



**Off-Base Drinking Water Sample Results,
Electronic Data Deliverable, Data Validation Report,
and the Sample Location Figure, SDG 320-44941-1**

*Naval Air Warfare Center Warminster
Warminster, Pennsylvania*

August 2019

"NAWC-110518-RW-179","537","RES","320-44941-1","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","13.2","ng/L","",0.842,"DL","",,"TRG","",,"4.43","LOQ","YES","-99","",282,"10.00","1.77",""
"NAWC-110518-RW-179","537","RES","320-44941-1","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","14.1","ng/L","M",2.39,"DL","",,"TRG","",,"6.21","LOQ","YES","-99","",282,"10.00","5.32",""
"NAWC-110518-RW-179","537","RES","320-44941-1","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","4.30","ng/L","J M",0.567,"DL","",,"TRG","",,"4.43","LOQ","YES","-99","",282,"10.00","1.77",""
"NAWC-110518-RW-179","537","RES","320-44941-1","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","3.34","ng/L","J",0.709,"DL","",,"TRG","",,"4.43","LOQ","YES","-99","",282,"10.00","1.77",""
"NAWC-110518-RW-179","537","RES","320-44941-1","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","3.66","ng/L","J",1.15,"DL","",,"TRG","",,"4.43","LOQ","YES","-99","",282,"10.00","2.66",""
"NAWC-110518-RW-179","537","RES","320-44941-1","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","2.55","ng/L","J",0.417,"DL","",,"TRG","",,"4.43","LOQ","YES","-99","",282,"10.00","0.887",""
"NAWC-110518-RW-179","537","RES","320-44941-1","TALSAC","STL00993","13C2 PFHxA","63.5","ng/L","",-99,"DL","",,"SURR","72","",-99,"LOQ","YES","88.7","",282,"10.00","0",""
"NAWC-110518-RW-179","537","RES","320-44941-1","TALSAC","STL00996","13C2 PFDA","68.6","ng/L","",-99,"DL","",,"SURR","77","",-99,"LOQ","YES","88.7","",282,"10.00","0",""
"NAWC-110518-FRB-179","537","RES","320-44941-2","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","1.74","ng/L","U",0.826,"DL","",,"TRG","",,"4.35","LOQ","YES","-99","",287.5,"10.00","1.74",""
"NAWC-110518-FRB-179","537","RES","320-44941-2","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","5.22","ng/L","U",2.35,"DL","",,"TRG","",,"6.09","LOQ","YES","-99","",287.5,"10.00","5.22",""
"NAWC-110518-FRB-179","537","RES","320-44941-2","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","1.74","ng/L","U",0.557,"DL","",,"TRG","",,"4.35","LOQ","YES","-99","",287.5,"10.00","1.74",""
"NAWC-110518-FRB-179","537","RES","320-44941-2","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","1.74","ng/L","U M",0.696,"DL","",,"TRG","",,"4.35","LOQ","YES","-99","",287.5,"10.00","1.74",""
"NAWC-110518-FRB-179","537","RES","320-44941-2","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","2.61","ng/L","U",1.13,"DL","",,"TRG","",,"4.35","LOQ","YES","-99","",287.5,"10.00","2.61",""
"NAWC-110518-FRB-179","537","RES","320-44941-2","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","0.870","ng/L","U",0.409,"DL","",,"TRG","",,"4.35","LOQ","YES","-99","",287.5,"10.00","0.870",""
"NAWC-110518-FRB-179","537","RES","320-44941-2","TALSAC","STL00993","13C2 PFHxA","69.1","ng/L","",-99,"DL","",,"SURR","79","",-99,"LOQ","YES","87.0","",287.5,"10.00","0",""
"NAWC-110518-FRB-179","537","RES","320-44941-2","TALSAC","STL00996","13C2 PFDA","75.0","ng/L","",-99,"DL","",,"SURR","86","",-99,"LOQ","YES","87.0","",287.5,"10.00","0",""
"WGNA-110518-DUP-52","537","RES","320-44941-3","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","16.9","ng/L","",0.834,"DL","",,"TRG","",,"4.39","LOQ","YES","-99","",284.7,"10.00","1.76",""
"WGNA-110518-DUP-52","537","RES","320-44941-3","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","18.0","ng/L","M",2.37,"DL","",,"TRG","",,"6.15","LOQ","YES","-99","",284.7,"10.00","5.27",""
"WGNA-110518-DUP-52","537","RES","320-44941-3","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","5.60","ng/L","",0.562,"DL","",,"TRG","",,"4.39","LOQ","YES","-99","",284.7,"10.00","1.76",""
"WGNA-110518-DUP-52","537","RES","320-44941-3","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","4.00","ng/L","J",0.702,"DL","",,"TRG","",,"4.39","LOQ","YES","-99","",284.7,"10.00","1.76",""
"WGNA-110518-DUP-52","537","RES","320-44941-3","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","4.94","ng/L","",1.14,"DL","",,"TRG","",,"4.39","LOQ","YES","-99","",284.7,"10.00","2.63",""
"WGNA-110518-DUP-52","537","RES","320-44941-3","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","3.10","ng/L","J",0.413,"DL","",,"TRG","",,"4.39","LOQ","YES","-99","",284.7,"10.00","0.878",""
"WGNA-110518-DUP-52","537","RES","320-44941-3","TALSAC","STL00993","13C2 PFHxA","77.3","ng/L","",-99,"DL","",,"SURR","88","",-99,"LOQ","YES","87.8","",284.7,"10.00","0",""
"WGNA-110518-DUP-52","537","RES","320-44941-3","TALSAC","STL00996","13C2 PFDA","86.6","ng/L","",-99,"DL","",,"SURR","99","",-99,"LOQ","YES","87.8","",284.7,"10.00","0",""
"LCS 320-260208/2-A","537","RES","LCS 320-260208/2-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","81.56","ng/L","",0.950,"DL","",,"SPK","88","",5.00,"LOQ","YES","92.8","",250.00,"10.00","2.00",""
"LCS 320-260208/2-A","537","RES","LCS 320-260208/2-A","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","93.88","ng/L","",2.70,"DL","",,"SPK","94","",7.00,"LOQ","YES","100","",250.00,"10.00","6.00",""
"LCS 320-260208/2-A","537","RES","LCS 320-260208/2-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid

