NAVFAC
Naval Facilities Engineering Command

Groundwater Sample Results, Combined Level 2 and Level 4 Laboratory Report, Electronic Data Deliverable, Data Validation Report, and the Sample Location Report, SDG 320-42603-1

Naval Air Warfare Center Warminster
Warminster, Pennsylvania

August 2019

N62269_001189
WARMINSTER_NAWC
SSIC 5000-33c

LABORATORY DATA PACKAGE, 320-42603-1, NAS WILLOW GROVE NAWC WARMINSTER PA

09/11/2018

TESTAMERICA LABORATORIES INC

Approved for public release: distribution unlimited.

ANALYTICAL REPORT

Job Number: 320-42603-1

Job Description: Warminster: PFAS, NAS JRB Willow Grove

For:
Tetra Tech, Inc.
234 Mall Boulevard
Suite 260
King of Prussia, PA 19406

Attention: Andy Frebowitz

Approved for release.
David R Alltucker
Project Manager I
9/11/2018 8:40 AM

David R Alltucker, Project Manager I
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09/11/2018

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Definitions/Glossary

Client: Tetra Tech, Inc. TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Qualifiers

LCMS

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

Glossary

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

Job Narrative
320-42603-1

Receipt
The samples were received on 8/29/2018 9:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1° C.

LCMS
Method(s) 537: The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

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

Organic Prep
Method(s) 537: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD/DUP) associated with preparation batch 320-244303.

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

Detection Summary

Client: Tetra Tech, Inc.
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

TestAmerica Job ID: 320-42603-1

Client Sample ID: NAWC-082818-RW-293 — Lab Sample ID: 320-42603-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	26	J	36	6.1	ng/L	1		537	Total/NA
Perfluorooctanoic acid (PFOA)	28		18	2.5	ng/L	1		537	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	9.6	J	27	4.9	ng/L	1		537	Total/NA
Perfluoroheptanoic acid (PFHpA)	11		8.9	1.7	ng/L	1		537	Total/NA

Client Sample ID: NAWC-082818-FRB-293 — Lab Sample ID: 320-42603-2

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: NAWC-082818-RW-293 — Lab Sample ID: 320-42603-1

Date Collected: 08/28/18 10:10 — **Matrix: Water**
Date Received: 08/29/18 09:45

Method: 537 - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	**26**	**J**	36	6.1	ng/L		09/06/18 18:53	09/08/18 22:40	1
Perfluorooctanoic acid (PFOA)	**28**		18	2.5	ng/L		09/06/18 18:53	09/08/18 22:40	1
Perfluorononanoic acid (PFNA)	18	U M	21	7.1	ng/L		09/06/18 18:53	09/08/18 22:40	1
Perfluorohexanesulfonic acid (PFHxS)	**9.6**	**J**	27	4.9	ng/L		09/06/18 18:53	09/08/18 22:40	1
Perfluoroheptanoic acid (PFHpA)	**11**		8.9	1.7	ng/L		09/06/18 18:53	09/08/18 22:40	1
Perfluorobutanesulfonic acid (PFBS)	32	U	80	14	ng/L		09/06/18 18:53	09/08/18 22:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*105*		*70 - 130*	*09/06/18 18:53*	*09/08/18 22:40*	*1*
13C2 PFDA	*109*		*70 - 130*	*09/06/18 18:53*	*09/08/18 22:40*	*1*

Client Sample ID: NAWC-082818-FRB-293 — Lab Sample ID: 320-42603-2

Date Collected: 08/28/18 10:05 — **Matrix: Water**
Date Received: 08/29/18 09:45

Method: 537 - Perfluorinated Alkyl Acids (LC/MS)

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	14	U	35	5.9	ng/L		09/06/18 18:53	09/08/18 22:44	1
Perfluorooctanoic acid (PFOA)	7.0	U	17	2.4	ng/L		09/06/18 18:53	09/08/18 22:44	1
Perfluorononanoic acid (PFNA)	17	U	21	7.0	ng/L		09/06/18 18:53	09/08/18 22:44	1
Perfluorohexanesulfonic acid (PFHxS)	10	U	26	4.8	ng/L		09/06/18 18:53	09/08/18 22:44	1
Perfluoroheptanoic acid (PFHpA)	3.5	U	8.7	1.7	ng/L		09/06/18 18:53	09/08/18 22:44	1
Perfluorobutanesulfonic acid (PFBS)	31	U	79	14	ng/L		09/06/18 18:53	09/08/18 22:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*114*		*70 - 130*	*09/06/18 18:53*	*09/08/18 22:44*	*1*
13C2 PFDA	*107*		*70 - 130*	*09/06/18 18:53*	*09/08/18 22:44*	*1*

Default Detection Limits

Client: Tetra Tech, Inc. TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Method: 537 - Perfluorinated Alkyl Acids (LC/MS)

Prep: 537

Analyte	LOQ	DL	Units	Method
Perfluorobutanesulfonic acid (PFBS)	90	16	ng/L	537
Perfluoroheptanoic acid (PFHpA)	10	1.9	ng/L	537
Perfluorohexanesulfonic acid (PFHxS)	30	5.5	ng/L	537
Perfluorononanoic acid (PFNA)	24	8.0	ng/L	537
Perfluorooctanesulfonic acid (PFOS)	40	6.8	ng/L	537
Perfluorooctanoic acid (PFOA)	20	2.8	ng/L	537

Surrogate Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Method: 537 - Perfluorinated Alkyl Acids (LC/MS)

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

		Percent Surrogate Recovery (Acceptance Limits)									
Lab Sample ID	Client Sample ID	PFHxA (70-130)	PFDA (70-130)								
320-42603-1	NAWC-082818-RW-293	105	109								
320-42603-2	NAWC-082818-FRB-293	114	107								
LLCS 320-244303/2-A	Lab Control Sample	110	104								
LLCSD 320-244303/3-A	Lab Control Sample Dup	115	104								
MB 320-244303/1-A	Method Blank	110	109								

Surrogate Legend

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA

Method: 537 - Perfluorinated Alkyl Acids (LC/MS)

Lab Sample ID: MB 320-244303/1-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 244655 **Prep Batch: 244303**

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	16	U	40	6.8	ng/L		09/06/18 18:53	09/08/18 22:28	1
Perfluorooctanoic acid (PFOA)	8.0	U	20	2.8	ng/L		09/06/18 18:53	09/08/18 22:28	1
Perfluorononanoic acid (PFNA)	20	U	24	8.0	ng/L		09/06/18 18:53	09/08/18 22:28	1
Perfluorohexanesulfonic acid (PFHxS)	12	U	30	5.5	ng/L		09/06/18 18:53	09/08/18 22:28	1
Perfluoroheptanoic acid (PFHpA)	4.0	U	10	1.9	ng/L		09/06/18 18:53	09/08/18 22:28	1
Perfluorobutanesulfonic acid (PFBS)	36	U	90	16	ng/L		09/06/18 18:53	09/08/18 22:28	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*110*		*70 - 130*	*09/06/18 18:53*	*09/08/18 22:28*	*1*
13C2 PFDA	*109*		*70 - 130*	*09/06/18 18:53*	*09/08/18 22:28*	*1*

Lab Sample ID: LLCS 320-244303/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 244655 **Prep Batch: 244303**

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorooctanesulfonic acid (PFOS)	40.2	45.8		ng/L		114	50 - 150
Perfluorooctanoic acid (PFOA)	20.0	21.6		ng/L		108	50 - 150
Perfluorononanoic acid (PFNA)	20.0	20.6	J	ng/L		103	50 - 150
Perfluorohexanesulfonic acid (PFHxS)	30.3	32.1		ng/L		106	50 - 150
Perfluoroheptanoic acid (PFHpA)	10.0	11.7		ng/L		117	50 - 150
Perfluorobutanesulfonic acid (PFBS)	90.2	128		ng/L		142	50 - 150

Surrogate	*LLCS %Recovery*	*LLCS Qualifier*	*Limits*
13C2 PFHxA	*110*		*70 - 130*
13C2 PFDA	*104*		*70 - 130*

Lab Sample ID: LLCSD 320-244303/3-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 244655 **Prep Batch: 244303**

Analyte	Spike Added	LLCSD Result	LLCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanesulfonic acid (PFOS)	40.2	45.6		ng/L		113	50 - 150	0.6	50
Perfluorooctanoic acid (PFOA)	20.0	22.8		ng/L		114	50 - 150	5	50
Perfluorononanoic acid (PFNA)	20.0	22.0	J	ng/L		110	50 - 150	7	50
Perfluorohexanesulfonic acid (PFHxS)	30.3	32.4		ng/L		107	50 - 150	0.9	50
Perfluoroheptanoic acid (PFHpA)	10.0	12.0		ng/L		120	50 - 150	3	50
Perfluorobutanesulfonic acid (PFBS)	90.2	132		ng/L		146	50 - 150	3	50

Surrogate	*LLCSD %Recovery*	*LLCSD Qualifier*	*Limits*
13C2 PFHxA	*115*		*70 - 130*
13C2 PFDA	*104*		*70 - 130*

QC Association Summary

Client: Tetra Tech, Inc.
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

TestAmerica Job ID: 320-42603-1

LCMS

Prep Batch: 244303

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42603-1	NAWC-082818-RW-293	Total/NA	Water	537	
320-42603-2	NAWC-082818-FRB-293	Total/NA	Water	537	
MB 320-244303/1-A	Method Blank	Total/NA	Water	537	
LLCS 320-244303/2-A	Lab Control Sample	Total/NA	Water	537	
LLCSD 320-244303/3-A	Lab Control Sample Dup	Total/NA	Water	537	

Analysis Batch: 244655

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-42603-1	NAWC-082818-RW-293	Total/NA	Water	537	244303
320-42603-2	NAWC-082818-FRB-293	Total/NA	Water	537	244303
MB 320-244303/1-A	Method Blank	Total/NA	Water	537	244303
LLCS 320-244303/2-A	Lab Control Sample	Total/NA	Water	537	244303
LLCSD 320-244303/3-A	Lab Control Sample Dup	Total/NA	Water	537	244303

Lab Chronicle

Client: Tetra Tech, Inc.
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

TestAmerica Job ID: 320-42603-1

Client Sample ID: NAWC-082818-RW-293

Lab Sample ID: 320-42603-1

Date Collected: 08/28/18 10:10

Matrix: Water

Date Received: 08/29/18 09:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			244303	09/06/18 18:53	JER	TAL SAC
Total/NA	Analysis	537		1	244655	09/08/18 22:40	JRB	TAL SAC

Client Sample ID: NAWC-082818-FRB-293

Lab Sample ID: 320-42603-2

Date Collected: 08/28/18 10:05

Matrix: Water

Date Received: 08/29/18 09:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			244303	09/06/18 18:53	JER	TAL SAC
Total/NA	Analysis	537		1	244655	09/08/18 22:44	JRB	TAL SAC

Laboratory References:

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

Accreditation/Certification Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Laboratory: TestAmerica Sacramento

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

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-020	01-20-21
ANAB	DoD ELAP		L2468	01-20-21
Arizona	State Program	9	AZ0708	08-11-19
Arkansas DEQ	State Program	6	88-0691	06-17-19
California	State Program	9	2897	01-31-19
Colorado	State Program	8	CA00044	08-31-19
Connecticut	State Program	1	PH-0691	06-30-19
Florida	NELAP	4	E87570	06-30-19
Georgia	State Program	4	N/A	01-28-19
Hawaii	State Program	9	N/A	01-29-19
Illinois	NELAP	5	200060	03-17-19
Kansas	NELAP	7	E-10375	10-31-18
Louisiana	NELAP	6	30612	06-30-19
Maine	State Program	1	CA0004	04-14-20
Michigan	State Program	5	9947	01-31-20
Nevada	State Program	9	CA00044	07-31-19
New Hampshire	NELAP	1	2997	04-18-19
New Jersey	NELAP	2	CA005	06-30-19
New York	NELAP	2	11666	03-31-19
Oregon	NELAP	10	4040	01-29-19
Pennsylvania	NELAP	3	68-01272	03-31-19
Texas	NELAP	6	T104704399	05-31-19
US Fish & Wildlife	Federal		LE148388-0	07-31-19
USDA	Federal		P330-18-00239	01-17-21
USEPA UCMR	Federal	1	CA00044	11-06-18
Utah	NELAP	8	CA00044	02-28-19
Vermont	State Program	1	VT-4040	04-30-19
Virginia	NELAP	3	460278	03-14-19
Washington	State Program	10	C581	05-05-19
West Virginia (DW)	State Program	3	9930C	12-31-18
Wyoming	State Program	8	8TMS-L	01-28-19

Method Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Method	Method Description	Protocol	Laboratory
537	Perfluorinated Alkyl Acids (LC/MS)	EPA	TAL SAC
537	Extraction of Perfluorinated Alkyl Acids	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Sample Summary

Client: Tetra Tech, Inc.
TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-42603-1	NAWC-082818-RW-293	Water	08/28/18 10:10	08/29/18 09:45
320-42603-2	NAWC-082818-FRB-293	Water	08/28/18 10:05	08/29/18 09:45

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Analysis Batch Number: 244655

Lab Sample ID: 320-42603-1 Client Sample ID: NAWC-082818-RW-293

Date Analyzed: 09/08/18 22:40 Lab File ID: 2018.09.08_537BD _054.d GC Column: GeminiC18 3x1 ID: 3(mm)

COMPOUND NAME	RETENTION TIME	MANUAL INTEGRATION		
		REASON	ANALYST	DATE
Perfluorononanoic acid (PFNA)	2.09	Split Peak	barnettj	09/10/18 13:52

537

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
LC537-ICV_00033	01/05/19	08/30/18	MeOH/H2O, Lot 197626	10 mL	LC537-IS_00081	1000 uL	13C2-PFOA	10 ng/mL
							13C4 PFOS	28.68 ng/mL
.LC537-IS_00081	02/02/19	08/27/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C2-PFOA	0.1 ug/mL
					LCMPFOS_00024	180 uL	13C4 PFOS	0.2868 ug/mL
..LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
..LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
LC537-ICV_00033	01/05/19	08/30/18	MeOH/H2O, Lot 197626	10 mL	LC537-SU_00078	1000 uL	13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/mL
					LC537ICIM2_00002	400 uL	Perfluorobutanesulfonic acid (PFBS)	88.4 ng/mL
							Perfluoroheptanoic acid (PFHpA)	10 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	18.92 ng/mL
							Perfluorononanoic acid (PFNA)	20 ng/mL
							Perfluorooctanoic acid (PFOA)	20.02 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	18.56 ng/mL
.LC537-SU_00078	01/05/19	08/27/18	Methanol, Lot 104453	30000 uL	LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
					LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
..LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
.LC537ICIM2_00002	02/28/19	08/30/18	Methanol, Lot 090285	10 mL	LCPFBS_00009	500 uL	Perfluorobutanesulfonic acid (PFBS)	2.21 ug/mL
					LCPFHpA_00010	50 uL	Perfluoroheptanoic acid (PFHpA)	0.25 ug/mL
					LCPFHxSA_00002	100 uL	Perfluorohexanesulfonic acid (PFHxS)	0.473 ug/mL
					LCPFNA_00010	100 uL	Perfluorononanoic acid (PFNA)	0.5 ug/mL
							Perfluorooctanoic acid (PFOA)	0.5005 ug/mL
					LCPFOA_00010	100 uL	Perfluorooctanoic acid (PFOA)	0.5005 ug/mL
					LCPFOS-br_00006	100 uL	Perfluorooctanesulfonic acid (PFOS)	0.464 ug/mL
..LCPFBS_00009	09/21/22	Wellington Laboratories, Lot LPFBS0917			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFHpA_00010	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHxSA_00002	09/20/22	Wellington Laboratories, Lot LPFHxS0917			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	47.3 ug/mL
..LCPFNA_00010	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
							Perfluorooctanoic acid (PFOA)	0.05 ug/mL
..LCPFOA_00010	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFOS-br_00006	01/12/22	Wellington Laboratories, Lot brPFOSK0117			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
LC537-IS_00082	02/02/19	09/06/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C2-PFOA	0.1 ug/mL
					LCMPFOS_00024	180 uL	13C4 PFOS	0.2868 ug/mL
.LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
.LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
LC537-L1_00022	09/30/18	04/02/18	MeOH/H2O, Lot 090285	5 mL	LC537-IS_00065	500 uL	13C2-PFOA	10 ng/mL
							13C4 PFOS	28.68 ng/mL
					LC537-MSP_00033	60 uL	Perfluorobutanesulfonic acid (PFBS)	8.99912 ng/mL
							Perfluoroheptanoic acid (PFHpA)	0.96 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	3.003 ng/mL
							Perfluorononanoic acid (PFNA)	1.98 ng/mL
							Perfluorooctanoic acid (PFOA)	1.98 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	3.95328 ng/mL
					LC537-SU_00064	500 uL	13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/mL
.LC537-IS_00065	10/02/18	04/02/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C2-PFOA	0.1 ug/mL
					LCMPFOS_00024	180 uL	13C4 PFOS	0.2868 ug/mL
..LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
..LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LC537-MSP_00033	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LCPFBSA_00002	509 uL	Perfluorobutanesulfonic acid (PFBS)	749.927 ng/mL
					LCPFHpA_00009	48 uL	Perfluoroheptanoic acid (PFHpA)	80 ng/mL
					LCPFHxS-br_00005	165 uL	Perfluorohexanesulfonic acid (PFHxS)	250.25 ng/mL
					LCPFNA_00009	99 uL	Perfluorononanoic acid (PFNA)	165 ng/mL
					LCPFOA_00010	99 uL	Perfluorooctanoic acid (PFOA)	165 ng/mL
					LCPFOS-br_00005	213 uL	Perfluorooctanesulfonic acid (PFOS)	329.44 ng/mL
..LCPFBSA_00002	12/02/21	Wellington Laboratories, Lot LPFBS1116			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFHpA_00009	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHxS-br_00005	01/04/22	Wellington Laboratories, Lot brPFHxSK0117			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00010	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFOS-br_00005	01/12/22	Wellington Laboratories, Lot brPFOSK0117			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LC537-SU_00064	10/02/18	04/02/18	Methanol, Lot 104453	30000 uL	LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
					LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
..LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
LC537-L2_00022	09/30/18	04/02/18	MeOH/H2O, Lot 090285	20 mL	LC537-HSP_00028	320 uL	Perfluorobutanesulfonic acid (PFBS)	20.0138 ng/mL
							Perfluoroheptanoic acid (PFHpA)	2.16 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	6.72187 ng/mL
							Perfluorononanoic acid (PFNA)	4.4 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Perfluorooctanoic acid (PFOA)	4.4 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	8.78507 ng/mL
					LC537-IS_00065	2 mL	13C2-PFOA	10 ng/mL
							13C4 PFOS	28.68 ng/mL
					LC537-SU_00064	2 mL	13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/mL
.LC537-HSP_00028	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LCPFBSA_00002	849 uL	Perfluorobutanesulfonic acid (PFBS)	1250.86 ng/mL
					LCPFHpA_00009	81 uL	Perfluoroheptanoic acid (PFHpA)	135 ng/mL
					LCPFHxS-br_00005	277 uL	Perfluorohexanesulfonic acid (PFHxS)	420.117 ng/mL
					LCPFNA_00009	165 uL	Perfluorononanoic acid (PFNA)	275 ng/mL
					LCPFOA_00010	165 uL	Perfluorooctanoic acid (PFOA)	275 ng/mL
					LCPFOS-br_00005	355 uL	Perfluorooctanesulfonic acid (PFOS)	549.067 ng/mL
..LCPFBSA_00002	12/02/21	Wellington Laboratories, Lot LPFBS1116			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFHpA_00009	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHxS-br_00005	01/04/22	Wellington Laboratories, Lot brPFHxSK0117			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00010	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFOS-br_00005	01/12/22	Wellington Laboratories, Lot brPFOSK0117			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LC537-IS_00065	10/02/18	04/02/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C2-PFOA	0.1 ug/mL
					LCMPFOS_00024	180 uL	13C4 PFOS	0.2868 ug/mL
..LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
..LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LC537-SU_00064	10/02/18	04/02/18	Methanol, Lot 104453	30000 uL	LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
					LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
..LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
LC537-L3_00025	09/30/18	04/02/18	MeOH/H2O, Lot 090285	20 mL	LC537-HSP_00028	720 uL	Perfluorobutanesulfonic acid (PFBS)	45.031 ng/mL
							Perfluoroheptanoic acid (PFHpA)	4.86 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	15.1242 ng/mL
							Perfluorononanoic acid (PFNA)	9.9 ng/mL
							Perfluorooctanoic acid (PFOA)	9.9 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	19.7664 ng/mL
					LC537-IS_00065	2 mL	13C2-PFOA	10 ng/mL
							13C4 PFOS	28.68 ng/mL
					LC537-SU_00064	2 mL	13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.LC537-HSP_00028	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LCPFBSA_00002	849 uL	Perfluorobutanesulfonic acid (PFBS)	1250.86 ng/mL
					LCPFHpA_00009	81 uL	Perfluoroheptanoic acid (PFHpA)	135 ng/mL
					LCPFHxS-br_00005	277 uL	Perfluorohexanesulfonic acid (PFHxS)	420.117 ng/mL
					LCPFNA_00009	165 uL	Perfluorononanoic acid (PFNA)	275 ng/mL
					LCPFOA_00010	165 uL	Perfluorooctanoic acid (PFOA)	275 ng/mL
					LCPFOS-br_00005	355 uL	Perfluorooctanesulfonic acid (PFOS)	549.067 ng/mL
..LCPFBSA_00002	12/02/21	Wellington Laboratories, Lot LPFBS1116			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFHpA_00009	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHxS-br_00005	01/04/22	Wellington Laboratories, Lot brPFHxSK0117			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00010	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFOS-br_00005	01/12/22	Wellington Laboratories, Lot brPFOSK0117			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LC537-IS_00065	10/02/18	04/02/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C2-PFOA	0.1 ug/mL
					LCMPFOS_00024	180 uL	13C4 PFOS	0.2868 ug/mL
..LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
..LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LC537-SU_00064	10/02/18	04/02/18	Methanol, Lot 104453	30000 uL	LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
					LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
..LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
LC537-L4_00022	09/30/18	04/02/18	MeOH/H2O, Lot 090285	5 mL	LC537-HSP_00028	360 uL	Perfluorobutanesulfonic acid (PFBS)	90.0619 ng/mL
							Perfluoroheptanoic acid (PFHpA)	9.72 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	30.2484 ng/mL
							Perfluorononanoic acid (PFNA)	19.8 ng/mL
							Perfluorooctanoic acid (PFOA)	19.8 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	39.5328 ng/mL
					LC537-IS_00065	500 uL	13C2-PFOA	10 ng/mL
							13C4 PFOS	28.68 ng/mL
					LC537-SU_00064	500 uL	13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/mL
.LC537-HSP_00028	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LCPFBSA_00002	849 uL	Perfluorobutanesulfonic acid (PFBS)	1250.86 ng/mL
					LCPFHpA_00009	81 uL	Perfluoroheptanoic acid (PFHpA)	135 ng/mL
					LCPFHxS-br_00005	277 uL	Perfluorohexanesulfonic acid (PFHxS)	420.117 ng/mL
					LCPFNA_00009	165 uL	Perfluorononanoic acid (PFNA)	275 ng/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCPFOA_00010	165 uL	Perfluorooctanoic acid (PFOA)	275 ng/mL
					LCPFOS-br_00005	355 uL	Perfluorooctanesulfonic acid (PFOS)	549.067 ng/mL
..LCPFBSA_00002	12/02/21	Wellington Laboratories, Lot LPFBS1116			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFHpA_00009	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHxS-br_00005	01/04/22	Wellington Laboratories, Lot brPFHxSK0117			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00010	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFOS-br_00005	01/12/22	Wellington Laboratories, Lot brPFOSK0117			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LC537-IS_00065	10/02/18	04/02/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C2-PFOA	0.1 ug/mL
					LCMPFOS_00024	180 uL	13C4 PFOS	0.2868 ug/mL
..LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
..LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LC537-SU_00064	10/02/18	04/02/18	Methanol, Lot 104453	30000 uL	LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
					LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
..LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
LC537-L5_00026	09/30/18	04/02/18	MeOH/H2O, Lot 090285	20 mL	LC537-HSP_00028	2160 uL	Perfluorobutanesulfonic acid (PFBS)	135.093 ng/mL
							Perfluoroheptanoic acid (PFHpA)	14.58 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	45.3726 ng/mL
							Perfluorononanoic acid (PFNA)	29.7 ng/mL
							Perfluorooctanoic acid (PFOA)	29.7 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	59.2992 ng/mL
					LC537-IS_00065	2 mL	13C2-PFOA	10 ng/mL
							13C4 PFOS	28.68 ng/mL
					LC537-SU_00064	2 mL	13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/mL
.LC537-HSP_00028	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LCPFBSA_00002	849 uL	Perfluorobutanesulfonic acid (PFBS)	1250.86 ng/mL
					LCPFHpA_00009	81 uL	Perfluoroheptanoic acid (PFHpA)	135 ng/mL
					LCPFHxS-br_00005	277 uL	Perfluorohexanesulfonic acid (PFHxS)	420.117 ng/mL
					LCPFNA_00009	165 uL	Perfluorononanoic acid (PFNA)	275 ng/mL
					LCPFOA_00010	165 uL	Perfluorooctanoic acid (PFOA)	275 ng/mL
					LCPFOS-br_00005	355 uL	Perfluorooctanesulfonic acid (PFOS)	549.067 ng/mL
..LCPFBSA_00002	12/02/21	Wellington Laboratories, Lot LPFBS1116			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFHpA_00009	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
..LCPFHxS-br_00005	01/04/22	Wellington Laboratories, Lot brPFHxSK0117			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00010	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFOS-br_00005	01/12/22	Wellington Laboratories, Lot brPFOSK0117			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LC537-IS_00065	10/02/18	04/02/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C2-PFOA	0.1 ug/mL
					LCMPFOS_00024	180 uL	13C4 PFOS	0.2868 ug/mL
..LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
..LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LC537-SU_00064	10/02/18	04/02/18	Methanol, Lot 104453	30000 uL	LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
					LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
..LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
LC537-L6_00022	09/30/18	04/02/18	MeOH/H2O, Lot 090285	5 mL	LC537-HSP_00028	720 uL	Perfluorobutanesulfonic acid (PFBS)	180.124 ng/mL
							Perfluoroheptanoic acid (PFHpA)	19.44 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	60.4968 ng/mL
							Perfluorononanoic acid (PFNA)	39.6 ng/mL
							Perfluorooctanoic acid (PFOA)	39.6 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	79.0656 ng/mL
					LC537-IS_00065	500 uL	13C2-PFOA	10 ng/mL
							13C4 PFOS	28.68 ng/mL
					LC537-SU_00064	500 uL	13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/mL
.LC537-HSP_00028	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LCPFBSA_00002	849 uL	Perfluorobutanesulfonic acid (PFBS)	1250.86 ng/mL
					LCPFHpA_00009	81 uL	Perfluoroheptanoic acid (PFHpA)	135 ng/mL
					LCPFHxS-br_00005	277 uL	Perfluorohexanesulfonic acid (PFHxS)	420.117 ng/mL
					LCPFNA_00009	165 uL	Perfluorononanoic acid (PFNA)	275 ng/mL
					LCPFOA_00010	165 uL	Perfluorooctanoic acid (PFOA)	275 ng/mL
					LCPFOS-br_00005	355 uL	Perfluorooctanesulfonic acid (PFOS)	549.067 ng/mL
..LCPFBSA_00002	12/02/21	Wellington Laboratories, Lot LPFBS1116			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
..LCPFHpA_00009	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFHxS-br_00005	01/04/22	Wellington Laboratories, Lot brPFHxSK0117			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
..LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFOA_00010	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFOS-br_00005	01/12/22	Wellington Laboratories, Lot brPFOSK0117			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LC537-IS_00065	10/02/18	04/02/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C2-PFOA	0.1 ug/mL

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
					LCMPFOS_00024	180 uL	13C4 PFOS	0.2868 ug/mL
..LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			(Purchased Reagent)		13C2-PFOA	50 ug/mL
..LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517			(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
.LC537-SU_00064	10/02/18	04/02/18	Methanol, Lot 104453	30000 uL	LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
					LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
..LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			(Purchased Reagent)		13C2 PFDA	50 ug/mL
..LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116			(Purchased Reagent)		13C2 PFHxA	50 ug/mL
LC537-LSP_00032	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LCPFBSA_00002	153 uL	Perfluorobutanesulfonic acid (PFBS)	225.42 ng/mL
					LCPFHpA_00009	15 uL	Perfluoroheptanoic acid (PFHpA)	25 ng/mL
					LCPFHxS-br_00005	50 uL	Perfluorohexane Sulfonate	75.8333 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	75.8333 ng/mL
					LCPFNA_00009	30 uL	Perfluorononanoic acid (PFNA)	50 ng/mL
					LCPFOA_00010	30 uL	Perfluorooctanoic acid (PFOA)	50 ng/mL
					LCPFOS-br_00005	65 uL	Perfluorooctanesulfonic acid (PFOS)	100.533 ng/mL
.LCPFBSA_00002	12/02/21	Wellington Laboratories, Lot LPFBS1116			(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
.LCPFHpA_00009	12/02/21	Wellington Laboratories, Lot PFHpA1216			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
.LCPFHxS-br_00005	01/04/22	Wellington Laboratories, Lot brPFHxSK0117			(Purchased Reagent)		Perfluorohexane Sulfonate	45.5 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
.LCPFNA_00009	07/20/22	Wellington Laboratories, Lot PFNA0717			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	50 ug/mL
.LCPFOA_00010	09/27/22	Wellington Laboratories, Lot PFOA0917			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
.LCPFOS-br_00005	01/12/22	Wellington Laboratories, Lot brPFOSK0117			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
LC537-SU_00076	01/20/19	07/20/18	Methanol, Lot 104453	30000 uL	LCd5-NEtFOSAA_00006	60 uL	d5-NEtFOSAA	0.1 ug/mL
					LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
					LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
.LCd5-NEtFOSAA_00006	11/08/22	WELLINGTON, Lot d5NEtFOSAA1117			(Purchased Reagent)		d5-NEtFOSAA	50 ug/mL
.LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			(Purchased Reagent)		13C2 PFDA	50 ug/mL
.LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116			(Purchased Reagent)		13C2 PFHxA	50 ug/mL

Reagent

LCd5-NEtFOSAA_00006

1106105
ID: LCd5-NEtFOSAA_00006
Exp: 11/08/22 Prpd: CCL
d5-N-EtFOSAA

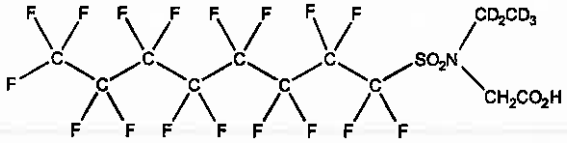
R: 12/4/17 ccc

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: d5-N-EtFOSAA **LOT NUMBER:** d5NEtFOSAA1117
COMPOUND: N-ethyl-d5-perfluoro-1-octanesulfonamidoacetic acid

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$C_{12}D_5H_3F_{17}NO_4S$	**MOLECULAR WEIGHT:**	590.26
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥98% $^2H_5$
LAST TESTED: (mm/dd/yyyy)	11/08/2017		
EXPIRY DATE: (mm/dd/yyyy)	11/08/2022		
RECOMMENDED STORAGE:	Refrigerate ampoule		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 11/16/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

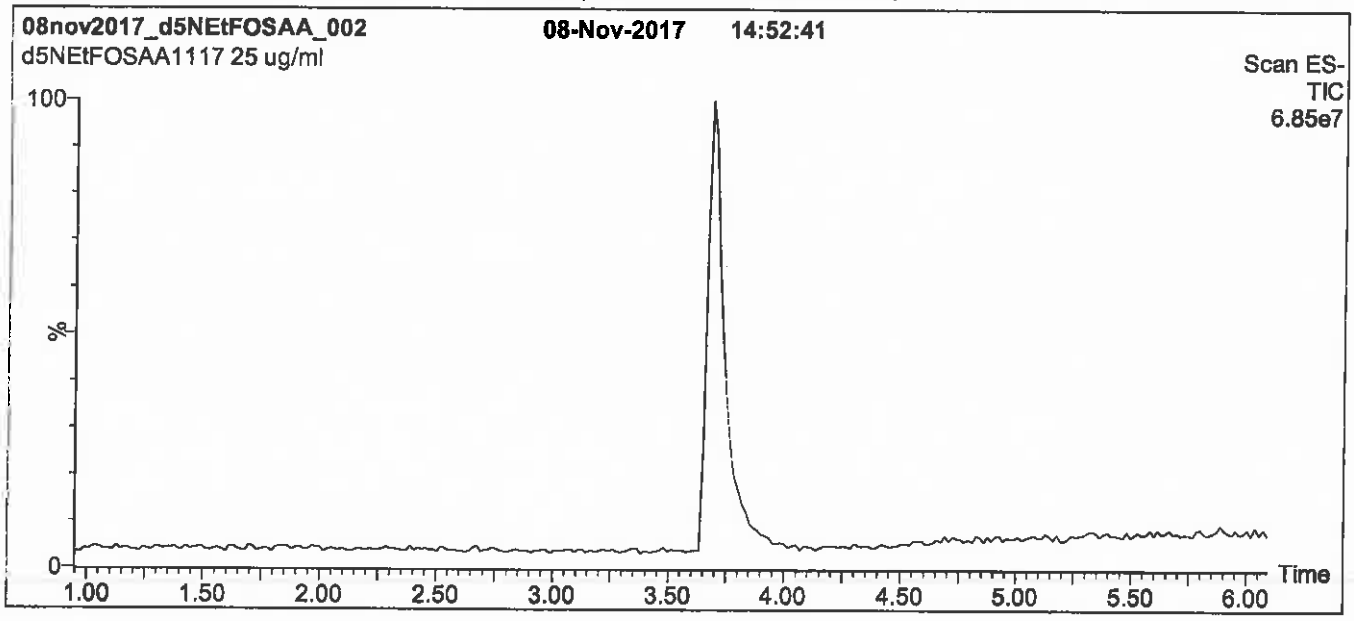
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

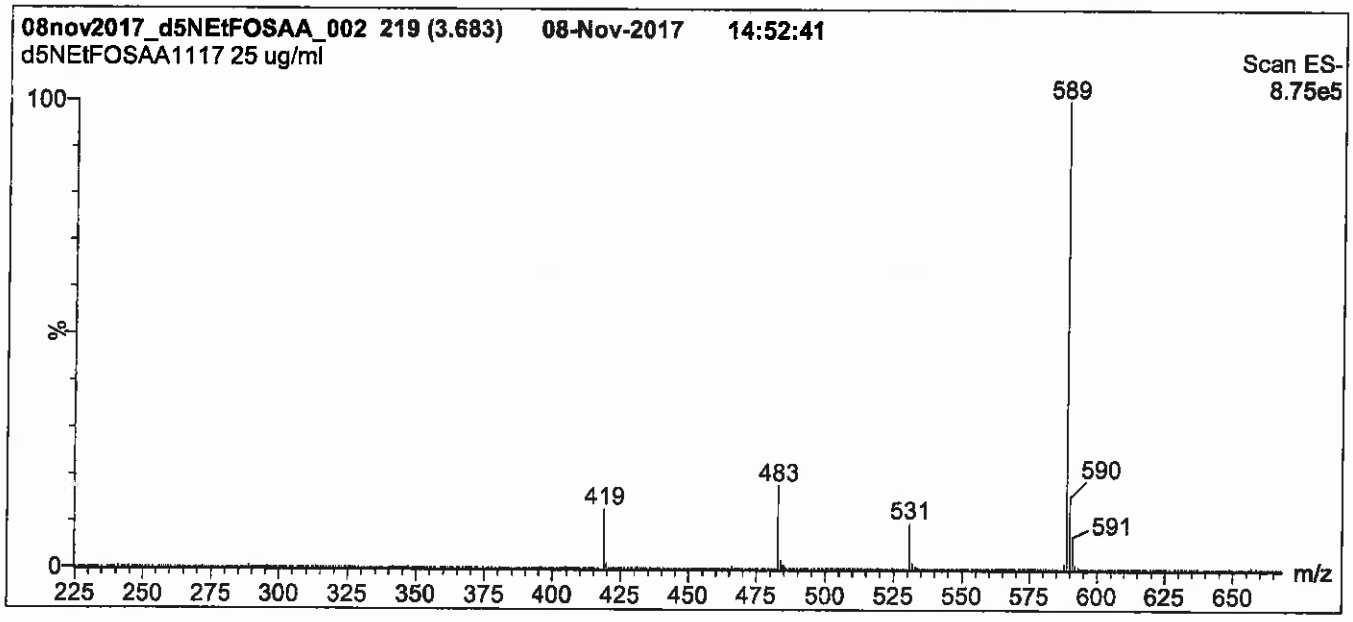
CALA

ANAB ACCREDITED

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

Figure 1: **d5-N-EtFOSAA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

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

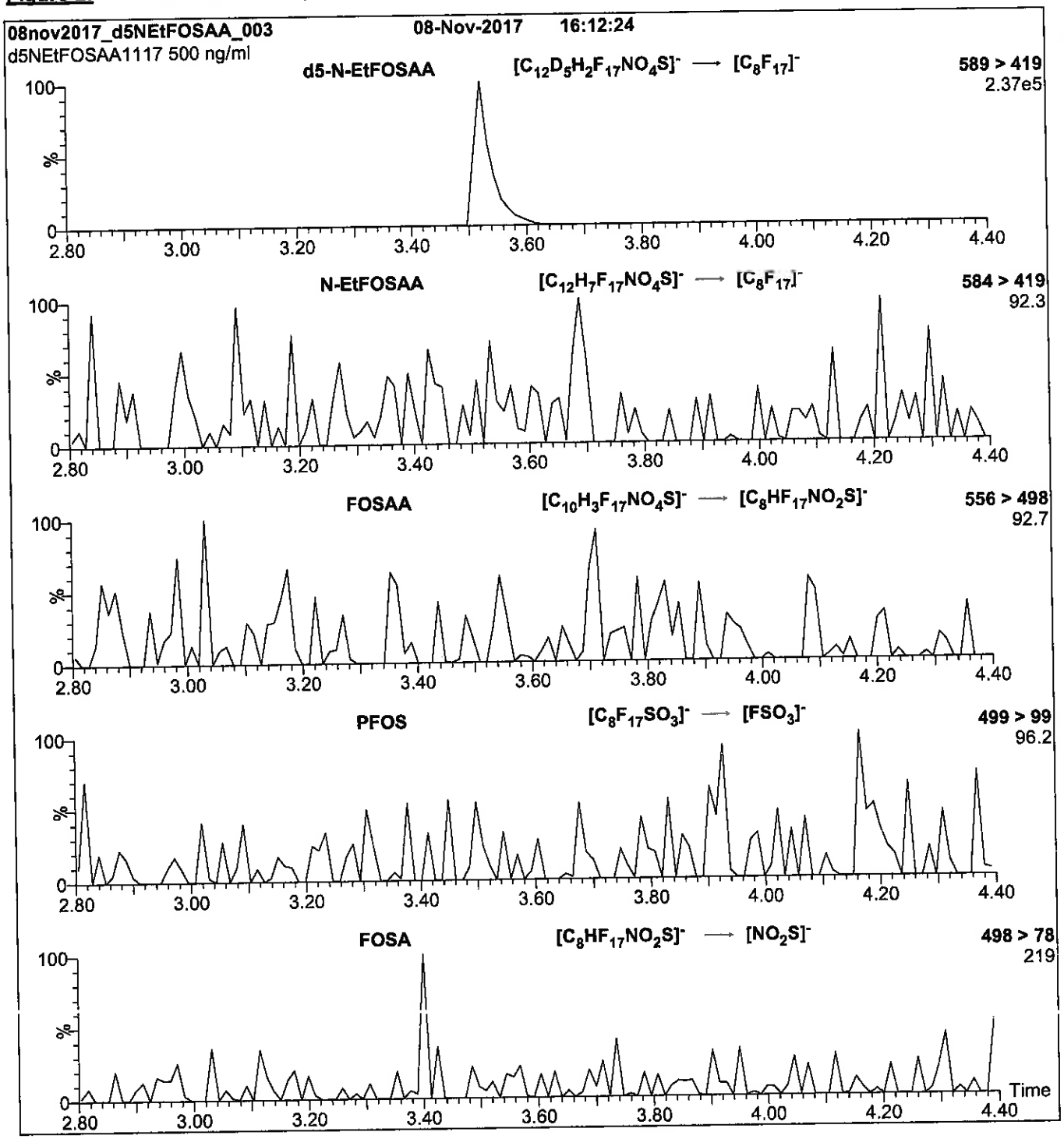
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 35.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **d5-N-EtFOSAA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml d5-N-EtFOSAA)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 20

Reagent

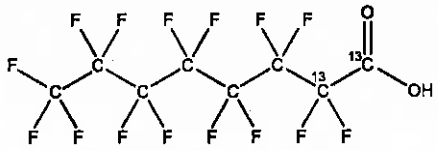
LCM2PFOA_00010

√ 8/30/14 SRV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M2PFOA	**LOT NUMBER:**	M2PFOA0216
COMPOUND:	Perfluoro-n-[1,2-$^{13}C_2$]octanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_8HF_{15}O_2$	**MOLECULAR WEIGHT:**	416.05
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2-$^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	02/12/2016		
EXPIRY DATE: (mm/dd/yyyy)	02/12/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 02/24/2016 (mm/dd/yyyy)
B.G. Chittim

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

INTENDED USE:

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:

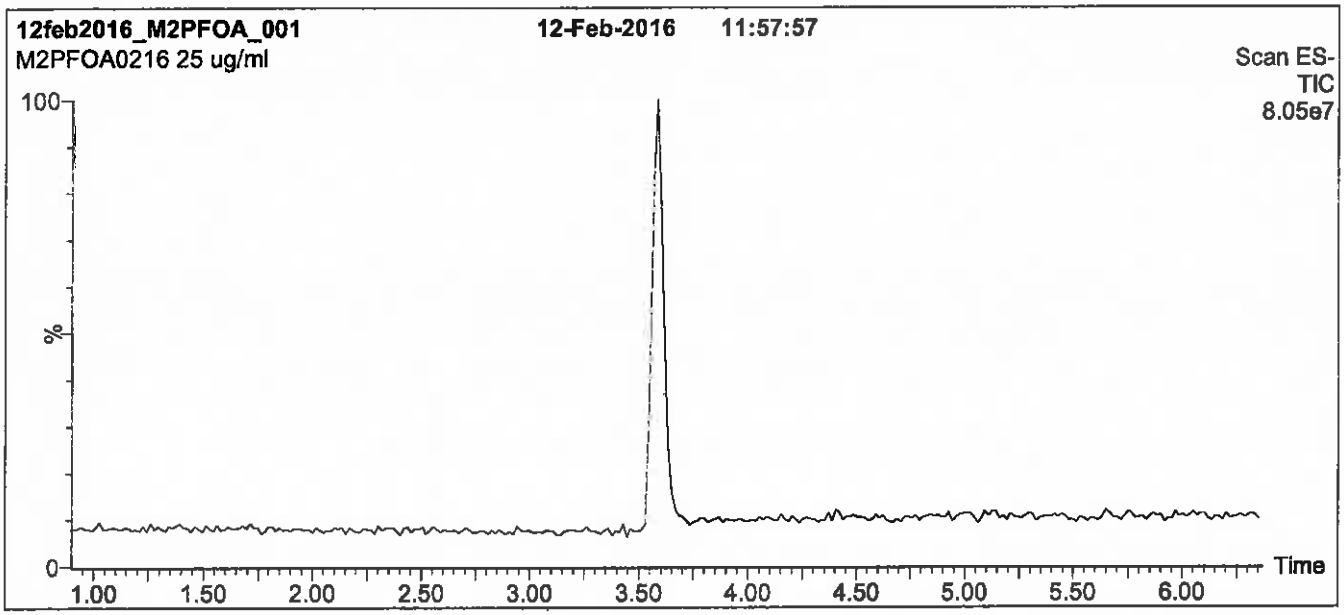
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

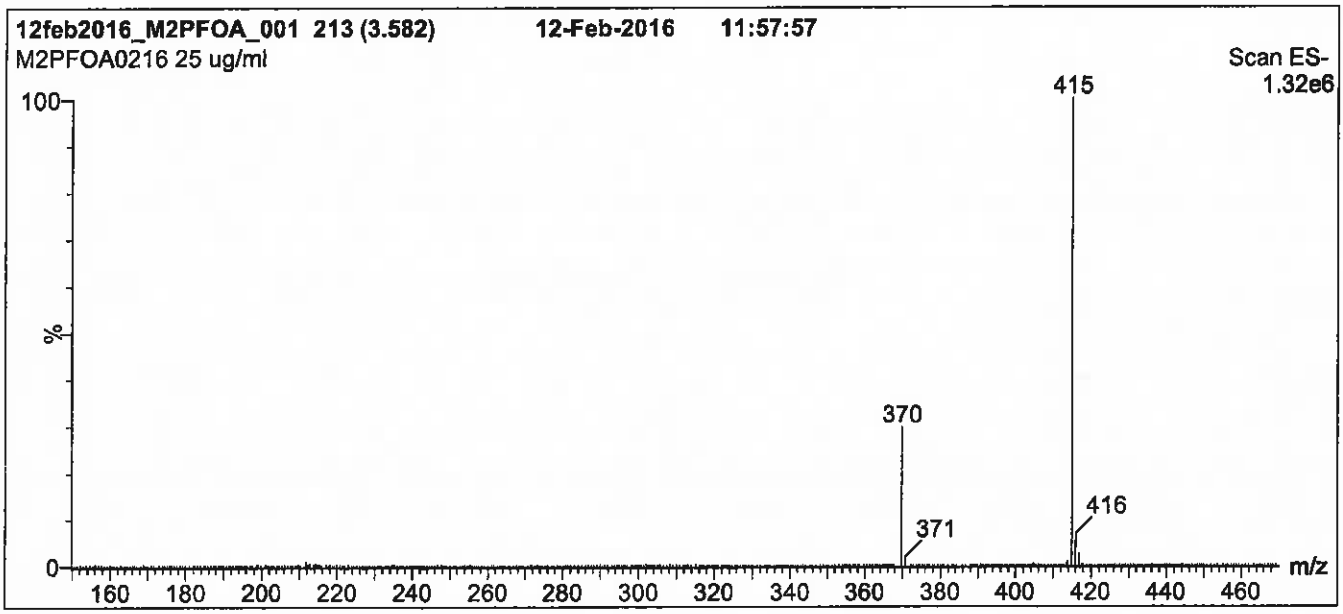
CALA

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: **M2PFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

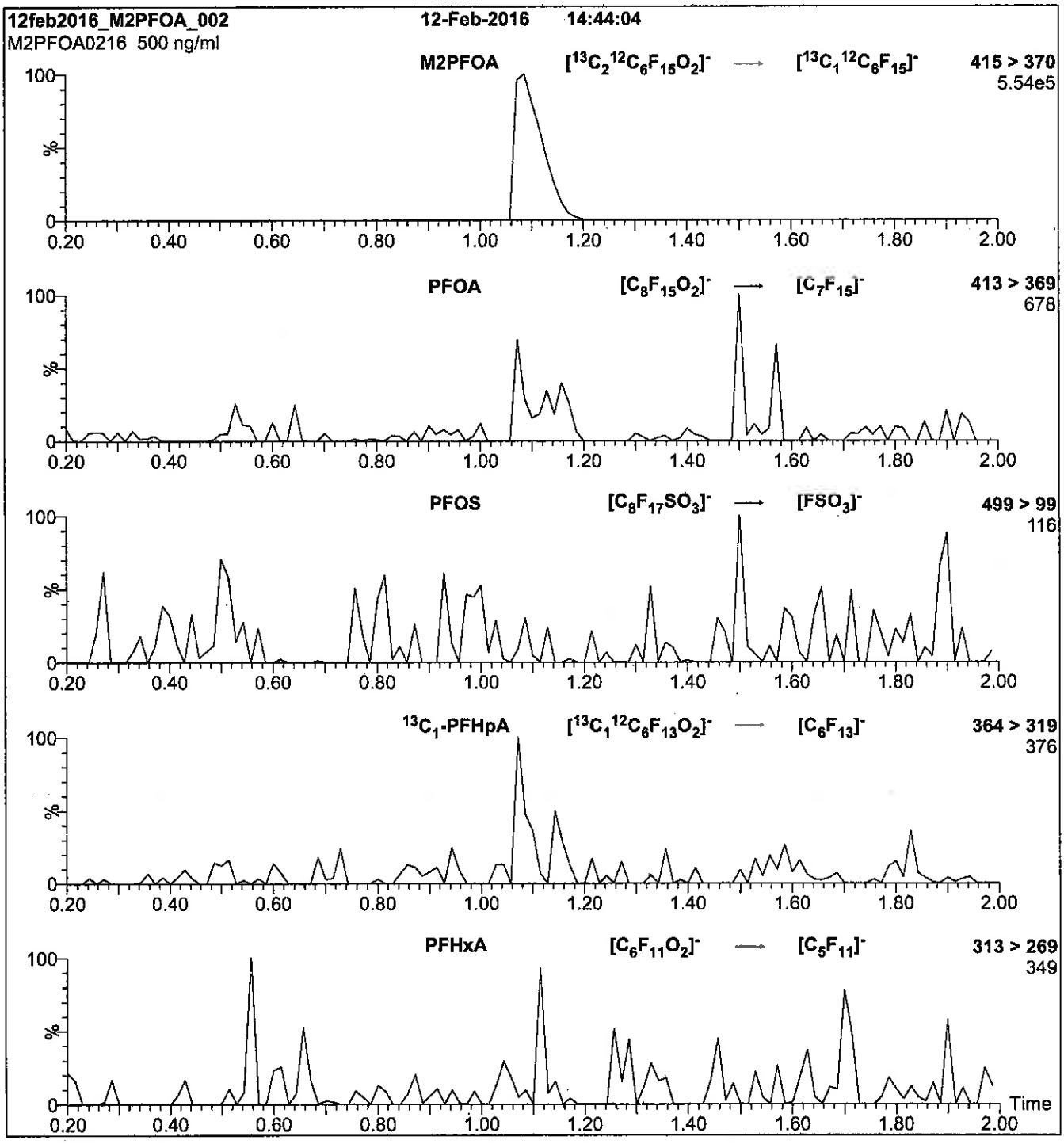
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

Figure 2: **M2PFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml M2PFOA)

Mobile phase: Isocratic 80% MeOH / 20% H_2O

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 10

Reagent

LCMPFDA_00012

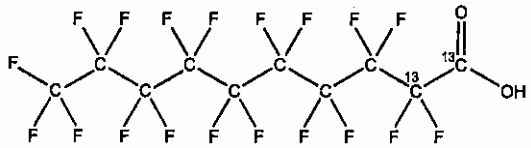
R: SBC 12/21/16

814255
ID: LCMPFDA_00012
Exp: 09/30/21 Prpd: SBC
13C2-Perfluorodecanoic a

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFDA	**LOT NUMBER:**	MPFDA0916
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)	09/30/2016		
EXPIRY DATE: (mm/dd/yyyy)	09/30/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: B.G. Chittim **Date:** 10/07/2016 (mm/dd/yyyy)

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

INTENDED USE:

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HAZARDS:

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

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TRACEABILITY:

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

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QUALITY MANAGEMENT:

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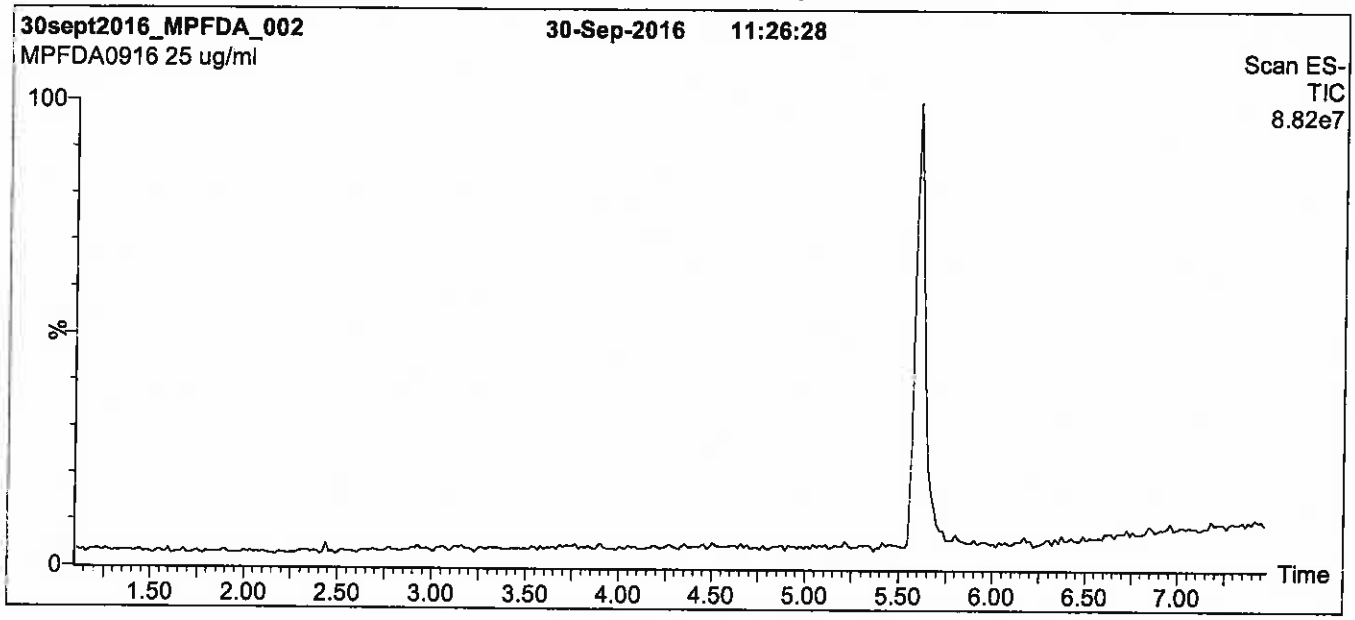
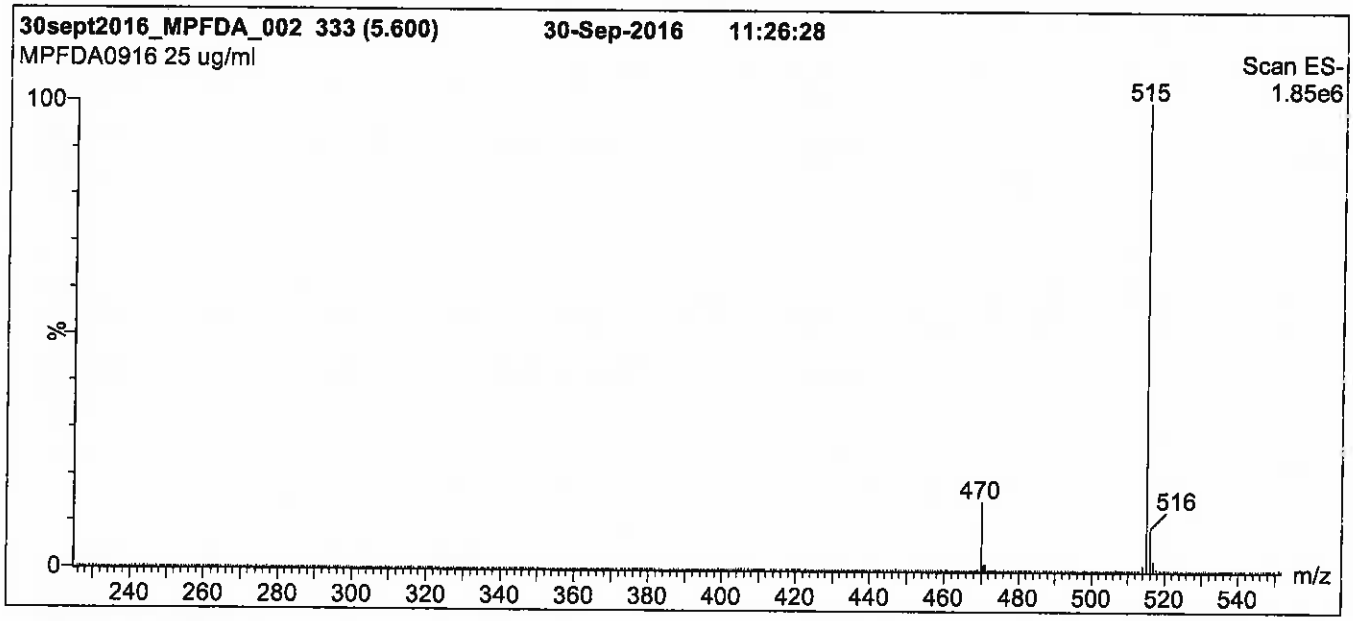
CALA Testing Accreditation No.: A 1226

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: **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 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

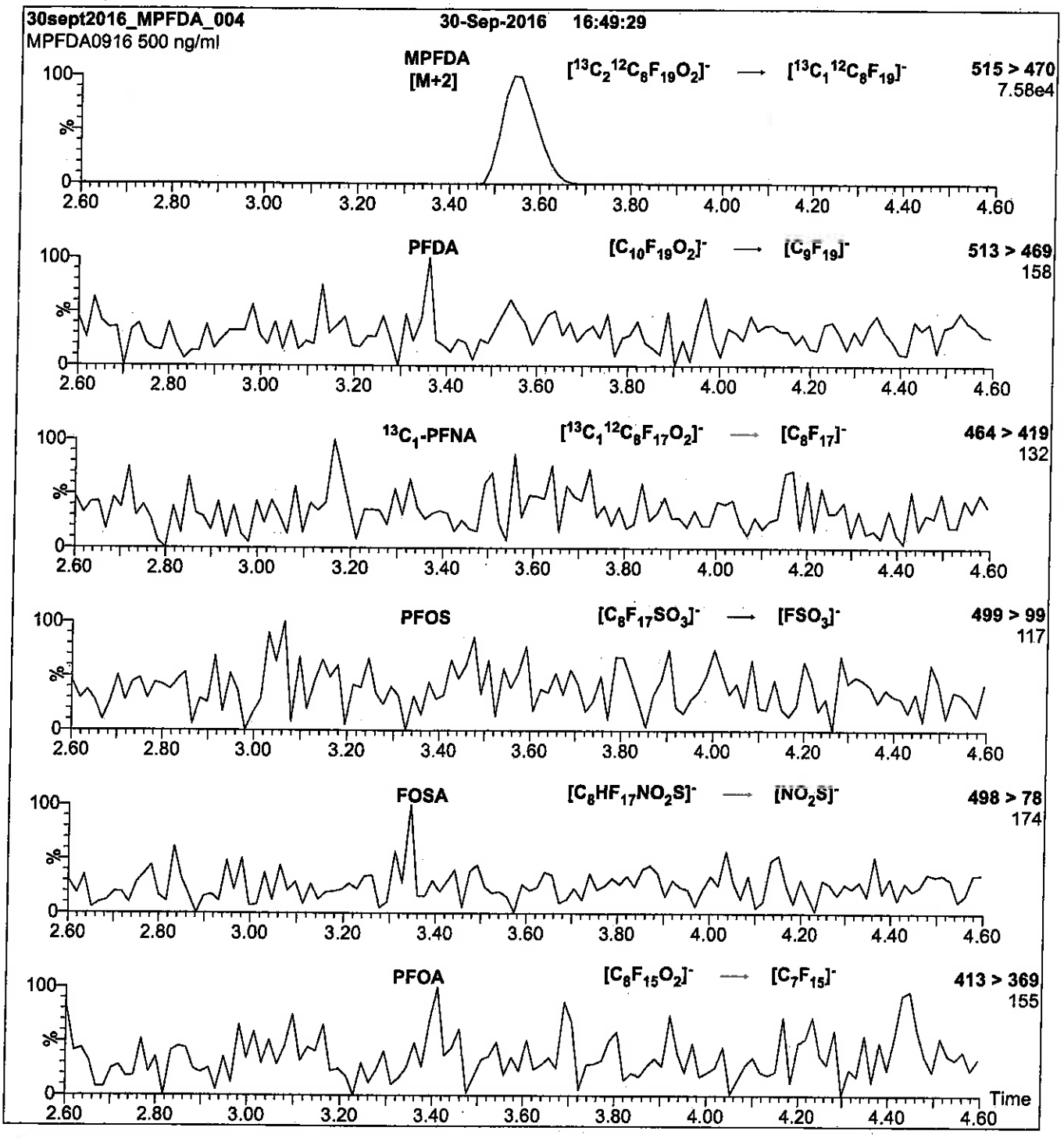
Flow: 300 µl/min

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 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

LCMPFHxA_00015

r: 5/8/17 SRV

WELLINGTON LABORATORIES

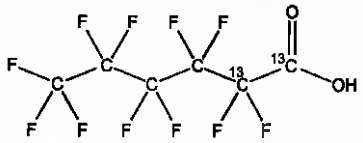
CERTIFICATE OF ANALYSIS
DOCUMENTATION

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

LOT NUMBER: MPFHxA1116

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) 11/22/2016
EXPIRY DATE: (mm/dd/yyyy) 11/22/2021
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 < 0.1% 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:** 12/13/2016 (mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters $x_1, x_2, ...x_n$ 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

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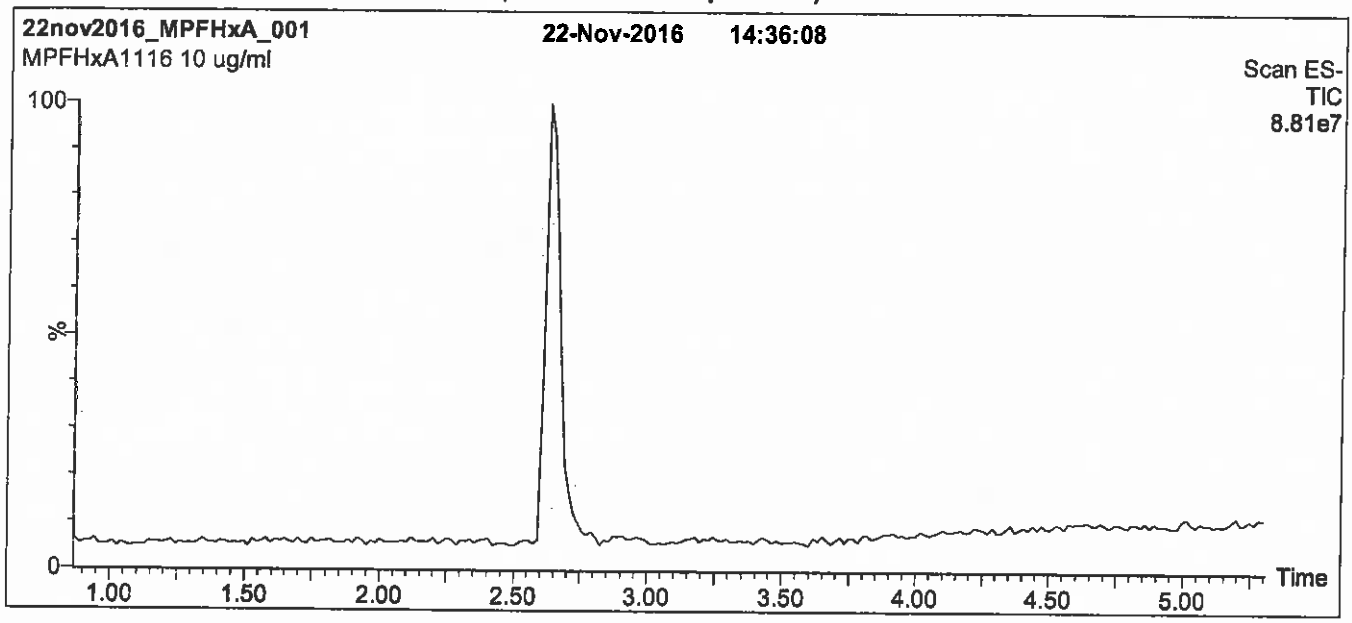
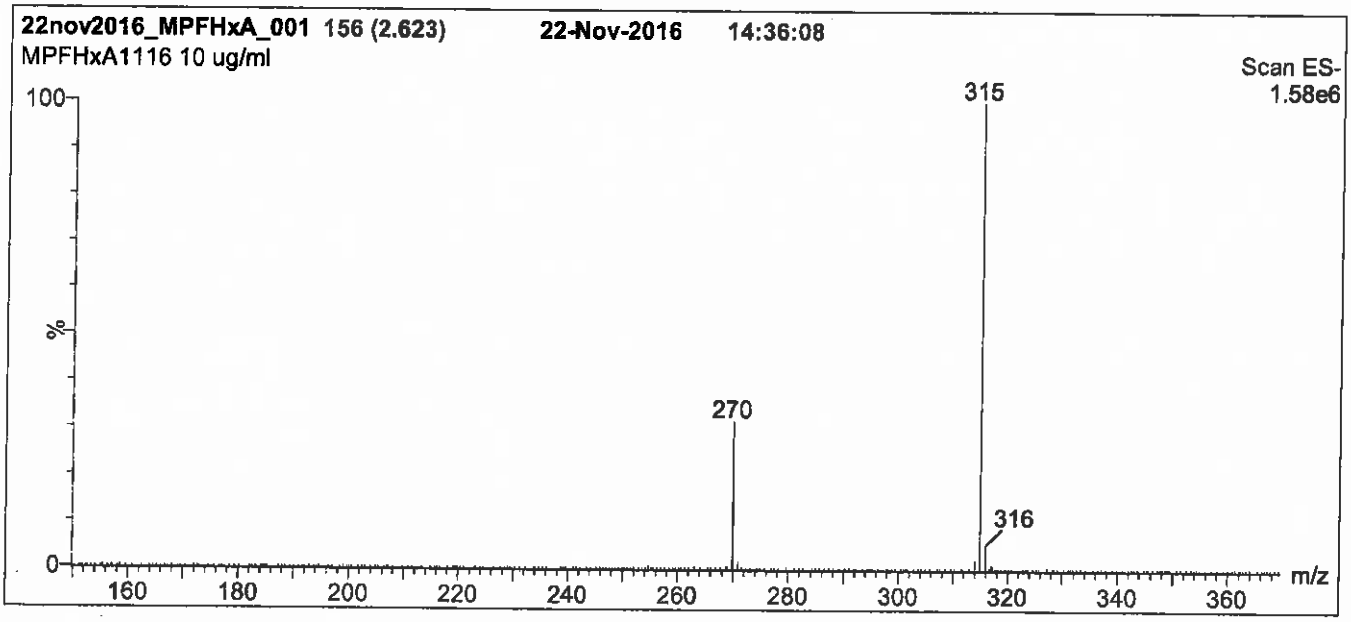
Figure 1: **MPFHxA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions over 0.5 min.
Time: 10 min

