



**Groundwater Sample Results,
Level 2 Laboratory Report, Level 4 Laboratory Report,
Electronic Data Deliverable, Data Validation Report,
and the Sample Location Report, SDG 1601472**

*Marine Corps Air Station Yuma
Yuma, Arizona*

November 2019



December 19, 2016

Vista Work Order No. 1601472

Mr. Curtis Moss
AMEC Foster Wheeler
9210 Sky Park Court Suite 200
San Diego, CA 92123

Dear Mr. Moss,

Enclosed are the amended results for the sample set received at Vista Analytical Laboratory on November 18, 2016. This sample set was analyzed on a rush turn-around time, under your Project Name 'MCAS Yuma, AZ TO 105'.

Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

A handwritten signature in cursive script that reads "Karen Lopez" followed by the word "for" in a smaller, simpler font.

Martha Maier
Laboratory Director



Vista Analytical Laboratory certifies that the report herein meets all the requirements set forth by NELAP for those applicable test methods. Results relate only to the samples as received by the laboratory. This report should not be reproduced except in full without the written approval of Vista.

Vista Work Order No. 1601472**Case Narrative****Sample Condition on Receipt:**

Four water samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. This report was amended on December 19, 2016 to correct the sample IDs to "OUA1" to match the Chain of Custody.

Analytical Notes:**Modified EPA Method 537**

The aqueous samples were extracted and analyzed for PFOA, PFOS and PFBS using Modified EPA Method 537.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria

The labeled standard recoveries for all QC and field samples were within the QAPP acceptance criteria.

As requested, an MS/MSD was performed on sample "OUAI-MW49-20161117".

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Sample Inventory Report

Vista Sample ID	Client Sample ID		Sampled	Received	Components/Containers
1601472-01	EB04-20161117		17-Nov-16 10:00	18-Nov-16 09:40	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1601472-02	OUA1-MW51-20161117		17-Nov-16 08:00	18-Nov-16 09:40	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1601472-03	OUA1-MW50-20161117		17-Nov-16 09:30	18-Nov-16 09:40	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1601472-04	OUA1-MW49-20161117	MS/MSD	17-Nov-16 10:20	18-Nov-16 09:40	HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Sample ID: Method Blank						Modified EPA Method 537				
Matrix: Aqueous Sample Size: 0.125 L		QC Batch: B6K0164 Date Extracted: 28-Nov-2016 9:21				Lab Sample: B6K0164-BLK1 Date Analyzed: 29-Nov-16 22:02 Column: BEH C18				
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
PFBS	ND	1.79	4.00	8.00		IS	13C3-PFBS	115	60 - 150	
PFOA	0.916	0.651	2.00	8.00	J	IS	13C2-PFOA	89.7	60 - 150	
PFOS	ND	0.807	0.900	8.00		IS	13C8-PFOS	93.3	60 - 150	

DL - Detection limit
RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix: Aqueous		QC Batch: B6K0164				Lab Sample: B6K0164-BS1			
Sample Size: 0.125 L		Date Extracted: 28-Nov-2016 9:21				Date Analyzed: 29-Nov-16 21:37 Column: BEH C18			
Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits	Labeled Standard		%R	LCL-UCL	
PFBS	93.1	80.0	116	60 - 130	IS	13C3-PFBS	123	60 - 150	
PFOA	89.3	80.0	112	70 - 130	IS	13C2-PFOA	85.9	60 - 150	
PFOS	84.7	80.0	106	70 - 130	IS	13C8-PFOS	94.2	60 - 150	

LCL-UCL - Lower control limit - upper control limit

Sample ID: EB04-20161117							Modified EPA Method 537			
Client Data			Sample Data			Laboratory Data				
Name: AMEC Foster Wheeler			Matrix: Water			Lab Sample: 1601472-01		Date Received: 18-Nov-2016 9:40		
Project: MCAS Yuma, AZ TO 105			Sample Size: 0.120 L			QC Batch: B6K0164		Date Extracted: 28-Nov-2016 9:21		
Date Collected: 17-Nov-2016 10:00						Date Analyzed: 29-Nov-16 23:27 Column: BEH C18				
Location:										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
PFBS	ND	1.87	4.17	8.35	J, B	IS	13C3-PFBS	110	60 - 150	
PFOA	0.741	0.680	2.08	8.35		IS	13C2-PFOA	83.6	60 - 150	
PFOS	ND	0.843	0.938	8.35		IS	13C8-PFOS	96.7	60 - 150	

DL - Detection limit
RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OUA1-MW51-20161117						Modified EPA Method 537				
Client Data			Sample Data			Laboratory Data				
Name: AMEC Foster Wheeler			Matrix: Water			Lab Sample: 1601472-02		Date Received: 18-Nov-2016 9:40		
Project: MCAS Yuma, AZ TO 105			Sample Size: 0.128 L			QC Batch: B6K0164		Date Extracted: 28-Nov-2016 9:21		
Date Collected: 17-Nov-2016 8:00						Date Analyzed: 29-Nov-16 23:40 Column: BEH C18				
Location:										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
PFBS	29.6	1.75	3.91	7.83		IS	13C3-PFBS	103	60 - 150	
PFOA	8.21	0.637	1.95	7.83	B	IS	13C2-PFOA	85.3	60 - 150	
PFOS	ND	0.790	0.879	7.83		IS	13C8-PFOS	92.4	60 - 150	

DL - Detection limit
RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OUA1-MW50-20161117						Modified EPA Method 537				
Client Data			Sample Data			Laboratory Data				
Name: AMEC Foster Wheeler			Matrix: Water			Lab Sample: 1601472-03		Date Received: 18-Nov-2016 9:40		
Project: MCAS Yuma, AZ TO 105			Sample Size: 0.132 L			QC Batch: B6K0164		Date Extracted: 28-Nov-2016 9:21		
Date Collected: 17-Nov-2016 9:30						Date Analyzed: 29-Nov-16 23:52 Column: BEH C18				
Location:										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
PFBS	25.5	1.70	3.79	7.59		IS	13C3-PFBS	108	60 - 150	
PFOA	10.6	0.618	1.89	7.59	B	IS	13C2-PFOA	92.2	60 - 150	
PFOS	1.52	0.766	0.852	7.59	J	IS	13C8-PFOS	97.3	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

Sample ID: OUA1-MW49-20161117						Modified EPA Method 537				
Client Data			Sample Data			Laboratory Data				
Name: AMEC Foster Wheeler			Matrix: Water			Lab Sample: 1601472-04		Date Received: 18-Nov-2016 9:40		
Project: MCAS Yuma, AZ TO 105			Sample Size: 0.126 L			QC Batch: B6K0164		Date Extracted: 28-Nov-2016 9:21		
Date Collected: 17-Nov-2016 10:20						Date Analyzed: 30-Nov-16 00:04 Column: BEH C18				
Location:										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
PFBS	4.70	1.77	3.97	7.91	J	IS	13C3-PFBS	103	60 - 150	
PFOA	0.821	0.644	1.98	7.91	J, B	IS	13C2-PFOA	89.6	60 - 150	
PFOS	ND	0.798	0.893	7.91		IS	13C8-PFOS	88.6	60 - 150	

DL - Detection limit
 RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
 Results reported to DL.
 When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
 Only the linear isomer is reported for all other analytes.

Matrix Spike Results										Modified EPA Method 537					
Source Client ID: OUA1-MW49-20161117 Source LabNumber: 1601472-04 Matrix: Aqueous Sample Size: 0.129/0.135 L				QC Batch: B6K0164 Date Extracted: 28-Nov-2016 9:21						Lab Sample: B6K0164-MS1/B6K0164-MSD1 Date Analyzed: 30-Nov-16 00:16 Column: BEH C18 30-Nov-16 00:29 Column: BEH C18					
Analyte	Spike-MS (ng/L)	MS %R	MS Qual.	Spike-MSD (ng/L)	MSD %R	RPD	MSD Qual.	%R Limit	%RPD Limit	Labeled Standard		MS %R	MS Qualifiers	MSD %R	MS Qual.
PFBS	77.8	116		74.1	118	1.71		60 - 130	25	IS	13C3-PFBS	104		98.9	
PFOA	77.8	95.0	B	74.1	101	6.12	B	70 - 130	25	IS	13C2-PFOA	92.4		87.3	
PFOS	77.8	112		74.1	106	5.50		70 - 130	25	IS	13C8-PFOS	89.6		87.7	

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank.
D	Dilution
E	The associated compound concentration exceeded the calibration range of the instrument.
H	Recovery and/or RPD was outside laboratory acceptance limits.
I	Chemical Interference
J	The amount detected is below the Reporting Limit/LOQ.
M	Estimated Maximum Possible Concentration. (CA Region 2 projects only)
*	See Cover Letter
Conc.	Concentration
NA	Not applicable
ND	Not Detected
TEQ	Toxic Equivalency

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2014022
Nevada Division of Environmental Protection	CA004132015-1
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-004
Pennsylvania Department of Environmental Protection	012
South Carolina Department of Health	87002001
Texas Commission on Environmental Quality	T104704189-15-6
Virginia Department of General Services	7923
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

[illegible]

SAMPLE LOG-IN CHECKLIST



Vista Project #: 1601472 TAT Std

Samples Arrival:	Date/Time 11/18/16 0940	Initials: YB/B	Location: WR-2
			Shelf/Rack: NA
Logged In:	Date/Time 11/18/16 1339	Initials: YB/B	Location: WR-2
			Shelf/Rack: F 4
Delivered By:	☒ FedEx	☐ UPS	☐ On Trac
		☐ DHL	☐ Hand Delivered
Other			
Preservation:	☒ Ice	☐ Blue Ice	☐ Dry Ice
	☐ None		
Temp °C: 1.4	(uncorrected)	Time: 0953	Thermometer ID: IR-1
Temp °C: 1.1	(corrected)	Probe used: Yes ☐ No ☒	

	YES	NO	NA
Adequate Sample Volume Received?	☒		
Holding Time Acceptable?	☒		
Shipping Container(s) Intact?	☒		
Shipping Custody Seals Intact?	☒		
Shipping Documentation Present?	☒		
Airbill	Trk # 810109521965	☒	
Sample Container Intact?	☒		
Sample Custody Seals Intact?			☒
Chain of Custody / Sample Documentation Present?	☒		
COC Anomaly/Sample Acceptance Form completed?		☒	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			☒
Preservation Documented:	Na ₂ S ₂ O ₃	Trizma	Yes No ☒ NA
Shipping Container	Vista	Client	Retain Return Dispose

Comments:



December 19, 2016

Vista Work Order No. 1601472

Mr. Curtis Moss
AMEC Foster Wheeler
9210 Sky Park Court Suite 200
San Diego, CA 92123

Dear Mr. Moss,

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Vista Analytical Laboratory is committed to serving you effectively. If you require additional information, please contact me at 916-673-1520 or by email at mmaier@vista-analytical.com.

Thank you for choosing Vista as part of your analytical support team.

Sincerely,

A handwritten signature in cursive script that reads "Karen Lopez" followed by a small "for" in a regular font.

Martha Maier
Laboratory Director



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Vista Work Order No. 1601472**Case Narrative****Sample Condition on Receipt:**

Four water samples were received in good condition and within the method temperature requirements. The samples were received and stored securely in accordance with Vista standard operating procedures and EPA methodology. This report was amended on December 19, 2016 to correct the sample IDs to "OUA1" to match the Chain of Custody.

Analytical Notes:**Modified EPA Method 537**

The aqueous samples were extracted and analyzed for PFOA, PFOS and PFBS using Modified EPA Method 537.

Holding Times

The samples were extracted and analyzed within the method hold times.

Quality Control

The Initial Calibration and Continuing Calibration Verifications met the method acceptance criteria.

A Method Blank and Ongoing Precision and Recovery (OPR) sample were extracted and analyzed with the preparation batch. No analytes were detected in the Method Blank above 1/2 the LOQ. The OPR recoveries were within the method acceptance criteria

The labeled standard recoveries for all QC and field samples were within the QAPP acceptance criteria.

As requested, an MS/MSD was performed on sample "OUAI-MW49-20161117".

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Sample Inventory Report

Vista Sample ID	Client Sample ID		Sampled	Received	Components/Containers
1601472-01	EB04-20161117		17-Nov-16 10:00	18-Nov-16 09:40	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1601472-02	OUA1-MW51-20161117		17-Nov-16 08:00	18-Nov-16 09:40	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1601472-03	OUA1-MW50-20161117		17-Nov-16 09:30	18-Nov-16 09:40	HDPE Bottle, 125 mL HDPE Bottle, 125 mL
1601472-04	OUA1-MW49-20161117	MS/MSD	17-Nov-16 10:20	18-Nov-16 09:40	HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL
		MS/MSD			HDPE Bottle, 125 mL

ANALYTICAL RESULTS

Sample ID: Method Blank						Modified EPA Method 537				
Matrix: Aqueous		QC Batch: B6K0164				Lab Sample: B6K0164-BLK1				
Sample Size: 0.125 L		Date Extracted: 28-Nov-2016 9:21				Date Analyzed: 29-Nov-16 22:02 Column: BEH C18				
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
PFBS	ND	1.79	4.00	8.00		IS	13C3-PFBS	115	60 - 150	
PFOA	0.916	0.651	2.00	8.00	J	IS	13C2-PFOA	89.7	60 - 150	
PFOS	ND	0.807	0.900	8.00		IS	13C8-PFOS	93.3	60 - 150	

DL - Detection limit
RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Sample ID: OPR

Modified EPA Method 537

Matrix: Aqueous Sample Size: 0.125 L		QC Batch: B6K0164 Date Extracted: 28-Nov-2016 9:21			Lab Sample: B6K0164-BS1 Date Analyzed: 29-Nov-16 21:37 Column: BEH C18		
Analyte	Amt Found (ng/L)	Spike Amt	%R	Limits	Labeled Standard		LCL-UCL
PFBS	93.1	80.0	116	60 - 130	IS	13C3-PFBS	60 - 150
PFOA	89.3	80.0	112	70 - 130	IS	13C2-PFOA	60 - 150
PFOS	84.7	80.0	106	70 - 130	IS	13C8-PFOS	60 - 150

LCL-UCL - Lower control limit - upper control limit

Sample ID: EB04-20161117							Modified EPA Method 537				
Client Data			Sample Data			Laboratory Data					
Name:	AMEC Foster Wheeler		Matrix:	Water		Lab Sample:	1601472-01		Date Received:	18-Nov-2016 9:40	
Project:	MCAS Yuma, AZ TO 105		Sample Size:	0.120 L		QC Batch:	B6K0164		Date Extracted:	28-Nov-2016 9:21	
Date Collected:	17-Nov-2016 10:00					Date Analyzed:	29-Nov-16 23:27 Column: BEH C18				
Location:											
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers	
PFBS	ND	1.87	4.17	8.35	J, B	IS	13C3-PFBS	110	60 - 150		
PFOA	0.741	0.680	2.08	8.35		IS	13C2-PFOA	83.6	60 - 150		
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Sample ID: OUA1-MW51-20161117						Modified EPA Method 537				
Client Data			Sample Data			Laboratory Data				
Name: AMEC Foster Wheeler			Matrix: Water			Lab Sample: 1601472-02		Date Received: 18-Nov-2016 9:40		
Project: MCAS Yuma, AZ TO 105			Sample Size: 0.128 L			QC Batch: B6K0164		Date Extracted: 28-Nov-2016 9:21		
Date Collected: 17-Nov-2016 8:00						Date Analyzed: 29-Nov-16 23:40 Column: BEH C18				
Location:										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
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PFOA	8.21	0.637	1.95	7.83	B	IS	13C2-PFOA	85.3	60 - 150	
PFOS	ND	0.790	0.879	7.83		IS	13C8-PFOS	92.4	60 - 150	

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LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
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Only the linear isomer is reported for all other analytes.

Sample ID: OUA1-MW50-20161117						Modified EPA Method 537				
Client Data			Sample Data			Laboratory Data				
Name:	AMEC Foster Wheeler		Matrix:	Water		Lab Sample:	1601472-03	Date Received:	18-Nov-2016 9:40	
Project:	MCAS Yuma, AZ TO 105		Sample Size:	0.132 L		QC Batch:	B6K0164	Date Extracted:	28-Nov-2016 9:21	
Date Collected:	17-Nov-2016 9:30					Date Analyzed:	29-Nov-16 23:52 Column: BEH C18			
Location:										
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
PFBS	25.5	1.70	3.79	7.59		IS	13C3-PFBS	108	60 - 150	
PFOA	10.6	0.618	1.89	7.59	B	IS	13C2-PFOA	92.2	60 - 150	
PFOS	1.52	0.766	0.852	7.59	J	IS	13C8-PFOS	97.3	60 - 150	

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Sample ID: OUA1-MW49-20161117						Modified EPA Method 537				
Client Data Name: AMEC Foster Wheeler Project: MCAS Yuma, AZ TO 105 Date Collected: 17-Nov-2016 10:20 Location:			Sample Data Matrix: Water Sample Size: 0.126 L			Laboratory Data Lab Sample: 1601472-04 Date Received: 18-Nov-2016 9:40 QC Batch: B6K0164 Date Extracted: 28-Nov-2016 9:21 Date Analyzed: 30-Nov-16 00:04 Column: BEH C18				
Analyte	Conc. (ng/L)	DL	LOD	LOQ	Qualifiers	Labeled Standard		%R	LCL-UCL	Qualifiers
PFBS	4.70	1.77	3.97	7.91	J	IS	13C3-PFBS	103	60 - 150	
PFOA	0.821	0.644	1.98	7.91	J, B	IS	13C2-PFOA	89.6	60 - 150	
PFOS	ND	0.798	0.893	7.91		IS	13C8-PFOS	88.6	60 - 150	

DL - Detection limit
RL - Reporting limit

LCL-UCL - Lower control limit - upper control limit
Results reported to DL.
When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

Matrix Spike Results										Modified EPA Method 537					
Source Client ID: OUA1-MW49-20161117 Source LabNumber: 1601472-04 Matrix: Aqueous Sample Size: 0.129/0.135 L				QC Batch: B6K0164 Date Extracted: 28-Nov-2016 9:21						Lab Sample: B6K0164-MS1/B6K0164-MSD1 Date Analyzed: 30-Nov-16 00:16 Column: BEH C18 30-Nov-16 00:29 Column: BEH C18					
Analyte	Spike-MS (ng/L)	MS %R	MS Qual.	Spike-MSD (ng/L)	MSD %R	RPD	MSD Qual.	%R Limit	%RPD Limit	Labeled Standard		MS %R	MS Qualifiers	MSD %R	MS Qual.
PFBS	77.8	116		74.1	118	1.71		60 - 130	25	IS	13C3-PFBS	104		98.9	
PFOA	77.8	95.0	B	74.1	101	6.12	B	70 - 130	25	IS	13C2-PFOA	92.4		87.3	
PFOS	77.8	112		74.1	106	5.50		70 - 130	25	IS	13C8-PFOS	89.6		87.7	

When reported, PFBS, PFHxS, PFOA and PFOS include both linear and branched isomers.
Only the linear isomer is reported for all other analytes.

DATA QUALIFIERS & ABBREVIATIONS

B	This compound was also detected in the method blank.
D	Dilution
E	The associated compound concentration exceeded the calibration range of the instrument.
H	Recovery and/or RPD was outside laboratory acceptance limits.
I	Chemical Interference
J	The amount detected is below the Reporting Limit/LOQ.
M	Estimated Maximum Possible Concentration. (CA Region 2 projects only)
*	See Cover Letter
Conc.	Concentration
NA	Not applicable
ND	Not Detected
TEQ	Toxic Equivalency

Unless otherwise noted, solid sample results are reported in dry weight. Tissue samples are reported in wet weight.

CERTIFICATIONS

Accrediting Authority	Certificate Number
California Department of Health – ELAP	2892
DoD ELAP - A2LA Accredited - ISO/IEC 17025:2005	3091.01
Florida Department of Health	E87777
Hawaii Department of Health	N/A
Louisiana Department of Environmental Quality	01977
Maine Department of Health	2014022
Nevada Division of Environmental Protection	CA004132015-1
New Jersey Department of Environmental Protection	CA003
New York Department of Health	11411
Oregon Laboratory Accreditation Program	4042-004
Pennsylvania Department of Environmental Protection	012
South Carolina Department of Health	87002001
Texas Commission on Environmental Quality	T104704189-15-6
Virginia Department of General Services	7923
Washington Department of Ecology	C584
Wisconsin Department of Natural Resources	998036160

Current certificates and lists of licensed parameters are located in the Quality Assurance office and are available upon request

NELAP Accredited Test Methods

MATRIX: Air	
Description of Test	Method
Determination of Polychlorinated p-Dioxins & Polychlorinated Dibenzofurans	EPA 23

MATRIX: Biological Tissue	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Drinking Water	
Description of Test	Method
2,3,7,8-Tetrachlorodibenzo- p-dioxin (2,3,7,8-TCDD) GC/HRMS	EPA 1613
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537

MATRIX: Non-Potable Water	
Description of Test	Method
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613B
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Pesticides in Water, Soil, Sediment, Biosolids, and Tissue by HRGC/HRMS	EPA 1699
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Dioxin by GC/HRMS	EPA 613
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

MATRIX: Solids	
Description of Test	Method
Tetra-Octa Chlorinated Dioxins and Furans by Isotope Dilution GC/HRMS	EPA 1613
Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope	EPA 1613B

Dilution GC/HRMS	
Brominated Diphenyl Ethers by HRGC/HRMS	EPA 1614A
Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by GC/HRMS	EPA 1668A/C
Perfluorinated Alkyl Acids in Drinking Water by SPE and LC/MS/MS	EPA 537
Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans by GC/HRMS	EPA 8280A/B
Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by GC/HRMS	EPA 8290/8290A

1104 Windfield Way
El Dorado Hills, CA 95762

TEL: 916-673-1520

Vista PM: Karen Lopez

CHAIN OF CUSTODY RECORD

DATE: 11/17/2016-B

PAGE: 1 OF 1

[illegible]

SAMPLE LOG-IN CHECKLIST



Vista Project #: 1601472 TAT Std

Samples Arrival:	Date/Time 11/18/16 0940	Initials: UPB	Location: WR-2
			Shelf/Rack: NA
Logged In:	Date/Time 11/18/16 1339	Initials: UPB	Location: WR-2
			Shelf/Rack: F 4
Delivered By:	☒ FedEx	☐ UPS	☐ On Trac
		☐ DHL	☐ Hand Delivered
Other			
Preservation:	☒ Ice	☐ Blue Ice	☐ Dry Ice
		☐ None	
Temp °C: 1.4	(uncorrected)	Time: 0953	Thermometer ID: IR-1
Temp °C: 1.1	(corrected)	Probe used: Yes ☐ No ☒	

	YES	NO	NA
Adequate Sample Volume Received?	☒		
Holding Time Acceptable?	☒		
Shipping Container(s) Intact?	☒		
Shipping Custody Seals Intact?	☒		
Shipping Documentation Present?	☒		
Airbill	Trk # 810109521965	☒	
Sample Container Intact?	☒		
Sample Custody Seals Intact?			☒
Chain of Custody / Sample Documentation Present?	☒		
COC Anomaly/Sample Acceptance Form completed?		☒	
If Chlorinated or Drinking Water Samples, Acceptable Preservation?			☒
Preservation Documented:	Na ₂ S ₂ O ₃	Trizma	Yes No ☒ NA
Shipping Container	Vista	Client	Retain Return Dispose

Comments:

EXTRACTION INFORMATION

Process Sheet

Workorder: **1601472**

Prep Expiration: 12/01/2016

Client: AMEC Foster Wheeler

Workorder Due: **02-Dec-16 00:00**

TAT: 14

Method: **537 PFAS DOD (LOQ as mRL)**

Matrix: **Aqueous**

Prep Batch: BULK 0164

Prep Data Entered: 11/29/16 JS
Date and Initials

Version: PFOA, PFOS, and PFBS only

Initial Sequence: _____

LabSampleID	Recon	ClientSampleID	Date Received	Location	Comments
1601472-01	☒	EB04-20161117	18-Nov-16 09:40	WR-2 F-4	
1601472-02	☒	OUAI-MW51-20161117	18-Nov-16 09:40	WR-2 F-4	
1601472-03	☒	OUAI-MW50-20161117	18-Nov-16 09:40	WR-2 F-4	
1601472-04	☒	OUAI-MW49-20161117	18-Nov-16 09:40	WR-2 F-4	MS/MSD

WO Comments: **DoD**
PFOA/PFOS/PFBS only
MS/MSD per analytical batch

Vista PM: Martha Maier

Vial Box ID: Method

Sample Reconciled By: [Signature] 11/29/16
Page 1 of 1

Percent Solids

Project: 1601464 Balance ID: NA

Sample ID	Chemist: <u>NA</u> Date: <u>J</u> Time: <u>J</u>		Chemist: <u>NA</u> Date: <u>J</u> Time: <u>J</u>		Chemist/Date <u>em 11/27/10</u>		
	Boat Wt.	Sample + Boat Wt.	Residue + Boat Wt.	pH before	pH* after	Cr	
1601464 - 1 A				5	2 ^(A)	0	
- 2				7	2	0	
- 3				7	2	0	
- 4				7	2	0	
- 5				9	2	0	
- 6				7	2	0	
- 7				7	2	0	
- 8				7	2	0	
- 9				7	2	0	
- 10				7	2	0	
- 11				7	2	0	
1601472 - 01				7	2	0	
- 02				7	2	0	
- 03				7	2	0	
- 04				7	2	0	
- 04 B				7	2	0	
- 04 C				7	2	0	

Procedure:

- Tare the balance.
- Record Boat Weight.
- Add 2 - 10 g of sample.
- Record Wet Wt. + Boat Wt.
- Dry in oven overnight at 107°C.
- Tare the balance.
- Record Residue + Boat Wt.

Notes:

Ⓢ pH adjusted with 2 drops of Hcl. em 11/27/10
 * pH adjusted with 3 drops of Hcl. em 11/27/10

- Methods 8280, 613, 1613, 8290, 1614 - pH < 9
- Methods 1668/PCN - pH 2-3
- NCASI 551 - pH 1

PREPARATION BENCH SHEET

Matrix: Aqueous

Method: 537 PFAS DOD (LOO as mRL)

B6K0164

Chemist: G. Mendola
~~G. Mendola~~
 Prep Date/Time: 27 Nov 16 10:17
~~28 Nov 16 09:21~~

Prepared using: LCMS - SPE Extraction-LCMS

C	VISTA Sample ID	Bottle + Sample (g)	Bottle Only (g)	Sample Amt. (L)	IS/NS CHEM/WIT DATE	SPE	RS CHEM/WIT DATE
☐	B6K0164-BLK1	NA	NA	10.125	dm 35 11/20/16	dm 11/20/16	dm 35 11/20/16
☐	B6K0164-BS1	↓	↓	↓			
☐	B6K0164-MS1 1601472-04	155.58	26.97	0.12861			
☐	B6K0164-MSD1 1601472-04	142.02	27.01	0.13501			
☐	1601464-01	154.65	27.04	0.12761			
☐	1601464-02	154.39	27.06	0.12733			
☐	1601464-03	151.73	27.31	0.12442			
☐	1601464-04	156.46	27.29	0.12917			
☐	1601464-05	155.56	27.24	0.12832			
☐	1601464-06	158.9	27.30	0.13071			
☐	1601464-07	151.48	26.94	0.12454			
☐	1601464-08	156.64	27.03	0.12961			
☐	1601464-09	157.54	27.01	0.13053			
☐	1601464-10	146.99	27.03	0.11996			
☐	1601464-11	155.52	26.91	0.12861			
☐	1601472-01	146.92	27.21	0.11971			

IS Name <u>16072604, 10-11</u> (V2)	NS Name <u>16071601, 10-11</u> (V1)	RS Name <u>16071105, 10-11</u> (V4)	SPE Chem: <u>Strata XAW 33um 200mg/6ml</u>	Check Out: Chemist/Date: <u>dm 11/20/16</u>
			Ele SOLV: <u>MADH + 0.5% PH4OH in MeOH</u>	Check In: Chemist/Date: <u>empty</u>
			Final Volume(s) <u>1 mL</u>	Balance ID: <u>HPLC-2</u>

Comments: Assume 1 g = 1 mL

PREPARATION BENCH SHEET

Matrix: Aqueous

Method: 537 PFAS DOD (LOO as mRL)

B6K0164

Chemist: G. Mendiola
dm 11/28/16
 Prep Date/Time: 27 Nov 16 10:17
28 Nov 16 09:21

Prepared using: LCMS - SPE Extraction-LCMS

C6K0139							
C	VISTA Sample ID	Bottle + Sample (g)	Bottle Only (g)	Sample Amt. (L)	IS/NS CHEM/WIT DATE	SPE	RS CHEM/WIT DATE
☐	1601472-02	154.67	26.98	0.1276A	dm 11/28/16	dm 11/28/16	dm 11/28/16
☐	1601472-03	158.74	26.97	0.13177	↓	↓	↓
☐	1601472-04	153.43	27.00	0.12643	↓	↓	↓

IS Name <u>1672604, 10</u> (V2)	NS Name <u>1671601, 10</u> (V1)	RS Name <u>16K1105, 10</u> (V4)	SPE Chem: <u>Strata XAW 33um 200mg/kml</u> Ele SOLV: <u>NEOH + 0.5% NH4OH in MeOH</u> Final Volume(s) <u>1mL</u>	Check Out: <u>dm 11/28/16</u> Check In: <u>empty</u> Balance ID: <u>HVUS-9</u>

Comments: Assume 1 g = 1 mL

SAMPLE DATA – MODIFIED EPA METHOD 537

Dataset: U:\Q2.PRO\Results\161129J1\161129J1_38.qld

Last Altered: Wednesday, November 30, 2016 14:28:42 Pacific Standard Time

Printed: Wednesday, November 30, 2016 14:29:42 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 30 Nov 2016 13:32:31

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-BLK1, Description: Method Blank, Name: 161129J1_38.wiff, Date: 29-Nov-2016, Time: 22:02:14

	# Name	Trace	Peak Area	IS Resp	RRF Mean	wt/vol	RT	Conc.	%Rec
1	3 PFBS	79.90		6.349e3		0.125			
2	8 PFOA	368.90	6.514e1	5.765e3		0.125	4.67	0.916	
3	10 PFOS	79.92		3.260e3		0.125			
4	15 13C3-PFBS	79.95	6.349e3	9.756e3	0.564	0.125	3.40	115	115
5	16 13C2-PFHxA	269.90	3.255e3	9.756e3	0.907	0.125	3.80	36.8	91.9
6	17 13C4-PFHpA	321.90	5.690e3	9.756e3	0.742	0.125	4.28	78.6	78.6
7	18 18O2-PFHxS	102.90	1.082e3	4.702e3	0.271	0.125	4.39	84.9	84.9
8	19 13C2-6:2 FTS	408.90	1.713e3	9.874e3	0.224	0.125	4.63	77.6	77.6
9	20 13C2-PFOA	369.90	5.765e3	9.874e3	0.651	0.125	4.67	89.7	89.7
10	21 13C5-PFNA	422.90	4.079e3	4.942e3	1.002	0.125	5.00	82.4	82.4
11	22 13C8-PFOS	79.93	3.260e3	3.675e3	0.950	0.125	5.06	93.3	93.3
12	25 13C4-PFBA	171.90	9.883e3	9.883e3	1.000	0.125	1.93	100	100
13	26 13C5-PFHxA	273.00	9.756e3	9.756e3	1.000	0.125	3.80	100	100
14	27 13C3-PFHxS	80.01	4.702e3	4.702e3	1.000	0.125	4.39	100	100
15	28 13C8-PFOA	375.90	9.874e3	9.874e3	1.000	0.125	4.67	100	100
16	29 13C4-PFOS	79.94	3.675e3	3.675e3	1.000	0.125	5.06	100	100
17	30 13C9-PFNA	427.00	4.942e3	4.942e3	1.000	0.125	4.99	100	100
18	31 13C6-PFDA	474.00	4.548e3	4.548e3	1.000	0.125	5.28	100	100
19	32 Total PFBS	79.90		6.349e3		0.125			
20	34 Total PFOA	368.90		5.765e3		0.125		0.916	
21	35 Total PFOS	79.92		3.260e3		0.125		0.109	

Vista Analytical Laboratory Q1

Dataset: U:\Q2.PRO\Results\161129J1\161129J1_38.qld

Last Altered: Wednesday, November 30, 2016 14:28:42 Pacific Standard Time

Printed: Wednesday, November 30, 2016 14:29:42 Pacific Standard Time

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Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-BLK1, Description: Method Blank, Name: 161129J1_38.wiff, Date: 29-Nov-2016, Time: 22:02:14

Total PFBS

	# Name	Trace	RT	Area	IS Area	Conc.
1						

Total PFHxS

	# Name	Trace	RT	Area	IS Area	Conc.
1	6 PFHxS	79.91	4.40	13.341	1082.133	1.3

Total PFOA

	# Name	Trace	RT	Area	IS Area	Conc.
1	8 PFOA	368.90	4.67	65.145	5764.815	0.9

Total PFOS

	# Name	Trace	RT	Area	IS Area	Conc.
1	35 Total PFOS	79.92	4.98	9.762	3259.676	0.1

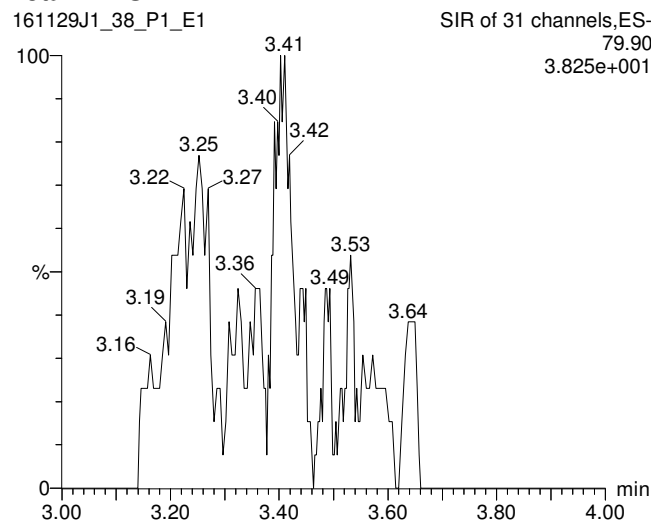
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Printed: Wednesday, November 30, 2016 14:29:42 Pacific Standard Time

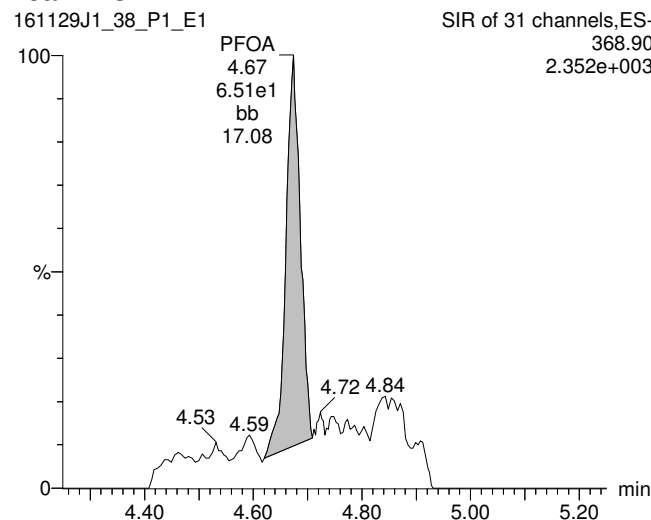
Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 30 Nov 2016 13:32:31
Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-BLK1, Description: Method Blank, Name: 161129J1_38.wiff, Date: 29-Nov-2016, Time: 22:02:14, Instrument: , Lab: ©PE-SCIEX, User: sciex

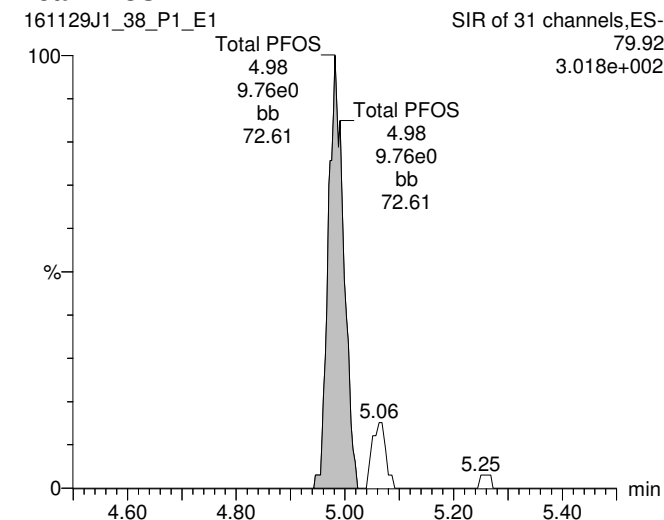
Total PFBS



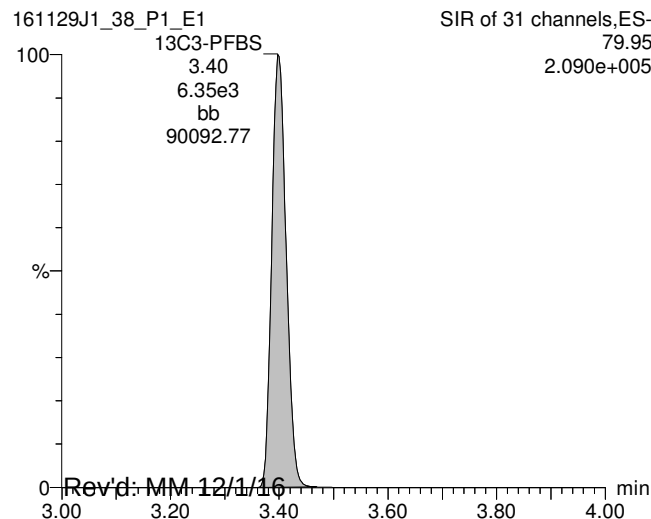
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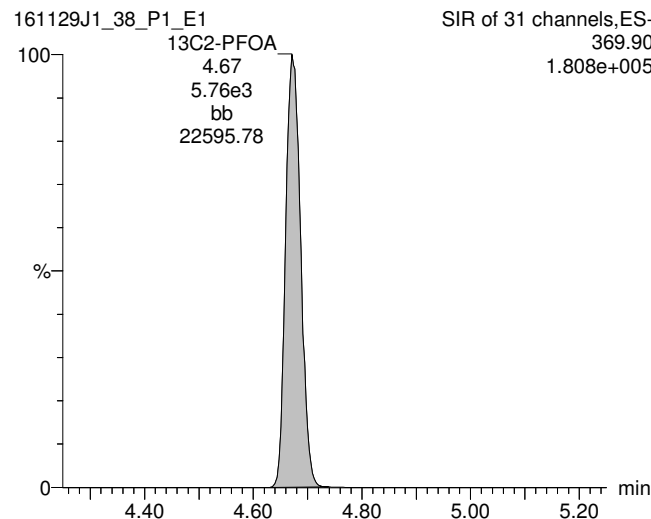
Total PFOS



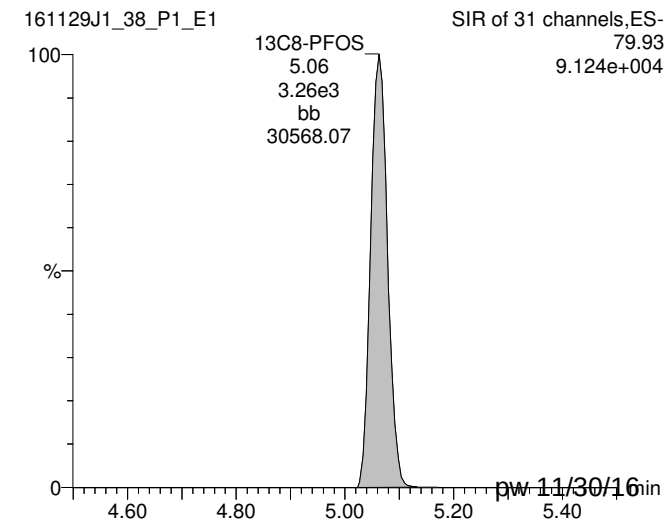
13C3-PFBS



13C2-PFOA

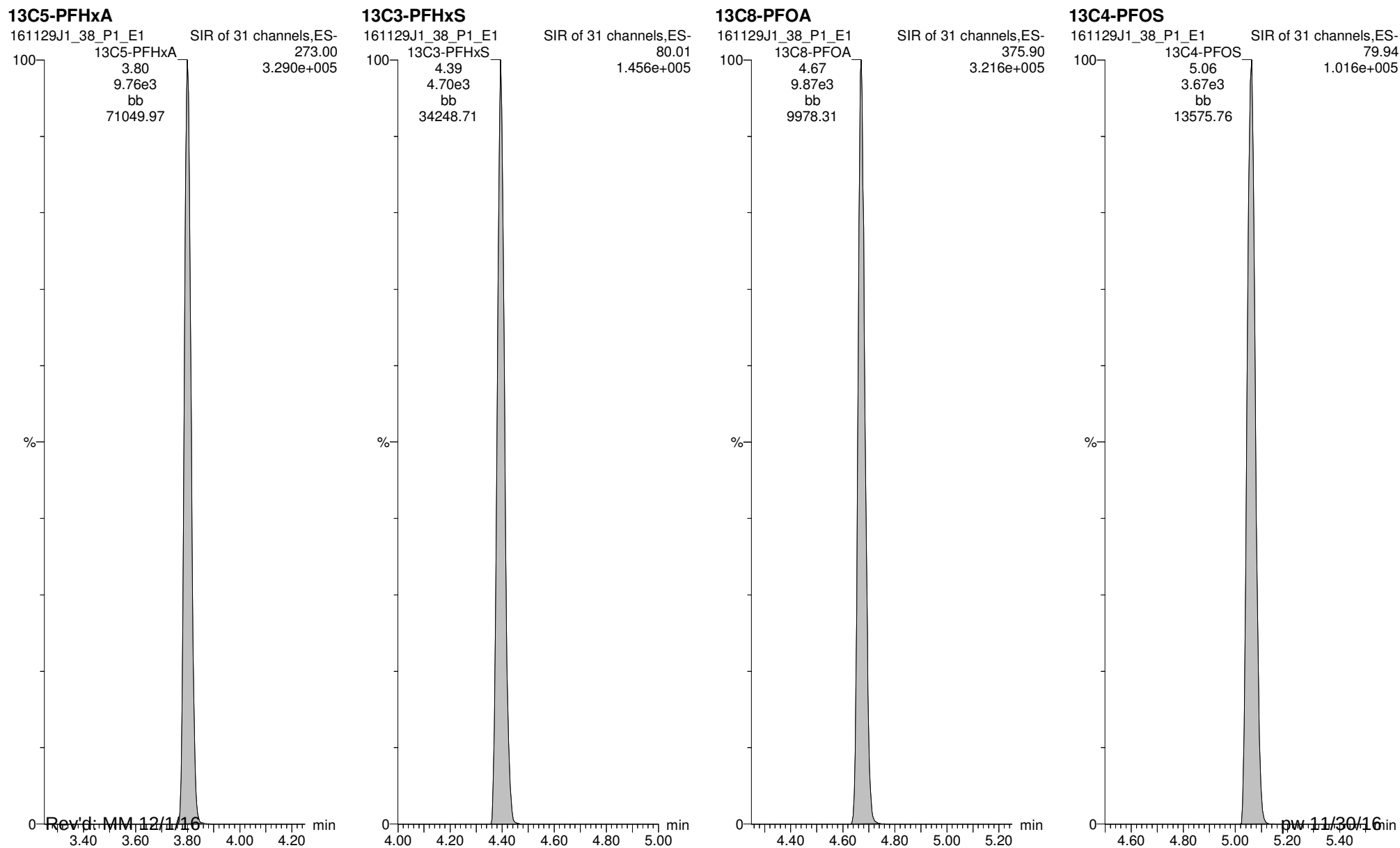


13C8-PFOS



Last Altered: Wednesday, November 30, 2016 14:28:42 Pacific Standard Time
Printed: Wednesday, November 30, 2016 14:29:42 Pacific Standard Time

ID: B6K0164-BLK1, Description: Method Blank, Name: 161129J1_38.wiff, Date: 29-Nov-2016, Time: 22:02:14, Instrument: , Lab: ©PE-SCIEX, User: sciex



Dataset: U:\Q2.PRO\Results\161129J1\161129J1_36.qld

Last Altered: Wednesday, November 30, 2016 14:27:40 Pacific Standard Time

Printed: Wednesday, November 30, 2016 14:28:04 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 30 Nov 2016 13:32:31

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-BS1, Description: OPR, Name: 161129J1_36.wiff, Date: 29-Nov-2016, Time: 21:37:45

	# Name	Trace	Peak Area	IS Resp	RRF Mean	wt/vol	RT	Conc.	%Rec
1	3 PFBS	79.90	5.194e3	7.218e3		0.125	3.40	93.1	116
2	8 PFOA	368.90	7.130e3	6.290e3		0.125	4.68	89.3	112
3	10 PFOS	79.92	3.483e3	3.569e3		0.125	5.07	84.7	106
4	15 13C3-PFBS	79.95	7.218e3	1.043e4	0.564	0.125	3.40	123	123
5	16 13C2-PFHxA	269.90	3.892e3	1.043e4	0.907	0.125	3.80	41.1	103
6	17 13C4-PFHpA	321.90	7.263e3	1.043e4	0.742	0.125	4.28	93.9	93.9
7	18 18O2-PFHxS	102.90	1.348e3	4.922e3	0.271	0.125	4.39	101	101
8	19 13C2-6:2 FTS	408.90	2.018e3	1.124e4	0.224	0.125	4.63	80.2	80.2
9	20 13C2-PFOA	369.90	6.290e3	1.124e4	0.651	0.125	4.68	85.9	85.9
10	21 13C5-PFNA	422.90	4.399e3	5.637e3	1.002	0.125	5.01	77.9	77.9
11	22 13C8-PFOS	79.93	3.569e3	3.988e3	0.950	0.125	5.07	94.2	94.2
12	25 13C4-PFBA	171.90	1.133e4	1.133e4	1.000	0.125	1.92	100	100
13	26 13C5-PFHxA	273.00	1.043e4	1.043e4	1.000	0.125	3.80	100	100
14	27 13C3-PFHxS	80.01	4.922e3	4.922e3	1.000	0.125	4.39	100	100
15	28 13C8-PFOA	375.90	1.124e4	1.124e4	1.000	0.125	4.67	100	100
16	29 13C4-PFOS	79.94	3.988e3	3.988e3	1.000	0.125	5.07	100	100
17	30 13C9-PFNA	427.00	5.637e3	5.637e3	1.000	0.125	5.00	100	100
18	31 13C6-PFDA	474.00	4.767e3	4.767e3	1.000	0.125	5.29	100	100
19	32 Total PFBS	79.90		7.218e3		0.125		93.1	
20	34 Total PFOA	368.90		6.290e3		0.125		89.3	
21	35 Total PFOS	79.92		3.569e3		0.125		84.7	

Vista Analytical Laboratory Q1

Dataset: U:\Q2.PRO\Results\161129J1\161129J1_36.qld

Last Altered: Wednesday, November 30, 2016 14:27:40 Pacific Standard Time

Printed: Wednesday, November 30, 2016 14:28:04 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 30 Nov 2016 13:32:31

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-BS1, Description: OPR, Name: 161129J1_36.wiff, Date: 29-Nov-2016, Time: 21:37:45

Total PFBS

	# Name	Trace	RT	Area	IS Area	Conc.
1	3 PFBS	79.90	3.40	5193.683	7218.484	93.1

Total PFHxS

	# Name	Trace	RT	Area	IS Area	Conc.
1	6 PFHxS	79.91	4.40	3950.831	1348.480	89.1

Total PFOA

	# Name	Trace	RT	Area	IS Area	Conc.
1	8 PFOA	368.90	4.68	7130.243	6289.707	89.3

Total PFOS

	# Name	Trace	RT	Area	IS Area	Conc.
1	10 PFOS	79.92	5.07	3483.217	3569.334	84.7

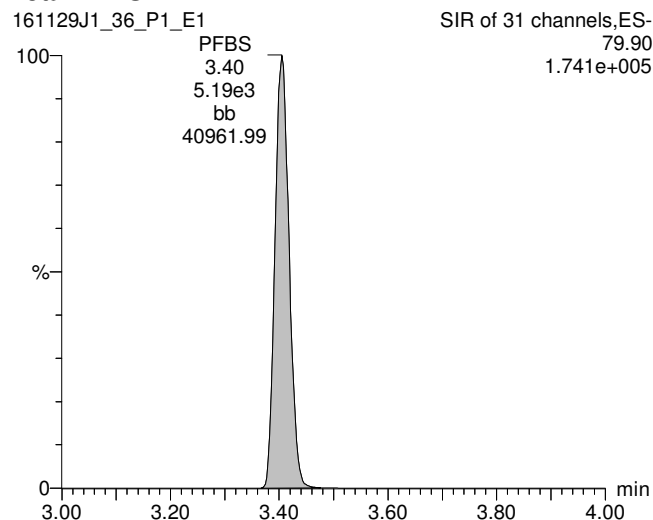
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Last Altered: Wednesday, November 30, 2016 14:27:40 Pacific Standard Time
Printed: Wednesday, November 30, 2016 14:28:04 Pacific Standard Time

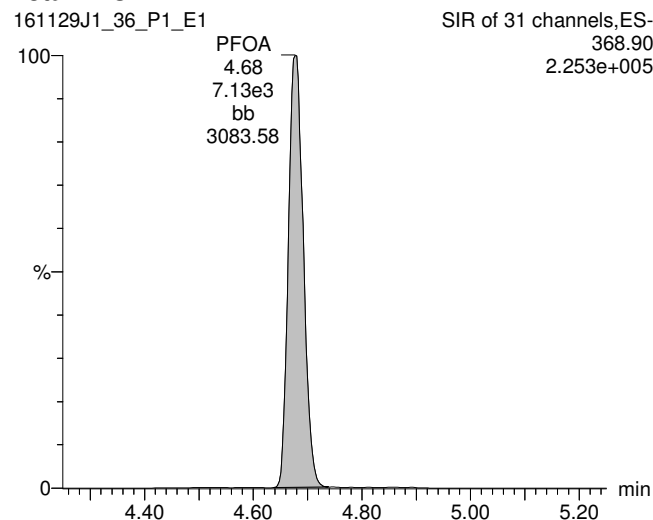
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ID: B6K0164-BS1, Description: OPR, Name: 161129J1_36.wiff, Date: 29-Nov-2016, Time: 21:37:45, Instrument: , Lab: ©PE-SCIEX, User: sciex

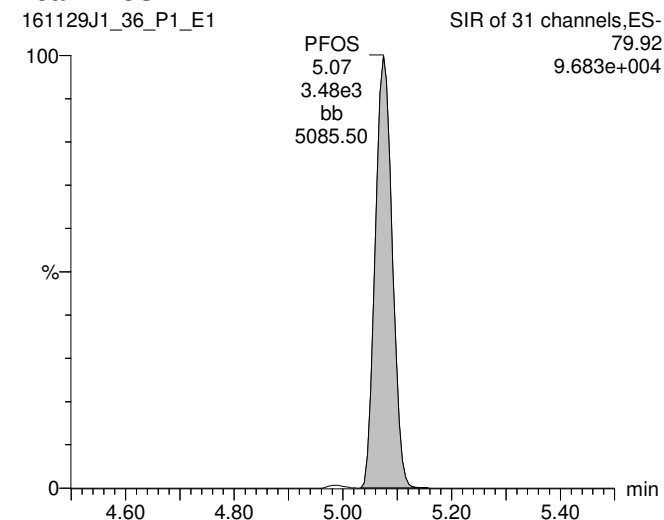
Total PFBS



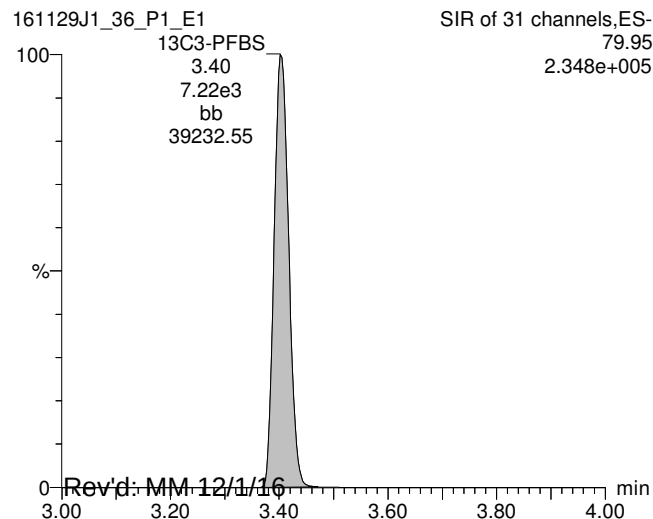
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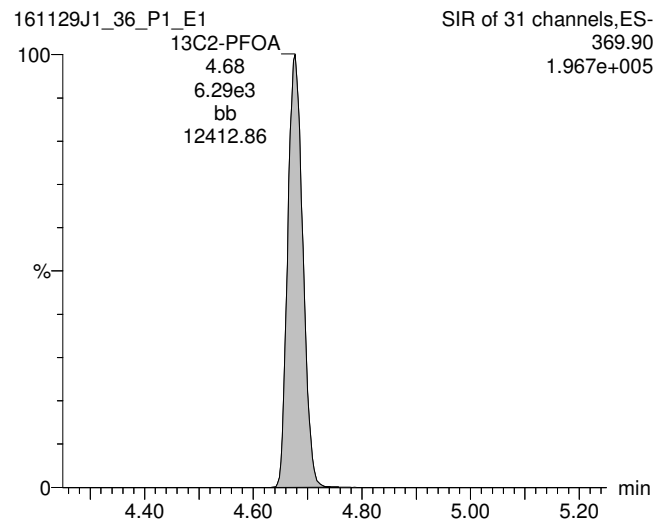
Total PFOS



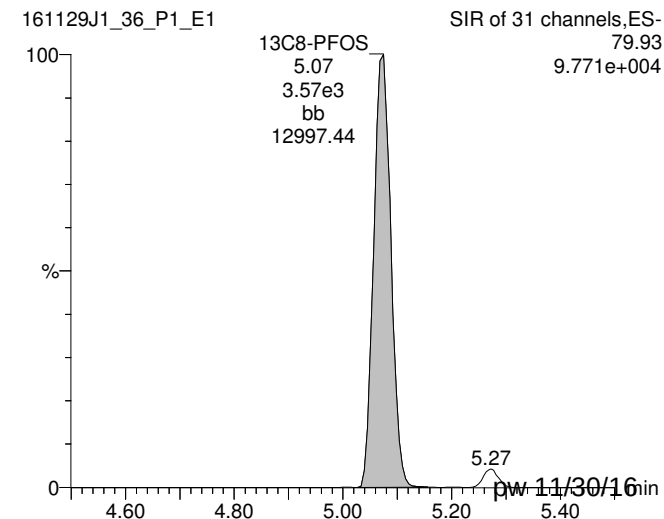
13C3-PFBS



13C2-PFOA



13C8-PFOS



Rev'd: MM-12/1/16

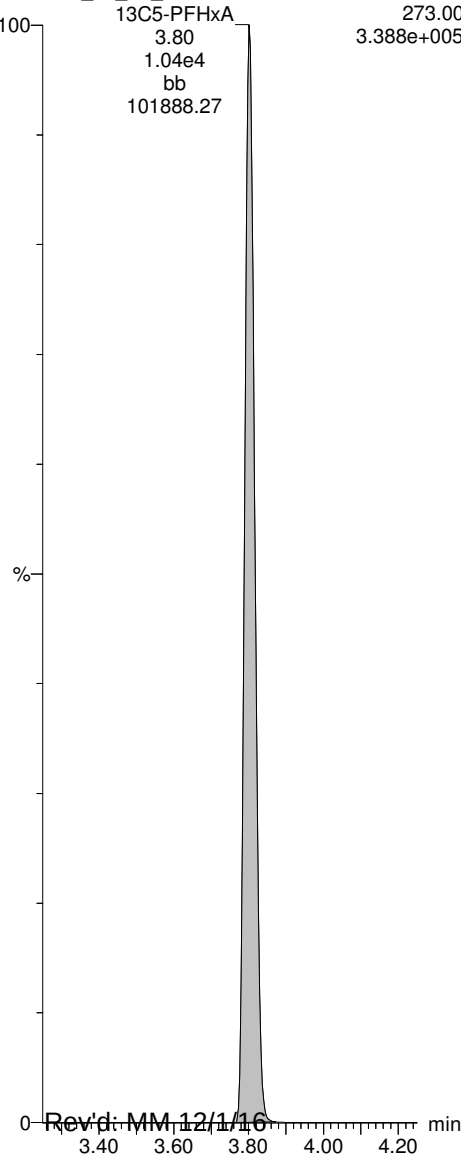
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Last Altered: Wednesday, November 30, 2016 14:27:40 Pacific Standard Time
Printed: Wednesday, November 30, 2016 14:28:04 Pacific Standard Time

ID: B6K0164-BS1, Description: OPR, Name: 161129J1_36.wiff, Date: 29-Nov-2016, Time: 21:37:45, Instrument: , Lab: ©PE-SCIEX, User: sciex

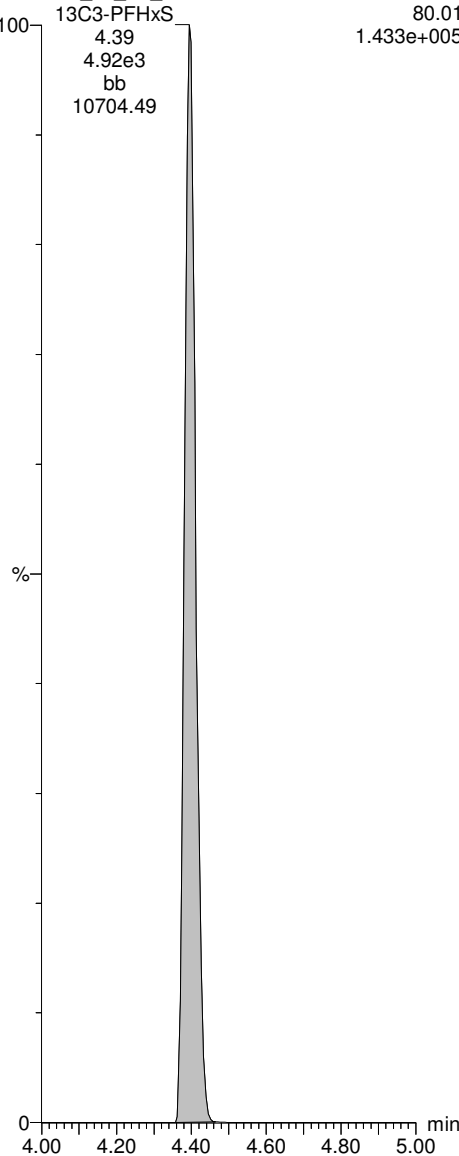
13C5-PFHxA

161129J1_36_P1_E1 SIR of 31 channels,ES-
13C5-PFHxA 273.00
3.80 3.388e+005
1.04e4
bb
101888.27



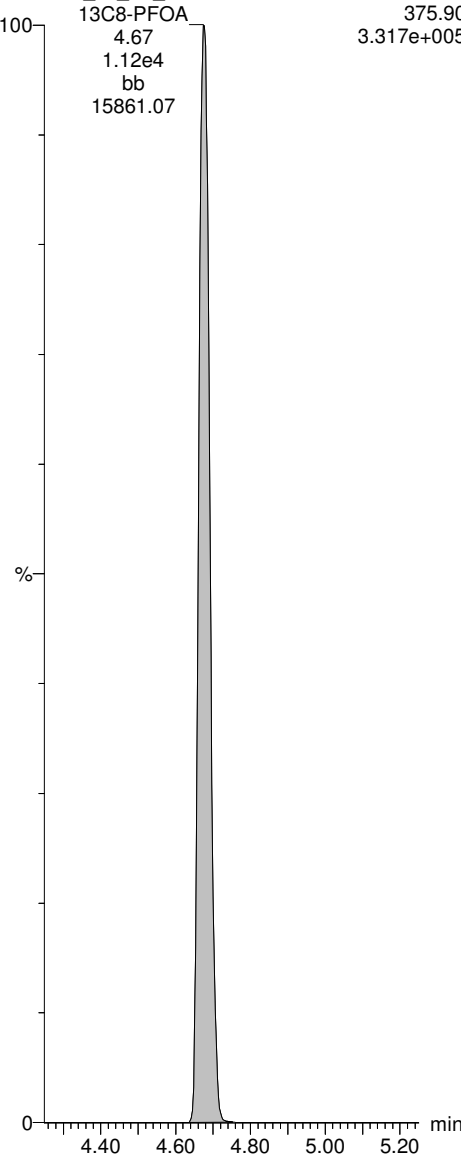
13C3-PFHxS

161129J1_36_P1_E1 SIR of 31 channels,ES-
13C3-PFHxS 80.01
4.39 1.433e+005
4.92e3
bb
10704.49



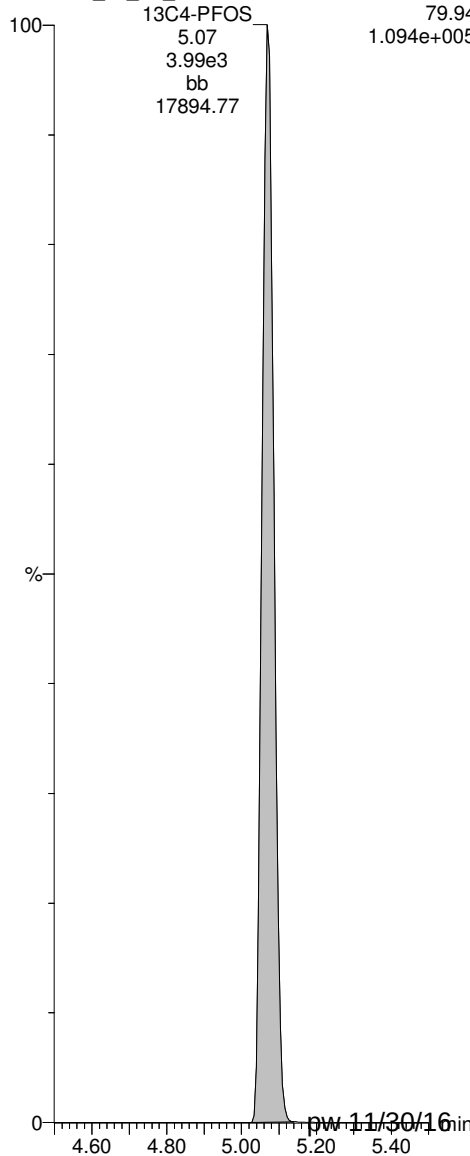
13C8-PFOA

161129J1_36_P1_E1 SIR of 31 channels,ES-
13C8-PFOA 375.90
4.67 3.317e+005
1.12e4
bb
15861.07



13C4-PFOS

161129J1_36_P1_E1 SIR of 31 channels,ES-
13C4-PFOS 79.94
5.07 1.094e+005
3.99e3
bb
17894.77



Rev'd: MM 12/1/16
Work Order 1601472 Revision 1

Dataset: U:\Q2.PRO\Results\161129J1\161129J1_45.qld

Last Altered: Wednesday, November 30, 2016 17:10:34 Pacific Standard Time

Printed: Wednesday, November 30, 2016 17:10:43 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_Mixed.mdb 30 Nov 2016 16:19:52

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: 1601472-01, Description: EB04-20161117, Name: 161129J1_45.wiff, Date: 29-Nov-2016, Time: 23:27:59

	# Name	Trace	Peak Area	IS Resp	RRF Mean	wt/vol	RT	Conc.	%Rec
1	3 PFBS	79.90		6.941e3		0.120			
2	8 PFOA	368.90	5.462e1	6.351e3		0.120	4.67	0.741	
3	10 PFOS	79.92	1.339e0	3.983e3		0.120	5.06		
4	15 13C3-PFBS	79.95	6.941e3	1.116e4	0.564	0.120	3.40	115	110
5	16 13C2-PFHxA	269.90	4.010e3	1.116e4	0.907	0.120	3.80	41.4	99.0
6	17 13C4-PFHpA	321.90	7.257e3	1.116e4	0.742	0.120	4.27	91.5	87.7
7	18 18O2-PFHxS	102.90	1.237e3	4.836e3	0.271	0.120	4.39	98.5	94.4
8	19 13C2-6:2 FTS	408.90	1.964e3	1.167e4	0.224	0.120	4.62	78.6	75.3
9	20 13C2-PFOA	369.90	6.351e3	1.167e4	0.651	0.120	4.67	87.3	83.6
10	21 13C5-PFNA	422.90	5.114e3	5.356e3	1.002	0.120	4.99	99.5	95.3
11	22 13C8-PFOS	79.93	3.983e3	4.334e3	0.950	0.120	5.06	101	96.7
12	25 13C4-PFBA	171.90	1.170e4	1.170e4	1.000	0.120	1.93	104	100
13	26 13C5-PFHxA	273.00	1.116e4	1.116e4	1.000	0.120	3.80	104	100
14	27 13C3-PFHxS	80.01	4.836e3	4.836e3	1.000	0.120	4.39	104	100
15	28 13C8-PFOA	375.90	1.167e4	1.167e4	1.000	0.120	4.66	104	100
16	29 13C9-PFNA	427.00	5.356e3	5.356e3	1.000	0.120	5.00	104	100
17	30 13C4-PFOS	79.94	4.334e3	4.334e3		0.120	5.06		
18	31 13C6-PFDA	474.00	5.502e3	5.502e3	1.000	0.120	5.28	104	100
19	32 Total PFBS	79.90		6.941e3		0.120			
20	34 Total PFOA	368.90		6.351e3		0.120		0.741	
21	35 Total PFOS	79.92		3.983e3		0.120		0.0844	

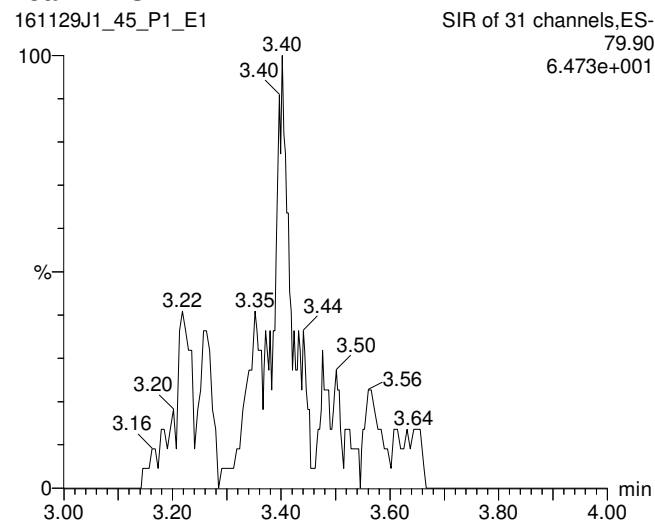
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Last Altered: Wednesday, November 30, 2016 17:10:34 Pacific Standard Time
Printed: Wednesday, November 30, 2016 17:10:43 Pacific Standard Time

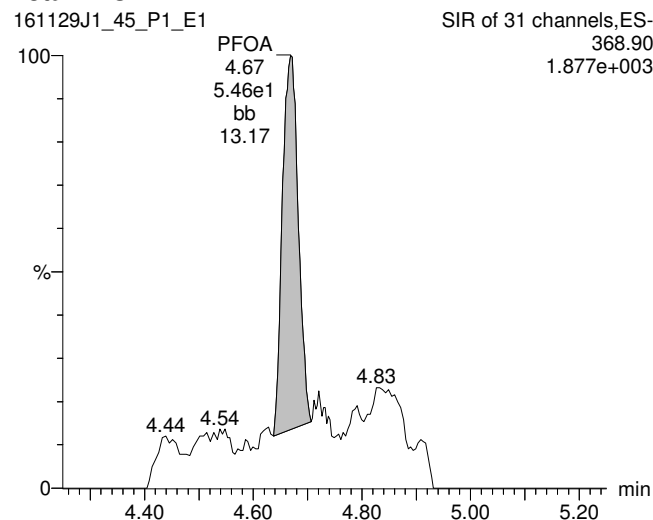
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Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: 1601472-01, Description: EB04-20161117, Name: 161129J1_45.wiff, Date: 29-Nov-2016, Time: 23:27:59, Instrument: , Lab: ©PE-SCIEX, User: sciex

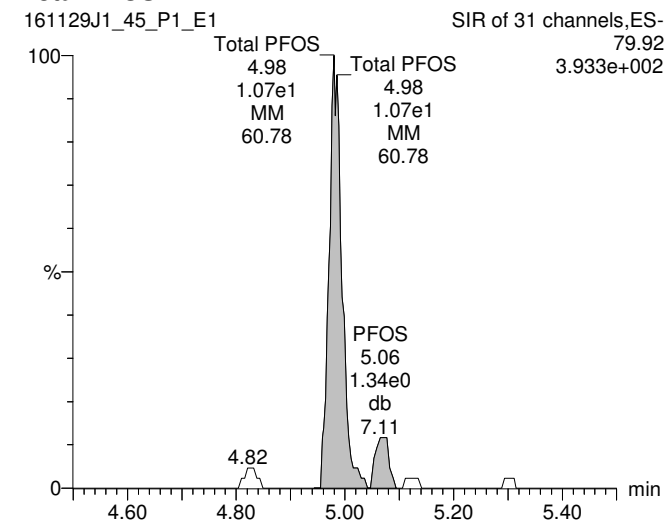
Total PFBS



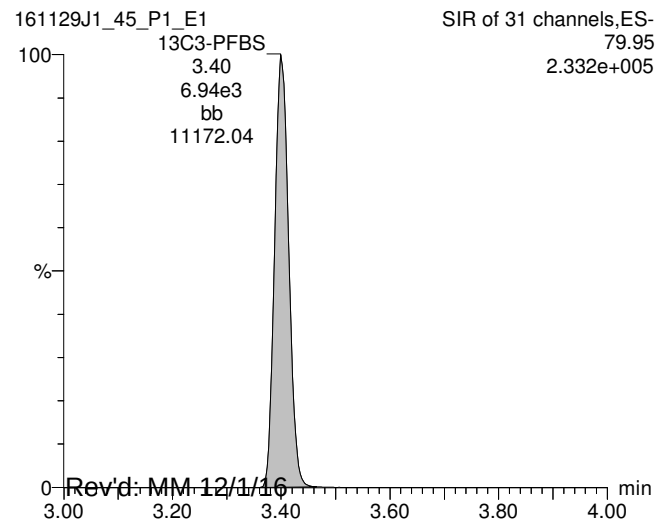
Total PFOA



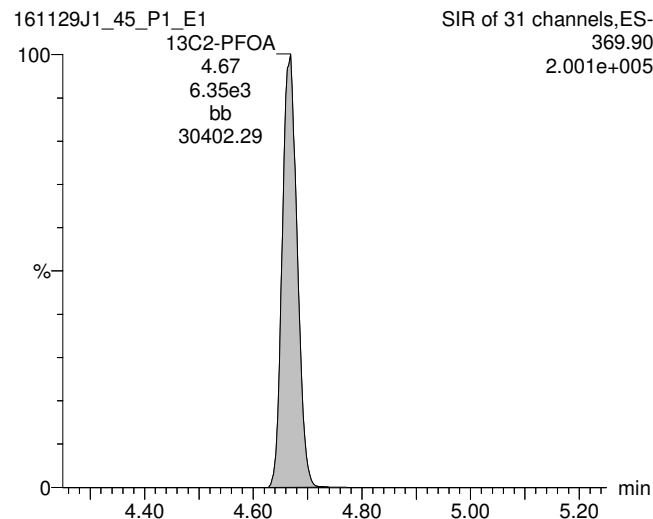
Total PFOS



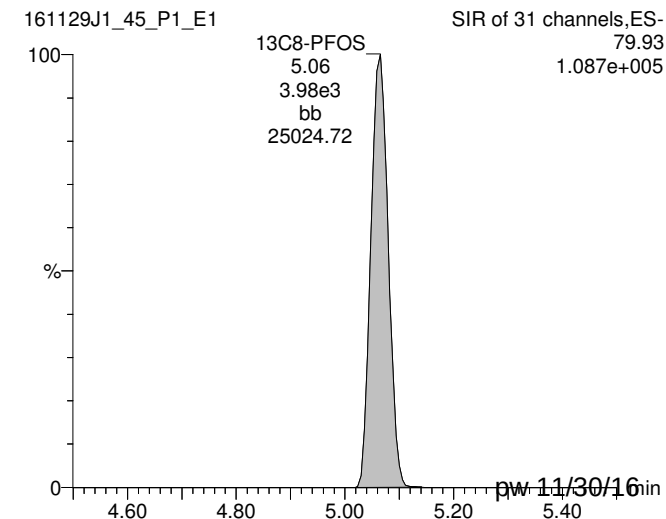
13C3-PFBS



13C2-PFOA

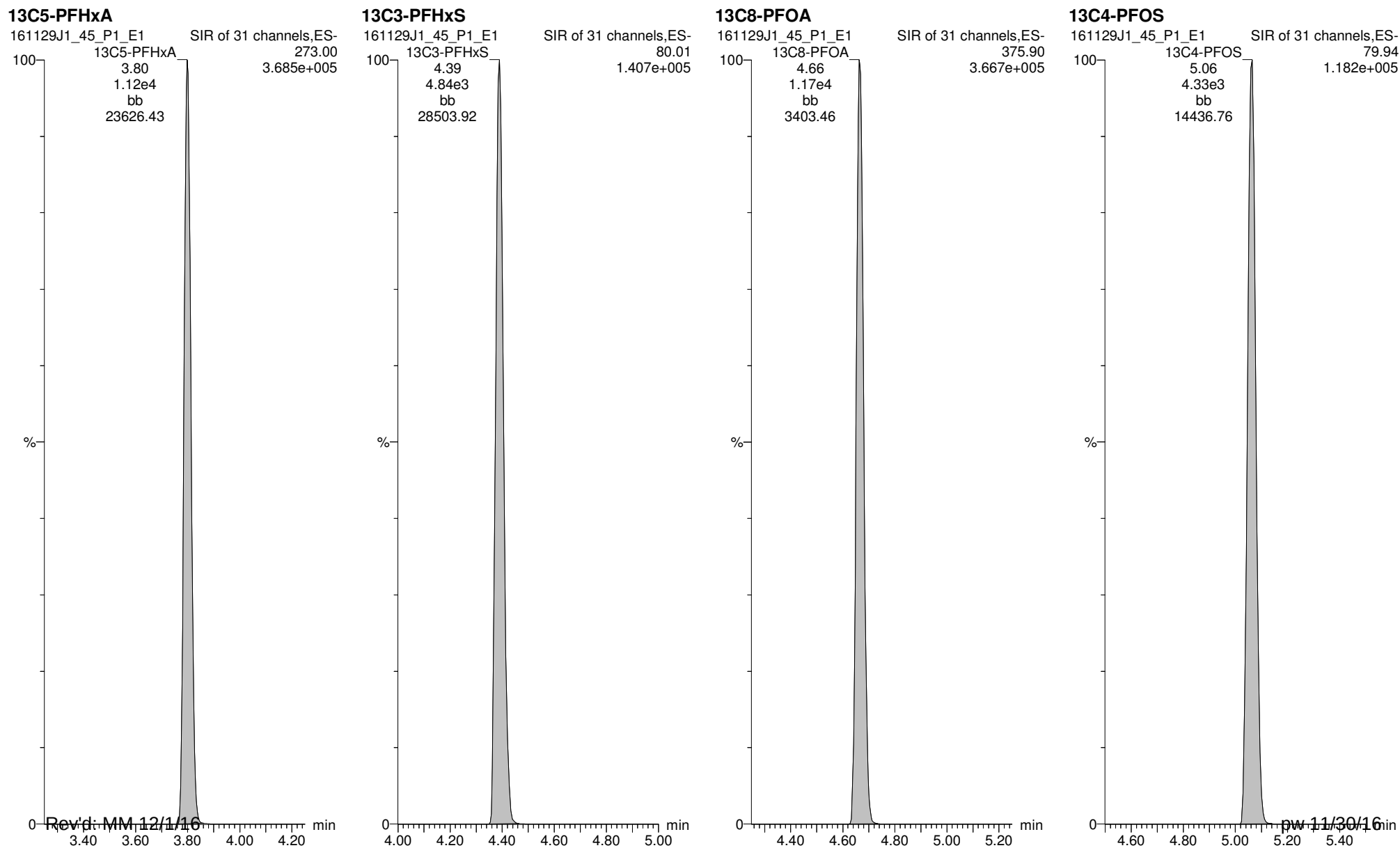


13C8-PFOS



Last Altered: Wednesday, November 30, 2016 17:10:34 Pacific Standard Time
Printed: Wednesday, November 30, 2016 17:10:43 Pacific Standard Time

ID: 1601472-01, Description: EB04-20161117, Name: 161129J1_45.wiff, Date: 29-Nov-2016, Time: 23:27:59, Instrument: , Lab: ©PE-SCIEX, User: sciex



Dataset: U:\Q2.PRO\Results\161129J1\161129J1_46.qld

Last Altered: Thursday, December 01, 2016 11:53:26 Pacific Standard Time

Printed: Thursday, December 01, 2016 11:53:46 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 01 Dec 2016 11:10:17

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: 1601472-02, Description: OUA1-MW51-20161117, Name: 161129J1_46.wiff, Date: 29-Nov-2016, Time: 23:40:10

	# Name	Trace	Peak Area	IS Resp	RRF Mean	wt/vol	RT	Conc.	%Rec
1	3 PFBS	79.90	1.363e3	6.053e3		0.128	3.40	28.7	
2	8 PFOA	368.90	5.073e2	5.556e3		0.128	4.67	6.91	
3	10 PFOS	79.92	7.928e0	3.200e3		0.128	5.06	0.0623	
4	15 13C3-PFBS	79.95	6.053e3	1.045e4	0.564	0.128	3.40	101	103
5	16 13C2-PFHxA	269.90	3.661e3	1.045e4	0.907	0.128	3.80	37.8	96.6
6	17 13C4-PFHpA	321.90	6.440e3	1.045e4	0.742	0.128	4.27	81.4	83.1
7	18 18O2-PFHxS	102.90	1.131e3	3.991e3	0.271	0.128	4.39	102	104
8	19 13C2-6:2 FTS	408.90	1.587e3	9.999e3	0.224	0.128	4.63	69.5	71.0
9	20 13C2-PFOA	369.90	5.556e3	9.999e3	0.651	0.128	4.67	83.5	85.3
10	21 13C5-PFNA	422.90	5.104e3	5.572e3	1.002	0.128	4.99	89.5	91.4
11	22 13C8-PFOS	79.93	3.200e3	3.642e3	0.950	0.128	5.05	90.5	92.4
12	25 13C4-PFBA	171.90	1.094e4	1.094e4	1.000	0.128	1.93	97.9	100
13	26 13C5-PFHxA	273.00	1.045e4	1.045e4	1.000	0.128	3.80	97.9	100
14	27 13C3-PFHxS	80.01	3.991e3	3.991e3	1.000	0.128	4.39	97.9	100
15	28 13C8-PFOA	375.90	9.999e3	9.999e3	1.000	0.128	4.66	97.9	100
16	29 13C4-PFOS	79.94	3.642e3	3.642e3	1.000	0.128	5.05	97.9	100
17	30 13C9-PFNA	427.00	5.572e3	5.572e3	1.000	0.128	4.99	97.9	100
18	31 13C6-PFDA	474.00	5.370e3	5.370e3	1.000	0.128	5.27	97.9	100
19	32 Total PFBS	79.90		6.053e3		0.128		29.6	
20	34 Total PFOA	368.90		5.556e3		0.128		8.21	
21	35 Total PFOS	79.92		3.200e3		0.128		0.780	

