



**Off-Base Drinking Water Sample Results,
Combined Level 2 and Level 4 Laboratory Report,
Electronic Data Deliverable, Data Validation Report,
and the Sample Location Figure, SDG 320-41442-1**

*Naval Air Warfare Center Warminster
Warminster, Pennsylvania*

August 2019

N62269_001200
WARMINSTER_NAWC
SSIC 5000-33c

**LABORATORY DATA PACKAGE, 320-41442-1, NAS WILLOW GROVE NAWC
WARMINSTER PA**

08/14/2018
TESTAMERICA LABORATORIES INC

Approved for public release: distribution unlimited.

ANALYTICAL REPORT

Job Number: 320-41442-1

Job Description: Warminster: PFAS, NAS JRB Willow Grove

For:
Tetra Tech, Inc.
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Attention: Andy Frebowitz



Approved for release.
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8/14/2018 6:09 PM

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Definitions/Glossary

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

TestAmerica Job ID: 320-41442-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	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
320-41442-1

Receipt

The samples were received on 7/25/2018 9:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.4° 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 320-237511.

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: 320-41442-1

Client Sample ID: WGNA-072418-RW-3148

Lab Sample ID: 320-41442-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	20	J	38	6.5	ng/L	1		537	Total/NA
Perfluorooctanoic acid (PFOA)	26		19	2.7	ng/L	1		537	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	5.2	ng/L	1		537	Total/NA
Perfluoroheptanoic acid (PFHpA)	7.5	J	9.5	1.8	ng/L	1		537	Total/NA

Client Sample ID: WGNA-072418-FRB-3148

Lab Sample ID: 320-41442-2

No Detections.

Client Sample ID: NAWC-072418-RW-061

Lab Sample ID: 320-41442-3

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	24	J	39	6.7	ng/L	1		537	Total/NA
Perfluorooctanoic acid (PFOA)	16	J	20	2.7	ng/L	1		537	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	5.4	ng/L	1		537	Total/NA
Perfluoroheptanoic acid (PFHpA)	3.6	J	9.8	1.9	ng/L	1		537	Total/NA

Client Sample ID: NAWC-072418-FRB-061

Lab Sample ID: 320-41442-4

No Detections.

Client Sample ID: NAWC-072418-RW-029

Lab Sample ID: 320-41442-5

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	19	J	38	6.5	ng/L	1		537	Total/NA
Perfluorooctanoic acid (PFOA)	18	J	19	2.7	ng/L	1		537	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	5.7	J	29	5.3	ng/L	1		537	Total/NA
Perfluoroheptanoic acid (PFHpA)	5.1	J	9.6	1.8	ng/L	1		537	Total/NA

Client Sample ID: NAWC-072418-FRB-029

Lab Sample ID: 320-41442-6

No Detections.

Client Sample ID: NAWC-072418-RW-141

Lab Sample ID: 320-41442-7

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid (PFOS)	20	J	39	6.7	ng/L	1		537	Total/NA
Perfluorooctanoic acid (PFOA)	14	J	20	2.8	ng/L	1		537	Total/NA
Perfluorohexanesulfonic acid (PFHxS)	13	J	30	5.4	ng/L	1		537	Total/NA
Perfluoroheptanoic acid (PFHpA)	6.2	J	9.8	1.9	ng/L	1		537	Total/NA

Client Sample ID: NAWC-072418-FRB-141

Lab Sample ID: 320-41442-8

No Detections.

This Detection Summary does not include radiochemical test results.

TestAmerica Sacramento

Client Sample Results

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

TestAmerica Job ID: 320-41442-1

Client Sample ID: WGNA-072418-RW-3148

Date Collected: 07/24/18 08:40

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-1

Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	20	J	38	6.5	ng/L	—	08/02/18 07:58	08/05/18 20:44	1
Perfluorooctanoic acid (PFOA)	26		19	2.7	ng/L		08/02/18 07:58	08/05/18 20:44	1
Perfluorononanoic acid (PFNA)	19	U	23	7.6	ng/L		08/02/18 07:58	08/05/18 20:44	1
Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	5.2	ng/L		08/02/18 07:58	08/05/18 20:44	1
Perfluoroheptanoic acid (PFHpA)	7.5	J	9.5	1.8	ng/L		08/02/18 07:58	08/05/18 20:44	1
Perfluorobutanesulfonic acid (PFBS)	34	U	86	15	ng/L		08/02/18 07:58	08/05/18 20:44	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFHxA	87		70 - 130				08/02/18 07:58	08/05/18 20:44	1
13C2 PFDA	110		70 - 130				08/02/18 07:58	08/05/18 20:44	1

Client Sample ID: WGNA-072418-FRB-3148

Date Collected: 07/24/18 08:35

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-2

Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	16	U	39	6.7	ng/L	—	08/02/18 07:58	08/05/18 20:49	1
Perfluorooctanoic acid (PFOA)	7.9	U	20	2.8	ng/L		08/02/18 07:58	08/05/18 20:49	1
Perfluorononanoic acid (PFNA)	20	U	24	7.9	ng/L		08/02/18 07:58	08/05/18 20:49	1
Perfluorohexanesulfonic acid (PFHxS)	12	U	30	5.4	ng/L		08/02/18 07:58	08/05/18 20:49	1
Perfluoroheptanoic acid (PFHpA)	3.9	U	9.9	1.9	ng/L		08/02/18 07:58	08/05/18 20:49	1
Perfluorobutanesulfonic acid (PFBS)	36	U	89	16	ng/L		08/02/18 07:58	08/05/18 20:49	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFHxA	94		70 - 130				08/02/18 07:58	08/05/18 20:49	1
13C2 PFDA	103		70 - 130				08/02/18 07:58	08/05/18 20:49	1

Client Sample ID: NAWC-072418-RW-061

Date Collected: 07/24/18 09:10

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-3

Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	24	J	39	6.7	ng/L	—	08/02/18 07:58	08/05/18 20:54	1
Perfluorooctanoic acid (PFOA)	16	J	20	2.7	ng/L		08/02/18 07:58	08/05/18 20:54	1
Perfluorononanoic acid (PFNA)	20	U	24	7.8	ng/L		08/02/18 07:58	08/05/18 20:54	1
Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	5.4	ng/L		08/02/18 07:58	08/05/18 20:54	1
Perfluoroheptanoic acid (PFHpA)	3.6	J	9.8	1.9	ng/L		08/02/18 07:58	08/05/18 20:54	1
Perfluorobutanesulfonic acid (PFBS)	35	U	88	16	ng/L		08/02/18 07:58	08/05/18 20:54	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFHxA	76		70 - 130				08/02/18 07:58	08/05/18 20:54	1
13C2 PFDA	105		70 - 130				08/02/18 07:58	08/05/18 20:54	1

TestAmerica Sacramento

Client Sample Results

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

TestAmerica Job ID: 320-41442-1

Client Sample ID: NAWC-072418-FRB-061

Lab Sample ID: 320-41442-4

Date Collected: 07/24/18 09:05

Matrix: Water

Date Received: 07/25/18 09:15

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	15	U	38	6.4	ng/L		08/02/18 07:58	08/05/18 20:58	1
Perfluorooctanoic acid (PFOA)	7.5	U	19	2.6	ng/L		08/02/18 07:58	08/05/18 20:58	1
Perfluorononanoic acid (PFNA)	19	U	23	7.5	ng/L		08/02/18 07:58	08/05/18 20:58	1
Perfluorohexanesulfonic acid (PFHxS)	11	U	28	5.2	ng/L		08/02/18 07:58	08/05/18 20:58	1
Perfluoroheptanoic acid (PFHpA)	3.8	U	9.4	1.8	ng/L		08/02/18 07:58	08/05/18 20:58	1
Perfluorobutanesulfonic acid (PFBS)	34	U	85	15	ng/L		08/02/18 07:58	08/05/18 20:58	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	97		70 - 130	08/02/18 07:58	08/05/18 20:58	1
13C2 PFDA	105		70 - 130	08/02/18 07:58	08/05/18 20:58	1

Client Sample ID: NAWC-072418-RW-029

Lab Sample ID: 320-41442-5

Date Collected: 07/24/18 09:40

Matrix: Water

Date Received: 07/25/18 09:15

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	19	J	38	6.5	ng/L		08/02/18 07:58	08/05/18 21:03	1
Perfluorooctanoic acid (PFOA)	18	J	19	2.7	ng/L		08/02/18 07:58	08/05/18 21:03	1
Perfluorononanoic acid (PFNA)	19	U	23	7.7	ng/L		08/02/18 07:58	08/05/18 21:03	1
Perfluorohexanesulfonic acid (PFHxS)	5.7	J	29	5.3	ng/L		08/02/18 07:58	08/05/18 21:03	1
Perfluoroheptanoic acid (PFHpA)	5.1	J	9.6	1.8	ng/L		08/02/18 07:58	08/05/18 21:03	1
Perfluorobutanesulfonic acid (PFBS)	35	U	87	15	ng/L		08/02/18 07:58	08/05/18 21:03	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	76		70 - 130	08/02/18 07:58	08/05/18 21:03	1
13C2 PFDA	100		70 - 130	08/02/18 07:58	08/05/18 21:03	1

Client Sample ID: NAWC-072418-FRB-029

Lab Sample ID: 320-41442-6

Date Collected: 07/24/18 09:35

Matrix: Water

Date Received: 07/25/18 09:15

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	15	U	38	6.5	ng/L		08/02/18 07:58	08/05/18 21:08	1
Perfluorooctanoic acid (PFOA)	7.6	U	19	2.7	ng/L		08/02/18 07:58	08/05/18 21:08	1
Perfluorononanoic acid (PFNA)	19	U	23	7.6	ng/L		08/02/18 07:58	08/05/18 21:08	1
Perfluorohexanesulfonic acid (PFHxS)	11	U	29	5.3	ng/L		08/02/18 07:58	08/05/18 21:08	1
Perfluoroheptanoic acid (PFHpA)	3.8	U	9.5	1.8	ng/L		08/02/18 07:58	08/05/18 21:08	1
Perfluorobutanesulfonic acid (PFBS)	34	U	86	15	ng/L		08/02/18 07:58	08/05/18 21:08	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	95		70 - 130	08/02/18 07:58	08/05/18 21:08	1
13C2 PFDA	103		70 - 130	08/02/18 07:58	08/05/18 21:08	1

Client Sample Results

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

TestAmerica Job ID: 320-41442-1

Client Sample ID: NAWC-072418-RW-141

Date Collected: 07/24/18 10:10

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-7

Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	20	J	39	6.7	ng/L		08/02/18 07:58	08/05/18 21:12	1
Perfluorooctanoic acid (PFOA)	14	J	20	2.8	ng/L		08/02/18 07:58	08/05/18 21:12	1
Perfluorononanoic acid (PFNA)	20	U	24	7.9	ng/L		08/02/18 07:58	08/05/18 21:12	1
Perfluorohexanesulfonic acid (PFHxS)	13	J	30	5.4	ng/L		08/02/18 07:58	08/05/18 21:12	1
Perfluoroheptanoic acid (PFHpA)	6.2	J	9.8	1.9	ng/L		08/02/18 07:58	08/05/18 21:12	1
Perfluorobutanesulfonic acid (PFBS)	35	U	89	16	ng/L		08/02/18 07:58	08/05/18 21:12	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFHxA	83		70 - 130				08/02/18 07:58	08/05/18 21:12	1
13C2 PFDA	107		70 - 130				08/02/18 07:58	08/05/18 21:12	1

Client Sample ID: NAWC-072418-FRB-141

Date Collected: 07/24/18 10:05

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-8

Matrix: Water

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

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	15	U	37	6.3	ng/L		08/02/18 07:58	08/05/18 21:26	1
Perfluorooctanoic acid (PFOA)	7.4	U	19	2.6	ng/L		08/02/18 07:58	08/05/18 21:26	1
Perfluorononanoic acid (PFNA)	19	U	22	7.4	ng/L		08/02/18 07:58	08/05/18 21:26	1
Perfluorohexanesulfonic acid (PFHxS)	11	U	28	5.1	ng/L		08/02/18 07:58	08/05/18 21:26	1
Perfluoroheptanoic acid (PFHpA)	3.7	U	9.3	1.8	ng/L		08/02/18 07:58	08/05/18 21:26	1
Perfluorobutanesulfonic acid (PFBS)	33	U	83	15	ng/L		08/02/18 07:58	08/05/18 21:26	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C2 PFHxA	98		70 - 130				08/02/18 07:58	08/05/18 21:26	1
13C2 PFDA	106		70 - 130				08/02/18 07:58	08/05/18 21:26	1

Default Detection Limits

Client: Tetra Tech, Inc.

TestAmerica Job ID: 320-41442-1

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.
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

TestAmerica Job ID: 320-41442-1

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)
320-41442-1	WGNA-072418-RW-3148	87	110
320-41442-2	WGNA-072418-FRB-3148	94	103
320-41442-3	NAWC-072418-RW-061	76	105
320-41442-4	NAWC-072418-FRB-061	97	105
320-41442-5	NAWC-072418-RW-029	76	100
320-41442-6	NAWC-072418-FRB-029	95	103
320-41442-7	NAWC-072418-RW-141	83	107
320-41442-8	NAWC-072418-FRB-141	98	106
LLCS 320-237511/2-A	Lab Control Sample	93	100
LLCSD 320-237511/3-A	Lab Control Sample Dup	92	100
MB 320-237511/1-A	Method Blank	95	108

Surrogate Legend

PFHxA = 13C2 PFHxA

PFDA = 13C2 PFDA

QC Sample Results

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

TestAmerica Job ID: 320-41442-1

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

Lab Sample ID: MB 320-237511/1-A

Matrix: Water

Analysis Batch: 238080

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 237511

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid (PFOS)	16	U	40	6.8	ng/L	-	08/02/18 07:58	08/05/18 20:30	1
Perfluorooctanoic acid (PFOA)	8.0	U	20	2.8	ng/L	-	08/02/18 07:58	08/05/18 20:30	1
Perfluorononanoic acid (PFNA)	20	U	24	8.0	ng/L	-	08/02/18 07:58	08/05/18 20:30	1
Perfluorohexanesulfonic acid (PFHxS)	12	U	30	5.5	ng/L	-	08/02/18 07:58	08/05/18 20:30	1
Perfluoroheptanoic acid (PFHpA)	4.0	U	10	1.9	ng/L	-	08/02/18 07:58	08/05/18 20:30	1
Perfluorobutanesulfonic acid (PFBS)	36	U	90	16	ng/L	-	08/02/18 07:58	08/05/18 20:30	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	95		70 - 130	08/02/18 07:58	08/05/18 20:30	1
13C2 PFDA	108		70 - 130	08/02/18 07:58	08/05/18 20:30	1

Lab Sample ID: LLCS 320-237511/2-A

Matrix: Water

Analysis Batch: 238080

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 237511

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorooctanesulfonic acid (PFOS)	40.2	40.5		ng/L	-	101	50 - 150
Perfluorooctanoic acid (PFOA)	20.0	18.4	J	ng/L	-	92	50 - 150
Perfluorononanoic acid (PFNA)	20.0	17.7	J	ng/L	-	89	50 - 150
Perfluorohexanesulfonic acid (PFHxS)	30.3	30.9		ng/L	-	102	50 - 150
Perfluoroheptanoic acid (PFHpA)	10.0	9.16	J	ng/L	-	92	50 - 150
Perfluorobutanesulfonic acid (PFBS)	90.2	101		ng/L	-	112	50 - 150

Surrogate	LLCS %Recovery	LLCS Qualifier	Limits
13C2 PFHxA	93		70 - 130
13C2 PFDA	100		70 - 130

Lab Sample ID: LLCSD 320-237511/3-A

Matrix: Water

Analysis Batch: 238080

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 237511

Analyte	Spike Added	LLCSD Result	LLCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluorooctanesulfonic acid (PFOS)	40.2	39.0	J	ng/L	-	97	50 - 150	4	50
Perfluorooctanoic acid (PFOA)	20.0	18.1	J	ng/L	-	90	50 - 150	2	50
Perfluorononanoic acid (PFNA)	20.0	17.1	J	ng/L	-	86	50 - 150	3	50
Perfluorohexanesulfonic acid (PFHxS)	30.3	29.5	J	ng/L	-	97	50 - 150	5	50
Perfluoroheptanoic acid (PFHpA)	10.0	9.06	J	ng/L	-	91	50 - 150	1	50
Perfluorobutanesulfonic acid (PFBS)	90.2	89.7	J	ng/L	-	99	50 - 150	12	50

Surrogate	LLCSD %Recovery	LLCSD Qualifier	Limits
13C2 PFHxA	92		70 - 130
13C2 PFDA	100		70 - 130

TestAmerica Sacramento

QC Association Summary

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

TestAmerica Job ID: 320-41442-1

LCMS

Prep Batch: 237511

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41442-1	WGNA-072418-RW-3148	Total/NA	Water	537	
320-41442-2	WGNA-072418-FRB-3148	Total/NA	Water	537	
320-41442-3	NAWC-072418-RW-061	Total/NA	Water	537	
320-41442-4	NAWC-072418-FRB-061	Total/NA	Water	537	
320-41442-5	NAWC-072418-RW-029	Total/NA	Water	537	
320-41442-6	NAWC-072418-FRB-029	Total/NA	Water	537	
320-41442-7	NAWC-072418-RW-141	Total/NA	Water	537	
320-41442-8	NAWC-072418-FRB-141	Total/NA	Water	537	
MB 320-237511/1-A	Method Blank	Total/NA	Water	537	
LLCS 320-237511/2-A	Lab Control Sample	Total/NA	Water	537	
LLCSD 320-237511/3-A	Lab Control Sample Dup	Total/NA	Water	537	

Analysis Batch: 238080

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41442-1	WGNA-072418-RW-3148	Total/NA	Water	537	237511
320-41442-2	WGNA-072418-FRB-3148	Total/NA	Water	537	237511
320-41442-3	NAWC-072418-RW-061	Total/NA	Water	537	237511
320-41442-4	NAWC-072418-FRB-061	Total/NA	Water	537	237511
320-41442-5	NAWC-072418-RW-029	Total/NA	Water	537	237511
320-41442-6	NAWC-072418-FRB-029	Total/NA	Water	537	237511
320-41442-7	NAWC-072418-RW-141	Total/NA	Water	537	237511
MB 320-237511/1-A	Method Blank	Total/NA	Water	537	237511
LLCS 320-237511/2-A	Lab Control Sample	Total/NA	Water	537	237511
LLCSD 320-237511/3-A	Lab Control Sample Dup	Total/NA	Water	537	237511

Analysis Batch: 238082

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-41442-8	NAWC-072418-FRB-141	Total/NA	Water	537	237511

Lab Chronicle

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

TestAmerica Job ID: 320-41442-1

Client Sample ID: WGNA-072418-RW-3148

Date Collected: 07/24/18 08:40

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			237511	08/02/18 07:58	SK	TAL SAC
Total/NA	Analysis	537		1	238080	08/05/18 20:44	JRB	TAL SAC

Client Sample ID: WGNA-072418-FRB-3148

Date Collected: 07/24/18 08:35

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			237511	08/02/18 07:58	SK	TAL SAC
Total/NA	Analysis	537		1	238080	08/05/18 20:49	JRB	TAL SAC

Client Sample ID: NAWC-072418-RW-061

Date Collected: 07/24/18 09:10

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			237511	08/02/18 07:58	SK	TAL SAC
Total/NA	Analysis	537		1	238080	08/05/18 20:54	JRB	TAL SAC

Client Sample ID: NAWC-072418-FRB-061

Date Collected: 07/24/18 09:05

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			237511	08/02/18 07:58	SK	TAL SAC
Total/NA	Analysis	537		1	238080	08/05/18 20:58	JRB	TAL SAC

Client Sample ID: NAWC-072418-RW-029

Date Collected: 07/24/18 09:40

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			237511	08/02/18 07:58	SK	TAL SAC
Total/NA	Analysis	537		1	238080	08/05/18 21:03	JRB	TAL SAC

Client Sample ID: NAWC-072418-FRB-029

Date Collected: 07/24/18 09:35

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			237511	08/02/18 07:58	SK	TAL SAC
Total/NA	Analysis	537		1	238080	08/05/18 21:08	JRB	TAL SAC

TestAmerica Sacramento

Lab Chronicle

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

TestAmerica Job ID: 320-41442-1

Client Sample ID: NAWC-072418-RW-141

Date Collected: 07/24/18 10:10

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			237511	08/02/18 07:58	SK	TAL SAC
Total/NA	Analysis	537		1	238080	08/05/18 21:12	JRB	TAL SAC

Client Sample ID: NAWC-072418-FRB-141

Date Collected: 07/24/18 10:05

Date Received: 07/25/18 09:15

Lab Sample ID: 320-41442-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537			237511	08/02/18 07:58	SK	TAL SAC
Total/NA	Analysis	537		1	238082	08/05/18 21:26	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: 320-41442-1

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.
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

TestAmerica Job ID: 320-41442-1

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: 320-41442-1

Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-41442-1	WGNA-072418-RW-3148	Water	07/24/18 08:40	07/25/18 09:15
320-41442-2	WGNA-072418-FRB-3148	Water	07/24/18 08:35	07/25/18 09:15
320-41442-3	NAWC-072418-RW-061	Water	07/24/18 09:10	07/25/18 09:15
320-41442-4	NAWC-072418-FRB-061	Water	07/24/18 09:05	07/25/18 09:15
320-41442-5	NAWC-072418-RW-029	Water	07/24/18 09:40	07/25/18 09:15
320-41442-6	NAWC-072418-FRB-029	Water	07/24/18 09:35	07/25/18 09:15
320-41442-7	NAWC-072418-RW-141	Water	07/24/18 10:10	07/25/18 09:15
320-41442-8	NAWC-072418-FRB-141	Water	07/24/18 10:05	07/25/18 09:15

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
LC537-ICV_00032	08/15/18	06/23/18	MeOH/H2O, Lot 197626	10 mL	LC537-IS_00074	1000 uL	13C2-PFOA	10 ng/mL
.LC537-IS_00074	12/16/18	06/16/18	Methanol, Lot 090285	30000 uL	LCM2PFOA_00010	60 uL	13C4 PFOS	28.68 ng/mL
..LCM2PFOA_00010	02/12/21	Wellington Laboratories, Lot M2PFOA0216			LCMPFOS_00024	180 uL	13C2-PFOA	0.1 ug/mL
..LCMPFOS_00024	05/19/22	Wellington Laboratories, Lot MPFOS517					13C4 PFOS	0.2868 ug/mL
LC537-ICV_00032	08/15/18	06/23/18	MeOH/H2O, Lot 197626	10 mL			13C2-PFOA	50 ug/mL
					LC537-SU_00072	1000 uL	13C4 PFOS	47.8 ug/mL
					LC537ICIM2_00001	400 uL	13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	100.092 ng/mL
							Perfluoroheptanoic acid (PFHpA)	10 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	20.1619 ng/mL
							Perfluorononanoic acid (PFNA)	20.1641 ng/mL
							Perfluorooctanoic acid (PFOA)	20.167 ng/mL
							Perfluorooctanesulfonic acid (PFOS)	20.1702 ng/mL
.LC537-SU_00072	12/16/18	06/16/18	Methanol, Lot 104453	30000 uL	LCMPFDA_00012	60 uL	13C2 PFDA	0.1 ug/mL
..LCMPFDA_00012	09/30/21	Wellington Laboratories, Lot MPFDA0916			LCMPFHxA_00015	60 uL	13C2 PFHxA	0.1 ug/mL
..LCMPFHxA_00015	11/22/21	Wellington Laboratories, Lot MPFHxA1116					13C2 PFDA	50 ug/mL
.LC537ICIM2_00001	08/15/18	02/15/18	Methanol, Lot 090285	10 mL			13C2 PFHxA	50 ug/mL
					LC537ICIM_00020	0.5 mL	Perfluorobutanesulfonic acid (PFBS)	2.5023 ug/mL
							Perfluoroheptanoic acid (PFHpA)	0.25 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	0.504047 ug/mL
							Perfluorononanoic acid (PFNA)	0.504103 ug/mL
							Perfluorooctanoic acid (PFOA)	0.504176 ug/mL
							Perfluorooctanesulfonic acid (PFOS)	0.504255 ug/mL
..LC537ICIM_00020	08/15/18	02/15/18	Methanol, Lot 090285	25 mL	LC537-PFBS2_00009	0.625 mL	Perfluorobutanesulfonic acid (PFBS)	50.0459 ug/mL
					LC537-PFHxA2_00012	0.0625 mL	Perfluoroheptanoic acid (PFHpA)	5 ug/mL
					LC537-PFHxS2_00009	0.126 mL	Perfluorohexanesulfonic acid (PFHxS)	10.0809 ug/mL
					LC537-PFNA2_00010	0.126 mL	Perfluorononanoic acid (PFNA)	10.0821 ug/mL
					LC537-PFOA2_00011	0.126 mL	Perfluorooctanoic acid (PFOA)	10.0835 ug/mL
					LC537-PFOS2_00011	0.126 mL	Perfluorooctanesulfonic acid (PFOS)	10.0851 ug/mL
...LC537-PFBS2_00009	08/15/18	02/15/18	Methanol, Lot 090285	17.1 mL	LC537_PFBS2_00002	0.0343 g	Perfluorobutanesulfonic acid (PFBS)	2001.84 ug/mL
....LC537_PFBS2_00002	09/08/22	Santa Cruz Biotechnology, Lot F0917					Perfluorobutanesulfonic acid (PFBS)	0.998 g/g

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
...LC537-PFHpA2_00012	08/15/18	02/15/18	Methanol, Lot 09092	23.95 mL	LC537_PFHpA2_00002	0.0479 g	Perfluoroheptanoic acid (PFHpA)	2000 ug/mL
....LC537_PFHpA2_00002	06/13/22	Afla Aesar, Lot 10200390			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	1 g/g
...LC537-PFHxS2_00009	08/15/18	02/15/18	Methanol, Lot 090285	25.87 mL	LC537_PFHxS2_00002	0.0569 g	Perfluorohexanesulfonic acid (PFHxS)	2000.19 ug/mL
....LC537_PFHxS2_00002	06/08/22	Santa Cruz Biotechnology, Lot G2516			(Purchased Reagent)		Perfluorohexanesulfonic acid (PFHxS)	0.9094 g/g
...LC537-PFNA2_00010	08/15/18	02/15/18	Methanol, Lot 090285	16.58 mL	LC537 PFNA2_00002	0.0333 g	Perfluorononanoic acid (PFNA)	2000.41 ug/mL
....LC537 PFNA2_00002	06/14/22	Aldrich, Lot MKCC0699			(Purchased Reagent)		Perfluorononanoic acid (PFNA)	0.996 g/g
...LC537-PFOA2_00011	08/15/18	02/15/18	Methanol, Lot 090285	22.96 mL	LC537 PFOA2_00002	0.0464 g	Perfluorooctanoic acid (PFOA)	2000.7 ug/mL
....LC537 PFOA2_00002	06/09/22	Afla Aesar, Lot 10199078			(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	0.99 g/g
...LC537-PFOS2_00011	08/15/18	02/15/18	Methanol, Lot 090285	14.71 mL	LC537_PFOS2_00002	0.0378 g	Perfluorooctanesulfonic acid (PFOS)	2001.01 ug/mL
....LC537_PFOS2_00002	06/14/22	Sigma, Lot BCBQ0108V			(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	0.7787 g/g
LC537-IS_00076	01/05/19	07/16/18	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-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
							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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

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-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
.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.: 320-41442-1

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-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
					LC537-SU_00064	500 uL	13C4 PFOS	28.68 ng/mL
							13C2 PFDA	10 ng/mL
..LC537-HSP_00028	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LCPFBSA_00002	849 uL	13C2 PFHxA	10 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	1250.86 ng/mL
							Perfluoroheptanoic acid (PFHpA)	135 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	420.117 ng/mL
							Perfluorononanoic acid (PFNA)	275 ng/mL
							Perfluorooctanoic acid (PFOA)	275 ng/mL
..LCPFBSA_00002	12/02/21				LCPFHxS-br_00005	277 uL	Perfluorooctanesulfonic acid (PFOS)	549.067 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
							Perfluoroheptanoic acid (PFHpA)	50 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
							Perfluorononanoic acid (PFNA)	50 ug/mL
..LCPFHxA 00009	12/02/21		Wellington Laboratories, Lot PFHpA1216		(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 ug/mL
..LCPFHxS-br_00005	01/04/22		Wellington Laboratories, Lot brPFHxSK0117		(Purchased Reagent)		Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
..LCPFNA 00009	07/20/22		Wellington Laboratories, Lot PFNA0717		(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	50 ug/mL
..LCPFOA 00010	09/27/22		Wellington Laboratories, Lot PFOA0917		(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
..LCPFOS-br_00005	01/12/22		Wellington Laboratories, Lot brPFOSK0117		(Purchased Reagent)		Perfluorooctanoic acid (PFOA)	50 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
..LCM2PFOA 00010	02/12/21		Wellington Laboratories, Lot M2PFOA0216		LCMPFOS 00024	180 uL	13C4 PFOS	0.2868 ug/mL
..LCMPFOS_00024	05/19/22		Wellington Laboratories, Lot MPFOS517		(Purchased Reagent)		13C2-PFOA	50 ug/mL
..LC537-SU_00064	10/02/18	04/02/18	Methanol, Lot 104453	30000 uL	(Purchased Reagent)		13C4 PFOS	47.8 ug/mL
					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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento

Job No.: 320-41442-1

SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
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
.LC537-HSP_00028	09/30/18	03/30/18	Methanol, Lot 104453	30 mL	LC537-SU_00064	2 mL	13C4 PFOS	28.68 ng/mL
							13C2 PFDA	10 ng/mL
							13C2 PFHxA	10 ng/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
..LCPFOS-br_00005	12/02/21	Wellington Laboratories, Lot LPPFBS1116			LCPFOA_00010	165 uL	Perfluorooctanoic acid (PFOA)	275 ng/mL
					LCPFOS-br_00005	355 uL	Perfluorooctanesulfonic acid (PFOS)	549.067 ng/mL
					(Purchased Reagent)		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
					(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
					(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
..LCMPFOS-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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
							Perfluorooctanoic acid (PFOA)	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
					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

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

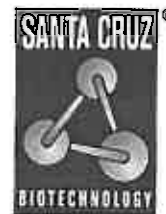
SDG No.: _____

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
.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_00075	01/05/19	07/16/18	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

Reagent

LC537_PFB2_00002

7:6&17 SW



CERTIFICATE OF ANALYSIS

The Power to Question

Catalog Number: sc-236187
 Lot Number: F0917
 Product Name: Nonafluorobutane-1-sulfonic acid
 CAS Number: 375-73-5
 Molecular Formula: $C_4HF_9O_3S$
 Molecular Weight: 300.10

Test	Specification	Result
Appearance	Colorless liquid	Complies
Identification (19F-NMR)	Conforms to structure	Complies
Purity (Sodium Hydroxide Titration)	$\geq 97\%$	101.3%
Infrared Spectrum	Conforms to structure	Complies

Reagent

LC537_PFHpA2_00002

Certificate of analysis

R: 6.13.17 SW

PFHe A

Product No.: A12092
Product: Perfluoroheptanoic acid, 98+%
Lot No.: 10200390

Appearance: White fused solid
Water Content (Karl-Fischer): 0.30%
Melting Point: 32.0-34.3°C
Assay (Aqueous acid-base titration): 99.7%
Identification (FTIR): Conforms

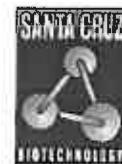
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SCIENTIFIC

Reagent

LC537_PFHxS2_00002



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CERTIFICATE OF ANALYSIS

Catalog Number: sc-237289
 Lot Number: G2516
 Product Name: Tridecafluorohexane-1-sulfonic acid potassium salt
 CAS Number: 3871-99-6
 Molecular Formula: $C_6F_{13}KO_3S$
 Molecular Weight: 438.20

Test	Specification	Result
Appearance	White to faint beige powder or crystals	White powder
Identification (Infrared Spectrum)	Consistent with structure	Complies
Purity (Titration, Ion Exchange)	$\geq 98.0\%$	100.4%

PFH_xS-K

$C_6F_{13}SO_3K$ 438.201

$C_6F_{13}SO_3H$ 400.111

$$MW \text{ correction} = \frac{400.11}{438.201} = 0.91307 \quad \frac{PFH_xS}{\text{cas\# 355-46-4}}$$

$$\text{Purity} \div MW \text{ correction} = 90.9\%$$

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Reagent

LC537_PFNA2_00002

17.6.14.17 SW

3050 Spruce Street, Saint Louis, MO 63103, USA

Website: www.sigmaaldrich.com

Email USA: techserv@sial.com

Outside USA: eurtechserv@sial.com

Certificate of Analysis

Product Name:

Perfluorononanoic acid - 97%

Product Number:

394459

Batch Number:

MKCC0699

Brand:

ALDRICH

CAS Number:

375-95-1

MDL Number:

MFCD00039605

Formula:

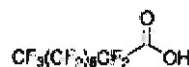
C₉H₁₇O₂

Formula Weight:

464.08 g/mol

Quality Release Date:

07 DEC 2016



Test	Specification	Result
Appearance (Color)	White to Off-White	White
Appearance (Form)	Powder or Crystals or Crystalline Chunk(s) or Granule or Flakes or Solid	Powder
Infrared Spectrum	Conforms to Structure	Conforms
GC (area %)	> 96.5 %	98.2 %

Michael Grady, Manager
Quality Control
Milwaukee, WI US

PFNA

Sigma-Aldrich warrants, that at the time of the quality release or subsequent retest date this product conformed to the information contained in this publication. The current Specification sheet may be available at Sigma-Aldrich.com. For further inquiries, please contact Technical Service. Purchaser must determine the suitability of the product for its particular use. See reverse side of invoice or packing slip for additional terms and conditions of sale.

Reagent

LC537_PFOA2_00002

Certificate of analysis

P: 6/9/17 SW

Product No.: L08862
Product: Perfluorooctanoic acid, 95%
Lot No.: 10199078

PFOA

Appearance: White powder
Water Content (Karl-Fischer): 1.30%
Melting Point: 47.6-54.0°C
Assay (Aqueous acid-base titration): 98.4%
Assay (GC Silyl Deriv): 97.2%

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ThermoFisher
SCIENTIFIC

Reagent

LC537_PFOS2_00002

V: 6.14.17 SKV

SIGMA-ALDRICH

3050 Spruce Street, Saint Louis, MO 63103 USA
Email USA: techserv@sial.com Outside USA: eurtechserv@sial.com

Certificate of Analysis

Product Name: HEPTADEC AFLUOROOCTANESULFONIC ACID TETRAETHYLAMMONIUM SALT
98 %
Product Number: 365289
Batch Number: BCBQ0108V
Brand: Aldrich
CAS Number: 56773-42-3
Formula: $\text{CF}_3(\text{CF}_2)_6\text{CF}_2\text{SO}_3\text{N}(\text{C}_2\text{H}_5)_4$
Formula Weight: 629.37
Quality Release Date: 11 JUN 2015

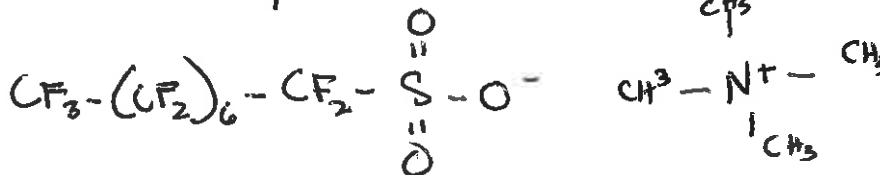
TEST	SPECIFICATION	RESULT
APPEARANCE (COLOR)	WHITE TO OFF WHITE	OFF-WHITE
APPEARANCE (FORM)	POWDER OR POWDER WITH CHUNK(S)	POWDER
CARBON CONTENT	29.77 % - 31.29 %	29.97 %
INFRARED SPECTRUM	CONFORMS TO STRUCTURE	CONFORMS

Claudia Geitner

Dr. Claudia Geitner
Manager Quality Control
Buchs, Switzerland

$$\text{MW correction: } \frac{500.125}{629.37} = 0.7946$$

$$\text{Purity \& mw correction} = 77.87\%$$



C = 12.011	96.088
F = 18.998	322.966
S = 32.066	32.066
O = 15.999	47.997
H = 1.008	1.008
N = 14.007	—
	500.125



96.088
—
—
—
20.460
14.007
130.255

Reagent

LCM2PFOA_00010



WELLINGTON LABORATORIES

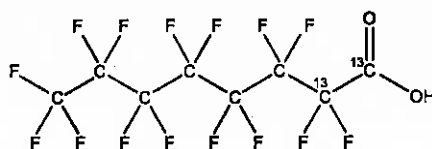
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: M2PFOA
COMPOUND: Perfluoro-n-[1,2-¹³C₂]octanoic acid

LOT NUMBER: M2PFOA0216

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA: ¹³C₂¹²C₆HF₁₆O₂
CONCENTRATION: 50 ± 2.5 µg/ml

MOLECULAR WEIGHT: 416.05
SOLVENT(S): Methanol
Water (<1%)

CHEMICAL PURITY: >98%
LAST TESTED: (mm/dd/yyyy) 02/12/2016
EXPIRY DATE: (mm/dd/yyyy) 02/12/2021

ISOTOPIC PURITY: ≥99% ¹³C
(1,2-¹³C₂)

RECOMMENDED STORAGE: Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: 02/24/2016
(mm/dd/yyyy)

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

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

$x_1, x_2, \dots, x_n$ on which it depends is:

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

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 $\pm 5\%$ (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:

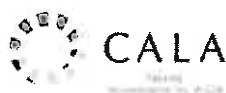
Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

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.

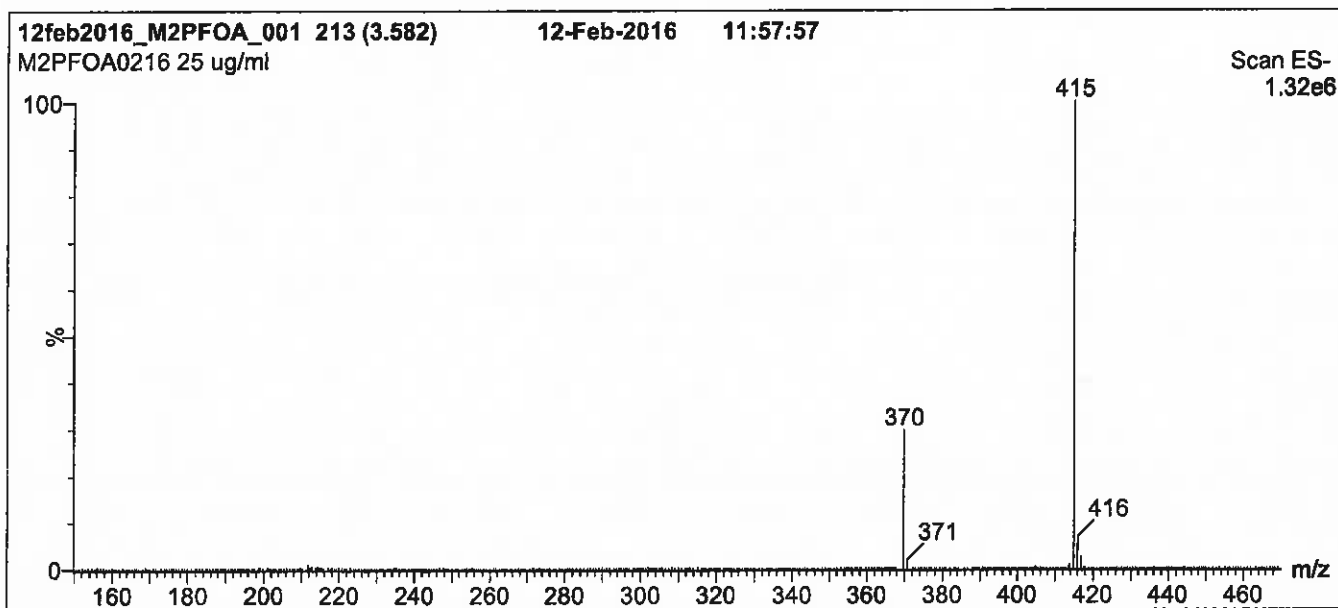
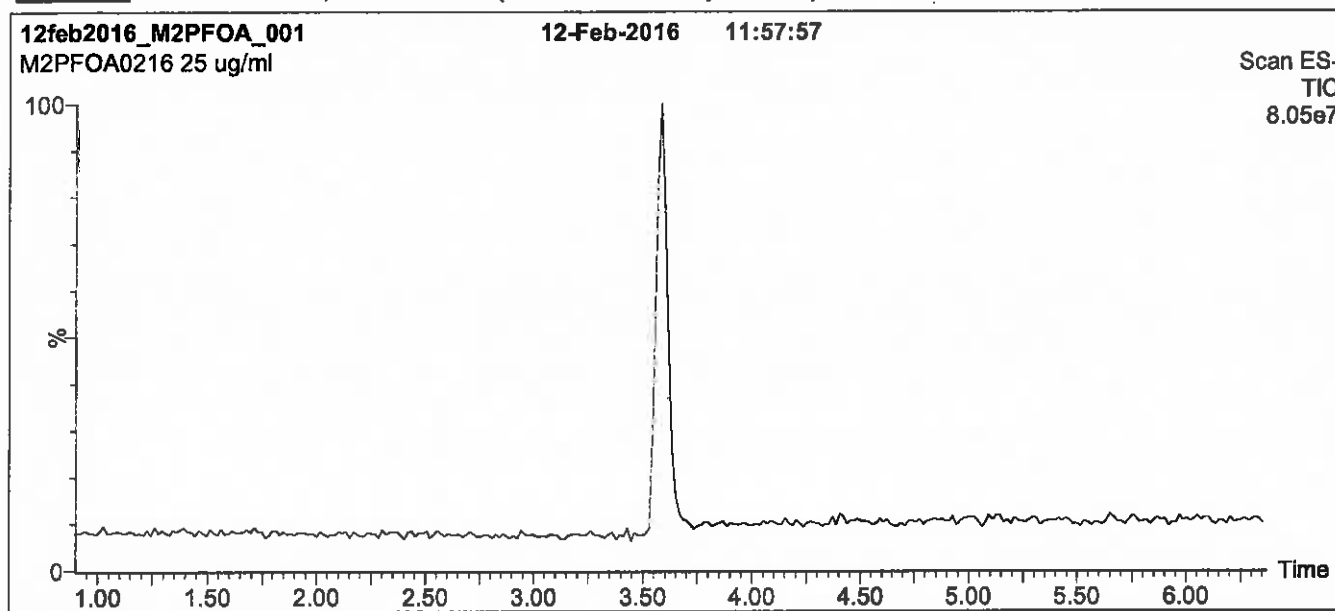
QUALITY MANAGEMENT:

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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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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H₂O
(both with 10 mM NH₄OAc 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

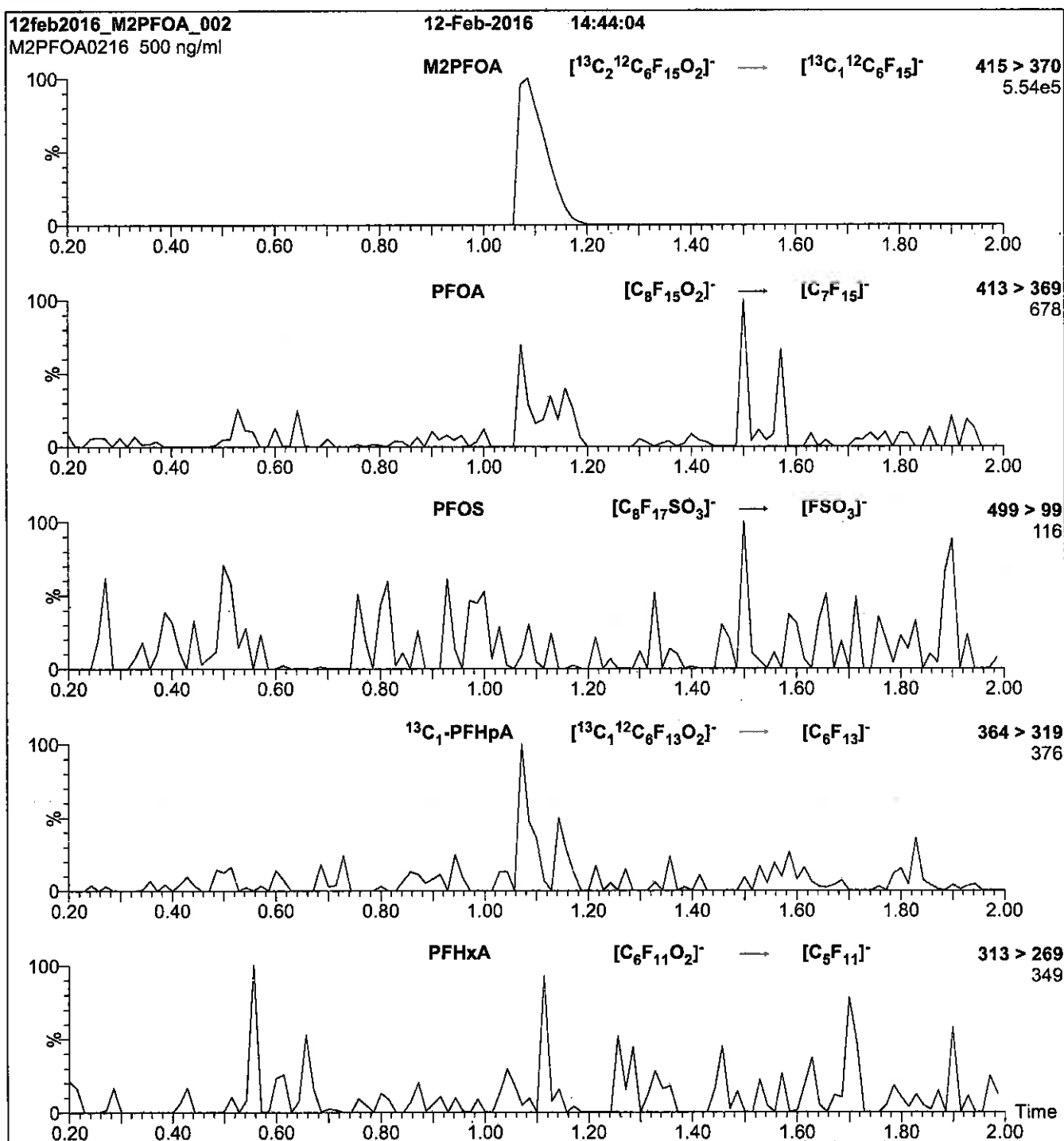
Flow: 300 μ l/min

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 $\mu\text{l}/\text{min}$

MS Parameters

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

Reagent

LCMPFDA_00012

R: SBC 12/21/16



814255

ID: LCMFDA_00012

Exp: 09/30/21 Prod: SBC

13C2-Perfluorodecanoic acid



WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFDA

LOT NUMBER:

MPFDA0916

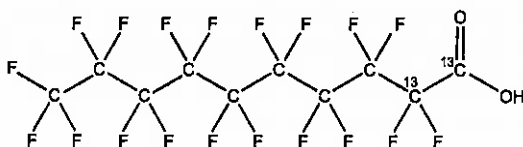
COMPOUND:

Perfluoro-n-[1,2-¹³C₂]decanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₂¹²C₈H₁₈O₂

MOLECULAR WEIGHT:

516.07

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99% ¹³C

LAST TESTED: (mm/dd/yyyy)

09/30/2016

(1,2-¹³C₂)

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 ¹³C₁-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:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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

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EXPIRY DATE / PERIOD OF VALIDITY:

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

LIMITED WARRANTY:

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

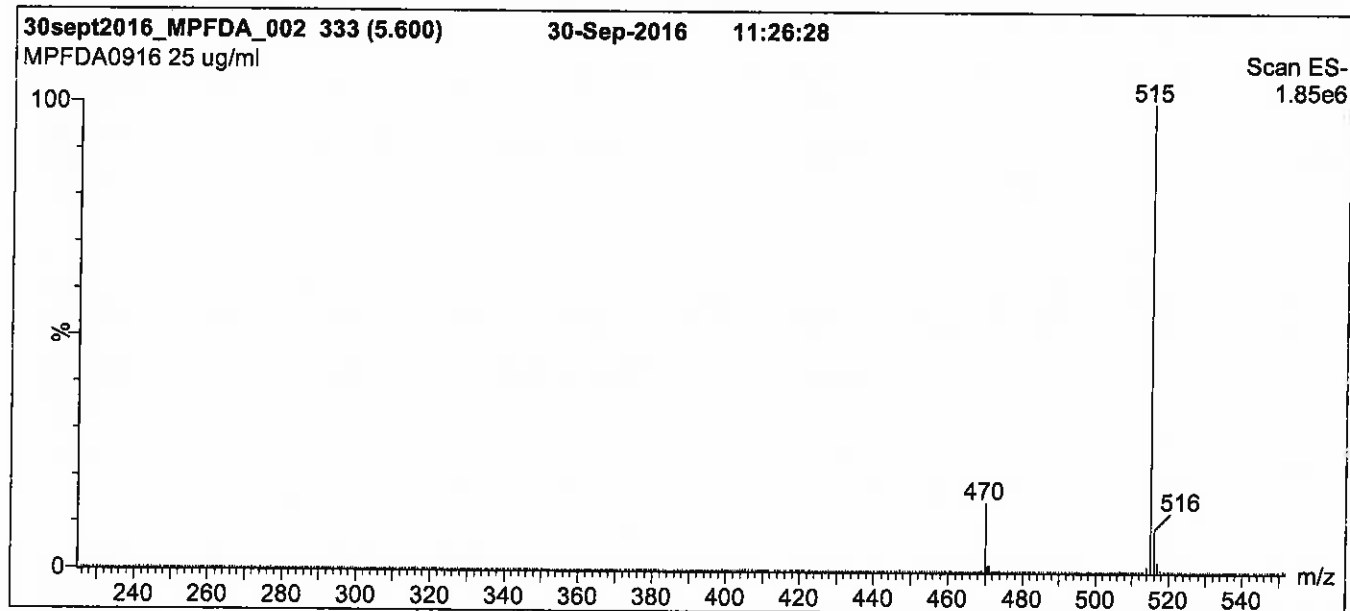
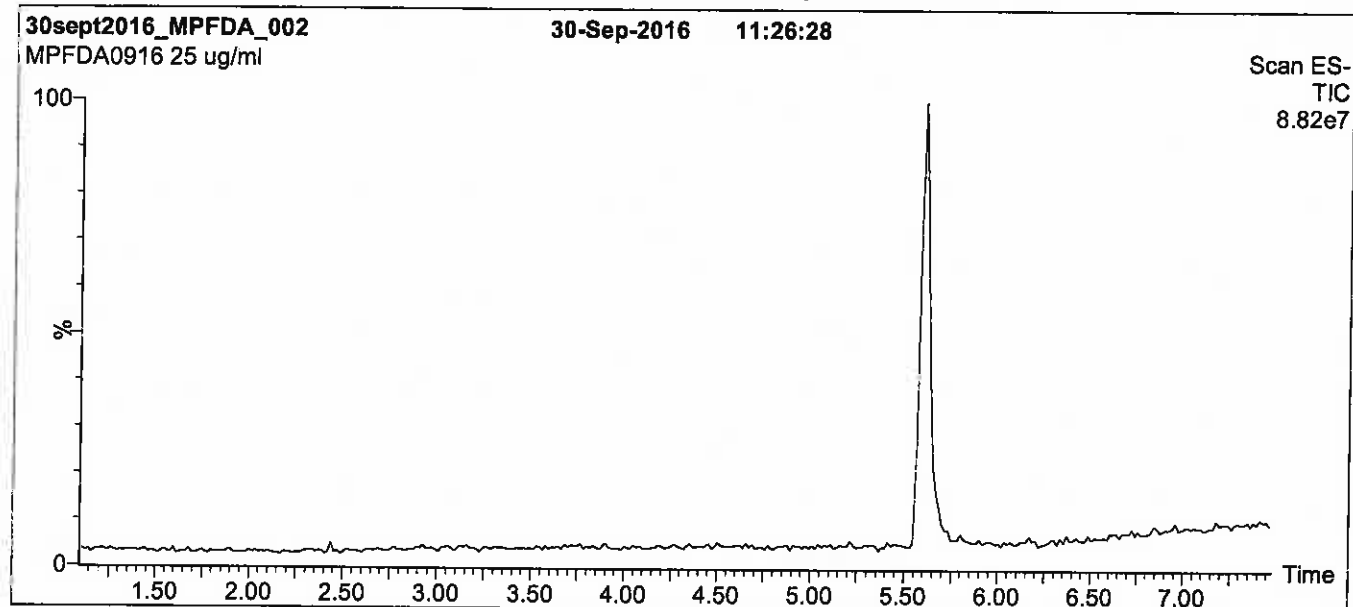
QUALITY MANAGEMENT:

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



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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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H₂O
(both with 10 mM NH₄OAc 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

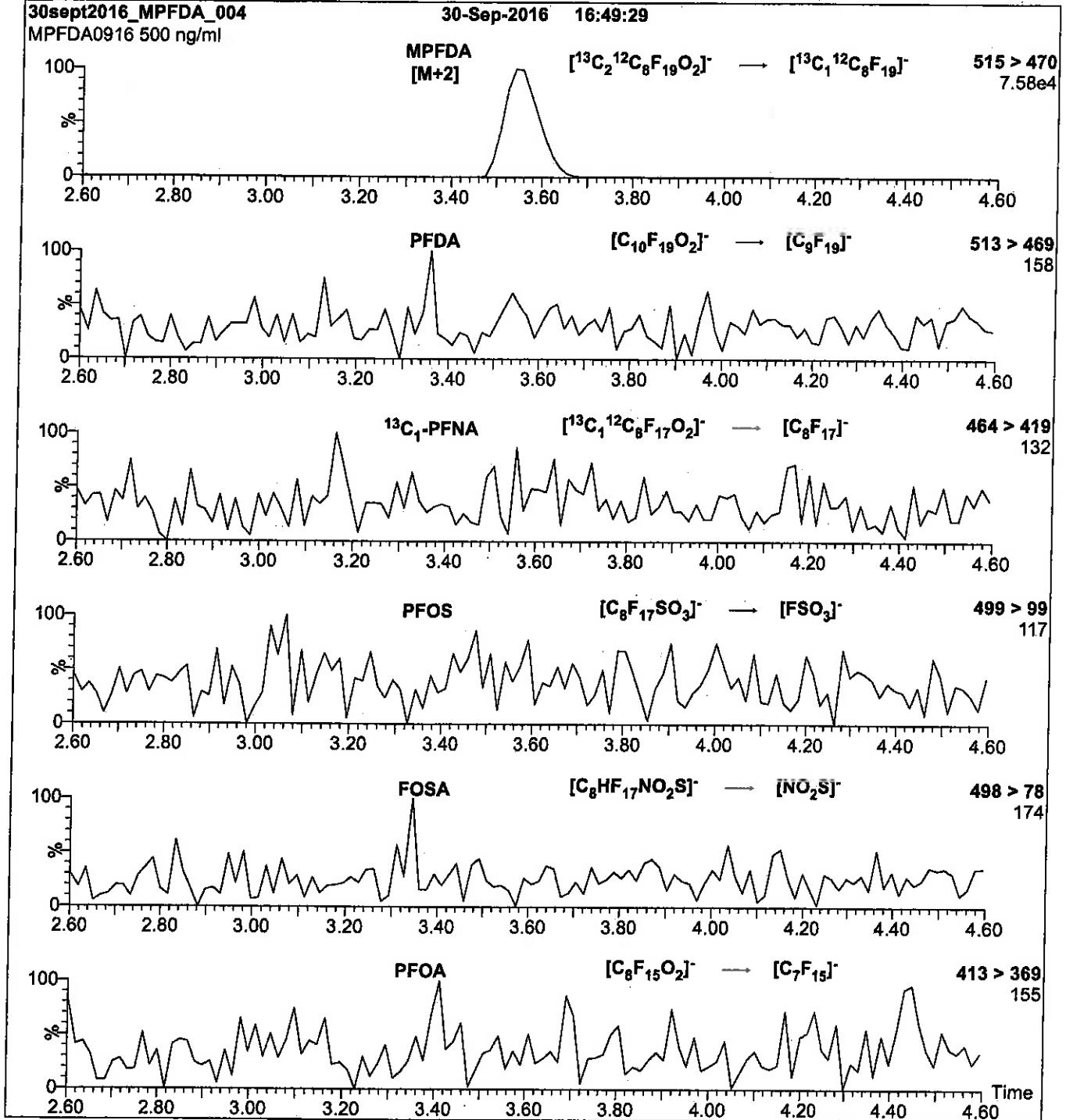
Flow: 300 μ l/min

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 μ l (500 ng/ml MPFDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O
(both with 10 mM NH₄OAc buffer)

Flow: 300 μ l/min

MS Parameters

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

Reagent

LCMPFHxA_00015

r: 5/10/17 SKJ



WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFHxA

LOT NUMBER:

MPFHxA1116

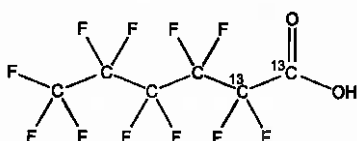
COMPOUND:

Perfluoro-n-[1,2-¹³C₂]hexanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₂¹²C₄HF₁₁O₂

MOLECULAR WEIGHT:

316.04

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99%¹³C

LAST TESTED: (mm/dd/yyyy)

11/22/2016

(1,2-¹³C₂)

EXPIRY DATE: (mm/dd/yyyy)

11/22/2021

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

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

ADDITIONAL INFORMATION:

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

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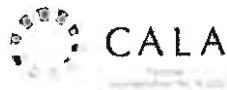
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LIMITED WARRANTY:

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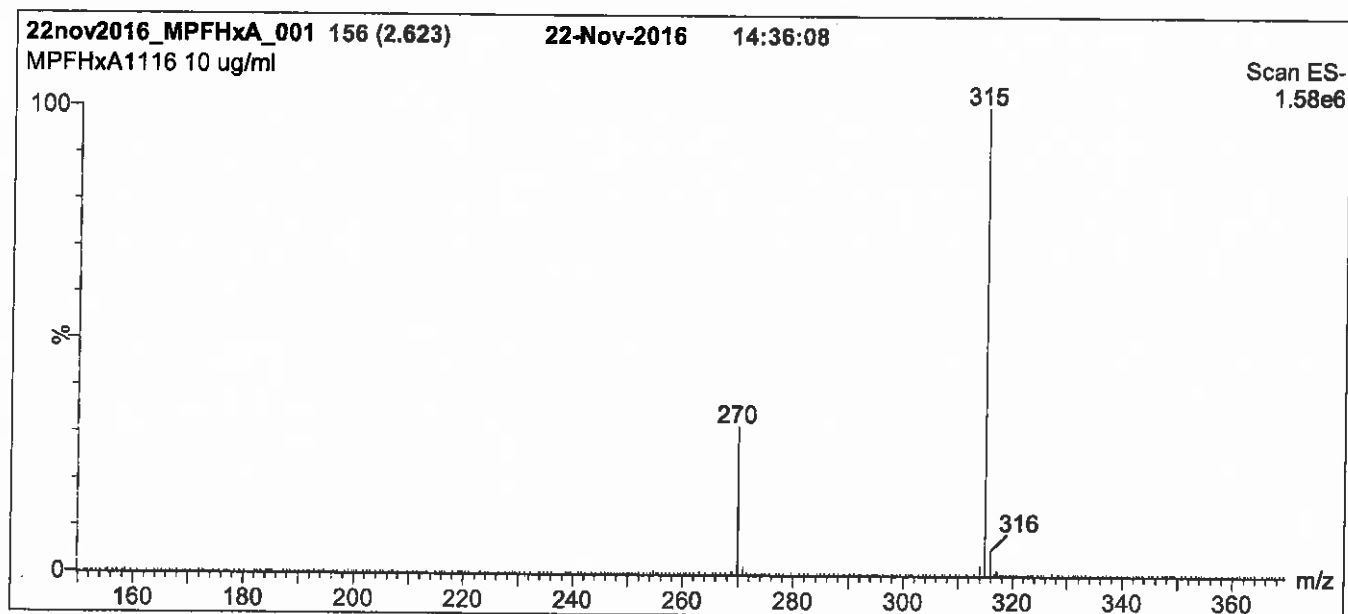
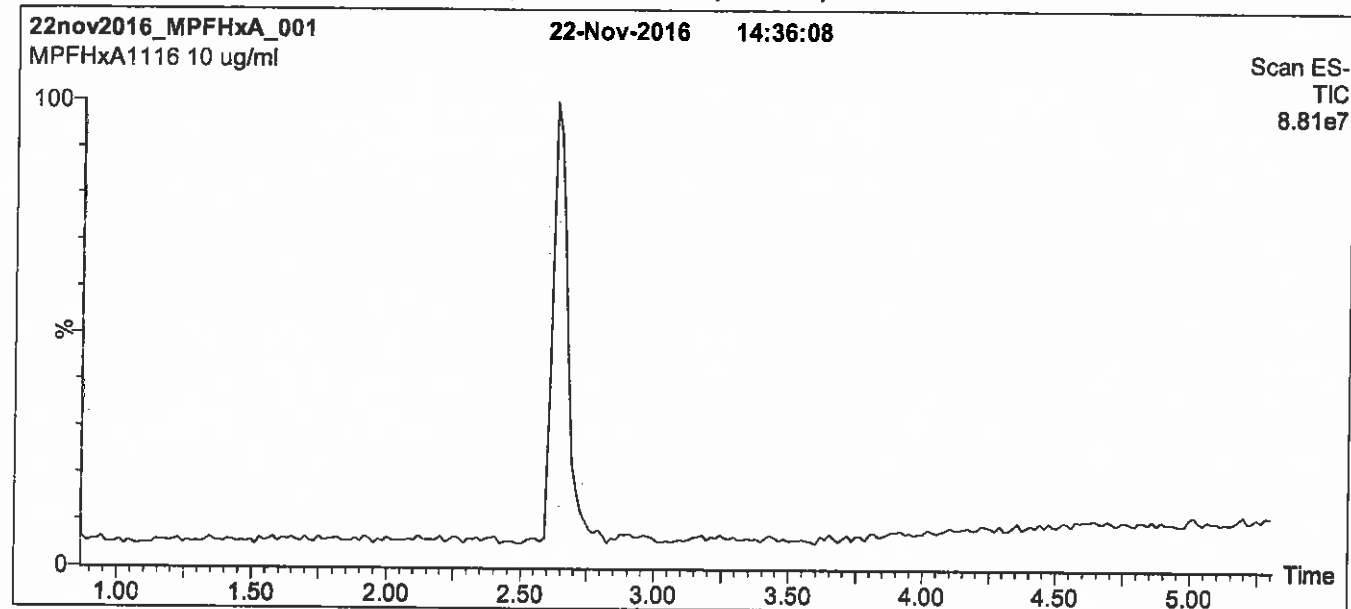
QUALITY MANAGEMENT:

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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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H₂O
(both with 10 mM NH₄OAc 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

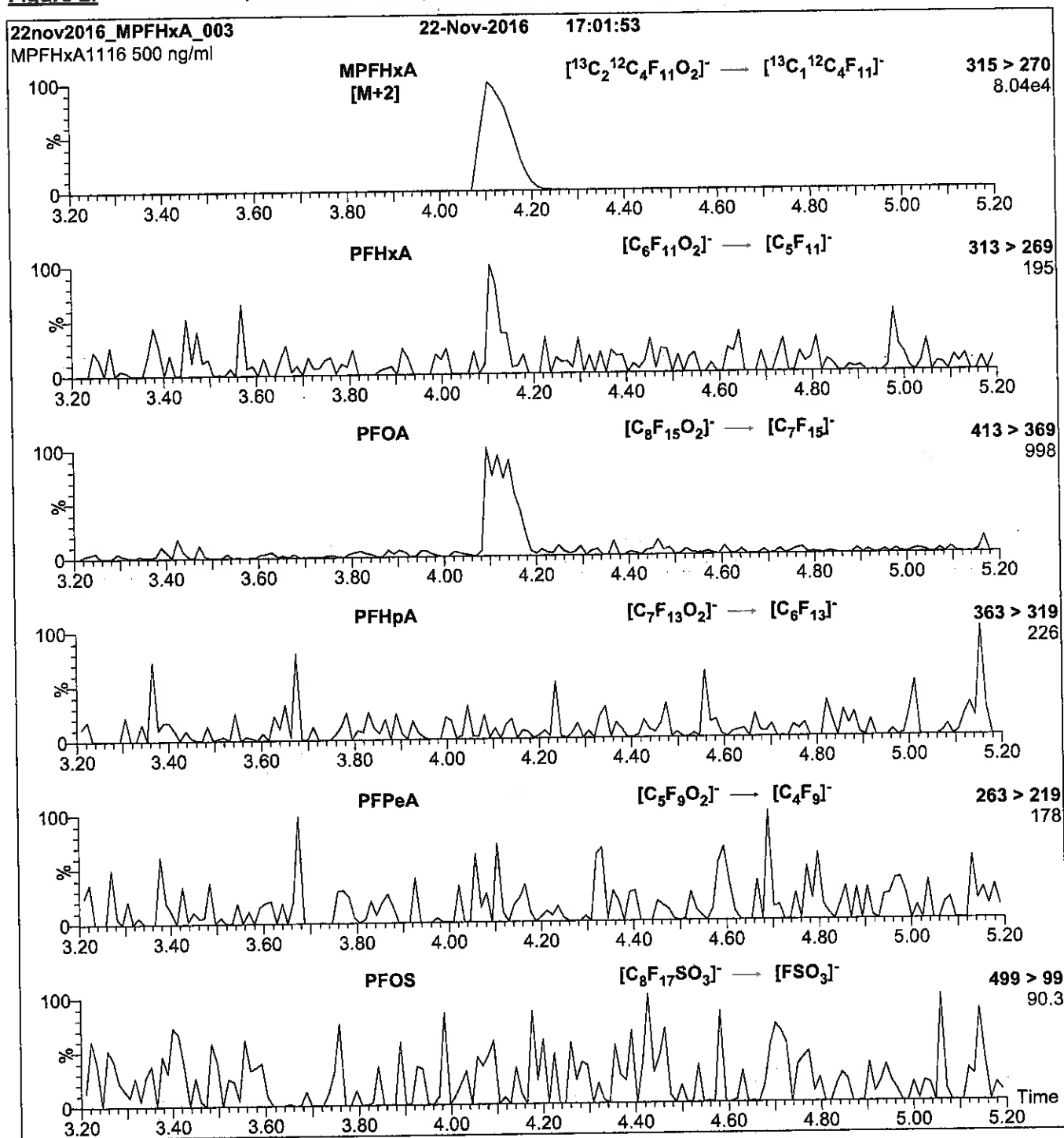
Flow: 300 μ l/min

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 $\mu\text{l}/\text{min}$

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

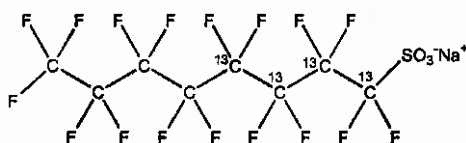
COMPOUND:

