

Off-Base Drinking Water Sample Results, Level 2 Laboratory Report, Level 4 Laboratory Report, Electronic Data Deliverable, Data Validation Report, and the Sample Location Figure, SDG J18918-1

Naval Air Station Oceana Virginia Beach, Virginia

July 2019



THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Sacramento 880 Riverside Parkway West Sacramento, CA 95605 Tel: (916)373-5600

TestAmerica Job ID: 320-18918-1

Client Project/Site: NAS Oceana, VA - 9000 CTO-WE01

For:

CH2M Hill Constructors, Inc. 1100 NE Circle Blvd Corvallis, Oregon 97330

Attn: Tiffany Hill

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Authorized for release by: 5/31/2016 12:23:22 PM

Laura Turpen, Project Manager I (916)374-4414

laura.turpen@testamericainc.com

·····LINKS ······

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

TestAmerica Job ID: 320-18918-1

Qualifiers

LCMS

Qualifier	Qualifier Description
Q	One or more quality control criteria failed.
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
M	Manual integrated compound.

Glossary

TEF

TEQ

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

TestAmerica Sacramento

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5/31/2016

Case Narrative

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Job ID: 320-18918-1

Laboratory: TestAmerica Sacramento

Narrative

CASE NARRATIVE

Client: CH2M Hill Constructors, Inc.

Project: NAS Oceana, VA - 9000 CTO-WE01

Report Number: 320-18918-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica West Sacramento attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the applicable methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

TestAmerica utilizes USEPA approved methods and DOD QSM, where applicable, in all analytical work. The samples presented in this report were analyzed for the parameter(s) listed on the analytical methods summary page in accordance with the method(s) indicated. A summary of QC data for these analyses is included at the back of the report.

All parameters for which TestAmerica West Sacramento has certification were evaluated to the QSM specified reporting convention or to the client specified format if different from QSM. Parameters not certified under QSM, if any, were evaluated to the detection limit (DL) and include qualified results where applicable.

The sample(s) that contain constituents flagged with U are undetected. The result associated with this flag is the limit of detection (LOD).

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 05/17/2016; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 3.1 C.

PFC

Samples OF-RW83-0516 (320-18918-1) and OF-FB83-0516 (320-18918-2) were analyzed for PFC in accordance with PFC. The samples were prepared on 05/20/2016 and analyzed on 05/27/2016.

The level 1 standard from the ICAL is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5 amu, so detection of the analyte serves as verification that the assigned mass is within +/- 0.5 amu of the true value, which meets the DOD tune criterion. (ICV 320-111733/10)

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Case Narrative

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Job ID: 320-18918-1 (Continued)

Laboratory: TestAmerica Sacramento (Continued)

The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit: OF-RW83-0516 (320-18918-1), OF-FB83-0516 (320-18918-2) and (LCSD 320-110721/3-A). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with analytical batch 320-110721.

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

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Detection Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Client Sample ID: OF-RW83-0516 Lab Sample ID: 320-18918-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.00095	J	0.0024	0.00084	ug/L	1	_	WS-LC-0025	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.0094	M	0.0039	0.0012	ug/L	1		WS-LC-0025	Total/NA

Client Sample ID: OF-FB83-0516 Lab Sample ID: 320-18918-2

No Detections.

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Client Sample Results

Client: CH2M Hill Constructors, Inc.

Date Collected: 05/16/16 08:22

Date Received: 05/17/16 09:15

Client Sample ID: OF-RW83-0516

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

Lab Sample ID: 320-18918-1

Matrix: Water

TestAmerica Job ID: 320-18918-1

Method: WS-LC-0025 - Perfluorinated Hydrocarbons DL Unit Analyte Result Qualifier LOQ Dil Fac D Prepared Analyzed Perfluoroheptanoic acid (PFHpA) 0.0019 U 0.0024 0.00077 ug/L 05/20/16 11:05 05/27/16 21:54 Perfluorooctanoic acid (PFOA) 0.0019 U 0.0024 0.00072 ug/L 05/20/16 11:05 05/27/16 21:54 Perfluorononanoic acid (PFNA) 0.0019 U 0.0024 0.00063 ug/L 05/20/16 11:05 05/27/16 21:54 Perfluorobutanesulfonic acid (PFBS) 0.0019 U 0.0024 0.00088 ug/L 05/20/16 11:05 05/27/16 21:54 0.00084 ug/L Perfluorohexanesulfonic acid 0.00095 J 0.0024 05/20/16 11:05 05/27/16 21:54 (PFHxS) 0.0012 ug/L Perfluorooctanesulfonic acid 0.0094 M 0.0039 05/20/16 11:05 05/27/16 21:54 (PFOS) Isotope Dilution %Recovery Qualifier Limits Prepared Dil Fac Analyzed 1802 PFHxS 47 25 - 150 05/20/16 11:05 05/27/16 21:54 7 13C4 PFOS 0 25 - 150 05/20/16 11:05 05/27/16 21:54 13C5 PFNA 64 25 - 150 05/20/16 11:05 05/27/16 21:54 13C4 PFOA 74 25 - 150 05/20/16 11:05 05/27/16 21:54 13C4-PFHpA 75 25 - 150 05/20/16 11:05 05/27/16 21:54

Client Sample ID: OF-FB83-0516 Lab Sample ID: 320-18918-2

Date Collected: 05/16/16 08:15 **Matrix: Water**

Date Received: 05/17/16 09:15

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0019	U	0.0024	0.00078	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorooctanoic acid (PFOA)	0.0019	U	0.0024	0.00073	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorononanoic acid (PFNA)	0.0019	UM	0.0024	0.00064	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0024	0.00089	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0024	0.00085	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorooctanesulfonic acid (PFOS)	0.0029	UM	0.0039	0.0012	ug/L		05/20/16 11:05	05/27/16 22:15	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1802 PFHxS	84		25 - 150				05/20/16 11:05	05/27/16 22:15	1
13C4 PFOS	24	Q	25 - 150				05/20/16 11:05	05/27/16 22:15	1
13C5 PFNA	100		25 - 150				05/20/16 11:05	05/27/16 22:15	1
13C4 PFOA	106		25 - 150				05/20/16 11:05	05/27/16 22:15	1
13C4-PFHpA	96		25 - 150				05/20/16 11:05	05/27/16 22:15	1

Isotope Dilution Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Matrix: Water Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Lin							
		BO2 PFHx	3C4 PFOS	3C5 PFN/	3C4 PFO	3C4-PFHp			
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)			
320-18918-1	OF-RW83-0516	47	7 Q	64	74	75			
320-18918-2	OF-FB83-0516	84	24 Q	100	106	96			
LCS 320-110721/2-A	Lab Control Sample	101	126	91	92	95			
LCSD 320-110721/3-A	Lab Control Sample Dup	84	107	82	83	81			
MB 320-110721/1-A	Method Blank	107	127	97	105	97			

Surrogate Legend

1802 PFHxS = 1802 PFHxS

13C4 PFOS = 13C4 PFOS

13C5 PFNA = 13C5 PFNA

13C4 PFOA = 13C4 PFOA

13C4-PFHpA = 13C4-PFHpA

TestAmerica Job ID: 320-18918-1

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Lab Sample ID: MB 320-110721/1-A

Matrix: Water

Analysis Batch: 111733

Client Sample ID: Method Blank Prep Type: Total/NA

Prep Batch: 110721

•	MB	MB						•	
Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.00080	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.00075	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorononanoic acid (PFNA)	0.0020	U	0.0025	0.00065	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.00092	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.00087	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorooctanesulfonic acid (PFOS)	0.0030	UM	0.0040	0.0013	ug/L		05/20/16 11:05	05/27/16 17:18	1
	MB	MB							

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1802 PFHxS	107		25 - 150	05/20/16 11:05	05/27/16 17:18	1
13C4 PFOS	127		25 - 150	05/20/16 11:05	05/27/16 17:18	1
13C5 PFNA	97		25 - 150	05/20/16 11:05	05/27/16 17:18	1
13C4 PFOA	105		25 - 150	05/20/16 11:05	05/27/16 17:18	1
13C4-PFHpA	97		25 - 150	05/20/16 11:05	05/27/16 17:18	1

Lab Sample ID: LCS 320-110721/2-A

Lab Sample ID: LCSD 320-110721/3-A

Matrix: Water

Matrix: Water

Analysis Batch: 111722

Analysis Batch: 111733

Client Sample ID: Lab Control Sample

Prep Type: Total/NA **Prep Batch: 110721**

%Rec.

LCS LCS Spike Added Result Qualifier Unit D %Rec Limits Perfluoroheptanoic acid (PFHpA) 0.0400 0.0305 76 60 - 140 ug/L Perfluorooctanoic acid (PFOA) 0.0400 0.0326 ug/L 81 60 - 140 Perfluorononanoic acid (PFNA) 0.0400 0.0340 85 60 - 140 ug/L Perfluorobutanesulfonic acid 0.0354 0.0273 ug/L 77 50 - 150 (PFBS) 0.0364 0.0288 M 79 60 - 140 Perfluorohexanesulfonic acid ug/L (PFHxS) 0.0371 0.0261 M 70 60 - 140 ug/L Perfluorooctanesulfonic acid (PFOS)

LCS LCS

Isotope Dilution	%Recovery	Qualifier	Limits
1802 PFHxS	101		25 - 150
13C4 PFOS	126		25 - 150
13C5 PFNA	91		25 - 150
13C4 PFOA	92		25 - 150
13C4-PFHpA	95		25 - 150

Client Sample ID: Lab Control Sample Dup

Pren Batch: 110721

Prep Type: Total/NA

Analysis batch: TTT733							Prep Da	aten: T	10/21
	Spike	LCSD	LCSD				%Rec.		RPD
Analyte	Added	Result	Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Perfluoroheptanoic acid (PFHpA)	0.0400	0.0318		ug/L		80	60 - 140	4	30
Perfluorooctanoic acid (PFOA)	0.0400	0.0305		ug/L		76	60 - 140	6	30
Perfluorononanoic acid (PFNA)	0.0400	0.0334		ug/L		84	60 - 140	2	30
Perfluorobutanesulfonic acid (PFBS)	0.0354	0.0291		ug/L		82	50 - 150	7	30
Perfluorohexanesulfonic acid (PFHxS)	0.0364	0.0314	M	ug/L		86	60 - 140	9	30
Perfluorooctanesulfonic acid	0.0371	0.0284	M	ug/L		76	60 - 140	8	30

TestAmerica Sacramento

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QC Sample Results

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

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Isotope Dilution	%Recovery	Qualifier	Limits
1802 PFHxS	84		25 - 150
13C4 PFOS	107		25 - 150
13C5 PFNA	82		25 - 150
13C4 PFOA	83		25 - 150
13C4-PFHpA	81		25 - 150

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QC Association Summary

Client: CH2M Hill Constructors, Inc. Project/Site: NAS Oceana, VA - 9000 CTO-WE01

LCMS

Prep Batch: 110721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18918-1	OF-RW83-0516	Total/NA	Water	3535	
320-18918-2	OF-FB83-0516	Total/NA	Water	3535	
LCS 320-110721/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-110721/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
MB 320-110721/1-A	Method Blank	Total/NA	Water	3535	

Analysis Batch: 111733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18918-1	OF-RW83-0516	Total/NA	Water	WS-LC-0025	110721
320-18918-2	OF-FB83-0516	Total/NA	Water	WS-LC-0025	110721
LCS 320-110721/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025	110721
LCSD 320-110721/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025	110721
MB 320-110721/1-A	Method Blank	Total/NA	Water	WS-LC-0025	110721

TestAmerica Job ID: 320-18918-1

Lab Chronicle

Client: CH2M Hill Constructors, Inc.

Client Sample ID: OF-RW83-0516

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Lab Sample ID: 320-18918-1

Matrix: Water

Date Collected: 05/16/16 08:22 Date Received: 05/17/16 09:15

	Batch	Batch		Dil	Initial	Final	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Amount	Amount	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	3535			518.9 mL	1.0 mL	110721	05/20/16 11:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	518.9 mL	1.0 mL	111733	05/27/16 21:54	JRB	TAL SAC

Lab Sample ID: 320-18918-2 Client Sample ID: OF-FB83-0516

Matrix: Water

Date Collected: 05/16/16 08:15 Date Received: 05/17/16 09:15

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			514.7 mL	1.0 mL	110721	05/20/16 11:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	514.7 mL	1.0 mL	111733	05/27/16 22:15	JRB	TAL SAC

Laboratory References:

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

Certification Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Laboratory: TestAmerica Sacramento

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	01-31-17
Oregon	NELAP	10	4040	01-29-17

Laboratory: TestAmerica Denver

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-17
Oregon	NELAP	10	4025	01-09-17

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Method Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025	Perfluorinated Hydrocarbons	TAL SOP	TAL SAC

Protocol References:

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

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

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Sample Summary

Client: CH2M Hill Constructors, Inc. Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-18918-1	OF-RW83-0516	Water	05/16/16 08:22	05/17/16 09:15
320-18918-2	OF-FB83-0516	Water	05/16/16 08:15	05/17/16 09:15

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Temperature on Receipt 3.10 TestAmerica CTU-WED! THE LEADER IN ENVIRONMENTAL TESTING Drinking Water? YesK No□ Chain of Custody Record

TAL-4124 (1007)						
CHIM HILL	Project Manager	Effans Hil	H		Date 5-16-16	Chain of Custody Number 286006
and Sheet,		Telephone Number (Area Code)/Fax Number	J/Fax Number		Lab Number	Page of
Virginia RoachailtA 1/14	Site Contact		Laura Tursen		Analysis (Attach list if more space is needed)	
Project Name and Location (State) Features 5 DFC Salve (I'vg WED)	Carrier/Waybill Number]				Special Instructions/
Contract/Purchase Orden/Quote No.		Matrix	Containers & Preservatives	Ptd †		Conditions of Receipt
Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Time	IIOS PAS snoenby	HOBN PUZ HOBN IOH EONH FOSZH SBJdUQ	ઝ્કલ		
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					320-18918 Chain of Custody	
Possible Hazard Identification Non-Hazard	□ Unknown	Sample Disposal Return To Client	🔲 Disposal By Lab	Archive For	(A fee may be assoments (A fee may be assoment)	(A fee may be assessed if samples are retained longer than 1 month)
e Required 7 Days 14 Days	Days Other_		OC Requirements (Spacify)	necity)		
or milan	Date 5-16-16	10:30 AM	1. Received By	12 St A	T SAR	Date Time ST C
2. Reinquished By V	Date	Time	2. Received By			Date Time
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Comments Comments			i			

Login Sample Receipt Checklist

Client: CH2M Hill Constructors, Inc.

Job Number: 320-18918-1

Login Number: 18918 List Source: TestAmerica Sacramento

List Number: 1

Creator: Nelson, Kym D

Creator. Neison, Kylli D		
Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

Job Number: 320-18918-1

Job Description: NAS Oceana, VA - 9000 CTO-WE01

For:

CH2M Hill Constructors, Inc. 1100 NE Circle Blvd Corvallis, OR 97330

Attention: Tiffany Hill

Approved for release Laura Turpen Project Manager I 5/31/2016 12:25 PM

Laura Turpen, Project Manager I 880 Riverside Parkway, West Sacramento, CA, 95605 (916)374-4414 laura.turpen@testamericainc.com 05/31/2016

The test results in this report relate only to the samples in this report and meet all requirements of NELAC, with any exceptions noted. Pursuant to NELAP, this report shall not be reproduced except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Denver Project Manager.

The Lab Certification ID# is 4025.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

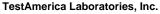






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Definitions/Glossary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

Qualifiers

	$\boldsymbol{\sim}$	R/	ıe
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Qualifier	Qualifier Description
Q	One or more quality control criteria failed.
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
M	Manual integrated compound.

Glossary

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

TestAmerica Job ID: 320-18918-1

CASE NARRATIVE

Client: CH2M Hill Constructors, Inc.

Project: NAS Oceana, VA - 9000 CTO-WE01

Report Number: 320-18918-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica West Sacramento attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the applicable methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

TestAmerica utilizes USEPA approved methods and DOD QSM, where applicable, in all analytical work. The samples presented in this report were analyzed for the parameter(s) listed on the analytical methods summary page in accordance with the method(s) indicated. A summary of QC data for these analyses is included at the back of the report.

All parameters for which TestAmerica West Sacramento has certification were evaluated to the QSM specified reporting convention or to the client specified format if different from QSM. Parameters not certified under QSM, if any, were evaluated to the detection limit (DL) and include qualified results where applicable.

The sample(s) that contain constituents flagged with U are undetected. The result associated with this flag is the limit of detection (LOD).

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 05/17/2016; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 3.1 C.

PFC

Samples OF-RW83-0516 (320-18918-1) and OF-FB83-0516 (320-18918-2) were analyzed for PFC in accordance with PFC. The samples were prepared on 05/20/2016 and analyzed on 05/27/2016.

The level 1 standard from the ICAL is used to evaluate the tune criteria. The instrument mass windows are set at +/- 0.5 amu, so detection of the analyte serves as verification that the assigned mass is within +/- 0.5 amu of the true value, which meets the DOD tune criterion. (ICV 320-111733/10)

The Isotope Dilution Analyte (IDA) recovery associated with the following samples is below the method recommended limit: OF-RW83-0516 (320-18918-1), OF-FB83-0516 (320-18918-2) and (LCSD 320-110721/3-A). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the samples.

Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with analytical batch 320-110721.

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

Detection Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Client Sample ID: OF-RW83-0516	Lab Sample ID: 320-18918-1

Analyte	Result	Qualifier	LOQ	DL	Unit	Dil Fac	D	Method	Prep Type
Perfluorohexanesulfonic acid (PFHxS)	0.00095	J	0.0024	0.00084	ug/L	1	_	WS-LC-0025	Total/NA
Perfluorooctanesulfonic acid (PFOS)	0.0094	M	0.0039	0.0012	ug/L	1		WS-LC-0025	Total/NA

Client Sample ID: OF-FB83-0516	Lab Sample ID: 320-18918-2

No Detections.

Client Sample Results

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Client Sample ID: OF-RW83-0516 Lab Sample ID: 320-18918-1

Date Collected: 05/16/16 08:22

Date Received: 05/17/16 09:15

Matrix: Water

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0019	U	0.0024	0.00077	ug/L		05/20/16 11:05	05/27/16 21:54	1
Perfluorooctanoic acid (PFOA)	0.0019	U	0.0024	0.00072	ug/L		05/20/16 11:05	05/27/16 21:54	1
Perfluorononanoic acid (PFNA)	0.0019	U	0.0024	0.00063	ug/L		05/20/16 11:05	05/27/16 21:54	1
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0024	0.00088	ug/L		05/20/16 11:05	05/27/16 21:54	1
Perfluorohexanesulfonic acid (PFHxS)	0.00095	J	0.0024	0.00084	ug/L		05/20/16 11:05	05/27/16 21:54	1
Perfluorooctanesulfonic acid (PFOS)	0.0094	M	0.0039	0.0012	ug/L		05/20/16 11:05	05/27/16 21:54	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1802 PFHxS	47		25 - 150				05/20/16 11:05	05/27/16 21:54	1
13C4 PFOS	7	Q	25 - 150				05/20/16 11:05	05/27/16 21:54	1
13C5 PFNA	64		25 - 150				05/20/16 11:05	05/27/16 21:54	1
13C4 PFOA	74		25 - 150				05/20/16 11:05	05/27/16 21:54	1
13C4-PFHpA	75		25 - 150				05/20/16 11:05	05/27/16 21:54	1

Client Sample ID: OF-FB83-0516 Lab Sample ID: 320-18918-2

Date Collected: 05/16/16 08:15 Matrix: Water Date Received: 05/17/16 09:15

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0019	U	0.0024	0.00078	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorooctanoic acid (PFOA)	0.0019	U	0.0024	0.00073	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorononanoic acid (PFNA)	0.0019	UM	0.0024	0.00064	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0024	0.00089	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorohexanesulfonic acid (PFHxS)	0.0019	U	0.0024	0.00085	ug/L		05/20/16 11:05	05/27/16 22:15	1
Perfluorooctanesulfonic acid (PFOS)	0.0029	UM	0.0039	0.0012	ug/L		05/20/16 11:05	05/27/16 22:15	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
1802 PFHxS	84		25 - 150				05/20/16 11:05	05/27/16 22:15	1
13C4 PFOS	24	Q	25 - 150				05/20/16 11:05	05/27/16 22:15	1
13C5 PFNA	100		25 - 150				05/20/16 11:05	05/27/16 22:15	1
13C4 PFOA	106		25 - 150				05/20/16 11:05	05/27/16 22:15	1
								05/27/16 22:15	

Default Detection Limits

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Prep: 3535

Analyte	LOQ	DL	Units	Method
Perfluorobutanesulfonic acid (PFBS)	0.0025	0.00092	ug/L	WS-LC-0025
Perfluoroheptanoic acid (PFHpA)	0.0025	0.00080	ug/L	WS-LC-0025
Perfluorohexanesulfonic acid (PFHxS)	0.0025	0.00087	ug/L	WS-LC-0025
Perfluorononanoic acid (PFNA)	0.0025	0.00065	ug/L	WS-LC-0025
Perfluorooctanesulfonic acid (PFOS)	0.0040	0.0013	ug/L	WS-LC-0025
Perfluorooctanoic acid (PFOA)	0.0025	0.00075	ug/L	WS-LC-0025

Isotope Dilution Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Matrix: Water Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)								
		3O2 PFHx	3C4 PFOS	3C5 PFN/	3C4 PFO	3C4-PFHp				
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)				
320-18918-1	OF-RW83-0516	47	7 Q	64	74	75				
320-18918-2	OF-FB83-0516	84	24 Q	100	106	96				
LCS 320-110721/2-A	Lab Control Sample	101	126	91	92	95				
LCSD 320-110721/3-A	Lab Control Sample Dup	84	107	82	83	81				
MB 320-110721/1-A	Method Blank	107	127	97	105	97				

Surrogate Legend

18O2 PFHxS = 18O2 PFHxS

13C4 PFOS = 13C4 PFOS

13C5 PFNA = 13C5 PFNA

13C4 PFOA = 13C4 PFOA

13C4-PFHpA = 13C4-PFHpA

QC Sample Results

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Method: WS-LC-0025 - Perfluorinated Hydrocarbons

Lab Sample ID: MB 320-110721/1-A

Matrix: Water

Analysis Batch: 111733

Client Sample ID: Method Blank Prep Type: Total/NA Prep Batch: 110721

	MB	MB							
Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.00080	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorooctanoic acid (PFOA)	0.0020	U	0.0025	0.00075	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorononanoic acid (PFNA)	0.0020	U	0.0025	0.00065	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorobutanesulfonic acid (PFBS)	0.0020	U	0.0025	0.00092	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.00087	ug/L		05/20/16 11:05	05/27/16 17:18	1
Perfluorooctanesulfonic acid (PFOS)	0.0030	UM	0.0040	0.0013	ug/L		05/20/16 11:05	05/27/16 17:18	1
	MD	MD							

MB MB

Isotope Dilution	%Recovery Qualifier	Limits	Prepared	Analyzed	Dil Fac
1802 PFHxS	107	25 - 150	05/20/16 11:05	05/27/16 17:18	1
13C4 PFOS	127	25 - 150	05/20/16 11:05	05/27/16 17:18	1
13C5 PFNA	97	25 - 150	05/20/16 11:05	05/27/16 17:18	1
13C4 PFOA	105	25 - 150	05/20/16 11:05	05/27/16 17:18	1
13C4-PFHpA	97	25 - 150	05/20/16 11:05	05/27/16 17:18	1

100 100

Lab Sample ID: LCS 320-110721/2-A

Lab Sample ID: LCSD 320-110721/3-A

Matrix: Water

Analysis Batch: 111733

Client Sample ID: Lab Control Sample

Prep Type: Total/NA Prep Batch: 110721

	эріке	LUS	LUS			%Rec.	
Analyte	Added	Result	Qualifier Uni	t D	%Rec	Limits	
Perfluoroheptanoic acid (PFHpA)	0.0400	0.0305	ug/l		76	60 - 140	
Perfluorooctanoic acid (PFOA)	0.0400	0.0326	ug/l	_	81	60 - 140	
Perfluorononanoic acid (PFNA)	0.0400	0.0340	ug/l	L	85	60 - 140	
Perfluorobutanesulfonic acid (PFBS)	0.0354	0.0273	ug/l	_	77	50 - 150	
Perfluorohexanesulfonic acid	0.0364	0.0288	M ug/l	_	79	60 - 140	
(PFHxS) Perfluorooctanesulfonic acid	0.0371	0.0261	M ug/	L	70	60 - 140	

Chika

(PFOS)

Matrix: Water

LCS LCS

Isotope Dilution	%Recovery	Qualifier	Limits
1802 PFHxS	101		25 - 150
13C4 PFOS	126		25 - 150
13C5 PFNA	91		25 - 150
13C4 PFOA	92		25 - 150
13C4-PFHpA	95		25 - 150

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA Prep Batch: 110721

Analysis Batch: 111733 Spike LCSD LCSD %Rec. **RPD** Added Result Qualifier Unit Limits RPD Limit **Analyte** %Rec Perfluoroheptanoic acid (PFHpA) 0.0400 0.0318 ug/L 80 60 - 140 4 30 0.0400 30 Perfluorooctanoic acid (PFOA) 0.0305 76 60 - 140 6 ug/L Perfluorononanoic acid (PFNA) 0.0400 0.0334 ug/L 60 - 140 2 30 0.0354 0.0291 82 50 - 150 30 Perfluorobutanesulfonic acid ug/L (PFBS) Perfluorohexanesulfonic acid 0.0364 0.0314 M ug/L 86 60 - 140 9 30 (PFHxS) 0.0371 0.0284 M 76 8 30 ug/L 60 - 140 Perfluorooctanesulfonic acid (PFOS)

TestAmerica Sacramento

05/31/2016

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QC Sample Results

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Isotope Dilution	%Recovery	Qualifier	Limits
1802 PFHxS	84		25 - 150
13C4 PFOS	107		25 - 150
13C5 PFNA	82		25 - 150
13C4 PFOA	83		25 - 150
13C4-PFHpA	81		25 - 150

QC Association Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

LCMS

Prep Batch: 110721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18918-1	OF-RW83-0516	Total/NA	Water	3535	
320-18918-2	OF-FB83-0516	Total/NA	Water	3535	
LCS 320-110721/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-110721/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
MB 320-110721/1-A	Method Blank	Total/NA	Water	3535	

Analysis Batch: 111733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
320-18918-1	OF-RW83-0516	Total/NA	Water	WS-LC-0025	110721
320-18918-2	OF-FB83-0516	Total/NA	Water	WS-LC-0025	110721
LCS 320-110721/2-A	Lab Control Sample	Total/NA	Water	WS-LC-0025	110721
LCSD 320-110721/3-A	Lab Control Sample Dup	Total/NA	Water	WS-LC-0025	110721
MB 320-110721/1-A	Method Blank	Total/NA	Water	WS-LC-0025	110721

Lab Chronicle

Client: CH2M Hill Constructors, Inc.

TestAmerica Job ID: 320-18918-1 Project/Site: NAS Oceana, VA - 9000 CTO-WE01

Client Sample ID: OF-RW83-0516

Lab Sample ID: 320-18918-1 Date Collected: 05/16/16 08:22 **Matrix: Water**

Date Received: 05/17/16 09:15

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	3535			110721	05/20/16 11:05	VPM	TAL SAC
Total/NA	Analysis	WS-LC-0025		1	111733	05/27/16 21:54	JRB	TAL SAC

Client Sample ID: OF-FB83-0516 Lab Sample ID: 320-18918-2

Date Collected: 05/16/16 08:15 **Matrix: Water**

Date Received: 05/17/16 09:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535	- Ituli			05/20/16 11:05		TAL SAC
Total/NA	Analysis	WS-LC-0025		1	111733	05/27/16 22:15	JRB	TAL SAC

Laboratory References:

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

Certification Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Laboratory: TestAmerica Sacramento

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	01-31-17
Oregon	NELAP	10	4040	01-29-17

Laboratory: TestAmerica Denver The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-17
Oregon	NELAP	10	4025	01-09-17

Method Summary

Client: CH2M Hill Constructors, Inc.

Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Method	Method Description	Protocol	Laboratory
WS-LC-0025	Perfluorinated Hydrocarbons	TAL SOP	TAL SAC

Protocol References:

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

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

Sample Summary

Client: CH2M Hill Constructors, Inc. Project/Site: NAS Oceana, VA - 9000 CTO-WE01

TestAmerica Job ID: 320-18918-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
320-18918-1	OF-RW83-0516	Water	05/16/16 08:22 0	05/17/16 09:15
320-18918-2	OF-FB83-0516	Water	05/16/16 08:15 0)5/17/16 09:15

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento	Job Nc	.: 320-18918-1			
SDG No.:					
Instrument ID: A4	Analys	is Batch Number: 111733			
Lab Sample ID: MB 320-110721/1-A	Client	Sample ID:			
Date Analyzed: 05/27/16 17:18	Lab Fi	le ID: 27MAY2016B4A_019.d	GC Colu	mn: Acquity	ID: 2.1 (mm)
COMPOUND NAME	RETENTION	RETENTION MANUAL INT		'EGRATION	
	TIME	REASON	ANALYST	DATE	
Perfluorooctanesulfonic acid (PFOS)	11.44	Isomers	barnettj	05/31/16 10:05	
Lab Sample ID: LCS 320-110721/2-A	Client	Sample ID:			
Date Analyzed: 05/27/16 17:39	Lab Fi	le ID: <u>27MAY2016B4A_020.d</u>	GC Colu	mn: Acquity	ID: <u>2.1(mm)</u>
COMPOUND NAME	RETENTION		ITEGRATION		
	TIME	REASON	ANALYST	DATE	
Perfluorohexanesulfonic acid (PFHxS)	9.40	Isomers	barnettj	05/29/16 13:39	
Perfluorooctanesulfonic acid (PFOS)	11.44	Isomers	barnettj	05/29/16 13:39	
Lab Sample ID: LCSD 320-110721/3-	A Client	Sample ID:			
Date Analyzed: 05/27/16 18:00	Lab Fi	le ID: 27MAY2016B4A_021.d	GC Colu	mn: Acquity	ID: <u>2.1(mm)</u>
COMPOUND NAME	RETENTION	MANUAL IN	ITEGRATION	GRATION	
	TIME	REASON	ANALYST	DATE	
Perfluorohexanesulfonic acid (PFHxS)	9.40	Isomers	barnettj	05/29/16 13:40	
Perfluorooctanesulfonic acid (PFOS)	11.45	Isomers	barnettj	05/29/16 13:40	
Lab Sample ID: 320-18918-1	Client	Sample ID: OF-RW83-0516			
Date Analyzed: 05/27/16 21:54	Lab Fi	le ID: 27MAY2016B4A_025.d	GC Colu	mn: Acquity	ID: 2.1(mm)
COMPOUND NAME	RETENTION	RETENTION MANUAL INTEG		GRATION	
	TIME	REASON	ANALYST	DATE	
Perfluorooctanesulfonic acid (PFOS)	11.41	Isomers	barnettj	05/31/16 10:09	

WS-LC-0025

LCMS MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

SDG No.:

Instrument ID: A4 Analysis Batch Number: 111733

Lab Sample ID: 320-18918-2

Client Sample ID: OF-FB83-0516

COMPOUND NAME	RETENTION	MANUAL INTEGRATION				
	TIME	REASON	ANALYST	DATE		
Perfluorooctanesulfonic acid (PFOS)	11.44	Missed Peak	barnettj	05/31/16 10:10		
Perfluorononanoic acid (PFNA)	11.45	Baseline	barnettj	05/31/16 10:10		

Lab Name: TestAmerica Sacramento	Job No.: 320-18918-1	
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				Reagent	Parent Reag	ent		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
LCMPFCSU_00040	11/05/16	05/11/16	Methanol, Lot Baker	10000 uL	LCM2PFHxDA_00005	200 uL	13C2-PFHxDA	1 ug/mL
			113333		LCM2PFTeDA 00005	200 uL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA 00005		13C4-PFHpA	1 ug/mL
					LCM5PFPEA 00006		13C5-PFPeA	1 ug/mL
					LCM8FOSA 00009		13C8 FOSA	1 ug/mL
					LCMPFBA 00006	200 uL	13C4 PFBA	1 ug/mL
					LCMPFDA 00007	200 uL	13C2 PFDA	1 ug/mL
					LCMPFDoA 00006		13C2 PFDoA	1 ug/mL
					LCMPFHxA 00008		13C2 PFHxA	1 ug/mL
					LCMPFHxS 00006	200 uL	1802 PFHxS	0.946 ug/mL
					LCMPFNA 00005		13C5 PFNA	1 ug/mL
					LCMPFOA 00010		13C4 PFOA	1 ug/mL
					LCMPFOS 00012		13C4 PFOS	0.956 ug/mL
					LCMPFUdA 00007		13C2 PFUnA	1 ug/mL
.LCM2PFHxDA 00005	01/07/21	Wellingt	on Laboratories, Lot M2P	FHxDA1112	(Purchased Rea		13C2-PFHxDA	50 ug/mL
.LCM2PFTeDA 00005			on Laboratories, Lot M2P		(Purchased Rea		13C2-PFTeDA	50 ug/mL
.LCM4PFHPA 00005	05/22/20		on Laboratories, Lot M4E		(Purchased Rea		13C4-PFHpA	50 ug/mL
.LCM5PFPEA 00006	05/22/20		on Laboratories, Lot M5E		(Purchased Rea	agent)	13C5-PFPeA	50 ug/mL
.LCM8FOSA 00009	12/22/17		on Laboratories, Lot M8E		(Purchased Rea		13C8 FOSA	50 ug/mL
.LCMPFBA 00006	10/31/19		ton Laboratories, Lot ME		(Purchased Rea	agent)	13C4 PFBA	50 ug/mL
.LCMPFDA 00007	08/19/20		gton Laboratories, Lot ME		(Purchased Rea		13C2 PFDA	50 ug/mL
.LCMPFDoA 00006	07/17/19		ton Laboratories, Lot MP		(Purchased Rea		13C2 PFDoA	50 ug/mL
.LCMPFHxA 00008	04/09/20		ton Laboratories, Lot MP		(Purchased Rea	agent)	13C2 PFHxA	50 ug/mL
.LCMPFHxS 00006	10/23/20	Welling	ton Laboratories, Lot MP	FHxS1015	(Purchased Rea	agent)	1802 PFHxS	47.3 ug/mL
.LCMPFNA 00005	04/13/19	Welling	ton Laboratories, Lot ME	FNA0414	(Purchased Rea	agent)	13C5 PFNA	50 ug/mL
.LCMPFOA 00010	01/22/21		gton Laboratories, Lot ME		(Purchased Rea	igent)	13C4 PFOA	50 ug/mL
.LCMPFOS 00012	01/22/21	Welling	gton Laboratories, Lot ME	FOS0116	(Purchased Rea	agent)	13C4 PFOS	47.8 ug/mL
.LCMPFUdA 00007	10/31/19		ton Laboratories, Lot MP		(Purchased Rea	igent)	13C2 PFUnA	50 ug/mL
LCPFC-L1_00018	06/29/16	12/30/15	MeOH/H2O, Lot 90285	5 mL	LCMPFCSU 00024	250 uL	13C2-PFHxDA	50 ng/mL
_					_		13C2-PFTeDA	50 ng/mL
							13C4-PFHpA	50 ng/mL
							13C5-PFPeA	50 ng/mL
							13C8 FOSA	50 ng/mL
							13C4 PFBA	50 ng/mL
							13C2 PFDA	50 ng/mL
							13C2 PFDoA	50 ng/mL
							13C2 PFHxA	50 ng/mL
							1802 PFHxS	47.3 ng/mL
							13C5 PFNA	50 ng/mL
							13C4 PFOA	50 ng/mL
							13C4 PFOS	47.8 ng/mL
							13C2 PFUnA	50 ng/mL
					LCPFCSP 00040	25 uL	Perfluorobutyric acid	0.5 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	0.442 ng/mL
							Perfluorodecanoic acid	0.5 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1		
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				Reagent	Parent Reag	ent		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
							Perfluorododecanoic acid	0.5 ng/mL
							Perfluorodecane Sulfonic acid	0.482 ng/mL
							Perfluoroheptanoic acid	0.5 ng/mL
							(PFHpA)	
							Perfluoroheptanesulfonic Acid	0.476 ng/mL
							Perfluorohexanoic acid	0.5 ng/mL
							Perfluorohexadecanoic acid	0.5 ng/mL
							Perfluorohexanesulfonic acid	0.473 ng/mL
							(PFHxS)	
							Perfluorononanoic acid (PFNA)	0.5 ng/mL
							Perfluorooctanoic acid (PFOA)	0.5 ng/mL
							Perfluorooctandecanoic acid	0.5 ng/mL
							Perfluorooctanesulfonic acid	0.478 ng/mL
							(PFOS)	
							Perfluorooctane Sulfonamide	0.5 ng/mL
							Perfluoropentanoic acid	0.5 ng/mL
							Perfluorotetradecanoic acid	0.5 ng/mL
							Perfluorotridecanoic acid	0.5 ng/mL
							Perfluoroundecanoic acid	0.5 ng/mL
.LCMPFCSU_00024	06/29/16	12/29/15	Methanol, Lot Baker	10 mL	LCM2PFHxDA_00003	0.2 mL	13C2-PFHxDA	1 ug/mL
			115491		7.01/0.000	0.0.7	1200 555 53	1 / -
					LCM2PFTeDA_00003		13C2-PFTeDA	1 ug/mL
					LCM4PFHPA_00003		13C4-PFHpA	1 ug/mL
					LCM5PFPEA_00004 LCM8FOSA 00006		13C5-PFPeA	1 ug/mL
					LCM8FOSA_00006		13C8 FOSA	1 ug/mL
					LCMPFBA_00004		13C4 PFBA 13C2 PFDA	1 ug/mL 1 ug/mL
					LCMPFDA_00004		13C2 PFDA	1 ug/mL
					LCMPFHxA 00005		13C2 PFHXA	1 ug/mL
					LCMPFHxS 00004		1802 PFHxS	0.946 ug/mL
					LCMPFNA 00003		13C5 PFNA	1 ug/mL
					LCMPFOA 00007		13C4 PFOA	1 ug/mL
					LCMPFOS 00009		13C4 PFOS	0.956 ug/mL
					LCMPFUdA 00005		13C2 PFUnA	1 ug/mL
LCM2PFHxDA 00003	11/29/17	Wellingt	on Laboratories, Lot M2	PFH×DA1112	(Purchased Rea		13C2-PFHxDA	50 ug/mL
LCM2PFTeDA 00003			on Laboratories, Lot M2		(Purchased Rea		13C2-PFTeDA	50 ug/mL
LCM4PFHPA 00003	05/22/20		on Laboratories, Lot M4		(Purchased Rea		13C4-PFHpA	50 ug/mL
LCM5PFPEA 00004	05/22/20		on Laboratories, Lot M5		(Purchased Rea	- ·	13C5-PFPeA	50 ug/mL
LCM8FOSA 00006	12/15/16		on Laboratories, Lot M8		(Purchased Rea		13C8 FOSA	50 ug/mL
LCMPFBA 00004	10/31/19		ton Laboratories, Lot M		(Purchased Rea		13C4 PFBA	50 ug/mL
LCMPFDA 00004	04/13/19		ton Laboratories, Lot M		(Purchased Rea		13C2 PFDA	50 ug/mL
LCMPFDoA 00004	07/17/19		ton Laboratories, Lot M		(Purchased Rea	agent)	13C2 PFDoA	50 ug/mL
LCMPFHxA 00005	04/13/19		ton Laboratories, Lot M		(Purchased Rea	agent)	13C2 PFHxA	50 ug/mL
LCMPFHxS 00004	07/25/18		ton Laboratories, Lot M		(Purchased Rea		1802 PFHxS	47.3 ug/mL
LCMPFNA 00003	04/13/19	Welling	ton Laboratories, Lot M		(Purchased Rea	agent)	13C5 PFNA	50 ug/mL
LCMPFOA 00007	04/10/20	Welling	ton Laboratories, Lot M	IPFOA0415	(Purchased Rea	agent)	13C4 PFOA	50 ug/mL
LCMPFOS 00009	05/15/20		ton Laboratories, Lot M	IPFOS0515	(Purchased Rea	agent)	13C4 PFOS	47.8 ug/mL
LCMPFUdA 00005	10/31/19	Welling	ton Laboratories, Lot M	PFUdA1014	(Purchased Rea	agent)	13C2 PFUnA	50 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

Reagent ID Reagent ID Date Date Date Date Date Date Dilutant Used Volume Reagent ID Reagent ID Reagent ID Reagent ID Added Analyte Analyte CCPFCSP_00040 Description of the perfluor obstacled acid perfluor obstacled perflu	0.1 ug/mL 0.1 ug/mL acid 0.0964 ug/mL 0.1 ug/mL
Reagent ID Date Date Used Volume Reagent ID Added Analyte .LCPFCSP_00040 06/30/16 12/30/15 Methanol, Lot 090285 5 mL LCPFCSP_00039 0.5 mL Perfluorobutyric acid Perfluorobutanesulfonic a (PFBS) Perfluorodecanoic acid Perfluorodecanoic acid Perfluorodecanoic acid Perfluorodecanoic acid Perfluorodecanoic acid Perfluorodecanoic Sulfonic	0.1 ug/mL cid 0.0884 ug/mL 0.1 ug/mL 0.1 ug/mL acid 0.0964 ug/mL 0.1 ug/mL 0.1 ug/mL 0.1 ug/mL
Perfluorobutanesulfonic a (PFBS) Perfluorodecanoic acid Perfluorododecanoic acid Perfluorodecane Sulfonic	0.0884 ug/mL 0.1 ug/mL 0.1 ug/mL 0.0964 ug/mL 0.1 ug/mL 0.0952 ug/mL
Perfluorobutanesulfonic a (PFBS) Perfluorodecanoic acid Perfluorododecanoic acid Perfluorodecane Sulfonic	0.1 ug/mL 0.1 ug/mL acid 0.0964 ug/mL 0.1 ug/mL Acid 0.0952 ug/mL
Perfluorodecanoic acid Perfluorododecanoic acid Perfluorodecane Sulfonic	0.1 ug/mL acid 0.0964 ug/mL 0.1 ug/mL Acid 0.0952 ug/mL
Perfluorododecanoic acid Perfluorodecane Sulfonic	0.1 ug/mL acid 0.0964 ug/mL 0.1 ug/mL Acid 0.0952 ug/mL
Perfluorodecane Sulfonic	acid 0.0964 ug/mL 0.1 ug/mL Acid 0.0952 ug/mL
	0.1 ug/mL Acid 0.0952 ug/mL
	Acid 0.0952 ug/mL
(PFHpA)	
Perfluoroheptanesulfonic	0.1 ya/mT.
Perfluorohexanoic acid	
Perfluorohexadecanoic aci	
Perfluorohexanesulfonic a (PFHxS)	3.
Perfluorononanoic acid (P	
Perfluorooctanoic acid (P	
Perfluorooctandecanoic ac	3.
Perfluorooctanesulfonic a	cid 0.0956 ug/mL
(PFOS)	0.1 / 7
Perfluorooctane Sulfonami	
Perfluoropentanoic acid Perfluorotetradecanoic ac	0.1 ug/mL id 0.1 ug/mL
Perfluorotetradecanoic acid	
Perfluoroundecanoic acid	0.1 ug/mL
LCPFCSP 00039 06/30/16 12/30/15 Methanol, Lot 090285 5 mL LCPFBA 00003 0.1 mL Perfluorobutyric acid	1 ug/mL
LCPFBSA 00001 0.1 mL Perfluorobutanesulfonic a	
(PFBS)	0.001 ug/mil
LCPFDA_00003 0.1 mL Perfluorodecanoic acid	1 ug/mL
LCPFDoA_00003 0.1 mL Perfluorododecanoic acid	1 ug/mL
LCPFDSA_00001 0.1 mL Perfluorodecane Sulfonic	
LCPFHpA_00004 0.1 mL Perfluoroheptanoic acid (PFHpA)	1 ug/mL
LCPFHpSA_00001 0.1 mL Perfluoroheptanesulfonic	
LCPFHxA_00003 0.1 mL Perfluorohexanoic acid	1 ug/mL
LCPFHxDA_00004 0.1 mL Perfluorohexadecanoic aci	3.
LCPFHxSA_00001 0.1 mL Perfluorohexanesulfonic a	0.946 ug/mL
LCPFNA 00004 0.1 mL Perfluorononanoic acid (P	FNA) 1 ug/mL
LCPFOA 00004 0.1 mL Perfluorooctanoic acid (P	
LCPFODA 00004 0.1 mL Perfluorooctandecanoic ac	id 1 ug/mL
LCPFOS_00004 0.1 mL Perfluorooctanesulfonic a	cid 0.956 ug/mL
LCPFOSA 00005 0.1 mL Perfluorooctane Sulfonami	de 1 ug/mL
LCPFPeA_00003 0.1 mL Perfluoropentanoic acid	1 ug/mL
LCPFTeDA_00003 0.1 mL Perfluorotetradecanoic ac	
LCPFTrDA_00003 0.1 mL Perfluorotridecanoic acid	2.
LCPFUdA_00003 0.1 mL Perfluoroundecanoic acid	1 ug/mL
LCPFBA_00003 03/05/18 Wellington Laboratories, Lot PFBA0313 (Purchased Reagent) Perfluorobutyric acid	50 ug/mL
LCPFBSA_00001 10/09/19 Wellington Laboratories, Lot LPFBS1014 (Purchased Reagent) Perfluorobutanesulfonic a (PFBS)	cid 44.2 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

					Reagent	Parent Reag	ent		
Reagent ID	Exp Date	Prep Date	Dilutant Used		Final Volume	Reagent ID	Volume Added	Analyte	Concentration
LCPFDA 00003	06/18/18	Wellin	gton Laboratories,	Lot	PFDA0613	(Purchased Rea	agent)	Perfluorodecanoic acid	50 ug/mL
LCPFDoA 00003	01/03/18	Welling	ton Laboratories,	Lot	PFDoA0113	(Purchased Rea	agent)	Perfluorododecanoic acid	50 ug/mL
LCPFDSA 00001	09/13/18	Welling	ton Laboratories,	Lot	LPFDS0913	(Purchased Rea	agent)	Perfluorodecane Sulfonic acid	48.2 ug/mL
LCPFHpA_00004	05/09/19	Welling	ton Laboratories,	Lot	PFHpA0514	(Purchased Rea	igent)	Perfluoroheptanoic acid (PFHpA)	50 ug/mL
LCPFHpSA 00001	11/21/17	Welling	ton Laboratories,	Lot	LPFHpS1112	(Purchased Rea	agent)	Perfluoroheptanesulfonic Acid	47.6 ug/mL
LCPFHxA 00003	05/09/19	Welling	ton Laboratories,	Lot	PFHxA0514	(Purchased Rea	agent)	Perfluorohexanoic acid	50 ug/mL
LCPFHxDA 00004	11/28/17	Welling	ton Laboratories,	Lot	PFHxDA0707	(Purchased Rea	agent)	Perfluorohexadecanoic acid	50 ug/mL
LCPFHxSA_00001	05/09/19	_	ton Laboratories,			(Purchased Rea	igent)	Perfluorohexanesulfonic acid (PFHxS)	47.3 ug/mL
LCPFNA 00004	05/09/19	Wellin	gton Laboratories,	, Lot	PFNA0514	(Purchased Rea	agent)	Perfluorononanoic acid (PFNA)	50 ug/mL
LCPFOA 00004	10/11/18		gton Laboratories,			(Purchased Rea	igent)	Perfluorooctanoic acid (PFOA)	50 ug/mL
LCPFODA 00004	04/25/17	Welling	ton Laboratories,	Lot	PFODA0807	(Purchased Rea	agent)	Perfluorooctandecanoic acid	50 ug/mL
LCPFOS_00004	06/20/19	Welling	ton Laboratories,	Lot	LPFOS0614	(Purchased Rea	igent)	Perfluorooctanesulfonic acid (PFOS)	47.8 ug/mL
LCPFOSA_00005	07/31/18	Welling	gton Laboratories,	Lot	FOSA0714I	(Purchased Rea	igent)	Perfluorooctane Sulfonamide	50 ug/mL
LCPFPeA_00003	01/03/18		gton Laboratories,			(Purchased Rea	igent)	Perfluoropentanoic acid	50 ug/mL
LCPFTeDA_00003	06/19/18		ton Laboratories,			(Purchased Rea	igent)	Perfluorotetradecanoic acid	50 ug/mL
LCPFTrDA_00003	12/10/18	Welling	ton Laboratories,	Lot	PFTrDA1213	(Purchased Rea	agent)	Perfluorotridecanoic acid	50 ug/mL
LCPFUdA_00003	06/19/18	Welling	ton Laboratories,	Lot	PFUdA0613	(Purchased Rea	agent)	Perfluoroundecanoic acid	50 ug/mL
LCPFC-L2 00018	06/29/16	12/30/15	MeOH/H2O, Lot 090)285	5 mL	LCMPFCSU 00024	250 uI	13C2-PFHxDA	50 ng/mL
						_		13C2-PFTeDA	50 ng/mL
								13C4-PFHpA	50 ng/mL
								13C5-PFPeA	50 ng/mL
								13C8 FOSA	50 ng/mL
								13C4 PFBA	50 ng/mL
								13C2 PFDA	50 ng/mL
								13C2 PFDoA	50 ng/mL
								13C2 PFHxA	50 ng/mL
								1802 PFHxS	47.3 ng/mL
								13C5 PFNA	50 ng/mL
								13C4 PFOA	50 ng/mL
								13C4 PFOS	47.8 ng/mL
								13C2 PFUnA	50 ng/mL
						LCPFCSP_00040	50 uI	Perfluorobutyric acid	1 ng/mL
								Perfluorobutanesulfonic acid (PFBS)	0.884 ng/mL
								Perfluorodecanoic acid	1 ng/mL
								Perfluorododecanoic acid	1 ng/mL
								Perfluorodecane Sulfonic acid	0.964 ng/mL
								Perfluoroheptanoic acid (PFHpA)	1 ng/mL
								Perfluoroheptanesulfonic Acid	0.952 ng/mL
								Perfluorohexanoic acid	1 ng/mL
								Perfluorohexadecanoic acid	1 ng/mL
								Perfluorohexanesulfonic acid	0.946 ng/mL
								(PFHxS)	
					1			Perfluorononanoic acid (PFNA)	1 ng/mL

Lab	Name:	TestAmerica	Sacramento	Job No.: 320-18918-1
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				Reagent	Parent Reage	ent		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
							Perfluorooctanoic acid (PFOA)	1 ng/mL
							Perfluorooctandecanoic acid	1 ng/mL
							Perfluorooctanesulfonic acid	0.956 ng/mL
							(PFOS)	
							Perfluorooctane Sulfonamide	1 ng/mL
							Perfluoropentanoic acid	1 ng/mL
							Perfluorotetradecanoic acid	1 ng/mL
							Perfluorotridecanoic acid	1 ng/mL
							Perfluoroundecanoic acid	1 ng/mL
.LCMPFCSU_00024	06/29/16	12/29/15	Methanol, Lot Baker 115491	10 mL	LCM2PFHxDA_00003	0.2 mL	13C2-PFHxDA	1 ug/mL
			110191		LCM2PFTeDA 00003	0.2 mL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA 00003		13C4-PFHpA	1 ug/mL
					LCM5PFPEA 00004		13C5-PFPeA	1 ug/mL
					LCM8FOSA 00006		13C8 FOSA	1 ug/mL
					LCMPFBA 00004		13C4 PFBA	1 ug/mL
					LCMPFDA 00004		13C2 PFDA	1 ug/mL
					LCMPFDoA 00004		13C2 PFDoA	1 ug/mL
					LCMPFHxA 00005		13C2 PFHXA	1 ug/mL
					LCMPFHxS 00004		1802 PFHxS	0.946 ug/mL
					LCMPFNA 00003		13C5 PFNA	1 ug/mL
					LCMPFOA 00007		13C4 PFOA	1 ug/mL
					LCMPFOS 00009		13C4 PFOS	0.956 ug/mL
					LCMPFUdA 00005		13C2 PFUnA	1 ug/mL
LCM2PFHxDA 00003	11/29/17	Wellingt	on Laboratories, Lot M2P1	HxDA1112	(Purchased Rea		13C2-PFHxDA	50 ug/mL
LCM2PFTeDA 00003	11/29/17		on Laboratories, Lot M2P1		(Purchased Rea		13C2-PFTeDA	50 ug/mL
LCM4PFHPA 00003	05/22/20		on Laboratories, Lot M4F		(Purchased Rea		13C4-PFHpA	50 ug/mL
LCM5PFPEA 00004	05/22/20		on Laboratories, Lot M5F		(Purchased Rea		13C5-PFPeA	50 ug/mL
LCM8FOSA 00006	12/15/16		on Laboratories, Lot M8F		(Purchased Rea		13C8 FOSA	50 ug/mL
LCMPFBA 00004	10/31/19		ton Laboratories, Lot MF		(Purchased Rea		13C4 PFBA	50 ug/mL
LCMPFDA 00004	04/13/19		ton Laboratories, Lot MF		(Purchased Rea		13C2 PFDA	50 ug/mL
LCMPFDoA 00004	07/17/19		ton Laboratories, Lot MP		(Purchased Rea		13C2 PFDoA	50 ug/mL
LCMPFHxA 00005	04/13/19		ton Laboratories, Lot MP		(Purchased Rea		13C2 PFHxA	50 ug/mL
LCMPFHxS 00004	07/25/18		ton Laboratories, Lot MP		(Purchased Rea		1802 PFHxS	47.3 ug/mL
LCMPFNA 00003	04/13/19		ton Laboratories, Lot MF		(Purchased Rea		13C5 PFNA	50 ug/mL
LCMPFOA 00007	04/10/20		ton Laboratories, Lot MF		(Purchased Rea		13C4 PFOA	50 ug/mL
LCMPFOS 00009	05/15/20		ton Laboratories, Lot MF		(Purchased Rea		13C4 PFOS	47.8 ug/mL
LCMPFUdA 00005	10/31/19		ton Laboratories, Lot MP1		(Purchased Rea		13C2 PFUnA	50 ug/mL
.LCPFCSP 00040			Methanol, Lot 090285		LCPFCSP 00039		Perfluorobutyric acid	0.1 ug/mL
12011001_00010	00,00,10	12,00,10	neemaner, zee esezee	02	2011001_0000	0.0	Perfluorobutanesulfonic acid	0.0884 ug/mL
							(PFBS)	1.0001 ag/mb
							Perfluorodecanoic acid	0.1 ug/mL
							Perfluorododecanoic acid	0.1 ug/mL
							Perfluorodecane Sulfonic acid	0.0964 ug/mL
							Perfluoroheptanoic acid	0.1 ug/mL
							(PFHpA)	
							Perfluoroheptanesulfonic Acid	0.0952 ug/mL
				1		1	Perfluorohexanoic acid	

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

				Reagent	Parent Reag	ent		
Reagent ID	Exp Date	Prep Date	Dilutant Used	Final Volume	Reagent ID	Volume Added	Analyte	Concentration
_					-		Perfluorohexadecanoic acid	0.1 ug/mL
							Perfluorohexanesulfonic acid	0.0946 ug/mL
							(PFHxS)	0.0310 dg/mb
							Perfluorononanoic acid (PFNA)	0.1 ug/mL
							Perfluorooctanoic acid (PFOA)	0.1 ug/mL
							Perfluorooctandecanoic acid	0.1 ug/mL
							Perfluorooctanesulfonic acid	0.0956 ug/mL
							(PFOS)	
							Perfluorooctane Sulfonamide	0.1 ug/mL
							Perfluoropentanoic acid	0.1 ug/mL
							Perfluorotetradecanoic acid	0.1 ug/mL
							Perfluorotridecanoic acid	0.1 ug/mL
							Perfluoroundecanoic acid	0.1 ug/mL
LCPFCSP 00039	06/30/16	12/30/15	Methanol, Lot 090285	5 mL	LCPFBA 00003	0.1 mL	Perfluorobutyric acid	1 ug/mL
_					LCPFBSA_00001	0.1 mL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA 00003	0.1 mL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA 00003		Perfluorododecanoic acid	1 ug/mL
					LCPFDSA 00001	0.1 mL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA 00004	0.1 mL	Perfluoroheptanoic acid	1 ug/mL
					i -		(PFHpA)	J.
					LCPFHpSA 00001	0.1 mL	Perfluoroheptanesulfonic Acid	0.952 ug/mL
					LCPFHxA 00003	0.1 mL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA 00004	0.1 mL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxSA 00001	0.1 mL	Perfluorohexanesulfonic acid	0.946 ug/mL
					_		(PFHxS)	
					LCPFNA 00004	0.1 mL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA 00004	0.1 mL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA 00004	0.1 mL	Perfluorooctandecanoic acid	1 ug/mL
					LCPFOS_00004		Perfluorooctanesulfonic acid (PFOS)	0.956 ug/mL
					LCPFOSA 00005	0.1 mL	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA 00003	0.1 mL	Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA 00003	0.1 mL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA 00003	0.1 mL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA 00003	0.1 mL	Perfluoroundecanoic acid	1 ug/mL
LCPFBA 00003	03/05/18	Wellin	gton Laboratories, Lot	PFBA0313	(Purchased Rea	agent)	Perfluorobutyric acid	50 ug/mL
LCPFBSA_00001	10/09/19	Welling	gton Laboratories, Lot 1	LPFBS1014	(Purchased Rea	agent)	Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
LCPFDA 00003	06/18/18	Wellin	gton Laboratories, Lot	PFDA0613	(Purchased Rea	agent)	Perfluorodecanoic acid	50 ug/mL
LCPFDoA 00003	01/03/18		gton Laboratories, Lot 1		(Purchased Rea		Perfluorododecanoic acid	50 ug/mL
LCPFDSA 00001	09/13/18	Welling	gton Laboratories, Lot 1	LPFDS0913	(Purchased Rea		Perfluorodecane Sulfonic acid	48.2 ug/mL
LCPFHpA_00004	05/09/19		gton Laboratories, Lot 1		(Purchased Rea	agent)	Perfluoroheptanoic acid (PFHpA)	50 ug/mL
LCPFHpSA 00001	11/21/17	Welling	ton Laboratories, Lot L	PFHpS1112	(Purchased Rea	agent.)	Perfluoroheptanesulfonic Acid	47.6 ug/mL
LCPFHxA 00003	05/09/19		ton Laboratories, Lot 1		(Purchased Rea		Perfluorohexanoic acid	50 ug/mL
LCPFHxDA 00004	11/28/17		ton Laboratories, Lot P		(Purchased Rea	,	Perfluorohexadecanoic acid	50 ug/mL
LCPFHxSA_00001	05/09/19		ton Laboratories, Lot L		(Purchased Rea		Perfluorohexanesulfonic acid (PFHxS)	47.3 ug/mL

Lab	Name:	TestAmerica	Sacramento	Job No.: 320-18918-1

SDG No.:							_	
				Reagent	Parent Reagen			
Reagent ID	Exp Date	Prep Date	Dilutant Used	Final Volume	Reagent ID	Volume Added	Analyte	Concentration
LCPFNA 00004	05/09/19	Wellin	gton Laboratories, Lot P	FNA0514	(Purchased Reage	ent.)	Perfluorononanoic acid (PFNA)	50 ug/mL
LCPFOA 00004	10/11/18		gton Laboratories, Lot P		(Purchased Reage		Perfluorooctanoic acid (PFOA)	50 ug/mL
LCPFODA 00004	04/25/17		ton Laboratories, Lot Pl		(Purchased Reage		Perfluorooctandecanoic acid	50 ug/mL
LCPFOS_00004	06/20/19		ton Laboratories, Lot L		(Purchased Reage		Perfluorooctanesulfonic acid (PFOS)	47.8 ug/mL
LCPFOSA 00005	07/31/18	Welling	ton Laboratories, Lot F	OSA0714I	(Purchased Reage	ent)	Perfluorooctane Sulfonamide	50 ug/mL
LCPFPeA 00003	01/03/18	Welling	ton Laboratories, Lot Pl	FPeA0113	(Purchased Reage	ent)	Perfluoropentanoic acid	50 ug/mL
LCPFTeDA 00003	06/19/18	Welling	ton Laboratories, Lot PF	TeDA0613	(Purchased Reage	ent)	Perfluorotetradecanoic acid	50 ug/mL
LCPFTrDA 00003	12/10/18	Welling	ton Laboratories, Lot PF	TrDA1213	(Purchased Reage	ent)	Perfluorotridecanoic acid	50 ug/mL
LCPFUdA 00003	06/19/18	Welling	ton Laboratories, Lot Pl	FUdA0613	(Purchased Reage	ent)	Perfluoroundecanoic acid	50 ug/mL
LCPFC-L3 00016	06/29/16	12/30/15	MeOH/H2O, Lot 090285	5 mT.	LCMPFCSU 00024	250 H.T.	13C2-PFHxDA	50 ng/mL
10110 13_00010	00/23/10	12/30/13	110011/1120/ 100 030200	0 1112		200 41	13C2-PFTeDA	50 ng/mL
							13C4-PFHpA	50 ng/mL
							13C5-PFPeA	50 ng/mL
							13C8 FOSA	50 ng/mL
							13C4 PFBA	50 ng/mL
							13C2 PFDA	50 ng/mL
							13C2 PFDoA	50 ng/mL
							13C2 PFHxA	50 ng/mL
							1802 PFHXS	47.3 ng/mL
							13C5 PFNA	50 ng/mL
							13C4 PFOA	50 ng/mL
							13C4 PFOS	47.8 ng/mL
							13C2 PFUnA	50 ng/mL
					LCPFCSP 00040	250 u.T.	Perfluorobutyric acid	5 ng/mL
					Leffest_00040	250 41	Perfluorobutanesulfonic acid (PFBS)	4.42 ng/mL
							Perfluorodecanoic acid	5 ng/mL
							Perfluorododecanoic acid	5 ng/mL
							Perfluorodecane Sulfonic acid	4.82 ng/mL
							Perfluoroheptanoic acid (PFHpA)	5 ng/mL
							Perfluoroheptanesulfonic Acid	4.76 ng/mL
							Perfluorohexanoic acid	5 ng/mL
							Perfluorohexadecanoic acid	5 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	4.73 ng/mL
							Perfluorononanoic acid (PFNA)	5 ng/mL
							Perfluorooctanoic acid (PFOA)	5 ng/mL
							Perfluorooctandecanoic acid Perfluorooctanesulfonic acid	5 ng/mL 4.78 ng/mL
							(PFOS)	
							Perfluorooctane Sulfonamide	5 ng/mL
							Perfluoropentanoic acid	5 ng/mL
							Perfluorotetradecanoic acid	5 ng/mL
							Perfluorotridecanoic acid	5 ng/mL
							Perfluoroundecanoic acid	5 ng/mL

Lab Name: TestAmerica Sacramento	Job No.: 320-18918-1	
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				Reagent	Parent Reage	nt		
Reagent ID	Exp Date	Prep Date	Dilutant Used	Final Volume	Reagent ID	Volume Added	Analyte	Concentration
.LCMPFCSU_00024	06/29/16	12/29/15	Methanol, Lot Baker 115491	10 mL	LCM2PFHxDA_00003	0.2 mL	13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA 00003	0.2 mL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA 00003	0.2 mL	13C4-PFHpA	1 ug/mL
					LCM5PFPEA 00004	0.2 mL	13C5-PFPeA	1 ug/mL
					LCM8FOSA 00006	0.2 mL	13C8 FOSA	1 ug/mL
					LCMPFBA 00004	0.2 mL	13C4 PFBA	1 ug/mL
					LCMPFDA 00004	0.2 mL	13C2 PFDA	1 ug/mL
					LCMPFDoA 00004	0.2 mL	13C2 PFDoA	1 ug/mL
					LCMPFHxA 00005	0.2 mL	13C2 PFHxA	1 ug/mL
					LCMPFHxS 00004	0.2 mL	1802 PFHxS	0.946 ug/mL
					LCMPFNA 00003	0.2 mL	13C5 PFNA	1 ug/mL
					LCMPFOA 00007	0.2 mL	13C4 PFOA	1 ug/mL
					LCMPFOS 00009	0.2 mL	13C4 PFOS	0.956 ug/mL
					LCMPFUdA 00005		13C2 PFUnA	1 ug/mL
LCM2PFHxDA 00003	11/29/17	Wellingt	on Laboratories, Lot M	I2PFHxDA1112	(Purchased Read	gent)	13C2-PFHxDA	50 ug/mL
LCM2PFTeDA 00003	11/29/17		on Laboratories, Lot M		(Purchased Read		13C2-PFTeDA	50 ug/mL
LCM4PFHPA 00003	05/22/20		on Laboratories, Lot N		(Purchased Read		13C4-PFHpA	50 ug/mL
LCM5PFPEA 00004	05/22/20		on Laboratories, Lot N		(Purchased Read		13C5-PFPeA	50 ug/mL
LCM8FOSA 00006	12/15/16		on Laboratories, Lot N		(Purchased Read	gent)	13C8 FOSA	50 ug/mL
LCMPFBA 00004	10/31/19		ton Laboratories, Lot		(Purchased Read		13C4 PFBA	50 ug/mL
LCMPFDA 00004	04/13/19		gton Laboratories, Lot		(Purchased Read		13C2 PFDA	50 ug/mL
LCMPFDoA 00004	07/17/19		ton Laboratories, Lot		(Purchased Read		13C2 PFDoA	50 ug/mL
LCMPFHxA 00005	04/13/19		ton Laboratories, Lot		(Purchased Read	-	13C2 PFHxA	50 ug/mL
LCMPFHxS 00004	07/25/18		ton Laboratories, Lot		(Purchased Read		1802 PFHxS	47.3 ug/mL
LCMPFNA 00003	04/13/19		ton Laboratories, Lot		(Purchased Read		13C5 PFNA	50 ug/mL
LCMPFOA 00007	04/10/20		ton Laboratories, Lot		(Purchased Read		13C4 PFOA	50 ug/mL
LCMPFOS 00009	05/15/20		gton Laboratories, Lot		(Purchased Read		13C4 PFOS	47.8 ug/mL
LCMPFUdA 00005	10/31/19		ton Laboratories, Lot		(Purchased Read		13C2 PFUnA	50 ug/mL
.LCPFCSP 00040			Methanol, Lot 090285		LCPFCSP 00039	0.5 mL		0.1 ug/mL
		,,					Perfluorobutanesulfonic acid	0.0884 ug/mL
							(PFBS)	
							Perfluorodecanoic acid	0.1 ug/mL
							Perfluorododecanoic acid	0.1 ug/mL
							Perfluorodecane Sulfonic acid	0.0964 ug/mL
							Perfluoroheptanoic acid	0.1 ug/mL
							(PFHpA)]
							Perfluoroheptanesulfonic Acid	0.0952 ug/mL
							Perfluorohexanoic acid	0.1 ug/mL
							Perfluorohexadecanoic acid	0.1 ug/mL
							Perfluorohexanesulfonic acid	0.0946 ug/mL
							(PFHxS)	
							Perfluorononanoic acid (PFNA)	0.1 ug/mL
							Perfluorooctanoic acid (PFOA)	0.1 ug/mL
							Perfluorooctandecanoic acid	0.1 ug/mL
							Perfluorooctanesulfonic acid (PFOS)	0.0956 ug/mL
							Perfluorooctane Sulfonamide	0.1 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1	
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				Reagent	Parent Reage	ent		
Reagent ID	Exp Date	Prep Date	Dilutant Used	Final Volume	Reagent ID	Volume Added	Analyte	Concentration
							Perfluoropentanoic acid	0.1 ug/mL
							Perfluorotetradecanoic acid	0.1 ug/mL
							Perfluorotridecanoic acid	0.1 ug/mL
							Perfluoroundecanoic acid	0.1 ug/mL
LCPFCSP 00039	06/30/16	12/30/15	Methanol, Lot 090285	5 mT ₁	LCPFBA 00003	0.1 mT.	Perfluorobutyric acid	1 ug/mL
		,,			LCPFBSA 00001		Perfluorobutanesulfonic acid	0.884 ug/mL
							(PFBS)	011111111111111111111111111111111111111
					LCPFDA 00003	0.1 mL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA 00003	0.1 mL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA 00001	0.1 mL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00004	0.1 mL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA 00001	0.1 mL	Perfluoroheptanesulfonic Acid	0.952 ug/mL
					LCPFHxA 00003		Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA 00004	0.1 mL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxSA_00001	0.1 mL	Perfluorohexanesulfonic acid (PFHxS)	0.946 ug/mL
					LCPFNA 00004	0.1 mL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA 00004		Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA 00004	0.1 mL	Perfluorooctandecanoic acid	1 ug/mL
					LCPFOS_00004	0.1 mL	Perfluorooctanesulfonic acid (PFOS)	0.956 ug/mL
					LCPFOSA 00005	0.1 mL	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA 00003		Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA 00003	0.1 mL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA 00003	0.1 mL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA 00003	0.1 mL	Perfluoroundecanoic acid	1 ug/mL
LCPFBA 00003	03/05/18		gton Laboratories, Lot P		(Purchased Rea	,	Perfluorobutyric acid	50 ug/mL
LCPFBSA_00001	10/09/19	Welling	ton Laboratories, Lot LE	PFBS1014	(Purchased Rea	gent)	Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
LCPFDA_00003	06/18/18	Welling	gton Laboratories, Lot P	FDA0613	(Purchased Rea		Perfluorodecanoic acid	50 ug/mL
LCPFDoA_00003	01/03/18		ton Laboratories, Lot PE		(Purchased Rea	.gent)	Perfluorododecanoic acid	50 ug/mL
LCPFDSA_00001	09/13/18		ton Laboratories, Lot LE		(Purchased Rea	.gent)	Perfluorodecane Sulfonic acid	48.2 ug/mL
LCPFHpA_00004	05/09/19	_	ton Laboratories, Lot PF	_	(Purchased Rea	gent)	Perfluoroheptanoic acid (PFHpA)	50 ug/mL
LCPFHpSA_00001	11/21/17		on Laboratories, Lot LP		(Purchased Rea		Perfluoroheptanesulfonic Acid	47.6 ug/mL
LCPFHxA_00003	05/09/19		ton Laboratories, Lot PE		(Purchased Rea	gent)	Perfluorohexanoic acid	50 ug/mL
LCPFHxDA_00004	11/28/17		on Laboratories, Lot PF.		(Purchased Rea	.gent)	Perfluorohexadecanoic acid	50 ug/mL
LCPFHxSA_00001	05/09/19	Wellingt	ton Laboratories, Lot LP	FHxS0514	(Purchased Rea	gent)	Perfluorohexanesulfonic acid (PFHxS)	47.3 ug/mL
LCPFNA 00004	05/09/19	Welling	gton Laboratories, Lot P	FNA0514	(Purchased Rea	gent)	Perfluorononanoic acid (PFNA)	50 ug/mL
LCPFOA 00004	10/11/18		gton Laboratories, Lot P		(Purchased Rea		Perfluorooctanoic acid (PFOA)	50 ug/mL
LCPFODA 00004	04/25/17		ton Laboratories, Lot PE		(Purchased Rea		Perfluorooctandecanoic acid	50 ug/mL
LCPFOS_00004	06/20/19	Welling	ton Laboratories, Lot LE	PFOS0614	(Purchased Rea	gent)	Perfluorooctanesulfonic acid (PFOS)	47.8 ug/mL
LCPFOSA 00005	07/31/18	Welling	ton Laboratories, Lot FC	DSA0714I	(Purchased Rea	gent)	Perfluorooctane Sulfonamide	50 ug/mL
LCPFPeA 00003	01/03/18		ton Laboratories, Lot PE		(Purchased Rea		Perfluoropentanoic acid	50 ug/mL
LCPFTeDA_00003	06/19/18	Wellingt	on Laboratories, Lot PF	TeDA0613	(Purchased Rea	gent)	Perfluorotetradecanoic acid	50 ug/mL
LCPFTrDA 00003	12/10/18	Wellingt	on Laboratories, Lot PF	TrDA1213	(Purchased Rea	gent)	Perfluorotridecanoic acid	50 ug/mL