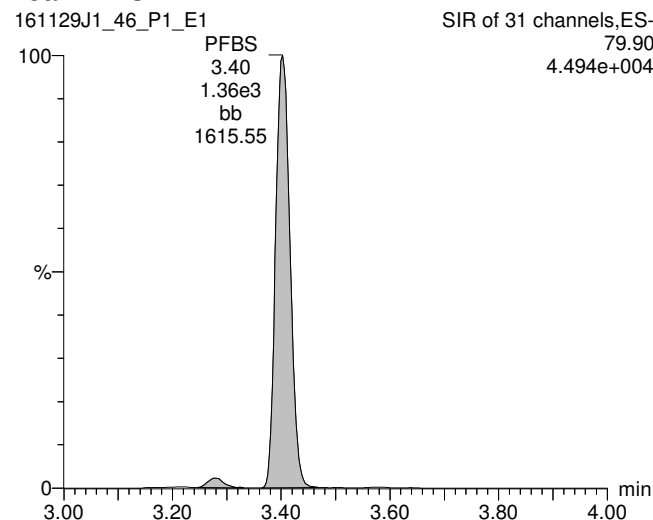
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Last Altered: Thursday, December 01, 2016 11:53:26 Pacific Standard Time
Printed: Thursday, December 01, 2016 11:53:46 Pacific Standard Time

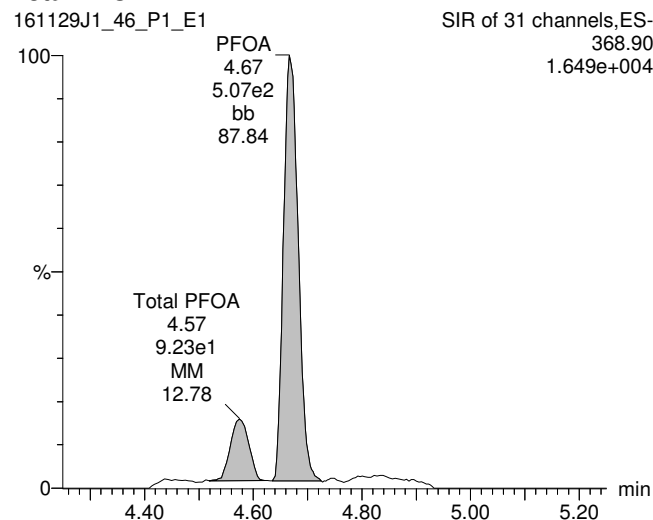
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Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: 1601472-02, Description: OUAI-MW51-20161117, Name: 161129J1_46.wiff, Date: 29-Nov-2016, Time: 23:40:10, Instrument: , Lab: ©PE-SCIEX, User: sciex

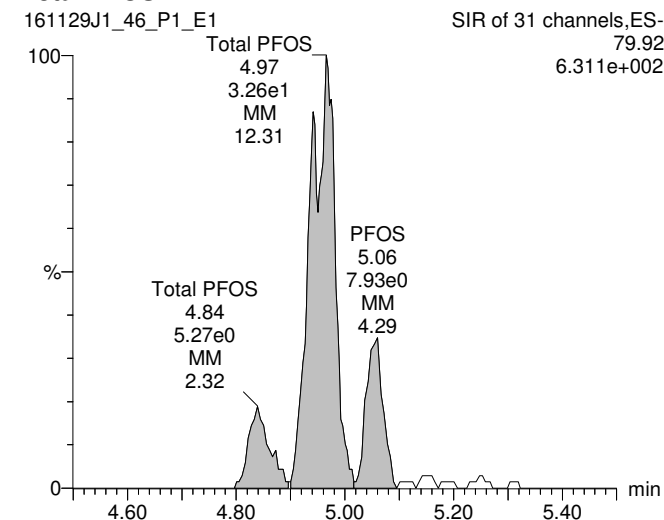
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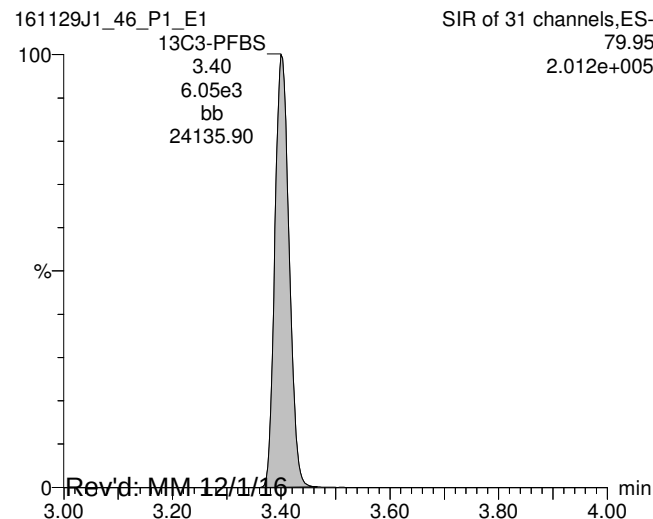
Total PFOA



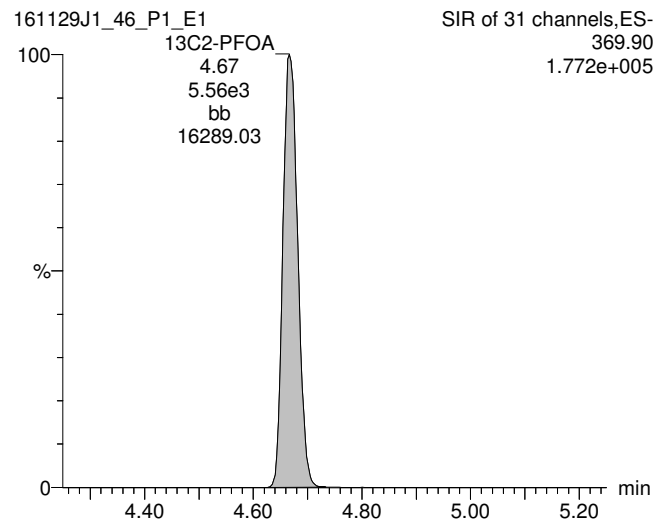
Total PFOS



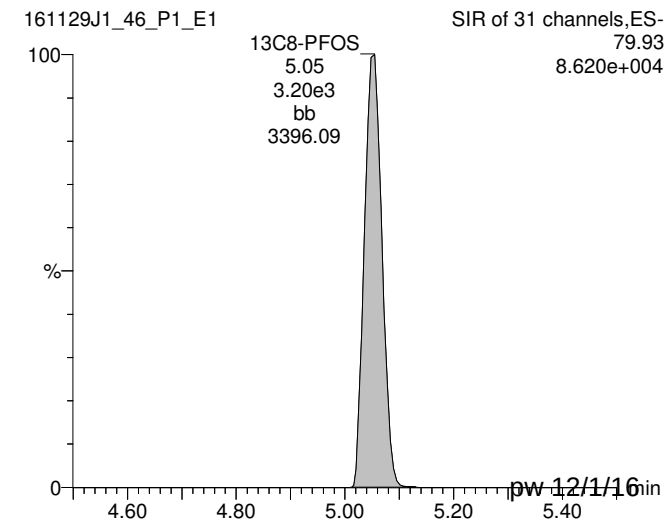
13C3-PFBS

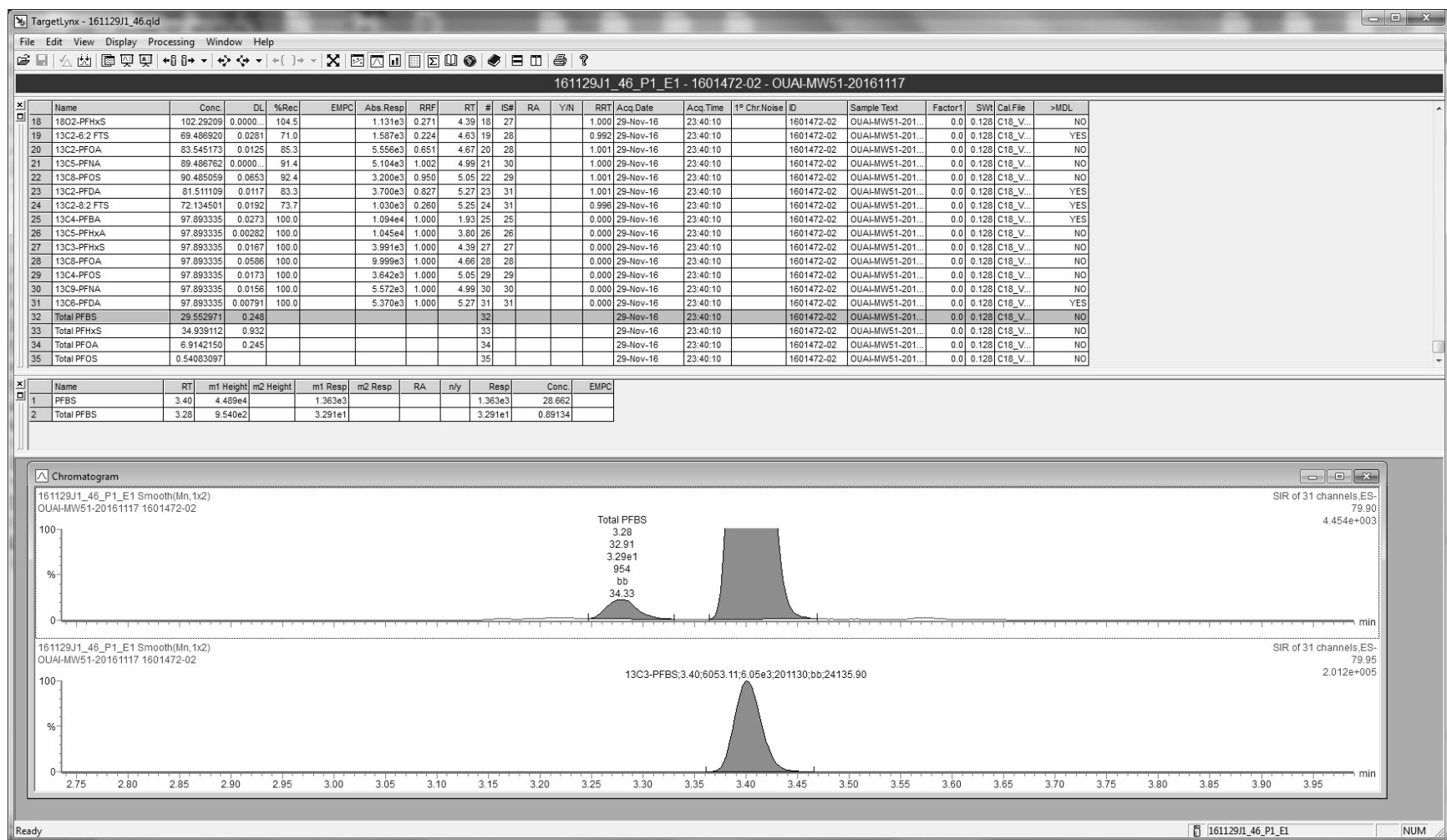


13C2-PFOA



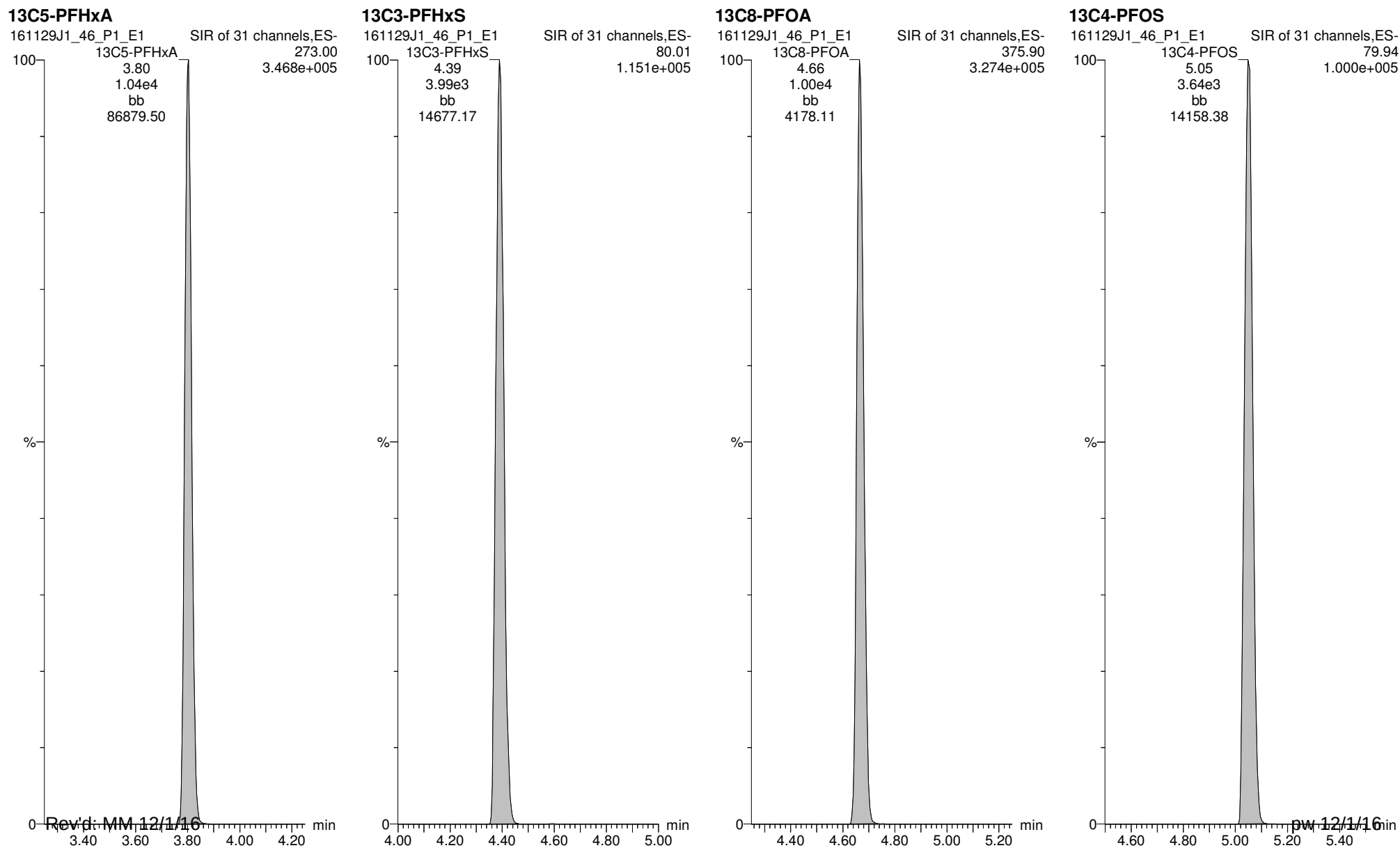
13C8-PFOS





Last Altered: Thursday, December 01, 2016 11:53:26 Pacific Standard Time
Printed: Thursday, December 01, 2016 11:53:46 Pacific Standard Time

ID: 1601472-02, Description: OUAI-MW51-20161117, Name: 161129J1_46.wiff, Date: 29-Nov-2016, Time: 23:40:10, Instrument: , Lab: ©PE-SCIEX, User: sciex



Dataset: U:\Q2.PRO\Results\161129J1\161129J1_47.qld

Last Altered: Thursday, December 01, 2016 11:56:09 Pacific Standard Time

Printed: Thursday, December 01, 2016 11:56:50 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 01 Dec 2016 11:10:17

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: 1601472-03, Description: OUA1-MW50-20161117, Name: 161129J1_47.wiff, Date: 29-Nov-2016, Time: 23:52:24

	# Name	Trace	Peak Area	IS Resp	RRF Mean	wt/vol	RT	Conc.	%Rec
1	3 PFBS	79.90	1.239e3	6.175e3		0.132	3.40	24.8	
2	8 PFOA	368.90	7.130e2	6.007e3		0.132	4.66	8.70	
3	10 PFOS	79.92	3.853e0	3.104e3		0.132	5.04		
4	15 13C3-PFBS	79.95	6.175e3	1.011e4	0.564	0.132	3.40	103	108
5	16 13C2-PFHxA	269.90	3.712e3	1.011e4	0.907	0.132	3.80	38.4	101
6	17 13C4-PFHpA	321.90	7.383e3	1.011e4	0.742	0.132	4.27	93.4	98.4
7	18 18O2-PFHxS	102.90	1.093e3	4.386e3	0.271	0.132	4.38	87.2	91.9
8	19 13C2-6:2 FTS	408.90	1.741e3	1.000e4	0.224	0.132	4.61	73.8	77.8
9	20 13C2-PFOA	369.90	6.007e3	1.000e4	0.651	0.132	4.65	87.5	92.2
10	21 13C5-PFNA	422.90	5.147e3	5.575e3	1.002	0.132	4.99	87.4	92.1
11	22 13C8-PFOS	79.93	3.104e3	3.358e3	0.950	0.132	5.05	92.3	97.3
12	25 13C4-PFBA	171.90	1.073e4	1.073e4	1.000	0.132	1.93	94.9	100
13	26 13C5-PFHxA	273.00	1.011e4	1.011e4	1.000	0.132	3.79	94.9	100
14	27 13C3-PFHxS	80.01	4.386e3	4.386e3	1.000	0.132	4.38	94.9	100
15	28 13C8-PFOA	375.90	1.000e4	1.000e4	1.000	0.132	4.66	94.9	100
16	29 13C4-PFOS	79.94	3.358e3	3.358e3	1.000	0.132	5.04	94.9	100
17	30 13C9-PFNA	427.00	5.575e3	5.575e3	1.000	0.132	4.99	94.9	100
18	31 13C6-PFDA	474.00	5.187e3	5.187e3	1.000	0.132	5.27	94.9	100
19	32 Total PFBS	79.90		6.175e3		0.132		25.5	
20	34 Total PFOA	368.90		6.007e3		0.132		10.6	
21	35 Total PFOS	79.92		3.104e3		0.132		1.52	

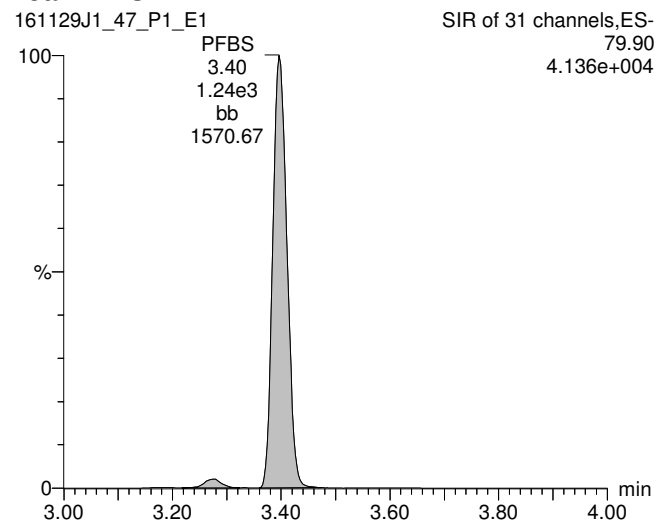
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Printed: Thursday, December 01, 2016 11:56:50 Pacific Standard Time

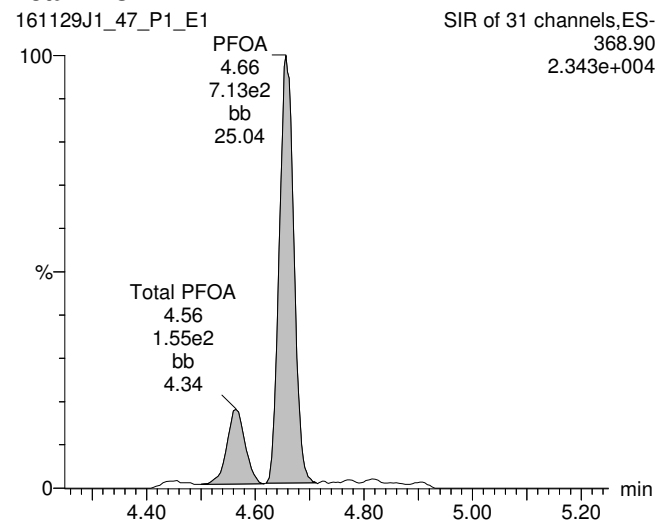
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ID: 1601472-03, Description: OUAI-MW50-20161117, Name: 161129J1_47.wiff, Date: 29-Nov-2016, Time: 23:52:24, Instrument: , Lab: ©PE-SCIEX, User: sciex

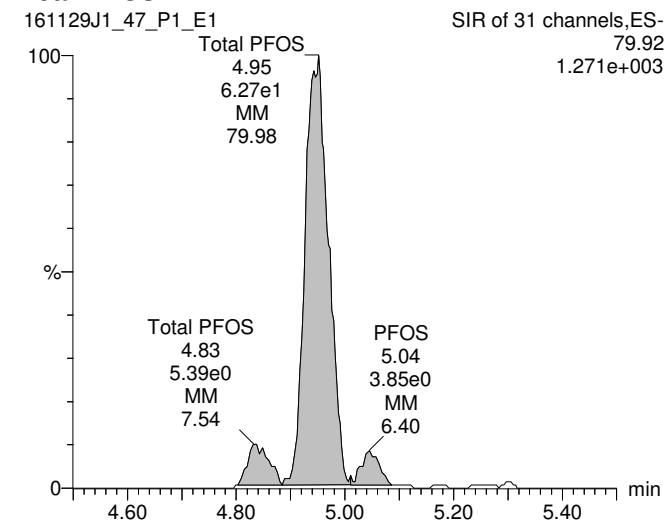
Total PFBS



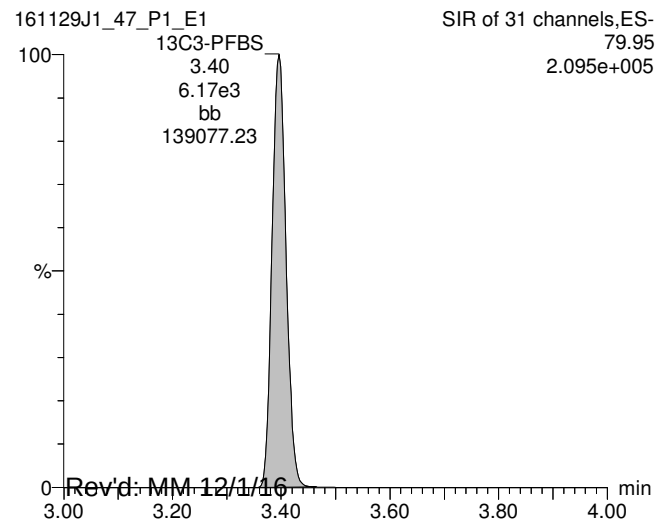
Total PFOA



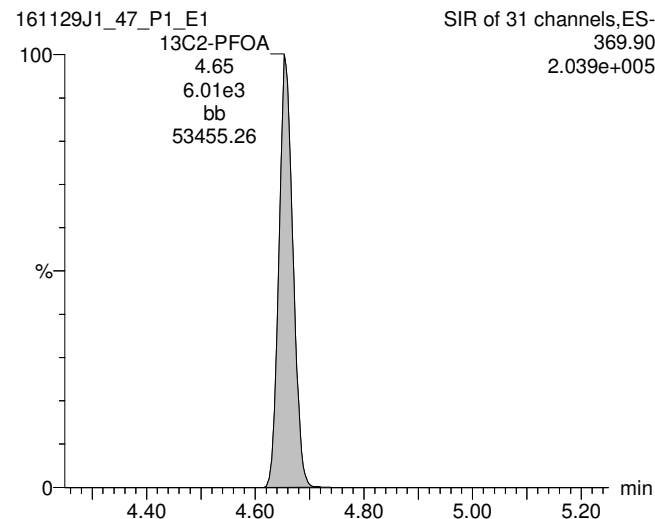
Total PFOS



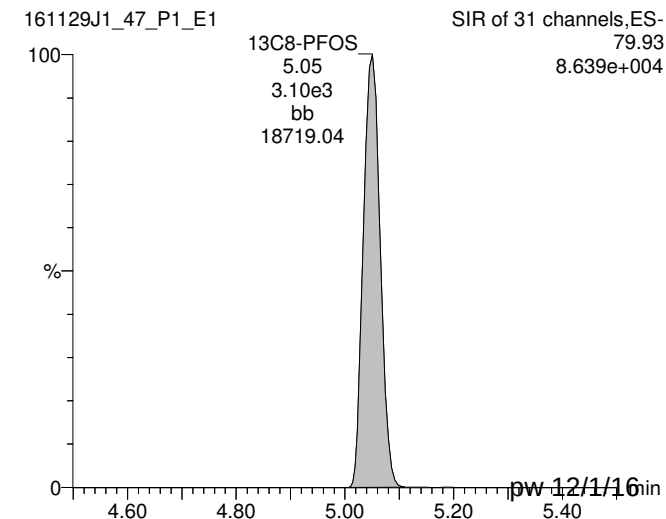
13C3-PFBS

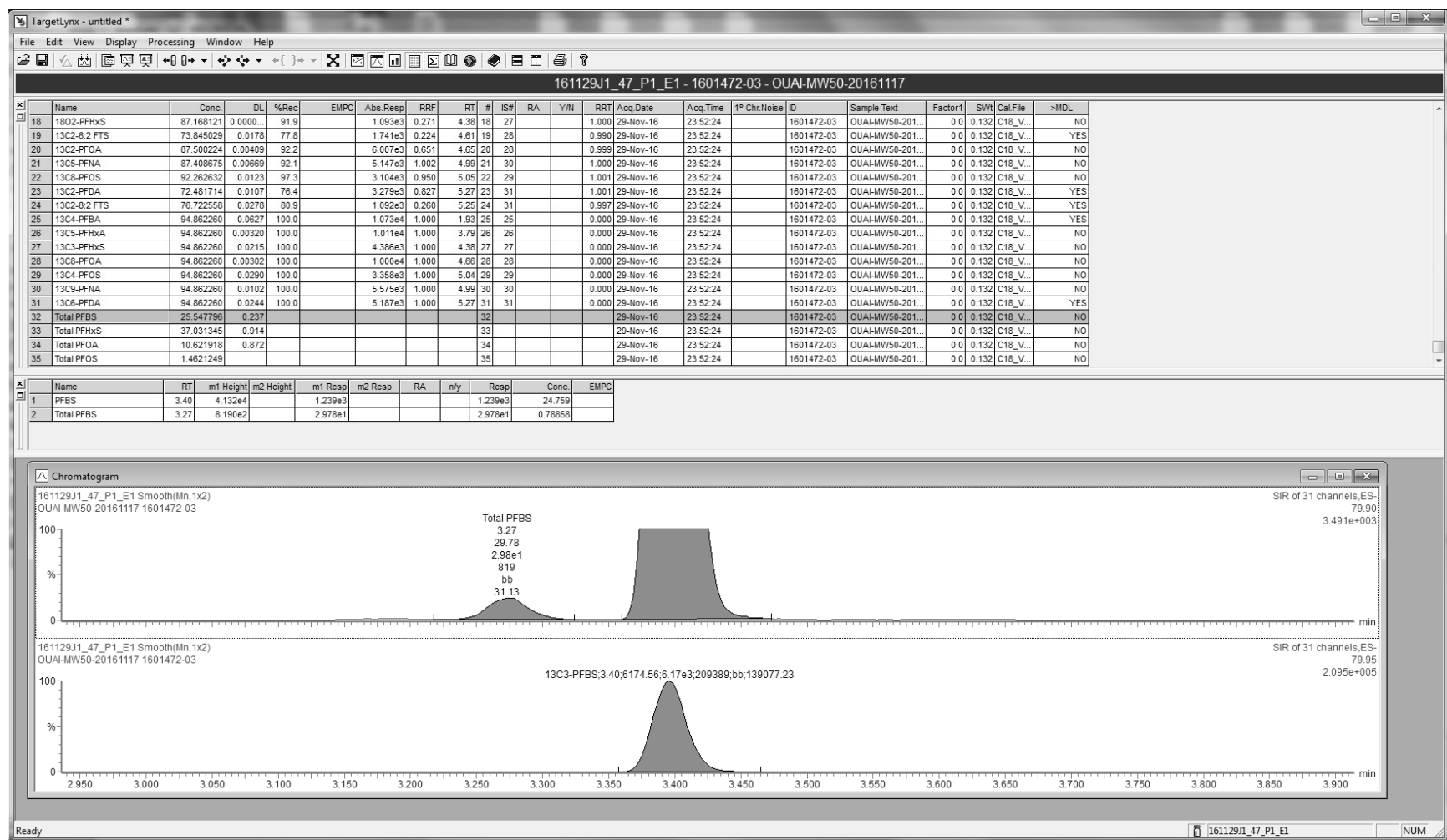


13C2-PFOA



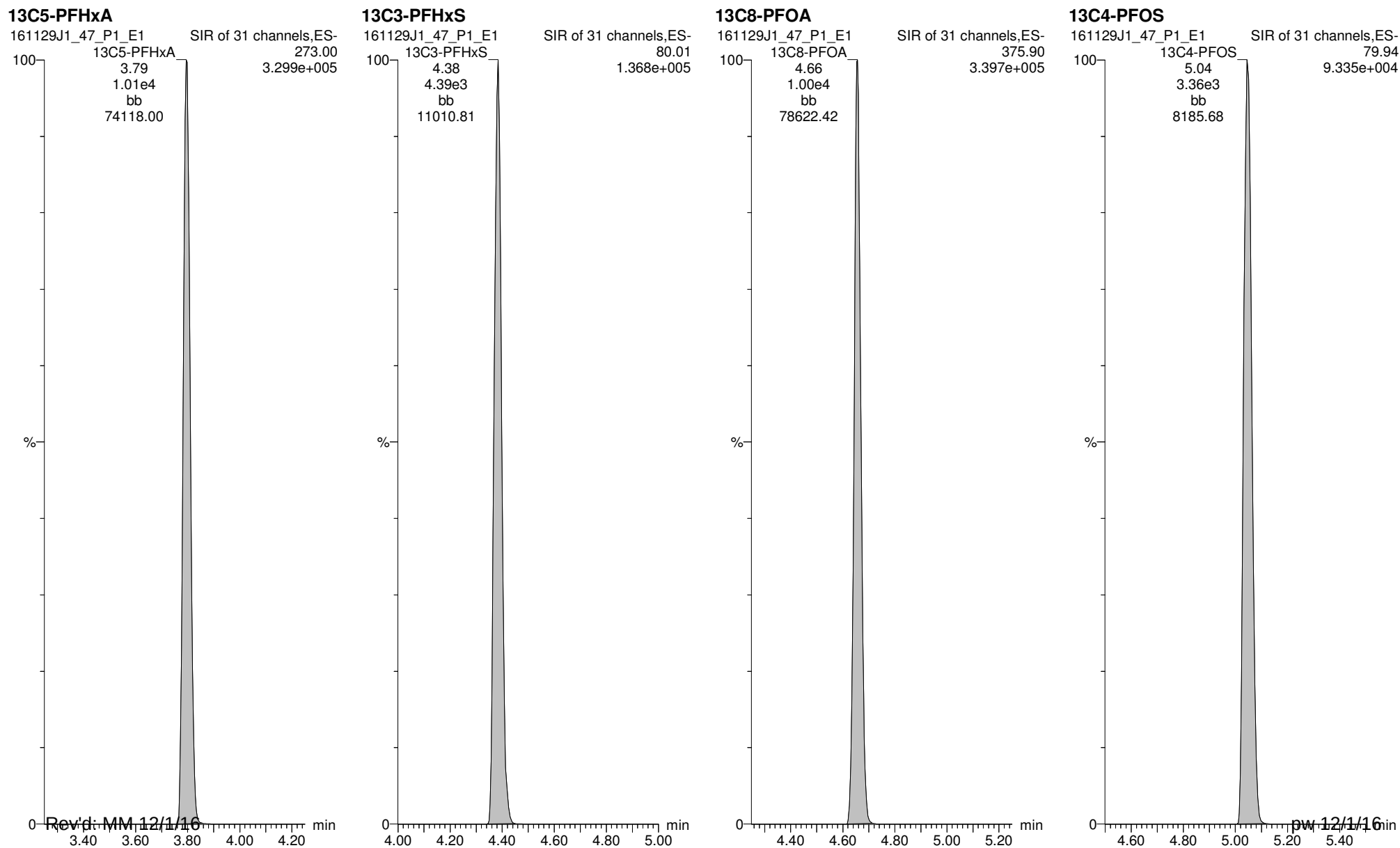
13C8-PFOS





Last Altered: Thursday, December 01, 2016 11:56:09 Pacific Standard Time
Printed: Thursday, December 01, 2016 11:56:50 Pacific Standard Time

ID: 1601472-03, Description: OUAI-MW50-20161117, Name: 161129J1_47.wiff, Date: 29-Nov-2016, Time: 23:52:24, Instrument: , Lab: ©PE-SCIEX, User: sciex



Dataset: U:\Q2.PRO\Results\161129J1\161129J1_48.qld

Last Altered: Thursday, December 01, 2016 11:58:52 Pacific Standard Time

Printed: Thursday, December 01, 2016 11:59:11 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 01 Dec 2016 11:10:17

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: 1601472-04, Description: OUA1-MW49-20161117, Name: 161129J1_48.wiff, Date: 30-Nov-2016, Time: 00:04:38

	# Name	Trace	Peak Area	IS Resp	RRF Mean	wt/vol	RT	Conc.	%Rec
1	3 PFBS	79.90	2.147e2	6.598e3		0.126	3.40	4.36	
2	8 PFOA	368.90	6.349e1	6.241e3		0.126	4.68	0.821	
3	10 PFOS	79.92	2.409e0	3.270e3		0.126	5.09		
4	15 13C3-PFBS	79.95	6.598e3	1.142e4	0.564	0.126	3.40	101	102
5	16 13C2-PFHxA	269.90	3.922e3	1.142e4	0.907	0.126	3.80	37.4	94.7
6	17 13C4-PFHpA	321.90	7.001e3	1.142e4	0.742	0.126	4.28	81.7	82.7
7	18 18O2-PFHxS	102.90	1.218e3	4.809e3	0.271	0.126	4.39	92.4	93.4
8	19 13C2-6:2 FTS	408.90	1.752e3	1.070e4	0.224	0.126	4.63	72.4	73.2
9	20 13C2-PFOA	369.90	6.241e3	1.070e4	0.651	0.126	4.68	88.6	89.6
10	21 13C5-PFNA	422.90	4.581e3	4.962e3	1.002	0.126	5.01	91.1	92.1
11	22 13C8-PFOS	79.93	3.270e3	3.885e3	0.950	0.126	5.07	87.6	88.6
12	25 13C4-PFBA	171.90	1.165e4	1.165e4	1.000	0.126	1.93	98.9	100
13	26 13C5-PFHxA	273.00	1.142e4	1.142e4	1.000	0.126	3.80	98.9	100
14	27 13C3-PFHxS	80.01	4.809e3	4.809e3	1.000	0.126	4.39	98.9	100
15	28 13C8-PFOA	375.90	1.070e4	1.070e4	1.000	0.126	4.68	98.9	100
16	29 13C4-PFOS	79.94	3.885e3	3.885e3	1.000	0.126	5.07	98.9	100
17	30 13C9-PFNA	427.00	4.962e3	4.962e3	1.000	0.126	5.01	98.9	100
18	31 13C6-PFDA	474.00	5.353e3	5.353e3	1.000	0.126	5.30	98.9	100
19	32 Total PFBS	79.90		6.598e3		0.126		4.70	
20	34 Total PFOA	368.90		6.241e3		0.126		0.821	
21	35 Total PFOS	79.92		3.270e3		0.126		0.164	

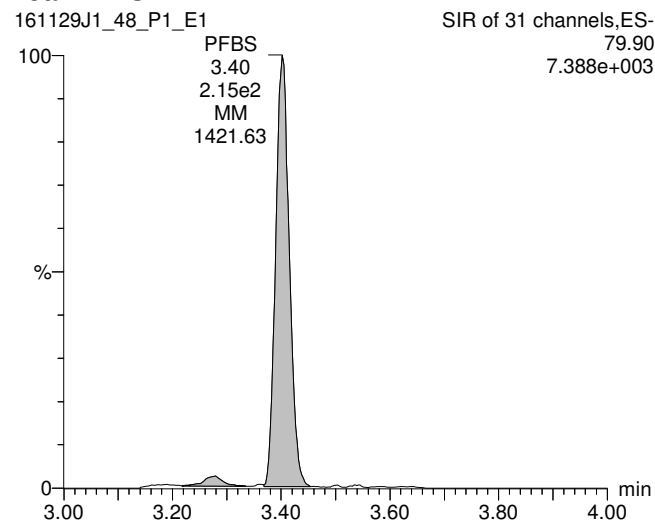
Dataset: U:\Q2.PRO\Results\161129J1\161129J1_48.qld

Last Altered: Thursday, December 01, 2016 11:58:52 Pacific Standard Time
Printed: Thursday, December 01, 2016 11:59:11 Pacific Standard Time

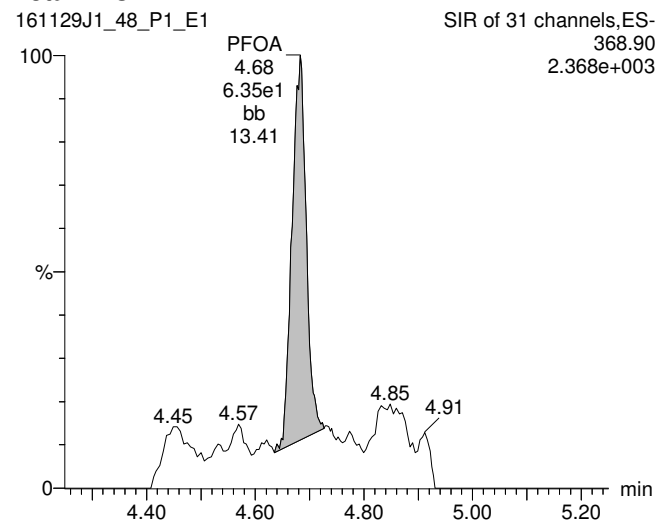
Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 01 Dec 2016 11:10:17
Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: 1601472-04, Description: OUAI-MW49-20161117, Name: 161129J1_48.wiff, Date: 30-Nov-2016, Time: 00:04:38, Instrument: , Lab: ©PE-SCIEX, User: sciex

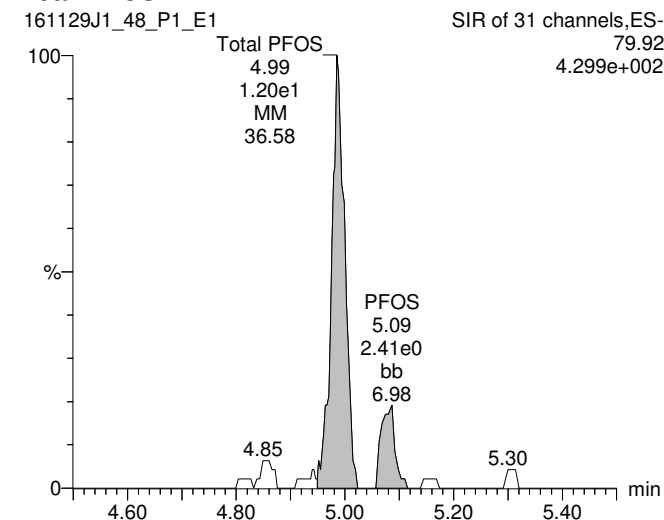
Total PFBS



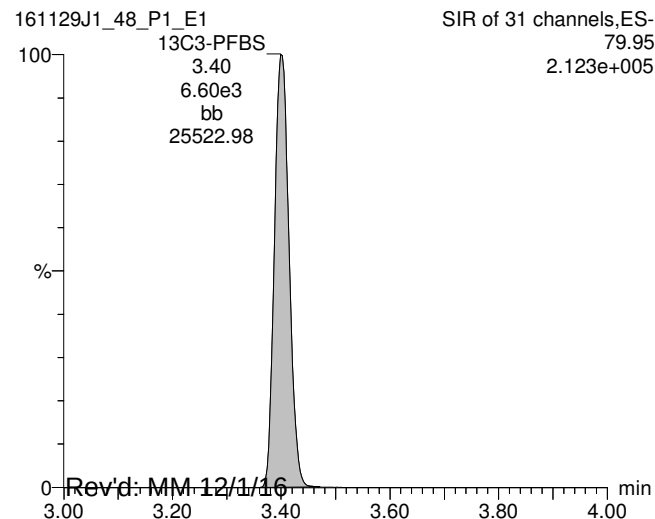
Total PFOA



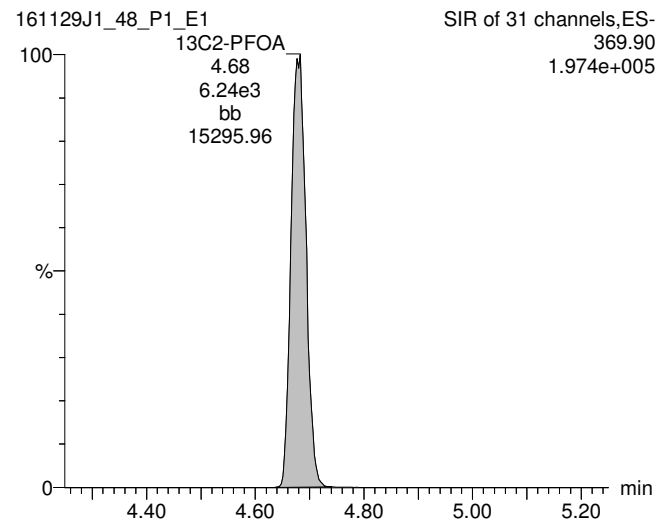
Total PFOS



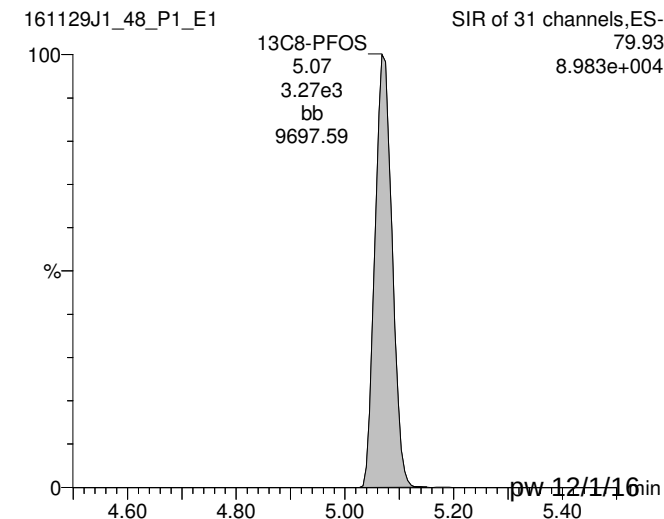
13C3-PFBS

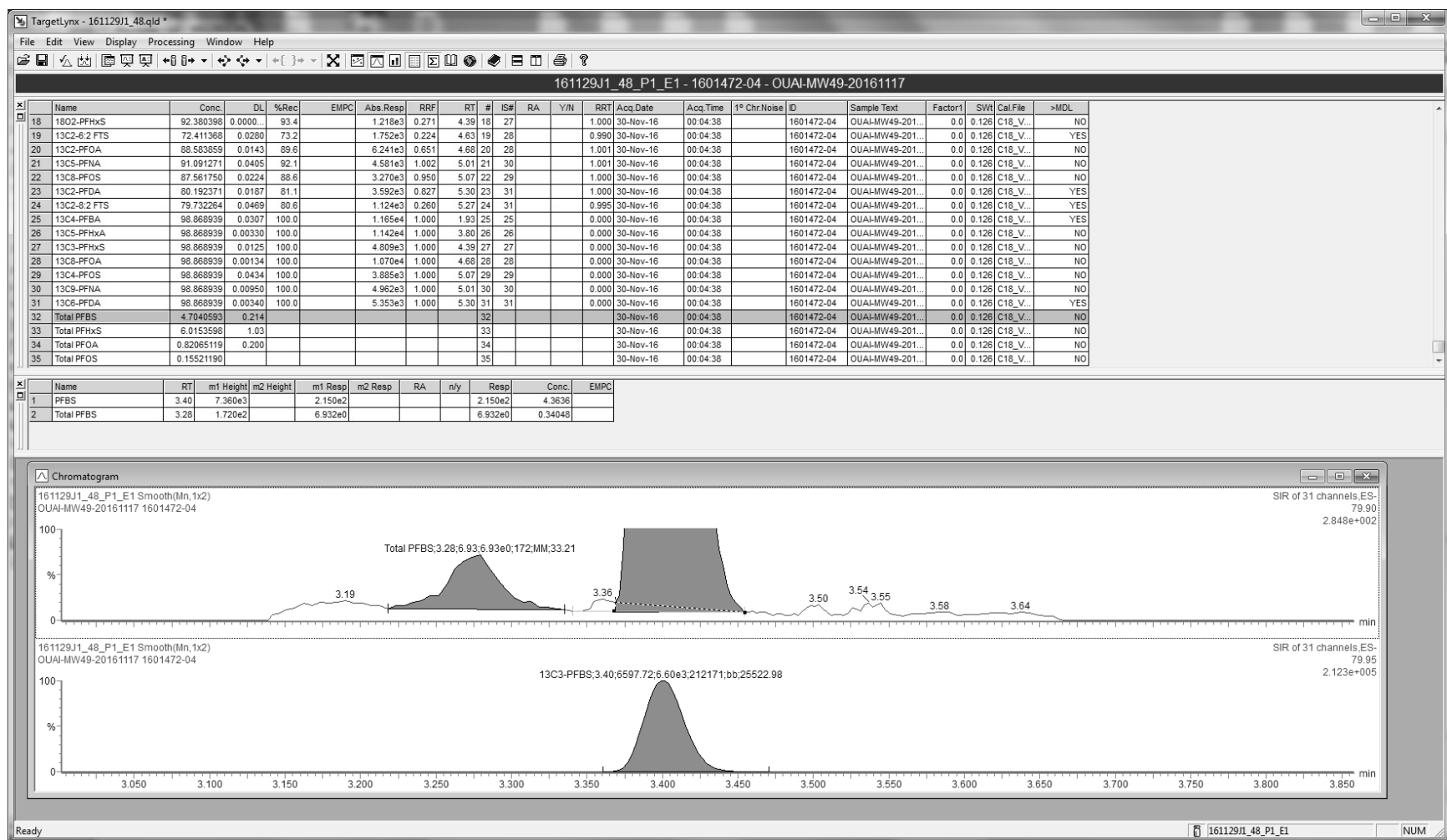


13C2-PFOA



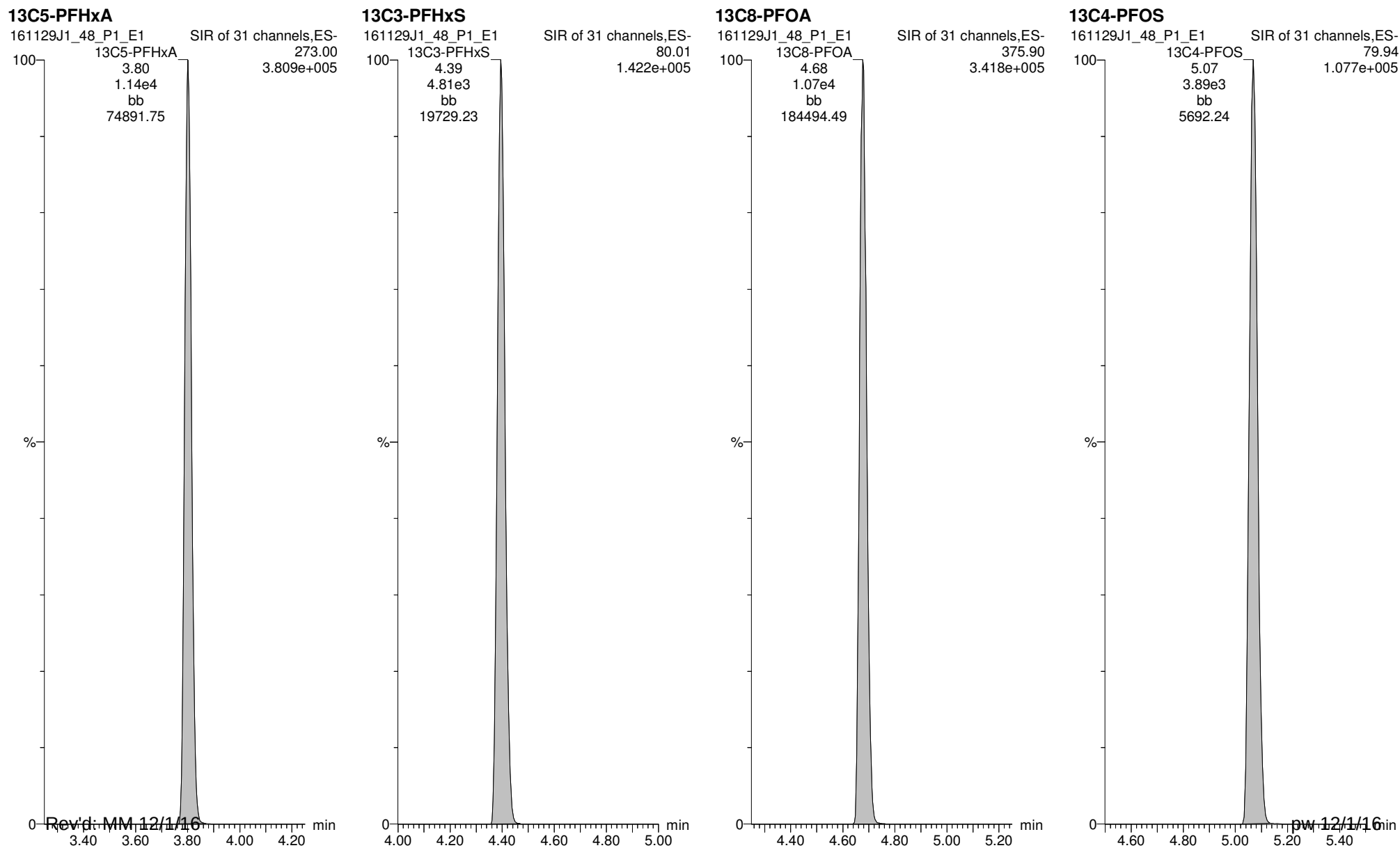
13C8-PFOS





Last Altered: Thursday, December 01, 2016 11:58:52 Pacific Standard Time
Printed: Thursday, December 01, 2016 11:59:11 Pacific Standard Time

ID: 1601472-04, Description: OUA1-MW49-20161117, Name: 161129J1_48.wiff, Date: 30-Nov-2016, Time: 00:04:38, Instrument: , Lab: ©PE-SCIEX, User: sciex



Dataset: U:\Q2.PRO\Results\161129J1\161129J1_49.qld

Last Altered: Thursday, December 01, 2016 12:03:17 Pacific Standard Time

Printed: Thursday, December 01, 2016 12:04:03 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_Mixed.mdb 30 Nov 2016 16:19:52

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-MS1, Description: Matrix Spike, Name: 161129J1_49.wiff, Date: 30-Nov-2016, Time: 00:16:53

	# Name	Trace	Peak Area	IS Resp	RRF Mean	wt/vol	RT	Conc.	%Rec
1	3 PFBS	79.90	5.228e3	6.926e3		0.129	3.40	94.9	
2	8 PFOA	368.90	7.022e3	7.173e3		0.129	4.67	74.7	
3	10 PFOS	79.92	3.654e3	3.540e3		0.129	5.08	87.1	
4	15 13C3-PFBS	79.95	6.926e3	1.182e4	0.564	0.129	3.40	101	104
5	16 13C2-PFHxA	269.90	4.305e3	1.182e4	0.907	0.129	3.80	39.0	100
6	17 13C4-PFHpA	321.90	7.656e3	1.182e4	0.742	0.129	4.28	84.9	87.3
7	18 18O2-PFHxS	102.90	1.324e3	4.961e3	0.271	0.129	4.39	95.7	98.5
8	19 13C2-6:2 FTS	408.90	1.942e3	1.193e4	0.224	0.129	4.63	70.8	72.8
9	20 13C2-PFOA	369.90	7.173e3	1.193e4	0.651	0.129	4.68	89.8	92.4
10	21 13C5-PFNA	422.90	5.227e3	5.735e3	1.002	0.129	5.01	88.4	91.0
11	22 13C8-PFOS	79.93	3.540e3	4.159e3	0.950	0.129	5.08	87.0	89.6
12	25 13C4-PFBA	171.90	1.211e4	1.211e4	1.000	0.129	1.92	97.2	100
13	26 13C5-PFHxA	273.00	1.182e4	1.182e4	1.000	0.129	3.79	97.2	100
14	27 13C3-PFHxS	80.01	4.961e3	4.961e3	1.000	0.129	4.39	97.2	100
15	28 13C8-PFOA	375.90	1.193e4	1.193e4	1.000	0.129	4.67	97.2	100
16	29 13C9-PFNA	427.00	5.735e3	5.735e3	1.000	0.129	5.01	97.2	100
17	30 13C4-PFOS	79.94	4.159e3	4.159e3		0.129	5.08		
18	31 13C6-PFDA	474.00	5.342e3	5.342e3	1.000	0.129	5.30	97.2	100
19	32 Total PFBS	79.90		6.926e3		0.129		94.9	
20	34 Total PFOA	368.90		7.173e3		0.129		74.7	
21	35 Total PFOS	79.92		3.540e3		0.129		87.4	

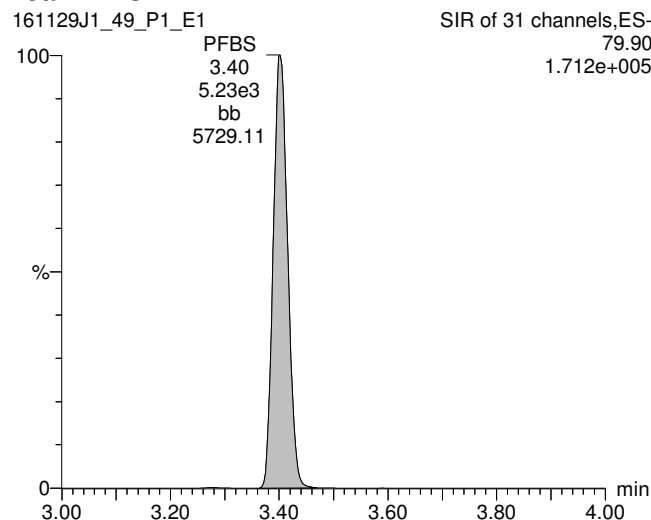
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Last Altered: Thursday, December 01, 2016 12:03:17 Pacific Standard Time
Printed: Thursday, December 01, 2016 12:04:03 Pacific Standard Time

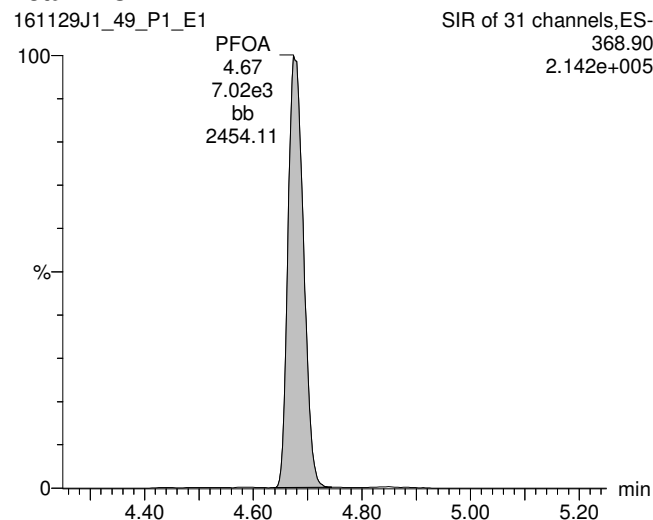
Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_Mixed.mdb 30 Nov 2016 16:19:52
Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-MS1, Description: Matrix Spike, Name: 161129J1_49.wiff, Date: 30-Nov-2016, Time: 00:16:53, Instrument: , Lab: ©PE-SCIEX, User: sciex

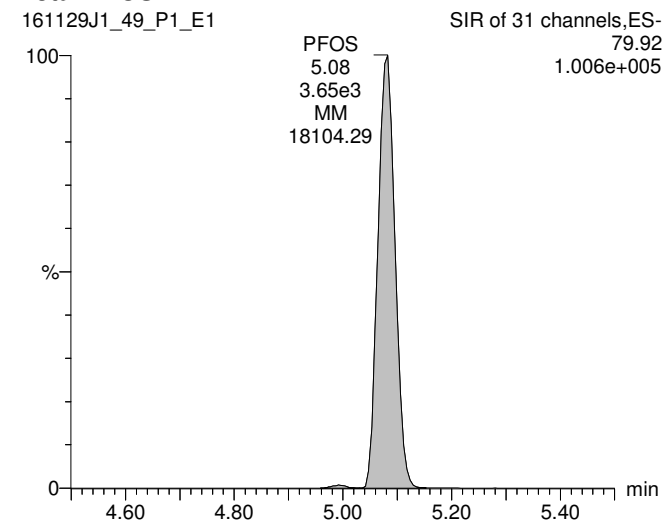
Total PFBS



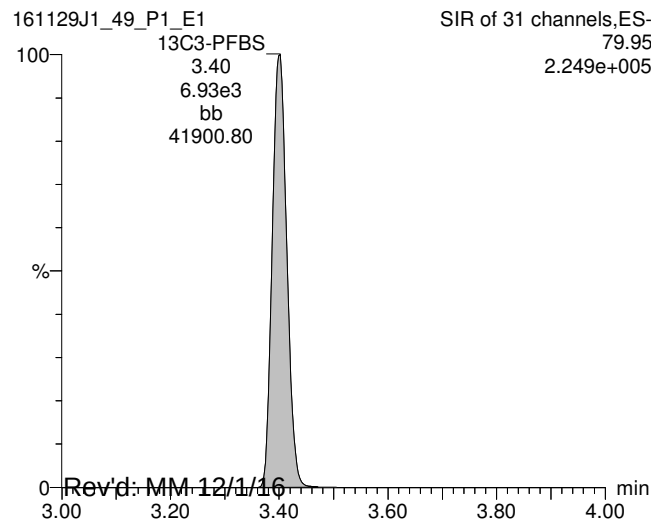
Total PFOA



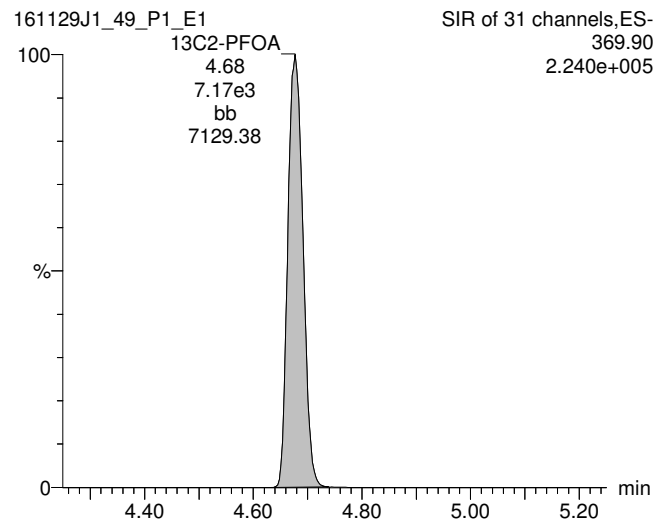
Total PFOS



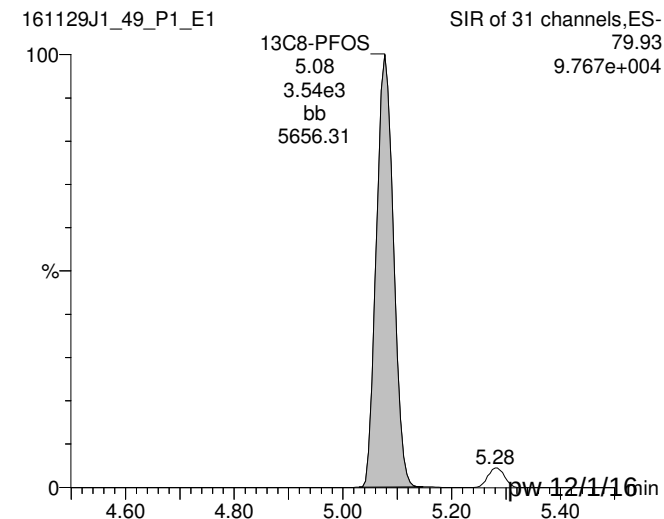
13C3-PFBS

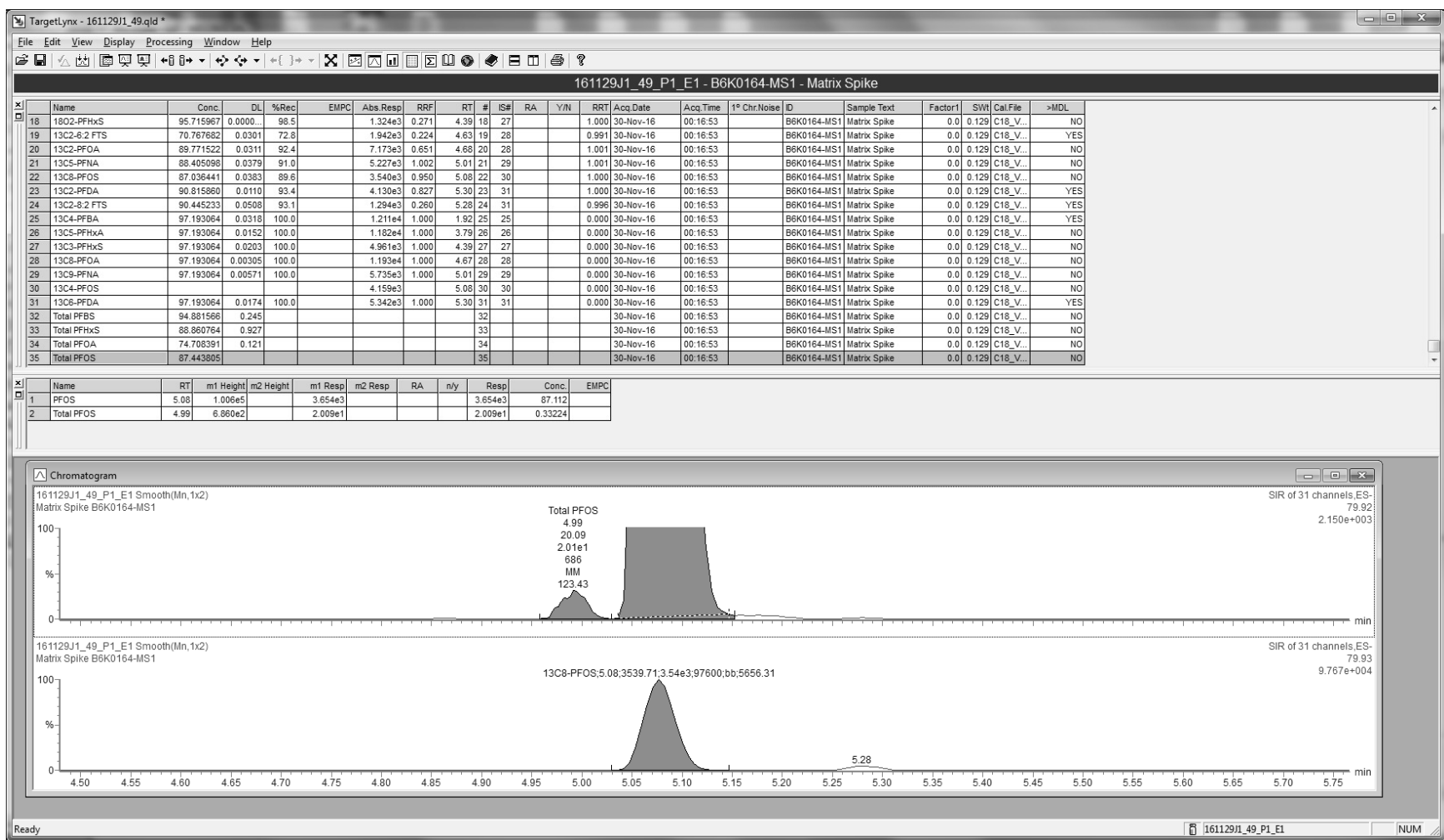


13C2-PFOA



13C8-PFOS





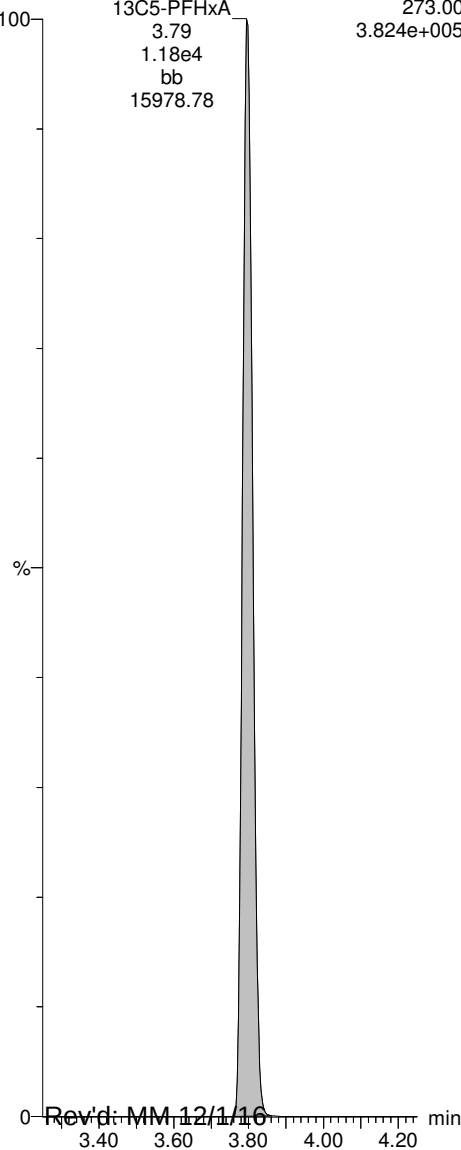
Dataset: U:\Q2.PRO\Results\161129J1\161129J1_49.qld

Last Altered: Thursday, December 01, 2016 12:03:17 Pacific Standard Time
Printed: Thursday, December 01, 2016 12:04:03 Pacific Standard Time

ID: B6K0164-MS1, Description: Matrix Spike, Name: 161129J1_49.wiff, Date: 30-Nov-2016, Time: 00:16:53, Instrument: , Lab: ©PE-SCIEX, User: sciex

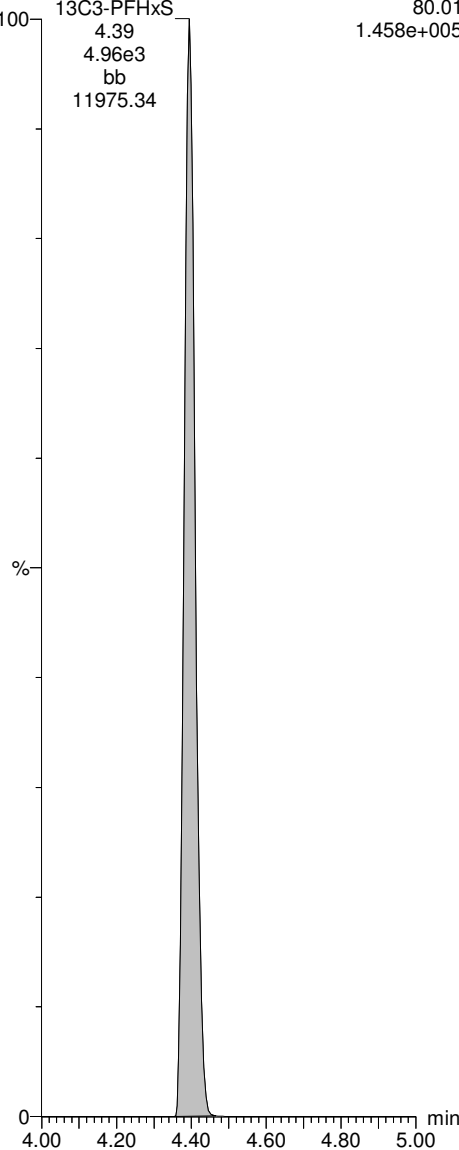
13C5-PFHxA

161129J1_49_P1_E1 SIR of 31 channels,ES-
13C5-PFHxA 273.00
3.79 3.824e+005
1.18e4
bb
15978.78



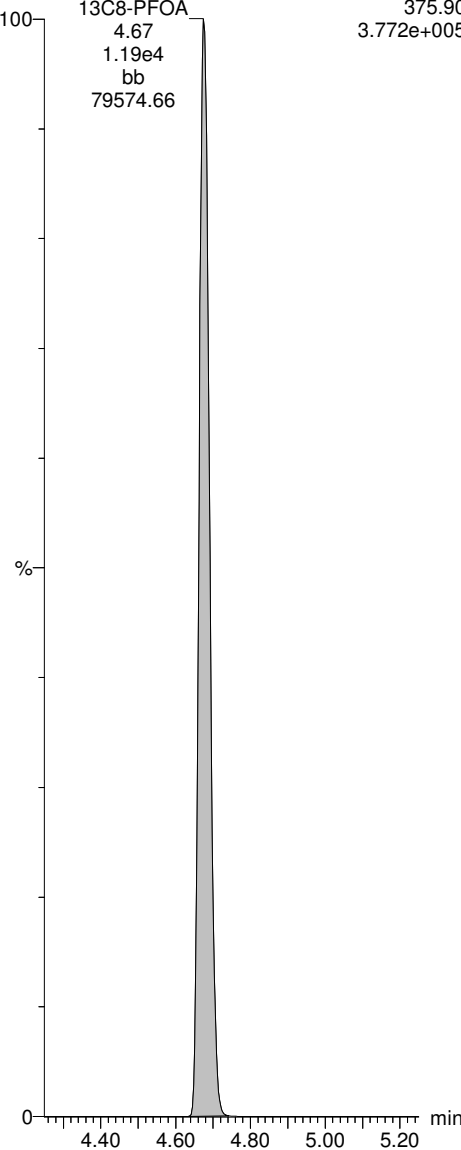
13C3-PFHxS

161129J1_49_P1_E1 SIR of 31 channels,ES-
13C3-PFHxS 80.01
4.39 1.458e+005
4.96e3
bb
11975.34



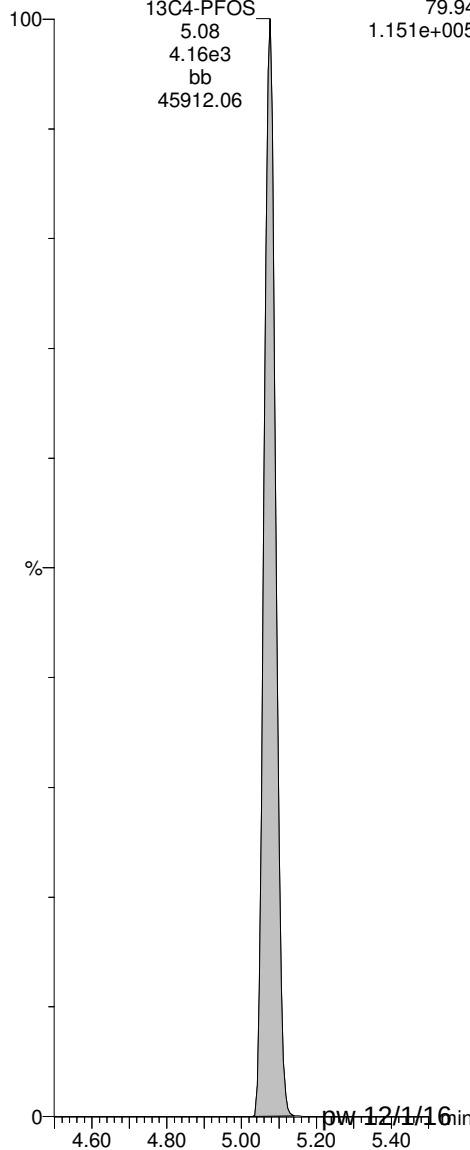
13C8-PFOA

161129J1_49_P1_E1 SIR of 31 channels,ES-
13C8-PFOA 375.90
4.67 3.772e+005
1.19e4
bb
79574.66



13C4-PFOS

161129J1_49_P1_E1 SIR of 31 channels,ES-
13C4-PFOS 79.94
5.08 1.151e+005
4.16e3
bb
45912.06



Dataset: U:\Q2.PRO\Results\161129J1\161129J1_50.qld

Last Altered: Thursday, December 01, 2016 12:01:03 Pacific Standard Time

Printed: Thursday, December 01, 2016 12:01:51 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_Mixed.mdb 30 Nov 2016 16:19:52

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-MSD1, Description: Matrix Spike Dup, Name: 161129J1_50.wiff, Date: 30-Nov-2016, Time: 00:29:08

	# Name	Trace	Peak Area	IS Resp	RRF Mean	wt/vol	RT	Conc.	%Rec
1	3 PFBS	79.90	4.891e3	6.338e3		0.135	3.40	92.4	
2	8 PFOA	368.90	6.496e3	6.266e3		0.135	4.66	75.5	
3	10 PFOS	79.92	3.197e3	3.273e3		0.135	5.06	78.5	
4	15 13C3-PFBS	79.95	6.338e3	1.137e4	0.564	0.135	3.40	91.5	98.9
5	16 13C2-PFHxA	269.90	3.985e3	1.137e4	0.907	0.135	3.80	35.8	96.6
6	17 13C4-PFHpA	321.90	6.920e3	1.137e4	0.742	0.135	4.27	76.0	82.1
7	18 18O2-PFHxS	102.90	1.088e3	4.449e3	0.271	0.135	4.39	83.6	90.2
8	19 13C2-6:2 FTS	408.90	1.863e3	1.102e4	0.224	0.135	4.62	70.0	75.6
9	20 13C2-PFOA	369.90	6.266e3	1.102e4	0.651	0.135	4.66	80.9	87.3
10	21 13C5-PFNA	422.90	4.967e3	5.695e3	1.002	0.135	4.99	80.6	87.1
11	22 13C8-PFOS	79.93	3.273e3	3.927e3	0.950	0.135	5.05	81.2	87.7
12	25 13C4-PFBA	171.90	1.152e4	1.152e4	1.000	0.135	1.93	92.6	100
13	26 13C5-PFHxA	273.00	1.137e4	1.137e4	1.000	0.135	3.80	92.6	100
14	27 13C3-PFHxS	80.01	4.449e3	4.449e3	1.000	0.135	4.39	92.6	100
15	28 13C8-PFOA	375.90	1.102e4	1.102e4	1.000	0.135	4.66	92.6	100
16	29 13C9-PFNA	427.00	5.695e3	5.695e3	1.000	0.135	4.99	92.6	100
17	30 13C4-PFOS	79.94	3.927e3	3.927e3		0.135	5.05		
18	31 13C6-PFDA	474.00	4.943e3	4.943e3	1.000	0.135	5.28	92.6	100
19	32 Total PFBS	79.90		6.338e3		0.135		92.4	
20	34 Total PFOA	368.90		6.266e3		0.135		75.5	
21	35 Total PFOS	79.92		3.273e3		0.135		78.8	

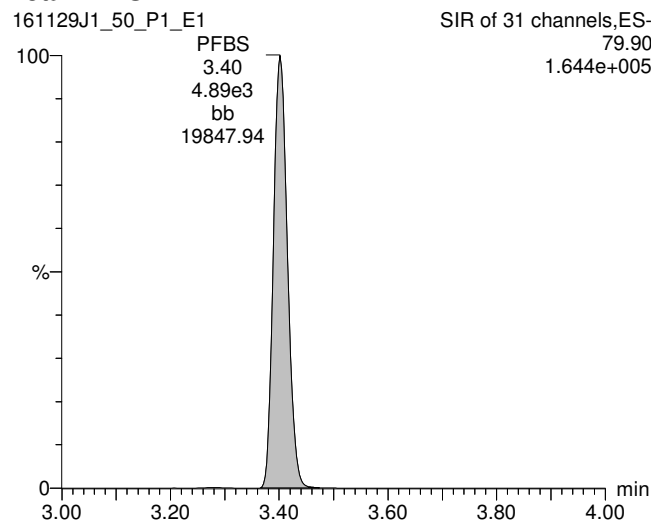
Dataset: U:\Q2.PRO\Results\161129J1\161129J1_50.qld

Last Altered: Thursday, December 01, 2016 12:01:03 Pacific Standard Time
Printed: Thursday, December 01, 2016 12:01:51 Pacific Standard Time

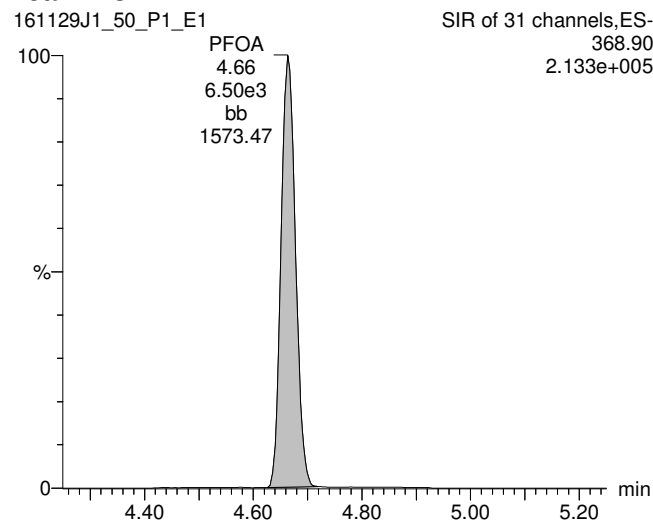
Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_Mixed.mdb 30 Nov 2016 16:19:52
Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

ID: B6K0164-MSD1, Description: Matrix Spike Dup, Name: 161129J1_50.wiff, Date: 30-Nov-2016, Time: 00:29:08, Instrument: , Lab: ©PE-SCIEX, User: sciex