Sodium perfluoro-1-[1,2,3,4-¹³C₄]octanesulfonate

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₄¹²C₄F₁₇SO₃Na

MOLECULAR WEIGHT:

526.08

CONCENTRATION:

50.0 ± 2.5 µg/ml (Na salt)

SOLVENT(S):

Methanol

47.8 ± 2.4 µg/ml (MPFOS anion)

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99% ¹³C

LAST TESTED: (mm/dd/yyyy)

05/19/2017

(1,2,3,4-¹³C₄)

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-[1,2,3-¹³C₃]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim, General Manager

Date: 05/30/2017

(mm/dd/yyyy)

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

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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

$x_1, x_2, \dots, x_n$ on which it depends is:

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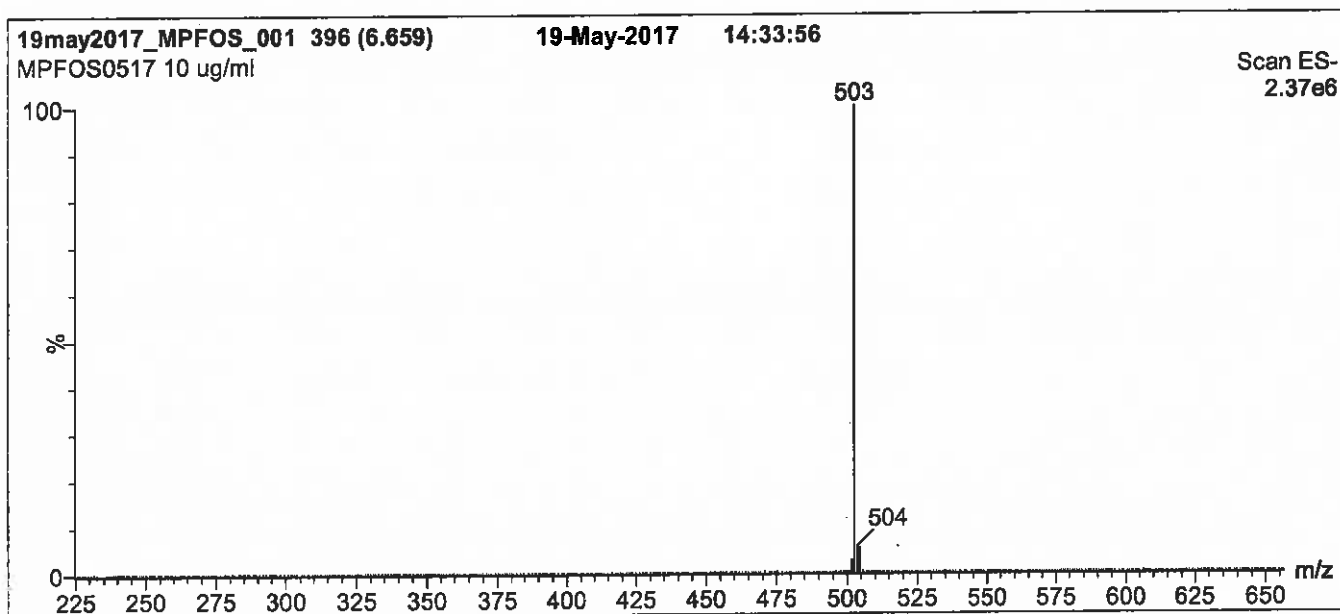
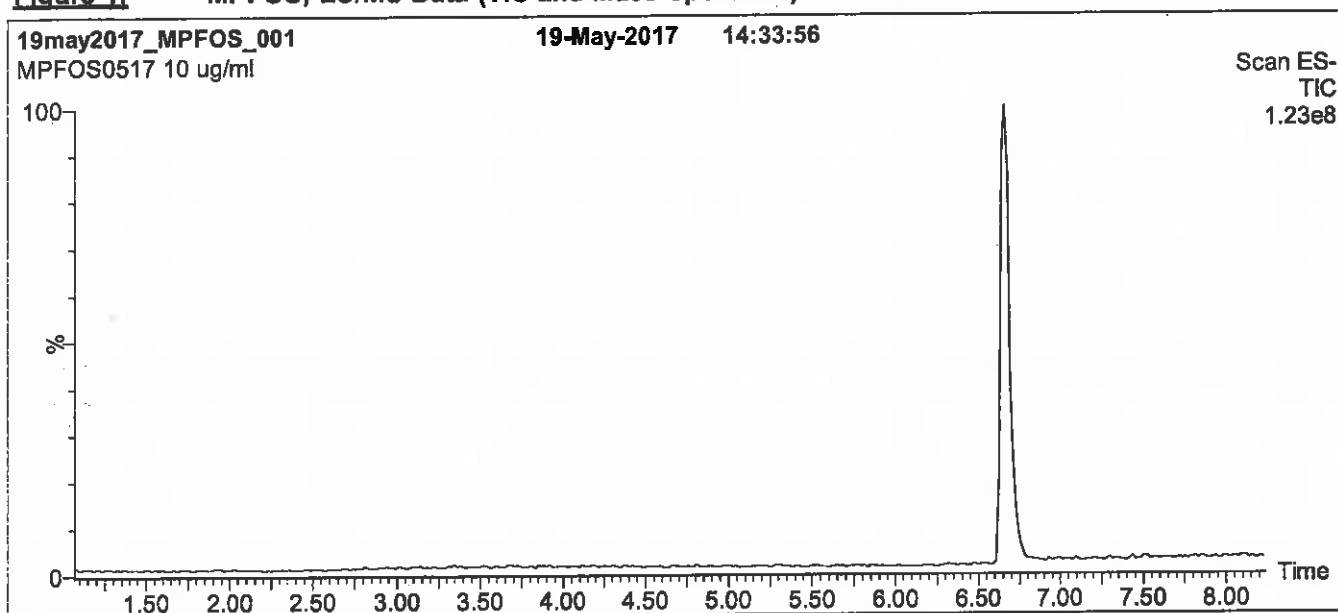
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Figure 1: MPFOS; LC/MS Data (TIC and Mass Spectrum)



Conditions for Figure 1:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H₂O
(both with 10 mM NH₄OAc 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

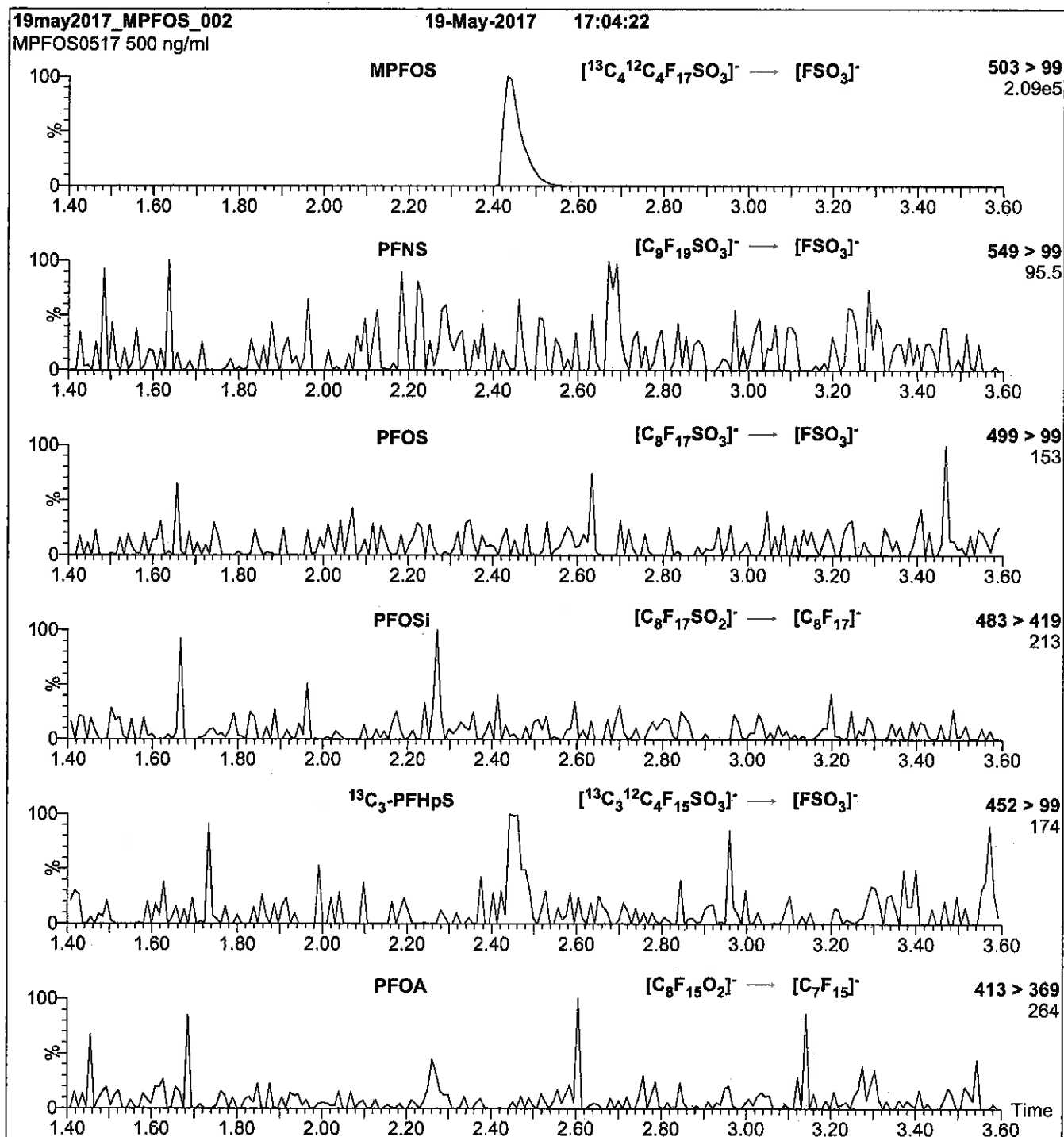
Flow: 300 μ l/min

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) = 60
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 $\mu\text{l}/\text{min}$

MS Parameters

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

Reagent

LCPFBSA_00002

n: 4/2/17 SKW



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CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

L-PFBS

LOT NUMBER:

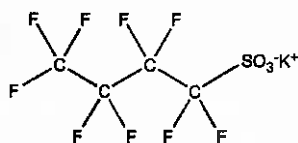
LPFBS1116

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)

SOLVENT(S):

Methanol

44.2 ± 2.2 µg/ml (PFBS anion)

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.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: 12/05/2016

(mm/dd/yyyy)

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

INTENDED USE:

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

HAZARDS:

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

SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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

UNCERTAINTY:

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

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

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

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 $\pm 5\%$ (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.

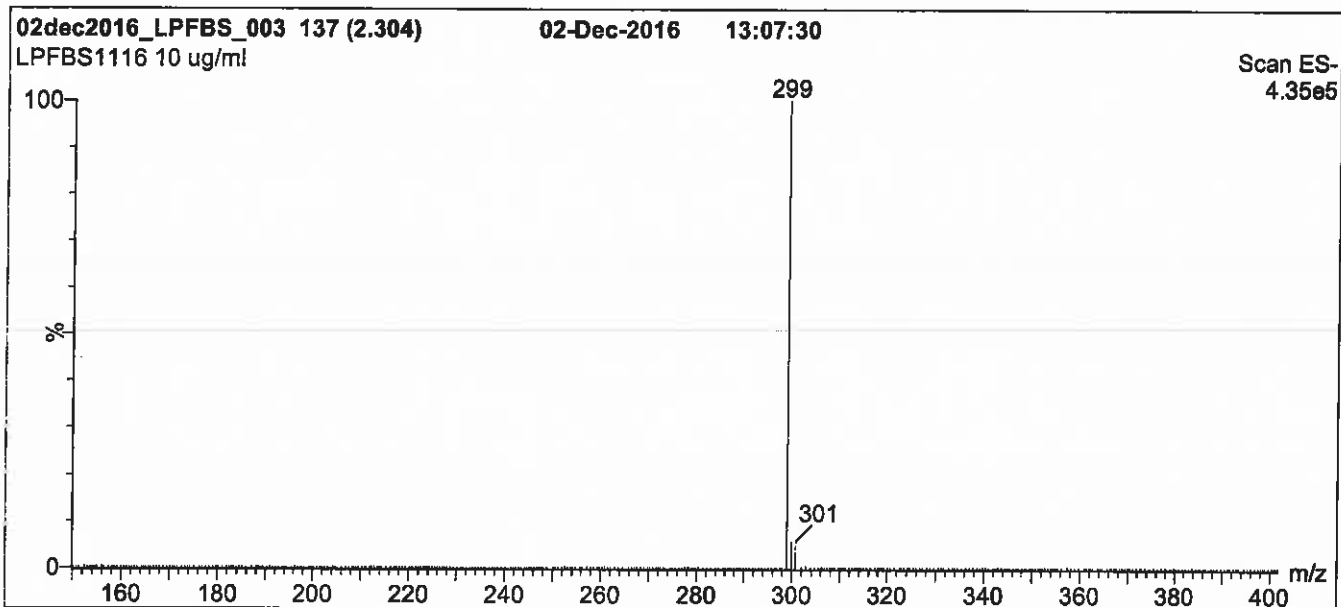
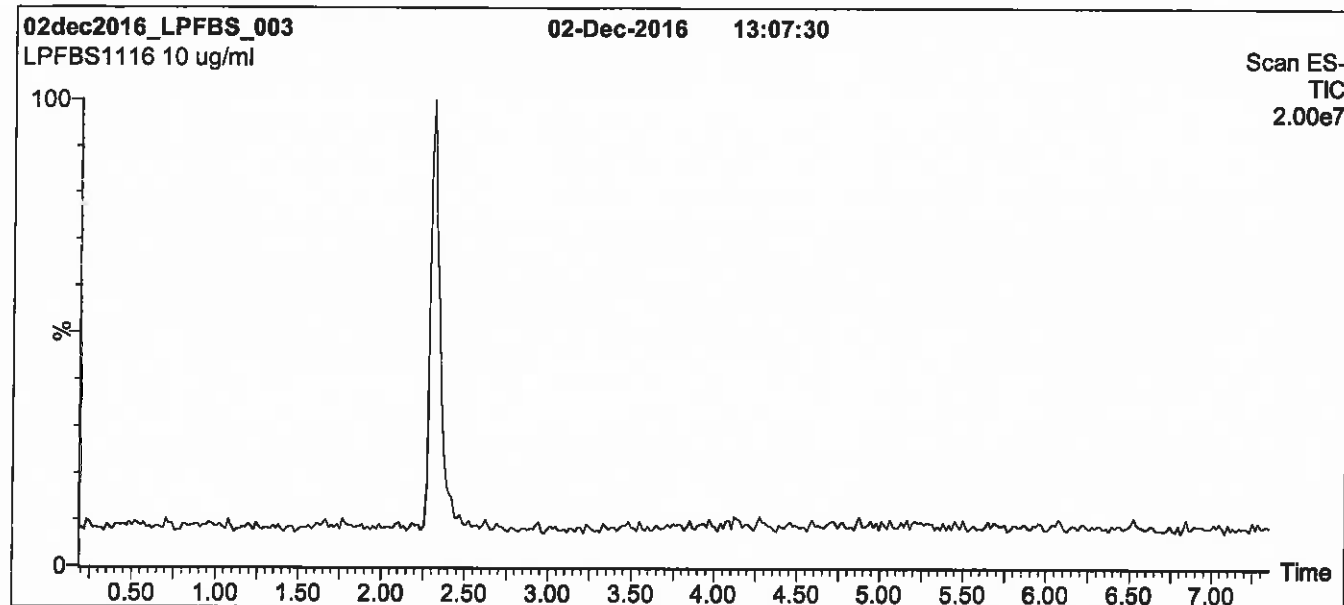
QUALITY MANAGEMENT:

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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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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H₂O
(both with 10 mM NH₄OAc 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

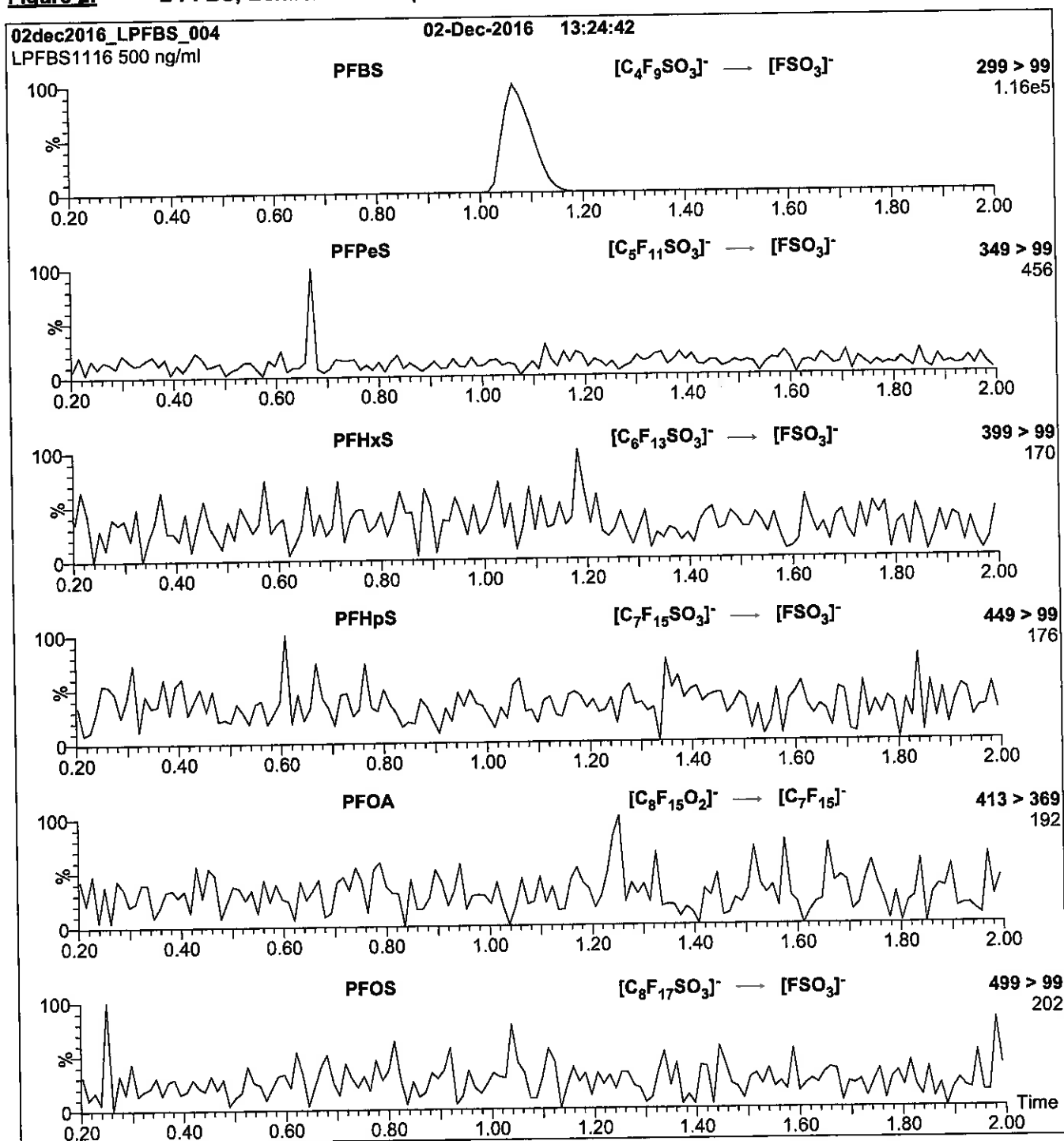
Flow: 300 μ l/min

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 μ l (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 μ l/min

MS Parameters

Collision Gas (mbar) = 3.28e-3
Collision Energy (eV) = 25

Reagent

LCPFHpA_00009

P: 9/21/17 SKJ



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CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFHpA

LOT NUMBER:

PFHpA1216

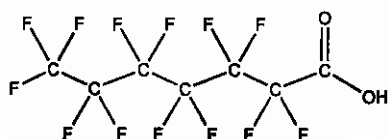
COMPOUND:

Perfluoro-n-heptanoic acid

STRUCTURE:

CAS #:

375-85-9



MOLECULAR FORMULA:

$C_7H_{13}O_2$

MOLECULAR WEIGHT:

364.06

CONCENTRATION:

$50 \pm 2.5 \mu\text{g/ml}$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

12/02/2016

EXPIRY DATE: (mm/dd/yyyy)

12/02/2021

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

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

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

ADDITIONAL INFORMATION:

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

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: 12/12/2016

(mm/dd/yyyy)

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

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 $x_1, x_2, \dots, x_n$ on which it depends is:

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

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 $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

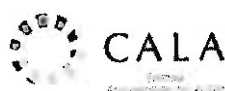
Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

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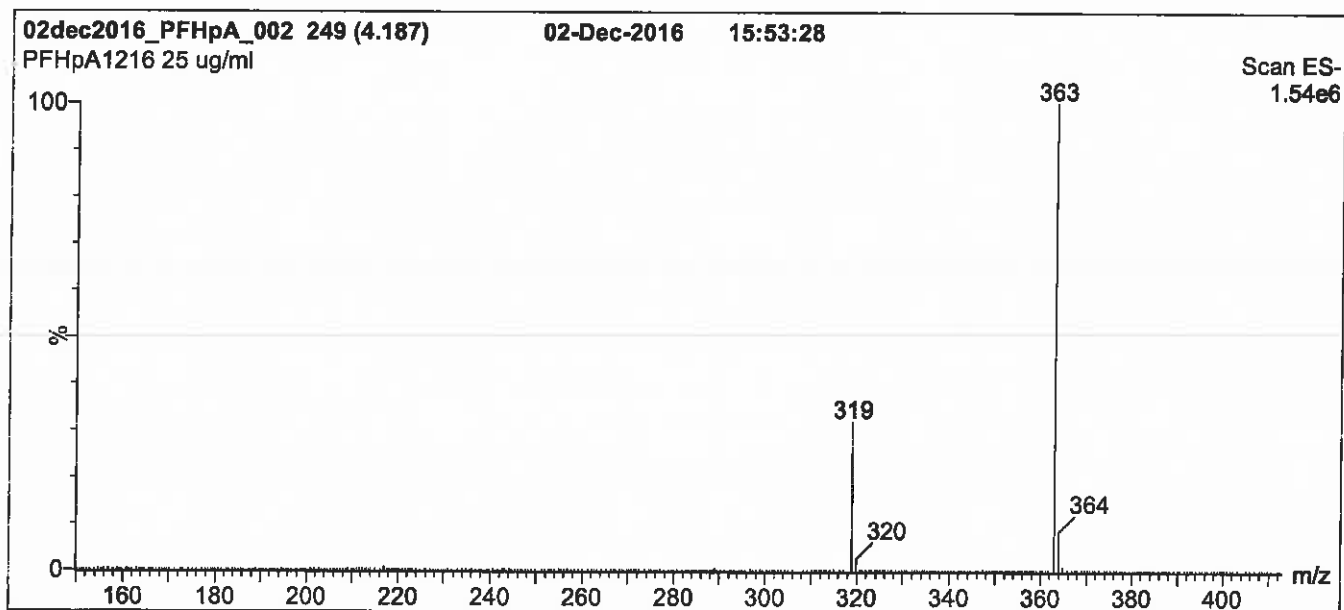
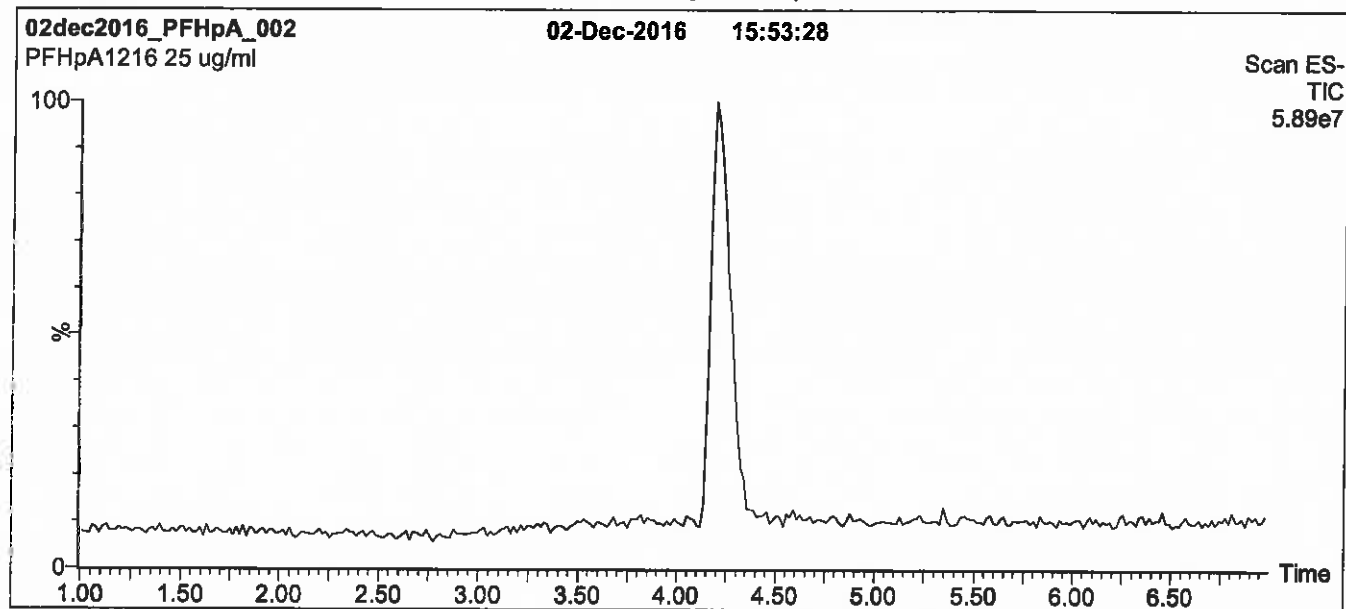
QUALITY MANAGEMENT:

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



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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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H₂O
(both with 10 mM NH₄OAc 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

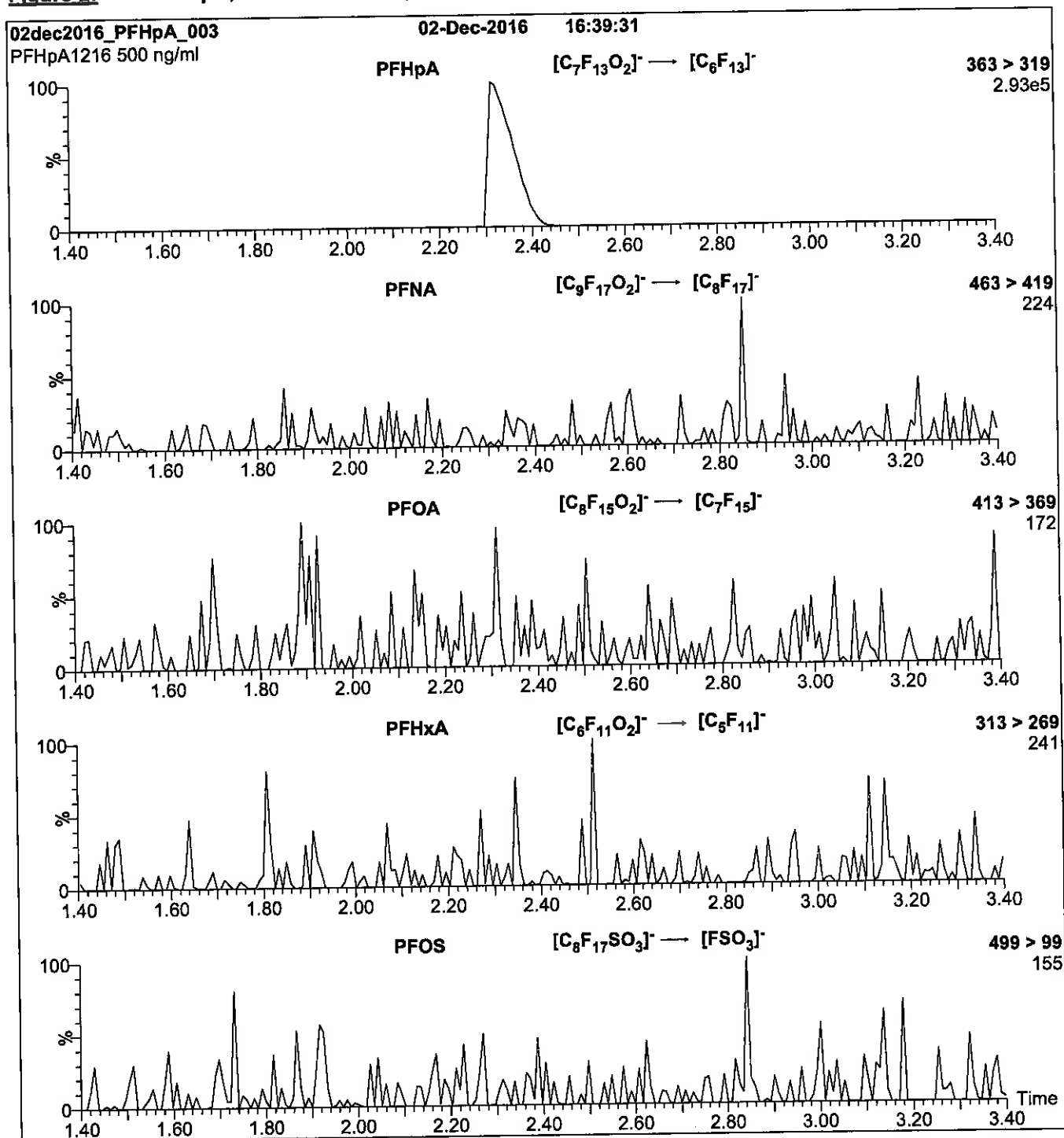
Flow: 300 μ l/min

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 μ l (500 ng/ml PFHpA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O
(both with 10 mM NH₄OAc buffer)

Flow: 300 μ l/min

MS Parameters

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

Reagent

LCPFHxS-br_00005



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**CERTIFICATE OF ANALYSIS
DOCUMENTATION**

br-PFHxSK

**Potassium Perfluorohexanesulfonate
Solution/Mixture of Linear and
Branched Isomers**

<u>PRODUCT CODE:</u>	br-PFHxSK
<u>LOT NUMBER:</u>	brPFHxSK0117
<u>CONCENTRATION:</u>	50.0 ± 2.5 µg/ml (total potassium salt) 45.5 ± 2.3 µg/ml (total PFHxS anion)
<u>SOLVENT(S):</u>	Methanol
<u>DATE PREPARED:</u> (mm/dd/yyyy)	01/03/2017
<u>LAST TESTED:</u> (mm/dd/yyyy)	01/04/2017
<u>EXPIRY DATE:</u> (mm/dd/yyyy)	01/04/2022
<u>RECOMMENDED STORAGE:</u>	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 ¹⁹F-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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HAZARDS:

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UNCERTAINTY:

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

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

$x_1, x_2, \dots, x_n$ on which it depends is:

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

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

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

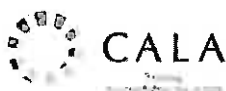
Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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

Isomer	Name	Structure	Percent Composition by ¹⁹ F-NMR
1	Potassium perfluoro-1-hexanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ ⁻ K ⁺	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	CF ₃ CF ₂ CF ₂ CF ₂ CF(SO ₃ ⁻)K ⁺ CF ₃	2.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	CF ₃ CF ₂ CF ₂ CF(CF ₃)CF ₂ SO ₃ ⁻ K ⁺ CF ₃	1.4
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	CF ₃ CF ₂ CF(CF ₃)CF ₂ CF ₂ SO ₃ ⁻ K ⁺ CF ₃	5.0
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	CF ₃ CF(CF ₃)CF ₂ CF ₂ CF ₂ SO ₃ ⁻ K ⁺ CF ₃	8.9
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	CF ₃ CF ₃ CCF ₂ CF ₂ SO ₃ ⁻ K ⁺ CF ₃	0.2
7	Other Unidentified Isomers		0.5

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

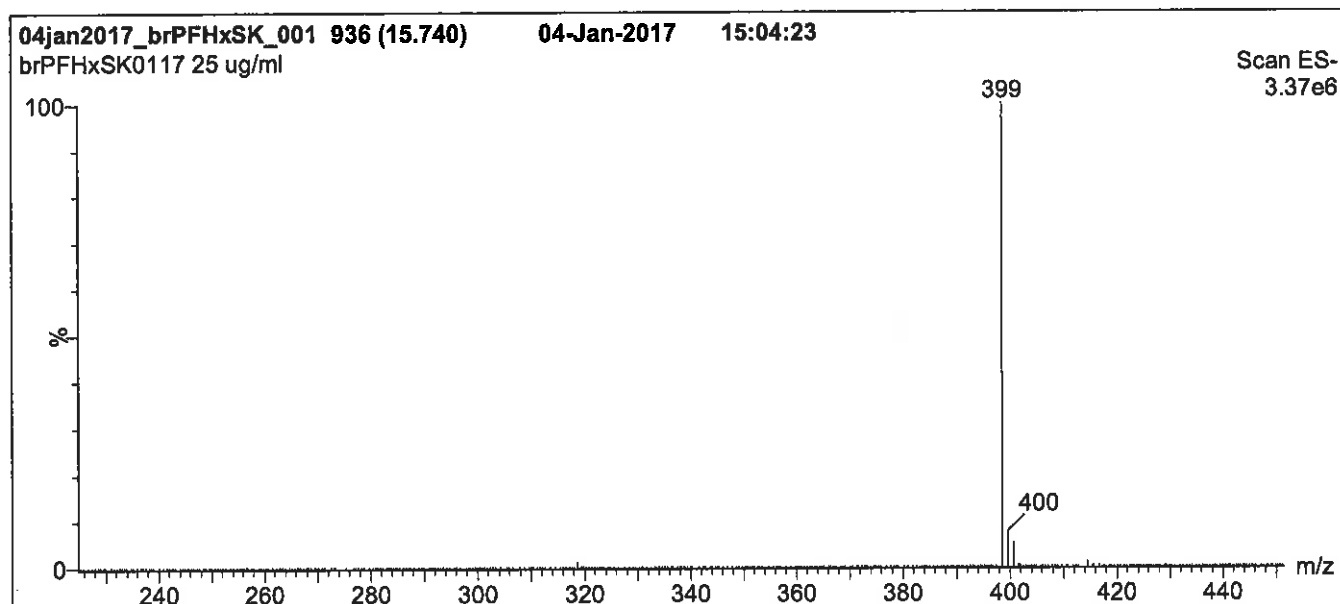
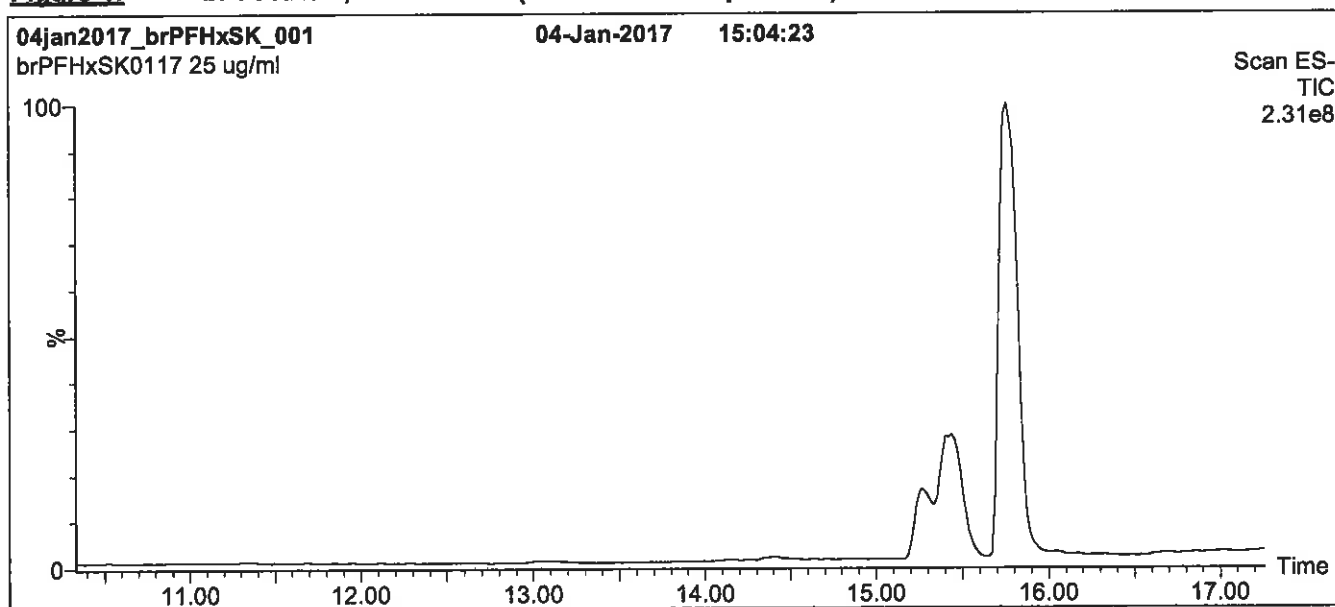
Certified By:


B.G. Chittim

Date: 01/20/2017

(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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient

Start: 20% (80:20 MeOH:ACN) / 80% H₂O
(both with 10 mM NH₄OAc 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 μ l/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)

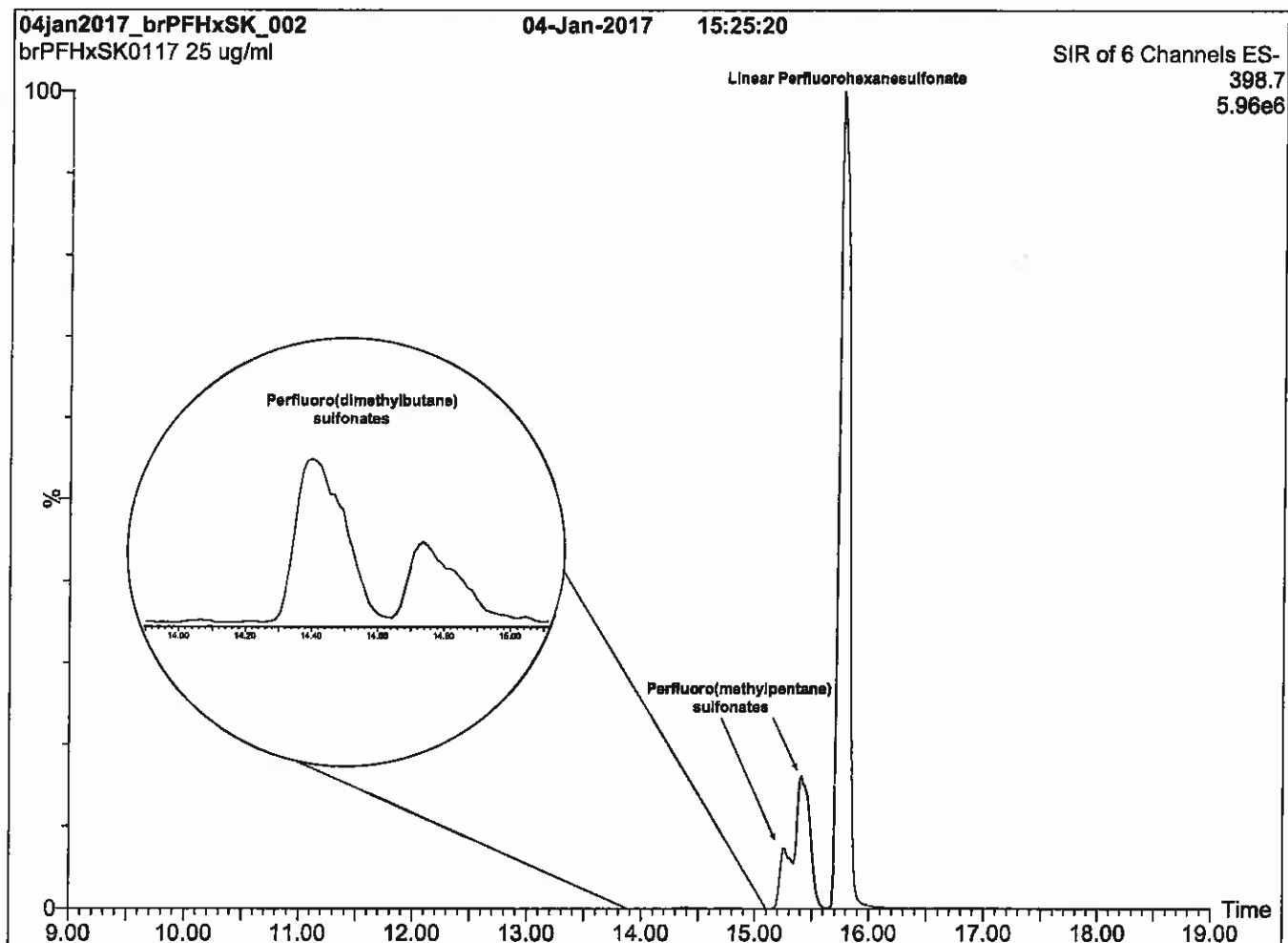
Capillary Voltage (kV) = 3.00

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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 20% (80:20 MeOH:ACN) / 80% H₂O
(both with 10 mM NH₄OAc 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

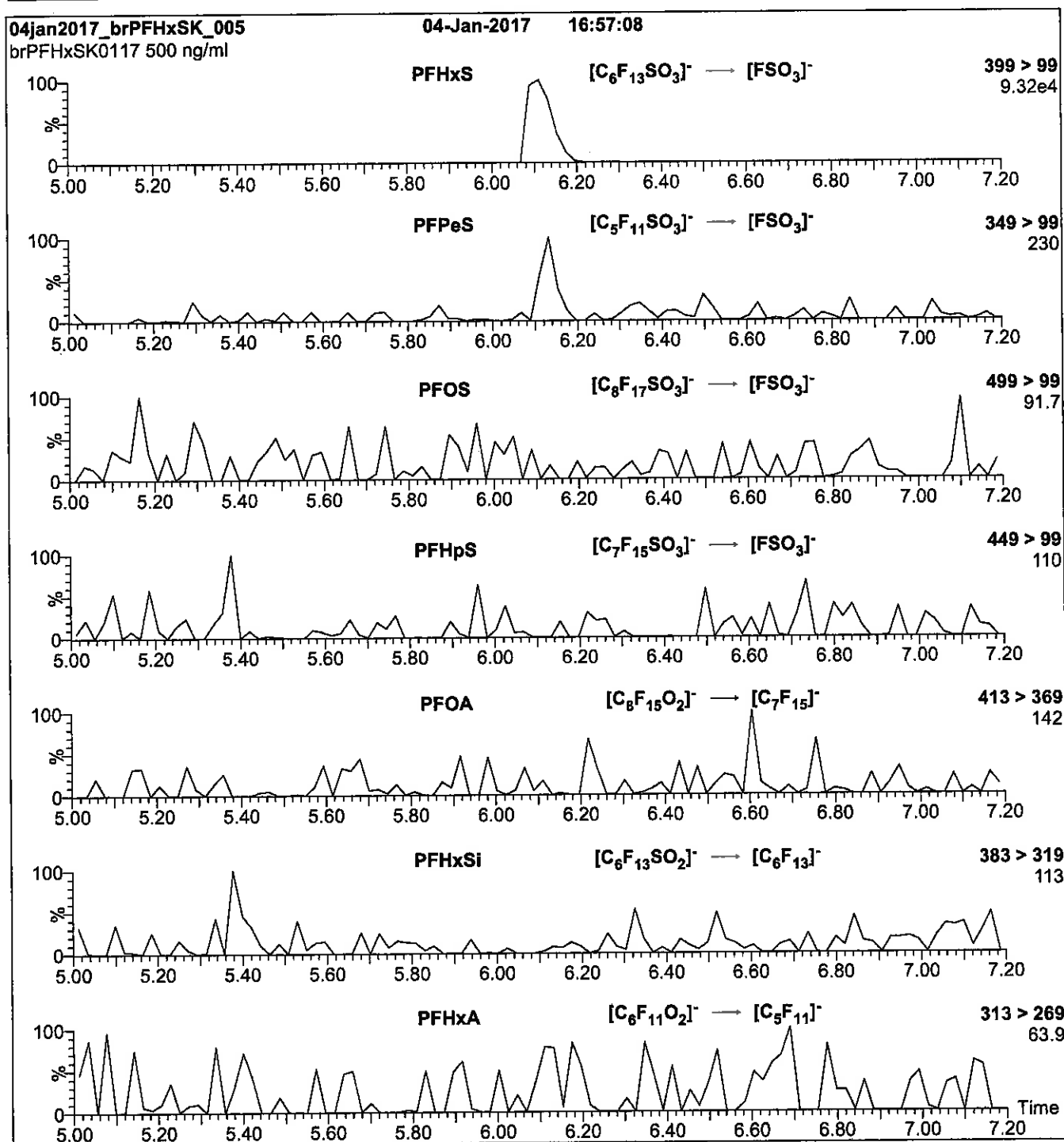
Flow: 300 μ l/min

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 μ l (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 μ l/min

MS Parameters

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

Reagent

LCPFNA_00009

r: 9/21/17 skv



WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFNA

LOT NUMBER:

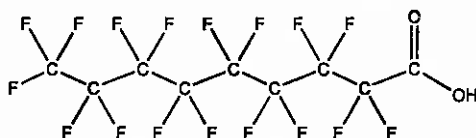
PFNA0717

COMPOUND:

Perfluoro-n-nonanoic acid

STRUCTURE:**CAS #:**

375-95-1

**MOLECULAR FORMULA:** $C_9H_{17}O_2$ **MOLECULAR WEIGHT:**

464.08

CONCENTRATION: $50 \pm 2.5 \mu\text{g/ml}$ **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:**
B.G. Chittim, General Manager**Date:** 07/24/2017

(mm/dd/yyyy)

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

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.

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UNCERTAINTY:

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

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

$x_1, x_2, \dots, x_n$ on which it depends is:

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

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 $\pm 5\%$ (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.

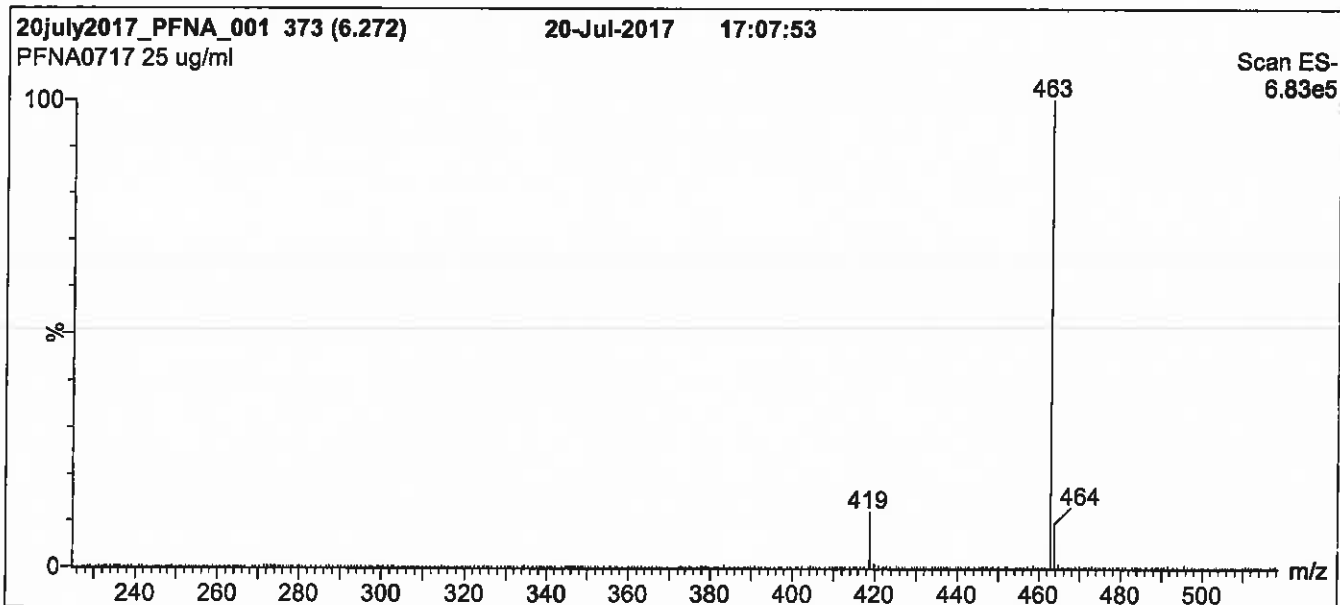
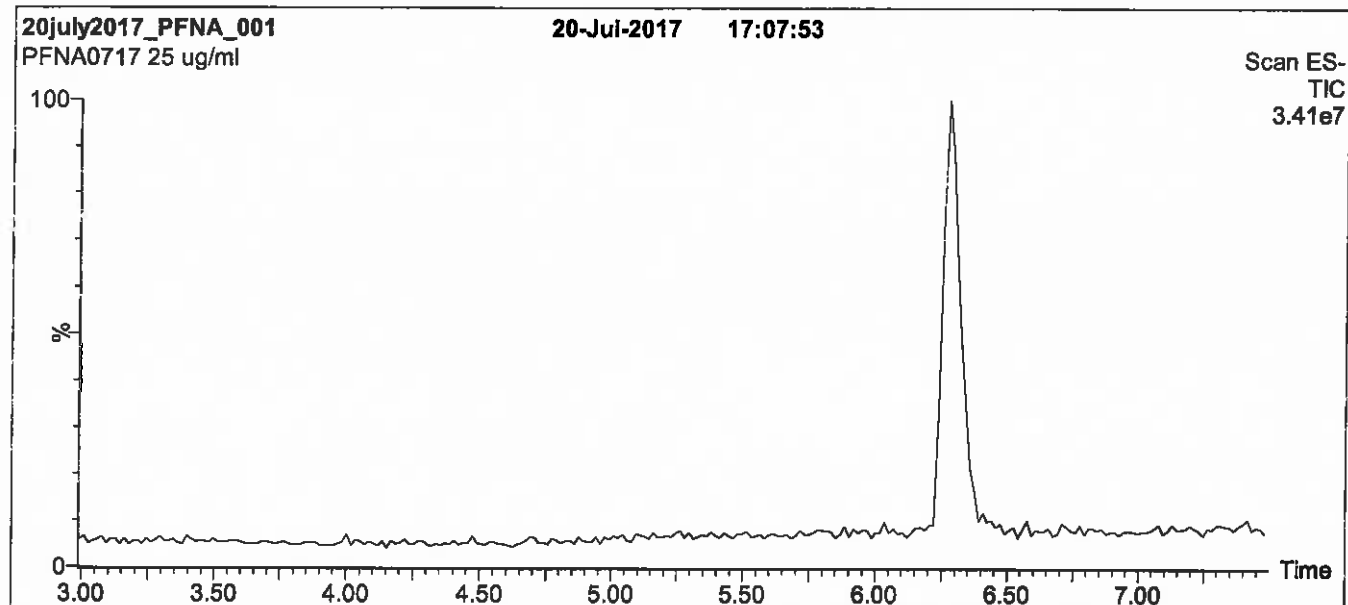
QUALITY MANAGEMENT:

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).



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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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient

Start: 50% (80:20 MeOH:ACN) / 50% H₂O
(both with 10 mM NH₄OAc 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 μ l/min

MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)

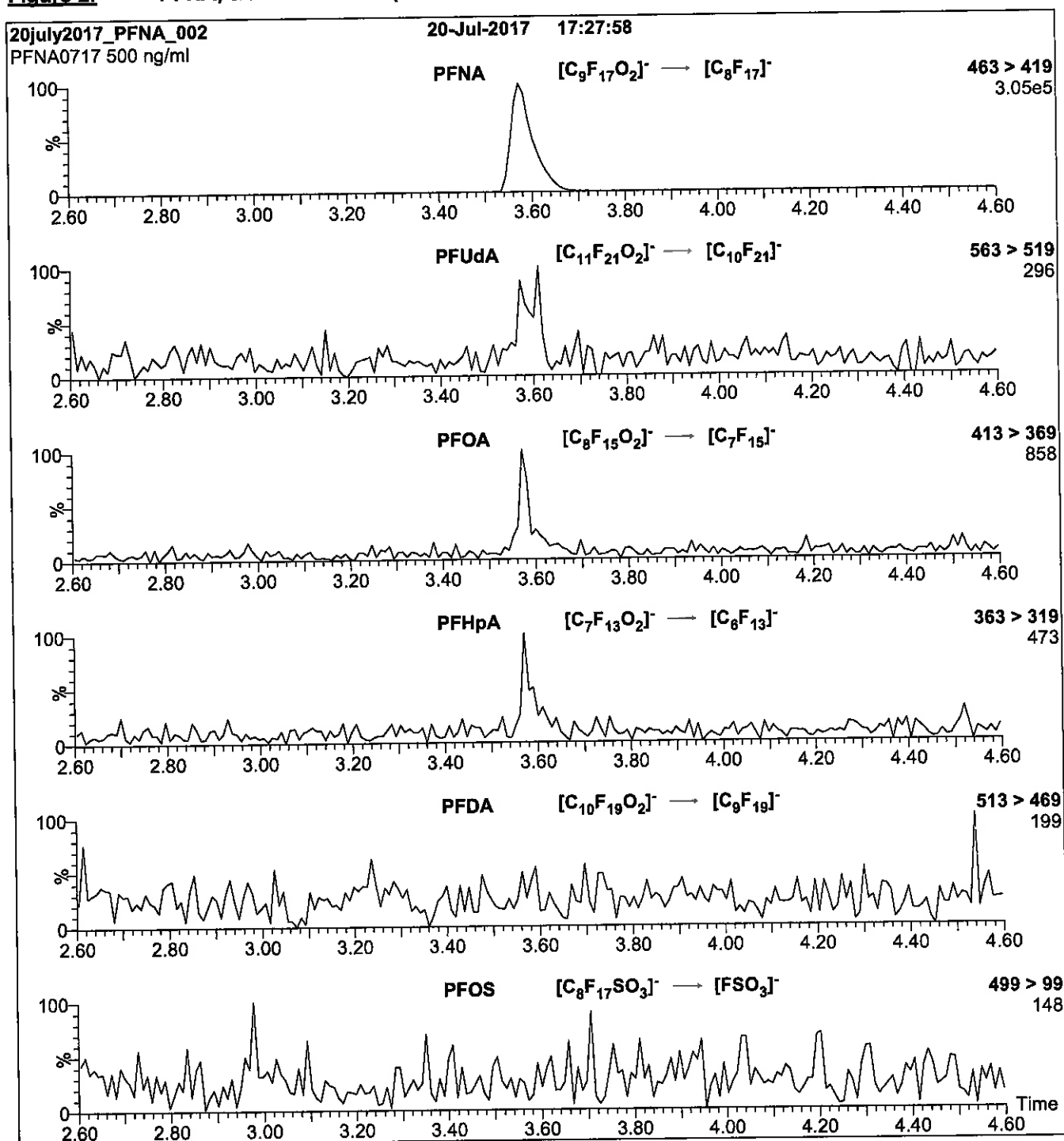
Capillary Voltage (kV) = 2.00

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 μ l (500 ng/ml PFNA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O
(both with 10 mM NH₄OAc buffer)

Flow: 300 μ l/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

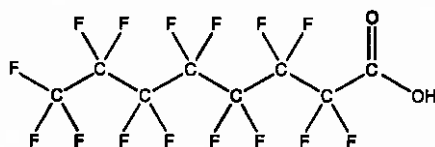
LOT NUMBER: PFOA0917

COMPOUND:

Perfluoro-n-octanoic acid

STRUCTURE:

CAS #: 335-67-1



MOLECULAR FORMULA:

$C_8H_{15}O_2$

MOLECULAR WEIGHT: 414.07

CONCENTRATION:

$50 \pm 2.5 \mu\text{g/ml}$

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:

B.G. Chittim, General Manager

Date: 09/28/2017

(mm/dd/yyyy)

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

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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:

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$x_1, x_2, \dots, x_n$ on which it depends is:

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

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 $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

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

EXPIRY DATE / PERIOD OF VALIDITY:

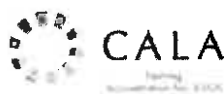
Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

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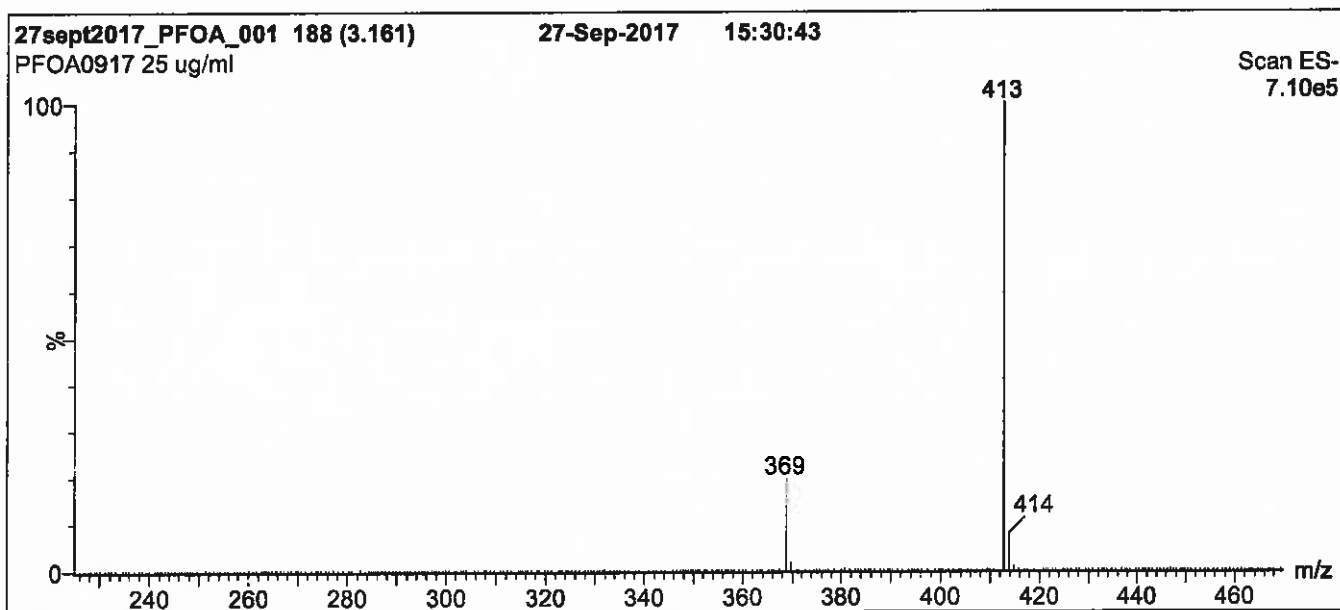
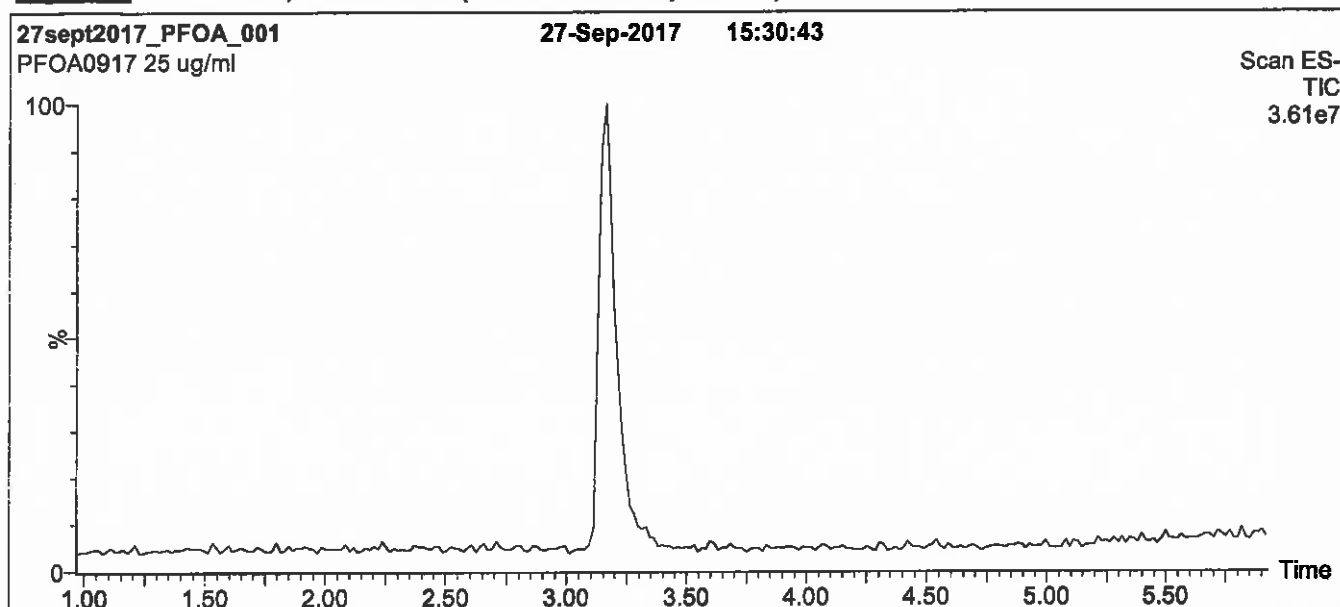
QUALITY MANAGEMENT:

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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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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H₂O
(both with 10 mM NH₄OAc 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

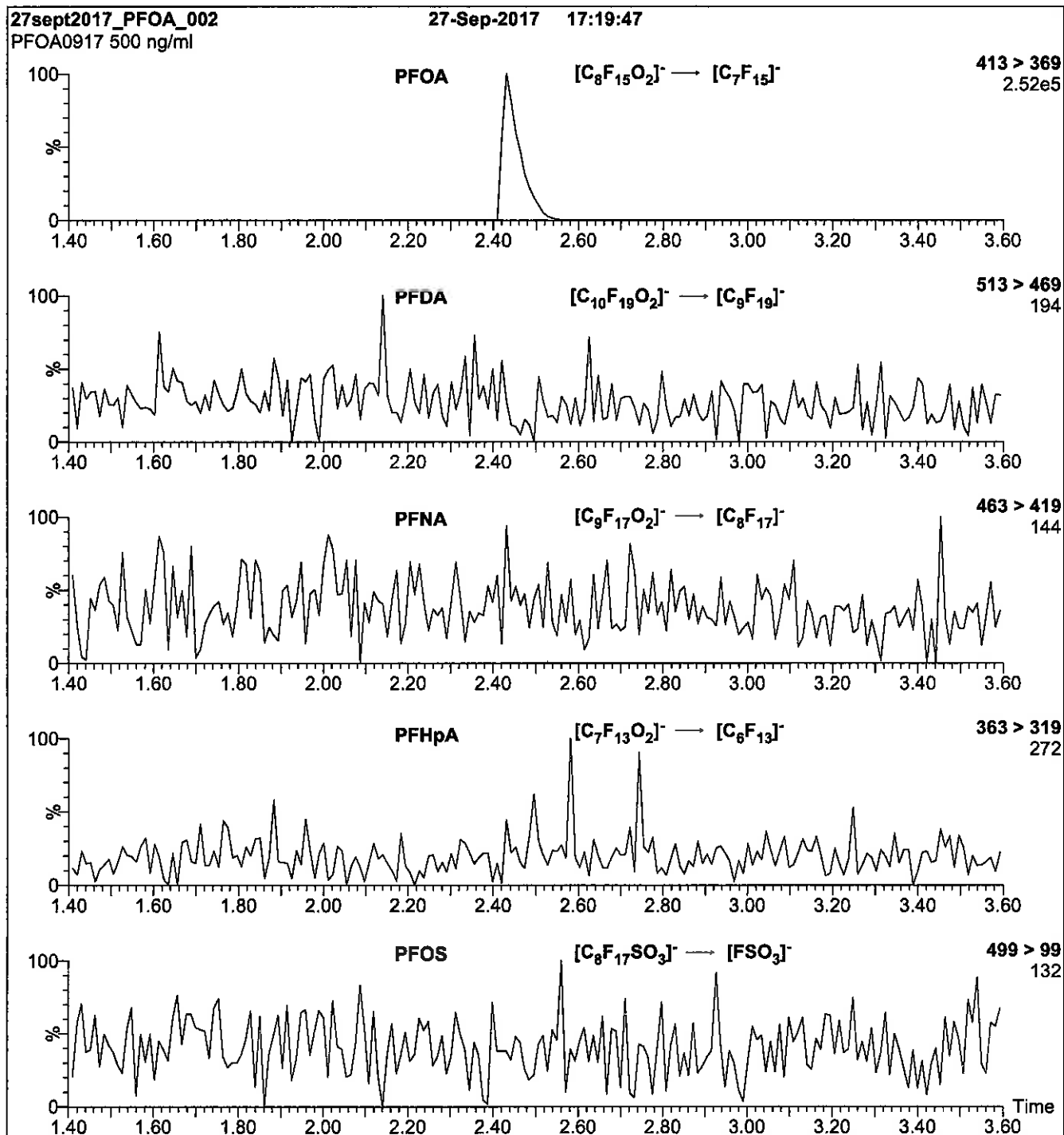
Flow: 300 μ l/min

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 μ l (500 ng/ml PFOA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O
(both with 10 mM NH₄OAc buffer)