Lab Na	ame:	TestAmerica	Sacramento	Job No.: 320	0-18918-1	
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				Reagent	Parent Reage	ent		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
LCPFUdA 00003	06/19/18	Welling	gton Laboratories, Lot F	FUdA0613	(Purchased Rea	ıgent)	Perfluoroundecanoic acid	50 ug/mL
LCPFC-L4 00018	08/11/16	03/02/16	MeOH/H2O, Lot 090285	5 mL	LCMPFCSU 00029	250 uL	13C2-PFHxDA	50 ng/mL
							13C2-PFTeDA	50 ng/mL
							13C4-PFHpA	50 ng/mL
							13C5-PFPeA	50 ng/mL
							13C8 FOSA	50 ng/mL
							13C4 PFBA	50 ng/mL
							13C2 PFDA	50 ng/mL
							13C2 PFDoA	50 ng/mL
							13C2 PFHxA	50 ng/mL
							1802 PFHxS	47.3 ng/mL
							13C5 PFNA	50 ng/mL
							13C4 PFOA	50 ng/mL
							13C4 PFOS	47.8 ng/mL
							13C2 PFUnA	50 ng/mL
					LCPFCSP 00041	100 uL	Perfluorobutyric acid	20 ng/mL
					_		Perfluorobutanesulfonic acid	17.68 ng/mL
							(PFBS)	_
							Perfluorodecanoic acid	20 ng/mL
							Perfluorododecanoic acid	20 ng/mL
							Perfluorodecane Sulfonic acid	19.28 ng/mL
							Perfluoroheptanoic acid	20 ng/mL
							(PFHpA)	
							Perfluoroheptanesulfonic Acid	19.04 ng/mL
							Perfluorohexanoic acid	20 ng/mL
							Perfluorohexadecanoic acid	20 ng/mL
							Perfluorohexanesulfonic acid	18.92 ng/mL
							(PFHxS)	
							Perfluorononanoic acid (PFNA)	20 ng/mL
							Perfluorooctanoic acid (PFOA)	20 ng/mL
							Perfluorooctandecanoic acid	20 ng/mL
							Perfluorooctanesulfonic acid	19.12 ng/mL
							(PFOS)	00 / 7
							Perfluorooctane Sulfonamide	20 ng/mL
							Perfluoropentanoic acid	20 ng/mL
							Perfluorotetradecanoic acid	20 ng/mL
							Perfluorotridecanoic acid	20 ng/mL
TOMPEGGH 00000	00/00/16	00/00/16	Marila and Tall Dalla	10000 т	T CMODELL D3 00000	200 -	Perfluoroundecanoic acid	20 ng/mL
.LCMPFCSU_00029	08/29/16	02/29/16	Methanol, Lot Baker 115491	10000 uL	LCM2PFHxDA_00003	200 uL	13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA 00003	200 uL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA 00003		13C4-PFHpA	1 ug/mL
					LCM5PFPEA 00004		13C5-PFPeA	1 ug/mL
					LCM8FOSA 00007		13C8 FOSA	1 ug/mL
					LCMPFBA 00004		13C4 PFBA	1 ug/mL
					LCMPFDA 00006		13C2 PFDA	1 ug/mL
					LCMPFDoA 00004		13C2 PFDoA	1 ug/mL
					LCMPFHxA 00007		13C2 PFHxA	1 ug/mL

	Lab Name: TestAmerica	Sacramento	Job No.: 320-18918-1	
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					Parent Reag	ent		
				Reagent	rarene neag	CIIC		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
					LCMPFHxS 00004	200 uL	1802 PFHxS	0.946 ug/mL
					LCMPFNA 00004	200 uL	13C5 PFNA	1 ug/mL
					LCMPFOA 00008	200 uL	13C4 PFOA	1 ug/mL
					LCMPFOS 00010		13C4 PFOS	0.956 ug/mL
					LCMPFUdA 00005		13C2 PFUnA	1 ug/mL
LCM2PFHxDA 00003	11/29/17	Wellingt.	on Laboratories, Lot M2P	FH×DA1112	(Purchased Rea		13C2-PFHxDA	50 ug/mL
LCM2PFTeDA 00003	11/29/17		on Laboratories, Lot M2P		(Purchased Rea		13C2-PFTeDA	50 ug/mL
LCM4PFHPA 00003	05/22/20		on Laboratories, Lot M41		(Purchased Rea	-	13C4-PFHpA	50 ug/mL
LCM5PFPEA 00004	05/22/20		on Laboratories, Lot M51		(Purchased Rea	-	13C5-PFPeA	50 ug/mL
LCM8FOSA 00007	12/15/16		on Laboratories, Lot M81		(Purchased Rea		13C8 FOSA	50 ug/mL
LCMPFBA 00004	10/31/19		ton Laboratories, Lot M		(Purchased Rea		13C4 PFBA	50 ug/mL
LCMPFDA 00006	08/19/20		ton Laboratories, Lot M		(Purchased Rea		13C2 PFDA	50 ug/mL
LCMPFDoA 00004	07/17/19		ton Laboratories, Lot MP		(Purchased Rea	-	13C2 PFDoA	50 ug/mL
LCMPFHxA 00007	04/09/20		ton Laboratories, Lot MP		(Purchased Rea		13C2 PFHxA	50 ug/mL
LCMPFHXA_00007	07/25/18		ton Laboratories, Lot MP		(Purchased Rea		1802 PFHXS	47.3 ug/mL
LCMPFNA 00004	04/13/19		ton Laboratories, Lot Mr		(Purchased Rea		13C5 PFNA	50 ug/mL
LCMPFOA 00008	04/10/20		ton Laboratories, Lot Mi		(Purchased Rea	-	13C4 PFOA	50 ug/mL
LCMPFOS 00010	05/15/20		gton Laboratories, Lot Mi		(Purchased Rea	-	13C4 PFOS	47.8 ug/mL
LCMPFUS_00010	10/31/19		ton Laboratories, Lot MP		(Purchased Rea	-	13C4 PFOS 13C2 PFUnA	50 ug/mL
.LCMFFOGA_00003		02/11/16	Methanol, Lot 090285		LCPFBA 00003		Perfluorobutyric acid	1 ug/mL
·LCPFCSP_00041	08/11/16	02/11/16	Methanol, Lot 090285	2 1111			Perfluorobutyric acid Perfluorobutanesulfonic acid	
					LCPFBSA_00001	0.1 mL	(PFBS)	0.884 ug/mL
					LCPFDA 00003	0 1 mT.	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA 00003		Perfluorododecanoic acid	1 ug/mL
					LCPFDSA 00001		Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00004		Perfluoroheptanoic acid	1 ug/mL
						0.1 1111	(PFHpA)	1 49/1111
					LCPFHpSA_00001	0.1 mL	Perfluoroheptanesulfonic Acid	0.952 ug/mL
					LCPFHxA 00003	0.1 mL	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA 00004	0.1 mL	Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxSA 00001	0.1 mL	Perfluorohexanesulfonic acid	0.946 ug/mL
							(PFHxS)	
					LCPFNA_00004		Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00004		Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00004		Perfluorooctandecanoic acid	1 ug/mL
					LCPFOS_00004	0.1 mL	Perfluorooctanesulfonic acid	0.956 ug/mL
							(PFOS)	
					LCPFOSA_00005		Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00003		Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00003		Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00003		Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA_00003		Perfluoroundecanoic acid	1 ug/mL
LCPFBA_00003	03/05/18		gton Laboratories, Lot P		(Purchased Rea		Perfluorobutyric acid	50 ug/mL
LCPFBSA_00001	10/09/19	Welling	ton Laboratories, Lot L	PFBS1014	(Purchased Rea	agent)	Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
LCPFDA 00003	06/18/18	Wellin	gton Laboratories, Lot P	FDA0613	(Purchased Rea	agent)	Perfluorodecanoic acid	50 ug/mL
LCPFDoA 00003	01/03/18		ton Laboratories, Lot Pl		(Purchased Rea	<i>y</i> ,	Perfluorododecanoic acid	50 ug/mL
LCPFDSA 00001	09/13/18		ton Laboratories, Lot Ll		(Purchased Rea		Perfluorodecane Sulfonic acid	48.2 ug/mL
	03,13,10		,		1 120114004 1100		1-1-140104004 Dailonio dela	10.2 49/1111

Lab	Name:	TestAmerica	Sacramento	Job No	/ 	Z U – I (ひノエリ	$_{\rm D}$ $_{\rm T}$	
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				Reagent	Parent Reagen	ıt		
Reagent ID	Exp Date	Prep Date	Dilutant Used	Final Volume	Reagent ID	Volume Added	- Analyte	Concentration
LCPFHpA_00004	05/09/19	Welling	l gton Laboratories, I	Lot PFHpA0514	(Purchased Reage	ent)	Perfluoroheptanoic acid (PFHpA)	50 ug/mL
LCPFHpSA 00001	11/21/17	Welling	ton Laboratories, Lo	ot LPFHpS1112	(Purchased Reage	ent)	Perfluoroheptanesulfonic Acid	47.6 ug/mL
LCPFHxA 00003	05/09/19		gton Laboratories, I		(Purchased Reage	ent)	Perfluorohexanoic acid	50 ug/mL
LCPFHxDA 00004	11/28/17	Welling	ton Laboratories, Lo	ot PFHxDA0707	(Purchased Reage	ent)	Perfluorohexadecanoic acid	50 ug/mL
LCPFHxSA_00001	05/09/19	Welling	ton Laboratories, Lo	ot LPFHxS0514	(Purchased Reage	ent)	Perfluorohexanesulfonic acid (PFHxS)	47.3 ug/mL
LCPFNA_00004	05/09/19	Wellin	gton Laboratories, 1	Lot PFNA0514	(Purchased Reage	ent)	Perfluorononanoic acid (PFNA)	50 ug/mL
LCPFOA_00004	10/11/18	Wellin	gton Laboratories, 1	Lot PFOA1013	(Purchased Reage	ent)	Perfluorooctanoic acid (PFOA)	50 ug/mL
LCPFODA_00004	04/25/17		gton Laboratories, L		(Purchased Reage		Perfluorooctandecanoic acid	50 ug/mL
LCPFOS_00004	06/20/19		gton Laboratories, I		(Purchased Reage		Perfluorooctanesulfonic acid (PFOS)	47.8 ug/mL
LCPFOSA_00005	07/31/18		gton Laboratories, I		(Purchased Reage		Perfluorooctane Sulfonamide	50 ug/mL
LCPFPeA_00003	01/03/18		gton Laboratories, I		(Purchased Reage		Perfluoropentanoic acid	50 ug/mL
LCPFTeDA_00003	06/19/18		ton Laboratories, L		(Purchased Reage		Perfluorotetradecanoic acid	50 ug/mL
LCPFTrDA_00003	12/10/18		ton Laboratories, Lo		(Purchased Reage		Perfluorotridecanoic acid	50 ug/mL
LCPFUdA_00003	06/19/18	Welling	gton Laboratories, L		(Purchased Reage	ent)	Perfluoroundecanoic acid	50 ug/mL
LCPFC-L5 00017	08/11/16	03/02/16	MeOH/H2O, Lot 09028	85 5 mL	LCMPFCSU 00029	250 uL	13C2-PFHxDA	50 ng/mL
_					_		13C2-PFTeDA	50 ng/mL
							13C4-PFHpA	50 ng/mL
							13C5-PFPeA	50 ng/mL
							13C8 FOSA	50 ng/mL
							13C4 PFBA	50 ng/mL
							13C2 PFDA	50 ng/mL
							13C2 PFDoA	50 ng/mL
							13C2 PFHxA	50 ng/mL
							1802 PFHxS	47.3 ng/mL
							13C5 PFNA	50 ng/mL
							13C4 PFOA	50 ng/mL
							13C4 PFOS	47.8 ng/mL
							13C2 PFUnA	50 ng/mL
					LCPFCSP_00041	250 uL	Perfluorobutyric acid	50 ng/mL
							Perfluorobutanesulfonic acid (PFBS)	44.2 ng/mL
							Perfluorodecanoic acid	50 ng/mL
							Perfluorododecanoic acid	50 ng/mL
							Perfluorodecane Sulfonic acid	48.2 ng/mL
							Perfluoroheptanoic acid (PFHpA)	50 ng/mL
							Perfluoroheptanesulfonic Acid	47.6 ng/mL
							Perfluorohexanoic acid	50 ng/mL
							Perfluorohexadecanoic acid	50 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	47.3 ng/mL
							Perfluorononanoic acid (PFNA)	50 ng/mL
							Perfluorooctanoic acid (PFOA)	50 ng/mL
							Perfluorooctandecanoic acid	50 ng/mL

Lab Name: TestAmerica Sacramento Job No.: 3	Job No.: 320-18918-1

				Reagent	Parent Reage	ent		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
							Perfluorooctanesulfonic acid (PFOS)	47.8 ng/mL
							Perfluorooctane Sulfonamide	50 ng/mL
							Perfluoropentanoic acid	50 ng/mL
							Perfluorotetradecanoic acid	50 ng/mL
							Perfluorotridecanoic acid	50 ng/mL
							Perfluoroundecanoic acid	50 ng/mL
.LCMPFCSU_00029	08/29/16	02/29/16	Methanol, Lot Baker 115491	10000 uL	LCM2PFHxDA_00003		13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA_00003	200 uL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA_00003		13C4-PFHpA	1 ug/mL
					LCM5PFPEA_00004		13C5-PFPeA	1 ug/mL
					LCM8FOSA_00007		13C8 FOSA	1 ug/mL
					LCMPFBA_00004		13C4 PFBA	1 ug/mL
					LCMPFDA_00006		13C2 PFDA	1 ug/mL
					LCMPFDoA 00004		13C2 PFDoA	1 ug/mL
					LCMPFHxA 00007		13C2 PFHxA	1 ug/mL
					LCMPFHxS_00004	200 uL	1802 PFHxS	0.946 ug/mL
					LCMPFNA 00004		13C5 PFNA	1 ug/mL
					LCMPFOA 00008		13C4 PFOA	1 ug/mL
					LCMPFOS_00010		13C4 PFOS	0.956 ug/mL
T 01/07 77 77 00000	11 /00 /15				LCMPFUdA_00005		13C2 PFUnA	1 ug/mL
LCM2PFHxDA_00003 LCM2PFTeDA_00003	11/29/17	Wellingto	on Laboratories, Lot M2P1 on Laboratories, Lot M2P1	THXDALLIZ	(Purchased Rea	-	13C2-PFHxDA 13C2-PFTeDA	50 ug/mL 50 ug/mL
LCM4PFHPA 00003	05/22/20		on Laboratories, Lot M2P on Laboratories, Lot M4P		(Purchased Rea (Purchased Rea		13C4-PFHpA	50 ug/mL
LCM5PFPEA 00004	05/22/20		on Laboratories, Lot M4F.		(Purchased Rea		13C5-PFPeA	50 ug/mL
LCM3FFFEA_00004	12/15/16		on Laboratories, Lot MSF		(Purchased Rea	-	13C8 FOSA	50 ug/mL
LCMPFBA 00004	10/31/19		ton Laboratories, Lot Mor		(Purchased Rea		13C4 PFBA	50 ug/mL
LCMPFDA 00006	08/19/20		ton Laboratories, Lot MF		(Purchased Rea		13C2 PFDA	50 ug/mL
LCMPFDoA 00004	07/17/19		ton Laboratories, Lot MP		(Purchased Rea		13C2 PFDoA	50 ug/mL
LCMPFHxA 00007	04/09/20		ton Laboratories, Lot MP		(Purchased Rea		13C2 PFHxA	50 ug/mL
LCMPFHxS 00004	07/25/18		ton Laboratories, Lot MP		(Purchased Rea		1802 PFHxS	47.3 ug/mL
LCMPFNA 00004	04/13/19		ton Laboratories, Lot MF		(Purchased Rea		13C5 PFNA	50 ug/mL
LCMPFOA 00008	04/10/20		ton Laboratories, Lot MF		(Purchased Rea		13C4 PFOA	50 ug/mL
LCMPFOS 00010	05/15/20		ton Laboratories, Lot MF		(Purchased Rea		13C4 PFOS	47.8 ug/mL
LCMPFUdA 00005	10/31/19		ton Laboratories, Lot MP		(Purchased Rea		13C2 PFUnA	50 ug/mL
.LCPFCSP 00041	08/11/16		Methanol, Lot 090285	5 mL			Perfluorobutyric acid	1 ug/mL
_					LCPFBSA_00001		Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA 00003	0.1 mL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA 00003	0.1 mL	Perfluorododecanoic acid	1 ug/mL
					LCPFDSA 00001		Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00004	0.1 mL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA 00001	0.1 mL	Perfluoroheptanesulfonic Acid	0.952 ug/mL
					LCPFHxA 00003		Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA 00004	0 1 mT.	Perfluorohexadecanoic acid	1 ug/mL

Lab	Name:	TestAmerica	Sacramento	Job No.:	320-18918-1	
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				Reagent	Parent Reage	ent		
Reagent ID	Exp Date	Prep Date	Dilutant Used	Final Volume	Reagent ID	Volume Added	Analyte	Concentration
					LCPFHxSA_00001	0.1 mL	Perfluorohexanesulfonic acid (PFHxS)	0.946 ug/mL
					LCPFNA 00004	0.1 mL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA_00004		Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00004		Perfluorooctandecanoic acid	1 ug/mL
					LCPFOS_00004		Perfluorooctanesulfonic acid (PFOS)	0.956 ug/mL
					LCPFOSA_00005		Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00003		Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA_00003		Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA_00003		Perfluorotridecanoic acid	1 ug/mL
	00/05/40				LCPFUdA_00003		Perfluoroundecanoic acid	1 ug/mL
LCPFBA_00003	03/05/18		gton Laboratories, Lo		(Purchased Rea		Perfluorobutyric acid Perfluorobutanesulfonic acid	50 ug/mL
LCPFBSA_00001	10/09/19	=	gton Laboratories, Lot		(Purchased Rea		(PFBS)	44.2 ug/mL
LCPFDA_00003	06/18/18		gton Laboratories, Lo		(Purchased Rea		Perfluorodecanoic acid	50 ug/mL
LCPFDoA_00003	01/03/18		ton Laboratories, Lot		(Purchased Rea		Perfluorododecanoic acid	50 ug/mL
LCPFDSA_00001 LCPFHpA 00004	09/13/18 05/09/19		gton Laboratories, Lot gton Laboratories, Lot		(Purchased Rea		Perfluorodecane Sulfonic acid Perfluoroheptanoic acid	48.2 ug/mL 50 ug/mL
_		-	•	-	(Purchased Rea		(PFHpA)	
LCPFHpSA_00001	11/21/17		ton Laboratories, Lot		(Purchased Rea		Perfluoroheptanesulfonic Acid	47.6 ug/mL
LCPFHxA 00003	05/09/19		ton Laboratories, Lot		(Purchased Rea		Perfluorohexanoic acid	50 ug/mL
LCPFHxDA_00004	11/28/17		ton Laboratories, Lot		(Purchased Rea		Perfluorohexadecanoic acid	50 ug/mL
LCPFHxSA_00001	05/09/19	_	ton Laboratories, Lot		(Purchased Rea		Perfluorohexanesulfonic acid (PFHxS)	47.3 ug/mL
LCPFNA_00004	05/09/19		gton Laboratories, Lo		(Purchased Rea		Perfluorononanoic acid (PFNA)	50 ug/mL
LCPFOA 00004	10/11/18		gton Laboratories, Lo		(Purchased Rea		Perfluorooctanoic acid (PFOA)	50 ug/mL
LCPFODA_00004	04/25/17		gton Laboratories, Lot		(Purchased Rea		Perfluorooctandecanoic acid	50 ug/mL
LCPFOS_00004	06/20/19	-	gton Laboratories, Lot		(Purchased Rea		Perfluorooctanesulfonic acid (PFOS)	47.8 ug/mL
LCPFOSA_00005	07/31/18		gton Laboratories, Lot		(Purchased Rea		Perfluorooctane Sulfonamide	50 ug/mL
LCPFPeA_00003	01/03/18		gton Laboratories, Lot		(Purchased Rea		Perfluoropentanoic acid	50 ug/mL
LCPFTeDA_00003	06/19/18		ton Laboratories, Lot		(Purchased Rea		Perfluorotetradecanoic acid	50 ug/mL
LCPFTrDA_00003	12/10/18		ton Laboratories, Lot		(Purchased Rea		Perfluorotridecanoic acid	50 ug/mL
LCPFUdA_00003	06/19/18		gton Laboratories, Lot		(Purchased Rea		Perfluoroundecanoic acid	50 ug/mL
LCPFC-L6_00015	06/29/16	12/30/15	MeOH/H2O, Lot 090285	2 mL	LCMPFCSU_00024	100 uL	13C2-PFHxDA	50 ng/mL
							13C2-PFTeDA	50 ng/mL
							13C4-PFHpA	50 ng/mL
							13C5-PFPeA 13C8 FOSA	50 ng/mL 50 ng/mL
							13C4 PFBA	50 ng/mL
							13C4 PFBA 13C2 PFDA	50 ng/mL
							13C2 PFDOA	50 ng/mL
							13C2 PFHxA	50 ng/mL
							1802 PFHXS	47.3 ng/mL
							13C5 PFNA	50 ng/mL
							13C4 PFOA	50 ng/mL
							13C4 PFOS	47.8 ng/mL

Lab	Name: Te	estAmerica S	Sacrament	o Job No.: 320-18918-1

				Reagent	Parent Reage	ent		
	Erro	Dwon	Dilutant	Final		Volume		
Reagent ID	Exp Date	Prep Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
					-		13C2 PFUnA	50 ng/mL
					LCPFCSP 00039	400 uT.	Perfluorobutyric acid	200 ng/mL
							Perfluorobutanesulfonic acid	176.8 ng/mL
							(PFBS)	1,010 Hg/ M2
							Perfluorodecanoic acid	200 ng/mL
							Perfluorododecanoic acid	200 ng/mL
							Perfluorodecane Sulfonic acid	192.8 ng/mL
							Perfluoroheptanoic acid (PFHpA)	200 ng/mL
							Perfluoroheptanesulfonic Acid	190.4 ng/mL
							Perfluorohexanoic acid	200 ng/mL
							Perfluoronexamore acid	
							Perfluoronexadecanoic acid	200 ng/mL
							(PFHxS)	189.2 ng/mL
							Perfluorononanoic acid (PFNA)	200 ng/mL
							Perfluorooctanoic acid (PFOA)	200 ng/mL
							Perfluorooctandecanoic acid	200 ng/mL
							Perfluorooctanesulfonic acid	191.2 ng/mL
							(PFOS)	
							Perfluorooctane Sulfonamide	200 ng/mL
							Perfluoropentanoic acid	200 ng/mL
							Perfluorotetradecanoic acid	200 ng/mL
							Perfluorotridecanoic acid	200 ng/mL
							Perfluoroundecanoic acid	200 ng/mL
.LCMPFCSU_00024	06/29/16	12/29/15	Methanol, Lot Baker 115491	10 mL	LCM2PFHxDA_00003	0.2 mL	13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA 00003	0.2 mL	13C2-PFTeDA	1 ug/mL
					LCM4PFHPA 00003	0.2 mL	13C4-PFHpA	1 ug/mL
					LCM5PFPEA 00004		13C5-PFPeA	1 ug/mL
					LCM8FOSA 00006	0.2 mL	13C8 FOSA	1 ug/mL
					LCMPFBA 00004	0.2 mL	13C4 PFBA	1 ug/mL
					LCMPFDA 00004	0.2 mL	13C2 PFDA	1 ug/mL
					LCMPFDoA 00004	0.2 mL	13C2 PFDoA	1 ug/mL
					LCMPFHxA 00005	0.2 mL	13C2 PFHxA	1 ug/mL
					LCMPFHxS_00004		1802 PFHxS	0.946 ug/mL
					LCMPFNA 00003	0.2 mL	13C5 PFNA	1 ug/mL
					LCMPFOA 00007		13C4 PFOA	1 ug/mL
					LCMPFOS 00009	0.2 mL	13C4 PFOS	0.956 ug/mL
					LCMPFUdA 00005	0.2 mL	13C2 PFUnA	1 ug/mL
LCM2PFHxDA_00003			on Laboratories, Lot M2P1		(Purchased Rea	gent)	13C2-PFHxDA	50 ug/mL
LCM2PFTeDA_00003			on Laboratories, Lot M2P1		(Purchased Rea	,	13C2-PFTeDA	50 ug/mL
LCM4PFHPA_00003	05/22/20		on Laboratories, Lot M4P		(Purchased Rea		13C4-PFHpA	50 ug/mL
LCM5PFPEA_00004	05/22/20		on Laboratories, Lot M5P		(Purchased Rea		13C5-PFPeA	50 ug/mL
LCM8FOSA_00006	12/15/16		on Laboratories, Lot M8F		(Purchased Rea		13C8 FOSA	50 ug/mL
LCMPFBA_00004	10/31/19		ton Laboratories, Lot MP		(Purchased Rea		13C4 PFBA	50 ug/mL
LCMPFDA_00004	04/13/19		ton Laboratories, Lot MP		(Purchased Rea		13C2 PFDA	50 ug/mL
LCMPFDoA_00004	07/17/19		ton Laboratories, Lot MP1		(Purchased Rea		13C2 PFDoA	50 ug/mL
LCMPFHxA_00005	04/13/19	Welling	ton Laboratories, Lot MPI	HXAU414	(Purchased Rea	gent)	13C2 PFHxA	50 ug/mL

Lab Nan	e: TestAmerica	Sacramento	Job	No.: 320-18918-1
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				Reagent	Parent Reag	ent		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
LCMPFHxS 00004	07/25/18	Welling	ton Laboratories, Lot ME	PFHxS0713	(Purchased Rea	agent)	1802 PFHxS	47.3 ug/mL
LCMPFNA 00003	04/13/19	Welling	ton Laboratories, Lot M	IPFNA0414	(Purchased Rea	agent)	13C5 PFNA	50 ug/mL
LCMPFOA 00007	04/10/20	Welling	ton Laboratories, Lot M	IPFOA0415	(Purchased Rea	agent)	13C4 PFOA	50 ug/mL
LCMPFOS 00009	05/15/20	Welling	ton Laboratories, Lot M	IPFOS0515	(Purchased Rea	agent)	13C4 PFOS	47.8 ug/mL
LCMPFUdA 00005	10/31/19	Welling	ton Laboratories, Lot ME	PFUdA1014	(Purchased Rea	agent)	13C2 PFUnA	50 ug/mL
.LCPFCSP 00039	06/30/16	12/30/15	Methanol, Lot 090285	5 mL		0.1 mL	Perfluorobutyric acid	1 ug/mL
_					LCPFBSA_00001	0.1 mL	Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA 00003	0.1 mL	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA 00003		Perfluorododecanoic acid	1 ug/mL
					LCPFDSA 00001	0.1 mL	Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00004		Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpSA 00001	0.1 mT.	Perfluoroheptanesulfonic Acid	0.952 ug/mL
					LCPFHxA 00003		Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA 00004		Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxSA_00001		Perfluorohexanesulfonic acid (PFHxS)	0.946 ug/mL
					LCPFNA 00004	0 1 mT.	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA 00004		Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA 00004		Perfluorooctandecanoic acid	1 ug/mL
					LCPFOS_00004		Perfluorooctanesulfonic acid (PFOS)	0.956 ug/mL
					LCPFOSA 00005	0.1 mT.	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA 00003		Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA 00003		Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA 00003		Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA 00003	0.1 mL	Perfluoroundecanoic acid	1 ug/mL
LCPFBA 00003	03/05/18	Welling	gton Laboratories, Lot E	PFBA0313	(Purchased Rea		Perfluorobutyric acid	50 ug/mL
LCPFBSA_00001	10/09/19		ton Laboratories, Lot L		(Purchased Rea		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
LCPFDA 00003	06/18/18	Wellin	gton Laboratories, Lot E	PFDA0613	(Purchased Rea	agent)	Perfluorodecanoic acid	50 ug/mL
LCPFDoA 00003	01/03/18	Welling	ton Laboratories, Lot P	FDoA0113	(Purchased Rea		Perfluorododecanoic acid	50 ug/mL
LCPFDSA 00001	09/13/18		ton Laboratories, Lot L		(Purchased Rea		Perfluorodecane Sulfonic acid	48.2 ug/mL
LCPFHpA_00004	05/09/19		ton Laboratories, Lot P		(Purchased Rea		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
LCPFHpSA 00001	11/21/17		ton Laboratories, Lot LE		(Purchased Rea	agent)	Perfluoroheptanesulfonic Acid	47.6 ug/mL
LCPFHxA 00003	05/09/19	Welling	ton Laboratories, Lot P	FHxA0514	(Purchased Rea		Perfluorohexanoic acid	50 ug/mL
LCPFHxDA 00004	11/28/17		ton Laboratories, Lot PE		(Purchased Rea	agent)	Perfluorohexadecanoic acid	50 ug/mL
LCPFHxSA_00001	05/09/19	Welling	ton Laboratories, Lot LE	PFHxS0514	(Purchased Rea		Perfluorohexanesulfonic acid (PFHxS)	47.3 ug/mL
LCPFNA 00004	05/09/19		gton Laboratories, Lot E		(Purchased Rea	agent)	Perfluorononanoic acid (PFNA)	50 ug/mL
LCPFOA 00004	10/11/18	Wellin	gton Laboratories, Lot E	PFOA1013	(Purchased Rea		Perfluorooctanoic acid (PFOA)	50 ug/mL
LCPFODA 00004	04/25/17		ton Laboratories, Lot P		(Purchased Rea	agent)	Perfluorooctandecanoic acid	50 ug/mL
LCPFOS_00004	06/20/19		ton Laboratories, Lot L		(Purchased Rea		Perfluorooctanesulfonic acid (PFOS)	47.8 ug/mL
LCPFOSA 00005	07/31/18	Welling	ton Laboratories, Lot F	OSA0714I	(Purchased Rea	agent)	Perfluorooctane Sulfonamide	50 ug/mL
LCPFPeA 00003	01/03/18		ton Laboratories, Lot P		(Purchased Rea		Perfluoropentanoic acid	50 ug/mL
LCPFTeDA 00003	06/19/18		ton Laboratories, Lot PE		(Purchased Rea		Perfluorotetradecanoic acid	50 ug/mL

Lab Name:	TestAmerica	Sacramento	Job No.: 320-18918-1

				Reagent	Parent Reage	ent		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
LCPFTrDA 00003	12/10/18	Welling	 ton Laboratories, Lot PF	מתיתייתייתייתייתייתייתייתייתייתייתייתיית	(Purchased Rea	agent)	Perfluorotridecanoic acid	50 ug/mL
LCPFUdA 00003	06/19/18		gton Laboratories, Lot F		(Purchased Rea		Perfluoroundecanoic acid	50 ug/mL
_								
LCPFC-L7_00015	06/29/16	12/30/15	MeOH/H2O, Lot 090285	2 mL	LCMPFCSU_00024	100 uL	13C2-PFHxDA	50 ng/mL
							13C2-PFTeDA	50 ng/mL
							13C4-PFHpA	50 ng/mL
							13C5-PFPeA	50 ng/mL
							13C8 FOSA 13C4 PFBA	50 ng/mL
							13C4 PFBA 13C2 PFDA	50 ng/mL
							13C2 PFDA 13C2 PFDoA	50 ng/mL
							13C2 PFDOA 13C2 PFHxA	50 ng/mL
							1802 PFHXS	50 ng/mL 47.3 ng/mL
							13C5 PFNA	47.3 ng/mL 50 ng/mL
							13C4 PFOA	50 ng/mL
							13C4 PFOA 13C4 PFOS	47.8 ng/mL
							13C2 PFUnA	50 ng/mL
					LCPFCSP 00039	800 uL		400 ng/mL
					Lettest_00039	000 41	Perfluorobutanesulfonic acid	353.6 ng/mL
							(PFBS)	333.0 Hg/III
							Perfluorodecanoic acid	400 ng/mL
							Perfluorododecanoic acid	400 ng/mL
							Perfluorodecane Sulfonic acid	385.6 ng/mL
							Perfluoroheptanoic acid	400 ng/mL
							(PFHpA)	
							Perfluoroheptanesulfonic Acid	380.8 ng/mL
							Perfluorohexanoic acid	400 ng/mL
							Perfluorohexadecanoic acid	400 ng/mL
							Perfluorohexanesulfonic acid (PFHxS)	378.4 ng/mL
							Perfluorononanoic acid (PFNA)	400 ng/mL
							Perfluorooctanoic acid (PFOA)	400 ng/mL
							Perfluorooctandecanoic acid	400 ng/mL
							Perfluorooctanesulfonic acid	382.4 ng/mL
							(PFOS)	
							Perfluorooctane Sulfonamide	400 ng/mL
							Perfluoropentanoic acid	400 ng/mL
							Perfluorotetradecanoic acid	400 ng/mL
							Perfluorotridecanoic acid	400 ng/mL
							Perfluoroundecanoic acid	400 ng/mL
.LCMPFCSU_00024	06/29/16	12/29/15	Methanol, Lot Baker 115491	10 mL	LCM2PFHxDA_00003	0.2 mL	13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA_00003		13C2-PFTeDA	1 ug/mL
					LCM4PFHPA_00003		13C4-PFHpA	1 ug/mL
					LCM5PFPEA 00004		13C5-PFPeA	1 ug/mL
					LCM8FOSA_00006	0.2 mL	13C8 FOSA	1 ug/mL
					LCMPFBA_00004		13C4 PFBA	1 ug/mL
					LCMPFDA 00004		13C2 PFDA	1 ug/mL
					LCMPFDoA 00004	0.2 mL	13C2 PFDoA	1 ug/mL

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

				Reagent	Parent Reag	ent		
Reagent ID	Exp Date	Prep Date	Dilutant Used	Final Volume	Reagent ID	Volume Added	Analyte	Concentration
					LCMPFHxA 00005	0.2 mL	13C2 PFHxA	1 ug/mL
					LCMPFHxS 00004	0.2 mL	1802 PFHxS	0.946 ug/mL
					LCMPFNA 00003	0.2 mL	13C5 PFNA	1 ug/mL
					LCMPFOA 00007	0.2 mL	13C4 PFOA	1 ug/mL
					LCMPFOS 00009	0.2 mL	13C4 PFOS	0.956 ug/mL
					LCMPFUdA 00005	0.2 mL	13C2 PFUnA	1 ug/mL
LCM2PFHxDA 00003	11/29/17		on Laboratories, Lot		(Purchased Rea	agent)	13C2-PFHxDA	50 ug/mL
LCM2PFTeDA 00003	11/29/17	Wellingt	on Laboratories, Lot	M2PFTeDA1112	(Purchased Rea	agent)	13C2-PFTeDA	50 ug/mL
LCM4PFHPA 00003	05/22/20	Wellingt	on Laboratories, Lot	M4PFHpA0515	(Purchased Rea	agent)	13C4-PFHpA	50 ug/mL
LCM5PFPEA 00004	05/22/20	Wellingt	on Laboratories, Lot	M5PFPeA0515	(Purchased Rea	agent)	13C5-PFPeA	50 ug/mL
LCM8FOSA 00006	12/15/16	Wellingt	on Laboratories, Lot	M8FOSA1214I	(Purchased Rea	agent)	13C8 FOSA	50 ug/mL
LCMPFBA 00004	10/31/19	Welling	gton Laboratories, Lo	t MPFBA1014	(Purchased Rea	agent)	13C4 PFBA	50 ug/mL
LCMPFDA 00004	04/13/19		gton Laboratories, Lo		(Purchased Rea	agent)	13C2 PFDA	50 ug/mL
LCMPFDoA 00004	07/17/19	Welling	ton Laboratories, Lot	t MPFDoA0714	(Purchased Rea	agent)	13C2 PFDoA	50 ug/mL
LCMPFHxA 00005	04/13/19	Welling	ton Laboratories, Lot	t MPFHxA0414	(Purchased Rea	agent)	13C2 PFHxA	50 ug/mL
LCMPFHxS 00004	07/25/18	Welling	ton Laboratories, Lot	t MPFHxS0713	(Purchased Rea	agent)	1802 PFHxS	47.3 ug/mL
LCMPFNA 00003	04/13/19	Welling	gton Laboratories, Lo	t MPFNA0414	(Purchased Rea	agent)	13C5 PFNA	50 ug/mL
LCMPFOA 00007	04/10/20	Welling	gton Laboratories, Lo	t MPFOA0415	(Purchased Rea	agent)	13C4 PFOA	50 ug/mL
LCMPFOS 00009	05/15/20		gton Laboratories, Lo		(Purchased Rea	agent)	13C4 PFOS	47.8 ug/mL
LCMPFUdA 00005	10/31/19		ton Laboratories, Lot		(Purchased Rea	agent)	13C2 PFUnA	50 ug/mL
.LCPFCSP 00039	06/30/16	12/30/15	Methanol, Lot 090285	5 mL	LCPFBA 00003	0.1 mL	Perfluorobutyric acid	1 ug/mL
_					LCPFBSA_00001		Perfluorobutanesulfonic acid (PFBS)	0.884 ug/mL
					LCPFDA 00003	0 1 mT.	Perfluorodecanoic acid	1 ug/mL
					LCPFDoA 00003		Perfluorododecanoic acid	1 ug/mL
					LCPFDSA 00001		Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA 00004		Perfluoroheptanoic acid	1 ug/mL
					_		(PFHpA)	
					LCPFHpSA_00001		Perfluoroheptanesulfonic Acid	0.952 ug/mL
					LCPFHxA_00003		Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA_00004		Perfluorohexadecanoic acid	1 ug/mL
					LCPFHxSA_00001		Perfluorohexanesulfonic acid (PFHxS)	0.946 ug/mL
					LCPFNA 00004		Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFOA 00004	0.1 mL	Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA 00004	0.1 mL	Perfluorooctandecanoic acid	1 ug/mL
					LCPFOS_00004	0.1 mL	Perfluorooctanesulfonic acid (PFOS)	0.956 ug/mL
					LCPFOSA 00005	0.1 mT	Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA 00003		Perfluoropentanoic acid	1 ug/mL
					LCPFTeDA 00003		Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA 00003		Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA 00003		Perfluoroundecanoic acid	1 ug/mL
LCPFBA 00003	03/05/18	Wellin	gton Laboratories, Lo	ot PFBA0313	(Purchased Rea		Perfluorobutyric acid	50 ug/mL
LCPFBSA_00001	10/09/19		gton Laboratories, Lo		(Purchased Rea		Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
LCPFDA 00003	06/18/18	Wellin	gton Laboratories, Lo	ot PFDA0613	(Purchased Rea	agent)	Perfluorodecanoic acid	50 ug/mL
LCPFDoA 00003	01/03/18		gton Laboratories, Lo		(Purchased Rea		Perfluorododecanoic acid	50 ug/mL

Lab Name: TestAmerica Sacramento	Job No.: 320-18918-1
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				Reagent	Parent Reage	ent		
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
LCPFDSA 00001	09/13/18	Welling	gton Laboratories, Lot	LPFDS0913	(Purchased Rea		Perfluorodecane Sulfonic acid	48.2 ug/mL
LCPFHpA_00004	05/09/19	Welling	gton Laboratories, Lot	PFHpA0514	(Purchased Rea	gent)	Perfluoroheptanoic acid (PFHpA)	50 ug/mL
LCPFHpSA 00001	11/21/17		ton Laboratories, Lot		(Purchased Rea	gent)	Perfluoroheptanesulfonic Acid	47.6 ug/mL
LCPFHxA 00003	05/09/19		gton Laboratories, Lot		(Purchased Rea	gent)	Perfluorohexanoic acid	50 ug/mL
LCPFHxDA 00004	11/28/17	Welling	ton Laboratories, Lot	PFHxDA0707	(Purchased Rea		Perfluorohexadecanoic acid	50 ug/mL
LCPFHxSA_00001	05/09/19	Welling	ton Laboratories, Lot	LPFHxS0514	(Purchased Rea	gent)	Perfluorohexanesulfonic acid (PFHxS)	47.3 ug/mL
LCPFNA_00004	05/09/19		gton Laboratories, Lo		(Purchased Rea		Perfluorononanoic acid (PFNA)	50 ug/mL
LCPFOA_00004	10/11/18		gton Laboratories, Lo		(Purchased Rea		Perfluorooctanoic acid (PFOA)	50 ug/mL
LCPFODA_00004	04/25/17		gton Laboratories, Lot		(Purchased Rea		Perfluorooctandecanoic acid	50 ug/mL
LCPFOS_00004	06/20/19		gton Laboratories, Lot		(Purchased Rea		Perfluorooctanesulfonic acid (PFOS)	47.8 ug/mL
LCPFOSA_00005	07/31/18		gton Laboratories, Lot		(Purchased Rea		Perfluorooctane Sulfonamide	50 ug/mL
LCPFPeA_00003	01/03/18		gton Laboratories, Lot		(Purchased Rea		Perfluoropentanoic acid	50 ug/mL
LCPFTeDA_00003	06/19/18		ton Laboratories, Lot		(Purchased Rea	J '	Perfluorotetradecanoic acid	50 ug/mL
LCPFTrDA_00003	12/10/18		ton Laboratories, Lot		(Purchased Rea	-	Perfluorotridecanoic acid	50 ug/mL
LCPFUdA_00003	06/19/18	Welling	gton Laboratories, Lot	PFUdA0613	(Purchased Rea	gent)	Perfluoroundecanoic acid	50 ug/mL
LCPFCIC_00016	06/16/16	12/22/15	MeOH/H2O, Lot 09285	5 mL	LCMPFCSU_00023	250 uI	13C2-PFHxDA	50 ng/mL
_					-		13C2-PFTeDA	50 ng/mL
							13C4-PFHpA	50 ng/mL
							13C5-PFPeA	50 ng/mL
							13C8 FOSA	50 ng/mL
							13C4 PFBA	50 ng/mL
							13C2 PFDA	50 ng/mL
							13C2 PFDoA	50 ng/mL
							13C2 PFHxA	50 ng/mL
							1802 PFHxS	47.3 ng/mL
							13C5 PFNA	50 ng/mL
							13C4 PFOA	50 ng/mL
							13C4 PFOS	47.8 ng/mL
						105 -	13C2 PFUnA	50 ng/mL
					LCPFACMXB_00008	125 uL	Perfluorobutanesulfonic acid	44.25 ng/mL
							(PFBS)	50 ng/mL
							Perfluoroheptanoic acid (PFHpA)	
							Perfluorohexanesulfonic acid (PFHxS)	47.25 ng/mL
							Perfluorononanoic acid (PFNA)	50 ng/mL
							Perfluorooctanesulfonic acid	47.75 ng/mL
							(PFOS)	F0 / -
7.01/27.00000	0.6 /01 /1.6	10/01/15			T 0140 D T 11 D 2 0 0 0 0 0	0 1 7	Perfluorooctanoic acid (PFOA)	50 ng/mL
.LCMPFCSU_00023	06/21/16	12/21/15	Methanol, Lot Baker 115491	5 mL	LCM2PFHxDA_00002		13C2-PFHxDA	1 ug/mL
					LCM2PFTeDA_00003		13C2-PFTeDA	1 ug/mL
					LCM4PFHPA_00003		13C4-PFHpA	1 ug/mL
					LCM5PFPEA_00004		13C5-PFPeA	1 ug/mL
			l		LCM8FOSA_00006	l O.I ml	13C8 FOSA	1 ug/mL

Lab Name: TestAmerica Sacramento	Job No.: 320-18918-1
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				Parent Reagent		ent.		
				Reagent				
	Exp	Prep	Dilutant	Final		Volume		
Reagent ID	Date	Date	Used	Volume	Reagent ID	Added	Analyte	Concentration
					LCMPFBA 00004	0.1 mL	13C4 PFBA	1 ug/mL
					LCMPFDA 00005	0.1 mL	13C2 PFDA	1 ug/mL
					LCMPFDoA 00003	0.1 mL	13C2 PFDoA	1 ug/mL
					LCMPFHxA 00006	0.1 mL	13C2 PFHxA	1 ug/mL
					LCMPFHxS 00004	0.1 mL	1802 PFHxS	0.946 ug/mL
					LCMPFNA 00003	0.1 mL	13C5 PFNA	1 ug/mL
					LCMPFOA 00007	0.1 mL	13C4 PFOA	1 ug/mL
					LCMPFOS 00009	0.1 mL	13C4 PFOS	0.956 ug/mL
					LCMPFUdA 00004	0.1 mL	13C2 PFUnA	1 ug/mL
LCM2PFHxDA 00002	11/29/17	Wellingto	on Laboratories, Lot M2F	FHxDA1112	(Purchased Rea	igent)	13C2-PFHxDA	50 ug/mL
LCM2PFTeDA 00003	11/29/17	Wellingto	on Laboratories, Lot M2F	FTeDA1112	(Purchased Rea	igent)	13C2-PFTeDA	50 ug/mL
LCM4PFHPA 00003	05/22/20		on Laboratories, Lot M4		(Purchased Rea		13C4-PFHpA	50 ug/mL
LCM5PFPEA 00004	05/22/20		on Laboratories, Lot M5		(Purchased Rea	-	13C5-PFPeA	50 ug/mL
LCM8FOSA 00006	12/15/16		on Laboratories, Lot M8		(Purchased Rea		13C8 FOSA	50 ug/mL
LCMPFBA 00004	10/31/19	Welling	ton Laboratories, Lot M	PFBA1014	(Purchased Rea		13C4 PFBA	50 ug/mL
LCMPFDA 00005	04/13/19		ton Laboratories, Lot M		(Purchased Rea	-	13C2 PFDA	50 ug/mL
LCMPFDoA 00003	07/17/19		on Laboratories, Lot MF		(Purchased Rea		13C2 PFDoA	50 ug/mL
LCMPFHxA 00006	04/13/19		on Laboratories, Lot MF		(Purchased Rea	-	13C2 PFHxA	50 ug/mL
LCMPFHxS 00004	07/25/18		on Laboratories, Lot MF		(Purchased Rea		1802 PFHxS	47.3 ug/mL
LCMPFNA 00003	04/13/19		ton Laboratories, Lot M		(Purchased Rea		13C5 PFNA	50 ug/mL
LCMPFOA 00007	04/10/20		ton Laboratories, Lot M		(Purchased Rea	-	13C4 PFOA	50 ug/mL
LCMPFOS 00009	05/15/20		ton Laboratories, Lot M		(Purchased Rea		13C4 PFOS	47.8 ug/mL
LCMPFUdA 00004	10/31/19		ton Laboratories, Lot MF		(Purchased Rea		13C2 PFUnA	50 ug/mL
.LCPFACMXB 00008	06/20/19		on Laboratories, Lot PF		(Purchased Reagent)		Perfluorobutanesulfonic acid	1.77 ug/mL
		, ,			, , , , , , , , , , , , , , , , , , , ,	5 /	(PFBS)	
							Perfluoroheptanoic acid	2 ug/mL
							(PFHpA)	
							Perfluorohexanesulfonic acid	1.89 ug/mL
							(PFHxS)	
							Perfluorononanoic acid (PFNA)	2 ug/mL
							Perfluorooctanesulfonic acid	1.91 ug/mL
							(PFOS)	
							Perfluorooctanoic acid (PFOA)	2 ug/mL
LCPFCSP 00049	11/17/16	05/17/16	Methanol, Lot 090285	10000 uL	LCPFBA 00004	200 uL	Perfluorobutyric acid	1 ug/mL
_					LCPFBS 00003		Perfluorobutane Sulfonate	0.884 ug/mL
					LCPFBSA 00001	200 uL	Perfluorobutanesulfonic acid	0.884 ug/mL
					_		(PFBS)	_
					LCPFDA_00004		Perfluorodecanoic acid	1 ug/mL
					LCPFDoA_00004	200 uL	Perfluorododecanoic acid	1 ug/mL
					LCPFDS_00005	200 uL	Perfluorodecane Sulfonate	0.964 ug/mL
					_		Perfluorodecane Sulfonic acid	0.964 ug/mL
					LCPFHpA_00005	200 uL	Perfluoroheptanoic acid (PFHpA)	1 ug/mL
					LCPFHpS 00008	2.00 11T	Perfluoroheptane Sulfonate	0.952 ug/mL
							Perfluoroheptanesulfonic Acid	0.952 ug/mL
					LCPFHxA 00004	200 117.	Perfluorohexanoic acid	1 ug/mL
					LCPFHxDA 00004		Perfluorohexadecanoic acid	1 ug/mL

Lab	Name:	TestAmerica	Sacramento	Job No.: 320-18918-1

Reagent ID				Reagent	Parent Reagent			
	Exp Date		Dilutant Used	Final Volume	Reagent ID	Volume Added	Analyte	Concentration
							Perfluorohexanesulfonic acid (PFHxS)	0.91 ug/mL
					LCPFNA 00005	200 uL	Perfluorononanoic acid (PFNA)	1 ug/mL
					LCPFNS_00002	200 uL	PFNS	0.96 ug/mL
							(Perflouro-1-nonanesulfonate)	
					LCPFOA_00005		Perfluorooctanoic acid (PFOA)	1 ug/mL
					LCPFODA_00005		Perfluorooctandecanoic acid	1 ug/mL
					LCPFOS-br_00001		Perfluorooctanesulfonic acid (PFOS)	0.928 ug/mL
					LCPFOSA_00006		Perfluorooctane Sulfonamide	1 ug/mL
					LCPFPeA_00004	200 uL	Perfluoropentanoic acid	1 ug/mL
					LCPFPeS_00002	200 uL	PFPeS (Perflouro-1-pentanesulfonate)	0.938 ug/mL
					LCPFTeDA 00004	200 uL	Perfluorotetradecanoic acid	1 ug/mL
					LCPFTrDA 00004	200 uL	Perfluorotridecanoic acid	1 ug/mL
					LCPFUdA 00004	200 uL	Perfluoroundecanoic acid	1 ug/mL
.LCPFBA 00004	01/30/20	Wellingt	on Laboratories, Lot	PFBA0115	(Purchased Rea	gent)	Perfluorobutyric acid	50 ug/mL
.LCPFBS 00003	10/09/19		on Laboratories, Lot		(Purchased Rea	gent)	Perfluorobutane Sulfonate	44.2 ug/mL
.LCPFBSA_00001	10/09/19	Wellingto	on Laboratories, Lot	LPFBS1014	(Purchased Rea	gent)	Perfluorobutanesulfonic acid (PFBS)	44.2 ug/mL
.LCPFDA 00004	07/02/20	Wellingt	on Laboratories, Lot	PFDA0615	(Purchased Rea	gent)	Perfluorodecanoic acid	50 ug/mL
.LCPFDoA 00004	01/30/20		on Laboratories, Lot		(Purchased Rea	gent)	Perfluorododecanoic acid	50 ug/mL
.LCPFDS_00005	07/02/20	Wellingto	on Laboratories, Lot	LPFDS0615	(Purchased Rea	gent)	Perfluorodecane Sulfonate	48.2 ug/mL
_							Perfluorodecane Sulfonic acid	48.2 ug/mL
.LCPFHpA_00005	01/22/21	Wellington Laboratories, Lot PFHpA0116			(Purchased Reagent)		Perfluoroheptanoic acid (PFHpA)	50 ug/mL
.LCPFHpS_00008	11/06/20	Wellingto	n Laboratories, Lot I	LPFHpS1115	(Purchased Rea	.gent)	Perfluoroheptane Sulfonate	47.6 ug/mL
							Perfluoroheptanesulfonic Acid	47.6 ug/mL
.LCPFHxA_00004	12/22/20		on Laboratories, Lot		(Purchased Rea		Perfluorohexanoic acid	50 ug/mL
.LCPFHxDA_00004	11/28/17		n Laboratories, Lot B		(Purchased Rea		Perfluorohexadecanoic acid	50 ug/mL
.LCPFHxS-br_00001	07/03/20	Wellington	Laboratories, Lot b	rPFHxSK0615	(Purchased Rea	.gent)	Perfluorohexane Sulfonate	45.5 ug/mL
							Perfluorohexanesulfonic acid (PFHxS)	45.5 ug/mL
.LCPFNA_00005	10/23/20	Wellingt	on Laboratories, Lot	PFNA1015	(Purchased Rea		Perfluorononanoic acid (PFNA)	50 ug/mL
.LCPFNS_00002	07/04/17	_	on Laboratories, Lot		(Purchased Rea	.gent)	PFNS (Perflouro-1-nonanesulfonate)	48 ug/mL
.LCPFOA_00005	11/06/20		on Laboratories, Lot		(Purchased Rea	.gent)	Perfluorooctanoic acid (PFOA)	50 ug/mL
.LCPFODA_00005	01/30/20		on Laboratories, Lot		(Purchased Rea		Perfluorooctandecanoic acid	50 ug/mL
.LCPFOS-br_00001	10/14/20	Wellington	n Laboratories, Lot b	rPFOSK1015	(Purchased Rea	gent)	Perfluorooctanesulfonic acid (PFOS)	46.4 ug/mL
.LCPFOSA_00006	09/02/17	Wellingto	on Laboratories, Lot	FOSA0815I	(Purchased Rea	gent)	Perfluorooctane Sulfonamide	50 ug/mL
.LCPFPeA_00004	01/30/20		on Laboratories, Lot		(Purchased Rea	gent)	Perfluoropentanoic acid	50 ug/mL
.LCPFPeS_00002	07/04/17	Wellingto	n Laboratories, Lot I	LPFPeS0712	(Purchased Rea	gent)	PFPeS (Perflouro-1-pentanesulfonate)	46.9 ug/mL
.LCPFTeDA 00004	12/09/20	Wellingto	on Laboratories, Lot B	PFTeDA1215	(Purchased Rea	gent)	Perfluorotetradecanoic acid	50 ug/mL
.LCPFTrDA 00004	12/10/18	Wellingto	on Laboratories, Lot B	PFTrDA1213	(Purchased Rea	gent)	Perfluorotridecanoic acid	50 ug/mL
.LCPFUdA 00004	08/19/20		on Laboratories, Lot		(Purchased Rea	gent)	Perfluoroundecanoic acid	50 ug/mL

Reagent

LCM2PFHxDA_00002

Rec: Gli4/14 SK





CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M2PFHxDA

LOT NUMBER:

M2PFHxDA1112

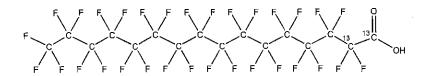
COMPOUND:

Perfluoro-n-[1,2-13C,]hexadecanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₂¹²C₁₄HF₃₁O₂

50 ± 2.5 µg/ml

MOLECULAR WEIGHT:

ISOTOPIC PURITY:

816.11

SOLVENT(S):

Methanol

≥99% ¹³C

(1,2-13C₂)

Water (<1%)

CHEMICAL PURITY:

CONCENTRATION:

>98%

LAST TESTED: (mm/dd/yyyy)

11/29/2012

EXPIRY DATE: (mm/ed/yyyy)

11/29/2017

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.3% of native perfluoro-n-hexadecanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 01/10/2013

INTENDED USE:

The products prepared by Weilington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_n(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2, ... x_n$ on which it depends is:

$$u_{\epsilon}(y(x_1, x_2, ..., x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

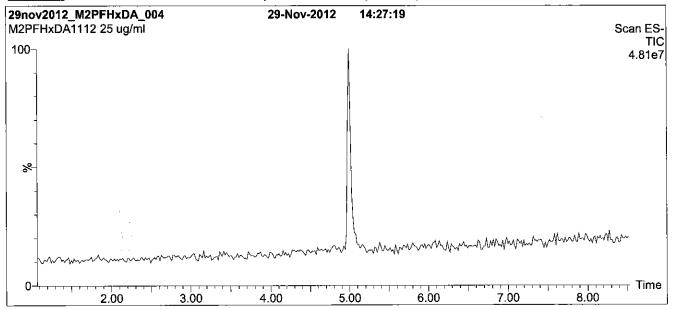
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

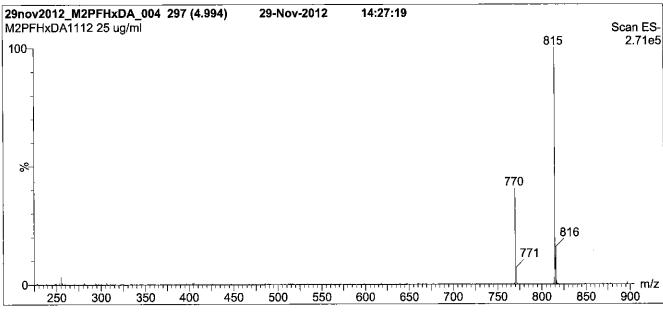




For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: M2PFHxDA; LC/MS Data (TIC and Mass Spectrum)





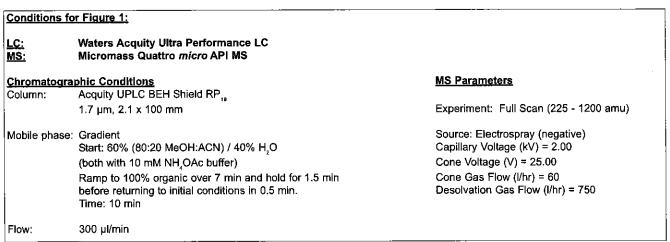
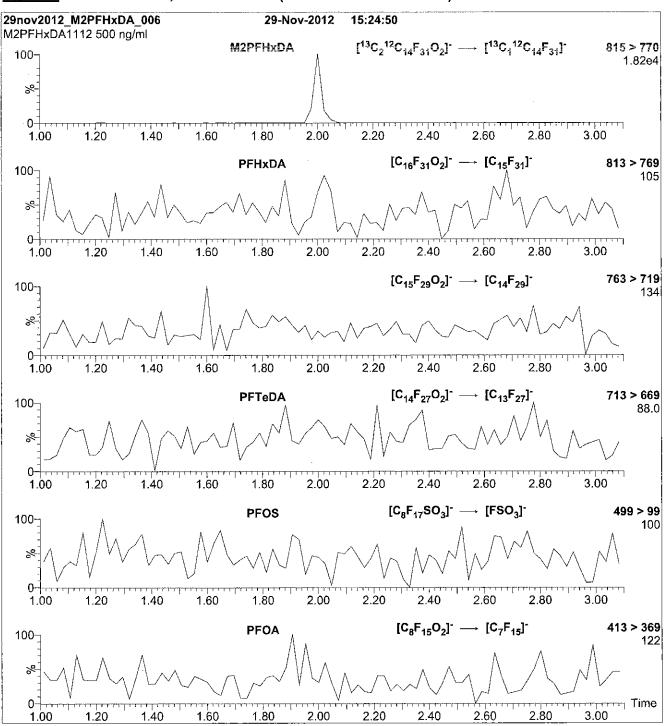
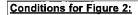


Figure 2: M2PFHxDA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml M2PFHxDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3 Collision Energy (eV) = 15

Reagent

LCM2PFHxDA_00003



CERTIFICATE OF ANALYSIS **DOCUMENTATION**

PRODUCT CODE:

M2PFHxDA

LOT NUMBER:

M2PFHxDA1112

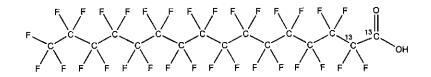
COMPOUND:

Perfluoro-n-[1,2-13C] hexadecanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₂¹²C₁₄HF₃₁O₂

MOLECULAR WEIGHT:

ISOTOPIC PURITY:

816.11

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

SOLVENT(S):

Methanol

≥99% 13C

 $(1,2^{-13}C_2)$

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy) EXPIRY DATE: (mm/dd/yyyy)

11/29/2012

11/29/2017

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.3% of native perfluoro-n-hexadecanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_i(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_{\varepsilon}(y(x_1, x_2, ... x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

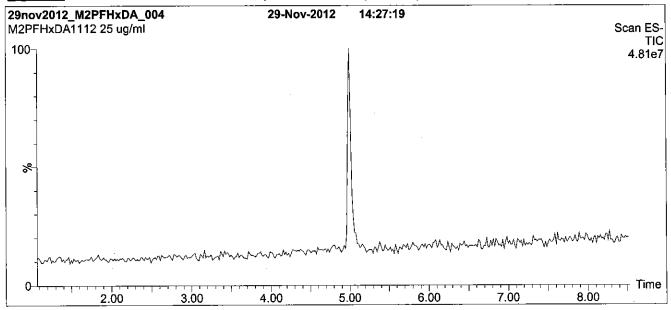
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

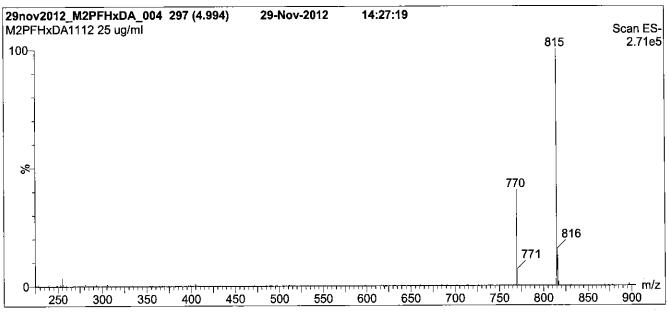




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Figure 1: M2PFHxDA; LC/MS Data (TIC and Mass Spectrum)





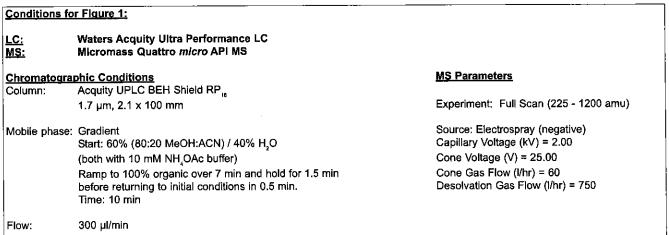
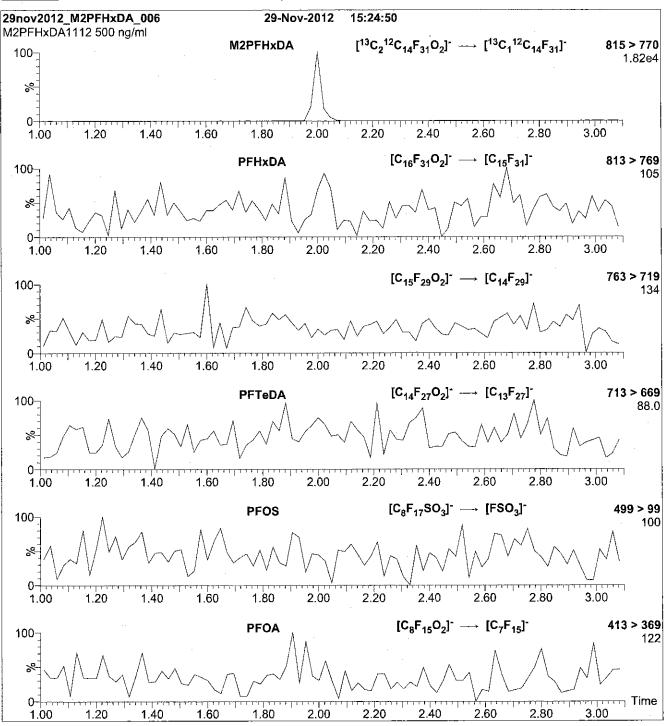


Figure 2: M2PFHxDA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 µl (500 ng/ml M2PFHxDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H,O

(both with 10 mM NH,OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3 Collision Energy (eV) = 15

Reagent

LCM2PFHxDA_00005

Exp: 01/07/21 Prpd: CBW 13C2-PFHxDA at 50ug/mL



WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M2PFHxDA

LOT NUMBER:

M2PFHxDA1112

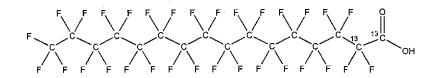
COMPOUND:

Perfluoro-n-[1,2-13C,]hexadecanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₂¹²C₁₄HF₃₁O₂

 $50 \pm 2.5 \,\mu \text{g/ml}$

MOLECULAR WEIGHT:

ISOTOPIC PURITY:

816.11

µg/ml SOLVENT(S):

Methanol

≥99% ¹³C

 $(1,2^{-13}C_2)$

Water (<1%)

CHEMICAL PURITY:

CONCENTRATION:

>98%

LAST TESTED: (mm/dd/yyyy)

01/07/2016

EXPIRY DATE: (mm/dd/yyyy)

01/07/2021

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.3% of native perfluoro-n-hexadecanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B G Chittim

Date:

/mm/dd/osor)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

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HAZARDS:

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UNCERTAINTY:

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 $X_1, X_2, ... X_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

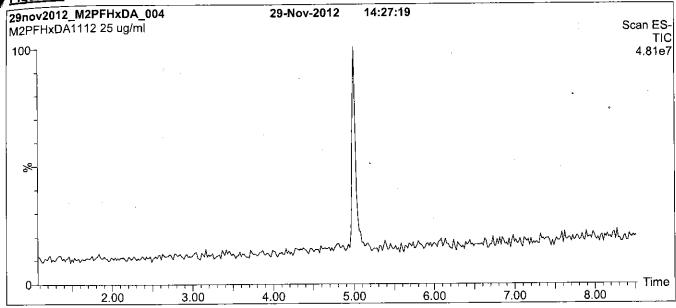
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

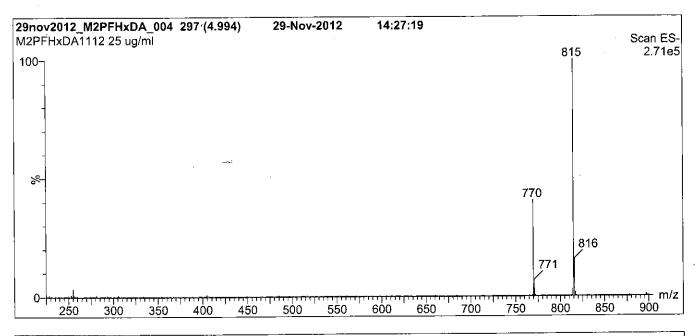


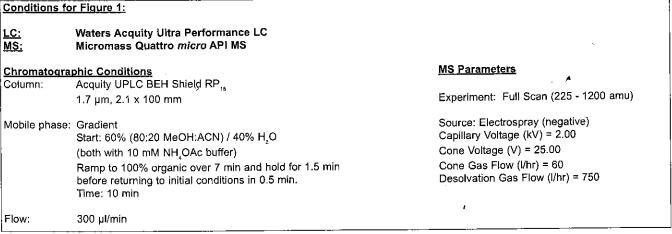


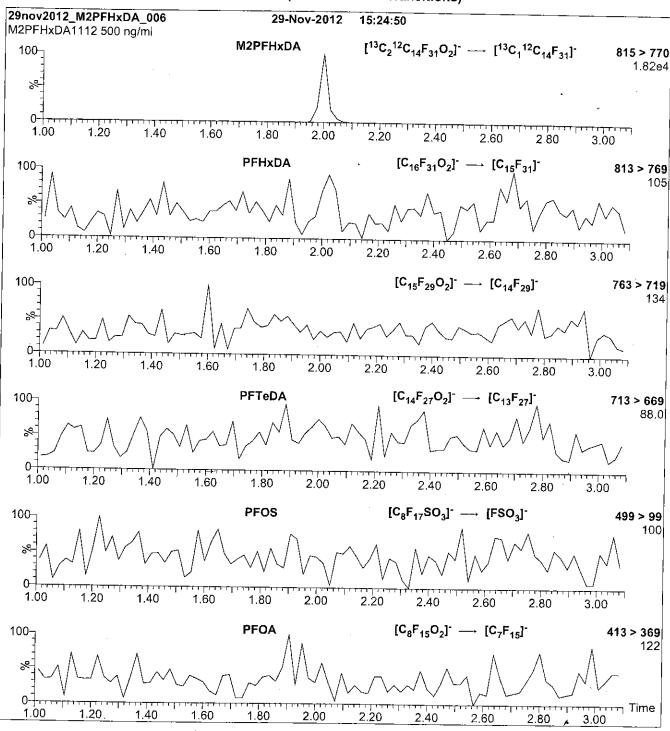
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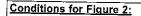












Injection:

Flow:

Direct loop injection

10 μl (500 ng/ml M2PFHxDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H,O

(both with 10 mM NH OAc buffer)

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3 Collision Energy (eV) = 15

LCM2PFTeDA_00003



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M2PFTeDA

LOT NUMBER:

M2PFTeDA1112

COMPOUND:

Perfluoro-n-[1,2-13C,]tetradecanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₂¹²C₁₂HF₂₇O₂

CONCENTRATION: 50 ± 2.5 μg/ml

MOLECULAR WEIGHT:

ISOTOPIC PURITY:

716.10

SOLVENT(S):

Methanol

>99% 13C

 $(1,2^{-13}C_{2})$

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

11/29/2012

EXPIRY DATE: (mm/dd/yyyy)

11/29/2017

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

<u> 04/01/201</u>

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

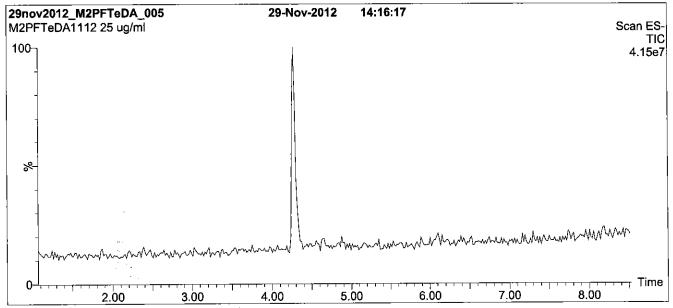
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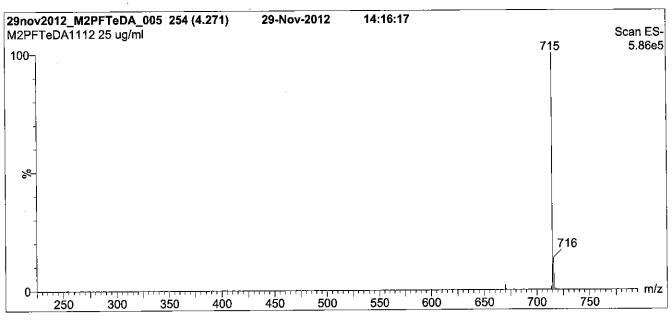




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Figure 1: M2PFTeDA; LC/MS Data (TIC and Mass Spectrum)





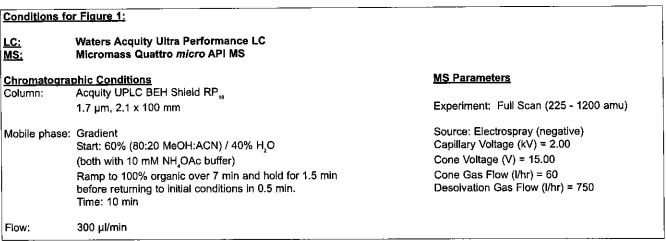
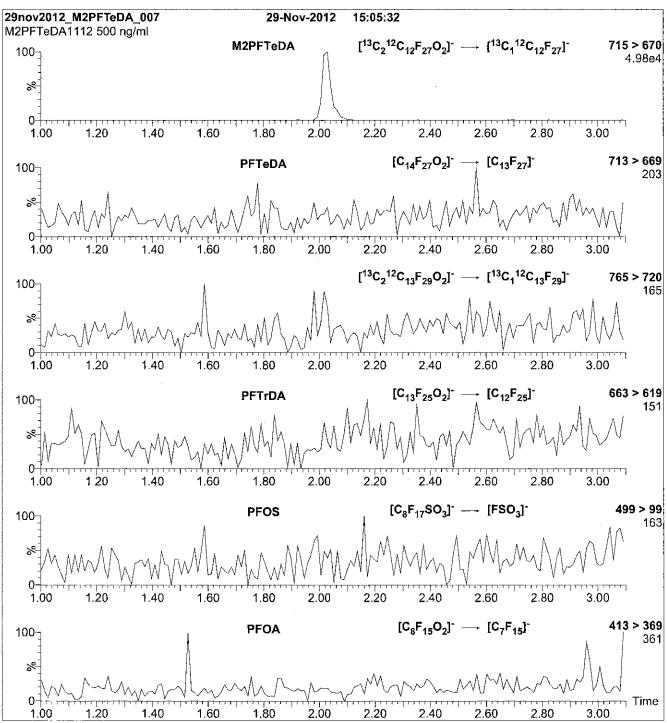
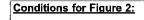


Figure 2: M2PFTeDA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μI (500 ng/ml M2PFTeDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow: 300 µl/min

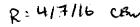
MS Parameters

Collision Gas (mbar) = 3.66e-3 Collision Energy (eV) = 14

Form#:27, Issued 2004-11-10 Revision#:3, Revised 2015-03-24

LCM2PFTeDA_00005

ID: LCM2PFTeDA 00005 Exp; 12/07/20 Prpd; CBW 13C2-PFTeDA at 50ug/mL





CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M2PFTeDA

LOT NUMBER:

M2PFTeDA1115

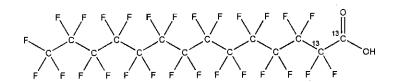
COMPOUND:

Perfluoro-n-[1,2-13C,]tetradecanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

13C, 12C, HF, O,

CONCENTRATION:

 $50 \pm 2.5 \mu g/ml$

MOLECULAR WEIGHT:

716.10

SOLVENT(S):

ISOTOPIC PURITY:

Methanol

≥99% 13C

 $(1,2^{-13}C_2)$

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

12/07/2015

EXPIRY DATE: (mm/dd/yyyy)

12/07/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON 'N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

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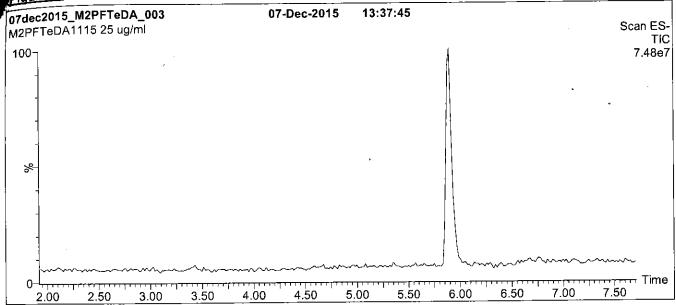


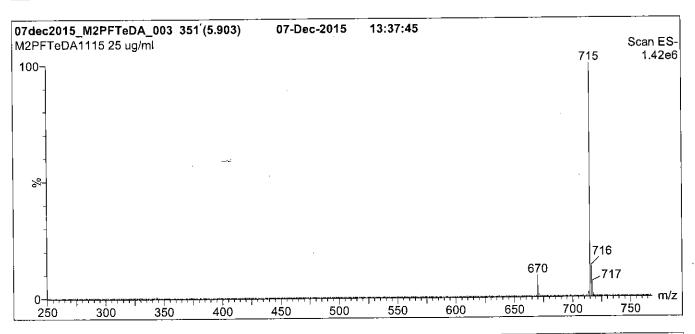


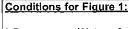
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igure 1:

M2PFTeDA; LC/MS Data (TIC and Mass Spectrum)







LC: MS: Waters Acquity Ultra Performance LC Micromass Quattro micro API MS

Chromatographic Conditions

Column:

Acquity UPLC BEH Shield RP

1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient

Start: 65% (80:20 MeOH:ACN) / 35% $\rm{H_2O}$

(both with 10 mM NH, OAc buffer)

Ramp to 90% organic over 7 min and hold for 2 min before returning to initial conditions in 0.5 min.