(PFHxS)", "86.38", "ng/L", "", "0.640", "DL", "", "SPK", "95", "", "5.00", "LOQ", "YES", "91.0", "", "250.00", "10.00", "2.00", ""
"LCS 320-260208/2-A", "537", "RES", "LCS 320-260208/2-A", "TALSAC", "375-73-5", "Perfluorobutanesulfonic acid
(PFBS)", "78.83", "ng/L", "", "0.800", "DL", "", "SPK", "89", "", "5.00", "LOQ", "YES", "88.4", "", "250.00", "10.00", "2.00", ""
"LCS 320-260208/2-A", "537", "RES", "LCS 320-260208/2-A", "TALSAC", "375-85-9", "Perfluoroheptanoic acid
(PFHpA)", "94.77", "ng/L", "", "1.30", "DL", "", "SPK", "95", "", "5.00", "LOQ", "YES", "100", "", "250.00", "10.00", "3.00", ""
"LCS 320-260208/2-A", "537", "RES", "LCS 320-260208/2-A", "TALSAC", "375-95-1", "Perfluorononanoic acid
(PFNA)", "98.92", "ng/L", "", "0.470", "DL", "", "SPK", "99", "", "5.00", "LOQ", "YES", "100", "", "250.00", "10.00", "1.00", ""
"LCS 320-260208/2-A", "537", "RES", "LCS 320-260208/2-A", "TALSAC", "STL00993", "13C2
PFHxA", "97.37", "ng/L", "", "-99", "DL", "", "SURR", "97", "", "-99", "LOQ", "YES", "100", "", "250.00", "10.00", "0", ""
"LCS 320-260208/2-A", "537", "RES", "LCS 320-260208/2-A", "TALSAC", "STL00996", "13C2
PFDA", "96.75", "ng/L", "", "-99", "DL", "", "SURR", "97", "", "-99", "LOQ", "YES", "100", "", "250.00", "10.00", "0", ""
"MB 320-260208/1-A", "537", "RES", "MB 320-260208/1-A", "TALSAC", "1763-23-1", "Perfluorooctanesulfonic acid
(PFOS)", "2.00", "ng/L", "U", "0.950", "DL", "", "TRG", "", "", "5.00", "LOQ", "YES", "-99", "", "250.00", "10.00", "2.00", ""
"MB 320-260208/1-A", "537", "RES", "MB 320-260208/1-A", "TALSAC", "335-67-1", "Perfluorooctanoic acid
(PFOA)", "6.00", "ng/L", "U M", "2.70", "DL", "", "TRG", "", "", "7.00", "LOQ", "YES", "-99", "", "250.00", "10.00", "6.00", ""
"MB 320-260208/1-A", "537", "RES", "MB 320-260208/1-A", "TALSAC", "355-46-4", "Perfluorohexanesulfonic acid
(PFHxS)", "2.00", "ng/L", "U", "0.640", "DL", "", "TRG", "", "", "5.00", "LOQ", "YES", "-99", "", "250.00", "10.00", "2.00", ""
"MB 320-260208/1-A", "537", "RES", "MB 320-260208/1-A", "TALSAC", "375-73-5", "Perfluorobutanesulfonic acid
(PFBS)", "2.00", "ng/L", "U", "0.800", "DL", "", "TRG", "", "", "5.00", "LOQ", "YES", "-99", "", "250.00", "10.00", "2.00", ""
"MB 320-260208/1-A", "537", "RES", "MB 320-260208/1-A", "TALSAC", "375-85-9", "Perfluoroheptanoic acid
(PFHpA)", "3.00", "ng/L", "U", "1.30", "DL", "", "TRG", "", "", "5.00", "LOQ", "YES", "-99", "", "250.00", "10.00", "3.00", ""
"MB 320-260208/1-A", "537", "RES", "MB 320-260208/1-A", "TALSAC", "375-95-1", "Perfluorononanoic acid
(PFNA)", "1.00", "ng/L", "U", "0.470", "DL", "", "TRG", "", "", "5.00", "LOQ", "YES", "-99", "", "250.00", "10.00", "1.00", ""
"MB 320-260208/1-A", "537", "RES", "MB 320-260208/1-A", "TALSAC", "STL00993", "13C2
PFHxA", "73.61", "ng/L", "", "-99", "DL", "", "SURR", "74", "", "-99", "LOQ", "YES", "100", "", "250.00", "10.00", "0", ""
"MB 320-260208/1-A", "537", "RES", "MB 320-260208/1-A", "TALSAC", "STL00996", "13C2
PFDA", "78.09", "ng/L", "", "-99", "DL", "", "SURR", "78", "", "-99", "LOQ", "YES", "100", "", "250.00", "10.00", "0", ""
"Unknown", "Unknown", "NAWC-110518-RW-179", "11/05/2018 11:10", "AQ", "320-44941-
1", "NM", "", "4.80", "537", "METHOD", "RES", "11/19/2018 16:16", "11/29/2018
05:24", "TALSAC", "COA", "WET", "NA", "1", "NA", "NA", "", "100", "320-260208", "320-260208", "NA", "320-
261830", "320-44941-1", "11/06/2018 10:10", "11/08/2018 14:25", ""
"Unknown", "Unknown", "NAWC-110518-FRB-179", "11/05/2018 11:05", "AQ", "320-44941-
2", "FB", "", "4.80", "537", "METHOD", "RES", "11/19/2018 16:16", "11/29/2018
05:46", "TALSAC", "COA", "WET", "NA", "1", "NA", "NA", "", "100", "320-260208", "320-260208", "NA", "320-
261832", "320-44941-1", "11/06/2018 10:10", "11/08/2018 14:25", ""
"Unknown", "Unknown", "WGNA-110518-DUP-52", "11/05/2018 07:00", "AQ", "320-44941-
3", "FD", "", "4.80", "537", "METHOD", "RES", "11/19/2018 16:16", "11/29/2018
05:54", "TALSAC", "COA", "WET", "NA", "1", "NA", "NA", "", "100", "320-260208", "320-260208", "NA", "320-
261832", "320-44941-1", "11/06/2018 10:10", "11/08/2018 14:25", ""
"Unknown", "Unknown", "LCS 320-260208/2-A", "", "AQ", "LCS 320-260208/2-
A", "LCS", "", "-99", "537", "METHOD", "RES", "11/19/2018 16:16", "11/29/2018
04:24", "TALSAC", "COA", "WET", "NA", "1", "NA", "NA", "", "100", "320-260208", "320-260208", "NA", "320-
261830", "320-44941-1", "11/19/2018 16:16", "11/08/2018 14:25", ""
"Unknown", "Unknown", "MB 320-260208/1-A", "", "AQ", "MB 320-260208/1-
A", "MB", "", "-99", "537", "METHOD", "RES", "11/19/2018 16:16", "11/30/2018
07:24", "TALSAC", "COA", "WET", "NA", "1", "NA", "NA", "", "100", "320-260208", "320-260208", "NA", "320-
262072", "320-44941-1", "11/19/2018 16:16", "11/08/2018 14:25", ""

TO: A. FREBOWITZ
SDG: 320-44941-1

PAGE 2

Executive Summary

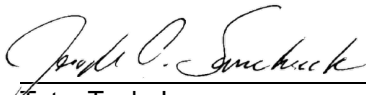
Laboratory Performance: No issues.

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

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



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



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

Attachments:

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

Data Qualifier Definitions

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

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

Appendix A

Qualified Analytical Results

Qualifier Codes:

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

PROJ_NO: 08005-WE04 SDG: 320-44941-1 FRACTION: PFAS MEDIA: WATER	NSAMPLE	NAWC-110518-FRB-179			NAWC-110518-RW-179			WGNA-110518-DUP-52		
	LAB_ID	320-44941-2			320-44941-1			320-44941-3		
	SAMP_DATE	11/5/2018			11/5/2018			11/5/2018		
	QC_TYPE	FB			NM			FD		
	UNITS	NG/L			NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF							NAWC-110518-RW-179		
PARAMETER	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	
PENTADECAFLUOROOCTANOIC ACID (PFOA)	5.22	U		14.1			18			
PERFLUOROBUTANESULFONIC ACID (PFBS)	1.74	U		3.34	J	P	4	J	P	
PERFLUOROHEPTANOIC ACID (PFHPA)	2.61	U		3.66	J	P	4.94			
PERFLUOROHEXANESULFONIC ACID (PFHXS)	1.74	U		4.3	J	P	5.6			
PERFLUORONONANOIC ACID (PFNA)	0.87	U		2.55	J	P	3.1	J	P	
PERFLUOROOCTANESULFONIC ACID (PFOS)	1.74	U		13.2			16.9			

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Client Sample ID: NAWC-110518-RW-179 Lab Sample ID: 320-44941-1
 Matrix: Water Lab File ID: 2018.11.28_537B_057.d
 Analysis Method: 537 Date Collected: 11/05/2018 11:10
 Extraction Method: 537 Date Extracted: 11/19/2018 16:16
 Sample wt/vol: 282 (mL) Date Analyzed: 11/29/2018 05:24
 Con. Extract Vol.: 10.00 (mL) Dilution Factor: 1
 Injection Volume: 14 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 261830 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	13.2		4.43	1.77	0.842
335-67-1	Perfluorooctanoic acid (PFOA)	14.1	M	6.21	5.32	2.39
375-95-1	Perfluorononanoic acid (PFNA)	2.55	J	4.43	0.887	0.417
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	4.30	J M	4.43	1.77	0.567
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.66	J	4.43	2.66	1.15
375-73-5	Perfluorobutanesulfonic acid (PFBS)	3.34	J	4.43	1.77	0.709

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	72		70-130
STL00996	13C2 PFDA	77		70-130

Wesley L. Salomon
12/20/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Client Sample ID: NAWC-110518-FRB-179 Lab Sample ID: 320-44941-2
 Matrix: Water Lab File ID: 2018.11.28_537B_060.d
 Analysis Method: 537 Date Collected: 11/05/2018 11:05
 Extraction Method: 537 Date Extracted: 11/19/2018 16:16
 Sample wt/vol: 287.5 (mL) Date Analyzed: 11/29/2018 05:46
 Con. Extract Vol.: 10.00 (mL) Dilution Factor: 1
 Injection Volume: 14 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 261832 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.74	U	4.35	1.74	0.826
335-67-1	Perfluorooctanoic acid (PFOA)	5.22	U	6.09	5.22	2.35
375-95-1	Perfluorononanoic acid (PFNA)	0.870	U	4.35	0.870	0.409
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.74	U	4.35	1.74	0.557
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.61	U	4.35	2.61	1.13
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.74	U M	4.35	1.74	0.696

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	79		70-130
STL00996	13C2 PFDA	86		70-130

Maria L. Salomon
12/20/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Client Sample ID: WGNA-110518-DUP-52 Lab Sample ID: 320-44941-3
 Matrix: Water Lab File ID: 2018.11.28_537B_061.d
 Analysis Method: 537 Date Collected: 11/05/2018 07:00
 Extraction Method: 537 Date Extracted: 11/19/2018 16:16
 Sample wt/vol: 284.7(mL) Date Analyzed: 11/29/2018 05:54
 Con. Extract Vol.: 10.00(mL) Dilution Factor: 1
 Injection Volume: 14(uL) GC Column: GeminiC18 3x100 ID: 3(mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 261832 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16.9		4.39	1.76	0.834
335-67-1	Perfluorooctanoic acid (PFOA)	18.0	M	6.15	5.27	2.37
375-95-1	Perfluorononanoic acid (PFNA)	3.10	J	4.39	0.878	0.413
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	5.60		4.39	1.76	0.562
375-85-9	Perfluoroheptanoic acid (PFHpA)	4.94		4.39	2.63	1.14
375-73-5	Perfluorobutanesulfonic acid (PFBS)	4.00	J	4.39	1.76	0.702

