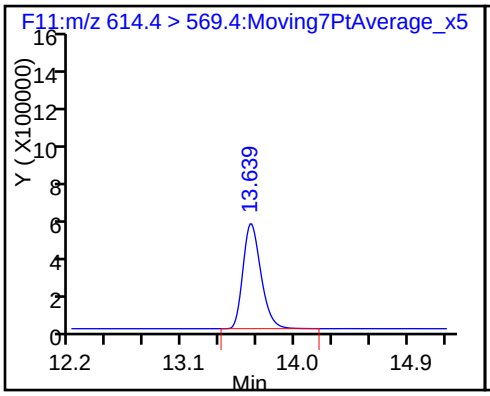
27 Perfluoroundecanoic acid



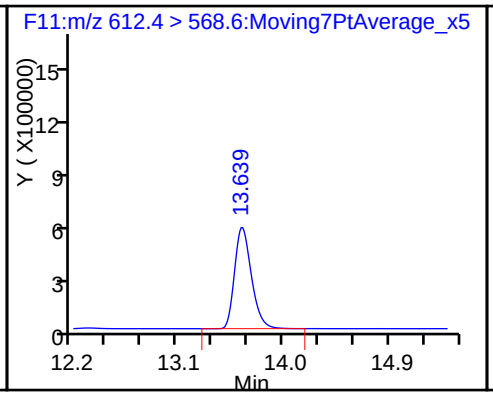
D 26 13C2 PFUnA



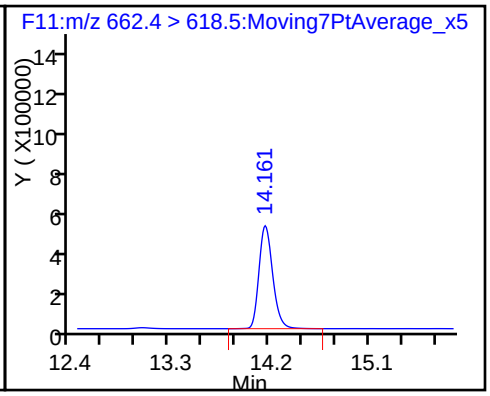
D 28 13C2 PFDoA



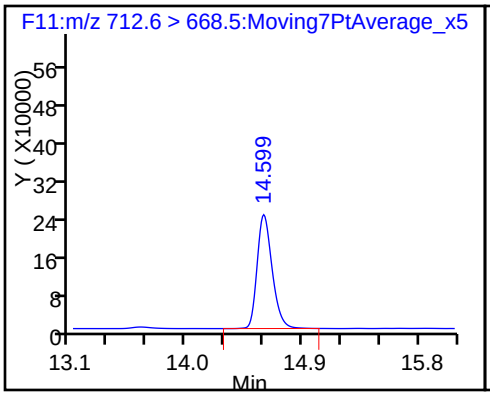
29 Perfluorododecanoic acid



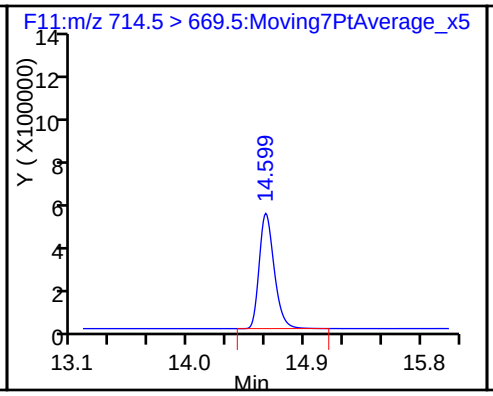
30 Perfluorotridecanoic acid



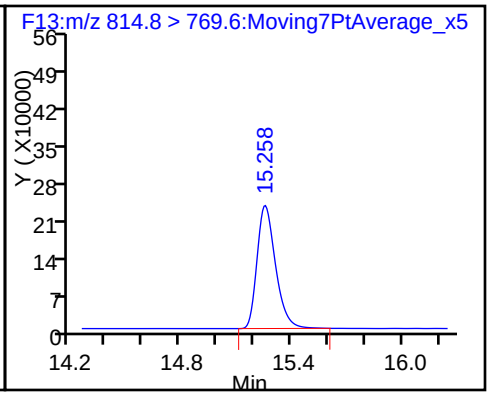
32 Perfluorotetradecanoic acid



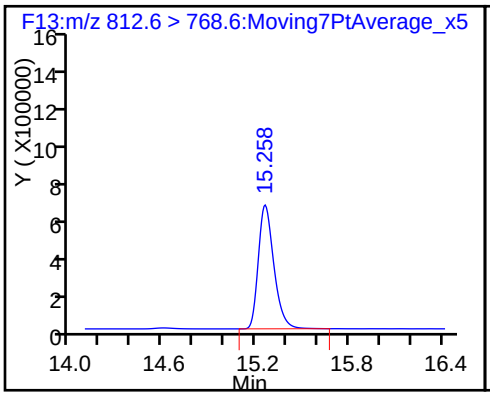
D 33 13C2-PFTeDA



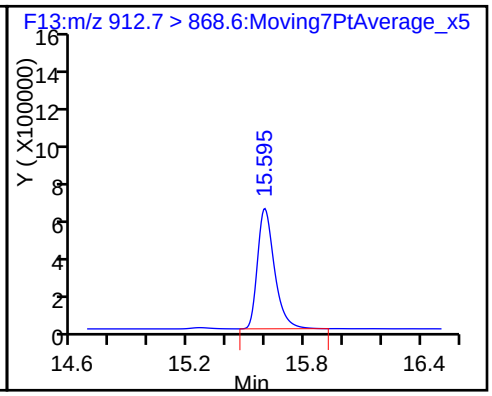
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_010.d
Lims ID: Std L6
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 25-May-2016 18:40:31 ALS Bottle#: 15 Worklist Smp#: 10
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L6
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:59:59 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 25-May-2016 19:32:47

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.797	5.798	-0.001	1.000	9621902	217.0		109	17052	
D 1 13C4 PFBA										
216.7 > 171.5	5.800	5.798	0.002		3454161	40.9		81.7	9277	
D 3 13C5-PFPeA										
267.6 > 222.7	6.909	6.907	0.002		3368310	43.9		87.8	7420	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.909	6.910	-0.001	1.000	6709860	196.1		98.1	2582	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.024	7.024	0.0	1.000	2975252	NC			7267	
298.8 > 98.6	7.024	7.024	0.0	1.000	1882375		1.58(0.00-0.00)		4185	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.024	7.024	0.0	1.000	2975252	186.4		105		
D 6 13C2 PFHxA										
314.6 > 269.7	8.155	8.156	-0.001		3792575	45.7		91.4	9905	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.155	8.157	-0.002	1.000	6791811	199.4		99.7	2196	
D 8 13C4-PFHpA										
366.6 > 321.6	9.388	9.387	0.001		3631838	42.5		85.0	5756	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.388	9.388	0.0	1.000	7377792	211.7		106	7400	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.427	9.421	0.006	1.000	7078226	NC			5491	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.427	9.421	0.006	1.000	7078226	189.4		100		
D 11 18O2 PFHxS										
402.5 > 83.6	9.419	9.422	-0.003		1034483	34.9		73.7	2680	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.509	10.503	0.006		3460734	38.8		77.6	6681	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.509	10.504	0.005	1.000	6221982	198.7		99.4	5486	
412.8 > 168.7	10.509	10.504	0.005	1.000	2017481		3.08(0.00-0.00)	99.4	3896	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.509	10.508	0.001	1.000	6537635	198.8		104		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.509	10.508	0.001	1.000	6537635	NC			5179	
D 16 13C4 PFOS										
502.4 > 79.7	11.467	11.465	0.002		202612	30.0		62.8	901	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.467	11.466	0.001	1.000	10959354	185.4		97.0	2831	
498.3 > 98.2	11.467	11.466	0.001	1.000	6591696		1.66(0.00-0.00)	97.0	3500	
D 17 13C5 PFNA										
467.5 > 422.6	11.487	11.484	0.003		3399779	43.3		86.7	4637	
18 Perfluorononanoic acid										
462.5 > 418.6	11.487	11.486	0.001	1.000	16403896	196.0		98.0	7842	
D 19 13C2 PFDA										
514.4 > 469.5	12.324	12.325	-0.001		4414285	44.2		88.4	7325	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.324	12.325	-0.001	1.000	18799359	205.0		103	6134	
D 23 13C8 FOSA										
505.4 > 77.6	12.896	12.893	0.003		4052543	42.0		84.0	3474	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.896	12.893	0.003	1.000	18507083	213.5		107	5047	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.999	12.996	0.003	1.000	3388769	NC			2969	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.999	12.996	0.003	1.000	3388769	189.9		98.5		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.041	13.042	-0.001	1.000	20642853	207.5		104	4465	
D 26 13C2 PFUnA										
564.3 > 519.5	13.041	13.044	-0.003		4218333	41.6		83.2	4177	
D 28 13C2 PFDoA										
614.4 > 569.4	13.650	13.646	0.004		4640667	44.0		88.1	3049	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.650	13.646	0.004	1.000	17735307	209.5		105	3265	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.161	14.162	-0.001	1.000	13845210	197.9		98.9	2730	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.598	14.600	-0.002	1.000	6238413	168.5		84.3	2114	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.598	14.601	-0.003		3412182	45.0		89.9	2965	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.257	15.255	0.002		1345541	46.2		92.3	2295	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.257	15.255	0.002	1.000	14179794	204.1		102	1901	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.595	15.593	0.002	1.000	10994803	184.8		92.4	3575	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L6_00015 Amount Added: 1.00 Units: mL

Report Date: 27-May-2016 10:00:00 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_010.d

Injection Date: 25-May-2016 18:40:31 Instrument ID: A4

Lims ID: Std L6

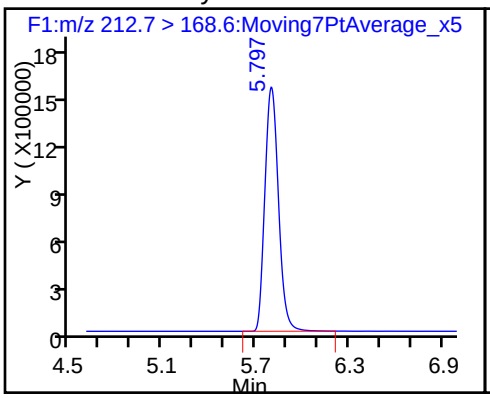
Client ID:

Operator ID: JRB ALS Bottle#: 15 Worklist Smp#: 10

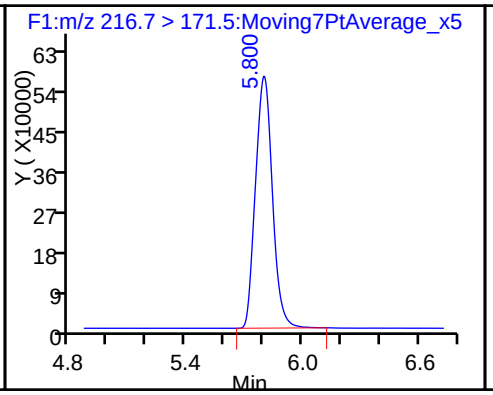
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

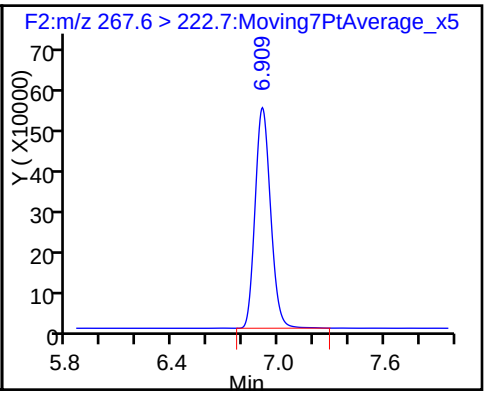
2 Perfluorobutyric acid



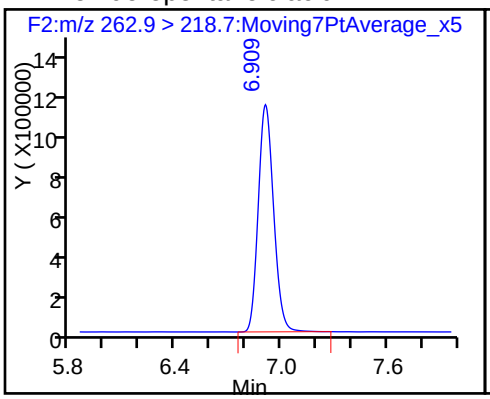
D 1 13C4 PFBA



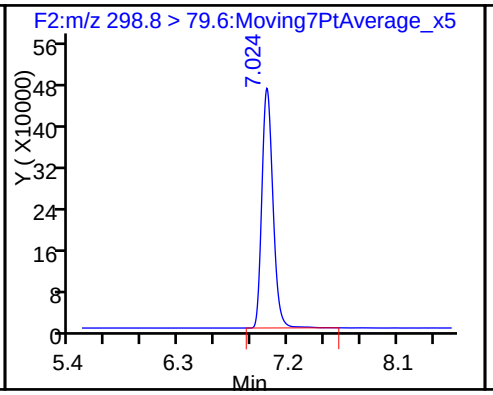
D 3 13C5-PFPeA



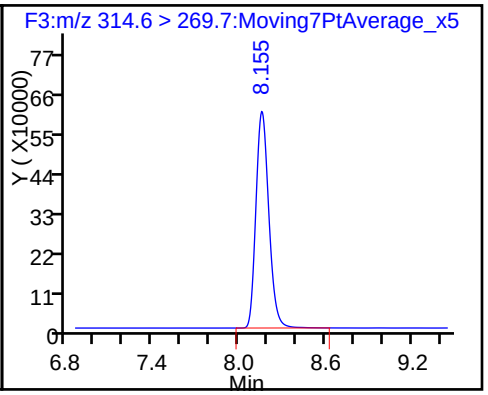
4 Perfluoropentanoic acid



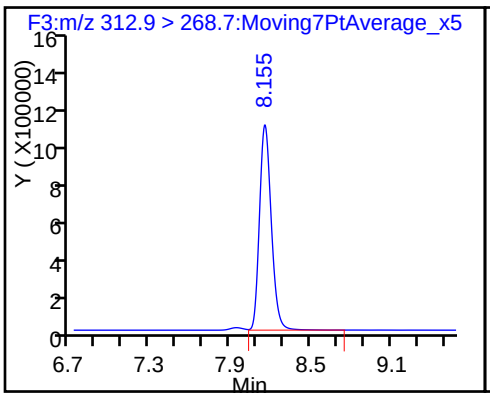
51 Perfluorobutanesulfonic acid



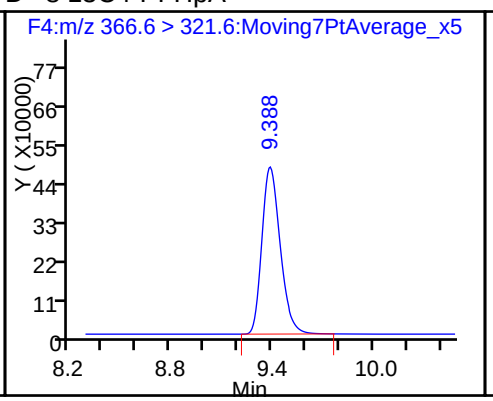
D 6 13C2 PFHxA



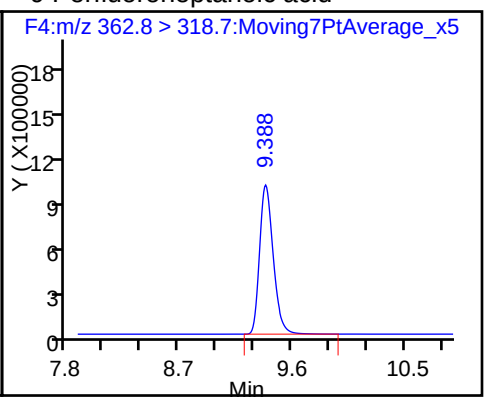
7 Perfluorohexanoic acid



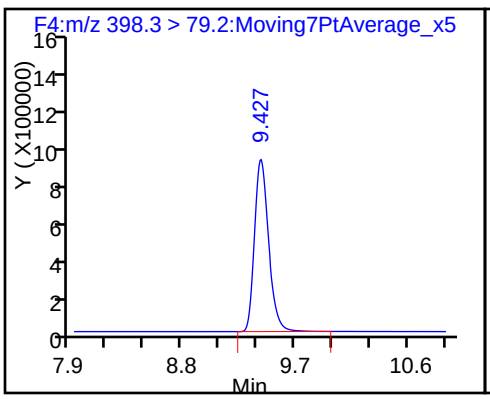
D 8 13C4-PFHpA



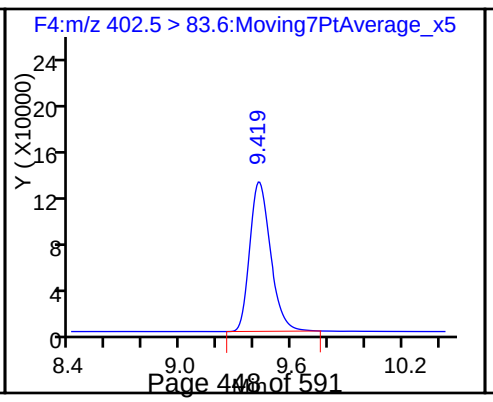
9 Perfluoroheptanoic acid



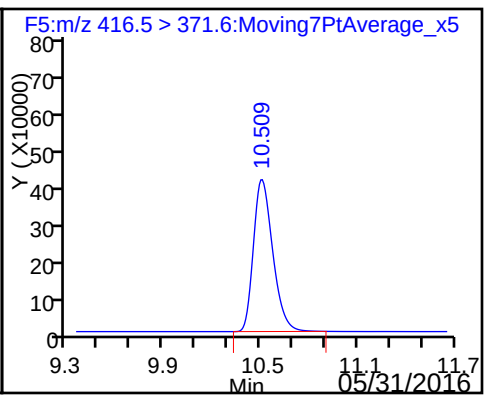
58 Perfluorohexanesulfonic acid



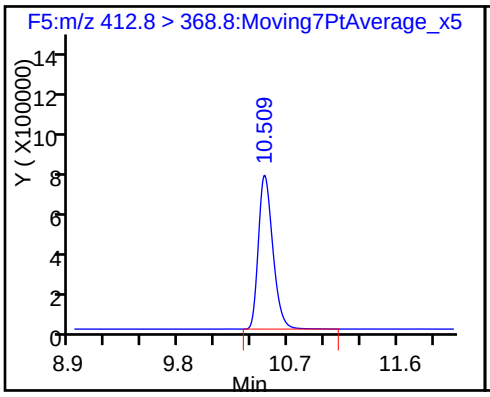
D 11 18O2 PFHxS



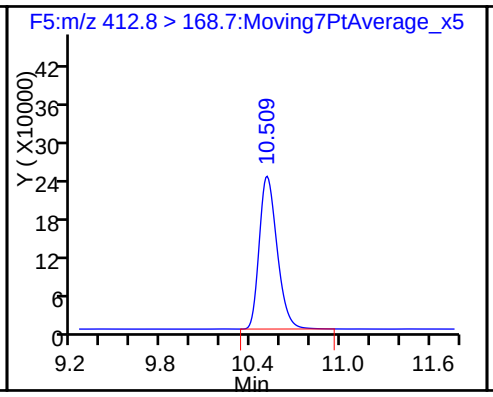
D 12 13C4 PFOA



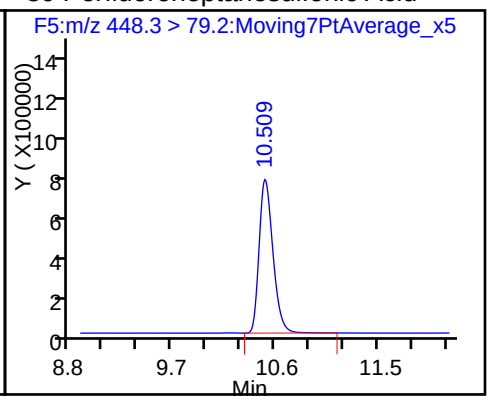
13 Perfluorooctanoic acid



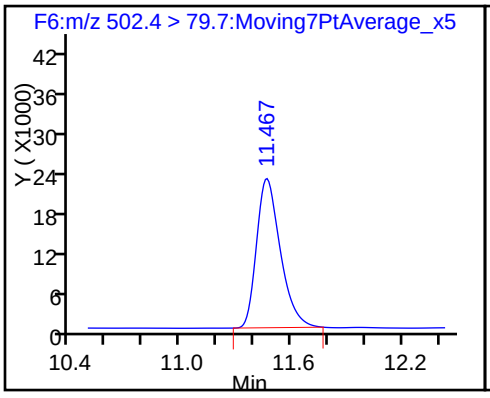
13 Perfluorooctanoic acid



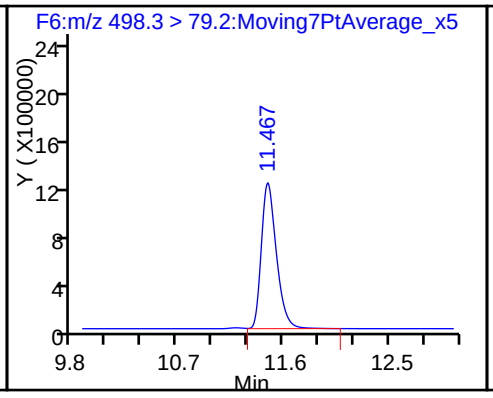
39 Perfluoroheptanesulfonic Acid



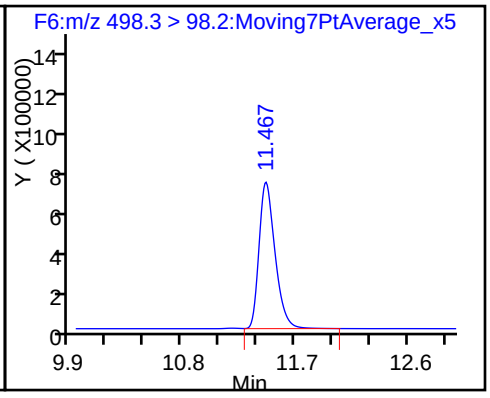
D 16 13C4 PFOS



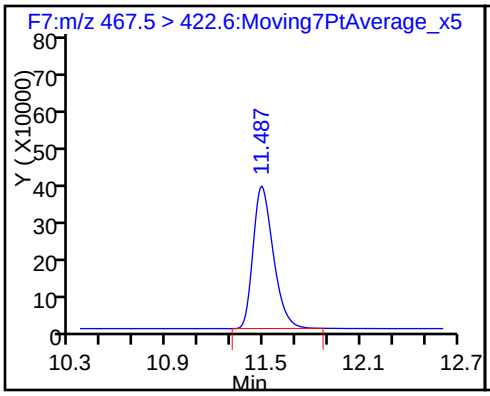
15 Perfluorooctane sulfonic acid



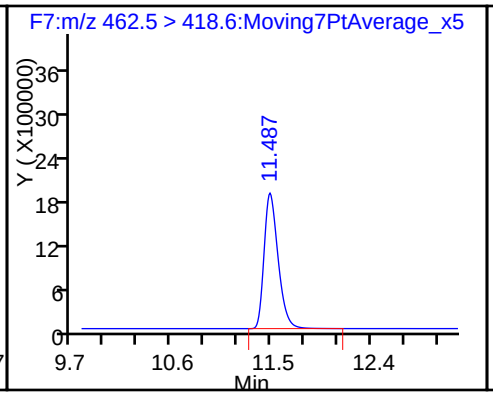
15 Perfluorooctane sulfonic acid



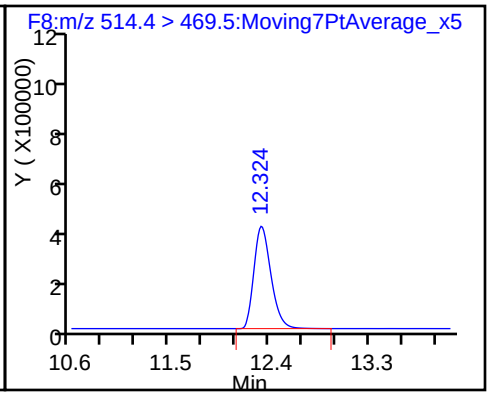
D 17 13C5 PFNA



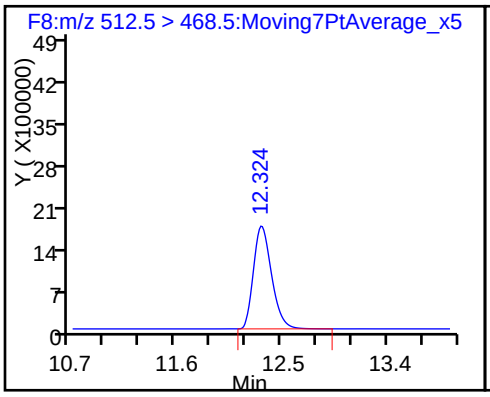
18 Perfluorononanoic acid



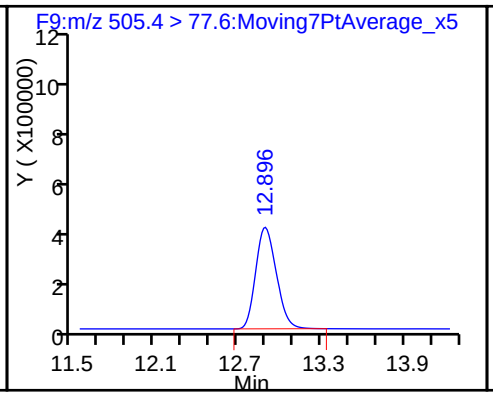
D 19 13C2 PFDA



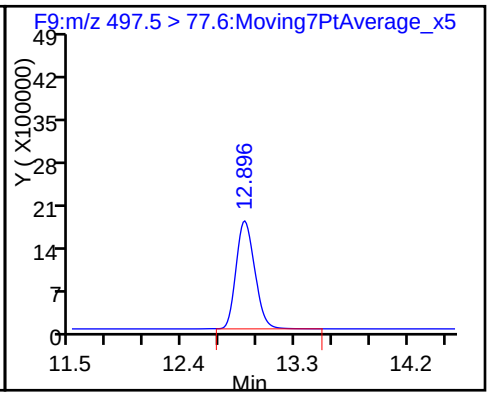
20 Perfluorodecanoic acid



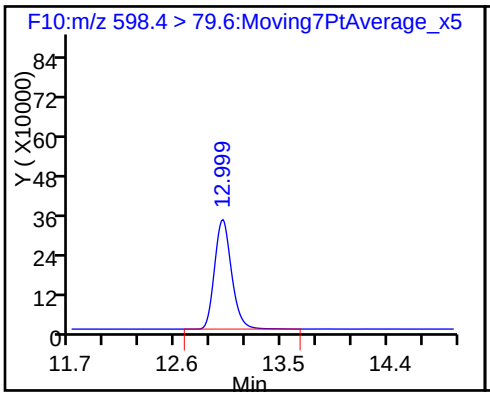
D 23 13C8 FOSA



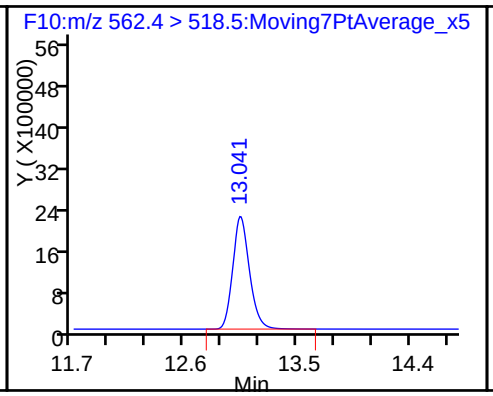
24 Perfluorooctane Sulfonamide



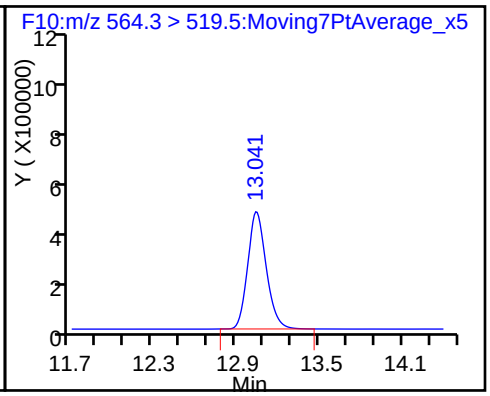
49 Perfluorodecane Sulfonic acid



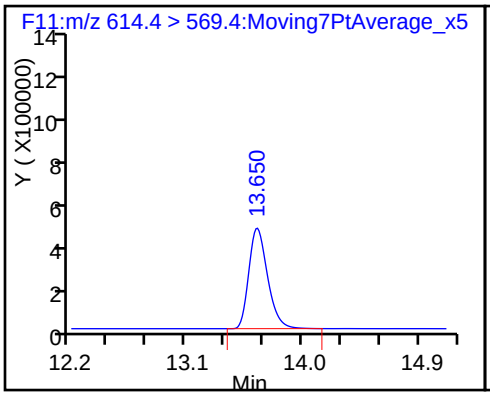
27 Perfluoroundecanoic acid



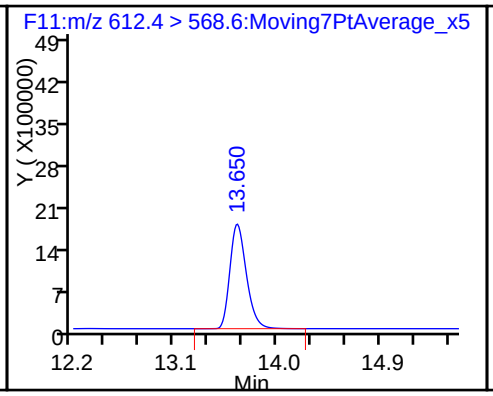
D 26 13C2 PFUnA



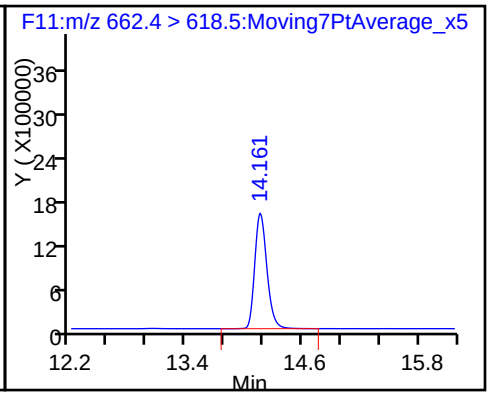
D 28 13C2 PFDoA



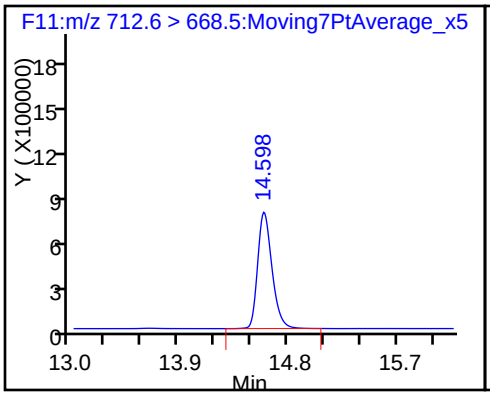
29 Perfluorododecanoic acid



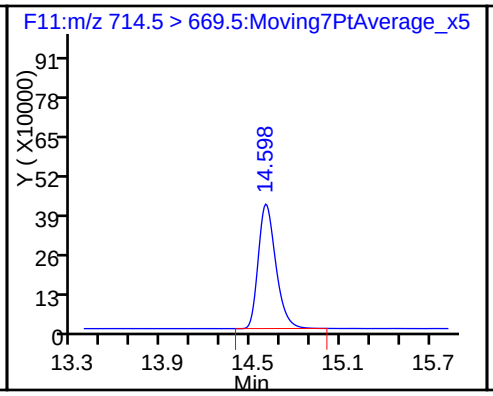
30 Perfluorotridecanoic acid



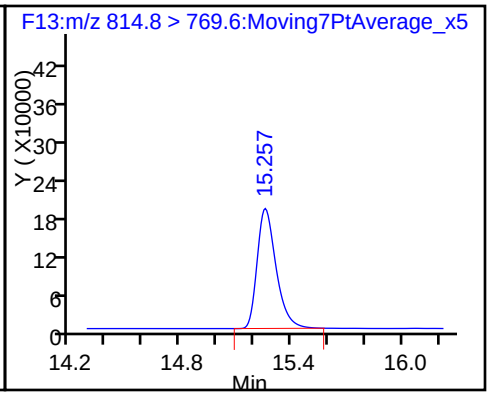
32 Perfluorotetradecanoic acid



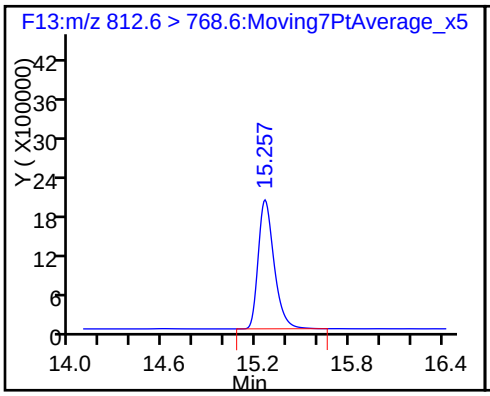
D 33 13C2-PFTeDA



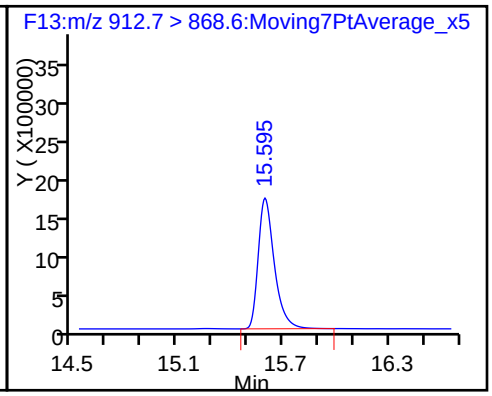
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d
Lims ID: Std L7
Client ID:
Sample Type: IC Calib Level: 7
Inject. Date: 25-May-2016 19:01:43 ALS Bottle#: 16 Worklist Smp#: 11
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L7
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 10:00:01 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 25-May-2016 19:38:14

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.800	5.798	0.002	1.000	18955715	439.6		110	31257	
D 1 13C4 PFBA										
216.7 > 171.5	5.800	5.798	0.002		3359557	39.7		79.5	9276	
D 3 13C5-PFPeA										
267.6 > 222.7	6.904	6.907	-0.003		2881925	37.6		75.1	4979	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.909	6.910	-0.001	1.000	10999657	375.7		93.9	3476	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.024	7.024	0.0	1.000	4799473	NC			10933	
298.8 > 98.6	7.024	7.024	0.0	1.000	3025074		1.59(0.00-0.00)		6160	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.024	7.024	0.0	1.000	4799473	354.6		100		
D 6 13C2 PFHxA										
314.6 > 269.7	8.155	8.156	-0.001		3168006	38.2		76.3	4926	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.155	8.157	-0.002	1.000	11383764	400.2		100	2155	
D 8 13C4-PFHpA										
366.6 > 321.6	9.380	9.387	-0.007		3129112	36.6		73.2	4202	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.388	9.388	0.0	1.000	12395409	413.1		103	6683	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.419	9.421	-0.002	1.000	12149225	NC			7701	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.419	9.421	-0.002	1.000	12149225	383.3		101		
D 11 18O2 PFHxS										
402.5 > 83.6	9.427	9.422	0.005		877315	29.6		62.5	2317	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.502	10.503	-0.001		2892631	32.4		64.9	3522	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.502	10.504	-0.002	1.000	10456476	399.6		99.9	5451	
412.8 > 168.7	10.502	10.504	-0.002	1.000	3385329		3.09(0.00-0.00)	99.9	3599	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.511	10.508	0.003	1.000	10288308	422.7		111		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.511	10.508	0.003	1.000	10288308	NC			4016	
D 16 13C4 PFOS										
502.4 > 79.7	11.461	11.465	-0.004		149927	22.2		46.5	435	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.461	11.466	-0.005	1.000	17351697	396.0		104	2400	
498.3 > 98.2	11.461	11.466	-0.005	1.000	10408783		1.67(0.00-0.00)	104	2974	
D 17 13C5 PFNA										
467.5 > 422.6	11.480	11.484	-0.004		2902258	37.0		74.0	4664	
18 Perfluorononanoic acid										
462.5 > 418.6	11.489	11.486	0.003	1.000	28286865	396.0		99.0	8740	
D 19 13C2 PFDA										
514.4 > 469.5	12.328	12.325	0.003		3546229	35.5		71.0	3861	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.328	12.325	0.003	1.000	31336025	425.4		106	5310	
D 23 13C8 FOSA										
505.4 > 77.6	12.888	12.893	-0.005		3500532	36.3		72.5	3380	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.888	12.893	-0.005	1.000	31417050	419.7		105	3789	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.991	12.996	-0.005	1.000	5249459	NC			3431	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.991	12.996	-0.005	1.000	5249459	397.6		103		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.045	13.042	0.003	1.000	33914731	394.1		98.5	5142	
D 26 13C2 PFUnA										
564.3 > 519.5	13.045	13.044	0.001		3648730	36.0		72.0	3746	
D 28 13C2 PFDoA										
614.4 > 569.4	13.644	13.646	-0.002		4064771	38.6		77.1	3105	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.644	13.646	-0.002	1.000	29646208	399.8		100.0	3037	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.165	14.162	0.003	1.000	23843779	364.8		91.2	3003	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.602	14.600	0.002	1.000	11465072	331.6		82.9	2655	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.602	14.601	0.001		3186926	42.0		84.0	3029	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.252	15.255	-0.003		1165903	40.0		80.0	2242	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.252	15.255	-0.003	1.000	25142674	418.5		105	2375	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.591	15.593	-0.002	1.000	21401177	415.1		104	4306	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L7_00015 Amount Added: 1.00 Units: mL

Report Date: 27-May-2016 10:00:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Injection Date: 25-May-2016 19:01:43 Instrument ID: A4

Lims ID: Std L7

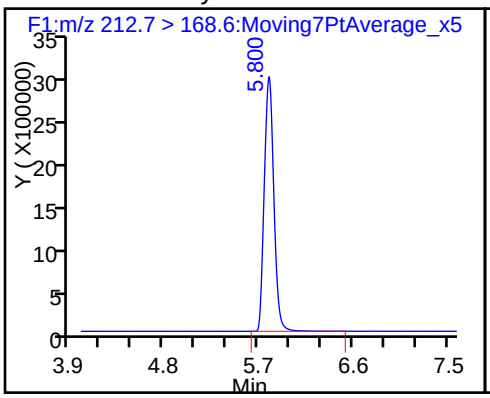
Client ID:

Operator ID: JRB ALS Bottle#: 16 Worklist Smp#: 11

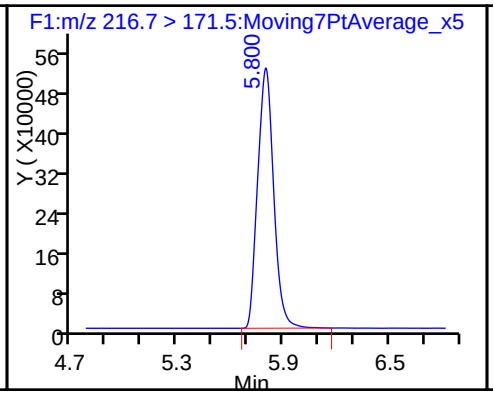
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

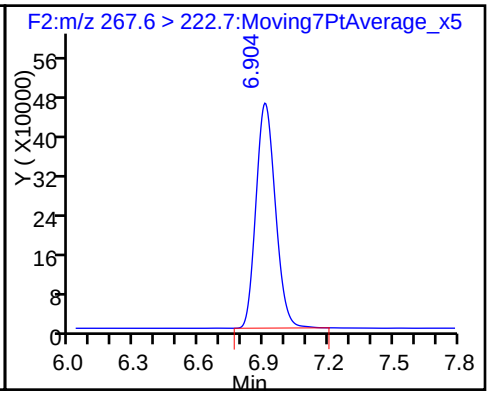
2 Perfluorobutyric acid



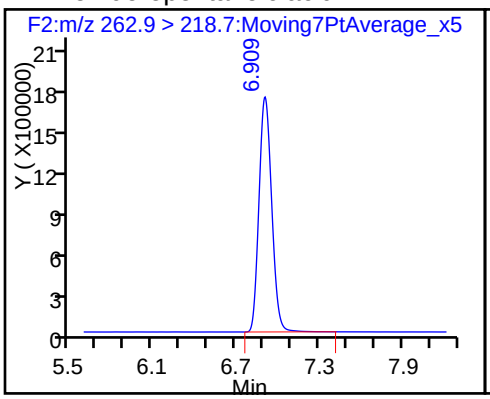
D 1 13C4 PFBA



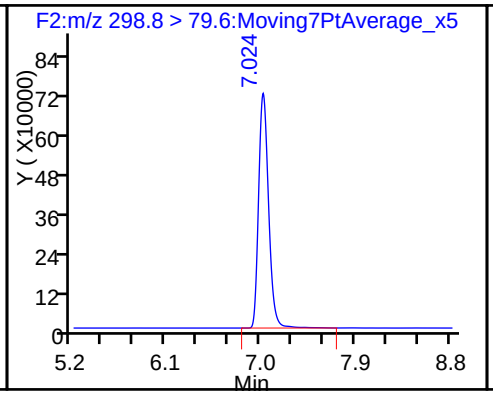
D 3 13C5-PFPeA



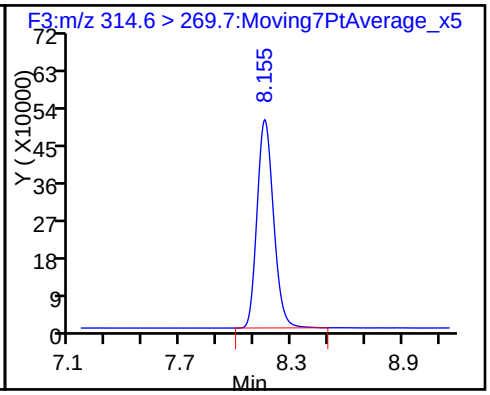
4 Perfluoropentanoic acid



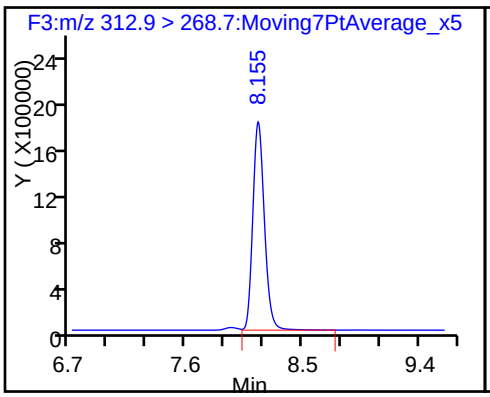
51 Perfluorobutanesulfonic acid



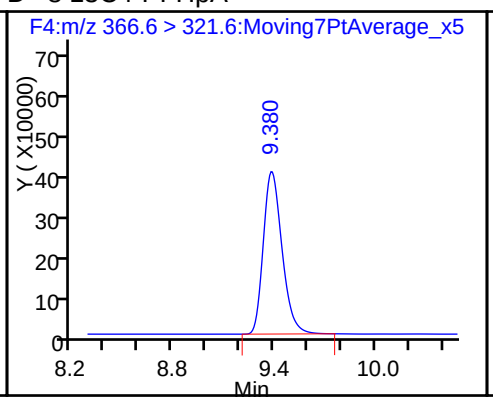
D 6 13C2 PFHxA



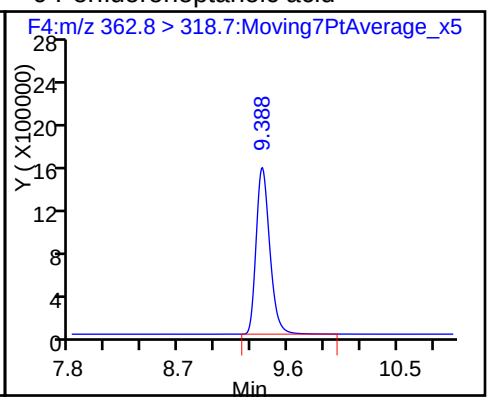
7 Perfluorohexanoic acid



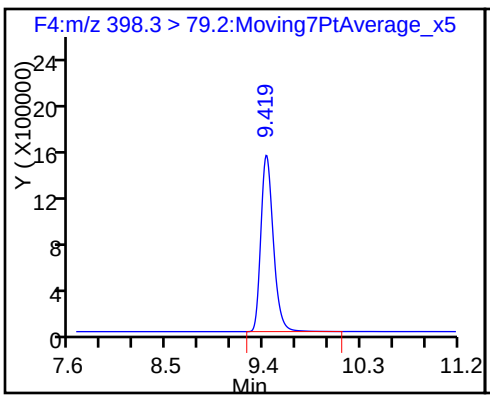
D 8 13C4-PFHpA



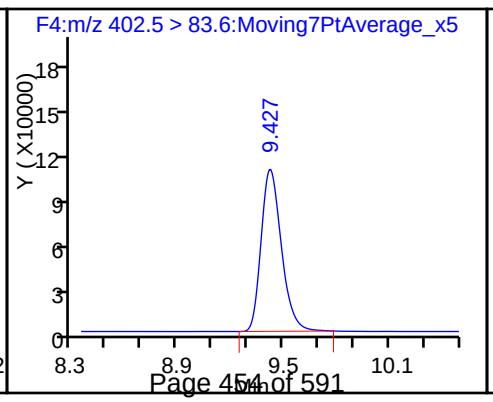
9 Perfluoroheptanoic acid



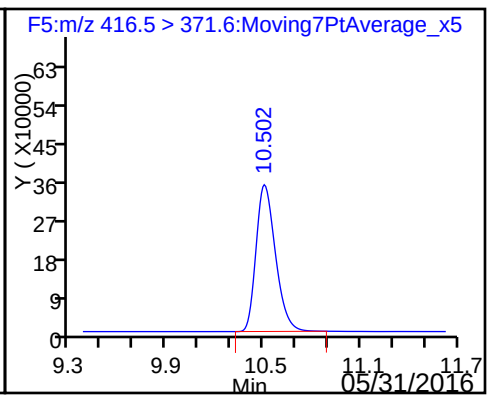
58 Perfluorohexanesulfonic acid



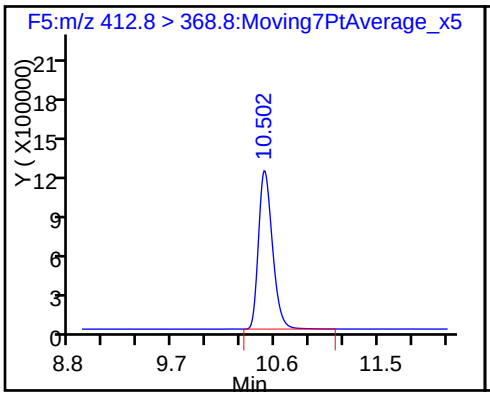
D 11 18O2 PFHxS



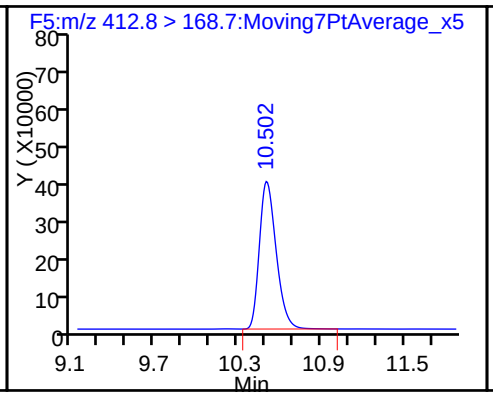
D 12 13C4 PFOA



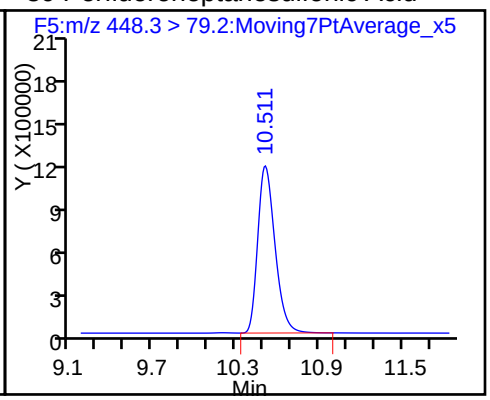
13 Perfluorooctanoic acid



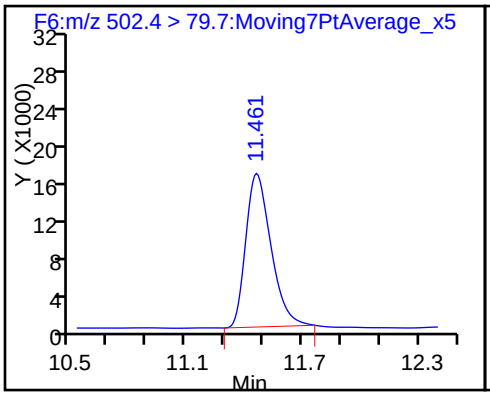
13 Perfluorooctanoic acid



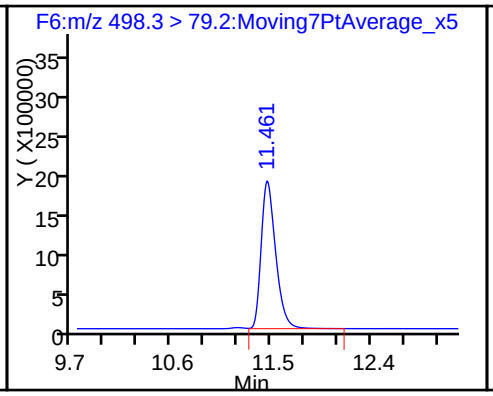
39 Perfluoroheptanesulfonic Acid



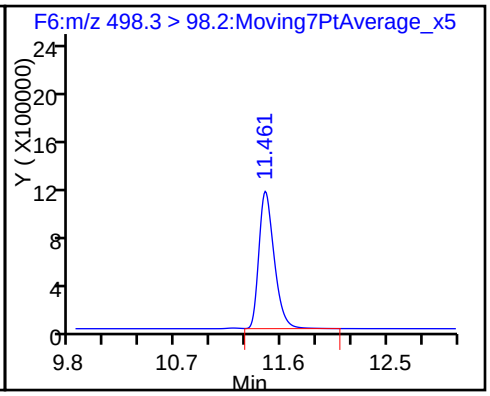
D 16 13C4 PFOS



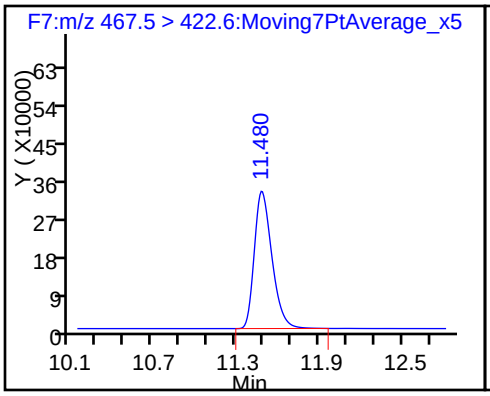
15 Perfluorooctane sulfonic acid



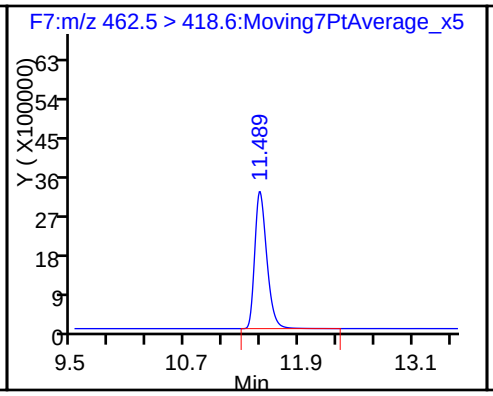
15 Perfluorooctane sulfonic acid



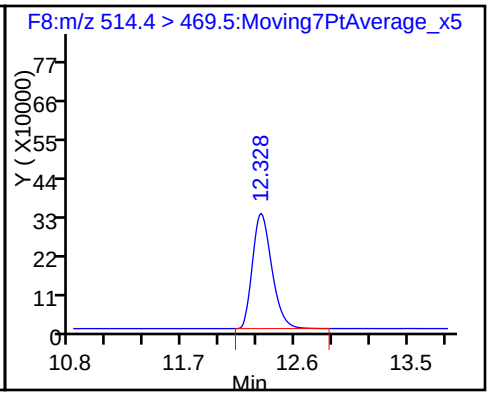
D 17 13C5 PFNA



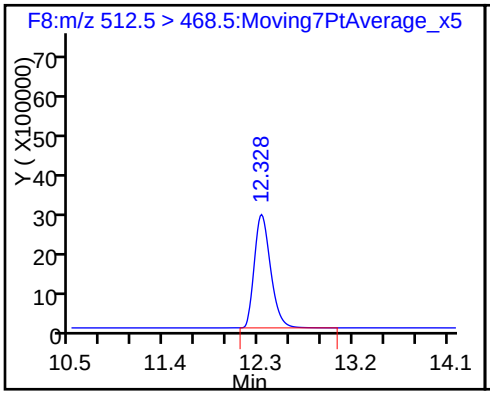
18 Perfluorononanoic acid



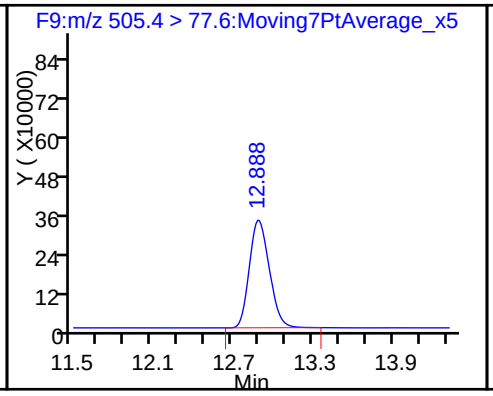
D 19 13C2 PFDA



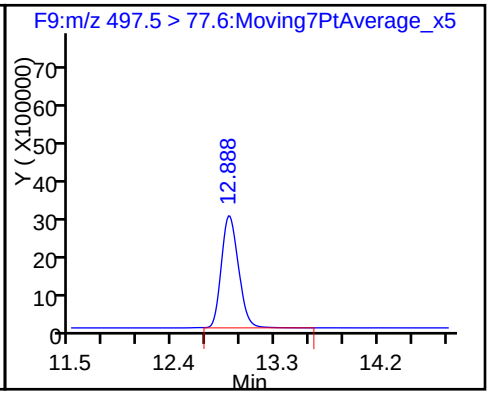
20 Perfluorodecanoic acid



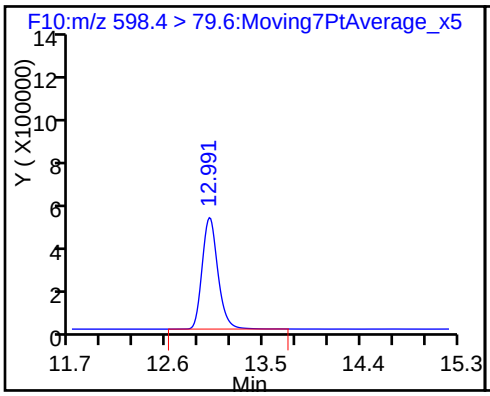
D 23 13C8 FOSA



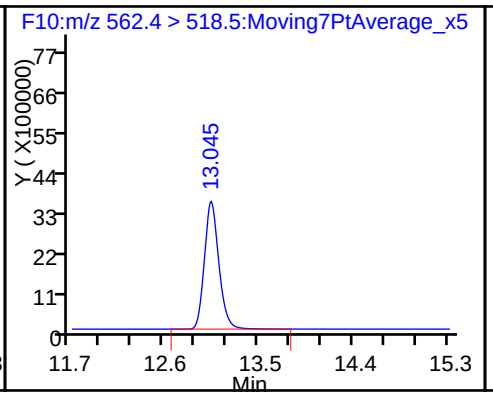
24 Perfluorooctane Sulfonamide



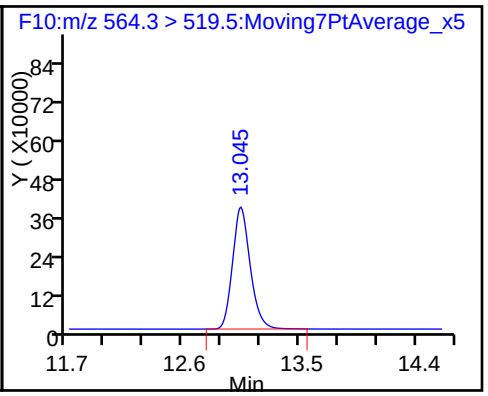
49 Perfluorodecane Sulfonic acid



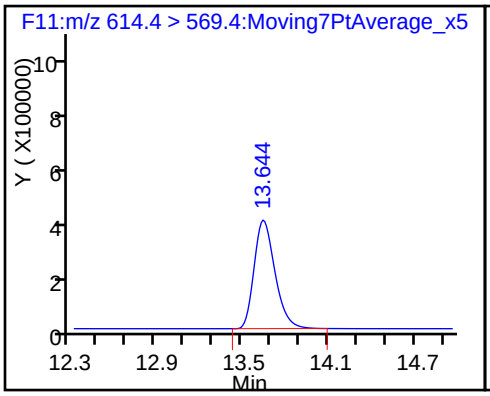
27 Perfluoroundecanoic acid



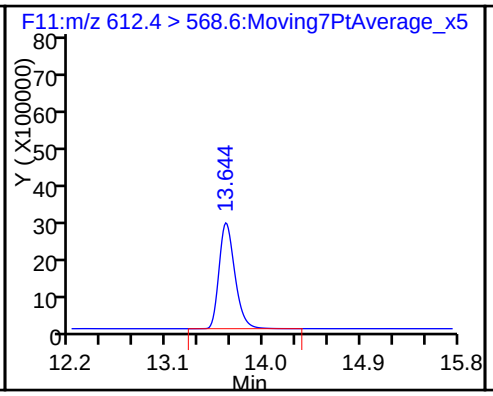
D 26 13C2 PFUnA



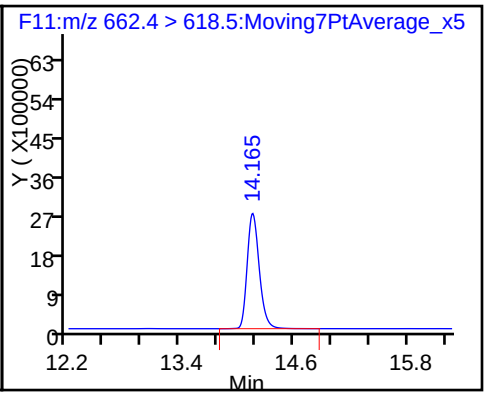
D 28 13C2 PFDoA



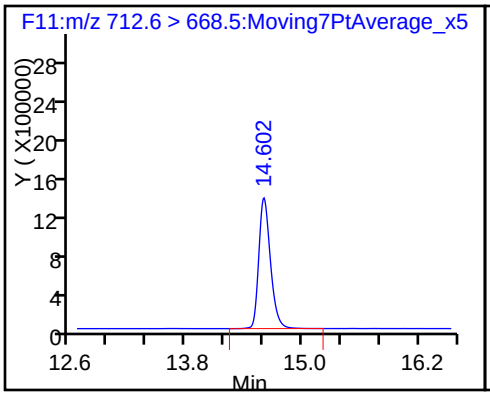
29 Perfluorododecanoic acid



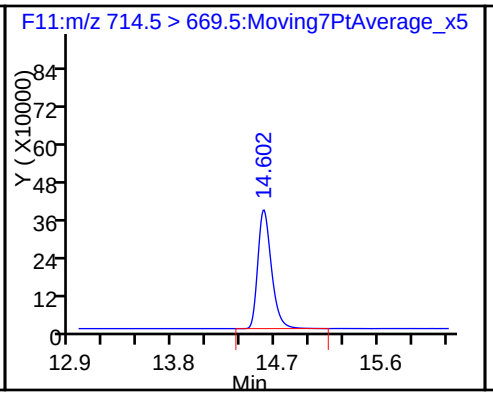
30 Perfluorotridecanoic acid



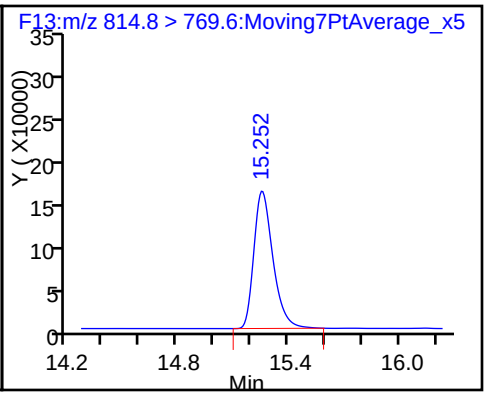
32 Perfluorotetradecanoic acid



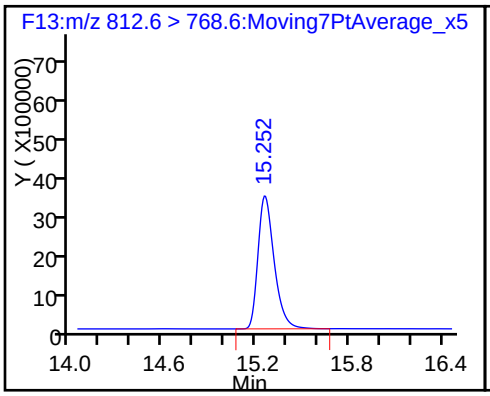
D 33 13C2-PFTeDA



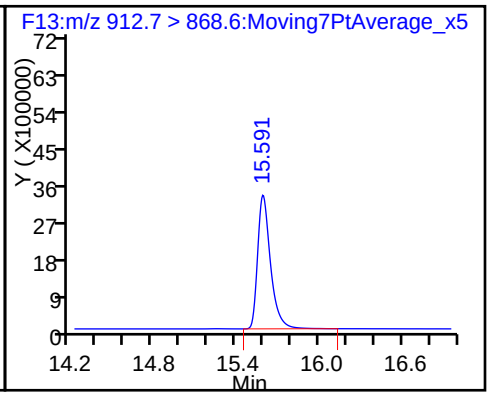
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/27/2016 11:17 Calibration End Date: 05/27/2016 13:24 Calibration ID: 21794

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111733/2	27MAY2016B4A_002.d
Level 2	STD 320-111733/3	27MAY2016B4A_003.d
Level 3	STD 320-111733/4	27MAY2016B4A_004.d
Level 4	STD 320-111733/5	27MAY2016B4A_005.d
Level 5	STD 320-111733/6	27MAY2016B4A_006.d
Level 6	STD 320-111733/7	27MAY2016B4A_007.d
Level 7	STD 320-111733/8	27MAY2016B4A_008.d

ANALYTE	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6	LVL 7				RT WINDOW	AVG RT
Perfluorobutanoic acid (PFBA)	5.797	5.791	5.791	5.791	5.791	5.794	5.791				5.542 - 6.042	5.792
Perfluoropentanoic acid (PFPeA)	6.899	6.899	6.895	6.895	6.895	6.890	6.895				6.645 - 7.145	6.895
Perfluorobutanesulfonic acid (PFBS)	7.024	7.014	7.005	7.005	7.010	7.010	7.005				6.761 - 7.261	7.010
Perfluorohexanoic acid (PFHxA)	8.138	8.144	8.144	8.138	8.144	8.138	8.133				7.890 - 8.390	8.140
Perfluoroheptanoic acid (PFHpA)	+++++	9.365	9.365	9.365	9.365	9.365	9.365				9.115 - 9.615	9.365
Perfluorohexanesulfonic acid (PFHxS)	9.404	9.404	9.396	9.396	9.404	9.404	9.404				9.151 - 9.651	9.402
Perfluoroheptanesulfonic Acid (PFHpS)	10.491	10.491	10.482	10.482	10.482	10.485	10.482				10.235 - 10.735	10.485
Perfluorooctanoic acid (PFOA)	10.491	10.491	10.482	10.482	10.482	10.485	10.482				10.235 - 10.735	10.485
Perfluorooctanesulfonic acid (PFOS)	11.449	11.449	11.440	11.440	11.440	11.442	11.440				11.193 - 11.693	11.443
Perfluorononanoic acid (PFNA)	11.459	11.469	11.459	11.459	11.469	11.462	11.459				11.212 - 11.712	11.462
Perfluorodecanoic acid (PFDA)	12.298	12.298	12.298	12.298	12.298	12.302	12.298				12.049 - 12.549	12.299
Perfluorooctane Sulfonamide (FOSA)	12.884	12.871	12.871	12.871	12.871	12.875	12.871				12.623 - 13.123	12.873
Perfluorodecanesulfonic acid (PFDS)	12.961	12.974	12.974	12.961	12.974	12.965	12.974				12.719 - 13.219	12.969
Perfluoroundecanoic acid (PFUnA)	13.020	13.020	13.020	13.020	13.020	13.024	13.020				12.771 - 13.271	13.021
Perfluorododecanoic acid (PFDoA)	13.626	13.627	13.627	13.626	13.626	13.620	13.626				13.376 - 13.876	13.625
Perfluorotridecanoic Acid (PFTriA)	14.140	14.140	14.130	14.140	14.140	14.134	14.140				13.888 - 14.388	14.138
Perfluorotetradecanoic acid (PFTeA)	14.579	14.579	14.579	14.579	14.579	14.574	14.570				14.327 - 14.827	14.577
Perfluoro-n-hexadecanoic acid (PFHxDA)	15.234	15.234	15.234	15.234	15.234	15.237	15.234				14.985 - 15.485	15.234
Perfluoro-n-octandecanoic acid (PFODA)	15.575	15.575	15.575	15.575	15.575	15.578	15.575				15.325 - 15.825	15.575
13C4 PFBA	5.791	5.794	5.787	5.791	5.791	5.791	5.787				5.540 - 6.040	5.790
13C5-PFPeA	6.890	6.895	6.895	6.890	6.895	6.890	6.890				6.642 - 7.142	6.892
13C2 PFHxA	8.138	8.144	8.138	8.138	8.138	8.138	8.133				7.888 - 8.388	8.138
13C4-PFHpA	9.372	9.372	9.365	9.365	9.365	9.365	9.357				9.116 - 9.616	9.366
18O2 PFHxS	9.404	9.404	9.396	9.396	9.396	9.396	9.404				9.149 - 9.649	9.399
13C4 PFOA	10.482	10.482	10.482	10.482	10.482	10.485	10.482				10.233 - 10.733	10.482
13C4 PFOS	11.449	11.440	11.440	11.440	11.440	11.442	11.440				11.191 - 11.691	11.442
13C5 PFNA	11.469	11.469	11.459	11.459	11.459	11.462	11.459				11.212 - 11.712	11.462
13C2 PFDA	12.298	12.298	12.298	12.298	12.298	12.302	12.298				12.049 - 12.549	12.299
13C8 FOSA	12.871	12.871	12.871	12.871	12.871	12.875	12.871				12.621 - 13.121	12.872
13C2 PFUnA	13.020	13.020	13.020	13.020	13.020	13.024	13.020				12.771 - 13.271	13.021
13C2 PFDoA	13.626	13.627	13.627	13.626	13.626	13.620	13.626				13.376 - 13.876	13.625
13C2-PFTeDA	14.579	14.579	14.579	14.579	14.579	14.574	14.579				14.329 - 14.829	14.578
13C2-PFHxDA	15.234	15.234	15.234	15.234	15.234	15.237	15.234				14.985 - 15.485	15.234

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/27/2016 11:17 Calibration End Date: 05/27/2016 13:24 Calibration ID: 21794

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111733/2	27MAY2016B4A_002.d
Level 2	STD 320-111733/3	27MAY2016B4A_003.d
Level 3	STD 320-111733/4	27MAY2016B4A_004.d
Level 4	STD 320-111733/5	27MAY2016B4A_005.d
Level 5	STD 320-111733/6	27MAY2016B4A_006.d
Level 6	STD 320-111733/7	27MAY2016B4A_007.d
Level 7	STD 320-111733/8	27MAY2016B4A_008.d

ANALYTE	CF				CURVE TYPE	COEFFICIENT			#	MIN CF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 5	LVL 2 LVL 6	LVL 3 LVL 7	LVL 4		B	M1	M2								
13C4 PFBA	122307 88914	118458 82594	122043 67111	122607	Ave		103433.463				22.5		50.0			
13C5-PFPeA	87834 65054	88862 60926	90292 49690	88307	Ave		75852.0829				22.2		50.0			
13C2 PFHxA	112782 86160	112072 71847	112613 60209	99440	Ave		93589.0229				22.9		50.0			
13C4-PFHpA	100884 84755	99034 65681	96339 52680	88445	Ave		83974.1286				21.7		50.0			
18O2 PFHxS	38330 30970	36244 22079	35530 17168	31964	Ave		30326.4452				25.9		50.0			
13C4 PFOA	120571 95011	120096 66703	113795 58013	96669	Ave		95836.9257				26.3		50.0			
13C4 PFOS	7637.4 6162.0	7795.1 4381.9	7876.9 3517.0	6369.6	Ave		6248.57143				27.7		50.0			
13C5 PFNA	95941 82537	95948 61401	96557 52872	83829	Ave		81298.0714				21.7		50.0			
13C2 PFDA	126977 98638	121863 77257	123356 68153	105046	Ave		103041.294				22.6		50.0			
13C8 FOSA	106795 96772	108930 78251	108843 68041	96734	Ave		94909.4200				16.9		50.0			
13C2 PFUnA	128164 109830	124879 82693	127974 72650	113351	Ave		108505.803				20.6		50.0			
13C2 PFDoA	126911 112831	132398 88968	124286 76848	116438	Ave		111239.746				18.6		50.0			
13C2-PFTeDA	86075 76846	85027 67184	89188 57696	82069	Ave		77726.4371				14.7		50.0			
13C2-PFHxDA	33736 28399	34182 25965	33606 21136	31233	Ave		29751.1229				16.4		50.0			

Note: The m1 coefficient is the same as Ave CF for an Ave curve type.