Time: 10 min

Flow:

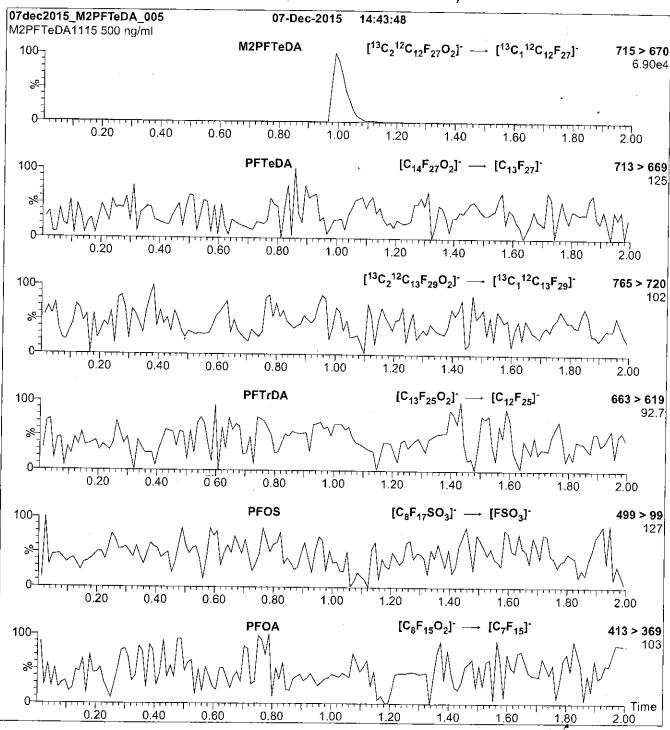
300 µl/min

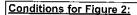
MS Parameters

Experiment: Full Scan (250 - 1250 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

Figure 2: M2PFTeDA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 µl (500 ng/ml M2PFTeDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH₄OAc buffer)

Flow:

300 µl/min

MS_Parameters

Collision Gas (mbar) = 3.28e-3 Collision Energy (eV) = 14

LCM4PFHPA_00003



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M4PFHpA

LOT NUMBER:

M4PFHpA0515

COMPOUND:

Perfluoro-n-[1,2,3,4-13C]heptanoic acid

CAS #:

Not available

STRUCTURE:

MOLECULAR FORMULA:

¹³C₄¹²C₃HF₁₃O₂

CONCENTRATION:

MOLECULAR WEIGHT:

ISOTOPIC PURITY:

368.03

 $50 \pm 2.5 \, \mu g/ml$

SOLVENT(S):

Methanol

≥99%¹³C

Water (<1%)

(1,2,3,4-13C₂)

CHEMICAL PURITY:

>98%

05/22/2015

LAST TESTED: (mm/dd/yyyy)

EXPIRY DATE: (mm/dd/yyyy)

05/22/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

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HAZARDS:

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UNCERTAINTY:

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$$x_1, x_2,...x_n$$
 on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

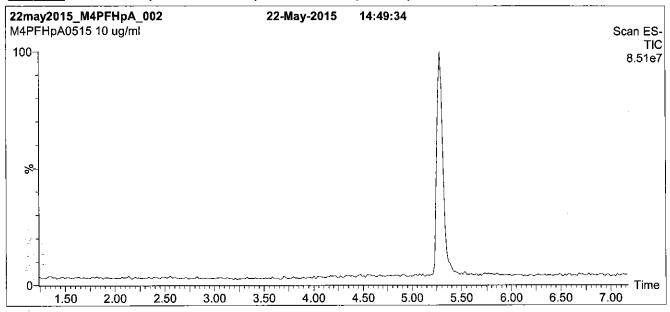
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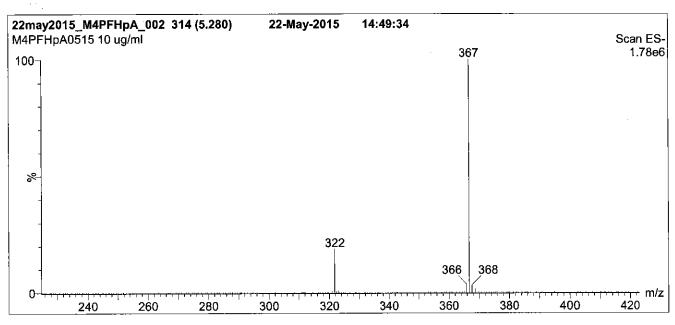




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Figure 1: M4PFHpA; LC/MS Data (TIC and Mass Spectrum)





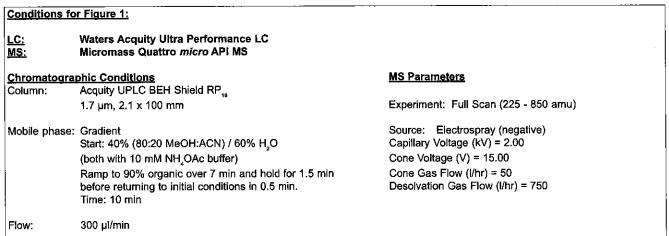
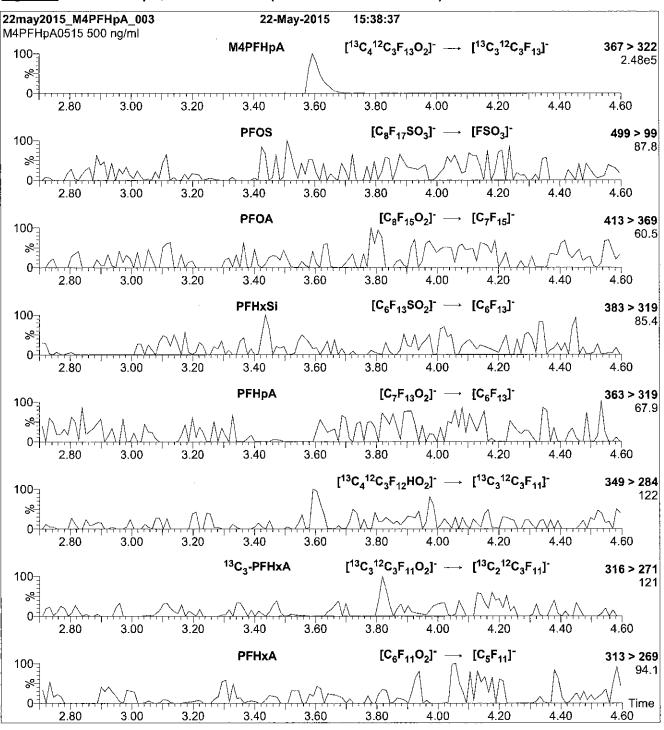
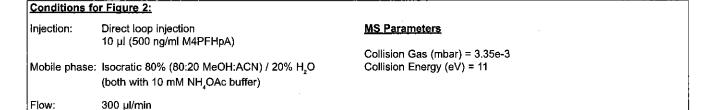


Figure 2: M4PFHpA; LC/MS/MS Data (Selected MRM Transitions)





Flow:

LCM4PFHPA_00005

13C4-Perfluoroheptanoic



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M4PFHpA

LOT NUMBER:

M4PFHpA0515

COMPOUND:

Perfluoro-n-[1,2,3,4-13C₄]heptanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹²C₄¹²C₃HF₁₃O₂

MOLECULAR WEIGHT:

368.03

CONCENTRATION:

50 ± 2.5 µg/ml

Methanol SOLVENT(S):

Water (<1%)

 $(1,2,3,4^{-13}C_{4})$

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99%¹³C

LAST TESTED: (mm/dd/yyyy)

05/22/2015

EXPIRY DATE: (mm/dd/yyyy)

05/22/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

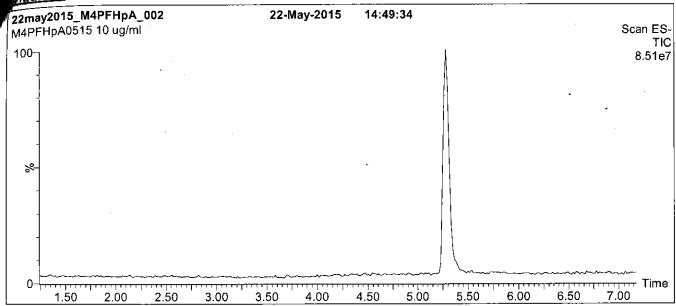
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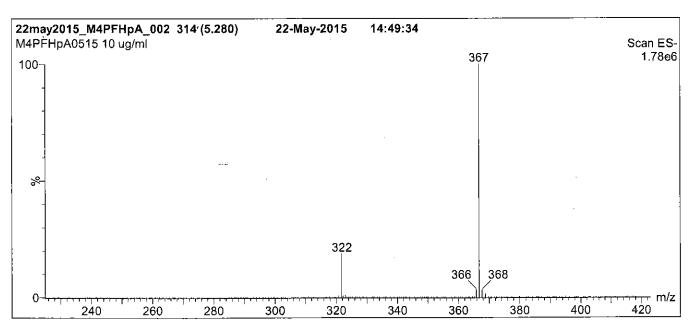




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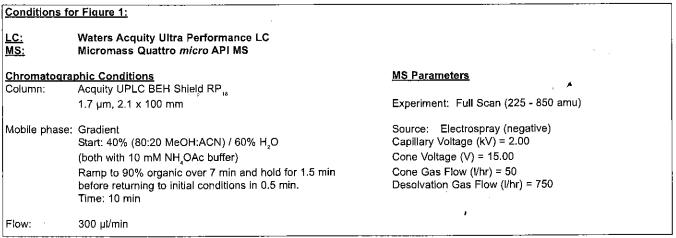
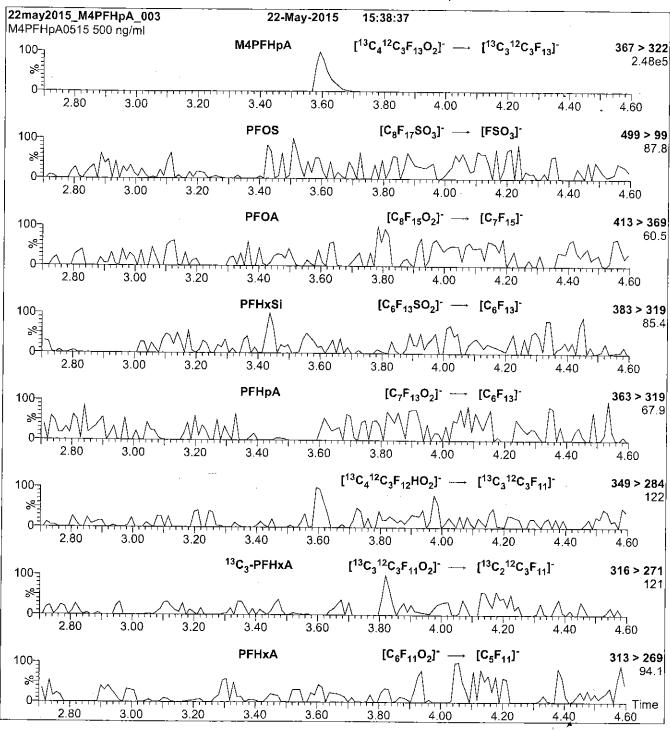
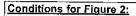


Figure 2: M4PFHpA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Flow:

Direct loop injection

10 μl (500 ng/ml M4PFHpA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3 Collision Energy (eV) = 11

LCM5PFPEA_00004



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M5PFPeA

LOT NUMBER:

M5PFPeA0515

COMPOUND:

Perfluoro-n-[13C_z]pentanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

13C,HF,O,

MOLECULAR WEIGHT:

269.01

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99% ¹³C

 $(^{13}C_{5})$

LAST TESTED: (mm/dd/yyyy)

05/22/2015

EXPIRY DATE: (mm/dd/yyyy)

05/22/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains < 0.1% of perfluoro-n-pentanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: _

(mm/dd/xxx)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

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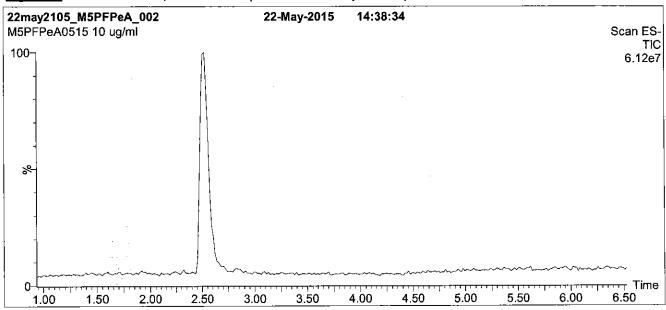
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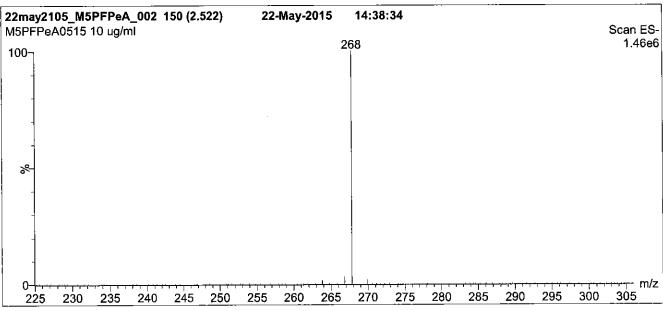




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Figure 1: M5PFPeA; LC/MS Data (TIC and Mass Spectrum)





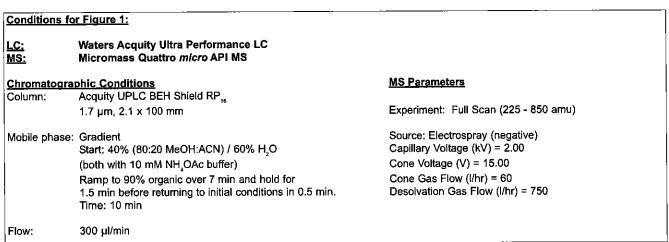
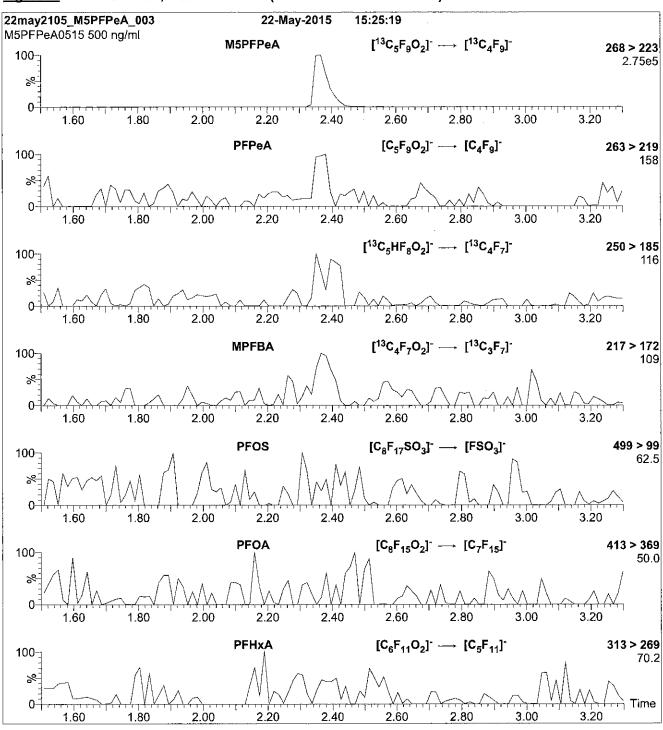
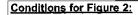


Figure 2: M5PFPeA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml M5PFPeA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3 Collision Energy (eV) = 9

LCM5PFPEA_00006



609706

ID: LCM5PFPEA_00006 Exp: 05/22/20 Prpd: CBW 13C5-Perfluoropentanoic R: 4/7/16



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M5PFPeA

LOT NUMBER:

M5PFPeA0515

COMPOUND:

Perfluoro-n-[13C_s]pentanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₅HF₆O₉

MOLECULAR WEIGHT:

269,01

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY: LAST TESTED: (mm/dd/yyyy) >98%

ISOTOPIC PURITY:

≥99% 13C

 $(^{13}C_{5})$

05/22/2015

EXPIRY DATE: (mm/dd/yyyy)

05/22/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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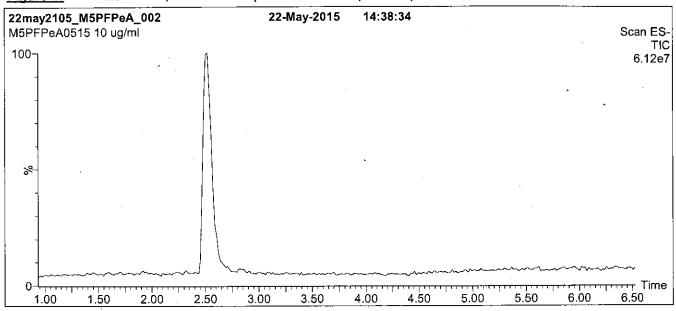
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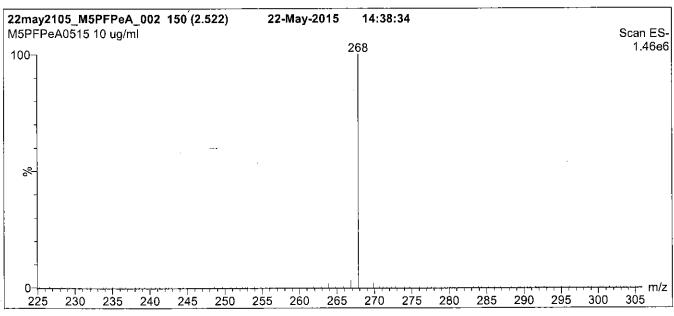




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Figure 1: M5PFPeA; LC/MS Data (TIC and Mass Spectrum)





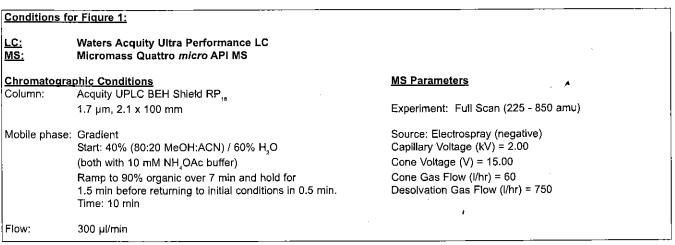
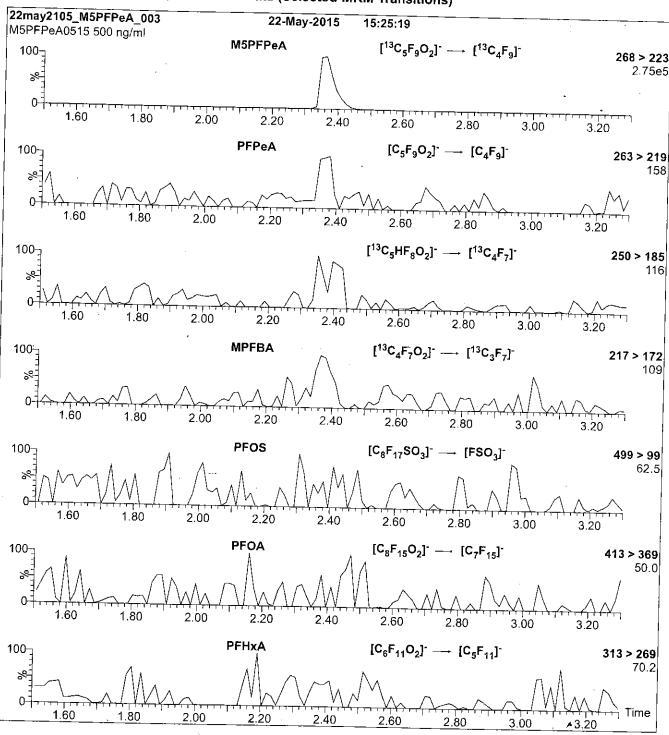
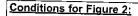


Figure 2: M5PFPeA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 µl (500 ng/ml M5PFPeA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H_oO

(both with 10 mM NH OAc buffer)

MS Parameters

Collision Gas (mbar) = 3.35e-3 Collision Energy (eV) = 9

Flow:

300 µl/min

LCM8FOSA_00006



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M8FOSA-I

LOT NUMBER:

M8FOSA1214I

COMPOUND:

Perfluoro-1-[13C] octanesulfonamide

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C_aH_aF₁₇NO_aS

 $50 \pm 2.5 \,\mu g/ml$

507.09

CONCENTRATION: CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy) EXPIRY DATE: (mm/dd/yyyy)

12/15/2014 12/15/2016

RECOMMENDED STORAGE:

Refrigerate ampoule

MOLECULAR WEIGHT:

SOLVENT(S): **ISOTOPIC PURITY:**

Isopropanol ≥99% 13C

 $(^{13}C_{R})$

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_x(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

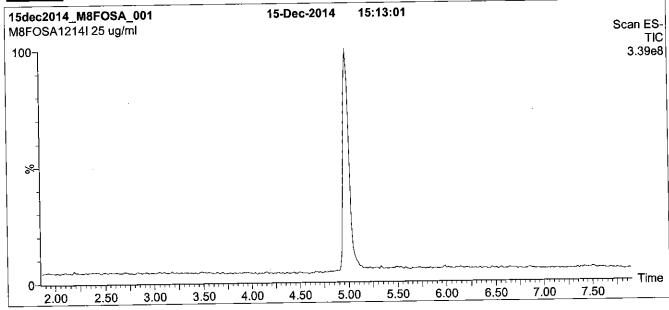
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

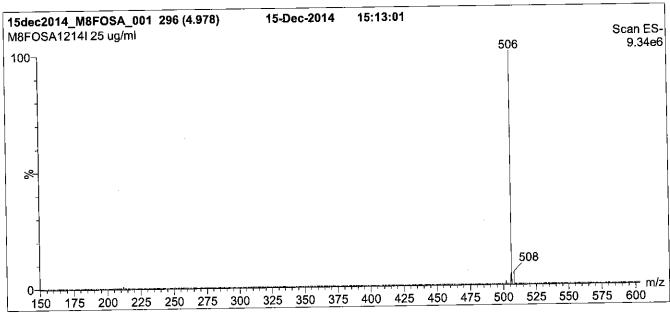




For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: M8FOSA-I; LC/MS Data (TIC and Mass Spectrum)





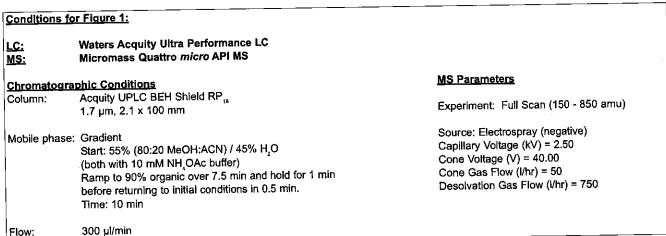
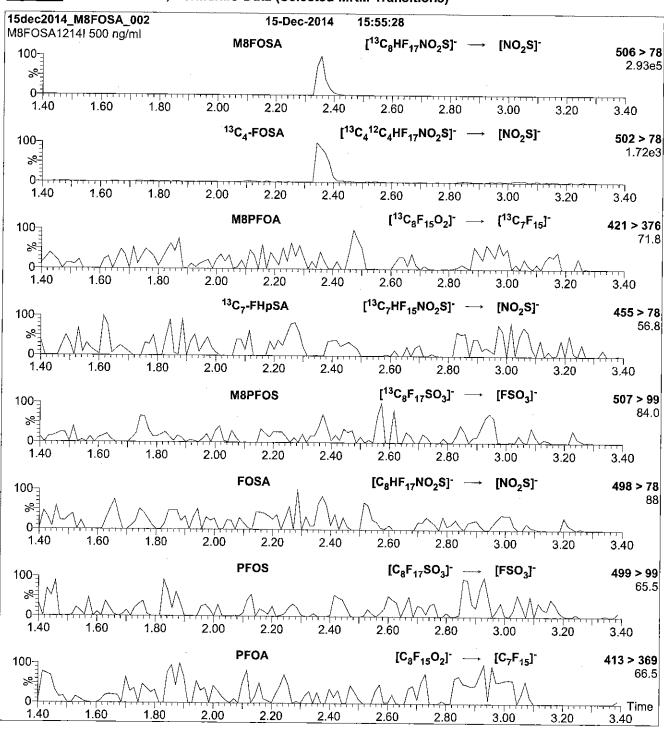
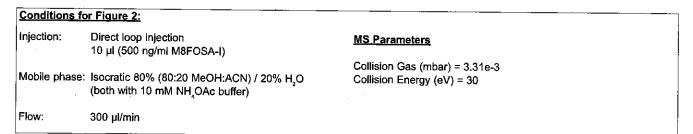


Figure 2: M8FOSA-I; LC/MS/MS Data (Selected MRM Transitions)





LCM8FOSA_00007



572887

ID: LCM8FOSA_00007 Exp. 12/15/16 Prpd: CBW 13C8-Perfluorooctanesulf R: 1/25/16

S:



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M8FOSA-I

LOT NUMBER:

M8FOSA1214I

COMPOUND:

Perfluoro-1-[13C]]octanesulfonamide

CAS#:

Not available

STRUCTURE:

MOLECULAR FORMULA:

¹³C₈H₉F₁₇NO₂S

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

12/15/2014

EXPIRY DATE: (mm/dd/yyyy)

12/15/2016

RECOMMENDED STORAGE:

Refrigerate ampoule

MOLECULAR WEIGHT:

507.09

SOLVENT(S):

Isopropanol

ISOTOPIC PURITY:

≥99% ¹³C

 $(^{13}C_{8})$

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: <u>04/01/2015</u>

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LIMITED WARRANTY:

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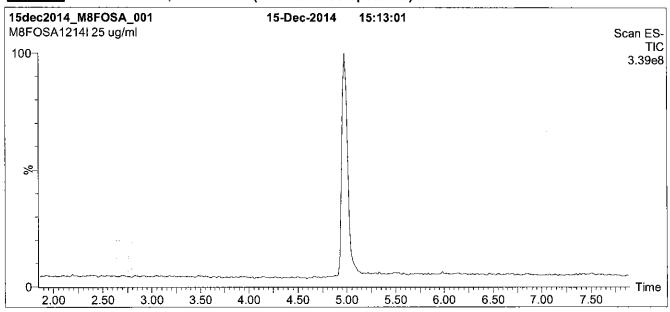
QUALITY MANAGEMENT:

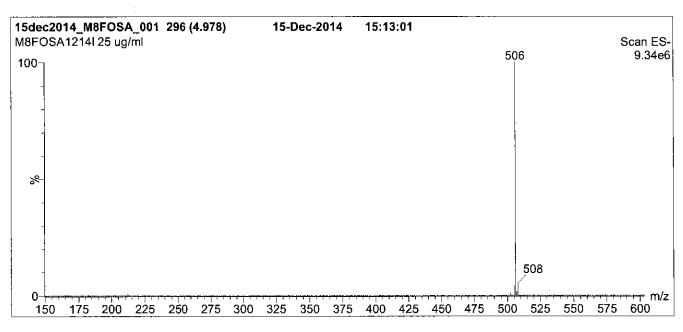
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Figure 1: M8FOSA-I; LC/MS Data (TIC and Mass Spectrum)





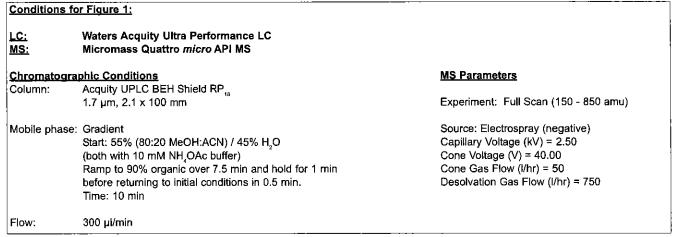
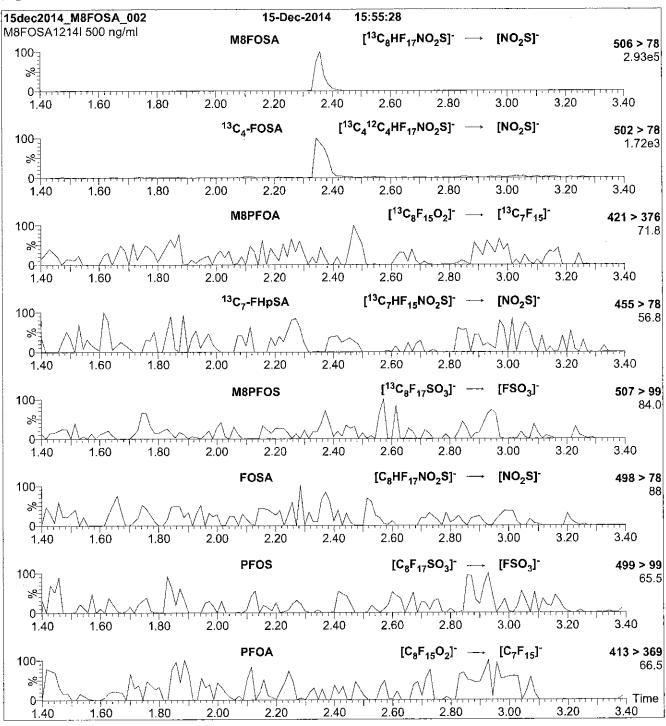
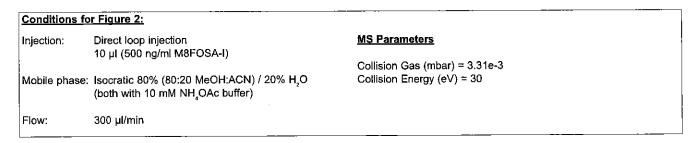


Figure 2: M8FOSA-I; LC/MS/MS Data (Selected MRM Transitions)





LCM8FOSA_00009

R=4/7/16 CBW



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

M8FOSA-I

COMPOUND:

Perfluoro-1-[13C] octanesulfonamide

LOT NUMBER:

M8FOSA1215I

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₈H₂F₁₇NO₂S

CONCENTRATION:

50 ± 2.5 µg/ml

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

12/22/2015

EXPIRY DATE: (mm/dd/yyyy)

RECOMMENDED STORAGE:

12/22/2017

Refrigerate ampoule

MOLECULAR WEIGHT:

SOLVENT(\$):

Isopropanol

507.09

ISOTOPIC PURITY:

≥99% 13C

 $(^{13}C_{_{\rm B}})$

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON 'N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

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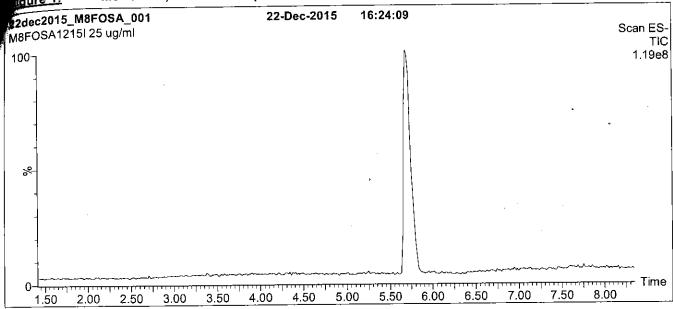
QUALITY MANAGEMENT:

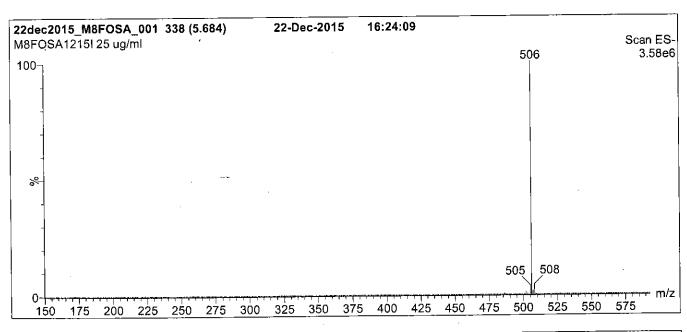
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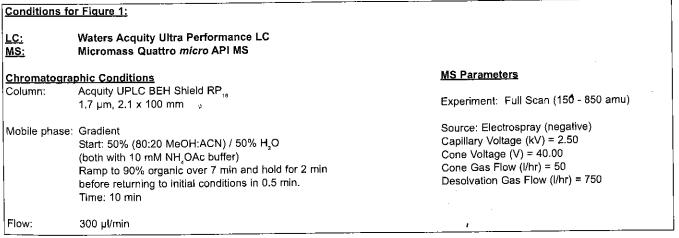
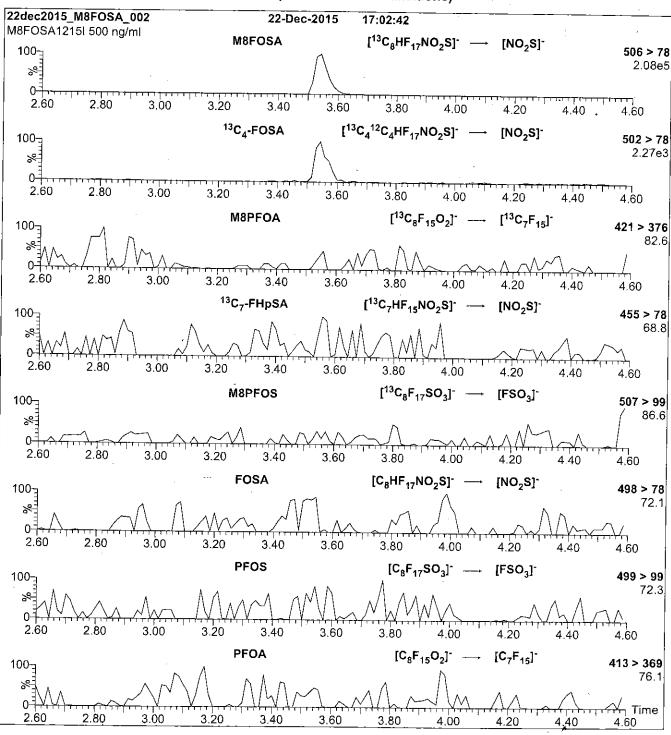
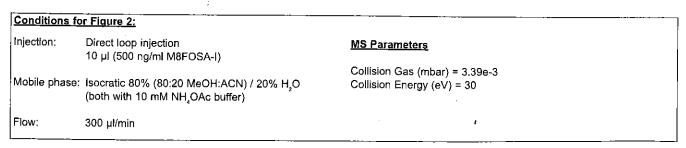


Figure 2: M8FOSA-I; LC/MS/MS Data (Selected MRM Transitions)





LCMPFBA_00004



PRODUCT CODE:

MPFBA

LOT NUMBER:

MPFBA1014

COMPOUND:

Perfluoro-n-[1,2,3,4-13C] butanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₄HF,O₂

MOLECULAR WEIGHT:

218.01

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

SOLVENT(S):

Methanol

Water (<1%) ≥99%¹³C

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

 $(1,2,3,4^{-13}C_{\lambda})$

LAST TESTED: (mm/dd/yyyy)

10/31/2014

EXPIRY DATE: (mm/dd/yyyy)

10/31/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

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HOMOGENEITY:

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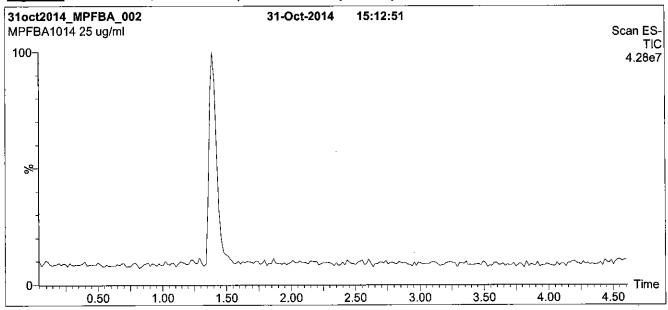
QUALITY MANAGEMENT:

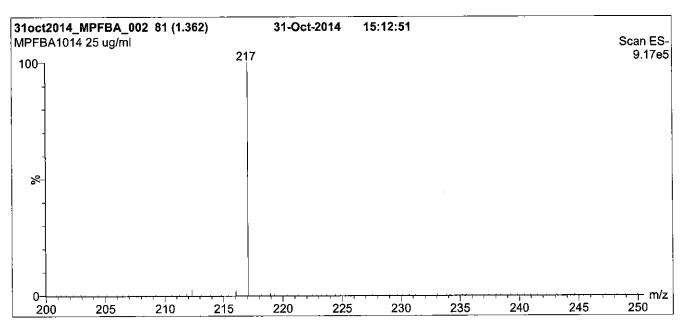
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Figure 1: MPFBA; LC/MS Data (TIC and Mass Spectrum)





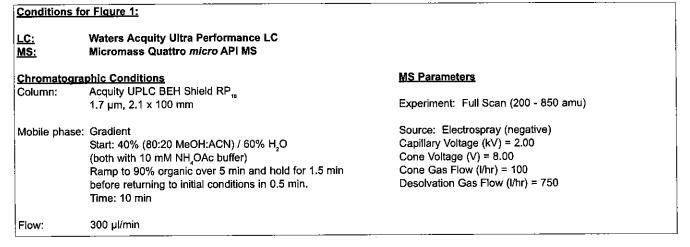
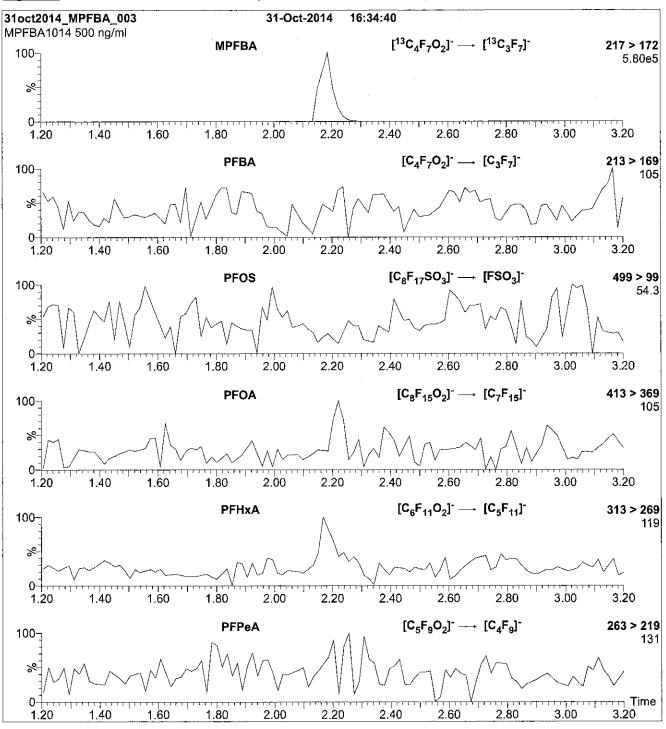
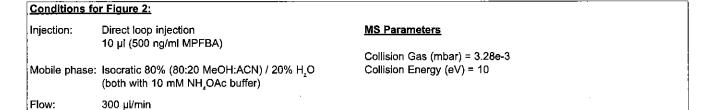


Figure 2: MPFBA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFBA_00006





PRODUCT CODE:

MPFBA

LOT NUMBER:

MPFBA1014

COMPOUND:

Perfluoro-n-[1,2,3,4-13C₄]butanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₄HF₂O,

MOLECULAR WEIGHT:

218.01

CONCENTRATION:

50 ± 2.5 μg/ml

SOLVENT(S):

Methanol Water (<1%)

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99%13C

LAST TESTED: (mm/dd/yyyy)

10/31/2014

(1,2,3,4-13C₁)

EXPIRY DATE: (mm/dd/yyyy)

10/31/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

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$$u_{\varepsilon}(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^{n} u(y_i, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

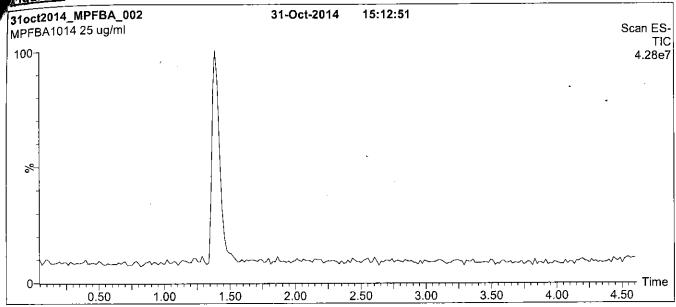
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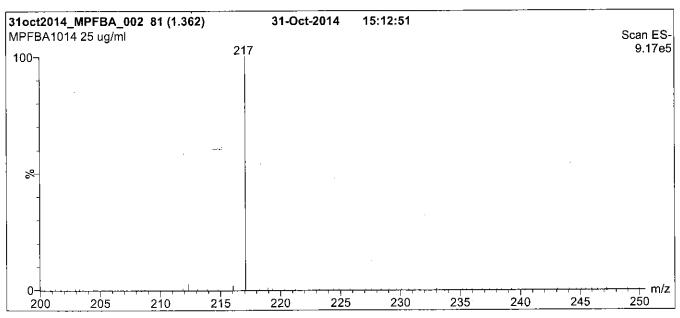
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GÜIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: MPFBA; LC/MS Data (TIC and Mass Spectrum)





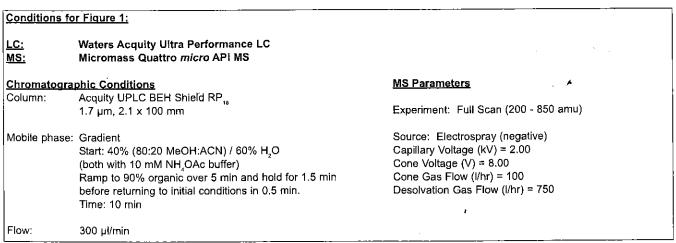
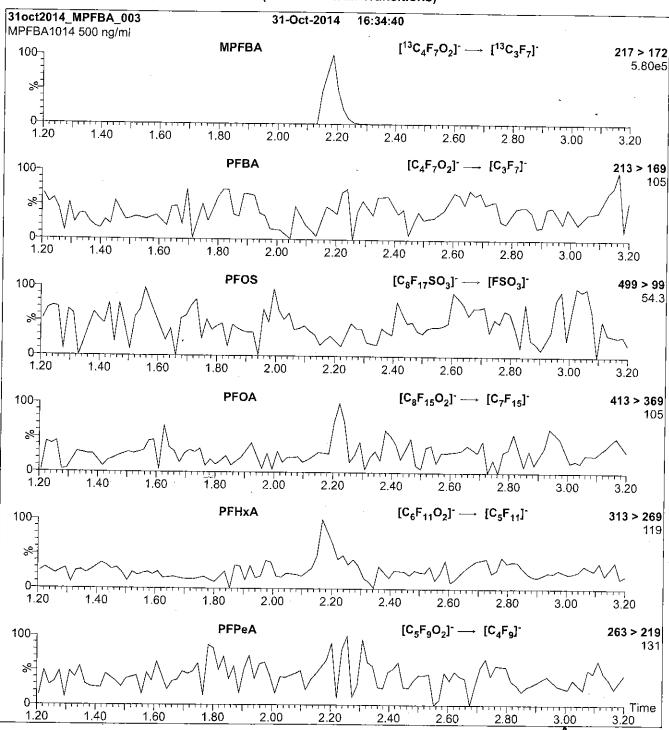
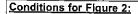


Figure 2: MPFBA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml MPFBA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3 Collision Energy (eV) = 10

LCMPFDA_00004





12LCMS0242

LCMPFDA-00001

PRODUCT CODE:

MPFDA

LOT NUMBER:

MPFDA0411

COMPOUND:

Perfluoro-n-[1,2-13C₂]decanoic acid

STRUCTURE:

CAS#

Not available

MOLECULAR FORMULA:

¹³C₂¹²C₈HF₁₉O₂

MOLECULAR WEIGHT:

516.07

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

SOLVENT(S):

Methanol

ISOTOPIC PURITY:

Water (<1%) ≥99% ¹³C

(1,2-13C₂)

CHEMICAL PURITY: LAST TESTED: (mm/dd/yyyy) >98%

04/07/2011

EXPIRY DATE: (mm/dd/yyyy) RECOMMENDED STORAGE: 04/07/2014 Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.1% of ¹³C₁-PFNA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

Form#:27, Issued 2004-11-10 Revision#:1, Revised 2010-07-26 MPFDA0411 (1 of 4)

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

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where x is expressed as a relative standard uncertainty of the individual parameter.

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

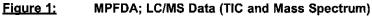
Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

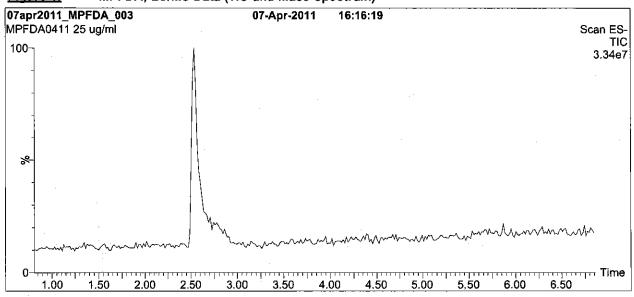
LIMITED WARRANTY:

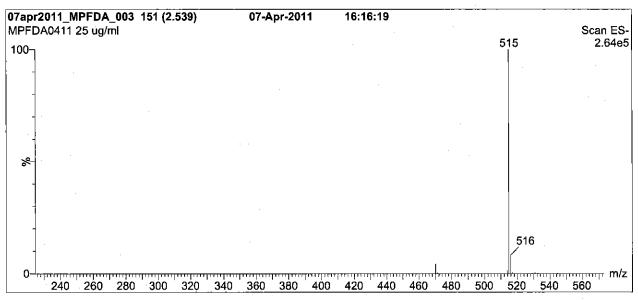
At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Form#:27, Issued 2004-11-10 Revision#:1, Revised 2010-07-26 MPFDA0411 (2 of 4)







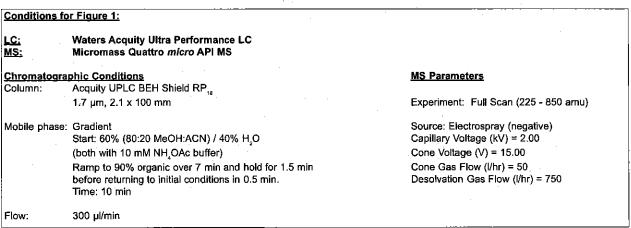
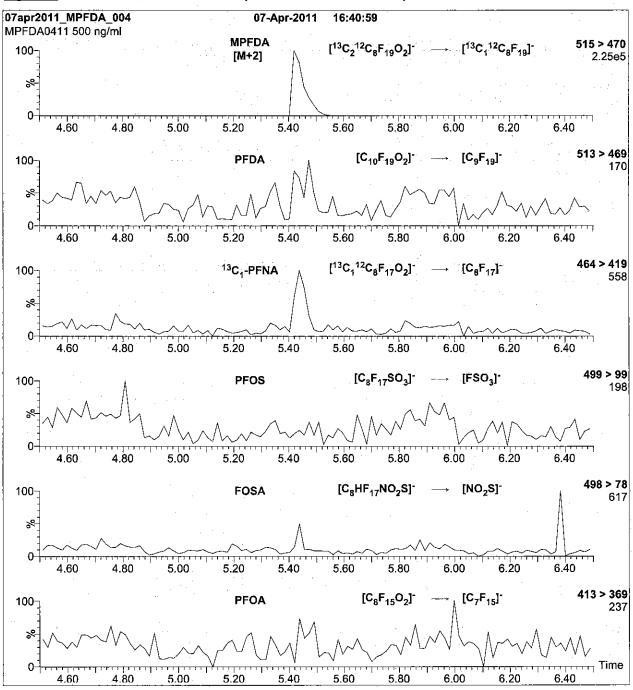
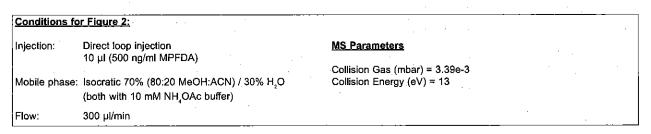


Figure 2: MPFDA; LC/MS/MS Data (Selected MRM Transitions)





Form#:27, Issued 2004-11-10 Revision#:1, Revised 2010-07-26 MPFDA0411 (4 of 4) rev0

LCMPFDA_00005



PRODUCT CODE:

MPFDA

LOT NUMBER:

MPFDA0414

COMPOUND:

Perfluoro-n-[1,2-13C]decanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

13C212CHF19O2

MOLECULAR WEIGHT:

516.07

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

>99% 13C $(1,2^{-13}C_2)$

LAST TESTED: (mm/dd/yyyy)

04/13/2014

EXPIRY DATE: (mm/dd/yyyy)

04/13/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.1% of ¹³C,-PFNA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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 $x_{\bullet}, x_{\circ}...x_{\circ}$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

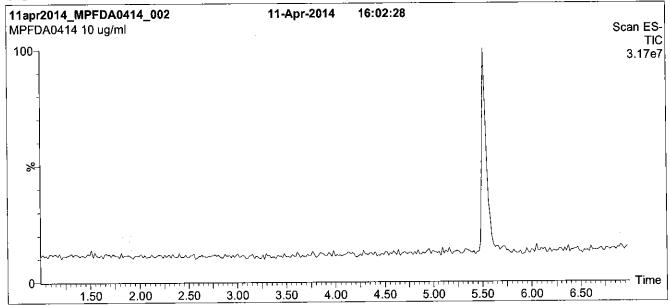
QUALITY MANAGEMENT:

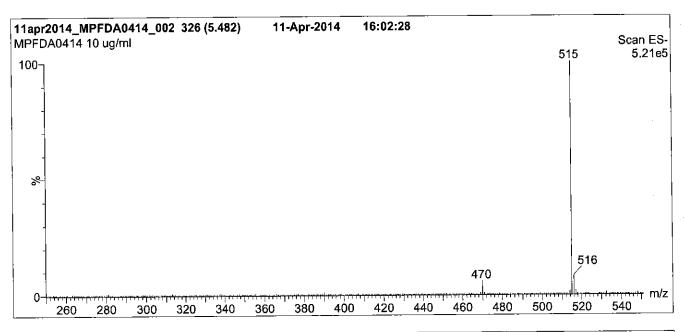
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).





Figure 1: MPFDA; LC/MS Data (TIC and Mass Spectrum)





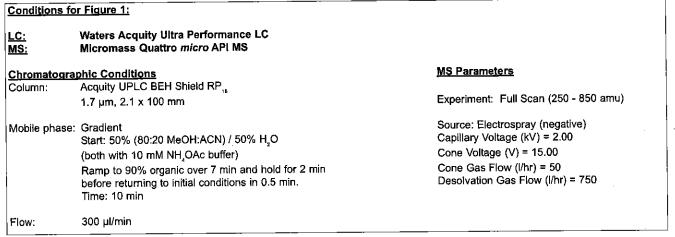
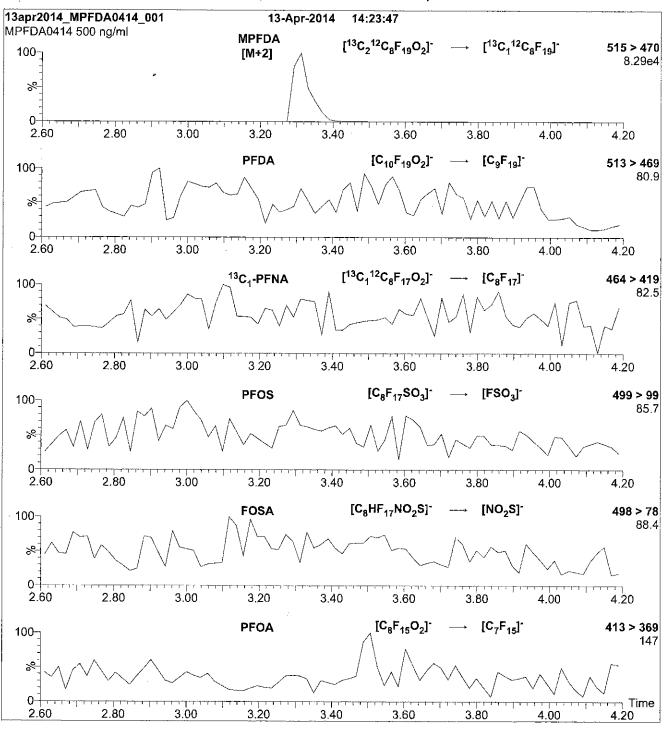
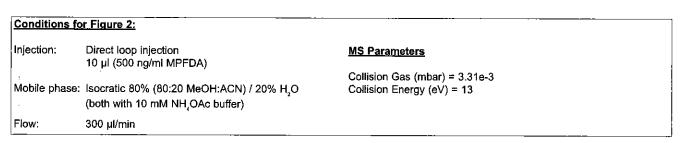


Figure 2: MPFDA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFDA_00006





PRODUCT CODE:

MPFDA

LOT NUMBER:

MPFDA0815

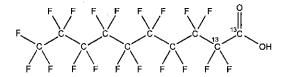
COMPOUND:

Perfluoro-n-[1,2-13C2]decanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₂¹²C₈HF₁₉O₂

MOLECULAR WEIGHT:

516.07

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

SOLVENT(S):

Methanol

ISOTOPIC PURITY:

Water (<1%) ≥99% ¹³C (1,2-¹³C₂)

CHEMICAL PURITY:

>98%

08/19/2015

LAST TESTED: (mm/dd/yyyy)

00/19/2013

EXPIRY DATE: (mm/dd/yyyy)

08/19/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains < 0.1% of ¹³C₄-PFNA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: <u>08</u>

(mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

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$$x_1, x_2,...x_n$$
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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

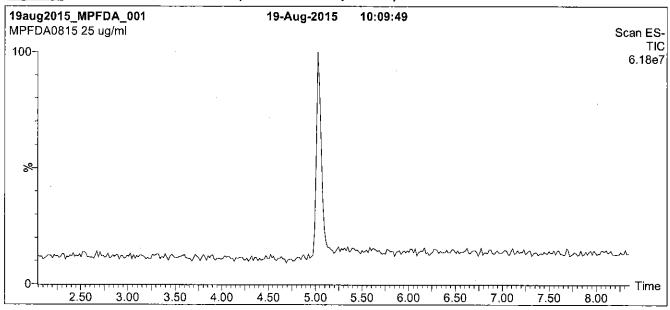
QUALITY MANAGEMENT:

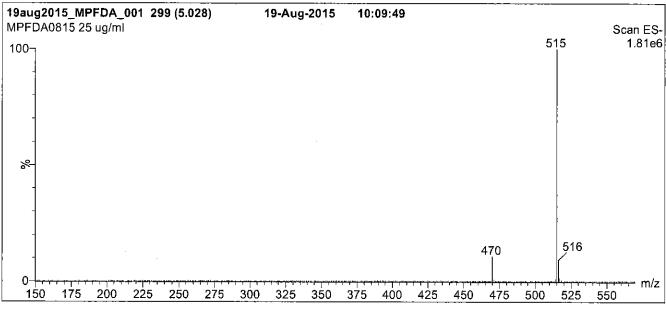
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: MPFDA; LC/MS Data (TIC and Mass Spectrum)





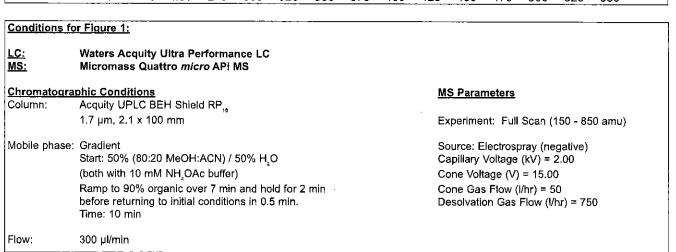
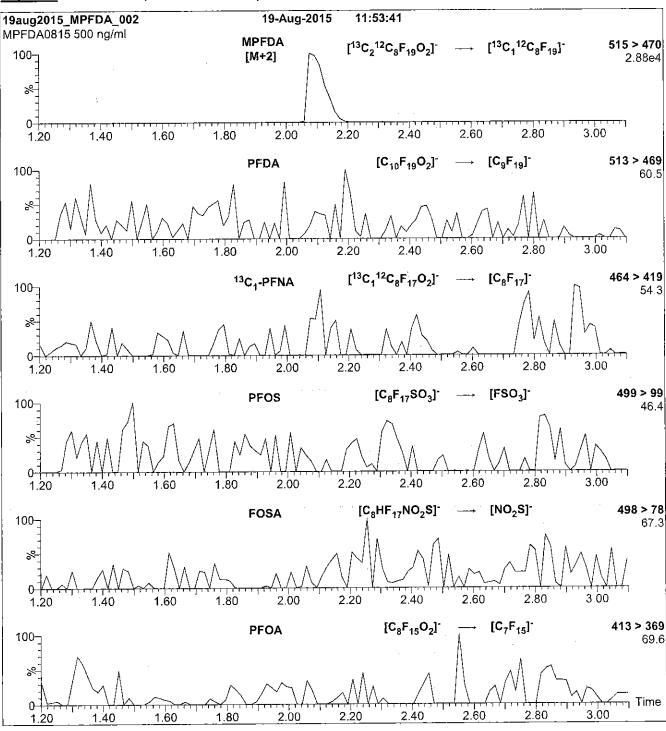
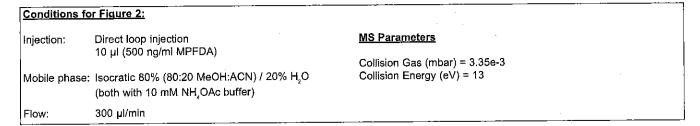


Figure 2: MPFDA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFDA_00007



605232 ID: LCMPFDA_00007 Exp: 08/19/20 Prpd: CBW 13C2-Perfluornodecanoic a



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFDA

LOT NUMBER:

MPFDA0815

COMPOUND:

Perfluoro-n-[1,2-13C₂]decanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₂¹²C₈HF₁₀O₂

50 ± 2.5 μg/ml

MOLECULAR WEIGHT:

ISOTOPIC PURITY:

516.07

SOLVENT(S):

Methanol

(1,2-13C₂)

Water (<1%) >99% ¹³C

CHEMICAL PURITY:

CONCENTRATION:

>98%

LAST TESTED: (mm/dd/yyyy)

08/19/2015

EXPIRY DATE: (mm/dd/yyyy)

08/19/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains < 0.1% of ¹³C₂-PFNA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

____ Ui

Date: 08/21/2015

(mm/dd/yyyy)

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

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LIMITED WARRANTY:

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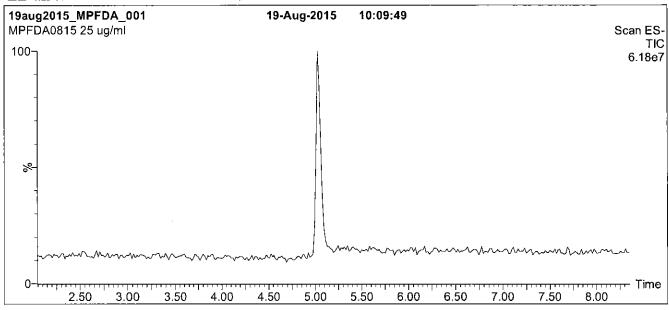
QUALITY MANAGEMENT:

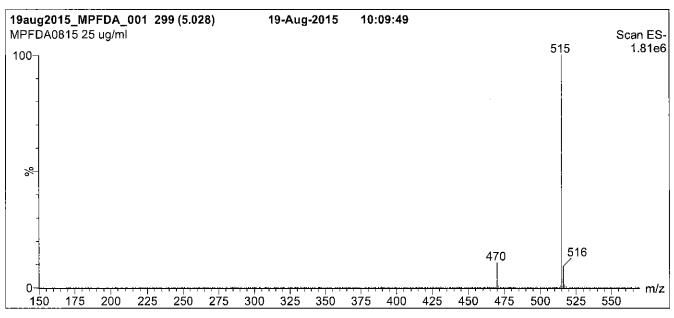
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Figure 1: MPFDA; LC/MS Data (TIC and Mass Spectrum)





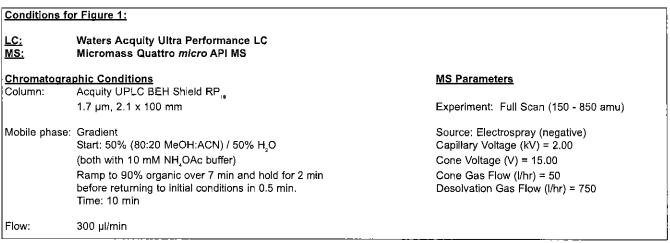
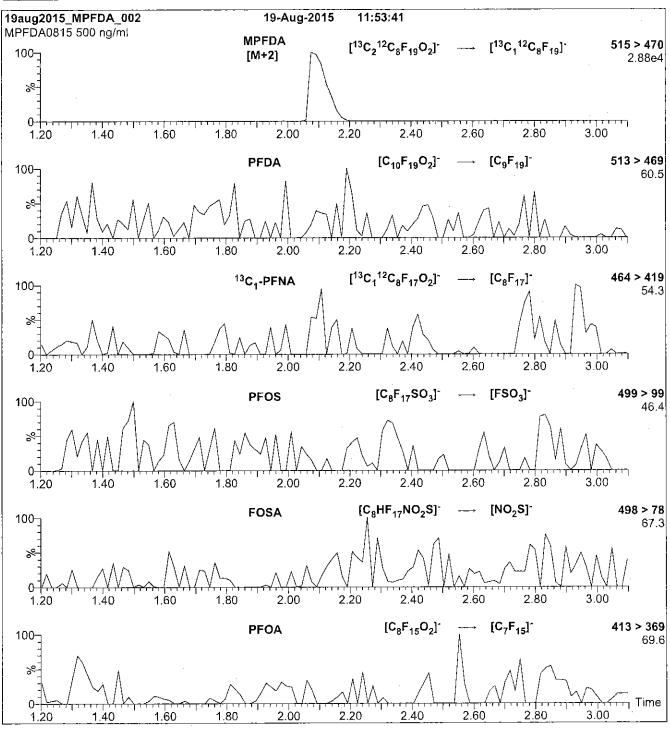
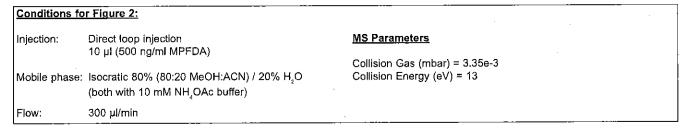


Figure 2: MPFDA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFDoA_00003



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFDoA

LOT NUMBER:

MPFDoA0714

COMPOUND:

Perfluoro-n-[1,2-13C]dodecanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₂¹²C₁₀HF₂₃O₂

CONCENTRATION:

50 ± 2.5 µg/ml

MOLECULAR WEIGHT:

616.08

Methanol

ISOTOPIC PURITY:

SOLVENT(S):

Water (<1%) ≥99% 13C (1,2-13C₂)

LAST TESTED: (mm/dd/yyyy)

CHEMICAL PURITY:

>98%

07/17/2014

EXPIRY DATE: (mm/dd/yyyy)

07/17/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

07/21/2014

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ... x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

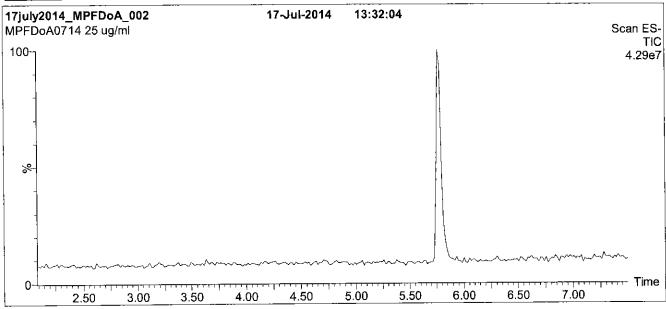
QUALITY MANAGEMENT:

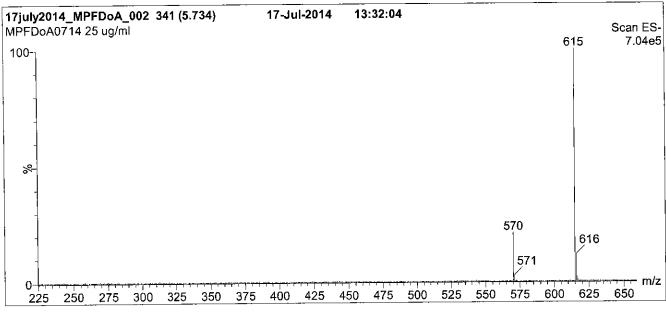
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).