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	88		70-130
STL00996	13C2 PFDA	99		70-130

Steve L. Selmer
12/20/2018

Appendix B

Results as Reported by the Laboratory

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Client Sample ID: NAWC-110518-RW-179 Lab Sample ID: 320-44941-1
 Matrix: Water Lab File ID: 2018.11.28_537B_057.d
 Analysis Method: 537 Date Collected: 11/05/2018 11:10
 Extraction Method: 537 Date Extracted: 11/19/2018 16:16
 Sample wt/vol: 282 (mL) Date Analyzed: 11/29/2018 05:24
 Con. Extract Vol.: 10.00 (mL) Dilution Factor: 1
 Injection Volume: 14 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 261830 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	13.2		4.43	1.77	0.842
335-67-1	Perfluorooctanoic acid (PFOA)	14.1	M	6.21	5.32	2.39
375-95-1	Perfluorononanoic acid (PFNA)	2.55	J	4.43	0.887	0.417
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	4.30	J M	4.43	1.77	0.567
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.66	J	4.43	2.66	1.15
375-73-5	Perfluorobutanesulfonic acid (PFBS)	3.34	J	4.43	1.77	0.709

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	72		70-130
STL00996	13C2 PFDA	77		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Client Sample ID: NAWC-110518-FRB-179 Lab Sample ID: 320-44941-2
 Matrix: Water Lab File ID: 2018.11.28_537B_060.d
 Analysis Method: 537 Date Collected: 11/05/2018 11:05
 Extraction Method: 537 Date Extracted: 11/19/2018 16:16
 Sample wt/vol: 287.5 (mL) Date Analyzed: 11/29/2018 05:46
 Con. Extract Vol.: 10.00 (mL) Dilution Factor: 1
 Injection Volume: 14 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 261832 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.74	U	4.35	1.74	0.826
335-67-1	Perfluorooctanoic acid (PFOA)	5.22	U	6.09	5.22	2.35
375-95-1	Perfluorononanoic acid (PFNA)	0.870	U	4.35	0.870	0.409
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.74	U	4.35	1.74	0.557
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.61	U	4.35	2.61	1.13
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.74	U M	4.35	1.74	0.696

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	79		70-130
STL00996	13C2 PFDA	86		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Client Sample ID: WGNA-110518-DUP-52 Lab Sample ID: 320-44941-3
 Matrix: Water Lab File ID: 2018.11.28_537B_061.d
 Analysis Method: 537 Date Collected: 11/05/2018 07:00
 Extraction Method: 537 Date Extracted: 11/19/2018 16:16
 Sample wt/vol: 284.7(mL) Date Analyzed: 11/29/2018 05:54
 Con. Extract Vol.: 10.00(mL) Dilution Factor: 1
 Injection Volume: 14(uL) GC Column: GeminiC18 3x100 ID: 3(mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 261832 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16.9		4.39	1.76	0.834
335-67-1	Perfluorooctanoic acid (PFOA)	18.0	M	6.15	5.27	2.37
375-95-1	Perfluorononanoic acid (PFNA)	3.10	J	4.39	0.878	0.413
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	5.60		4.39	1.76	0.562
375-85-9	Perfluoroheptanoic acid (PFHpA)	4.94		4.39	2.63	1.14
375-73-5	Perfluorobutanesulfonic acid (PFBS)	4.00	J	4.39	1.76	0.702

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	88		70-130
STL00996	13C2 PFDA	99		70-130

Appendix C

Support Documentation

ANALYTE	ORIGINAL	DUPLICATE		RL	RPD	RPD > 30% Aqueous	ORIGINAL SAMPLE	DUPLICATE	DIFFERENCE >2XRL
	110518-RW-179	110518-DUP-52	CONC >2xRL				SAMPLE CONC >2xRL		
PENTADECAFLUOROOCTANOIC ACID (PFOA)	14.1	18	6.21	24.30	FALSE	TRUE	TRUE	FALSE	
PERFLUOROBUTANESULFONIC ACID (PFBS)	3.34	4	4.43	17.98	FALSE	FALSE	FALSE	FALSE	
PERFLUOROHEPTANOIC ACID (PFHPA)	3.66	4.94	4.43	29.77	FALSE	FALSE	FALSE	FALSE	
PERFLUOROHXANESULFONIC ACID (PFHXS)	4.3	5.6	4.43	26.26	FALSE	FALSE	FALSE	FALSE	
PERFLUORONONANOIC ACID (PFNA)	2.55	3.1	4.43	19.47	FALSE	FALSE	FALSE	FALSE	
PERFLUOROOCTANESULFONIC ACID (PFOS)	13.2	16.9	4.43	24.58	FALSE	TRUE	TRUE	FALSE	

TestAmerica Sacramento

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

Chain of Custody Record



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: 11/5/2018		COC No.:	
TetraTech		Tel/Fax: 610.382.2920		Lab Contact: Dave Alltucker		Carrier: FedEx		1 of 1 COCs	
234 Mall Boulevard Suite 260		Analysis Turnaround Time		Filtered Sample (Y/N) Perform MS/MSD (Y/N) EPA 537 UCMR3				Sampler: Mary Kay Bond	
King of Prussia, PA 19406		<input type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS						For Lab Use Only:	
610-382-2924		TAT if different from Below 21						Walk-in Client:	
610-491-9688		<input checked="" type="checkbox"/> 2 weeks <input type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 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:
NAWC-110518-RW-179	11/5/2018	11:10	G	DW	2	N	N	Y	
NAWC-110518-FRB-179	11/5/2018	11:05	G	DW	2	N	N	Y	Field Reagent Blank
WGNA-110518-DUP-52	11/5/2018	07:00	G	DW	2	N	N	Y	Duplicate



320-44941 Chain of Custody

6

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

Non-Hazard Flammable Skin Irritant Poison B Unknown

Return to Client Disposal by Lab Archive for _____ Months

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
PREVIOUS SDGS 6=TRIZMA

Fed Ex Tracking: 7736 4715 8486

Custody Seals Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.:		Cooler Temp. (°C): Obs'd: 4.8 Corr'd: 4.3		Therm ID No.:	
Relinquished by: <i>Cottal...</i>	Company: Tetra Tech	Date/Time: 11/5/2018 16:00	Received by: <i>Jamie...</i>	Company: <i>JA SAC</i>	Date/Time: 10/10 11:00		
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:		
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:		

Page 305 of 306

Job Narrative
320-44941-1

Receipt

The samples were received on 11/6/2018 10:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.8° 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

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

Definitions/Glossary

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

TestAmerica Job ID: 320-44941-1

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)

Method Summary

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

TestAmerica Job ID: 320-44941-1

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

TestAmerica Job ID: 320-44941-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-44941-1	NAWC-110518-RW-179	Water	11/05/18 11:10	11/06/18 10:10
320-44941-2	NAWC-110518-FRB-179	Water	11/05/18 11:05	11/06/18 10:10
320-44941-3	WGNA-110518-DUP-52	Water	11/05/18 07:00	11/06/18 10:10

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1

SDG No.: _____

Matrix: Water Level: Low

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

Client Sample ID	Lab Sample ID	PFHxA #	PFDA #
NAWC-110518-RW-179	320-44941-1	72	77
NAWC-110518-FRB-179	320-44941-2	79	86
WGNA-110518-DUP-52	320-44941-3	88	99
	MB 320-260208/1-A	74	78
	LCS 320-260208/2-A	97	97

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA

QC LIMITS
70-130
70-130

Column to be used to flag recovery values

FORM II 537

FORM III
LCMS LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.11.28_537B_049.d
 Lab ID: LCS 320-260208/2-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LCS CONCENTRATION (ng/L)	LCS % REC	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	92.8	81.56	88	70-130	
Perfluorooctanoic acid (PFOA)	100	93.88	94	70-130	
Perfluorononanoic acid (PFNA)	100	98.92	99	70-130	
Perfluorohexanesulfonic acid (PFHxS)	91.0	86.38	95	70-130	
Perfluoroheptanoic acid (PFHpA)	100	94.77	95	70-130	
Perfluorobutanesulfonic acid (PFBS)	88.4	78.83	89	70-130	