FORM VI

CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/27/2016 11:17 Calibration End Date: 05/27/2016 13:24 Calibration ID: 21794

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)	65522 56359	79038 46329	82380	74651	60800	AveID		0.6490				8.8		35.0			
Perfluoropentanoic acid (PFPeA)	51010 28041	49163 23320	43069	38026	31761	AveID		0.4942				10.8		35.0			
Perfluorobutanesulfonic acid (PFBS)	27425 15501	25102 12585	24298	20519	17010	L2ID	0.0251	0.6607							0.9910		0.9900
Perfluorohexanoic acid (PFHxA)	67250 33501	58420 27922	57894	41486	41258	L1ID	0.0637	0.4641							1.0000		0.9900
Perfluoroheptanoic acid (PFHpA)	+++++ 33003	67952 27317	50342	40522	45343	AveID		0.5371				14.5		35.0			
Perfluorohexanesulfonic acid (PFHxS)	65531 35505	59249 27721	52571	43254	50120	AveID		1.5740				7.5		35.0			
Perfluoroheptanesulfonic Acid (PFHpS)	49246 32706	54930 27101	64201	48800	50676	L2ID	-0.678	7.8620							0.9980		0.9900
Perfluorooctanoic acid (PFOA)	51236 31609	47860 26247	53369	40862	42247	L1ID	-0.036	0.4577							0.9990		0.9900
Perfluorooctanesulfonic acid (PFOS)	82199 53102	88417 42560	89165	71708	74665	L1ID	-1.045	12.086							1.0000		0.9900
Perfluorononanoic acid (PFNA)	103188 75899	135842 68236	118695	98608	106986	L2ID	-0.050	1.2692							0.9930		0.9900
Perfluorodecanoic acid (PFDA)	115172 86500	137110 72650	136484	109503	114180	AveID		1.0749				7.8		35.0			
Perfluorooctane Sulfonamide (FOSA)	89732 83504	115881 74646	121324	101379	111037	AveID		1.0540				9.5		35.0			
Perfluorodecanesulfonic acid (PFDS)	23757 15730	28387 12155	35716	25207	24030	AveID		3.7414				12.0		50.0			
Perfluoroundecanoic acid (PFUnA)	141984 96215	155280 80772	153552	125553	129956	AveID		1.1596				4.6		35.0			
Perfluorododecanoic acid (PFDoA)	112984 84187	112952 72339	121702	96050	110750	AveID		0.9167				6.7		35.0			
Perfluorotridecanoic Acid (PFTriA)	79968 66960	96792 53270	107640	77966	83193	AveID		1.0324				10.8		50.0			
Perfluorotetradecanoic acid (PFTeA)	77696 31907	50651 27285	47012	35516	38030	AveID		0.5573				28.8		50.0			
Perfluoro-n-hexadecanoic acid (PFHxDA)	238502 70660	166963 58772	115123	82757	86042	L2ID	2.1338	2.7954							0.9960		0.9900
Perfluoro-n-octandecanoic acid (PFODA)	70620 57025	70399 49504	71507	67811	68007	AveID		2.1978				5.7		50.0			

Note: The m1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/27/2016 11:17 Calibration End Date: 05/27/2016 13:24 Calibration ID: 21794

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111733/2	27MAY2016B4A_002.d
Level 2	STD 320-111733/3	27MAY2016B4A_003.d
Level 3	STD 320-111733/4	27MAY2016B4A_004.d
Level 4	STD 320-111733/5	27MAY2016B4A_005.d
Level 5	STD 320-111733/6	27MAY2016B4A_006.d
Level 6	STD 320-111733/7	27MAY2016B4A_007.d
Level 7	STD 320-111733/8	27MAY2016B4A_008.d

ANALYTE	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
		LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
13C4 PFBA	Ave	6115372 4129683	5922896 3355560	6102158	6130329	4445714	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C5-PFPeA	Ave	4391700 3046275	4443078 2484518	4514607	4415347	3252704	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFHxA	Ave	5639104 3592360	5603613 3010443	5630648	4971985	4308005	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C4-PFHpA	Ave	5044178 3284058	4951706 2634013	4816964	4422269	4237757	50.0 50.0	50.0 50.0	50.0	50.0	50.0
18O2 PFHxS	Ave	1812994 1044335	1714340 812066	1680553	1511920	1464878	47.3 47.3	47.3 47.3	47.3	47.3	47.3
13C4 PFOA	Ave	6028555 3335155	6004812 2900631	5689738	4833468	4750565	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C4 PFOS	Ave	365070 209455	372607 168111	376516	304468	294545	47.8 47.8	47.8 47.8	47.8	47.8	47.8
13C5 PFNA	Ave	4797041 3070065	4797422 2643621	4827839	4191465	4126872	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFDA	Ave	6348829 3862828	6093155 3407629	6167778	5252314	4931920	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C8 FOSA	Ave	5339736 3912535	5446523 3402041	5442155	4836707	4838600	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFUnA	Ave	6408182 4134664	6243971 3632488	6398716	5667533	5491477	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFDoA	Ave	6345542 4448387	6619880 3842375	6214302	5821892	5641533	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2-PFTeDA	Ave	4303766 3359201	4251362 2884794	4459397	4103454	3842279	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2-PFHxDA	Ave	1686815 1298274	1709081 1056796	1680316	1561650	1419961	50.0 50.0	50.0 50.0	50.0	50.0	50.0

Curve Type Legend:
Ave = Average

FORM VI

RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/27/2016 11:17 Calibration End Date: 05/27/2016 13:24 Calibration ID: 21794

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111733/2	27MAY2016B4A_002.d
Level 2	STD 320-111733/3	27MAY2016B4A_003.d
Level 3	STD 320-111733/4	27MAY2016B4A_004.d
Level 4	STD 320-111733/5	27MAY2016B4A_005.d
Level 5	STD 320-111733/6	27MAY2016B4A_006.d
Level 6	STD 320-111733/7	27MAY2016B4A_007.d
Level 7	STD 320-111733/8	27MAY2016B4A_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	32761 11271766	79038 18531497	411899	1493014	3040022	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoropentanoic acid (PFPeA)		AveID	25505 5608119	49163 9327831	215346	760519	1588028	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorobutanesulfonic acid (PFBS)		L2ID	12122 2740499	22190 4450007	107395	362783	751821	0.442 177	0.884 354	4.42	17.7	44.2
Perfluorohexanoic acid (PFHxA)		L1ID	33625 6700227	58420 11168800	289472	829722	2062892	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoroheptanoic acid (PFHpA)		AveID	+++++ 6600504	67952 10926693	251708	810433	2267149	+++++ 200	1.00 400	5.00	20.0	50.0
Perfluorohexanesulfonic acid (PFHxS)		AveID	30996 6717467	56050 10489666	248660	818371	2370680	0.473 189	0.946 378	4.73	18.9	47.3
Perfluoroheptanesulfonic Acid (PFHpS)		L2ID	23441 6227195	52293 10320043	305599	929146	2412173	0.476 190	0.952 381	4.76	19.0	47.6
Perfluorooctanoic acid (PFOA)		L1ID	25618 6321774	47860 10498872	266844	817233	2112373	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorooctanesulfonic acid (PFOS)		L1ID	39291 10153061	84527 16274880	426209	1371052	3568981	0.478 191	0.956 382	4.78	19.1	47.8
Perfluorononanoic acid (PFNA)		L2ID	51594 15179720	135842 27294533	593475	1972169	5349285	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorodecanoic acid (PFDA)		AveID	57586 17300091	137110 29059913	682419	2190054	5708999	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorooctane Sulfonamide (FOSA)		AveID	44866 16700878	115881 29858502	606618	2027572	5551847	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorodecanesulfonic acid (PFDS)		AveID	11451 3032821	27365 4687057	172152	485982	1158252	0.482 193	0.964 386	4.82	19.3	48.2
Perfluoroundecanoic acid (PFUnA)		AveID	70992 19242949	155280 32308856	767762	2511061	6497810	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorododecanoic acid (PFDoA)		AveID	56492 16837391	112952 28935429	608510	1920992	5537515	0.500 200	1.00 400	5.00	20.0	50.0

FORM VI

RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/27/2016 11:17 Calibration End Date: 05/27/2016 13:24 Calibration ID: 21794

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
Perfluorotridecanoic Acid (PFTriA)		AveID	39984 13391959	96792 21307860	538198	1559315	4159657	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorotetradecanoic acid (PFTeA)		AveID	38848 6381395	50651 10914055	235060	710312	1901507	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoro-n-hexadecanoic acid (PFHxDA)		L2ID	119251 14132019	166963 23508759	575613	1655130	4302103	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoro-n-octandecanoic acid (PFODA)		AveID	35310 11405069	70399 19801766	357536	1356212	3400331	0.500 200	1.00 400	5.00	20.0	50.0

Curve Type Legend:

AveID = Average isotope dilution
L1ID = Linear 1/conc IsoDil
L2ID = Linear 1/conc^2 IsoDil

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_002.d
Lims ID: Std L1
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 27-May-2016 11:17:01 ALS Bottle#: 10 Worklist Smp#: 2
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L1
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:49:58 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 27-May-2016 14:03:51

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.791	5.790	0.001		6115372	59.1		118	20681	
2 Perfluorobutyric acid										
212.7 > 168.6	5.797	5.792	0.005	1.000	32761	0.4127		82.5	113	
D 3 13C5-PFPeA										
267.6 > 222.7	6.890	6.892	-0.002		4391700	57.9		116	11555	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.899	6.895	0.004	1.000	25505	0.5876		118	11.1	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.024	7.011	0.013	1.000	12122	NC			26.4	
298.8 > 98.6	7.014	7.011	0.003	0.999	7477		1.62(0.00-0.00)		21.4	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.024	7.011	0.013	1.000	12122	0.4406		99.7		
D 6 13C2 PFHxA										
314.6 > 269.7	8.138	8.138	0.0		5639104	60.3		121	11489	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.138	8.140	-0.002	1.000	33625	0.5051		101	154	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	26504	0.4891		97.8	113	
D 8 13C4-PFHpA										
366.6 > 321.6	9.372	9.366	0.006		5044178	60.1		120	9387	
D 11 18O2 PFHxS										
402.5 > 83.6	9.404	9.399	0.005		1812994	59.8		126	3359	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.404	9.401	0.003	1.000	30996	0.5138		109		
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.404	9.401	0.003	1.000	30996	NC			73.8	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		6028555	62.9		126	8659	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.491	10.485	0.006	1.000	25618	0.5428		109	45.3	
412.8 > 168.7	10.482	10.485	-0.003	0.999	9443		2.71(0.00-0.00)	109	43.6	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.491	10.485	0.006	1.000	23441	0.4766		100		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.491	10.485	0.006	1.000	23441	NC			101	
D 16 13C4 PFOS										
502.4 > 79.7	11.449	11.441	0.008		365070	58.4		122	1441	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.449	11.443	0.006	1.000	39291	0.5121		107	157	
498.3 > 98.2	11.440	11.443	-0.003	0.999	23532		1.67(0.00-0.00)	107	73.0	
18 Perfluorononanoic acid										
462.5 > 418.6	11.459	11.462	-0.003	1.000	51594	0.4632		92.6	97.8	
D 17 13C5 PFNA										
467.5 > 422.6	11.469	11.462	0.007		4797041	59.0		118	8091	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		6348829	61.6		123	8474	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	57586	0.4219		84.4	173	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		5339736	56.3		113	4679	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.884	12.873	0.011	1.000	44866	0.3986		79.7	174	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.961	12.969	-0.008	1.000	11451	NC			43.4	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.961	12.969	-0.008	1.000	11451	0.4007		83.1		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	70992	0.4777		95.5	118	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		6408182	59.1		118	5833	
D 28 13C2 PFDoA										
614.4 > 569.4	13.626	13.626	0.0		6345542	57.0		114	4500	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.626	13.626	0.0	1.000	56492	0.4856		97.1	21.1	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.140	14.138	0.002	1.000	39984	0.4499		90.0	15.6	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.579	14.577	0.002	1.000	38848	0.8099		162	20.5	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.579	14.579	0.0		4303766	55.4		111	4184	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1686815	56.7		113	3330	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	119251	0.5012		100	21.2	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	35310	0.4762		95.2	53.5	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L1_00018 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:49:59 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_002.d

Injection Date: 27-May-2016 11:17:01 Instrument ID: A4

Lims ID: Std L1

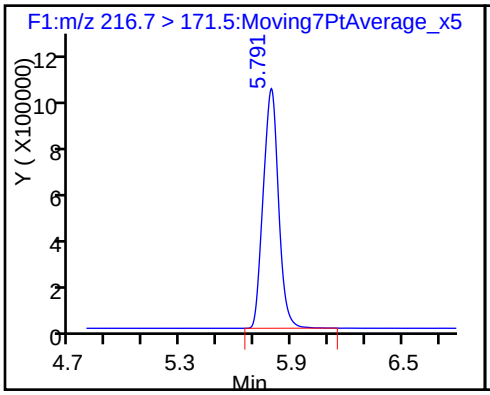
Client ID:

Operator ID: JRB ALS Bottle#: 10 Worklist Smp#: 2

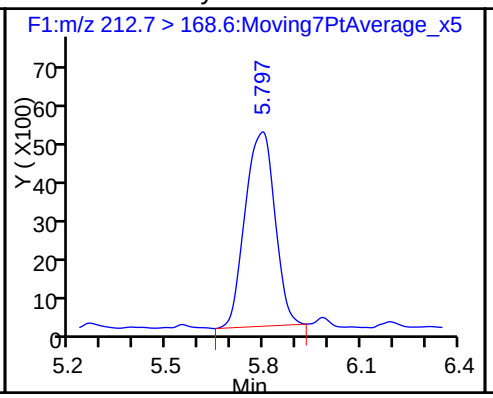
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

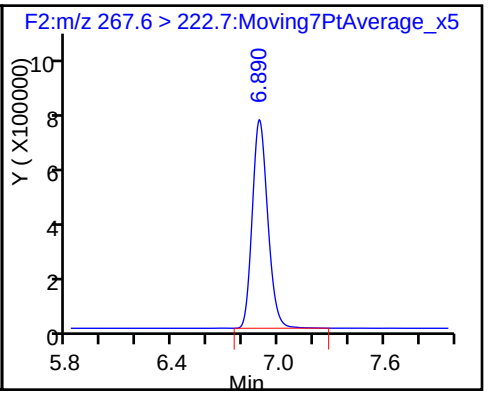
D 1 13C4 PFBA



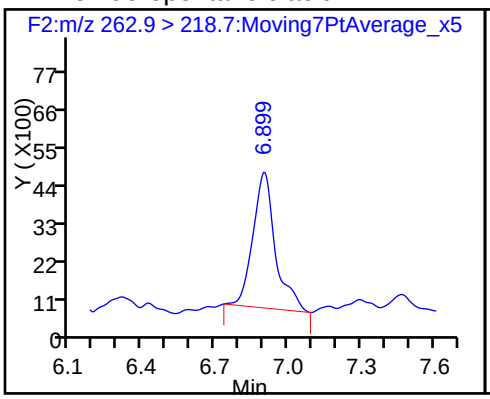
2 Perfluorobutyric acid



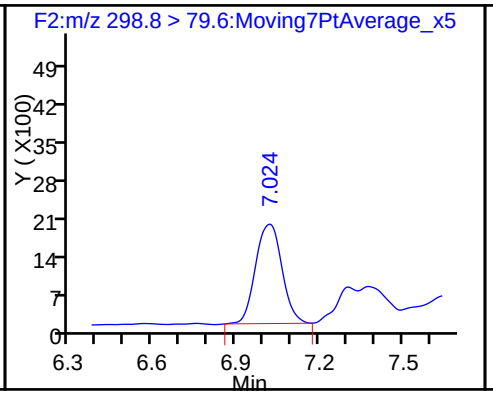
D 3 13C5-PFPeA



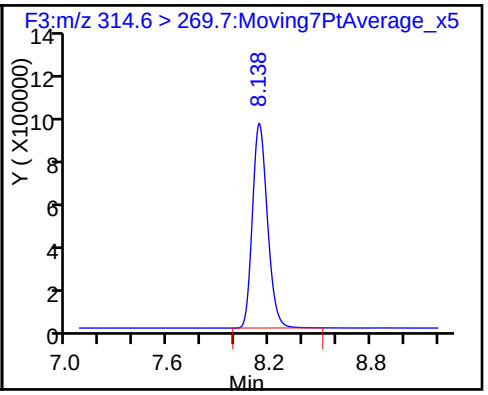
4 Perfluoropentanoic acid



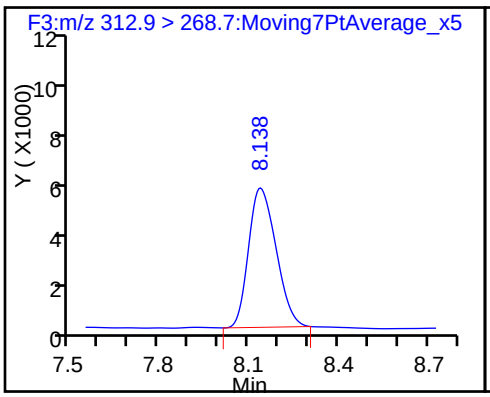
51 Perfluorobutanesulfonic acid



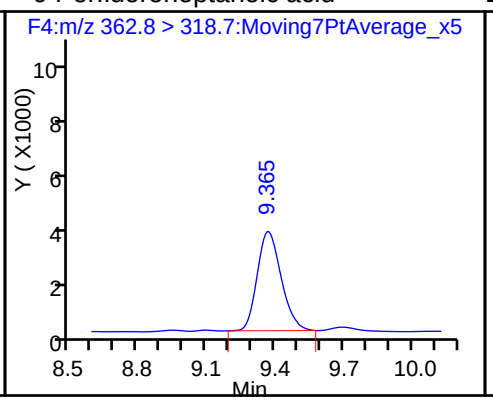
D 6 13C2 PFHxA



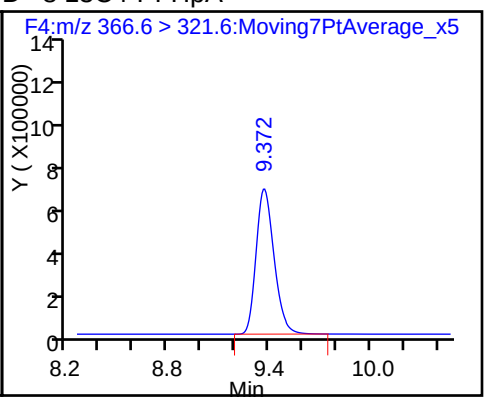
7 Perfluorohexanoic acid



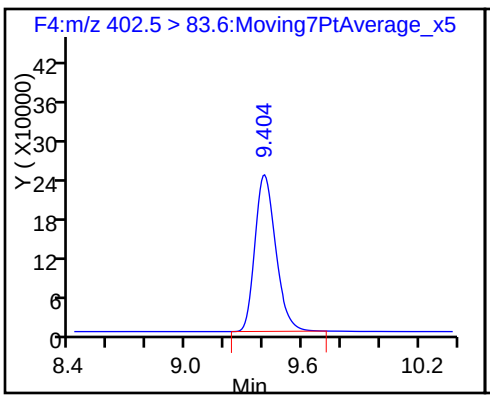
9 Perfluoroheptanoic acid



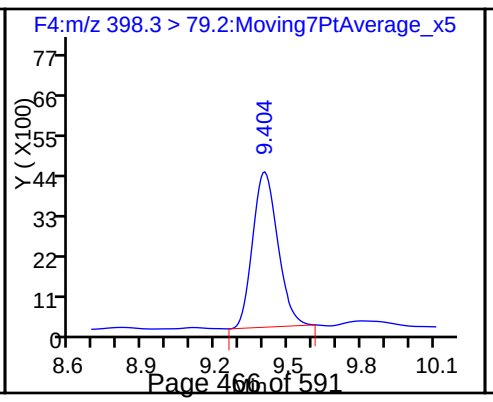
D 8 13C4-PFHpA



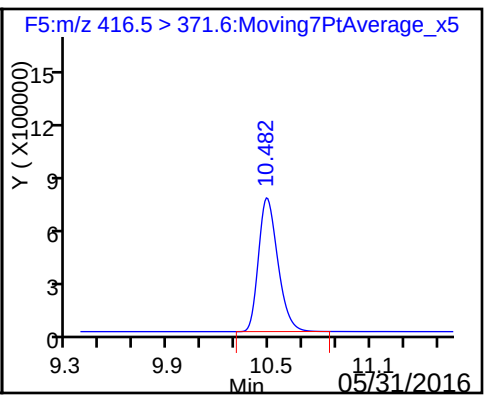
D 11 18O2 PFHxS



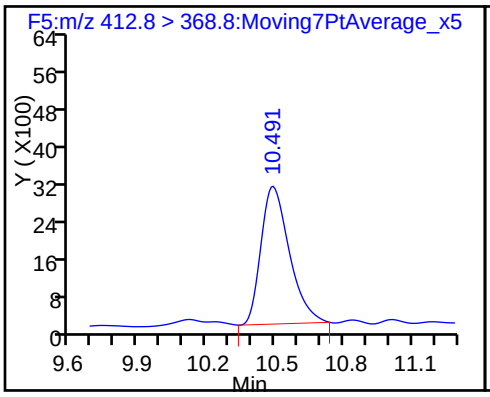
58 Perfluorohexanesulfonic acid



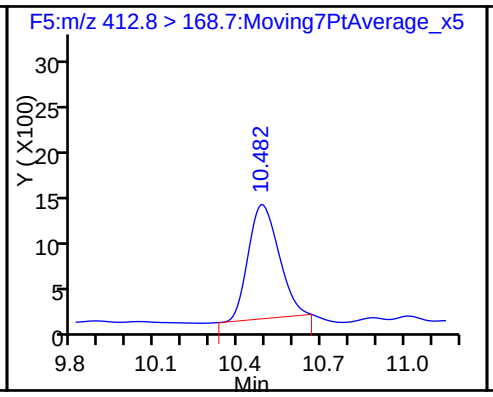
D 12 13C4 PFOA



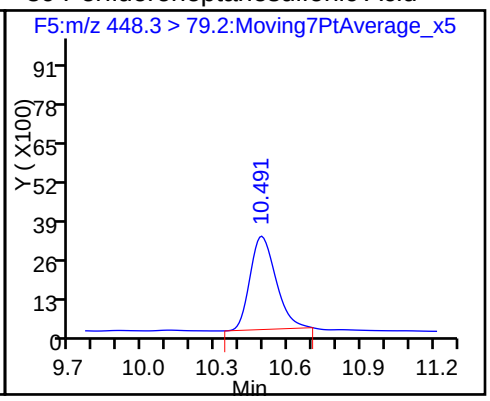
13 Perfluorooctanoic acid



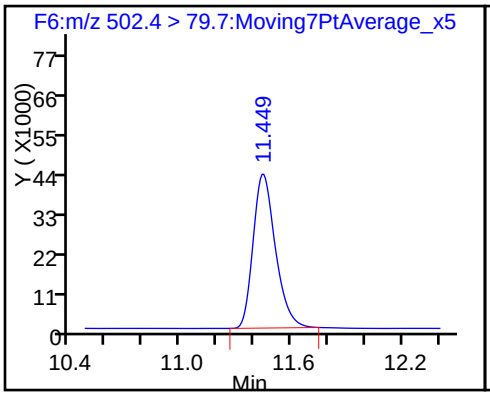
13 Perfluorooctanoic acid



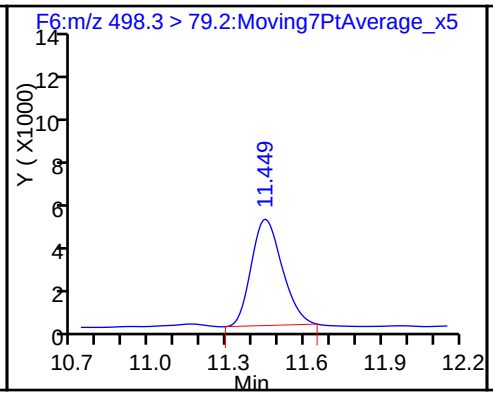
39 Perfluoroheptanesulfonic Acid



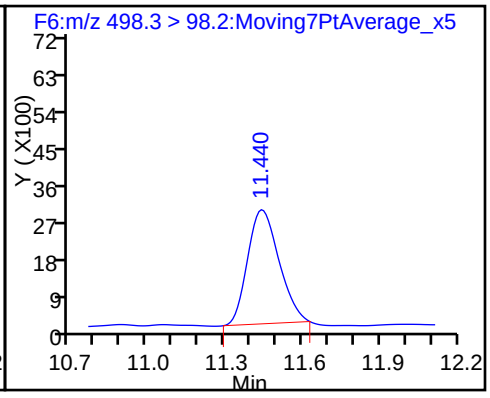
D 16 13C4 PFOS



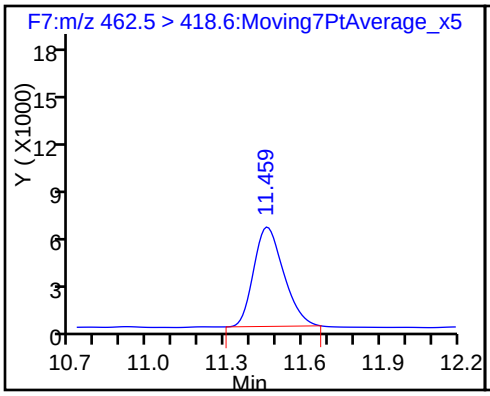
15 Perfluorooctane sulfonic acid



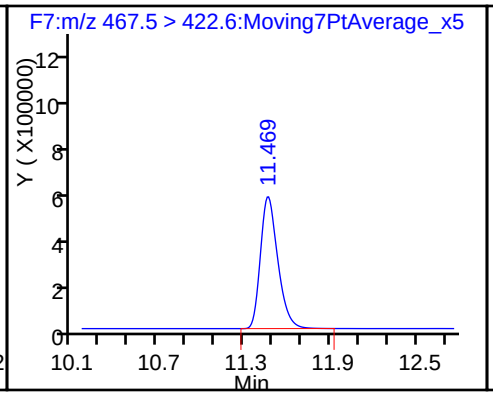
15 Perfluorooctane sulfonic acid



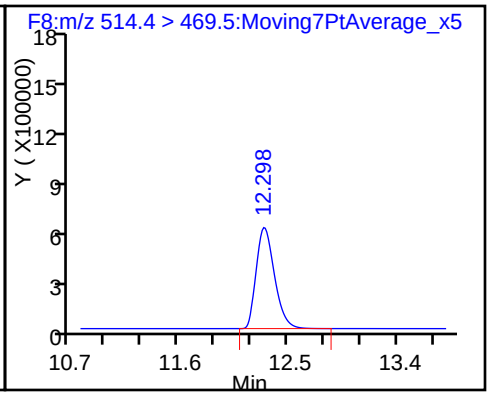
18 Perfluorononanoic acid



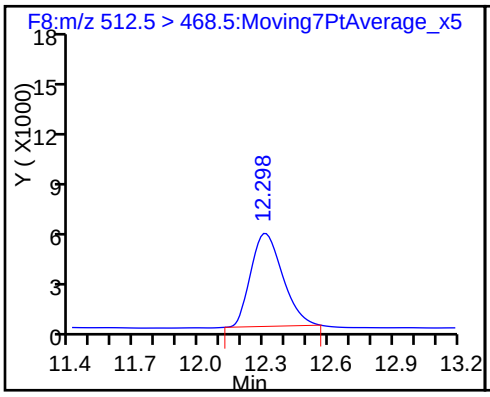
D 17 13C5 PFNA



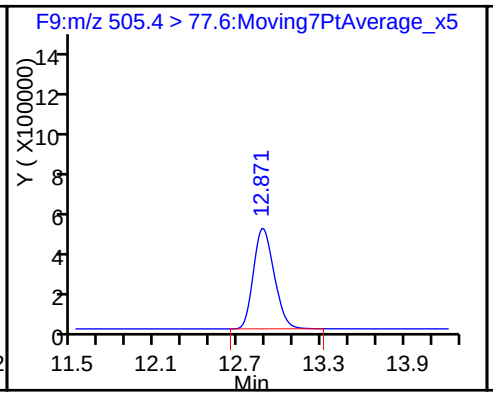
D 19 13C2 PFDA



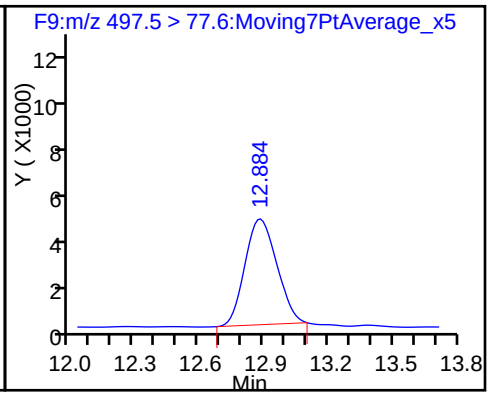
20 Perfluorodecanoic acid



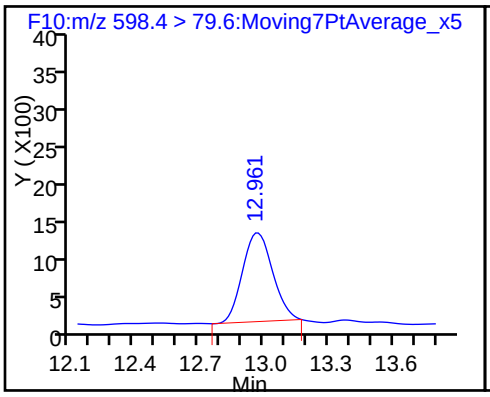
D 23 13C8 FOSA



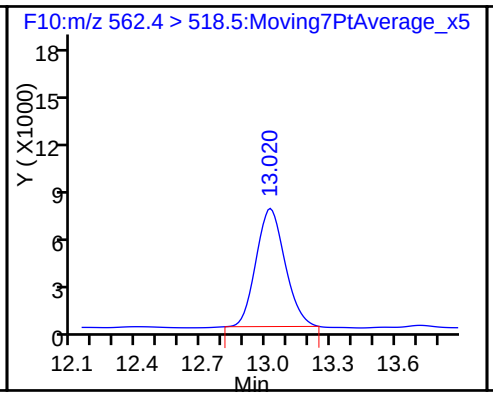
24 Perfluorooctane Sulfonamide



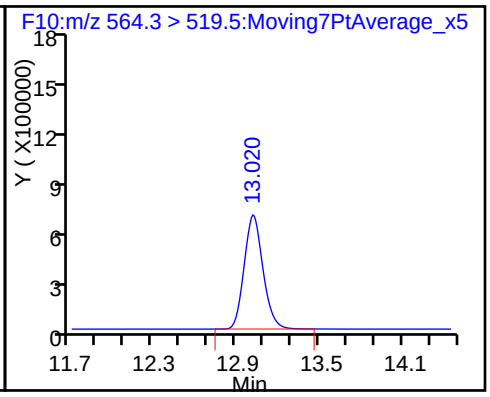
49 Perfluorodecane Sulfonic acid



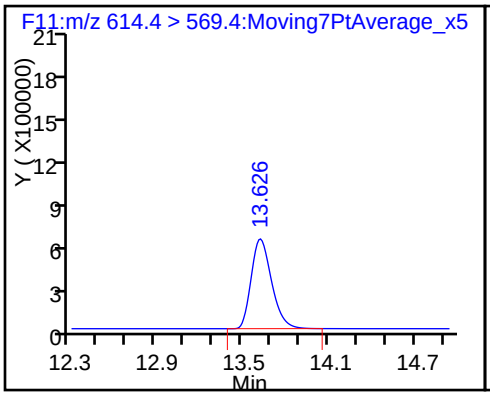
27 Perfluoroundecanoic acid



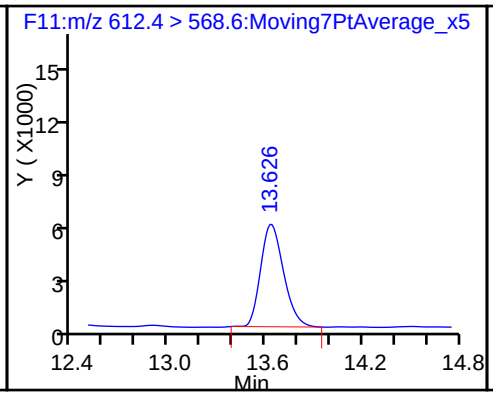
D 26 13C2 PFUnA



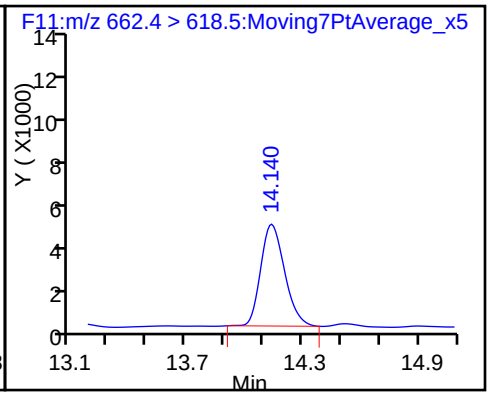
D 28 13C2 PFDoA



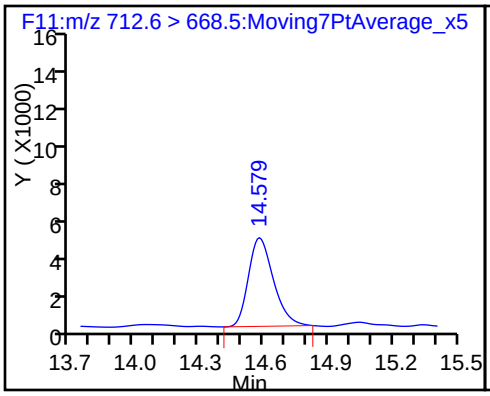
29 Perfluorododecanoic acid



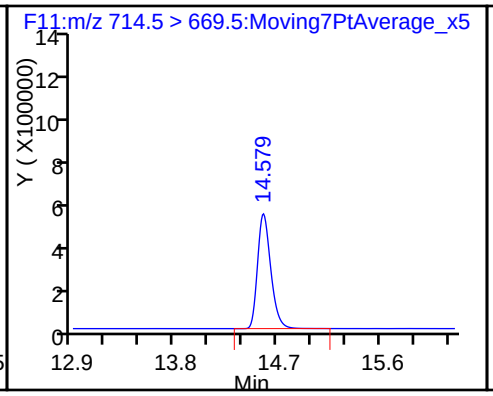
30 Perfluorotridecanoic acid



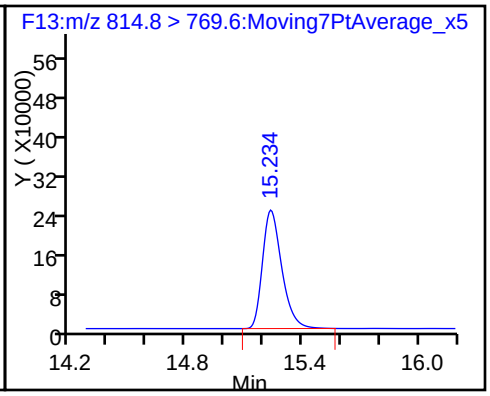
32 Perfluorotetradecanoic acid



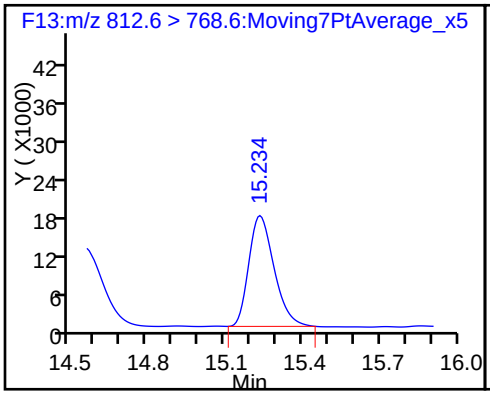
D 33 13C2-PFTeDA



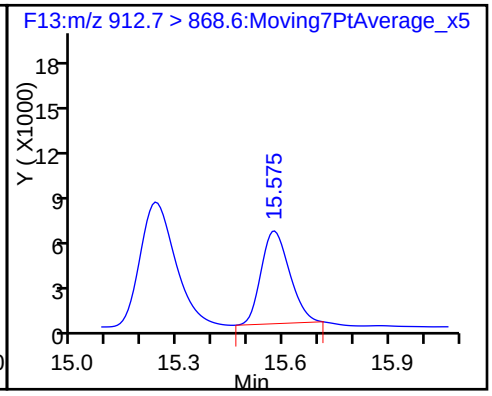
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_003.d
Lims ID: Std L2
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 27-May-2016 11:38:10 ALS Bottle#: 11 Worklist Smp#: 3
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L2
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:50:12 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 27-May-2016 14:08:02

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.794	5.790	0.004		5922896	57.3		115	14014	
2 Perfluorobutyric acid										
212.7 > 168.6	5.791	5.792	-0.001	1.000	79038	1.03		103	268	
D 3 13C5-PFPeA										
267.6 > 222.7	6.895	6.892	0.003		4443078	58.6		117	11183	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.899	6.895	0.004	1.000	49163	1.12		112	15.9	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.014	7.011	0.003	1.000	22190	NC			51.2	
298.8 > 98.6	7.005	7.011	-0.006	0.999	14858		1.49(0.00-0.00)		41.6	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.014	7.011	0.003	1.000	22190	0.8886		101		
D 6 13C2 PFHxA										
314.6 > 269.7	8.144	8.138	0.006		5603613	59.9		120	9795	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.144	8.140	0.004	1.000	58420	0.9858		98.6	298	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	67952	1.28		128	253	
D 8 13C4-PFHpA										
366.6 > 321.6	9.372	9.366	0.006		4951706	59.0		118	7163	
D 11 18O2 PFHxS										
402.5 > 83.6	9.404	9.399	0.005		1714340	56.5		120	4479	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.404	9.401	0.003	1.000	56050	0.9825		104		
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.404	9.401	0.003	1.000	56050	NC			121	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		6004812	62.7		125	8251	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.491	10.485	0.006	1.000	47860	0.9492		94.9	109	
412.8 > 168.7	10.482	10.485	-0.003	0.999	16962		2.82(0.00-0.00)	94.9	93.0	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.491	10.485	0.006	1.000	52293	0.9395		98.7		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.491	10.485	0.006	1.000	52293	NC			315	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		372607	59.6		125	1761	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.449	11.443	0.006	1.000	84527	0.9837		103	187	
498.3 > 98.2	11.449	11.443	0.006	1.000	55334		1.53(0.00-0.00)	103	169	
18 Perfluorononanoic acid										
462.5 > 418.6	11.469	11.462	0.007	1.000	135842	1.16		116	277	
D 17 13C5 PFNA										
467.5 > 422.6	11.469	11.462	0.007		4797422	59.0		118	6793	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		6093155	59.1		118	5984	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	137110	1.05		105	347	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		5446523	57.4		115	3669	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.871	12.873	-0.002	1.000	115881	1.01		101	485	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.974	12.969	0.005	1.000	27365	NC			88.5	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.974	12.969	0.005	1.000	27365	0.9383		97.3		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	155280	1.07		107	280	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		6243971	57.5		115	5308	
D 28 13C2 PFDoA										
614.4 > 569.4	13.627	13.626	0.001		6619880	59.5		119	4617	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.627	13.626	0.001	1.000	112952	0.9307		93.1	44.2	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.140	14.138	0.002	1.000	96792	1.10		110	45.0	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.579	14.577	0.002	1.000	50651	1.07		107	32.4	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.579	14.579	0.0		4251362	54.7		109	3386	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1709081	57.4		115	3894	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	166963	0.9840		98.4	29.0	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	70399	0.9371		93.7	85.8	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L2_00018 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:50:14 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_003.d

Injection Date: 27-May-2016 11:38:10 Instrument ID: A4

Lims ID: Std L2

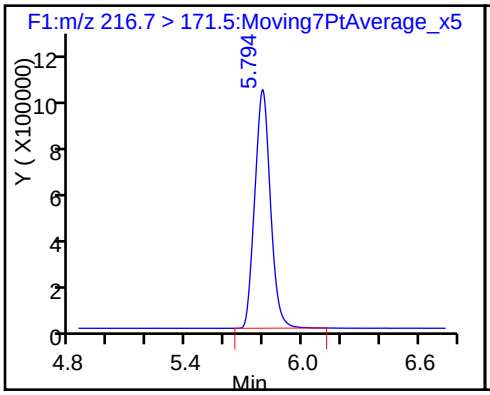
Client ID:

Operator ID: JRB ALS Bottle#: 11 Worklist Smp#: 3

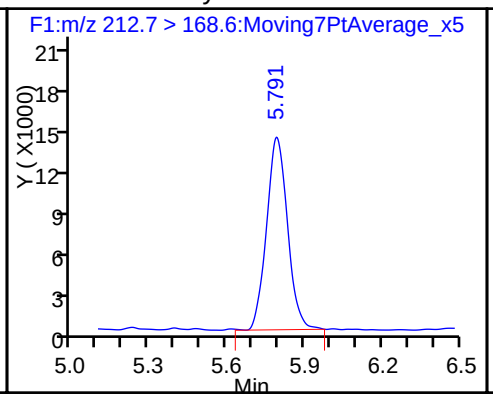
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

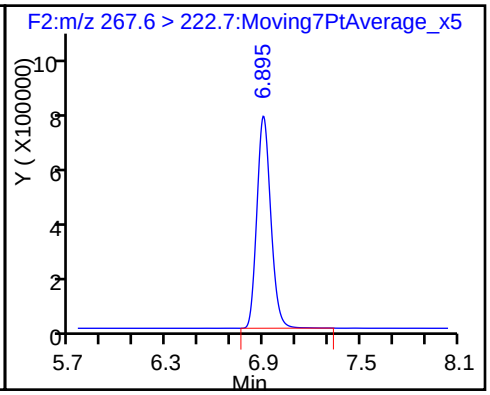
D 1 13C4 PFBA



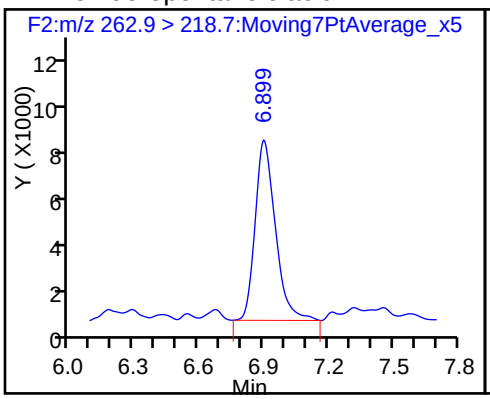
2 Perfluorobutyric acid



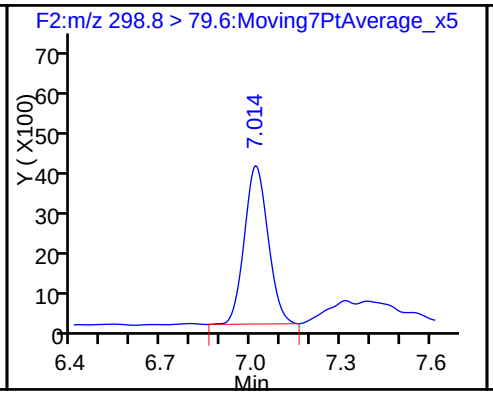
D 3 13C5-PFPeA



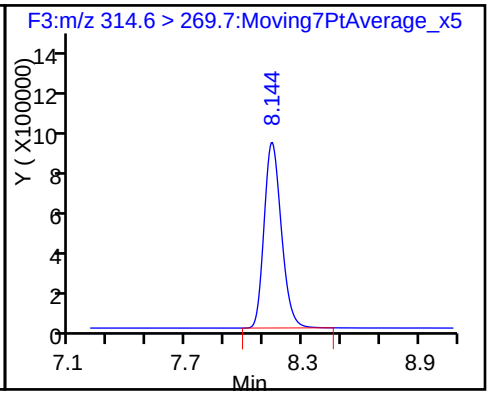
4 Perfluoropentanoic acid



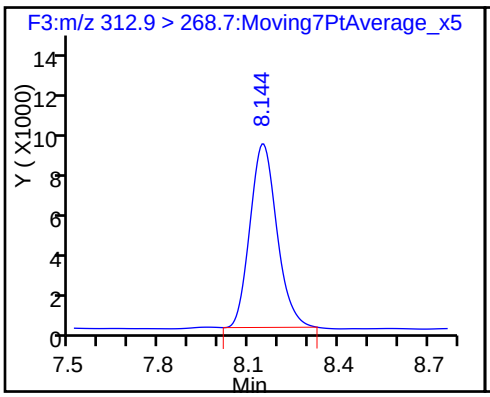
51 Perfluorobutanesulfonic acid



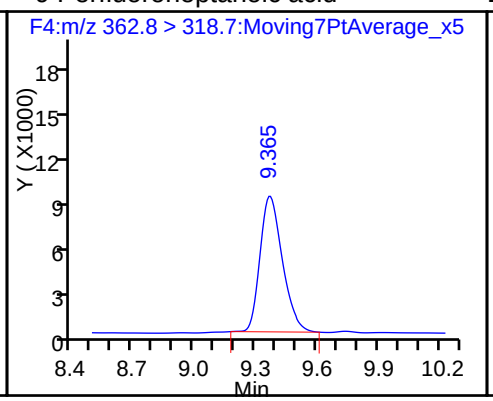
D 6 13C2 PFHxA



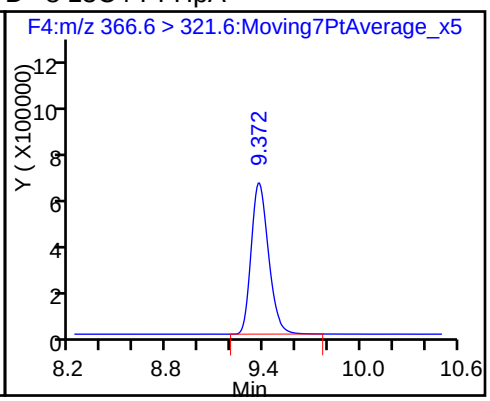
7 Perfluorohexanoic acid



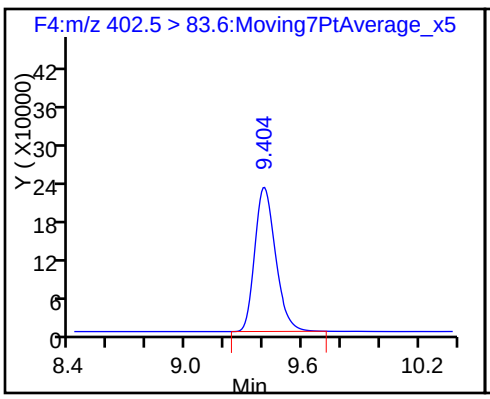
9 Perfluoroheptanoic acid



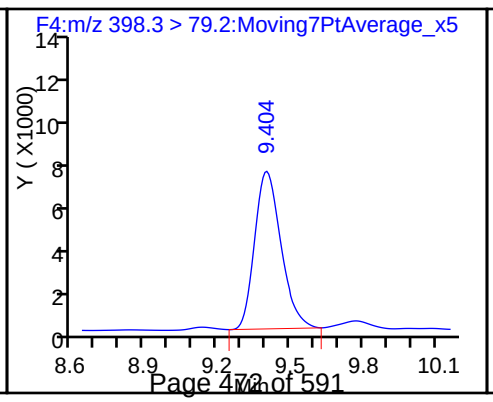
D 8 13C4-PFHpA



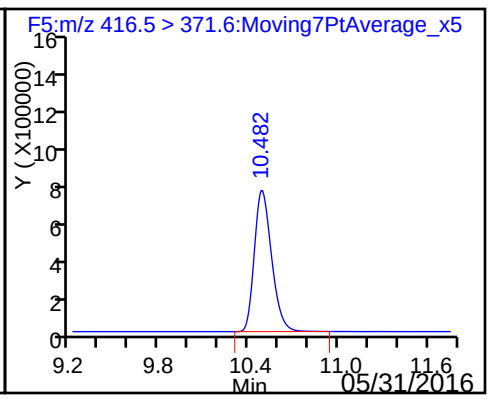
D 11 18O2 PFHxS



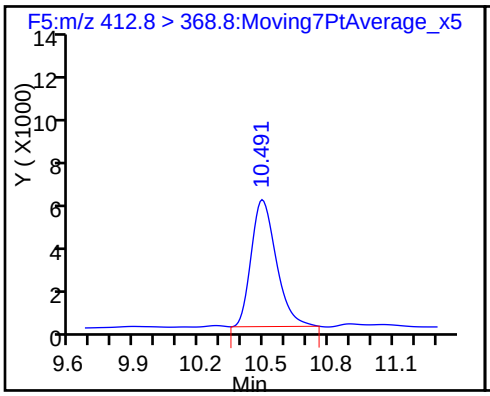
58 Perfluorohexanesulfonic acid



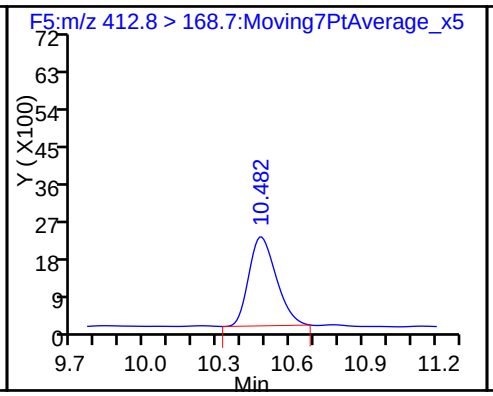
D 12 13C4 PFOA



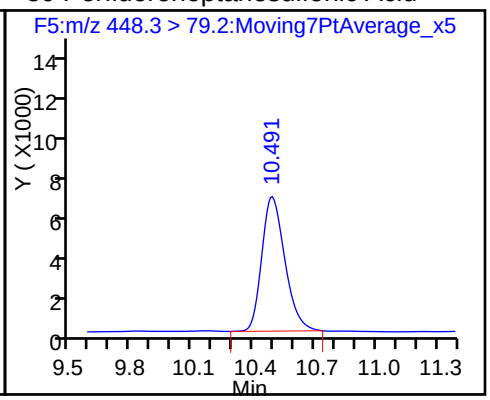
13 Perfluorooctanoic acid



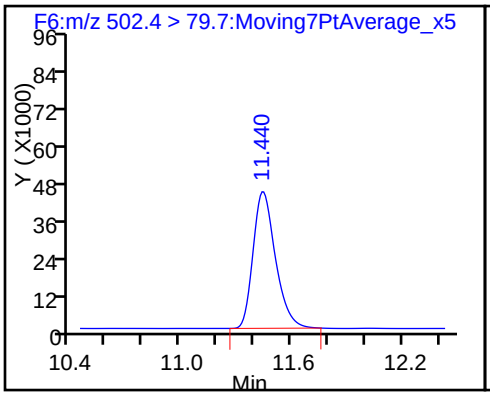
13 Perfluorooctanoic acid



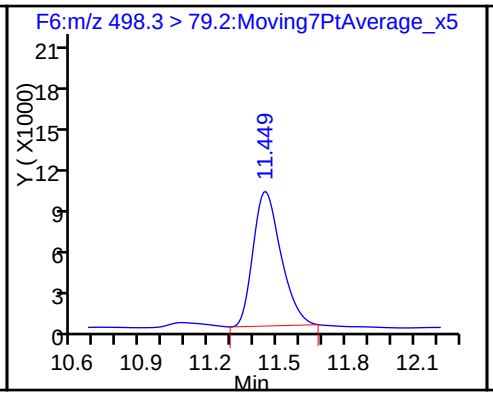
39 Perfluoroheptanesulfonic Acid



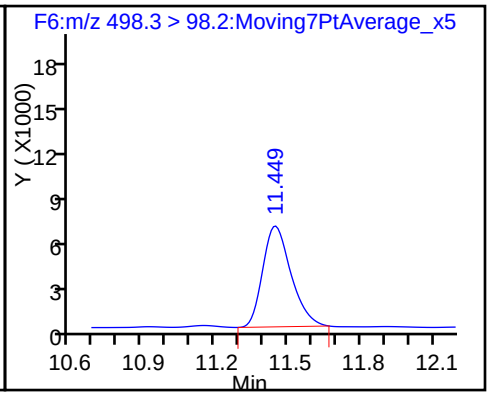
D 16 13C4 PFOS



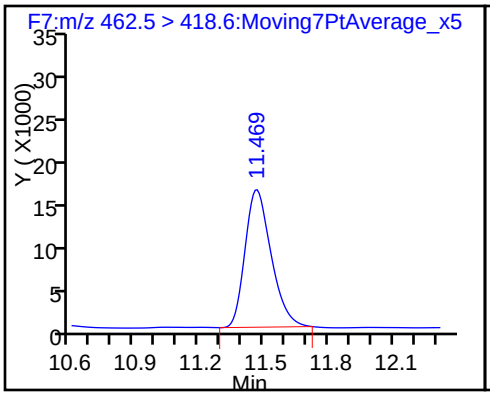
15 Perfluorooctane sulfonic acid



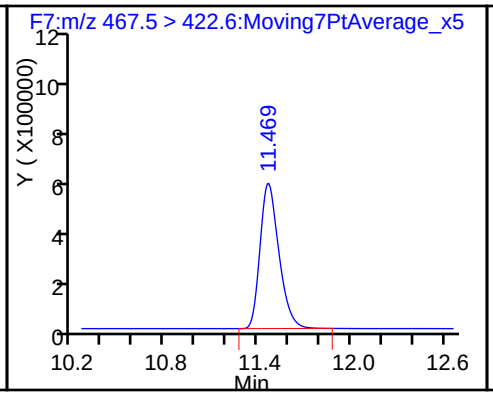
15 Perfluorooctane sulfonic acid



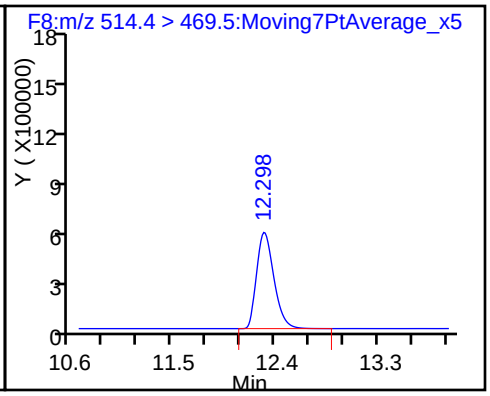
18 Perfluorononanoic acid



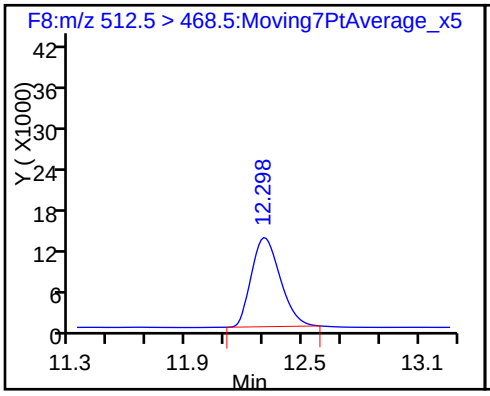
D 17 13C5 PFNA



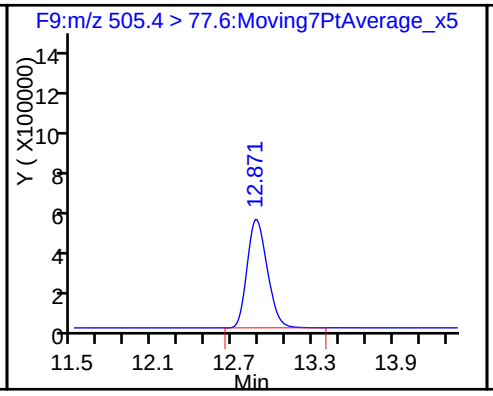
D 19 13C2 PFDA



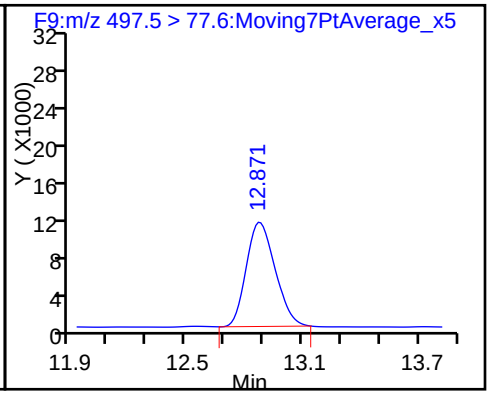
20 Perfluorodecanoic acid



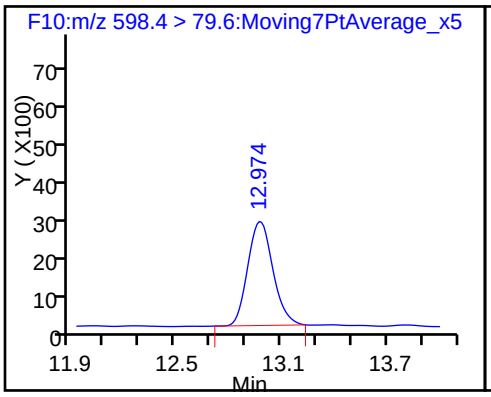
D 23 13C8 FOSA



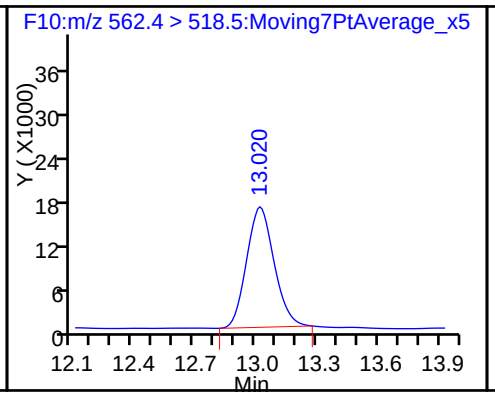
24 Perfluorooctane Sulfonamide



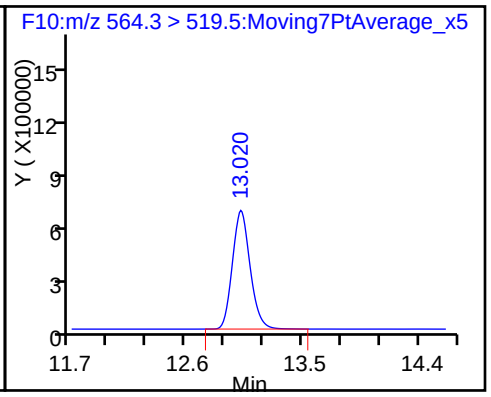
49 Perfluorodecane Sulfonic acid



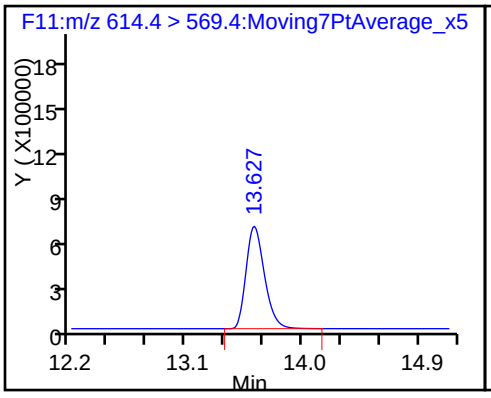
27 Perfluoroundecanoic acid



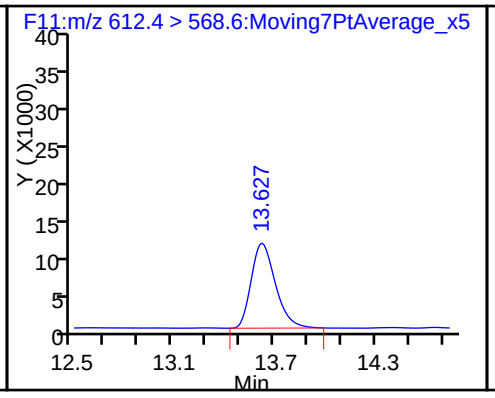
D 26 13C2 PFUnA



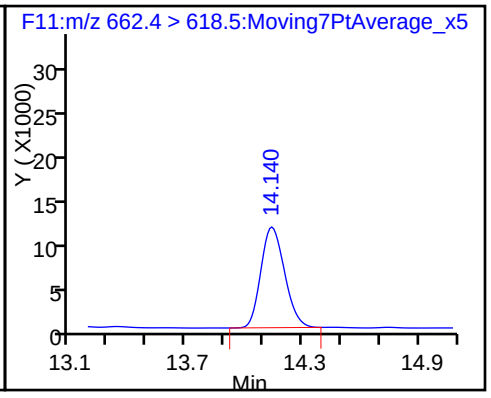
D 28 13C2 PFDoA



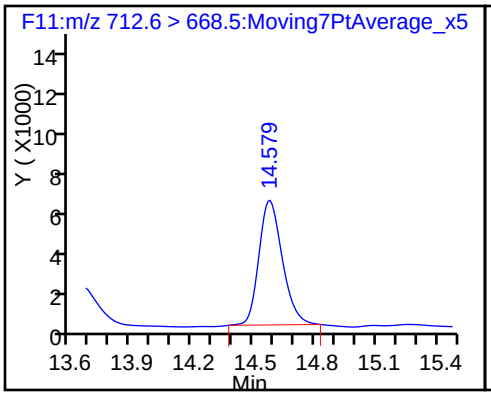
29 Perfluorododecanoic acid



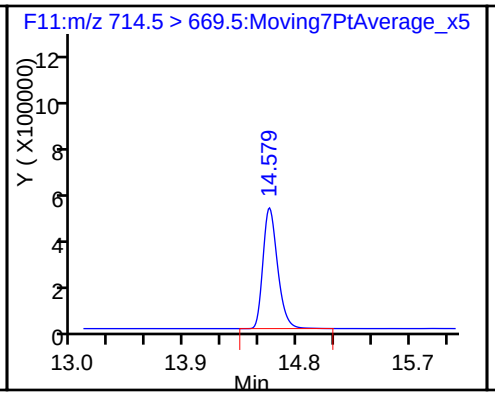
30 Perfluorotridecanoic acid



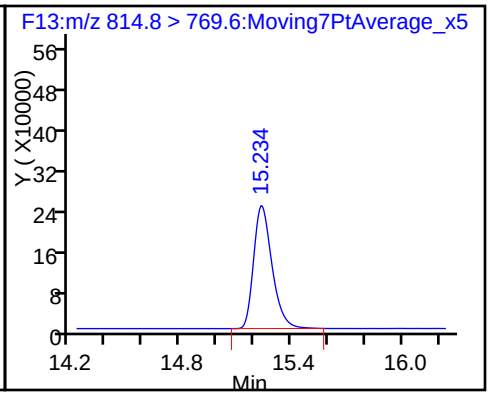
32 Perfluorotetradecanoic acid



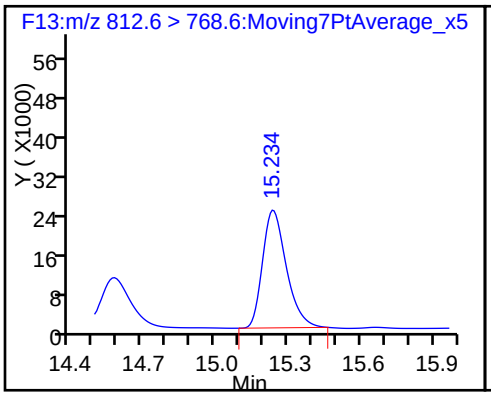
D 33 13C2-PFTeDA



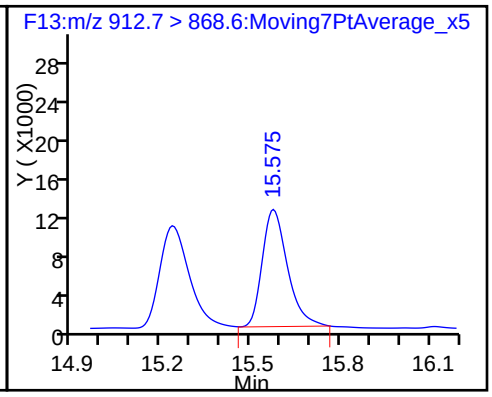
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_004.d
Lims ID: Std L3
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 27-May-2016 11:59:21 ALS Bottle#: 12 Worklist Smp#: 4
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L3
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:50:30 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.787	5.790	-0.003		6102158	59.0		118	14691	
2 Perfluorobutyric acid										
212.7 > 168.6	5.791	5.792	-0.001	1.000	411899	5.20		104	1461	
D 3 13C5-PFPeA										
267.6 > 222.7	6.895	6.892	0.003		4514607	59.5		119	9487	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.895	6.895	0.0	1.000	215346	4.83		96.5	77.8	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.005	7.011	-0.006	1.000	107395	NC			217	
298.8 > 98.6	7.005	7.011	-0.006	1.000	65863		1.63(0.00-0.00)		139	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.005	7.011	-0.006	1.000	107395	4.54		103		
D 6 13C2 PFHxA										
314.6 > 269.7	8.138	8.138	0.0		5630648	60.2		120	8412	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.144	8.140	0.004	1.000	289472	5.40		108	919	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	251708	4.86		97.3	774	
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		4816964	57.4		115	7041	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1680553	55.4		117	4139	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.396	9.401	-0.005	1.000	248660	4.45		94.0		
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.396	9.401	-0.005	1.000	248660	NC			398	
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		5689738	59.4		119	6550	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooctanoic acid										
412.8 > 368.8	10.482	10.485	-0.003	1.000	266844	5.20		104	661	
412.8 > 168.7	10.482	10.485	-0.003	1.000	78658		3.39(0.00-0.00)	104	289	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.482	10.485	-0.003	1.000	305599	5.02		105		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.482	10.485	-0.003	1.000	305599	NC			1764	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		376516	60.3		126	1031	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.440	11.443	-0.003	1.000	426209	4.56		95.5	797	
498.3 > 98.2	11.440	11.443	-0.003	1.000	261944		1.63(0.00-0.00)	95.5	610	
18 Perfluorononanoic acid										
462.5 > 418.6	11.459	11.462	-0.003	1.000	593475	4.88		97.6	939	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		4827839	59.4		119	8973	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		6167778	59.9		120	6345	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	682419	5.15		103	1762	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		5442155	57.3		115	3814	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.871	12.873	-0.002	1.000	606618	5.29		106	1126	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.974	12.969	0.005	1.000	172152	NC			928	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.974	12.969	0.005	1.000	172152	5.84		121		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	767762	5.17		103	971	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		6398716	59.0		118	6789	
D 28 13C2 PFDoA										
614.4 > 569.4	13.627	13.626	0.001		6214302	55.9		112	3491	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.627	13.626	0.001	1.000	608510	5.34		107	269	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.130	14.138	-0.008	1.000	538198	5.85		117	261	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.579	14.577	0.002	1.000	235060	4.73		94.6	114	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.579	14.579	0.0		4459397	57.4		115	4200	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1680316	56.5		113	3475	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	575613	5.36		107	96.1	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	357536	4.84		96.8	420	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L3_00016 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:50:32 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_004.d

Injection Date: 27-May-2016 11:59:21 Instrument ID: A4

Lims ID: Std L3

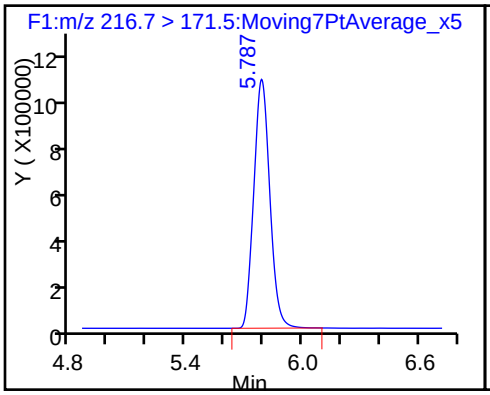
Client ID:

Operator ID: JRB ALS Bottle#: 12 Worklist Smp#: 4

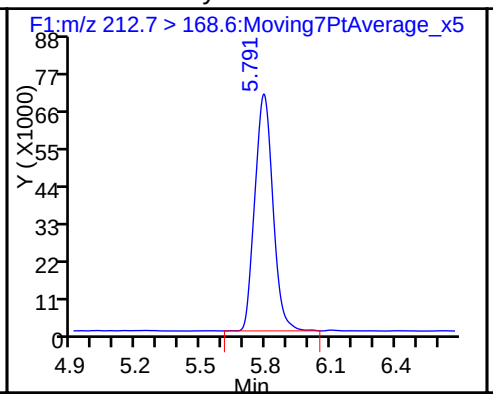
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

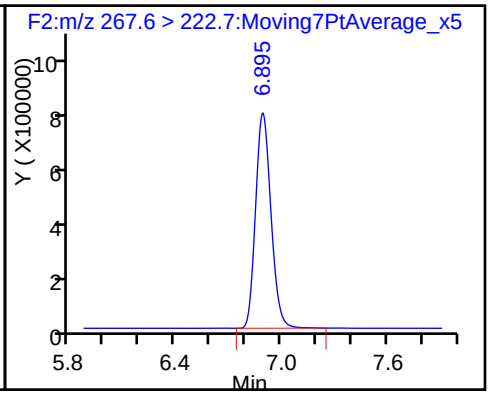
D 1 13C4 PFBA



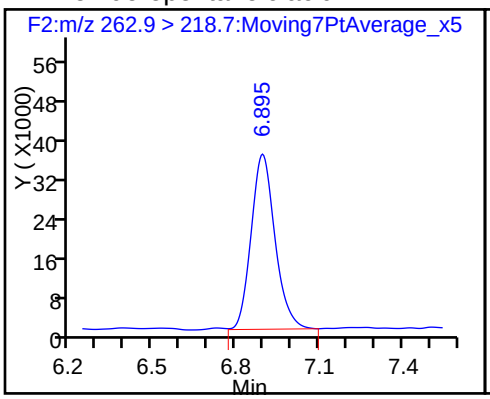
2 Perfluorobutyric acid



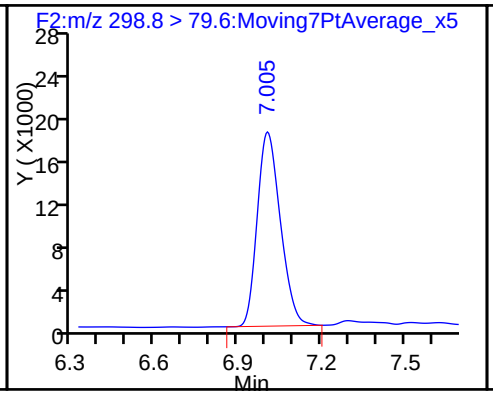
D 3 13C5-PFPeA



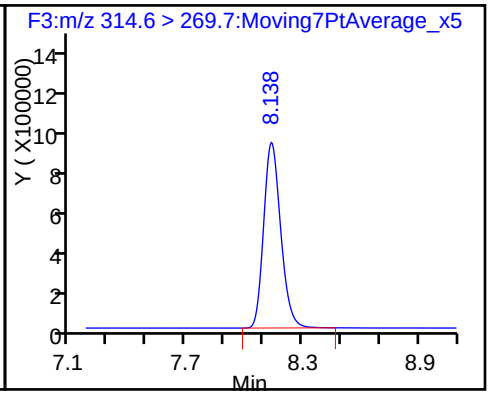
4 Perfluoropentanoic acid



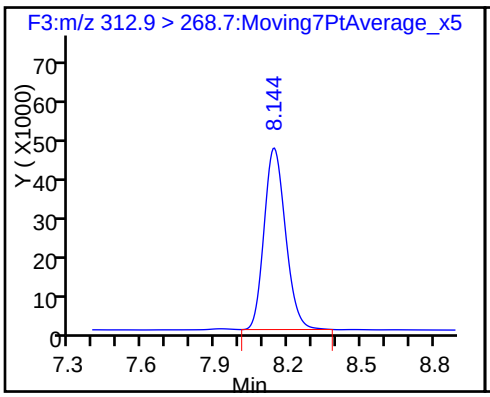
51 Perfluorobutanesulfonic acid



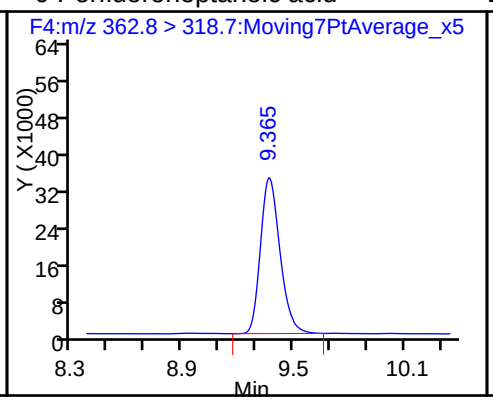
D 6 13C2 PFHxA



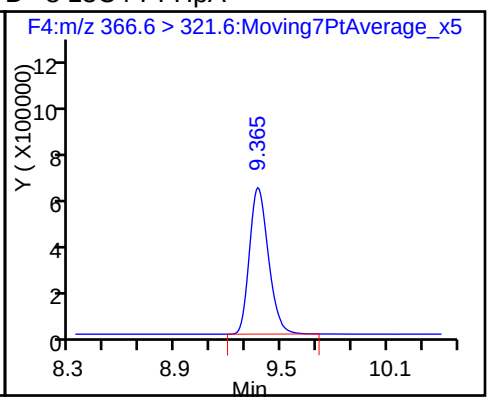
7 Perfluorohexanoic acid



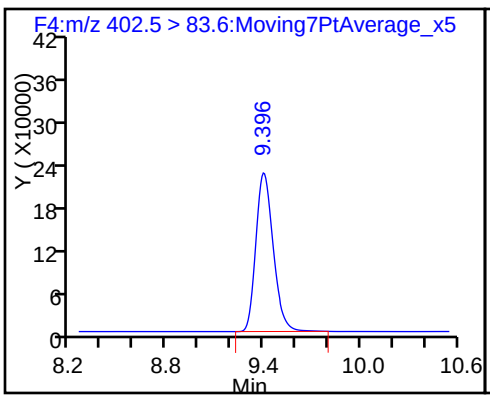
9 Perfluoroheptanoic acid



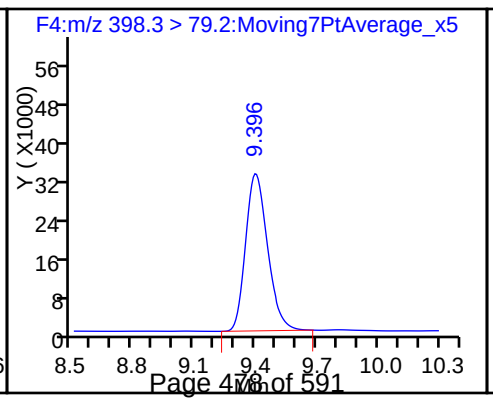
D 8 13C4-PFHpA



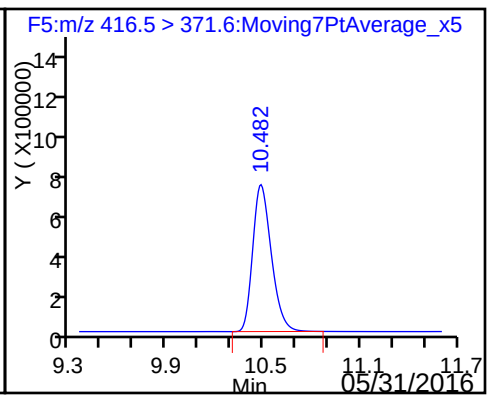
D 11 18O2 PFHxS



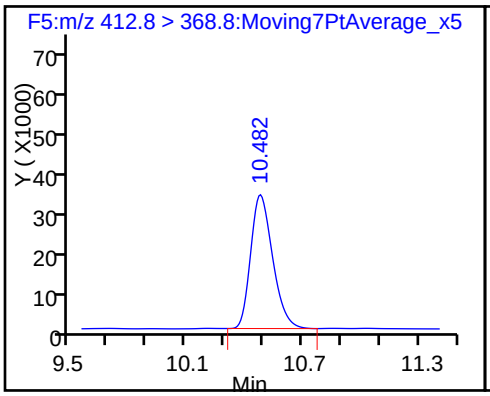
58 Perfluorohexanesulfonic acid



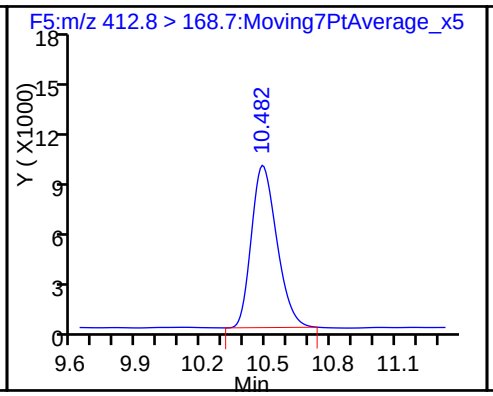
D 12 13C4 PFOA



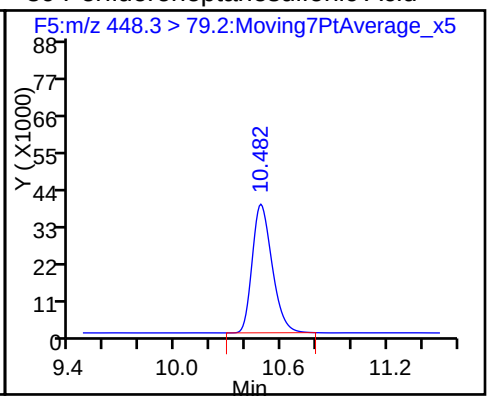
13 Perfluorooctanoic acid



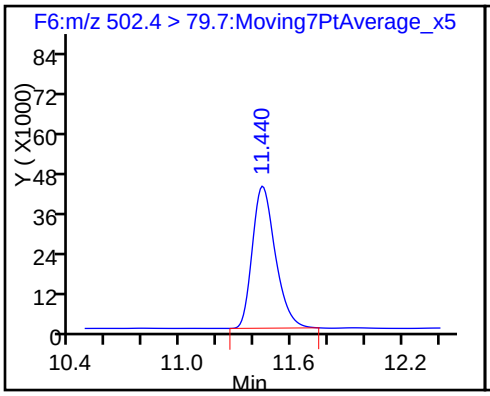
13 Perfluorooctanoic acid



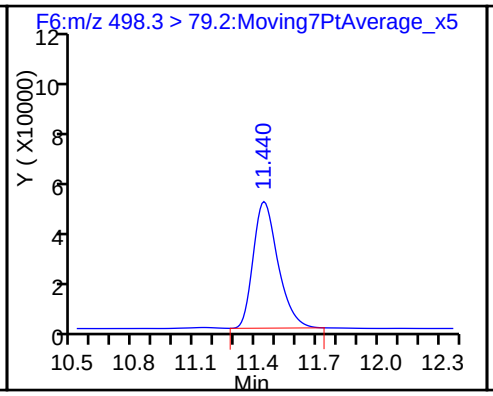
39 Perfluoroheptanesulfonic Acid



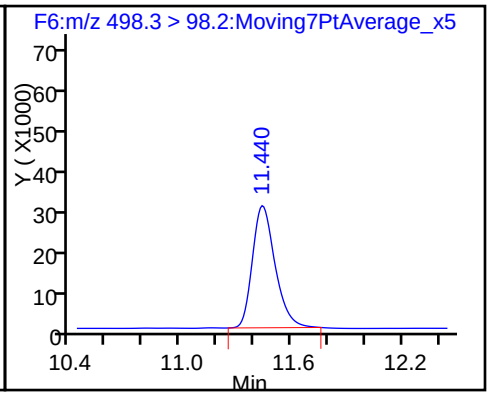
D 16 13C4 PFOS



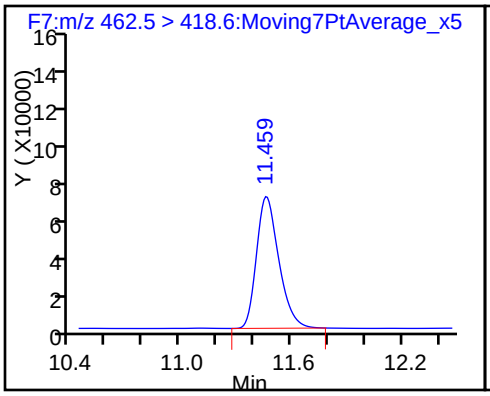
15 Perfluorooctane sulfonic acid



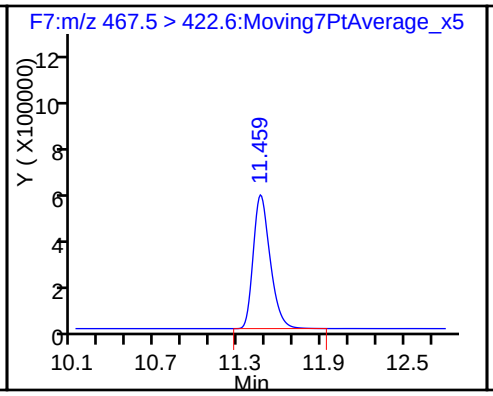
15 Perfluorooctane sulfonic acid



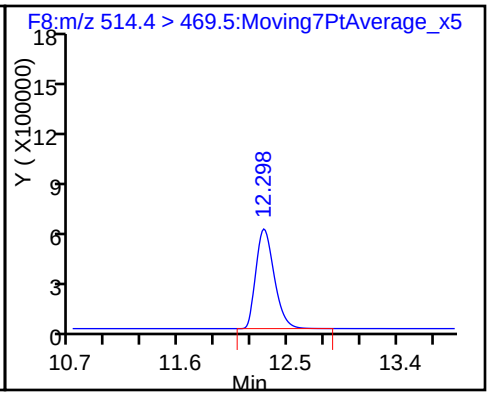
18 Perfluorononanoic acid



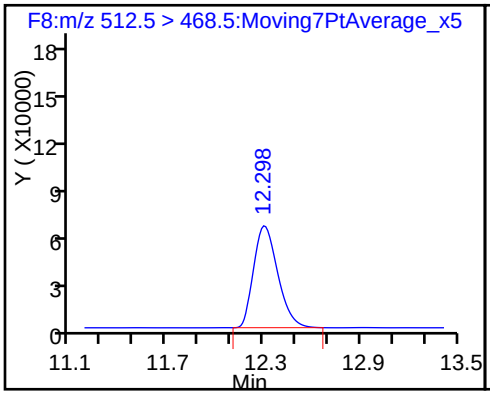
D 17 13C5 PFNA



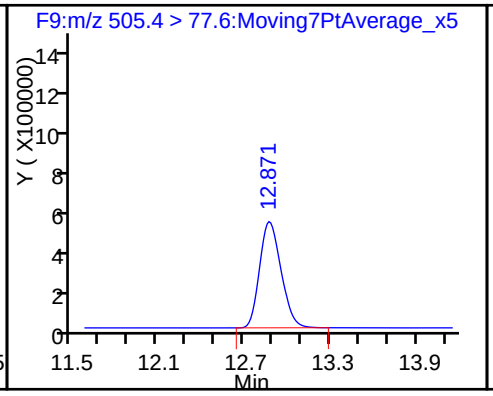
D 19 13C2 PFDA



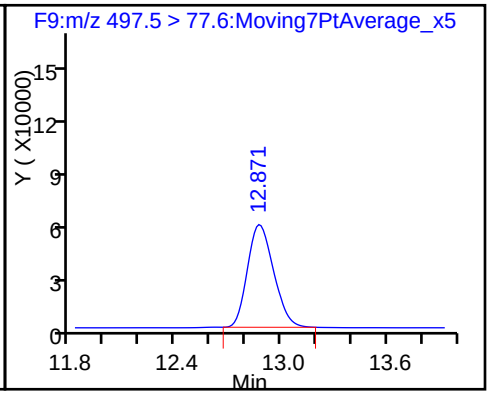
20 Perfluorodecanoic acid



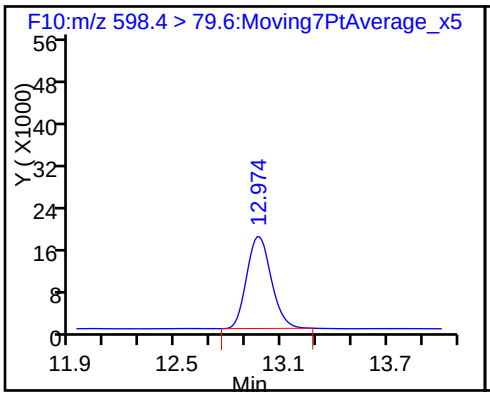
D 23 13C8 FOSA



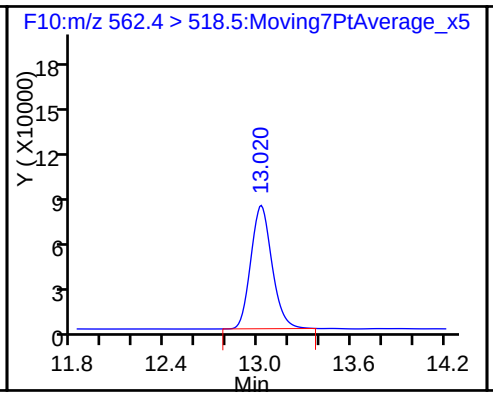
24 Perfluorooctane Sulfonamide



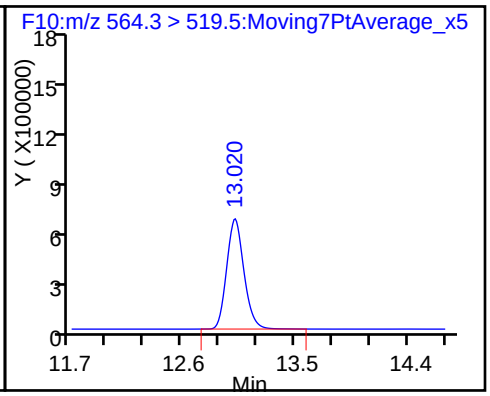
49 Perfluorodecane Sulfonic acid



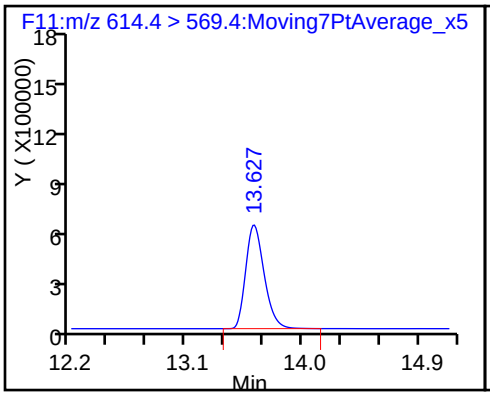
27 Perfluoroundecanoic acid



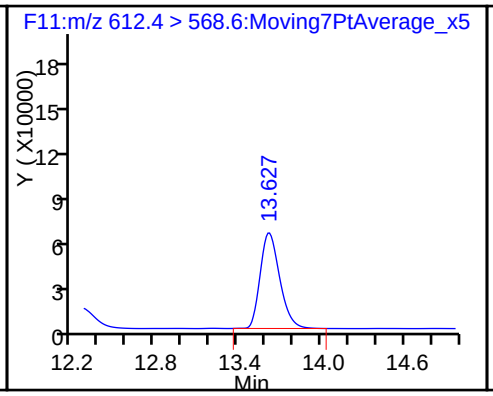
D 26 13C2 PFUnA



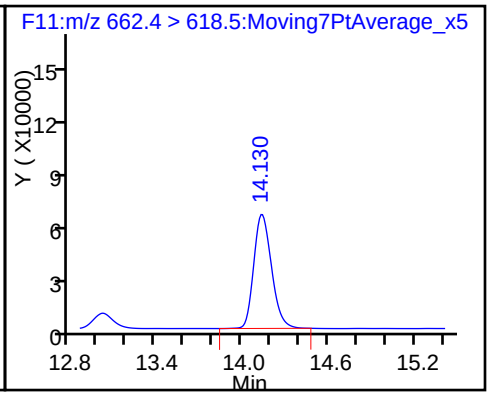
D 28 13C2 PFDoA



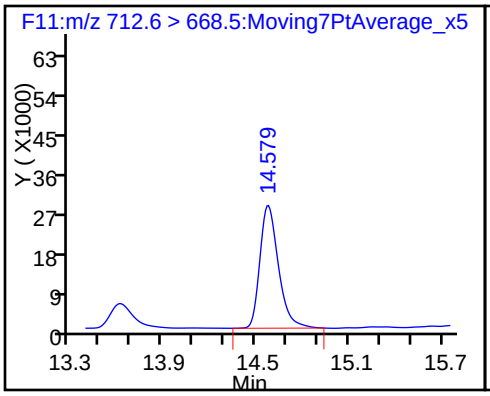
29 Perfluorododecanoic acid



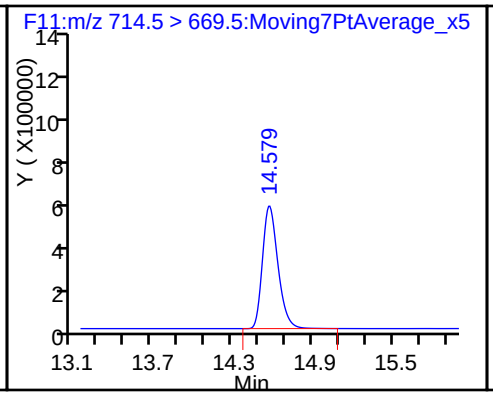
30 Perfluorotridecanoic acid



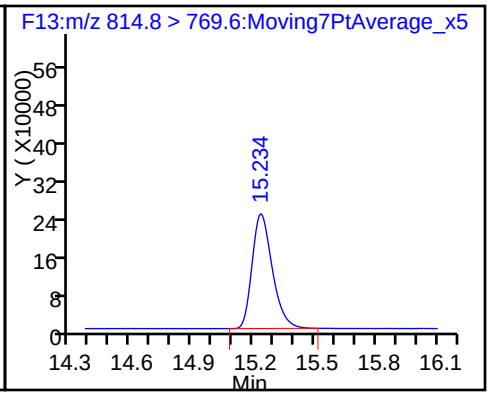
32 Perfluorotetradecanoic acid



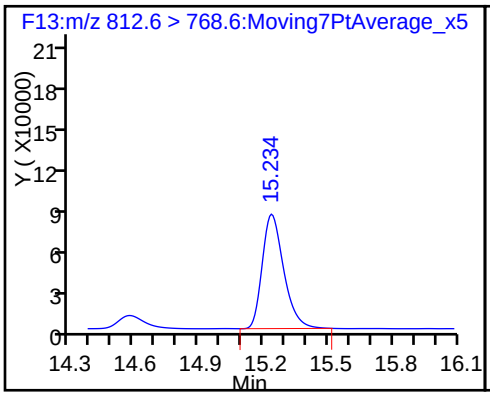
D 33 13C2-PFTeDA



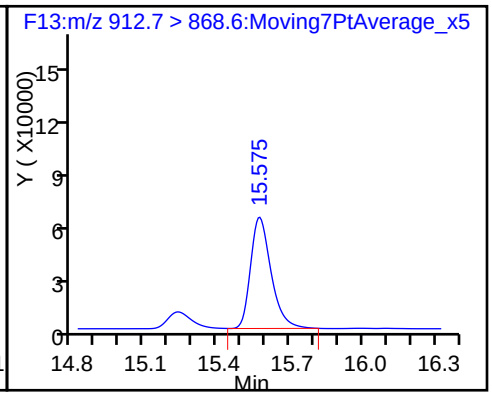
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_005.d
Lims ID: Std L4
Client ID:
Sample Type: IC Calib Level: 4
Inject. Date: 27-May-2016 12:20:32 ALS Bottle#: 13 Worklist Smp#: 5
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L4
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:50:42 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 29-May-2016 15:54:25