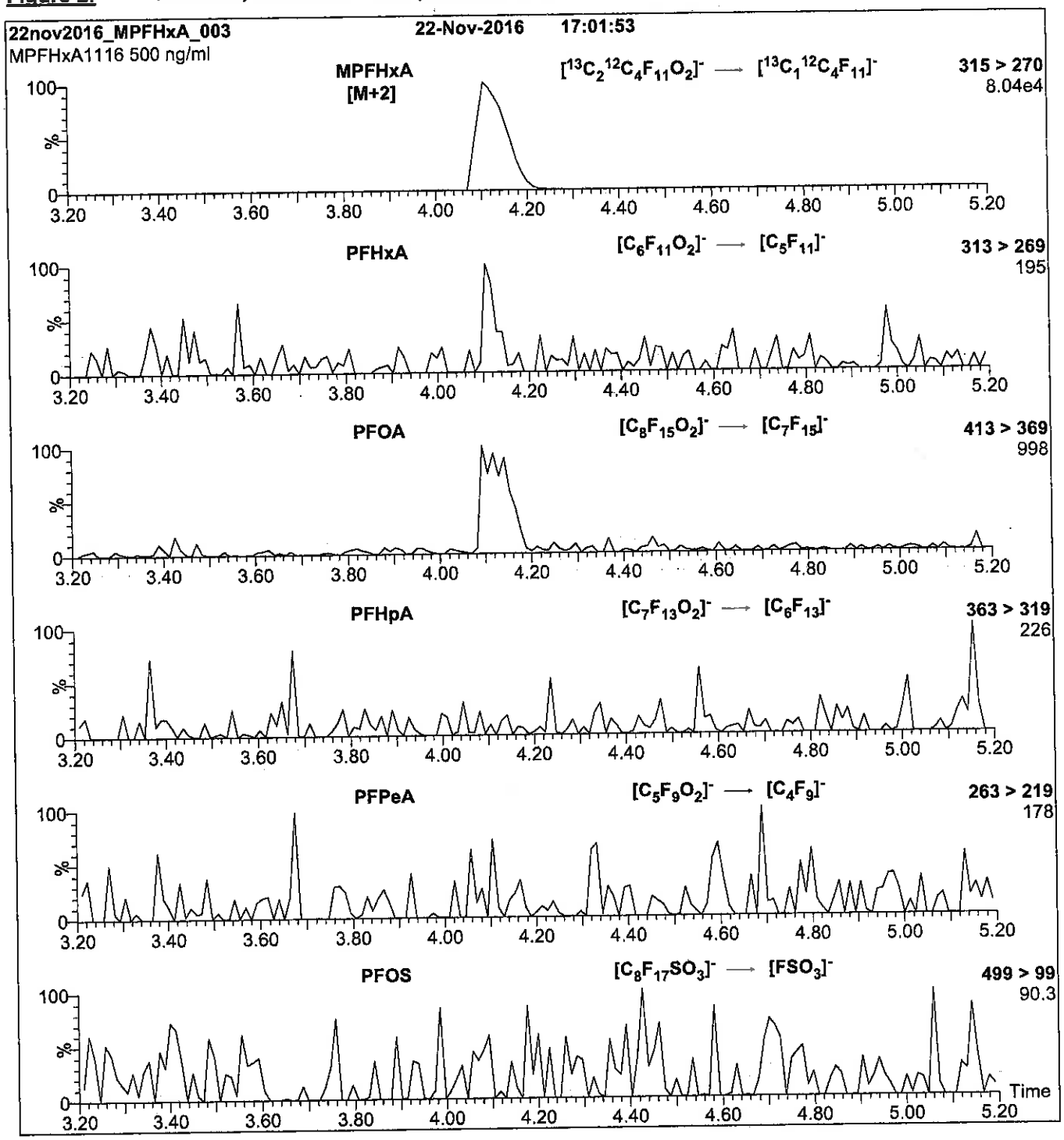
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

MS Parameters

Collision Gas (mbar) = 3.46e-3
Collision Energy (eV) = 10

Reagent

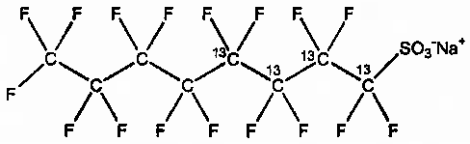
LCMPFOS_00024

r: 8/2/17 SKJ

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFOS	**LOT NUMBER:**	MPFOS0517
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)	05/19/2017		
EXPIRY DATE: (mm/dd/yyyy)	05/19/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 05/30/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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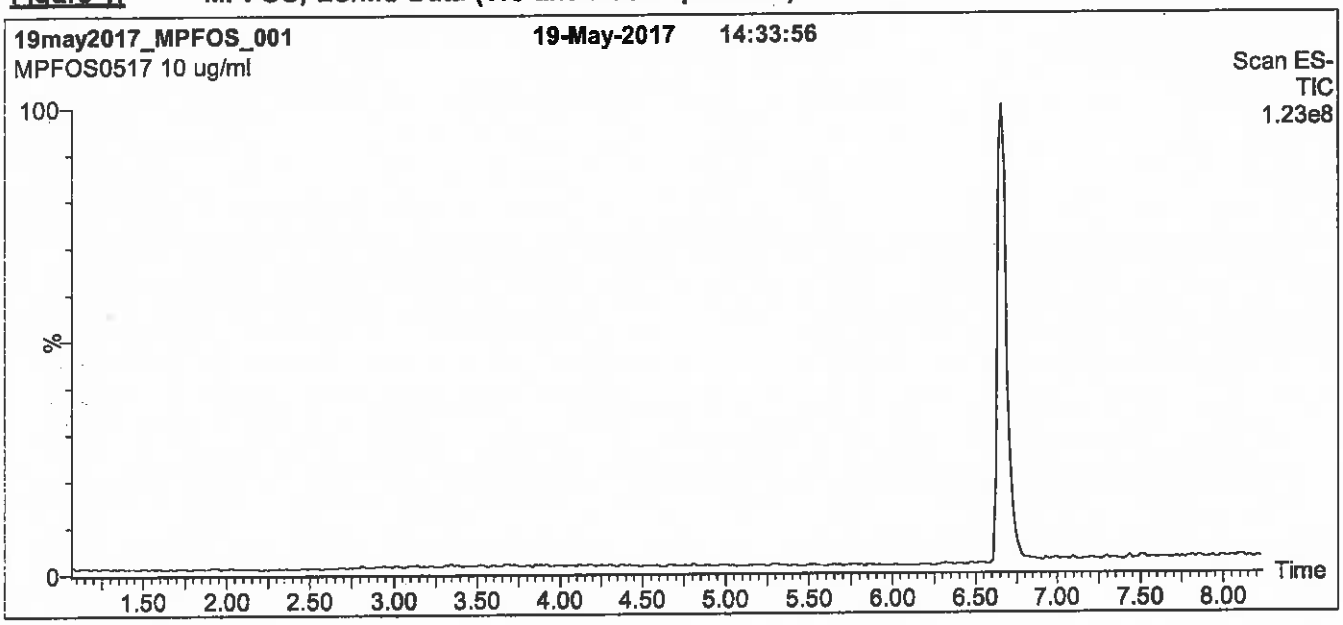
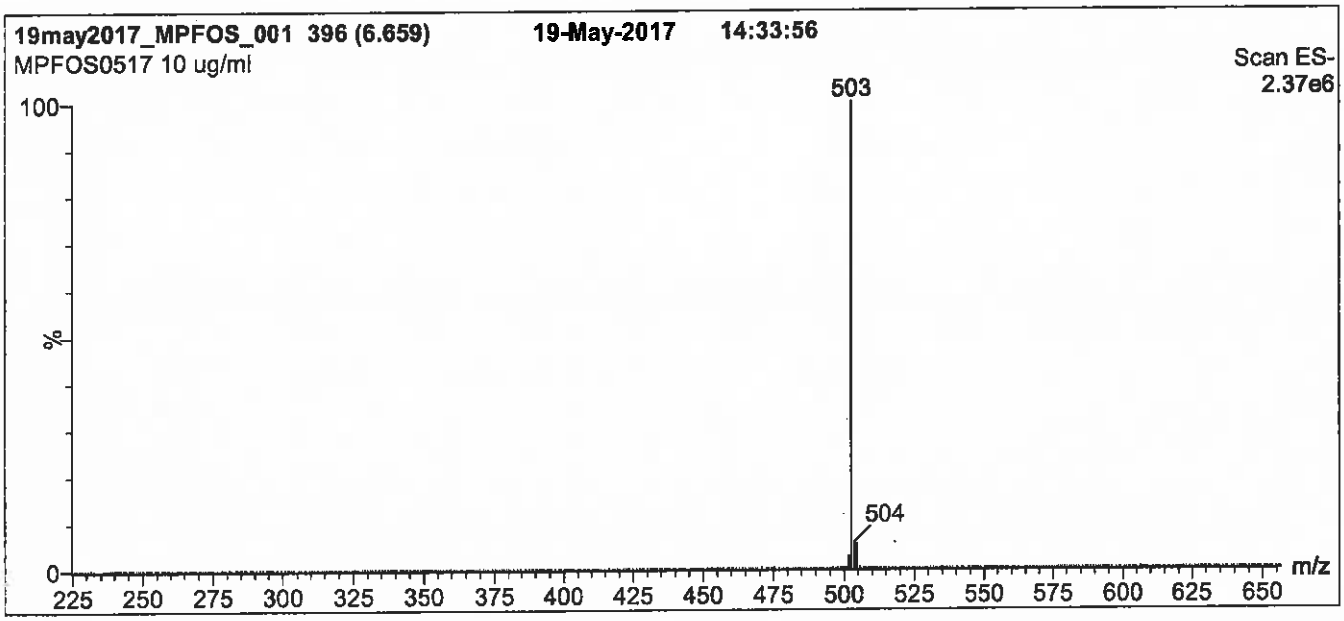
Figure 1: **MPFOS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 1 min
before returning to initial conditions in 0.5 min.
Time: 10 min

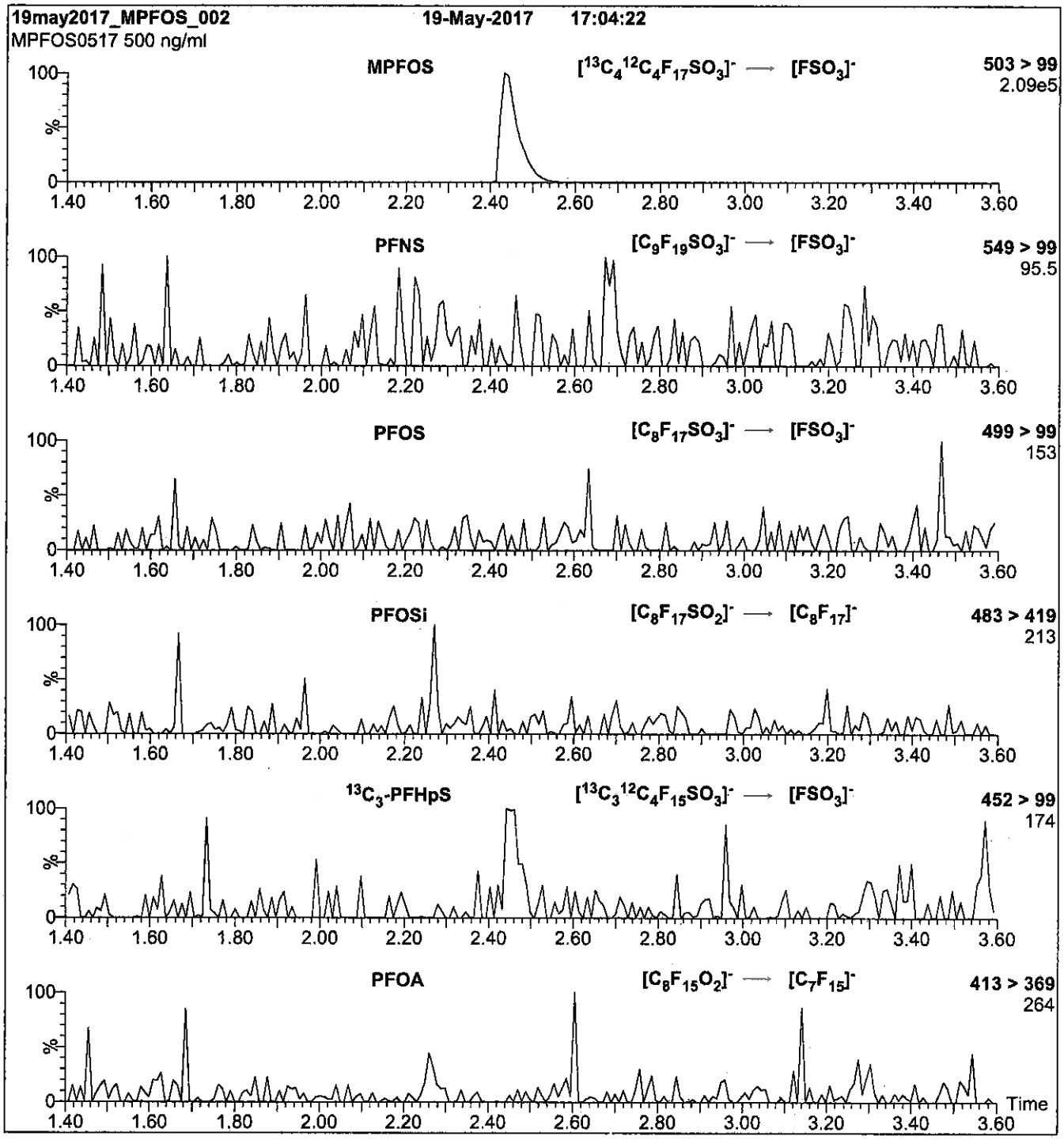
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 40

Reagent

LCPFBS_00009

D: 2/16/18 SW

WELLINGTON LABORATORIES

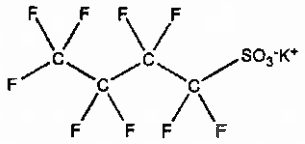
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: L-PFBS
COMPOUND: Potassium perfluoro-1-butanesulfonate

LOT NUMBER: LPFBS0917

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)	09/21/2017		
EXPIRY DATE: (mm/dd/yyyy)	09/21/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 09/22/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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CALA

ANAB ACCREDITED

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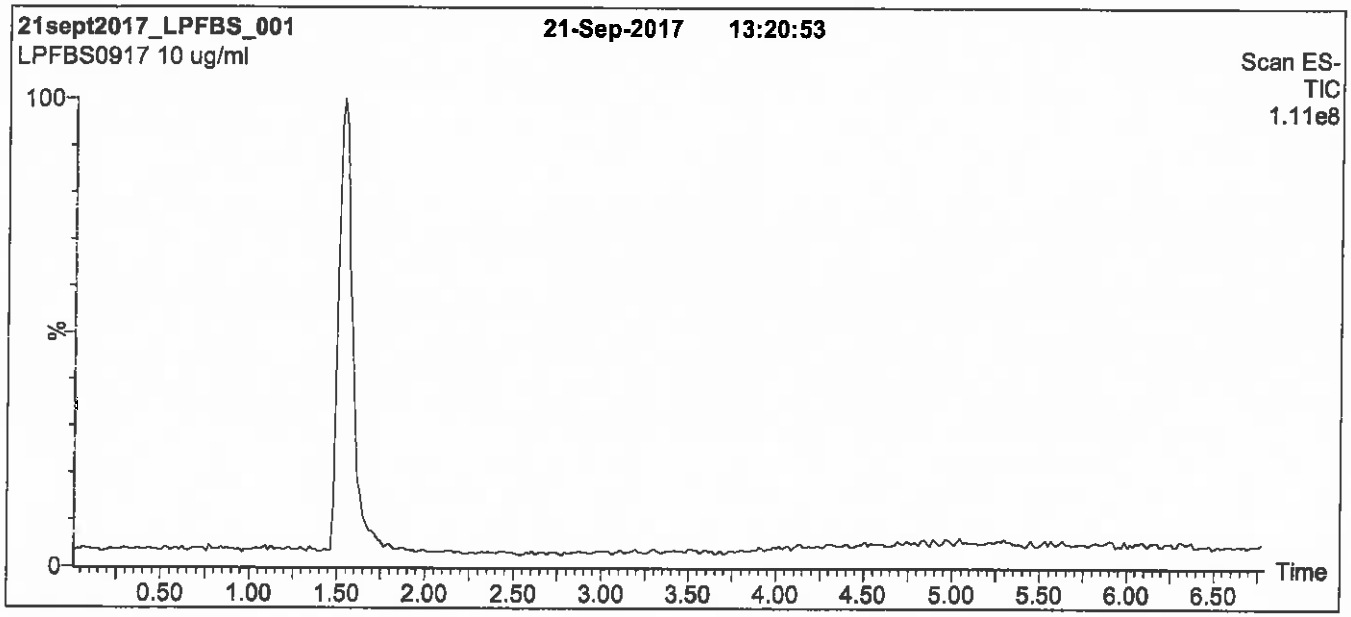
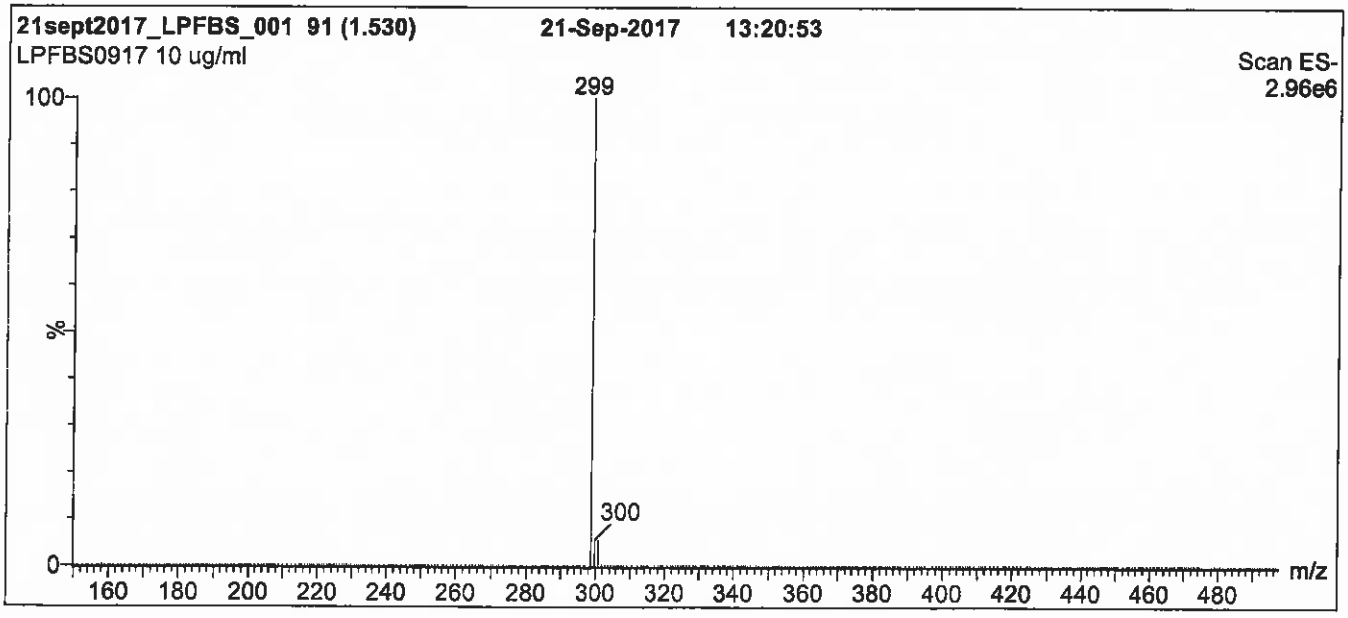
Figure 1: **L-PFBS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 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

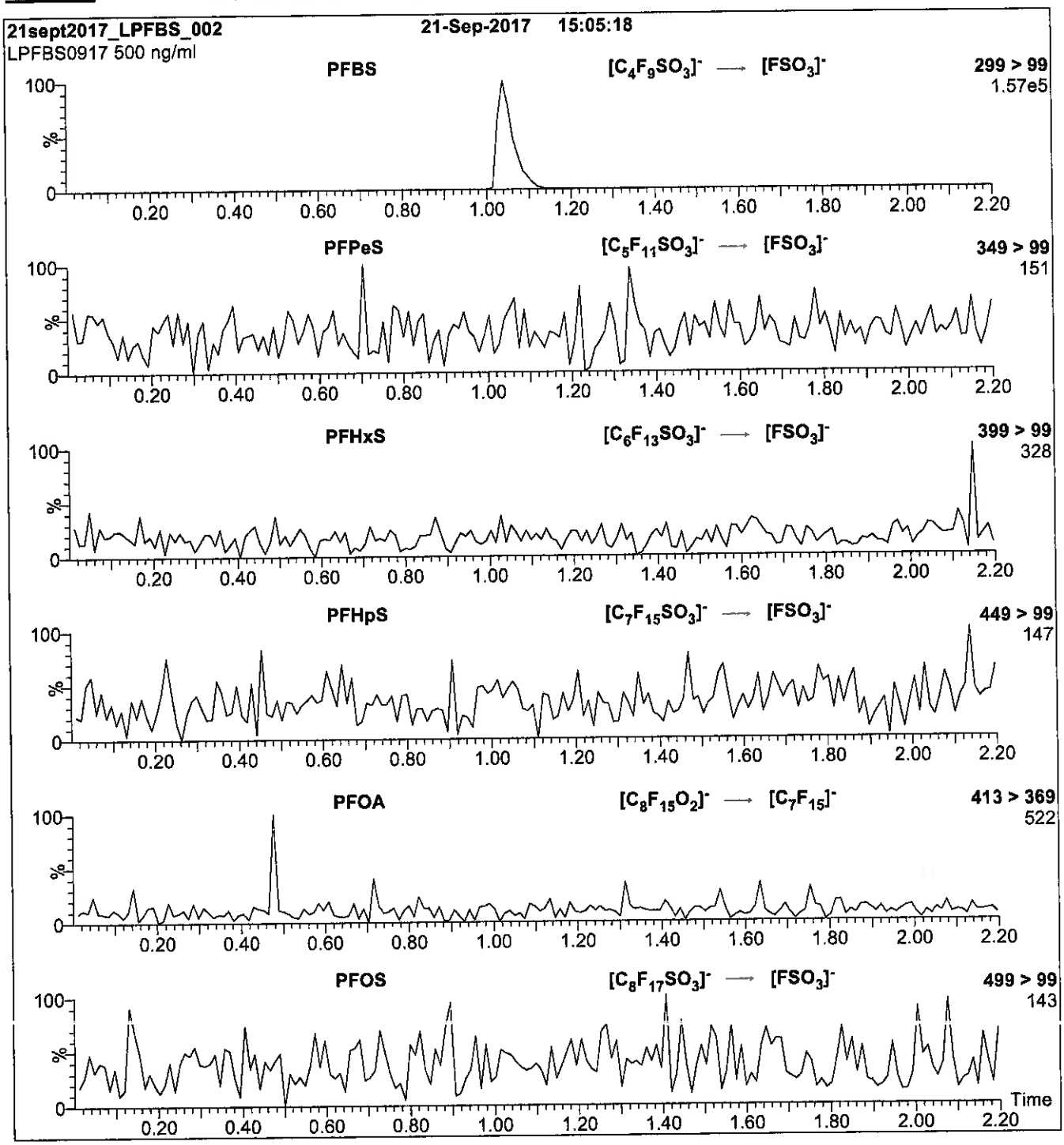
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 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) = 3.39e-3
Collision Energy (eV) = 25

Reagent

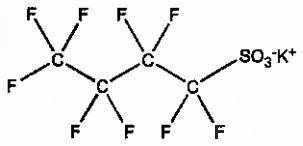
LCPFBSA_00002

D: 9/12/17 SKW

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	L-PFBS	**LOT NUMBER:**	LPFBS1116
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)	12/02/2016		
EXPIRY DATE: (mm/dd/yyyy)	12/02/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

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

ADDITIONAL INFORMATION:

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Certified By: B.G. Chittim **Date:** 12/05/2016 (mm/dd/yyyy)

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

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QUALITY MANAGEMENT:

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CALA

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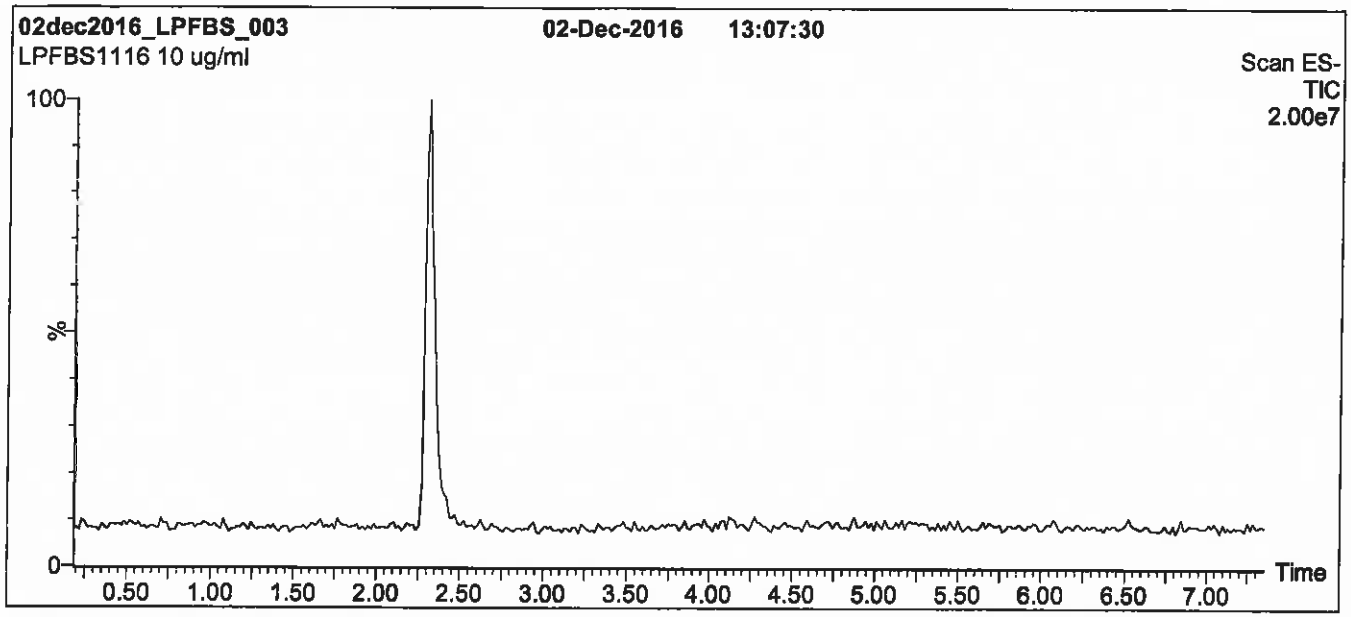
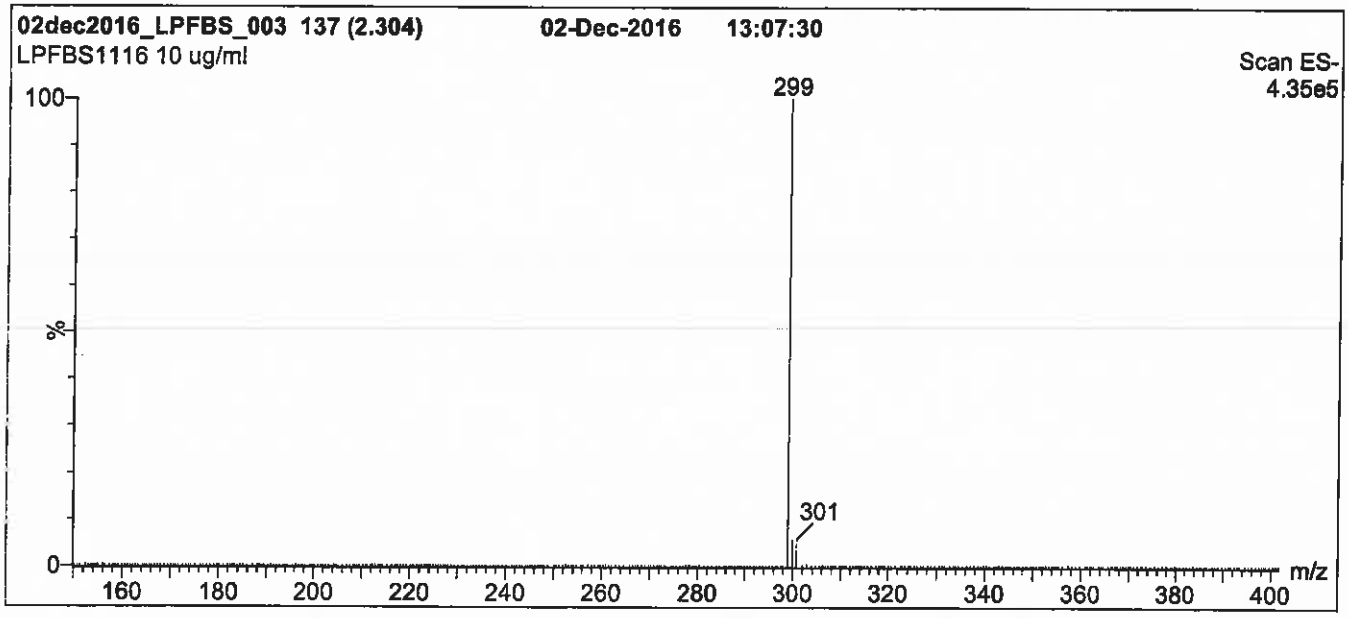
Figure 1: **L-PFBS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 2 min
before returning to initial conditions in 0.5 min.
Time: 10 min

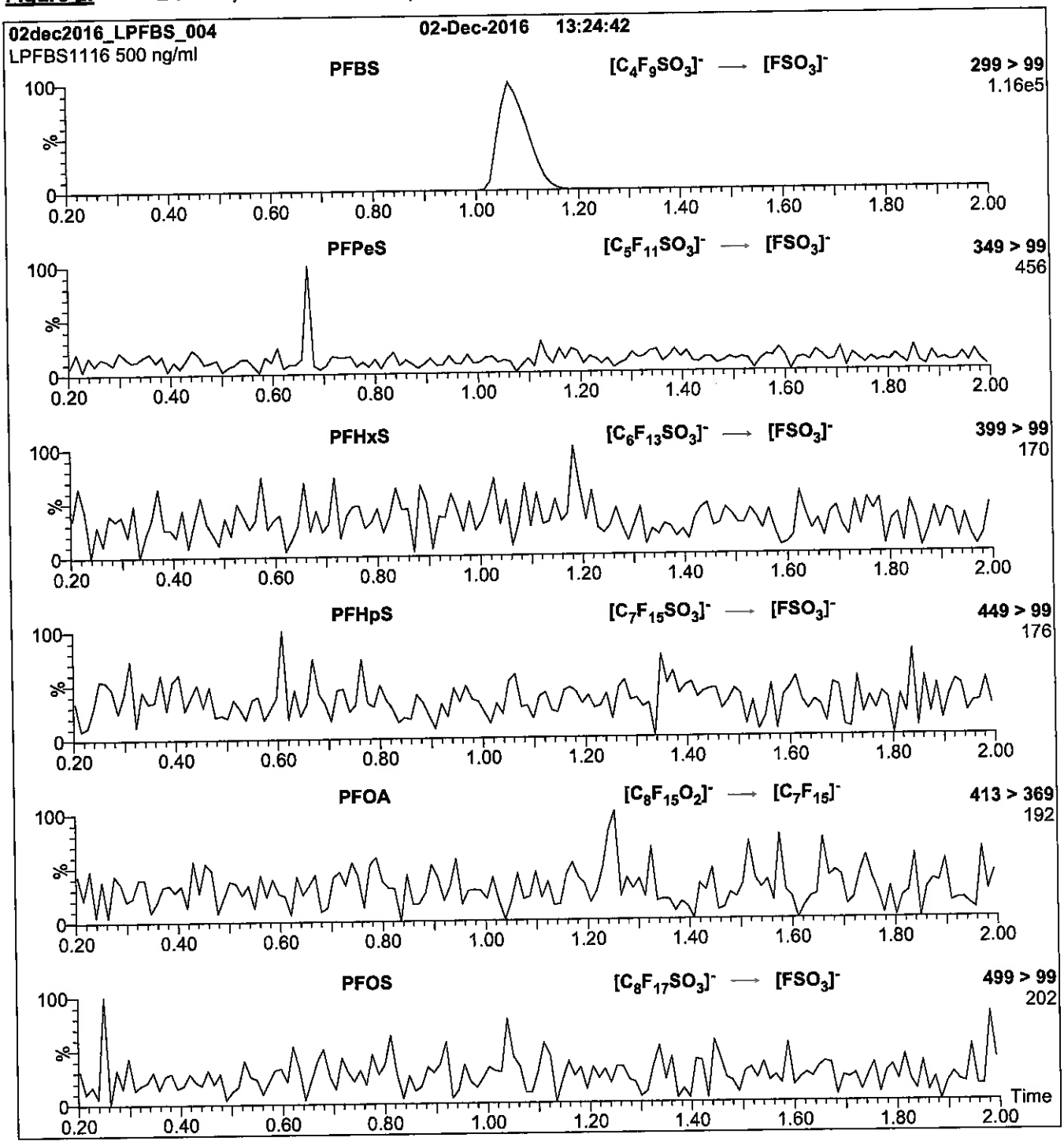
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **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) = 3.28e-3
Collision Energy (eV) = 25

Reagent

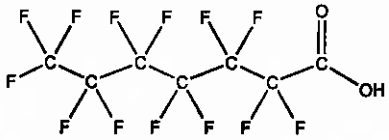
LCPFHpA_00009

D: 9/21/17 SRV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFHpA	**LOT NUMBER:**	PFHpA1216
COMPOUND:	Perfluoro-n-heptanoic acid		
STRUCTURE:		**CAS #:**	375-85-9



MOLECULAR FORMULA:	$C_7HF_{13}O_2$	**MOLECULAR WEIGHT:**	364.06
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	12/02/2016		
EXPIRY DATE: (mm/dd/yyyy)	12/02/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

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Certified By: _____ **Date:** 12/12/2016
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

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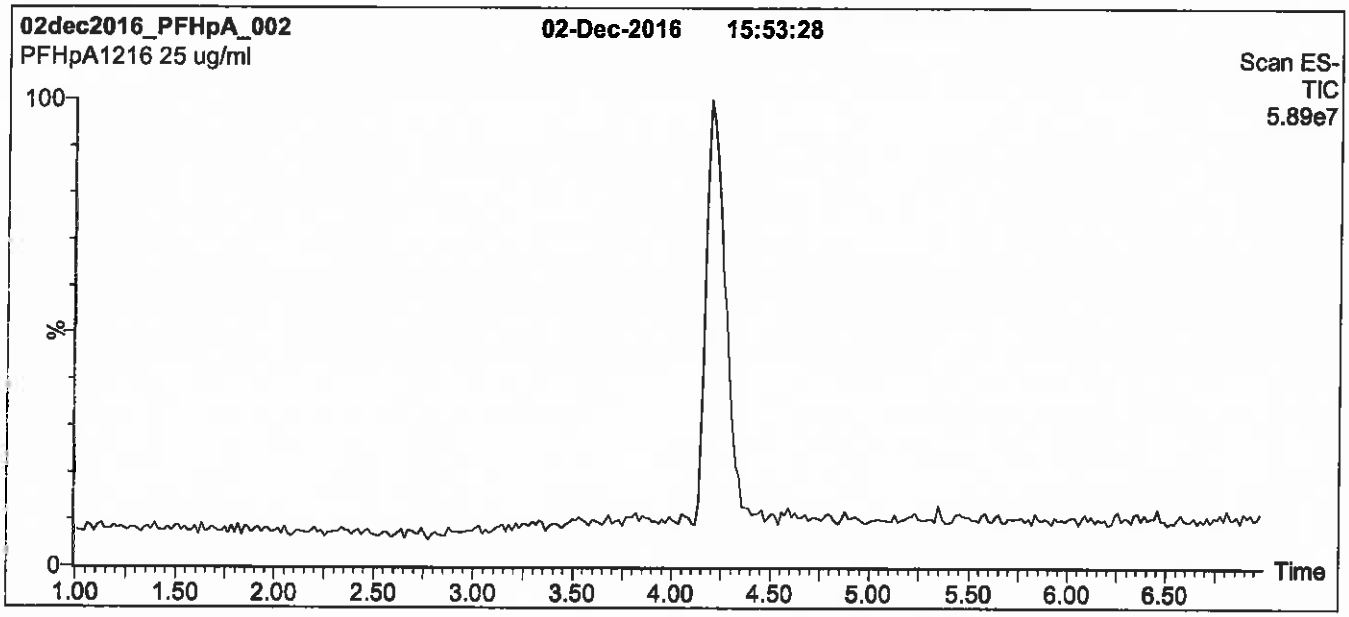
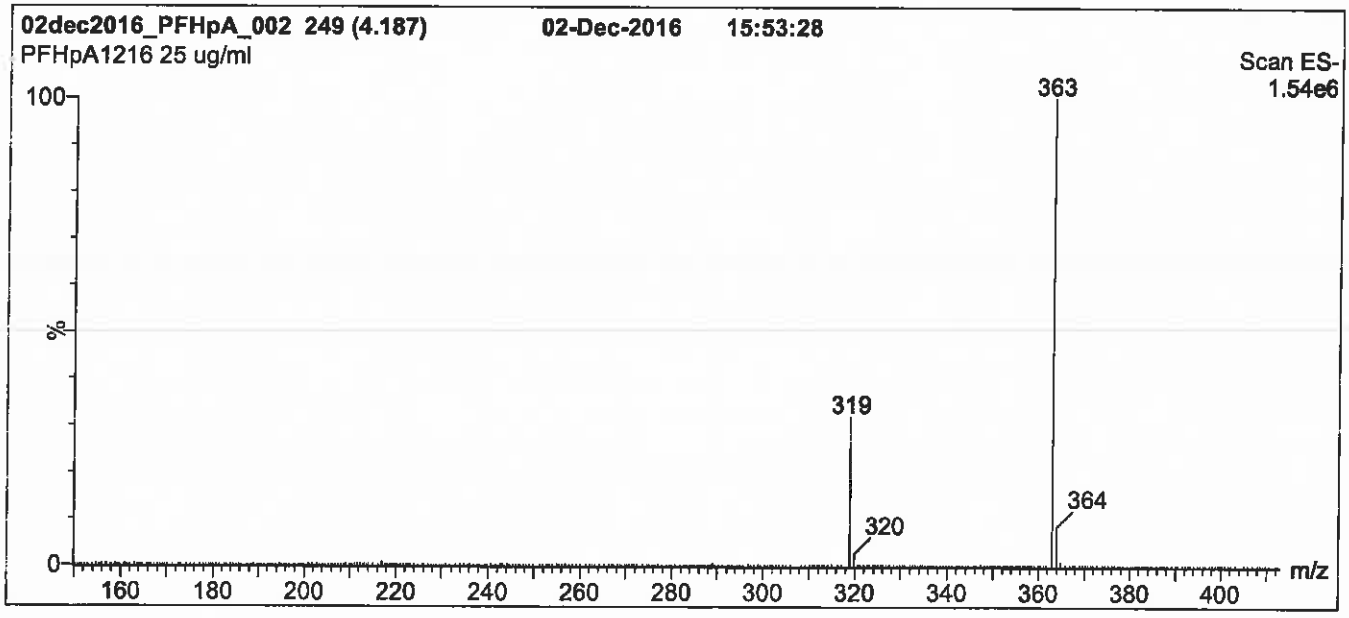
Figure 1: **PFHpA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

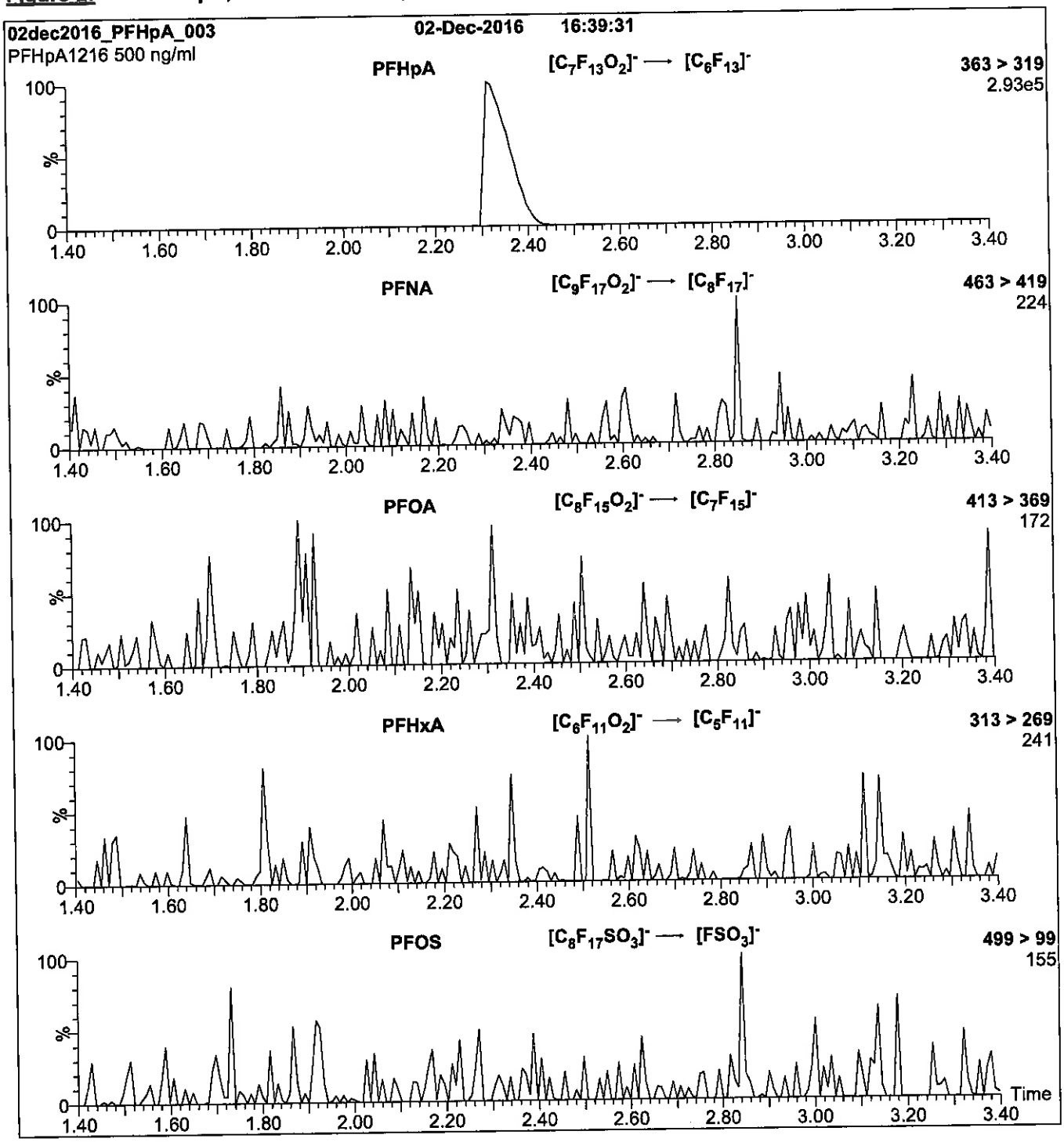
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 11

Reagent

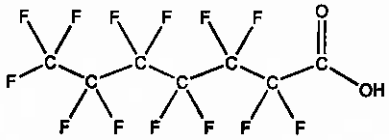
LCPFHpA_00010

D: 9/21/17 SRV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	PFHpA	**LOT NUMBER:**	PFHpA1216
COMPOUND:	Perfluoro-n-heptanoic acid		
STRUCTURE:		**CAS #:**	375-85-9



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CHEMICAL PURITY:	>98%		
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EXPIRY DATE: (mm/dd/yyyy)	12/02/2021		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

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Certified By: _____ B.G. Chittim **Date:** 12/12/2016 (mm/dd/yyyy)

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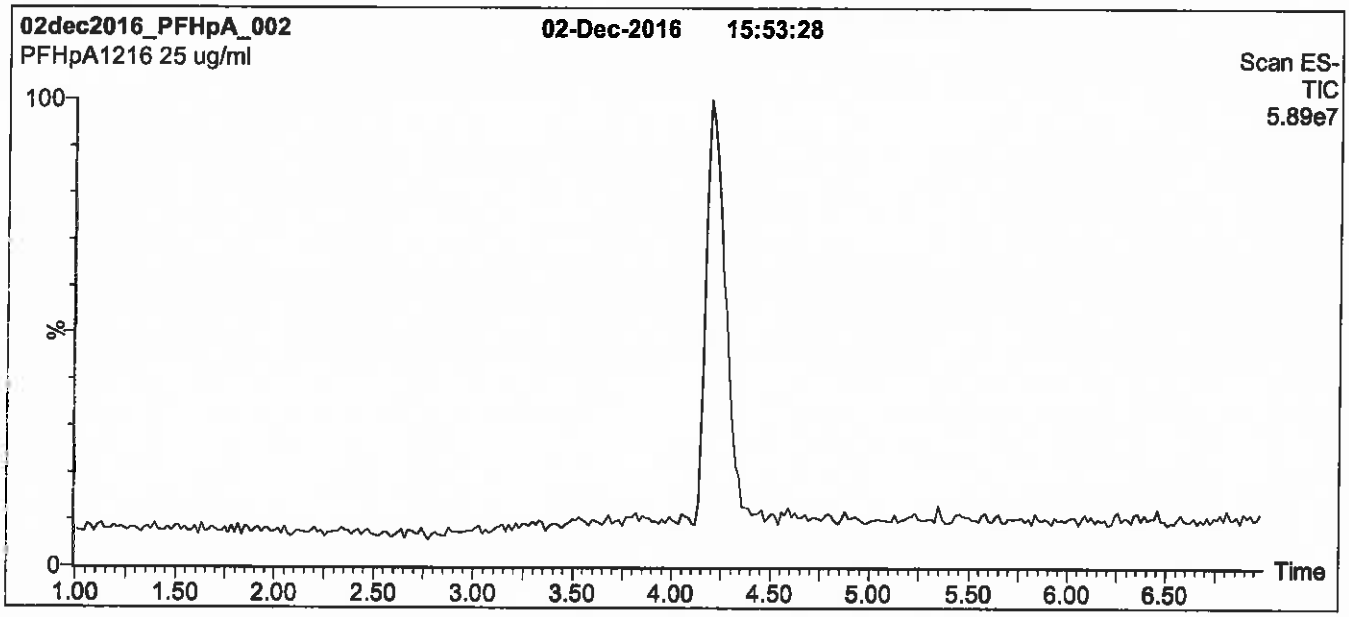
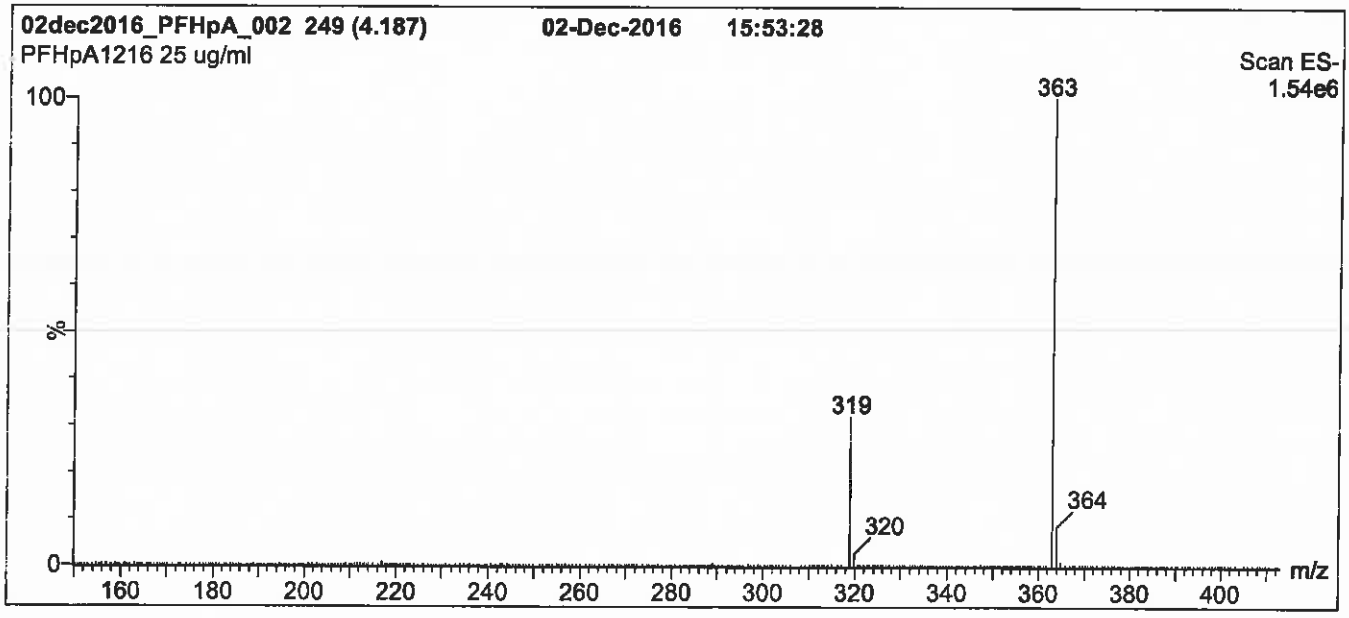
Figure 1: **PFHpA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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MS: Micromass Quattro *micro* API MS

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold for
1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

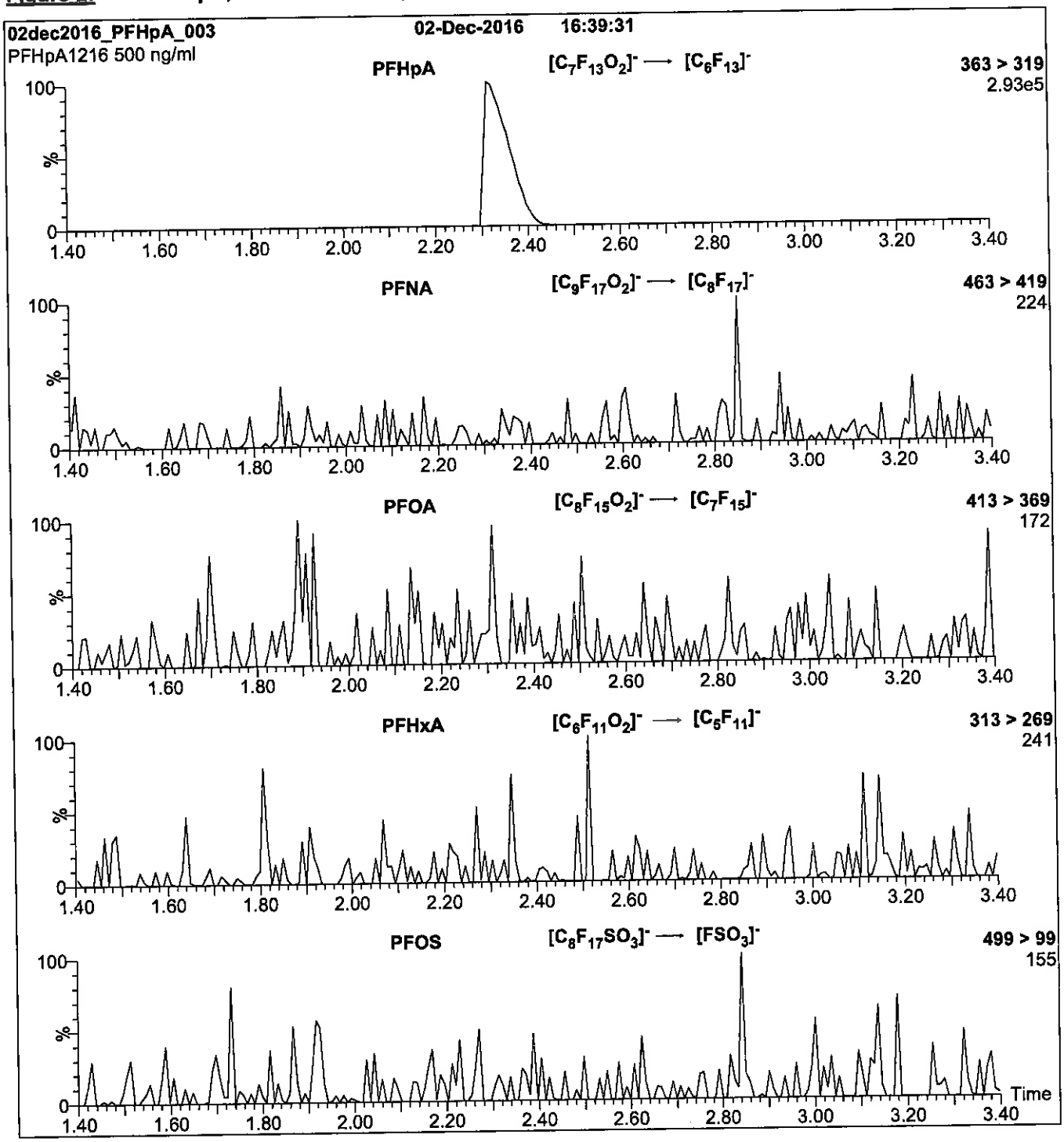
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (150 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 11

Reagent

LCPFHxS-br_00005

P: 10/20 A SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

br-PFHxSK

Potassium Perfluorohexanesulfonate
Solution/Mixture of Linear and
Branched Isomers

PRODUCT CODE:	br-PFHxSK
LOT NUMBER:	brPFHxSK0117
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)	01/03/2017
LAST TESTED: (mm/dd/yyyy)	01/04/2017
EXPIRY DATE: (mm/dd/yyyy)	01/04/2022
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 (SIR)
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains ~ 0.5% of perfluoro-1-pentanesulfonate and ~ 0.2% of perfluoro-1-octanesulfonate.
- CAS#: 3871-99-6 (for linear isomer; potassium salt).

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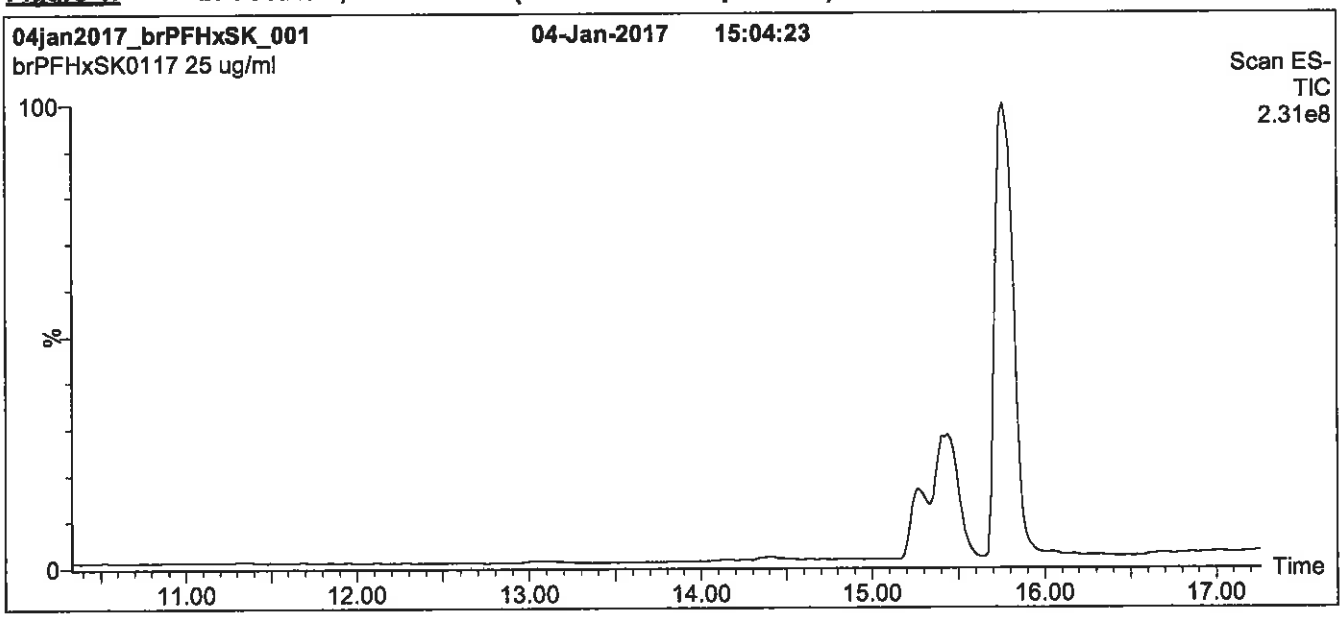
Table A: **br-PFHxSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

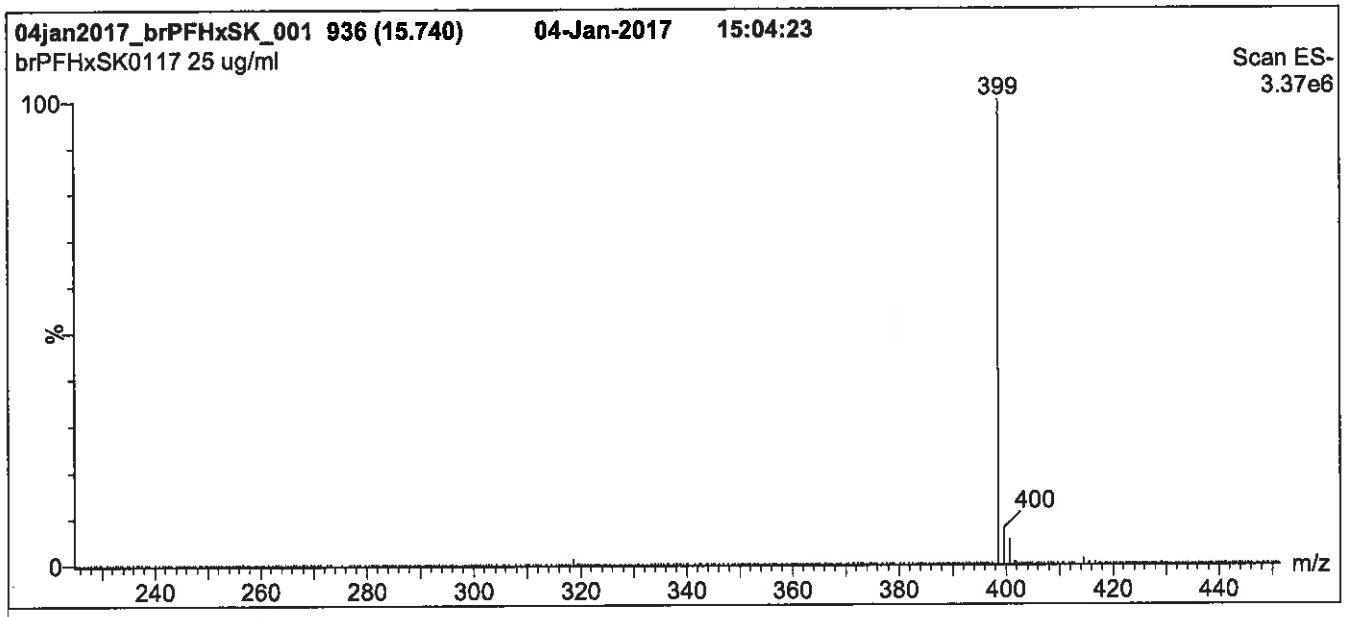
Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	Potassium perfluoro-1-hexanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	$CF_3CF_2CF_2CF_2\underset{\displaystyle CF_3}{\underset{\vert}{C}}FSO_3^-K^+$	2.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2CF_2\underset{\displaystyle CF_3}{\underset{\vert}{C}}FCF_2SO_3^-K^+$	1.4
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	$CF_3CF_2\underset{\displaystyle CF_3}{\underset{\vert}{C}}FCF_2CF_2SO_3^-K^+$	5.0
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	$CF_3\underset{\displaystyle CF_3}{\underset{\vert}{C}}FCF_2CF_2CF_2SO_3^-K^+$	8.9
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	$CF_3\underset{\displaystyle CF_3}{\underset{\vert}{\overset{\displaystyle CF_3}{\overset{\vert}{C}}}}CF_2CF_2SO_3^-K^+$	0.2
7	Other Unidentified Isomers		0.5

* Percent of total perfluorohexanesulfonate isomers only.
** Systematic Name: Potassium perfluorohexane-2-sulfonate.