Column to be used to flag recovery and RPD values

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab File ID: 2018.11.29_537C_055.d Lab Sample ID: MB 320-260208/1-A
 Matrix: Water Date Extracted: 11/19/2018 16:16
 Instrument ID: A8_N Date Analyzed: 11/30/2018 07:24
 Level: (Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LCS 320-260208/2-A	2018.11.28_537B_049.d	11/29/2018 04:24
NAWC-110518-RW-179	320-44941-1	2018.11.28_537B_057.d	11/29/2018 05:24
NAWC-110518-FRB-179	320-44941-2	2018.11.28_537B_060.d	11/29/2018 05:46
WGNA-110518-DUP-52	320-44941-3	2018.11.28_537B_061.d	11/29/2018 05:54

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: MB 320-260208/1-A
 Matrix: Water Lab File ID: 2018.11.29_537C_055.d
 Analysis Method: 537 Date Collected: _____
 Extraction Method: 537 Date Extracted: 11/19/2018 16:16
 Sample wt/vol: 250.00 (mL) Date Analyzed: 11/30/2018 07:24
 Con. Extract Vol.: 10.00 (mL) Dilution Factor: 1
 Injection Volume: 14 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 262072 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	2.00	U	5.00	2.00	0.950
335-67-1	Perfluorooctanoic acid (PFOA)	6.00	U	7.00	6.00	2.70
375-95-1	Perfluorononanoic acid (PFNA)	1.00	U	5.00	1.00	0.470
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	2.00	U	5.00	2.00	0.640
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.00	U	5.00	3.00	1.30
375-73-5	Perfluorobutanesulfonic acid (PFBS)	2.00	U	5.00	2.00	0.800

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	74		70-130
STL00996	13C2 PFDA	78		70-130

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Instrument ID: A8_N Calibration Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3(mm) Calibration End Date: 11/28/2018 13:51
 Calibration ID: 42464

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MEAN AREA AND MEAN RT		3424979	3.19	2530065	3.59		
UPPER LIMIT		5137469	3.69	3795098	4.09		
LOWER LIMIT		1712490	2.69	1265033	3.09		
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCVL 320-261708/10		3361485	3.19	2496845	3.57		
ICV 320-261708/12		3358714	3.20	2579571	3.59		
CCV 320-261830/42 CCVIS		3410876	3.17	2451605	3.56		
LCS 320-260208/2-A		3328136	3.19	2607499	3.57		
320-44941-1	NAWC-110518-RW-179	4187873	3.17	3106400	3.57		
CCV 320-261830/54 CCVIS		3468169	3.19	2344126	3.57		
CCV 320-261832/54 CCVIS		3468169	3.19	2344126	3.57		
320-44941-2	NAWC-110518-FRB-179	3968781	3.17	2901193	3.56		
320-44941-3	WGNA-110518-DUP-52	3331094	3.19	2471988	3.57		
CCV 320-261832/58 CCVIS		3311341	3.19	2395223	3.57		
CCVL 320-262060/1		3476137	3.17	2441171	3.56		
CCV 320-262072/50 CCVIS		3252673	3.17	2569871	3.56		
MB 320-260208/1-A		3792909	3.17	3093071	3.56		
CCV 320-262072/58 CCVIS		3345941	3.17	2574473	3.56		

13PFOA = 13C2 PFOA

PFOS = 13C4 PFOS

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

Column used to flag values outside QC limits

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Sample No.: CCV 320-261830/42 Date Analyzed: 11/29/2018 04:02
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.11.28_537B_046 Heated Purge: (Y/N) N
 Calibration ID: 42464

	13PFOA		PFOS		AREA #	RT #
	AREA #	RT #	AREA #	RT #		
12/24 HOUR STD	3410876	3.17	2451605	3.56		
UPPER LIMIT	4775226	3.67	3432247	4.06		
LOWER LIMIT	2387613	2.67	1716124	3.06		
LAB SAMPLE ID	CLIENT SAMPLE ID					
LCS 320-260208/2-A	3328136	3.19	2607499	3.57		
320-44941-1	NAWC-110518-RW-179	4187873	3.17	3106400	3.57	

13PFOA = 13C2 PFOA
 PFOS = 13C4 PFOS

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

Column used to flag values outside QC limits

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Sample No.: CCV 320-261830/54 Date Analyzed: 11/29/2018 05:31
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.11.28_537B_058 Heated Purge: (Y/N) N
 Calibration ID: 42464

	13PFOA		PFOS		AREA #	RT #
	AREA #	RT #	AREA #	RT #		
12/24 HOUR STD	3468169	3.19	2344126	3.57		
UPPER LIMIT	4855437	3.69	3281776	4.07		
LOWER LIMIT	2427718	2.69	1640888	3.07		
LAB SAMPLE ID	CLIENT SAMPLE ID					
LCS 320-260208/2-A	3328136	3.19	2607499	3.57		
320-44941-1	NAWC-110518-RW-179	4187873	3.17	3106400	3.57	

13PFOA = 13C2 PFOA
 PFOS = 13C4 PFOS

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

Column used to flag values outside QC limits

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Sample No.: CCV 320-261832/54 Date Analyzed: 11/29/2018 05:31
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.11.28_537B_058 Heated Purge: (Y/N) N
 Calibration ID: 42464

	13PFOA		PFOS		AREA #	RT #
	AREA #	RT #	AREA #	RT #		
12/24 HOUR STD	3468169	3.19	2344126	3.57		
UPPER LIMIT	4855437	3.69	3281776	4.07		
LOWER LIMIT	2427718	2.69	1640888	3.07		
LAB SAMPLE ID	CLIENT SAMPLE ID					
320-44941-2	NAWC-110518-FRB-179		3968781	3.17	2901193	3.56
320-44941-3	WGNA-110518-DUP-52		3331094	3.19	2471988	3.57

13PFOA = 13C2 PFOA
 PFOS = 13C4 PFOS

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

Column used to flag values outside QC limits

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Sample No.: CCV 320-261832/58 Date Analyzed: 11/29/2018 06:01
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.11.28_537B_062 Heated Purge: (Y/N) N
 Calibration ID: 42464

	13PFOA		PFOS		AREA #	RT #
	AREA #	RT #	AREA #	RT #		
12/24 HOUR STD	3311341	3.19	2395223	3.57		
UPPER LIMIT	4635877	3.69	3353312	4.07		
LOWER LIMIT	2317939	2.69	1676656	3.07		
LAB SAMPLE ID	CLIENT SAMPLE ID					
320-44941-2	NAWC-110518-FRB-179		3968781	3.17	2901193	3.56
320-44941-3	WGNA-110518-DUP-52		3331094	3.19	2471988	3.57

13PFOA = 13C2 PFOA
 PFOS = 13C4 PFOS

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

Column used to flag values outside QC limits

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Sample No.: CCV 320-262072/50 Date Analyzed: 11/30/2018 07:09
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.11.29_537C_053 Heated Purge: (Y/N) N
 Calibration ID: 42464

	13PFOA		PFOS		AREA #	RT #
	AREA #	RT #	AREA #	RT #		
12/24 HOUR STD	3252673	3.17	2569871	3.56		
UPPER LIMIT	4553742	3.67	3597819	4.06		
LOWER LIMIT	2276871	2.67	1798910	3.06		
LAB SAMPLE ID	CLIENT SAMPLE ID					
MB 320-260208/1-A	3792909	3.17	3093071	3.56		

13PFOA = 13C2 PFOA
 PFOS = 13C4 PFOS

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

Column used to flag values outside QC limits

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Sample No.: CCV 320-262072/58 Date Analyzed: 11/30/2018 08:09
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.11.29_537C_061 Heated Purge: (Y/N) N
 Calibration ID: 42464

	13PFOA		PFOS		AREA #	RT #
	AREA #	RT #	AREA #	RT #		
12/24 HOUR STD	3345941	3.17	2574473	3.56		
UPPER LIMIT	4684317	3.67	3604262	4.06		
LOWER LIMIT	2342159	2.67	1802131	3.06		
LAB SAMPLE ID	CLIENT SAMPLE ID					
MB 320-260208/1-A	3792909	3.17	3093071	3.56		

13PFOA = 13C2 PFOA
 PFOS = 13C4 PFOS

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

Column used to flag values outside QC limits

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

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1 Analy Batch No.: 261708

SDG No.: _____

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

Calibration Start Date: 11/28/2018 13:06 Calibration End Date: 11/28/2018 13:51 Calibration ID: 42464

