



Off-Base Drinking Water Sample Results, Electronic Data Deliverable, Data Validation Report, and the Sample Location Figure, SDG 320-44634-1

*Naval Air Station Willow Grove
Willow Grove, Pennsylvania*

August 2019

"WGNA-102518-RW-0569","537","RES","320-44634-1","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","20","ng/L","",0.84,"DL","",TRG","",4.4,"LOQ","YES",-99,"",283.7,"10.00","1.8",""
"WGNA-102518-RW-0569","537","RES","320-44634-1","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","18","ng/L","M","2.4","DL","",TRG","",6.2,"LOQ","YES",-99,"",283.7,"10.00","5.3",""
"WGNA-102518-RW-0569","537","RES","320-44634-1","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","3.7","ng/L","J","0.56","DL","",TRG","",4.4,"LOQ","YES",-99,"",283.7,"10.00","1.8",""
"WGNA-102518-RW-0569","537","RES","320-44634-1","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","5.3","ng/L","",0.70,"DL","",TRG","",4.4,"LOQ","YES",-99,"",283.7,"10.00","1.8",""
"WGNA-102518-RW-0569","537","RES","320-44634-1","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","6.7","ng/L","",1.1,"DL","",TRG","",4.4,"LOQ","YES",-99,"",283.7,"10.00","2.6",""
"WGNA-102518-RW-0569","537","RES","320-44634-1","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","3.6","ng/L","J","0.41","DL","",TRG","",4.4,"LOQ","YES",-99,"",283.7,"10.00","0.88",""
"WGNA-102518-RW-0569","537","RES","320-44634-1","TALSAC","STL00993","13C2
PFHxA","84","ng/L","",-99,"DL","",SURR","95","",-99,"LOQ","YES","88.1","",283.7,"10.00","0",""
"WGNA-102518-RW-0569","537","RES","320-44634-1","TALSAC","STL00996","13C2
PFDA","84","ng/L","",-99,"DL","",SURR","95","",-99,"LOQ","YES","88.1","",283.7,"10.00","0",""
"WGNA-102518-FRB-0569","537","RES","320-44634-2","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","1.8","ng/L","U","0.87","DL","",TRG","",4.6,"LOQ","YES",-99,"",272.7,"10.00","1.8",""
"WGNA-102518-FRB-0569","537","RES","320-44634-2","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","5.5","ng/L","U","2.5","DL","",TRG","",6.4,"LOQ","YES",-99,"",272.7,"10.00","5.5",""
"WGNA-102518-FRB-0569","537","RES","320-44634-2","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","1.8","ng/L","U","0.59","DL","",TRG","",4.6,"LOQ","YES",-99,"",272.7,"10.00","1.8",""
"WGNA-102518-FRB-0569","537","RES","320-44634-2","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","1.8","ng/L","U","0.73","DL","",TRG","",4.6,"LOQ","YES",-99,"",272.7,"10.00","1.8",""
"WGNA-102518-FRB-0569","537","RES","320-44634-2","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","2.8","ng/L","U","1.2","DL","",TRG","",4.6,"LOQ","YES",-99,"",272.7,"10.00","2.8",""
"WGNA-102518-FRB-0569","537","RES","320-44634-2","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","0.92","ng/L","U","0.43","DL","",TRG","",4.6,"LOQ","YES",-99,"",272.7,"10.00","0.92",""
"WGNA-102518-FRB-0569","537","RES","320-44634-2","TALSAC","STL00993","13C2
PFHxA","93","ng/L","",-99,"DL","",SURR","101","",-99,"LOQ","YES","91.7","",272.7,"10.00","0",""
"WGNA-102518-FRB-0569","537","RES","320-44634-2","TALSAC","STL00996","13C2
PFDA","87","ng/L","",-99,"DL","",SURR","95","",-99,"LOQ","YES","91.7","",272.7,"10.00","0",""
"LLCS 320-257580/2-A","537","RES","LLCS 320-257580/2-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","3.32","ng/L","J","0.95","DL","",SPK","89","",5.0,"LOQ","YES","3.71","",250,"10.00","2.0",""
"LLCS 320-257580/2-A","537","RES","LLCS 320-257580/2-A","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","3.59","ng/L","J M","2.7","DL","",SPK","90","",7.0,"LOQ","YES","4.00","",250,"10.00","6.0",""
"LLCS 320-257580/2-A","537","RES","LLCS 320-257580/2-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","3.50","ng/L","J","0.64","DL","",SPK","96","",5.0,"LOQ","YES","3.64","",250,"10.00","2.0",""
"LLCS 320-257580/2-A","537","RES","LLCS 320-257580/2-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","3.15","ng/L","J","0.80","DL","",SPK","89","",5.0,"LOQ","YES","3.54","",250,"10.00","2.0",""
"LLCS 320-257580/2-A","537","RES","LLCS 320-257580/2-A","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","3.62","ng/L","J","1.3","DL","",SPK","90","",5.0,"LOQ","YES","4.00","",250,"10.00","3.0",""
"LLCS 320-257580/2-A","537","RES","LLCS 320-257580/2-A","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","3.74","ng/L","J","0.47","DL","",SPK","94","",5.0,"LOQ","YES","4.00","",250,"10.00","1.0",""
"LLCS 320-257580/2-A","537","RES","LLCS 320-257580/2-A","TALSAC","STL00993","13C2
PFHxA","94.6","ng/L","",-99,"DL","",SURR","95","",-99,"LOQ","YES","100","",250,"10.00","0",""
"LLCS 320-257580/2-A","537","RES","LLCS 320-257580/2-A","TALSAC","STL00996","13C2
PFDA","91.0","ng/L","",-99,"DL","",SURR","91","",-99,"LOQ","YES","100","",250,"10.00","0",""
"LLCSD 320-257580/3-A","537","RES","LLCSD 320-257580/3-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","3.38","ng/L","J","0.95","DL","",SPK","91","2",5.0,"LOQ","YES","3.71","LLCS 320-257580/2-A","250","10.00","2.0",""
"LLCSD 320-257580/3-A","537","RES","LLCSD 320-257580/3-A","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","3.98","ng/L","J","2.7","DL","",SPK","99","10",7.0,"LOQ","YES","4.00","LLCS 320-257580/2-

A","250","10.00","6.0",""
"LLCSD 320-257580/3-A","537","RES","LLCSD 320-257580/3-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","3.38","ng/L","J","0.64","DL","","SPK","93","3","5.0","LOQ","YES","3.64","LLCS 320-257580/2-A","250","10.00","2.0",""
"LLCSD 320-257580/3-A","537","RES","LLCSD 320-257580/3-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","3.51","ng/L","J","0.80","DL","","SPK","99","11","5.0","LOQ","YES","3.54","LLCS 320-257580/2-A","250","10.00","2.0",""
"LLCSD 320-257580/3-A","537","RES","LLCSD 320-257580/3-A","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","3.56","ng/L","J","1.3","DL","","SPK","89","1","5.0","LOQ","YES","4.00","LLCS 320-257580/2-A","250","10.00","3.0",""
"LLCSD 320-257580/3-A","537","RES","LLCSD 320-257580/3-A","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","3.82","ng/L","J","0.47","DL","","SPK","96","2","5.0","LOQ","YES","4.00","LLCS 320-257580/2-A","250","10.00","1.0",""
"LLCSD 320-257580/3-A","537","RES","LLCSD 320-257580/3-A","TALSAC","STL00993","13C2 PFHxA","104","ng/L","","-99","DL","","SURRE","104","9","-99","LOQ","YES","100","LLCS 320-257580/2-A","250","10.00","0",""
"LLCSD 320-257580/3-A","537","RES","LLCSD 320-257580/3-A","TALSAC","STL00996","13C2 PFDA","98.5","ng/L","","-99","DL","","SURRE","99","8","-99","LOQ","YES","100","LLCS 320-257580/2-A","250","10.00","0",""
"MB 320-257580/1-A","537","RES","MB 320-257580/1-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","2.0","ng/L","U","0.95","DL","","TRG","","","5.0","LOQ","YES","-99","","250","10.00","2.0",""
"MB 320-257580/1-A","537","RES","MB 320-257580/1-A","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","6.0","ng/L","U","2.7","DL","","TRG","","","7.0","LOQ","YES","-99","","250","10.00","6.0",""
"MB 320-257580/1-A","537","RES","MB 320-257580/1-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","2.0","ng/L","U","0.64","DL","","TRG","","","5.0","LOQ","YES","-99","","250","10.00","2.0",""
"MB 320-257580/1-A","537","RES","MB 320-257580/1-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","2.0","ng/L","U","0.80","DL","","TRG","","","5.0","LOQ","YES","-99","","250","10.00","2.0",""
"MB 320-257580/1-A","537","RES","MB 320-257580/1-A","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","3.0","ng/L","U","1.3","DL","","TRG","","","5.0","LOQ","YES","-99","","250","10.00","3.0",""
"MB 320-257580/1-A","537","RES","MB 320-257580/1-A","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","1.0","ng/L","U","0.47","DL","","TRG","","","5.0","LOQ","YES","-99","","250","10.00","1.0",""
"MB 320-257580/1-A","537","RES","MB 320-257580/1-A","TALSAC","STL00993","13C2 PFHxA","87.0","ng/L","","-99","DL","","SURRE","87","","-99","LOQ","YES","100","","250","10.00","0",""
"MB 320-257580/1-A","537","RES","MB 320-257580/1-A","TALSAC","STL00996","13C2 PFDA","82.4","ng/L","","-99","DL","","SURRE","82","","-99","LOQ","YES","100","","250","10.00","0",""
"Unknown","Unknown","WGNA-102518-RW-0569","10/25/2018 15:10","AQ","320-44634-1","NM","","14.70","537","METHOD","RES","11/07/2018 10:40","11/08/2018 16:19","TALSAC","COA","WET","NA","1","NA","NA","","100","320-257580","320-257580","NA","320-257875","320-44634-1","10/29/2018 09:55","11/12/2018 13:29",""
"Unknown","Unknown","WGNA-102518-FRB-0569","10/25/2018 15:05","AQ","320-44634-2","FB","","14.70","537","METHOD","RES","11/07/2018 10:40","11/08/2018 16:26","TALSAC","COA","WET","NA","1","NA","NA","","100","320-257580","320-257580","NA","320-257875","320-44634-1","10/29/2018 09:55","11/12/2018 13:29",""
"Unknown","Unknown","LLCS 320-257580/2-A","","AQ","LLCS 320-257580/2-A","LCS","","-99","537","METHOD","RES","11/07/2018 10:40","11/08/2018 15:35","TALSAC","COA","WET","NA","1","NA","NA","","100","320-257580","320-257580","NA","320-257875","320-44634-1","11/07/2018 10:40","11/12/2018 13:29",""
"Unknown","Unknown","LLCSD 320-257580/3-A","","AQ","LLCSD 320-257580/3-A","LCSD","","-99","537","METHOD","RES","11/07/2018 10:40","11/08/2018 15:42","TALSAC","COA","WET","NA","1","NA","NA","","100","320-257580","320-257580","NA","320-257875","320-44634-1","11/07/2018 10:40","11/12/2018 13:29",""
"Unknown","Unknown","MB 320-257580/1-A","","AQ","MB 320-257580/1-A","MB","","-99","537","METHOD","RES","11/07/2018 10:40","11/08/2018 15:27","TALSAC","COA","WET","NA","1","NA","NA","","100","320-257580","320-257580","NA","320-

257875","320-44634-1","11/07/2018 10:40","11/12/2018 13:29",""



TO: A. FREBOWITZ **DATE:** DECEMBER 19, 2018

FROM: MICHELLE L. WOEBER **COPIES:** DV FILE

SUBJECT: ORGANIC DATA VALIDATION –POLYFLUOROALKYL SUBSTANCES (PFAS)
NAVAL AIR STATION JOINT BASE RESERVE (NASJRB) WILLOW GROVE
WILLOW GROVE, PENNSYLVANIA
SAMPLE DELIVERY GROUP (SDG) 320-44634-1

SAMPLES: 1/Field Reagent Blank (FRB)

WGNA-102518-FRB-0569

1/Drinking Water

WGNA-102518-RW-0569

Overview

The sample set for NAS JRB Willow Grove, SDG 320-44634-1, consisted of one (1) drinking water sample and one (1) FRB sample. Both 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 pair was included in this SDG.

The samples were collected by Tetra Tech, Inc. on October 25, 2018 and analyzed by Test America. 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 blank and FRB results, 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

- Due to carrier error, the samples were received by the laboratory at a temperature of 14.7°C with water present indicating evidence of melted ice. The samples were placed on ice and were likely kept below 10 celsius for the first 48 hours after collection. The temperature of samples upon receipt at the laboratory must be < 10 celsius according to Method 537. Samples should have been received on 10/26/18 and not on 10/29/18. Therefore, because the temperature was exceeded during shipment, the detected and non-detected results were qualified, (X) and (UX), respectively, for both samples.

Minor

- The detected results reported below the Limit of Quantitation (LOQ) but above the Detection Limit (D) were qualified as estimated, (J).

Notes

The samples with detections and the associated FRB are summarized below. No detected results were present in the FRB.

TO: A. FREBOWITZ
SDG: 320-44634-1

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Sample
WGNA-102518-RW-0569

Associated FRB
WGNA-102518-FRB-0569

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

A Matrix Spike/Matrix Spike Duplicate (MS/MSD) sample was not included in this SDG.

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

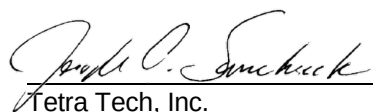
Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: Results below the LOQ were estimated. Samples were received at a temperature of 14.7 C which is above the 10 C upper limit.

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.

for 
Tetra Tech, Inc.
Michelle L. Woeber
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 ($< 2 \times$ 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: 320-44634-1 FRACTION: PFAS MEDIA: WATER	NSAMPLE	WGNA-102518-FRB-0569			WGNA-102518-RW-0569		
	LAB_ID	320-44634-2			320-44634-1		
	SAMP_DATE	10/25/2018			10/25/2018		
	QC_TYPE	FB			NM		
	UNITS	NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0		
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
PENTADECAFLUOROOCTANOIC ACID (PFOA)		5.5	UX	M	18	X	M
PERFLUOROBUTANESULFONIC ACID (PFBS)		1.8	UX	M	5.3	X	M
PERFLUOROHEPTANOIC ACID (PFHPA)		2.8	UX	M	6.7	X	M
PERFLUOROHEXANESULFONIC ACID (PFHXS)		1.8	UX	M	3.7	X	MP
PERFLUORONONANOIC ACID (PFNA)		0.92	UX	M	3.6	X	MP
PERFLUOROOCTANESULFONIC ACID (PFOS)		1.8	UX	M	20	X	M

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-44634-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-102518-RW-0569</u>	Lab Sample ID: <u>320-44634-1</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.11.08_537AA_037.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>10/25/2018 15:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>11/07/2018 10:40</u>
Sample wt/vol: <u>283.7 (mL)</u>	Date Analyzed: <u>11/08/2018 16:19</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>10 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>257875</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	20	X	4.4	1.8	0.84
335-67-1	Perfluorooctanoic acid (PFOA)	18	M X	6.2	5.3	2.4
375-95-1	Perfluorononanoic acid (PFNA)	3.6	J X	4.4	0.88	0.41
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	3.7	J X	4.4	1.8	0.56
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.7	X	4.4	2.6	1.1
375-73-5	Perfluorobutanesulfonic acid (PFBS)	5.3	X	4.4	1.8	0.70

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

Michelle A. Woelber

12/19/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Client Sample ID: WGNA-102518-FRB-0569 Lab Sample ID: 320-44634-2
 Matrix: Water Lab File ID: 2018.11.08_537AA_038.d
 Analysis Method: 537 Date Collected: 10/25/2018 15:05
 Extraction Method: 537 Date Extracted: 11/07/2018 10:40
 Sample wt/vol: 272.7(mL) Date Analyzed: 11/08/2018 16:26
 Con. Extract Vol.: 10.00(mL) Dilution Factor: 1
 Injection Volume: 10(uL) GC Column: GeminiC18 3x100 ID: 3(mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 257875 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.8	U X	4.6	1.8	0.87
335-67-1	Perfluorooctanoic acid (PFOA)	5.5	U X	6.4	5.5	2.5
375-95-1	Perfluorononanoic acid (PFNA)	0.92	U X	4.6	0.92	0.43
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.8	U X	4.6	1.8	0.59
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.8	U X	4.6	2.8	1.2
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.8	U X	4.6	1.8	0.73

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	101		70-130
STL00996	13C2 PFDA	95		70-130

Michelle J. Weber
12/19/2018

Appendix B

Results as Reported by the Laboratory

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-44634-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-102518-RW-0569</u>	Lab Sample ID: <u>320-44634-1</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.11.08_537AA_037.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>10/25/2018 15:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>11/07/2018 10:40</u>
Sample wt/vol: <u>283.7 (mL)</u>	Date Analyzed: <u>11/08/2018 16:19</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>10 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>257875</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	20		4.4	1.8	0.84
335-67-1	Perfluorooctanoic acid (PFOA)	18	M	6.2	5.3	2.4
375-95-1	Perfluorononanoic acid (PFNA)	3.6	J	4.4	0.88	0.41
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	3.7	J	4.4	1.8	0.56
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.7		4.4	2.6	1.1
375-73-5	Perfluorobutanesulfonic acid (PFBS)	5.3		4.4	1.8	0.70

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

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-44634-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-102518-FRB-0569</u>	Lab Sample ID: <u>320-44634-2</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.11.08_537AA_038.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>10/25/2018 15:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>11/07/2018 10:40</u>
Sample wt/vol: <u>272.7(mL)</u>	Date Analyzed: <u>11/08/2018 16:26</u>
Con. Extract Vol.: <u>10.00(mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>10(uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3(mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>257875</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.8	U	4.6	1.8	0.87
335-67-1	Perfluorooctanoic acid (PFOA)	5.5	U	6.4	5.5	2.5
375-95-1	Perfluorononanoic acid (PFNA)	0.92	U	4.6	0.92	0.43
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.8	U	4.6	1.8	0.59
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.8	U	4.6	2.8	1.2
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.8	U	4.6	1.8	0.73

