



Off-Base Drinking Water Sample Results, Electronic Data Deliverable, Data Validation Report, and the Sample Location Figure, SDG 320-46387-1

*Naval Air Station Willow Grove
Willow Grove, Pennsylvania*

August 2019

"WGNA-121818-RW-0443","537","RES","320-46387-1","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","16.7","ng/L","",,"0.895","DL","",,"TRG","",,"4.71","LOQ","YES","-99","",,"265.3","10.00","1.88",""
"WGNA-121818-RW-0443","537","RES","320-46387-1","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","16.8","ng/L","M","2.54","DL","",,"TRG","",,"6.60","LOQ","YES","-99","",,"265.3","10.00","5.65",""
"WGNA-121818-RW-0443","537","RES","320-46387-1","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","4.97","ng/L","M","0.603","DL","",,"TRG","",,"4.71","LOQ","YES","-99","",,"265.3","10.00","1.88",""
"WGNA-121818-RW-0443","537","RES","320-46387-1","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","17.5","ng/L","",,"0.754","DL","",,"TRG","",,"4.71","LOQ","YES","-99","",,"265.3","10.00","1.88",""
"WGNA-121818-RW-0443","537","RES","320-46387-1","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","6.92","ng/L","",,"1.23","DL","",,"TRG","",,"4.71","LOQ","YES","-99","",,"265.3","10.00","2.83",""
"WGNA-121818-RW-0443","537","RES","320-46387-1","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","2.04","ng/L","J","0.443","DL","",,"TRG","",,"4.71","LOQ","YES","-99","",,"265.3","10.00","0.942",""
"WGNA-121818-RW-0443","537","RES","320-46387-1","TALSAC","STL00993","13C2 PFHxA","93.1","ng/L","",,"-99","DL","",,"SURR","99","",,"-99","LOQ","YES","94.2","",,"265.3","10.00","5.65",""
"WGNA-121818-RW-0443","537","RES","320-46387-1","TALSAC","STL00996","13C2 PFDA","87.8","ng/L","",,"-99","DL","",,"SURR","93","",,"-99","LOQ","YES","94.2","",,"265.3","10.00","5.65",""
"WGNA-121818-FRB-0443","537","RES","320-46387-2","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","1.77","ng/L","U","0.841","DL","",,"TRG","",,"4.43","LOQ","YES","-99","",,"282.4","10.00","1.77",""
"WGNA-121818-FRB-0443","537","RES","320-46387-2","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","5.31","ng/L","U M","2.39","DL","",,"TRG","",,"6.20","LOQ","YES","-99","",,"282.4","10.00","5.31",""
"WGNA-121818-FRB-0443","537","RES","320-46387-2","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","1.77","ng/L","U","0.567","DL","",,"TRG","",,"4.43","LOQ","YES","-99","",,"282.4","10.00","1.77",""
"WGNA-121818-FRB-0443","537","RES","320-46387-2","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","1.77","ng/L","U","0.708","DL","",,"TRG","",,"4.43","LOQ","YES","-99","",,"282.4","10.00","1.77",""
"WGNA-121818-FRB-0443","537","RES","320-46387-2","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","2.66","ng/L","U","1.15","DL","",,"TRG","",,"4.43","LOQ","YES","-99","",,"282.4","10.00","2.66",""
"WGNA-121818-FRB-0443","537","RES","320-46387-2","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","0.885","ng/L","U","0.416","DL","",,"TRG","",,"4.43","LOQ","YES","-99","",,"282.4","10.00","0.885",""
"WGNA-121818-FRB-0443","537","RES","320-46387-2","TALSAC","STL00993","13C2 PFHxA","80.7","ng/L","",,"-99","DL","",,"SURR","91","",,"-99","LOQ","YES","88.5","",,"282.4","10.00","5.31",""
"WGNA-121818-FRB-0443","537","RES","320-46387-2","TALSAC","STL00996","13C2 PFDA","90.6","ng/L","",,"-99","DL","",,"SURR","102","",,"-99","LOQ","YES","88.5","",,"282.4","10.00","5.31",""
"NAWC-121918-RW-361","537","RES","320-46387-3","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","11.0","ng/L","",,"0.829","DL","",,"TRG","",,"4.36","LOQ","YES","-99","",,"286.5","10.00","1.75",""
"NAWC-121918-RW-361","537","RES","320-46387-3","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","21.9","ng/L","M","2.36","DL","",,"TRG","",,"6.11","LOQ","YES","-99","",,"286.5","10.00","5.24",""
"NAWC-121918-RW-361","537","RES","320-46387-3","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","8.34","ng/L","",,"0.558","DL","",,"TRG","",,"4.36","LOQ","YES","-99","",,"286.5","10.00","1.75",""
"NAWC-121918-RW-361","537","RES","320-46387-3","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","11.2","ng/L","",,"0.698","DL","",,"TRG","",,"4.36","LOQ","YES","-99","",,"286.5","10.00","1.75",""
"NAWC-121918-RW-361","537","RES","320-46387-3","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","6.07","ng/L","",,"1.13","DL","",,"TRG","",,"4.36","LOQ","YES","-99","",,"286.5","10.00","2.62",""
"NAWC-121918-RW-361","537","RES","320-46387-3","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","1.17","ng/L","J","0.410","DL","",,"TRG","",,"4.36","LOQ","YES","-99","",,"286.5","10.00","0.873",""
"NAWC-121918-RW-361","537","RES","320-46387-3","TALSAC","STL00993","13C2 PFHxA","87.2","ng/L","",,"-99","DL","",,"SURR","100","",,"-99","LOQ","YES","87.3","",,"286.5","10.00","5.24",""
"NAWC-121918-RW-361","537","RES","320-46387-3","TALSAC","STL00996","13C2 PFDA","84.7","ng/L","",,"-99","DL","",,"SURR","97","",,"-99","LOQ","YES","87.3","",,"286.5","10.00","5.24",""
"NAWC-121918-FRB-361","537","RES","320-46387-4","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","1.81","ng/L","U","0.862","DL","",,"TRG","",,"4.54","LOQ","YES","-99","",,"275.5","10.00","1.81",""
"NAWC-121918-FRB-361","537","RES","320-46387-4","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","5.44","ng/L","U M","2.45","DL","",,"TRG","",,"6.35","LOQ","YES","-99","",,"275.5","10.00","5.44",""
"NAWC-121918-FRB-361","537","RES","320-46387-4","TALSAC","355-46-4","Perfluorohexanesulfonic acid