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-261708/2	2018.11.28_537ICALTPX_002.d
Level 2	IC 320-261708/3	2018.11.28_537ICALTPX_003.d
Level 3	IC 320-261708/4	2018.11.28_537ICALTPX_004.d
Level 4	IC 320-261708/5	2018.11.28_537ICALTPX_005.d
Level 5	IC 320-261708/6	2018.11.28_537ICALTPX_006.d
Level 6	IC 320-261708/7	2018.11.28_537ICALTPX_007.d
Level 7	IC 320-261708/8	2018.11.28_537ICALTPX_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								
	LVL 6	LVL 7															
Perfluorobutanesulfonic acid (PFBS)	1.0388 1.1489	1.1365 1.1585	1.0547	1.1161	1.0610	Ave		1.1021			4.5		30.0				
Perfluoroheptanoic acid (PFHpA)	1.1785 1.0717	1.1773 1.0331	1.0436	1.0795	1.0602	Ave		1.0920			5.6		30.0				
Perfluorohexanesulfonic acid (PFHxS)	1.5510 1.5200	1.5154 1.5186	1.4306	1.6489	1.4266	Ave		1.5159			5.0		30.0				
Perfluorooctanoic acid (PFOA)	1.3708 1.0949	1.0876 1.0617	1.0316	1.0346	1.0862	Ave		1.1096			10.6		30.0				
Perfluorooctanesulfonic acid (PFOS)	1.3564 1.0553	1.1480 1.1008	1.0855	1.0475	1.0232	Ave		1.1167			10.1		30.0				
Perfluorononanoic acid (PFNA)	0.8532 0.8136	0.8026 0.7695	0.7938	0.7765	0.8213	Ave		0.8044			3.5		30.0				
13C2 PFHxA	1.0211 0.9588	0.9790 0.9541	0.9550	0.9581	0.9800	Ave		0.9723			2.5		30.0				
13C2 PFDA	0.7170 0.6883	0.7063 0.6634	0.6923	0.6499	0.7060	Ave		0.6890			3.5		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.: 320-44941-1 Analy Batch No.: 261708

SDG No.: _____

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

Calibration Start Date: 11/28/2018 13:06 Calibration End Date: 11/28/2018 13:51 Calibration ID: 42464

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-261708/2	2018.11.28_537ICALTPX_002.d
Level 2	IC 320-261708/3	2018.11.28_537ICALTPX_003.d
Level 3	IC 320-261708/4	2018.11.28_537ICALTPX_004.d
Level 4	IC 320-261708/5	2018.11.28_537ICALTPX_005.d
Level 5	IC 320-261708/6	2018.11.28_537ICALTPX_006.d
Level 6	IC 320-261708/7	2018.11.28_537ICALTPX_007.d
Level 7	IC 320-261708/8	2018.11.28_537ICALTPX_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
			LVL 6	LVL 7				LVL 6	LVL 7			
Perfluorobutanesulfonic acid (PFBS)	PFOS	Ave	24683 5388468	51738 10213970	251462	1046520	2596086	0.0221 4.42	0.0442 8.84	0.221	0.884	2.21
Perfluoroheptanoic acid (PFHpA)	13PF OA	Ave	40652 7139685	80331 13578406	368755	1552410	3571313	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorohexanesulfonic acid (PFHxS)	PFOS	Ave	37936 7338783	71018 13781782	351103	1591569	3593335	0.0228 4.55	0.0455 9.10	0.228	0.910	2.28
Perfluorooctanoic acid (PFOA)	13PF OA	Ave	47331 7301376	74285 13968411	364884	1489386	3662288	0.0250 5.01	0.0501 10.0	0.250	1.00	2.50
Perfluorooctanesulfonic acid (PFOS)	PFOS	Ave	33833 5196086	54866 10188257	271684	1031103	2628210	0.0232 4.64	0.0464 9.28	0.232	0.928	2.32
Perfluorononanoic acid (PFNA)	13PF OA	Ave	29431 5420001	54763 10113962	280495	1116613	2766383	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
13C2 PFHxA	13PF OA	Ave	3522233 3193611	3340174 3135028	3374605	3444540	3300906	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFDA	13PF OA	Ave	2473031 2292639	2409794 2179789	2446341	2336562	2377959	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.: 320-44941-1 Analy Batch No.: 261708

SDG No.: _____

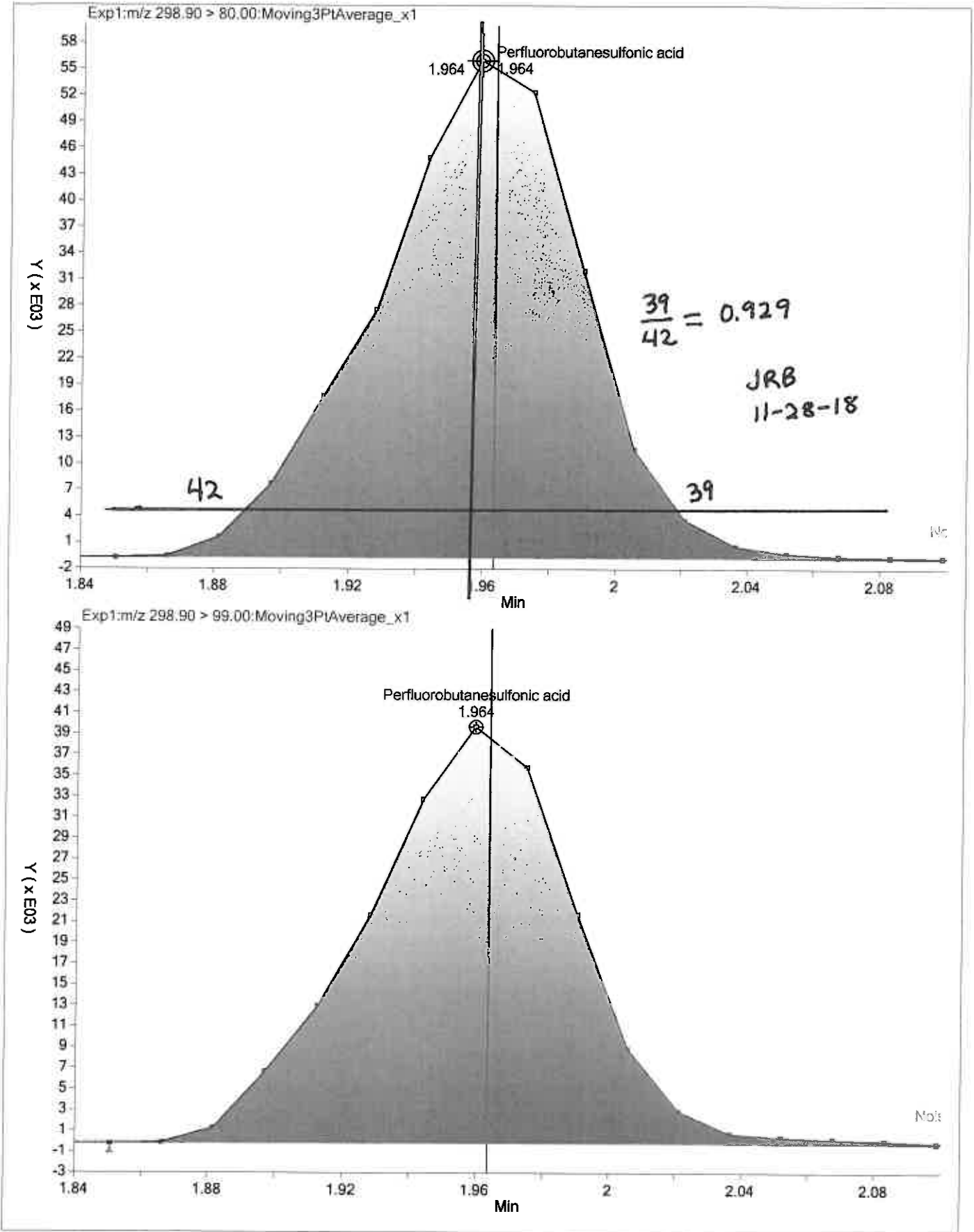
Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