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	101		70-130
STL00996	13C2 PFDA	95		70-130

Appendix C

Support Documentation

NASJRB WILLOW GROVE
SDG 320-44634-1

Initial Calibration
Instrument A8_N

10/25/2018

PFOA

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	Reported RRF/RSD
0.025	11946	940209	2.5	1.27057	1.2693
0.0501	24097	943285	2.5	1.27474	1.276
0.25	104050	966840	2.5	1.07619	1.0751
1	394334	904232	2.5	1.09025	1.0892
2.5	1049529	943717	2.5	1.11212	1.111
5.01	2201725	993600	2.5	1.10574	1.1068
10	4298280	992963	2.5	1.08219	1.0811
Average				1.14454	1.1441
Standard Deviation				0.0884	
RSD				0.0772	
%RSD				7.72467	7.8

Continuing Calibration
PFOA

11/08/2018 @ 15:12

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	%D	Reported RRF	Reported %D
1	352470	801193	2.5	1.0998	-3.869536705	1.099	-4

Sample Identification
Compound

WGNA-102518-RW-0569
PFOA

Compound Area	251249	Average RRF	1.1441
Internal Standard Amount (ng)	2.5	Sample Volume(ml)	283.7
Dilution Factor	1	Volume Extract (ml)	10
Internal Standard Area	1061334		
Concentration	18.2335 ng/L		
Reported Result	18 ng/L		

NASJRB WILLOW GROVE
SDG 320-44634-1

Surrogate 13C2-PFHxA

Compound Area	997451		
Internal Standard Amount (ng)	2.5		
Dilution Factor	1	Volume Extract (ml)	1
Internal Standard Area	1061334		
Average RRF	0.9888		
Concentration	2.3761		
Surrogate %R	95.05	Spike amount	2.5
Reported Surrogate %R	95		

LCS %R

320-257580/2-A			
PFOS		Spike amount	LCS concentration
Calculated LCS %R	89.49	3.71	3.32
Reported LCS %R	89		

LCSD %R

320-257580/3-A			
PFOS		Spike amount	LCS concentration
Calculated LCSD %R	91.11	3.71	3.38
Reported LCSD %R	91		

RPD (%)	1.7910
Reported RPD (%)	2

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181108-67354.b\2018.11.08_537AA_037.d
 Lims ID: 320-44634-A-1-A
 Client ID: WGNA-102518-RW-0569
 Sample Type: Client
 Inject. Date: 08-Nov-2018 16:19:21 ALS Bottle#: 27 Worklist Smp#: 33
 Injection Vol: 10.0 ul Dil. Factor: 1.0000
 Sample Info: 320-44634-a-1-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20181108-67354.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 08-Nov-2018 17:26:56 Calib Date: 25-Oct-2018 15:43:40
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d

Column 1 : Det: EXP1
 Process Host: XAWRK008

First Level Reviewer: barnettj Date: 08-Nov-2018 17:26:03

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.561	1.561	0.0	1.000	57050	0.1501		33.5	
298.90 > 99.00	1.561	1.561	0.0	1.000	43103		1.32(0.00-0.00)	41.9	
13 Perfluorohexanoic acid									
313.00 > 269.00	1.835	1.819	0.016	0.704	116635	0.3090		21.6	
313.00 > 119.00	1.835	1.819	0.016	0.704	14371		8.12(0.00-0.00)	25.7	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.851	1.835	0.016	1.000	997451	2.38		4637	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.221	2.205	0.016	1.000	87234	0.1888		10.3	
363.00 > 169.00	2.221	2.205	0.016	1.000	35545		2.45(0.00-0.00)	32.1	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.253	2.237	0.016	1.000	53310	0.1042		29.3	
399.00 > 99.00	2.253	2.237	0.016	1.000	19288		2.76(0.00-0.00)	11.4	
* 5 13C2 PFOA									
415.00 > 370.00	2.608	2.592	0.016		1061334	2.50		6345	
6 Perfluorooctanoic acid									
413.00 > 369.00	2.608	2.592	0.016	1.000	251249	0.5173		21.5	M
413.00 > 169.00	2.608	2.592	0.016	1.000	156118		1.61(0.00-0.00)	137	M
9 Perfluorononanoic acid									
463.00 > 419.00	2.994	2.978	0.016	1.000	36791	0.1032		4.0	
463.00 > 169.00	2.994	2.978	0.016	1.000	11363		3.24(0.00-0.00)	64.0	
* 7 13C4 PFOS									
503.00 > 80.00	2.994	2.994	0.0		802959	2.39		1089	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	3.010	2.994	0.016	1.000	217972	0.5811		103	
499.00 > 99.00	2.994	2.994	0.0	0.995	42774		5.10(0.00-0.00)	63.4	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
14 Perfluorodecanoic acid									M
513.00 > 469.00	3.364	3.348	0.016	1.290	10836	0.0363		3.9	
513.00 > 169.00	3.348	3.348	0.0	1.284	2347		4.62(0.00-0.00)	11.4	M
\$ 10 13C2 PFDA									
515.00 > 470.00	3.364	3.348	0.016	1.000	698777	2.39		2737	
* 12 d3-NMeFOSAA									
573.00 > 419.00	3.509	3.509	0.0		359274	2.50		2202	
\$ 11 d5-NEtFOSAA									
589.00 > 419.00	3.686	3.670	0.016	1.050	360903	2.33		396	

QC Flag Legend

Review Flags

M - Manually Integrated

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181108-67354.b\2018.11.08_537AA_037.d

Injection Date: 08-Nov-2018 16:19:21

Instrument ID: A8_N

Lims ID: 320-44634-A-1-A

Lab Sample ID: 320-44634-1

Client ID: WGNA-102518-RW-0569

Operator ID: SACINSTLCMS01

ALS Bottle#: 27

Worklist Smp#: 33

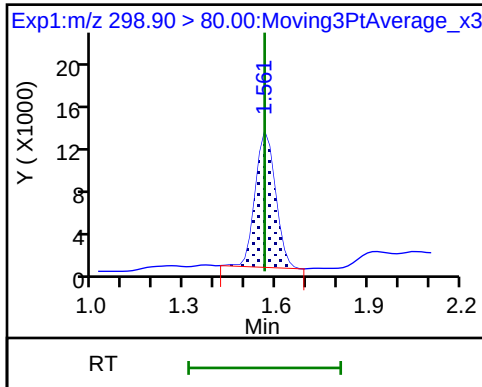
Injection Vol: 10.0 ul

Dil. Factor: 1.0000

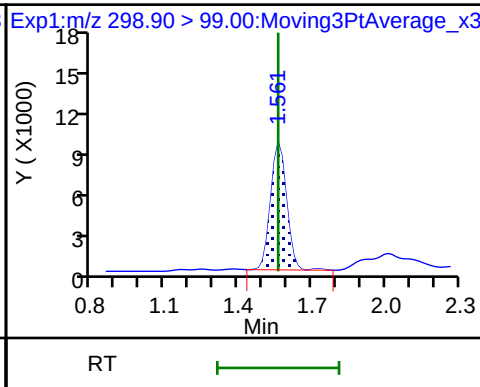
Method: 537_A8_N

Limit Group: LC 537 ICAL

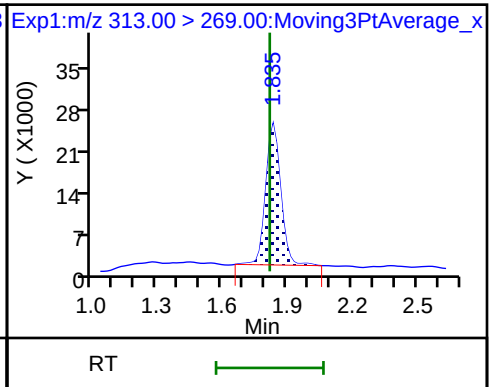
1 Perfluorobutanesulfonic acid



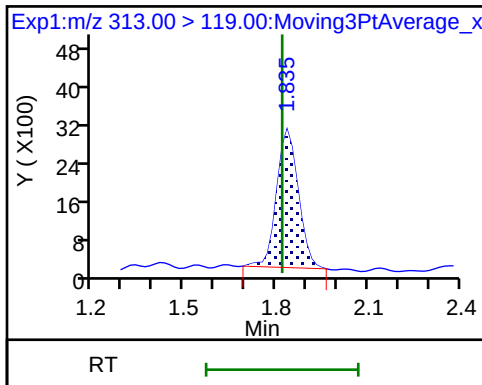
1 Perfluorobutanesulfonic acid



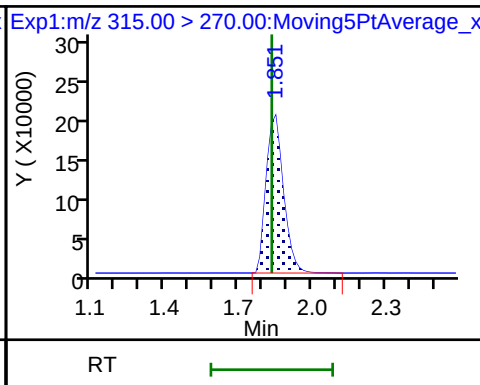
13 Perfluorohexanoic acid



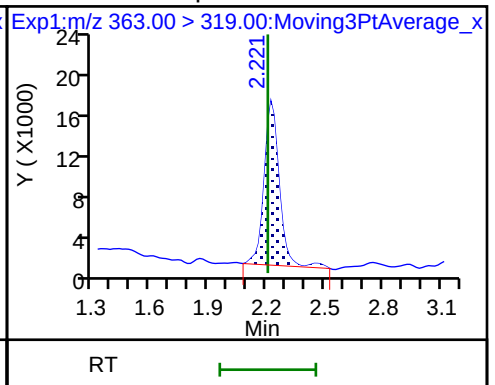
13 Perfluorohexanoic acid



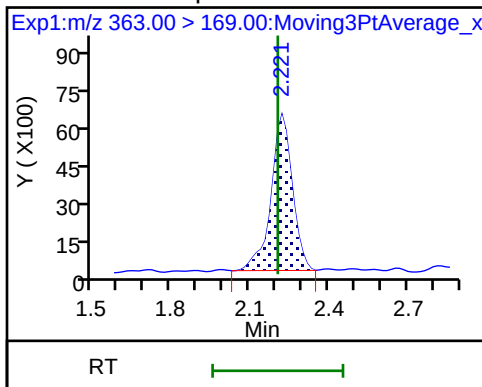
\$ 2 13C2 PFHxA



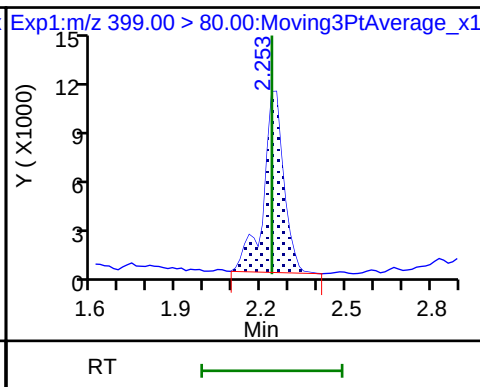
4 Perfluoroheptanoic acid



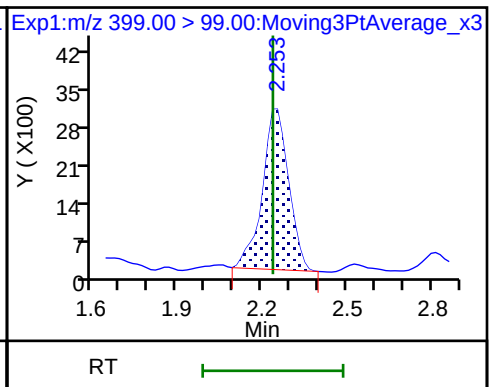
4 Perfluoroheptanoic acid



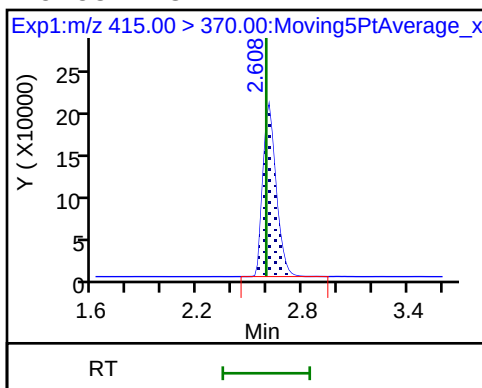
3 Perfluorohexanesulfonic acid



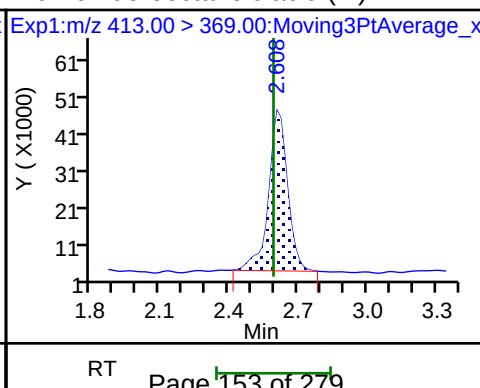
3 Perfluorohexanesulfonic acid



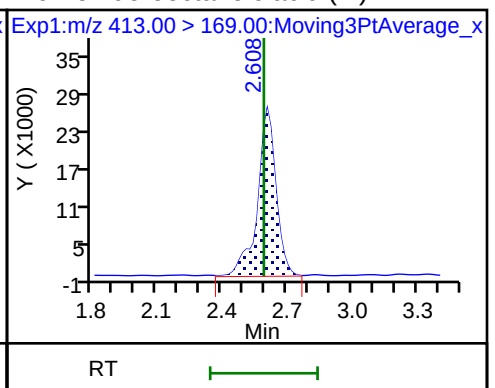
* 5 13C2 PFOA

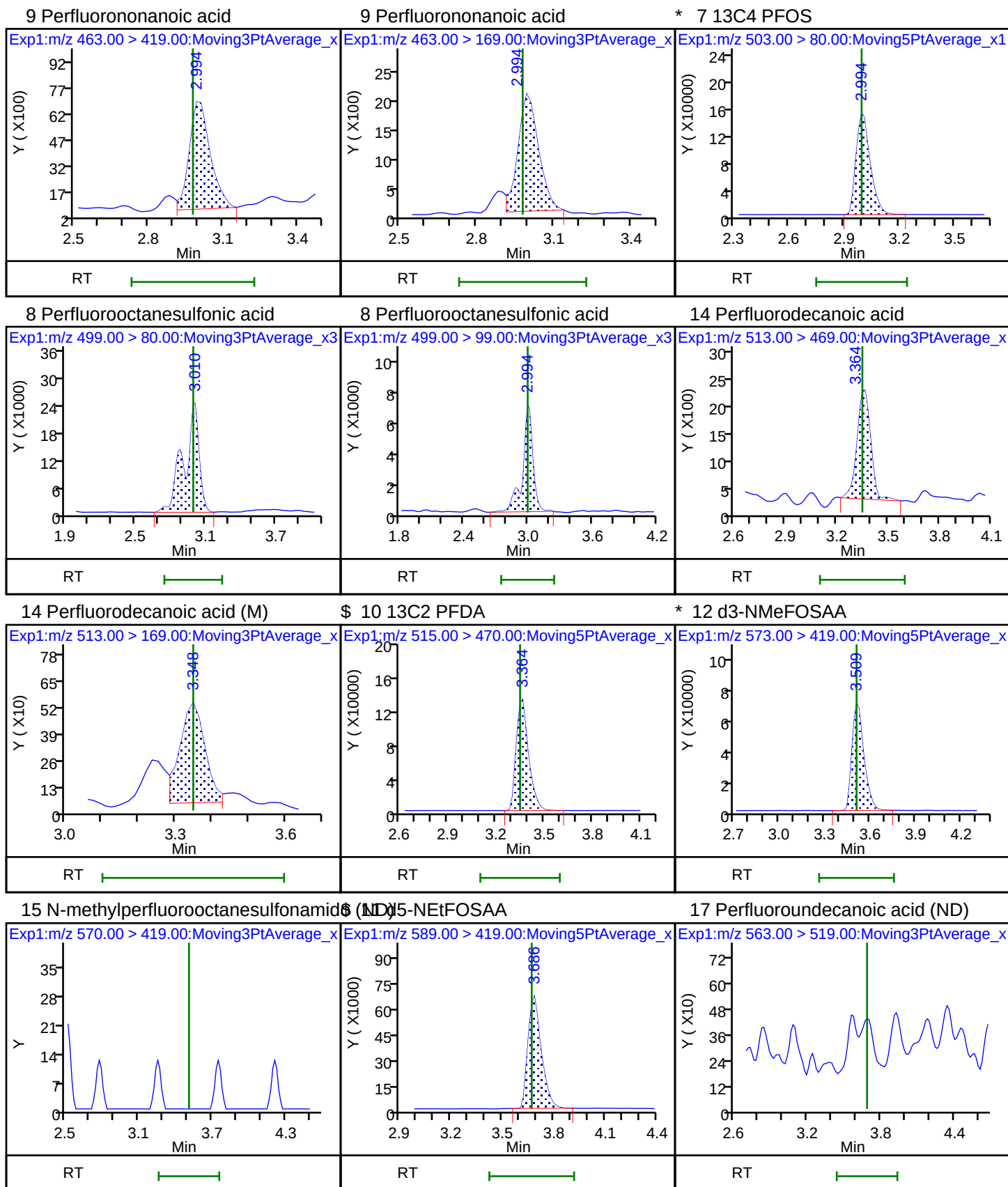


6 Perfluorooctanoic acid (M)

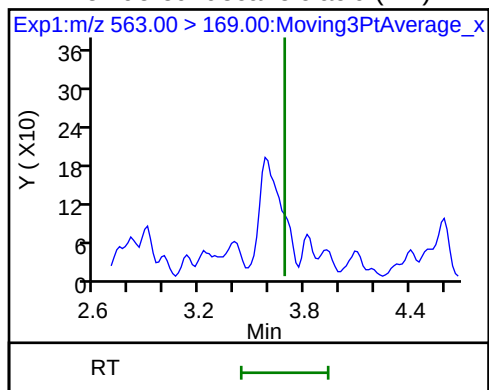


6 Perfluorooctanoic acid (M)

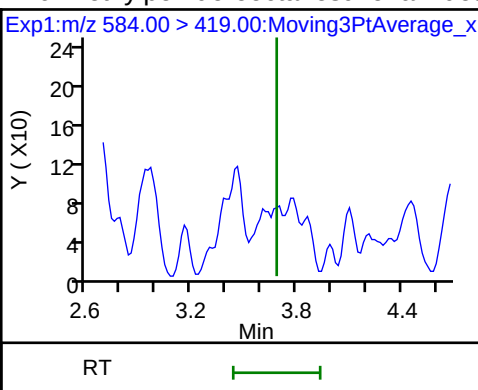




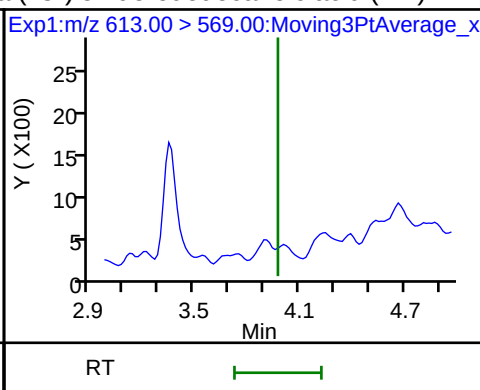
17 Perfluoroundecanoic acid (ND)



