



**Off-Base Drinking Water Sample Results,
Combined Level 2 and Level 4 Laboratory Report,
Electronic Data Deliverable, Data Validation Report,
and the Sample Location Figure, SDG 320-37566-1**

*Naval Air Warfare Center Warminster
Warminster, Pennsylvania*

August 2019

N62269_001212
WARMINSTER_NAWC
SSIC 5000-33c

**LABORATORY DATA PACKAGE, 320-37566-1, NAS WILLOW GROVE NAWC
WARMINSTER PA**

04/13/2018
TESTAMERICA LABORATORIES INC

Approved for public release: distribution unlimited.

ANALYTICAL REPORT

Job Number: 320-37566-1

Job Description: Warminster: PFAS, NAS JRB Willow Grove

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



Approved for release.
David R Alltucker
Project Manager I
4/13/2018 9:49 AM

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04/13/2018

"NAWC-032718-RW-091","537","RES","320-37566-1","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","17","ng/L","J M","7.0","DL","","TRG","","","41","LOQ","YES","-99","","242.5","1.00","16",""
"NAWC-032718-RW-091","537","RES","320-37566-1","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","22","ng/L","","2.9","DL","","TRG","","","21","LOQ","YES","-99","","242.5","1.00","8.2",""
"NAWC-032718-RW-091","537","RES","320-37566-1","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","6.0","ng/L","J","5.7","DL","","TRG","","","31","LOQ","YES","-99","","242.5","1.00","12",""
"NAWC-032718-RW-091","537","RES","320-37566-1","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","37","ng/L","U","17","DL","","TRG","","","93","LOQ","YES","-99","","242.5","1.00","37",""
"NAWC-032718-RW-091","537","RES","320-37566-1","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","8.5","ng/L","J","2.0","DL","","TRG","","","10","LOQ","YES","-99","","242.5","1.00","4.1",""
"NAWC-032718-RW-091","537","RES","320-37566-1","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","21","ng/L","U","8.2","DL","","TRG","","","25","LOQ","YES","-99","","242.5","1.00","21",""
"NAWC-032718-RW-091","537","RES","320-37566-1","TALSAC","STL00993","13C2 PFHxA","42","ng/L","","-99","DL","","SURRE","102","","-99","LOQ","YES","41.2","","242.5","1.00","0",""
"NAWC-032718-RW-091","537","RES","320-37566-1","TALSAC","STL00996","13C2 PFDA","40","ng/L","","-99","DL","","SURRE","97","","-99","LOQ","YES","41.2","","242.5","1.00","0",""
"NAWC-032718-FRB-091","537","RES","320-37566-2","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","16","ng/L","U","6.6","DL","","TRG","","","39","LOQ","YES","-99","","256.2","1.00","16",""
"NAWC-032718-FRB-091","537","RES","320-37566-2","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","7.8","ng/L","U","2.7","DL","","TRG","","","20","LOQ","YES","-99","","256.2","1.00","7.8",""
"NAWC-032718-FRB-091","537","RES","320-37566-2","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","12","ng/L","U","5.4","DL","","TRG","","","29","LOQ","YES","-99","","256.2","1.00","12",""
"NAWC-032718-FRB-091","537","RES","320-37566-2","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","35","ng/L","U","16","DL","","TRG","","","88","LOQ","YES","-99","","256.2","1.00","35",""
"NAWC-032718-FRB-091","537","RES","320-37566-2","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","3.9","ng/L","U","1.9","DL","","TRG","","","9.8","LOQ","YES","-99","","256.2","1.00","3.9",""
"NAWC-032718-FRB-091","537","RES","320-37566-2","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","20","ng/L","U","7.8","DL","","TRG","","","23","LOQ","YES","-99","","256.2","1.00","20",""
"NAWC-032718-FRB-091","537","RES","320-37566-2","TALSAC","STL00993","13C2 PFHxA","36","ng/L","","-99","DL","","SURRE","91","","-99","LOQ","YES","39.0","","256.2","1.00","0",""
"NAWC-032718-FRB-091","537","RES","320-37566-2","TALSAC","STL00996","13C2 PFDA","37","ng/L","","-99","DL","","SURRE","96","","-99","LOQ","YES","39.0","","256.2","1.00","0",""
"NAWC-032718-RW-029","537","RES","320-37566-3","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","21","ng/L","J M","6.8","DL","","TRG","","","40","LOQ","YES","-99","","248.2","1.00","16",""
"NAWC-032718-RW-029","537","RES","320-37566-3","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","19","ng/L","J","2.8","DL","","TRG","","","20","LOQ","YES","-99","","248.2","1.00","8.1",""
"NAWC-032718-RW-029","537","RES","320-37566-3","TALSAC","355-46-4","Perfluorohexanesulfonic acid (PFHxS)","6.7","ng/L","J","5.5","DL","","TRG","","","30","LOQ","YES","-99","","248.2","1.00","12",""
"NAWC-032718-RW-029","537","RES","320-37566-3","TALSAC","375-73-5","Perfluorobutanesulfonic acid (PFBS)","36","ng/L","U","16","DL","","TRG","","","91","LOQ","YES","-99","","248.2","1.00","36",""
"NAWC-032718-RW-029","537","RES","320-37566-3","TALSAC","375-85-9","Perfluoroheptanoic acid (PFHpA)","5.7","ng/L","J","1.9","DL","","TRG","","","10","LOQ","YES","-99","","248.2","1.00","4.0",""
"NAWC-032718-RW-029","537","RES","320-37566-3","TALSAC","375-95-1","Perfluorononanoic acid (PFNA)","20","ng/L","U","8.1","DL","","TRG","","","24","LOQ","YES","-99","","248.2","1.00","20",""
"NAWC-032718-RW-029","537","RES","320-37566-3","TALSAC","STL00993","13C2 PFHxA","39","ng/L","","-99","DL","","SURRE","96","","-99","LOQ","YES","40.3","","248.2","1.00","0",""
"NAWC-032718-RW-029","537","RES","320-37566-3","TALSAC","STL00996","13C2 PFDA","40","ng/L","","-99","DL","","SURRE","100","","-99","LOQ","YES","40.3","","248.2","1.00","0",""
"NAWC-032718-FRB-029","537","RES","320-37566-4","TALSAC","1763-23-1","Perfluorooctanesulfonic acid (PFOS)","15","ng/L","U","6.5","DL","","TRG","","","38","LOQ","YES","-99","","260.9","1.00","15",""
"NAWC-032718-FRB-029","537","RES","320-37566-4","TALSAC","335-67-1","Perfluorooctanoic acid (PFOA)","7.7","ng/L","U","2.7","DL","","TRG","","","19","LOQ","YES","-99","","260.9","1.00","7.7",""
"NAWC-032718-FRB-029","537","RES","320-37566-4","TALSAC","355-46-4","Perfluorohexanesulfonic acid

(PFHxS),"11","ng/L","U","5.3","DL","","TRG","","","29","LOQ","YES",-99","","260.9","1.00","11","","
"NAWC-032718-FRB-029","537","RES","320-37566-4","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS),"34","ng/L","U","15","DL","","TRG","","","86","LOQ","YES",-99","","260.9","1.00","34","","
"NAWC-032718-FRB-029","537","RES","320-37566-4","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA),"3.8","ng/L","U","1.8","DL","","TRG","","","9.6","LOQ","YES",-99","","260.9","1.00","3.8","","
"NAWC-032718-FRB-029","537","RES","320-37566-4","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA),"19","ng/L","U","7.7","DL","","TRG","","","23","LOQ","YES",-99","","260.9","1.00","19","","
"NAWC-032718-FRB-029","537","RES","320-37566-4","TALSAC","STL00993","13C2
PFHxA),"36","ng/L","","-99","DL","","SURRE","94","","-99","LOQ","YES","38.3","","260.9","1.00","0","","
"NAWC-032718-FRB-029","537","RES","320-37566-4","TALSAC","STL00996","13C2
PFDA),"35","ng/L","","-99","DL","","SURRE","92","","-99","LOQ","YES","38.3","","260.9","1.00","0","","
"WGNA-032718-DUP030","537","RES","320-37566-5","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS),"18","ng/L","J M","6.5","DL","","TRG","","","38","LOQ","YES",-99","","260.3","1.00","15","","
"WGNA-032718-DUP030","537","RES","320-37566-5","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA),"17","ng/L","J","2.7","DL","","TRG","","","19","LOQ","YES",-99","","260.3","1.00","7.7","","
"WGNA-032718-DUP030","537","RES","320-37566-5","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS),"6.0","ng/L","J","5.3","DL","","TRG","","","29","LOQ","YES",-99","","260.3","1.00","12","","
"WGNA-032718-DUP030","537","RES","320-37566-5","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS),"35","ng/L","U","15","DL","","TRG","","","86","LOQ","YES",-99","","260.3","1.00","35","","
"WGNA-032718-DUP030","537","RES","320-37566-5","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA),"5.2","ng/L","J","1.8","DL","","TRG","","","9.6","LOQ","YES",-99","","260.3","1.00","3.8","","
"WGNA-032718-DUP030","537","RES","320-37566-5","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA),"19","ng/L","U","7.7","DL","","TRG","","","23","LOQ","YES",-99","","260.3","1.00","19","","
"WGNA-032718-DUP030","537","RES","320-37566-5","TALSAC","STL00993","13C2
PFHxA),"33","ng/L","","-99","DL","","SURRE","87","","-99","LOQ","YES","38.4","","260.3","1.00","0","","
"WGNA-032718-DUP030","537","RES","320-37566-5","TALSAC","STL00996","13C2
PFDA),"35","ng/L","","-99","DL","","SURRE","91","","-99","LOQ","YES","38.4","","260.3","1.00","0","","
"NAWC-032718-RW-094","537","RES","320-37566-6","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS),"21","ng/L","J M","6.8","DL","","TRG","","","40","LOQ","YES",-99","","251.8","1.00","16","","
"NAWC-032718-RW-094","537","RES","320-37566-6","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA),"13","ng/L","J","2.8","DL","","TRG","","","20","LOQ","YES",-99","","251.8","1.00","7.9","","
"NAWC-032718-RW-094","537","RES","320-37566-6","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS),"17","ng/L","J","5.5","DL","","TRG","","","30","LOQ","YES",-99","","251.8","1.00","12","","
"NAWC-032718-RW-094","537","RES","320-37566-6","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS),"36","ng/L","U","16","DL","","TRG","","","89","LOQ","YES",-99","","251.8","1.00","36","","
"NAWC-032718-RW-094","537","RES","320-37566-6","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA),"4.4","ng/L","J","1.9","DL","","TRG","","","9.9","LOQ","YES",-99","","251.8","1.00","4.0","","
"NAWC-032718-RW-094","537","RES","320-37566-6","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA),"20","ng/L","U","7.9","DL","","TRG","","","24","LOQ","YES",-99","","251.8","1.00","20","","
"NAWC-032718-RW-094","537","RES","320-37566-6","TALSAC","STL00993","13C2
PFHxA),"33","ng/L","","-99","DL","","SURRE","83","","-99","LOQ","YES","39.7","","251.8","1.00","0","","
"NAWC-032718-RW-094","537","RES","320-37566-6","TALSAC","STL00996","13C2
PFDA),"35","ng/L","","-99","DL","","SURRE","87","","-99","LOQ","YES","39.7","","251.8","1.00","0","","
"NAWC-032718-FRB-094","537","RES","320-37566-7","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS),"16","ng/L","U","6.6","DL","","TRG","","","39","LOQ","YES",-99","","257.1","1.00","16","","
"NAWC-032718-FRB-094","537","RES","320-37566-7","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA),"7.8","ng/L","U","2.7","DL","","TRG","","","19","LOQ","YES",-99","","257.1","1.00","7.8","","
"NAWC-032718-FRB-094","537","RES","320-37566-7","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS),"12","ng/L","U","5.3","DL","","TRG","","","29","LOQ","YES",-99","","257.1","1.00","12","","
"NAWC-032718-FRB-094","537","RES","320-37566-7","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS),"35","ng/L","U","16","DL","","TRG","","","88","LOQ","YES",-99","","257.1","1.00","35","","
"NAWC-032718-FRB-094","537","RES","320-37566-7","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA),"3.9","ng/L","U","1.8","DL","","TRG","","","9.7","LOQ","YES",-99","","257.1","1.00","3.9","","
"NAWC-032718-FRB-094","537","RES","320-37566-7","TALSAC","375-95-1","Perfluorononanoic acid