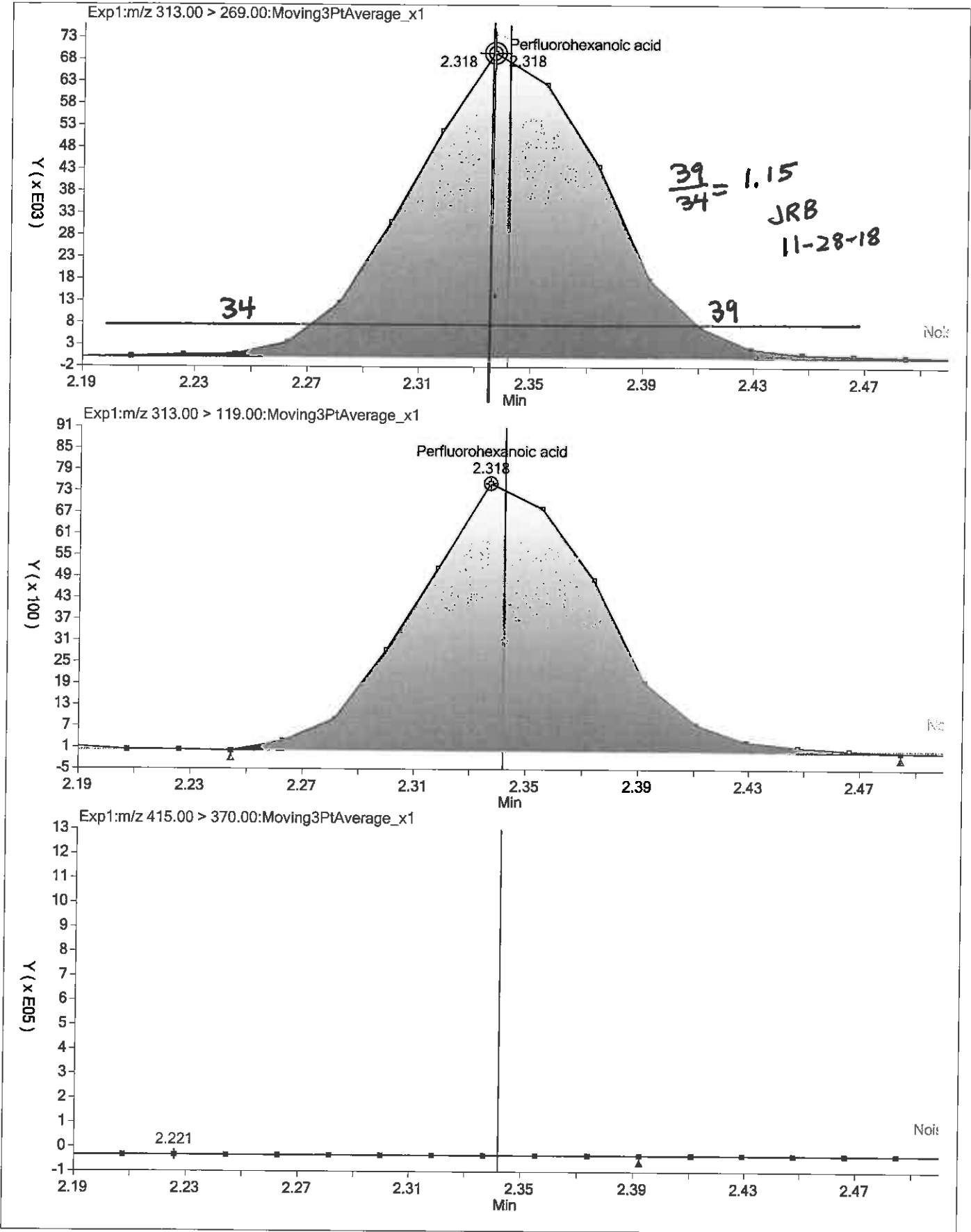
Calibration Start Date: 11/28/2018 13:06 Calibration End Date: 11/28/2018 13:51 Calibration ID: 42464

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-261708/2	2018.11.28_537ICALTPX_002.d
Level 2	IC 320-261708/3	2018.11.28_537ICALTPX_003.d
Level 3	IC 320-261708/4	2018.11.28_537ICALTPX_004.d
Level 4	IC 320-261708/5	2018.11.28_537ICALTPX_005.d
Level 5	IC 320-261708/6	2018.11.28_537ICALTPX_006.d
Level 6	IC 320-261708/7	2018.11.28_537ICALTPX_007.d
Level 7	IC 320-261708/8	2018.11.28_537ICALTPX_008.d

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 # LVL 7 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #	LVL 6 #	LVL 1 LVL 7	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6
Perfluorobutanesulfonic acid (PFBS)	-5.7 5.1	3.1	-4.3	1.3	-3.7	4.2	50 30	30	30	30	30	30
Perfluoroheptanoic acid (PFHpA)	7.9 -5.4	7.8	-4.4	-1.1	-2.9	-1.9	50 30	30	30	30	30	30
Perfluorohexanesulfonic acid (PFHxS)	2.3 0.2	0.0	-5.6	8.8	-5.9	0.3	50 30	30	30	30	30	30
Perfluorooctanoic acid (PFOA)	23.5 -4.3	-2.0	-7.0	-6.8	-2.1	-1.3	50 30	30	30	30	30	30
Perfluorooctanesulfonic acid (PFOS)	21.5 -1.4	2.8	-2.8	-6.2	-8.4	-5.5	50 30	30	30	30	30	30
Perfluorononanoic acid (PFNA)	6.1 -4.3	-0.2	-1.3	-3.5	2.1	1.1	50 30	30	30	30	30	30
13C2 PFHxA	5.0 -1.9	0.7	-1.8	-1.5	0.8	-1.4	30 30	30	30	30	30	30
13C2 PFDA	4.1 -3.7	2.5	0.5	-5.7	2.5	-0.1	30 30	30	30	30	30	30





FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-261708/10 Calibration Date: 11/28/2018 14:06
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.28_537ICALTPX_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	1.102	1.065		9.00	0.0442	-3.4	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.020		1.00	0.0500	-6.6	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.483		3.00	0.0455	-2.2	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.169		2.00	0.0501	5.4	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.236		4.00	0.0464	10.7	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.8258		5.00	0.0500	2.7	50.0
13C2 PFHxA	Ave	0.9723	0.9667		2.49	2.50	-0.6	30.0
13C2 PFDA	Ave	0.6890	0.6934		2.52	2.50	0.6	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: ICV 320-261708/12 Calibration Date: 11/28/2018 14:21
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.28_537ICALTPX_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	1.102	1.069		9.00	1.77	-3.0	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.104		2.02	2.00	1.1	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.504		1.81	1.82	-0.8	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.096		1.98	2.00	-1.2	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.8428		2.10	2.00	4.8	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.005		4.00	1.85	-10.0	30.0
13C2 PFHxA	Ave	0.9723	0.9637		2.48	2.50	-0.9	30.0
13C2 PFDA	Ave	0.6890	0.7109		2.58	2.50	3.2	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: CCV 320-261830/42 Calibration Date: 11/29/2018 04:02
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.28_537B_046.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.102	1.049		9.00	0.884	-4.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.037		0.949	1.00	-5.1	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.554		3.00	0.910	2.5	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.077		0.972	1.00	-2.9	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.8017		5.00	1.00	-0.3	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.019		4.00	0.928	-8.8	30.0
13C2 PFHxA	Ave	0.9723	0.9354		2.41	2.50	-3.8	30.0
13C2 PFDA	Ave	0.6890	0.6936		2.52	2.50	0.7	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: CCV 320-261830/54 Calibration Date: 11/29/2018 05:31
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.28_537B_058.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.102	1.141		4.57	4.42	3.5	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.068		4.89	5.00	-2.2	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.625		4.88	4.55	7.2	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.021		4.61	5.01	-7.9	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.7555		4.70	5.00	-6.1	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.103		4.58	4.64	-1.3	30.0
13C2 PFHxA	Ave	0.9723	0.9270		2.38	2.50	-4.7	30.0
13C2 PFDA	Ave	0.6890	0.6938		2.52	2.50	0.7	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: CCV 320-261832/54 Calibration Date: 11/29/2018 05:31
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.28_537B_058.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.102	1.141		4.57	4.42	3.5	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.068		4.89	5.00	-2.2	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.625		4.88	4.55	7.2	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.021		4.61	5.01	-7.9	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.7555		4.70	5.00	-6.1	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.103		4.58	4.64	-1.3	30.0
13C2 PFHxA	Ave	0.9723	0.9270		2.38	2.50	-4.7	30.0
13C2 PFDA	Ave	0.6890	0.6938		2.52	2.50	0.7	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: CCV 320-261832/58 Calibration Date: 11/29/2018 06:01
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.28_537B_062.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.102	1.046		9.00	0.884	-5.1	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.056		0.967	1.00	-3.3	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.553		3.00	0.910	2.5	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.116		1.01	1.00	0.5	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.8297		5.00	1.00	3.1	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.092		4.00	0.928	-2.2	30.0
13C2 PFHxA	Ave	0.9723	0.9769		2.51	2.50	0.5	30.0
13C2 PFDA	Ave	0.6890	0.7148		2.59	2.50	3.7	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-262060/1 Calibration Date: 11/30/2018 01:03
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.29_537C_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	1.102	1.099		9.00	0.0442	-0.3	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.202		1.00	0.0500	10.0	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.638		3.00	0.0455	8.0	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.406		2.00	0.0501	26.7	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.177		4.00	0.0464	5.4	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.9000		5.00	0.0500	11.9	50.0
13C2 PFHxA	Ave	0.9723	0.9376		2.41	2.50	-3.6	30.0
13C2 PFDA	Ave	0.6890	0.7278		2.64	2.50	5.6	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: CCV 320-262072/50 Calibration Date: 11/30/2018 07:09
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.29_537C_053.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.102	1.149		4.61	4.42	4.2	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.127		5.16	5.00	3.2	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.511		4.54	4.55	-0.3	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.112		5.02	5.01	0.2	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.8851		5.50	5.00	10.0	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.067		4.43	4.64	-4.4	30.0
13C2 PFHxA	Ave	0.9723	0.9856		2.53	2.50	1.4	30.0
13C2 PFDA	Ave	0.6890	0.7561		2.74	2.50	9.7	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1
 SDG No.: _____
 Lab Sample ID: CCV 320-262072/58 Calibration Date: 11/30/2018 08:09
 Instrument ID: A8_N Calib Start Date: 11/28/2018 13:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 11/28/2018 13:51
 Lab File ID: 2018.11.29_537C_061.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.102	1.090		9.00	0.884	-1.1	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.092	1.032		0.945	1.00	-5.5	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.516	1.399		3.00	0.910	-7.7	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.110	1.109		1.00	1.00	-0.0	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.117	1.032		4.00	0.928	-7.6	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8044	0.8186		5.00	1.00	1.8	30.0
13C2 PFHxA	Ave	0.9723	0.9701		2.49	2.50	-0.2	30.0
13C2 PFDA	Ave	0.6890	0.7390		2.68	2.50	7.3	30.0