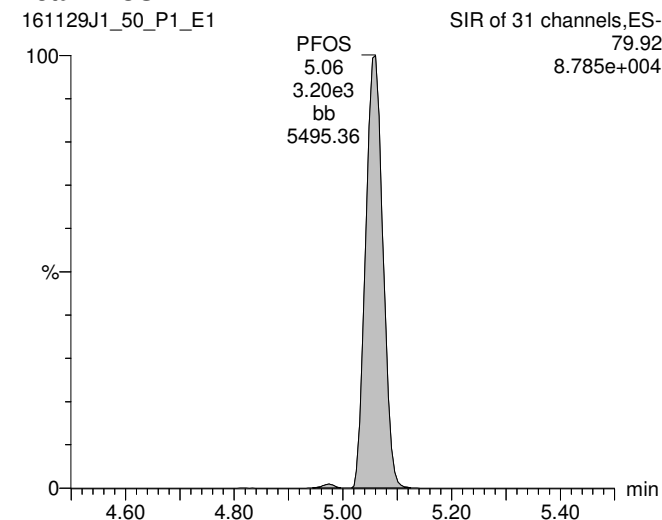
Total PFBS



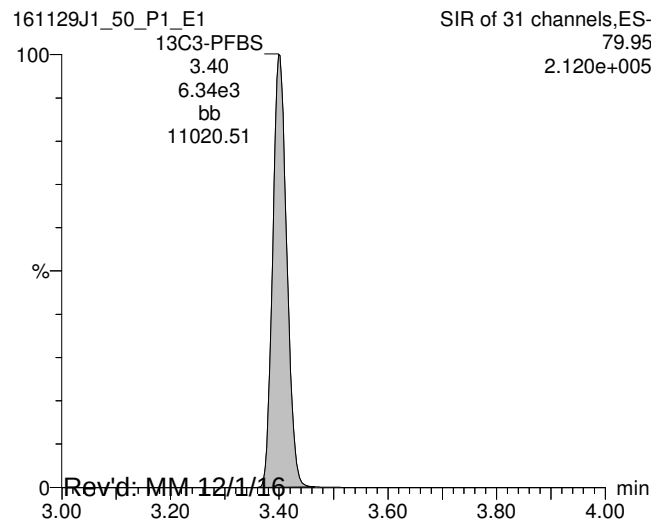
Total PFOA



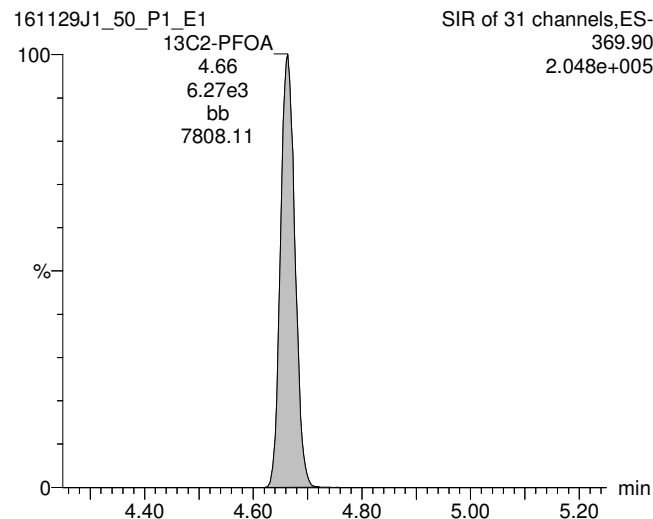
Total PFOS



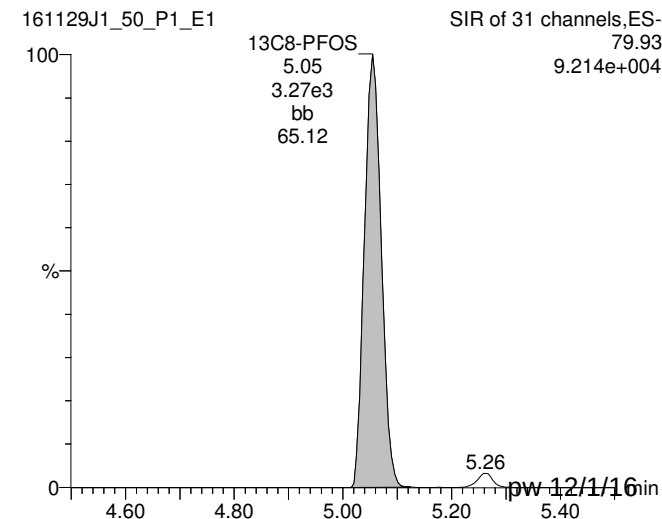
13C3-PFBS

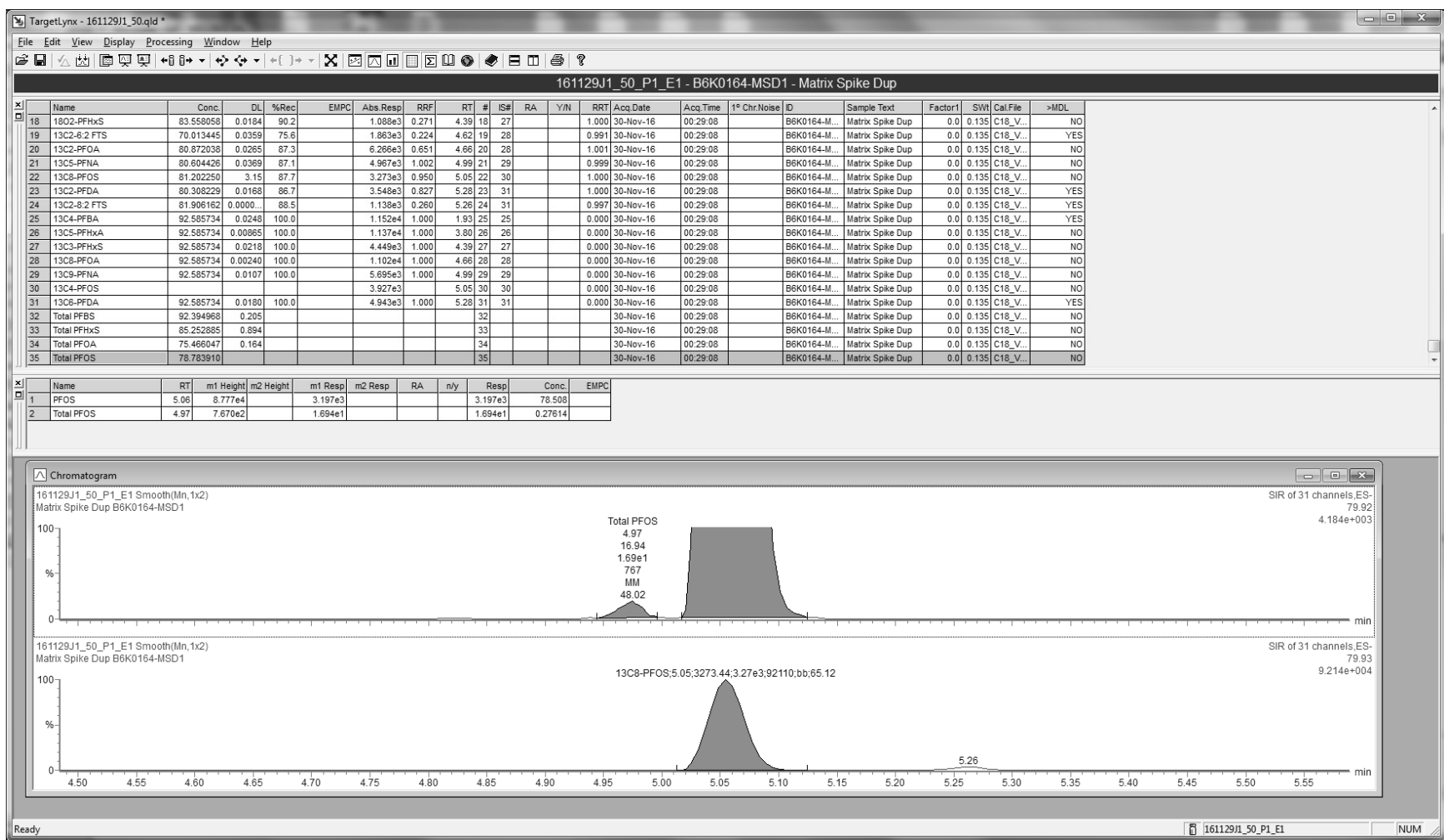


13C2-PFOA



13C8-PFOS





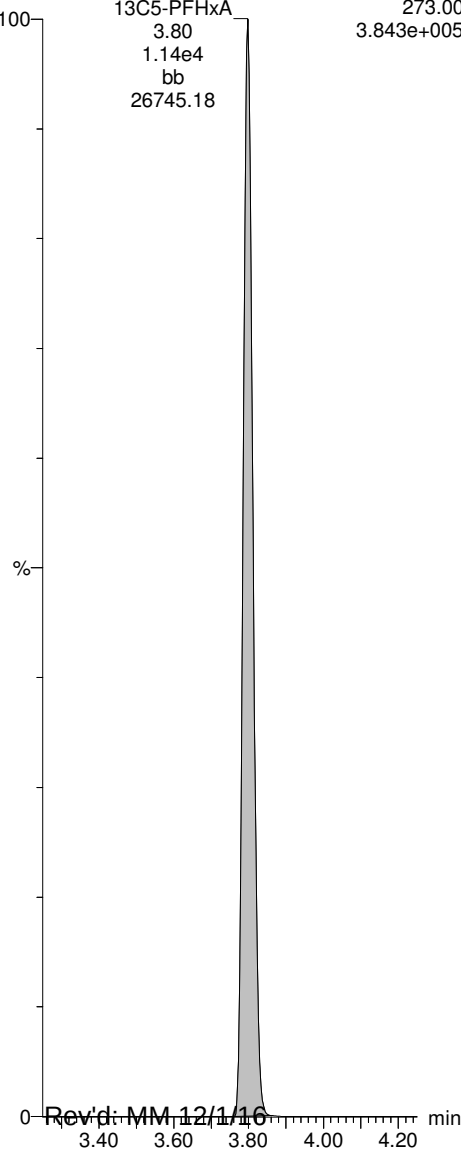
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Last Altered: Thursday, December 01, 2016 12:01:03 Pacific Standard Time
Printed: Thursday, December 01, 2016 12:01:51 Pacific Standard Time

ID: B6K0164-MSD1, Description: Matrix Spike Dup, Name: 161129J1_50.wiff, Date: 30-Nov-2016, Time: 00:29:08, Instrument: , Lab: ©PE-SCIEX, User: sciex

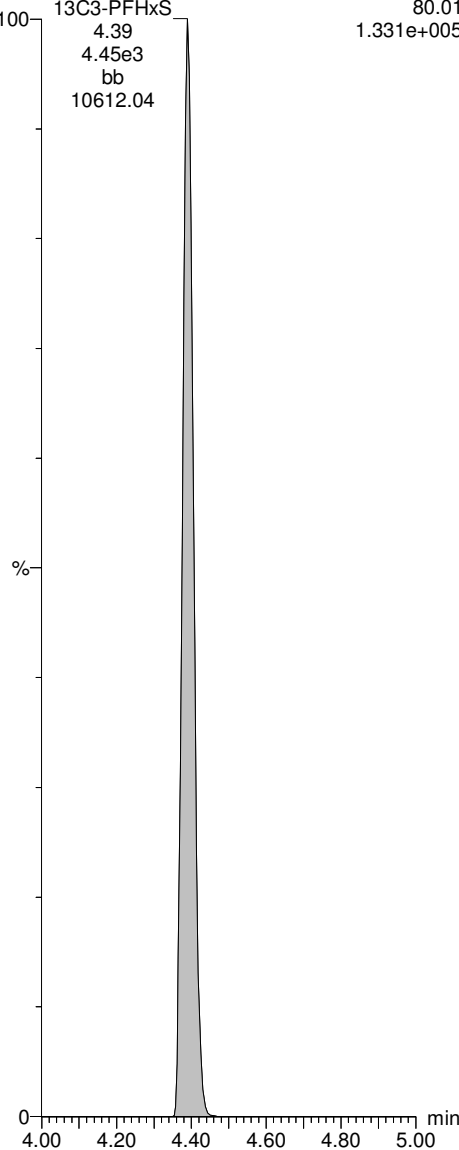
13C5-PFHxA

161129J1_50_P1_E1 SIR of 31 channels,ES-
13C5-PFHxA 273.00
3.80 3.843e+005
1.14e4
bb
26745.18



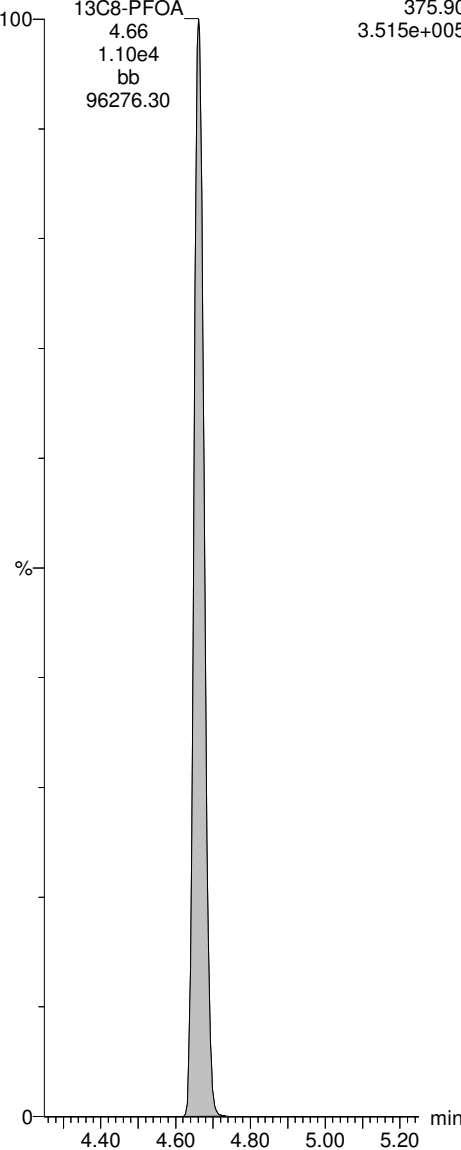
13C3-PFHxS

161129J1_50_P1_E1 SIR of 31 channels,ES-
13C3-PFHxS 80.01
4.39 1.331e+005
4.45e3
bb
10612.04



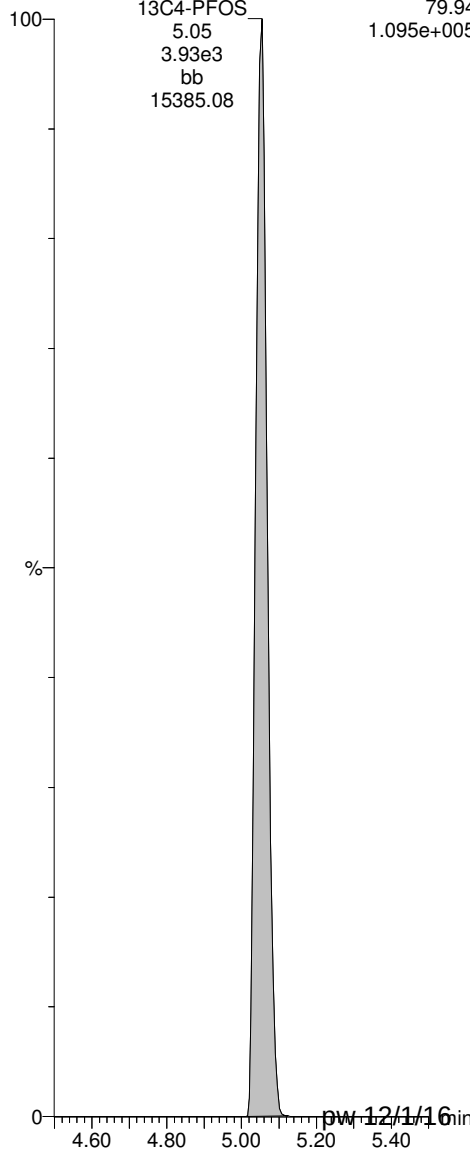
13C8-PFOA

161129J1_50_P1_E1 SIR of 31 channels,ES-
13C8-PFOA 375.90
4.66 3.515e+005
1.10e4
bb
96276.30



13C4-PFOS

161129J1_50_P1_E1 SIR of 31 channels,ES-
13C4-PFOS 79.94
5.05 1.095e+005
3.93e3
bb
15385.08



CONTINUING CALIBRATION

Dataset: U:\Q2.PRO\Results\161129J1\161129J1_34.qld

Last Altered: Wednesday, November 30, 2016 13:34:16 Pacific Standard Time

Printed: Wednesday, November 30, 2016 13:39:00 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 30 Nov 2016 13:32:31

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

Name: 161129J1_34.wiff, Date: 29-Nov-2016, Time: 21:13:14, ID: ST161129J1-3 PFC C3.5 16K2902, Description: PFC C3.5 16K2902 A

#	Name	Trace	Response	IS Resp	RRF	Wt/Vol	RT	Conc.	%Rec
1	1 PFBA	168.90	2.15e4	1.02e4		1.000	1.94	26.9	107.5
2	2 PFPeA	218.90	2.18e4	1.17e4		1.000	3.11	27.0	108.1
3	3 PFBS	79.90	1.10e4	6.46e3		1.000	3.40	27.4	109.6
4	4 PFHxA	268.90	1.74e4	4.22e3		1.000	3.80	24.8	99.3
5	5 PFHpA	318.90	1.36e4	8.01e3		1.000	4.28	25.6	102.6
6	6 PFHxS	79.91	8.12e3	1.23e3		1.000	4.39	25.3	101.2
7	7 6:2 FTS	406.90	3.78e3	1.89e3		1.000	4.62	26.3	105.2
8	8 PFOA	368.90	1.60e4	7.05e3		1.000	4.67	23.0	91.9
9	9 PFNA	419.00	1.12e4	5.82e3		1.000	4.99	29.5	118.0
10	10 PFOS	79.92	9.11e3	3.95e3		1.000	5.06	25.0	100.1
11	11 PFDA	469.00	7.99e3	4.02e3		1.000	5.29	25.0	99.9
12	12 8:2 FTS	506.90	2.13e3	9.75e2		1.000	5.27	30.9	123.7
13	13 13C3-PFBA	172.00	1.02e4	1.10e4	0.867	1.000	1.94	13.4	106.9
14	14 13C3-PFPeA	221.90	1.17e4	1.05e4	0.994	1.000	3.11	14.0	112.4
15	15 13C3-PFBS	79.95	6.46e3	1.05e4	0.564	1.000	3.40	13.7	109.3
16	16 13C2-PFHxA	269.90	4.22e3	1.05e4	0.907	1.000	3.80	5.55	111.0
17	17 13C4-PFHpA	321.90	8.01e3	1.05e4	0.742	1.000	4.28	12.9	103.1
18	18 18O2-PFHxS	102.90	1.23e3	4.31e3	0.271	1.000	4.39	13.2	105.3
19	19 13C2-6:2 FTS	408.90	1.89e3	1.04e4	0.224	1.000	4.62	10.1	81.1
20	20 13C2-PFOA	369.90	7.05e3	1.04e4	0.651	1.000	4.66	13.0	103.9
21	21 13C5-PFNA	422.90	5.82e3	6.06e3	1.002	1.000	4.99	12.0	95.9
22	22 13C8-PFOS	79.93	3.95e3	4.10e3	0.950	1.000	5.06	12.7	101.4
23	23 13C2-PFDA	470.00	4.02e3	4.64e3	0.827	1.000	5.28	13.1	104.6
24	24 13C2-8:2 FTS	508.70	9.75e2	4.64e3	0.260	1.000	5.26	10.1	80.6
25	25 13C4-PFBA	171.90	1.10e4	1.10e4	1.000	1.000	1.94	12.5	100.0
26	26 13C5-PFHxA	273.00	1.05e4	1.05e4	1.000	1.000	3.80	12.5	100.0
27	27 13C3-PFHxS	80.01	4.31e3	4.31e3	1.000	1.000	4.39	12.5	100.0
28	28 13C8-PFOA	375.90	1.04e4	1.04e4	1.000	1.000	4.66	12.5	100.0
29	29 13C4-PFOS	79.94	4.10e3	4.10e3	1.000	1.000	5.06	12.5	100.0
30	30 13C9-PFNA	427.00	6.06e3	6.06e3	1.000	1.000	4.99	12.5	100.0
31	31 13C6-PFDA	474.00	4.64e3	4.64e3	1.000	1.000	5.28	12.5	100.0

75-125

60-150

40-150

60-150

50-150

60-150

40-150

PW
11/30/16

✓ AC 11/30/16

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1	161129J1_01	11/29/2016 14:29:06	IPA	IPA
2	161129J1_02	11/29/2016 14:41:22	ST161129J1-1 PFC C3.5 16K2902	PFC C3.5 16K2902 A
3	161129J1_03	11/29/2016 14:53:37	IPA	IPA
4	161129J1_04	11/29/2016 15:05:52	B6K0139-BS1	OPR
5	161129J1_05	11/29/2016 15:18:05	B6K0139-BSD1	LCS Dup
6	161129J1_06	11/29/2016 15:30:21	IPA	IPA
7	161129J1_07	11/29/2016 15:42:35	B6K0139-BLK1	Method Blank
8	161129J1_08	11/29/2016 15:54:51	1601456-01	PFAS-SW39-111416
9	161129J1_09	11/29/2016 16:07:03	1601456-02	PFAS-SW32-111416
10	161129J1_10	11/29/2016 16:19:18	1601456-03	PFAS-SW29-111416
11	161129J1_11	11/29/2016 16:31:35	1601456-04	PFAS-SW38-111416
12	161129J1_12	11/29/2016 16:43:48	1601456-05	PFAS-SW28-111416
13	161129J1_13	11/29/2016 16:56:04	1601456-06	PFAS-W5-DUP3-111416
14	161129J1_14	11/29/2016 17:08:18	1601456-07	EB2-WS-111016
15	161129J1_15	11/29/2016 17:20:34	1601456-08	EB2-SED-110916
16	161129J1_16	11/29/2016 17:32:49	1601456-09	EB3-WS-111116
17	161129J1_17	11/29/2016 17:45:05	1601456-10	EB3-WG-110916
18	161129J1_18	11/29/2016 17:57:20	IPA	IPA
19	161129J1_19	11/29/2016 18:09:35	ST161129J1-2 PFC C3.5 16K2902	PFC C3.5 16K2902 A
20	161129J1_20	11/29/2016 18:21:49	IPA	IPA
21	161129J1_21	11/29/2016 18:34:05	1601456-11	EB4-WG-111116
22	161129J1_22	11/29/2016 18:46:19	1601456-12	EB3-SED-111016
23	161129J1_23	11/29/2016 18:58:35	1601456-13	EB4-SED-111116
24	161129J1_24	11/29/2016 19:10:48	1601456-14	EB4-WS-111416
25	161129J1_25	11/29/2016 19:23:02	1601456-15	EB5-SED-111416
26	161129J1_26	11/29/2016 19:35:15	B6K0139-MS1	Matrix Spike
27	161129J1_27	11/29/2016 19:47:28	B6K0139-MSD1	Matrix Spike Dup
28	161129J1_28	11/29/2016 19:59:43	1601464-01	EB03-20161116
29	161129J1_29	11/29/2016 20:12:00	1601464-02	OUI-MW53-20161116
30	161129J1_30	11/29/2016 20:24:14	1601464-03	OUI-MW54-20161116
31	161129J1_31	11/29/2016 20:36:29	1601464-04	OUI-MW42-20161116
32	161129J1_32	11/29/2016 20:48:43	1601464-05	OUI-MW01-20161116
33	161129J1_33	11/29/2016 21:00:59	IPA	IPA
34	161129J1_34	11/29/2016 21:13:14	ST161129J1-3 PFC C3.5 16K2902	PFC C3.5 16K2902 A
35	161129J1_35	11/29/2016 21:25:29	IPA	IPA
36	161129J1_36	11/29/2016 21:37:45	B6K0164-BS1	OPR
37	161129J1_37	11/29/2016 21:50:00	IPA	IPA
38	161129J1_38	11/29/2016 22:02:14	B6K0164-BLK1	Method Blank
39	161129J1_39	11/29/2016 22:14:30	1601464-06	OUI-MW31-20161116
40	161129J1_40	11/29/2016 22:26:45	1601464-07	OUI-PZ19-20161116
41	161129J1_41	11/29/2016 22:38:58	1601464-08	OUI-MW52-20161116
42	161129J1_42	11/29/2016 22:51:14	1601464-09	OUI-MW04-20161116
43	161129J1_43	11/29/2016 23:03:30	1601464-10	OUI-MW04A-20161116
44	161129J1_44	11/29/2016 23:15:44	1601464-11	OUI-MW05-20161116
45	161129J1_45	11/29/2016 23:27:59	1601472-01	EB04-20161117
46	161129J1_46	11/29/2016 23:40:10	1601472-02	OUI-MW51-20161117
47	161129J1_47	11/29/2016 23:52:24	1601472-03	OUI-MW50-20161117
48	161129J1_48	11/30/2016 00:04:38	1601472-04	OUI-MW49-20161117
49	161129J1_49	11/30/2016 00:16:53	B6K0164-MS1	Matrix Spike
50	161129J1_50	11/30/2016 00:29:08	B6K0164-MSD1	Matrix Spike Dup
51	161129J1_51	11/30/2016 00:41:22	IPA	IPA
52	161129J1_52	11/30/2016 00:53:34	ST161129J1-4 PFC C3.5 16K2902	PFC C3.5 16K2902 A
53	161129J1_53	11/30/2016 01:05:50	IPA	IPA
54	161129J1_54	11/30/2016 01:18:03	161128-QC1	Milk QC
55	161129J1_55	11/30/2016 01:30:18	161128-QC2	Milk QC
56	161129J1_56	11/30/2016 01:42:33	1601432-09@5x	WURTS-VAS15009-18-21_FD
57	161129J1_57	11/30/2016 01:54:48	1601432-09@40x	WURTS-VAS15009-18-21_FD

	Sample Name	Acquisition Date	Sample ID	Sample Comment
58	161129J1_58	11/30/2016 02:07:04	B6K0133-MS2@5x	WURTS-VAS15009-18-21_FD
59	161129J1_59	11/30/2016 02:19:19	B6K0133-MS2@40x	WURTS-VAS15009-18-21_FD
60	161129J1_60	11/30/2016 02:31:33	B6K0133-MSD2@5x	WURTS-VAS15009-28-31
61	161129J1_61	11/30/2016 02:43:48	B6K0133-MSD2@40x	WURTS-VAS15009-28-31
62	161129J1_62	11/30/2016 02:56:03	IPA	IPA
63	161129J1_63	11/30/2016 03:08:18	ST161129J1-5 PFC C3.5 16K2902	PFC C3.5 16K2902 A
64	161129J1_64	11/30/2016 03:20:33	IPA	IPA

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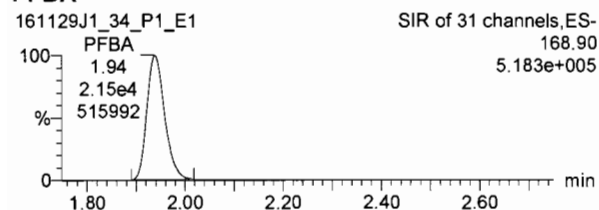
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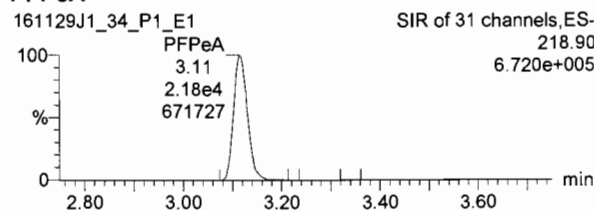
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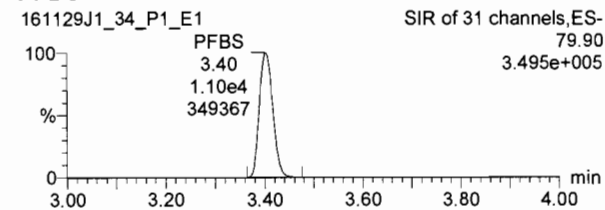
PFBA



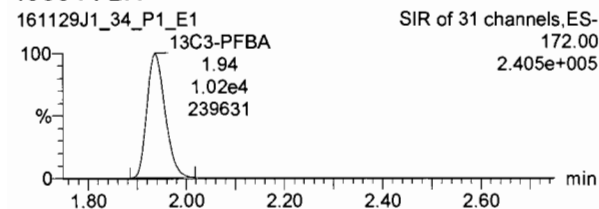
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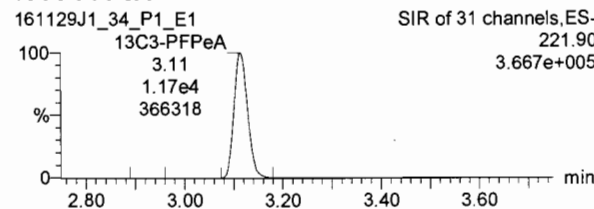
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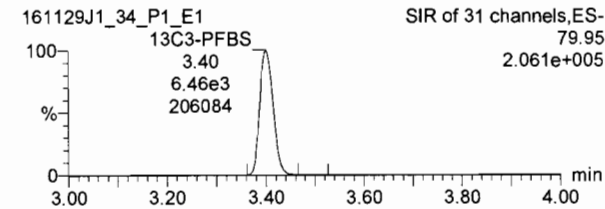
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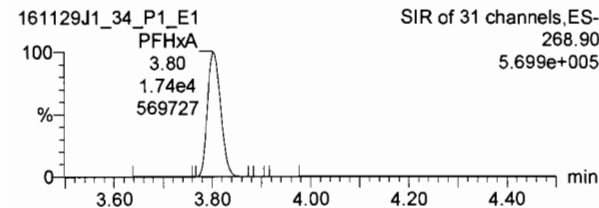
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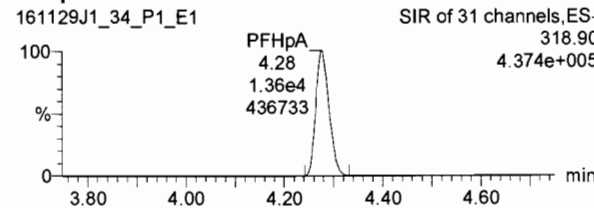
13C3-PFBS



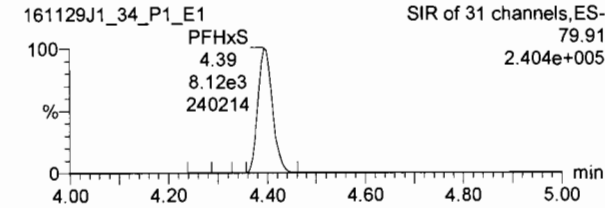
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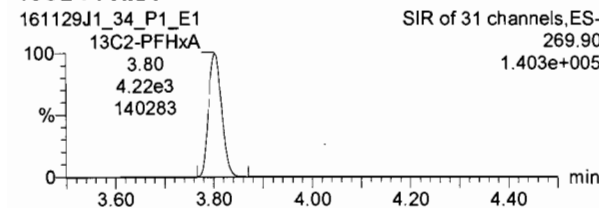
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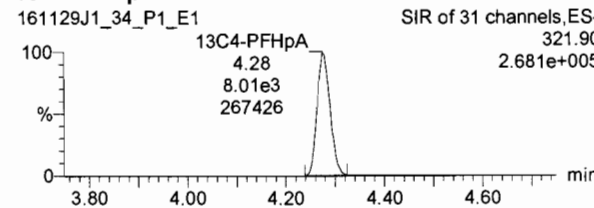
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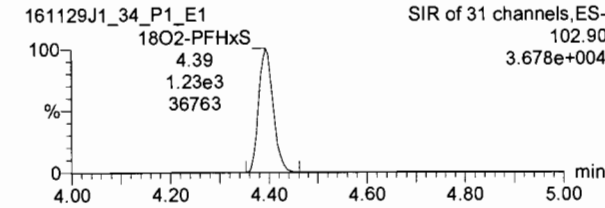
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13C4-PFHpA



18O2-PFHxS



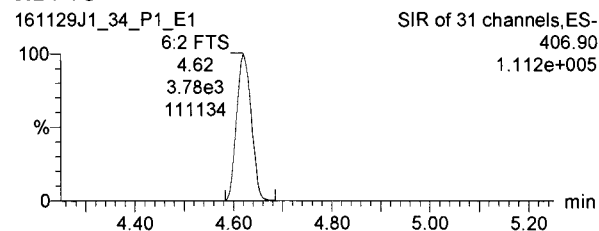
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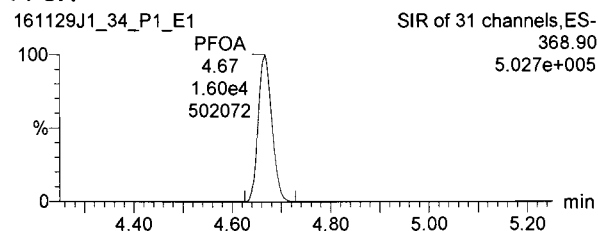
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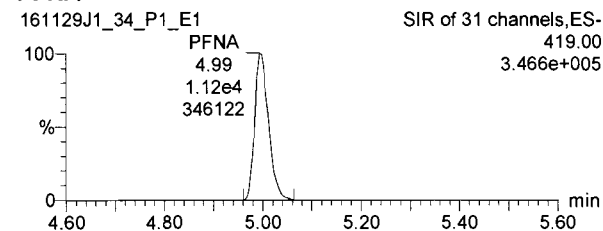
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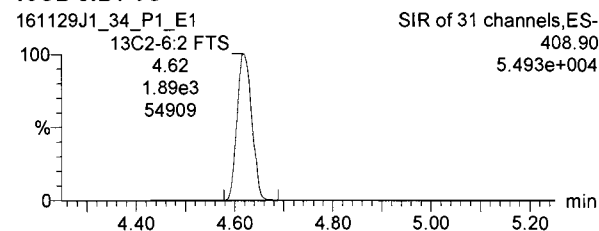
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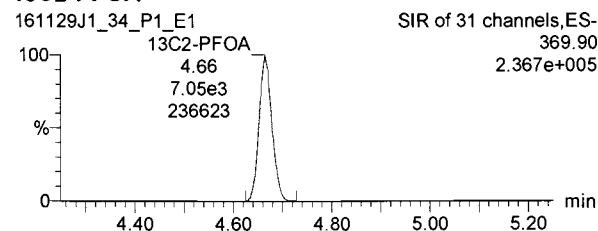
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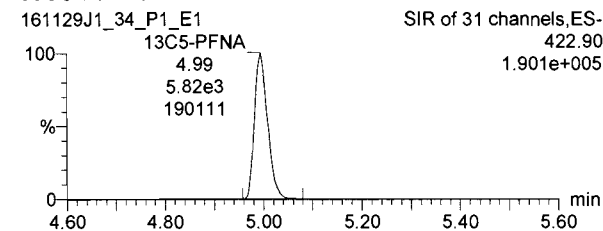
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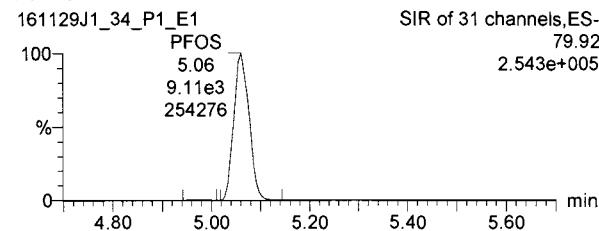
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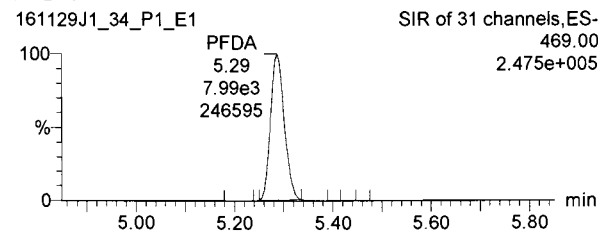
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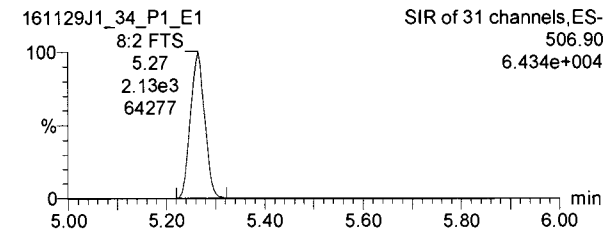
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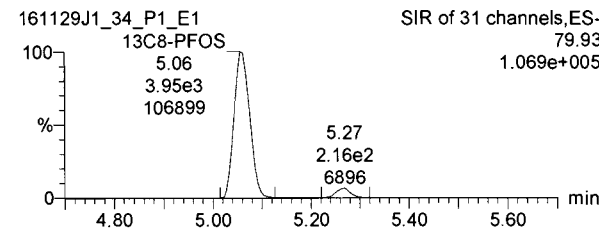
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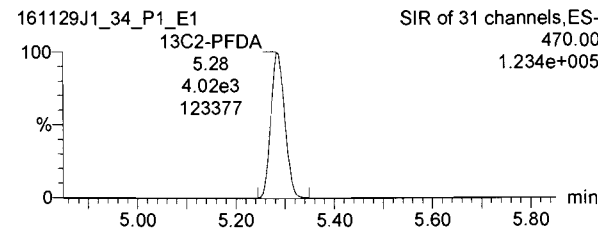
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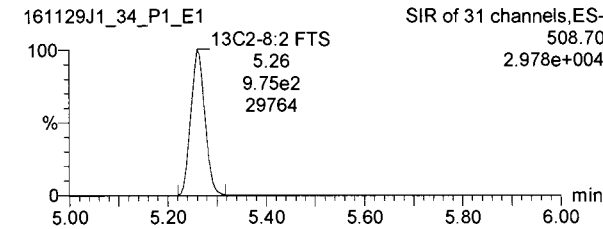
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13C2-PFDA



13C2-8:2 FTS



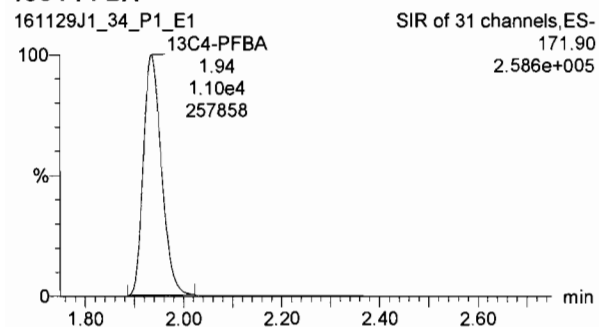
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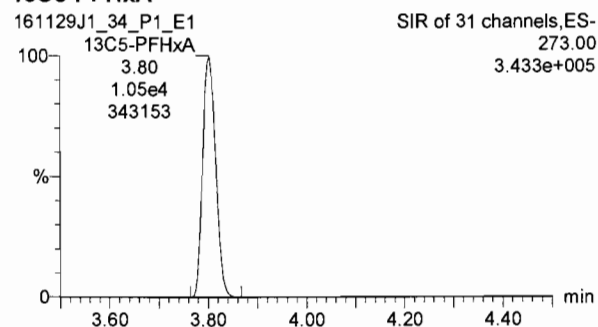
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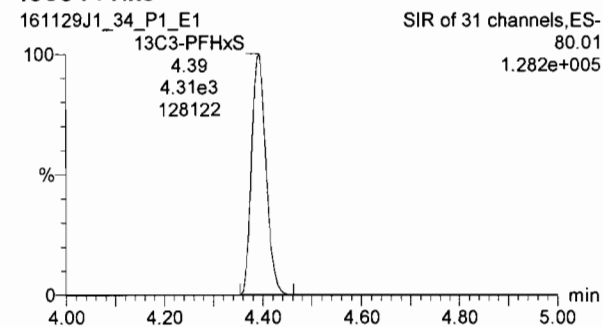
13C4-PFBA



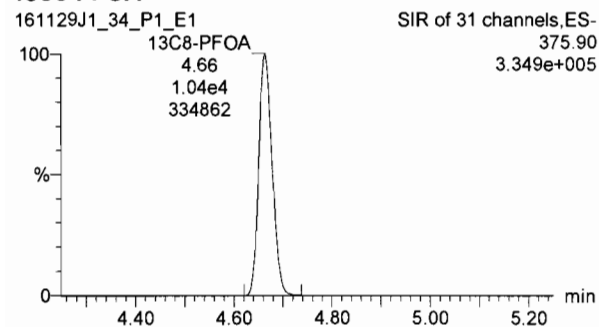
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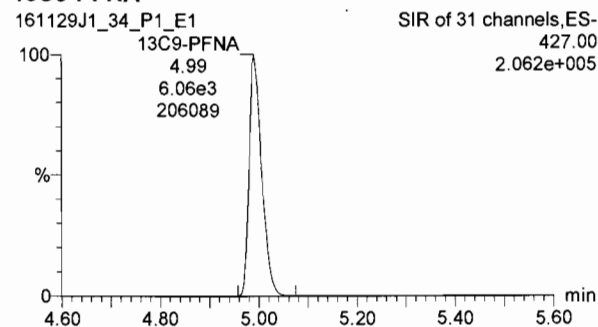
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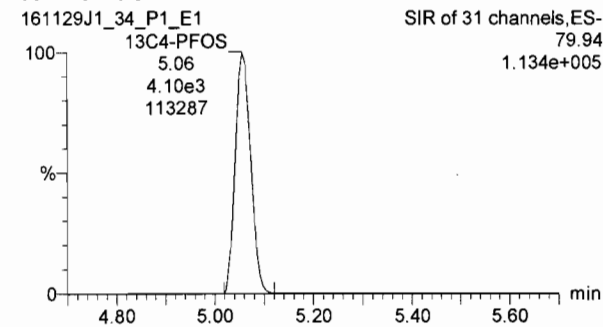
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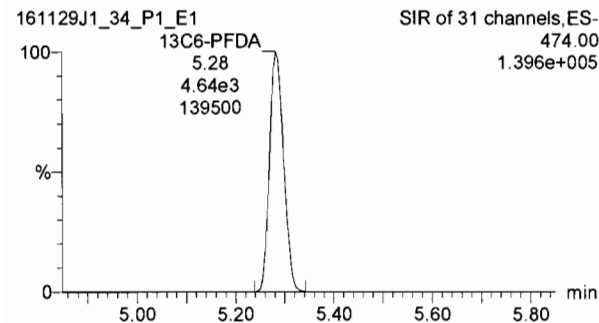
13C9-PFNA



13C4-PFOS



13C6-PFDA



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2	2 PFPeA	218.90	2.14e4	1.16e4		1.000	3.12	26.8	107.0
3	3 PFBS	79.90	1.07e4	6.57e3		1.000	3.40	26.3	105.2
4	4 PFHxA	268.90	1.80e4	3.99e3		1.000	3.80	27.2	109.0
5	5 PFHpA	318.90	1.32e4	7.97e3		1.000	4.27	25.1	100.5
6	6 PFHxS	79.91	7.74e3	1.32e3		1.000	4.39	22.5	89.9
7	7 6:2 FTS	406.90	3.53e3	1.95e3		1.000	4.63	23.6	94.3
8	8 PFOA	368.90	1.72e4	7.11e3		1.000	4.67	24.6	98.5
9	9 PFNA	419.00	1.26e4	5.95e3		1.000	5.01	32.3	129.4
10	10 PFOS	79.92	8.76e3	3.98e3		1.000	5.07	23.9	95.6
11	11 PFDA	469.00	8.27e3	4.12e3		1.000	5.30	25.2	100.9
12	12 8:2 FTS	506.90	2.12e3	1.03e3		1.000	5.27	28.9	115.5
13	13 13C3-PFBA	172.00	1.03e4	1.11e4	0.867	1.000	1.94	13.4	107.0
14	14 13C3-PFPeA	221.90	1.16e4	1.04e4	0.994	1.000	3.12	14.0	111.9
15	15 13C3-PFBS	79.95	6.57e3	1.04e4	0.564	1.000	3.40	14.0	111.7
16	16 13C2-PFHxA	269.90	3.99e3	1.04e4	0.907	1.000	3.80	5.27	105.4
17	17 13C4-PFHpA	321.90	7.97e3	1.04e4	0.742	1.000	4.27	12.9	103.0
18	18 18O2-PFHxS	102.90	1.32e3	4.24e3	0.271	1.000	4.39	14.3	114.8
19	19 13C2-6:2 FTS	408.90	1.95e3	1.09e4	0.224	1.000	4.62	10.0	80.0
20	20 13C2-PFOA	369.90	7.11e3	1.09e4	0.651	1.000	4.67	12.5	100.1
21	21 13C5-PFNA	422.90	5.95e3	5.33e3	1.002	1.000	5.01	13.9	111.4
22	22 13C8-PFOS	79.93	3.98e3	3.93e3	0.950	1.000	5.07	13.3	106.7
23	23 13C2-PFDA	470.00	4.12e3	4.43e3	0.827	1.000	5.30	14.1	112.5
24	24 13C2-8:2 FTS	508.70	1.03e3	4.43e3	0.260	1.000	5.27	11.2	89.7
25	25 13C4-PFBA	171.90	1.11e4	1.11e4	1.000	1.000	1.94	12.5	100.0
26	26 13C5-PFHxA	273.00	1.04e4	1.04e4	1.000	1.000	3.80	12.5	100.0
27	27 13C3-PFHxS	80.01	4.24e3	4.24e3	1.000	1.000	4.38	12.5	100.0
28	28 13C8-PFOA	375.90	1.09e4	1.09e4	1.000	1.000	4.67	12.5	100.0
29	29 13C4-PFOS	79.94	3.93e3	3.93e3	1.000	1.000	5.07	12.5	100.0
30	30 13C9-PFNA	427.00	5.33e3	5.33e3	1.000	1.000	5.00	12.5	100.0
31	31 13C6-PFDA	474.00	4.43e3	4.43e3	1.000	1.000	5.30	12.5	100.0

75-125

PW
11/30/16

✓ AC 11/30/16

↓ PW 11/30/16
60-150

ⓐ outside criteria
PW
11/30/16

40-150
60-150
50-150
60-150
↓
40-150

	Sample Name	Acquisition Date	Sample ID	Sample Comment
1	161129J1_01	11/29/2016 14:29:06	IPA	IPA
2	161129J1_02	11/29/2016 14:41:22	ST161129J1-1 PFC C3.5 16K2902	PFC C3.5 16K2902 A
3	161129J1_03	11/29/2016 14:53:37	IPA	IPA
4	161129J1_04	11/29/2016 15:05:52	B6K0139-BS1	OPR
5	161129J1_05	11/29/2016 15:18:05	B6K0139-BSD1	LCS Dup
6	161129J1_06	11/29/2016 15:30:21	IPA	IPA
7	161129J1_07	11/29/2016 15:42:35	B6K0139-BLK1	Method Blank
8	161129J1_08	11/29/2016 15:54:51	1601456-01	PFAS-SW39-111416
9	161129J1_09	11/29/2016 16:07:03	1601456-02	PFAS-SW32-111416
10	161129J1_10	11/29/2016 16:19:18	1601456-03	PFAS-SW29-111416
11	161129J1_11	11/29/2016 16:31:35	1601456-04	PFAS-SW38-111416
12	161129J1_12	11/29/2016 16:43:48	1601456-05	PFAS-SW28-111416
13	161129J1_13	11/29/2016 16:56:04	1601456-06	PFAS-WS-DUP3-111416
14	161129J1_14	11/29/2016 17:08:18	1601456-07	EB2-WS-111016
15	161129J1_15	11/29/2016 17:20:34	1601456-08	EB2-SED-110916
16	161129J1_16	11/29/2016 17:32:49	1601456-09	EB3-WS-111116
17	161129J1_17	11/29/2016 17:45:05	1601456-10	EB3-WG-110916
18	161129J1_18	11/29/2016 17:57:20	IPA	IPA
19	161129J1_19	11/29/2016 18:09:35	ST161129J1-2 PFC C3.5 16K2902	PFC C3.5 16K2902 A
20	161129J1_20	11/29/2016 18:21:49	IPA	IPA
21	161129J1_21	11/29/2016 18:34:05	1601456-11	EB4-WG-111116
22	161129J1_22	11/29/2016 18:46:19	1601456-12	EB3-SED-111016
23	161129J1_23	11/29/2016 18:58:35	1601456-13	EB4-SED-111116
24	161129J1_24	11/29/2016 19:10:48	1601456-14	EB4-WS-111416
25	161129J1_25	11/29/2016 19:23:02	1601456-15	EB5-SED-111416
26	161129J1_26	11/29/2016 19:35:15	B6K0139-MS1	Matrix Spike
27	161129J1_27	11/29/2016 19:47:28	B6K0139-MSD1	Matrix Spike Dup
28	161129J1_28	11/29/2016 19:59:43	1601464-01	EB03-20161116
29	161129J1_29	11/29/2016 20:12:00	1601464-02	OUI-MW53-20161116
30	161129J1_30	11/29/2016 20:24:14	1601464-03	OUI-MW54-20161116
31	161129J1_31	11/29/2016 20:36:29	1601464-04	OUI-MW42-20161116
32	161129J1_32	11/29/2016 20:48:43	1601464-05	OUI-MW01-20161116
33	161129J1_33	11/29/2016 21:00:59	IPA	IPA
34	161129J1_34	11/29/2016 21:13:14	ST161129J1-3 PFC C3.5 16K2902	PFC C3.5 16K2902 A
35	161129J1_35	11/29/2016 21:25:29	IPA	IPA
36	161129J1_36	11/29/2016 21:37:45	B6K0164-BS1	OPR
37	161129J1_37	11/29/2016 21:50:00	IPA	IPA
38	161129J1_38	11/29/2016 22:02:14	B6K0164-BLK1	Method Blank
39	161129J1_39	11/29/2016 22:14:30	1601464-06	OUI-MW31-20161116
40	161129J1_40	11/29/2016 22:26:45	1601464-07	OUI-PZ19-20161116
41	161129J1_41	11/29/2016 22:38:58	1601464-08	OUI-MW52-20161116
42	161129J1_42	11/29/2016 22:51:14	1601464-09	OUI-MW04-20161116
43	161129J1_43	11/29/2016 23:03:30	1601464-10	OUI-MW04A-20161116
44	161129J1_44	11/29/2016 23:15:44	1601464-11	OUI-MW05-20161116
45	161129J1_45	11/29/2016 23:27:59	1601472-01	EB04-20161117
46	161129J1_46	11/29/2016 23:40:10	1601472-02	OUI-MW51-20161117
47	161129J1_47	11/29/2016 23:52:24	1601472-03	OUI-MW50-20161117
48	161129J1_48	11/30/2016 00:04:38	1601472-04	OUI-MW49-20161117
49	161129J1_49	11/30/2016 00:16:53	B6K0164-MS1	Matrix Spike
50	161129J1_50	11/30/2016 00:29:08	B6K0164-MSD1	Matrix Spike Dup
51	161129J1_51	11/30/2016 00:41:22	IPA	IPA
52	161129J1_52	11/30/2016 00:53:34	ST161129J1-4 PFC C3.5 16K2902	PFC C3.5 16K2902 A
53	161129J1_53	11/30/2016 01:05:50	IPA	IPA
54	161129J1_54	11/30/2016 01:18:03	161128-QC1	Milk QC
55	161129J1_55	11/30/2016 01:30:18	161128-QC2	Milk QC
56	161129J1_56	11/30/2016 01:42:33	1601432-09@5x	WURTS-VAS15009-18-21_FD
57	161129J1_57	11/30/2016 01:54:48	1601432-09@40x	WURTS-VAS15009-18-21_FD

	Sample Name	Acquisition Date	Sample ID	Sample Comment
58	161129J1_58	11/30/2016 02:07:04	B6K0133-MS2@5x	WURTS-VAS15009-18-21_FD
59	161129J1_59	11/30/2016 02:19:19	B6K0133-MS2@40x	WURTS-VAS15009-18-21_FD
60	161129J1_60	11/30/2016 02:31:33	B6K0133-MSD2@5x	WURTS-VAS15009-28-31
61	161129J1_61	11/30/2016 02:43:48	B6K0133-MSD2@40x	WURTS-VAS15009-28-31
62	161129J1_62	11/30/2016 02:56:03	IPA	IPA
63	161129J1_63	11/30/2016 03:08:18	ST161129J1-5 PFC C3.5 16K2902	PFC C3.5 16K2902 A
64	161129J1_64	11/30/2016 03:20:33	IPA	IPA

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Last Altered: Wednesday, November 30, 2016 13:40:28 Pacific Standard Time

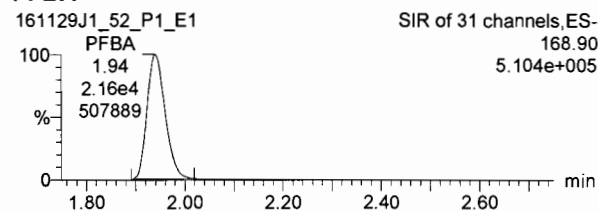
Printed: Wednesday, November 30, 2016 13:41:08 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 30 Nov 2016 13:32:31

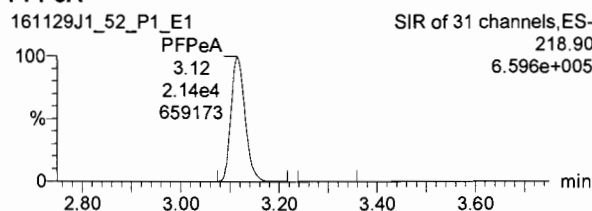
Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

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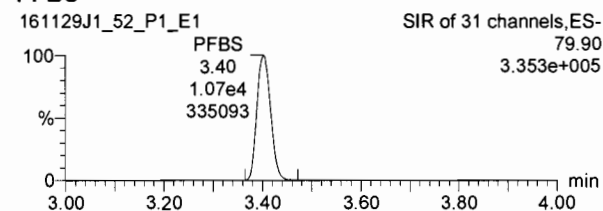
PFBA



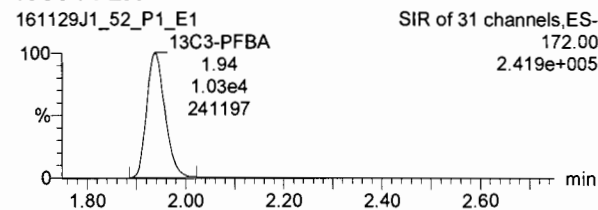
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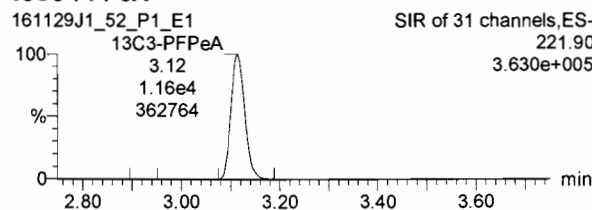
PFBS



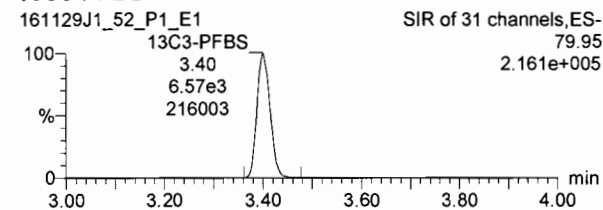
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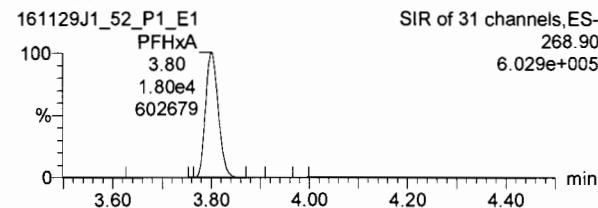
13C3-PFPeA



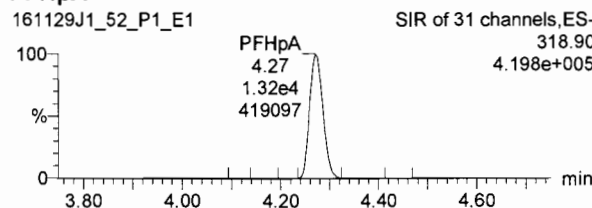
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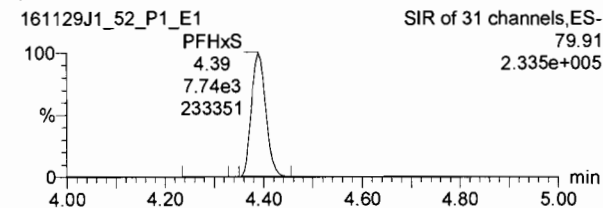
PFHxA



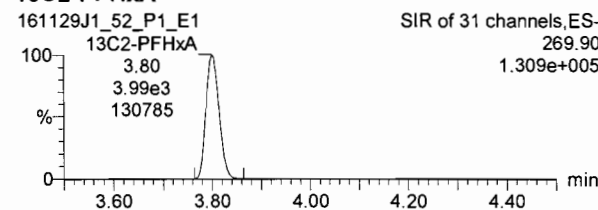
PFHpA



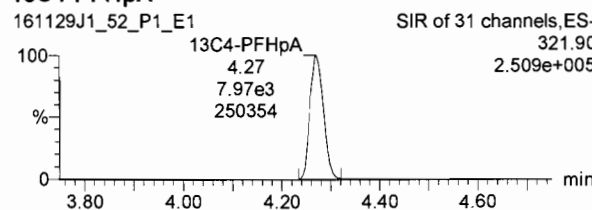
PFHxS



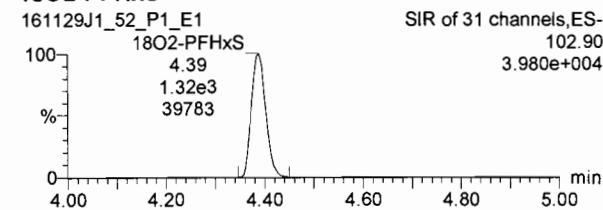
13C2-PFHxA



13C4-PFHpA



18O2-PFHxS



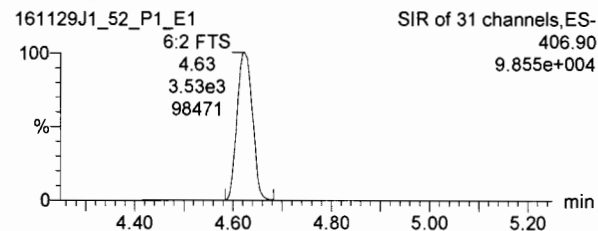
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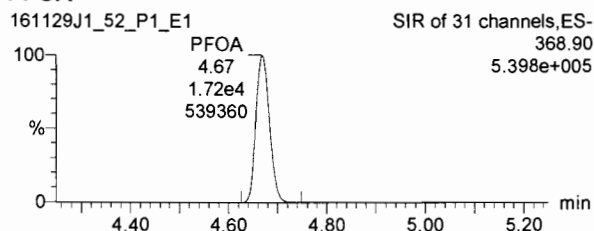
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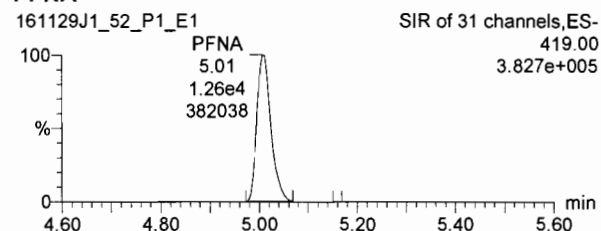
6:2 FTS



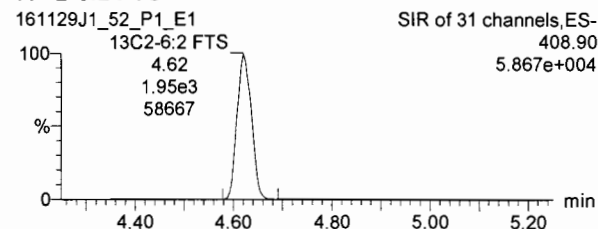
PFOA



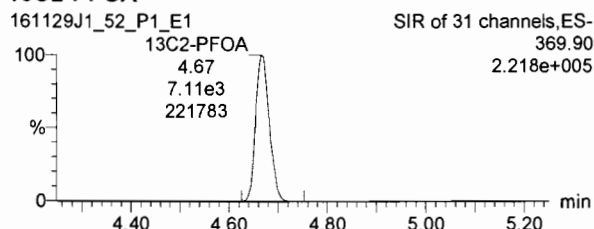
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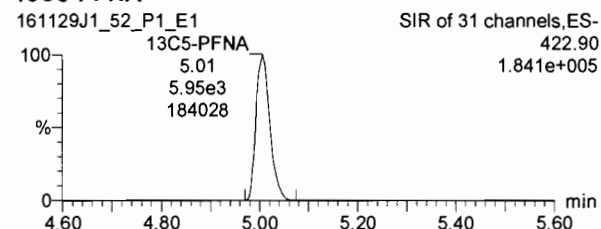
13C2-6:2 FTS



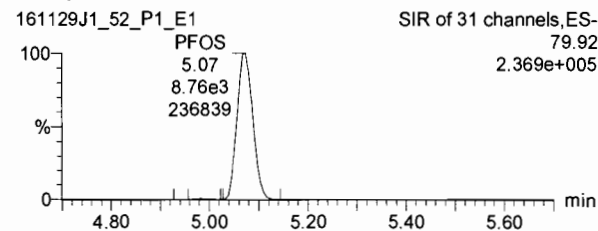
13C2-PFOA



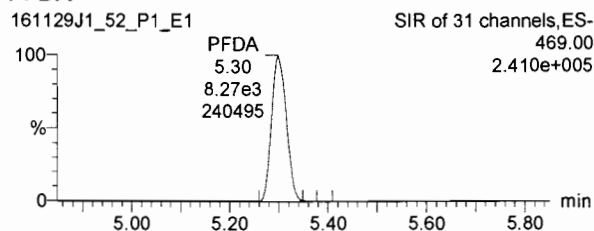
13C5-PFNA



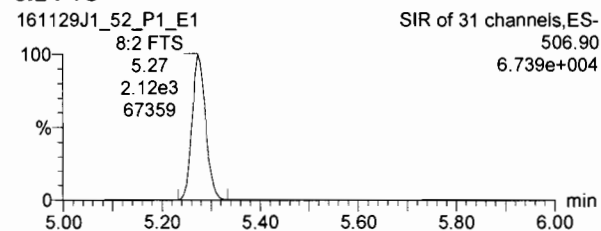
PFOS



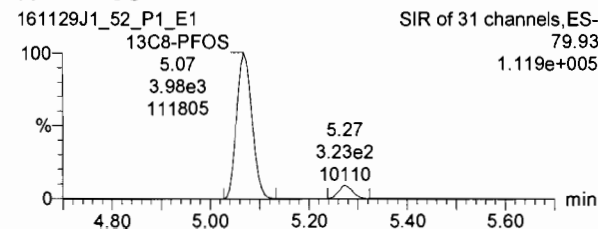
PFDA



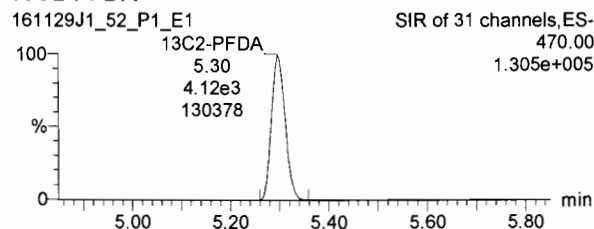
8:2 FTS



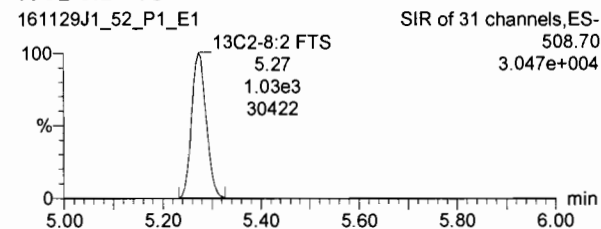
13C8-PFOS



13C2-PFDA



13C2-8:2 FTS



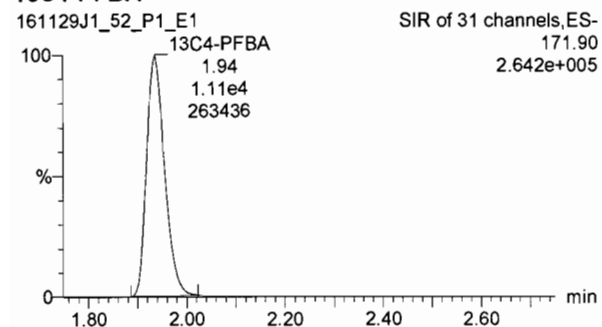
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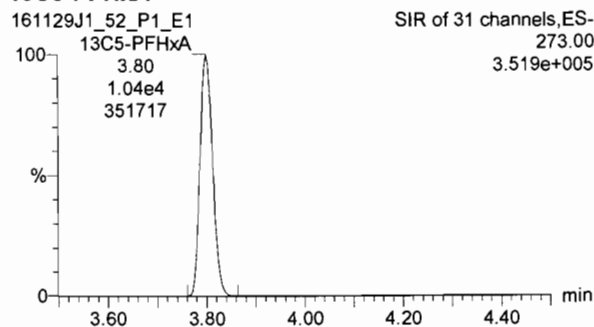
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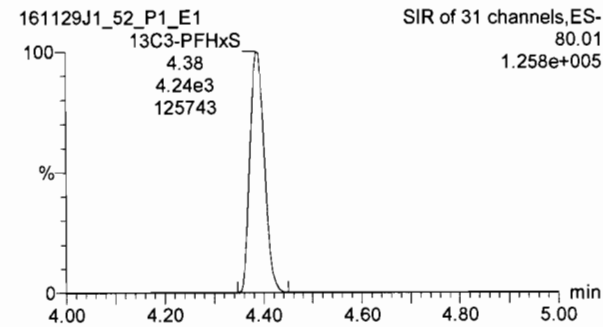
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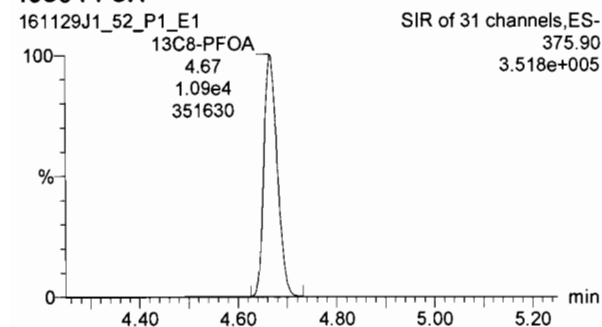
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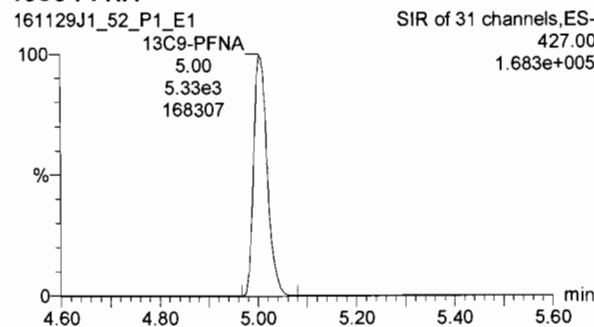
13C3-PFHxS



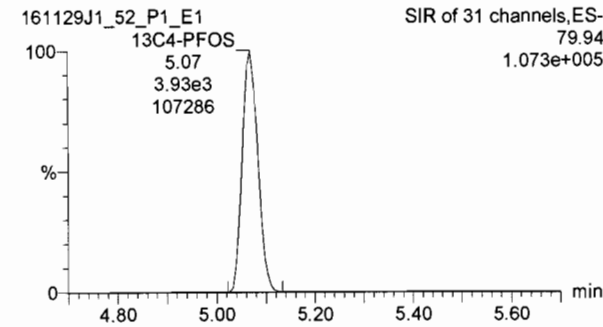
13C8-PFOA



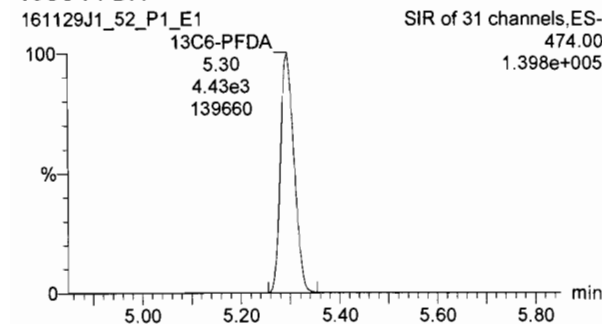
13C9-PFNA



13C4-PFOS



13C6-PFDA



INITIAL CALIBRATION

Vista Analytical Laboratory Q2

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:59:09 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 19 Nov 2016 12:55:02

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

Compound name: PFBACorrelation coefficient: $r = 0.999219$, $r^2 = 0.998438$ Calibration curve: $0.982791 * x + 0.0230635$

Response type: Internal Std (Ref 13), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	1.90	4.24e2	9.66e3	0.535	7.1	1.10
2	2 161118J2_04_P1_E1	1.00	1.91	7.90e2	1.01e4	0.972	-2.8	0.978
3	3 161118J2_05_P1_E1	2.00	1.91	1.58e3	1.05e4	1.88	-6.0	0.936
4	4 161118J2_06_P1_E1	5.00	1.91	3.59e3	9.99e3	4.55	-9.1	0.898
5	5 161118J2_07_P1_E1	10.0	1.91	8.91e3	1.04e4	10.9	9.2	1.08
6	6 161118J2_08_P1_E1	25.0	1.91	1.96e4	9.20e3	27.1	8.5	1.07
7	7 161118J2_09_P1_E1	50.0	1.91	3.98e4	9.95e3	50.8	1.7	1.00
8	8 161118J2_10_P1_E1	75.0	1.91	6.13e4	1.06e4	73.2	-2.4	0.960
9	9 161118J2_11_P1_E1	100	1.90	7.16e4	9.24e3	98.4	-1.6	0.968

AC
11/19/16PW
11/21/16**Compound name: PFPeA**Correlation coefficient: $r = 0.998741$, $r^2 = 0.997484$ Calibration curve: $0.85968 * x + 0.0362224$

Response type: Internal Std (Ref 14), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	3.11	4.30e2	1.11e4	0.524	4.7	0.973
2	2 161118J2_04_P1_E1	1.00	3.10	7.66e2	1.13e4	0.945	-5.5	0.848
3	3 161118J2_05_P1_E1	2.00	3.11	1.58e3	1.17e4	1.92	-4.1	0.842
4	4 161118J2_06_P1_E1	5.00	3.11	3.65e3	1.13e4	4.65	-6.9	0.807
5	5 161118J2_07_P1_E1	10.0	3.11	8.91e3	1.15e4	11.2	12.1	0.968
6	6 161118J2_08_P1_E1	25.0	3.11	1.96e4	1.02e4	27.9	11.8	0.962
7	7 161118J2_09_P1_E1	50.0	3.11	3.82e4	1.10e4	50.5	1.0	0.869
8	8 161118J2_10_P1_E1	75.0	3.10	5.94e4	1.17e4	73.8	-1.6	0.846
9	9 161118J2_11_P1_E1	100	3.11	6.78e4	1.02e4	97.0	-3.0	0.835

SS reinjected.
Both injections
are included.