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.791	5.790	0.001		6130329	59.3		119	18828	
2 Perfluorobutyric acid										
212.7 > 168.6	5.791	5.792	-0.001	1.000	1493014	18.8		93.8	4980	
D 3 13C5-PFPeA										
267.6 > 222.7	6.890	6.892	-0.002		4415347	58.2		116	8480	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.895	6.895	0.0	1.000	760519	17.4		87.1	250	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.005	7.011	-0.006	1.000	362783	NC			654	
298.8 > 98.6	7.005	7.011	-0.006	1.000	232034		1.56(0.00-0.00)		560	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.005	7.011	-0.006	1.000	362783	17.1		96.9		
D 6 13C2 PFHxA										
314.6 > 269.7	8.138	8.138	0.0		4971985	53.1		106	9074	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.138	8.140	-0.002	1.000	829722	17.8		89.2	1731	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	810433	17.1		85.3	3008	
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		4422269	52.7		105	7341	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1511920	49.9		105	3328	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.396	9.401	-0.005	1.000	818371	16.3		86.0		
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.396	9.401	-0.005	1.000	818371	NC			1391	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		4833468	50.4		101	7797	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.482	10.485	-0.003	1.000	817233	18.5		92.7	1245	
412.8 > 168.7	10.482	10.485	-0.003	1.000	260959		3.13(0.00-0.00)	92.7	887	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.482	10.485	-0.003	1.000	929146	18.6		97.9		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.482	10.485	-0.003	1.000	929146	NC			3380	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		304468	48.7		102	1155	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.440	11.443	-0.003	1.000	1371052	17.9		93.6	2346	
498.3 > 98.2	11.440	11.443	-0.003	1.000	799992		1.71(0.00-0.00)	93.6	1591	
18 Perfluorononanoic acid										
462.5 > 418.6	11.459	11.462	-0.003	1.000	1972169	18.6		92.9	3227	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		4191465	51.6		103	7798	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		5252314	51.0		102	8197	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	2190054	19.4		97.0	3088	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		4836707	51.0		102	3152	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.871	12.873	-0.002	1.000	2027572	19.9		99.4	2656	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.961	12.969	-0.008	1.000	485982	NC			1758	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.961	12.969	-0.008	1.000	485982	20.4		106		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	2511061	19.1		95.5	2483	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		5667533	52.2		104	5291	
D 28 13C2 PFDoA										
614.4 > 569.4	13.626	13.626	0.0		5821892	52.3		105	3435	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.626	13.626	0.0	1.000	1920992	18.0		90.0	899	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.140	14.138	0.002	1.000	1559315	18.4		92.0	706	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.579	14.577	0.002	1.000	710312	15.5		77.7	457	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.579	14.579	0.0		4103454	52.8		106	3009	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1561650	52.5		105	3268	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	1655130	18.2		91.0	281	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	1356212	19.8		98.8	1737	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L4_00018 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:50:43 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_005.d

Injection Date: 27-May-2016 12:20:32 Instrument ID: A4

Lims ID: Std L4

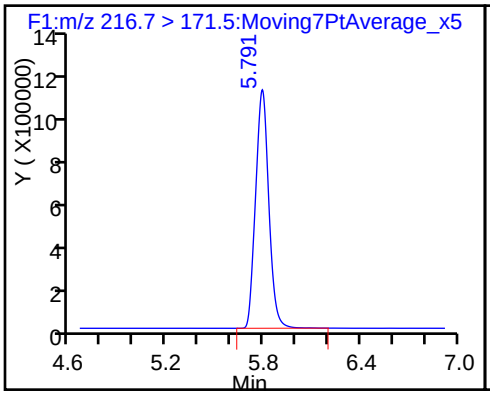
Client ID:

Operator ID: JRB ALS Bottle#: 13 Worklist Smp#: 5

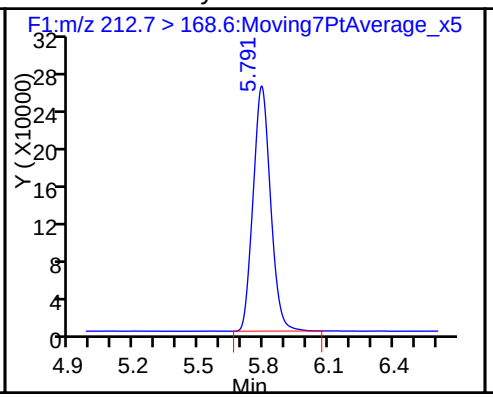
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

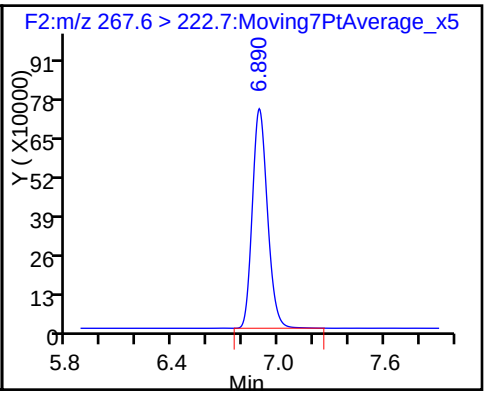
D 1 13C4 PFBA



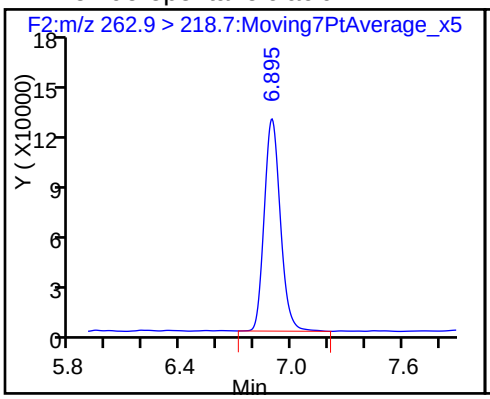
2 Perfluorobutyric acid



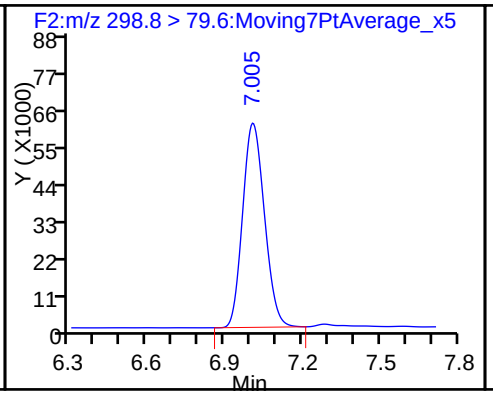
D 3 13C5-PFPeA



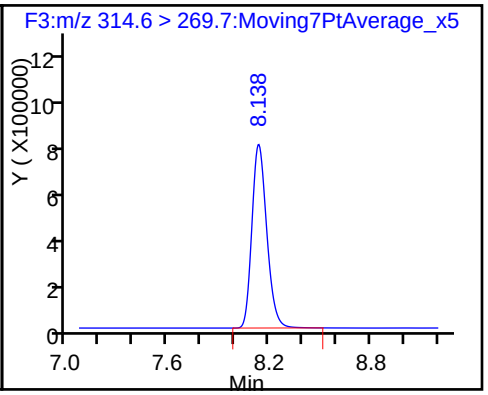
4 Perfluoropentanoic acid



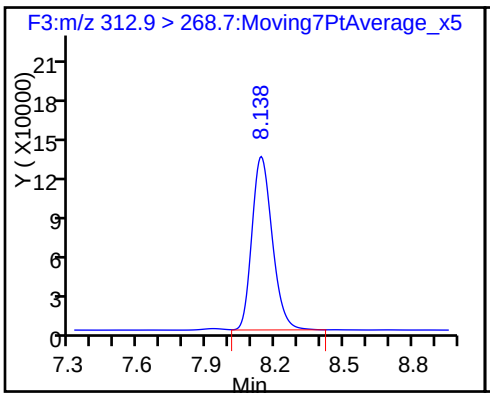
51 Perfluorobutanesulfonic acid



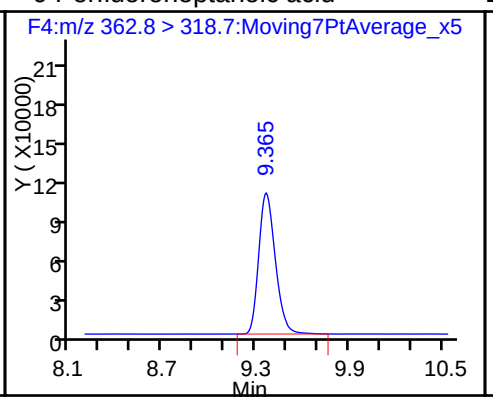
D 6 13C2 PFHxA



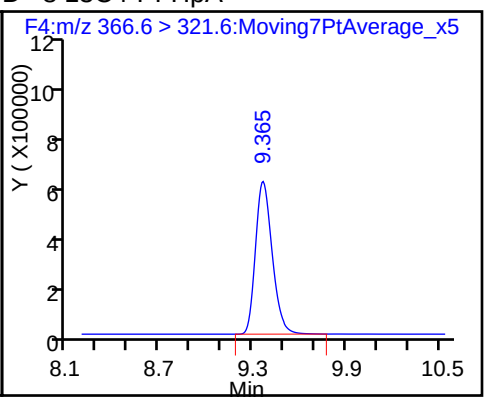
7 Perfluorohexanoic acid



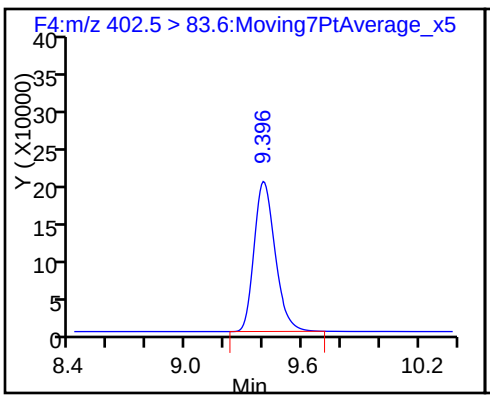
9 Perfluoroheptanoic acid



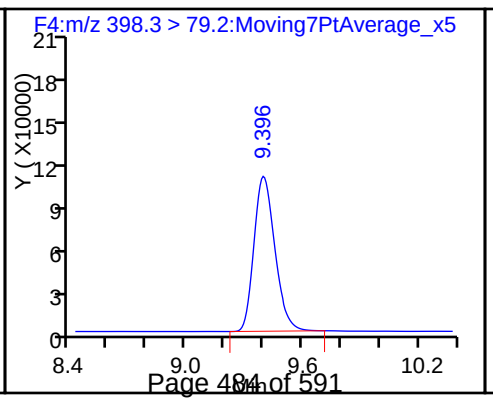
D 8 13C4-PFHpA



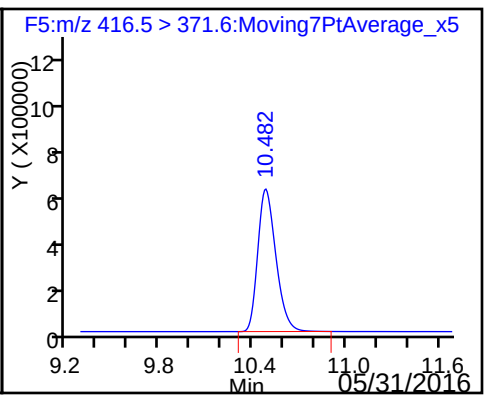
D 11 18O2 PFHxS



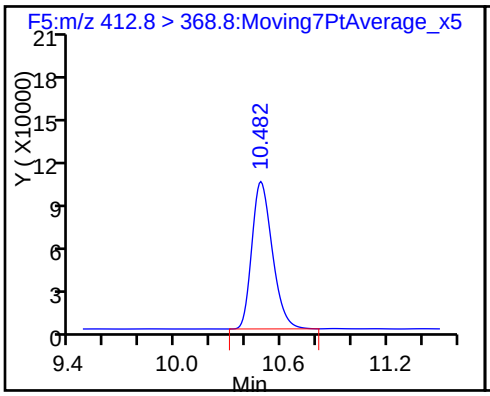
58 Perfluorohexanesulfonic acid



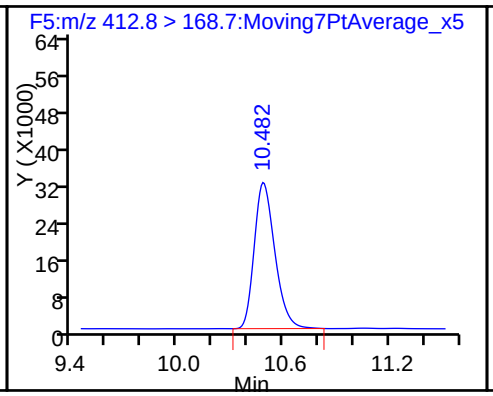
D 12 13C4 PFOA



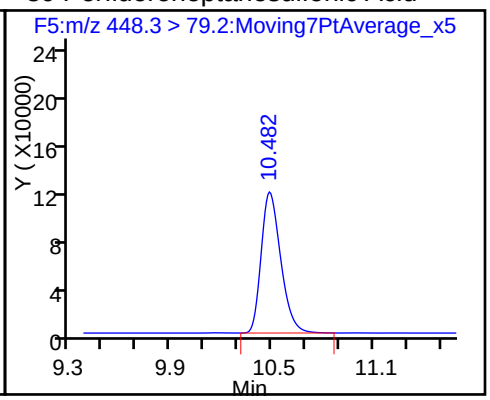
13 Perfluorooctanoic acid



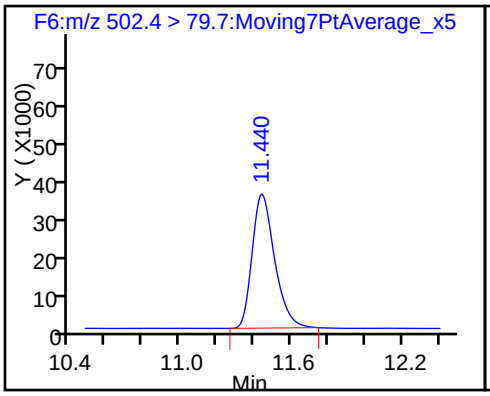
13 Perfluorooctanoic acid



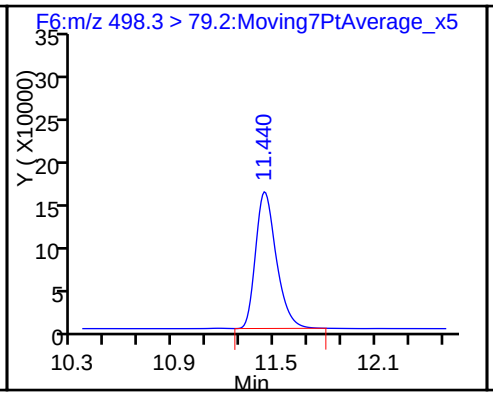
39 Perfluoroheptanesulfonic Acid



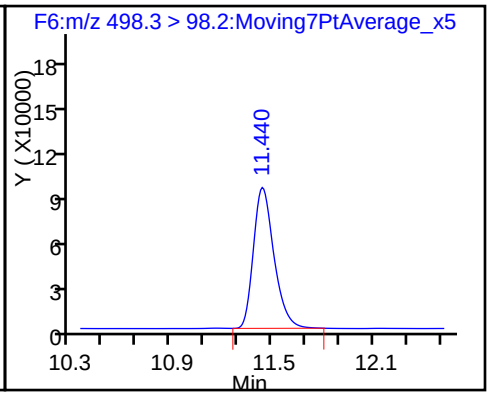
D 16 13C4 PFOS



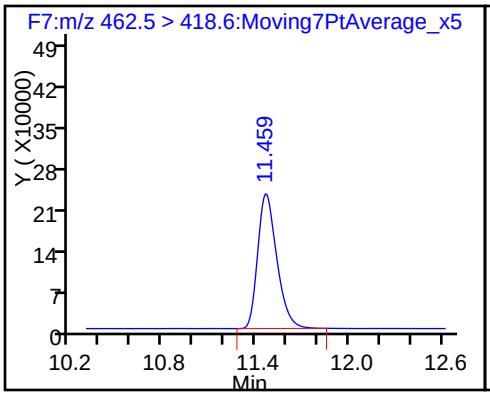
15 Perfluorooctane sulfonic acid



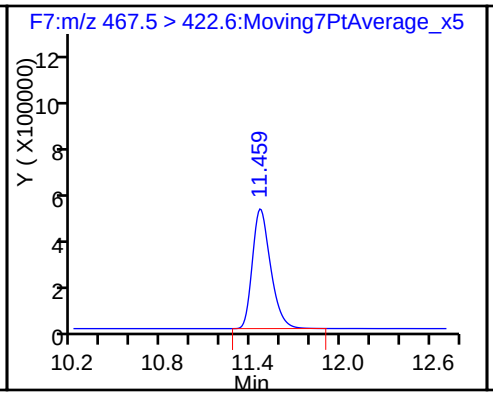
15 Perfluorooctane sulfonic acid



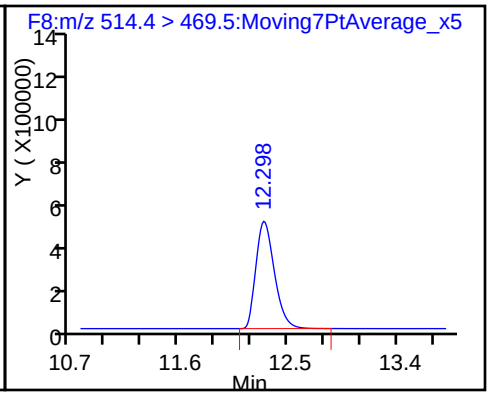
18 Perfluorononanoic acid



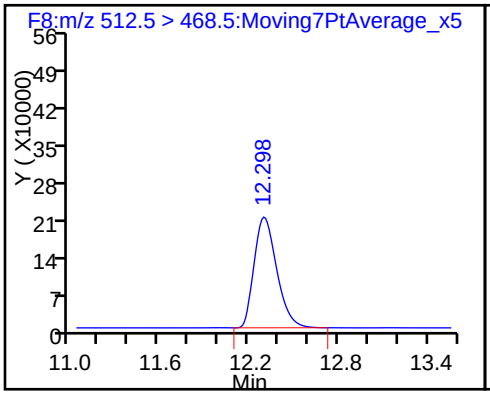
D 17 13C5 PFNA



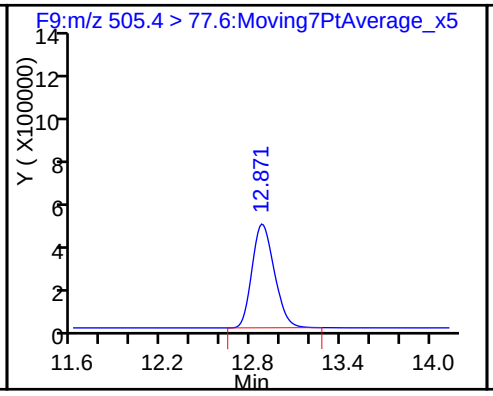
D 19 13C2 PFDA



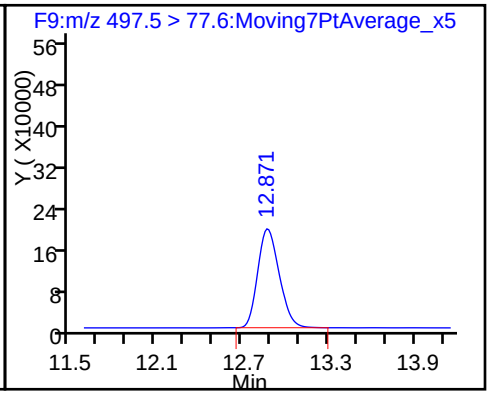
20 Perfluorodecanoic acid



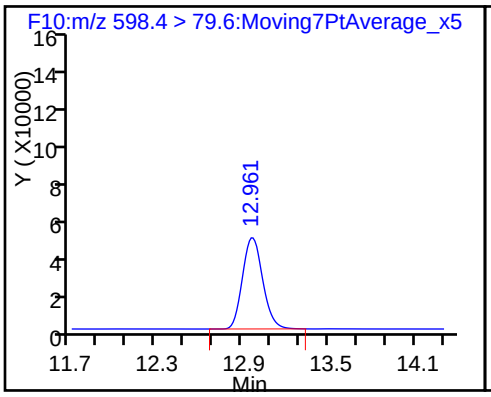
D 23 13C8 FOSA



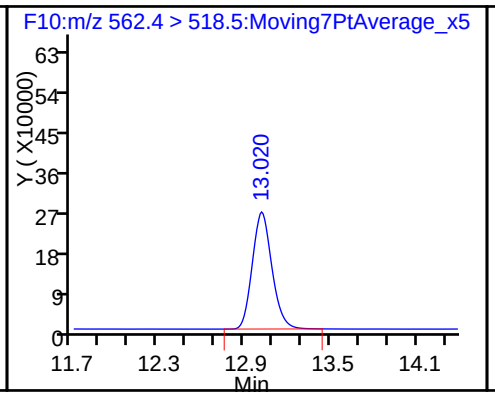
24 Perfluorooctane Sulfonamide



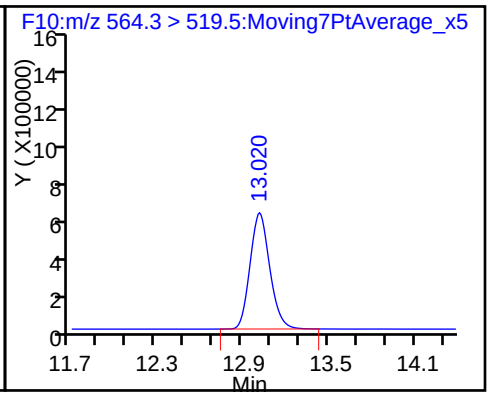
49 Perfluorodecane Sulfonic acid



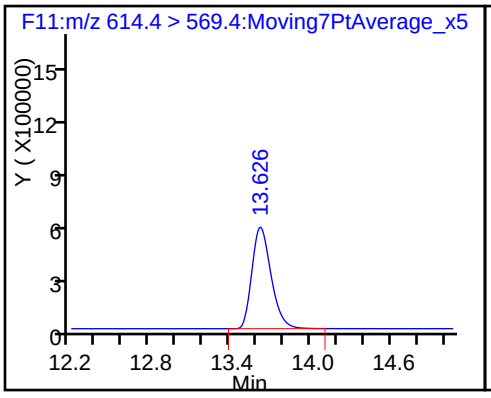
27 Perfluoroundecanoic acid



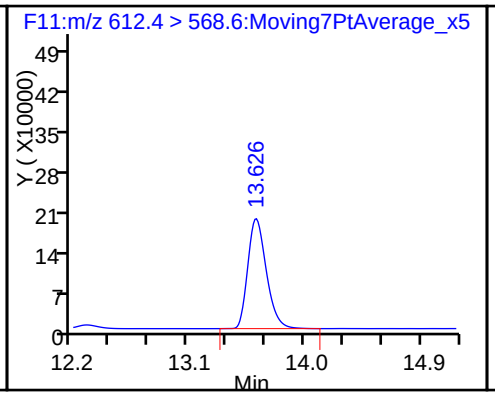
D 26 13C2 PFUnA



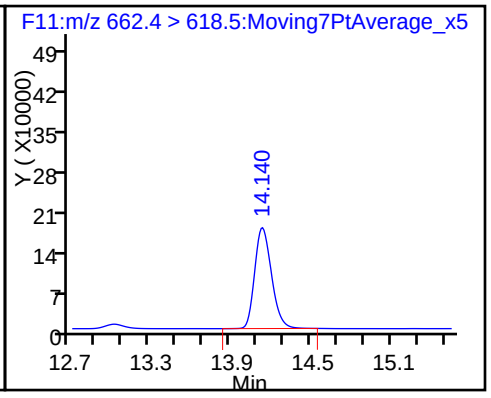
D 28 13C2 PFDoA



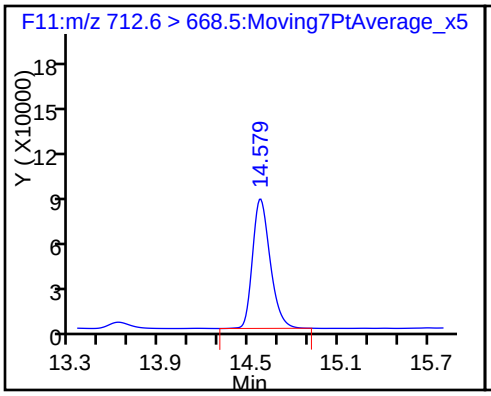
29 Perfluorododecanoic acid



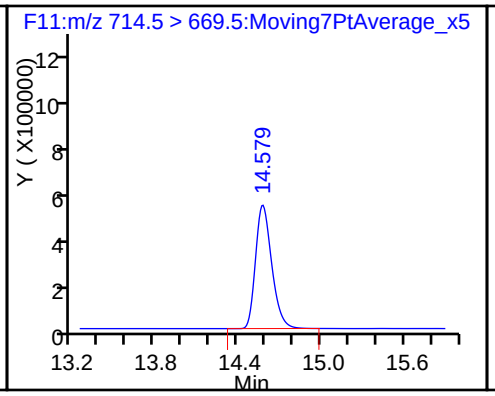
30 Perfluorotridecanoic acid



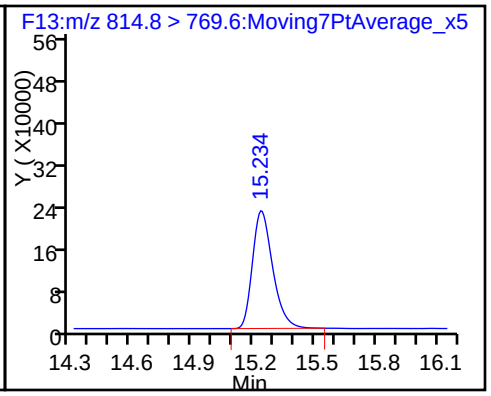
32 Perfluorotetradecanoic acid



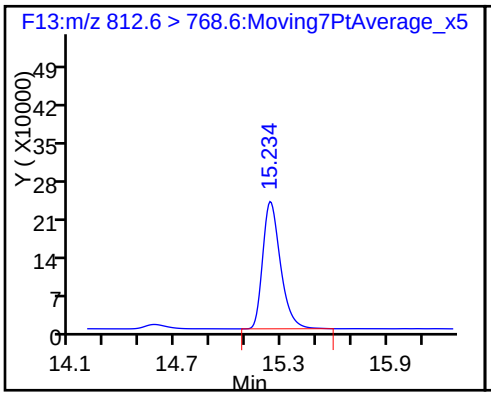
D 33 13C2-PFTeDA



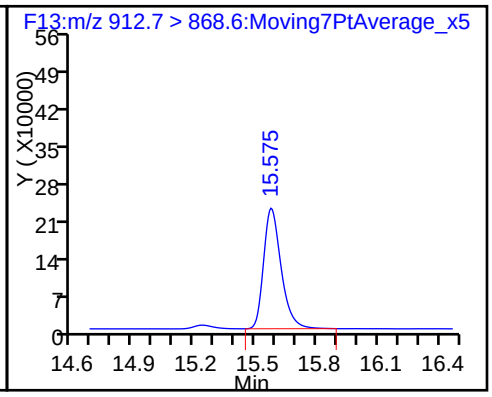
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_006.d
Lims ID: Std L5
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 27-May-2016 12:41:42 ALS Bottle#: 14 Worklist Smp#: 6
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L5
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:50:49 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.791	5.790	0.001		4445714	43.0		86.0	12758	
2 Perfluorobutyric acid										
212.7 > 168.6	5.791	5.792	-0.001	1.000	3040022	52.7		105	8654	
D 3 13C5-PFPeA										
267.6 > 222.7	6.895	6.892	0.003		3252704	42.9		85.8	5848	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.895	6.895	0.0	1.000	1588028	49.4		98.8	997	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.010	7.011	-0.001	1.000	751821	NC			1558	
298.8 > 98.6	7.010	7.011	-0.001	1.000	512374		1.47(0.00-0.00)		1372	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.010	7.011	-0.001	1.000	751821	36.7		83.0		
D 6 13C2 PFHxA										
314.6 > 269.7	8.138	8.138	0.0		4308005	46.0		92.1	10683	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.144	8.140	0.004	1.000	2062892	51.4		103	2429	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	2267149	49.8		99.6	5056	
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		4237757	50.5		101	4835	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1464878	48.3		102	3478	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.404	9.401	0.003	1.000	2370680	48.6		103		
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.404	9.401	0.003	1.000	2370680	NC			3836	
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		4750565	49.6		99.1	7574	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooctanoic acid										
412.8 > 368.8	10.482	10.485	-0.003	1.000	2112373	48.7		97.3	2867	
412.8 > 168.7	10.482	10.485	-0.003	1.000	670755		3.15(0.00-0.00)	97.3	2092	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.482	10.485	-0.003	1.000	2412173	49.9		105		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.482	10.485	-0.003	1.000	2412173	NC			3934	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		294545	47.1		98.6	1232	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.440	11.443	-0.003	1.000	3568981	48.0		100	2998	
498.3 > 98.2	11.440	11.443	-0.003	1.000	2186636		1.63(0.00-0.00)	100	2647	
18 Perfluorononanoic acid										
462.5 > 418.6	11.469	11.462	0.007	1.000	5349285	51.1		102	6345	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		4126872	50.8		102	5282	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		4931920	47.9		95.7	5124	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	5708999	53.8		108	4919	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		4838600	51.0		102	3850	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.871	12.873	-0.002	1.000	5551847	54.4		109	3529	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.974	12.969	0.005	1.000	1158252	NC			2554	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.974	12.969	0.005	1.000	1158252	50.2		104		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	6497810	51.0		102	4552	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		5491477	50.6		101	5508	
D 28 13C2 PFDoA										
614.4 > 569.4	13.626	13.626	0.0		5641533	50.7		101	3903	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.626	13.626	0.0	1.000	5537515	53.5		107	2034	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.140	14.138	0.002	1.000	4159657	52.4		105	1532	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.579	14.577	0.002	1.000	1901507	44.4		88.8	1148	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.579	14.579	0.0		3842279	49.4		98.9	3211	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1419961	47.7		95.5	2830	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	4302103	53.4		107	676	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	3400331	54.5		109	3004	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:50:50 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_006.d

Injection Date: 27-May-2016 12:41:42 Instrument ID: A4

Lims ID: Std L5

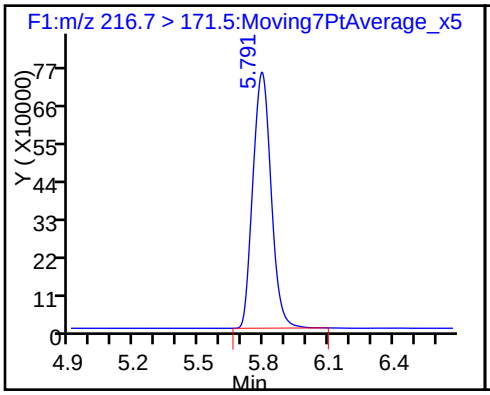
Client ID:

Operator ID: JRB ALS Bottle#: 14 Worklist Smp#: 6

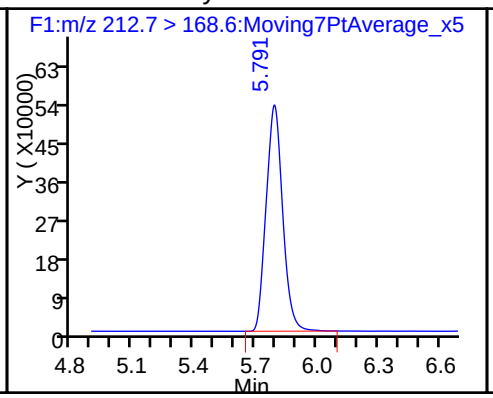
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

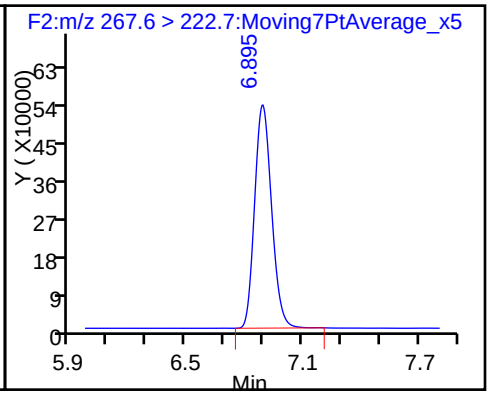
D 1 13C4 PFBA



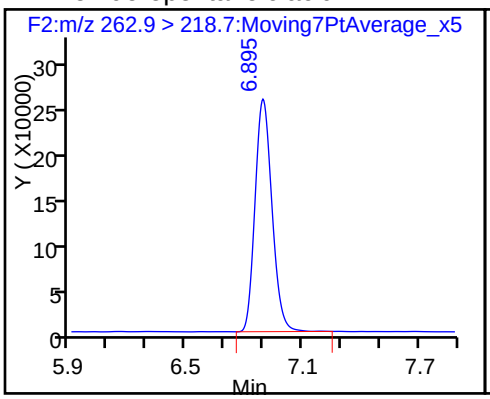
2 Perfluorobutyric acid



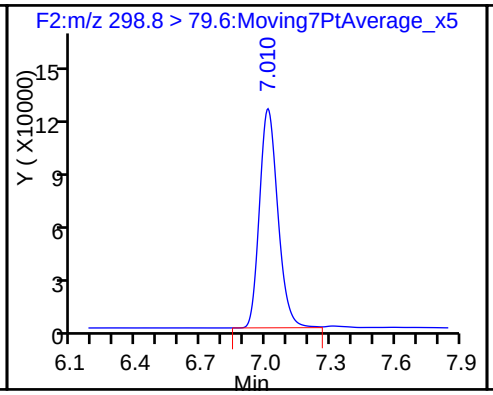
D 3 13C5-PFPeA



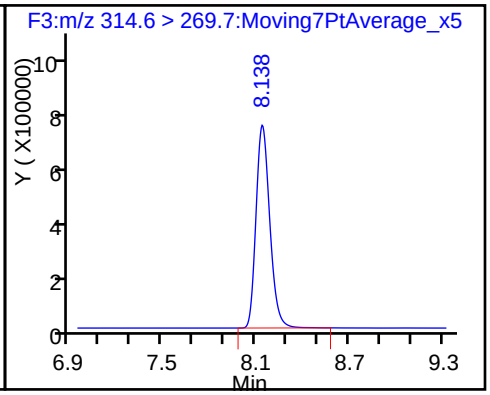
4 Perfluoropentanoic acid



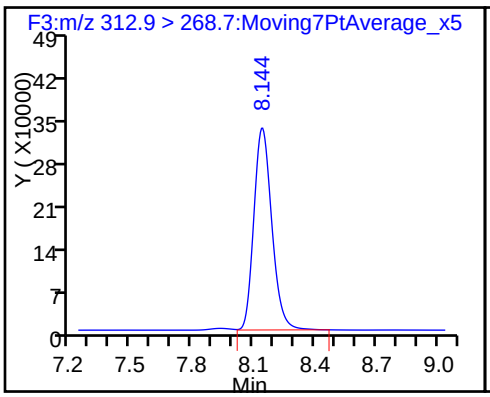
51 Perfluorobutanesulfonic acid



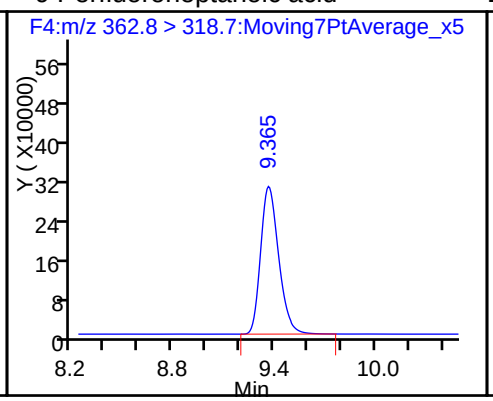
D 6 13C2 PFHxA



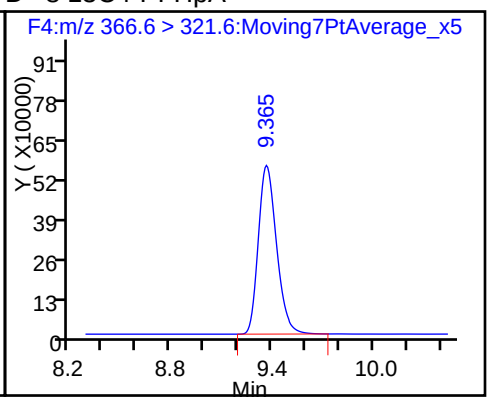
7 Perfluorohexanoic acid



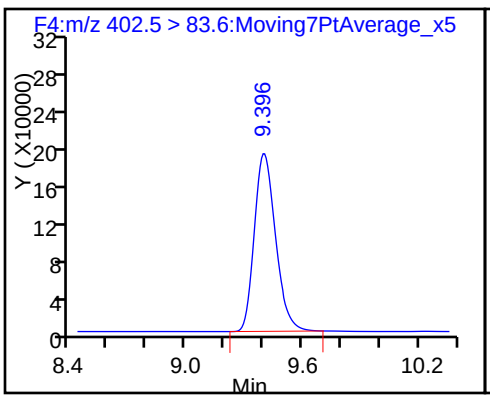
9 Perfluoroheptanoic acid



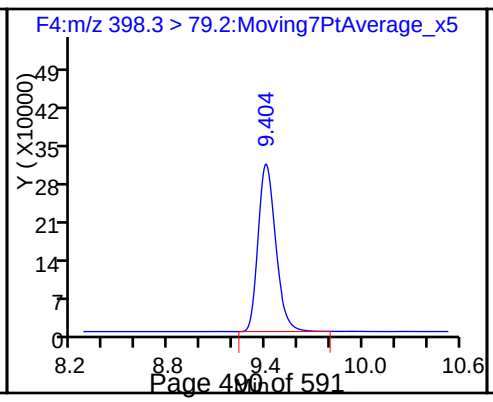
D 8 13C4-PFHpA



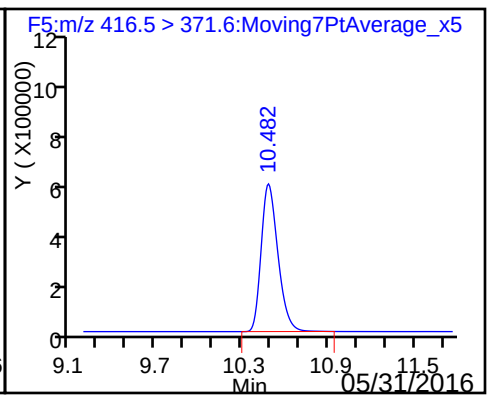
D 11 18O2 PFHxS



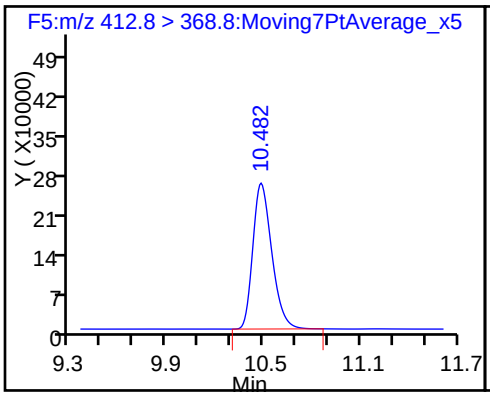
58 Perfluorohexanesulfonic acid



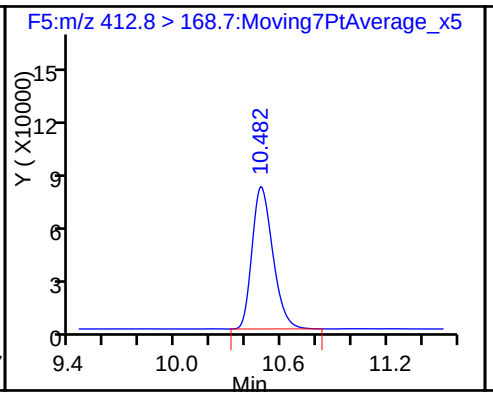
D 12 13C4 PFOA



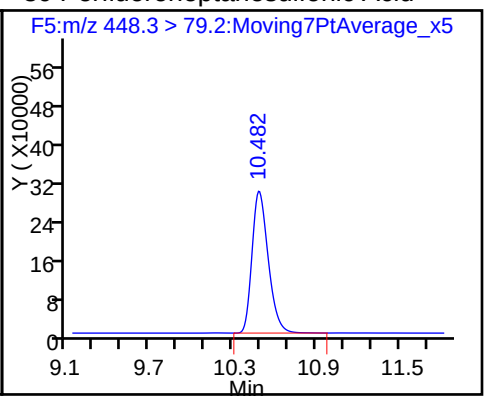
13 Perfluorooctanoic acid



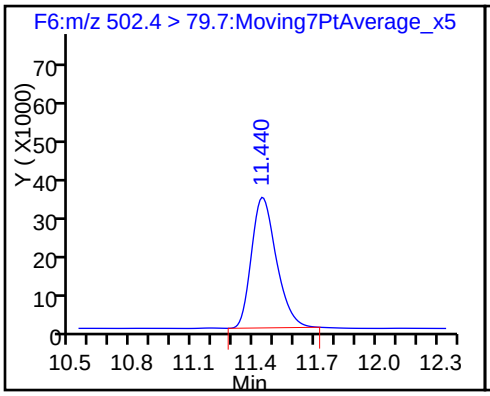
13 Perfluorooctanoic acid



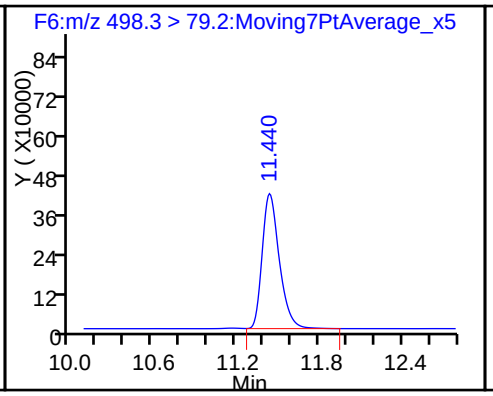
39 Perfluoroheptanesulfonic Acid



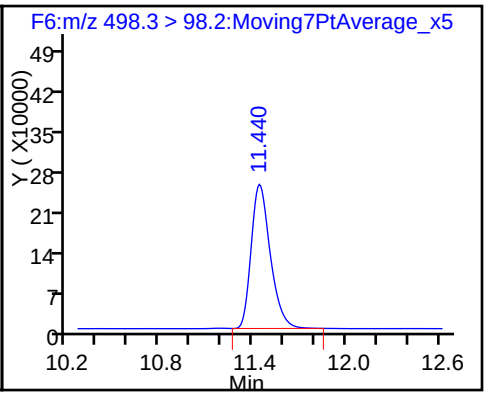
D 16 13C4 PFOS



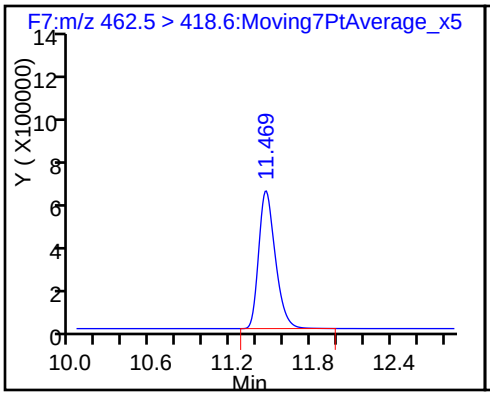
15 Perfluorooctane sulfonic acid



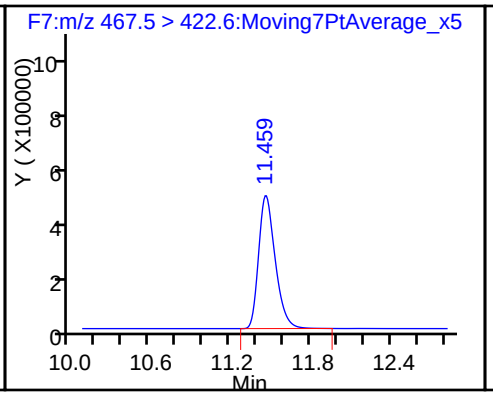
15 Perfluorooctane sulfonic acid



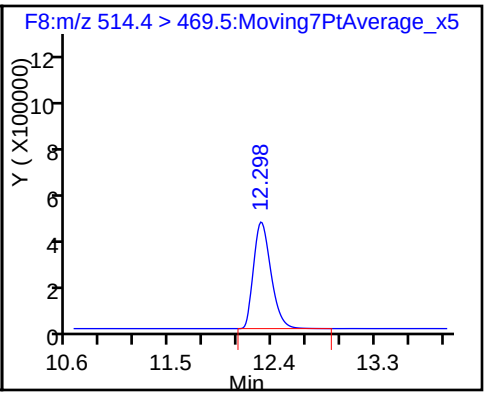
18 Perfluorononanoic acid



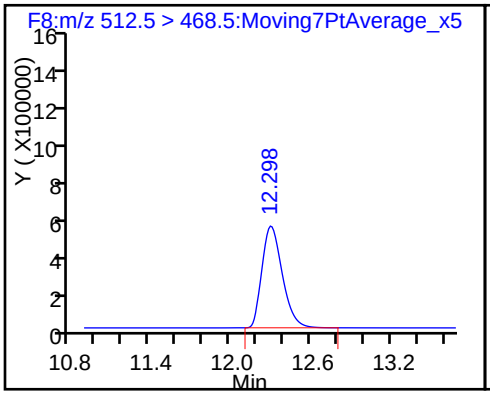
D 17 13C5 PFNA



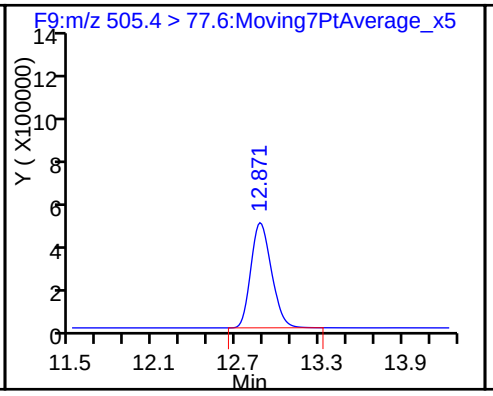
D 19 13C2 PFDA



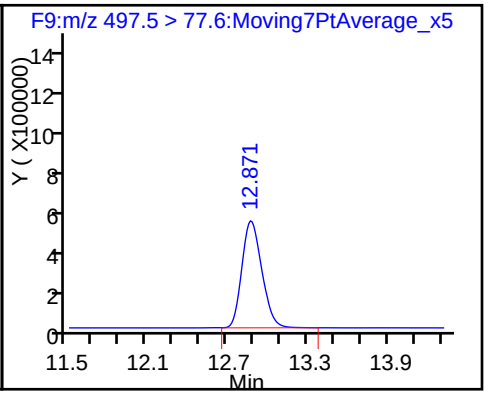
20 Perfluorodecanoic acid



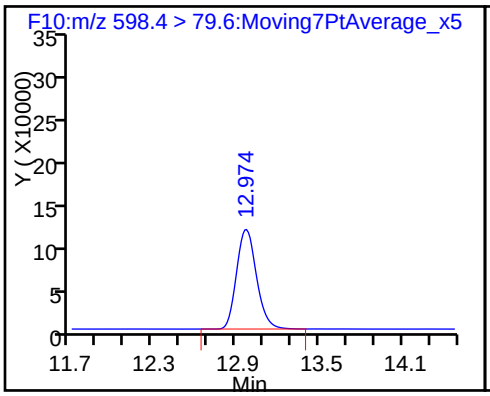
D 23 13C8 FOSA



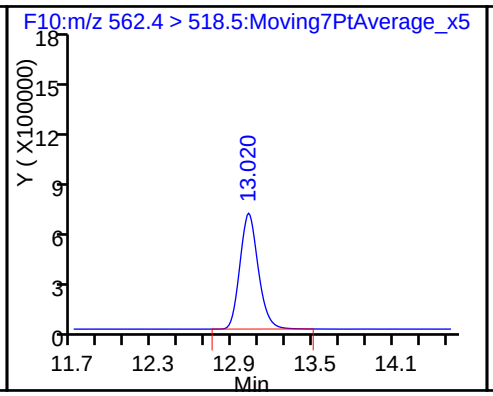
24 Perfluorooctane Sulfonamide



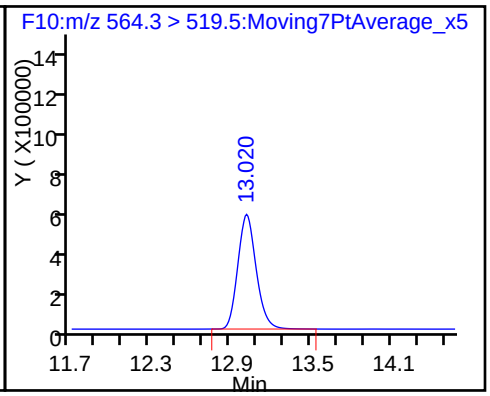
49 Perfluorodecane Sulfonic acid



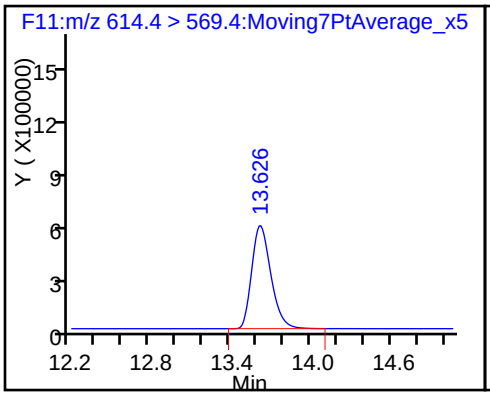
27 Perfluoroundecanoic acid



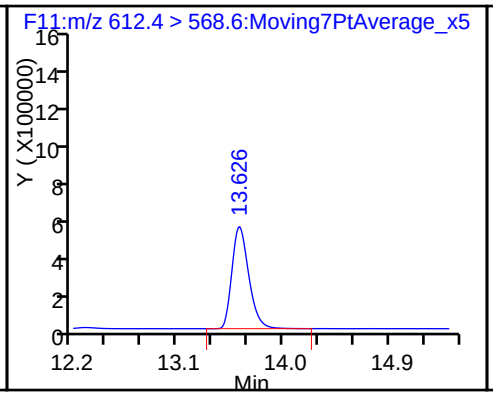
D 26 13C2 PFUnA



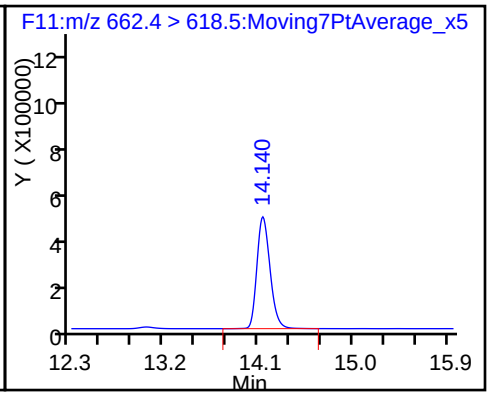
D 28 13C2 PFDoA



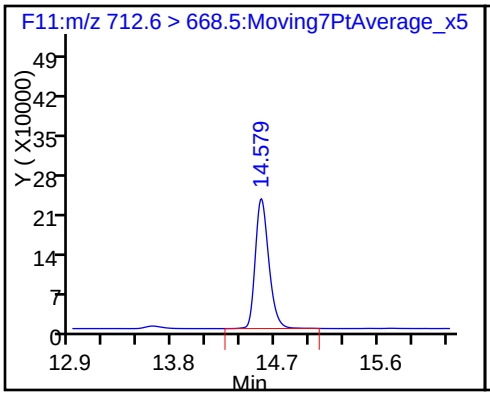
29 Perfluorododecanoic acid



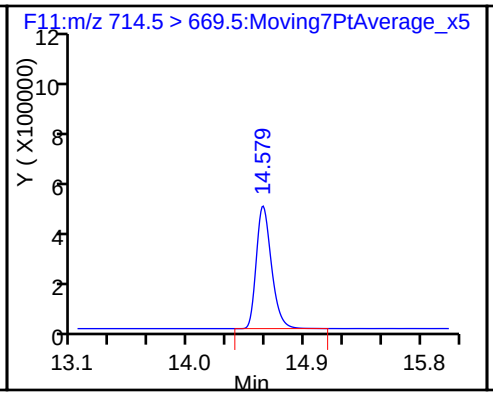
30 Perfluorotridecanoic acid



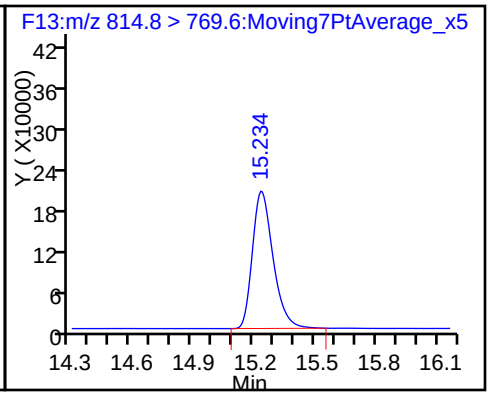
32 Perfluorotetradecanoic acid



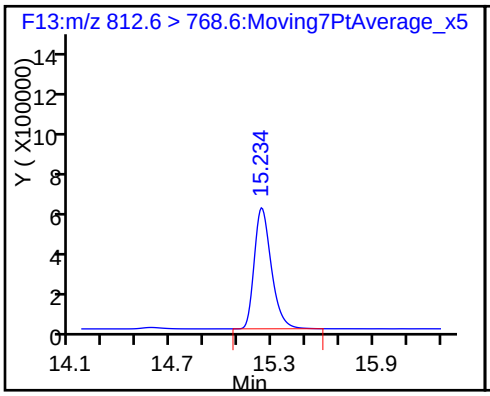
D 33 13C2-PFTeDA



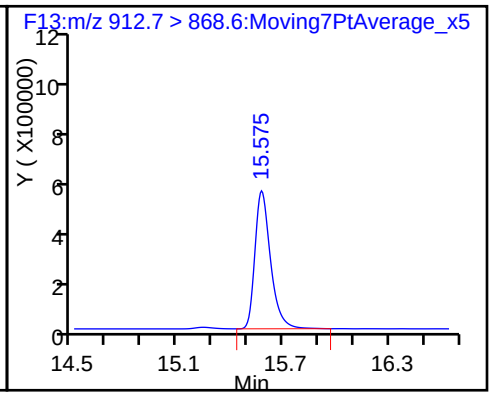
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_007.d
Lims ID: Std L6
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 27-May-2016 13:02:54 ALS Bottle#: 15 Worklist Smp#: 7
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L6
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:51:01 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.791	5.790	0.001		4129683	39.9		79.9	10855	
2 Perfluorobutyric acid										
212.7 > 168.6	5.794	5.792	0.002	1.000	11271766	210.3		105	17046	
D 3 13C5-PFPeA										
267.6 > 222.7	6.890	6.892	-0.002		3046275	40.2		80.3	6563	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.890	6.895	-0.005	1.000	5608119	186.3		93.1	1894	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.010	7.011	-0.001	1.000	2740499	NC			5174	
298.8 > 98.6	7.010	7.011	-0.001	1.000	1739607		1.58(0.00-0.00)		3444	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.010	7.011	-0.001	1.000	2740499	187.8		106		
D 6 13C2 PFHxA										
314.6 > 269.7	8.138	8.138	0.0		3592360	38.4		76.8	8171	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.138	8.140	-0.002	1.000	6700227	200.8		100	2266	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	6600504	187.1		93.5	7377	
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		3284058	39.1		78.2	7093	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1044335	34.4		72.8	3013	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.404	9.401	0.003	1.000	6717467	193.3		102		
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.404	9.401	0.003	1.000	6717467	NC			5359	
D 12 13C4 PFOA										
416.5 > 371.6	10.485	10.483	0.002		3335155	34.8		69.6	4602	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooctanoic acid										
412.8 > 368.8	10.485	10.485	0.0	1.000	6321774	207.1		104	6033	
412.8 > 168.7	10.485	10.485	0.0	1.000	1901540		3.32(0.00-0.00)	104	3439	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.485	10.485	0.0	1.000	6227195	180.8		95.0		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.485	10.485	0.0	1.000	6227195	NC			4735	
D 16 13C4 PFOS										
502.4 > 79.7	11.442	11.441	0.001		209455	33.5		70.1	753	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.442	11.443	-0.001	1.000	10153061	191.8		100	2698	
498.3 > 98.2	11.442	11.443	-0.001	1.000	6092175		1.67(0.00-0.00)	100	3208	
18 Perfluorononanoic acid										
462.5 > 418.6	11.462	11.462	0.0	1.000	15179720	194.8		97.4	8936	
D 17 13C5 PFNA										
467.5 > 422.6	11.462	11.462	0.0		3070065	37.8		75.5	3786	
D 19 13C2 PFDA										
514.4 > 469.5	12.302	12.299	0.003		3862828	37.5		75.0	5604	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.302	12.299	0.003	1.000	17300091	208.3		104	5465	
D 23 13C8 FOSA										
505.4 > 77.6	12.875	12.871	0.004		3912535	41.2		82.4	2881	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.875	12.873	0.002	1.000	16700878	202.5		101	3630	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.965	12.969	-0.004	1.000	3032821	NC			3770	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.965	12.969	-0.004	1.000	3032821	185.0		96.0		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.024	13.021	0.003	1.000	19242949	200.7		100	4801	
D 26 13C2 PFUnA										
564.3 > 519.5	13.024	13.021	0.003		4134664	38.1		76.2	3861	
D 28 13C2 PFDoA										
614.4 > 569.4	13.620	13.626	-0.006		4448387	40.0		80.0	2888	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.620	13.626	-0.006	1.000	16837391	206.5		103	3348	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.134	14.138	-0.004	1.000	13391959	193.1		96.5	2972	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.574	14.577	-0.003	1.000	6381395	170.4		85.2	2136	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.574	14.579	-0.005		3359201	43.2		86.4	2740	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.237	15.235	0.002		1298274	43.6		87.3	2490	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.237	15.235	0.002	1.000	14132019	193.9		97.0	1746	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.578	15.575	0.003	1.000	11405069	199.9		99.9	4282	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L6_00015 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:51:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_007.d

Injection Date: 27-May-2016 13:02:54 Instrument ID: A4

Lims ID: Std L6

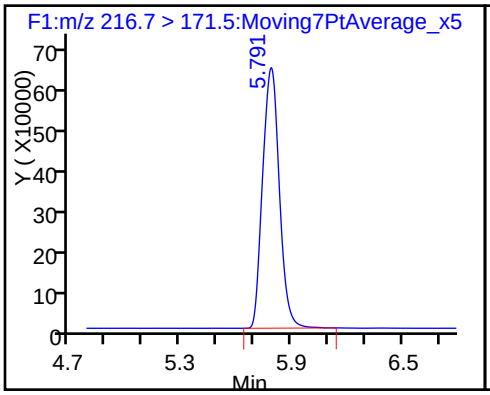
Client ID:

Operator ID: JRB ALS Bottle#: 15 Worklist Smp#: 7

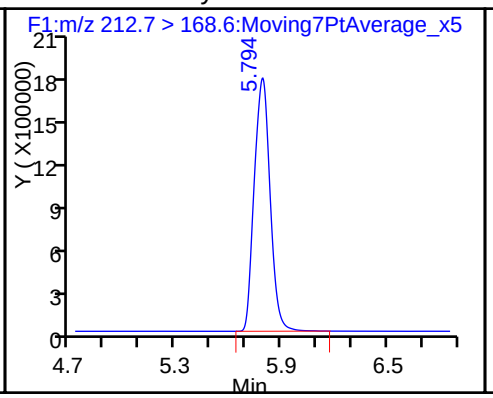
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

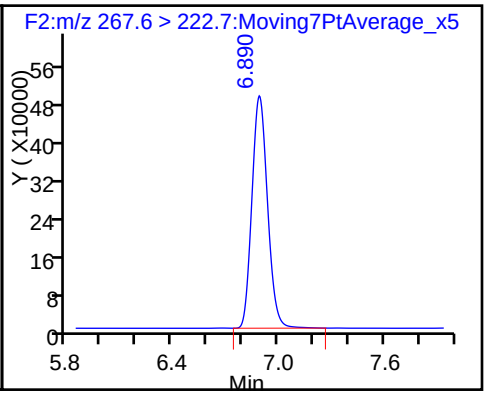
D 1 13C4 PFBA



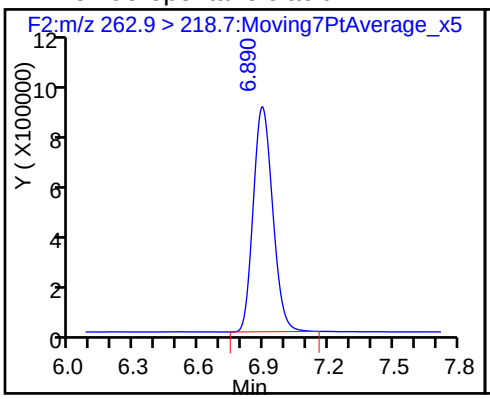
2 Perfluorobutyric acid



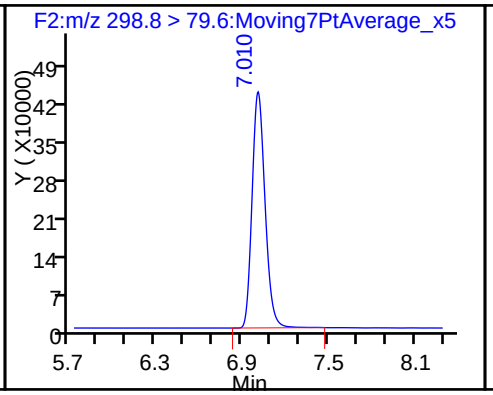
D 3 13C5-PFPeA



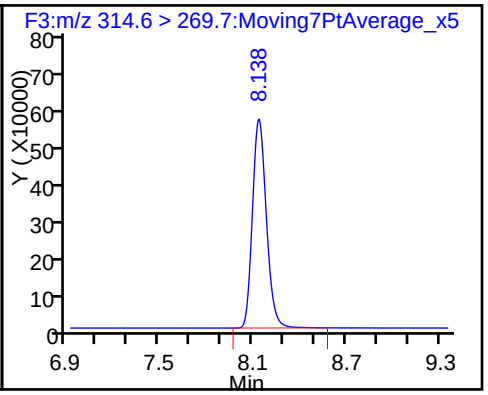
4 Perfluoropentanoic acid



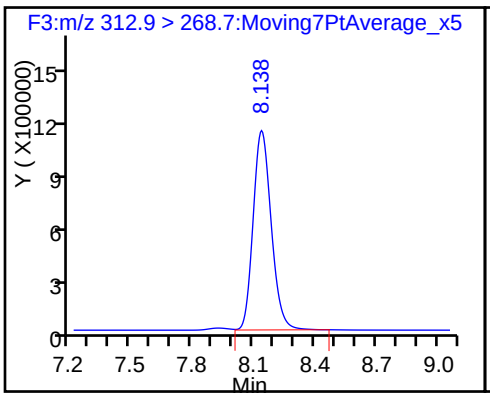
51 Perfluorobutanesulfonic acid



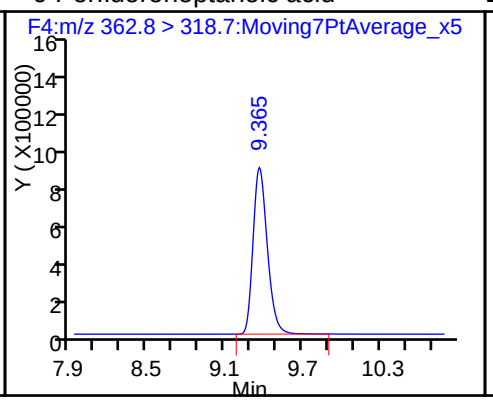
D 6 13C2 PFHxA



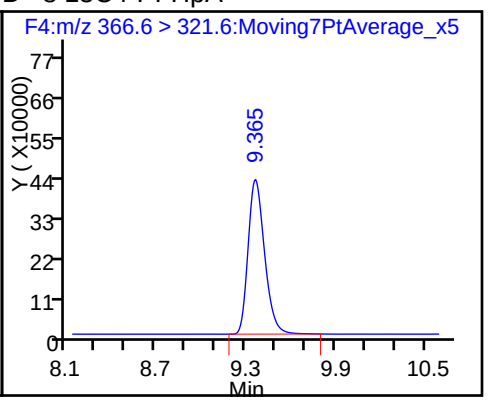
7 Perfluorohexanoic acid



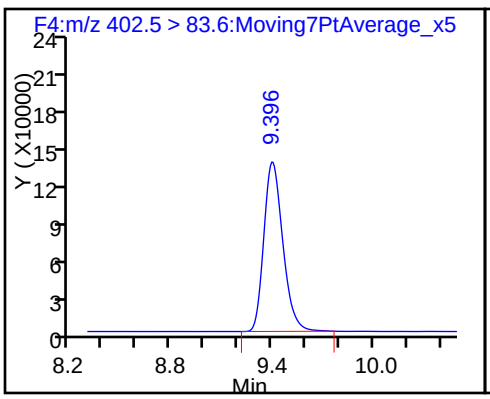
9 Perfluoroheptanoic acid



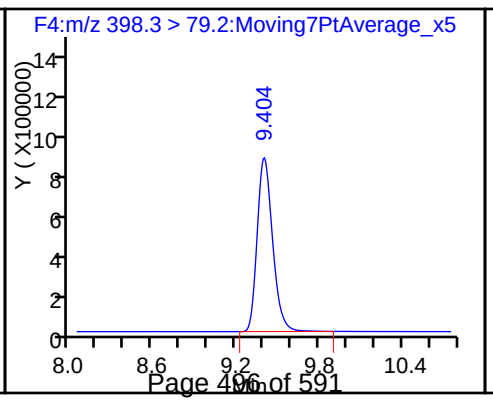
D 8 13C4-PFHpA



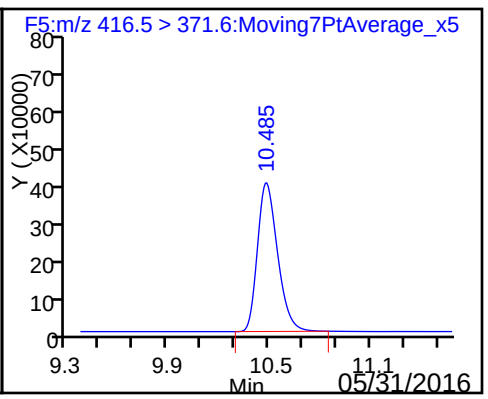
D 11 18O2 PFHxS



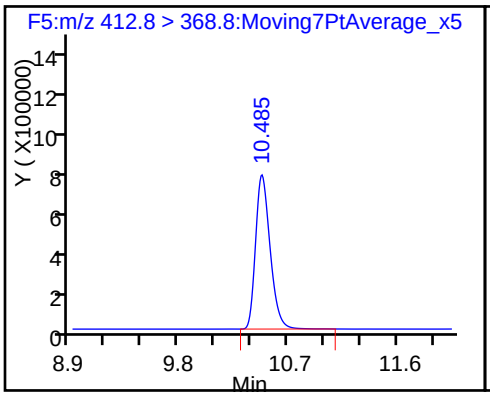
58 Perfluorohexanesulfonic acid



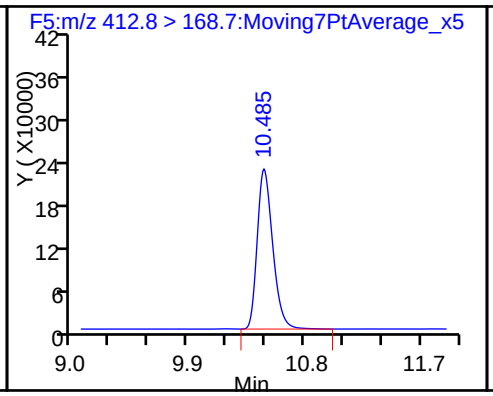
D 12 13C4 PFOA



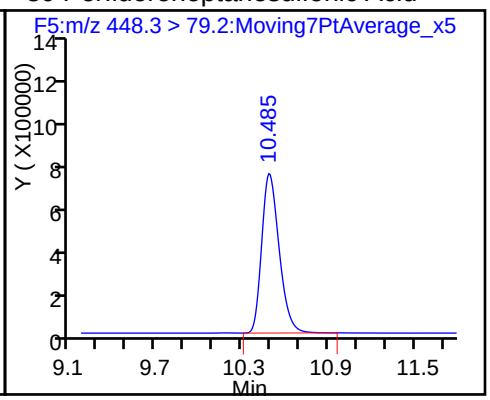
13 Perfluorooctanoic acid



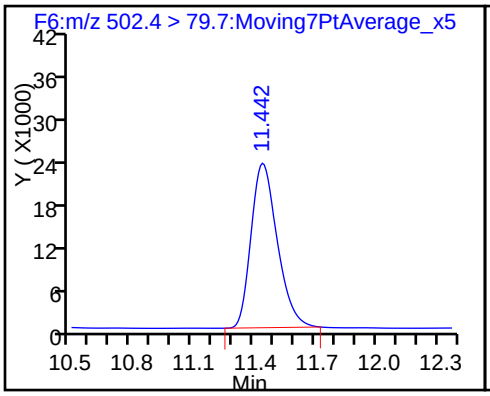
13 Perfluorooctanoic acid



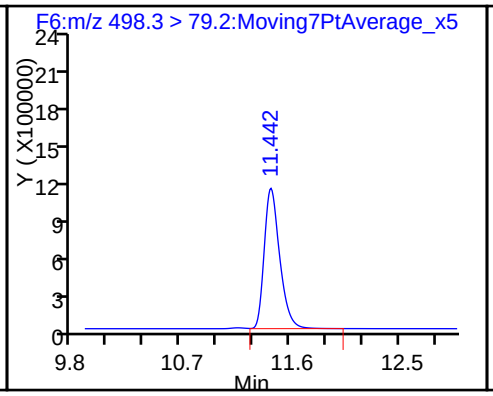
39 Perfluoroheptanesulfonic Acid



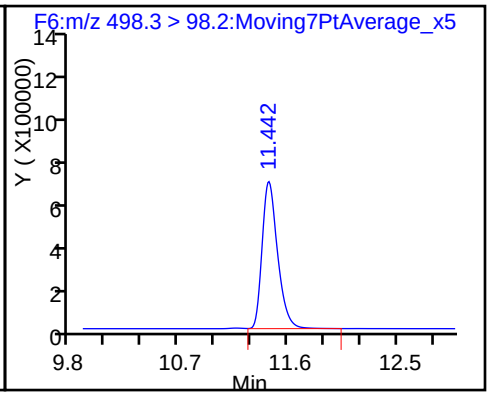
D 16 13C4 PFOS



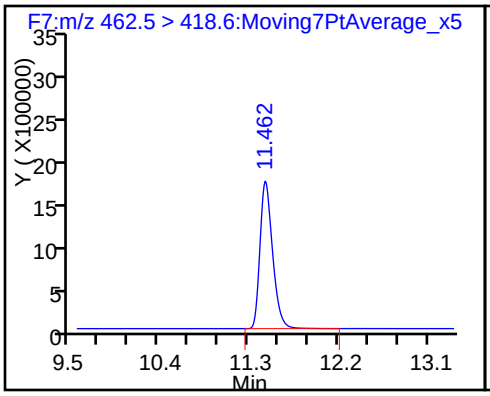
15 Perfluorooctane sulfonic acid



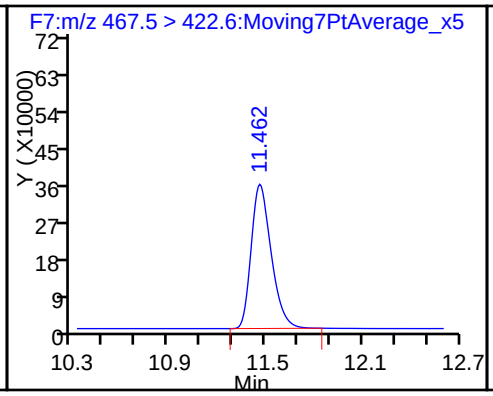
15 Perfluorooctane sulfonic acid



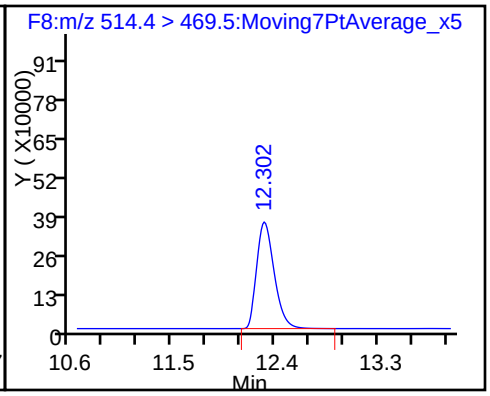
18 Perfluorononanoic acid



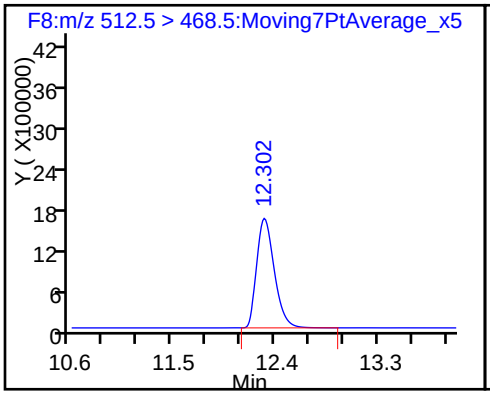
D 17 13C5 PFNA



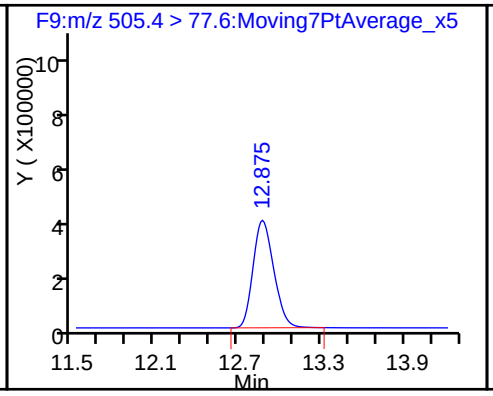
D 19 13C2 PFDA



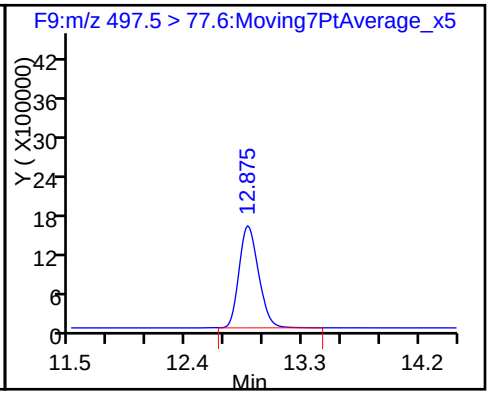
20 Perfluorodecanoic acid



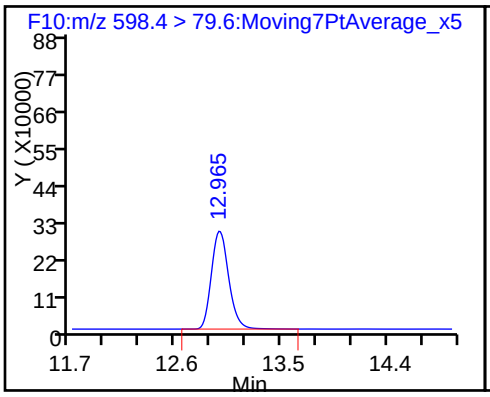
D 23 13C8 FOSA



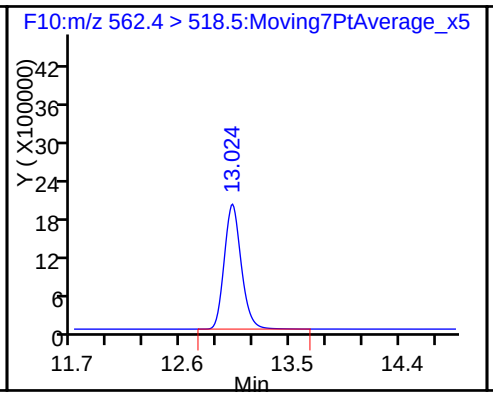
24 Perfluorooctane Sulfonamide



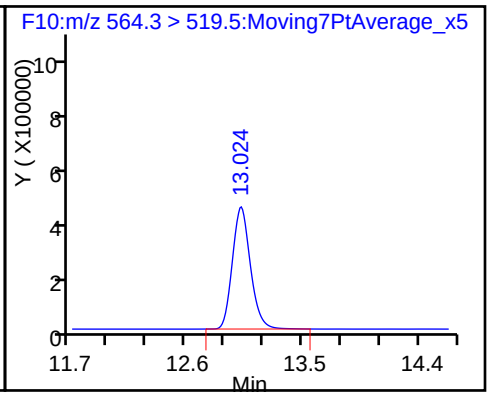
49 Perfluorodecane Sulfonic acid



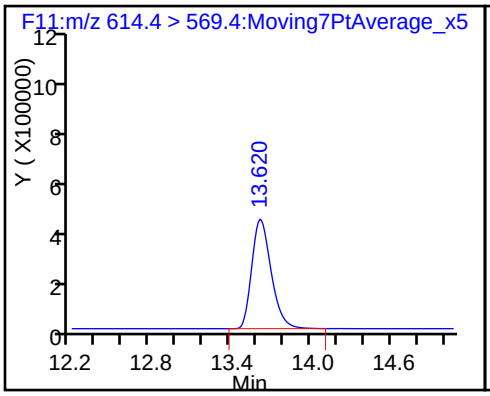
27 Perfluoroundecanoic acid



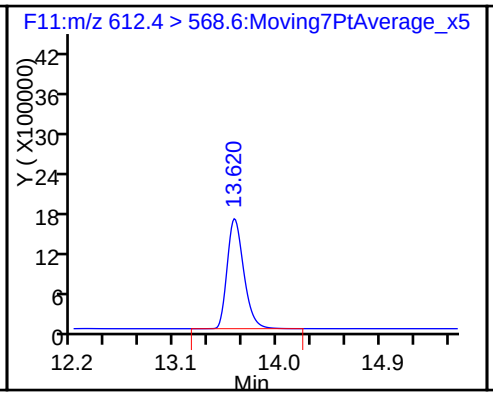
D 26 13C2 PFUnA



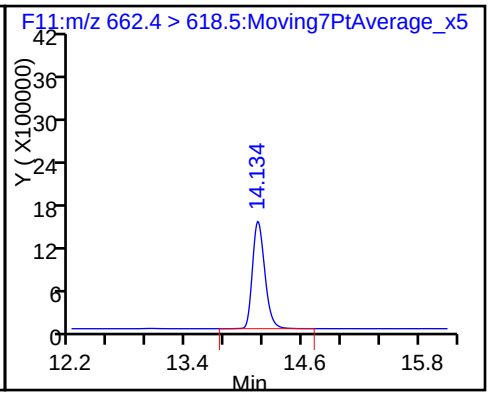
D 28 13C2 PFDoA



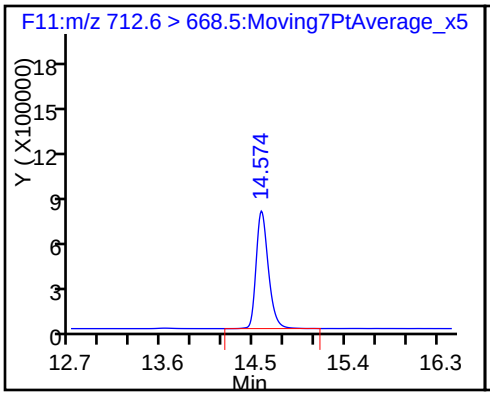
29 Perfluorododecanoic acid



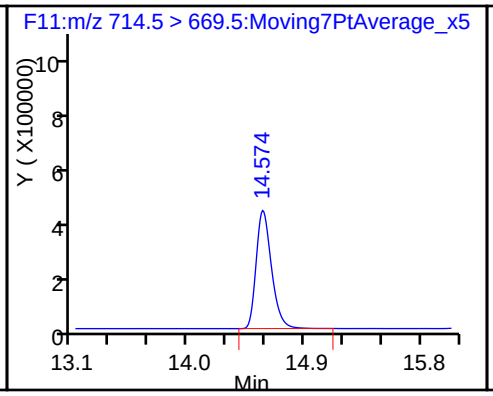
30 Perfluorotridecanoic acid



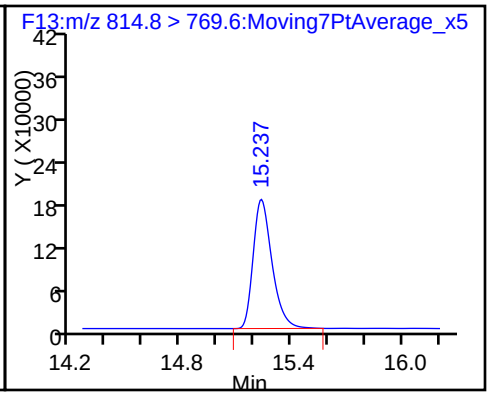
32 Perfluorotetradecanoic acid



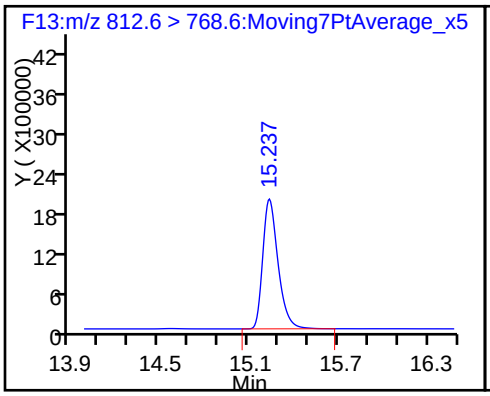
D 33 13C2-PFTeDA



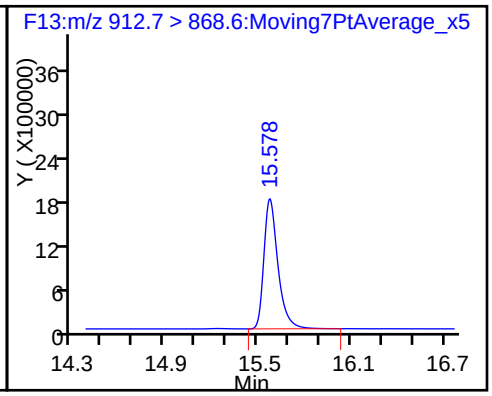
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d
Lims ID: Std L7
Client ID:
Sample Type: IC Calib Level: 7
Inject. Date: 27-May-2016 13:24:04 ALS Bottle#: 16 Worklist Smp#: 8
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: STD L7
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:51:09 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.787	5.790	-0.003		3355560	32.4		64.9	7469	
2 Perfluorobutyric acid										
212.7 > 168.6	5.791	5.792	-0.001	1.000	18531497	425.4		106	22364	
D 3 13C5-PFPeA										
267.6 > 222.7	6.890	6.892	-0.002		2484518	32.8		65.5	5553	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.895	6.895	0.0	1.000	9327831	379.8		95.0	3498	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.005	7.011	-0.006	1.000	4450007	NC			4580	
298.8 > 98.6	7.005	7.011	-0.006	1.000	2812494		1.58(0.00-0.00)		4396	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.005	7.011	-0.006	1.000	4450007	392.3		111		
D 6 13C2 PFHxA										
314.6 > 269.7	8.133	8.138	-0.005		3010443	32.2		64.3	6380	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.133	8.140	-0.007	1.000	11168800	399.5		99.9	2093	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	10926693	386.1		96.5	6916	
D 8 13C4-PFHpA										
366.6 > 321.6	9.357	9.366	-0.009		2634013	31.4		62.7	4520	
D 11 18O2 PFHxS										
402.5 > 83.6	9.404	9.399	0.005		812066	26.8		56.6	2294	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.404	9.401	0.003	1.000	10489666	388.2		103		
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.404	9.401	0.003	1.000	10489666	NC			6098	
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		2900631	30.3		60.5	4395	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooctanoic acid										
412.8 > 368.8	10.482	10.485	-0.003	1.000	10498872	395.5		98.9	6045	
412.8 > 168.7	10.482	10.485	-0.003	1.000	3328897		3.15(0.00-0.00)	98.9	4124	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.482	10.485	-0.003	1.000	10320043	373.3		98.0		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.482	10.485	-0.003	1.000	10320043	NC			5191	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		168111	26.9		56.3	476	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.440	11.443	-0.003	1.000	16274880	383.0		100	2363	
498.3 > 98.2	11.440	11.443	-0.003	1.000	9729875		1.67(0.00-0.00)	100	2767	
18 Perfluorononanoic acid										
462.5 > 418.6	11.459	11.462	-0.003	1.000	27294533	406.8		102	10033	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		2643621	32.5		65.0	4183	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		3407629	33.1		66.1	5758	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	29059913	396.7		99.2	5879	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		3402041	35.8		71.7	3118	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.871	12.873	-0.002	1.000	29858502	416.3		104	3765	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.974	12.969	0.005	1.000	4687057	NC			3586	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.974	12.969	0.005	1.000	4687057	356.2		92.4		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	32308856	383.5		95.9	5439	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		3632488	33.5		67.0	2894	
D 28 13C2 PFDoA										
614.4 > 569.4	13.626	13.626	0.0		3842375	34.5		69.1	2541	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.626	13.626	0.0	1.000	28935429	410.8		103	2905	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.140	14.138	0.002	1.000	21307860	357.7		89.4	2679	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.570	14.577	-0.007	1.000	10914055	339.4		84.9	2523	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.579	14.579	0.0		2884794	37.1		74.2	2660	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1056796	35.5		71.0	1898	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	23508759	397.1		99.3	2028	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	19801766	426.3		107	4001	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L7_00015 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:51:10 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Injection Date: 27-May-2016 13:24:04 Instrument ID: A4