Certified By: _____ **Date:** 01/20/2017
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

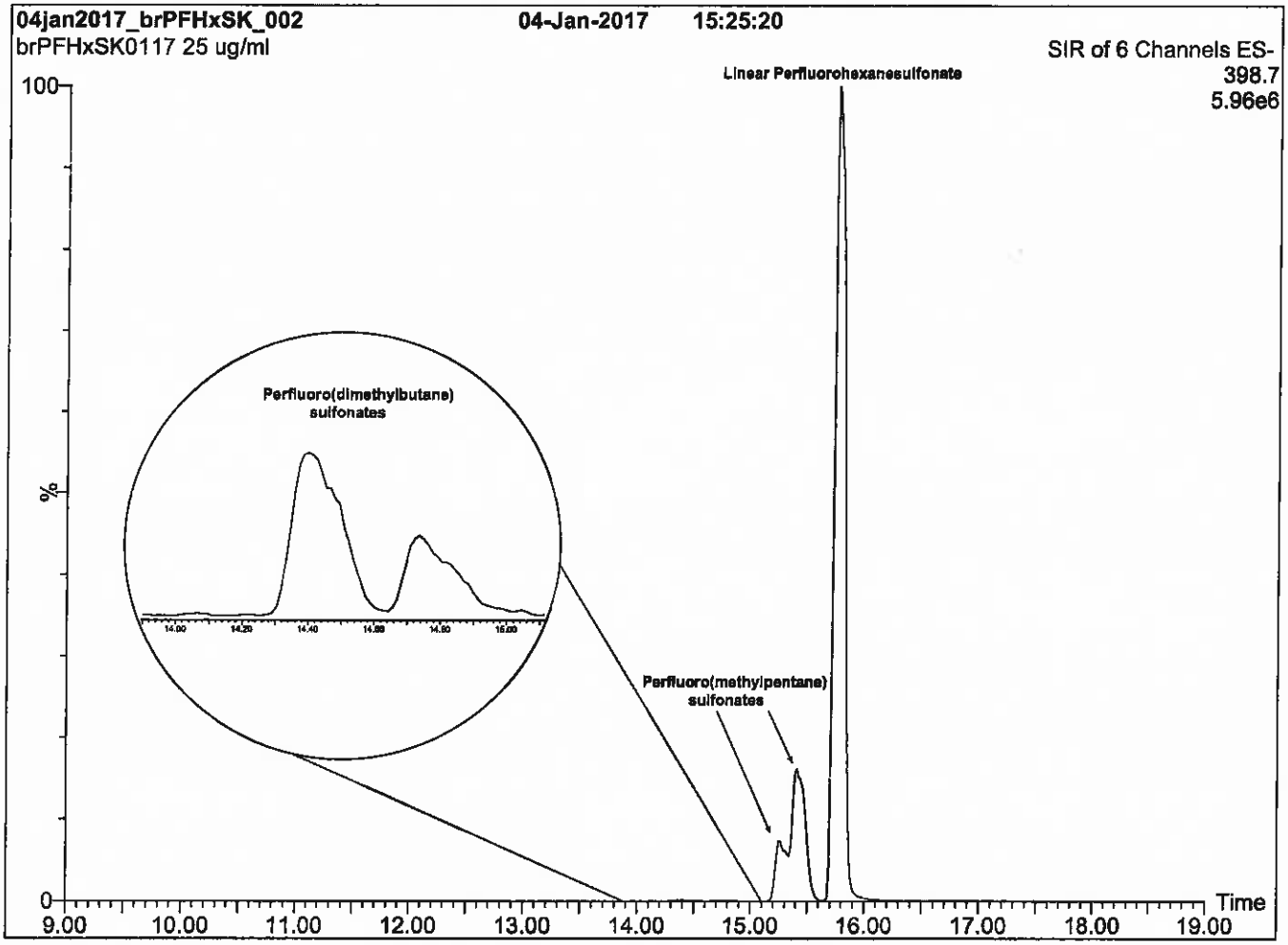
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

Figure 2: **br-PFHxSK; 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

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

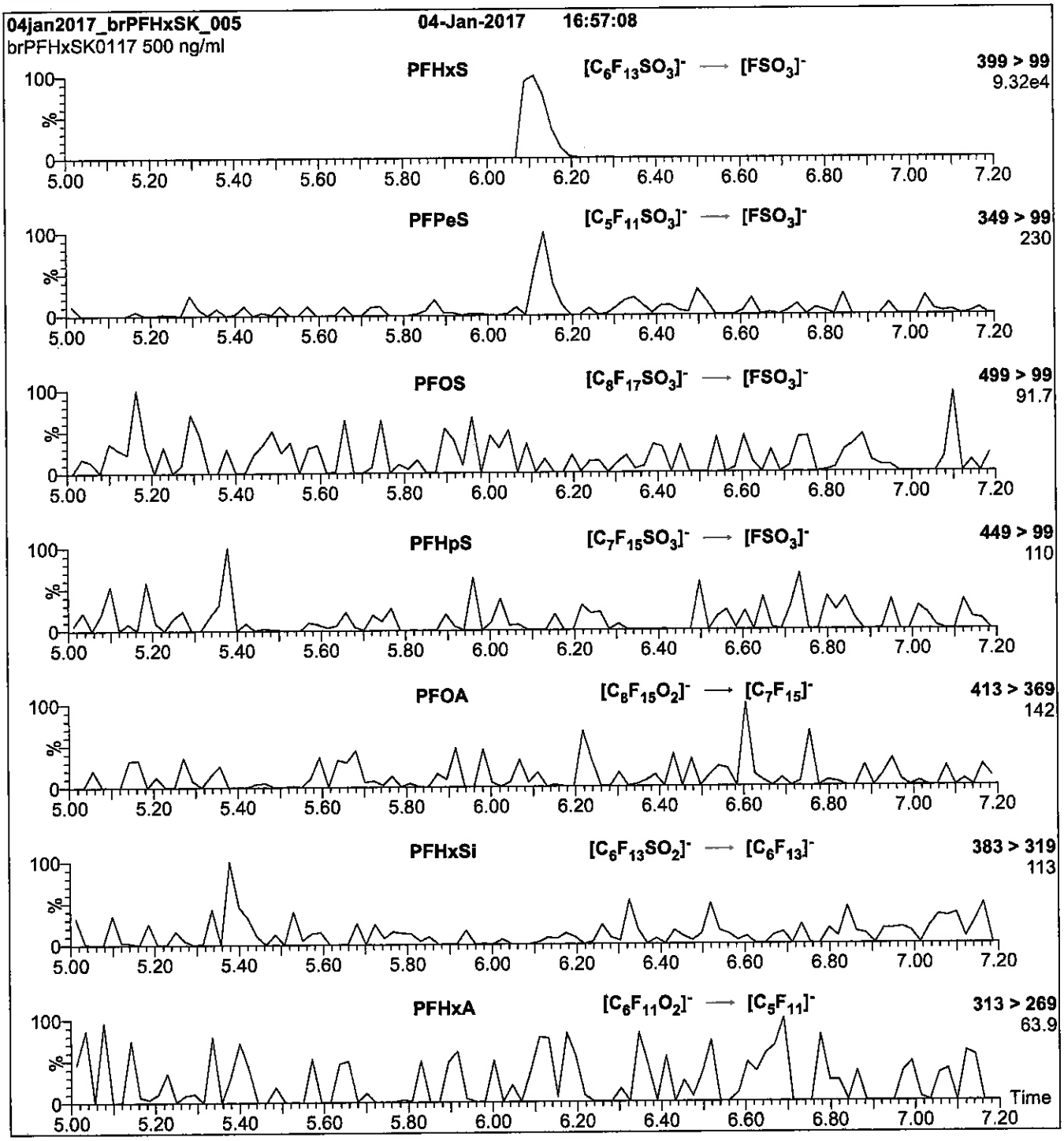
Flow: 300 µl/min

MS Parameters

Experiment: SIR (6 channels)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = variable (15-62)
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) = 3.35e-3
Collision Energy (eV) = 30

Reagent

LCPFHxSA_00002

11/4/18 SKJ

WELLINGTON LABORATORIES

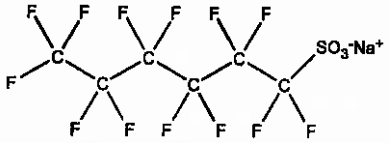
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: L-PFHxS
COMPOUND: Sodium perfluoro-1-hexanesulfonate

LOT NUMBER: LPFHxS0917

STRUCTURE:

CAS #: 82382-12-5



MOLECULAR FORMULA:	$C_6F_{13}SO_3Na$	**MOLECULAR WEIGHT:**	422.10
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.3 ± 2.4 µg/ml (PFHxS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	09/21/2017		
EXPIRY DATE: (mm/dd/yyyy)	09/21/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 09/22/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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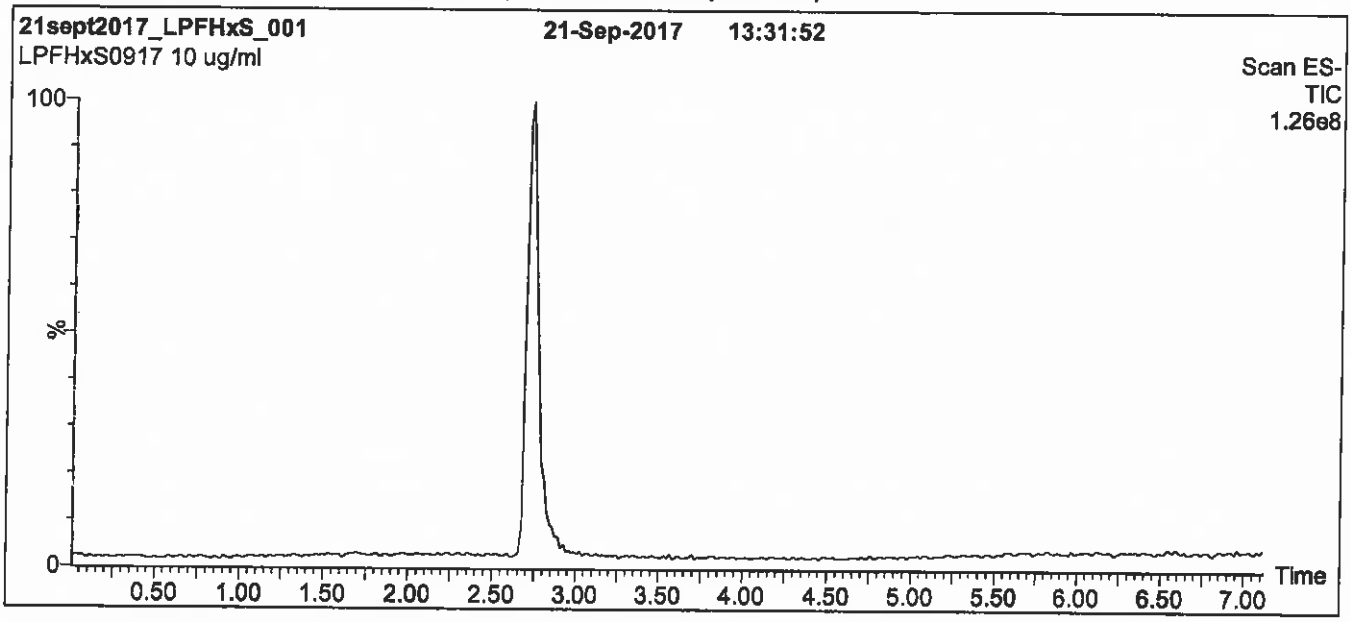

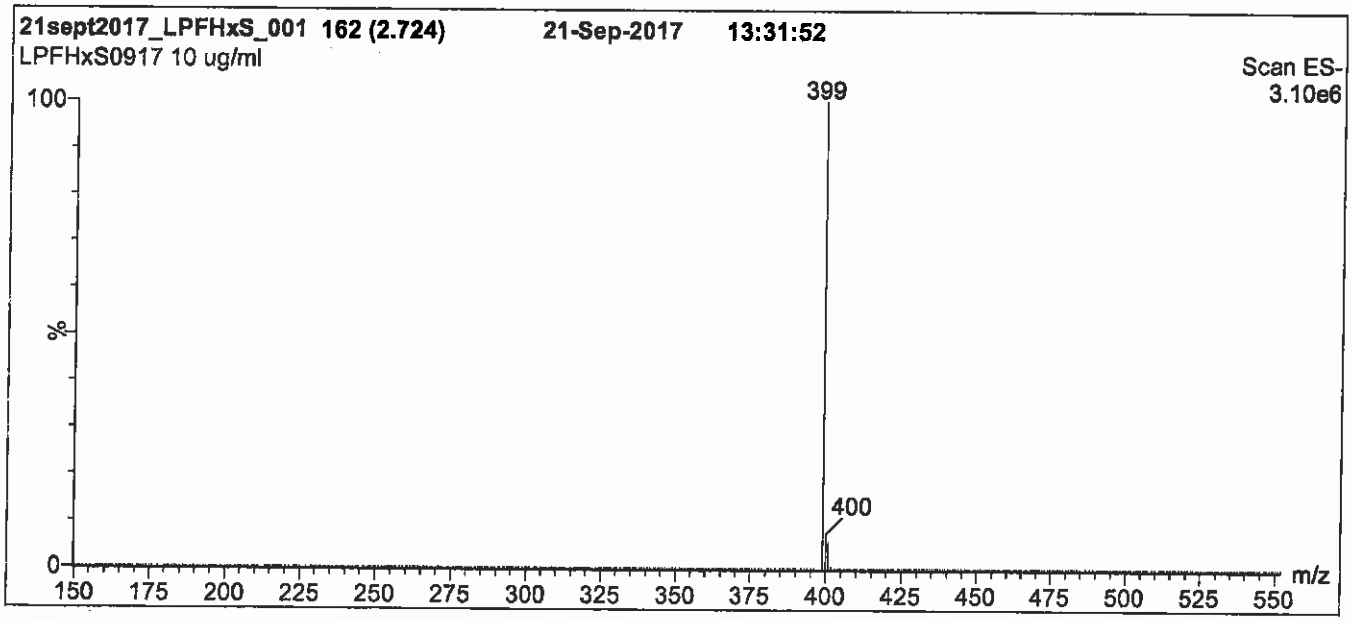

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Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

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

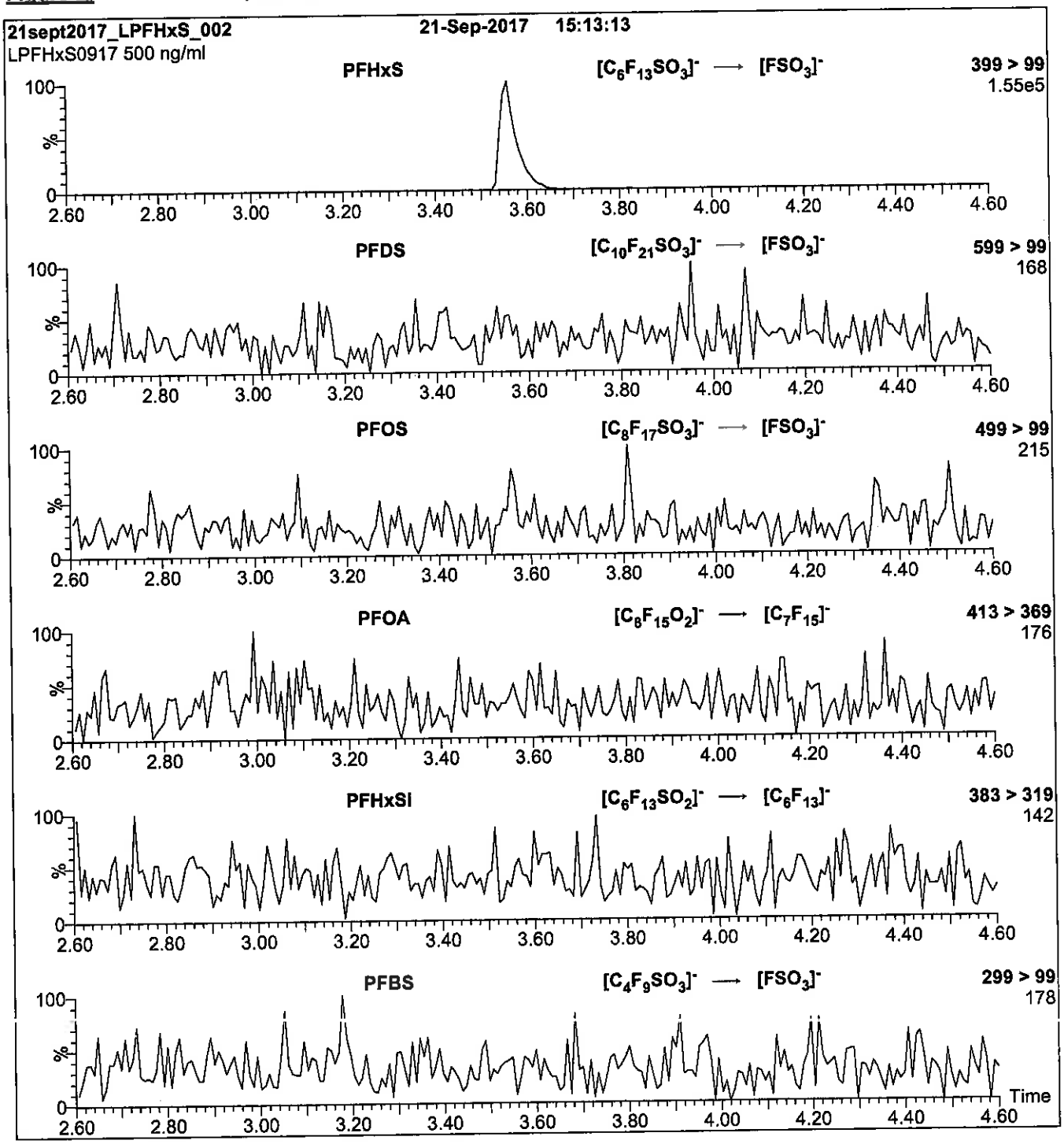
Flow: 300 µl/min

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: **L-PFHxS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFHxS)

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 30

Reagent

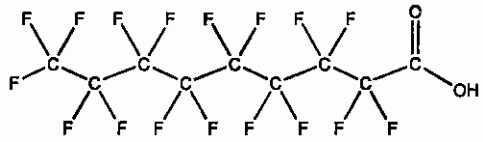
LCPFNA_00009

R: 9/21/17 SKJ

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	PFNA	**LOT NUMBER:**	PFNA0717
COMPOUND:	Perfluoro-n-nonanoic acid		
STRUCTURE:		**CAS #:**	375-95-1



MOLECULAR FORMULA:	$C_9HF_{17}O_2$	**MOLECULAR WEIGHT:**	464.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	07/20/2017		
EXPIRY DATE: (mm/dd/yyyy)	07/20/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

- See page 2 for further details.
- Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.
- Contains ~ 0.1% of perfluoro-n-octanoic acid (PFOA), < 0.1% of perfluoro-n-heptanoic acid (PFHpA), and < 0.1% of perfluoro-n-undecanoic acid (PFUdA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 07/24/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

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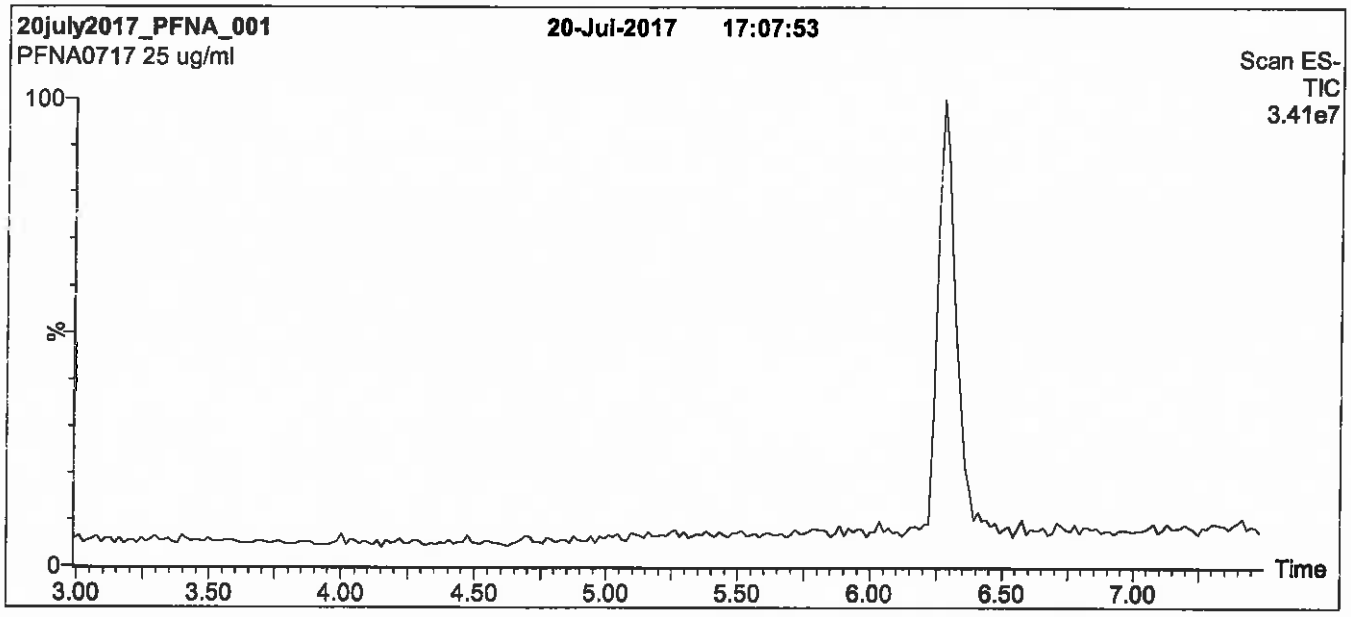
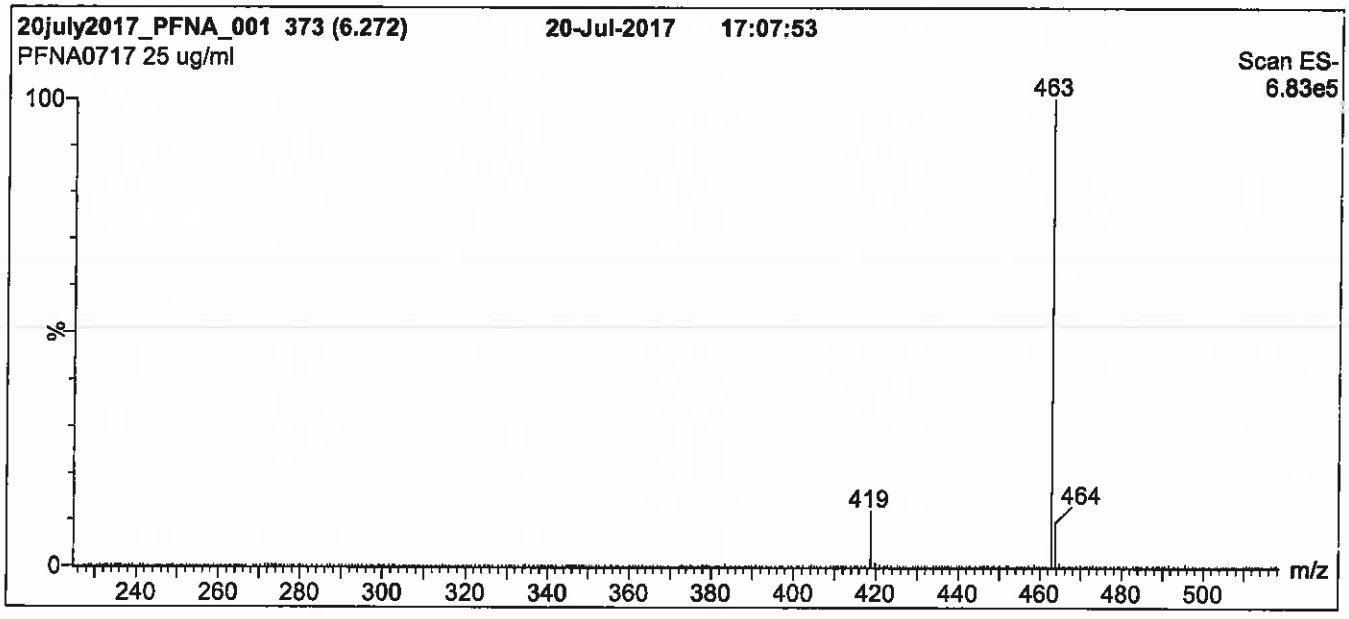
Figure 1: **PFNA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Hold for 1 min. Ramp to 90% organic over 7 min and hold for 1 min before returning to initial conditions in 0.5 min.
Time: 10 min

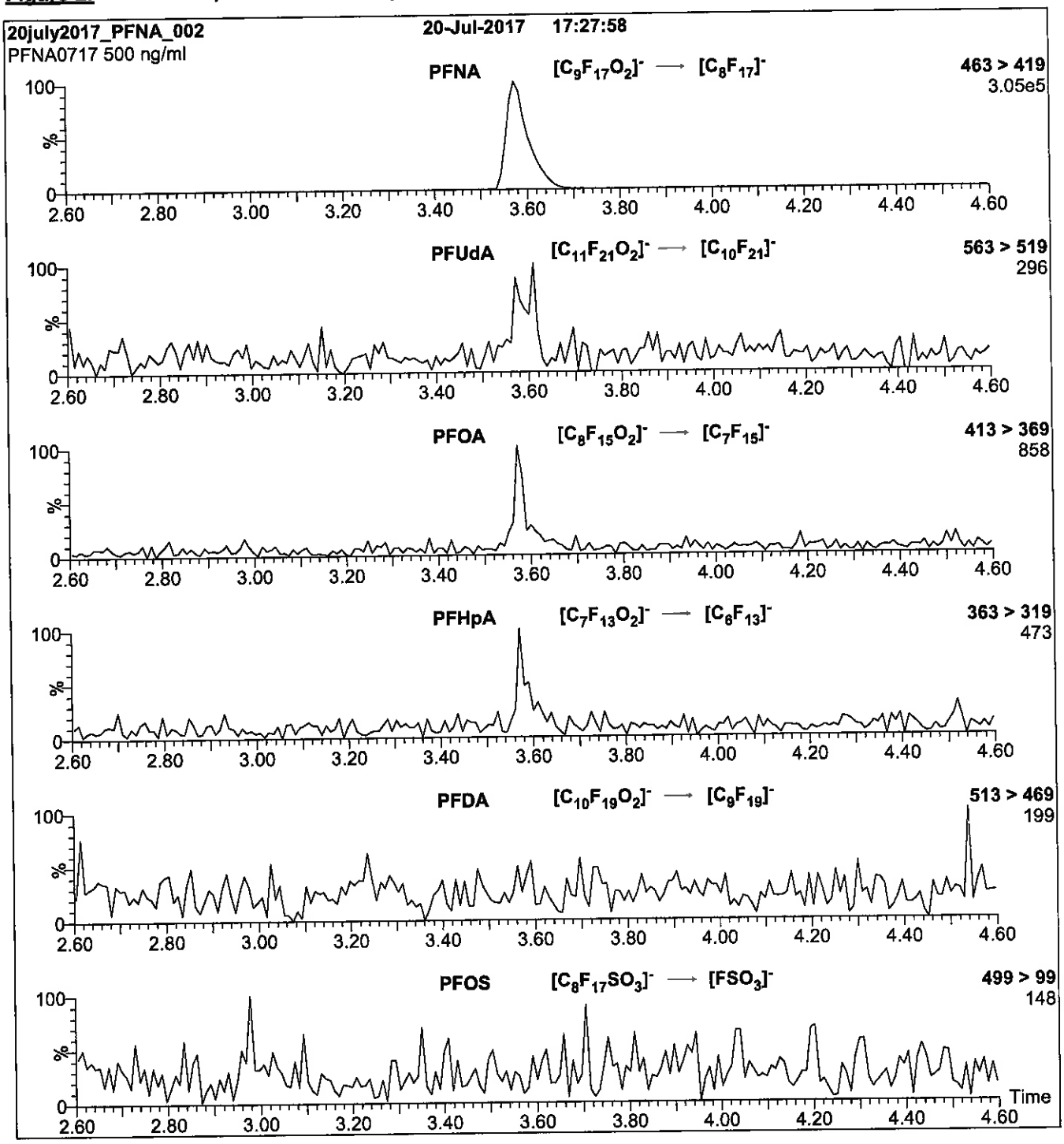
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 11

Reagent

LCPFNA_00010

r: 2/16/18 SKJ

WELLINGTON LABORATORIES

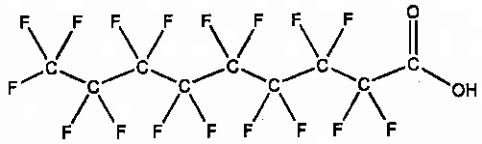
CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: PFNA
COMPOUND: Perfluoro-n-nonanoic acid

LOT NUMBER: PFNA0717

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) 07/20/2017
EXPIRY DATE: (mm/dd/yyyy) 07/20/2022
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Figure 1: LC/MS Data (TIC and Mass Spectrum)
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- See page 2 for further details.
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ANAB ACCREDITED

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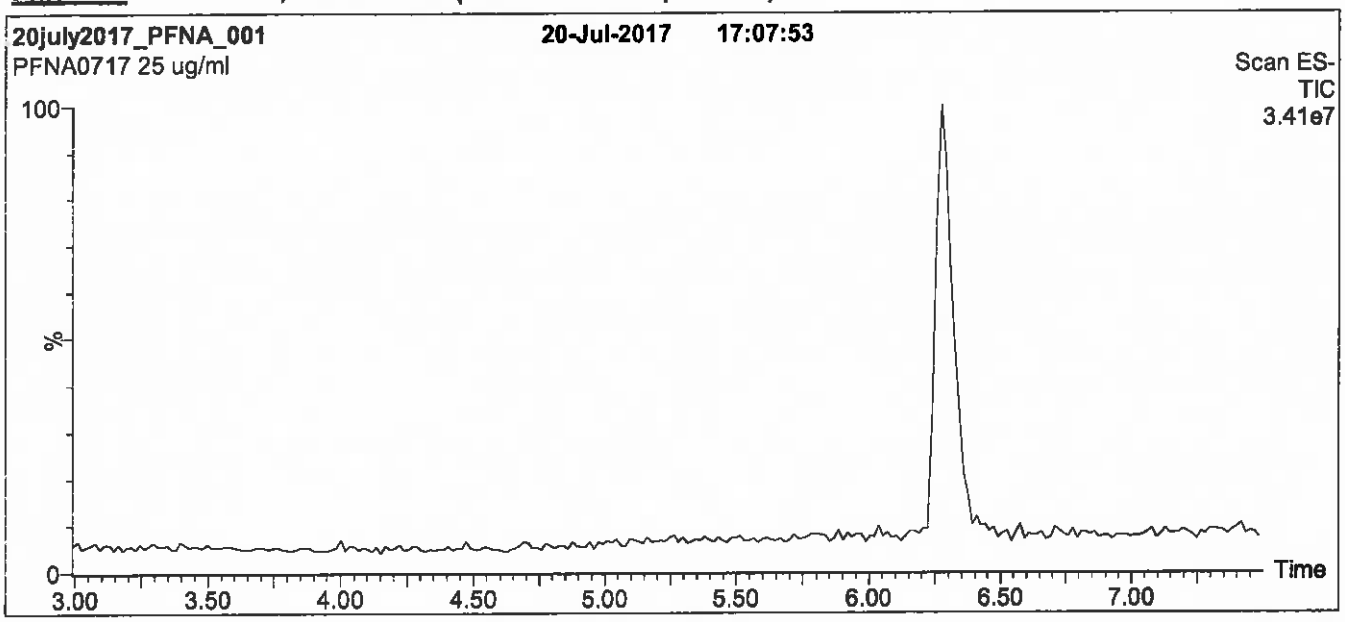

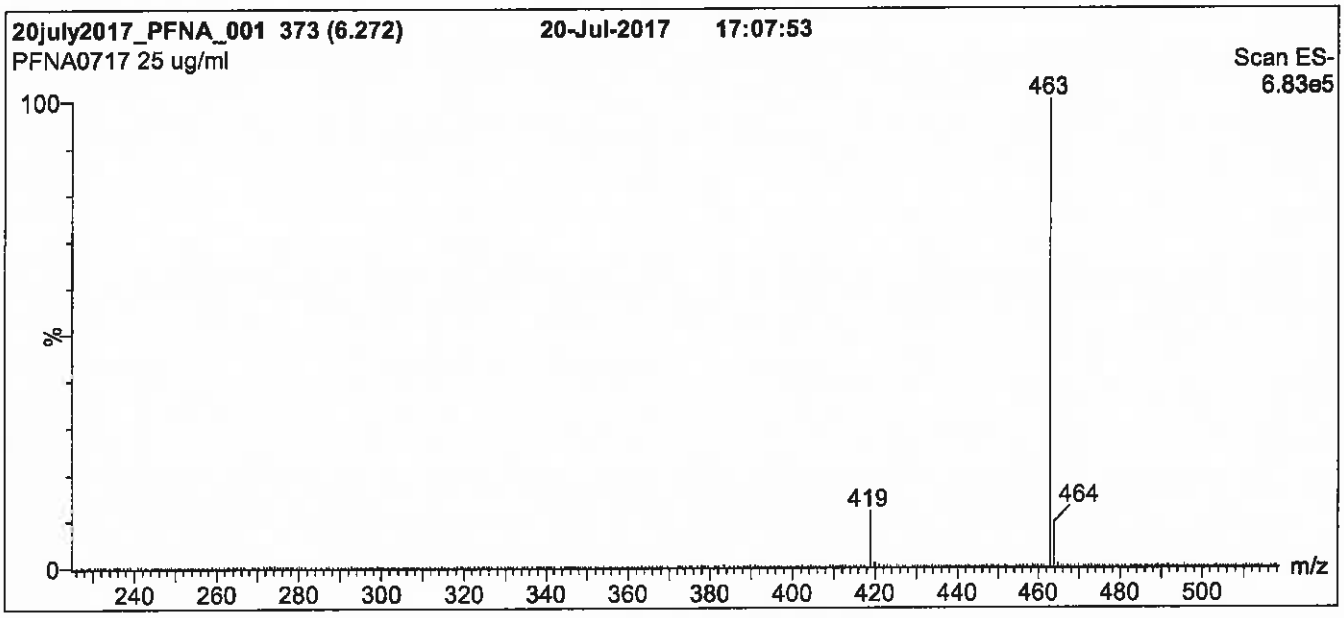

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MS: **Micromass Quattro *micro* API MS**

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

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Hold for 1 min. Ramp to 90% organic over 7 min and hold for 1 min before returning to initial conditions in 0.5 min.
Time: 10 min

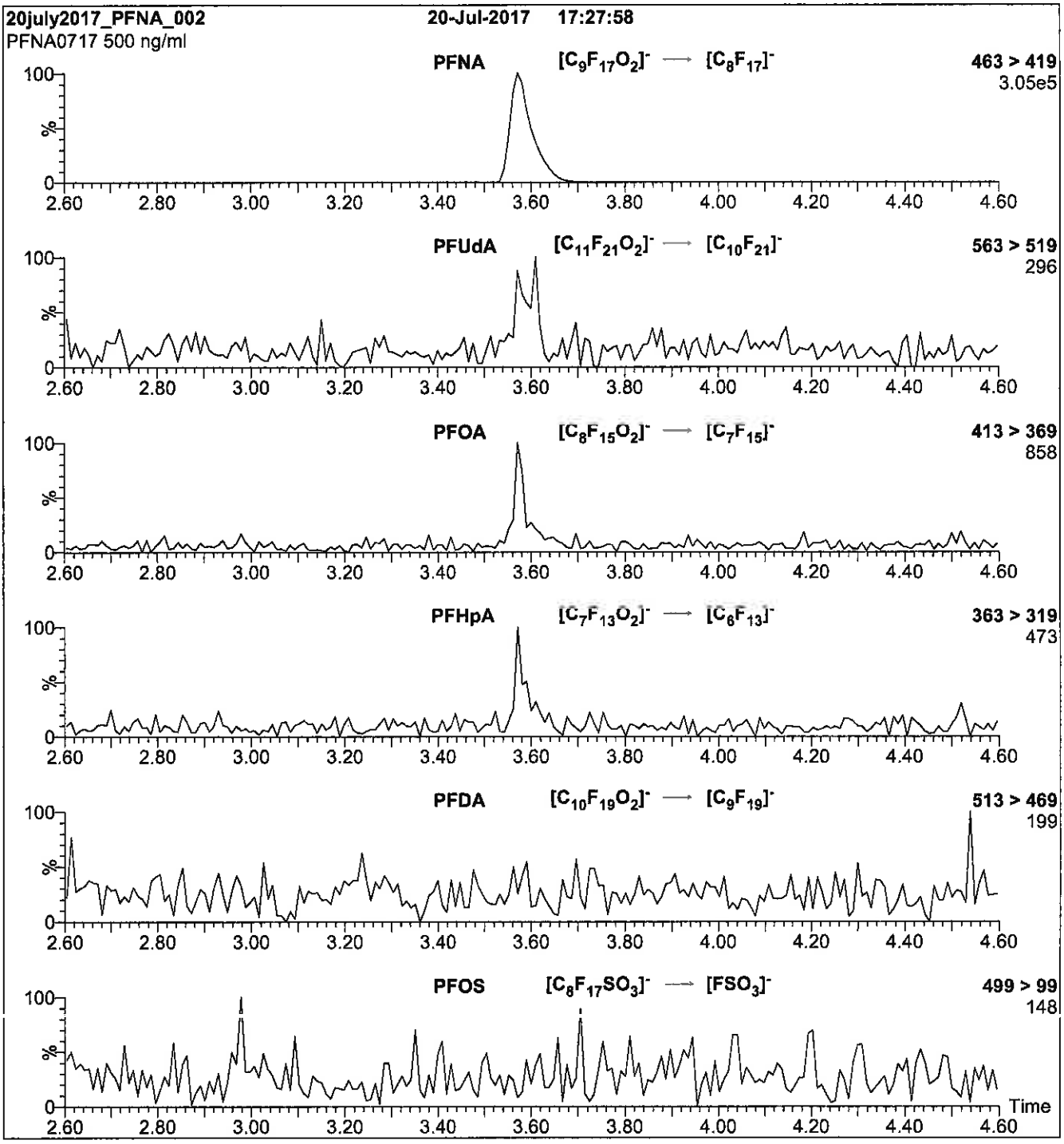
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

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

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



Conditions for Figure 2:

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

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

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3
Collision Energy (eV) = 11

Reagent

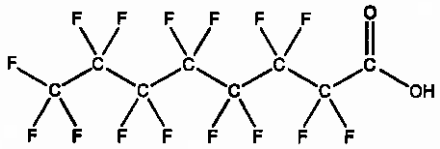
LCPFOA_00010

P: 10/2017 SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	PFOA	**LOT NUMBER:**	PFOA0917
COMPOUND:	Perfluoro-n-octanoic acid		
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)	09/27/2017		
EXPIRY DATE: (mm/dd/yyyy)	09/27/2022		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 09/28/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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

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

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

QUALITY MANAGEMENT:

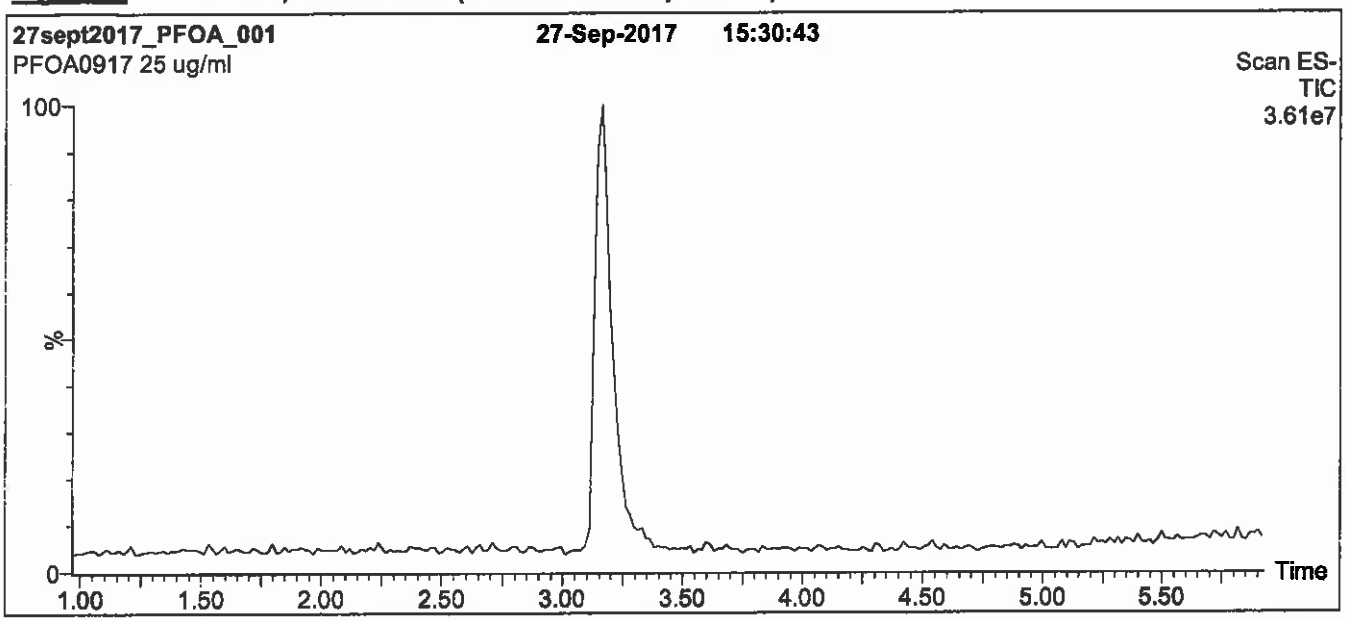
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

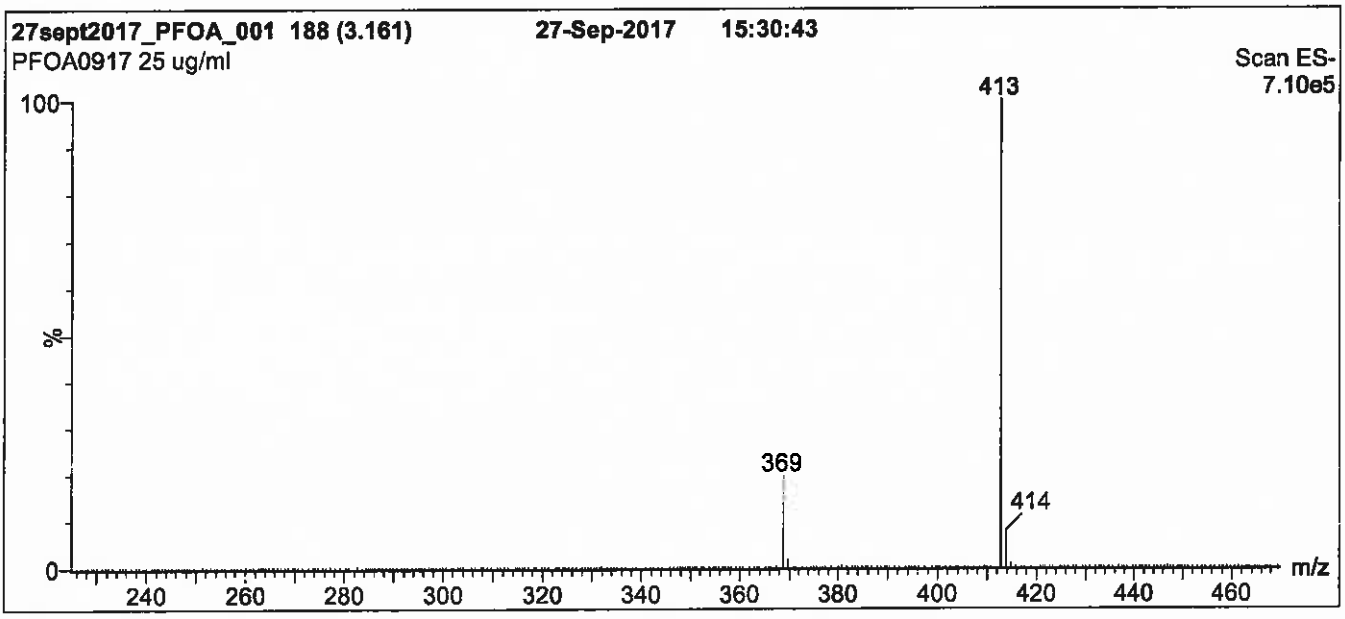
CALA

ANAB ACCREDITED

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

Figure 1: **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

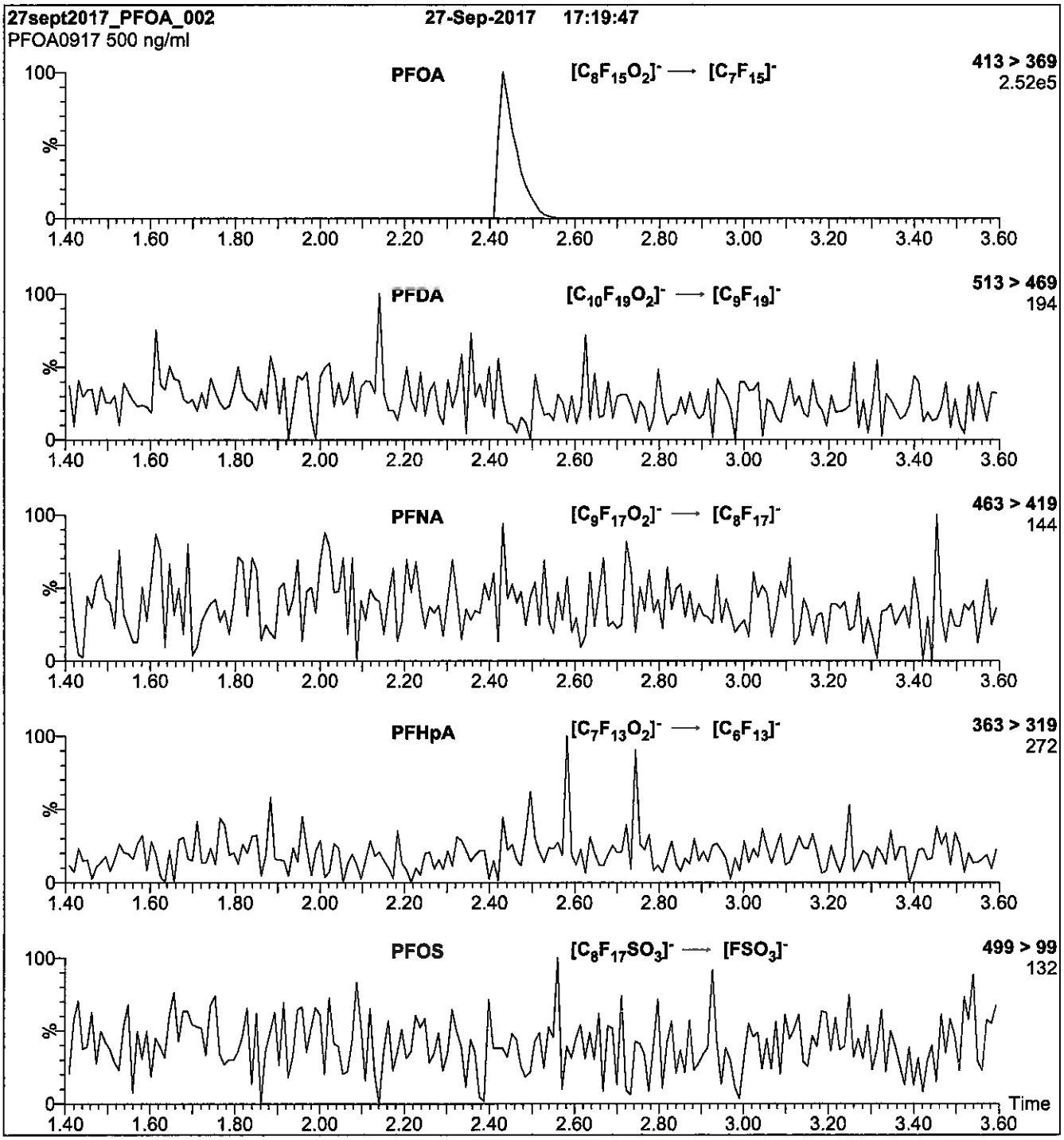
Flow: 300 µl/min

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) = 3.46e-3
Collision Energy (eV) = 11

Reagent

LCPFOS-br_00005

P: 10/2017 SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

br-PFOSK

Potassium Perfluorooctanesulfonate Solution/Mixture of Linear and Branched Isomers

PRODUCT CODE:	br-PFOSK
LOT NUMBER:	brPFOSK0117
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)	01/09/2017
LAST TESTED: (mm/dd/yyyy)	01/12/2017
EXPIRY DATE: (mm/dd/yyyy)	01/12/2022
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).

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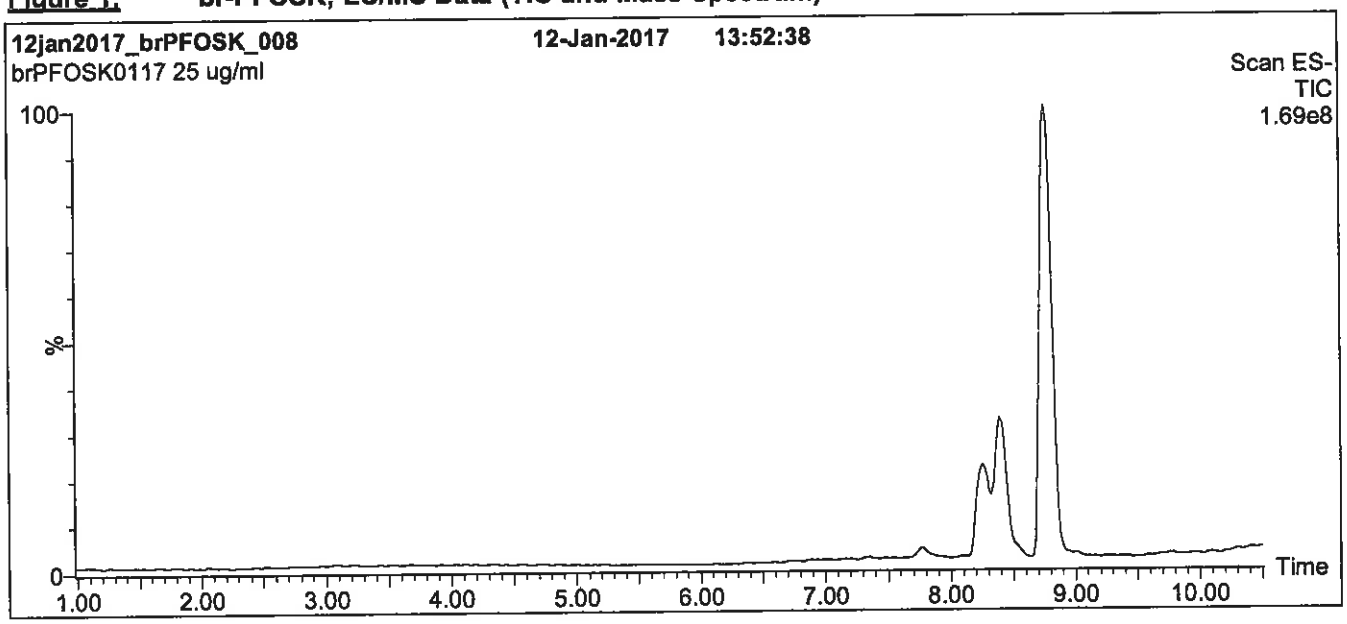
Table A: **br-PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

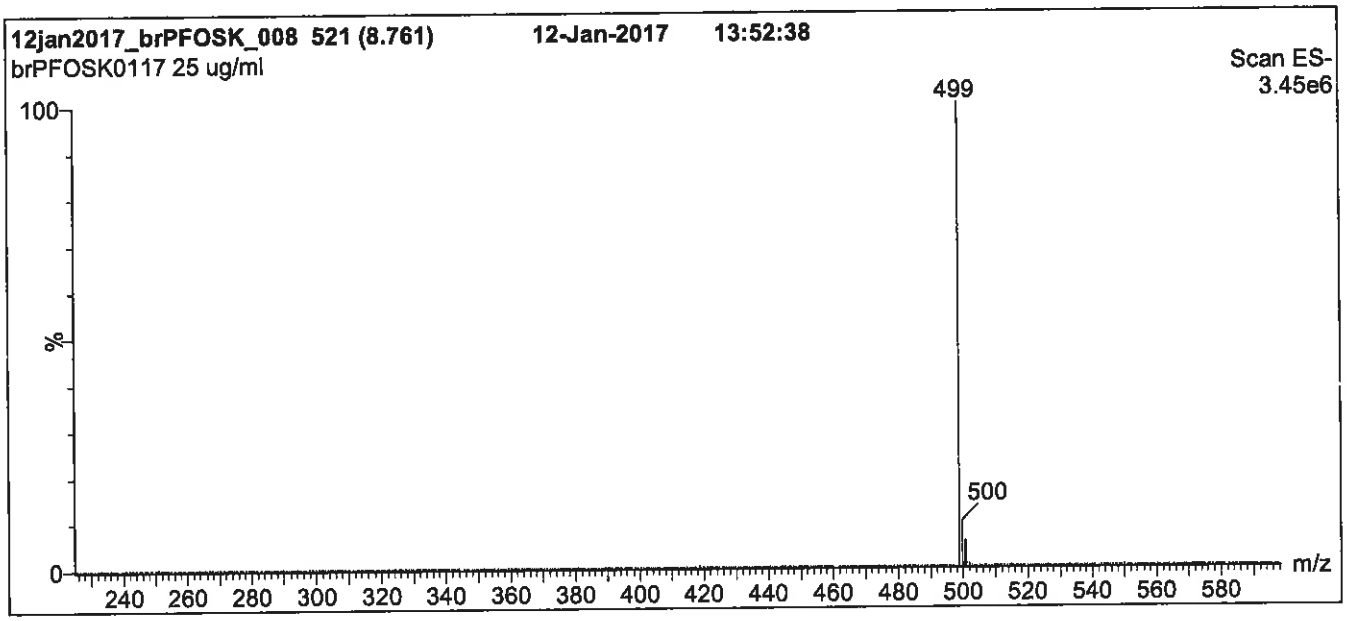
Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	1.2
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	0.6
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	1.9
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	2.2
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	4.5
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	10.0
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3C(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.2
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF_2C(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.03
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.4
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF(CF_3)CF_2SO_3^-K^+$	0.07

* Percent of total perfluorooctanesulfonate isomers only. Isomers are labelled in Figure 2.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

Certified By: B.G. Chittim **Date:** 01/20/2017 (mm/dd/yyyy)

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 12 min and hold for 2 min.
Return to initial conditions over 0.5 min.
Time: 16 min

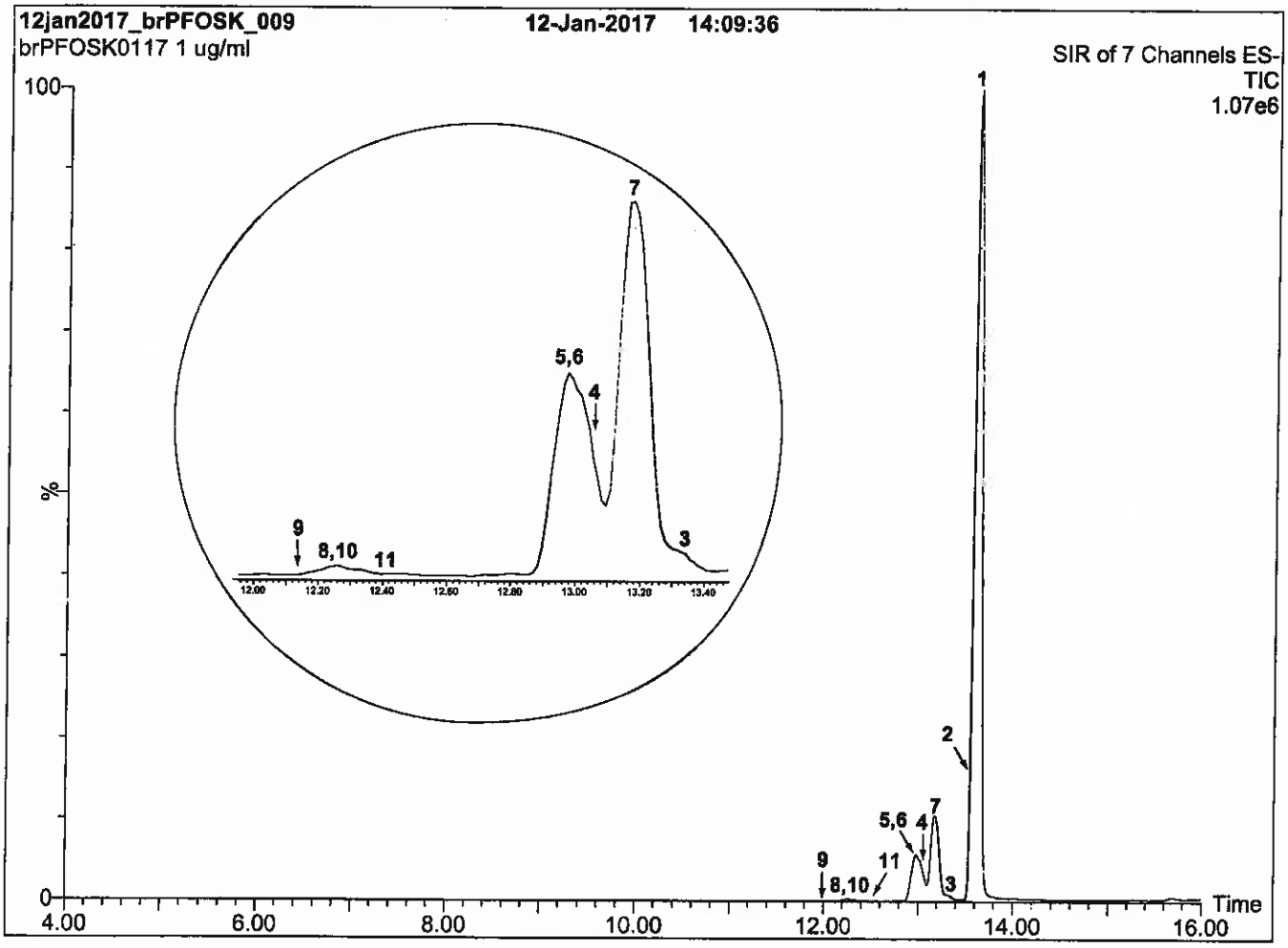
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **br-PFOSK; LC/MS Data (SIR)**



Conditions for Figure 2:

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

Chromatographic Conditions:

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

Injection: 1.0 µg/ml of br-PFOSK

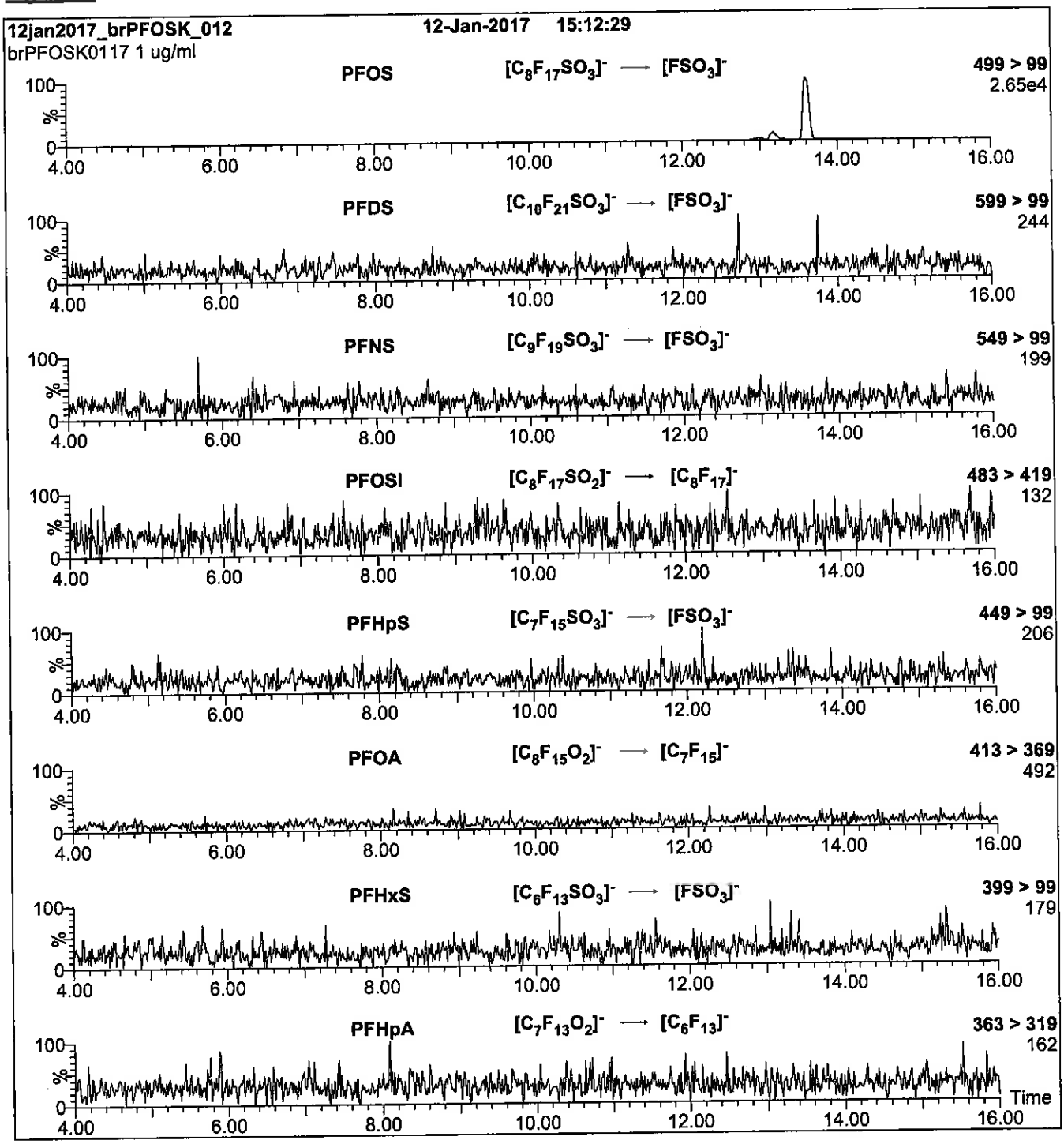
Mobile Phase: Gradient
45% (80:20 MeOH:ACN) / 55% H_2O (both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 15 min and hold for 3 min.
Return to initial conditions over 1 min.
Time: 20 min

Flow: 300 µl/min

MS Conditions:

SIR (ES^-)
Source = 110 °C
Desolvation = 325 °C
Cone Voltage = 60V

Figure 3: **br-PFOSK; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 3:

Injection: On-column

Mobile phase: Same as Figure 2

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 11-50 (variable)

Reagent

LCPFOS-br_00006

P: 10/2017 SKV

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

br-PFOSK

Potassium Perfluorooctanesulfonate Solution/Mixture of Linear and Branched Isomers

PRODUCT CODE:	br-PFOSK
LOT NUMBER:	brPFOSK0117
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)	01/09/2017
LAST TESTED: (mm/dd/yyyy)	01/12/2017
EXPIRY DATE: (mm/dd/yyyy)	01/12/2022
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place

DESCRIPTION:

The chemical purity has been determined to be ≥98% perfluorooctanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the isomeric components are given in Table A.

DOCUMENTATION/ DATA ATTACHED:

Table A: Isomeric Components and Percent Composition by ^{19}F-NMR
Figure 1: LC/MS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data (SIR)
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- A 5-point calibration curve was generated using linear PFOS (potassium salt) and mass-labelled PFOS as an internal standard to enable quantitation of br-PFOSK using isotopic dilution.
- CAS#: 2795-39-3 (for linear isomer; potassium salt).