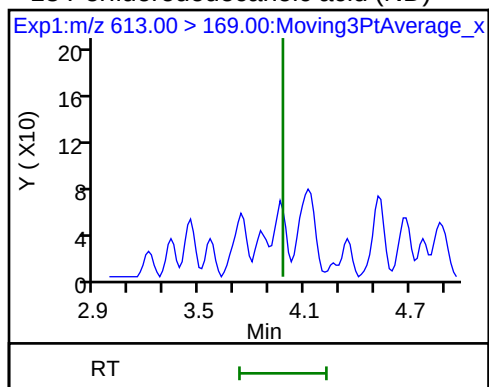
16 N-ethylperfluorooctanesulfonamidoa (ND)



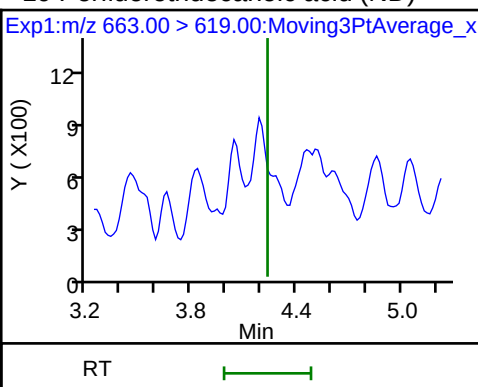
18 Perfluorododecanoic acid (ND)



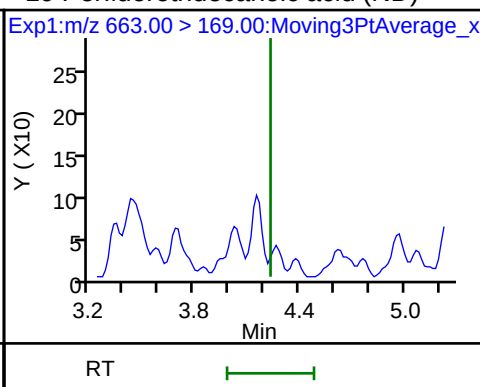
18 Perfluorododecanoic acid (ND)



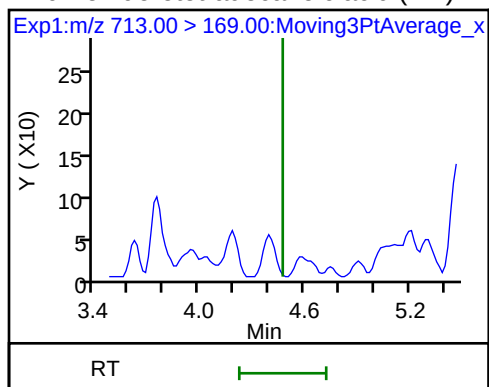
19 Perfluorotridecanoic acid (ND)



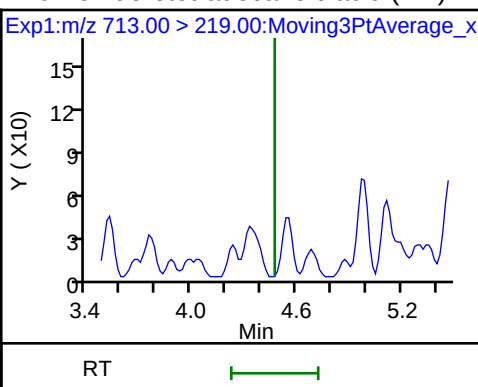
19 Perfluorotridecanoic acid (ND)



20 Perfluorotetradecanoic acid (ND)



20 Perfluorotetradecanoic acid (ND)



TestAmerica Sacramento
Recovery Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181108-67354.b\2018.11.08_537AA_037.d
Lims ID: 320-44634-A-1-A
Client ID: WGNA-102518-RW-0569
Sample Type: Client
Inject. Date: 08-Nov-2018 16:19:21 ALS Bottle#: 27 Worklist Smp#: 33
Injection Vol: 10.0 ul Dil. Factor: 1.0000
Sample Info: 320-44634-a-1-a
Misc. Info.: Plate: 1 Rack: 2
Operator ID: SACINSTLCMS01 Instrument ID: A8_N
Method: \\ChromNa\Sacramento\ChromData\A8_N\20181108-67354.b\537_A8_N.m
Limit Group: LC 537 ICAL
Last Update: 08-Nov-2018 17:26:56 Calib Date: 25-Oct-2018 15:43:40
Integrator: Picker
Quant Method: Internal Standard Quant By: Initial Calibration
Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d
Column 1 : Det: EXP1
Process Host: XAWRK008

First Level Reviewer: barnettj

Date: 08-Nov-2018 17:26:03

Compound	Amount Added	Amount Recovered	% Rec.
\$ 2 13C2 PFHxA	2.50	2.38	95.05
\$ 10 13C2 PFDA	2.50	2.39	95.45
\$ 11 d5-NEtFOSAA	2.50	2.33	93.19

TestAmerica Sacramento

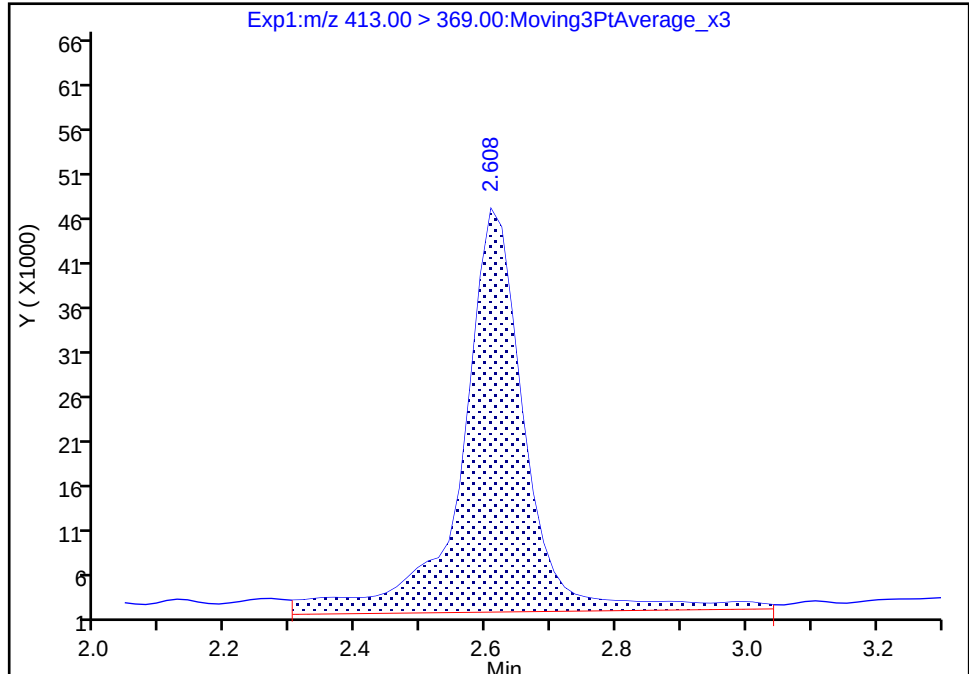
Data File:	\\ChromNa\Sacramento\ChromData\A8_N\20181108-67354.b\2018.11.08_537AA_037.d				
Injection Date:	08-Nov-2018 16:19:21	Instrument ID:	A8_N		
Lims ID:	320-44634-A-1-A	Lab Sample ID:	320-44634-1		
Client ID:	WGNA-102518-RW-0569				
Operator ID:	SACINSTLCMS01	ALS Bottle#:	27	Worklist Smp#:	33
Injection Vol:	10.0 ul	Dil. Factor:	1.0000		
Method:	537_A8_N	Limit Group:	LC 537 ICAL		
Column:		Detector	EXP1		

6 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 1

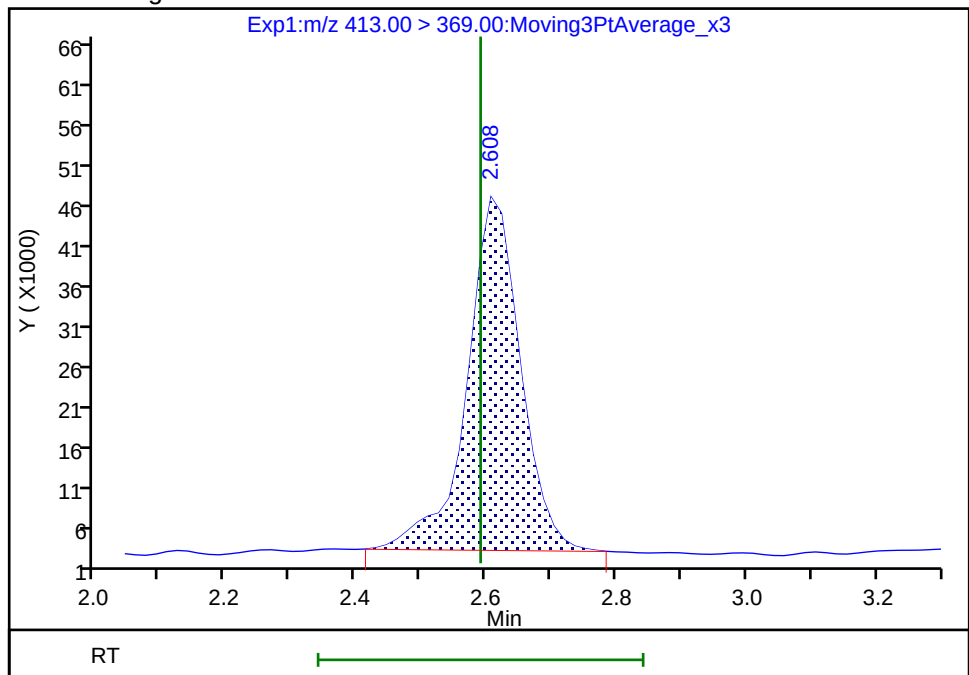
RT: 2.61
Area: 309305
Amount: 0.636824
Amount Units: ng/ml

Processing Integration Results



RT: 2.61
Area: 251249
Amount: 0.517293
Amount Units: ng/ml

Manual Integration Results



Reviewer: barnettj, 08-Nov-2018 17:25:16
Audit Action: Manually Integrated

Audit Reason: Baseline
Page 157 of 279

TestAmerica Sacramento

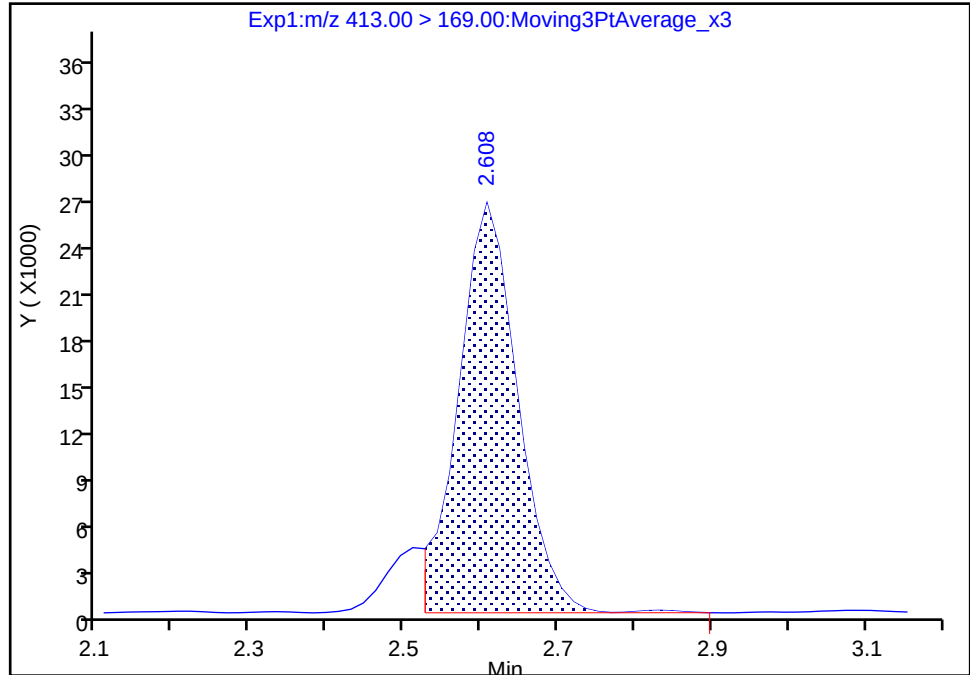
Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181108-67354.b\2018.11.08_537AA_037.d
Injection Date: 08-Nov-2018 16:19:21 Instrument ID: A8_N
Lims ID: 320-44634-A-1-A Lab Sample ID: 320-44634-1
Client ID: WGNA-102518-RW-0569
Operator ID: SACINSTLCMS01 ALS Bottle#: 27 Worklist Smp#: 33
Injection Vol: 10.0 ul Dil. Factor: 1.0000
Method: 537_A8_N Limit Group: LC 537 ICAL
Column: Detector EXP1

6 Perfluorooctanoic acid, CAS: 335-67-1

Signal: 2

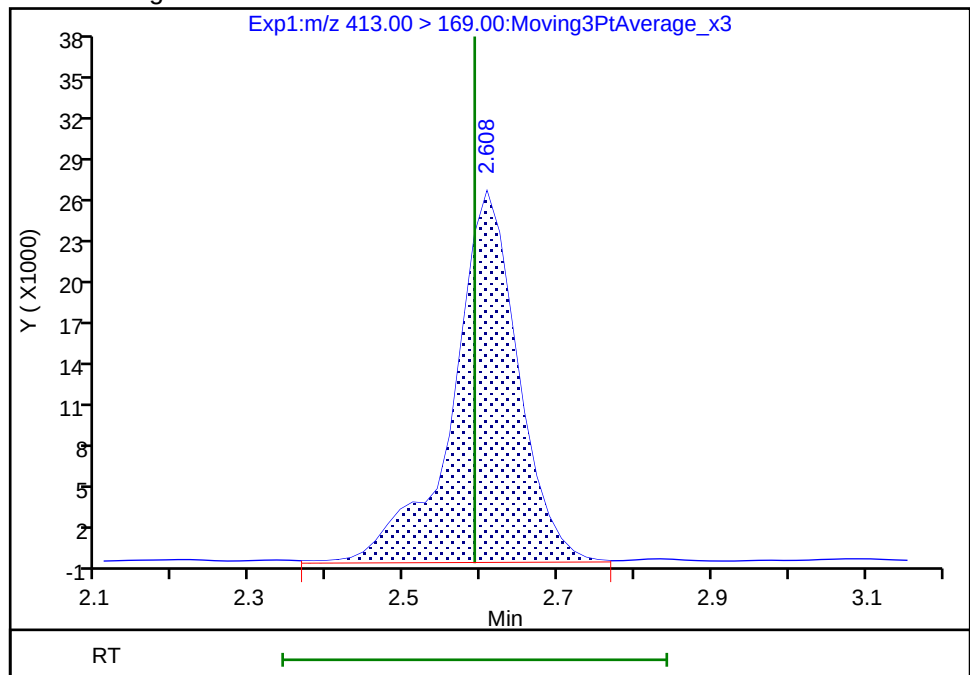
RT: 2.61
Area: 139719
Amount: 0.636824
Amount Units: ng/ml

Processing Integration Results



RT: 2.61
Area: 156118
Amount: 0.517293
Amount Units: ng/ml

Manual Integration Results



Reviewer: barnettj, 08-Nov-2018 17:25:29

Audit Action: Manually Integrated

Audit Reason: Isomers

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_003.d
 Lims ID: IC L1
 Client ID:
 Sample Type: IC Calib Level: 1
 Inject. Date: 25-Oct-2018 14:59:27 ALS Bottle#: 1 Worklist Smp#: 2
 Injection Vol: 10.0 ul Dil. Factor: 1.0000
 Sample Info: L1_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub10
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 26-Oct-2018 08:32:52 Calib Date: 25-Oct-2018 15:43:40
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d