(PFHxS)","1.81","ng/L","U","0.581","DL","","TRG","","","4.54","LOQ","YES","-99","","275.5","10.00","1.81",""
"NAWC-121918-FRB-361","537","RES","320-46387-4","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","1.81","ng/L","U","0.726","DL","","TRG","","","4.54","LOQ","YES","-99","","275.5","10.00","1.81",""
"NAWC-121918-FRB-361","537","RES","320-46387-4","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","2.72","ng/L","U","1.18","DL","","TRG","","","4.54","LOQ","YES","-99","","275.5","10.00","2.72",""
"NAWC-121918-FRB-361","537","RES","320-46387-4","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","0.907","ng/L","U M","0.426","DL","","TRG","","","4.54","LOQ","YES","-99","","275.5","10.00","0.907",""
"NAWC-121918-FRB-361","537","RES","320-46387-4","TALSAC","STL00993","13C2
PFHxA","85.9","ng/L","","-99","DL","","SURR","95","","-99","LOQ","YES","90.7","","275.5","10.00","5.44",""
"NAWC-121918-FRB-361","537","RES","320-46387-4","TALSAC","STL00996","13C2
PFDA","83.3","ng/L","","-99","DL","","SURR","92","","-99","LOQ","YES","90.7","","275.5","10.00","5.44",""
"LCS 320-267871/2-A","537","RES","LCS 320-267871/2-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS)","183.9","ng/L","","0.950","DL","","SPK","99","","5.00","LOQ","YES","186","","250.00","10.00","2.00",""
"LCS 320-267871/2-A","537","RES","LCS 320-267871/2-A","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","192.6","ng/L","","2.70","DL","","SPK","96","","7.00","LOQ","YES","200","","250.00","10.00","6.00",""
"LCS 320-267871/2-A","537","RES","LCS 320-267871/2-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","186.8","ng/L","","0.640","DL","","SPK","103","","5.00","LOQ","YES","182","","250.00","10.00","2.00",""
"LCS 320-267871/2-A","537","RES","LCS 320-267871/2-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","165.8","ng/L","","0.800","DL","","SPK","94","","5.00","LOQ","YES","177","","250.00","10.00","2.00",""
"LCS 320-267871/2-A","537","RES","LCS 320-267871/2-A","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","196.7","ng/L","","1.30","DL","","SPK","98","","5.00","LOQ","YES","200","","250.00","10.00","3.00",""
"LCS 320-267871/2-A","537","RES","LCS 320-267871/2-A","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","196.0","ng/L","","0.470","DL","","SPK","98","","5.00","LOQ","YES","200","","250.00","10.00","1.00",""
"LCS 320-267871/2-A","537","RES","LCS 320-267871/2-A","TALSAC","STL00993","13C2
PFHxA","97.09","ng/L","","-99","DL","","SURR","97","","-99","LOQ","YES","100","","250.00","10.00","6.00",""
"LCS 320-267871/2-A","537","RES","LCS 320-267871/2-A","TALSAC","STL00996","13C2
PFDA","104.7","ng/L","","-99","DL","","SURR","105","","-99","LOQ","YES","100","","250.00","10.00","6.00",""
"LCSD 320-267871/3-A","537","RES","LCSD 320-267871/3-A","TALSAC","1763-23-1","Perfluorooctanesulfonic
acid (PFOS)","179.8","ng/L","","0.950","DL","","SPK","97","2","5.00","LOQ","YES","186","LCS 320-267871/2-
A","250.00","10.00","2.00",""
"LCSD 320-267871/3-A","537","RES","LCSD 320-267871/3-A","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","195.2","ng/L","","2.70","DL","","SPK","98","1","7.00","LOQ","YES","200","LCS 320-267871/2-
A","250.00","10.00","6.00",""
"LCSD 320-267871/3-A","537","RES","LCSD 320-267871/3-A","TALSAC","355-46-4","Perfluorohexanesulfonic
acid (PFHxS)","190.3","ng/L","","0.640","DL","","SPK","105","2","5.00","LOQ","YES","182","LCS 320-267871/2-
A","250.00","10.00","2.00",""
"LCSD 320-267871/3-A","537","RES","LCSD 320-267871/3-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","177.9","ng/L","","0.800","DL","","SPK","101","7","5.00","LOQ","YES","177","LCS 320-267871/2-
A","250.00","10.00","2.00",""
"LCSD 320-267871/3-A","537","RES","LCSD 320-267871/3-A","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","189.6","ng/L","","1.30","DL","","SPK","95","4","5.00","LOQ","YES","200","LCS 320-267871/2-
A","250.00","10.00","3.00",""
"LCSD 320-267871/3-A","537","RES","LCSD 320-267871/3-A","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","189.9","ng/L","","0.470","DL","","SPK","95","3","5.00","LOQ","YES","200","LCS 320-267871/2-
A","250.00","10.00","1.00",""
"LCSD 320-267871/3-A","537","RES","LCSD 320-267871/3-A","TALSAC","STL00993","13C2
PFHxA","101.2","ng/L","","-99","DL","","SURR","101","","-99","LOQ","YES","100","LCS 320-267871/2-
A","250.00","10.00","6.00",""
"LCSD 320-267871/3-A","537","RES","LCSD 320-267871/3-A","TALSAC","STL00996","13C2
PFDA","91.01","ng/L","","-99","DL","","SURR","91","","-99","LOQ","YES","100","LCS 320-267871/2-
A","250.00","10.00","6.00",""
"MB 320-267871/1-A","537","RES","MB 320-267871/1-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 320-267871/1-A","537","RES","MB 320-267871/1-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 320-267871/1-A","537","RES","MB 320-267871/1-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 320-267871/1-A","537","RES","MB 320-267871/1-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 320-267871/1-A","537","RES","MB 320-267871/1-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 320-267871/1-A","537","RES","MB 320-267871/1-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 320-267871/1-A","537","RES","MB 320-267871/1-A","TALSAC","STL00993","13C2
PFHxA","96.15","ng/L","","","-99","DL","","","SURR","96","","","-99","LOQ","YES","100","","","250.00","10.00","6.00",""
"MB 320-267871/1-A","537","RES","MB 320-267871/1-A","TALSAC","STL00996","13C2
PFDA","94.29","ng/L","","","-99","DL","","","SURR","94","","","-99","LOQ","YES","100","","","250.00","10.00","6.00",""
"Unknown","Unknown","WGNA-121818-RW-0443","12/18/2018 10:10","AQ","320-46387-
1","NM","","","1.10","537","METHOD","RES","12/28/2018 07:13","12/29/2018
05:35","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-267871","320-267871","NA","320-
268089","320-46387-1","12/20/2018 16:12","01/03/2019 08:52","",""
"Unknown","Unknown","WGNA-121818-FRB-0443","12/18/2018 10:05","AQ","320-46387-
2","FB","","","1.10","537","METHOD","RES","12/28/2018 07:13","12/29/2018
05:42","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-267871","320-267871","NA","320-
268089","320-46387-1","12/20/2018 16:12","01/03/2019 08:52","",""
"Unknown","Unknown","NAWC-121918-RW-361","12/19/2018 10:10","AQ","320-46387-
3","NM","","","1.10","537","METHOD","RES","12/28/2018 07:13","12/29/2018
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268089","320-46387-1","12/20/2018 16:12","01/03/2019 08:52","",""
"Unknown","Unknown","NAWC-121918-FRB-361","12/19/2018 10:05","AQ","320-46387-
4","FB","","","1.10","537","METHOD","RES","12/28/2018 07:13","12/29/2018
05:57","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-267871","320-267871","NA","320-
268089","320-46387-1","12/20/2018 16:12","01/03/2019 08:52","",""
"Unknown","Unknown","LCS 320-267871/2-A","","","AQ","LCS 320-267871/2-
A","LCS","","","-99","537","METHOD","RES","12/28/2018 07:13","12/29/2018
05:20","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-267871","320-267871","NA","320-
268089","320-46387-1","12/28/2018 07:13","01/03/2019 08:52","",""
"Unknown","Unknown","LCSD 320-267871/3-A","","","AQ","LCSD 320-267871/3-
A","LCSD","","","-99","537","METHOD","RES","12/28/2018 07:13","12/29/2018
05:27","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-267871","320-267871","NA","320-
268089","320-46387-1","12/28/2018 07:13","01/03/2019 08:52","",""
"Unknown","Unknown","MB 320-267871/1-A","","","AQ","MB 320-267871/1-
A","MB","","","-99","537","METHOD","RES","12/28/2018 07:13","12/29/2018
05:12","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-267871","320-267871","NA","320-
268089","320-46387-1","12/28/2018 07:13","01/03/2019 08:52","",""