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

INTENDED USE:

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HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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

HOMOGENEITY:

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

UNCERTAINTY:

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:

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CALA

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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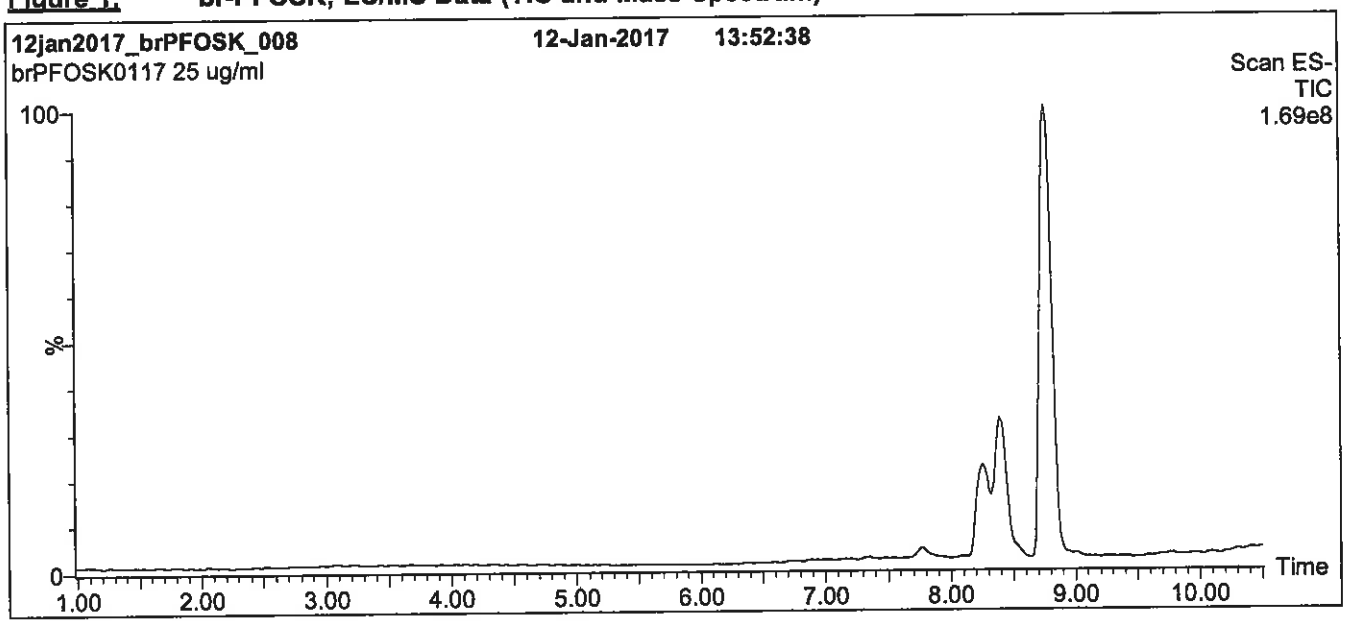
Table A: **br-PFOSK; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

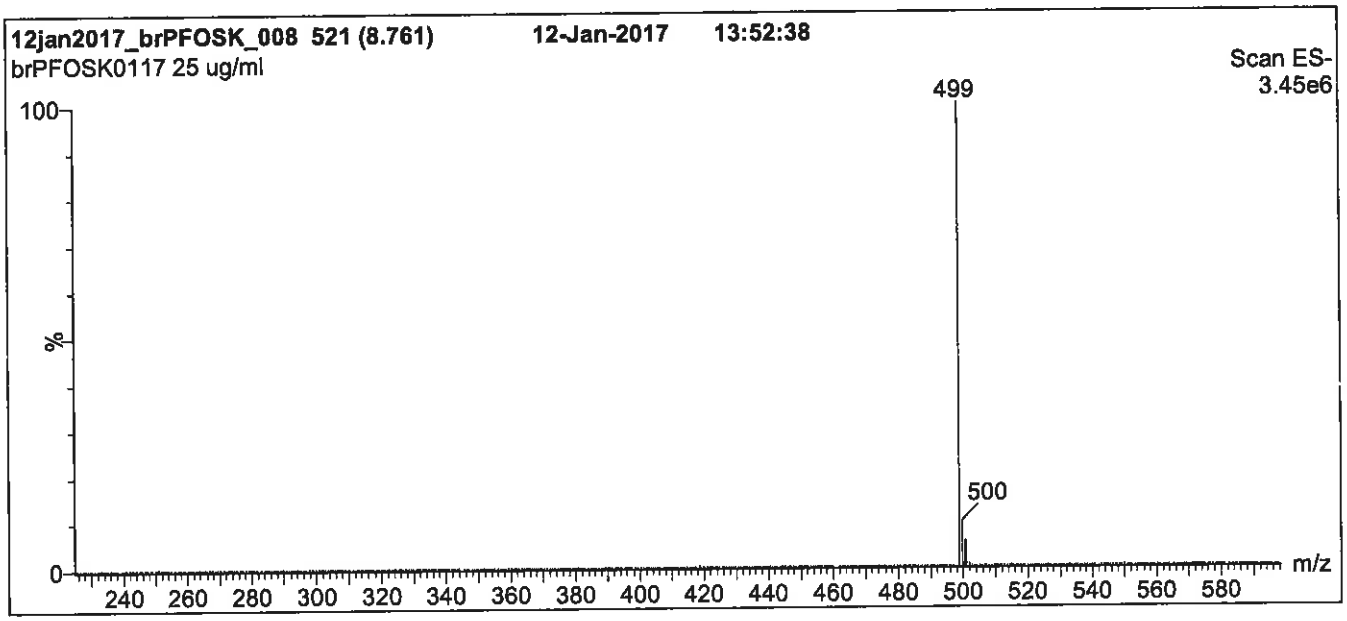
Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	Potassium perfluoro-1-octanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	$CF_3CF_2CF_2CF_2CF_2CF_2CF(CF_3)SO_3^-K^+$	1.2
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF_2CF(CF_3)CF_2SO_3^-K^+$	0.6
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF_2CF(CF_3)CF_2CF_2SO_3^-K^+$	1.9
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF_2CF(CF_3)CF_2CF_2CF_2SO_3^-K^+$	2.2
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	$CF_3CF_2CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	4.5
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2CF_2SO_3^-K^+$	10.0
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3C(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.2
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF_2C(CF_3)CF_2CF_2CF_2SO_3^-K^+$	0.03
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF_2CF_2CF_2SO_3^-K^+$	0.4
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	$CF_3CF(CF_3)CF_2CF(CF_3)CF_2SO_3^-K^+$	0.07

* Percent of total perfluorooctanesulfonate isomers only. Isomers are labelled in Figure 2.
** Systematic Name: Potassium perfluorooctane-2-sulfonate.

Certified By: B.G. Chittim **Date:** 01/20/2017 (mm/dd/yyyy)

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





Conditions for Figure 1:

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

Chromatographic Conditions

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

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 12 min and hold for 2 min.
Return to initial conditions over 0.5 min.
Time: 16 min

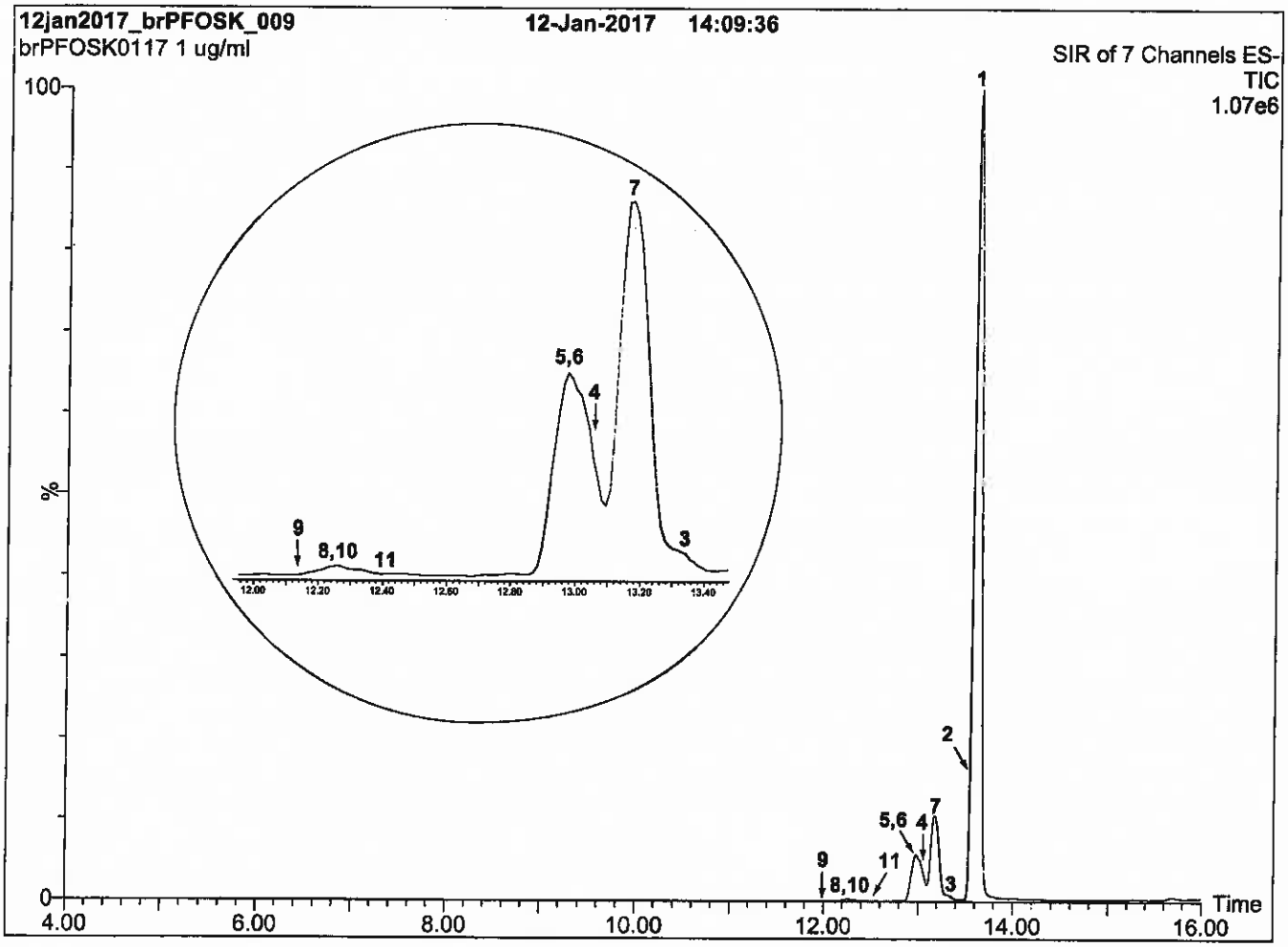
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 60.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

Figure 2: **br-PFOSK; LC/MS Data (SIR)**



Conditions for Figure 2:

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

Chromatographic Conditions:

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

Injection: 1.0 µg/ml of br-PFOSK

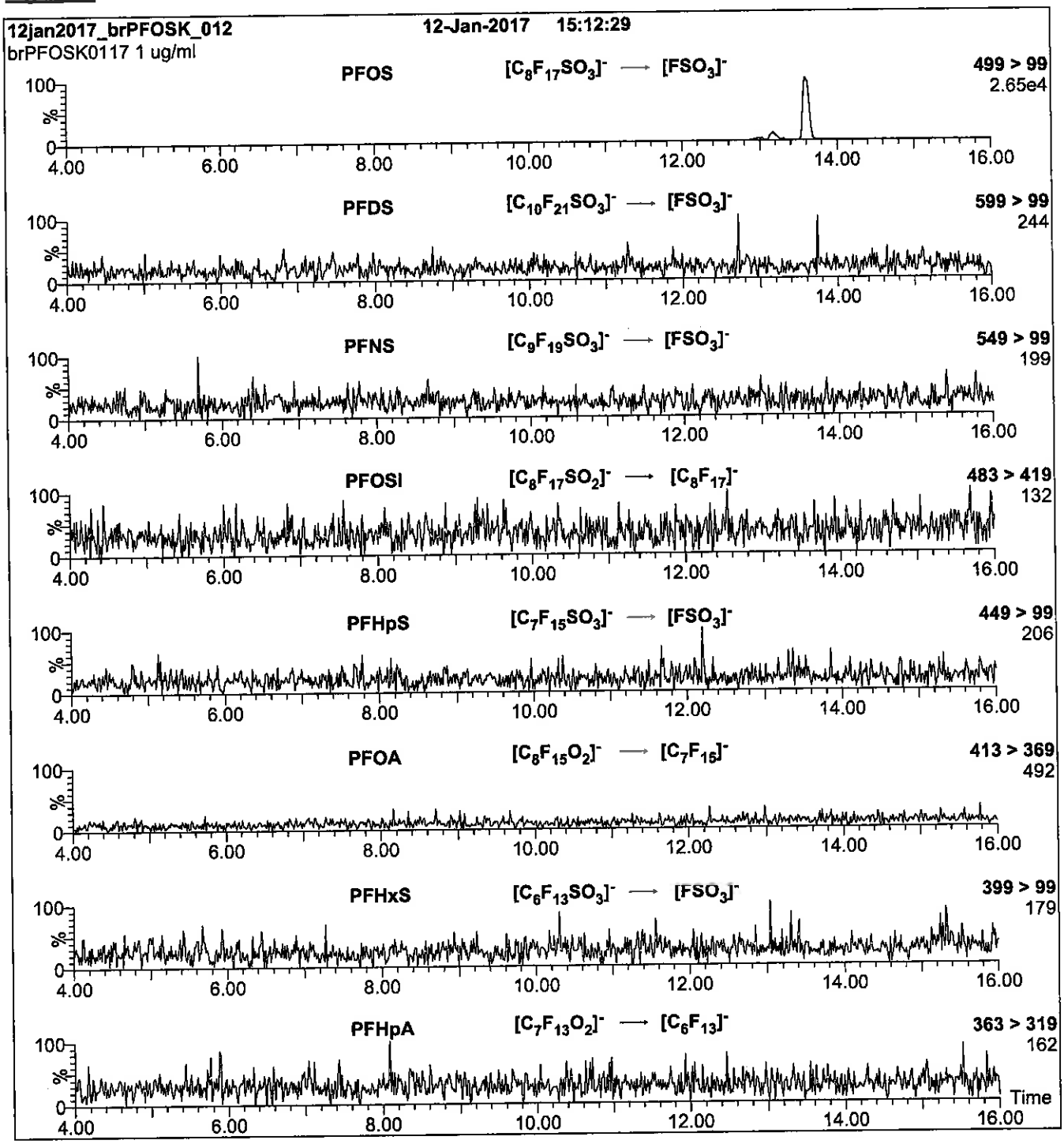
Mobile Phase: Gradient
45% (80:20 MeOH:ACN) / 55% H_2O (both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 15 min and hold for 3 min.
Return to initial conditions over 1 min.
Time: 20 min

Flow: 300 µl/min

MS Conditions:

SIR (ES^-)
Source = 110 °C
Desolvation = 325 °C
Cone Voltage = 60V

Figure 3: **br-PFOSK; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 3:

Injection: On-column

Mobile phase: Same as Figure 2

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 11-50 (variable)

Method 537 DOD

Perfluorinated Alkyl Acids (LC/MS) by Method 537 DOD

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFHxA #	PFDA #
NAWC-082818-RW-293	320-42603-1	105	109
NAWC-082818-FRB-293	320-42603-2	114	107
	MB 320-244303/1-A	110	109
	LLCS 320-244303/2-A	110	104
	LLCSD 320-244303/3-A	115	104

	QC LIMITS
PFHxA = 13C2 PFHxA	70-130
PFDA = 13C2 PFDA	70-130

Column to be used to flag recovery values

FORM II 537

FORM III
LCMS LOW LEVEL CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 2018.09.08_537BD _052.d

Lab ID: LLCS 320-244303/2-A Client ID:

COMPOUND	SPIKE ADDED (ng/L)	LLCS CONCENTRATION (ng/L)	LLCS % REC	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	40.2	45.8	114	50-150	
Perfluorooctanoic acid (PFOA)	20.0	21.6	108	50-150	
Perfluorononanoic acid (PFNA)	20.0	20.6 J	103	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	32.1	106	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	11.7	117	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	128	142	50-150	

Column to be used to flag recovery and RPD values

FORM III 537

FORM III
LCMS LOW LEVEL CONTROL STANDARD DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 2018.09.08_537BD _053.d

Lab ID: LLCSD 320-244303/3-A Client ID:

COMPOUND	SPIKE ADDED (ng/L)	LLCSD CONCENTRATION (ng/L)	LLCSD % REC	% RPD	QC LIMITS RPD	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	40.2	45.6	113	0.6	50	50-150	
Perfluorooctanoic acid (PFOA)	20.0	22.8	114	5	50	50-150	
Perfluorononanoic acid (PFNA)	20.0	22.0 J	110	7	50	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	32.4	107	0.9	50	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	12.0	120	3	50	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	132	146	3	50	50-150	

Column to be used to flag recovery and RPD values

FORM III 537

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab File ID: 2018.09.08_537BD _051.d Lab Sample ID: MB 320-244303/1-A

Matrix: Water Date Extracted: 09/06/2018 18:53

Instrument ID: A8_N Date Analyzed: 09/08/2018 22:28

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LLCS 320-244303/2-A	2018.09.08_537BD_052.d	09/08/2018 22:32
	LLCSD 320-244303/3-A	2018.09.08_537BD_053.d	09/08/2018 22:36
NAWC-082818-RW-293	320-42603-1	2018.09.08_537BD_054.d	09/08/2018 22:40
NAWC-082818-FRB-293	320-42603-2	2018.09.08_537BD_055.d	09/08/2018 22:44

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Calibration Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3(mm) Calibration End Date: 08/30/2018 16:42

Calibration ID: 40933

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MEAN AREA AND MEAN RT		899367	1.83	2339667	2.08		
UPPER LIMIT		1349051	2.33	3509501	2.58		
LOWER LIMIT		449684	1.33	1169834	1.58		
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCVL 320-243207/9		960926	1.83	2460442	2.08		
ICV 320-243207/11		788747	1.83	2000251	2.08		
CCVL 320-244644/1		1214024	1.86	3247674	2.10		
CCV 320-244655/46 CCVIS		918005	1.84	2391130	2.09		
MB 320-244303/1-A		1238890	1.85	3236532	2.09		
LLCS 320-244303/2-A		1155150	1.85	3056932	2.09		
LLCSD 320-244303/3-A		1183349	1.84	3220491	2.09		
320-42603-1	NAWC-082818-RW-293	1099812	1.84	2860537	2.09		
320-42603-2	NAWC-082818-FRB-293	1134047	1.84	3031793	2.09		
CCV 320-244655/53 CCVIS		1070182	1.84	2965225	2.09		

13PFOA = 13C2-PFOA
PFOS = 13C4 PFOS

Area Limit = 50%-150% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Sample No.: CCV 320-244655/46 Date Analyzed: 09/08/2018 22:20

Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3(mm)

Lab File ID (Standard): 2018.09.08_537BD _0 Heated Purge: (Y/N) N

Calibration ID: 40933

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		918005	1.84	2391130	2.09		
UPPER LIMIT		1285207	2.34	3347582	2.59		
LOWER LIMIT		642604	1.34	1673791	1.59		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-244303/1-A		1238890	1.85	3236532	2.09		
LLCS 320-244303/2-A		1155150	1.85	3056932	2.09		
LLCSD 320-244303/3-A		1183349	1.84	3220491	2.09		
320-42603-1	NAWC-082818-RW-293	1099812	1.84	2860537	2.09		
320-42603-2	NAWC-082818-FRB-293	1134047	1.84	3031793	2.09		

13PFOA = 13C2-PFOA
PFOS = 13C4 PFOS

Area Limit = 70%-140% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Sample No.: CCV 320-244655/53 Date Analyzed: 09/08/2018 22:48

Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3(mm)

Lab File ID (Standard): 2018.09.08_537BD _0 Heated Purge: (Y/N) N

Calibration ID: 40933

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		1070182	1.84	2965225	2.09		
UPPER LIMIT		1498255	2.34	4151315	2.59		
LOWER LIMIT		749127	1.34	2075658	1.59		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-244303/1-A		1238890	1.85	3236532	2.09		
LLCS 320-244303/2-A		1155150	1.85	3056932	2.09		
LLCSD 320-244303/3-A		1183349	1.84	3220491	2.09		
320-42603-1	NAWC-082818-RW-293	1099812	1.84	2860537	2.09		
320-42603-2	NAWC-082818-FRB-293	1134047	1.84	3031793	2.09		

13PFOA = 13C2-PFOA
PFOS = 13C4 PFOS

Area Limit = 70%-140% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Client Sample ID: NAWC-082818-RW-293 Lab Sample ID: 320-42603-1

Matrix: Water Lab File ID: 2018.09.08_537BD _054.d

Analysis Method: 537 Date Collected: 08/28/2018 10:10

Extraction Method: 537 Date Extracted: 09/06/2018 18:53

Sample wt/vol: 280.4(mL) Date Analyzed: 09/08/2018 22:40

Con. Extract Vol.: 1.00(mL) Dilution Factor: 1

Injection Volume: 2(uL) GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	26	J	36	14	6.1
335-67-1	Perfluorooctanoic acid (PFOA)	28		18	7.1	2.5
375-95-1	Perfluorononanoic acid (PFNA)	18	U M	21	18	7.1
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	9.6	J	27	11	4.9
375-85-9	Perfluoroheptanoic acid (PFHpA)	11		8.9	3.6	1.7
375-73-5	Perfluorobutanesulfonic acid (PFBS)	32	U	80	32	14

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	105		70-130
STL00996	13C2 PFDA	109		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _054.d
Lims ID: 320-42603-A-1-A
Client ID: NAWC-082818-RW-293
Sample Type: Client
Inject. Date: 08-Sep-2018 22:40:29 ALS Bottle#: 38 Worklist Smp#: 51
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-42603-a-1-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

First Level Reviewer: barnettj Date: 10-Sep-2018 13:52:26

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.426	1.426	0.0	1.000	394011	3.47		122	
298.90 > 99.00	1.426	1.426	0.0	1.000	252308		1.56(0.00-0.00)	315	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.525	1.525	0.0	1.000	1307228	10.5		8099	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.662	1.662	0.0	1.000	459685	2.70		178	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.662	1.662	0.0	1.000	369242	3.08		40.6	
* 6 13C2-PFOA									
415.00 > 370.00	1.844	1.844	0.0		1099812	10.0		7069	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.844	1.844	0.0	1.000	932096	7.85		111	
413.00 > 169.00	1.844	1.844	0.0	1.000	632545		1.47(0.00-0.00)	792	
* 7 13C4 PFOS									
503.00 > 80.00	2.086	2.094	-0.008		2860537	28.7		3109	
9 Perfluorononanoic acid									M
463.00 > 419.00	2.094	2.102	-0.008	1.000	104612	1.17		10.1	M
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.086	2.109	-0.023	1.000	772607	7.23		425	
499.00 > 99.00	2.086	2.109	-0.023	1.000	150739		5.13(0.00-0.00)	244	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.261	-0.008	1.000	1079160	10.9		10565	

QC Flag Legend

Review Flags

M - Manually Integrated

Report Date: 10-Sep-2018 13:52:55 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _054.d

Injection Date: 08-Sep-2018 22:40:29 Instrument ID: A8_N

Lims ID: 320-42603-A-1-A Lab Sample ID: 320-42603-1

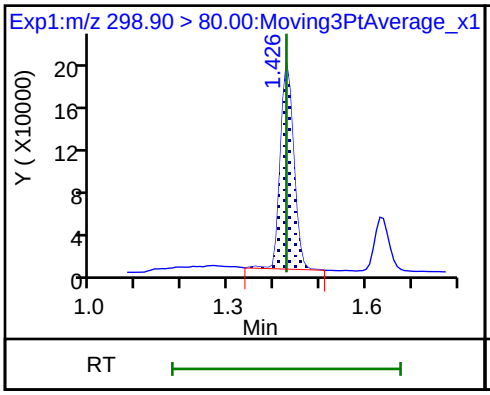
Client ID: NAWC-082818-RW-293

Operator ID: SACINSTLCMS01 ALS Bottle#: 38 Worklist Smp#: 51

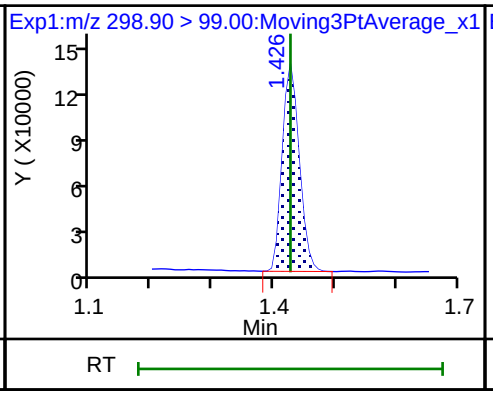
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

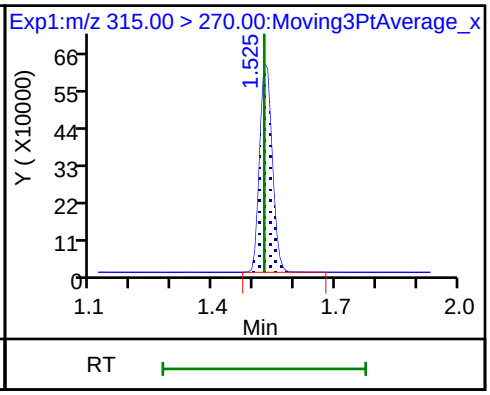
1 Perfluorobutanesulfonic acid



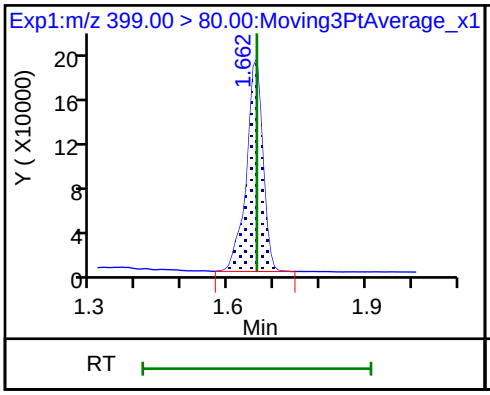
1 Perfluorobutanesulfonic acid



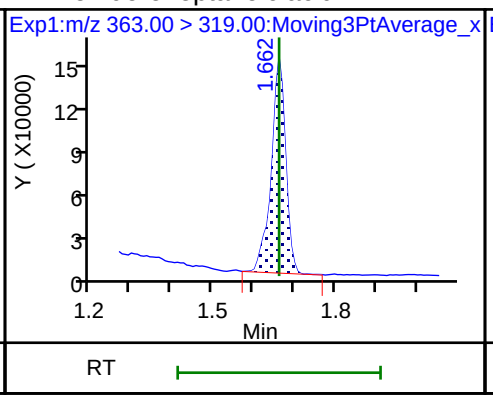
$ 2 13C2 PFHxA



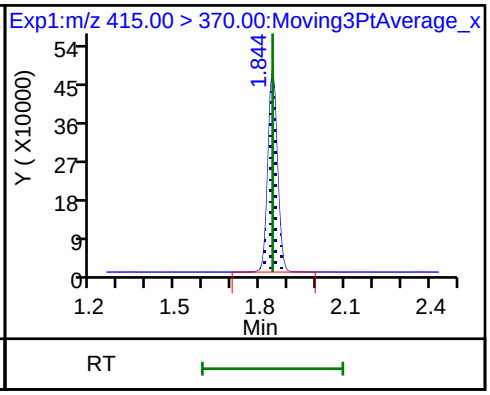
3 Perfluorohexanesulfonic acid



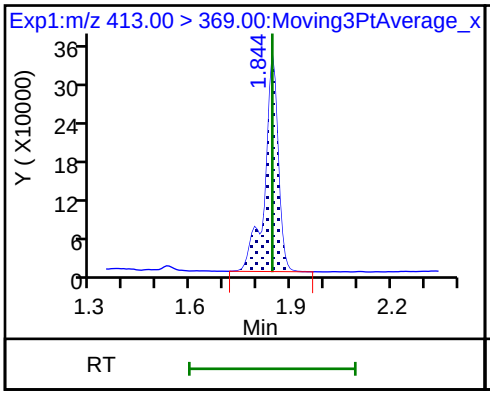
4 Perfluoroheptanoic acid



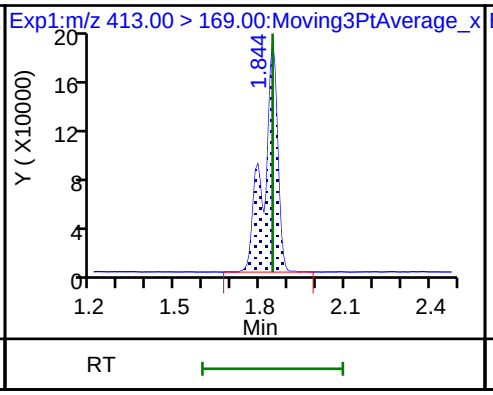
* 6 13C2-PFOA



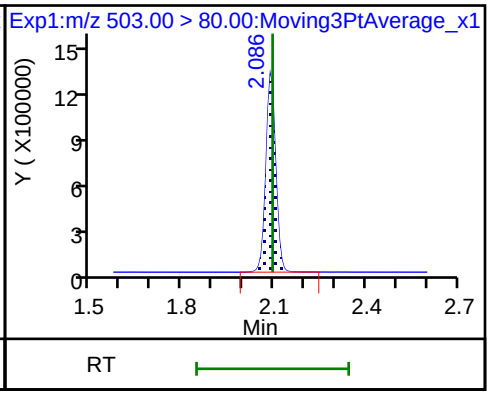
5 Perfluorooctanoic acid



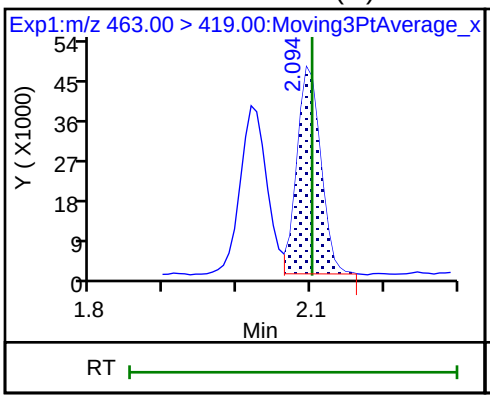
5 Perfluorooctanoic acid



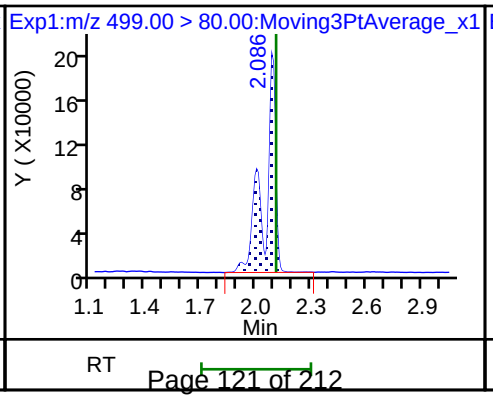
* 7 13C4 PFOS



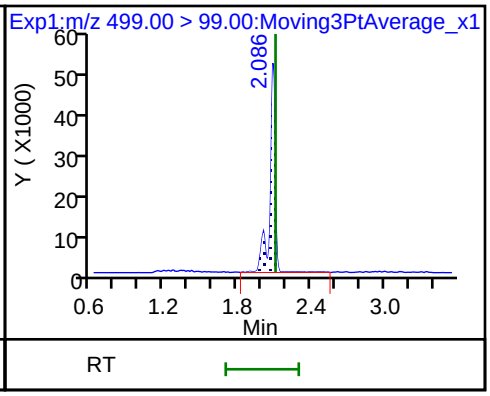
9 Perfluorononanoic acid (M)



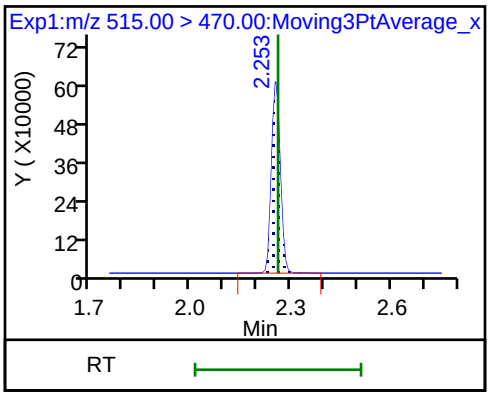
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
72
60
48
36
24
12
0
1.7
2.0
2.3
2.6
Min
RT

TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _054.d
Lims ID: 320-42603-A-1-A
Client ID: NAWC-082818-RW-293
Sample Type: Client
Inject. Date: 08-Sep-2018 22:40:29 ALS Bottle#: 38 Worklist Smp#: 51
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-42603-a-1-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

First Level Reviewer: barnettj Date: 10-Sep-2018 13:52:26

Compound	Amount Added	Amount Recovered	% Rec.
$ 2 13C2 PFHxA	10.0	10.5	104.50
$ 10 13C2 PFDA	10.0	10.9	108.74

Manual Integration/User Assign Peak Report

TestAmerica Sacramento

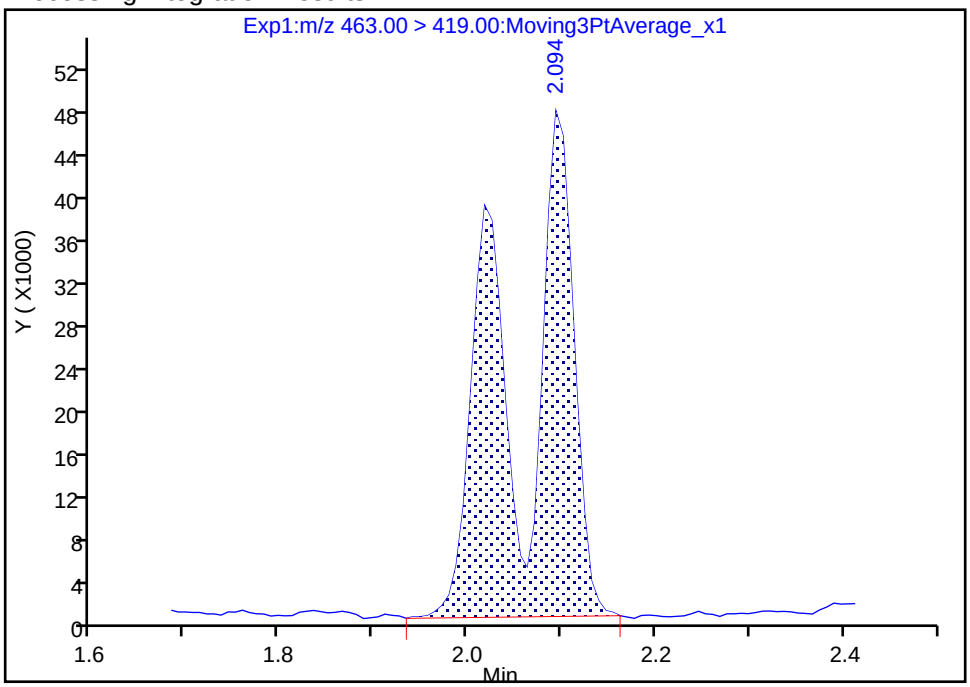
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _054.d				
Injection Date:	08-Sep-2018 22:40:29	Instrument ID:	A8_N		
Lims ID:	320-42603-A-1-A	Lab Sample ID:	320-42603-1		
Client ID:	NAWC-082818-RW-293				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	38	Worklist Smp#:	51
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Method:	537_A8_N	Limit Group:	LC 537 ICAL		
Column:		Detector	EXP1		

9 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

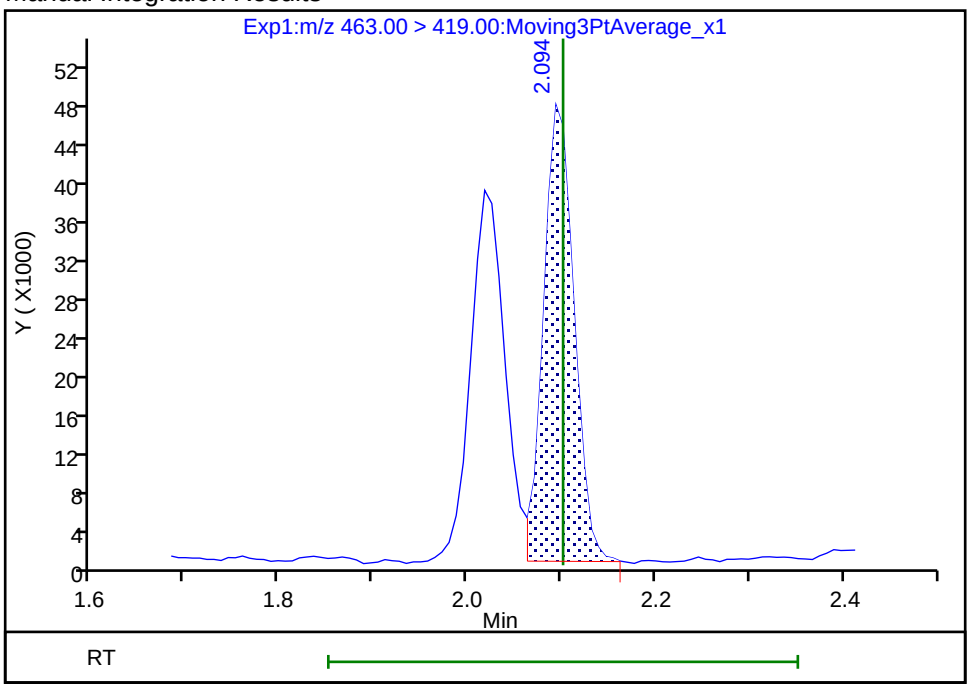
Processing Integration Results

RT: 2.09
Area: 202058
Amount: 2.263588
Amount Units: ng/ml



Manual Integration Results

RT: 2.09
Area: 104612
Amount: 1.171933
Amount Units: ng/ml



Reviewer: barnettj, 10-Sep-2018 13:52:06

Audit Action: Manually Integrated Audit Reason: Split Peak

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-42603-1

SDG No.:

Client Sample ID: NAWC-082818-FRB-293 | Lab Sample ID: 320-42603-2

Matrix: Water | Lab File ID: 2018.09.08_537BD _055.d

Analysis Method: 537 | Date Collected: 08/28/2018 10:05

Extraction Method: 537 | Date Extracted: 09/06/2018 18:53

Sample wt/vol: 286.6(mL) | Date Analyzed: 09/08/2018 22:44

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	14	U	35	14	5.9
335-67-1	Perfluorooctanoic acid (PFOA)	7.0	U	17	7.0	2.4
375-95-1	Perfluorononanoic acid (PFNA)	17	U	21	17	7.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	10	U	26	10	4.8
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.5	U	8.7	3.5	1.7
375-73-5	Perfluorobutanesulfonic acid (PFBS)	31	U	79	31	14

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	114		70-130
STL00996	13C2 PFDA	107		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _055.d
Lims ID: 320-42603-A-2-A
Client ID: NAWC-082818-FRB-293
Sample Type: Client
Inject. Date: 08-Sep-2018 22:44:26 ALS Bottle#: 39 Worklist Smp#: 52
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-42603-a-2-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
$ 2 13C2 PFHxA									
315.00 > 270.00	1.525	1.525	0.0	1.000	1468894	11.4		10612	
* 6 13C2-PFOA									
415.00 > 370.00	1.844	1.844	0.0		1134047	10.0		8318	
* 7 13C4 PFOS									
503.00 > 80.00	2.086	2.094	-0.008		3031793	28.7		7401	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.261	-0.008	1.000	1098777	10.7		9715	

Report Date: 10-Sep-2018 13:52:56 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _055.d

Injection Date: 08-Sep-2018 22:44:26 Instrument ID: A8_N

Lims ID: 320-42603-A-2-A Lab Sample ID: 320-42603-2

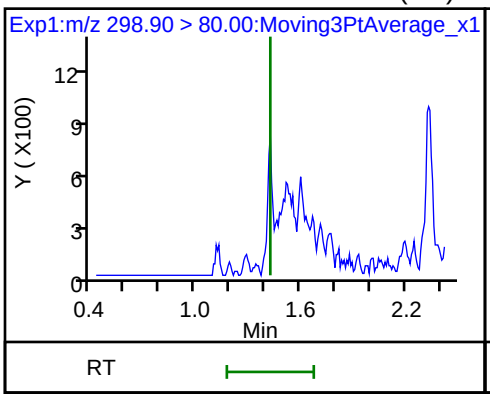
Client ID: NAWC-082818-FRB-293

Operator ID: SACINSTLCMS01 ALS Bottle#: 39 Worklist Smp#: 52

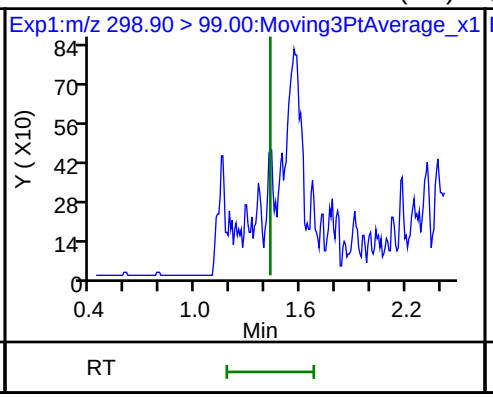
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

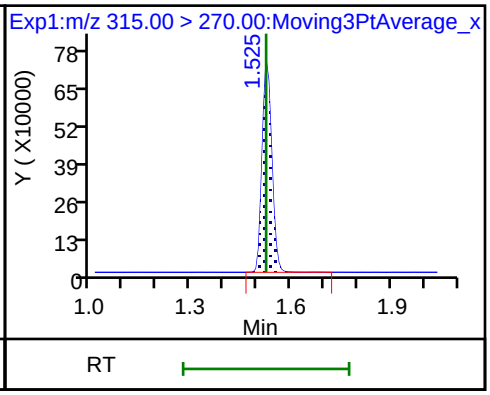
1 Perfluorobutanesulfonic acid (ND)



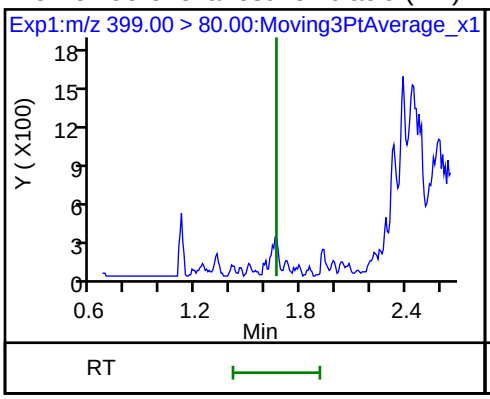
1 Perfluorobutanesulfonic acid (ND)



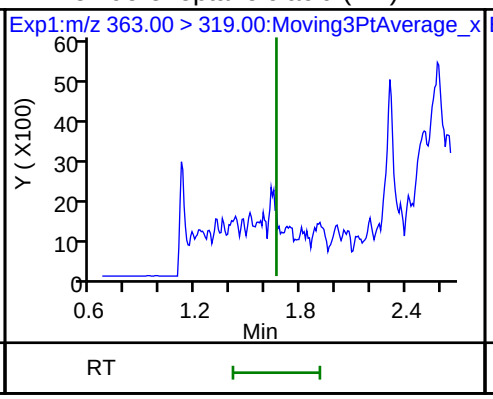
$ 2 13C2 PFHxA



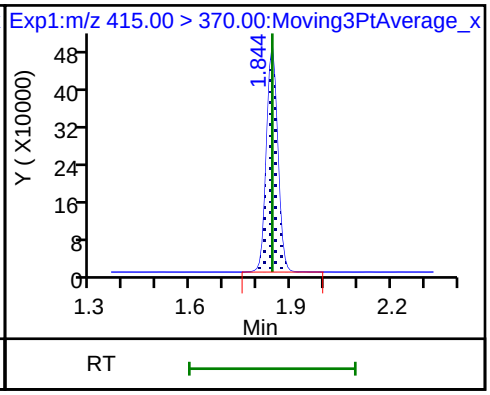
3 Perfluorohexanesulfonic acid (ND)



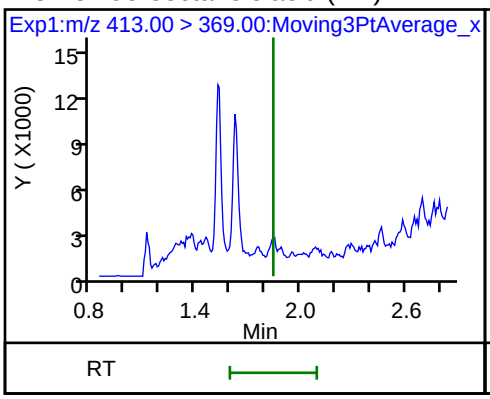
4 Perfluoroheptanoic acid (ND)



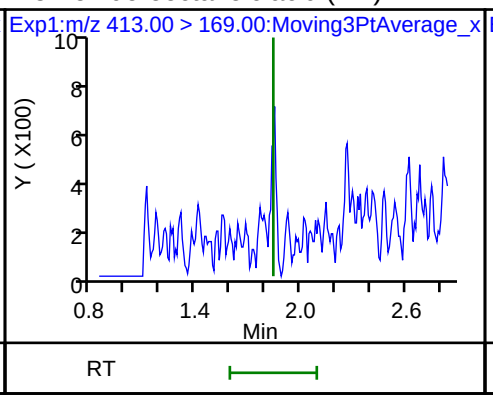
* 6 13C2-PFOA



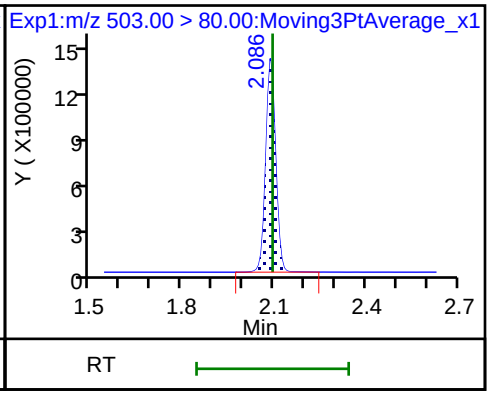
5 Perfluorooctanoic acid (ND)



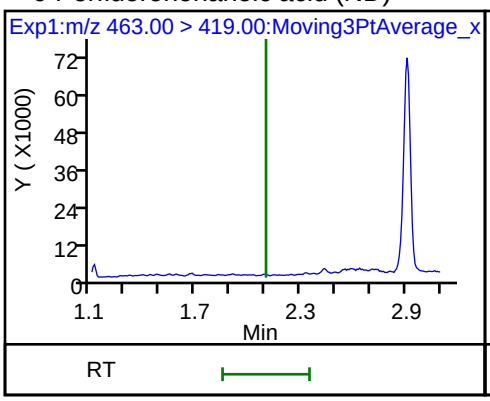
5 Perfluorooctanoic acid (ND)



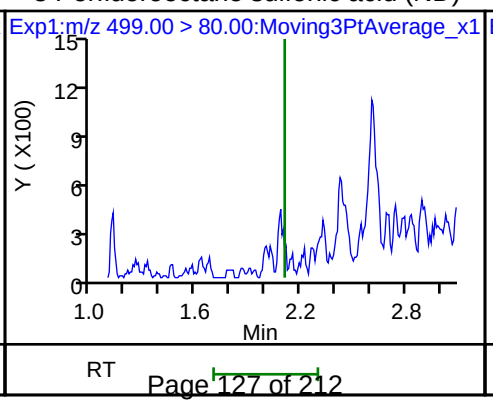
* 7 13C4 PFOS



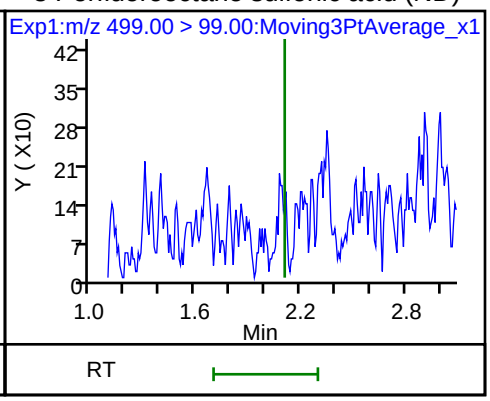
9 Perfluorononanoic acid (ND)



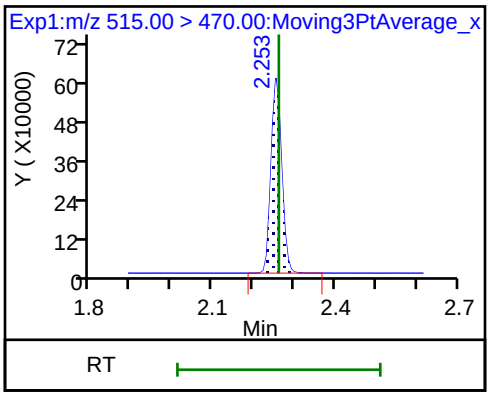
8 Perfluorooctane sulfonic acid (ND)



8 Perfluorooctane sulfonic acid (ND)



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
72
60
48
36
24
12
0
1.8
2.1
2.4
2.7
Min
RT

TestAmerica Sacramento
Recovery Report

Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _055.d				
Lims ID:	320-42603-A-2-A				
Client ID:	NAWC-082818-FRB-293				
Sample Type:	Client				
Inject. Date:	08-Sep-2018 22:44:26	ALS Bottle#:	39	Worklist Smp#:	52
Injection Vol:	2.0 ul	Dil. Factor:	1.0000		
Sample Info:	320-42603-a-2-a				
Misc. Info.:	Plate: 1 Rack: 2				
Operator ID:	SACINSTLCMS01	Instrument ID:	A8_N		
Method:	\\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m				
Limit Group:	LC 537 ICAL				
Last Update:	10-Sep-2018 13:52:50	Calib Date:	30-Aug-2018 16:42:48		
Integrator:	Picker				
Quant Method:	Internal Standard	Quant By:	Initial Calibration		
Last ICal File:	\\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d				
Column 1 :			Det: EXP1		
Process Host:	XAWRK008				

Compound	Amount Added	Amount Recovered	% Rec.
$ 2 13C2 PFHxA	10.0	11.4	113.88
$ 10 13C2 PFDA	10.0	10.7	107.38

FORM VI
LCMS BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1 Analy Batch No.: 243207

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/30/2018 16:19 Calibration End Date: 08/30/2018 16:42 Calibration ID: 40933

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-243207/2	2018.08.30_537ICALXX_003.d
Level 2	IC 320-243207/3	2018.08.30_537ICALXX_004.d
Level 3	IC 320-243207/4	2018.08.30_537ICALXX_005.d
Level 4	IC 320-243207/5	2018.08.30_537ICALXX_006.d
Level 5	IC 320-243207/6	2018.08.30_537ICALXX_007.d
Level 6	IC 320-243207/7	2018.08.30_537ICALXX_008.d

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Perfluorobutanesulfonic acid (PFBS)	1.2230 0.9930	1.1860	1.1753	1.1605	1.0890	Ave		1.1378				7.3		30.0			
Perfluoroheptanoic acid (PFHpA)	1.0381 1.0845	1.0721	1.0557	1.1770	1.1132	Ave		1.0901				4.6		30.0			
Perfluorohexanesulfonic acid (PFHxS)	1.6889 1.6717	1.6473	1.7005	1.7822	1.7495	Ave		1.7067				2.9		30.0			
Perfluorooctanoic acid (PFOA)	1.1238 1.0683	1.0221	1.0750	1.0854	1.1051	Ave		1.0799				3.2		30.0			
Perfluorooctanesulfonic acid (PFOS)	1.0648 1.0771	1.0440	1.0513	1.1032	1.0916	Ave		1.0720				2.1		30.0			
Perfluorononanoic acid (PFNA)	0.8008 0.7934	0.8096	0.8197	0.8356	0.8107	Ave		0.8116				1.8		30.0			
13C2 PFHxA	1.1521 1.1375	1.1090	1.1128	1.1379	1.1749	Ave		1.1374				2.2		30.0			
13C2 PFDA	0.8838 0.8930	0.8995	0.8727	0.9522	0.9127	Ave		0.9023				3.1		30.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
LCMS BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1 Analy Batch No.: 243207

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/30/2018 16:19 Calibration End Date: 08/30/2018 16:42 Calibration ID: 40933

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-243207/2	2018.08.30_537ICALXX_003.d
Level 2	IC 320-243207/3	2018.08.30_537ICALXX_004.d
Level 3	IC 320-243207/4	2018.08.30_537ICALXX_005.d
Level 4	IC 320-243207/5	2018.08.30_537ICALXX_006.d
Level 5	IC 320-243207/6	2018.08.30_537ICALXX_007.d
Level 6	IC 320-243207/7	2018.08.30_537ICALXX_008.d

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Perfluorobutanesulfonic acid (PFBS)	PFOS	Ave	885235 14291597	2051546	4145133	8657186	11998694	9.00 180	20.0	45.0	90.1	135
Perfluoroheptanoic acid (PFHpA)	13PFOA	Ave	88795 1861705	225064	443367	1011347	1464161	0.960 19.4	2.16	4.86	9.72	14.6
Perfluorohexanesulfonic acid (PFHxS)	PFOS	Ave	407943 8080418	957042	2014325	4465219	6473859	3.00 60.5	6.72	15.1	30.2	45.4
Perfluorooctanoic acid (PFOA)	13PFOA	Ave	198271 3735476	437086	919687	1899747	2960649	1.98 39.6	4.40	9.90	19.8	29.7
Perfluorooctanesulfonic acid (PFOS)	PFOS	Ave	338576 6804405	792676	1627539	3612214	5279410	3.95 79.1	8.79	19.8	39.5	59.3
Perfluorononanoic acid (PFNA)	13PFOA	Ave	141277 2774537	346235	701242	1462550	2171914	1.98 39.6	4.40	9.90	19.8	29.7
13C2 PFHxA	13PFOA	Ave	1026522 1004475	1077815	961641	1005876	1059885	10.0 10.0	10.0	10.0	10.0	10.0
13C2 PFDA	13PFOA	Ave	787485 788559	874271	754115	841794	823302	10.0 10.0	10.0	10.0	10.0	10.0

Curve Type Legend:
Ave = Average ISTD

FORM VI
LCMS BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
READBACK PERCENT ERROR

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1 Analy Batch No.: 243207

SDG No.:

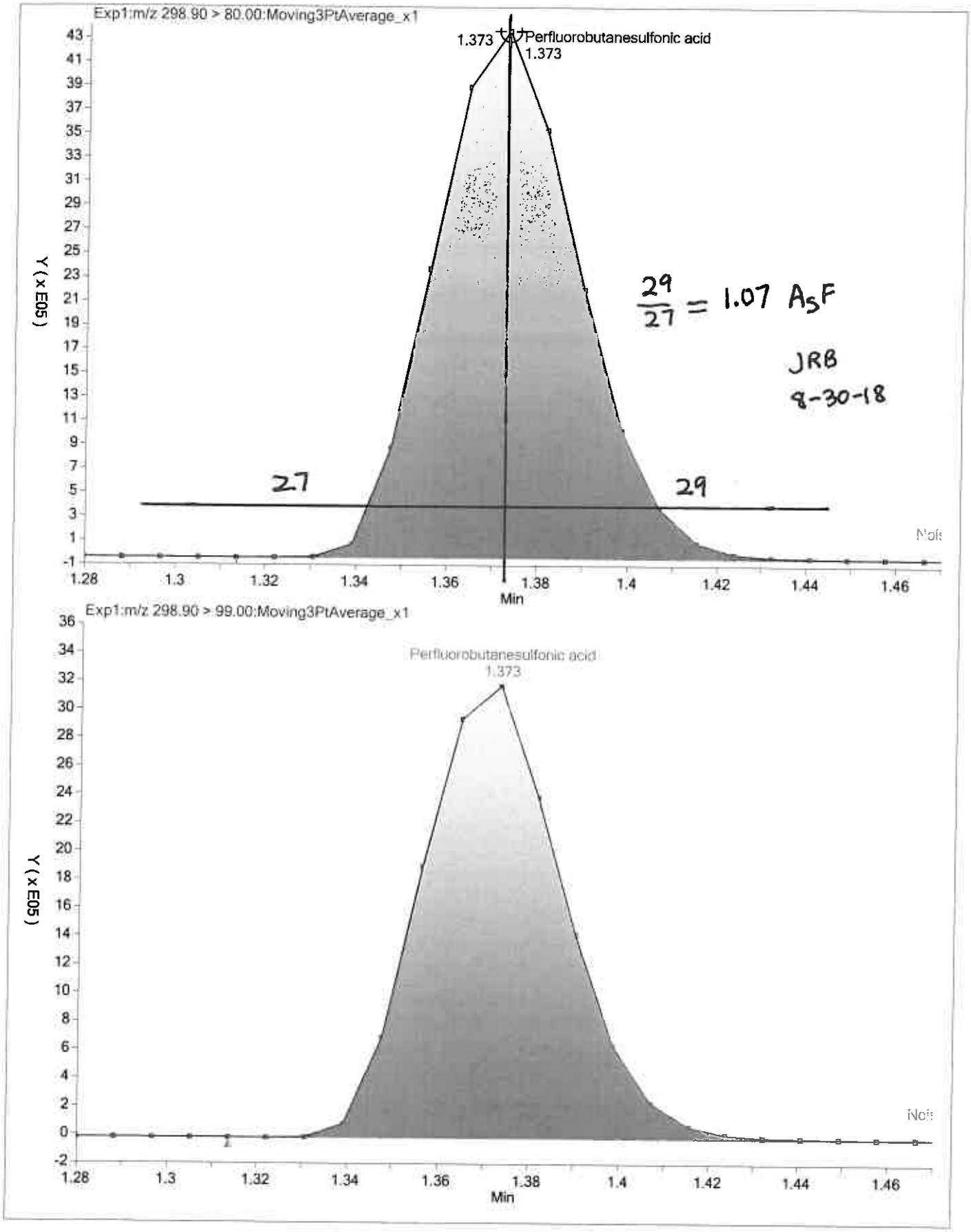
Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

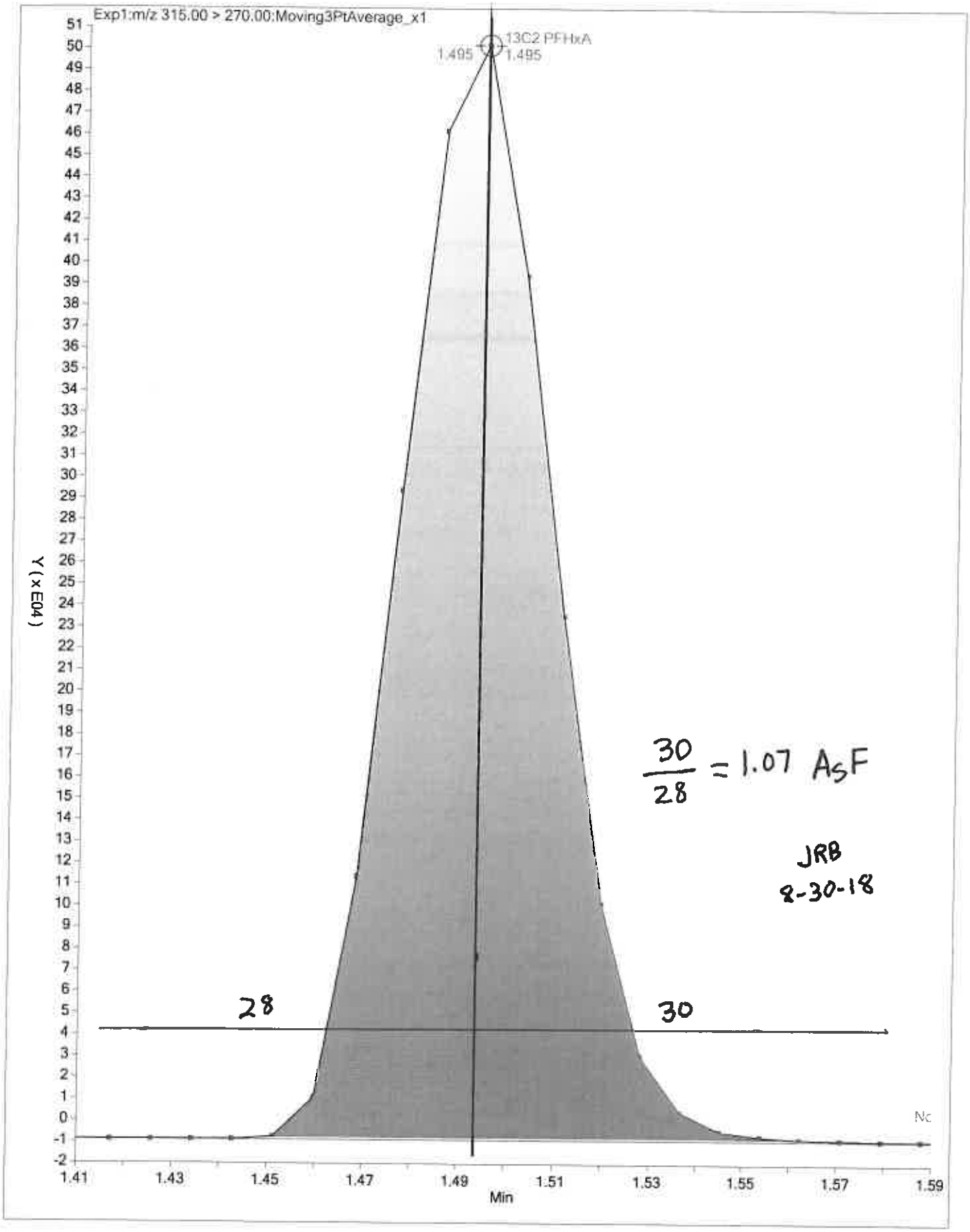
Calibration Start Date: 08/30/2018 16:19 Calibration End Date: 08/30/2018 16:42 Calibration ID: 40933

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-243207/2	2018.08.30_537ICALXX_003.d
Level 2	IC 320-243207/3	2018.08.30_537ICALXX_004.d
Level 3	IC 320-243207/4	2018.08.30_537ICALXX_005.d
Level 4	IC 320-243207/5	2018.08.30_537ICALXX_006.d
Level 5	IC 320-243207/6	2018.08.30_537ICALXX_007.d
Level 6	IC 320-243207/7	2018.08.30_537ICALXX_008.d

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #	LVL 6 #	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6
Perfluorobutanesulfonic acid (PFBS)	7.5	4.2	3.3	2.0	-4.3	-12.7	50	30	30	30	30	30
Perfluoroheptanoic acid (PFHpA)	-4.8	-1.7	-3.2	8.0	2.1	-0.5	50	30	30	30	30	30
Perfluorohexanesulfonic acid (PFHxS)	-1.0	-3.5	-0.4	4.4	2.5	-2.1	50	30	30	30	30	30
Perfluorooctanoic acid (PFOA)	4.1	-5.4	-0.5	0.5	2.3	-1.1	50	30	30	30	30	30
Perfluorooctanesulfonic acid (PFOS)	-0.7	-2.6	-1.9	2.9	1.8	0.5	50	30	30	30	30	30
Perfluorononanoic acid (PFNA)	-1.3	-0.2	1.0	3.0	-0.1	-2.2	50	30	30	30	30	30
13C2 PFHxA	1.3	-2.5	-2.2	0.0	3.3	0.0	30	30	30	30	30	30
13C2 PFDA	-2.1	-0.3	-3.3	5.5	1.1	-1.0	30	30	30	30	30	30


Exp1:m/z 298.90 > 80.00:Moving3PtAverage_x1
1.373
Perfluorobutanesulfonic acid
1.373
Y (x E05)
Min
27
29
29/27 = 1.07 A5F
JRB
8-30-18
Exp1:m/z 298.90 > 99.00:Moving3PtAverage_x1
Perfluorobutanesulfonic acid
1.373
Y (x E05)
Min


Exp1:m/z 315.00 > 270.00:Moving3PtAverage_x1
13C2 PFHxA
1.495
1.495
Y (x E04)
Min
28
30
Nc
30/28 = 1.07 ASF
JRB
8-30-18

TestAmerica Laboratories
Istd/Surrogate Recovery Report

Worklist Name: 30AUG2018_537_ICALB Worklist Num: 63556
Instrument: A8_N Method: 537_A8_N
Batch Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b
Limit Group: LC 537 ICAL
Analysis Type: SemiVOA
Inj Volume: 2.00 Inj Vol Units: ul

Lims Batch: 243207
CCV IS Mode: Select Ical Level, Cal Level: 3
Non-Cal IS Mode: Last Ccal Sample

$ 2 13C2 PFHxA
$ 10 13C2 PFDA

Lab ID Inj Date	$ 2	$ 10	6 13C2-PFOA	* 7 13C4 PFOS
IS Std			864139 1.83	2246292 2.08
# 1 RB 30-Aug-2018 16:14:42			1.83 898985 104.0	2.09 2234437 99.5
IS Std				
# 2 IC L1 30-Aug-2018 16:19:26	1.50 101.30	2.25 97.95	1.83 891025> 100.0*	2.09 2306829> 100.0*
# 3 IC L2 30-Aug-2018 16:24:08	1.50 97.50	2.25 99.69	1.83 971912> 109.1*	2.09 2478769> 107.5*
# 4 IC L3 30-Aug-2018 16:28:48	1.50 97.84	2.25 96.71	1.83 864139> 97.0*	2.08 2246292> 97.4*
# 5 IC L4 30-Aug-2018 16:33:28	1.50 100.00	2.25 105.50	1.83 884013> 99.2*	2.08 2375494> 103.0*
# 6 IC L5 30-Aug-2018 16:38:09	1.50 103.30	2.25 101.10	1.83 902081> 101.2*	2.09 2339063> 101.4*
# 7 IC L6 30-Aug-2018 16:42:48	1.49 100.00	2.25 98.97	1.82 883033> 99.1*	2.08 2291552> 99.3*