Column 1 : Det: EXP1

Process Host: XAWRK003

First Level Reviewer: westendorfc

Date: 26-Oct-2018 08:29:58

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									M
298.90 > 80.00	1.537	1.544	-0.007	1.000	7850	0.0220		2.8	
298.90 > 99.00	1.537	1.544	-0.007	1.000	6459		1.22(0.00-0.00)	3.3	M
13 Perfluorohexanoic acid									a
313.00 > 269.00	1.810	1.818	-0.008	0.701	9040	0.0270		2.7	
313.00 > 119.00	1.803	1.818	-0.015	0.000	0		0.00(0.00-0.00)		
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.826	1.822	0.004	1.000	913787	2.46		3977	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.197	2.202	-0.005	1.000	10502	0.0257		1.8	
363.00 > 169.00	2.197	2.202	-0.005	1.000	4186		2.51(0.00-0.00)	4.6	
3 Perfluorohexanesulfonic acid									M
399.00 > 80.00	2.213	2.220	-0.007	1.000	12384	0.0258		13.5	M
399.00 > 99.00	2.213	2.220	-0.007	1.000	3260		3.80(0.00-0.00)	2.1	
* 5 13C2 PFOA									
415.00 > 370.00	2.583	2.579	0.004		940209	2.50		7005	
6 Perfluorooctanoic acid									
413.00 > 369.00	2.583	2.584	-0.001	1.000	11946	0.0278		2.0	
413.00 > 169.00	2.583	2.584	-0.001	1.000	5765		2.07(0.00-0.00)	9.3	
9 Perfluorononanoic acid									
463.00 > 419.00	2.969	2.973	-0.004	1.000	7360	0.0233		1.1	
463.00 > 169.00	2.969	2.973	-0.004	1.000	2035		3.62(0.00-0.00)	16.0	
* 7 13C4 PFOS									
503.00 > 80.00	2.969	2.975	-0.006		753053	2.39		1426	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	2.969	3.010	-0.041	1.000	8839	0.0251		3.4	
499.00 > 99.00	2.969	3.010	-0.041	1.000	2271		3.89(0.00-0.00)	3.5	

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
14 Perfluorodecanoic acid									
513.00 > 469.00	3.336	3.331	0.005	1.293	12683	0.0478		6.6	
513.00 > 169.00	3.336	3.331	0.005	1.293	4179		3.03(0.00-0.00)	22.3	
\$ 10 13C2 PFDA									
515.00 > 470.00	3.336	3.338	-0.002	1.000	633723	2.44		5031	
* 12 d3-NMeFOSAA									
573.00 > 419.00	3.497	3.495	0.002		294326	2.50		2287	
15 N-methylperfluorooctanesulfonamido									
570.00 > 419.00	3.497	3.501	-0.004	1.000	6218	0.0581		75.4	
\$ 11 d5-NEtFOSAA									
589.00 > 419.00	3.658	3.665	-0.007	1.046	318232	2.51		700	
16 N-ethylperfluorooctanesulfonamidoa									
584.00 > 419.00	3.674	3.672	0.002	1.051	7040	0.0605		28.9	
17 Perfluoroundecanoic acid									
563.00 > 519.00	3.674	3.672	0.002	1.424	11771	0.0564		10.0	
563.00 > 169.00	3.674	3.672	0.002	1.424	1969		5.98(0.00-0.00)	20.2	
18 Perfluorododecanoic acid									
613.00 > 569.00	3.963	3.973	-0.010	1.537	9791	0.0492		6.7	
613.00 > 169.00	3.963	3.973	-0.010	1.537	2583		3.79(0.00-0.00)	26.0	
19 Perfluorotridecanoic acid									
663.00 > 619.00	4.237	4.240	-0.003	1.643	11574	0.0485		8.7	
663.00 > 169.00	4.253	4.240	0.013	1.649	2479		4.67(0.00-0.00)	26.9	
20 Perfluorotetradecanoic acid									
713.00 > 169.00	4.479	4.479	0.0	1.736	4642	0.0646		47.7	
713.00 > 219.00	4.479	4.479	0.0	1.736	2280		2.04(0.00-0.00)	26.5	

Reagents:

LC537_NC_L2_00002

Amount Added: 1.00

Units: mL

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_005.d
 Lims ID: IC L3
 Client ID:
 Sample Type: IC Calib Level: 3
 Inject. Date: 25-Oct-2018 15:14:13 ALS Bottle#: 3 Worklist Smp#: 4
 Injection Vol: 10.0 ul Dil. Factor: 1.0000
 Sample Info: L3_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub10
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 26-Oct-2018 08:33:06 Calib Date: 25-Oct-2018 15:43:40
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d

Column 1 : Det: EXP1

Process Host: XAWRK003

First Level Reviewer: barnettj

Date: 25-Oct-2018 16:22:22

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.545	1.544	0.001	1.000	90415	0.2437		32.6	
298.90 > 99.00	1.545	1.544	0.001	1.000	57882		1.56(0.00-0.00)	32.6	
13 Perfluorohexanoic acid									
313.00 > 269.00	1.819	1.818	0.001	0.706	85477	0.2486		24.7	
313.00 > 119.00	1.819	1.818	0.001	0.706	9967		8.58(0.00-0.00)	26.2	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.819	1.822	-0.003	1.000	959790	2.51		5021	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.205	2.202	0.003	1.000	107565	0.2556		18.2	
363.00 > 169.00	2.205	2.202	0.003	1.000	41486		2.59(0.00-0.00)	54.0	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.221	2.220	0.001	1.000	111433	0.2230		114	
399.00 > 99.00	2.221	2.220	0.001	1.000	41121		2.71(0.00-0.00)	32.8	
* 5 13C2 PFOA									
415.00 > 370.00	2.575	2.579	-0.004		966840	2.50		6484	
6 Perfluorooctanoic acid									
413.00 > 369.00	2.591	2.584	0.007	1.000	104050	0.2352		18.1	
413.00 > 169.00	2.591	2.584	0.007	1.000	54439		1.91(0.00-0.00)	88.3	
9 Perfluorononanoic acid									
463.00 > 419.00	2.978	2.973	0.005	1.000	85638	0.2637		12.1	
463.00 > 169.00	2.978	2.973	0.005	1.000	19716		4.34(0.00-0.00)	141	
* 7 13C4 PFOS									
503.00 > 80.00	2.978	2.975	0.003		783934	2.39		1346	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	2.978	3.010	-0.032	1.000	86001	0.2348		35.5	
499.00 > 99.00	2.978	3.010	-0.032	1.000	19600		4.39(0.00-0.00)	35.1	

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_006.d
 Lims ID: IC L4
 Client ID:
 Sample Type: ICISAV Calib Level: 4
 Inject. Date: 25-Oct-2018 15:21:36 ALS Bottle#: 4 Worklist Smp#: 5
 Injection Vol: 10.0 ul Dil. Factor: 1.0000
 Sample Info: L4_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub10
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 26-Oct-2018 08:34:55 Calib Date: 25-Oct-2018 15:43:40
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d

Column 1 : Det: EXP1

Process Host: XAWRK003

First Level Reviewer: westendorfc

Date: 26-Oct-2018 08:34:55

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.545	1.544	0.001	1.000	321034	0.8850		108	
298.90 > 99.00	1.545	1.544	0.001	1.000	225509		1.42(0.00-0.00)	121	
13 Perfluorohexanoic acid									
313.00 > 269.00	1.819	1.818	0.001	0.702	328293	1.02		92.6	
313.00 > 119.00	1.803	1.818	-0.015	0.696	37392		8.78(0.00-0.00)	93.6	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.819	1.822	-0.003	1.000	947296	2.65		5181	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.205	2.202	0.003	1.000	394448	1.00		66.3	
363.00 > 169.00	2.205	2.202	0.003	1.000	155041		2.54(0.00-0.00)	198	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.221	2.220	0.001	1.000	440068	0.9010		459	
399.00 > 99.00	2.221	2.220	0.001	1.000	143963		3.06(0.00-0.00)	110	
* 5 13C2 PFOA									
415.00 > 370.00	2.592	2.579	0.013		904232	2.50		6499	
6 Perfluorooctanoic acid									
413.00 > 369.00	2.592	2.584	0.008	1.000	394334	0.9529		66.3	
413.00 > 169.00	2.592	2.584	0.008	1.000	217612		1.81(0.00-0.00)	364	
9 Perfluorononanoic acid									
463.00 > 419.00	2.978	2.973	0.005	1.000	313227	1.03		45.4	
463.00 > 169.00	2.978	2.973	0.005	1.000	78987		3.97(0.00-0.00)	631	
* 7 13C4 PFOS									
503.00 > 80.00	2.978	2.975	0.003		766417	2.39		1288	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	2.978	3.010	-0.032	1.000	313486	0.8755		138	
499.00 > 99.00	2.978	3.010	-0.032	1.000	75429		4.16(0.00-0.00)	149	

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_007.d
 Lims ID: IC L5
 Client ID:
 Sample Type: IC Calib Level: 5
 Inject. Date: 25-Oct-2018 15:29:01 ALS Bottle#: 5 Worklist Smp#: 6
 Injection Vol: 10.0 ul Dil. Factor: 1.0000
 Sample Info: L5_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub10
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 26-Oct-2018 08:33:15 Calib Date: 25-Oct-2018 15:43:40
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d

Column 1 : Det: EXP1

Process Host: XAWRK003

First Level Reviewer: barnettj

Date: 25-Oct-2018 16:23:09

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.545	1.544	0.001	1.000	771338	2.05		251	
298.90 > 99.00	1.545	1.544	0.001	1.000	548061		1.41(0.00-0.00)	301	
13 Perfluorohexanoic acid									
313.00 > 269.00	1.819	1.818	0.001	0.706	830764	2.48		237	
313.00 > 119.00	1.819	1.818	0.001	0.706	101040		8.22(0.00-0.00)	272	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.819	1.822	-0.003	1.000	954767	2.56		4947	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.205	2.202	0.003	1.000	1045338	2.54		164	
363.00 > 169.00	2.205	2.202	0.003	1.000	423357		2.47(0.00-0.00)	473	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.221	2.220	0.001	1.000	1097729	2.16		1184	
399.00 > 99.00	2.221	2.220	0.001	1.000	391350		2.80(0.00-0.00)	301	
* 5 13C2 PFOA									
415.00 > 370.00	2.575	2.579	-0.004		943717	2.50		7252	
6 Perfluorooctanoic acid									
413.00 > 369.00	2.575	2.584	-0.009	1.000	1049529	2.43		189	
413.00 > 169.00	2.575	2.584	-0.009	1.000	598552		1.75(0.00-0.00)	980	
9 Perfluorononanoic acid									
463.00 > 419.00	2.978	2.973	0.005	1.000	773614	2.44		109	
463.00 > 169.00	2.978	2.973	0.005	1.000	206125		3.75(0.00-0.00)	1433	
* 7 13C4 PFOS									
503.00 > 80.00	2.978	2.975	0.003		796733	2.39		1529	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	2.978	3.010	-0.032	1.000	809220	2.17		319	
499.00 > 99.00	2.978	3.010	-0.032	1.000	189222		4.28(0.00-0.00)	361	

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_008.d
 Lims ID: IC L6
 Client ID:
 Sample Type: IC Calib Level: 6
 Inject. Date: 25-Oct-2018 15:36:20 ALS Bottle#: 6 Worklist Smp#: 7
 Injection Vol: 10.0 ul Dil. Factor: 1.0000
 Sample Info: L6_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub10
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 26-Oct-2018 08:33:21 Calib Date: 25-Oct-2018 15:43:40
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d

Column 1 : Det: EXP1

Process Host: XAWRK003

First Level Reviewer: barnettj

Date: 25-Oct-2018 16:23:27

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.545	1.544	0.001	1.000	1805727	4.43		627	
298.90 > 99.00	1.545	1.544	0.001	1.000	1107548		1.63(0.00-0.00)	568	
13 Perfluorohexanoic acid									
313.00 > 269.00	1.819	1.818	0.001	0.706	1763578	4.99		540	
313.00 > 119.00	1.819	1.818	0.001	0.706	187220		9.42(0.00-0.00)	438	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.835	1.822	0.013	1.000	955852	2.43		5124	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.205	2.202	0.003	1.000	2168310	5.01		367	
363.00 > 169.00	2.205	2.202	0.003	1.000	859822		2.52(0.00-0.00)	1038	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.221	2.220	0.001	1.000	2396371	4.37		2313	
399.00 > 99.00	2.221	2.220	0.001	1.000	806727		2.97(0.00-0.00)	626	
* 5 13C2 PFOA									
415.00 > 370.00	2.575	2.579	-0.004		993600	2.50		7862	
6 Perfluorooctanoic acid									
413.00 > 369.00	2.591	2.584	0.007	1.000	2201725	4.84		371	
413.00 > 169.00	2.575	2.584	-0.009	0.994	1179226		1.87(0.00-0.00)	1783	
9 Perfluorononanoic acid									
463.00 > 419.00	2.978	2.973	0.005	1.000	1590432	4.77		240	
463.00 > 169.00	2.978	2.973	0.005	1.000	418868		3.80(0.00-0.00)	2419	
* 7 13C4 PFOS									
503.00 > 80.00	2.978	2.975	0.003		860427	2.39		1516	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	2.978	3.010	-0.032	1.000	1709437	4.25		663	
499.00 > 99.00	2.978	3.010	-0.032	1.000	402370		4.25(0.00-0.00)	714	

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d
 Lims ID: IC L7
 Client ID:
 Sample Type: IC Calib Level: 7
 Inject. Date: 25-Oct-2018 15:43:40 ALS Bottle#: 7 Worklist Smp#: 8
 Injection Vol: 10.0 ul Dil. Factor: 1.0000
 Sample Info: L7_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub10
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 26-Oct-2018 08:33:28 Calib Date: 25-Oct-2018 15:43:40
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d

Column 1 : Det: EXP1

Process Host: XAWRK003

First Level Reviewer: barnettj

Date: 25-Oct-2018 16:24:18

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.545	1.544	0.001	1.000	3593985	9.24		1205	
298.90 > 99.00	1.545	1.544	0.001	1.000	2374238		1.51(0.00-0.00)	1272	
13 Perfluorohexanoic acid									
313.00 > 269.00	1.819	1.818	0.001	0.706	3539234	10.0		1045	
313.00 > 119.00	1.819	1.818	0.001	0.706	369315		9.58(0.00-0.00)	859	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.819	1.822	-0.003	1.000	961713	2.45		5625	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.189	2.202	-0.013	1.000	4036861	9.34		685	
363.00 > 169.00	2.189	2.202	-0.013	1.000	1718157		2.35(0.00-0.00)	2270	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.221	2.220	0.001	1.000	4720764	9.01		4159	
399.00 > 99.00	2.221	2.220	0.001	1.000	1609736		2.93(0.00-0.00)	1294	
* 5 13C2 PFOA									
415.00 > 370.00	2.575	2.579	-0.004		992963	2.50		6169	
6 Perfluorooctanoic acid									
413.00 > 369.00	2.575	2.584	-0.009	1.000	4298280	9.46		740	
413.00 > 169.00	2.575	2.584	-0.009	1.000	2397241		1.79(0.00-0.00)	3611	
9 Perfluorononanoic acid									
463.00 > 419.00	2.962	2.973	-0.011	1.000	3194105	9.58		439	
463.00 > 169.00	2.962	2.973	-0.011	1.000	839203		3.81(0.00-0.00)	4755	
* 7 13C4 PFOS									
503.00 > 80.00	2.962	2.975	-0.013		821968	2.39		1367	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	2.962	3.010	-0.048	1.000	3340812	8.70		1357	
499.00 > 99.00	2.962	3.010	-0.048	1.000	759730		4.40(0.00-0.00)	1448	

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20181108-67345.b\2018.11.08_537AA_004.d
 Lims ID: CCVL
 Client ID:
 Sample Type: CCVL
 Inject. Date: 08-Nov-2018 10:54:59 ALS Bottle#: 2 Worklist Smp#: 1
 Injection Vol: 10.0 ul Dil. Factor: 1.0000
 Sample Info: CCVL
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub10
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20181108-67345.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 08-Nov-2018 13:14:36 Calib Date: 25-Oct-2018 15:43:40
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b\2018.10.25_537ICAL_009.d

Column 1 : Det: EXP1

Process Host: XAWRK008

First Level Reviewer: barnettj

Date: 08-Nov-2018 11:14:39

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.561	1.561	0.0	1.000	16785	0.0507		12.4	
298.90 > 99.00	1.561	1.561	0.0	1.000	11265		1.49(0.00-0.00)	13.6	
13 Perfluorohexanoic acid									
313.00 > 269.00	1.835	1.835	0.0	0.704	18541	0.0570		4.0	M
313.00 > 119.00	1.835	1.835	0.0	0.704	1910		9.71(0.00-0.00)	2.7	M
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.835	1.851	-0.016	1.000	929312	2.57		5313	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.221	2.221	0.0	1.000	20192	0.0507		3.1	
363.00 > 169.00	2.221	2.221	0.0	1.000	9053		2.23(0.00-0.00)	14.2	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.237	2.237	0.0	1.000	21866	0.0490		14.2	
399.00 > 99.00	2.237	2.237	0.0	1.000	7499		2.92(0.00-0.00)	6.0	
* 5 13C2 PFOA									
415.00 > 370.00	2.608	2.608	0.0		914756	2.50		5396	
6 Perfluorooctanoic acid									
413.00 > 369.00	2.608	2.608	0.0	1.000	22593	0.0540		2.6	
413.00 > 169.00	2.608	2.608	0.0	1.000	9324		2.42(0.00-0.00)	13.8	
* 7 13C4 PFOS									
503.00 > 80.00	2.994	2.994	0.0		699877	2.39		1192	
9 Perfluorononanoic acid									
463.00 > 419.00	2.994	2.994	0.0	1.000	17276	0.0562		2.3	
463.00 > 169.00	2.994	2.994	0.0	1.000	4252		4.06(0.00-0.00)	21.7	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	2.994	2.994	0.0	1.000	18867	0.0577		13.0	
499.00 > 99.00	2.994	2.994	0.0	1.000	4237		4.45(0.00-0.00)	8.6	

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

☐ NPDES ☐ RCRA ☐ Other:

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: 320-44634-1

Login Number: 44634
List Number: 1
Creator: Nelson, Kym D

List Source: TestAmerica Sacramento

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	seal
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Water present in cooler; indicates evidence of melted ice.
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	14.7C
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	

Job Narrative
320-44634-1

Receipt

The samples were received on 10/29/2018 9:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 14.7° C.