Flow: 300 μ l/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**

<u>PRODUCT CODE:</u>	br-PFOSK
<u>LOT NUMBER:</u>	brPFOSK0117
<u>CONCENTRATION:</u>	50 ± 2.5 µg/ml (total potassium salt) 46.4 ± 2.3 µg/ml (total PFOS anion)
<u>SOLVENT(S):</u>	Methanol
<u>DATE PREPARED:</u> (mm/dd/yyyy)	01/09/2017
<u>LAST TESTED:</u> (mm/dd/yyyy)	01/12/2017
<u>EXPIRY DATE:</u> (mm/dd/yyyy)	01/12/2022
<u>RECOMMENDED STORAGE:</u>	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 ¹⁹F-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
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$$u_c(y(x_1, x_2, \dots, x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

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EXPIRY DATE / PERIOD OF VALIDITY:

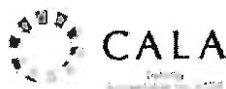
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Table A: br-PFOSK; Isomeric Components and Percent Composition (by ¹⁹F-NMR)*

Isomer	Name	Structure	Percent Composition by ¹⁹ F-NMR
1	Potassium perfluoro-1-octanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ ⁻ K ⁺	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF ₂ CF ₃ SO ₃ ⁻ K ⁺	1.2
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF(CF ₃)SO ₃ ⁻ K ⁺	0.6
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF(CF ₃)CF ₂ SO ₃ ⁻ K ⁺	1.9
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF ₂ CF ₂ CF(CF ₃)CF ₂ CF ₂ SO ₃ ⁻ K ⁺	2.2
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF ₂ CF(CF ₃)CF ₂ CF ₂ CF ₂ SO ₃ ⁻ K ⁺	4.5
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF(CF ₃)CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ ⁻ K ⁺	10.0
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	CF ₃ CF(CF ₃)CF ₂ CF ₂ CF ₂ SO ₃ ⁻ K ⁺	0.2
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	CF ₃ CF ₂ CF(CF ₃)CF ₂ CF ₂ SO ₃ ⁻ K ⁺	0.03
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	CF ₃ CF(CF ₃)CF(CF ₃)CF ₂ CF ₂ SO ₃ ⁻ K ⁺	0.4
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	CF ₃ CF(CF ₃)CF ₂ CF(CF ₃)CF ₂ SO ₃ ⁻ K ⁺	0.07

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

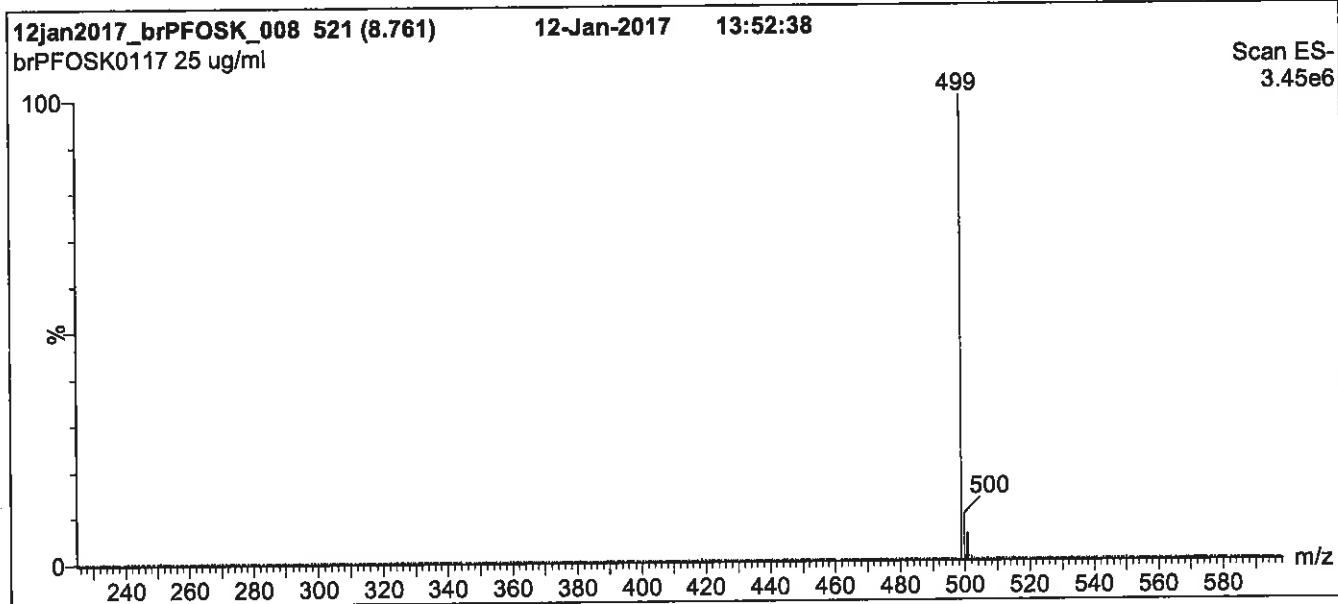
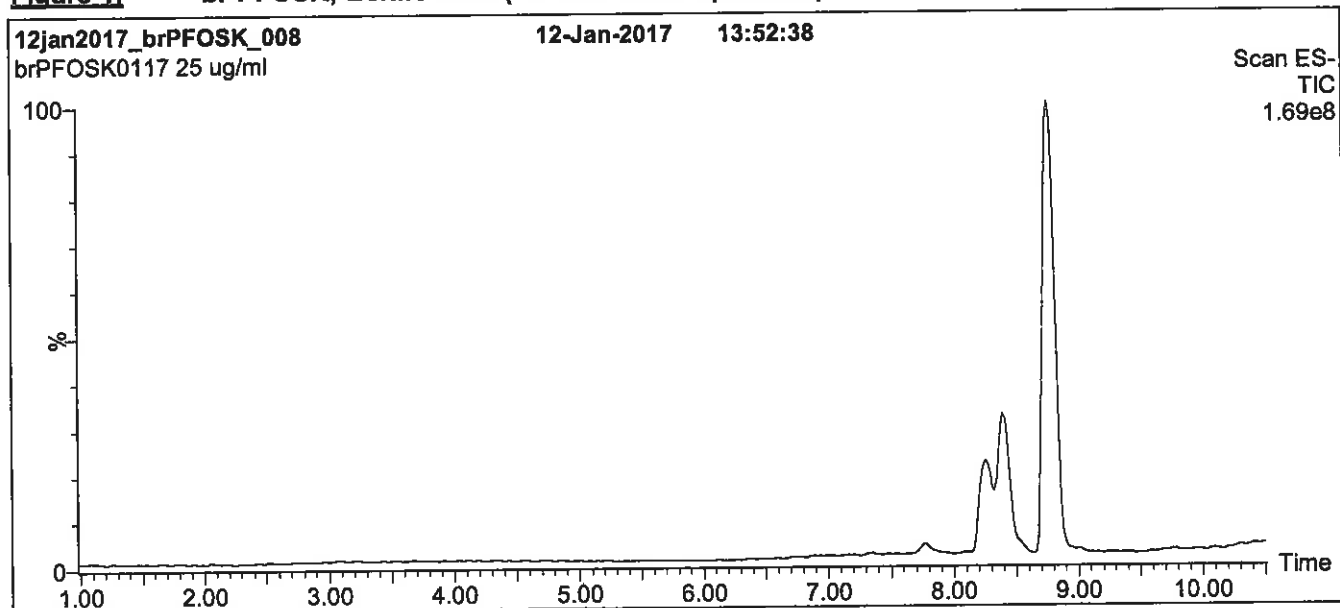
Certified By:


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 RP₁₈
1.7 μ m, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H₂O
(both with 10 mM NH₄OAc buffer)
Ramp to 90% organic over 12 min and hold for 2 min.
Return to initial conditions over 0.5 min.
Time: 16 min

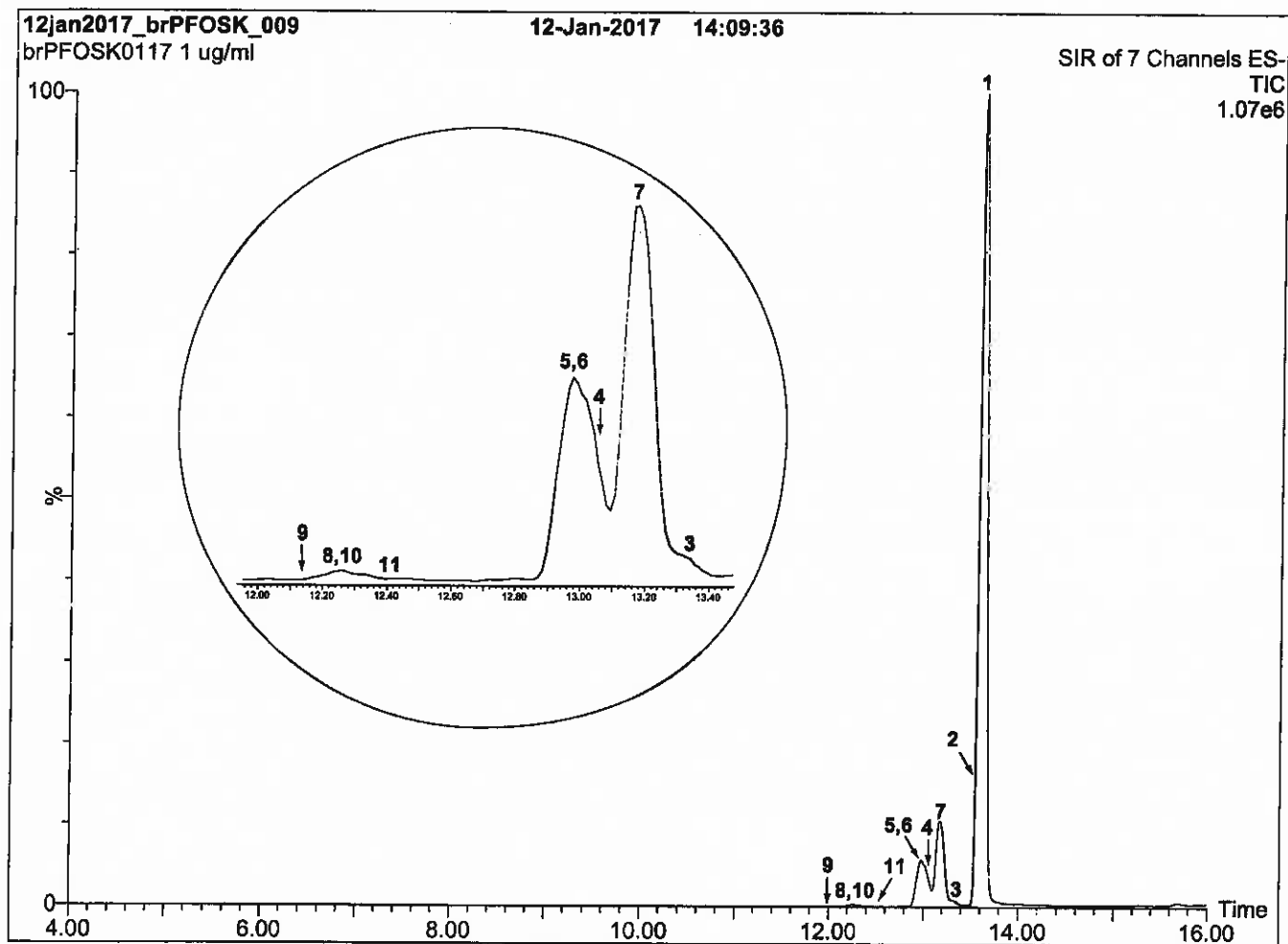
Flow: 300 μ l/min

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

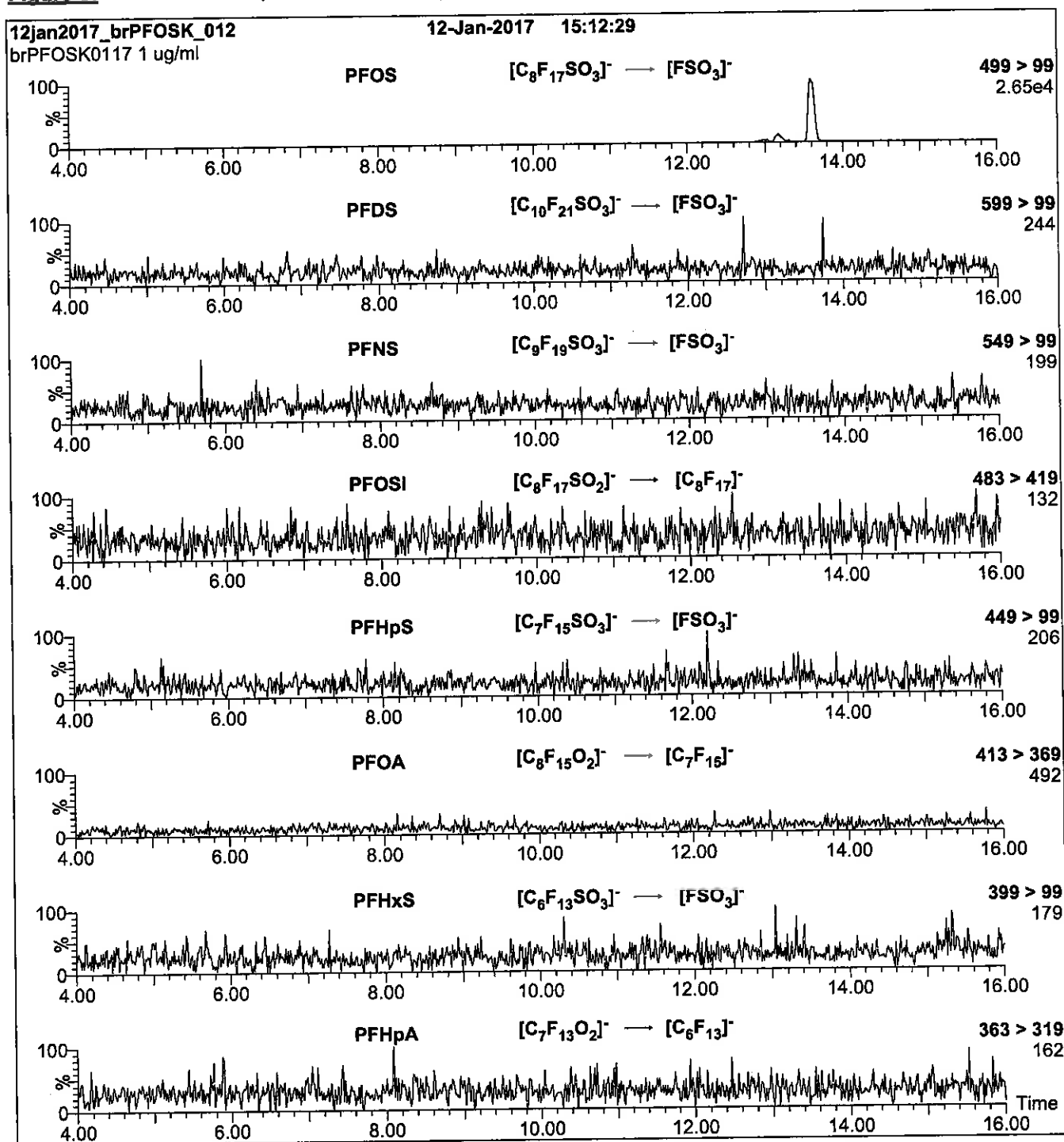
Chromatographic Conditions:

Column: Acquity UPLC BEH Shield RP₁₈ (1.7 μ m, 2.1 x 100 mm)
Injection: 1.0 μ g/ml of br-PFOSK
Mobile Phase: Gradient
45% (80:20 MeOH:ACN) / 55% H₂O (both with 10 mM NH₄OAc 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 μ l/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 μ l/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.: 320-41442-1

SDG No.: _____

Matrix: Water Level: Low

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

Client Sample ID	Lab Sample ID	PFHxA #	PFDA #
WGNA-072418-RW-3148	320-41442-1	87	110
WGNA-072418-FRB-3148	320-41442-2	94	103
NAWC-072418-RW-061	320-41442-3	76	105
NAWC-072418-FRB-061	320-41442-4	97	105
NAWC-072418-RW-029	320-41442-5	76	100
NAWC-072418-FRB-029	320-41442-6	95	103
NAWC-072418-RW-141	320-41442-7	83	107
NAWC-072418-FRB-141	320-41442-8	98	106
	MB 320-237511/1-A	95	108
	LLCS 320-237511/2-A	93	100
	LLCSD 320-237511/3-A	92	100

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA

QC LIMITS
70-130
70-130

Column to be used to flag recovery values

FORM III
LCMS LOW LEVEL CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.08.05_537A_008.d
 Lab ID: LLCS 320-237511/2-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LLCS CONCENTRATION (ng/L)	LLCS % REC	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	40.2	40.5	101	50-150	
Perfluorooctanoic acid (PFOA)	20.0	18.4 J	92	50-150	
Perfluorononanoic acid (PFNA)	20.0	17.7 J	89	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	30.9	102	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	9.16 J	92	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	101	112	50-150	

Column to be used to flag recovery and RPD values

FORM III
LCMS LOW LEVEL CONTROL STANDARD DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.08.05_537A_009.d
 Lab ID: LLCSD 320-237511/3-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LLCSD CONCENTRATION (ng/L)	LLCSD % REC	% RPD	QC LIMITS		#
					RPD	REC	
Perfluorooctanesulfonic acid (PFOS)	40.2	39.0 J	97	4	50	50-150	
Perfluorooctanoic acid (PFOA)	20.0	18.1 J	90	2	50	50-150	
Perfluorononanoic acid (PFNA)	20.0	17.1 J	86	3	50	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	29.5 J	97	5	50	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	9.06 J	91	1	50	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	89.7 J	99	12	50	50-150	

Column to be used to flag recovery and RPD values

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab File ID: 2018.08.05_537A_007.d Lab Sample ID: MB 320-237511/1-A
 Matrix: Water Date Extracted: 08/02/2018 07:58
 Instrument ID: A8_N Date Analyzed: 08/05/2018 20:30
 Level: (Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LLCS 320-237511/2-A	2018.08.05_537A_008.d	08/05/2018 20:35
	LLCSD 320-237511/3-A	2018.08.05_537A_009.d	08/05/2018 20:40
WGNA-072418-RW-3148	320-41442-1	2018.08.05_537A_010.d	08/05/2018 20:44
WGNA-072418-FRB-3148	320-41442-2	2018.08.05_537A_011.d	08/05/2018 20:49
NAWC-072418-RW-061	320-41442-3	2018.08.05_537A_012.d	08/05/2018 20:54
NAWC-072418-FRB-061	320-41442-4	2018.08.05_537A_013.d	08/05/2018 20:58
NAWC-072418-RW-029	320-41442-5	2018.08.05_537A_014.d	08/05/2018 21:03
NAWC-072418-FRB-029	320-41442-6	2018.08.05_537A_015.d	08/05/2018 21:08
NAWC-072418-RW-141	320-41442-7	2018.08.05_537A_016.d	08/05/2018 21:12
NAWC-072418-FRB-141	320-41442-8	2018.08.05_537A_019.d	08/05/2018 21:26

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Instrument ID: A8_N Calibration Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3(mm) Calibration End Date: 08/01/2018 02:11
 Calibration ID: 40445

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MEAN AREA AND MEAN RT		832406	1.78	2360189	2.02		
UPPER LIMIT		1248609	2.28	3540284	2.52		
LOWER LIMIT		416203	1.28	1180095	1.52		
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCVL 320-237363/8		871132	1.78	2468904	2.02		
ICV 320-237363/10		856625	1.78	2420430	2.02		
CCVL 320-238066/1		859047	1.78	2433121	2.02		
CCV 320-238080/1 CCVIS		882956	1.76	2543401	2.00		
MB 320-237511/1-A		960279	1.76	2736351	1.99		
LLCS 320-237511/2-A		865247	1.75	2312825	1.99		
LLCSD 320-237511/3-A		900385	1.75	2457298	1.99		
320-41442-1	WGNA-072418-RW-3148	1036280	1.75	2913947	1.99		
320-41442-2	WGNA-072418-FRB-3148	1033646	1.75	2810138	1.99		
320-41442-3	NAWC-072418-RW-061	1093336	1.75	3023812	1.98		
320-41442-4	NAWC-072418-FRB-061	983786	1.75	2664621	1.99		
320-41442-5	NAWC-072418-RW-029	1014582	1.75	2765316	1.99		
320-41442-6	NAWC-072418-FRB-029	901429	1.75	2399270	1.98		
320-41442-7	NAWC-072418-RW-141	892541	1.75	2449468	1.99		
CCV 320-238080/13 CCVIS		905788	1.75	2508704	1.98		
CCV 320-238082/13 CCVIS		905788	1.75	2508704	1.98		
320-41442-8	NAWC-072418-FRB-141	872868	1.76	2385033	1.99		
CCV 320-238082/25 CCVIS		804484	1.75	2288548	1.98		

13PFOA = 13C2-PFOA

PFOS = 13C4 PFOS

Area Limit = 50%-150% of internal standard area

RT Limit = $\pm$ 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Sample No.: CCV 320-238080/1 Date Analyzed: 08/05/2018 20:21
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.08.05_537A_005 Heated Purge: (Y/N) N
 Calibration ID: 40445

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		882956	1.76	2543401	2.00		
UPPER LIMIT		1236138	2.26	3560761	2.50		
LOWER LIMIT		618069	1.26	1780381	1.50		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-237511/1-A		960279	1.76	2736351	1.99		
LLCS 320-237511/2-A		865247	1.75	2312825	1.99		
LLCSD 320-237511/3-A		900385	1.75	2457298	1.99		
320-41442-1	WGNA-072418-RW-3148	1036280	1.75	2913947	1.99		
320-41442-2	WGNA-072418-FRB-3148	1033646	1.75	2810138	1.99		
320-41442-3	NAWC-072418-RW-061	1093336	1.75	3023812	1.98		
320-41442-4	NAWC-072418-FRB-061	983786	1.75	2664621	1.99		
320-41442-5	NAWC-072418-RW-029	1014582	1.75	2765316	1.99		
320-41442-6	NAWC-072418-FRB-029	901429	1.75	2399270	1.98		
320-41442-7	NAWC-072418-RW-141	892541	1.75	2449468	1.99		

13PFOA = 13C2-PFOA
 13PFOA = 13C2-PFOA
 PFOS = 13C4 PFOS
 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
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Sample No.: CCV 320-238080/13 Date Analyzed: 08/05/2018 21:17
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.08.05_537A_017 Heated Purge: (Y/N) N
 Calibration ID: 40445

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		905788	1.75	2508704	1.98		
UPPER LIMIT		1268103	2.25	3512186	2.48		
LOWER LIMIT		634052	1.25	1756093	1.48		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-237511/1-A		960279	1.76	2736351	1.99		
LLCS 320-237511/2-A		865247	1.75	2312825	1.99		
LLCSD 320-237511/3-A		900385	1.75	2457298	1.99		
320-41442-1	WGNA-072418-RW-3148	1036280	1.75	2913947	1.99		
320-41442-2	WGNA-072418-FRB-3148	1033646	1.75	2810138	1.99		
320-41442-3	NAWC-072418-RW-061	1093336	1.75	3023812	1.98		
320-41442-4	NAWC-072418-FRB-061	983786	1.75	2664621	1.99		
320-41442-5	NAWC-072418-RW-029	1014582	1.75	2765316	1.99		
320-41442-6	NAWC-072418-FRB-029	901429	1.75	2399270	1.98		
320-41442-7	NAWC-072418-RW-141	892541	1.75	2449468	1.99		

13PFOA = 13C2-PFOA
 13PFOA = 13C2-PFOA
 PFOS = 13C4 PFOS
 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
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Sample No.: CCV 320-238082/13 Date Analyzed: 08/05/2018 21:17
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.08.05_537A_017 Heated Purge: (Y/N) N
 Calibration ID: 40445

	13PFOA		PFOS			
	AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD	905788	1.75	2508704	1.98		
UPPER LIMIT	1268103	2.25	3512186	2.48		
LOWER LIMIT	634052	1.25	1756093	1.48		
LAB SAMPLE ID	CLIENT SAMPLE ID					
320-41442-8	NAWC-072418-FRB-141		872868	1.76	2385033	1.99

13PFOA = 13C2-PFOA
 13PFOA = 13C2-PFOA
 PFOS = 13C4 PFOS
 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
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Sample No.: CCV 320-238082/25 Date Analyzed: 08/05/2018 22:13
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.08.05_537A_029 Heated Purge: (Y/N) N
 Calibration ID: 40445

	13PFOA		PFOS			
	AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD	804484	1.75	2288548	1.98		
UPPER LIMIT	1126278	2.25	3203967	2.48		
LOWER LIMIT	563139	1.25	1601984	1.48		
LAB SAMPLE ID	CLIENT SAMPLE ID					
320-41442-8	NAWC-072418-FRB-141		872868	1.76	2385033	1.99

13PFOA = 13C2-PFOA
 13PFOA = 13C2-PFOA
 PFOS = 13C4 PFOS
 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 I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: WGNA-072418-RW-3148 Lab Sample ID: 320-41442-1
 Matrix: Water Lab File ID: 2018.08.05_537A_010.d
 Analysis Method: 537 Date Collected: 07/24/2018 08:40
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 263.1(mL) Date Analyzed: 08/05/2018 20:44
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	20	J	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	26		19	7.6	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.6
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	11	5.2
375-85-9	Perfluoroheptanoic acid (PFHpA)	7.5	J	9.5	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	86	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	87		70-130
STL00996	13C2 PFDA	110		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_010.d
 Lims ID: 320-41442-A-1-A
 Client ID: WGNA-072418-RW-3148
 Sample Type: Client
 Inject. Date: 05-Aug-2018 20:44:44 ALS Bottle#: 4 Worklist Smp#: 6
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: 320-41442-a-1-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
 Column 1 : Det: EXP1
 Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:38:57

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.343	1.350	-0.007	1.000	249352	1.91		143	
298.90 > 99.00	1.343	1.350	-0.007	1.000	153777		1.62(0.00-0.00)	336	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.457	1.464	-0.007	1.000	1022303	8.67		12546	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.593	1.593	0.0	1.000	405847	2.27		121	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.593	1.601	-0.008	1.000	227446	1.96		16.1	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		1036280	10.0		9996	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.753	1.760	-0.007	1.000	746542	6.72		79.0	
413.00 > 169.00	1.753	1.760	-0.007	1.000	415922		1.79(0.00-0.00)	1486	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.995	-0.007		2913947	28.7		1622	
9 Perfluorononanoic acid									
463.00 > 419.00	1.995	2.003	-0.008	1.000	81396	0.9803		4.8	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.988	2.018	-0.030	1.000	579364	5.22		204	
499.00 > 99.00	1.988	2.018	-0.030	1.000	117114		4.95(0.00-0.00)	112	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.208	-0.008	1.000	706552	11.0		10597	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_010.d

Injection Date: 05-Aug-2018 20:44:44

Instrument ID: A8_N

Lims ID: 320-41442-A-1-A

Lab Sample ID: 320-41442-1

Client ID: WGNA-072418-RW-3148

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 4

Worklist Smp#: 6

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

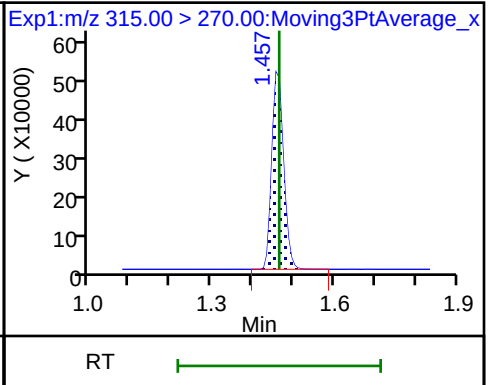
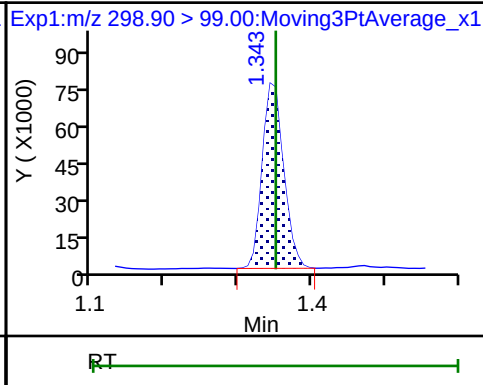
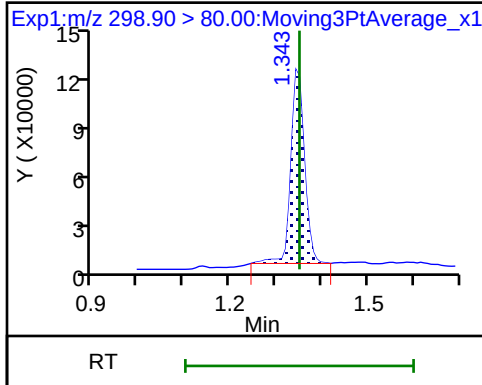
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

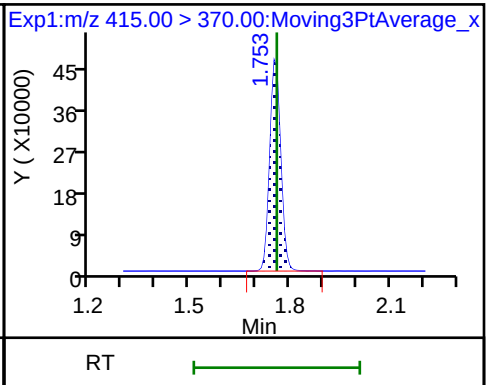
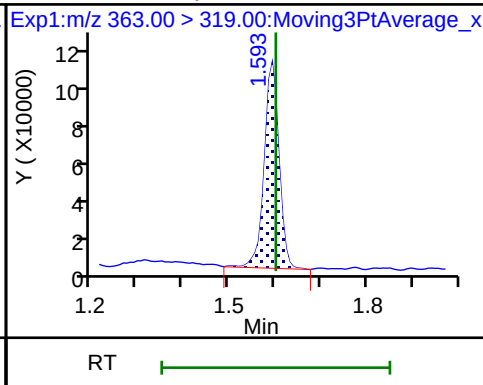
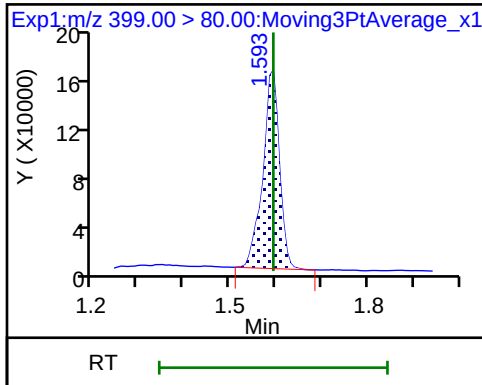
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

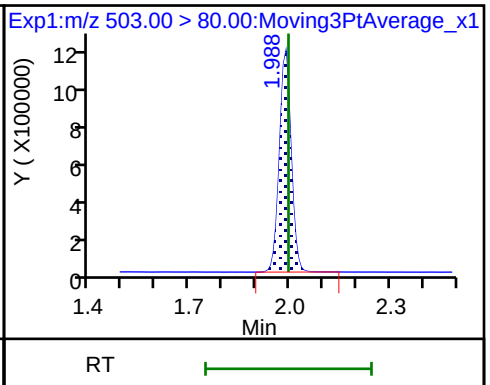
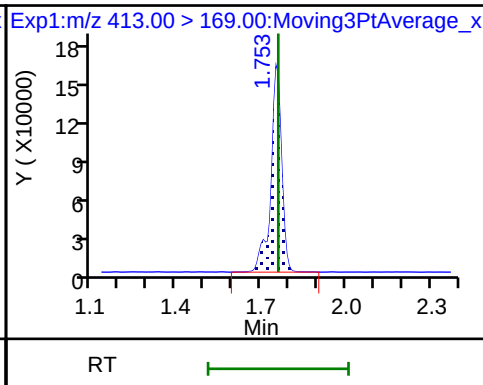
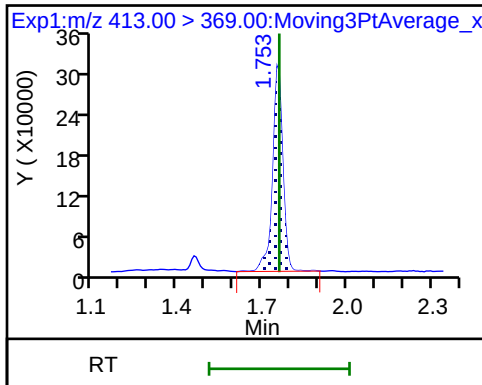
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

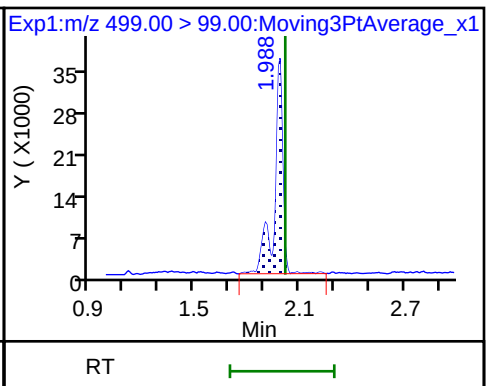
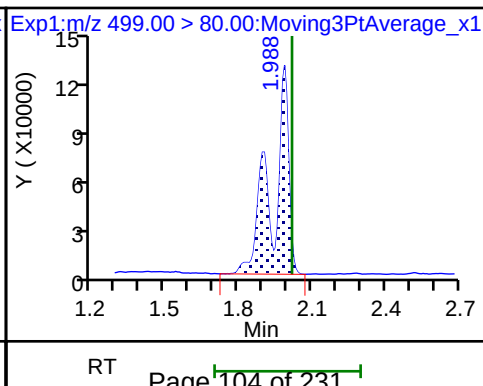
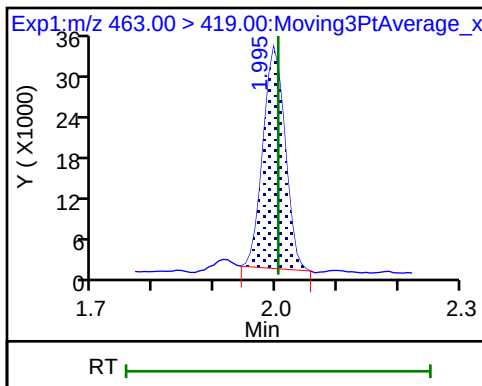
* 7 13C4 PFOS



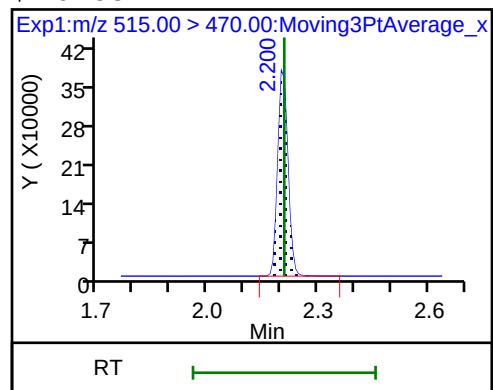
9 Perfluorononanoic acid

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_010.d
Lims ID: 320-41442-A-1-A
Client ID: WGNA-072418-RW-3148
Sample Type: Client
Inject. Date: 05-Aug-2018 20:44:44 ALS Bottle#: 4 Worklist Smp#: 6
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-41442-a-1-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
Column 1 : Det: EXP1
Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:38:57

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	8.67	86.66
\$ 10 13C2 PFDA	10.0	11.0	109.86

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-072418-FRB-3148</u>	Lab Sample ID: <u>320-41442-2</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_011.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 08:35</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>253.4 (mL)</u>	Date Analyzed: <u>08/05/2018 20:49</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	7.9	U	20	7.9	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.9
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	30	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.9	U	9.9	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	89	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	94		70-130
STL00996	13C2 PFDA	103		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_011.d
 Lims ID: 320-41442-A-2-A
 Client ID: WGNA-072418-FRB-3148
 Sample Type: Client
 Inject. Date: 05-Aug-2018 20:49:25 ALS Bottle#: 5 Worklist Smp#: 7
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: 320-41442-a-2-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.457	1.464	-0.007	1.000	1104654	9.39		14882	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		1033646	10.0		11209	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.995	-0.007		2810138	28.7		3277	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.208	2.208	0.0	1.000	658856	10.3		9292	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_011.d

Injection Date: 05-Aug-2018 20:49:25

Instrument ID: A8_N

Lims ID: 320-41442-A-2-A

Lab Sample ID: 320-41442-2

Client ID: WGNA-072418-FRB-3148

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 5

Worklist Smp#: 7

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

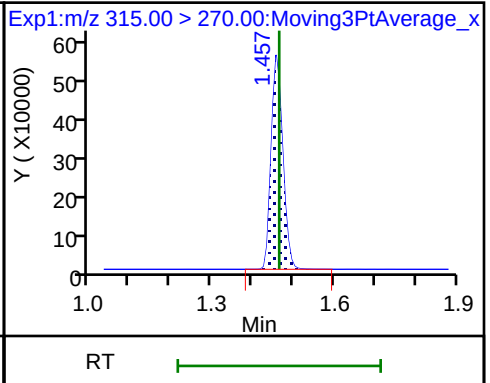
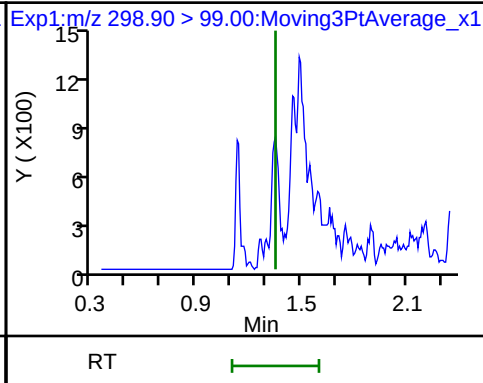
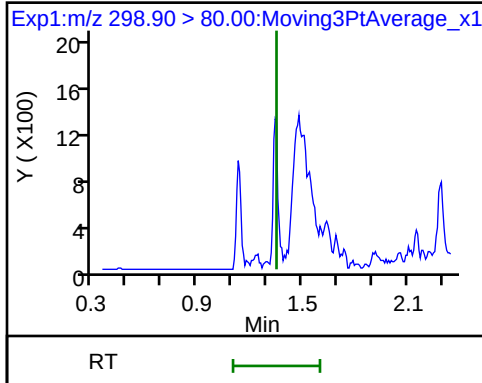
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid (ND)

1 Perfluorobutanesulfonic acid (ND)

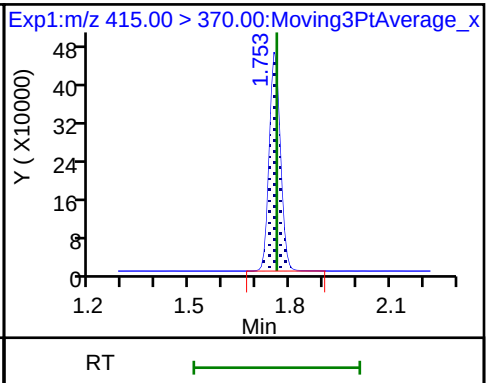
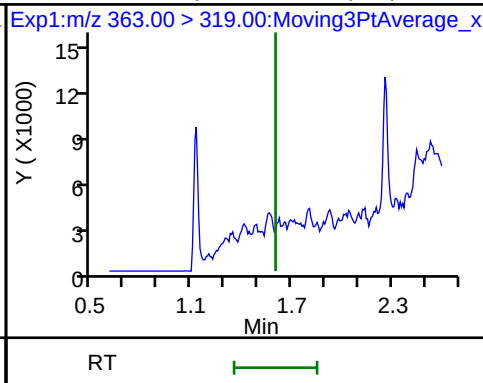
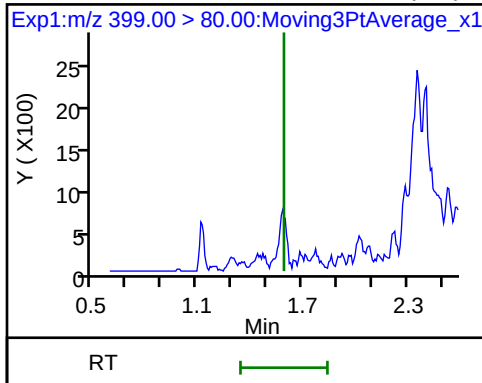
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid (ND)

4 Perfluoroheptanoic acid (ND)

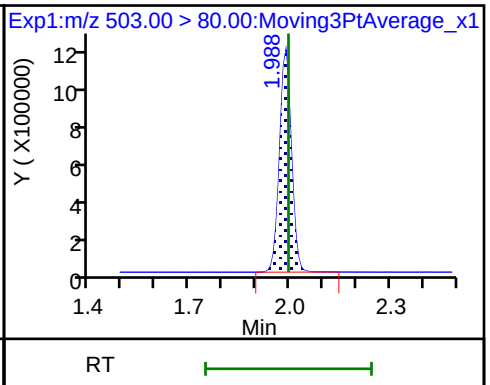
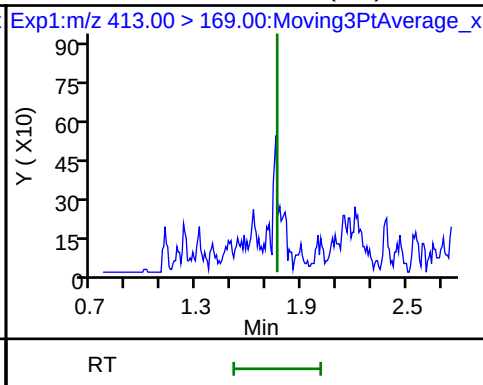
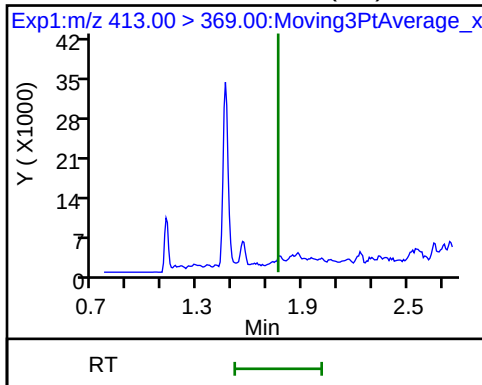
* 6 13C2-PFOA



5 Perfluorooctanoic acid (ND)

5 Perfluorooctanoic acid (ND)

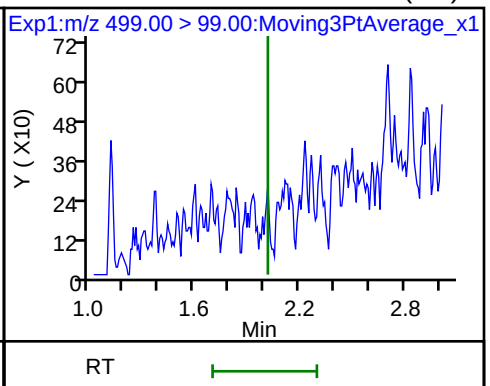
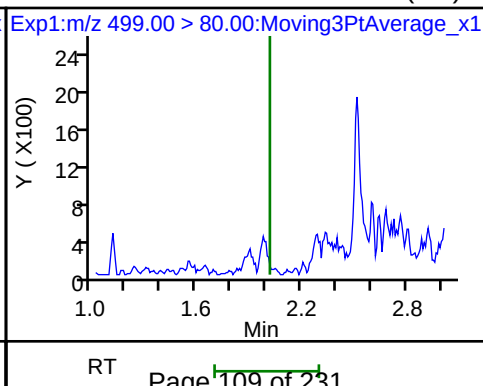
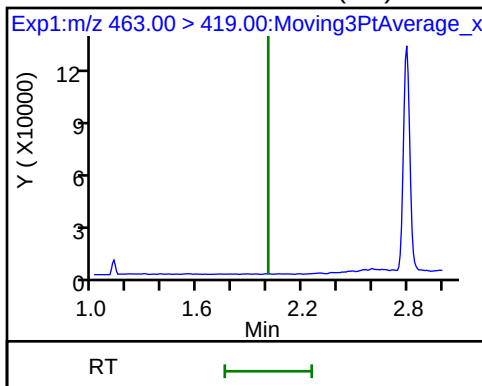
* 7 13C4 PFOS



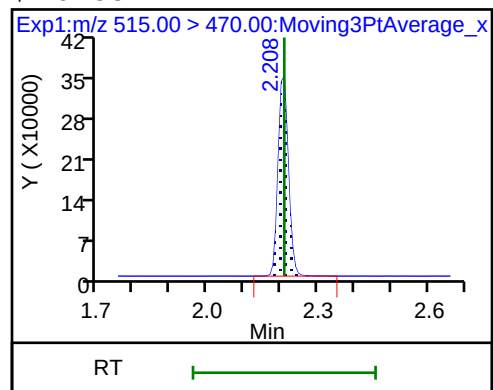
9 Perfluorononanoic acid (ND)

8 Perfluorooctane sulfonic acid (ND)

8 Perfluorooctane sulfonic acid (ND)



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_011.d
Lims ID: 320-41442-A-2-A
Client ID: WGNA-072418-FRB-3148
Sample Type: Client
Inject. Date: 05-Aug-2018 20:49:25 ALS Bottle#: 5 Worklist Smp#: 7
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-41442-a-2-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	9.39	93.88
\$ 10 13C2 PFDA	10.0	10.3	102.71

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-RW-061</u>	Lab Sample ID: <u>320-41442-3</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_012.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>255.3 (mL)</u>	Date Analyzed: <u>08/05/2018 20:54</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	24	J	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	16	J	20	7.8	2.7
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.8
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.6	J	9.8	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	88	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	76		70-130
STL00996	13C2 PFDA	105		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_012.d
 Lims ID: 320-41442-A-3-A
 Client ID: NAWC-072418-RW-061
 Sample Type: Client
 Inject. Date: 05-Aug-2018 20:54:06 ALS Bottle#: 6 Worklist Smp#: 8
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: 320-41442-a-3-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
 Column 1 : Det: EXP1
 Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:39:20

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.343	1.350	-0.007	1.000	205707	1.52		85.7	
298.90 > 99.00	1.343	1.350	-0.007	1.000	131257		1.57(0.00-0.00)	289	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.457	1.464	-0.007	1.000	943218	7.58		13929	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.586	1.593	-0.007	1.000	406523	2.20		99.7	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.586	1.601	-0.015	1.000	111062	0.9094		6.7	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		1093336	10.0		10683	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.753	1.760	-0.007	1.000	484346	4.13		42.3	
413.00 > 169.00	1.753	1.760	-0.007	1.000	285327		1.70(0.00-0.00)	815	
* 7 13C4 PFOS									
503.00 > 80.00	1.980	1.995	-0.015		3023812	28.7		1481	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.980	2.018	-0.038	1.000	711157	6.17		190	
499.00 > 99.00	1.980	2.018	-0.038	1.000	136079		5.23(0.00-0.00)	118	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.208	-0.008	1.000	714528	10.5		9997	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_012.d

Injection Date: 05-Aug-2018 20:54:06

Instrument ID: A8_N

Lims ID: 320-41442-A-3-A

Lab Sample ID: 320-41442-3

Client ID: NAWC-072418-RW-061

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 6

Worklist Smp#: 8

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

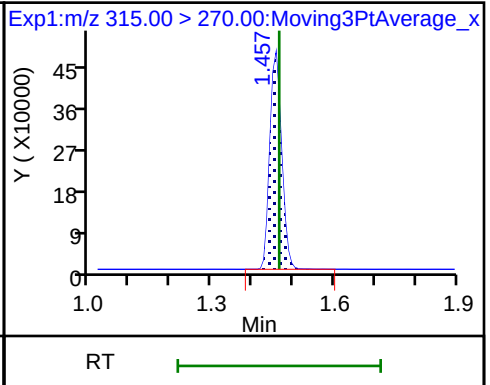
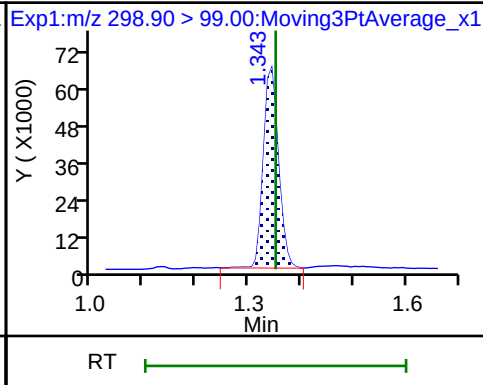
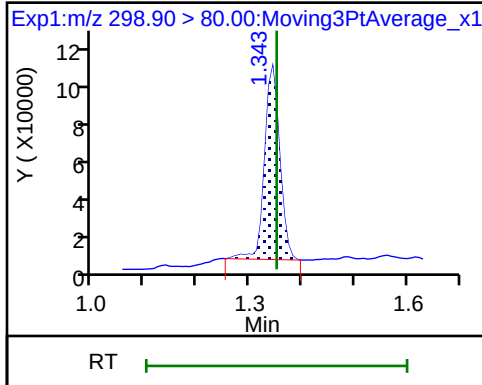
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

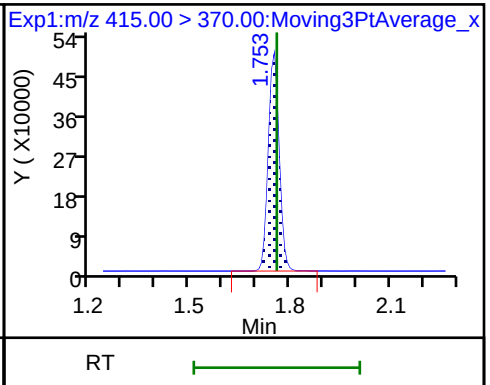
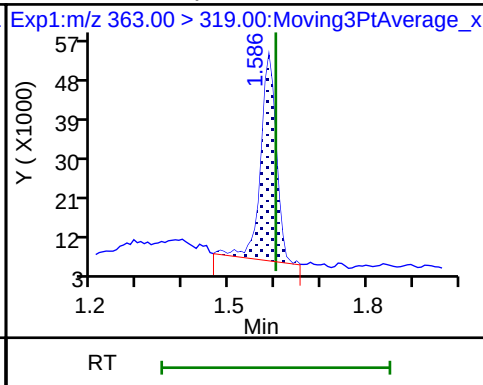
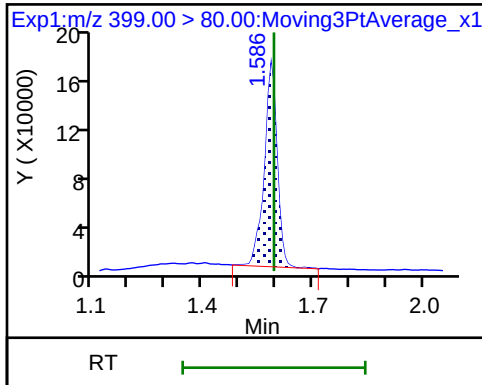
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

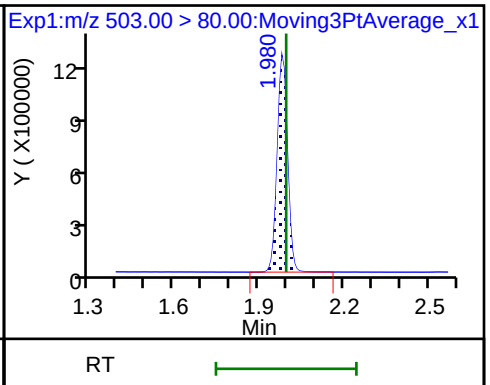
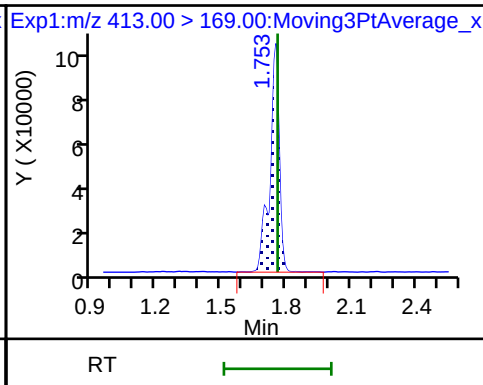
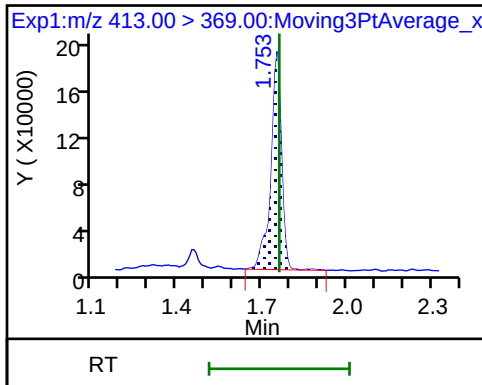
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

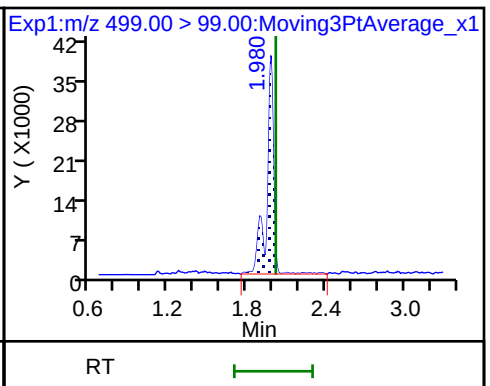
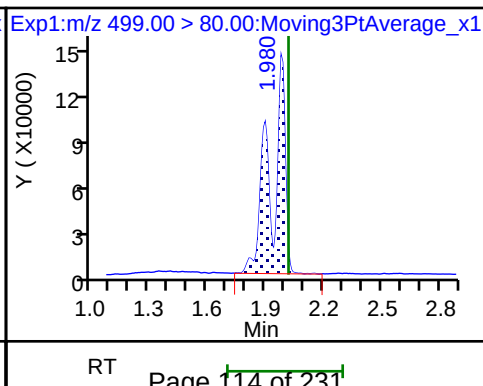
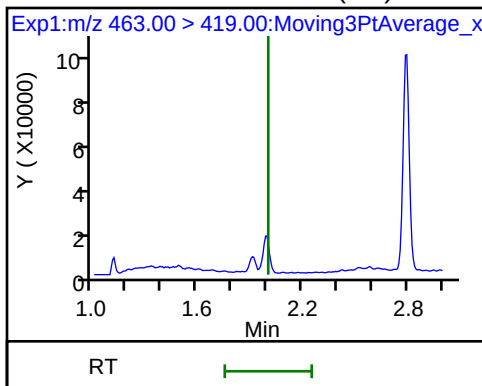
* 7 13C4 PFOS



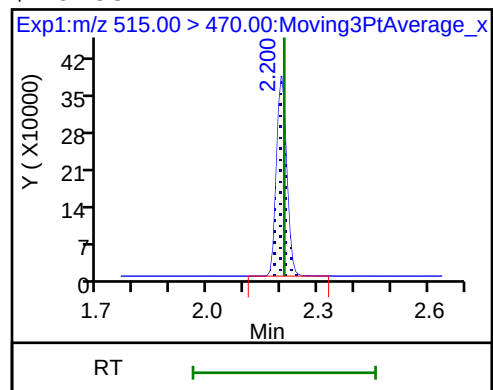
9 Perfluorononanoic acid (ND)

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_012.d
Lims ID: 320-41442-A-3-A
Client ID: NAWC-072418-RW-061
Sample Type: Client
Inject. Date: 05-Aug-2018 20:54:06 ALS Bottle#: 6 Worklist Smp#: 8
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-41442-a-3-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
Column 1 : Det: EXP1
Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:39:20

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	7.58	75.78
\$ 10 13C2 PFDA	10.0	10.5	105.31

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: NAWC-072418-FRB-061 Lab Sample ID: 320-41442-4
 Matrix: Water Lab File ID: 2018.08.05_537A_013.d
 Analysis Method: 537 Date Collected: 07/24/2018 09:05
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 266.2 (mL) Date Analyzed: 08/05/2018 20:58
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	38	15	6.4
335-67-1	Perfluorooctanoic acid (PFOA)	7.5	U	19	7.5	2.6
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.5
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	28	11	5.2
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.8	U	9.4	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	85	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	97		70-130
STL00996	13C2 PFDA	105		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_013.d
 Lims ID: 320-41442-A-4-A
 Client ID: NAWC-072418-FRB-061
 Sample Type: Client
 Inject. Date: 05-Aug-2018 20:58:47 ALS Bottle#: 7 Worklist Smp#: 9
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: 320-41442-a-4-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.457	1.464	-0.007	1.000	1088285	9.72		14996	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		983786	10.0		11182	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.995	-0.007		2664621	28.7		3077	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.208	-0.008	1.000	639579	10.5		8939	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_013.d

Injection Date: 05-Aug-2018 20:58:47

Instrument ID: A8_N

Lims ID: 320-41442-A-4-A

Lab Sample ID: 320-41442-4

Client ID: NAWC-072418-FRB-061

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 7

Worklist Smp#: 9

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

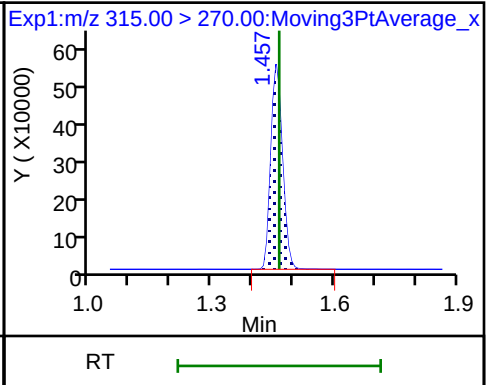
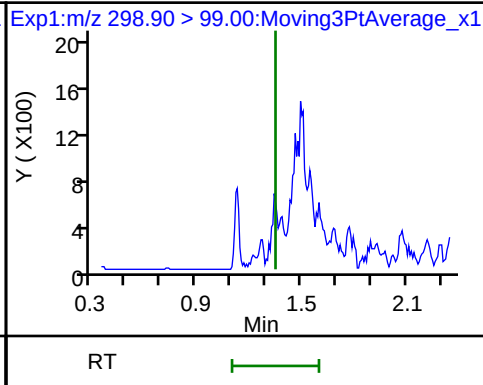
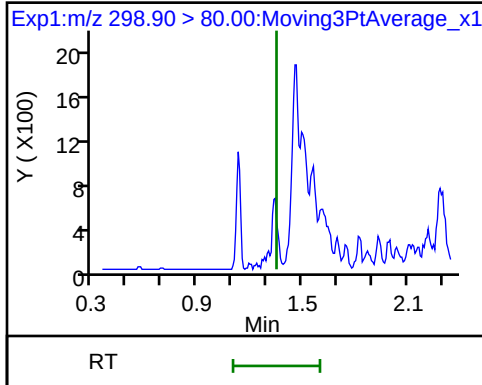
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid (ND)

1 Perfluorobutanesulfonic acid (ND)

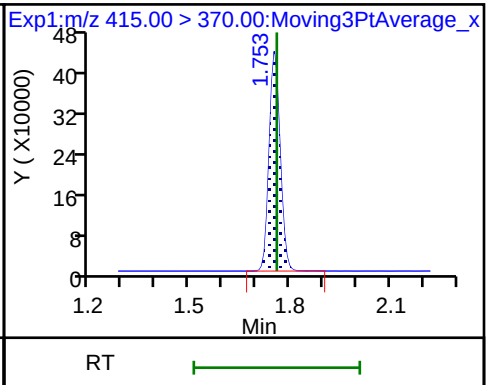
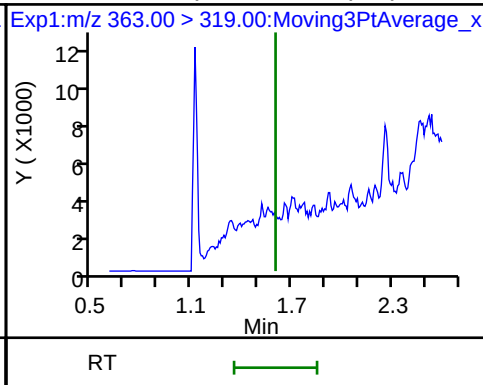
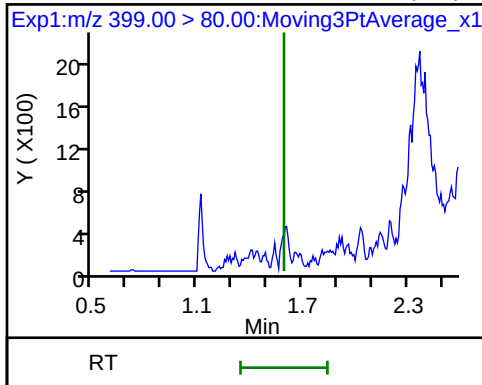
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid (ND)

4 Perfluoroheptanoic acid (ND)

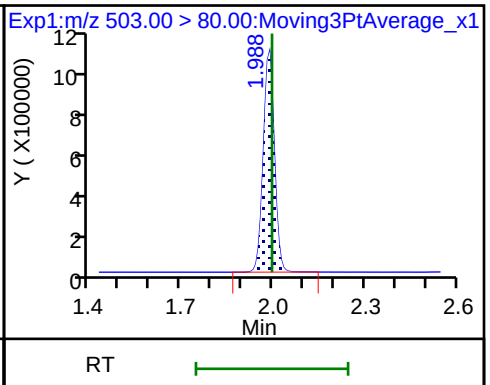
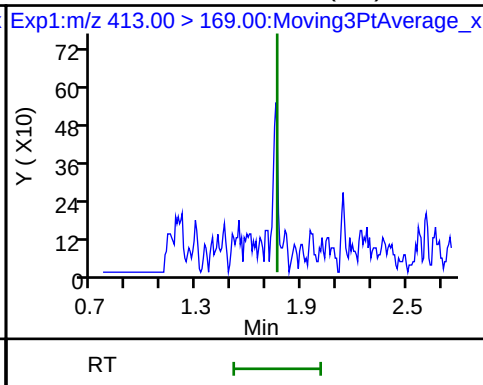
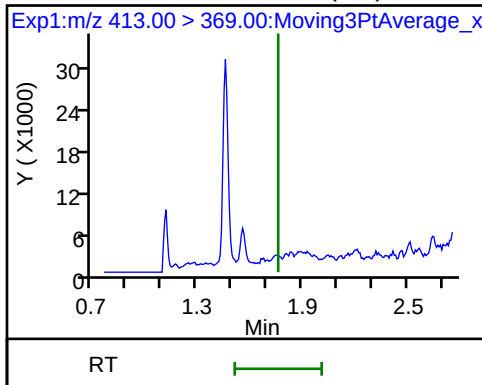
* 6 13C2-PFOA



5 Perfluorooctanoic acid (ND)

5 Perfluorooctanoic acid (ND)

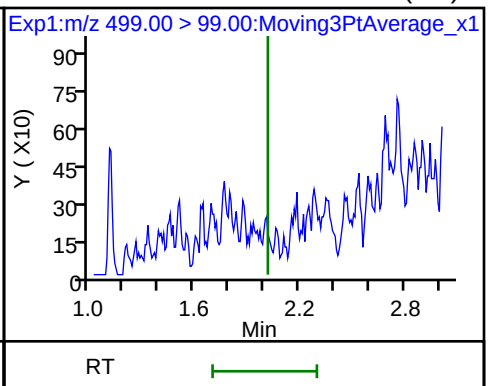
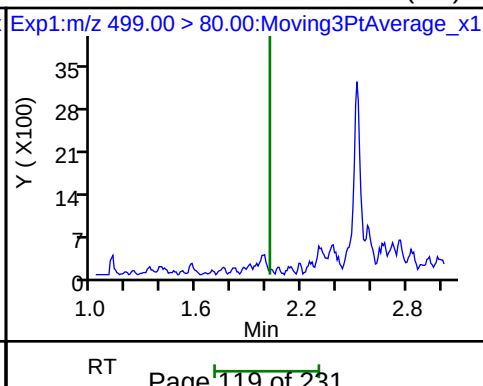
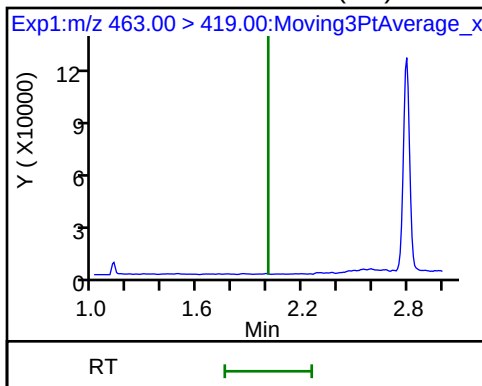
* 7 13C4 PFOS



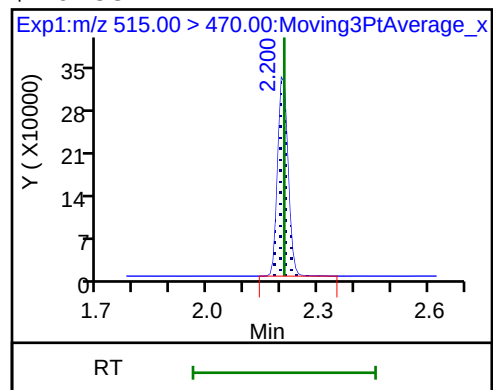
9 Perfluorononanoic acid (ND)