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time
Printed: Saturday, November 19, 2016 12:59:09 Pacific Standard Time

Compound name: PFBS

Correlation coefficient: $r = 0.999357$, $r^2 = 0.998715$

Calibration curve: $0.774866 * x + -0.0202219$

Response type: Internal Std (Ref 15), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	3.40	2.02e2	6.31e3	0.543	8.7	0.802
2	2 161118J2_04_P1_E1	1.00	3.40	3.70e2	6.41e3	0.957	-4.3	0.722
3	3 161118J2_05_P1_E1	2.00	3.40	7.47e2	6.75e3	1.81	-9.5	0.691
4	4 161118J2_06_P1_E1	5.00	3.40	1.76e3	6.54e3	4.36	-12.8	0.672
5	5 161118J2_07_P1_E1	10.0	3.40	4.41e3	6.60e3	10.8	7.9	0.834
6	6 161118J2_08_P1_E1	25.0	3.40	9.83e3	6.03e3	26.4	5.4	0.816
7	7 161118J2_09_P1_E1	50.0	3.40	1.92e4	6.06e3	51.3	2.5	0.794
8	8 161118J2_10_P1_E1	75.0	3.40	2.90e4	6.40e3	73.1	-2.6	0.755
9	9 161118J2_11_P1_E1	100	3.40	3.44e4	5.59e3	99.3	-0.7	0.770

Compound name: PFHxA

Correlation coefficient: $r = 0.998535$, $r^2 = 0.997072$

Calibration curve: $0.829371 * x + 0.0163807$

Response type: Internal Std (Ref 16), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	3.80	3.69e2	4.09e3	0.524	4.8	0.902
2	2 161118J2_04_P1_E1	1.00	3.80	6.83e2	4.14e3	0.977	-2.3	0.826
3	3 161118J2_05_P1_E1	2.00	3.80	1.34e3	4.46e3	1.79	-10.3	0.752
4	4 161118J2_06_P1_E1	5.00	3.80	3.15e3	4.17e3	4.52	-9.5	0.754
5	5 161118J2_07_P1_E1	10.0	3.80	7.88e3	4.20e3	11.3	13.0	0.939
6	6 161118J2_08_P1_E1	25.0	3.80	1.70e4	3.62e3	28.3	13.2	0.940
7	7 161118J2_09_P1_E1	50.0	3.80	3.29e4	4.00e3	49.6	-0.8	0.823
8	8 161118J2_10_P1_E1	75.0	3.80	5.07e4	4.17e3	73.3	-2.3	0.810
9	9 161118J2_11_P1_E1	100	3.80	5.96e4	3.66e3	98.2	-1.8	0.815

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:59:09 Pacific Standard Time

Compound name: PFHpA

Correlation coefficient: $r = 0.999224$, $r^2 = 0.998449$

Calibration curve: $0.825598 * x + -0.00188587$

Response type: Internal Std (Ref 17), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	4.28	2.89e2	7.89e3	0.557	11.4	0.916
2	2 161118J2_04_P1_E1	1.00	4.27	5.60e2	7.91e3	1.08	7.6	0.886
3	3 161118J2_05_P1_E1	2.00	4.27	1.03e3	8.97e3	1.75	-12.6	0.720
4	4 161118J2_06_P1_E1	5.00	4.28	2.40e3	8.54e3	4.25	-15.0	0.701
5	5 161118J2_07_P1_E1	10.0	4.27	6.00e3	8.73e3	10.4	4.1	0.860
6	6 161118J2_08_P1_E1	25.0	4.28	1.36e4	7.71e3	26.7	6.8	0.881
7	7 161118J2_09_P1_E1	50.0	4.27	2.72e4	8.57e3	48.1	-3.9	0.794
8	8 161118J2_10_P1_E1	75.0	4.27	4.38e4	8.67e3	76.4	1.9	0.841
9	9 161118J2_11_P1_E1	100	4.27	4.99e4	7.61e3	99.3	-0.7	0.820

Compound name: PFHxS

Coefficient of Determination: $R^2 = 0.997308$

Calibration curve: $-0.00339694 * x^2 + 3.36003 * x + -0.393288$

Response type: Internal Std (Ref 18), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Exclude, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	4.39	1.60e2	1.21e3	0.610	22.0	3.31
2	2 161118J2_04_P1_E1	1.00	4.40	3.00e2	1.22e3	1.03	3.1	3.07
3	3 161118J2_05_P1_E1	2.00	4.40	5.85e2	1.28e3	1.81	-9.3	2.85
4	4 161118J2_06_P1_E1	5.00	4.40	1.28e3	1.29e3	3.83	-23.4	2.48
5	5 161118J2_07_P1_E1	10.0	4.39	3.33e3	1.24e3	10.2	1.7	3.34
6	6 161118J2_08_P1_E1	25.0	4.40	7.64e3	1.10e3	26.6	6.4	3.46
7	7 161118J2_09_P1_E1	50.0	4.40	1.57e4	1.21e3	51.4	2.7	3.26
8	8 161118J2_10_P1_E1	75.0	4.39	2.39e4	1.35e3	71.5	-4.7	2.97
9	9 161118J2_11_P1_E1	100	4.39	2.78e4	1.13e3	102	1.6	3.06

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

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Compound name: 6:2 FTS

Coefficient of Determination: $R^2 = 0.997896$

Calibration curve: $-0.00379453 * x^2 + 1.05162 * x + -0.0537721$

Response type: Internal Std (Ref 19), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Exclude, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	4.63	8.82e1	2.25e3	0.518	3.6	0.980
2	2 161118J2_04_P1_E1	1.00	4.63	1.70e2	2.23e3	0.961	-3.9	0.953
3	3 161118J2_05_P1_E1	2.00	4.63	3.64e2	2.36e3	1.90	-5.0	0.966
4	4 161118J2_06_P1_E1	5.00	4.63	8.22e2	2.08e3	4.84	-3.2	0.989
5	5 161118J2_07_P1_E1	10.0	4.62	2.16e3	2.34e3	11.5	14.7	1.15
6	6 161118J2_08_P1_E1	25.0	4.64	4.19e3	2.35e3	23.2	-7.3	0.892
7	7 161118J2_09_P1_E1	50.0	4.63	9.45e3	2.73e3	50.5	0.9	0.867
8	8 161118J2_10_P1_E1	75.0	4.62	1.32e4	2.87e3	75.2	0.3	0.768
9	9 161118J2_11_P1_E1	100	4.62	1.58e4	2.93e3	100	0.1	0.672

Compound name: PFOA

Coefficient of Determination: $R^2 = 0.997857$

Calibration curve: $-0.00316403 * x^2 + 1.30489 * x + -0.00818696$

Response type: Internal Std (Ref 20), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	4.67	4.20e2	6.73e3	0.604	20.9	1.56
2	2 161118J2_04_P1_E1	1.00	4.67	6.86e2	7.03e3	0.944	-5.6	1.22
3	3 161118J2_05_P1_E1	2.00	4.68	1.42e3	7.65e3	1.79	-10.6	1.16
4	4 161118J2_06_P1_E1	5.00	4.67	3.16e3	7.34e3	4.17	-16.5	1.08
5	5 161118J2_07_P1_E1	10.0	4.66	7.24e3	6.63e3	10.7	7.4	1.36
6	6 161118J2_08_P1_E1	25.0	4.68	1.80e4	6.89e3	26.8	7.1	1.31
7	7 161118J2_09_P1_E1	50.0	4.67	3.40e4	7.68e3	48.0	-4.0	1.11
8	8 161118J2_10_P1_E1	75.0	4.67	4.86e4	7.62e3	74.4	-0.7	1.06
9	9 161118J2_11_P1_E1	100	4.67	5.64e4	7.07e3	101	1.2	0.997

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

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Compound name: PFNA

Correlation coefficient: $r = 0.999117$, $r^2 = 0.998235$

Calibration curve: $0.818566 * x + -0.00476162$

Response type: Internal Std (Ref 21), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	5.01	2.12e2	5.85e3	0.558	11.6	0.904
2	2 161118J2_04_P1_E1	1.00	5.00	3.84e2	6.59e3	0.896	-10.4	0.728
3	3 161118J2_05_P1_E1	2.00	5.02	8.03e2	6.89e3	1.78	-10.8	0.728
4	4 161118J2_06_P1_E1	5.00	5.00	1.89e3	5.98e3	4.82	-3.6	0.788
5	5 161118J2_07_P1_E1	10.0	4.99	4.85e3	6.45e3	11.5	14.9	0.940
6	6 161118J2_08_P1_E1	25.0	5.01	1.07e4	6.86e3	23.9	-4.4	0.782
7	7 161118J2_09_P1_E1	50.0	5.01	2.28e4	6.69e3	52.1	4.3	0.854
8	8 161118J2_10_P1_E1	75.0	4.99	3.67e4	7.65e3	73.3	-2.3	0.800
9	9 161118J2_11_P1_E1	100	5.00	4.09e4	6.27e3	99.6	-0.4	0.816

Compound name: PFOS

Correlation coefficient: $r = 0.997516$, $r^2 = 0.995038$

Calibration curve: $1.14981 * x + 0.021829$

Response type: Internal Std (Ref 22), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	5.07	1.47e2	3.06e3	0.501	0.2	1.20
2	2 161118J2_04_P1_E1	1.00	5.06	3.11e2	3.35e3	0.988	-1.2	1.16
3	3 161118J2_05_P1_E1	2.00	5.08	6.07e2	3.38e3	1.94	-3.2	1.12
4	4 161118J2_06_P1_E1	5.00	5.06	1.46e3	3.64e3	4.35	-13.0	1.00
5	5 161118J2_07_P1_E1	10.0	5.05	3.76e3	3.74e3	10.9	9.0	1.26
6	6 161118J2_08_P1_E1	25.0	5.07	8.96e3	3.27e3	29.7	19.0	1.37
7	7 161118J2_09_P1_E1	50.0	5.08	1.61e4	3.68e3	47.7	-4.6	1.10
8	8 161118J2_10_P1_E1	75.0	5.05	2.98e4	4.29e3	75.4	0.5	1.16
9	9 161118J2_11_P1_E1	100	5.06	3.07e4	3.44e3	97.0	-3.0	1.12

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

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Compound name: PFDA

Coefficient of Determination: $R^2 = 0.994991$

Calibration curve: $-0.00347007 * x^2 + 1.08566 * x + -0.0891482$

Response type: Internal Std (Ref 23), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	5.30	1.24e2	2.90e3	0.573	14.6	1.06
2	2 161118J2_04_P1_E1	1.00	5.28	2.45e2	3.23e3	0.957	-4.3	0.947
3	3 161118J2_05_P1_E1	2.00	5.31	4.89e2	3.43e3	1.73	-13.3	0.891
4	4 161118J2_06_P1_E1	5.00	5.29	1.19e3	3.48e3	4.09	-18.3	0.858
5	5 161118J2_07_P1_E1	10.0	5.28	3.03e3	3.83e3	9.49	-5.1	0.990
6	6 161118J2_08_P1_E1	25.0	5.29	8.23e3	3.72e3	28.0	12.2	1.11
7	7 161118J2_09_P1_E1	50.0	5.30	1.73e4	4.61e3	51.8	3.6	0.936
8	8 161118J2_10_P1_E1	75.0	5.27	2.38e4	5.18e3	67.7	-9.7	0.767
9	9 161118J2_11_P1_E1	100	5.28	2.69e4	4.43e3	105	5.3	0.758

Compound name: 8:2 FTS

Coefficient of Determination: $R^2 = 0.996754$

Calibration curve: $-0.0034291 * x^2 + 0.988926 * x + -0.0486443$

Response type: Internal Std (Ref 24), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Include, Weighting: 1/x, Axis trans: None

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	0.500	5.27	3.13e1	9.39e2	0.471	-5.8	0.833
2	2 161118J2_04_P1_E1	1.00	5.26	7.68e1	9.83e2	1.04	4.0	0.976
3	3 161118J2_05_P1_E1	2.00	5.28	1.39e2	1.07e3	1.70	-15.2	0.809
4	4 161118J2_06_P1_E1	5.00	5.26	3.98e2	1.10e3	4.69	-6.2	0.903
5	5 161118J2_07_P1_E1	10.0	5.26	9.60e2	1.10e3	11.6	15.7	1.09
6	6 161118J2_08_P1_E1	25.0	5.27	2.18e3	1.18e3	25.8	3.1	0.927
7	7 161118J2_09_P1_E1	50.0	5.28	4.62e3	1.52e3	45.7	-8.5	0.760
8	8 161118J2_10_P1_E1	75.0	5.25	7.29e3	1.64e3	76.8	2.4	0.742
9	9 161118J2_11_P1_E1	100	5.26	7.46e3	1.43e3	102	1.7	0.651

Vista Analytical Laboratory Q2

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:59:09 Pacific Standard Time

Compound name: 13C3-PFBA

Response Factor: 0.866891

RRF SD: 0.0236312, Relative SD: 2.72597

Response type: Internal Std (Ref 25), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	1.90	9.66e3	1.15e4	12.1	-3.4	0.838
2	2 161118J2_04_P1_E1	12.5	1.90	1.01e4	1.16e4	12.6	0.6	0.872
3	3 161118J2_05_P1_E1	12.5	1.90	1.05e4	1.16e4	13.1	5.1	0.911
4	4 161118J2_06_P1_E1	12.5	1.90	9.99e3	1.18e4	12.2	-2.0	0.849
5	5 161118J2_07_P1_E1	12.5	1.91	1.04e4	1.17e4	12.7	1.9	0.883
6	6 161118J2_08_P1_E1	12.5	1.90	9.20e3	1.06e4	12.5	0.2	0.868
7	7 161118J2_09_P1_E1	12.5	1.90	9.95e3	1.16e4	12.4	-1.0	0.858
8	8 161118J2_10_P1_E1	12.5	1.91	1.06e4	1.21e4	12.7	1.8	0.883
9	9 161118J2_11_P1_E1	12.5	1.90	9.24e3	1.10e4	12.1	-3.1	0.840

Compound name: 13C3-PFPeA

Response Factor: 0.994106

RRF SD: 0.0301656, Relative SD: 3.03445

Response type: Internal Std (Ref 26), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	3.10	1.11e4	1.12e4	12.4	-0.7	0.987
2	2 161118J2_04_P1_E1	12.5	3.10	1.13e4	1.09e4	13.0	4.2	1.04
3	3 161118J2_05_P1_E1	12.5	3.10	1.17e4	1.15e4	12.9	3.0	1.02
4	4 161118J2_06_P1_E1	12.5	3.11	1.13e4	1.15e4	12.3	-1.2	0.982
5	5 161118J2_07_P1_E1	12.5	3.10	1.15e4	1.17e4	12.4	-0.8	0.986
6	6 161118J2_08_P1_E1	12.5	3.11	1.02e4	1.03e4	12.5	-0.3	0.991
7	7 161118J2_09_P1_E1	12.5	3.10	1.10e4	1.12e4	12.3	-1.5	0.979
8	8 161118J2_10_P1_E1	12.5	3.10	1.17e4	1.14e4	12.9	3.1	1.02
9	9 161118J2_11_P1_E1	12.5	3.10	1.02e4	1.08e4	11.8	-5.7	0.937

Vista Analytical Laboratory Q2

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

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Compound name: 13C3-PFBS

Response Factor: 0.563832

RRF SD: 0.0242321, Relative SD: 4.29775

Response type: Internal Std (Ref 26), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	3.40	6.31e3	1.12e4	12.5	-0.2	0.563
2	2 161118J2_04_P1_E1	12.5	3.40	6.41e3	1.09e4	13.0	4.4	0.589
3	3 161118J2_05_P1_E1	12.5	3.40	6.75e3	1.15e4	13.1	4.4	0.589
4	4 161118J2_06_P1_E1	12.5	3.40	6.54e3	1.15e4	12.6	0.8	0.568
5	5 161118J2_07_P1_E1	12.5	3.40	6.60e3	1.17e4	12.5	0.3	0.566
6	6 161118J2_08_P1_E1	12.5	3.40	6.03e3	1.03e4	13.0	3.9	0.586
7	7 161118J2_09_P1_E1	12.5	3.40	6.06e3	1.12e4	12.0	-4.4	0.539
8	8 161118J2_10_P1_E1	12.5	3.40	6.40e3	1.14e4	12.4	-0.7	0.560
9	9 161118J2_11_P1_E1	12.5	3.40	5.59e3	1.08e4	11.4	-8.6	0.516

Compound name: 13C2-PFHxA

Response Factor: 0.907083

RRF SD: 0.0372162, Relative SD: 4.10285

Response type: Internal Std (Ref 26), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	5.00	3.80	4.09e3	1.12e4	5.03	0.5	0.912
2	2 161118J2_04_P1_E1	5.00	3.80	4.14e3	1.09e4	5.23	4.6	0.948
3	3 161118J2_05_P1_E1	5.00	3.79	4.46e3	1.15e4	5.36	7.1	0.972
4	4 161118J2_06_P1_E1	5.00	3.80	4.17e3	1.15e4	5.00	0.0	0.907
5	5 161118J2_07_P1_E1	5.00	3.80	4.20e3	1.17e4	4.95	-0.9	0.898
6	6 161118J2_08_P1_E1	5.00	3.80	3.62e3	1.03e4	4.85	-3.1	0.879
7	7 161118J2_09_P1_E1	5.00	3.80	4.00e3	1.12e4	4.91	-1.8	0.890
8	8 161118J2_10_P1_E1	5.00	3.79	4.17e3	1.14e4	5.03	0.6	0.913
9	9 161118J2_11_P1_E1	5.00	3.80	3.66e3	1.08e4	4.65	-7.0	0.844

Vista Analytical Laboratory Q2

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

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Compound name: 13C4-PFHpA

Response Factor: 0.741732

RRF SD: 0.0267417, Relative SD: 3.60531

Response type: Internal Std (Ref 26), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	4.27	7.89e3	1.12e4	11.9	-5.1	0.704
2	2 161118J2_04_P1_E1	12.5	4.27	7.91e3	1.09e4	12.2	-2.2	0.725
3	3 161118J2_05_P1_E1	12.5	4.27	8.97e3	1.15e4	13.2	5.5	0.782
4	4 161118J2_06_P1_E1	12.5	4.28	8.54e3	1.15e4	12.5	0.1	0.742
5	5 161118J2_07_P1_E1	12.5	4.27	8.73e3	1.17e4	12.6	0.8	0.747
6	6 161118J2_08_P1_E1	12.5	4.28	7.71e3	1.03e4	12.6	1.1	0.750
7	7 161118J2_09_P1_E1	12.5	4.27	8.57e3	1.12e4	12.9	2.9	0.763
8	8 161118J2_10_P1_E1	12.5	4.27	8.67e3	1.14e4	12.8	2.3	0.759
9	9 161118J2_11_P1_E1	12.5	4.27	7.61e3	1.08e4	11.8	-5.3	0.702

Compound name: 18O2-PFHxS

Response Factor: 0.271084

RRF SD: 0.0155398, Relative SD: 5.73246

Response type: Internal Std (Ref 27), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	4.39	1.21e3	4.58e3	12.2	-2.8	0.264
2	2 161118J2_04_P1_E1	12.5	4.39	1.22e3	4.43e3	12.7	1.8	0.276
3	3 161118J2_05_P1_E1	12.5	4.39	1.28e3	4.57e3	13.0	3.7	0.281
4	4 161118J2_06_P1_E1	12.5	4.40	1.29e3	4.57e3	13.0	4.2	0.283
5	5 161118J2_07_P1_E1	12.5	4.39	1.24e3	4.83e3	11.9	-5.0	0.258
6	6 161118J2_08_P1_E1	12.5	4.40	1.10e3	4.35e3	11.7	-6.6	0.253
7	7 161118J2_09_P1_E1	12.5	4.39	1.21e3	4.71e3	11.8	-5.5	0.256
8	8 161118J2_10_P1_E1	12.5	4.39	1.35e3	4.47e3	13.9	11.0	0.301
9	9 161118J2_11_P1_E1	12.5	4.39	1.13e3	4.22e3	12.4	-0.8	0.269

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

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Compound name: 13C2-6:2 FTS

Response Factor: 0.223576

RRF SD: 0.0338864, Relative SD: 15.1566

Response type: Internal Std (Ref 28), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	4.63	2.25e3	1.13e4	11.1	-11.0	0.199
2	2 161118J2_04_P1_E1	12.5	4.63	2.23e3	1.00e4	12.5	-0.1	0.223
3	3 161118J2_05_P1_E1	12.5	4.63	2.36e3	1.28e4	10.3	-17.3	0.185
4	4 161118J2_06_P1_E1	12.5	4.63	2.08e3	1.16e4	10.0	-20.0	0.179
5	5 161118J2_07_P1_E1	12.5	4.62	2.34e3	9.79e3	13.4	7.0	0.239
6	6 161118J2_08_P1_E1	12.5	4.63	2.35e3	1.11e4	11.8	-5.8	0.211
7	7 161118J2_09_P1_E1	12.5	4.63	2.73e3	1.16e4	13.1	5.0	0.235
8	8 161118J2_10_P1_E1	12.5	4.62	2.87e3	1.08e4	14.8	18.4	0.265
9	9 161118J2_11_P1_E1	12.5	4.62	2.93e3	1.06e4	15.5	23.9	0.277

Compound name: 13C2-PFOA

Response Factor: 0.651033

RRF SD: 0.0415144, Relative SD: 6.3767

Response type: Internal Std (Ref 28), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	4.67	6.73e3	1.13e4	11.4	-8.6	0.595
2	2 161118J2_04_P1_E1	12.5	4.67	7.03e3	1.00e4	13.5	7.9	0.703
3	3 161118J2_05_P1_E1	12.5	4.68	7.65e3	1.28e4	11.5	-7.8	0.600
4	4 161118J2_06_P1_E1	12.5	4.67	7.34e3	1.16e4	12.1	-2.9	0.632
5	5 161118J2_07_P1_E1	12.5	4.66	6.63e3	9.79e3	13.0	4.1	0.678
6	6 161118J2_08_P1_E1	12.5	4.68	6.89e3	1.11e4	11.9	-5.0	0.618
7	7 161118J2_09_P1_E1	12.5	4.67	7.68e3	1.16e4	12.7	1.6	0.662
8	8 161118J2_10_P1_E1	12.5	4.66	7.62e3	1.08e4	13.5	8.1	0.704
9	9 161118J2_11_P1_E1	12.5	4.67	7.07e3	1.06e4	12.8	2.6	0.668

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

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Compound name: 13C5-PFNA

Response Factor: 1.00196

RRF SD: 0.0611671, Relative SD: 6.10474

Response type: Internal Std (Ref 30), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	5.00	5.85e3	6.09e3	12.0	-4.1	0.961
2	2 161118J2_04_P1_E1	12.5	4.99	6.59e3	6.13e3	13.4	7.3	1.07
3	3 161118J2_05_P1_E1	12.5	5.01	6.89e3	6.68e3	12.9	3.0	1.03
4	4 161118J2_06_P1_E1	12.5	5.00	5.98e3	6.62e3	11.3	-9.7	0.904
5	5 161118J2_07_P1_E1	12.5	4.99	6.45e3	6.34e3	12.7	1.6	1.02
6	6 161118J2_08_P1_E1	12.5	5.01	6.86e3	6.45e3	13.3	6.2	1.06
7	7 161118J2_09_P1_E1	12.5	5.01	6.69e3	6.76e3	12.3	-1.2	0.990
8	8 161118J2_10_P1_E1	12.5	4.99	7.65e3	7.29e3	13.1	4.7	1.05
9	9 161118J2_11_P1_E1	12.5	5.00	6.27e3	6.78e3	11.5	-7.7	0.925

Compound name: 13C8-PFOS

Response Factor: 0.950357

RRF SD: 0.0485013, Relative SD: 5.10348

Response type: Internal Std (Ref 29), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	5.07	3.06e3	3.20e3	12.6	0.9	0.959
2	2 161118J2_04_P1_E1	12.5	5.05	3.35e3	3.59e3	12.3	-1.8	0.933
3	3 161118J2_05_P1_E1	12.5	5.08	3.38e3	3.93e3	11.3	-9.5	0.860
4	4 161118J2_06_P1_E1	12.5	5.06	3.64e3	3.66e3	13.1	4.5	0.993
5	5 161118J2_07_P1_E1	12.5	5.05	3.74e3	3.92e3	12.6	0.5	0.955
6	6 161118J2_08_P1_E1	12.5	5.07	3.27e3	3.50e3	12.3	-1.6	0.935
7	7 161118J2_09_P1_E1	12.5	5.07	3.68e3	3.55e3	13.6	9.0	1.04
8	8 161118J2_10_P1_E1	12.5	5.05	4.29e3	4.48e3	12.6	0.9	0.959
9	9 161118J2_11_P1_E1	12.5	5.06	3.44e3	3.73e3	12.1	-2.9	0.923

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Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

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Compound name: 13C2-PFDA

Response Factor: 0.827364

RRF SD: 0.0452081, Relative SD: 5.46412

Response type: Internal Std (Ref 31), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	5.29	2.90e3	3.19e3	13.8	10.2	0.912
2	2 161118J2_04_P1_E1	12.5	5.28	3.23e3	3.86e3	12.7	1.2	0.837
3	3 161118J2_05_P1_E1	12.5	5.31	3.43e3	4.26e3	12.1	-2.8	0.804
4	4 161118J2_06_P1_E1	12.5	5.28	3.48e3	4.40e3	11.9	-4.4	0.791
5	5 161118J2_07_P1_E1	12.5	5.28	3.83e3	4.78e3	12.1	-3.1	0.801
6	6 161118J2_08_P1_E1	12.5	5.29	3.72e3	4.92e3	11.4	-8.6	0.756
7	7 161118J2_09_P1_E1	12.5	5.30	4.61e3	5.39e3	12.9	3.4	0.855
8	8 161118J2_10_P1_E1	12.5	5.27	5.18e3	6.20e3	12.6	0.9	0.835
9	9 161118J2_11_P1_E1	12.5	5.28	4.43e3	5.19e3	12.9	3.3	0.855

Compound name: 13C2-8:2 FTS

Response Factor: 0.26028

RRF SD: 0.0208158, Relative SD: 7.99747

Response type: Internal Std (Ref 31), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	5.27	9.39e2	3.19e3	14.1	13.2	0.295
2	2 161118J2_04_P1_E1	12.5	5.26	9.83e2	3.86e3	12.2	-2.1	0.255
3	3 161118J2_05_P1_E1	12.5	5.28	1.07e3	4.26e3	12.1	-3.4	0.252
4	4 161118J2_06_P1_E1	12.5	5.26	1.10e3	4.40e3	12.0	-3.8	0.250
5	5 161118J2_07_P1_E1	12.5	5.26	1.10e3	4.78e3	11.0	-11.7	0.230
6	6 161118J2_08_P1_E1	12.5	5.27	1.18e3	4.92e3	11.5	-8.0	0.239
7	7 161118J2_09_P1_E1	12.5	5.27	1.52e3	5.39e3	13.5	8.2	0.282
8	8 161118J2_10_P1_E1	12.5	5.25	1.64e3	6.20e3	12.7	1.5	0.264
9	9 161118J2_11_P1_E1	12.5	5.26	1.43e3	5.19e3	13.3	6.1	0.276

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

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Compound name: 13C4-PFBA

Response Factor: 1

RRF SD: 0, Relative SD: 0

Response type: Internal Std (Ref 25), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	1.90	1.15e4	1.15e4	12.5	0.0	1.00
2	2 161118J2_04_P1_E1	12.5	1.90	1.16e4	1.16e4	12.5	0.0	1.00
3	3 161118J2_05_P1_E1	12.5	1.90	1.16e4	1.16e4	12.5	0.0	1.00
4	4 161118J2_06_P1_E1	12.5	1.90	1.18e4	1.18e4	12.5	0.0	1.00
5	5 161118J2_07_P1_E1	12.5	1.91	1.17e4	1.17e4	12.5	0.0	1.00
6	6 161118J2_08_P1_E1	12.5	1.90	1.06e4	1.06e4	12.5	0.0	1.00
7	7 161118J2_09_P1_E1	12.5	1.90	1.16e4	1.16e4	12.5	0.0	1.00
8	8 161118J2_10_P1_E1	12.5	1.90	1.21e4	1.21e4	12.5	0.0	1.00
9	9 161118J2_11_P1_E1	12.5	1.90	1.10e4	1.10e4	12.5	0.0	1.00

Compound name: 13C5-PFHxA

Response Factor: 1

RRF SD: 0, Relative SD: 0

Response type: Internal Std (Ref 26), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	3.80	1.12e4	1.12e4	12.5	0.0	1.00
2	2 161118J2_04_P1_E1	12.5	3.80	1.09e4	1.09e4	12.5	0.0	1.00
3	3 161118J2_05_P1_E1	12.5	3.79	1.15e4	1.15e4	12.5	0.0	1.00
4	4 161118J2_06_P1_E1	12.5	3.79	1.15e4	1.15e4	12.5	0.0	1.00
5	5 161118J2_07_P1_E1	12.5	3.79	1.17e4	1.17e4	12.5	0.0	1.00
6	6 161118J2_08_P1_E1	12.5	3.80	1.03e4	1.03e4	12.5	0.0	1.00
7	7 161118J2_09_P1_E1	12.5	3.79	1.12e4	1.12e4	12.5	0.0	1.00
8	8 161118J2_10_P1_E1	12.5	3.79	1.14e4	1.14e4	12.5	0.0	1.00
9	9 161118J2_11_P1_E1	12.5	3.80	1.08e4	1.08e4	12.5	0.0	1.00

Vista Analytical Laboratory Q2

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

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Compound name: 13C3-PFHxS

Response Factor: 1

RRF SD: 5.55112e-017, Relative SD: 5.55112e-015

Response type: Internal Std (Ref 27), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	4.39	4.58e3	4.58e3	12.5	0.0	1.00
2	2 161118J2_04_P1_E1	12.5	4.39	4.43e3	4.43e3	12.5	-0.0	1.00
3	3 161118J2_05_P1_E1	12.5	4.39	4.57e3	4.57e3	12.5	0.0	1.00
4	4 161118J2_06_P1_E1	12.5	4.40	4.57e3	4.57e3	12.5	0.0	1.00
5	5 161118J2_07_P1_E1	12.5	4.38	4.83e3	4.83e3	12.5	0.0	1.00
6	6 161118J2_08_P1_E1	12.5	4.40	4.35e3	4.35e3	12.5	-0.0	1.00
7	7 161118J2_09_P1_E1	12.5	4.39	4.71e3	4.71e3	12.5	0.0	1.00
8	8 161118J2_10_P1_E1	12.5	4.39	4.47e3	4.47e3	12.5	0.0	1.00
9	9 161118J2_11_P1_E1	12.5	4.39	4.22e3	4.22e3	12.5	0.0	1.00

Compound name: 13C8-PFOA

Response Factor: 1

RRF SD: 0, Relative SD: 0

Response type: Internal Std (Ref 28), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	4.67	1.13e4	1.13e4	12.5	0.0	1.00
2	2 161118J2_04_P1_E1	12.5	4.67	1.00e4	1.00e4	12.5	0.0	1.00
3	3 161118J2_05_P1_E1	12.5	4.68	1.28e4	1.28e4	12.5	0.0	1.00
4	4 161118J2_06_P1_E1	12.5	4.67	1.16e4	1.16e4	12.5	0.0	1.00
5	5 161118J2_07_P1_E1	12.5	4.66	9.79e3	9.79e3	12.5	0.0	1.00
6	6 161118J2_08_P1_E1	12.5	4.68	1.11e4	1.11e4	12.5	0.0	1.00
7	7 161118J2_09_P1_E1	12.5	4.67	1.16e4	1.16e4	12.5	0.0	1.00
8	8 161118J2_10_P1_E1	12.5	4.66	1.08e4	1.08e4	12.5	0.0	1.00
9	9 161118J2_11_P1_E1	12.5	4.67	1.06e4	1.06e4	12.5	0.0	1.00

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

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Compound name: 13C4-PFOS

Response Factor: 1

RRF SD: 1.35974e-016, Relative SD: 1.35974e-014

Response type: Internal Std (Ref 29), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	5.07	3.20e3	3.20e3	12.5	0.0	1.00
2	2 161118J2_04_P1_E1	12.5	5.05	3.59e3	3.59e3	12.5	0.0	1.00
3	3 161118J2_05_P1_E1	12.5	5.08	3.93e3	3.93e3	12.5	0.0	1.00
4	4 161118J2_06_P1_E1	12.5	5.06	3.66e3	3.66e3	12.5	0.0	1.00
5	5 161118J2_07_P1_E1	12.5	5.05	3.92e3	3.92e3	12.5	0.0	1.00
6	6 161118J2_08_P1_E1	12.5	5.07	3.50e3	3.50e3	12.5	0.0	1.00
7	7 161118J2_09_P1_E1	12.5	5.07	3.55e3	3.55e3	12.5	0.0	1.00
8	8 161118J2_10_P1_E1	12.5	5.05	4.48e3	4.48e3	12.5	0.0	1.00
9	9 161118J2_11_P1_E1	12.5	5.05	3.73e3	3.73e3	12.5	0.0	1.00

Compound name: 13C9-PFNA

Response Factor: 1

RRF SD: 3.92523e-017, Relative SD: 3.92523e-015

Response type: Internal Std (Ref 30), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc.	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	5.01	6.09e3	6.09e3	12.5	0.0	1.00
2	2 161118J2_04_P1_E1	12.5	4.99	6.13e3	6.13e3	12.5	0.0	1.00
3	3 161118J2_05_P1_E1	12.5	5.02	6.68e3	6.68e3	12.5	0.0	1.00
4	4 161118J2_06_P1_E1	12.5	5.00	6.62e3	6.62e3	12.5	0.0	1.00
5	5 161118J2_07_P1_E1	12.5	4.99	6.34e3	6.34e3	12.5	0.0	1.00
6	6 161118J2_08_P1_E1	12.5	5.01	6.45e3	6.45e3	12.5	0.0	1.00
7	7 161118J2_09_P1_E1	12.5	5.01	6.76e3	6.76e3	12.5	0.0	1.00
8	8 161118J2_10_P1_E1	12.5	4.99	7.29e3	7.29e3	12.5	-0.0	1.00
9	9 161118J2_11_P1_E1	12.5	5.00	6.78e3	6.78e3	12.5	0.0	1.00

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

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Compound name: 13C6-PFDA

Response Factor: 1

RRF SD: 0, Relative SD: 0

Response type: Internal Std (Ref 31), Area * (IS Conc. / IS Area)

Curve type: RF

	# Name	Std. Conc	RT	Resp	IS Resp	Conc	%Dev	RRF
1	1 161118J2_03_P1_E1	12.5	5.29	3.19e3	3.19e3	12.5	0.0	1.00
2	2 161118J2_04_P1_E1	12.5	5.28	3.86e3	3.86e3	12.5	0.0	1.00
3	3 161118J2_05_P1_E1	12.5	5.31	4.26e3	4.26e3	12.5	0.0	1.00
4	4 161118J2_06_P1_E1	12.5	5.28	4.40e3	4.40e3	12.5	0.0	1.00
5	5 161118J2_07_P1_E1	12.5	5.28	4.78e3	4.78e3	12.5	0.0	1.00
6	6 161118J2_08_P1_E1	12.5	5.29	4.92e3	4.92e3	12.5	0.0	1.00
7	7 161118J2_09_P1_E1	12.5	5.30	5.39e3	5.39e3	12.5	0.0	1.00
8	8 161118J2_10_P1_E1	12.5	5.27	6.20e3	6.20e3	12.5	0.0	1.00
9	9 161118J2_11_P1_E1	12.5	5.28	5.19e3	5.19e3	12.5	0.0	1.00

Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

Method: U:\Q2.PRO\MethDB\PFC List 18_A No4-2FTS_161118.mdb 19 Nov 2016 12:55:02

Calibration: U:\Q2.PRO\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

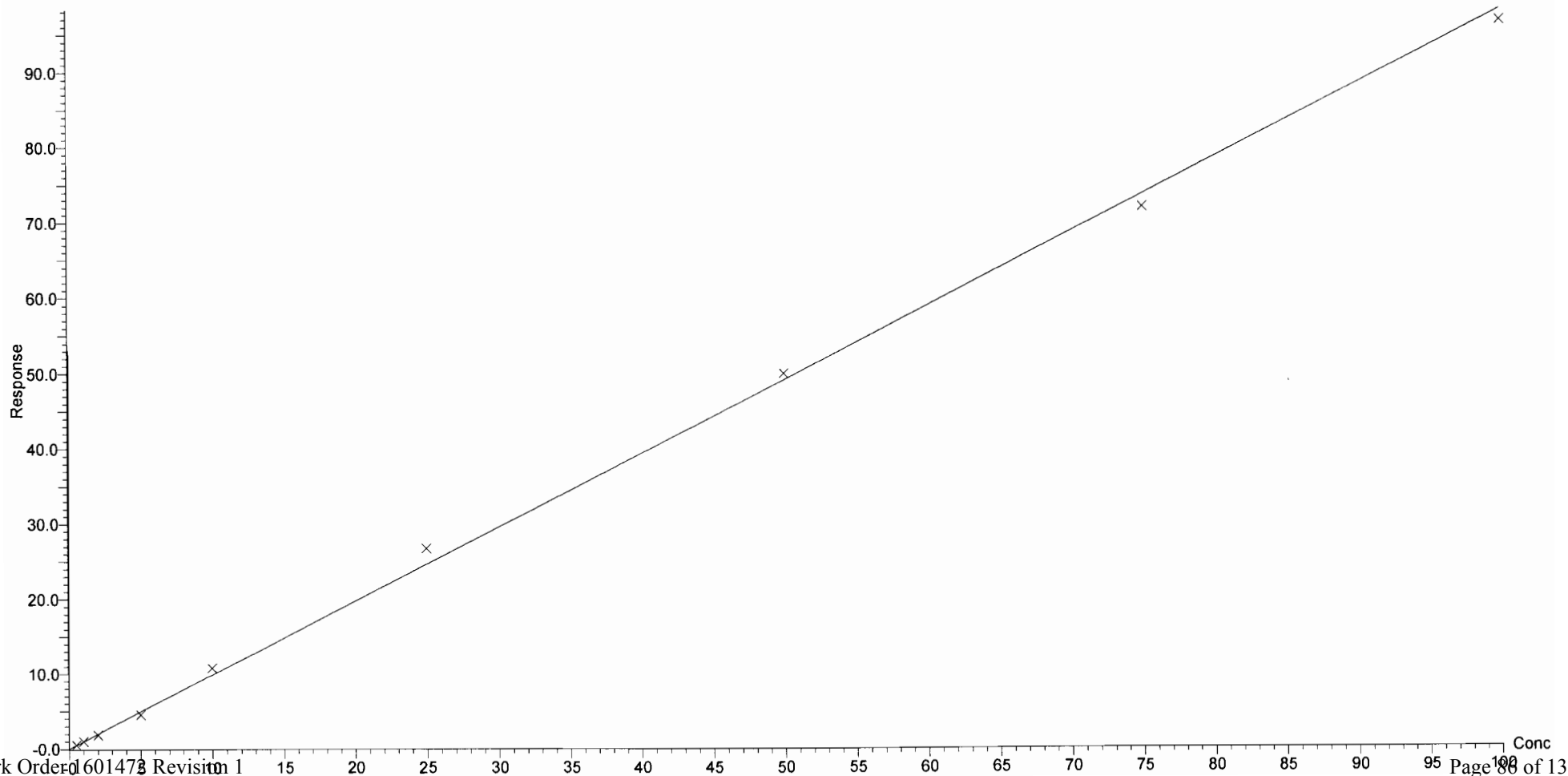
Compound name: PFBA

Correlation coefficient: $r = 0.999219$, $r^2 = 0.998438$

Calibration curve: $0.982791 * x + 0.0230635$

Response type: Internal Std (Ref 13), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

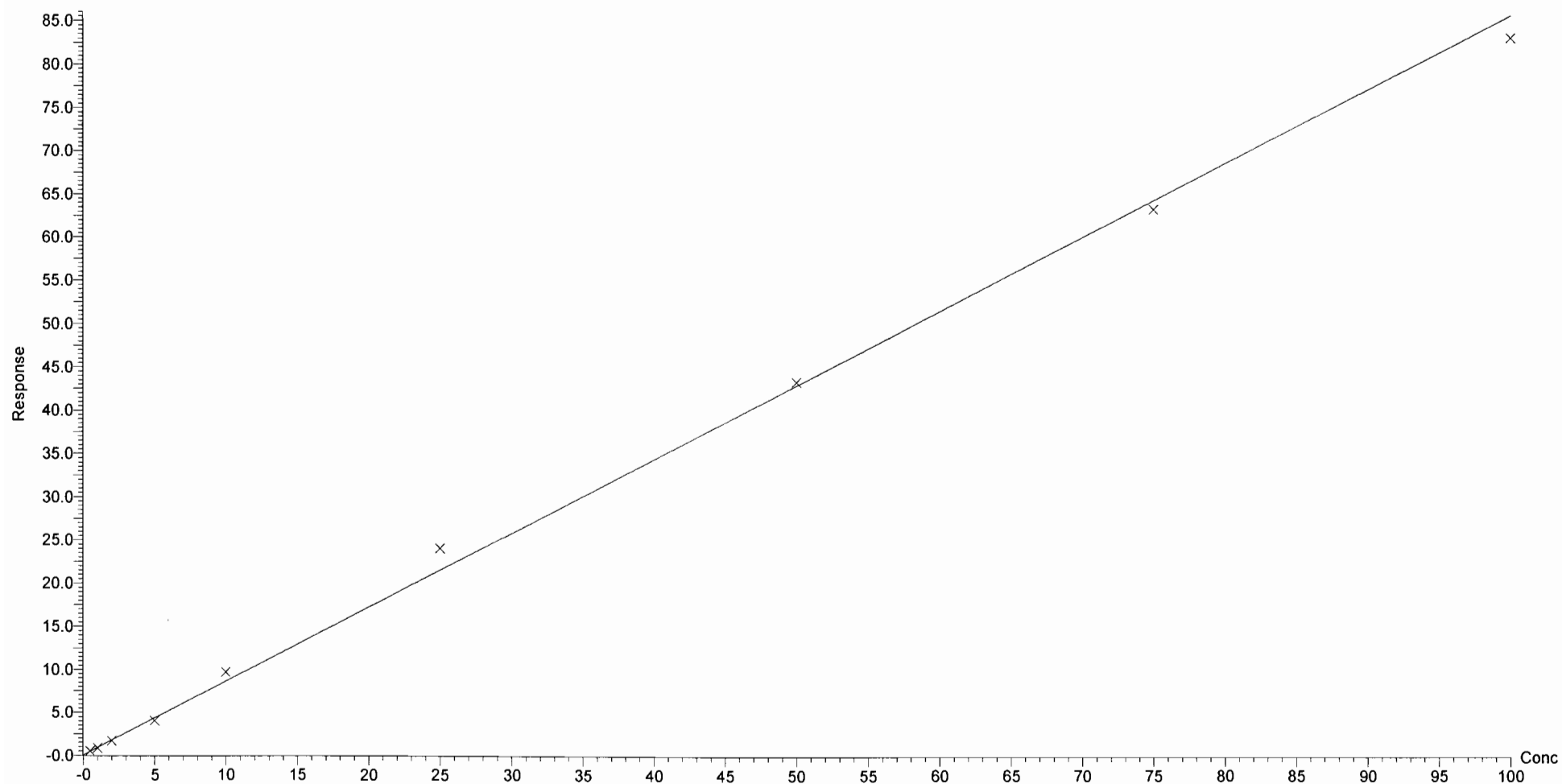
Compound name: PFPeA

Correlation coefficient: $r = 0.998741$, $r^2 = 0.997484$

Calibration curve: $0.85968 * x + 0.0362224$

Response type: Internal Std (Ref 14), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

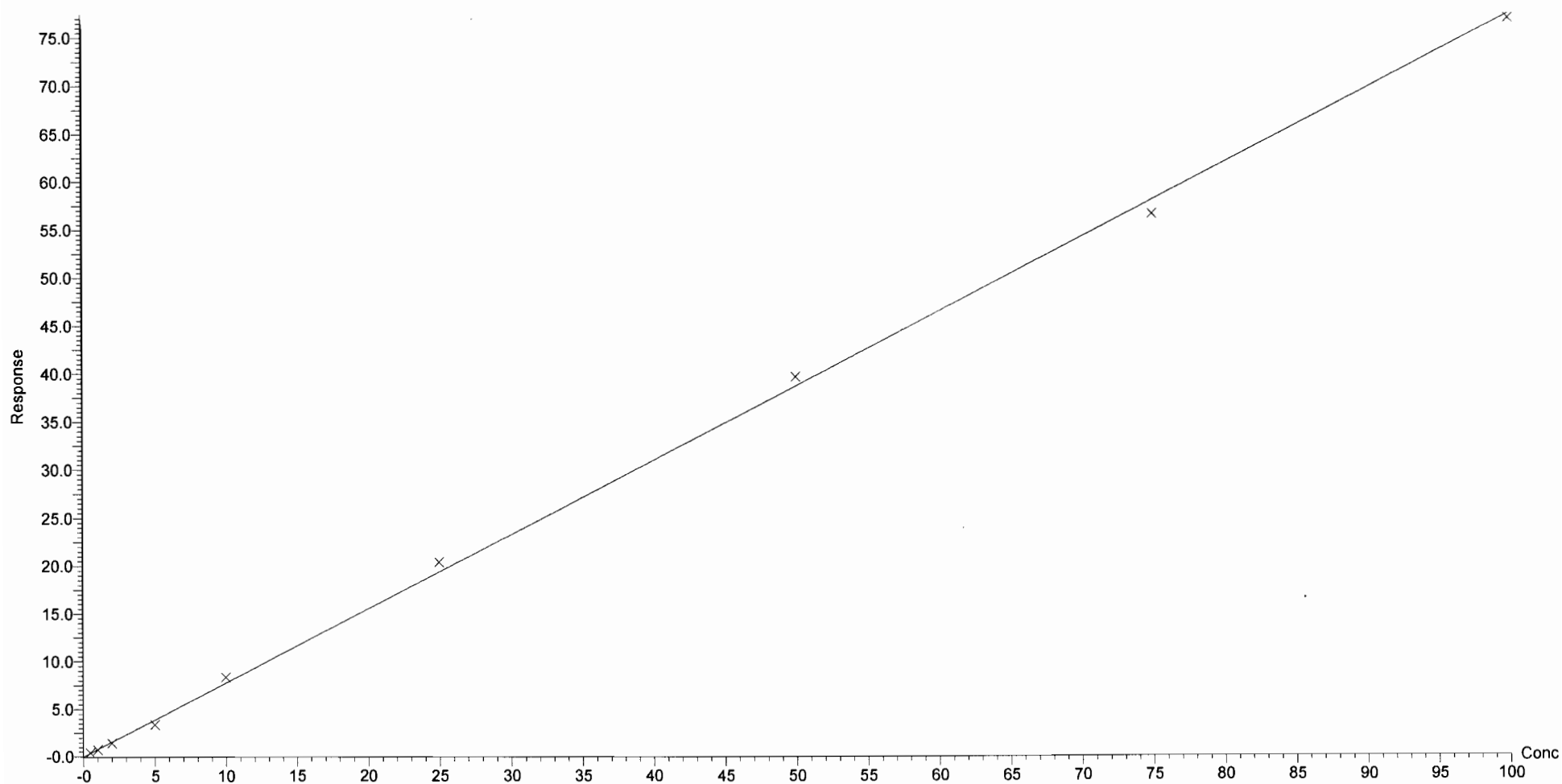
Compound name: PFBS

Correlation coefficient: $r = 0.999357$, $r^2 = 0.998715$

Calibration curve: $0.774866 * x + -0.0202219$

Response type: Internal Std (Ref 15), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

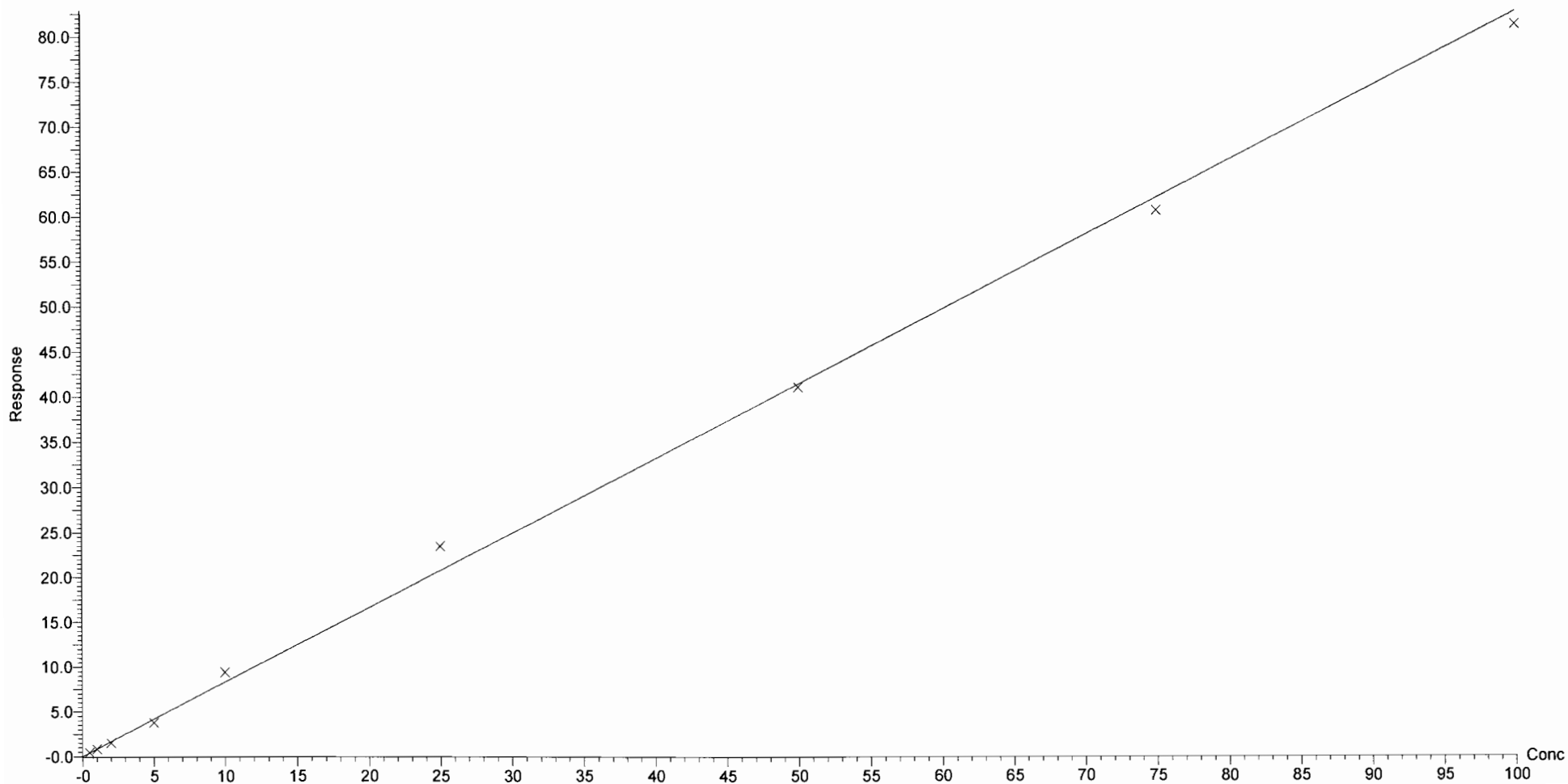
Compound name: PFHxA

Correlation coefficient: $r = 0.998535$, $r^2 = 0.997072$

Calibration curve: $0.829371 * x + 0.0163807$

Response type: Internal Std (Ref 16), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

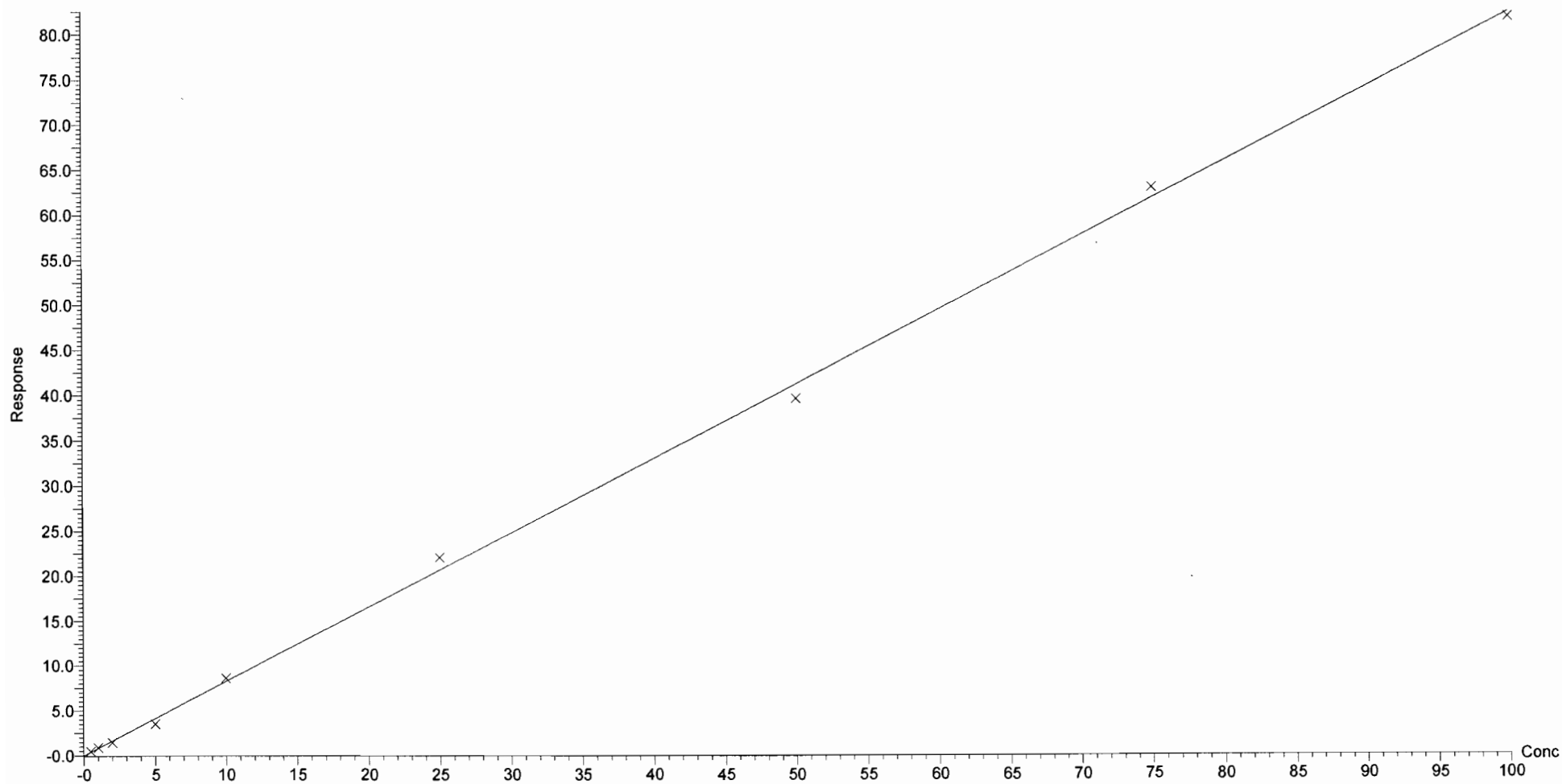
Compound name: PFHpA

Correlation coefficient: $r = 0.999224$, $r^2 = 0.998449$

Calibration curve: $0.825598 * x + -0.00188587$

Response type: Internal Std (Ref 17), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

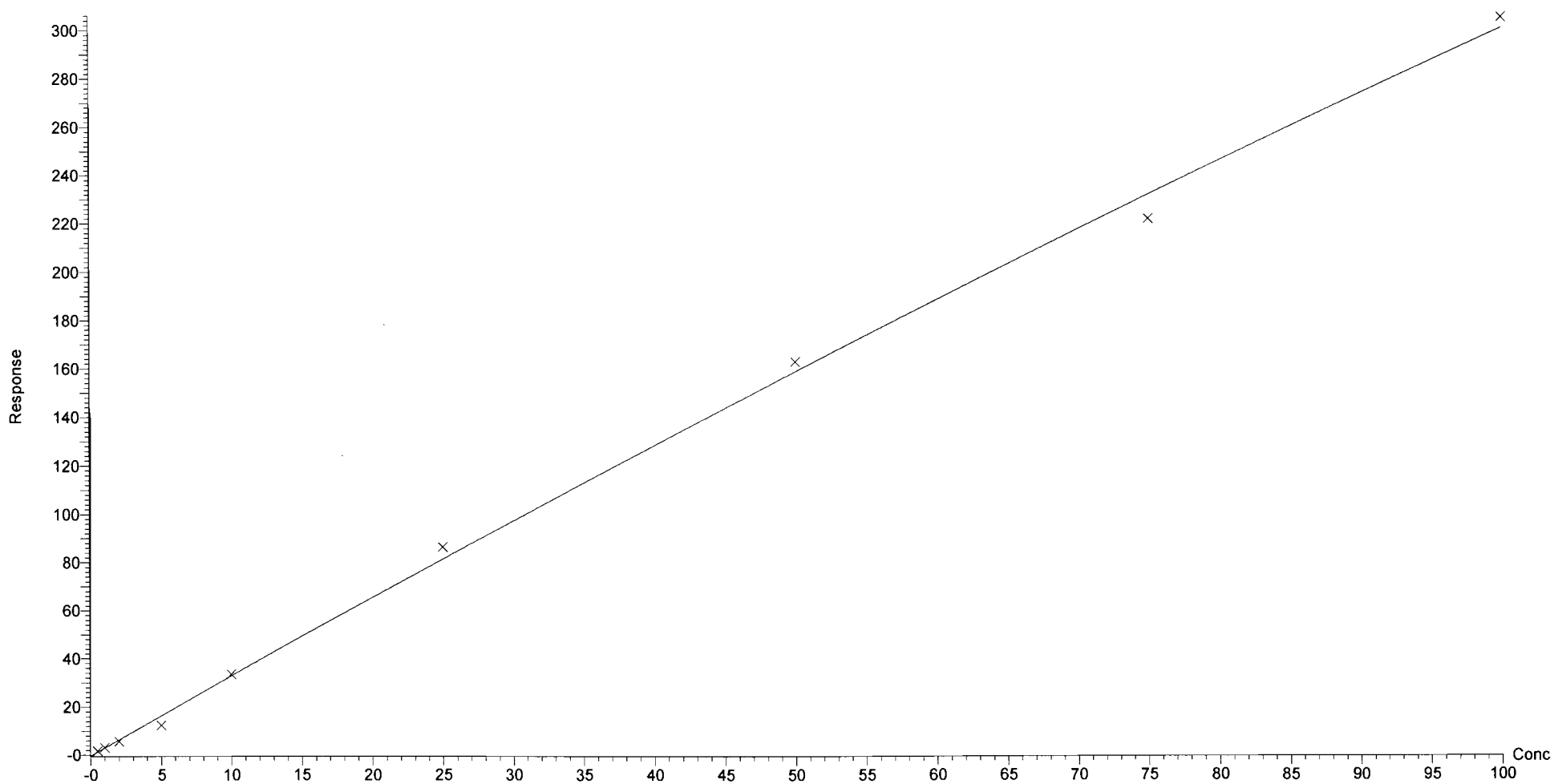
Compound name: PFHxS

Coefficient of Determination: $R^2 = 0.997308$

Calibration curve: $-0.00339694 * x^2 + 3.36003 * x + -0.393288$

Response type: Internal Std (Ref 18), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Exclude, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

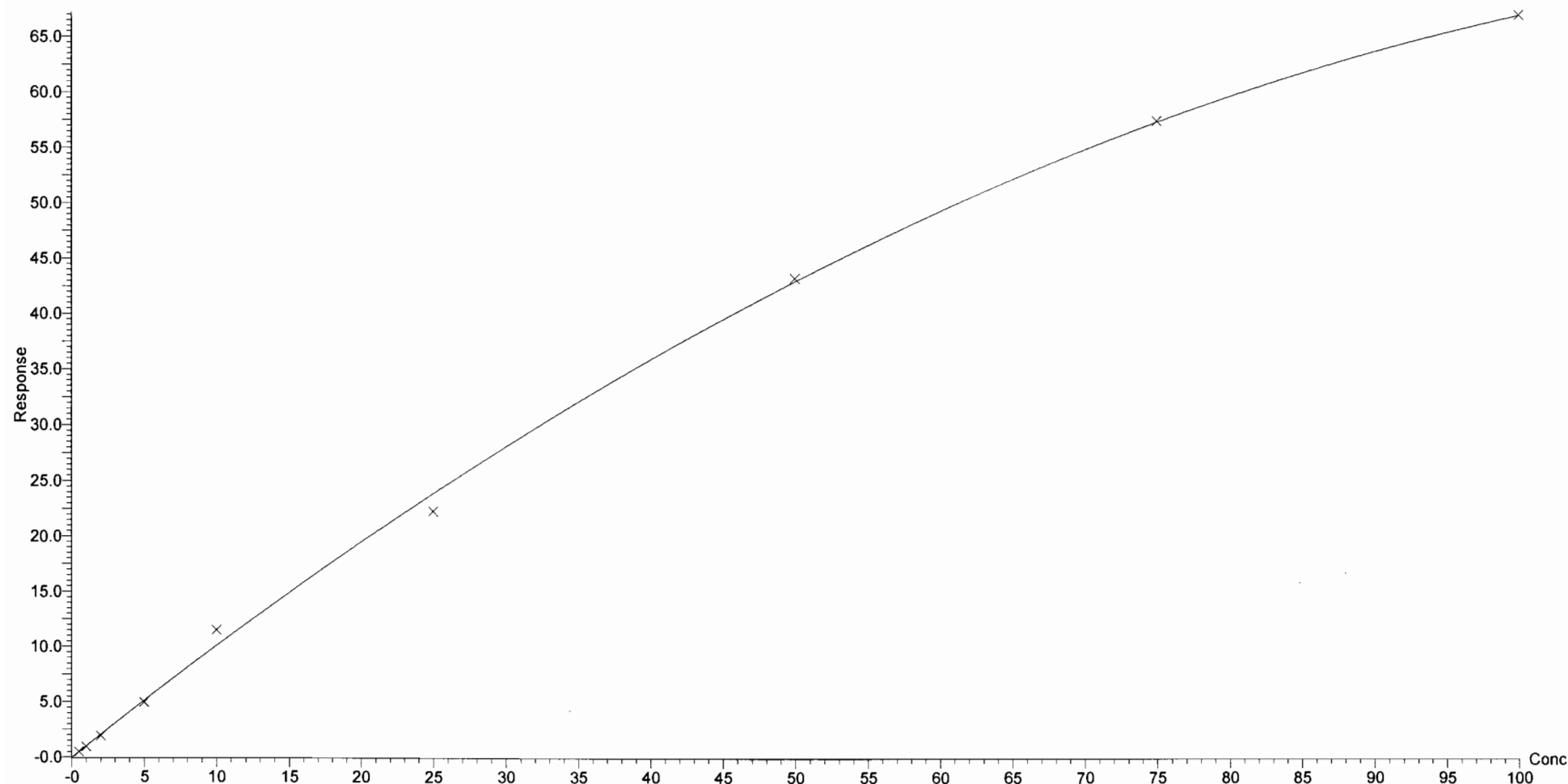
Compound name: 6:2 FTS

Coefficient of Determination: $R^2 = 0.997896$

Calibration curve: $-0.00379453 * x^2 + 1.05162 * x + -0.0537721$

Response type: Internal Std (Ref 19), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Exclude, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

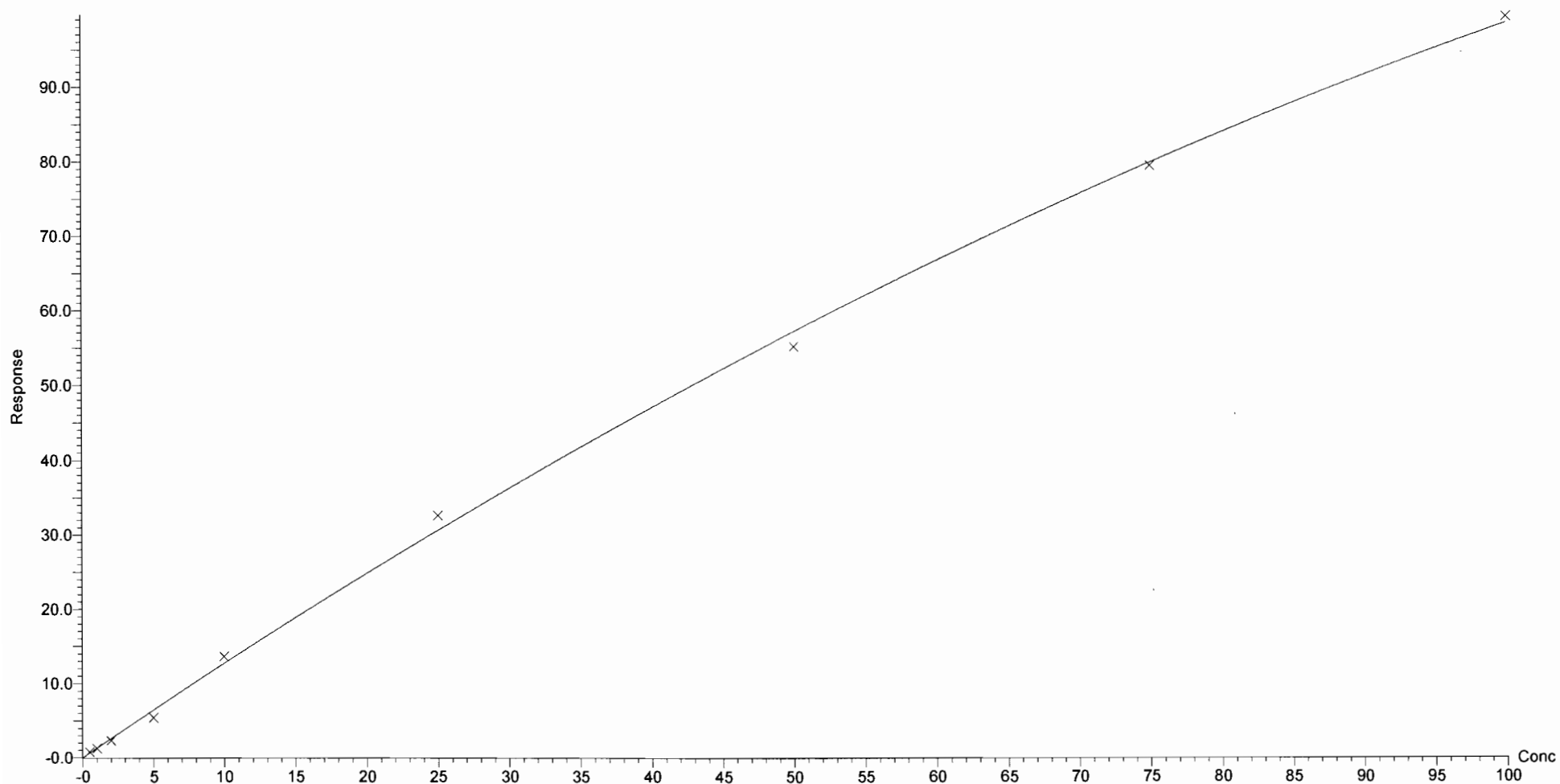
Compound name: PFOA

Coefficient of Determination: $R^2 = 0.997857$

Calibration curve: $-0.00316403 * x^2 + 1.30489 * x + -0.00818696$

Response type: Internal Std (Ref 20), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

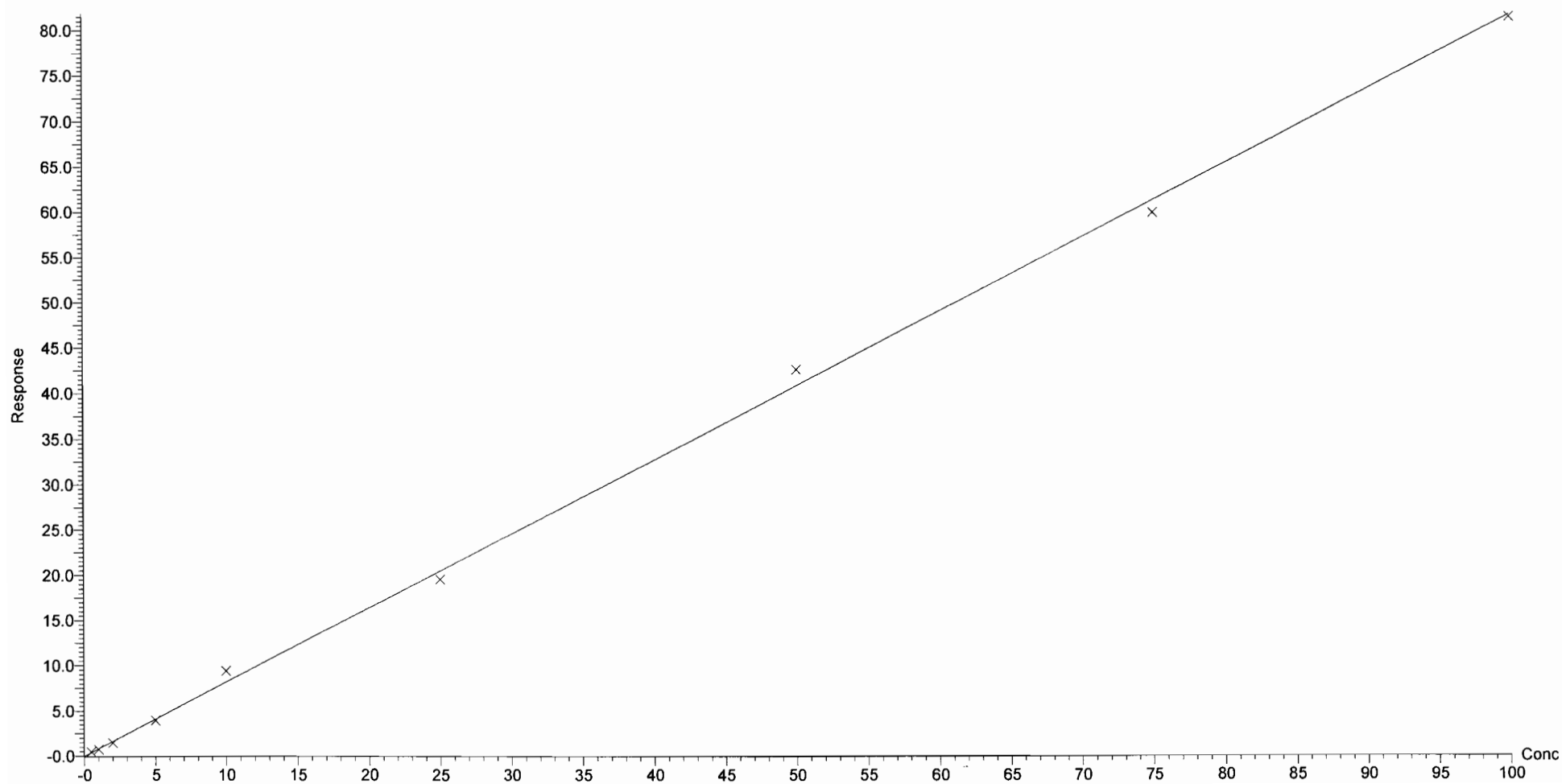
Compound name: PFNA

Correlation coefficient: $r = 0.999117$, $r^2 = 0.998235$

Calibration curve: $0.818566 * x + -0.00476162$

Response type: Internal Std (Ref 21), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

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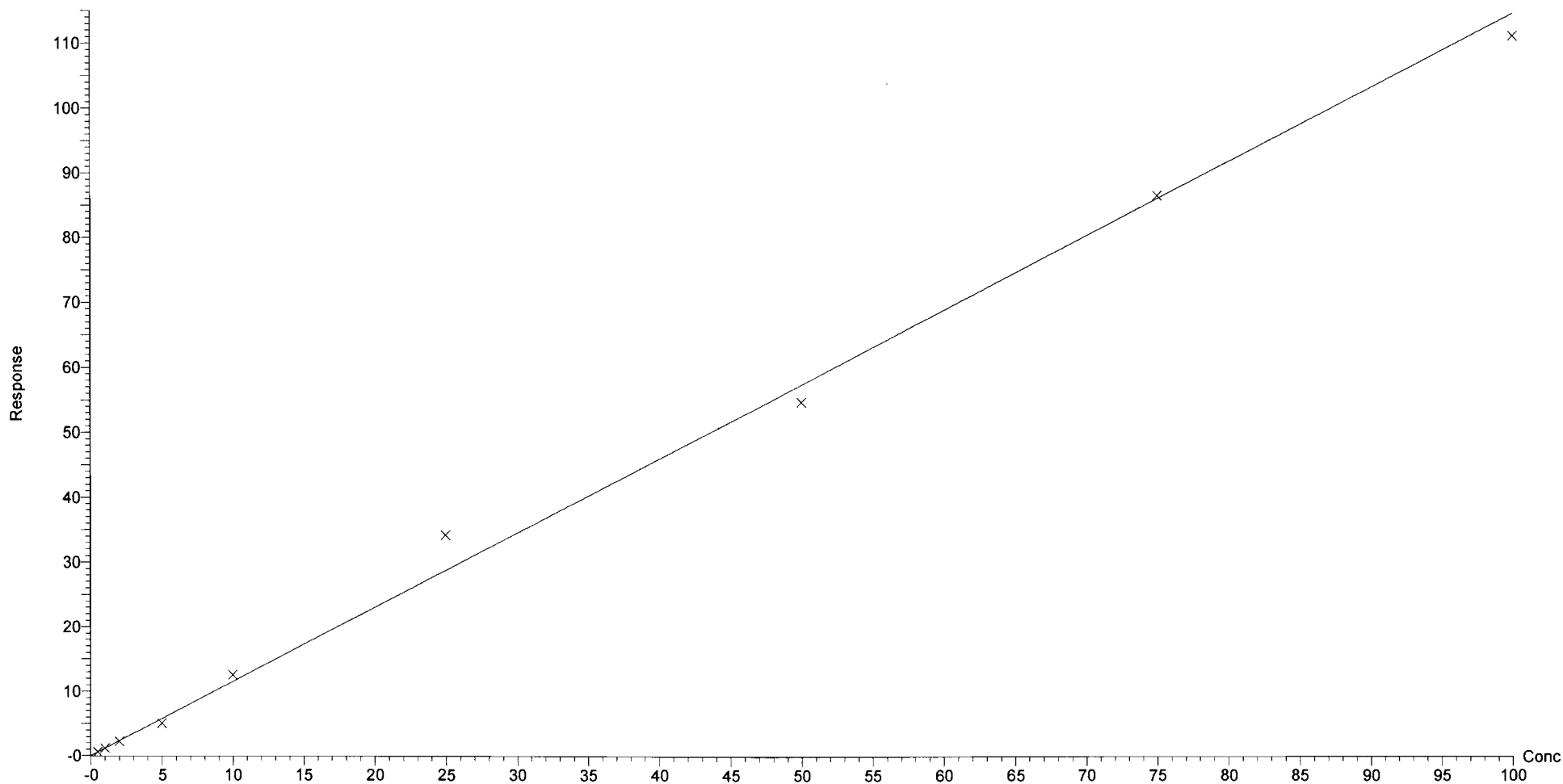
Compound name: PFOS

Correlation coefficient: $r = 0.997516$, $r^2 = 0.995038$

Calibration curve: $1.14981 * x + 0.021829$

Response type: Internal Std (Ref 22), Area * (IS Conc. / IS Area)

Curve type: Linear, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

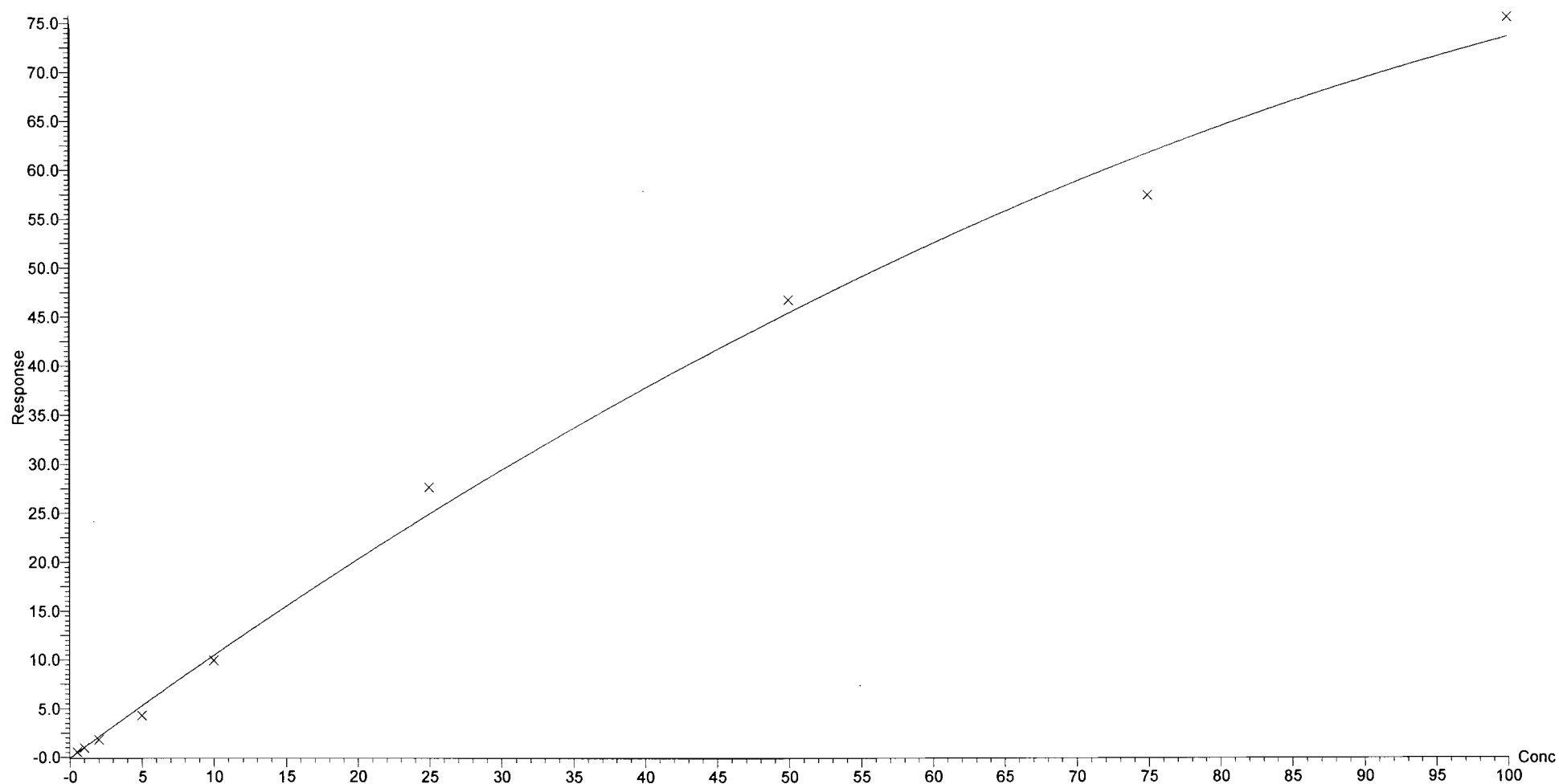
Compound name: PFDA

Coefficient of Determination: $R^2 = 0.994991$

Calibration curve: $-0.00347007 * x^2 + 1.08566 * x + -0.0891482$

Response type: Internal Std (Ref 23), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Include, Weighting: 1/x, Axis trans: None



Dataset: U:\Q2.PRO\Results\161118J2\161118J2-CRV.qld

Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

Printed: Saturday, November 19, 2016 12:57:59 Pacific Standard Time

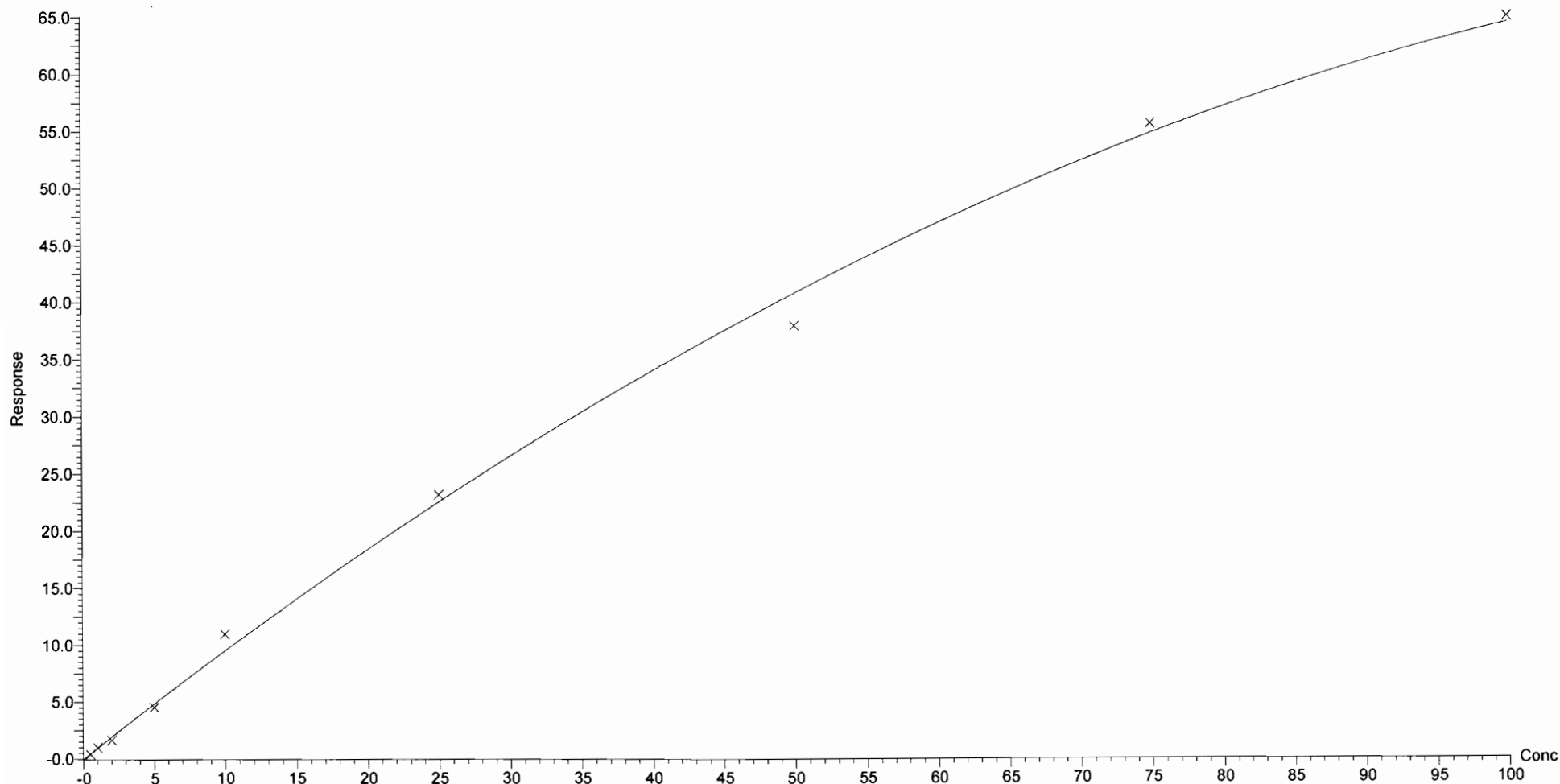
Compound name: 8:2 FTS

Coefficient of Determination: $R^2 = 0.996754$

Calibration curve: $-0.0034291 * x^2 + 0.988926 * x + -0.0486443$

Response type: Internal Std (Ref 24), Area * (IS Conc. / IS Area)

Curve type: 2nd Order, Origin: Include, Weighting: 1/x, Axis trans: None



Sample Name	Acquisition Date	Sample ID	Sample Comment
1 161118J2_01	11/18/2016 17:01:53	IPA	IPA
2 161118J2_02	11/18/2016 17:14:07	ST161118J2-1 PFC C-2 16K1714	PFC C-2 16K1714 A
3 161118J2_03	11/18/2016 17:26:18	ST161118J2-2 PFC C-1 16K1715	PFC C-1 16K1715 A
4 161118J2_04	11/18/2016 17:38:30	ST161118J2-3 PFC C0 16K1716	PFC C0 16K1716 A
5 161118J2_05	11/18/2016 17:50:45	ST161118J2-4 PFC C1 16K1717	PFC C1 16K1717 A
6 161118J2_06	11/18/2016 18:03:03	ST161118J2-5 PFC C2 16K1718	PFC C2 16K1718 A
7 161118J2_07	11/18/2016 18:15:16	ST161118J2-6 PFC C3 16K1719	PFC C3 16K1719 A
8 161118J2_08	11/18/2016 18:27:31	ST161118J2-7 PFC C3.5 16K1720	PFC C3.5 16K1720 A
9 161118J2_09	11/18/2016 18:39:42	ST161118J2-8 PFC C4 16K1721	PFC C4 16K1721 A
10 161118J2_10	11/18/2016 18:51:58	ST161118J2-9 PFC C4.5 16K1722	PFC C4.5 16K1722 A
11 161118J2_11	11/18/2016 19:04:12	ST161118J2-10 PFC C5 16K1723	PFC C5 16K1723 A
12 161118J2_12	11/18/2016 19:16:24	IPA	IPA
13 161118J2_13	11/18/2016 19:28:40	SS161118J2-1 PFC SSS 16J1810	PFC SSS 16J1810 A
14 161118J2_14	11/18/2016 19:40:55	IPA	IPA
15 161118J2_15	11/18/2016 19:53:06	B6J0127-BS1	OPR
16 161118J2_16	11/18/2016 20:05:18	B6J0168-BS1	OPR
17 161118J2_17	11/18/2016 20:17:34	B6K0037-BS1	OPR
18 161118J2_18	11/18/2016 20:29:47	B6K0110-BS1	OPR
19 161118J2_19	11/18/2016 20:42:02	B6K0117-BS1	OPR
20 161118J2_20	11/18/2016 20:54:16	B6K0117-BSD1	OPR Dup
21 161118J2_21	11/18/2016 21:06:30	B6K0111-BS1	OPR
22 161118J2_22	11/18/2016 21:18:45	IPA	IPA
23 161118J2_23	11/18/2016 21:30:57	B6J0127-BLK1	Method Blank
24 161118J2_24	11/18/2016 21:43:12	B6J0168-BLK1	Method Blank
25 161118J2_25	11/18/2016 21:55:28	B6K0037-BLK1	Method Blank
26 161118J2_26	11/18/2016 22:07:40	B6K0110-BLK1	Method Blank
27 161118J2_27	11/18/2016 22:19:56	B6K0117-BLK1	Method Blank
28 161118J2_28	11/18/2016 22:32:10	B6K0111-BLK1	Method Blank
29 161118J2_29	11/18/2016 22:44:24	IPA	IPA
30 161118J2_30	11/18/2016 22:56:38	1601299-01	Sample No. I
31 161118J2_31	11/18/2016 23:08:49	1601299-02	Sample No. II
32 161118J2_32	11/18/2016 23:21:05	1601299-03	Sample No. III
33 161118J2_33	11/18/2016 23:33:20	1601299-04	Sample No. IV
34 161118J2_34	11/18/2016 23:45:31	1601299-06	Sample No. VI
35 161118J2_35	11/18/2016 23:57:48	1601299-07	Sample No. VII
36 161118J2_36	11/19/2016 00:10:03	1601299-05RE1	Sample No. V
37 161118J2_37	11/19/2016 00:22:16	1601379-01@20X	Sample #1
38 161118J2_38	11/19/2016 00:34:31	1601379-02@20X	Sample #2
39 161118J2_39	11/19/2016 00:46:45	1601379-03@20X	Sample #3
40 161118J2_40	11/19/2016 00:58:58	IPA	IPA
41 161118J2_41	11/19/2016 01:11:14	ST161118J2-11 PFC C3.5 16K1720	PFC C3.5 16K1720A
42 161118J2_42	11/19/2016 01:23:28	IPA	IPA
43 161118J2_43	11/19/2016 01:35:40	1601379-01	Sample #1
44 161118J2_44	11/19/2016 01:47:56	1601379-02	Sample #2
45 161118J2_45	11/19/2016 02:00:10	1601379-03	Sample #3
46 161118J2_46	11/19/2016 02:12:22	1601410-01	WURTS-EB008JH-110216
47 161118J2_47	11/19/2016 02:24:39	1601410-02	WURTS-VAS04006-32-35_FD
48 161118J2_48	11/19/2016 02:36:53	1601410-03	WURTS-VAS04006-42-45
49 161118J2_49	11/19/2016 02:49:08	1601410-04	WURTS-VAS04006-52-55
50 161118J2_50	11/19/2016 03:01:23	1601410-05	WURTS-VAS17001-21-24
51 161118J2_51	11/19/2016 03:13:40	1601410-06	WURTS-VAS17001-21-24_FD
52 161118J2_52	11/19/2016 03:25:55	1601410-07	WURTS-VAS17001-31-34
53 161118J2_53	11/19/2016 03:38:09	IPA	IPA
54 161118J2_54	11/19/2016 03:50:25	ST161118J2-12 PFC C3.5 16K1720	PFC C3.5 16K1720A
55 161118J2_55	11/19/2016 04:02:39	IPA	IPA
56 161118J2_56	11/19/2016 04:14:55	1601410-08	WURTS-VAS17001-41-44
57 161118J2_57	11/19/2016 04:27:09	1601410-09	WURTS-VAS17003-22-25