TO: A. FREBOWITZ **DATE:** JANUARY 11, 2019

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

SUBJECT: ORGANIC DATA VALIDATION –POLYFLUOROALKYL SUBSTANCES (PFAS)
NAS JRB WILLOW GROVE
SAMPLE DELIVERY GROUP (SDG) 320-46387-1

SAMPLES: 2/Field Reagent Blank (FRB)
NAWC-121918-FRB-361 WGNA-121818-FRB-0443

2/Drinking Water
NAWC-121918-RW-361 WGNA-121818-RW-0443

Overview

The sample set for NAS JRB Willow Grove, SDG 320-46387-1, consisted of two (2) drinking water samples and two (2) FRB samples. All samples were analyzed for select perfluorinated alkyl acids including pentadecafluorooctanoic acid (PFOA), perfluorobutane sulfonic acid (PFBS), perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA) and perfluorooctane sulfonic acid (PFOS). No field duplicate pairs were included in this SDG.

The samples were collected by Tetra Tech on December 18 and 19, 2018 and analyzed by Test America-Sacramento. All sample analyses were conducted in accordance with EPA Method 537 version 1.1 analytical and reporting protocols.

The data contained in this SDG was validated with regard to the following parameters: data completeness, holding times, mass calibration, mass spectral acquisition rate, instrument sensitivity check, peak asymmetry factor, initial/continuing calibrations, ion transitions, laboratory method/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

No issues.

Minor

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

Notes

It was noted that a preservative was indicated on the chain of custody. However, Trizma was not listed as the preservative.

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

Sample

NAWC-121918-RW-361
WGNA-121818-RW-0443

Associated FRB

NAWC-121918-FRB-361
WGNA-121818-FRB-0443

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

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

Executive Summary

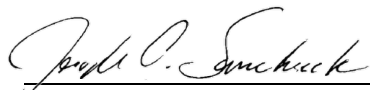
Laboratory Performance: No issues.

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

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



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



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

Attachments:

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

Data Qualifier Definitions

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

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

Appendix A

Qualified Analytical Results

Qualifier Codes:

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

PROJ_NO: 08005-WE04 SDG: 320-46387-1 FRACTION: PFAS MEDIA: WATER	NSAMPLE	NAWC-121918-FRB-361			NAWC-121918-RW-361			WGNA-121818-FRB-0443			WGNA-121818-RW-0443		
	LAB_ID	320-46387-4			320-46387-3			320-46387-2			320-46387-1		
	SAMP_DATE	12/19/2018			12/19/2018			12/18/2018			12/18/2018		
	QC_TYPE	FB			NM			FB			NM		
	UNITS	NG/L			NG/L			NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PENTADECAFLUOROOCTANOIC ACID (PFOA)		5.44	U		21.9			5.31	U		16.8		
PERFLUOROBUTANESULFONIC ACID (PFBS)		1.81	U		11.2			1.77	U		17.5		
PERFLUOROHEPTANOIC ACID (PFHPA)		2.72	U		6.07			2.66	U		6.92		
PERFLUOROHXANESULFONIC ACID (PFHXS)		1.81	U		8.34			1.77	U		4.97		
PERFLUORONONANOIC ACID (PFNA)		0.907	U		1.17	J	P	0.885	U		2.04	J	P
PERFLUOROOCTANESULFONIC ACID (PFOS)		1.81	U		11			1.77	U		16.7		

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-46387-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-121818-RW-0443</u>	Lab Sample ID: <u>320-46387-1</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.12.28_537A_022.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>12/18/2018 10:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>12/28/2018 07:13</u>
Sample wt/vol: <u>265.3 (mL)</u>	Date Analyzed: <u>12/29/2018 05:35</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>14 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>268089</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16.7		4.71	1.88	0.895
335-67-1	Perfluorooctanoic acid (PFOA)	16.8	M	6.60	5.65	2.54
375-95-1	Perfluorononanoic acid (PFNA)	2.04	J	4.71	0.942	0.443
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	4.97	M	4.71	1.88	0.603
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.92		4.71	2.83	1.23
375-73-5	Perfluorobutanesulfonic acid (PFBS)	17.5		4.71	1.88	0.754

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	99		70-130
STL00996	13C2 PFDA	93		70-130

Steve L. Selmer
01/11/2019

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-46387-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-121818-FRB-0443</u>	Lab Sample ID: <u>320-46387-2</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.12.28_537A_023.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>12/18/2018 10:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>12/28/2018 07:13</u>
Sample wt/vol: <u>282.4 (mL)</u>	Date Analyzed: <u>12/29/2018 05:42</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>14 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>268089</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.77	U	4.43	1.77	0.841
335-67-1	Perfluorooctanoic acid (PFOA)	5.31	U M	6.20	5.31	2.39
375-95-1	Perfluorononanoic acid (PFNA)	0.885	U	4.43	0.885	0.416
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.77	U	4.43	1.77	0.567
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.66	U	4.43	2.66	1.15
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.77	U	4.43	1.77	0.708

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	91		70-130
STL00996	13C2 PFDA	102		70-130

Mari L. Salomon
01/11/2019

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Client Sample ID: NAWC-121918-RW-361 Lab Sample ID: 320-46387-3
 Matrix: Water Lab File ID: 2018.12.28_537A_024.d
 Analysis Method: 537 Date Collected: 12/19/2018 10:10
 Extraction Method: 537 Date Extracted: 12/28/2018 07:13
 Sample wt/vol: 286.5 (mL) Date Analyzed: 12/29/2018 05:50
 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.: 268089 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	11.0		4.36	1.75	0.829
335-67-1	Perfluorooctanoic acid (PFOA)	21.9	M	6.11	5.24	2.36
375-95-1	Perfluorononanoic acid (PFNA)	1.17	J	4.36	0.873	0.410
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	8.34		4.36	1.75	0.558
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.07		4.36	2.62	1.13
375-73-5	Perfluorobutanesulfonic acid (PFBS)	11.2		4.36	1.75	0.698

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	100		70-130
STL00996	13C2 PFDA	97		70-130

Ali L. Salem
01/11/2019

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-46387-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-121918-FRB-361</u>	Lab Sample ID: <u>320-46387-4</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.12.28_537A_025.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>12/19/2018 10:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>12/28/2018 07:13</u>
Sample wt/vol: <u>275.5 (mL)</u>	Date Analyzed: <u>12/29/2018 05:57</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>14 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>268089</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.81	U	4.54	1.81	0.862
335-67-1	Perfluorooctanoic acid (PFOA)	5.44	U M	6.35	5.44	2.45
375-95-1	Perfluorononanoic acid (PFNA)	0.907	U M	4.54	0.907	0.426
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.81	U	4.54	1.81	0.581
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.72	U	4.54	2.72	1.18
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.81	U	4.54	1.81	0.726

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	95		70-130
STL00996	13C2 PFDA	92		70-130