8 Perfluorooctane sulfonic acid (ND)

8 Perfluorooctane sulfonic acid (ND)



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_013.d
Lims ID: 320-41442-A-4-A
Client ID: NAWC-072418-FRB-061
Sample Type: Client
Inject. Date: 05-Aug-2018 20:58:47 ALS Bottle#: 7 Worklist Smp#: 9
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-41442-a-4-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	9.72	97.17
\$ 10 13C2 PFDA	10.0	10.5	104.76

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-RW-029</u>	Lab Sample ID: <u>320-41442-5</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_014.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:40</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>260 (mL)</u>	Date Analyzed: <u>08/05/2018 21:03</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	19	J	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	18	J	19	7.7	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.7
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	5.7	J	29	12	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	5.1	J	9.6	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	87	35	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	76		70-130
STL00996	13C2 PFDA	100		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_014.d
 Lims ID: 320-41442-A-5-A
 Client ID: NAWC-072418-RW-029
 Sample Type: Client
 Inject. Date: 05-Aug-2018 21:03:28 ALS Bottle#: 8 Worklist Smp#: 10
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: 320-41442-a-5-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
 Column 1 : Det: EXP1
 Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:39:42

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	165112	1.33		141	
298.90 > 99.00	1.343	1.350	-0.007	0.994	108202		1.53(0.00-0.00)	260	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.464	0.0	1.000	878978	7.61		12206	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.593	1.593	0.0	1.000	251688	1.49		102	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.593	1.601	-0.008	1.000	149806	1.32		10.2	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		1014582	10.0		12108	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.753	1.760	-0.007	1.000	499249	4.59		52.0	
413.00 > 169.00	1.753	1.760	-0.007	1.000	291539		1.71(0.00-0.00)	922	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.995	-0.007		2765316	28.7		2138	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.988	2.018	-0.030	1.000	525327	4.99		222	
499.00 > 99.00	1.988	2.018	-0.030	1.000	88620		5.93(0.00-0.00)	80.0	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.208	2.208	0.0	1.000	627806	9.97		8626	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_014.d

Injection Date: 05-Aug-2018 21:03:28

Instrument ID: A8_N

Lims ID: 320-41442-A-5-A

Lab Sample ID: 320-41442-5

Client ID: NAWC-072418-RW-029

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 8

Worklist Smp#: 10

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

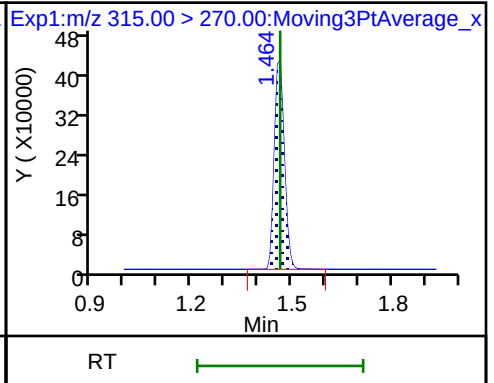
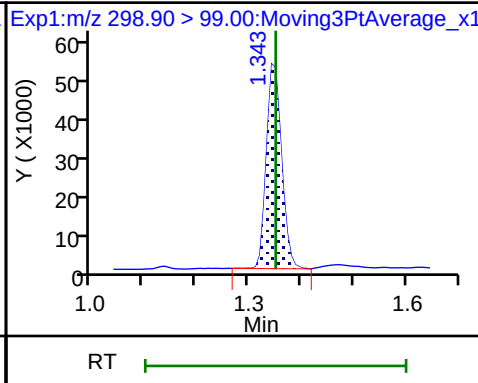
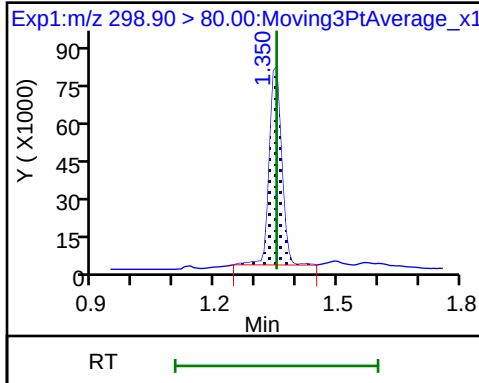
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

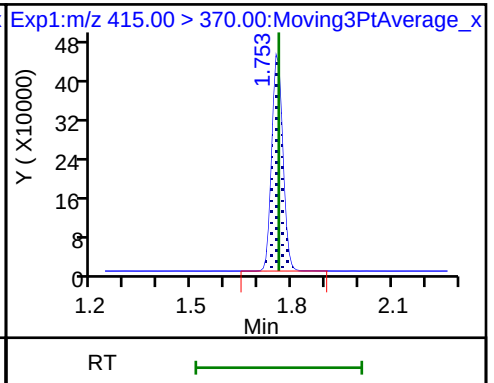
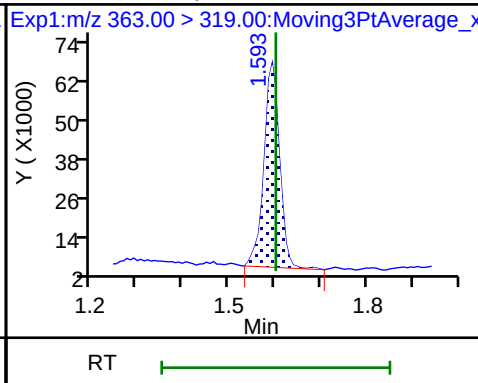
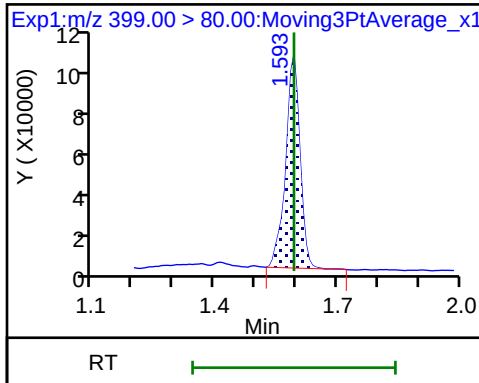
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

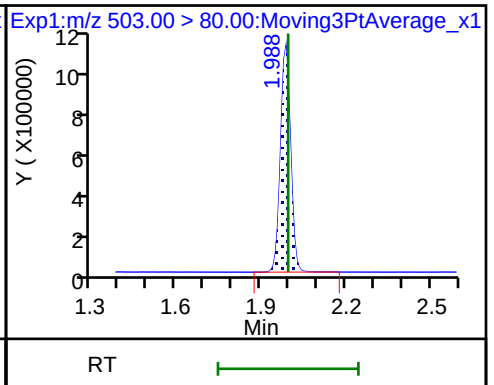
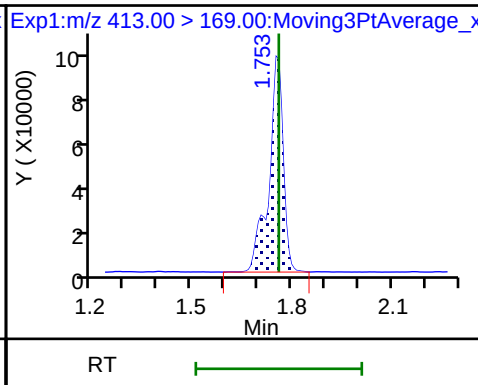
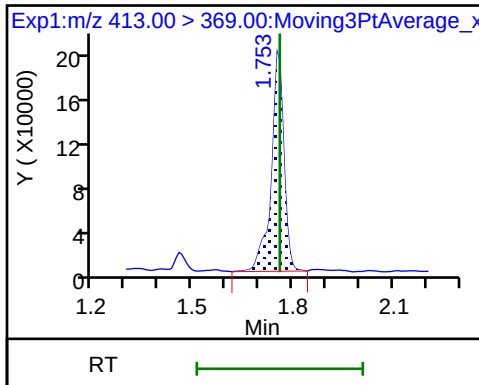
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

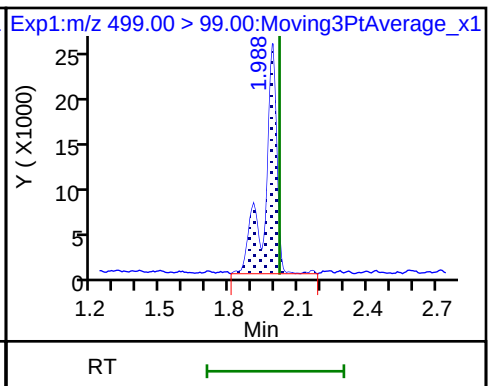
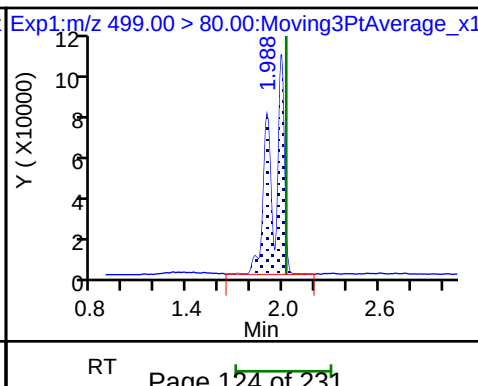
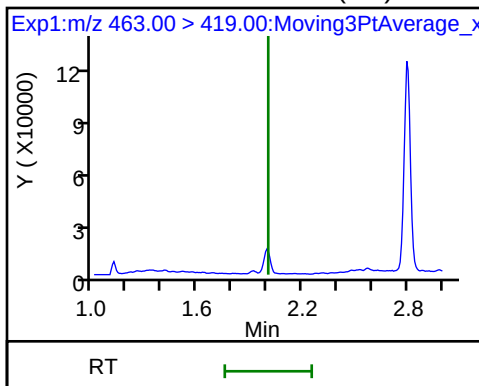
* 7 13C4 PFOS



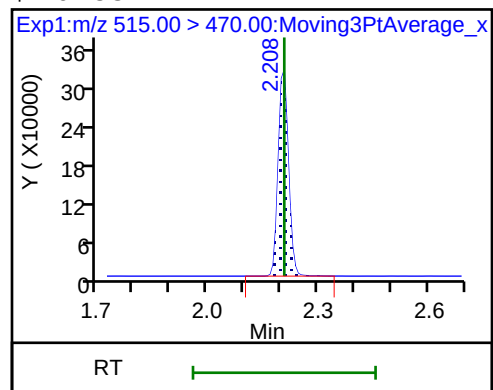
9 Perfluorononanoic acid (ND)

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_014.d
Lims ID: 320-41442-A-5-A
Client ID: NAWC-072418-RW-029
Sample Type: Client
Inject. Date: 05-Aug-2018 21:03:28 ALS Bottle#: 8 Worklist Smp#: 10
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-41442-a-5-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
Column 1 : Det: EXP1
Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:39:42

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	7.61	76.10
\$ 10 13C2 PFDA	10.0	9.97	99.71

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-FRB-029</u>	Lab Sample ID: <u>320-41442-6</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_015.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:35</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>261.9(mL)</u>	Date Analyzed: <u>08/05/2018 21:08</u>
Con. Extract Vol.: <u>1.00(mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2(uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3(mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	7.6	U	19	7.6	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.6
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	29	11	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.8	U	9.5	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	86	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	95		70-130
STL00996	13C2 PFDA	103		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_015.d
 Lims ID: 320-41442-A-6-A
 Client ID: NAWC-072418-FRB-029
 Sample Type: Client
 Inject. Date: 05-Aug-2018 21:08:10 ALS Bottle#: 9 Worklist Smp#: 11
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: 320-41442-a-6-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.457	1.464	-0.007	1.000	972039	9.47		14365	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		901429	10.0		10843	
* 7 13C4 PFOS									
503.00 > 80.00	1.980	1.995	-0.015		2399270	28.7		3108	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.208	-0.008	1.000	575677	10.3		7470	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_015.d

Injection Date: 05-Aug-2018 21:08:10

Instrument ID: A8_N

Lims ID: 320-41442-A-6-A

Lab Sample ID: 320-41442-6

Client ID: NAWC-072418-FRB-029

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 9

Worklist Smp#: 11

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

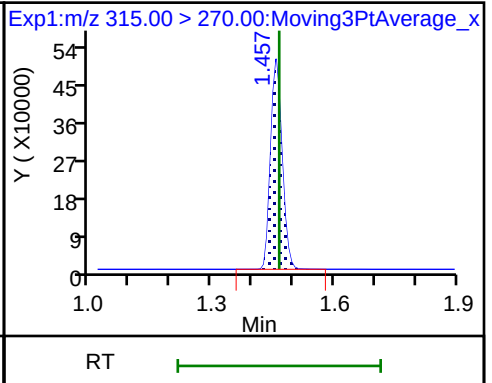
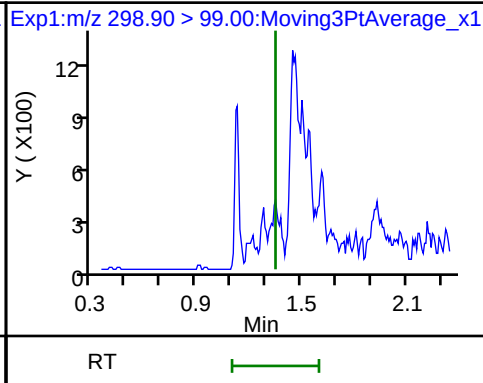
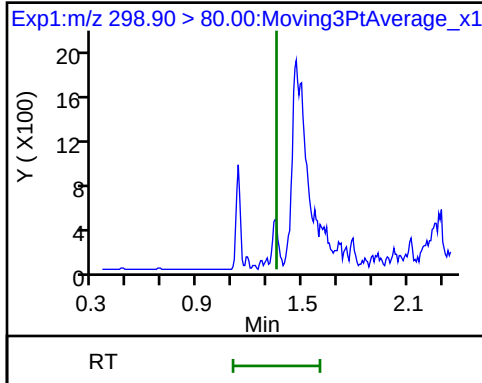
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid (ND)

1 Perfluorobutanesulfonic acid (ND)

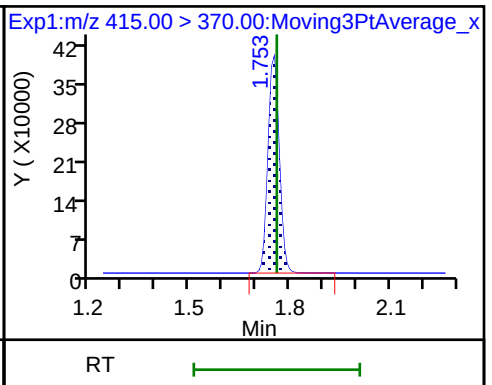
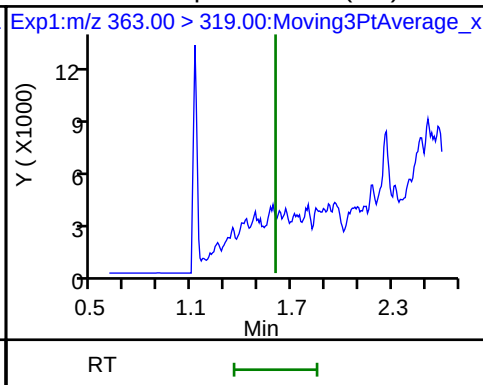
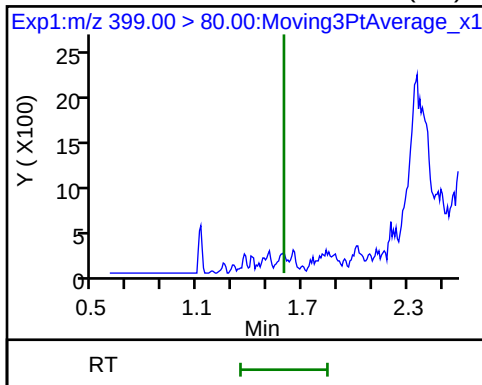
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid (ND)

4 Perfluoroheptanoic acid (ND)

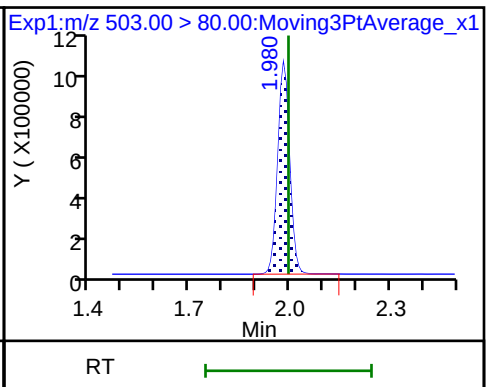
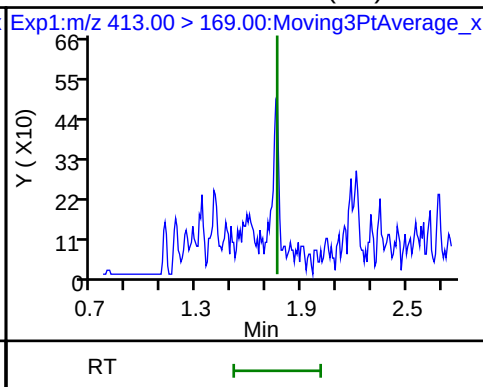
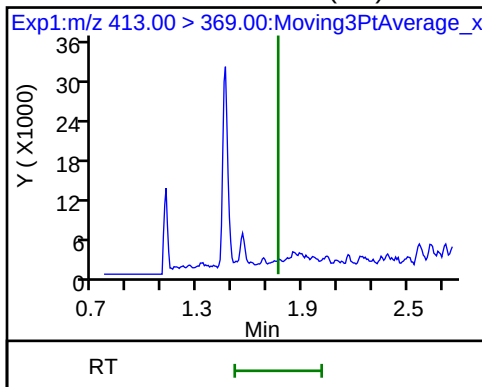
* 6 13C2-PFOA



5 Perfluorooctanoic acid (ND)

5 Perfluorooctanoic acid (ND)

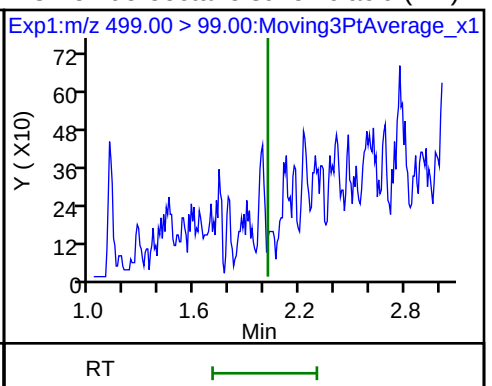
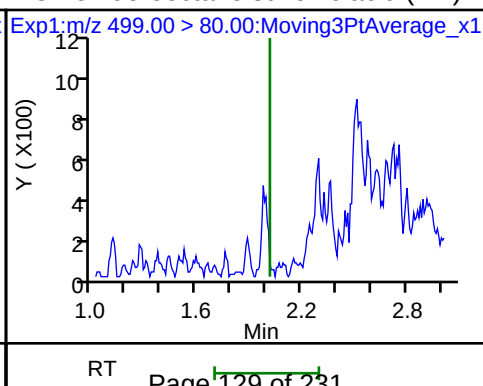
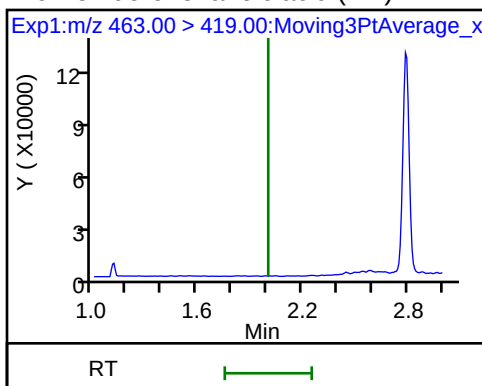
* 7 13C4 PFOS



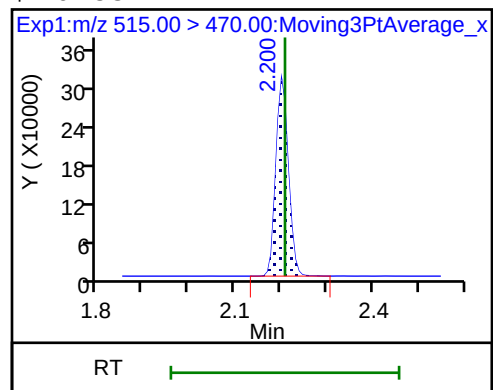
9 Perfluorononanoic acid (ND)

8 Perfluorooctane sulfonic acid (ND)

8 Perfluorooctane sulfonic acid (ND)



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_015.d
Lims ID: 320-41442-A-6-A
Client ID: NAWC-072418-FRB-029
Sample Type: Client
Inject. Date: 05-Aug-2018 21:08:10 ALS Bottle#: 9 Worklist Smp#: 11
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-41442-a-6-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	9.47	94.72
\$ 10 13C2 PFDA	10.0	10.3	102.91

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-RW-141</u>	Lab Sample ID: <u>320-41442-7</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_016.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 10:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>254.1 (mL)</u>	Date Analyzed: <u>08/05/2018 21:12</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	20	J	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	14	J	20	7.9	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.9
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	13	J	30	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.2	J	9.8	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	89	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	83		70-130
STL00996	13C2 PFDA	107		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_016.d
 Lims ID: 320-41442-A-7-A
 Client ID: NAWC-072418-RW-141
 Sample Type: Client
 Inject. Date: 05-Aug-2018 21:12:50 ALS Bottle#: 10 Worklist Smp#: 12
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: 320-41442-a-7-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
 Column 1 : Det: EXP1
 Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:40:06

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	186848	1.70		150	
298.90 > 99.00	1.350	1.350	0.0	1.000	122963		1.52(0.00-0.00)	323	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.464	0.0	1.000	841290	8.28		11533	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.593	1.593	0.0	1.000	506840	3.38		197	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.593	1.601	-0.008	1.000	156926	1.57		10.7	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		892541	10.0		11151	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.753	1.760	-0.007	1.000	351100	3.67		35.3	
413.00 > 169.00	1.753	1.760	-0.007	1.000	206939		1.70(0.00-0.00)	667	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.995	-0.007		2449468	28.7		1824	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.988	2.018	-0.030	1.000	485143	5.20		221	
499.00 > 99.00	1.988	2.018	-0.030	1.000	88039		5.51(0.00-0.00)	71.2	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.208	-0.008	1.000	595275	10.7		8816	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_016.d

Injection Date: 05-Aug-2018 21:12:50

Instrument ID: A8_N

Lims ID: 320-41442-A-7-A

Lab Sample ID: 320-41442-7

Client ID: NAWC-072418-RW-141

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 10

Worklist Smp#: 12

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

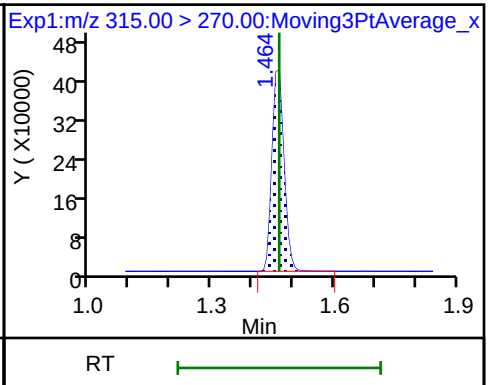
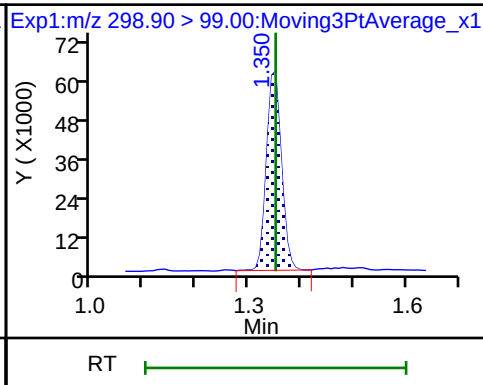
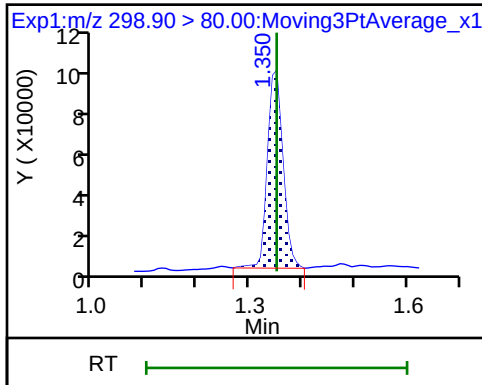
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

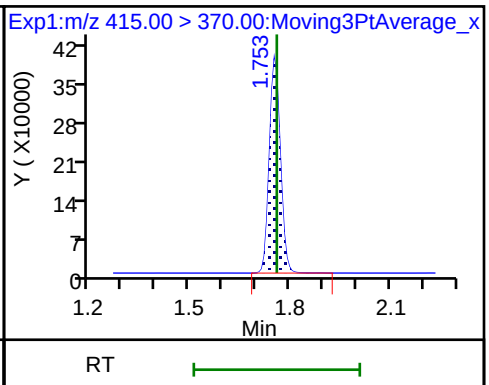
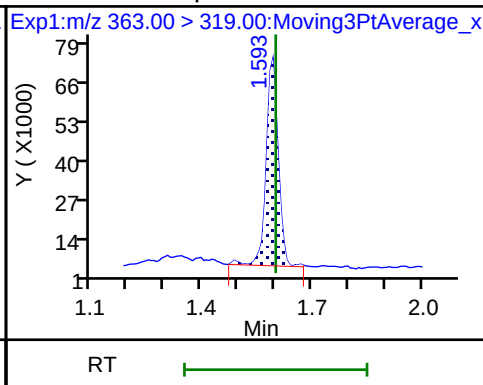
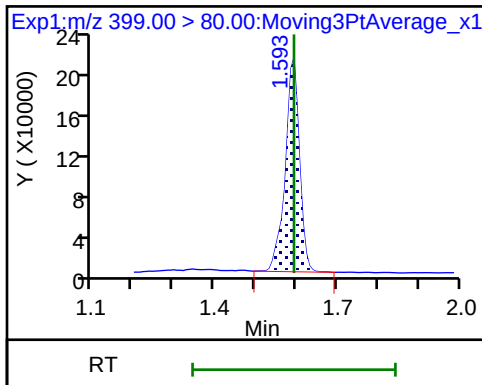
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

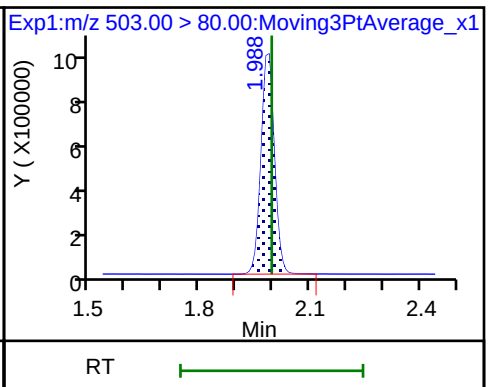
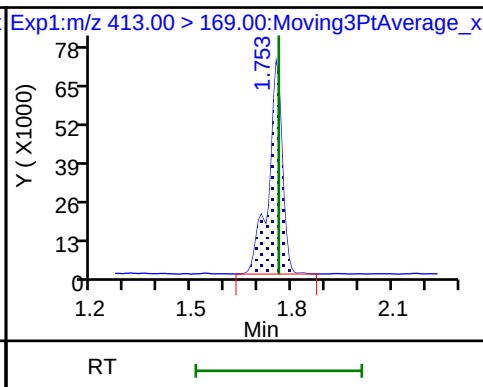
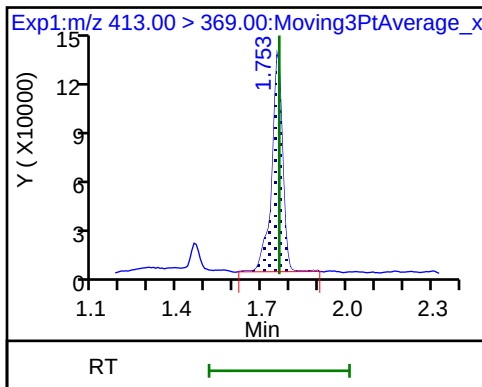
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

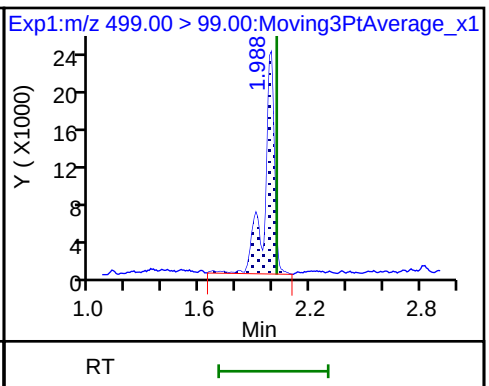
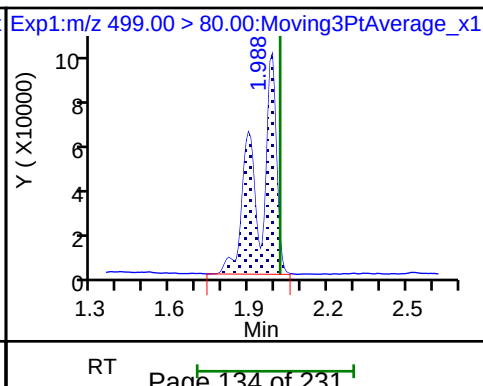
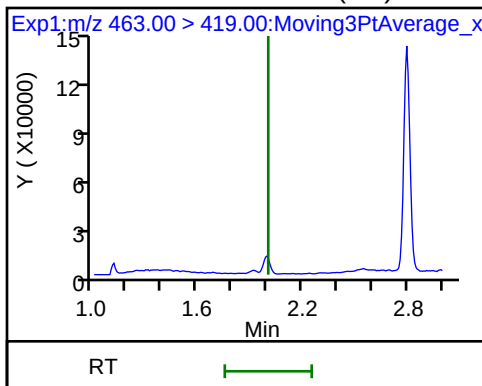
* 7 13C4 PFOS



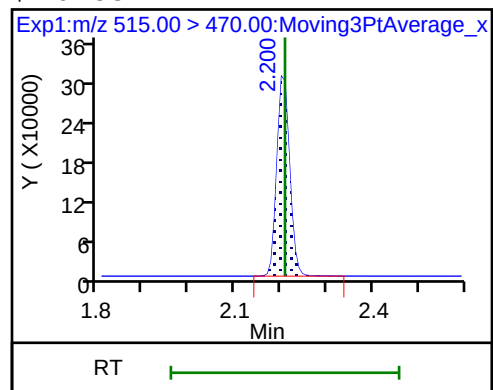
9 Perfluorononanoic acid (ND)

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_016.d
Lims ID: 320-41442-A-7-A
Client ID: NAWC-072418-RW-141
Sample Type: Client
Inject. Date: 05-Aug-2018 21:12:50 ALS Bottle#: 10 Worklist Smp#: 12
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-41442-a-7-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
Column 1 : Det: EXP1
Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:40:06

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	8.28	82.80
\$ 10 13C2 PFDA	10.0	10.7	107.47

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-FRB-141</u>	Lab Sample ID: <u>320-41442-8</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_019.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 10:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>270.2 (mL)</u>	Date Analyzed: <u>08/05/2018 21:26</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238082</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	37	15	6.3
335-67-1	Perfluorooctanoic acid (PFOA)	7.4	U	19	7.4	2.6
375-95-1	Perfluorononanoic acid (PFNA)	19	U	22	19	7.4
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	28	11	5.1
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.7	U	9.3	3.7	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	33	U	83	33	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	98		70-130
STL00996	13C2 PFDA	106		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_019.d
 Lims ID: 320-41442-A-8-A
 Client ID: NAWC-072418-FRB-141
 Sample Type: Client
 Inject. Date: 05-Aug-2018 21:26:51 ALS Bottle#: 11 Worklist Smp#: 15
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: 320-41442-a-8-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:54:09 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.464	0.0	1.000	974835	9.81		15421	
* 6 13C2-PFOA									
415.00 > 370.00	1.760	1.753	0.007		872868	10.0		9373	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.980	0.008		2385033	28.7		3027	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.208	2.200	0.008	1.000	571597	10.6		8622	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_019.d

Injection Date: 05-Aug-2018 21:26:51

Instrument ID: A8_N

Lims ID: 320-41442-A-8-A

Lab Sample ID: 320-41442-8

Client ID: NAWC-072418-FRB-141

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 11

Worklist Smp#: 15

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

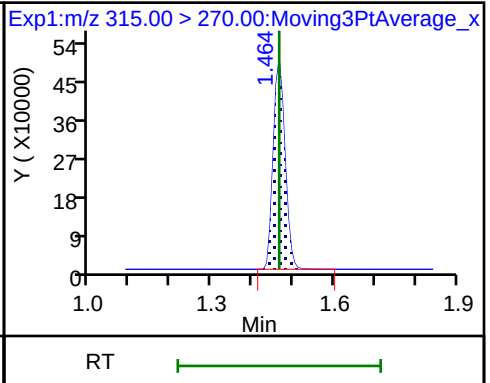
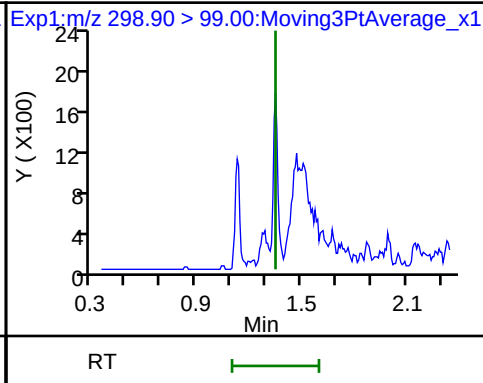
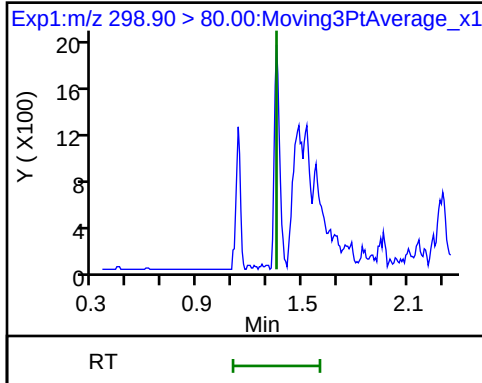
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid (ND)

1 Perfluorobutanesulfonic acid (ND)

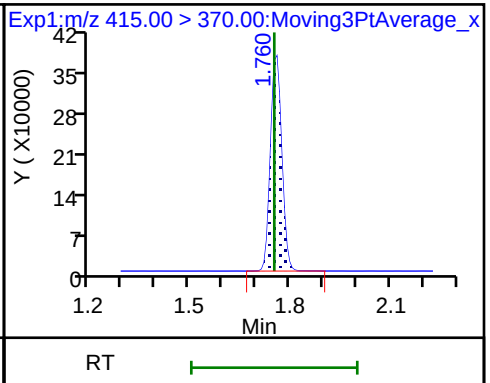
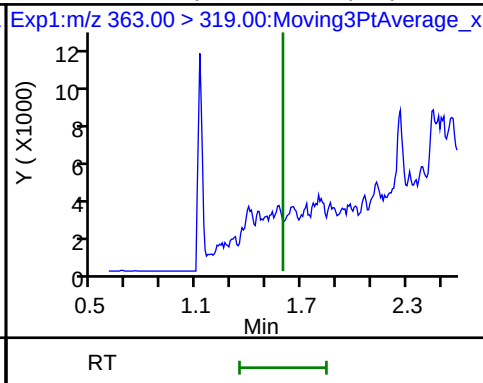
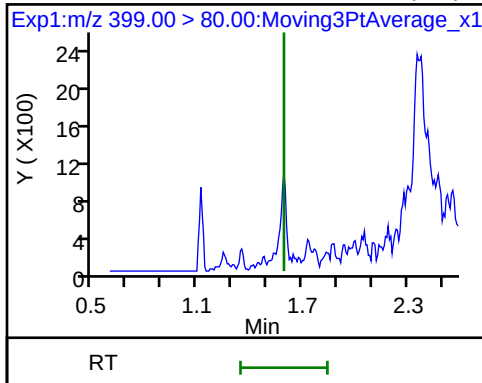
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid (ND)

4 Perfluoroheptanoic acid (ND)

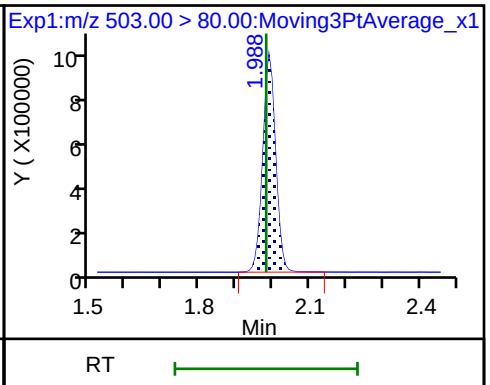
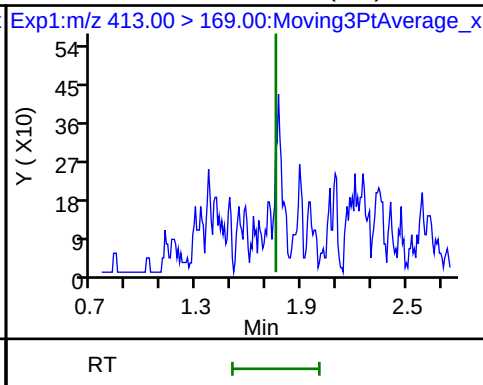
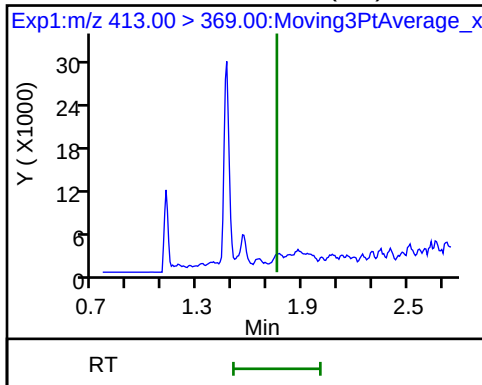
* 6 13C2-PFOA



5 Perfluorooctanoic acid (ND)

5 Perfluorooctanoic acid (ND)

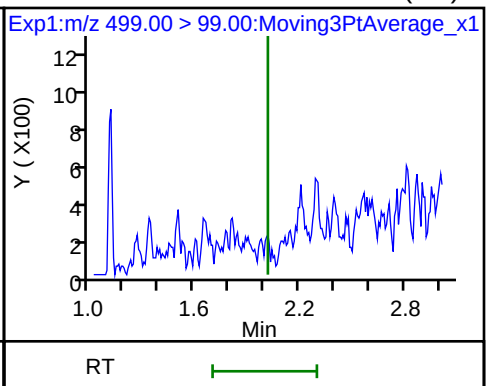
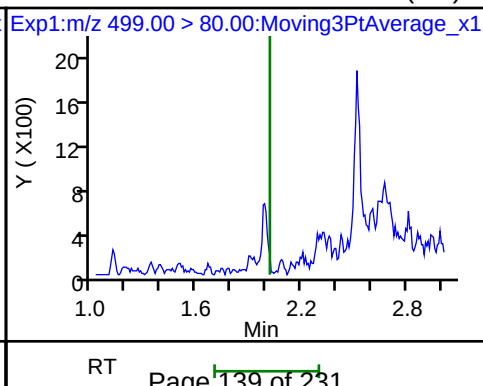
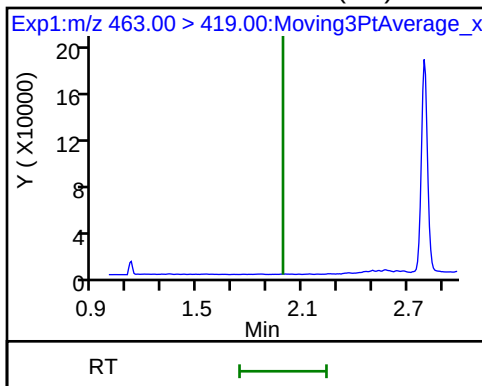
* 7 13C4 PFOS



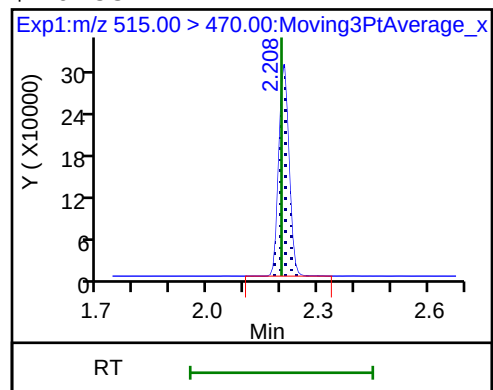
9 Perfluorononanoic acid (ND)

8 Perfluorooctane sulfonic acid (ND)

8 Perfluorooctane sulfonic acid (ND)



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_019.d
Lims ID: 320-41442-A-8-A
Client ID: NAWC-072418-FRB-141
Sample Type: Client
Inject. Date: 05-Aug-2018 21:26:51 ALS Bottle#: 11 Worklist Smp#: 15
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: 320-41442-a-8-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:54:09 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	9.81	98.10
\$ 10 13C2 PFDA	10.0	10.6	105.52

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

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1 Analy Batch No.: 237363

SDG No.: _____

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

Calibration Start Date: 08/01/2018 01:52 Calibration End Date: 08/01/2018 02:11 Calibration ID: 40445

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-237363/2	2018.07.31_537CURVEA_004.d
Level 2	IC 320-237363/3	2018.07.31_537CURVEA_005.d
Level 3	IC 320-237363/4	2018.07.31_537CURVEA_006.d
Level 4	IC 320-237363/5	2018.07.31_537CURVEA_007.d
Level 5	IC 320-237363/6	2018.07.31_537CURVEA_008.d

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Perfluorobutanesulfonic acid (PFBS)	1.3554	1.4070	1.3182	1.2380	1.1154	Ave		1.2868				8.9		30.0			
Perfluoroheptanoic acid (PFHpA)	1.1193	1.1541	1.1333	1.0993	1.0790	Ave		1.1170				2.6		30.0			
Perfluorohexanesulfonic acid (PFHxS)	1.6429	1.7774	1.7898	1.7946	1.7766	Ave		1.7563				3.6		30.0			
Perfluorooctanoic acid (PFOA)	1.0363	1.0657	1.0996	1.0823	1.0783	Ave		1.0724				2.2		30.0			
Perfluorooctanesulfonic acid (PFOS)	1.0310	1.0895	1.1067	1.1155	1.1193	Ave		1.0924				3.3		30.0			
Perfluorononanoic acid (PFNA)	0.8099	0.7963	0.8125	0.7888	0.7990	Ave		0.8013				1.2		30.0			
13C2 PFHxA	1.1430	1.1282	1.1389	1.1123	1.1697	Ave		1.1384				1.9		30.0			
13C2 PFDA	0.6080	0.6204	0.6351	0.6159	0.6236	Ave		0.6206				1.6		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.: 320-41442-1 Analy Batch No.: 237363

SDG No.: _____

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

Calibration Start Date: 08/01/2018 01:52 Calibration End Date: 08/01/2018 02:11 Calibration ID: 40445

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-237363/2	2018.07.31_537CURVEA_004.d
Level 2	IC 320-237363/3	2018.07.31_537CURVEA_005.d
Level 3	IC 320-237363/4	2018.07.31_537CURVEA_006.d
Level 4	IC 320-237363/5	2018.07.31_537CURVEA_007.d
Level 5	IC 320-237363/6	2018.07.31_537CURVEA_008.d

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5
Perfluorobutanesulfonic acid (PFBS)	PFOS	Ave	2332223	5165086	9911205	12708606	16978219	20.0	45.0	90.1	135	180
Perfluoroheptanoic acid (PFHpA)	13PFO	Ave	207280	471272	907971	1244808	1811361	2.16	4.86	9.72	14.6	19.4
Perfluorohexanesulfonic acid (PFHxS)	PFOS	Ave	949475	2191389	4519511	6187681	9082366	6.72	15.1	30.2	45.4	60.5
Perfluorooctanoic acid (PFOA)	13PFO	Ave	390921	886431	1794490	2496628	3687616	4.40	9.90	19.8	29.7	39.6
Perfluorooctanesulfonic acid (PFOS)	PFOS	Ave	778689	1755508	3652253	5026530	7478599	8.79	19.8	39.5	59.3	79.1
Perfluorononanoic acid (PFNA)	13PFO	Ave	305510	662336	1325997	1819468	2732485	4.40	9.90	19.8	29.7	39.6
13C2 PFHxA	13PFO	Ave	979950	947875	938720	863882	1010165	10.0	10.0	10.0	10.0	10.0
13C2 PFDA	13PFO	Ave	521256	521256	523489	478337	538534	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.: 320-41442-1 Analy Batch No.: 237363

SDG No.: _____

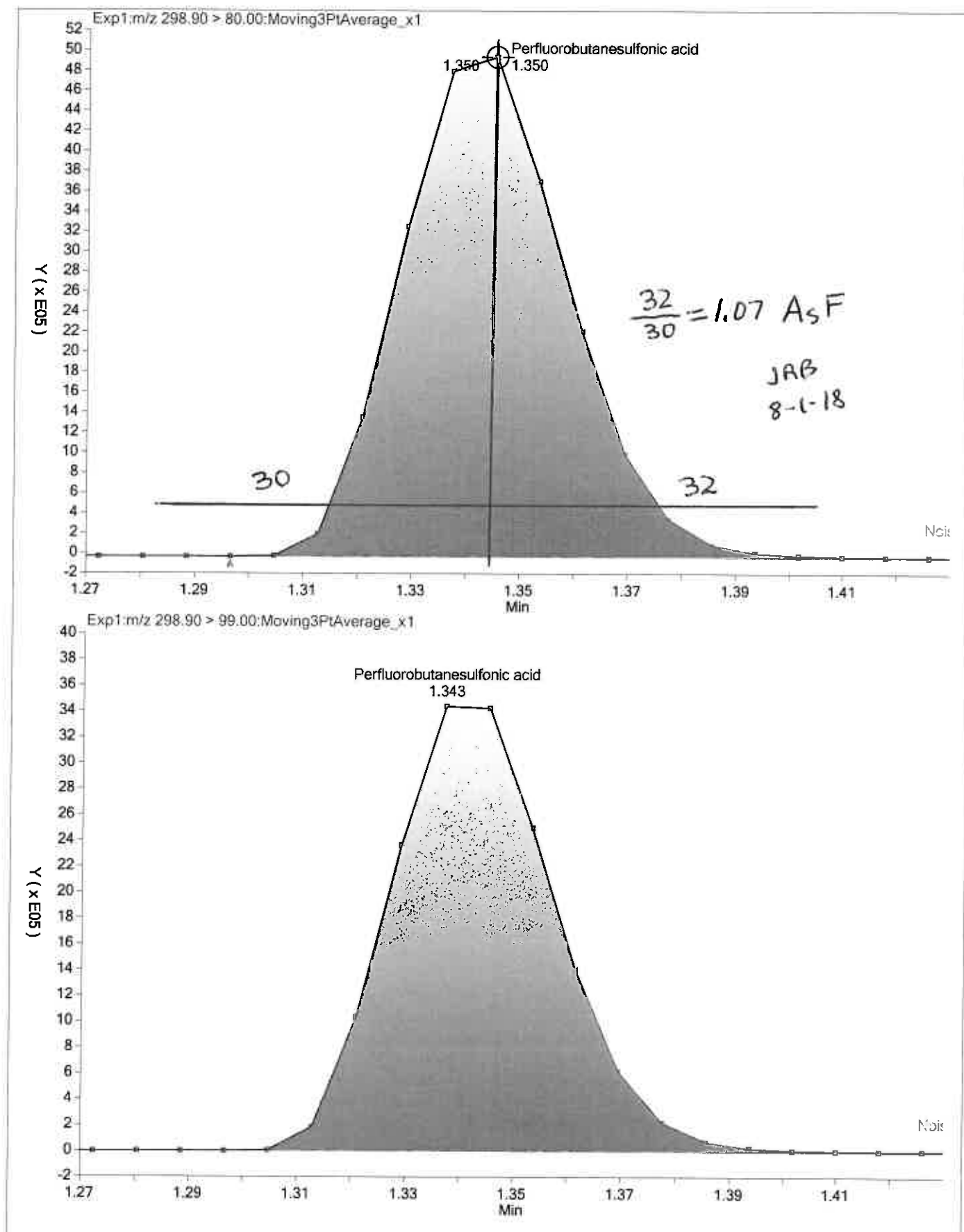
Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

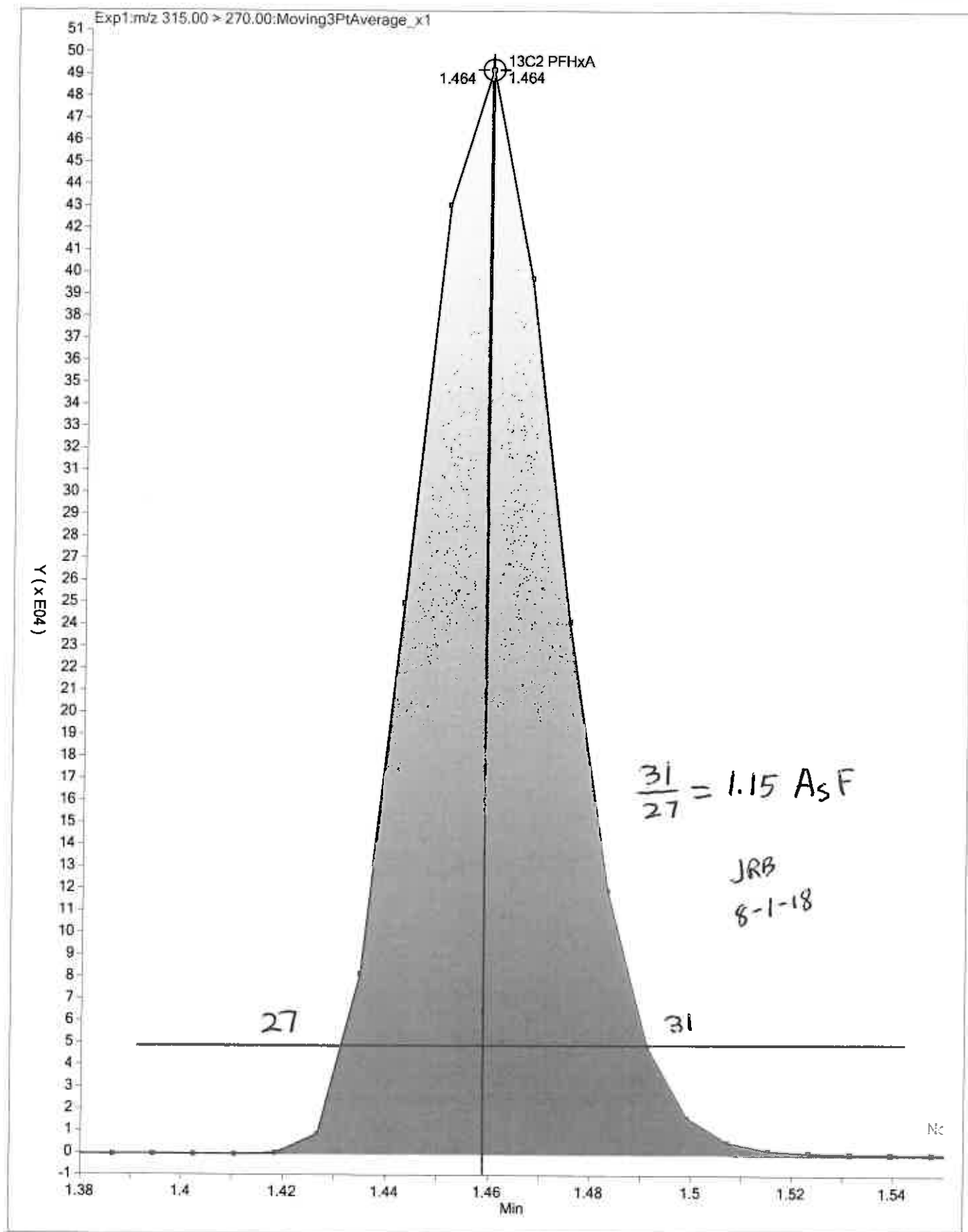
Calibration Start Date: 08/01/2018 01:52 Calibration End Date: 08/01/2018 02:11 Calibration ID: 40445

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
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Level 2	IC 320-237363/3	2018.07.31_537CURVEA_005.d
Level 3	IC 320-237363/4	2018.07.31_537CURVEA_006.d
Level 4	IC 320-237363/5	2018.07.31_537CURVEA_007.d
Level 5	IC 320-237363/6	2018.07.31_537CURVEA_008.d

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #		LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	
Perfluorobutanesulfonic acid (PFBS)	5.3	9.3	2.4	-3.8	-13.3		50	30	30	30	30	
Perfluoroheptanoic acid (PFHpA)	0.2	3.3	1.5	-1.6	-3.4		50	30	30	30	30	
Perfluorohexanesulfonic acid (PFHxS)	-6.5	1.2	1.9	2.2	1.2		50	30	30	30	30	
Perfluorooctanoic acid (PFOA)	-3.4	-0.6	2.5	0.9	0.5		50	30	30	30	30	
Perfluorooctanesulfonic acid (PFOS)	-5.6	-0.3	1.3	2.1	2.5		50	30	30	30	30	
Perfluorononanoic acid (PFNA)	1.1	-0.6	1.4	-1.6	-0.3		50	30	30	30	30	
13C2 PFHxA	0.4	-0.9	0.0	-2.3	2.8		30	30	30	30	30	
13C2 PFDA	-2.0	0.0	2.3	-0.8	0.5		30	30	30	30	30	





TestAmerica Laboratories
Istd/Surrogate Recovery Report

Worklist Name: 01AUG2018_537_ICAL

Worklist Num: 61977

Instrument: A8_N

Method: 537_A8_N

Batch Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b

Limit Group: LC 537 ICAL

Analysis Type: SemiVOA

Inj Volume: 2.00

Inj Vol Units: ul

Lims Batch: 237363

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				1130833 1.78	2703792 2.02
# 1 RB	01-Aug-2018 01:43:39			756821 66.9 1.78	2445625 90.5 2.03
IS Std					
# 2 IC L2	01-Aug-2018 01:52:59	1.46 100.40	2.23 97.97	857329> 100.0* 1.78	2465749> 100.0* 2.03
# 3 IC L3	01-Aug-2018 01:57:38	1.46 99.10	2.22 99.97	840187> 98.0* 1.78	2338004> 94.8* 2.02
# 4 IC L4	01-Aug-2018 02:02:18	1.46 100.00	2.22 102.30	824246> 96.1* 1.78	2394250> 97.1* 2.02
# 5 IC L5	01-Aug-2018 02:06:58	1.47 97.70	2.23 99.24	776688> 90.6* 1.78	2179386> 88.4* 2.03
# 6 IC L6	01-Aug-2018 02:11:38	1.46 102.80	2.22 100.50	863581> 100.7* 1.78	2423557> 98.3* 2.02

13C2-PFOA

$$RPD = \frac{863581 - 776688}{\frac{(863581 + 776688)}{2}} \times 100 = 10.6$$

13C4-PFOS

$$RPD = \frac{2465749 - 2179386}{\frac{(2465749 + 2179386)}{2}} \times 100 = 12.3$$

JRB 8-1-18

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_004.d
 Lims ID: IC L2
 Client ID:
 Sample Type: IC Calib Level: 1
 Inject. Date: 01-Aug-2018 01:52:59 ALS Bottle#: 2 Worklist Smp#: 2
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: L2_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 02-Aug-2018 10:22:15 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK022

First Level Reviewer: barnettj

Date: 01-Aug-2018 11:53:31

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	2332223	21.1		1569	
298.90 > 99.00	1.350	1.350	0.0	1.000	1532619		1.52(0.00-0.00)	3134	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.466	-0.002	1.000	979950	10.0		12290	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.601	1.602	-0.001	1.000	207280	2.16		13.6	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.601	1.602	-0.001	1.000	949475	6.29		744	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.775	1.777	-0.002	1.000	390921	4.25		67.5	
413.00 > 169.00	1.775	1.777	-0.002	1.000	210480		1.86(0.00-0.00)	585	
* 6 13C2-PFOA									
415.00 > 370.00	1.775	1.777	-0.002		857329	10.0		10753	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.026	2.018	0.008	1.000	778689	8.29		620	
499.00 > 99.00	2.026	2.018	0.008	1.000	170481		4.57(0.00-0.00)	224	
* 7 13C4 PFOS									
503.00 > 80.00	2.026	2.021	0.005		2465749	28.7		1573	
9 Perfluorononanoic acid									
463.00 > 419.00	2.033	2.032	0.001	1.000	305510	4.45		9.1	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.231	2.226	0.005	1.000	521256	9.80		8808	

Reagents:

LC537-L2_00022

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_004.d

Injection Date: 01-Aug-2018 01:52:59

Instrument ID: A8_N

Lims ID: IC L2

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 2

Worklist Smp#: 2

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

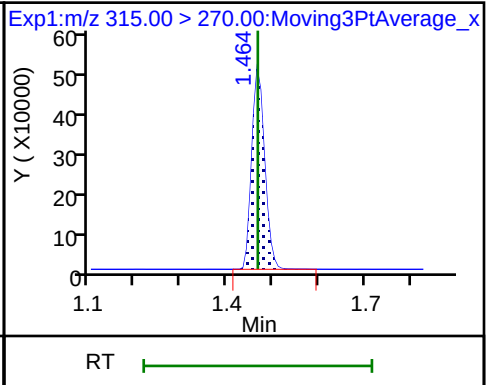
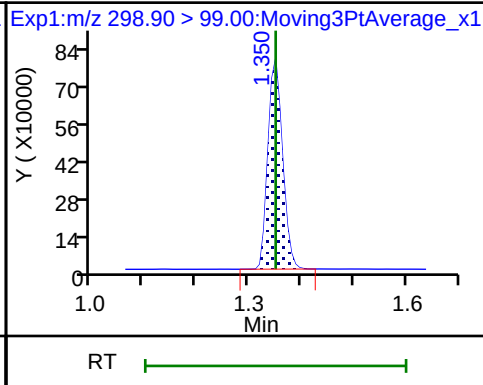
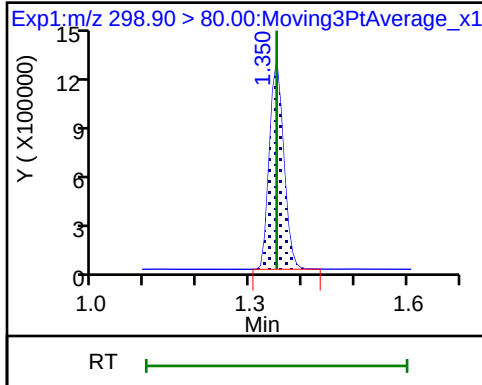
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

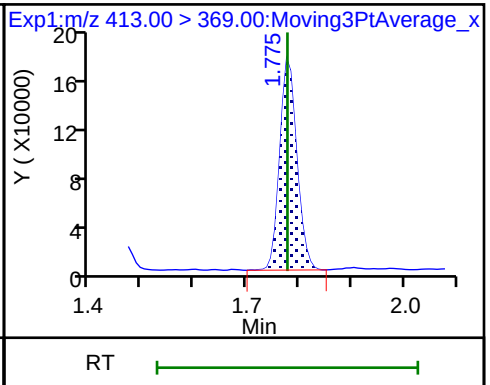
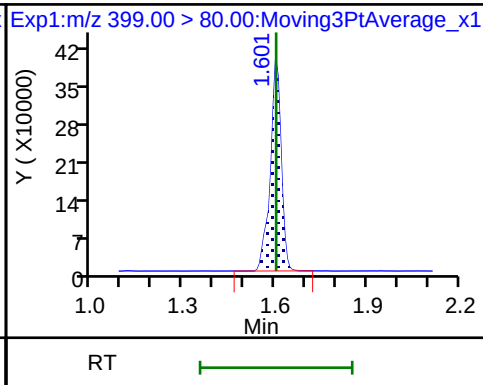
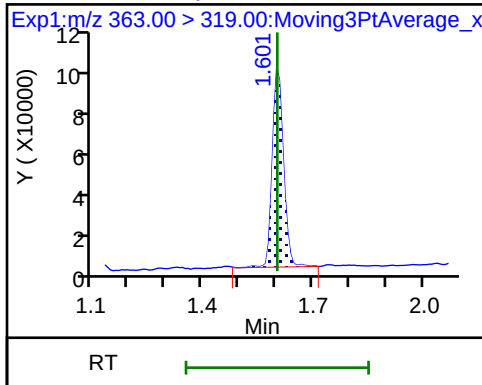
\$ 2 13C2 PFHxA



4 Perfluoroheptanoic acid

3 Perfluorohexanesulfonic acid

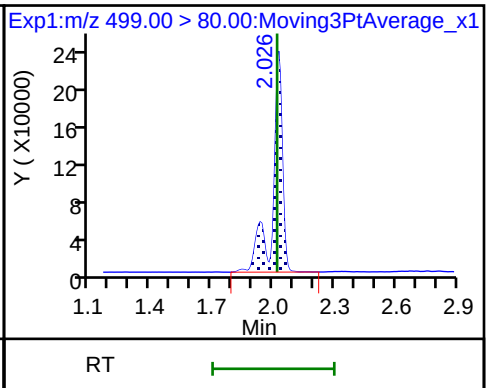
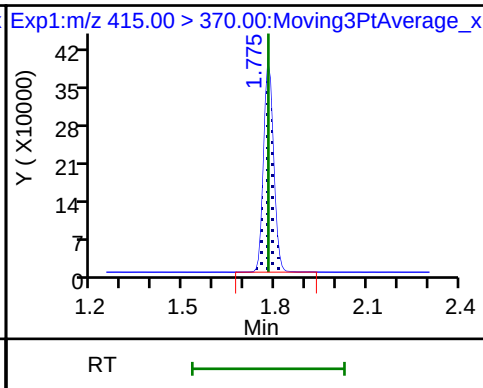
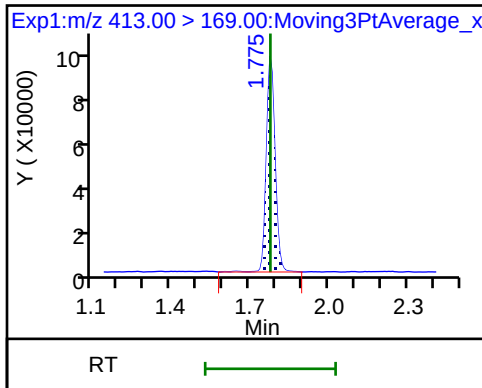
5 Perfluorooctanoic acid



5 Perfluorooctanoic acid

* 6 13C2-PFOA

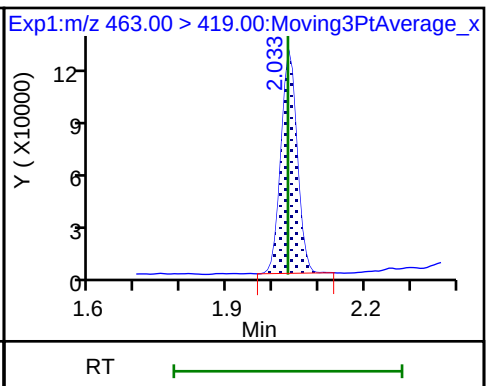
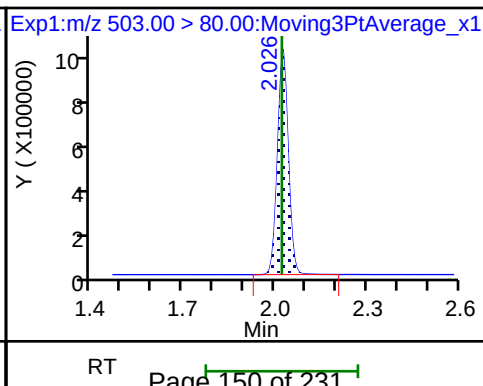
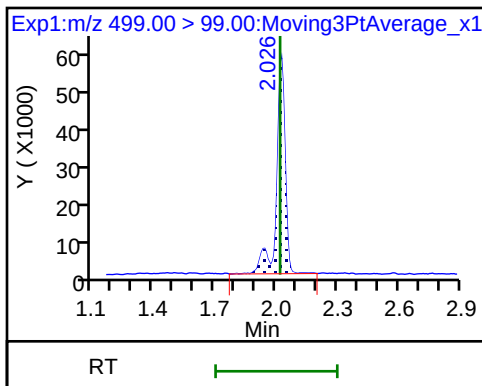
8 Perfluorooctane sulfonic acid



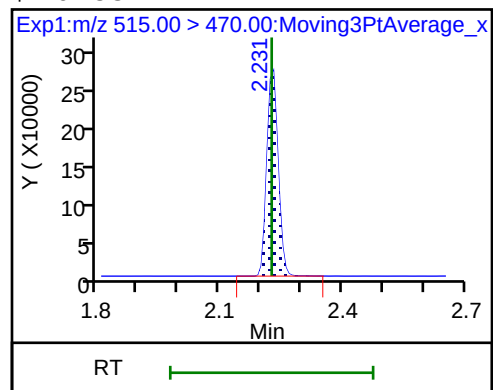
8 Perfluorooctane sulfonic acid

* 7 13C4 PFOS

9 Perfluorononanoic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_005.d
 Lims ID: IC L3
 Client ID:
 Sample Type: IC Calib Level: 2
 Inject. Date: 01-Aug-2018 01:57:38 ALS Bottle#: 3 Worklist Smp#: 3
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: L3_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 02-Aug-2018 10:22:16 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK022