Lims ID: Std L7

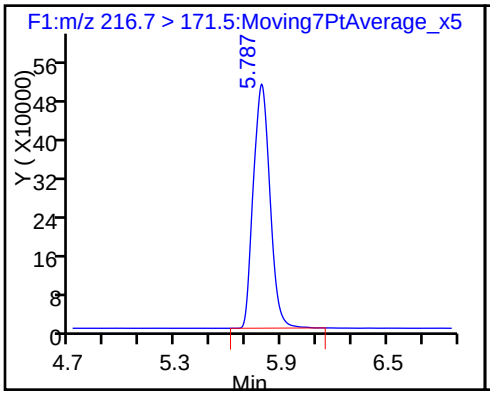
Client ID:

Operator ID: JRB ALS Bottle#: 16 Worklist Smp#: 8

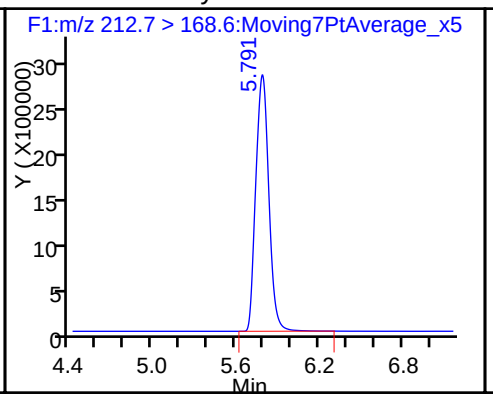
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

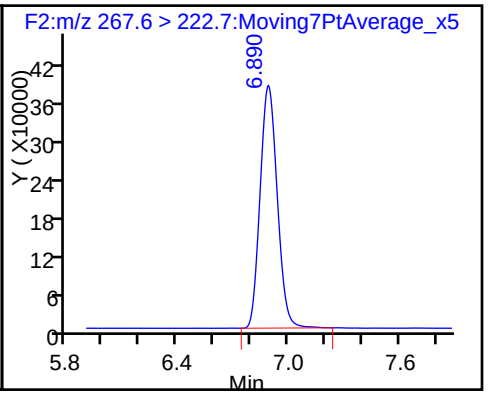
D 1 13C4 PFBA



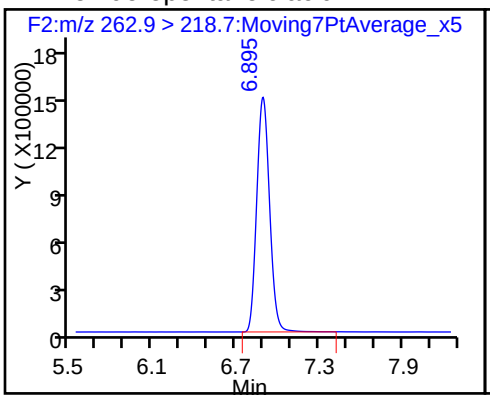
2 Perfluorobutyric acid



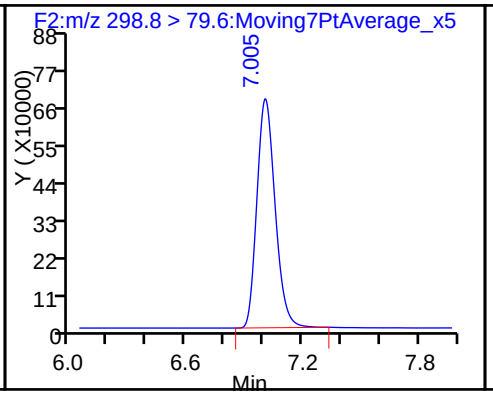
D 3 13C5-PFPeA



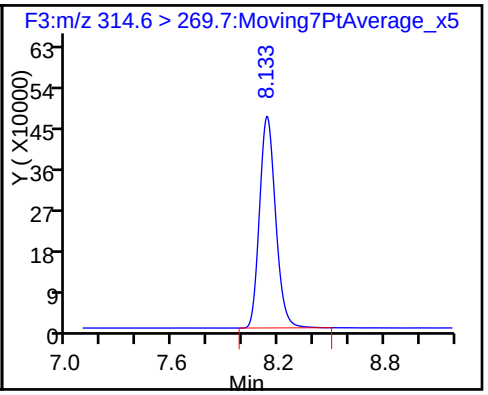
4 Perfluoropentanoic acid



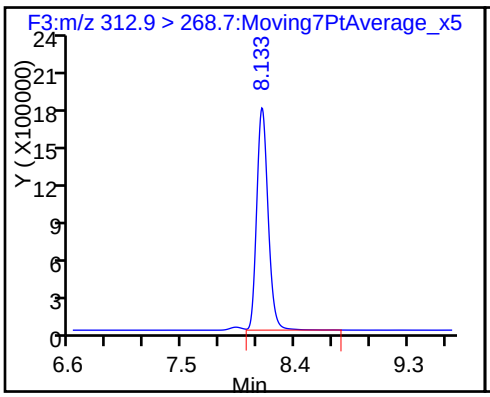
51 Perfluorobutanesulfonic acid



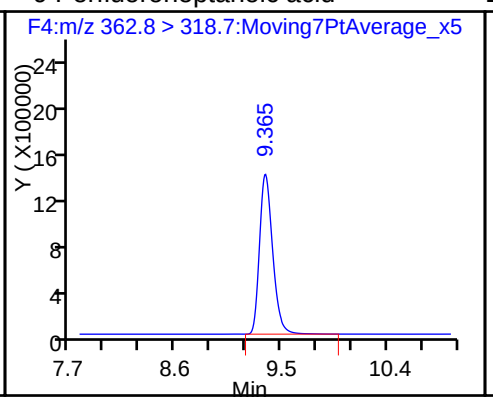
D 6 13C2 PFHxA



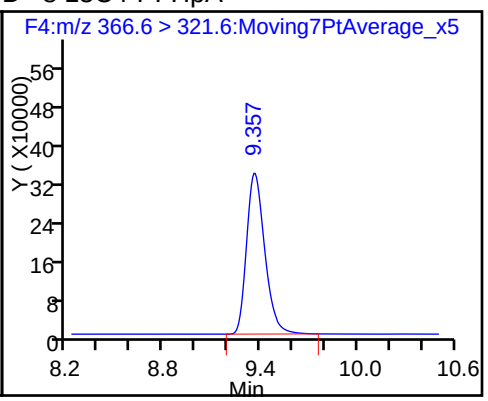
7 Perfluorohexanoic acid



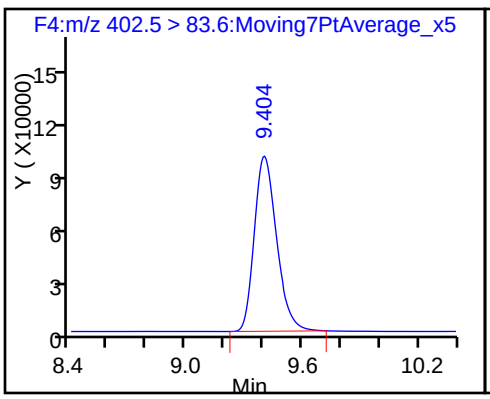
9 Perfluoroheptanoic acid



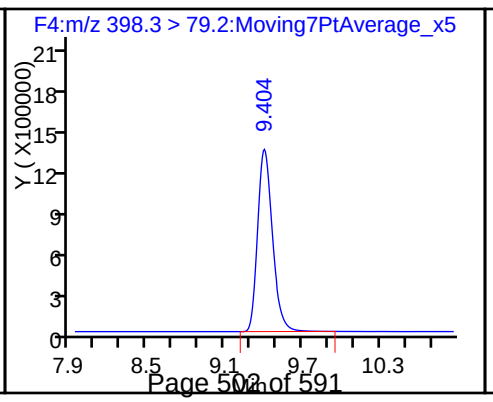
D 8 13C4-PFHpA



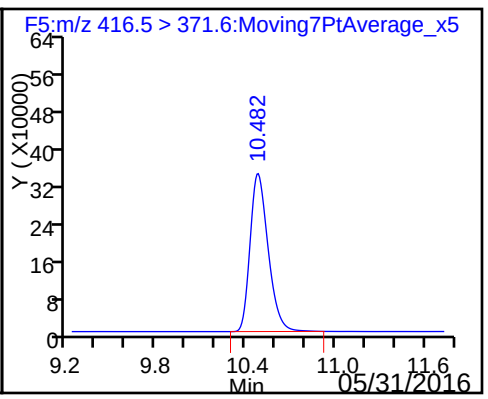
D 11 18O2 PFHxS



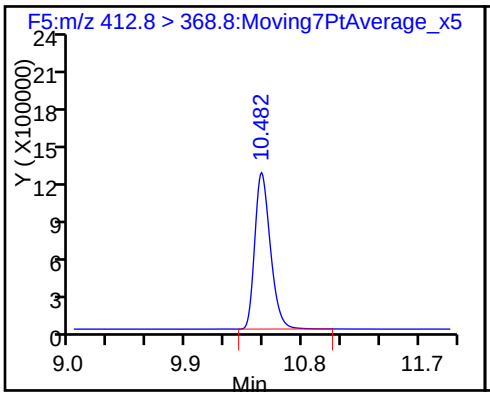
58 Perfluorohexanesulfonic acid



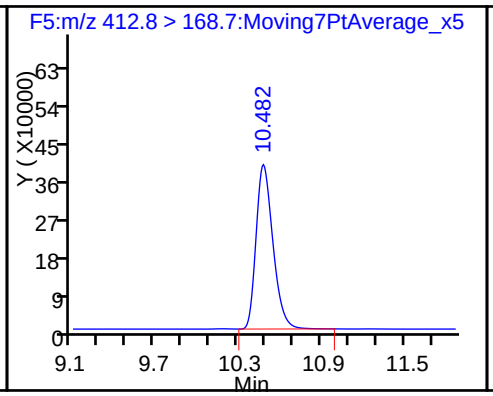
D 12 13C4 PFOA



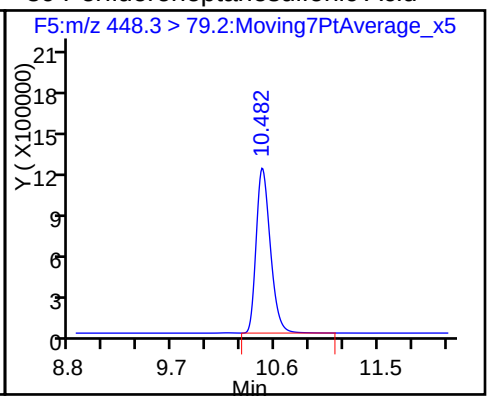
13 Perfluorooctanoic acid



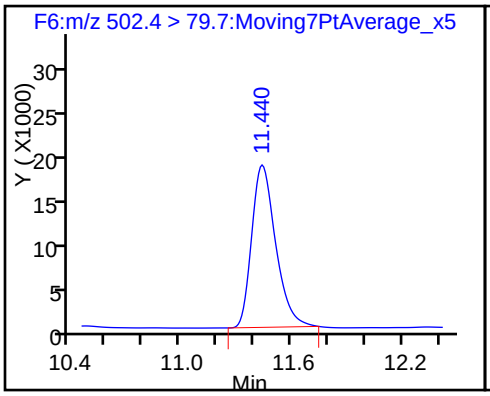
13 Perfluorooctanoic acid



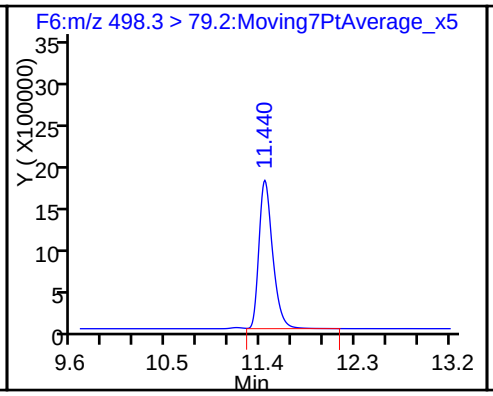
39 Perfluoroheptanesulfonic Acid



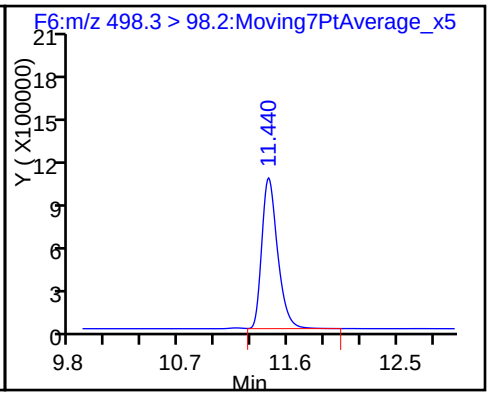
D 16 13C4 PFOS



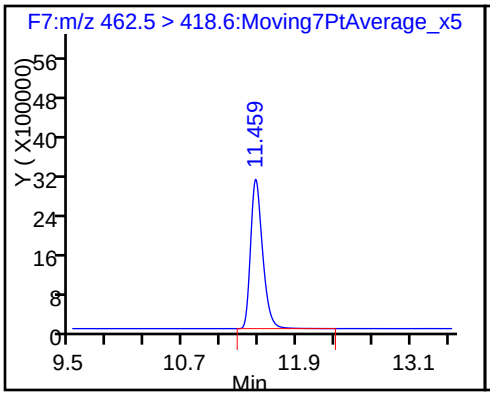
15 Perfluorooctane sulfonic acid



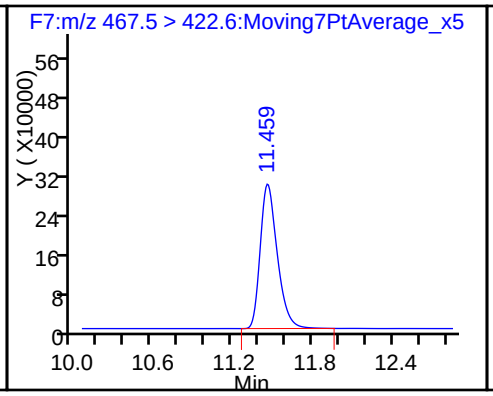
15 Perfluorooctane sulfonic acid



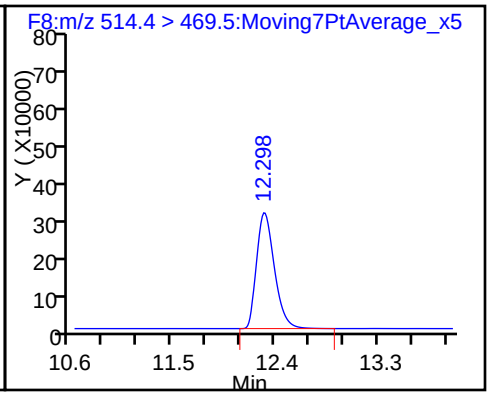
18 Perfluorononanoic acid



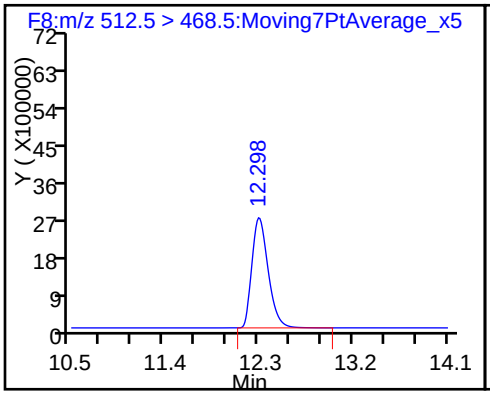
D 17 13C5 PFNA



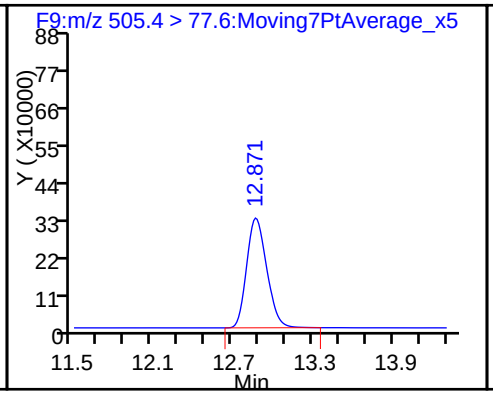
D 19 13C2 PFDA



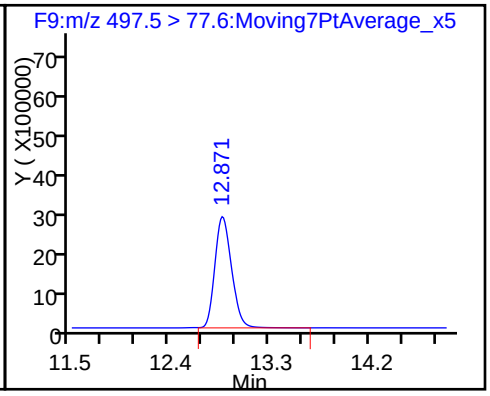
20 Perfluorodecanoic acid



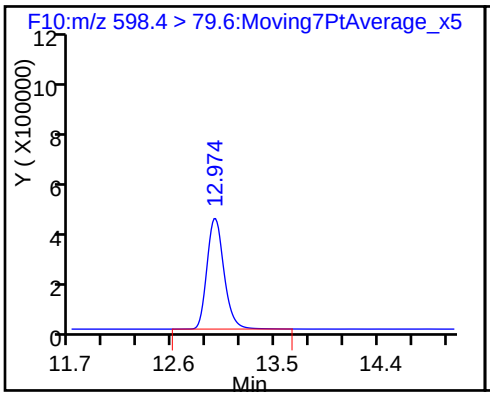
D 23 13C8 FOSA



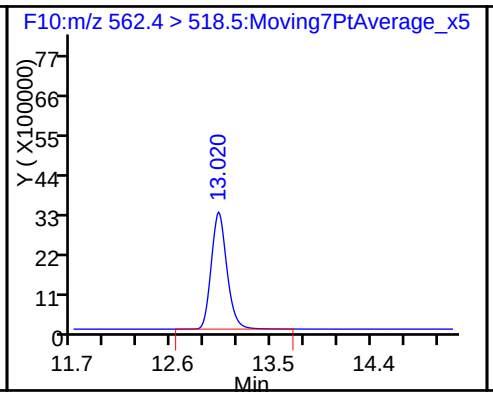
24 Perfluorooctane Sulfonamide



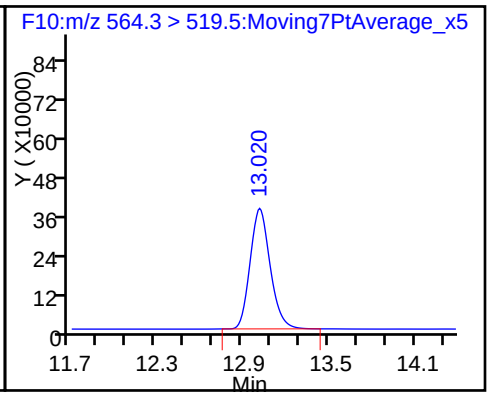
49 Perfluorodecane Sulfonic acid



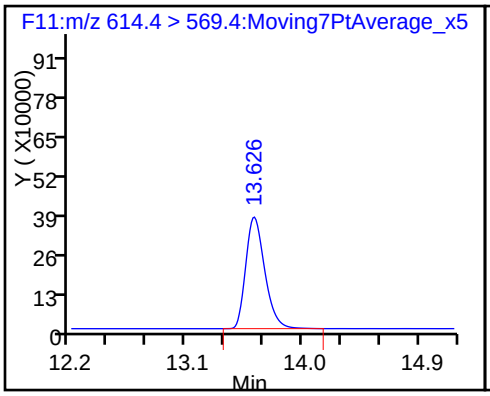
27 Perfluoroundecanoic acid



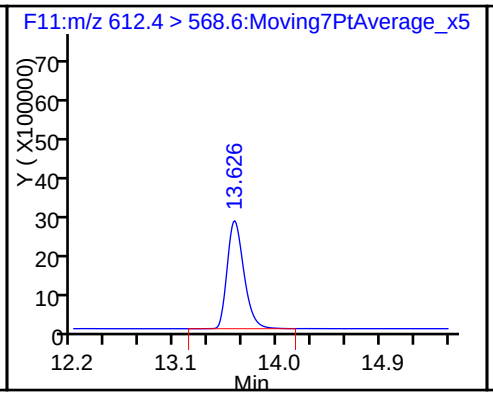
D 26 13C2 PFUnA



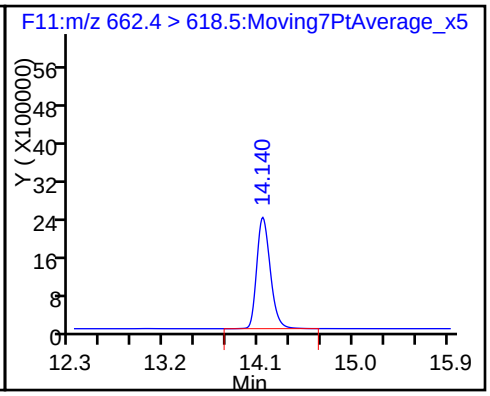
D 28 13C2 PFDoA



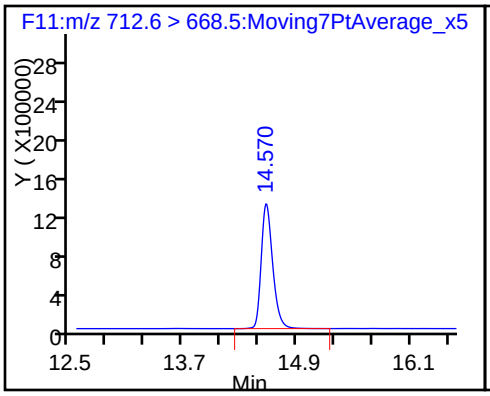
29 Perfluorododecanoic acid



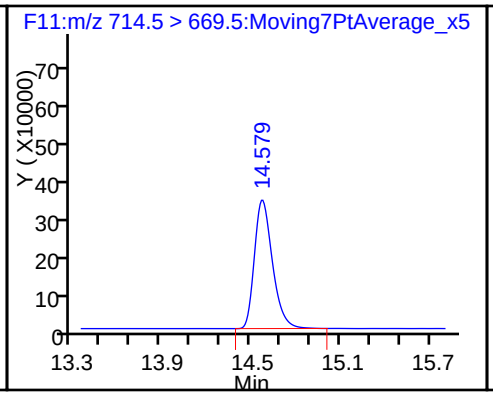
30 Perfluorotridecanoic acid



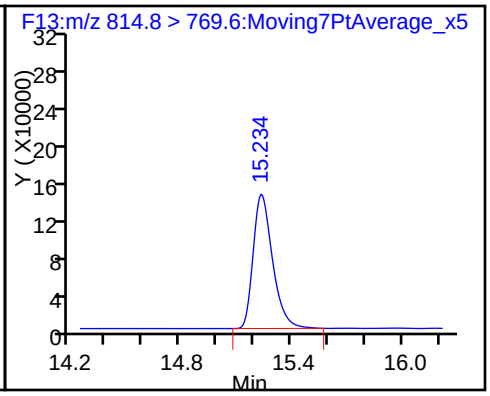
32 Perfluorotetradecanoic acid



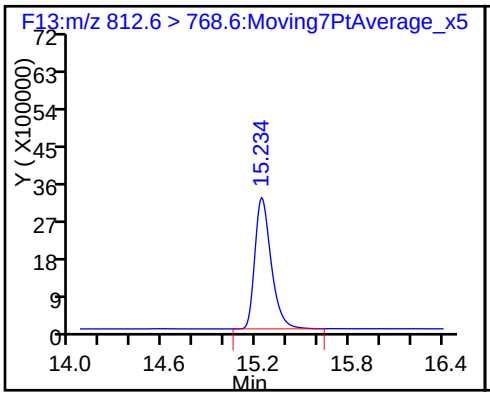
D 33 13C2-PFTeDA



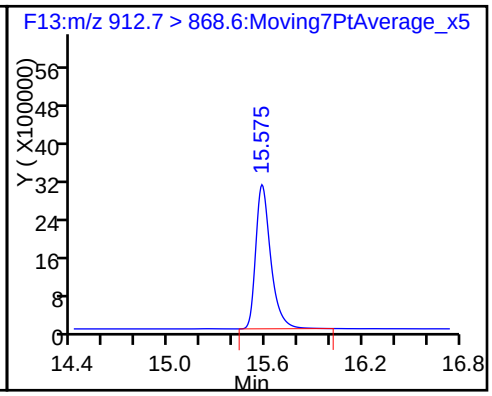
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Lab Sample ID: ICV 320-111390/13 Calibration Date: 05/25/2016 19:44

Instrument ID: A4 Calib Start Date: 05/25/2016 16:55

GC Column: Acquity ID: 2.10(mm) Calib End Date: 05/25/2016 19:01

Lab File ID: 25MAY2016B4A_013.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.6418	0.6042		47.1	50.0	-5.9	25.0
Perfluoropentanoic acid (PFPeA)	AveID	0.5079	0.4357		42.9	50.0	-14.2	25.0
Perfluorobutanesulfonic acid (PFBS)	L2ID	0.7655	0.6286		38.0	44.3	-14.2	25.0
Perfluorohexanoic acid (PFHxA)	L1ID		0.4002		44.4	50.0	-11.2	25.0
Perfluoroheptanoic acid (PFHpA)	L2ID		0.4343		44.9	50.0	-10.1	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.705	1.616		44.7	47.3	-5.2	25.0
Perfluorooctanoic acid (PFOA)	L1ID	0.4698	0.4140		45.7	50.0	-8.6	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID	7.344	7.099		43.6	47.6	-8.3	25.0
Perfluorooctanesulfonic acid (PFOS)	L1ID	11.43	11.46		39.8	47.8	-16.7	25.0
Perfluorononanoic acid (PFNA)	L2ID		1.183		48.1	50.0	-3.9	25.0
Perfluorodecanoic acid (PFDA)	AveID	1.039	1.015		48.8	50.0	-2.3	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	1.069	0.9064		42.4	50.0	-15.2	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	4.187	4.035		46.3	48.3	-3.6	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.179	1.055		44.7	50.0	-10.5	25.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9121	0.8447		46.3	50.0	-7.4	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.025	1.020		49.7	50.0	-0.5	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.5424	0.4528		41.7	50.0	-16.5	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		2.841		54.5	50.0	9.0	25.0
Perfluoro-n-octandecanoic acid (PFODA)	AveID	2.211	2.063		46.7	50.0	-6.7	25.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_013.d
Lims ID: ICV
Client ID:
Sample Type: ICV
Inject. Date: 25-May-2016 19:44:02 ALS Bottle#: 9 Worklist Smp#: 13
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: ICV
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub6

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 26-May-2016 11:03:48 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK003

First Level Reviewer: barnettj Date: 25-May-2016 20:10:40

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.800	5.798	0.002	1.000	2958964	47.1			7956	
D 1 13C4 PFBA										
216.7 > 171.5	5.797	5.798	-0.001		4897041	57.9		116	17343	
D 3 13C5-PFPeA										
267.6 > 222.7	6.909	6.907	0.002		4007616	52.2		104	7316	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.909	6.910	-0.001	1.000	1746168	42.9			558	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.024	7.024	0.0	1.000	795232	NC			2061	
298.8 > 98.6	7.024	7.024	0.0	1.000	539269		1.47(0.00-0.00)		1224	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.024	7.024	0.0	1.000	795232	38.0				
D 6 13C2 PFHxA										
314.6 > 269.7	8.155	8.156	-0.001		4868461	58.6		117	8025	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.155	8.157	-0.002	1.000	1948205	44.4			2121	
22 PFPeS (Perflouro-1-pentanesulfonat										
348.7 > 79.5	8.231	8.231	0.0	0.874	1626958	NC			6115	
D 8 13C4-PFHpA										
366.6 > 321.6	9.388	9.387	0.001		4696622	54.9		110	6023	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.388	9.388	0.0	1.000	2039886	44.9			4057	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.419	9.421	-0.002	1.000	2183057	NC			3581	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.419	9.421	-0.002	1.000	2183057	44.7				

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 11 18O2 PFHxS										
402.5 > 83.6	9.419	9.422	-0.003		1352349	45.6		96.3	4547	
D 12 13C4 PFOA										
416.5 > 371.6	10.500	10.503	-0.003		4522634	50.7		101	6631	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.500	10.504	-0.004	1.000	1872553	45.7			2392	
412.8 > 168.7	10.500	10.504	-0.004	1.000	614282		3.05(0.00-0.00)		1683	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.509	10.508	0.001	1.000	2002003	43.6				
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.509	10.508	0.001	1.000	2002003	NC			4517	
D 16 13C4 PFOS										
502.4 > 79.7	11.459	11.465	-0.006		283194	42.0		87.8	1259	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.459	11.466	-0.007	1.000	3241703	39.8			2688	
498.3 > 98.2	11.459	11.466	-0.007	1.000	2020911		1.60(0.00-0.00)		2424	
D 17 13C5 PFNA										
467.5 > 422.6	11.479	11.484	-0.005		4181087	53.3		107	8671	
18 Perfluorononanoic acid										
462.5 > 418.6	11.488	11.486	0.002	1.000	4947520	48.1			5432	
D 19 13C2 PFDA										
514.4 > 469.5	12.325	12.325	0.0		5407179	54.1		108	6738	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.325	12.325	0.0	1.000	5486255	48.8			4722	
D 23 13C8 FOSA										
505.4 > 77.6	12.897	12.893	0.004		5081241	52.6		105	4736	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.897	12.893	0.004	1.000	4605524	42.4			3112	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.988	12.996	-0.008	1.000	1153396	NC			3804	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.988	12.996	-0.008	1.000	1153396	46.3				
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.042	13.042	0.0	1.000	5563123	44.7			4406	
D 26 13C2 PFUnA										
564.3 > 519.5	13.042	13.044	-0.002		5271958	52.0		104	4367	
D 28 13C2 PFDoA										
614.4 > 569.4	13.639	13.646	-0.007		5767571	54.7		109	3882	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.639	13.646	-0.007	1.000	4872011	46.3			1800	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.161	14.162	-0.001	1.000	3975330	49.7			1664	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.599	14.600	-0.001	1.000	1765191	41.7			1124	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.599	14.601	-0.002		3898106	51.4		103	3149	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.250	15.255	-0.005		1343496	46.1		92.2	2719	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.250	15.255	-0.005	1.000	3816658	54.5			669	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.589	15.593	-0.004	1.000	2771533	46.7			2240	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFCIC_00016 Amount Added: 1.00 Units: mL

Report Date: 26-May-2016 11:03:49 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_013.d

Injection Date: 25-May-2016 19:44:02 Instrument ID: A4

Lims ID: ICV

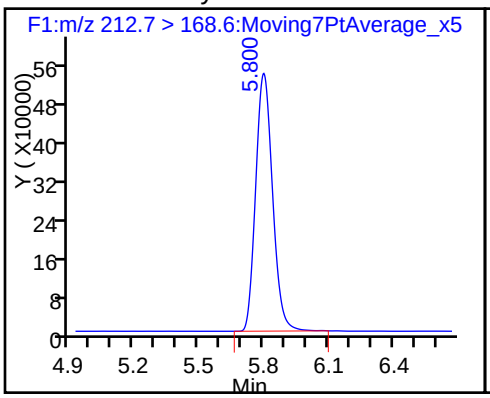
Client ID:

Operator ID: JRB ALS Bottle#: 9 Worklist Smp#: 13

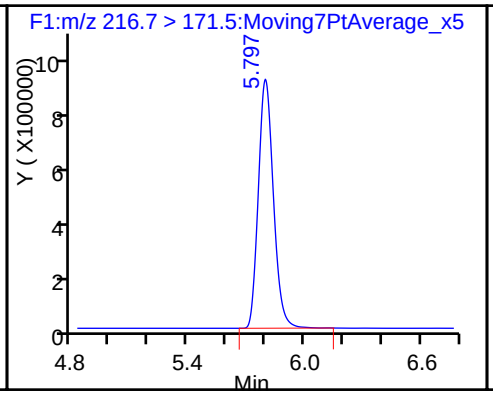
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

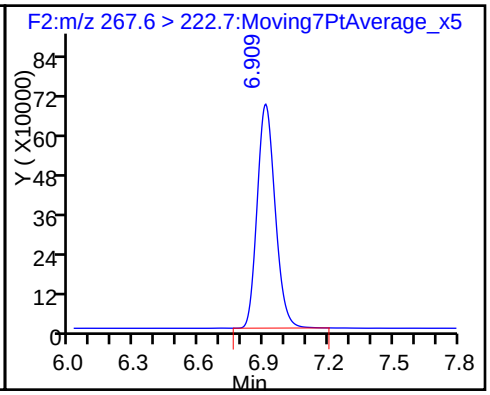
2 Perfluorobutyric acid



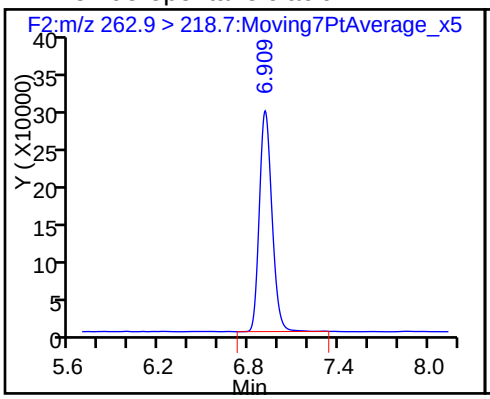
D 1 13C4 PFBA



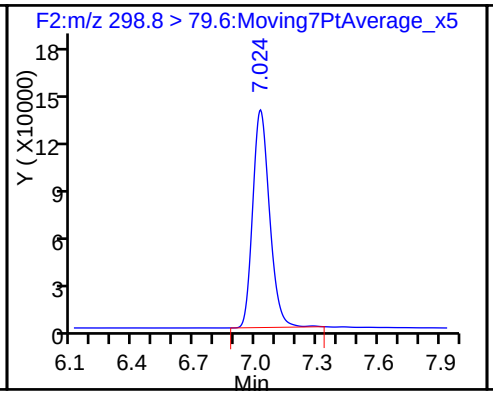
D 3 13C5-PFPeA



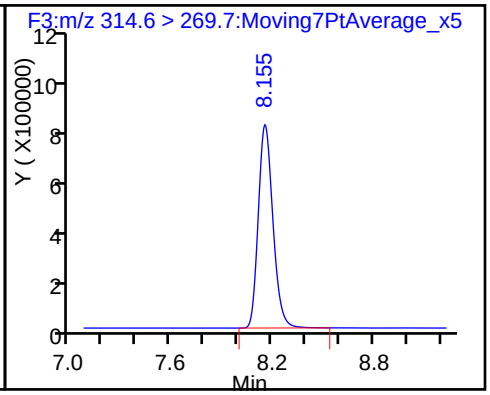
4 Perfluoropentanoic acid



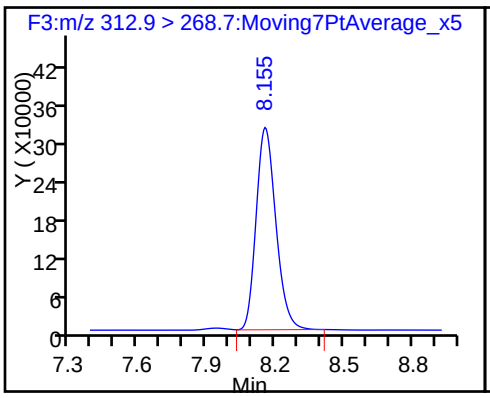
51 Perfluorobutanesulfonic acid



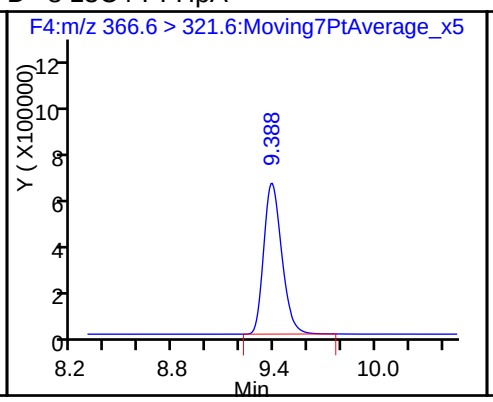
D 6 13C2 PFHxA



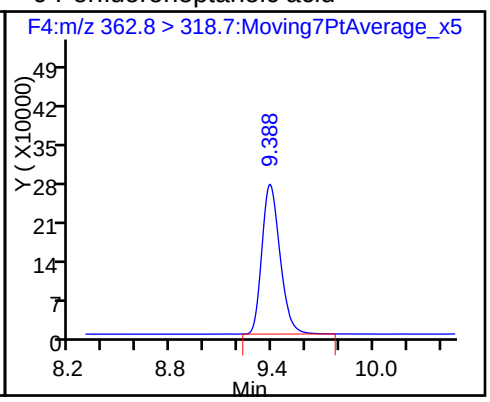
7 Perfluorohexanoic acid



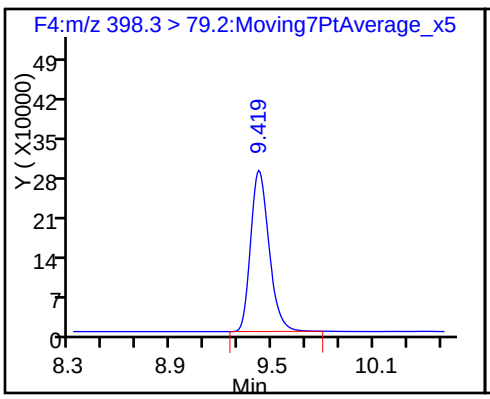
D 8 13C4-PFHpA



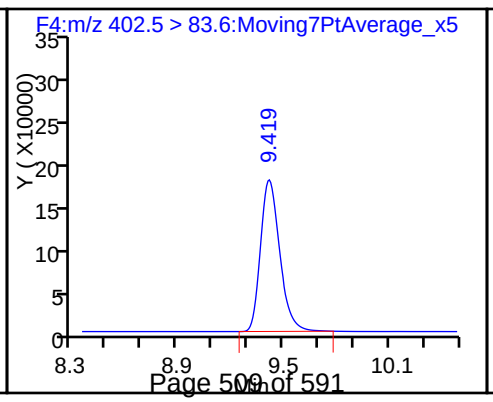
9 Perfluoroheptanoic acid



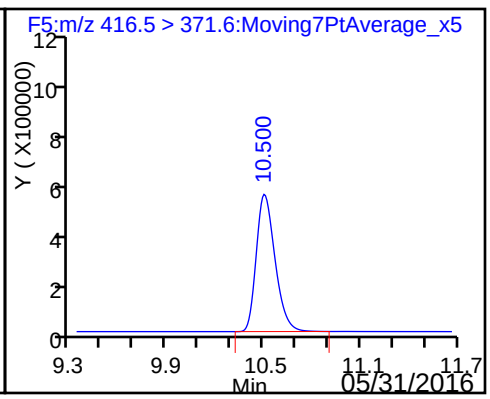
58 Perfluorohexanesulfonic acid



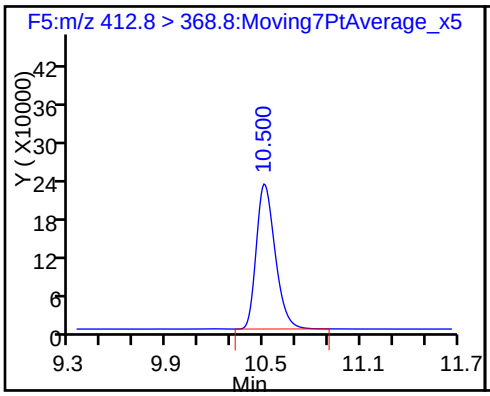
D 11 18O2 PFHxS



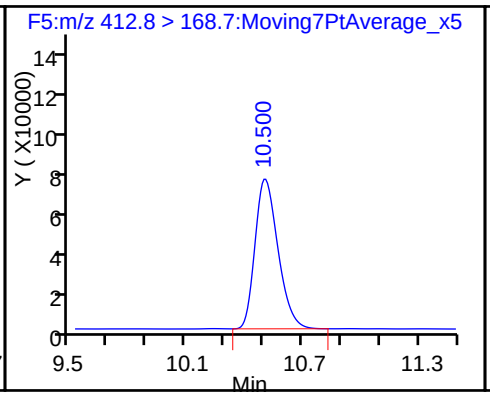
D 12 13C4 PFOA



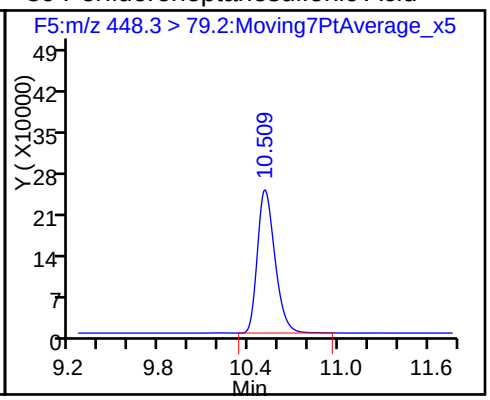
13 Perfluorooctanoic acid



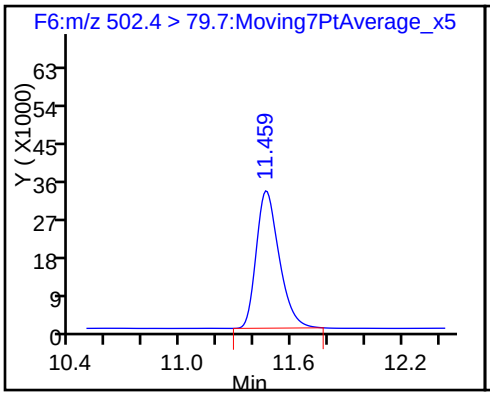
13 Perfluorooctanoic acid



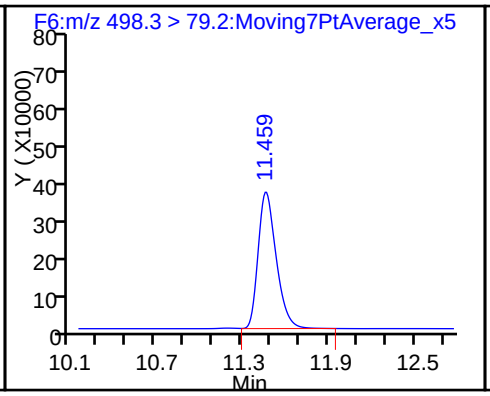
39 Perfluoroheptanesulfonic Acid



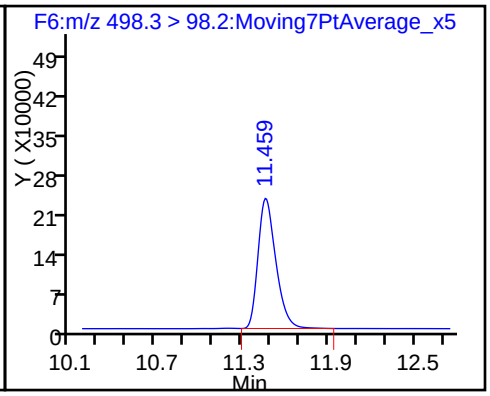
D 16 13C4 PFOS



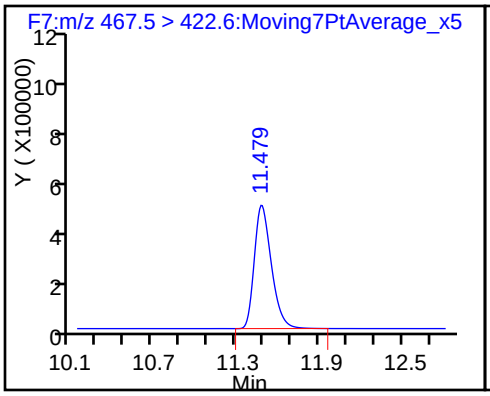
15 Perfluorooctane sulfonic acid



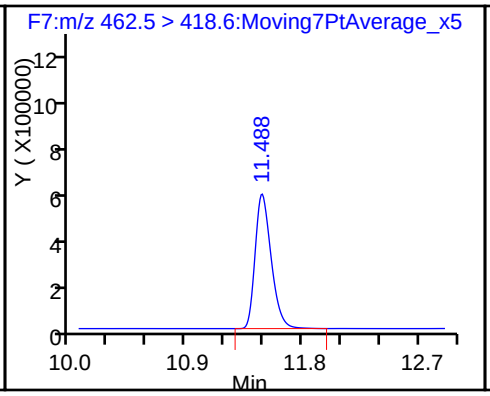
15 Perfluorooctane sulfonic acid



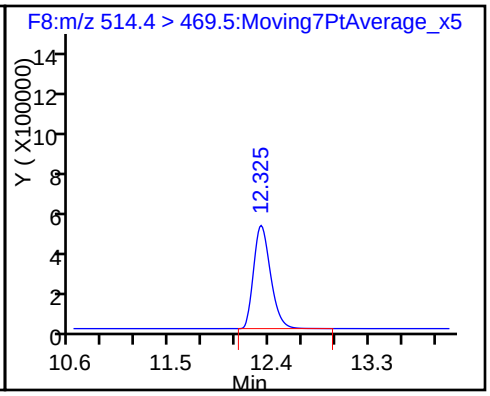
D 17 13C5 PFNA



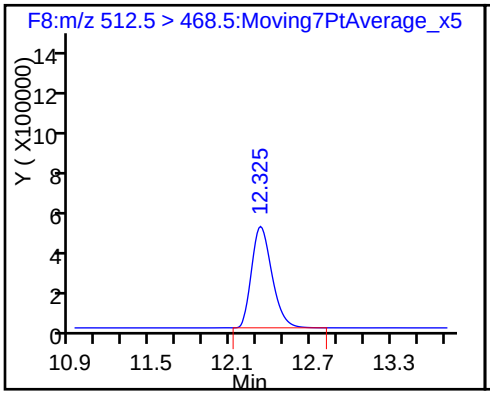
18 Perfluorononanoic acid



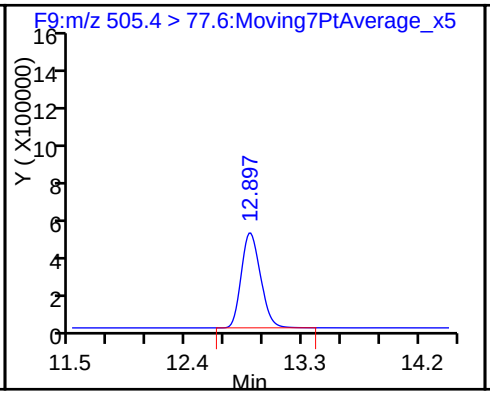
D 19 13C2 PFDA



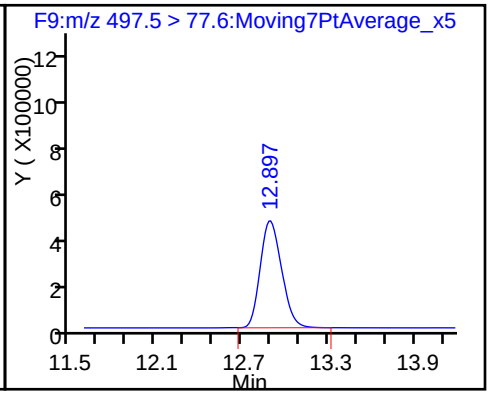
20 Perfluorodecanoic acid



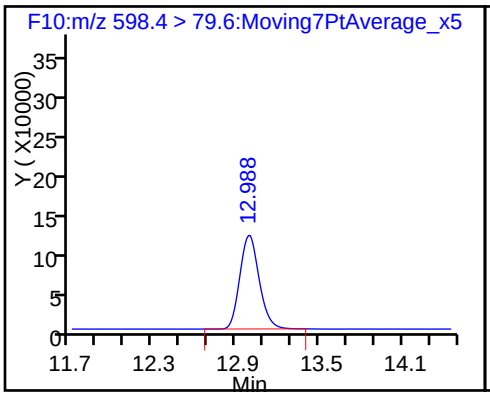
D 23 13C8 FOSA



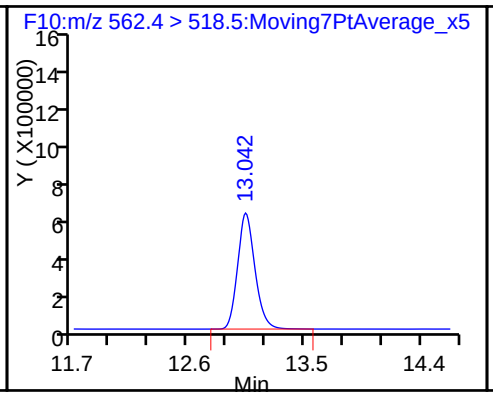
24 Perfluorooctane Sulfonamide



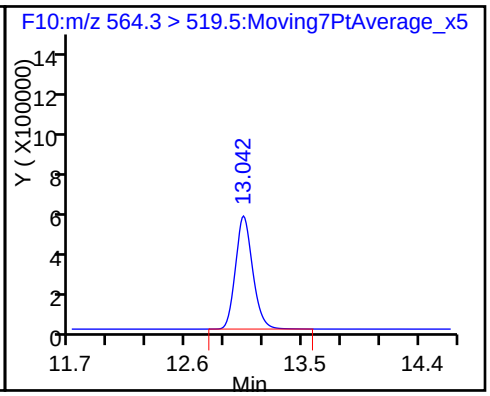
49 Perfluorodecane Sulfonic acid



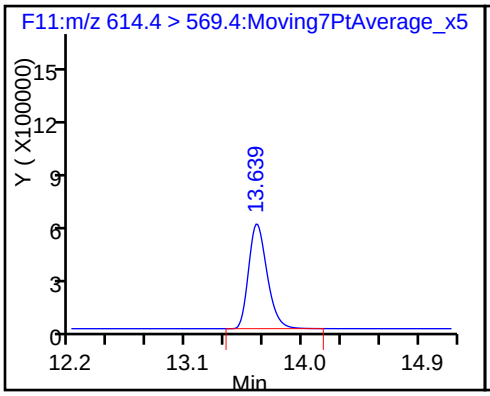
27 Perfluoroundecanoic acid



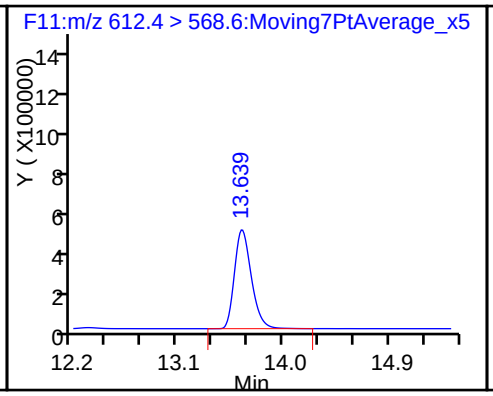
D 26 13C2 PFUnA



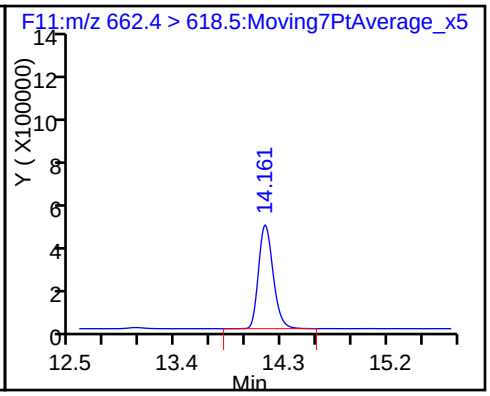
D 28 13C2 PFDoA



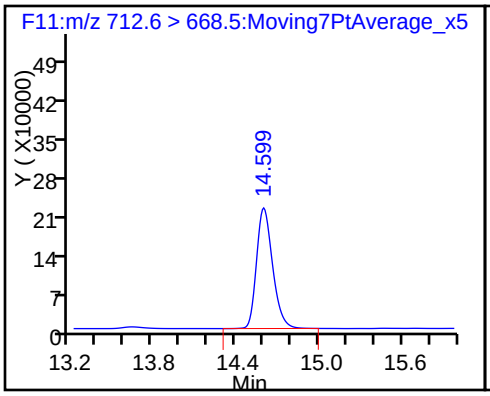
29 Perfluorododecanoic acid



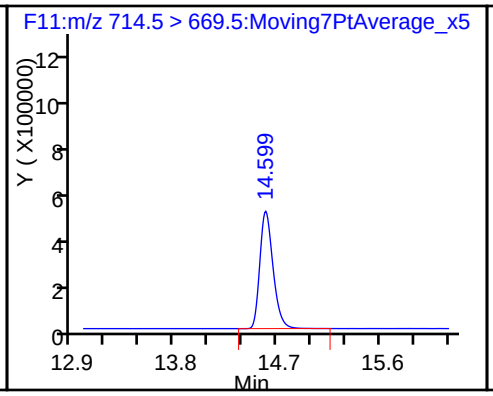
30 Perfluorotridecanoic acid



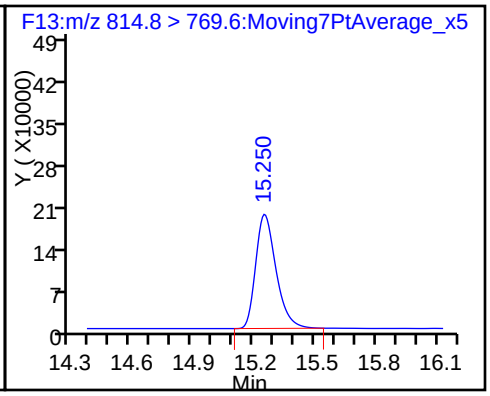
32 Perfluorotetradecanoic acid



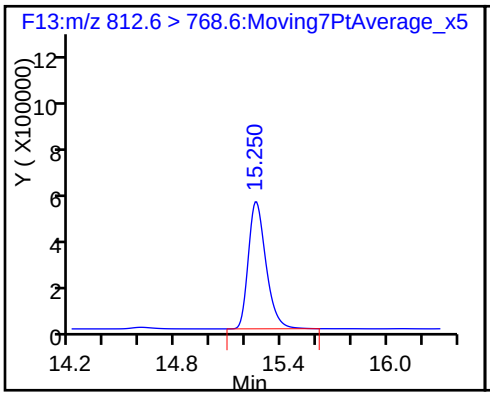
D 33 13C2-PFTeDA



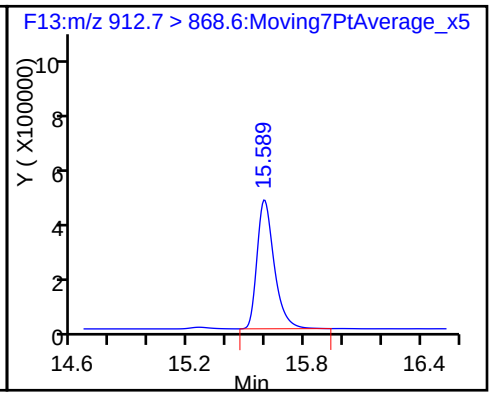
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Lab Sample ID: CCV 320-111390/64 Calibration Date: 05/26/2016 13:49

Instrument ID: A4 Calib Start Date: 05/25/2016 16:55

GC Column: Acquity ID: 2.10(mm) Calib End Date: 05/25/2016 19:01

Lab File ID: 25MAY2016B4A_064.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.6418	0.6718		52.3	50.0	4.7	25.0
Perfluoropentanoic acid (PFPeA)	AveID	0.5079	0.4928		48.5	50.0	-3.0	25.0
Perfluorobutanesulfonic acid (PFBS)	L2ID	0.7655	0.7326		44.2	44.2	0.0	25.0
Perfluorohexanoic acid (PFHxA)	L1ID		0.4616		51.3	50.0	2.5	25.0
Perfluoroheptanoic acid (PFHpA)	L2ID		0.5380		55.7	50.0	11.5	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.705	1.591		44.0	47.3	-6.7	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID	7.344	8.682		53.4	47.6	12.1	25.0
Perfluorooctanoic acid (PFOA)	L1ID	0.4698	0.4627		51.1	50.0	2.2	25.0
Perfluorooctanesulfonic acid (PFOS)	L1ID	11.43	13.34		46.2	47.8	-3.3	25.0
Perfluorononanoic acid (PFNA)	L2ID		1.221		49.6	50.0	-0.8	25.0
Perfluorodecanoic acid (PFDA)	AveID	1.039	1.148		55.3	50.0	10.5	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	1.069	1.178		55.1	50.0	10.1	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	4.187	4.102		47.0	48.2	-2.0	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.179	1.190		50.5	50.0	0.9	25.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9121	0.9790		53.7	50.0	7.3	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.025	1.053		51.3	50.0	2.7	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.5424	0.4888		45.1	50.0	-9.9	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		2.693		51.6	50.0	3.2	25.0
Perfluoro-n-octandecanoic acid (PFODA)	AveID	2.211	2.266		51.2	50.0	2.5	25.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_064.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 26-May-2016 13:49:32 ALS Bottle#: 14 Worklist Smp#: 64
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 26-May-2016 14:56:20 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK003

First Level Reviewer: barnettj Date: 26-May-2016 14:50:11

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.791	5.798	-0.007	1.000	3909541	52.3		105	10035	
D 1 13C4 PFBA										
216.7 > 171.5	5.794	5.798	-0.004		5819143	68.8		138	18650	
D 3 13C5-PFPeA										
267.6 > 222.7	6.895	6.907	-0.012		4228763	55.1		110	8144	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.899	6.910	-0.011	1.000	2083837	48.5		97.0	907	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.014	7.024	-0.010	1.000	1021530	NC			2076	
298.8 > 98.6	7.010	7.024	-0.014	0.999	677240		1.51(0.00-0.00)		1356	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.014	7.024	-0.010	1.000	1021530	44.2		100		
D 6 13C2 PFHxA										
314.6 > 269.7	8.144	8.156	-0.012		5142554	61.9		124	11094	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.144	8.157	-0.013	1.000	2373850	51.3		103	2342	
22 PFPeS (Perflouro-1-pentanesulfonat										
348.7 > 79.5	8.220	8.231	-0.011	0.874	1999761	NC			9023	
D 8 13C4-PFHpA										
366.6 > 321.6	9.372	9.387	-0.015		4424729	51.8		104	6396	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.372	9.388	-0.016	1.000	2380302	55.7		111	4855	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.404	9.421	-0.017	1.000	2373405	NC			2875	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.404	9.421	-0.017	1.000	2373405	44.0		93.1		

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 11 18O2 PFHxS										
402.5 > 83.6	9.404	9.422	-0.018		1492109	50.3		106	3060	
D 12 13C4 PFOA										
416.5 > 371.6	10.491	10.503	-0.012		4761254	53.4		107	7285	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.491	10.504	-0.013	1.000	2203209	51.1		102	3047	
412.8 > 168.7	10.491	10.504	-0.013	1.000	699540		3.15(0.00-0.00)		1803	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.491	10.508	-0.017	1.000	2485571	53.4		112		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.491	10.508	-0.017	1.000	2485571	NC			5482	
D 16 13C4 PFOS										
502.4 > 79.7	11.449	11.465	-0.016		287502	42.6		89.1	1295	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.449	11.466	-0.017	1.000	3834781	46.2		96.7	4693	
498.3 > 98.2	11.449	11.466	-0.017	1.000	2258814		1.70(0.00-0.00)		2821	
D 17 13C5 PFNA										
467.5 > 422.6	11.469	11.484	-0.015		4388244	55.9		112	6278	
18 Perfluorononanoic acid										
462.5 > 418.6	11.478	11.486	-0.008	1.000	5356499	49.6		99.2	5267	
D 19 13C2 PFDA										
514.4 > 469.5	12.311	12.325	-0.014		5394950	54.0		108	6978	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.311	12.325	-0.014	1.000	6191531	55.3		111	5809	
D 23 13C8 FOSA										
505.4 > 77.6	12.884	12.893	-0.009		4957169	51.4		103	3869	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.884	12.893	-0.009	1.000	5838662	55.1		110	3345	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.987	12.996	-0.009	1.000	1189326	NC			3145	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.987	12.996	-0.009	1.000	1189326	47.0		97.5		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.030	13.042	-0.012	1.000	6692247	50.5		101	5103	
D 26 13C2 PFUnA										
564.3 > 519.5	13.030	13.044	-0.014		5622371	55.5		111	5156	
D 28 13C2 PFDoA										
614.4 > 569.4	13.638	13.646	-0.008		5829629	55.3		111	3700	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.638	13.646	-0.008	1.000	5706941	53.7		107	2568	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.150	14.162	-0.012	1.000	4389239	51.3		103	1370	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.588	14.600	-0.012	1.000	2038037	45.1		90.1	1016	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.588	14.601	-0.013		4169691	54.9		110	4008	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.250	15.255	-0.005		1647750	56.5		113	2912	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.250	15.255	-0.005	1.000	4437409	51.6		103	623	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.581	15.593	-0.012	1.000	3733517	51.2		102	2866	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 26-May-2016 14:56:21 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_064.d

Injection Date: 26-May-2016 13:49:32 Instrument ID: A4

Lims ID: CCV L5

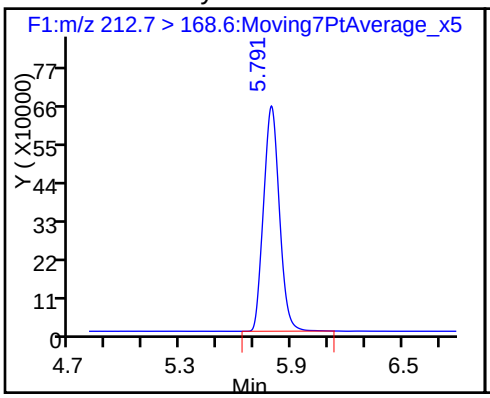
Client ID:

Operator ID: JRB ALS Bottle#: 14 Worklist Smp#: 64

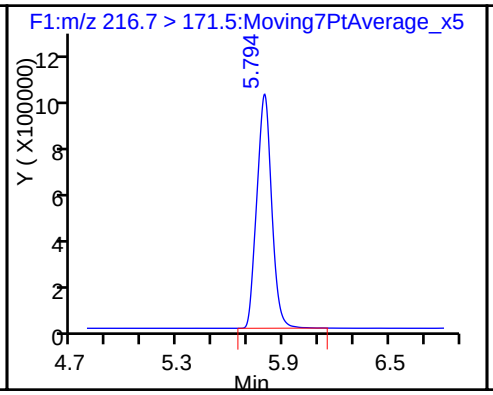
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