Receipt Exceptions

The following samples were received at the laboratory outside the required temperature criteria 14.7C WGNA-102518-RW-0569 (320-44634-1) and WGNA-102518-FRB-0569 (320-44634-2). Samples were received on Monday 10/29/18 with melted ice. The fedex tag say they were to be received on Friday 10/26/18.

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 (MS/MSD) associated with preparation batch 320-257580.

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: 320-44634-1

Qualifiers

LCMS

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

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: 320-44634-1

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

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-44634-1	WGNA-102518-RW-0569	Water	10/25/18 15:10	10/29/18 09:55
320-44634-2	WGNA-102518-FRB-0569	Water	10/25/18 15:05	10/29/18 09:55

Method Summary

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

TestAmerica Job ID: 320-44634-1

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.: 320-44634-1

SDG No.: _____

Matrix: Water Level: Low

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

Client Sample ID	Lab Sample ID	PFHxA #	PFDA #
WGNA-102518-RW-056 9	320-44634-1	95	95
WGNA-102518-FRB-05 69	320-44634-2	101	95
	MB 320-257580/1-A	87	82
	LLCS 320-257580/2-A	95	91
	LLCSD 320-257580/3-A	104	99

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA

QC LIMITS
70-130
70-130

Column to be used to flag recovery values

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Instrument ID: A8_N Calibration Start Date: 10/25/2018 14:59
 GC Column: GeminiC18 3x100 ID: 3(mm) Calibration End Date: 10/25/2018 15:43
 Calibration ID: 41909

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MEAN AREA AND MEAN RT		954978	2.58	794812	2.98		
UPPER LIMIT		1432467	3.08	1192218	3.48		
LOWER LIMIT		477489	2.08	397406	2.48		
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCVL 320-254941/10		971947	2.58	820552	2.98		
ICV 320-254941/12		974787	2.58	788400	2.98		
CCVL 320-257836/1		914756	2.61	699877	2.99		
CCV 320-257875/24 CCVIS		801193	2.59	590850	2.99		
MB 320-257580/1-A		974125	2.59	717756	2.99		
LLCS 320-257580/2-A		1049766	2.59	794682	2.99		
LLCSD 320-257580/3-A		1041506	2.59	777080	2.98		
320-44634-1	WGNA-102518-RW-0569	1061334	2.61	802959	2.99		
320-44634-2	WGNA-102518-FRB-0569	1003914	2.59	765842	2.99		
CCV 320-257875/35 CCVIS		858756	2.59	671592	2.99		

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.: 320-44634-1
 SDG No.: _____
 Sample No.: CCV 320-257875/24 Date Analyzed: 11/08/2018 15:12
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.11.08_537AA_02 Heated Purge: (Y/N) N
 Calibration ID: 41909

	13PFOA		PFOS			
	AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD	801193	2.59	590850	2.99		
UPPER LIMIT	1121670	3.09	827190	3.49		
LOWER LIMIT	560835	2.09	413595	2.49		
LAB SAMPLE ID	CLIENT SAMPLE ID					
MB 320-257580/1-A		974125	2.59	717756	2.99	
LLCS 320-257580/2-A		1049766	2.59	794682	2.99	
LLCSD 320-257580/3-A		1041506	2.59	777080	2.98	
320-44634-1	WGNA-102518-RW-0569	1061334	2.61	802959	2.99	
320-44634-2	WGNA-102518-FRB-0569	1003914	2.59	765842	2.99	

13PFOA = 13C2 PFOA
 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 VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Sample No.: CCV 320-257875/35 Date Analyzed: 11/08/2018 16:34
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.11.08_537AA_03 Heated Purge: (Y/N) N
 Calibration ID: 41909

	13PFOA		PFOS			
	AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD	858756	2.59	671592	2.99		
UPPER LIMIT	1202258	3.09	940229	3.49		
LOWER LIMIT	601129	2.09	470114	2.49		
LAB SAMPLE ID	CLIENT SAMPLE ID					
MB 320-257580/1-A		974125	2.59	717756	2.99	
LLCS 320-257580/2-A		1049766	2.59	794682	2.99	
LLCSD 320-257580/3-A		1041506	2.59	777080	2.98	
320-44634-1	WGNA-102518-RW-0569	1061334	2.61	802959	2.99	
320-44634-2	WGNA-102518-FRB-0569	1003914	2.59	765842	2.99	

13PFOA = 13C2 PFOA
 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 IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Lab File ID: 2018.11.08_537AA_030.d Lab Sample ID: MB 320-257580/1-A
 Matrix: Water Date Extracted: 11/07/2018 10:40
 Instrument ID: A8_N Date Analyzed: 11/08/2018 15:27
 Level: (Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LLCS 320-257580/2-A	2018.11.08_537AA_031.d	11/08/2018 15:35
	LLCSD 320-257580/3-A	2018.11.08_537AA_032.d	11/08/2018 15:42
WGNA-102518-RW-0569	320-44634-1	2018.11.08_537AA_037.d	11/08/2018 16:19
WGNA-102518-FRB-0569	320-44634-2	2018.11.08_537AA_038.d	11/08/2018 16:26

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: MB 320-257580/1-A
 Matrix: Water Lab File ID: 2018.11.08_537AA_030.d
 Analysis Method: 537 Date Collected: _____
 Extraction Method: 537 Date Extracted: 11/07/2018 10:40
 Sample wt/vol: 250 (mL) Date Analyzed: 11/08/2018 15:27
 Con. Extract Vol.: 10.00 (mL) Dilution Factor: 1
 Injection Volume: 10 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 257875 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	2.0	U	5.0	2.0	0.95
335-67-1	Perfluorooctanoic acid (PFOA)	6.0	U	7.0	6.0	2.7
375-95-1	Perfluorononanoic acid (PFNA)	1.0	U	5.0	1.0	0.47
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	2.0	U	5.0	2.0	0.64
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.0	U	5.0	3.0	1.3
375-73-5	Perfluorobutanesulfonic acid (PFBS)	2.0	U	5.0	2.0	0.80

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	87		70-130
STL00996	13C2 PFDA	82		70-130

FORM III
LCMS LOW LEVEL CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.11.08_537AA_031.d
 Lab ID: LLCS 320-257580/2-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LLCS CONCENTRATION (ng/L)	LLCS % REC	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	3.71	3.32 J	89	50-150	
Perfluorooctanoic acid (PFOA)	4.00	3.59 J	90	50-150	M
Perfluorononanoic acid (PFNA)	4.00	3.74 J	94	50-150	
Perfluorohexanesulfonic acid (PFHxS)	3.64	3.50 J	96	50-150	
Perfluoroheptanoic acid (PFHpA)	4.00	3.62 J	90	50-150	
Perfluorobutanesulfonic acid (PFBS)	3.54	3.15 J	89	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.: 320-44634-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.11.08_537AA_032.d
 Lab ID: LLCSD 320-257580/3-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LLCSD CONCENTRATION (ng/L)	LLCSD % REC	% RPD	QC LIMITS		#
					RPD	REC	
Perfluorooctanesulfonic acid (PFOS)	3.71	3.38 J	91	2	50	50-150	
Perfluorooctanoic acid (PFOA)	4.00	3.98 J	99	10	50	50-150	
Perfluorononanoic acid (PFNA)	4.00	3.82 J	96	2	50	50-150	
Perfluorohexanesulfonic acid (PFHxS)	3.64	3.38 J	93	3	50	50-150	
Perfluoroheptanoic acid (PFHpA)	4.00	3.56 J	89	1	50	50-150	
Perfluorobutanesulfonic acid (PFBS)	3.54	3.51 J	99	11	50	50-150	

Column to be used to flag recovery and RPD values

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica SacramentoJob No.: 320-44634-1

SDG No.: _____

Instrument ID: A8_NStart Date: 10/25/2018 14:59Analysis Batch Number: 254941End Date: 10/25/2018 16:12

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-254941/2		10/25/2018 14:59	1	2018.10.25_537I CAL 003.d	GeminiC18 3x100 3(mm)
IC 320-254941/3		10/25/2018 15:06	1	2018.10.25_537I CAL 004.d	GeminiC18 3x100 3(mm)
IC 320-254941/4		10/25/2018 15:14	1	2018.10.25_537I CAL 005.d	GeminiC18 3x100 3(mm)
IC 320-254941/5 ICISAV		10/25/2018 15:21	1	2018.10.25_537I CAL 006.d	GeminiC18 3x100 3(mm)
IC 320-254941/6		10/25/2018 15:29	1	2018.10.25_537I CAL 007.d	GeminiC18 3x100 3(mm)
IC 320-254941/7		10/25/2018 15:36	1	2018.10.25_537I CAL 008.d	GeminiC18 3x100 3(mm)
IC 320-254941/8		10/25/2018 15:43	1	2018.10.25_537I CAL 009.d	GeminiC18 3x100 3(mm)
CCVL 320-254941/10		10/25/2018 15:58	1	2018.10.25_537I CAL 011.d	GeminiC18 3x100 3(mm)
ICB 320-254941/11		10/25/2018 16:05	1		GeminiC18 3x100 3(mm)
ICV 320-254941/12		10/25/2018 16:12	1	2018.10.25_537I CAL 013.d	GeminiC18 3x100 3(mm)

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

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1 Analy Batch No.: 254941

SDG No.: _____

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

Calibration Start Date: 10/25/2018 14:59 Calibration End Date: 10/25/2018 15:43 Calibration ID: 41909

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-254941/2	2018.10.25_537ICAL_003.d
Level 2	IC 320-254941/3	2018.10.25_537ICAL_004.d
Level 3	IC 320-254941/4	2018.10.25_537ICAL_005.d
Level 4	IC 320-254941/5	2018.10.25_537ICAL_006.d
Level 5	IC 320-254941/6	2018.10.25_537ICAL_007.d
Level 6	IC 320-254941/7	2018.10.25_537ICAL_008.d
Level 7	IC 320-254941/8	2018.10.25_537ICAL_009.d

ANALYTE	RRF					CURVE TYPE	COEFFICIENT			#	MIN RRF	%RSD	#	MAX %RSD	R^2 OR COD	#	MIN R^2 OR COD
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5		B	M1	M2								
Perfluorobutanesulfonic acid (PFBS)	1.1273 1.1348	1.0472 1.1821	1.2473	1.1325	1.0470	Ave		1.1312				6.3		30.0			
Perfluoroheptanoic acid (PFHpA)	1.1170 1.0911	1.0831 1.0164	1.1125	1.0906	1.1077	Ave		1.0883				3.1		30.0			
Perfluorohexanesulfonic acid (PFHxS)	1.7276 1.4629	1.5144 1.5084	1.4933	1.5080	1.4474	Ave		1.5232				6.1		30.0			
Perfluorooctanoic acid (PFOA)	1.2693 1.1068	1.2760 1.0811	1.0751	1.0892	1.1110	Ave		1.1441				7.8		30.0			
Perfluorononanoic acid (PFNA)	0.7828 0.8003	0.9188 0.8042	0.8858	0.8660	0.8198	Ave		0.8397				6.1		30.0			
Perfluorooctanesulfonic acid (PFOS)	1.2092 1.0233	1.3067 1.0468	1.1301	1.0534	1.0463	Ave		1.1166				9.5		30.0			
13C2 PFHxA	0.9719 0.9620	0.9669 0.9685	0.9927	1.0476	1.0117	Ave		0.9888				3.2		30.0			
13C2 PFDA	0.7273 0.6763	0.6718 0.6663	0.6660	0.7153	0.7053	Ave		0.6898				3.7		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.: 320-44634-1 Analy Batch No.: 254941

SDG No.: _____

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

Calibration Start Date: 10/25/2018 14:59 Calibration End Date: 10/25/2018 15:43 Calibration ID: 41909

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-254941/2	2018.10.25_537ICAL_003.d
Level 2	IC 320-254941/3	2018.10.25_537ICAL_004.d
Level 3	IC 320-254941/4	2018.10.25_537ICAL_005.d
Level 4	IC 320-254941/5	2018.10.25_537ICAL_006.d
Level 5	IC 320-254941/6	2018.10.25_537ICAL_007.d
Level 6	IC 320-254941/7	2018.10.25_537ICAL_008.d
Level 7	IC 320-254941/8	2018.10.25_537ICAL_009.d

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
Perfluorobutanesulfonic acid (PFBS)	PFOS	Ave	7850 1805727	15129 3593985	90415	321034	771338	0.0221 4.42	0.0442 8.84	0.221	0.884	2.21
Perfluoroheptanoic acid (PFHpA)	13PF OA	Ave	10502 2168310	20433 4036861	107565	394448	1045338	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorohexanesulfonic acid (PFHxS)	PFOS	Ave	12384 2396371	22521 4720764	111433	440068	1097729	0.0228 4.55	0.0455 9.10	0.228	0.910	2.28
Perfluorooctanoic acid (PFOA)	13PF OA	Ave	11946 2201725	24097 4298280	104050	394334	1049529	0.0250 5.01	0.0501 10.0	0.250	1.00	2.50
Perfluorononanoic acid (PFNA)	13PF OA	Ave	7360 1590432	17333 3194105	85638	313227	773614	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorooctanesulfonic acid (PFOS)	PFOS	Ave	8839 1709437	19817 3340812	86001	313486	809220	0.0232 4.64	0.0464 9.28	0.232	0.928	2.32
13C2 PFHxA	13PF OA	Ave	913787 955852	912101 961713	959790	947296	954767	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFDA	13PF OA	Ave	683785 672010	633723 661601	643936	646763	665573	2.50 2.50	2.50 2.50	2.50	2.50	2.50

Curve Type Legend:

Ave = Average ISTD

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

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1 Analy Batch No.: 254941

SDG No.: _____

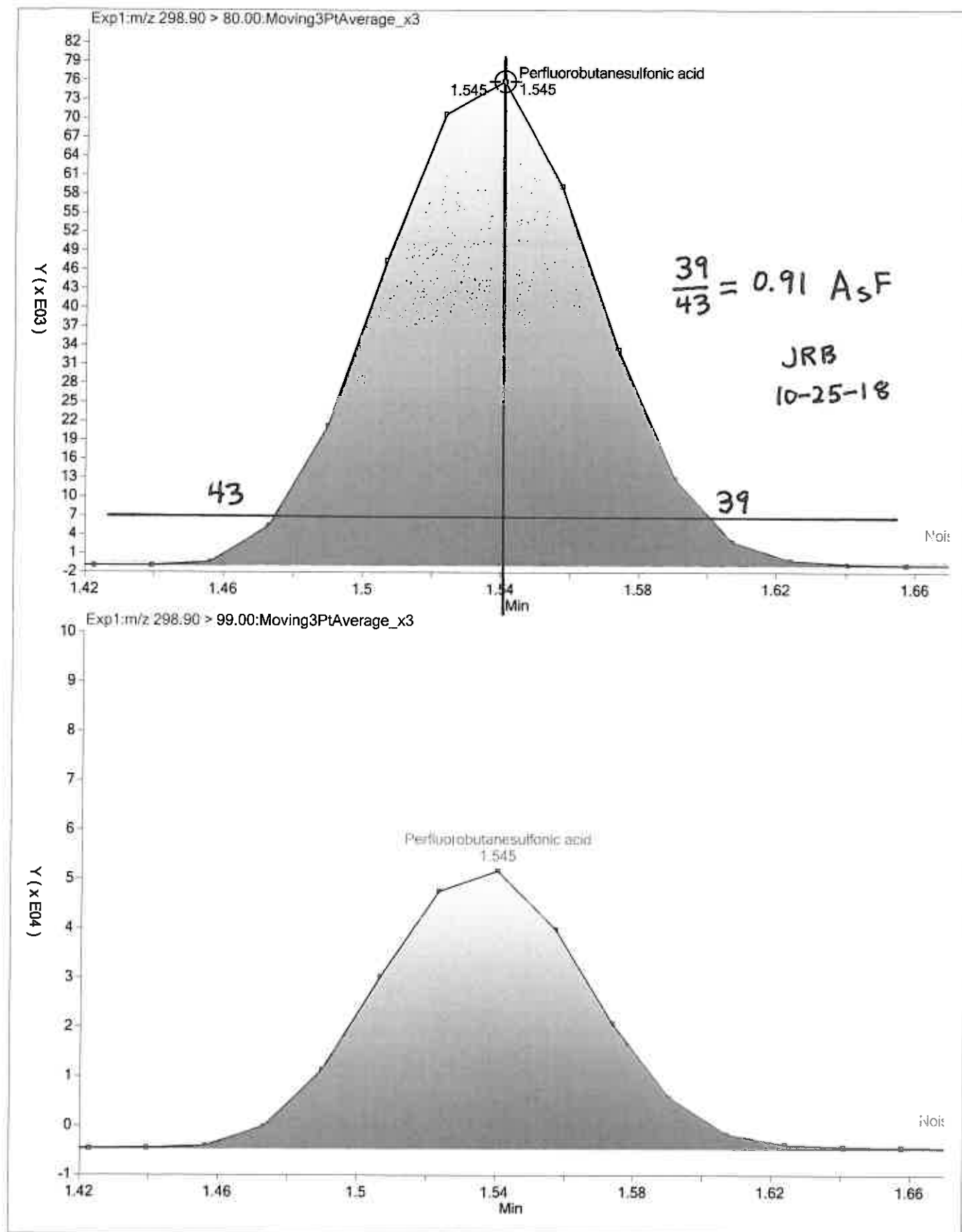
Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