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1

SDG No.: _____

Instrument ID: A8_N Start Date: 11/28/2018 13:06

Analysis Batch Number: 261708 End Date: 11/28/2018 14:28

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-261708/2		11/28/2018 13:06	1	2018.11.28_537I CALTPX 002.d	GeminiC18 3x100 3(mm)
IC 320-261708/3		11/28/2018 13:14	1	2018.11.28_537I CALTPX 003.d	GeminiC18 3x100 3(mm)
IC 320-261708/4		11/28/2018 13:21	1	2018.11.28_537I CALTPX 004.d	GeminiC18 3x100 3(mm)
IC 320-261708/5 ICISAV		11/28/2018 13:29	1	2018.11.28_537I CALTPX 005.d	GeminiC18 3x100 3(mm)
IC 320-261708/6		11/28/2018 13:36	1	2018.11.28_537I CALTPX 006.d	GeminiC18 3x100 3(mm)
IC 320-261708/7		11/28/2018 13:44	1	2018.11.28_537I CALTPX 007.d	GeminiC18 3x100 3(mm)
IC 320-261708/8		11/28/2018 13:51	1	2018.11.28_537I CALTPX 008.d	GeminiC18 3x100 3(mm)
ZZZZZ		11/28/2018 13:59	1		GeminiC18 3x100 3(mm)
CCVL 320-261708/10		11/28/2018 14:06	1	2018.11.28_537I CALTPX 010.d	GeminiC18 3x100 3(mm)
ICB 320-261708/11		11/28/2018 14:13	1		GeminiC18 3x100 3(mm)
ICV 320-261708/12		11/28/2018 14:21	1	2018.11.28_537I CALTPX 012.d	GeminiC18 3x100 3(mm)
ZZZZZ		11/28/2018 14:28	1		GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1

SDG No.: _____

Instrument ID: A8_N Start Date: 11/29/2018 04:02

Analysis Batch Number: 261830 End Date: 11/29/2018 05:31

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-261830/42 CCVIS		11/29/2018 04:02	1	2018.11.28_537B 046.d	GeminiC18 3x100 3(mm)
ZZZZZ		11/29/2018 04:17	1		GeminiC18 3x100 3(mm)
LCS 320-260208/2-A		11/29/2018 04:24	1	2018.11.28_537B 049.d	GeminiC18 3x100 3(mm)
ZZZZZ		11/29/2018 04:32	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/29/2018 04:39	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/29/2018 04:47	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/29/2018 04:54	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/29/2018 05:02	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/29/2018 05:09	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/29/2018 05:16	1		GeminiC18 3x100 3(mm)
320-44941-1		11/29/2018 05:24	1	2018.11.28_537B 057.d	GeminiC18 3x100 3(mm)
CCV 320-261830/54 CCVIS		11/29/2018 05:31	1	2018.11.28_537B 058.d	GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1

SDG No.: _____

Instrument ID: A8_N Start Date: 11/29/2018 05:31

Analysis Batch Number: 261832 End Date: 11/29/2018 06:01

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-261832/54 CCVIS		11/29/2018 05:31	1	2018.11.28_537B 058.d	GeminiC18 3x100 3(mm)
320-44941-2		11/29/2018 05:46	1	2018.11.28_537B 060.d	GeminiC18 3x100 3(mm)
320-44941-3		11/29/2018 05:54	1	2018.11.28_537B 061.d	GeminiC18 3x100 3(mm)
CCV 320-261832/58 CCVIS		11/29/2018 06:01	1	2018.11.28_537B 062.d	GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1

SDG No.: _____

Instrument ID: A8_N Start Date: 11/30/2018 01:03

Analysis Batch Number: 262060 End Date: 11/30/2018 02:40

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-262060/1		11/30/2018 01:03	1	2018.11.29_537C 004.d	GeminiC18 3x100 3(mm)
CCV 320-262060/2 CCVIS		11/30/2018 01:10	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 01:18	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 01:25	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 01:33	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 01:40	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 01:48	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 01:55	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 02:03	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 02:10	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 02:18	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 02:25	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 02:33	1		GeminiC18 3x100 3(mm)
CCV 320-262060/14 CCVIS		11/30/2018 02:40	1		GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1

SDG No.: _____

Instrument ID: A8_N Start Date: 11/30/2018 07:09

Analysis Batch Number: 262072 End Date: 11/30/2018 08:09

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-262072/50 CCVIS		11/30/2018 07:09	1	2018.11.29_537C 053.d	GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 07:17	1		GeminiC18 3x100 3(mm)
MB 320-260208/1-A		11/30/2018 07:24	1	2018.11.29_537C 055.d	GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 07:32	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 07:39	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 07:47	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 07:54	1		GeminiC18 3x100 3(mm)
ZZZZZ		11/30/2018 08:01	1		GeminiC18 3x100 3(mm)
CCV 320-262072/58 CCVIS		11/30/2018 08:09	1	2018.11.29_537C 061.d	GeminiC18 3x100 3(mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-44941-1

SDG No.: _____

Batch Number: 260208 Batch Start Date: 11/19/18 16:16 Batch Analyst: Reed, Jonathan E

Batch Method: 537 Batch End Date: 11/20/18 00:10

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	ReceivedpH	LC537-IS 00090
MB 320-260208/1		537, 537				250.00 mL	10.00 mL	7 SU	500 uL
LCS 320-260208/2		537, 537				250.00 mL	10.00 mL	7 SU	500 uL
320-44941-A-1	NAWC-110518-RW-1 79	537, 537	T	310.10 g	28.09 g	282 mL	10.00 mL	7 SU	500 uL
320-44941-B-2	NAWC-110518-FRB- 179	537, 537	T	314.74 g	27.20 g	287.5 mL	10.00 mL	7 SU	500 uL
320-44941-A-3	WGNA-110518-DUP- 52	537, 537	T	312.72 g	28.07 g	284.7 mL	10.00 mL	7 SU	500 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-SU 00086	LC537MSP 00001	AnalysisComment			
MB 320-260208/1		537, 537		500 uL		Chlorine: ND			
LCS 320-260208/2		537, 537		500 uL	500 uL	Chlorine: ND			
320-44941-A-1	NAWC-110518-RW-1 79	537, 537	T	500 uL		Chlorine: ND			
320-44941-B-2	NAWC-110518-FRB- 179	537, 537	T	500 uL		Chlorine: ND			
320-44941-A-3	WGNA-110518-DUP- 52	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.: 320-44941-1

SDG No.: _____

Batch Number: 260208 Batch Start Date: 11/19/18 16:16 Batch Analyst: Reed, Jonathan E

Batch Method: 537 Batch End Date: 11/20/18 00:10

Batch Notes	
Analyst ID - Aliquot Step	JER
Batch Comment	TA labels match client IDs(44946-2 discrepancy covered by NCM from SC)
Analyst ID - Final Volume Step	JER
Internal Standard ID#	1408098
Manifold ID	Q
Methanol ID	1441326
pH Indicator ID	3718
Pipette ID	I46162G
Analyst ID - IS Reagent Drop	JER
Analyst ID - IS Reagent Drop Witness	GXL
Analyst ID - SU Reagent Drop	JER
Analyst ID - SU Reagent Drop Witness	DTH
Analyst ID - TA Reagent Drop	JER
Analyst ID - TA Reagent Drop Witness	DTH
SPE Cartridge Lot ID	6413968-03
Trizma ID	SLBR5241V
Reagent Water ID	11/17/18

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

11/28/2018

PFOS

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	Reported RRF
0.0232	33833	2569546	2.39	1.35642	1.3564
0.0464	54866	2461689	2.39	1.14802	1.148
0.232	271684	2578275	2.39	1.08554	1.0855
0.928	1031103	2535104	2.39	1.04751	1.0475
2.32	2628210	2646127	2.39	1.02320	1.0232
4.64	5196086	2536142	2.39	1.05532	1.0553
9.28	10188257	2383569	2.39	1.10083	1.1008
Average				1.11669	1.1167
Standard Deviation				0.1133	
RSD				0.1014	
%RSD				10.14254	10.1