(PFNA),"19","ng/L","U","7.8","DL","","","TRG","","","23","LOQ","YES","-99","","","257.1","1.00","19","","
"NAWC-032718-FRB-094","537","RES","320-37566-7","TALSAC","STL00993","13C2
PFHxA","37","ng/L","","","-99","DL","","","SURRE","95","","","-99","LOQ","YES","38.9","","","257.1","1.00","0","","
"NAWC-032718-FRB-094","537","RES","320-37566-7","TALSAC","STL00996","13C2
PFDA","36","ng/L","","","-99","DL","","","SURRE","93","","","-99","LOQ","YES","38.9","","","257.1","1.00","0","","
"LLCS 320-216794/2-A","537","RES","LLCS 320-216794/2-A","TALSAC","1763-23-1","Perfluorooctanesulfonic
acid (PFOS)","36.8","ng/L","J M","6.8","DL","","","SPK","91","","","40","LOQ","YES","40.2","","","250","1.00","16","","
"LLCS 320-216794/2-A","537","RES","LLCS 320-216794/2-A","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","18.1","ng/L","J","2.8","DL","","","SPK","90","","","20","LOQ","YES","20.0","","","250","1.00","8.0","","
"LLCS 320-216794/2-A","537","RES","LLCS 320-216794/2-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","27.9","ng/L","J","5.5","DL","","","SPK","92","","","30","LOQ","YES","30.3","","","250","1.00","12","","
"LLCS 320-216794/2-A","537","RES","LLCS 320-216794/2-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","81.0","ng/L","J","16","DL","","","SPK","90","","","90","LOQ","YES","90.2","","","250","1.00","36","","
"LLCS 320-216794/2-A","537","RES","LLCS 320-216794/2-A","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","8.90","ng/L","J","1.9","DL","","","SPK","89","","","10","LOQ","YES","10.0","","","250","1.00","4.0","","
"LLCS 320-216794/2-A","537","RES","LLCS 320-216794/2-A","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","16.7","ng/L","J","8.0","DL","","","SPK","84","","","24","LOQ","YES","20.0","","","250","1.00","20","","
"LLCS 320-216794/2-A","537","RES","LLCS 320-216794/2-A","TALSAC","STL00993","13C2
PFHxA","36.3","ng/L","","","-99","DL","","","SURRE","91","","","-99","LOQ","YES","40.0","","","250","1.00","0","","
"LLCS 320-216794/2-A","537","RES","LLCS 320-216794/2-A","TALSAC","STL00996","13C2
PFDA","35.6","ng/L","","","-99","DL","","","SURRE","89","","","-99","LOQ","YES","40.0","","","250","1.00","0","","
"LLCSD 320-216794/3-A","537","RES","LLCSD 320-216794/3-A","TALSAC","1763-23-1","Perfluorooctanesulfonic
acid (PFOS)","35.3","ng/L","J M","6.8","DL","","","SPK","88","4","40","LOQ","YES","40.2","LLCS 320-216794/2-
A","250","1.00","16","","
"LLCSD 320-216794/3-A","537","RES","LLCSD 320-216794/3-A","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","18.1","ng/L","J","2.8","DL","","","SPK","90","0","20","LOQ","YES","20.0","LLCS 320-216794/2-
A","250","1.00","8.0","","
"LLCSD 320-216794/3-A","537","RES","LLCSD 320-216794/3-A","TALSAC","355-46-4","Perfluorohexanesulfonic
acid (PFHxS)","28.5","ng/L","J","5.5","DL","","","SPK","94","2","30","LOQ","YES","30.3","LLCS 320-216794/2-
A","250","1.00","12","","
"LLCSD 320-216794/3-A","537","RES","LLCSD 320-216794/3-A","TALSAC","375-73-5","Perfluorobutanesulfonic
acid (PFBS)","81.3","ng/L","J","16","DL","","","SPK","90","0.4","90","LOQ","YES","90.2","LLCS 320-216794/2-
A","250","1.00","36","","
"LLCSD 320-216794/3-A","537","RES","LLCSD 320-216794/3-A","TALSAC","375-85-9","Perfluoroheptanoic acid
(PFHpA)","9.28","ng/L","J","1.9","DL","","","SPK","93","4","10","LOQ","YES","10.0","LLCS 320-216794/2-
A","250","1.00","4.0","","
"LLCSD 320-216794/3-A","537","RES","LLCSD 320-216794/3-A","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","16.5","ng/L","J","8.0","DL","","","SPK","83","1","24","LOQ","YES","20.0","LLCS 320-216794/2-
A","250","1.00","20","","
"LLCSD 320-216794/3-A","537","RES","LLCSD 320-216794/3-A","TALSAC","STL00993","13C2
PFHxA","37.4","ng/L","","","-99","DL","","","SURRE","93","3","-99","LOQ","YES","40.0","LLCS 320-216794/2-
A","250","1.00","0","","
"LLCSD 320-216794/3-A","537","RES","LLCSD 320-216794/3-A","TALSAC","STL00996","13C2
PFDA","37.4","ng/L","","","-99","DL","","","SURRE","94","5","-99","LOQ","YES","40.0","LLCS 320-216794/2-
A","250","1.00","0","","
"MB 320-216794/1-A","537","RES","MB 320-216794/1-A","TALSAC","1763-23-1","Perfluorooctanesulfonic acid
(PFOS)","16","ng/L","U","6.8","DL","","","TRG","","","40","LOQ","YES","-99","","","250","1.00","16","","
"MB 320-216794/1-A","537","RES","MB 320-216794/1-A","TALSAC","335-67-1","Perfluorooctanoic acid
(PFOA)","8.0","ng/L","U","2.8","DL","","","TRG","","","20","LOQ","YES","-99","","","250","1.00","8.0","","
"MB 320-216794/1-A","537","RES","MB 320-216794/1-A","TALSAC","355-46-4","Perfluorohexanesulfonic acid
(PFHxS)","12","ng/L","U","5.5","DL","","","TRG","","","30","LOQ","YES","-99","","","250","1.00","12","","
"MB 320-216794/1-A","537","RES","MB 320-216794/1-A","TALSAC","375-73-5","Perfluorobutanesulfonic acid
(PFBS)","36","ng/L","U","16","DL","","","TRG","","","90","LOQ","YES","-99","","","250","1.00","36","","
"MB 320-216794/1-A","537","RES","MB 320-216794/1-A","TALSAC","375-85-9","Perfluoroheptanoic acid

(PFHpA),"4.0","ng/L","U","1.9","DL","","","TRG","","","10","LOQ","YES","-99","","250","1.00","4.0","","
"MB 320-216794/1-A","537","RES","MB 320-216794/1-A","TALSAC","375-95-1","Perfluorononanoic acid
(PFNA)","20","ng/L","U","8.0","DL","","","TRG","","","24","LOQ","YES","-99","","250","1.00","20","","
"MB 320-216794/1-A","537","RES","MB 320-216794/1-A","TALSAC","STL00993","13C2
PFHxA","36.1","ng/L","","","-99","DL","","","SURR","90","","","-99","LOQ","YES","40.0","","250","1.00","0","","
"MB 320-216794/1-A","537","RES","MB 320-216794/1-A","TALSAC","STL00996","13C2
PFDA","37.2","ng/L","","","-99","DL","","","SURR","93","","","-99","LOQ","YES","40.0","","250","1.00","0","","
"Unknown","Unknown","NAWC-032718-RW-091","03/27/2018 09:40","AQ","320-37566-
1","NM","","","7.70","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:24","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","03/28/2018 09:20","03/29/2018 12:50","","
"Unknown","Unknown","NAWC-032718-FRB-091","03/27/2018 09:35","AQ","320-37566-
2","FB","","","7.70","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:28","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","03/28/2018 09:20","03/29/2018 12:50","","
"Unknown","Unknown","NAWC-032718-RW-029","03/27/2018 10:10","AQ","320-37566-
3","NM","","","7.70","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:33","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","03/28/2018 09:20","03/29/2018 12:50","","
"Unknown","Unknown","NAWC-032718-FRB-029","03/27/2018 10:05","AQ","320-37566-
4","FB","","","7.70","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:38","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","03/28/2018 09:20","03/29/2018 12:50","","
"Unknown","Unknown","WGNA-032718-DUP030","03/27/2018 07:00","AQ","320-37566-
5","FD","","","7.70","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:42","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","03/28/2018 09:20","03/29/2018 12:50","","
"Unknown","Unknown","NAWC-032718-RW-094","03/27/2018 10:35","AQ","320-37566-
6","NM","","","7.70","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:47","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","03/28/2018 09:20","03/29/2018 12:50","","
"Unknown","Unknown","NAWC-032718-FRB-094","03/27/2018 10:40","AQ","320-37566-
7","FB","","","7.70","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:52","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","03/28/2018 09:20","03/29/2018 12:50","","
"Unknown","Unknown","LLCS 320-216794/2-A","","","AQ","LLCS 320-216794/2-
A","LCS","","","-99","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:14","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","04/07/2018 08:29","03/29/2018 12:50","","
"Unknown","Unknown","LLCSD 320-216794/3-A","","","AQ","LLCSD 320-216794/3-
A","LCSD","","","-99","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:19","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","04/07/2018 08:29","03/29/2018 12:50","","
"Unknown","Unknown","MB 320-216794/1-A","","","AQ","MB 320-216794/1-
A","MB","","","-99","537","METHOD","RES","04/07/2018 08:29","04/12/2018
01:10","TALSAC","COA","WET","NA","1","NA","NA","","","100","320-216794","320-216794","NA","320-
217529","320-37566-1","04/07/2018 08:29","03/29/2018 12:50","","



INTERNAL CORRESPONDENCE

TO: A. FREBOWITZ **DATE:** APRIL 26, 2018

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

SUBJECT: ORGANIC DATA VALIDATION –POLYFLUOROALKYL SUBSTANCES (PFAS)
NAS JRB WILLOW GROVE
SAMPLE DELIVERY GROUP (SDG) 320-37566-1

SAMPLES:	3/Field Reagent Blank (FRB)	
	NAWC-032718-FRB-029	NAWC-032718-FRB-091
	NAWC-032718-FRB-094	
	4/Drinking Water	
	NAWC-032718-RW-029	NAWC-032718-RW-091
	NAWC-032718-RW-094	WGNA-032718-DUP030

Overview

The sample set for NAS JRB Willow Grove, SDG 320-37566-1, consisted of four (4) drinking water samples and three (3) 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). One (1) field duplicate pair, NAWC-032718-RW-029 / WGNA-032718-DUP030, was included in this SDG.

The samples were collected by Tetra Tech on March 27, 2018 and analyzed by Test America-Sacramento. All sample analyses were conducted in accordance with EPA Method 537 version 1.1 analytical and reporting protocols.

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

Major

None.

Minor

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

Notes

It was noted by the laboratory that the sample IDs on the bottles did not match the chain of custody for samples NAWC-032718-RW-091, NAWC-032718-FRB-091, NAWC-032718-RW-029 and NAWC-032718-FRB-029. The containers listed the number 032717 instead of 032718. The laboratory contacted the project manager and the laboratory used the sample IDs with the correct date.