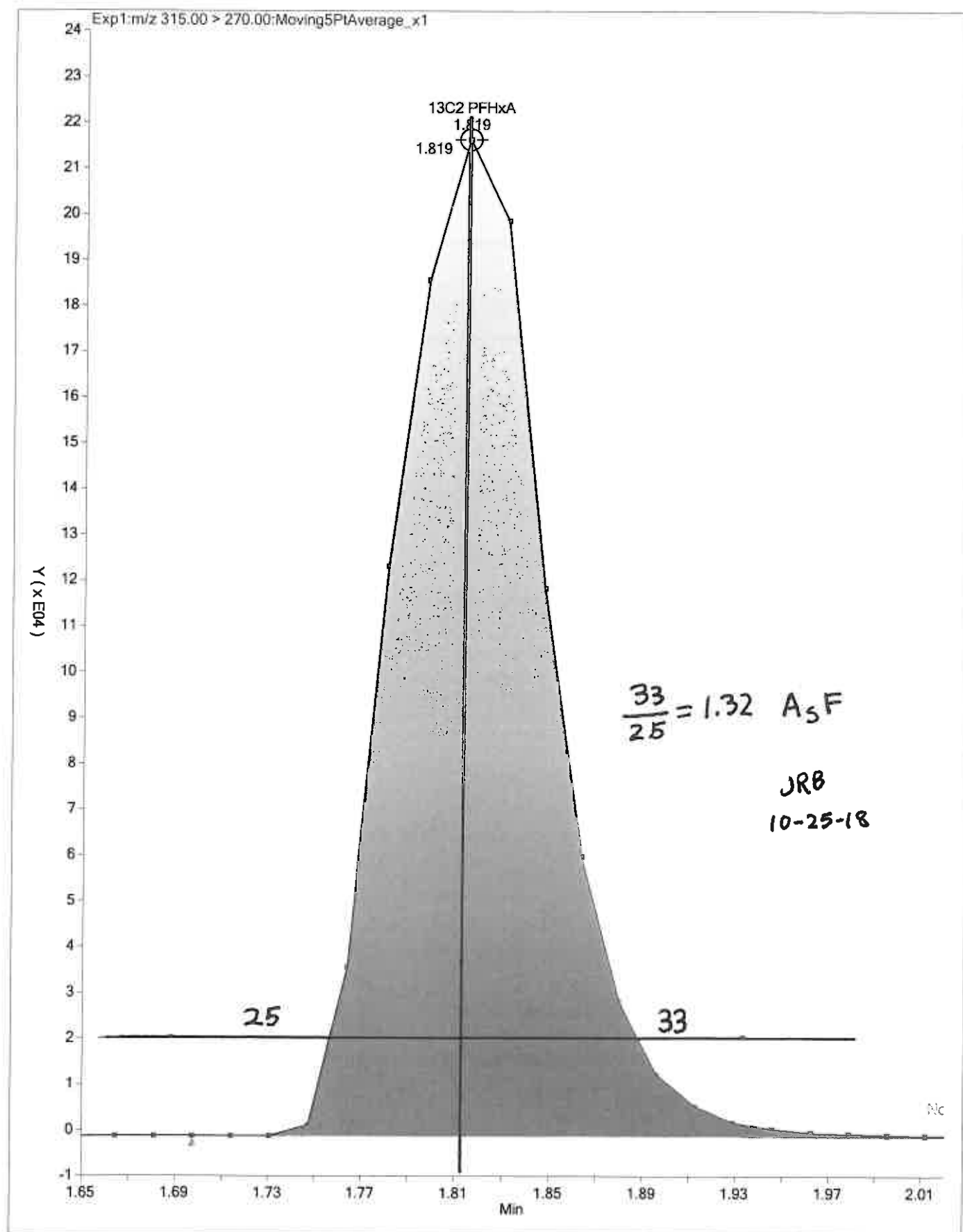
Calibration Start Date: 10/25/2018 14:59 Calibration End Date: 10/25/2018 15:43 Calibration ID: 41909

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-254941/2	2018.10.25_537ICAL_003.d
Level 2	IC 320-254941/3	2018.10.25_537ICAL_004.d
Level 3	IC 320-254941/4	2018.10.25_537ICAL_005.d
Level 4	IC 320-254941/5	2018.10.25_537ICAL_006.d
Level 5	IC 320-254941/6	2018.10.25_537ICAL_007.d
Level 6	IC 320-254941/7	2018.10.25_537ICAL_008.d
Level 7	IC 320-254941/8	2018.10.25_537ICAL_009.d

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 # LVL 7 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #	LVL 6 #	LVL 1 LVL 7	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6
Perfluorobutanesulfonic acid (PFBS)	-0.3 4.5	-7.4	10.3	0.1	-7.4	0.3	50 30	30	30	30	30	30
Perfluoroheptanoic acid (PFHpA)	2.6 -6.6	-0.5	2.2	0.2	1.8	0.3	50 30	30	30	30	30	30
Perfluorohexanesulfonic acid (PFHxS)	13.4 -1.0	-0.6	-2.0	-1.0	-5.0	-4.0	50 30	30	30	30	30	30
Perfluorooctanoic acid (PFOA)	10.9 -5.5	11.5	-6.0	-4.8	-2.9	-3.3	50 30	30	30	30	30	30
Perfluorononanoic acid (PFNA)	-6.8 -4.2	9.4	5.5	3.1	-2.4	-4.7	50 30	30	30	30	30	30
Perfluorooctanesulfonic acid (PFOS)	8.3 -6.3	17.0	1.2	-5.7	-6.3	-8.3	50 30	30	30	30	30	30
13C2 PFHxA	-1.7 -2.0	-2.2	0.4	6.0	2.3	-2.7	30 30	30	30	30	30	30
13C2 PFDA	5.4 -3.4	-2.6	-3.4	3.7	2.2	-1.9	30 30	30	30	30	30	30





TestAmerica Laboratories
Istd/Surrogate Recovery Report

Worklist Name: 25OCT2018_ICAL_537FULL Worklist Num: 66581
Instrument: A8_N Method: 537_A8_N
Batch Directory: \\ChromNa\Sacramento\ChromData\A8_N\20181025-66581.b
Limit Group: LC 537 ICAL
Analysis Type: SemiVOA
Inj Volume: 10.00 Inj Vol Units: ul

Lims Batch: 254941
CCV IS Mode: Select Ical Level, Cal Level: 3
Non-Cal IS Mode: Last Ccal Sample

\$ 2 13C2 PFHxA
\$ 10 13C2 PFDA
\$ 11 d5-NEtFOSAA

Lab ID	Inj Date	\$ 2	\$ 10	\$ 11	* 5 13C2 PFOA	* 7 13C4 PFOS	* 12 d3-NMeFOSAA
IS Std					380219 2.61	294947 3.01	133031 3.53
# 1 RB	25-Oct-2018 14:52:04				955642> 251.3* 2.59	772204> 261.8* 2.98	286349> 215.2* 3.49
IS Std							
# 2 IC L1	25-Oct-2018 14:59:27	1.83 97.96	3.34 104.80	3.66 104.10	2.58 940209> 100.0* 2.59	2.97 753053> 100.0* 2.98	3.50 285319> 100.0* 3.49
# 3 IC L2	25-Oct-2018 15:06:50	1.82 97.79	3.34 97.40	3.66 100.30	2.58 943285> 100.3* 2.59	2.98 781153> 103.7* 2.98	3.50 294326> 103.2* 3.49
# 4 IC L3	25-Oct-2018 15:14:13	1.82 101.60	3.35 96.75	3.67 98.15	2.58 966840> 102.8* 2.59	2.98 783934> 104.1* 2.98	3.49 291201> 102.1* 3.49
# 5 IC L4	25-Oct-2018 15:21:36	1.82 106.00	3.35 103.70	3.67 102.20	2.58 904232> 96.2* 2.59	2.98 766417> 101.8* 2.98	3.49 285764> 100.2* 3.49
# 6 IC L5	25-Oct-2018 15:29:01	1.82 101.40	3.33 101.20	3.67 101.40	2.58 943717> 100.4* 2.58	2.98 796733> 105.8* 2.98	3.49 297764> 104.4* 3.49
# 7 IC L6	25-Oct-2018 15:36:20	1.84 96.96	3.33 97.50	3.67 93.66	2.58 993600> 105.7* 2.58	2.98 860427> 114.3* 2.98	3.49 309979> 108.6* 3.49
# 8 IC L7	25-Oct-2018 15:43:40	1.82 97.95	3.33 96.60	3.65 94.62	2.58 992963> 105.6* 2.58	2.96 821968> 109.2* 2.96	3.49 309839> 108.6* 3.49

13C2 PFOA

$$RPD = \frac{993600 - 904232}{(993600 + 904232)} \times 100 = 9.4$$

13C4 PFOS

$$RPD = \frac{860427 - 753053}{(860427 + 753053)} \times 100 = 13.3$$

d3-NMeFOSAA

$$RPD = \frac{309979 - 285319}{(309979 + 285319)} \times 100 = 8.3$$

JRB

10-25-18

Calibration

/ Perfluorobutanesulfonic acid

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

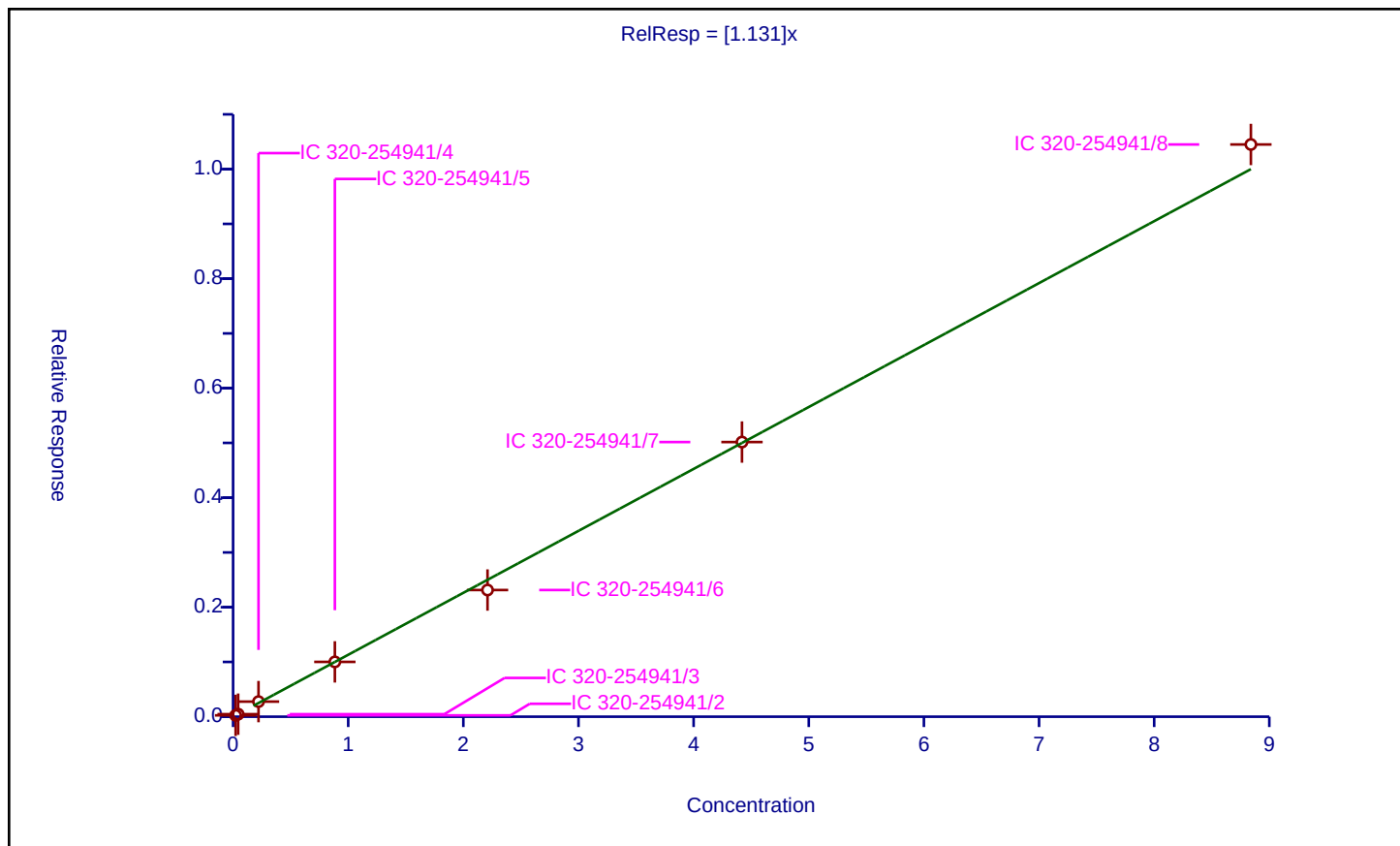
Curve Coefficients

Intercept: 0
 Slope: 1.131

Error Coefficients

Standard Error: 1680000
 Relative Standard Error: 6.3
 Correlation Coefficient: 0.999
 Coefficient of Determination (Adjusted): 0.995

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-254941/2	0.0221	0.024914	2.39	753053.0	1.127327	Y
2	IC 320-254941/3	0.0442	0.046288	2.39	781153.0	1.047249	Y
3	IC 320-254941/4	0.221	0.275651	2.39	783934.0	1.247288	Y
4	IC 320-254941/5	0.884	1.001115	2.39	766417.0	1.132483	Y
5	IC 320-254941/6	2.21	2.313821	2.39	796733.0	1.046978	Y
6	IC 320-254941/7	4.42	5.015751	2.39	860427.0	1.134785	Y
7	IC 320-254941/8	8.84	10.450071	2.39	821968.0	1.182135	Y



Calibration

/ 13C2 PFHxA

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

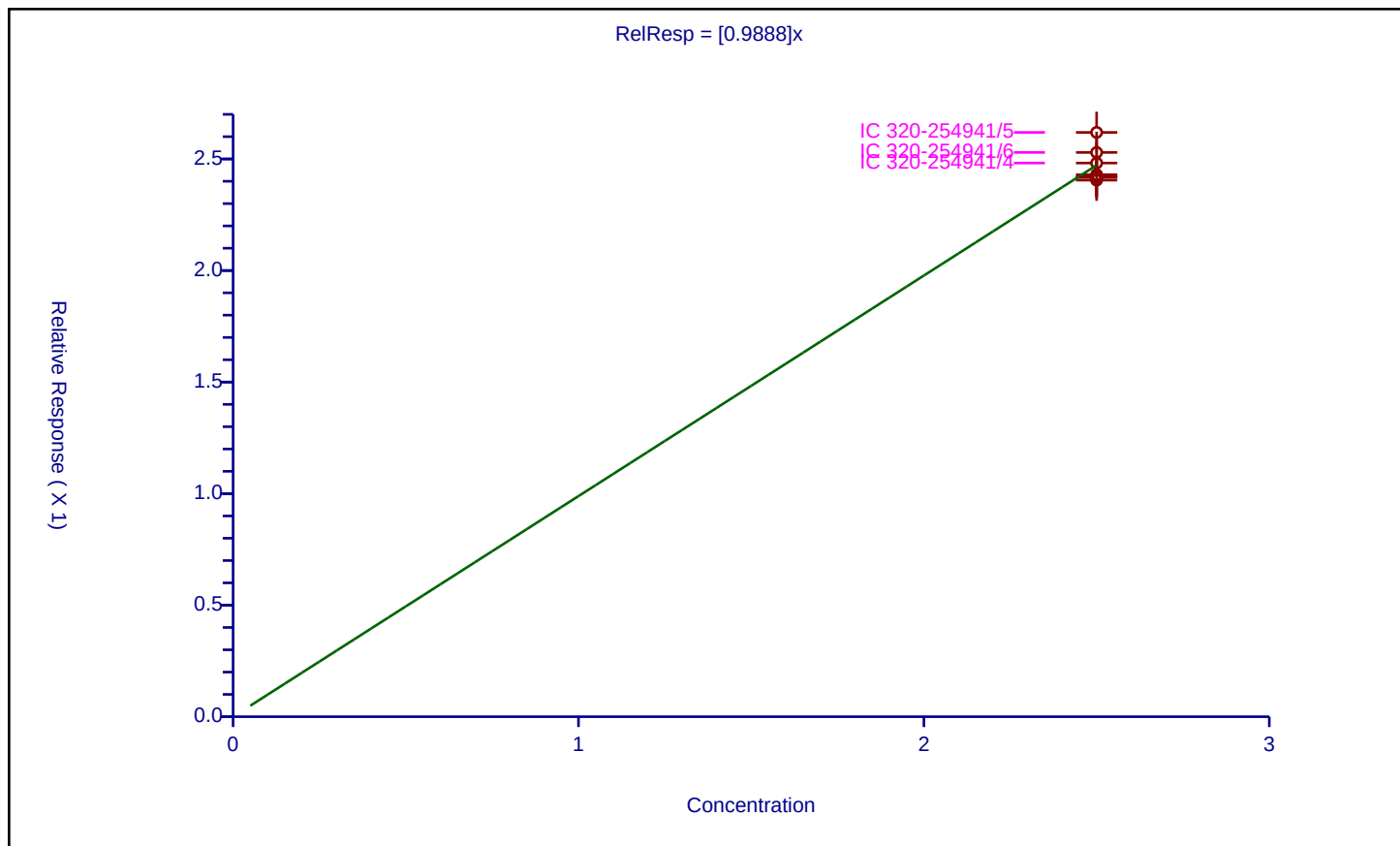
Curve Coefficients

Intercept: 0
Slope: 0.9888

Error Coefficients

Standard Error: 1020000
Relative Standard Error: 3.2
Correlation Coefficient: NA
Coefficient of Determination (Adjusted): 0

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-254941/2	2.5	2.429744	2.5	940209.0	0.971898	Y
2	IC 320-254941/3	2.5	2.417353	2.5	943285.0	0.966941	Y
3	IC 320-254941/4	2.5	2.481771	2.5	966840.0	0.992708	Y
4	IC 320-254941/5	2.5	2.619062	2.5	904232.0	1.047625	Y
5	IC 320-254941/6	2.5	2.529273	2.5	943717.0	1.011709	Y
6	IC 320-254941/7	2.5	2.405022	2.5	993600.0	0.962009	Y
7	IC 320-254941/8	2.5	2.421321	2.5	992963.0	0.968529	Y