First Level Reviewer: barnettj

Date: 01-Aug-2018 11:53:41

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	5165086	49.2		3242	
298.90 > 99.00	1.350	1.350	0.0	1.000	3575139		1.44(0.00-0.00)	7701	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.466	-0.002	1.000	947875	9.91		12403	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.601	1.602	-0.001	1.000	2191389	15.3		1644	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.601	1.602	-0.001	1.000	471272	5.02		31.9	
* 6 13C2-PFOA									
415.00 > 370.00	1.775	1.777	-0.002		840187	10.0		9188	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.775	1.777	-0.002	1.000	886431	9.84		141	
413.00 > 169.00	1.775	1.777	-0.002	1.000	472599		1.88(0.00-0.00)	1262	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.026	2.018	0.008	1.000	1755508	19.7		1296	
499.00 > 99.00	2.018	2.018	0.0	0.996	382670		4.59(0.00-0.00)	508	
* 7 13C4 PFOS									
503.00 > 80.00	2.018	2.021	-0.003		2338004	28.7		1450	
9 Perfluorononanoic acid									
463.00 > 419.00	2.033	2.032	0.001	1.000	662336	9.84		18.6	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.223	2.226	-0.003	1.000	521256	10.0		7613	

Reagents:

LC537-L3_00025

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_005.d

Injection Date: 01-Aug-2018 01:57:38

Instrument ID: A8_N

Lims ID: IC L3

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 3

Worklist Smp#: 3

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

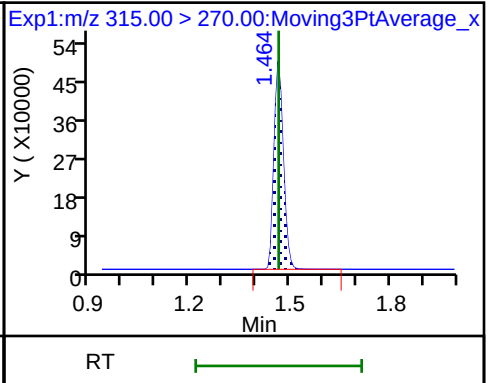
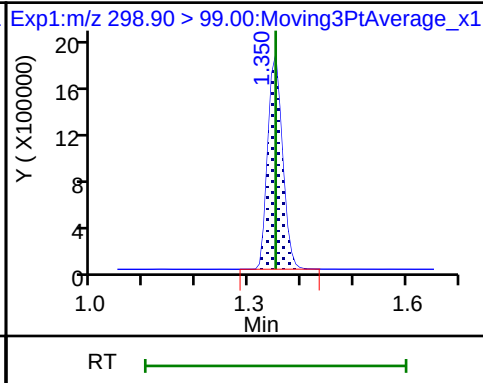
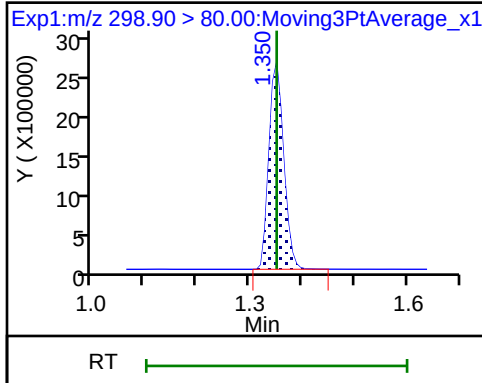
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

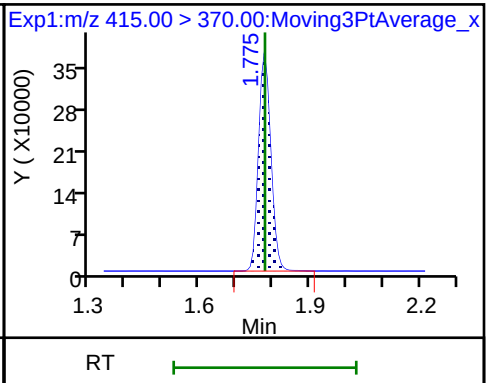
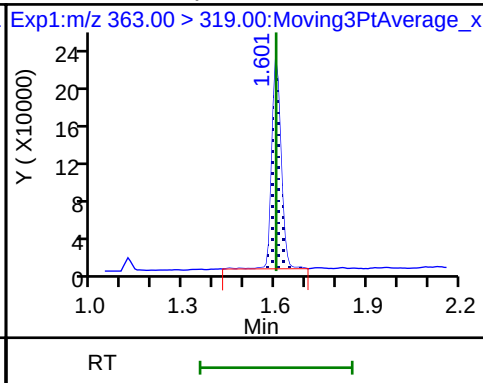
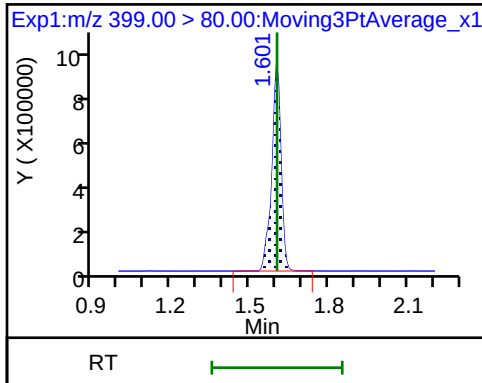
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

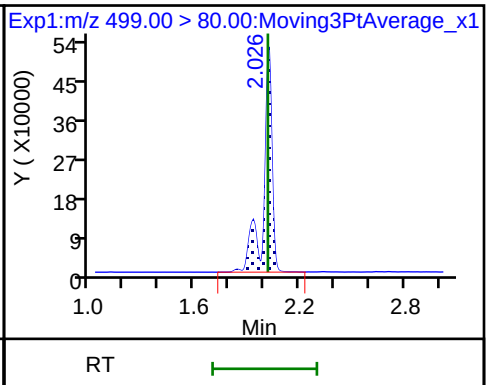
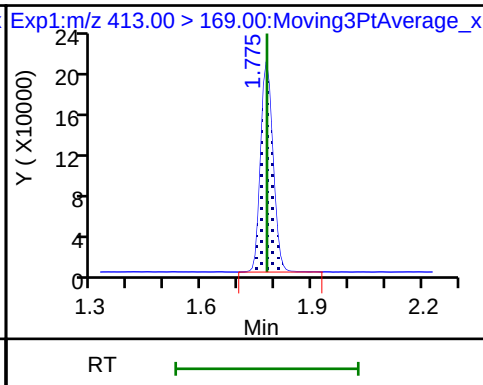
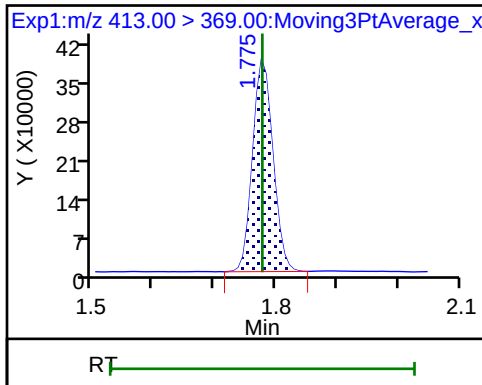
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

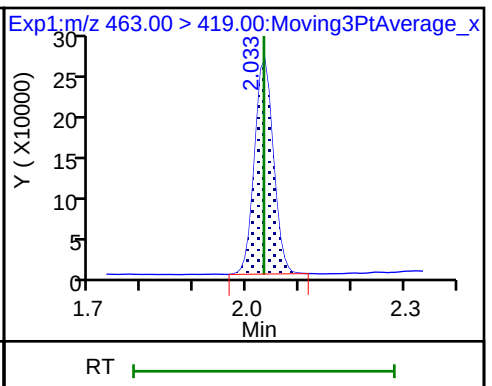
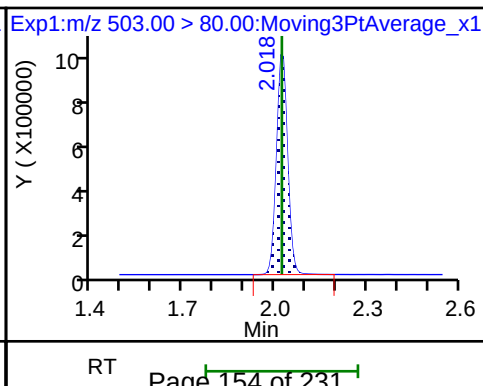
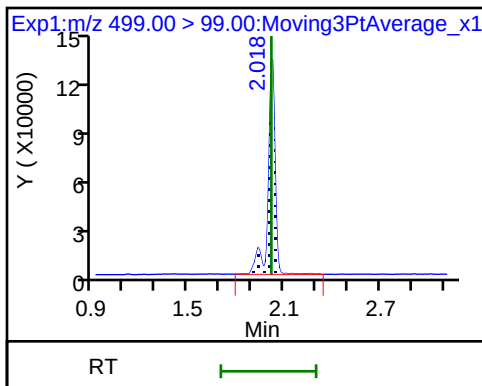
8 Perfluorooctane sulfonic acid



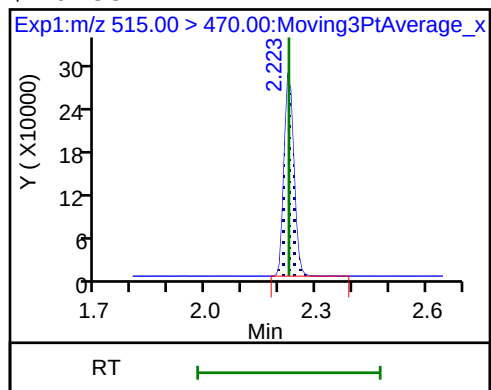
8 Perfluorooctane sulfonic acid

* 7 13C4 PFOS

9 Perfluorononanoic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_006.d
 Lims ID: IC L4
 Client ID:
 Sample Type: ICISAV Calib Level: 3
 Inject. Date: 01-Aug-2018 02:02:18 ALS Bottle#: 4 Worklist Smp#: 4
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: L4_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 02-Aug-2018 10:22:17 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK022

First Level Reviewer: barnettj

Date: 01-Aug-2018 11:53:49

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	9911205	92.3		5308	
298.90 > 99.00	1.343	1.350	-0.007	0.994	6864477		1.44(0.00-0.00)	12771	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.466	-0.002	1.000	938720	10.0		11502	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.601	1.602	-0.001	1.000	907971	9.86		59.0	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.601	1.602	-0.001	1.000	4519511	30.8		3355	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.775	1.777	-0.002	1.000	1794490	20.3		294	
413.00 > 169.00	1.775	1.777	-0.002	1.000	949825		1.89(0.00-0.00)	2607	
* 6 13C2-PFOA									
415.00 > 370.00	1.775	1.777	-0.002		824246	10.0		10149	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.018	2.018	0.0	1.000	3652253	40.0		2628	
499.00 > 99.00	2.018	2.018	0.0	1.000	790777		4.62(0.00-0.00)	928	
* 7 13C4 PFOS									
503.00 > 80.00	2.018	2.021	-0.003		2394250	28.7		1431	
9 Perfluorononanoic acid									
463.00 > 419.00	2.033	2.032	0.001	1.000	1325997	20.1		35.0	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.223	2.226	-0.003	1.000	523489	10.2		7189	

Reagents:

LC537-L4_00022

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_006.d

Injection Date: 01-Aug-2018 02:02:18

Instrument ID: A8_N

Lims ID: IC L4

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 4

Worklist Smp#: 4

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

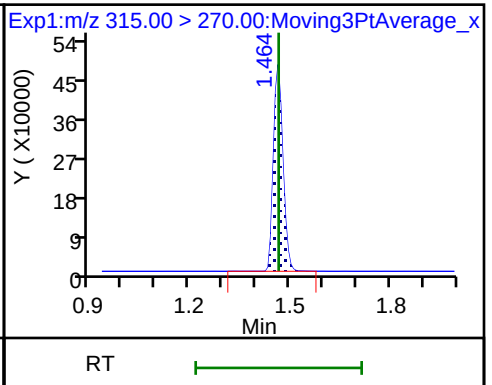
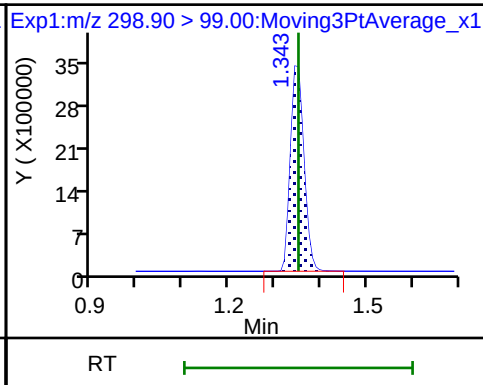
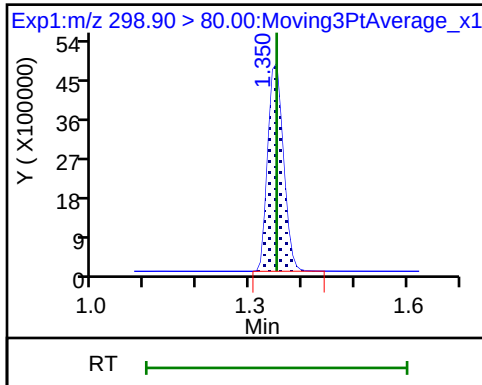
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

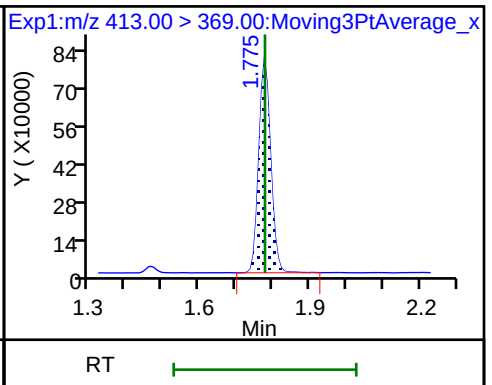
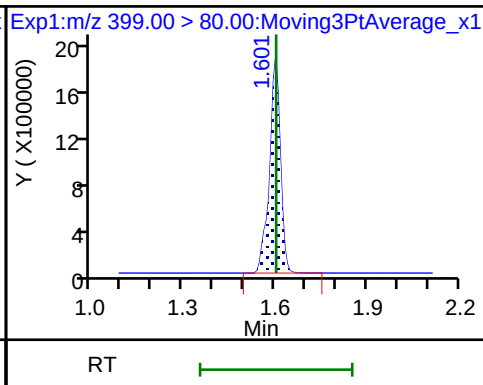
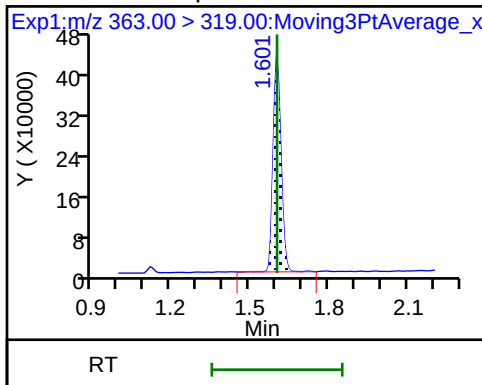
\$ 2 13C2 PFHxA



4 Perfluoroheptanoic acid

3 Perfluorohexanesulfonic acid

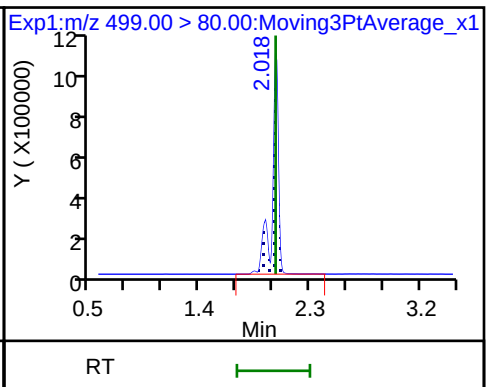
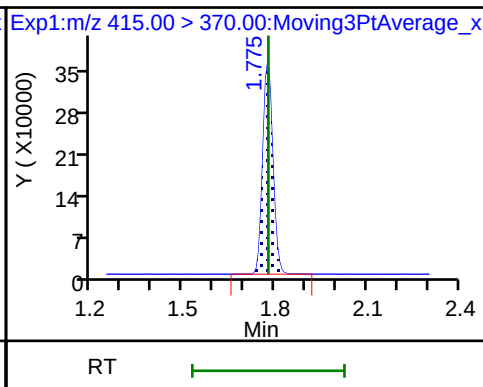
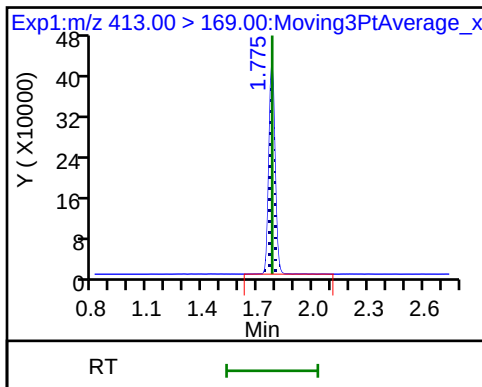
5 Perfluorooctanoic acid



5 Perfluorooctanoic acid

* 6 13C2-PFOA

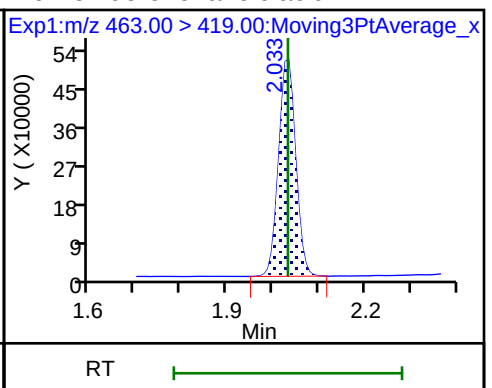
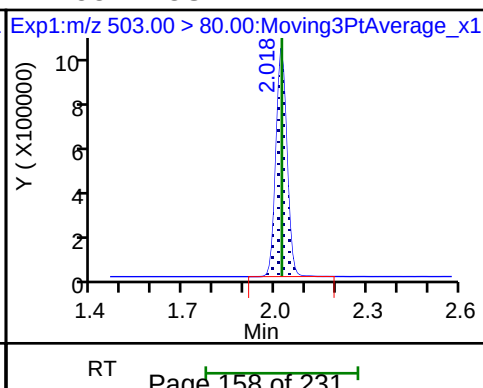
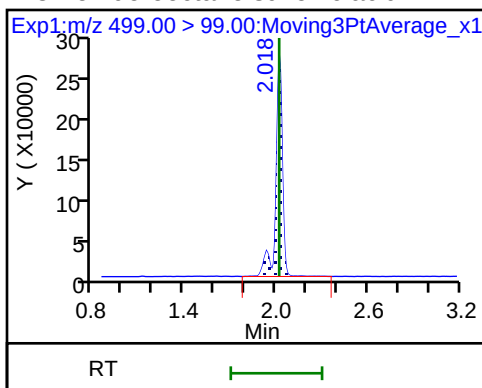
8 Perfluorooctane sulfonic acid



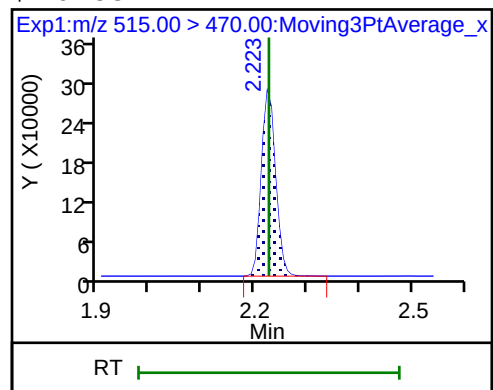
8 Perfluorooctane sulfonic acid

* 7 13C4 PFOS

9 Perfluorononanoic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_007.d
 Lims ID: IC L5
 Client ID:
 Sample Type: IC Calib Level: 4
 Inject. Date: 01-Aug-2018 02:06:58 ALS Bottle#: 5 Worklist Smp#: 5
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: L5_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 02-Aug-2018 10:22:18 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK022

First Level Reviewer: barnettj

Date: 01-Aug-2018 11:53:59

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	12708606	130.0		6425	
298.90 > 99.00	1.350	1.350	0.0	1.000	8959971		1.42(0.00-0.00)	14699	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.472	1.466	0.006	1.000	863882	9.77		10728	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.608	1.602	0.006	1.000	6187681	46.4		4316	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.608	1.602	0.006	1.000	1244808	14.3		80.5	
* 6 13C2-PFOA									
415.00 > 370.00	1.783	1.777	0.006		776688	10.0		8608	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.783	1.777	0.006	1.000	2496628	30.0		391	
413.00 > 169.00	1.783	1.777	0.006	1.000	1306115		1.91(0.00-0.00)	3551	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.026	2.018	0.008	1.000	5026530	60.6		3423	
499.00 > 99.00	2.026	2.018	0.008	1.000	1082827		4.64(0.00-0.00)	1280	
* 7 13C4 PFOS									
503.00 > 80.00	2.026	2.021	0.005		2179386	28.7		1406	
9 Perfluorononanoic acid									
463.00 > 419.00	2.033	2.032	0.001	1.000	1819468	29.2		50.2	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.231	2.226	0.005	1.000	478337	9.92		7017	

Reagents:

LC537-L5_00026

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_007.d

Injection Date: 01-Aug-2018 02:06:58

Instrument ID: A8_N

Lims ID: IC L5

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 5

Worklist Smp#: 5

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

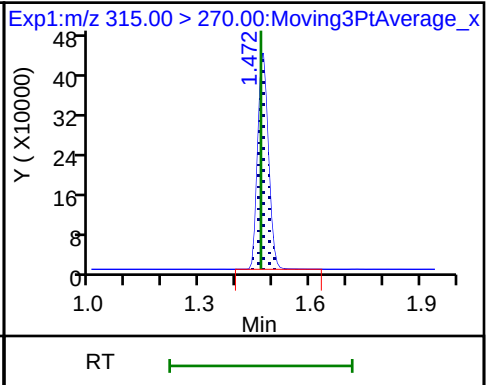
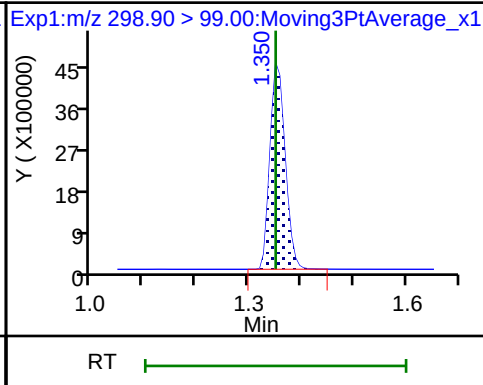
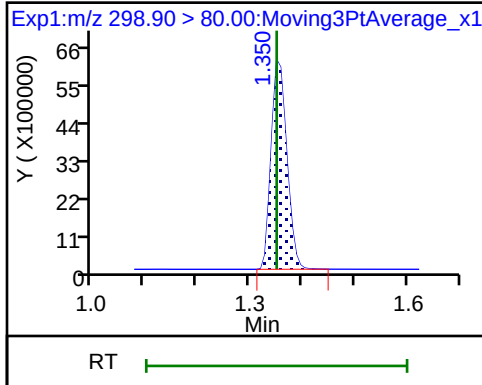
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

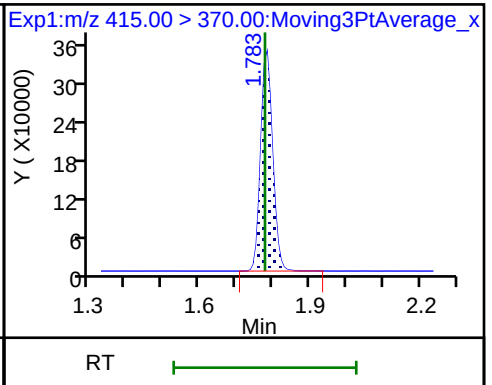
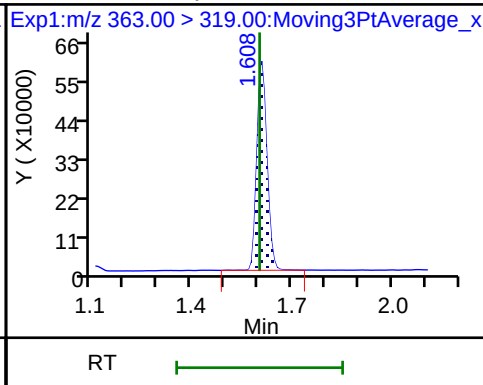
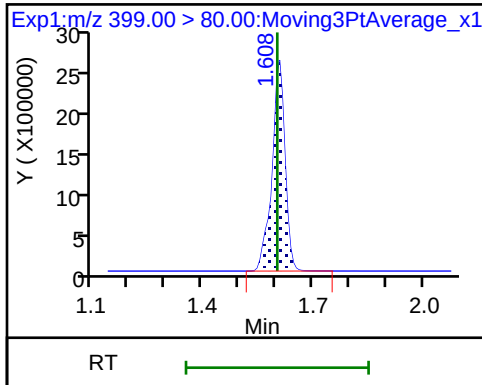
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

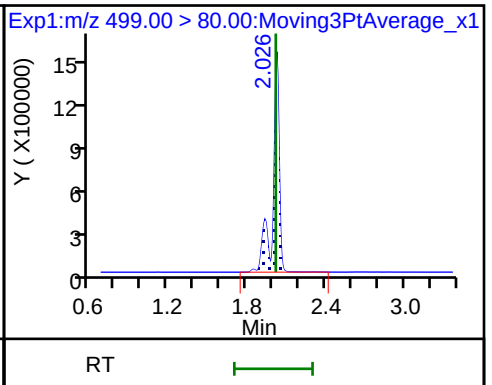
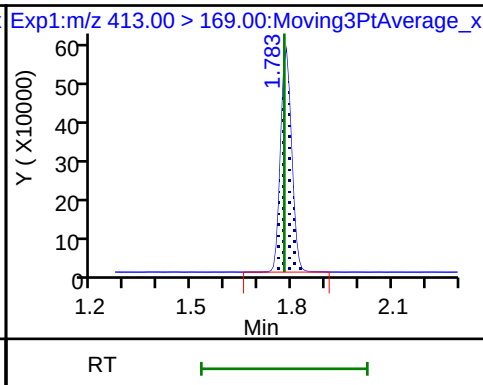
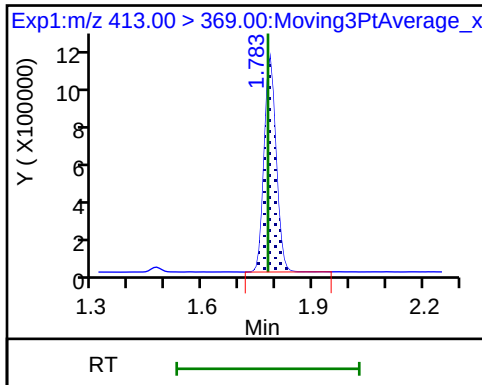
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

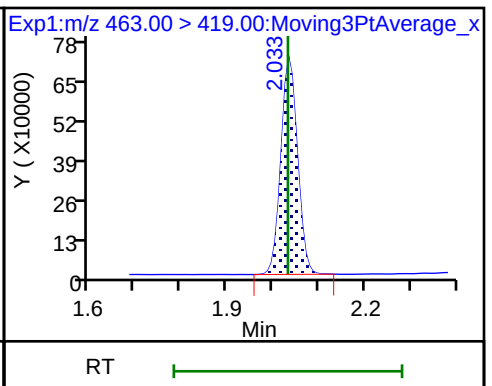
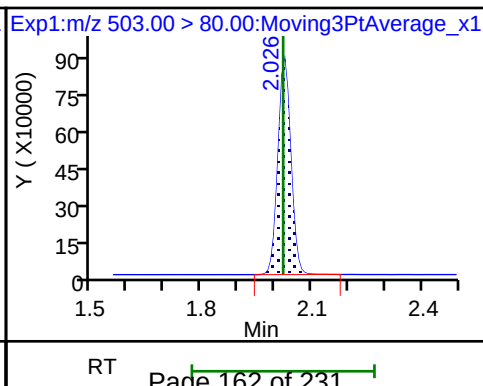
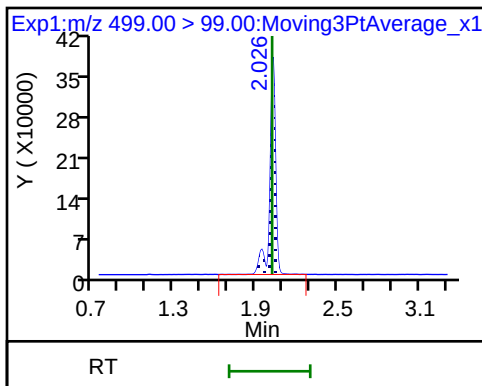
8 Perfluorooctane sulfonic acid



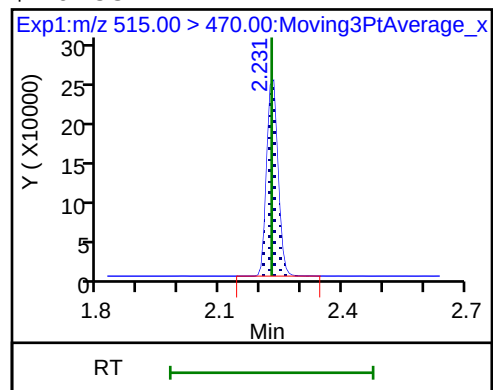
8 Perfluorooctane sulfonic acid

* 7 13C4 PFOS

9 Perfluorononanoic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
 Lims ID: IC L6
 Client ID:
 Sample Type: IC Calib Level: 5
 Inject. Date: 01-Aug-2018 02:11:38 ALS Bottle#: 6 Worklist Smp#: 6
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: L6_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 02-Aug-2018 10:22:19 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK022

First Level Reviewer: barnettj

Date: 01-Aug-2018 11:54:14

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	16978219	156.1		8626	
298.90 > 99.00	1.350	1.350	0.0	1.000	12253756		1.39(0.00-0.00)	16774	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.466	-0.002	1.000	1010165	10.3		15307	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.601	1.602	-0.001	1.000	1811361	18.8		120	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.601	1.602	-0.001	1.000	9082366	61.2		6249	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.775	1.777	-0.002	1.000	3687616	39.8		562	
413.00 > 169.00	1.775	1.777	-0.002	1.000	1979332		1.86(0.00-0.00)	4816	
* 6 13C2-PFOA									
415.00 > 370.00	1.775	1.777	-0.002		863581	10.0		10398	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.018	2.018	0.0	1.000	7478599	81.0		5613	
499.00 > 99.00	2.018	2.018	0.0	1.000	1617765		4.62(0.00-0.00)	1994	
* 7 13C4 PFOS									
503.00 > 80.00	2.018	2.021	-0.003		2423557	28.7		1483	
9 Perfluorononanoic acid									
463.00 > 419.00	2.026	2.032	-0.006	1.000	2732485	39.5		81.7	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.223	2.226	-0.003	1.000	538534	10.0		8927	

Reagents:

LC537-L6_00022

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Injection Date: 01-Aug-2018 02:11:38

Instrument ID: A8_N

Lims ID: IC L6

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 6

Worklist Smp#: 6

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

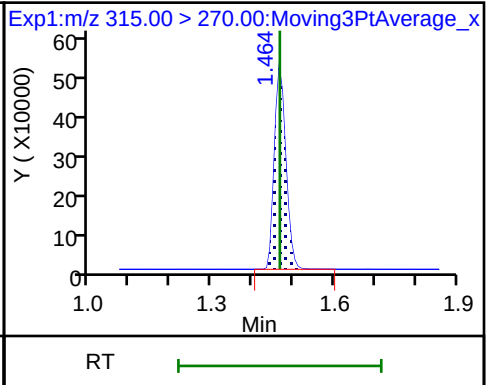
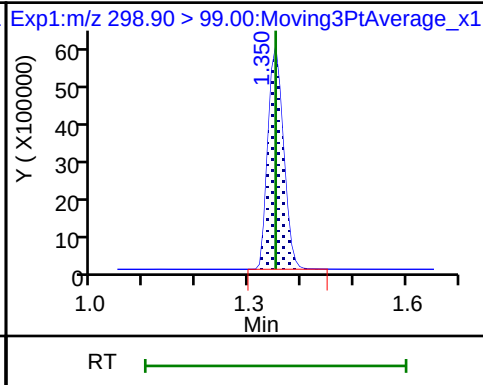
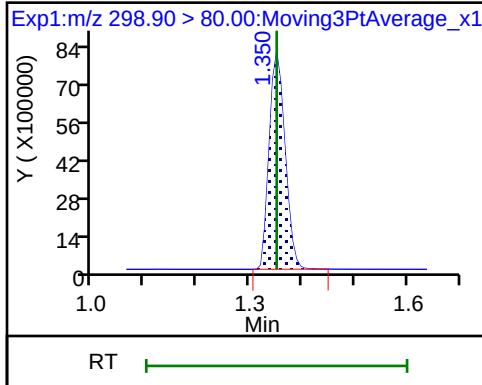
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

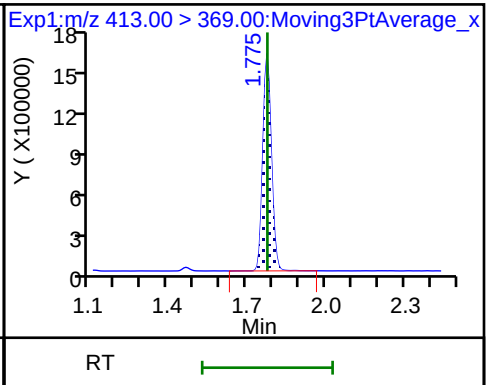
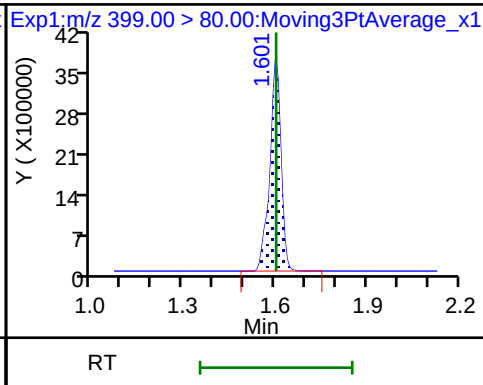
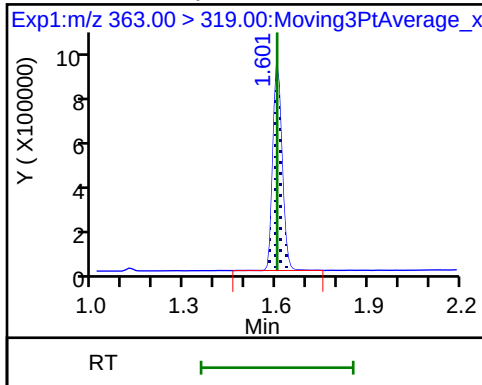
\$ 2 13C2 PFHxA



4 Perfluoroheptanoic acid

3 Perfluorohexanesulfonic acid

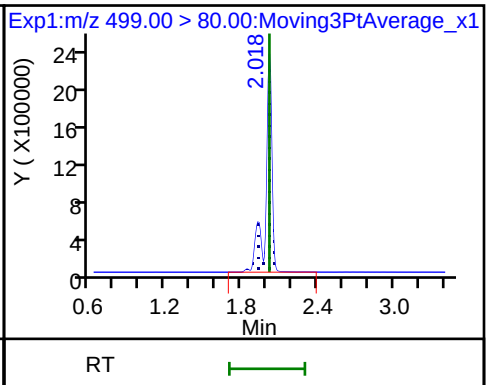
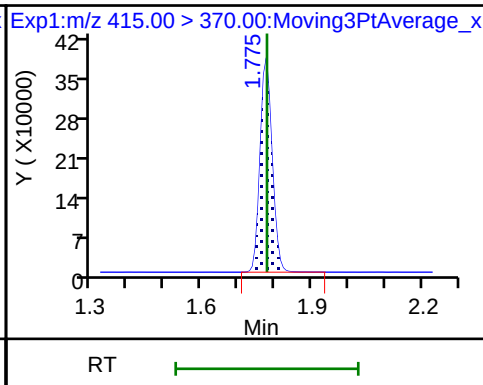
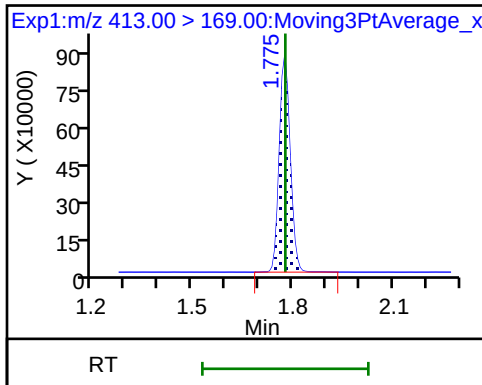
5 Perfluorooctanoic acid



5 Perfluorooctanoic acid

* 6 13C2-PFOA

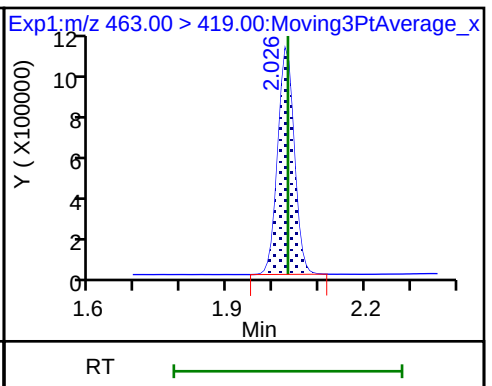
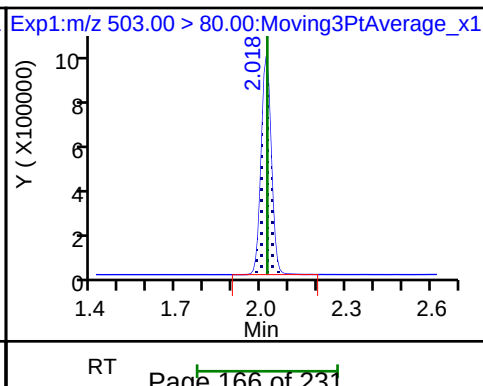
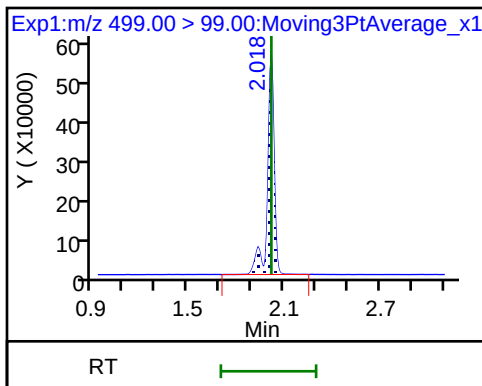
8 Perfluorooctane sulfonic acid



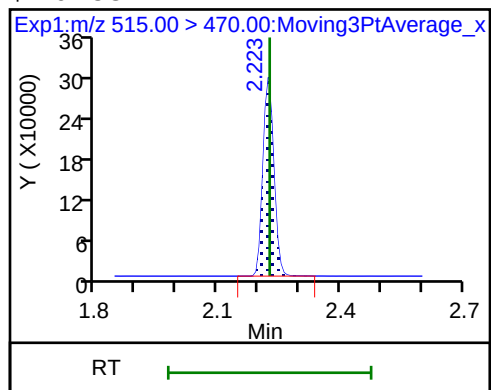
8 Perfluorooctane sulfonic acid

* 7 13C4 PFOS

9 Perfluorononanoic acid



\$ 10 13C2 PFDA



Calibration

/ Perfluorobutanesulfonic acid

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

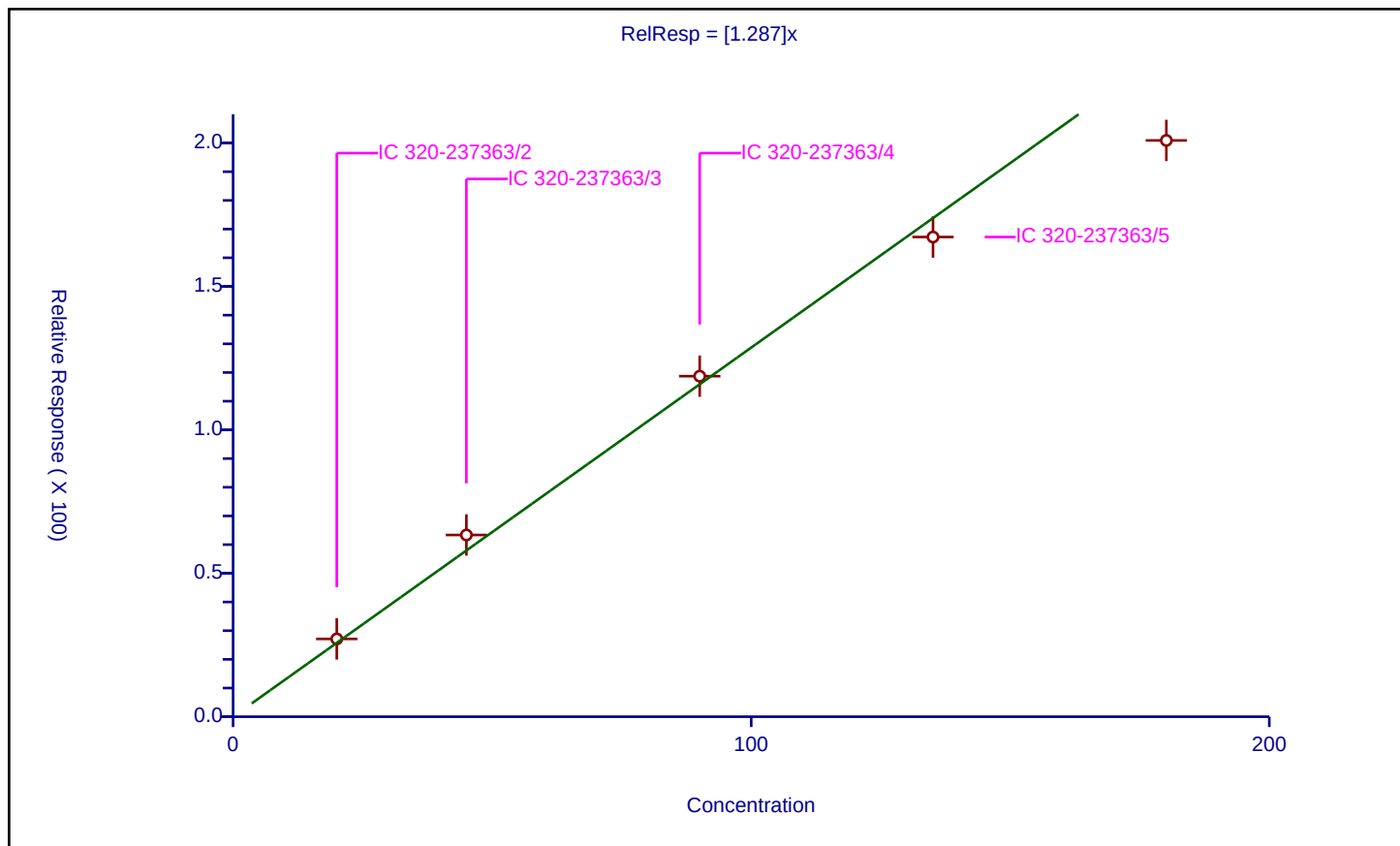
Curve Coefficients

Intercept: 0
Slope: 1.287

Error Coefficients

Standard Error: 12000000
Relative Standard Error: 8.9
Correlation Coefficient: 0.992
Coefficient of Determination (Adjusted): 0.983

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-237363/2	20.01376	27.126912	28.68	2465749.0	1.355413	Y
2	IC 320-237363/3	45.03096	63.359458	28.68	2338004.0	1.40702	Y
3	IC 320-237363/4	90.06192	118.723341	28.68	2394250.0	1.318241	Y
4	IC 320-237363/5	135.09288	167.241058	28.68	2179386.0	1.237971	Y
5	IC 320-237363/6	180.12384	200.917627	28.68	2423557.0	1.115442	Y



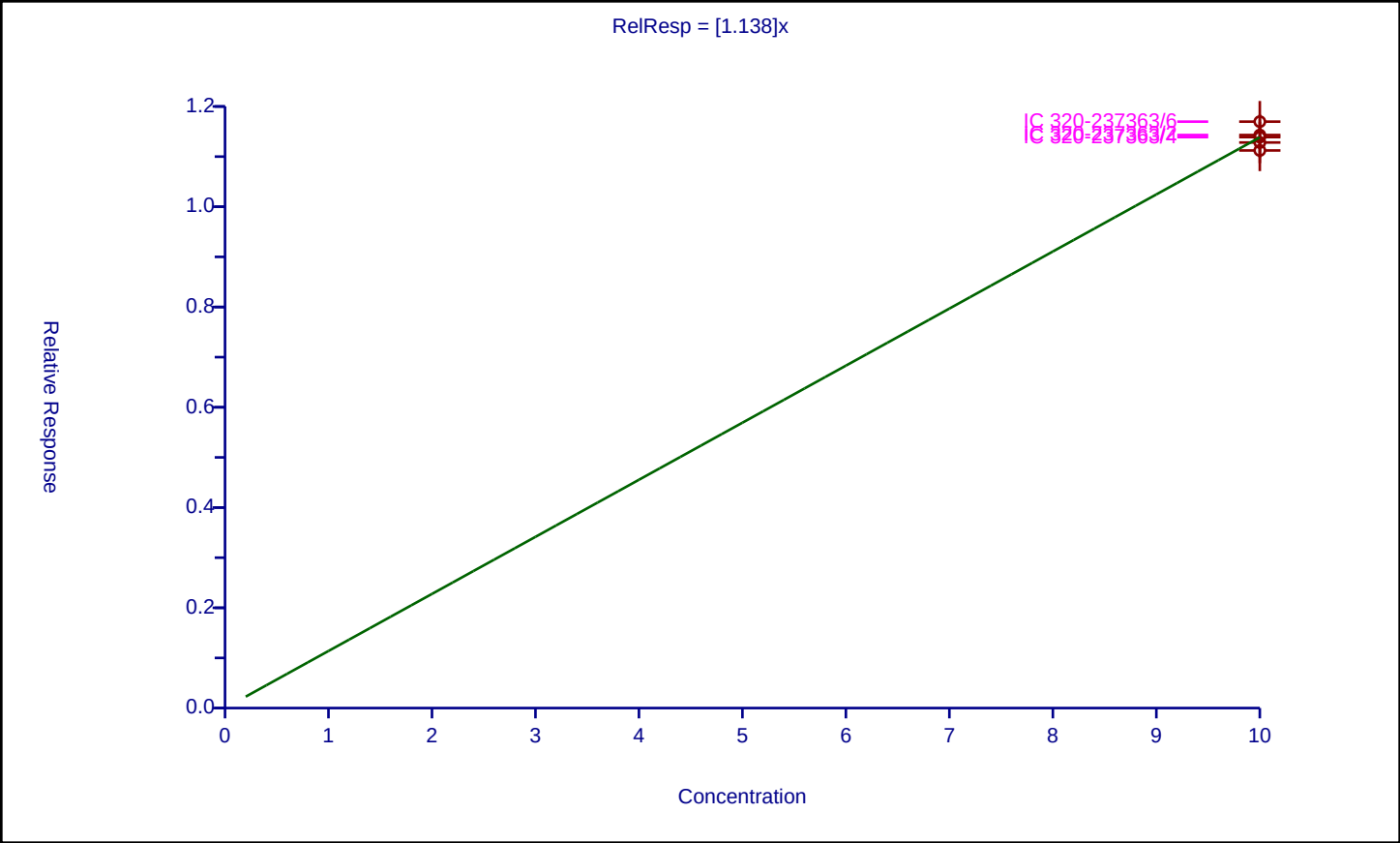
Calibration

/ 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:	1.138
Error Coefficients	
Standard Error:	1060000
Relative Standard Error:	1.9
Correlation Coefficient:	NA
Coefficient of Determination (Adjusted):	0

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-237363/2	10.0	11.430268	10.0	857329.0	1.143027	Y
2	IC 320-237363/3	10.0	11.281715	10.0	840187.0	1.128171	Y
3	IC 320-237363/4	10.0	11.388833	10.0	824246.0	1.138883	Y
4	IC 320-237363/5	10.0	11.122639	10.0	776688.0	1.112264	Y
5	IC 320-237363/6	10.0	11.697397	10.0	863581.0	1.16974	Y



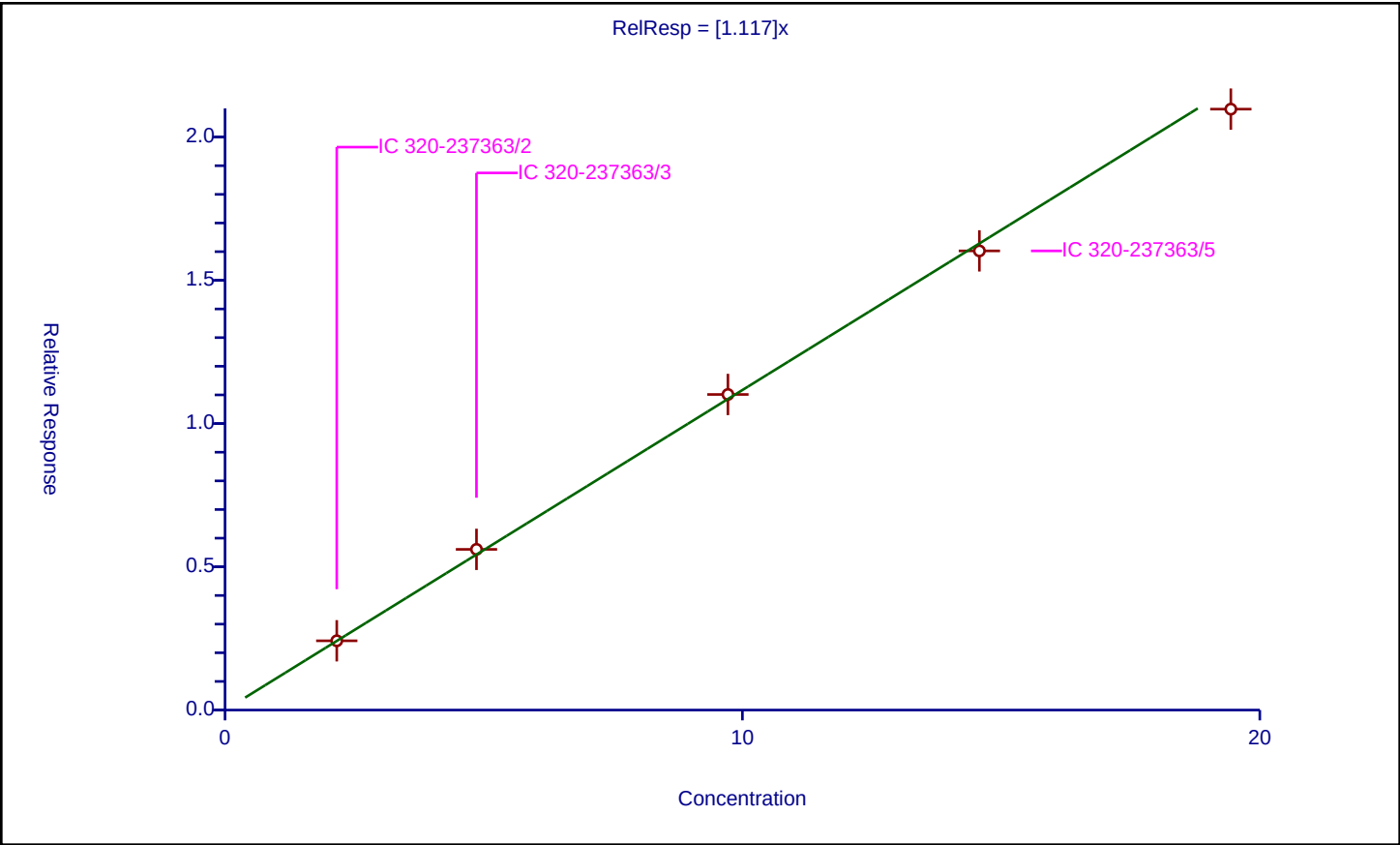
Calibration

/ 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:	1.117
Error Coefficients	
Standard Error:	1220000
Relative Standard Error:	2.6
Correlation Coefficient:	0.994
Coefficient of Determination (Adjusted):	0.999

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-237363/2	2.16	2.417742	10.0	857329.0	1.119325	Y
2	IC 320-237363/3	4.86	5.609132	10.0	840187.0	1.154142	Y
3	IC 320-237363/4	9.72	11.015777	10.0	824246.0	1.13331	Y
4	IC 320-237363/5	14.58	16.027131	10.0	776688.0	1.099254	Y
5	IC 320-237363/6	19.44	20.974998	10.0	863581.0	1.078961	Y



Calibration

/ Perfluorohexanesulfonic acid

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

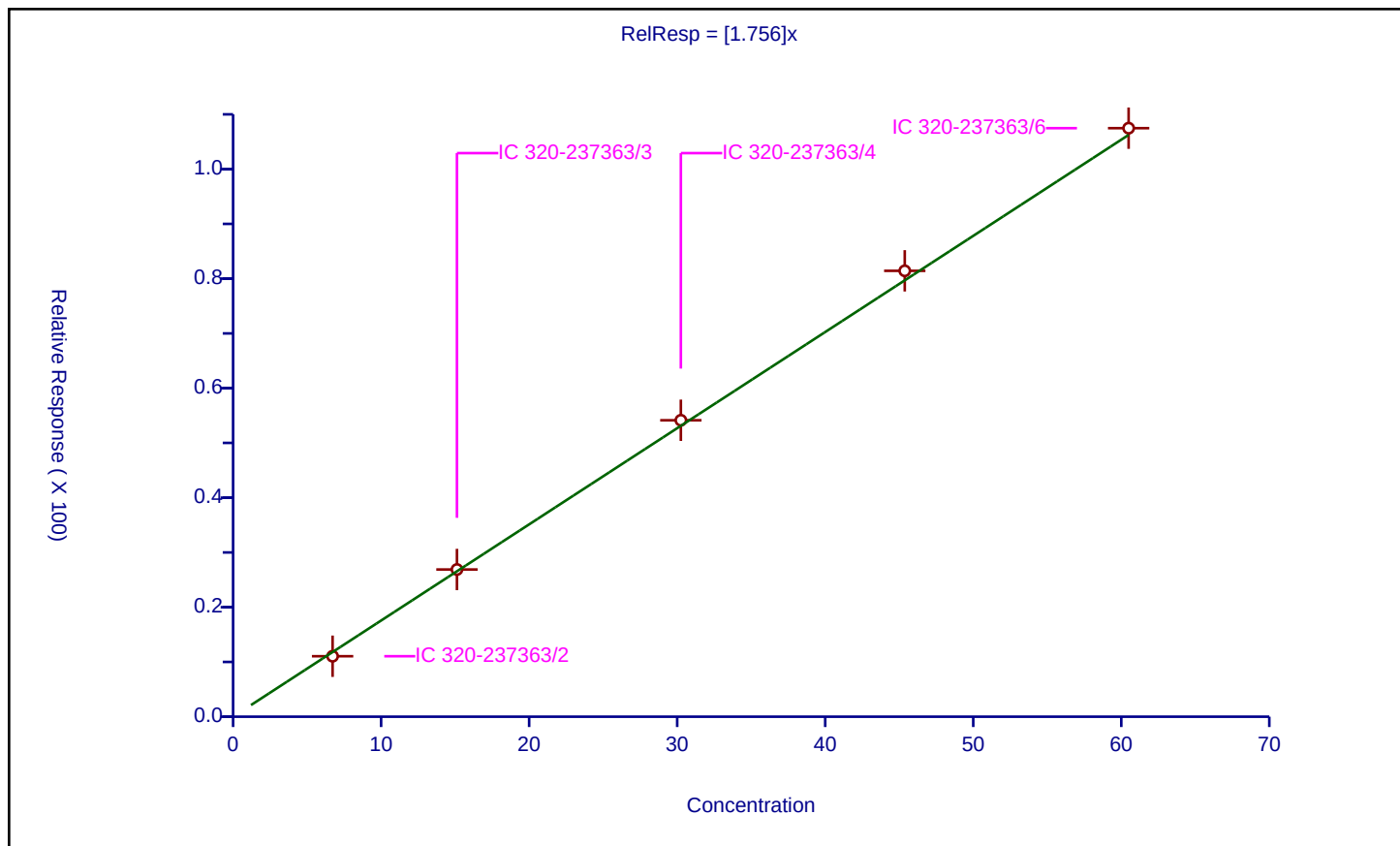
Curve Coefficients

Intercept: 0
 Slope: 1.756

Error Coefficients

Standard Error: 6060000
 Relative Standard Error: 3.6
 Correlation Coefficient: 0.994
 Coefficient of Determination (Adjusted): 0.998

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-237363/2	6.721867	11.04368	28.68	2465749.0	1.642948	Y
2	IC 320-237363/3	15.1242	26.881492	28.68	2338004.0	1.777383	Y
3	IC 320-237363/4	30.2484	54.137862	28.68	2394250.0	1.789776	Y
4	IC 320-237363/5	45.3726	81.427838	28.68	2179386.0	1.794648	Y
5	IC 320-237363/6	60.4968	107.479319	28.68	2423557.0	1.776612	Y



Calibration

/ Perfluorooctanoic acid

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

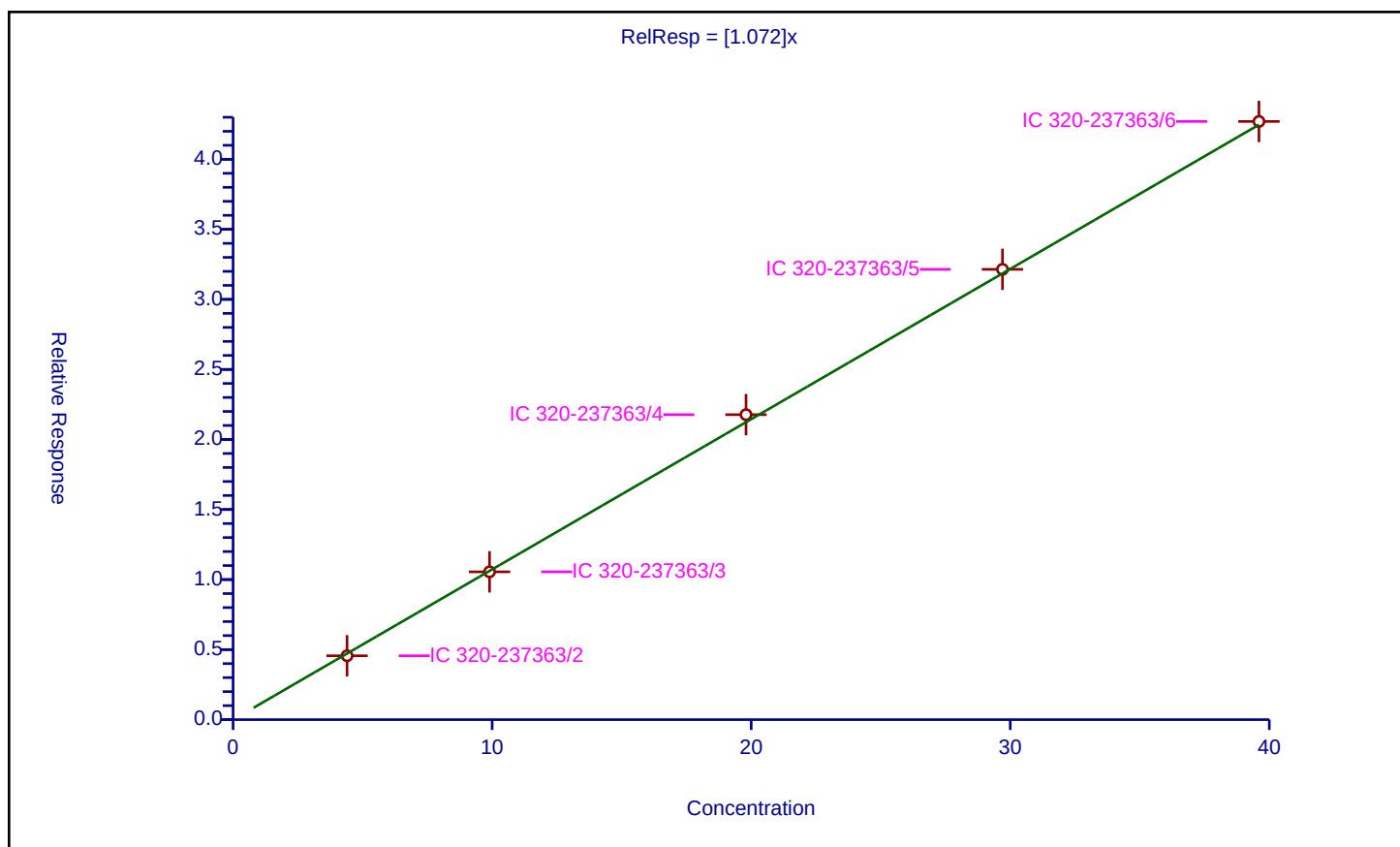
Curve Coefficients

Intercept: 0
Slope: 1.072

Error Coefficients

Standard Error: 2450000
Relative Standard Error: 2.2
Correlation Coefficient: 0.993
Coefficient of Determination (Adjusted): 0.999

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-237363/2	4.4	4.559755	10.0	857329.0	1.036308	Y
2	IC 320-237363/3	9.9	10.550401	10.0	840187.0	1.065697	Y
3	IC 320-237363/4	19.8	21.771292	10.0	824246.0	1.09956	Y
4	IC 320-237363/5	29.7	32.144542	10.0	776688.0	1.082308	Y
5	IC 320-237363/6	39.6	42.701449	10.0	863581.0	1.078319	Y



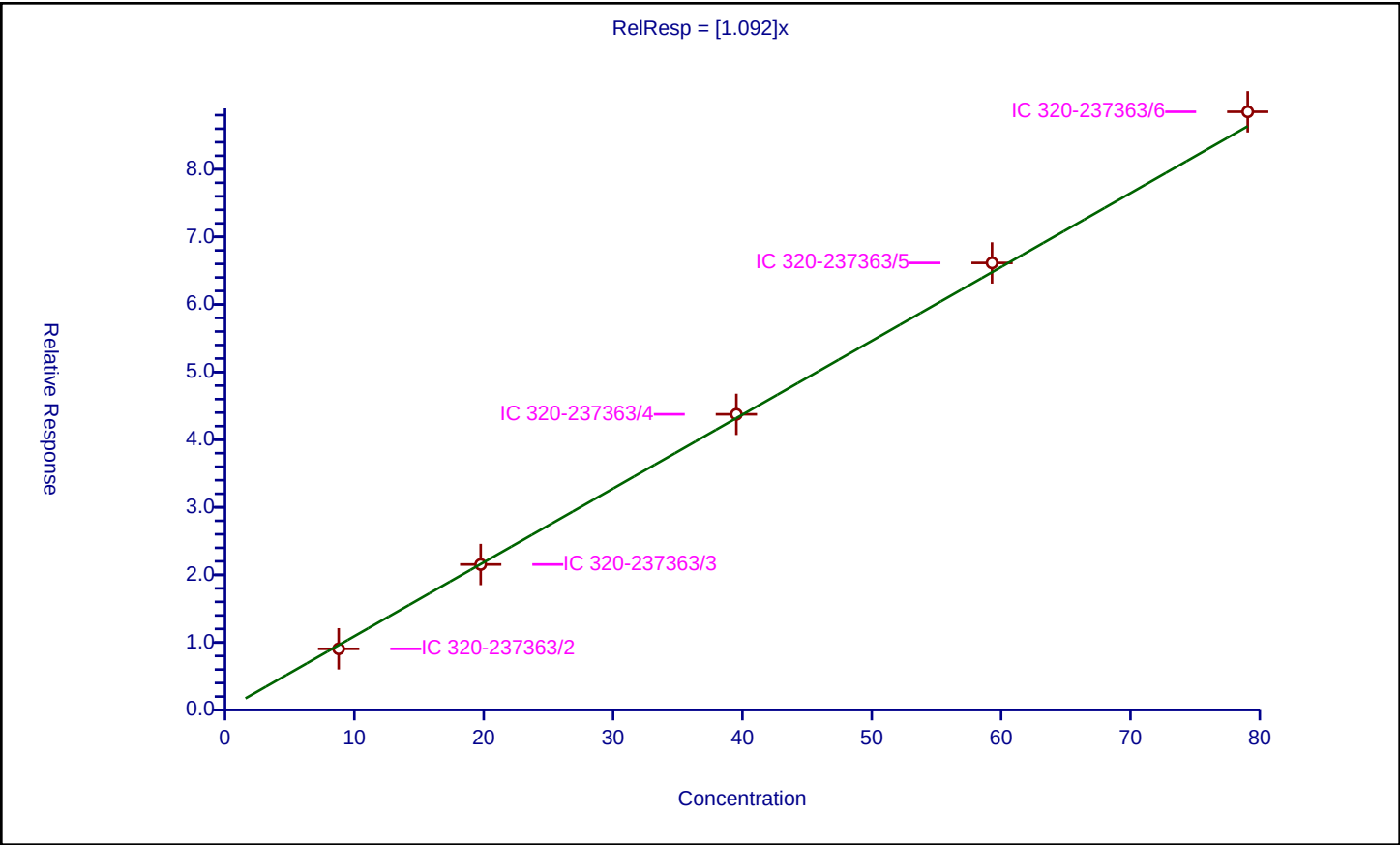
Calibration

/ 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:	1.092
Error Coefficients	
Standard Error:	4960000
Relative Standard Error:	3.3
Correlation Coefficient:	0.993
Coefficient of Determination (Adjusted):	0.998

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-237363/2	8.785067	9.057208	28.68	2465749.0	1.030978	Y
2	IC 320-237363/3	19.7664	21.534595	28.68	2338004.0	1.089455	Y
3	IC 320-237363/4	39.5328	43.749239	28.68	2394250.0	1.106657	Y
4	IC 320-237363/5	59.2992	66.147475	28.68	2179386.0	1.115487	Y
5	IC 320-237363/6	79.0656	88.500588	28.68	2423557.0	1.119331	Y