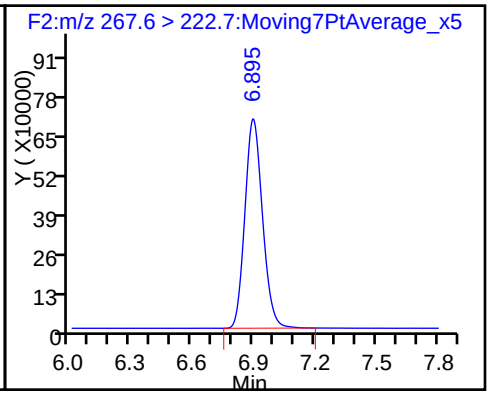
2 Perfluorobutyric acid



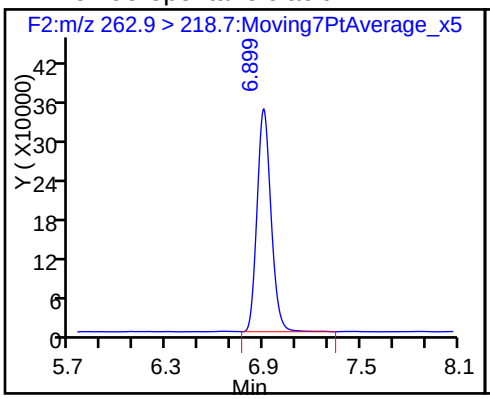
D 1 13C4 PFBA



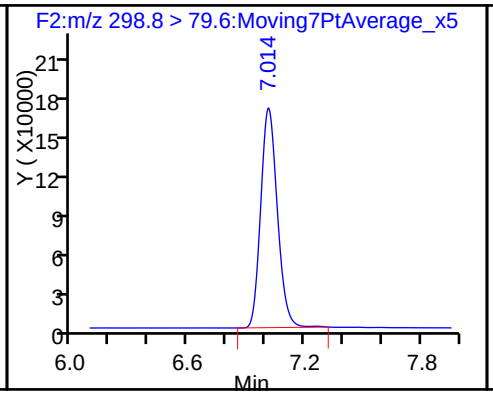
D 3 13C5-PFPeA



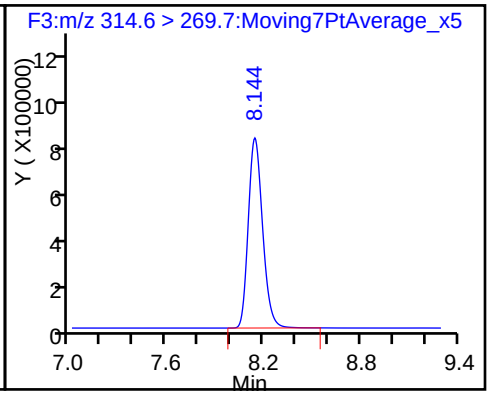
4 Perfluoropentanoic acid



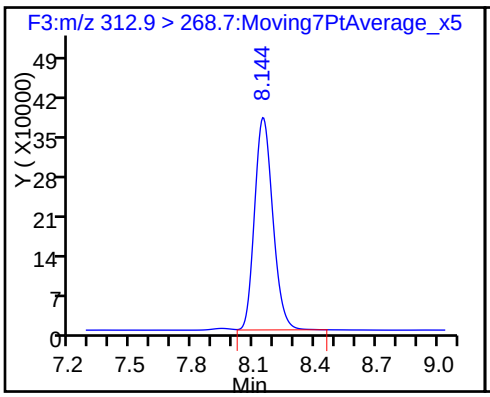
51 Perfluorobutanesulfonic acid



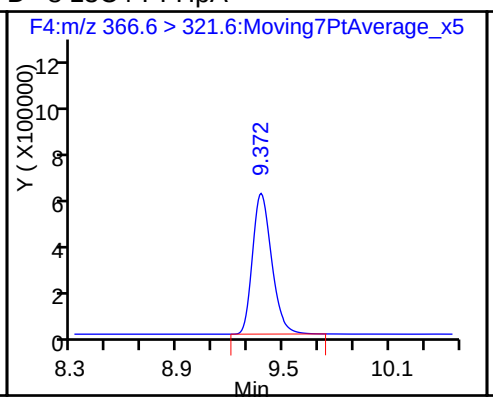
D 6 13C2 PFHxA



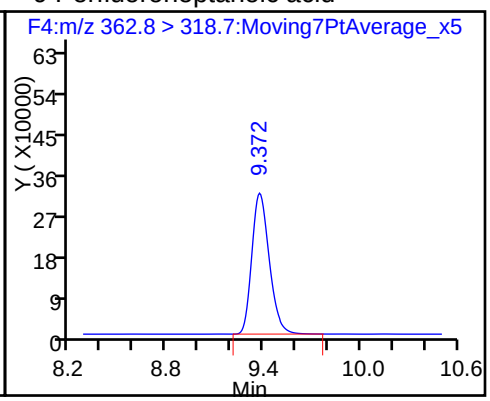
7 Perfluorohexanoic acid



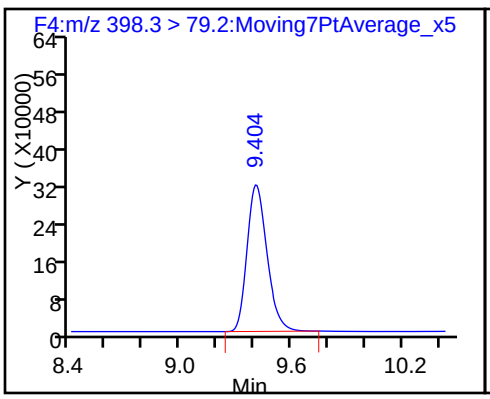
D 8 13C4-PFHpA



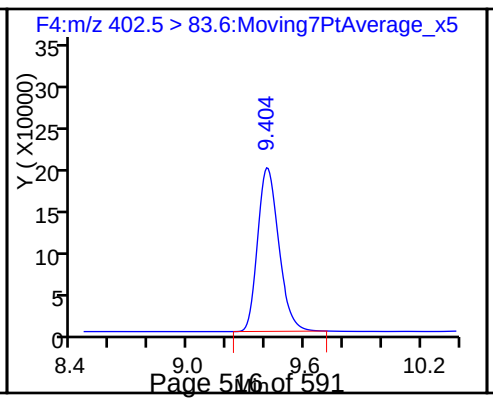
9 Perfluoroheptanoic acid



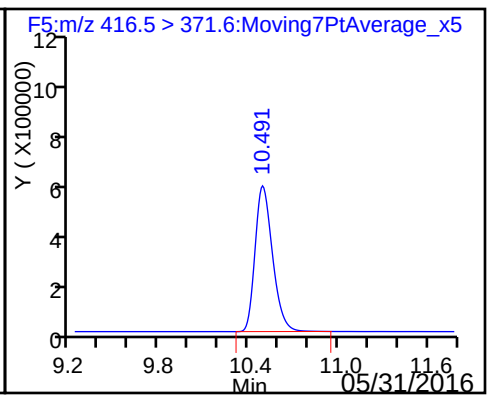
58 Perfluorohexanesulfonic acid



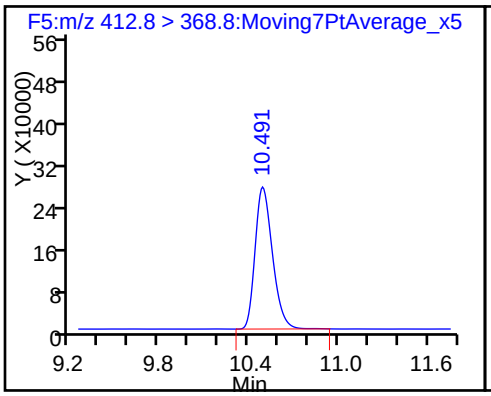
D 11 18O2 PFHxS



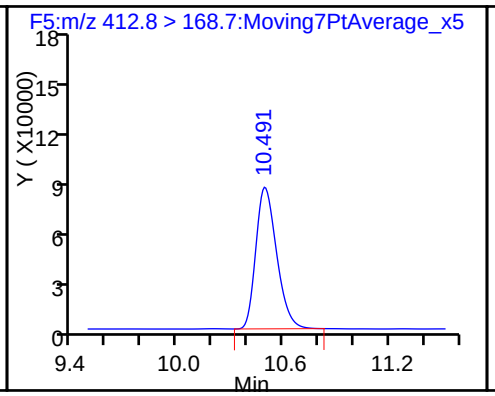
D 12 13C4 PFOA



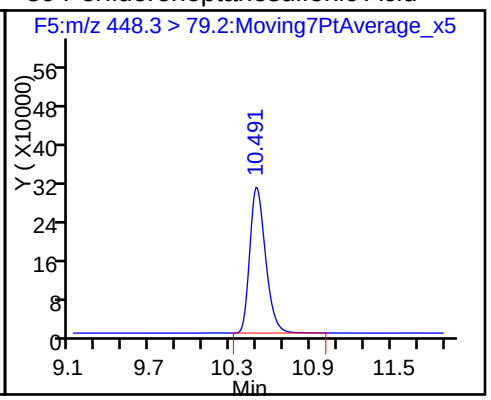
13 Perfluorooctanoic acid



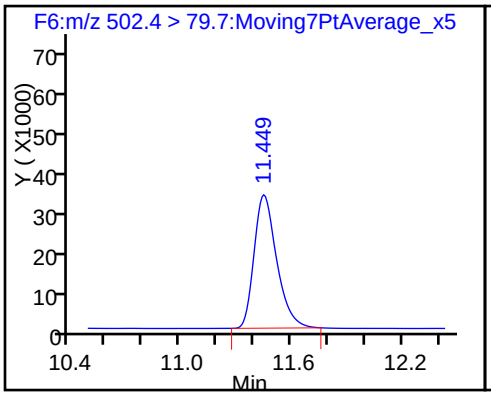
13 Perfluorooctanoic acid



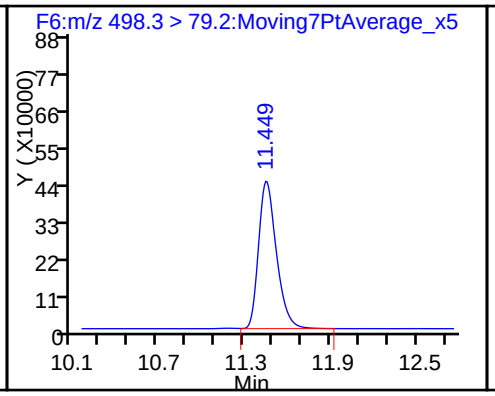
39 Perfluoroheptanesulfonic Acid



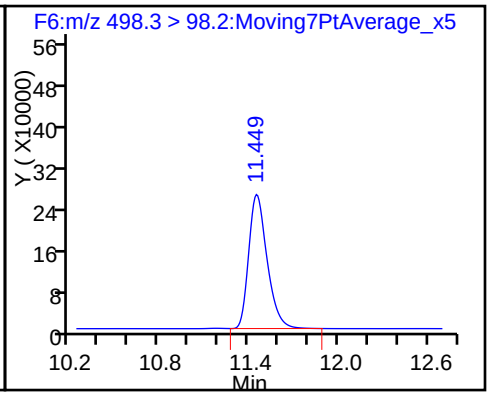
D 16 13C4 PFOS



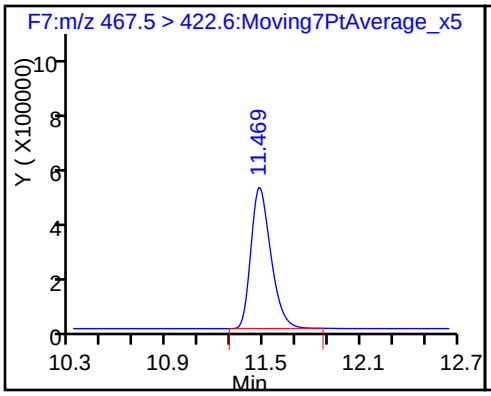
15 Perfluorooctane sulfonic acid



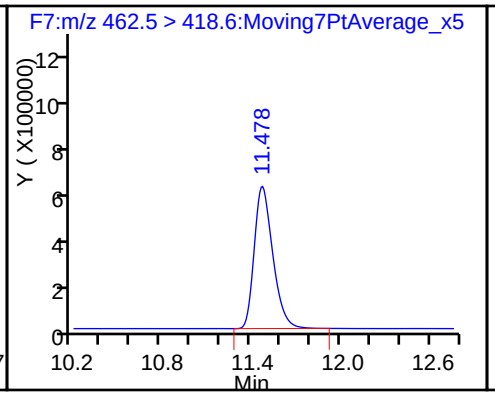
15 Perfluorooctane sulfonic acid



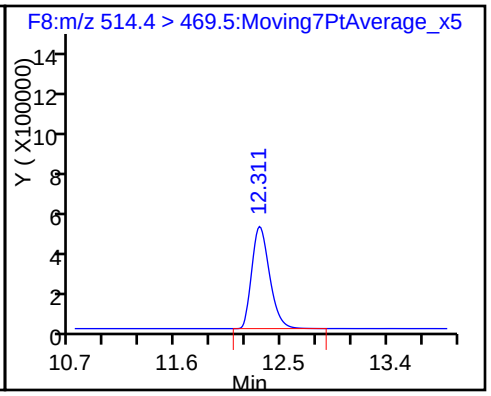
D 17 13C5 PFNA



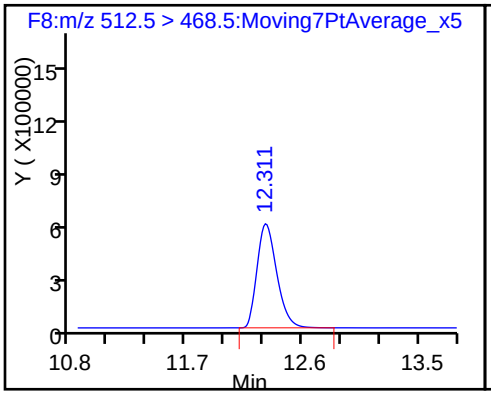
18 Perfluorononanoic acid



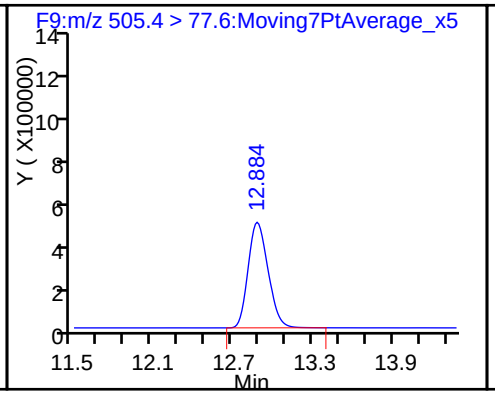
D 19 13C2 PFDA



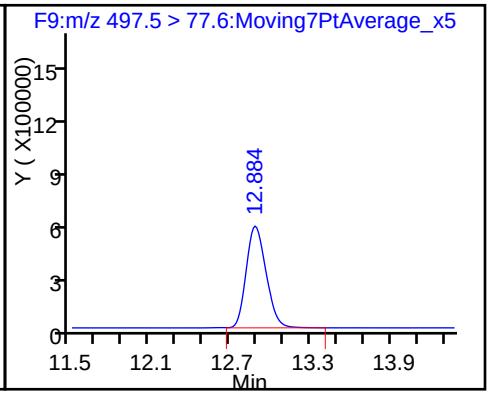
20 Perfluorodecanoic acid



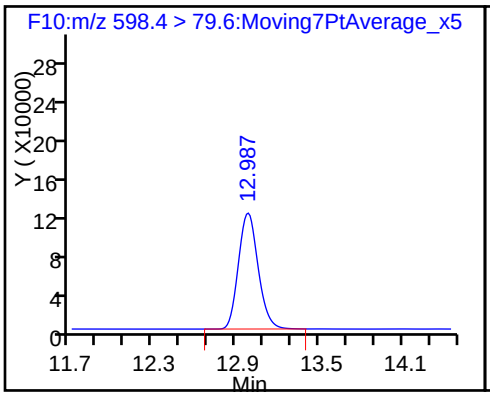
D 23 13C8 FOSA



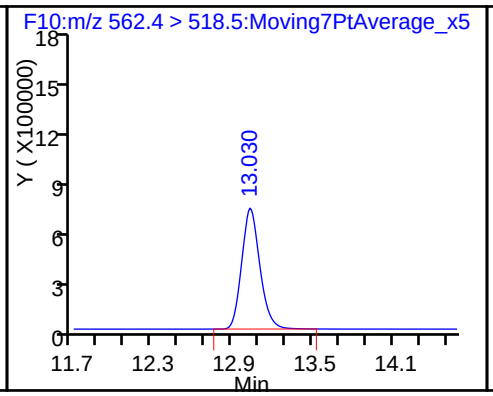
24 Perfluorooctane Sulfonamide



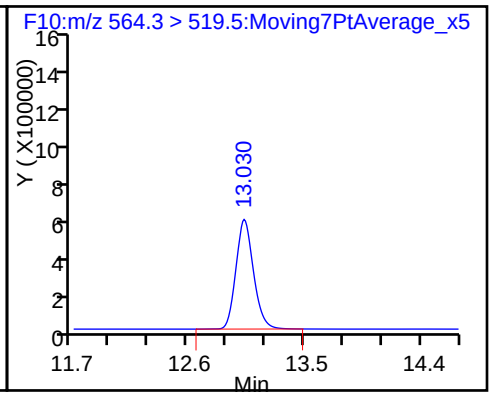
49 Perfluorodecane Sulfonic acid



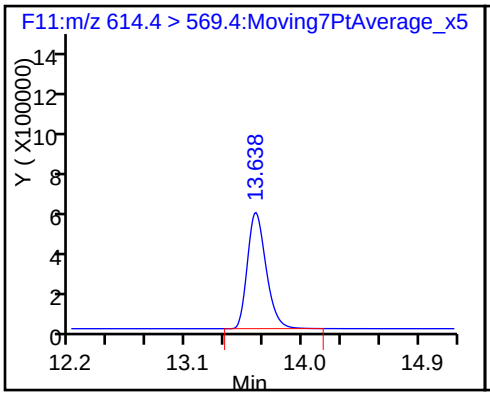
27 Perfluoroundecanoic acid



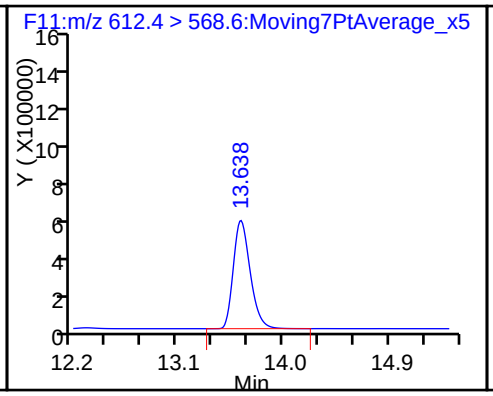
D 26 13C2 PFUnA



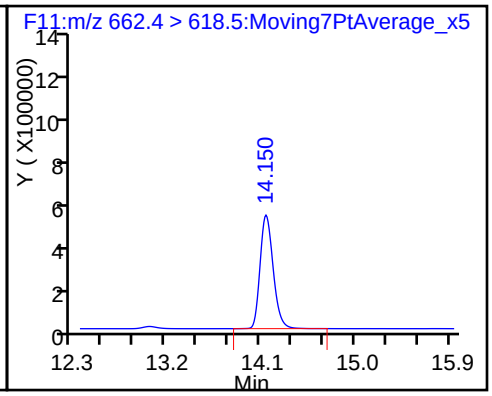
D 28 13C2 PFDoA



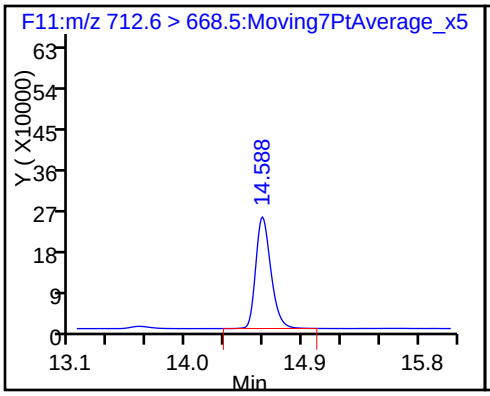
29 Perfluorododecanoic acid



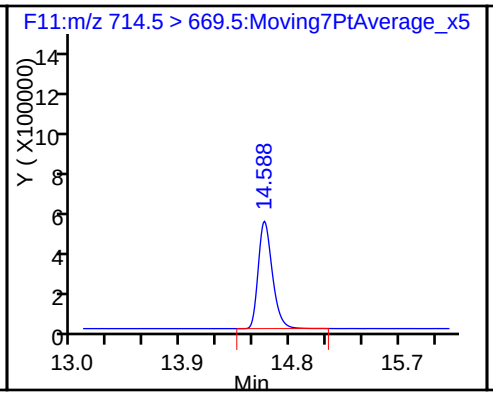
30 Perfluorotridecanoic acid



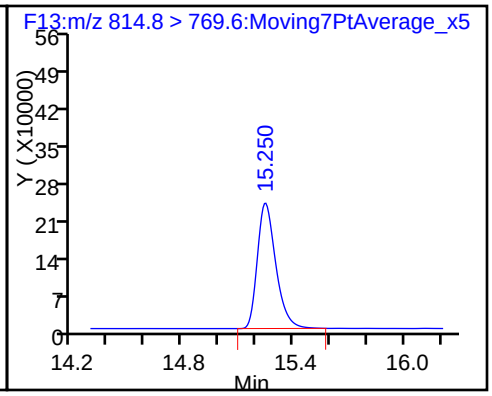
32 Perfluorotetradecanoic acid



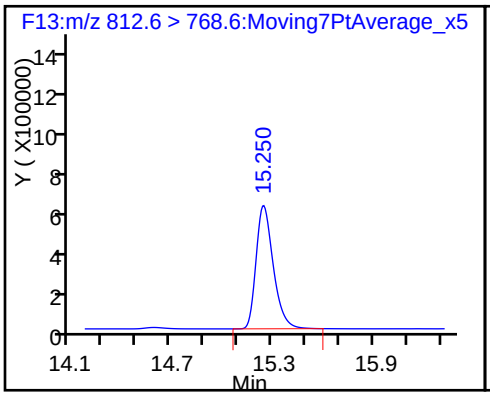
D 33 13C2-PFTeDA



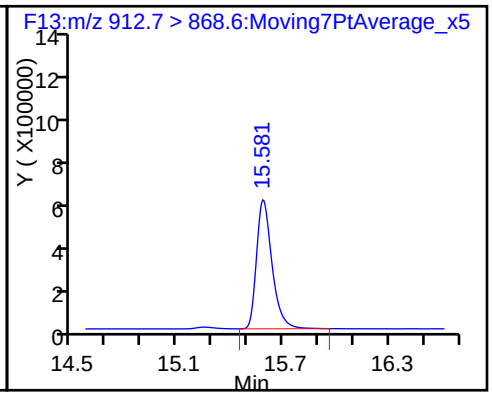
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Lab Sample ID: CCV 320-111390/78 Calibration Date: 05/26/2016 18:53

Instrument ID: A4 Calib Start Date: 05/25/2016 16:55

GC Column: Acquity ID: 2.10(mm) Calib End Date: 05/25/2016 19:01

Lab File ID: 25MAY2016B4A_078.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.6418	0.6771		52.8	50.0	5.5	25.0
Perfluoropentanoic acid (PFPeA)	AveID	0.5079	0.5131		50.5	50.0	1.0	25.0
Perfluorobutanesulfonic acid (PFBS)	L2ID	0.7655	0.7222		43.6	44.2	-1.4	25.0
Perfluorohexanoic acid (PFHxA)	L1ID		0.4791		53.2	50.0	6.4	25.0
Perfluoroheptanoic acid (PFHpA)	L2ID		0.5074		52.6	50.0	5.1	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.705	1.591		44.0	47.3	-6.7	25.0
Perfluorooctanoic acid (PFOA)	L1ID	0.4698	0.4710		52.0	50.0	4.0	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID	7.344	7.807		48.0	47.6	0.8	25.0
Perfluorooctanesulfonic acid (PFOS)	L1ID	11.43	11.93		41.4	47.8	-13.3	25.0
Perfluorononanoic acid (PFNA)	L2ID		1.238		50.3	50.0	0.6	25.0
Perfluorodecanoic acid (PFDA)	AveID	1.039	1.172		56.4	50.0	12.8	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	1.069	1.130		52.8	50.0	5.6	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	4.187	3.867		44.3	48.2	-7.6	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.179	1.240		52.6	50.0	5.2	25.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9121	0.996		54.6	50.0	9.1	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.025	1.120		54.6	50.0	9.2	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.5424	0.4886		45.0	50.0	-9.9	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		2.649		50.8	50.0	1.5	25.0
Perfluoro-n-octandecanoic acid (PFODA)	AveID	2.211	2.154		48.7	50.0	-2.6	25.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_078.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 26-May-2016 18:53:34 ALS Bottle#: 14 Worklist Smp#: 78
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:58:04 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: westendorfc Date: 27-May-2016 08:58:24

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.797	5.798	-0.001	1.000	3221735	52.8		106	9336	
D 1 13C4 PFBA										
216.7 > 171.5	5.794	5.798	-0.004		4758076	56.3		113	13666	
D 3 13C5-PFPeA										
267.6 > 222.7	6.899	6.907	-0.008		3555691	46.4		92.7	9590	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.904	6.910	-0.006	1.000	1824477	50.5		101	833	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.019	7.024	-0.005	1.000	910375	NC			1831	
298.8 > 98.6	7.014	7.024	-0.010	0.999	585238		1.56(0.00-0.00)		1353	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.019	7.024	-0.005	1.000	910375	43.6		98.6		
D 6 13C2 PFHxA										
314.6 > 269.7	8.149	8.156	-0.007		4625076	55.7		111	9708	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.149	8.157	-0.008	1.000	2216031	53.2		106	2910	
22 PFPeS (Perflouro-1-pentanesulfonat										
348.7 > 79.5	8.225	8.231	-0.006	0.874	1794626	NC			6410	
D 8 13C4-PFHpA										
366.6 > 321.6	9.372	9.387	-0.015		4110461	48.1		96.2	7259	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.380	9.388	-0.008	1.000	2085677	52.6		105	4070	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.412	9.421	-0.009	1.000	2145885	NC			3546	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.412	9.421	-0.009	1.000	2145885	44.0		93.1		

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 11 18O2 PFHxS										
402.5 > 83.6	9.412	9.422	-0.010		1348908	45.4		96.1	3231	
D 12 13C4 PFOA										
416.5 > 371.6	10.491	10.503	-0.012		4404711	49.4		98.8	6427	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.491	10.504	-0.013	1.000	2074448	52.0		104	2879	
412.8 > 168.7	10.499	10.504	-0.005	1.001	649970		3.19(0.00-0.00)		2362	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.499	10.508	-0.009	1.000	2333985	48.0		101		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.499	10.508	-0.009	1.000	2333985	NC			5523	
D 16 13C4 PFOS										
502.4 > 79.7	11.449	11.465	-0.016		300215	44.5		93.1	1343	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.458	11.466	-0.008	1.000	3582577	41.4		86.7	3931	
498.3 > 98.2	11.458	11.466	-0.008	1.000	2146192		1.67(0.00-0.00)		2220	
D 17 13C5 PFNA										
467.5 > 422.6	11.478	11.484	-0.006		4030722	51.4		103	7151	
18 Perfluorononanoic acid										
462.5 > 418.6	11.478	11.486	-0.008	1.000	4990163	50.3		101	6553	
D 19 13C2 PFDA										
514.4 > 469.5	12.311	12.325	-0.014		4879546	48.8		97.7	5342	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.311	12.325	-0.014	1.000	5717158	56.4		113	5170	
D 23 13C8 FOSA										
505.4 > 77.6	12.884	12.893	-0.009		4925432	51.0		102	3978	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.884	12.893	-0.009	1.000	5563383	52.8		106	2756	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.987	12.996	-0.009	1.000	1170685	NC			2794	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.987	12.996	-0.009	1.000	1170685	44.3		91.9		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.030	13.042	-0.012	1.000	6302445	52.6		105	4903	
D 26 13C2 PFUnA										
564.3 > 519.5	13.030	13.044	-0.014		5082319	50.1		100	5124	
D 28 13C2 PFDoA										
614.4 > 569.4	13.638	13.646	-0.008		5486712	52.1		104	3733	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.638	13.646	-0.008	1.000	5462266	54.6		109	2014	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.150	14.162	-0.012	1.000	4385200	54.6		109	1851	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.588	14.600	-0.012	1.000	1913320	45.0		90.1	1157	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.588	14.601	-0.013		3916174	51.6		103	3721	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.250	15.255	-0.005		1702272	58.4		117	3171	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.250	15.255	-0.005	1.000	4509761	50.8		102	638	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.581	15.593	-0.012	1.000	3666348	48.7		97.4	2514	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 27-May-2016 09:58:04 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_078.d

Injection Date: 26-May-2016 18:53:34 Instrument ID: A4

Lims ID: CCV L5

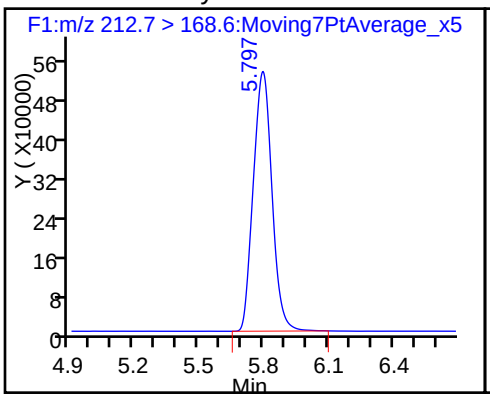
Client ID:

Operator ID: JRB ALS Bottle#: 14 Worklist Smp#: 78

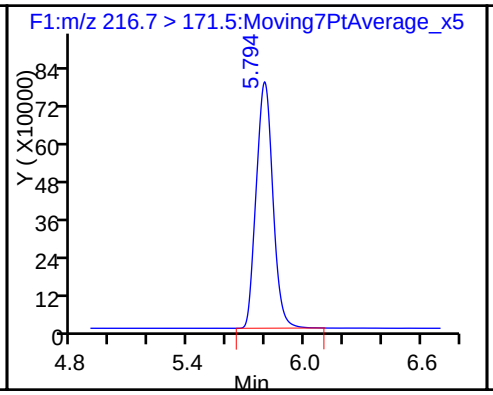
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

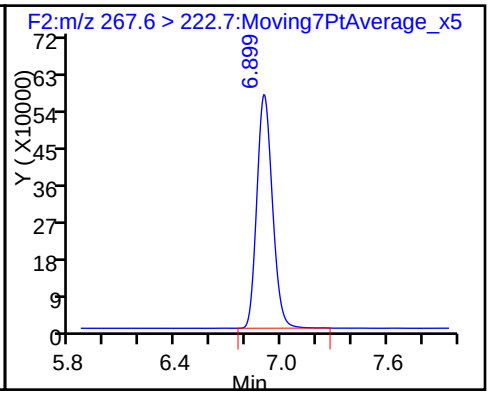
2 Perfluorobutyric acid



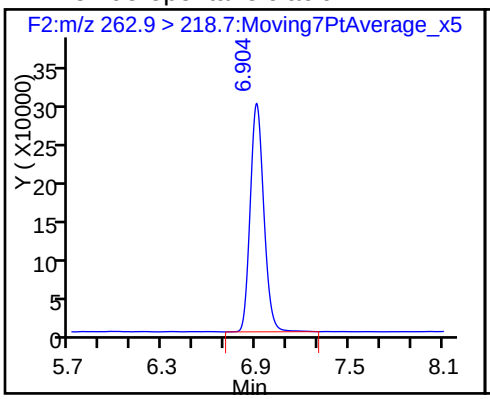
D 1 13C4 PFBA



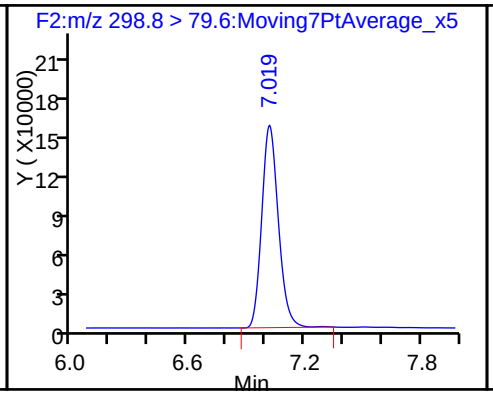
D 3 13C5-PFPeA



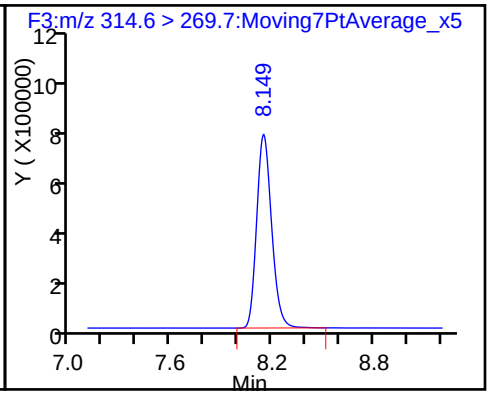
4 Perfluoropentanoic acid



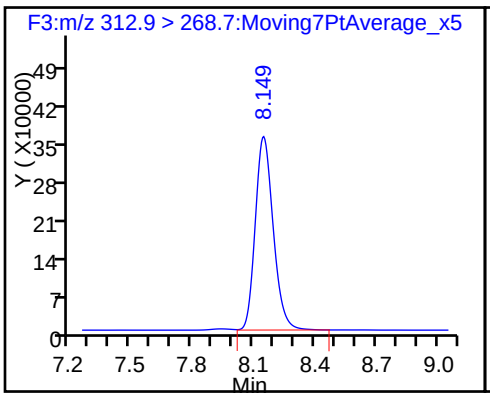
51 Perfluorobutanesulfonic acid



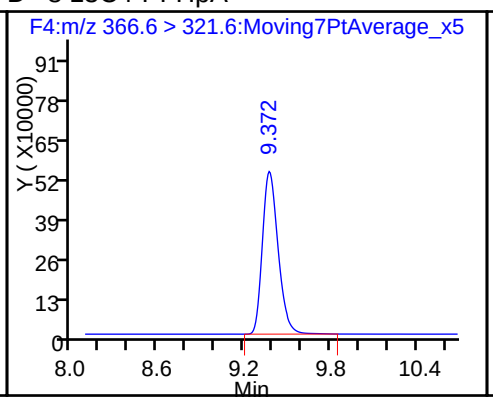
D 6 13C2 PFHxA



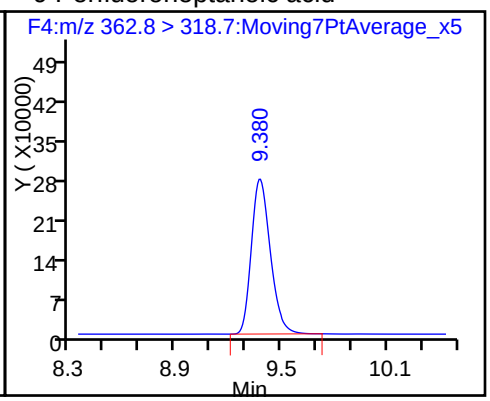
7 Perfluorohexanoic acid



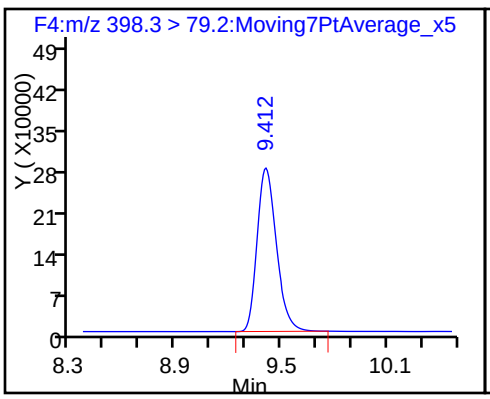
D 8 13C4-PFHpA



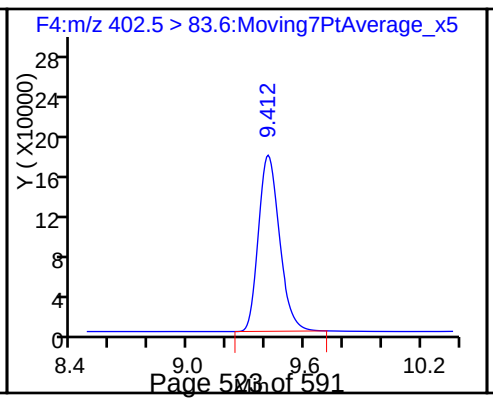
9 Perfluoroheptanoic acid



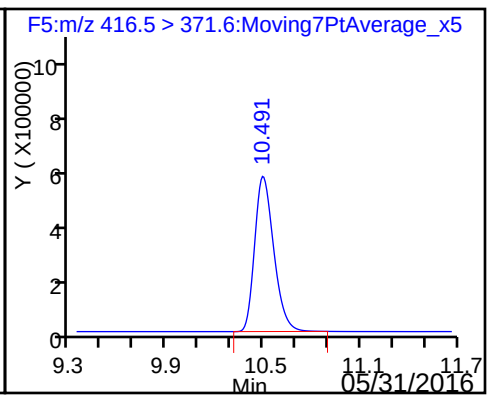
58 Perfluorohexanesulfonic acid



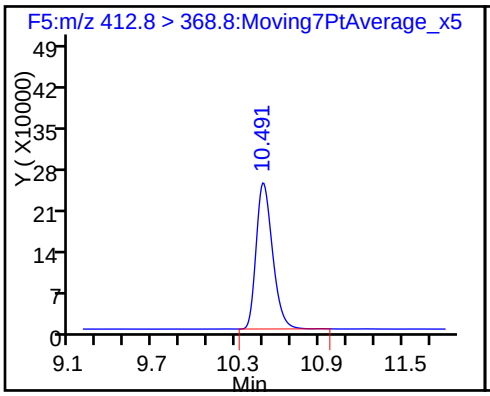
D 11 18O2 PFHxS



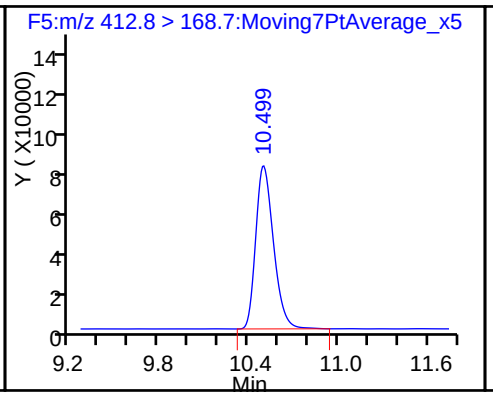
D 12 13C4 PFOA



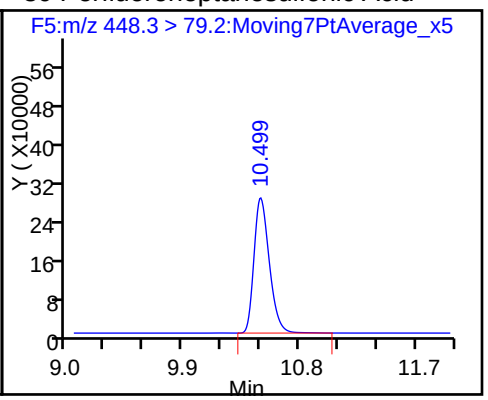
13 Perfluorooctanoic acid



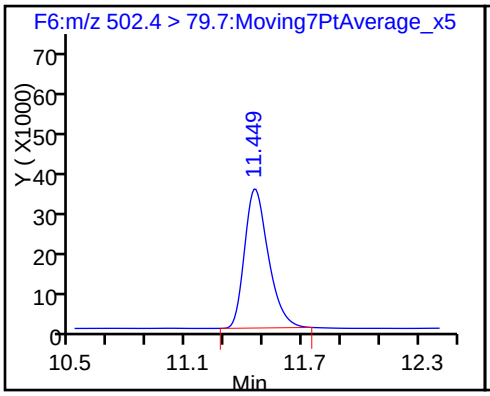
13 Perfluorooctanoic acid



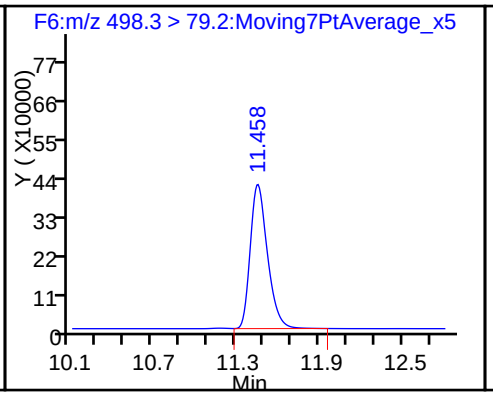
39 Perfluoroheptanesulfonic Acid



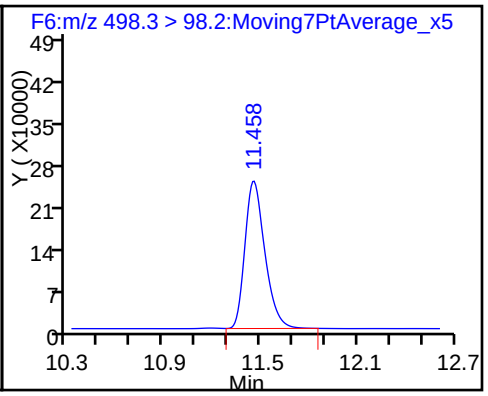
D 16 13C4 PFOS



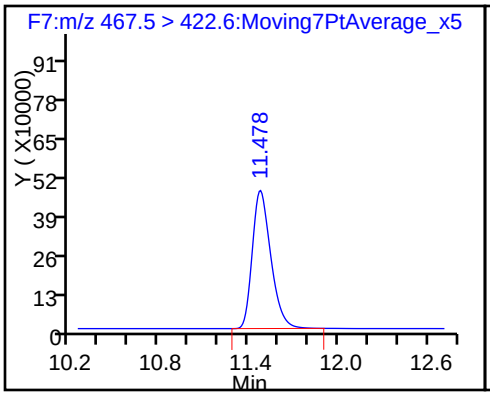
15 Perfluorooctane sulfonic acid



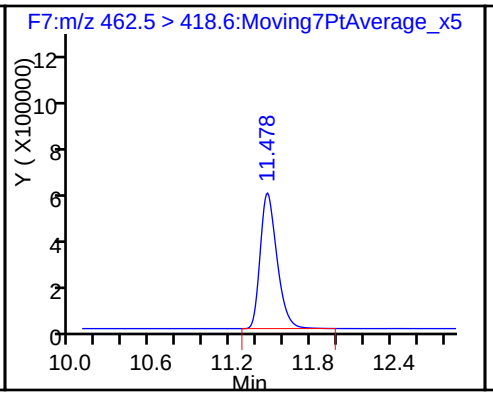
15 Perfluorooctane sulfonic acid



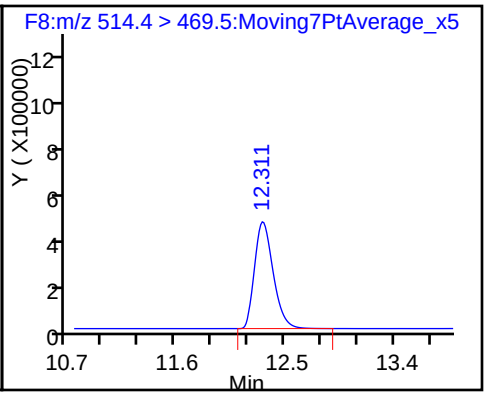
D 17 13C5 PFNA



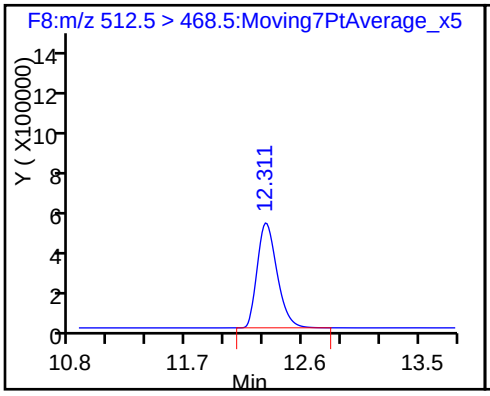
18 Perfluorononanoic acid



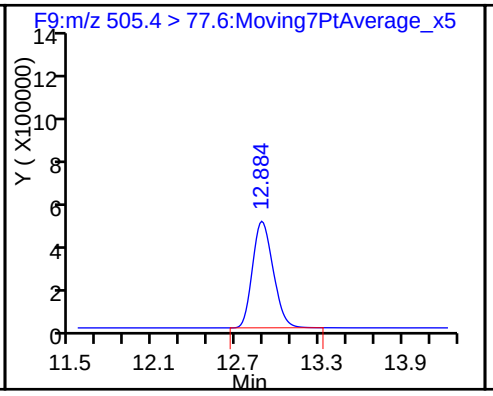
D 19 13C2 PFDA



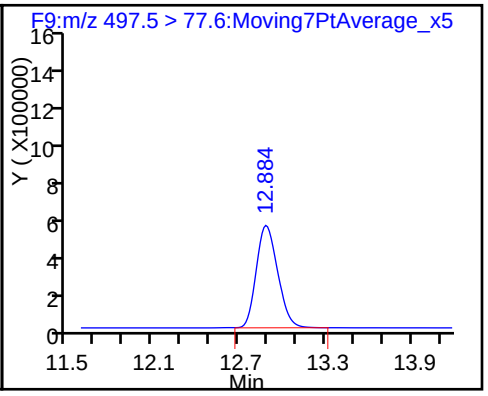
20 Perfluorodecanoic acid



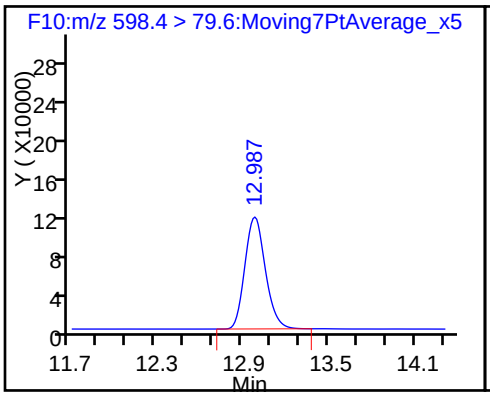
D 23 13C8 FOSA



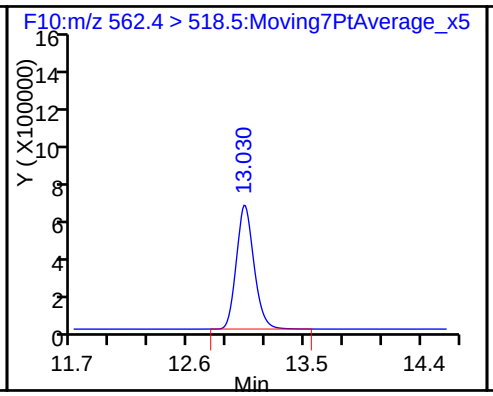
24 Perfluorooctane Sulfonamide



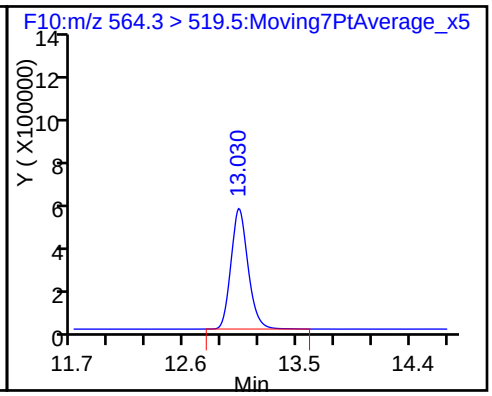
49 Perfluorodecane Sulfonic acid



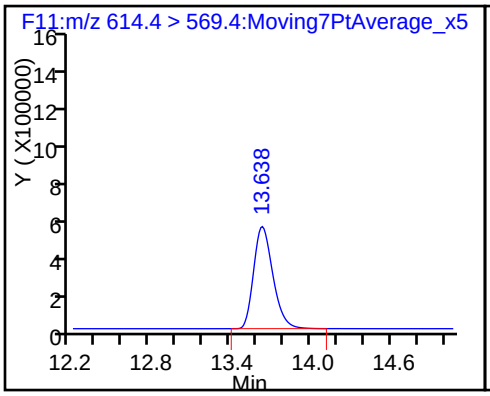
27 Perfluoroundecanoic acid



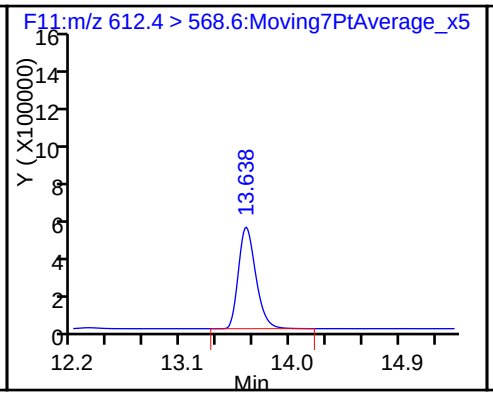
D 26 13C2 PFUnA



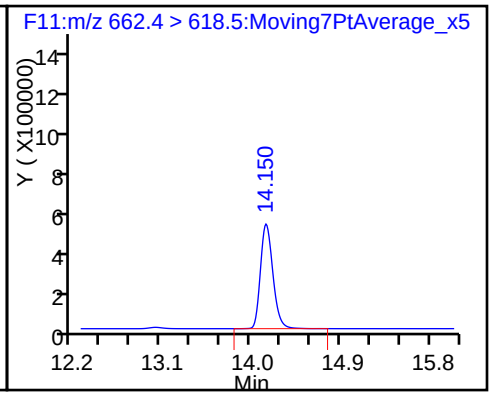
D 28 13C2 PFDoA



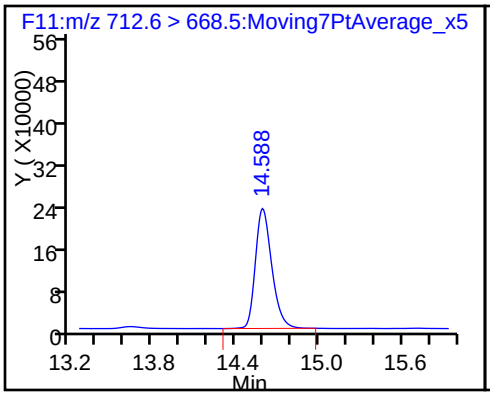
29 Perfluorododecanoic acid



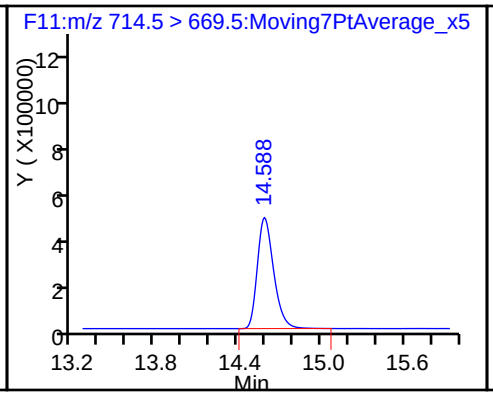
30 Perfluorotridecanoic acid



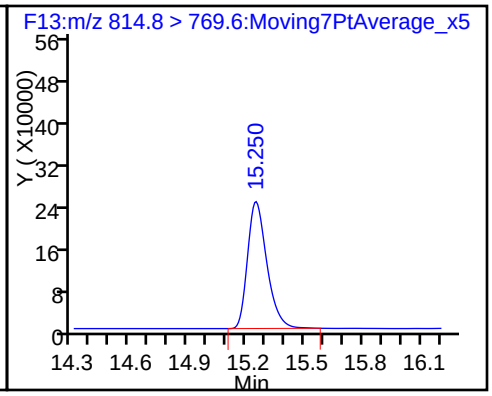
32 Perfluorotetradecanoic acid



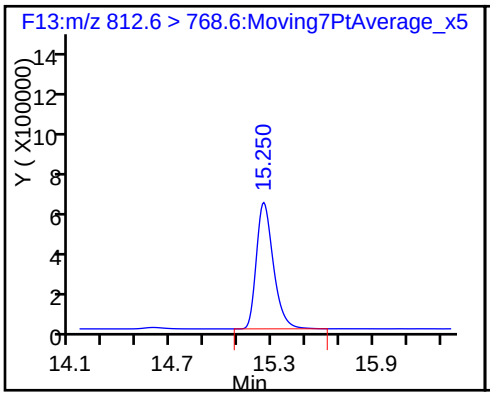
D 33 13C2-PFTeDA



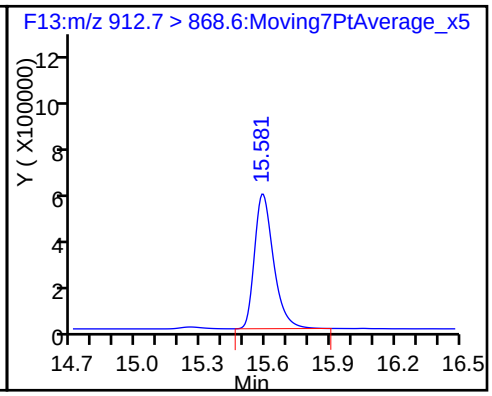
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Lab Sample ID: ICV 320-111733/10 Calibration Date: 05/27/2016 14:06

Instrument ID: A4 Calib Start Date: 05/27/2016 11:17

GC Column: Acquity ID: 2.10(mm) Calib End Date: 05/27/2016 13:24

Lab File ID: 27MAY2016B4A_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	0.6490	0.6106		47.0	50.0	-5.9	25.0
Perfluoropentanoic acid (PFPeA)	AveID	0.4942	0.4467		45.2	50.0	-9.6	25.0
Perfluorobutanesulfonic acid (PFBS)	L2ID		0.5371		35.9	44.3	-18.8	25.0
Perfluorohexanoic acid (PFHxA)	L1ID		0.4056		43.6	50.0	-12.9	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	0.5371	0.4909		45.7	50.0	-8.6	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.574	1.417		42.5	47.3	-10.0	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID		6.445		39.1	47.6	-17.8	25.0
Perfluorooctanoic acid (PFOA)	L1ID		0.4084		44.7	50.0	-10.6	25.0
Perfluorooctanesulfonic acid (PFOS)	L1ID		10.80		42.7	47.8	-10.5	25.0
Perfluorononanoic acid (PFNA)	L2ID		1.163		45.8	50.0	-8.3	25.0
Perfluorodecanoic acid (PFDA)	AveID	1.075	1.076		50.0	50.0	0.0	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	1.054	0.9925		47.1	50.0	-5.8	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	3.741	3.558		45.9	48.3	-4.9	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.160	1.089		47.0	50.0	-6.1	25.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9167	0.8220		44.8	50.0	-10.3	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.032	1.033		50.0	50.0	0.0	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.5573	0.4620		41.4	50.0	-17.1	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		2.732		48.1	50.0	-3.8	25.0
Perfluoro-n-octandecanoic acid (PFODA)	AveID	2.198	2.276		51.8	50.0	3.6	25.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_010.d
Lims ID: ICV
Client ID:
Sample Type: ICV
Inject. Date: 27-May-2016 14:06:25 ALS Bottle#: 9 Worklist Smp#: 10
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: ICV
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub6

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:51:28 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 27-May-2016 14:38:15

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.787	5.790	-0.003		4762953	46.0		92.1	12836	
2 Perfluorobutyric acid										
212.7 > 168.6	5.791	5.792	-0.001	1.000	2908312	47.0			6463	
D 3 13C5-PFPeA										
267.6 > 222.7	6.890	6.892	-0.002		3768377	49.7		99.4	6733	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.895	6.895	0.0	1.000	1683388	45.2			721	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.005	7.011	-0.006	1.000	775730	NC			1770	
298.8 > 98.6	7.005	7.011	-0.006	1.000	505850		1.53(0.00-0.00)		931	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.005	7.011	-0.006	1.000	775730	35.9				
D 6 13C2 PFHxA										
314.6 > 269.7	8.133	8.138	-0.005		5345566	57.1		114	11504	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.138	8.140	-0.002	1.000	2168211	43.6			2213	
22 PFPeS (Perflouro-1-pentanesulfonat										
348.7 > 79.5	8.209	8.231	-0.022	0.874	1628045	NC			5207	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	2193294	45.7			4658	
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		4467607	53.2		106	4498	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1543863	50.9		108	3545	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.396	9.401	-0.005	1.000	2185638	42.5				

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.396	9.401	-0.005	1.000	2185638	NC			3964	
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		5005370	52.2		104	8349	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.482	10.485	-0.003	1.000	2044289	44.7			3150	
412.8 > 168.7	10.482	10.485	-0.003	1.000	668559		3.06(0.00-0.00)		2148	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.482	10.485	-0.003	1.000	2061791	39.1				
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.482	10.485	-0.003	1.000	2061791	NC			4750	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		321274	51.4		108	949	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.440	11.443	-0.003	1.000	3465080	42.7			3222	
498.3 > 98.2	11.440	11.443	-0.003	1.000	2032381		1.70(0.00-0.00)		2333	
18 Perfluorononanoic acid										
462.5 > 418.6	11.459	11.462	-0.003	1.000	5235010	45.8			4934	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		4502788	55.4		111	7277	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		5277737	51.2		102	6872	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	5676317	50.0			4286	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		5127590	54.0		108	4296	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.871	12.873	-0.002	1.000	5089191	47.1			3054	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.974	12.969	0.005	1.000	1153936	NC			3829	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.974	12.969	0.005	1.000	1153936	45.9				
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	6290982	47.0			4186	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		5776341	53.2		106	4803	
D 28 13C2 PFDoA										
614.4 > 569.4	13.615	13.626	-0.011		6289554	56.5		113	4741	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.627	13.626	0.001	1.000	5169926	44.8			1542	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.140	14.138	0.002	1.000	4217813	50.0			1427	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.570	14.577	-0.007	1.000	1885580	41.4			895	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.570	14.579	-0.009		4081543	52.5		105	3965	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1437743	48.3		96.7	2542	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	3927794	48.1			613	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	3272932	51.8			2337	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFCIC_00016 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:51:29 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_010.d

Injection Date: 27-May-2016 14:06:25 Instrument ID: A4

Lims ID: ICV

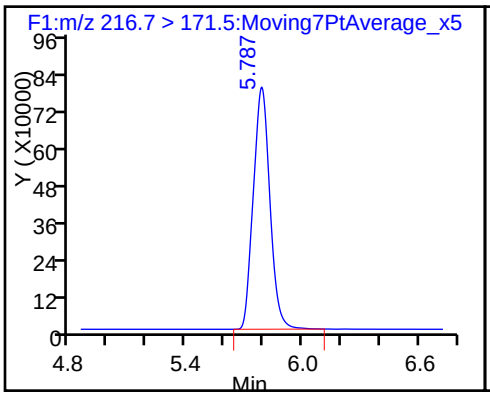
Client ID:

Operator ID: JRB ALS Bottle#: 9 Worklist Smp#: 10

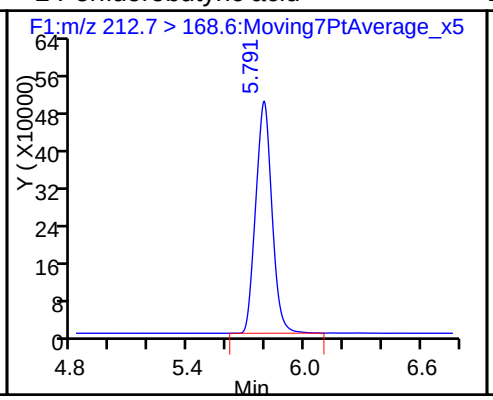
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

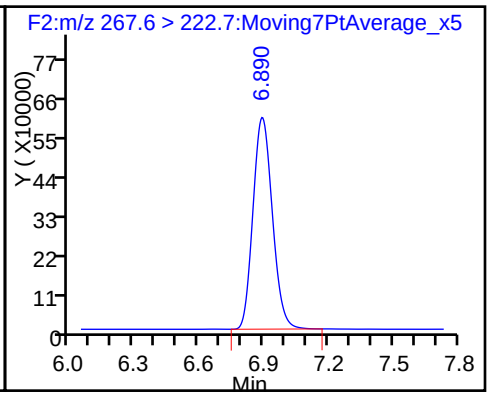
D 1 13C4 PFBA



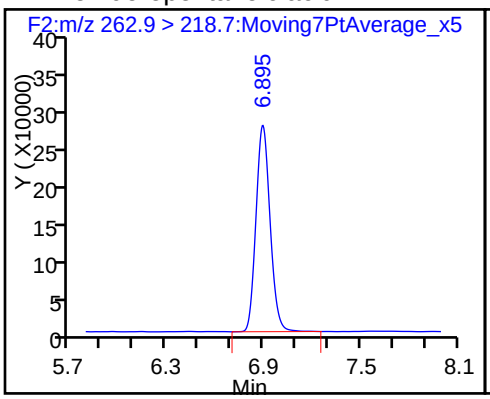
2 Perfluorobutyric acid



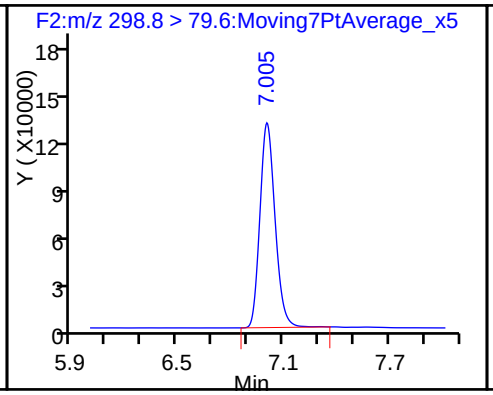
D 3 13C5-PFPeA



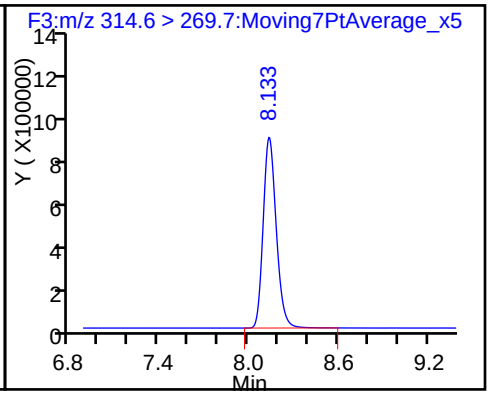
4 Perfluoropentanoic acid



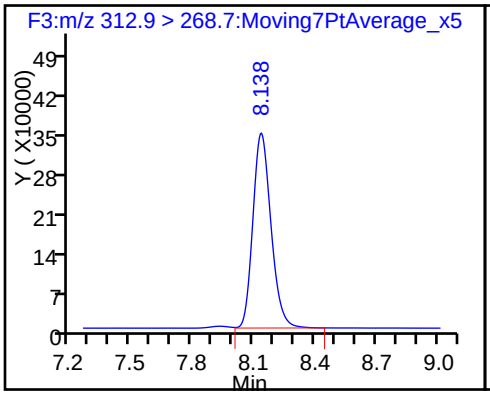
51 Perfluorobutanesulfonic acid



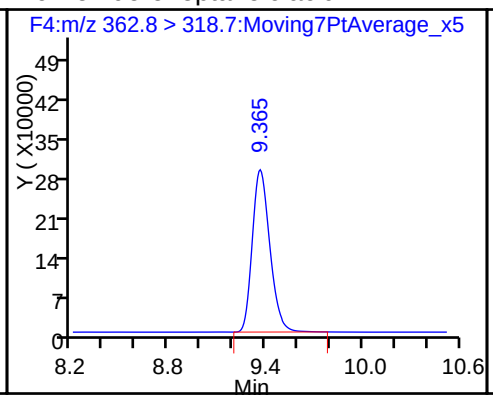
D 6 13C2 PFHxA



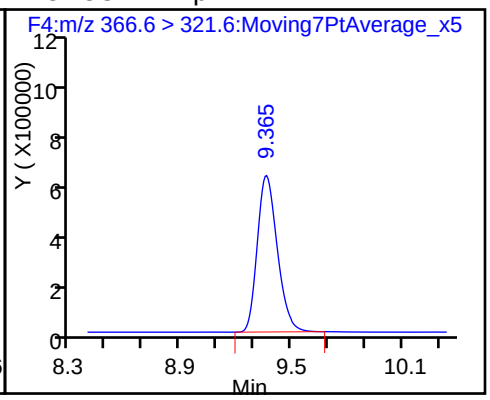
7 Perfluorohexanoic acid



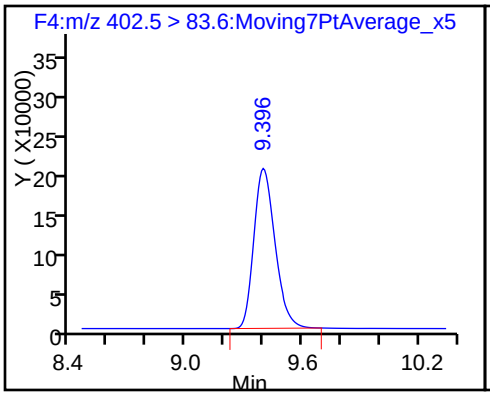
9 Perfluoroheptanoic acid



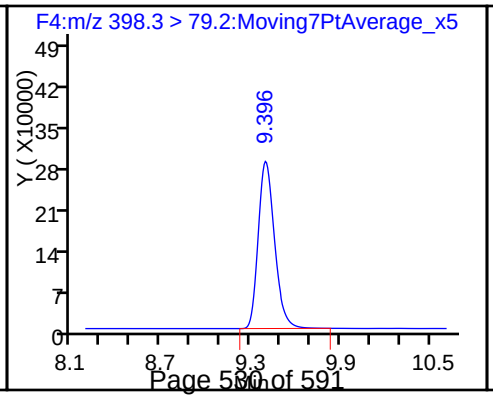
D 8 13C4-PFHpA



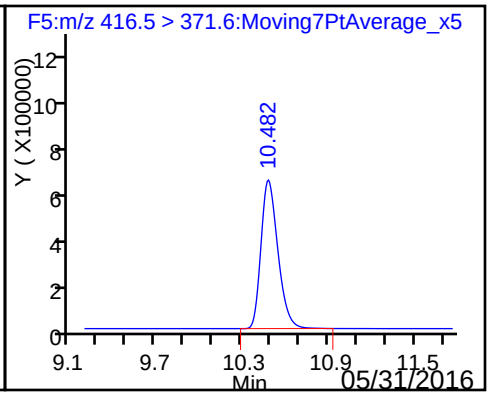
D 11 18O2 PFHxS



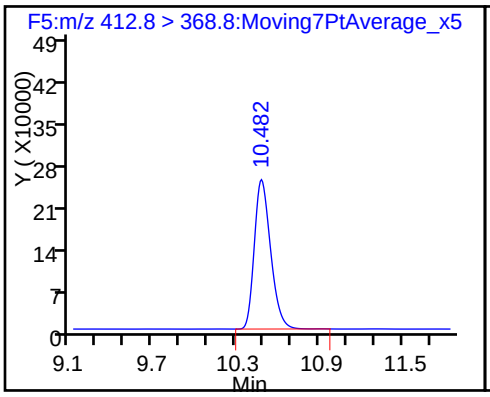
58 Perfluorohexanesulfonic acid



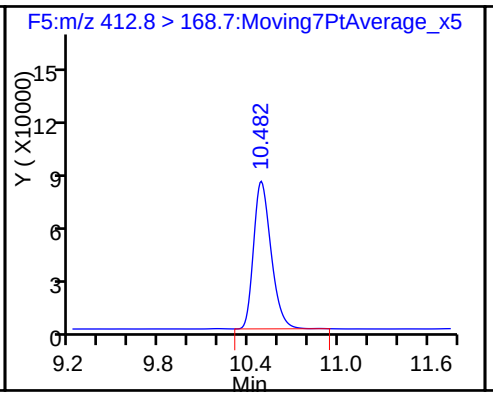
D 12 13C4 PFOA



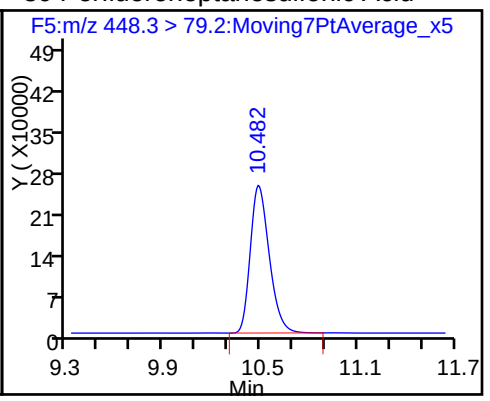
13 Perfluorooctanoic acid



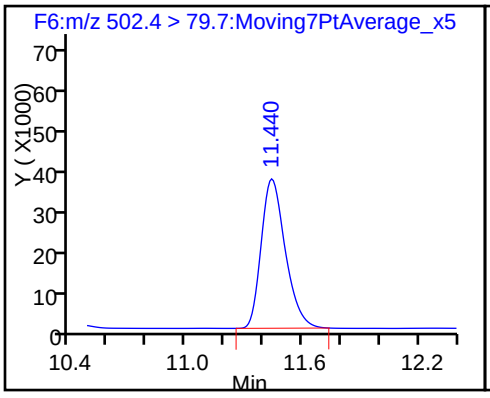
13 Perfluorooctanoic acid



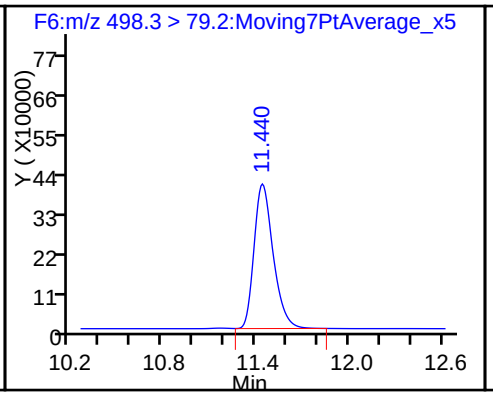
39 Perfluoroheptanesulfonic Acid



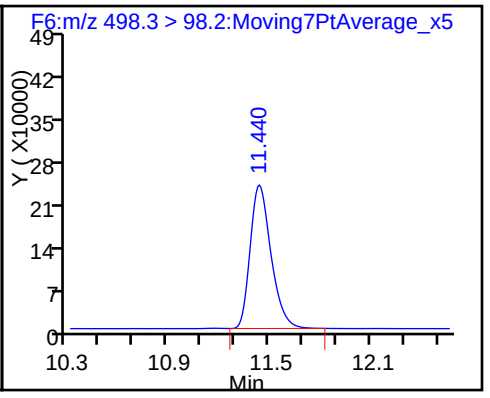
D 16 13C4 PFOS



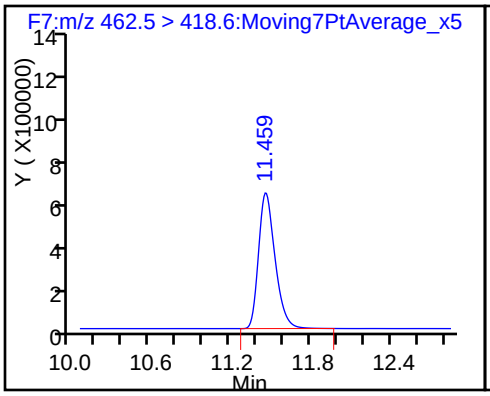
15 Perfluorooctane sulfonic acid



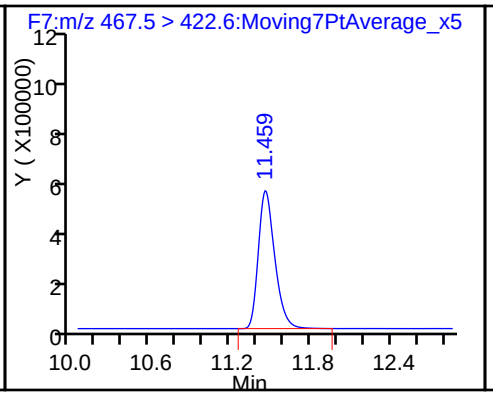
15 Perfluorooctane sulfonic acid



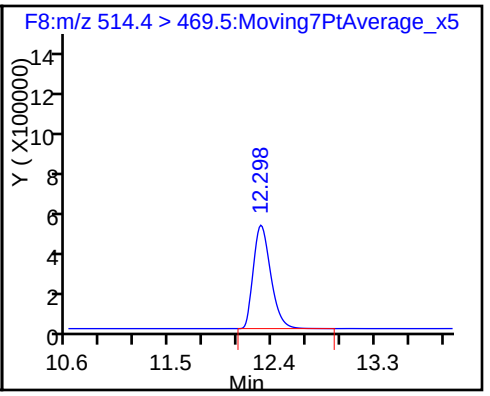
18 Perfluorononanoic acid



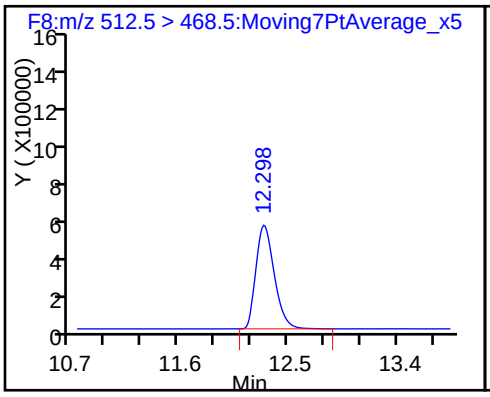
D 17 13C5 PFNA



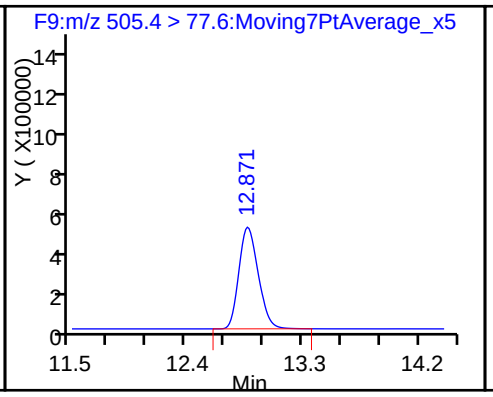
D 19 13C2 PFDA



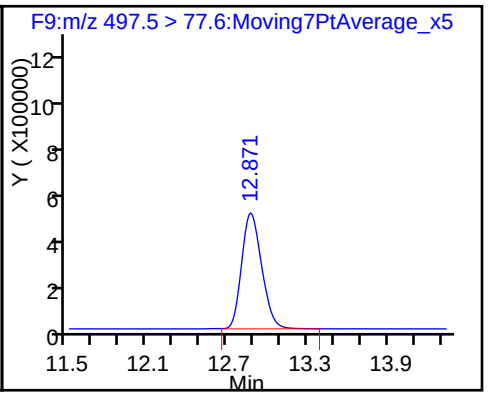
20 Perfluorodecanoic acid



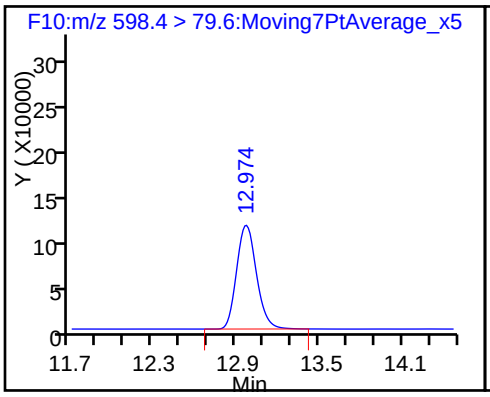
D 23 13C8 FOSA



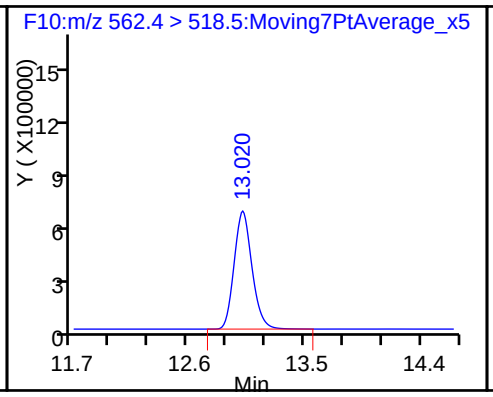
24 Perfluorooctane Sulfonamide



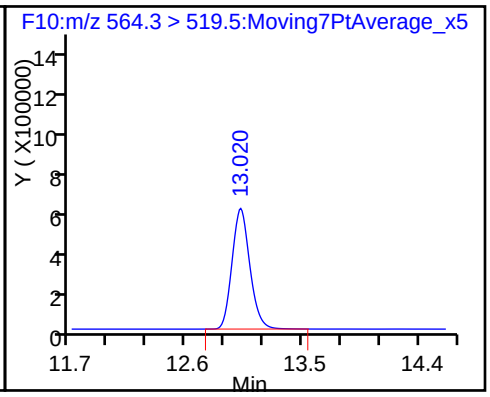
49 Perfluorodecane Sulfonic acid



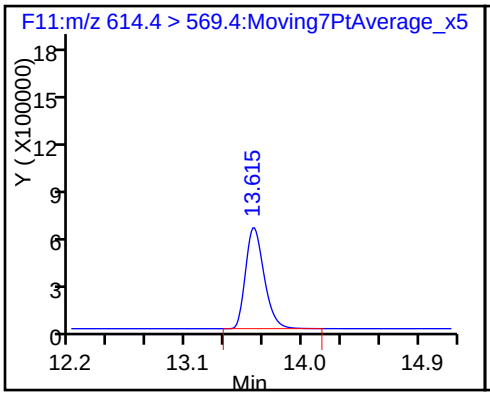
27 Perfluoroundecanoic acid



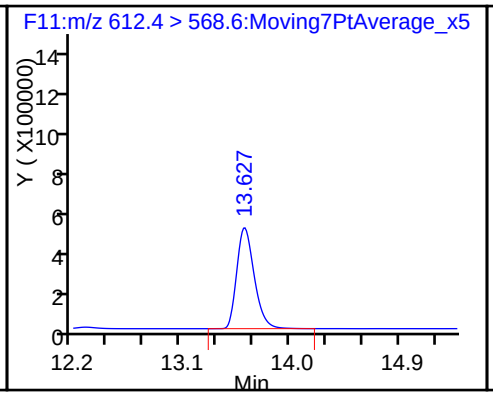
D 26 13C2 PFUnA



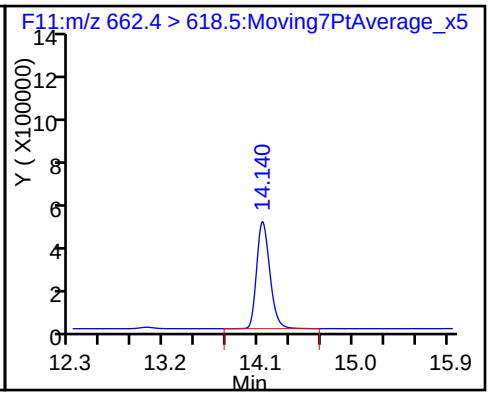
D 28 13C2 PFDoA



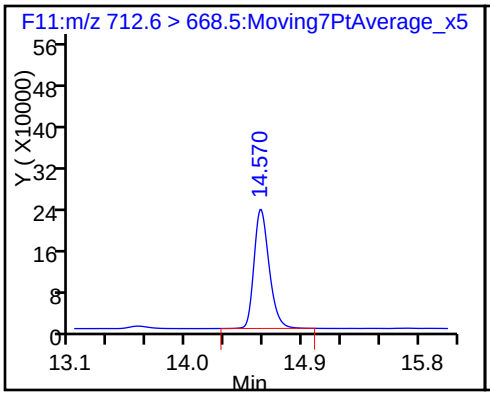
29 Perfluorododecanoic acid



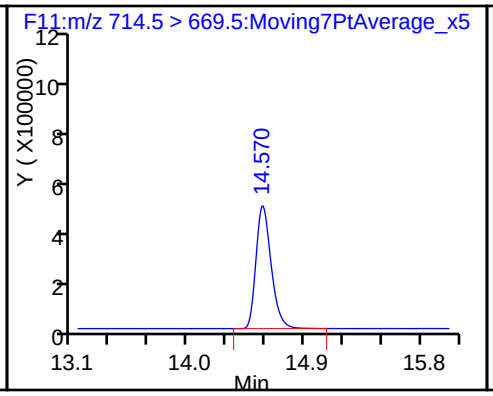
30 Perfluorotridecanoic acid



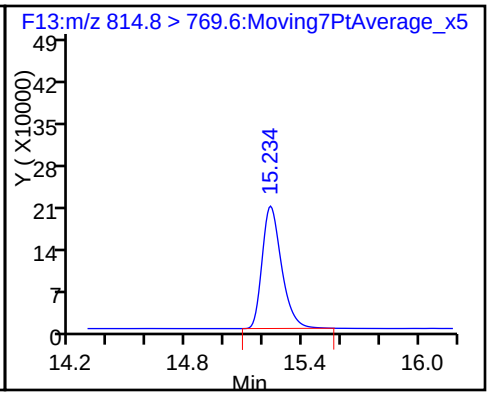
32 Perfluorotetradecanoic acid



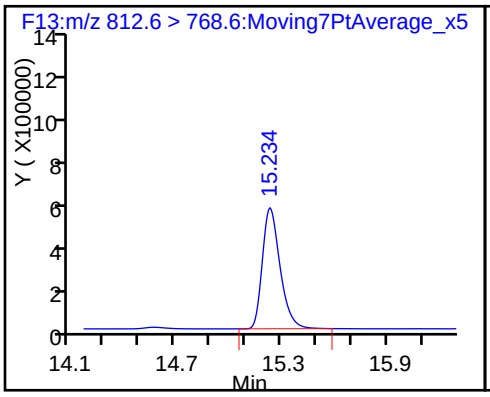
D 33 13C2-PFTeDA



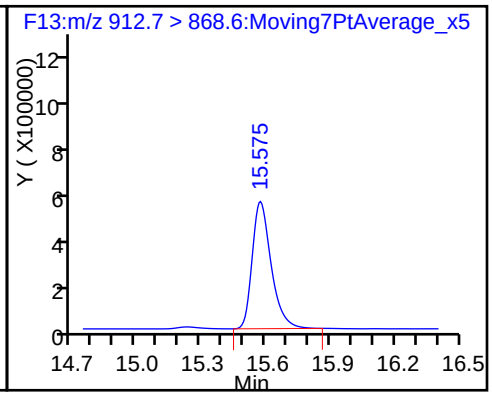
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Lab Sample ID: CCV 320-111733/23 Calibration Date: 05/27/2016 18:42

Instrument ID: A4 Calib Start Date: 05/27/2016 11:17

GC Column: Acquity ID: 2.10(mm) Calib End Date: 05/27/2016 13:24

Lab File ID: 27MAY2016B4A_023.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.6490	0.6915		53.3	50.0	6.5	25.0
Perfluoropentanoic acid (PFPeA)	AveID	0.4942	0.4740		48.0	50.0	-4.1	25.0
Perfluorobutanesulfonic acid (PFBS)	L2ID		0.6882		46.0	44.2	4.1	25.0
Perfluorohexanoic acid (PFHxA)	L1ID		0.4513		48.5	50.0	-3.0	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	0.5371	0.5293		49.3	50.0	-1.5	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.574	1.487		44.7	47.3	-5.6	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID		7.252		44.0	47.6	-7.6	25.0
Perfluorooctanoic acid (PFOA)	L1ID		0.4505		49.3	50.0	-1.4	25.0
Perfluorooctanesulfonic acid (PFOS)	L1ID		11.15		44.2	47.8	-7.6	25.0
Perfluorononanoic acid (PFNA)	L2ID		1.224		48.3	50.0	-3.5	25.0
Perfluorodecanoic acid (PFDA)	AveID	1.075	1.202		55.9	50.0	11.8	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	1.054	1.111		52.7	50.0	5.4	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	3.741	3.363		43.3	48.2	-10.1	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.160	1.201		51.8	50.0	3.6	25.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9167	0.9270		50.6	50.0	1.1	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.032	1.091		52.8	50.0	5.7	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.5573	0.4756		42.7	50.0	-14.7	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		3.269		57.7	50.0	15.4	25.0
Perfluoro-n-octandecanoic acid (PFODA)	AveID	2.198	2.375		54.0	50.0	8.0	25.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_023.d
Lims ID: CCV L5
Client ID:
Sample Type: CCV
Inject. Date: 27-May-2016 18:42:57 ALS Bottle#: 14 Worklist Smp#: 23
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4
Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:52:33 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.794	5.790	0.004		4072019	39.4		78.7	12139	
2 Perfluorobutyric acid										
212.7 > 168.6	5.794	5.792	0.002	1.000	2815816	53.3		107	7619	
D 3 13C5-PFPeA										
267.6 > 222.7	6.895	6.892	0.003		3203912	42.2		84.5	6581	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.895	6.895	0.0	1.000	1518596	48.0		95.9	959	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.014	7.011	0.003	1.000	802755	NC			1808	
298.8 > 98.6	7.014	7.011	0.003	1.000	496028		1.62(0.00-0.00)		1282	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.014	7.011	0.003	1.000	802755	46.0		104		
D 6 13C2 PFHxA										
314.6 > 269.7	8.138	8.138	0.0		4113361	44.0		87.9	9803	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.138	8.140	-0.002	1.000	1856391	48.5		97.0	2713	
22 PFPeS (Perflouro-1-pentanesulfonat										
348.7 > 79.5	8.220	8.231	-0.011	0.874	1559642	NC			9304	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	1821889	49.3		98.5	5113	
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		3442177	41.0		82.0	4860	
D 11 18O2 PFHxS										
402.5 > 83.6	9.404	9.399	0.005		1248263	41.2		87.0	3831	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.404	9.401	0.003	1.000	1855698	44.7		94.4		
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.404	9.401	0.003	1.000	1855698	NC			3223	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		3881044	40.5		81.0	4588	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.482	10.485	-0.003	1.000	1748581	49.3		98.6	5320	
412.8 > 168.7	10.482	10.485	-0.003	1.000	572400		3.05(0.00-0.00)		1661	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.482	10.485	-0.003	1.000	2037774	44.0		92.4		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.482	10.485	-0.003	1.000	2037774	NC			4798	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		282170	45.2		94.5	792	
15 Perfluorooctane sulfonic acid										
498.3 > 79.2	11.440	11.443	-0.003	1.000	3146623	44.2		92.4	2909	
498.3 > 98.2	11.440	11.443	-0.003	1.000	1901433		1.65(0.00-0.00)		2771	
18 Perfluorononanoic acid										
462.5 > 418.6	11.469	11.462	0.007	1.000	4254039	48.3		96.5	5552	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		3475259	42.7		85.5	4914	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		4116684	40.0		79.9	5197	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	4949296	55.9		112	6267	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		4126571	43.5		87.0	4203	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.871	12.873	-0.002	1.000	4583763	52.7		105	2323	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.974	12.969	0.005	1.000	956792	NC			1657	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.974	12.969	0.005	1.000	956792	43.3		89.9		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	5665647	51.8		104	4508	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		4718095	43.5		87.0	5290	
D 28 13C2 PFDoA										
614.4 > 569.4	13.627	13.626	0.001		5012463	45.1		90.1	3260	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.627	13.626	0.001	1.000	4646597	50.6		101	2036	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.140	14.138	0.002	1.000	3598133	52.8		106	1342	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.579	14.577	0.002	1.000	1568861	42.7		85.3	928	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.579	14.579	0.0		3298754	42.4		84.9	3425	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1056305	35.5		71.0	2548	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	3453129	57.7		115	603	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	2508338	54.0		108	2662	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:52:33 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_023.d

Injection Date: 27-May-2016 18:42:57 Instrument ID: A4

Lims ID: CCV L5

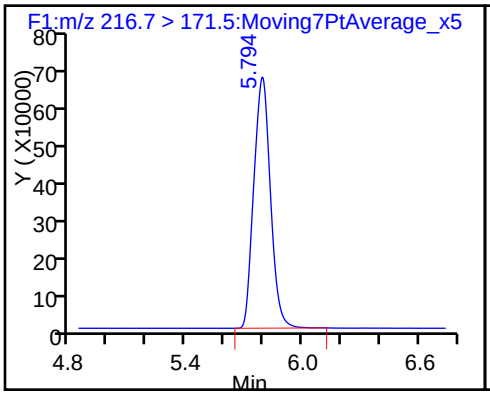
Client ID:

Operator ID: JRB ALS Bottle#: 14 Worklist Smp#: 23

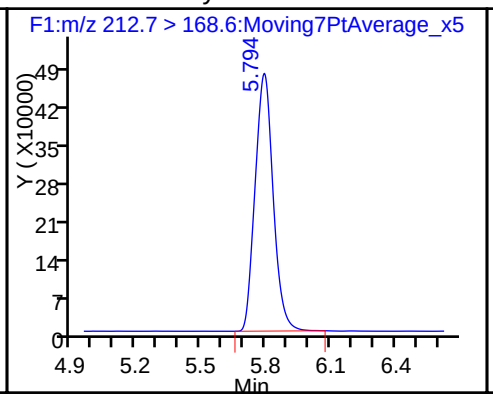
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