Sample Name	Acquisition Date	Sample ID	Sample Comment
58 161118J2_58	11/19/2016 04:39:19	1601410-10	WURTS-VAS17003-32-35
59 161118J2_59	11/19/2016 04:51:36	1601410-11	WURTS-VAS17003-42-45
60 161118J2_60	11/19/2016 05:03:50	1601410-12	WURTS-VAS17003-52-55
61 161118J2_61	11/19/2016 05:16:02	1601413-01	PFAS-ABT-MW-58-110316
62 161118J2_62	11/19/2016 05:28:17	1601413-02	PFAS-MW01-62-110316
63 161118J2_63	11/19/2016 05:40:32	1601413-03	PFAS-BW-MW-30-110316
64 161118J2_64	11/19/2016 05:52:47	1601413-04	PFAS-B82-MW-105-110316
65 161118J2_65	11/19/2016 06:04:59	1601413-05	PFAS-WG-DUP2-110416
66 161118J2_66	11/19/2016 06:17:15	IPA	IPA
67 161118J2_67	11/19/2016 06:29:31	ST61118J2-13 PFC C3.5 16K1720	PFC C3.5 16K1720A
68 161118J2_68	11/19/2016 06:41:45	IPA	IPA
69 161118J2_69	11/19/2016 06:54:01	1601413-06	PFAS-B82-MW-11D-110416
70 161118J2_70	11/19/2016 07:06:17	1601413-07	PFAS-B82-MW-11S-110416
71 161118J2_71	11/19/2016 07:18:32	1601413-08	PFAS-B82-MW-10D-110316
72 161118J2_72	11/19/2016 07:30:59	1601413-09	PFAS-B82-MW-09D-110316
73 161118J2_73	11/19/2016 07:43:18	1601413-10	PFAS-B82-MW-09S-110316
74 161118J2_74	11/19/2016 07:55:41	1601413-11	PFAS-B81-MW-46S-110416
75 161118J2_75	11/19/2016 08:07:55	1601413-12	EB1-WG-110316
76 161118J2_76	11/19/2016 08:20:11	1601413-13	PFAS-MW11-093-110416
77 161118J2_77	11/19/2016 08:32:43	1601413-14	PFAS-MW11-095-110416
78 161118J2_78	11/19/2016 08:45:15	1601413-15	PFAS-ABT-36-110416
79 161118J2_79	11/19/2016 08:57:48	IPA	IPA
80 161118J2_80	11/19/2016 09:10:17	ST61118J2-14 PFC C3.5 16K1720	PFC C3.5 16K1720A
81 161118J2_81	11/19/2016 09:22:47	IPA	IPA
82 161118J2_82	11/19/2016 09:35:19	1601413-16	PFAS-B81-MW-215-110416
83 161118J2_83	11/19/2016 09:47:51	1601413-17	PFAS-ABT-MW-20-110416
84 161118J2_84	11/19/2016 10:00:22	1601413-18	PFAS-WS-DUP1-110416
85 161118J2_85	11/19/2016 10:12:56	1601413-19	EB2-WG-110416
86 161118J2_86	11/19/2016 10:25:12	1601413-20	PFAS-B24-MW-03-110416
87 161118J2_87	11/19/2016 10:37:27	1601437-01	OW11-MW9-1016
88 161118J2_88	11/19/2016 10:49:38	1601437-02	OW11-MW9P-1016
89 161118J2_89	11/19/2016 11:01:53	1601437-03	OW11-MW1-1016
90 161118J2_90	11/19/2016 11:14:05	1601437-04	OW11-MW7-1016
91 161118J2_91	11/19/2016 11:26:21	1601437-05	OW11-MW5-1016
92 161118J2_92	11/19/2016 11:38:32	IPA	IPA
93 161118J2_93	11/19/2016 11:50:49	ST61118J2-15 PFC C3.5 16K1720	PFC C3.5 16K1720A
94 161118J2_94	11/19/2016 12:03:03	IPA	IPA
95 161118J2_95	11/19/2016 12:15:18	1601437-06	OW11-MW6-1016
96 161118J2_96	11/19/2016 12:27:29	1601437-07	OW11-MW4-1016
97 161118J2_97	11/19/2016 12:39:45	B6K0117-MS1	Matrix Spike
98 161118J2_98	11/19/2016 12:51:58	B6K0117-MSD1	Matrix Spike Dup
99 161118J2_99	11/19/2016 13:04:12	B6K0111-MS1	Matrix Spike
100 161118J2_100	11/19/2016 13:16:23	B6K0111-MSD1	Matrix Spike Dup
101 161118J2_101	11/19/2016 13:28:39	IPA	IPA
102 161118J2_102	11/19/2016 13:40:50	ST61118J2-16 PFC C3.5 16K1720	PFC C3.5 16K1720A
103 161118J2_103	11/19/2016 13:53:06	IPA	IPA

Dataset: Untitled

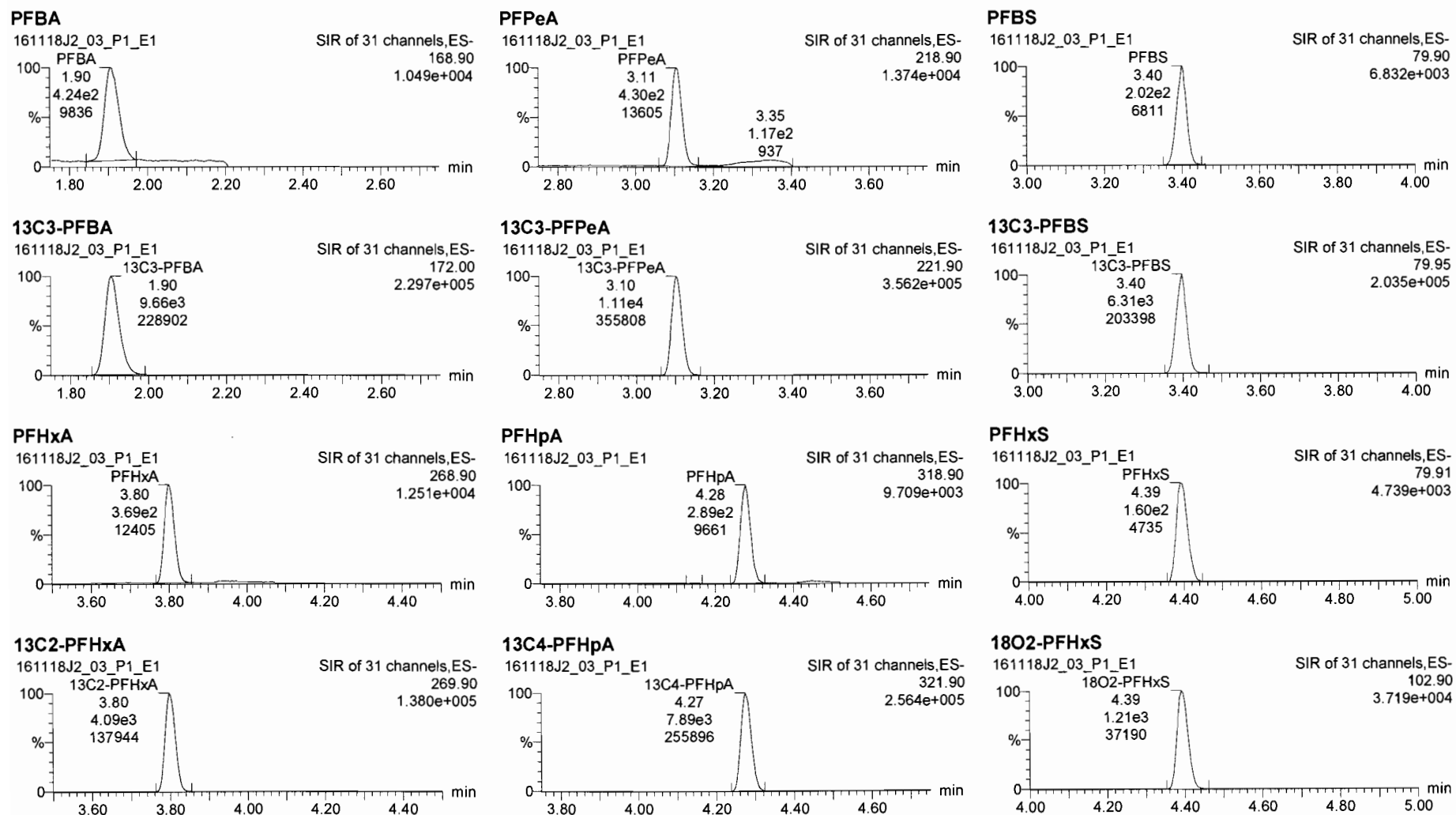
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Printed: Saturday, November 19, 2016 12:55:40 Pacific Standard Time

Method: U:\Q2.PROMethDB\PFC List 18_A No4-2FTS_161118.mdb 19 Nov 2016 12:55:02

Calibration: 19 Nov 2016 12:55:25

Name: 161118J2_03.wiff, Date: 18-Nov-2016, Time: 17:26:18, ID: ST161118J2-2 PFC C-1 16K1715, Description: PFC C-1 16K1715 A



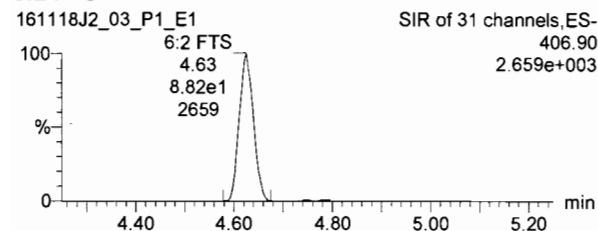
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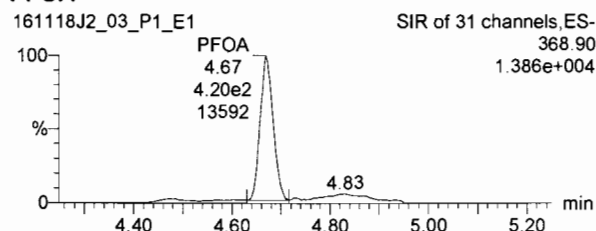
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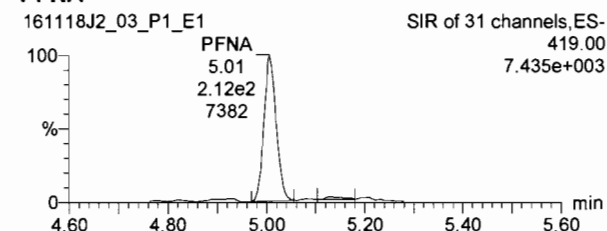
6:2 FTS



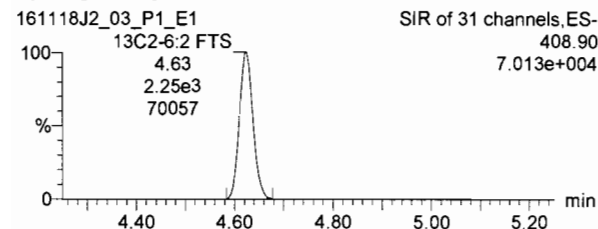
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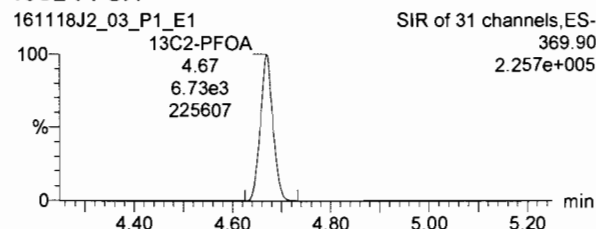
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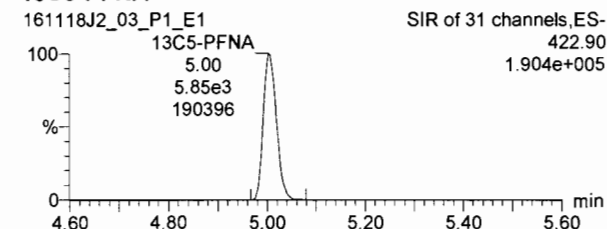
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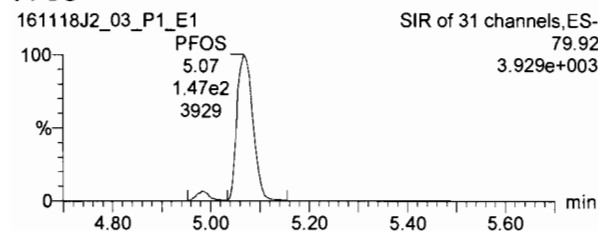
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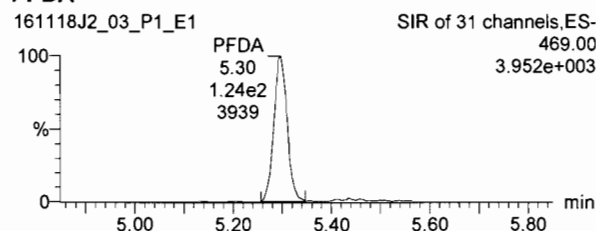
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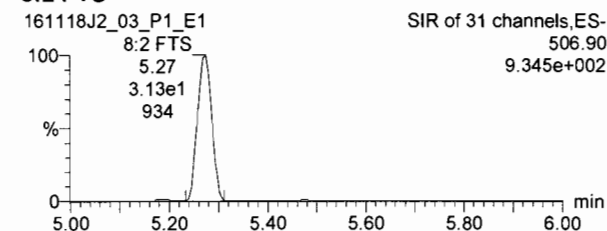
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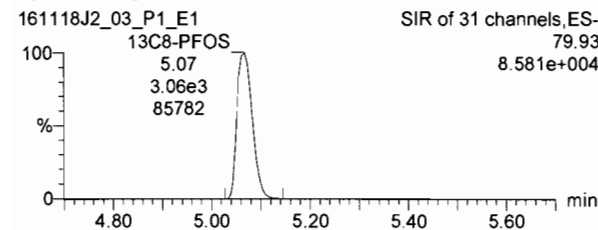
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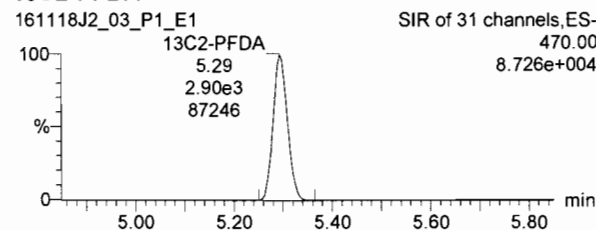
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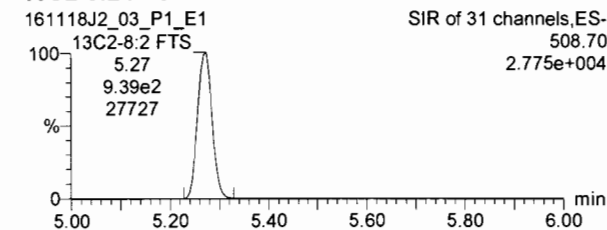
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13C2-PFDA



13C2-8:2 FTS



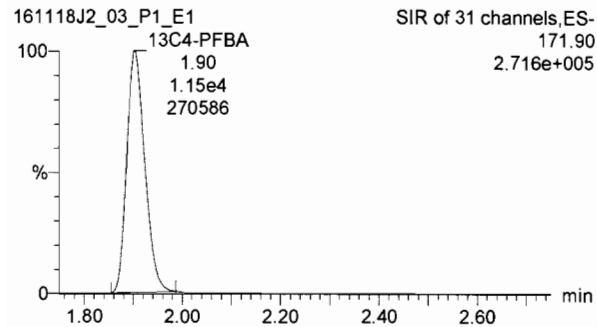
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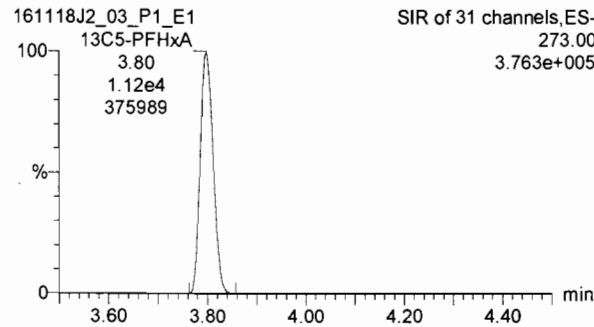
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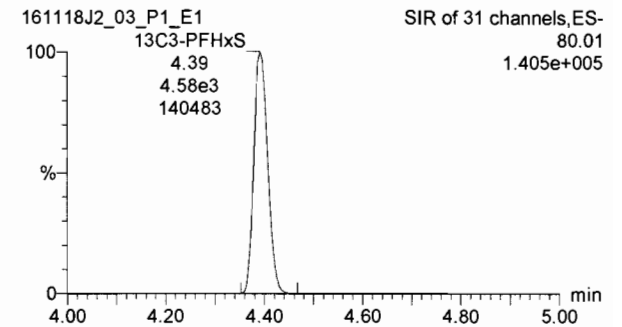
13C4-PFBA



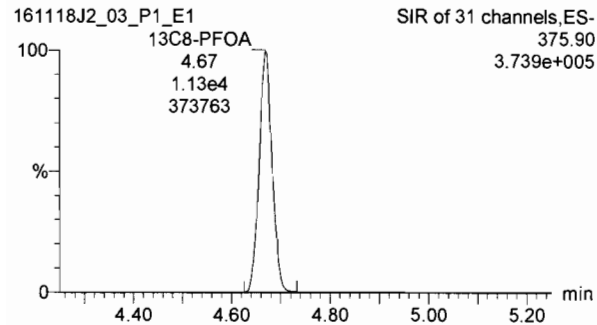
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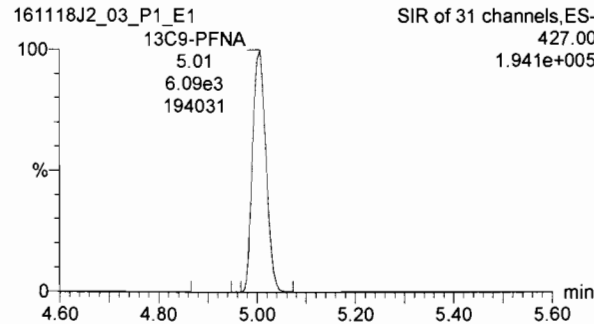
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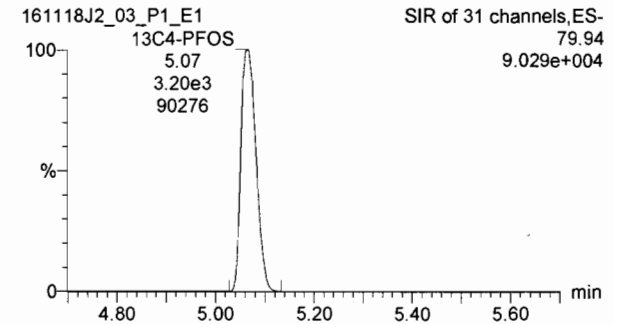
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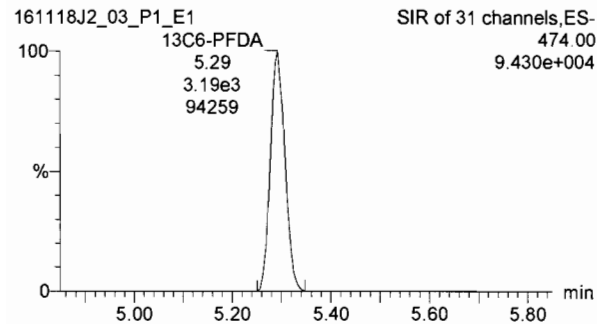
13C9-PFNA



13C4-PFOS



13C6-PFDA

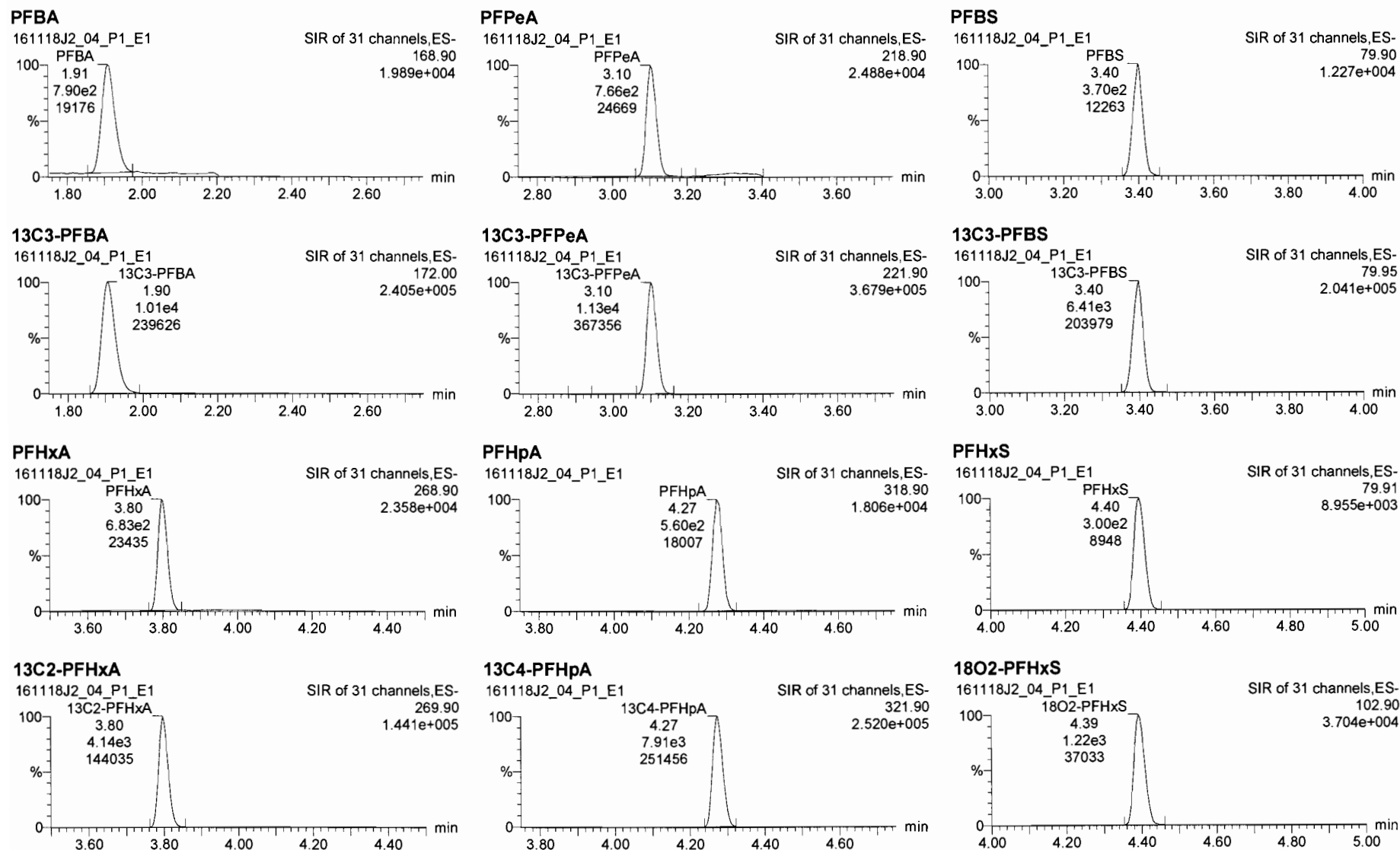


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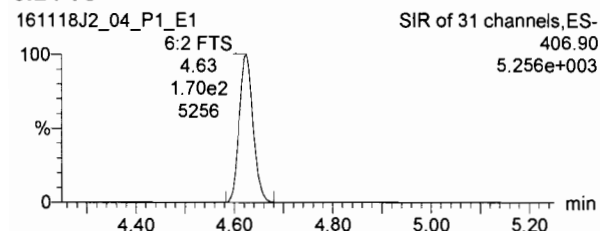
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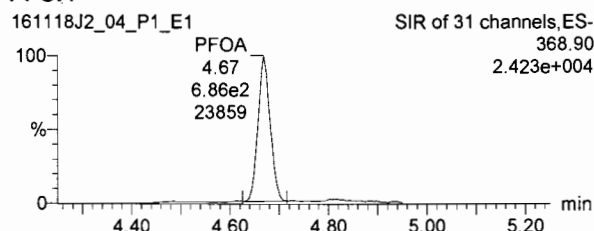
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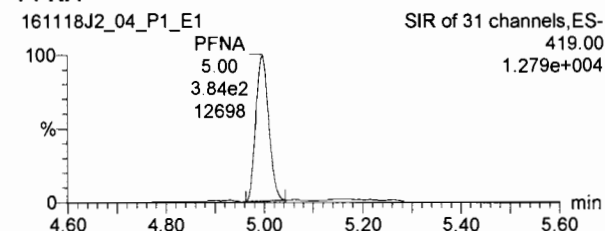
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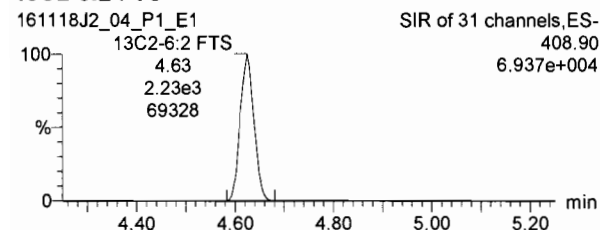
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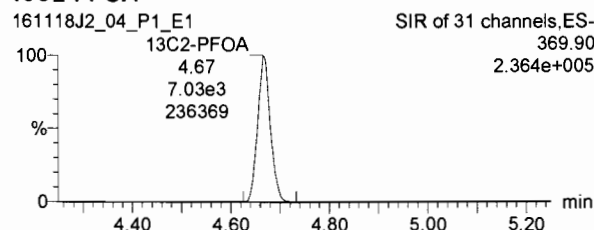
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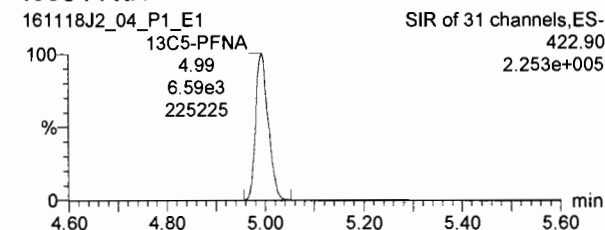
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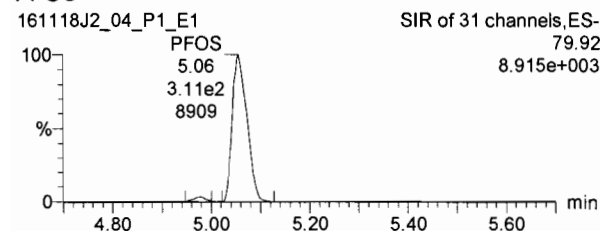
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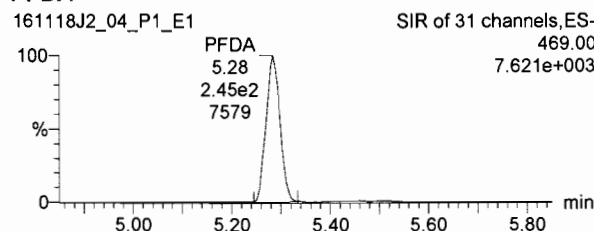
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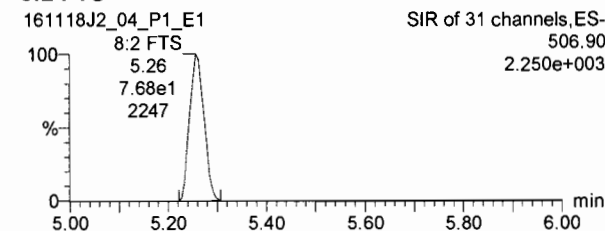
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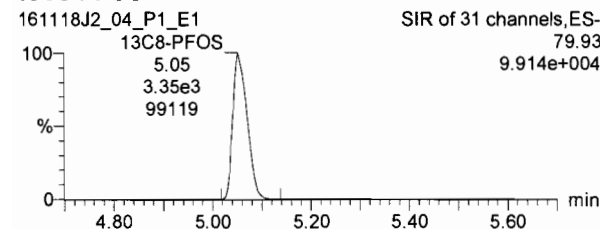
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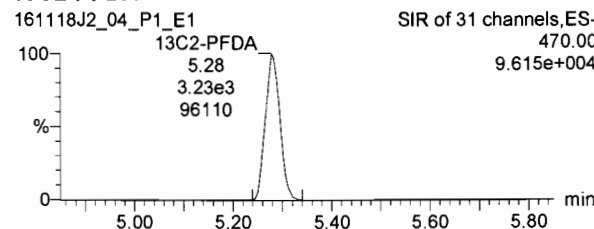
8:2 FTS



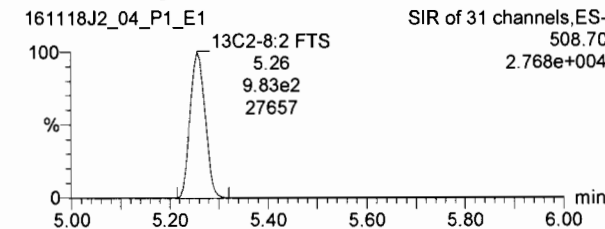
13C8-PFOS



13C2-PFDA



13C2-8:2 FTS



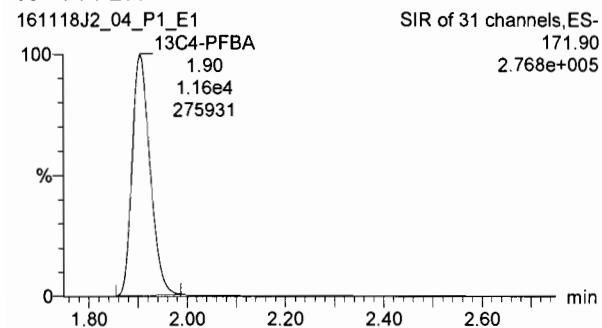
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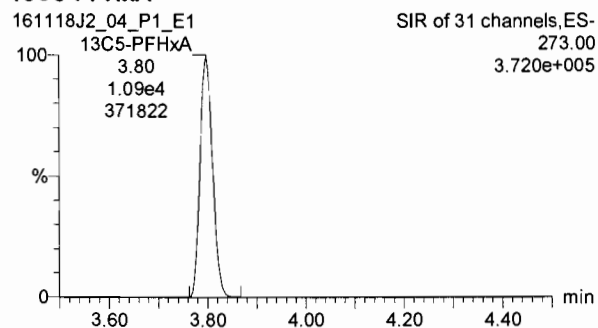
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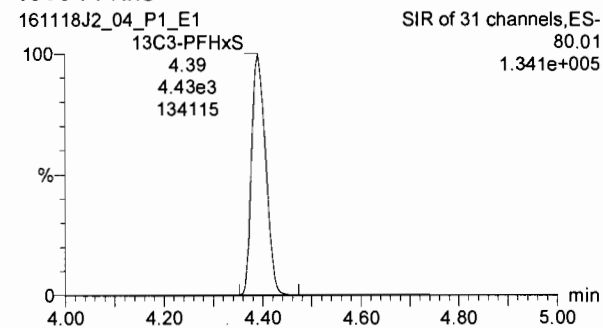
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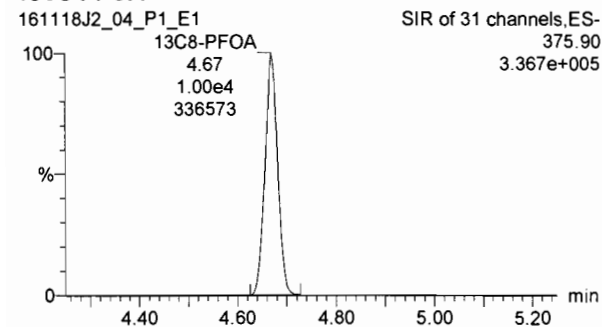
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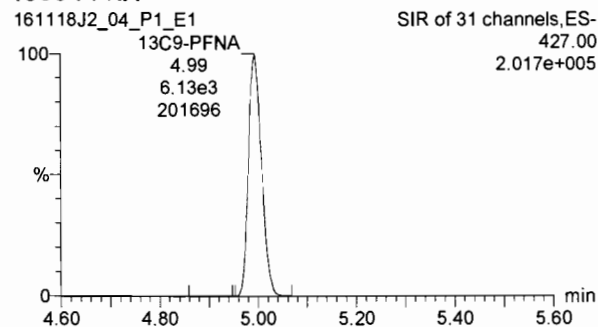
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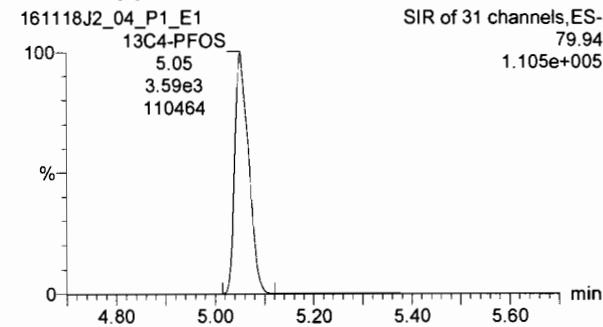
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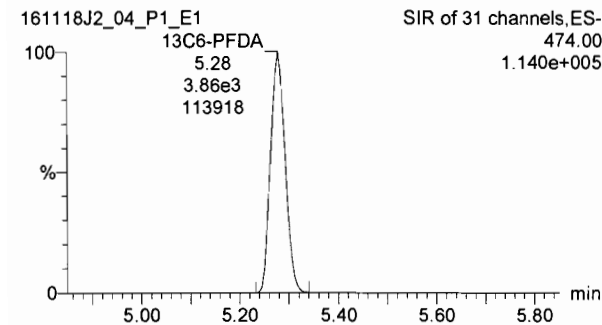
13C9-PFNA



13C4-PFOS



13C6-PFDA

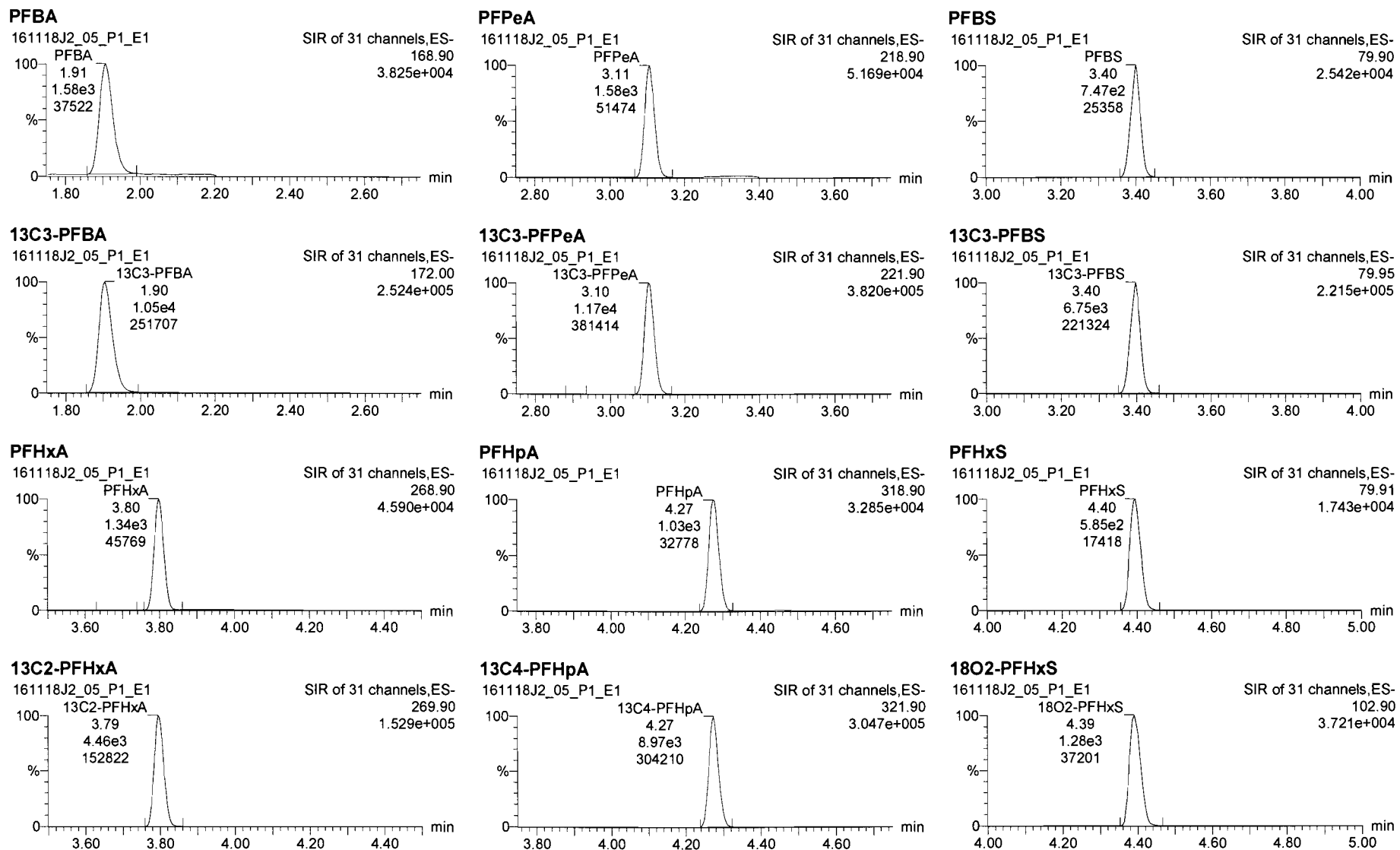


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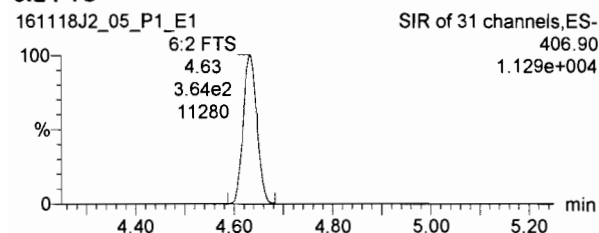
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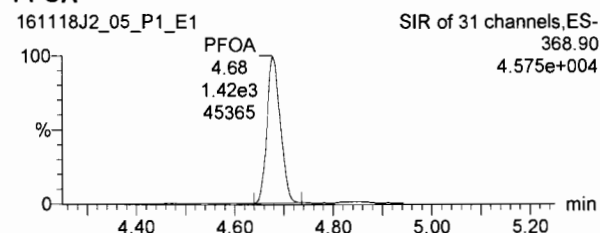
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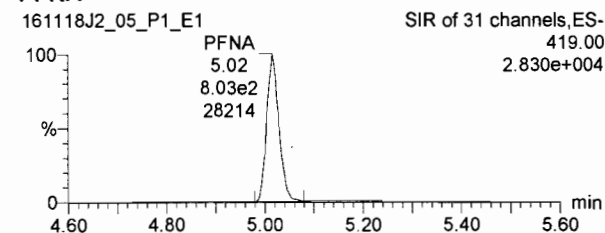
6:2 FTS



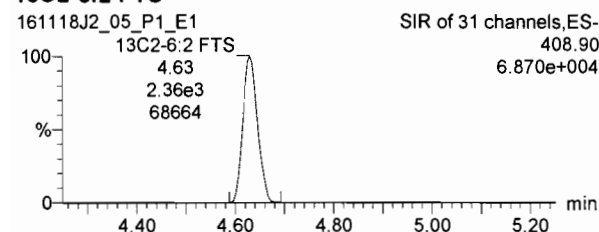
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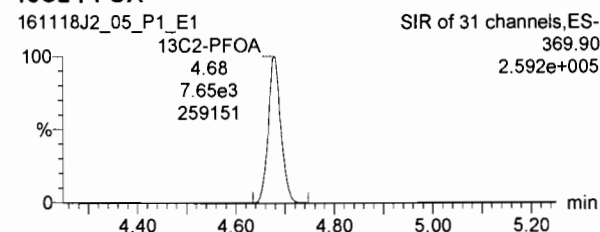
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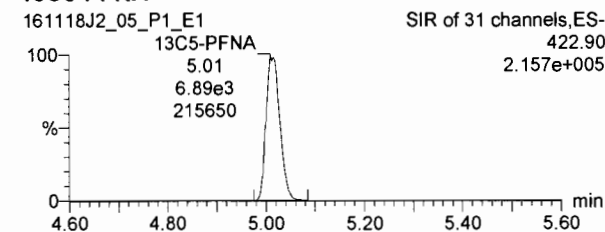
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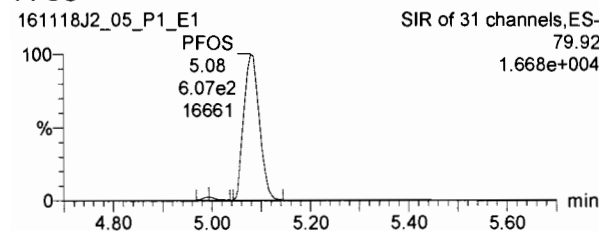
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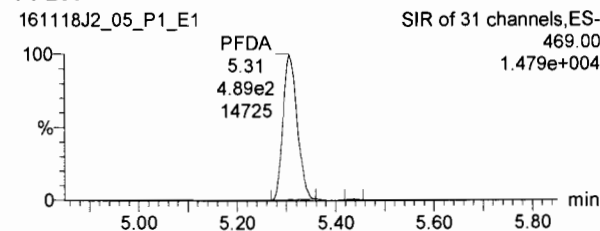
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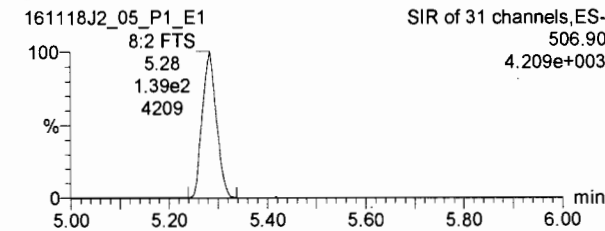
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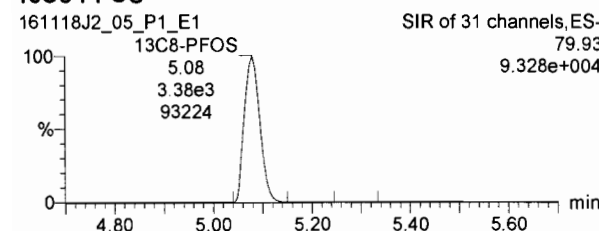
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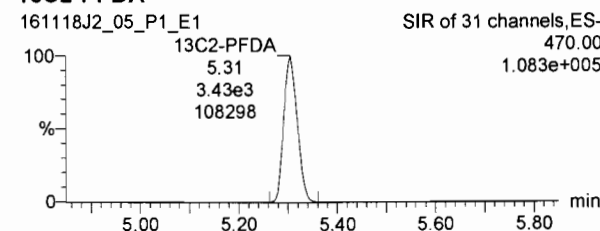
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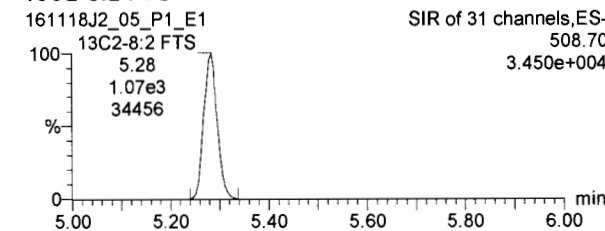
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13C2-PFDA



13C2-8:2 FTS



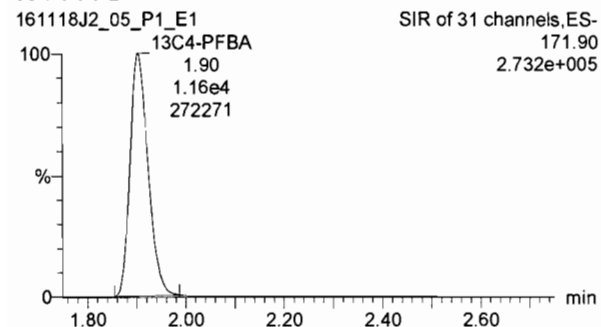
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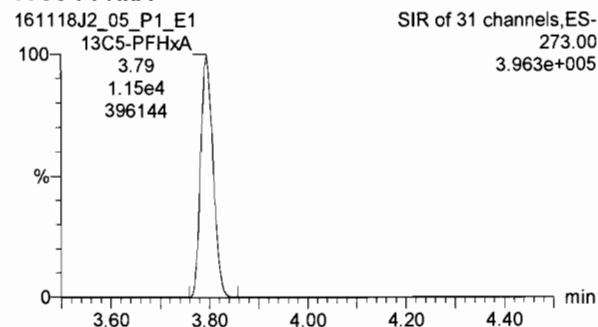
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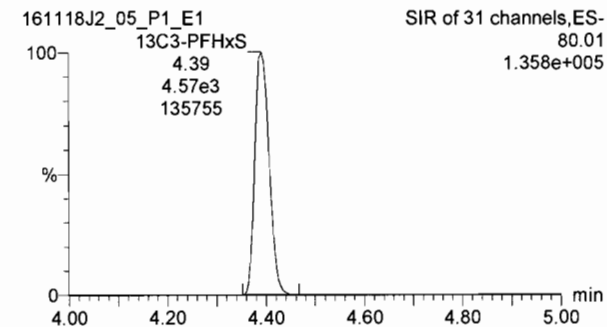
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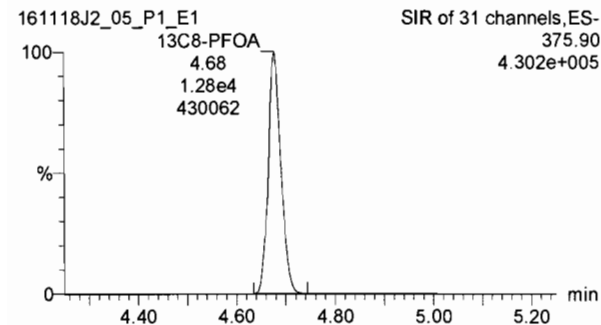
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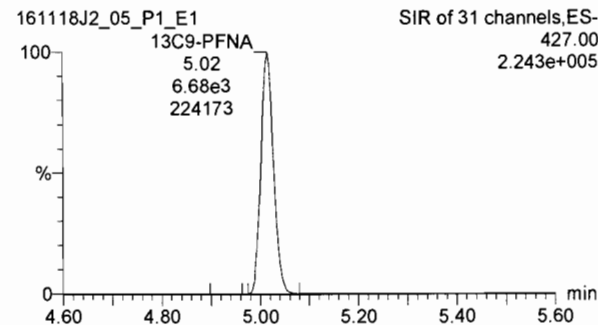
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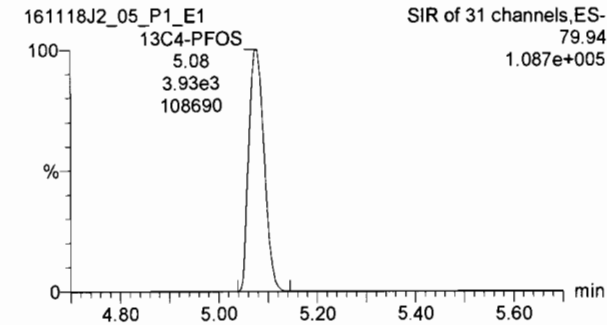
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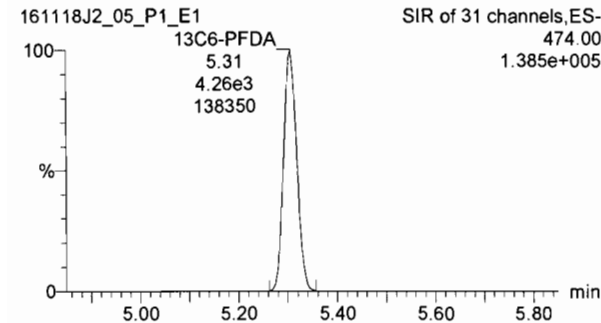
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13C4-PFOS



13C6-PFDA

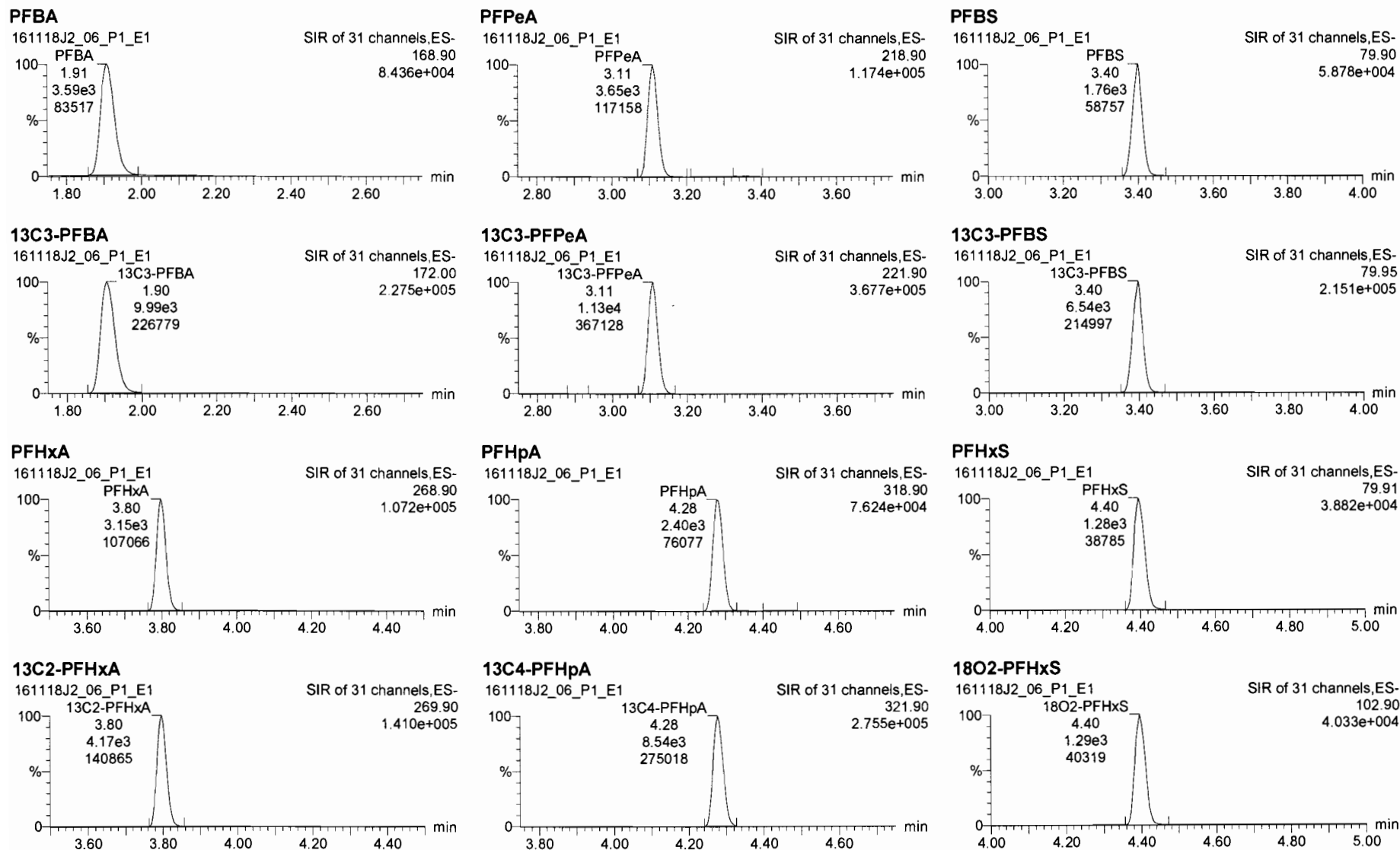


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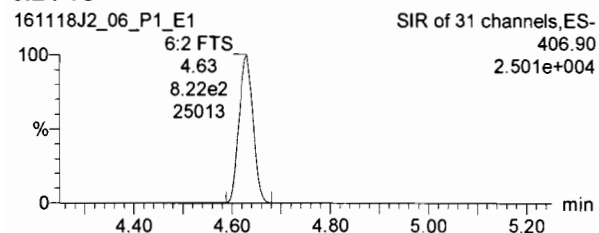
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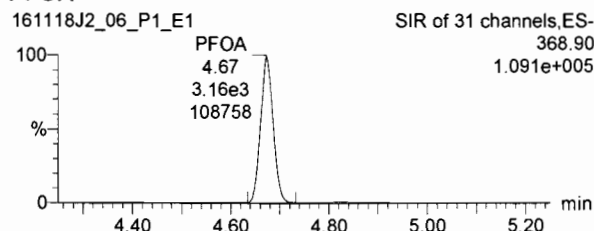
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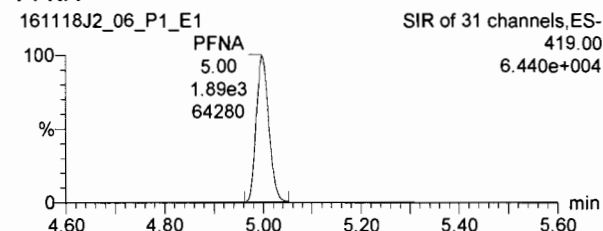
6:2 FTS



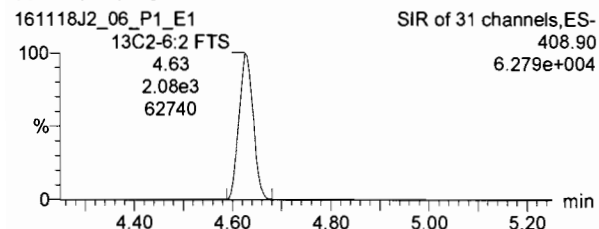
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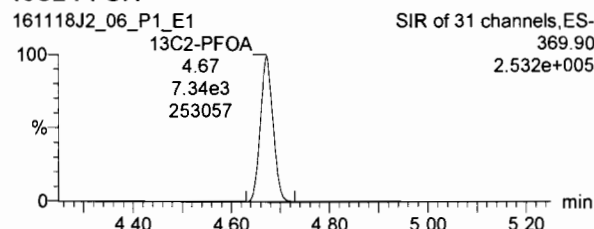
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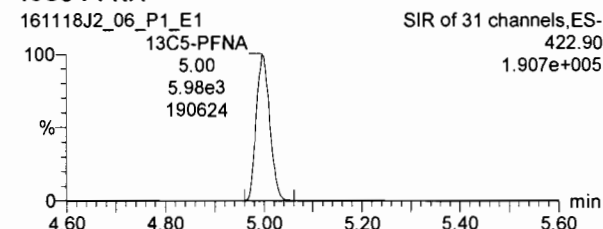
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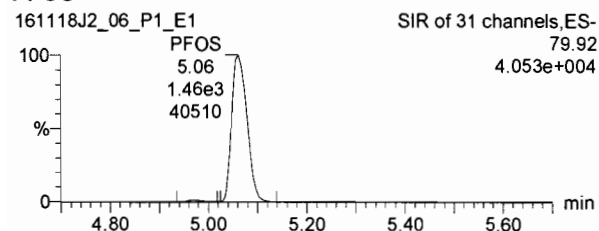
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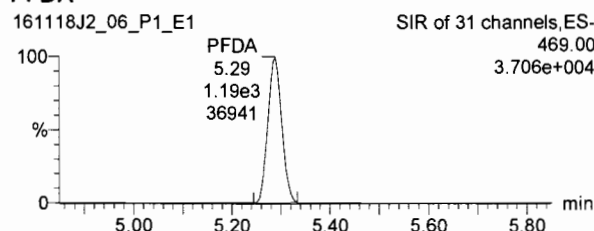
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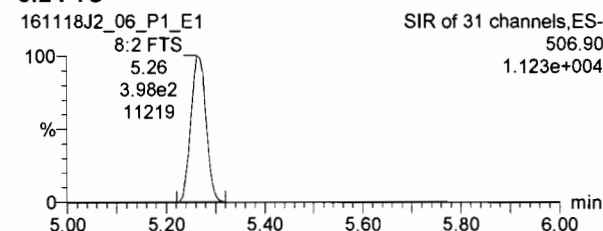
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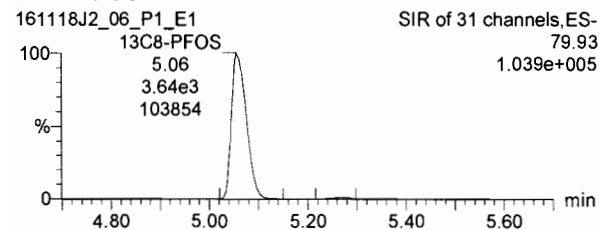
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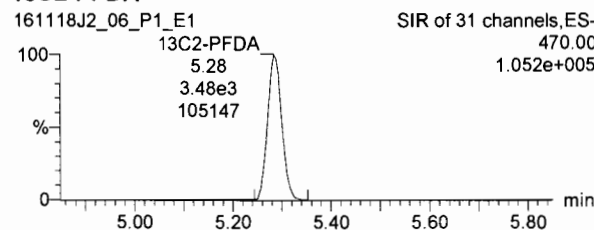
8:2 FTS



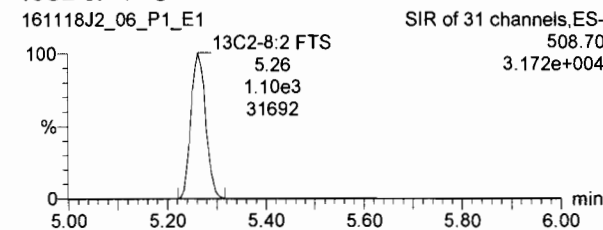
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13C2-PFDA



13C2-8:2 FTS



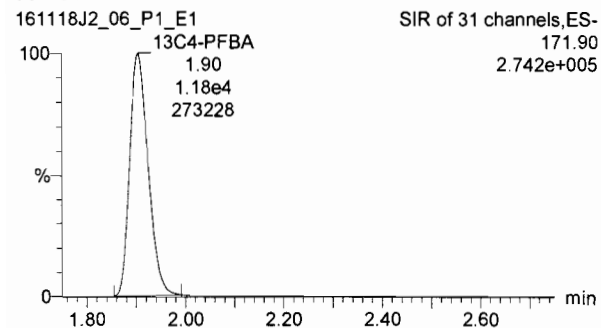
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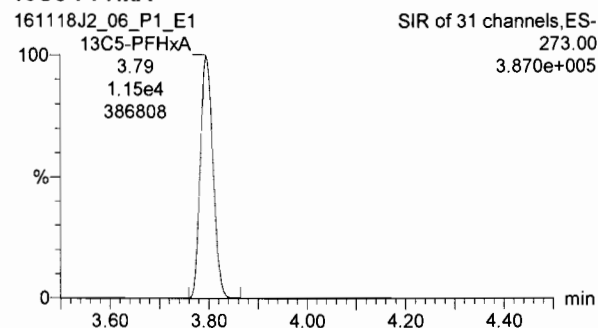
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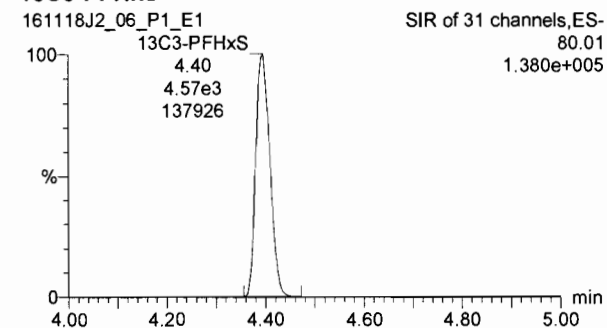
13C4-PFBA



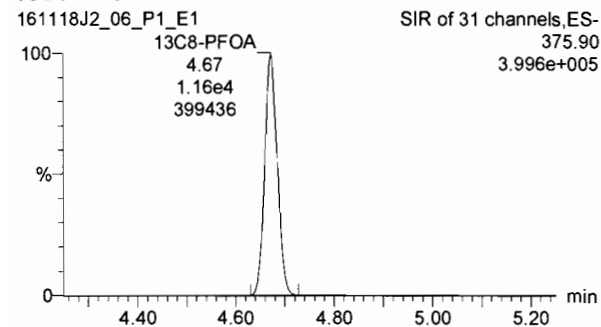
13C5-PFHxA



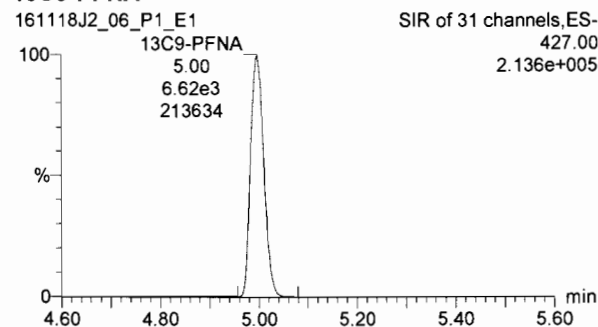
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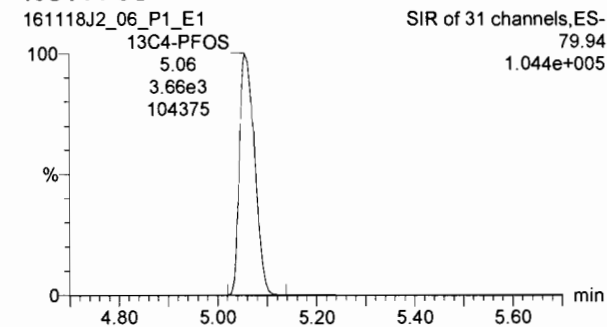
13C8-PFOA



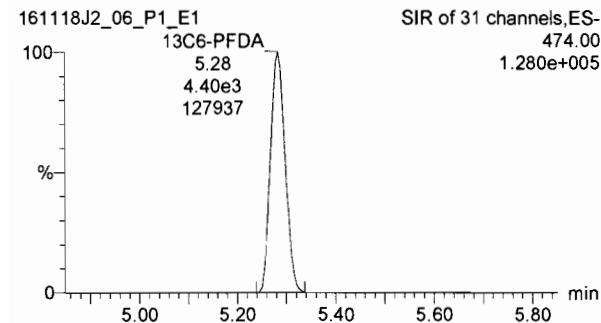
13C9-PFNA



13C4-PFOS



13C6-PFDA

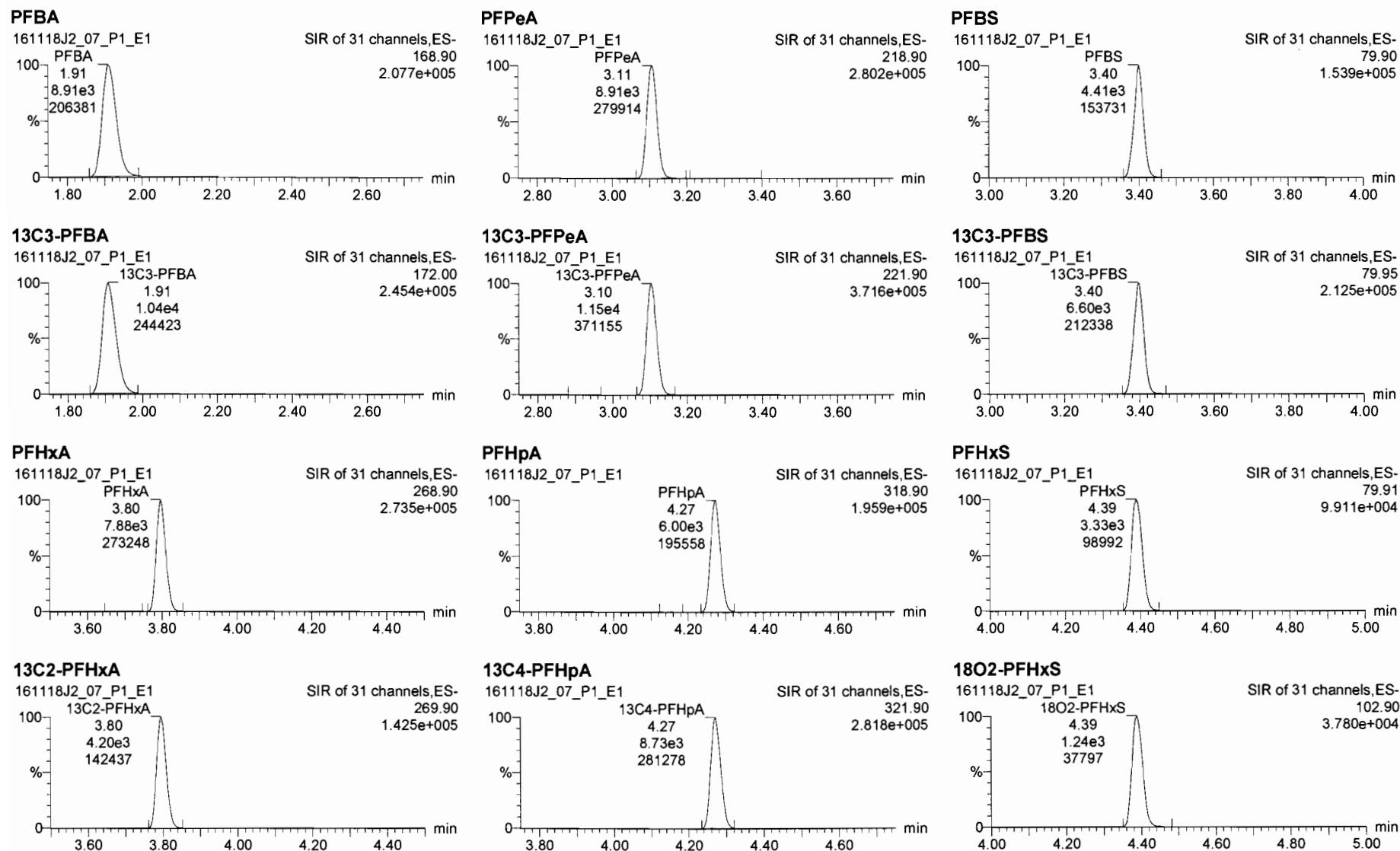


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Printed: Saturday, November 19, 2016 12:55:40 Pacific Standard Time

Name: 161118J2_07.wiff, Date: 18-Nov-2016, Time: 18:15:16, ID: ST161118J2-6 PFC C3 16K1719, Description: PFC C3 16K1719 A



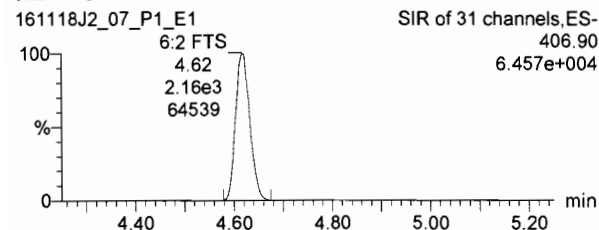
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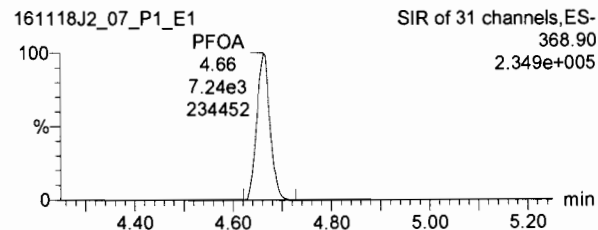
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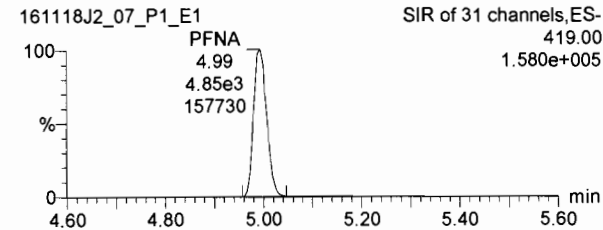
6:2 FTS



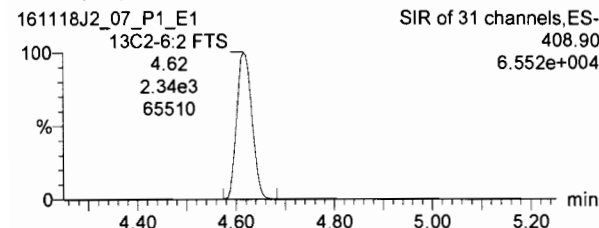
PFOA



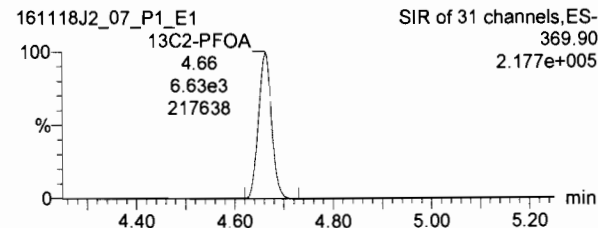
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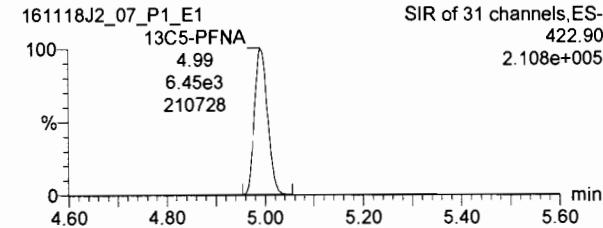
13C2-6:2 FTS



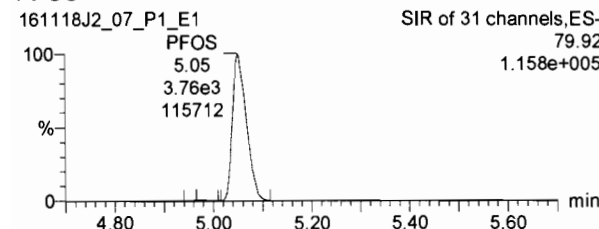
13C2-PFOA



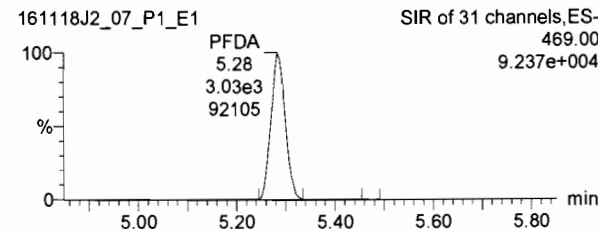
13C5-PFNA



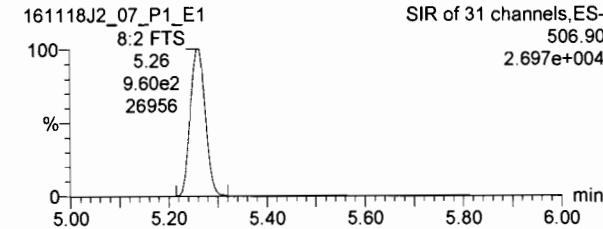
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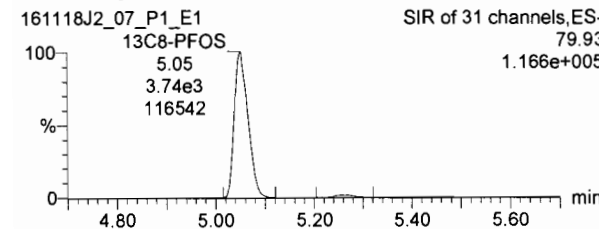
PFDA



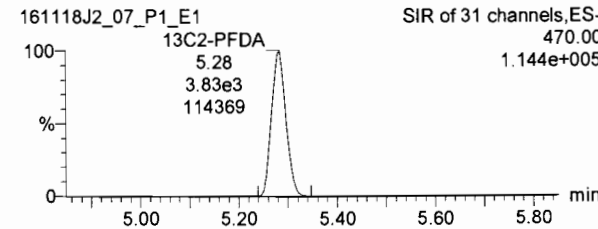
8:2 FTS



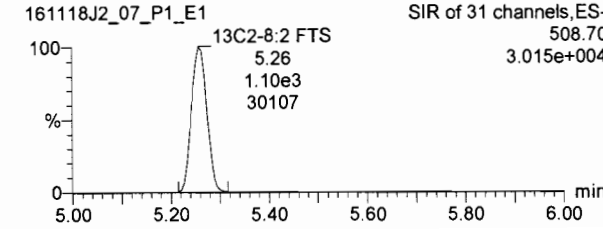
13C8-PFOS



13C2-PFDA



13C2-8:2 FTS



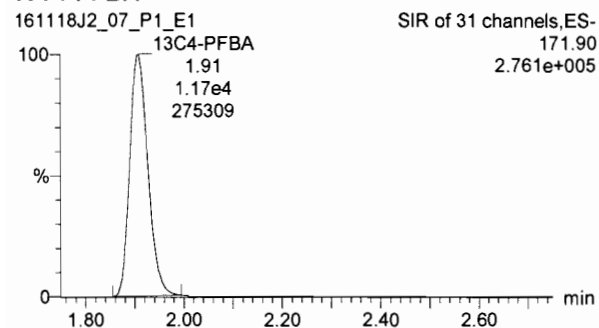
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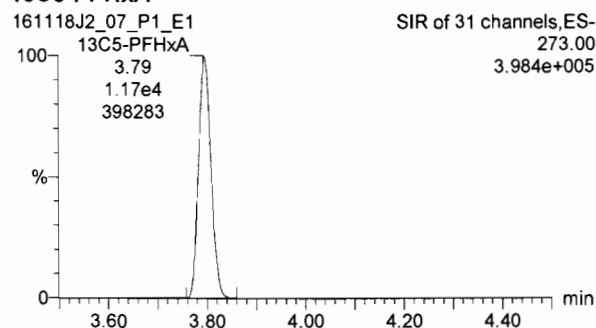
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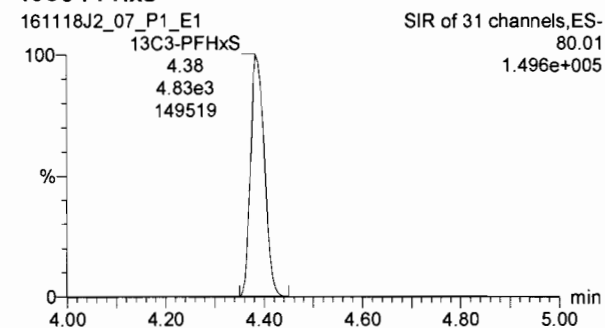
13C4-PFBA



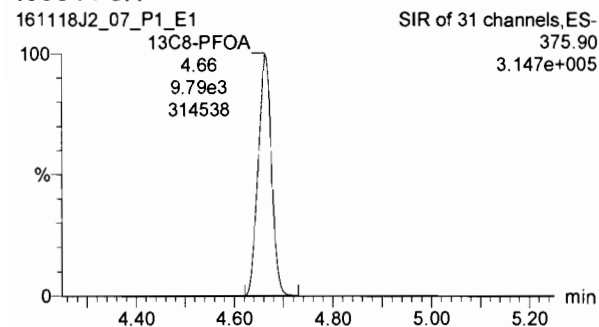
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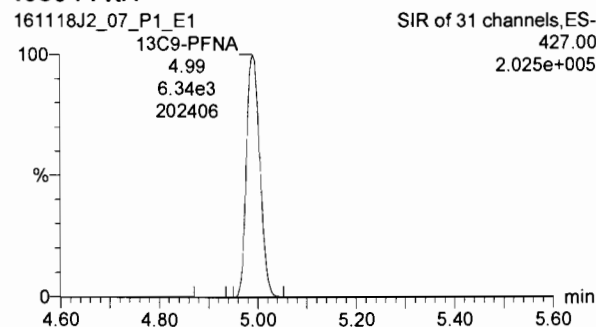
13C3-PFHxS



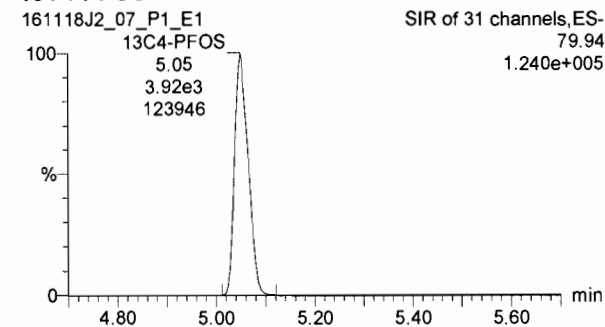
13C8-PFOA



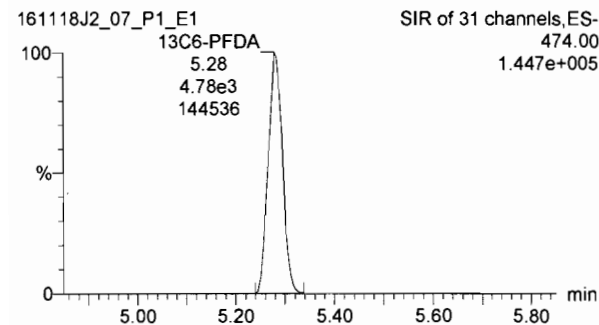
13C9-PFNA



13C4-PFOS



13C6-PFDA

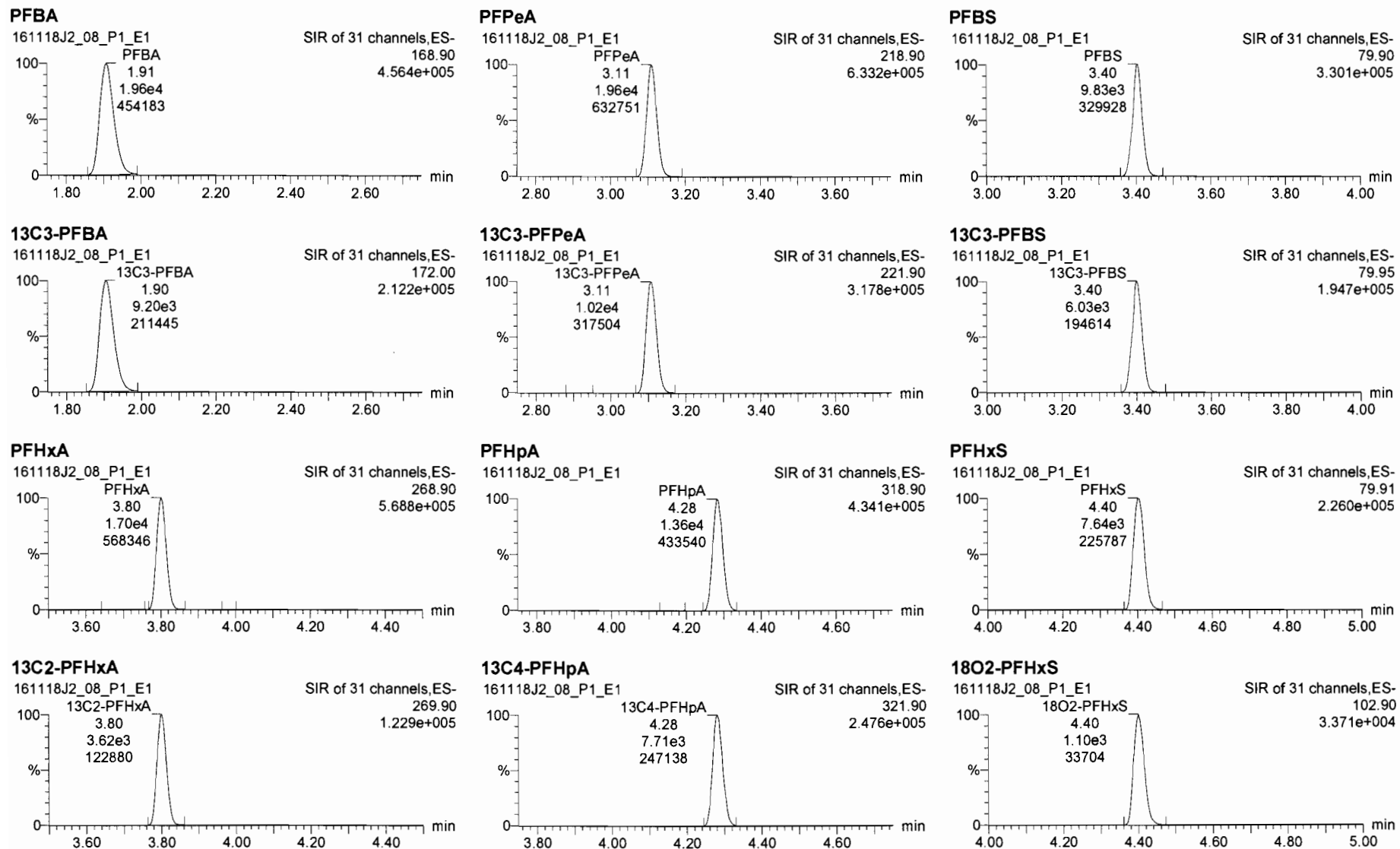


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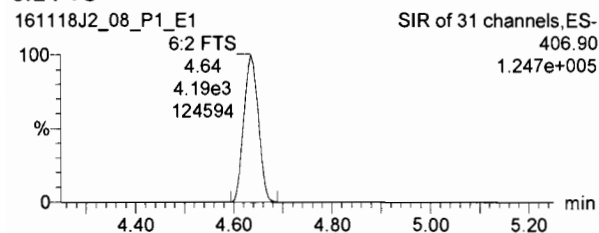
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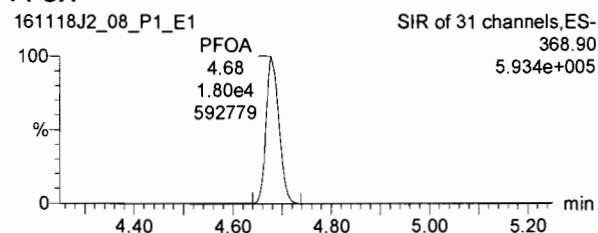
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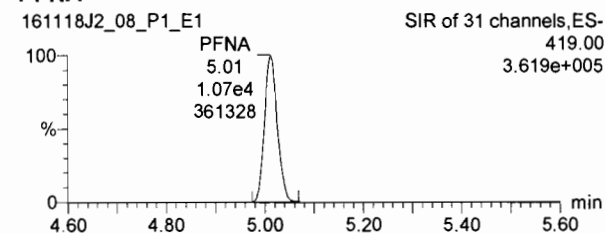
6:2 FTS