Continuing Calibration

11/29/2018 @ 4:02

PFOS

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	%D	Reported RRF	Reported %D
0.928	969685	2451605	2.39	1.0187	-8.779261	1.019	-8.8

Sample Identification
Compound

NAWC-110518-RW-179
PFOS

Compound Area	539873	Average RRF	1.1167
Internal Standard Amount (ng)	2.39	Sample Volume(ml)	282
Dilution Factor	1	Volume Extract (ml)	10
Internal Standard Area	3106400		

Concentration	13.1901 ng/L
Reported Result	13.2 ng/L

Surrogate PFHxA

Compound Area	2918905		
Internal Standard Amount (ng)	2.5		
Dilution Factor	1	Volume Extract (ml)	1
Internal Standard Area	4187873	Injection Volume (µl)	1
Average RRF	0.9723		
Concentration	1.7921		
Surrogate %R	71.68	Spike amount	2.5

LCS %R

320-260208/2-A			
PFOS	Spike amount	LCS concentration	
87.89	92.8	81.56	

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromdocs2018\q3\Sacramento\ChromData\A8_N\20181128-68345.b\2018.11.28_537B_057.d
 Lims ID: 320-44941-A-1-A
 Client ID: NAWC-110518-RW-179
 Sample Type: Client
 Inject. Date: 29-Nov-2018 05:24:27 ALS Bottle#: 43 Worklist Smp#: 53
 Injection Vol: 14.0 ul Dil. Factor: 1.0000
 Sample Info: 320-44941-a-1-a
 Misc. Info.: Plate: 1 Rack: 3
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Method: \\chromdocs2018\q3\Sacramento\ChromData\A8_N\20181128-68345.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 29-Nov-2018 13:32:29 Calib Date: 28-Nov-2018 13:51:37
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\chromdocs2018\q3\Sacramento\ChromData\A8_N\20181128-68320.b\2018.11.28_537ICALTPX_008.d

Column 1 : Det: EXP1
 Process Host: CTX0318

First Level Reviewer: barnettj Date: 29-Nov-2018 13:29:27
 Ratio Calibration: None

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.948	1.964	-0.016	1.000	135114	0.0943	Target=1.47	174	
298.90 > 99.00	1.948	1.964	-0.016	1.000	97284		1.39(0.00-0.00)	48.9	
13 Perfluorohexanoic acid									
313.00 > 269.00	2.302	2.302	0.0	0.726	240850	0.1594	Target=10.61	55.8	
313.00 > 119.00	2.302	2.302	0.0	0.726	25541		9.43(0.00-0.00)	76.0	
\$ 2 13C2 PFHxA									
315.00 > 270.00	2.318	2.318	0.0	1.000	2918905	1.79		6877	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.753	2.752	0.001	1.000	189026	0.1033	Target=2.39	26.1	
363.00 > 169.00	2.753	2.752	0.001	1.000	76056		2.49(0.00-0.00)	83.9	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.769	2.769	0.0	1.000	238932	0.1213	Target=3.00	228	M
399.00 > 99.00	2.769	2.769	0.0	1.000	77160		3.10(0.00-0.00)	80.3	M
* 5 13C2 PFOA									
415.00 > 370.00	3.171	3.171	0.0		4187873	2.50		9861	
6 Perfluorooctanoic acid									
413.00 > 369.00	3.187	3.171	0.016	1.000	737811	0.3969	Target=1.75	64.5	M
413.00 > 169.00	3.187	3.171	0.016	1.000	446311		1.65(0.00-0.00)	160	M
* 7 13C4 PFOS									
503.00 > 80.00	3.573	3.557	0.016		3106400	2.39		5969	
9 Perfluorononanoic acid									
463.00 > 419.00	3.573	3.573	0.0	1.000	96716	0.0718	Target=3.59	21.5	
463.00 > 169.00	3.573	3.573	0.0	1.000	24430		3.96(0.00-0.00)	85.4	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	3.573	3.590	-0.017	1.000	539873	0.3720	Target=4.81	393	
499.00 > 99.00	3.573	3.590	-0.017	1.000	100056		5.40(0.00-0.00)	180	

Ratio Calibration: None

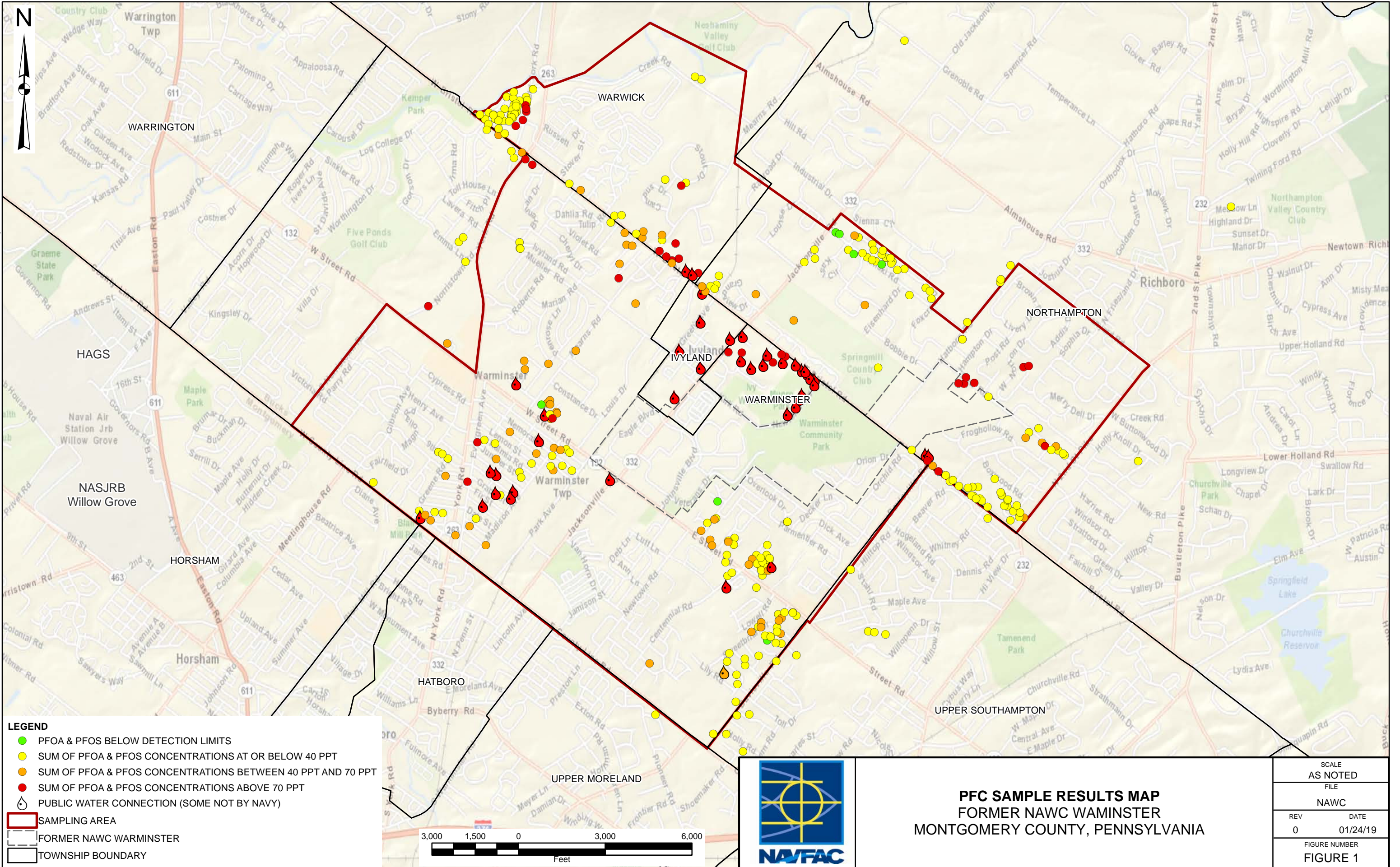
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
\$ 10 13C2 PFDA	515.00 > 470.00	3.928	3.927	0.001	1.000	2231920	1.93	9069	
* 12 d3-NMeFOSAA	573.00 > 419.00	4.105	4.105	0.0		1470921	2.50	5856	
\$ 11 d5-NEtFOSAA	589.00 > 419.00	4.249	4.249	0.0	1.035	1058586	1.70	2580	

QC Flag Legend

Review Flags

M - Manually Integrated

C:\AI\Projects\112008005\WE04\F.S.DR.03\NAWC_201901.mxd MKB 1/24/2019



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 WARRINSTER
- TOWNSHIP BOUNDARY



PFC SAMPLE RESULTS MAP
FORMER NAWC WARRINSTER
MONTGOMERY COUNTY, PENNSYLVANIA

SCALE AS NOTED	
FILE	
NAWC	
REV 0	DATE 01/24/19
FIGURE NUMBER	
FIGURE 1	