Ali J. Salem
01/11/2019

Appendix B

Results as Reported by the Laboratory

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-46387-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-121818-RW-0443</u>	Lab Sample ID: <u>320-46387-1</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.12.28_537A_022.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>12/18/2018 10:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>12/28/2018 07:13</u>
Sample wt/vol: <u>265.3 (mL)</u>	Date Analyzed: <u>12/29/2018 05:35</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>14 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>268089</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16.7		4.71	1.88	0.895
335-67-1	Perfluorooctanoic acid (PFOA)	16.8	M	6.60	5.65	2.54
375-95-1	Perfluorononanoic acid (PFNA)	2.04	J	4.71	0.942	0.443
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	4.97	M	4.71	1.88	0.603
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.92		4.71	2.83	1.23
375-73-5	Perfluorobutanesulfonic acid (PFBS)	17.5		4.71	1.88	0.754

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	99		70-130
STL00996	13C2 PFDA	93		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-46387-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-121818-FRB-0443</u>	Lab Sample ID: <u>320-46387-2</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.12.28_537A_023.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>12/18/2018 10:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>12/28/2018 07:13</u>
Sample wt/vol: <u>282.4 (mL)</u>	Date Analyzed: <u>12/29/2018 05:42</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>14 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>268089</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.77	U	4.43	1.77	0.841
335-67-1	Perfluorooctanoic acid (PFOA)	5.31	U M	6.20	5.31	2.39
375-95-1	Perfluorononanoic acid (PFNA)	0.885	U	4.43	0.885	0.416
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.77	U	4.43	1.77	0.567
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.66	U	4.43	2.66	1.15
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.77	U	4.43	1.77	0.708

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	91		70-130
STL00996	13C2 PFDA	102		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-46387-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-121918-RW-361</u>	Lab Sample ID: <u>320-46387-3</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.12.28_537A_024.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>12/19/2018 10:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>12/28/2018 07:13</u>
Sample wt/vol: <u>286.5 (mL)</u>	Date Analyzed: <u>12/29/2018 05:50</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>14 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>268089</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	11.0		4.36	1.75	0.829
335-67-1	Perfluorooctanoic acid (PFOA)	21.9	M	6.11	5.24	2.36
375-95-1	Perfluorononanoic acid (PFNA)	1.17	J	4.36	0.873	0.410
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	8.34		4.36	1.75	0.558
375-85-9	Perfluoroheptanoic acid (PFHpA)	6.07		4.36	2.62	1.13
375-73-5	Perfluorobutanesulfonic acid (PFBS)	11.2		4.36	1.75	0.698

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	100		70-130
STL00996	13C2 PFDA	97		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-46387-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-121918-FRB-361</u>	Lab Sample ID: <u>320-46387-4</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.12.28_537A_025.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>12/19/2018 10:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>12/28/2018 07:13</u>
Sample wt/vol: <u>275.5 (mL)</u>	Date Analyzed: <u>12/29/2018 05:57</u>
Con. Extract Vol.: <u>10.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>14 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>268089</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	1.81	U	4.54	1.81	0.862
335-67-1	Perfluorooctanoic acid (PFOA)	5.44	U M	6.35	5.44	2.45
375-95-1	Perfluorononanoic acid (PFNA)	0.907	U M	4.54	0.907	0.426
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	1.81	U	4.54	1.81	0.581
375-85-9	Perfluoroheptanoic acid (PFHpA)	2.72	U	4.54	2.72	1.18
375-73-5	Perfluorobutanesulfonic acid (PFBS)	1.81	U	4.54	1.81	0.726

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	95		70-130
STL00996	13C2 PFDA	92		70-130

Appendix C

Support Documentation

320-46387 Chain of Custody

Job Narrative
320-46387-1

Receipt

The samples were received on 12/20/2018 4:12 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.1° C.

LCMS

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

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

Organic Prep

Method(s) 537: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-267871.

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: 320-46387-1

Qualifiers

LCMS

Qualifier	Qualifier Description
M	Manual integrated compound.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
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: 320-46387-1

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

Protocol References:
EPA = US Environmental Protection Agency

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

Sample Summary

Client: Tetra Tech, Inc.

TestAmerica Job ID: 320-46387-1

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

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-46387-1	WGNA-121818-RW-0443	Water	12/18/18 10:10	12/20/18 16:12
320-46387-2	WGNA-121818-FRB-0443	Water	12/18/18 10:05	12/20/18 16:12
320-46387-3	NAWC-121918-RW-361	Water	12/19/18 10:10	12/20/18 16:12
320-46387-4	NAWC-121918-FRB-361	Water	12/19/18 10:05	12/20/18 16:12

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Matrix: Water Level: Low
 GC Column (1): GeminiC18 3 ID: 3 (mm)

Client Sample ID	Lab Sample ID	PFHxA #	PFDA #
WGNA-121818-RW-044 3	320-46387-1	99	93
WGNA-121818-FRB-04 43	320-46387-2	91	102
NAWC-121918-RW-361	320-46387-3	100	97
NAWC-121918-FRB-36 1	320-46387-4	95	92
	MB 320-267871/1-A	96	94
	LCS 320-267871/2-A	97	105
	LCSD 320-267871/3-A	101	91

PFHxA = 13C2 PFHxA
 PFDA = 13C2 PFDA

QC LIMITS
 70-130
 70-130

Column to be used to flag recovery values

FORM III
LCMS LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.12.28_537A_020.d
 Lab ID: LCS 320-267871/2-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LCS CONCENTRATION (ng/L)	LCS % REC	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	186	183.9	99	70-130	
Perfluorooctanoic acid (PFOA)	200	192.6	96	70-130	
Perfluorononanoic acid (PFNA)	200	196.0	98	70-130	
Perfluorohexanesulfonic acid (PFHxS)	182	186.8	103	70-130	
Perfluoroheptanoic acid (PFHpA)	200	196.7	98	70-130	
Perfluorobutanesulfonic acid (PFBS)	177	165.8	94	70-130	

Column to be used to flag recovery and RPD values

FORM III
LCMS LAB CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.12.28_537A_021.d
 Lab ID: LCSD 320-267871/3-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LCSD CONCENTRATION (ng/L)	LCSD % REC	% RPD	QC LIMITS		#
					RPD	REC	
Perfluorooctanesulfonic acid (PFOS)	186	179.8	97	2	30	70-130	
Perfluorooctanoic acid (PFOA)	200	195.2	98	1	30	70-130	
Perfluorononanoic acid (PFNA)	200	189.9	95	3	30	70-130	
Perfluorohexanesulfonic acid (PFHxS)	182	190.3	105	2	30	70-130	
Perfluoroheptanoic acid (PFHpA)	200	189.6	95	4	30	70-130	
Perfluorobutanesulfonic acid (PFBS)	177	177.9	101	7	30	70-130	

Column to be used to flag recovery and RPD values

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Lab File ID: 2018.12.28_537A_019.d Lab Sample ID: MB 320-267871/1-A
 Matrix: Water Date Extracted: 12/28/2018 07:13
 Instrument ID: A8_N Date Analyzed: 12/29/2018 05:12
 Level: (Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LCS 320-267871/2-A	2018.12.28_537A_020.d	12/29/2018 05:20
	LCSD 320-267871/3-A	2018.12.28_537A_021.d	12/29/2018 05:27
WGNA-121818-RW-0443	320-46387-1	2018.12.28_537A_022.d	12/29/2018 05:35
WGNA-121818-FRB-0443	320-46387-2	2018.12.28_537A_023.d	12/29/2018 05:42
NAWC-121918-RW-361	320-46387-3	2018.12.28_537A_024.d	12/29/2018 05:50
NAWC-121918-FRB-361	320-46387-4	2018.12.28_537A_025.d	12/29/2018 05:57