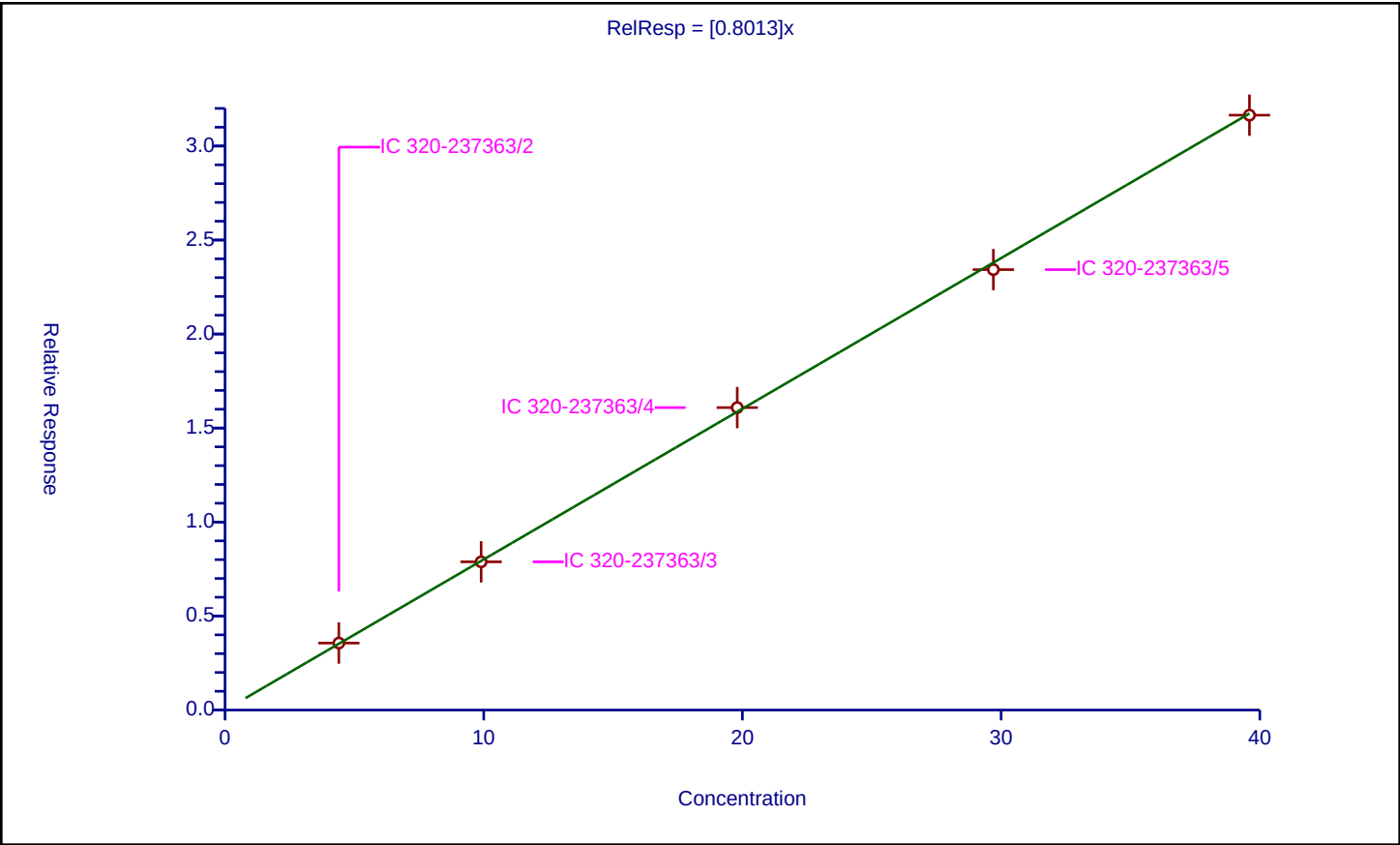
Calibration

/ 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:	0.8013
Error Coefficients	
Standard Error:	1810000
Relative Standard Error:	1.2
Correlation Coefficient:	0.991
Coefficient of Determination (Adjusted):	1.000

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-237363/2	4.4	3.563509	10.0	857329.0	0.809889	Y
2	IC 320-237363/3	9.9	7.883197	10.0	840187.0	0.796283	Y
3	IC 320-237363/4	19.8	16.087394	10.0	824246.0	0.812495	Y
4	IC 320-237363/5	29.7	23.425983	10.0	776688.0	0.788754	Y
5	IC 320-237363/6	39.6	31.641328	10.0	863581.0	0.799023	Y



Calibration

/ 13C2 PFDA

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

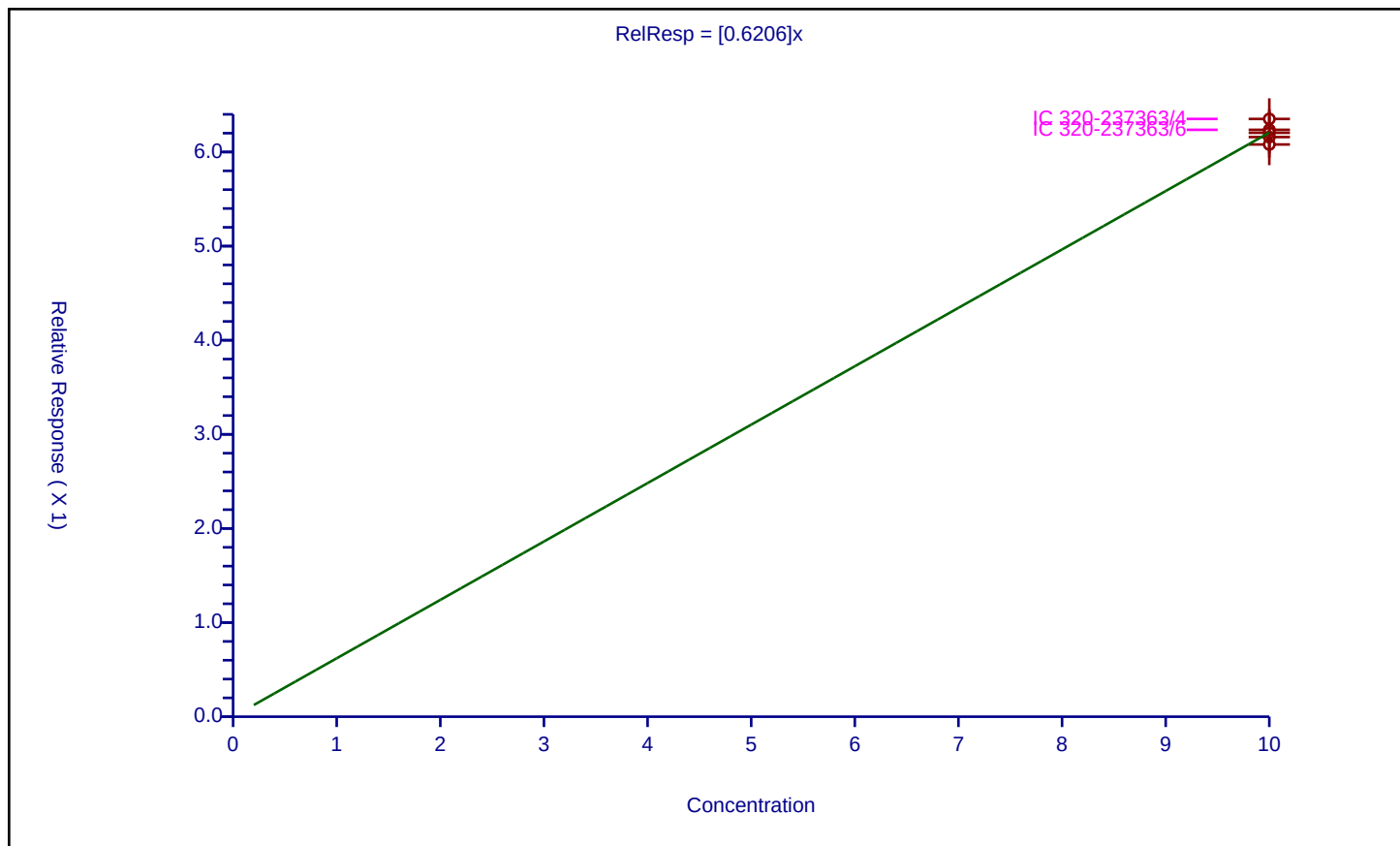
Curve Coefficients

Intercept: 0
Slope: 0.6206

Error Coefficients

Standard Error: 578000
Relative Standard Error: 1.6
Correlation Coefficient: NA
Coefficient of Determination (Adjusted): 0

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-237363/2	10.0	6.08	10.0	857329.0	0.608	Y
2	IC 320-237363/3	10.0	6.204047	10.0	840187.0	0.620405	Y
3	IC 320-237363/4	10.0	6.351126	10.0	824246.0	0.635113	Y
4	IC 320-237363/5	10.0	6.158676	10.0	776688.0	0.615868	Y
5	IC 320-237363/6	10.0	6.236057	10.0	863581.0	0.623606	Y



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-237363/8 Calibration Date: 08/01/2018 02:20
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.07.31_537CURVEA_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	1.287	1.385		21.5	20.0	7.6	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.176		2.27	2.16	5.3	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.686		6.45	6.72	-4.0	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.050		4.31	4.40	-2.1	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.024		8.24	8.79	-6.2	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.7777		4.27	4.40	-2.9	50.0
13C2 PFHxA	Ave	1.138	1.112		9.77	10.0	-2.3	30.0
13C2 PFDA	Ave	0.6206	0.6172		9.94	10.0	-0.6	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_010.d
 Lims ID: CCVL
 Client ID:
 Sample Type: CCVL
 Inject. Date: 01-Aug-2018 02:20:59 ALS Bottle#: 2 Worklist Smp#: 8
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: CCV L2
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 02-Aug-2018 10:22:21 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK022

First Level Reviewer: barnettj

Date: 01-Aug-2018 12:02:08

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	2385595	21.5		1507	
298.90 > 99.00	1.350	1.350	0.0	1.000	1562683		1.53(0.00-0.00)	3546	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.472	1.466	0.006	1.000	968714	9.77		15490	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.608	1.602	0.006	1.000	975847	6.45		790	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.608	1.602	0.006	1.000	221244	2.27		13.7	
* 6 13C2-PFOA									
415.00 > 370.00	1.775	1.777	-0.002		871132	10.0		10178	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.783	1.777	0.006	1.000	402440	4.31		64.5	
413.00 > 169.00	1.775	1.777	-0.002	0.996	209561		1.92(0.00-0.00)	562	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.018	2.018	0.0	1.000	774718	8.24		618	
499.00 > 99.00	2.018	2.018	0.0	1.000	172573		4.49(0.00-0.00)	238	
* 7 13C4 PFOS									
503.00 > 80.00	2.018	2.021	-0.003		2468904	28.7		1608	
9 Perfluorononanoic acid									
463.00 > 419.00	2.033	2.032	0.001	1.000	298090	4.27		8.3	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.223	2.226	-0.003	1.000	537645	9.94		7942	

Reagents:

LC537-L2_00022

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_010.d

Injection Date: 01-Aug-2018 02:20:59

Instrument ID: A8_N

Lims ID: CCVL

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 2

Worklist Smp#: 8

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

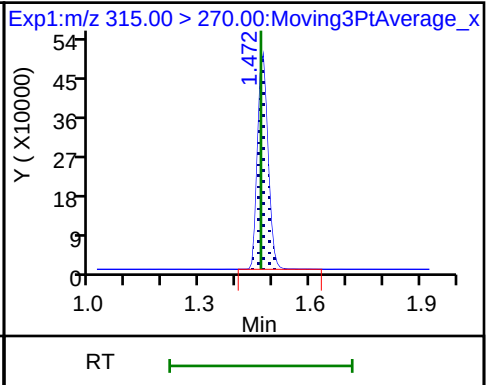
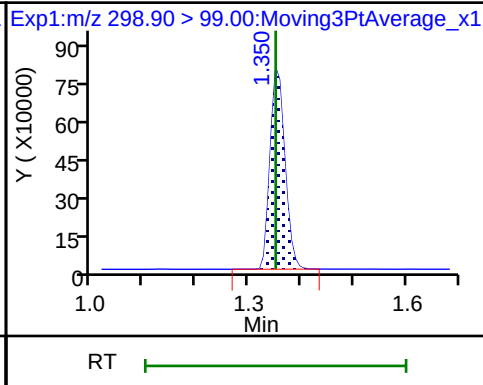
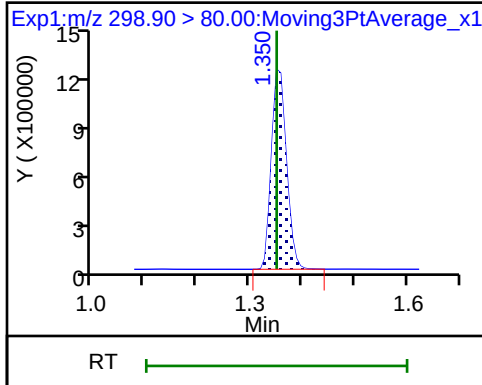
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

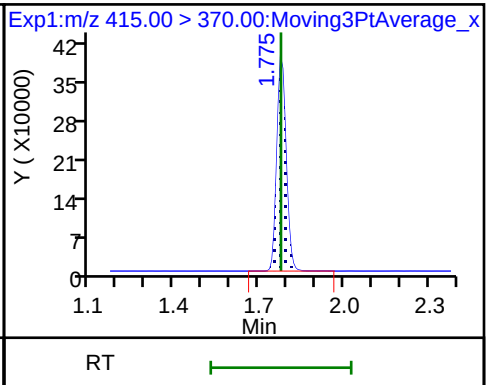
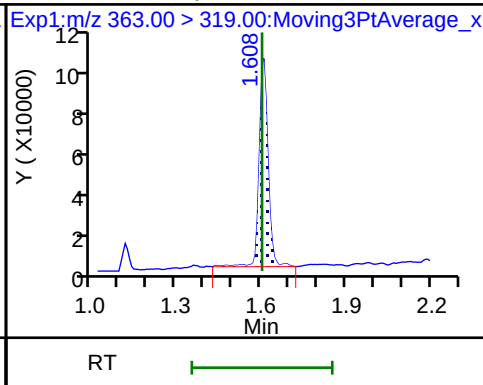
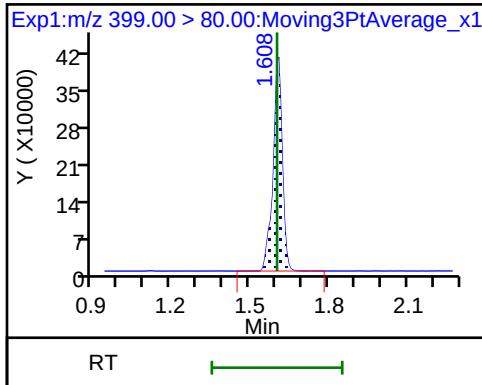
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

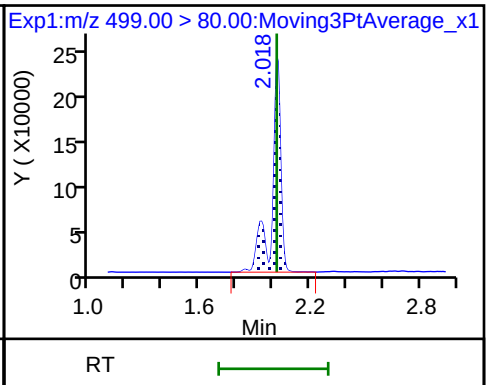
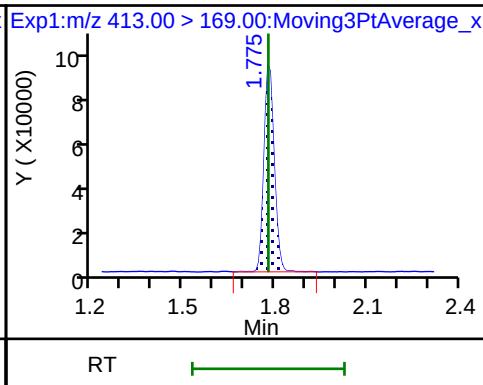
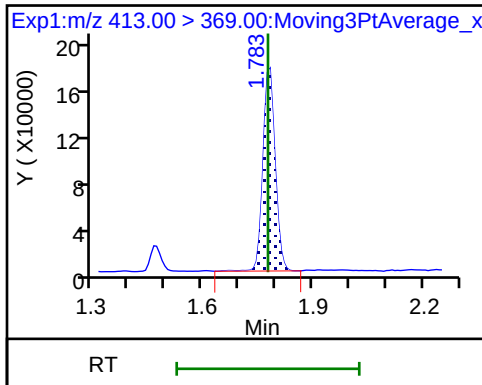
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

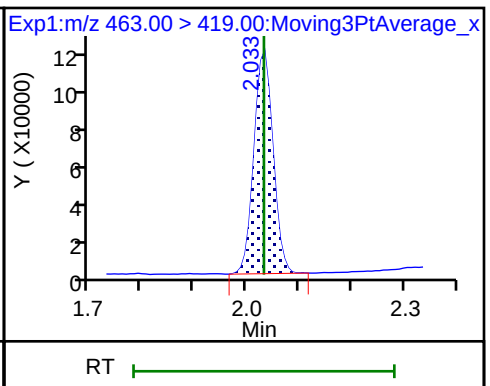
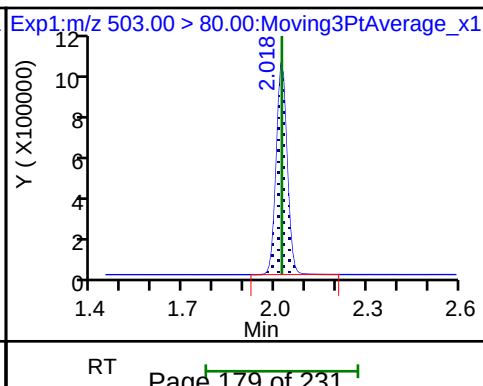
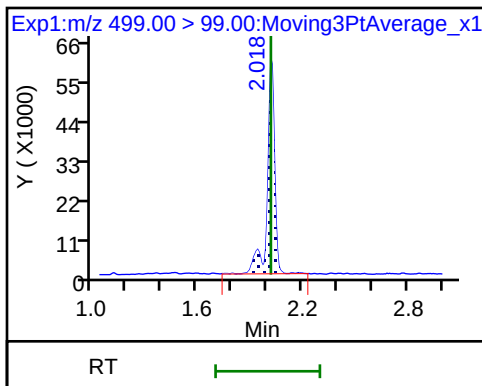
8 Perfluorooctane sulfonic acid



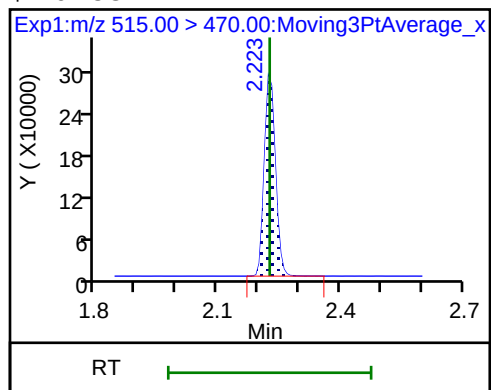
8 Perfluorooctane sulfonic acid

* 7 13C4 PFOS

9 Perfluorononanoic acid



\$ 10 13C2 PFDA



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: ICV 320-237363/10 Calibration Date: 08/01/2018 02:30
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.07.31_537CURVEA_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	1.287	1.128		87.8	100	-12.3	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	0.997		8.93	10.0	-10.7	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.607		18.4	20.2	-8.5	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	0.8804		16.6	20.2	-17.9	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	0.9637		17.8	20.2	-11.8	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.7462		18.8	20.2	-6.9	30.0
13C2 PFHxA	Ave	1.138	1.073		9.43	10.0	-5.7	30.0
13C2 PFDA	Ave	0.6206	0.6210		10.0	10.0	0.0	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_012.d
 Lims ID: ICV
 Client ID:
 Sample Type: ICV
 Inject. Date: 01-Aug-2018 02:30:17 ALS Bottle#: 7 Worklist Smp#: 10
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: ICV
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist:

Method: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 02-Aug-2018 10:22:23 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK022

First Level Reviewer: barnettj

Date: 01-Aug-2018 12:02:21

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	9529735	87.8		5624	
298.90 > 99.00	1.350	1.350	0.0	1.000	6620616		1.44(0.00-0.00)	12953	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.466	-0.002	1.000	919466	9.43		13255	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.601	1.602	-0.001	1.000	2734346	18.4		2225	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.601	1.602	-0.001	1.000	854150	8.93		55.2	
* 6 13C2-PFOA									
415.00 > 370.00	1.775	1.777	-0.002		856625	10.0		9643	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.775	1.777	-0.002	1.000	1520906	16.6		242	
413.00 > 169.00	1.775	1.777	-0.002	1.000	816383		1.86(0.00-0.00)	2150	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.018	2.018	0.0	1.000	1640513	17.8		1031	
499.00 > 99.00	2.018	2.018	0.0	1.000	324286		5.06(0.00-0.00)	390	
* 7 13C4 PFOS									
503.00 > 80.00	2.018	2.021	-0.003		2420430	28.7		1486	
9 Perfluorononanoic acid									
463.00 > 419.00	2.026	2.032	-0.006	1.000	1288845	18.8		37.3	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.223	2.226	-0.003	1.000	531980	10.0		7429	

Reagents:

LC537-ICV_00032

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_012.d

Injection Date: 01-Aug-2018 02:30:17

Instrument ID: A8_N

Lims ID: ICV

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 7

Worklist Smp#: 10

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

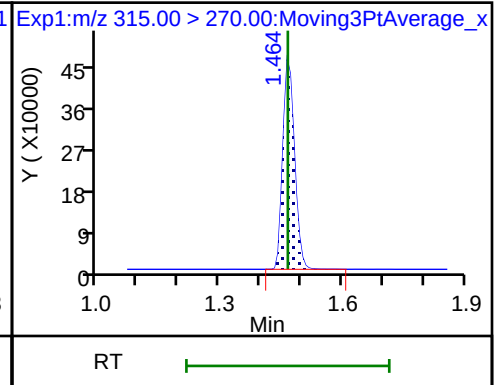
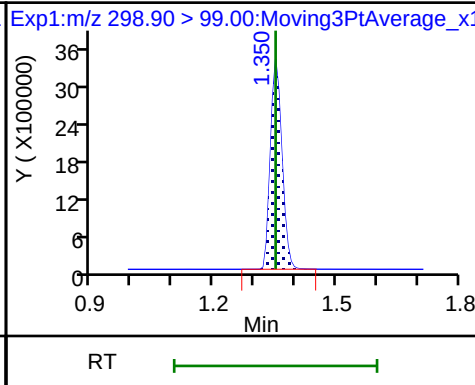
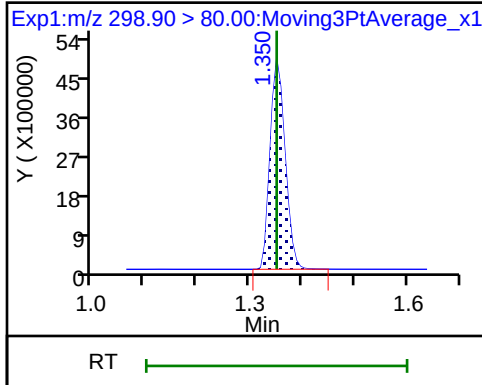
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

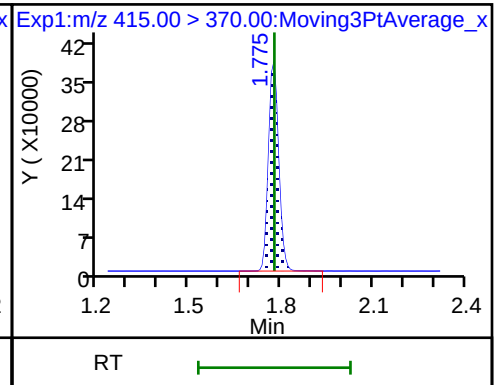
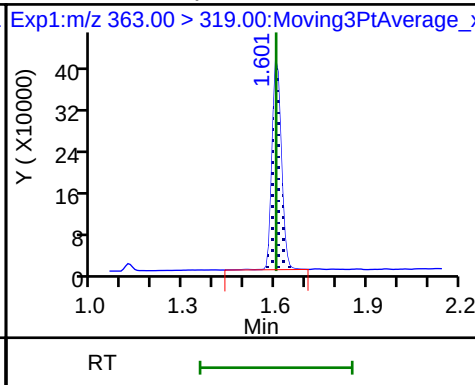
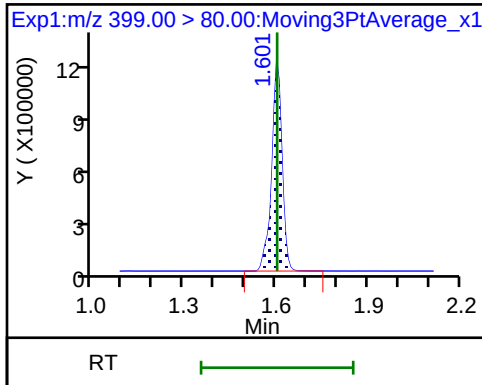
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

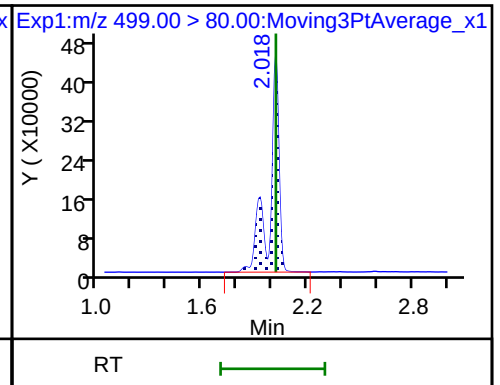
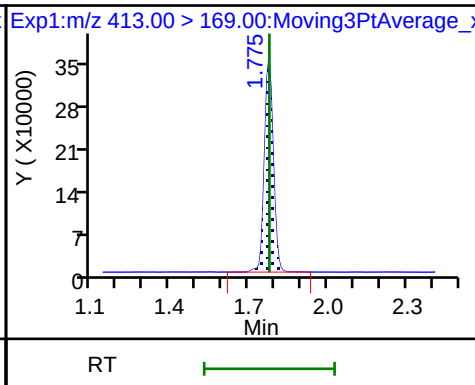
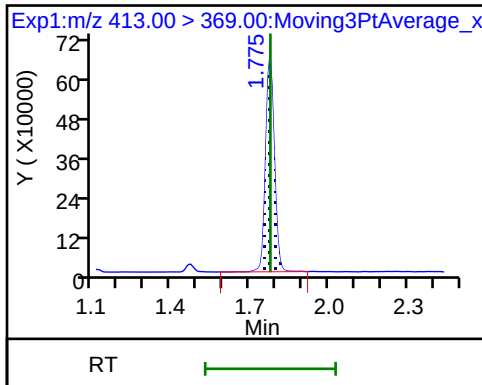
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

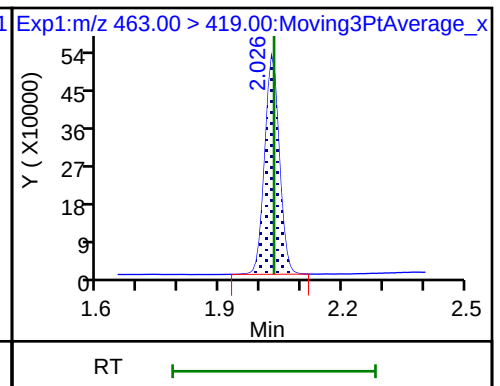
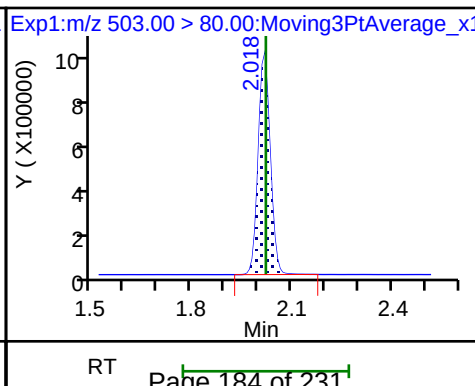
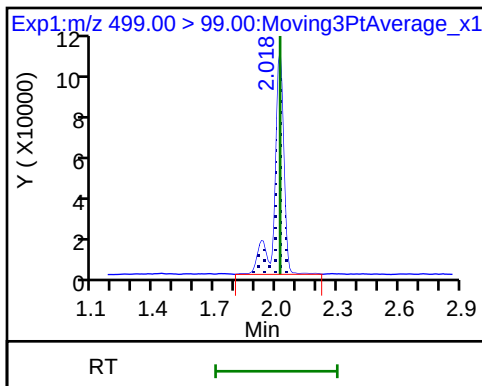
8 Perfluorooctane sulfonic acid



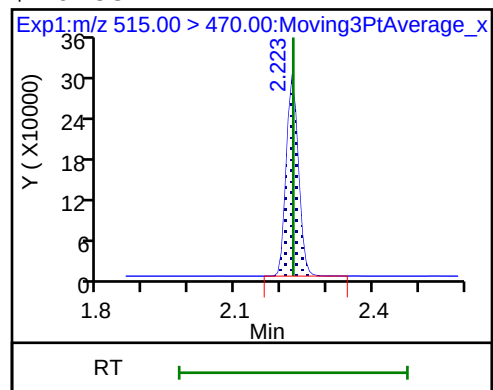
8 Perfluorooctane sulfonic acid

* 7 13C4 PFOS

9 Perfluorononanoic acid



\$ 10 13C2 PFDA



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-238066/1 Calibration Date: 08/05/2018 15:35
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.04_537A_003.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.315		20.4	20.0	2.2	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.604		6.14	6.72	-8.7	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.147		2.22	2.16	2.7	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.028		4.22	4.40	-4.1	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.049		8.43	8.79	-4.0	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.7729		4.24	4.40	-3.5	50.0
13C2 PFHxA	Ave	1.138	1.169		10.3	10.0	2.6	30.0
13C2 PFDA	Ave	0.6206	0.6328		10.2	10.0	2.0	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62172.b\2018.08.04_537A_003.d
 Lims ID: CCVL
 Client ID:
 Sample Type: CCVL
 Inject. Date: 05-Aug-2018 15:35:50 ALS Bottle#: 2 Worklist Smp#: 1
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: CCVL
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62172.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 10:43:14 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
 Column 1 : Det: EXP1
 Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 10:37:15

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.358	1.343	0.015	1.000	2232054	20.4		3098	
298.90 > 99.00	1.350	1.343	0.007	0.994	1499910		1.49(0.00-0.00)	2702	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.472	1.457	0.015	1.000	1003800	10.3		11685	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.601	1.593	0.008	1.000	914665	6.14		722	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.608	1.593	0.015	1.000	212840	2.22		19.1	
* 6 13C2-PFOA									
415.00 > 370.00	1.775	1.760	0.015		859047	10.0		10736	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.775	1.760	0.015	1.000	388658	4.22		57.5	
413.00 > 169.00	1.775	1.760	0.015	1.000	205339		1.89(0.00-0.00)	702	
* 7 13C4 PFOS									
503.00 > 80.00	2.018	1.995	0.023		2433121	28.7		2860	
9 Perfluorononanoic acid									
463.00 > 419.00	2.026	2.003	0.023	1.000	292132	4.24		40.5	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.018	2.018	0.0	1.000	781630	8.43		955	
499.00 > 99.00	2.011	2.018	-0.007	0.996	174745		4.47(0.00-0.00)	252	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.223	2.208	0.015	1.000	543592	10.2		8861	

Reagents:

LC537-L2_00022

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62172.b\2018.08.04_537A_003.d

Injection Date: 05-Aug-2018 15:35:50

Instrument ID: A8_N

Lims ID: CCVL

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 2

Worklist Smp#: 1

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

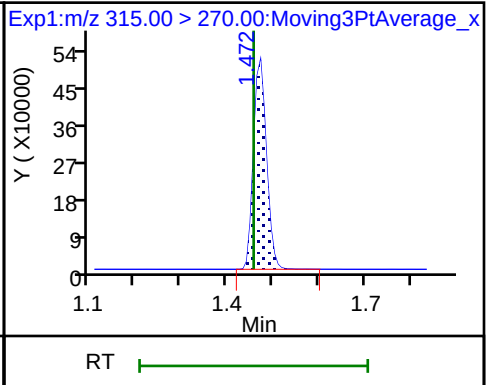
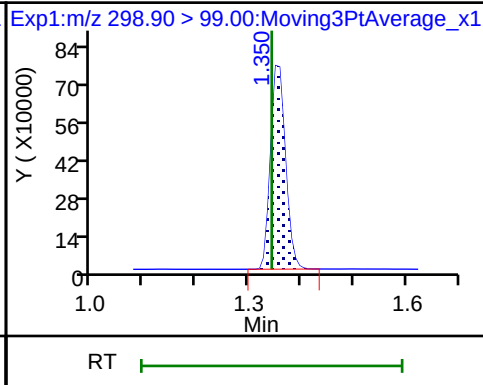
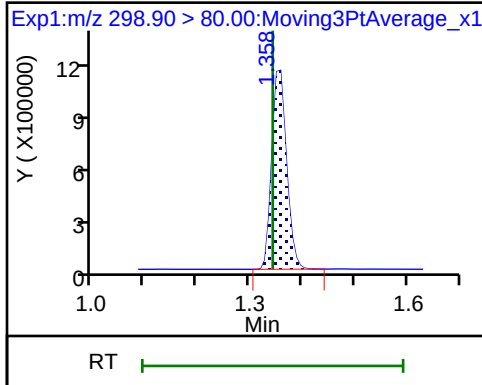
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

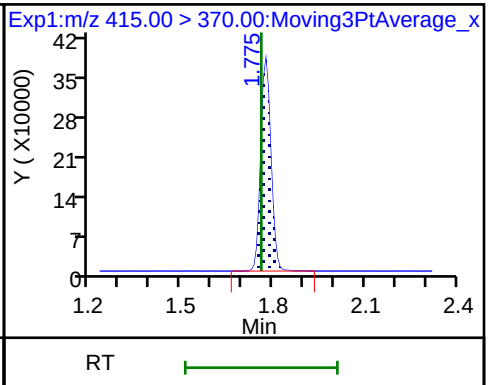
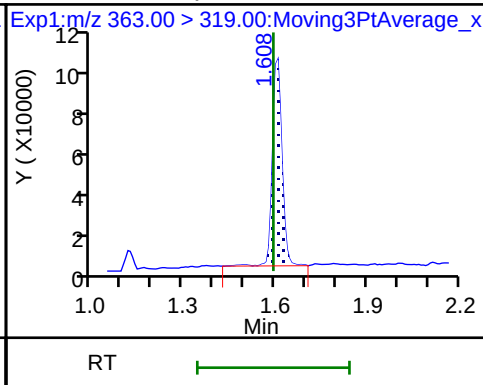
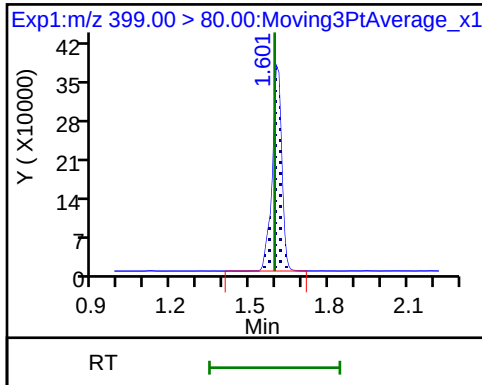
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

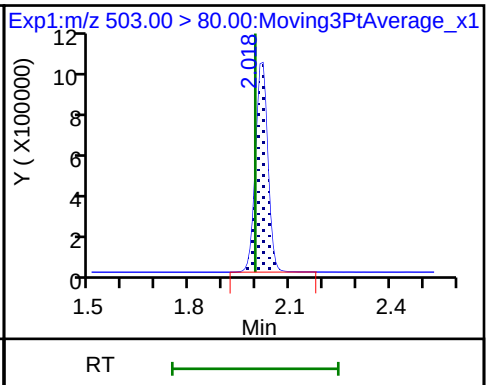
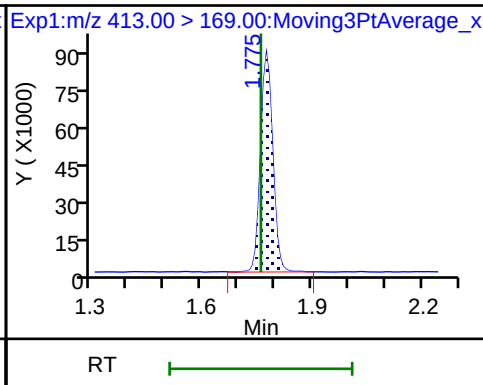
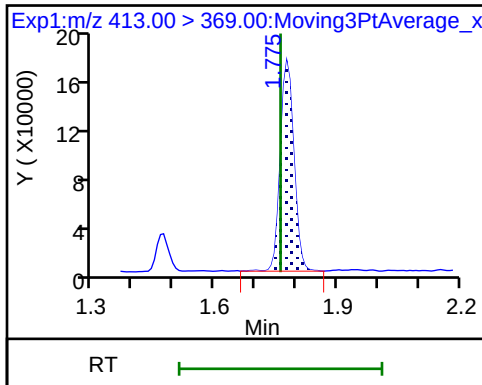
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

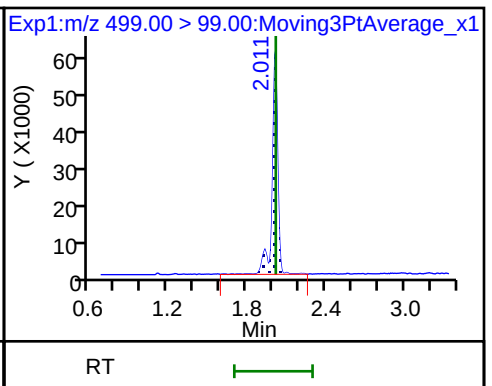
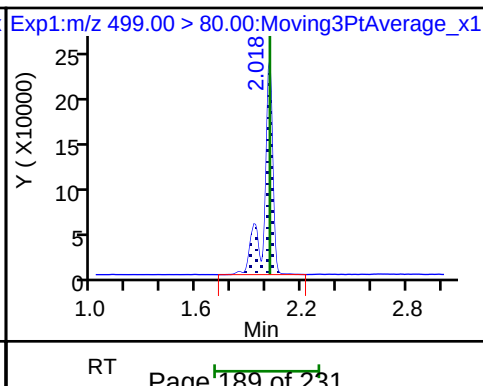
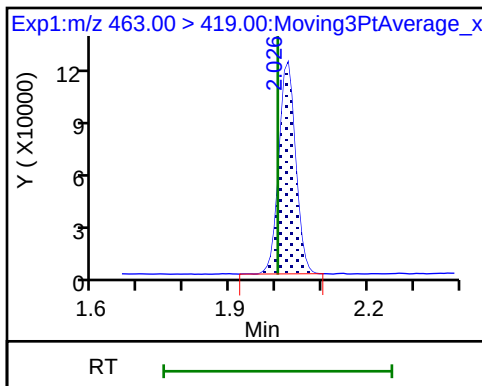
* 7 13C4 PFOS



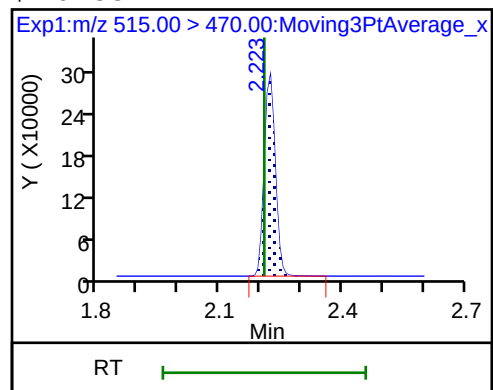
9 Perfluorononanoic acid

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCV 320-238080/1 Calibration Date: 08/05/2018 20:21
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.05_537A_005.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.163		122	135	-9.6	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.742		45.0	45.4	-0.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.094		14.3	14.6	-2.0	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.059		29.3	29.7	-1.2	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.091		59.2	59.3	-0.2	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.7839		29.1	29.7	-2.2	30.0
13C2 PFHxA	Ave	1.138	1.188		10.4	10.0	4.4	30.0
13C2 PFDA	Ave	0.6206	0.6424		10.4	10.0	3.5	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_005.d
 Lims ID: CCV L5
 Client ID:
 Sample Type: CCVIS
 Inject. Date: 05-Aug-2018 20:21:20 ALS Bottle#: 5 Worklist Smp#: 1
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: CCV L5
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	13937978	122.1		12207	
298.90 > 99.00	1.350	1.350	0.0	1.000	9707491		1.44(0.00-0.00)	15021	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.464	0.0	1.000	1048975	10.4		13879	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.593	1.593	0.0	1.000	7010541	45.0		4097	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.601	1.601	0.0	1.000	1408936	14.3		122	
* 6 13C2-PFOA									
415.00 > 370.00	1.760	1.760	0.0		882956	10.0		8124	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.760	1.760	0.0	1.000	2777959	29.3		358	
413.00 > 169.00	1.760	1.760	0.0	1.000	1535538		1.81(0.00-0.00)	5651	
* 7 13C4 PFOS									
503.00 > 80.00	1.995	1.995	0.0		2543401	28.7		3170	
9 Perfluorononanoic acid									
463.00 > 419.00	2.003	2.003	0.0	1.000	2055555	29.1		197	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.995	2.018	-0.023	1.000	5735917	59.2		6281	
499.00 > 99.00	1.995	2.018	-0.023	1.000	1248487		4.59(0.00-0.00)	1767	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.208	2.208	0.0	1.000	567245	10.4		7937	

Reagents:

LC537-L5_00026

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_005.d

Injection Date: 05-Aug-2018 20:21:20

Instrument ID: A8_N

Lims ID: CCV L5

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 5

Worklist Smp#: 1

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

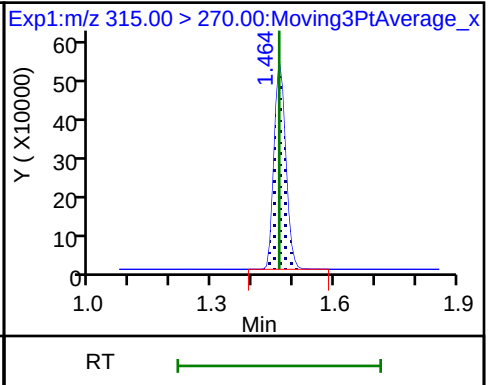
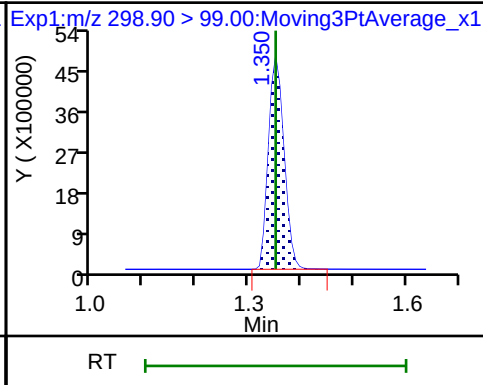
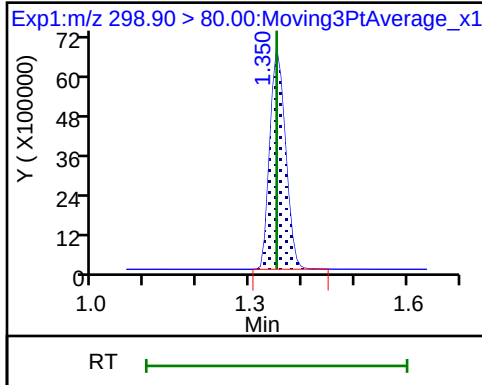
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

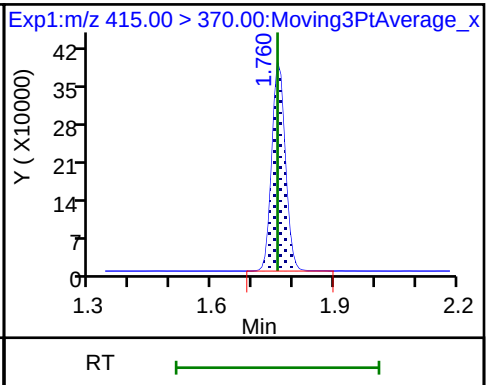
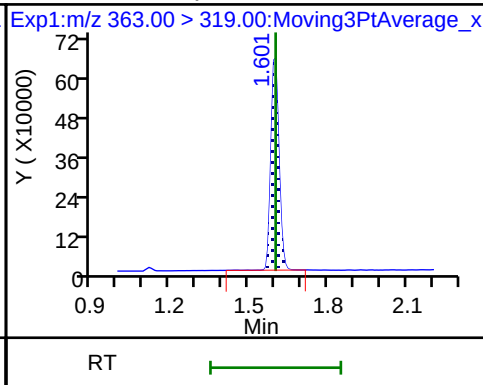
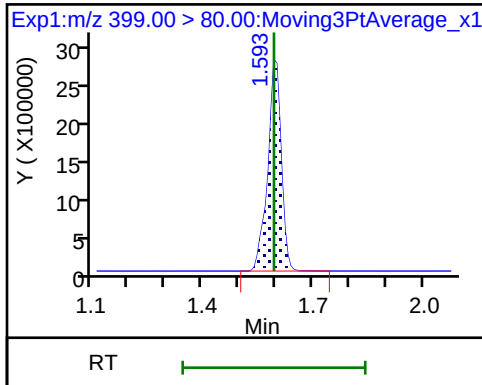
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

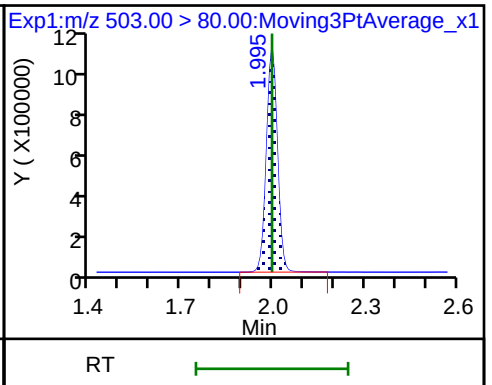
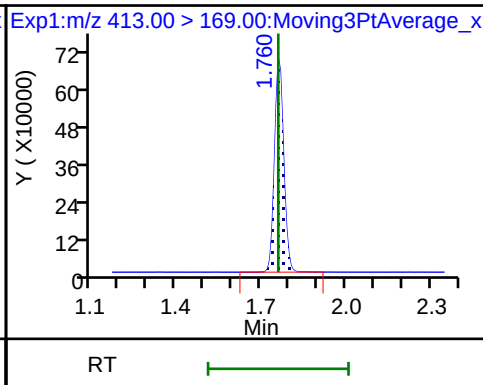
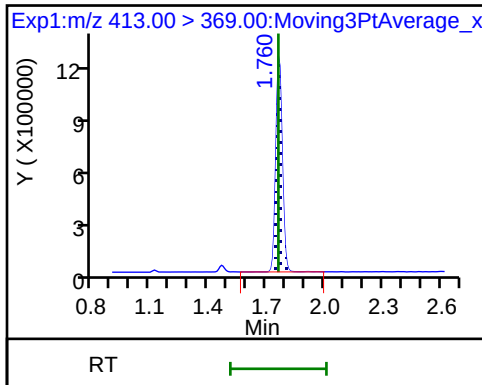
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

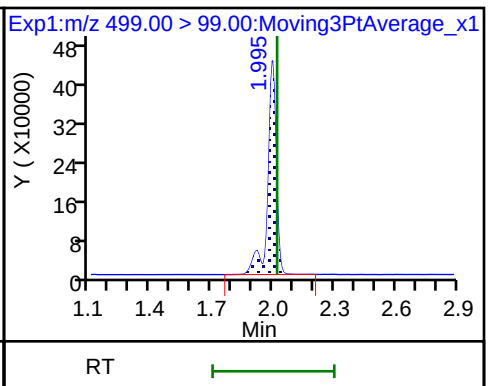
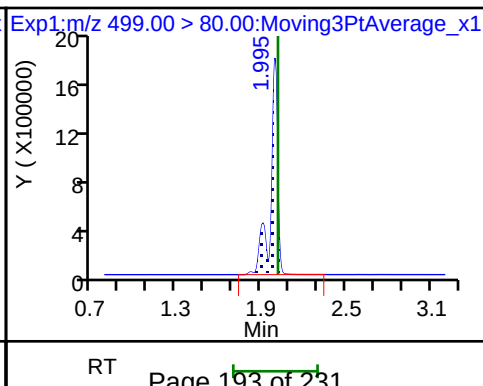
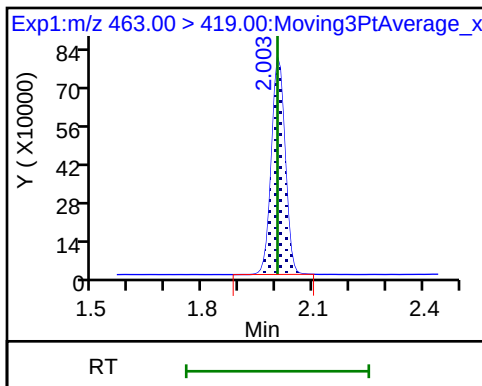
* 7 13C4 PFOS



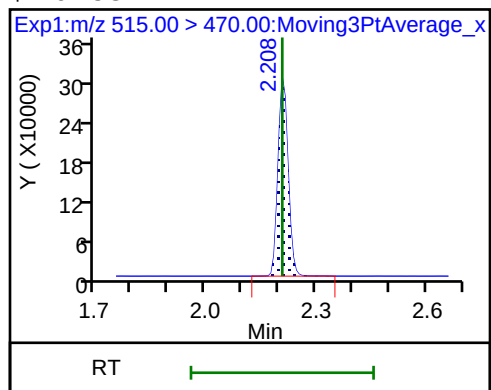
9 Perfluorononanoic acid

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCV 320-238080/13 Calibration Date: 08/05/2018 21:17
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.05_537A_017.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.388		48.6	45.0	7.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.157		5.03	4.86	3.6	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.781		15.3	15.1	1.4	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.087		10.0	9.90	1.4	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.077		19.5	19.8	-1.4	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.8027		9.92	9.90	0.2	30.0
13C2 PFHxA	Ave	1.138	1.174		10.3	10.0	3.1	30.0
13C2 PFDA	Ave	0.6206	0.6362		10.3	10.0	2.5	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCV 320-238082/13 Calibration Date: 08/05/2018 21:17
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.05_537A_017.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.388		48.6	45.0	7.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.157		5.03	4.86	3.6	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.781		15.3	15.1	1.4	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.087		10.0	9.90	1.4	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.077		19.5	19.8	-1.4	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.8027		9.92	9.90	0.2	30.0
13C2 PFHxA	Ave	1.138	1.174		10.3	10.0	3.1	30.0
13C2 PFDA	Ave	0.6206	0.6362		10.3	10.0	2.5	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_017.d
 Lims ID: CCV L3
 Client ID:
 Sample Type: CCVIS
 Inject. Date: 05-Aug-2018 21:17:31 ALS Bottle#: 3 Worklist Smp#: 13
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: CCV L3
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:42:08 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.343	1.343	0.0	1.000	5466465	48.6		6967	
298.90 > 99.00	1.343	1.343	0.0	1.000	3648376		1.50(0.00-0.00)	8380	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.457	1.457	0.0	1.000	1063532	10.3		14724	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.586	1.586	0.0	1.000	2356757	15.3		1534	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.586	1.586	0.0	1.000	509406	5.03		41.7	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.753	0.0		905788	10.0		8951	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.753	1.753	0.0	1.000	974878	10.0		126	
413.00 > 169.00	1.753	1.753	0.0	1.000	489098		1.99(0.00-0.00)	2287	
* 7 13C4 PFOS									
503.00 > 80.00	1.980	1.980	0.0		2508704	28.7		3166	
9 Perfluorononanoic acid									
463.00 > 419.00	1.995	1.995	0.0	1.000	719834	9.92		65.3	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.988	2.018	-0.030	1.000	1862975	19.5		2159	
499.00 > 99.00	1.980	2.018	-0.038	0.996	396072		4.70(0.00-0.00)	524	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.200	0.0	1.000	576299	10.3		10835	

Reagents:

LC537-L3_00025

Amount Added: 1.00

Units: mL

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_017.d
 Lims ID: CCV L3
 Client ID:
 Sample Type: CCVIS
 Inject. Date: 05-Aug-2018 21:17:31 ALS Bottle#: 3 Worklist Smp#: 13
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: CCV L3
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:42:08 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.343	1.343	0.0	1.000	5466465	48.6		6967	
298.90 > 99.00	1.343	1.343	0.0	1.000	3648376		1.50(0.00-0.00)	8380	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.457	1.457	0.0	1.000	1063532	10.3		14724	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.586	1.586	0.0	1.000	2356757	15.3		1534	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.586	1.586	0.0	1.000	509406	5.03		41.7	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.753	0.0		905788	10.0		8951	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.753	1.753	0.0	1.000	974878	10.0		126	
413.00 > 169.00	1.753	1.753	0.0	1.000	489098		1.99(0.00-0.00)	2287	
* 7 13C4 PFOS									
503.00 > 80.00	1.980	1.980	0.0		2508704	28.7		3166	
9 Perfluorononanoic acid									
463.00 > 419.00	1.995	1.995	0.0	1.000	719834	9.92		65.3	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.988	2.018	-0.030	1.000	1862975	19.5		2159	
499.00 > 99.00	1.980	2.018	-0.038	0.996	396072		4.70(0.00-0.00)	524	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.200	0.0	1.000	576299	10.3		10835	

Reagents:

LC537-L3_00025

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_017.d

Injection Date: 05-Aug-2018 21:17:31

Instrument ID: A8_N

Lims ID: CCV L3

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 3

Worklist Smp#: 13

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

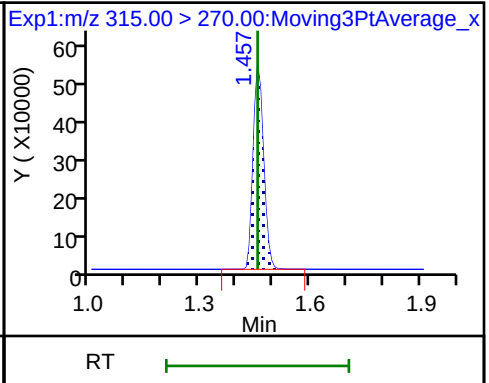
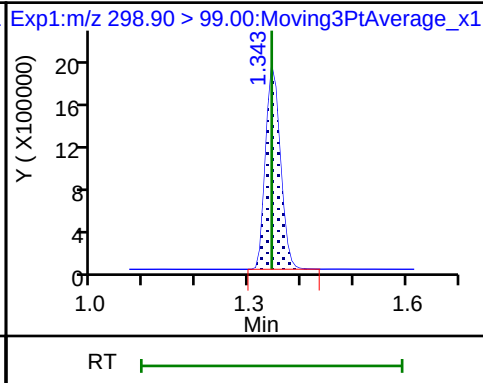
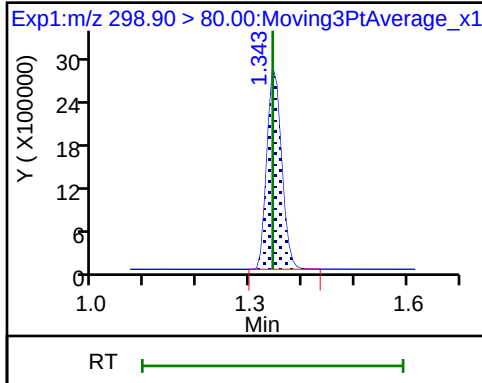
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

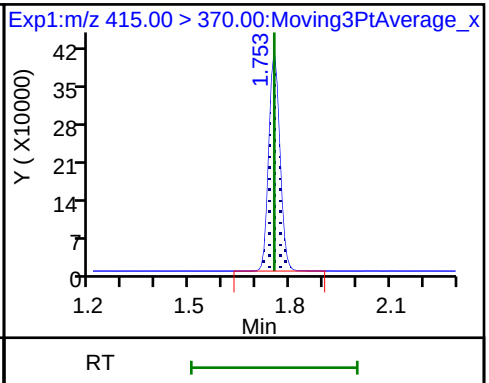
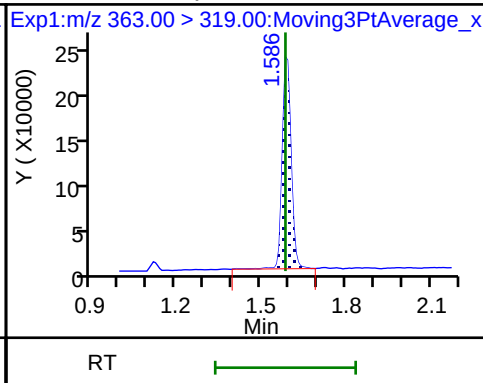
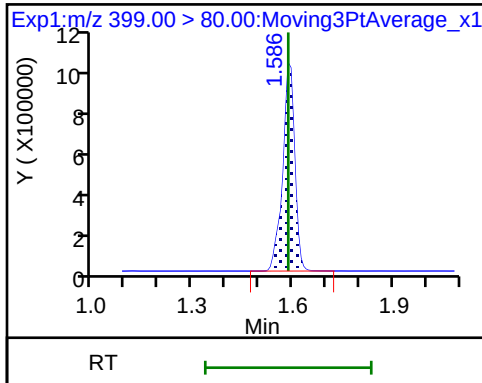
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

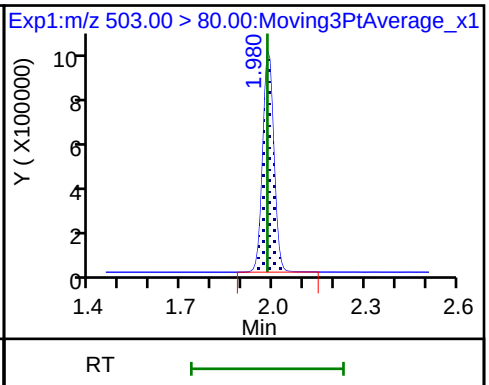
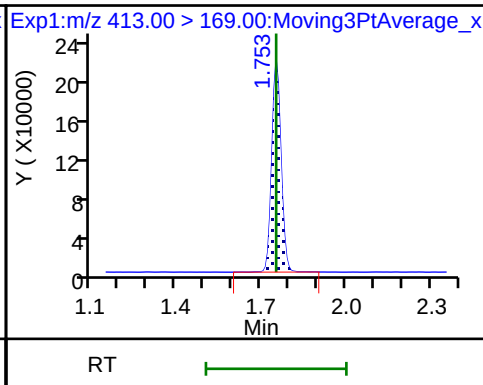
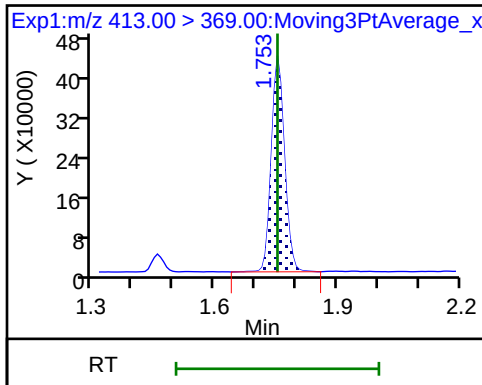
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

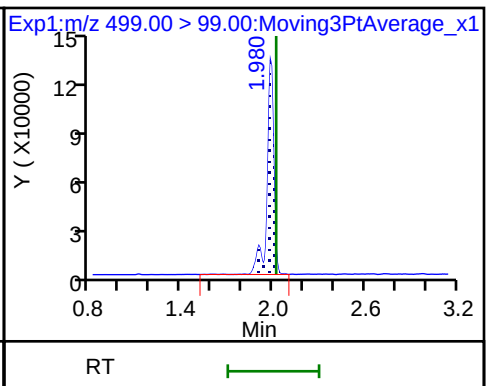
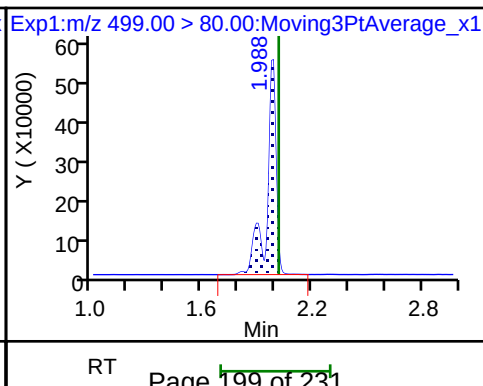
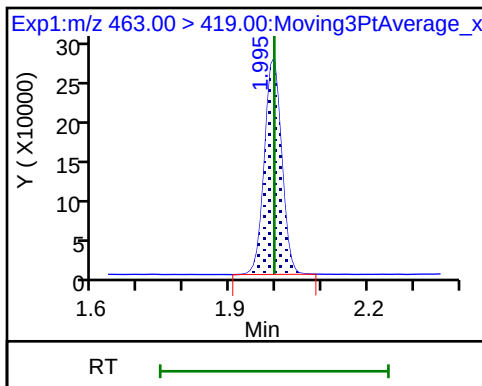
* 7 13C4 PFOS



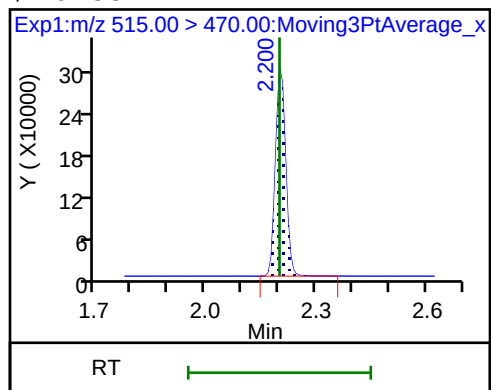
9 Perfluorononanoic acid

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_017.d

Injection Date: 05-Aug-2018 21:17:31

Instrument ID: A8_N

Lims ID: CCV L3

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 3

Worklist Smp#: 13

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

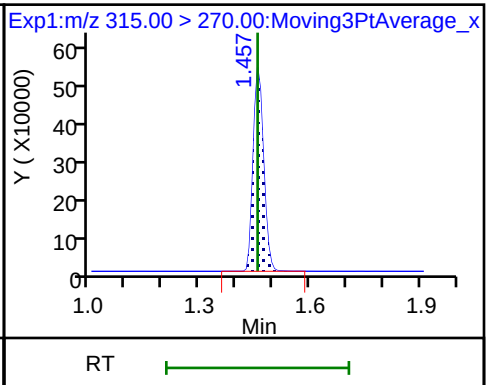
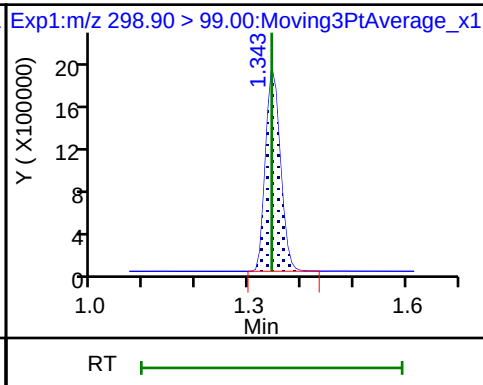
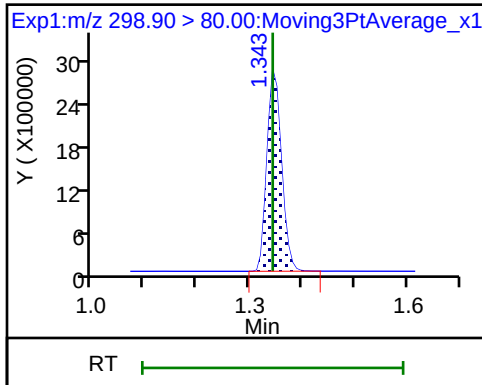
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

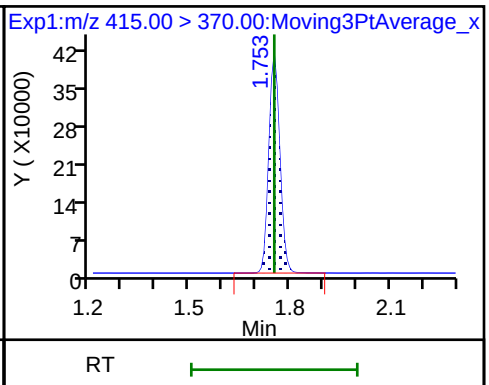
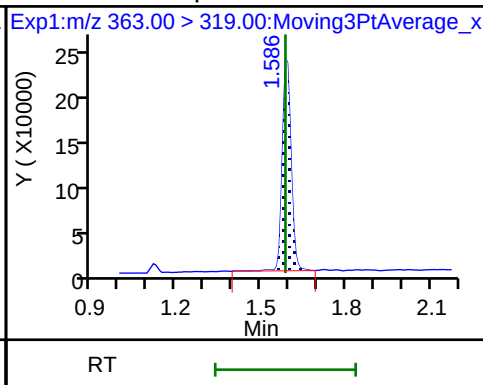
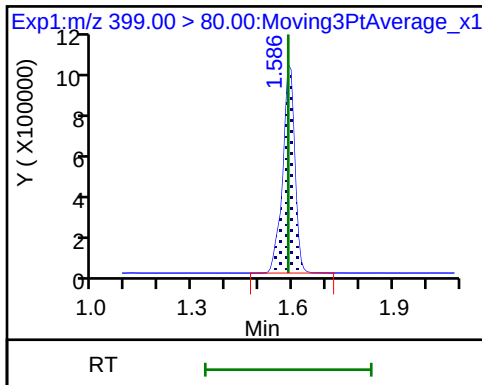
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