Calibration

/ Perfluoroheptanoic acid

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

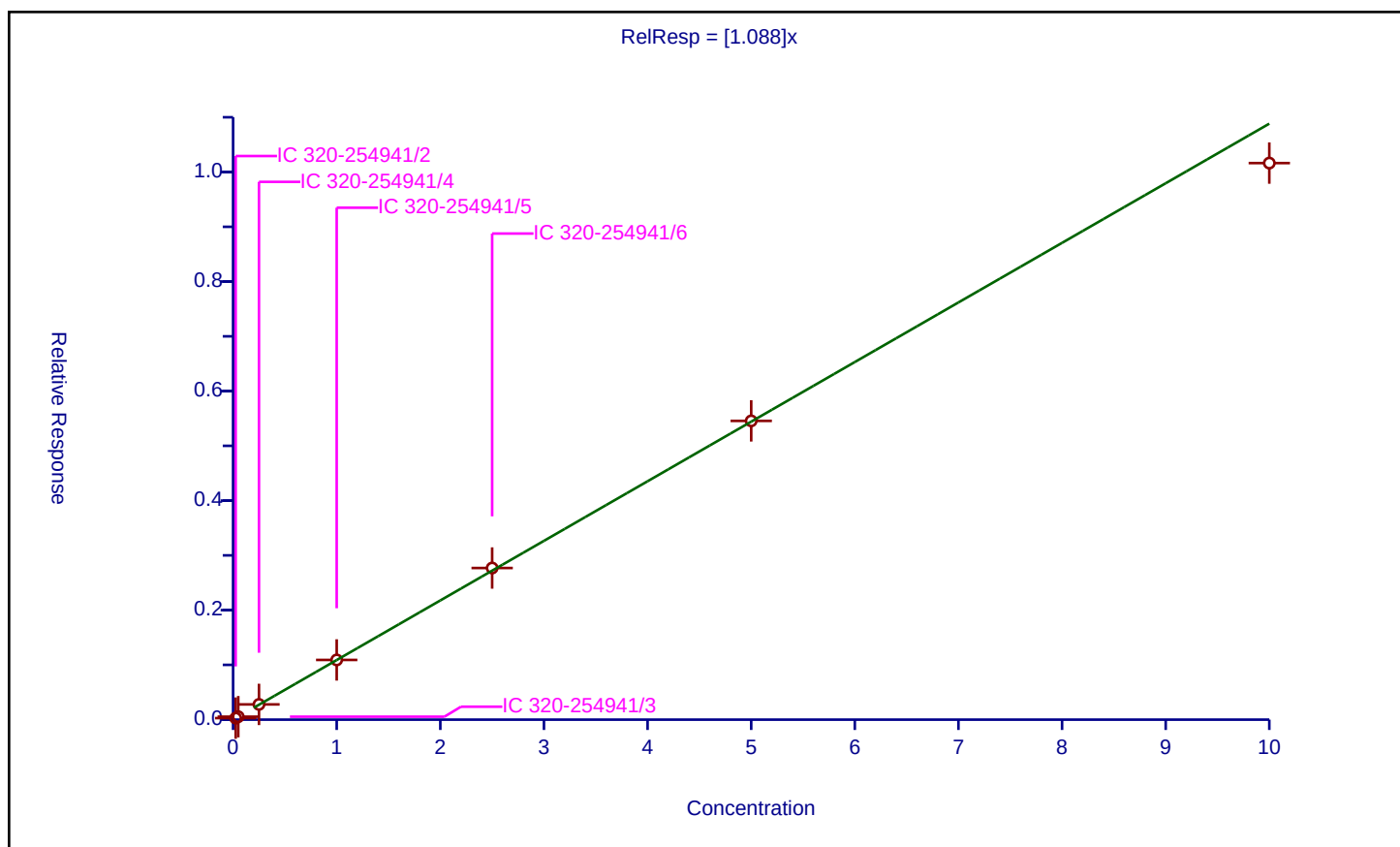
Curve Coefficients

Intercept: 0
 Slope: 1.088

Error Coefficients

Standard Error: 1930000
 Relative Standard Error: 3.1
 Correlation Coefficient: 0.999
 Coefficient of Determination (Adjusted): 0.999

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-254941/2	0.025	0.027925	2.5	940209.0	1.116986	Y
2	IC 320-254941/3	0.05	0.054154	2.5	943285.0	1.083077	Y
3	IC 320-254941/4	0.25	0.278135	2.5	966840.0	1.112542	Y
4	IC 320-254941/5	1.0	1.090561	2.5	904232.0	1.090561	Y
5	IC 320-254941/6	2.5	2.769204	2.5	943717.0	1.107682	Y
6	IC 320-254941/7	5.0	5.455691	2.5	993600.0	1.091138	Y
7	IC 320-254941/8	10.0	10.163674	2.5	992963.0	1.016367	Y



Calibration

/ Perfluorohexanesulfonic acid

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

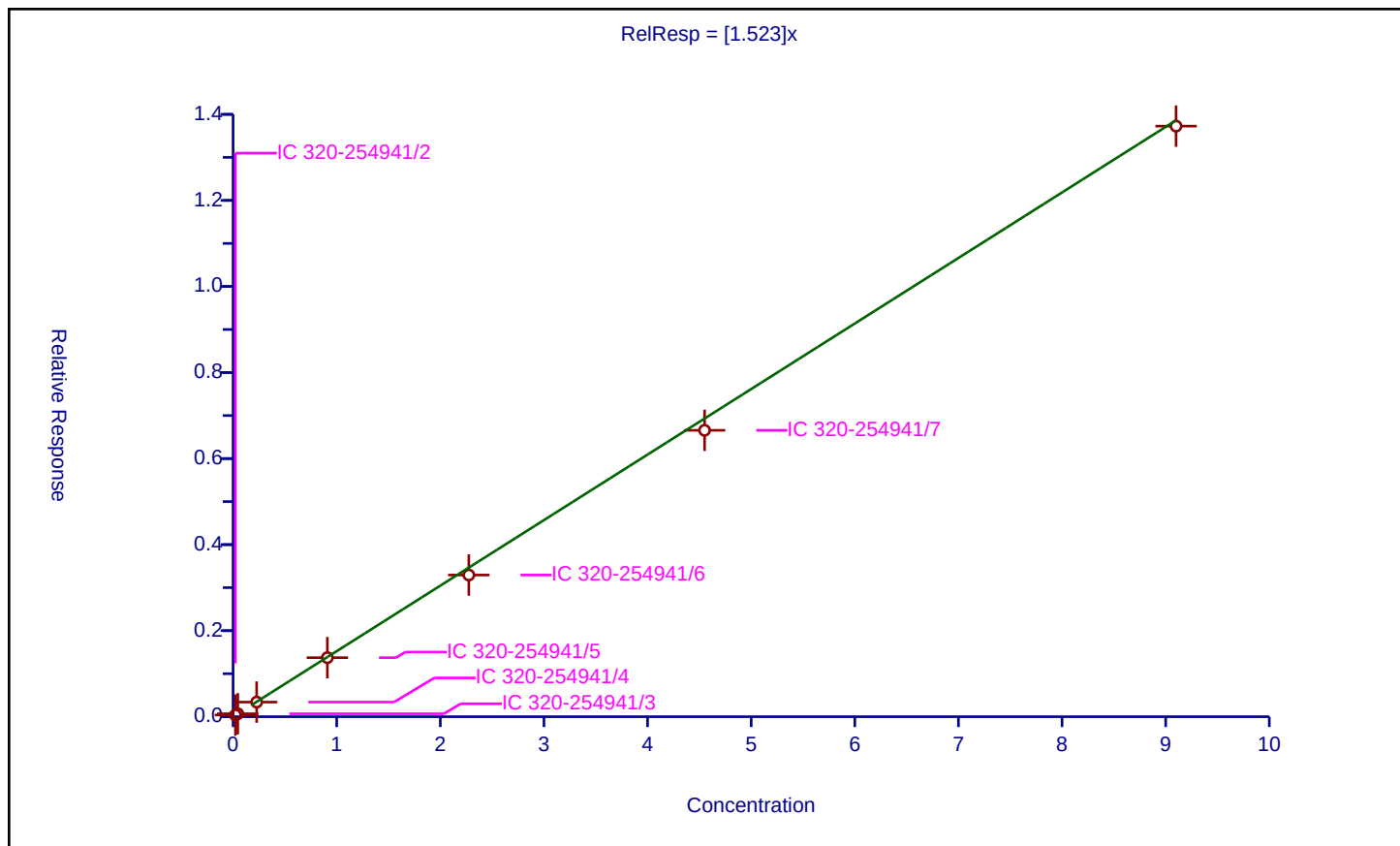
Curve Coefficients

Intercept: 0
 Slope: 1.523

Error Coefficients

Standard Error: 2220000
 Relative Standard Error: 6.1
 Correlation Coefficient: 1.000
 Coefficient of Determination (Adjusted): 0.995

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-254941/2	0.02275	0.039304	2.39	753053.0	1.727635	Y
2	IC 320-254941/3	0.0455	0.068905	2.39	781153.0	1.514391	Y
3	IC 320-254941/4	0.2275	0.339729	2.39	783934.0	1.493313	Y
4	IC 320-254941/5	0.91	1.372311	2.39	766417.0	1.508034	Y
5	IC 320-254941/6	2.275	3.292913	2.39	796733.0	1.447434	Y
6	IC 320-254941/7	4.55	6.656377	2.39	860427.0	1.46294	Y
7	IC 320-254941/8	9.1	13.726357	2.39	821968.0	1.508391	Y



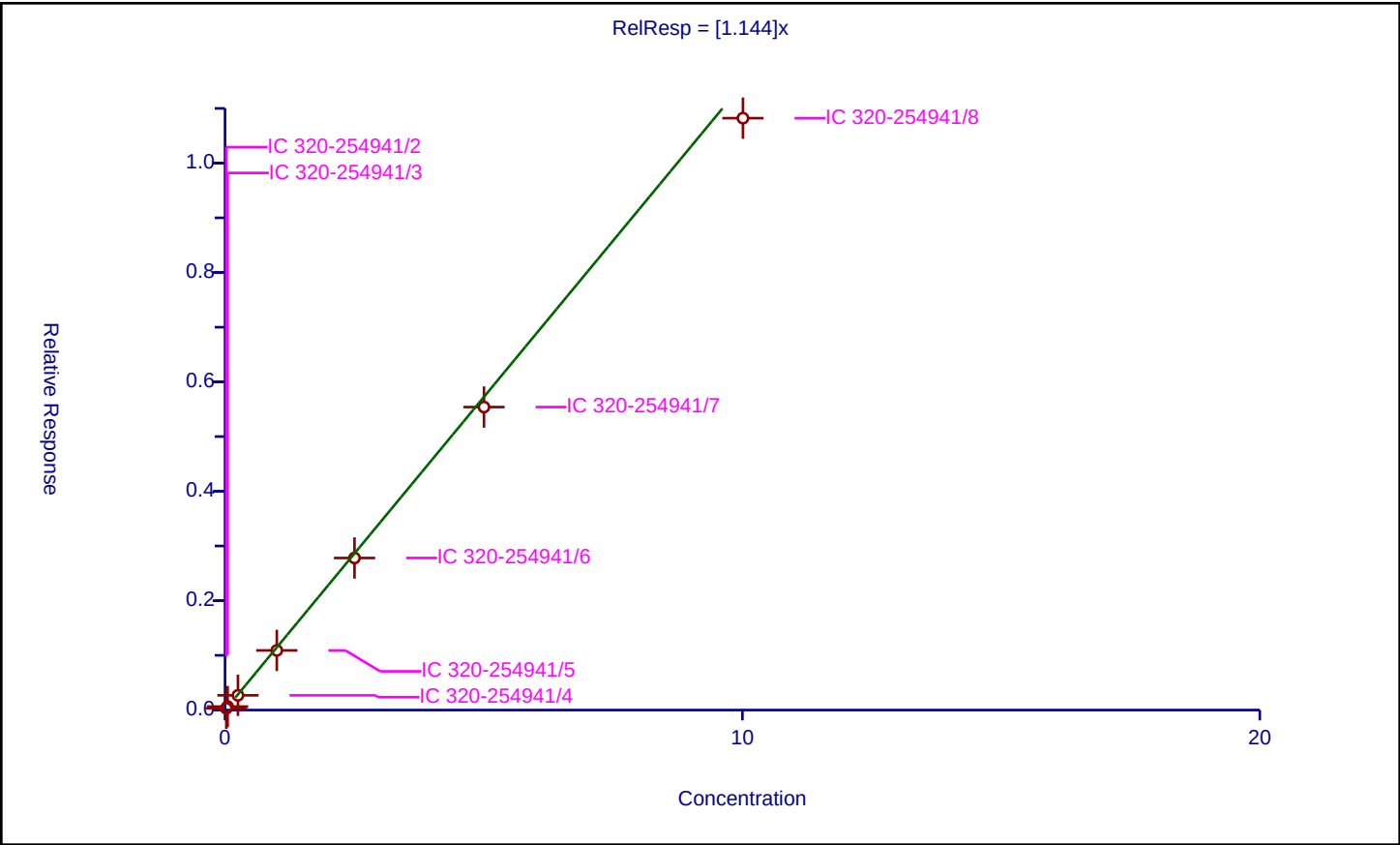
Calibration

/ 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:	1.144
Error Coefficients	
Standard Error:	2020000
Relative Standard Error:	7.8
Correlation Coefficient:	1.000
Coefficient of Determination (Adjusted):	0.992

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-254941/2	0.025025	0.031764	2.5	940209.0	1.269299	Y
2	IC 320-254941/3	0.05005	0.063865	2.5	943285.0	1.276016	Y
3	IC 320-254941/4	0.25025	0.269047	2.5	966840.0	1.075111	Y
4	IC 320-254941/5	1.001	1.090246	2.5	904232.0	1.089156	Y
5	IC 320-254941/6	2.5025	2.780306	2.5	943717.0	1.111012	Y
6	IC 320-254941/7	5.005	5.539767	2.5	993600.0	1.106847	Y
7	IC 320-254941/8	10.01	10.821853	2.5	992963.0	1.081104	Y



Calibration

/ Perfluorononanoic acid

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

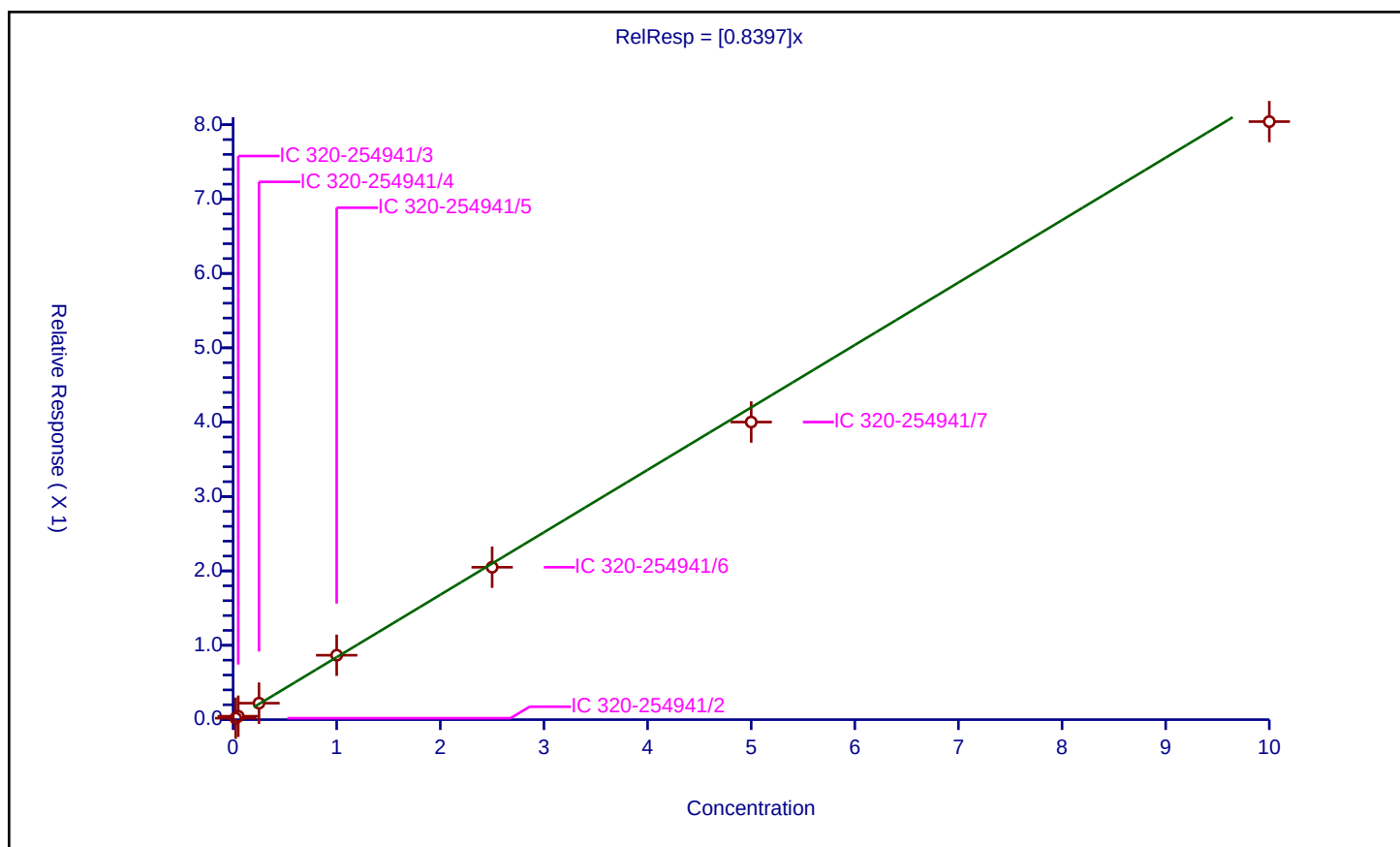
Curve Coefficients

Intercept: 0
 Slope: 0.8397

Error Coefficients

Standard Error: 1500000
 Relative Standard Error: 6.1
 Correlation Coefficient: 1.000
 Coefficient of Determination (Adjusted): 0.996