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: MB 320-267871/1-A
 Matrix: Water Lab File ID: 2018.12.28_537A_019.d
 Analysis Method: 537 Date Collected: _____
 Extraction Method: 537 Date Extracted: 12/28/2018 07:13
 Sample wt/vol: 250.00 (mL) Date Analyzed: 12/29/2018 05:12
 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.: 268089 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	96		70-130
STL00996	13C2 PFDA	94		70-130

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Instrument ID: A8_N Calibration Start Date: 12/07/2018 15:06
 GC Column: GeminiC18 3x100 ID: 3(mm) Calibration End Date: 12/07/2018 15:50
 Calibration ID: 42659

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MEAN AREA AND MEAN RT		3528472	3.19	2654650	3.59		
UPPER LIMIT		5292708	3.69	3981975	4.09		
LOWER LIMIT		1764236	2.69	1327325	3.09		
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCVL 320-263818/10		3854163	3.20	2764360	3.59		
ICV 320-263818/12		3693184	3.19	2637299	3.57		
CCVL 320-268087/1		3714136	3.17	2862206	3.56		
CCV 320-268089/14 CCVIS		3629466	3.17	2624421	3.56		
MB 320-267871/1-A		3901664	3.16	2818784	3.54		
LCS 320-267871/2-A		3693190	3.17	2815486	3.56		
LCSD 320-267871/3-A		3723478	3.17	2740830	3.56		
320-46387-1	WGNA-121818-RW-0443	3921741	3.17	2972356	3.56		
320-46387-2	WGNA-121818-FRB-0443	3701966	3.16	2824102	3.54		
320-46387-3	NAWC-121918-RW-361	3633237	3.17	2844887	3.54		
320-46387-4	NAWC-121918-FRB-361	3992558	3.16	2846146	3.54		
CCV 320-268089/23 CCVIS		3694960	3.17	2792560	3.56		

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.: 320-46387-1
 SDG No.: _____
 Sample No.: CCV 320-268089/14 Date Analyzed: 12/29/2018 04:57
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.12.28_537A_017 Heated Purge: (Y/N) N
 Calibration ID: 42659

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		3629466	3.17	2624421	3.56		
UPPER LIMIT		5081252	3.67	3674189	4.06		
LOWER LIMIT		2540626	2.67	1837095	3.06		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-267871/1-A		3901664	3.16	2818784	3.54		
LCS 320-267871/2-A		3693190	3.17	2815486	3.56		
LCSD 320-267871/3-A		3723478	3.17	2740830	3.56		
320-46387-1	WGNA-121818-RW-0443	3921741	3.17	2972356	3.56		
320-46387-2	WGNA-121818-FRB-0443	3701966	3.16	2824102	3.54		
320-46387-3	NAWC-121918-RW-361	3633237	3.17	2844887	3.54		
320-46387-4	NAWC-121918-FRB-361	3992558	3.16	2846146	3.54		

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.: 320-46387-1
 SDG No.: _____
 Sample No.: CCV 320-268089/23 Date Analyzed: 12/29/2018 06:04
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.12.28_537A_026 Heated Purge: (Y/N) N
 Calibration ID: 42659

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		3694960	3.17	2792560	3.56		
UPPER LIMIT		5172944	3.67	3909584	4.06		
LOWER LIMIT		2586472	2.67	1954792	3.06		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-267871/1-A		3901664	3.16	2818784	3.54		
LCS 320-267871/2-A		3693190	3.17	2815486	3.56		
LCSD 320-267871/3-A		3723478	3.17	2740830	3.56		
320-46387-1	WGNA-121818-RW-0443	3921741	3.17	2972356	3.56		
320-46387-2	WGNA-121818-FRB-0443	3701966	3.16	2824102	3.54		
320-46387-3	NAWC-121918-RW-361	3633237	3.17	2844887	3.54		
320-46387-4	NAWC-121918-FRB-361	3992558	3.16	2846146	3.54		

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 VI
LCMS BY INTERNAL STANDARD - INITIAL CALIBRATION DATA
CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1 Analy Batch No.: 263818

SDG No.: _____

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

Calibration Start Date: 12/07/2018 15:06 Calibration End Date: 12/07/2018 15:50 Calibration ID: 42659

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-263818/2	2018.12.07_537ICAL_003.d
Level 2	IC 320-263818/3	2018.12.07_537ICAL_004.d
Level 3	IC 320-263818/4	2018.12.07_537ICAL_005.d
Level 4	IC 320-263818/5	2018.12.07_537ICAL_006.d
Level 5	IC 320-263818/6	2018.12.07_537ICAL_007.d
Level 6	IC 320-263818/7	2018.12.07_537ICAL_008.d
Level 7	IC 320-263818/8	2018.12.07_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)	1.0988 1.1767	1.2086 1.1302	1.0474	1.1169	1.0674	Ave		1.1209				5.1		30.0			
Perfluoroheptanoic acid (PFHpA)	1.2239 1.0659	1.0707 1.0573	1.0359	1.0224	0.9766	Ave		1.0647				7.3		30.0			
Perfluorohexanesulfonic acid (PFHxS)	1.4212 1.5811	1.4959 1.4890	1.3853	1.5308	1.4287	Ave		1.4760				4.6		30.0			
Perfluorooctanoic acid (PFOA)	1.2538 1.0902	1.0919 1.0484	1.0827	1.0711	0.9868	Ave		1.0893				7.5		30.0			
Perfluorooctanesulfonic acid (PFOS)	1.2739 1.0826	1.1148 1.0827	1.0146	1.0841	1.0634	Ave		1.1023				7.4		30.0			
Perfluorononanoic acid (PFNA)	0.8864 0.8230	0.8400 0.8262	0.8111	0.8329	0.8003	Ave		0.8314				3.3		30.0			
13C2 PFHxA	0.9542 0.9684	0.9959 0.9973	0.9365	0.9604	0.8704	Ave		0.9547				4.5		30.0			
13C2 PFDA	0.7164 0.7292	0.7303 0.7164	0.7050	0.7335	0.6982	Ave		0.7184				1.9		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.: 320-46387-1 Analy Batch No.: 263818

SDG No.: _____

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

Calibration Start Date: 12/07/2018 15:06 Calibration End Date: 12/07/2018 15:50 Calibration ID: 42659

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-263818/2	2018.12.07_537ICAL_003.d
Level 2	IC 320-263818/3	2018.12.07_537ICAL_004.d
Level 3	IC 320-263818/4	2018.12.07_537ICAL_005.d
Level 4	IC 320-263818/5	2018.12.07_537ICAL_006.d
Level 5	IC 320-263818/6	2018.12.07_537ICAL_007.d
Level 6	IC 320-263818/7	2018.12.07_537ICAL_008.d
Level 7	IC 320-263818/8	2018.12.07_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	27320 5447804	62153 10829607	265789	1062646	2667621	0.0221 4.42	0.0442 8.84	0.221	0.884	2.21
Perfluoroheptanoic acid (PFHpA)	13PF OA	Ave	43264 7185923	80008 14333785	365716	1393593	3642688	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
Perfluorohexanesulfonic acid (PFHxS)	PFOS	Ave	36374 7535367	79188 14686493	361859	1499172	3675806	0.0228 4.55	0.0455 9.10	0.228	0.910	2.28
Perfluorooctanoic acid (PFOA)	13PF OA	Ave	44364 7357085	81675 14227009	382620	1461416	3684632	0.0250 5.01	0.0501 10.0	0.250	1.00	2.50
Perfluorooctanesulfonic acid (PFOS)	PFOS	Ave	33250 5261445	60183 10890349	270284	1082696	2790009	0.0232 4.64	0.0464 9.28	0.232	0.928	2.32
Perfluorononanoic acid (PFNA)	13PF OA	Ave	31332 5548381	62765 11200160	286352	1135323	2985342	0.0250 5.00	0.0500 10.0	0.250	1.00	2.50
13C2 PFHxA	13PF OA	Ave	3372926 3264066	3720908 3379961	3306344	3272924	3246608	2.50 2.50	2.50 2.50	2.50	2.50	2.50
13C2 PFDA	13PF OA	Ave	2532483 2457743	2728445 2428151	2488961	2499615	2604411	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.: 320-46387-1 Analy Batch No.: 263818