TO: A. FREBOWITZ
SDG: 320-37566-1

PAGE 2

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

<u>Sample</u>	<u>Associated FRB</u>
NAWC-032718-RW-029	NAWC-032718-FRB-029
NAWC-032718-RW-091	NAWC-032718-FRB-091
NAWC-032718-RW-094	NAWC-032718-FRB-094
WGNA-032718-DUP030	NAWC-032718-FRB-029

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

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

Executive Summary

Laboratory Performance: None.

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

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



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



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

Attachments:

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

Data Qualifier Definitions

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

U	The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted method detection limit for sample and method.
J	The analyte was positively identified and 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.
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.

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: 320-37566-1 FRACTION: PFAS MEDIA: WATER	NSAMPLE	NAWC-032718-FRB-029			NAWC-032718-FRB-091			NAWC-032718-FRB-094			NAWC-032718-RW-029		
	LAB_ID	320-37566-4			320-37566-2			320-37566-7			320-37566-3		
	SAMP_DATE	3/27/2018			3/27/2018			3/27/2018			3/27/2018		
	QC_TYPE	FB			FB			FB			NM		
	UNITS	NG/L			NG/L			NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PENTADECAFLUOROOCTANOIC ACID		7.7	U		7.8	U		7.8	U		19	J	P
PERFLUOROBUTANESULFONIC ACID		34	U		35	U		35	U		36	U	
PERFLUOROHEPTANOIC ACID		3.8	U		3.9	U		3.9	U		5.7	J	P
PERFLUOROHEXANESULFONIC ACID		11	U		12	U		12	U		6.7	J	P
PERFLUORONONANOIC ACID		19	U		20	U		19	U		20	U	
PERFLUOROOCTANE SULFONIC ACID		15	U		16	U		16	U		21	J	P

PROJ_NO: 08005-WE04 SDG: 320-37566-1 FRACTION: PFAS MEDIA: WATER	NSAMPLE	NAWC-032718-RW-091			NAWC-032718-RW-094			WGNA-032718-DUP030		
	LAB_ID	320-37566-1			320-37566-6			320-37566-5		
	SAMP_DATE	3/27/2018			3/27/2018			3/27/2018		
	QC_TYPE	NM			NM			FD		
	UNITS	NG/L			NG/L			NG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF							NAWC-032718-RW-029		
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
PENTADECAFLUOROOCTANOIC ACID		22			13	J	P	17	J	P
PERFLUOROBUTANESULFONIC ACID		37	U		36	U		35	U	
PERFLUOROHEPTANOIC ACID		8.5	J	P	4.4	J	P	5.2	J	P
PERFLUOROHXANESULFONIC ACID		6	J	P	17	J	P	6	J	P
PERFLUORONONANOIC ACID		21	U		20	U		19	U	
PERFLUOROOCTANE SULFONIC ACID		17	J	P	21	J	P	18	J	P

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-032718-RW-091</u>	Lab Sample ID: <u>320-37566-1</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_006.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 09:40</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>242.5 (mL)</u>	Date Analyzed: <u>04/12/2018 01:24</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	17	J M	41	16	7.0
335-67-1	Perfluorooctanoic acid (PFOA)	22		21	8.2	2.9
375-95-1	Perfluorononanoic acid (PFNA)	21	U	25	21	8.2
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	6.0	J	31	12	5.7
375-85-9	Perfluoroheptanoic acid (PFHpA)	8.5	J	10	4.1	2.0
375-73-5	Perfluorobutanesulfonic acid (PFBS)	37	U	93	37	17

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	102		70-130
STL00996	13C2 PFDA	97		70-130

Wesley L. Salomon
04/20/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Client Sample ID: NAWC-032718-FRB-091 Lab Sample ID: 320-37566-2
 Matrix: Water Lab File ID: 2018.04.11_537C_007.d
 Analysis Method: 537 Date Collected: 03/27/2018 09:35
 Extraction Method: 537 Date Extracted: 04/07/2018 08:29
 Sample wt/vol: 256.2 (mL) Date Analyzed: 04/12/2018 01:28
 Con. Extract Vol.: 1.00 (mL) Dilution Factor: 1
 Injection Volume: 2 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 217529 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	39	16	6.6
335-67-1	Perfluorooctanoic acid (PFOA)	7.8	U	20	7.8	2.7
375-95-1	Perfluorononanoic acid (PFNA)	20	U	23	20	7.8
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	29	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.9	U	9.8	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	88	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	91		70-130
STL00996	13C2 PFDA	96		70-130

Ali L. Salameh
04/20/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Client Sample ID: NAWC-032718-RW-029 Lab Sample ID: 320-37566-3
 Matrix: Water Lab File ID: 2018.04.11_537C_008.d
 Analysis Method: 537 Date Collected: 03/27/2018 10:10
 Extraction Method: 537 Date Extracted: 04/07/2018 08:29
 Sample wt/vol: 248.2 (mL) Date Analyzed: 04/12/2018 01:33
 Con. Extract Vol.: 1.00 (mL) Dilution Factor: 1
 Injection Volume: 2 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 217529 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	21	J M	40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	19	J	20	8.1	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	8.1
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	6.7	J	30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	5.7	J	10	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	91	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	96		70-130
STL00996	13C2 PFDA	100		70-130

Ali L. Salameh
04/20/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Client Sample ID: NAWC-032718-FRB-029 Lab Sample ID: 320-37566-4
 Matrix: Water Lab File ID: 2018.04.11_537C_009.d
 Analysis Method: 537 Date Collected: 03/27/2018 10:05
 Extraction Method: 537 Date Extracted: 04/07/2018 08:29
 Sample wt/vol: 260.9(mL) Date Analyzed: 04/12/2018 01:38
 Con. Extract Vol.: 1.00(mL) Dilution Factor: 1
 Injection Volume: 2(uL) GC Column: GeminiC18 3x100 ID: 3(mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 217529 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	7.7	U	19	7.7	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.7
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	29	11	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.8	U	9.6	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	86	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	94		70-130
STL00996	13C2 PFDA	92		70-130

Ami L. Salaman
04/20/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-032718-DUP030</u>	Lab Sample ID: <u>320-37566-5</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_010.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 07:00</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>260.3 (mL)</u>	Date Analyzed: <u>04/12/2018 01:42</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	18	J M	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	17	J	19	7.7	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.7
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	6.0	J	29	12	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	5.2	J	9.6	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	86	35	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	87		70-130
STL00996	13C2 PFDA	91		70-130

Steve L. Salaman
04/20/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-032718-RW-094</u>	Lab Sample ID: <u>320-37566-6</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_011.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 10:35</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>251.8 (mL)</u>	Date Analyzed: <u>04/12/2018 01:47</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	21	J M	40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	13	J	20	7.9	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.9
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	17	J	30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	4.4	J	9.9	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	89	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	83		70-130
STL00996	13C2 PFDA	87		70-130

Ali L. Salem
04/20/2018

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Client Sample ID: NAWC-032718-FRB-094 Lab Sample ID: 320-37566-7
 Matrix: Water Lab File ID: 2018.04.11_537C_012.d
 Analysis Method: 537 Date Collected: 03/27/2018 10:40
 Extraction Method: 537 Date Extracted: 04/07/2018 08:29
 Sample wt/vol: 257.1 (mL) Date Analyzed: 04/12/2018 01:52
 Con. Extract Vol.: 1.00 (mL) Dilution Factor: 1
 Injection Volume: 2 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 217529 Units: ng/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	39	16	6.6
335-67-1	Perfluorooctanoic acid (PFOA)	7.8	U	19	7.8	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.8
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	29	12	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.9	U	9.7	3.9	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	88	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	95		70-130
STL00996	13C2 PFDA	93		70-130


04/20/2018

Appendix B

Results as Reported by the Laboratory

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-032718-RW-091</u>	Lab Sample ID: <u>320-37566-1</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_006.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 09:40</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>242.5 (mL)</u>	Date Analyzed: <u>04/12/2018 01:24</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	17	J M	41	16	7.0
335-67-1	Perfluorooctanoic acid (PFOA)	22		21	8.2	2.9
375-95-1	Perfluorononanoic acid (PFNA)	21	U	25	21	8.2
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	6.0	J	31	12	5.7
375-85-9	Perfluoroheptanoic acid (PFHpA)	8.5	J	10	4.1	2.0
375-73-5	Perfluorobutanesulfonic acid (PFBS)	37	U	93	37	17

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	102		70-130
STL00996	13C2 PFDA	97		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-032718-FRB-091</u>	Lab Sample ID: <u>320-37566-2</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_007.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 09:35</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>256.2 (mL)</u>	Date Analyzed: <u>04/12/2018 01:28</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	39	16	6.6
335-67-1	Perfluorooctanoic acid (PFOA)	7.8	U	20	7.8	2.7
375-95-1	Perfluorononanoic acid (PFNA)	20	U	23	20	7.8
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	29	12	5.4
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.9	U	9.8	3.9	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	88	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	91		70-130
STL00996	13C2 PFDA	96		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-032718-RW-029</u>	Lab Sample ID: <u>320-37566-3</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_008.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 10:10</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>248.2 (mL)</u>	Date Analyzed: <u>04/12/2018 01:33</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	21	J M	40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	19	J	20	8.1	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	8.1
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	6.7	J	30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	5.7	J	10	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	91	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	96		70-130
STL00996	13C2 PFDA	100		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-032718-FRB-029</u>	Lab Sample ID: <u>320-37566-4</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_009.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 10:05</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>260.9(mL)</u>	Date Analyzed: <u>04/12/2018 01:38</u>
Con. Extract Vol.: <u>1.00(mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2(uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3(mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	15	U	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	7.7	U	19	7.7	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.7
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	11	U	29	11	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.8	U	9.6	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	34	U	86	34	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	94		70-130
STL00996	13C2 PFDA	92		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>WGNA-032718-DUP030</u>	Lab Sample ID: <u>320-37566-5</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_010.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 07:00</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>260.3(mL)</u>	Date Analyzed: <u>04/12/2018 01:42</u>
Con. Extract Vol.: <u>1.00(mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2(uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3(mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	18	J M	38	15	6.5
335-67-1	Perfluorooctanoic acid (PFOA)	17	J	19	7.7	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.7
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	6.0	J	29	12	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	5.2	J	9.6	3.8	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	86	35	15

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	87		70-130
STL00996	13C2 PFDA	91		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-032718-RW-094</u>	Lab Sample ID: <u>320-37566-6</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_011.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 10:35</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>251.8 (mL)</u>	Date Analyzed: <u>04/12/2018 01:47</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	21	J M	40	16	6.8
335-67-1	Perfluorooctanoic acid (PFOA)	13	J	20	7.9	2.8
375-95-1	Perfluorononanoic acid (PFNA)	20	U	24	20	7.9
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	17	J	30	12	5.5
375-85-9	Perfluoroheptanoic acid (PFHpA)	4.4	J	9.9	4.0	1.9
375-73-5	Perfluorobutanesulfonic acid (PFBS)	36	U	89	36	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	83		70-130
STL00996	13C2 PFDA	87		70-130