13C2-PFOA

$$RPD = \frac{971912 - 864139}{\left(\frac{971912 + 864139}{2}\right)} \times 100 = 11.7$$

13C4-PFOS

$$RPD = \frac{2478769 - 2246292}{\left(\frac{2478769 + 2246292}{2}\right)} \times 100 = 9.84$$

JRB
8-30-18

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_003.d
Lims ID: IC L1
Client ID:
Sample Type: IC Calib Level: 1
Inject. Date: 30-Aug-2018 16:19:26 ALS Bottle#: 1 Worklist Smp#: 2
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L1_537
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 30-Aug-2018 17:06:59 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK020

First Level Reviewer: barnettj Date: 30-Aug-2018 16:36:38

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.373	1.372	0.001	1.000	885235	9.67		4243	
298.90 > 99.00	1.373	1.372	0.001	1.000	642141		1.38(0.00-0.00)	1937	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.495	1.493	0.002	1.000	1026522	10.1		10481	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.639	1.639	0.0	1.000	88795	0.9142		24.9	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.639	1.639	0.0	1.000	407943	2.97		266	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.828	1.827	0.001	1.000	198271	2.06		31.7	
413.00 > 169.00	1.828	1.827	0.001	1.000	102081		1.94(0.00-0.00)	383	
* 6 13C2-PFOA									
415.00 > 370.00	1.828	1.827	0.001		891025	10.0		7408	
* 7 13C4 PFOS									
503.00 > 80.00	2.086	2.083	0.003		2306829	28.7		5507	
9 Perfluorononanoic acid									
463.00 > 419.00	2.094	2.093	0.001	1.000	141277	1.95		27.5	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.086	2.109	-0.023	1.000	338576	3.93		646	
499.00 > 99.00	2.086	2.109	-0.023	1.000	75852		4.46(0.00-0.00)	266	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	787485	9.79		4286	

Reagents:

LC537-L1_00022 Amount Added: 1.00 Units: mL

Report Date: 30-Aug-2018 17:07:00 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_003.d

Injection Date: 30-Aug-2018 16:19:26 Instrument ID: A8_N

Lims ID: IC L1

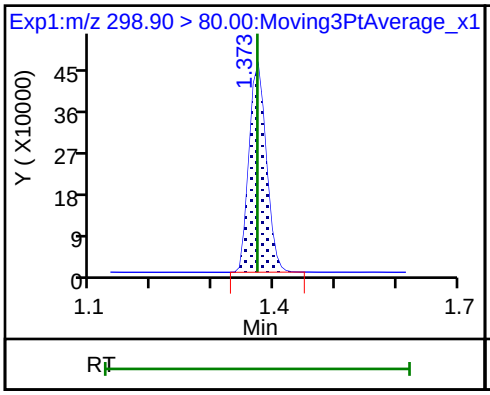
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 1 Worklist Smp#: 2

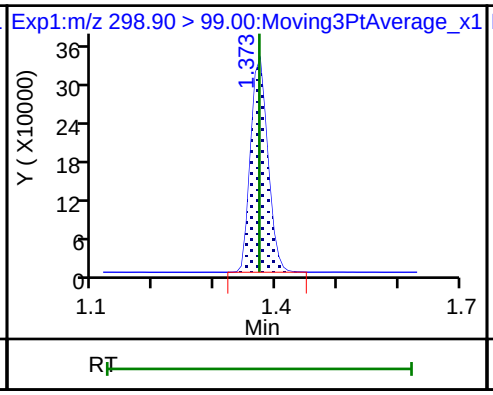
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

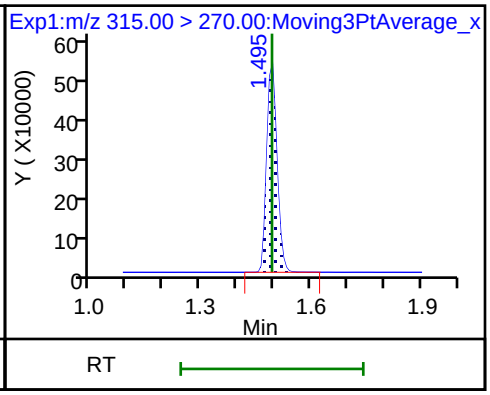
1 Perfluorobutanesulfonic acid



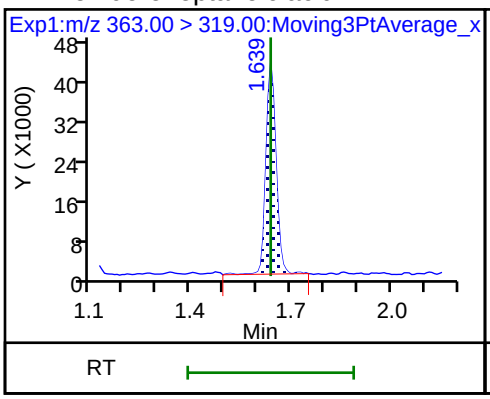
1 Perfluorobutanesulfonic acid



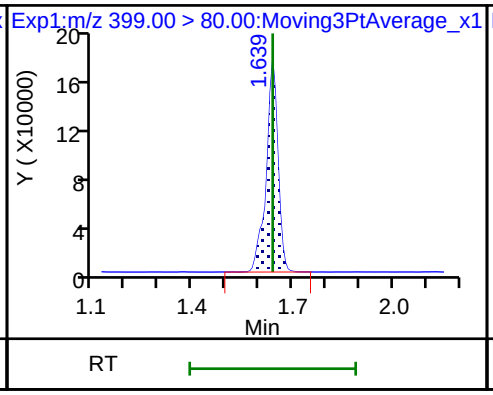
$ 2 13C2 PFHxA



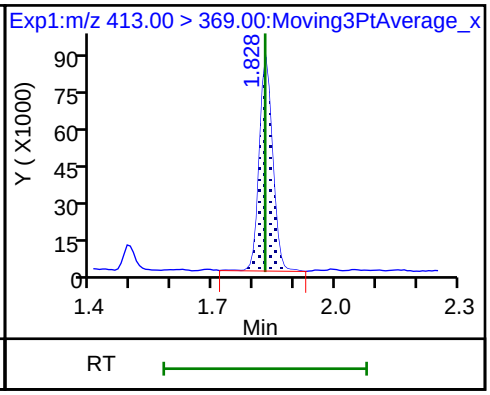
4 Perfluoroheptanoic acid



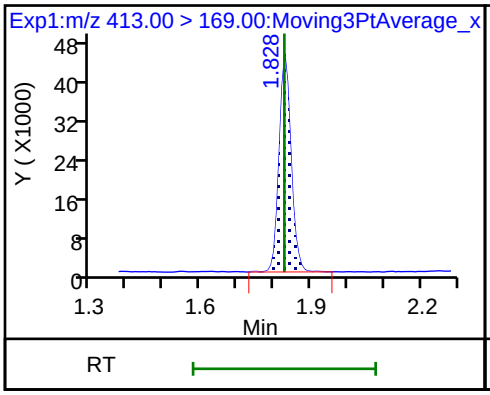
3 Perfluorohexanesulfonic acid



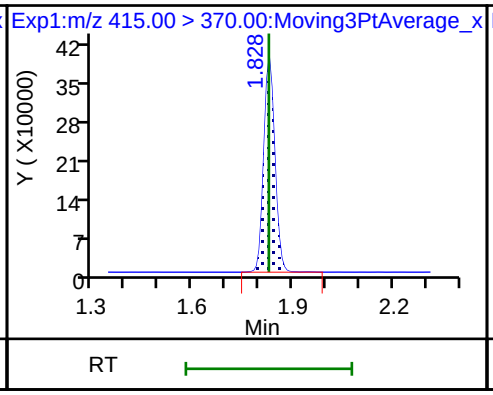
5 Perfluorooctanoic acid



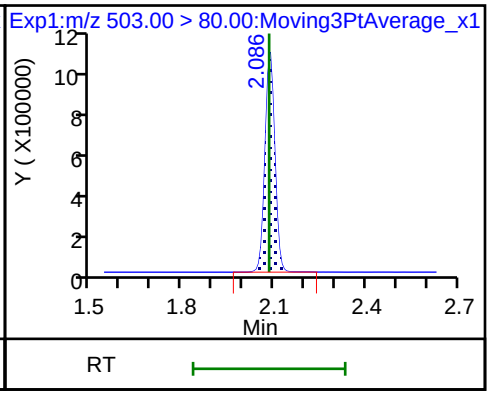
5 Perfluorooctanoic acid



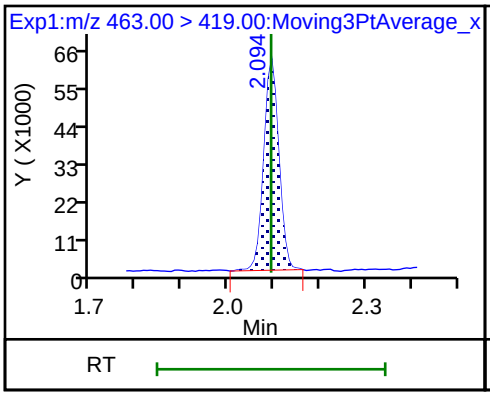
* 6 13C2-PFOA



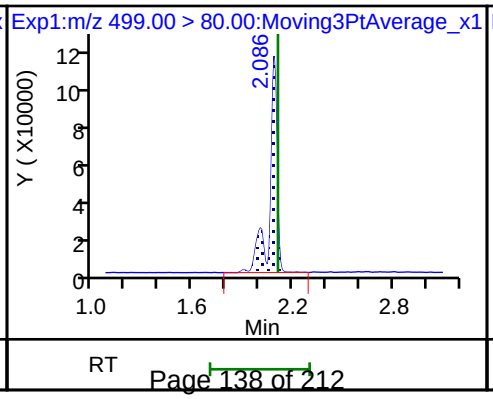
* 7 13C4 PFOS



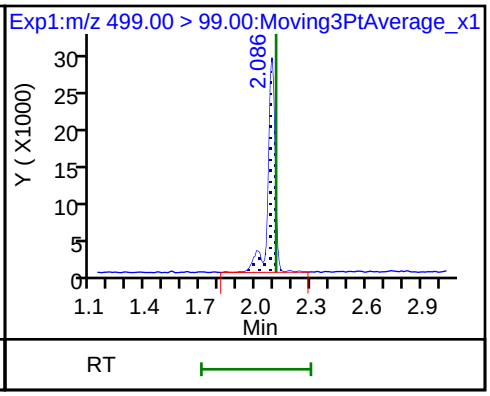
9 Perfluorononanoic acid



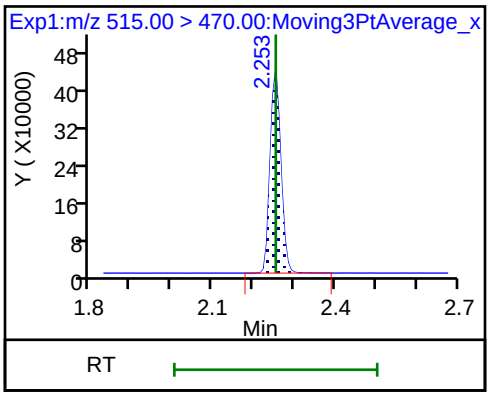
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
48
40
32
24
16
8
0
1.8
2.1
2.4
2.7
Min
RT

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_004.d
Lims ID: IC L2
Client ID:
Sample Type: IC Calib Level: 2
Inject. Date: 30-Aug-2018 16:24:08 ALS Bottle#: 2 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L2_537
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 30-Aug-2018 17:07:01 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK020

First Level Reviewer: barnettj Date: 30-Aug-2018 16:38:24

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.373	1.372	0.001	1.000	2051546	20.9		9134	
298.90 > 99.00	1.373	1.372	0.001	1.000	1424011		1.44(0.00-0.00)	3524	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.495	1.493	0.002	1.000	1077815	9.75		9678	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.639	1.639	0.0	1.000	957042	6.49		615	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.639	1.639	0.0	1.000	225064	2.12		61.8	
* 6 13C2-PFOA									
415.00 > 370.00	1.828	1.827	0.001		971912	10.0		7693	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.828	1.827	0.001	1.000	437086	4.16		69.2	
413.00 > 169.00	1.828	1.827	0.001	1.000	234097		1.87(0.00-0.00)	815	
* 7 13C4 PFOS									
503.00 > 80.00	2.086	2.083	0.003		2478769	28.7		5657	
9 Perfluorononanoic acid									
463.00 > 419.00	2.094	2.093	0.001	1.000	346235	4.39		68.5	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.086	2.109	-0.023	1.000	792676	8.56		1635	
499.00 > 99.00	2.086	2.109	-0.023	1.000	174841		4.53(0.00-0.00)	646	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	874271	9.97		4640	

Reagents:

LC537-L2_00022 Amount Added: 1.00 Units: mL

Report Date: 30-Aug-2018 17:07:01 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_004.d

Injection Date: 30-Aug-2018 16:24:08 Instrument ID: A8_N

Lims ID: IC L2

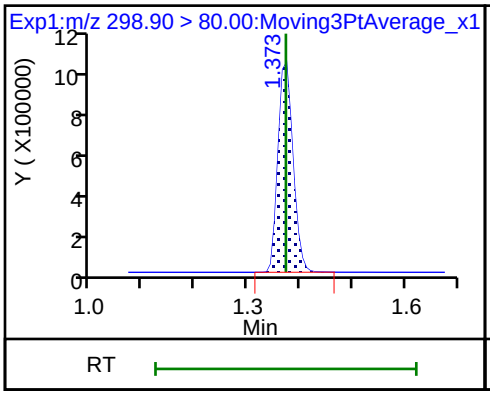
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 2 Worklist Smp#: 3

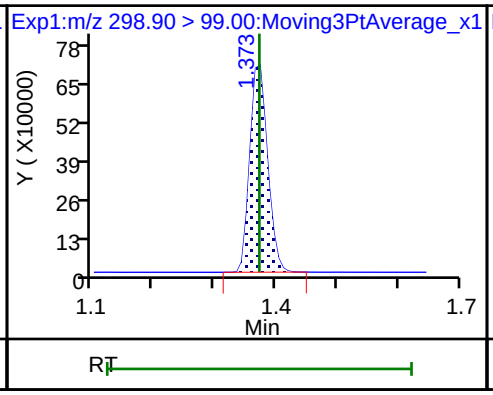
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

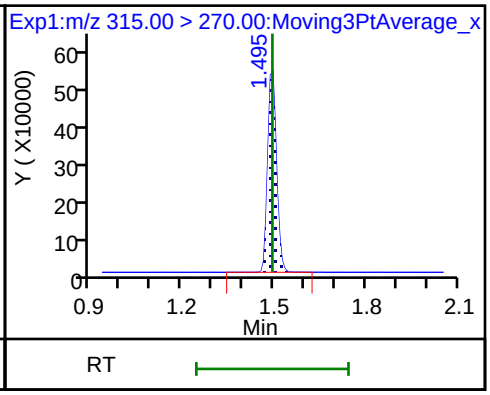
1 Perfluorobutanesulfonic acid



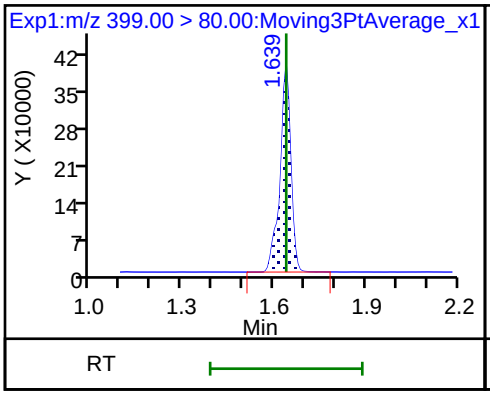
1 Perfluorobutanesulfonic acid



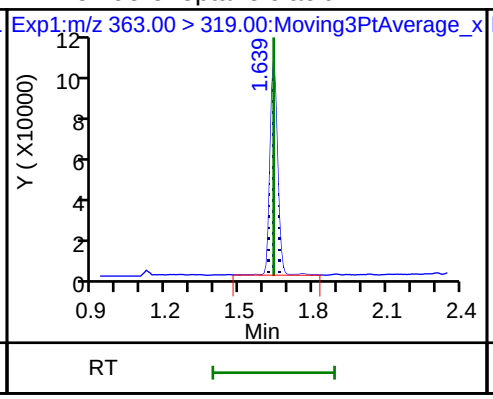
$ 2 13C2 PFHxA



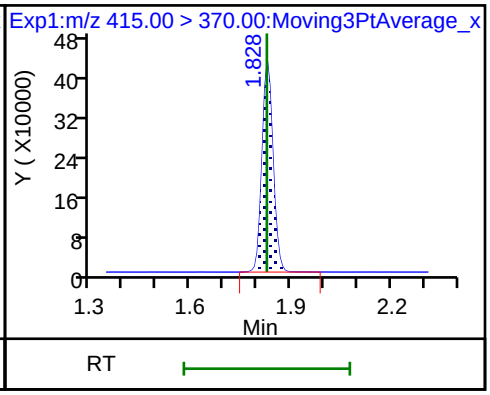
3 Perfluorohexanesulfonic acid



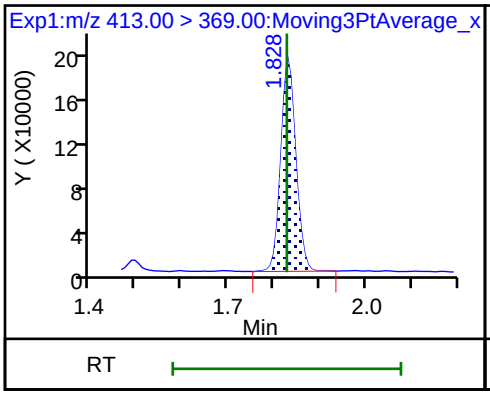
4 Perfluoroheptanoic acid



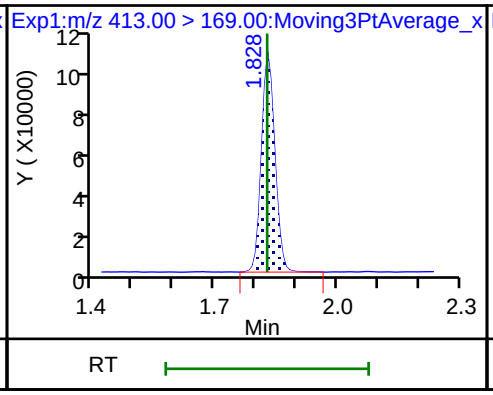
* 6 13C2-PFOA



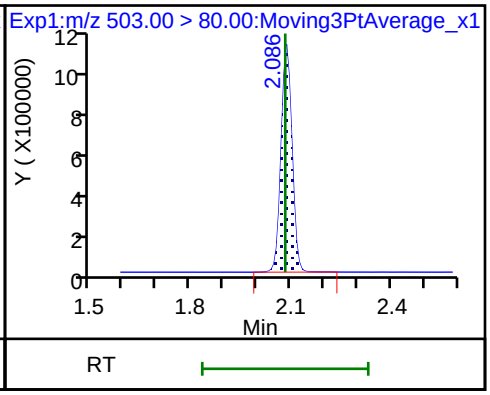
5 Perfluorooctanoic acid



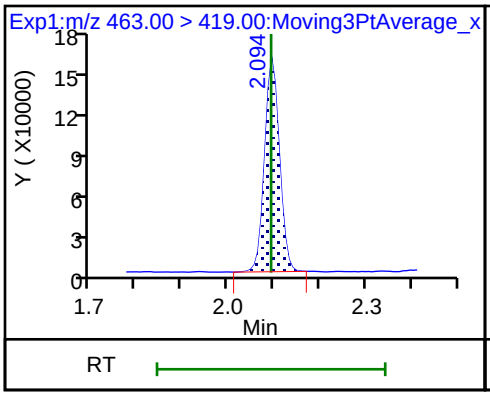
5 Perfluorooctanoic acid



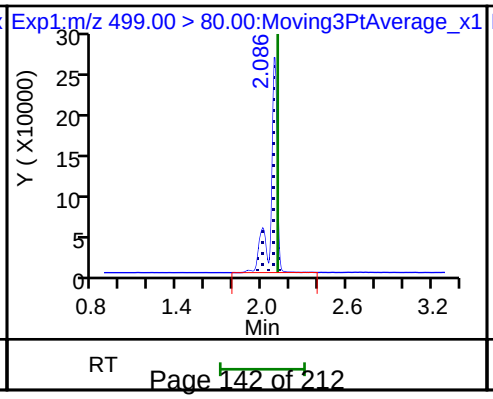
* 7 13C4 PFOS



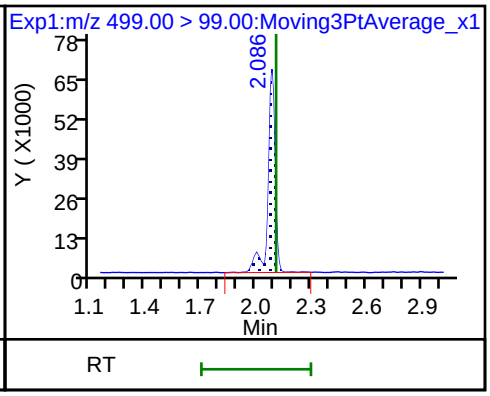
9 Perfluorononanoic acid



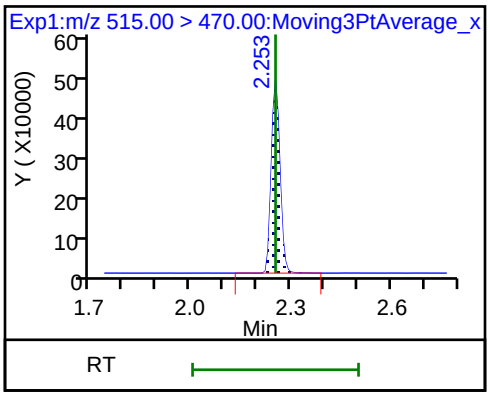
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
60
50
40
30
20
10
0
1.7
2.0
2.3
2.6
Min
RT

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_005.d
Lims ID: IC L3
Client ID:
Sample Type: IC Calib Level: 3
Inject. Date: 30-Aug-2018 16:28:48 ALS Bottle#: 3 Worklist Smp#: 4
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L3_537
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 30-Aug-2018 17:07:02 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK020

First Level Reviewer: barnettj Date: 30-Aug-2018 16:42:25

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.373	1.372	0.001	1.000	4145133	46.5		14673	
298.90 > 99.00	1.373	1.372	0.001	1.000	2978447		1.39(0.00-0.00)	7598	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.495	1.493	0.002	1.000	961641	9.78		10250	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.639	1.639	0.0	1.000	443367	4.71		118	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.639	1.639	0.0	1.000	2014325	15.1		1239	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.828	1.827	0.001	1.000	919687	9.86		147	
413.00 > 169.00	1.828	1.827	0.001	1.000	473380		1.94(0.00-0.00)	1656	
* 6 13C2-PFOA									
415.00 > 370.00	1.828	1.827	0.001		864139	10.0		6969	
* 7 13C4 PFOS									
503.00 > 80.00	2.079	2.083	-0.004		2246292	28.7		5298	
9 Perfluorononanoic acid									
463.00 > 419.00	2.094	2.093	0.001	1.000	701242	10.0		130	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.086	2.109	-0.023	1.000	1627539	19.4		2714	
499.00 > 99.00	2.086	2.109	-0.023	1.000	362010		4.50(0.00-0.00)	1289	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	754115	9.67		3724	

Reagents:

LC537-L3_00025 Amount Added: 1.00 Units: mL

Report Date: 30-Aug-2018 17:07:02 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_005.d

Injection Date: 30-Aug-2018 16:28:48 Instrument ID: A8_N

Lims ID: IC L3

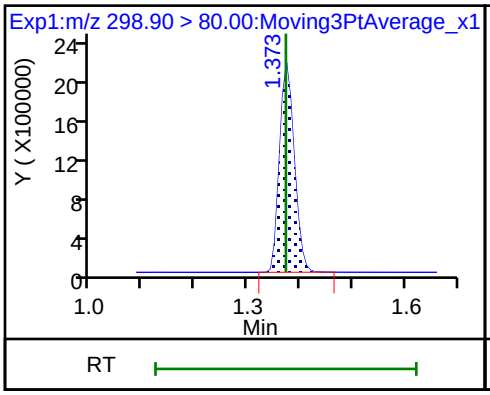
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 3 Worklist Smp#: 4

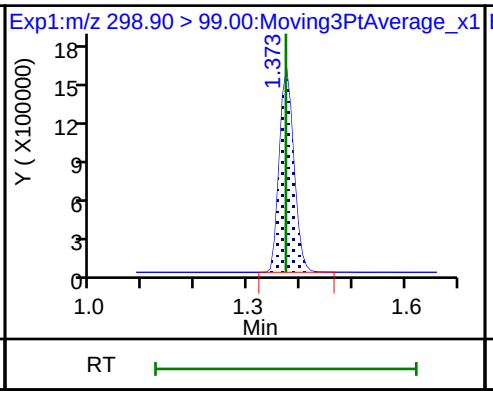
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

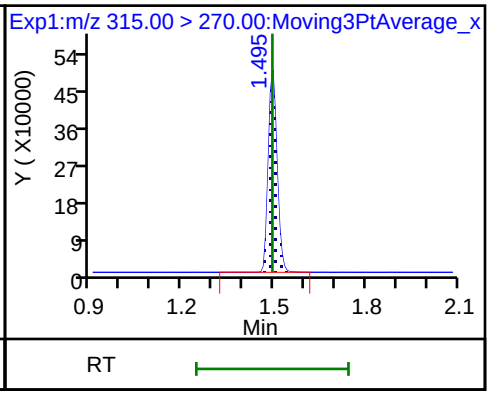
1 Perfluorobutanesulfonic acid



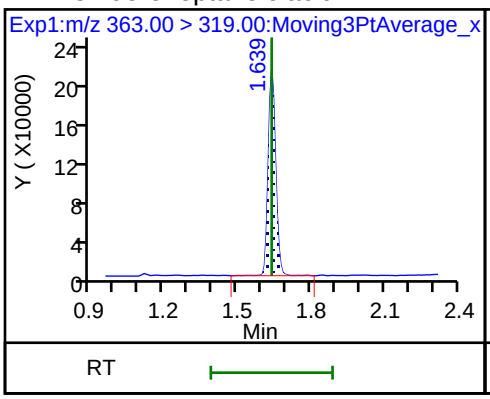
1 Perfluorobutanesulfonic acid



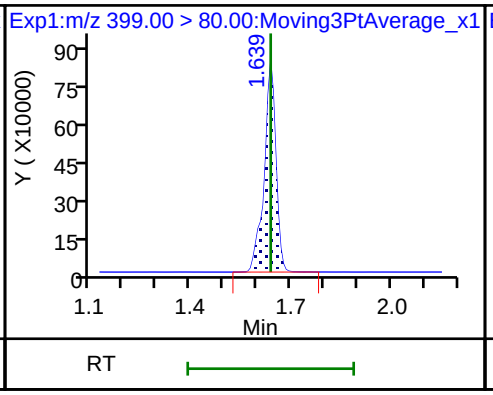
$ 2 13C2 PFHxA



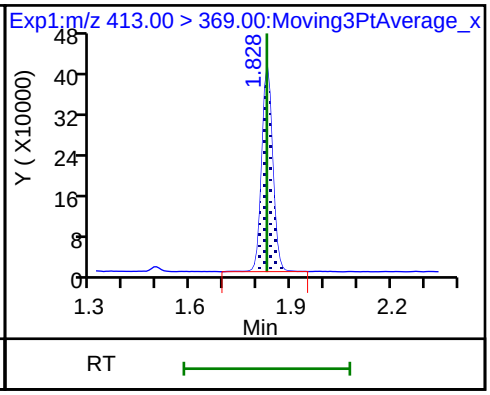
4 Perfluoroheptanoic acid



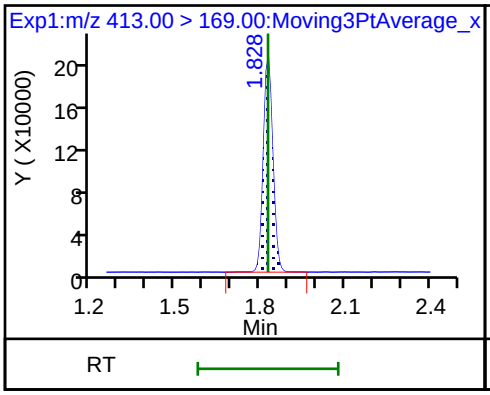
3 Perfluorohexanesulfonic acid



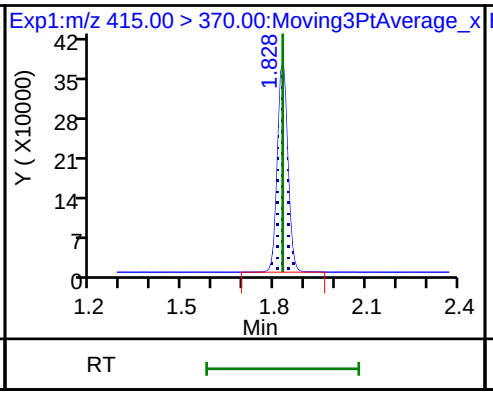
5 Perfluorooctanoic acid



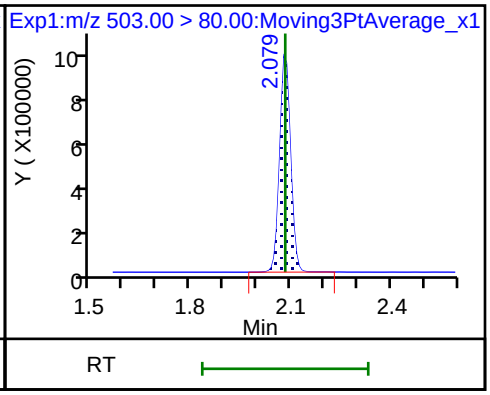
5 Perfluorooctanoic acid



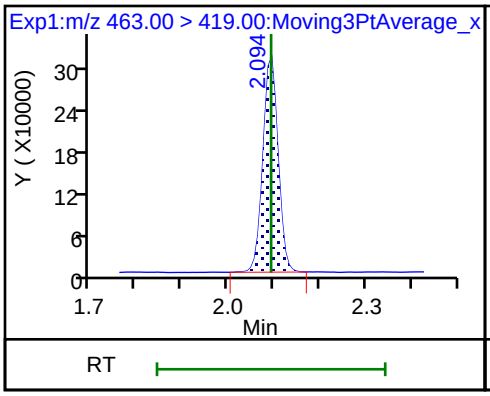
* 6 13C2-PFOA



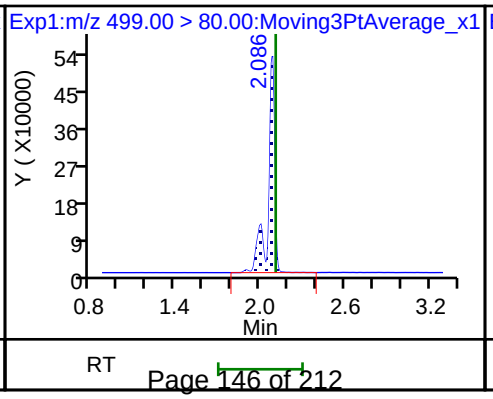
* 7 13C4 PFOS



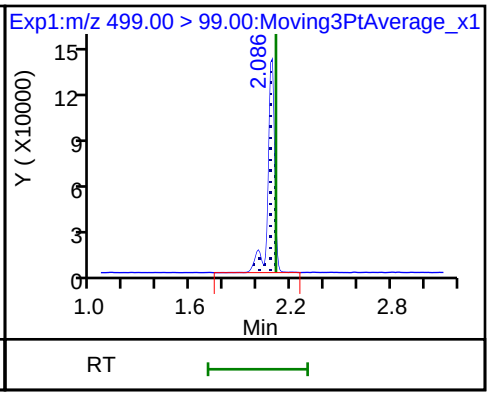
9 Perfluorononanoic acid



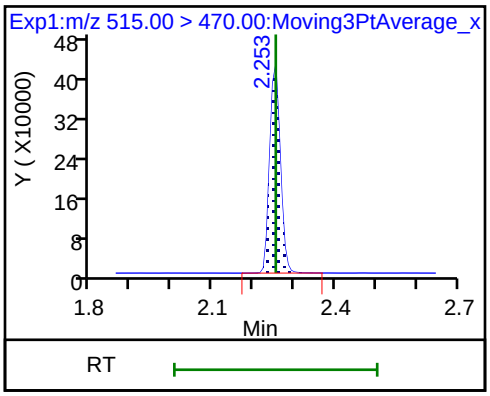
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
48
40
32
24
16
8
0
1.8
2.1
2.4
2.7
Min
RT

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_006.d
Lims ID: IC L4
Client ID:
Sample Type: ICISAV Calib Level: 4
Inject. Date: 30-Aug-2018 16:33:28 ALS Bottle#: 4 Worklist Smp#: 5
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L4_537
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 30-Aug-2018 17:07:03 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK020

First Level Reviewer: barnettj Date: 30-Aug-2018 16:47:47

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.373	1.372	0.001	1.000	8657186	91.9		21276	
298.90 > 99.00	1.373	1.372	0.001	1.000	6156478		1.41(0.00-0.00)	12068	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.495	1.493	0.002	1.000	1005876	10.0		9296	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.639	1.639	0.0	1.000	4465219	31.6		2661	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.639	1.639	0.0	1.000	1011347	10.5		280	
* 6 13C2-PFOA									
415.00 > 370.00	1.828	1.827	0.001		884013	10.0		6353	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.828	1.827	0.001	1.000	1899747	19.9		294	
413.00 > 169.00	1.828	1.827	0.001	1.000	1058455		1.79(0.00-0.00)	3204	
* 7 13C4 PFOS									
503.00 > 80.00	2.079	2.083	-0.004		2375494	28.7		5107	
9 Perfluorononanoic acid									
463.00 > 419.00	2.094	2.093	0.001	1.000	1462550	20.4		267	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.086	2.109	-0.023	1.000	3612214	40.7		6141	
499.00 > 99.00	2.079	2.109	-0.030	0.996	775288		4.66(0.00-0.00)	2519	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	841794	10.6		4709	

Reagents:

LC537-L4_00022 Amount Added: 1.00 Units: mL

Report Date: 30-Aug-2018 17:07:03 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_006.d

Injection Date: 30-Aug-2018 16:33:28 Instrument ID: A8_N

Lims ID: IC L4

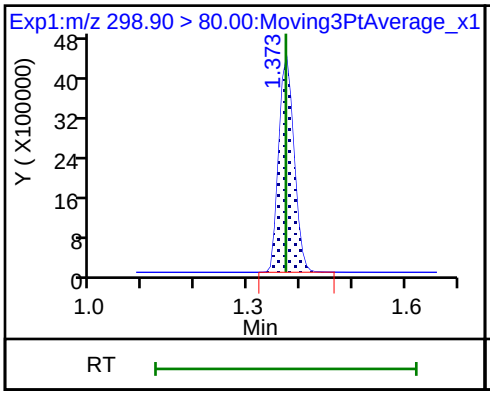
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 4 Worklist Smp#: 5

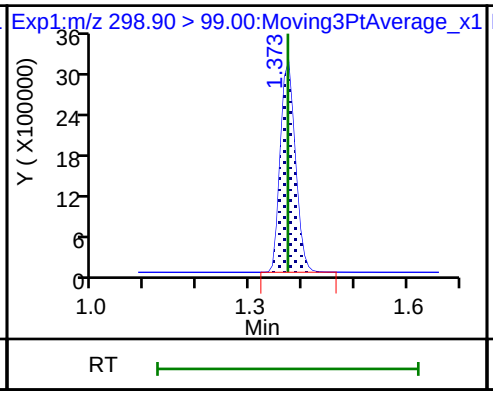
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

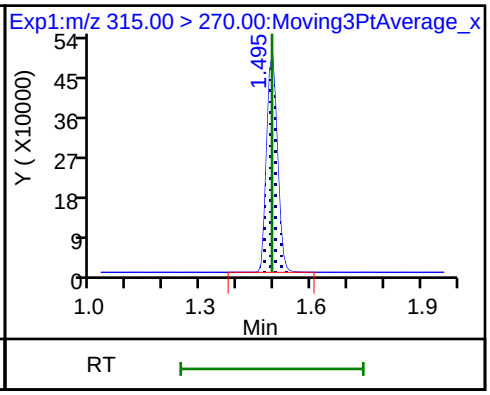
1 Perfluorobutanesulfonic acid



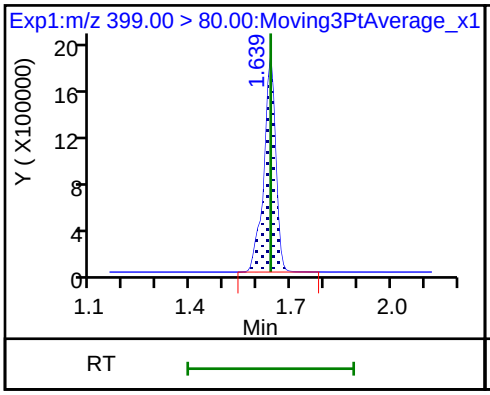
1 Perfluorobutanesulfonic acid



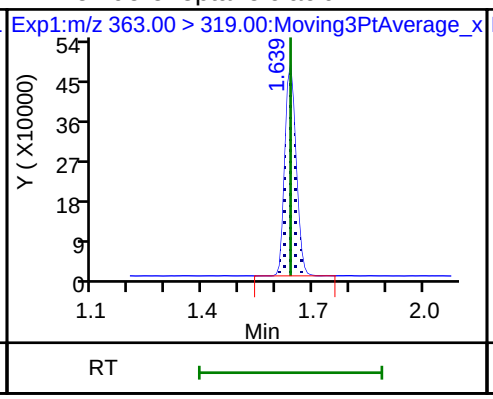
$ 2 13C2 PFHxA



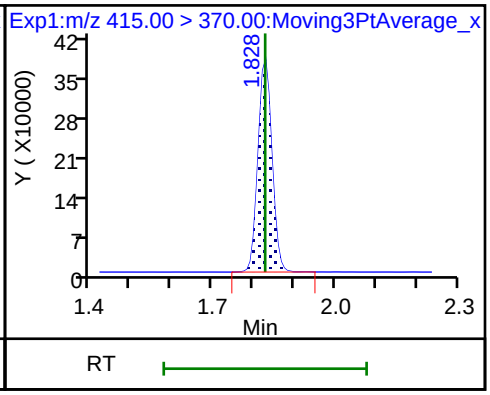
3 Perfluorohexanesulfonic acid



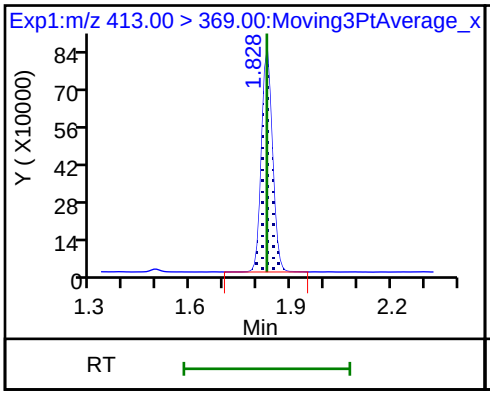
4 Perfluoroheptanoic acid



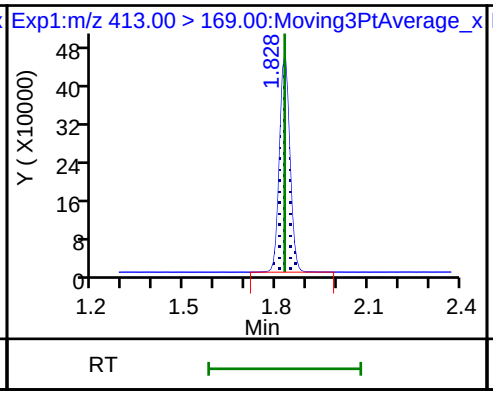
* 6 13C2-PFOA



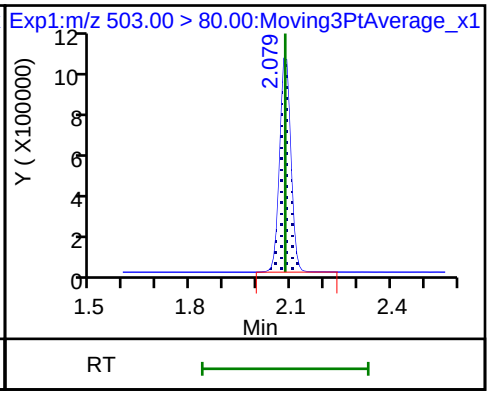
5 Perfluorooctanoic acid



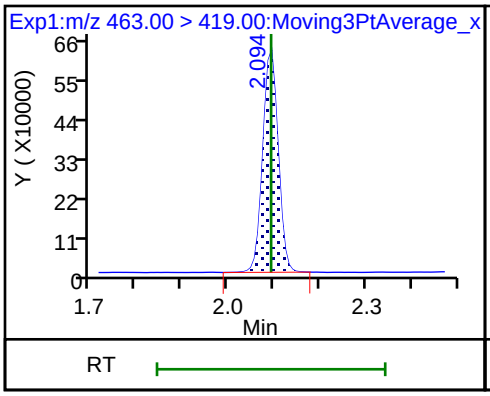
5 Perfluorooctanoic acid



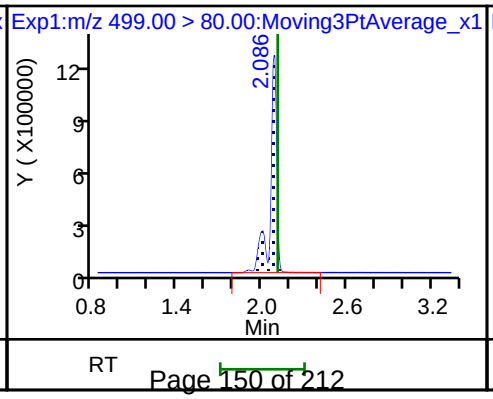
* 7 13C4 PFOS



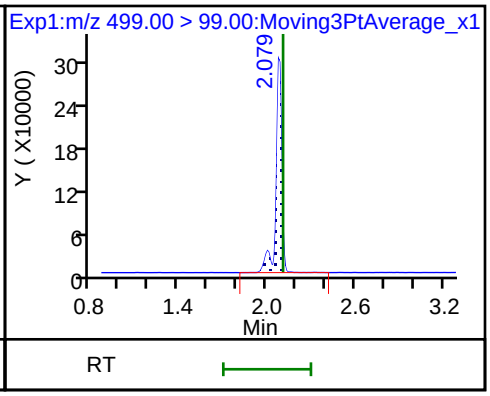
9 Perfluorononanoic acid



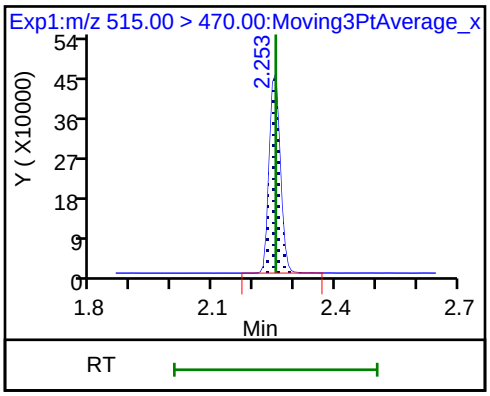
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
54
45
36
27
18
9
0
1.8
2.1
2.4
2.7
Min
RT

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_007.d
Lims ID: IC L5
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 30-Aug-2018 16:38:09 ALS Bottle#: 5 Worklist Smp#: 6
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L5_537
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 30-Aug-2018 17:07:04 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK020

First Level Reviewer: barnettj Date: 30-Aug-2018 16:48:57

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.373	1.372	0.001	1.000	11998694	129.3		24682	
298.90 > 99.00	1.373	1.372	0.001	1.000	8649032		1.39(0.00-0.00)	16832	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.495	1.493	0.002	1.000	1059885	10.3		10382	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.639	1.639	0.0	1.000	1464161	14.9		393	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.639	1.639	0.0	1.000	6473859	46.5		3818	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.828	1.827	0.001	1.000	2960649	30.4		452	
413.00 > 169.00	1.828	1.827	0.001	1.000	1546610		1.91(0.00-0.00)	4716	
* 6 13C2-PFOA									
415.00 > 370.00	1.828	1.827	0.001		902081	10.0		7371	
* 7 13C4 PFOS									
503.00 > 80.00	2.086	2.083	0.003		2339063	28.7		5475	
9 Perfluorononanoic acid									
463.00 > 419.00	2.094	2.093	0.001	1.000	2171914	29.7		409	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.086	2.109	-0.023	1.000	5279410	60.4		8022	
499.00 > 99.00	2.086	2.109	-0.023	1.000	1146085		4.61(0.00-0.00)	3820	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	823302	10.1		4442	

Reagents:

LC537-L5_00026 Amount Added: 1.00 Units: mL

Report Date: 30-Aug-2018 17:07:05 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_007.d

Injection Date: 30-Aug-2018 16:38:09 Instrument ID: A8_N

Lims ID: IC L5

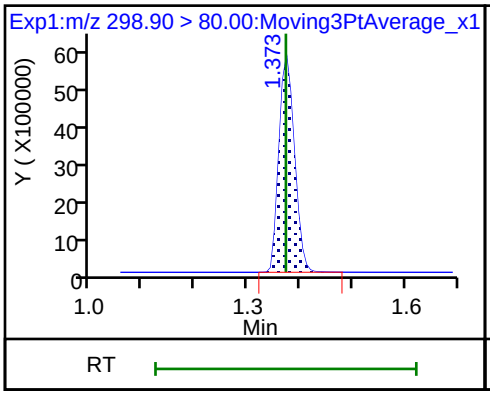
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 5 Worklist Smp#: 6

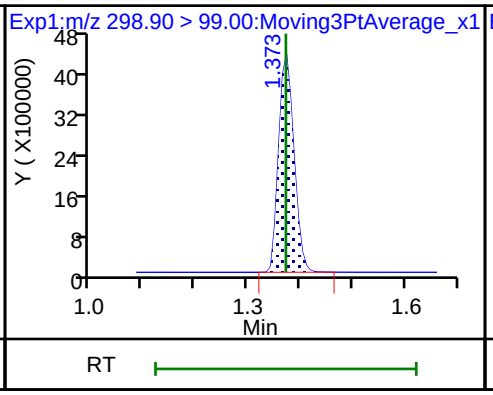
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

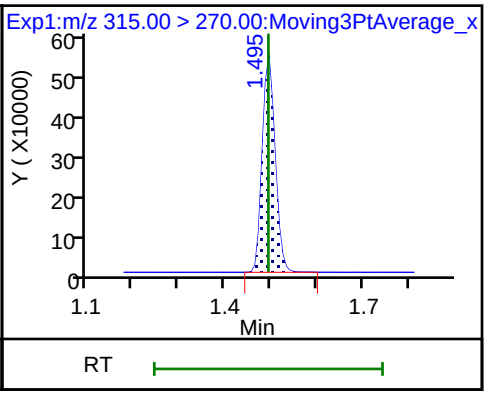
1 Perfluorobutanesulfonic acid



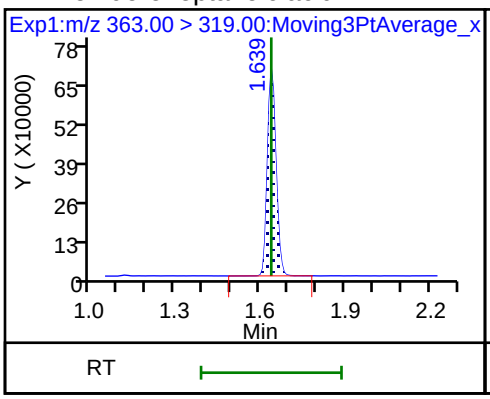
1 Perfluorobutanesulfonic acid



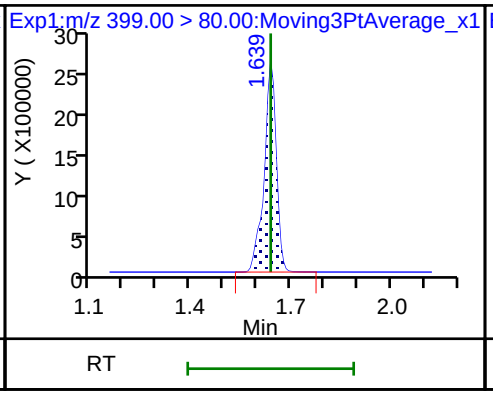
$ 2 13C2 PFHxA



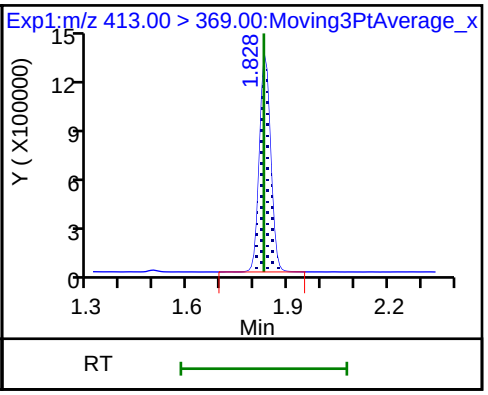
4 Perfluoroheptanoic acid



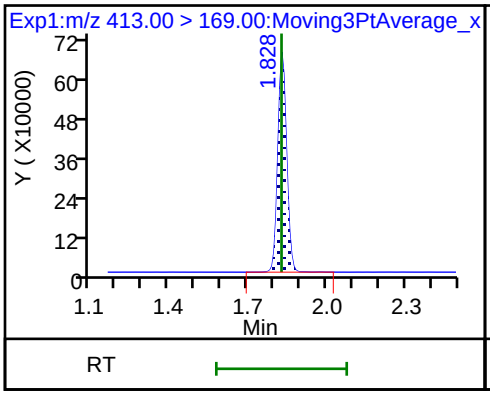
3 Perfluorohexanesulfonic acid



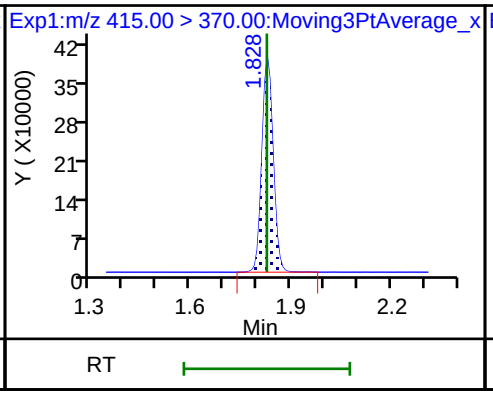
5 Perfluorooctanoic acid



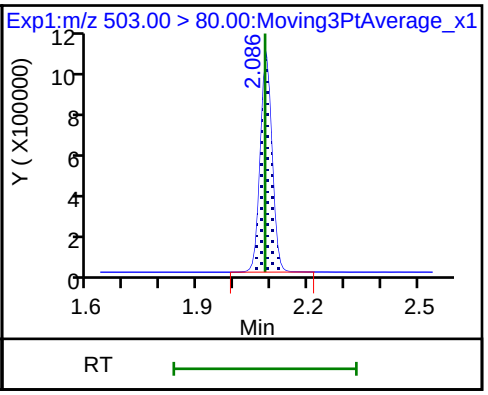
5 Perfluorooctanoic acid



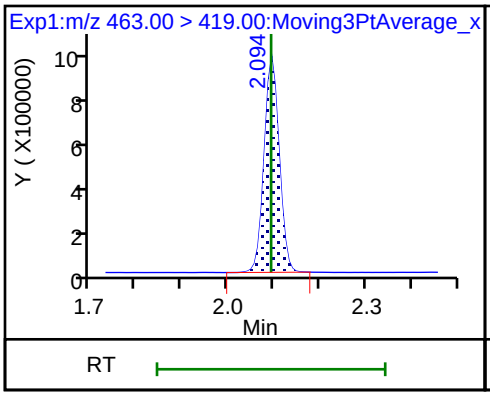
* 6 13C2-PFOA



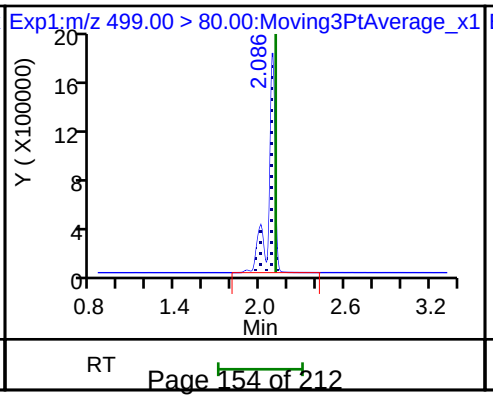
* 7 13C4 PFOS



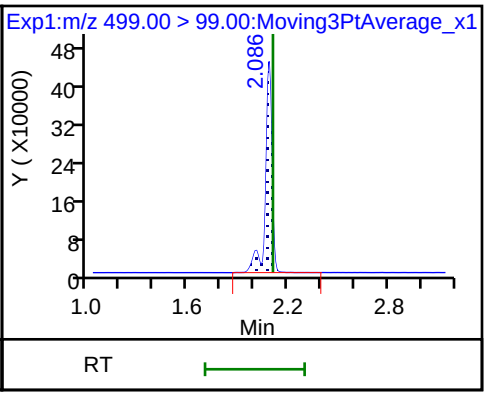
9 Perfluorononanoic acid



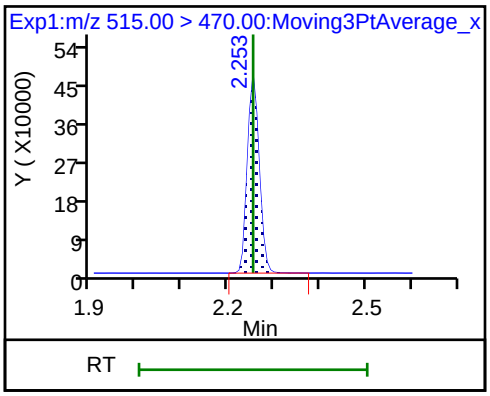
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
54
45
36
27
18
9
0
1.9
2.2
2.5
Min
RT

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d
Lims ID: IC L6
Client ID:
Sample Type: IC Calib Level: 6
Inject. Date: 30-Aug-2018 16:42:48 ALS Bottle#: 6 Worklist Smp#: 7
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: L6_537
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 30-Aug-2018 17:07:05 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK020

First Level Reviewer: barnettj Date: 30-Aug-2018 16:58:18

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.366	1.372	-0.006	1.000	14291597	157.2		21954	
298.90 > 99.00	1.366	1.372	-0.006	1.000	10507057		1.36(0.00-0.00)	16029	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.487	1.493	-0.006	1.000	1004475	10.0		9632	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.639	1.639	0.0	1.000	8080418	59.3		4290	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.639	1.639	0.0	1.000	1861705	19.3		487	
* 6 13C2-PFOA									
415.00 > 370.00	1.821	1.827	-0.006		883033	10.0		7408	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.821	1.827	-0.006	1.000	3735476	39.2		584	
413.00 > 169.00	1.821	1.827	-0.006	1.000	1966520		1.90(0.00-0.00)	5962	
* 7 13C4 PFOS									
503.00 > 80.00	2.079	2.083	-0.004		2291552	28.7		5219	
9 Perfluorononanoic acid									
463.00 > 419.00	2.086	2.093	-0.007	1.000	2774537	38.7		514	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.079	2.109	-0.030	1.000	6804405	79.4		8435	
499.00 > 99.00	2.079	2.109	-0.030	1.000	1472545		4.62(0.00-0.00)	4896	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	788559	9.90		4282	

Reagents:

LC537-L6_00022 Amount Added: 1.00 Units: mL

Report Date: 30-Aug-2018 17:07:06 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Injection Date: 30-Aug-2018 16:42:48 Instrument ID: A8_N

Lims ID: IC L6

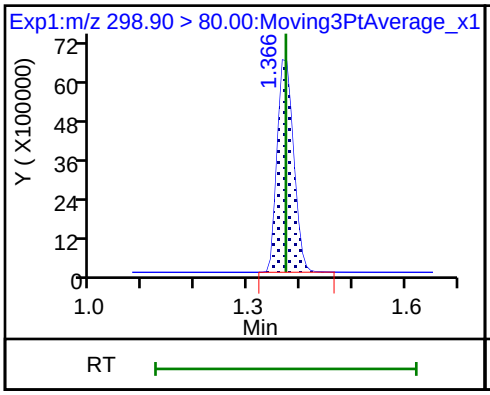
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 6 Worklist Smp#: 7

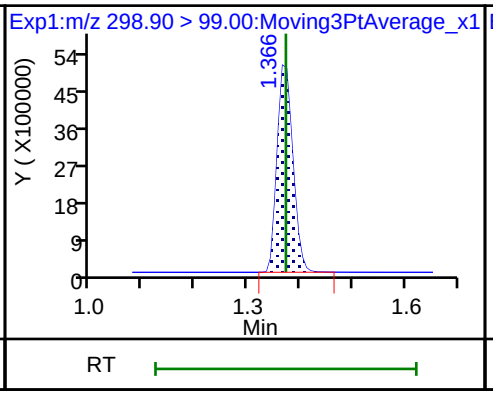
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

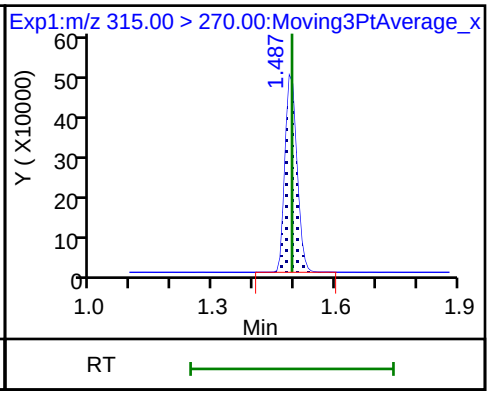
1 Perfluorobutanesulfonic acid



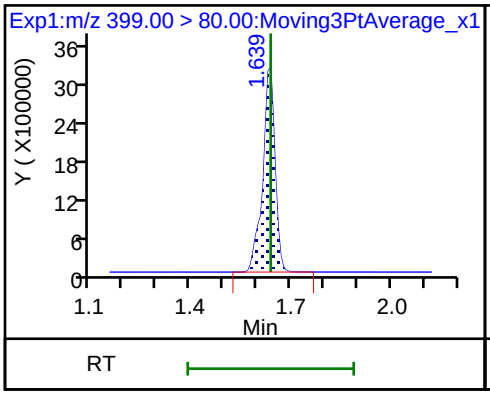
1 Perfluorobutanesulfonic acid



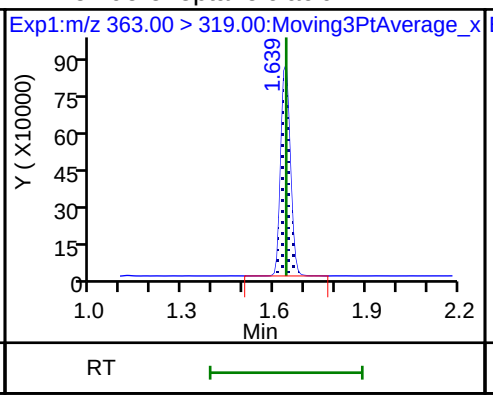
$ 2 13C2 PFHxA



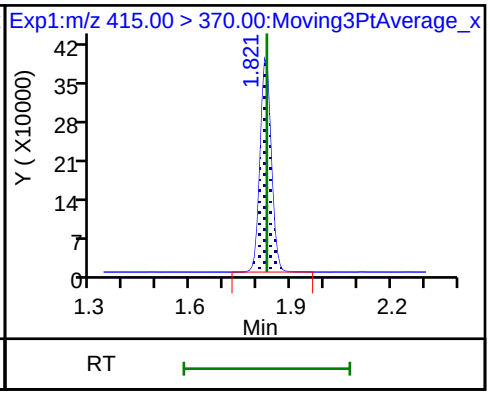
3 Perfluorohexanesulfonic acid



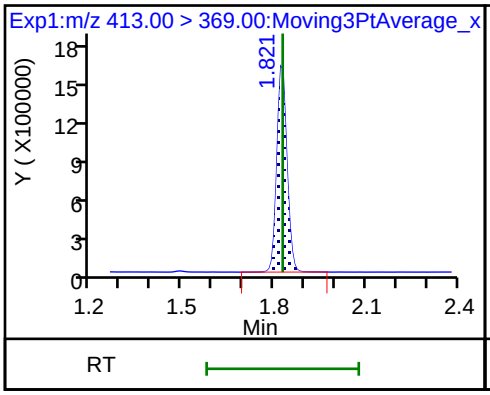
4 Perfluoroheptanoic acid



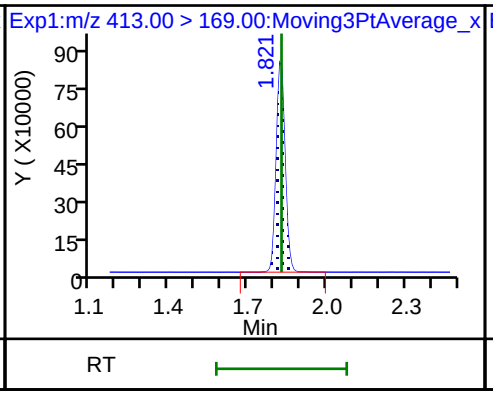
* 6 13C2-PFOA



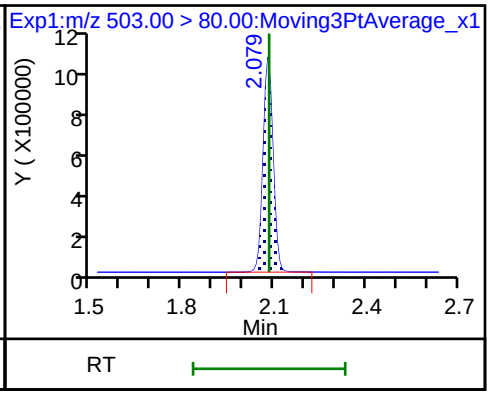
5 Perfluorooctanoic acid



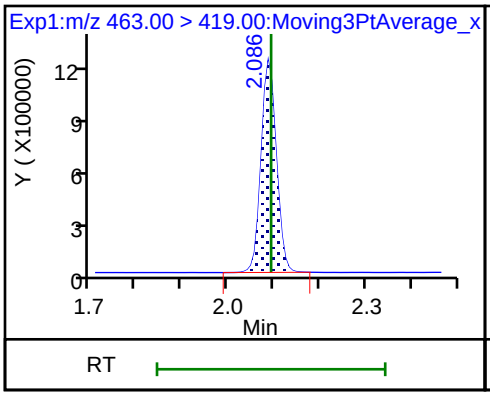
5 Perfluorooctanoic acid



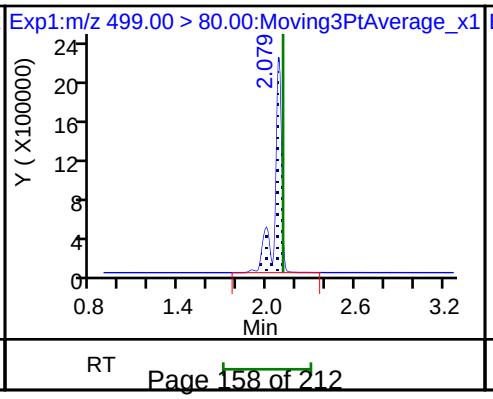
* 7 13C4 PFOS



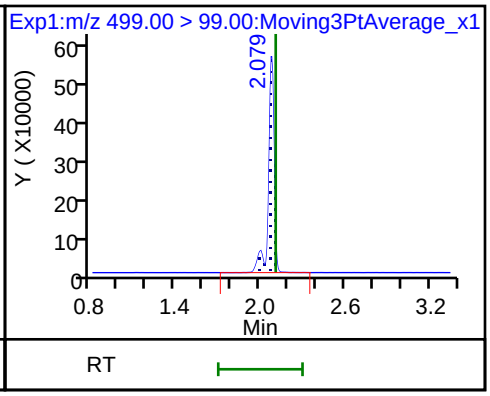
9 Perfluorononanoic acid



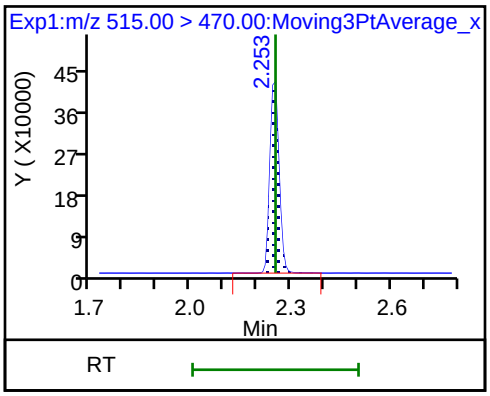
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
45
36
27
18
9
0
1.7
2.0
2.3
2.6
Min
RT