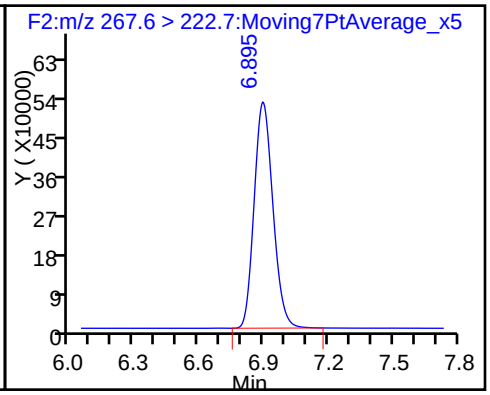
D 1 13C4 PFBA



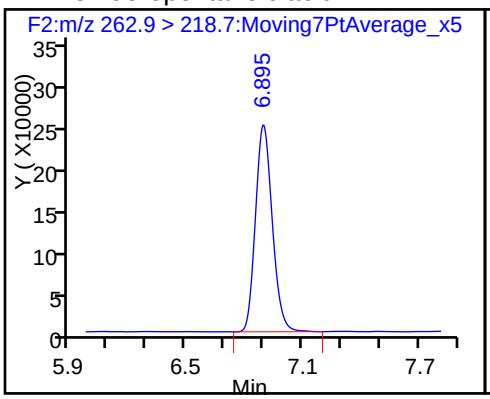
2 Perfluorobutyric acid



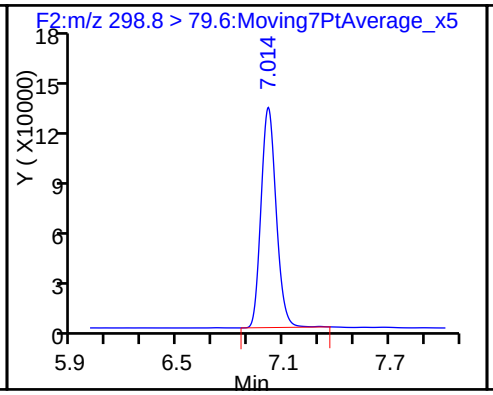
D 3 13C5-PFPeA



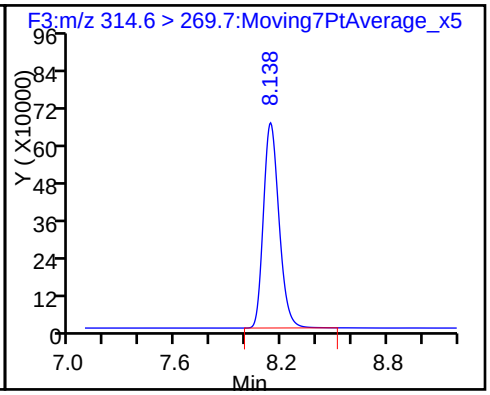
4 Perfluoropentanoic acid



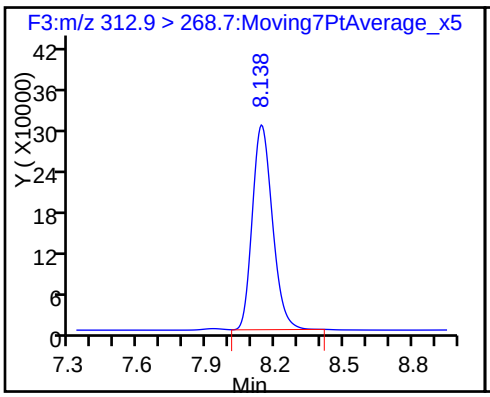
51 Perfluorobutanesulfonic acid



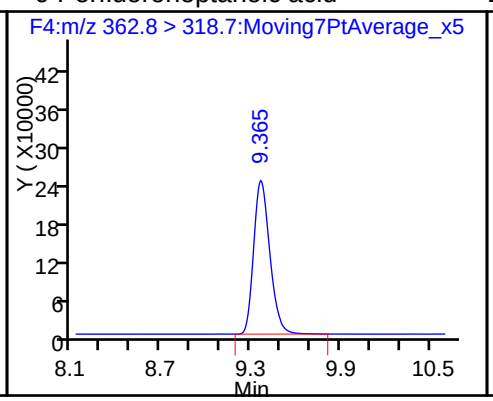
D 6 13C2 PFHxA



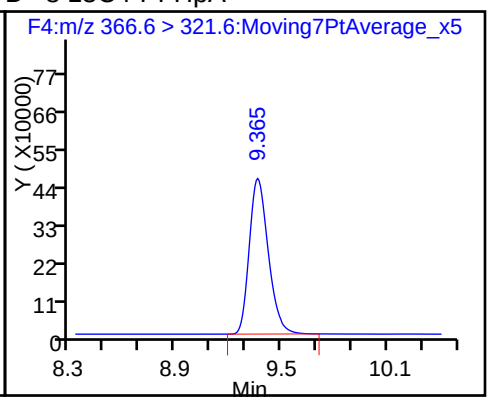
7 Perfluorohexanoic acid



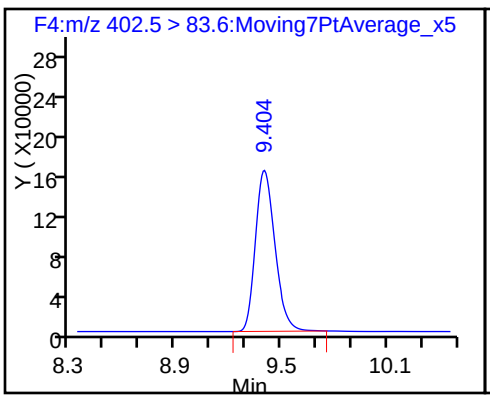
9 Perfluoroheptanoic acid



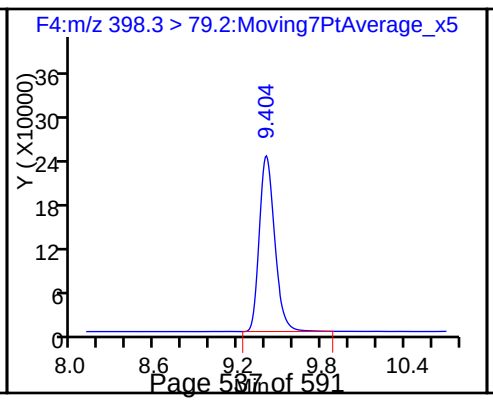
D 8 13C4-PFHpA



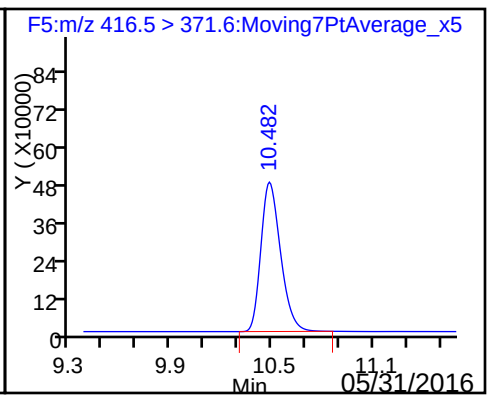
D 11 18O2 PFHxS



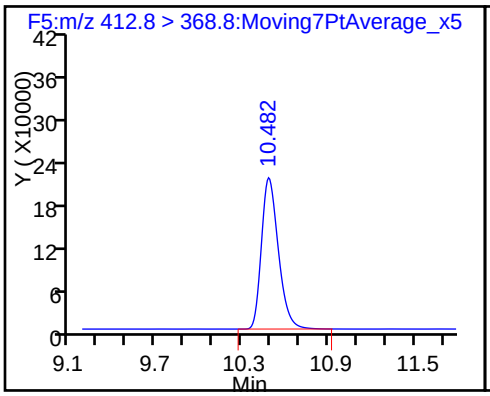
58 Perfluorohexanesulfonic acid



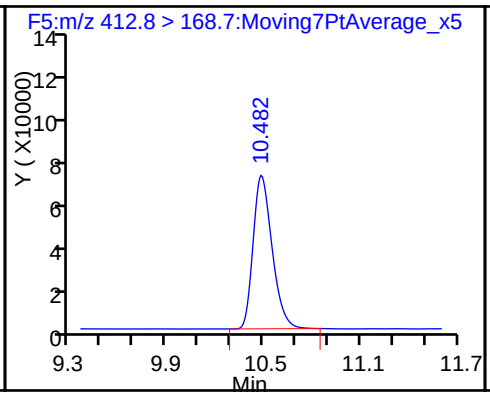
D 12 13C4 PFOA



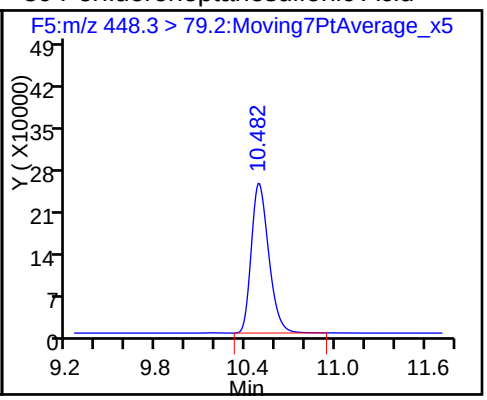
13 Perfluorooctanoic acid



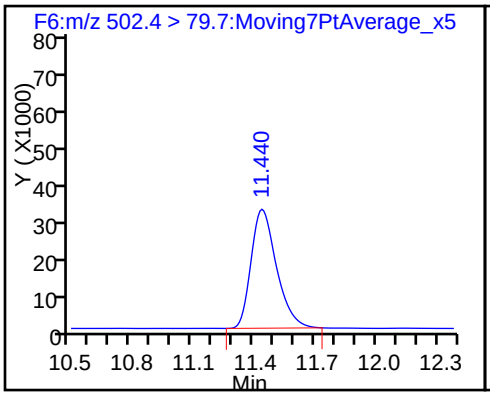
13 Perfluorooctanoic acid



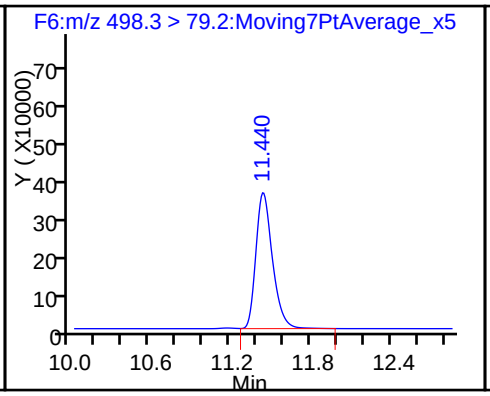
39 Perfluoroheptanesulfonic Acid



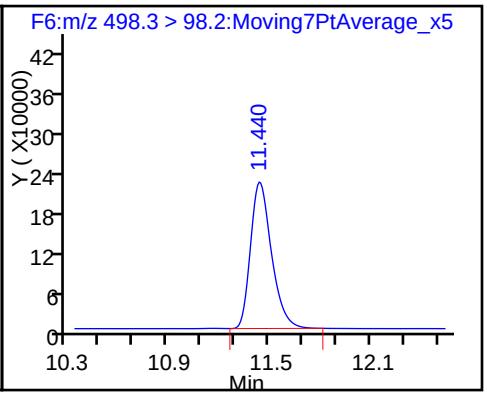
D 16 13C4 PFOS



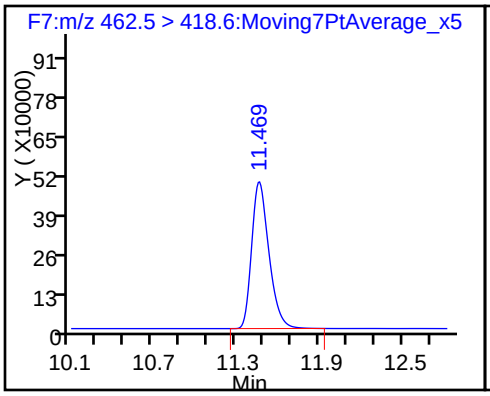
15 Perfluorooctane sulfonic acid



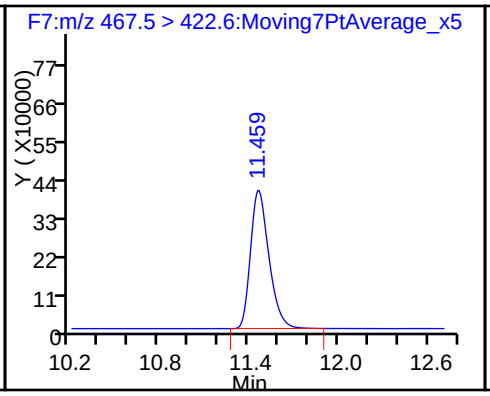
15 Perfluorooctane sulfonic acid



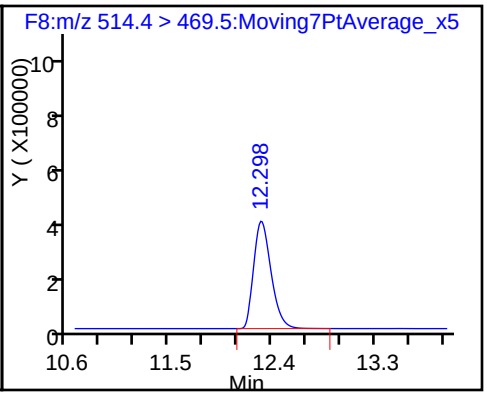
18 Perfluorononanoic acid



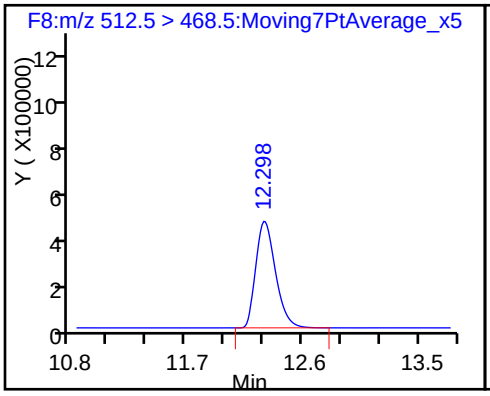
D 17 13C5 PFNA



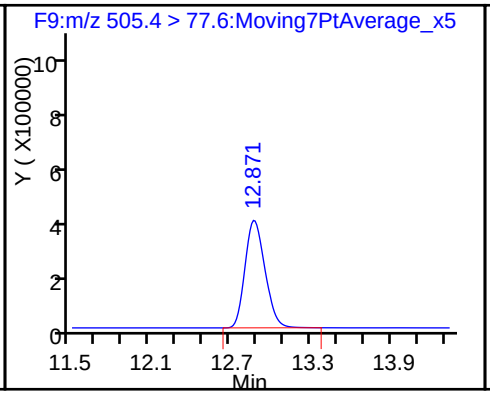
D 19 13C2 PFDA



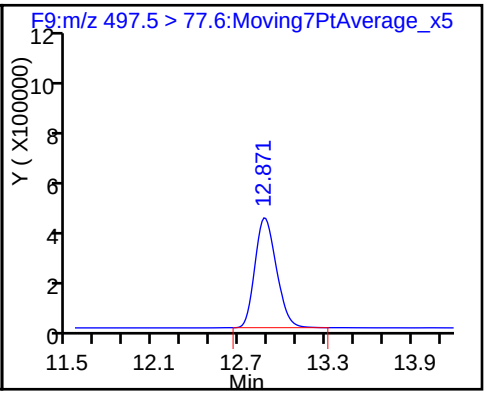
20 Perfluorodecanoic acid



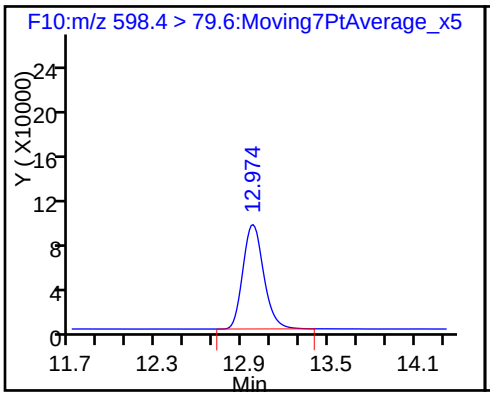
D 23 13C8 FOSA



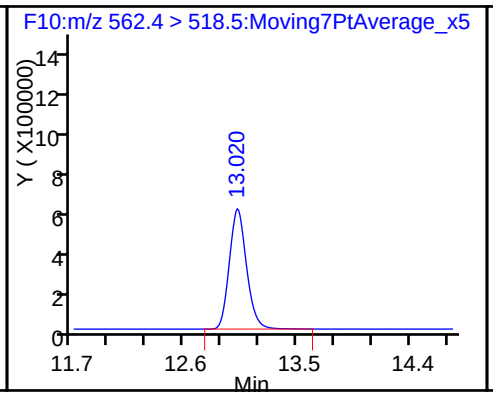
24 Perfluorooctane Sulfonamide



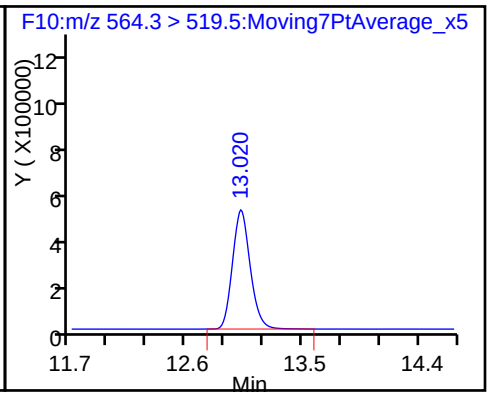
49 Perfluorodecane Sulfonic acid



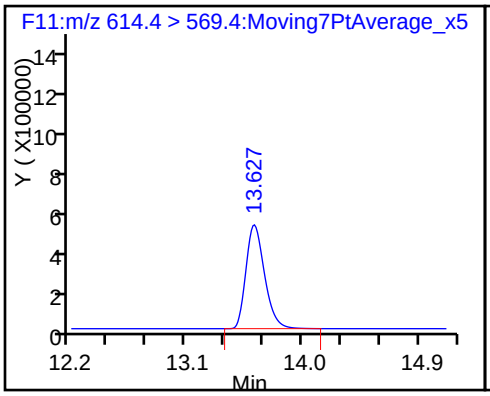
27 Perfluoroundecanoic acid



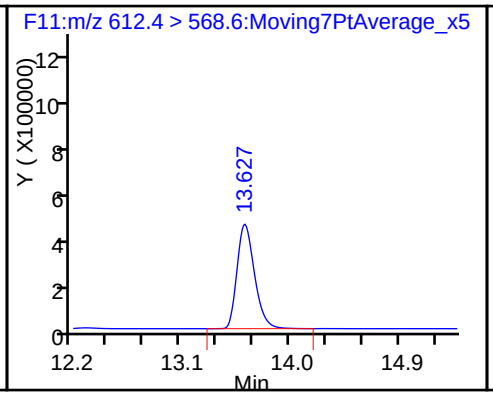
D 26 13C2 PFUnA



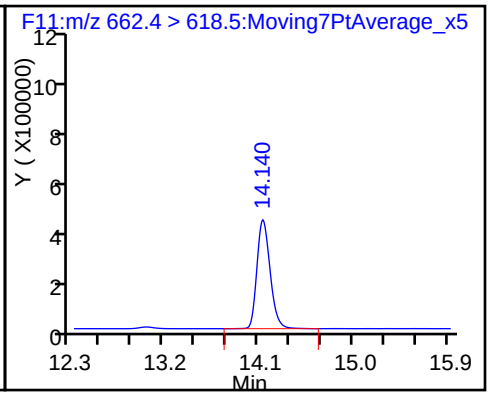
D 28 13C2 PFDoA



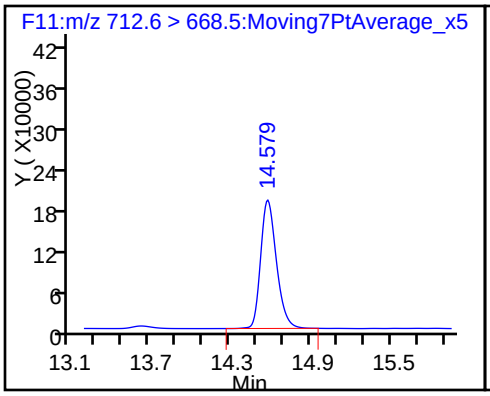
29 Perfluorododecanoic acid



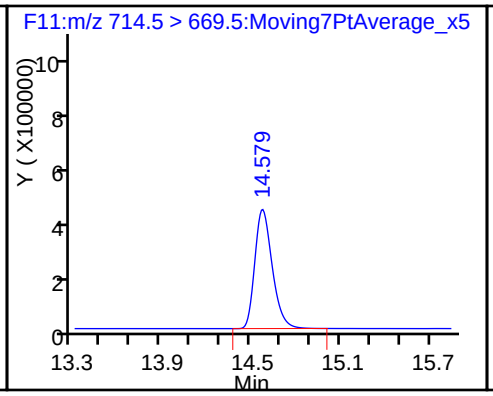
30 Perfluorotridecanoic acid



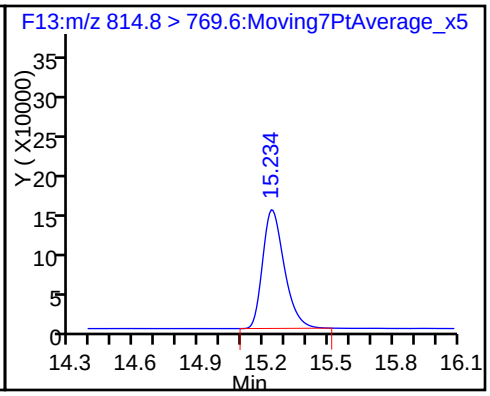
32 Perfluorotetradecanoic acid



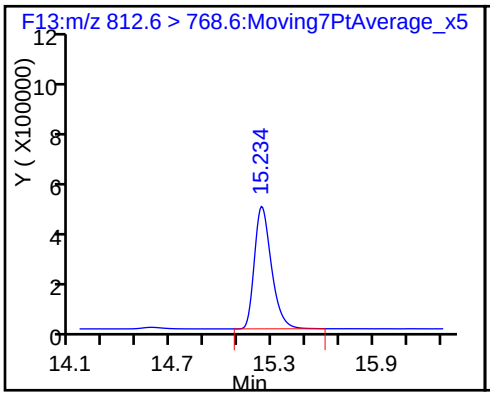
D 33 13C2-PFTeDA



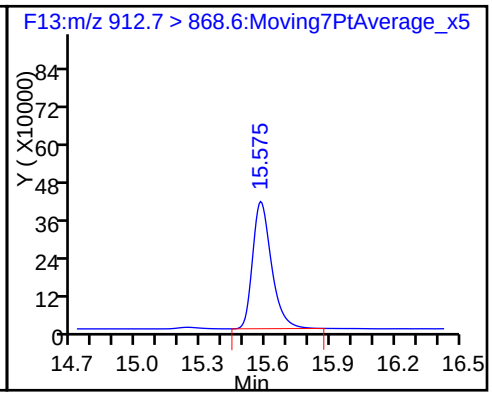
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18849-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-110230/1-A

Matrix: Water | Lab File ID: 25MAY2016B4A_073.d

Analysis Method: WS-LC-0025 | Date Collected:

Extraction Method: 3535 | Date Extracted: 05/17/2016 11:08

Sample wt/vol: 500(mL) | Date Analyzed: 05/26/2016 17:07

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 111390 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.0020	0.00080
335-67-1	Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.0020	0.00075
375-95-1	Perfluorononanoic acid (PFNA)	0.0020	U	0.0025	0.0020	0.00065
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.0020	0.00092
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.0020	0.00087
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0030	U	0.0040	0.0030	0.0013

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	113		25-150
STL00991	13C4 PFOS	119		25-150
STL00995	13C5 PFNA	112		25-150
STL00990	13C4 PFOA	116		25-150
STL01892	13C4-PFHpA	104		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_073.d
Lims ID: MB 320-110230/1-A
Client ID:
Sample Type: MB
Inject. Date: 26-May-2016 17:07:41 ALS Bottle#: 43 Worklist Smp#: 73
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-110230/1-a BOX 76
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 09:57:28 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: westendorfc Date: 27-May-2016 08:27:32

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.800	5.798	0.002	1.000	10272	0.1614			31.1	
D 1 13C4 PFBA										
216.7 > 171.5	5.791	5.798	-0.007		4958212	58.7		117	17278	
D 3 13C5-PFPeA										
267.6 > 222.7	6.899	6.907	-0.008		3763463	49.1		98.1	8319	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.913	6.910	0.003	1.000	3646	0.0954			2.8	
D 6 13C2 PFHxA										
314.6 > 269.7	8.144	8.156	-0.012		5006671	60.3		121	10373	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.144	8.157	-0.013	1.000	12254	0.0912			65.3	
D 8 13C4-PFHpA										
366.6 > 321.6	9.372	9.387	-0.015		4456857	52.1		104	8448	
10 Perfluorohexane Sulfonate										
398.3 > 79.2	9.396	9.421	-0.025	1.000	7194	NC			17.8	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.396	9.421	-0.025	1.000	7194	0.1259				
D 11 18O2 PFHxS										
402.5 > 83.6	9.404	9.422	-0.018		1582063	53.3		113	3960	
D 12 13C4 PFOA										
416.5 > 371.6	10.491	10.503	-0.012		5173072	58.0		116	10175	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.499	10.504	-0.005	1.000	5462	0.0456			11.7	
D 16 13C4 PFOS										
502.4 > 79.7	11.449	11.465	-0.016		383276	56.8		119	1667	
D 17 13C5 PFNA										
467.5 > 422.6	11.469	11.484	-0.015		4384586	55.9		112	6844	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 19 13C2 PFDA										
514.4 > 469.5	12.311	12.325	-0.014		5599078	56.0		112	5015	
D 23 13C8 FOSA										
505.4 > 77.6	12.884	12.893	-0.009		733975	7.60		15.2	1412	
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.030	13.042	-0.012	1.000	15659	0.1143			28.1	
D 26 13C2 PFUnA										
564.3 > 519.5	13.030	13.044	-0.014		5808956	57.3		115	6955	
D 28 13C2 PFDoA										
614.4 > 569.4	13.638	13.646	-0.008		5906359	56.0		112	3725	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.638	13.646	-0.008	1.000	6607	0.0613			2.9	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.150	14.162	-0.012	1.000	6268	0.0803			3.5	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.579	14.600	-0.021	1.000	17754	0.4302			9.4	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.588	14.601	-0.013		3804000	50.1		100	3217	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.242	15.255	-0.013		1539409	52.8		106	3269	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.250	15.255	-0.005	1.000	70029	0.1346			11.6	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.581	15.593	-0.012	1.000	5263	0.0773			9.7	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Report Date: 27-May-2016 09:57:56 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_073.d

Injection Date: 26-May-2016 17:07:41 Instrument ID: A4

Lims ID: MB 320-110230/1-A

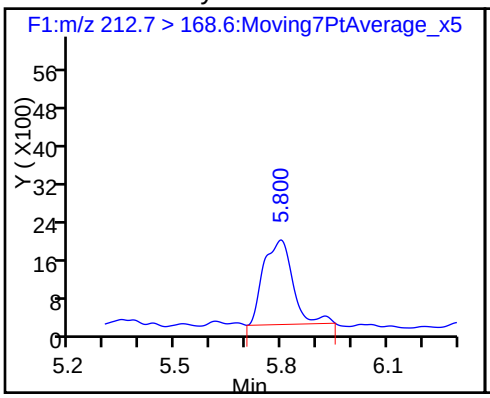
Client ID:

Operator ID: JRB ALS Bottle#: 43 Worklist Smp#: 73

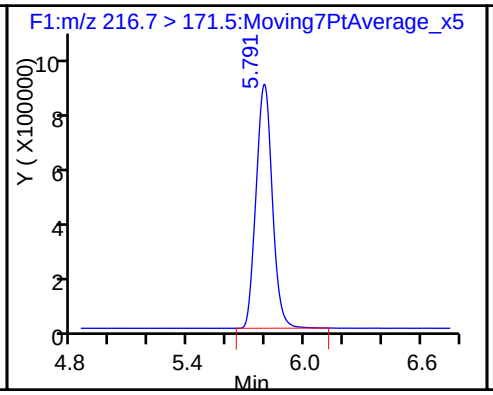
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

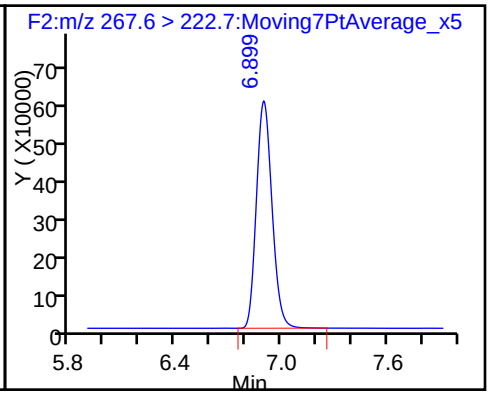
2 Perfluorobutyric acid



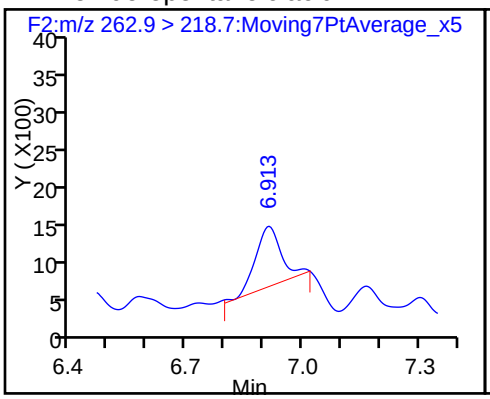
D 1 13C4 PFBA



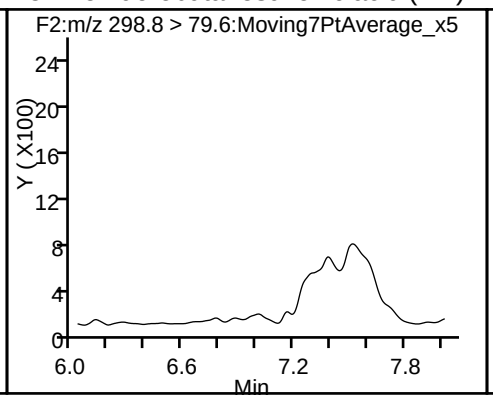
D 3 13C5-PFPeA



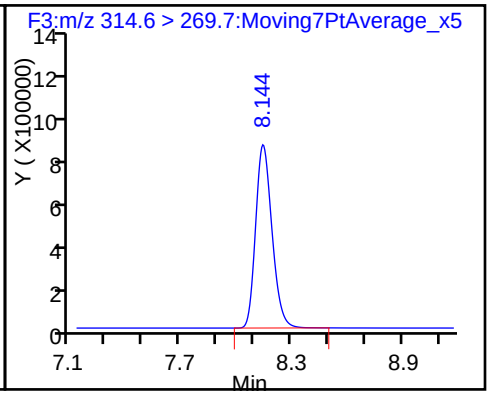
4 Perfluoropentanoic acid



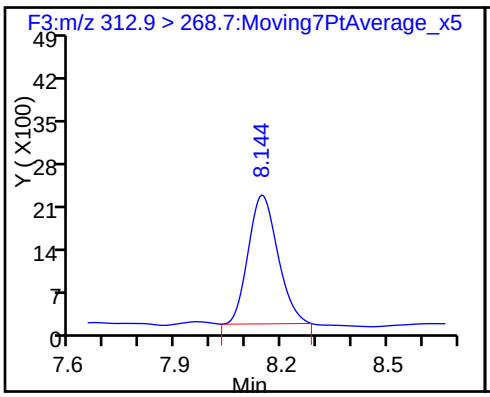
51 Perfluorobutanesulfonic acid (ND)



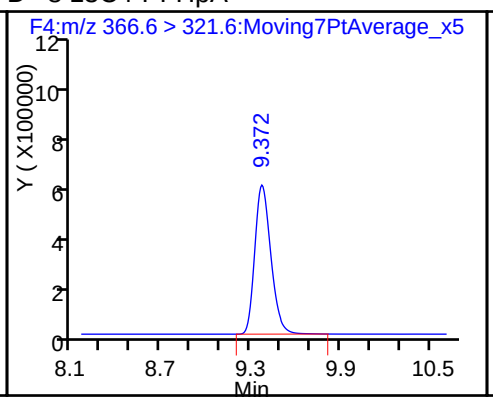
D 6 13C2 PFHxA



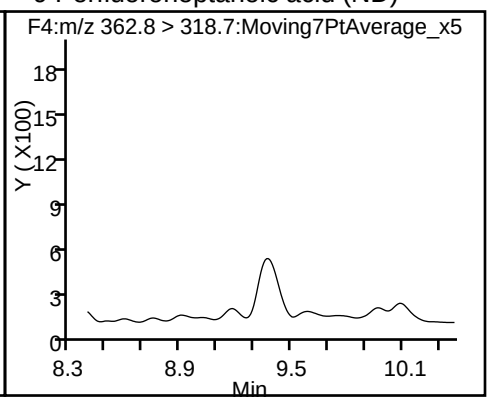
7 Perfluorohexanoic acid



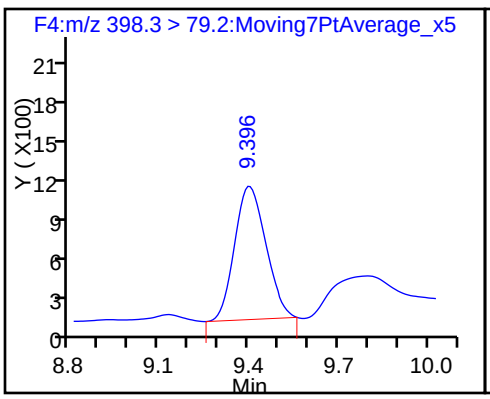
D 8 13C4-PFHpA



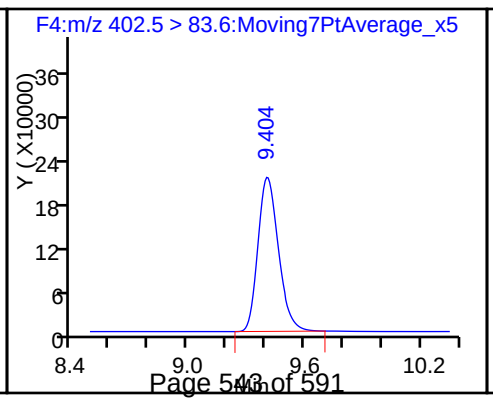
9 Perfluoroheptanoic acid (ND)



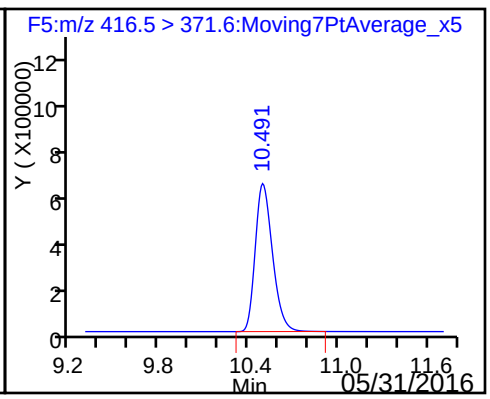
58 Perfluorohexanesulfonic acid



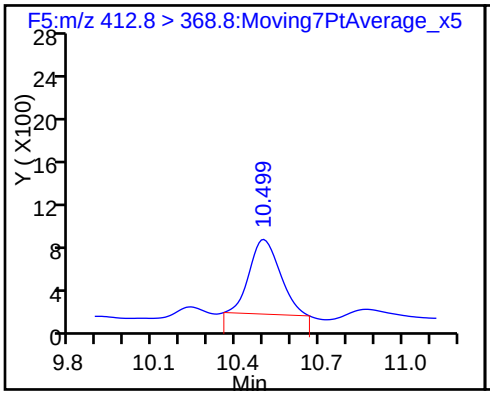
D 11 18O2 PFHxS



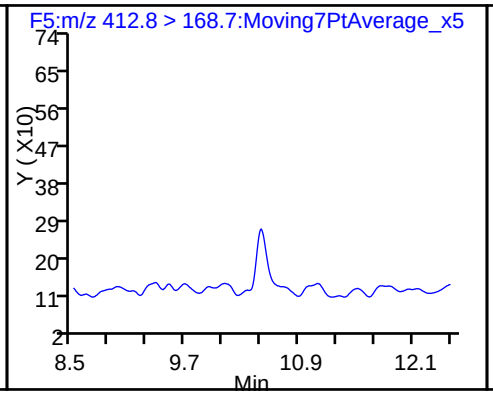
D 12 13C4 PFOA



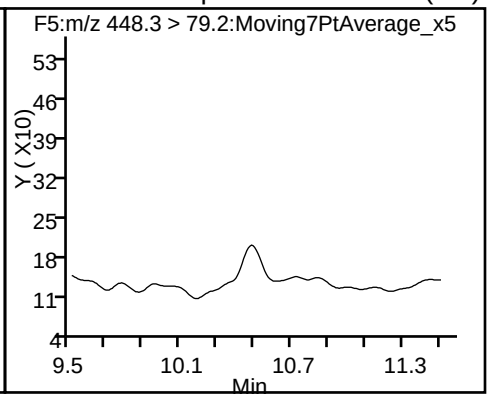
13 Perfluorooctanoic acid



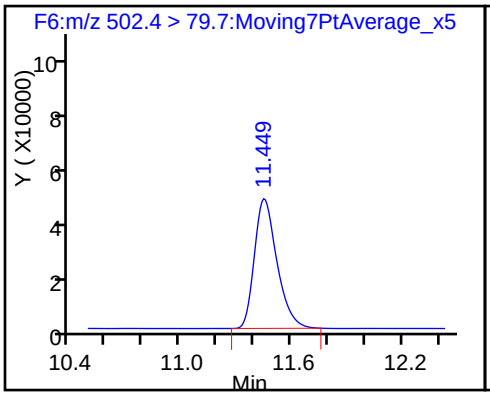
13 Perfluorooctanoic acid



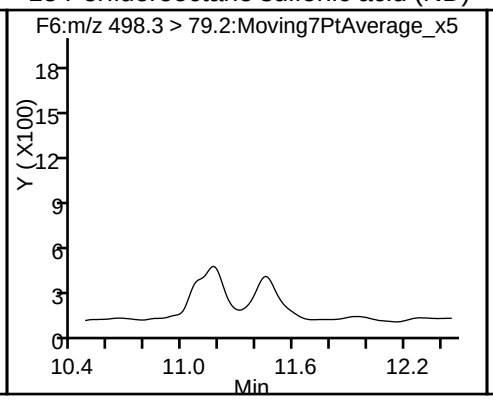
39 Perfluoroheptanesulfonic Acid (ND)



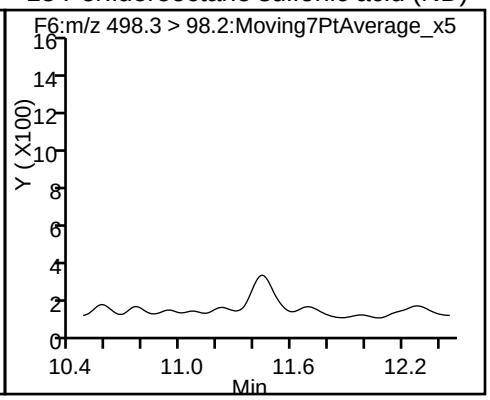
D 16 13C4 PFOS



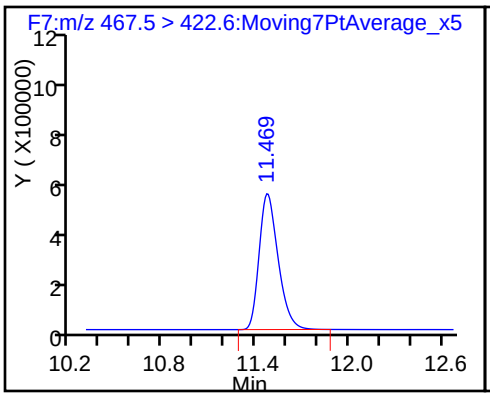
15 Perfluorooctane sulfonic acid (ND)



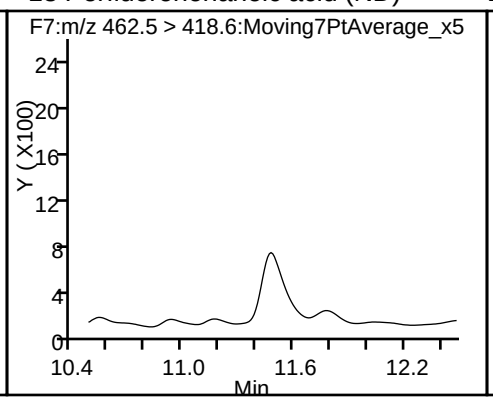
15 Perfluorooctane sulfonic acid (ND)



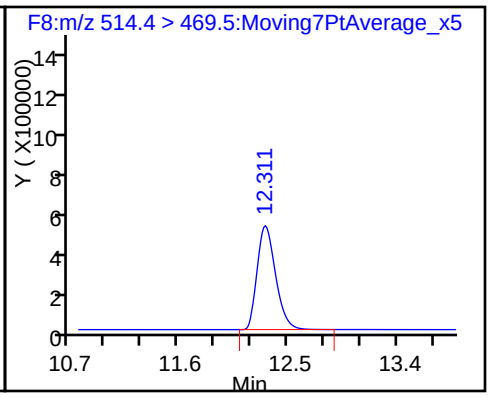
D 17 13C5 PFNA



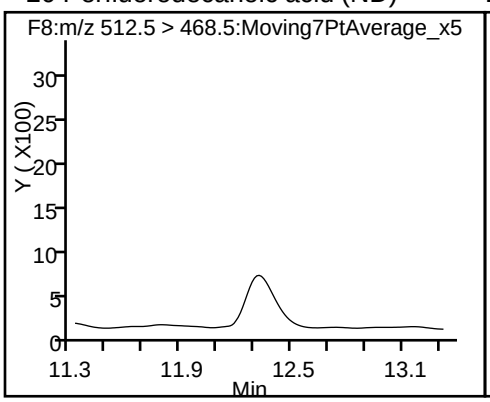
18 Perfluorononanoic acid (ND)



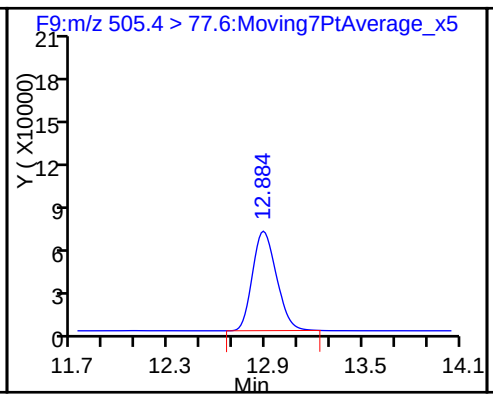
D 19 13C2 PFDA



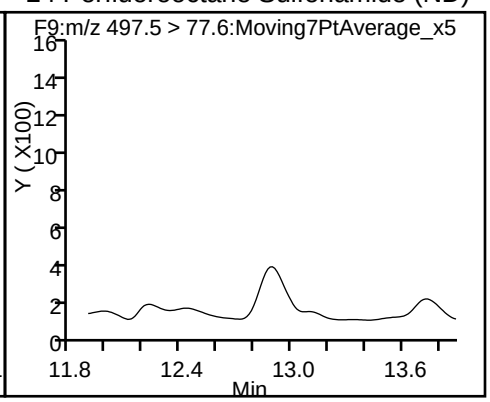
20 Perfluorodecanoic acid (ND)



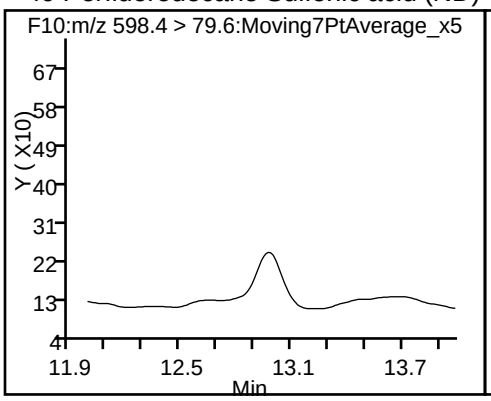
D 23 13C8 FOSA



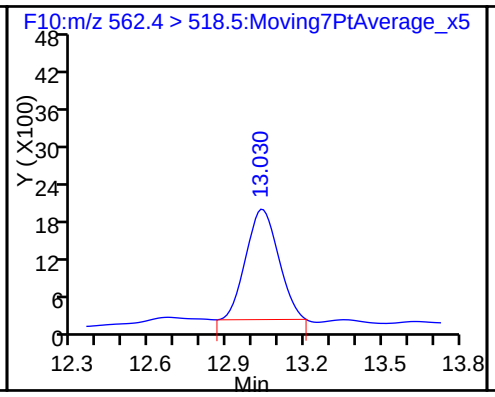
24 Perfluorooctane Sulfonamide (ND)



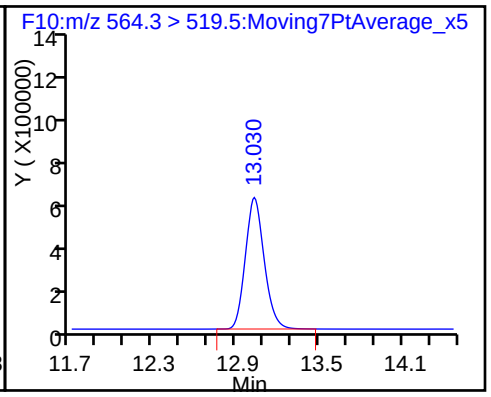
49 Perfluorodecane Sulfonic acid (ND)



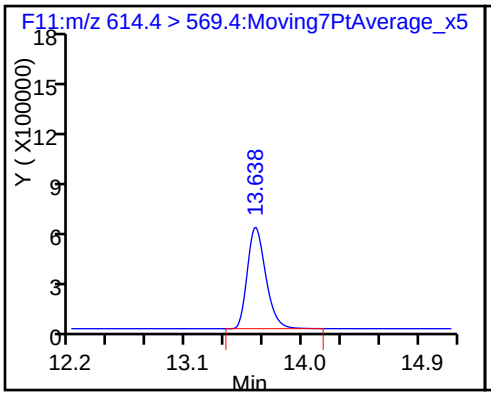
27 Perfluoroundecanoic acid



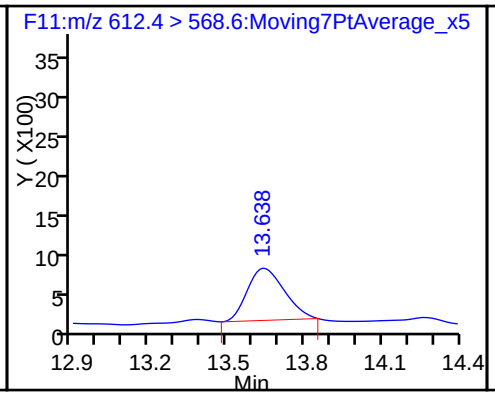
D 26 13C2 PFUnA



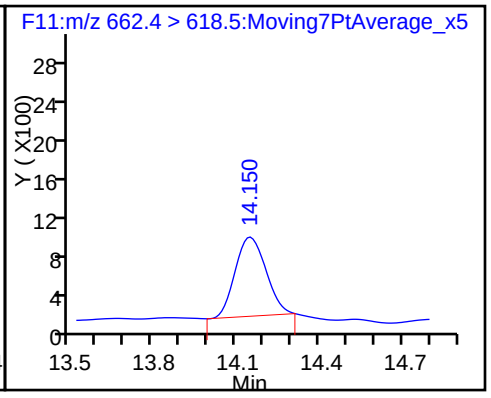
D 28 13C2 PFDoA



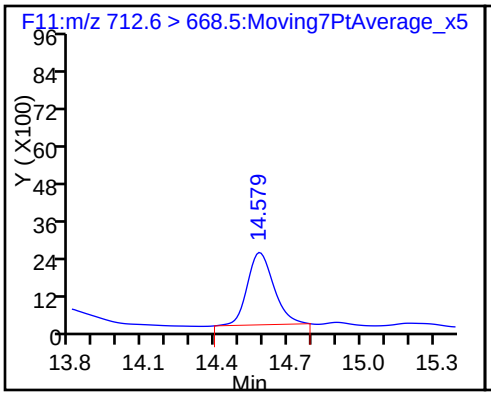
29 Perfluorododecanoic acid



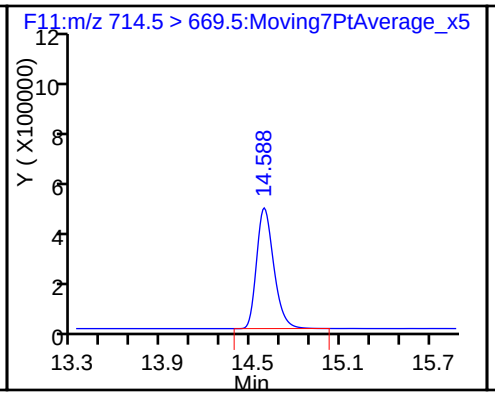
30 Perfluorotridecanoic acid



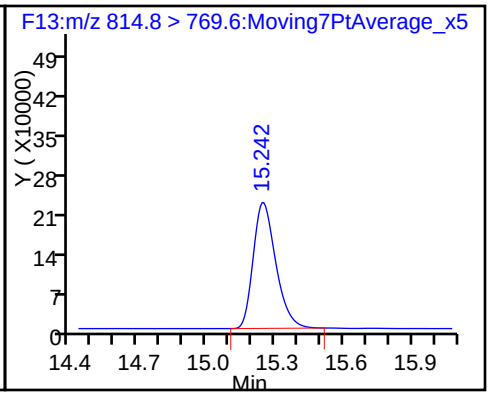
32 Perfluorotetradecanoic acid



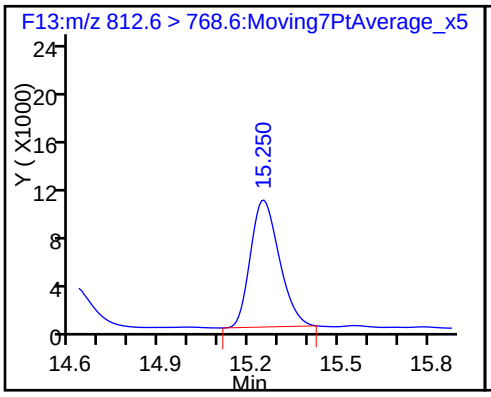
D 33 13C2-PFTeDA



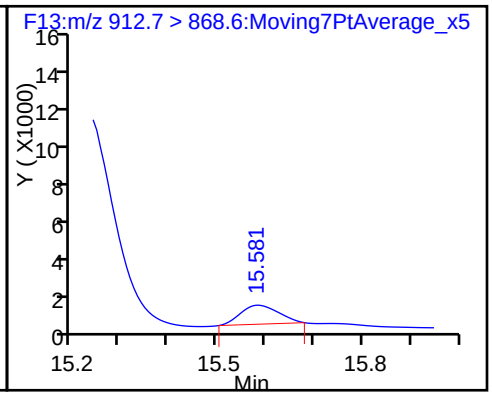
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18849-1

SDG No.:

Client Sample ID: | Lab Sample ID: LCS 320-110230/2-A

Matrix: Water | Lab File ID: 25MAY2016B4A_074.d

Analysis Method: WS-LC-0025 | Date Collected:

Extraction Method: 3535 | Date Extracted: 05/17/2016 11:08

Sample wt/vol: 500(mL) | Date Analyzed: 05/26/2016 17:28

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 111390 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0433		0.0025	0.0020	0.00080
335-67-1	Perfluorooctanoic acid (PFOA)	0.0418		0.0025	0.0020	0.00075
375-95-1	Perfluorononanoic acid (PFNA)	0.0432		0.0025	0.0020	0.00065
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0336		0.0025	0.0020	0.00092
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0337	M	0.0025	0.0020	0.00087
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0368	M	0.0040	0.0030	0.0013

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	100		25-150
STL00991	13C4 PFOS	103		25-150
STL00995	13C5 PFNA	99		25-150
STL00990	13C4 PFOA	100		25-150
STL01892	13C4-PFHpA	91		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_074.d
Lims ID: LCS 320-110230/2-A
Client ID:
Sample Type: LCS
Inject. Date: 26-May-2016 17:28:51 ALS Bottle#: 44 Worklist Smp#: 74
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: lcs 320-110230/2-a
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 27-May-2016 10:26:53 Calib Date: 25-May-2016 19:01:43
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_011.d

Column 1 : Det: F1:MRM
Process Host: XAWRK014

First Level Reviewer: barnettj Date: 27-May-2016 10:26:53

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
2 Perfluorobutyric acid										
212.7 > 168.6	5.794	5.798	-0.004	1.000	1263189	21.2		106	3345	
D 1 13C4 PFBA										
216.7 > 171.5	5.791	5.798	-0.007		4632640	54.8		110	13239	
D 3 13C5-PFPeA										
267.6 > 222.7	6.899	6.907	-0.008		3505426	45.7		91.4	8127	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.899	6.910	-0.011	1.000	698559	19.6		98.1	358	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.014	7.024	-0.010	1.000	369371	NC			812	
298.8 > 98.6	7.014	7.024	-0.010	1.000	239175		1.54(0.00-0.00)		514	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.014	7.024	-0.010	1.000	369371	16.8		95.1		
D 6 13C2 PFHxA										
314.6 > 269.7	8.149	8.156	-0.007		4738667	57.1		114	13148	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.149	8.157	-0.008	1.000	888171	20.7		104	1992	
D 8 13C4-PFHpA										
366.6 > 321.6	9.372	9.387	-0.015		3879214	45.4		90.8	6838	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.372	9.388	-0.016	1.000	819717	21.6		108	3296	
10 Perfluorohexane Sulfonate										M
398.3 > 79.2	9.412	9.421	-0.009	1.000	858780	NC			1792	M
58 Perfluorohexanesulfonic acid										M
398.3 > 79.2	9.412	9.421	-0.009	1.000	858780	16.9		92.6		M
D 11 18O2 PFHxS										
402.5 > 83.6	9.404	9.422	-0.018		1410238	47.5		100	4533	
D 12 13C4 PFOA										
416.5 > 371.6	10.491	10.503	-0.012		4446263	49.9		99.8	8784	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooctanoic acid										
412.8 > 368.8	10.491	10.504	-0.013	1.000	843424	20.9		105	1838	
412.8 > 168.7	10.491	10.504	-0.013	1.000	258340		3.26(0.00-0.00)		989	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.491	10.508	-0.017	1.000	1011902	18.9		99.4		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.491	10.508	-0.017	1.000	1011902	NC			2972	
D 16 13C4 PFOS										
502.4 > 79.7	11.449	11.465	-0.016		331224	49.1		103	1364	
15 Perfluorooctane sulfonic acid										M
498.3 > 79.2	11.449	11.466	-0.017	1.000	1719290	18.4		99.1	3799	M
498.3 > 98.2	11.449	11.466	-0.017	1.000	844391		2.04(0.00-0.00)		2142	M
D 17 13C5 PFNA										
467.5 > 422.6	11.469	11.484	-0.015		3864801	49.3		98.5	6048	
18 Perfluorononanoic acid										
462.5 > 418.6	11.478	11.486	-0.008	1.000	2052760	21.6		108	2203	
D 19 13C2 PFDA										
514.4 > 469.5	12.311	12.325	-0.014		5303792	53.1		106	7029	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.311	12.325	-0.014	1.000	2464691	22.4		112	4061	
D 23 13C8 FOSA										
505.4 > 77.6	12.884	12.893	-0.009		857839	8.89		17.8	1340	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.884	12.893	-0.009	1.000	384669	21.0		105	938	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.987	12.996	-0.009	1.000	513865	NC			1243	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.987	12.996	-0.009	1.000	513865	17.6		91.4		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.030	13.042	-0.012	1.000	2652042	20.8		104	2550	
D 26 13C2 PFUnA										
564.3 > 519.5	13.030	13.044	-0.014		5417983	53.4		107	6394	
D 28 13C2 PFDoA										
614.4 > 569.4	13.638	13.646	-0.008		5701285	54.1		108	3203	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.638	13.646	-0.008	1.000	2057997	19.8		98.9	905	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.150	14.162	-0.012	1.000	1655154	26.0		130	887	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.588	14.600	-0.012	1.000	628950	18.6		93.2	342	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.588	14.601	-0.013		3109056	41.0		81.9	3316	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.242	15.255	-0.013		1304519	44.8		89.5	3503	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.242	15.255	-0.013	1.000	1654602	23.9		120	257	
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.581	15.593	-0.012	1.000	1131122	19.6		98.0	1528	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 27-May-2016 10:27:01 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_074.d

Injection Date: 26-May-2016 17:28:51 Instrument ID: A4

Lims ID: LCS 320-110230/2-A

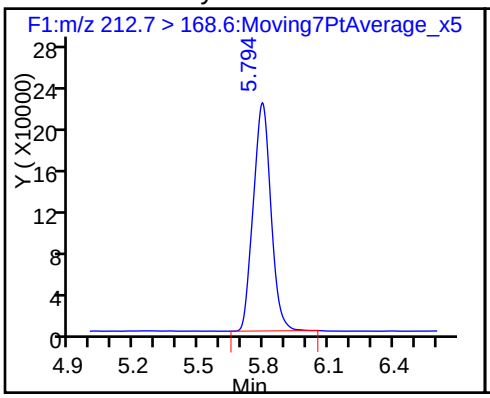
Client ID:

Operator ID: JRB ALS Bottle#: 44 Worklist Smp#: 74

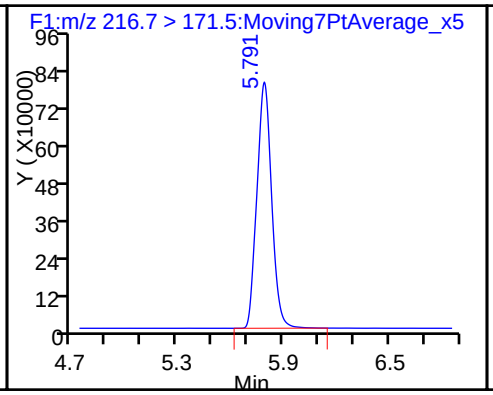
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

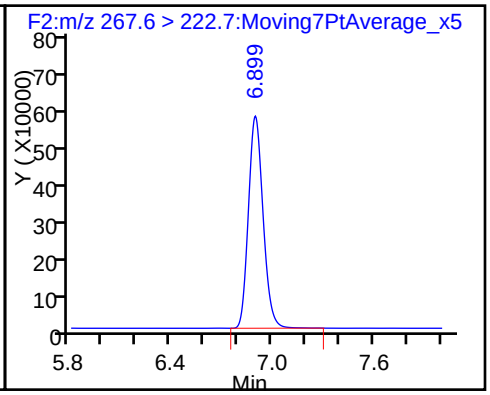
2 Perfluorobutyric acid



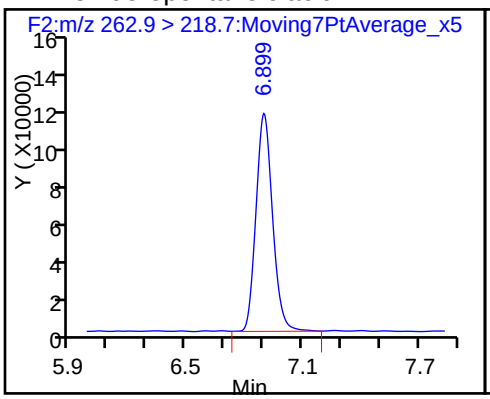
D 1 13C4 PFBA



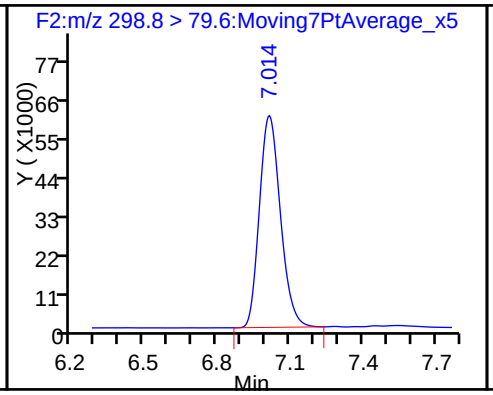
D 3 13C5-PFPeA



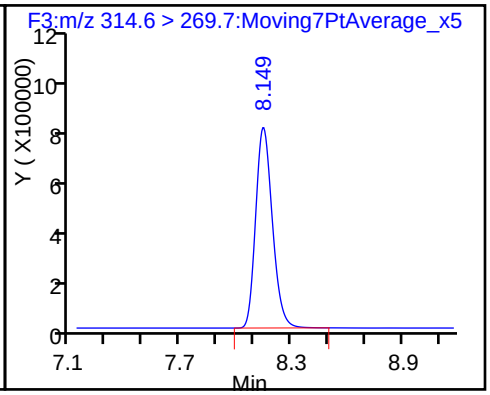
4 Perfluoropentanoic acid



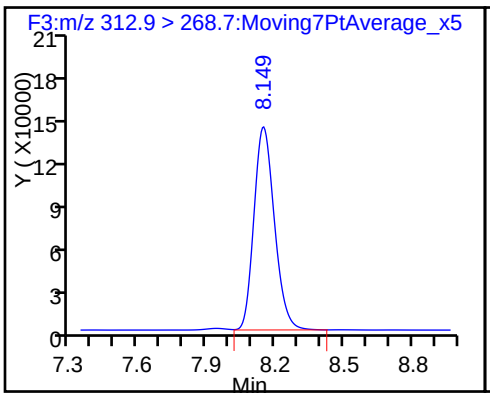
51 Perfluorobutanesulfonic acid



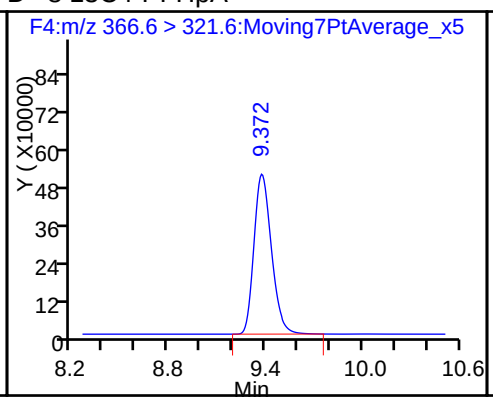
D 6 13C2 PFHxA



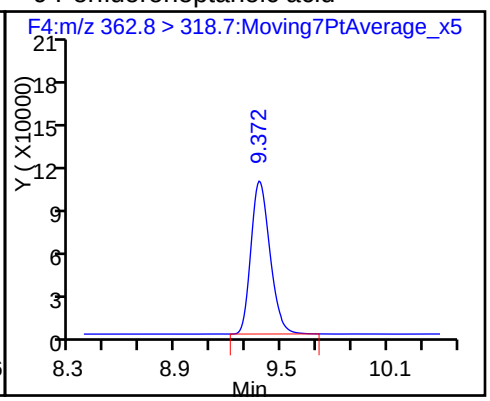
7 Perfluorohexanoic acid



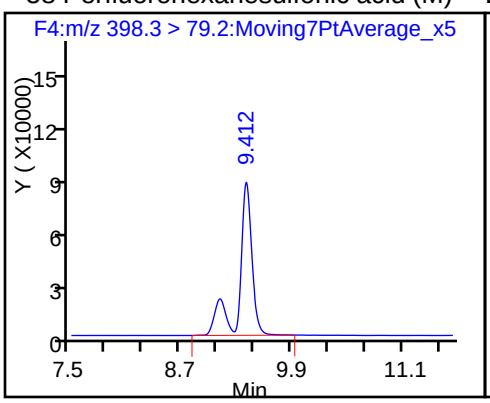
D 8 13C4-PFHpA



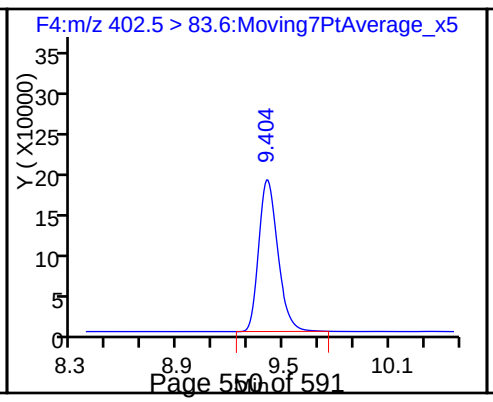
9 Perfluoroheptanoic acid



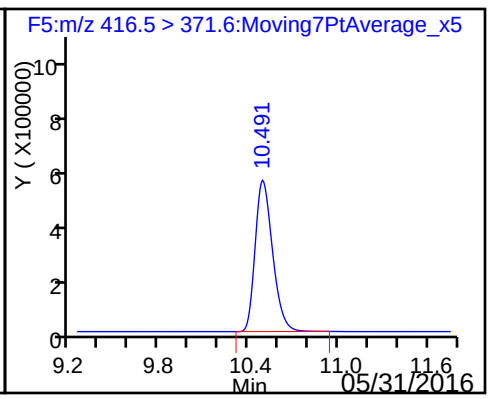
58 Perfluorohexanesulfonic acid (M)



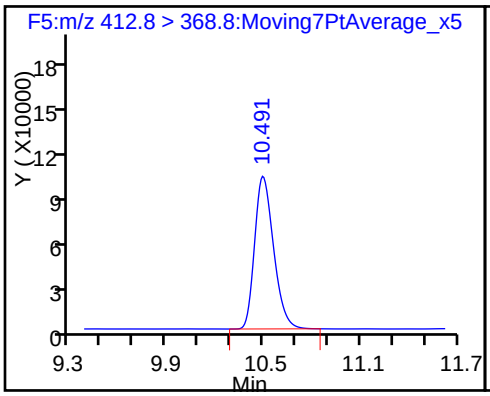
D 11 18O2 PFHxS



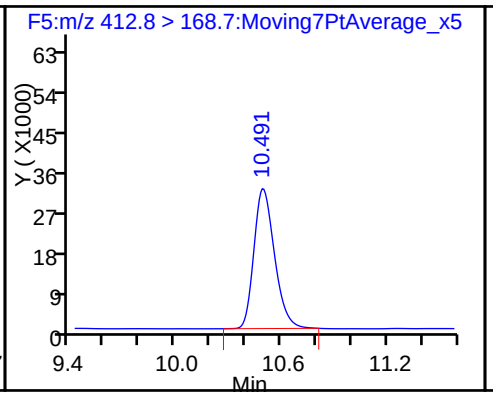
D 12 13C4 PFOA



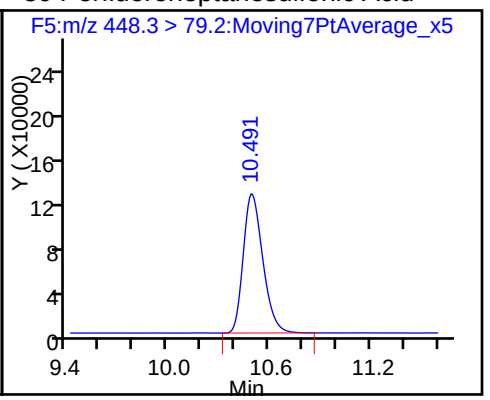
13 Perfluorooctanoic acid



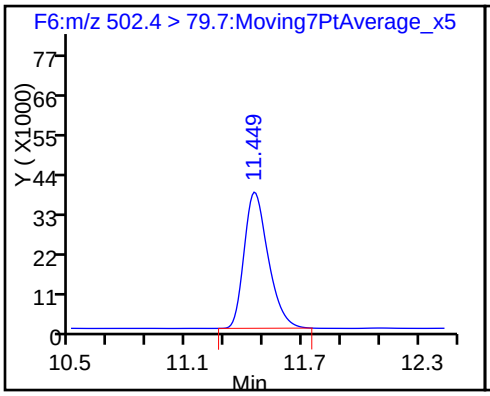
13 Perfluorooctanoic acid



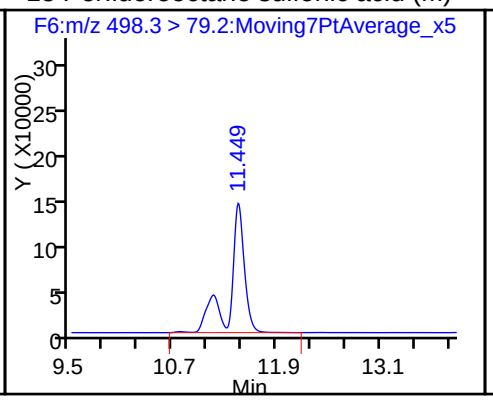
39 Perfluoroheptanesulfonic Acid



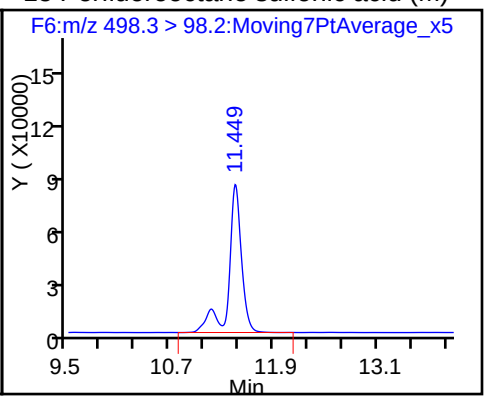
D 16 13C4 PFOS



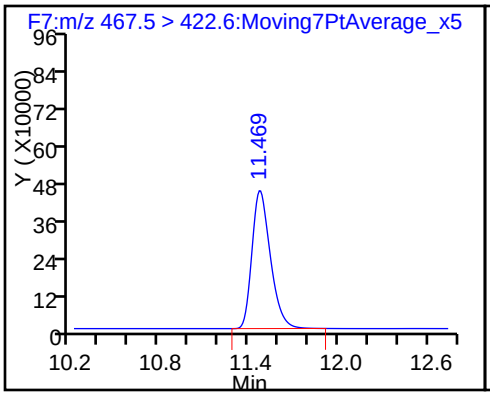
15 Perfluorooctane sulfonic acid (M)



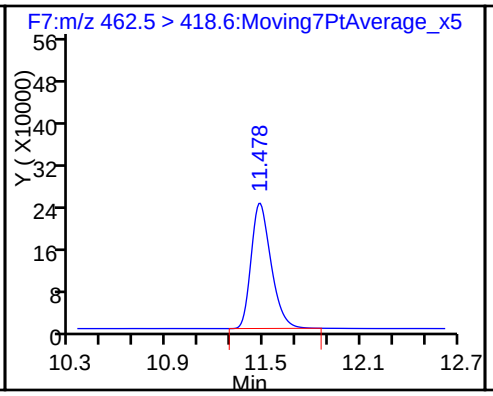
15 Perfluorooctane sulfonic acid (M)



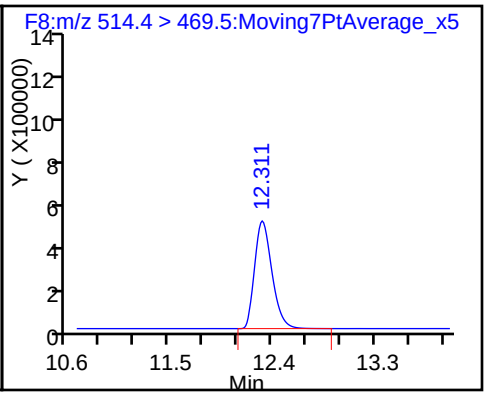
D 17 13C5 PFNA



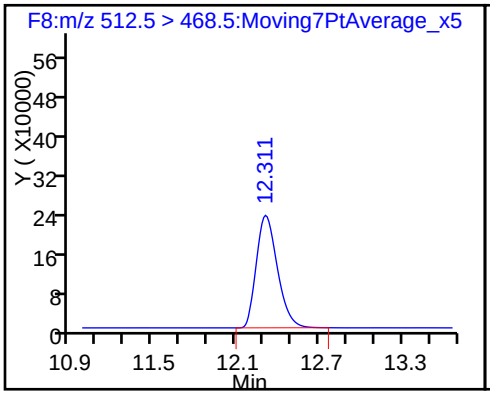
18 Perfluorononanoic acid



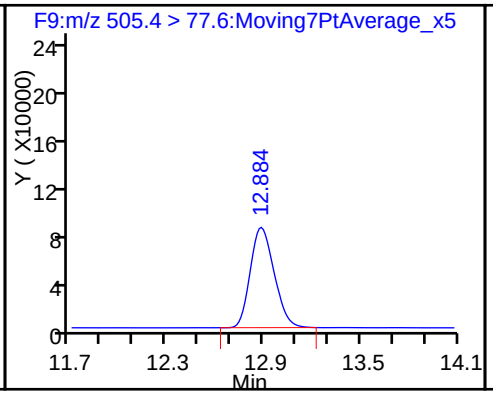
D 19 13C2 PFDA



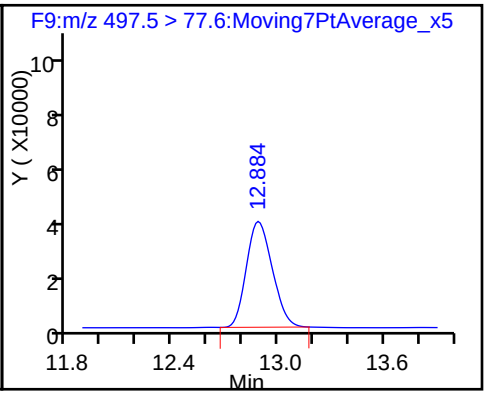
20 Perfluorodecanoic acid



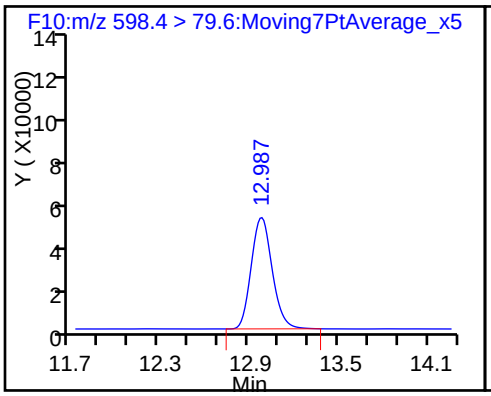
D 23 13C8 FOSA



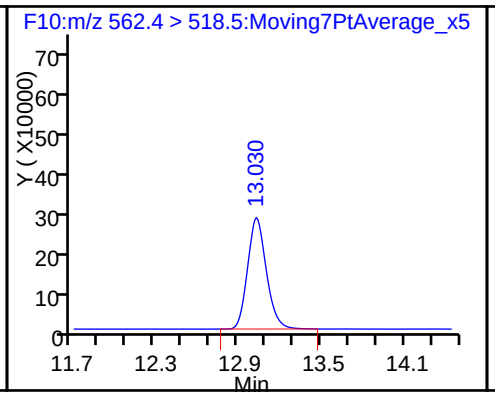
24 Perfluorooctane Sulfonamide



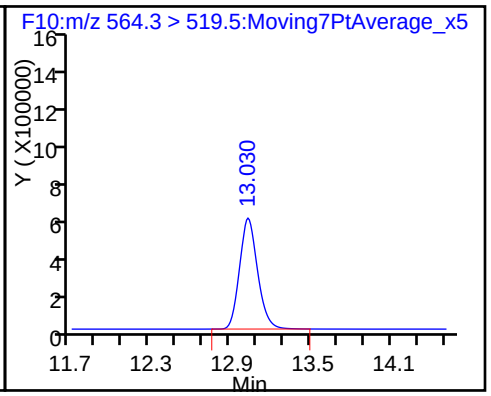
49 Perfluorodecane Sulfonic acid



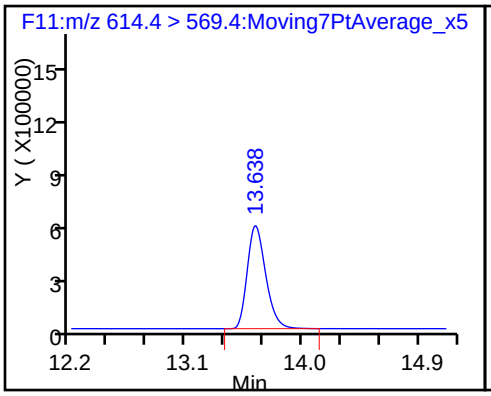
27 Perfluoroundecanoic acid



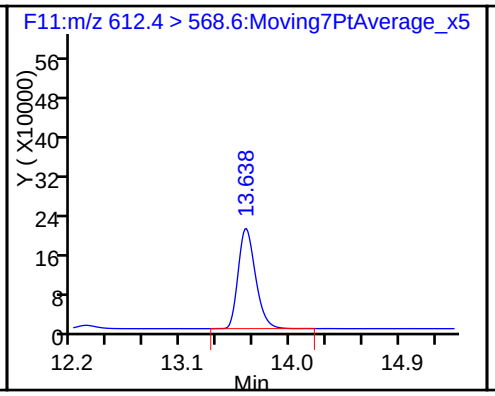
D 26 13C2 PFUnA



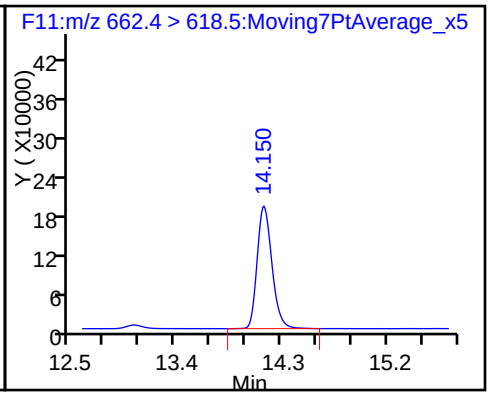
D 28 13C2 PFDoA



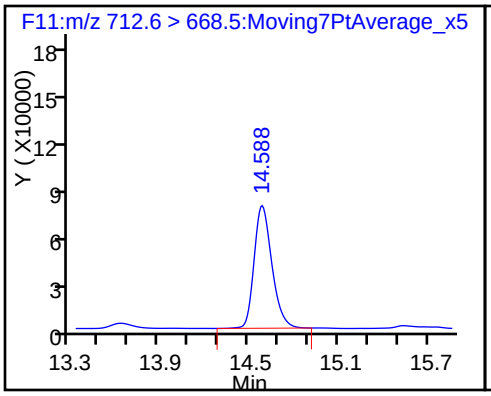
29 Perfluorododecanoic acid



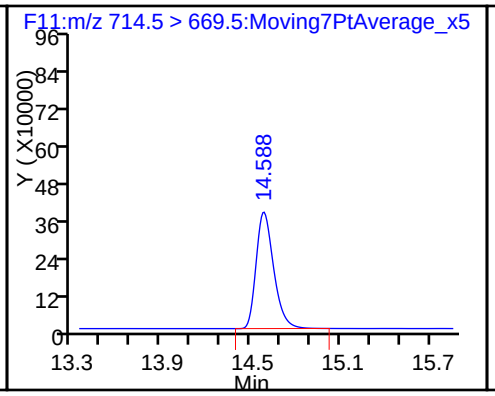
30 Perfluorotridecanoic acid



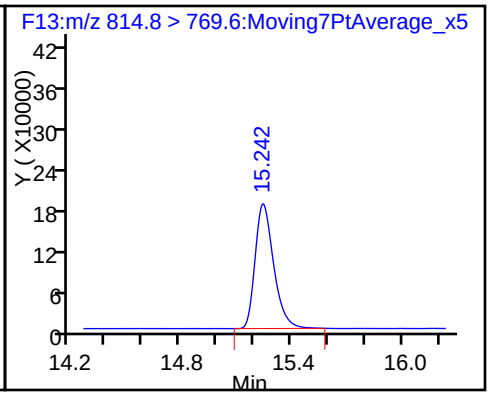
32 Perfluorotetradecanoic acid



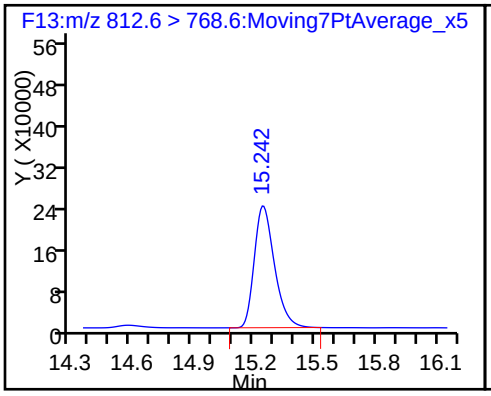
D 33 13C2-PFTeDA



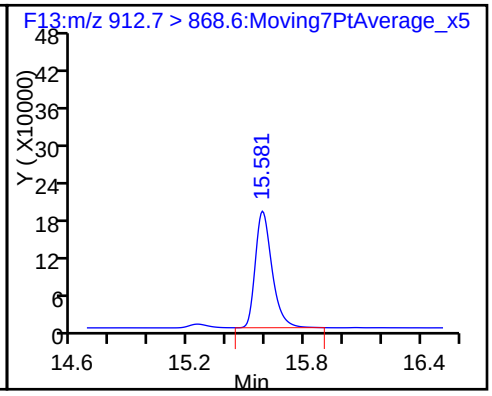
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

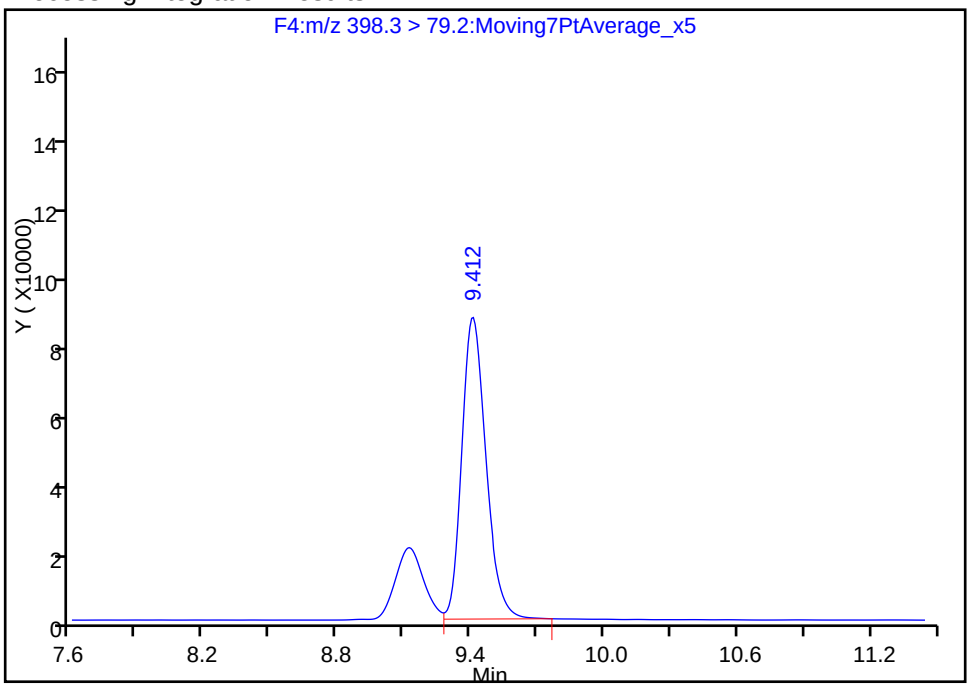
Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_074.d
Injection Date: 26-May-2016 17:28:51 Instrument ID: A4
Lims ID: LCS 320-110230/2-A
Client ID:
Operator ID: JRB ALS Bottle#: 44 Worklist Smp#: 74
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F4:MRM