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: <u>TestAmerica Sacramento</u>	Job No.: <u>320-37566-1</u>
SDG No.: _____	
Client Sample ID: <u>NAWC-032718-FRB-094</u>	Lab Sample ID: <u>320-37566-7</u>
Matrix: <u>Water</u>	Lab File ID: <u>2018.04.11_537C_012.d</u>
Analysis Method: <u>537</u>	Date Collected: <u>03/27/2018 10:40</u>
Extraction Method: <u>537</u>	Date Extracted: <u>04/07/2018 08:29</u>
Sample wt/vol: <u>257.1 (mL)</u>	Date Analyzed: <u>04/12/2018 01:52</u>
Con. Extract Vol.: <u>1.00 (mL)</u>	Dilution Factor: <u>1</u>
Injection Volume: <u>2 (uL)</u>	GC Column: <u>GeminiC18 3x100 ID: 3 (mm)</u>
% Moisture: _____	GPC Cleanup: (Y/N) <u>N</u>
Analysis Batch No.: <u>217529</u>	Units: <u>ng/L</u>

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	16	U	39	16	6.6
335-67-1	Perfluorooctanoic acid (PFOA)	7.8	U	19	7.8	2.7
375-95-1	Perfluorononanoic acid (PFNA)	19	U	23	19	7.8
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	12	U	29	12	5.3
375-85-9	Perfluoroheptanoic acid (PFHpA)	3.9	U	9.7	3.9	1.8
375-73-5	Perfluorobutanesulfonic acid (PFBS)	35	U	88	35	16

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	95		70-130
STL00996	13C2 PFDA	93		70-130

Appendix C

Support Documentation

ANALYTE	ORIGINAL NAWC- 032718-RW-029	DUPLICATE WGNA- 032718-DUP030	RL	RPD	RPD > 50%	ORIGINAL	DUPLICATE SAMPLE	DIFFERENCE >2XRL
						SAMPLE CONC >2xRL		
Perfluoroheptanoic acid (PFHpA)	5.7	5.2	10	9.174	FALSE	FALSE	FALSE	FALSE
Perfluorooctanoic acid (PFOA)	19	17	20	11.111	FALSE	FALSE	FALSE	FALSE
Perfluorohexanesulfonic acid (PFHxS)	6.7	6	30	11.024	FALSE	FALSE	FALSE	FALSE
Perfluorooctanesulfonic acid (PFOS)	21	18	40	15.385	FALSE	FALSE	FALSE	FALSE

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

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

[illegible]

Form No. CA-C-WI-002, Rev. 4.11, +A26:AD44 dated 1/24/2017

* Samples Labeled w/

S:\WillowGrove PFOs Private Well\COCs TT\COC 2018.03.27.xls

-32718 ✓ DH 3/28/80

Definitions/Glossary

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

TestAmerica Job ID: 320-37566-1

Qualifiers

LCMS

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

Glossary

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

Job Narrative
320-37566-1

Receipt

The samples were received on 3/28/2018 9:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 7.7° C.

Receipt Exceptions

The container label for the following samples did not match the information listed on the Chain-of-Custody (COC): NAWC-032717-RW-091 (320-37566-1), NAWC-032717-FRB-091 (320-37566-2), NAWC-032717-RW-029 (320-37566-3) and NAWC-032717-FRB-029 (320-37566-4). Containers mid numbers list -032718-, while coc mid numbers list -032717-. for example Sample 1 Container label Lists NAWC-032718-RW-091, while coc lists NAWC-032717-RW-091. The client was contacted and sample IDs corrected with the correct date in the sample IDs.

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 320-216794.

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

Method Summary

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

TestAmerica Job ID: 320-37566-1

Method	Method Description	Protocol	Laboratory
537	Perfluorinated Alkyl Acids (LC/MS)	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: 320-37566-1

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

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-37566-1	NAWC-032718-RW-091	Water	03/27/18 09:40	03/28/18 09:20
320-37566-2	NAWC-032718-FRB-091	Water	03/27/18 09:35	03/28/18 09:20
320-37566-3	NAWC-032718-RW-029	Water	03/27/18 10:10	03/28/18 09:20
320-37566-4	NAWC-032718-FRB-029	Water	03/27/18 10:05	03/28/18 09:20
320-37566-5	WGNA-032718-DUP030	Water	03/27/18 07:00	03/28/18 09:20
320-37566-6	NAWC-032718-RW-094	Water	03/27/18 10:35	03/28/18 09:20
320-37566-7	NAWC-032718-FRB-094	Water	03/27/18 10:40	03/28/18 09:20

FORM II
LCMS SURROGATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1

SDG No.: _____

Matrix: Water Level: Low

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

Client Sample ID	Lab Sample ID	PFHxA #	PFDA #
NAWC-032718-RW-091	320-37566-1	102	97
NAWC-032718-FRB-091	320-37566-2	91	96
NAWC-032718-RW-029	320-37566-3	96	100
NAWC-032718-FRB-029	320-37566-4	94	92
WGNA-032718-DUP030	320-37566-5	87	91
NAWC-032718-RW-094	320-37566-6	83	87
NAWC-032718-FRB-094	320-37566-7	95	93
	MB 320-216794/1-A	90	93
	LLCS 320-216794/2-A	91	89
	LLCSD 320-216794/3-A	93	94

PFHxA = 13C2 PFHxA
PFDA = 13C2 PFDA

QC LIMITS
70-130
70-130

Column to be used to flag recovery values

FORM III
LCMS LOW LEVEL CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.04.11_537C_004.d
 Lab ID: LLCS 320-216794/2-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LLCS CONCENTRATION (ng/L)	LLCS % REC	QC LIMITS REC	#
Perfluorooctanesulfonic acid (PFOS)	40.2	36.8 J	91	50-150	M
Perfluorooctanoic acid (PFOA)	20.0	18.1 J	90	50-150	
Perfluorononanoic acid (PFNA)	20.0	16.7 J	84	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	27.9 J	92	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	8.90 J	89	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	81.0 J	90	50-150	

Column to be used to flag recovery and RPD values

FORM III
LCMS LOW LEVEL CONTROL STANDARD DUPLICATE RECOVERY

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Matrix: Water Level: Low Lab File ID: 2018.04.11_537C_005.d
 Lab ID: LLCSD 320-216794/3-A Client ID: _____

COMPOUND	SPIKE ADDED (ng/L)	LLCSD CONCENTRATION (ng/L)	LLCSD % REC	% RPD	QC LIMITS		#
					RPD	REC	
Perfluorooctanesulfonic acid (PFOS)	40.2	35.3 J	88	4	50	50-150	M
Perfluorooctanoic acid (PFOA)	20.0	18.1 J	90	0	50	50-150	
Perfluorononanoic acid (PFNA)	20.0	16.5 J	83	1	50	50-150	
Perfluorohexanesulfonic acid (PFHxS)	30.3	28.5 J	94	2	50	50-150	
Perfluoroheptanoic acid (PFHpA)	10.0	9.28 J	93	4	50	50-150	
Perfluorobutanesulfonic acid (PFBS)	90.2	81.3 J	90	0.4	50	50-150	

Column to be used to flag recovery and RPD values

FORM IV
LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Lab File ID: 2018.04.11_537C_003.d Lab Sample ID: MB 320-216794/1-A
 Matrix: Water Date Extracted: 04/07/2018 08:29
 Instrument ID: A8_N Date Analyzed: 04/12/2018 01:10
 Level: (Low/Med) Low

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
	LLCS 320-216794/2-A	2018.04.11_537C 004.d	04/12/2018 01:14
	LLCSD 320-216794/3-A	2018.04.11_537C 005.d	04/12/2018 01:19
NAWC-032718-RW-091	320-37566-1	2018.04.11_537C 006.d	04/12/2018 01:24
NAWC-032718-FRB-091	320-37566-2	2018.04.11_537C 007.d	04/12/2018 01:28
NAWC-032718-RW-029	320-37566-3	2018.04.11_537C 008.d	04/12/2018 01:33
NAWC-032718-FRB-029	320-37566-4	2018.04.11_537C 009.d	04/12/2018 01:38
WGNA-032718-DUP030	320-37566-5	2018.04.11_537C 010.d	04/12/2018 01:42
NAWC-032718-RW-094	320-37566-6	2018.04.11_537C 011.d	04/12/2018 01:47
NAWC-032718-FRB-094	320-37566-7	2018.04.11_537C 012.d	04/12/2018 01:52

FORM I
LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Client Sample ID: _____ Lab Sample ID: MB 320-216794/1-A
 Matrix: Water Lab File ID: 2018.04.11_537C_003.d
 Analysis Method: 537 Date Collected: _____
 Extraction Method: 537 Date Extracted: 04/07/2018 08:29
 Sample wt/vol: 250 (mL) Date Analyzed: 04/12/2018 01:10
 Con. Extract Vol.: 1.00 (mL) Dilution Factor: 1
 Injection Volume: 2 (uL) GC Column: GeminiC18 3x100 ID: 3 (mm)
 % Moisture: _____ GPC Cleanup: (Y/N) N
 Analysis Batch No.: 217529 Units: ng/L

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

CAS NO.	SURROGATE	%REC	Q	LIMITS
STL00993	13C2 PFHxA	90		70-130
STL00996	13C2 PFDA	93		70-130

FORM VIII
LCMS INTERNAL STANDARD AREA AND RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Instrument ID: A8_N Calibration Start Date: 04/11/2018 11:45
 GC Column: GeminiC18 3x100 ID: 3(mm) Calibration End Date: 04/11/2018 12:09
 Calibration ID: 38530

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
INITIAL CALIBRATION MEAN AREA AND MEAN RT		970041	1.86	2344935	2.10		
UPPER LIMIT		1455062	2.36	3517403	2.60		
LOWER LIMIT		485021	1.36	1172468	1.60		
LAB SAMPLE ID	CLIENT SAMPLE ID						
CCVL 320-217453/10		964533	1.87	2387973	2.10		
ICV 320-217453/12		1123391	1.86	2710764	2.10		
CCV 320-217529/1 CCVIS		926529	1.86	2312508	2.09		
MB 320-216794/1-A		1063805	1.87	2444661	2.10		
LLCS 320-216794/2-A		1015259	1.86	2395544	2.09		
LLCSD 320-216794/3-A		958050	1.85	2297852	2.09		
320-37566-1	NAWC-032718-RW-091	952297	1.85	2289187	2.09		
320-37566-2	NAWC-032718-FRB-091	970537	1.86	2368145	2.09		
320-37566-3	NAWC-032718-RW-029	934144	1.86	2229124	2.09		
320-37566-4	NAWC-032718-FRB-029	958396	1.86	2301564	2.10		
320-37566-5	WGNA-032718-DUP030	1001099	1.86	2366616	2.09		
320-37566-6	NAWC-032718-RW-094	994358	1.85	2442201	2.09		
320-37566-7	NAWC-032718-FRB-094	1001801	1.86	2443180	2.09		
CCV 320-217529/13 CCVIS		948579	1.85	2243970	2.09		

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.: 320-37566-1
 SDG No.: _____
 Sample No.: CCV 320-217529/1 Date Analyzed: 04/12/2018 01:00
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.04.11_537C_001 Heated Purge: (Y/N) N
 Calibration ID: 38530

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		926529	1.86	2312508	2.09		
UPPER LIMIT		1297141	2.36	3237511	2.59		
LOWER LIMIT		648570	1.36	1618756	1.59		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-216794/1-A		1063805	1.87	2444661	2.10		
LLCS 320-216794/2-A		1015259	1.86	2395544	2.09		
LLCSD 320-216794/3-A		958050	1.85	2297852	2.09		
320-37566-1	NAWC-032718-RW-091	952297	1.85	2289187	2.09		
320-37566-2	NAWC-032718-FRB-091	970537	1.86	2368145	2.09		
320-37566-3	NAWC-032718-RW-029	934144	1.86	2229124	2.09		
320-37566-4	NAWC-032718-FRB-029	958396	1.86	2301564	2.10		
320-37566-5	WGNA-032718-DUP030	1001099	1.86	2366616	2.09		
320-37566-6	NAWC-032718-RW-094	994358	1.85	2442201	2.09		
320-37566-7	NAWC-032718-FRB-094	1001801	1.86	2443180	2.09		