SDG No.: _____

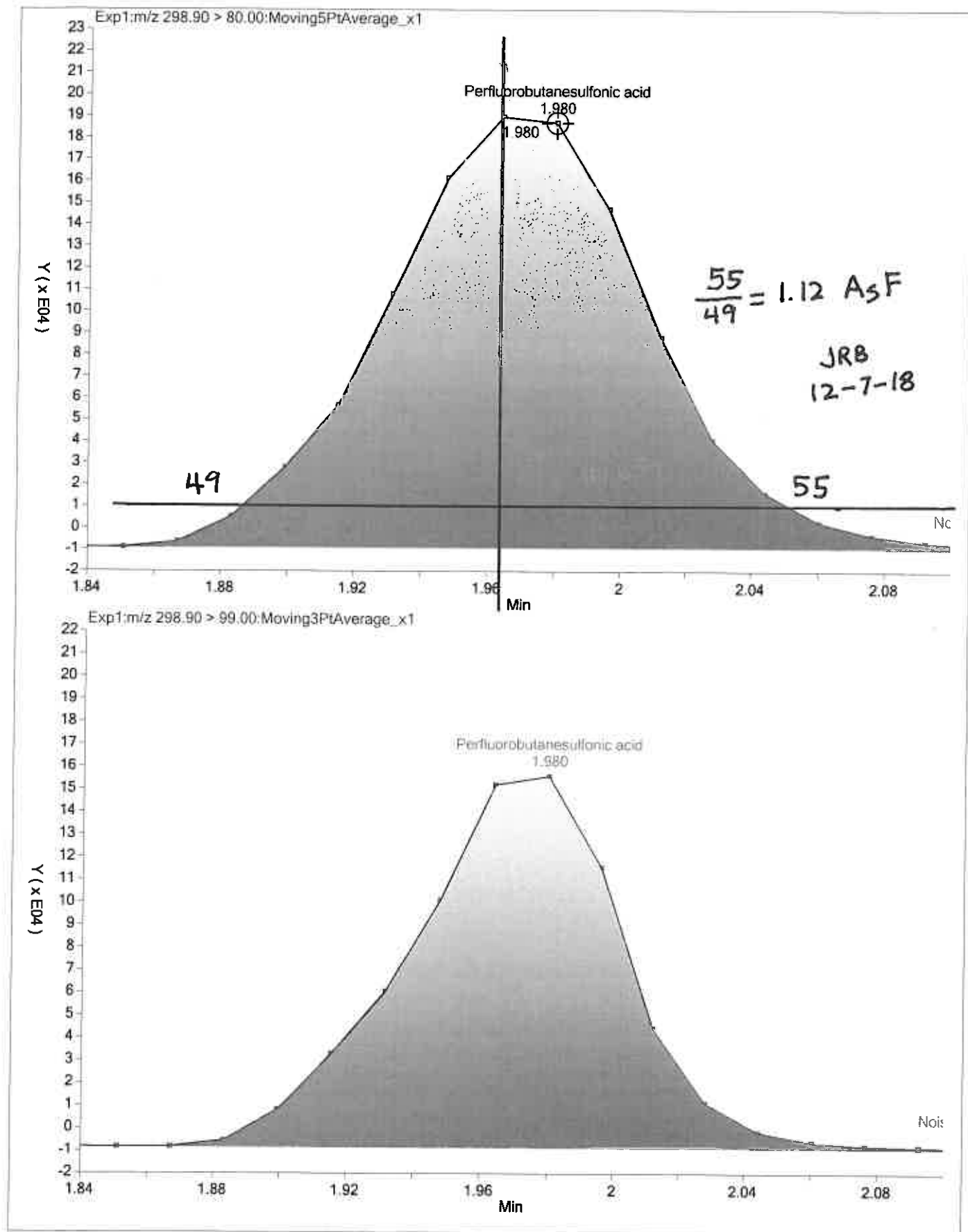
Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

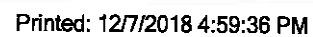
Calibration Start Date: 12/07/2018 15:06 Calibration End Date: 12/07/2018 15:50 Calibration ID: 42659

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-263818/2	2018.12.07_537ICAL_003.d
Level 2	IC 320-263818/3	2018.12.07_537ICAL_004.d
Level 3	IC 320-263818/4	2018.12.07_537ICAL_005.d
Level 4	IC 320-263818/5	2018.12.07_537ICAL_006.d
Level 5	IC 320-263818/6	2018.12.07_537ICAL_007.d
Level 6	IC 320-263818/7	2018.12.07_537ICAL_008.d
Level 7	IC 320-263818/8	2018.12.07_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)	-2.0 0.8	7.8	-6.6	-0.4	-4.8	5.0	50 30	30	30	30	30	30
Perfluoroheptanoic acid (PFHpA)	15.0 -0.7	0.6	-2.7	-4.0	-8.3	0.1	50 30	30	30	30	30	30
Perfluorohexanesulfonic acid (PFHxS)	-3.7 0.9	1.3	-6.1	3.7	-3.2	7.1	50 30	30	30	30	30	30
Perfluorooctanoic acid (PFOA)	15.1 -3.8	0.2	-0.6	-1.7	-9.4	0.1	50 30	30	30	30	30	30
Perfluorooctanesulfonic acid (PFOS)	15.6 -1.8	1.1	-8.0	-1.7	-3.5	-1.8	50 30	30	30	30	30	30
Perfluorononanoic acid (PFNA)	6.6 -0.6	1.0	-2.4	0.2	-3.7	-1.0	50 30	30	30	30	30	30
13C2 PFHxA	-0.1 4.5	4.3	-1.9	0.6	-8.8	1.4	30 30	30	30	30	30	30
13C2 PFDA	-0.3 -0.3	1.6	-1.9	2.1	-2.8	1.5	30 30	30	30	30	30	30





FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-263818/10 Calibration Date: 12/07/2018 16:05
 Instrument ID: A8_N Calib Start Date: 12/07/2018 15:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 12/07/2018 15:50
 Lab File ID: 2018.12.07_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	1.121	1.084		9.00	0.0442	-3.3	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.065	1.081		1.00	0.0500	1.5	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.476	1.539		3.00	0.0455	4.2	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.089	1.107		2.00	0.0501	1.6	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8314	0.8012		5.00	0.0500	-3.6	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.102	1.251		4.00	0.0464	13.5	50.0
13C2 PFHxA	Ave	0.9547	0.9343		2.45	2.50	-2.1	30.0
13C2 PFDA	Ave	0.7184	0.6646		2.31	2.50	-7.5	30.0
d5-NEtFOSAA	Ave	1.065	1.074		2.52	2.50	0.8	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Lab Sample ID: ICV 320-263818/12 Calibration Date: 12/07/2018 16:20
 Instrument ID: A8_N Calib Start Date: 12/07/2018 15:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 12/07/2018 15:50
 Lab File ID: 2018.12.07_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	1.121	1.102		9.00	1.77	-1.7	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.065	1.021		1.92	2.00	-4.1	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.476	1.548		1.91	1.82	4.9	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.089	1.035		1.90	2.00	-4.9	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.102	1.058		1.78	1.85	-4.0	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8314	0.7865		5.00	2.00	-5.4	30.0
13C2 PFHxA	Ave	0.9547	0.9303		2.44	2.50	-2.6	30.0
13C2 PFDA	Ave	0.7184	0.6774		2.36	2.50	-5.7	30.0
d5-NEtFOSAA	Ave	1.065	1.097		2.57	2.50	2.9	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-268087/1 Calibration Date: 12/29/2018 03:20
 Instrument ID: A8_N Calib Start Date: 12/07/2018 15:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 12/07/2018 15:50
 Lab File ID: 2018.12.28_537A_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	1.121	1.152		9.00	0.0442	2.8	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.065	1.131		1.00	0.0500	6.3	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.476	1.516		3.00	0.0455	2.7	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.089	1.236		2.00	0.0501	13.5	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.102	1.172		4.00	0.0464	6.3	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8314	0.8712		5.00	0.0500	4.8	50.0
13C2 PFHxA	Ave	0.9547	0.9822		2.57	2.50	2.9	30.0
13C2 PFDA	Ave	0.7184	0.7371		2.57	2.50	2.6	30.0
d5-NEtFOSAA	Ave	1.065	1.076		2.53	2.50	1.0	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Lab Sample ID: CCV 320-268089/14 Calibration Date: 12/29/2018 04:57
 Instrument ID: A8_N Calib Start Date: 12/07/2018 15:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 12/07/2018 15:50
 Lab File ID: 2018.12.28_537A_017.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.121	1.231		4.85	4.42	9.8	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.065	1.060		4.98	5.00	-0.5	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.476	1.630		5.03	4.55	10.4	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.089	1.053		4.84	5.01	-3.3	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8314	0.8051		4.84	5.00	-3.2	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.102	1.087		4.58	4.64	-1.4	30.0
13C2 PFHxA	Ave	0.9547	0.9501		2.49	2.50	-0.5	30.0
13C2 PFDA	Ave	0.7184	0.7518		2.62	2.50	4.6	30.0
d5-NEtFOSAA	Ave	1.065	1.042		2.45	2.50	-2.2	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Lab Sample ID: CCV 320-268089/23 Calibration Date: 12/29/2018 06:04
 Instrument ID: A8_N Calib Start Date: 12/07/2018 15:06
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 12/07/2018 15:50
 Lab File ID: 2018.12.28_537A_026.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.121	1.178		9.00	0.884	5.1	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.065	1.030		0.968	1.00	-3.2	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.476	1.580		3.00	0.910	7.0	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.089	1.015		0.933	1.00	-6.8	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8314	0.8291		5.00	1.00	-0.3	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.102	1.083		4.00	0.928	-1.8	30.0
13C2 PFHxA	Ave	0.9547	0.9805		2.57	2.50	2.7	30.0
13C2 PFDA	Ave	0.7184	0.7381		2.57	2.50	2.7	30.0
d5-NEtFOSAA	Ave	1.065	1.088		2.55	2.50	2.1	30.0

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1

SDG No.: _____

Instrument ID: A8_N Start Date: 12/07/2018 15:06

Analysis Batch Number: 263818 End Date: 12/07/2018 16:20

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-263818/2		12/07/2018 15:06	1	2018.12.07_537I CAL 003.d	GeminiC18 3x100 3(mm)
IC 320-263818/3		12/07/2018 15:13	1	2018.12.07_537I CAL 004.d	GeminiC18 3x100 3(mm)
IC 320-263818/4		12/07/2018 15:21	1	2018.12.07_537I CAL 005.d	GeminiC18 3x100 3(mm)
IC 320-263818/5 ICISAV		12/07/2018 15:28	1	2018.12.07_537I CAL 006.d	GeminiC18 3x100 3(mm)
IC 320-263818/6		12/07/2018 15:36	1	2018.12.07_537I CAL 007.d	GeminiC18 3x100 3(mm)
IC 320-263818/7		12/07/2018 15:43	1	2018.12.07_537I CAL 008.d	GeminiC18 3x100 3(mm)
IC 320-263818/8		12/07/2018 15:50	1	2018.12.07_537I CAL 009.d	GeminiC18 3x100 3(mm)
CCVL 320-263818/10		12/07/2018 16:05	1	2018.12.07_537I CAL 011.d	GeminiC18 3x100 3(mm)
ICB 320-263818/11		12/07/2018 16:13	1		GeminiC18 3x100 3(mm)
ICV 320-263818/12		12/07/2018 16:20	1	2018.12.07_537I CAL 013.d	GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica SacramentoJob No.: 320-46387-1

SDG No.: _____

Instrument ID: A8_NStart Date: 12/29/2018 03:20Analysis Batch Number: 268087End Date: 12/29/2018 04:57

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCVL 320-268087/1		12/29/2018 03:20	1	2018.12.28_537A 004.d	GeminiC18 3x100 3(mm)
CCV 320-268087/2 CCVIS		12/29/2018 03:28	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 03:35	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 03:43	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 03:50	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 03:58	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 04:05	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 04:13	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 04:20	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 04:28	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 04:35	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 04:43	1		GeminiC18 3x100 3(mm)
ZZZZZ		12/29/2018 04:50	1		GeminiC18 3x100 3(mm)
CCV 320-268087/14 CCVIS		12/29/2018 04:57	1		GeminiC18 3x100 3(mm)

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1
 SDG No.: _____
 Instrument ID: A8_N Start Date: 12/29/2018 04:57
 Analysis Batch Number: 268089 End Date: 12/29/2018 06:04

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-268089/14 CCVIS		12/29/2018 04:57	1	2018.12.28_537A 017.d	GeminiC18 3x100 3(mm)
MB 320-267871/1-A		12/29/2018 05:12	1	2018.12.28_537A 019.d	GeminiC18 3x100 3(mm)
LCS 320-267871/2-A		12/29/2018 05:20	1	2018.12.28_537A 020.d	GeminiC18 3x100 3(mm)
LCSD 320-267871/3-A		12/29/2018 05:27	1	2018.12.28_537A 021.d	GeminiC18 3x100 3(mm)
320-46387-1		12/29/2018 05:35	1	2018.12.28_537A 022.d	GeminiC18 3x100 3(mm)
320-46387-2		12/29/2018 05:42	1	2018.12.28_537A 023.d	GeminiC18 3x100 3(mm)
320-46387-3		12/29/2018 05:50	1	2018.12.28_537A 024.d	GeminiC18 3x100 3(mm)
320-46387-4		12/29/2018 05:57	1	2018.12.28_537A 025.d	GeminiC18 3x100 3(mm)
CCV 320-268089/23 CCVIS		12/29/2018 06:04	1	2018.12.28_537A 026.d	GeminiC18 3x100 3(mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-46387-1

SDG No.: _____

Batch Number: 267871 Batch Start Date: 12/28/18 07:07 Batch Analyst: Vang, Mai YeeBatch Method: 537 Batch End Date: 12/28/18 14:30