Calibration / Perfluorobutanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	ISTD
Response Base:	AREA
RF Rounding:	0

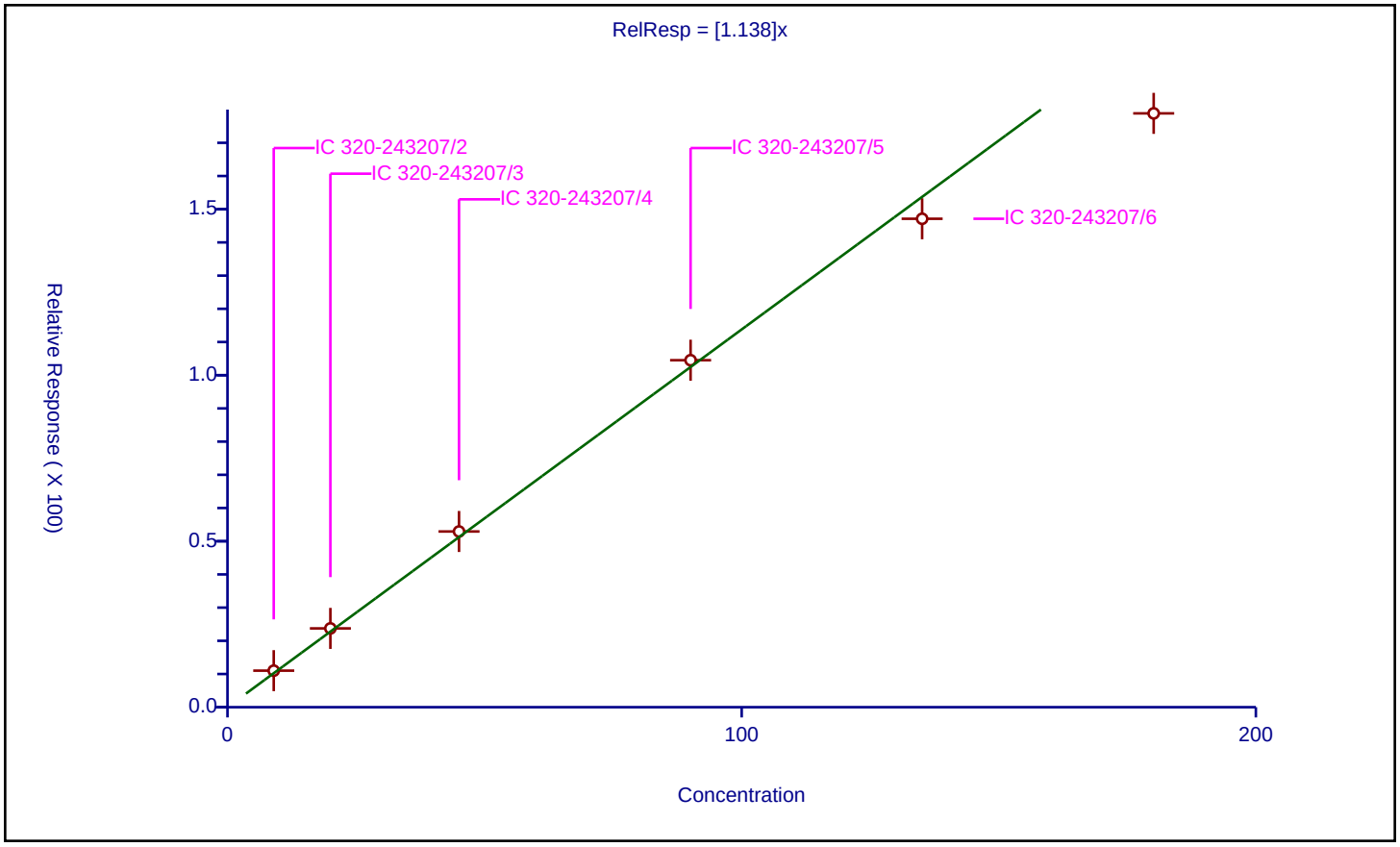
Curve Coefficients

Intercept:	0
Slope:	1.138

Error Coefficients

Standard Error:	9440000
Relative Standard Error:	7.3
Correlation Coefficient:	0.988
Coefficient of Determination (Adjusted):	0.991

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-243207/2	8.99912	11.005818	28.68	2306829.0	1.222988	Y
2	IC 320-243207/3	20.01376	23.736919	28.68	2478769.0	1.18603	Y
3	IC 320-243207/4	45.03096	52.923847	28.68	2246292.0	1.175277	Y
4	IC 320-243207/5	90.06192	104.520615	28.68	2375494.0	1.160542	Y
5	IC 320-243207/6	135.09288	147.119827	28.68	2339063.0	1.089027	Y
6	IC 320-243207/7	180.12384	178.866987	28.68	2291552.0	0.993022	Y



Calibration / 13C2 PFHxA

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	ISTD
Response Base:	AREA
RF Rounding:	0

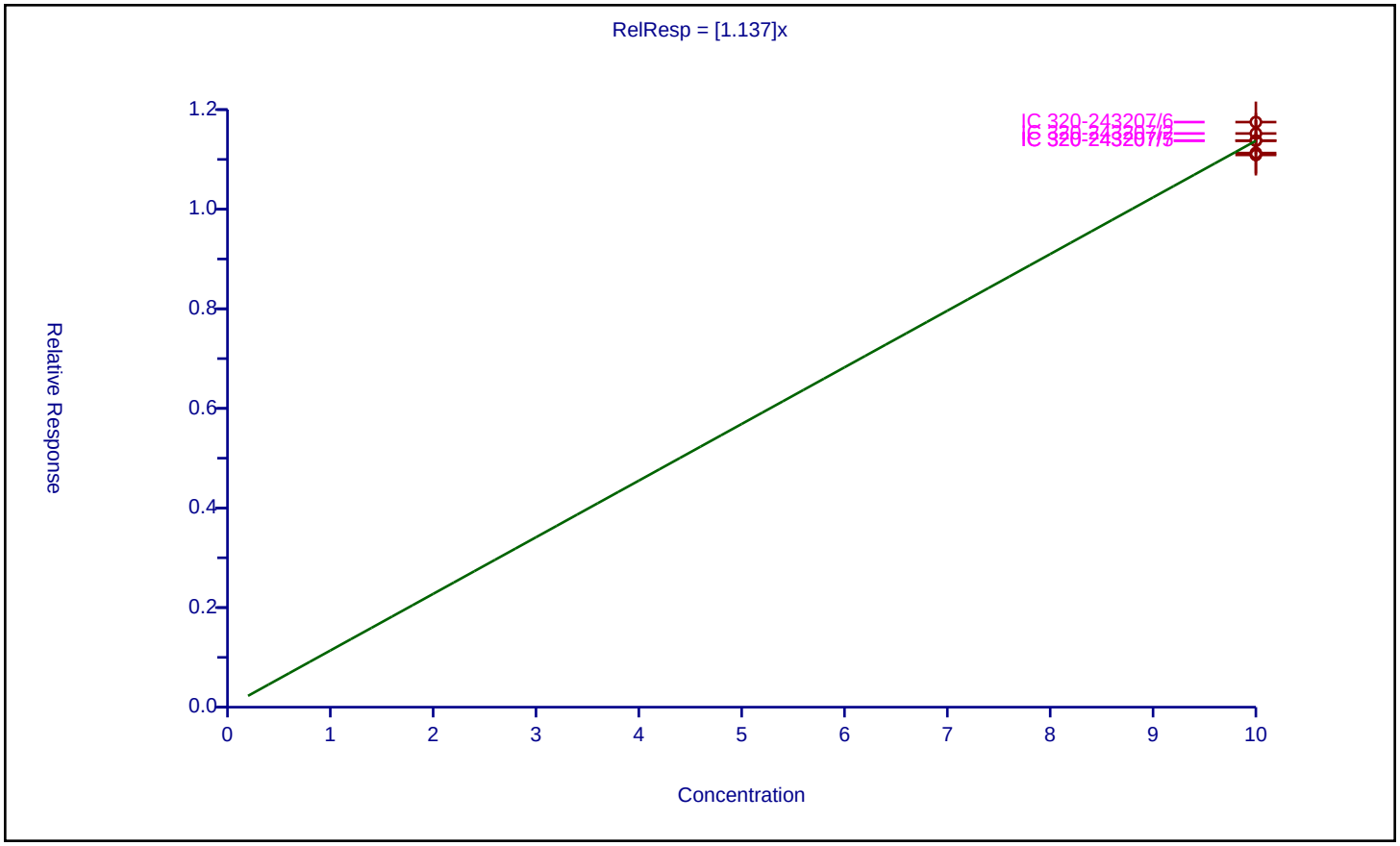
Curve Coefficients

Intercept:	0
Slope:	1.137

Error Coefficients

Standard Error:	1120000
Relative Standard Error:	2.2
Correlation Coefficient:	NA
Coefficient of Determination (Adjusted):	0

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-243207/2	10.0	11.520687	10.0	891025.0	1.152069	Y
2	IC 320-243207/3	10.0	11.089636	10.0	971912.0	1.108964	Y
3	IC 320-243207/4	10.0	11.128314	10.0	864139.0	1.112831	Y
4	IC 320-243207/5	10.0	11.37852	10.0	884013.0	1.137852	Y
5	IC 320-243207/6	10.0	11.749333	10.0	902081.0	1.174933	Y
6	IC 320-243207/7	10.0	11.375283	10.0	883033.0	1.137528	Y



Calibration / Perfluoroheptanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	ISTD
Response Base:	AREA
RF Rounding:	0

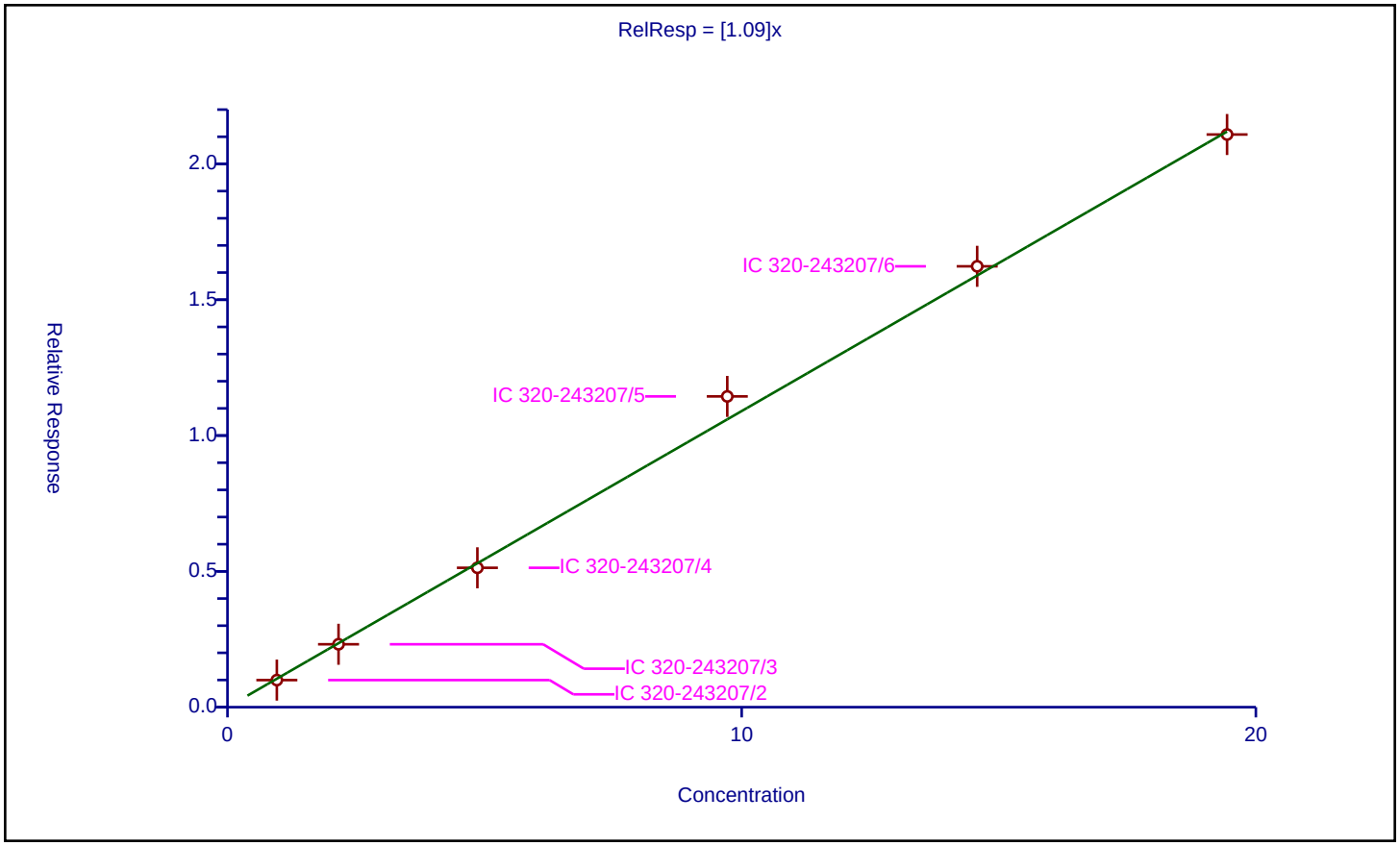
Curve Coefficients

Intercept:	0
Slope:	1.09

Error Coefficients

Standard Error:	1170000
Relative Standard Error:	4.6
Correlation Coefficient:	0.997
Coefficient of Determination (Adjusted):	0.997

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-243207/2	0.96	0.996549	10.0	891025.0	1.038072	Y
2	IC 320-243207/3	2.16	2.315683	10.0	971912.0	1.072075	Y
3	IC 320-243207/4	4.86	5.130737	10.0	864139.0	1.055707	Y
4	IC 320-243207/5	9.72	11.440409	10.0	884013.0	1.176997	Y
5	IC 320-243207/6	14.58	16.230926	10.0	902081.0	1.113232	Y
6	IC 320-243207/7	19.44	21.083074	10.0	883033.0	1.08452	Y



Calibration / Perfluorohexanesulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	ISTD
Response Base:	AREA
RF Rounding:	0

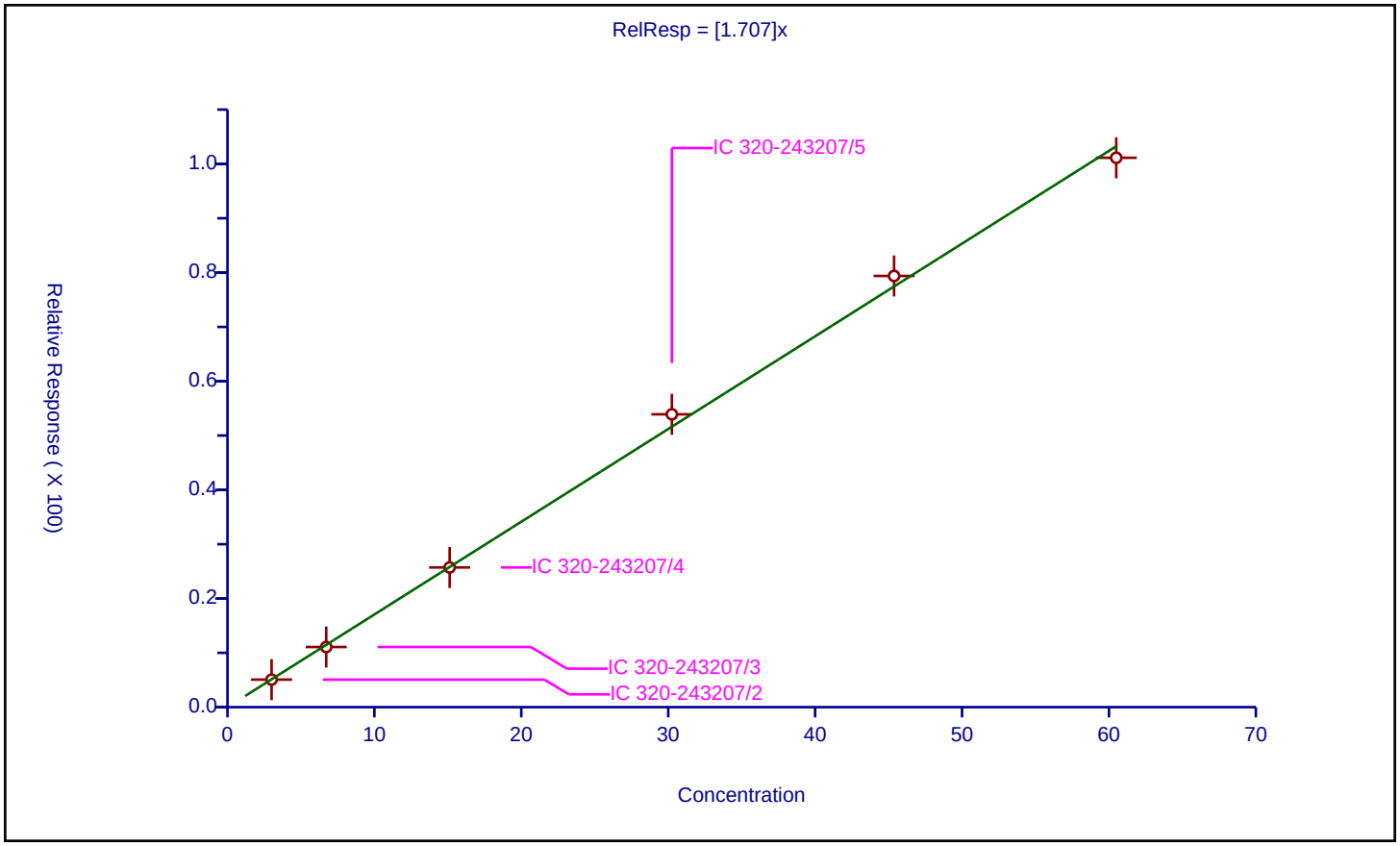
Curve Coefficients

Intercept:	0
Slope:	1.707

Error Coefficients

Standard Error:	5140000
Relative Standard Error:	2.9
Correlation Coefficient:	0.996
Coefficient of Determination (Adjusted):	0.999

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-243207/2	3.003	5.071813	28.68	2306829.0	1.688915	Y
2	IC 320-243207/3	6.721867	11.073224	28.68	2478769.0	1.647344	Y
3	IC 320-243207/4	15.1242	25.718313	28.68	2246292.0	1.700474	Y
4	IC 320-243207/5	30.2484	53.909831	28.68	2375494.0	1.782237	Y
5	IC 320-243207/6	45.3726	79.378057	28.68	2339063.0	1.749471	Y
6	IC 320-243207/7	60.4968	101.130757	28.68	2291552.0	1.671671	Y



Calibration / Perfluorooctanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	ISTD
Response Base:	AREA
RF Rounding:	0

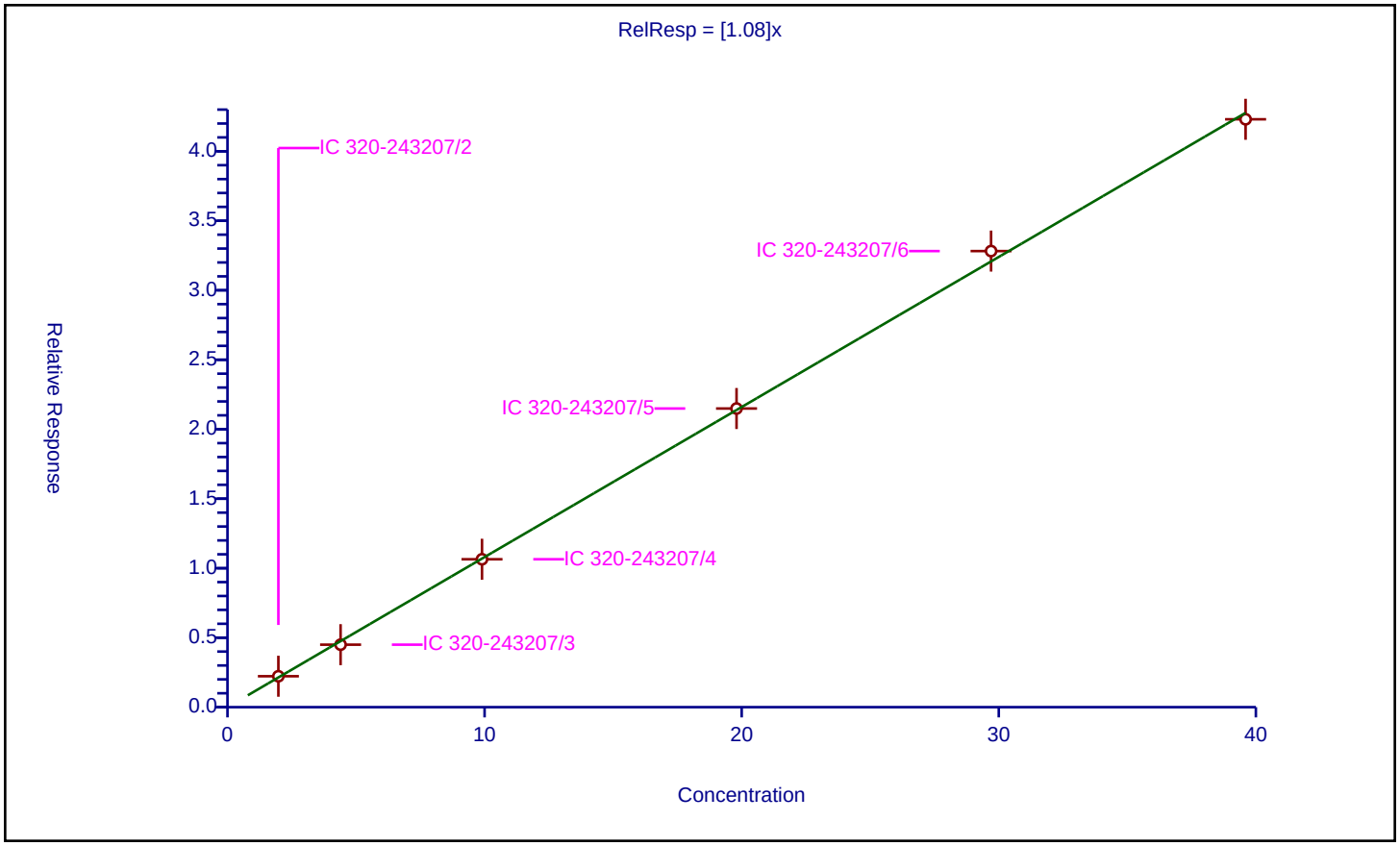
Curve Coefficients

Intercept:	0
Slope:	1.08

Error Coefficients

Standard Error:	2340000
Relative Standard Error:	3.2
Correlation Coefficient:	0.998
Coefficient of Determination (Adjusted):	0.998

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-243207/2	1.98	2.225201	10.0	891025.0	1.123839	Y
2	IC 320-243207/3	4.4	4.497177	10.0	971912.0	1.022086	Y
3	IC 320-243207/4	9.9	10.642813	10.0	864139.0	1.075032	Y
4	IC 320-243207/5	19.8	21.490035	10.0	884013.0	1.085355	Y
5	IC 320-243207/6	29.7	32.820212	10.0	902081.0	1.105058	Y
6	IC 320-243207/7	39.6	42.30279	10.0	883033.0	1.068252	Y



Calibration / Perfluorooctane sulfonic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	ISTD
Response Base:	AREA
RF Rounding:	0

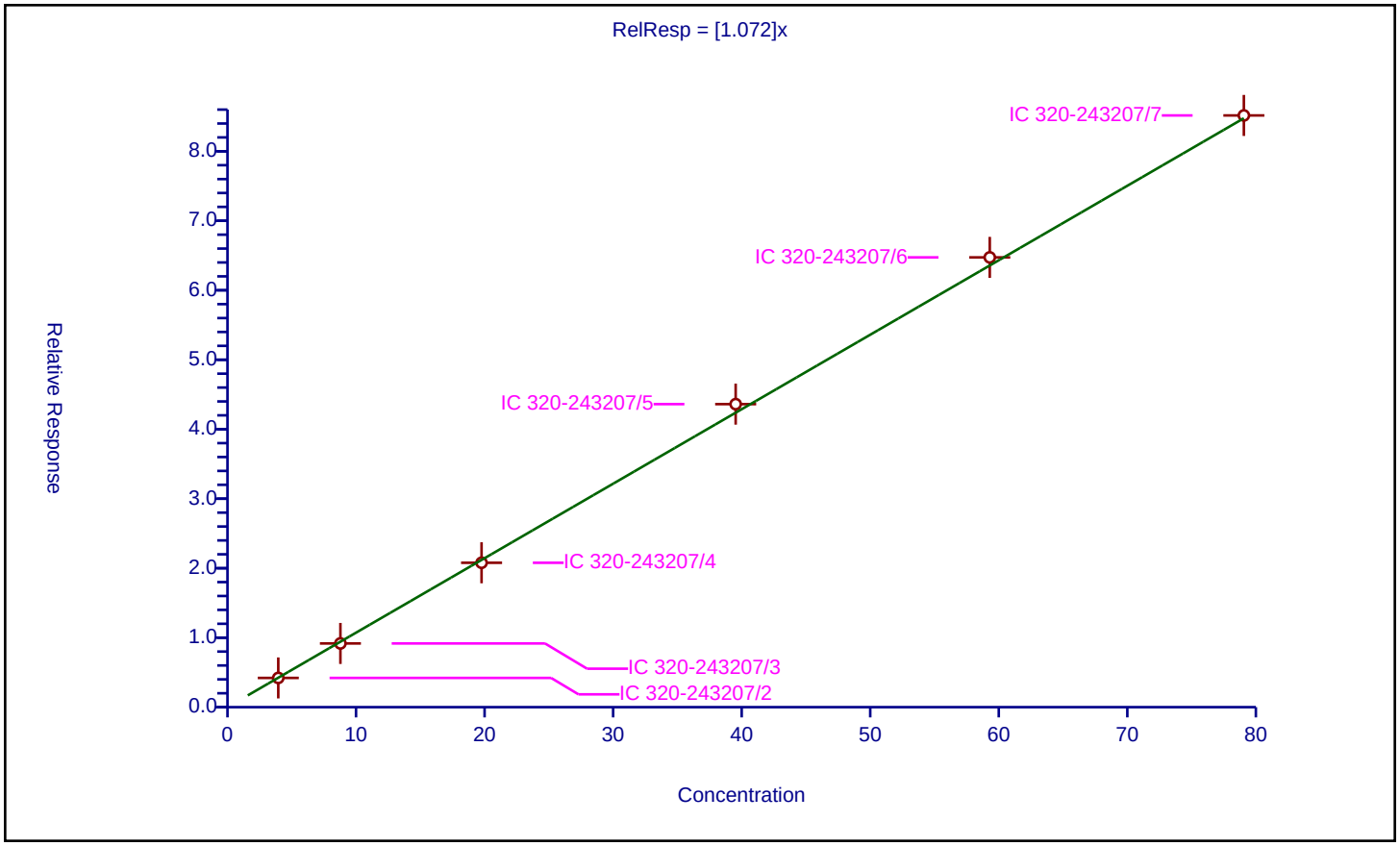
Curve Coefficients

Intercept:	0
Slope:	1.072

Error Coefficients

Standard Error:	4260000
Relative Standard Error:	2.1
Correlation Coefficient:	0.998
Coefficient of Determination (Adjusted):	0.999

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-243207/2	3.95328	4.209397	28.68	2306829.0	1.064786	Y
2	IC 320-243207/3	8.785067	9.171467	28.68	2478769.0	1.043984	Y
3	IC 320-243207/4	19.7664	20.779942	28.68	2246292.0	1.051276	Y
4	IC 320-243207/5	39.5328	43.611265	28.68	2375494.0	1.103167	Y
5	IC 320-243207/6	59.2992	64.732536	28.68	2339063.0	1.091626	Y
6	IC 320-243207/7	79.0656	85.160771	28.68	2291552.0	1.07709	Y



Calibration / Perfluorononanoic acid

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	ISTD
Response Base:	AREA
RF Rounding:	0

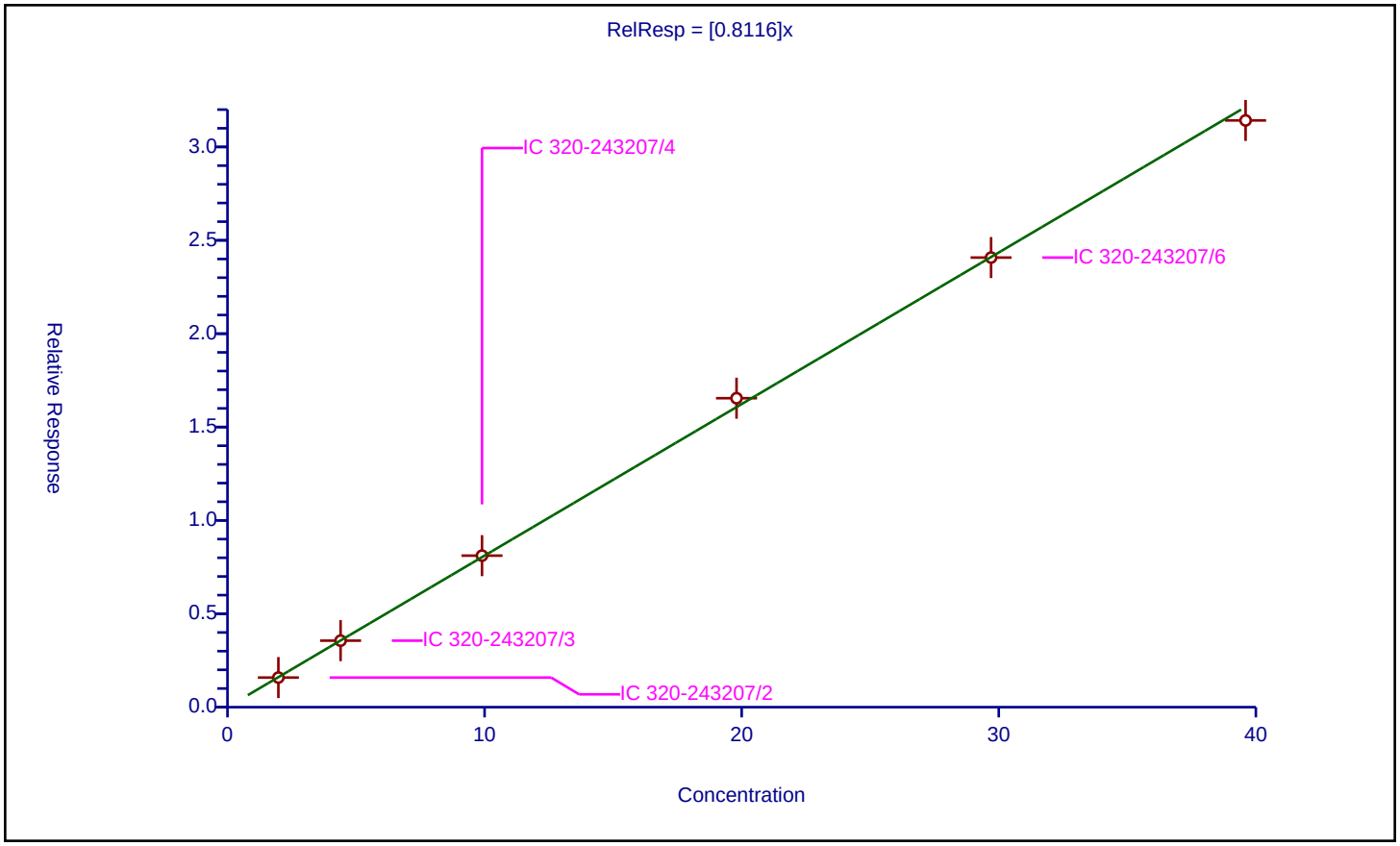
Curve Coefficients

Intercept:	0
Slope:	0.8116

Error Coefficients

Standard Error:	1740000
Relative Standard Error:	1.8
Correlation Coefficient:	0.999
Coefficient of Determination (Adjusted):	0.999

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-243207/2	1.98	1.585556	10.0	891025.0	0.800786	Y
2	IC 320-243207/3	4.4	3.562411	10.0	971912.0	0.809639	Y
3	IC 320-243207/4	9.9	8.114921	10.0	864139.0	0.819689	Y
4	IC 320-243207/5	19.8	16.54444	10.0	884013.0	0.835578	Y
5	IC 320-243207/6	29.7	24.076707	10.0	902081.0	0.810664	Y
6	IC 320-243207/7	39.6	31.420536	10.0	883033.0	0.793448	Y



Calibration / 13C2 PFDA

Curve Type:	Average
Weighting:	Conc_Sq
Origin:	Force
Dependency:	Response
Calib Mode:	ISTD
Response Base:	AREA
RF Rounding:	0

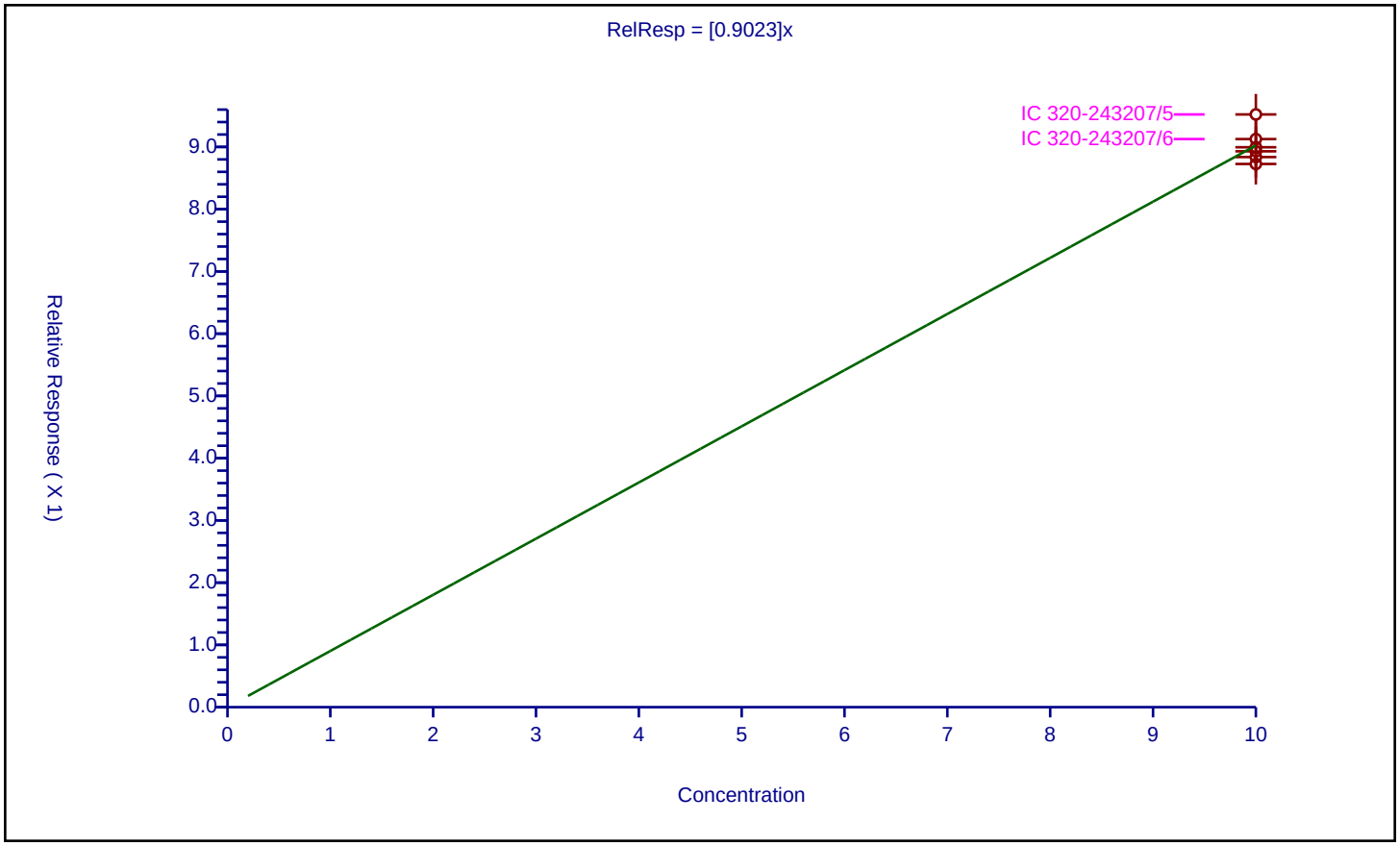
Curve Coefficients

Intercept:	0
Slope:	0.9023

Error Coefficients

Standard Error:	890000
Relative Standard Error:	3.1
Correlation Coefficient:	NA
Coefficient of Determination (Adjusted):	0

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-243207/2	10.0	8.837968	10.0	891025.0	0.883797	Y
2	IC 320-243207/3	10.0	8.995372	10.0	971912.0	0.899537	Y
3	IC 320-243207/4	10.0	8.726779	10.0	864139.0	0.872678	Y
4	IC 320-243207/5	10.0	9.522417	10.0	884013.0	0.952242	Y
5	IC 320-243207/6	10.0	9.126697	10.0	902081.0	0.91267	Y
6	IC 320-243207/7	10.0	8.930119	10.0	883033.0	0.893012	Y



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: CCVL 320-243207/9 Calibration Date: 08/30/2018 16:52

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.08.30_537ICALXX_010.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.175		20.7	20.0	3.3	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.068		2.12	2.16	-2.0	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.650		6.50	6.72	-3.3	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.033		4.21	4.40	-4.4	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.040		8.52	8.79	-3.0	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.7621		4.13	4.40	-6.1	50.0
13C2 PFHxA	Ave	1.137	1.089		9.57	10.0	-4.3	30.0
13C2 PFDA	Ave	0.9023	0.8856		9.81	10.0	-1.9	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_010.d
Lims ID: CCVL
Client ID:
Sample Type: CCVL
Inject. Date: 30-Aug-2018 16:52:08 ALS Bottle#: 2 Worklist Smp#: 9
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L2
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 30-Aug-2018 17:16:36 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK020

First Level Reviewer: barnettj Date: 30-Aug-2018 17:16:36

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.373	1.372	0.001	1.000	2017597	20.7		8090	
298.90 > 99.00	1.373	1.372	0.001	1.000	1394105		1.45(0.00-0.00)	3784	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.495	1.493	0.002	1.000	1046271	9.57		8745	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.639	1.639	0.0	1.000	221692	2.12		62.9	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.639	1.639	0.0	1.000	951702	6.50		650	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.828	1.827	0.001	1.000	436671	4.21		70.1	
413.00 > 169.00	1.828	1.827	0.001	1.000	235622		1.85(0.00-0.00)	786	
* 6 13C2-PFOA									
415.00 > 370.00	1.828	1.827	0.001		960926	10.0		7005	
* 7 13C4 PFOS									
503.00 > 80.00	2.079	2.083	-0.004		2460442	28.7		5772	
9 Perfluorononanoic acid									
463.00 > 419.00	2.094	2.093	0.001	1.000	322240	4.13		63.2	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.086	2.109	-0.023	1.000	783497	8.52		1378	
499.00 > 99.00	2.079	2.109	-0.030	0.996	174467		4.49(0.00-0.00)	680	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	850972	9.81		4746	

Reagents:

LC537-L2_00022 Amount Added: 1.00 Units: mL

Report Date: 30-Aug-2018 17:16:37 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_010.d

Injection Date: 30-Aug-2018 16:52:08 Instrument ID: A8_N

Lims ID: CCVL

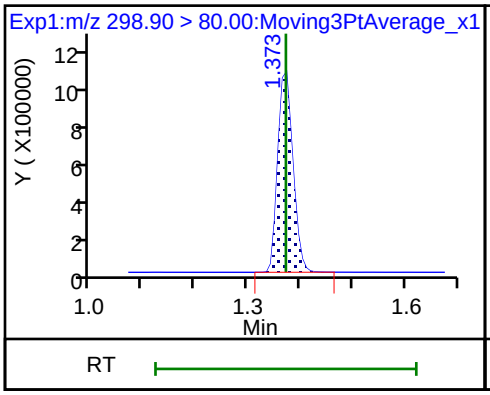
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 2 Worklist Smp#: 9

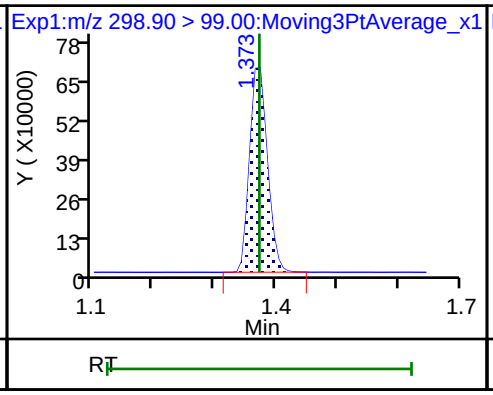
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

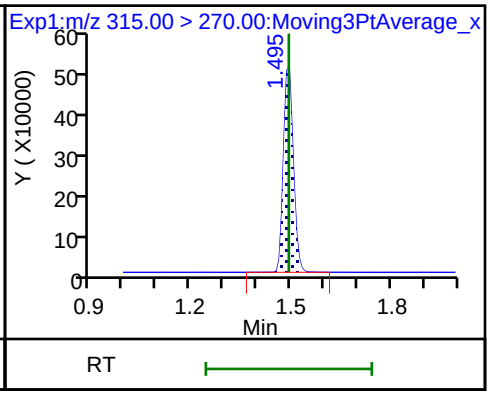
1 Perfluorobutanesulfonic acid



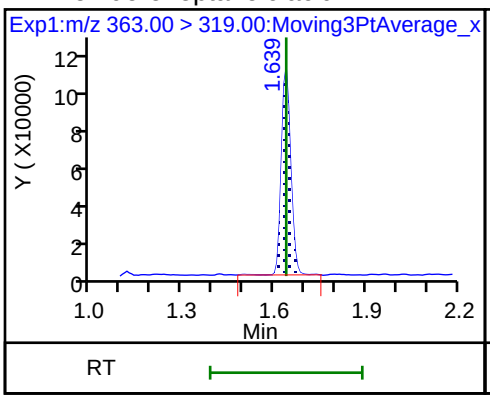
1 Perfluorobutanesulfonic acid



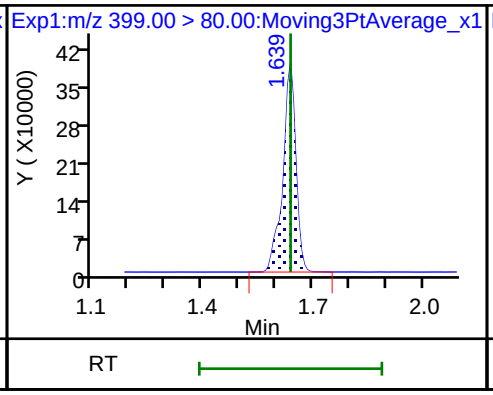
$ 2 13C2 PFHxA



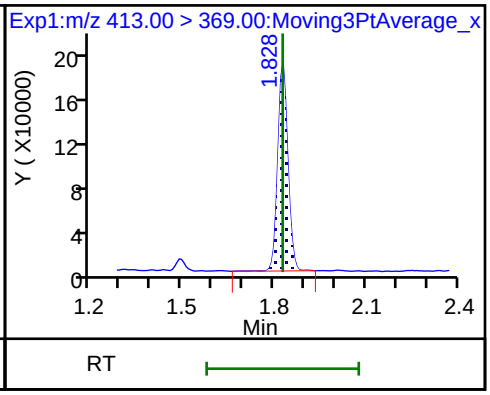
4 Perfluoroheptanoic acid



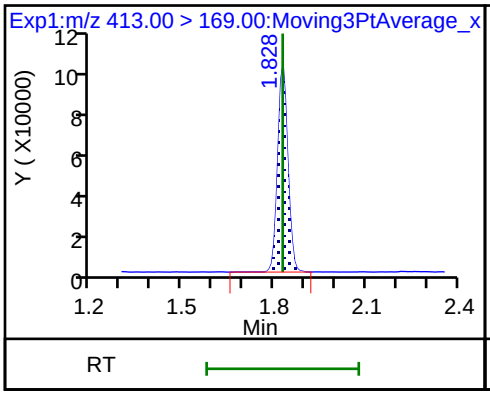
3 Perfluorohexanesulfonic acid



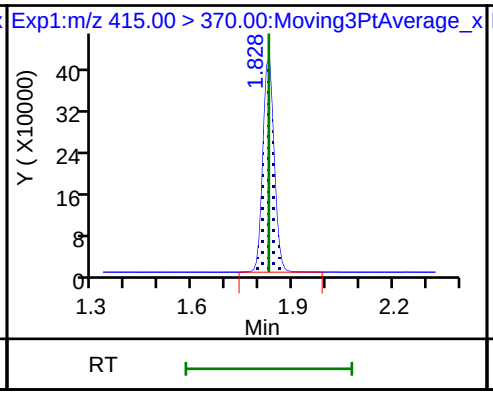
5 Perfluorooctanoic acid



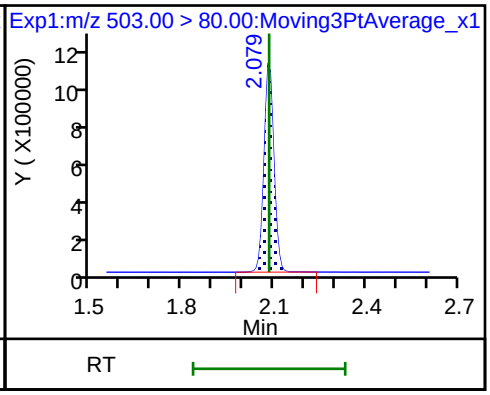
5 Perfluorooctanoic acid



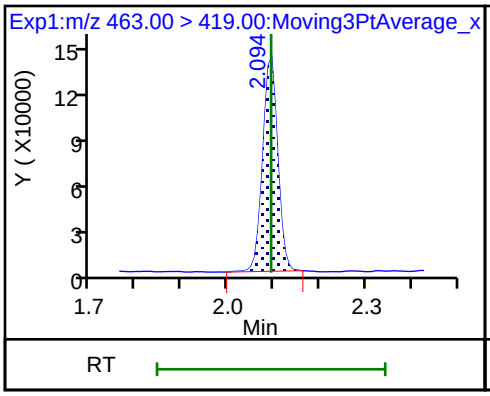
* 6 13C2-PFOA



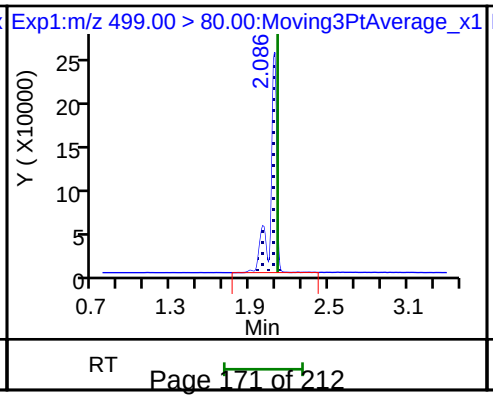
* 7 13C4 PFOS



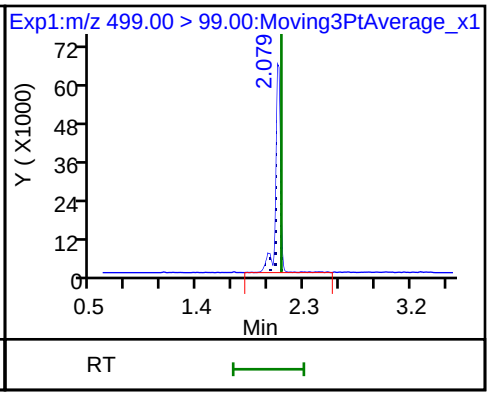
9 Perfluorononanoic acid



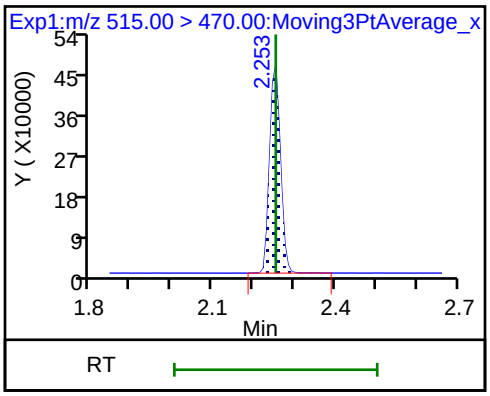
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
54
45
36
27
18
9
0
1.8
2.1
2.4
2.7
Min
RT

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: ICV 320-243207/11 Calibration Date: 08/30/2018 17:01

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.08.30_537ICALXX_012.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.148		89.2	88.4	0.9	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.042		9.56	10.0	-4.4	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.677		18.6	18.9	-1.7	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.073		19.9	20.0	-0.6	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.035		17.9	18.6	-3.5	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.8003		19.7	20.0	-1.4	30.0
13C2 PFHxA	Ave	1.137	1.135		9.98	10.0	-0.2	30.0
13C2 PFDA	Ave	0.9023	0.9123		10.1	10.0	1.1	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_012.d
Lims ID: ICV
Client ID:
Sample Type: ICV
Inject. Date: 30-Aug-2018 17:01:27 ALS Bottle#: 7 Worklist Smp#: 11
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: ICV
Misc. Info.: Plate: 1 Rack: 1
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist:

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 30-Aug-2018 17:17:04 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK020

First Level Reviewer: barnettj Date: 30-Aug-2018 17:16:11

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.373	1.372	0.001	1.000	7080596	89.2		19967	
298.90 > 99.00	1.373	1.372	0.001	1.000	5108571		1.39(0.00-0.00)	10975	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.495	1.493	0.002	1.000	895198	9.98		8225	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.639	1.639	0.0	1.000	821585	9.56		235	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.639	1.639	0.0	1.000	2213288	18.6		1683	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.828	1.827	0.001	1.000	1694618	19.9		267	
413.00 > 169.00	1.828	1.827	0.001	1.000	888319		1.91(0.00-0.00)	3010	
* 6 13C2-PFOA									
415.00 > 370.00	1.828	1.827	0.001		788747	10.0		7424	
* 7 13C4 PFOS									
503.00 > 80.00	2.079	2.083	-0.004		2000251	28.7		4724	
9 Perfluorononanoic acid									
463.00 > 419.00	2.094	2.093	0.001	1.000	1262526	19.7		256	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.079	2.109	-0.030	1.000	1339234	17.9		2471	
499.00 > 99.00	2.079	2.109	-0.030	1.000	298563		4.49(0.00-0.00)	1145	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	719548	10.1		3873	

Reagents:

LC537-ICV_00033 Amount Added: 1.00 Units: mL

Report Date: 30-Aug-2018 17:17:04 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_012.d

Injection Date: 30-Aug-2018 17:01:27 Instrument ID: A8_N

Lims ID: ICV

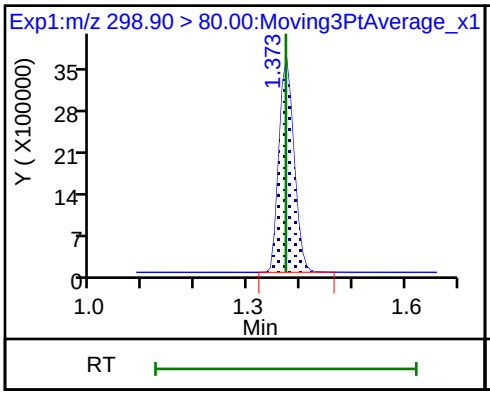
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 7 Worklist Smp#: 11

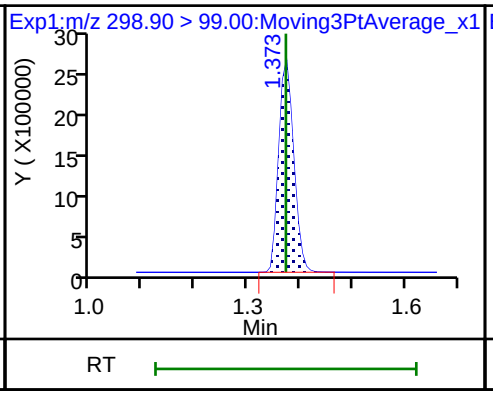
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

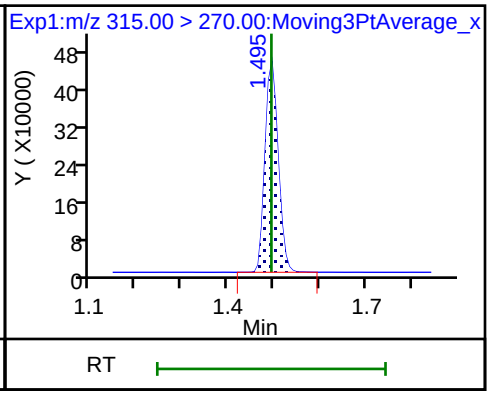
1 Perfluorobutanesulfonic acid



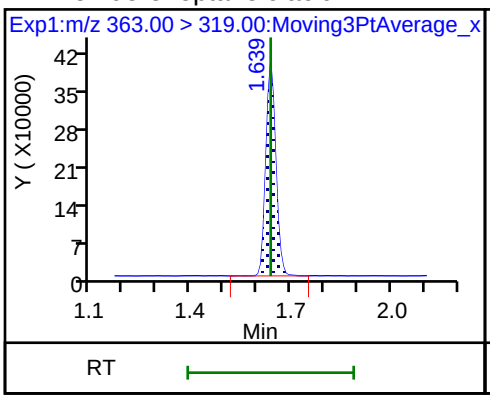
1 Perfluorobutanesulfonic acid



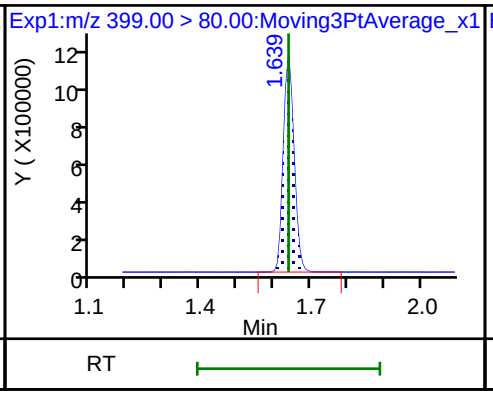
$ 2 13C2 PFHxA



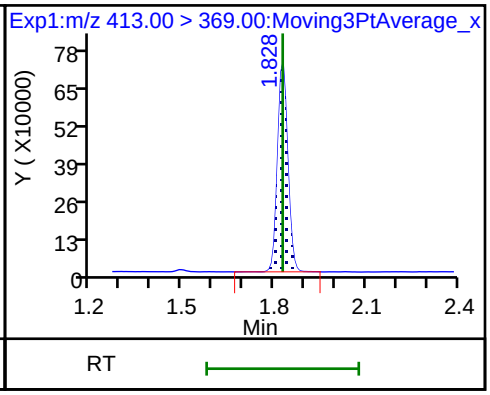
4 Perfluoroheptanoic acid



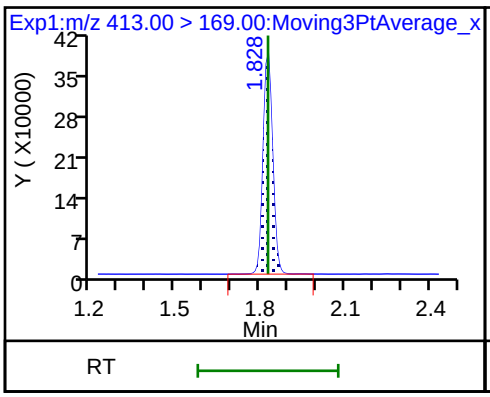
3 Perfluorohexanesulfonic acid



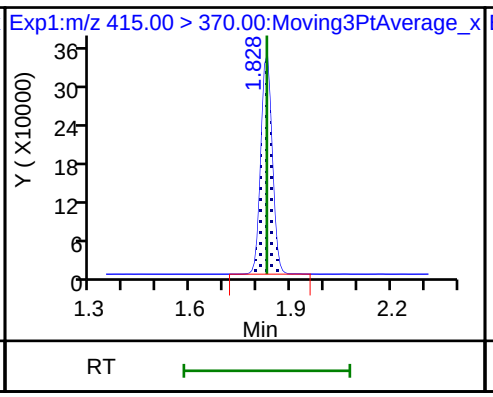
5 Perfluorooctanoic acid



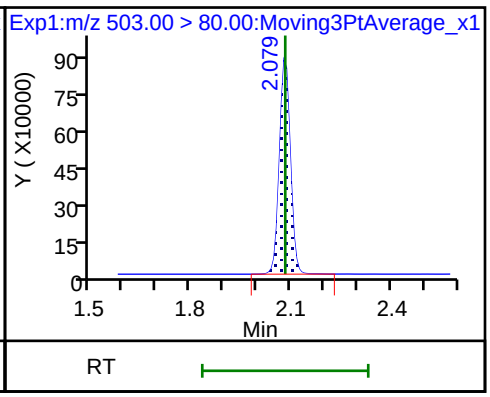
5 Perfluorooctanoic acid



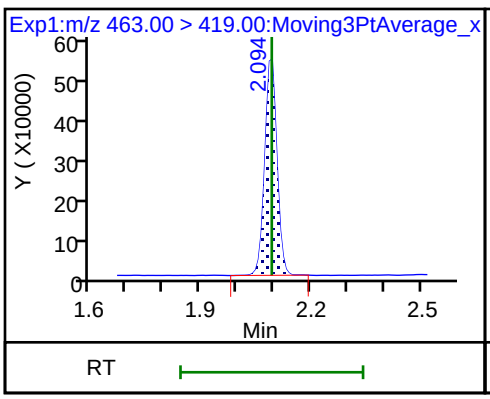
* 6 13C2-PFOA



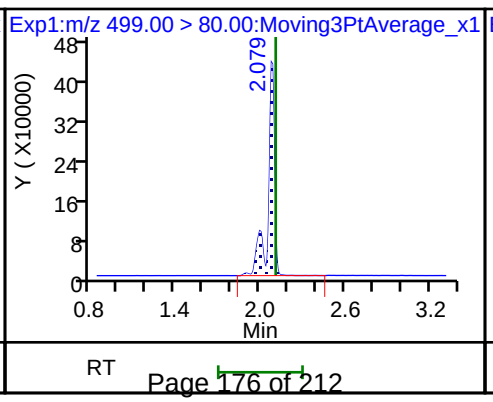
* 7 13C4 PFOS



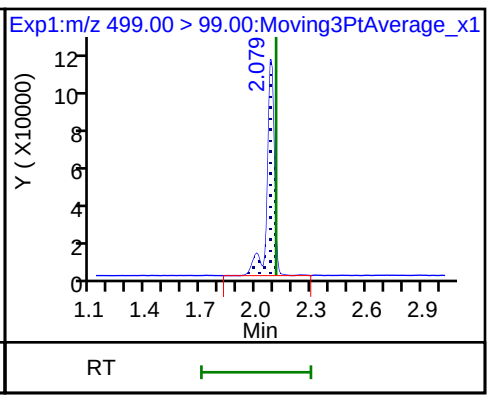
9 Perfluorononanoic acid



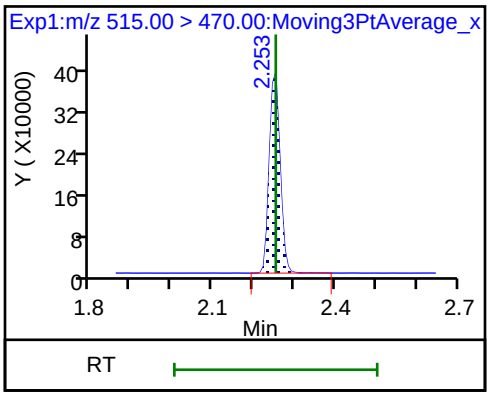
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
40
32
24
16
8
0
1.8
2.1
2.4
2.7
Min
RT

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: CCVL 320-244644/1 Calibration Date: 09/08/2018 19:22

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.09.08_537BD _004.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.283		22.6	20.0	12.8	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.112		2.20	2.16	2.0	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.457		5.74	6.72	-14.6	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.026		4.18	4.40	-5.0	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.000		8.20	8.79	-6.7	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.7933		4.30	4.40	-2.3	50.0
13C2 PFHxA	Ave	1.137	1.209		10.6	10.0	6.3	30.0
13C2 PFDA	Ave	0.9023	0.9194		10.2	10.0	1.9	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _004.d
Lims ID: CCVL
Client ID:
Sample Type: CCVL
Inject. Date: 08-Sep-2018 19:22:58 ALS Bottle#: 47 Worklist Smp#: 1
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCVL
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:45:12 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.434	1.426	0.008	1.000	2907880	22.6		9541	
298.90 > 99.00	1.434	1.426	0.008	1.000	1993541		1.46(0.00-0.00)	4922	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.533	1.525	0.008	1.000	1467689	10.6		8138	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.669	1.662	0.007	1.000	1108779	5.74		1162	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.669	1.662	0.007	1.000	291629	2.20		74.0	
* 6 13C2-PFOA									
415.00 > 370.00	1.859	1.844	0.015		1214024	10.0		9167	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.859	1.844	0.015	1.000	548294	4.18		103	
413.00 > 169.00	1.859	1.844	0.015	1.000	294692		1.86(0.00-0.00)	519	
* 7 13C4 PFOS									
503.00 > 80.00	2.102	2.094	0.008		3247674	28.7		7825	
9 Perfluorononanoic acid									
463.00 > 419.00	2.109	2.102	0.007	1.000	423743	4.30		105	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.102	2.109	-0.007	1.000	994878	8.20		2273	
499.00 > 99.00	2.102	2.109	-0.007	1.000	216670		4.59(0.00-0.00)	791	
$ 10 13C2 PFDA									
515.00 > 470.00	2.261	2.261	0.0	1.000	1116115	10.2		10726	

Reagents:

LC537-L2_00022 Amount Added: 1.00 Units: mL

Report Date: 10-Sep-2018 13:45:12 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _004.d

Injection Date: 08-Sep-2018 19:22:58 Instrument ID: A8_N

Lims ID: CCVL

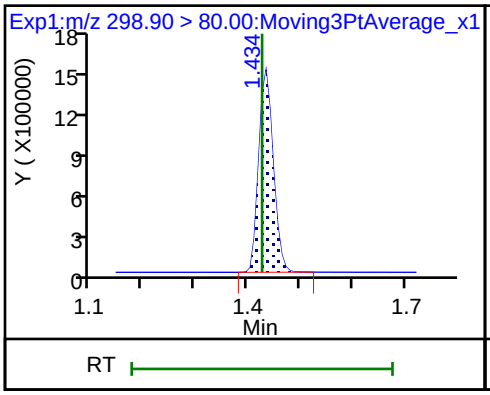
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 47 Worklist Smp#: 1

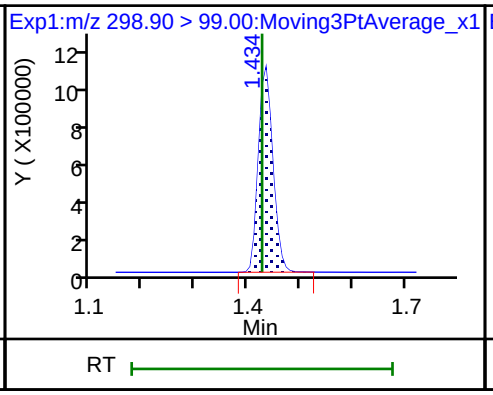
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