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.: 320-37566-1
 SDG No.: _____
 Sample No.: CCV 320-217529/13 Date Analyzed: 04/12/2018 01:56
 Instrument ID: A8_N GC Column: GeminiC18 3x100 ID: 3 (mm)
 Lab File ID (Standard): 2018.04.11_537C_013 Heated Purge: (Y/N) N
 Calibration ID: 38530

		13PFOA		PFOS			
		AREA #	RT #	AREA #	RT #	AREA #	RT #
12/24 HOUR STD		948579	1.85	2243970	2.09		
UPPER LIMIT		1328011	2.35	3141558	2.59		
LOWER LIMIT		664005	1.35	1570779	1.59		
LAB SAMPLE ID	CLIENT SAMPLE ID						
MB 320-216794/1-A		1063805	1.87	2444661	2.10		
LLCS 320-216794/2-A		1015259	1.86	2395544	2.09		
LLCSD 320-216794/3-A		958050	1.85	2297852	2.09		
320-37566-1	NAWC-032718-RW-091	952297	1.85	2289187	2.09		
320-37566-2	NAWC-032718-FRB-091	970537	1.86	2368145	2.09		
320-37566-3	NAWC-032718-RW-029	934144	1.86	2229124	2.09		
320-37566-4	NAWC-032718-FRB-029	958396	1.86	2301564	2.10		
320-37566-5	WGNA-032718-DUP030	1001099	1.86	2366616	2.09		
320-37566-6	NAWC-032718-RW-094	994358	1.85	2442201	2.09		
320-37566-7	NAWC-032718-FRB-094	1001801	1.86	2443180	2.09		

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.: 320-37566-1 Analy Batch No.: 217453

SDG No.: _____

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

Calibration Start Date: 04/11/2018 11:45 Calibration End Date: 04/11/2018 12:09 Calibration ID: 38530

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-217453/3	2018.04.11_537ICALB_004.d
Level 2	IC 320-217453/4	2018.04.11_537ICALB_005.d
Level 3	IC 320-217453/5	2018.04.11_537ICALB_006.d
Level 4	IC 320-217453/6	2018.04.11_537ICALB_007.d
Level 5	IC 320-217453/7	2018.04.11_537ICALB_008.d
Level 6	IC 320-217453/8	2018.04.11_537ICALB_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 3	LVL 4	LVL 5		B	M1	M2								
Perfluorobutanesulfonic acid (PFBS)	1.1422 0.9535	1.0952	1.0744	1.0454	1.0008	Ave		1.0519				6.4		30.0			
Perfluoroheptanoic acid (PFHpA)	1.0850 1.0447	1.0991	1.0649	1.0783	1.0702	Ave		1.0737				1.7		30.0			
Perfluorohexanesulfonic acid (PFHxS)	1.6457 1.6837	1.5988	1.6030	1.6384	1.6838	Ave		1.6422				2.3		30.0			
Perfluorooctanoic acid (PFOA)	1.0599 1.0325	1.0296	1.0703	1.0516	1.1300	Ave		1.0623				3.5		30.0			
Perfluorooctanesulfonic acid (PFOS)	1.0432 1.0989	1.0519	1.0326	1.0935	1.0764	Ave		1.0661				2.6		30.0			
Perfluorononanoic acid (PFNA)	0.8261 0.8363	0.8133	0.8488	0.8818	0.8480	Ave		0.8424				2.8		30.0			
13C2 PFHxA	1.0447 1.0648	1.0532	1.0875	1.0687	1.0602	Ave		1.0632				1.4		30.0			
13C2 PFDA	0.8513 0.8262	0.8714	0.8533	0.8487	0.8519	Ave		0.8505				1.7		30.0			

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

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

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1 Analy Batch No.: 217453

SDG No.: _____

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

Calibration Start Date: 04/11/2018 11:45 Calibration End Date: 04/11/2018 12:09 Calibration ID: 38530

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-217453/3	2018.04.11_537ICALB_004.d
Level 2	IC 320-217453/4	2018.04.11_537ICALB_005.d
Level 3	IC 320-217453/5	2018.04.11_537ICALB_006.d
Level 4	IC 320-217453/6	2018.04.11_537ICALB_007.d
Level 5	IC 320-217453/7	2018.04.11_537ICALB_008.d
Level 6	IC 320-217453/8	2018.04.11_537ICALB_009.d

ANALYTE	IS REF	CURVE TYPE	RESPONSE					CONCENTRATION (NG/ML)				
			LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2	LVL 3	LVL 4	LVL 5
Perfluorobutanesulfonic acid (PFBS)	PFOS	Ave	870696 13871852	1696932	4015148	8010147	10764182	9.00 180	20.0	45.0	90.1	135
Perfluoroheptanoic acid (PFHpA)	13PF OA	Ave	108741 1996261	218860	489075	1044752	1450463	0.960 19.4	2.16	4.86	9.72	14.6
Perfluorohexanesulfonic acid (PFHxS)	PFOS	Ave	418640 8226588	831963	2012030	4216387	6082352	3.00 60.5	6.72	15.1	30.2	45.4
Perfluorooctanoic acid (PFOA)	13PF OA	Ave	219100 4019004	417632	1001316	2075568	3119787	1.98 39.6	4.40	9.90	19.8	29.7
Perfluorooctanesulfonic acid (PFOS)	PFOS	Ave	349354 7016962	715378	1693810	3678059	5081660	3.95 79.1	8.79	19.8	39.5	59.3
Perfluorononanoic acid (PFNA)	13PF OA	Ave	170770 3255374	329904	794076	1740422	2341235	1.98 39.6	4.40	9.90	19.8	29.7
13C2 PFHxA	13PF OA	Ave	1090690 1046576	970942	1027706	1065262	985534	10.0 10.0	10.0	10.0	10.0	10.0
13C2 PFDA	13PF OA	Ave	888742 812112	803402	806360	845990	791901	10.0 10.0	10.0	10.0	10.0	10.0

Curve Type Legend:

Ave = Average ISTD

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

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1 Analy Batch No.: 217453

SDG No.: _____

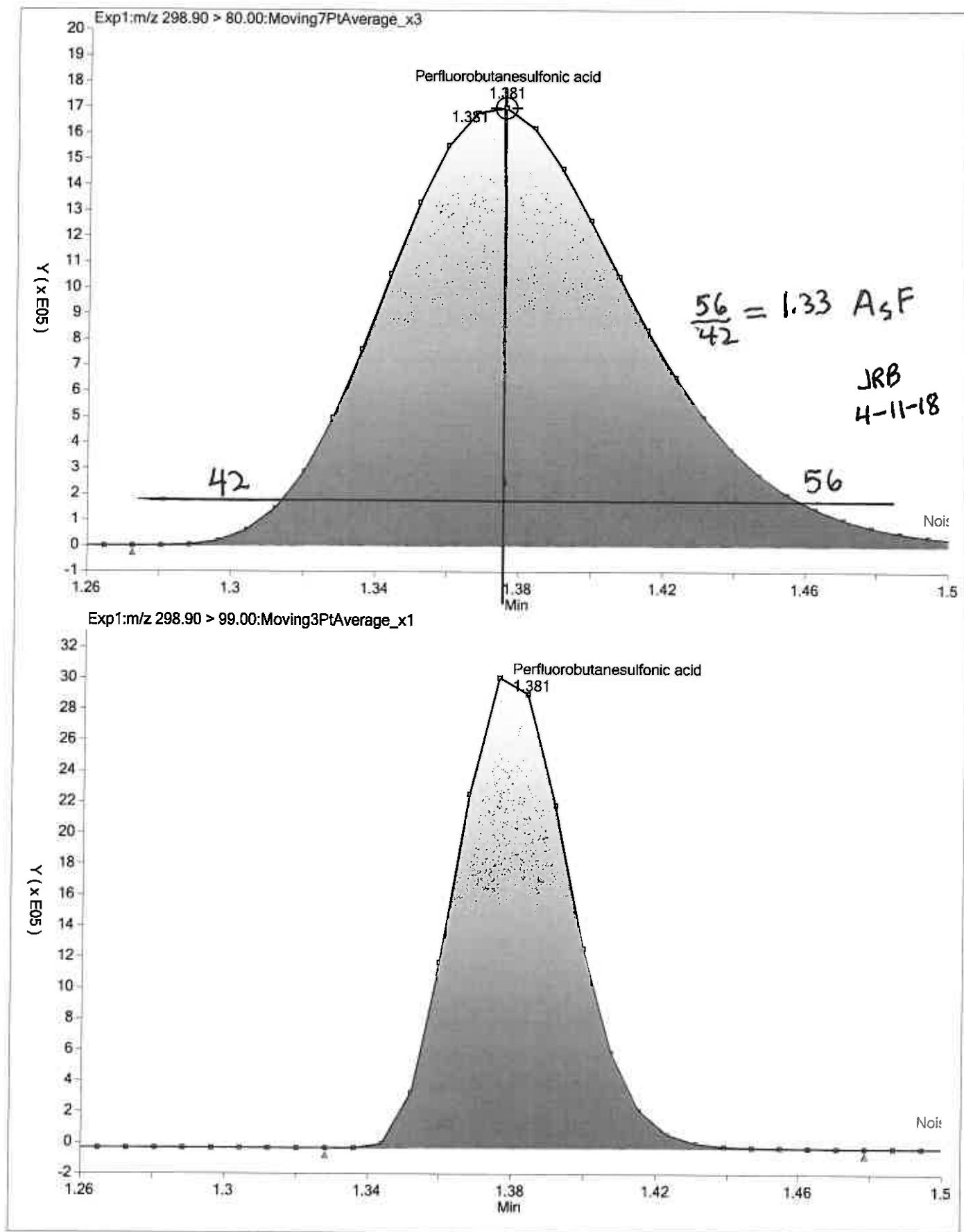
Instrument ID: A8_N GC Column: GeminiC18 3 ID: 3(mm) Heated Purge: (Y/N) N