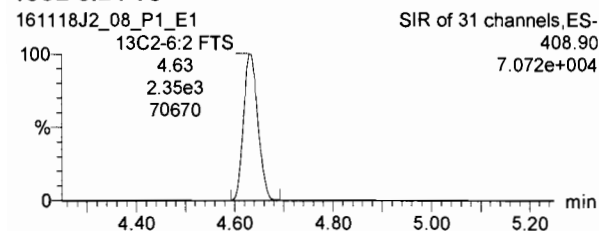
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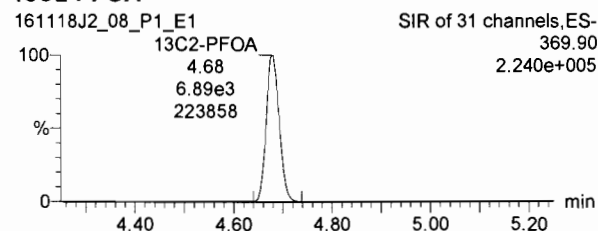
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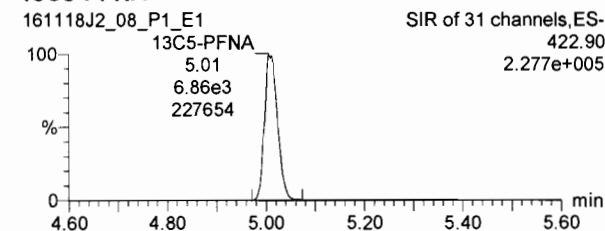
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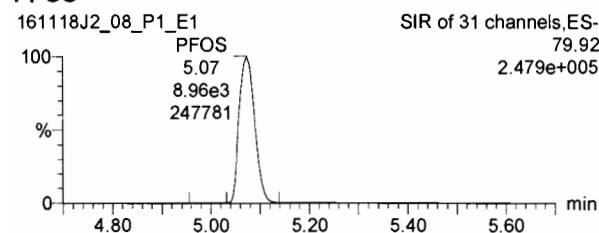
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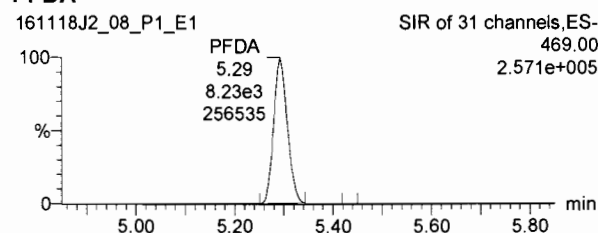
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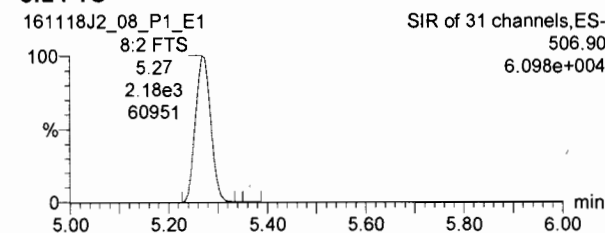
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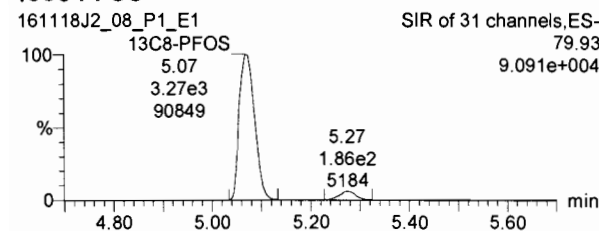
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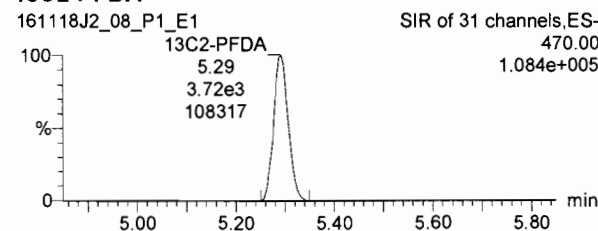
8:2 FTS



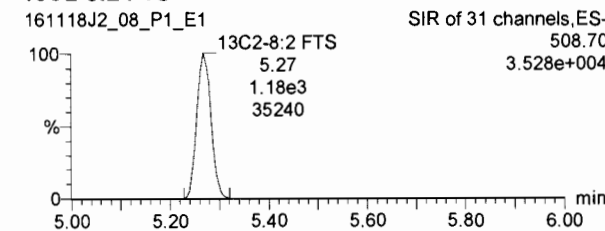
13C8-PFOS



13C2-PFDA



13C2-8:2 FTS



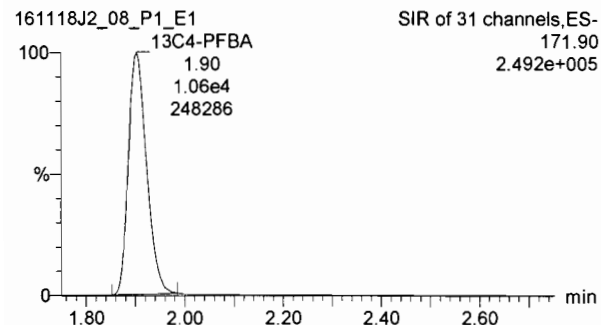
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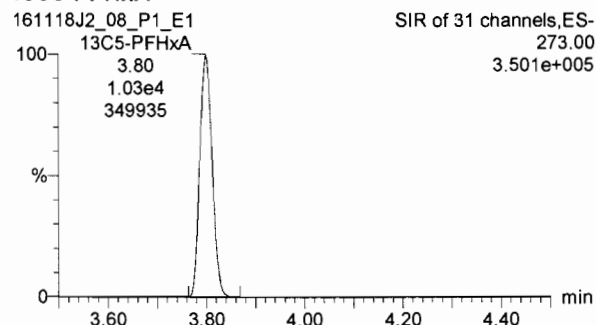
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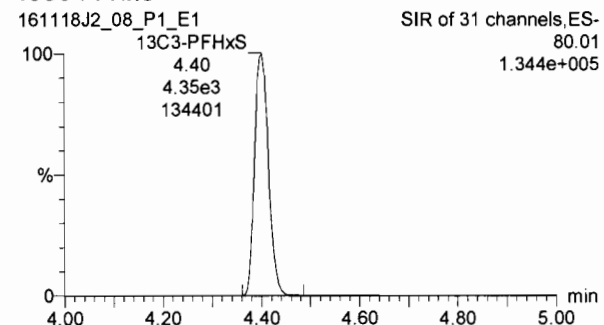
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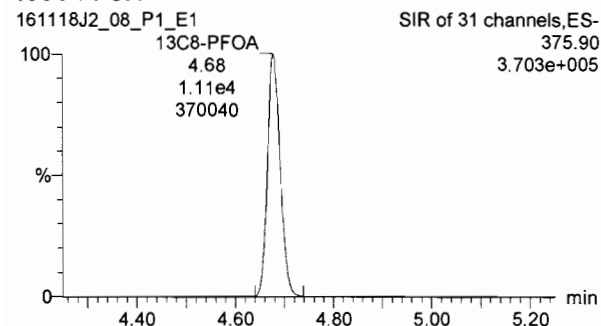
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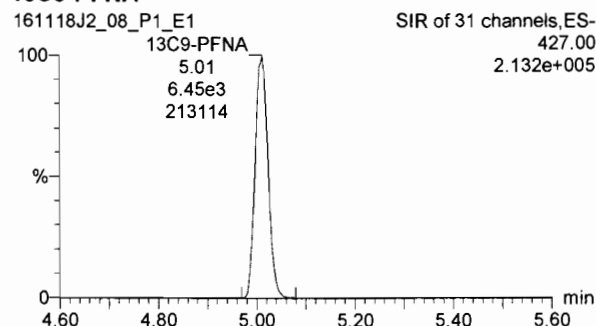
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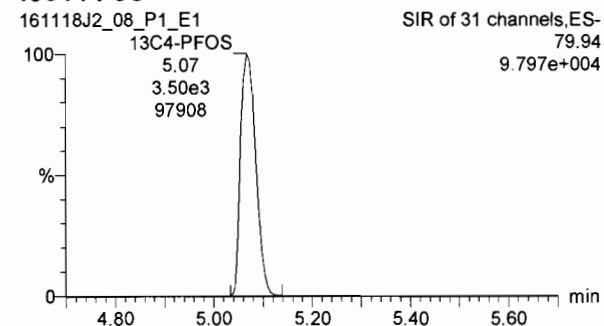
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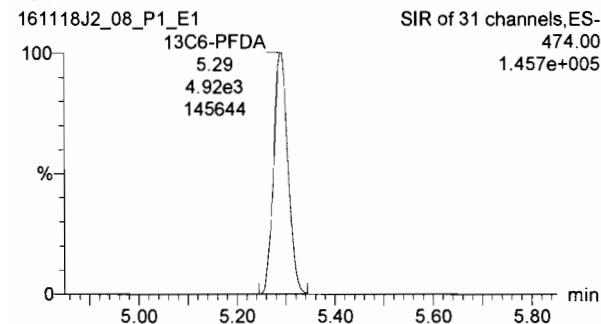
13C9-PFNA



13C4-PFOS



13C6-PFDA

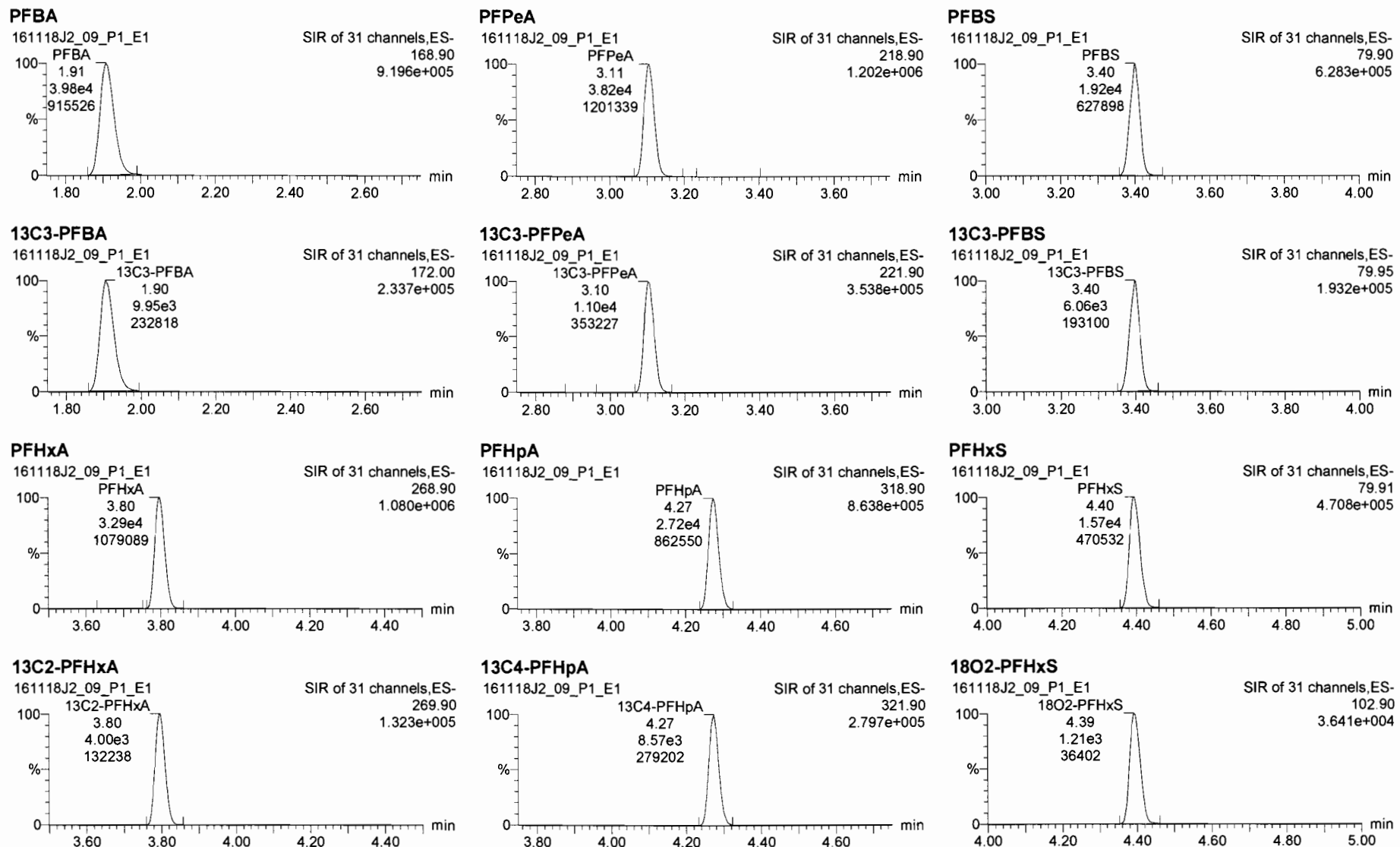


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Name: 161118J2_09.wiff, Date: 18-Nov-2016, Time: 18:39:42, ID: ST161118J2-8 PFC C4 16K1721, Description: PFC C4 16K1721 A



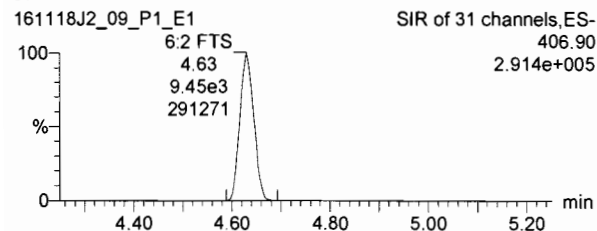
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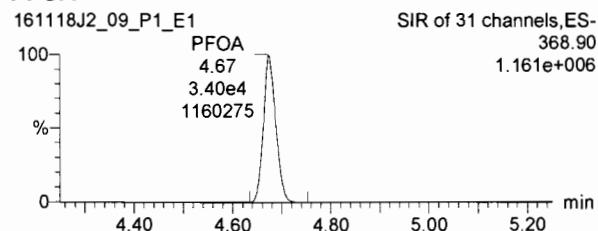
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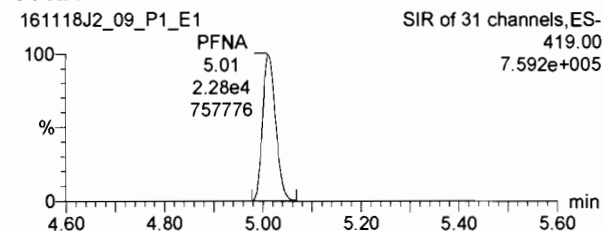
6:2 FTS



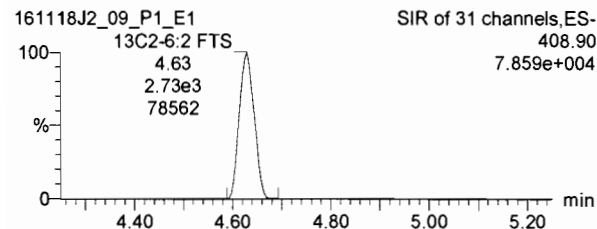
PFOA



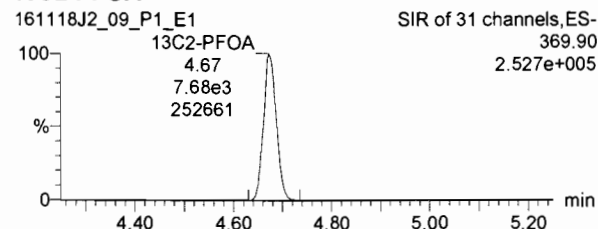
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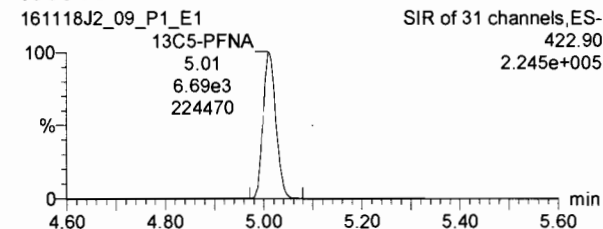
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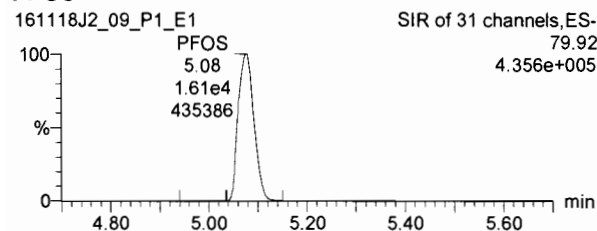
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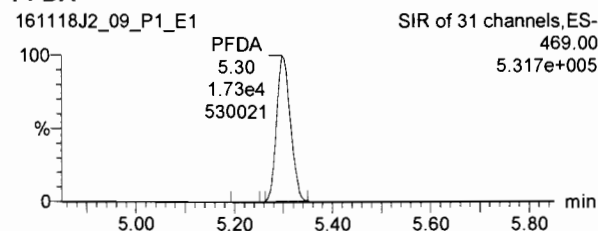
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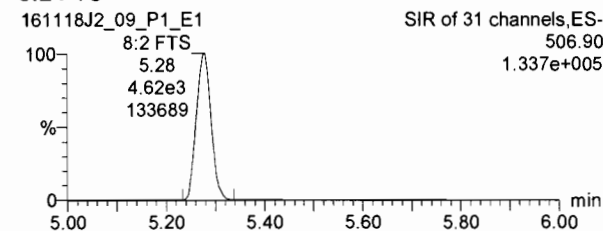
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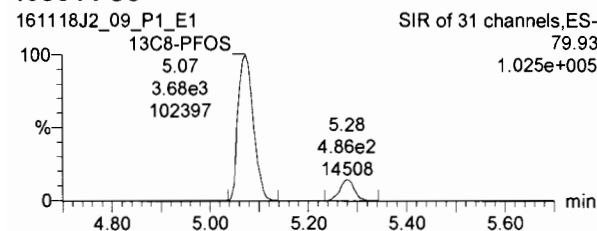
PFDA



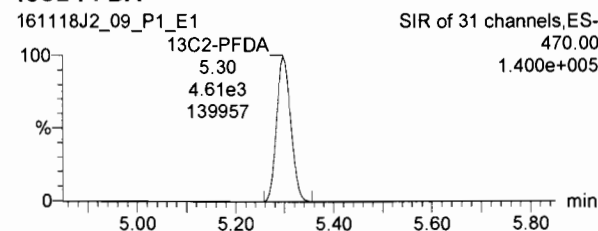
8:2 FTS



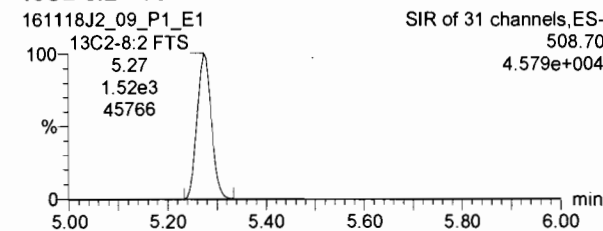
13C8-PFOS



13C2-PFDA



13C2-8:2 FTS



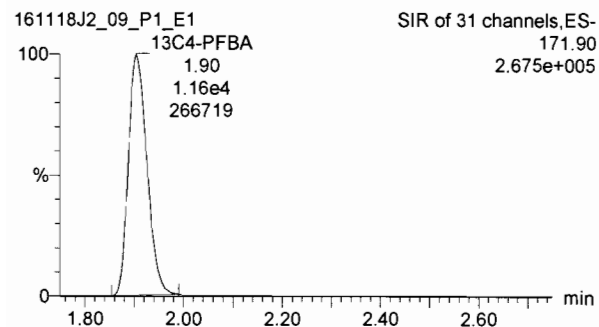
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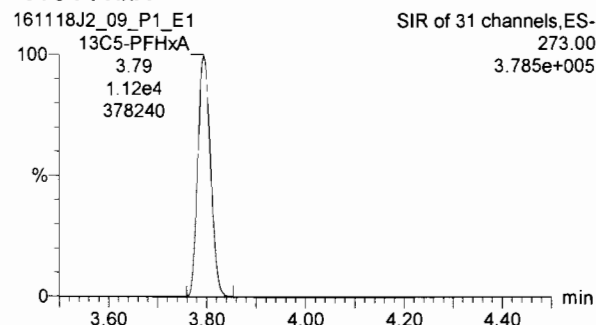
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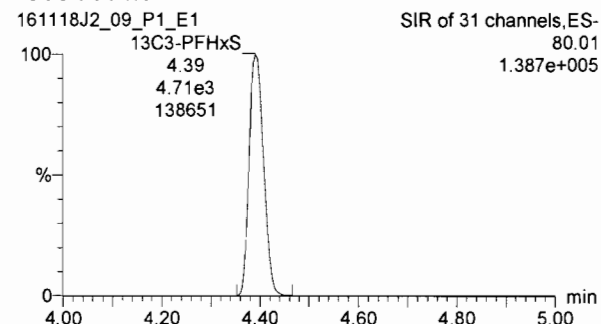
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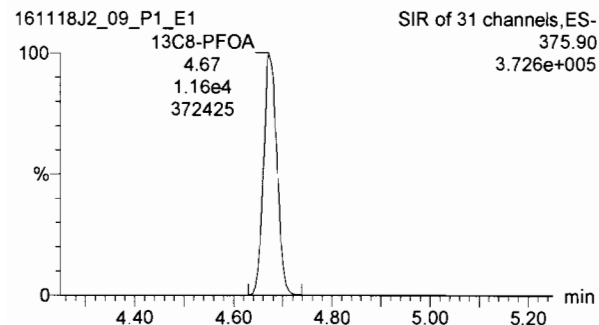
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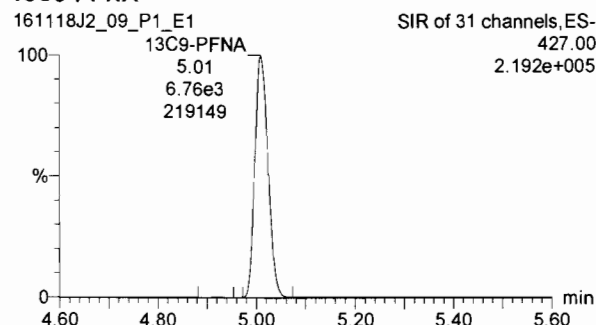
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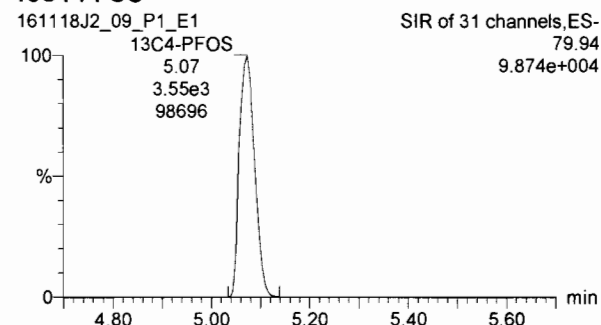
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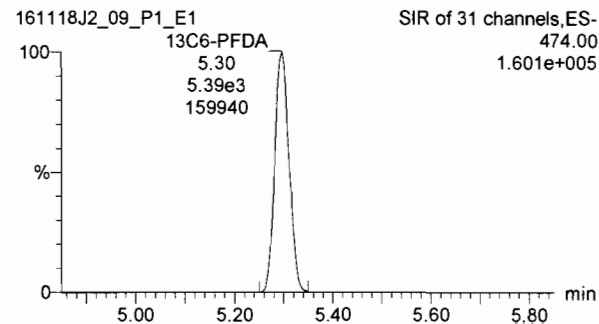
13C9-PFNA



13C4-PFOS



13C6-PFDA

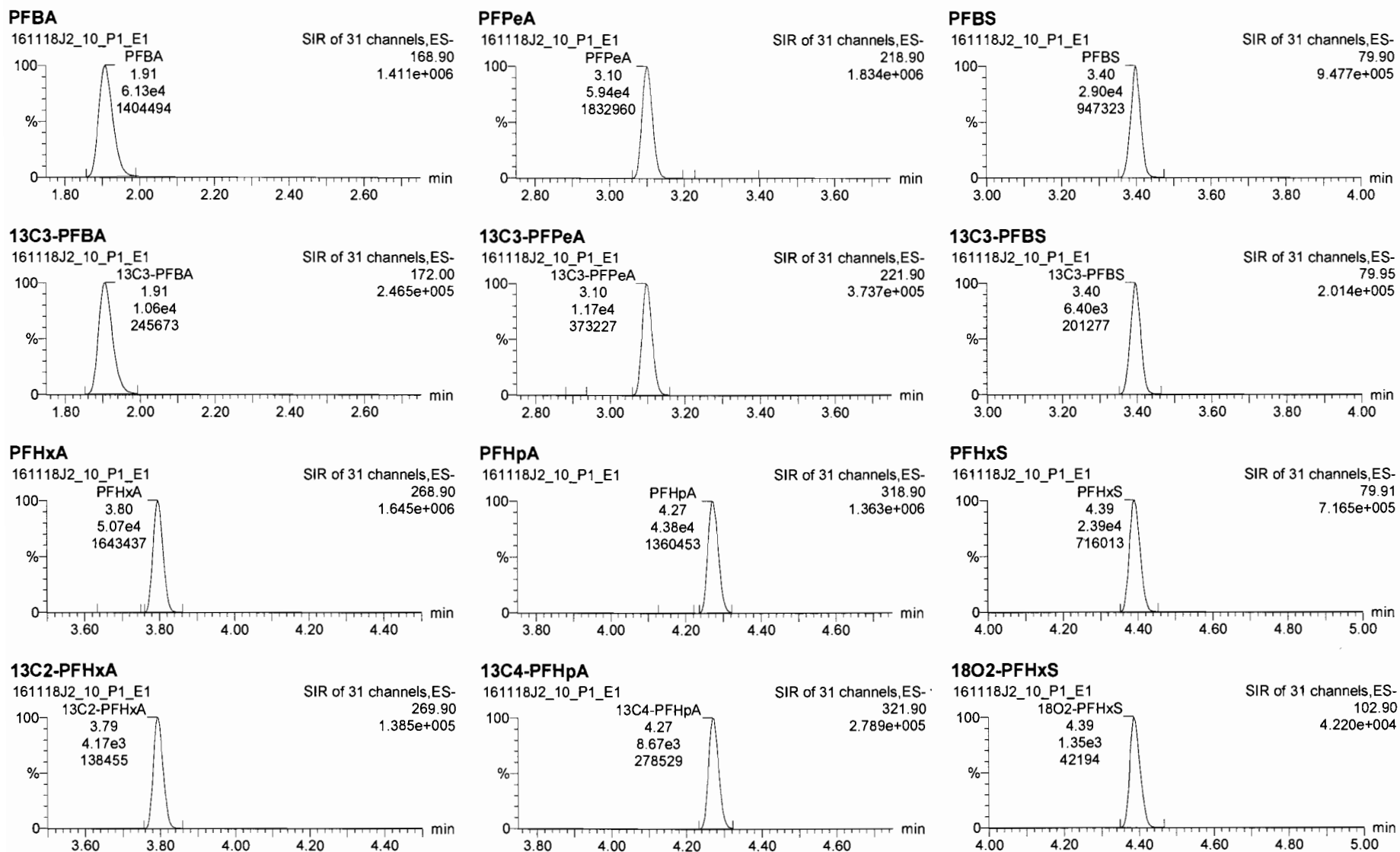


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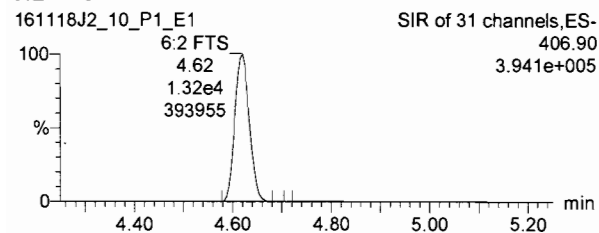
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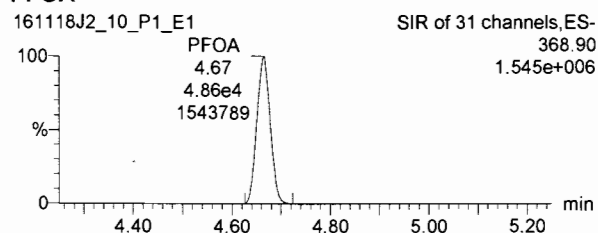
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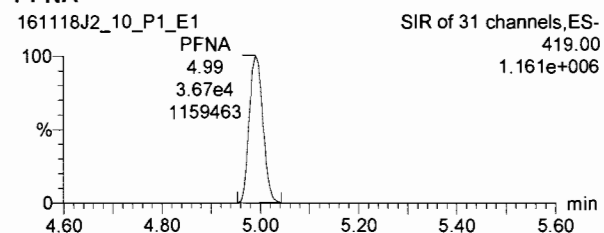
6:2 FTS



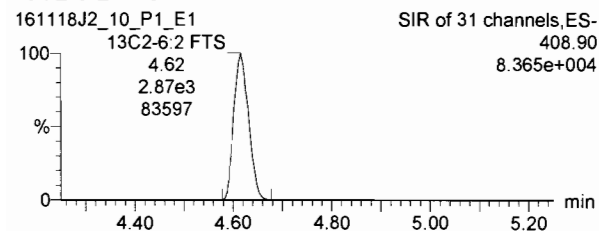
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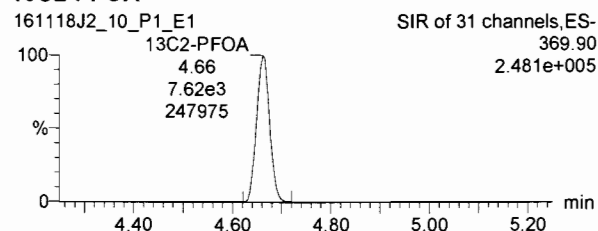
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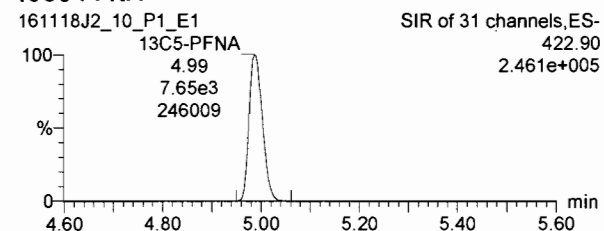
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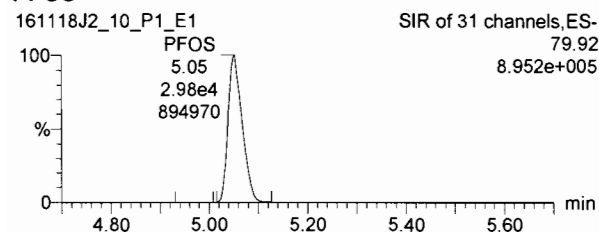
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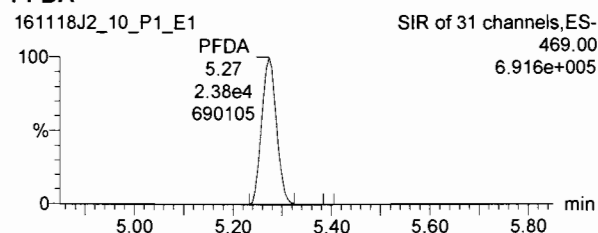
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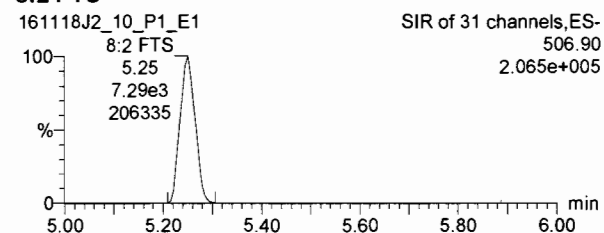
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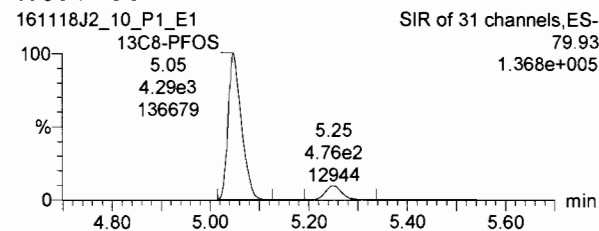
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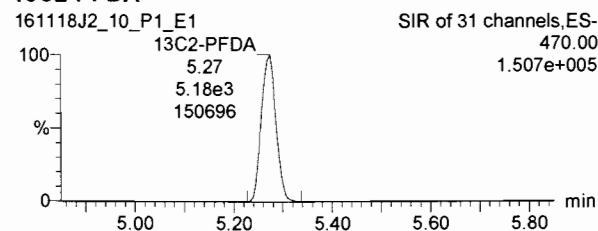
8:2 FTS



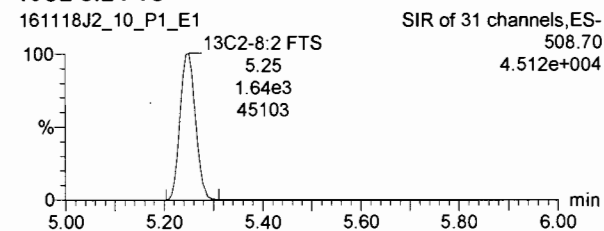
13C8-PFOS



13C2-PFDA



13C2-8:2 FTS



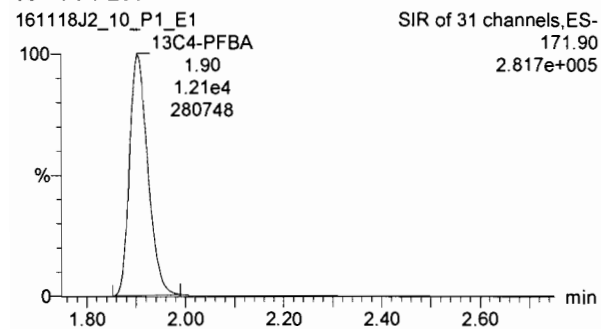
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Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

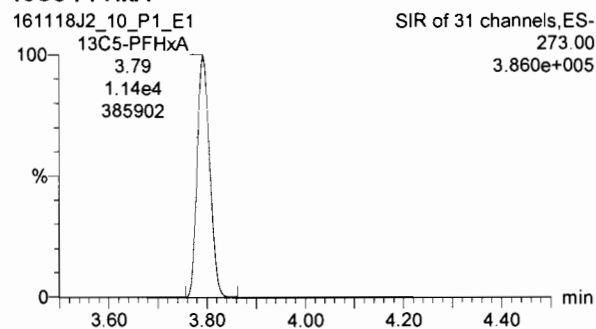
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Name: 161118J2_10.wiff, Date: 18-Nov-2016, Time: 18:51:58, ID: ST161118J2-9 PFC C4.5 16K1722, Description: PFC C4.5 16K1722 A

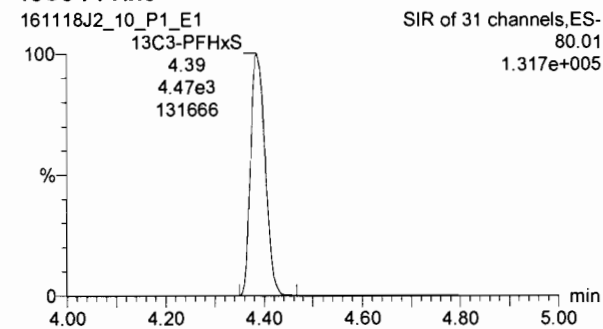
13C4-PFBA



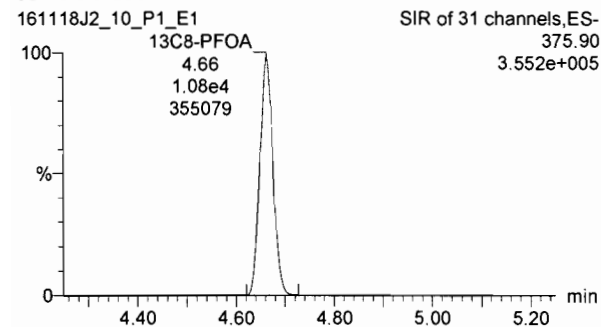
13C5-PFHxA



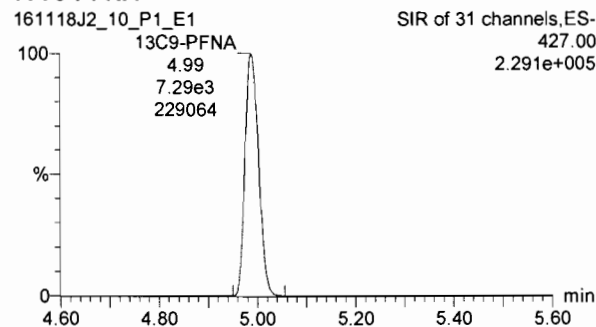
13C3-PFHxS



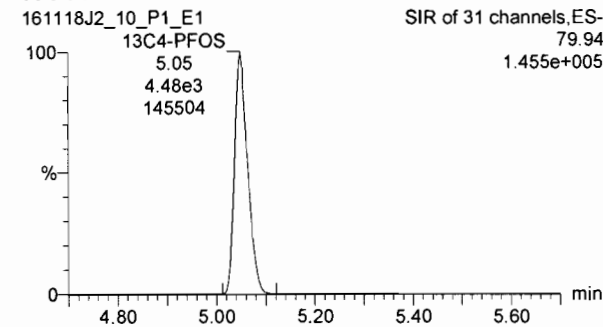
13C8-PFOA



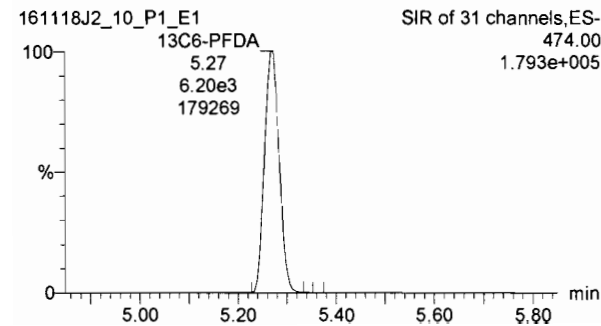
13C9-PFNA



13C4-PFOS



13C6-PFDA



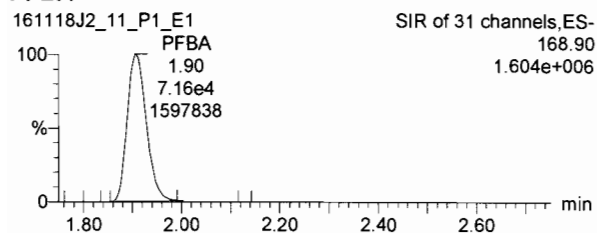
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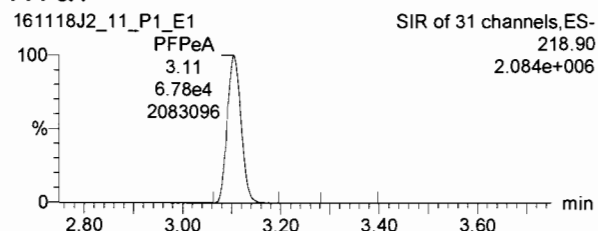
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Name: 161118J2_11.wiff, Date: 18-Nov-2016, Time: 19:04:12, ID: ST161118J2-10 PFC C5 16K1723, Description: PFC C5 16K1723 A

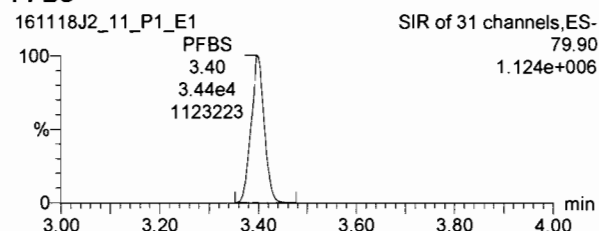
PFBA



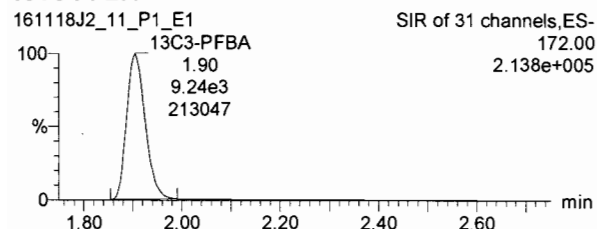
PFPeA



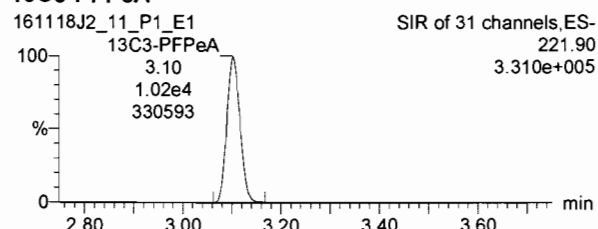
PFBS



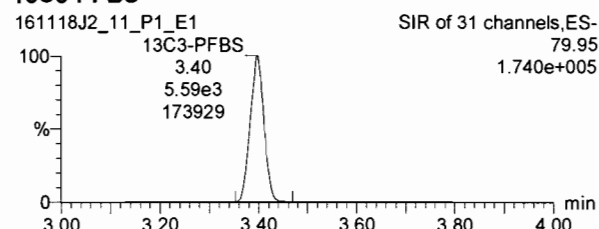
13C3-PFBA



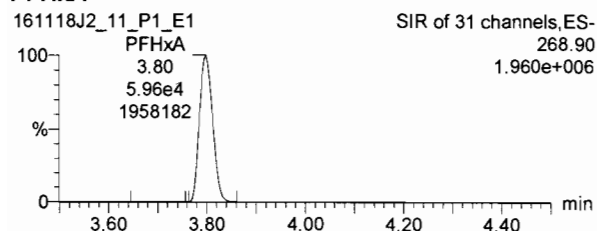
13C3-PFPeA



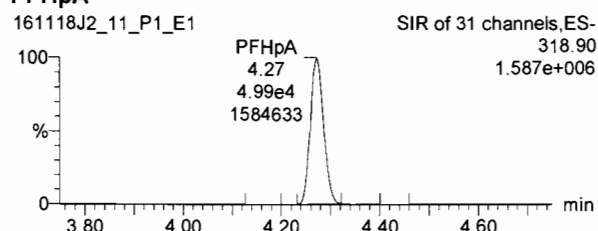
13C3-PFBS



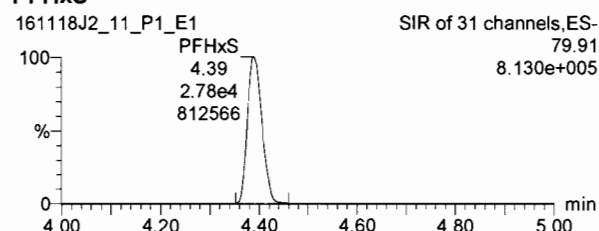
PFHxA



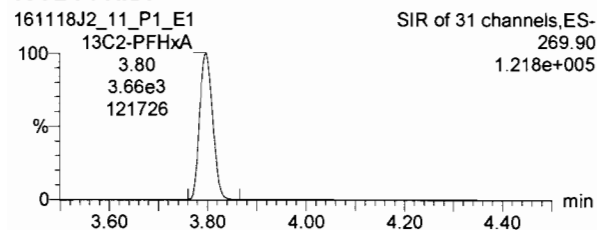
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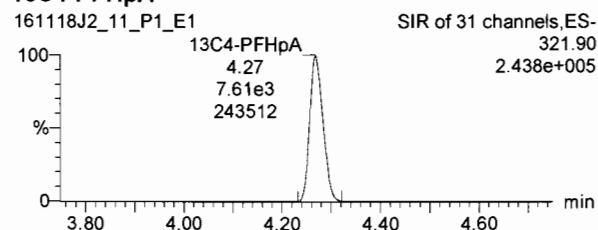
PFHxS



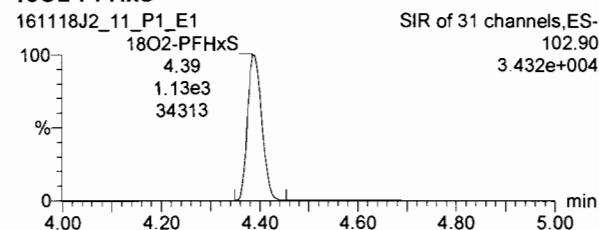
13C2-PFHxA



13C4-PFHpA



18O2-PFHxS



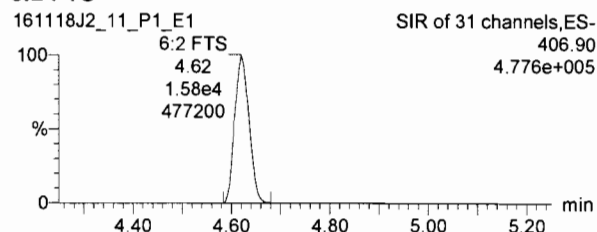
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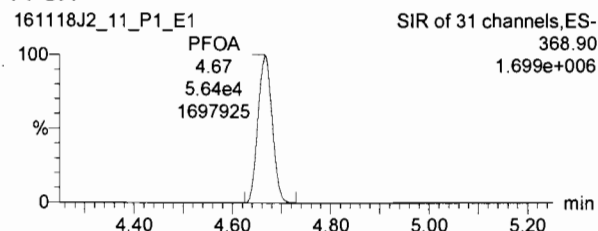
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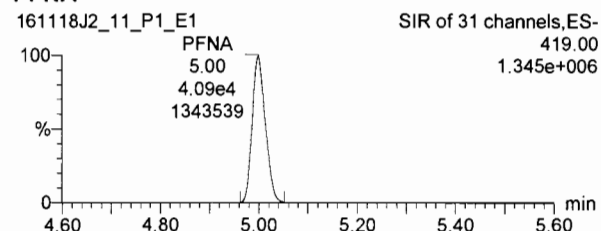
6:2 FTS



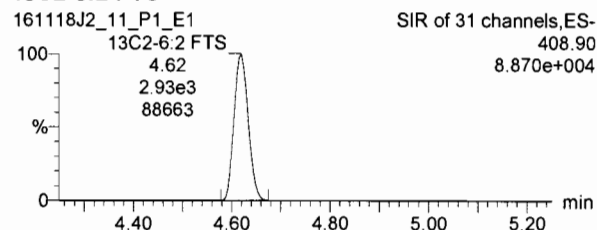
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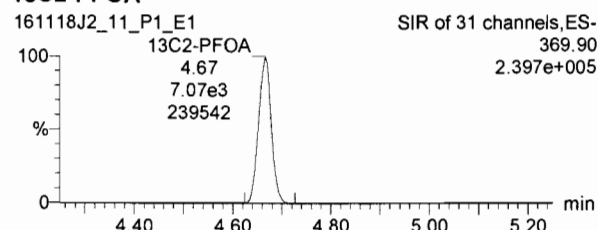
PFNA



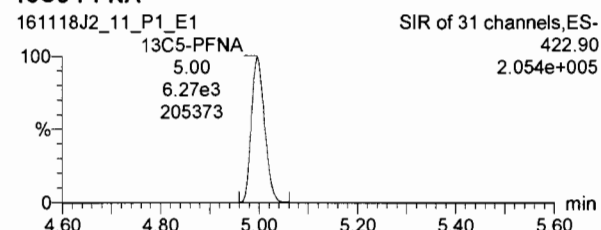
13C2-6:2 FTS



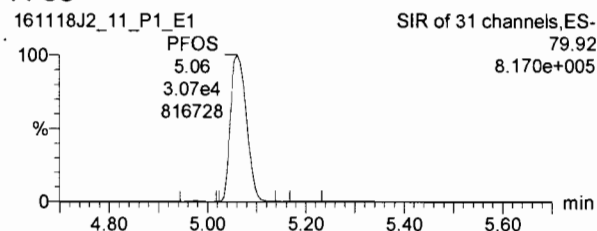
13C2-PFOA



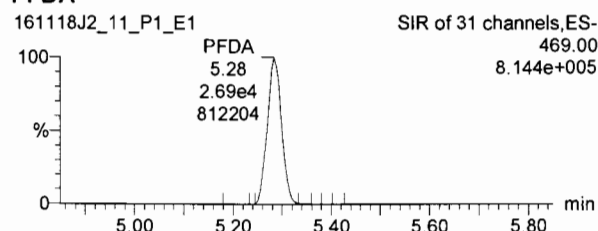
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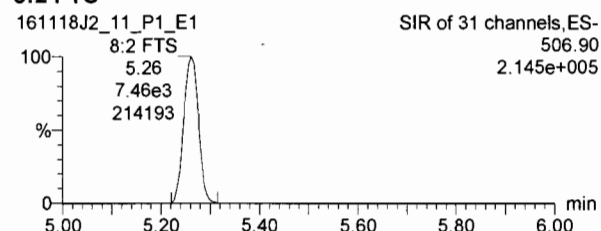
PFOS



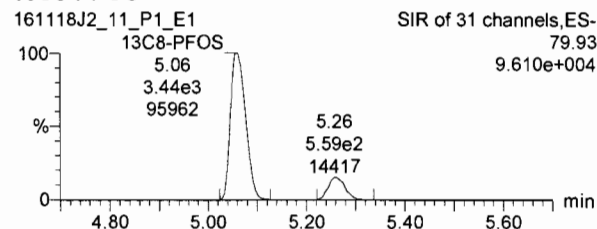
PFDA



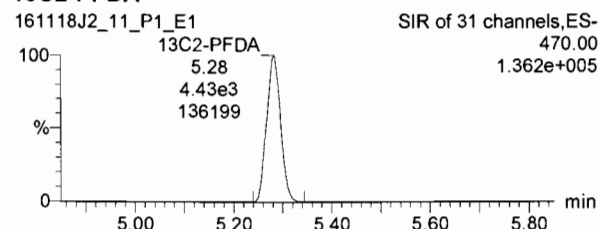
8:2 FTS



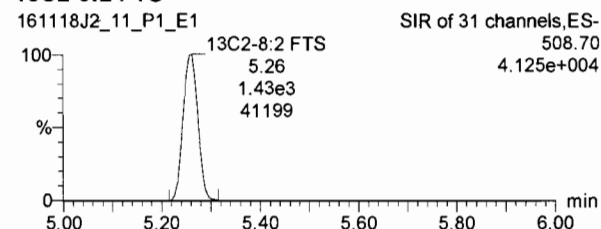
13C8-PFOS



13C2-PFDA



13C2-8:2 FTS



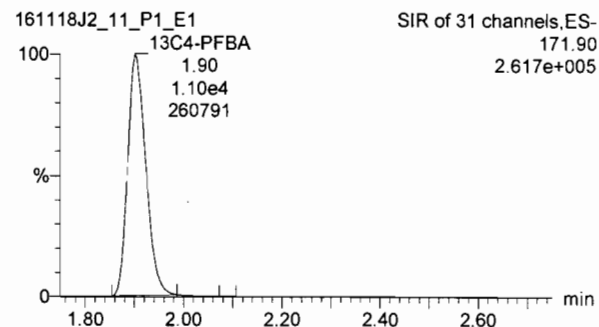
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Last Altered: Saturday, November 19, 2016 12:55:25 Pacific Standard Time

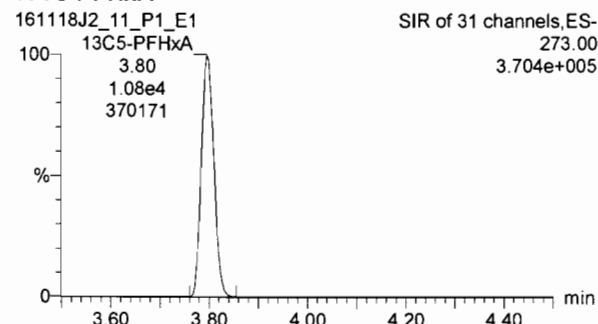
Printed: Saturday, November 19, 2016 12:55:40 Pacific Standard Time

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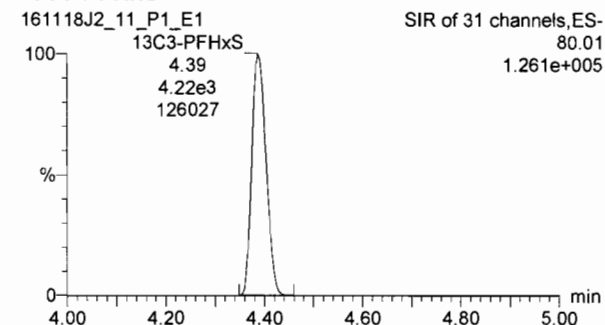
13C4-PFBA



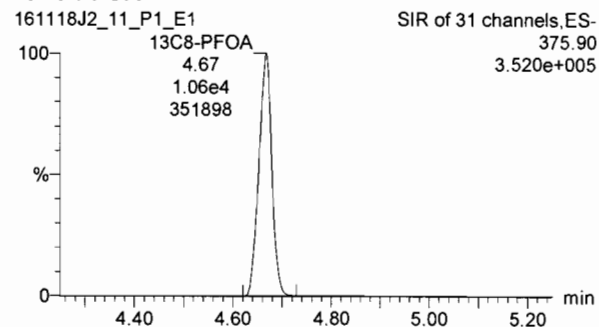
13C5-PFHxA



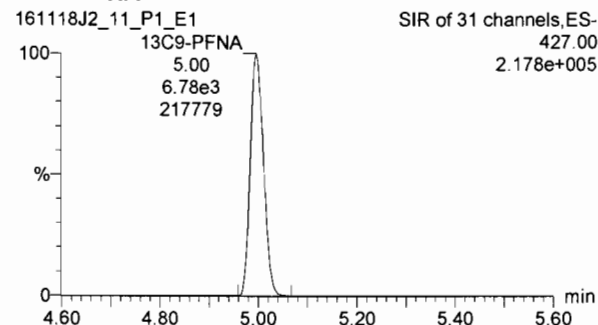
13C3-PFHxS



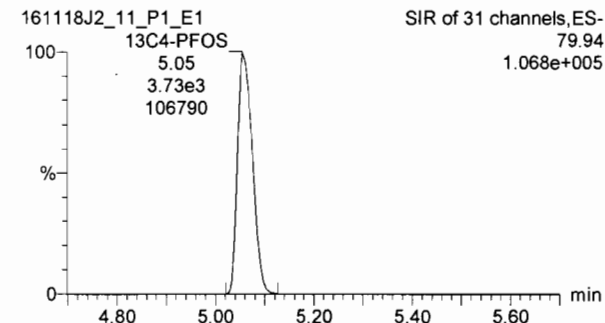
13C8-PFOA



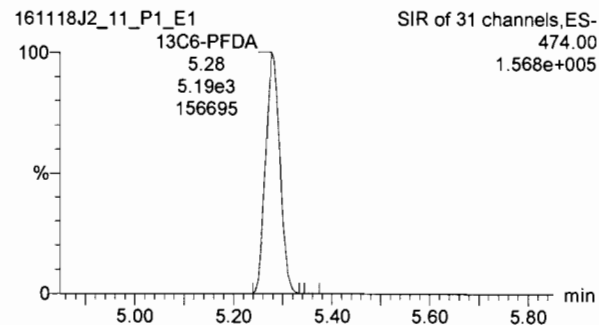
13C9-PFNA



13C4-PFOS



13C6-PFDA



Dataset: U:\Q2.PRO\Results\161118J2\161118J2_13.qld

Last Altered: Monday, November 21, 2016 15:52:24 Pacific Standard Time

Printed: Monday, November 21, 2016 15:53:35 Pacific Standard Time

Method: U:\Q2.pro\MethDB\PFC List 18_A No4-2FTS_161118.mdb 19 Nov 2016 12:55:02

Calibration: U:\Q2.pro\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

Name: 161118J2_13.wiff, Date: 18-Nov-2016, Time: 19:28:40, ID: SS161118J2-1 PFC SSS 16J1810, Description: PFC SSS 16J1810 A

	# Name	Trace	Response	IS Resp	RRF	Wt/Vol	RT	Conc.	%Rec
1	1 PFBA	168.90	2.63e4	1.10e4		1.000	1.91	30.4	121.4
2	2 PFPeA	218.90	2.00e4	1.26e4		1.000	3.11	23.1	92.5
3	3 PFBS	79.90	1.17e4	6.92e3		1.000	3.40	27.2	108.7
4	4 PFHxA	268.90	2.22e4	4.28e3		1.000	3.80	31.2	124.8
5	5 PFHpA	318.90	1.84e4	8.37e3		1.000	4.28	33.2	132.8
6	6 PFHxS	79.91	6.70e3	1.12e3		1.000	4.40	22.9	91.7
7	7 6:2 FTS	406.90	4.86e3	2.41e3		1.000	4.63	26.6	106.3
8	8 PFOA	368.90	1.49e4	6.69e3		1.000	4.67	22.6	90.3
9	9 PFNA	419.00	1.14e4	5.85e3		1.000	5.01	29.8	119.2
10	10 PFOS	79.92	5.24e3	2.56e3		1.000	5.06	22.2	88.9
11	11 PFDA	469.00	4.84e3	2.16e3		1.000	5.29	28.5	113.9
12	12 8:2 FTS	506.90	1.30e3	6.66e2		1.000	5.27	27.4	109.5
13	13 13C3-PFBA	172.00	1.10e4	1.26e4	0.867	1.000	1.91	12.6	100.4
14	14 13C3-PFPeA	221.90	1.26e4	1.21e4	0.994	1.000	3.11	13.0	104.1
15	15 13C3-PFBS	79.95	6.92e3	1.21e4	0.564	1.000	3.40	12.6	101.1
16	16 13C2-PFHxA	269.90	4.28e3	1.21e4	0.907	1.000	3.80	4.86	97.1
17	17 13C4-PFHpA	321.90	8.37e3	1.21e4	0.742	1.000	4.28	11.6	92.9
18	18 18O2-PFHxS	102.90	1.12e3	4.29e3	0.271	1.000	4.40	12.0	96.2
19	19 13C2-6:2 FTS	408.90	2.41e3	1.00e4	0.224	1.000	4.63	13.4	107.3
20	20 13C2-PFOA	369.90	6.69e3	1.00e4	0.651	1.000	4.67	12.8	102.2
21	21 13C5-PFNA	422.90	5.85e3	5.95e3	1.002	1.000	5.00	12.3	98.2
22	22 13C8-PFOS	79.93	2.56e3	2.54e3	0.950	1.000	5.06	13.3	106.0
23	23 13C2-PFDA	470.00	2.16e3	2.56e3	0.827	1.000	5.29	12.8	102.1
24	24 13C2-8:2 FTS	508.70	6.66e2	2.56e3	0.260	1.000	5.26	12.5	100.0
25	25 13C4-PFBA	171.90	1.26e4	1.26e4	1.000	1.000	1.91	12.5	100.0
26	26 13C5-PFHxA	273.00	1.21e4	1.21e4	1.000	1.000	3.80	12.5	100.0
27	27 13C3-PFHxS	80.01	4.29e3	4.29e3	1.000	1.000	4.39	12.5	100.0
28	28 13C8-PFOA	375.90	1.00e4	1.00e4	1.000	1.000	4.67	12.5	100.0
29	29 13C4-PFOS	79.94	2.54e3	2.54e3	1.000	1.000	5.06	12.5	100.0
30	30 13C9-PFNA	427.00	5.95e3	5.95e3	1.000	1.000	5.00	12.5	100.0
31	31 13C3-PFDA	474.00	2.56e3	2.56e3	1.000	1.000	5.28	12.5	100.0

75-125

Ⓐ outside
method limits.
AC 11/21/16

Dataset: Untitled

Last Altered: Monday, November 21, 2016 15:51:43 Pacific Standard Time

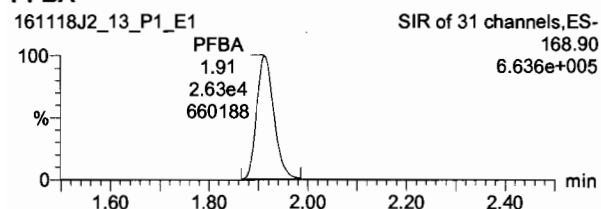
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Method: U:\Q2.pro\MethDB\PFC List 18_A No4-2FTS_161118.mdb 19 Nov 2016 12:55:02

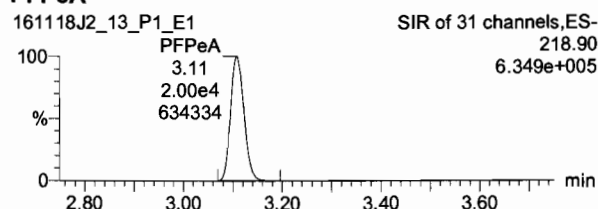
Calibration: U:\Q2.pro\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

Name: 161118J2_13.wiff, Date: 18-Nov-2016, Time: 19:28:40, ID: SS161118J2-1 PFC SSS 16J1810, Description: PFC SSS 16J1810 A

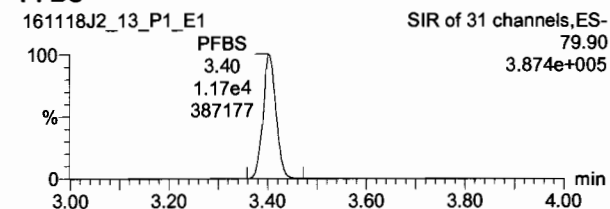
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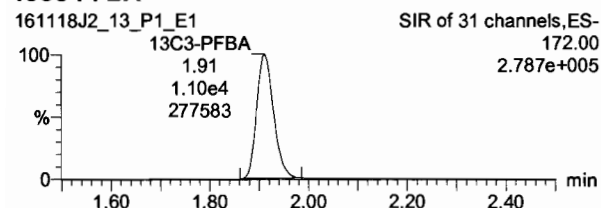
PFPeA



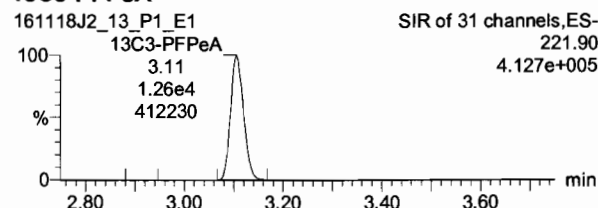
PFBS



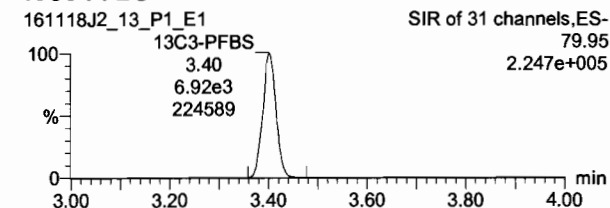
13C3-PFBA



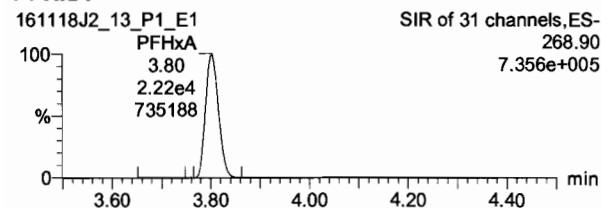
13C3-PFPeA



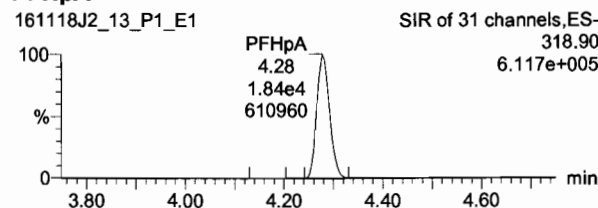
13C3-PFBS



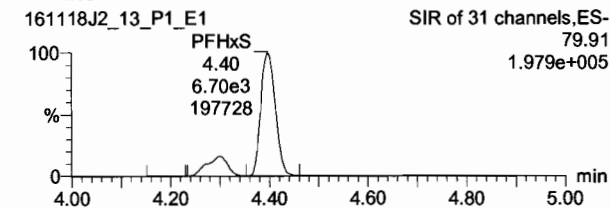
PFHxA



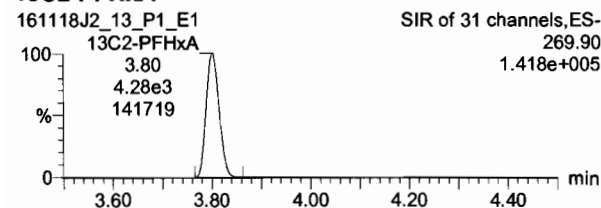
PFHpA



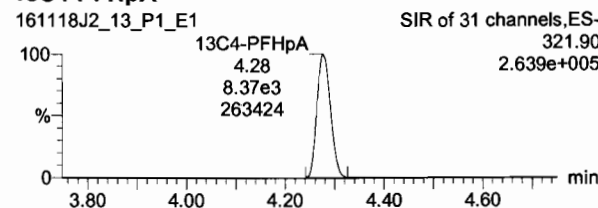
PFHxS



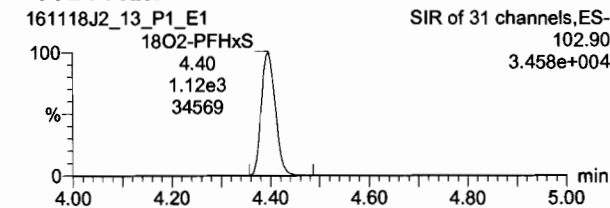
13C2-PFHxA



13C4-PFHpA



18O2-PFHxS

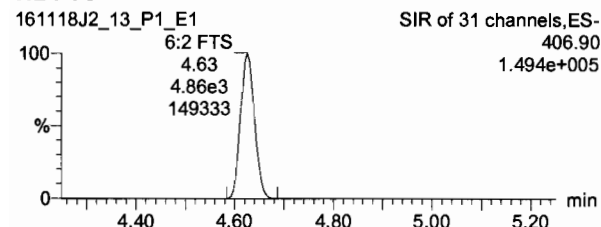


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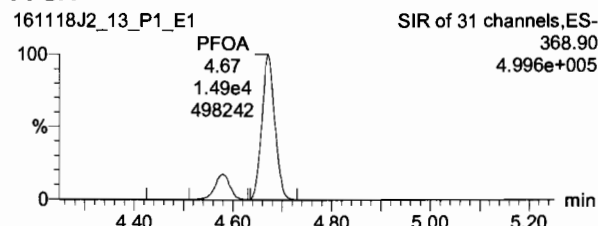
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Printed: Monday, November 21, 2016 15:51:59 Pacific Standard Time

Name: 161118J2_13.wiff, Date: 18-Nov-2016, Time: 19:28:40, ID: SS161118J2-1 PFC SSS 16J1810, Description: PFC SSS 16J1810 A

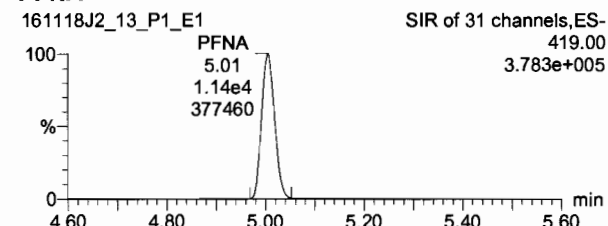
6:2 FTS



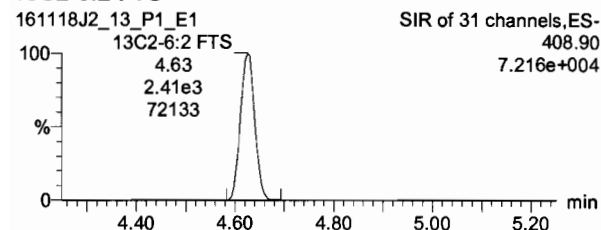
PFOA



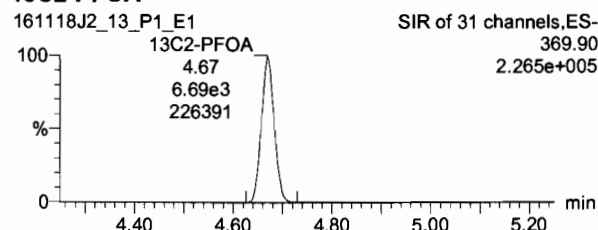
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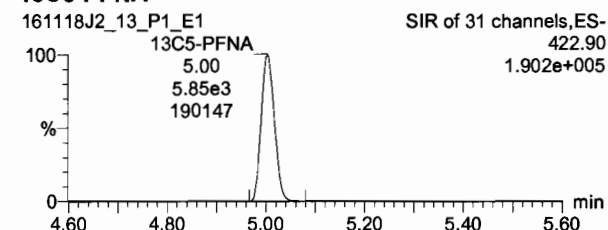
13C2-6:2 FTS



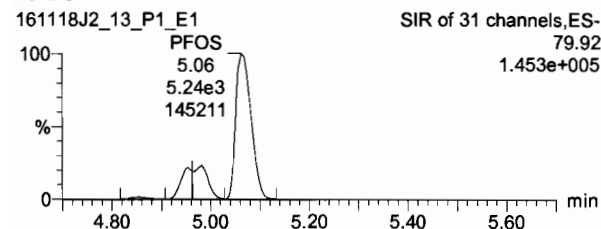
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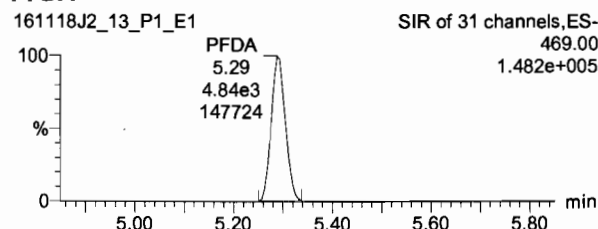
13C5-PFNA



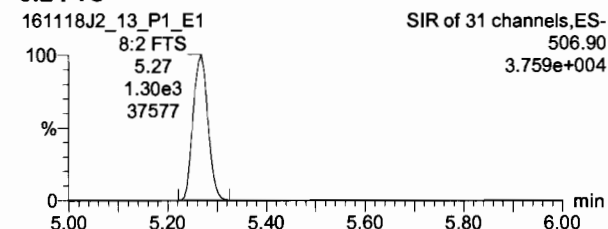
PFOS



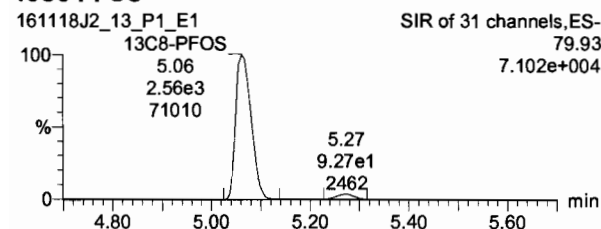
PFDA



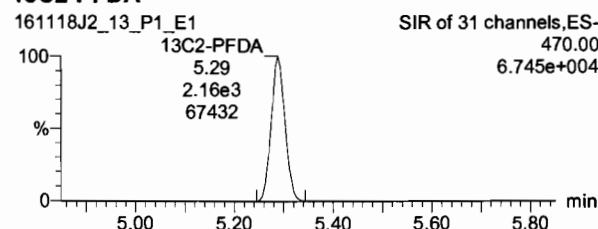
8:2 FTS



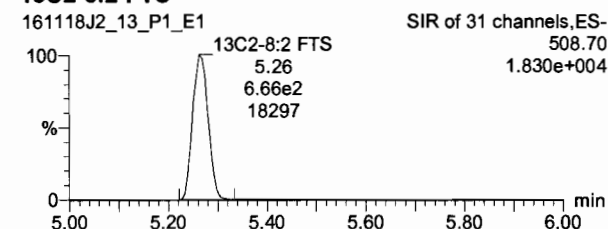
13C8-PFOS



13C2-PFDA



13C2-8:2 FTS

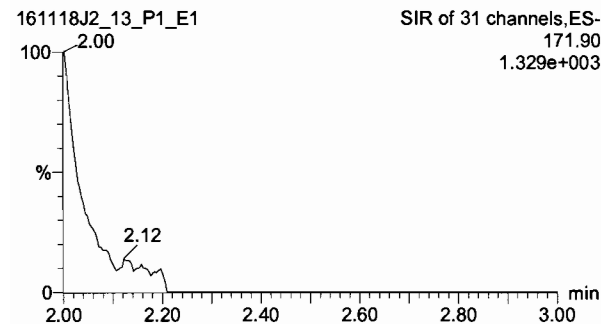


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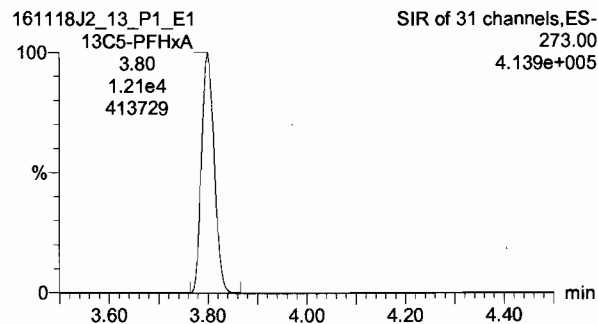
Last Altered: Monday, November 21, 2016 15:51:43 Pacific Standard Time
Printed: Monday, November 21, 2016 15:51:59 Pacific Standard Time

Name: 161118J2_13.wiff, Date: 18-Nov-2016, Time: 19:28:40, ID: SS161118J2-1 PFC SSS 16J1810, Description: PFC SSS 16J1810 A

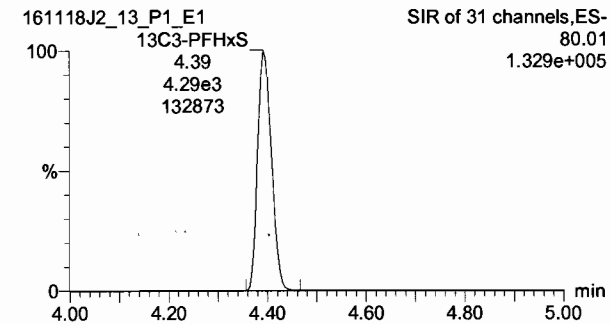
13C4-PFBA



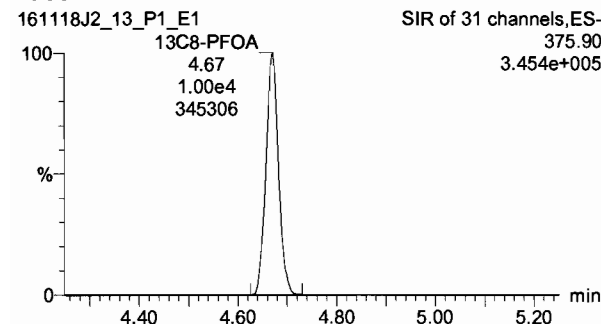
13C5-PFHxA



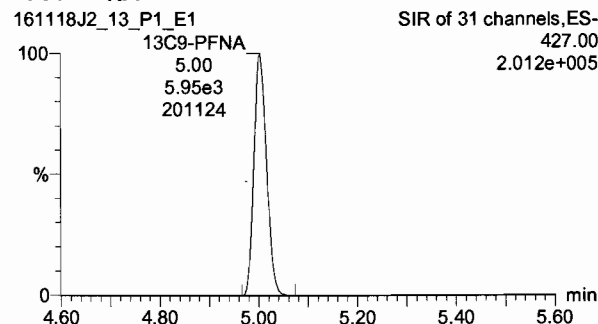
13C3-PFHxS



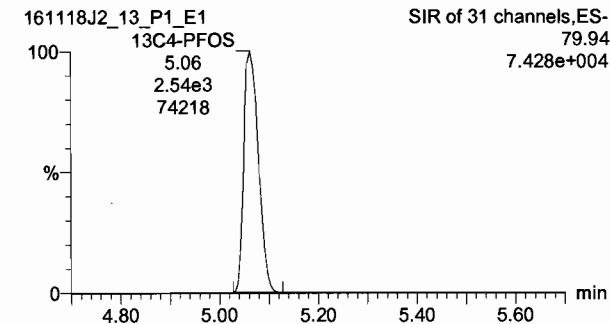
13C8-PFOA



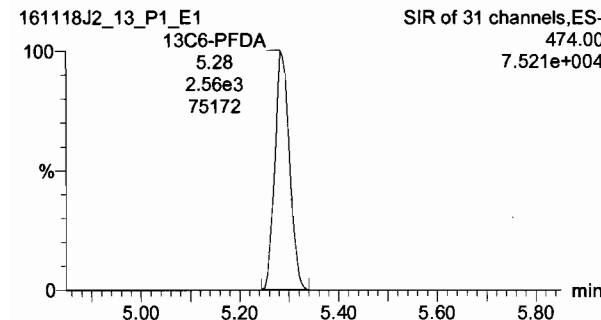
13C9-PFNA



13C4-PFOS



13C6-PFDA



Dataset: U:\Q2.PRO\Results\161121J4\161121J4_04.qld

Last Altered: Tuesday, November 22, 2016 08:55:40 Pacific Standard Time

Printed: Tuesday, November 22, 2016 10:09:28 Pacific Standard Time

Method: U:\Q2.pro\MethDB\PFC List 18_A No4-2FTS_161118.mdb 19 Nov 2016 12:55:02

Calibration: U:\Q2.pro\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

Name: 161121J4_04.wiff, Date: 21-Nov-2016, Time: 12:25:30, ID: SS161118J2-1 PFC SSS 16J1810, Description: PFC SSS 16J1810 A

	# Name	Trace	Response	IS Resp	RRF	Wt/Vol	RT	Conc.	%Rec
1	1 PFBA	168.90	2.81e4	1.15e4		1.000	1.85	30.9	123.7
2	2 PFPeA	218.90	2.17e4	1.38e4		1.000	3.07	22.8	91.2
3	3 PFBS	79.90	1.26e4	7.52e3		1.000	3.38	27.0	108.0
4	4 PFHxA	268.90	2.43e4	4.88e3		1.000	3.78	30.0	119.9
5	5 PFHpA	318.90	2.15e4	1.04e4		1.000	4.25	31.2	124.9
6	6 PFHxS	79.91	8.48e3	1.52e3		1.000	4.37	21.4	85.6
7	7 6:2 FTS	406.90	5.93e3	2.88e3		1.000	4.60	27.2	109.0
8	8 PFOA	368.90	1.80e4	8.36e3		1.000	4.65	21.8	87.2
9	9 PFNA	419.00	1.28e4	6.34e3		1.000	4.97	30.8	123.3
10	10 PFOS	79.92	5.20e3	2.47e3		1.000	5.03	22.8	91.3
11	11 PFDA	469.00	4.19e3	1.94e3		1.000	5.26	27.4	109.6
12	12 8:2 FTS	506.90	1.24e3	6.02e2		1.000	5.23	28.9	115.5
13	13 13C3-PFBA	172.00	1.15e4	1.29e4	0.867	1.000	1.85	12.9	103.5
14	14 13C3-PFPeA	221.90	1.38e4	1.38e4	0.994	1.000	3.07	12.5	100.3
15	15 13C3-PFBS	79.95	7.52e3	1.38e4	0.564	1.000	3.37	12.0	96.3
16	16 13C2-PFHxA	269.90	4.88e3	1.38e4	0.907	1.000	3.78	4.86	97.2
17	17 13C4-PFHpA	321.90	1.04e4	1.38e4	0.742	1.000	4.25	12.7	101.4
18	18 18O2-PFHxS	102.90	1.52e3	5.28e3	0.271	1.000	4.37	13.2	106.0
19	19 13C2-6:2 FTS	408.90	2.88e3	9.25e3	0.224	1.000	4.60	17.4	139.0
20	20 13C2-PFOA	369.90	8.36e3	9.25e3	0.651	1.000	4.64	17.3	138.8
21	21 13C5-PFNA	422.90	6.34e3	6.66e3	1.002	1.000	4.97	11.9	94.9
22	22 13C8-PFOS	79.93	2.47e3	2.59e3	0.950	1.000	5.03	12.6	100.6
23	23 13C2-PFDA	470.00	1.94e3	2.51e3	0.827	1.000	5.26	11.6	93.1
24	24 13C2-8:2 FTS	508.70	6.02e2	2.51e3	0.260	1.000	5.23	11.5	92.1
25	25 13C4-PFBA	171.90	1.29e4	1.29e4	1.000	1.000	1.85	12.5	100.0
26	26 13C5-PFHxA	273.00	1.38e4	1.38e4	1.000	1.000	3.78	12.5	100.0
27	27 13C3-PFHxS	80.01	5.28e3	5.28e3	1.000	1.000	4.37	12.5	100.0
28	28 13C8-PFOA	375.90	9.25e3	9.25e3	1.000	1.000	4.64	12.5	100.0
29	29 13C4-PFOS	79.94	2.59e3	2.59e3	1.000	1.000	5.03	12.5	100.0
30	30 13C9-PFNA	427.00	6.66e3	6.66e3	1.000	1.000	4.97	12.5	100.0
31	31 13C2-PFDA	474.00	2.51e3	2.51e3	1.000	1.000	5.25	12.5	100.0

75-125
↓
ⓐ
ⓑ
ⓒ

ⓐ % recovery based on linear isomer only.