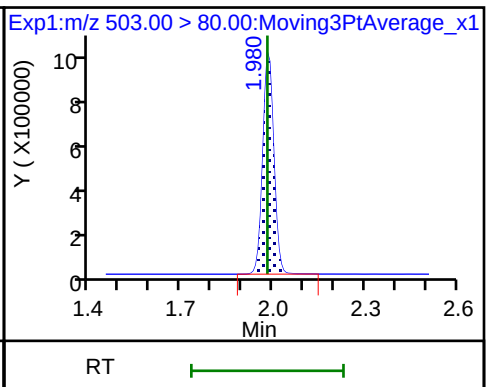
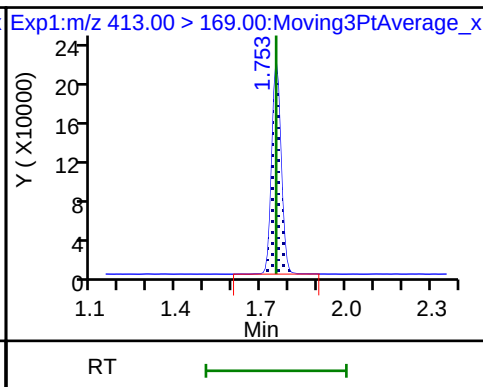
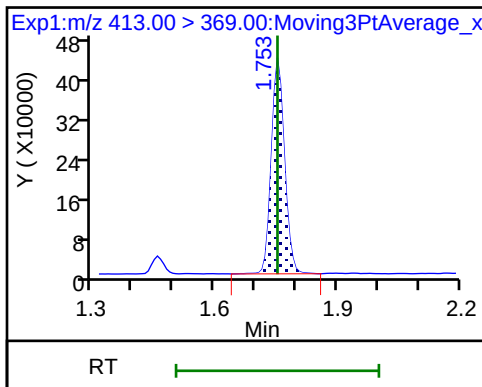
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

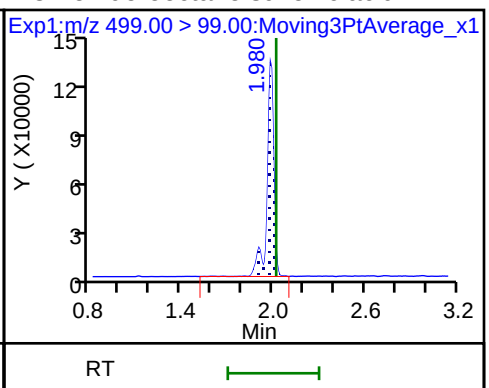
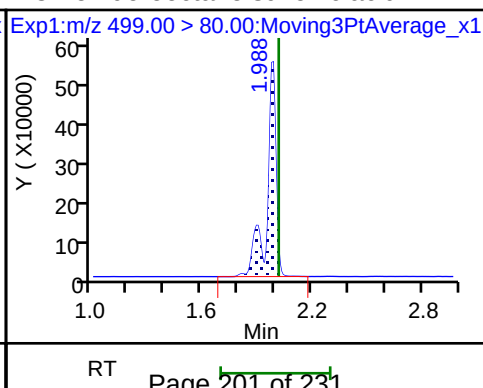
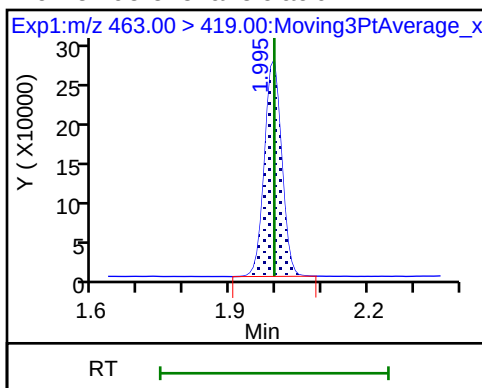
* 7 13C4 PFOS



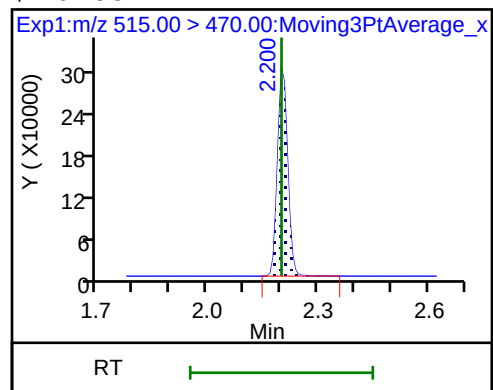
9 Perfluorononanoic acid

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCV 320-238082/25 Calibration Date: 08/05/2018 22:13
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.05_537A_029.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.180		124	135	-8.3	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.182		15.4	14.6	5.8	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.811		46.8	45.4	3.1	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.112		30.8	29.7	3.7	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.127		61.2	59.3	3.2	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.8025		29.7	29.7	0.2	30.0
13C2 PFHxA	Ave	1.138	1.246		10.9	10.0	9.5	30.0
13C2 PFDA	Ave	0.6206	0.6692		10.8	10.0	7.8	30.0

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_029.d
 Lims ID: CCV L5
 Client ID:
 Sample Type: CCVIS
 Inject. Date: 05-Aug-2018 22:13:39 ALS Bottle#: 5 Worklist Smp#: 25
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: CCV L5
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:54:33 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
 Column 1 : Det: EXP1
 Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:54:09

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	12715455	123.8		12147	
298.90 > 99.00	1.350	1.350	0.0	1.000	9158178		1.39(0.00-0.00)	14805	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.464	0.0	1.000	1002774	10.9		13283	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.593	1.593	0.0	1.000	6557826	46.8		4116	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.593	1.593	0.0	1.000	1386039	15.4		120	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.753	0.0		804484	10.0		9939	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.753	1.753	0.0	1.000	2657672	30.8		330	
413.00 > 169.00	1.753	1.753	0.0	1.000	1398618		1.90(0.00-0.00)	6778	
* 7 13C4 PFOS									
503.00 > 80.00	1.980	1.980	0.0		2288548	28.7		3187	
9 Perfluorononanoic acid									
463.00 > 419.00	1.988	1.988	0.0	1.000	1917531	29.7		169	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.980	2.018	-0.038	1.000	5333227	61.2		5966	
499.00 > 99.00	1.980	2.018	-0.038	1.000	1133586		4.70(0.00-0.00)	1498	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.200	0.0	1.000	538394	10.8		7471	

Reagents:

LC537-L5_00026

Amount Added: 1.00

Units: mL

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_029.d

Injection Date: 05-Aug-2018 22:13:39

Instrument ID: A8_N

Lims ID: CCV L5

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 5

Worklist Smp#: 25

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

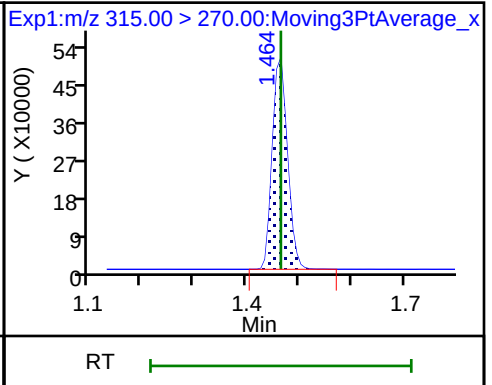
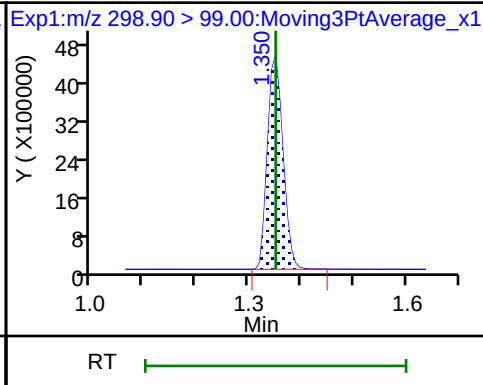
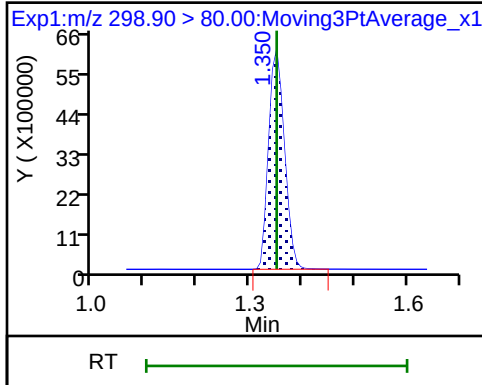
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

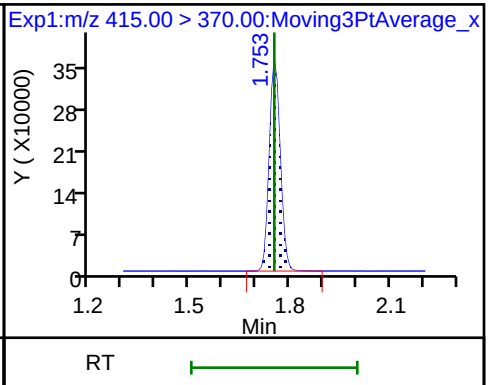
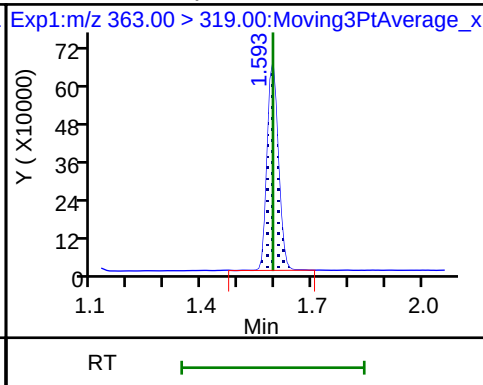
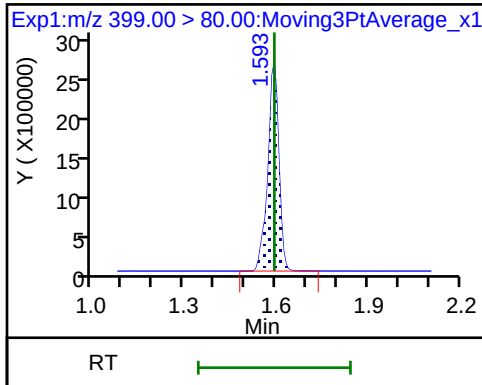
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

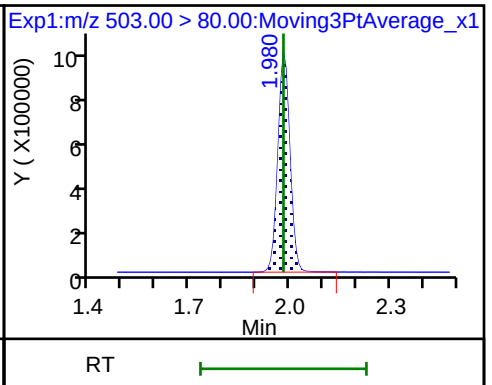
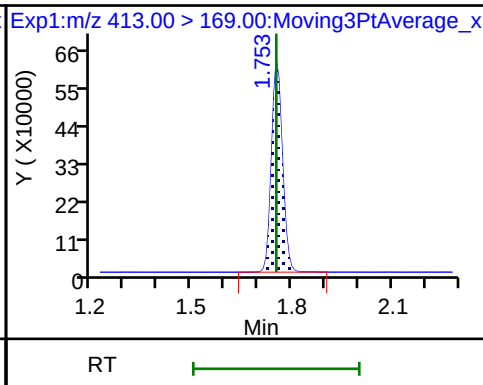
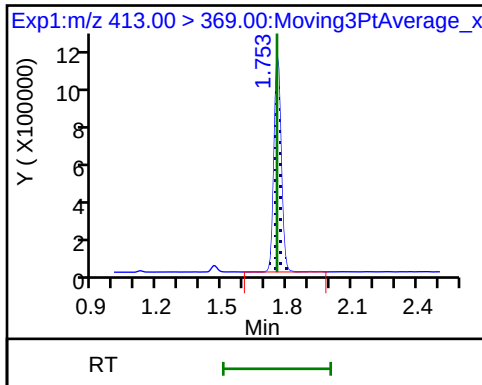
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

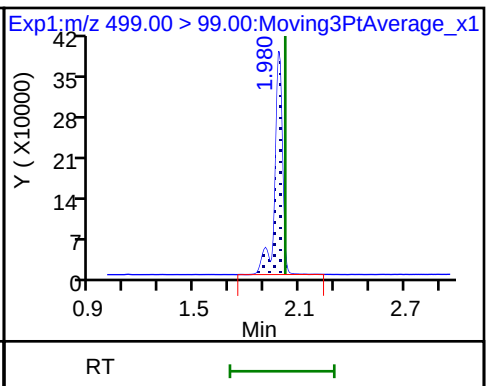
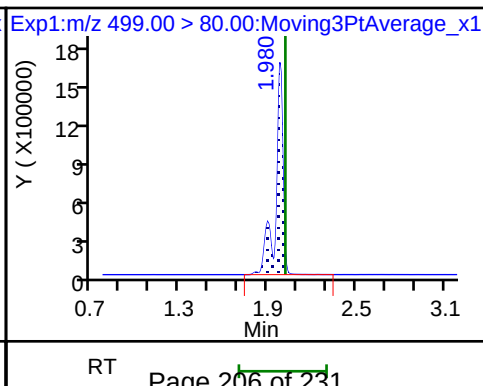
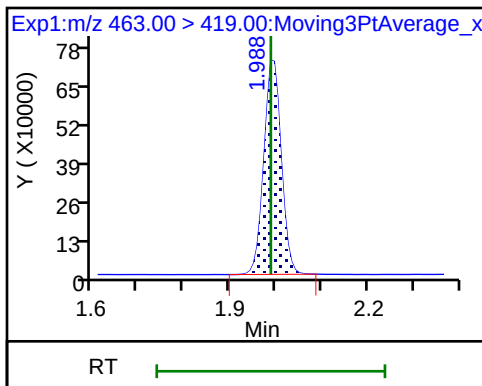
* 7 13C4 PFOS



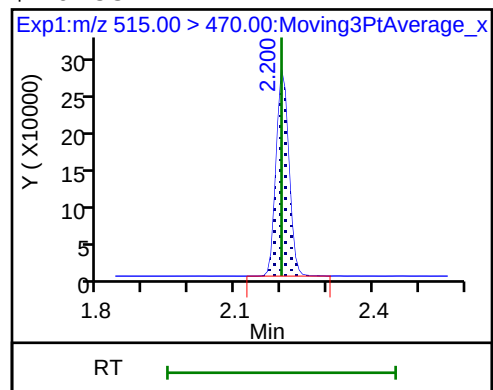
9 Perfluorononanoic acid

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: MB 320-237511/1-A
 Matrix: Water Lab File ID: 2018.08.05_537A_007.d
 Analysis Method: 537 Date Collected: _____
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 250 (mL) Date Analyzed: 08/05/2018 20:30
 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.: 238080 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	95		70-130
STL00996	13C2 PFDA	108		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_007.d
 Lims ID: MB 320-237511/1-A
 Client ID:
 Sample Type: MB
 Inject. Date: 05-Aug-2018 20:30:39 ALS Bottle#: 1 Worklist Smp#: 3
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: mb 320-237511/1-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.464	0.0	1.000	1034030	9.46		13547	
* 6 13C2-PFOA									
415.00 > 370.00	1.760	1.760	0.0		960279	10.0		10359	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.995	-0.007		2736351	28.7		3237	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.208	2.208	0.0	1.000	643442	10.8		9311	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_007.d

Injection Date: 05-Aug-2018 20:30:39

Instrument ID: A8_N

Lims ID: MB 320-237511/1-A

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 1

Worklist Smp#: 3

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

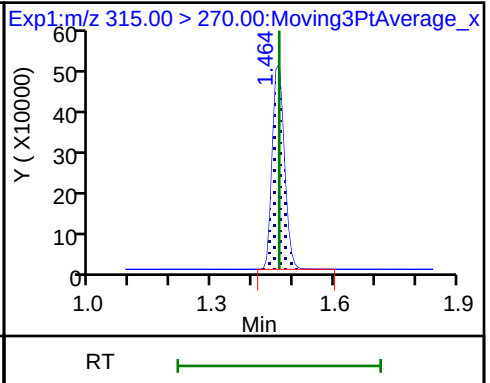
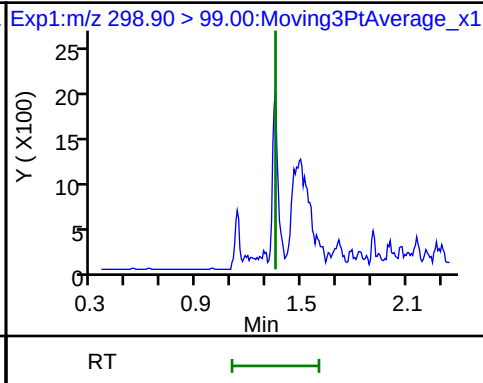
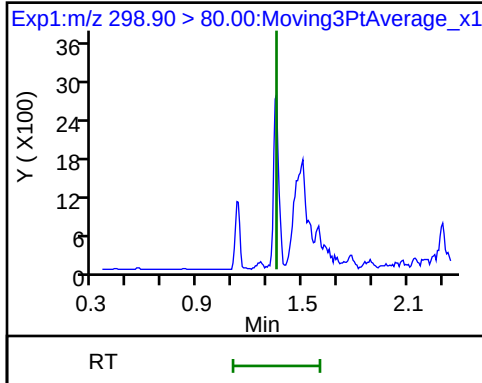
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid (ND)

1 Perfluorobutanesulfonic acid (ND)

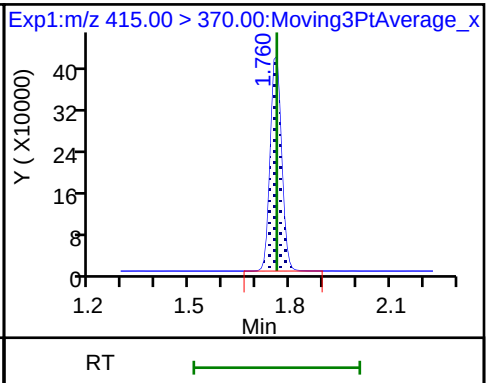
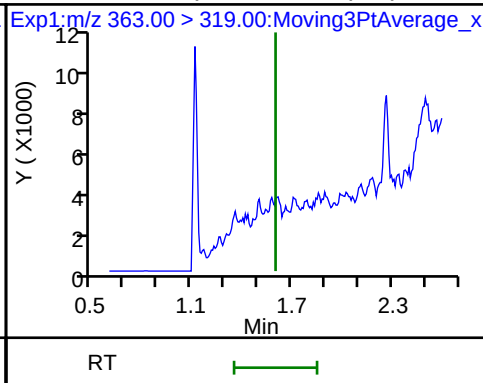
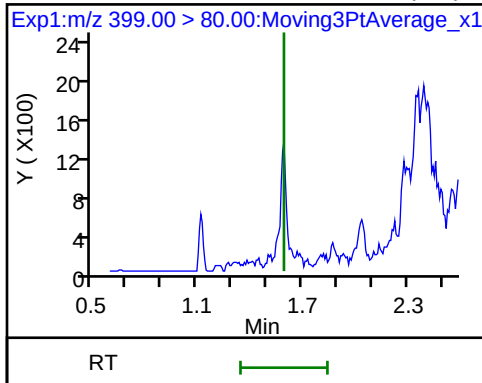
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid (ND)

4 Perfluoroheptanoic acid (ND)

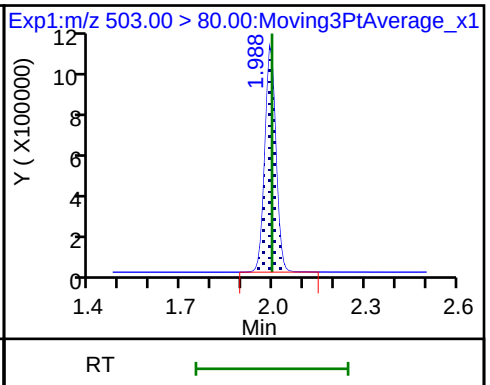
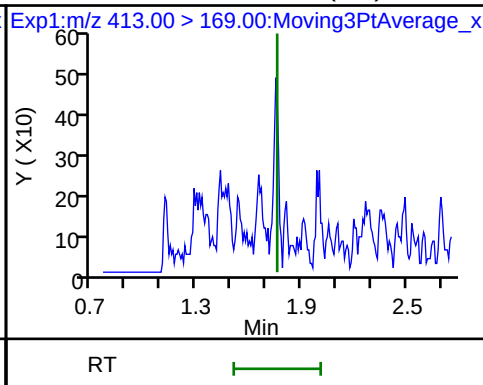
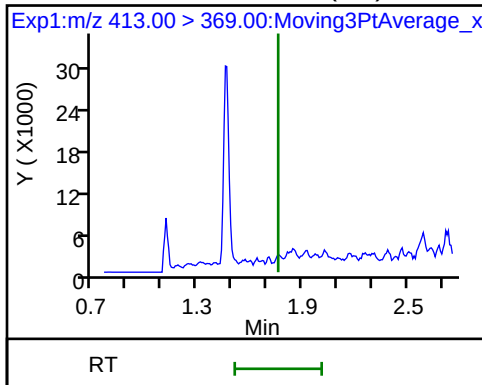
* 6 13C2-PFOA



5 Perfluorooctanoic acid (ND)

5 Perfluorooctanoic acid (ND)

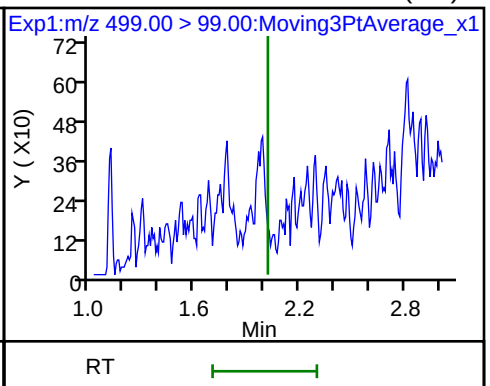
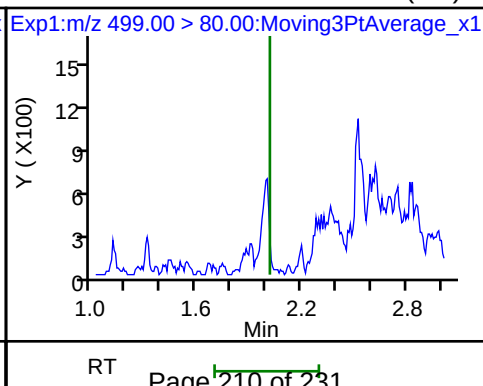
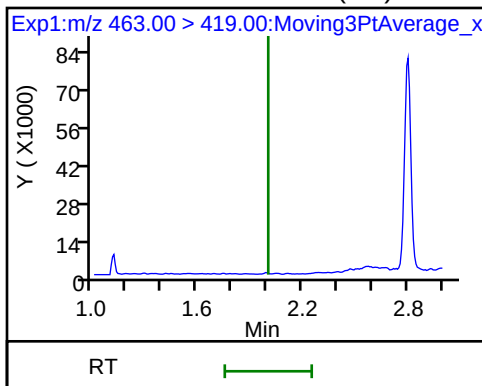
* 7 13C4 PFOS



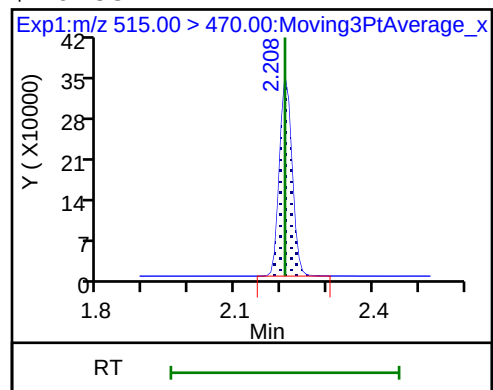
9 Perfluorononanoic acid (ND)

8 Perfluorooctane sulfonic acid (ND)

8 Perfluorooctane sulfonic acid (ND)



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_007.d
Lims ID: MB 320-237511/1-A
Client ID:
Sample Type: MB
Inject. Date: 05-Aug-2018 20:30:39 ALS Bottle#: 1 Worklist Smp#: 3
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: mb 320-237511/1-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	9.46	94.59
\$ 10 13C2 PFDA	10.0	10.8	107.97

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: LLCS 320-237511/2-A
 Matrix: Water Lab File ID: 2018.08.05_537A_008.d
 Analysis Method: 537 Date Collected: _____
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 250 (mL) Date Analyzed: 08/05/2018 20:35
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	40.5		40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	18.4	J	20	8.0	2.8
375-95-1	Perfluorononanoic acid (PFNA)	17.7	J	24	20	8.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	30.9		30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	9.16	J	10	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	101		90	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	93		70-130
STL00996	13C2 PFDA	100		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_008.d
 Lims ID: LLCS 320-237511/2-A
 Client ID:
 Sample Type: LLCS
 Inject. Date: 05-Aug-2018 20:35:20 ALS Bottle#: 2 Worklist Smp#: 4
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: llcs 320-237511/2
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
 Column 1 : Det: EXP1
 Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:38:06

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.350	1.350	0.0	1.000	2617808	25.2		3418	
298.90 > 99.00	1.350	1.350	0.0	1.000	1734748		1.51(0.00-0.00)	4138	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.464	1.464	0.0	1.000	920835	9.35		12317	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.593	1.593	0.0	1.000	1093445	7.72		802	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.593	1.601	-0.008	1.000	221276	2.29		19.3	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		865247	10.0		9414	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.760	1.760	0.0	1.000	426544	4.60		53.3	
413.00 > 169.00	1.760	1.760	0.0	1.000	232282		1.84(0.00-0.00)	1041	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.995	-0.007		2312825	28.7		2798	
9 Perfluorononanoic acid									
463.00 > 419.00	1.995	2.003	-0.008	1.000	307163	4.43		19.3	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.988	2.018	-0.030	1.000	892843	10.1		1183	
499.00 > 99.00	1.988	2.018	-0.030	1.000	192534		4.64(0.00-0.00)	244	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.208	2.208	0.0	1.000	535198	9.97		7310	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_008.d

Injection Date: 05-Aug-2018 20:35:20

Instrument ID: A8_N

Lims ID: LLCS 320-237511/2-A

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 2

Worklist Smp#: 4

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

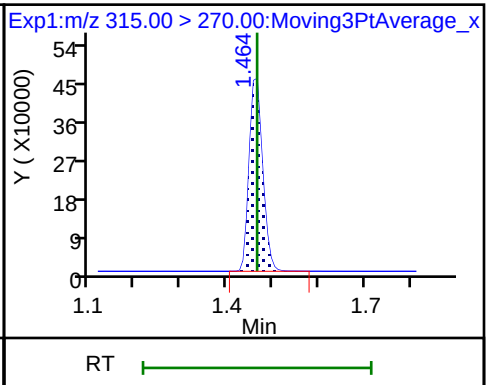
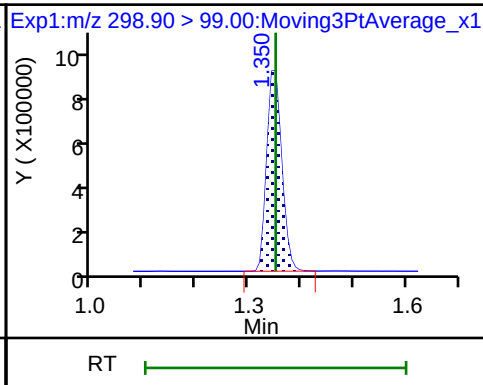
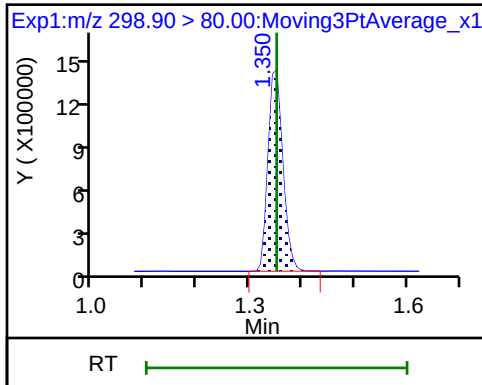
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

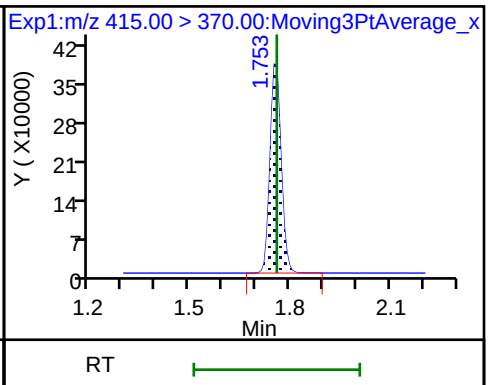
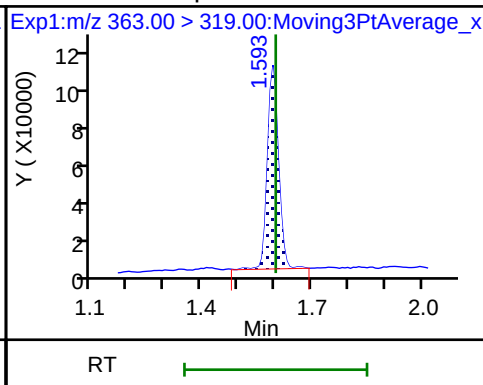
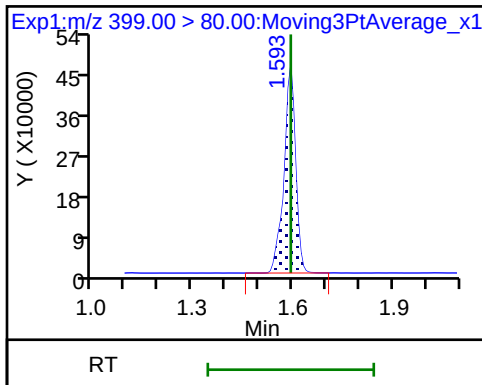
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

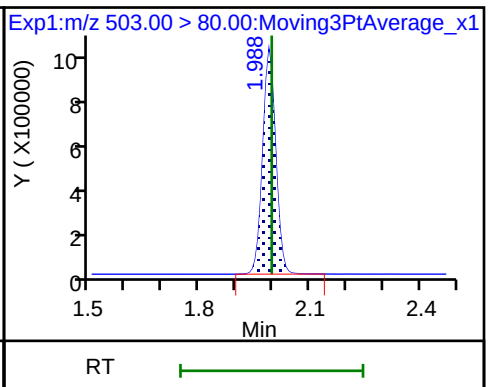
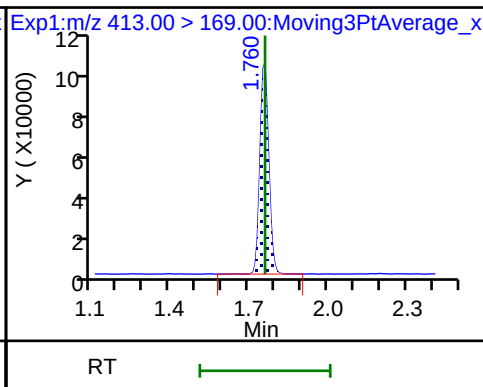
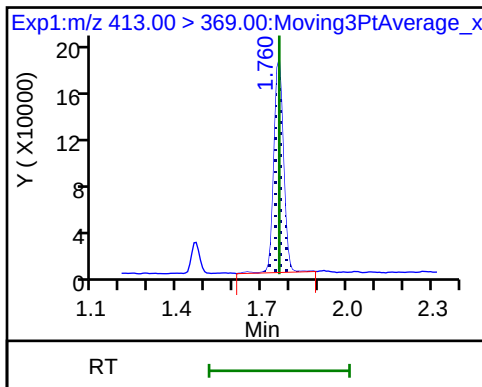
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

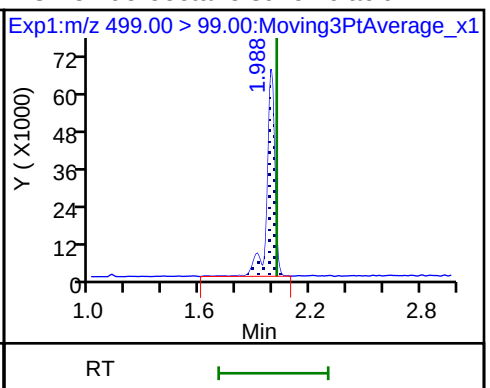
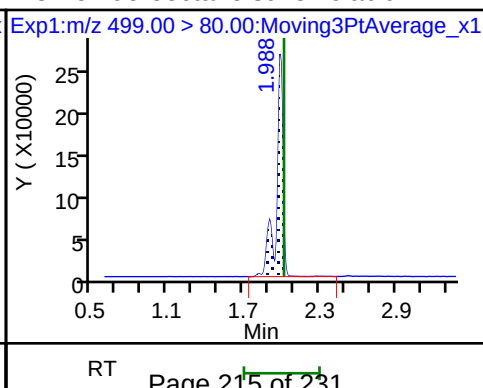
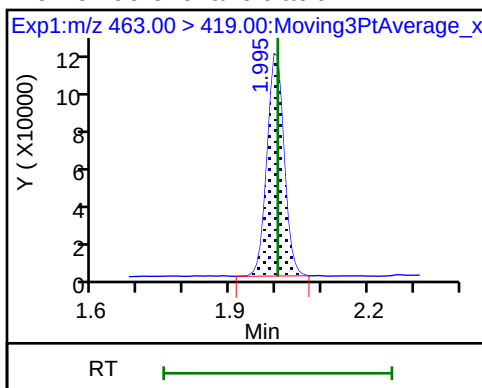
* 7 13C4 PFOS



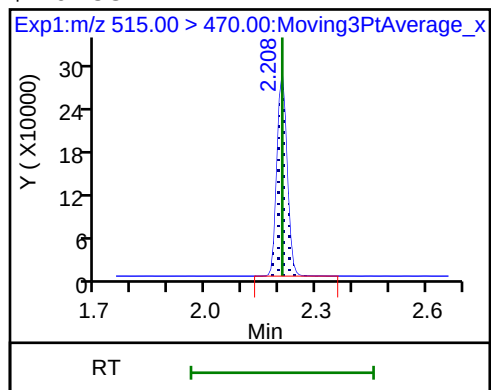
9 Perfluorononanoic acid

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_008.d
Lims ID: LLCS 320-237511/2-A
Client ID:
Sample Type: LLCS
Inject. Date: 05-Aug-2018 20:35:20 ALS Bottle#: 2 Worklist Smp#: 4
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: llcs 320-237511/2
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d
Column 1 : Det: EXP1
Process Host: XAWRK007

First Level Reviewer: barnettj

Date: 06-Aug-2018 13:38:06

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	9.35	93.48
\$ 10 13C2 PFDA	10.0	9.97	99.67

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: LLCSD 320-237511/3-A
 Matrix: Water Lab File ID: 2018.08.05_537A_009.d
 Analysis Method: 537 Date Collected: _____
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 250 (mL) Date Analyzed: 08/05/2018 20:40
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	39.0	J	40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	18.1	J	20	8.0	2.8
375-95-1	Perfluorononanoic acid (PFNA)	17.1	J	24	20	8.0
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	29.5	J	30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	9.06	J	10	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	89.7	J	90	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	92		70-130
STL00996	13C2 PFDA	100		70-130

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_009.d
 Lims ID: LLCSD 320-237511/3-A
 Client ID:
 Sample Type: LLCSD
 Inject. Date: 05-Aug-2018 20:40:03 ALS Bottle#: 3 Worklist Smp#: 5
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: llcsd 320-237511
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 : Det: EXP1

Process Host: XAWRK007

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.343	1.350	-0.007	1.000	2472829	22.4		3261	
298.90 > 99.00	1.343	1.350	-0.007	1.000	1703069		1.45(0.00-0.00)	4599	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.457	1.464	-0.007	1.000	944918	9.22		14979	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.593	1.593	0.0	1.000	1110115	7.38		709	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.593	1.601	-0.008	1.000	227691	2.26		18.7	
* 6 13C2-PFOA									
415.00 > 370.00	1.753	1.760	-0.007		900385	10.0		11623	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.753	1.760	-0.007	1.000	436116	4.52		55.1	
413.00 > 169.00	1.753	1.760	-0.007	1.000	233856		1.86(0.00-0.00)	1170	
* 7 13C4 PFOS									
503.00 > 80.00	1.988	1.995	-0.007		2457298	28.7		2995	
9 Perfluorononanoic acid									
463.00 > 419.00	1.995	2.003	-0.008	1.000	309199	4.29		23.3	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	1.988	2.018	-0.030	1.000	912016	9.74		1058	
499.00 > 99.00	1.988	2.018	-0.030	1.000	205732		4.43(0.00-0.00)	258	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.200	2.208	-0.008	1.000	560208	10.0		8180	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_009.d

Injection Date: 05-Aug-2018 20:40:03

Instrument ID: A8_N

Lims ID: LLCSD 320-237511/3-A

Client ID:

Operator ID: \SACINSTLCMS01@tai.com

ALS Bottle#: 3

Worklist Smp#: 5

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

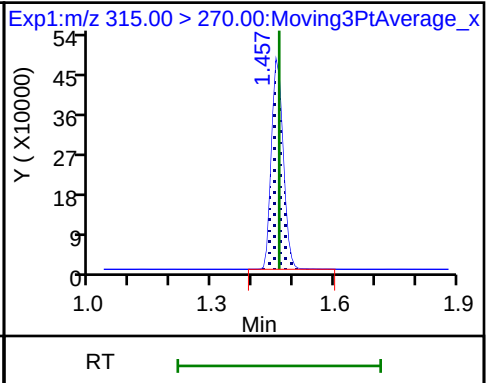
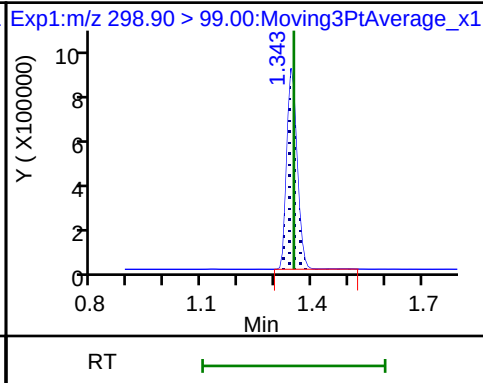
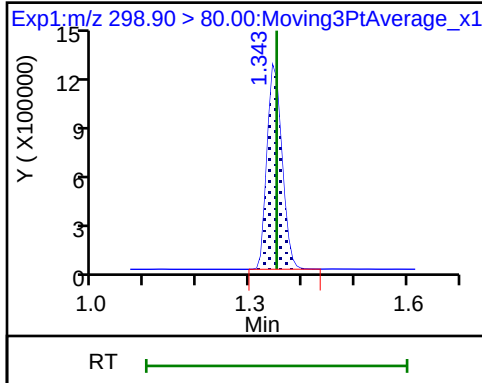
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

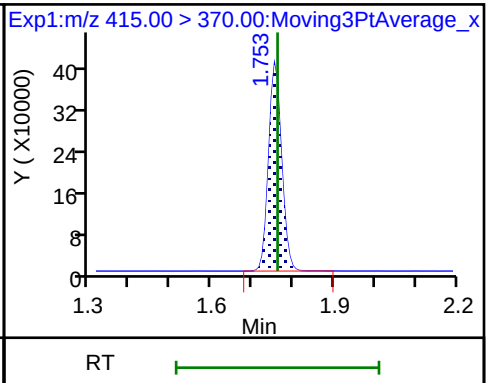
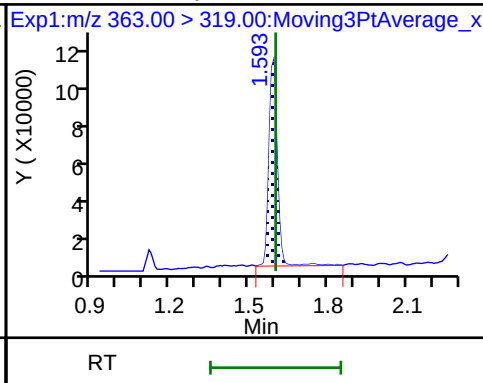
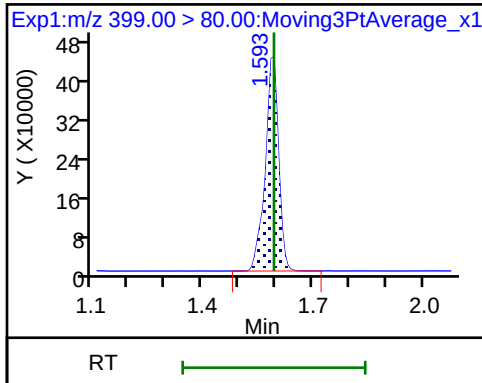
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

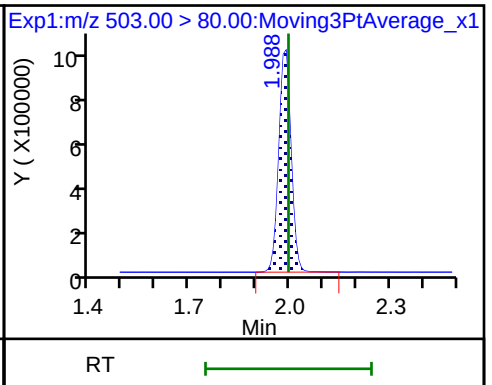
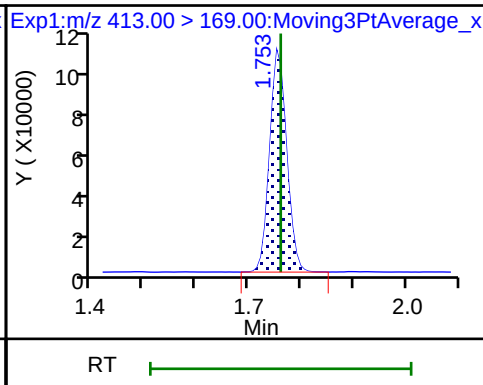
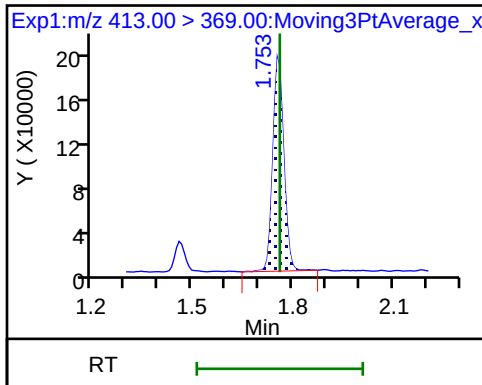
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

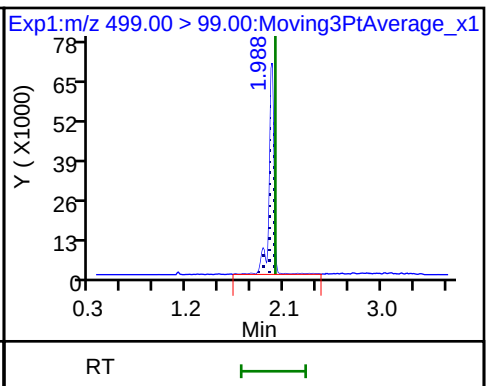
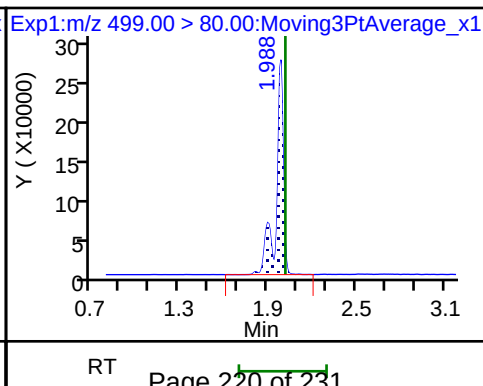
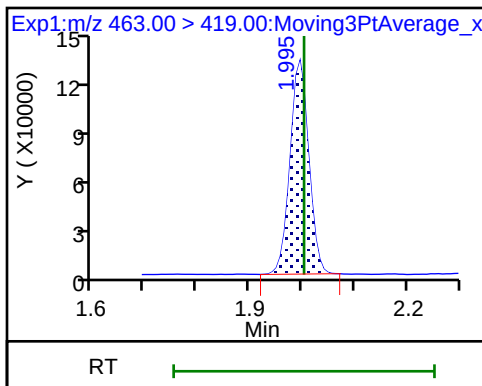
* 7 13C4 PFOS



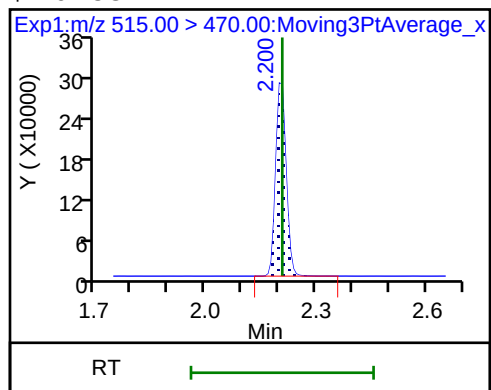
9 Perfluorononanoic acid

8 Perfluorooctane sulfonic acid

8 Perfluorooctane sulfonic acid



\$ 10 13C2 PFDA



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\2018.08.05_537A_009.d
Lims ID: LLCSD 320-237511/3-A
Client ID:
Sample Type: LLCSD
Inject. Date: 05-Aug-2018 20:40:03 ALS Bottle#: 3 Worklist Smp#: 5
Injection Vol: 2.0 ul Dil. Factor: 1.0000
Sample Info: llcsd 320-237511
Misc. Info.: Plate: 1 Rack: 2
Operator ID: \SACINSTLCMS01@tai.com Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20180805-62174.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 06-Aug-2018 13:41:50 Calib Date: 01-Aug-2018 02:11:38
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNA\Sacramento\ChromData\A8_N\20180801-61977.b\2018.07.31_537CURVEA_008.d

Column 1 :

Det: EXP1

Process Host: XAWRK007

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	10.0	9.22	92.19
\$ 10 13C2 PFDA	10.0	10.0	100.26

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Instrument ID: A8_N Start Date: 08/01/2018 01:52Analysis Batch Number: 237363 End Date: 08/01/2018 02:30

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-237363/2		08/01/2018 01:52	1	2018.07.31_537C URVEA 004.d	GeminiC18 3x100 3(mm)
IC 320-237363/3		08/01/2018 01:57	1	2018.07.31_537C URVEA 005.d	GeminiC18 3x100 3(mm)
IC 320-237363/4 ICISAV		08/01/2018 02:02	1	2018.07.31_537C URVEA 006.d	GeminiC18 3x100 3(mm)
IC 320-237363/5		08/01/2018 02:06	1	2018.07.31_537C URVEA 007.d	GeminiC18 3x100 3(mm)
IC 320-237363/6		08/01/2018 02:11	1	2018.07.31_537C URVEA 008.d	GeminiC18 3x100 3(mm)
ZZZZZ		08/01/2018 02:16	1		GeminiC18 3x100 3(mm)
CCVL 320-237363/8		08/01/2018 02:20	1	2018.07.31_537C URVEA 010.d	GeminiC18 3x100 3(mm)
ICB 320-237363/9		08/01/2018 02:25	1		GeminiC18 3x100 3(mm)
ICV 320-237363/10		08/01/2018 02:30	1	2018.07.31_537C URVEA 012.d	GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica SacramentoJob No.: 320-41442-1

SDG No.: _____

Instrument ID: A8_NStart Date: 08/05/2018 15:35Analysis Batch Number: 238066End Date: 08/05/2018 16:36

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-238066/1		08/05/2018 15:35	1	2018.08.04_537A 003.d	GeminiC18 3x100 3(mm)
CCV 320-238066/2 CCVIS		08/05/2018 15:40	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 15:45	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 15:49	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 15:54	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 15:59	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:03	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:08	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:13	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:17	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:22	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:27	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:32	1		GeminiC18 3x100 3(mm)
CCV 320-238066/14 CCVIS		08/05/2018 16:36	1		GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica SacramentoJob No.: 320-41442-1

SDG No.: _____

Instrument ID: A8_NStart Date: 08/05/2018 20:21Analysis Batch Number: 238080End Date: 08/05/2018 21:17

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-238080/1 CCVIS		08/05/2018 20:21	1	2018.08.05_537A 005.d	GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 20:25	1		GeminiC18 3x100 3(mm)
MB 320-237511/1-A		08/05/2018 20:30	1	2018.08.05_537A 007.d	GeminiC18 3x100 3(mm)
LLCS 320-237511/2-A		08/05/2018 20:35	1	2018.08.05_537A 008.d	GeminiC18 3x100 3(mm)
LLCSD 320-237511/3-A		08/05/2018 20:40	1	2018.08.05_537A 009.d	GeminiC18 3x100 3(mm)
320-41442-1		08/05/2018 20:44	1	2018.08.05_537A 010.d	GeminiC18 3x100 3(mm)
320-41442-2		08/05/2018 20:49	1	2018.08.05_537A 011.d	GeminiC18 3x100 3(mm)
320-41442-3		08/05/2018 20:54	1	2018.08.05_537A 012.d	GeminiC18 3x100 3(mm)
320-41442-4		08/05/2018 20:58	1	2018.08.05_537A 013.d	GeminiC18 3x100 3(mm)
320-41442-5		08/05/2018 21:03	1	2018.08.05_537A 014.d	GeminiC18 3x100 3(mm)
320-41442-6		08/05/2018 21:08	1	2018.08.05_537A 015.d	GeminiC18 3x100 3(mm)
320-41442-7		08/05/2018 21:12	1	2018.08.05_537A 016.d	GeminiC18 3x100 3(mm)
CCV 320-238080/13 CCVIS		08/05/2018 21:17	1	2018.08.05_537A 017.d	GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Instrument ID: A8_N Start Date: 08/05/2018 21:17Analysis Batch Number: 238082 End Date: 08/05/2018 22:13

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-238082/13 CCVIS		08/05/2018 21:17	1	2018.08.05_537A 017.d	GeminiC18 3x100 3(mm)
320-41442-8		08/05/2018 21:26	1	2018.08.05_537A 019.d	GeminiC18 3x100 3(mm)
CCV 320-238082/25 CCVIS		08/05/2018 22:13	1	2018.08.05_537A 029.d	GeminiC18 3x100 3(mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Batch Number: 237511 Batch Start Date: 08/02/18 07:57 Batch Analyst: Kouchari, ShamiranBatch Method: 537 Batch End Date: 08/02/18 16:50

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	ReceivedpH	LC537-IS 00076
MB 320-237511/1		537, 537				250 mL	1.00 mL	7 SU	100 uL
LLCS 320-237511/2		537, 537				250 mL	1.00 mL	7 SU	100 uL
LLCSD 320-237511/3		537, 537				250 mL	1.00 mL	7 SU	100 uL
320-41442-A-1	WGNA-072418-RW-3148	537, 537	T	291.60 g	28.48 g	263.1 mL	1.00 mL	7 SU	100 uL
320-41442-A-2	WGNA-072418-FRB-3148	537, 537	T	282.62 g	29.25 g	253.4 mL	1.00 mL	7 SU	100 uL
320-41442-A-3	NAWC-072418-RW-061	537, 537	T	283.92 g	28.66 g	255.3 mL	1.00 mL	7 SU	100 uL
320-41442-A-4	NAWC-072418-FRB-061	537, 537	T	295.51 g	29.27 g	266.2 mL	1.00 mL	7 SU	100 uL
320-41442-A-5	NAWC-072418-RW-029	537, 537	T	288.94 g	28.94 g	260 mL	1.00 mL	7 SU	100 uL
320-41442-A-6	NAWC-072418-FRB-029	537, 537	T	292.47 g	30.55 g	261.9 mL	1.00 mL	7 SU	100 uL
320-41442-A-7	NAWC-072418-RW-141	537, 537	T	282.77 g	28.70 g	254.1 mL	1.00 mL	7 SU	100 uL
320-41442-A-8	NAWC-072418-FRB-141	537, 537	T	299.33 g	29.16 g	270.2 mL	1.00 mL	7 SU	100 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-LSP 00032	LC537-SU 00075	AnalysisComment			
MB 320-237511/1		537, 537			100 uL	Chlorine, ND			
LLCS 320-237511/2		537, 537		100 uL	100 uL	Chlorine, ND			
LLCSD 320-237511/3		537, 537		100 uL	100 uL	Chlorine, ND			
320-41442-A-1	WGNA-072418-RW-3148	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-2	WGNA-072418-FRB-3148	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-3	NAWC-072418-RW-061	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-4	NAWC-072418-FRB-061	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-5	NAWC-072418-RW-029	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-6	NAWC-072418-FRB-029	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.: 320-41442-1

SDG No.: _____

Batch Number: 237511 Batch Start Date: 08/02/18 07:57 Batch Analyst: Kouchari, ShamiranBatch Method: 537 Batch End Date: 08/02/18 16:50

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-LSP 00032	LC537-SU 00075	AnalysisComment			
320-41442-A-7	NAWC-072418-RW-141	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-8	NAWC-072418-FRB-141	537, 537	T		100 uL	Chlorine, ND			

Batch Notes	
Analyst ID - Aliquot Step	SKD
Batch Comment	Client labels match TA label, SKD 08/02/18
Analyst ID - Concentration	SKD
Analyst ID - Final Volume Step	SKD
Internal Standard ID#	1303557
Manifold ID	1
Methanol ID	1319275
pH Indicator ID	0818
Pipette ID	R40536G
Analyst ID - IS Reagent Drop	SKD
Analyst ID - IS Reagent Drop Witness	SR
Analyst ID - SU Reagent Drop	SKD
Analyst ID - SU Reagent Drop Witness	HJA
Analyst ID - TA Reagent Drop	SKD
Analyst ID - TA Reagent Drop Witness	HJA
SPE Cartridge Lot ID	6390138-07
Trizma ID	SLBR5241V
Reagent Water ID	07/30/18

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

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



THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

[illegible]

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

Login Sample Receipt Checklist

Client: Tetra Tech, Inc.

Job Number: 320-41442-1

Login Number: 41442

List Source: TestAmerica Sacramento

List Number: 1

Creator: Nelson, Kym D

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	453748, 749
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 $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

"WGNA-072418-RW-3148","537","RES","320-41442-1","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","20","ng/L","J","6.5","DL","","TRG","","","38","LOQ","YES","-99","","263.1","1.00","15",""
"WGNA-072418-RW-3148","537","RES","320-41442-1","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","26","ng/L","","2.7","DL","","TRG","","","19","LOQ","YES","-99","","263.1","1.00","7.6",""
"WGNA-072418-RW-3148","537","RES","320-41442-1","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","8.6","ng/L","J","5.2","DL","","TRG","","","29","LOQ","YES","-99","","263.1","1.00","11",""
"WGNA-072418-RW-3148","537","RES","320-41442-1","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","34","ng/L","U","15","DL","","TRG","","","86","LOQ","YES","-99","","263.1","1.00","34",""
"WGNA-072418-RW-3148","537","RES","320-41442-1","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","7.5","ng/L","J","1.8","DL","","TRG","","","9.5","LOQ","YES","-99","","263.1","1.00","3.8",""
"WGNA-072418-RW-3148","537","RES","320-41442-1","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","19","ng/L","U","7.6","DL","","TRG","","","23","LOQ","YES","-99","","263.1","1.00","19",""
"WGNA-072418-RW-3148","537","RES","320-41442-1","TALSAC","STL00993","13C2 PFHxA","33","ng/L","","-99","DL","","SURRE","87","","-99","LOQ","YES","38.0","","263.1","1.00","0",""
"WGNA-072418-RW-3148","537","RES","320-41442-1","TALSAC","STL00996","13C2 PFDA","42","ng/L","","-99","DL","","SURRE","110","","-99","LOQ","YES","38.0","","263.1","1.00","0",""
"WGNA-072418-FRB-3148","537","RES","320-41442-2","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","16","ng/L","U","6.7","DL","","TRG","","","39","LOQ","YES","-99","","253.4","1.00","16",""
"WGNA-072418-FRB-3148","537","RES","320-41442-2","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","7.9","ng/L","U","2.8","DL","","TRG","","","20","LOQ","YES","-99","","253.4","1.00","7.9",""
"WGNA-072418-FRB-3148","537","RES","320-41442-2","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","12","ng/L","U","5.4","DL","","TRG","","","30","LOQ","YES","-99","","253.4","1.00","12",""
"WGNA-072418-FRB-3148","537","RES","320-41442-2","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","36","ng/L","U","16","DL","","TRG","","","89","LOQ","YES","-99","","253.4","1.00","36",""
"WGNA-072418-FRB-3148","537","RES","320-41442-2","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","3.9","ng/L","U","1.9","DL","","TRG","","","9.9","LOQ","YES","-99","","253.4","1.00","3.9",""
"WGNA-072418-FRB-3148","537","RES","320-41442-2","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","20","ng/L","U","7.9","DL","","TRG","","","24","LOQ","YES","-99","","253.4","1.00","20",""
"WGNA-072418-FRB-3148","537","RES","320-41442-2","TALSAC","STL00993","13C2 PFHxA","37","ng/L","","-99","DL","","SURRE","94","","-99","LOQ","YES","39.5","","253.4","1.00","0",""
"WGNA-072418-FRB-3148","537","RES","320-41442-2","TALSAC","STL00996","13C2 PFDA","41","ng/L","","-99","DL","","SURRE","103","","-99","LOQ","YES","39.5","","253.4","1.00","0",""
"NAWC-072418-RW-061","537","RES","320-41442-3","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","24","ng/L","J","6.7","DL","","TRG","","","39","LOQ","YES","-99","","255.3","1.00","16",""
"NAWC-072418-RW-061","537","RES","320-41442-3","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","16","ng/L","J","2.7","DL","","TRG","","","20","LOQ","YES","-99","","255.3","1.00","7.8",""
"NAWC-072418-RW-061","537","RES","320-41442-3","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","8.6","ng/L","J","5.4","DL","","TRG","","","29","LOQ","YES","-99","","255.3","1.00","12",""
"NAWC-072418-RW-061","537","RES","320-41442-3","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","35","ng/L","U","16","DL","","TRG","","","88","LOQ","YES","-99","","255.3","1.00","35",""
"NAWC-072418-RW-061","537","RES","320-41442-3","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","3.6","ng/L","J","1.9","DL","","TRG","","","9.8","LOQ","YES","-99","","255.3","1.00","3.9",""
"NAWC-072418-RW-061","537","RES","320-41442-3","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","20","ng/L","U","7.8","DL","","TRG","","","24","LOQ","YES","-99","","255.3","1.00","20",""
"NAWC-072418-RW-061","537","RES","320-41442-3","TALSAC","STL00993","13C2 PFHxA","30","ng/L","","-99","DL","","SURRE","76","","-99","LOQ","YES","39.2","","255.3","1.00","0",""
"NAWC-072418-RW-061","537","RES","320-41442-3","TALSAC","STL00996","13C2 PFDA","41","ng/L","","-99","DL","","SURRE","105","","-99","LOQ","YES","39.2","","255.3","1.00","0",""
"NAWC-072418-FRB-061","537","RES","320-41442-4","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","15","ng/L","U","6.4","DL","","TRG","","","38","LOQ","YES","-99","","266.2","1.00","15",""
"NAWC-072418-FRB-061","537","RES","320-41442-4","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","7.5","ng/L","U","2.6","DL","","TRG","","","19","LOQ","YES","-99","","266.2","1.00","7.5",""
"NAWC-072418-FRB-061","537","RES","320-41442-4","TALSAC","355-46-4","Perfluorohexanesulfonic acid

(PFHxS)","11","ng/L","U","5.2","DL","","","TRG","","","28","LOQ","YES","-99","","","266.2","1.00","11","","
"NAWC-072418-FRB-061","537","RES","320-41442-4","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","34","ng/L","U","15","DL","","","TRG","","","85","LOQ","YES","-99","","","266.2","1.00","34","","
"NAWC-072418-FRB-061","537","RES","320-41442-4","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","3.8","ng/L","U","1.8","DL","","","TRG","","","9.4","LOQ","YES","-99","","","266.2","1.00","3.8","","
"NAWC-072418-FRB-061","537","RES","320-41442-4","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","19","ng/L","U","7.5","DL","","","TRG","","","23","LOQ","YES","-99","","","266.2","1.00","19","","
"NAWC-072418-FRB-061","537","RES","320-41442-4","TALSAC","STL00993","13C2
PFHxA","37","ng/L","","","-99","DL","","","SURR","97","","","-99","LOQ","YES","37.6","","","266.2","1.00","0","","
"NAWC-072418-FRB-061","537","RES","320-41442-4","TALSAC","STL00996","13C2
PFDA","39","ng/L","","","-99","DL","","","SURR","105","","","-99","LOQ","YES","37.6","","","266.2","1.00","0","","
"NAWC-072418-RW-029","537","RES","320-41442-5","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS)","19","ng/L","J","6.5","DL","","","TRG","","","38","LOQ","YES","-99","","","260","1.00","15","","
"NAWC-072418-RW-029","537","RES","320-41442-5","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","18","ng/L","J","2.7","DL","","","TRG","","","19","LOQ","YES","-99","","","260","1.00","7.7","","
"NAWC-072418-RW-029","537","RES","320-41442-5","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","5.7","ng/L","J","5.3","DL","","","TRG","","","29","LOQ","YES","-99","","","260","1.00","12","","
"NAWC-072418-RW-029","537","RES","320-41442-5","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","35","ng/L","U","15","DL","","","TRG","","","87","LOQ","YES","-99","","","260","1.00","35","","
"NAWC-072418-RW-029","537","RES","320-41442-5","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","5.1","ng/L","J","1.8","DL","","","TRG","","","9.6","LOQ","YES","-99","","","260","1.00","3.8","","
"NAWC-072418-RW-029","537","RES","320-41442-5","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","19","ng/L","U","7.7","DL","","","TRG","","","23","LOQ","YES","-99","","","260","1.00","19","","
"NAWC-072418-RW-029","537","RES","320-41442-5","TALSAC","STL00993","13C2
PFHxA","29","ng/L","","","-99","DL","","","SURR","76","","","-99","LOQ","YES","38.5","","","260","1.00","0","","
"NAWC-072418-RW-029","537","RES","320-41442-5","TALSAC","STL00996","13C2
PFDA","38","ng/L","","","-99","DL","","","SURR","100","","","-99","LOQ","YES","38.5","","","260","1.00","0","","
"NAWC-072418-FRB-029","537","RES","320-41442-6","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS)","15","ng/L","U","6.5","DL","","","TRG","","","38","LOQ","YES","-99","","","261.9","1.00","15","","
"NAWC-072418-FRB-029","537","RES","320-41442-6","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","7.6","ng/L","U","2.7","DL","","","TRG","","","19","LOQ","YES","-99","","","261.9","1.00","7.6","","
"NAWC-072418-FRB-029","537","RES","320-41442-6","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","11","ng/L","U","5.3","DL","","","TRG","","","29","LOQ","YES","-99","","","261.9","1.00","11","","
"NAWC-072418-FRB-029","537","RES","320-41442-6","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","34","ng/L","U","15","DL","","","TRG","","","86","LOQ","YES","-99","","","261.9","1.00","34","","
"NAWC-072418-FRB-029","537","RES","320-41442-6","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","3.8","ng/L","U","1.8","DL","","","TRG","","","9.5","LOQ","YES","-99","","","261.9","1.00","3.8","","
"NAWC-072418-FRB-029","537","RES","320-41442-6","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","19","ng/L","U","7.6","DL","","","TRG","","","23","LOQ","YES","-99","","","261.9","1.00","19","","
"NAWC-072418-FRB-029","537","RES","320-41442-6","TALSAC","STL00993","13C2
PFHxA","36","ng/L","","","-99","DL","","","SURR","95","","","-99","LOQ","YES","38.2","","","261.9","1.00","0","","
"NAWC-072418-FRB-029","537","RES","320-41442-6","TALSAC","STL00996","13C2
PFDA","39","ng/L","","","-99","DL","","","SURR","103","","","-99","LOQ","YES","38.2","","","261.9","1.00","0","","
"NAWC-072418-RW-141","537","RES","320-41442-7","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS)","20","ng/L","J","6.7","DL","","","TRG","","","39","LOQ","YES","-99","","","254.1","1.00","16","","
"NAWC-072418-RW-141","537","RES","320-41442-7","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","14","ng/L","J","2.8","DL","","","TRG","","","20","LOQ","YES","-99","","","254.1","1.00","7.9","","
"NAWC-072418-RW-141","537","RES","320-41442-7","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","13","ng/L","J","5.4","DL","","","TRG","","","30","LOQ","YES","-99","","","254.1","1.00","12","","
"NAWC-072418-RW-141","537","RES","320-41442-7","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","35","ng/L","U","16","DL","","","TRG","","","89","LOQ","YES","-99","","","254.1","1.00","35","","
"NAWC-072418-RW-141","537","RES","320-41442-7","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","6.2","ng/L","J","1.9","DL","","","TRG","","","9.8","LOQ","YES","-99","","","254.1","1.00","3.9","","
"NAWC-072418-RW-141","537","RES","320-41442-7","TALSAC","375-95-1","Perfluorononanoic acid