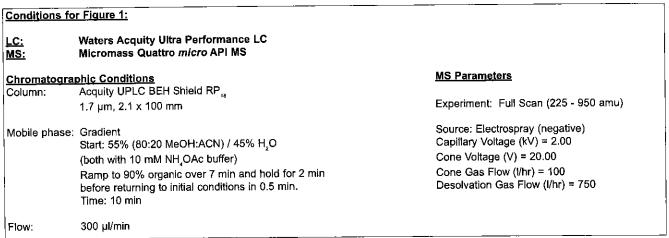
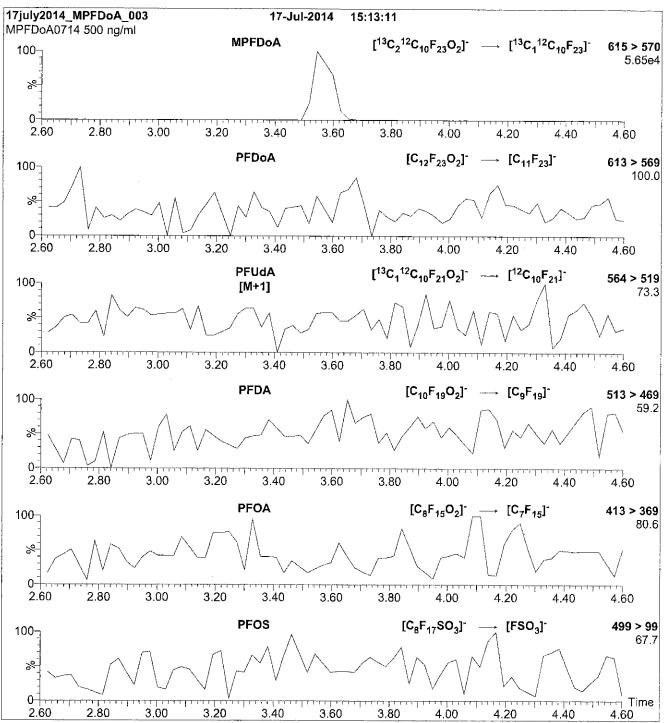
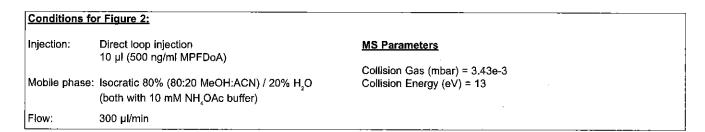


Figure 2: MPFDoA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFDoA_00004



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFDoA

LOT NUMBER:

MPFDoA0714

COMPOUND:

Perfluoro-n-[1,2-13C]dodecanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₂¹²C₁₀HF₂₃O₂

MOLECULAR WEIGHT:

616.08

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

≥99% ¹³C

 $(1,2^{-13}C_{o})$

ISOTOPIC PURITY:

Water (<1%)

CHEMICAL PURITY:

>98%

07/17/2014

LAST TESTED: (mm/dd/yyyy)

07/17/2014

EXPIRY DATE: (mm/dd/yyyy)
RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

<u> 14/01/2015</u>

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, u_s(y), of a value y and the uncertainty of the independent parameters

 $x_{*}, x_{*}, ...x_{*}$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

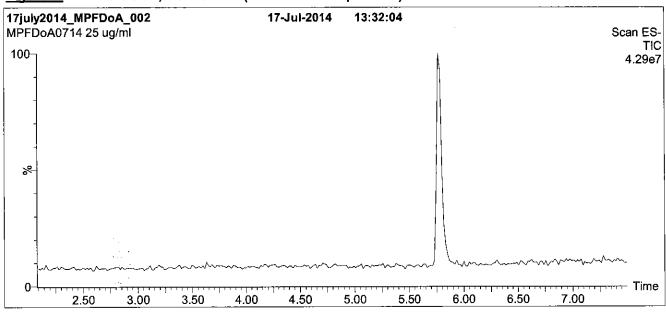
QUALITY MANAGEMENT:

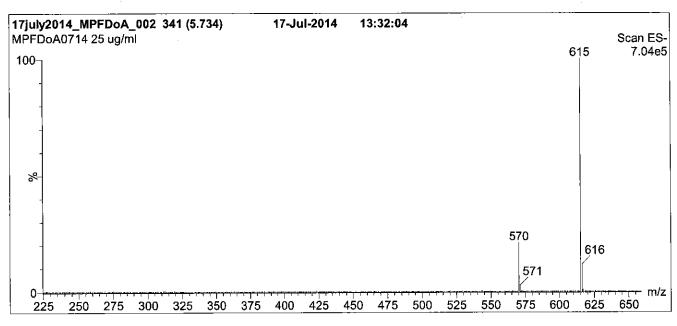
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: MPFDoA; LC/MS Data (TIC and Mass Spectrum)





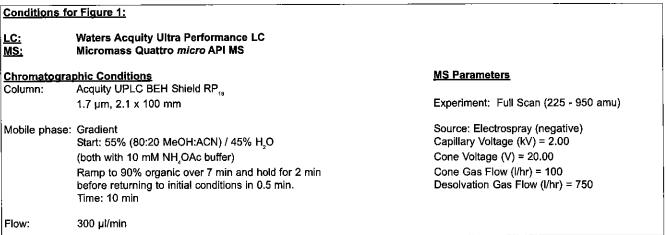
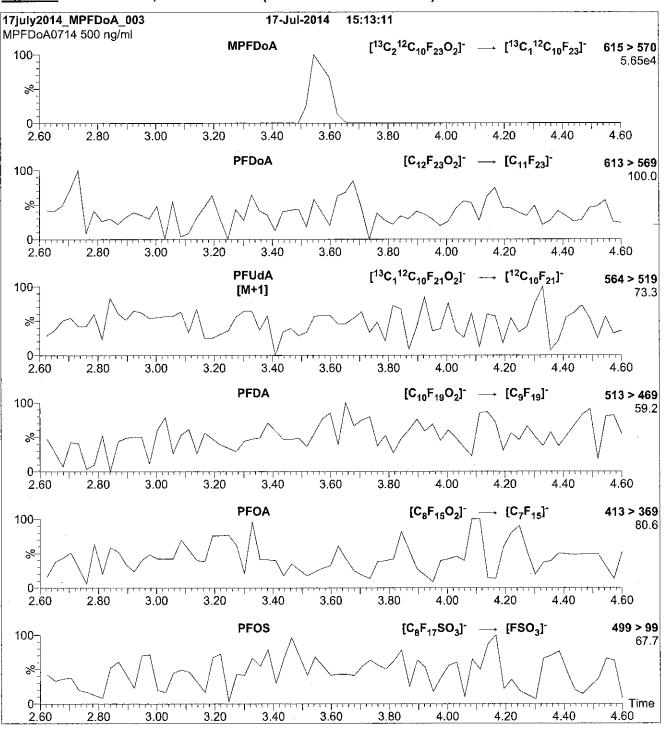
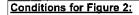


Figure 2: MPFDoA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Flow:

Direct loop injection

10 μl (500 ng/ml MPFDoA)

MS Parameters

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

300 µ1/min

Collision Gas (mbar) = 3.43e-3 Collision Energy (eV) = 13

LCMPFDoA_00006



ID: LCMPFDoA_00006 Exp: 07/17/19 Prpd; CBW 13C2-Perfluornododecanoio R: 4/7/16



BORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFDoA

LOT NUMBER:

MPFDoA0714

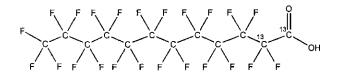
COMPOUND:

Perfluoro-n-[1,2-13C₂]dodecanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₂¹²C₁₀HF₂₃O₂

CONCENTRATION:

MOLECULAR WEIGHT:

616.08

50 ± 2.5 µg/ml

Methanol

SOLVENT(S):

≥99% ¹³C

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

07/17/2014 07/17/2019

EXPIRY DATE: (mm/dd/yyyy) RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

ISOTOPIC PURITY:

(1,2-13C₂)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

04/01/2015

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters

$$x_1, x_2,...x_n$$
 on which it depends is:

$$u_e(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

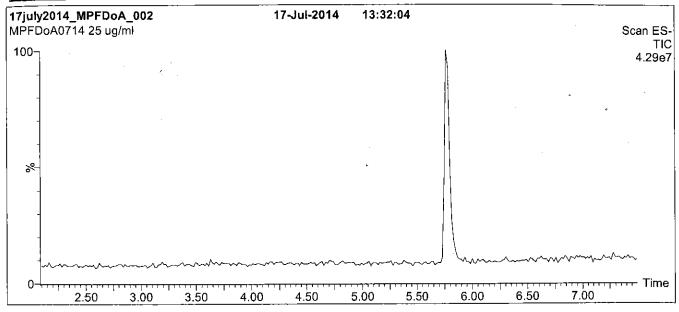
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

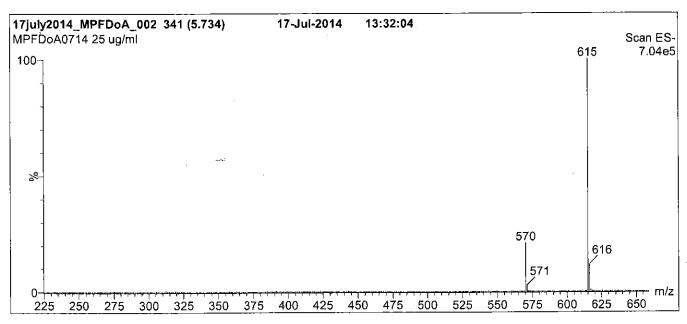




For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: MPFDoA; LC/MS Data (TIC and Mass Spectrum)





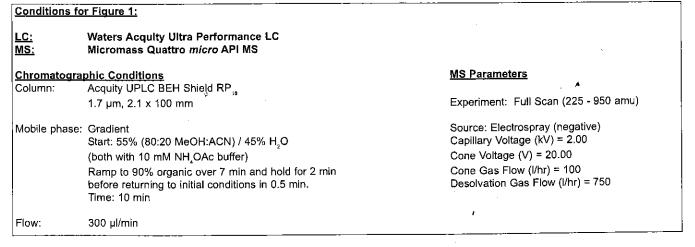
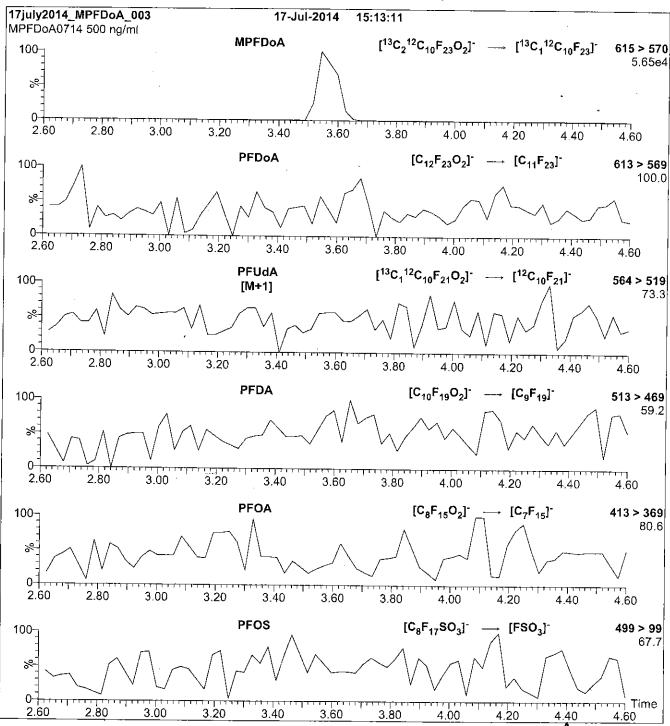
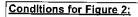


Figure 2: MPFDoA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml MPFDoA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3 Collision Energy (eV) = 13

LCMPFHxA_00006



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFHxA

LOT NUMBER:

MPFHxA0414

COMPOUND:

Perfluoro-n-[1,2-13C]hexanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

13C212C4HF4O2

MOLECULAR WEIGHT:

316.04

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol Water (<1%)

>99%13C

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

(1,2-13C₂)

LAST TESTED: (mm/dd/yyyy) EXPIRY DATE: (mm/dd/yyyy)

04/13/2014

RECOMMENDED STORAGE:

04/13/2019 Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains < 0.1% of perfluoro-n-hexanoic acid and ~ 0.3% of perfluoro-n-octanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: <u>04/15/2014</u>

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_z(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

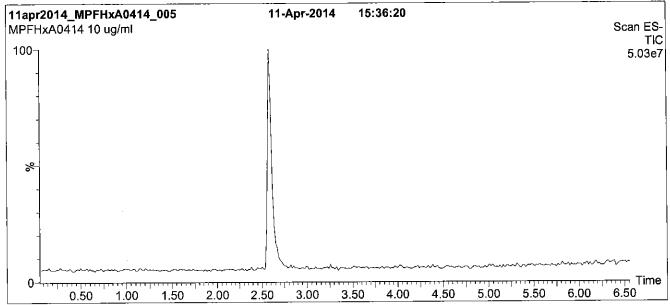
QUALITY MANAGEMENT:

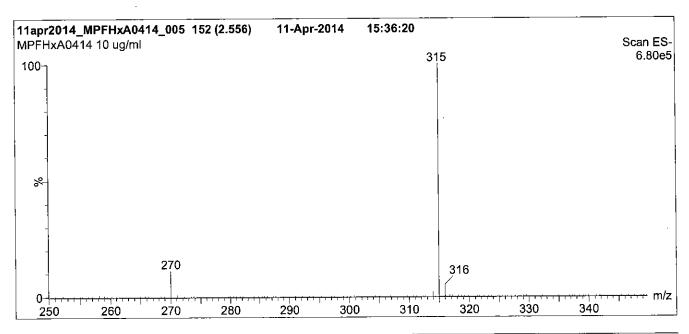
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

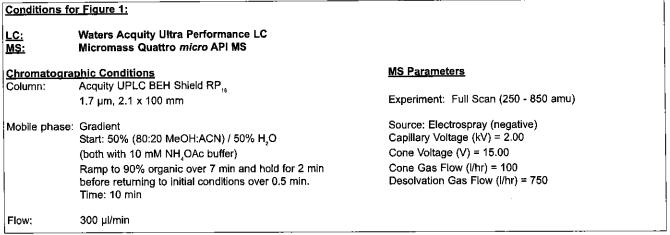




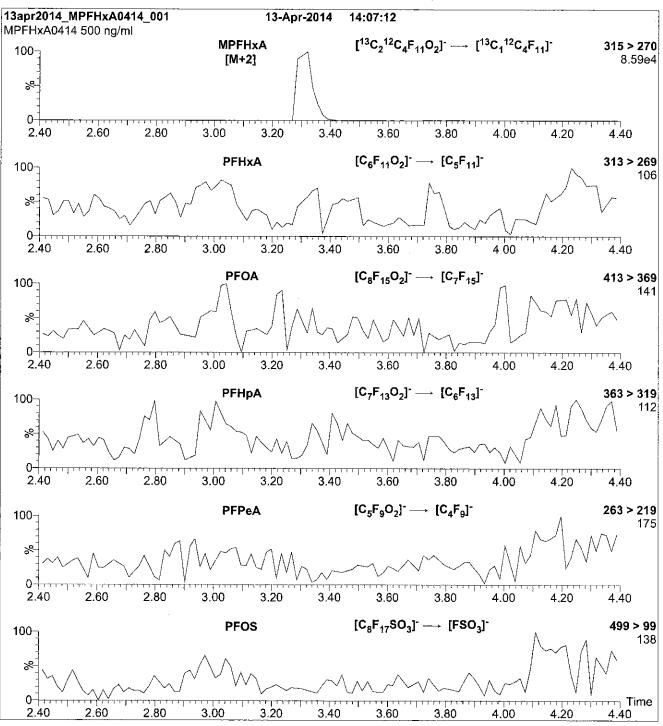


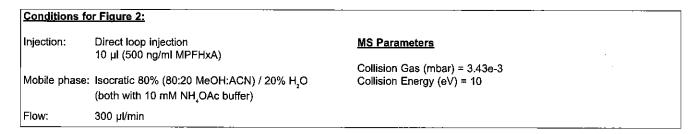






<u>Figure 2:</u> MPFHxA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFHxA_00007



ID: LCMPFHxA 00007 Exp:04/09/20 Prpd;CBW Opn:02/25/16

13C2-Perfluorohexanoic ac



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFHxA

LOT NUMBER:

MPFHxA0415

COMPOUND:

Perfluoro-n-[1,2-13C,]hexanoic acid

STRUCTURE:

CAS #:

Not available

¹³C₂¹²C₄HF₁₁O₂

MOLECULAR WEIGHT:

316.04

CONCENTRATION:

MOLECULAR FORMULA:

 $50 \pm 2.5 \,\mu g/ml$

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99%13C

LAST TESTED: (mm/dd/yyyy)

04/09/2015

 $(1,2^{-13}C_2)$

Water (<1%)

EXPIRY DATE: (mm/dd/yyyy)

04/09/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains < 0.1% of perfluoro-n-hexanoic acid and ~ 0.3% of perfluoro-n-octanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

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UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_i(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2, ... x_n$ on which it depends is:

$$u_{\epsilon}(y(x_1, x_2, ... x_n)) = \sqrt{\sum_{i=1}^{n} u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

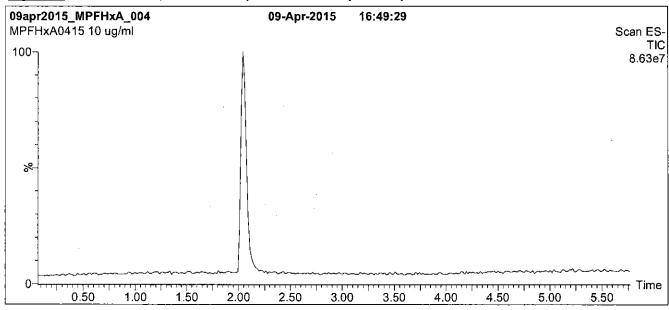
QUALITY MANAGEMENT:

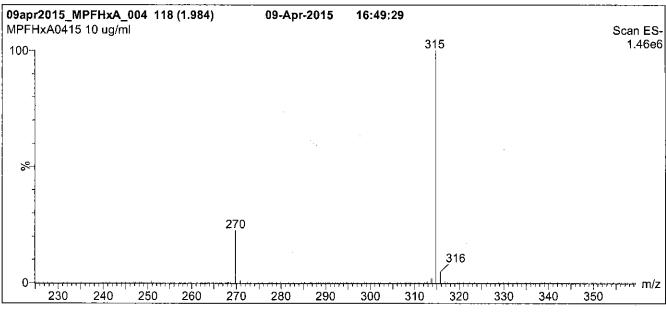
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

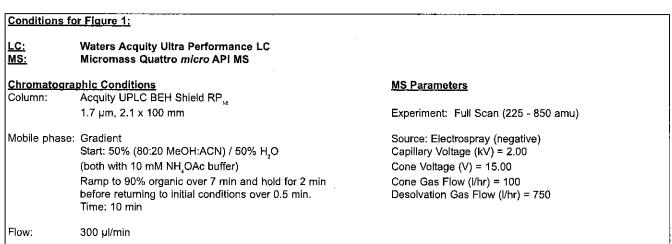




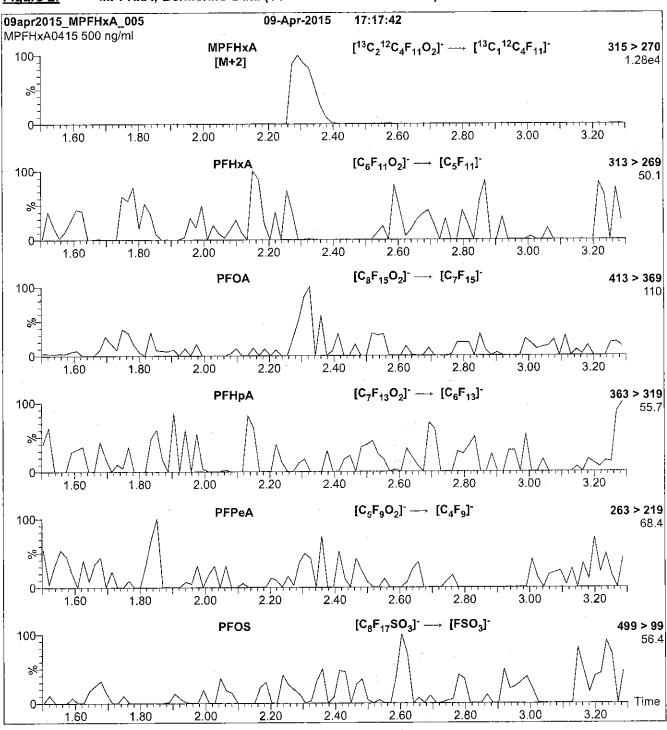
Figure 1: MPFHxA; LC/MS Data (TIC and Mass Spectrum)

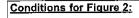






MPFHxA; LC/MS/MS Data (Selected MRM Transitions) Figure 2:





Injection:

Direct loop injection

10 µl (500 ng/ml MPFHxA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

Collision Gas (mbar) = 3.20e-3 Collision Energy (eV) = 10

LCMPFHxA_00008



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFHxA

LOT NUMBER:

MPFHxA0415

COMPOUND:

Perfluoro-n-[1,2-13C] hexanoic acid

STRUCTURE:

CAS#:

Not available

F F F F F F

MOLECULAR FORMULA:

¹³C₂¹²C₄HF₄O₂

MOLECULAR WEIGHT:

316.04

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

SOLVENT(S):

Methanol

IOOTOBIO DUDI

Water (<1%)

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99%¹³C

LAST TESTED: (mm/dd/yyyy)

04/09/2015

10 1 O 1 A 1 1 1

 $(1,2^{-13}C_2)$

EXPIRY DATE: (mm/dd/yyyy)

04/09/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains < 0.1% of perfluoro-n-hexanoic acid and ~ 0.3% of perfluoro-n-octanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date:

(mm/dd/yyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

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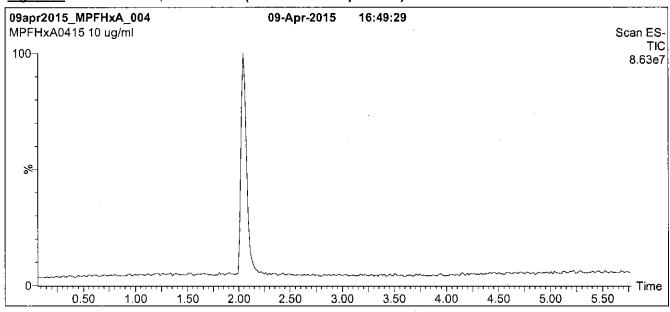
QUALITY MANAGEMENT:

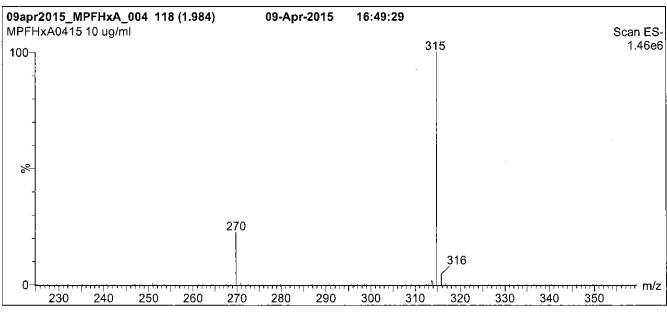
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Figure 1: MPFHxA; LC/MS Data (TIC and Mass Spectrum)





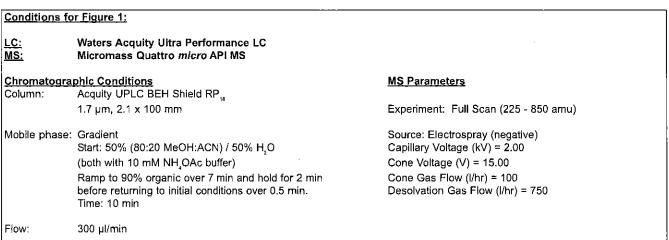
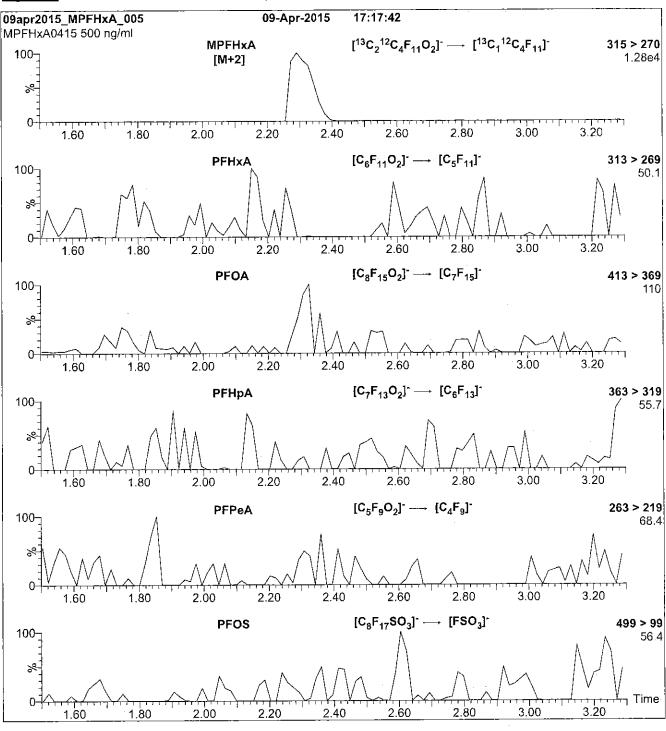
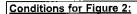


Figure 2: MPFHxA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 µl (500 ng/ml MPFHxA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.20e-3 Collision Energy (eV) = 10

LCMPFHxS_00004



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFHxS

LOT NUMBER:

MPFHxS0713

COMPOUND:

Sodium perfluoro-1-hexane[18O]sulfonate

STRUCTURE:

CAS #:

Not available

F F F F F

MOLECULAR FORMULA:

C₆F₁₃S¹⁶O₂¹⁶ONa

MOLECULAR WEIGHT:

426.10

CONCENTRATION:

 $50.0 \pm 2.5 \,\mu g/ml$ (Na salt)

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

>94% (18O₃)

LAST TESTED: (mm/dd/yyyy)

EXPIRY DATE: (mm/dd/yyyy)

07/25/2013

EXFIRT DATE, (mm/dd/yyyy)

07/25/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

 $47.3 \pm 2.4 \mu g/ml$ (MPFHxS anion)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

• The response factor for MPFHxS (C₆F₁₃S¹⁶O₂¹⁶O⁻) has been observed to be up to 10% lower than for PFHxS (C₆F₁₃S¹⁶O₃⁻) when both compounds are injected together. This difference may vary between instruments.

Due to the isotopic purity of the starting material (¹⁸O₂ >94%), MPFHxS contains ~ 0.3% of PFHxS.
 This value agrees with the theoretical percent relative abundance that is expected based on the stated isotopic purity.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

)3/3<u>0/2015</u>

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

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LIMITED WARRANTY:

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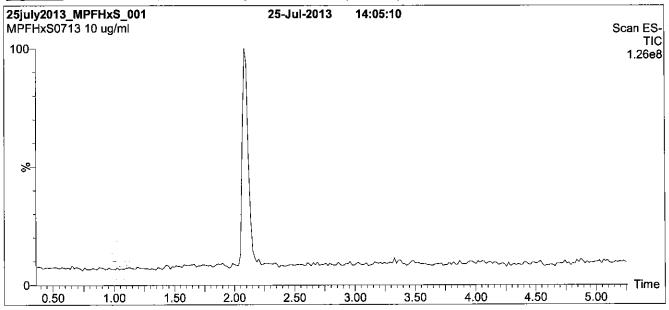
QUALITY MANAGEMENT:

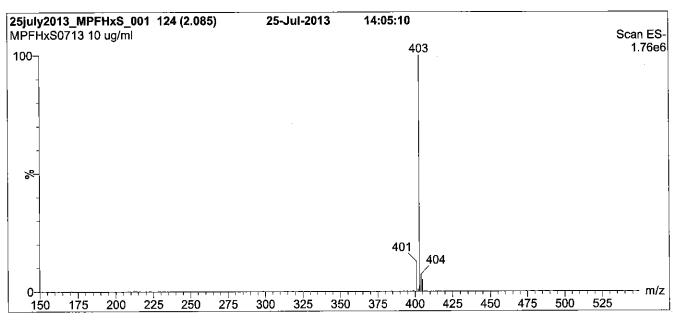
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Figure 1: MPFHxS; LC/MS Data (TIC and Mass Spectrum)





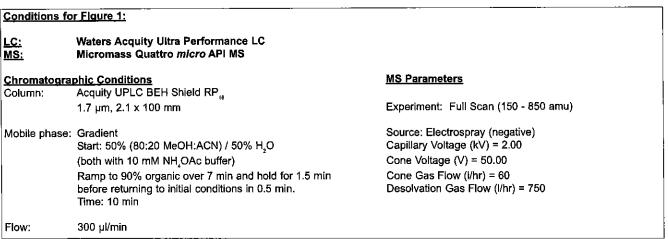
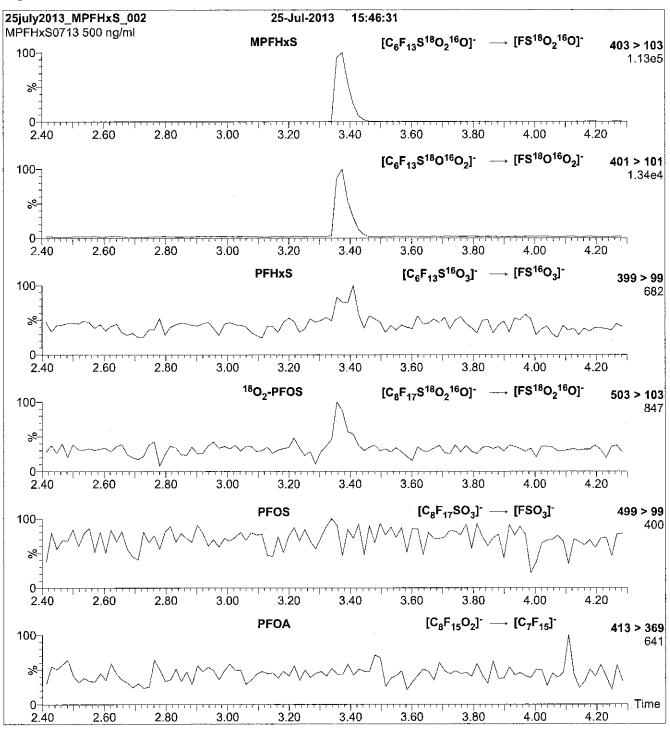
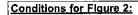


Figure 2: MPFHxS; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 µl (500 ng/ml MPFHxS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.58e-3 Collision Energy (eV) = 30

LCMPFHxS_00006



609705

ID: LCMPFHxS_00006

Exp: 10/23/20 Prpd: CBW

18O2-Perfluorohexanesulfo

R: 4/7/16 CBW



WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFHxS

LOT NUMBER:

MPFHxS1015

COMPOUND:

Sodium perfluoro-1-hexane[180,]sulfonate

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

C₆F₁₃S¹⁸O₂¹⁶ONa

MOLECULAR WEIGHT:

426.10

CONCENTRATION:

 $50.0 \pm 2.5 \,\mu g/ml$ (Na salt)

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

>94% (18O₂)

LAST TESTED: (mm/dd/yyyy)

10/23/2015

EXPIRY DATE: (mm/dd/yyyy)

10/23/2010

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

 $47.3 \pm 2.4 \mu g/ml$ (MPFHxS anion)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

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FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

10/28/201

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

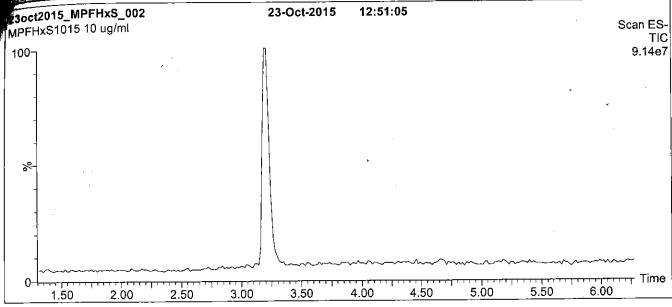
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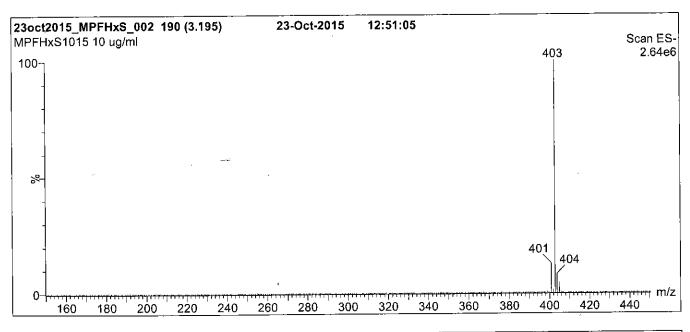




For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com







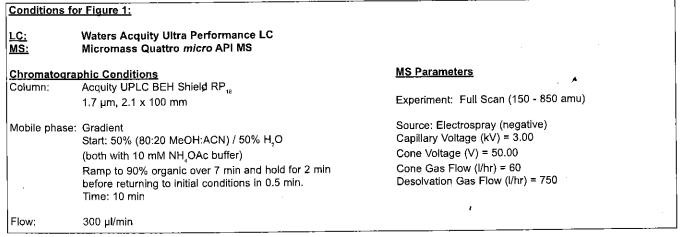
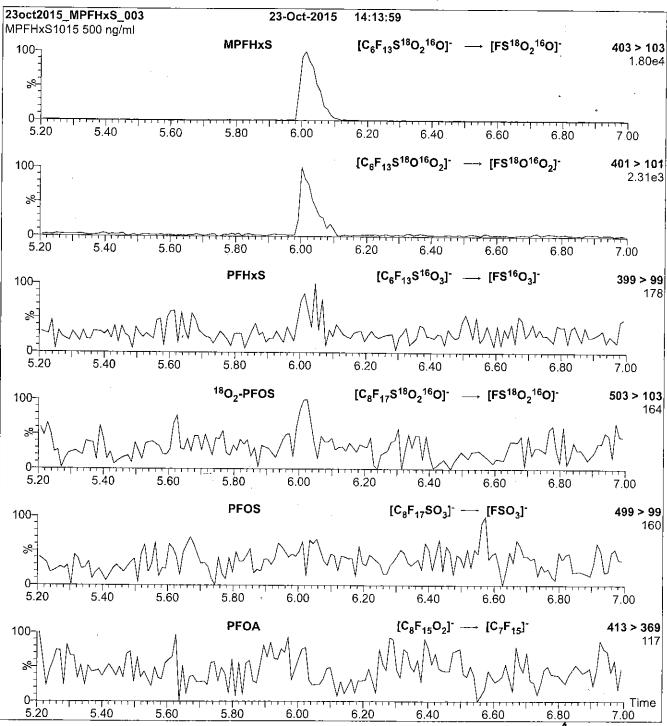
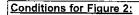


Figure 2: MPFHxS; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μI (500 ng/ml MPFHxS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3 Collision Energy (eV) = 30

LCMPFNA_00003



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFNA

LOT NUMBER:

MPFNA0414

COMPOUND:

Perfluoro-n-[1,2,3,4,5-13C]nonanoic acid

CAS #:

Not available

STRUCTURE:

MOLECULAR FORMULA:

¹³C₅¹²C₄HF₁₇O₂

 $50 \pm 2.5 \mu g/ml$ **CONCENTRATION:**

MOLECULAR WEIGHT:

469.04

SOLVENT(S):

Methanol

Water (<1%)

 $(1,2,3,4,5^{-13}C_{5})$

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99%13C

LAST TESTED: (mm/dd/yyyy)

04/13/2014

EXPIRY DATE: (mm/dd/yyyy)

04/13/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 04/13/2014

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HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, u_c(y), of a value y and the uncertainty of the independent parameters

$$x_1, x_2,...x_n$$
 on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

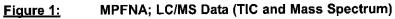
At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

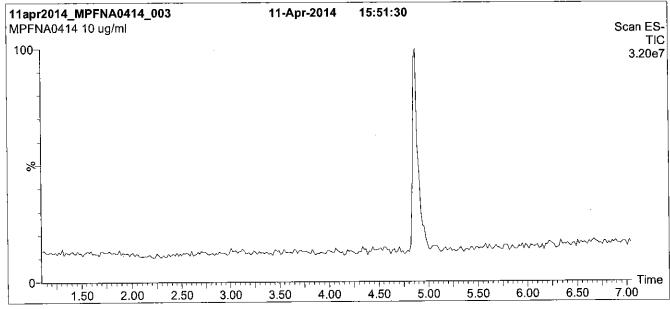
QUALITY MANAGEMENT:

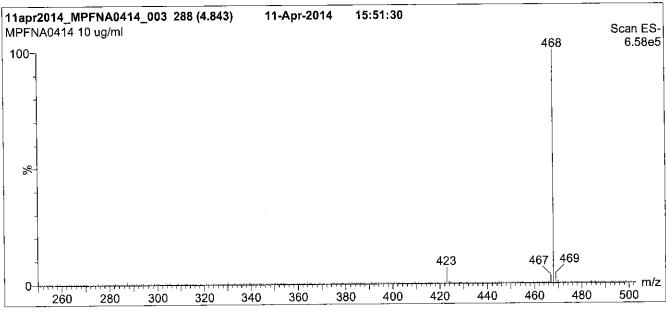
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).











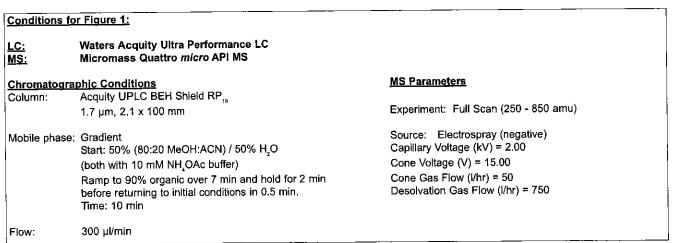
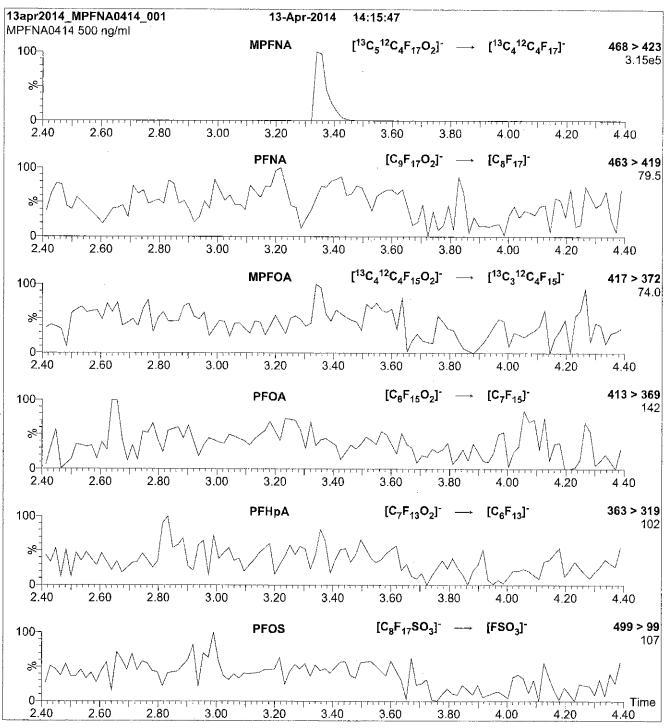
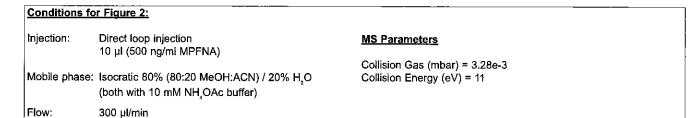


Figure 2: MPFNA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFNA_00004







CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFNA

LOT NUMBER:

MPFNA0414

COMPOUND:

Perfluoro-n-[1,2,3,4,5-13C]nonanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₅¹²C₄HF₁₇O₇

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

SOLVENT(S):

469.04

MOLECULAR WEIGHT:

Methanol

 $(1,2,3,4,5^{-13}C_{5})$

Water (<1%) **ISOTOPIC PURITY:** >99%13C

CHEMICAL PURITY: LAST TESTED: (mm/dd/yyyy) >98%

04/13/2014

EXPIRY DATE: (mm/dd/yyyy)

04/13/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

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UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters

$$x_4, x_2,...x_n$$
 on which it depends is:

$$u_c(y(x_1, x_2, ... x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

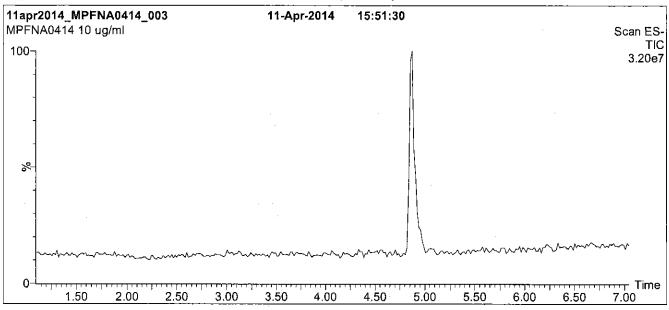
QUALITY MANAGEMENT:

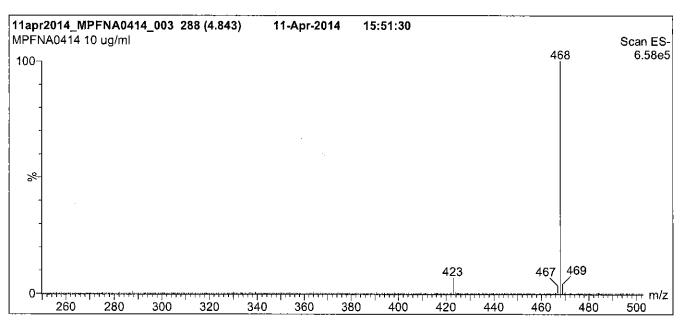
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: MPFNA; LC/MS Data (TIC and Mass Spectrum)





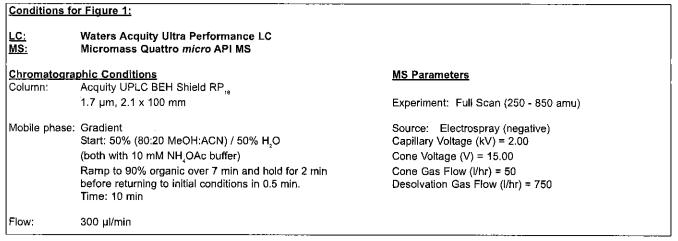
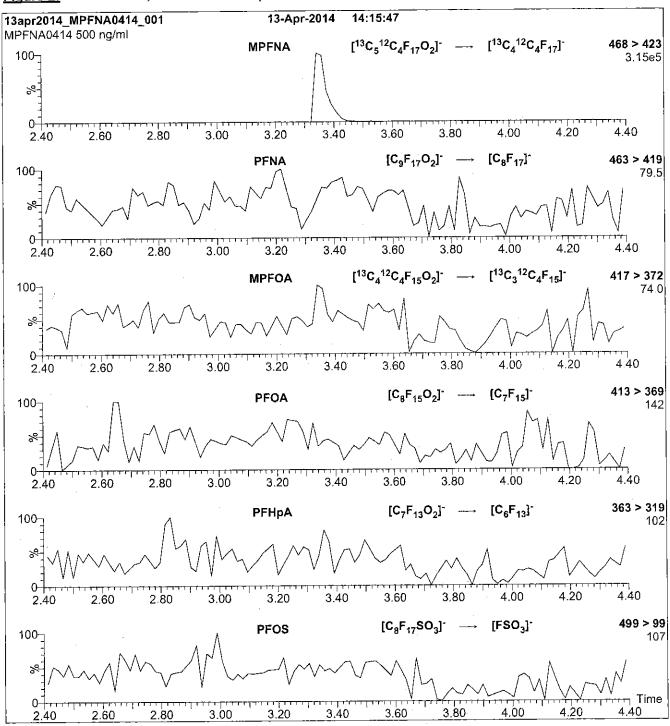


Figure 2: MPFNA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml MPFNA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3 Collision Energy (eV) = 11

LCMPFNA_00005



ID: LCMPFNA 00005 Exp: 04/13/19 Prpd: CBW 13C5-Perfluornonanoic aci



CERTIFICATE OF ANALYSIS **DOCUMENTATION**

PRODUCT CODE:

MPFNA

LOT NUMBER:

MPFNA0414

COMPOUND:

Perfluoro-n-[1,2,3,4,5-13C_s]nonanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₅¹²C₄HF₁₇O₂

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

MOLECULAR WEIGHT:

469.04

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

04/13/2014

EXPIRY DATE: (mm/dd/yyyy)

04/13/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

ISOTOPIC PURITY:

>99%13C

 $(1,2,3,4,5^{-13}C_{5})$

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified Bv:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

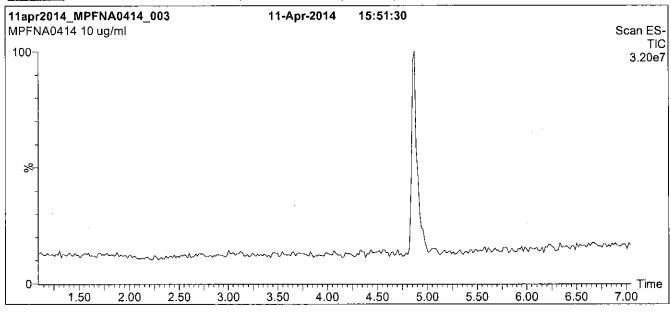
QUALITY MANAGEMENT:

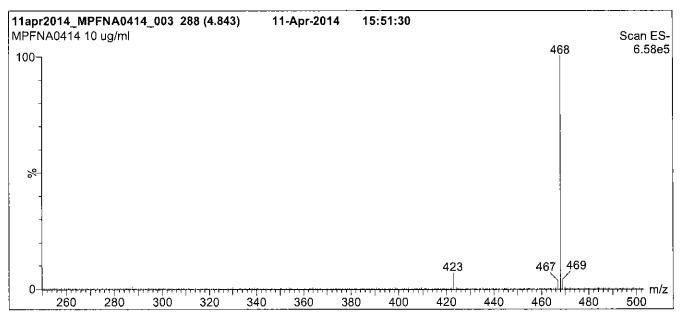
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: MPFNA; LC/MS Data (TIC and Mass Spectrum)





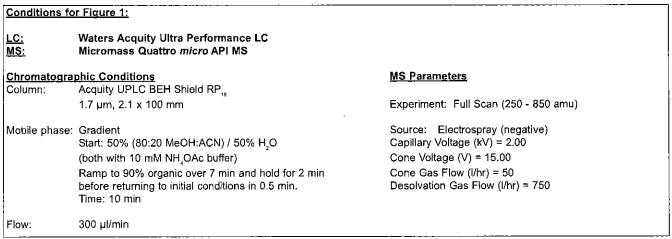
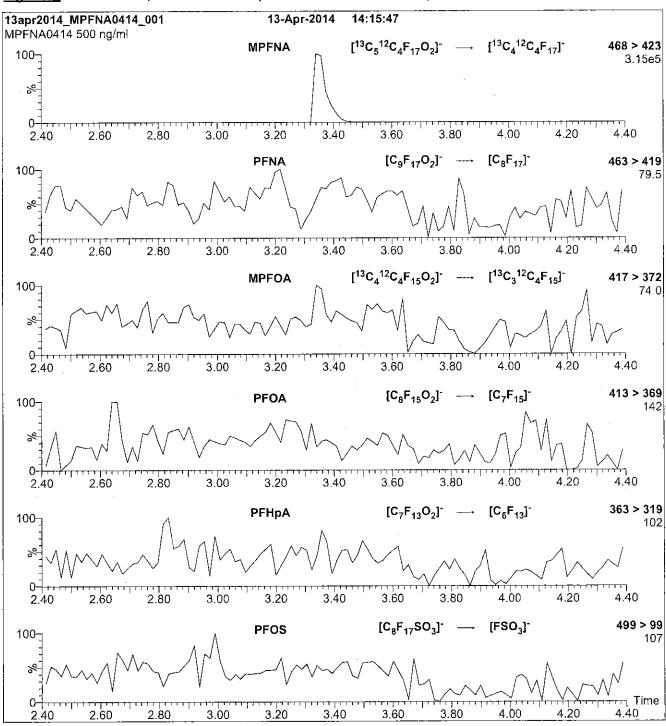
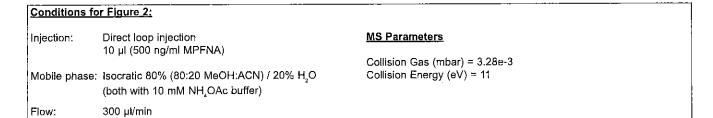


Figure 2: MPFNA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFOA 00007

V: 9/5/5 8V



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFOA

LOT NUMBER:

MPFOA0415

COMPOUND:

Perfluoro-n-[1,2,3,4-12C₄]octanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₄¹²C₄HF₁₅O₂

CONCENTRATION:

CHEMICAL PURITY:

50 ± 2.5 µg/ml

MOLECULAR WEIGHT:

418.04

SOLVENT(S):

Methanol

ISOTOPIC PURITY:

Water (<1%) >99% 13C

(1,2,3,4-13C₄)

LAST TESTED: (mm/dd/yyyy)

>98%

04/10/2015

EXPIRY DATE: (mm/sd/yyyy)

04/10/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.1% of native perfluoro-n-octanoic acid (PFOA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 04/1<u>0/2015</u>

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

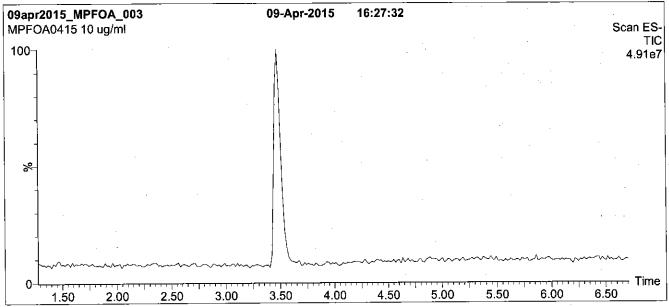
QUALITY MANAGEMENT:

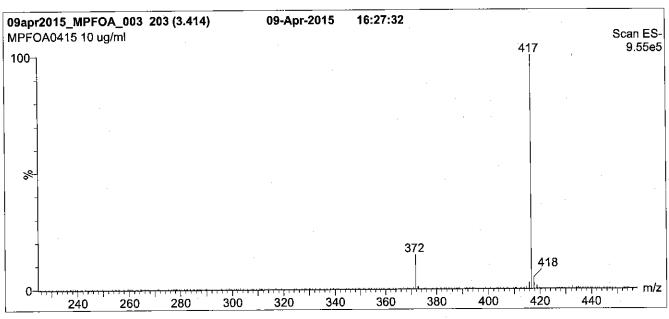
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Figure 1: MPFOA; LC/MS Data (TIC and Mass Spectrum)





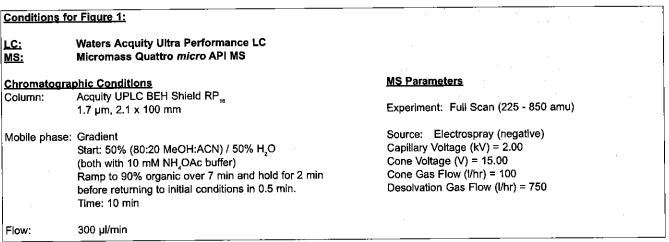
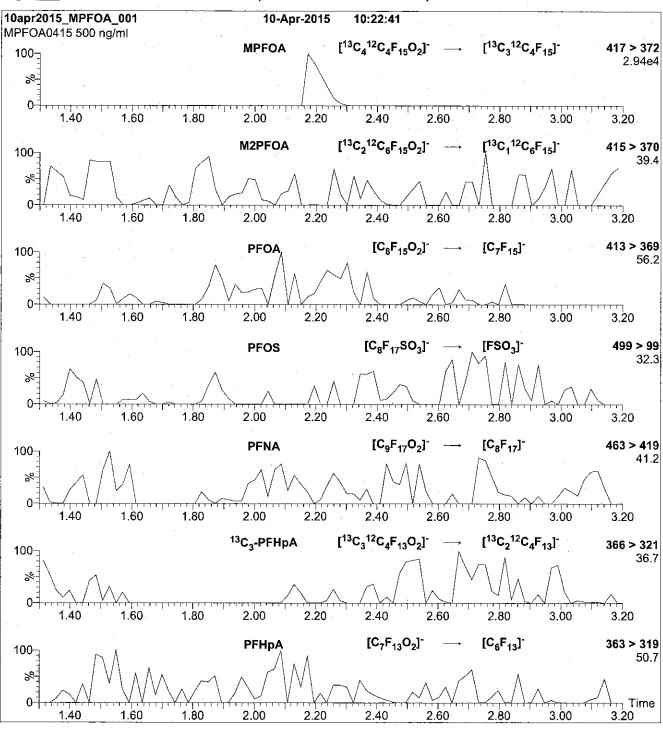
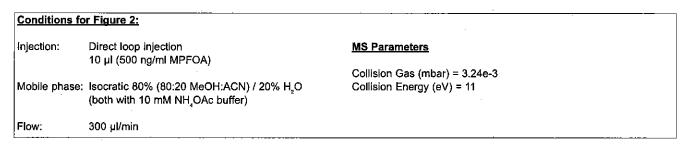


Figure 2: MPFOA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFOA_00008



ID: LCMPFOA_00008 Exp. 04/10/20 Prod: CBW 13C4-Perfluorocctanoic ac R: 1/25/16



CERTIFICATE OF ANALYSIS **DOCUMENTATION**

PRODUCT CODE:

MPFOA

LOT NUMBER:

MPFOA0415

COMPOUND:

Perfluoro-n-[1,2,3,4-13C] octanoic acid

CAS #:

Not available

STRUCTURE:

MOLECULAR FORMULA:

¹³C₄¹²C₄HF₁₅O₂

MOLECULAR WEIGHT:

418.04

CONCENTRATION: $50 \pm 2.5 \, \mu g/ml$ SOLVENT(S):

Methanol

>98%

ISOTOPIC PURITY:

Water (<1%) ≥99% ¹³C

 $(1,2,3,4^{-13}C_{4})$

LAST TESTED: (mm/dd/yyyy)

CHEMICAL PURITY:

04/10/2015

EXPIRY DATE: (mm/dd/yyyy)

04/10/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.1% of native perfluoro-n-octanoic acid (PFOA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: <u>04/10/2015</u>

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SYNTHESIS / CHARACTERIZATION:

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 on which it depends is:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

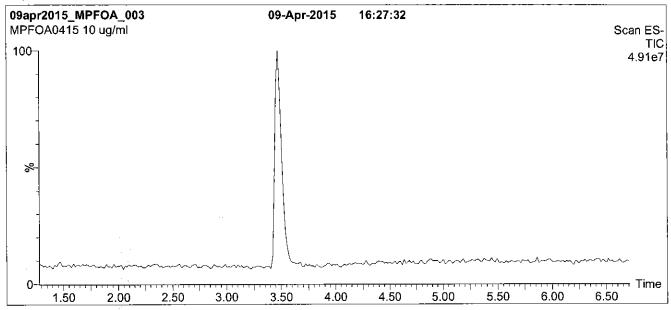
QUALITY MANAGEMENT:

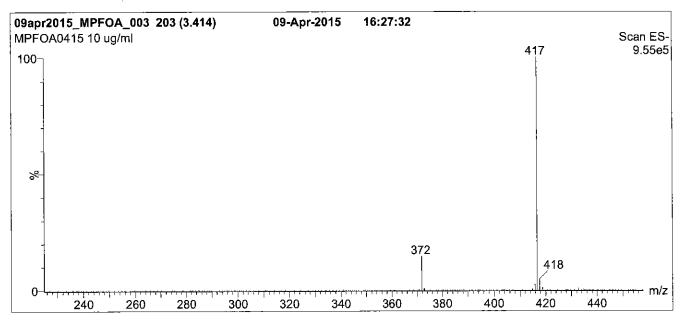
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: MPFOA; LC/MS Data (TIC and Mass Spectrum)





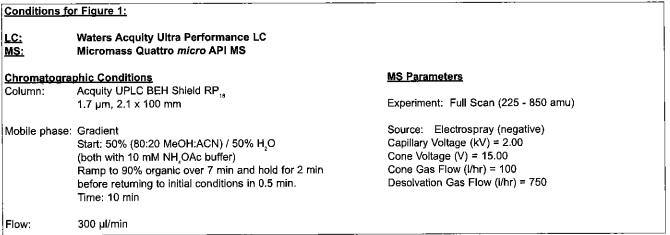
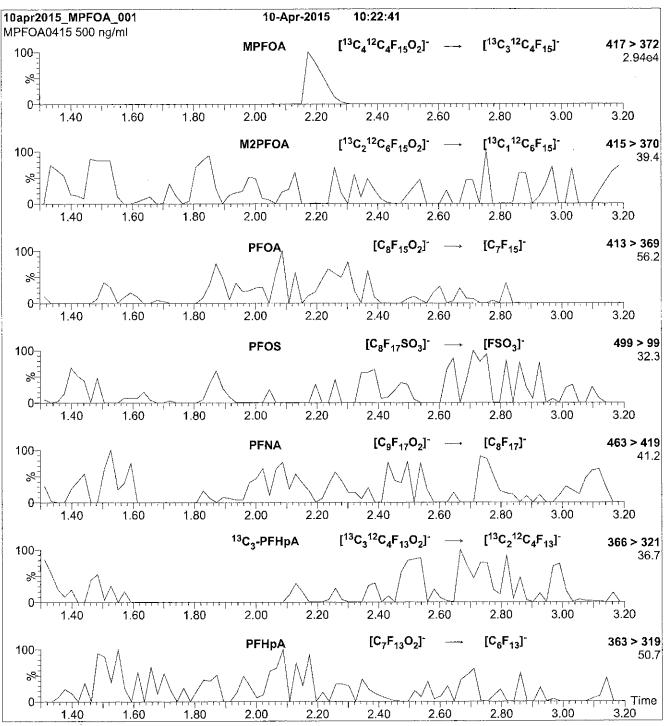
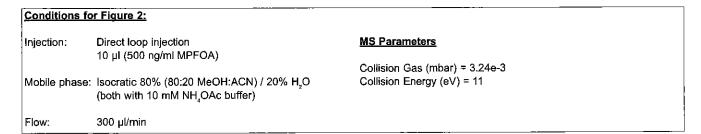


Figure 2: MPFOA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFOA_00010



ID: LCMPFOA 00010 Exp: 01/22/21 Prpd: CBW

13C4-Perfluorooctanoic ac



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFOA

LOT NUMBER:

MPFOA0116

COMPOUND:

Perfluoro-n-[1,2,3,4-13C] octanoic acid

CAS #:

Not available

STRUCTURE:

MOLECULAR FORMULA:

¹³C₄¹²C₄HF₁₅O₉

CONCENTRATION:

50 ± 2.5 µg/ml

MOLECULAR WEIGHT:

418.04

SOLVENT(S):

Methanol

ISOTOPIC PURITY:

Water (<1%) ≥99% ¹³C

(1,2,3,4-13C₄)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

01/22/2016

EXPIRY DATE: (mm/ad/yyyy)

01/22/2021

RECOMMENDED STORAGE:

Störe ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

<u>ADDITIONAL INFORMATION:</u>

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.1% of native perfluoro-n-octanoic acid (PFOA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 02/01/2016

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters

 $X_1, X_2, ... X_n$ on which it depends is:

$$u_c(y(x_1, x_2, ... x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

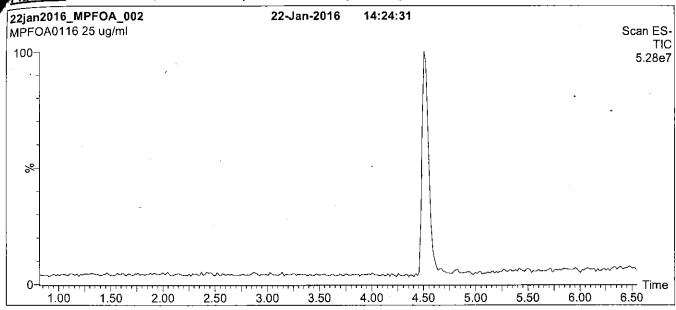
QUALITY MANAGEMENT:

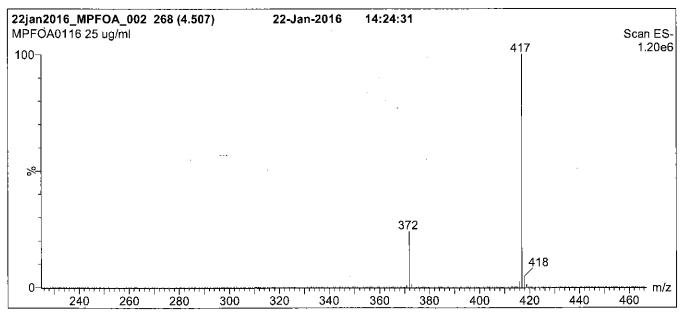
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA, A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: MPFOA; LC/MS Data (TIC and Mass Spectrum)





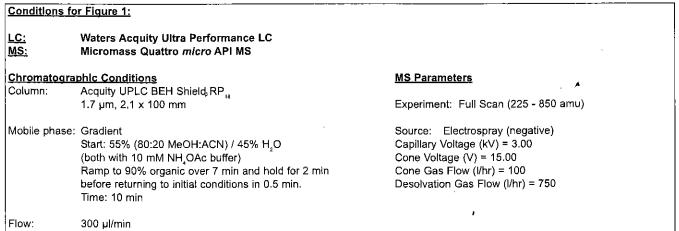
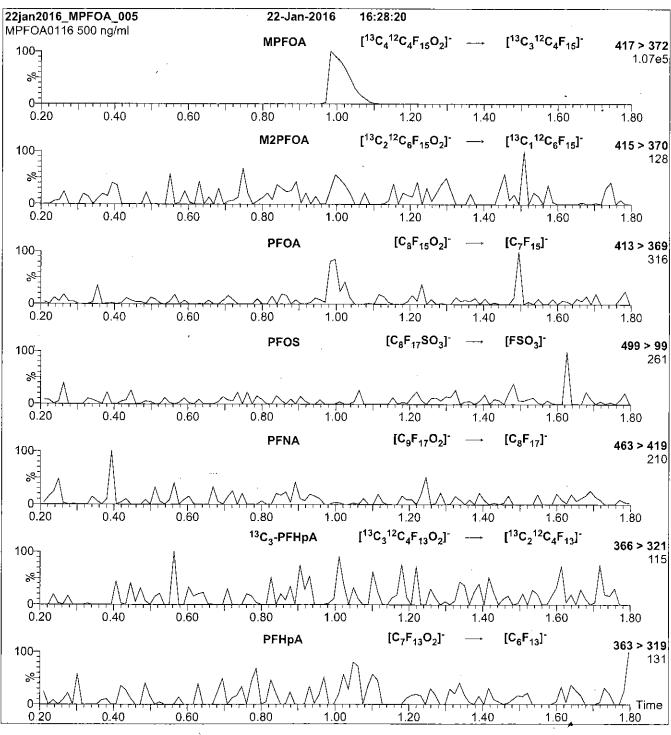
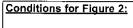