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-254941/2	0.025	0.01957	2.5	940209.0	0.782805	Y
2	IC 320-254941/3	0.05	0.045938	2.5	943285.0	0.918757	Y
3	IC 320-254941/4	0.25	0.221438	2.5	966840.0	0.885752	Y
4	IC 320-254941/5	1.0	0.866003	2.5	904232.0	0.866003	Y
5	IC 320-254941/6	2.5	2.04938	2.5	943717.0	0.819752	Y
6	IC 320-254941/7	5.0	4.001691	2.5	993600.0	0.800338	Y
7	IC 320-254941/8	10.0	8.041853	2.5	992963.0	0.804185	Y



Calibration

/ Perfluorooctanesulfonic acid

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

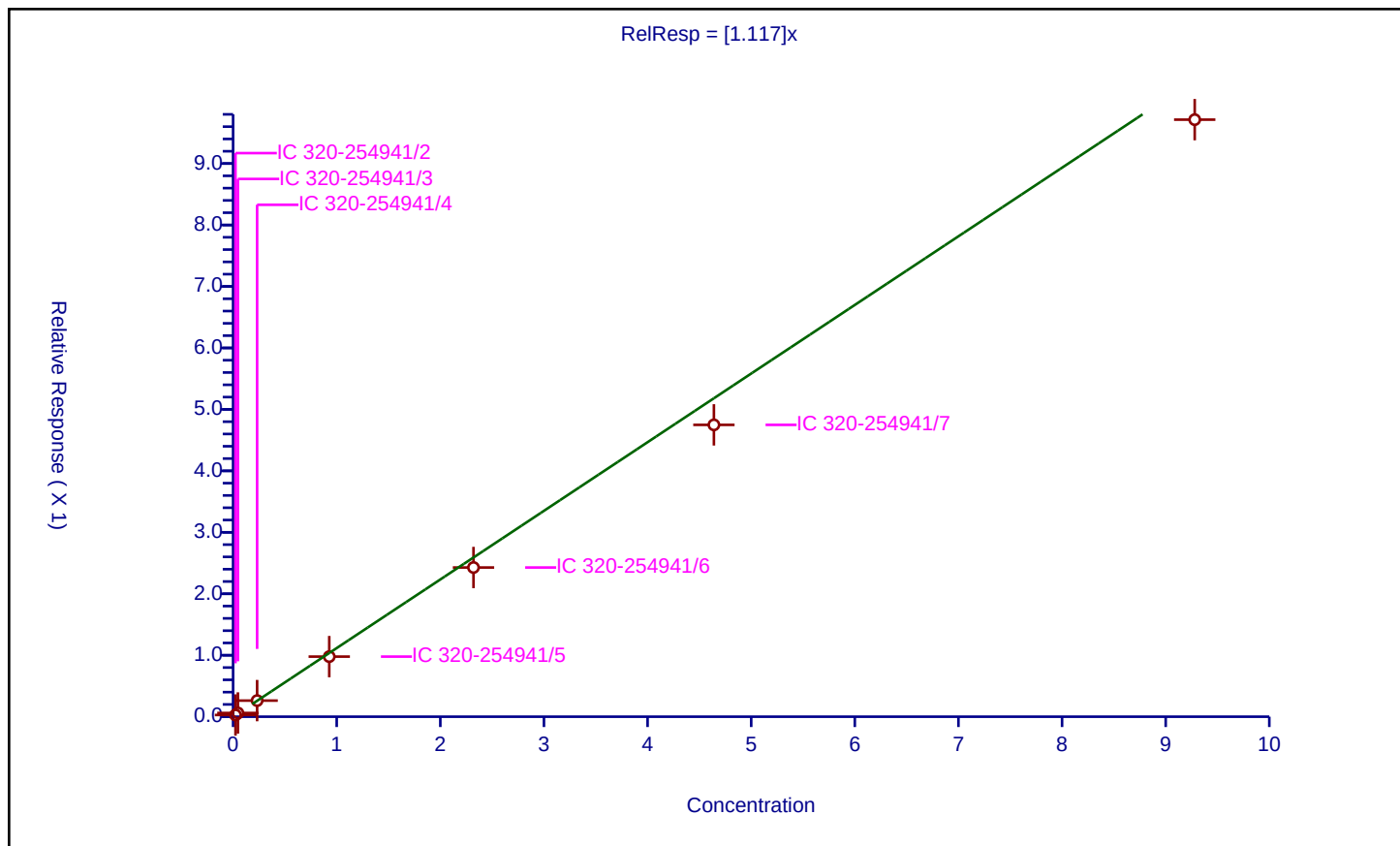
Curve Coefficients

Intercept: 0
 Slope: 1.117

Error Coefficients

Standard Error: 1570000
 Relative Standard Error: 9.5
 Correlation Coefficient: 1.000
 Coefficient of Determination (Adjusted): 0.988

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-254941/2	0.0232	0.028053	2.39	753053.0	1.20917	Y
2	IC 320-254941/3	0.0464	0.060632	2.39	781153.0	1.306718	Y
3	IC 320-254941/4	0.232	0.262193	2.39	783934.0	1.130144	Y
4	IC 320-254941/5	0.928	0.977577	2.39	766417.0	1.053423	Y
5	IC 320-254941/6	2.32	2.427458	2.39	796733.0	1.046318	Y
6	IC 320-254941/7	4.64	4.748287	2.39	860427.0	1.023338	Y
7	IC 320-254941/8	9.28	9.713931	2.39	821968.0	1.04676	Y



Calibration

/ 13C2 PFDA

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

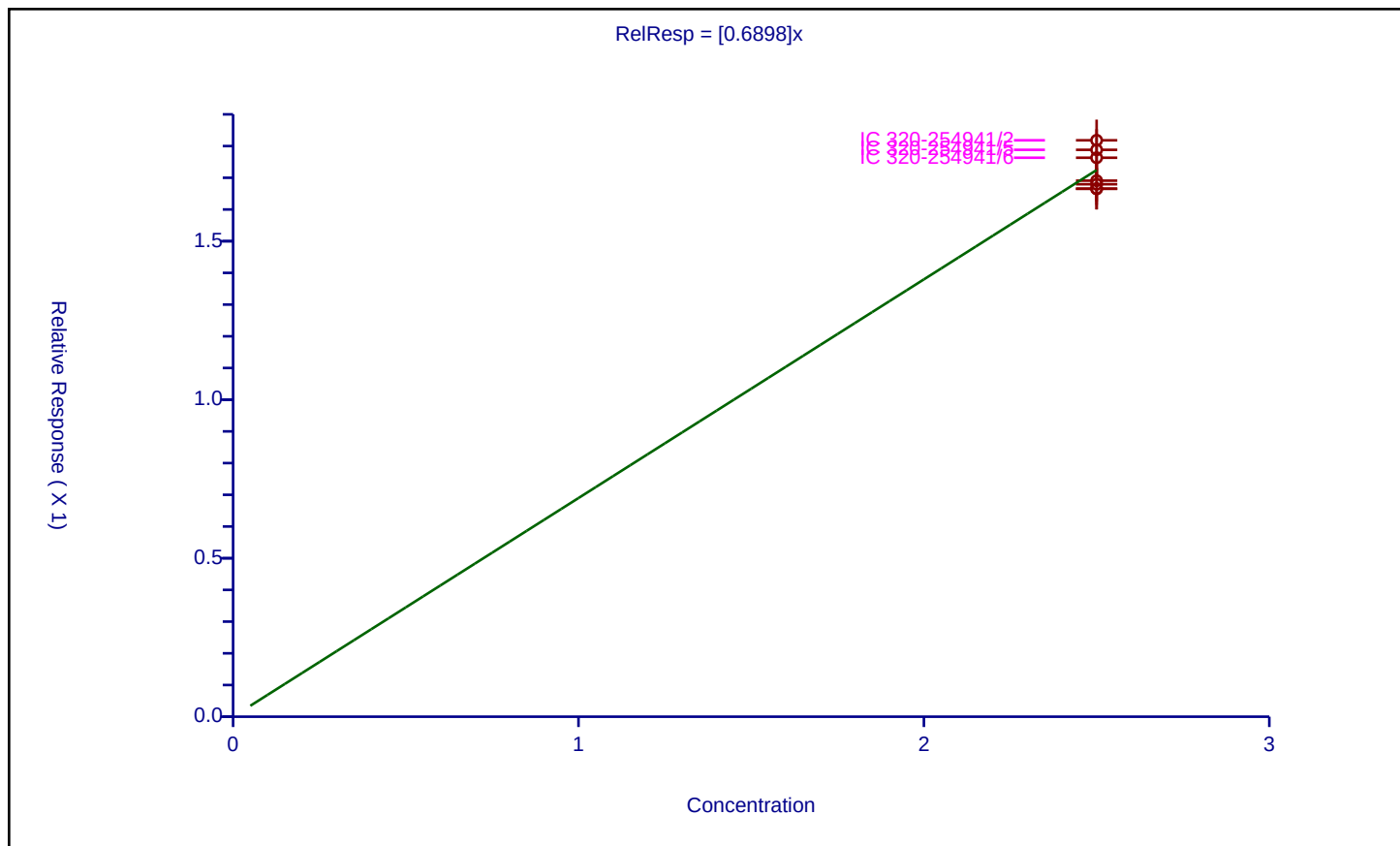
Curve Coefficients

Intercept: 0
Slope: 0.6898

Error Coefficients

Standard Error: 711000
Relative Standard Error: 3.7
Correlation Coefficient: NA
Coefficient of Determination (Adjusted): 0

ID	Level	Concentration	Rel. Resp.	IS Amount	IS Response	RRF	Used
1	IC 320-254941/2	2.5	1.818173	2.5	940209.0	0.727269	Y
2	IC 320-254941/3	2.5	1.679564	2.5	943285.0	0.671826	Y
3	IC 320-254941/4	2.5	1.665053	2.5	966840.0	0.666021	Y
4	IC 320-254941/5	2.5	1.788156	2.5	904232.0	0.715262	Y
5	IC 320-254941/6	2.5	1.763169	2.5	943717.0	0.705268	Y
6	IC 320-254941/7	2.5	1.690846	2.5	993600.0	0.676339	Y
7	IC 320-254941/8	2.5	1.665724	2.5	992963.0	0.66629	Y



FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-254941/10 Calibration Date: 10/25/2018 15:58
 Instrument ID: A8_N Calib Start Date: 10/25/2018 14:59
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 10/25/2018 15:43
 Lab File ID: 2018.10.25_537ICAL_011.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.131	1.160		9.00	0.0442	2.6	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.088	1.236		1.00	0.0500	13.6	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.523	1.856		3.00	0.0455	21.8	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.144	1.011		2.00	0.0501	-11.6	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8397	0.8737		5.00	0.0500	4.1	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	0.9171		4.00	0.0464	-17.9	50.0
13C2 PFHxA	Ave	0.9888	1.053		2.66	2.50	6.5	30.0
13C2 PFDA	Ave	0.6898	0.6953		2.52	2.50	0.8	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Lab Sample ID: ICV 320-254941/12 Calibration Date: 10/25/2018 16:12
 Instrument ID: A8_N Calib Start Date: 10/25/2018 14:59
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 10/25/2018 15:43
 Lab File ID: 2018.10.25_537ICAL_013.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.131	1.180		9.00	1.77	4.3	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.088	1.136		2.09	2.00	4.4	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.523	1.516		1.82	1.82	-0.5	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.144	1.037		1.81	2.00	-9.4	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8397	0.8648		2.06	2.00	3.0	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.116		1.85	1.85	-0.0	30.0
13C2 PFHxA	Ave	0.9888	1.084		2.74	2.50	9.7	30.0
13C2 PFDA	Ave	0.6898	0.7056		2.56	2.50	2.3	30.0

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1

SDG No.: _____

Instrument ID: A8_N Start Date: 11/08/2018 10:54

Analysis Batch Number: 257836 End Date: 11/08/2018 10:54

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-257836/1		11/08/2018 10:54	1	2018.11.08_537A A 004.d	GeminiC18 3x100 3(mm)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-257836/1 Calibration Date: 11/08/2018 10:54
 Instrument ID: A8_N Calib Start Date: 10/25/2018 14:59
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 10/25/2018 15:43
 Lab File ID: 2018.11.08_537AA_004.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.131	1.297		9.00	0.0442	14.6	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.088	1.104		1.00	0.0500	1.4	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.523	1.641		3.00	0.0455	7.7	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.144	1.234		2.00	0.0501	7.8	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8397	0.9443		5.00	0.0500	12.5	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.389		4.00	0.0464	24.4	50.0
13C2 PFHxA	Ave	0.9888	1.016		2.57	2.50	2.7	30.0
13C2 PFDA	Ave	0.6898	0.6893		2.50	2.50	-0.0	30.0

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica SacramentoJob No.: 320-44634-1

SDG No.: _____

Instrument ID: A8_NStart Date: 11/08/2018 15:12Analysis Batch Number: 257875End Date: 11/08/2018 16:34

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-257875/24 CCVIS		11/08/2018 15:12	1	2018.11.08_537A A 028.d	GeminiC18 3x100 3(mm)
MB 320-257580/1-A		11/08/2018 15:27	1	2018.11.08_537A A 030.d	GeminiC18 3x100 3(mm)
LLCS 320-257580/2-A		11/08/2018 15:35	1	2018.11.08_537A A 031.d	GeminiC18 3x100 3(mm)
LLCSD 320-257580/3-A		11/08/2018 15:42	1	2018.11.08_537A A 032.d	GeminiC18 3x100 3(mm)
ZZZZZ		11/08/2018 15:49	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/08/2018 15:57	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/08/2018 16:04	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/08/2018 16:11	1		GeminiC18 3x100 3(mm)
320-44634-1		11/08/2018 16:19	1	2018.11.08_537A A 037.d	GeminiC18 3x100 3(mm)
320-44634-2		11/08/2018 16:26	1	2018.11.08_537A A 038.d	GeminiC18 3x100 3(mm)
CCV 320-257875/35 CCVIS		11/08/2018 16:34	1	2018.11.08_537A A 039.d	GeminiC18 3x100 3(mm)

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Lab Sample ID: CCV 320-257875/24 Calibration Date: 11/08/2018 15:12
 Instrument ID: A8_N Calib Start Date: 10/25/2018 14:59
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 10/25/2018 15:43
 Lab File ID: 2018.11.08_537AA_028.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.131	1.149		9.00	0.884	1.6	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.088	1.094		1.00	1.00	0.5	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.523	1.565		3.00	0.910	2.7	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.144	1.099		0.961	1.00	-4.0	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8397	0.8317		5.00	1.00	-1.0	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.062		4.00	0.928	-4.9	30.0
13C2 PFHxA	Ave	0.9888	0.9485		2.40	2.50	-4.1	30.0
13C2 PFDA	Ave	0.6898	0.6763		2.45	2.50	-1.9	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1
 SDG No.: _____
 Lab Sample ID: CCV 320-257875/35 Calibration Date: 11/08/2018 16:34
 Instrument ID: A8_N Calib Start Date: 10/25/2018 14:59
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 10/25/2018 15:43
 Lab File ID: 2018.11.08_537AA_039.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.131	1.124		4.39	4.42	-0.6	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.088	1.112		5.11	5.00	2.2	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.523	1.526		4.56	4.55	0.2	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.144	1.060		4.64	5.01	-7.3	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8397	0.8535		5.08	5.00	1.7	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.072		4.45	4.64	-4.0	30.0
13C2 PFHxA	Ave	0.9888	1.028		2.60	2.50	4.0	30.0
13C2 PFDA	Ave	0.6898	0.6868		2.49	2.50	-0.4	30.0

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44634-1

SDG No.: _____

Batch Number: 257580 Batch Start Date: 11/07/18 10:40 Batch Analyst: Long, Tyrel WBatch Method: 537 Batch End Date: 11/07/18 17:00

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	ReceivedpH	LC537-IS 00087
MB 320-257580/1		537, 537				250 mL	10.00 mL	7 SU	500 uL
LLCS 320-257580/2		537, 537				250 mL	10.00 mL	7 SU	500 uL
LLCSD 320-257580/3		537, 537				250 mL	10.00 mL	7 SU	500 uL
320-44634-A-1	WGNA-102518-RW-0569	537, 537	T	312.71 g	29.01 g	283.7 mL	10.00 mL	7 SU	500 uL
320-44634-A-2	WGNA-102518-FRB-0569	537, 537	T	300.21 g	27.50 g	272.7 mL	10.00 mL	7 SU	500 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-SU 00085	LC537LSP 00002	AnalysisComment			
MB 320-257580/1		537, 537		500 uL		Chlorine ND			
LLCS 320-257580/2		537, 537		500 uL	500 uL	Chlorine ND			
LLCSD 320-257580/3		537, 537		500 uL	500 uL	Chlorine ND			
320-44634-A-1	WGNA-102518-RW-0569	537, 537	T	500 uL		Chlorine ND			
320-44634-A-2	WGNA-102518-FRB-0569	537, 537	T	500 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.: 320-44634-1

SDG No.: _____

Batch Number: 257580 Batch Start Date: 11/07/18 10:40 Batch Analyst: Long, Tyrel WBatch Method: 537 Batch End Date: 11/07/18 17:00

Batch Notes	
Analyst ID - Aliquot Step	TWL
Batch Comment	Client labels match TA labels TWL 11/7/18
Analyst ID - Final Volume Step	TWL
Internal Standard ID#	1408095
Manifold ID	M
Methanol ID	1423730
pH Indicator ID	3718
Pipette ID	I46345G
Analyst ID - IS Reagent Drop	TWL
Analyst ID - IS Reagent Drop Witness	KJP
Analyst ID - SU Reagent Drop	TWL
Analyst ID - SU Reagent Drop Witness	MYV
Analyst ID - TA Reagent Drop	TWL
Analyst ID - TA Reagent Drop Witness	MYV
SPE Cartridge Lot ID	6413635-03
Trizma ID	SLBR5241V
Reagent Water ID	11/03/18

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.

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