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	ReceivedpH	LC537-IS 00091
MB 320-267871/1		537, 537				250.00 mL	10.00 mL	7 SU	500 uL
LCS 320-267871/2		537, 537				250.00 mL	10.00 mL	7 SU	500 uL
LCSD 320-267871/3		537, 537				250.00 mL	10.00 mL	7 SU	500 uL
320-46387-A-1	WGNA-121818-RW-0443	537, 537	T	293.47 g	28.19 g	265.3 mL	10.00 mL	7 SU	500 uL
320-46387-B-2	WGNA-121818-FRB-0443	537, 537	T	310.25 g	27.82 g	282.4 mL	10.00 mL	7 SU	500 uL
320-46387-A-3	NAWC-121918-RW-361	537, 537	T	315.41 g	28.88 g	286.5 mL	10.00 mL	7 SU	500 uL
320-46387-A-4	NAWC-121918-FRB-361	537, 537	T	303.50 g	28.04 g	275.5 mL	10.00 mL	7 SU	500 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-SU 00091	LC537HSP 00001	AnalysisComment			
MB 320-267871/1		537, 537		500 uL		Chlorine ND.			
LCS 320-267871/2		537, 537		500 uL	500 uL	Chlorine ND.			
LCSD 320-267871/3		537, 537		500 uL	500 uL	Chlorine ND.			
320-46387-A-1	WGNA-121818-RW-0443	537, 537	T	500 uL		Chlorine ND.			
320-46387-B-2	WGNA-121818-FRB-0443	537, 537	T	500 uL		Chlorine ND.			
320-46387-A-3	NAWC-121918-RW-361	537, 537	T	500 uL		Chlorine ND.			
320-46387-A-4	NAWC-121918-FRB-361	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.: 320-46387-1

SDG No.: _____

Batch Number: 267871 Batch Start Date: 12/28/18 07:07 Batch Analyst: Vang, Mai YeeBatch Method: 537 Batch End Date: 12/28/18 14:30

Batch Notes	
Analyst ID - Aliquot Step	MYV
Batch Comment	TA labels match client IDs MYV: 12/28/2018.
Analyst ID - Final Volume Step	MYV
Internal Standard ID#	1451881
Manifold ID	Y
Methanol ID	147594
pH Indicator ID	3718
Pipette ID	N32761F
Analyst ID - IS Reagent Drop	MYV
Analyst ID - IS Reagent Drop Witness	MNV
Analyst ID - SU Reagent Drop	MYV
Analyst ID - SU Reagent Drop Witness	MNV
Analyst ID - TA Reagent Drop	MYV
Analyst ID - TA Reagent Drop Witness	MNV
SPE Cartridge Lot ID	6413968-09
Trizma ID	SLBR5241V
Reagent Water ID	12/28/18

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

12/7/2018

PFOA

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	Reported RRF
0.025	44364	3534903	2.5	1.25503	1.2538
0.0501	81675	3736172	2.5	1.09085	1.0919
0.25	382620	3530447	2.5	1.08377	1.0827
1	1461416	3407730	2.5	1.07213	1.0711
2.5	3684632	3730120	2.5	0.98781	0.9868
5.01	7357085	3370676	2.5	1.08916	1.0902
10	14227009	3389257	2.5	1.04942	1.0484
Average				1.08974	1.0893
Standard Deviation				0.0813	
RSD				0.0746	
%RSD				7.46290	7.5

Continuing Calibration
PFOA

12/29/2018 @ 04:57

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	%D	Reported RRF	Reported %D
5.01	7652220	3629466	2.5	1.0521	-3.417266	1.053	-3.3

Sample Identification
Compound

WGNA-121818-RW-0443
PFOA

Compound Area	760364	Average RRF	1.0893
Internal Standard Amount (ng)	2.5	Sample Volume(ml)	265.3
Dilution Factor	1	Volume Extract (ml)	10
Internal Standard Area	3921741		

Concentration
Reported Result

16.7725 ng/L
16.8 ng/L

Surrogate PFHxA

Compound Area	3699679		
Internal Standard Amount (ng)	10		
Dilution Factor	1	Volume Extract (ml)	1
Internal Standard Area	3921741	Injection Volume (µl)	1
Average RRF	0.9547		
Concentration	9.8814		
Surrogate %R	98.81	Spike amount	10

LCS/LCSD %R

320-267871/2-A PFOA 96.30	Spike amount 200	LCS concentration 192.6
320-267871/3-A PFOA 97.60	Spike amount 200	LCS concentration 195.2
RPD	1.34	

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\chromna\Sacramento\ChromData\A8_N\20181228-69872.b\2018.12.28_537A_022.d
 Lims ID: 320-46387-A-1-A
 Client ID: WGNA-121818-RW-0443
 Sample Type: Client
 Inject. Date: 29-Dec-2018 05:35:08 ALS Bottle#: 14 Worklist Smp#: 19
 Injection Vol: 14.0 ul Dil. Factor: 1.0000
 Sample Info: 320-46387-a-1-a
 Misc. Info.: Plate: 1 Rack: 2
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Method: \\chromna\Sacramento\ChromData\A8_N\20181228-69872.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 31-Dec-2018 15:08:31 Calib Date: 07-Dec-2018 15:50:53
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last ICal File: \\chromna\Sacramento\ChromData\A8_N\20181207-68811.b\2018.12.07_537ICAL_009.d
 Column 1 : Det: EXP1
 Process Host: CTX0316

First Level Reviewer: barnettj Date: 31-Dec-2018 15:06:12
 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	1.964	1.964	0.0	1.000	647624	0.4646	Target=1.52	582	
298.90 > 99.00	1.964	1.964	0.0	1.000	451243		1.44(0.00-0.00)	643	
13 Perfluorohexanoic acid									
313.00 > 269.00	2.318	2.318	0.0	0.731	341945	0.2610	Target=10.04	74.1	
313.00 > 119.00	2.318	2.318	0.0	0.731	31143		10.98(0.00-0.00)	75.7	
\$ 2 13C2 PFHxA									
315.00 > 270.00	2.334	2.318	0.016	1.000	3699679	2.47		7582	
4 Perfluoroheptanoic acid									
363.00 > 319.00	2.753	2.752	0.001	1.000	306787	0.1837	Target=2.50	39.3	
363.00 > 169.00	2.753	2.752	0.001	1.000	112105		2.74(0.00-0.00)	163	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	2.769	2.752	0.017	1.000	242223	0.1320	Target=2.91	140	M
399.00 > 99.00	2.769	2.752	0.017	1.000	74558		3.25(0.00-0.00)	73.4	M
* 5 13C2 PFOA									
415.00 > 370.00	3.171	3.171	0.0		3921741	2.50		9127	
6 Perfluorooctanoic acid									
413.00 > 369.00	3.171	3.171	0.0	1.000	760364	0.4450	Target=1.80	70.1	M
413.00 > 169.00	3.171	3.171	0.0	1.000	435473		1.75(0.00-0.00)	365	M
* 7 13C4 PFOS									
503.00 > 80.00	3.558	3.557	0.001		2972356	2.39		4467	
9 Perfluorononanoic acid									
463.00 > 419.00	3.558	3.557	0.001	1.000	70442	0.0540	Target=3.74	14.2	
463.00 > 169.00	3.558	3.557	0.001	1.000	17482		4.03(0.00-0.00)	64.3	
8 Perfluorooctanesulfonic acid									
499.00 > 80.00	3.558	3.573	-0.015	1.000	606713	0.4426	Target=4.83	402	
499.00 > 99.00	3.558	3.573	-0.015	1.000	106704		5.69(0.00-0.00)	181	

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