Figure 2: MPFOA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml MPFOA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH OAc buffer)

MS Parameters

Collision Gas (mbar) = 3.58e-3 Collision Energy (eV) = 10

Flow:

300 µl/min

LCMPFOS_00009



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFOS

LOT NUMBER:

MPFOS0515

COMPOUND:

Sodium perfluoro-1-[1,2,3,4-13C] octanesulfonate

STRUCTURE:

CAS #:

Not available

F F F F F F F F

MOLECULAR FORMULA:

¹³C₄¹²C₄F₁₇SO₃Na

MOLECULAR WEIGHT:

526.08

CONCENTRATION:

 $50.0 \pm 2.5 \,\mu\text{g/ml}$ (Na salt)

SOLVENT(S):

Methanol

 $47.8 \pm 2.4 \mu g/ml$ (MPFOS anion)

ISOTOPIC PURITY:

≥99% ¹³C (1,2,3,4-¹³C₄)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

05/15/2015

EXPIRY DATE: (mm/dd/yyyy)

05/15/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-13C]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: 05/28/2015

(mm/dd/yyyy

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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UNCERTAINTY:

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$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

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TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

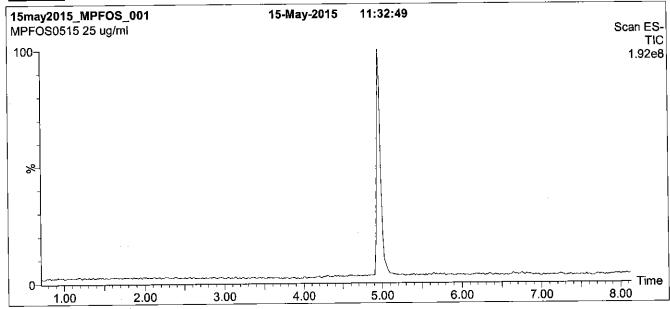
QUALITY MANAGEMENT:

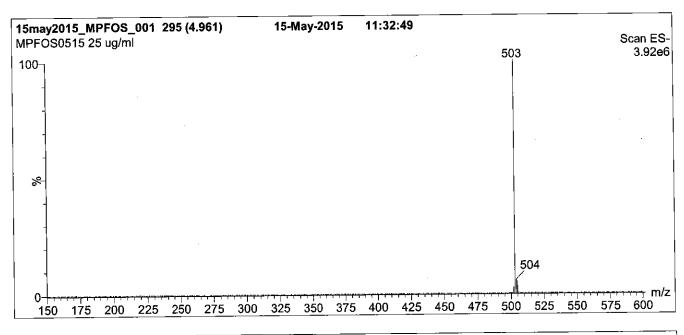
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Figure 1: MPFOS; LC/MS Data (TIC and Mass Spectrum)





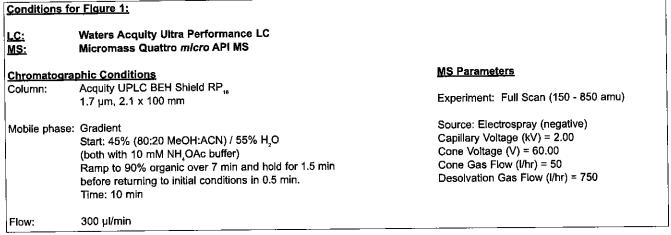
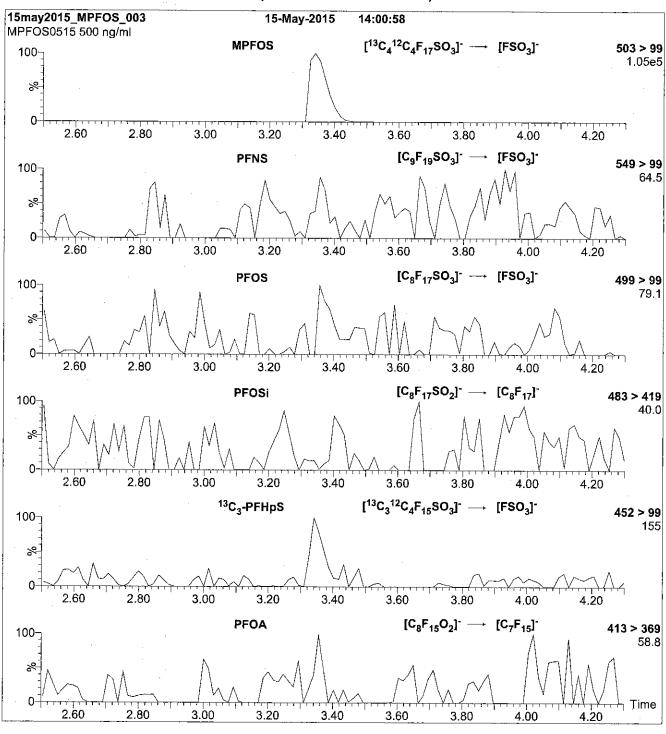
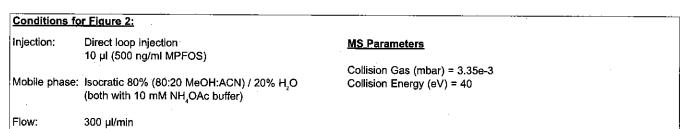


Figure 2: MPFOS; LC/MS/MS Data (Selected MRM Transitions)





LCMPFOS_00010



572886

ID: LCMPFOS_00010 Exp; 05/15/20 Prpd: CBW 13C4-Perfluorooctanesulfo R: 1/25/16

: 2



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFOS

LOT NUMBER:

MPFOS0515

COMPOUND:

Sodium perfluoro-1-[1,2,3,4-13C] octanesulfonate

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₄¹²C₄F₁₇SO₃Na

MOLECULAR WEIGHT:

526.08

CONCENTRATION:

50.0 ± 2.5 µg/ml (Na salt)

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

≥99% ¹³C (1,2,3,4-¹³C₄)

LAST TESTED: (mm/dd/yyyy)

05/15/2015

00/10/2010

EXPIRY DATE: (mm/dd/yyyy)

05/15/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

 $47.8 \pm 2.4 \mu g/ml$ (MPFOS anion)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

• Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-13C,]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: _

05/28/2015

Chittim

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SYNTHESIS / CHARACTERIZATION:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

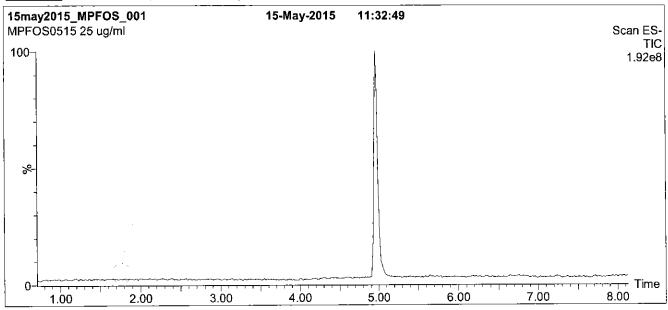
QUALITY MANAGEMENT:

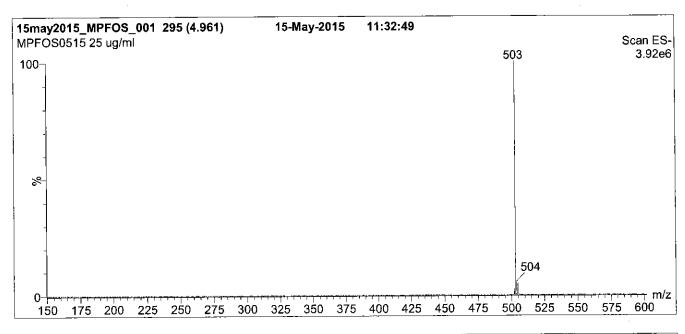
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Figure 1: MPFOS; LC/MS Data (TIC and Mass Spectrum)





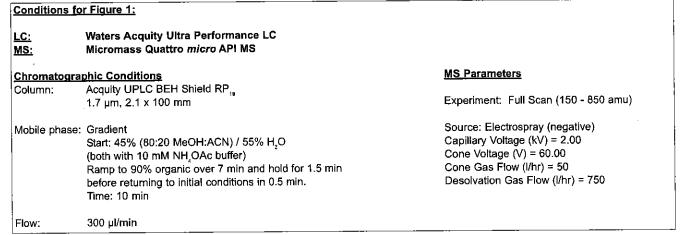
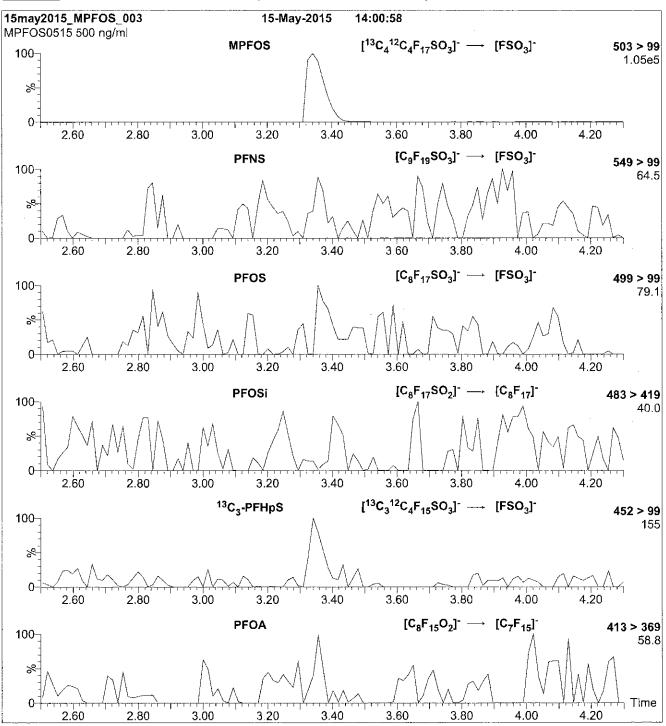
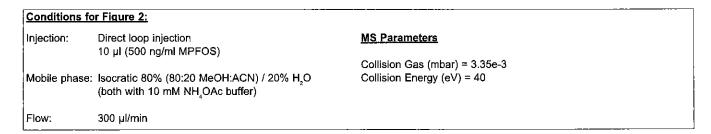


Figure 2: MPFOS; LC/MS/MS Data (Selected MRM Transitions)

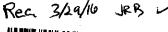




LCMPFOS_00012



ID: LCMPFOS_00012 Exp: 01/22/21 Prpd: CBW 13C4-Perfluorooctanesulfo



ID: LCMPFOS_00013 Exp: 01/22/21 Prpd: CBW 13C4-Perfluorooctanesulfo



ELLINGTON A B O R A T O R I E S

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFOS

LOT NUMBER:

MPFOS0116

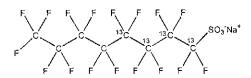
COMPOUND:

Sodium perfluoro-1-[1,2,3,4-13C] octanesulfonate

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₄¹²C₄F₁₇SO₃Na

MOLECULAR WEIGHT:

526.08

CONCENTRATION:

 $50.0 \pm 2.5 \,\mu g/ml$ (Na salt)

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

ISOTOPIC PURITY:

>99% 13C $(1,2,3,4^{-13}C_{\lambda})$

LAST TESTED: (mm/dd/yyyy)

01/22/2016

EXPIRY DATE: (mm/dd/yyyy)

01/22/2021

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

 $47.8 \pm 2.4 \,\mu\text{g/ml}$ (MPFOS anion)

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains ~ 0.8% Sodium perfluoro-1-[1,2,3-13C], heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified Bv:

Chittim

Date: 02/01/2016

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • Info@well-labs.com

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HAZARDS:

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HOMOGENEITY:

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

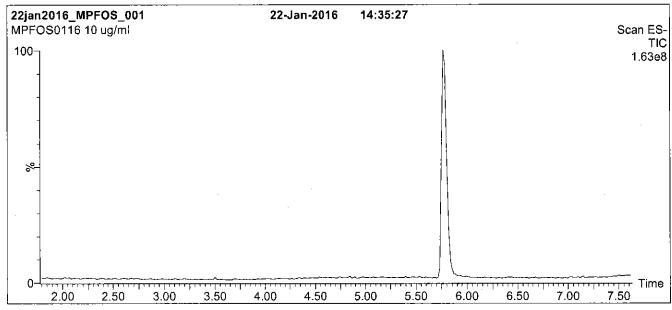
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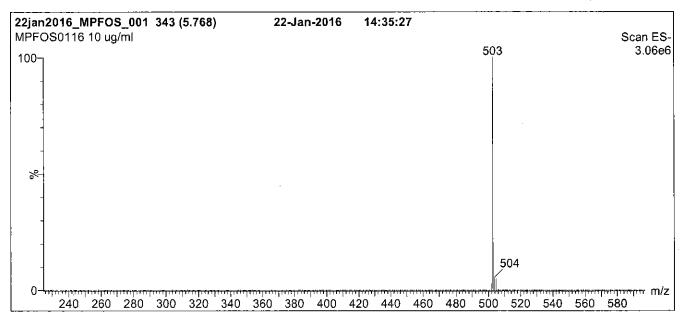




^{**}For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com**

Figure 1: MPFOS; LC/MS Data (TIC and Mass Spectrum)





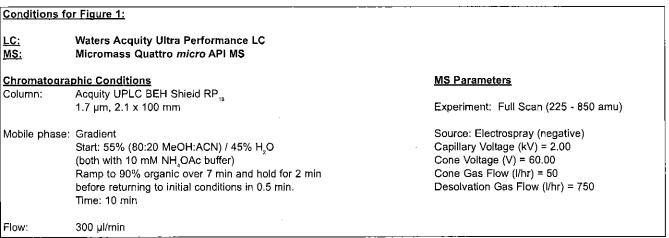
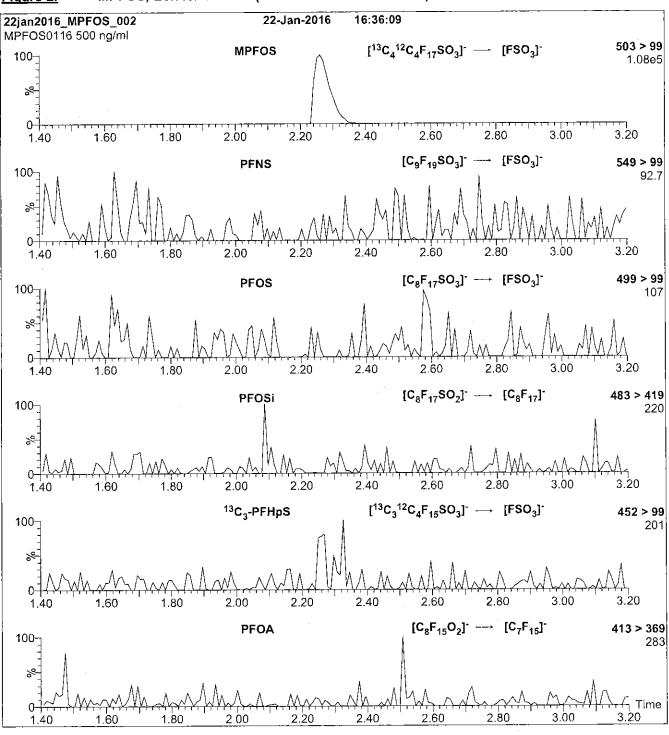
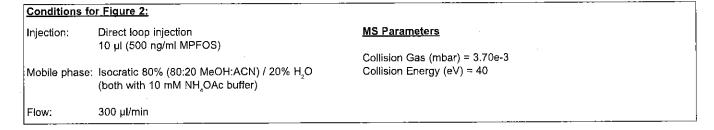


Figure 2: MPFOS; LC/MS/MS Data (Selected MRM Transitions)





LCMPFUdA_00004



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFUdA

LOT NUMBER:

MPFUdA1014

COMPOUND:

Perfluoro-n-[1,2-13C₂]undecanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

¹³C₂¹²C₉HF₂₁O₂

MOLECULAR WEIGHT:

ISOTOPIC PURITY:

566.08

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

>99% 13C

 $(1,2^{-13}C_2)$

Water (<1%)

CHEMICAL PURITY:

>98%

4 = 4 = 4 = 4

LAST TESTED: (mm/dd/yyyy)

10/31/2014

EXPIRY DATE: (mm/dd/yyyy)

10/31/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

• Presence of 1-13C₁-PFUdA (~1%; see Figure 2), 2-13C₁-PFUdA (~1%), and PFUdA (~0.2%; see Figure 2) are due to the isotopic purity of the 13C-precursor.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

<u> 1/03/2014</u>

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_{x}(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ... x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule, Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

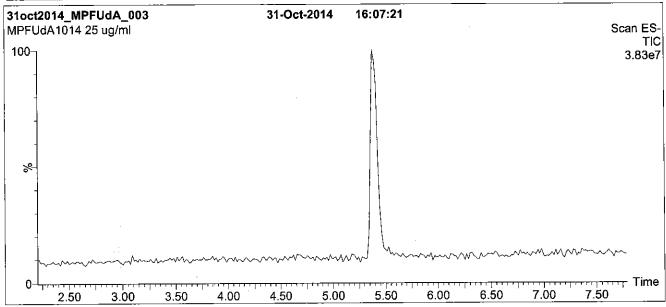
QUALITY MANAGEMENT:

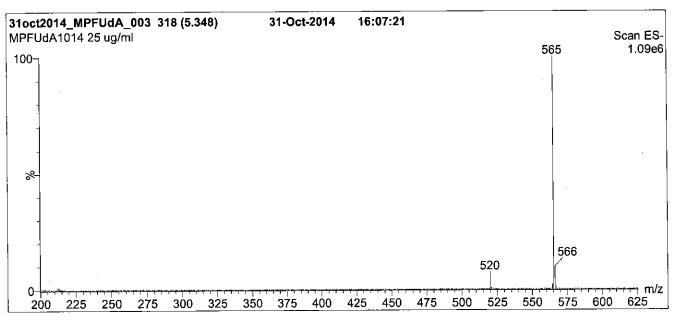
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).





Figure 1: MPFUdA; LC/MS Data (TIC and Mass Spectrum)





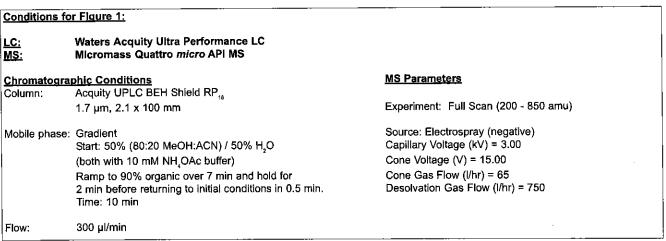
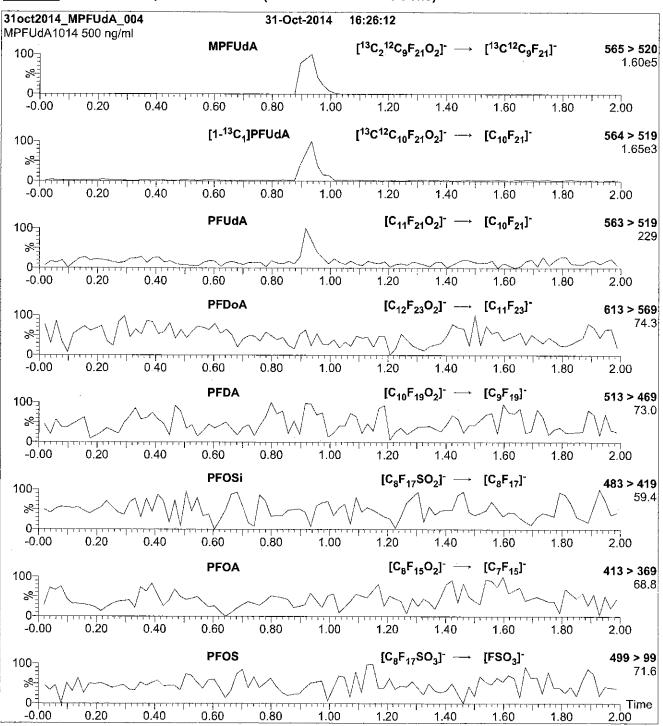
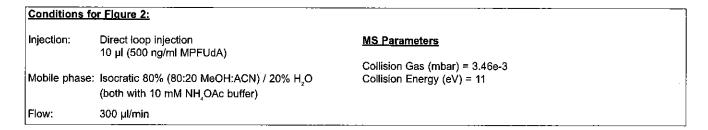


Figure 2: MPFUdA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFUdA_00005



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFUdA

LOT NUMBER:

MPFUdA1014

COMPOUND:

Perfluoro-n-[1,2-13C₃]undecanoic acid

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

13C, 12C, HF, O,

CONCENTRATION:

50 ± 2.5 μg/ml

MOLECULAR WEIGHT:

ISOTOPIC PURITY:

566.08

.5 μg/ml <u>SOLVENT(S):</u>

Methanol

>99% 13C

 $(1,2^{-13}C_{2})$

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

10/31/2014

EXPIRY DATE: (mm/dd/yyyy)

10/31/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Presence of 1-¹³C₁-PFUdA (~1%; see Figure 2), 2-¹³C₁-PFUdA (~1%), and PFUdA (~0.2%; see Figure 2) are due to the isotopic purity of the ¹³C-precursor.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

04/01/2015

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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UNCERTAINTY:

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

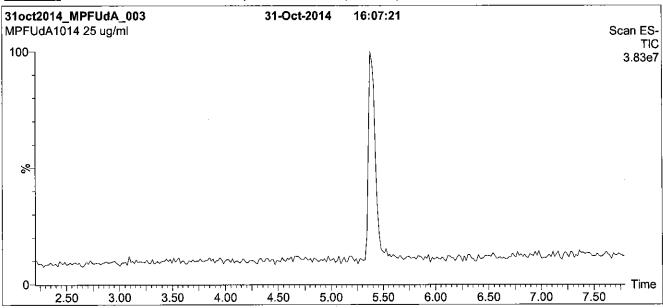
QUALITY MANAGEMENT:

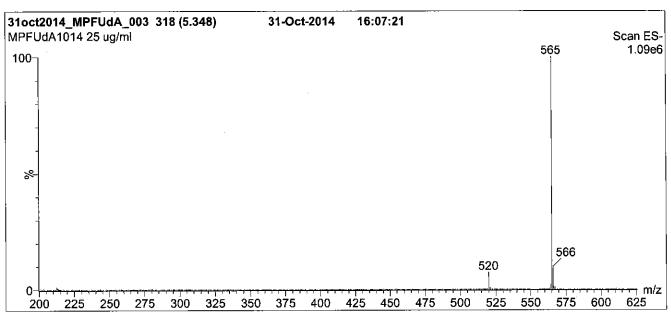
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).











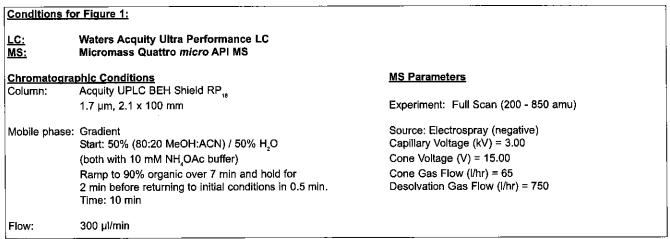
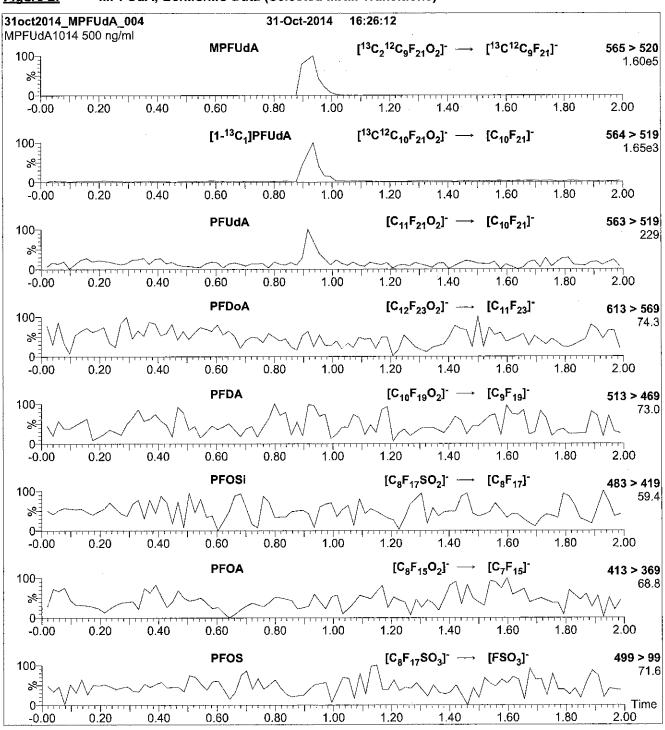
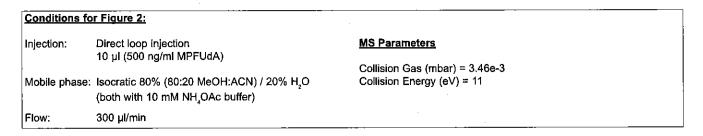


Figure 2: MPFUdA; LC/MS/MS Data (Selected MRM Transitions)





LCMPFUdA_00007



ID: LCMPFUdA_00007 Exp: 10/31/19 Prpd: CBW 13C2-Perfluornoundecanoid R: 4/7/16 CBW



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

MPFUdA

LOT NUMBER:

MPFUdA1014

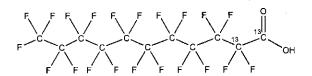
COMPOUND:

Perfluoro-n-[1,2-13C₃]undecanoic acid

STRUCTURE:

CAS #:

Not available



MOLECULAR FORMULA:

¹³C₂¹²C₄HF₂₄O₂

MOLECULAR WEIGHT:

566.08

CONCENTRATION:

50 ± 2.5 µg/ml

Methanol SOLVENT(S):

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

10/31/2014

EXPIRY DATE: (mm/dd/yyyy)

10/31/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

ISOTOPIC PURITY:

≥99% 13C $(1,2^{-13}C_{2})$

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Presence of 1-13C,-PFUdA (~1%; see Figure 2), 2-13C,-PFUdA (~1%), and PFUdA (~0.2%; see Figure 2) are due to the isotopic purity of the ¹³C-precursor.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON 'N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

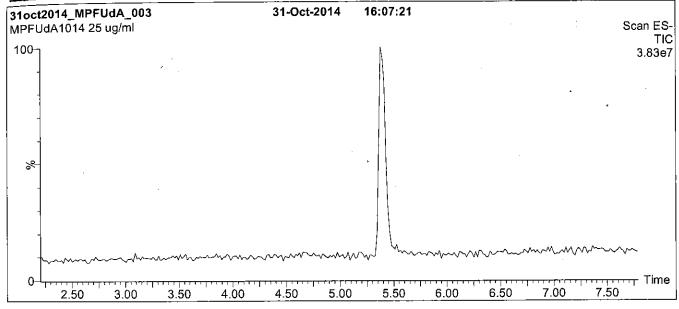
QUALITY MANAGEMENT:

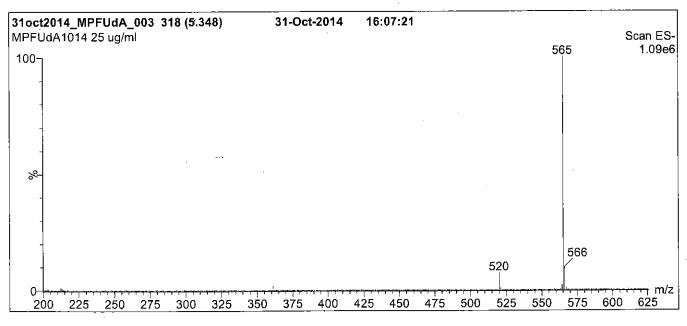
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Figure 1: MPFUdA; LC/MS Data (TIC and Mass Spectrum)





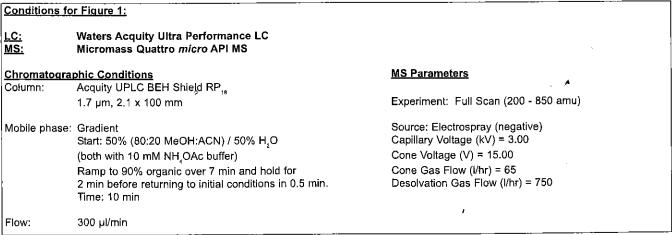
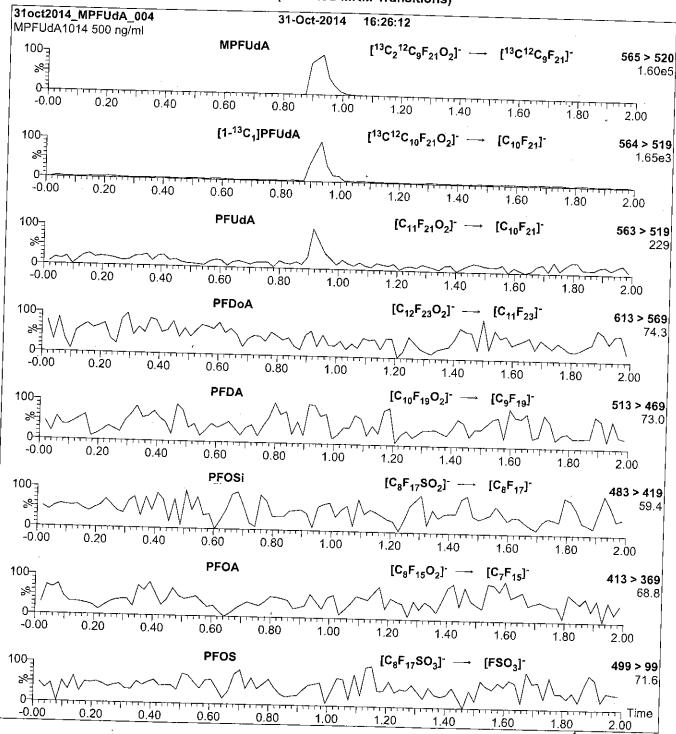
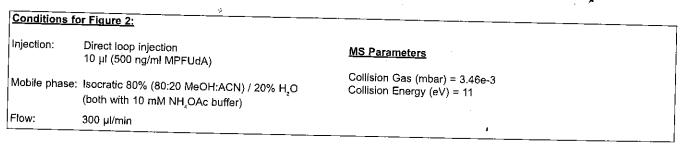


Figure 2: MPFUdA; LC/MS/MS Data (Selected MRM Transitions)





LCPFBA_00003



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFBA

LOT NUMBER:

PFBA0313

COMPOUND:

Perfluoro-n-butanoic acid

STRUCTURE:

CAS #:

375-22-4

F F F F

MOLECULAR FORMULA:

C₄HF₂O₃

MOLECULAR WEIGHT:

214.04

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

03/05/2013

EXPIRY DATE: (mm/dd/yyyy)

03/05/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: 03/06/2013

(mm/dd/vvvv

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

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UNCERTAINTY:

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

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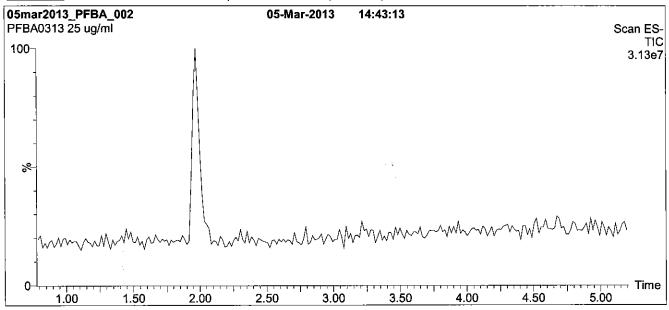
QUALITY MANAGEMENT:

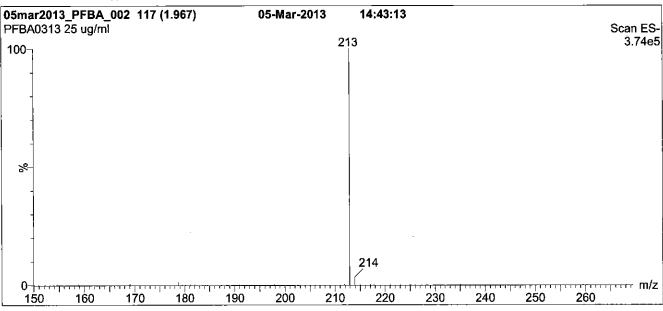
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Figure 1: PFBA; LC/MS Data (TIC and Mass Spectrum)





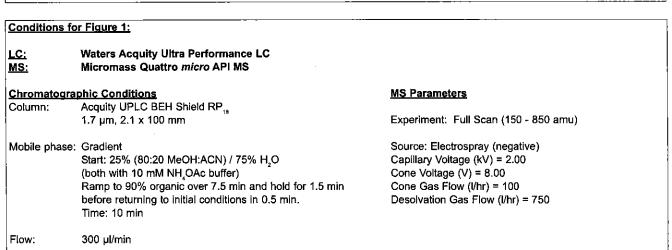
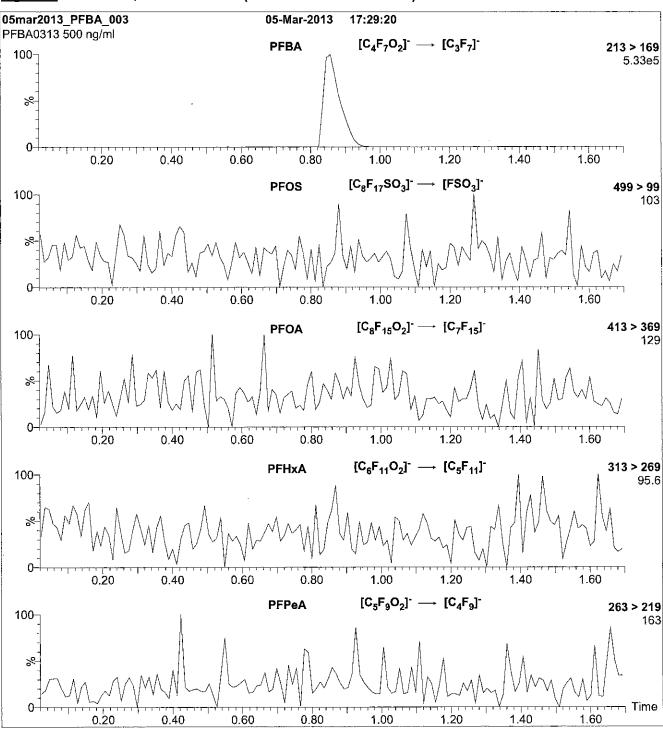
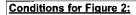


Figure 2: PFBA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 µl (500 ng/ml PFBA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $\rm H_2O$ (both with 10 mM $\rm NH_4OAc$ buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.70e-3 Collision Energy (eV) = 10

LCPFBA_00004



ID: LCPFBA_00004 Exp: 01/30/20 Prpd: CBW PF-n-butanoic acid



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFBA

LOT NUMBER:

PFBA0115

COMPOUND:

Perfluoro-n-butanoic acid

STRUCTURE:

CAS #:

375-22-4

MOLECULAR FORMULA:

C₄HF₂O₂

MOLECULAR WEIGHT:

214.04

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

01/30/2015

EXPIRY DATE: (mm/dd/yyyy)

01/30/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

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This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

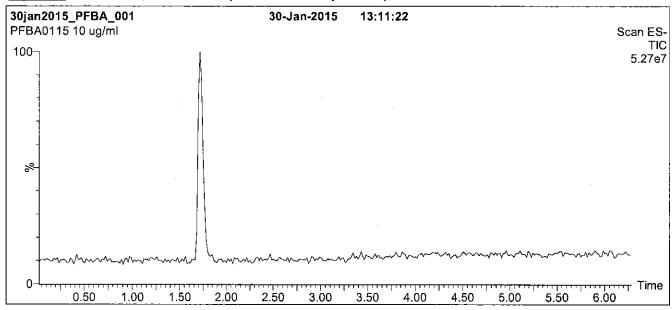
QUALITY MANAGEMENT:

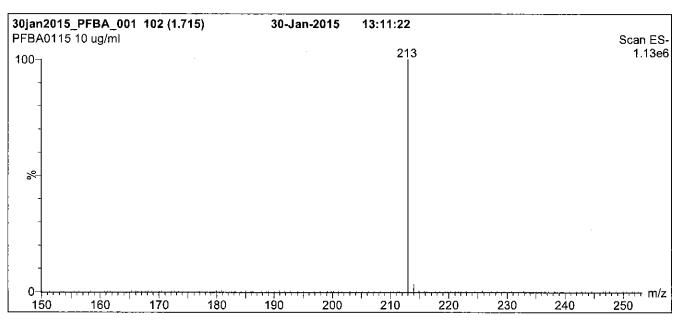
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

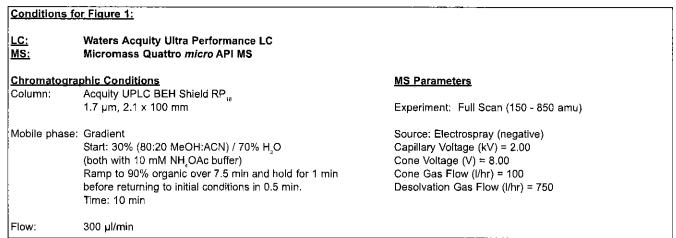




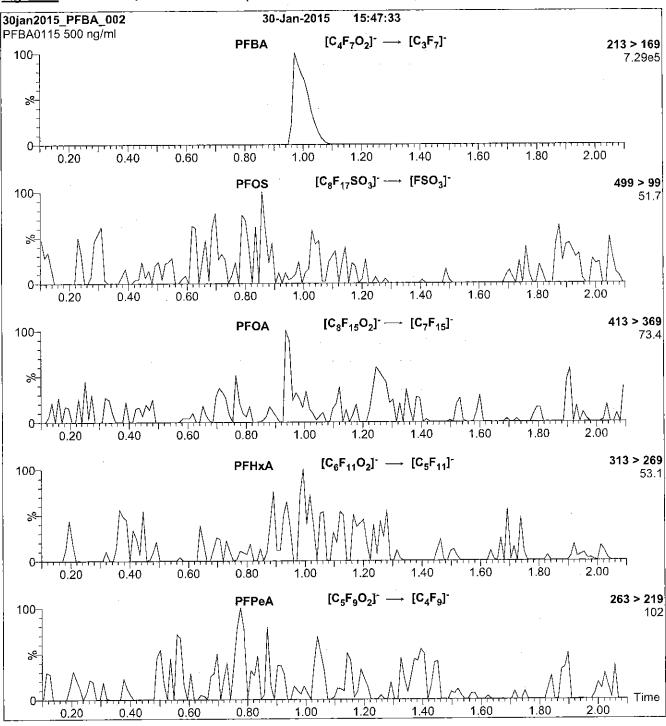
Figure 1: PFBA; LC/MS Data (TIC and Mass Spectrum)

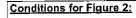






PFBA; LC/MS/MS Data (Selected MRM Transitions) Figure 2:





Injection:

Direct loop injection

10 µl (500 ng/ml PFBA)

 $\begin{array}{lll} \mbox{Mobile phase: Isocratic 80\% (80:20 MeOH:ACN) / 20\% \ H_{\rm 2}O \\ \mbox{(both with 10 mM NH}_{\rm 4}OAc \ buffer) \end{array}$

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3 Collision Energy (eV) = 10

LCPFBS_00003



PRODUCT CODE:

L-PFBS

LOT NUMBER:

MOLECULAR WEIGHT:

LPFBS1014

COMPOUND:

Potassium perfluoro-1-butanesulfonate

STRUCTURE:

CAS #:

29420-49-3

338.19

Methanol

MOLECULAR FORMULA:

C₄F₄SO₃K

 $50.0 \pm 2.5 \,\mu g/ml$ (K salt) SOLVENT(S):

 $44.2 \pm 2.2 \mu g/ml$ (PFBS anion)

CHEMICAL PURITY:

CONCENTRATION:

>98%

LAST TESTED: (mm/dd/yyyy)

10/09/2014

EXPIRY DATE: (mm/dd/yyyy)

10/09/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

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$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

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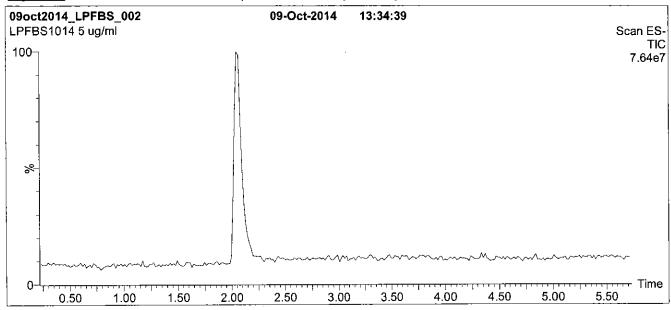
QUALITY MANAGEMENT:

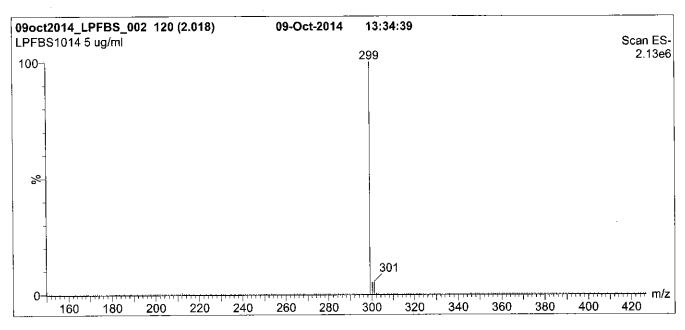
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).





Figure 1: L-PFBS; LC/MS Data (TIC and Mass Spectrum)





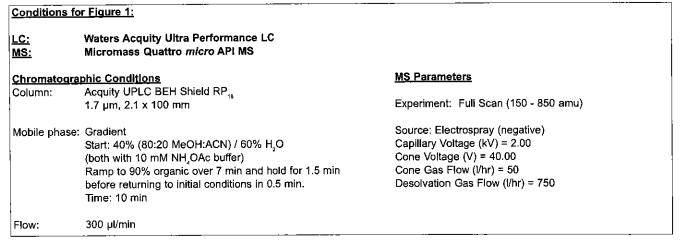
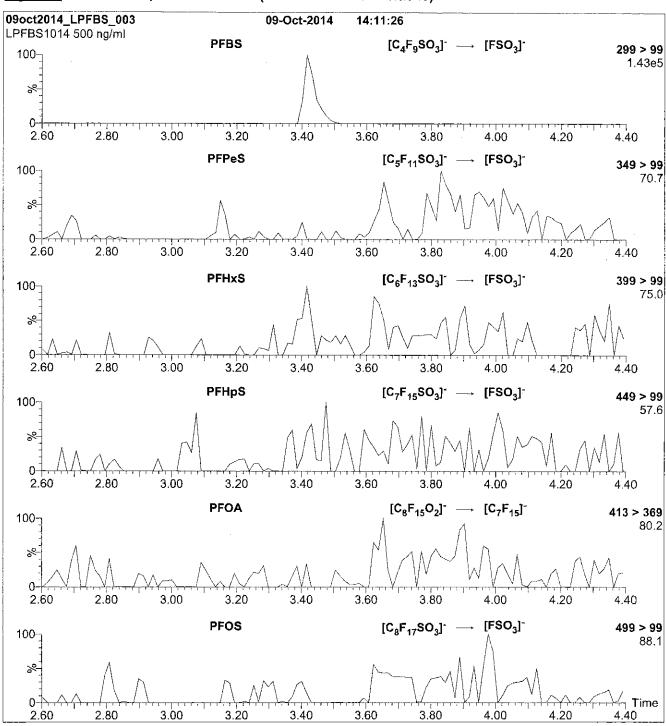
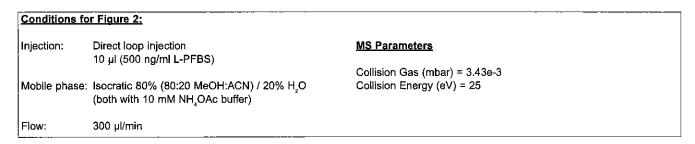


Figure 2: L-PFBS; LC/MS/MS Data (Selected MRM Transitions)





LCPFDA_00003



PRODUCT CODE:

PFDA

LOT NUMBER:

PFDA0613

COMPOUND:

Perfluoro-n-decanoic acid

STRUCTURE:

CAS #:

335-76-2

F F F F F F F F

MOLECULAR FORMULA:

C₁₀HF₁₉O₂

MOLECULAR WEIGHT:

514.08

CONCENTRATION:

 $50 \pm 2.5 \mu g/ml$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

06/19/2013

EXPIRY DATE: (mm/dd/yyyy)

06/19/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.4% PFNA and ~ 0.1% PFOA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

(mm/dd/yyy)

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

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UNCERTAINTY:

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 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

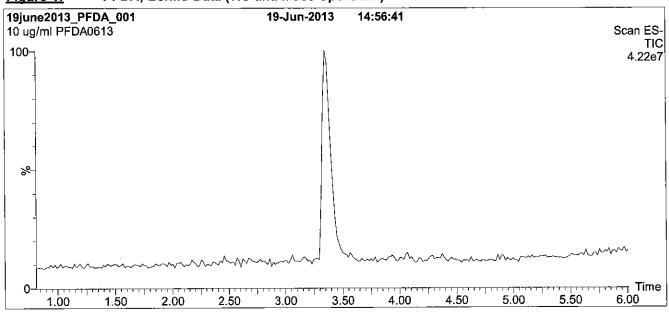
QUALITY MANAGEMENT:

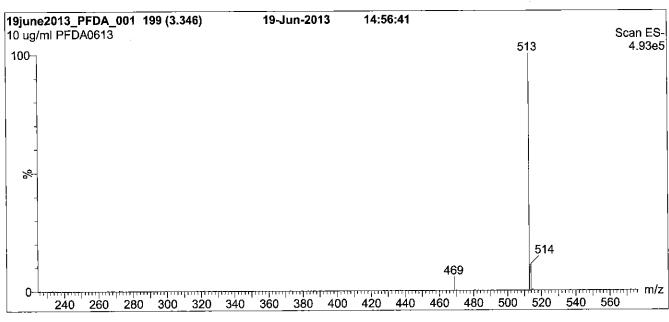
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).





Figure 1: PFDA; LC/MS Data (TIC and Mass Spectrum)





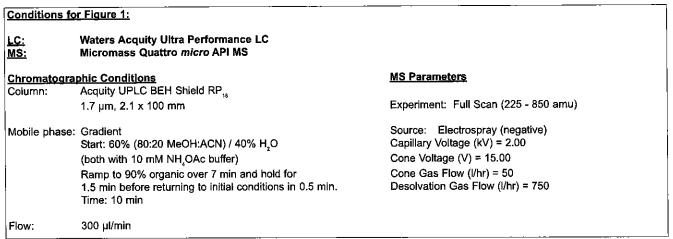
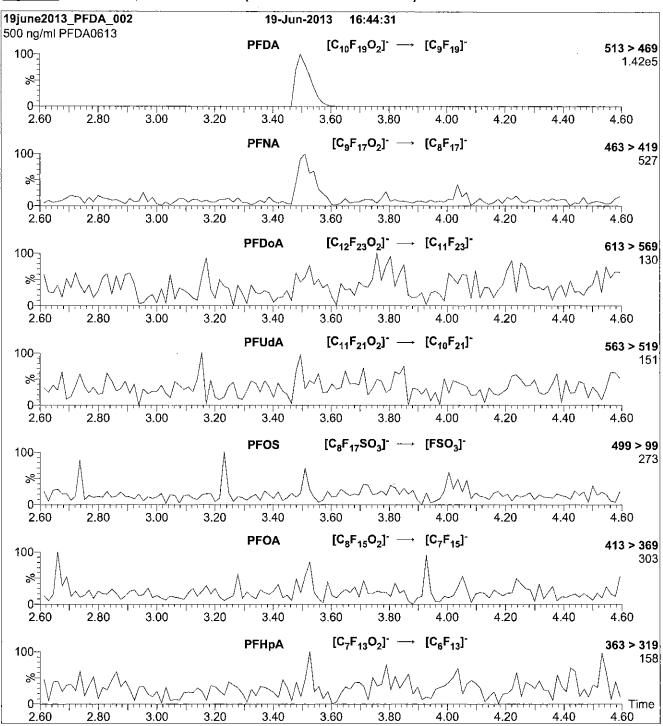
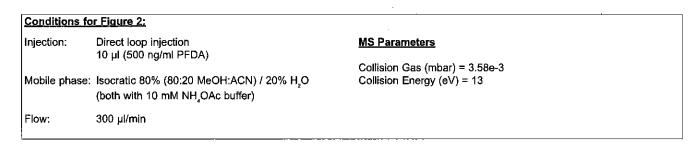


Figure 2: PFDA; LC/MS/MS Data (Selected MRM Transitions)





LCPFDA_00004



PRODUCT CODE:

PFDA

LOT NUMBER:

PFDA0615

COMPOUND:

Perfluoro-n-decanoic acid

STRUCTURE:

CAS #:

335-76-2

MOLECULAR FORMULA:

50 ± 2.5 μg/ml

MOLECULAR WEIGHT:

514.08

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

CONCENTRATION:

>98%

LAST TESTED: (mm/dd/yyyy)

07/02/2015

EXPIRY DATE: (mm/dd/yyyy)

07/02/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.6% PFNA and ~ 0.3% PFOA.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

<u>07/24/2015</u>

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_n(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

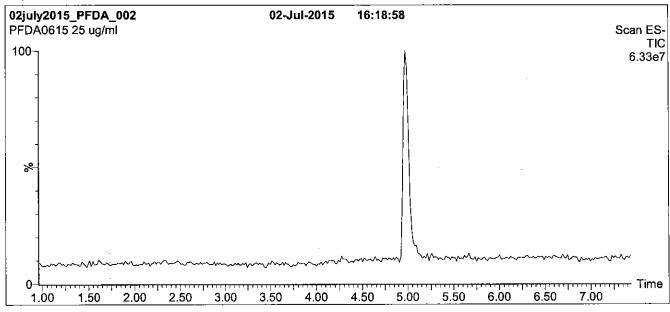
QUALITY MANAGEMENT:

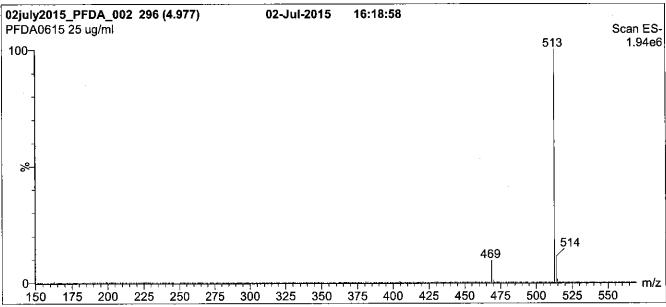
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Figure 1: PFDA; LC/MS Data (TIC and Mass Spectrum)





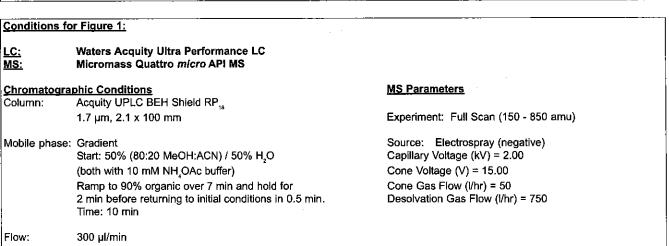
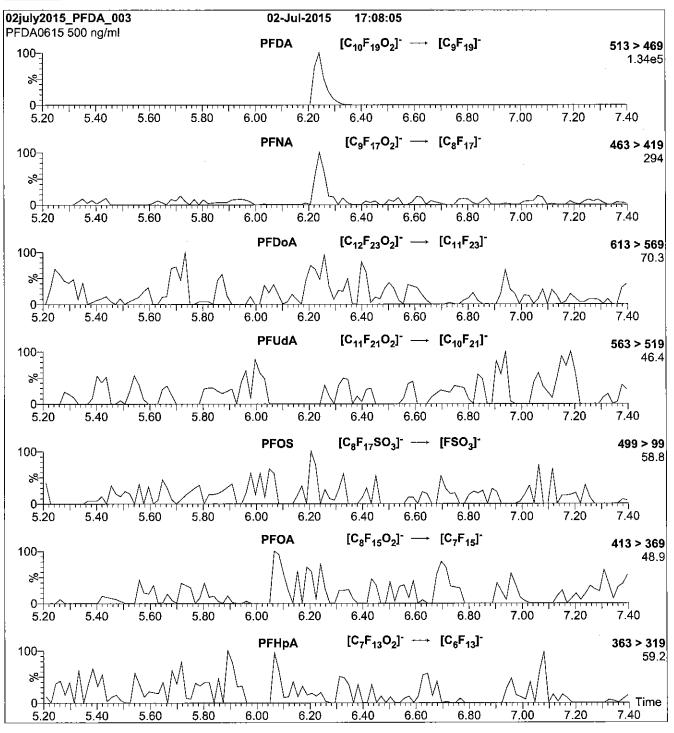


Figure 2: PFDA; LC/MS/MS Data (Selected MRM Transitions)





Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH₄OAc buffer)

Flow: 300 µl/min

Collision Energy (eV) = 13

LCPFDoA_00003



PRODUCT CODE:

PFDoA

LOT NUMBER:

PFDoA0113

COMPOUND:

Perfluoro-n-dodecanoic acid

STRUCTURE:

CAS #:

307-55-1

MOLECULAR FORMULA:

C₁₂HF₂₃O₂

MOLECULAR WEIGHT:

614.10

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

01/03/2013

EXPIRY DATE: (mm/dd/yyyy)

01/03/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

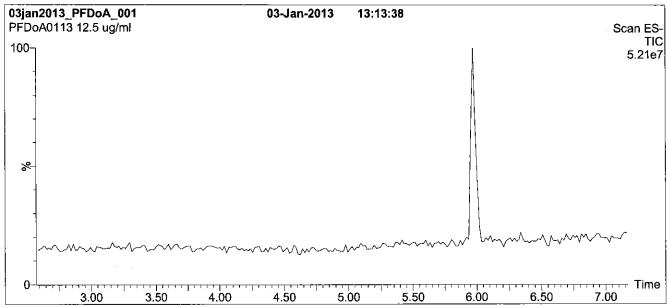
Certified By:

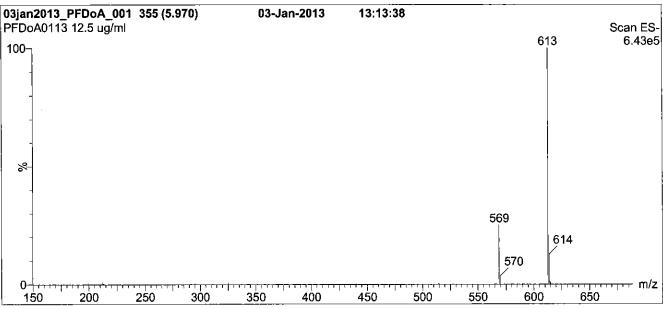
B.G. Chittim

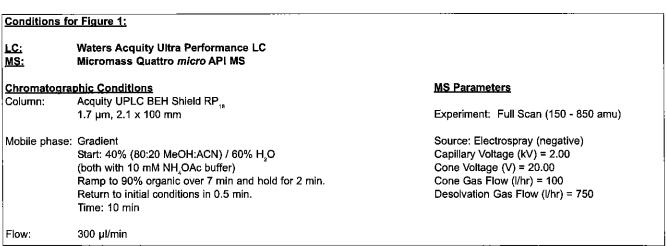
Date: (

)<u>2/01/2013</u>

Figure 1: PFDoA; LC/MS Data (TIC and Mass Spectrum)







LCPFDoA_00004



PRODUCT CODE:

PFDoA

LOT NUMBER:

PFDoA0115

COMPOUND:

Perfluoro-n-dodecanoic acid

CAS #:

307-55-1

STRUCTURE:

MOLECULAR FORMULA:

C,2HF,3O,2

MOLECULAR WEIGHT:

614.10

CONCENTRATION:

50 ± 2.5 μg/ml

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

01/30/2015

EXPIRY DATE: (mm/dd/yyyy)

01/30/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

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HAZARDS:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

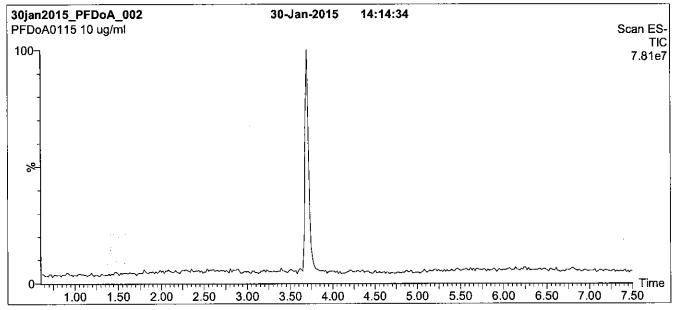
QUALITY MANAGEMENT:

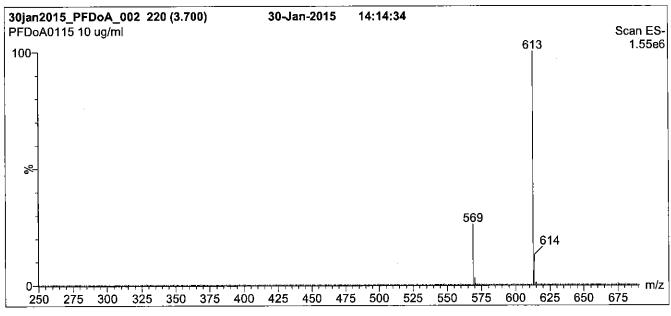
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: PFDoA; LC/MS Data (TIC and Mass Spectrum)





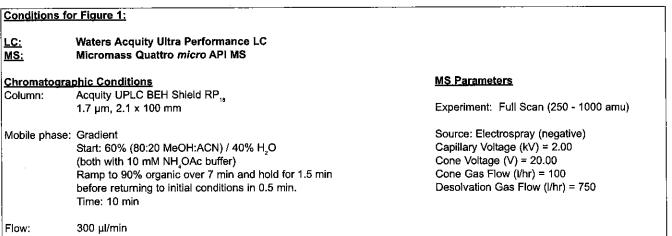
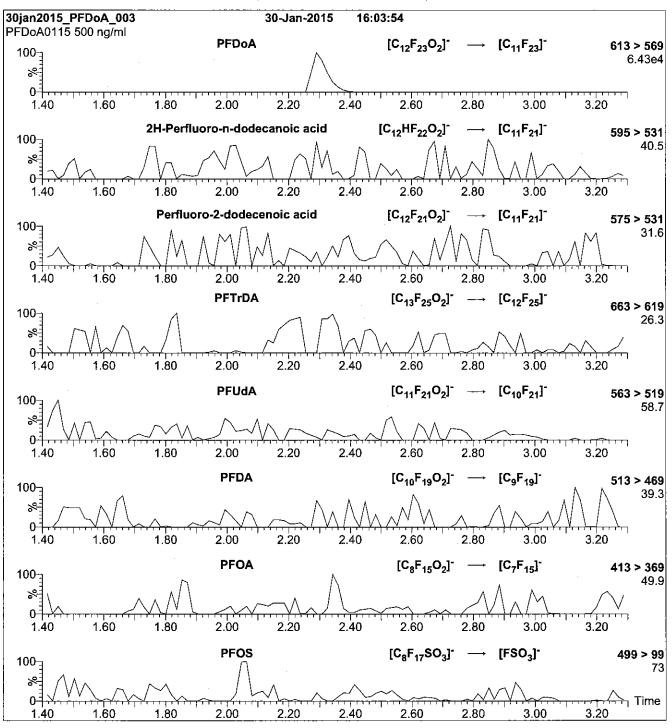
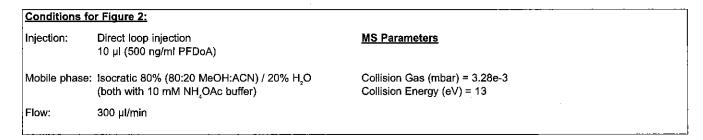


Figure 2: PFDoA; LC/MS/MS Data (Selected MRM Transitions)





LCPFDS_00005

ID: LCPFDS_00005 Exp: 07/02/20 Ppd: CBW PF-1-decanesulfonate sodi



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

L-PFDS

LOT NUMBER:

LPFDS0615

COMPOUND:

Sodium perfluoro-1-decanesulfonate

STRUCTURE:

CAS #:

2806-15-7

MOLECULAR FORMULA:

C₁₀F₂₁SO₃Na

MOLECULAR WEIGHT:

622.13

CONCENTRATION:

 $50.0 \pm 2.5 \,\mu g/ml$ (Na salt)

 $48.2 \pm 2.4 \mu g/ml$ (PFDS anion)

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

07/02/2015

EXPIRY DATE: (mm/dd/yyyy)

07/02/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains ~ 0.9% of sodium perfluoro-1-dodecanesulfonate (L-PFDoS).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: 12/07/2015

(mm/dd/www)

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the Identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_i(y)$, of a value y and the uncertainty of the independent parameters

 $x_4, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

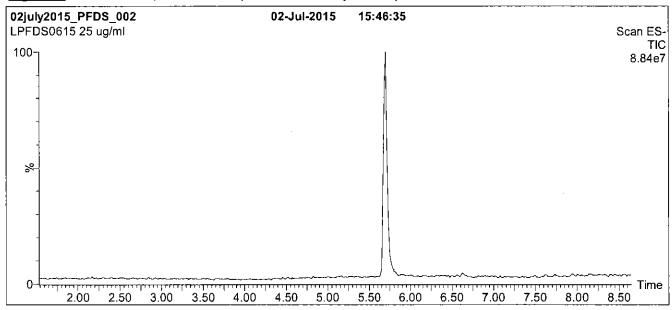
QUALITY MANAGEMENT:

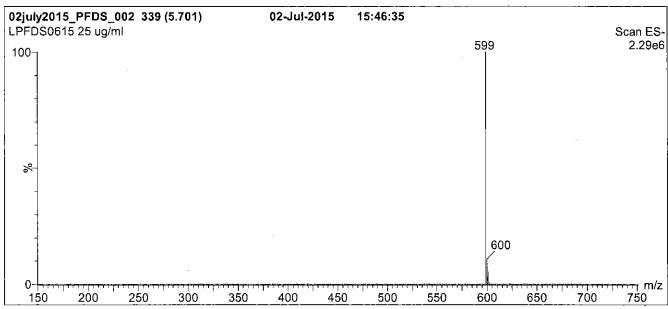
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Figure 1: L-PFDS; LC/MS Data (TIC and Mass Spectrum)





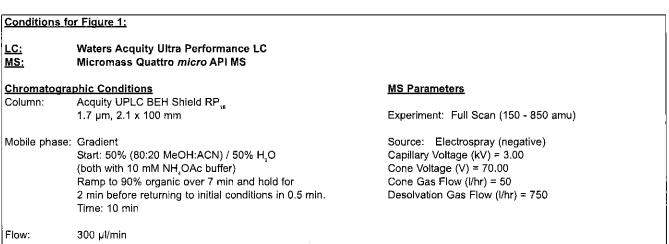
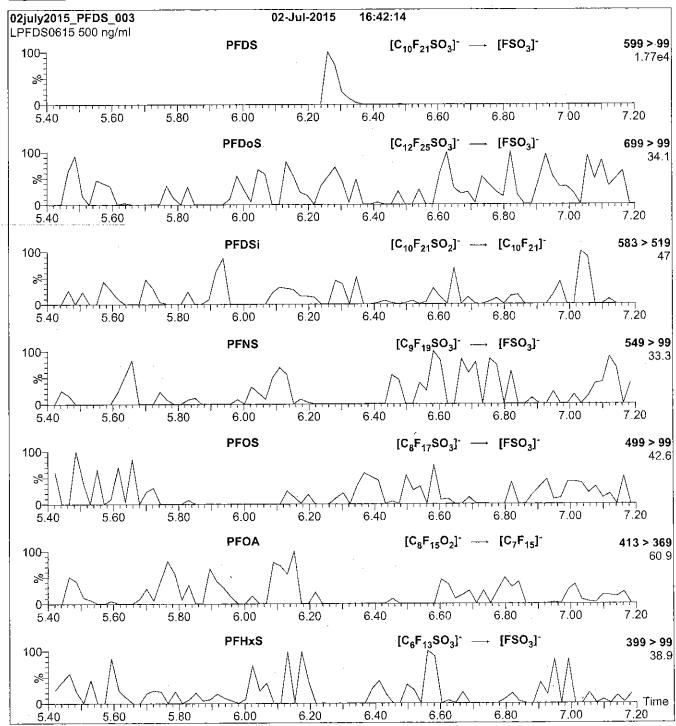
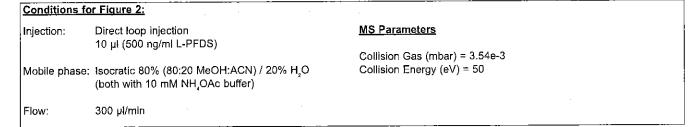


Figure 2: L-PFDS; LC/MS/MS Data (Selected MRM Transitions)





LCPFHpA_00004



PRODUCT CODE:

PFHpA

LOT NUMBER:

PFHpA0514

COMPOUND:

Perfluoro-n-heptanoic acid

CAS #:

375-85-9

STRUCTURE:

F F F F F

MOLECULAR FORMULA:

C,HF₁₃O₂

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

MOLECULAR WEIGHT:

364.06

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

05/09/2014

EXPIRY DATE: (mm/dd/yyyy)

05/09/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

05/22/2014

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_{c}(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_{c}(y(x_{1}, x_{2}, ..., x_{n})) = \sqrt{\sum_{i=1}^{n} u(y, x_{i})^{2}}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

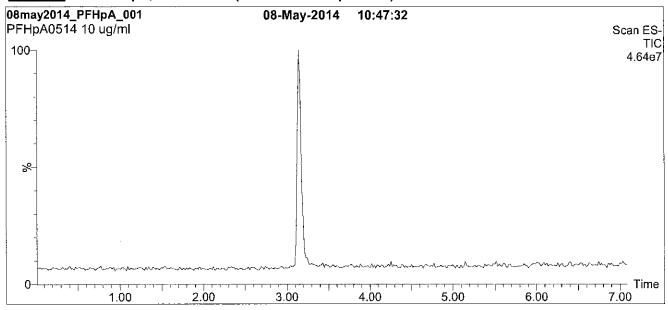
QUALITY MANAGEMENT:

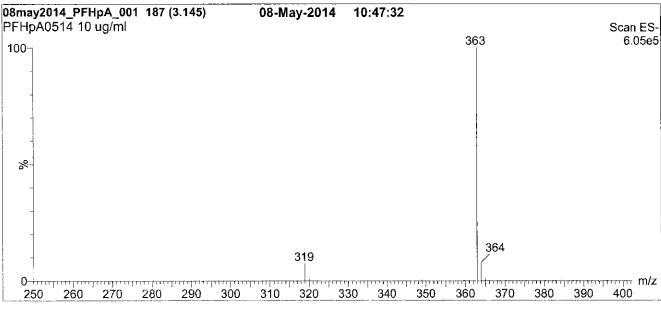
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).