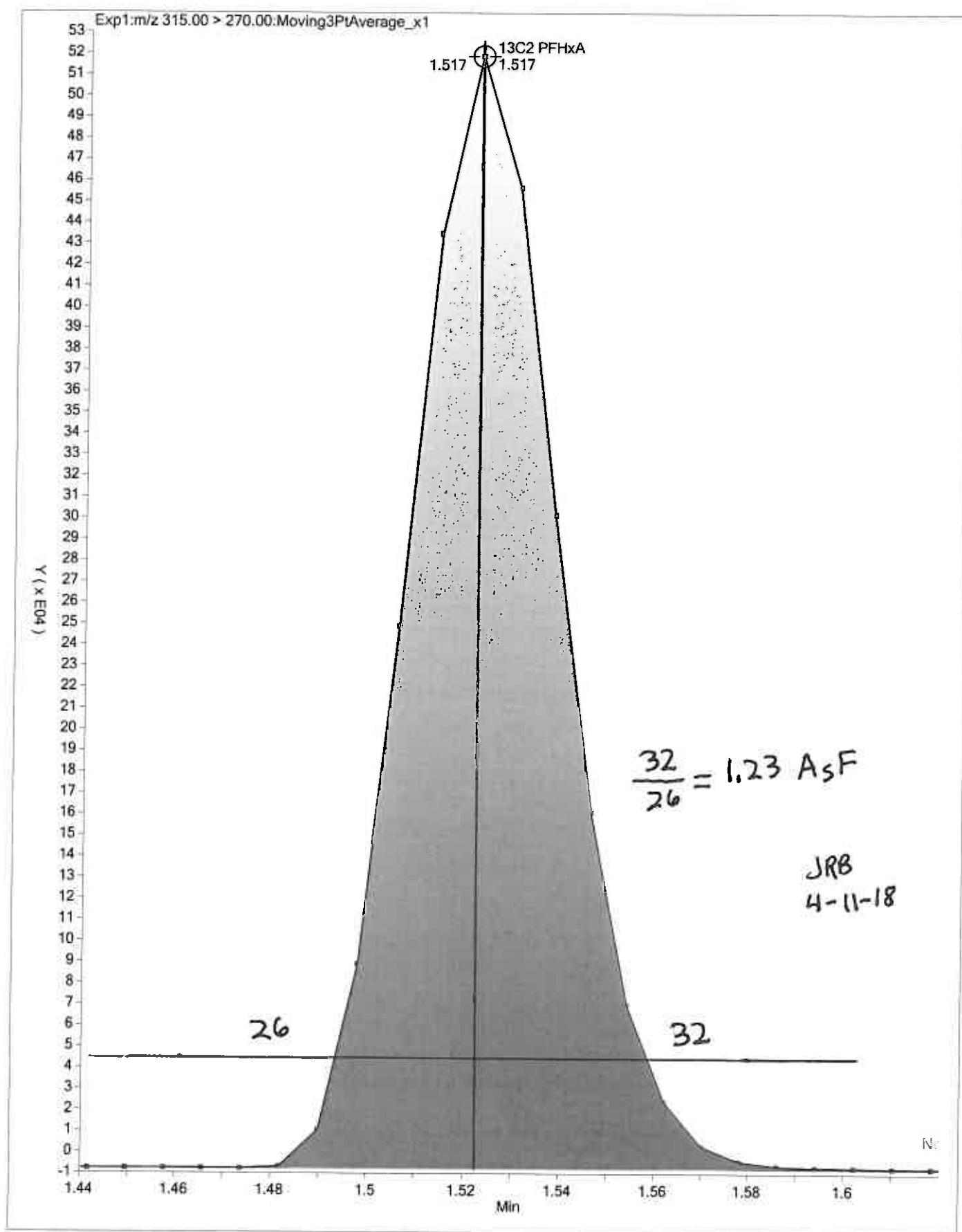
Calibration Start Date: 04/11/2018 11:45 Calibration End Date: 04/11/2018 12:09 Calibration ID: 38530

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	IC 320-217453/3	2018.04.11_537ICALB_004.d
Level 2	IC 320-217453/4	2018.04.11_537ICALB_005.d
Level 3	IC 320-217453/5	2018.04.11_537ICALB_006.d
Level 4	IC 320-217453/6	2018.04.11_537ICALB_007.d
Level 5	IC 320-217453/7	2018.04.11_537ICALB_008.d
Level 6	IC 320-217453/8	2018.04.11_537ICALB_009.d

ANALYTE	PERCENT ERROR						PERCENT ERROR LIMIT					
	LVL 1 #	LVL 2 #	LVL 3 #	LVL 4 #	LVL 5 #	LVL 6 #	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6
Perfluorobutanesulfonic acid (PFBS)	8.6	4.1	2.1	-0.6	-4.9	-9.4	50	30	30	30	30	30
Perfluoroheptanoic acid (PFHpA)	1.0	2.4	-0.8	0.4	-0.3	-2.7	50	30	30	30	30	30
Perfluorohexanesulfonic acid (PFHxS)	0.2	-2.6	-2.4	-0.2	2.5	2.5	50	30	30	30	30	30
Perfluorooctanoic acid (PFOA)	-0.2	-3.1	0.7	-1.0	6.4	-2.8	50	30	30	30	30	30
Perfluorooctanesulfonic acid (PFOS)	-2.1	-1.3	-3.1	2.6	1.0	3.1	50	30	30	30	30	30
Perfluorononanoic acid (PFNA)	-1.9	-3.5	0.8	4.7	0.7	-0.7	50	30	30	30	30	30
13C2 PFHxA	-1.7	-0.9	2.3	0.5	-0.3	0.1	30	30	30	30	30	30
13C2 PFDA	0.1	2.5	0.3	-0.2	0.2	-2.9	30	30	30	30	30	30





FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Lab Sample ID: CCVL 320-217453/10 Calibration Date: 04/11/2018 12:18
 Instrument ID: A8_N Calib Start Date: 04/11/2018 11:45
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 04/11/2018 12:09
 Lab File ID: 2018.04.11_537ICALB_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	1.052	1.078		20.5	20.0	2.5	50.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.074	1.079		2.17	2.16	0.5	50.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.642	1.583		6.48	6.72	-3.6	50.0
Perfluorooctanoic acid (PFOA)	Ave	1.062	1.067		4.42	4.40	0.4	50.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.066	1.026		8.45	8.79	-3.8	50.0
Perfluorononanoic acid (PFNA)	Ave	0.8424	0.8056		4.21	4.40	-4.4	50.0
13C2 PFHxA	Ave	1.063	1.036		9.74	10.0	-2.6	30.0
13C2 PFDA	Ave	0.8505	0.8798		10.3	10.0	3.4	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Lab Sample ID: ICV 320-217453/12 Calibration Date: 04/11/2018 12:27
 Instrument ID: A8_N Calib Start Date: 04/11/2018 11:45
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 04/11/2018 12:09
 Lab File ID: 2018.04.11_537ICALB_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	1.052	0.9079		86.4	100	-13.7	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.074	0.9453		8.80	10.0	-12.0	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.642	1.546		19.0	20.2	-5.8	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.062	0.8947		17.0	20.2	-15.8	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.066	0.9451		17.9	20.2	-11.3	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8424	0.7643		18.3	20.2	-9.3	30.0
13C2 PFHxA	Ave	1.063	0.9887		9.30	10.0	-7.0	30.0
13C2 PFDA	Ave	0.8505	0.7817		9.19	10.0	-8.1	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Lab Sample ID: CCV 320-217529/1 Calibration Date: 04/12/2018 01:00
 Instrument ID: A8_N Calib Start Date: 04/11/2018 11:45
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 04/11/2018 12:09
 Lab File ID: 2018.04.11_537C_001.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanesulfonic acid (PFBS)	Ave	1.052	1.098		47.0	45.0	4.4	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.074	1.083		4.90	4.86	0.9	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.642	1.606		14.8	15.1	-2.2	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.062	1.070		9.98	9.90	0.8	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.066	1.037		19.2	19.8	-2.7	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8424	0.8275		9.72	9.90	-1.8	30.0
13C2 PFHxA	Ave	1.063	1.053		9.90	10.0	-1.0	30.0
13C2 PFDA	Ave	0.8505	0.8915		10.5	10.0	4.8	30.0

FORM VII
LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Lab Sample ID: CCV 320-217529/13 Calibration Date: 04/12/2018 01:56
 Instrument ID: A8_N Calib Start Date: 04/11/2018 11:45
 GC Column: GeminiC18 3x100 ID: 3.00 (mm) Calib End Date: 04/11/2018 12:09
 Lab File ID: 2018.04.11_537C_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	1.052	1.038		133	135	-1.3	30.0
Perfluoroheptanoic acid (PFHpA)	Ave	1.074	1.023		13.9	14.6	-4.7	30.0
Perfluorohexanesulfonic acid (PFHxS)	Ave	1.642	1.697		46.9	45.4	3.3	30.0
Perfluorooctanoic acid (PFOA)	Ave	1.062	1.072		30.0	29.7	0.9	30.0
Perfluorooctanesulfonic acid (PFOS)	Ave	1.066	1.081		60.1	59.3	1.4	30.0
Perfluorononanoic acid (PFNA)	Ave	0.8424	0.8168		28.8	29.7	-3.0	30.0
13C2 PFHxA	Ave	1.063	1.052		9.89	10.0	-1.1	30.0
13C2 PFDA	Ave	0.8505	0.8410		9.89	10.0	-1.1	30.0

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica SacramentoJob No.: 320-37566-1

SDG No.: _____

Instrument ID: A8_NStart Date: 04/11/2018 11:45Analysis Batch Number: 217453End Date: 04/11/2018 12:27

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
IC 320-217453/3		04/11/2018 11:45	1	2018.04.11_537I CALB 004.d	GeminiC18 3x100 3(mm)
IC 320-217453/4		04/11/2018 11:50	1	2018.04.11_537I CALB 005.d	GeminiC18 3x100 3(mm)
IC 320-217453/5		04/11/2018 11:55	1	2018.04.11_537I CALB 006.d	GeminiC18 3x100 3(mm)
IC 320-217453/6 ICISAV		04/11/2018 11:59	1	2018.04.11_537I CALB 007.d	GeminiC18 3x100 3(mm)
IC 320-217453/7		04/11/2018 12:04	1	2018.04.11_537I CALB 008.d	GeminiC18 3x100 3(mm)
IC 320-217453/8		04/11/2018 12:09	1	2018.04.11_537I CALB 009.d	GeminiC18 3x100 3(mm)
ZZZZZ		04/11/2018 12:13	1		GeminiC18 3x100 3(mm)
CCVL 320-217453/10		04/11/2018 12:18	1	2018.04.11_537I CALB 011.d	GeminiC18 3x100 3(mm)
ICB 320-217453/11		04/11/2018 12:23	1		GeminiC18 3x100 3(mm)
ICV 320-217453/12		04/11/2018 12:27	1	2018.04.11_537I CALB 013.d	GeminiC18 3x100 3(mm)

TestAmerica Laboratories

Worklist QC Batch Report

Worklist Name: 11APR2018_537D

Worklist Number: 56579

Instrument Name: A8_N

Chrom Method: 537_A8_N

Data Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180411-56579.b

QC Batching: Enabled

Limit Group Batching: Enabled

QC Batch: 1	LC 537 ICAL Raw Batch: 217529
# 1 CCV L3	# 1 CCV L3
# 2 RB	# 2 RB
# 3 MB 320-216794/1-A	# 3 MB 320-216794/1-A
# 4 LLCS 320-216794/2-A	# 4 LLCS 320-216794/2-A
# 5 LLCSD 320-216794/3-A	# 5 LLCSD 320-216794/3-A
# 6 320-37566-A-1-B	# 6 320-37566-A-1-B
# 7 320-37566-A-2-A	# 7 320-37566-A-2-A
# 8 320-37566-A-3-A	# 8 320-37566-A-3-A
# 9 320-37566-A-4-A	# 9 320-37566-A-4-A
#10 320-37566-A-5-A	#10 320-37566-A-5-A
#11 320-37566-A-6-A	#11 320-37566-A-6-A
#12 320-37566-A-7-A	#12 320-37566-A-7-A
#13 CCV L5	#13 CCV L5
#14 RB	#14 RB

Run after ICAL. No daily CCV.