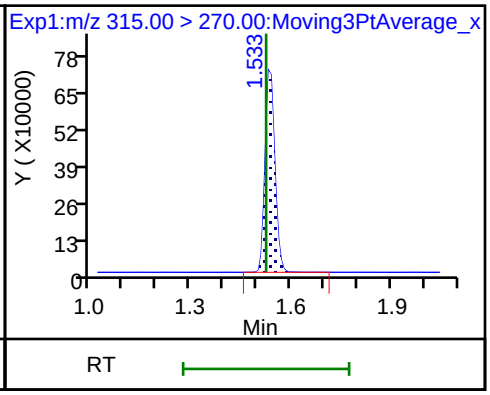
1 Perfluorobutanesulfonic acid



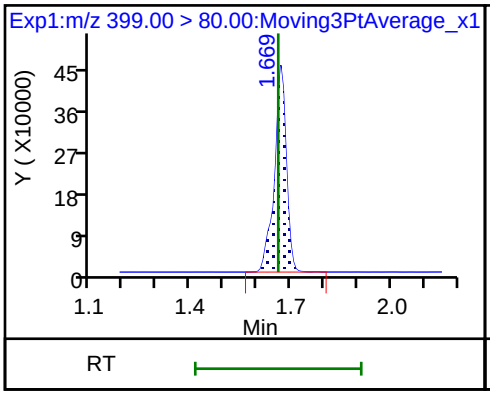
1 Perfluorobutanesulfonic acid



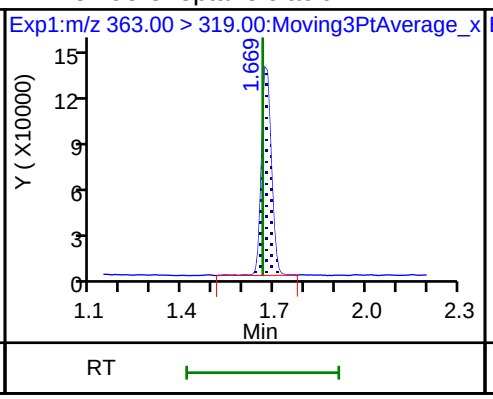
$ 2 13C2 PFHxA



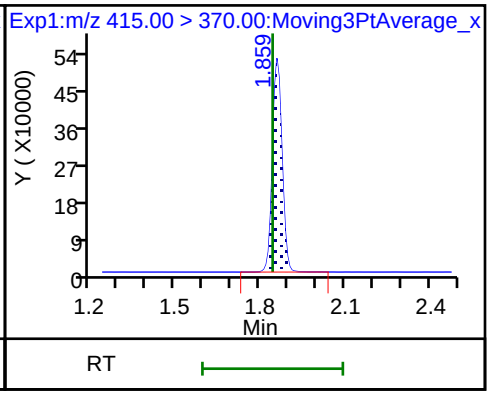
3 Perfluorohexanesulfonic acid



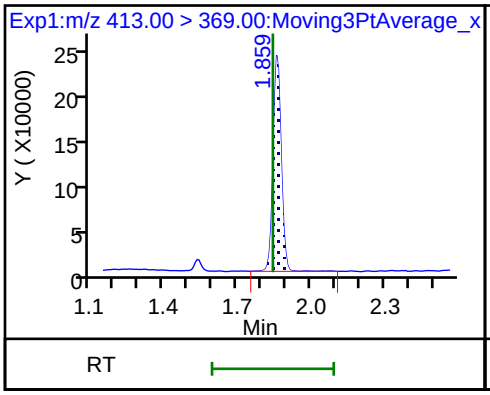
4 Perfluoroheptanoic acid



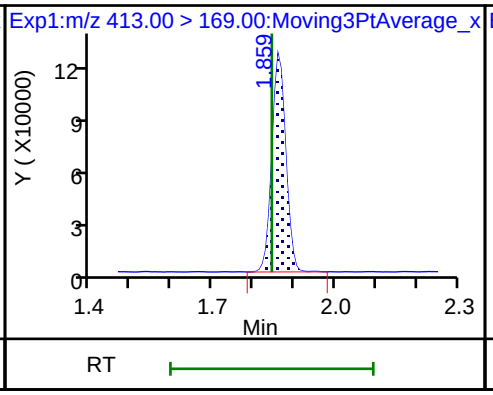
* 6 13C2-PFOA



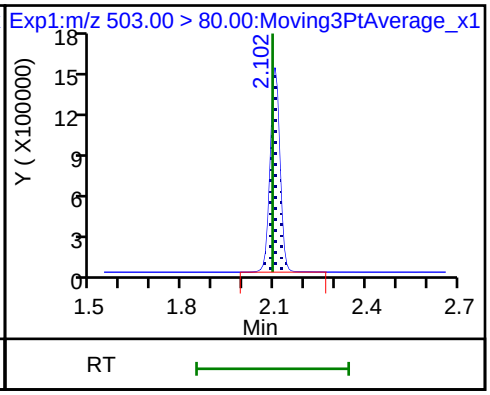
5 Perfluorooctanoic acid



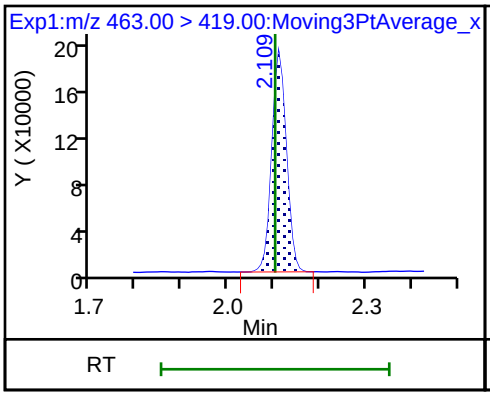
5 Perfluorooctanoic acid



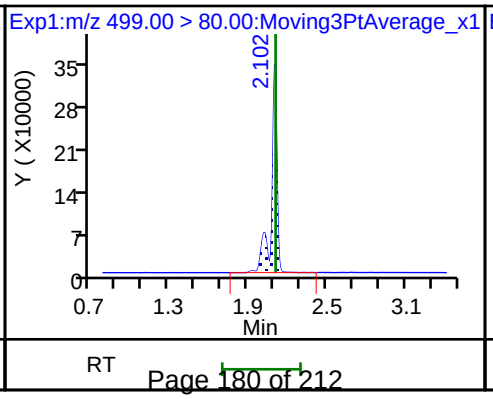
* 7 13C4 PFOS



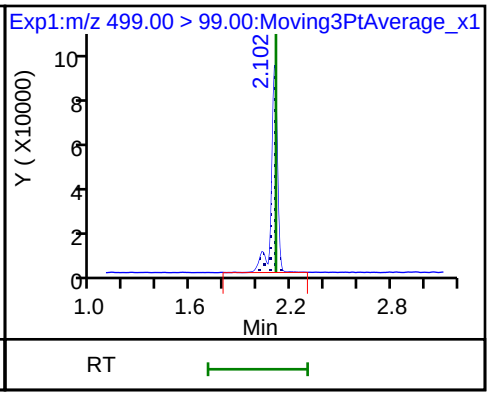
9 Perfluorononanoic acid



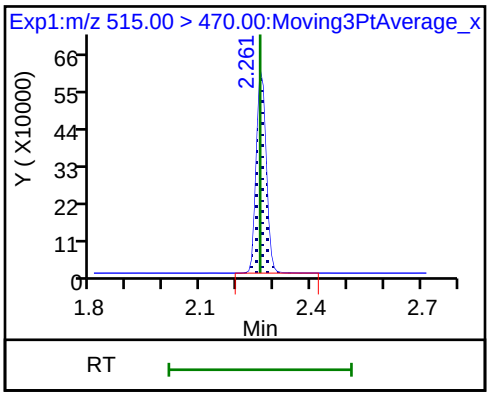
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.261
Y (X10000)
66
55
44
33
22
11
0
1.8
2.1
2.4
2.7
Min
RT

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: CCV 320-244655/46 Calibration Date: 09/08/2018 22:20

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.09.08_537BD _049.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.195		142	135	5.0	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.157		15.5	14.6	6.1	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.570		41.7	45.4	-8.0	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.048		28.8	29.7	-2.9	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.093		60.5	59.3	2.0	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.7995		29.3	29.7	-1.5	30.0
13C2 PFHxA	Ave	1.137	1.198		10.5	10.0	5.4	30.0
13C2 PFDA	Ave	0.9023	0.9250		10.3	10.0	2.5	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _049.d
Lims ID: CCV L5
Client ID:
Sample Type: CCVIS
Inject. Date: 08-Sep-2018 22:20:43 ALS Bottle#: 50 Worklist Smp#: 46
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L5
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.426	1.426	0.0	1.000	13461511	141.9		20087	
298.90 > 99.00	1.426	1.426	0.0	1.000	9676393		1.39(0.00-0.00)	15562	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.525	1.525	0.0	1.000	1100170	10.5		8888	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.662	1.662	0.0	1.000	5937583	41.7		4207	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.662	1.662	0.0	1.000	1548174	15.5		416	
* 6 13C2-PFOA									
415.00 > 370.00	1.844	1.844	0.0		918005	10.0		7255	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.844	1.844	0.0	1.000	2857654	28.8		526	
413.00 > 169.00	1.844	1.844	0.0	1.000	1529840		1.87(0.00-0.00)	3296	
* 7 13C4 PFOS									
503.00 > 80.00	2.094	2.094	0.0		2391130	28.7		5612	
9 Perfluorononanoic acid									
463.00 > 419.00	2.102	2.102	0.0	1.000	2179726	29.3		484	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.094	2.109	-0.015	1.000	5403317	60.5		7826	
499.00 > 99.00	2.094	2.109	-0.015	1.000	1140717		4.74(0.00-0.00)	3970	
$ 10 13C2 PFDA									
515.00 > 470.00	2.261	2.261	0.0	1.000	849174	10.3		8754	

Reagents:

LC537-L5_00026 Amount Added: 1.00 Units: mL

Report Date: 10-Sep-2018 13:52:52 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _049.d

Injection Date: 08-Sep-2018 22:20:43 Instrument ID: A8_N

Lims ID: CCV L5

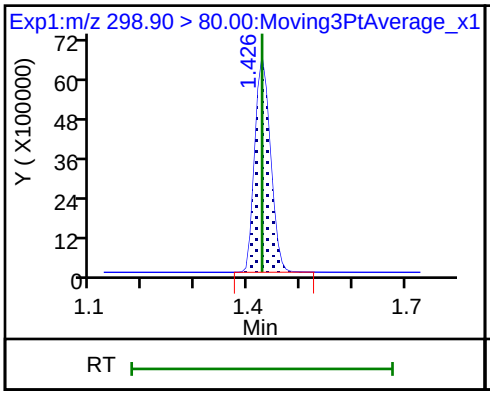
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 50 Worklist Smp#: 46

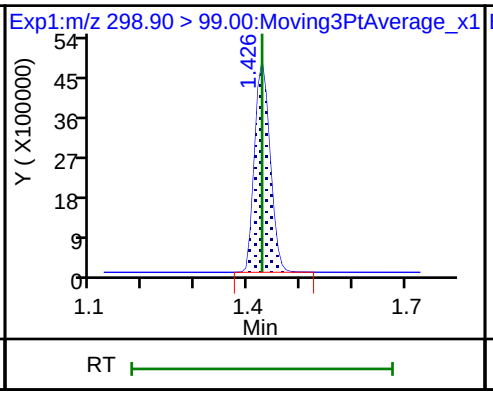
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

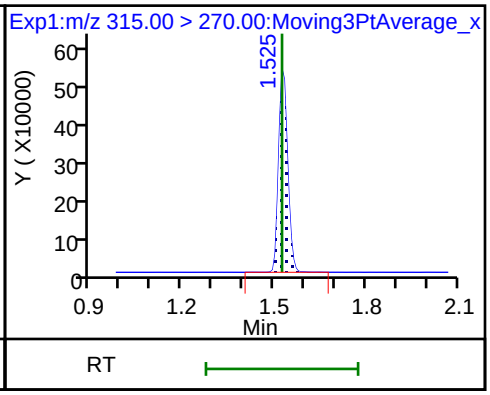
1 Perfluorobutanesulfonic acid



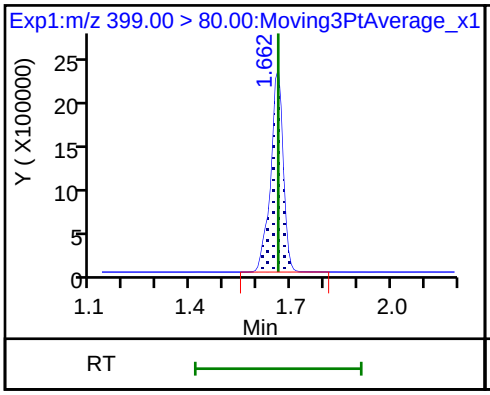
1 Perfluorobutanesulfonic acid



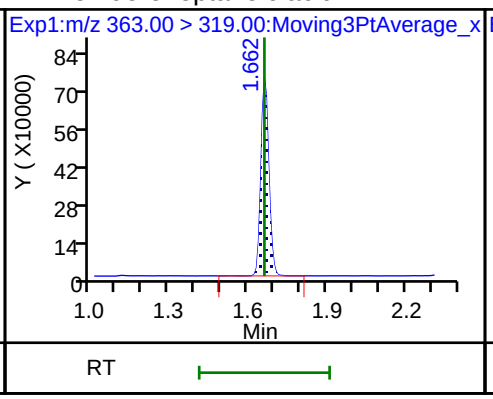
$ 2 13C2 PFHxA



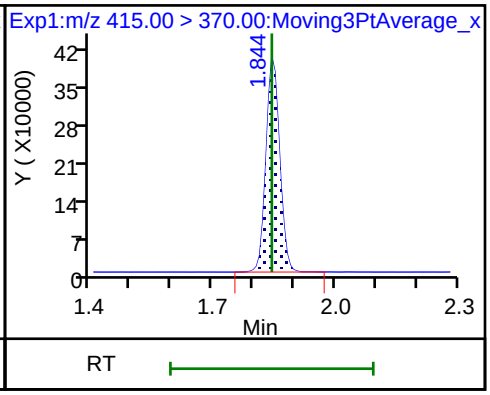
3 Perfluorohexanesulfonic acid



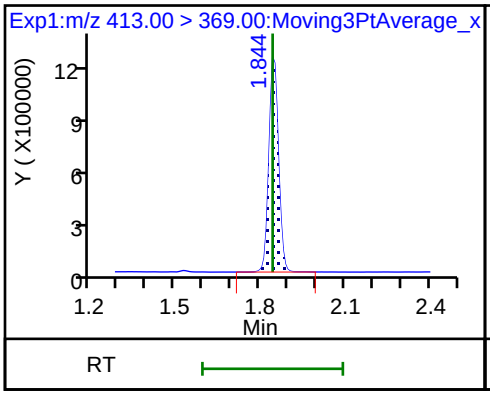
4 Perfluoroheptanoic acid



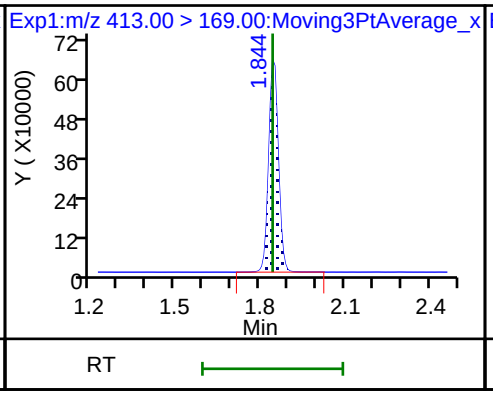
* 6 13C2-PFOA



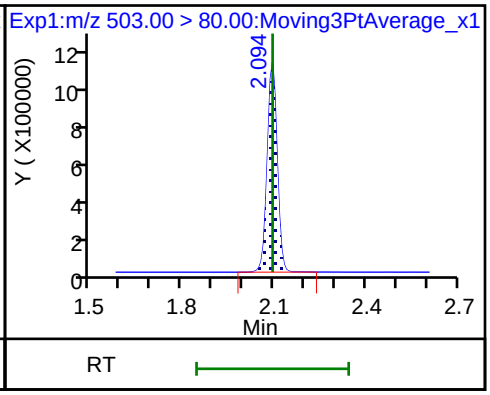
5 Perfluorooctanoic acid



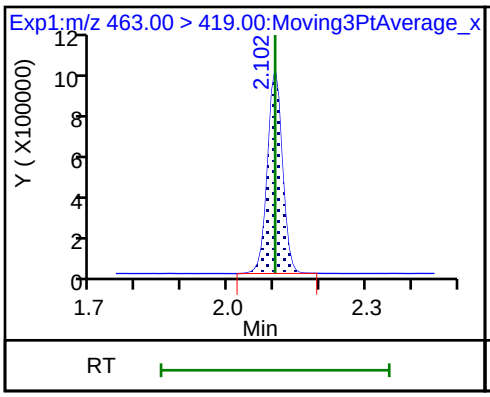
5 Perfluorooctanoic acid



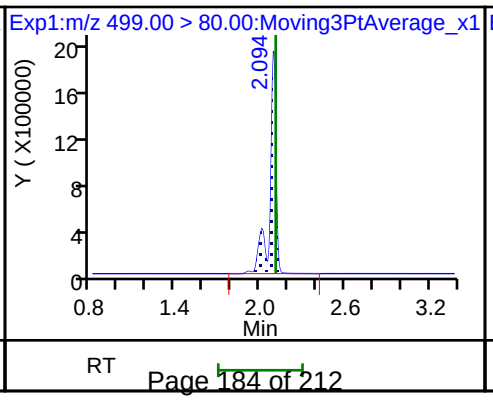
* 7 13C4 PFOS



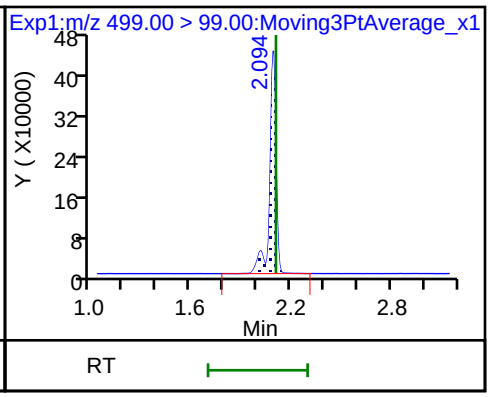
9 Perfluorononanoic acid



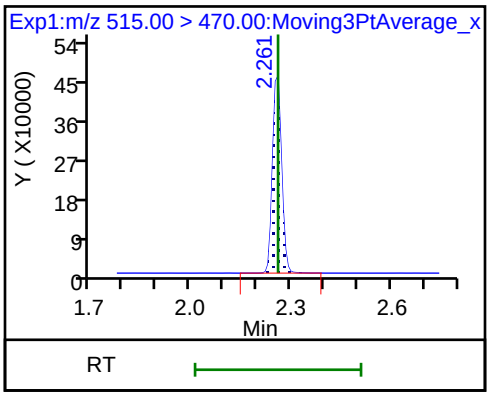
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.261
Y (X10000)
54
45
36
27
18
9
0
1.7
2.0
2.3
2.6
Min
RT

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: CCV 320-244655/53 Calibration Date: 09/08/2018 22:48

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.09.08_537BD _056.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.352		53.5	45.0	18.8	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.522		13.5	15.1	-10.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.124		5.01	4.86	3.1	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.076		9.86	9.90	-0.4	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.035		19.1	19.8	-3.4	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.8473		10.3	9.90	4.4	30.0
13C2 PFHxA	Ave	1.137	1.254		11.0	10.0	10.3	30.0
13C2 PFDA	Ave	0.9023	0.9466		10.5	10.0	4.9	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _056.d
Lims ID: CCV L3
Client ID:
Sample Type: CCVIS
Inject. Date: 08-Sep-2018 22:48:23 ALS Bottle#: 48 Worklist Smp#: 53
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: CCV L3
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Sublist: chrom-537_A8_N*sub9

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:56 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.426	1.426	0.0	1.000	6293185	53.5		16814	
298.90 > 99.00	1.426	1.426	0.0	1.000	4043591		1.56(0.00-0.00)	7847	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.525	1.525	0.0	1.000	1342262	11.0		10188	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.654	1.654	0.0	1.000	2379263	13.5		1938	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.662	1.662	0.0	1.000	584516	5.01		152	
* 6 13C2-PFOA									
415.00 > 370.00	1.844	1.844	0.0		1070182	10.0		7214	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.844	1.844	0.0	1.000	1140034	9.86		228	
413.00 > 169.00	1.844	1.844	0.0	1.000	622959		1.83(0.00-0.00)	1537	
* 7 13C4 PFOS									
503.00 > 80.00	2.094	2.094	0.0		2965225	28.7		6626	
9 Perfluorononanoic acid									
463.00 > 419.00	2.102	2.102	0.0	1.000	897722	10.3		190	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.094	2.109	-0.015	1.000	2115695	19.1		3980	
499.00 > 99.00	2.094	2.109	-0.015	1.000	440175		4.81(0.00-0.00)	1611	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.253	0.0	1.000	1013076	10.5		10378	

Reagents:

LC537-L3_00025 Amount Added: 1.00 Units: mL

Report Date: 10-Sep-2018 13:52:56 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _056.d

Injection Date: 08-Sep-2018 22:48:23 Instrument ID: A8_N

Lims ID: CCV L3

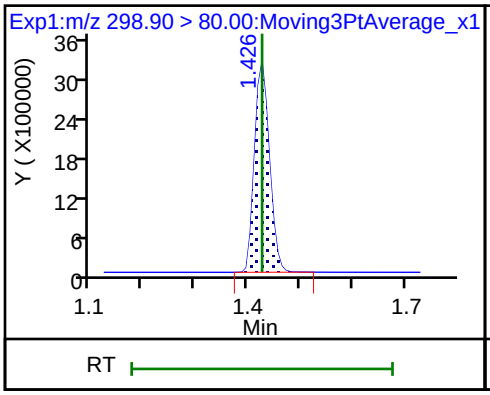
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 48 Worklist Smp#: 53

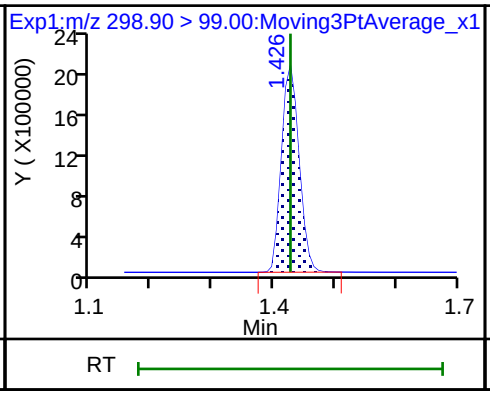
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

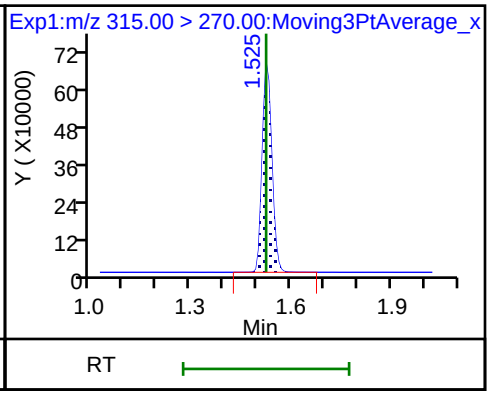
1 Perfluorobutanesulfonic acid



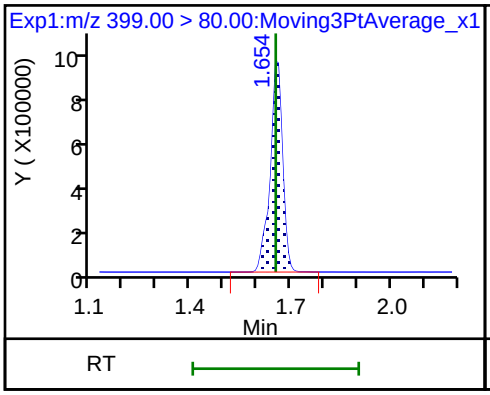
1 Perfluorobutanesulfonic acid



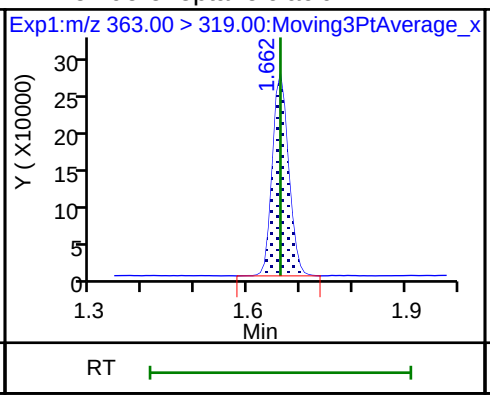
$ 2 13C2 PFHxA



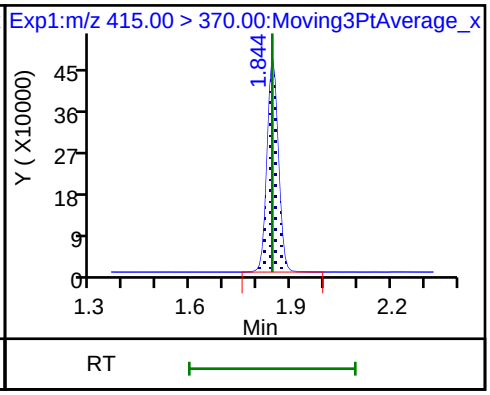
3 Perfluorohexanesulfonic acid



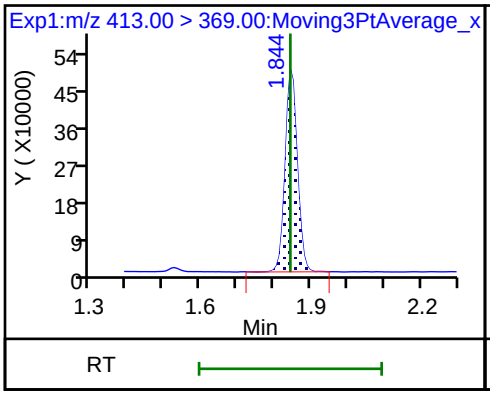
4 Perfluoroheptanoic acid



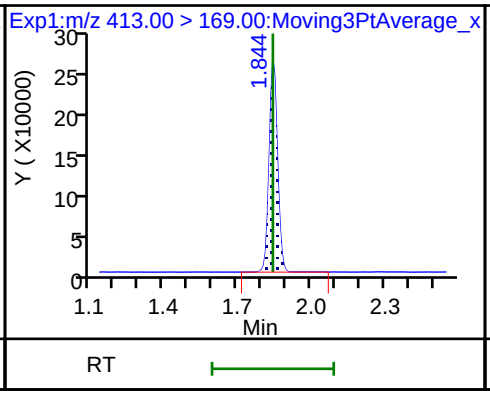
* 6 13C2-PFOA



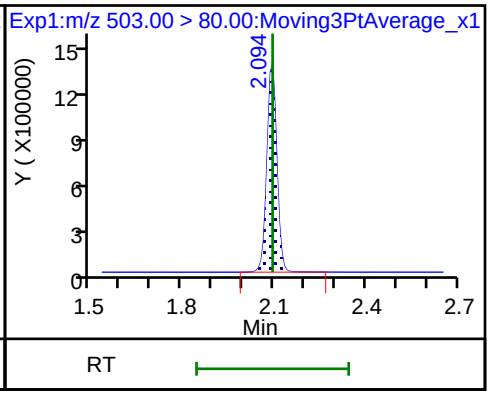
5 Perfluorooctanoic acid



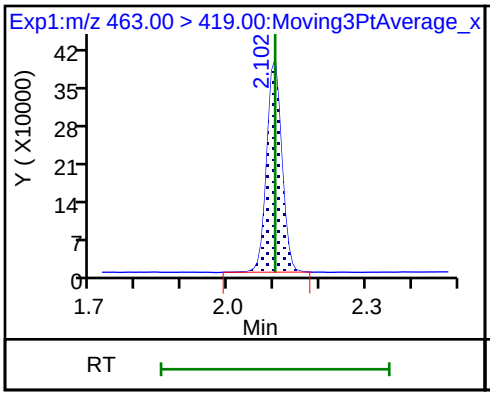
5 Perfluorooctanoic acid



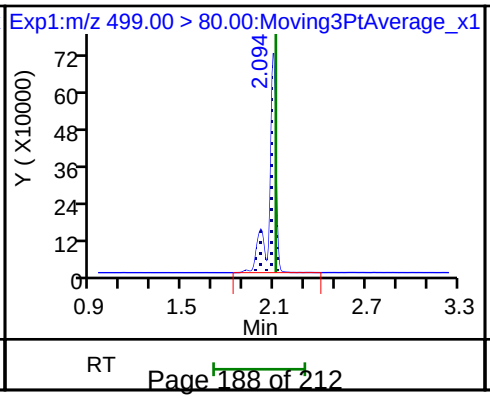
* 7 13C4 PFOS



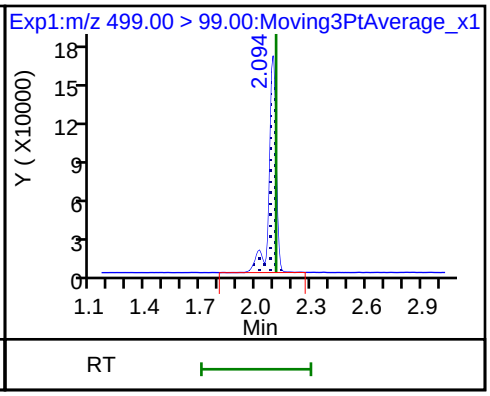
9 Perfluorononanoic acid



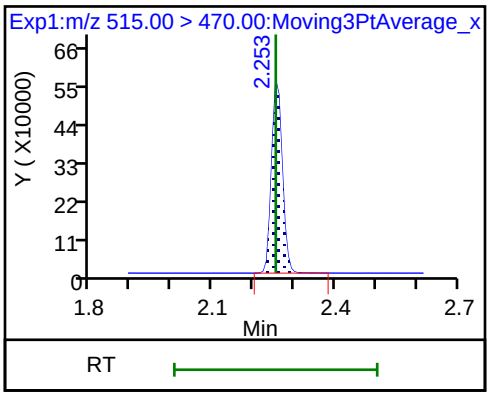
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
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Y (X10000)
66
55
44
33
22
11
0
1.8
2.1
2.4
2.7
Min
RT

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-42603-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-244303/1-A

Matrix: Water | Lab File ID: 2018.09.08_537BD _051.d

Analysis Method: 537 | Date Collected:

Extraction Method: 537 | Date Extracted: 09/06/2018 18:53

Sample wt/vol: 250.00(mL) | Date Analyzed: 09/08/2018 22:28

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	8.0	U	20	8.0	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	8.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	4.0	U	10	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	90	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	110		70-130
STL00996	13C2 PFDA	109		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _051.d
Lims ID: MB 320-244303/1-A
Client ID:
Sample Type: MB
Inject. Date: 08-Sep-2018 22:28:38 ALS Bottle#: 35 Worklist Smp#: 48
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-244303/1-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
$ 2 13C2 PFHxA									
315.00 > 270.00	1.533	1.525	0.008	1.000	1555991	11.0		11221	
* 6 13C2-PFOA									
415.00 > 370.00	1.851	1.844	0.007		1238890	10.0		8174	
* 7 13C4 PFOS									
503.00 > 80.00	2.094	2.094	0.0		3236532	28.7		8223	
$ 10 13C2 PFDA									
515.00 > 470.00	2.261	2.261	0.0	1.000	1217755	10.9		10519	

Report Date: 10-Sep-2018 13:52:53 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _051.d

Injection Date: 08-Sep-2018 22:28:38 Instrument ID: A8_N

Lims ID: MB 320-244303/1-A

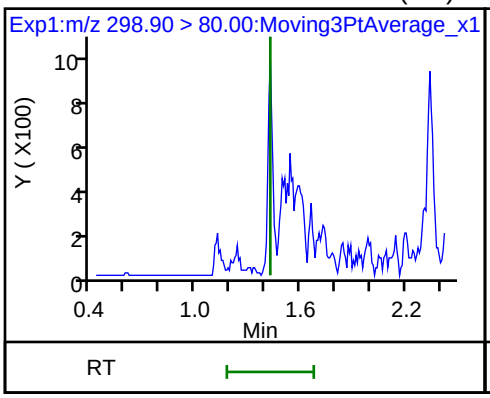
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 35 Worklist Smp#: 48

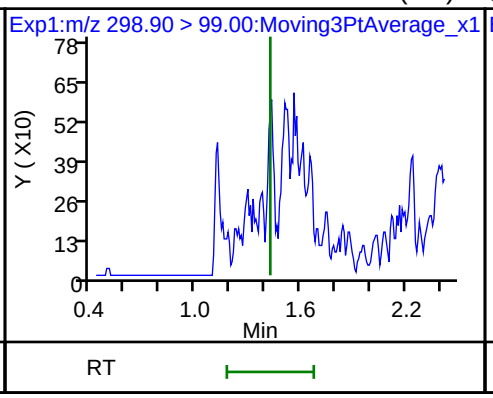
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

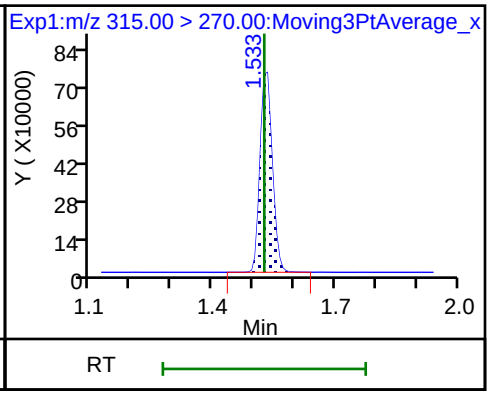
1 Perfluorobutanesulfonic acid (ND)



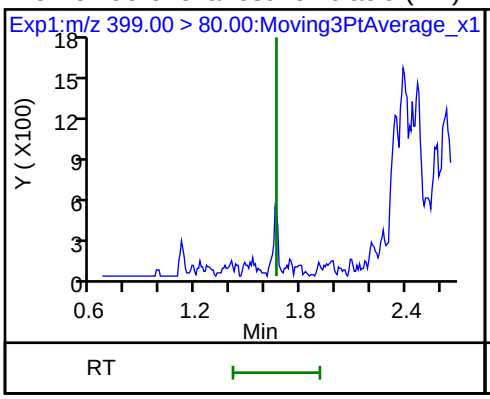
1 Perfluorobutanesulfonic acid (ND)



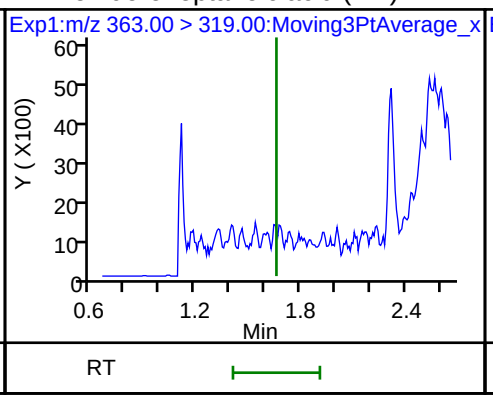
$ 2 13C2 PFHxA



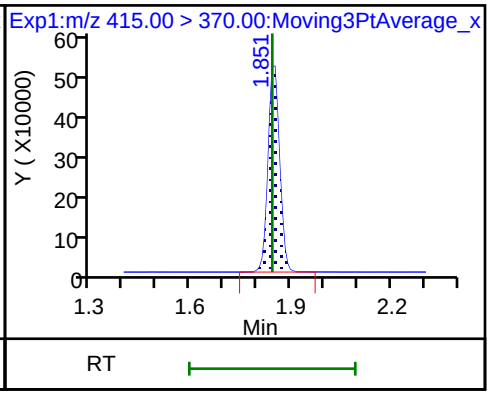
3 Perfluorohexanesulfonic acid (ND)



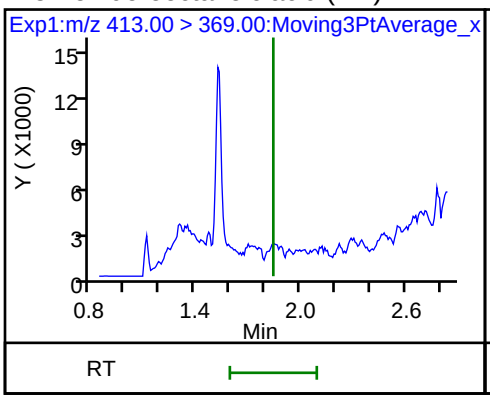
4 Perfluoroheptanoic acid (ND)



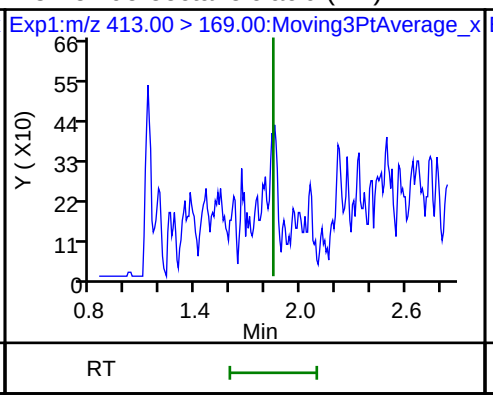
* 6 13C2-PFOA



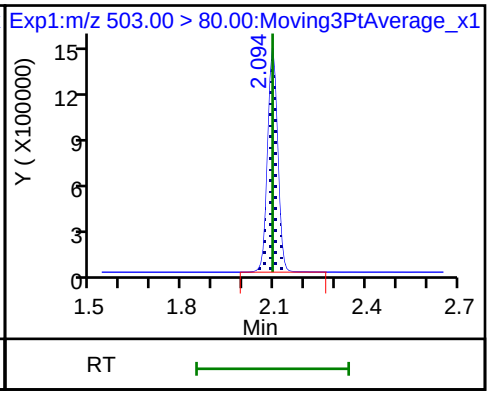
5 Perfluorooctanoic acid (ND)



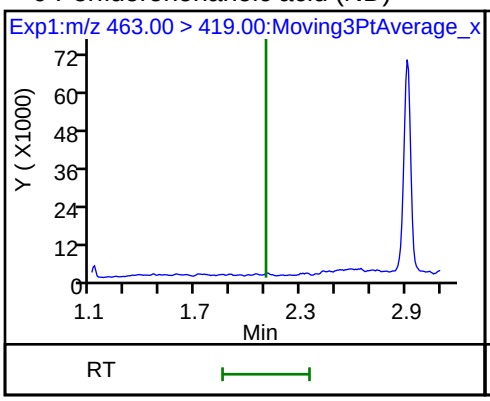
5 Perfluorooctanoic acid (ND)



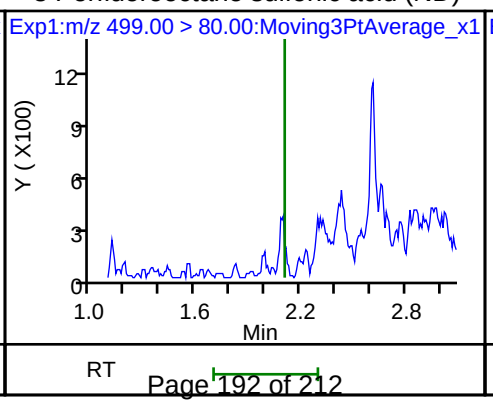
* 7 13C4 PFOS



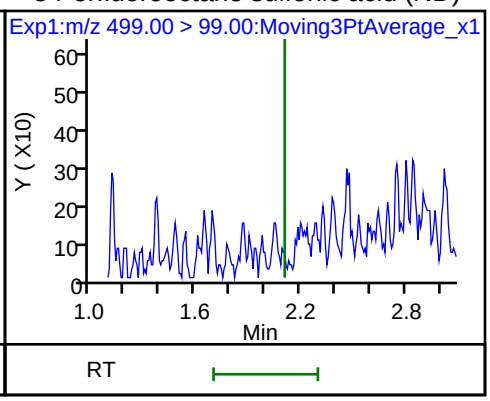
9 Perfluorononanoic acid (ND)



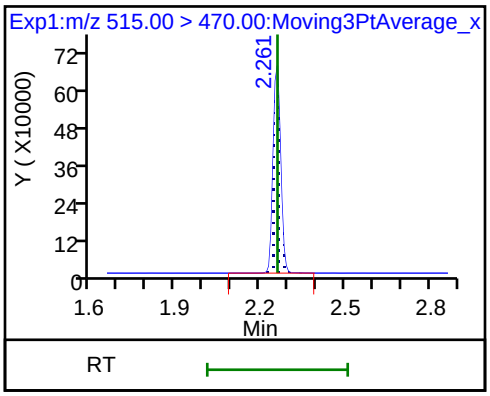
8 Perfluorooctane sulfonic acid (ND)



8 Perfluorooctane sulfonic acid (ND)



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.261
Y (X10000)
72
60
48
36
24
12
0
1.6
1.9
2.2
2.5
2.8
Min
RT

TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _051.d
Lims ID: MB 320-244303/1-A
Client ID:
Sample Type: MB
Inject. Date: 08-Sep-2018 22:28:38 ALS Bottle#: 35 Worklist Smp#: 48
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-244303/1-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Compound	Amount Added	Amount Recovered	% Rec.
$ 2 13C2 PFHxA	10.0	11.0	110.43
$ 10 13C2 PFDA	10.0	10.9	108.93

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-42603-1

SDG No.:

Client Sample ID: | Lab Sample ID: LLCS 320-244303/2-A

Matrix: Water | Lab File ID: 2018.09.08_537BD _052.d

Analysis Method: 537 | Date Collected:

Extraction Method: 537 | Date Extracted: 09/06/2018 18:53

Sample wt/vol: 250.00(mL) | Date Analyzed: 09/08/2018 22:32

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	45.8		40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	21.6		20	8.0	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20.6	J	24	20	8.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	32.1		30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	11.7		10	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	128		90	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	110		70-130
STL00996	13C2 PFDA	104		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _052.d
Lims ID: LLCS 320-244303/2-A
Client ID:
Sample Type: LLCS
Inject. Date: 08-Sep-2018 22:32:35 ALS Bottle#: 36 Worklist Smp#: 49
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: llcs 320-244303/2-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.434	1.426	0.008	1.000	3892270	32.1		11401	
298.90 > 99.00	1.434	1.426	0.008	1.000	2610651		1.49(0.00-0.00)	5279	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.533	1.525	0.008	1.000	1449324	11.0		10219	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.662	1.662	0.0	1.000	1461191	8.03		1365	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.669	1.662	0.007	1.000	367072	2.92		99.5	
* 6 13C2-PFOA									
415.00 > 370.00	1.851	1.844	0.007		1155150	10.0		7437	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.851	1.844	0.007	1.000	674053	5.40		125	
413.00 > 169.00	1.851	1.844	0.007	1.000	393398		1.71(0.00-0.00)	807	
* 7 13C4 PFOS									
503.00 > 80.00	2.094	2.094	0.0		3056932	28.7		7259	
9 Perfluorononanoic acid									
463.00 > 419.00	2.102	2.102	0.0	1.000	483808	5.16		80.5	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.094	2.109	-0.015	1.000	1308458	11.5		2173	
499.00 > 99.00	2.094	2.109	-0.015	1.000	280457		4.67(0.00-0.00)	1093	
$ 10 13C2 PFDA									
515.00 > 470.00	2.261	2.261	0.0	1.000	1078880	10.4		9016	

Report Date: 10-Sep-2018 13:52:54 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _052.d

Injection Date: 08-Sep-2018 22:32:35 Instrument ID: A8_N

Lims ID: LLCS 320-244303/2-A

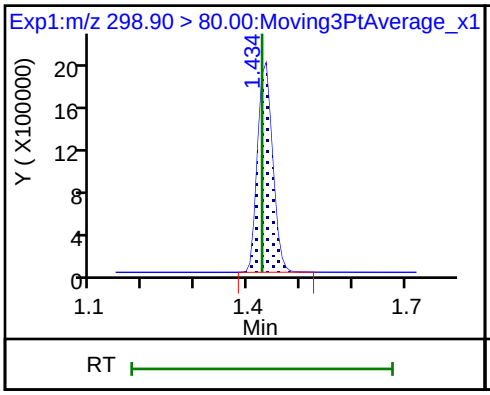
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 36 Worklist Smp#: 49

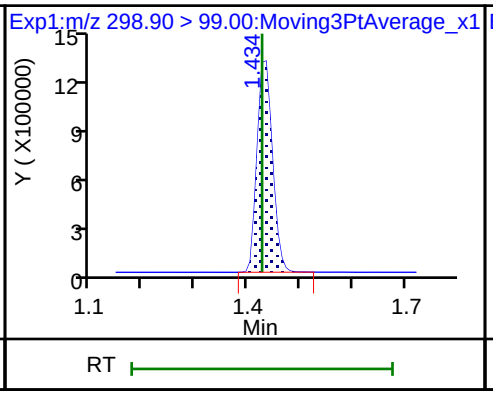
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

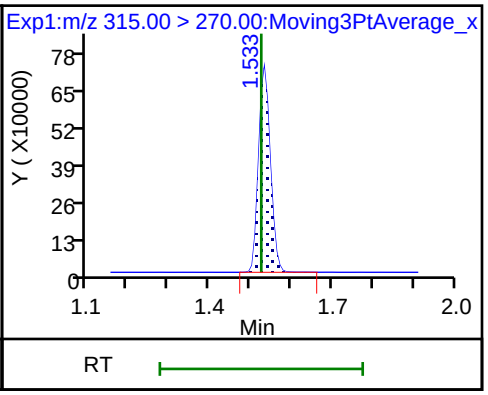
1 Perfluorobutanesulfonic acid



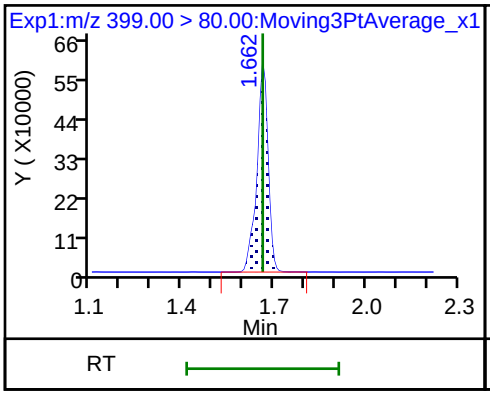
1 Perfluorobutanesulfonic acid



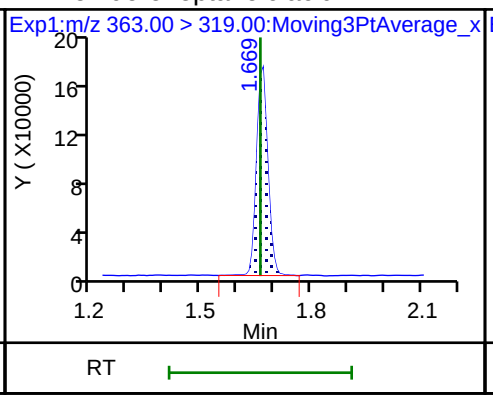
$ 2 13C2 PFHxA



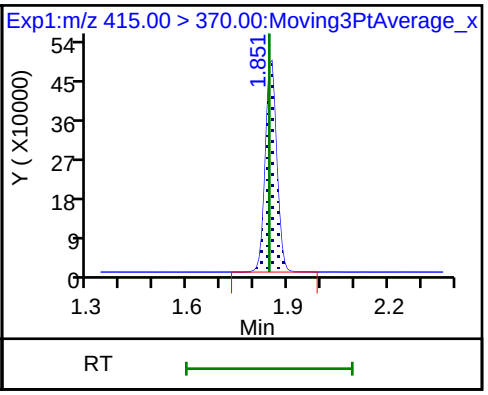
3 Perfluorohexanesulfonic acid



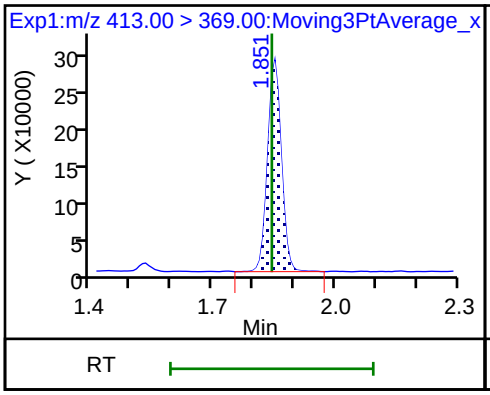
4 Perfluoroheptanoic acid



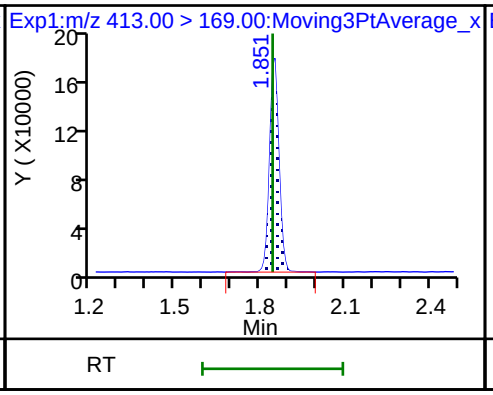
* 6 13C2-PFOA



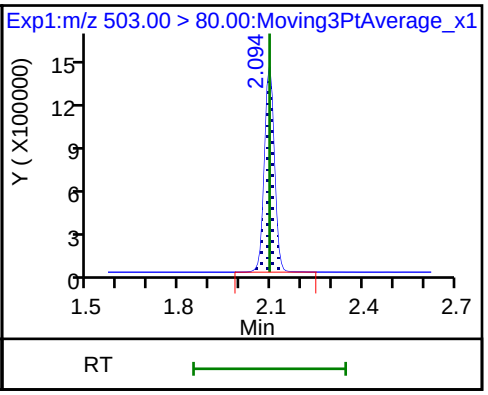
5 Perfluorooctanoic acid



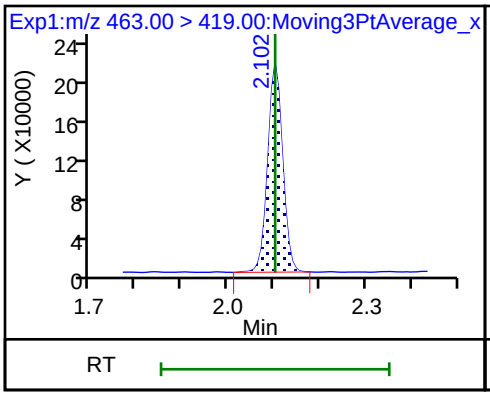
5 Perfluorooctanoic acid



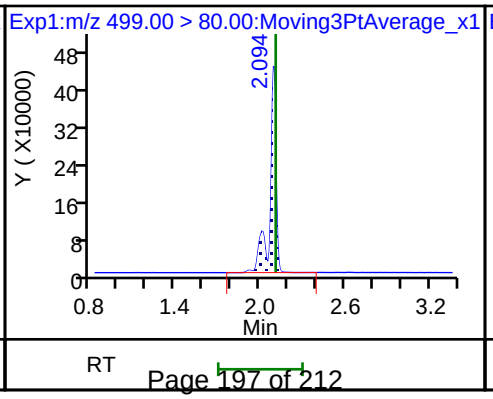
* 7 13C4 PFOS



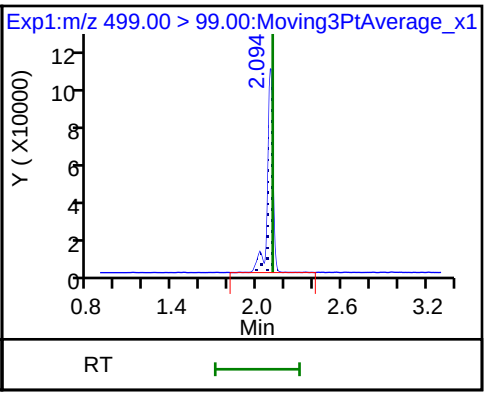
9 Perfluorononanoic acid



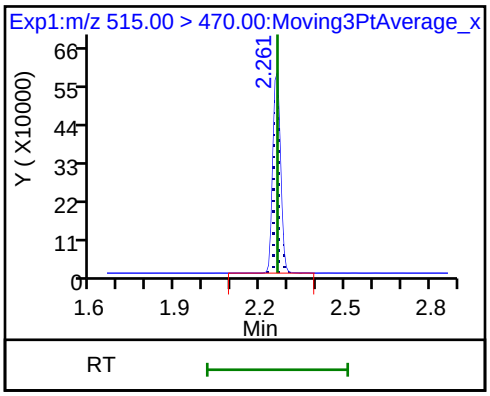
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.261
Y (X10000)
66
55
44
33
22
11
0
1.6
1.9
2.2
2.5
2.8
Min
RT

TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _052.d
Lims ID: LLCS 320-244303/2-A
Client ID:
Sample Type: LLCS
Inject. Date: 08-Sep-2018 22:32:35 ALS Bottle#: 36 Worklist Smp#: 49
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: llcs 320-244303/2-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Compound	Amount Added	Amount Recovered	% Rec.
$ 2 13C2 PFHxA	10.0	11.0	110.31
$ 10 13C2 PFDA	10.0	10.4	103.51

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-42603-1

SDG No.:

Client Sample ID: | Lab Sample ID: LLCSD 320-244303/3-A

Matrix: Water | Lab File ID: 2018.09.08_537BD _053.d

Analysis Method: 537 | Date Collected:

Extraction Method: 537 | Date Extracted: 09/06/2018 18:53

Sample wt/vol: 250.00(mL) | Date Analyzed: 09/08/2018 22:36

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	45.6		40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	22.8		20	8.0	2.8
375-95-1	Perfluorononanoic acid (PFNA)	22.0	J	24	20	8.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	32.4		30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	12.0		10	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	132		90	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	115		70-130
STL00996	13C2 PFDA	104		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _053.d
Lims ID: LLCSD 320-244303/3-A
Client ID:
Sample Type: LLCSD
Inject. Date: 08-Sep-2018 22:36:31 ALS Bottle#: 37 Worklist Smp#: 50
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: llcsd 320-2443
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.426	1.426	0.0	1.000	4219073	33.0		9622	
298.90 > 99.00	1.426	1.426	0.0	1.000	2786371		1.51(0.00-0.00)	5663	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.525	1.525	0.0	1.000	1543697	11.5		11799	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.654	1.662	-0.008	1.000	1552914	8.10		1418	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.662	1.662	0.0	1.000	386540	3.00		102	
* 6 13C2-PFOA									
415.00 > 370.00	1.844	1.844	0.0		1183349	10.0		8890	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.844	1.844	0.0	1.000	728796	5.70		141	
413.00 > 169.00	1.844	1.844	0.0	1.000	392590		1.86(0.00-0.00)	894	
* 7 13C4 PFOS									
503.00 > 80.00	2.086	2.094	-0.008		3220491	28.7		7156	
9 Perfluorononanoic acid									
463.00 > 419.00	2.102	2.102	0.0	1.000	528960	5.51		77.2	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.094	2.109	-0.015	1.000	1370828	11.4		2207	
499.00 > 99.00	2.094	2.109	-0.015	1.000	298390		4.59(0.00-0.00)	1047	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.261	-0.008	1.000	1115490	10.4		10108	

Report Date: 10-Sep-2018 13:52:54 Chrom Revision: 2.3 19-Jul-2018 15:14:50

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _053.d

Injection Date: 08-Sep-2018 22:36:31 Instrument ID: A8_N

Lims ID: LLCSD 320-244303/3-A

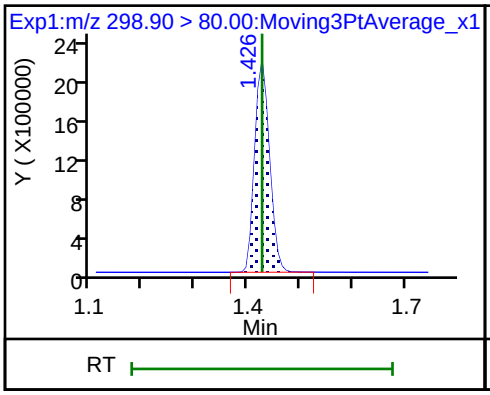
Client ID:

Operator ID: SACINSTLCMS01 ALS Bottle#: 37 Worklist Smp#: 50

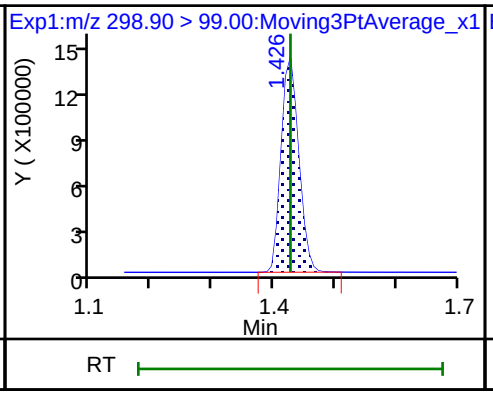
Injection Vol: 2.0 ul Dil. Factor: 1.0000

Method: 537_A8_N Limit Group: LC 537 ICAL

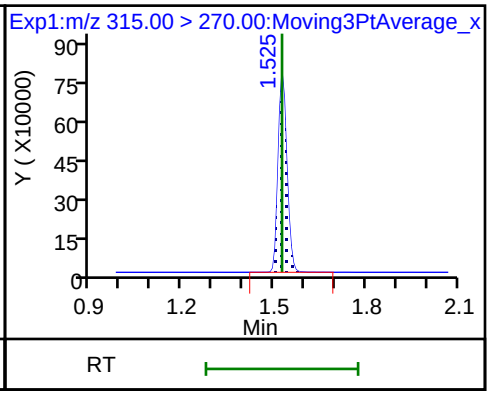
1 Perfluorobutanesulfonic acid



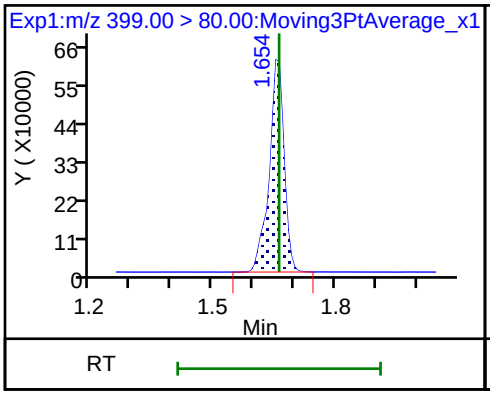
1 Perfluorobutanesulfonic acid



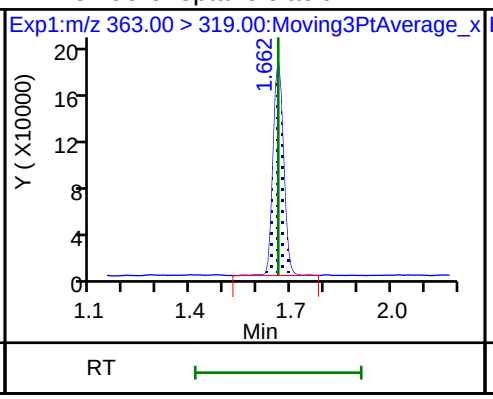
$ 2 13C2 PFHxA



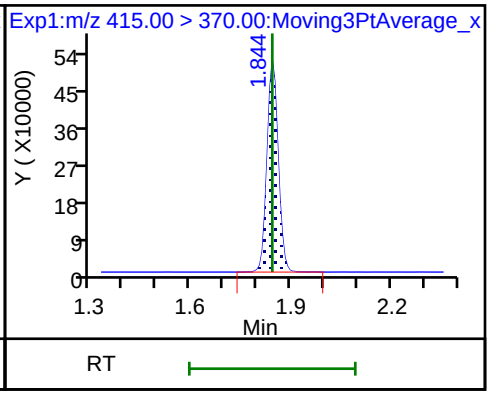
3 Perfluorohexanesulfonic acid



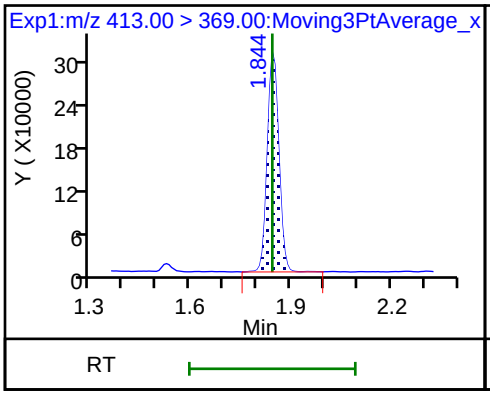
4 Perfluoroheptanoic acid



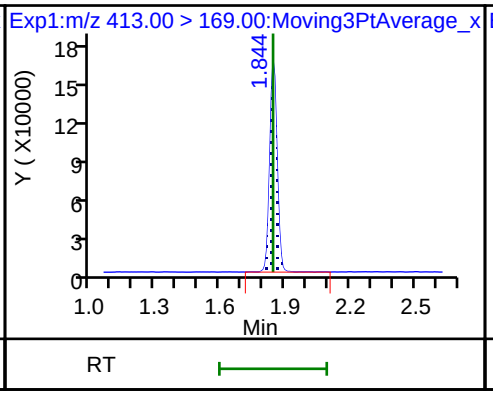
* 6 13C2-PFOA



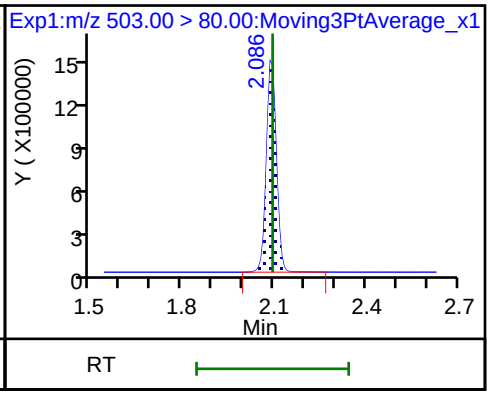
5 Perfluorooctanoic acid



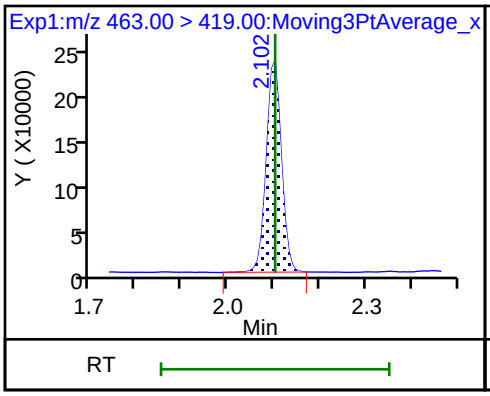
5 Perfluorooctanoic acid



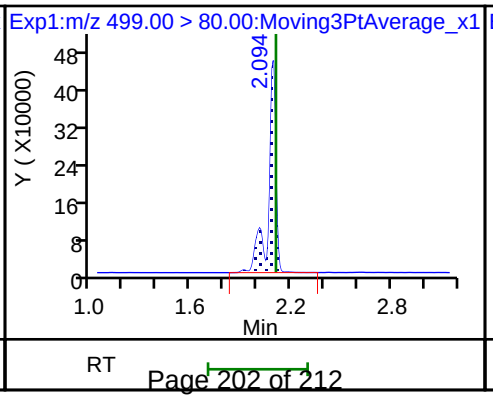
* 7 13C4 PFOS



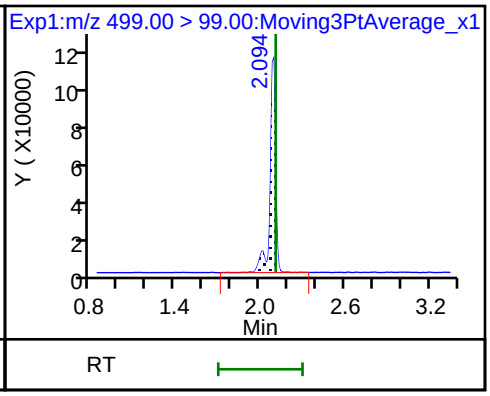
9 Perfluorononanoic acid



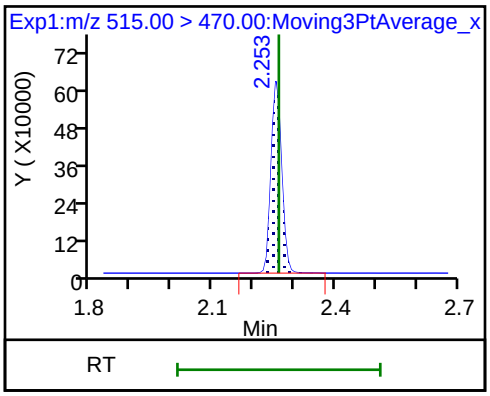
8 Perfluorooctane sulfonic acid



8 Perfluorooctane sulfonic acid



$ 10 13C2 PFDA


Exp1:m/z 515.00 > 470.00:Moving3PtAverage_x
2.253
Y (X10000)
72
60
48
36
24
12
0
1.8
2.1
2.4
2.7
Min
RT

TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _053.d
Lims ID: LLCSD 320-244303/3-A
Client ID:
Sample Type: LLCSD
Inject. Date: 08-Sep-2018 22:36:31 ALS Bottle#: 37 Worklist Smp#: 50
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: llcsd 320-2443
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

Compound	Amount Added	Amount Recovered	% Rec.
$ 2 13C2 PFHxA	10.0	11.5	114.70
$ 10 13C2 PFDA	10.0	10.4	104.47

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Start Date: 08/30/2018 16:19

Analysis Batch Number: 243207 End Date: 08/30/2018 17:01

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-243207/2		08/30/2018 16:19	1	2018.08.30_537ICALXX_003.d	GeminiC18 3x100 3(mm)
IC 320-243207/3		08/30/2018 16:24	1	2018.08.30_537ICALXX_004.d	GeminiC18 3x100 3(mm)
IC 320-243207/4		08/30/2018 16:28	1	2018.08.30_537ICALXX_005.d	GeminiC18 3x100 3(mm)
IC 320-243207/5 ICISAV		08/30/2018 16:33	1	2018.08.30_537ICALXX_006.d	GeminiC18 3x100 3(mm)
IC 320-243207/6		08/30/2018 16:38	1	2018.08.30_537ICALXX_007.d	GeminiC18 3x100 3(mm)
IC 320-243207/7		08/30/2018 16:42	1	2018.08.30_537ICALXX_008.d	GeminiC18 3x100 3(mm)
ZZZZZ		08/30/2018 16:47	1		GeminiC18 3x100 3(mm)
CCVL 320-243207/9		08/30/2018 16:52	1	2018.08.30_537ICALXX_010.d	GeminiC18 3x100 3(mm)
ICB 320-243207/10		08/30/2018 16:56	1		GeminiC18 3x100 3(mm)
ICV 320-243207/11		08/30/2018 17:01	1	2018.08.30_537ICALXX_012.d	GeminiC18 3x100 3(mm)

537

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Start Date: 09/08/2018 19:22

Analysis Batch Number: 244644 End Date: 09/08/2018 20:14

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-244644/1		09/08/2018 19:22	1	2018.09.08_537B D 004.d	GeminiC18 3x100 3(mm)
CCV 320-244644/2 CCVIS		09/08/2018 19:26	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:34	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:38	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:42	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:46	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:50	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:54	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:58	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 20:02	1		GeminiC18 3x100 3(mm)
CCV 320-244644/14 CCVIS		09/08/2018 20:14	1		GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Start Date: 09/08/2018 22:20

Analysis Batch Number: 244655 End Date: 09/08/2018 22:48

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-244655/46 CCVIS		09/08/2018 22:20	1	2018.09.08_537B D_049.d	GeminiC18 3x100 3(mm)
MB 320-244303/1-A		09/08/2018 22:28	1	2018.09.08_537B D_051.d	GeminiC18 3x100 3(mm)
LLCS 320-244303/2-A		09/08/2018 22:32	1	2018.09.08_537B D_052.d	GeminiC18 3x100 3(mm)
LLCSD 320-244303/3-A		09/08/2018 22:36	1	2018.09.08_537B D_053.d	GeminiC18 3x100 3(mm)
320-42603-1		09/08/2018 22:40	1	2018.09.08_537B D_054.d	GeminiC18 3x100 3(mm)
320-42603-2		09/08/2018 22:44	1	2018.09.08_537B D_055.d	GeminiC18 3x100 3(mm)
CCV 320-244655/53 CCVIS		09/08/2018 22:48	1	2018.09.08_537B D_056.d	GeminiC18 3x100 3(mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Batch Number: 244303 Batch Start Date: 09/06/18 18:53 Batch Analyst: Reed, Jonathan E

Batch Method: 537 Batch End Date: 09/08/18 14:15

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	ReceivedpH	LC537-IS 00082
MB 320-244303/1		537, 537				250.00 mL	1.00 mL	7 SU	100 uL
LLCS 320-244303/2		537, 537				250.00 mL	1.00 mL	7 SU	100 uL
LLCSD 320-244303/3		537, 537				250.00 mL	1.00 mL	7 SU	100 uL
320-42603-A-1	NAWC-082818-RW-293	537, 537	T	308.83 g	28.44 g	280.4 mL	1.00 mL	7 SU	100 uL
320-42603-A-2	NAWC-082818-FRB-293	537, 537	T	315.06 g	28.51 g	286.6 mL	1.00 mL	7 SU	100 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-LSP 00032	LC537-SU 00076	AnalysisComment			
MB 320-244303/1		537, 537			100 uL	Chlorine: ND			
LLCS 320-244303/2		537, 537		100 uL	100 uL	Chlorine: ND			
LLCSD 320-244303/3		537, 537		100 uL	100 uL	Chlorine: ND			
320-42603-A-1	NAWC-082818-RW-293	537, 537	T		100 uL	Chlorine: ND			
320-42603-A-2	NAWC-082818-FRB-293	537, 537	T		100 uL	Chlorine: ND			

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Batch Number: 244303 Batch Start Date: 09/06/18 18:53 Batch Analyst: Reed, Jonathan E

Batch Method: 537 Batch End Date: 09/08/18 14:15

Batch Notes	
Analyst ID - Aliquot Step	SKD
Batch Comment	Client labels match TA labels JER
Analyst ID - Concentration	SKD
Analyst ID - Final Volume Step	SKD
Internal Standard ID#	1356051
Manifold ID	3, 4
Methanol ID	1352682
pH Indicator ID	2618
Pipette ID	R40538G
Analyst ID - IS Reagent Drop	SKD
Analyst ID - IS Reagent Drop Witness	KJP
Analyst ID - SU Reagent Drop	JER
Analyst ID - SU Reagent Drop Witness	TWL
Analyst ID - TA Reagent Drop	JER
Analyst ID - TA Reagent Drop Witness	TWL
SPE Cartridge Lot ID	6390138-06
Trizma ID	SLBR5241V
Reagent Water ID	9/06/18

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.