AC
11/22/16

	Sample Name	Acquisition Date	Sample ID	Sample Comment
1	161121J4_01	11/21/2016 11:48:45	IPA	IPA
2	161121J4_02	11/21/2016 12:01:00	ST161120J2-1 PFC C3.5 16K1421	PFC C3.5 16K1421 A
3	161121J4_03	11/21/2016 12:13:14	IPA	IPA
4	161121J4_04	11/21/2016 12:25:30	SS161118J2-1 PFC SSS 16J1810	PFC SSS 16J1810 A
5	161121J4_05	11/21/2016 12:37:43	IPA	IPA
6	161121J4_06	11/21/2016 12:49:58	B6K0124-BS1	OPR
7	161121J4_07	11/21/2016 13:02:12	B6K0124-BSD1	OPR Dup
8	161121J4_08	11/21/2016 13:14:25	IPA	IPA
9	161121J4_09	11/21/2016 13:26:39	B6K0124-BLK1	Method Blank
10	161121J4_10	11/21/2016 13:38:53	IPA	IPA
11	161121J4_11	11/21/2016 13:51:06	1601447-01	OF-INF01-111116
12	161121J4_12	11/21/2016 14:03:22	1601447-02	OF-GAC-EFF01-111116
13	161121J4_13	11/21/2016 14:15:40	IPA	IPA
14	161121J4_14	11/21/2016 14:27:55	ST161120J2-2 PFC C3.5 16K1421	PFC C3.5 16K1421 A
15	161121J4_15	11/21/2016 14:40:09	IPA	IPA

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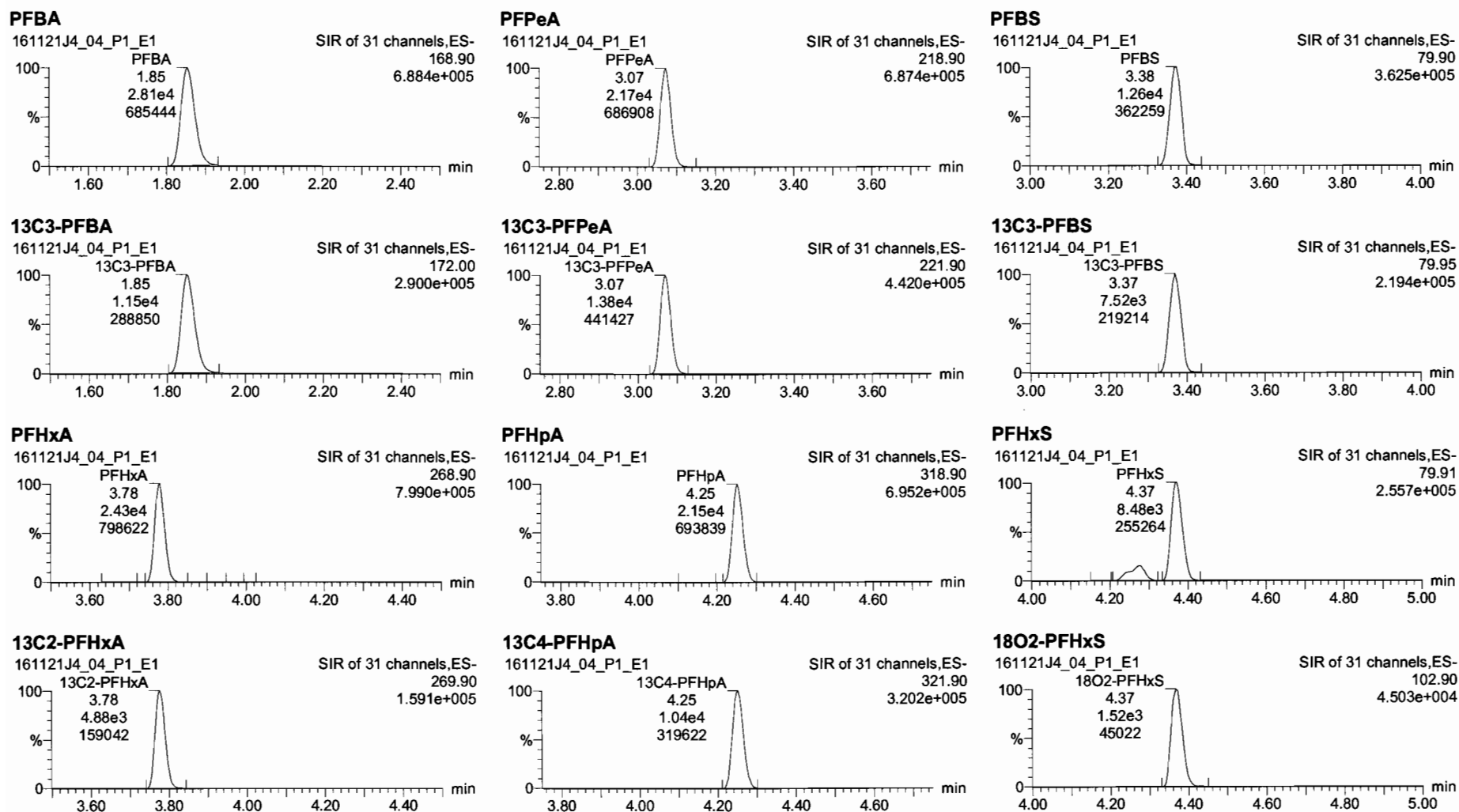
Last Altered: Tuesday, November 22, 2016 08:53:22 Pacific Standard Time

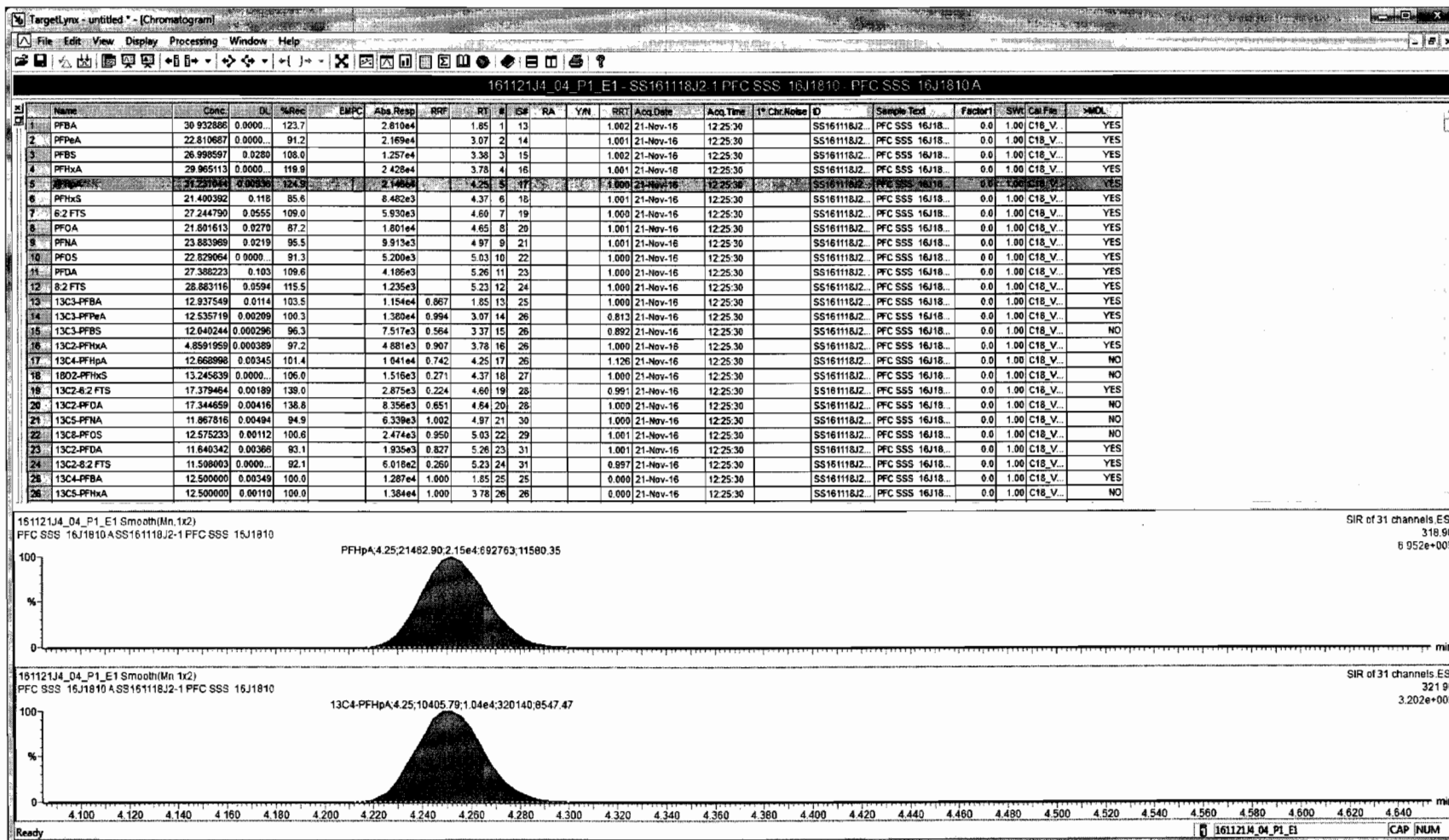
Printed: Tuesday, November 22, 2016 08:53:36 Pacific Standard Time

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Calibration: U:\Q2.pro\CurveDB\C18_VAL-PFC_Q2_11-18-16_L18_A.cdb 19 Nov 2016 12:55:25

Name: 161121J4_04.wiff, Date: 21-Nov-2016, Time: 12:25:30, ID: SS161118J2-1 PFC SSS 16J1810, Description: PFC SSS 16J1810 A

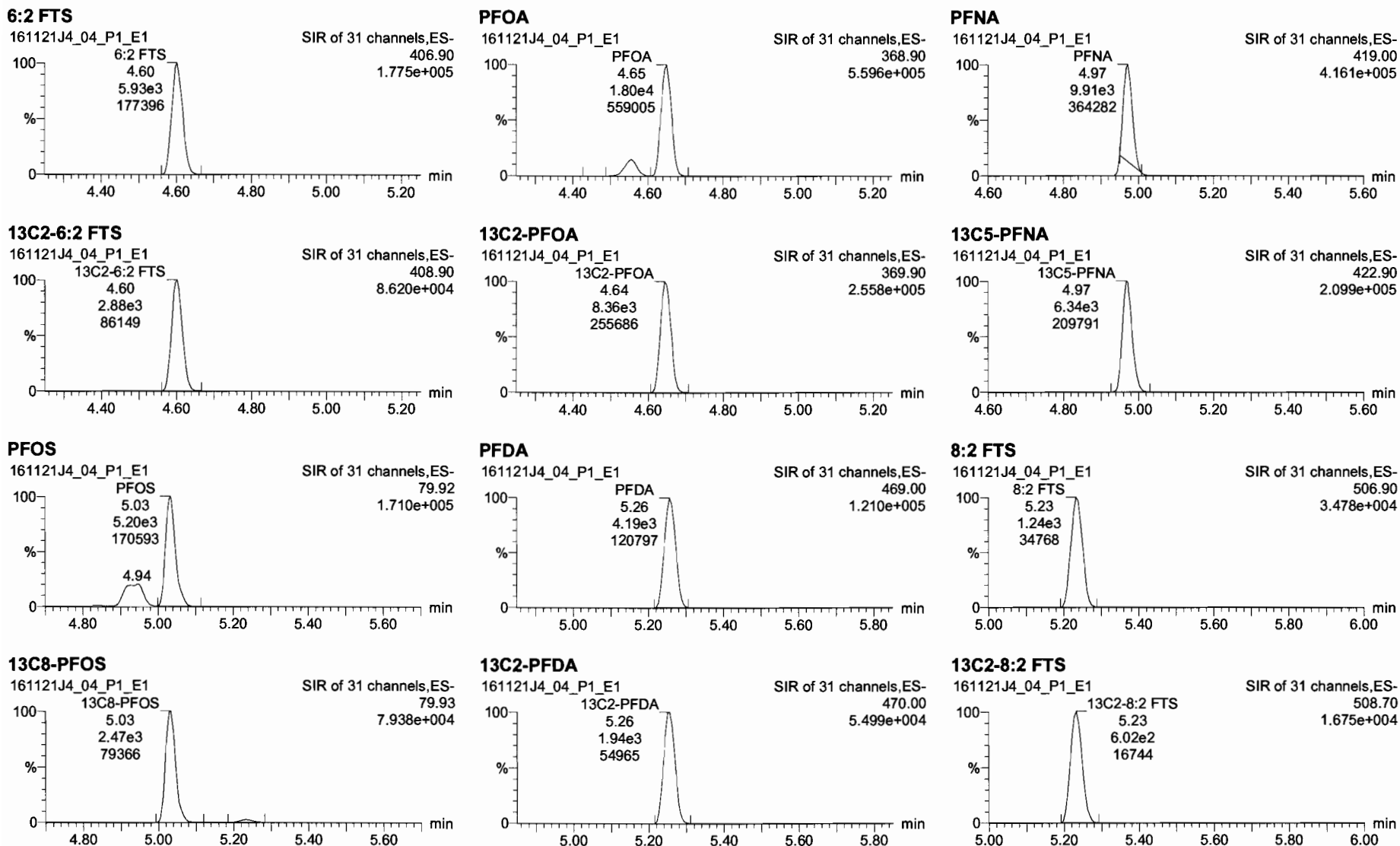


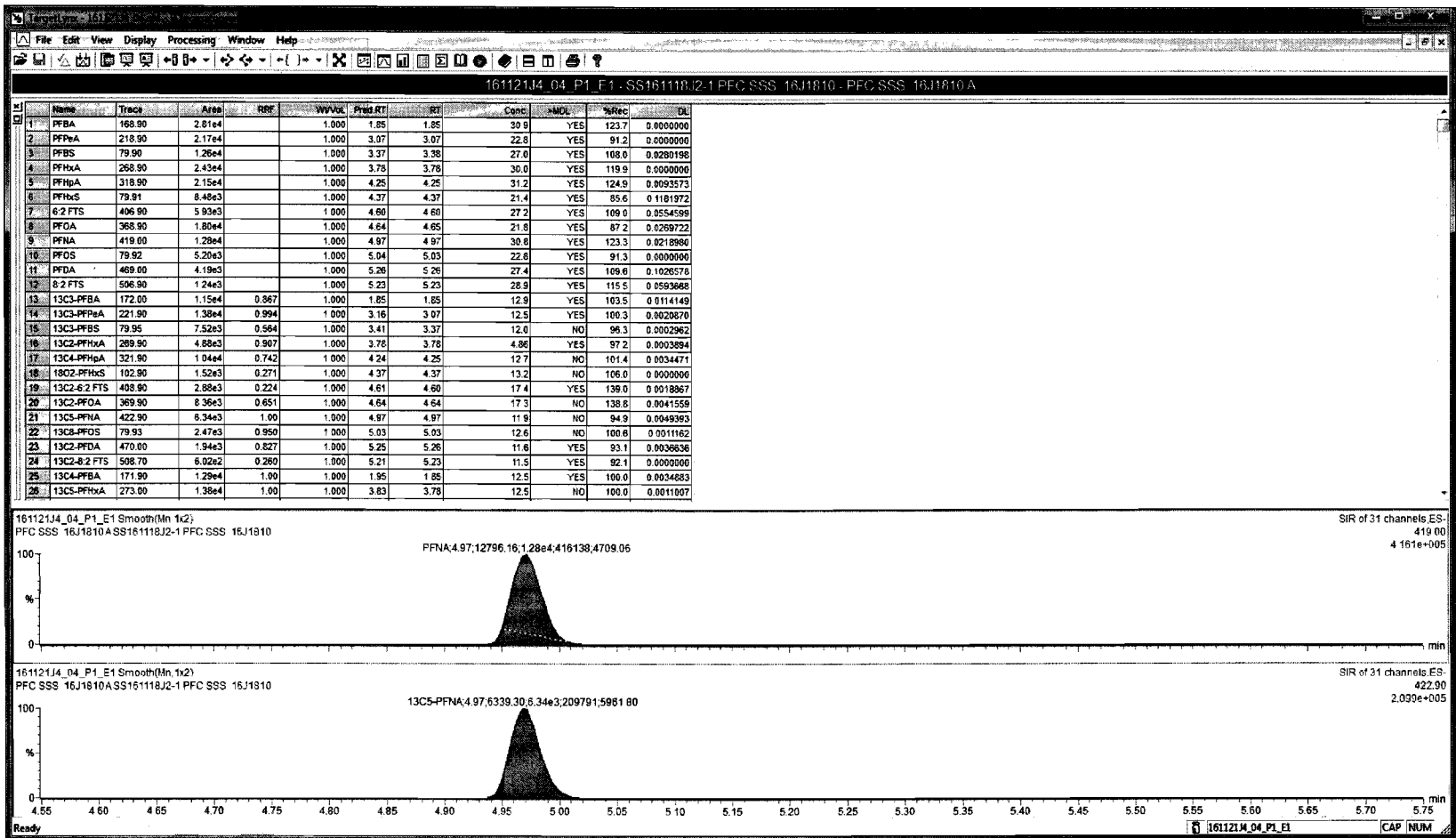


Dataset: Untitled

Last Altered: Tuesday, November 22, 2016 08:53:22 Pacific Standard Time
Printed: Tuesday, November 22, 2016 08:53:36 Pacific Standard Time

Name: 161121J4_04.wiff, Date: 21-Nov-2016, Time: 12:25:30, ID: SS161118J2-1 PFC SSS 16J1810, Description: PFC SSS 16J1810 A





Dataset: Untitled

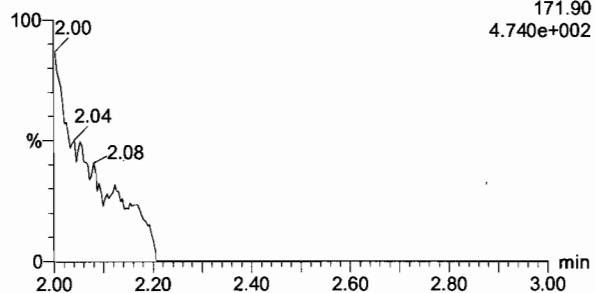
Last Altered: Tuesday, November 22, 2016 08:53:22 Pacific Standard Time
Printed: Tuesday, November 22, 2016 08:53:36 Pacific Standard Time

Name: 161121J4_04.wiff, Date: 21-Nov-2016, Time: 12:25:30, ID: SS161118J2-1 PFC SSS 16J1810, Description: PFC SSS 16J1810 A

13C4-PFBA

161121J4_04_P1_E1

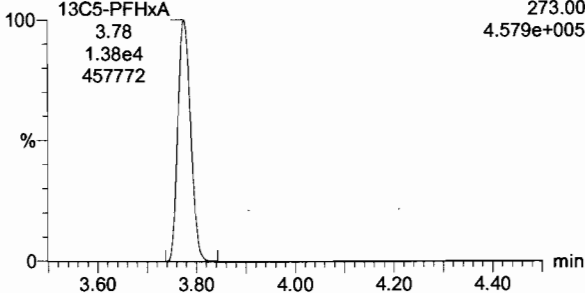
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13C5-PFHxA

161121J4_04_P1_E1

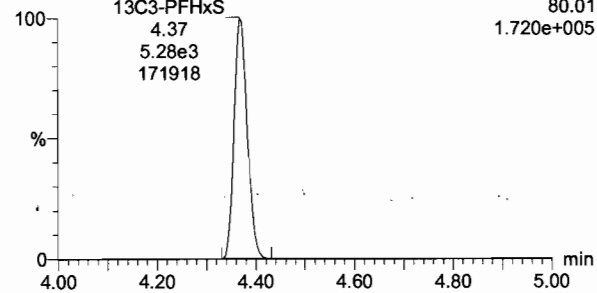
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13C3-PFHxS

161121J4_04_P1_E1

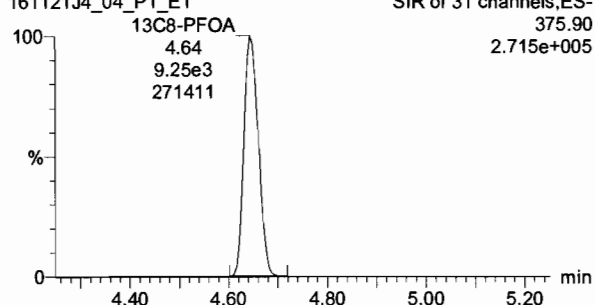
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13C8-PFOA

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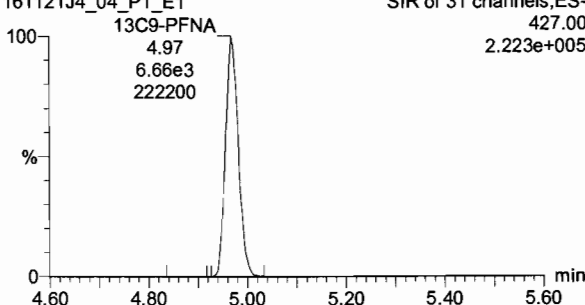
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13C9-PFNA

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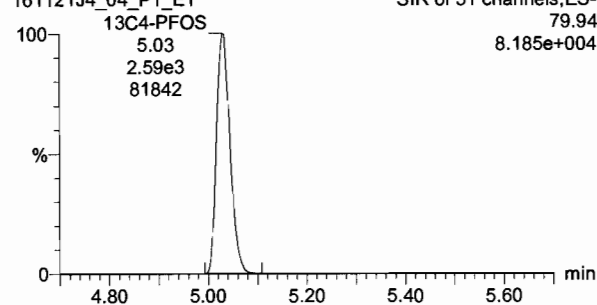
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13C4-PFOS

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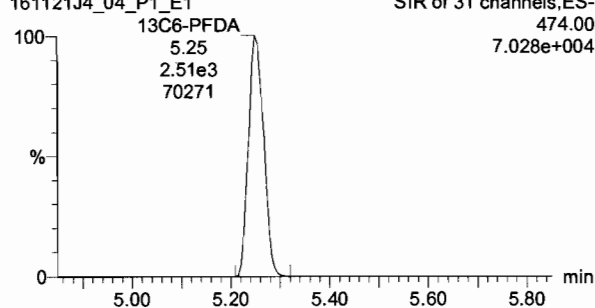
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13C6-PFDA

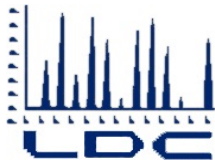
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SIR of 31 channels, ES-
474.00
7.028e+004



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ACID
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ACID
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","84.7","","TRG","Yes","Y","","Y","0.807","0.900","8.00","NG_L","NG_L","","","","80.0","84.7","106","","","","","70","130","","","","
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","78.8","","TRG","Yes","Y","","Y","0.747","0.833","7.41","NG_L","NG_L","","","0.164","74.1","78.8","106","87.4","74.1","78.8","106","5.50","70","130","25","",""
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LABORATORY DATA CONSULTANTS, INC.

2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

AMEC Foster Wheeler, Inc.
7376 SW Durham Road
Portland, OR 97224
Attn: Ms. Marina Mitchell

February 2, 2017

SUBJECT: MCAS Yuma, Data Validation

Dear Ms. Mitchell,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 20, 2016. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #37797:

SDG #

Fraction

280-90987-1, 280-91067-1, 280-91122-1, 280-91192-1
1601451, 1601461, 1601464, 1601472

Volatiles, 1,4-Dioxane, Wet Chemistry,
Perfluorinated Alkyl Acids

The data validation was performed under Stage 2B & 4 guidelines. The analyses were validated using the following documents, as applicable to each method:

- Final Addendum 3 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona, February 2017
- Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona, September 2015
- Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona, May 2013
- Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona, May 2013
- U.S. Department of Defense Quality Systems Manual for Environmental Laboratories, Version 5.0, July 2013
- USEPA, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, August 2014
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review, August 2014
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
Project Manager/Senior Chemist

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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 6, 2017
Parameters: Volatiles
Validation Level: Stage 2B & 4
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-90987-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW13-20161114	280-90987-4	Water	11/14/16
OUA1-MW37-20161114	280-90987-5	Water	11/14/16
OUA1-MW37A-20161114	280-90987-6	Water	11/14/16
OUA1-HS03-20161114	280-90987-7	Water	11/14/16
OUA1-MW19-20161114	280-90987-8	Water	11/14/16
OUA1-MW18-20161114**	280-90987-9**	Water	11/14/16
OUA1-MW08-20161114	280-90987-10	Water	11/14/16
OUA1-MW06-20161114	280-90987-11	Water	11/14/16
OUA1-HS03-20161114MS	280-90987-7MS	Water	11/14/16
OUA1-HS03-20161114MSD	280-90987-7MSD	Water	11/14/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260B

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detect): The compound or analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detect at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 15.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB01-20161114 was identified as a trip blank. No contaminants were found.

Sample EB01-20161114 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 was identified as a source blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
OUA1-MW13-20161114	Bromofluorobenzene	117 (85-114)	All compounds	J (all detects)	P
OUA1-MW37A-20161114	Bromofluorobenzene	116 (85-114)	All compounds	J (all detects)	P

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples OUA1-MW37-20161114 and OUA1-MW37A-20161114 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	OUA1-MW37-20161114	OUA1-MW37A-20161114				
1,1-Dichloroethene	0.76	0.78	-	0.02 (≤ 1.0)	-	-
Trichloroethene	1.7	1.8	6 (≤ 20)	-	-	-

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to surrogate %R, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**Volatiles - Data Qualification Summary - SDG 280-90987-1**

Sample	Compound	Flag	A or P	Reason
OUA1-MW13-20161114 OUA1-MW37A-20161114	All compounds	J (all detects)	P	Surrogates (%R)

MCAS Yuma**Volatiles - Laboratory Blank Data Qualification Summary - SDG 280-90987-1**

No Sample Data Qualified in this SDG

MCAS Yuma**Volatiles - Field Blank Data Qualification Summary - SDG 280-90987-1**

No Sample Data Qualified in this SDG

LDC #: 37797A1
 SDG #: 280-90987-1
 Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date: 12/14/16
 Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: [Signature]

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	RSD ≤ 15% Y' ICV ≤ 20%
IV.	Continuing calibration / 2nd sig	D	CCV ≤ 20/50%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	SB=1. 2B=2. TB=3
VII.	Surrogate spikes	AW	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LC9
X.	Field duplicates	AW	D=5+6
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
 N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
 SW = See worksheet FB = Field blank EB = Equipment blank

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	SB01-20161114	280-90987-1	Water	11/14/16
2	EB01-20161114	280-90987-2	Water	11/14/16
3	TB01-20161114	280-90987-3	Water	11/14/16
4	OUA1-MW13-20161114	280-90987-4	Water	11/14/16
5	OUA1-MW37-20161114	280-90987-5	Water	11/14/16
6	OUA1-MW37A-20161114	280-90987-6	Water	11/14/16
7	OUA1-HS03-20161114	280-90987-7	Water	11/14/16
8	OUA1-MW19-20161114	280-90987-8	Water	11/14/16
9	OUA1-MW18-20161114**	280-90987-9**	Water	11/14/16
10	OUA1-MW08-20161114	280-90987-10	Water	11/14/16
11	OUA1-MW06-20161114	280-90987-11	Water	11/14/16
12	OUA1-HS03-20161114MS	280-90987-7MS	Water	11/14/16
13	OUA1-HS03-20161114MSD	280-90987-7MSD	Water	11/14/16

VALIDATION FINDINGS CHECKLIST

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	☒	☐	☐	
Was cooler temperature criteria met?	☒	☐	☐	
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	☒	☐	☐	
Were all samples analyzed within the 12 hour clock criteria?	☒	☐	☐	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	☒	☐	☐	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	☒	☐	☐	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990 ?	☐	☐	☒	
Were all percent relative standard deviations (%RSD) $\leq 30\%/15\%$ and relative response factors (RRF) ≥ 0.05 ?	☒	☐	☐	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	☒	☐	☐	
Were all percent differences (%D) $\leq 20\%$ or percent recoveries (%R) 80-120%?	☒	☐	☐	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	☒	☐	☐	
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	☒	☐	☐	
Were all percent differences (%D) $\leq 20\%$ and relative response factors (RRF) ≥ 0.05 ?	☒	☐	☐	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	☒	☐	☐	
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	☒	☐	☐	
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.	☐	☒	☐	
VI. Field blanks				
Were field blanks were identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field blanks?	☐	☒	☐	
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	☐	☒	☐	
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?	☐	☒	☐	

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	/		Ø	
Was a MS/MSD analyzed every 20 samples of each matrix?	/			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	/			
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	/			
Was an LCS analyzed per analytical batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	/			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	/			
Were target compounds detected in the field duplicates?	/			
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	/			
Were retention times within + 30 seconds of the associated calibration standard?	/			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
XIII. Target compound identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	/			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/			
Were chromatogram peaks verified and accounted for?	/			
XIV. System performance				
System performance was found to be acceptable.	/			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC. 1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl chloride	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachloroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform	EE. Ethylbenzene	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. Iodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO. 1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

LDC#: 37797A1**VALIDATION FINDINGS WORKSHEET**
Field DuplicatesPage: 1 of 1
Reviewer: S
2nd Reviewer: JLB**METHOD:** GCMS voa (EPA SW 846 Method 8260B)

Compound	Concentration (ug/L)		(<20) RPD	Difference	Limits	Qual
	5	6				
H	0.76	0.78		0.02	≤1.0	
S	1.7	1.8	6			

V:\FIELD DUPLICATES\37797A1.wpd

VALIDATION FINDINGS WORKSHEET **Initial Calibration Calculation Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$$RRF = (A_x)(C_{is}) / (A_{is})(C_x)$$

average RRF = sum of the RRFs/number of standards

$$\%RSD = 100 * (S/X)$$

A_x = Area of compound,

C_x = Concentration of compound,

S = Standard deviation of the RRFs

X = Mean of the RRFs

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (10 std)	RRF (10 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
1	ICAL (VMS_H)	11/25/16	S (1st internal standard)	0.6242	0.6242	0.6492	0.6492	6.8	6.8
			AA (2nd internal standard)	1.8423	1.8423	1.9091	1.9091	6.9	6.9
			(3rd internal standard)						
			(4th internal standard)						
2			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						
3			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						
4			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Continuing Calibration Results Verification**

Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: [Signature]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Difference} = 100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$$

$$\text{RRF} = (A_x)(C_{is}) / (A_{is})(C_x)$$

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

A_x = Area of compound,

C_x = Concentration of compound,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	H2165	11/28/16	S (1st internal standard)	0.6492	0.6532	0.6532	0.6	0.6
			AA (2nd internal standard)	1.9091	2.012	2.012	5.4	5.4
			(2nd internal standard)					
			(3rd internal standard)					
2			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					
3			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					
4			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification**METHOD:** GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate SpikedSample ID: 9

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	10.1	10.9	107	107	0
1,2-Dichloroethane-d4	↓	9.54	94	94	↓
Toluene-d8	↓	9.87	97	97	↓
Bromofluorobenzene	↓	10.8	107	107	↓

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

VALIDATION FINDINGS WORKSHEET **Matrix Spike/Matrix Spike Duplicates Results Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Recovery} = 100 * (\text{SSC} - \text{SC}) / \text{SA}$$

Where: SSC = Spiked sample concentration
 SA = Spike added

SC = Sample concentration

$$\text{RPD} = | \text{MSC} - \text{MSC} | * 2 / (\text{MSC} + \text{MSDC})$$

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD sample: 12/13

Compound	Spike Added (100)		Sample Concentration (100)	Spiked Sample Concentration (100)		Matrix Spike		Matrix Spike Duplicate		MS/MSD	
						Percent Recovery		Percent Recovery		RPD	
	MS	MSD		-----	MS	MSD	Reported	Recalc	Reported	Recalc	Reported
1,1-Dichloroethene	500	500	2.8	7.81	7.79	100	100	100	100	0	0
Trichloroethene	✓	✓	3.7	8.42	8.67	95	94	100	99	3	3
Benzene											
Toluene											
Chlorobenzene											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3797A

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 \times \text{SSC} / \text{SA}$

Where: SSC = Spiked sample concentration
SA = Spike added

RPD = $100 \times (\text{LCSC} - \text{LCSDC}) / (\text{LCSC} + \text{LCSDC})$

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: 280-253224

Compound	Spike Added (<u>µg/L</u>)		Spiked Sample Concentration (<u>µg/L</u>)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	<u>500</u>	<u>NA</u>	<u>529</u>	<u>NA</u>	<u>106</u>	<u>106</u>				
Trichloroethene	<u>↓</u>	<u>↓</u>	<u>500</u>	<u>↓</u>	<u>100</u>	<u>100</u>				
Benzene										
Toluene										
Chlorobenzene										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Y	N	N/A	Were all reported results recalculated and verified for all level IV samples?

Y	N	N/A	Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_y)(I_s)(DF)}{(A_{Is})(RRF)(V_o)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 9, 5:

$$\text{Conc.} = \frac{(63.77)(12.5)(1)}{(105485)(0.642)} = 1.16 \mu\text{f}$$
[illegible]

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 6, 2017
Parameters: 1,4-Dioxane
Validation Level: Stage 2B & 4
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-90987-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW13-20161114	280-90987-4	Water	11/14/16
OUA1-MW37-20161114	280-90987-5	Water	11/14/16
OUA1-MW37A-20161114	280-90987-6	Water	11/14/16
OUA1-HS03-20161114	280-90987-7	Water	11/14/16
OUA1-MW19-20161114	280-90987-8	Water	11/14/16
OUA1-MW18-20161114**	280-90987-9**	Water	11/14/16
OUA1-MW08-20161114	280-90987-10	Water	11/14/16
OUA1-MW06-20161114	280-90987-11	Water	11/14/16
OUA1-HS03-20161114MS	280-90987-7MS	Water	11/14/16
OUA1-HS03-20161114MSD	280-90987-7MSD	Water	11/14/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

1,4-Dioxane by Environmental Protection Agency (EPA) SW 846 Method 8270C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0%.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0%.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample EB01-20161114 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 was identified as a source blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were not within the QC limits for OUA1-HS03-20161114MS/MSD. No data were qualified since the parent sample results were greater than 4X the spiked concentration. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples OUA1-MW37-20161114 and OUA1-MW37A-20161114 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	OUA1-MW37-20161114	OUA1-MW37A-20161114				
1,4-Dioxane	5.6	5.7	2 (≤20)	-	-	-

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

MCAS Yuma

1,4-Dioxane - Data Qualification Summary - SDG 280-90987-1

No Sample Data Qualified in this SDG

MCAS Yuma

1,4-Dioxane - Laboratory Blank Data Qualification Summary - SDG 280-90987-1

No Sample Data Qualified in this SDG

MCAS Yuma

1,4-Dioxane - Field Blank Data Qualification Summary - SDG 280-90987-1

No Sample Data Qualified in this SDG

LDC #: 37797A2b

VALIDATION COMPLETENESS WORKSHEET

SDG #: 280-90987-1

Stage 2B/4

Laboratory: Test America, Inc.

Date: 11/16/16

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	RSO ≤ 15% . ICV ≤ 20%
IV.	Continuing calibration /ending	A	ECV ≤ 20/50%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	SB=1. ZB=2.
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	W	11/12 - 70% out > 4x.
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	W	D=4+5
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

SB=Source blank
OTHER:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	SB01-20161114	280-90987-1	Water	11/14/16
2	EB01-20161114	280-90987-2	Water	11/14/16
3	OUA1-MW13-20161114	280-90987-4	Water	11/14/16
4	OUA1-MW37-20161114	280-90987-5	Water	11/14/16
5	OUA1-MW37A-20161114	280-90987-6	Water	11/14/16
6	OUA1-HS03-20161114	280-90987-7	Water	11/14/16
7	OUA1-MW19-20161114	280-90987-8	Water	11/14/16
8	OUA1-MW18-20161114**	280-90987-9**	Water	11/14/16
9	OUA1-MW08-20161114	280-90987-10	Water	11/14/16
10	OUA1-MW06-20161114	280-90987-11	Water	11/14/16
11	OUA1-HS03-20161114MS	280-90987-7MS	Water	11/14/16
12	OUA1-HS03-20161114MSD	280-90987-7MSD	Water	11/14/16
13				

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	☒	☐	☐	
Was cooler temperature criteria met?	☒	☐	☐	
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	☒	☐	☐	
Were all samples analyzed within the 12 hour clock criteria?	☒	☐	☐	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	☒	☐	☐	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	☐	☐	☒	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of > 0.990 ?	☐	☐	☒	
Were all percent relative standard deviations (%RSD) $\leq 30\%/15\%$ and relative response factors (RRF) > 0.05 ?	☒	☐	☐	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each ICAL for each instrument?	☒	☐	☐	
Were all percent difference (%D) $\leq 20\%$ or percent recoveries (%R) 80-120%?	☒	☐	☐	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	☒	☐	☐	
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	☐	☐	☒	
Were all percent differences (%D) $\leq 20\%$ and relative response factors (RRF) > 0.05 ?	☒	☐	☐	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	☒	☐	☐	
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	☒	☐	☐	
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.	☐	☒	☐	
VI. Field blanks				
Were field blanks identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field blanks?	☐	☒	☐	
VII. Surrogate spikes				
Were all surrogate %R within QC limits?	☒	☐	☐	
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	☐	☐	☒	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?	☐	☐	☒	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	☒	☐	☐	
Was a MS/MSD analyzed every 20 samples of each matrix?	☒	☐	☐	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	☐	☒	☐	
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	☒	☐	☐	
Was an LCS analyzed per analytical batch?	☒	☐	☐	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	☒	☐	☐	
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field duplicates?	☒	☐	☐	
XI. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	☒	☐	☐	
Were retention times within ± 30 seconds of the associated calibration standard?	☒	☐	☐	
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	☒	☐	☐	
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	☒	☐	☐	
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	☒	☐	☐	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	☒	☐	☐	
Were chromatogram peaks verified and accounted for?	☒	☐	☐	
XIV. System performance				
System performance was found to be acceptable.	☒	☐	☐	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	☒	☐	☐	

LDC#: 37797A-2b

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GCMS svoa (EPA SW 846 Method 8270C)

Compound	Concentration (ug/L)		(≤20) RPD	Difference	Limits	Qual
	4	5				
1,4-Dioxane	5.6	5.7	2			

V:\FIELD DUPLICATES\37797A2b.wpd

VALIDATION FINDINGS WORKSHEET **Initial Calibration Calculation Verification**

METHOD: GC/MS SVOC (EPA SW 846 Method 8270C)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$$RRF = (A_x)(C_{is}) / (A_{is})(C_x)$$

average RRF = sum of the RRFs/number of standards

$$\%RSD = 100 * (S/X)$$

A_x = Area of compound,

C_x = Concentration of compound,

S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (5000 std)	RRF (5000 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
1	ICAL	10/14/16	1,4-Dioxane (1st internal standard)	0.5594	0.5594	0.5511	0.5511	3.6	3.6
	(SMS_G4)		1,2,4-Trichlorobenzene (2nd internal standard)						
			2,6-Dinitrotoluene (3rd internal standard)						
			Hexachlorobenzene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
2			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Phenanthrene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Phenanthrene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Continuing Calibration Results Verification**

Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: JNB

METHOD: GC/MS SVOC (EPA SW 846 Method 8270C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = $100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$

$\text{RRF} = (A_x)(C_{is}) / (A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

A_x = Area of compound,

C_x = Concentration of compound,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported	Recalculated	Reported	Recalculated
					RRF (CC)	RRF (CC)	%D	%D
1	G4_3626	11/25/16	1,4-Dioxane (1st internal standard)	0.5511	0.5008	0.5008	9.1	9.1
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
2			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37797**VALIDATION FINDINGS WORKSHEET**
Surrogate Results VerificationPage: 1 of 1Reviewer: 92nd reviewer: JG**METHOD:** GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: $SF/SS \times 100$ Where: SF = Surrogate Found
SS = Surrogate SpikedSample ID: 8

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl	2500.0	1936.7	77	77	0
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

VALIDATION FINDINGS WORKSHEET **Matrix Spike/Matrix Spike Duplicates Results Verification**

METHOD: GC/MS PAH (EPA SW 846 Method 8270C)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 * (SSC - SC) / SA$

Where: SSC = Spiked sample concentration
 SA = Spike added

SC = Sample concentration

RPD = $|MSC - MSC1| * 2 / (MSC + MSC1)$

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD samples: 11/12

Compound	Spike Added (<i>MS</i>)		Sample Concentration (<i>MS</i>)	Spiked Sample Concentration (<i>MS</i>)		Matrix Spike		Matrix Spike Duplicate		MS/MSD	
	MS	MSD		MS	MSD	Percent Recovery		Percent Recovery		RPD	
			Reported			Recalc	Reported	Recalc	Reported	Recalculated	
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene											
Pentachlorophenol											
Pyrene											
1,4-Dioxane	9.8	10.0	68	74.8	63.6	66	69	-46	-44	16	16

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Laboratory Control Sample/Laboratory Control Sample Duplicates Results VerificationReviewer: CP2nd Reviewer: JR**METHOD:** GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA)

Where: SSC = Spike concentration
SA = Spike added

RPD = $|LCSC - LCSDC| * 2 / (LCSC + LCSDC)$

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: 280-752338

Compound	Spike Added (<u>10.0</u>)		Spike Concentration (<u>6.44</u>)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene										
Pentachlorophenol										
Pyrene										
<u>1,4-Dioxane</u>	<u>10.0</u>	<u>NA</u>	<u>6.44</u>	<u>NA</u>	<u>64</u>	<u>64</u>				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

METHOD: GC/MS SVOA (EPA SW 846 Method 8270C)

Y N N/A

Were all reported results recalculated and verified for all level IV samples?

Y	N	N/A

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 8, 1,4-Dioxane

$$\text{Conc.} = \frac{(1.799 \times 1000) \times 2000 \times 1}{201731 \times 0.551 \times 1 \times 10128 \times 1000}$$

[illegible]

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 5, 2017
Parameters: Wet Chemistry
Validation Level: Stage 2B & 4
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-90987-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW37-20161114	280-90987-5	Water	11/14/16
OUA1-MW37A-20161114	280-90987-6	Water	11/14/16
OUA1-HS03-20161114	280-90987-7	Water	11/14/16
OUA1-MW19-20161114	280-90987-8	Water	11/14/16
OUA1-MW18-20161114**	280-90987-9**	Water	11/14/16
OUA1-MW08-20161114	280-90987-10	Water	11/14/16
OUA1-MW06-20161114	280-90987-11	Water	11/14/16
OUA1-HS03-20161114MS	280-90987-7MS	Water	11/14/16
OUA1-HS03-20161114MSD	280-90987-7MSD	Water	11/14/16
OUA1-HS03-20161114DUP	280-90987-7DUP	Water	11/14/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Chloride, Nitrate as Nitrogen, and Sulfate by Environmental Protection Agency (EPA) SW 846 Method 9056

Ferrous Iron by Standard Method 3500 FE D

pH by EPA SW 846 Method 9040C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detect at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UU (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
OUA1-MW37-20161114	pH	52.98 hours	48 hours	J (all detects)	P
OUA1-HS03-20161114	pH	52.05 hours	48 hours	J (all detects)	P
OUA1-MW18-20161114**	pH	50.38 hours	48 hours	J (all detects)	P
OUA1-MW08-20161114	pH	49.48 hours	48 hours	J (all detects)	P
OUA1-MW06-20161114	pH	48.48 hours	48 hours	J (all detects)	P
OUA1-MW37-20161114	Ferrous iron	78.43 hours	48 hours	UJ (all non-detects)	P
OUA1-MW37A-20161114	Ferrous iron	78.35 hours	48 hours	UJ (all non-detects)	P
OUA1-HS03-20161114	Ferrous iron	77.43 hours	48 hours	UJ (all non-detects)	P
OUA1-MW18-20161114**	Ferrous iron	75.68 hours	48 hours	UJ (all non-detects)	P
OUA1-MW08-20161114	Ferrous iron	74.68 hours	48 hours	UJ (all non-detects)	P
OUA1-MW06-20161114	Ferrous iron	73.60 hours	48 hours	UJ (all non-detects)	P

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

Sample EB01-20161114 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 was identified as a source blank. No contaminants were found.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicates

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples OUA1-MW37-20161114 and OUA1-MW37A-20161114 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD (Limits)	Flag	A or P
	OUA1-MW37-20161114	OUA1-MW37A-20161114			
Chloride	630	630	0 (≤20)	-	-
Nitrate as N	6.3	6.3	0 (≤20)	-	-
Sulfate	1500	1500	0 (≤20)	-	-

X. Sample Result Verification

All sample result verifications were acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to technical holding time, data were qualified as estimated in six samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**Wet Chemistry - Data Qualification Summary - SDG 280-90987-1**

Sample	Analyte	Flag	A or P	Reason
OUA1-MW37-20161114 OUA1-HS03-20161114 OUA1-MW18-20161114** OUA1-MW08-20161114 OUA1-MW06-20161114	pH	J (all detects)	P	Technical holding times
OUA1-MW37-20161114 OUA1-MW37A-20161114 OUA1-HS03-20161114 OUA1-MW18-20161114** OUA1-MW08-20161114 OUA1-MW06-20161114	Ferrous iron	UJ (all non-detects)	P	Technical holding times

MCAS Yuma**Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 280-90987-1**

No Sample Data Qualified in this SDG

MCAS Yuma**Wet Chemistry - Field Blank Data Qualification Summary - SDG 280-90987-1**

No Sample Data Qualified in this SDG

LDC #: 37797A6
SDG #: 280-90987-1
Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET Stage 2B/4

Date: 1/3/17
Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: (Analyte) Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Ferrous Iron (3500-FE D) pH, (EPA SW846 Method 9040C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A SW	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	ND	SB=1 EB=2
VI.	Matrix Spike/Matrix Spike Duplicates	A	
VII.	Duplicate sample analysis	A	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	(3,4)
X.	Sample result verification	A	Not reviewed for Stage 2B validation.
XI.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	SB01-20161114	280-90987-1	Water	11/14/16
2	EB01-20161114	280-90987-2	Water	11/14/16
3	OUA1-MW37-20161114	280-90987-5	Water	11/14/16
4	OUA1-MW37A-20161114	280-90987-6	Water	11/14/16
5	OUA1-HS03-20161114	280-90987-7	Water	11/14/16
6	OUA1-MW19-20161114	280-90987-8	Water	11/14/16
7	OUA1-MW18-20161114**	280-90987-9**	Water	11/14/16
8	OUA1-MW08-20161114	280-90987-10	Water	11/14/16
9	OUA1-MW06-20161114	280-90987-11	Water	11/14/16
10	OUA1-HS03-20161114MS	280-90987-7MS	Water	11/14/16
11	OUA1-HS03-20161114MSD	280-90987-7MSD	Water	11/14/16
12	OUA1-HS03-20161114DUP	280-90987-7DUP	Water	11/14/16
13				
14				
15				
16				

Notes:

377C7A6

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2

Reviewer: CR

2nd Reviewer: CR

Method: Inorganics (EPA Method *See cover*)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	☒	☒	☐	
II. Calibration				
Were all instruments calibrated daily, each set-up time?	☒	☐	☐	
Were the proper number of standards used?	☒	☐	☐	
Were all initial calibration correlation coefficients ≥ 0.995 ?	☒	☐	☐	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	☒	☐	☐	
Were titrant checks performed as required? (Level IV only)	☐	☐	☒	
Were balance checks performed as required? (Level IV only)	☐	☐	☒	
III. Blanks				
Was a method blank associated with every sample in this SDG?	☒	☐	☐	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	☐	☒	☐	
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	☒	☐	☐	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	☒	☐	☐	
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq 20\%$ for waters and $\leq 35\%$ for soil samples? A control limit of $\leq \text{CRDL}$ ($\leq 2\text{X CRDL}$ for soil) was used for samples that were $\leq 5\text{X}$ the CRDL, including when only one of the duplicate sample values were $\leq 5\text{X}$ the CRDL.	☒	☐	☐	
V. Laboratory control samples				
Was an LCS analyzed for this SDG?	☒	☐	☐	
Was an LCS analyzed per extraction batch?	☒	☐	☐	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	☒	☐	☐	
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?	☐	☒	☒	
Were the performance evaluation (PE) samples within the acceptance limits?	☐	☐	☒	

LDC #: 37797A6

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: [Signature]
2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
Were detection limits < RL?	/			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	/			
Target analytes were detected in the field duplicates.	/			
X. Field blanks				
Field blanks were identified in this SDG.	/			
Target analytes were detected in the field blanks.		/		

VALIDATION FINDINGS WORKSHEET

Sample Specific Analysis Reference

All circled methods are applicable to each sample.

[illegible]

Comments: _____

VALIDATION FINDINGS WORKSHEET

Technical Holding Times

All circled dates have exceeded the technical holding time.

Y N N/A Were all samples preserved as applicable to each method ?

Y N N/A Were all cooler temperatures within validation criteria?

Method:		9040C			SM8500-FE-D		
Parameters:		pH			Ferrus Iron		
Technical holding time:		48 hrs			48 hrs		
Sample ID	Sampling date	Analysis date	Total Time (hrs)	Qualifier	Analysis date	Total Time (hrs)	Qualifier
3	11/14/16 09:00	11/16/16 13:59	52.98	J/UT/P(Act)			
5	10:00	14:03	52.05	↓			
7	11:45	14:08	50.38				
8	12:45	14:14	49.48				
9	13:50	14:19	48.48				
3	11/14/16 09:00	11/17/16 16:26			11/17/16 16:26	78.43	J/UT/P(No)
4	09:05	↓				78.35	↓
5, 10, 11, 12	10:00				77.43		
7	11:45				75.68		
8	12:45				74.68		
9	13:50				73.60		

LDC#: 37797A6**VALIDATION FINDINGS WORKSHEET****Field Duplicates**Page: 1 of 1Reviewer: [Signature]2nd Reviewer: [Signature]Inorganics, Method See Cover

Analyte	Concentration (mg/L)		RPD (≤ 20)	Qualification (Parent only)
	3	4		
Chloride	630	630	0	
Nitrate as N	6.3	6.3	0	
Sulfate	1500	1500	0	

\\LDCFILESERVER\Validation\FIELD DUPLICATES\FD_inorganic\37797A6.wpd

LDC #: 379746

Validation Findings Worksheet **Initial and Continuing Calibration Calculation Verification**

Page: 1 of 1
 Reviewer: ag
 2nd Reviewer: g

Method: Inorganics, Method See CoverThe correlation coefficient (r) for the calibration of Fe II was recalculated. Calibration date: 11/15/16

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where,

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/L)	Area	Recalculated	Reported	Acceptable (Y/N)
					r or r ²	r or r ²	
Initial calibration	Ferrous Iron	s1	0.0	0.002	0.9990	0.9990	Y
		s2	0.2	0.046			
		s3	0.5	0.103			
		s4	1	0.221			
		s5	2	0.432			
		s6	3	0.609			
Calibration verification	NO ₃ -N	CCV	4.00	<u>Found</u> 3.97	99	99	J
Calibration verification	SO ₄	CCV	100	100.8	101	101	
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3777A6**VALIDATION FINDINGS WORKSHEET**
Level IV Recalculation WorksheetPage: 1 of 1
Reviewer: CR
2nd Reviewer: Q**METHOD:** Inorganics, Method see over

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R / RPD	%R / RPD	
LCS	Laboratory control sample	NO ₃ N	5.05	5	101	101	Y
10	Matrix spike sample	Fe ⁺⁺	(SSR-SR) 1.69	2.00	85	85	
12	Duplicate sample	Cl	434	427	1	1	

Comments: _____

LDC #:

Sample Calculation Verification

Page: 1 of 1

Reviewer: OR

2nd reviewer: _____

METHOD: Inorganics, Method see cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?

Y) N N/A Are results within the calibrated range of the instruments?

☒ N N/A Are all detection limits below the CRQL?

Compound (analyte) results for SED reported with a positive detect were recalculated and verified using the following equation:

Concentration =

Recalculation:

$$C_8 = 12272020x + 577503$$

$$\frac{381594601 - 577503}{12272020} \times 50 = 155 \text{ mg/L}$$

[illegible]

Note: _____

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma

LDC Report Date: January 4, 2017

Parameters: Volatiles

Validation Level: Stage 2B & 4

Laboratory: TestAmerica, Inc.

Sample Delivery Group (SDG): 280-91067-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW14-20161115**	280-91067-3**	Water	11/15/16
OUA1-MW15-20161115	280-91067-4	Water	11/15/16
OUA1-MW07-20161115	280-91067-5	Water	11/15/16
OUA1-MW23-20161115	280-91067-6	Water	11/15/16
OUA1-MW55-20161115	280-91067-7	Water	11/15/16
OUA1-MW55A-20161115	280-91067-8	Water	11/15/16
OUA1-MW27-20161115	280-91067-9	Water	11/15/16
OUA1-MW25-20161115	280-91067-10	Water	11/15/16
OUA1-MW11-20161115	280-91067-11	Water	11/15/16
OUA1-MW11-20161115RE	280-91067-11RE	Water	11/15/16
OUA1-MW14-20161115MS	280-91067-3MS	Water	11/15/16
OUA1-MW14-20161115MSD	280-91067-3MSD	Water	11/15/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260B

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detect): The compound or analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detect at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met with the following exceptions:

Sample	Compound	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
OUA1-MW11-20161115RE	All compounds	27	14	J (all detects) UJ (all non-detects)	A

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 15.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB02-20161115 was identified as a trip blank. No contaminants were found.

Sample EB02-20161115 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 (from SDG 280-90987-1) was identified as a source blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
OUA1-MW23-20161115	1,2-Dichloroethane-d4 Dibromofluoromethane	123 (81-118) 121 (80-119)	All compounds	NA	-
OUA1-MW55-20161115	1,2-Dichloroethane-d4	125 (81-118)	All compounds	NA	-
OUA1-MW55A-20161115	1,2-Dichloroethane-d4	124 (81-118)	All compounds	NA	-
OUA1-MW27-20161115	1,2-Dichloroethane-d4	121 (81-118)	All compounds	J (all detects)	P
OUA1-MW25-20161115	1,2-Dichloroethane-d4	125 (81-118)	All compounds	J (all detects)	P
OUA1-MW11-20161115	1,2-Dichloroethane-d4 Bromofluorobenzene	123 (81-118) 117 (85-114)	All compounds	J (all detects)	A

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
OUA1-MW14-20161115MS/MSD (OUA1-MW14-20161115**)	Trichloroethene	136 (79-123)	141 (79-123)	J (all detects)	A

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
OUA1-MW14-20161115MS/MSD (OUA1-MW14-20161115**)	cis-1,2-Dichloroethene	-	127 (78-123)	NA	-

Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

Samples OUA1-MW55-20161115 and OUA1-MW55A-20161115 were identified as field duplicates. No results were detected in any of the samples.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed unusable as follows:

Sample	Compound	Flag	A or P
OUA1-MW11-20161115RE	All compounds	R	A

Due to surrogate %R and MS/MSD %R, data were qualified as estimated in four samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma
Volatiles - Data Qualification Summary - SDG 280-91067-1

Sample	Compound	Flag	A or P	Reason
OUA1-MW25-20161115 OUA1-MW27-20161115	All compounds	J (all detects)	P	Surrogates (%R)
OUA1-MW11-20161115	All compounds	J (all detects)	A	Surrogates (%R)
OUA1-MW14-20161115**	Trichloroethene	J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
OUA1-MW11-20161115RE	All compounds	R	A	Overall assessment of data

MCAS Yuma
Volatiles - Laboratory Blank Data Qualification Summary - SDG 280-91067-1

No Sample Data Qualified in this SDG

MCAS Yuma
Volatiles - Field Blank Data Qualification Summary - SDG 280-91067-1

No Sample Data Qualified in this SDG

LDC #: 37797B1
SDG #: 280-91067-1
Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET Stage 2B/4

Date: 12/29/16
Page: 1 of 2
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, W	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A, A	$RSO \leq 15\% \cdot x^2$ $ICV \leq 20\%$
IV.	Continuing calibration / ending	A	$CCV \leq 20/50\%$
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	EB=1. TB=2. SB=SB01-20161114 (280-91067-1)
VII.	Surrogate spikes	W	
VIII.	Matrix spike/Matrix spike duplicates	W	
IX.	Laboratory control samples	A	LCs 10
X.	Field duplicates	ND	$\sigma = T + 8$
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	W	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	EB02-20161115	280-91067-1	Water	11/15/16
2	TB02-20161115	280-91067-2	Water	11/15/16
3	OUA1-MW14-20161115**	280-91067-3**	Water	11/15/16
4	OUA1-MW15-20161115	280-91067-4	Water	11/15/16
5	OUA1-MW07-20161115	280-91067-5	Water	11/15/16
6	OUA1-MW23-20161115	280-91067-6	Water	11/15/16
7	OUA1-MW55-20161115	280-91067-7	Water	11/15/16
8	OUA1-MW55A-20161115	280-91067-8	Water	11/15/16
9	OUA1-MW27-20161115	280-91067-9	Water	11/15/16
10	OUA1-MW25-20161115	280-91067-10	Water	11/15/16
11	OUA1-MW11-20161115	280-91067-11	Water	11/15/16
12	OUA1-MW11-20161115RE	280-91067-11RE	Water	11/15/16
13	OUA1-MW14-20161115MS	280-91067-3MS	Water	11/15/16

LDC #: 37797B1

VALIDATION COMPLETENESS WORKSHEET

SDG #: 280-91067-1

Stage 2B/4

Laboratory: Test America, Inc.

Date: 11/16/16

Page: 2 of 2

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

	Client ID	Lab ID	Matrix	Date
14	OUA1-MW14-20161115MSD	280-91067-3MSD	Water	11/15/16
15				
16				
17				
18				
19				

Notes:

VALIDATION FINDINGS CHECKLIST

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?		☒		
Was cooler temperature criteria met?	☒			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	☒			
Were all samples analyzed within the 12 hour clock criteria?	☒			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	☒			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	☒			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990 ?	☒			
Were all percent relative standard deviations (%RSD) $\leq 30\%/15\%$ and relative response factors (RRF) ≥ 0.05 ?	☒			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	☒			
Were all percent differences (%D) $\leq 20\%$ or percent recoveries (%R) 80-120%?	☒			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	☒			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	☒			
Were all percent differences (%D) $\leq 20\%$ and relative response factors (RRF) ≥ 0.05 ?	☒			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	☒			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	☒			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		☒		
VI. Field blanks				
Were field blanks were identified in this SDG?	☒			
Were target compounds detected in the field blanks?		☒		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?		☒		
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?		☒		

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	/			
Was a MS/MSD analyzed every 20 samples of each matrix?	/			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		/		
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	/			
Was an LCS analyzed per analytical batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	/			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	/			
Were target compounds detected in the field duplicates?		/		
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	/			
Were retention times within + 30 seconds of the associated calibration standard?	/			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
XIII. Target compound identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	/			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/			
Were chromatogram peaks verified and accounted for?	/			
XIV. System performance				
System performance was found to be acceptable.	/			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC. 1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl chloride	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachloroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform	EE. Ethylbenzene	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. Iodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO. 1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all surrogate %R within QC limits?

Y N N/A If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R out of outside of criteria?

[illegible]

(TOL) = Toluene-d8
(BFB) = Bromofluorobenzene

(DCE) = 1,2-Dichloroethane-d4
(DFM) = Dibromofluoromethane

METHOD : GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y ~~N~~ N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y	N	N/A	Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

[illegible]

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data**METHOD:** GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Compound	Finding	Qualifications
		<u>12</u>	<u>All</u>		<u>R/A</u>

Comments: _____

VALIDATION FINDINGS WORKSHEET **Initial Calibration Calculation Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$$RRF = (A_x)(C_{is}) / (A_{is})(C_x)$$

average RRF = sum of the RRFs/number of standards

$$\%RSD = 100 * (S/X)$$

A_x = Area of compound,

C_x = Concentration of compound,

S = Standard deviation of the RRFs

X = Mean of the RRFs

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (10 std)	RRF (10 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
1	ICAL (VMS_G)	11/23/16	S (1st internal standard)	0.3967	0.3967	0.3984	0.3984	4.1	4.1
			AA (2nd internal standard)	1.2500	1.2500	1.2786	1.2786	6.1	6.1
			(3rd internal standard)						
			(4th internal standard)						
2			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						
3			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						
4			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Continuing Calibration Results Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Difference} = 100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$$

$$\text{RRF} = (A_x)(C_{is}) / (A_{is})(C_x)$$

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

A_x = Area of compound,

C_x = Concentration of compound,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	G0848	11/28/16	S (1st internal standard)	0.3984	0.4098	0.4098	2.8	2.8
			AA (2nd internal standard)	1.2786	1.199	1.199	6.3	6.3
			(2nd internal standard)					
			(3rd internal standard)					
2			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					
3			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					
4			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Surrogate Results Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
 SS = Surrogate Spiked

Sample ID: 3

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	11.0	11.7	106	106	0
1,2-Dichloroethane-d4	↓	12.0	109	109	↓
Toluene-d8	↓	11.9	108	108	↓
Bromofluorobenzene	↓	11.2	102	102	↓

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

LDC #: 379B

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 * (SSC - SC) / SA$

Where: SSC = Spiked sample concentration
SA = Spike added

SC = Sample concentration

RPD = $|MSC - MSC| * 2 / (MSC + MSDC)$

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD sample: 1.3/1.4

Compound	Spike Added (1.4)		Sample Concentration (1.1)	Spiked Sample Concentration (1.4)		Matrix Spike		Matrix Spike Duplicate		MS/MSD	
						Percent Recovery		Percent Recovery		RPD	
	MS	MSD		-----	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported
1,1-Dichloroethene	5.00	5.00	1.1	7.32	7.52	124	124	128	128	3	3
Trichloroethene	↓	↓	1.4	8.22	8.46	136	136	141	141	3	3
Benzene											
Toluene											
Chlorobenzene											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3190B

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: Q
2nd Reviewer: JR

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 * SSC/SA$

Where: SSC = Spiked sample concentration
SA = Spike added

RPD = $|LCSC - LCSDC| * 2 / (LCSC + LCSDC)$

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: 280-353386

Compound	Spike Added (<u>1 µg</u>)		Spiked Sample Concentration (<u>1 µg</u>)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	<u>5.00</u>	<u>5.00</u>	<u>5.21</u>	<u>5.28</u>	<u>104</u>	<u>104</u>	<u>106</u>	<u>106</u>	<u>1</u>	<u>1</u>
Trichloroethene	<u>↓</u>	<u>↓</u>	<u>5.48</u>	<u>5.86</u>	<u>110</u>	<u>110</u>	<u>117</u>	<u>117</u>	<u>7</u>	<u>7</u>
Benzene										
Toluene										
Chlorobenzene										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

1Y N N/A Were all reported results recalculated and verified for all level IV samples?

Y/ N	N/A	Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_v)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 3, 5

$$\text{Conc.} = \frac{(32217)(12.5)(1)}{(71057)(0.3784)() ()}$$

$$= 1.42 \text{ } \mu\text{g/L}$$
[illegible]

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 4, 2017
Parameters: 1,4-Dioxane
Validation Level: Stage 2B & 4
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-91067-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW14-20161115**	280-91067-3**	Water	11/15/16
OUA1-MW15-20161115	280-91067-4	Water	11/15/16
OUA1-MW07-20161115	280-91067-5	Water	11/15/16
OUA1-MW23-20161115	280-91067-6	Water	11/15/16
OUA1-MW55-20161115	280-91067-7	Water	11/15/16
OUA1-MW55A-20161115	280-91067-8	Water	11/15/16
OUA1-MW27-20161115	280-91067-9	Water	11/15/16
OUA1-MW25-20161115	280-91067-10	Water	11/15/16
OUA1-MW11-20161115	280-91067-11	Water	11/15/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

1,4-Dioxane by Environmental Protection Agency (EPA) SW 846 Method 8270C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0%.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0%.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample EB02-20161115 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 (from SDG 280-90987-1) was identified as a source blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples OUA1-MW55-20161115 and OUA1-MW55A-20161115 were identified as field duplicates. No results were detected in any of the samples.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

MCAS Yuma

1,4-Dioxane - Data Qualification Summary - SDG 280-91067-1

No Sample Data Qualified in this SDG

MCAS Yuma

1,4-Dioxane - Laboratory Blank Data Qualification Summary - SDG 280-91067-1

No Sample Data Qualified in this SDG

MCAS Yuma

1,4-Dioxane - Field Blank Data Qualification Summary - SDG 280-91067-1

No Sample Data Qualified in this SDG

LDC #: 37797B2b

VALIDATION COMPLETENESS WORKSHEET

SDG #: 280-91067-1

Stage 2B/4

Laboratory: Test America, Inc.

Date: 12/9/16

Page: 1 of 1

Reviewer: JSG

2nd Reviewer: JSG

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	RSO ≤ 1570, 1 CV ≤ 20%
IV.	Continuing calibration <i>Endic</i>	A	CCV ≤ 20/50%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	ZB = 1, SB = SB01-20161114 (280-90987-1)
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	"A"
IX.	Laboratory control samples	A	ACS
X.	Field duplicates	ND	D = 6+7
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

SB = Source blank
OTHER:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	EB02-20161115	280-91067-1	Water	11/15/16
2	OUA1-MW14-20161115**	280-91067-3**	Water	11/15/16
3	OUA1-MW15-20161115	280-91067-4	Water	11/15/16
4	OUA1-MW07-20161115	280-91067-5	Water	11/15/16
5	OUA1-MW23-20161115	280-91067-6	Water	11/15/16
6	OUA1-MW55-20161115	280-91067-7	Water	11/15/16
7	OUA1-MW55A-20161115	280-91067-8	Water	11/15/16
8	OUA1-MW27-20161115	280-91067-9	Water	11/15/16
9	OUA1-MW25-20161115	280-91067-10	Water	11/15/16
10	OUA1-MW11-20161115	280-91067-11	Water	11/15/16
11				
12				
13				

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	☒	☐	☐	
Was cooler temperature criteria met?	☒	☐	☐	
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	☒	☐	☐	
Were all samples analyzed within the 12 hour clock criteria?	☒	☐	☐	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	☒	☐	☐	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	☐	☐	☒	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990 ?	☐	☐	☒	
Were all percent relative standard deviations (%RSD) $\leq 30\%/15\%$ and relative response factors (RRF) > 0.05 ?	☒	☐	☐	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each ICAL for each instrument?	☒	☐	☐	
Were all percent difference (%D) $\leq 20\%$ or percent recoveries (%R) 80-120%?	☒	☐	☐	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	☒	☐	☐	
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	☒	☐	☐	
Were all percent differences (%D) $\leq 20\%$ and relative response factors (RRF) > 0.05 ?	☒	☐	☐	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	☒	☐	☐	
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	☒	☐	☐	
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.	☐	☒	☐	
VI. Field blanks				
Were field blanks identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field blanks?	☐	☒	☐	
VII. Surrogate spikes				
Were all surrogate %R within QC limits?	☒	☐	☐	
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	☐	☐	☒	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?	☐	☐	☒	

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	☒	☐	☐	
Was a MS/MSD analyzed every 20 samples of each matrix?	☒	☐	☐	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	☒	☐	☐	
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	☒	☐	☐	
Was an LCS analyzed per analytical batch?	☒	☐	☐	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	☒	☐	☐	
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field duplicates?	☐	☒	☐	
XI. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	☒	☐	☐	
Were retention times within + 30 seconds of the associated calibration standard?	☒	☐	☐	
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	☒	☐	☐	
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	☒	☐	☐	
XIII. Target compound identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	☒	☐	☐	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	☒	☐	☐	
Were chromatogram peaks verified and accounted for?	☒	☐	☐	
XIV. System performance				
System performance was found to be acceptable.	☒	☐	☐	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	☒	☐	☐	

VALIDATION FINDINGS WORKSHEET **Initial Calibration Calculation Verification**

Page: 1 of 1
 Reviewer: Q
 2nd Reviewer: DR

METHOD: GC/MS SVOC (EPA SW 846 Method 8270C)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$$RRF = (A_x)(C_{is}) / (A_{is})(C_x)$$

average RRF = sum of the RRFs/number of standards

$$\%RSD = 100 * (S/X)$$

A_x = Area of compound,

C_x = Concentration of compound,

S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (5000 std)	RRF (5000 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
1	ICAL	10/14/16	1,4-Dioxane (1st internal standard)	0.5594	0.5594	0.5511	0.5511	3.6	3.6
	(SMS_G4)		1,2,4-Trichlorobenzene (2nd internal standard)						
			2,6-Dinitrotoluene (3rd internal standard)						
			Hexachlorobenzene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
2			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Phenanthrene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Phenanthrene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Continuing Calibration Results Verification**

Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: [Signature]

METHOD: GC/MS SVOC (EPA SW 846 Method 8270C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Difference} = 100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$$

$$\text{RRF} = (A_x)(C_{is}) / (A_{is})(C_x)$$

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

A_x = Area of compound,

C_x = Concentration of compound,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported	Recalculated	Reported	Recalculated
					RRF (CC)	RRF (CC)	%D	%D
1	G4_3626	11/25/16	1,4-Dioxane (1st internal standard)	0.5511	0.5008	0.5008	9.1	9.1
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
2			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3174TB-6**VALIDATION FINDINGS WORKSHEET**
Surrogate Results VerificationPage: 1 of 1Reviewer: Q2nd reviewer: NR**METHOD:** GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: $SF/SS * 100$ Where: SF = Surrogate Found
SS = Surrogate Spiked**Sample ID:** 2

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl	2500.0	1816.1	73	73	0
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Laboratory Control Sample/Laboratory Control Sample Duplicates Results VerificationReviewer: Q2nd Reviewer: JB**METHOD:** GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Recovery} = 100 * (\text{SC}/\text{SA})$$

Where: SSC = Spike concentration
SA = Spike added

$$\text{RPD} = | \text{LCSC} - \text{LCSDC} | * 2 / (\text{LCSC} + \text{LCSDC})$$

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: 280-352338

Compound	Spike Added (<u>NA</u>)		Spike Concentration (<u>NA</u>)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene										
Pentachlorophenol										
Pyrene										
<u>1,4-Dioxane</u>	<u>10.0</u>	<u>NA</u>	<u>6.44</u>	<u>NA</u>	<u>64</u>	<u>64</u>				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1

Reviewer:

2nd reviewer: 12/20

METHOD: GC/MS SVOA (EPA SW 846 Method 8270C)

Y	N	N/A
Y	N	N/A

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_s)(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

$$I_s = \text{Amount of internal standard added in nanograms (ng)}$$

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_1 = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 2, 1,4-Dioxane

$$\text{Conc.} = \frac{(59822 \times 1000)^0 \times 2 \times 1}{(22874 \times 0.551) \times 1 \times (0.17.1) \times 1}$$

$$= 3.73 \text{ mg}$$

[illegible]

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 5, 2017
Parameters: Wet Chemistry
Validation Level: Stage 2B & 4
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-91067-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW14-20161115**	280-91067-3**	Water	11/15/16
OUA1-MW07-20161115	280-91067-5	Water	11/15/16
OUA1-MW55-20161115	280-91067-7	Water	11/15/16
OUA1-MW55A-20161115	280-91067-8	Water	11/15/16
OUA1-MW27-20161115	280-91067-9	Water	11/15/16
OUA1-MW14-20161115DUP	280-91067-3DUP	Water	11/15/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Chloride, Nitrate as Nitrogen, and Sulfate by Environmental Protection Agency (EPA) SW 846 Method 9056

Ferrous Iron by Standard Method 3500 FE D

pH by EPA SW 846 Method 9040C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detect at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
OUA1-MW14-20161115**	pH	6 days	48 hours	J (all detects)	P
OUA1-MW07-20161115	pH	6 days	48 hours	J (all detects)	P
OUA1-MW55-20161115	pH	6 days	48 hours	J (all detects)	P
OUA1-MW27-20161115	pH	6 days	48 hours	J (all detects)	P
OUA1-MW14-20161115**	Ferrous iron	55.10 hours	48 hours	UJ (all non-detects)	P
OUA1-MW07-20161115	Ferrous iron	54.60 hours	48 hours	UJ (all non-detects)	P
OUA1-MW55-20161115	Ferrous iron	52.93 hours	48 hours	UJ (all non-detects)	P
OUA1-MW55A-20161115	Ferrous iron	52.77 hours	48 hours	UJ (all non-detects)	P
OUA1-MW27-20161115	Ferrous iron	51.27 hours	48 hours	UJ (all non-detects)	P

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Chloride Sulfate	0.391 mg/L 0.439 mg/L	All samples in SDG 280-91067-1

Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Chloride Nitrate as N Sulfate	0.424 mg/L 0.109 mg/L 0.483 mg/L	All samples in SDG 280-91067-1

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks.

V. Field Blanks

Sample EB02-20161115 was identified as an equipment blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Analyte	Concentration	Associated Samples
EB02-20161115	11/15/16	Chloride Sulfate	0.39 mg/L 0.43 mg/L	All samples in SDG 280-91067-1

Sample SB01-20161114 (from SDG 280-90987-1) was identified as a source blank. No contaminants were found.

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicates

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples OUA1-MW55-20161115 and OUA1-MW55A-20161115 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/L)		RPD (Limits)	Flag	A or P
	OUA1-MW55-20161115	OUA1-MW55A-20161115			
Chloride	520	520	0 (≤ 20)	-	-
Sulfate	120	120	0 (≤ 20)	-	-

X. Sample Result Verification

All sample result verifications were acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to technical holding time, data were qualified as estimated in five samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**Wet Chemistry - Data Qualification Summary - SDG 280-91067-1**

Sample	Analyte	Flag	A or P	Reason
OUA1-MW14-20161115** OUA1-MW07-20161115 OUA1-MW55-20161115 OUA1-MW27-20161115	pH	J (all detects)	P	Technical holding times
OUA1-MW14-20161115** OUA1-MW07-20161115 OUA1-MW55-20161115 OUA1-MW55A-20161115 OUA1-MW27-20161115	Ferrous iron	UJ (all non-detects)	P	Technical holding times

MCAS Yuma**Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 280-91067-1**

No Sample Data Qualified in this SDG

MCAS Yuma**Wet Chemistry - Field Blank Data Qualification Summary - SDG 280-91067-1**

No Sample Data Qualified in this SDG

LDC #: 37797B6
 SDG #: 280-91067-1
 Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET Stage 2B/4

Date: 1/3/17
 Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: [Signature]

METHOD: (Analyte) Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Ferrous Iron (3500-FE D) pH, (EPA SW846 Method 9040C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, SW	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	ASW	
V.	Field blanks	SW	CB=1 SB=SB01-20161114 (280-90987-1) ^{506:}
VI.	Matrix Spike/Matrix Spike Duplicates	N CS	
VII.	Duplicate sample analysis	A	
VIII.	Laboratory control samples	A	LC5/10
IX.	Field duplicates	SW	(45)
X.	Sample result verification	A	Not reviewed for Stage 2B validation.
XI.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
 N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
 SW = See worksheet FB = Field blank EB = Equipment blank

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	EB02-20161115	280-91067-1	Water	11/15/16
2	OUA1-MW14-20161115**	280-91067-3**	Water	11/15/16
3	OUA1-MW07-20161115	280-91067-5	Water	11/15/16
4	OUA1-MW55-20161115	280-91067-7	Water	11/15/16
5	OUA1-MW55A-20161115	280-91067-8	Water	11/15/16
6	OUA1-MW27-20161115	280-91067-9	Water	11/15/16
7	OUA1-MW14-20161115DUP	280-91067-3DUP	Water	11/15/16
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

VALIDATION FINDINGS CHECKLIST

Method: Inorganics (EPA Method *See cover*)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.		✓		
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995 ?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			✓	
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq 20\%$ for waters and $\leq 35\%$ for soil samples? A control limit of $\leq \text{CRDL}$ ($\leq 2\text{X CRDL}$ for soil) was used for samples that were $\leq 5\text{X}$ the CRDL, including when only one of the duplicate sample values were $\leq 5\text{X}$ the CRDL.	✓			
V. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓	✓	
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 37797B6

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: [Signature]
2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	☒	☐	☐	
Were detection limits < RL?	☒	☐	☐	
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	☒	☐	☐	
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	☒	☐	☐	
Target analytes were detected in the field duplicates.	☒	☐	☐	
X. Field blanks				
Field blanks were identified in this SDG.	☒	☐	☐	
Target analytes were detected in the field blanks.	☒	☐	☐	

VALIDATION FINDINGS WORKSHEET

Sample Specific Analysis Reference

All circled methods are applicable to each sample.

[illegible]

Comments: _____

Y	N	N/A	Were all cooler temperatures within validation criteria?

Method:		9040C			SM 380FED		
Parameters:		pH			Ferrus Iron		
Technical holding time:		48hrs			48hrs		
Sample ID	Sampling date	Analysis date	Total Time	Qualifier	Analysis date	Total Time(hrs)	Qualifier
2,7	11/15/16 08:20	11/21/16 11:53	6 days	J/OJ/P (det)			
3	09:50	12:03	↓	↓			
4	11:30	12:08					
6	13:10	12:13	↓	↓			
2	11/15/16 08:20				11/17/16 16:26	56.10	J/OJ/P (mo)
3	09:50				↓	54.60	↓
4	11:30				↓	52.93	↓
5	11:40				↓	52.77	↓
6	13:10				↓	51.27	↓
						</	

VALIDATION FINDINGS WORKSHEET
Blanks

METHOD: Inorganics, Method See Cover

Conc. units: mg/L

Associated Samples: All

Analyte	Blank ID	Blank ID	Blank Action Limit										
	PB	ICB/CCB (mg/L)		No qual (>5x)									
Cl	0.391	0.424	2.12										
NO3-N		0.109	0.545										
SO4	0.439	0.483	2.415										

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

All contaminants within five times the method blank concentration were qualified as not detected, "U".

VALIDATION FINDINGS WORKSHEET
Field BlanksPage: 1 of 1
Reviewer: g
2nd Reviewer: g**METHOD:** Inorganics, EPA Method See Cover**Blank units:** mg/L **Associated sample units:** mg/L**Sampling date:** 11/15/16 **Soil factor applied:** NA**Field blank type:** (circle one) Field Blank / Rinsate / Other: _____ **Associated Samples:** All

Analyte	Blank ID	Action Limit	Sample Identification							
	EB02-20161115		No Qualifiers (≥5x)							
Chloride	0.39	1.95								
Sulfate	0.43	2.15								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

Samples with analyte concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC#: 37797B6

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

Inorganics, Method See Cover

Analyte	Concentration (mg/L)		RPD (≤ 20)	Qualification (Parent only)
	4	5		
Chloride	520	520	0	
Sulfate	120	120	0	

\\LDCFILESERVER\Validation\FIELD DUPLICATES\FD_inorganic\37797B6.wpd

LDC #: 3797B6

Validation Findings Worksheet **Initial and Continuing Calibration Calculation Verification**

Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: [Signature]

Method: Inorganics, Method See CoverThe correlation coefficient (r) for the calibration of NO₃⁻ was recalculated. Calibration date: 10/19/16

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where,

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
 True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/L)	Area	Recalculated	Reported	Acceptable (Y/N)
					r or r ²	r or r ²	
Initial calibration	NO ₃ ⁻	s1	0.2	1590920	1.000	0.998	Y
		s2	0.5	4076842			
		s3	1	8789224			
		s4	4	40800587			
		s5	8	87082615			
		s6	10	110756388			
Calibration verification	SO ₄	CCV	100	Found 101.5	102	102	Y
Calibration verification	Fe ^{II+}	CCV	1.00	108	108	108	
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3777B6**VALIDATION FINDINGS WORKSHEET**
Level IV Recalculation WorksheetPage: 1 of 1
Reviewer: CR
2nd Reviewer: g**METHOD:** Inorganics, Method see cal

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R / RPD	%R / RPD	
LCS	Laboratory control sample	Fe ^{II}	2.07	2.00	104	104	Y
N	Matrix spike sample		(SSR-SR)				
7	Duplicate sample	pH	7.82 7.79	7.82 7.76	0.4	0.4	Y

Comments: _____

LDC #:

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1

Reviewer

2nd reviewer

METHOD: Inorganics, Method see cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

~~Y~~ N N/A

Have results been reported and calculated correctly?