TestAmerica Laboratories

Worklist Run Log Report

Worklist Name: 11APR2018_537D

Worklist Num: 56579

Instrument: A8_N

Method: 537_A8_N

Batch Directory: \\ChromNa\Sacramento\ChromData\A8_N\20180411-56579.b

Analysis Type: SemiVOA

Creator: Royce, Amani A

Inj Volume: 2.00

Inj Vol Units: ul

Lab ID	Worklist ID	Sample Type	Inj Date/Time	File Name	Vial	Dil Factor	Client ID	Fract
CCV L3	320-0056579-001	CCVIS	12-Apr-2018 01:00:41	2018.04.11_537C_001.d	3	1.0		sv
RB	320-0056579-002	RB	12-Apr-2018 01:05:22	2018.04.11_537C_002.d	8	1.0		sv
MB 320-216794/1-A	320-0056579-003	MB	12-Apr-2018 01:10:03	2018.04.11_537C_003.d	28	1.0		sv
LLCS 320-216794/2-A	320-0056579-004	LLCS	12-Apr-2018 01:14:43	2018.04.11_537C_004.d	29	1.0		sv
LLCSD 320-216794/3-A	320-0056579-005	LLCSD	12-Apr-2018 01:19:23	2018.04.11_537C_005.d	30	1.0		sv
320-37566-A-1-B	320-0056579-006	Client	12-Apr-2018 01:24:04	2018.04.11_537C_006.d	31	1.0	NAWC-032717-RW-091	sv
320-37566-A-2-A	320-0056579-007	Client	12-Apr-2018 01:28:43	2018.04.11_537C_007.d	32	1.0	NAWC-032717-FRB-091	sv
320-37566-A-3-A	320-0056579-008	Client	12-Apr-2018 01:33:24	2018.04.11_537C_008.d	33	1.0	NAWC-032717-RW-029	sv
320-37566-A-4-A	320-0056579-009	Client	12-Apr-2018 01:38:06	2018.04.11_537C_009.d	34	1.0	NAWC-032717-FRB-029	sv
320-37566-A-5-A	320-0056579-010	Client	12-Apr-2018 01:42:48	2018.04.11_537C_010.d	35	1.0	WGNA-032718-DUP030	sv
320-37566-A-6-A	320-0056579-011	Client	12-Apr-2018 01:47:29	2018.04.11_537C_011.d	36	1.0	NAWC-032718-RW-094	sv
320-37566-A-7-A	320-0056579-012	Client	12-Apr-2018 01:52:09	2018.04.11_537C_012.d	37	1.0	NAWC-032718-FRB-094	sv
CCV L5	320-0056579-013	CCVIS	12-Apr-2018 01:56:48	2018.04.11_537C_013.d	5	1.0		sv
RB	320-0056579-014	RB	12-Apr-2018 02:01:28	2018.04.11_537C_014.d	8	1.0		sv

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-216794 ✓
Method Code: 320-537_Prep-320

Analyst: Kouchari, Shamiran

Batch Open: 4/7/2018 8:29:00AM

Batch End: 4/10/2018 4:22:00PM

52

AS 4/11/18

Extraction of Perfluorinated Alkyl Acids

4/1/18

Input Sample Lab ID (Analytical Method)	SDG (Job #)	GrossWt TareWt	InitAmnt FinAmnt	Rcvd	PHs Adj1	Adj2	Due Date	Analytical TAT	Div Rank	Comments	Output Sample Lab ID
1 MB-320-216794/1 N/A	N/A		250 mL	7			N/A	N/A	N/A	Chlorine, ND	
			1.00 mL								
2 LLCS-320-216794/2 N/A	N/A		250 mL	7			N/A	N/A	N/A	Chlorine, ND	
			1.00 mL								
3 LLCSD-320-216794/3 N/A	N/A		250 mL	7			N/A	N/A	N/A	Chlorine, ND	
			1.00 mL								
320-37566-A-1 (537_DOD5)	N/A (320-37566-1)	270.76 g	242.5 mL	7			4/1/18	16_Days	4	Chlorine, ND	
		28.27 g	1.00 mL								
320-37566-A-2 (537_DOD5)	N/A (320-37566-1)	285.99 g	256.2 mL	7			4/1/18	16_Days	4	Chlorine, ND	
		29.79 g	1.00 mL								
6 320-37566-A-3 (537_DOD5)	N/A (320-37566-1)	275.58 g	248.2 mL	7			4/1/18	16_Days	4	Chlorine, ND	
		27.34 g	1.00 mL								
7 320-37566-A-4 (537_DOD5)	N/A (320-37566-1)	290.59 g	260.9 mL	7			4/1/18	16_Days	4	Chlorine, ND	
		29.73 g	1.00 mL								
8 320-37566-A-5 (537_DOD5)	N/A (320-37566-1)	290.59 g	260.3 mL	7			4/1/18	16_Days	4	Chlorine, ND	
		30.34 g	1.00 mL								
9 320-37566-A-6 (537_DOD5)	N/A (320-37566-1)	280.36 g	251.8 mL	7			4/1/18	16_Days	4	Chlorine, ND	
		28.52 g	1.00 mL								
10 320-37566-A-7 (537_DOD5)	N/A (320-37566-1)	286.89 g	257.1 mL	7			4/1/18	16_Days	4	Chlorine, ND	
		29.75 g	1.00 mL								

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 320-216794

Analyst: Kouchari, Shamiran

Batch Open: 4/7/2018 8:29:00AM

Method Code: 320-537_Prep-320

Batch End: 4/10/2018 4:22:00PM

Batch Notes

Manifold ID 1

pH Indicator ID 3817

Trizma ID SDLBR5241V

SPE Cartridge Lot ID 6369499-12

Methanol ID 1204219

Reagent Water ID 04/05/18

Internal Standard ID# 1201031

Pipette ID O43082F

Analyst ID - TA Reagent Drop SKD

Analyst ID - TA Reagent Drop HJA

Witness

Analyst ID - SU Reagent Drop SKD

Analyst ID - SU Reagent Drop HJA

Witness

Analyst ID - IS Reagent Drop VPM

Analyst ID - IS Reagent Drop NS

Witness

Analyst ID - Concentration SKD/KMK

Analyst ID - Aliquot Step VPM

Analyst ID - Final Volume Step VPM

Batch Comment Client labels match TA label, 04/07/18 SKD

LCMS ANALYSIS RUN LOG

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1
 SDG No.: _____
 Instrument ID: A8_N Start Date: 04/12/2018 01:00
 Analysis Batch Number: 217529 End Date: 04/12/2018 01:56

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
CCV 320-217529/1 CCVIS		04/12/2018 01:00	1	2018.04.11_537C 001.d	GeminiC18 3x100 3(mm)
MB 320-216794/1-A		04/12/2018 01:10	1	2018.04.11_537C 003.d	GeminiC18 3x100 3(mm)
LLCS 320-216794/2-A		04/12/2018 01:14	1	2018.04.11_537C 004.d	GeminiC18 3x100 3(mm)
LLCSD 320-216794/3-A		04/12/2018 01:19	1	2018.04.11_537C 005.d	GeminiC18 3x100 3(mm)
320-37566-1		04/12/2018 01:24	1	2018.04.11_537C 006.d	GeminiC18 3x100 3(mm)
320-37566-2		04/12/2018 01:28	1	2018.04.11_537C 007.d	GeminiC18 3x100 3(mm)
320-37566-3		04/12/2018 01:33	1	2018.04.11_537C 008.d	GeminiC18 3x100 3(mm)
320-37566-4		04/12/2018 01:38	1	2018.04.11_537C 009.d	GeminiC18 3x100 3(mm)
320-37566-5		04/12/2018 01:42	1	2018.04.11_537C 010.d	GeminiC18 3x100 3(mm)
320-37566-6		04/12/2018 01:47	1	2018.04.11_537C 011.d	GeminiC18 3x100 3(mm)
320-37566-7		04/12/2018 01:52	1	2018.04.11_537C 012.d	GeminiC18 3x100 3(mm)
CCV 320-217529/13 CCVIS		04/12/2018 01:56	1	2018.04.11_537C 013.d	GeminiC18 3x100 3(mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1

SDG No.: _____

Batch Number: 216794 Batch Start Date: 04/07/18 08:29 Batch Analyst: Kouchari, ShamiranBatch Method: 537 Batch End Date: 04/10/18 16:22

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	ReceivedpH	LC537-IS 00065
MB 320-216794/1		537, 537				250 mL	1.00 mL	7 SU	100 uL
LLCS 320-216794/2		537, 537				250 mL	1.00 mL	7 SU	100 uL
LLCSD 320-216794/3		537, 537				250 mL	1.00 mL	7 SU	100 uL
320-37566-A-1	NAWC-032718-RW-091	537, 537	T	270.76 g	28.27 g	242.5 mL	1.00 mL	7 SU	100 uL
320-37566-A-2	NAWC-032718-FRB-091	537, 537	T	285.99 g	29.79 g	256.2 mL	1.00 mL	7 SU	100 uL
320-37566-A-3	NAWC-032718-RW-029	537, 537	T	275.58 g	27.34 g	248.2 mL	1.00 mL	7 SU	100 uL
320-37566-A-4	NAWC-032718-FRB-029	537, 537	T	290.59 g	29.73 g	260.9 mL	1.00 mL	7 SU	100 uL
320-37566-A-5	WGNA-032718-DUP030	537, 537	T	290.59 g	30.34 g	260.3 mL	1.00 mL	7 SU	100 uL
320-37566-A-6	NAWC-032718-RW-094	537, 537	T	280.36 g	28.52 g	251.8 mL	1.00 mL	7 SU	100 uL
320-37566-A-7	NAWC-032718-FRB-094	537, 537	T	286.89 g	29.75 g	257.1 mL	1.00 mL	7 SU	100 uL

Lab Sample ID	Client Sample ID	Method Chain	Basis	LC537-LSP 00032	LC537-SU 00064	AnalysisComment			
MB 320-216794/1		537, 537			100 uL	Chlorine, ND			
LLCS 320-216794/2		537, 537		100 uL	100 uL	Chlorine, ND			
LLCSD 320-216794/3		537, 537		100 uL	100 uL	Chlorine, ND			
320-37566-A-1	NAWC-032718-RW-091	537, 537	T		100 uL	Chlorine, ND			
320-37566-A-2	NAWC-032718-FRB-091	537, 537	T		100 uL	Chlorine, ND			
320-37566-A-3	NAWC-032718-RW-029	537, 537	T		100 uL	Chlorine, ND			
320-37566-A-4	NAWC-032718-FRB-029	537, 537	T		100 uL	Chlorine, ND			
320-37566-A-5	WGNA-032718-DUP030	537, 537	T		100 uL	Chlorine, ND			
320-37566-A-6	NAWC-032718-RW-094	537, 537	T		100 uL	Chlorine, ND			
320-37566-A-7	NAWC-032718-FRB-094	537, 537	T		100 uL	Chlorine, ND			

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

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-37566-1

SDG No.: _____

Batch Number: 216794 Batch Start Date: 04/07/18 08:29 Batch Analyst: Kouchari, ShamiranBatch Method: 537 Batch End Date: 04/10/18 16:22

Batch Notes	
Analyst ID - Aliquot Step	VPM
Batch Comment	Client labels match TA label, 04/07/18 SKD
Analyst ID - Concentration	SKD/KMK
Analyst ID - Final Volume Step	VPM
Internal Standard ID#	1201031
Manifold ID	1
Methanol ID	1204219
pH Indicator ID	3817
Pipette ID	O43082F
Analyst ID - IS Reagent Drop	VPM
Analyst ID - IS Reagent Drop Witness	NS
Analyst ID - SU Reagent Drop	SKD
Analyst ID - SU Reagent Drop Witness	HJA
Analyst ID - TA Reagent Drop	SKD
Analyst ID - TA Reagent Drop Witness	HJA
SPE Cartridge Lot ID	6369499-12
Trizma ID	SDLBR5241V
Reagent Water ID	04/05/18

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.