Shipping and Receiving Documents

TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605-1500
phone 916.373.5600 fax 303.467.7248

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program: ☑DW ☐NPDES ☐RCRA ☐Other:

Client Contact	Project Manager: Andy Frebowitz	Site Contact: Mary Kay Bond	Date: 8/28/2018	COC No:
TetraTech	Tel/Fax: 610.382.2920	Lab Contact: Dave Alltucker	Carrier: FedEx	1 of 1 COCs
234 Mall Boulevard Suite 260	**Analysis Turnaround Time**			Sampler: Mary Kay Bond
King of Prussia, PA 19406	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
610-382-2924	TAT if different from Below 21			Walk-in Client:
610-491-9688	☐ 2 weeks			Lab Sampling:
Project Name: WE04	☐ 1 week			
Site: WE04	☐ 2 days			Job / SDG No.:
P O # 1132358 (through EarthToxics)	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 537 UCMR3	Sample Specific Notes:
NAWC-082818-RW-293	8/28/2018	10:10	G	DW	2	N	N	Y	
NAWC-082818-FRB-293	8/28/2018	10:05	G	DW	2	N	N	Y	Field Reagent Blank
								6	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other: Trizma

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑Non-Hazard ☐Flammable ☐Skin Irritant ☐Poison B ☐Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐Return to Client ☑Disposal by Lab ☐Archive for_____ Months

Fed Ex Tracking: 7730 7693 2569

Custody Seals Intact: ☑Yes ☐ No	Custody Seal No.: Seal		Cooler Temp. (°C): Obs'd: 2.1 Corr'd: 2.1		Therm ID No.: AK-5
Relinquished by: Mary Kay Bond	Company: Tetra Tech	Date/Time: 8/28/2018 16:00	Received by:	Company: TA-Sac	Date/Time: 8/29/18 945
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.11, dated 1/24/2017

Login Sample Receipt Checklist

Client: Tetra Tech, Inc.

Job Number: 320-42603-1

Login Number: 42603
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	seal
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

"NAWC-082818-RW-293","537","RES","320-42603-1","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","26","ng/L","J","6.1","DL","","TRG","","","36","LOQ","YES","-99","","280.4","1.00","14",""
"NAWC-082818-RW-293","537","RES","320-42603-1","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","28","ng/L","","2.5","DL","","TRG","","","18","LOQ","YES","-99","","280.4","1.00","7.1",""
"NAWC-082818-RW-293","537","RES","320-42603-1","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","9.6","ng/L","J","4.9","DL","","TRG","","","27","LOQ","YES","-99","","280.4","1.00","11",""
"NAWC-082818-RW-293","537","RES","320-42603-1","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","32","ng/L","U","14","DL","","TRG","","","80","LOQ","YES","-99","","280.4","1.00","32",""
"NAWC-082818-RW-293","537","RES","320-42603-1","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","11","ng/L","","1.7","DL","","TRG","","","8.9","LOQ","YES","-99","","280.4","1.00","3.6",""
"NAWC-082818-RW-293","537","RES","320-42603-1","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","18","ng/L","U M","7.1","DL","","TRG","","","21","LOQ","YES","-99","","280.4","1.00","18",""
"NAWC-082818-RW-293","537","RES","320-42603-1","TALSAC","STL00993","13C2 PFHxA","37","ng/L","","-99","DL","","SURR","105","","-99","LOQ","YES","35.7","","280.4","1.00","0",""
"NAWC-082818-RW-293","537","RES","320-42603-1","TALSAC","STL00996","13C2 PFDA","39","ng/L","","-99","DL","","SURR","109","","-99","LOQ","YES","35.7","","280.4","1.00","0",""
"NAWC-082818-FRB-293","537","RES","320-42603-2","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","14","ng/L","U","5.9","DL","","TRG","","","35","LOQ","YES","-99","","286.6","1.00","14",""
"NAWC-082818-FRB-293","537","RES","320-42603-2","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","7.0","ng/L","U","2.4","DL","","TRG","","","17","LOQ","YES","-99","","286.6","1.00","7.0",""
"NAWC-082818-FRB-293","537","RES","320-42603-2","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","10","ng/L","U","4.8","DL","","TRG","","","26","LOQ","YES","-99","","286.6","1.00","10",""
"NAWC-082818-FRB-293","537","RES","320-42603-2","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","31","ng/L","U","14","DL","","TRG","","","79","LOQ","YES","-99","","286.6","1.00","31",""
"NAWC-082818-FRB-293","537","RES","320-42603-2","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","3.5","ng/L","U","1.7","DL","","TRG","","","8.7","LOQ","YES","-99","","286.6","1.00","3.5",""
"NAWC-082818-FRB-293","537","RES","320-42603-2","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","17","ng/L","U","7.0","DL","","TRG","","","21","LOQ","YES","-99","","286.6","1.00","17",""
"NAWC-082818-FRB-293","537","RES","320-42603-2","TALSAC","STL00993","13C2 PFHxA","40","ng/L","","-99","DL","","SURR","114","","-99","LOQ","YES","34.9","","286.6","1.00","0",""
"NAWC-082818-FRB-293","537","RES","320-42603-2","TALSAC","STL00996","13C2 PFDA","37","ng/L","","-99","DL","","SURR","107","","-99","LOQ","YES","34.9","","286.6","1.00","0",""
"LLCS 320-244303/2-A","537","RES","LLCS 320-244303/2-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","45.8","ng/L","","6.8","DL","","SPK","114","","40","LOQ","YES","40.2","","250.00","1.00","16",""
"LLCS 320-244303/2-A","537","RES","LLCS 320-244303/2-A","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","21.6","ng/L","","2.8","DL","","SPK","108","","20","LOQ","YES","20.0","","250.00","1.00","8.0",""
"LLCS 320-244303/2-A","537","RES","LLCS 320-244303/2-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","32.1","ng/L","","5.5","DL","","SPK","106","","30","LOQ","YES","30.3","","250.00","1.00","12",""
"LLCS 320-244303/2-A","537","RES","LLCS 320-244303/2-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","128","ng/L","","16","DL","","SPK","142","","90","LOQ","YES","90.2","","250.00","1.00","36",""
"LLCS 320-244303/2-A","537","RES","LLCS 320-244303/2-A","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","11.7","ng/L","","1.9","DL","","SPK","117","","10","LOQ","YES","10.0","","250.00","1.00","4.0",""
"LLCS 320-244303/2-A","537","RES","LLCS 320-244303/2-A","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","20.6","ng/L","J","8.0","DL","","SPK","103","","24","LOQ","YES","20.0","","250.00","1.00","20",""
"LLCS 320-244303/2-A","537","RES","LLCS 320-244303/2-A","TALSAC","STL00993","13C2 PFHxA","44.1","ng/L","","-99","DL","","SURR","110","","-99","LOQ","YES","40.0","","250.00","1.00","0",""
"LLCS 320-244303/2-A","537","RES","LLCS 320-244303/2-A","TALSAC","STL00996","13C2 PFDA","41.4","ng/L","","-99","DL","","SURR","104","","-99","LOQ","YES","40.0","","250.00","1.00","0",""
"LLCSD 320-244303/3-A","537","RES","LLCSD 320-244303/3-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","45.6","ng/L","","6.8","DL","","SPK","113","0.6","40","LOQ","YES","40.2","LLCS 320-244303/2-A","250.00","1.00","16",""
"LLCSD 320-244303/3-A","537","RES","LLCSD 320-244303/3-A","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","22.8","ng/L","","2.8","DL","","SPK","114","5","20","LOQ","YES","20.0","LLCS 320-244303/2-

A","250.00","1.00","8.0",""
"LLCSD 320-244303/3-A","537","RES","LLCSD 320-244303/3-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","32.4","ng/L","","5.5","DL","","SPK","107","0.9","30","LOQ","YES","30.3","LLCS 320-244303/2-A","250.00","1.00","12",""
"LLCSD 320-244303/3-A","537","RES","LLCSD 320-244303/3-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","132","ng/L","","16","DL","","SPK","146","3","90","LOQ","YES","90.2","LLCS 320-244303/2-A","250.00","1.00","36",""
"LLCSD 320-244303/3-A","537","RES","LLCSD 320-244303/3-A","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","12.0","ng/L","","1.9","DL","","SPK","120","3","10","LOQ","YES","10.0","LLCS 320-244303/2-A","250.00","1.00","4.0",""
"LLCSD 320-244303/3-A","537","RES","LLCSD 320-244303/3-A","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","22.0","ng/L","J","8.0","DL","","SPK","110","7","24","LOQ","YES","20.0","LLCS 320-244303/2-A","250.00","1.00","20",""
"LLCSD 320-244303/3-A","537","RES","LLCSD 320-244303/3-A","TALSAC","STL00993","13C2 PFHxA","45.9","ng/L","","-99","DL","","SURR","115","4","-99","LOQ","YES","40.0","LLCS 320-244303/2-A","250.00","1.00","0",""
"LLCSD 320-244303/3-A","537","RES","LLCSD 320-244303/3-A","TALSAC","STL00996","13C2 PFDA","41.8","ng/L","","-99","DL","","SURR","104","0.9","-99","LOQ","YES","40.0","LLCS 320-244303/2-A","250.00","1.00","0",""
"MB 320-244303/1-A","537","RES","MB 320-244303/1-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","16","ng/L","U","6.8","DL","","TRG","","","40","LOQ","YES","-99","","250.00","1.00","16",""
"MB 320-244303/1-A","537","RES","MB 320-244303/1-A","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","8.0","ng/L","U","2.8","DL","","TRG","","","20","LOQ","YES","-99","","250.00","1.00","8.0",""
"MB 320-244303/1-A","537","RES","MB 320-244303/1-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","12","ng/L","U","5.5","DL","","TRG","","","30","LOQ","YES","-99","","250.00","1.00","12",""
"MB 320-244303/1-A","537","RES","MB 320-244303/1-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","36","ng/L","U","16","DL","","TRG","","","90","LOQ","YES","-99","","250.00","1.00","36",""
"MB 320-244303/1-A","537","RES","MB 320-244303/1-A","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","4.0","ng/L","U","1.9","DL","","TRG","","","10","LOQ","YES","-99","","250.00","1.00","4.0",""
"MB 320-244303/1-A","537","RES","MB 320-244303/1-A","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","20","ng/L","U","8.0","DL","","TRG","","","24","LOQ","YES","-99","","250.00","1.00","20",""
"MB 320-244303/1-A","537","RES","MB 320-244303/1-A","TALSAC","STL00993","13C2 PFHxA","44.2","ng/L","","-99","DL","","SURR","110","","-99","LOQ","YES","40.0","","250.00","1.00","0",""
"MB 320-244303/1-A","537","RES","MB 320-244303/1-A","TALSAC","STL00996","13C2 PFDA","43.6","ng/L","","-99","DL","","SURR","109","","-99","LOQ","YES","40.0","","250.00","1.00","0",""
"Unknown","Unknown","NAWC-082818-RW-293","08/28/2018 10:10","AQ","320-42603-1","NM","","2.10","537","METHOD","RES","09/06/2018 18:53","09/08/2018 22:40","TALSAC","COA","WET","NA","1","NA","NA","","100","320-244303","320-244303","NA","320-244655","320-42603-1","08/29/2018 09:45","08/31/2018 07:35",""
"Unknown","Unknown","NAWC-082818-FRB-293","08/28/2018 10:05","AQ","320-42603-2","FB","","2.10","537","METHOD","RES","09/06/2018 18:53","09/08/2018 22:44","TALSAC","COA","WET","NA","1","NA","NA","","100","320-244303","320-244303","NA","320-244655","320-42603-1","08/29/2018 09:45","08/31/2018 07:35",""
"Unknown","Unknown","LLCS 320-244303/2-A","","AQ","LLCS 320-244303/2-A","LCS","","-99","537","METHOD","RES","09/06/2018 18:53","09/08/2018 22:32","TALSAC","COA","WET","NA","1","NA","NA","","100","320-244303","320-244303","NA","320-244655","320-42603-1","09/06/2018 18:53","08/31/2018 07:35",""
"Unknown","Unknown","LLCSD 320-244303/3-A","","AQ","LLCSD 320-244303/3-A","LCSD","","-99","537","METHOD","RES","09/06/2018 18:53","09/08/2018 22:36","TALSAC","COA","WET","NA","1","NA","NA","","100","320-244303","320-244303","NA","320-244655","320-42603-1","09/06/2018 18:53","08/31/2018 07:35",""
"Unknown","Unknown","MB 320-244303/1-A","","AQ","MB 320-244303/1-A","MB","","-99","537","METHOD","RES","09/06/2018 18:53","09/08/2018 22:28","TALSAC","COA","WET","NA","1","NA","NA","","100","320-244303","320-244303","NA","320-

244655","320-42603-1","09/06/2018 18:53","08/31/2018 07:35",""

TETRA TECH

INTERNAL CORRESPONDENCE

TO: **A. FREBOWITZ** **DATE:** **OCTOBER 4, 2018**

FROM: **TERRI L. SOLOMON** **COPIES:** **DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION –POLYFLUOROALKYL SUBSTANCES (PFAS)**
NAS JRB WILLOW GROVE
SAMPLE DELIVERY GROUP (SDG) 320-42603-1

SAMPLES: 1/Field Reagent Blank (FRB)
NAWC-082818-FRB-293

1/Drinking Water
NAWC-082818-RW-293

Overview

The sample set for NAS JRB Willow Grove, SDG 320-42603-1, consisted of one (1) drinking water sample and one (1) FRB sample. All samples were analyzed for select perfluorinated alkyl acids including pentadecafluorooctanoic acid (PFOA), perfluorobutane sulfonic acid (PFBS), perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA) and perfluorooctane sulfonic acid (PFOS). No field duplicate pairs were included in this SDG.

The samples were collected by Tetra Tech on August 28, 2018 and analyzed by Test America-Sacramento. All sample analyses were conducted in accordance with EPA Method 537 version 1.1 analytical and reporting protocols.

The data contained in this SDG was validated with regard to the following parameters: data completeness, holding times, mass calibration, mass spectral acquisition rate, tune check, instrument sensitivity check, initial/continuing calibrations, ion transitions, laboratory method/FRBs, surrogate spike recoveries, laboratory control sample / laboratory control sample duplicate results, injected internal standard areas and recoveries, chromatographic resolution, analyte identification, analyte quantitation, and detection limits. Areas of concern are listed below.

Major

None.

Minor

Detected results reported below the limit of quantitation (LOQ) but above the detection limit (DL) were qualified as estimated (J).

Notes

The sample with detections and its associated FRB is summarized below. No detected results were present in the FRB.

Sample	**Associated FRB**
NAWC-082818-RW-293	NAWC-082818-FRB-293

Non-detected results were reported to the Limit of Detection (LOD).

The buffering agent Trizma was added to all drinking water samples.

Executive Summary

Laboratory Performance: No issues.

Other Factors Affecting Data Quality: Results below the RL were estimated.

The data for these analyses were reviewed with reference to the Environmental Protection Agency document EPA/600/R-08/092, Method 537, "Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)", (September 2009), US EPA National Functional Guidelines for Organic Data Review (January 2017), and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories" (July 2013) as applicable. The text of this report has been formulated to address only those areas affecting data quality.

Tetra Tech, Inc.
Terri L. Solomon
Chemist/Data Validator

Tetra Tech, Inc.
Joseph A. Samchuck
Data Validation Manager

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Data Qualifier Definitions

The following definitions provide brief explanations of the validation qualifiers assigned to results in the data review process.

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted detection limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte was below the reporting limit).
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
UJ	The analyte was analyzed for, but was not detected. The reported detection limit is approximate and may be inaccurate or imprecise.
NJ	The analyte has been “tentatively identified” or “presumptively” as present and the associated numerical value is the estimated concentration in the sample.
R	The sample result (detected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
UR	The sample result (nondetected) is unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team, but exclusion of the data is recommended.

Appendix A

Qualified Analytical Results

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (i.e., % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = ICP PDS Recovery Noncompliance; MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; i.e.chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = RPD between columns/detectors >40% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 standard deviations is greater than sample activity
Z1 = Tentatively Identified Compound considered presumptively present
Z2 = Tentatively Identified Compound column bleed
Z3 = Tentatively Identified Compound aldol condensate
Z4 = Sample activity is less than the at uncertainty at 3 standard deviations and greater than the MDC
Z5 = Sample activity is less than the at uncertainty at 3 standard deviations and less than the MDC

PROJ_NO: 08005-WE04	NSAMPLE	NAWC-082818-FRB-293			NAWC-082818-RW-293		
SDG: 320-42603-1	LAB_ID	320-42603-2			320-42603-1		
FRACTION: PFAS	SAMP_DATE	8/28/2018			8/28/2018		
MEDIA: WATER	QC_TYPE	FB			NM		
	UNITS	NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0		
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
PENTADECAFLUOROOCTANOIC ACID (PFOA)		7	U		28		
PERFLUOROBUTANESULFONIC ACID (PFBS)		31	U		32	U	
PERFLUOROHEPTANOIC ACID (PFHPA)		3.5	U		11		
PERFLUOROHEXANESULFONIC ACID (PFHXS)		10	U		9.6	J	P
PERFLUORONONANOIC ACID (PFNA)		17	U		18	U	
PERFLUOROOCTANESULFONIC ACID (PFOS)		14	U		26	J	P

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-42603-1

SDG No.:

Client Sample ID: NAWC-082818-RW-293 | Lab Sample ID: 320-42603-1

Matrix: Water | Lab File ID: 2018.09.08_537BD _054.d

Analysis Method: 537 | Date Collected: 08/28/2018 10:10

Extraction Method: 537 | Date Extracted: 09/06/2018 18:53

Sample wt/vol: 280.4(mL) | Date Analyzed: 09/08/2018 22:40

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	26	J	36	14	6.1
335-67-1	Perfluorooctanoic acid (PFOA)	28		18	7.1	2.5
375-95-1	Perfluorononanoic acid (PFNA)	18	U ~~M~~	21	18	7.1
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	9.6	J	27	11	4.9
375-85-9	Perfluoroheptanoic acid (PFHpA)	11		8.9	3.6	1.7
375-73-5	Perfluorobutanesulfonic acid (PFBS)	32	U	80	32	14

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	105		70-130
STL00996	13C2 PFDA	109		70-130

Teri L Salemen
10/04/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-42603-1

SDG No.:

Client Sample ID: NAWC-082818-FRB-293 | Lab Sample ID: 320-42603-2

Matrix: Water | Lab File ID: 2018.09.08_537BD _055.d

Analysis Method: 537 | Date Collected: 08/28/2018 10:05

Extraction Method: 537 | Date Extracted: 09/06/2018 18:53

Sample wt/vol: 286.6(mL) | Date Analyzed: 09/08/2018 22:44

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	14	U	35	14	5.9
335-67-1	Perfluorooctanoic acid (PFOA)	7.0	U	17	7.0	2.4
375-95-1	Perfluorononanoic acid (PFNA)	17	U	21	17	7.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	10	U	26	10	4.8
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.5	U	8.7	3.5	1.7
375-73-5	Perfluorobutanesulfonic acid (PFBS)	31	U	79	31	14

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	114		70-130
STL00996	13C2 PFDA	107		70-130

10/04/2018

Appendix B

Results as Reported by the Laboratory

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Client Sample ID: NAWC-082818-RW-293 Lab Sample ID: 320-42603-1

Matrix: Water Lab File ID: 2018.09.08_537BD _054.d

Analysis Method: 537 Date Collected: 08/28/2018 10:10

Extraction Method: 537 Date Extracted: 09/06/2018 18:53

Sample wt/vol: 280.4(mL) Date Analyzed: 09/08/2018 22:40

Con. Extract Vol.: 1.00(mL) Dilution Factor: 1

Injection Volume: 2(uL) GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	26	J	36	14	6.1
335-67-1	Perfluorooctanoic acid (PFOA)	28		18	7.1	2.5
375-95-1	Perfluorononanoic acid (PFNA)	18	U M	21	18	7.1
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	9.6	J	27	11	4.9
375-85-9	Perfluoroheptanoic acid (PFHpA)	11		8.9	3.6	1.7
375-73-5	Perfluorobutanesulfonic acid (PFBS)	32	U	80	32	14

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	105		70-130
STL00996	13C2 PFDA	109		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-42603-1

SDG No.:

Client Sample ID: NAWC-082818-FRB-293 | Lab Sample ID: 320-42603-2

Matrix: Water | Lab File ID: 2018.09.08_537BD _055.d

Analysis Method: 537 | Date Collected: 08/28/2018 10:05

Extraction Method: 537 | Date Extracted: 09/06/2018 18:53

Sample wt/vol: 286.6(mL) | Date Analyzed: 09/08/2018 22:44

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	14	U	35	14	5.9
335-67-1	Perfluorooctanoic acid (PFOA)	7.0	U	17	7.0	2.4
375-95-1	Perfluorononanoic acid (PFNA)	17	U	21	17	7.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	10	U	26	10	4.8
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.5	U	8.7	3.5	1.7
375-73-5	Perfluorobutanesulfonic acid (PFBS)	31	U	79	31	14

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	114		70-130
STL00996	13C2 PFDA	107		70-130

Appendix C

Support Documentation

TestAmerica Sacramento
880 Riverside Parkway
West Sacramento, CA 95605-1500
phone 916.373.5600 fax 303.467.7248

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

Regulatory Program: ☑DW ☐NPDES ☐RCRA ☐Other:

Client Contact	Project Manager: Andy Frebowitz	Site Contact: Mary Kay Bond	Date: 8/28/2018	COC No:
TetraTech	Tel/Fax: 610.382.2920	Lab Contact: Dave Alltucker	Carrier: FedEx	1 of 1 COCs
234 Mall Boulevard Suite 260	Analysis Turnaround Time			Sampler: Mary Kay Bond
King of Prussia, PA 19406	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
610-382-2924	TAT if different from Below 21			Walk-in Client:
610-491-9688	☐ 2 weeks			Lab Sampling:
Project Name: WE04	☐ 1 week			
Site: WE04	☐ 2 days			Job / SDG No.:
P O # 1132358 (through EarthToxics)	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	EPA 537 UCMR3	Sample Specific Notes:
NAWC-082818-RW-293	8/28/2018	10:10	G	DW	2	N	N	Y	
NAWC-082818-FRB-293	8/28/2018	10:05	G	DW	2	N	N	Y	Field Reagent Blank

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other: Trizma — 6

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☑Non-Hazard ☐Flammable ☐Skin Irritant ☐Poison B ☐Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐Return to Client ☑Disposal by Lab ☐Archive for_____ Months

Fed Ex Tracking: 7730 7693 2569

Custody Seals Intact: ☒ Yes ☐ No	Custody Seal No.: Seal	Cooler Temp. (°C): Obs'd: 2.1 Corr'd: 2.1	Therm ID No.: AK-5

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Mary Kay Bond	Tetra Tech	8/28/2018 16:00		TA-Sac	8/29/18 945
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.11, dated 1/24/2017

S:\I\WillowGrove PFOs Private Well\COCs TT\COC 20180828.xls

Job Narrative
320-42603-1

Receipt
The samples were received on 8/29/2018 9:45 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.1° C.

LCMS
Method(s) 537: The first level standard from the initial calibration curve is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5amu; therefore, detection of the analyte serves as verification that the assigned mass is within +/- 0.5amu of the true value, which meets the DoD/DOE QSM tune criterion.

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

Organic Prep
Method(s) 537: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate/sample duplicate (MS/MSD/DUP) associated with preparation batch 320-244303.

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

Definitions/Glossary

Client: Tetra Tech, Inc. TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Qualifiers

LCMS

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

Glossary

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

Method Summary

Client: Tetra Tech, Inc. TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Method	Method Description	Protocol	Laboratory
537	Perfluorinated Alkyl Acids (LC/MS)	EPA	TAL SAC
537	Extraction of Perfluorinated Alkyl Acids	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Sample Summary

Client: Tetra Tech, Inc.
TestAmerica Job ID: 320-42603-1
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-42603-1	NAWC-082818-RW-293	Water	08/28/18 10:10	08/29/18 09:45
320-42603-2	NAWC-082818-FRB-293	Water	08/28/18 10:05	08/29/18 09:45

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Matrix: Water Level: Low

GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFHxA #	PFDA #
NAWC-082818-RW-293	320-42603-1	105	109
NAWC-082818-FRB-293	320-42603-2	114	107
	MB 320-244303/1-A	110	109
	LLCS 320-244303/2-A	110	104
	LLCSD 320-244303/3-A	115	104

	QC LIMITS
PFHxA = 13C2 PFHxA	70-130
PFDA = 13C2 PFDA	70-130

Column to be used to flag recovery values

FORM II 537

FORM III
LCMS LOW LEVEL CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 2018.09.08_537BD _052.d

Lab ID: LLCS 320-244303/2-A Client ID:

COMPOUND	SPIKE ADDED (ng/L)	LLCS CONCENTRATION (ng/L)	LLCS % REC	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	40.2	45.8	114	50-150	
Perfluorooctanoic acid (PFOA)	20.0	21.6	108	50-150	
Perfluorononanoic acid (PFNA)	20.0	20.6 J	103	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	32.1	106	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	11.7	117	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	128	142	50-150	

Column to be used to flag recovery and RPD values

FORM III 537

FORM III
LCMS LOW LEVEL CONTROL STANDARD DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Matrix: Water Level: Low Lab File ID: 2018.09.08_537BD _053.d

Lab ID: LLCSD 320-244303/3-A Client ID:

COMPOUND	SPIKE ADDED (ng/L)	LLCSD CONCENTRATION (ng/L)	LLCSD % REC	% RPD	QC LIMITS RPD	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	40.2	45.6	113	0.6	50	50-150	
Perfluorooctanoic acid (PFOA)	20.0	22.8	114	5	50	50-150	
Perfluorononanoic acid (PFNA)	20.0	22.0 J	110	7	50	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	32.4	107	0.9	50	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	12.0	120	3	50	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	132	146	3	50	50-150	

Column to be used to flag recovery and RPD values

FORM III 537

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab File ID: 2018.09.08_537BD _051.d Lab Sample ID: MB 320-244303/1-A

Matrix: Water Date Extracted: 09/06/2018 18:53

Instrument ID: A8_N Date Analyzed: 09/08/2018 22:28

Level:(Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LLCS 320-244303/2-A	2018.09.08_537BD_052.d	09/08/2018 22:32
	LLCSD 320-244303/3-A	2018.09.08_537BD_053.d	09/08/2018 22:36
NAWC-082818-RW-293	320-42603-1	2018.09.08_537BD_054.d	09/08/2018 22:40
NAWC-082818-FRB-293	320-42603-2	2018.09.08_537BD_055.d	09/08/2018 22:44

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento | Job No.: 320-42603-1

SDG No.:

Client Sample ID: | Lab Sample ID: MB 320-244303/1-A

Matrix: Water | Lab File ID: 2018.09.08_537BD _051.d

Analysis Method: 537 | Date Collected:

Extraction Method: 537 | Date Extracted: 09/06/2018 18:53

Sample wt/vol: 250.00(mL) | Date Analyzed: 09/08/2018 22:28

Con. Extract Vol.: 1.00(mL) | Dilution Factor: 1

Injection Volume: 2(uL) | GC Column: GeminiC18 3x100 ID: 3(mm)

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

Analysis Batch No.: 244655 | Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	8.0	U	20	8.0	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	8.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	4.0	U	10	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	90	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	110		70-130
STL00996	13C2 PFDA	109		70-130

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Calibration Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3(mm) Calibration End Date: 08/30/2018 16:42

Calibration ID: 40933

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MEAN AREA AND MEAN RT		899367	1.83	2339667	2.08		
UPPER LIMIT		1349051	2.33	3509501	2.58		
LOWER LIMIT		449684	1.33	1169834	1.58		
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCVL 320-243207/9		960926	1.83	2460442	2.08		
ICV 320-243207/11		788747	1.83	2000251	2.08		
CCVL 320-244644/1		1214024	1.86	3247674	2.10		
CCV 320-244655/46 CCVIS		918005	1.84	2391130	2.09		
MB 320-244303/1-A		1238890	1.85	3236532	2.09		
LLCS 320-244303/2-A		1155150	1.85	3056932	2.09		
LLCSD 320-244303/3-A		1183349	1.84	3220491	2.09		
320-42603-1	NAWC-082818-RW-293	1099812	1.84	2860537	2.09		
320-42603-2	NAWC-082818-FRB-293	1134047	1.84	3031793	2.09		
CCV 320-244655/53 CCVIS		1070182	1.84	2965225	2.09		

13PFOA = 13C2-PFOA
PFOS = 13C4 PFOS

Area Limit = 50%-150% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Sample No.: CCV 320-244655/46 Date Analyzed: 09/08/2018 22:20

Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3(mm)

Lab File ID (Standard): 2018.09.08_537BD _0 Heated Purge: (Y/N) N

Calibration ID: 40933

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		918005	1.84	2391130	2.09		
UPPER LIMIT		1285207	2.34	3347582	2.59		
LOWER LIMIT		642604	1.34	1673791	1.59		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-244303/1-A		1238890	1.85	3236532	2.09		
LLCS 320-244303/2-A		1155150	1.85	3056932	2.09		
LLCSD 320-244303/3-A		1183349	1.84	3220491	2.09		
320-42603-1	NAWC-082818-RW-293	1099812	1.84	2860537	2.09		
320-42603-2	NAWC-082818-FRB-293	1134047	1.84	3031793	2.09		

13PFOA = 13C2-PFOA
PFOS = 13C4 PFOS

Area Limit = 70%-140% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Sample No.: CCV 320-244655/53 Date Analyzed: 09/08/2018 22:48

Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3(mm)

Lab File ID (Standard): 2018.09.08_537BD _0 Heated Purge: (Y/N) N

Calibration ID: 40933

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		1070182	1.84	2965225	2.09		
UPPER LIMIT		1498255	2.34	4151315	2.59		
LOWER LIMIT		749127	1.34	2075658	1.59		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-244303/1-A		1238890	1.85	3236532	2.09		
LLCS 320-244303/2-A		1155150	1.85	3056932	2.09		
LLCSD 320-244303/3-A		1183349	1.84	3220491	2.09		
320-42603-1	NAWC-082818-RW-293	1099812	1.84	2860537	2.09		
320-42603-2	NAWC-082818-FRB-293	1134047	1.84	3031793	2.09		

13PFOA = 13C2-PFOA
PFOS = 13C4 PFOS

Area Limit = 70%-140% of internal standard area
RT Limit = ± 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII 537

FORM VI
LCMS BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1 Analy Batch No.: 243207

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/30/2018 16:19 Calibration End Date: 08/30/2018 16:42 Calibration ID: 40933

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-243207/2	2018.08.30_537ICALXX_003.d
Level 2	IC 320-243207/3	2018.08.30_537ICALXX_004.d
Level 3	IC 320-243207/4	2018.08.30_537ICALXX_005.d
Level 4	IC 320-243207/5	2018.08.30_537ICALXX_006.d
Level 5	IC 320-243207/6	2018.08.30_537ICALXX_007.d
Level 6	IC 320-243207/7	2018.08.30_537ICALXX_008.d

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Perfluorobutanesulfonic acid (PFBS)	1.2230 0.9930	1.1860	1.1753	1.1605	1.0890	Ave		1.1378				7.3		30.0			
Perfluoroheptanoic acid (PFHpA)	1.0381 1.0845	1.0721	1.0557	1.1770	1.1132	Ave		1.0901				4.6		30.0			
Perfluorohexanesulfonic acid (PFHxS)	1.6889 1.6717	1.6473	1.7005	1.7822	1.7495	Ave		1.7067				2.9		30.0			
Perfluorooctanoic acid (PFOA)	1.1238 1.0683	1.0221	1.0750	1.0854	1.1051	Ave		1.0799				3.2		30.0			
Perfluorooctanesulfonic acid (PFOS)	1.0648 1.0771	1.0440	1.0513	1.1032	1.0916	Ave		1.0720				2.1		30.0			
Perfluorononanoic acid (PFNA)	0.8008 0.7934	0.8096	0.8197	0.8356	0.8107	Ave		0.8116				1.8		30.0			
13C2 PFHxA	1.1521 1.1375	1.1090	1.1128	1.1379	1.1749	Ave		1.1374				2.2		30.0			
13C2 PFDA	0.8838 0.8930	0.8995	0.8727	0.9522	0.9127	Ave		0.9023				3.1		30.0			

Note: The M1 coefficient is the same as Ave RRF for an Ave curve type.

FORM VI
LCMS BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1 Analy Batch No.: 243207

SDG No.:

Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

Calibration Start Date: 08/30/2018 16:19 Calibration End Date: 08/30/2018 16:42 Calibration ID: 40933

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-243207/2	2018.08.30_537ICALXX_003.d
Level 2	IC 320-243207/3	2018.08.30_537ICALXX_004.d
Level 3	IC 320-243207/4	2018.08.30_537ICALXX_005.d
Level 4	IC 320-243207/5	2018.08.30_537ICALXX_006.d
Level 5	IC 320-243207/6	2018.08.30_537ICALXX_007.d
Level 6	IC 320-243207/7	2018.08.30_537ICALXX_008.d

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Perfluorobutanesulfonic acid (PFBS)	PFOS	Ave	885235 14291597	2051546	4145133	8657186	11998694	9.00 180	20.0	45.0	90.1	135
Perfluoroheptanoic acid (PFHpA)	13PFOA	Ave	88795 1861705	225064	443367	1011347	1464161	0.960 19.4	2.16	4.86	9.72	14.6
Perfluorohexanesulfonic acid (PFHxS)	PFOS	Ave	407943 8080418	957042	2014325	4465219	6473859	3.00 60.5	6.72	15.1	30.2	45.4
Perfluorooctanoic acid (PFOA)	13PFOA	Ave	198271 3735476	437086	919687	1899747	2960649	1.98 39.6	4.40	9.90	19.8	29.7
Perfluorooctanesulfonic acid (PFOS)	PFOS	Ave	338576 6804405	792676	1627539	3612214	5279410	3.95 79.1	8.79	19.8	39.5	59.3
Perfluorononanoic acid (PFNA)	13PFOA	Ave	141277 2774537	346235	701242	1462550	2171914	1.98 39.6	4.40	9.90	19.8	29.7
13C2 PFHxA	13PFOA	Ave	1026522 1004475	1077815	961641	1005876	1059885	10.0 10.0	10.0	10.0	10.0	10.0
13C2 PFDA	13PFOA	Ave	787485 788559	874271	754115	841794	823302	10.0 10.0	10.0	10.0	10.0	10.0

Curve Type Legend:
Ave = Average ISTD

FORM VI
LCMS BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
READBACK PERCENT ERROR

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1 Analy Batch No.: 243207

SDG No.:

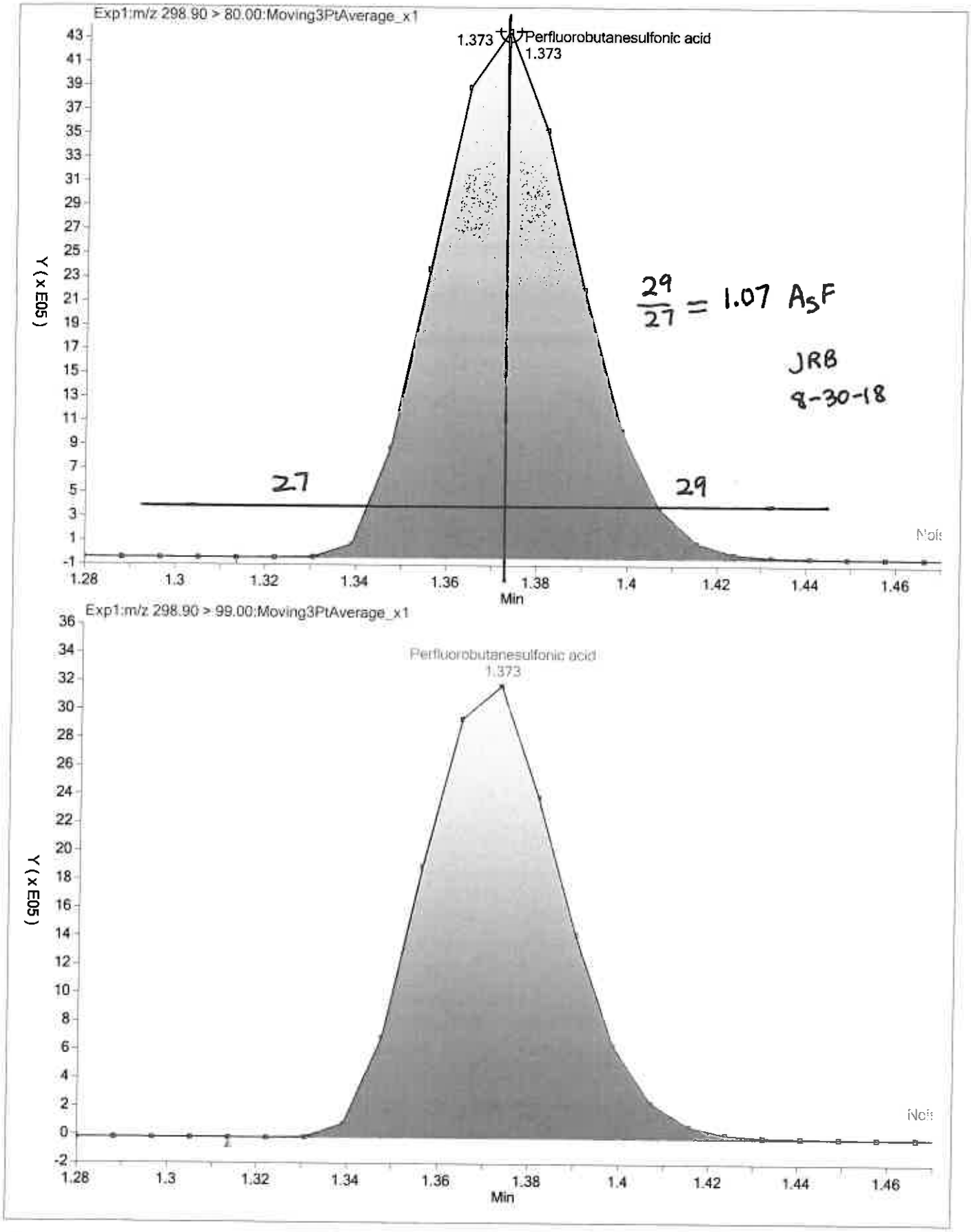
Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

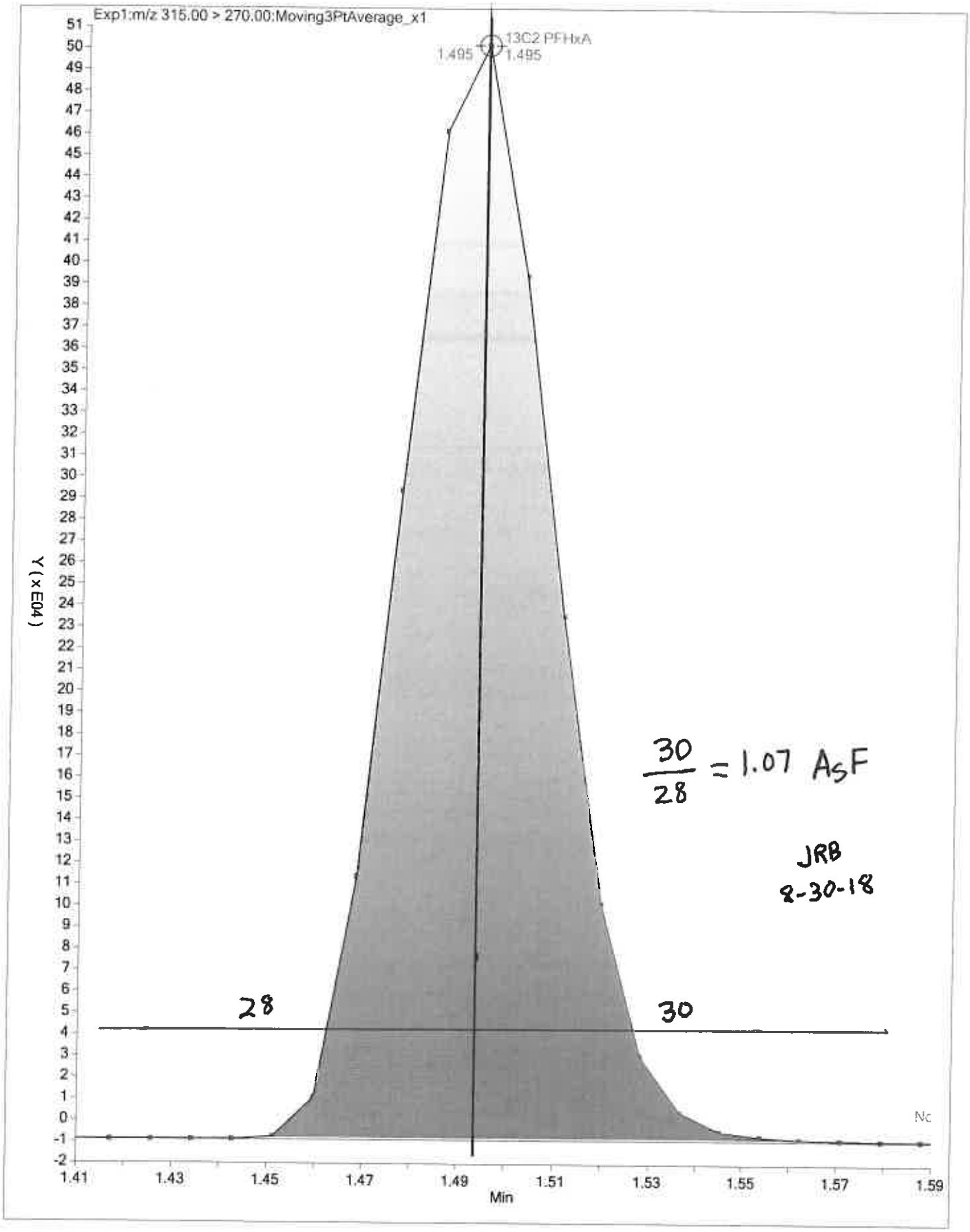
Calibration Start Date: 08/30/2018 16:19 Calibration End Date: 08/30/2018 16:42 Calibration ID: 40933

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-243207/2	2018.08.30_537ICALXX_003.d
Level 2	IC 320-243207/3	2018.08.30_537ICALXX_004.d
Level 3	IC 320-243207/4	2018.08.30_537ICALXX_005.d
Level 4	IC 320-243207/5	2018.08.30_537ICALXX_006.d
Level 5	IC 320-243207/6	2018.08.30_537ICALXX_007.d
Level 6	IC 320-243207/7	2018.08.30_537ICALXX_008.d

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #	LVL 6 #	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6
Perfluorobutanesulfonic acid (PFBS)	7.5	4.2	3.3	2.0	-4.3	-12.7	50	30	30	30	30	30
Perfluoroheptanoic acid (PFHpA)	-4.8	-1.7	-3.2	8.0	2.1	-0.5	50	30	30	30	30	30
Perfluorohexanesulfonic acid (PFHxS)	-1.0	-3.5	-0.4	4.4	2.5	-2.1	50	30	30	30	30	30
Perfluorooctanoic acid (PFOA)	4.1	-5.4	-0.5	0.5	2.3	-1.1	50	30	30	30	30	30
Perfluorooctanesulfonic acid (PFOS)	-0.7	-2.6	-1.9	2.9	1.8	0.5	50	30	30	30	30	30
Perfluorononanoic acid (PFNA)	-1.3	-0.2	1.0	3.0	-0.1	-2.2	50	30	30	30	30	30
13C2 PFHxA	1.3	-2.5	-2.2	0.0	3.3	0.0	30	30	30	30	30	30
13C2 PFDA	-2.1	-0.3	-3.3	5.5	1.1	-1.0	30	30	30	30	30	30


Exp1:m/z 298.90 > 80.00:Moving3PtAverage_x1
1.373
Perfluorobutanesulfonic acid
1.373
Y (x E05)
Min
27
29
29/27 = 1.07 A5F
JRB
8-30-18
Exp1:m/z 298.90 > 99.00:Moving3PtAverage_x1
Perfluorobutanesulfonic acid
1.373
Y (x E05)
Min


Exp1:m/z 315.00 > 270.00:Moving3PtAverage_x1
13C2 PFHxA
1.495
1.495
Y (x E04)
Min
28
30
Nc
30/28 = 1.07 ASF
JRB
8-30-18

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: CCVL 320-243207/9 Calibration Date: 08/30/2018 16:52

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.08.30_537ICALXX_010.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.175		20.7	20.0	3.3	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.068		2.12	2.16	-2.0	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.650		6.50	6.72	-3.3	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.033		4.21	4.40	-4.4	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.040		8.52	8.79	-3.0	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.7621		4.13	4.40	-6.1	50.0
13C2 PFHxA	Ave	1.137	1.089		9.57	10.0	-4.3	30.0
13C2 PFDA	Ave	0.9023	0.8856		9.81	10.0	-1.9	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: ICV 320-243207/11 Calibration Date: 08/30/2018 17:01

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.08.30_537ICALXX_012.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.148		89.2	88.4	0.9	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.042		9.56	10.0	-4.4	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.677		18.6	18.9	-1.7	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.073		19.9	20.0	-0.6	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.035		17.9	18.6	-3.5	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.8003		19.7	20.0	-1.4	30.0
13C2 PFHxA	Ave	1.137	1.135		9.98	10.0	-0.2	30.0
13C2 PFDA	Ave	0.9023	0.9123		10.1	10.0	1.1	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: CCVL 320-244644/1 Calibration Date: 09/08/2018 19:22

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.09.08_537BD _004.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.283		22.6	20.0	12.8	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.112		2.20	2.16	2.0	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.457		5.74	6.72	-14.6	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.026		4.18	4.40	-5.0	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.000		8.20	8.79	-6.7	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.7933		4.30	4.40	-2.3	50.0
13C2 PFHxA	Ave	1.137	1.209		10.6	10.0	6.3	30.0
13C2 PFDA	Ave	0.9023	0.9194		10.2	10.0	1.9	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: CCV 320-244655/46 Calibration Date: 09/08/2018 22:20

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.09.08_537BD _049.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.195		142	135	5.0	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.157		15.5	14.6	6.1	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.570		41.7	45.4	-8.0	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.048		28.8	29.7	-2.9	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.093		60.5	59.3	2.0	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.7995		29.3	29.7	-1.5	30.0
13C2 PFHxA	Ave	1.137	1.198		10.5	10.0	5.4	30.0
13C2 PFDA	Ave	0.9023	0.9250		10.3	10.0	2.5	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Lab Sample ID: CCV 320-244655/53 Calibration Date: 09/08/2018 22:48

Instrument ID: A8_N Calib Start Date: 08/30/2018 16:19

GC Column: GeminiC18 3x100 ID: 3.00(mm) Calib End Date: 08/30/2018 16:42

Lab File ID: 2018.09.08_537BD _056.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.138	1.352		53.5	45.0	18.8	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.707	1.522		13.5	15.1	-10.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.090	1.124		5.01	4.86	3.1	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.080	1.076		9.86	9.90	-0.4	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.072	1.035		19.1	19.8	-3.4	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8116	0.8473		10.3	9.90	4.4	30.0
13C2 PFHxA	Ave	1.137	1.254		11.0	10.0	10.3	30.0
13C2 PFDA	Ave	0.9023	0.9466		10.5	10.0	4.9	30.0

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Start Date: 08/30/2018 16:19

Analysis Batch Number: 243207 End Date: 08/30/2018 17:01

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-243207/2		08/30/2018 16:19	1	2018.08.30_537ICALXX_003.d	GeminiC18 3x100 3(mm)
IC 320-243207/3		08/30/2018 16:24	1	2018.08.30_537ICALXX_004.d	GeminiC18 3x100 3(mm)
IC 320-243207/4		08/30/2018 16:28	1	2018.08.30_537ICALXX_005.d	GeminiC18 3x100 3(mm)
IC 320-243207/5 ICISAV		08/30/2018 16:33	1	2018.08.30_537ICALXX_006.d	GeminiC18 3x100 3(mm)
IC 320-243207/6		08/30/2018 16:38	1	2018.08.30_537ICALXX_007.d	GeminiC18 3x100 3(mm)
IC 320-243207/7		08/30/2018 16:42	1	2018.08.30_537ICALXX_008.d	GeminiC18 3x100 3(mm)
ZZZZZ		08/30/2018 16:47	1		GeminiC18 3x100 3(mm)
CCVL 320-243207/9		08/30/2018 16:52	1	2018.08.30_537ICALXX_010.d	GeminiC18 3x100 3(mm)
ICB 320-243207/10		08/30/2018 16:56	1		GeminiC18 3x100 3(mm)
ICV 320-243207/11		08/30/2018 17:01	1	2018.08.30_537ICALXX_012.d	GeminiC18 3x100 3(mm)

537

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Start Date: 09/08/2018 19:22

Analysis Batch Number: 244644 End Date: 09/08/2018 20:14

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-244644/1		09/08/2018 19:22	1	2018.09.08_537B D 004.d	GeminiC18 3x100 3(mm)
CCV 320-244644/2 CCVIS		09/08/2018 19:26	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:34	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:38	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:42	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:46	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:50	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:54	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 19:58	1		GeminiC18 3x100 3(mm)
ZZZZZ		09/08/2018 20:02	1		GeminiC18 3x100 3(mm)
CCV 320-244644/14 CCVIS		09/08/2018 20:14	1		GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Instrument ID: A8_N Start Date: 09/08/2018 22:20

Analysis Batch Number: 244655 End Date: 09/08/2018 22:48

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-244655/46 CCVIS		09/08/2018 22:20	1	2018.09.08_537B D_049.d	GeminiC18 3x100 3(mm)
MB 320-244303/1-A		09/08/2018 22:28	1	2018.09.08_537B D_051.d	GeminiC18 3x100 3(mm)
LLCS 320-244303/2-A		09/08/2018 22:32	1	2018.09.08_537B D_052.d	GeminiC18 3x100 3(mm)
LLCSD 320-244303/3-A		09/08/2018 22:36	1	2018.09.08_537B D_053.d	GeminiC18 3x100 3(mm)
320-42603-1		09/08/2018 22:40	1	2018.09.08_537B D_054.d	GeminiC18 3x100 3(mm)
320-42603-2		09/08/2018 22:44	1	2018.09.08_537B D_055.d	GeminiC18 3x100 3(mm)
CCV 320-244655/53 CCVIS		09/08/2018 22:48	1	2018.09.08_537B D_056.d	GeminiC18 3x100 3(mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Batch Number: 244303 Batch Start Date: 09/06/18 18:53 Batch Analyst: Reed, Jonathan E

Batch Method: 537 Batch End Date: 09/08/18 14:15

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	ReceivedpH	LC537-IS 00082
MB 320-244303/1		537, 537				250.00 mL	1.00 mL	7 SU	100 uL
LLCS 320-244303/2		537, 537				250.00 mL	1.00 mL	7 SU	100 uL
LLCSD 320-244303/3		537, 537				250.00 mL	1.00 mL	7 SU	100 uL
320-42603-A-1	NAWC-082818-RW-293	537, 537	T	308.83 g	28.44 g	280.4 mL	1.00 mL	7 SU	100 uL
320-42603-A-2	NAWC-082818-FRB-293	537, 537	T	315.06 g	28.51 g	286.6 mL	1.00 mL	7 SU	100 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-LSP 00032	LC537-SU 00076	AnalysisComment			
MB 320-244303/1		537, 537			100 uL	Chlorine: ND			
LLCS 320-244303/2		537, 537		100 uL	100 uL	Chlorine: ND			
LLCSD 320-244303/3		537, 537		100 uL	100 uL	Chlorine: ND			
320-42603-A-1	NAWC-082818-RW-293	537, 537	T		100 uL	Chlorine: ND			
320-42603-A-2	NAWC-082818-FRB-293	537, 537	T		100 uL	Chlorine: ND			

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-42603-1

SDG No.:

Batch Number: 244303 Batch Start Date: 09/06/18 18:53 Batch Analyst: Reed, Jonathan E

Batch Method: 537 Batch End Date: 09/08/18 14:15

Batch Notes	
Analyst ID - Aliquot Step	SKD
Batch Comment	Client labels match TA labels JER
Analyst ID - Concentration	SKD
Analyst ID - Final Volume Step	SKD
Internal Standard ID#	1356051
Manifold ID	3, 4
Methanol ID	1352682
pH Indicator ID	2618
Pipette ID	R40538G
Analyst ID - IS Reagent Drop	SKD
Analyst ID - IS Reagent Drop Witness	KJP
Analyst ID - SU Reagent Drop	JER
Analyst ID - SU Reagent Drop Witness	TWL
Analyst ID - TA Reagent Drop	JER
Analyst ID - TA Reagent Drop Witness	TWL
SPE Cartridge Lot ID	6390138-06
Trizma ID	SLBR5241V
Reagent Water ID	9/06/18

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.

PFAS Calibration Calculations:

Initial Calibration 8/30/2018
Instrument A8_N

PFOA

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	Reported RRF
1.98	198271	891025	10	1.12384	1.1238
4.4	437086	971912	10	1.02209	1.0221
9.9	919687	864139	10	1.07503	1.075
19.8	1899747	884013	10	1.08536	1.0854
29.7	2960649	902081	10	1.10506	1.1051
39.6	3735476	883033	10	1.06825	1.0683
			Average	1.07994	1.0799
			Standard Deviation	0.0349	
			RSD	0.0323	
			%RSD	3.23303	3.2

Continuing Calibration 09/08/2018 @ 19:22
PFOA

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	%D	Reported RRF	Reported %D
4.4	548294	1214024	10	1.0264	-4.950464	1.026	-5

Sample Identification NAWC-082818-RW-293
Compound PFOA

Compound Area	932096	Average RRF	1.0895
Internal Standard Amount (ng)	10	Sample Volume(ml)	280.4
Dilution Factor	1	Volume Extract (ml)	1
Internal Standard Area	1099812	Injection Volume (µl)	1
Concentration	27.7419 ng/L		
Reported Result	28 ng/L		

Surrogate PFHxA

Compound Area	1307228		
Internal Standard Amount (ng)	10		
Dilution Factor	1	Volume Extract (ml)	1
Internal Standard Area	1099812	Injection Volume (µl	1
Average RRF	1.1374		
Concentration	10.4501		
Surrogate %R	104.50	Spike amount	10

LCS/LCSD %R

320-244303/2-A		
PFOA	Spike amount	LCS concentration
108.00	20	21.6

320-244303/3-A		RPD	5.405405
PFOA	Spike amount	LCS concentration	
114.00	20	22.8	

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\2018.09.08_537BD _054.d
Lims ID: 320-42603-A-1-A
Client ID: NAWC-082818-RW-293
Sample Type: Client
Inject. Date: 08-Sep-2018 22:40:29 ALS Bottle#: 38 Worklist Smp#: 51
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-42603-a-1-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180908-63936.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 10-Sep-2018 13:52:50 Calib Date: 30-Aug-2018 16:42:48
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180830-63556.b\2018.08.30_537ICALXX_008.d

Column 1 : Det: EXP1
Process Host: XAWRK008

First Level Reviewer: barnettj Date: 10-Sep-2018 13:52:26

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.426	1.426	0.0	1.000	394011	3.47		122	
298.90 > 99.00	1.426	1.426	0.0	1.000	252308		1.56(0.00-0.00)	315	
$ 2 13C2 PFHxA									
315.00 > 270.00	1.525	1.525	0.0	1.000	1307228	10.5		8099	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.662	1.662	0.0	1.000	459685	2.70		178	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.662	1.662	0.0	1.000	369242	3.08		40.6	
* 6 13C2-PFOA									
415.00 > 370.00	1.844	1.844	0.0		1099812	10.0		7069	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.844	1.844	0.0	1.000	932096	7.85		111	
413.00 > 169.00	1.844	1.844	0.0	1.000	632545		1.47(0.00-0.00)	792	
* 7 13C4 PFOS									
503.00 > 80.00	2.086	2.094	-0.008		2860537	28.7		3109	
9 Perfluorononanoic acid									M
463.00 > 419.00	2.094	2.102	-0.008	1.000	104612	1.17		10.1	M
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.086	2.109	-0.023	1.000	772607	7.23		425	
499.00 > 99.00	2.086	2.109	-0.023	1.000	150739		5.13(0.00-0.00)	244	
$ 10 13C2 PFDA									
515.00 > 470.00	2.253	2.261	-0.008	1.000	1079160	10.9		10565	

DODCMD_ID	INSTALLATION_ID	SDG	SITE_NAME	NORM_SITE_NAME	LOCATION_NAME	LOCATION_TYPE_DESC	COORD_X	COORD_Y	CONTRACT_ID	DO_CTO_NUMBER	CONTR_NAME	SAMPLE_NAME	SAMPLE_MATRIX_DESC	SAMPLE_TYPE_DESC	COLLECT_DATE	ANALYTICAL_METHOD	ANALYTICAL_METHOD_GRP_DESC
MID_ATLANTIC	WARMINSTER_NAWC	320-42603-1							N6247016D9008	WE04	TETRA TECH, INC.	NAWC-082818-FRB-293	Water for QC samples	Field Reagent Blank	28-Aug-18	537	Perfluoroalkyl Compounds
MID_ATLANTIC	WARMINSTER_NAWC	320-42603-1	OFFSITE_RW	SITE 00001	NAWC-RW-293	Domestic well	2716327.795	332502.3451	N6247016D9008	WE04	TETRA TECH, INC.	NAWC-082818-RW-293	Ground water	Normal (Regular)	28-Aug-18	537	Perfluoroalkyl Compounds