Figure 1: PFHpA; LC/MS Data (TIC and Mass Spectrum)





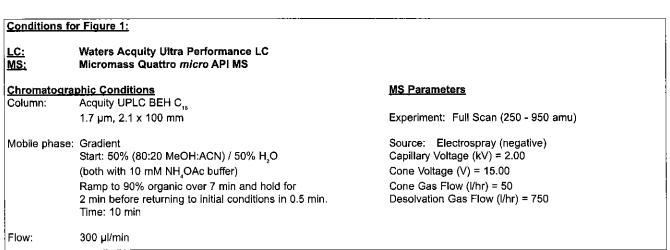
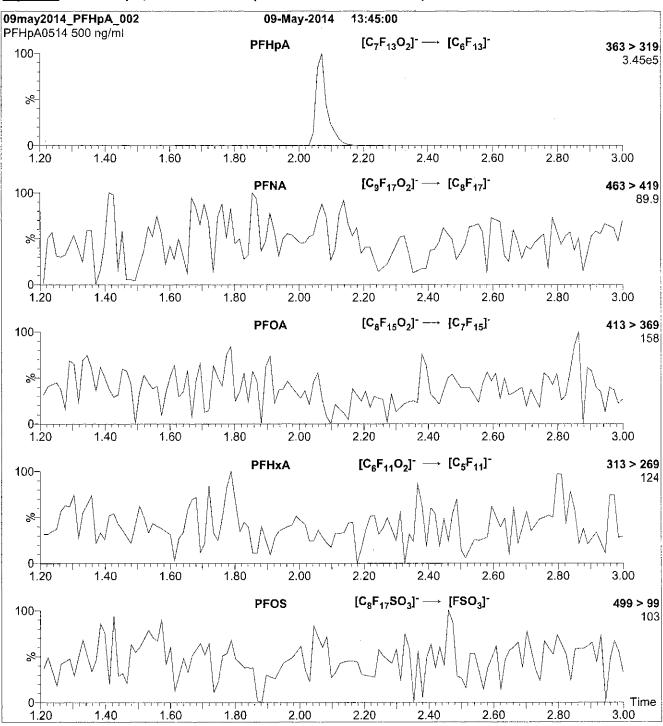
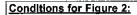


Figure 2: PFHpA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml PFHpA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH₂OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.24e-3 Collision Energy (eV) = 11

LCPFHpA_00005



xp: 01/22/21 Prpd: CBW PF-n-heptanoic acid R: 4/7/16 CBW



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFHpA

LOT NUMBER:

PFHpA0116

COMPOUND:

Perfluoro-n-heptanoic acid

CAS #:

375-85-9

STRUCTURE:

MOLECULAR FORMULA:

C,HF,O2

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

MOLECULAR WEIGHT:

364.06

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

01/22/2016

EXPIRY DATE: (mm/dd/yyyy)

01/22/2021

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TiC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 02/02/2016

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON 'N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

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UNCERTAINTY:

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The combined relative standard uncertainty, $u_c(y)$, of a value y and the uncertainty of the independent parameters

 $X_1, X_2, ... X_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the fisted analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

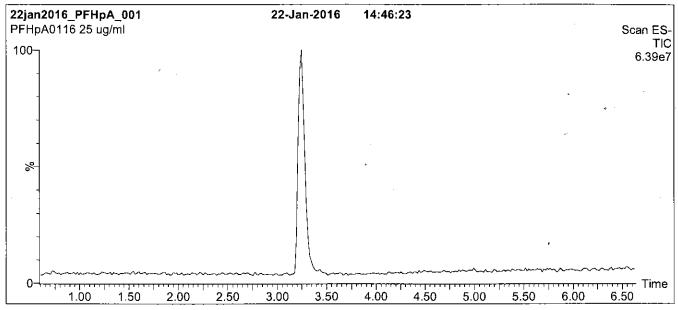
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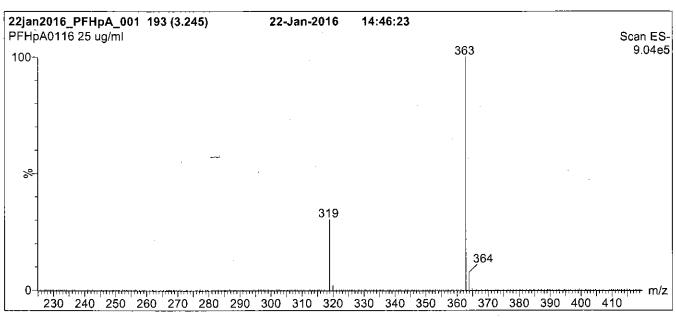




For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: PFHpA; LC/MS Data (TIC and Mass Spectrum)





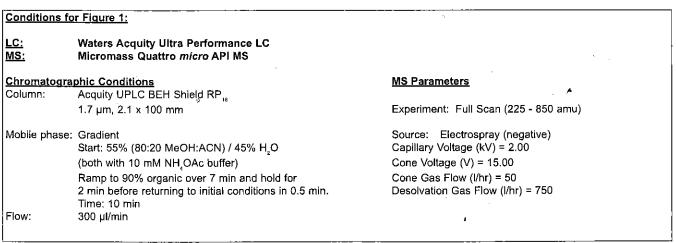
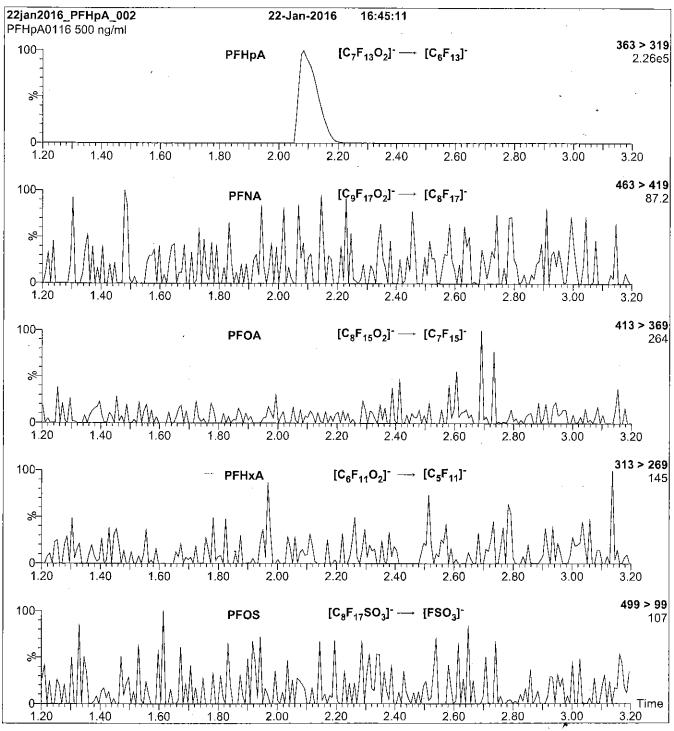
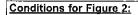


Figure 2: PFHpA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml PFHpA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH₂OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.50e-3 Collision Energy (eV) = 11

LCPFHxA_00003



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFHxA

LOT NUMBER:

PFHxA0514

COMPOUND:

Perfluoro-n-hexanoic acid

STRUCTURE:

CAS #:

307-24-4

MOLECULAR FORMULA:

C₆HF₁₁O₂

MOLECULAR WEIGHT:

314.05

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

05/09/2014

EXPIRY DATE: (mm/dd/yyyy)

05/09/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

15/22/2014

(mm/dd/yyyy

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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UNCERTAINTY:

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$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

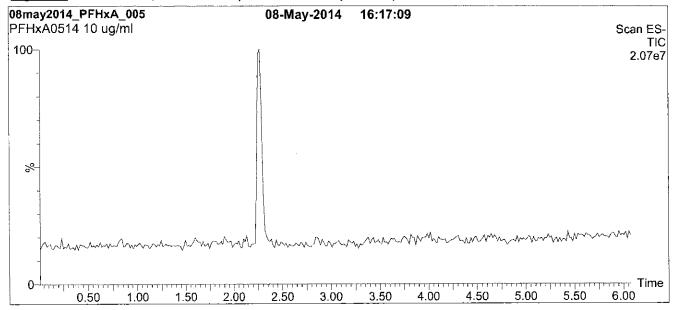
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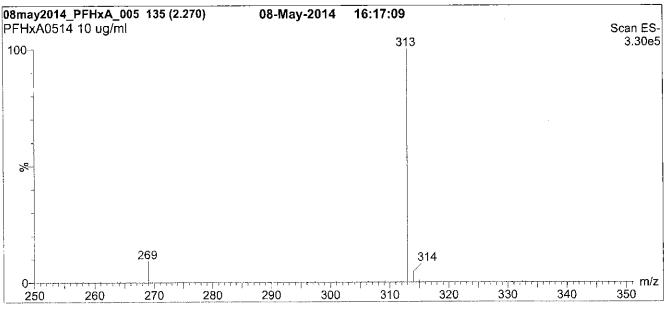




For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: PFHxA; LC/MS Data (TIC and Mass Spectrum)





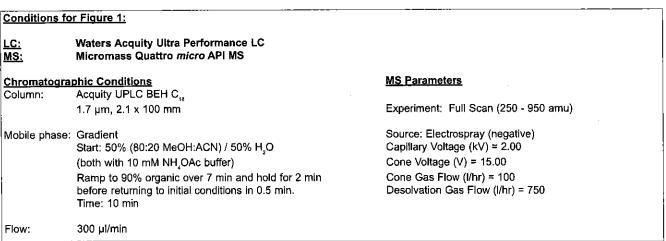
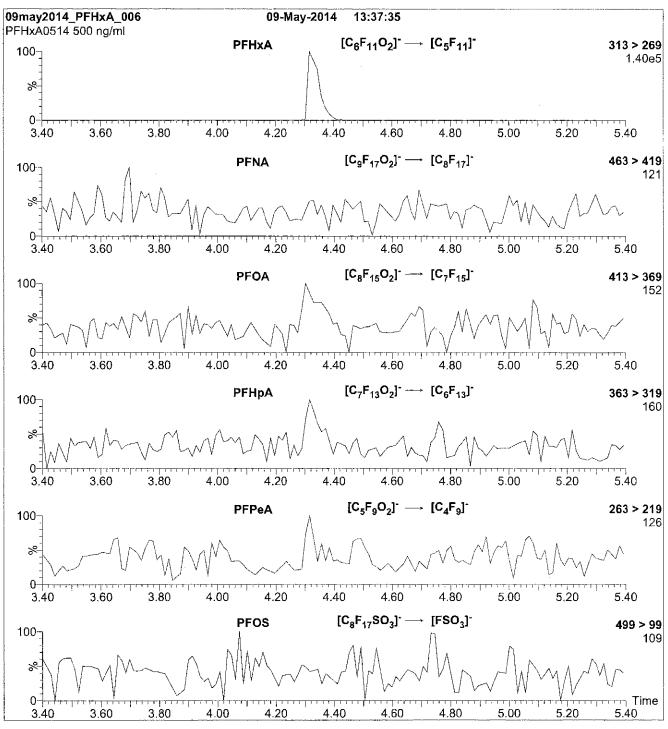
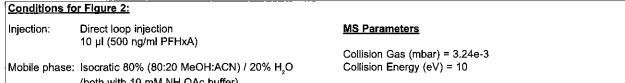


Figure 2: PFHxA; LC/MS/MS Data (Selected MRM Transitions)





(both with 10 mM NH,OAc buffer)

300 µl/min Flow:

LCPFHxA_00004

Exp.: 12/22/20 Prpd: CBW PF-n-hexanoic acid

ELLINGTON BORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFHxA

LOT NUMBER:

PFHxA1215

COMPOUND:

Perfluoro-n-hexanoic acid

STRUCTURE:

CAS #:

307-24-4

C,HF,O,

MOLECULAR WEIGHT:

314.05

CONCENTRATION:

MOLECULAR FORMULA:

 $50 \pm 2.5 \,\mu g/ml$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

12/22/2015

EXPIRY DATE: (mm/dd/yyyy)

12/22/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.2% of Perfluoro-n-pentanoic acid (PFPeA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 12/23/2015

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_{\varepsilon}(y)$, of a value y and the uncertainty of the independent parameters

 $X_1, X_2,...X_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

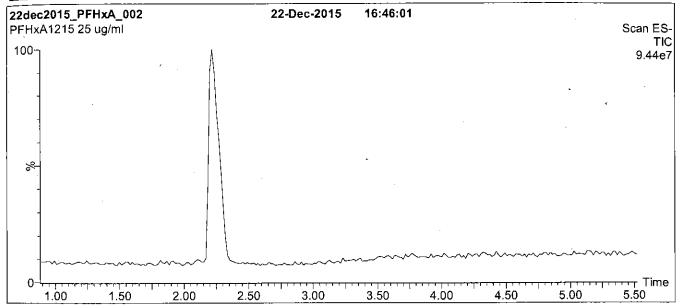
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

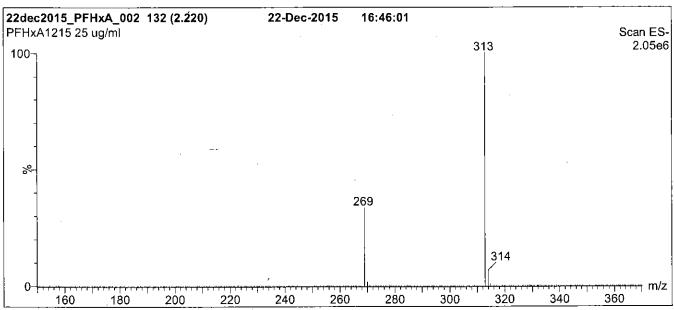




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Figure 1: PFHxA; LC/MS Data (TIC and Mass Spectrum)





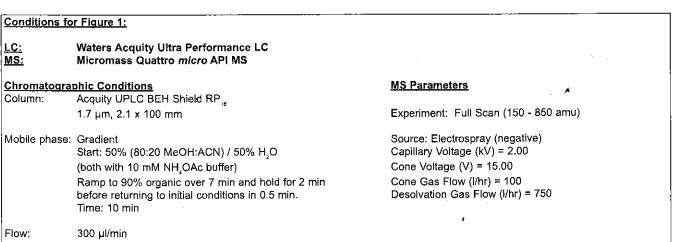
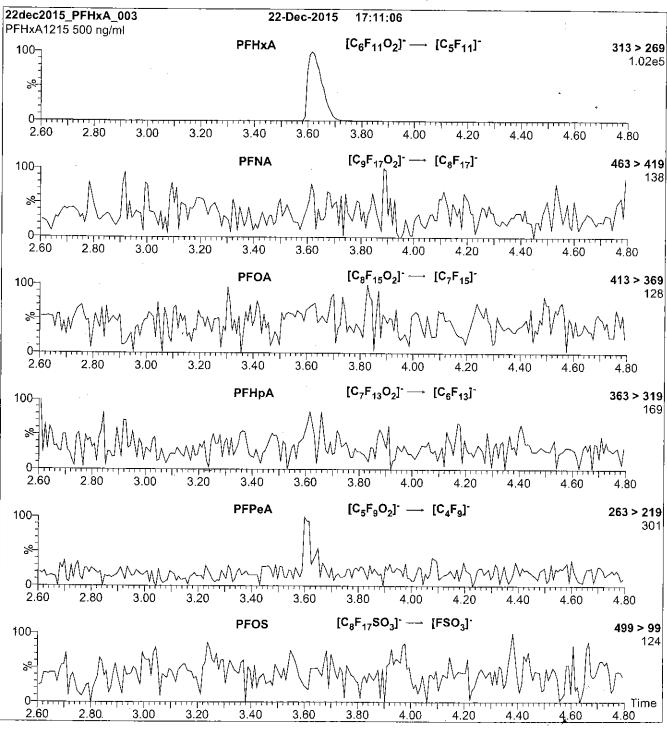
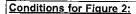


Figure 2: PFHxA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml PFHxA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3 Collision Energy (eV) = 10

LCPFHxS-br_00001





CERTIFICATE OF ANALYSIS DOCUMENTATION

br-PFHxSK

Potassium Perfluorohexanesulfonate Solution/Mixture of Linear and Branched Isomers

PRODUCT CODE:

br-PFHxSK

LOT NUMBER:

brPFHxSK0615

CONCENTRATION:

50.0 ± 2.5 μg/ml (total potassium salt)

45.5 ± 2.3 μg/ml (total PFHxS anion)

SOLVENT(S):

Methanol

DATE PREPARED: (mm/dd/yyyy)

06/29/2015

LAST TESTED: (mm/dd/yyyy)

07/03/2015

EXPIRY DATE: (mm/dd/yyyy)

07/03/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DESCRIPTION:

The chemical purity has been determined to be ≥98% perfluorohexanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the identified isomeric components are given in Table A.

DOCUMENTATION/ DATA ATTACHED:

Table A: Isomeric Components and Percent Composition by 19F-NMR

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS Data

Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

• Contains ~ 0.5% of perfluoro-1-pentanesulfonate and ~ 0.2% of perfluoro-1-octanesulfonate.

CAS#: 3871-99-6 (for linear isomer; potassium salt).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

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HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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where x is expressed as a relative standard uncertainty of the individual parameter.

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TRACEABILITY:

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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Table A: br-PFHxSK; Isomeric Components and Percent Composition (by 19F-NMR)*

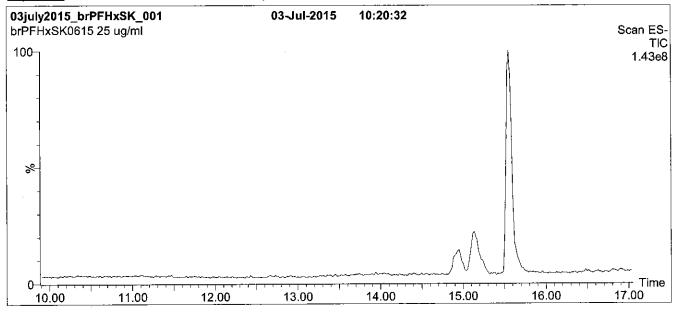
Isomer	Name	Structure	Percent Composition by ¹⁹ F-NMR
1	Potassium perfluoro-1-hexanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ -K+	81.1
2	Potassium 1-trifluoromethylperfluoropentanesulfonate**	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ -K ⁺ CF ₃	2.9
3	Potassium 2-trifluoromethylperfluoropentanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ -K⁺ CF ₃	1.4
4	Potassium 3-trifluoromethylperfluoropentanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ -K+ CF ₃	5.0
5	Potassium 4-trifluoromethylperfluoropentanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ ·K ⁺ CF ₃	8.9
6	Potassium 3,3-di(trifluoromethyl)perfluorobutanesulfonate	CF ₃ CF ₃ CCF ₂ CF ₂ SO ₃ -K ⁺ CF ₃	0.2
7	Other Unidentified Isomers		0.5

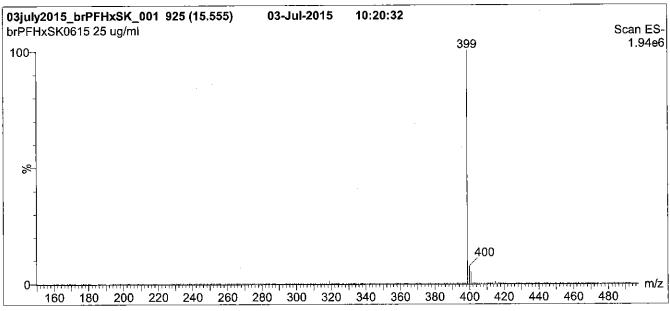
Percent of total perfluorohexanesulfonate isomers only.
 Systematic Name: Potassium perfluorohexane-2-sulfonate.

Certified By:

Date: 07/15/

Figure 1: br-PFHxSK; LC/MS Data (TIC and Mass Spectrum)





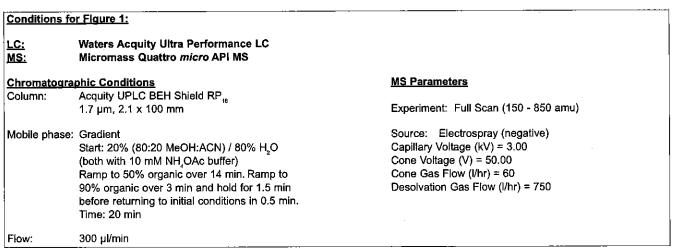
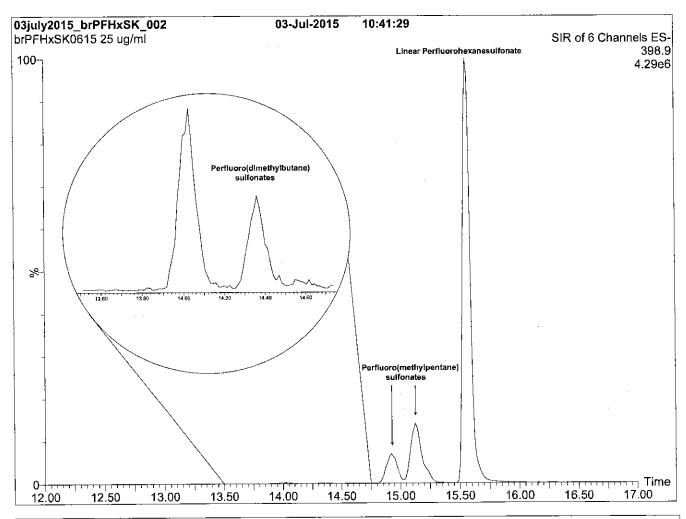


Figure 2: br-PFHxSK; LC/MS Data



Conditions for Figure 2:

LC:

MS:

Waters Acquity Ultra Performance LC Micromass Quattro *micro* API MS

Chromatographic Conditions

Column:

Acquity UPLC BEH Shield RP,

1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient

Start: 20% (80:20 MeOH:ACN) / 80% H₂O

(both with 10 mM NH₄OAc buffer) Ramp to 50% organic over 14 min. Ramp to 90% organic over 3 min and hold for 1.5 min before returning to initial conditions in 0.5 min.

Time: 20 min

Flow:

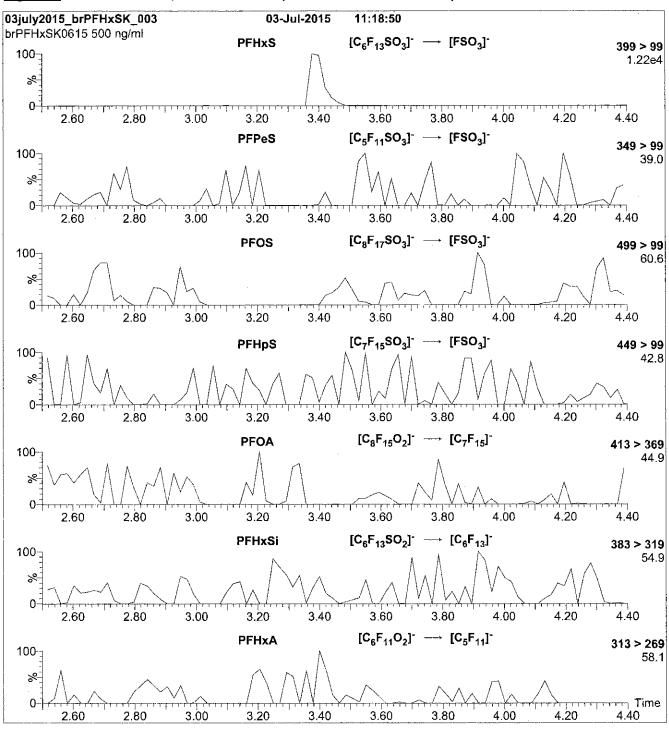
300 µl/min

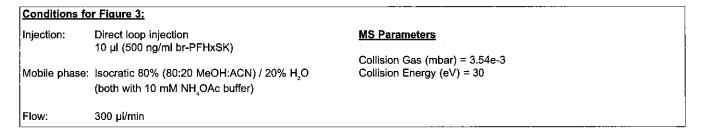
MS Parameters

Experiment: SIR (6 channels)

Source: Electrospray (negative) Capillary Voltage (kV) = 3.00 Cone Voltage (V) = 50.00 Cone Gas Flow (l/hr) = 60 Desolvation Gas Flow (l/hr) = 750

Figure 3: br-PFHxSK; LC/MS/MS Data (Selected MRM Transitions)





LCPFNA 00004

: 8



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFNA

LOT NUMBER:

PFNA0514

COMPOUND:

Perfluoro-n-nonanoic acid

STRUCTURE:

CAS #:

375-95-1

F F F F F F

MOLECULAR FORMULA:

 $C_9HF_{17}O_2$

CONCENTRATION:

 $50 \pm 2.5 \mu g/ml$

MOLECULAR WEIGHT:

464.08

SOLVENT(\$):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

05/09/2014

EXPIRY DATE: (mm/dd/yyyy)

05/09/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

 Contains ~ 0.1% of perfluoro-n-octanoic acid (PFOA) and < 0.1% of perfluoro-n-heptanoic acid (PFHpA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

<u>05/22/2014</u>

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

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SYNTHESIS / CHARACTERIZATION:

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

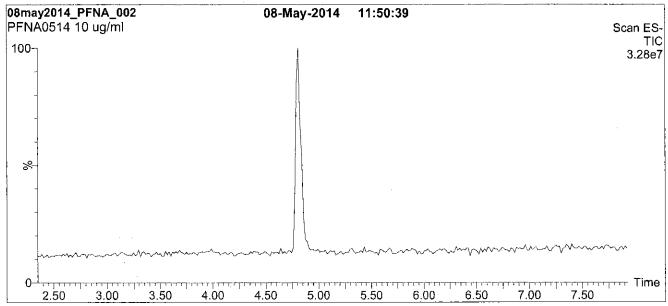
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

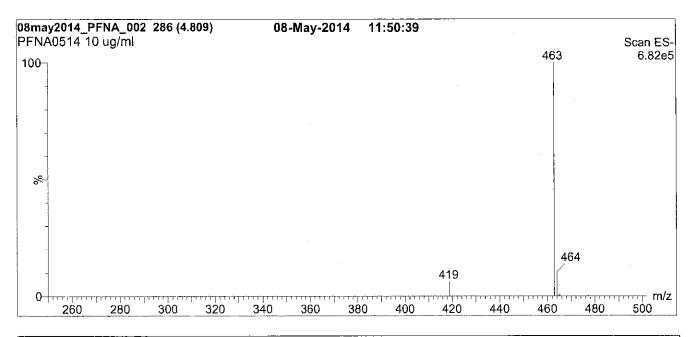




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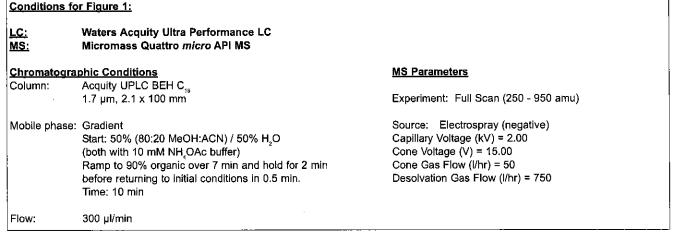
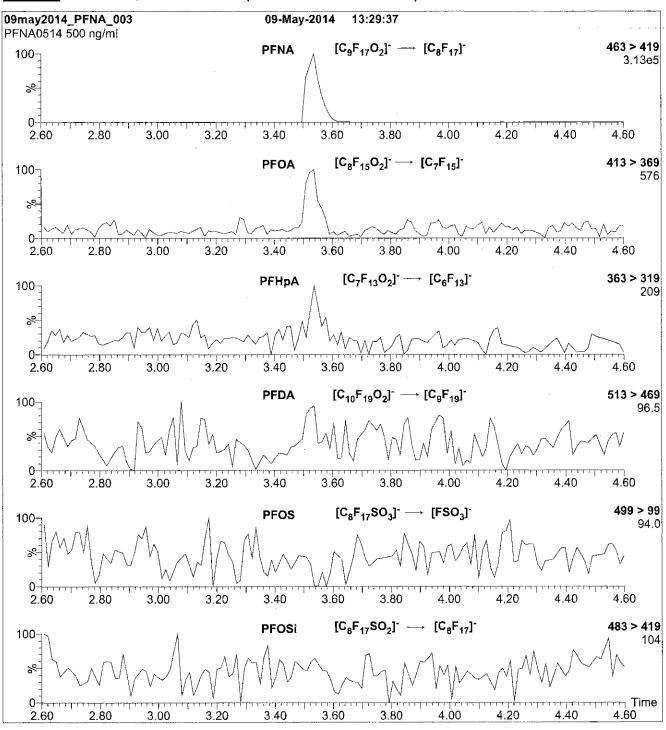
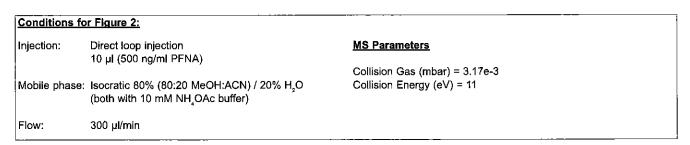


Figure 2: PFNA; LC/MS/MS Data (Selected MRM Transitions)





LCPFNA_00005

Exp: 10/23/20 Prpd: CBW

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFNA

LOT NUMBER:

PFNA1015

COMPOUND:

Perfluoro-n-nonanoic acid

STRUCTURE:

CAS #:

375-95-1

F F F F F F F

MOLECULAR FORMULA:

 $C_9HF_{17}O_2$

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

MOLECULAR WEIGHT:

464.08

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

10/23/2015

EXPIRY DATE: (mm/dd/yyyy)

10/23/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

 Contains ~ 0.1% of perfluoro-n-octanoic acid (PFOA) and < 0.1% of perfluoro-n-heptanoic acid (PFHpA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

(mm/ddhaan)

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

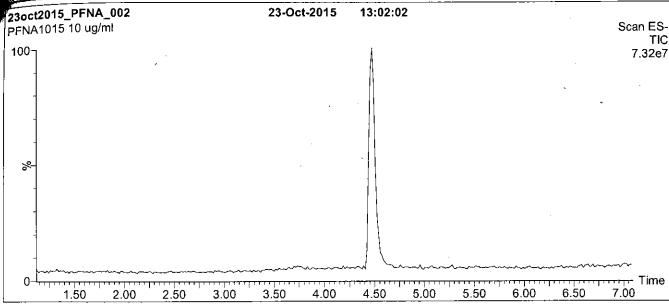
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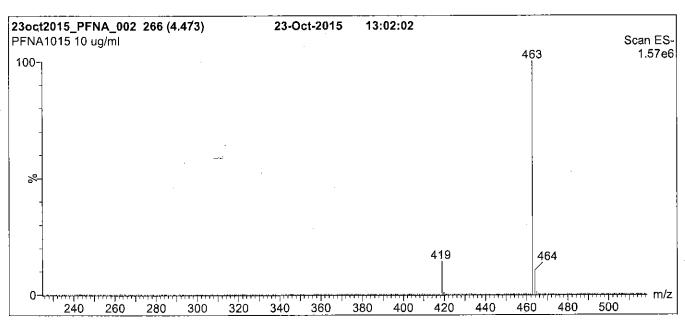




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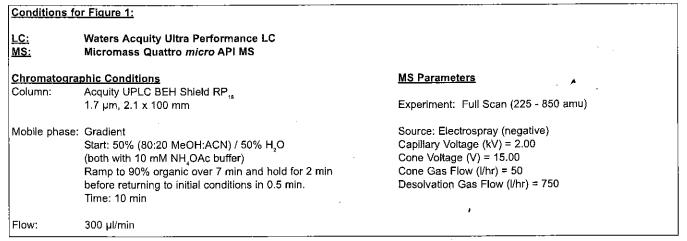
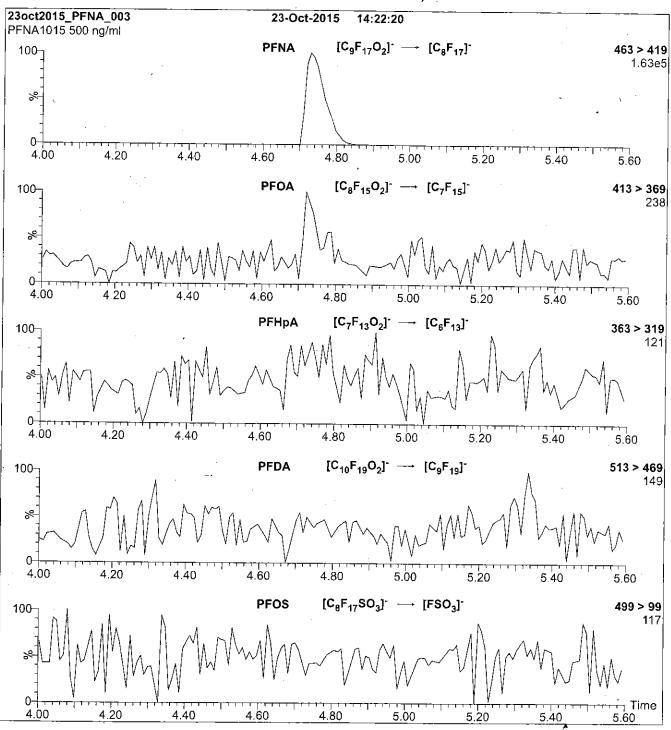
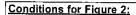


Figure 2: PFNA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 µI (500 ng/ml PFNA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3 Collision Energy (eV) ≈ 11

LCPFNS_00002



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

L-PFNS

LOT NUMBER:

LPFNS0712

COMPOUND:

Sodium perfluoro-1-nonanesulfonate

STRUCTURE:

CAS #:

98789-57-2

MOLECULAR FORMULA:

C_aF₁₉SO₃Na

MOLECULAR WEIGHT:

572.12

CONCENTRATION:

 $50.0 \pm 2.5 \mu \text{g/ml}$ (Na salt)

 $48.0 \pm 2.4 \mu g/ml$ (PFNS anion)

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

07/04/2012

EXPIRY DATE: (mm/dd/yyyy)

07/04/2017

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 01/15/2013

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

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The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_{x}(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

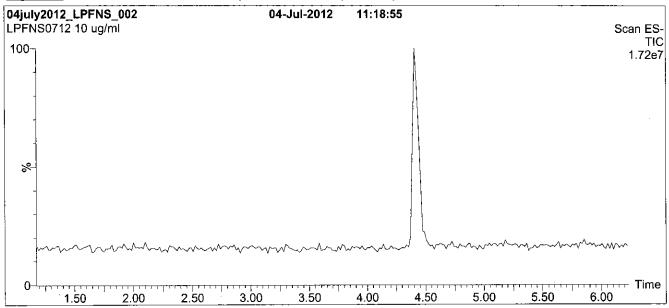
QUALITY MANAGEMENT:

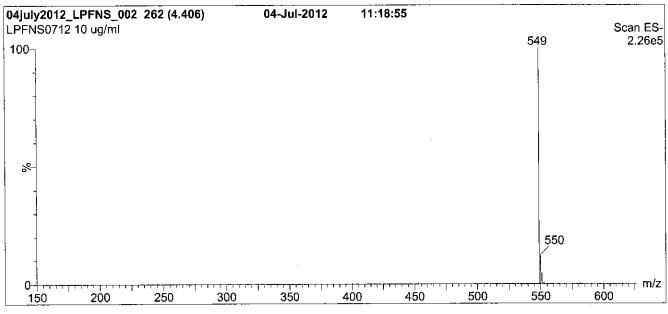
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).





Figure 1: L-PFNS; LC/MS Data (TIC and Mass Spectrum)





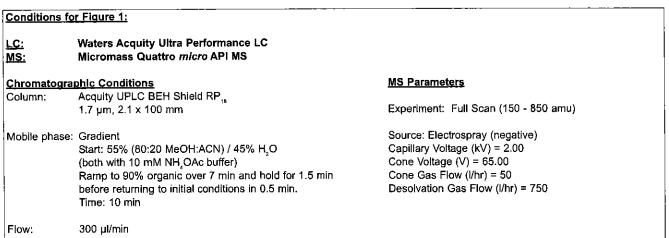
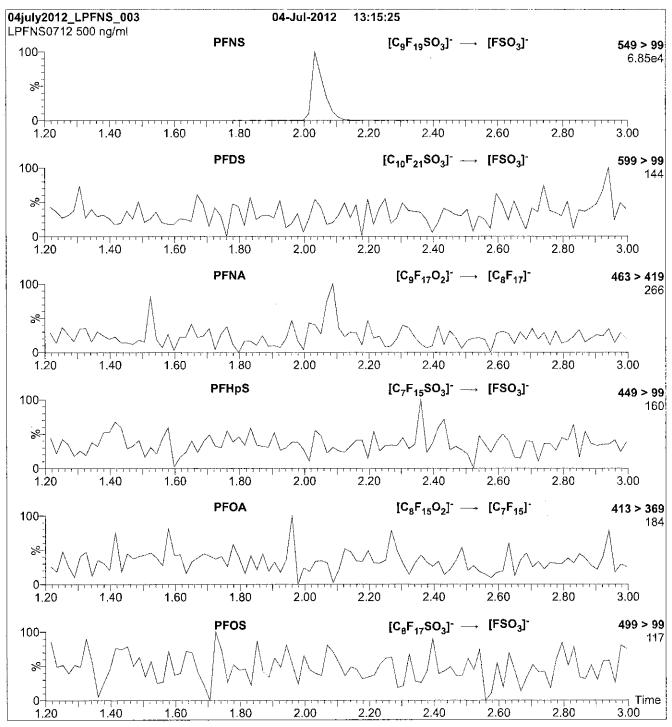
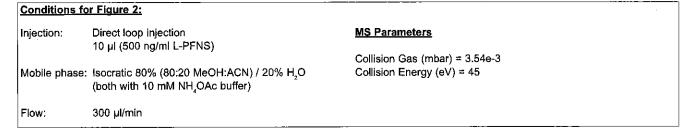


Figure 2: L-PFNS; LC/MS/MS Data (Selected MRM Transitions)





LCPFOA_00004



PRODUCT CODE:

PFOA

LOT NUMBER:

PFOA1013

COMPOUND:

Perfluoro-n-octanoic acid

STRUCTURE:

CAS #:

335-67-1

MOLECULAR FORMULA: CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

MOLECULAR WEIGHT:

414.07

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

10/11/2013

EXPIRY DATE: (mm/dd/yyyy)

10/11/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: 10

(mm/dd/vyyy)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

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LIMITED WARRANTY:

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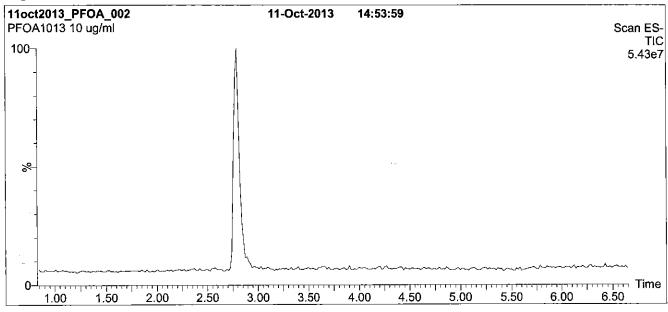
QUALITY MANAGEMENT:

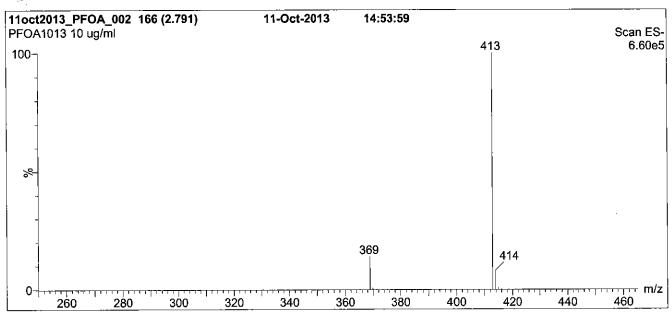
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).





Figure 1: PFOA; LC/MS Data (TIC and Mass Spectrum)





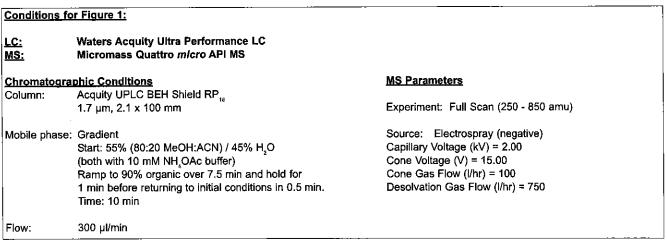
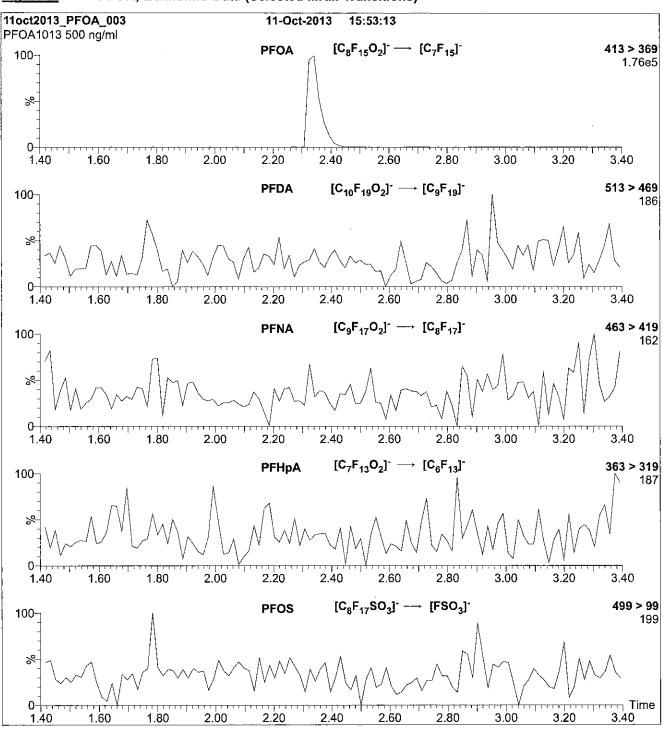
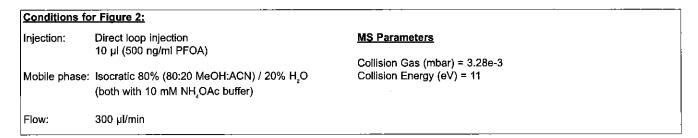


Figure 2: PFOA; LC/MS/MS Data (Selected MRM Transitions)





LCPFOA_00005



PRODUCT CODE:

PFOA

LOT NUMBER:

PFOA1115

COMPOUND:

Perfluoro-n-octanoic acid

STRUCTURE:

CAS #:

335-67-1

MOLECULAR FORMULA:

C, HF, O,

CONCENTRATION:

50 ± 2.5 µg/ml

MOLECULAR WEIGHT:

414.07

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

11/06/2015

EXPIRY DATE: (mm/dd/yyyy)

11/06/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

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UNCERTAINTY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

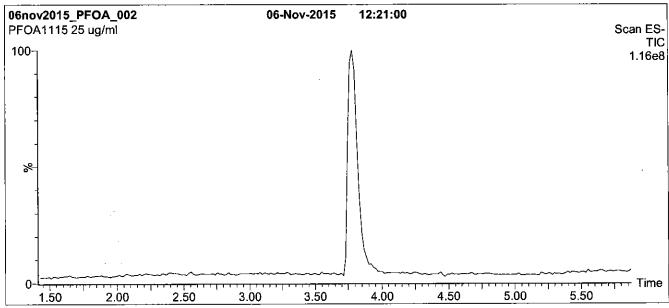
QUALITY MANAGEMENT:

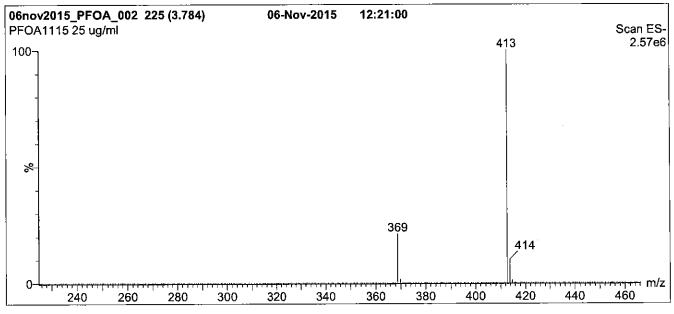
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: PFOA; LC/MS Data (TIC and Mass Spectrum)





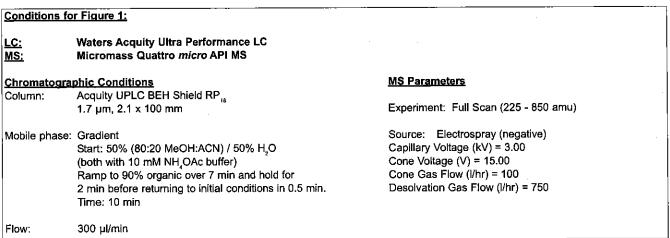
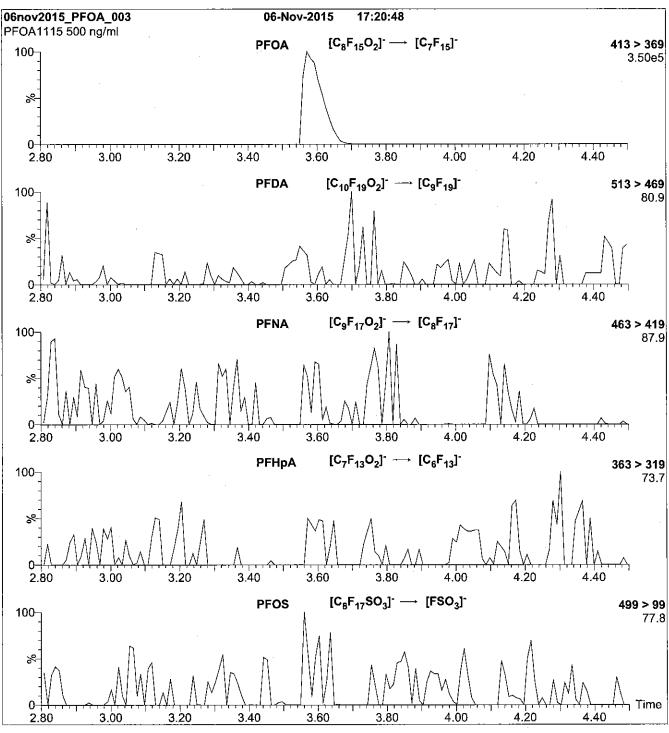
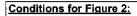


Figure 2: PFOA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 µl (500 ng/ml PFOA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH₄OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.17e-3 Collision Energy (eV) = 10

LCPFODA 00004



PRODUCT CODE:

PFODA

LOT NUMBER:

PFODA0807

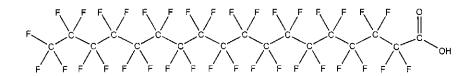
COMPOUND:

Perfluoro-n-octadecanoic acid

STRUCTURE:

CAS #:

16517-11-6



MOLECULAR FORMULA:

C18HF36O2

 $50 \pm 2.5 \,\mu g/ml$

MOLECULAR WEIGHT:

914.15

SOLVENT(S):

Methanol

Water (4%)

CHEMICAL PURITY:

CONCENTRATION:

>98%

LAST TESTED: (mm/dd/yyyy)

04/25/2014

EXPIRY DATE: (mm/dd/yyyy)

04/25/2017

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

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ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

04/28/2014

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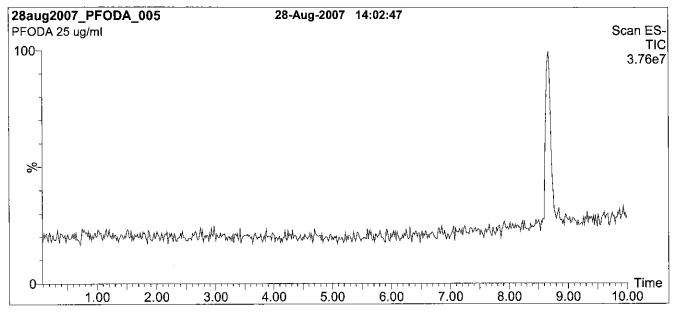
QUALITY MANAGEMENT:

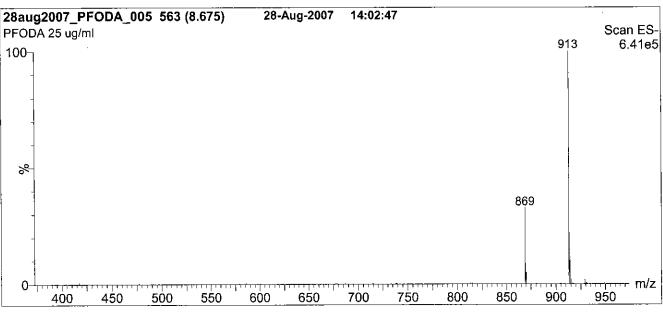
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Figure 1: PFODA; LC/MS Data (TIC and Mass Spectrum)





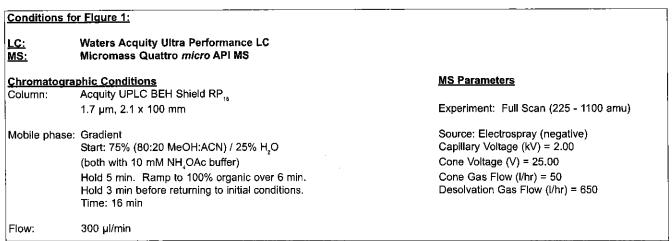
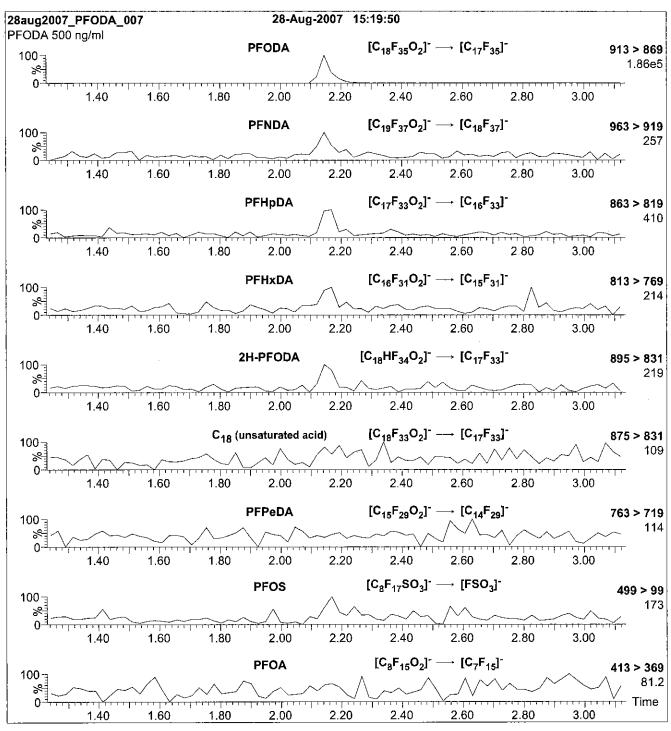
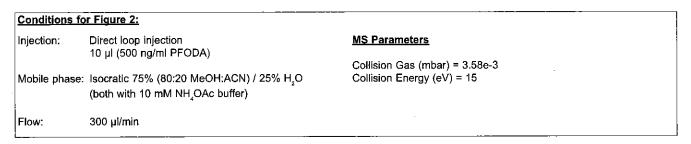


Figure 2: PFODA; LC/MS/MS Data (Selected MRM Transitions)





LCPFODA_00005

PRODUCT CODE:

PFODA

LOT NUMBER:

PFODA0115

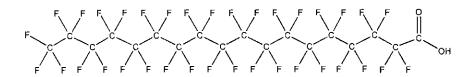
COMPOUND:

Perfluoro-n-octadecanoic acid

STRUCTURE:

CAS #:

16517-11-6



MOLECULAR FORMULA:

C, HF, O,

 $50 \pm 2.5 \,\mu g/ml$

MOLECULAR WEIGHT:

914.14

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

CONCENTRATION:

>98%

LAST TESTED: (mm/dd/yyyy)

01/30/2015

EXPIRY DATE: (mm/dd/yyyy)

01/30/2020

RECOMMENDED STORAGE:

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DOCUMENTATION/ DATA ATTACHED:

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ADDITIONAL INFORMATION:

See page 2 for further details.

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LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

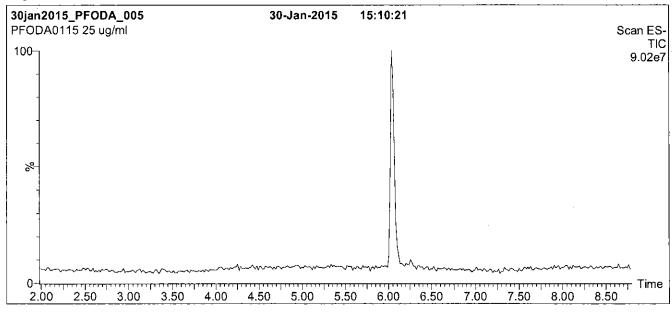
QUALITY MANAGEMENT:

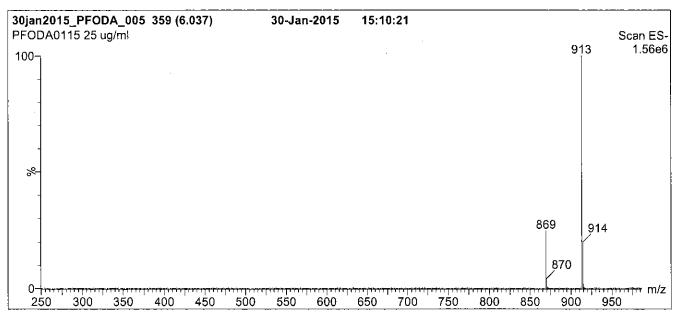
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).





Figure 1: PFODA; LC/MS Data (TIC and Mass Spectrum)





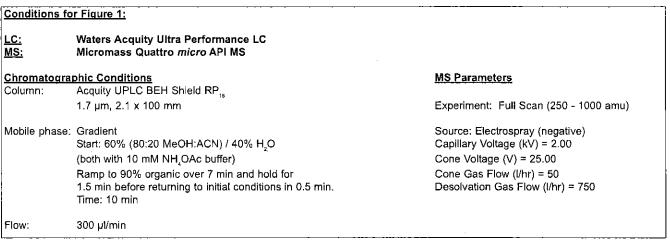
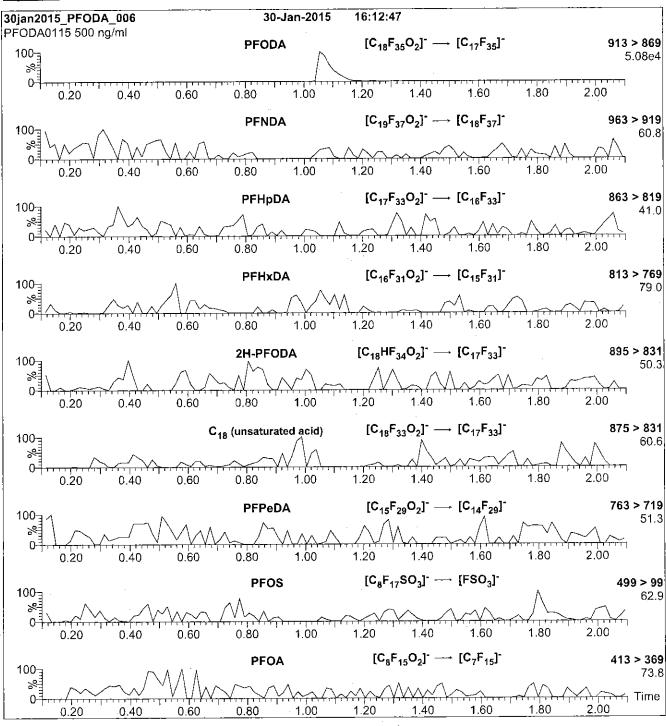
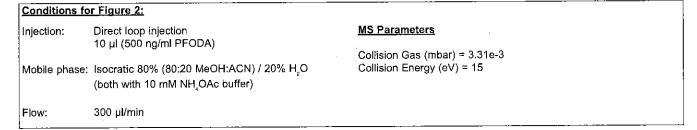


Figure 2: PFODA; LC/MS/MS Data (Selected MRM Transitions)





LCPFOS-br_00001



br-PFOSK

Potassium Perfluorooctanesulfonate Solution/Mixture of Linear and Branched Isomers

PRODUCT_CODE:

br-PFOSK

LOT NUMBER:

brPFOSK1015

CONCENTRATION:

 $50 \pm 2.5 \mu g/ml$ (total potassium salt)

 $46.4 \pm 2.3 \,\mu\text{g/ml}$ (total PFOS anion)

SOLVENT(S):

Methanol

DATE PREPARED: (mm/dd/yyyy)

10/13/2015

LAST TESTED: (mm/dd/yyyy)

10/14/2015

EXPIRY DATE: (mm/dd/yyyy)

10/14/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DESCRIPTION:

The chemical purity has been determined to be ≥98% perfluorooctanesulfonate linear and branched isomers. The full name, structure and percent composition for each of the isomeric components are given in Table A.

DOCUMENTATION/ DATA ATTACHED:

Table A: Isomeric Components and Percent Composition by 19F-NMR

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS Data (SIR)

Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

 A 5-point calibration curve was generated using linear PFOS (potassium salt) and mass-labelled PFOS as an internal standard to enable quantitation of br-PFOSK using isotopic dilution.

CAS#: 2795-39-3 (for linear isomer; potassium salt).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compounds it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, u(y), of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

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Table A: br-PFOSK; Isomeric Components and Percent Composition (by 19F-NMR)*

Isomer	Name	Structure	Percent Composition by ¹⁹ F-NMR
1 1	Potassium perfluoro-1-octanesulfonate	CF ₃ CF ₂ SO ₃ K*	78.8
2	Potassium 1-trifluoromethylperfluoroheptanesulfonate**	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF ₂ CF ₃ K ⁺ CF ₃	1.2
3	Potassium 2-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ K* CF ₃	0.6
4	Potassium 3-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ K* CF ₃	1.9
5	Potassium 4-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF ₂ CF ₂ CF ₂ CF ₂ CF ₃ SO ₃ K ⁺ CF ₃	2.2
6	Potassium 5-trifluoromethylperfluoroheptanesulfonate	CF ₃ CF ₂ CFCF ₂ CF ₂ CF ₂ CF ₂ SO ₃ K [†] CF ₃	4.5
7	Potassium 6-trifluoromethylperfluoroheptanesulfonate	CF ₃ CFCF ₂ CF ₂ CF ₂ CF ₂ CF ₂ SO ₃ K ⁺ CF ₃	10.0
8	Potassium 5,5-di(trifluoromethyl)perfluorohexanesulfonate	CF ₃ CF ₃ -CCF ₂ CF ₂ CF ₂ CF ₂ SO ₃ K ⁺ CF ₃	0.2
9	Potassium 4,4-di(trifluoromethyl)perfluorohexanesulfonate	CF ₃ CF ₃ CF ₂ -C-CF ₂ CF ₂ CF ₂ SO ₃ K ⁺ CF ₃	0.03
10	Potassium 4,5-di(trifluoromethyl)perfluorohexanesulfonate	CF ₃ -CF-CF-CF ₂ CF ₂ CF ₂ SO ₃ K ⁺ CF ₃ CF ₃	0.4
11	Potassium 3,5-di(trifluoromethyl)perfluorohexanesulfonate	CF ₃ -CF-CF ₂ -CF-CF ₂ CF ₂ SO ₃ K ⁺ CF ₃ CF ₃	0.07

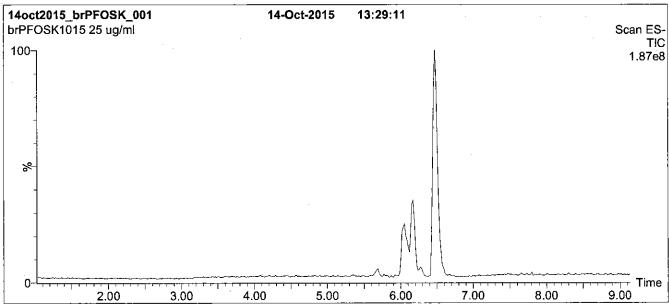
Percent of total perfluorooctanesulfonate isomers only. Isomers are labelled in Figure 2.
 Systematic Name: Potassium perfluorooctane-2-sulfonate.

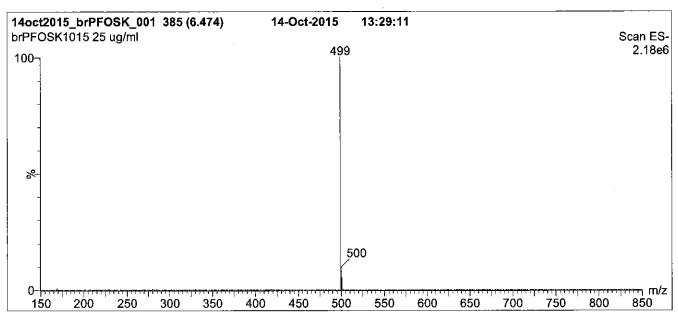
Certified By:

Date:

10/15/2015

Figure 1: br-PFOSK; LC/MS Data (TIC and Mass Spectrum)





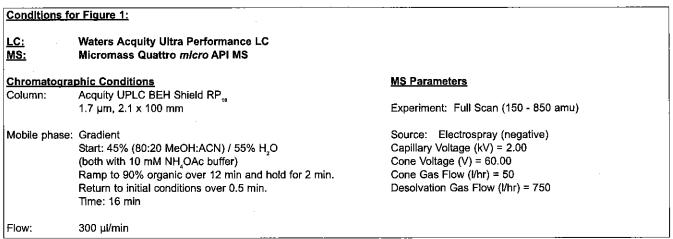
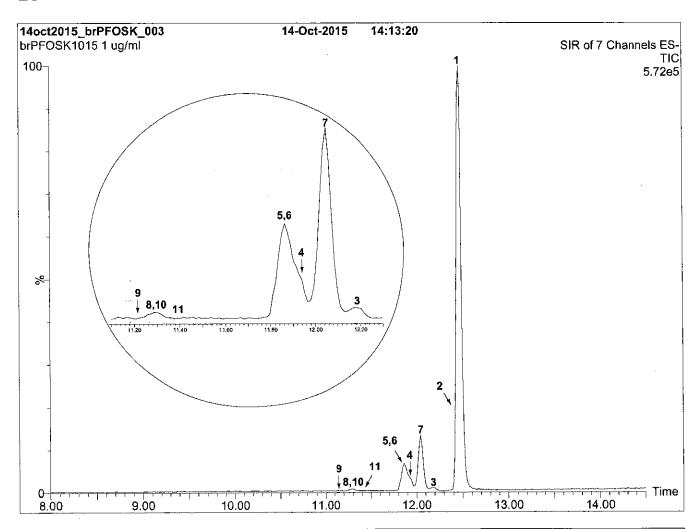


Figure 2: br-PFOSK; LC/MS Data (SIR)



Conditions for Figure 2:

<u>LC:</u> MS: Waters Acquity Ultra Performance LC Micromass Quattro micro API MS

Chromatographic Conditions:

Column:

Acquity UPLC BEH Shield RP18 (1.7 µm, 2.1 x 100 mm)

Injection:

1.0 µg/ml of br-PFOSK

Mobile Phase:

Gradient

45% (80:20 MeOH:ACN) / 55% H₂O (both with 10 mM NH₂OAc buffer)

Ramp to 90% organic over 15 min and hold for 3 min. Return to initial conditions over 1 min.

Time: 20 min

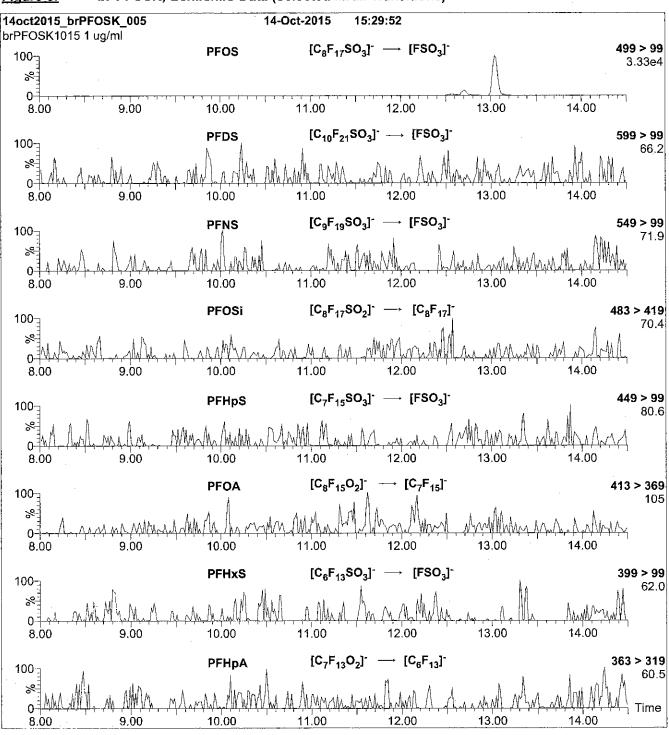
Flow:

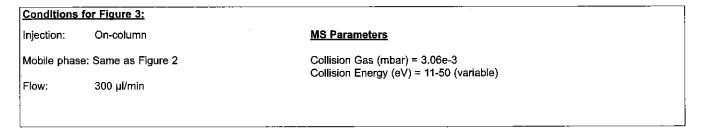
300 µl/min

MS Conditions:

SIR (ES') Source = 110 °C Desolvation = 325 °C Cone Voltage = 60V

Figure 3: br-PFOSK; LC/MS/MS Data (Selected MRM Transitions)





LCPFOS_00004



PRODUCT CODE:

L-PFOS

LOT NUMBER:

LPFOS0614

COMPOUND:

Sodium perfluoro-1-octanesulfonate

STRUCTURE:

CAS #:

4021-47-0

MOLECULAR FORMULA:

C_xF₁₇SO₃Na

MOLECULAR WEIGHT:

522.11

CONCENTRATION:

 $50.0 \pm 2.5 \,\mu g/ml$ (Na salt)

 $47.8 \pm 2.4 \mu g/ml$ (PFOS anion)

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

06/20/2014

EXPIRY DATE: (mm/dd/yyyy)

06/20/2019

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TiC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 10/27/2014

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

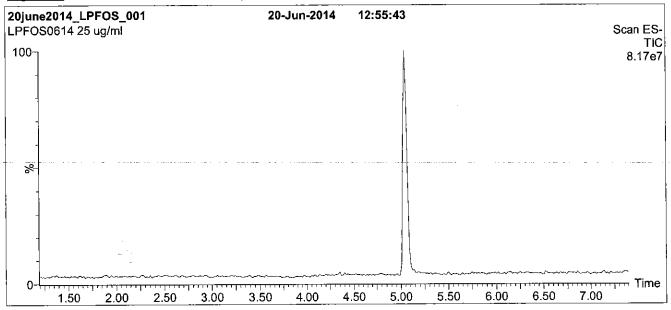
QUALITY MANAGEMENT:

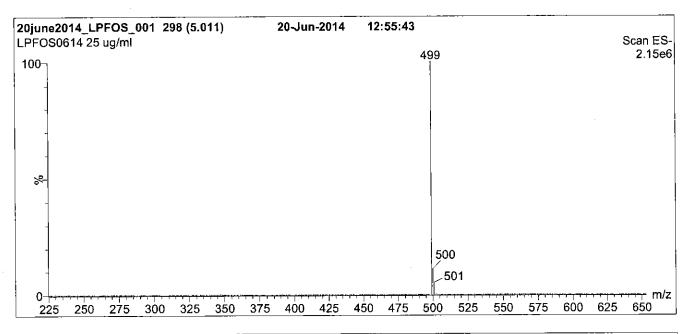
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).