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180411-56557.b\2018.04.11_537ICALB_004.d
 Lims ID: IC L1
 Client ID:
 Sample Type: IC Calib Level: 1
 Inject. Date: 11-Apr-2018 11:45:47 ALS Bottle#: 1 Worklist Smp#: 3
 Injection Vol: 2.0 ul Dil. Factor: 1.0000
 Sample Info: L1_537
 Misc. Info.: Plate: 1 Rack: 1
 Operator ID: SACINSTLCMS01 Instrument ID: A8_N
 Sublist: chrom-537_A8_N*sub9
 Method: \\ChromNa\Sacramento\ChromData\A8_N\20180411-56557.b\537_A8_N.m
 Limit Group: LC 537 ICAL
 Last Update: 11-Apr-2018 12:35:27 Calib Date: 11-Apr-2018 12:09:09
 Integrator: Picker
 Quant Method: Internal Standard Quant By: Initial Calibration
 Last Ical File: \\ChromNa\Sacramento\ChromData\A8_N\20180411-56557.b\2018.04.11_537ICALB_009.d

Column 1 : Det: EXP1

Process Host: XAWRK015

First Level Reviewer: westendorfc

Date: 11-Apr-2018 12:31:32

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	S/N	Flags
1 Perfluorobutanesulfonic acid									
298.90 > 80.00	1.381	1.382	-0.001	1.000	870696	9.77		690	
298.90 > 99.00	1.381	1.382	-0.001	1.000	638403		1.36(0.00-0.00)	875	
\$ 2 13C2 PFHxA									
315.00 > 270.00	1.517	1.515	0.002	1.000	1090690	9.83		11391	
3 Perfluorohexanesulfonic acid									
399.00 > 80.00	1.669	1.669	0.0	1.000	418640	3.01		133	
4 Perfluoroheptanoic acid									
363.00 > 319.00	1.669	1.669	0.0	1.000	108741	0.9701		13.9	
* 6 13C2-PFOA									
415.00 > 370.00	1.866	1.865	0.001		1044020	10.0		6295	
5 Perfluorooctanoic acid									
413.00 > 369.00	1.866	1.866	0.0	1.000	219100	1.98		35.1	
413.00 > 169.00	1.866	1.866	0.0	1.000	116014		1.89(0.00-0.00)	128	
8 Perfluorooctane sulfonic acid									
499.00 > 80.00	2.102	2.094	0.008	1.000	349354	3.87		105	a
499.00 > 99.00	2.102	2.094	0.008	1.000	79188		4.41(0.00-0.00)	237	a
* 7 13C4 PFOS									
503.00 > 80.00	2.102	2.102	0.0		2429483	28.7		1437	
9 Perfluorononanoic acid									
463.00 > 419.00	2.109	2.109	0.0	1.000	170770	1.94		31.2	
\$ 10 13C2 PFDA									
515.00 > 470.00	2.261	2.260	0.001	1.000	888742	10.0		8004	

TestAmerica Sacramento

Data File: \\ChromNa\Sacramento\ChromData\A8_N\20180411-56557.b\2018.04.11_537ICALB_004.d

Injection Date: 11-Apr-2018 11:45:47

Instrument ID: A8_N

Lims ID: IC_1.1

Client ID:

Operator ID: SACINSTLCMS01

ALS Bottle#: 1

Worklist Smp#: 3

Injection Vol: 2.0 ul

Dil. Factor: 1.0000

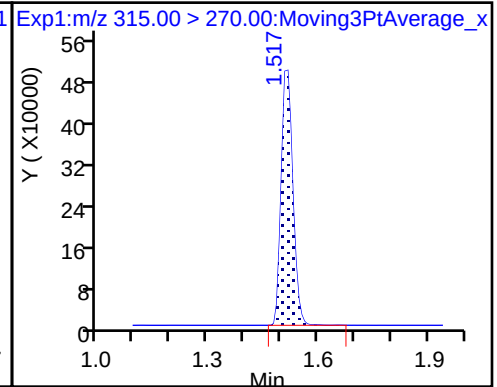
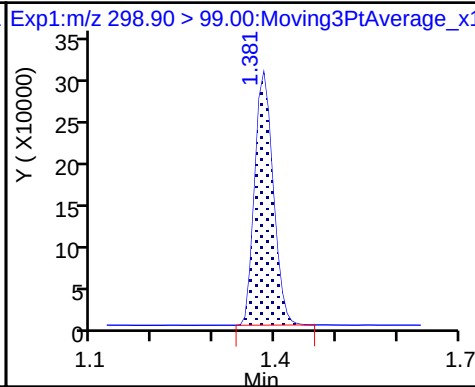
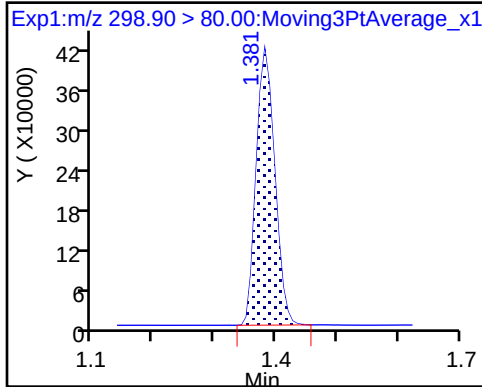
Method: 537_A8_N

Limit Group: LC 537 ICAL

1 Perfluorobutanesulfonic acid

1 Perfluorobutanesulfonic acid

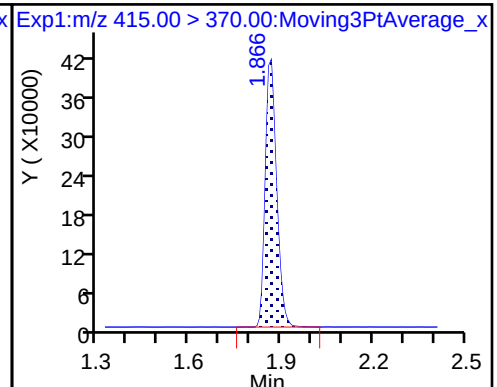
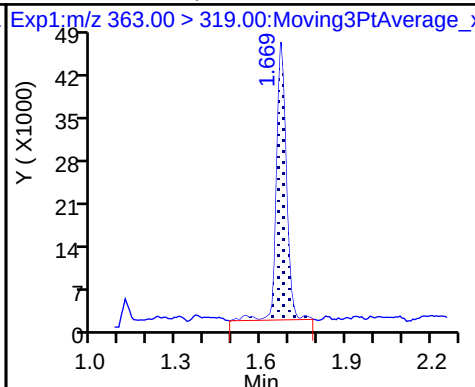
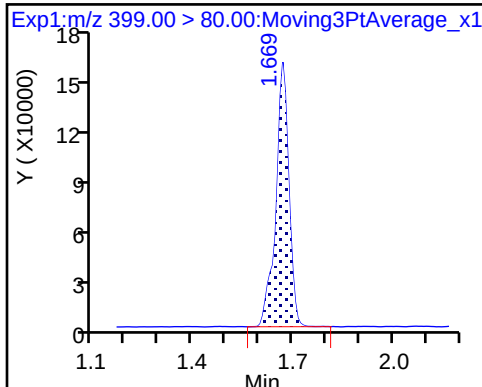
\$ 2 13C2 PFHxA



3 Perfluorohexanesulfonic acid

4 Perfluoroheptanoic acid

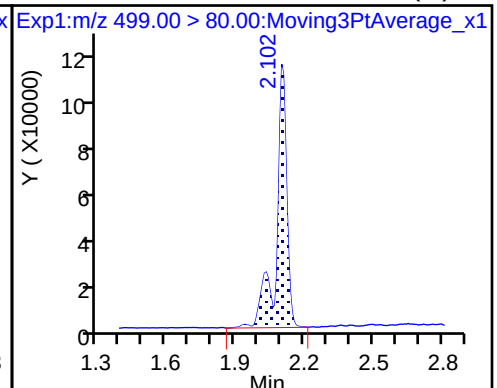
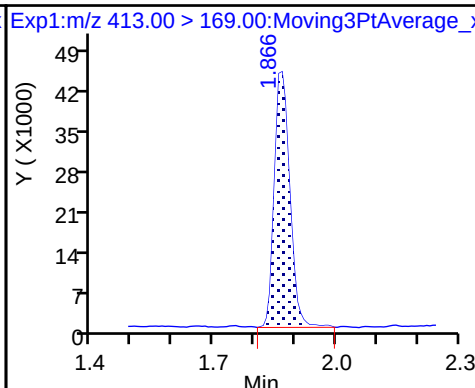
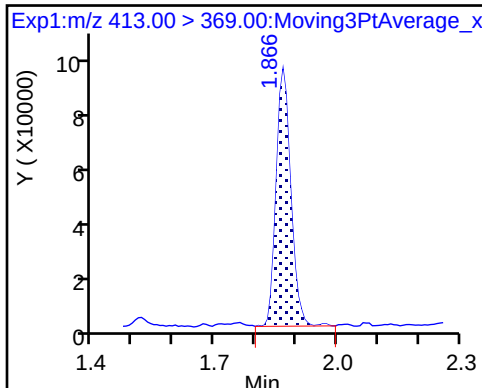
* 6 13C2-PFOA



5 Perfluorooctanoic acid

5 Perfluorooctanoic acid

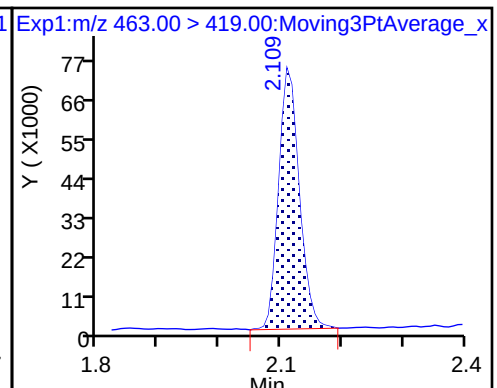
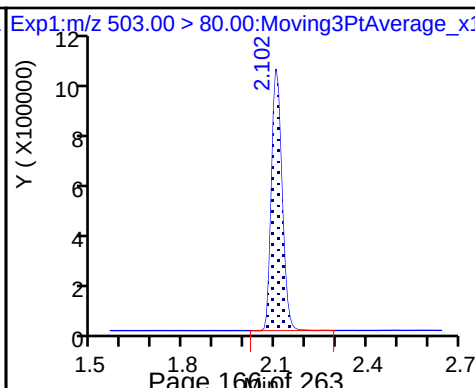
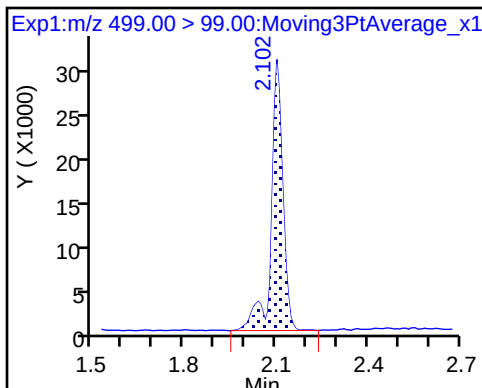
8 Perfluorooctane sulfonic acid (M)



8 Perfluorooctane sulfonic acid

* 7 13C4 PFOS

9 Perfluorononanoic acid



PFAS Calibration Calculations:

Initial Calibration 4/11/2018
Instrument A8_N

PFOS

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	Reported RRF
3.95	349354	2429483	28.7	1.04481	1.0432
8.79	715378	2220259	28.7	1.05202	1.0519
19.8	1693810	2380125	28.7	1.03153	1.0326
39.5	3678059	2440107	28.7	1.09520	1.0935
59.3	5081660	2283311	28.7	1.07713	1.0764
79.1	7016962	2316327	28.7	1.09914	1.0989
Average				1.06664	1.0661
Standard Deviation				0.0279	
RSD				0.0262	
%RSD				2.62018	2.6

Continuing Calibration 04/12/2018 @ 01:56

PFOS

Analyte Concentration	Analyte Response	Internal Standard Response	Internal Standard Amount	RRF	%D	Reported RRF	Reported %D
59.3	5015428	2243970	28.7	1.0817	1.4659238	1.081	1.4

Willow Grove
SDG 320-37566-1

Sample Identification NAWC-032718-RW-091

Compound Perfluorooctanesulfonic acid

Compound Area	358432
Internal Standard Amount (ng)	28.7
Dilution Factor	1
Internal Standard Area	2289187
Average RRF	1.0661
Sample Volume(L)	0.2425
Volume Extract (ml)	1
Injection Volume (µl)	1
Concentration	17.3819 ng/L

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