Y	N	N/A

Are results within the calibrated range of the instruments?

Y	N	N/A

Are all detection limits below the CRQL?

Compound (analyte) results for NO₃⁻ reported with a positive detect were recalculated and verified using the following equation:

Concentration =

Recalculation:

$$\text{Area}(9 \times 10^{-8}) + 0.17$$

recalculation:

$$34350661(A \times 10^8) + 0.17 = 3.249 \text{ mg/L}$$

[illegible]

Note: _____

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma

LDC Report Date: January 4, 2017

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: TestAmerica, Inc.

Sample Delivery Group (SDG): 280-91122-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW53-20161116	280-91122-3	Water	11/16/16
OUA1-MW54-20161116	280-91122-4	Water	11/16/16
OUA1-MW42-20161116	280-91122-5	Water	11/16/16
OUA1-MW01-20161116	280-91122-6	Water	11/16/16
OUA1-MW31-20161116	280-91122-7	Water	11/16/16
OUA1-PZ19-20161116	280-91122-8	Water	11/16/16
OUA1-MW52-20161116	280-91122-9	Water	11/16/16
OUA1-MW04-20161116	280-91122-10	Water	11/16/16
OUA1-MW04A-20161116	280-91122-11	Water	11/16/16
OUA1-MW05-20161116	280-91122-12	Water	11/16/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260B

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 15.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

The percent differences (%D) of the ending CCVs were less than or equal to 50.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB03-20161116 was identified as a trip blank. No contaminants were found.

Sample EB03-20161116 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 (from SDG 280-90987-1 was identified as a source blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
OUA1-MW54-20161116	Bromofluorobenzene	84 (85-114)	All compounds	J (all detects) UJ (all non-detects)	P
OUA1-MW01-20161116	Bromofluorobenzene	84 (85-114)	All compounds	J (all detects) UJ (all non-detects)	P
OUA1-MW04-20161116	Bromofluorobenzene	83 (85-114)	All compounds	J (all detects) UJ (all non-detects)	P

VIII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples OUA1-MW04-20161116 and OUA1-MW04A-20161116 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	OUA1-MW04-20161116	OUA1-MW04A-20161116				
1,1-Dichloroethene	0.44	0.50	-	0.06 (≤ 1.0)	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	OUA1-MW04-20161116	OUA1-MW04A-20161116				
Trichloroethene	0.40	0.49	-	0.09 (≤ 1.0)	-	-

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to surrogate %R, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**Volatiles - Data Qualification Summary - SDG 280-91122-1**

Sample	Compound	Flag	A or P	Reason
OUA1-MW54-20161116 OUA1-MW01-20161116 OUA1-MW04-20161116	All compounds	J (all detects) UJ (all non-detects)	P	Surrogates (%R)

MCAS Yuma**Volatiles - Laboratory Blank Data Qualification Summary - SDG 280-91122-1**

No Sample Data Qualified in this SDG

MCAS Yuma**Volatiles - Field Blank Data Qualification Summary - SDG 280-91122-1**

No Sample Data Qualified in this SDG

LDC #: 37797C1
SDG #: 280-91122-1
Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 11/16/16
Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: JB

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	RSD ≤ 15% . 8 ² ICV ≤ 20%
IV.	Continuing calibration / 2nd sig	A	CCV ≤ 20/50%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	EB=1. TB=2. SB=SB01-420161114 (=80-90987-1)
VII.	Surrogate spikes	W	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	D	ICS
X.	Field duplicates	W	D=10+11
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB03-20161116	280-91122-1	Water	11/16/16
2	TB03-20161116	280-91122-2	Water	11/16/16
3	OUA1-MW53-20161116	280-91122-3	Water	11/16/16
4	OUA1-MW54-20161116	280-91122-4	Water	11/16/16
5	OUA1-MW42-20161116	280-91122-5	Water	11/16/16
6	OUA1-MW01-20161116	280-91122-6	Water	11/16/16
7	OUA1-MW31-20161116	280-91122-7	Water	11/16/16
8	OUA1-PZ19-20161116	280-91122-8	Water	11/16/16
9	OUA1-MW52-20161116	280-91122-9	Water	11/16/16
10	OUA1-MW04-20161116	280-91122-10	Water	11/16/16
11	OUA1-MW04A-20161116	280-91122-11	Water	11/16/16
12	OUA1-MW05-20161116	280-91122-12	Water	11/16/16
13				

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane
C. Vinyl chloride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO. 1,1-Difluoroethane	O1. 3-Methylpentane
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylenes	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1.
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1.

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y	N	N/A	Were all surrogate %R within QC limits?
Y	N	N/A	If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R out of outside of criteria?

[illegible]

(TOL) = Toluene-d8
(BFB) = Bromofluorobenzene

(DCE) = 1,2-Dichloroethane-d4
(DFM) = Dibromofluoromethane

LDC#: 3797C1**VALIDATION FINDINGS WORKSHEET**
Field DuplicatesPage: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]**METHOD:** GCMS voa (EPA SW 846 Method 8260B)

Compound	Concentration (ug/L)		(≤20) RPD	Difference	Limits	Qual
	10	11				
H	0.44	0.50		0.06	≤1.0	
S	0.40	0.49		0.09	≤1.0	

V:\FIELD DUPLICATES\37797C1.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 4, 2017
Parameters: 1,4-Dioxane
Validation Level: Stage 2B
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-91122-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW53-20161116	280-91122-3	Water	11/16/16
OUA1-MW54-20161116	280-91122-4	Water	11/16/16
OUA1-MW42-20161116	280-91122-5	Water	11/16/16
OUA1-MW01-20161116	280-91122-6	Water	11/16/16
OUA1-MW31-20161116	280-91122-7	Water	11/16/16
OUA1-PZ19-20161116	280-91122-8	Water	11/16/16
OUA1-MW52-20161116	280-91122-9	Water	11/16/16
OUA1-MW04-20161116	280-91122-10	Water	11/16/16
OUA1-MW04A-20161116	280-91122-11	Water	11/16/16
OUA1-MW05-20161116	280-91122-12	Water	11/16/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

1,4-Dioxane by Environmental Protection Agency (EPA) SW 846 Method 8270C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0%.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0%.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample EB03-20161116 was identified as an equipment blank. No contaminants were found.

Sample SB01-2016114 (from SDG 280-90987-1) was identified as a source blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

X. Field Duplicates

Samples OUA1-MW04-20161116 and OUA1-MW04A-20161116 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	OUA1-MW04-20161116	OUA1-MW04A-20161116				
1,4-Dioxane	2.5	1.8	33 (≤20)	-	J (all detects)	A

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to field duplicate RPD, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**1,4-Dioxane - Data Qualification Summary - SDG 280-91122-1**

Sample	Compound	Flag	A or P	Reason
OUA1-MW04-20161116 OUA1-MW04A-20161116	1,4-Dioxane	J (all detects)	A	Field duplicates (RPD)

MCAS Yuma**1,4-Dioxane - Laboratory Blank Data Qualification Summary - SDG 280-91122-1**

No Sample Data Qualified in this SDG

MCAS Yuma**1,4-Dioxane - Field Blank Data Qualification Summary - SDG 280-91122-1**

No Sample Data Qualified in this SDG

LDC #: 37797C2b

VALIDATION COMPLETENESS WORKSHEET

SDG #: 280-91122-1

Stage 2B

Laboratory: Test America, Inc.

Date: 11-9-16

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A	RSD ≤ 15% . ICV ≤ 20%
IV.	Continuing calibration / ending	A	CCV ≤ 20/50%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	EB = 1. SB = SB01-20161114 (280-90987-1)
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	LCSD
X.	Field duplicates	SW	D = 9 + 10
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

SB = Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB03-20161116	280-91122-1	Water	11/16/16
2	OUA1-MW53-20161116	280-91122-3	Water	11/16/16
3	OUA1-MW54-20161116	280-91122-4	Water	11/16/16
4	OUA1-MW42-20161116	280-91122-5	Water	11/16/16
5	OUA1-MW01-20161116	280-91122-6	Water	11/16/16
6	OUA1-MW31-20161116	280-91122-7	Water	11/16/16
7	OUA1-PZ19-20161116	280-91122-8	Water	11/16/16
8	OUA1-MW52-20161116	280-91122-9	Water	11/16/16
9	OUA1-MW04-20161116	280-91122-10	Water	11/16/16
10	OUA1-MW04A-20161116	280-91122-11	Water	11/16/16
11	OUA1-MW05-20161116	280-91122-12	Water	11/16/16
12				
13				

LDC#: 37797C2b

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: JR

METHOD: GCMS svoa (EPA SW 846 Method 8270C)

Compound	Concentration (ug/L)		(≤20) RPD	Difference	Limits	Qual
	9	10				
1,4-Dioxane	2.5	1.8	33			<u>OK</u>

V:\FIELD DUPLICATES\37797C2b.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 5, 2017
Parameters: Wet Chemistry
Validation Level: Stage 2B
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-91122-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW53-20161116	280-91122-3	Water	11/16/16
OUA1-MW54-20161116	280-91122-4	Water	11/16/16
OUA1-MW01-20161116	280-91122-6	Water	11/16/16
OUA1-MW52-20161116	280-91122-9	Water	11/16/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Chloride, Nitrate as Nitrogen, and Sulfate by Environmental Protection Agency (EPA) SW 846 Method 9056

Ferrous Iron by Standard Method 3500 FE D

pH by EPA SW 846 Method 9040C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detect at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
All samples in SDG 280-91122-1	pH	5 days	48 hours	J (all detects)	P
All samples in SDG 280-91122-1	Ferrous iron	9 days	48 hours	UJ (all non-detects)	P

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

Sample EB03-20161116 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 (from SDG 280-90987-1) was identified as a source blank. No contaminants were found.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VII. Duplicates

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to technical holding time, data were qualified as estimated in four samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**Wet Chemistry - Data Qualification Summary - SDG 280-91122-1**

Sample	Analyte	Flag	A or P	Reason
OUA1-MW53-20161116 OUA1-MW54-20161116 OUA1-MW01-20161116 OUA1-MW52-20161116	pH	J (all detects)	P	Technical holding times
OUA1-MW53-20161116 OUA1-MW54-20161116 OUA1-MW01-20161116 OUA1-MW52-20161116	Ferrous iron	UJ (all non-detects)	P	Technical holding times

MCAS Yuma**Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 280-91122-1**

No Sample Data Qualified in this SDG

MCAS Yuma**Wet Chemistry - Field Blank Data Qualification Summary - SDG 280-91122-1**

No Sample Data Qualified in this SDG

LDC #: 37797C6
 SDG #: 280-91122-1
 Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 1/3/17

Page: 1 of 1

Reviewer: [Signature]

2nd Reviewer: [Signature]

METHOD: (Analyte) Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Ferrous Iron (3500-FE D) pH, (EPA SW846 Method 9040C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A SW	
II.	Initial calibration	A	
III.	Calibration verification	A	
IV.	Laboratory Blanks	A	
V.	Field blanks	ND	EB=1 SB=SB01-201611M (SOG: 280-90987-1)
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VII.	Duplicate sample analysis	A	Dup
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	N	
X.	Sample result verification	N	
XI.	Overall assessment of data	A	

Note: A = Acceptable
 N = Not provided/applicable
 SW = See worksheet

ND = No compounds detected
 R = Rinsate
 FB = Field blank

D = Duplicate
 TB = Trip blank
 EB = Equipment blank

SB=Source blank
 OTHER:

	Client ID	Lab ID	Matrix	Date
1	EB03-20161116	280-91122-1	Water	11/16/16
2	OUA1-MW53-20161116	280-91122-3	Water	11/16/16
3	OUA1-MW54-20161116	280-91122-4	Water	11/16/16
4	OUA1-MW01-20161116	280-91122-6	Water	11/16/16
5	OUA1-MW52-20161116	280-91122-9	Water	11/16/16
6	EB03-20161116MS	280-91122-1MS	Water	11/16/16
7	EB03-20161116MSD	280-91122-1MSD	Water	11/16/16
8	EB03-20161116DUP	280-91122-1DUP	Water	11/16/16
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #:

VALIDATION FINDINGS WORKSHEET

Sample Specific Analysis Reference

Page: 1 of 1

Reviewer: CR

2nd reviewer: CL

All circled methods are applicable to each sample.

[illegible]

Comments:

LDC #: 3779706

VALIDATION FINDINGS WORKSHEET

Technical Holding Times

Page: 1 of 1

Reviewer: Ch

2nd reviewer: _____

All circled dates have exceeded the technical holding time.

Y N N/A Were all samples preserved as applicable to each method ?

Y	N	N/A	Were all cooler temperatures within validation criteria?

[illegible]

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 4, 2017
Parameters: Volatiles
Validation Level: Stage 2B & 4
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-91192-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW51-20161117	280-91192-3	Water	11/17/16
OUA1-MW50-20161117	280-91192-4	Water	11/17/16
OUA1-MW49-20161117**	280-91192-5**	Water	11/17/16
OUA1-MW49-20161117MS	280-91192-5MS	Water	11/17/16
OUA1-MW49-20161117MSD	280-91192-5MSD	Water	11/17/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260B

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detect): The compound or analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detect at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A bromofluorobenzene (BFB) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 15.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample TB04-20161117 was identified as a trip blank. No contaminants were found.

Sample EB04-20161117 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 (from SDG 280-90987-1) was identified as a source blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

MCAS Yuma

Volatiles - Data Qualification Summary - SDG 280-91192-1

No Sample Data Qualified in this SDG

MCAS Yuma

Volatiles - Laboratory Blank Data Qualification Summary - SDG 280-91192-1

No Sample Data Qualified in this SDG

MCAS Yuma

Volatiles - Field Blank Data Qualification Summary - SDG 280-91192-1

No Sample Data Qualified in this SDG

LDC #: 37797D1
SDG #: 280-91192-1
Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date: 11/17/16
Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: [Signature]

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A, A	$RSD \leq 15\%$, r^2 $ICV \leq 20\%$
IV.	Continuing calibration / ending	A	$CCV \leq 20/50\%$
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	EB=1. TB=*. SB=1-20161114 (280-90987-1)
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LC9
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	EB04-20161117	280-91192-1	Water	11/17/16
2	TB04-20161117	280-91192-2	Water	11/17/16
3	OUA1-MW51-20161117	280-91192-3	Water	11/17/16
4	OUA1-MW50-20161117	280-91192-4	Water	11/17/16
5	OUA1-MW49-20161117**	280-91192-5**	Water	11/17/16
6	OUA1-MW49-20161117MS	280-91192-5MS	Water	11/17/16
7	OUA1-MW49-20161117MSD	280-91192-5MSD	Water	11/17/16
8				
9				
10				

Notes:

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	/			
Was cooler temperature criteria met?	/			
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?	/			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	/			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990 ?	/			
Were all percent relative standard deviations (%RSD) $\leq 30\%/15\%$ and relative response factors (RRF) > 0.05 ?	/			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	/			
Were all percent differences (%D) $\leq 20\%$ or percent recoveries (%R) 80-120%?	/			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	/			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			
Were all percent differences (%D) $\leq 20\%$ and relative response factors (RRF) ≥ 0.05 ?	/			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	/			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	/			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		/		
VI. Field blanks				
Were field blanks were identified in this SDG?	/			
Were target compounds detected in the field blanks?		/		
VII. Surrogate spikes				
Were all surrogate percent recovery (%R) within QC limits?	/			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			/	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	/			
Was a MS/MSD analyzed every 20 samples of each matrix?	/			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	/			
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	/			
Was an LCS analyzed per analytical batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	/			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		/		
Were target compounds detected in the field duplicates?			/	
XI. Internal standards				
Were internal standard area counts within -50% to +100% of the associated calibration standard?	/			
Were retention times within + 30 seconds of the associated calibration standard?	/			
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
XIII. Target compound identification				
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	/			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/			
Were chromatogram peaks verified and accounted for?	/			
XIV. System performance				
System performance was found to be acceptable.	/			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC. 1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl chloride	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene	BB. 1,1,2,2-Tetrachloroethane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane	CC. Toluene	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform	EE. Ethylbenzene	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. Iodomethane
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO. 1,1-Difluoroethane
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP.
Ó. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

VALIDATION FINDINGS WORKSHEET **Initial Calibration Calculation Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$$RRF = (A_x)(C_{is}) / (A_{is})(C_x)$$

average RRF = sum of the RRFs/number of standards

$$\%RSD = 100 * (S/X)$$

A_x = Area of compound,

C_x = Concentration of compound,

S = Standard deviation of the RRFs

X = Mean of the RRFs

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (10 std)	RRF (10 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
1	1CAZ	11/25/16	S (1st internal standard)	0.3351	0.3351	0.3175	0.3175	3.3	3.3
			AA (2nd internal standard)	1.2757	1.2757	1.2176	1.2176	3.5	3.5
			(3rd internal standard)						
			(4th internal standard)						
2			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						
3			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						
4			(1st internal standard)						
			(2nd internal standard)						
			(3rd internal standard)						
			(4th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Continuing Calibration Results Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Difference} = 100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$$

$$\text{RRF} = (A_x)(C_{is}) / (A_{is})(C_x)$$

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

A_x = Area of compound,

C_x = Concentration of compound,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	NSLTT60	11/30/16	<u>S</u> (1st internal standard)	<u>0.3175</u>	<u>0.3483</u>	<u>0.3483</u>	<u>9.7</u>	<u>9.7</u>
			<u>AA</u> (2nd internal standard)	<u>1.2176</u>	<u>1.248</u>	<u>1.248</u>	<u>2.5</u>	<u>2.5</u>
			(3rd internal standard)					
			(4th internal standard)					
2			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					
3			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					
4			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Surrogate Results Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

 Where: SF = Surrogate Found
 SS = Surrogate Spiked

Sample ID: 5

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane	11.0	11.5	104	104	0
1,2-Dichloroethane-d4	1	12.4	113	113	1
Toluene-d8	1	10.9	99	99	1
Bromofluorobenzene	1	10.7	98	98	1

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Dibromofluoromethane					
1,2-Dichloroethane-d4					
Toluene-d8					
Bromofluorobenzene					

VALIDATION FINDINGS WORKSHEET **Matrix Spike/Matrix Spike Duplicates Results Verification**

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Recovery} = 100 * (\text{SSC} - \text{SC}) / \text{SA}$$

Where: SSC = Spiked sample concentration
 SA = Spike added

SC = Sample concentration

$$\text{RPD} = | \text{MSC} - \text{MSC} | * 2 / (\text{MSC} + \text{MSDC})$$

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD sample: 67

Compound	Spike Added (<u>176</u>)		Sample Concentration (<u>176</u>)	Spiked Sample Concentration (<u>176</u>)		Matrix Spike		Matrix Spike Duplicate		MS/MSD	
						Percent Recovery		Percent Recovery		RPD	
	MS	MSD	-----	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	<u>5.00</u>	<u>5.00</u>	<u>ND</u>	<u>5.20</u>	<u>5.36</u>	<u>104</u>	<u>104</u>	<u>107</u>	<u>107</u>	<u>3</u>	<u>3</u>
Trichloroethene	<u>1</u>	<u>1</u>	<u>0.27</u>	<u>5.13</u>	<u>5.18</u>	<u>97</u>	<u>97</u>	<u>98</u>	<u>98</u>	<u>1</u>	<u>1</u>
Benzene											
Toluene											
Chlorobenzene											

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 379701

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: CA
2nd Reviewer: NZ

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate (if applicable) were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 * SSC/SA$

Where: SSC = Spiked sample concentration
SA = Spike added

RPD = $|LCSC - LCSDC| * 2 / (LCSC + LCSDC)$

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS ID: 280-353TT9

Compound	Spike Added (<u>NA</u>)		Spiked Sample Concentration (<u>NA</u>)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	<u>5.00</u>	<u>NA</u>	<u>5.34</u>	<u>NA</u>	<u>107</u>	<u>107</u>				
Trichloroethene	<u>↓</u>	<u>↓</u>	<u>5.41</u>	<u>↓</u>	<u>108</u>	<u>108</u>				
Benzene										
Toluene										
Chlorobenzene										

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

1	Y	N	N/A	Were all reported results recalculated and verified for all level IV samples?

Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_v)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

%S = Percent solids, applicable to soils and solid matrices only.

Example:

Sample I.D. 5, 9:

$$\text{Conc.} = \frac{(12312)(12.5)(1)}{(18094)(0.3175)} = 0.2678 \text{ } \mu\text{g/L}$$

[illegible]

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma
LDC Report Date: January 4, 2017
Parameters: 1,4-Dioxane
Validation Level: Stage 2B & 4
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-91192-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW51-20161117	280-91192-3	Water	11/17/16
OUA1-MW50-20161117	280-91192-4	Water	11/17/16
OUA1-MW49-20161117**	280-91192-5**	Water	11/17/16
OUA1-MW49-20161117MS	280-91192-5MS	Water	11/17/16
OUA1-MW49-20161117MSD	280-91192-5MSD	Water	11/17/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

1,4-Dioxane by Environmental Protection Agency (EPA) SW 846 Method 8270C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met with the following exceptions:

Sample	Compound	Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
All samples in SDG 280-91192-1	All compounds	11	7	UJ (all non-detects)	P

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 15.0%.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0%.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0%.

The percent differences (%D) of the ending continuing calibration verifications (CCVs) were less than or equal to 50.0%.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample EB04-20161117 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 (from SDG 280-90987-1) was identified as a source blank. No contaminants were found.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
OUA1-MW49-20161117MS/MSD (OUA1-MW49-20161117**)	1,4-Dioxane	35 (38-120)	36 (38-120)	UJ (all non-detects)	A

Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

No field duplicates were identified in this SDG.

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to technical holding time and MS/MSD %R, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**1,4-Dioxane - Data Qualification Summary - SDG 280-91192-1**

Sample	Compound	Flag	A or P	Reason
OUA1-MW51-20161117 OUA1-MW50-20161117 OUA1-MW49-20161117**	All compounds	UJ (all non-detects)	P	Technical holding times
OUA1-MW49-20161117**	1,4-Dioxane	UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

MCAS Yuma**1,4-Dioxane - Laboratory Blank Data Qualification Summary - SDG 280-91192-1**

No Sample Data Qualified in this SDG

MCAS Yuma**1,4-Dioxane - Field Blank Data Qualification Summary - SDG 280-91192-1**

No Sample Data Qualified in this SDG

LDC #: 37797D2b

SDG #: 280-91192-1

Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date: 11/17/16

Page: 1 of 1

Reviewer: JVB

2nd Reviewer: JVB

METHOD: GC/MS 1,4-Dioxane (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A	RSO ≤ 15% . ICV ≤ 20%
IV.	Continuing calibration / <i>Endleg</i>	A	CCV ≤ 20/50%
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	EB=1. SB01-20161114 (280-90987-1)
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LC5
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

SB=Source blank
OTHER:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	EB04-20161117	280-91192-1	Water	11/17/16
2	OUA1-MW51-20161117	280-91192-3	Water	11/17/16
3	OUA1-MW50-20161117	280-91192-4	Water	11/17/16
4	OUA1-MW49-20161117**	280-91192-5**	Water	11/17/16
5	OUA1-MW49-20161117MS	280-91192-5MS	Water	11/17/16
6	OUA1-MW49-20161117MSD	280-91192-5MSD	Water	11/17/16
7				
8				
9				
10				

Notes:

LDC #: 3191026

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: [Signature]
2nd Reviewer: JVB**Method:** Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical/holding times				
Were all technical holding times met?		☒		
Was cooler temperature criteria met?	☒			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	☒			
Were all samples analyzed within the 12 hour clock criteria?	☒			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	☒			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?			☒	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit acceptance criteria of > 0.990 ?			☒	
Were all percent relative standard deviations (%RSD) $\leq 30\%/15\%$ and relative response factors (RRF) > 0.05 ?	☒			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each ICAL for each instrument?	☒			
Were all percent difference (%D) $\leq 20\%$ or percent recoveries (%R) 80-120%?	☒			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	☒			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?			☒	
Were all percent differences (%D) $< 20\%$ and relative response factors (RRF) > 0.05 ?	☒			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	☒			
Was a laboratory blank analyzed at least once every 12 hours for each matrix and concentration?	☒			
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.		☒		
VI. Field blanks				
Were field blanks identified in this SDG?	☒			
Were target compounds detected in the field blanks?		☒		
VII. Surrogate spikes				
Were all surrogate %R within QC limits?	☒			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			☒	
If any percent recoveries (%R) was less than 10 percent, was a reanalysis performed to confirm %R?			☒	

Validation Area	Yes	No	NA	Findings/Comments
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	☒	☐	☐	
Was a MS/MSD analyzed every 20 samples of each matrix?	☒	☐	☐	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	☒	☒	☐	
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	☒	☐	☐	
Was an LCS analyzed per analytical batch?	☒	☐	☐	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	☒	☐	☐	
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	☐	☒	☐	
Were target compounds detected in the field duplicates?	☐	☐	☒	
XI. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	☒	☐	☐	
Were retention times within ± 30 seconds of the associated calibration standard?	☒	☐	☐	
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	☒	☐	☐	
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	☒	☐	☐	
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	☒	☐	☐	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	☒	☐	☐	
Were chromatogram peaks verified and accounted for?	☒	☐	☐	
XIV. System performance				
System performance was found to be acceptable.	☒	☐	☐	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	☒	☐	☐	

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y/N/N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Was a MS/MSD analyzed every 20 samples of each matrix?

Y	N	N/A	Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

[illegible]

VALIDATION FINDINGS WORKSHEET **Initial Calibration Calculation Verification**

METHOD: GC/MS SVOC (EPA SW 846 Method 8270C)

The Relative Response Factor (RRF), average RRF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

$$RRF = (A_x)(C_{is}) / (A_{is})(C_x)$$

average RRF = sum of the RRFs/number of standards

$$\%RSD = 100 * (S/X)$$

A_x = Area of compound,

C_x = Concentration of compound,

S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (5000 std)	RRF (5000 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
1	ICAL	10/14/16	1,4-Dioxane (1st internal standard)	0.5594	0.5594	0.5511	0.5511	3.6	3.6
	(SMS_G4)		1,2,4-Trichlorobenzene (2nd internal standard)						
			2,6-Dinitrotoluene (3rd internal standard)						
			Hexachlorobenzene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
2			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Phenanthrene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Phenanthrene (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

Comments: Refer to Initial Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Continuing Calibration Results Verification**

Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: JV

METHOD: GC/MS SVOC (EPA SW 846 Method 8270C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Difference} = 100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$$

$$\text{RRF} = (A_x)(C_{is}) / (A_{is})(C_x)$$

Where: ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

A_x = Area of compound,

C_x = Concentration of compound,

A_{is} = Area of associated internal standard

C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported	Recalculated	Reported	Recalculated
					RRF (CC)	RRF (CC)	%D	%D
1	G4_3718	12/5/16	1,4-Dioxane (1st internal standard)	0.5511	0.5128	0.5128	6.9	6.9
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
2	G4_3766	12/6/16	1,4-Dioxane (1st internal standard)	0.5511	0.4945	0.4945	10.3	10.3
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 31911-6**VALIDATION FINDINGS WORKSHEET**
Surrogate Results VerificationPage: 1 of 1Reviewer: Q2nd reviewer: NL**METHOD:** GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: $SF/SS \times 100$ Where: SF = Surrogate Found
SS = Surrogate SpikedSample ID: 4

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl	2500.0	2315.3	93	93	0
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

VALIDATION FINDINGS WORKSHEET **Matrix Spike/Matrix Spike Duplicates Results Verification**

Page: 1 of 1
 Reviewer: g
 2nd Reviewer: sn

METHOD: GC/MS PAH (EPA SW 846 Method 8270C)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 * (SSC - SC) / SA$

Where: SSC = Spiked sample concentration
 SA = Spike added

SC = Sample concentration

RPD = $|MSC - MSC| * 2 / (MSC + MSDC)$

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD samples: 5/6

Compound	Spike Added (<i>MS</i>)		Sample Concentration (<i>MS</i>)	Spiked Sample Concentration (<i>MS</i>)		Matrix Spike		Matrix Spike Duplicate		MS/MSD	
	MS	MSD		MS	MSD	Percent Recovery		Percent Recovery		RPD	
						Reported	Recalc	Reported	Recalc	Reported	Recalculated

Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene											
Pentachlorophenol											
Pyrene											
1,4-Dioxane	9.65	9.81	ND	3.40	3.55	35	35	36	36	4	4

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification**METHOD:** GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

$$\% \text{ Recovery} = 100 * (\text{SC}/\text{SA})$$

Where: SSC = Spike concentration
SA = Spike added

$$\text{RPD} = | \text{LCSC} - \text{LCSDC} | * 2 / (\text{LCSC} + \text{LCSDC})$$

LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: 280-253290

Compound	Spike Added (<u>10.0</u>)		Spike Concentration (<u>7.26</u>)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene										
Pentachlorophenol										
Pyrene										
<u>1,4-Dioxane</u>	<u>10.0</u>	<u>NA</u>	<u>7.26</u>	<u>NA</u>	<u>73</u>	<u>73</u>				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 31191026

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1

Reviewer: 9

2nd reviewer: NZ

METHOD: GC/MS SVOA (EPA SW 846 Method 8270C)

Y	N	N/A
Y	N	N/A

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

$$\text{Concentration} = \frac{(A_v)(I_s)(V_i)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 4, Nb:

$$\text{Conc.} = \frac{(\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)(\quad)(\quad)(\quad)(\quad)}$$

11

[illegible]

**Laboratory Data Consultants, Inc.
Data Validation Report**

Project/Site Name: MCAS Yuma
LDC Report Date: January 5, 2017
Parameters: Wet Chemistry
Validation Level: Stage 2B & 4
Laboratory: TestAmerica, Inc.
Sample Delivery Group (SDG): 280-91192-1

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW51-20161117	280-91192-3	Water	11/17/16
OUA1-MW50-20161117	280-91192-4	Water	11/17/16
OUA1-MW49-20161117**	280-91192-5**	Water	11/17/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Inorganic Superfund Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Chloride, Nitrate as Nitrogen, and Sulfate by Environmental Protection Agency (EPA)
SW 846 Method 9056
Ferrous Iron by Standard Method 3500 FE D
pH by EPA SW 846 Method 9040C

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detect at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met with the following exceptions:

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
All samples in SDG 280-91192-1	pH	4 days	48 hours	J (all detects)	P
All samples in SDG 280-91192-1	Ferrous iron	8 days	48 hours	J (all detects) UJ (all non-detects)	P

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

Sample EB04-20161117 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 (from SDG 280-90987-1) was identified as a source blank. No contaminants were found.

VI. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VII. Duplicates

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

All sample result verifications were acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to technical holding time, data were qualified as estimated in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**Wet Chemistry - Data Qualification Summary - SDG 280-91192-1**

Sample	Analyte	Flag	A or P	Reason
OUA1-MW51-20161117 OUA1-MW50-20161117 OUA1-MW49-20161117**	pH	J (all detects)	P	Technical holding times
OUA1-MW51-20161117 OUA1-MW50-20161117 OUA1-MW49-20161117**	Ferrous iron	J (all detects) UJ (all non-detects)	P	Technical holding times

MCAS Yuma**Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 280-91192-1**

No Sample Data Qualified in this SDG

MCAS Yuma**Wet Chemistry - Field Blank Data Qualification Summary - SDG 280-91192-1**

No Sample Data Qualified in this SDG

LDC #: 37797D6
 SDG #: 280-91192-1
 Laboratory: Test America, Inc.

VALIDATION COMPLETENESS WORKSHEET Stage 2B/4

Date: 1/3/17

Page: 1 of 1

Reviewer: *ag*

2nd Reviewer: *sm*

METHOD: (Analyte) Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Ferrous Iron (3500-FE D) pH, (EPA SW846 Method 9040C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, SW	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	ND	EB=1 SB=SB01-2061114 (SOG: 280-90987-1)
VI.	Matrix Spike/Matrix Spike Duplicates	N	CS
VII.	Duplicate sample analysis	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	N	
X.	Sample result verification	A	Not reviewed for Stage 2B validation.
XI	Overall assessment of data	A	

Note: A = Acceptable
 N = Not provided/applicable
 SW = See worksheet

ND = No compounds detected
 R = Rinsate
 FB = Field blank

D = Duplicate
 TB = Trip blank
 EB = Equipment blank

SB=Source blank
 OTHER:

** Indicates sample underwent Stage 4 validation

	Client ID	Lab ID	Matrix	Date
1	EB04-20161117	280-91192-1	Water	11/17/16
2	OUA1-MW51-20161117	280-91192-3	Water	11/17/16
3	OUA1-MW50-20161117	280-91192-4	Water	11/17/16
4	OUA1-MW49-20161117**	280-91192-5**	Water	11/17/16
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Notes:

LDC #: 3779706

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: CZ
2nd Reviewer: [Signature]Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.		/		
II. Calibration				
Were all instruments calibrated daily, each set-up time?	/			
Were the proper number of standards used?	/			
Were all initial calibration correlation coefficients ≥ 0.995 ?	/			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	/			
Were titrant checks performed as required? (Level IV only)			/	
Were balance checks performed as required? (Level IV only)			/	
III. Blanks				
Was a method blank associated with every sample in this SDG?	/			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.		/		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			/	
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq 20\%$ for waters and $\leq 35\%$ for soil samples? A control limit of $\leq \text{CRDL}$ ($\leq 2\text{X CRDL}$ for soil) was used for samples that were $\leq 5\text{X}$ the CRDL, including when only one of the duplicate sample values were $\leq 5\text{X}$ the CRDL.			/	
V. Laboratory control samples				
Was an LCS analyzed for this SDG?	/			
Was an LCS analyzed per extraction batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	/			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		/	/	
Were the performance evaluation (PE) samples within the acceptance limits?			/	

LDC #: 3779706

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: [Signature]
2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
Were detection limits < RL?	/			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	/	/		
Target analytes were detected in the field duplicates.			/	
X. Field blanks				
Field blanks were identified in this SDG.	/	/		
Target analytes were detected in the field blanks.		/		

VALIDATION FINDINGS WORKSHEET

Sample Specific Analysis Reference

All circled methods are applicable to each sample.

[illegible]

Comments: _____

LDC #:

VALIDATION FINDINGS WORKSHEET

Technical Holding Times

Page: 5 of 1

Reviewer: g

2nd reviewer: _____

All circled dates have exceeded the technical holding time.

(Y) N N/A Were all samples preserved as applicable to each method ?

Y N N/A Were all cooler temperatures within validation criteria?

[illegible]

LDC #: 3779706

Validation Findings Worksheet **Initial and Continuing Calibration Calculation Verification**

Page: 1 of 1
 Reviewer: ag
 2nd Reviewer: g

Method: Inorganics, Method See Cover

The correlation coefficient (r) for the calibration of Cl was recalculated. Calibration date: 10/7/16

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution
 True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (mg/L)	Area	Recalculated	Reported	Acceptable (Y/N)
					r or r ²	r or r ²	
Initial calibration	Cl	s1	1.0	18297919	1.000	1.000	g
		s2	2.5	44595772			
		s3	5	89809352			
		s4	60	1129842185			
		s5	120	2243362063			
		s6	200	3718642140			
Calibration verification	SO ₄	CCV	100	~~Found~~ 101.4	101	101	↓
Calibration verification	Fe ^{II+}	↓	1.00	1.02	102	102	↓
Calibration verification							

Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 37771706**VALIDATION FINDINGS WORKSHEET**
Level IV Recalculation WorksheetPage: 1 of 1
Reviewer: CR
2nd Reviewer: 9**METHOD:** Inorganics, Method see over

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$ Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).
True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated	Reported	Acceptable (Y/N)
					%R / RPD	%R / RPD	
LCS	Laboratory control sample	Ferric Fe	1.90	2.00	95	95	Y
N	Matrix spike sample		(SSR-SR)				
N	Duplicate sample						

Comments: _____

LDC #: 311

VALIDATION FINDINGS WORKSHEET

Sample Calculation Verification

Page: 1 of 1

Reviewer:

2nd reviewer:

METHOD: Inorganics, Method see cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A

Have results been reported and calculated correctly?

Y) N N/A

Are results within the calibrated range of the instruments?

Y	N	N/A

Are all detection limits below the CRQL?

Compound (analyte) results for C1 reported with a positive detect were recalculated and verified using the following equation:

Concentration =

Recalculation:

$$\text{Area}(S, 10^{-8}) = 0.09$$

Recalculation:

$$20 (84929047(5 \times 10^{-8}) - 0.09) = 910.4 \text{ mg/L}$$

[illegible]

Note: _____

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma

LDC Report Date: January 5, 2017

Parameters: Perfluorinated Alkyl Acids

Validation Level: Stage 2B & 4

Laboratory: Vista Analytical Laboratory

Sample Delivery Group (SDG): 1601451

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW13-20161114	1601451-03	Water	11/14/16
OUA1-MW37-20161114	1601451-04	Water	11/14/16
OUA1-MW37A-20161114	1601451-05	Water	11/14/16
OUA1-HS03-20161114	1601451-06	Water	11/14/16
OUA1-MW19-20161114	1601451-07	Water	11/14/16
OUA1-MW18-20161114**	1601451-08**	Water	11/14/16
OUA1-MW08-20161114	1601451-09	Water	11/14/16
OUA1-MW06-20161114	1601451-10	Water	11/14/16
OUA1-HS03-20161114MS	1601451-06MS	Water	11/14/16
OUA1-HS03-20161114MSD	1601451-06MSD	Water	11/14/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 3 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (February 2017), the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluorinated Alkyl Acids by Environmental Protection Agency (EPA) Method 537

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NJ (Presumptive and Estimated): The analysis indicates the presence of a compound or analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance was checked as applicable.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all compounds.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample EB01-20161114 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 was identified as a source blank. No contaminants were found.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Ongoing Precision Recovery Samples

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples OUA1-MW37-20161114 and OUA1-MW37A-20161114 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/L)		RPD (Limits)	Differences (Limits)	Flag	A or P
	OUA1-MW37-20161114	OUA1-MW37A-20161114				
PFBS	145	139	4 (≤20)	-	-	-
PFOA	26.2	28.9	10 (≤20)	-	-	-
PFOS	25.0	27.8	11 (≤20)	-	-	-

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

MCAS Yuma

Perfluorinated Alkyl Acids - Data Qualification Summary - SDG 1601451

No Sample Data Qualified in this SDG

MCAS Yuma

Perfluorinated Alkyl Acids - Laboratory Blank Data Qualification Summary - SDG 1601451

No Sample Data Qualified in this SDG

MCAS Yuma

Perfluorinated Alkyl Acids - Field Blank Data Qualification Summary - SDG 1601451

No Sample Data Qualified in this SDG

METHOD: LC/MS Perfluorinated Alkyl Acids (EPA Method 537)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	N	
III.	Initial calibration/ICV	A	$RSD \leq 15\%$, γ^2 $ICV \leq 25\%$
IV.	Continuing calibration	A	QC limits $< 30\%$
V.	Laboratory Blanks	A	
VI.	Field blanks	NO	SB=1. EB=2
VII.	Surrogate spikes		
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	OPR
X.	Field duplicates	W	D=4+5
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank

** Indicates sample was underwent Stage 4 review

	Client ID	Lab ID	Matrix	Date
1	SB01-20161114	1601451-01	Water	11/14/16
2	EB01-20161114	1601451-02	Water	11/14/16
3	OUA1-MW13-20161114	1601451-03	Water	11/14/16
4	OUA1-MW37-20161114	1601451-04	Water	11/14/16
5	OUA1-MW37A-20161114	1601451-05	Water	11/14/16
6	OUA1-HS03-20161114	1601451-06	Water	11/14/16
7	OUA1-MW19-20161114	1601451-07	Water	11/14/16
8	OUA1-MW18-20161114**	1601451-08**	Water	11/14/16
9	OUA1-MW08-20161114	1601451-09	Water	11/14/16
10	OUA1-MW06-20161114	1601451-10	Water	11/14/16
11	OUA1-HS03-20161114MS	1601451-06MS	Water	11/14/16
12	OUA1-HS03-20161114MSD	1601451-06MSD	Water	11/14/16
13				
14				

LDC #: 3197490

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: [Signature]
2nd Reviewer: [Signature]

Method: LCMS (EPA Method 537)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	☒	☐	☐	
Was cooler temperature criteria met?	☒	☐	☐	
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the specified criteria?	☐	☐	☒	
Were all samples analyzed within the 12 hour clock criteria?	☒	☐	☐	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	☒	☐	☐	
Were all percent relative standard deviations (%RSD) $\leq 15\%$?	☒	☐	☐	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of > 0.990 ?	☒	☐	☐	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	☒	☐	☐	
Were all percent differences (%D) $< 15\%$?	☒	☐	☐	
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	☒	☐	☐	
Were all percent differences (%D) of the continuing calibration $\leq 15\%$?	☒	☐	☐	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	☒	☐	☐	
Was a laboratory blank analyzed for each matrix and concentration?	☒	☐	☐	
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.	☐	☒	☐	
VI. Field blanks				
Were field blanks identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field blanks?	☐	☒	☐	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	☒	☐	☐	
Was a MS/MSD analyzed every 20 samples of each matrix?	☒	☐	☐	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	☒	☐	☐	
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	☒	☐	☐	
Was an LCS analyzed per extraction batch?	☒	☐	☐	

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	☒	☐	☐	
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field duplicates?	☒	☐	☐	
XI. Internal standards				
Were internal standard area counts within <u>QC limits</u> $\pm 50\%$ of the associated calibration standard?	☒	☐	☐	
Were retention times within ± 30 seconds from the associated calibration standard?	☒	☐	☐	
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	☒	☐	☐	
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	☒	☐	☐	
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	☒	☐	☐	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	☒	☐	☐	
Were chromatogram peaks verified and accounted for?	☒	☐	☐	
XIV. System performance				
System performance was found to be acceptable.	☒	☐	☐	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	☒	☐	☐	

LDC#: 31191496**VALIDATION FINDINGS WORKSHEET**
Field DuplicatesPage: 1 of 1
Reviewer: Q
2nd Reviewer: NB**METHOD:** LCMS PFCs (EPA Method 537)

Compound	Concentration (ng/L)		(≤20) RPD	Difference	Limits	Qual
	4	5				
PFBS	145	139	4			
PFOA	26.2	28.9	10			
PFOS	25.0	27.8	11			

V:\FIELD DUPLICATES\37797G96.wpd

LDC#: 37797G96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: [Signature]
2nd Reviewer: JN

Method: LC/MS/MS PFCs

Calibration Date	System	Compound	Standard	(Y) Response	(X) Concentration
11/22/2016	LCMS03	PFOA	0	0.5677075	0.50
			s1	0.9756087	1.00
			s2	1.8279562	2.00
			s3	4.0526312	5.00
			s4	9.8076912	10.00
			s5	23.514343	25.00
			s6	45.372340	50.00
			s7	68.277310	75.00
			s8	88.133640	100.00

Regression Output**Reported**

Constant	0.384668	0.091734
Std Err of Y Est		
R Squared	0.999416	0.999048
Degrees of Freedom		
X Coefficient(s)	0.890381	0.899906
Std Err of Coef.		
Correlation Coefficient	0.999708	
Coefficient of Determination (r^2)	0.999416	0.999048

LDC #: ~~3194796~~VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results VerificationPage: 1 of 1
Reviewer: [Signature]
2nd Reviewer: NCMETHOD: GC HPLC MS

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = $100 * (\text{ave. CF} - \text{CF}) / \text{ave. CF}$
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(lcal)/ CCV Conc.	Reported	Recalculated	Reported	Recalculated
					CF/Conc. CCV	CF/Conc. CCV	%D	%D
1	16112712	11/5/16	PFOA	25.0	26.5	26.5	5.9	5.8
2	16112712	11/5/16	PFOA	25.0	26.3	26.3	5.1	5.0
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET **Matrix Spike/Matrix Spike Duplicates Results Verification**

METHOD: GC ☒ HPLC MS

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = $100 * (SSC - SC) / SA$

Where

SSC = Spiked sample concentration

SC = Sample concentration

SA = Spike added

MS = Matrix spike

MSD = Matrix spike duplicate

RPD = $((SSCMS - SSCMSD) * 2) / (SSCMS + SSCMSD) * 100$

MS/MSD samples: 11/12

Compound	Spike Added		Sample Conc.	Spike Sample Concentration		Matrix spike		Matrix Spike Duplicate		MS/MSD	
	()			()		Percent Recovery		Percent Recovery		RPD	
	MS	MSD		---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported
Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
PFDA	79.3	78.9	36.3	114	115	97.5	98.0	100	100	2.53	2.02

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3791596

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results VerificationPage: 1 of 1Reviewer: Q2nd Reviewer: JBMETHOD: GC HPLC MS

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

 $\% \text{ Recovery} = 100 * (\text{SSC} - \text{SC}) / \text{SA}$

Where: SSC = Spiked sample concentration

SC = Concentration

SA = Spike added

 $\text{RPD} = | \text{SSCLCS} - \text{SSCLCSD} | * 2 / (\text{SSCLCS} + \text{SSCLCSD})$

LCS = Laboratory control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: OPR

Compound	Spike Added (<u>1.5/4</u>)		Spiked Sample Concentration (<u>1.5/4</u>)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)										
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										
<u>OPR</u>	<u>80.0</u>	<u>NA</u>	<u>86.0</u>	<u>NA</u>	<u>10 T</u>	<u>10 T</u>				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3191496VALIDATION FINDINGS WORKSHEET
Sample Calculation VerificationPage: 1 of 1
Reviewer: 9
2nd Reviewer: NRMETHOD: GC ☒ HPLC MSY N N/A
Y N N/A

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10% of the reported results?

Concentration= $\frac{(A)(F_v)(D_f)}{(RF)(V_s \text{ or } W_s)(\%S/100)}$

Example:

Sample ID. 8 Compound Name PEOAConcentration = $\frac{(7.245e2 \times 12.5)}{(2.382e4)} - 0.0917344$
 $(0.899906) (0.124)$ $= 2.585 \mu g/c$

#	Sample ID	Compound	Reported Concentrations (<u>μg/c</u>)	Recalculated Results Concentrations ()	Qualifications
	<u>8</u>	<u>PEOA</u>	<u>2.58</u>		

omments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: MCAS Yuma

LDC Report Date: January 5, 2017

Parameters: Perfluorinated Alkyl Acids

Validation Level: Stage 2B & 4

Laboratory: Vista Analytical Laboratory

Sample Delivery Group (SDG): 1601461

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW14-20161115**	1601461-02**	Water	11/15/16
OUA1-MW15-20161115	1601461-03	Water	11/15/16
OUA1-MW07-20161115	1601461-04	Water	11/15/16
OUA1-MW23-20161115	1601461-05	Water	11/15/16
OUA1-MW55-20161115	1601461-06	Water	11/15/16
OUA1-MW55A-20161115	1601461-07	Water	11/15/16
OUA1-MW27-20161115	1601461-08	Water	11/15/16
OUA1-MW25-20161115	1601461-09	Water	11/15/16
OUA1-MW11-20161115	1601461-10	Water	11/15/16

**Indicates sample underwent Stage 4 validation

Introduction

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- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NJ (Presumptive and Estimated): The analysis indicates the presence of a compound or analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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Initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all compounds.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

Sample EB02-20161115 was identified as an equipment blank. No contaminants were found.

Sample SB01-20161114 (from SDG 1601451) was identified as a source blank. No contaminants were found.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Ongoing Precision Recovery Samples

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples OUA1-MW55-20161115 and OUA1-MW55A-20161115 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/L)		RPD (Limits)	Differences (Limits)	Flag	A or P
	OUA1-MW55-20161115	OUA1-MW55A-20161115				
PFOS	5.39	5.33	-	0.06 (≤8.19)	-	-

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

MCAS Yuma

Perfluorinated Alkyl Acids - Data Qualification Summary - SDG 1601461

No Sample Data Qualified in this SDG

MCAS Yuma

Perfluorinated Alkyl Acids - Laboratory Blank Data Qualification Summary - SDG 1601461

No Sample Data Qualified in this SDG

MCAS Yuma

Perfluorinated Alkyl Acids - Field Blank Data Qualification Summary - SDG 1601461

No Sample Data Qualified in this SDG

METHOD: LC/MS Perfluorinated Alkyl Acids (EPA Method 537)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	N	
III.	Initial calibration/ICV	A, A	20 $RSO \leq 15\%$. $\gamma \leq 2$ $ICV \leq 25\%$
IV.	Continuing calibration	A	$RE \text{ limits} \leq 30\%$
V.	Laboratory Blanks	A	
VI.	Field blanks	ND	$EB = 1$. SB01-20161114 (1601451)
VII.	Surrogate spikes		
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	OPR
X.	Field duplicates	W	$\Phi = 6+7$
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank

** Indicates sample was underwent Stage 4 review

	Client ID	Lab ID	Matrix	Date
1	EB02-20161115	1601461-01	Water	11/15/16
2	OUA1-MW14-20161115**	1601461-02**	Water	11/15/16
3	OUA1-MW15-20161115	1601461-03	Water	11/15/16
4	OUA1-MW07-20161115	1601461-04	Water	11/15/16
5	OUA1-MW23-20161115	1601461-05	Water	11/15/16
6	OUA1-MW55-20161115	1601461-06	Water	11/15/16
7	OUA1-MW55A-20161115	1601461-07	Water	11/15/16
8	OUA1-MW27-20161115	1601461-08	Water	11/15/16
9	OUA1-MW25-20161115	1601461-09	Water	11/15/16
10	OUA1-MW11-20161115	1601461-10	Water	11/15/16
11				
12				
13				
14				

Method: LCMS (EPA Method 537)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	☒	☐	☐	
Was cooler temperature criteria met?	☒	☐	☐	
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the specified criteria?	☐	☐	☒	
Were all samples analyzed within the 12 hour clock criteria?	☒	☐	☐	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	☒	☐	☐	
Were all percent relative standard deviations (%RSD) < 15%?	☒	☐	☐	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of > 0.990?	☒	☐	☐	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	☒	☐	☐	
Were all percent differences (%D) ²⁵ < 15%?	☒	☐	☐	
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	☒	☐	☐	
Were all percent differences (%D) of the continuing calibration ²⁵ < 15%?	☒	☐	☐	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	☒	☐	☐	
Was a laboratory blank analyzed for each matrix and concentration?	☒	☐	☐	
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.	☐	☒	☐	
VI. Field blanks				
Were field blanks identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field blanks?	☐	☒	☐	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	☒	☐	☐	
Was a MS/MSD analyzed every 20 samples of each matrix?	☒	☐	☐	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	☒	☐	☐	
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	☒	☐	☐	
Was an LCS analyzed per extraction batch?	☒	☐	☐	

LDC #: 31197496

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: Q
2nd Reviewer: NZ

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	☒	☐	☐	
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field duplicates?	☒	☐	☐	
XI. Internal standards				
Were internal standard area counts within $\pm 50\%$ of the associated calibration standard?	☒	☐	☐	
Were retention times within ± 30 seconds from the associated calibration standard?	☒	☐	☐	
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	☒	☐	☐	
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	☒	☐	☐	
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	☒	☐	☐	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	☒	☐	☐	
Were chromatogram peaks verified and accounted for?	☒	☐	☐	
XIV. System performance				
System performance was found to be acceptable.	☒	☐	☐	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	☒	☐	☐	

LDC# 3797H96**VALIDATION FINDINGS WORKSHEET**
Field DuplicatesPage: 1 of 1
Reviewer: Q
2nd Reviewer: JR**METHOD:** LCMS PFCs (EPA Method 537)

Compound	Concentration (ng/L)		(≤20) RPD	Difference	Limits	Qual
	6	7				
PFOS	5.39	5.33		0.06	≤8.19	

V:\FIELD DUPLICATES\37797H96.wpd

LDC#: 37797G96VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation VerificationPage: 1 of 1
Reviewer: Q
2nd Reviewer: NB

Method: LC/MS/MS PFCs

Calibration Date	System	Compound	Standard	(Y) Response	(X) Concentration
11/22/2016	LCMS03	PFOA	0	0.5677075	0.50
			s1	0.9756087	1.00
			s2	1.8279562	2.00
			s3	4.0526312	5.00
			s4	9.8076912	10.00
			s5	23.514343	25.00
			s6	45.372340	50.00
			s7	68.277310	75.00
			s8	88.133640	100.00

Regression Output

Reported

Constant	0.384668	0.091734
Std Err of Y Est		
R Squared	0.999416	0.999048
Degrees of Freedom		
X Coefficient(s)	0.890381	0.899906
Std Err of Coef.		
Correlation Coefficient	0.999708	
Coefficient of Determination (r^2)	0.999416	0.999048

LDC #: 31971-96

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: 9
2nd Reviewer: NR

METHOD: GC ✓ HPLC NR

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = $100 * (\text{ave. CF} - \text{CF}) / \text{ave. CF}$
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(lcal)/ CCV Conc.	Reported	Recalculated	Reported	Recalculated
					CF/Conc. CCV	CF/Conc. CCV	%D	%D
1	161211-2	11/5T/16	PTOA	25.0	26.5	26.5	5.9	5.8
2	161211-4	11/5T/16	PTOA	25.0	27.4	27.4	9.4	9.6
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 31796/16

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results VerificationPage: 1 of 1Reviewer: Q2nd Reviewer: NEMETHOD: GC ☒ HPLC MS

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 * (SSC - SC) / SA$

Where: SSC = Spiked sample concentration

SC = Concentration

SA = Spike added

RPD = $|SSCLCS - SSCLCSD| * 2 / (SSCLCS + SSCLCSD)$

LCS = Laboratory control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: OPR

Compound	Spike Added (115/4)		Spiked Sample Concentration (115/4)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)										
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										
<u>PTOA</u>	<u>80%</u>	<u>NA</u>	<u>86%</u>	<u>NA</u>	<u>107</u>	<u>107</u>				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC # 3196196VALIDATION FINDINGS WORKSHEET
Sample Calculation VerificationPage: 1 of 1
Reviewer: P
2nd Reviewer: NRMETHOD: GC ☒ HPLC NR☒ Y ☐ N ☐ N/A
☒ Y ☐ N ☐ N/A

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

Example:

Sample ID. 2 Compound Name PFOAConcentration = $\frac{(9.94e3 \times 12.5)}{(2.61e4 - 0.0917344)} = 40.44 \text{ ng/L}$
 $(0.899906)(0.128)$

Total = 46.9 ng/L

#	Sample ID	Compound	Reported Concentrations ()	Recalculated Results Concentrations ()	Qualifications

omments: _____

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: MCAS Yuma

LDC Report Date: January 4, 2017

Parameters: Perfluorinated Alkyl Acids

Validation Level: Stage 2B

Laboratory: Vista Analytical Laboratory

Sample Delivery Group (SDG): 1601464

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW53-20161116	1601464-02	Water	11/16/16
OUA1-MW54-20161116	1601464-03	Water	11/16/16
OUA1-MW42-20161116	1601464-04	Water	11/16/16
OUA1-MW01-20161116	1601464-05	Water	11/16/16
OUA1-MW31-20161116	1601464-06	Water	11/16/16
OUA1-PZ19-20161116	1601464-07	Water	11/16/16
OUA1-MW52-20161116	1601464-08	Water	11/16/16
OUA1-MW04-20161116	1601464-09	Water	11/16/16
OUA1-MW04A-20161116	1601464-10	Water	11/16/16
OUA1-MW05-20161116	1601464-11	Water	11/16/16

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 3 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (February 2017), the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluorinated Alkyl Acids by Environmental Protection Agency (EPA) Method 537

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NJ (Presumptive and Estimated): The analysis indicates the presence of a compound or analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance was not required by the method.

III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all compounds.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
B6K0164-BLK1	11/28/16	PFOA	0.916 ng/L	All samples in SDG 1601464

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
OUA1-MW01-20161116	PFOA	1.40 ng/L	1.95U ng/L
OUA1-MW05-20161116	PFOA	0.859 ng/L	1.94U ng/L

VI. Field Blanks

Sample EB03-20161116 was identified as an equipment blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Compound	Concentration	Associated Samples
EB03-20161116	11/16/16	PFOA	0.837 ng/L	All samples in SDG 1601464

Sample SB01-20161114 (from SDG 1601451) was identified as a source blank. No contaminants were found.

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
OUA1-MW01-20161116	PFOA	1.40 ng/L	1.95U ng/L
OUA1-MW05-20161116	PFOA	0.859 ng/L	1.94U ng/L

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Ongoing Precision Recovery Samples

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples OUA1-MW04-20161116 and OUA1-MW04A-20161116 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/L)		RPD (Limits)	Difference (Limits)	Flag	A or P
	OUA1-MW04-20161116	OUA1-MW04A-20161116				
PFBS	157	162	3 (≤ 20)	-	-	-
PFOA	20.0	22.1	10 (≤ 20)	-	-	-
PFOS	2.50	2.83	-	0.33 (≤ 8.34)	-	-

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

Due to equipment blank contamination, data were qualified as not detected in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma
Perfluorinated Alkyl Acids - Data Qualification Summary - SDG 1601464

No Sample Data Qualified in this SDG

MCAS Yuma
Perfluorinated Alkyl Acids - Laboratory Blank Data Qualification Summary - SDG 1601464

Sample	Compound	Modified Final Concentration	A or P
OUA1-MW01-20161116	PFOA	1.95U ng/L	A
OUA1-MW05-20161116	PFOA	1.94U ng/L	A

MCAS Yuma
Perfluorinated Alkyl Acids - Field Blank Data Qualification Summary - SDG 1601464

Sample	Compound	Modified Final Concentration	A or P
OUA1-MW01-20161116	PFOA	1.95U ng/L	A
OUA1-MW05-20161116	PFOA	1.94U ng/L	A

METHOD: LC/MS Perfluorinated Alkyl Acids (EPA Method 537)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	N	
III.	Initial calibration/ICV	A, A	$RSR \leq 15\%$. Y^2 $ICV \leq 35\%$
IV.	Continuing calibration	A	$QC \text{ limits} \leq 30\%$
V.	Laboratory Blanks	TW	
VI.	Field blanks	TW	EB=1. SB01-20161114 (1601451)
VII.	Surrogate spikes		
VIII.	Matrix spike/Matrix spike duplicates	AN	
IX.	Laboratory control samples	A	OPR
X.	Field duplicates	TW	$S = 9+10$
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank

	Client ID	Lab ID	Matrix	Date
1	EB03-20161116	1601464-01	Water	11/16/16
2	OUA1-MW53-20161116	1601464-02	Water	11/16/16
3	OUA1-MW54-20161116	1601464-03	Water	11/16/16
4	OUA1-MW42-20161116	1601464-04	Water	11/16/16
5	OUA1-MW01-20161116	1601464-05	Water	11/16/16
6	OUA1-MW31-20161116	1601464-06	Water	11/16/16
7	OUA1-PZ19-20161116	1601464-07	Water	11/16/16
8	OUA1-MW52-20161116	1601464-08	Water	11/16/16
9	OUA1-MW04-20161116	1601464-09	Water	11/16/16
10	OUA1-MW04A-20161116	1601464-10	Water	11/16/16
11	OUA1-MW05-20161116	1601464-11	Water	11/16/16
12				
13				
14				

VALIDATION FINDINGS WORKSHEET

BlanksMETHOD: √ GC-MS

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

- ☒ N N/A Were all samples associated with a given method blank?
- ☒ N N/A Was a method blank performed for each matrix and whenever a sample extraction procedure was performed?
- ☒ N N/A Was a method blank performed with each extraction batch?
- ☒ N N/A Were any contaminants found in the method blanks? If yes, please see findings below.

Blank extraction date: 11/28/16 Blank analysis date: 11/29/16Conc. units: 115/LAssociated samples: W

Compound	Blank ID	Sample Identification							
	~~BK0164-BK15X~~	5	11						
PFOA	0.916	4.58	1.40/ 1.95U	0.859/ 1.94U					

Blank extraction date: _____ Blank analysis date: _____

Associated samples: _____

Conc. units: _____

Compound	Blank ID	Sample Identification							

ALL CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

All contaminants within five times the method blank concentration were qualified as not detected, "U".

VALIDATION FINDINGS WORKSHEET
Field BlanksMETHOD: GC LC/MSY N N/A Field blanks were identified in this SDG.Y N N/A Were target compounds detected in the field blanks?Blank units: 15/L Associated sample units: 12/LSampling date: 1/16/16Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: ml

Compound	Blank ID	Sample Identification							
	<u>1</u>	<u>5X</u>	<u>5</u>	<u>11</u>					
<u>PF2A</u>	<u>0.837</u>	<u>4.185</u>	<u>1.40/</u>	<u>0.859/</u>					
			<u>1.95U</u>	<u>1.94U</u>					

Blank units: _____ Associated sample units: _____

Sampling date: _____

Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification							

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC#: 37797196

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
 Reviewer: [Signature]
 2nd Reviewer: JL

METHOD: LCMS PFCs (EPA Method 537)

Compound	Concentration (ng/L)		(≤20) RPD	Difference	Limits	Qual
	9	10				
PFBS	157	162	3			
PFOA	20.0	22.1	10			
PFOS	2.50	2.83		0.33	≤8.34	

V:\FIELD DUPLICATES\37797196.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: MCAS Yuma

LDC Report Date: January 5, 2017

Parameters: Perfluorinated Alkyl Acids

Validation Level: Stage 2B & 4

Laboratory: Vista Analytical Laboratory

Sample Delivery Group (SDG): 1601472

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
OUA1-MW51-20161117	1601472-02	Water	11/17/16
OUA1-MW50-20161117	1601472-03	Water	11/17/16
OUA1-MW49-20161117**	1601472-04**	Water	11/17/16
OUA1-MW49-20161117MS	1601472-04MS	Water	11/17/16
OUA1-MW49-20161117MSD	1601472-04MSD	Water	11/17/16

**Indicates sample underwent Stage 4 validation

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Addendum 3 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (February 2017), the Final Addendum 2 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (September 2015), the Final Addendum 1 to the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, for Groundwater Long Term Monitoring and System Operation at Marine Corps Air Station Yuma, Yuma, Arizona (May 2013), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.0 (July 2013), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines (CLPNFG) for Superfund Organic Methods Data Review (August 2014). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluorinated Alkyl Acids by Environmental Protection Agency (EPA) Method 537

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results. Samples appended with a double asterisk on the cover page were subjected to Stage 4 data validation, which is comprised of the QC summary forms as well as the raw data, to confirm sample quantitation and identification.

The following are definitions of the data qualifiers utilized during data validation:

- J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.
- U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).
- UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.
- R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.
- NJ (Presumptive and Estimated): The analysis indicates the presence of a compound or analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance was checked as applicable.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, the percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all compounds.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
BLK0164-BLK1	11/28/16	PFOA	0.916 ng/L	All samples in SDG 1601472

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
OUA1-MW49-20161117**	PFOA	0.821 ng/L	1.98U ng/L

VI. Field Blanks

Sample EB04-20161117 was identified as an equipment blank. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Compound	Concentration	Associated Samples
EB04-20161117	11/17/16	PFOA	0.741 ng/L	All samples in SDG 1601472

Sample SB01-20161114 (from SDG 1601451) was identified as a source blank. No contaminants were found.

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
OUA1-MW49-20161117**	PFOA	0.821 ng/L	1.98U ng/L

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VIII. Ongoing Precision Recovery Samples

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Compound Quantitation

All compound quantitations met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XII. Target Compound Identifications

All target compound identifications met validation criteria for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

The system performance was acceptable for samples which underwent Stage 4 validation. Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to laboratory blank contamination, data were qualified as not detected in one sample.

Due to equipment blank contamination, data were qualified as not detected in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Based upon the data validation all other results are considered valid and usable for all purposes.

MCAS Yuma**Perfluorinated Alkyl Acids - Data Qualification Summary - SDG 1601472**

No Sample Data Qualified in this SDG

MCAS Yuma**Perfluorinated Alkyl Acids - Laboratory Blank Data Qualification Summary - SDG 1601472**

Sample	Compound	Modified Final Concentration	A or P
OUA1-MW49-20161117**	PFOA	1.98U ng/L	A

MCAS Yuma**Perfluorinated Alkyl Acids - Field Blank Data Qualification Summary - SDG 1601472**

Sample	Compound	Modified Final Concentration	A or P
OUA1-MW49-20161117**	PFOA	1.98U ng/L	A

METHOD: LC/MS Perfluorinated Alkyl Acids (EPA Method 537)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	N	
III.	Initial calibration/ICV	A A	$RSO \leq 15\%$ $ICV \leq 30\%$
IV.	Continuing calibration	A	$RC \text{ limits} \leq 30\%$
V.	Laboratory Blanks	W	
VI.	Field blanks	W	EB=1. SB01-20161114(1601451)
VII.	Surrogate spikes		
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	DPR
X.	Field duplicates	N	
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	A	Not reviewed for Stage 2B validation.
XIII.	Target compound identification	A	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

SB=Source blank
OTHER:

** Indicates sample was underwent Stage 4 review

	Client ID	Lab ID	Matrix	Date
1	EB04-20161117	1601472-01	Water	11/17/16
2	OUA1-MW51-20161117	1601472-02	Water	11/17/16
3	OUA1-MW50-20161117	1601472-03	Water	11/17/16
4	OUA1-MW49-20161117**	1601472-04**	Water	11/17/16
5	OUA1-MW49-20161117MS	1601472-04MS	Water	11/17/16
6	OUA1-MW49-20161117MSD	1601472-04MSD	Water	11/17/16
7				
8				
9				
10				

Notes:

Method: LCMS (EPA Method 537)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	☒	☐	☐	
Was cooler temperature criteria met?	☒	☐	☐	
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the specified criteria?	☐	☐	☒	
Were all samples analyzed within the 12 hour clock criteria?	☒	☐	☐	
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	☒	☐	☐	
Were all percent relative standard deviations (%RSD) $\leq 15\%$?	☒	☐	☐	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of > 0.990 ?	☒	☐	☐	
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	☒	☐	☐	
Were all percent differences (%D) $\leq 15\%$?	☒	☐	☐	
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	☒	☐	☐	
Were all percent differences (%D) of the continuing calibration $\leq 15\%$?	☒	☐	☐	
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	☒	☐	☐	
Was a laboratory blank analyzed for each matrix and concentration?	☒	☐	☐	
Was there contamination in the laboratory blanks? If yes, please see the Blanks validation completeness worksheet.	☒	☐	☐	
VI. Field blanks				
Were field blanks identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field blanks?	☒	☐	☐	
VIII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	☒	☐	☐	
Was a MS/MSD analyzed every 20 samples of each matrix?	☒	☐	☐	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	☒	☐	☐	
IX. Laboratory control samples				
Was an LCS analyzed for this SDG?	☒	☐	☐	
Was an LCS analyzed per extraction batch?	☒	☐	☐	

LDC #: 3199196

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 9
2nd Reviewer: NB

Validation Area	Yes	No	NA	Findings/Comments
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	☒	☐	☐	
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	☒	☐	☐	
Were target compounds detected in the field duplicates?	☐	☐	☒	
XI. Internal standards				
Were internal standard area counts within $\pm 50\%$ of the associated calibration standard?	☒	☐	☐	
Were retention times within ± 30 seconds from the associated calibration standard?	☒	☐	☐	
XII. Compound quantitation				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	☒	☐	☐	
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	☒	☐	☐	
XIII. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	☒	☐	☐	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	☒	☐	☐	
Were chromatogram peaks verified and accounted for?	☒	☐	☐	
XIV. System performance				
System performance was found to be acceptable.	☒	☐	☐	
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	☒	☐	☐	

VALIDATION FINDINGS WORKSHEET
BlanksMETHOD: VG 10/19

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

- ☒ Y ☐ N ☐ N/A Were all samples associated with a given method blank?
- ☒ Y ☐ N ☐ N/A Was a method blank performed for each matrix and whenever a sample extraction procedure was performed?
- ☒ Y ☐ N ☐ N/A Was a method blank performed with each extraction batch?
- ☒ Y ☐ N ☐ N/A Were any contaminants found in the method blanks? If yes, please see findings below.

Blank extraction date: 11/28/16 Blank analysis date: 11/29/16Conc. units: 115/LAssociated samples: 111

Compound	Blank ID	Sample Identification							
	<u>B410164-BK1</u>	<u>4</u>							
<u>PFOA</u>	<u>0.916</u>	<u>0.821</u>							
		<u>1.98U</u>							

Blank extraction date: _____ Blank analysis date: _____

Associated samples: _____

Conc. units: _____

Compound	Blank ID	Sample Identification							

ALL CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 3199146**VALIDATION FINDINGS WORKSHEET**
Field BlanksPage: 1 of 1Reviewer: Q2nd Reviewer: NEMETHOD: GC LC/MS☒ N/A Field blanks were identified in this SDG.☒ N/A Were target compounds detected in the field blanks?Blank units: NS/L Associated sample units: NS/LSampling date: 11/17/16Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: U

Compound	Blank ID	Sample Identification							
	1	4.2							
PFCA	0.741	0.821							
		1.984							

Blank units: _____ Associated sample units: _____

Sampling date: _____

Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification							

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC #: 3TT9T196

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: G
2nd Reviewer: NB

METHOD: GC ✓ HPLC NB

The percent difference (%D) of the initial calibration average Calibration Factors (CF) and the continuing calibration CF were recalculated for the compounds identified below using the following calculation:

% Difference = $100 * (\text{ave. CF} - \text{CF}) / \text{ave. CF}$
CF = A/C

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(lcal)/ CCV Conc.	Reported	Recalculated	Reported	Recalculated
					CF/Conc. CCV	CF/Conc. CCV	%D	%D
1	~~1129JL34~~	11/29/16	PFOS	25.0	25.0	25.05	0.1	0.2
2								
3								
4								

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Method: LC/MS/MS PFCs

Calibration Date	System	Compound	Standard	(Y) Response	(X) Concentration
11/18/2016	LCMS03	PFOS	0	0.60049	0.50
			s1	1.1604475	1.00
			s2	2.2448212	2.00
			s3	5.0137362	5.00
			s4	12.566843	10.00
			s5	34.250763	25.00
			s6	54.687500	50.00
			s7	86.829836	75.00
			s8	111.555230	100.00

Regression Output**Reported**

Constant	0.841659	0.021829
Std Err of Y Est		
R Squared	0.996818	0.995038
Degrees of Freedom		
X Coefficient(s)	1.122290	1.149810
Std Err of Coef.		
Correlation Coefficient	0.998408	
Coefficient of Determination (r^2)	0.996818	0.995038

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification

METHOD: GC ☒ HPLC MS

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

$$\% \text{Recovery} = 100 * (\text{SSC} - \text{SC}) / \text{SA}$$

Where

SSC = Spiked sample concentration

SC = Sample concentration

SA = Spike added

MS = Matrix spike

MSD = Matrix spike duplicate

$$\text{RPD} = ((\text{SSCMS} - \text{SSCMSD}) * 2) / (\text{SSCMS} + \text{SSCMSD}) * 100$$

MS/MSD samples: 5/6

Compound	Spike Added (MS/L)		Sample Conc. (MS/L)	Spike Sample Concentration (MS/L)		Matrix spike		Matrix Spike Duplicate		MS/MSD	
	MS	MSD		MS	MSD	Percent Recovery		Percent Recovery		RPD	
						Reported	Recalc.	Reported	Recalc.	Reported	Recalc.

Gasoline (8015)											
Diesel (8015)											
Benzene (8021B)											
Methane (RSK-175)											
2,4-D (8151)											
Dinoseb (8151)											
Naphthalene (8310)											
Anthracene (8310)											
HMX (8330)											
2,4,6-Trinitrotoluene (8330)											
PROS	11.8	14.1	ND	87.4	18.8	112	112	106	106	5.50	5.50

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3195198

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results VerificationPage: 1 of 1Reviewer: JK2nd Reviewer: JKMETHOD: GC ☒ HPLC MS

The percent recoveries (%R) and Relative Percent difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = $100 * (SSC - SC) / SA$

Where: SSC = Spiked sample concentration

SC = Concentration

SA = Spike added

RPD = $|SSCLCS - SSCLCSD| * 2 / (SSCLCS + SSCLCSD)$

LCS = Laboratory control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: OPR

Compound	Spike Added (<u>113/4</u>)		Spiked Sample Concentration (<u>113/4</u>)		LCS		LCSD		LCS/LCSD	
					Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)										
Benzene (8021B)										
Methane (RSK-175)										
2,4-D (8151)										
Dinoseb (8151)										
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)										
<u>DDOS</u>	<u>80.0</u>	<u>NA</u>	<u>84.7</u>	<u>NA</u>	<u>106</u>	<u>106</u>				

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 3119196

VALIDATION FINDINGS WORKSHEET

Sample Calculation VerificationPage: 1 of 1Reviewer: 92nd Reviewer: JRMETHOD: GC ☒ HPLC MSY N N/A

Were all reported results recalculated and verified for all level IV samples?

Y N N/A

Were all recalculated results for detected target compounds agree within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

Example:

Sample ID: 4 Compound Name: PFOA

A= Area or height of the compound to be measured

Fv= Final Volume of extract

Df= Dilution Factor

RF= Average response factor of the compound

In the initial calibration

Vs= Initial volume of the sample

Ws= Initial weight of the sample

%S= Percent Solid

$$\text{Concentration} = \frac{-1.30489 + \sqrt{(1.30489)^2 - [4 \times (-0.00316403) \times \left(\frac{6.349e1 \times P.S}{624.1e1} - 0.00818696 \right)]}}{2 \times (-0.00316403) (0.126)}$$

$$= 0.823 \text{ ng/L}$$

#	Sample ID	Compound	Reported Concentrations (<u>ng/L</u>)	Recalculated Results Concentrations (<u> </u>)	Qualifications
	<u>4</u>	<u>PFOA</u>	<u>0.821</u>		

Comments: _____

The zip file contains two files:

<u>File</u>	<u>Format</u>	<u>Description</u>
1) Readme_Yuma_010617.docx	MS Word	A "Readme" file (this document).
2) Validation Export_Nov2016_20161219.xlsx	MS Excel	<u>A spreadsheet for the following SDGs:</u>
		280-90987-1 37797A
		280-91067-1 37797B
		280-91122-1 37797C
		280-91192-1 37797D
		1601451 37797G
		1601461 37797H
		1601464 37797I
		1601472 37797J
3) ValExp_Yuma_VCT_Nov2016_20161215.xlsx		280-91405-1 37797E
4) ValExp_Yuma_VCT_Nov2016PFAS_20161219.xlsx		1601443 37797F

No discrepancies were observed between the hardcopy data packages and the electronic data deliverables during EDD population of validation qualifiers. A 100% verification of the EDD was not performed.

Please contact Pei Geng at (760) 827-1100 if you have any questions regarding this electronic data submittal.

LDC #: 37797

EDD POPULATION COMPLETENESS WORKSHEET

Date: 1/6/17
Page: 1 of 1
2nd Reviewer: BAThe LDC job number listed above was entered by JE.

	EDD Process		Comments/Action
I.	EDD Completeness	-	
Ia.	- All methods present?	Y	
Ib.	- All samples present/match report?	Y	
Ic.	- All reported analytes present?	Y	
Id.	- <u>10%</u> or 100% verification of EDD?	Y	
II.	EDD Preparation/Entry	-	
IIa.	- Carryover U/J?	-	
IIb.	- Reason Codes used? If so, note which codes.	Y	client
IIc.	- Additional Information (QC Level, Validator, Validated Y/N, etc.)	Y	
III.	Reasonableness Checks	-	
IIIa.	- Do all qualified ND results have ND qualifier (e.g. UJ)?	Y	
IIIb.	- Do all qualified detect results have detect qualifier (e.g. J)?	Y	
IIIc.	- If reason codes are used, do all qualified results have reason code field populated, and vice versa?	Y	
IIId.	- Does the detect flag require changing for blank qualifier? If so, are all U results marked ND?	Y/Y	
IIIe.	- Do blank concentrations in report match EDD where data was qualified due to blank contamination?	Y	
IIIf.	- Were any results reported above calibration range? If so, were results qualified appropriately?	Y/Y	
IIIg.	- Is the readme complete? If applicable, were edits or discrepancies listed in the readme?	Y	

Notes: *see discrepancy sheet

The zip file contains two files:

<u>File</u>	<u>Format</u>	<u>Description</u>
1) Readme_Yuma_010617.docx	MS Word	A "Readme" file (this document).
2) Validation Export_Nov2016_20161219.xlsx	MS Excel	<u>A spreadsheet for the following SDGs:</u>
		280-90987-1 37797A
		280-91067-1 37797B
		280-91122-1 37797C
		280-91192-1 37797D
		1601451 37797G
		1601461 37797H
		1601464 37797I
		1601472 37797J
3) ValExp_Yuma_VCT_Nov2016_20161215.xlsx		280-91405-1 37797E
4) ValExp_Yuma_VCT_Nov2016PFAS_20161219.xlsx		1601443 37797F

No discrepancies were observed between the hardcopy data packages and the electronic data deliverables during EDD population of validation qualifiers. A 100% verification of the EDD was not performed.

Please contact Pei Geng at (760) 827-1100 if you have any questions regarding this electronic data submittal.

LDC #: 37797

EDD POPULATION COMPLETENESS WORKSHEET

Date: 1/6/17
Page: 1 of 1
2nd Reviewer: BAThe LDC job number listed above was entered by JE.

	EDD Process		Comments/Action
I.	EDD Completeness	-	
Ia.	- All methods present?	Y	
Ib.	- All samples present/match report?	Y	
Ic.	- All reported analytes present?	Y	
Id.	- <u>10%</u> or 100% verification of EDD?	Y	
II.	EDD Preparation/Entry	-	
IIa.	- Carryover U/J?	-	
IIb.	- Reason Codes used? If so, note which codes.	Y	client
IIc.	- Additional Information (QC Level, Validator, Validated Y/N, etc.)	Y	
III.	Reasonableness Checks	-	
IIIa.	- Do all qualified ND results have ND qualifier (e.g. UJ)?	Y	
IIIb.	- Do all qualified detect results have detect qualifier (e.g. J)?	Y	
IIIc.	- If reason codes are used, do all qualified results have reason code field populated, and vice versa?	Y	
IIId.	- Does the detect flag require changing for blank qualifier? If so, are all U results marked ND?	Y/Y	
IIIe.	- Do blank concentrations in report match EDD where data was qualified due to blank contamination?	Y	
IIIf.	- Were any results reported above calibration range? If so, were results qualified appropriately?	Y/Y	
IIIg.	- Is the readme complete? If applicable, were edits or discrepancies listed in the readme?	Y	

Notes: *see discrepancy sheet

INSTALLATION_ID	SDG	LOCATION-NAME	SITE_NAME	INSTALLATION_ID	LOCATION_TYPE	LOCATION_TYPE_DESC	COORD_X	COORD_Y	SAMPLE_NAME	SAMPLE_MATRIX	SAMPLE_MATRIC_DESC	COLLECT_DATE	CHEMICAL_NAME
MCAS YUMA	1601472	A1-MW-50	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436424.214	607790.973	OUA1-MW50-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorooctanesulfonic Acid (PFOS)
MCAS YUMA	1601472	A1-MW-50	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436424.214	607790.973	OUA1-MW50-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorooctanoic Acid (PFOA)
MCAS YUMA	1601472	A1-MW-50	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436424.214	607790.973	OUA1-MW50-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorobutanesulfonic Acid (PFBS)
MCAS YUMA	1601472	A1-MW-49A	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436416.958	607790.698	OUA1-MW49-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorooctanesulfonic Acid (PFOS)
MCAS YUMA	1601472	A1-MW-49A	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436416.958	607790.698	OUA1-MW49-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorooctanoic Acid (PFOA)
MCAS YUMA	1601472	A1-MW-49A	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436416.958	607790.698	OUA1-MW49-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorobutanesulfonic Acid (PFBS)
MCAS YUMA	1601472	A1-MW-51	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436441.752	607789.623	OUA1-MW51-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorooctanesulfonic Acid (PFOS)
MCAS YUMA	1601472	A1-MW-51	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436441.752	607789.623	OUA1-MW51-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorooctanoic Acid (PFOA)
MCAS YUMA	1601472	A1-MW-51	OU 0000001 AREA 1	YUMA_MCAS	WLM	MONITORING WELL	436441.752	607789.623	OUA1-MW51-20161117	WG	GROUNDWATER	17-Nov-16	Perfluorobutanesulfonic Acid (PFBS)