Figure 1: L-PFOS; LC/MS Data (TIC and Mass Spectrum)





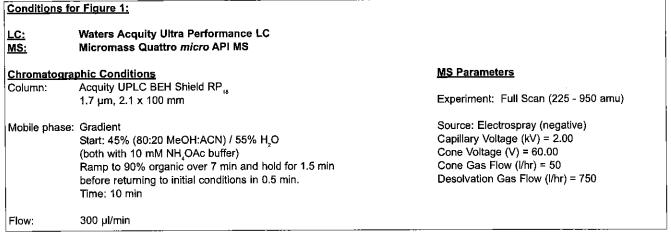
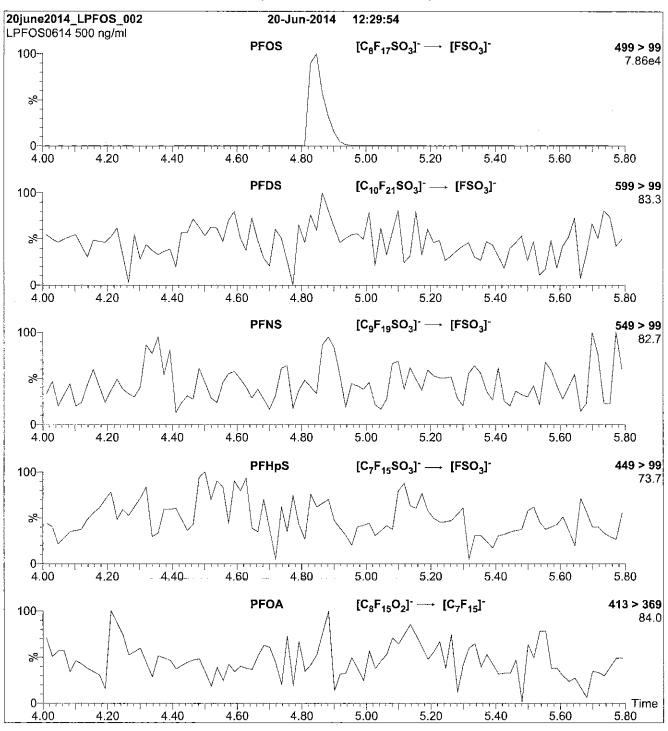
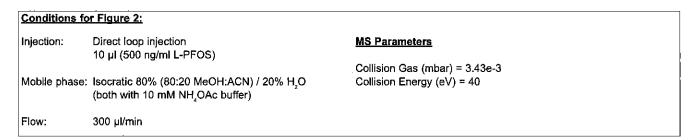


Figure 2: L-PFOS; LC/MS/MS Data (Selected MRM Transitions)





LCPFOSA_00005



PRODUCT CODE:

FOSA-I

LOT NUMBER:

MOLECULAR WEIGHT:

SOLVENT(S):

FOSA0714I

COMPOUND:

Perfluoro-1-octanesulfonamide

STRUCTURE:

CAS #:

754-91-6

499.14

Isopropanol

MOLECULAR FORMULA:

 $C_BH_2F_{17}NO_2S$

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

07/31/2014

EXPIRY DATE: (mm/dd/yyyy)

Stability studies ongoing

RECOMMENDED STORAGE:

Refrigerate ampoule

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 08/05/2014

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning furne hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

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HOMOGENEITY:

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UNCERTAINTY:

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 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

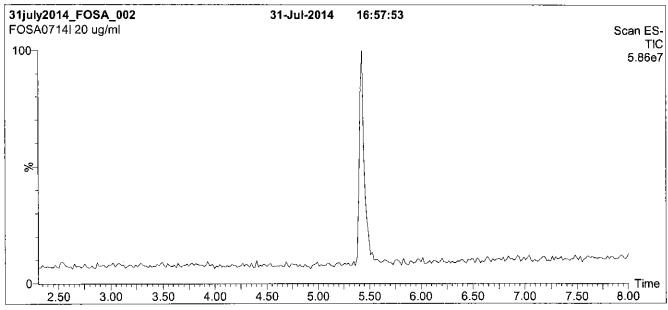
This product was produced using a Quality Management System registered to ISO 9001:2008 by SAI Global, ISO/IEC 17025:2005 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34:2009 by ACLASS (certificate number AR-1523).

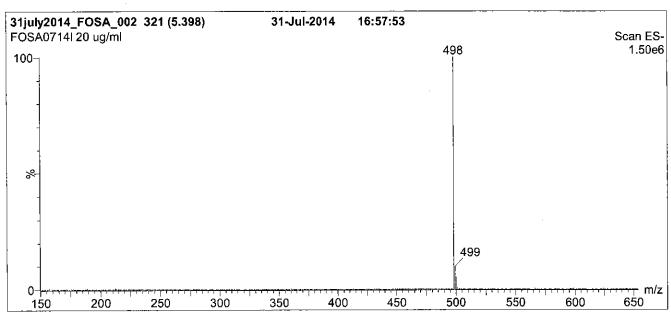




For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: FOSA-I; LC/MS Data (TIC and Mass Spectrum)





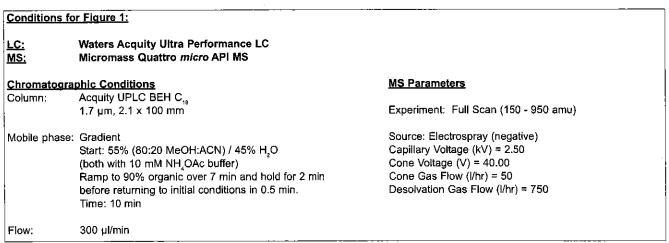
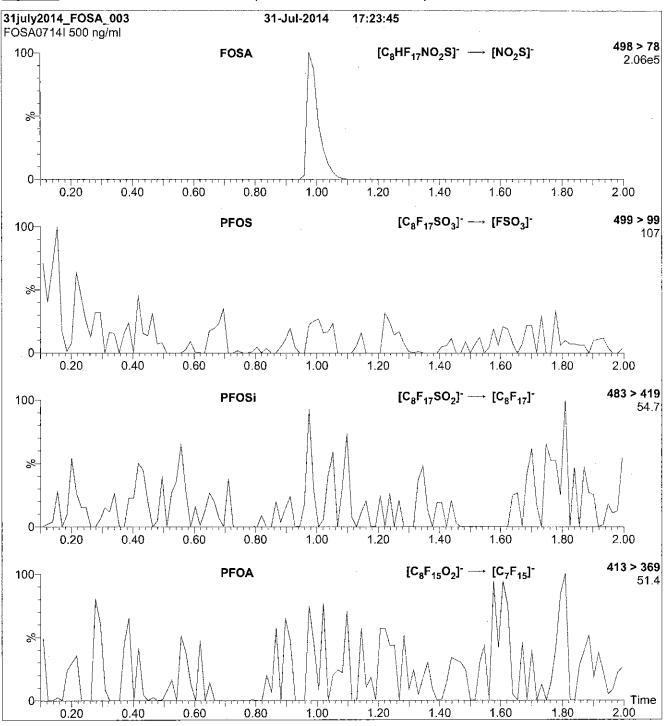


Figure 2: FOSA-I; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml FOSA-I)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H,O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.58e-3 Collision Energy (eV) = 30

LCPFOSA_00006



PRODUCT CODE:

FOSA-I

LOT NUMBER:

MOLECULAR WEIGHT:

SOLVENT(S):

FOSA0815I

COMPOUND:

Perfluoro-1-octanesulfonamide

STRUCTURE:

CAS #:

754-91-6

499.14

Isopropanol

F F F F F F F F

MOLECULAR FORMULA:

C,H,F,NO,S

CONCENTRATION:

 $50 \pm 2.5 \,\mu g/ml$

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

09/02/2015

EXPIRY DATE: (mm/dd/yyyy)

09/02/2017

RECOMMENDED STORAGE:

Refrigerate ampoule

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.C. Chittim

Date:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

<u>INTENDED USE:</u>

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HOMOGENEITY:

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$$x_{ij} x_{ij} ... x_{ij}$$
 on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

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EXPIRY DATE / PERIOD OF VALIDITY:

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LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

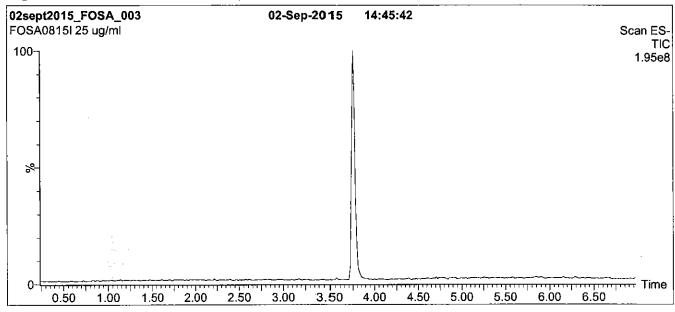
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

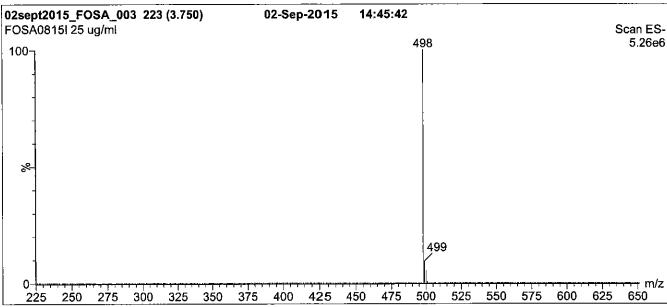




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Figure 1: FOSA-I; LC/MS Data (TIC and Mass Spectrum)





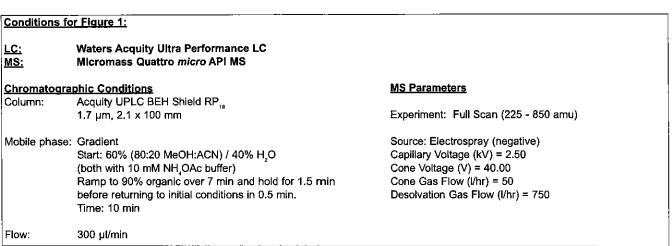
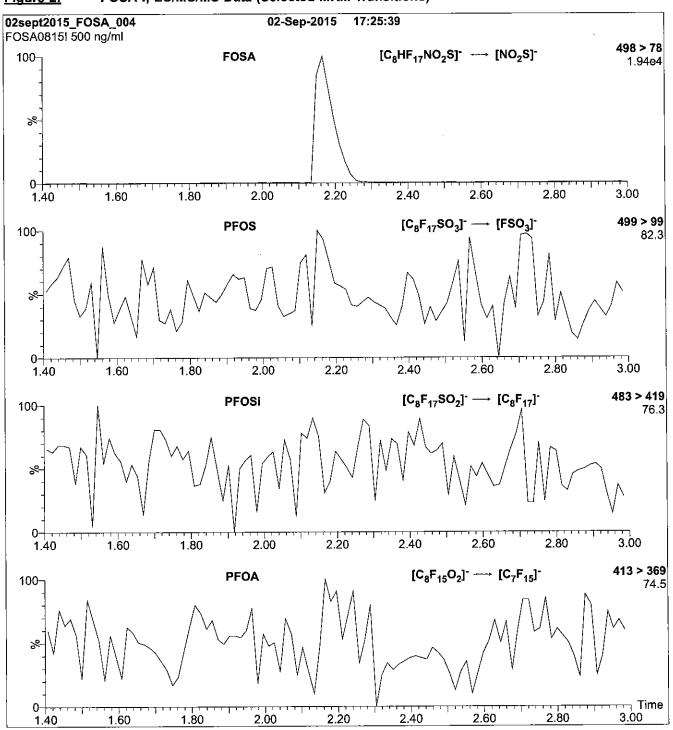
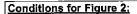


Figure 2: FOSA-I; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml FOSA-I)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% $\rm H_2O$

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.54e-3 Collision Energy (eV) = 30

LCPFPeA_00003



PRODUCT CODE:

PFPeA

LOT NUMBER:

PFPeA0113

COMPOUND:

Perfluoro-n-pentanoic acid

STRUCTURE:

CAS #:

2706-90-3

MOLECULAR FORMULA:

C_eHF_aO_a

MOLECULAR WEIGHT:

264.05

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

01/03/2013

EXPIRY DATE: (mm/dd/yyyy)

01/03/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.3% of Perfluoro-n-heptanoic acid (PFHpA) and ~ 0.2% of C₅H₂F₈O₂ (hydrido - derivative) as measured by ¹⁹F NMR.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B G Chittim

Date:

(mm/dd/vvvv)

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

<u>HAZARDS:</u>

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_{x}(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

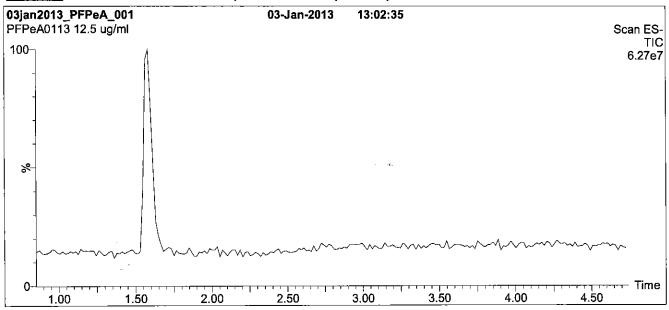
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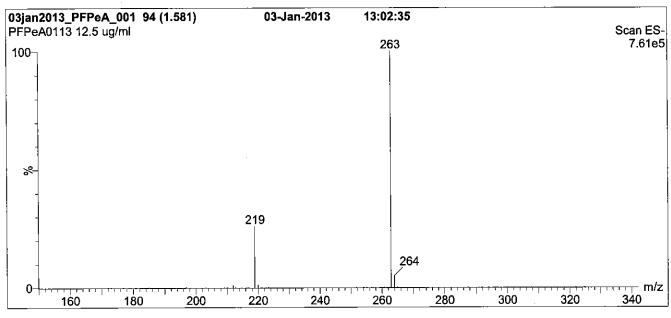




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Figure 1: PFPeA; LC/MS Data (TIC and Mass Spectrum)





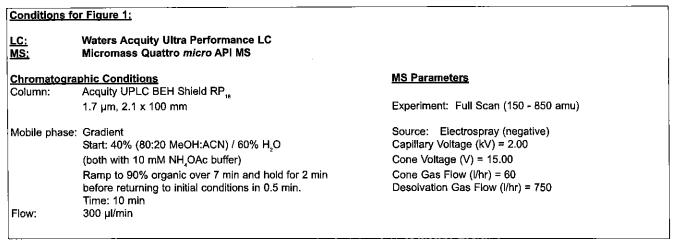
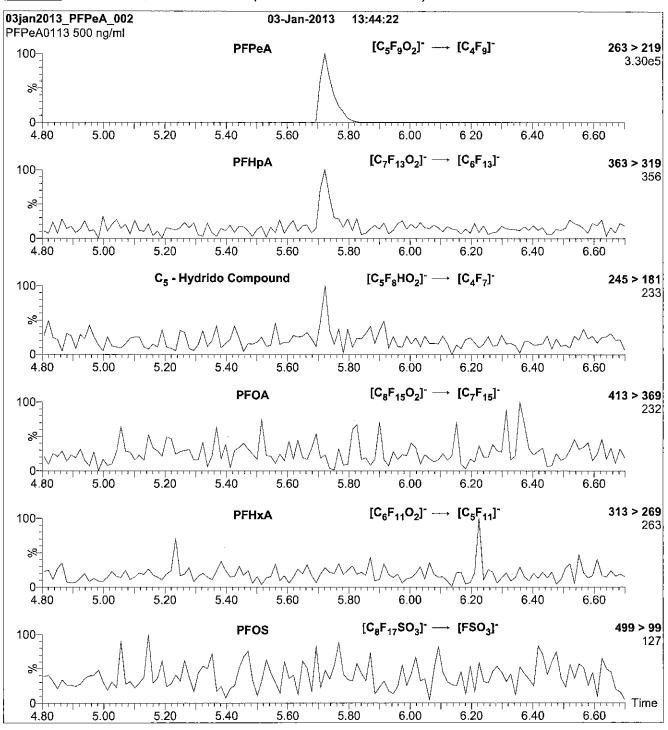
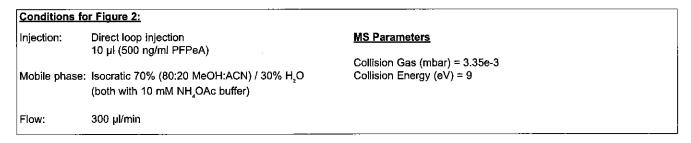


Figure 2: PFPeA; LC/MS/MS Data (Selected MRM Transitions)





LCPFPeA_00004



PRODUCT CODE:

PFPeA

LOT NUMBER:

PFPeA0115

COMPOUND:

Perfluoro-n-pentanoic acid

STRUCTURE:

CAS #:

2706-90-3

C,HF,O,

MOLECULAR WEIGHT:

264.05

CONCENTRATION:

MOLECULAR FORMULA:

 $50 \pm 2.5 \,\mu g/ml$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

01/30/2015

EXPIRY DATE: (mrn/dd/yyyy)

01/30/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

• Contains ~ 0.3% of Perfluoro-n-heptanoic acid (PFHpA) and ~ 0.2% of $C_5H_2F_8O_2$ (hydrido - derivative) as measured by ¹⁹F NMR.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B G Chittim

Date:

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, u(y), of a value y and the uncertainty of the independent parameters

$$x_{ij}, x_{2i}...x_{n}$$
 on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

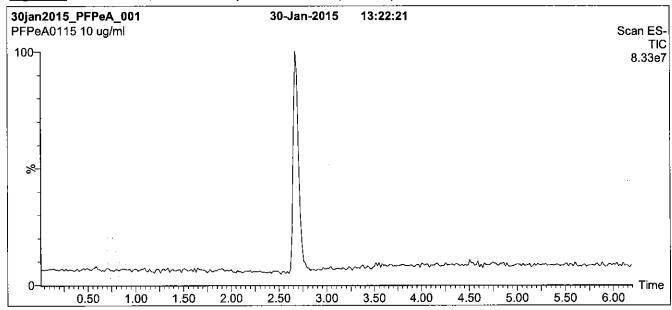
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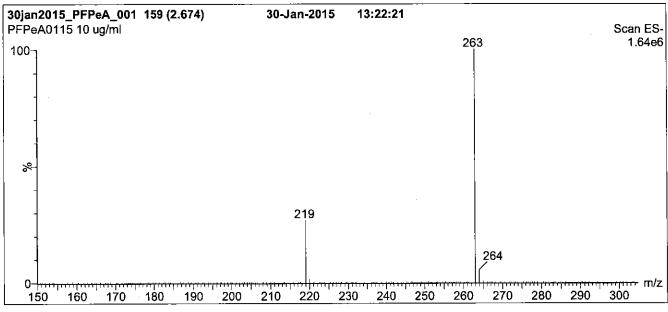




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Figure 1: PFPeA; LC/MS Data (TIC and Mass Spectrum)





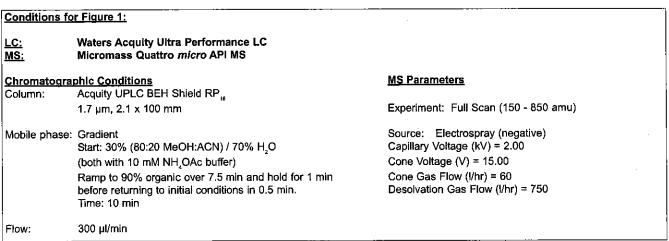
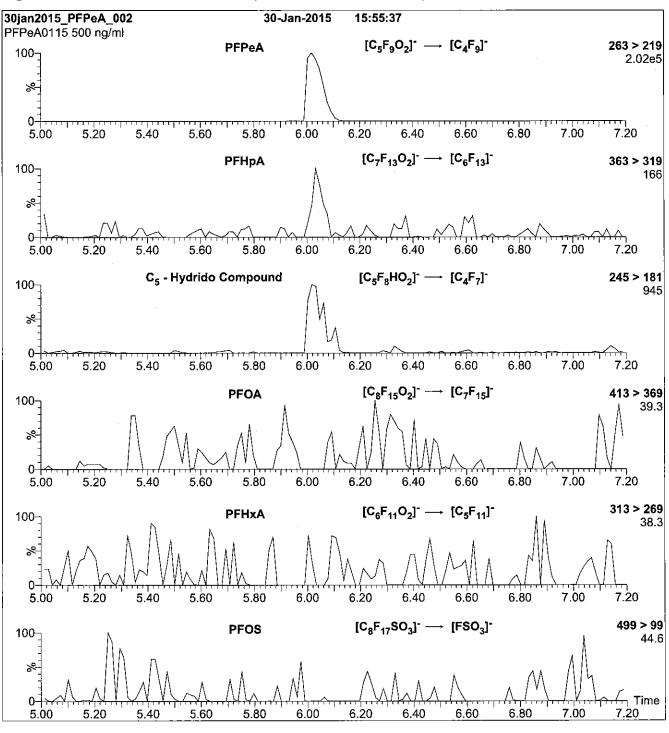


Figure 2: PFPeA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml PFPeA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.35e-3 Collision Energy (eV) = 9

LCPFPeS_00002



PRODUCT CODE:

L-PFPe\$

LOT NUMBER:

LPFPeS0712

COMPOUND:

Sodium perfluoro-1-pentanesulfonate

STRUCTURE:

CAS #:

Not available

MOLECULAR FORMULA:

C₅F₄SO₃Na

MOLECULAR WEIGHT:

372.09

CONCENTRATION:

 $50.0 \pm 2.5 \,\mu g/ml$ (Na salt)

 $46.9 \pm 2.3 \mu g/ml$ (PFPeS anion)

SOLVENT(S):

Methanol

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

07/04/2012

EXPIRY DATE: (mm/dd/yyyy)

07/04/2017

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 01/15/2013

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Material Safety Data Sheets (MSDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_i(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ... x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

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TRACEABILITY:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

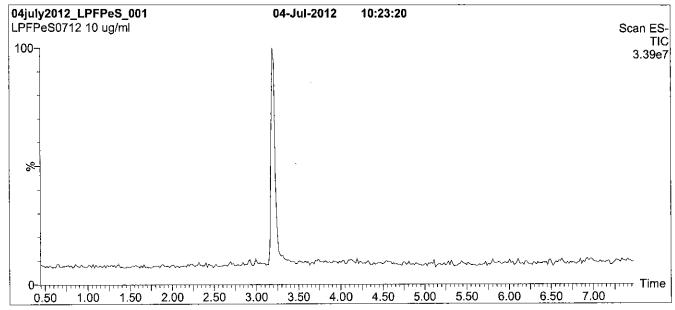
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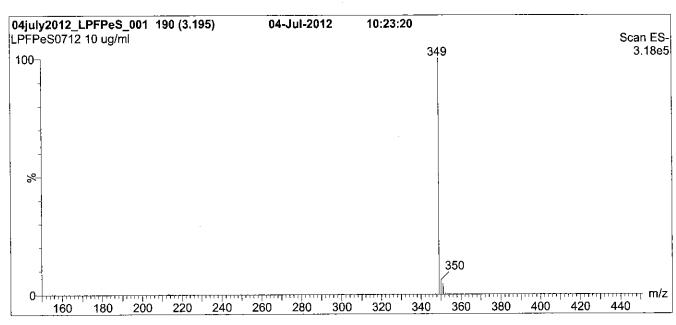




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Figure 1: L-PFPeS; LC/MS Data (TIC and Mass Spectrum)





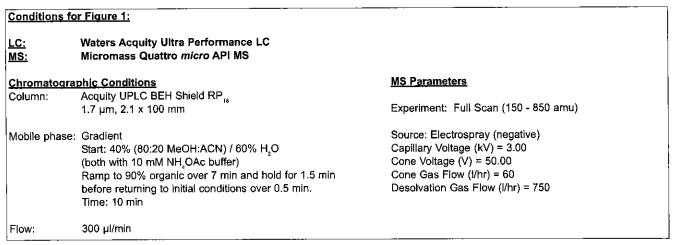
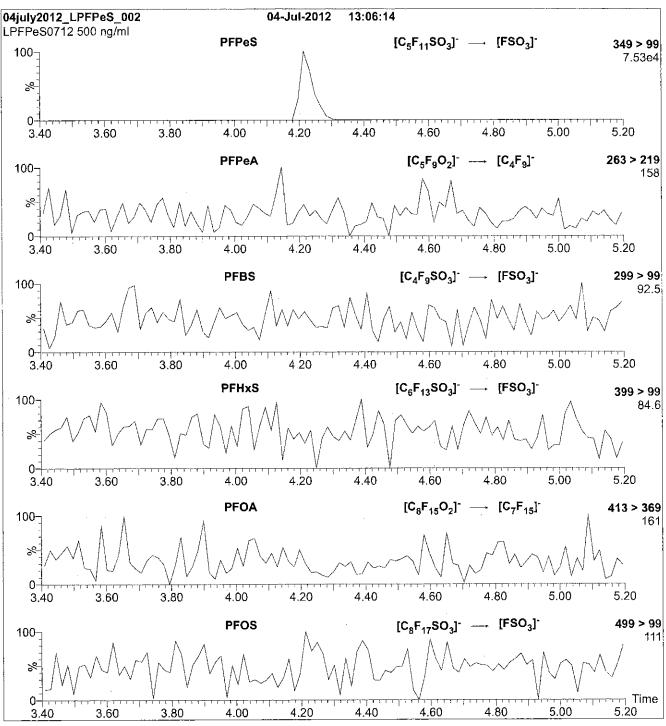
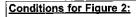


Figure 2: L-PFPeS; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml L-PFPeS)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.66e-3 Collision Energy (eV) = 30

LCPFTeDA_00003



PRODUCT CODE:

PFTeDA

LOT NUMBER:

PFTeDA0613

COMPOUND:

Perfluoro-n-tetradecanoic acid

STRUCTURE:

CAS #:

376-06-7

MOLECULAR FORMULA:

C,4HF,27O,

MOLECULAR WEIGHT:

714.11

CONCENTRATION:

 $50 \pm 2.5 \, \mu g/ml$

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

06/19/2013

EXPIRY DATE: (mm/dd/yyyy)

06/19/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.2% of PFDoA ($C_{12}HF_{23}O_2$) and ~ 0.2% of PFPeDA ($C_{15}HF_{29}O_2$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 07/17/2013

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product, unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, x-ray crystallography and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS and/or LC/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, u(y), of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{l=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

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TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external, ISO/IEC 17025:2005 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration for the period of time specified by the expiry date in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

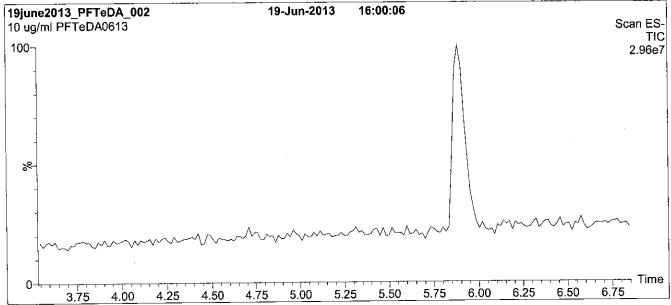
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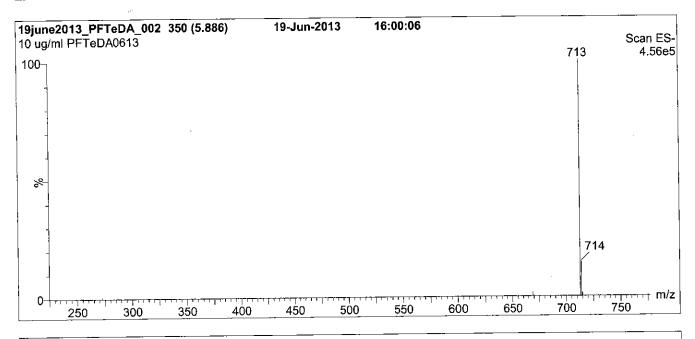




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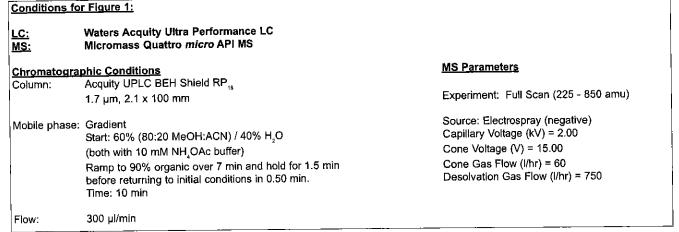
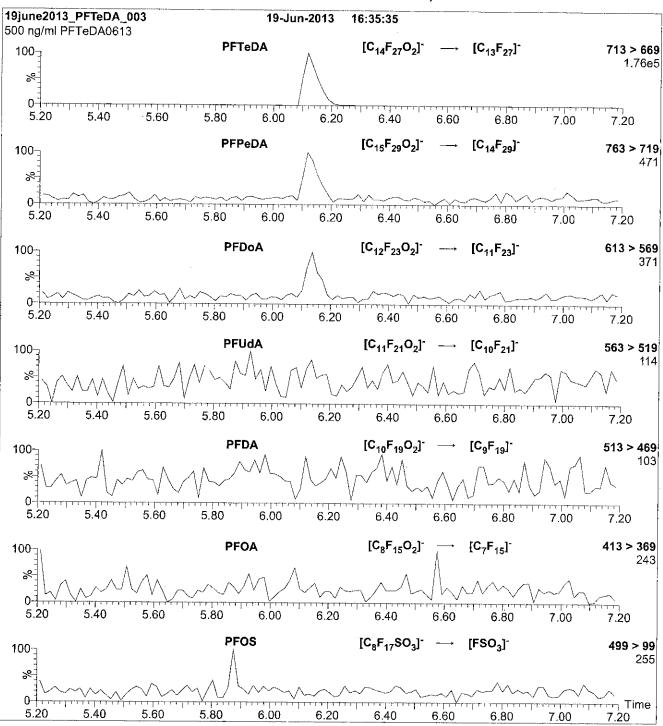
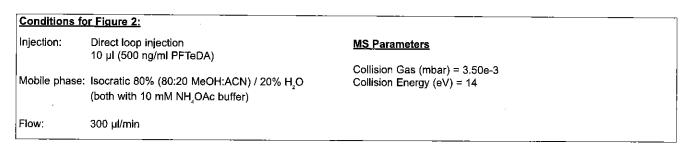


Figure 2: PFTeDA; LC/MS/MS Data (Selected MRM Transitions)





LCPFTeDA_00004



WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFTeDA

LOT NUMBER:

PFTeDA1215

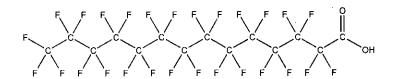
COMPOUND:

Perfluoro-n-tetradecanoic acid

STRUCTURE:

CAS #:

376-06-7



MOLECULAR FORMULA:

C₁₄HF₂₇O₂

MOLECULAR WEIGHT:

714.11

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

,>98%

LAST TESTED: (mm/dd/yyyy)

12/09/2015

EXPIRY DATE: (mm/dd/yyyy)

12/09/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

· Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.2% of PFDoA (C₁₅HF₂₃O₂) and ~ 0.2% of PFPeDA (C₁₅HF₂₃O₂).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date: 12/09/2015

(mm/dd/ssss)

(mm/dd/yyyy)

The products prepared by Wellington Laboratories Inc. are for laboratory use only. This certified reference material (CRM) was designed to be used as a standard for the identification and/or quantification of the specific chemical compound it contains.

HAZARDS:

This product should only be used by qualified personnel familiar with its potential hazards and trained in the handling of hazardous chemicals. Due care should be exercised to prevent unnecessary human contact or ingestion. All procedures should be carried out in a well-functioning fume hood and suitable gloves, eye protection, and clothing should be worn at all times. Waste should be disposed of according to national and regional regulations. Safety Data Sheets (SDSs) are available upon request.

SYNTHESIS / CHARACTERIZATION:

Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, u(y), of a value y and the uncertainty of the independent parameters

 $x_1, x_2,...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of ±5% (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

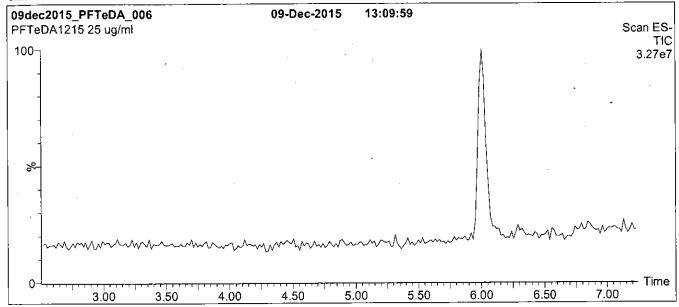
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

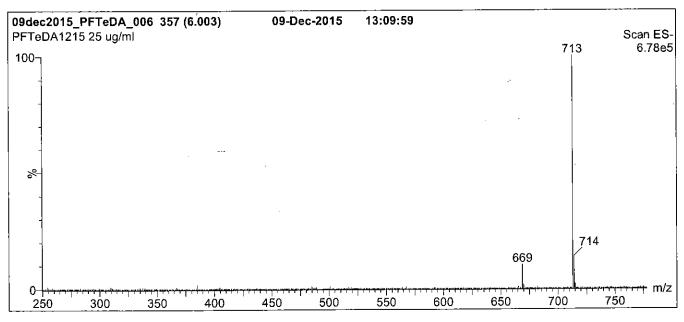




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Figure 1: PFTeDA; LC/MS Data (TIC and Mass Spectrum)





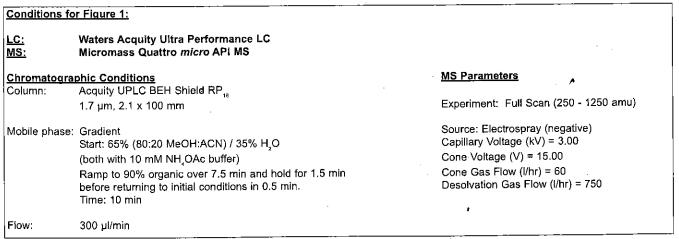
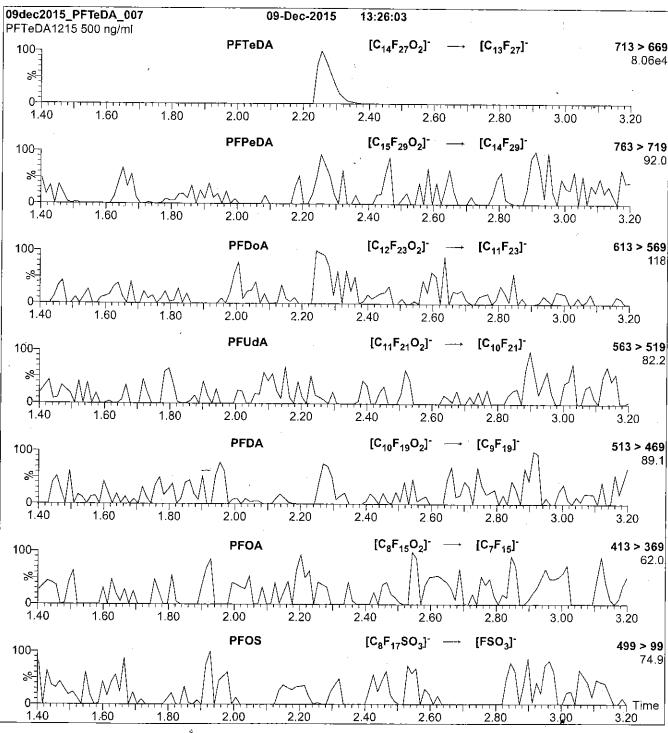
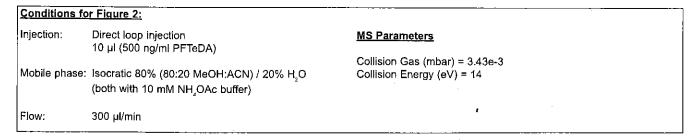


Figure 2: PFTeDA; LC/MS/MS Data (Selected MRM Transitions)





LCPFTrDA_00003



PRODUCT CODE:

PFTrDA

LOT NUMBER:

PFTrDA1213

COMPOUND:

Perfluoro-n-tridecanoic acid

STRUCTURE:

CAS #:

72629-94-8

MOLECULAR FORMULA:

C, HF, O,

MOLECULAR WEIGHT:

664.11

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

12/10/2013

EXPIRY DATE: (mm/dd/yyyy)

12/10/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

Contains ~ 0.1% of PFUdA (C₁₁HF₂₁O₂), ~ 0.4% of PFDoA (C₁₂HF₂₃O₂), and ~ 0.1% of PFTeDA $(C_{14}HF_{27}O_2).$

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: 12/11/2013

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

The products prepared by Wellington Laboratories Inc. are for laboratory use only. They are designed to be used as reference standards for the identification and/or quantification of specific chemical compound(s).

HAZARDS:

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SYNTHESIS / CHARACTERIZATION:

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TRACEABILITY:

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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

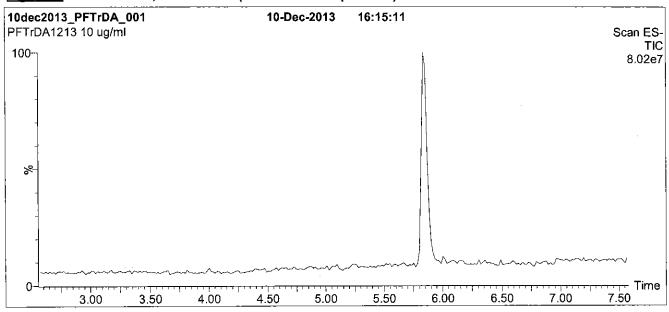
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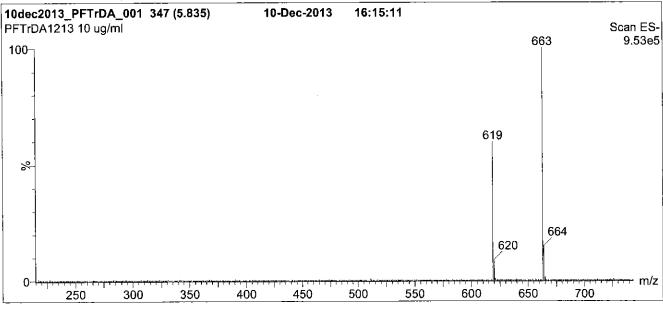




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Figure 1: PFTrDA; LC/MS Data (TIC and Mass Spectrum)





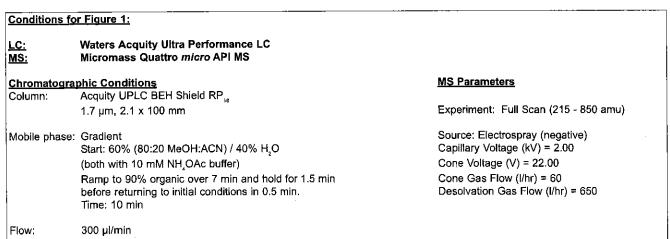
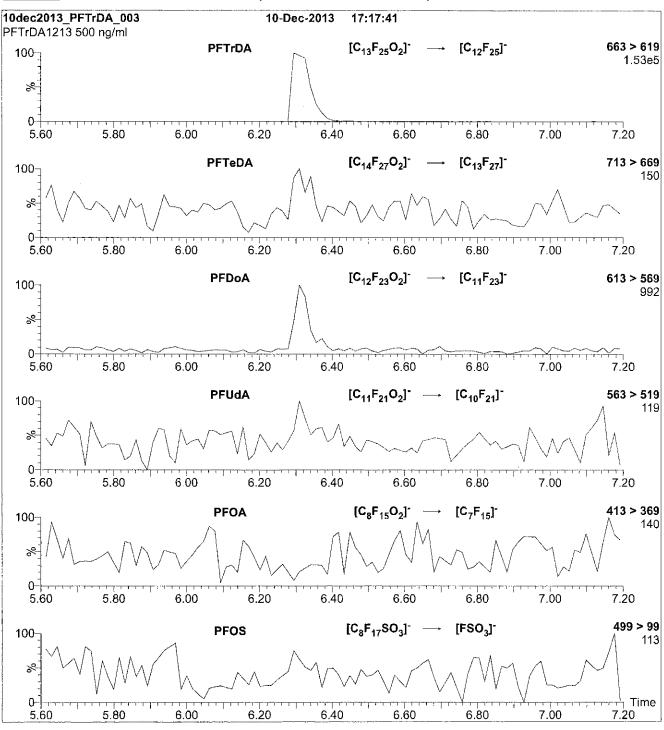
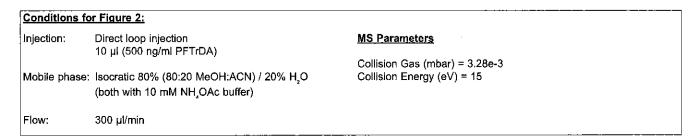


Figure 2: PFTrDA; LC/MS/MS Data (Selected MRM Transitions)





Reagent

LCPFTrDA_00004

Exp: 12/10/18 Prpd: CBW PF-n-tridecanoic acid



WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFTrDA

LOT NUMBER:

PFTrDA1213

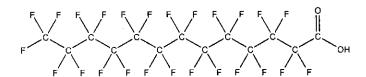
COMPOUND:

Perfluoro-n-tridecanoic acid

STRUCTURE:

CAS #:

72629-94-8



MOLECULAR FORMULA:

C, HF, O,

50 ± 2.5 μg/ml

MOLECULAR WEIGHT:

664.11

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

CONCENTRATION:

>98%

LAST TESTED: (mm/dd/yyyy)

12/10/2013

EXPIRY DATE: (mm/dd/yyyy)

12/10/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

• Contains ~ 0.1% of PFUdA ($C_{11}HF_{21}O_2$); ~ 0.4% of PFDoA ($C_{12}HF_{23}O_2$), and ~ 0.1% of PFTeDA ($C_{14}HF_{27}O_2$).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

B.G. Chittim

Date:

<u>(mm/dd/man/</u>

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON 'N1G 3M5 CANADA 519-822-2436 • Fax: 519-822-2849 • info@well-labs.com

INTENDED USE:

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EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

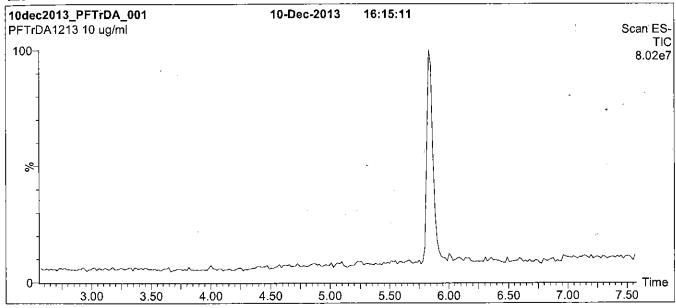
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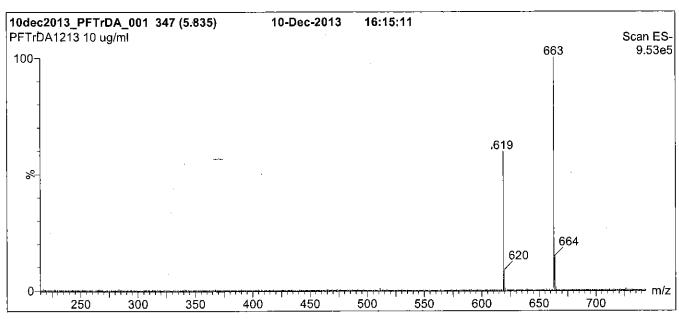




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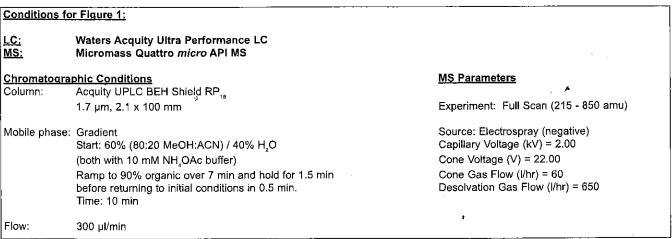
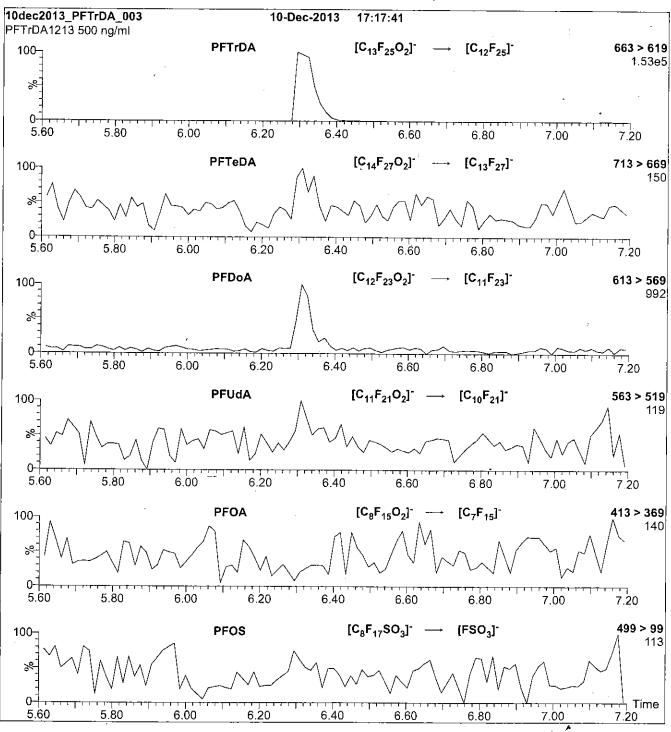
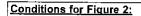


Figure 2: PFTrDA; LC/MS/MS Data (Selected MRM Transitions)





Injection:

Direct loop injection

10 μl (500 ng/ml PFTrDA)

Mobile phase: Isocratic 80% (80:20 MeOH:ACN) / 20% H₂O

(both with 10 mM NH,OAc buffer)

Flow:

300 µl/min

MS Parameters

Collision Gas (mbar) = 3.28e-3 Collision Energy (eV) ≈ 15

Reagent

LCPFUdA_00003



CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFUdA

LOT NUMBER:

PFUdA0613

COMPOUND:

Perfluoro-n-undecanoic acid

STRUCTURE:

CAS #:

2058-94-8

MOLECULAR FORMULA:

C,HF,O,

MOLECULAR WEIGHT:

564.09

CONCENTRATION:

50 ± 2.5 µg/ml

SOLVENT(S):

Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

06/19/2013

EXPIRY DATE: (mm/dd/yyyy)

06/19/2018

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By:

Date: <u>07/03/2013</u>

INTENDED USE:

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QUALITY MANAGEMENT:

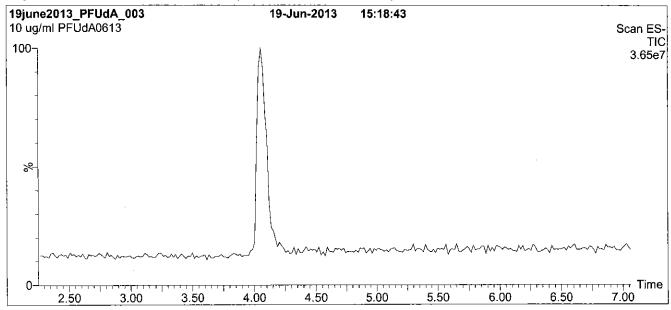
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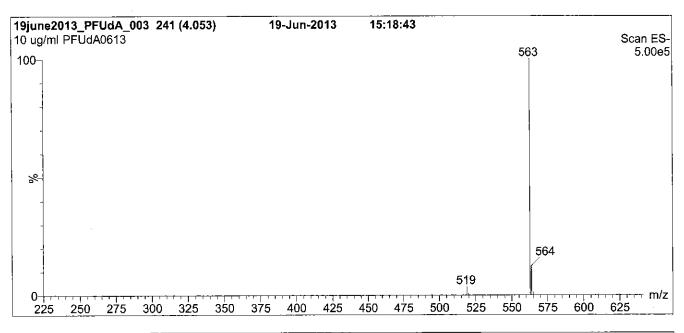




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Figure 1: PFUdA; LC/MS Data (TIC and Mass Spectrum)





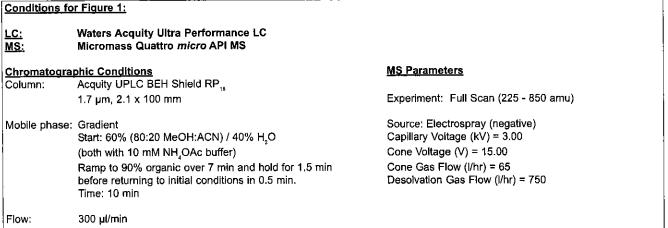
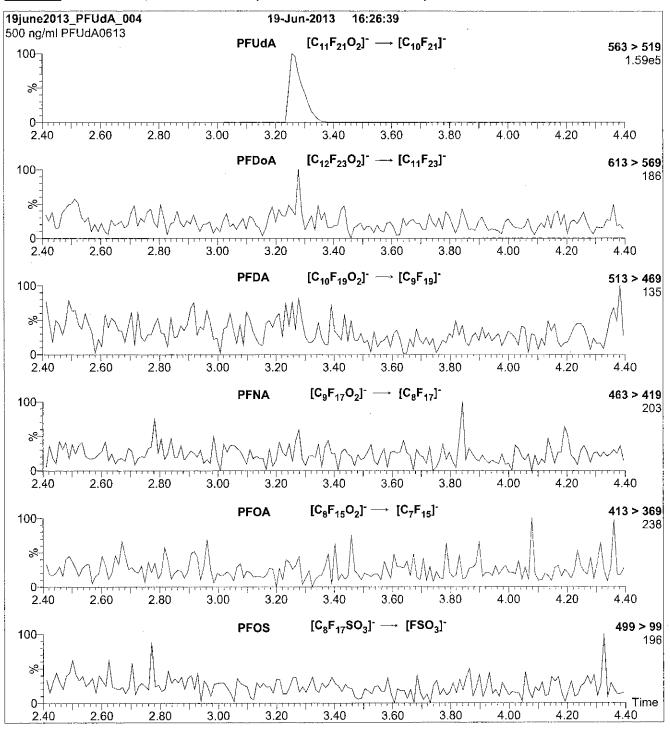
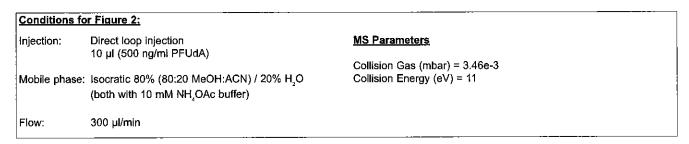


Figure 2: PFUdA; LC/MS/MS Data (Selected MRM Transitions)





Reagent

LCPFUdA_00004



PF-n-undecanoic acid





CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:

PFUdA

LOT NUMBER:

PFUdA0815

COMPOUND:

Perfluoro-n-undecanoic acid

2058-94-8

STRUCTURE:

CAS#:

MOLECULAR FORMULA:

C,HF,O,

MOLECULAR WEIGHT:

564.09

 $50 \pm 2.5 \, \mu g/ml$ SOLVENT(S): Methanol

Water (<1%)

CHEMICAL PURITY:

>98%

LAST TESTED: (mm/dd/yyyy)

CONCENTRATION:

08/19/2015

EXPIRY DATE: (mm/dd/yyyy)

08/19/2020

RECOMMENDED STORAGE:

Store ampoule in a cool, dark place

DOCUMENTATION/ DATA ATTACHED:

Figure 1: LC/MS Data (TIC and Mass Spectrum)

Figure 2: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

See page 2 for further details.

Contains 4 mole eq. of NaOH to prevent conversion of the carboxylic acid to the methyl ester.

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Certified By:

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Where possible, all of our products are synthesized using single-product unambiguous routes. They are then characterized, and their structures and purities confirmed, using a combination of the most relevant techniques, such as NMR, GC/MS, LC/MS/MS, SFC/UV/MS/MS, x-ray crystallography, and melting point. Isotopic purities of mass-labelled compounds are also confirmed using HRGC/HRMS and/or LC/MS/MS.

HOMOGENEITY:

Prior to solution preparation, crystalline material is tested for homogeneity using a variety of techniques (as stated above) and its solubility in a given diluent is taken into consideration. Duplicate solutions of a new product are prepared from the same crystalline lot and, after the addition of an appropriate internal standard, they are compared by GC/MS, LC/MS/MS and/or SFC/UV/MS/MS. The relative response factors of the analyte of interest in each solution are required to be <5% RSD. New solution lots of existing products are compared to older lots in the same manner, which further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers.

UNCERTAINTY:

The maximum combined relative standard uncertainty of our reference standard solutions is calculated using the following equation:

The combined relative standard uncertainty, $u_{c}(y)$, of a value y and the uncertainty of the independent parameters

 $x_1, x_2...x_n$ on which it depends is:

$$u_c(y(x_1, x_2, ...x_n)) = \sqrt{\sum_{i=1}^n u(y, x_i)^2}$$

where x is expressed as a relative standard uncertainty of the individual parameter.

The individual uncertainties taken into account include those associated with weights (calibration of the balance) and volumes (calibration of the volumetric glassware). An expanded maximum combined percent relative uncertainty of $\pm 5\%$ (calculated with a coverage factor of 2 and a level of confidence of 95%) is stated on the Certificate of Analysis for all of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly tested by an external ISO/IEC 17025 accredited calibration company. In addition, their calibration is verified prior to each weighing using NIST and/or NRC traceable external weights. All volumetric glassware used is of Class A tolerance and has been tested according to the appropriate ASTM procedures, which are ultimately traceable to NIST. For certain products, traceability to international interlaboratory studies has also been established.

EXPIRY DATE / PERIOD OF VALIDITY:

Ongoing stability studies of this product have demonstrated stability in its composition and concentration, until the specified expiry date, in the unopened ampoule. Monitoring for any degradation or change in concentration of the listed analyte(s) is performed on a routine basis.

LIMITED WARRANTY:

At the time of shipment, all products are warranted to be free of defects in material and workmanship and to conform to the stated technical and purity specifications.

QUALITY MANAGEMENT:

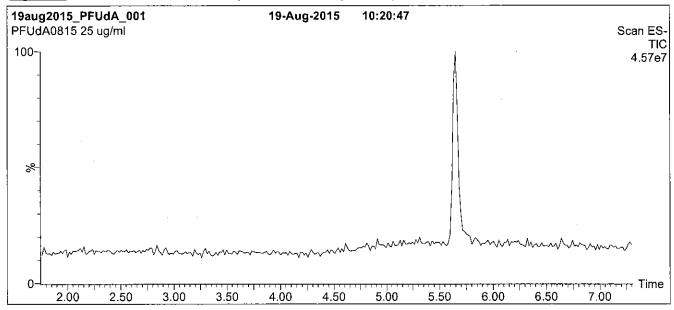
This product was produced using a Quality Management System registered to the latest versions of ISO 9001 by SAI Global, ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA; A 1226), and ISO GUIDE 34 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

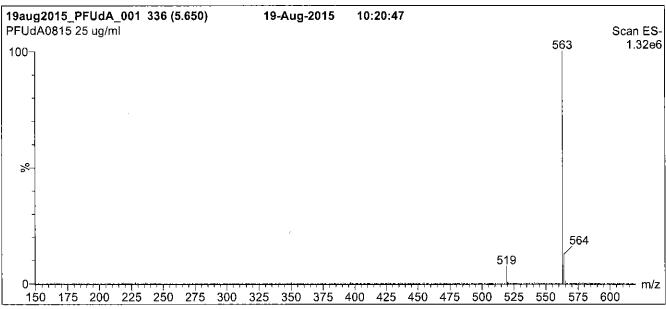




For additional information or assistance concerning this or any other products from Wellington Laboratories Inc., please visit our website at www.well-labs.com or contact us directly at info@well-labs.com

Figure 1: PFUdA; LC/MS Data (TIC and Mass Spectrum)





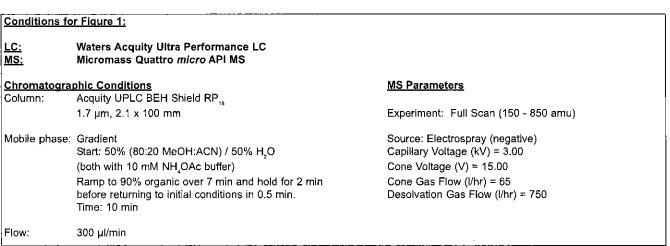
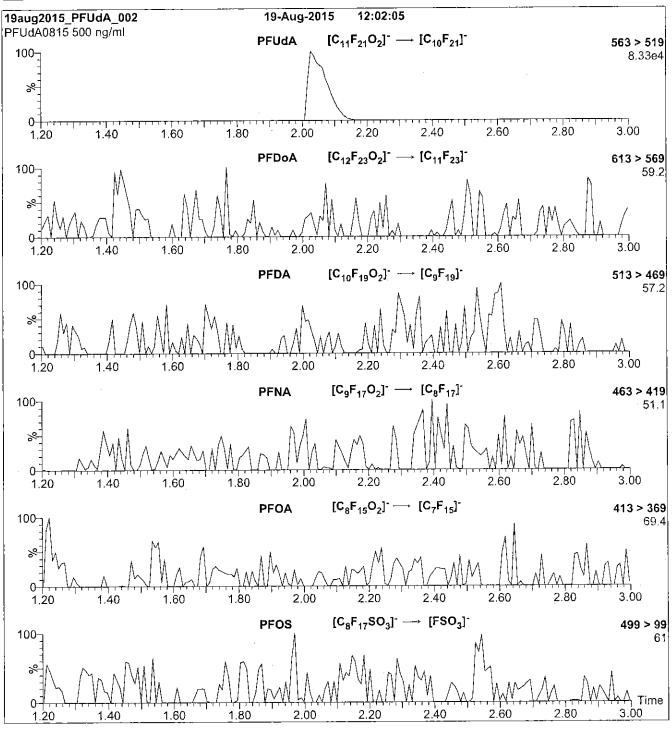
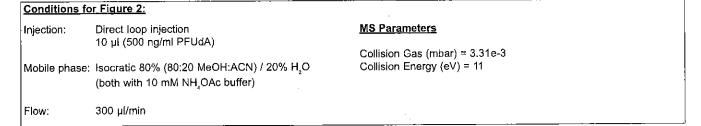


Figure 2: PFUdA; LC/MS/MS Data (Selected MRM Transitions)





Method PFC DOD

Perfluronated Hydrocarbons (LC/MS) by Method PFC_DOD

FORM II LCMS SURROGATE RECOVERY

Lab Name:	TestAmerica	Sacramento	Job No.:	320-18918-1
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SDG No.:

Matrix: Water Level: Low

GC Column (1): Acquity ID: 2.1 (mm)

Client Sample ID	Lab Sample ID	13CHpA #	PFHxS #	PFOA #	PFOS #	PFNA #
OF-RW83-0516	320-18918-1	75	47	74	7 Ç	64
OF-FB83-0516	320-18918-2	96	84	106	24 Ç	100
	MB 320-110721/1-A	97	107	105	127	97
	LCS 320-110721/2-A	95	101	92	126	91
	LCSD 320-110721/3-A	81	84	83	107	82

	QC LIMITS
13CHpA = 13C4-PFHpA	25-150
PFHxS = 1802 PFHxS	25-150
PFOA = 13C4 PFOA	25-150
PFOS = 13C4 PFOS	25-150
PFNA = 13C5 PFNA	25-150

Column to be used to flag recovery values

FORM III LCMS LAB CONTROL SAMPLE RECOVERY

Lab Name	Jame: TestAmerica Sacramento		Job No.: 320	-18918-1
SDG No.	:			
Matrix:	Water	Level: Low	Lab File ID:	27MAY2016B4A_020.d
Lab ID:	LCS 320-110721/2-A		Client ID:	

	SPIKE	LCS	LCS	QC	
	ADDED	CONCENTRATION	%	LIMITS	#
COMPOUND	(ug/L)	(ug/L)	REC	REC	
Perfluoroheptanoic acid	0.0400	0.0305	76	60-140	
(PFHpA)					
Perfluorooctanoic acid (PFOA)	0.0400	0.0326	81	60-140	
Perfluorononanoic acid (PFNA)	0.0400	0.0340	85	60-140	
Perfluorobutanesulfonic acid	0.0354	0.0273	77	50-150	
(PFBS)					
Perfluorohexanesulfonic acid	0.0364	0.0288	79	60-140	М
(PFHxS)					
Perfluorooctanesulfonic acid	0.0371	0.0261	70	60-140	М
(PFOS)					
1802 PFHxS	0.0946	0.0957	101	25-150	
13C4 PFOS	0.0956	0.120	126	25-150	
13C5 PFNA	0.100	0.0911	91	25-150	
13C4 PFOA	0.100	0.0920	92	25-150	
13C4-PFHpA	0.100	0.0954	95	25-150	

 $[\]mbox{\#}$ Column to be used to flag recovery and RPD values FORM III WS-LC-0025

FORM III LCMS LAB CONTROL SAMPLE DUPLICATE RECOVERY

Lab Name	ab Name: TestAmerica Sacramento		Job No.: 320	-18918-1
SDG No.	:			
Matrix:	Water	Level: Low	Lab File ID:	27MAY2016B4A_021.d
Lab ID:	LCSD 320-110721/3	-A	Client ID:	

	SPIKE ADDED	LCSD LCSD CONCENTRATION % %		o _l c	QC L1	#	
COMPOUND	(ug/L)	(ug/L)	REC	RPD	RPD	REC	"
Perfluoroheptanoic acid (PFHpA)	0.0400	0.0318	80	4	30	60-140	
Perfluorooctanoic acid (PFOA)	0.0400	0.0305	76	6	30	60-140	
Perfluorononanoic acid (PFNA)	0.0400	0.0334	84	2	30	60-140	
Perfluorobutanesulfonic acid (PFBS)	0.0354	0.0291	82	7	30	50-150	
Perfluorohexanesulfonic acid (PFHxS)	0.0364	0.0314	86	9	30	60-140	М
Perfluorooctanesulfonic acid (PFOS)	0.0371	0.0284	76	8	30	60-140	М
1802 PFHxS	0.0946	0.0794	84			25-150	
13C4 PFOS	0.0956	0.102	107			25-150	
13C5 PFNA	0.100	0.0815	82			25-150	
13C4 PFOA	0.100	0.0828	83			25-150	
13C4-PFHpA	0.100	0.0812	81			25-150	

 $[\]mbox{\#}$ Column to be used to flag recovery and RPD values FORM III WS-LC-0025

FORM IV LCMS METHOD BLANK SUMMARY

Lab Name: TestAmerica Sacramento	Job No.: 320-18918-1					
SDG No.:						
Lab File ID: 27MAY2016B4A_019.d	Lab Sample ID: MB 320-110721/1-A					
Matrix: Water	Date Extracted: 05/20/2016 11:05					
Instrument ID: A4	Date Analyzed: 05/27/2016 17:18					
Level: (Low/Med) Low						

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

		LAB	
CLIENT SAMPLE ID	LAB SAMPLE ID	FILE ID	DATE ANALYZED
	LCS 320-110721/2-A	27MAY2016B4	05/27/2016 17:39
		A 020.d	
	LCSD 320-110721/3-A	27MAY2016B4	05/27/2016 18:00
		A 021.d	
OF-RW83-0516	320-18918-1	27MAY2016B4	05/27/2016 21:54
		A 025.d	
OF-FB83-0516	320-18918-2	27MAY2016B4	05/27/2016 22:15
		A_026.d	

FORM I LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

SDG No.:

Client Sample ID: OF-RW83-0516 Lab Sample ID: 320-18918-1

Matrix: Water Lab File ID: 27MAY2016B4A_025.d

Analysis Method: WS-LC-0025 Date Collected: 05/16/2016 08:22

Extraction Method: 3535 Date Extracted: 05/20/2016 11:05

Sample wt/vol: 518.9(mL) Date Analyzed: 05/27/2016 21:54

Con. Extract Vol.: 1.0 (mL) Dilution Factor: 1

Injection Volume: 15(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 111733 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0019	U	0.0024	0.0019	0.00077
335-67-1	Perfluorooctanoic acid (PFOA)	0.0019	Ū	0.0024	0.0019	0.00072
375-95-1	Perfluorononanoic acid (PFNA)	0.0019	U	0.0024	0.0019	0.00063
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0019	U	0.0024	0.0019	0.00088
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.00095	J	0.0024	0.0019	0.00084
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0094	М	0.0039	0.0029	0.0012

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	1802 PFHxS	47		25-150
STL00991	13C4 PFOS	7	Q	25-150
STL00995	13C5 PFNA	64		25-150
STL00990	13C4 PFOA	74		25-150
STL01892	13C4-PFHpA	75		25-150

Report Date: 31-May-2016 10:42:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_025.d

Lims ID: 320-18918-A-1-A Client ID: 0F-RW83-0516

Sample Type: Client

Inject. Date: 27-May-2016 21:54:22 ALS Bottle#: 31 Worklist Smp#: 25

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: 320-18918-a-1-a

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 10:41:00 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 31-May-2016 10:09:04

1 1131 23131 1131	iowon bai				Dato.		or may zoro relevit	-		
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 8 13C4-PFF	НрА									
366.6 > 321.6	9.333	9.366	-0.033		3158826	37.6		75.2	6625	
D 11 18O2 PF	HxS									
402.5 > 83.6	9.365	9.399	-0.034		673981	22.2		47.0	563	
58 Perfluoroh	exanesulf	onic acid	b							
398.3 > 79.2	9.357	9.401	-0.044	1.000	11001	0.4905				
D 12 13C4 PF	AC									
416.5 > 371.6	10.451	10.483	-0.032		3531018	36.8		73.7	5211	
D 16 13C4 PF	SC									
502.4 > 79.7	11.414	11.441	-0.027		19872	3.18		6.7	40.2	
15 Perfluoroo			-							M
498.3 > 79.2		11.443		1.000	24077	4.88			20.6	M
498.3 > 98.2	11.405	11.443	-0.038	0.999	12299		1.96(0.00-0.00)		7.1	M
D 17 13C5 PF										
467.5 > 422.6	11.434	11.462	-0.028		2598360	32.0		63.9	2997	

QC Flag Legend

Review Flags

M - Manually Integrated

ALS Bottle#:

31

Worklist Smp#:

25

Operator ID:

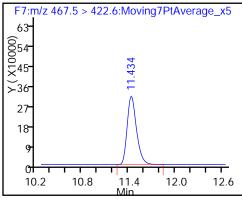
JRB

Dil. Factor: Injection Vol: 15.0 ul 1.0000 PFAC A4 LC PFC_DOD ICAL Method: Limit Group: D 813C4-PFHpA 51 Perfluorobutanesulfonic acid (ND) 9 Perfluoroheptanoic acid (ND) F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 (0066-×55-30 0015-X 12-<u>25</u>-. ∑₂₀ 15 33 10 22 11 8.8 9.4 6.0 6.6 7.2 7.8 8.3 8.9 9.5 10.1 8.2 10.0 10.6 D 11 1802 PFHxS D 12 13C4 PFOA 58 Perfluorohexanesulfonic acid F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F5:m/z 416.5 > 371.6:Moving7PtAverage x5(000015⁻ X) 12⁻ 42 77- 636- ∑30 ×55 **≻**24 18 33 12 22 11 9.0 9.6 9.9 10.2 9.0 9.3 9.6 10.0 11.2 10.6 8.7 9.4 D 16 13C4 PFOS 13 Perfluorooctanoic acid (ND) 13 Perfluorooctanoic acid (ND) F5:m/z 412.8 > 368.8:Moving7PtAverage_x5 F5:m/z 412.8 > 168.7:Moving7PtAverage_x5 F6:m/z 502.4 > 79.7:Moving7PtAverage_x5 79 70 35 68 830 860 ×50 ×25 >46 ≻₂₀ ≻₄₀ 35 15 30 24 20 10 13 10 10.0 11.2 11.1 11.4 12.0 10.6 11.2 9.4 10.0 10.6 11.7 10.8 15 Perfluorooctane sulfonic acid (M) 15 Perfluorooctane sulfonic acid (M) 18 Perfluorononanoic acid (ND) F6:m/z 498.3 > 79.2:Moving7PtAverage_x5 F6:m/z 498.3 > 98.2:Moving7PtAverage_x5 F7:m/z 462.5 > 418.6:Moving7PtAverage_x5 24 56- 36 ©²⁰ ×16 ×40 ×₂₄ ≻₃₂-12 18 24 12 0 010.6 11.2 11.8 12.4 10.2 10.8 11.4 Page 404h of 5 12.6 10.4 11.0 10.0 11.6

Report Date: 31-May-2016 10:42:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_025.d

D 17 13C5 PFNA



Report Date: 31-May-2016 10:42:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_025.d

Injection Date: 27-May-2016 21:54:22 Instrument ID: A4

Lims ID: 320-18918-A-1-A Lab Sample ID: 320-18918-1

Client ID: OF-RW83-0516

Operator ID: JRB ALS Bottle#: 31 Worklist Smp#: 25

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

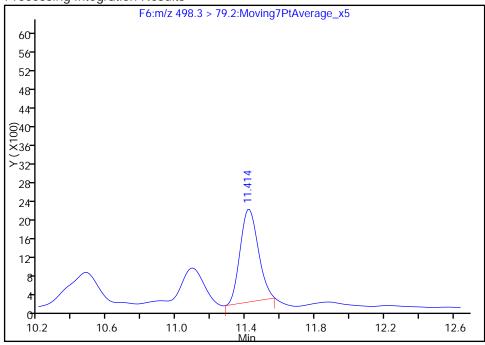
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

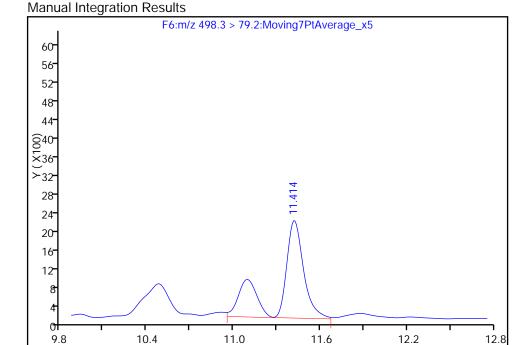
Signal: 1

RT: 11.41
Area: 14482
Amount: 2.968716
Amount Units: ng/ml

Processing Integration Results



RT: 11.41 Area: 24077 Amount: 4.878344 Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 10:09:04

Audit Action: Manually Integrated

Audit Reason: Isomers

Page 406 of 523

Report Date: 31-May-2016 10:42:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46
Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_025.d