58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

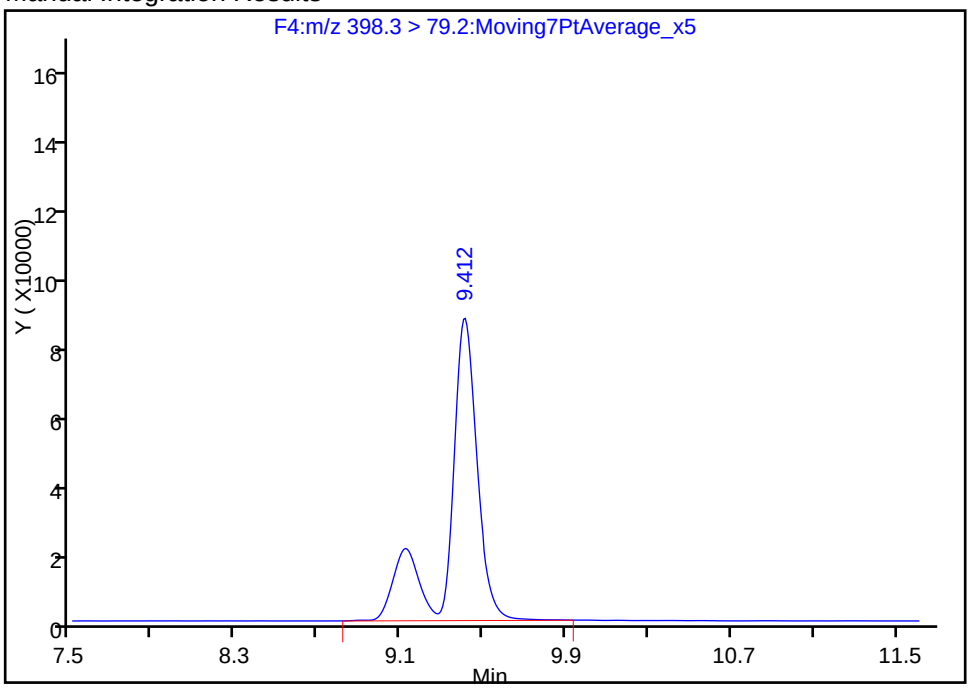
Processing Integration Results

RT: 9.41
Area: 664288
Amount: 13.039186
Amount Units: ng/ml



Manual Integration Results

RT: 9.41
Area: 858780
Amount: 16.856833
Amount Units: ng/ml



Reviewer: barnettj, 27-May-2016 10:26:53
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

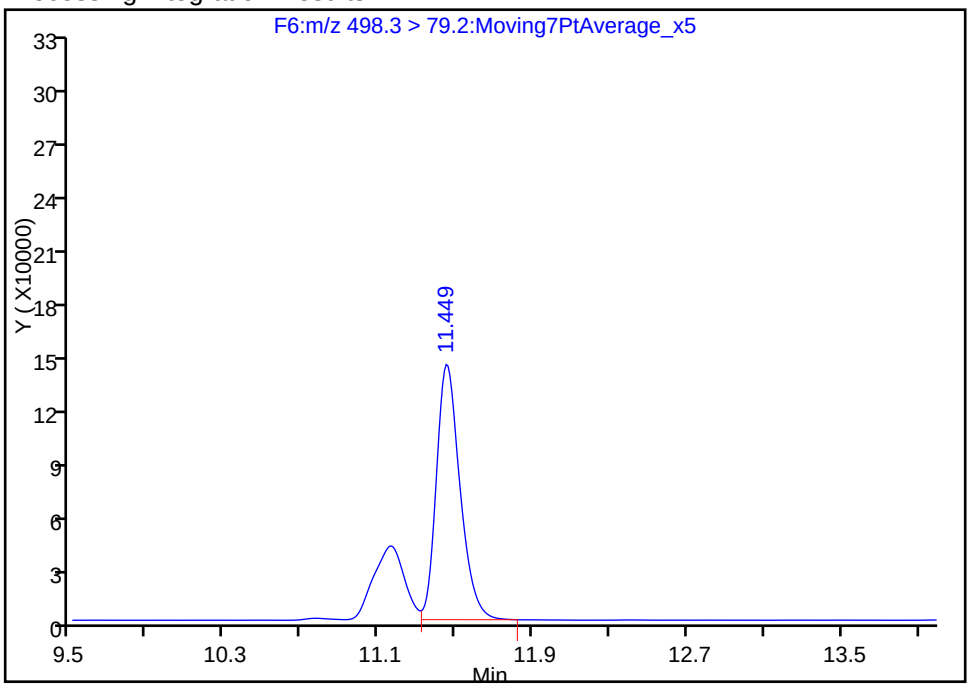
Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_074.d
Injection Date: 26-May-2016 17:28:51 Instrument ID: A4
Lims ID: LCS 320-110230/2-A
Client ID:
Operator ID: JRB ALS Bottle#: 44 Worklist Smp#: 74
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

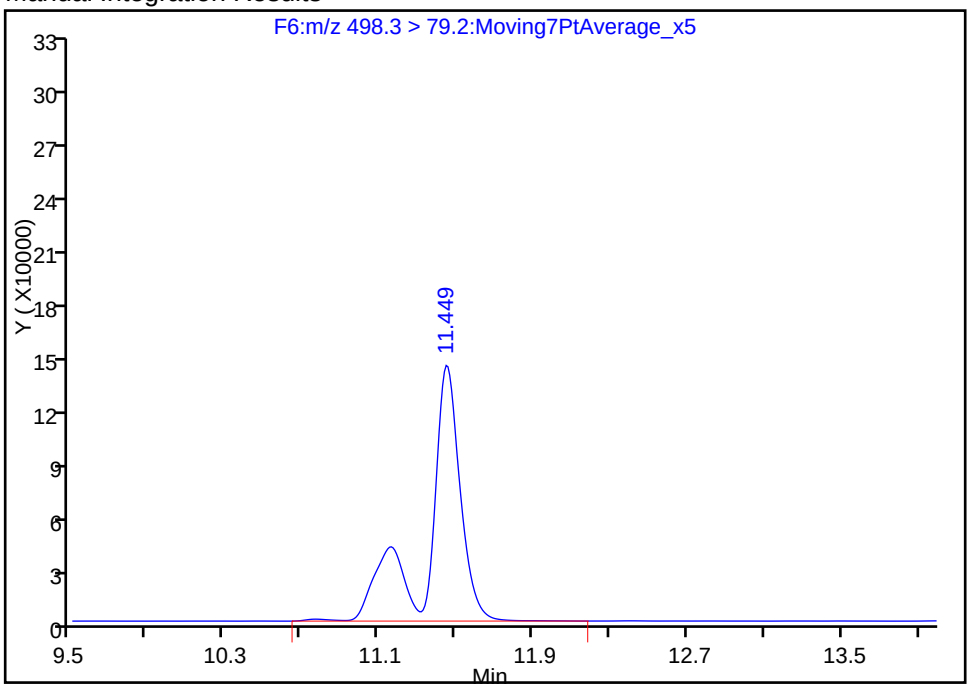
Processing Integration Results

RT: 11.45
Area: 1231102
Amount: 13.357613
Amount Units: ng/ml



Manual Integration Results

RT: 11.45
Area: 1719290
Amount: 18.392466
Amount Units: ng/ml



Reviewer: westendorfc, 27-May-2016 08:28:40
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

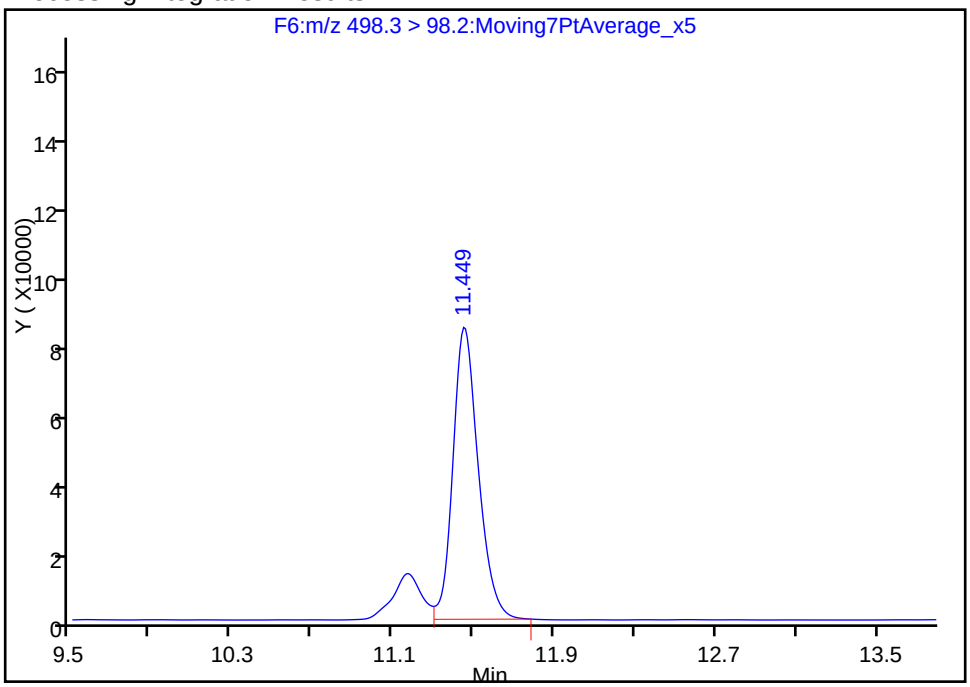
Data File: \\ChromNA\Sacramento\ChromData\A4\20160525-31065.b\25MAY2016B4A_074.d
Injection Date: 26-May-2016 17:28:51 Instrument ID: A4
Lims ID: LCS 320-110230/2-A
Client ID:
Operator ID: JRB ALS Bottle#: 44 Worklist Smp#: 74
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

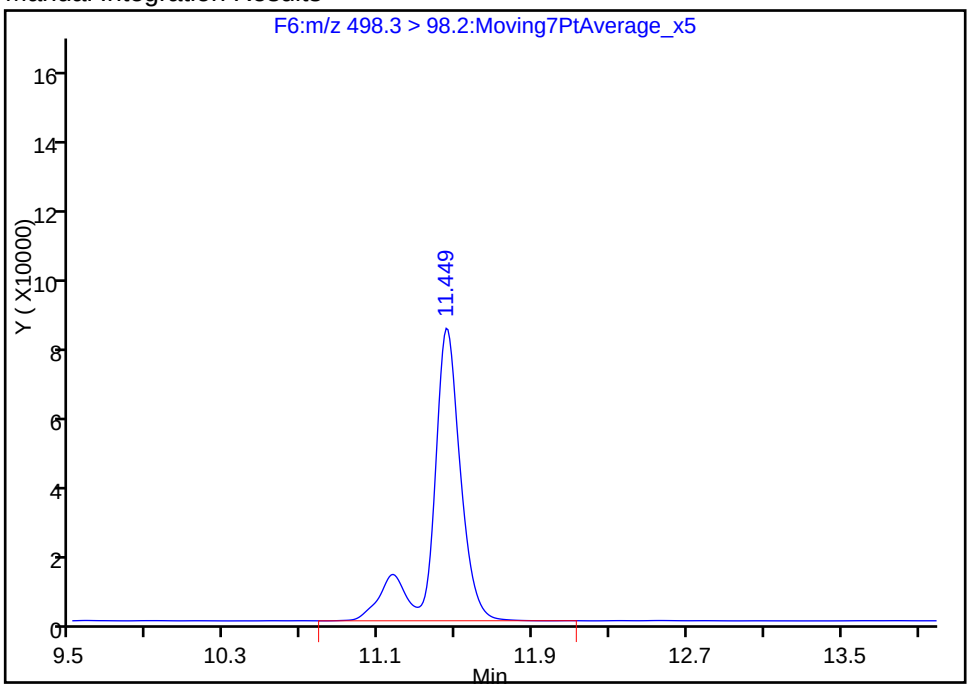
Processing Integration Results

RT: 11.45
Area: 709857
Amount: 13.357613
Amount Units: ng/ml



Manual Integration Results

RT: 11.45
Area: 844391
Amount: 18.392466
Amount Units: ng/ml



Reviewer: westendorfc, 27-May-2016 08:28:40
Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18849-1

SDG No.:

Client Sample ID: OF-RW74-0516 MS | Lab Sample ID: 320-18849-2 MS

Matrix: Water | Lab File ID: 27MAY2016B4A_014.d

Analysis Method: WS-LC-0025 | Date Collected: 05/11/2016 14:17

Extraction Method: 3535 | Date Extracted: 05/17/2016 11:08

Sample wt/vol: 518.8(mL) | Date Analyzed: 05/27/2016 15:31

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 111733 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0378		0.0024	0.0019	0.00077
335-67-1	Perfluorooctanoic acid (PFOA)	0.0400		0.0024	0.0019	0.00072
375-95-1	Perfluorononanoic acid (PFNA)	0.0427		0.0024	0.0019	0.00063
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0276		0.0024	0.0019	0.00088
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0355	M	0.0024	0.0019	0.00084
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0419	M	0.0039	0.0029	0.0012

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	103		25-150
STL00991	13C4 PFOS	106		25-150
STL00995	13C5 PFNA	77		25-150
STL00990	13C4 PFOA	81		25-150
STL01892	13C4-PFHpA	85		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_014.d
Lims ID: 320-18849-A-2-A MS
Client ID: OF-RW74-0516
Sample Type: MS
Inject. Date: 27-May-2016 15:31:42 ALS Bottle#: 47 Worklist Smp#: 14
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: 320-18849-a-2-a ms
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 09:51:28 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 31-May-2016 09:43:48

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.784	5.790	-0.006		2280935	22.1		44.1	6824	
2 Perfluorobutyric acid										
212.7 > 168.6	5.787	5.792	-0.005	1.000	636736	21.5		108	1046	
D 3 13C5-PFPeA										
267.6 > 222.7	6.886	6.892	-0.006		2535066	33.4		66.8	4985	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.886	6.895	-0.009	1.000	477010	19.0		95.2	55.2	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.001	7.011	-0.010	1.000	298068	NC			261	
298.8 > 98.6	7.001	7.011	-0.010	1.000	182914		1.63(0.00-0.00)		111	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.001	7.011	-0.010	1.000	298068	14.3		81.1		
D 6 13C2 PFHxA										
314.6 > 269.7	8.133	8.138	-0.005		3753195	40.1		80.2	8357	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.133	8.140	-0.007	1.000	689752	19.7		98.3	121	
22 PFPeS (Perflouro-1-pentanesulfonat										
348.7 > 79.5	8.220	8.231	-0.011	0.876	4869	NC			10.5	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	751699	19.6		98.1	257	
D 8 13C4-PFHpA										
366.6 > 321.6	9.357	9.366	-0.009		3566076	42.5		84.9	4871	
D 11 18O2 PFHxS										
402.5 > 83.6	9.388	9.399	-0.011		1483634	48.9		103	3082	
58 Perfluorohexanesulfonic acid										M
398.3 > 79.2	9.388	9.401	-0.013	1.000	909608	18.4		101		M
10 Perfluorohexane Sulfonate										M
398.3 > 79.2	9.401	9.401	0.0	1.000	0	NC			19	M

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.474	10.483	-0.009		3862596	40.3		80.6	7091	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.474	10.485	-0.011	1.000	731105	20.8		104	327	
412.8 > 168.7	10.482	10.485	-0.003	1.001	246473		2.97(0.00-0.00)		720	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.482	10.485	-0.003	1.000	1105140	21.3		112		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.482	10.485	-0.003	1.000	1105140	NC			2522	
D 16 13C4 PFOS										
502.4 > 79.7	11.430	11.441	-0.011		316941	50.7		106	683	
15 Perfluorooctane sulfonic acid										M
498.3 > 79.2	11.440	11.443	-0.003	1.000	1735442	21.7		117	2306	M
498.3 > 98.2	11.440	11.443	-0.003	1.000	970518		1.79(0.00-0.00)		710	M
18 Perfluorononanoic acid										
462.5 > 418.6	11.459	11.462	-0.003	1.000	1765318	22.1		111	966	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		3148648	38.7		77.5	4710	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		4455965	43.2		86.5	4962	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	2054343	21.4		107	1207	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		129212	1.36		2.7	549	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.871	12.873	-0.002	1.000	77487	28.4		142	169	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.974	12.969	0.005	1.000	515438	NC			1678	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.974	12.969	0.005	1.000	515438	20.8		108		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	2288812	22.2		111	1799	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		4446422	41.0		82.0	4274	
D 28 13C2 PFDoA										
614.4 > 569.4	13.615	13.626	-0.011		5272653	47.4		94.8	3811	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.615	13.626	-0.011	1.000	1977946	20.5		102	1129	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.130	14.138	-0.008	1.000	1646449	24.7		123	1118	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.570	14.577	-0.007	1.000	670084	18.6		92.9	425	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.570	14.579	-0.009		3234064	41.6		83.2	2957	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		1098628	36.9		73.9	2436	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	1466922	23.1		116	270	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	905759	18.8		93.8	1208	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 31-May-2016 09:52:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_014.d

Injection Date: 27-May-2016 15:31:42 Instrument ID: A4

Lims ID: 320-18849-A-2-A MS

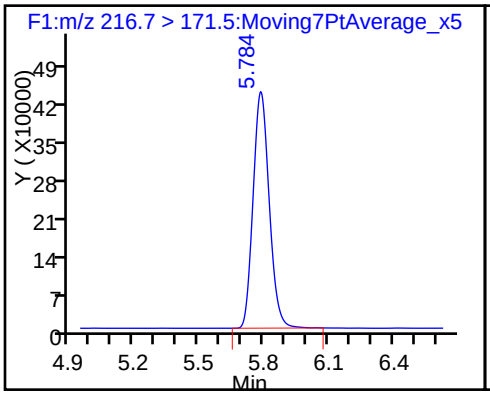
Client ID: OF-RW74-0516

Operator ID: JRB ALS Bottle#: 47 Worklist Smp#: 14

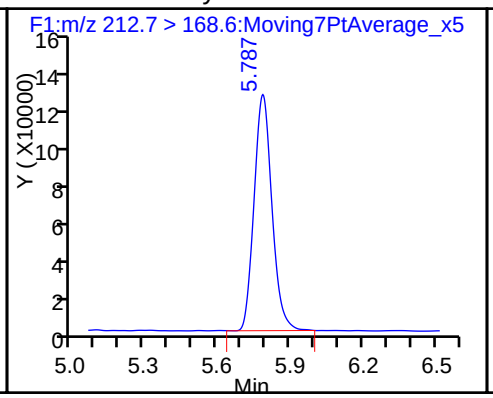
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

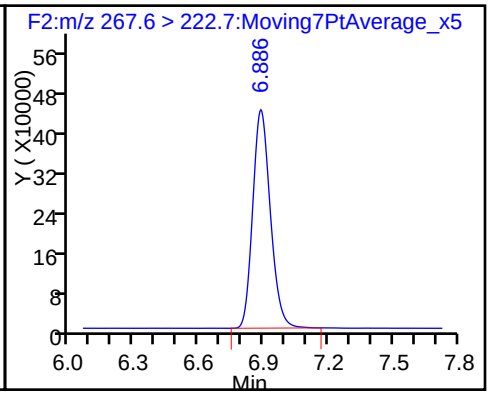
D 1 13C4 PFBA



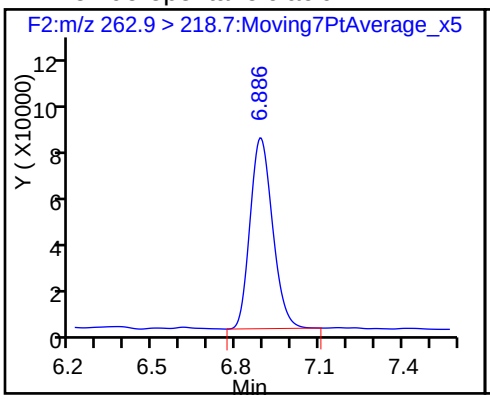
2 Perfluorobutyric acid



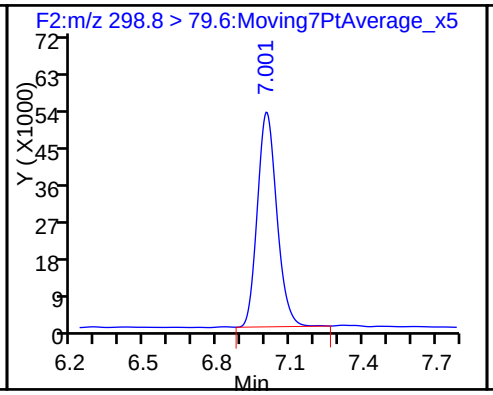
D 3 13C5-PFPeA



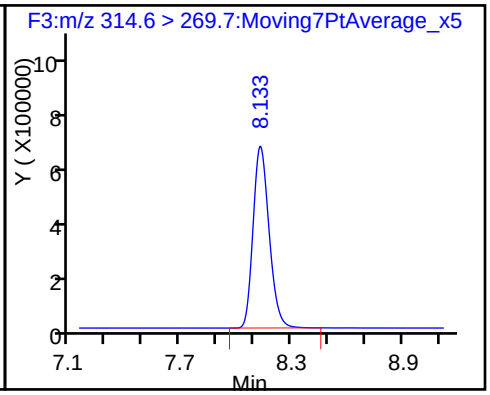
4 Perfluoropentanoic acid



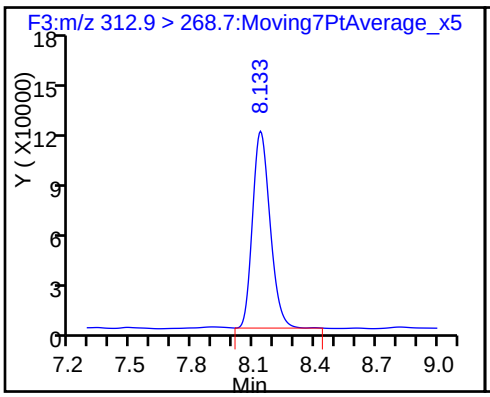
51 Perfluorobutanesulfonic acid



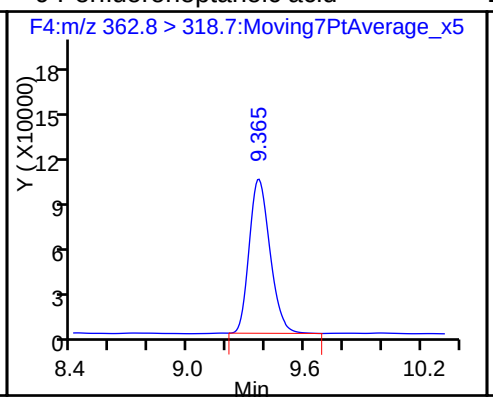
D 6 13C2 PFHxA



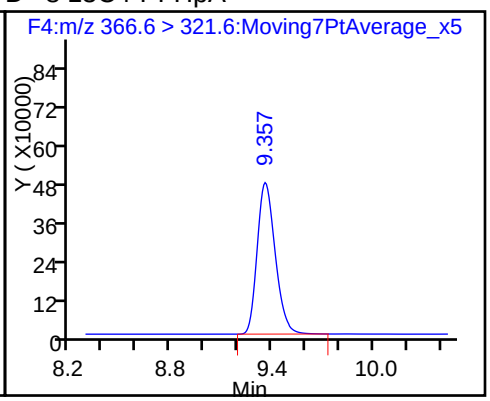
7 Perfluorohexanoic acid



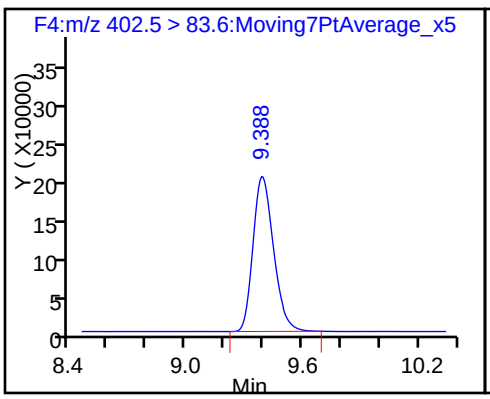
9 Perfluoroheptanoic acid



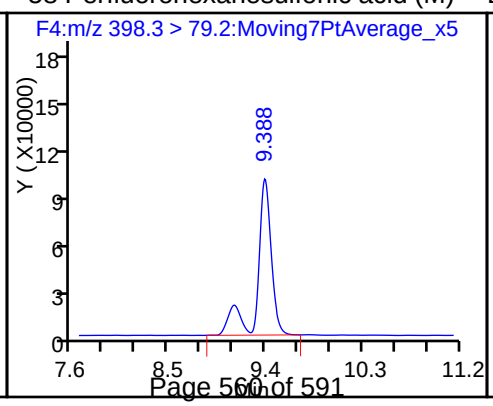
D 8 13C4-PFHpA



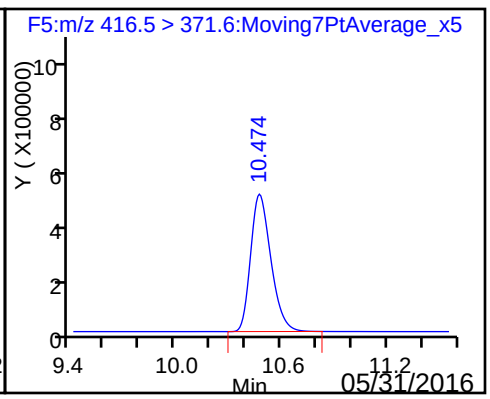
D 11 18O2 PFHxS



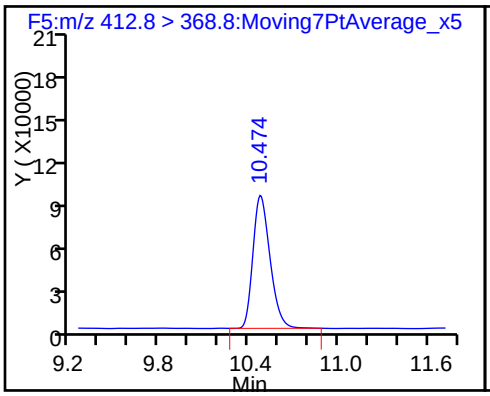
58 Perfluorohexanesulfonic acid (M)



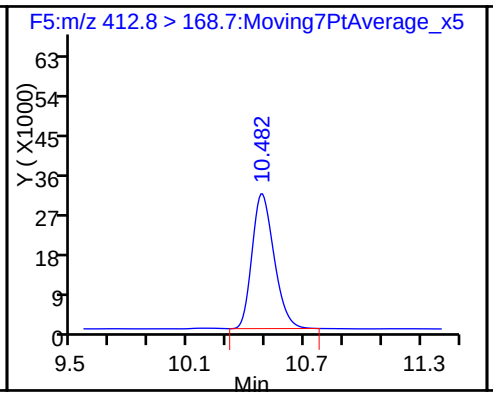
D 12 13C4 PFOA



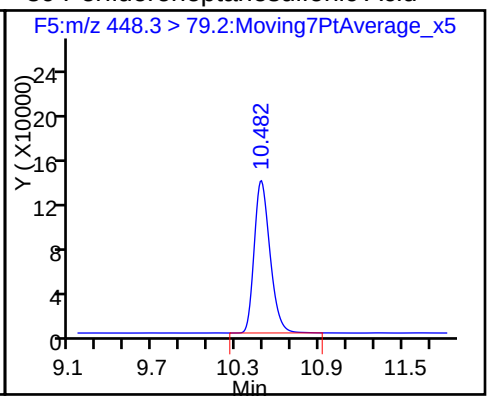
13 Perfluorooctanoic acid



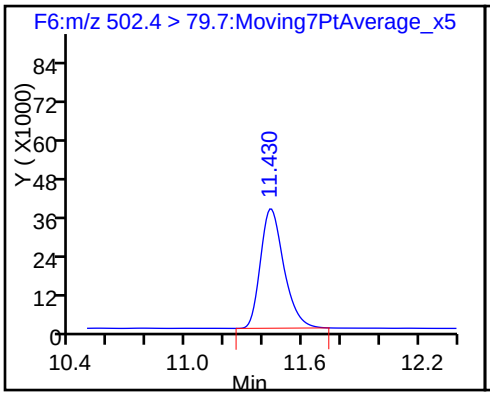
13 Perfluorooctanoic acid



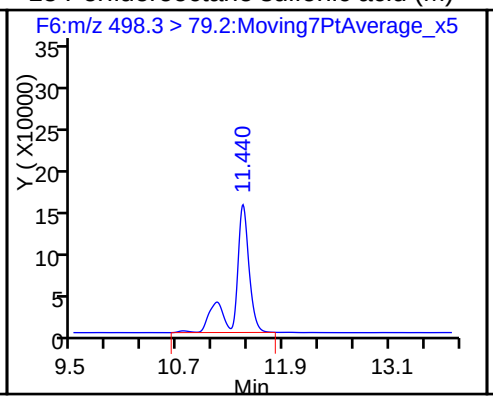
39 Perfluoroheptanesulfonic Acid



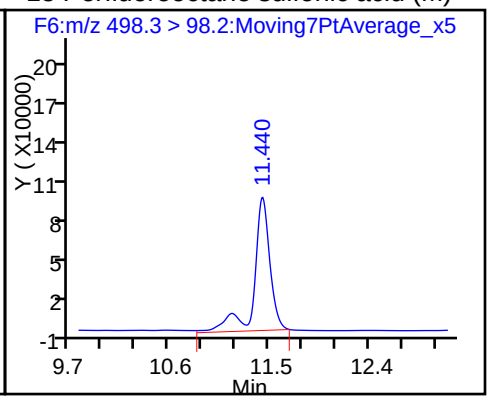
D 16 13C4 PFOS



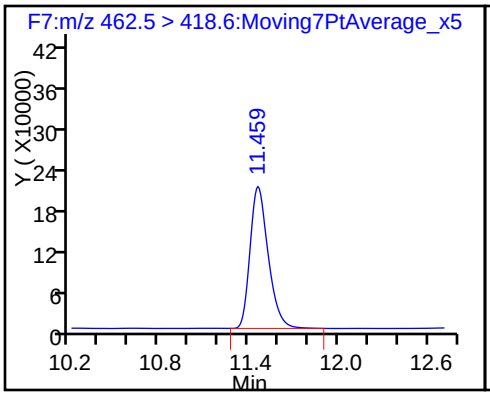
15 Perfluorooctane sulfonic acid (M)



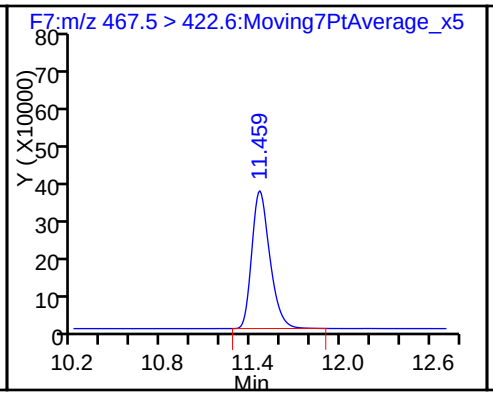
15 Perfluorooctane sulfonic acid (M)



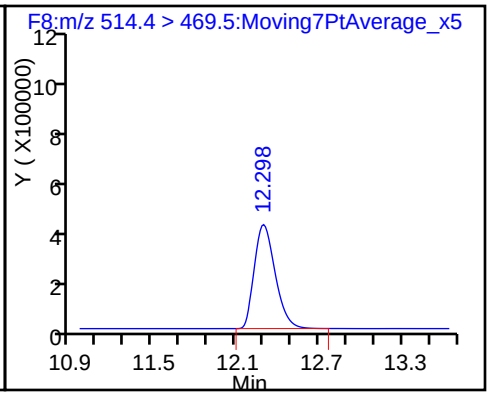
18 Perfluorononanoic acid



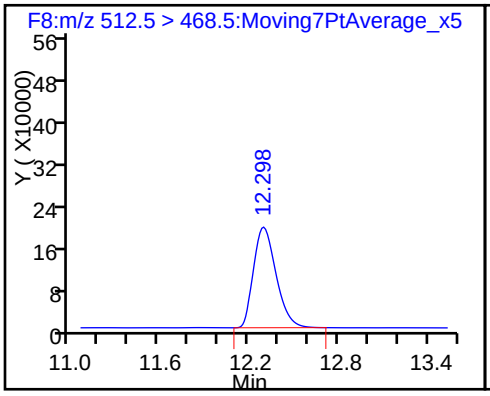
D 17 13C5 PFNA



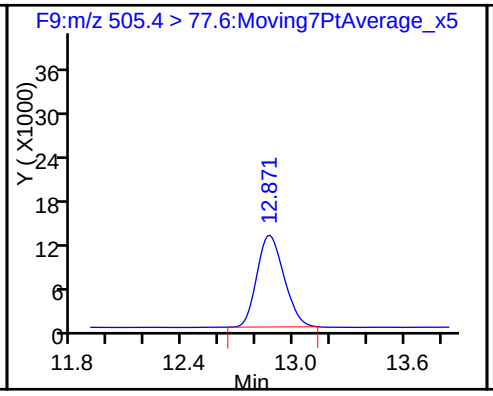
D 19 13C2 PFDA



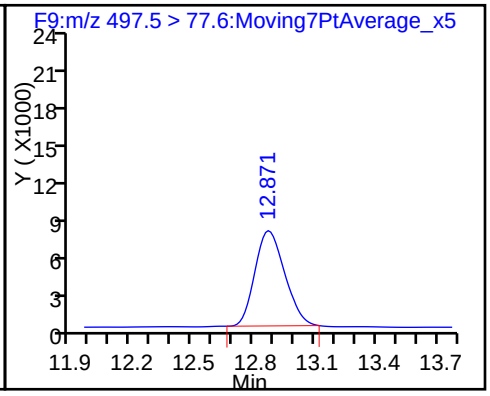
20 Perfluorodecanoic acid



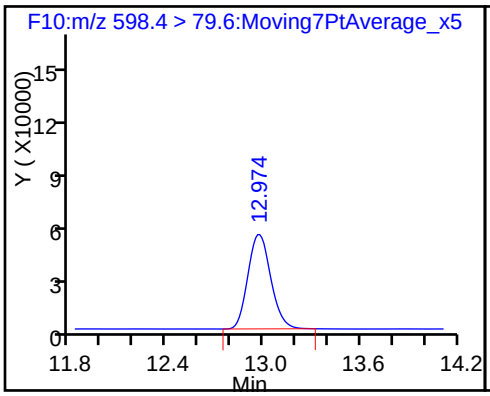
D 23 13C8 FOSA



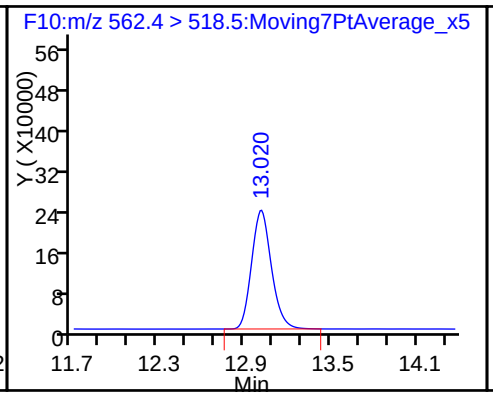
24 Perfluorooctane Sulfonamide



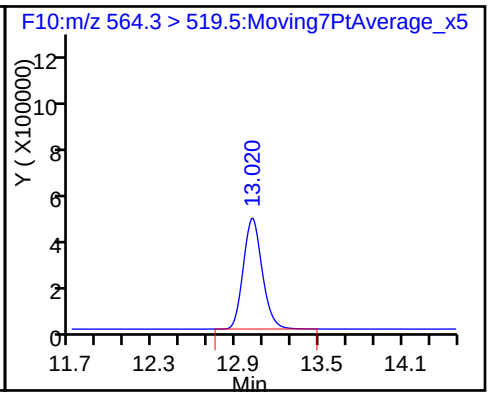
49 Perfluorodecane Sulfonic acid



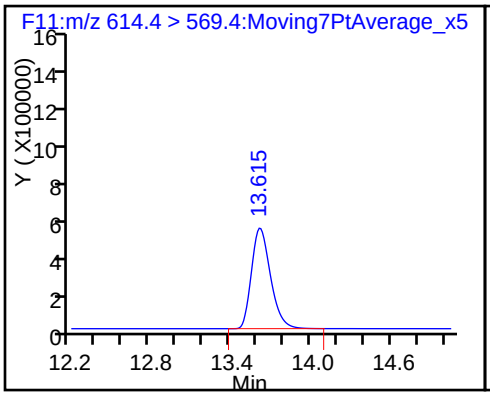
27 Perfluoroundecanoic acid



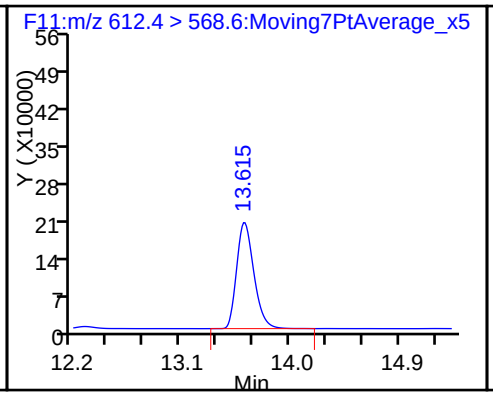
D 26 13C2 PFUnA



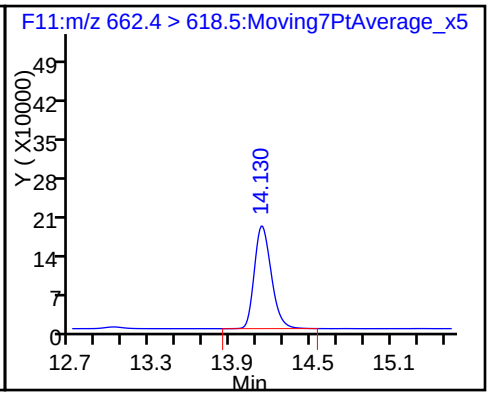
D 28 13C2 PFDoA



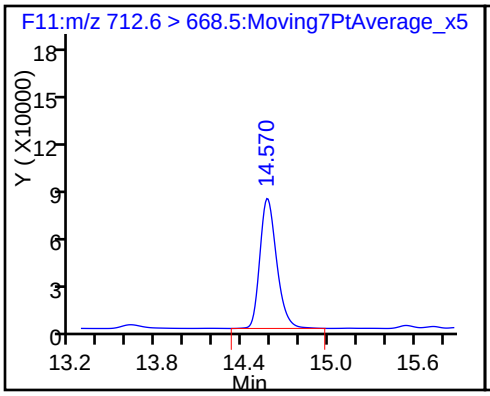
29 Perfluorododecanoic acid



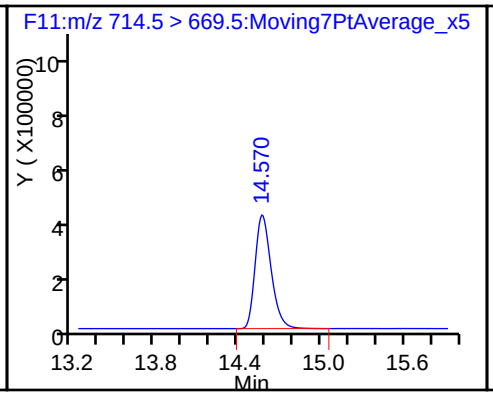
30 Perfluorotridecanoic acid



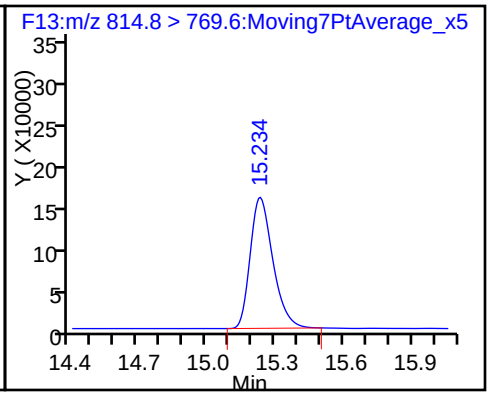
32 Perfluorotetradecanoic acid



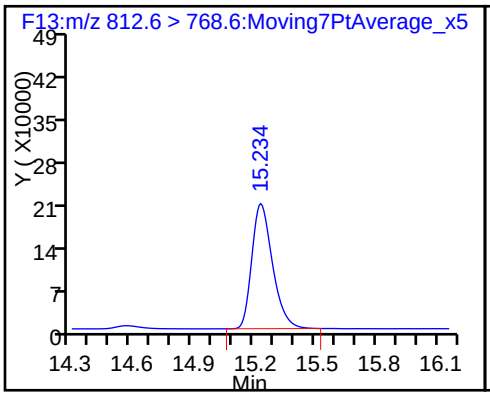
D 33 13C2-PFTeDA



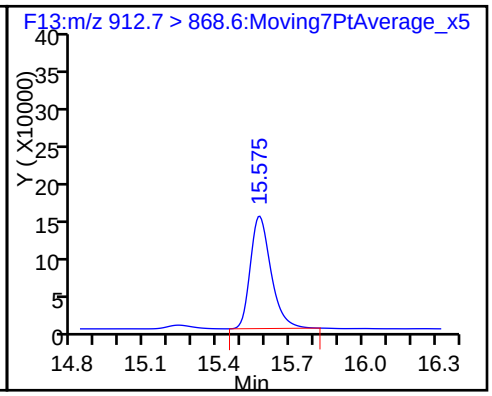
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

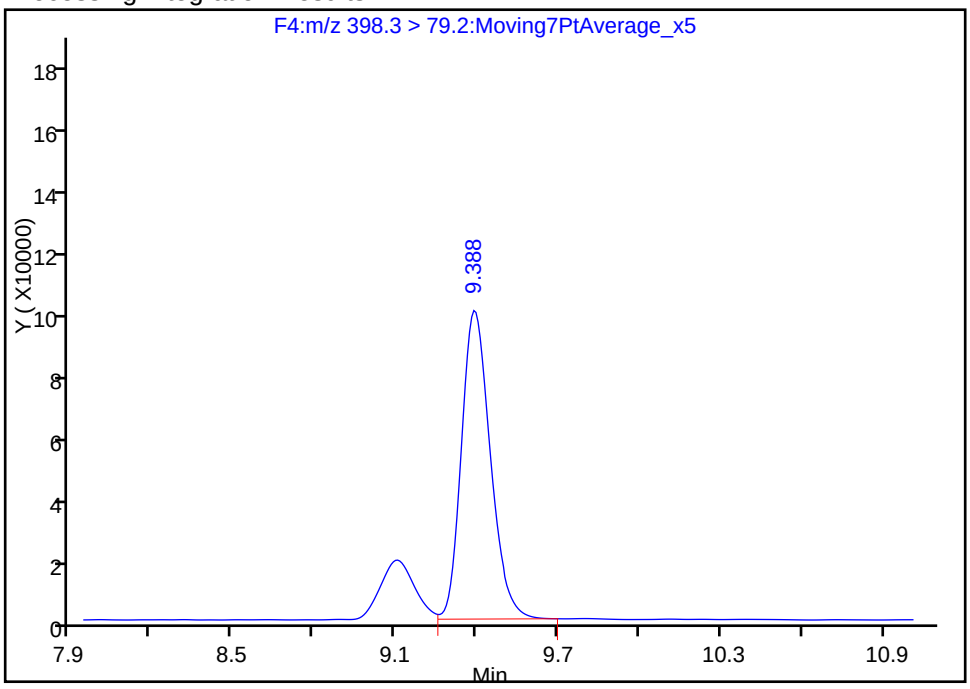
Data File:	\\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_014.d				
Injection Date:	27-May-2016 15:31:42	Instrument ID:	A4		
Lims ID:	320-18849-A-2-A MS				
Client ID:	OF-RW74-0516				
Operator ID:	JRB	ALS Bottle#:	47	Worklist Smp#:	14
Injection Vol:	15.0 ul	Dil. Factor:	1.0000		
Method:	PFAC_A4	Limit Group:	LC PFC_DOD ICAL		
Column:		Detector	F4:MRM		

58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

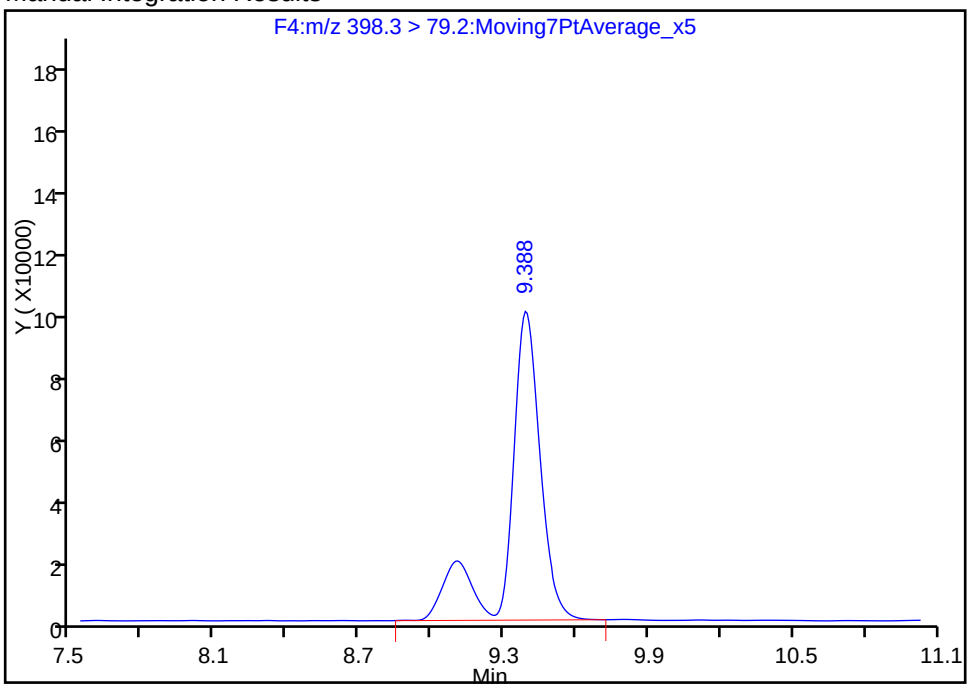
Processing Integration Results

RT: 9.39
Area: 740584
Amount: 15.000024
Amount Units: ng/ml



Manual Integration Results

RT: 9.39
Area: 909608
Amount: 18.423490
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:43:48

Audit Action: Assigned Compound ID Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

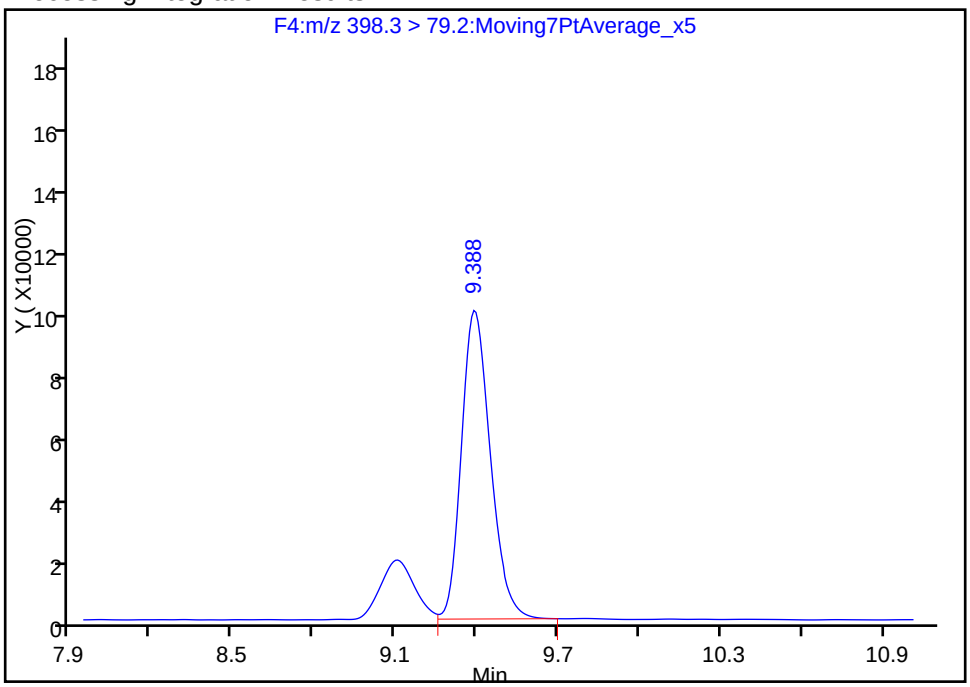
Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_014.d
Injection Date: 27-May-2016 15:31:42 Instrument ID: A4
Lims ID: 320-18849-A-2-A MS
Client ID: OF-RW74-0516
Operator ID: JRB ALS Bottle#: 47 Worklist Smp#: 14
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F4:MRM

58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

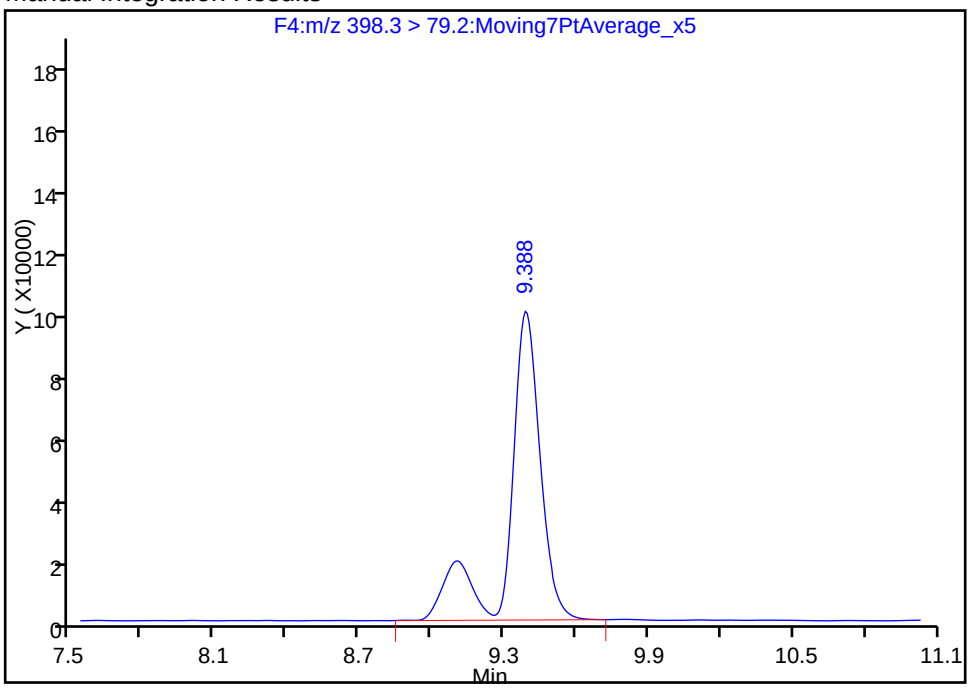
Processing Integration Results

RT: 9.39
Area: 740584
Amount: 15.000024
Amount Units: ng/ml



Manual Integration Results

RT: 9.39
Area: 909608
Amount: 18.423490
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:43:48
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

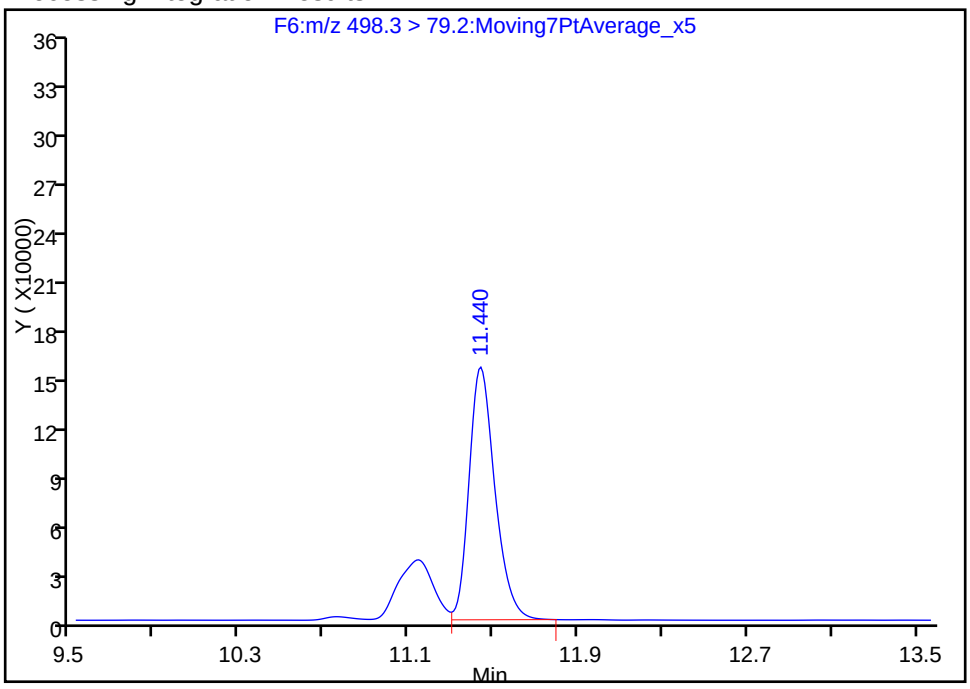
Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_014.d
Injection Date: 27-May-2016 15:31:42 Instrument ID: A4
Lims ID: 320-18849-A-2-A MS
Client ID: OF-RW74-0516
Operator ID: JRB ALS Bottle#: 47 Worklist Smp#: 14
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

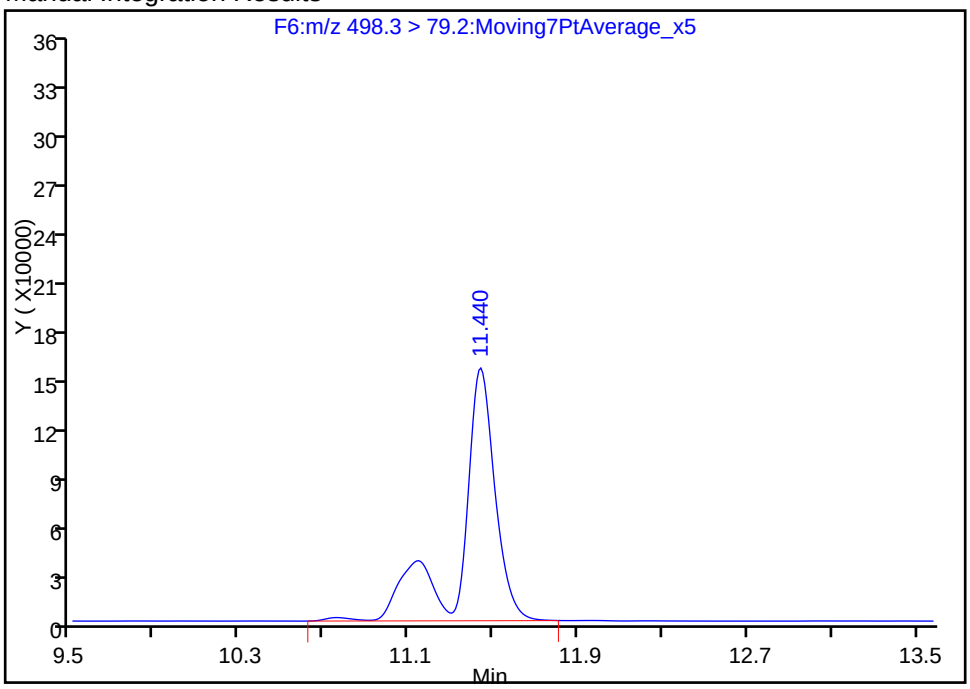
Processing Integration Results

RT: 11.44
Area: 1296482
Amount: 16.264782
Amount Units: ng/ml



Manual Integration Results

RT: 11.44
Area: 1735442
Amount: 21.742402
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:43:48
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

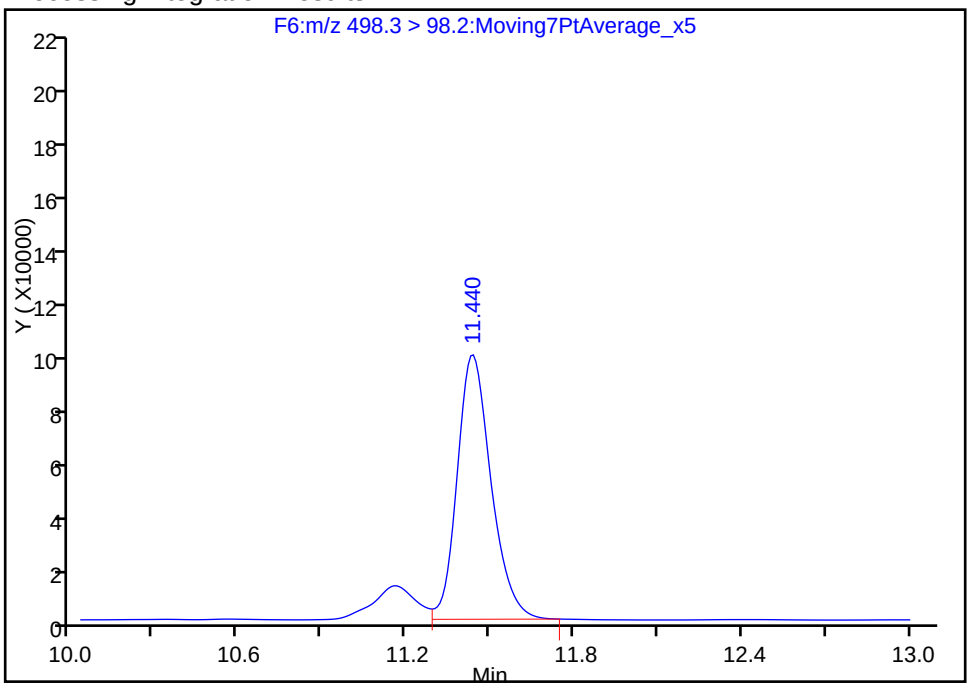
Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_014.d
Injection Date: 27-May-2016 15:31:42 Instrument ID: A4
Lims ID: 320-18849-A-2-A MS
Client ID: OF-RW74-0516
Operator ID: JRB ALS Bottle#: 47 Worklist Smp#: 14
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

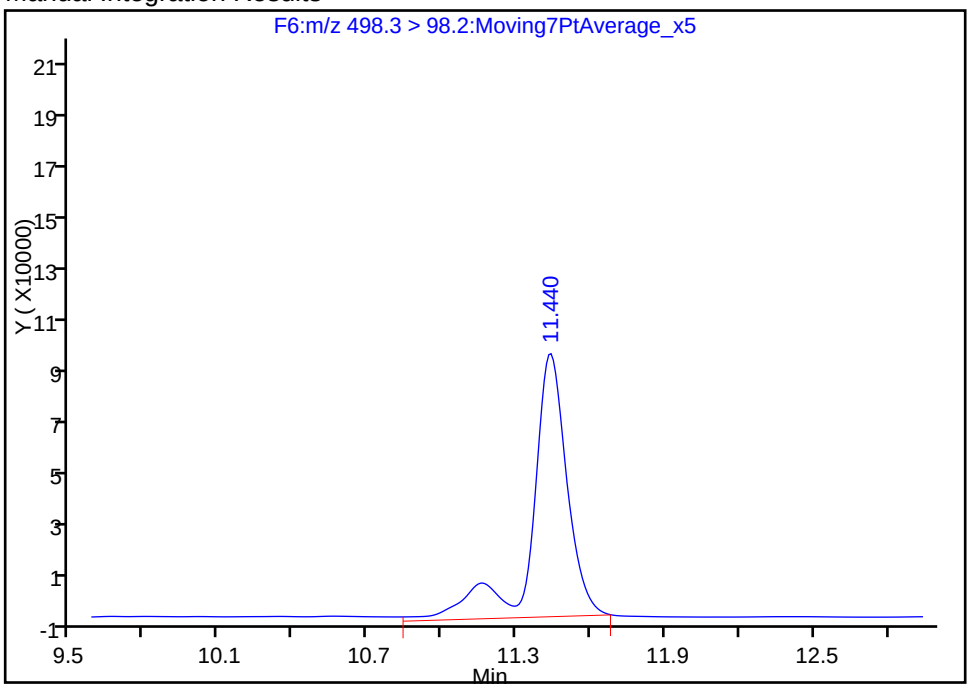
Processing Integration Results

RT: 11.44
Area: 813203
Amount: 16.264782
Amount Units: ng/ml



Manual Integration Results

RT: 11.44
Area: 970518
Amount: 21.742402
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:43:48
Audit Action: Manually Integrated Audit Reason: Isomers

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-18849-1

SDG No.:

Client Sample ID: OF-RW74-0516 MSD | Lab Sample ID: 320-18849-2 MSD

Matrix: Water | Lab File ID: 27MAY2016B4A_015.d

Analysis Method: WS-LC-0025 | Date Collected: 05/11/2016 14:17

Extraction Method: 3535 | Date Extracted: 05/17/2016 11:08

Sample wt/vol: 513.5(mL) | Date Analyzed: 05/27/2016 15:54

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 15(uL) | GC Column: Acquity ID: 2.1(mm)

% Moisture: | GPC Cleanup:(Y/N) N

Analysis Batch No.: 111733 | Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0395		0.0024	0.0019	0.00078
335-67-1	Perfluorooctanoic acid (PFOA)	0.0396		0.0024	0.0019	0.00073
375-95-1	Perfluorononanoic acid (PFNA)	0.0421		0.0024	0.0019	0.00064
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0329		0.0024	0.0019	0.00089
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0382	M	0.0024	0.0019	0.00085
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0415	M	0.0039	0.0029	0.0012

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	18O2 PFHxS	89		25-150
STL00991	13C4 PFOS	95		25-150
STL00995	13C5 PFNA	65		25-150
STL00990	13C4 PFOA	68		25-150
STL01892	13C4-PFHpA	75		25-150

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_015.d
Lims ID: 320-18849-A-2-B MSD
Client ID: OF-RW74-0516
Sample Type: MSD
Inject. Date: 27-May-2016 15:54:00 ALS Bottle#: 48 Worklist Smp#: 15
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Sample Info: 320-18849-a-2-b msd
Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C
Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m
Limit Group: LC PFC_DOD ICAL
Last Update: 31-May-2016 10:45:21 Calib Date: 27-May-2016 13:24:04
Integrator: Picker
Quant Method: Isotopic Dilution Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1 : Det: F1:MRM
Process Host: XAWRK048

First Level Reviewer: barnettj Date: 31-May-2016 10:31:21

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA										
216.7 > 171.5	5.787	5.790	-0.003		2146164	20.7		41.5	6395	
2 Perfluorobutyric acid										
212.7 > 168.6	5.787	5.792	-0.005	1.000	609608	21.9		109	942	
D 3 13C5-PFPeA										
267.6 > 222.7	6.890	6.892	-0.002		2427213	32.0		64.0	3915	
4 Perfluoropentanoic acid										
262.9 > 218.7	6.890	6.895	-0.005	1.000	488721	20.4		102	56.0	
5 Perfluorobutane Sulfonate										
298.8 > 79.6	7.005	7.011	-0.006	1.000	302548	NC			245	
298.8 > 98.6	7.001	7.011	-0.010	0.999	195246		1.55(0.00-0.00)		111	
51 Perfluorobutanesulfonic acid										
298.8 > 79.6	7.005	7.011	-0.006	1.000	302548	16.9		95.5		
D 6 13C2 PFHxA										
314.6 > 269.7	8.133	8.138	-0.005		3248986	34.7		69.4	7286	
7 Perfluorohexanoic acid										
312.9 > 268.7	8.138	8.140	-0.002	1.000	596931	19.7		98.3	138	
22 PFPeS (Perflouro-1-pentanesulfonat										
348.7 > 79.5	8.220	8.231	-0.011	0.875	4252	NC			9.0	
9 Perfluoroheptanoic acid										
362.8 > 318.7	9.365	9.365	0.0	1.000	681593	20.3		101	247	
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		3128356	37.3		74.5	5589	
D 11 18O2 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1279327	42.2		89.2	2647	
58 Perfluorohexanesulfonic acid										M
398.3 > 79.2	9.396	9.401	-0.005	1.000	834317	19.6		108		M
10 Perfluorohexane Sulfonate										M
398.3 > 79.2	9.401	9.401	0.0	1.000	0	NC			852	M

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFOA										
416.5 > 371.6	10.482	10.483	-0.001		3265485	34.1		68.1	5223	
13 Perfluorooctanoic acid										
412.8 > 368.8	10.482	10.485	-0.003	1.000	605049	20.3		102	239	
412.8 > 168.7	10.482	10.485	-0.003	1.000	195959		3.09(0.00-0.00)		728	
39 Perfluoroheptanesulfonic Acid										
448.3 > 79.2	10.482	10.485	-0.003	1.000	983483	21.1		111		
14 Perfluoroheptane Sulfonate										
448.3 > 79.2	10.482	10.485	-0.003	1.000	983483	NC			3090	
D 16 13C4 PFOS										
502.4 > 79.7	11.440	11.441	-0.001		284774	45.6		95.3	546	
15 Perfluorooctane sulfonic acid										M
498.3 > 79.2	11.440	11.443	-0.003	1.000	1529891	21.3		115	2197	M
498.3 > 98.2	11.440	11.443	-0.003	1.000	854179		1.79(0.00-0.00)		530	M
18 Perfluorononanoic acid										
462.5 > 418.6	11.459	11.462	-0.003	1.000	1454884	21.6		108	939	
D 17 13C5 PFNA										
467.5 > 422.6	11.459	11.462	-0.003		2655345	32.7		65.3	4960	
D 19 13C2 PFDA										
514.4 > 469.5	12.298	12.299	-0.001		3488779	33.9		67.7	7027	
20 Perfluorodecanoic acid										
512.5 > 468.5	12.298	12.299	-0.001	1.000	1705872	22.7		114	869	
D 23 13C8 FOSA										
505.4 > 77.6	12.871	12.871	0.0		159387	1.68		3.4	486	
24 Perfluorooctane Sulfonamide										
497.5 > 77.6	12.884	12.873	0.011	1.000	110714	33.0		165	485	
25 Perfluorodecane Sulfonate										
598.4 > 79.6	12.974	12.969	0.005	1.000	510941	NC			1768	
49 Perfluorodecane Sulfonic acid										
598.4 > 79.6	12.974	12.969	0.005	1.000	510941	22.9		119		
27 Perfluoroundecanoic acid										
562.4 > 518.5	13.020	13.021	-0.001	1.000	2090250	22.7		114	2072	
D 26 13C2 PFUnA										
564.3 > 519.5	13.020	13.021	-0.001		3962328	36.5		73.0	3921	
D 28 13C2 PFDoA										
614.4 > 569.4	13.627	13.626	0.001		4652897	41.8		83.7	3896	
29 Perfluorododecanoic acid										
612.4 > 568.6	13.627	13.626	0.001	1.000	1902071	22.3		111	1253	
30 Perfluorotridecanoic acid										
662.4 > 618.5	14.140	14.138	0.002	1.000	1603841	25.1		126	854	
32 Perfluorotetradecanoic acid										
712.6 > 668.5	14.579	14.577	0.002	1.000	615583	17.9		89.3	326	
D 33 13C2-PFTeDA										
714.5 > 669.5	14.579	14.579	0.0		3091414	39.8		79.5	3019	
D 35 13C2-PFHxDA										
814.8 > 769.6	15.234	15.235	-0.001		976078	32.8		65.6	2506	
34 Perfluorohexadecanoic acid										
812.6 > 768.6	15.234	15.235	-0.001	1.000	1430127	25.4		127	279	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
36 Perfluorooctandecanoic acid										
912.7 > 868.6	15.575	15.575	0.0	1.000	839351	19.6		97.8	1309	

QC Flag Legend

Processing Flags

NC - Not Calibrated

Review Flags

M - Manually Integrated

Report Date: 31-May-2016 10:45:31 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_015.d

Injection Date: 27-May-2016 15:54:00 Instrument ID: A4

Lims ID: 320-18849-A-2-B MSD

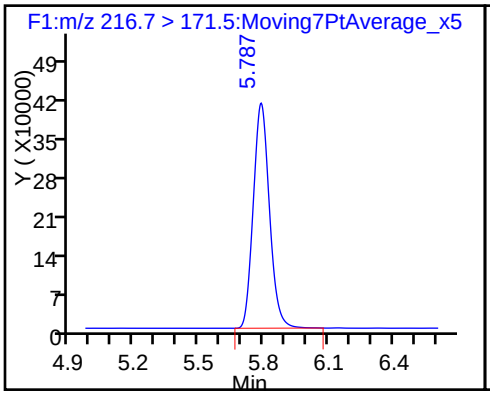
Client ID: OF-RW74-0516

Operator ID: JRB ALS Bottle#: 48 Worklist Smp#: 15

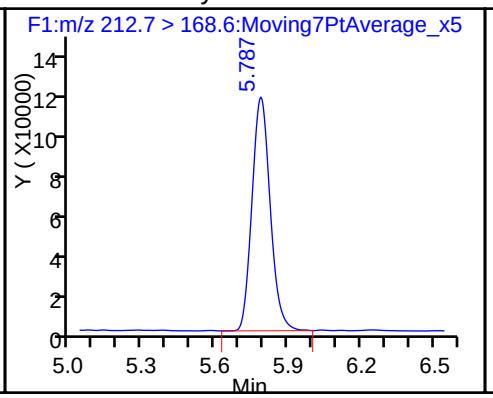
Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

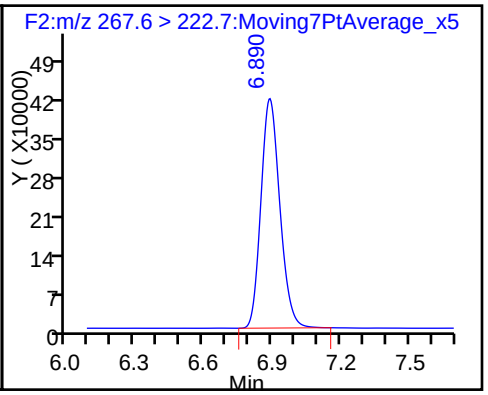
D 1 13C4 PFBA



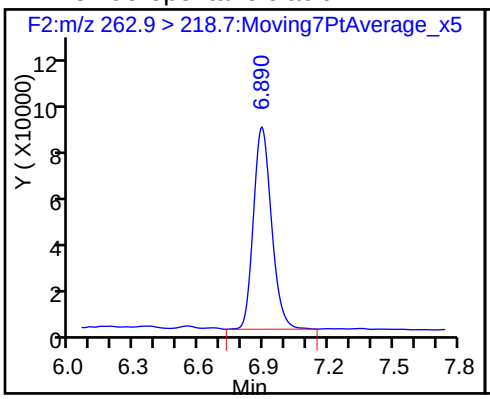
2 Perfluorobutyric acid



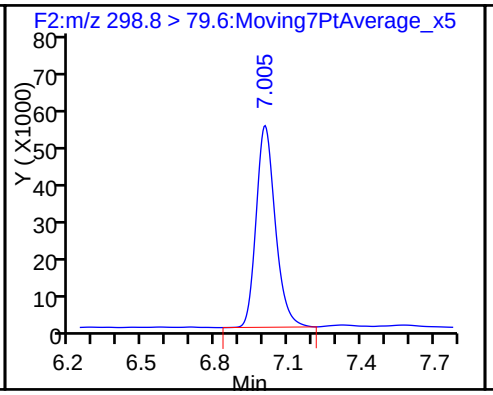
D 3 13C5-PFPeA



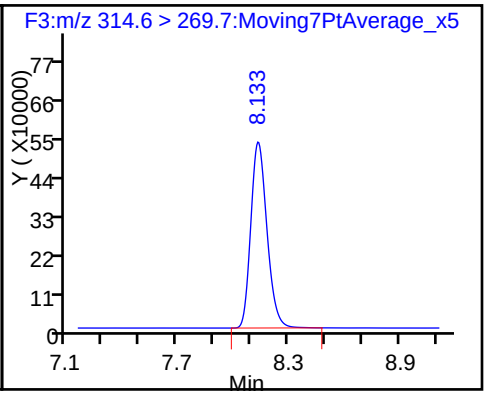
4 Perfluoropentanoic acid



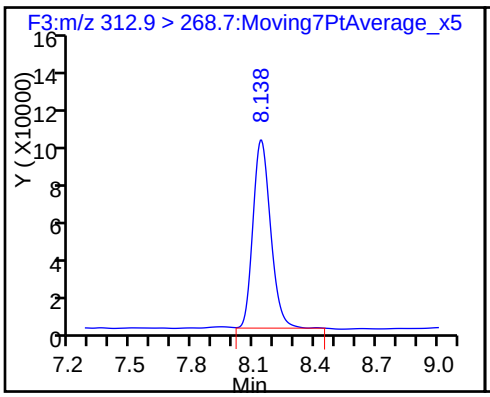
51 Perfluorobutanesulfonic acid



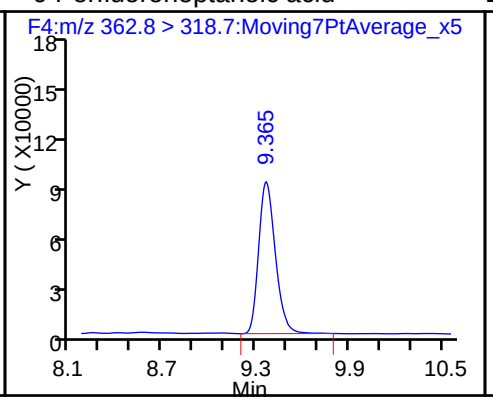
D 6 13C2 PFHxA



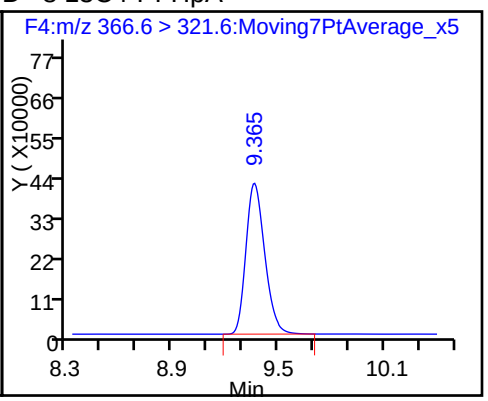
7 Perfluorohexanoic acid



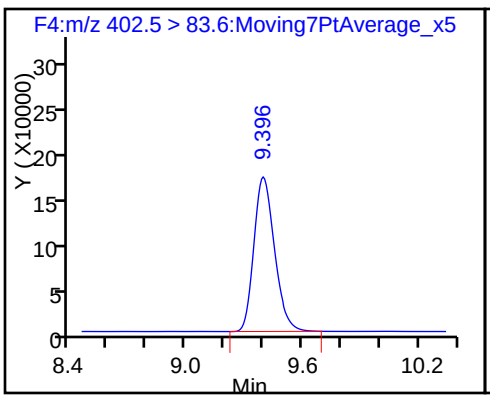
9 Perfluoroheptanoic acid



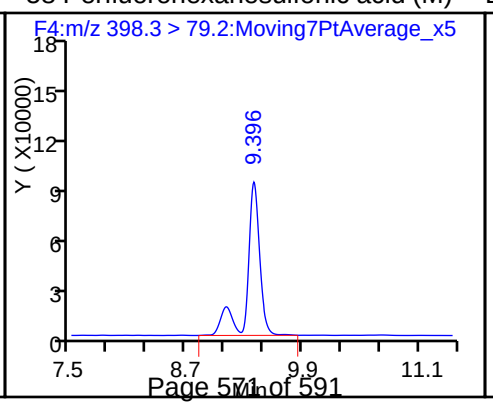
D 8 13C4-PFHpA



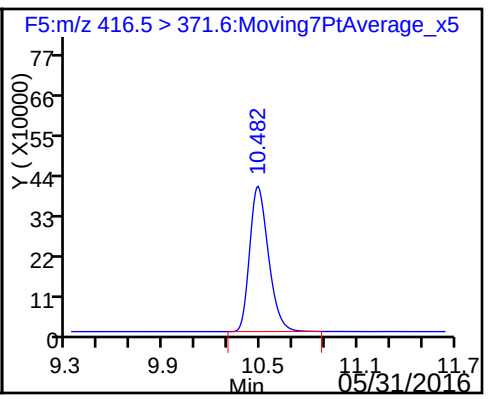
D 11 18O2 PFHxS



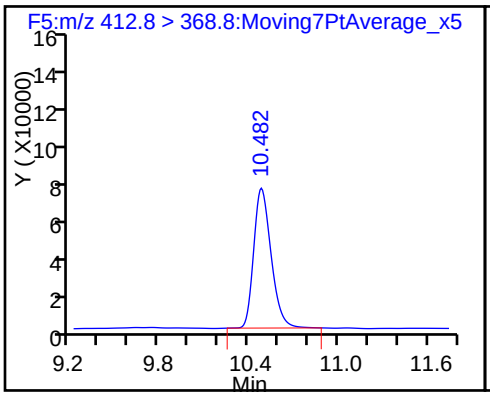
58 Perfluorohexanesulfonic acid (M)



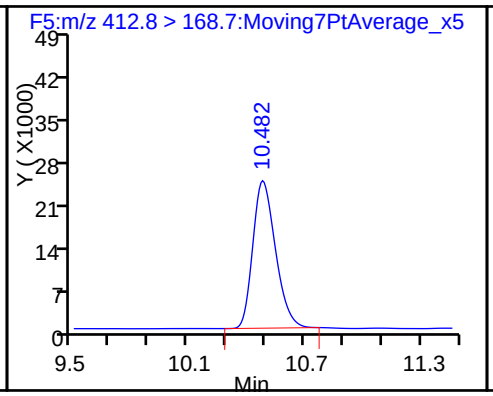
D 12 13C4 PFOA



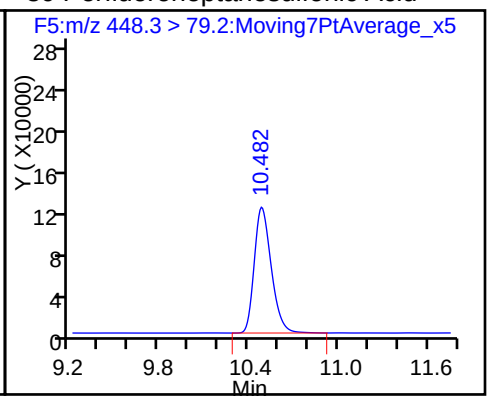
13 Perfluorooctanoic acid



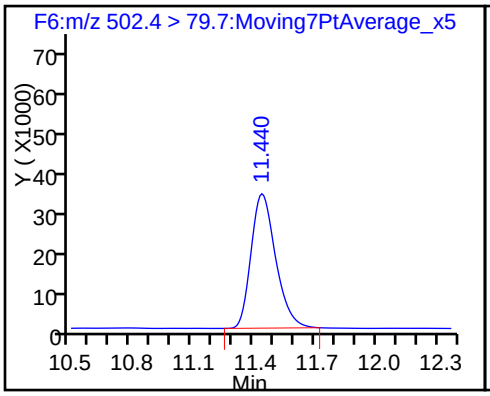
13 Perfluorooctanoic acid



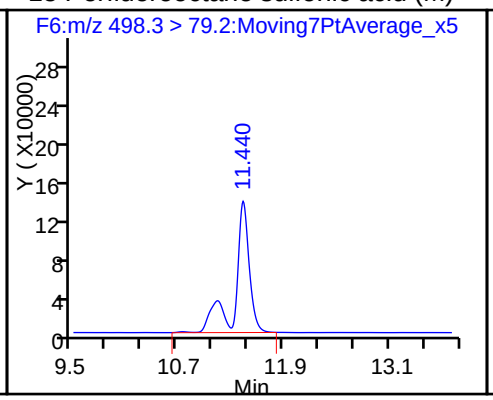
39 Perfluoroheptanesulfonic Acid



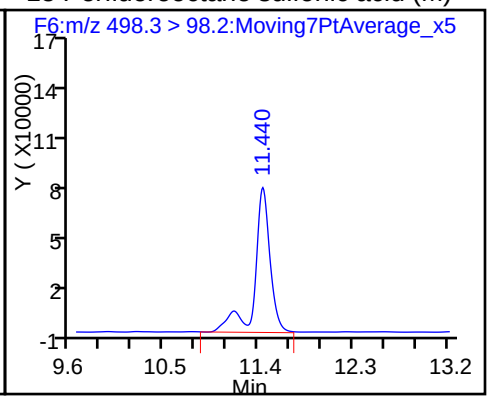
D 16 13C4 PFOS



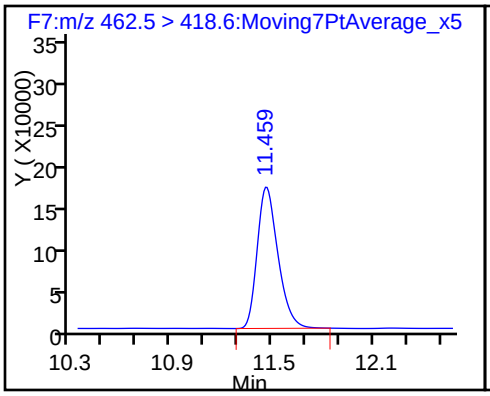
15 Perfluorooctane sulfonic acid (M)