(PFNA),"20","ng/L","U","7.9","DL","","","TRG","","","24","LOQ","YES",-99","","254.1","1.00","20","","
"NAWC-072418-RW-141","537","RES","320-41442-7","TALSAC","STL00993","13C2
PFHxA","33","ng/L","","-99","DL","","","SURRE","83","","-99","LOQ","YES","39.4","","254.1","1.00","0","","
"NAWC-072418-RW-141","537","RES","320-41442-7","TALSAC","STL00996","13C2
PFDA","42","ng/L","","-99","DL","","","SURRE","107","","-99","LOQ","YES","39.4","","254.1","1.00","0","","
"NAWC-072418-FRB-141","537","RES","320-41442-8","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS)","15","ng/L","U","6.3","DL","","","TRG","","","37","LOQ","YES",-99","","270.2","1.00","15","","
"NAWC-072418-FRB-141","537","RES","320-41442-8","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","7.4","ng/L","U","2.6","DL","","","TRG","","","19","LOQ","YES",-99","","270.2","1.00","7.4","","
"NAWC-072418-FRB-141","537","RES","320-41442-8","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","11","ng/L","U","5.1","DL","","","TRG","","","28","LOQ","YES",-99","","270.2","1.00","11","","
"NAWC-072418-FRB-141","537","RES","320-41442-8","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","33","ng/L","U","15","DL","","","TRG","","","83","LOQ","YES",-99","","270.2","1.00","33","","
"NAWC-072418-FRB-141","537","RES","320-41442-8","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","3.7","ng/L","U","1.8","DL","","","TRG","","","9.3","LOQ","YES",-99","","270.2","1.00","3.7","","
"NAWC-072418-FRB-141","537","RES","320-41442-8","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","19","ng/L","U","7.4","DL","","","TRG","","","22","LOQ","YES",-99","","270.2","1.00","19","","
"NAWC-072418-FRB-141","537","RES","320-41442-8","TALSAC","STL00993","13C2
PFHxA","36","ng/L","","-99","DL","","","SURRE","98","","-99","LOQ","YES","37.0","","270.2","1.00","0","","
"NAWC-072418-FRB-141","537","RES","320-41442-8","TALSAC","STL00996","13C2
PFDA","39","ng/L","","-99","DL","","","SURRE","106","","-99","LOQ","YES","37.0","","270.2","1.00","0","","
"LLCS 320-237511/2-A","537","RES","LLCS 320-237511/2-A","TALSAC","1763-23-1","Perfluorooctanesulfonic
acid (PFOS)","40.5","ng/L","","6.8","DL","","","SPK","101","","40","LOQ","YES","40.2","","250","1.00","16","","
"LLCS 320-237511/2-A","537","RES","LLCS 320-237511/2-A","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","18.4","ng/L","J","2.8","DL","","","SPK","92","","20","LOQ","YES","20.0","","250","1.00","8.0","","
"LLCS 320-237511/2-A","537","RES","LLCS 320-237511/2-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","30.9","ng/L","","5.5","DL","","","SPK","102","","30","LOQ","YES","30.3","","250","1.00","12","","
"LLCS 320-237511/2-A","537","RES","LLCS 320-237511/2-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","101","ng/L","","16","DL","","","SPK","112","","90","LOQ","YES","90.2","","250","1.00","36","","
"LLCS 320-237511/2-A","537","RES","LLCS 320-237511/2-A","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","9.16","ng/L","J","1.9","DL","","","SPK","92","","10","LOQ","YES","10.0","","250","1.00","4.0","","
"LLCS 320-237511/2-A","537","RES","LLCS 320-237511/2-A","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","17.7","ng/L","J","8.0","DL","","","SPK","89","","24","LOQ","YES","20.0","","250","1.00","20","","
"LLCS 320-237511/2-A","537","RES","LLCS 320-237511/2-A","TALSAC","STL00993","13C2
PFHxA","37.4","ng/L","","-99","DL","","","SURRE","93","","-99","LOQ","YES","40.0","","250","1.00","0","","
"LLCS 320-237511/2-A","537","RES","LLCS 320-237511/2-A","TALSAC","STL00996","13C2
PFDA","39.9","ng/L","","-99","DL","","","SURRE","100","","-99","LOQ","YES","40.0","","250","1.00","0","","
"LLCSD 320-237511/3-A","537","RES","LLCSD 320-237511/3-A","TALSAC","1763-23-1","Perfluorooctanesulfonic
acid (PFOS)","39.0","ng/L","J","6.8","DL","","","SPK","97","4","40","LOQ","YES","40.2","LLCS 320-237511/2-
A","250","1.00","16","","
"LLCSD 320-237511/3-A","537","RES","LLCSD 320-237511/3-A","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","18.1","ng/L","J","2.8","DL","","","SPK","90","2","20","LOQ","YES","20.0","LLCS 320-237511/2-
A","250","1.00","8.0","","
"LLCSD 320-237511/3-A","537","RES","LLCSD 320-237511/3-A","TALSAC","355-46-4","Perfluorohexanesulfonic
acid (PFHxS)","29.5","ng/L","J","5.5","DL","","","SPK","97","5","30","LOQ","YES","30.3","LLCS 320-237511/2-
A","250","1.00","12","","
"LLCSD 320-237511/3-A","537","RES","LLCSD 320-237511/3-A","TALSAC","375-73-5","Perfluorobutanesulfonic
acid (PFBS)","89.7","ng/L","J","16","DL","","","SPK","99","12","90","LOQ","YES","90.2","LLCS 320-237511/2-
A","250","1.00","36","","
"LLCSD 320-237511/3-A","537","RES","LLCSD 320-237511/3-A","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","9.06","ng/L","J","1.9","DL","","","SPK","91","1","10","LOQ","YES","10.0","LLCS 320-237511/2-
A","250","1.00","4.0","","
"LLCSD 320-237511/3-A","537","RES","LLCSD 320-237511/3-A","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","17.1","ng/L","J","8.0","DL","","","SPK","86","3","24","LOQ","YES","20.0","LLCS 320-237511/2-

A","250","1.00","20",""
"LLCSD 320-237511/3-A","537","RES","LLCSD 320-237511/3-A","TALSAC","STL00993","13C2
PFHxA","36.9","ng/L","","-99","DL","","SURR","92","1","-99","LOQ","YES","40.0","LLCS 320-237511/2-
A","250","1.00","0",""
"LLCSD 320-237511/3-A","537","RES","LLCSD 320-237511/3-A","TALSAC","STL00996","13C2
PFDA","40.1","ng/L","","-99","DL","","SURR","100","0.6","-99","LOQ","YES","40.0","LLCS 320-237511/2-
A","250","1.00","0",""
"MB 320-237511/1-A","537","RES","MB 320-237511/1-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS)","16","ng/L","U","6.8","DL","","TRG","","","40","LOQ","YES","-99","","250","1.00","16",""
"MB 320-237511/1-A","537","RES","MB 320-237511/1-A","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","8.0","ng/L","U","2.8","DL","","TRG","","","20","LOQ","YES","-99","","250","1.00","8.0",""
"MB 320-237511/1-A","537","RES","MB 320-237511/1-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","12","ng/L","U","5.5","DL","","TRG","","","30","LOQ","YES","-99","","250","1.00","12",""
"MB 320-237511/1-A","537","RES","MB 320-237511/1-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","36","ng/L","U","16","DL","","TRG","","","90","LOQ","YES","-99","","250","1.00","36",""
"MB 320-237511/1-A","537","RES","MB 320-237511/1-A","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","4.0","ng/L","U","1.9","DL","","TRG","","","10","LOQ","YES","-99","","250","1.00","4.0",""
"MB 320-237511/1-A","537","RES","MB 320-237511/1-A","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","20","ng/L","U","8.0","DL","","TRG","","","24","LOQ","YES","-99","","250","1.00","20",""
"MB 320-237511/1-A","537","RES","MB 320-237511/1-A","TALSAC","STL00993","13C2
PFHxA","37.8","ng/L","","-99","DL","","SURR","95","","-99","LOQ","YES","40.0","","250","1.00","0",""
"MB 320-237511/1-A","537","RES","MB 320-237511/1-A","TALSAC","STL00996","13C2
PFDA","43.2","ng/L","","-99","DL","","SURR","108","","-99","LOQ","YES","40.0","","250","1.00","0",""
"Unknown","Unknown","WGNA-072418-RW-3148","07/24/2018 08:40","AQ","320-41442-
1","NM","","2.40","537","METHOD","RES","08/02/2018 07:58","08/05/2018
20:44","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","07/25/2018 09:15","08/14/2018 18:06",""
"Unknown","Unknown","WGNA-072418-FRB-3148","07/24/2018 08:35","AQ","320-41442-
2","FB","","2.40","537","METHOD","RES","08/02/2018 07:58","08/05/2018
20:49","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","07/25/2018 09:15","08/14/2018 18:06",""
"Unknown","Unknown","NAWC-072418-RW-061","07/24/2018 09:10","AQ","320-41442-
3","NM","","2.40","537","METHOD","RES","08/02/2018 07:58","08/05/2018
20:54","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","07/25/2018 09:15","08/14/2018 18:06",""
"Unknown","Unknown","NAWC-072418-FRB-061","07/24/2018 09:05","AQ","320-41442-
4","FB","","2.40","537","METHOD","RES","08/02/2018 07:58","08/05/2018
20:58","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","07/25/2018 09:15","08/14/2018 18:06",""
"Unknown","Unknown","NAWC-072418-RW-029","07/24/2018 09:40","AQ","320-41442-
5","NM","","2.40","537","METHOD","RES","08/02/2018 07:58","08/05/2018
21:03","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","07/25/2018 09:15","08/14/2018 18:06",""
"Unknown","Unknown","NAWC-072418-FRB-029","07/24/2018 09:35","AQ","320-41442-
6","FB","","2.40","537","METHOD","RES","08/02/2018 07:58","08/05/2018
21:08","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","07/25/2018 09:15","08/14/2018 18:06",""
"Unknown","Unknown","NAWC-072418-RW-141","07/24/2018 10:10","AQ","320-41442-
7","NM","","2.40","537","METHOD","RES","08/02/2018 07:58","08/05/2018
21:12","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","07/25/2018 09:15","08/14/2018 18:06",""
"Unknown","Unknown","NAWC-072418-FRB-141","07/24/2018 10:05","AQ","320-41442-
8","FB","","2.40","537","METHOD","RES","08/02/2018 07:58","08/05/2018
21:26","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-

238082","320-41442-1","07/25/2018 09:15","08/14/2018 18:06",""
"Unknown","Unknown","LLCS 320-237511/2-A","","AQ","LLCS 320-237511/2-
A","LCS","","-99","537","METHOD","RES","08/02/2018 07:58","08/05/2018
20:35","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","08/02/2018 07:58","08/14/2018 18:06",""
"Unknown","Unknown","LLCSD 320-237511/3-A","","AQ","LLCSD 320-237511/3-
A","LCSD","","-99","537","METHOD","RES","08/02/2018 07:58","08/05/2018
20:40","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","08/02/2018 07:58","08/14/2018 18:06",""
"Unknown","Unknown","MB 320-237511/1-A","","AQ","MB 320-237511/1-
A","MB","","-99","537","METHOD","RES","08/02/2018 07:58","08/05/2018
20:30","TALSAC","COA","WET","NA","1","NA","NA","","100","320-237511","320-237511","NA","320-
238080","320-41442-1","08/02/2018 07:58","08/14/2018 18:06",""



TO: A. FREBOWITZ **DATE:** SEPTEMBER 19, 2018
FROM: TERRI L. SOLOMON **COPIES:** DV FILE
SUBJECT: ORGANIC DATA VALIDATION –POLYFLUOROALKYL SUBSTANCES (PFAS)
NAS JRB WILLOW GROVE
SAMPLE DELIVERY GROUP (SDG) 320-41442-1

SAMPLES: 4/Field Reagent Blank (FRB)

NAWC-072418-FRB-029
NAWC-072418-FRB-141

NAWC-072418-FRB-061
WGNA-072418-FRB-3148

4/Drinking Water

NAWC-072418-RW-029
NAWC-072418-RW-141

NAWC-072418-RW-061
WGNA-072418-RW-3148

Overview

The sample set for NAS JRB Willow Grove, SDG 320-41442-1, consisted of four (4) drinking water samples and four (4) FRB samples. 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 July 24, 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

Samples with detections and their associated FRBs are summarized below. No detected results were present in the FRBs.

Sample
NAWC-072418-RW-029

Associated FRB
NAWC-072418-FRB-029

TO: A. FREBOWITZ
SDG: 320-41442-1

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NAWC-072418-RW-061
NAWC-072418-RW-141
WGNA-072418-RW-3148

NAWC-072418-FRB-061
NAWC-072418-FRB-141
NAWC-072418-FRB-3148

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

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

Executive Summary

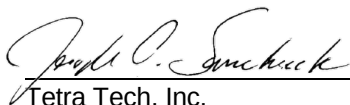
Laboratory Performance: None.

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 ($< 2 \times \text{IDL}$ for inorganics and $< \text{CRQL}$ 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 SDG: 320-41442-1 FRACTION: PFAS MEDIA: WATER	NSAMPLE	NAWC-072418-FRB-029			NAWC-072418-FRB-061			NAWC-072418-FRB-141			NAWC-072418-RW-029		
	LAB_ID	320-41442-6			320-41442-4			320-41442-8			320-41442-5		
	SAMP_DATE	7/24/2018			7/24/2018			7/24/2018			7/24/2018		
	QC_TYPE	FB			FB			FB			NM		
	UNITS	NG/L			NG/L			NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PENTADECAFLUOROOCTANOIC ACID (PFOA)		7.6	U		7.5	U		7.4	U		18	J	P
PERFLUOROBUTANESULFONIC ACID (PFBS)		34	U		34	U		33	U		35	U	
PERFLUOROHEPTANOIC ACID (PFHPA)		3.8	U		3.8	U		3.7	U		5.1	J	P
PERFLUOROHXANESULFONIC ACID (PFHXS)		11	U		11	U		11	U		5.7	J	P
PERFLUORONONANOIC ACID (PFNA)		19	U		19	U		19	U		19	U	
PERFLUOROOCTANESULFONIC ACID (PFOS)		15	U		15	U		15	U		19	J	P

PROJ_NO: 08005-WE04 SDG: 320-41442-1 FRACTION: PFAS MEDIA: WATER	NSAMPLE	NAWC-072418-RW-061			NAWC-072418-RW-141			WGNA-072418-FRB-3148			WGNA-072418-RW-3148		
	LAB_ID	320-41442-3			320-41442-7			320-41442-2			320-41442-1		
	SAMP_DATE	7/24/2018			7/24/2018			7/24/2018			7/24/2018		
	QC_TYPE	NM			NM			FB			NM		
	UNITS	NG/L			NG/L			NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PENTADECAFLUOROOCTANOIC ACID (PFOA)		16	J	P	14	J	P	7.9	U		26		
PERFLUOROBUTANESULFONIC ACID (PFBS)		35	U		35	U		36	U		34	U	
PERFLUOROHEPTANOIC ACID (PFHPA)		3.6	J	P	6.2	J	P	3.9	U		7.5	J	P
PERFLUOROHXANESULFONIC ACID (PFHXS)		8.6	J	P	13	J	P	12	U		8.6	J	P
PERFLUORONONANOIC ACID (PFNA)		20	U		20	U		20	U		19	U	
PERFLUOROOCTANESULFONIC ACID (PFOS)		24	J	P	20	J	P	16	U		20	J	P

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: WGNA-072418-RW-3148 Lab Sample ID: 320-41442-1
 Matrix: Water Lab File ID: 2018.08.05_537A_010.d
 Analysis Method: 537 Date Collected: 07/24/2018 08:40
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 263.1 (mL) Date Analyzed: 08/05/2018 20:44
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	20	J	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	26		19	7.6	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.6
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	11	5.2
375-85-9	Perfluoroheptanoic acid (PFHpA)	7.5	J	9.5	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	86	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	87		70-130
STL00996	13C2 PFDA	110		70-130

Steve L. Selman
09/19/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: WGNA-072418-FRB-3148 Lab Sample ID: 320-41442-2
 Matrix: Water Lab File ID: 2018.08.05_537A_011.d
 Analysis Method: 537 Date Collected: 07/24/2018 08:35
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 253.4 (mL) Date Analyzed: 08/05/2018 20:49
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	7.9	U	20	7.9	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.9
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	30	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.9	U	9.9	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	89	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	94		70-130
STL00996	13C2 PFDA	103		70-130

Heidi L. Selman

09/19/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-RW-061</u>	Lab Sample ID: <u>320-41442-3</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_012.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>255.3 (mL)</u>	Date Analyzed: <u>08/05/2018 20:54</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	24	J	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	16	J	20	7.8	2.7
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.8
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.6	J	9.8	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	88	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	76		70-130
STL00996	13C2 PFDA	105		70-130

Teri L. Salmeron
09/19/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: NAWC-072418-FRB-061 Lab Sample ID: 320-41442-4
 Matrix: Water Lab File ID: 2018.08.05_537A_013.d
 Analysis Method: 537 Date Collected: 07/24/2018 09:05
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 266.2 (mL) Date Analyzed: 08/05/2018 20:58
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	38	15	6.4
335-67-1	Perfluorooctanoic acid (PFOA)	7.5	U	19	7.5	2.6
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.5
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	28	11	5.2
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.8	U	9.4	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	85	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	97		70-130
STL00996	13C2 PFDA	105		70-130

Amir L. Salameh

09/19/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-RW-029</u>	Lab Sample ID: <u>320-41442-5</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_014.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:40</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>260 (mL)</u>	Date Analyzed: <u>08/05/2018 21:03</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	19	J	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	18	J	19	7.7	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.7
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	5.7	J	29	12	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	5.1	J	9.6	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	87	35	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	76		70-130
STL00996	13C2 PFDA	100		70-130

Teri L. Selman
09/19/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: NAWC-072418-FRB-029 Lab Sample ID: 320-41442-6
 Matrix: Water Lab File ID: 2018.08.05_537A_015.d
 Analysis Method: 537 Date Collected: 07/24/2018 09:35
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 261.9(mL) Date Analyzed: 08/05/2018 21:08
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	7.6	U	19	7.6	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.6
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	29	11	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.8	U	9.5	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	86	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	95		70-130
STL00996	13C2 PFDA	103		70-130

Ali L. Salameh

09/19/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: NAWC-072418-RW-141 Lab Sample ID: 320-41442-7
 Matrix: Water Lab File ID: 2018.08.05_537A_016.d
 Analysis Method: 537 Date Collected: 07/24/2018 10:10
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 254.1 (mL) Date Analyzed: 08/05/2018 21:12
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	20	J	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	14	J	20	7.9	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.9
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	13	J	30	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.2	J	9.8	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	89	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	83		70-130
STL00996	13C2 PFDA	107		70-130

Steve L. Salameh

09/19/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: NAWC-072418-FRB-141 Lab Sample ID: 320-41442-8
 Matrix: Water Lab File ID: 2018.08.05_537A_019.d
 Analysis Method: 537 Date Collected: 07/24/2018 10:05
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 270.2 (mL) Date Analyzed: 08/05/2018 21:26
 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.: 238082 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	37	15	6.3
335-67-1	Perfluorooctanoic acid (PFOA)	7.4	U	19	7.4	2.6
375-95-1	Perfluorononanoic acid (PFNA)	19	U	22	19	7.4
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	28	11	5.1
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.7	U	9.3	3.7	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	33	U	83	33	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	98		70-130
STL00996	13C2 PFDA	106		70-130


09/19/2018

Appendix B

Results as Reported by the Laboratory

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: WGNA-072418-RW-3148 Lab Sample ID: 320-41442-1
 Matrix: Water Lab File ID: 2018.08.05_537A_010.d
 Analysis Method: 537 Date Collected: 07/24/2018 08:40
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 263.1(mL) Date Analyzed: 08/05/2018 20:44
 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.: 238080 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	20	J	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	26		19	7.6	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.6
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	11	5.2
375-85-9	Perfluoroheptanoic acid (PFHpA)	7.5	J	9.5	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	86	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	87		70-130
STL00996	13C2 PFDA	110		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-072418-FRB-3148</u>	Lab Sample ID: <u>320-41442-2</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_011.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 08:35</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>253.4 (mL)</u>	Date Analyzed: <u>08/05/2018 20:49</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	7.9	U	20	7.9	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.9
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	30	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.9	U	9.9	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	89	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	94		70-130
STL00996	13C2 PFDA	103		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-RW-061</u>	Lab Sample ID: <u>320-41442-3</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_012.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>255.3 (mL)</u>	Date Analyzed: <u>08/05/2018 20:54</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	24	J	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	16	J	20	7.8	2.7
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.8
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	8.6	J	29	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.6	J	9.8	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	88	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	76		70-130
STL00996	13C2 PFDA	105		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-FRB-061</u>	Lab Sample ID: <u>320-41442-4</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_013.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>266.2 (mL)</u>	Date Analyzed: <u>08/05/2018 20:58</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	38	15	6.4
335-67-1	Perfluorooctanoic acid (PFOA)	7.5	U	19	7.5	2.6
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.5
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	28	11	5.2
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.8	U	9.4	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	85	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	97		70-130
STL00996	13C2 PFDA	105		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-RW-029</u>	Lab Sample ID: <u>320-41442-5</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_014.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:40</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>260 (mL)</u>	Date Analyzed: <u>08/05/2018 21:03</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	19	J	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	18	J	19	7.7	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.7
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	5.7	J	29	12	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	5.1	J	9.6	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	87	35	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	76		70-130
STL00996	13C2 PFDA	100		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-FRB-029</u>	Lab Sample ID: <u>320-41442-6</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_015.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 09:35</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>261.9(mL)</u>	Date Analyzed: <u>08/05/2018 21:08</u>
Con. Extract Vol.: <u>1.00(mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2(uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3(mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	7.6	U	19	7.6	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.6
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	29	11	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.8	U	9.5	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	86	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	95		70-130
STL00996	13C2 PFDA	103		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-RW-141</u>	Lab Sample ID: <u>320-41442-7</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_016.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 10:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>254.1 (mL)</u>	Date Analyzed: <u>08/05/2018 21:12</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100</u> ID: <u>3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238080</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	20	J	39	16	6.7
335-67-1	Perfluorooctanoic acid (PFOA)	14	J	20	7.9	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.9
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	13	J	30	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.2	J	9.8	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	89	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	83		70-130
STL00996	13C2 PFDA	107		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-41442-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-072418-FRB-141</u>	Lab Sample ID: <u>320-41442-8</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.08.05_537A_019.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>07/24/2018 10:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>08/02/2018 07:58</u>
Sample wt/vol: <u>270.2 (mL)</u>	Date Analyzed: <u>08/05/2018 21:26</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>238082</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	37	15	6.3
335-67-1	Perfluorooctanoic acid (PFOA)	7.4	U	19	7.4	2.6
375-95-1	Perfluorononanoic acid (PFNA)	19	U	22	19	7.4
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	28	11	5.1
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.7	U	9.3	3.7	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	33	U	83	33	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	98		70-130
STL00996	13C2 PFDA	106		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: 7/24/2018		COC No:	
TetraTech		Tel/Fax: 610.382.1170		Lab Contact: Dave Alltucker		Carrier: FedEx		1 of 1 COCs	
234 Mall Boulevard Suite 260		Analysis Turnaround Time		Filtered Sample (Y/N) Perform MS/MSD (Y/N) EPA 537 UCMR3				Sampler: Mary Kay Bond	
King of Prussia, PA 19406		☐ CALENDAR DAYS ☐ WORKING DAYS						For Lab Use Only:	
610-382-1174		TAT if different from Below 21						Walk-in Client:	
610-491-9688		☐ 2 weeks ☐ 1 week ☐ 2 days ☐ 1 day						Lab Sampling:	
Project Name: WE04								Job / SDG No.:	
Site: WE04									
P O # 1132358 (through EarthToxics)									
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:
WGNA-072418-RW-3148	07/24/2018	08:40	G	DW	2	N	N	Y	
WGNA-072418-FRB-3148	07/24/2018	08:35	G	DW	2	N	N	Y	Field Reagent Blank
NAWC-072418-RW-061	07/24/2018	09:10	G	DW	2	N	N	Y	
NAWC-072418-FRB-061	07/24/2018	09:05	G	DW	2	N	N	Y	Field Reagent Blank
NAWC-072418-RW-029	07/24/2018	09:40	G	DW	2	N	N	Y	
NAWC-072418-FRB-029	07/24/2018	09:35	G	DW	2	N	N	Y	Field Reagent Blank
NAWC-072418-RW-141	07/24/2018	10:10	G	DW	2	N	N	Y	
NAWC-072418-FRB-141	07/24/2018	10:05	G	DW	2	N	N	Y	Field Reagent Blank
									
320-41442 Chain of Custody									
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other: Trizma						6			
Possible Hazard Identification:						Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)			
Comments Section if the lab is to dispose of the sample.									
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown						☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months			
Fed Ex Tracking: 7728 0247 5550									
Custody Seals Intact: ☐ Yes ☐ No		Custody Seal No.:		Cooler Temp. (°C): Obs'd: 24 Corr'd: 24		Therm ID No.: 112			
Relinquished by: <i>[Signature]</i>		Company: Tetra Tech		Date/Time: 7/24/2018 16:00		Received by: <i>[Signature]</i>		Company: <i>[Signature]</i>	
Relinquished by:		Company:		Date/Time:		Received by:		Company:	
Relinquished by:		Company:		Date/Time:		Received in Laboratory by:		Company:	

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

Job Narrative
320-41442-1

Receipt

The samples were received on 7/25/2018 9:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.4° 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 320-237511.

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.
Project/Site: Warminster: PFAS, NAS JRB Willow Grove

TestAmerica Job ID: 320-41442-1

Qualifiers

LCMS

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

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	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)

Sample Summary

Client: Tetra Tech, Inc.

TestAmerica Job ID: 320-41442-1

Project/Site: Warminster: PFAS, NAS JRB Willow Grove

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-41442-1	WGNA-072418-RW-3148	Water	07/24/18 08:40	07/25/18 09:15
320-41442-2	WGNA-072418-FRB-3148	Water	07/24/18 08:35	07/25/18 09:15
320-41442-3	NAWC-072418-RW-061	Water	07/24/18 09:10	07/25/18 09:15
320-41442-4	NAWC-072418-FRB-061	Water	07/24/18 09:05	07/25/18 09:15
320-41442-5	NAWC-072418-RW-029	Water	07/24/18 09:40	07/25/18 09:15
320-41442-6	NAWC-072418-FRB-029	Water	07/24/18 09:35	07/25/18 09:15
320-41442-7	NAWC-072418-RW-141	Water	07/24/18 10:10	07/25/18 09:15
320-41442-8	NAWC-072418-FRB-141	Water	07/24/18 10:05	07/25/18 09:15

Method Summary

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

TestAmerica Job ID: 320-41442-1

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

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Matrix: Water Level: Low

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

Client Sample ID	Lab Sample ID	PFHxA #	PFDA #
WGNA-072418-RW-3148	320-41442-1	87	110
WGNA-072418-FRB-3148	320-41442-2	94	103
NAWC-072418-RW-061	320-41442-3	76	105
NAWC-072418-FRB-061	320-41442-4	97	105
NAWC-072418-RW-029	320-41442-5	76	100
NAWC-072418-FRB-029	320-41442-6	95	103
NAWC-072418-RW-141	320-41442-7	83	107
NAWC-072418-FRB-141	320-41442-8	98	106
	MB 320-237511/1-A	95	108
	LLCS 320-237511/2-A	93	100
	LLCSD 320-237511/3-A	92	100

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA

QC LIMITS
70-130
70-130

Column to be used to flag recovery values

FORM III
LCMS LOW LEVEL CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.08.05_537A_008.d
 Lab ID: LLCS 320-237511/2-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LLCS CONCENTRATION (ng/L)	LLCS % REC	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	40.2	40.5	101	50-150	
Perfluorooctanoic acid (PFOA)	20.0	18.4 J	92	50-150	
Perfluorononanoic acid (PFNA)	20.0	17.7 J	89	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	30.9	102	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	9.16 J	92	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	101	112	50-150	

Column to be used to flag recovery and RPD values

FORM III
LCMS LOW LEVEL CONTROL STANDARD DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.08.05_537A_009.d
 Lab ID: LLCSD 320-237511/3-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LLCSD CONCENTRATION (ng/L)	LLCSD % REC	% RPD	QC LIMITS		#
					RPD	REC	
Perfluorooctanesulfonic acid (PFOS)	40.2	39.0 J	97	4	50	50-150	
Perfluorooctanoic acid (PFOA)	20.0	18.1 J	90	2	50	50-150	
Perfluorononanoic acid (PFNA)	20.0	17.1 J	86	3	50	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	29.5 J	97	5	50	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	9.06 J	91	1	50	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	89.7 J	99	12	50	50-150	

Column to be used to flag recovery and RPD values

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab File ID: 2018.08.05_537A_007.d Lab Sample ID: MB 320-237511/1-A
 Matrix: Water Date Extracted: 08/02/2018 07:58
 Instrument ID: A8_N Date Analyzed: 08/05/2018 20:30
 Level: (Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LLCS 320-237511/2-A	2018.08.05_537A_008.d	08/05/2018 20:35
	LLCSD 320-237511/3-A	2018.08.05_537A_009.d	08/05/2018 20:40
WGNA-072418-RW-3148	320-41442-1	2018.08.05_537A_010.d	08/05/2018 20:44
WGNA-072418-FRB-3148	320-41442-2	2018.08.05_537A_011.d	08/05/2018 20:49
NAWC-072418-RW-061	320-41442-3	2018.08.05_537A_012.d	08/05/2018 20:54
NAWC-072418-FRB-061	320-41442-4	2018.08.05_537A_013.d	08/05/2018 20:58
NAWC-072418-RW-029	320-41442-5	2018.08.05_537A_014.d	08/05/2018 21:03
NAWC-072418-FRB-029	320-41442-6	2018.08.05_537A_015.d	08/05/2018 21:08
NAWC-072418-RW-141	320-41442-7	2018.08.05_537A_016.d	08/05/2018 21:12
NAWC-072418-FRB-141	320-41442-8	2018.08.05_537A_019.d	08/05/2018 21:26

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: MB 320-237511/1-A
 Matrix: Water Lab File ID: 2018.08.05_537A_007.d
 Analysis Method: 537 Date Collected: _____
 Extraction Method: 537 Date Extracted: 08/02/2018 07:58
 Sample wt/vol: 250 (mL) Date Analyzed: 08/05/2018 20:30
 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.: 238080 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	95		70-130
STL00996	13C2 PFDA	108		70-130

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Instrument ID: A8_N Calibration Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3(mm) Calibration End Date: 08/01/2018 02:11
 Calibration ID: 40445

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MEAN AREA AND MEAN RT		832406	1.78	2360189	2.02		
UPPER LIMIT		1248609	2.28	3540284	2.52		
LOWER LIMIT		416203	1.28	1180095	1.52		
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCVL 320-237363/8		871132	1.78	2468904	2.02		
ICV 320-237363/10		856625	1.78	2420430	2.02		
CCVL 320-238066/1		859047	1.78	2433121	2.02		
CCV 320-238080/1 CCVIS		882956	1.76	2543401	2.00		
MB 320-237511/1-A		960279	1.76	2736351	1.99		
LLCS 320-237511/2-A		865247	1.75	2312825	1.99		
LLCSD 320-237511/3-A		900385	1.75	2457298	1.99		
320-41442-1	WGNA-072418-RW-3148	1036280	1.75	2913947	1.99		
320-41442-2	WGNA-072418-FRB-3148	1033646	1.75	2810138	1.99		
320-41442-3	NAWC-072418-RW-061	1093336	1.75	3023812	1.98		
320-41442-4	NAWC-072418-FRB-061	983786	1.75	2664621	1.99		
320-41442-5	NAWC-072418-RW-029	1014582	1.75	2765316	1.99		
320-41442-6	NAWC-072418-FRB-029	901429	1.75	2399270	1.98		
320-41442-7	NAWC-072418-RW-141	892541	1.75	2449468	1.99		
CCV 320-238080/13 CCVIS		905788	1.75	2508704	1.98		
CCV 320-238082/13 CCVIS		905788	1.75	2508704	1.98		
320-41442-8	NAWC-072418-FRB-141	872868	1.76	2385033	1.99		
CCV 320-238082/25 CCVIS		804484	1.75	2288548	1.98		

13PFOA = 13C2-PFOA

PFOS = 13C4 PFOS

Area Limit = 50%-150% of internal standard area

RT Limit = $\pm$ 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Sample No.: CCV 320-238080/1 Date Analyzed: 08/05/2018 20:21
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.08.05_537A_005 Heated Purge: (Y/N) N
 Calibration ID: 40445

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		882956	1.76	2543401	2.00		
UPPER LIMIT		1236138	2.26	3560761	2.50		
LOWER LIMIT		618069	1.26	1780381	1.50		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-237511/1-A		960279	1.76	2736351	1.99		
LLCS 320-237511/2-A		865247	1.75	2312825	1.99		
LLCSD 320-237511/3-A		900385	1.75	2457298	1.99		
320-41442-1	WGNA-072418-RW-3148	1036280	1.75	2913947	1.99		
320-41442-2	WGNA-072418-FRB-3148	1033646	1.75	2810138	1.99		
320-41442-3	NAWC-072418-RW-061	1093336	1.75	3023812	1.98		
320-41442-4	NAWC-072418-FRB-061	983786	1.75	2664621	1.99		
320-41442-5	NAWC-072418-RW-029	1014582	1.75	2765316	1.99		
320-41442-6	NAWC-072418-FRB-029	901429	1.75	2399270	1.98		
320-41442-7	NAWC-072418-RW-141	892541	1.75	2449468	1.99		

13PFOA = 13C2-PFOA
 13PFOA = 13C2-PFOA
 PFOS = 13C4 PFOS
 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
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Sample No.: CCV 320-238080/13 Date Analyzed: 08/05/2018 21:17
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.08.05_537A_017 Heated Purge: (Y/N) N
 Calibration ID: 40445

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		905788	1.75	2508704	1.98		
UPPER LIMIT		1268103	2.25	3512186	2.48		
LOWER LIMIT		634052	1.25	1756093	1.48		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-237511/1-A		960279	1.76	2736351	1.99		
LLCS 320-237511/2-A		865247	1.75	2312825	1.99		
LLCSD 320-237511/3-A		900385	1.75	2457298	1.99		
320-41442-1	WGNA-072418-RW-3148	1036280	1.75	2913947	1.99		
320-41442-2	WGNA-072418-FRB-3148	1033646	1.75	2810138	1.99		
320-41442-3	NAWC-072418-RW-061	1093336	1.75	3023812	1.98		
320-41442-4	NAWC-072418-FRB-061	983786	1.75	2664621	1.99		
320-41442-5	NAWC-072418-RW-029	1014582	1.75	2765316	1.99		
320-41442-6	NAWC-072418-FRB-029	901429	1.75	2399270	1.98		
320-41442-7	NAWC-072418-RW-141	892541	1.75	2449468	1.99		

13PFOA = 13C2-PFOA
 13PFOA = 13C2-PFOA
 PFOS = 13C4 PFOS
 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
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Sample No.: CCV 320-238082/13 Date Analyzed: 08/05/2018 21:17
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.08.05_537A_017 Heated Purge: (Y/N) N
 Calibration ID: 40445

	13PFOA		PFOS			
	AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD	905788	1.75	2508704	1.98		
UPPER LIMIT	1268103	2.25	3512186	2.48		
LOWER LIMIT	634052	1.25	1756093	1.48		
LAB SAMPLE ID	CLIENT SAMPLE ID					
320-41442-8	NAWC-072418-FRB-141		872868	1.76	2385033	1.99

13PFOA = 13C2-PFOA
 13PFOA = 13C2-PFOA
 PFOS = 13C4 PFOS
 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
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Sample No.: CCV 320-238082/25 Date Analyzed: 08/05/2018 22:13
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.08.05_537A_029 Heated Purge: (Y/N) N
 Calibration ID: 40445

	13PFOA		PFOS		AREA #	RT #
	AREA #	RT #	AREA #	RT #		
12/24 HOUR STD	804484	1.75	2288548	1.98		
UPPER LIMIT	1126278	2.25	3203967	2.48		
LOWER LIMIT	563139	1.25	1601984	1.48		
LAB SAMPLE ID	CLIENT SAMPLE ID					
320-41442-8	NAWC-072418-FRB-141		872868	1.76	2385033	1.99

13PFOA = 13C2-PFOA
 13PFOA = 13C2-PFOA
 PFOS = 13C4 PFOS
 PFOS = 13C4 PFOS
 Area Limit = 70%-140% of internal standard area
 RT Limit = $\pm$ 0.5 minutes of internal standard RT

Column used to flag values outside QC limits

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

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1 Analy Batch No.: 237363

SDG No.: _____

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

Calibration Start Date: 08/01/2018 01:52 Calibration End Date: 08/01/2018 02:11 Calibration ID: 40445

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-237363/2	2018.07.31_537CURVEA_004.d
Level 2	IC 320-237363/3	2018.07.31_537CURVEA_005.d
Level 3	IC 320-237363/4	2018.07.31_537CURVEA_006.d
Level 4	IC 320-237363/5	2018.07.31_537CURVEA_007.d
Level 5	IC 320-237363/6	2018.07.31_537CURVEA_008.d

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5		B	M1	M2								
Perfluorobutanesulfonic acid (PFBS)	1.3554	1.4070	1.3182	1.2380	1.1154	Ave		1.2868				8.9		30.0			
Perfluoroheptanoic acid (PFHpA)	1.1193	1.1541	1.1333	1.0993	1.0790	Ave		1.1170				2.6		30.0			
Perfluorohexanesulfonic acid (PFHxS)	1.6429	1.7774	1.7898	1.7946	1.7766	Ave		1.7563				3.6		30.0			
Perfluorooctanoic acid (PFOA)	1.0363	1.0657	1.0996	1.0823	1.0783	Ave		1.0724				2.2		30.0			
Perfluorooctanesulfonic acid (PFOS)	1.0310	1.0895	1.1067	1.1155	1.1193	Ave		1.0924				3.3		30.0			
Perfluorononanoic acid (PFNA)	0.8099	0.7963	0.8125	0.7888	0.7990	Ave		0.8013				1.2		30.0			
13C2 PFHxA	1.1430	1.1282	1.1389	1.1123	1.1697	Ave		1.1384				1.9		30.0			
13C2 PFDA	0.6080	0.6204	0.6351	0.6159	0.6236	Ave		0.6206				1.6		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.: 320-41442-1 Analy Batch No.: 237363

SDG No.: _____

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

Calibration Start Date: 08/01/2018 01:52 Calibration End Date: 08/01/2018 02:11 Calibration ID: 40445

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-237363/2	2018.07.31_537CURVEA_004.d
Level 2	IC 320-237363/3	2018.07.31_537CURVEA_005.d
Level 3	IC 320-237363/4	2018.07.31_537CURVEA_006.d
Level 4	IC 320-237363/5	2018.07.31_537CURVEA_007.d
Level 5	IC 320-237363/6	2018.07.31_537CURVEA_008.d

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5
Perfluorobutanesulfonic acid (PFBS)	PFOS	Ave	2332223	5165086	9911205	12708606	16978219	20.0	45.0	90.1	135	180
Perfluoroheptanoic acid (PFHpA)	13PFO	Ave	207280	471272	907971	1244808	1811361	2.16	4.86	9.72	14.6	19.4
Perfluorohexanesulfonic acid (PFHxS)	PFOS	Ave	949475	2191389	4519511	6187681	9082366	6.72	15.1	30.2	45.4	60.5
Perfluorooctanoic acid (PFOA)	13PFO	Ave	390921	886431	1794490	2496628	3687616	4.40	9.90	19.8	29.7	39.6
Perfluorooctanesulfonic acid (PFOS)	PFOS	Ave	778689	1755508	3652253	5026530	7478599	8.79	19.8	39.5	59.3	79.1
Perfluorononanoic acid (PFNA)	13PFO	Ave	305510	662336	1325997	1819468	2732485	4.40	9.90	19.8	29.7	39.6
13C2 PFHxA	13PFO	Ave	979950	947875	938720	863882	1010165	10.0	10.0	10.0	10.0	10.0
13C2 PFDA	13PFO	Ave	521256	521256	523489	478337	538534	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.: 320-41442-1 Analy Batch No.: 237363

SDG No.: _____

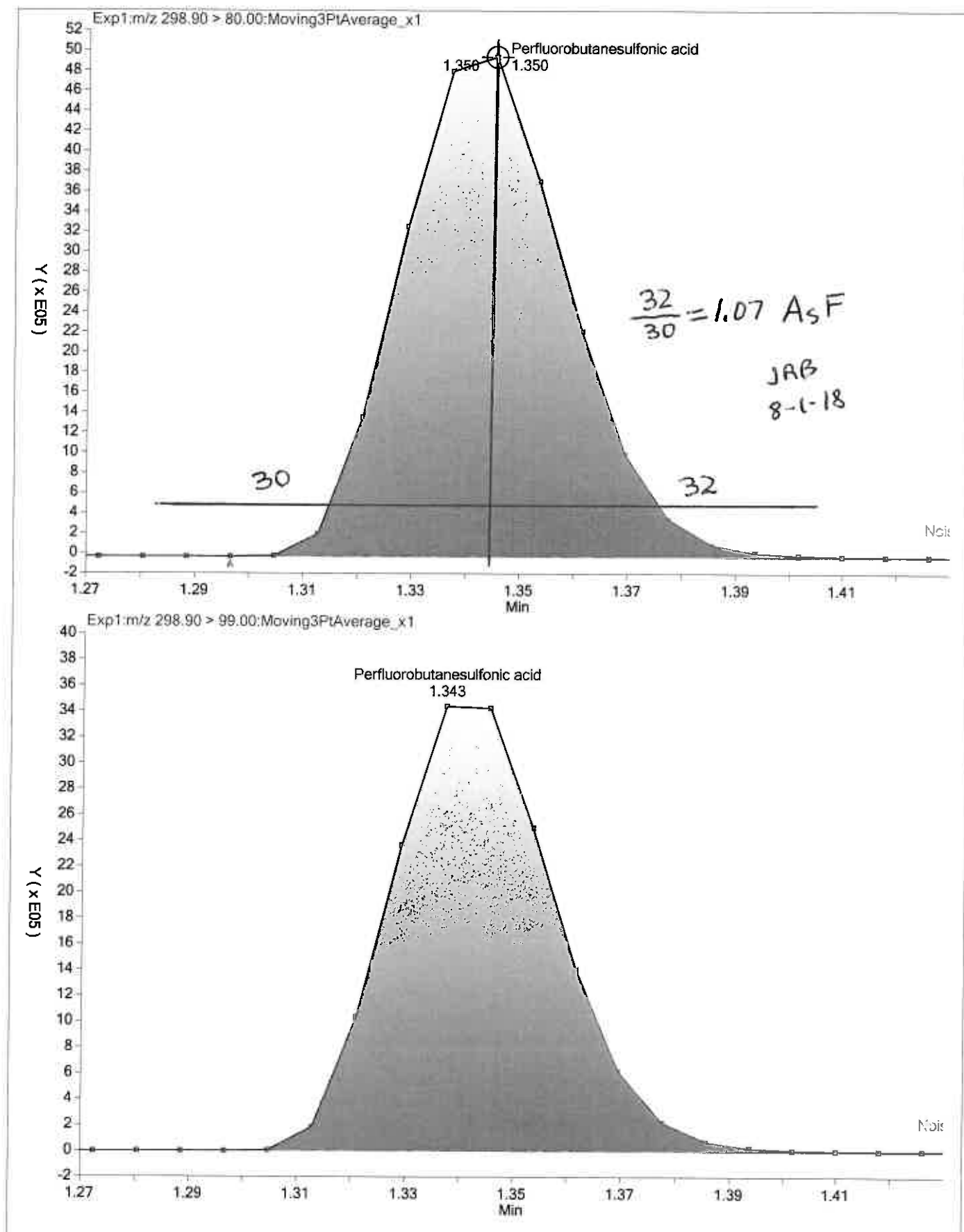
Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

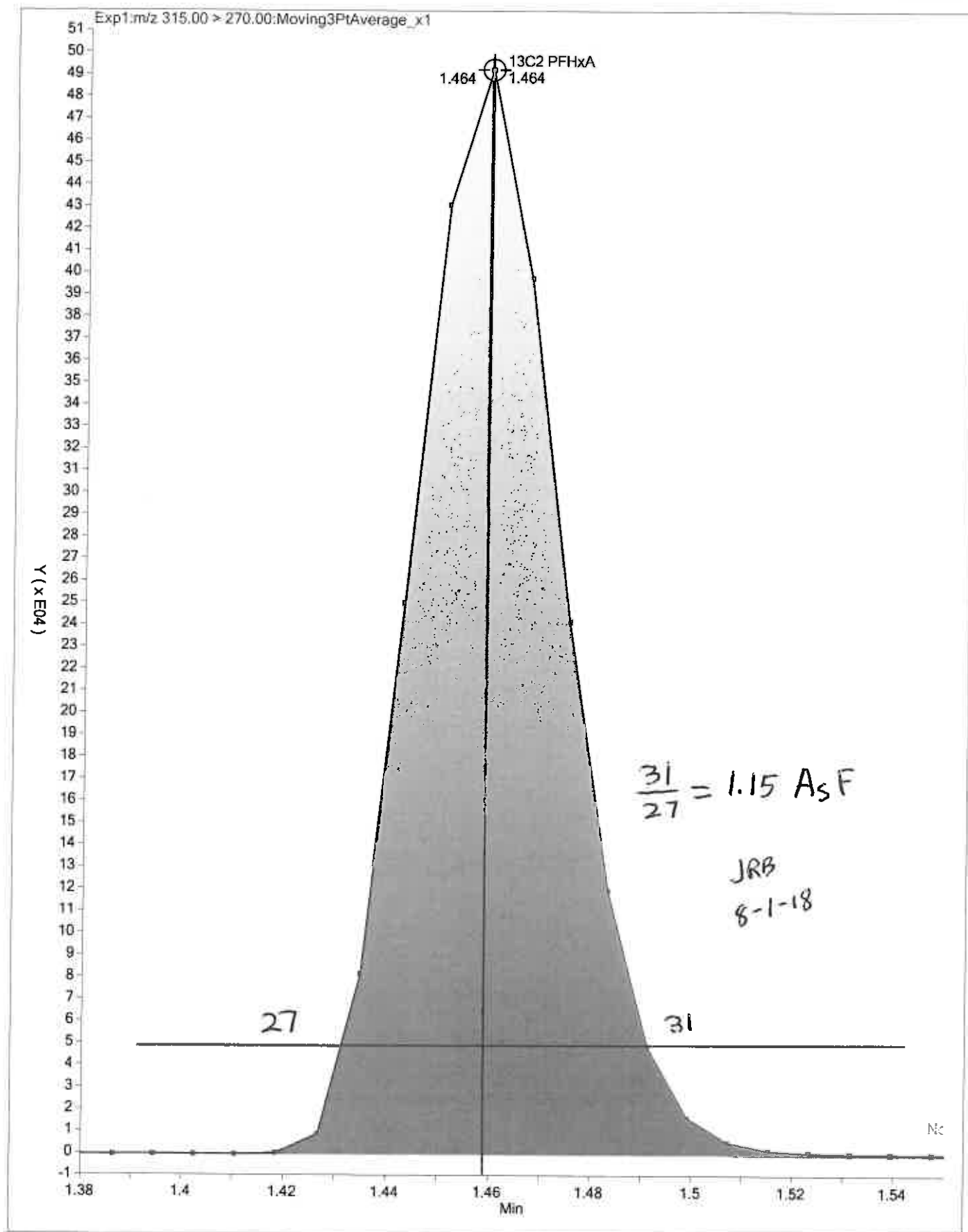
Calibration Start Date: 08/01/2018 01:52 Calibration End Date: 08/01/2018 02:11 Calibration ID: 40445

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-237363/2	2018.07.31_537CURVEA_004.d
Level 2	IC 320-237363/3	2018.07.31_537CURVEA_005.d
Level 3	IC 320-237363/4	2018.07.31_537CURVEA_006.d
Level 4	IC 320-237363/5	2018.07.31_537CURVEA_007.d
Level 5	IC 320-237363/6	2018.07.31_537CURVEA_008.d

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #		LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	
Perfluorobutanesulfonic acid (PFBS)	5.3	9.3	2.4	-3.8	-13.3		50	30	30	30	30	
Perfluoroheptanoic acid (PFHpA)	0.2	3.3	1.5	-1.6	-3.4		50	30	30	30	30	
Perfluorohexanesulfonic acid (PFHxS)	-6.5	1.2	1.9	2.2	1.2		50	30	30	30	30	
Perfluorooctanoic acid (PFOA)	-3.4	-0.6	2.5	0.9	0.5		50	30	30	30	30	
Perfluorooctanesulfonic acid (PFOS)	-5.6	-0.3	1.3	2.1	2.5		50	30	30	30	30	
Perfluorononanoic acid (PFNA)	1.1	-0.6	1.4	-1.6	-0.3		50	30	30	30	30	
13C2 PFHxA	0.4	-0.9	0.0	-2.3	2.8		30	30	30	30	30	
13C2 PFDA	-2.0	0.0	2.3	-0.8	0.5		30	30	30	30	30	





FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-237363/8 Calibration Date: 08/01/2018 02:20
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.07.31_537CURVEA_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	1.287	1.385		21.5	20.0	7.6	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.176		2.27	2.16	5.3	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.686		6.45	6.72	-4.0	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.050		4.31	4.40	-2.1	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.024		8.24	8.79	-6.2	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.7777		4.27	4.40	-2.9	50.0
13C2 PFHxA	Ave	1.138	1.112		9.77	10.0	-2.3	30.0
13C2 PFDA	Ave	0.6206	0.6172		9.94	10.0	-0.6	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: ICV 320-237363/10 Calibration Date: 08/01/2018 02:30
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.07.31_537CURVEA_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	1.287	1.128		87.8	100	-12.3	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	0.997		8.93	10.0	-10.7	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.607		18.4	20.2	-8.5	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	0.8804		16.6	20.2	-17.9	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	0.9637		17.8	20.2	-11.8	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.7462		18.8	20.2	-6.9	30.0
13C2 PFHxA	Ave	1.138	1.073		9.43	10.0	-5.7	30.0
13C2 PFDA	Ave	0.6206	0.6210		10.0	10.0	0.0	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-238066/1 Calibration Date: 08/05/2018 15:35
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.04_537A_003.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.315		20.4	20.0	2.2	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.604		6.14	6.72	-8.7	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.147		2.22	2.16	2.7	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.028		4.22	4.40	-4.1	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.049		8.43	8.79	-4.0	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.7729		4.24	4.40	-3.5	50.0
13C2 PFHxA	Ave	1.138	1.169		10.3	10.0	2.6	30.0
13C2 PFDA	Ave	0.6206	0.6328		10.2	10.0	2.0	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCV 320-238080/1 Calibration Date: 08/05/2018 20:21
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.05_537A_005.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.163		122	135	-9.6	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.742		45.0	45.4	-0.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.094		14.3	14.6	-2.0	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.059		29.3	29.7	-1.2	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.091		59.2	59.3	-0.2	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.7839		29.1	29.7	-2.2	30.0
13C2 PFHxA	Ave	1.138	1.188		10.4	10.0	4.4	30.0
13C2 PFDA	Ave	0.6206	0.6424		10.4	10.0	3.5	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCV 320-238080/13 Calibration Date: 08/05/2018 21:17
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.05_537A_017.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.388		48.6	45.0	7.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.157		5.03	4.86	3.6	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.781		15.3	15.1	1.4	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.087		10.0	9.90	1.4	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.077		19.5	19.8	-1.4	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.8027		9.92	9.90	0.2	30.0
13C2 PFHxA	Ave	1.138	1.174		10.3	10.0	3.1	30.0
13C2 PFDA	Ave	0.6206	0.6362		10.3	10.0	2.5	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCV 320-238082/13 Calibration Date: 08/05/2018 21:17
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.05_537A_017.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.388		48.6	45.0	7.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.157		5.03	4.86	3.6	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.781		15.3	15.1	1.4	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.087		10.0	9.90	1.4	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.077		19.5	19.8	-1.4	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.8027		9.92	9.90	0.2	30.0
13C2 PFHxA	Ave	1.138	1.174		10.3	10.0	3.1	30.0
13C2 PFDA	Ave	0.6206	0.6362		10.3	10.0	2.5	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1
 SDG No.: _____
 Lab Sample ID: CCV 320-238082/25 Calibration Date: 08/05/2018 22:13
 Instrument ID: A8_N Calib Start Date: 08/01/2018 01:52
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 08/01/2018 02:11
 Lab File ID: 2018.08.05_537A_029.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.287	1.180		124	135	-8.3	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.117	1.182		15.4	14.6	5.8	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.756	1.811		46.8	45.4	3.1	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.072	1.112		30.8	29.7	3.7	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.092	1.127		61.2	59.3	3.2	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8013	0.8025		29.7	29.7	0.2	30.0
13C2 PFHxA	Ave	1.138	1.246		10.9	10.0	9.5	30.0
13C2 PFDA	Ave	0.6206	0.6692		10.8	10.0	7.8	30.0

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Instrument ID: A8_N Start Date: 08/01/2018 01:52Analysis Batch Number: 237363 End Date: 08/01/2018 02:30

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-237363/2		08/01/2018 01:52	1	2018.07.31_537C URVEA 004.d	GeminiC18 3x100 3(mm)
IC 320-237363/3		08/01/2018 01:57	1	2018.07.31_537C URVEA 005.d	GeminiC18 3x100 3(mm)
IC 320-237363/4 ICISAV		08/01/2018 02:02	1	2018.07.31_537C URVEA 006.d	GeminiC18 3x100 3(mm)
IC 320-237363/5		08/01/2018 02:06	1	2018.07.31_537C URVEA 007.d	GeminiC18 3x100 3(mm)
IC 320-237363/6		08/01/2018 02:11	1	2018.07.31_537C URVEA 008.d	GeminiC18 3x100 3(mm)
ZZZZZ		08/01/2018 02:16	1		GeminiC18 3x100 3(mm)
CCVL 320-237363/8		08/01/2018 02:20	1	2018.07.31_537C URVEA 010.d	GeminiC18 3x100 3(mm)
ICB 320-237363/9		08/01/2018 02:25	1		GeminiC18 3x100 3(mm)
ICV 320-237363/10		08/01/2018 02:30	1	2018.07.31_537C URVEA 012.d	GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Instrument ID: A8_N Start Date: 08/05/2018 15:35Analysis Batch Number: 238066 End Date: 08/05/2018 16:36

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-238066/1		08/05/2018 15:35	1	2018.08.04_537A 003.d	GeminiC18 3x100 3(mm)
CCV 320-238066/2 CCVIS		08/05/2018 15:40	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 15:45	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 15:49	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 15:54	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 15:59	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:03	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:08	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:13	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:17	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:22	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:27	1		GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 16:32	1		GeminiC18 3x100 3(mm)
CCV 320-238066/14 CCVIS		08/05/2018 16:36	1		GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica SacramentoJob No.: 320-41442-1

SDG No.: _____

Instrument ID: A8_NStart Date: 08/05/2018 20:21Analysis Batch Number: 238080End Date: 08/05/2018 21:17

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-238080/1 CCVIS		08/05/2018 20:21	1	2018.08.05_537A 005.d	GeminiC18 3x100 3(mm)
ZZZZZ		08/05/2018 20:25	1		GeminiC18 3x100 3(mm)
MB 320-237511/1-A		08/05/2018 20:30	1	2018.08.05_537A 007.d	GeminiC18 3x100 3(mm)
LLCS 320-237511/2-A		08/05/2018 20:35	1	2018.08.05_537A 008.d	GeminiC18 3x100 3(mm)
LLCSD 320-237511/3-A		08/05/2018 20:40	1	2018.08.05_537A 009.d	GeminiC18 3x100 3(mm)
320-41442-1		08/05/2018 20:44	1	2018.08.05_537A 010.d	GeminiC18 3x100 3(mm)
320-41442-2		08/05/2018 20:49	1	2018.08.05_537A 011.d	GeminiC18 3x100 3(mm)
320-41442-3		08/05/2018 20:54	1	2018.08.05_537A 012.d	GeminiC18 3x100 3(mm)
320-41442-4		08/05/2018 20:58	1	2018.08.05_537A 013.d	GeminiC18 3x100 3(mm)
320-41442-5		08/05/2018 21:03	1	2018.08.05_537A 014.d	GeminiC18 3x100 3(mm)
320-41442-6		08/05/2018 21:08	1	2018.08.05_537A 015.d	GeminiC18 3x100 3(mm)
320-41442-7		08/05/2018 21:12	1	2018.08.05_537A 016.d	GeminiC18 3x100 3(mm)
CCV 320-238080/13 CCVIS		08/05/2018 21:17	1	2018.08.05_537A 017.d	GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Instrument ID: A8_N Start Date: 08/05/2018 21:17Analysis Batch Number: 238082 End Date: 08/05/2018 22:13

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-238082/13 CCVIS		08/05/2018 21:17	1	2018.08.05_537A 017.d	GeminiC18 3x100 3(mm)
320-41442-8		08/05/2018 21:26	1	2018.08.05_537A 019.d	GeminiC18 3x100 3(mm)
CCV 320-238082/25 CCVIS		08/05/2018 22:13	1	2018.08.05_537A 029.d	GeminiC18 3x100 3(mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-41442-1

SDG No.: _____

Batch Number: 237511 Batch Start Date: 08/02/18 07:57 Batch Analyst: Kouchari, ShamiranBatch Method: 537 Batch End Date: 08/02/18 16:50

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	ReceivedpH	LC537-IS 00076
MB 320-237511/1		537, 537				250 mL	1.00 mL	7 SU	100 uL
LLCS 320-237511/2		537, 537				250 mL	1.00 mL	7 SU	100 uL
LLCSD 320-237511/3		537, 537				250 mL	1.00 mL	7 SU	100 uL
320-41442-A-1	WGNA-072418-RW-3148	537, 537	T	291.60 g	28.48 g	263.1 mL	1.00 mL	7 SU	100 uL
320-41442-A-2	WGNA-072418-FRB-3148	537, 537	T	282.62 g	29.25 g	253.4 mL	1.00 mL	7 SU	100 uL
320-41442-A-3	NAWC-072418-RW-061	537, 537	T	283.92 g	28.66 g	255.3 mL	1.00 mL	7 SU	100 uL
320-41442-A-4	NAWC-072418-FRB-061	537, 537	T	295.51 g	29.27 g	266.2 mL	1.00 mL	7 SU	100 uL
320-41442-A-5	NAWC-072418-RW-029	537, 537	T	288.94 g	28.94 g	260 mL	1.00 mL	7 SU	100 uL
320-41442-A-6	NAWC-072418-FRB-029	537, 537	T	292.47 g	30.55 g	261.9 mL	1.00 mL	7 SU	100 uL
320-41442-A-7	NAWC-072418-RW-141	537, 537	T	282.77 g	28.70 g	254.1 mL	1.00 mL	7 SU	100 uL
320-41442-A-8	NAWC-072418-FRB-141	537, 537	T	299.33 g	29.16 g	270.2 mL	1.00 mL	7 SU	100 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-LSP 00032	LC537-SU 00075	AnalysisComment			
MB 320-237511/1		537, 537			100 uL	Chlorine, ND			
LLCS 320-237511/2		537, 537		100 uL	100 uL	Chlorine, ND			
LLCSD 320-237511/3		537, 537		100 uL	100 uL	Chlorine, ND			
320-41442-A-1	WGNA-072418-RW-3148	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-2	WGNA-072418-FRB-3148	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-3	NAWC-072418-RW-061	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-4	NAWC-072418-FRB-061	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-5	NAWC-072418-RW-029	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-6	NAWC-072418-FRB-029	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.: 320-41442-1

SDG No.: _____

Batch Number: 237511 Batch Start Date: 08/02/18 07:57 Batch Analyst: Kouchari, ShamiranBatch Method: 537 Batch End Date: 08/02/18 16:50

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-LSP 00032	LC537-SU 00075	AnalysisComment			
320-41442-A-7	NAWC-072418-RW-141	537, 537	T		100 uL	Chlorine, ND			
320-41442-A-8	NAWC-072418-FRB-141	537, 537	T		100 uL	Chlorine, ND			

Batch Notes	
Analyst ID - Aliquot Step	SKD
Batch Comment	Client labels match TA label, SKD 08/02/18
Analyst ID - Concentration	SKD
Analyst ID - Final Volume Step	SKD
Internal Standard ID#	1303557
Manifold ID	1
Methanol ID	1319275
pH Indicator ID	0818
Pipette ID	R40536G
Analyst ID - IS Reagent Drop	SKD
Analyst ID - IS Reagent Drop Witness	SR
Analyst ID - SU Reagent Drop	SKD
Analyst ID - SU Reagent Drop Witness	HJA
Analyst ID - TA Reagent Drop	SKD
Analyst ID - TA Reagent Drop Witness	HJA
SPE Cartridge Lot ID	6390138-07
Trizma ID	SLBR5241V
Reagent Water ID	07/30/18

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
Instrument A8_N

8/1/2018

PFOA

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	Reported RRF
4.4	390921	857329	10	1.03631	1.0363
9.9	886431	840187	10	1.06570	1.0657
19.8	1794490	824246	10	1.09956	1.0996
29.7	2496628	776688	10	1.08231	1.0823
39.6	3687616	863581	10	1.07832	1.0783
Average				1.07244	1.0724
Standard Deviation				0.0236	
RSD				0.0220	
%RSD				2.19595	2.2

Continuing Calibration
PFOA

08/05/2018 @ 20:21

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	%D	Reported RRF	Reported %D
29.7	2777959	882956	10	1.0593	-1.218978	1.059	-1.2

Sample Identification
Compound

WGNA-072418-RW-3148
PFOA

Compound Area	746542	Average RRF	1.0724
Internal Standard Amount (ng)	10	Sample Volume(ml)	263.1
Dilution Factor	1	Volume Extract (ml)	1
Internal Standard Area	1036280	Injection Volume (µl)	1

Concentration
Reported Result

25.5329 ng/L
26 ng/L

Surrogate PFHxA

Compound Area	1022303		
Internal Standard Amount (ng)	10		
Dilution Factor	1	Volume Extract (ml)	1
Internal Standard Area	1036280	Injection Volume (µl)	1
Average RRF	1.1384		
Concentration	8.6658		
Surrogate %R	86.66	Spike amount	10

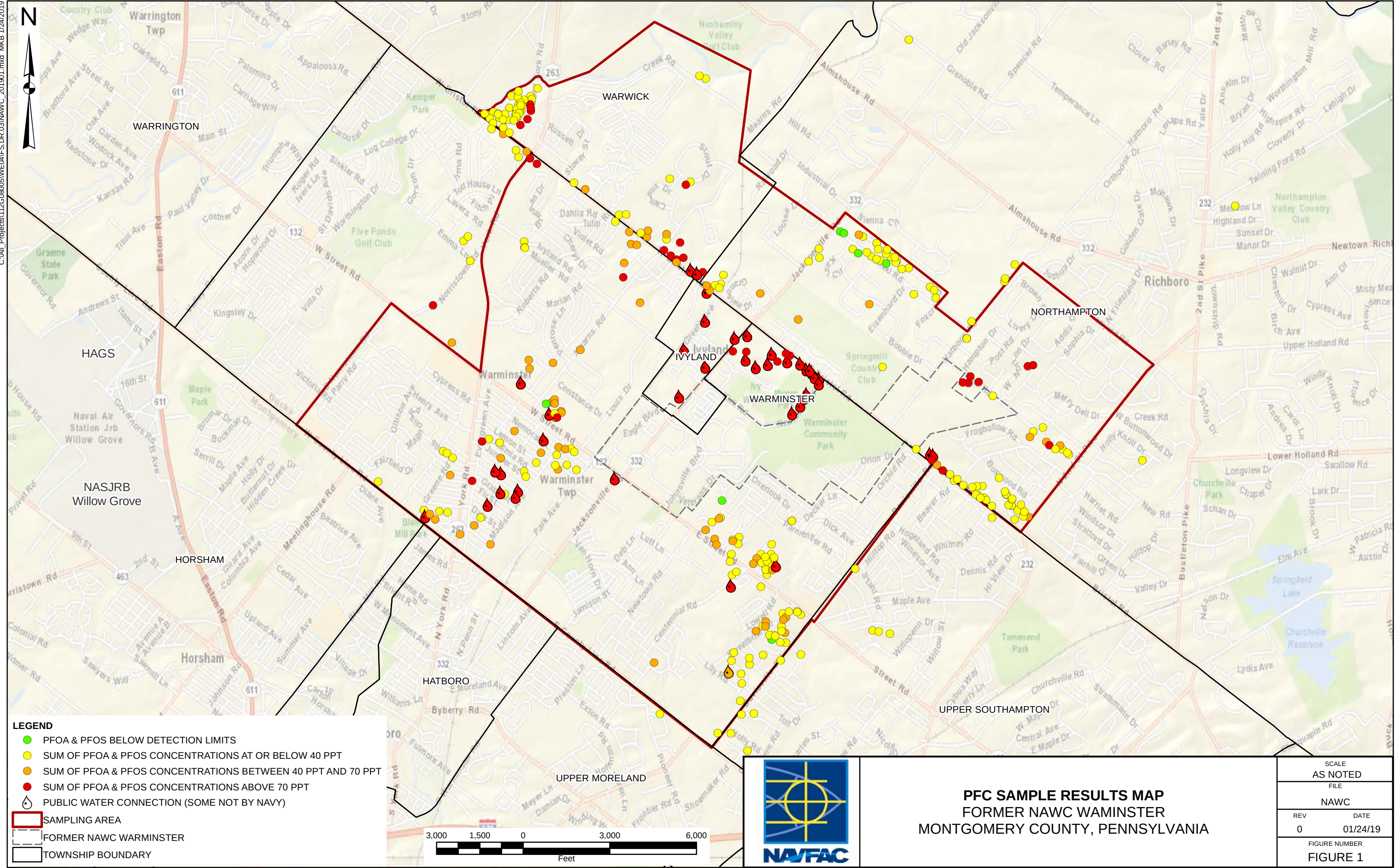
LCS %R

320-237511/2-A
PFOA
92.00

Spike amount
20

LCS concentration
18.4

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LEGEND

PFOA & PFOS BELOW DETECTION LIMITS

SUM OF PFOA & PFOS CONCENTRATIONS AT OR BELOW 40 PPT

SUM OF PFOA & PFOS CONCENTRATIONS BETWEEN 40 PPT AND 70 PPT

SUM OF PFOA & PFOS CONCENTRATIONS ABOVE 70 PPT

PUBLIC WATER CONNECTION (SOME NOT BY NAVY)

SAMPLING AREA

FORMER NAWC WARMINSTER

TOWNSHIP BOUNDARY



PFC SAMPLE RESULTS MAP

FORMER NAWC WAMINSTER

MONTGOMERY COUNTY, PENNSYLVANIA

SCALE

AS NOTED

FILE

NAWC

REV

DATE

0

01/24/19

FIGURE NUMBER

FIGURE 1