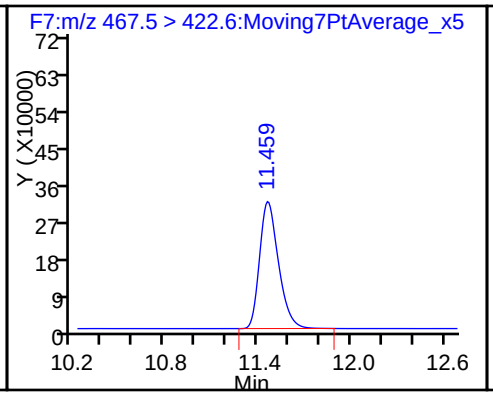
15 Perfluorooctane sulfonic acid (M)



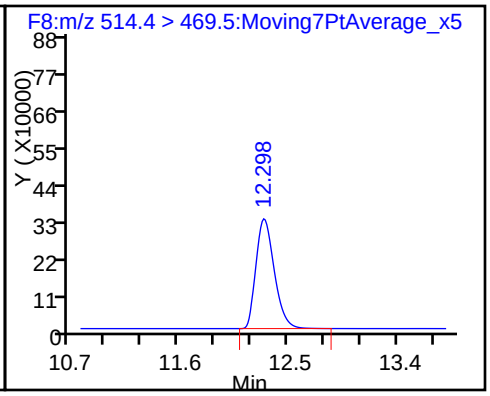
18 Perfluorononanoic acid



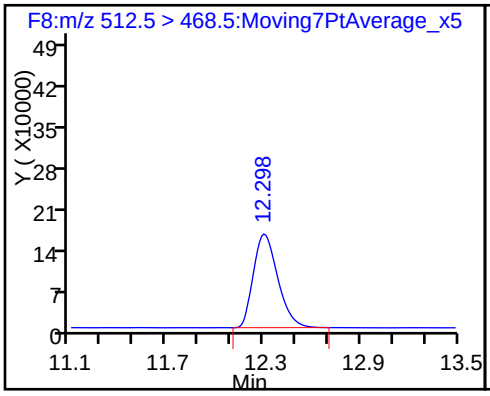
D 17 13C5 PFNA



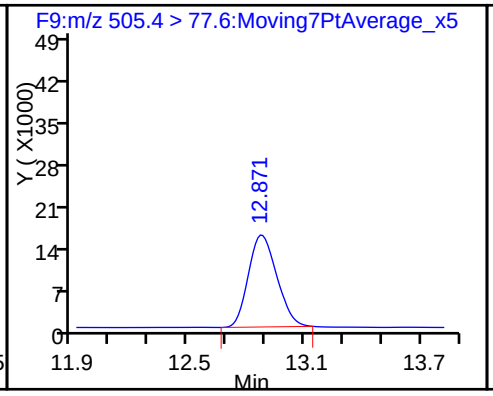
D 19 13C2 PFDA



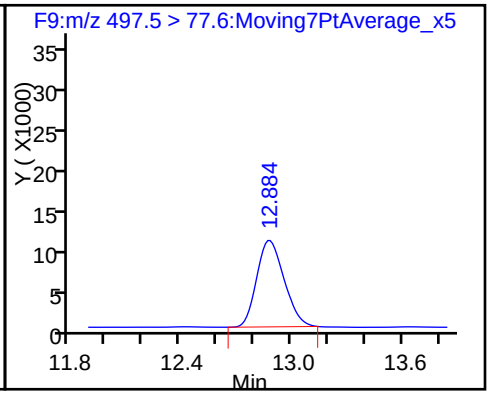
20 Perfluorodecanoic acid



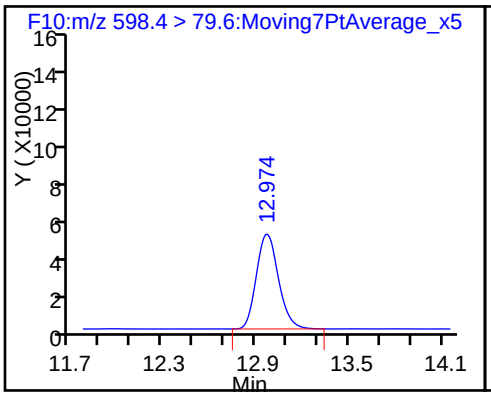
D 23 13C8 FOSA



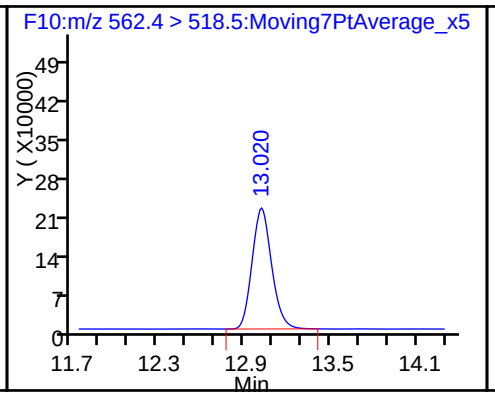
24 Perfluorooctane Sulfonamide



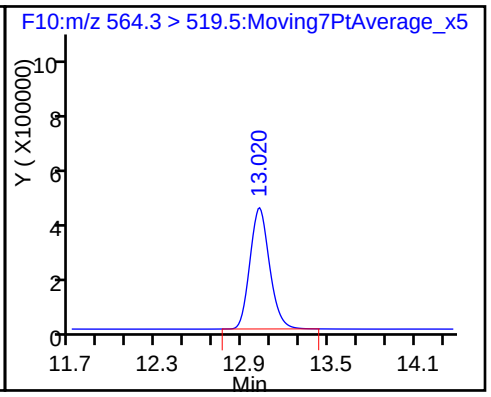
49 Perfluorodecane Sulfonic acid



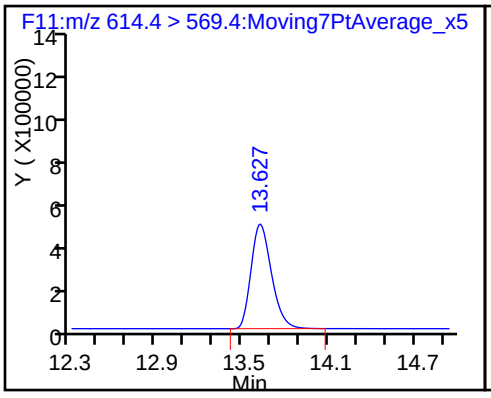
27 Perfluoroundecanoic acid



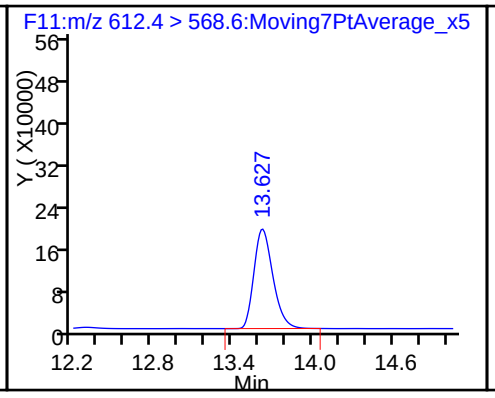
D 26 13C2 PFUnA



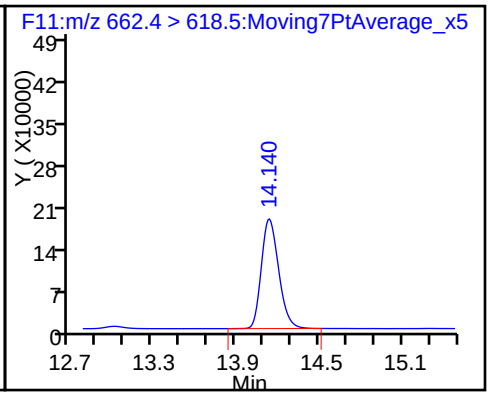
D 28 13C2 PFDoA



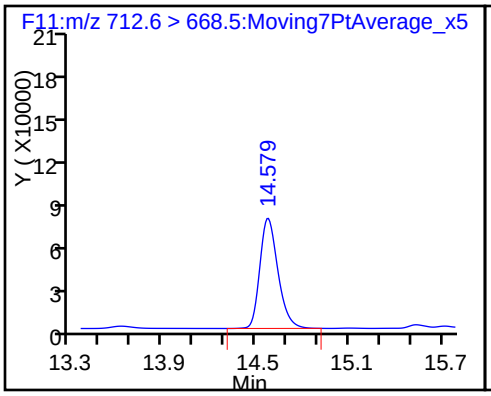
29 Perfluorododecanoic acid



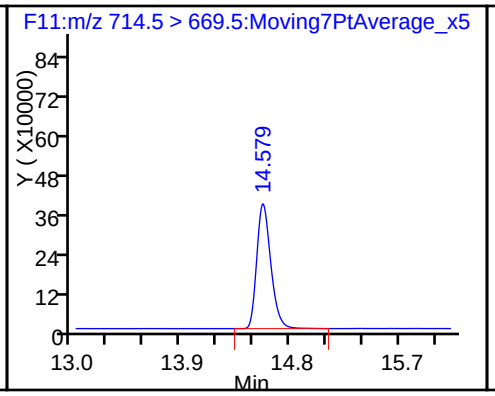
30 Perfluorotridecanoic acid



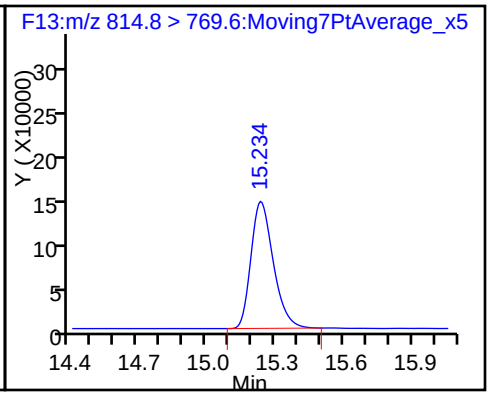
32 Perfluorotetradecanoic acid



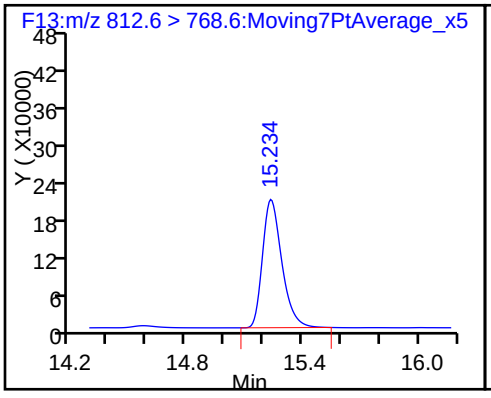
D 33 13C2-PFTeDA



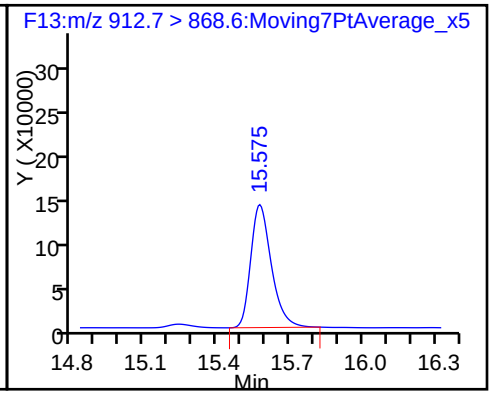
D 35 13C2-PFHxDA



34 Perfluorohexadecanoic acid



36 Perfluorooctandecanoic acid



Manual Integration/User Assign Peak Report

TestAmerica Sacramento

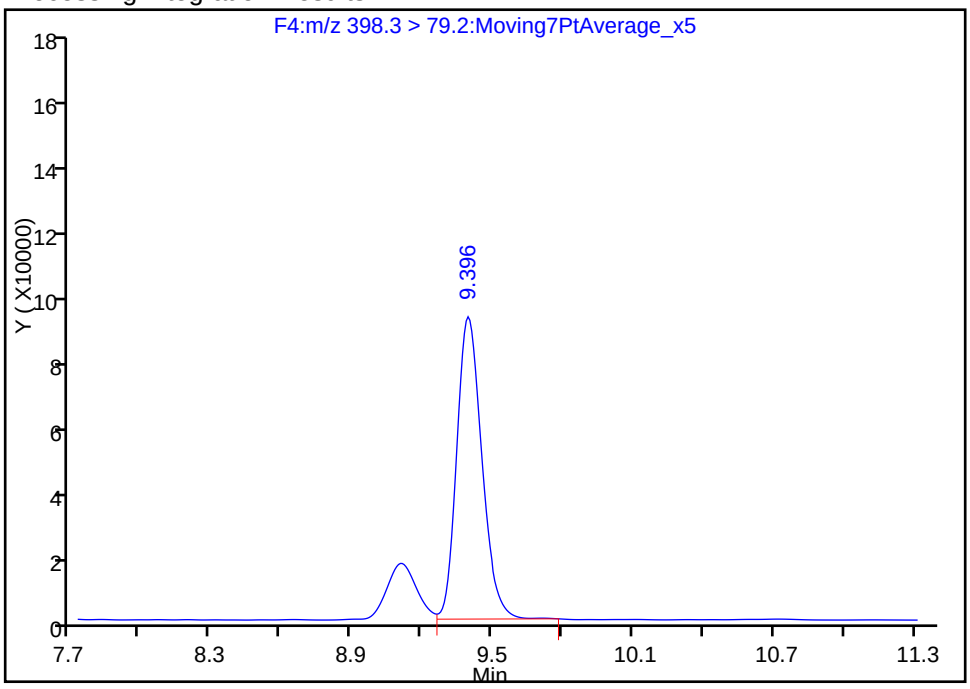
Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_015.d
Injection Date: 27-May-2016 15:54:00 Instrument ID: A4
Lims ID: 320-18849-A-2-B MSD
Client ID: OF-RW74-0516
Operator ID: JRB ALS Bottle#: 48 Worklist Smp#: 15
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F4:MRM

58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

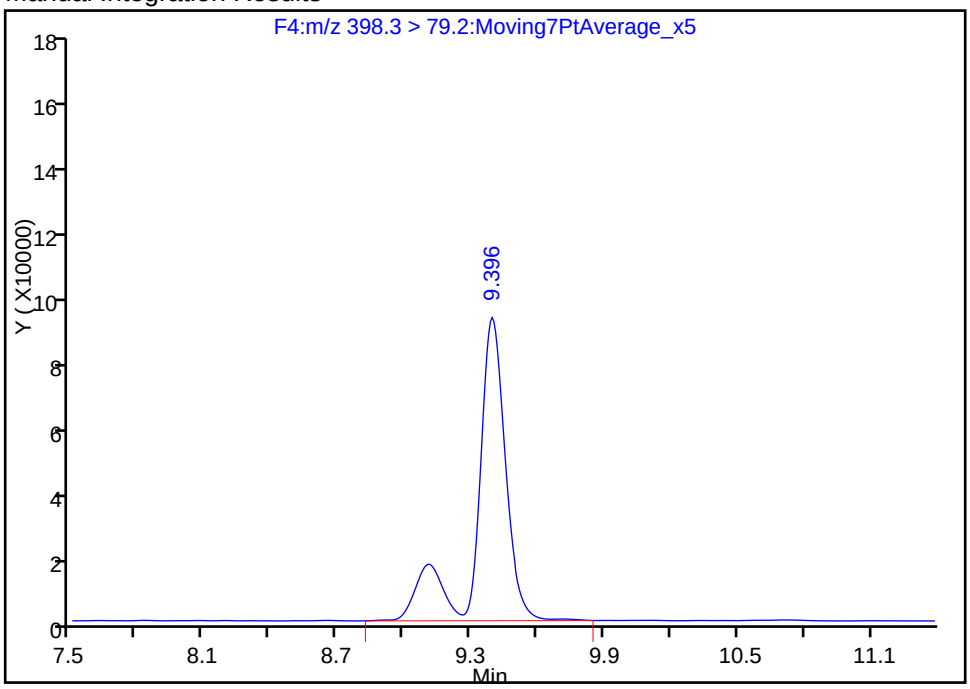
Processing Integration Results

RT: 9.40
Area: 675231
Amount: 15.860439
Amount Units: ng/ml



Manual Integration Results

RT: 9.40
Area: 834317
Amount: 19.597196
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:45:13
Audit Action: Assigned Compound ID Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

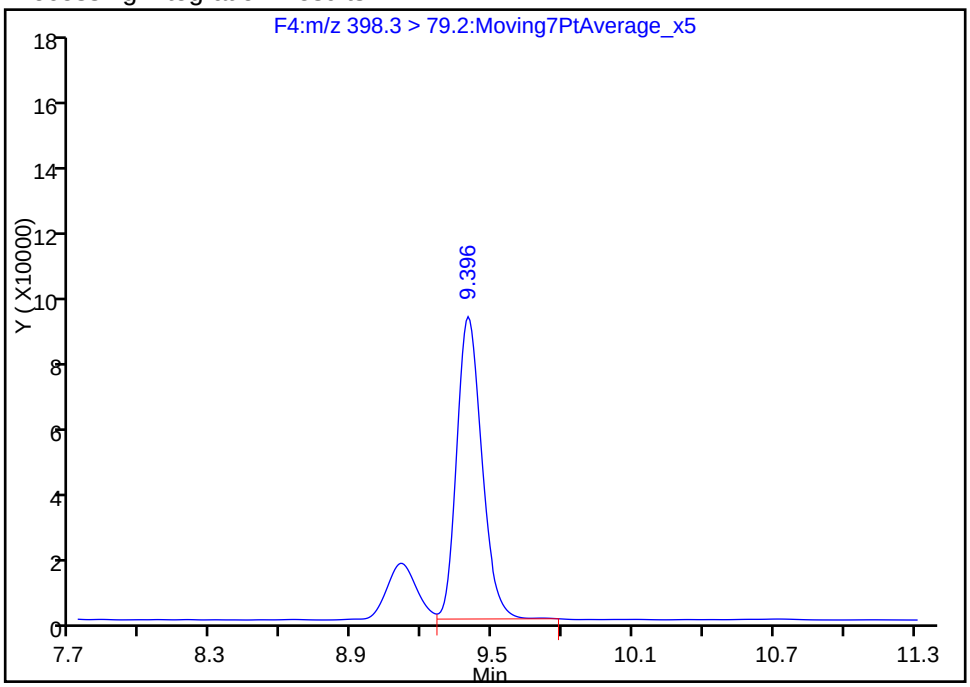
Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_015.d
Injection Date: 27-May-2016 15:54:00 Instrument ID: A4
Lims ID: 320-18849-A-2-B MSD
Client ID: OF-RW74-0516
Operator ID: JRB ALS Bottle#: 48 Worklist Smp#: 15
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F4:MRM

58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

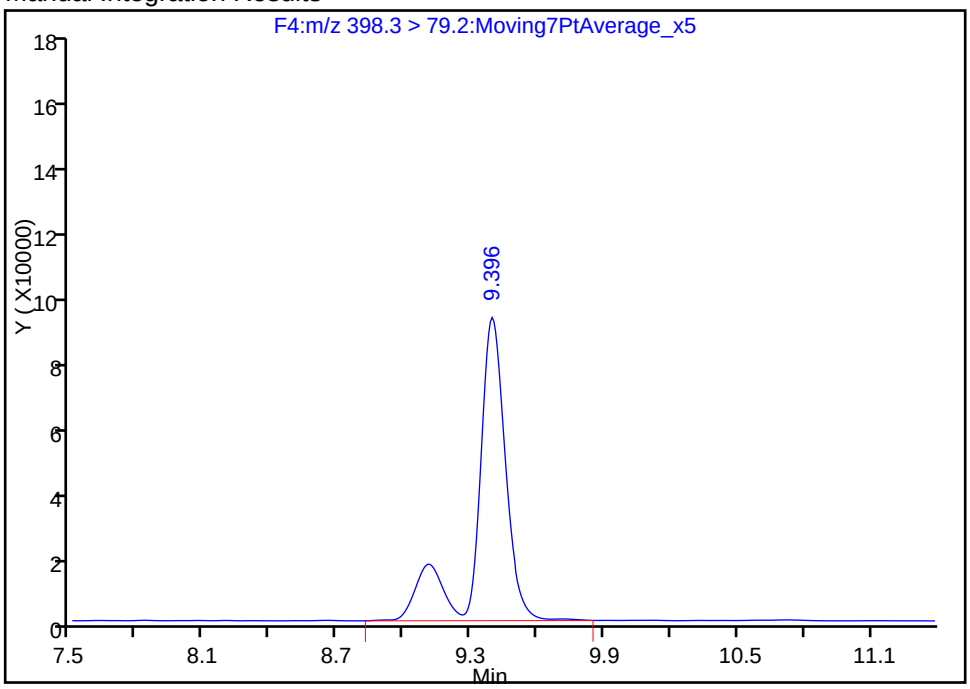
Processing Integration Results

RT: 9.40
Area: 675231
Amount: 15.860439
Amount Units: ng/ml



Manual Integration Results

RT: 9.40
Area: 834317
Amount: 19.597196
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 10:30:38
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

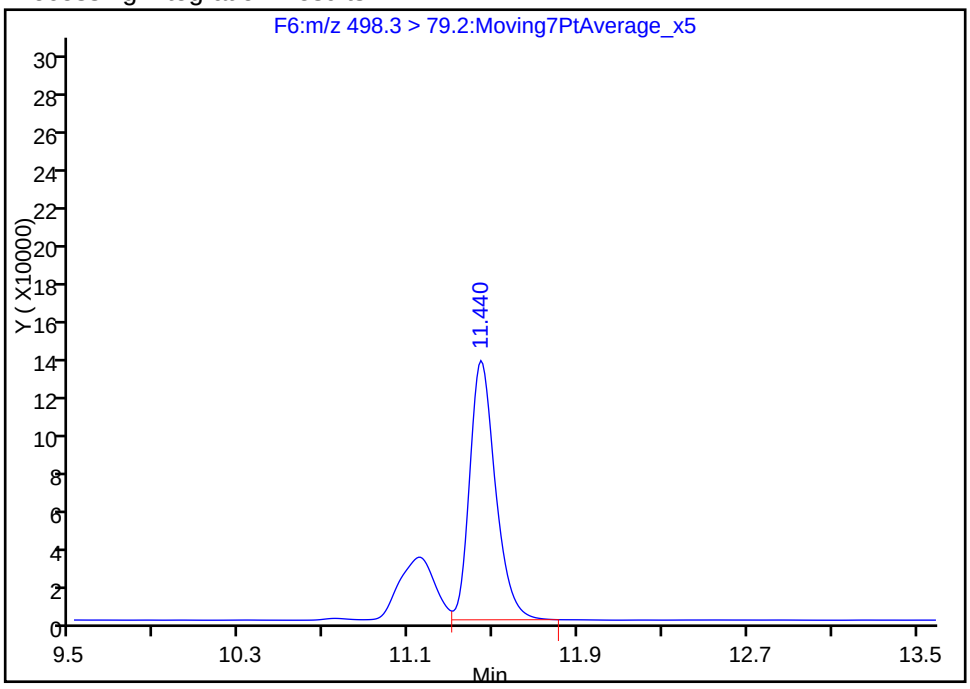
Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_015.d
Injection Date: 27-May-2016 15:54:00 Instrument ID: A4
Lims ID: 320-18849-A-2-B MSD
Client ID: OF-RW74-0516
Operator ID: JRB ALS Bottle#: 48 Worklist Smp#: 15
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

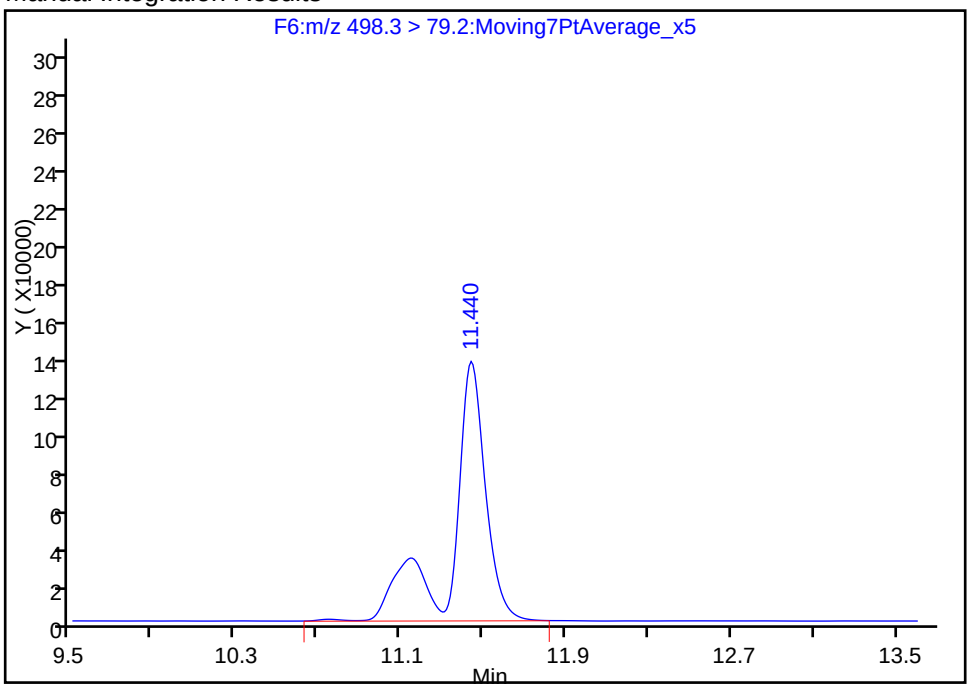
Processing Integration Results

RT: 11.44
Area: 1137400
Amount: 15.882866
Amount Units: ng/ml



Manual Integration Results

RT: 11.44
Area: 1529891
Amount: 21.333848
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:45:13
Audit Action: Manually Integrated Audit Reason: Isomers

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

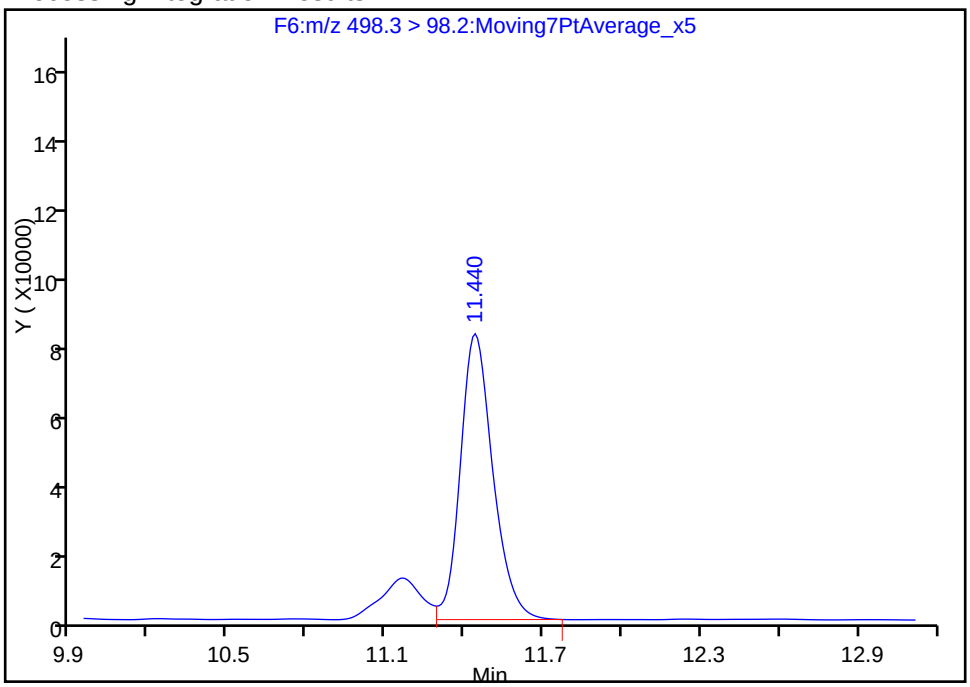
Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_015.d
Injection Date: 27-May-2016 15:54:00 Instrument ID: A4
Lims ID: 320-18849-A-2-B MSD
Client ID: OF-RW74-0516
Operator ID: JRB ALS Bottle#: 48 Worklist Smp#: 15
Injection Vol: 15.0 ul Dil. Factor: 1.0000
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

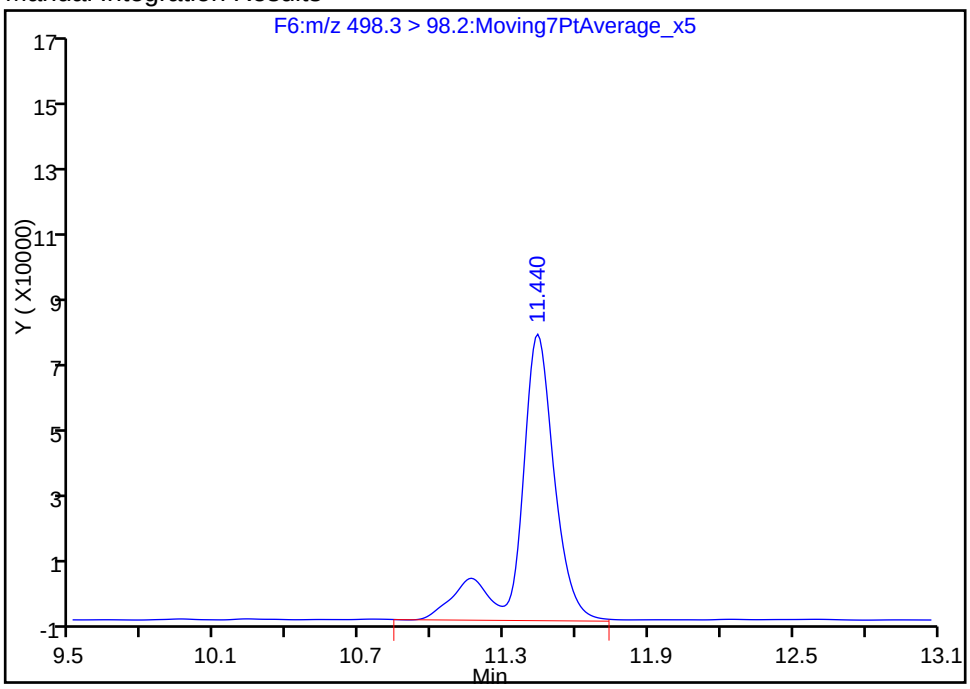
Processing Integration Results

RT: 11.44
Area: 715431
Amount: 15.882866
Amount Units: ng/ml



Manual Integration Results

RT: 11.44
Area: 854179
Amount: 21.333848
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 09:45:13
Audit Action: Manually Integrated Audit Reason: Isomers

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Instrument ID: A4 Start Date: 05/25/2016 16:55

Analysis Batch Number: 111390 End Date: 05/26/2016 18:53

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
STD 320-111390/5 IC		05/25/2016 16:55	1	25MAY2016B4A_005.d	Acquity 2.1(mm)
STD 320-111390/6 IC		05/25/2016 17:15	1	25MAY2016B4A_006.d	Acquity 2.1(mm)
STD 320-111390/7 IC		05/25/2016 17:36	1	25MAY2016B4A_007.d	Acquity 2.1(mm)
STD 320-111390/8 IC		05/25/2016 17:58	1	25MAY2016B4A_008.d	Acquity 2.1(mm)
STD 320-111390/9 IC		05/25/2016 18:19	1	25MAY2016B4A_009.d	Acquity 2.1(mm)
STD 320-111390/10 IC		05/25/2016 18:40	1	25MAY2016B4A_010.d	Acquity 2.1(mm)
STD 320-111390/11 IC		05/25/2016 19:01	1	25MAY2016B4A_011.d	Acquity 2.1(mm)
ZZZZZ		05/25/2016 19:22	1		Acquity 2.1(mm)
ICV 320-111390/13		05/25/2016 19:44	1	25MAY2016B4A_013.d	Acquity 2.1(mm)
ZZZZZ		05/25/2016 20:05	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 20:26	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 20:47	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 21:08	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 21:29	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 21:51	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 22:12	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 22:33	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 22:54	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 23:15	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 23:37	1		Acquity 2.1(mm)
ZZZZZ		05/25/2016 23:58	1		Acquity 2.1(mm)
CCV 320-111390/26		05/26/2016 00:19	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 00:40	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 01:01	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 01:22	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 01:44	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 02:05	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 02:26	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 02:47	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 03:08	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 03:29	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 03:51	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 04:12	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 04:33	1		Acquity 2.1(mm)
CCV 320-111390/39		05/26/2016 04:54	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 05:15	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 05:37	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 05:58	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 06:19	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 06:40	20		Acquity 2.1(mm)
ZZZZZ		05/26/2016 07:01	20		Acquity 2.1(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Instrument ID: A4 Start Date: 05/25/2016 16:55

Analysis Batch Number: 111390 End Date: 05/26/2016 18:53

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
ZZZZZ		05/26/2016 07:22	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 07:44	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 08:05	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 08:26	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 08:47	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 09:08	1		Acquity 2.1(mm)
CCV 320-111390/52		05/26/2016 09:30	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 09:51	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 10:12	20		Acquity 2.1(mm)
ZZZZZ		05/26/2016 10:33	100		Acquity 2.1(mm)
ZZZZZ		05/26/2016 10:58	20		Acquity 2.1(mm)
ZZZZZ		05/26/2016 11:21	20		Acquity 2.1(mm)
ZZZZZ		05/26/2016 11:42	20		Acquity 2.1(mm)
ZZZZZ		05/26/2016 12:03	20		Acquity 2.1(mm)
ZZZZZ		05/26/2016 12:24	20		Acquity 2.1(mm)
ZZZZZ		05/26/2016 12:46	20		Acquity 2.1(mm)
ZZZZZ		05/26/2016 13:07	20		Acquity 2.1(mm)
CCV 320-111390/64		05/26/2016 13:49	1	25MAY2016B4A_064.d	Acquity 2.1(mm)
ZZZZZ		05/26/2016 14:10	1		Acquity 2.1(mm)
ZZZZZ		05/26/2016 16:46	1		Acquity 2.1(mm)
MB 320-110230/1-A		05/26/2016 17:07	1	25MAY2016B4A_073.d	Acquity 2.1(mm)
LCS 320-110230/2-A		05/26/2016 17:28	1	25MAY2016B4A_074.d	Acquity 2.1(mm)
320-18849-1		05/26/2016 17:50	1	25MAY2016B4A_075.d	Acquity 2.1(mm)
ZZZZZ		05/26/2016 18:11	10		Acquity 2.1(mm)
ZZZZZ		05/26/2016 18:32	1		Acquity 2.1(mm)
CCV 320-111390/78		05/26/2016 18:53	1	25MAY2016B4A_078.d	Acquity 2.1(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Instrument ID: A4 Start Date: 05/27/2016 11:17

Analysis Batch Number: 111733 End Date: 05/28/2016 02:08

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
STD 320-111733/2 IC		05/27/2016 11:17	1	27MAY2016B4A_002.d	Acquity 2.1(mm)
STD 320-111733/3 IC		05/27/2016 11:38	1	27MAY2016B4A_003.d	Acquity 2.1(mm)
STD 320-111733/4 IC		05/27/2016 11:59	1	27MAY2016B4A_004.d	Acquity 2.1(mm)
STD 320-111733/5 IC		05/27/2016 12:20	1	27MAY2016B4A_005.d	Acquity 2.1(mm)
STD 320-111733/6 IC		05/27/2016 12:41	1	27MAY2016B4A_006.d	Acquity 2.1(mm)
STD 320-111733/7 IC		05/27/2016 13:02	1	27MAY2016B4A_007.d	Acquity 2.1(mm)
STD 320-111733/8 IC		05/27/2016 13:24	1	27MAY2016B4A_008.d	Acquity 2.1(mm)
ZZZZZ		05/27/2016 13:45	1		Acquity 2.1(mm)
ICV 320-111733/10		05/27/2016 14:06	1	27MAY2016B4A_010.d	Acquity 2.1(mm)
ZZZZZ		05/27/2016 14:27	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 14:48	1		Acquity 2.1(mm)
320-18849-2		05/27/2016 15:10	1	27MAY2016B4A_013.d	Acquity 2.1(mm)
320-18849-2 MS		05/27/2016 15:31	1	27MAY2016B4A_014.d	Acquity 2.1(mm)
320-18849-2 MSD		05/27/2016 15:54	1	27MAY2016B4A_015.d	Acquity 2.1(mm)
320-18849-3		05/27/2016 16:14	1	27MAY2016B4A_016.d	Acquity 2.1(mm)
320-18849-4		05/27/2016 16:35	1	27MAY2016B4A_017.d	Acquity 2.1(mm)
ZZZZZ		05/27/2016 16:57	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 17:18	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 17:39	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 18:00	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 18:21	1		Acquity 2.1(mm)
CCV 320-111733/23		05/27/2016 18:42	1	27MAY2016B4A_023.d	Acquity 2.1(mm)
ZZZZZ		05/27/2016 21:54	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 22:15	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 22:36	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 22:57	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 23:18	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 23:39	1		Acquity 2.1(mm)
ZZZZZ		05/28/2016 00:00	1		Acquity 2.1(mm)
ZZZZZ		05/28/2016 00:22	1		Acquity 2.1(mm)
ZZZZZ		05/28/2016 00:43	4		Acquity 2.1(mm)
ZZZZZ		05/28/2016 01:04	4		Acquity 2.1(mm)
ZZZZZ		05/28/2016 01:25	20		Acquity 2.1(mm)
ZZZZZ		05/28/2016 01:46	1		Acquity 2.1(mm)
CCV 320-111733/37		05/28/2016 02:08	1		Acquity 2.1(mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-18849-1

SDG No.:

Batch Number: 110230 Batch Start Date: 05/17/16 11:07 Batch Analyst: Edwards, Stephanie N

Batch Method: 3535 Batch End Date: 05/18/16 15:50

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	LCMPFCSU 00040	LCPFCSP 00047
MB 320-110230/1		3535, WS-LC-0025				500 mL	1.00 mL	50 uL	
LCS 320-110230/2		3535, WS-LC-0025				500 mL	1.00 mL	50 uL	20 uL
320-18849-B-1	OF-FB74-0516	3535, WS-LC-0025	T	549.57 g	44.85 g	504.7 mL	1.00 mL	50 uL	
320-18849-B-2	OF-RW74-0516	3535, WS-LC-0025	T	564.07 g	47.20 g	516.9 mL	1.00 mL	50 uL	
320-18849-A-2 MS	OF-RW74-0516	3535, WS-LC-0025	T	563.99 g	45.23 g	518.8 mL	1.00 mL	50 uL	20 uL
320-18849-A-2 MSD	OF-RW74-0516	3535, WS-LC-0025	T	558.58 g	45.06 g	513.5 mL	1.00 mL	50 uL	20 uL
320-18849-A-3	OF-FB59-0516	3535, WS-LC-0025	T	549.68 g	44.61 g	505.1 mL	1.00 mL	50 uL	
320-18849-B-4	OF-RW59-0516	3535, WS-LC-0025	T	568.65 g	47.04 g	521.6 mL	1.00 mL	50 uL	

Batch Notes	
Balance ID	QA-070
Batch Comment	0.1N NaOH/H2O: 607459; HEXANE: 0000125986; MeOH: 625010; Manifold 5
H2O ID	5/12/16
Pipette ID	EC15219, EC15131
Analyst ID - Reagent Drop	SNE
Analyst ID - SU Reagent Drop	SNE
Analyst ID - SU Reagent Drop Witness	HJA
Solvent Lot #	626675
Solvent Name	0.3% NH4OH/MeOH
SOP Number	WS-LC-0025
SPE Cartridge Type	WAX 500mg
Solid Phase Extraction Disk ID	002736075A

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

West Sacramento

HPLC/LCMS Data Review Checklist

Job Number(s): 320-18849 Work List ID(s): 31151, 31065

Extraction Batch: 110230 Analysis Batch(es): 111390, 111733

Delivery Rank 4 Due Date:

A. Calibration/Instrument Run QC	1st Level	2nd Level	N/A
1. ICAL locked in Chrom and TALS? ICAL Batch#	✓	✓	
2. ICAL, CCV Frequency & Criteria met.	✓	✓	
• $RF_{average}$ criteria appropriate for the method.	✓	✓	
• Linear Regression criteria appropriate if required ($r \geq 0.995$).	✓	✓	
• Quadratic fit criteria appropriate if required ($r^2 \geq 0.990$).			✓
• For Linear Regression and Quadratic fit – Does the y-intercept support ½ the reporting limit as described in CA-Q-S-005?	✓	✓	
• All curve points show calculated concentrations.	✓	✓	
3. Peaks correctly ID'd by data system.	✓	✓	
5. Tune check frequency & criteria met and Tune check report attached.	✓	✓	
B. QA/QC			
1. Are all QC samples properly linked in TALS?	✓	✓	
2. Method blank, LCS/LCSD and MS/SD frequencies met.	✓	✓	
3. LCS/LCSD and MB data are within control limits. If not, NCM is present.	✓	✓	
4. Are MS/MSD recoveries and RPD within control limits?	✓	✓	
5. Holding Times were met for prep and analytical.	✓	✓	
6. IS/Surrogate recoveries meet criteria or properly noted.	✓	✓	
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# 53464	✓	✓	
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): JRB Date: 5-31-16

2nd Level Reviewer: MLWalp Date: 5/31/2016

16

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-110230

Analyst: Edwards, Stephanie N

Batch Open: 5/17/2016 11:07:38AM

Method Code: 320-3535_IVWT-320

Batch End: 5-18-16 15:50

Due 5/27

CH2

Solid-Phase Extraction (SPE)

	Input Sample Lab ID (Analytical Method)	SDG (Job #)	GrossWt TareWt	InitAmnt FinAmnt	PHs Rcvd	PHs Adj1	PHs Adj2	Due Date	Analytical TAT	Dlv Rank	Comments	Output Sample Lab ID
1	MB~320-110230/1 N/A	N/A		500 mL				N/A	N/A	N/A		MB 320-110230/1-A
				1.00 mL								
2	LCS~320-110230/2 N/A	N/A		500 mL				N/A	N/A	N/A		LCS 320-110230/2-A
				1.00 mL								
3	320-18849-B-1 (PFC_IDA_DOD5)	N/A (320-18849-1)	549.57 g					5/17/16	11_Days	4		320-18849-B-1-A
				1.00 mL								
4	320-18849-B-2 (PFC_IDA_DOD5)	N/A (320-18849-1)	564.07 g					5/17/16	11_Days	4		320-18849-B-2-A
				1.00 mL								
5	320-18849-A-2~MS (PFC_IDA_DOD5)	N/A (320-18849-1)	563.99 g					5/17/16	11_Days	4		320-18849-A-2-A MS
				1.00 mL								
6	320-18849-A-2~MSD (PFC_IDA_DOD5)	N/A (320-18849-1)	558.58 g					5/17/16	11_Days	4		320-18849-A-2-B MSD
				1.00 mL								
7	320-18849-A-3 (PFC_IDA_DOD5)	N/A (320-18849-1)	549.68 g					5/17/16	11_Days	4		320-18849-A-3-A
				1.00 mL								
8	320-18849-B-4 (PFC_IDA_DOD5)	N/A (320-18849-1)	568.65 g					5/17/16	11_Days	4		320-18849-B-4-A
				1.00 mL								

05/31/2016

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-110230

Analyst: Edwards, Stephanie N

Batch Open: 5/17/2016 11:07:38AM

Method Code: 320-3535_IVWT-320

Batch End:

Batch Notes

First Start time	NA
First End time	NA
Balance ID	QA-070
SPE Cartridge Type	WAX 500mg
Solid Phase Extraction Disk ID	002736075A
H2O ID	5/12/16
Pipette ID	EC15219, EC15131
Solvent Name	0.3% NH4OH/MeOH
Solvent Lot #	626675
Analyst ID - Reagent Drop	SNE
Analyst ID - SU Reagent Drop	SNE
Analyst ID - SU Reagent Drop Witness	HJA
Acid Name	NA
Acid ID	NA
Reagent ID	NA
Reagent Lot Number	NA
NaCl ID	NA
SOP Number	WS-LC-0025
Batch Comment	0.1N NaOH/H2O: 607459; HEXANE: 0000125986; MeOH: 625010; Manifold 5

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-110230

Analyst: Edwards, Stephanie N

Batch Open: 5/17/2016 11:07:38AM

Method Code: 320-3535_IVWT-320

Batch End:

Comments

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-110230
Method Code: 320-3535_IVWT-320

Analyst: Edwards, Stephanie N

Batch Open: 5/17/2016 11:07:38AM
Batch End:

Reagent Additions Worksheet

Lab ID	Reagent Code	Amount Added	Final Amount	By	Witness
MB 320-110230/1	LCMPFCSU_00040	50 uL	1.00 mL	SNE 5/17/16	HJA 5-17-16
LCS 320-110230/2	LCMPFCSU_00040	50 uL	1.00 mL		
LCS 320-110230/2	LCPFCSP_00047	20 uL	1.00 mL		
320-18849-B-1	LCMPFCSU_00040	50 uL	1.00 mL		
320-18849-B-2	LCMPFCSU_00040	50 uL	1.00 mL		
320-18849-A-2 MS	LCMPFCSU_00040	50 uL	1.00 mL		
320-18849-A-2 MS	LCPFCSP_00047	20 uL	1.00 mL		
320-18849-A-2 MSD	LCMPFCSU_00040	50 uL	1.00 mL		
320-18849-A-2 MSD	LCPFCSP_00047	20 uL	1.00 mL		
320-18849-A-3	LCMPFCSU_00040	50 uL	1.00 mL		
320-18849-B-4	LCMPFCSU_00040	50 uL	1.00 mL		

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-110230

Analyst: Edwards, Stephanie N

Batch Open: 5/17/2016 11:07:38AM

Method Code: 320-3535_IVWT-320

Batch End:

Other Reagents:

Reagent	Amount/Units	Lot#:

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Sacramento
Preparation Data Review Checklist

Preparation Batch Number(s): 110230 Test: PFC-IDA-DOD5

Earliest Holding Time: 5/18/19

Sample List Tab	1st Level Reviewer	2nd Level Reviewer
Samples identified to the correct method	✓	✓
All necessary NCMs filed (including holding time)	NA	NA
Method/sample/login/QAS checked and correct	✓	✓
Worksheet Tab	**1st Level Reviewer**	**2nd Level Reviewer**
All samples properly preserved	NA	NA
Weights in anticipated range and not targeted	✓	✓
All additional test requirements performed, documented, and uploaded to TALS correctly (e.g. final amount, initial amount, turbidity, and Cl Check)	✓	✓
The pH is transcribed correctly in TALS	NA	NA
All additional information transcribed into TALS is correct and raw data is attached	✓	✓
Comments are transcribed correctly in TALS	✓	✓
Reagents Tab	**1st Level Reviewer**	**2nd Level Reviewer**
All necessary reagents not expired and entered into TALS	✓	✓
All spike amounts correct and added to necessary samples and QC	✓	✓
Batch Information	**1st Level Reviewer**	**2nd Level Reviewer**
Date and time accurate and entered into TALS correctly	✓	✓
All necessary 'batch information' complete and entered into TALS correctly	✓	✓

1st Level Reviewer: SNE Date: 5/18/16

2nd Level Reviewer: VPM Date: 5-18-16

Comments:

Shipping and Receiving Documents

WE #1

Chain of Custody Record

Temperature on Receipt 29°C

Drinking Water? Yes [X] No [ ]

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)

Client	Project Manager	Date	Chain of Custody Number
CH2M Hill	Bill Friedmann	05/12/16	286058
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
5701 Cleveland Street, Suite 200	757-671-6232		
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	
Virginia Beach / VA / 23462			
Project Name and Location (State)	**Carrier/Waybill Number**		
Fentress PFC Sampling WE#1	FedEx		
Contract/Purchase Order/Quote No			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: PFCs
OF-FB74-0516	05/11/16	1408		X			2						2
OF-RW74-0516		1417		X			2						2
OF-RW74-0516-MS		1417		X			2						2
OF-RW74-0516-SD	↓	1417		X			2						2
OF-FB59-0516	05/12/16	1708		X			2						2
OF-RW59-0516	05/12/16	1716		X			2						2

Special Instructions/ Conditions of Receipt

320-18849 Chain of Custody

Possible Hazard Identification
[ ] Non-Hazard [ ] Flammable [ ] Skin Irritant [ ] Poison B [ ] Unknown

Sample Disposal
[ ] Return To Client [ ] Disposal By Lab [ ] Archive For _____ Months
(A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required
[ ] 24 Hours [ ] 48 Hours [ ] 7 Days [ ] 14 Days [ ] 21 Days [ ] Other _____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By	05/12/16	18:15	1. Received By	05/13/16	0935
2. Relinquished By			2. Received By		
3. Relinquished By			3 Received By		

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

05/31/2016

Login Sample Receipt Checklist

Client: CH2M Hill Constructors, Inc.

Job Number: 320-18849-1

Login Number: 18849
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.	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?	N/A	
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	

Contract_ID	SIO_STN_Number	Phase	IsolationId_ID	Sample_Name	OSIM_Code	Analysis_Group	Analytical_Method	FRC_Code	Lab_Code	Lab_Name	Leachate_Method	Sample_Basis	Extraction_Method	Result_Type	Lab_QC_Type	Sample_Medium	QC_Level	Date/Time_Collected	Date_Received	Leachate_Date	Leachate_Time	Extraction_Date	Extraction_Time	Analysis_Date	Analysis_Time	Lab_Sample_ID	Dilution	Run_Number	Percent_Moisture	Percent_Lipid	Chem_Name	Analyte_ID	Analyte_Value	Original_Analyte_Value	Result_Units	Lab_Qualifier	Validator_Qualifier	QC_Criteria_Type	Analysis_Result_Type	Result_Narrative	QC_Control_Limit_Code	QC_Accuracy_Upper	QC_Accuracy_Lower	Quoted_Limit_Date	QC_Narrative	MDL	Detection_Limit	QAM_Version	DL	LOD	LOQ	Analysis_Batch	Validator_Name	Val_Date
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:12	05/06/2016			20160509	16:04:00	20160525	01:29:00	105-18750-1	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.016	0.016	ng/L			PB	TRG				00000000			0.0024	1.0	0.00075	0.0024	0.0024	105-18750-1	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:12	05/06/2016			20160509	16:04:00	20160525	01:29:00	105-18750-1	1	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.36	0.36	ng/L		M	PB	TRG				00000000			0.0024	1.0	0.00075	0.0024	0.0024	105-18750-1	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:12	05/06/2016			20160509	16:04:00	20160525	01:29:00	105-18750-1	1	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.014	0.014	ng/L			PB	TRG				00000000			0.0024	1.0	0.00086	0.0024	0.0024	105-18750-1	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:12	05/06/2016			20160509	16:04:00	20160525	01:29:00	105-18750-1	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.32	0.32	ng/L		Y2	PB	TRG				00000000			0.0024	1.0	0.00082	0.0024	0.0024	105-18750-1	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:12	05/06/2016			20160509	16:04:00	20160525	01:29:00	105-18750-1	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-1	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:12	05/06/2016			20160509	16:04:00	20160525	01:29:00	105-18750-1	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-1	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:12	05/06/2016			20160509	16:04:00	20160525	01:29:00	105-18750-1	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-1	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	DLI	NSS	W		05/09/2016 09:12	05/06/2016			20160509	16:04:00	20160526	12:24:00	105-18750-1	20	2			Perfluorooctane Sulfonate (PFOS)	1763-23-1	0.80	0.80	ng/L		D M Q	PB	TRG				00000000		0.375	0.5	1.0	0.214	0.556	0.375	105-18750-1	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	NM-100-180926/S-A	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	LBS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.0035	0.0035	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00077	0.0024	0.0024	105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	NM-100-180926/S-A	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	LBS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.0018	0.0018	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00082	0.0024	0.0024	105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.0019	0.0019	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00077	0.0024	0.0024	105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.0018	0.0018	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00086	0.0024	0.0024	105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.0167	0.0167	ng/L		J M Q	PB	TRG				00000000		0.0012	0.0024	1.0	0.0012	0.0028	0.0024	105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:00	05/06/2016			20160509	16:04:00	20160525	01:51:00	105-18750-2	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-2	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			Perfluorohexanoic acid (PFHpA)	375-85-9	0.013	0.013	ng/L			PB	TRG				00000000		0.0079	0.0020	0.0024	0.0079	0.0020	0.0024	105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.0019	0.0019	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00077	0.0024	0.0024	105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.0018	0.0018	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00086	0.0024	0.0024	105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.0019	0.0019	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00077	0.0024	0.0024	105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.016	0.016	ng/L			PB	TRG				00000000		0.0012	0.0024	1.0	0.0012	0.0028	0.0024	105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:44	05/06/2016			20160509	16:04:00	20160525	02:02:00	105-18750-3	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-3	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			Perfluorohexanoic acid (PFHpA)	375-85-9	0.0019	0.0019	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00076	0.0024	0.0024	105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.0019	0.0019	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00077	0.0024	0.0024	105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.0018	0.0018	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00086	0.0024	0.0024	105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.0114	0.0114	ng/L		J	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.0012	0.0028	0.0024	105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:32	05/06/2016			20160509	16:04:00	20160525	01:55:00	105-18750-4	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-4	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			Perfluorohexanoic acid (PFHpA)	375-85-9	0.0019	0.0019	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00076	0.0024	0.0024	105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.0019	0.0019	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00077	0.0024	0.0024	105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.0067	0.0067	ng/L		M Q	PB	TRG				00000000		0.0012	0.0024	1.0	0.00082	0.0024	0.0024	105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.0129	0.0129	ng/L		J	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.0012	0.0028	0.0024	105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:20	05/06/2016			20160509	16:04:00	20160525	01:49:00	105-18750-5	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-5	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:08	05/06/2016			20160509	16:04:00	20160525	01:37:00	105-18750-6	1	1			Perfluorohexanoic acid (PFHpA)	375-85-9	0.013	0.013	ng/L			PB	TRG				00000000		0.0079	0.0020	0.0024	0.0079	0.0020	0.0024	105-18750-6	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:08	05/06/2016			20160509	16:04:00	20160525	01:37:00	105-18750-6	1	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.0019	0.0019	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00077	0.0024	0.0024	105-18750-6	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:08	05/06/2016			20160509	16:04:00	20160525	01:37:00	105-18750-6	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.0018	0.0018	ng/L		U	PT_ISC			PB	TRG				00000000			0.0024	1.0	0.00086	0.0024	0.0024	105-18750-6	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:08	05/06/2016			20160509	16:04:00	20160525	01:37:00	105-18750-6	1	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.0167	0.0167	ng/L		J M Q	PB	TRG				00000000		0.0012	0.0024	1.0	0.0012	0.0028	0.0024	105-18750-6	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:08	05/06/2016			20160509	16:04:00	20160525	01:37:00	105-18750-6	1	1			1802 PFAS	1802 PFAS	NA			PT_ISC			PB	SUMI				00000000							105-18750-6	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:08	05/06/2016			20160509	16:04:00	20160525	01:37:00	105-18750-6	1	1			1414 PFAA	1414 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-6	105-111160	
NAUTI0SIO0000	W001		OCEANA_NAS	OP-R4H4-0116	NONE	SVOA	TAMS_WLS-0005	SVOA	TAMS	Test America	NONE	NA	SW8181	SSD	NSS	W		05/09/2016 09:08	05/06/2016			20160509	16:04:00	20160525	01:37:00	105-18750-6	1	1			1363 PFAA	1363 PFAA	NA			PT_ISC			PB	SUMI				00000000							105-18750-6	105-111160

Contract_ID	Inv_YSI_Number	Phase	IsolationId_ID	Sample_Name	OWM_Code	Analysis_Group	Analytical_Method	FBG_Code	Lab_Code	Lab_Name	Leachate_Method	Sample_Basis	Extraction_Method	Result_Type	Lab_ID_Type	Sample_Medium	QC_Level	Date/Time_Collected	Date_Received	Leachate_Date	Leachate_Time	Extraction_Date	Extraction_Time	Analysis_Date	Analysis_Time	Lab_Sample_ID	Dilution	Run_Number	Percent_Moisture	Percent_Lipid	Chem_Name	Analyte_ID	Analyte_Value	Original_Analyte_Value	Result_Units	Lab_Qualifier	Validator_Qualifier	QC_Criteria_Type	Analysis_Result_Type	Result_Narrative	QC_Control_Limit_Code	QC_Accuracy_Upper	QC_Accuracy_Lower	Control_Limit_Date	QC_Narrative	MDL	Detection_Limit	EMM_Version	EL	LOD	LOQ	Analysis_Batch	Validator_Name	Val_Date
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TMS_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 09:51	05/11/2016			20160512	0050-00	20160526	12:46:00	320-18756-1	20	1			Iron	7439-89-6	5300		DIL_I		PR	SUMI		TRG				0000000			100	L		22	85	100	320-18756-1	280-104010	
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	MATAL	6010C	MET	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 09:51	05/11/2016			20160512	0050-00	20160526	12:46:00	320-18756-1	1	1			Iron	7439-89-6	5300		DIL_I		PR	SUMI		TRG				0000000			100	L		22	85	100	320-18756-1	280-104010	
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 10:06	05/11/2016			20160512	0050-00	20160526	13:07:00	320-18756-2	20	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.964		DIL_I	D	PR	TRG		TRG				0000000			0.021	0.098	0.098	320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 10:06	05/11/2016			20160512	0050-00	20160526	13:07:00	320-18756-2	20	1			Perfluorooctanoic acid (PFOA)	335-67-1	0.7		DIL_I	D M	PR	TRG		TRG				0000000			0.014	0.098	0.098	320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 10:06	05/11/2016			20160512	0050-00	20160526	13:07:00	320-18756-2	20	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.098		DIL_I	D	PR	TRG		TRG				0000000			0.012	0.098	0.098	320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 10:06	05/11/2016			20160512	0050-00	20160526	13:07:00	320-18756-2	20	1			Perfluorononanoic acid (PFNA)	375-95-1	0.031		DIL_I	D	PR	TRG		TRG				0000000			0.009	0.098	0.098	320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 10:06	05/11/2016			20160512	0050-00	20160526	13:07:00	320-18756-2	20	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.2		DIL_I	D B M	PR	TRG		TRG				0000000			0.014	0.057	0.076	320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-TRMTS40-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 11:50	05/11/2016			20160512	0050-00	20160526	18:11:00	320-18756-3	10	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.075		DIL_I	D	PR	TRG		TRG				0000000			0.014	0.057	0.076	320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-TRMTS40-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8270C	000	MAS	W	D	05/10/2016 11:50	05/11/2016			20160512	0050-00	20160526	18:11:00	320-18756-3	10	1			1802 PFHxS	1802 PFHxS	166		PCT_ISC	CL		SUMI		SUM		150	25		0000000				L					320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-TRMTS40-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8270C	000	MAS	W	D	05/10/2016 11:50	05/11/2016			20160512	0050-00	20160526	18:11:00	320-18756-3	10	1			13C4 PFOS	13C4 PFOS	55		PCT_ISC	CL		SUMI		SUM		150	25		0000000				L					320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-TRMTS40-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 11:50	05/11/2016			20160512	0050-00	20160526	18:11:00	320-18756-3	10	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.2		DIL_I	D B M	PR	TRG		TRG				0000000			0.014	0.057	0.076	320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-TRMTS40-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8270C	000	MAS	W	D	05/10/2016 11:50	05/11/2016			20160512	0050-00	20160526	18:11:00	320-18756-3	10	1			1802 PFHxS	1802 PFHxS	166		PCT_ISC	CL		SUMI		SUM		150	25		0000000				L					320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-TRMTS40-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8270C	000	MAS	W	D	05/10/2016 11:50	05/11/2016			20160512	0050-00	20160526	18:11:00	320-18756-3	10	1			13C4 PFOS	13C4 PFOS	55		PCT_ISC	CL		SUMI		SUM		150	25		0000000				L					320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8310A	000	MAS	W	D	05/10/2016 10:06	05/11/2016			20160512	0050-00	20160526	13:07:00	320-18756-2	20	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	1.2		DIL_I	D B M	PR	TRG		TRG				0000000			0.014	0.057	0.076	320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8270C	000	MAS	W	D	05/10/2016 10:06	05/11/2016			20160512	0050-00	20160526	13:07:00	320-18756-2	20	1			1802 PFHxS	1802 PFHxS	166		PCT_ISC	CL		SUMI		SUM		150	25		0000000				L					320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-FR70-0116	NONE	SVOA	TA_WS-C-0015	SVOA	TAMER	Test America	NONE	NA	SW8270C	000	MAS	W	D	05/10/2016 10:06	05/11/2016			20160512	0050-00	20160526	13:07:00	320-18756-2	20	1			13C4 PFOS	13C4 PFOS	55		PCT_ISC	CL		SUMI		SUM		150	25		0000000				L					320-18756-1	320-111190		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-CLTHW-0116	NONE	MCHEM	9060	PCHAR	TAMER	Test America	NONE	NA	NONE	000	MAS	W	D	05/10/2016 10:48	05/11/2016			20160518	0100-00	20160526	21:55:59	320-18756-3	2	1			Total organic carbon (TOC)	TOC	51		NPL_I		PR	TRG		TRG				0000000			0.31	1.0	2.0	320-18756-1	280-106566		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-CLTHW-0116	NONE	MCHEM	9060	PCHAR	TAMER	Test America	NONE	NA	NONE	000	MAS	W	D	05/10/2016 10:48	05/11/2016			20160518	0100-00	20160526	21:55:59	320-18756-3	2	1			Total organic carbon (TOC)	TOC	51		NPL_I		PR	TRG		TRG				0000000			0.31	1.0	2.0	320-18756-1	280-106566		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-CLTHW-0116	NONE	MCHEM	9060	PCHAR	TAMER	Test America	NONE	NA	NONE	000	MAS	W	D	05/10/2016 10:48	05/11/2016			20160518	0100-00	20160526	21:55:59	320-18756-3	2	1			Total organic carbon (TOC)	TOC	50		NPL_I		PR	TRG		TRG				0000000			0.31	1.0	2.0	320-18756-1	280-106566		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-CLTHW-0116	NONE	MCHEM	9060	PCHAR	TAMER	Test America	NONE	NA	NONE	000	MAS	W	D	05/10/2016 10:48	05/11/2016			20160518	0100-00	20160526	21:55:59	320-18756-3	2	1			Total organic carbon (TOC)	TOC	50		NPL_I		PR	TRG		TRG				0000000			0.31	1.0	2.0	320-18756-1	280-106566		
NAUXTRIAD9000	WEEK		OCEANA_NAS	OP-CLTHW-0116	FILT	FWCHEM	9060	PCHAR	TAMER	Test America	NONE	FF	NONE	000	MAS	W	D	05/10/2016 10:48	05/11/2016			20160518	0100-00	20160526	21:23:43	320-18756-3	2	1			Dissolved organic carbon	DOC	29		NPL_I		PR	TRG		TRG				0000000			0.31	1.0	2.0	320-18756-1	280-106567

Contract_ID	Sol_ITN_Number	Phase	Installation_ID	Sample_Name	OWM_Code	Analyte_Group	Analytical_Method	PBS_Code	Lab_Code	Lab_Name	Leachate_Method	Sample_Basis	Extraction_Method	Result_Type	Lab_QC_Type	Sample_Medium	QC_Level	Waterflow_Collected	Date_Received	Leachate_Date	Leachate_Time	Extraction_Date	Extraction_Time	Analysis_Date	Analysis_Time	Lab_Sample_ID	Dilution	Run_Number	Percent_Moisture	Percent_Lipid	Chem_Name	Analyte_ID	Analyte_Value	Original_Analyte_Value	Result_Units	Lab_Qualifier	Validator_Qualifier	QC_Criteria_Type	Analysis_Result_Type	Result_Narrative	QC_Control_Limit_Code	QC_Accuracy_Upper	QC_Accuracy_Lower	Quoted_Limit_Data	QC_Narrative	MDL	Detection_Limit	EDM_Version	DL	LOD	LOQ	Sample_Batch	Validator_Name	Val_Date
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.01		ug/L	M		PB	TRG			00000000		N	0.00686	0.0034	0.0034	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorooctane Sulfonate (PFOS)	1763-23-1	0.0019		ug/L	M		PB	TRG			00000000		N	0.0012	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			1,4-Dioxane	123-91-1	0.5		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0686	0.034	0.034	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			11Cl-PF3OUdS	763051-92-9	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			4,8-dioxa-3H-perfluorononanoic acid	919005-14-4	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorobutanesulfonic acid (PFBS)	375-73-5	0.0019		ug/L	M		PB	TRG		S10A	150	25	00000000		N	0.0019	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorohexanesulfonic acid (PFHxS)	355-46-4	0.01		ug/L	M		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorooctanesulfonamide (FOSA)	754-91-6	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorotetradecanoic acid (PFTeA)	376-06-7	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoroundecanoic acid (PFUnA)	2058-94-8	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoroundecanesulfonic acid (PFUnS)	749786-16-1	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorononanoic acid (PFNA)	375-95-1	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.0019		ug/L	M		PB	TRG		S10A	150	25	00000000		N	0.0012	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoropentanesulfonic acid (PFPeS)	2706-91-4	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoropentanoic acid (PFPeA)	2706-90-3	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorotetradecanoic acid (PFTeA)	376-06-7	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoroundecanoic acid (PFUnA)	2058-94-8	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorononanoic acid (PFNA)	375-95-1	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorooctanesulfonic acid (PFOS)	1763-23-1	0.0019		ug/L	M		PB	TRG		S10A	150	25	00000000		N	0.0012	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoropentanesulfonic acid (PFPeS)	2706-91-4	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoropentanoic acid (PFPeA)	2706-90-3	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorotetradecanoic acid (PFTeA)	376-06-7	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoroundecanoic acid (PFUnA)	2058-94-8	0.01		ug/L	U		PB	TRG		S10A	150	25	00000000		N	0.0034	0.0019	0.0019	320-18918-1	320-111733	
NAUTH20439000	W691		OCEANA_NAS	OP-FB80-0516	NONE	SVOA	TA_WS-LC-MS/MS	SVOA	TAMER	Test America	NONE	NA	SWB301	000	MDL	W	O	05/16/2016 08:15	05/17/2016		20160520	11:05:00	20160527	22:21:00	320-18918-2	1	1			Perfluoroundecanesulfonic acid (PFUnS)	749786-16-1

Data Validation Summary

Oceana CTO-WE44, NALF Fentress

TO: Tiffany Hill/CVO

Anita Dodson/VBO

FROM: Tiffany McGlynn/GNV

CC: Herb Kelly/GNV

DATE: June 14, 2016

Introduction

The following data validation report discusses the data validation process and findings for TestAmerica Laboratories in the Sample Delivery Groups (SDGs) listed in the table below.

Samples were analyzed using the following analytical methods:

- WS-LC-0025 Perfluorinated Hydrocarbons
- SW6010C Iron, total & dissolved

The samples included in these SDGs are listed in the table below.

SDG	Sample_Name	Matrix
320-18704-1	OF-RW44-0516	Water
320-18704-1	OF-FB44-0516	Water
320-18704-1	OF-RW42B2-0516	Water
320-18704-1	OF-FB42B2-0516	Water
320-18704-1	OF-RW42A-0516	Water
320-18704-1	OF-FB42A-0516	Water
320-18704-1	OF-RW42B-0516	Water
320-18704-1	OF-FB42B-0516	Water
320-18704-1	OF-RW42C-516	Water
320-18704-1	OF-RW42CD-0516	Water

SDG	Sample_Name	Matrix
320-18704-1	OF-FB42C-0516	Water
320-18719-1	OF-FB08-0516	Water
320-18719-1	OF-RW08-0516	Water
320-18719-1	OF-FB71-0516	Water
320-18719-1	OF-RW71-0516	Water
320-18719-1	OF-FB84-0516	Water
320-18719-1	OF-RW84-0516	Water
320-18794-1	OF-INF01-0516	Water
320-18794-1	OF-EFF01-0516	Water
320-18794-1	OF-FB78-0516	Water
320-18794-1	OF-RW78-0516	Water
320-18794-1	OF-RW78D-0516	Water
320-18794-1	OF-FB77-0516	Water
320-18794-1	OF-RW77-0516	Water
320-18796-1	OF-STORLAG-0516	Water
320-18796-1	OF-TRMTLAG-0516	Water
320-18796-1	OF-POLLLAG-0516	Water
320-18796-1	OF-CLTANK-0516	Water
320-18796-1	OF-BACKWASH-0516	Water
320-18796-1	OF-FILTER-0516	Water
320-18918-1	OF-RW83-0516	Water
320-18918-1	OF-FB83-0516	Water
320-18849-1	OF-FB74-0516	Water
320-18849-1	OF-RW74-0516	Water
320-18849-1	OF-FB59-0516	Water
320-18849-1	OF-RW59-0516	Water
320-19022-1	OF-STORLAG-PT-0516	Water
320-19022-1	OF-TRMLAG-PT-0516	Water
320-19022-1	OF-POLLAG-PT-0516	Water
320-19022-1	OF-CLTANK-PT-0516	Water
320-19022-1	OF-BACKWASH-PT-0516	Water
320-19022-1	OF-FILTER-PT-0516	Water
320-19022-1	OF-INF01-PT-0615	Water
320-19022-1	OF-PROCESS BLANK-PT-0516	Water

Data Evaluation

Data was evaluated in accordance with the analytical methods and with the criteria found in the following guidance documents: Sampling and Analysis Plan Perfluorinated Compound Investigation, Naval Auxiliary Landing Field Fentress, Chesapeake, Virginia Contract Task Order WE44 (December 2015), National Functional Guidelines for Organic Data Review

(August 2014), and National Functional Guidelines for Inorganic Data Review (August 2014), with Region 3 Modification (Use of 'B' qualifier) as applicable. The samples were evaluated based on the following criteria:

- Data Completeness
- Technical Holding Times
- Tuning Instrument
- Initial/Continuing Calibrations
- Blanks
- Internal Standards
- Laboratory Control Samples
- Matrix Spike/Spike Duplicate
- Serial Dilution
- Isotope Dilution Analyte
- Field Duplicates
- Identification/Quantitation
- Reporting Limits
- Total vs. Dissolved

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the sections below. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte, the validator has chosen the qualifier that best indicates possible bias in the results and qualified these data accordingly.

Data Completeness

The SDGs were received complete and intact.

Technical Holding Times

According to the chain of custody records, sampling was performed on 5/4/16 through 5/19/16. Samples were received at the laboratory 5/6/16 through 5/20/16. All sample preparation and analyses were performed within holding time requirements.

Blanks

Several compounds were detected in the field blanks and method blanks as listed below. Affected data are summarized in **Attachment 1**.

Blank ID	Compound	Conc.	Units
OF-FB42C-0516	Perfluorohexanesulfonic acid (PFHxS)	0.0011	UG_L
OF-FB44-0516	Perfluorooctane Sulfonate (PFOS)	0.0037	UG_L
OF-FB42B2-0516	Perfluorohexanesulfonic acid (PFHxS)	0.00097	UG_L
OF-FB42A-0516	Perfluorooctane Sulfonate (PFOS)	0.0029	UG_L
OF-FB78-0516	Perfluorooctane Sulfonate (PFOS)	0.011	UG_L
OF-FB78-0516	Perfluorooctanoic acid (PFOA)	0.0040	UG_L
OF-FB78-0516	Perfluorohexanesulfonic acid (PFHxS)	0.0016	UG_L
MB 280-325382/1-A	Iron	23.7	UG_L
MB 320-109334/1-A	Perfluorooctane Sulfonate (PFOS)	0.00149	UG_L
MB 320-109334/1-A	Perfluorooctane Sulfonate (PFOS)	0.00149	UG_L
MB 320-109640/1-A	Perfluorooctane Sulfonate (PFOS)	0.00136	UG_L
MB 320-109640/1-A	Perfluorooctane Sulfonate (PFOS)	0.00136	UG_L

Lab Control Sample/Sample Duplicate

Perfluorohexanesulfonic acid (PFHxS) did not meet RPD criteria between the LCS and LCSD in SDGs 320-18719-1 and 320-18704-1. Affected data are summarized in **Attachment 1**.

Isotope Dilution Analyte

Internal standards exhibited low or high recoveries for the samples listed below. Affected data are summarized in **Attachment 1**.

SDG	Sample_Name
320-18794-1	OF-INF01-0516
320-18794-1	OF-EFF01-0516
320-18794-1	OF-RW78-0516
320-18796-1	OF-STORLAG-0516
320-18796-1	OF-POLLLAG-0516
320-18796-1	OF-CLTANK-0516
320-18796-1	OF-BACKWASH-0516

SDG	Sample_Name
320-18918-1	OF-RW83-0516
320-18918-1	OF-FB83-0516
320-19022-1	OF-INF01-PT-0615

Total vs. Dissolved

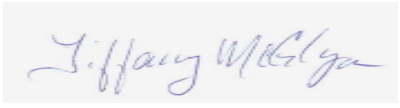
Iron did not meet criteria for total and dissolved for sample OF-STORLAG-0516. Affected data are summarized in **Attachment 1**.

Conclusion

These data can be used in the project decision-making process as qualified by the data quality evaluation process.

Please do not hesitate to contact us about this validation report.

Sincerely,



Tiffany McGlynn

Qualification Flags

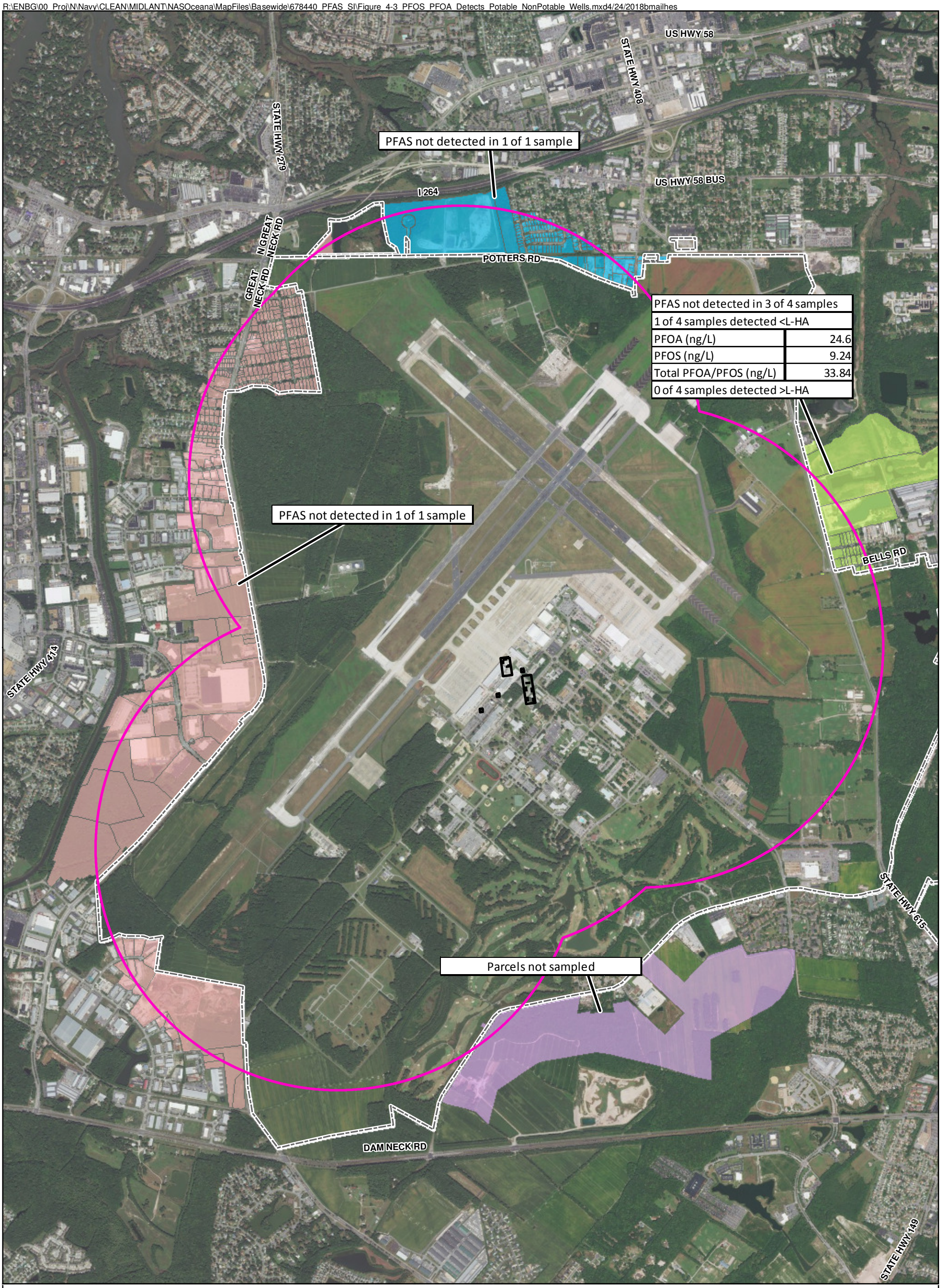
Exclude	More appropriate data exist for this analyte.
R	Data were rejected for use.
UL	Analyte not detected, quantitation limit is potentially biased low.
UJ	Analyte not detected, estimated quantitation limit.
U	Analyte not detected.
B	Not detected substantially above the level reported in laboratory or field blanks.
L	Analyte present, estimated value potentially biased low.
K	Analyte present, estimated value potentially biased high.
N	Analyte identification presumptive; no second column analysis performed or GC/MS tentative identification.
J	Analyte present, estimated value.
NJ	Analysis indicates the presence of an analyte that was "tentatively identified" and the associated value represents its approximate concentration.
None	Placeholder for calculating quality control issues that do not require flagging.
=	Analyte was detected at a concentration greater than the quantitation limit.

Qualifier Code Reference

Value	Description
%SOL	High Moisture content
2C	Second Column – Poor Dual Column Reproducibility
2S	Second Source – Bad reproducibility between tandem detectors
BD	Blank Spike/Blank Spike Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
CCBL	Continuing Calibration Blank Contamination
CCH	Continuing Calibration Verification – High Recovery
CCL	Continuing Calibration Verification – Low Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	Field Duplicate
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
ICH	Initial Calibration – High Relative Response Factors
ICL	Initial Calibration – Low Relative Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data

Value	Description
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

R:\ENBG\00_Proj\N\Navy\CLEAN\MIDLANT\NASOceana\MapFiles\Basewide\678440_PFAS_SI\Figure_4-3_PFOS_PFOA_Detects_Potable_NonPotable_Wells.mxd4/24/2018bmailhes



Legend

- Non-Core Target Treatment Area (2004)
- Core Target Treatment Area (2004) (Core)
- Sampling Area
- Installation Boundary

Off-Base Parcels

- East
- North
- South
- West

N
W E
S

0 1,000 2,000 4,000 Feet

Imagery Source: ©2017 Esri

Figure 4-3
COCs Detections in Potable Wells Sampled from Parcels Located Off-Base
Basewide Per- and Polyfluoroalkyl Substances Site Inspection Report
NAS Oceana, Virginia Beach, Virginia

ch2m