Injection Date: 27-May-2016 21:54:22 Instrument ID: A4

Lims ID: 320-18918-A-1-A Lab Sample ID: 320-18918-1

Client ID: OF-RW83-0516

Operator ID: JRB ALS Bottle#: 31 Worklist Smp#: 25

Injection Vol: 15.0 ul Dil. Factor: 1.0000

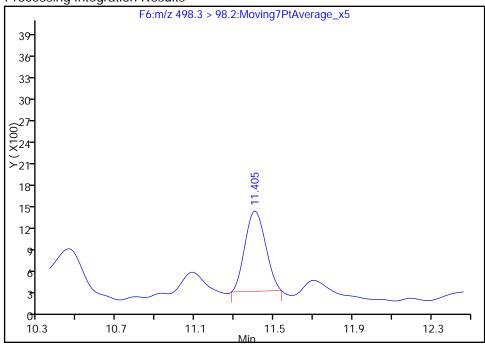
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

Column: Detector F6:MRM

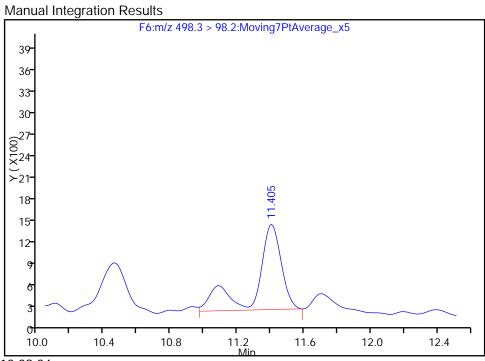
15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

RT: 11.41 Area: 8032 Amount: 2.968716 Amount Units: ng/ml **Processing Integration Results**



RT: 11.41 Area: 12299 Amount: 4.878344 Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 10:09:04

Audit Action: Manually Integrated

Audit Reason: Isomers Page 407 of 523

of 523 05/31/2016

FORM I LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

SDG No.:

Client Sample ID: OF-FB83-0516 Lab Sample ID: 320-18918-2

Matrix: Water Lab File ID: 27MAY2016B4A_026.d

Analysis Method: WS-LC-0025 Date Collected: 05/16/2016 08:15

Extraction Method: 3535 Date Extracted: 05/20/2016 11:05

Sample wt/vol: 514.7 (mL) Date Analyzed: 05/27/2016 22:15

Con. Extract Vol.: 1.0 (mL) Dilution Factor: 1

Injection Volume: 15(uL) GC Column: Acquity ID: 2.1(mm)

% Moisture: GPC Cleanup:(Y/N) N

Analysis Batch No.: 111733 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0019	U	0.0024	0.0019	0.00078
335-67-1	Perfluorooctanoic acid (PFOA)	0.0019	U	0.0024	0.0019	0.00073
375-95-1	Perfluorononanoic acid (PFNA)	0.0019	U M	0.0024	0.0019	0.00064
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0019	Ū	0.0024	0.0019	0.00089
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0019	Ū	0.0024	0.0019	0.00085
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0029	U M	0.0039	0.0029	0.0012

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	1802 PFHxS	84		25-150
STL00991	13C4 PFOS	24	Q	25-150
STL00995	13C5 PFNA	100		25-150
STL00990	13C4 PFOA	106		25-150
STL01892	13C4-PFHpA	96		25-150

Report Date: 31-May-2016 10:42:04 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_026.d

Lims ID: 320-18918-A-2-A Client ID: 0F-FB83-0516

Sample Type: Client

Inject. Date: 27-May-2016 22:15:04 ALS Bottle#: 32 Worklist Smp#: 26

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: 320-18918-a-2-a

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 10:41:00 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 31-May-2016 10:10:22

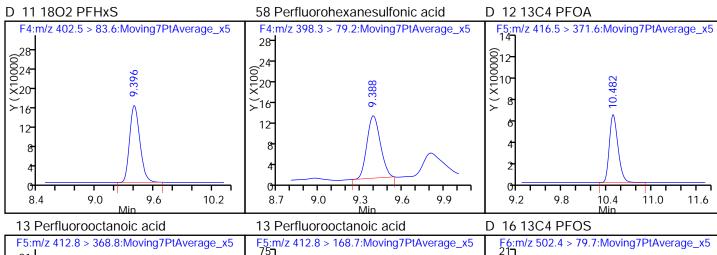
							,			
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 8 13C4-PFHpA										
366.6 > 321.6	9.365	9.366	-0.001		4041583	48.1		96.3	7762	
D 11 1802 PFHxS										
402.5 > 83.6	9.396	9.399	-0.003		1199777	39.6		83.6	3666	
58 Perfluorohexanesulfonic acid										
398.3 > 79.2	9.388	9.401	-0.013	1.000	8086	0.2025				
D 12 13C4 PFC	PΑ									
416.5 > 371.6	10.482	10.483	-0.001		5103308	53.2		106	8903	
13 Perfluorood	ctanoic ac	cid								
412.8 > 368.8	10.474	10.485	-0.011	1.000	3201	0.1471			11.2	
D 16 13C4 PFC)S									
502.4 > 79.7	11.440	11.441	-0.001		71074	11.4		23.8	207	
15 Perfluorood										M
498.3 > 79.2		11.443		1.000	5533	0.3944			13.9	M
498.3 > 98.2	11.440	11.443	-0.003	1.000	4056		1.36(0.00-0.00)		12.3	M
18 Perfluorono										M
	11.450	11.462	-0.012	1.000	6468	0.1019			18.1	M
D 17 13C5 PFN		44.4.5	0.005		1000015	500		100	7400	
467.5 > 422.6	11.459	11.462	-0.003		4080319	50.2		100	7128	

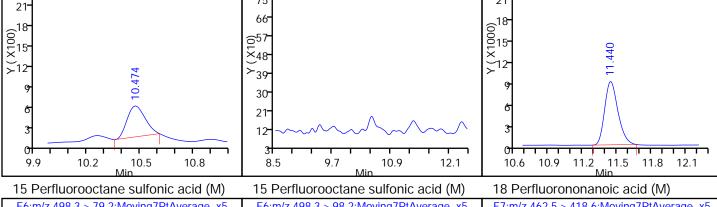
QC Flag Legend

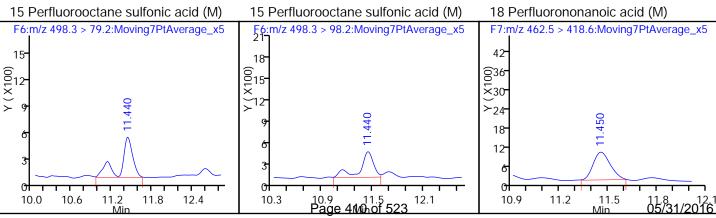
Review Flags

M - Manually Integrated

Report Date: 31-May-2016 10:42:04 Chrom Revision: 2.2 20-Apr-2016 13:59:46 TestAmerica Sacramento Data File: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\27MAY2016B4A_026.d **Injection Date:** 27-May-2016 22:15:04 Instrument ID: Lims ID: 320-18918-A-2-A Lab Sample ID: 320-18918-2 OF-FB83-0516 Client ID: Operator ID: **JRB** ALS Bottle#: 32 Worklist Smp#: 26 Dil. Factor: Injection Vol: 15.0 ul 1.0000 PFAC A4 LC PFC_DOD ICAL Method: Limit Group: D 813C4-PFHpA 51 Perfluorobutanesulfonic acid (ND) 9 Perfluoroheptanoic acid (ND) F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 15- (0078-×65-(X100 (X100 8 0012 × × × 9 **≻**52 39 26 13 9.5 6.0 6.6 7.2 7.8 8.3 8.9 10.1 8.2 8.8 9.4 10.0 D 11 1802 PFHxS 12 13C4 PFOA 58 Perfluorohexanesulfonic acid F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 28 (0012 000010 X) × 8 ©24-©24-0020-×20-∑20 ∑16- ≻16⁻ 12 12



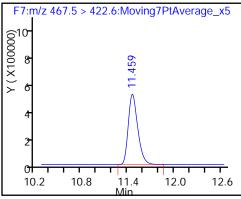




Report Date: 31-May-2016 10:42:04 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_026.d

D 17 13C5 PFNA



Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report Report Date: 31-May-2016 10:42:04

TestAmerica Sacramento

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_026.d

Injection Date: 27-May-2016 22:15:04 Instrument ID:

Lims ID: 320-18918-A-2-A Lab Sample ID: 320-18918-2

Client ID: OF-FB83-0516

ALS Bottle#: Operator ID: **JRB** 32 Worklist Smp#: 26

Injection Vol: 15.0 ul Dil. Factor: 1.0000

PFAC_A4 Method: Limit Group: LC PFC_DOD ICAL

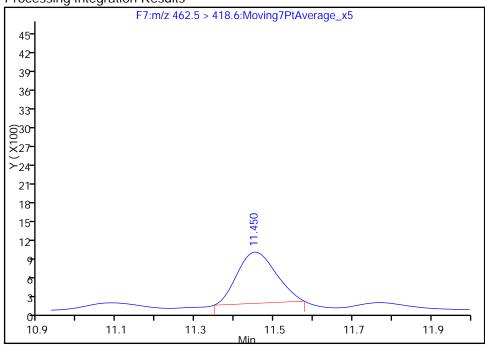
Column: Detector F7:MRM

18 Perfluorononanoic acid, CAS: 375-95-1

Signal: 1

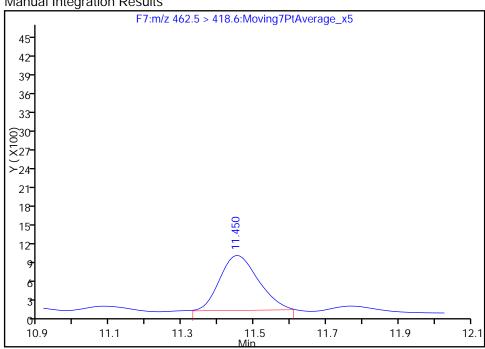
RT: 11.45 Area: 5550 Amount: 0.093085 Amount Units: ng/ml

Processing Integration Results



RT: 11.45 Area: 6468 Amount: 0.101949 Amount Units: ng/ml

Manual Integration Results



Reviewer: barnettj, 31-May-2016 10:10:22

Audit Action: Manually Integrated

Audit Reason: Baseline

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report Report Date: 31-May-2016 10:42:04

TestAmerica Sacramento

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_026.d

Injection Date: 27-May-2016 22:15:04 Instrument ID:

Lims ID: 320-18918-A-2-A Lab Sample ID: 320-18918-2

Client ID: OF-FB83-0516

Operator ID: ALS Bottle#: 32 **JRB** Worklist Smp#: 26

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

Column: Detector F6:MRM

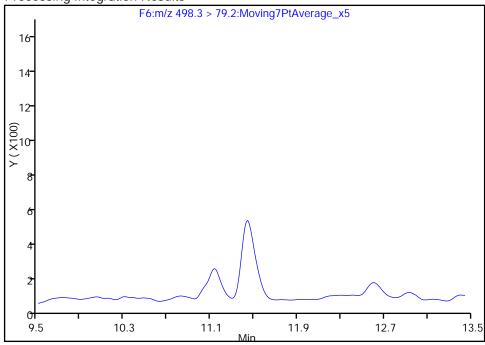
15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

Not Detected

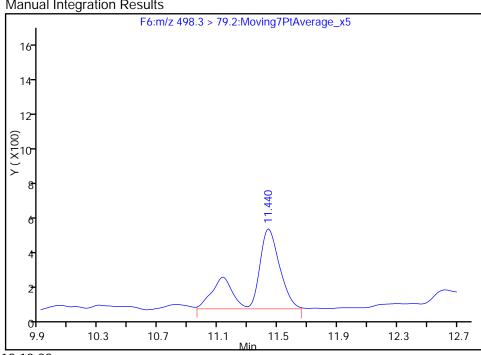
Expected RT: 11.44

Processing Integration Results



RT: 11.44 Area: 5533 Amount: 0.394351 Amount Units: ng/ml

Manual Integration Results



Reviewer: barnettj, 31-May-2016 10:10:22

Audit Action: Manually Integrated

Audit Reason: Missed Peak

Report Date: 31-May-2016 10:42:04 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_026.d

Injection Date: 27-May-2016 22:15:04 Instrument ID: A4

Lims ID: 320-18918-A-2-A Lab Sample ID: 320-18918-2

Client ID: OF-FB83-0516

Operator ID: JRB ALS Bottle#: 32 Worklist Smp#: 26

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

Column: Detector F6:MRM

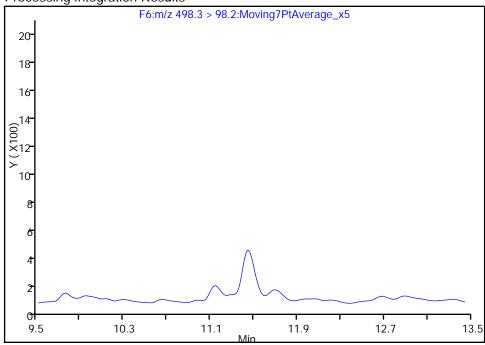
15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

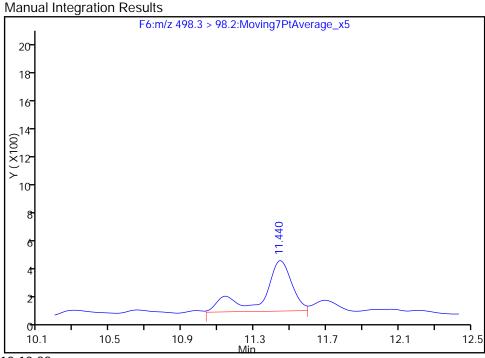
Not Detected

Expected RT: 11.44

Processing Integration Results



RT: 11.44
Area: 4056
Amount: 0.394351
Amount Units: ng/ml



Reviewer: barnettj, 31-May-2016 10:10:22

Audit Action: Manually Integrated

Audit Reason: Missed Peak

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LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA RETENTION TIME SUMMARY

Lab Name: TestAmerica Sacramento

SDG No.:

Instrument ID: A4

GC Column: Acquity

Calibration Start Date: 05/27/2016 11:17

Job No.: 320-18918-1

Analy Batch No.: 111733

Heated Purge: (Y/N) N

Calibration End Date: 05/27/2016 13:24

Calibration ID: 21794

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111733/2	27MAY2016B4A 002.d
Level 2	STD 320-111733/3	27MAY2016B4A 003.d
Level 3	STD 320-111733/4	27MAY2016B4A 004.d
Level 4	STD 320-111733/5	27MAY2016B4A 005.d
Level 5	STD 320-111733/6	27MAY2016B4A 006.d
Level 6	STD 320-111733/7	27MAY2016B4A 007.d
Level 7	STD 320-111733/8	27MAY2016B4A 008.d

ANALYTE	LVL 1	LVL 2	LVL 3	LVL 4	LVL 5	LVL 6	LVL 7	RT WINDOW	AVG RT
Perfluorobutanoic acid (PFBA)	5.797	5.791	5.791	5.791	5.791	5.794	5.791	5.542 - 6.042	5.792
Perfluoropentanoic acid (PFPeA)	6.899	6.899	6.895	6.895	6.895	6.890	6.895	6.645 - 7.145	6.895
Perfluorobutanesulfonic acid (PFBS)	7.024	7.014	7.005	7.005	7.010	7.010	7.005	6.761 - 7.261	7.010
Perfluorohexanoic acid (PFHxA)	8.138	8.144	8.144	8.138	8.144	8.138	8.133	7.890 - 8.390	8.140
Perfluoroheptanoic acid (PFHpA)	+++++	9.365	9.365	9.365	9.365	9.365	9.365	9.115 - 9.615	9.365
Perfluorohexanesulfonic acid (PFHxS)	9.404	9.404	9.396	9.396	9.404	9.404	9.404	9.151 - 9.651	9.402
Perfluoroheptanesulfonic Acid (PFHpS)	10.491	10.491	10.482	10.482	10.482	10.485	10.482	10.235 - 10.735	10.485
Perfluorooctanoic acid (PFOA)	10.491	10.491	10.482	10.482	10.482	10.485	10.482	10.235 - 10.735	10.485
Perfluorooctanesulfonic acid (PFOS)	11.449	11.449	11.440	11.440	11.440	11.442	11.440	11.193 - 11.693	11.443
Perfluorononanoic acid (PFNA)	11.459	11.469	11.459	11.459	11.469	11.462	11.459	11.212 - 11.712	11.462
Perfluorodecanoic acid (PFDA)	12.298	12.298	12.298	12.298	12.298	12.302	12.298	12.049 - 12.549	12.299
Perfluorooctane Sulfonamide (FOSA)	12.884	12.871	12.871	12.871	12.871	12.875	12.871	12.623 - 13.123	12.873
Perfluorodecanesulfonic acid (PFDS)	12.961	12.974	12.974	12.961	12.974	12.965	12.974	12.719 - 13.219	12.969
Perfluoroundecanoic acid (PFUnA)	13.020	13.020	13.020	13.020	13.020	13.024	13.020	12.771 - 13.271	13.021
Perfluorododecanoic acid (PFDoA)	13.626	13.627	13.627	13.626	13.626	13.620	13.626	13.376 - 13.876	13.625
Perfluorotridecanoic Acid (PFTriA)	14.140	14.140	14.130	14.140	14.140	14.134	14.140	13.888 - 14.388	14.138
Perfluorotetradecanoic acid (PFTeA)	14.579	14.579	14.579	14.579	14.579	14.574	14.570	14.327 - 14.827	14.577
Perfluoro-n-hexadecanoic acid (PFHxDA)	15.234	15.234	15.234	15.234	15.234	15.237	15.234	14.985 - 15.485	15.234
Perfluoro-n-octandecanoic acid (PFODA)	15.575	15.575	15.575	15.575	15.575	15.578	15.575	15.325 - 15.825	15.575
13C4 PFBA	5.791	5.794	5.787	5.791	5.791	5.791	5.787	5.540 - 6.040	5.790
13C5-PFPeA	6.890	6.895	6.895	6.890	6.895	6.890	6.890	6.642 - 7.142	6.892
13C2 PFHxA	8.138	8.144	8.138	8.138	8.138	8.138	8.133	7.888 - 8.388	8.138
13C4-PFHpA	9.372	9.372	9.365	9.365	9.365	9.365	9.357	9.116 - 9.616	9.366
1802 PFHxS	9.404	9.404	9.396	9.396	9.396	9.396	9.404	9.149 - 9.649	9.399
13C4 PFOA	10.482	10.482	10.482	10.482	10.482	10.485	10.482	10.233 - 10.733	10.482
13C4 PFOS	11.449	11.440	11.440	11.440	11.440	11.442	11.440	11.191 - 11.691	11.442
13C5 PFNA	11.469	11.469	11.459	11.459	11.459	11.462	11.459	11.212 - 11.712	11.462
13C2 PFDA	12.298	12.298	12.298	12.298	12.298	12.302	12.298	12.049 - 12.549	12.299
13C8 FOSA	12.871	12.871	12.871	12.871	12.871	12.875	12.871	12.621 - 13.121	12.872
13C2 PFUnA	13.020	13.020	13.020	13.020	13.020	13.024	13.020	12.771 - 13.271	13.021
13C2 PFDoA	13.626	13.627	13.627	13.626	13.626	13.620	13.626	13.376 - 13.876	13.625
13C2-PFTeDA	14.579	14.579	14.579	14.579	14.579	14.574	14.579	14.329 - 14.829	14.578
13C2-PFHxDA	15.234	15.234	15.234	15.234	15.234	15.237	15.234	14.985 - 15.485	15.234

LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: $\underline{A4}$ GC Column: $\underline{Acquity}$ ID: $\underline{2.1 (mm)}$ Heated Purge: (Y/N) \underline{N}

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:	
Level 1	STD 320-111733/2	27MAY2016B4A 002.d	
Level 2	STD 320-111733/3	27MAY2016B4A 003.d	
Level 3	STD 320-111733/4	27MAY2016B4A 004.d	
Level 4	STD 320-111733/5	27MAY2016B4A 005.d	
Level 5	STD 320-111733/6	27MAY2016B4A 006.d	
Level 6	STD 320-111733/7	27MAY2016B4A 007.d	
Level 7	STD 320-111733/8	27MAY2016B4A 008.d	

ANALYTE		CF	יק		CURVE		COEFFICIENT	#	MIN CF	%RSD		R^2	# MIN R^2
	LVL 1 LVL 5	LVL 2 LVL 6	LVL 3 LVL 7	LVL 4	TYPE	В	M1	M2			%RSI	OR COD	OR COD
13C4 PFBA	122307 88914	118458 82594	122043 67111	122607	Ave		103433.463			22.5	50.0)	
13C5-PFPeA	87834 65054	88862 60926	90292 49690	88307	Ave		75852.0829			22.2	50.0)	
13C2 PFHxA	112782 86160	112072 71847	112613 60209	99440	Ave		93589.0229			22.9	50.0)	
13C4-PFHpA	100884 84755	99034 65681	96339 52680	88445	Ave		83974.1286			21.7	50.0)	
1802 PFHxS	38330 30970	36244 22079	35530 17168	31964	Ave		30326.4452			25.9	50.0)	
13C4 PFOA	120571 95011	120096 66703	113795 58013	96669	Ave		95836.9257			26.3	50.0)	
13C4 PFOS	7637.4 6162.0	7795.1 4381.9	7876.9 3517.0	6369.6	Ave		6248.57143			27.7	50.0)	
13C5 PFNA	95941 82537	95948 61401	96557 52872	83829	Ave		81298.0714			21.7	50.0)	
13C2 PFDA	126977 98638	121863 77257	123356 68153	105046	Ave		103041.294			22.6	50.0)	
13C8 FOSA	106795 96772	108930 78251	108843 68041	96734	Ave		94909.4200			16.9	50.0)	
13C2 PFUnA	128164 109830	124879 82693	127974 72650	113351	Ave		108505.803			20.6	50.0)	
13C2 PFDoA	126911 112831	132398 88968	124286 76848	116438	Ave		111239.746			18.6	50.0)	
13C2-PFTeDA	86075 76846	85027 67184	89188 57696	82069	Ave		77726.4371			14.7	50.0)	
13C2-PFHxDA	33736 28399	34182 25965	33606 21136	31233	Ave		29751.1229			16.4	50.0)	

Note: The ml coefficient is the same as Ave CF for an Ave curve type.

CURVE EVALUATION

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

ANALYTE			RRF			CURVE		COEFFICIE	NT	# MIN RRF	%RSD	#	MAX	R^2	 IIN R^2
	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	TYPE	В	M1	M2				%RSD	OR COD	OR COD
Perfluorobutanoic acid (PFBA)	65522 56359	79038 46329	82380	74651	60800	AveID		0.6490			8.8		35.0		
Perfluoropentanoic acid (PFPeA)	51010 28041	49163 23320	43069	38026	31761	AveID		0.4942			10.8		35.0		
Perfluorobutanesulfonic acid (PFBS)	27425 15501	25102 12585	24298	20519	17010	L2ID		0.6607						0.9910	0.9900
Perfluorohexanoic acid (PFHxA)	67250 33501	58420 27922	57894			L1ID		0.4641						1.0000	0.9900
Perfluoroheptanoic acid (PFHpA)	++++ 33003	67952 27317				AveID		0.5371			14.5		35.0		
Perfluorohexanesulfonic acid (PFHxS)	65531 35505	59249 27721		43254		AveID		1.5740			7.5		35.0		
Perfluoroheptanesulfonic Acid (PFHpS)	49246 32706	54930 27101	64201	48800		L2ID		7.8620						0.9980	0.9900
Perfluorooctanoic acid (PFOA)	51236 31609	47860 26247	53369	40862		L1ID		0.4577						0.9990	0.9900
Perfluorooctanesulfonic acid (PFOS)	82199 53102	88417 42560	89165	71708		L1ID		12.086						1.0000	0.9900
Perfluorononanoic acid (PFNA)	103188 75899	135842 68236		98608	106986			1.2692						0.9930	0.9900
Perfluorodecanoic acid (PFDA)	115172 86500	72650						1.0749			7.8		35.0		
Perfluorooctane Sulfonamide (FOSA)	89732 83504	115881 74646		101379	111037	AveID		1.0540			9.5		35.0		
Perfluorodecanesulfonic acid (PFDS)	23757 15730	28387 12155	35716			AveID		3.7414			12.0		50.0		
Perfluoroundecanoic acid (PFUnA)	141984 96215	155280 80772		125553	129956	AveID		1.1596			4.6		35.0		
Perfluorododecanoic acid (PFDoA)	112984 84187	72339		96050	110750	AveID		0.9167			6.7		35.0		
Perfluorotridecanoic Acid (PFTriA)	79968 66960	96792 53270		77966	83193	AveID		1.0324			10.8		50.0		
Perfluorotetradecanoic acid (PFTeA)	77696 31907	50651 27285	47012	35516	38030	AveID		0.5573			28.8		50.0		
Perfluoro-n-hexadecanoic acid (PFHxDA)	238502 70660	166963 58772	115123	82757	86042	L2ID	2.1338	2.7954						0.9960	0.9900
Perfluoro-n-octandecanoic acid (PFODA)	70620 57025	70399 49504	71507	67811	68007	AveID		2.1978			5.7		50.0		

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

LCMS BY EXTERNAL STANDARD - INITIAL CALIBRATION DATA RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111733/2	27MAY2016B4A 002.d
Level 2	STD 320-111733/3	27MAY2016B4A 003.d
Level 3	STD 320-111733/4	27MAY2016B4A 004.d
Level 4	STD 320-111733/5	27MAY2016B4A 005.d
Level 5	STD 320-111733/6	27MAY2016B4A 006.d
Level 6	STD 320-111733/7	27MAY2016B4A 007.d
Level 7	STD 320-111733/8	27MAY2016B4A 008.d

ANALYTE	CURVE			RESPONSE				CONCEN	TRATION (N	G/ML)	
	TYPE	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
13C4 PFBA	Ave	6115372 4129683	5922896 3355560	6102158	6130329	4445714	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C5-PFPeA	Ave	4391700 3046275	4443078 2484518	4514607	4415347	3252704	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFHxA	Ave	5639104 3592360	5603613 3010443	5630648	4971985	4308005	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C4-PFHpA	Ave	5044178 3284058	4951706 2634013	4816964	4422269	4237757	50.0 50.0	50.0 50.0	50.0	50.0	50.0
1802 PFHxS	Ave	1812994 1044335	1714340 812066	1680553	1511920	1464878	47.3 47.3	47.3 47.3	47.3	47.3	47.3
13C4 PFOA	Ave	6028555 3335155	6004812 2900631	5689738	4833468	4750565	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C4 PFOS	Ave	365070 209455	372607 168111	376516	304468	294545	47.8 47.8	47.8 47.8	47.8	47.8	47.8
13C5 PFNA	Ave	4797041 3070065	4797422 2643621	4827839	4191465	4126872	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFDA	Ave	6348829 3862828	6093155 3407629	6167778	5252314	4931920	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C8 FOSA	Ave	5339736 3912535	5446523 3402041	5442155	4836707	4838600	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFUnA	Ave	6408182 4134664	6243971 3632488	6398716	5667533	5491477	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2 PFDoA	Ave	6345542 4448387	6619880 3842375	6214302	5821892	5641533	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2-PFTeDA	Ave	4303766 3359201	4251362 2884794	4459397	4103454	3842279	50.0 50.0	50.0 50.0	50.0	50.0	50.0
13C2-PFHxDA	Ave	1686815 1298274	1709081 1056796	1680316	1561650	1419961	50.0 50.0	50.0 50.0	50.0	50.0	50.0

Curve Type Legend:

Ave = Average

RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1 Analy Batch No.: 111733

SDG No.:

Instrument ID: A4 GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N

Calibration Files:

LEVEL:	LAB SAMPLE ID:	LAB FILE ID:
Level 1	STD 320-111733/2	27MAY2016B4A 002.d
Level 2	STD 320-111733/3	27MAY2016B4A 003.d
Level 3	STD 320-111733/4	27MAY2016B4A 004.d
Level 4	STD 320-111733/5	27MAY2016B4A 005.d
Level 5	STD 320-111733/6	27MAY2016B4A 006.d
Level 6	STD 320-111733/7	27MAY2016B4A 007.d
Level 7	STD 320-111733/8	27MAY2016B4A 008.d

ANALYTE	IS CURVI			RESPONSE				CONCEN	ITRATION (N	G/ML)	
	REF TYPE	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5
Perfluorobutanoic acid (PFBA)	AveI	32761 11271766	79038 18531497	411899	1493014	3040022	0.500 200	1.00	5.00	20.0	50.0
Perfluoropentanoic acid (PFPeA)	AveI	25505 5608119	49163 9327831	215346	760519	1588028	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorobutanesulfonic acid (PFBS)	L2ID	12122 2740499	22190 4450007	107395	362783	751821	0.442 177	0.884 354	4.42	17.7	44.2
Perfluorohexanoic acid (PFHxA)	L1ID	33625 6700227	58420 11168800	289472	829722	2062892	0.500 200	1.00 400	5.00	20.0	50.0
Perfluoroheptanoic acid (PFHpA)	AveI	6600504	67952 10926693	251708	810433	2267149	+++++ 200	1.00 400	5.00	20.0	50.0
Perfluorohexanesulfonic acid (PFHxS)	AveI	30996 6717467	56050 10489666	248660	818371	2370680	0.473 189	0.946 378	4.73	18.9	47.3
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID	23441 6227195	52293 10320043	305599	929146	2412173	0.476 190	0.952 381	4.76	19.0	47.6
Perfluorooctanoic acid (PFOA)	L1ID	25618 6321774	47860 10498872	266844	817233	2112373	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorooctanesulfonic acid (PFOS)	L1ID	39291 10153061	84527 16274880	426209	1371052	3568981	0.478 191	0.956 382	4.78	19.1	47.8
Perfluorononanoic acid (PFNA)	L2ID	51594 15179720	135842 27294533	593475	1972169	5349285	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorodecanoic acid (PFDA)	AveI	57586 17300091	137110 29059913	682419	2190054	5708999	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorooctane Sulfonamide (FOSA)	AveI	44866 16700878	115881 29858502	606618	2027572	5551847	0.500 200	1.00 400	5.00	20.0	50.0
Perfluorodecanesulfonic acid (PFDS)	AveI	11451 3032821	27365 4687057	172152	485982	1158252	0.482 193	0.964 386	4.82	19.3	48.2
Perfluoroundecanoic acid (PFUnA)	AveI	70992 19242949	155280 32308856	767762	2511061	6497810	0.500	1.00	5.00	20.0	50.0
Perfluorododecanoic acid (PFDoA)	AveI	56492 16837391	112952 28935429	608510	1920992	5537515	0.500 200	1.00 400	5.00	20.0	50.0

RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Sacramento Analy Batch No.: 111733 Job No.: 320-18918-1

SDG No.:

GC Column: Acquity ID: 2.1(mm) Heated Purge: (Y/N) N Instrument ID: A4

Calibration Start Date: 05/27/2016 11:17 Calibration End Date: 05/27/2016 13:24 Calibration ID: 21794

ANALYTE	IS								CONCENTRATION (NG/ML)						
	REF	TYPE	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5	LVL 1 LVL 6	LVL 2 LVL 7	LVL 3	LVL 4	LVL 5			
Perfluorotridecanoic Acid (PFTriA)		AveID	39984 13391959	96792 21307860	538198	1559315	4159657	0.500	1.00	5.00	20.0	50.0			
Perfluorotetradecanoic acid (PFTeA)		AveID	38848 6381395	50651 10914055	235060	710312	1901507	0.500 200	1.00 400	5.00	20.0	50.0			
Perfluoro-n-hexadecanoic acid (PFHxDA)		L2ID	119251 14132019	166963 23508759	575613	1655130	4302103	0.500 200	1.00 400	5.00	20.0	50.0			
Perfluoro-n-octandecanoic acid (PFODA)		AveID	35310 11405069	70399 19801766	357536	1356212	3400331	0.500 200	1.00 400	5.00	20.0	50.0			

Curve Type Legend:

AveID = Average isotope dilution

L1ID = Linear 1/conc IsoDil

L2ID = Linear 1/conc^2 IsoDil

Report Date: 31-May-2016 09:49:59 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_002.d

Lims ID: Std L1

Client ID:

Sample Type: IC Calib Level: 1

Inject. Date: 27-May-2016 11:17:01 ALS Bottle#: 10 Worklist Smp#: 2

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: STD L1

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:49:58 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 27-May-2016 14:03:51

First Level Revie	ewer: bar	nettj			Date:	2	27-May-2016 14:03:	ay-2016 14:03:51				
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags		
D 113C4 PFB/	Δ											
216.7 > 171.5	5.791	5.790	0.001		6115372	59.1		118	20681			
2 Perfluorobu	tvric acid											
212.7 > 168.6	5.797	5.792	0.005	1.000	32761	0.4127		82.5	113			
D 3 13C5-PFP	eA											
267.6 > 222.7	6.890	6.892	-0.002		4391700	57.9		116	11555			
4 Perfluorope	ntanoic a	cid										
262.9 > 218.7	6.899	6.895	0.004	1.000	25505	0.5876		118	11.1			
5 Perfluorobu												
298.8 > 79.6	7.024	7.011	0.013	1.000	12122	NC			26.4			
298.8 > 98.6	7.014	7.011	0.003	0.999	7477		1.62(0.00-0.00)		21.4			
51 Perfluorobu				1 000	10100	0.4407		00.7				
298.8 > 79.6	7.024	7.011	0.013	1.000	12122	0.4406		99.7				
D 6 13C2 PFH: 314.6 > 269.7		8.138	0.0		5639104	60.3		121	11489			
			0.0		3039104	00.3		121	11409			
7 Perfluorohe: 312.9 > 268.7			-0.002	1.000	33625	0.5051		101	154			
9 Perfluorohe			-0.002	1.000	33023	0.3031		101	134			
362.8 > 318.7	•	9.365	0.0	1.000	26504	0.4891		97.8	113			
D 8 13C4-PFH		7.000	0.0	1.000	2000 1	0.1071		77.0				
	9.372	9.366	0.006		5044178	60.1		120	9387			
D 11 1802 PFH												
402.5 > 83.6	9.404	9.399	0.005		1812994	59.8		126	3359			
58 Perfluorohe	exanesulf	onic aci	d									
398.3 > 79.2	9.404	9.401	0.003	1.000	30996	0.5138		109				
10 Perfluorohe	exane Su	lfonate										
398.3 > 79.2	9.404	9.401	0.003	1.000	30996	NC			73.8			
					Page 421 of	523			05/31	1/2016		

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Report Date: 31-May-2016 09:49:59 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Data File:													
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags			
	10.482		-0.001		6028555	62.9		126	8659				
412.8 > 168.7	10.491 10.482	10.485 10.485	-0.003	1.000 0.999	25618 9443	0.5428	2.71(0.00-0.00)	109 109	45.3 43.6				
	10.491	10.485		1.000	23441	0.4766		100					
	10.491		0.006	1.000	23441	NC			101				
D 16 13C4 PFC 502.4 > 79.7		11.441	0.008		365070	58.4		122	1441				
15 Perfluorood 498.3 > 79.2 498.3 > 98.2	11.449 11.440	11.443 11.443	0.006	1.000 0.999	39291 23532	0.5121	1.67(0.00-0.00)	107 107	157 73.0				
18 Perfluorono 462.5 > 418.6			-0.003	1.000	51594	0.4632		92.6	97.8				
D 17 13C5 PFN 467.5 > 422.6		11.462	0.007		4797041	59.0		118	8091				
D 19 13C2 PFD 514.4 > 469.5	A 12.298	12.299	-0.001		6348829	61.6		123	8474				
20 Perfluorode 512.5 > 468.5	ecanoic a 12.298		-0.001	1.000	57586	0.4219		84.4	173				
D 23 13C8 FOS 505.4 > 77.6	SA 12.871	12.871	0.0		5339736	56.3		113	4679				
24 Perfluorood 497.5 > 77.6				1.000	44866	0.3986		79.7	174				
25 Perfluorode 598.4 > 79.6			-0.008	1.000	11451	NC			43.4				
49 Perfluorode 598.4 > 79.6	ecane Su 12.961			1.000	11451	0.4007		83.1					
27 Perfluorour 562.4 > 518.5	ndecanoio	c acid		1.000	70992	0.4777		95.5	118				
D 26 13C2 PFU 564.3 > 519.5	InA			1.000	6408182	59.1		118	5833				
D 28 13C2 PFD	οΑ												
614.4 > 569.4 29 Perfluorodo			0.0		6345542	57.0		114	4500				
612.4 > 568.6 30 Perfluorotri			0.0	1.000	56492	0.4856		97.1	21.1				
662.4 > 618.5 32 Perfluorote	14.140 tradecan		0.002	1.000	39984	0.4499		90.0	15.6				
712.6 > 668.5	14.579		0.002	1.000	38848	0.8099		162	20.5				
D 33 13C2-PFT 714.5 > 669.5	14.579	14.579	0.0		4303766	55.4		111	4184				
D 35 13C2-PFF 814.8 > 769.6	15.234		-0.001		1686815	56.7		113	3330				
34 Perfluorohe 812.6 > 768.6			-0.001	1.000	Page 422 of	523 ^{0.5012}		100	²¹ 05/3	1/2016			

Report Date: 31-May-2016 09:49:59 Chrom Revision: 2.2 20-Apr-2016 13:59:46 \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_002.d Data File:

EXP **DLT REL** Amount Signal RT RT ng/ml Ratio(Limits) %Rec S/N Flags RT RT Response

36 Perfluorooctandecanoic acid

912.7 > 868.6 15.575 15.575 0.0 1.000 95.2 35310 0.4762 53.5

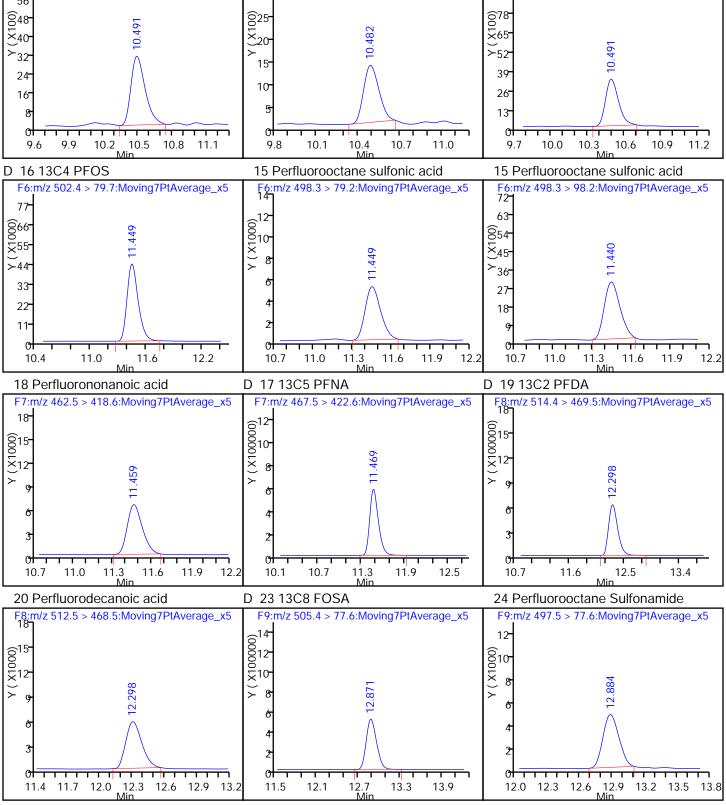
OC Flag Legend Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L1_00018 Amount Added: 1.00 Units: mL

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Report Date: 31-May-2016 09:49:59 TestAmerica Sacramento Data File: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\27MAY2016B4A_002.d **Injection Date:** 27-May-2016 11:17:01 Instrument ID: A4 Lims ID: Std L1 Client ID: Operator ID: **JRB** ALS Bottle#: 10 Worklist Smp#: 2 15.0 ul Dil. Factor: 1.0000 Injection Vol: PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 (12 (0000010 (X) X Y (X100000) 960 ×50-≻₄₀ 30 20 10 5.3 5.9 6.5 5.5 5.8 5.8 7.0 6.1 6.4 7.6 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid D F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 (0012 000010 X) × 49 77 <u>6</u>42 966 ×55 ×35• >₄₄ ≻₂₈-33 21 22 14 7.0 6.9 7.6 7.3 7.2 8.2 8.8 6.4 6.7 7.6 6.3 7.5 7.0 6.6 8 13C4-PFHpA 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 10 (0000012 X) X Y (X1000) Y (X1000) 7.8 8.1 8.7 8.8 9.1 9.4 9.7 10.0 8.2 8.8 9.4 7.5 8.4 8.5 10.0 11 1802 PFHxS D 12 13C4 PFOA 58 Perfluorohexanesulfonic acid F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 77-000012 X (00001X) (0036 66⁶⁶ ×55 <u>~</u>44 **≻**24 33 18 22 12 0 0 9.0 9.6 10.2 8.6 8.9 9.2 9.5 Page 424h of 5 9.8 10.1 9.3 9.9 10.5 8.4



15.6

15.9

18-

14.5

14.8

15.1

15.4

15.7

16.0

15.0

15.3

Report Date: 31-May-2016 09:50:14 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_003.d

Lims ID: Std L2

Client ID:

Sample Type: IC Calib Level: 2

Inject. Date: 27-May-2016 11:38:10 ALS Bottle#: 11 Worklist Smp#: 3

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: STD L2

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:50:12 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 27-May-2016 14:08:02

First Level Revie	wer: bar	nettj			Date:	2	27-May-2016 14:08:	02		
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA	4									
216.7 > 171.5	5.794	5.790	0.004		5922896	57.3		115	14014	
2 Perfluorobut	yric acid									
212.7 > 168.6	5.791		-0.001	1.000	79038	1.03		103	268	
D 3 13C5-PFP6	eΑ									
267.6 > 222.7	6.895	6.892	0.003		4443078	58.6		117	11183	
4 Perfluoroper	ntanoic a	cid								
262.9 > 218.7	6.899	6.895	0.004	1.000	49163	1.12		112	15.9	
5 Perfluorobut	ane Sulf	onate								
298.8 > 79.6	7.014	7.011	0.003	1.000	22190	NC			51.2	
298.8 > 98.6	7.005	7.011	-0.006	0.999	14858		1.49(0.00-0.00)		41.6	
51 Perfluorobu										
298.8 > 79.6	7.014	7.011	0.003	1.000	22190	0.8886		101		
D 6 13C2 PFHx										
314.6 > 269.7	8.144		0.006		5603613	59.9		120	9795	
7 Perfluorohex										
	8.144		0.004	1.000	58420	0.9858		98.6	298	
9 Perfluoroher				1 000	/7050	4.00		400	050	
362.8 > 318.7		9.365	0.0	1.000	67952	1.28		128	253	
D 8 13C4-PFH _k		0.044	0.007		1051707	50.0		440	74.0	
	9.372	9.366	0.006		4951706	59.0		118	7163	
D 11 1802 PFH			0.005		1711010	5 / 5		100		
402.5 > 83.6	9.404	9.399	0.005		1714340	56.5		120	4479	
58 Perfluorohe				1 000	5,050	0.0005		101		
398.3 > 79.2	9.404		0.003	1.000	56050	0.9825		104		
10 Perfluorohe			0.000	1 000	F/050	NIO			101	
398.3 > 79.2	9.404	9.401	0.003	1.000	56050	NC			121	
					Page 427 of	523			05/31	1/2016

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Report Date: 31-May-2016 09:50:14 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Report Date: 31 Data File:	,			to\Chrom			20-Apr-2016 13:59 0\27MAY2016B4A_(
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFC 416.5 > 371.6	OA 10.482	10.483	-0.001		6004812	62.7		125	8251	
412.8 > 168.7	10.491 10.482	10.485 10.485	-0.003	1.000 0.999	47860 16962	0.9492	2.82(0.00-0.00)	94.9 94.9	109 93.0	
	10.491	10.485		1.000	52293	0.9395		98.7		
	10.491		0.006	1.000	52293	NC			315	
D 16 13C4 PFC 502.4 > 79.7		11.441	-0.001		372607	59.6		125	1761	
15 Perfluorood 498.3 > 79.2 498.3 > 98.2	11.449 11.449	11.443 11.443	0.006	1.000 1.000	84527 55334	0.9837	1.53(0.00-0.00)	103 103	187 169	
18 Perfluorono 462.5 > 418.6			0.007	1.000	135842	1.16		116	277	
D 17 13C5 PFN 467.5 > 422.6		11.462	0.007		4797422	59.0		118	6793	
D 19 13C2 PFD 514.4 > 469.5	0A 12.298	12.299	-0.001		6093155	59.1		118	5984	
20 Perfluorode 512.5 > 468.5	ecanoic a 12.298		-0.001	1.000	137110	1.05		105	347	
D 23 13C8 FOS 505.4 > 77.6	SA 12.871	12.871	0.0		5446523	57.4		115	3669	
24 Perfluorood 497.5 > 77.6				1.000	115881	1.01		101	485	
25 Perfluorode 598.4 > 79.6			0.005	1.000	27365	NC			88.5	
49 Perfluorode		lfonic ac	id	1.000	27365	0.9383		97.3		
27 Perfluorour 562.4 > 518.5	ndecanoio	c acid		1.000	155280	1.07		107	280	
D 26 13C2 PFL	JnA			1.000						
564.3 > 519.5 D 28 13C2 PFD	ООА				6243971	57.5		115	5308	
614.4 > 569.4 29 Perfluorodo			0.001		6619880	59.5		119	4617	
612.4 > 568.6 30 Perfluorotri			0.001	1.000	112952	0.9307		93.1	44.2	
662.4 > 618.5	14.140	14.138	0.002	1.000	96792	1.10		110	45.0	
32 Perfluorote 712.6 > 668.5	14.579		0.002	1.000	50651	1.07		107	32.4	
D 33 13C2-PFT 714.5 > 669.5		14.579	0.0		4251362	54.7		109	3386	
D 35 13C2-PFF 814.8 > 769.6		15.235	-0.001		1709081	57.4		115	3894	
34 Perfluorohe 812.6 > 768.6			-0.001	1.000	Page 428 of	523 ^{0.9840}		98.4	²⁹ 05/3	1/2016

Report Date: 31-May-2016 09:50:14 Chrom Revision: 2.2 20-Apr-2016 13:59:46 \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_003.d Data File:

		EXP	DLT	REL		Amount				
Signal	RT	RT	RT	RT	Response	ng/ml	Ratio(Limits)	%Rec	S/N	Flags

36 Perfluorooctandecanoic acid

1.000 70399 0.9371 93.7 85.8

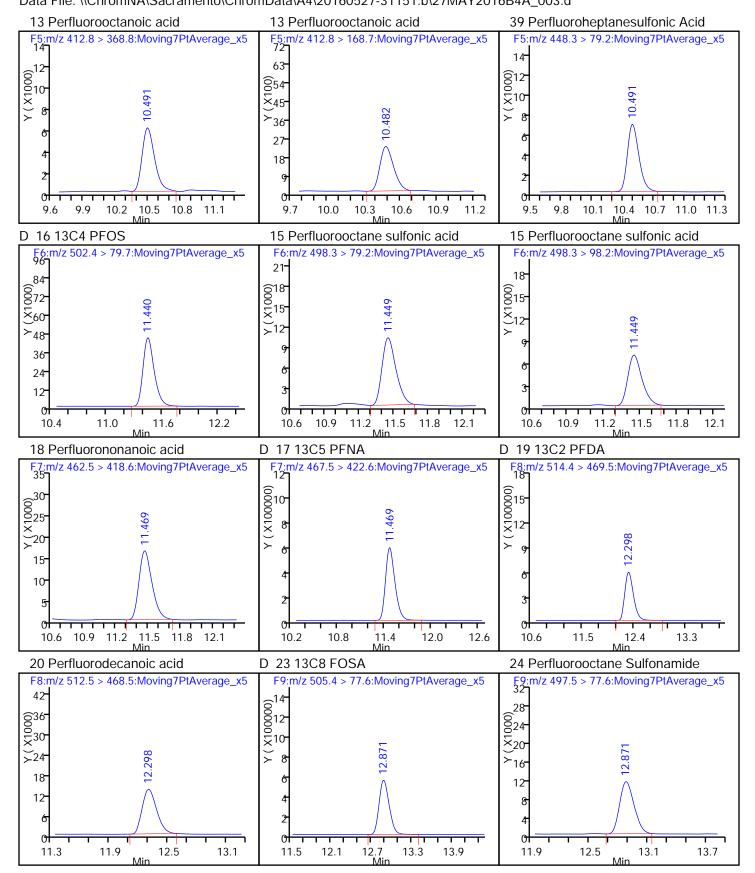
OC Flag Legend Processing Flags

NC - Not Calibrated

Reagents:

LCPFC-L2_00018 Amount Added: 1.00 Units: mL

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Report Date: 31-May-2016 09:50:14 TestAmerica Sacramento Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_003.d **Injection Date:** 27-May-2016 11:38:10 Instrument ID: A4 Lims ID: Std L2 Client ID: Operator ID: **JRB** ALS Bottle#: 11 Worklist Smp#: 3 15.0 ul Dil. Factor: 1.0000 Injection Vol: PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 (12 (0000010 (X) X (X100000) 018 0015 X 12 6.9 5.4 5.3 5.9 6.2 5.7 6.3 7.5 4.8 6.0 6.6 5.0 5.6 8.1 51 Perfluorobutanesulfonic acid 6 13C2 PFHxA 4 Perfluoropentanoic acid D F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 (00012-10-10-10-70 12 6.899 (X1000 X) × 60° ×50° _ ≻40 30 20 10 6.9 7.0 7.7 7.2 7.5 6.7 7.3 7.6 8.3 8.9 6.3 6.6 7.8 7.1 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid 8 13C4-PFHpA F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 14 (12¹ (0000010) (12¹ 18 0012 X) X) 8 0015 X 12 7.8 8.1 8.7 8.7 9.0 9.3 9.6 9.9 8.2 8.8 9.4 10.0 7.5 8.4 10.6 11 1802 PFHxS 58 Perfluorohexanesulfonic acid D 12 13C4 PFOA F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 0014 00012 X10 642 636 (00010 X) ×30 **≻**24 18 12 0 0| 0 8.9 9.2 9.5 Page 48@of 5 9.0 9.6 10.2 8.6 9.8 10.1 9.2 9.8 10.4 8.4



15.8

16.1

12

8

14.9

15.2

24

16

14.4

14.7

15.0

15.3

15.6

15.9

Report Date: 31-May-2016 09:50:32 Chrom Revision: 2.2 20-Apr-2016 13:59:46

> TestAmerica Sacramento **Target Compound Quantitation Report**

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_004.d

Lims ID: Std L3

Client ID:

Sample Type: IC Calib Level: 3

Inject. Date: 27-May-2016 11:59:21 ALS Bottle#: 12 Worklist Smp#: 4

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: STD L3

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm, T=35C

Operator ID: **JRB** Instrument ID: Α4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:50:30 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: **Initial Calibration**

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host:	XAWI	RK048								
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA										
216.7 > 171.5	5.787	5.790	-0.003		6102158	59.0		118	14691	
2 Perfluorobut	yric acid									
212.7 > 168.6	5.791	5.792	-0.001	1.000	411899	5.20		104	1461	
D 3 13C5-PFPe	eΑ									
267.6 > 222.7	6.895	6.892	0.003		4514607	59.5		119	9487	
4 Perfluoroper										
262.9 > 218.7			0.0	1.000	215346	4.83		96.5	77.8	
5 Perfluorobut										
298.8 > 79.6 298.8 > 98.6	7.005 7.005	7.011 7.011	-0.006 -0.006	1.000 1.000	107395 65863	NC	1 (2(0 00 0 00)		217	
				1.000	03803		1.63(0.00-0.00)		139	
51 Perfluorobu 298.8 > 79.6	7.005	7.011		1.000	107395	4.54		103		
D 6 13C2 PFHx		7.011	-0.000	1.000	107373	4.54		103		
314.6 > 269.7	8.138	8.138	0.0		5630648	60.2		120	8412	
7 Perfluorohex			0.0		0000010	00.2		120	0112	
312.9 > 268.7		8.140	0.004	1.000	289472	5.40		108	919	
9 Perfluorohep	otanoic a	cid								
362.8 > 318.7			0.0	1.000	251708	4.86		97.3	774	
D 8 13C4-PFHp	Α									
366.6 > 321.6	9.365	9.366	-0.001		4816964	57.4		115	7041	
D 11 1802 PFH	xS									
402.5 > 83.6	9.396	9.399	-0.003		1680553	55.4		117	4139	
58 Perfluorohe	xanesulf	onic acid	b							
398.3 > 79.2	9.396	9.401	-0.005	1.000	248660	4.45		94.0		
10 Perfluorohe										
398.3 > 79.2	9.396	9.401	-0.005	1.000	248660	NC			398	
D 12 13C4 PFO										
416.5 > 371.6	10.482	10.483	-0.001		5689738 Page 433 of 52	59.4 3		119	6550 05/31	/2016
						-			20,0	•

Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooct	anoic ac	id								
	10.482			1.000 1.000	266844 78658	5.20	3.39(0.00-0.00)	104 104	661 289	
412.8 > 168.7 39 Perfluorohe	10.482 ntanasuli			1.000	78038		3.39(0.00-0.00)	104	289	
448.3 > 79.2				1.000	305599	5.02		105		
14 Perfluorohe										
	10.482	10.485	-0.003	1.000	305599	NC			1764	
D 16 13C4 PFO: 502.4 > 79.7	S 11.440	11 441	-0 001		376516	60.3		126	1031	
15 Perfluorooct					0,0010	00.0		120	1001	
	11.440			1.000	426209	4.56		95.5	797	
	11.440		-0.003	1.000	261944		1.63(0.00-0.00)	95.5	610	
18 Perfluoronoi 462.5 > 418.6			-0.003	1.000	593475	4.88		97.6	939	
D 17 13C5 PFN			000					3		
467.5 > 422.6		11.462	-0.003		4827839	59.4		119	8973	
D 19 13C2 PFD		12 200	0.001		41/7770	E0.0		100	404F	
514.4 > 469.5 20 Perfluorode			-0.001		6167778	59.9		120	6345	
	12.298		-0.001	1.000	682419	5.15		103	1762	
D 23 13C8 FOS	A									
	12.871				5442155	57.3		115	3814	
24 Perfluorooct 497.5 > 77.6	ane Sulf 12.871			1.000	606618	5.29		106	1126	
25 Perfluorode			-0.002	1.000	000010	5.29		100	1120	
	12.974		0.005	1.000	172152	NC			928	
49 Perfluorode										
	12.974		0.005	1.000	172152	5.84		121		
27 Perfluoround 562.4 > 518.5			-0.001	1 000	767762	5.17		103	971	
D 26 13C2 PFU		13.021	-0.001	1.000	707702	3.17		103	771	
564.3 > 519.5		13.021	-0.001		6398716	59.0		118	6789	
D 28 13C2 PFD										
614.4 > 569.4			0.001		6214302	55.9		112	3491	
29 Perfluorodo 612.4 > 568.6			0.001	1.000	608510	5.34		107	269	
30 Perfluorotrid			0.001	1.000	000310	3.34		107	207	
662.4 > 618.5			-0.008	1.000	538198	5.85		117	261	
32 Perfluoroteti										
712.6 > 668.5		14.577	0.002	1.000	235060	4.73		94.6	114	
D 33 13C2-PFT6 714.5 > 669.5		1/ 570	0.0		4459397	57.4		115	4200	
D 35 13C2-PFH		14.0/7	0.0		440707/	57.4		110	4200	
814.8 > 769.6		15.235	-0.001		1680316	56.5		113	3475	
34 Perfluorohe										
812.6 > 768.6			-0.001	1.000	575613	5.36		107	96.1	
36 Perfluorooct 912.7 > 868.6			0.0	1.000	257526	1 01		96.8	420	
712.1 > 000.0	10.070	10.070	U.U	1.000	Page 434 of 52	3 4.04		70.0	420 65/31	1/2016

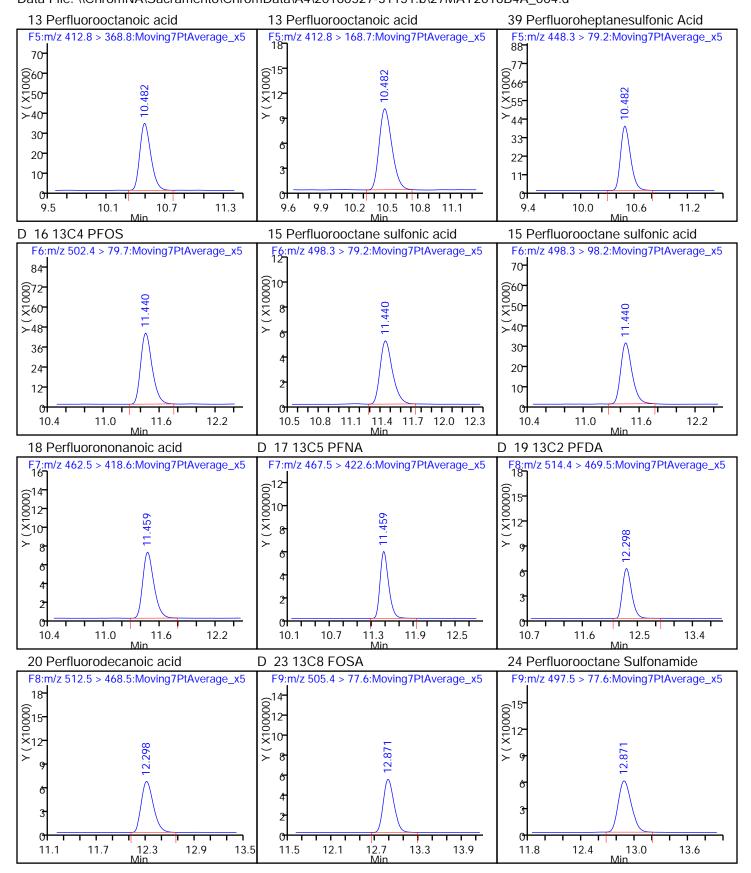
Report Date: 31-May-2016 09:50:32 Chrom Revision: 2.2 20-Apr-2016 13:59:46

OC Flag Legend Processing Flags NC - Not Calibrated

Reagents:

LCPFC-L3_00016 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:50:32 Chrom Revision: 2.2 20-Apr-2016 13:59:46 TestAmerica Sacramento Data File: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\27MAY2016B4A_004.d **Injection Date:** 27-May-2016 11:59:21 Instrument ID: A4 Lims ID: Std L3 Client ID: Operator ID: **JRB** ALS Bottle#: 12 Worklist Smp#: 15.0 ul Dil. Factor: 1.0000 Injection Vol: PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 (12 (0000010 (X) X Y (X100000) 6 8 8 8 $\stackrel{\smile}{\times}_{55}$ 33 22 5.4 5.8 7.0 4.8 6.0 6.6 5.2 5.5 5.8 6.1 6.4 7.6 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid D F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 (000012-X) > 8 56- 24- 0648- 1240- ∑ >16**-**-32 24 6.9 6.8 7.2 7.7 8.3 8.9 6.5 7.1 7.4 6.3 6.6 7.5 7.1 6.2 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid 8 13C4-PFHpA F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 (12¹ (0000010) (12¹ 70 ©56**-**0048**-**660 ∑50 ×40-≻40 ≻₃₂-30 24 20 16 10 01 7.9 8.2 8.5 8.9 9.5 8.9 9.5 10.1 7.6 8.8 8.3 10.1 8.3 D 12 13C4 PFOA 11 1802 PFHxS 58 Perfluorohexanesulfonic acid F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 (0000012 (0000012) 56**-**(36⁻ 00001× ×)24⁻ <u>8</u>48 ×40− **≻**32 18 24 12 16 0 0 8.8 9.1 9.4 9 Page 4866 of 5 8.8 9.4 10.0 10.6 8.5 10.0 10.3 9.3 9.9 10.5 8.2 11.1 05/31/2016



14.3 14.6

14.9

15.2 15.5 15.8 16.1

14.8

Report Date: 31-May-2016 09:50:43 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_005.d

Lims ID: Std L4

Client ID:

Sample Type: IC Calib Level: 4

Inject. Date: 27-May-2016 12:20:32 ALS Bottle#: 13 Worklist Smp#: 5

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: STD L4

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:50:42 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 29-May-2016 15:54:25

First Level Revie	eviewer: barnettj Date: 29-May-2016 15:54:25									
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA	7									
216.7 > 171.5	5.791	5.790	0.001		6130329	59.3		119	18828	
2 Perfluorobut	yric acid									
212.7 > 168.6	5.791		-0.001	1.000	1493014	18.8		93.8	4980	
D 3 13C5-PFP6	eΑ									
267.6 > 222.7	6.890	6.892	-0.002		4415347	58.2		116	8480	
4 Perfluoroper	ntanoic a	cid								
262.9 > 218.7	6.895	6.895	0.0	1.000	760519	17.4		87.1	250	
5 Perfluorobut										
298.8 > 79.6	7.005	7.011	-0.006	1.000	362783	NC	/		654	
298.8 > 98.6	7.005	7.011	-0.006	1.000	232034		1.56(0.00-0.00)		560	
51 Perfluorobu				1 000	2/2702	17.1		0/.0		
298.8 > 79.6	7.005	7.011	-0.006	1.000	362783	17.1		96.9		
D 6 13C2 PFHx 314.6 > 269.7		8.138	0.0		4971985	53.1		106	9074	
			0.0		4971900	JJ. I		100	9074	
7 Perfluorohex 312.9 > 268.7	8.138		-0.002	1.000	829722	17.8		89.2	1731	
9 Perfluoroher			0.002	1.000	027722	17.0		07.2	1731	
362.8 > 318.7		9.365	0.0	1.000	810433	17.1		85.3	3008	
D 8 13C4-PFH _k		7.000	0.0		0.0.00			00.0		
	9.365	9.366	-0.001		4422269	52.7		105	7341	
D 11 1802 PFH	xS									
402.5 > 83.6	9.396	9.399	-0.003		1511920	49.9		105	3328	
58 Perfluorohe	xanesulf	onic aci	d							
398.3 > 79.2	9.396	9.401	-0.005	1.000	818371	16.3		86.0		
10 Perfluorohe	xane Su	lfonate								
398.3 > 79.2	9.396	9.401	-0.005	1.000	818371	NC			1391	
					Page 439 of	523			05/3	1/2016

Page 439 of 523

Report Date: 31-May-2016 09:50:43 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Report Date: 31- Data File:	,			to\Chrom			20-Apr-2016 13:59: 0\27MAY2016B4A_0			
Data File.	1,01110	EXP	DLT	REL		Amount	727WA12010D4A_0	03.u		
Signal	RT	RT	RT	RT	Response	ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFO	Α									
416.5 > 371.6	10.482	10.483	-0.001		4833468	50.4		101	7797	
13 Perfluorooc				4 000	0.1.7000	40.5		00.7	10.15	
412.8 > 368.8 412.8 > 168.7	10.482 10.482			1.000 1.000	817233 260959	18.5	3.13(0.00-0.00)	92.7 92.7	1245 887	
39 Perfluorohe				1.000	200737		3.13(0.00-0.00)	72.1	007	
448.3 > 79.2	10.482			1.000	929146	18.6		97.9		
14 Perfluorohe	ptane Su	ılfonate								
448.3 > 79.2	10.482	10.485	-0.003	1.000	929146	NC			3380	
D 16 13C4 PFO			0.004		004440	40.7		100	4455	
502.4 > 79.7	11.440				304468	48.7		102	1155	
15 Perfluorooc 498.3 > 79.2	tane sulf 11.440			1.000	1371052	17.9		93.6	2346	
498.3 > 79.2	11.440			1.000	799992	17.7	1.71(0.00-0.00)	93.6	1591	
18 Perfluorono							(1.1.1.1.7)			
	11.459		-0.003	1.000	1972169	18.6		92.9	3227	
D 17 13C5 PFN	Α									
467.5 > 422.6	11.459	11.462	-0.003		4191465	51.6		103	7798	
D 19 13C2 PFD										
	12.298		-0.001		5252314	51.0		102	8197	
20 Perfluorode 512.5 > 468.5	canoic a 12.298		0.001	1.000	2190054	19.4		97.0	3088	
D 23 13C8 FOS		12.299	-0.001	1.000	2190054	19.4		97.0	3000	
505.4 > 77.6	A 12.871	12.871	0.0		4836707	51.0		102	3152	
24 Perfluorooc										
	12.871			1.000	2027572	19.9		99.4	2656	
25 Perfluorode	cane Sul	lfonate								
598.4 > 79.6	12.961	12.969	-0.008	1.000	485982	NC			1758	
49 Perfluorode										
598.4 > 79.6	12.961		-0.008	1.000	485982	20.4		106		
27 Perfluoroun			0.001	1 000	25110/1	10.1		05.5	2402	
562.4 > 518.5		13.021	-0.001	1.000	2511061	19.1		95.5	2483	
D 26 13C2 PFU 564.3 > 519.5		13 021	-0.001		5667533	52.2		104	5291	
D 28 13C2 PFD		10.021	0.001		0007000	02.2		101	0271	
614.4 > 569.4		13.626	0.0		5821892	52.3		105	3435	
29 Perfluorodo										
612.4 > 568.6			0.0	1.000	1920992	18.0		90.0	899	
30 Perfluorotrio	decanoic	acid								
662.4 > 618.5	14.140	14.138	0.002	1.000	1559315	18.4		92.0	706	
32 Perfluorotet										
712.6 > 668.5		14.577	0.002	1.000	710312	15.5		77.7	457	
D 33 13C2-PFT		14.570	0.0		4400454	F0.0		10/	2000	
714.5 > 669.5		14.579	0.0		4103454	52.8		106	3009	
D 35 13C2-PFH 814.8 > 769.6	XDA 15.234	15 225	-0 001		1561650	52.5		105	3268	
34 Perfluorohe			0.001		1001000	02.0		100	0200	
812.6 > 768.6			-0.001	1.000	Page 440 of 523	18.2		91.0	²⁸¹ 05/31	/2040
			•	-	Page 440 01 52)		-	U5/31	12010

Report Date: 31-May-2016 09:50:43 Chrom Revision: 2.2 20-Apr-2016 13:59:46 \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_005.d Data File:

EXP **REL DLT** Amount Signal RT RT ng/ml Ratio(Limits) %Rec S/N Flags RT RT Response

36 Perfluorooctandecanoic acid

912.7 > 868.6 15.575 15.575 0.0 19.8 98.8 1.000 1356212 1737

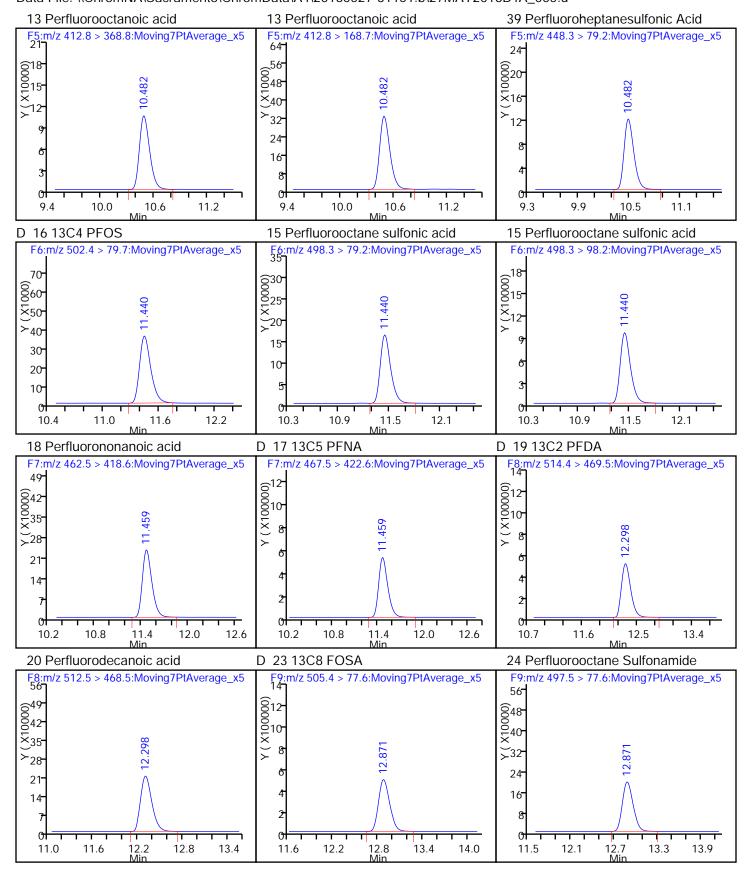
OC Flag Legend Processing Flags

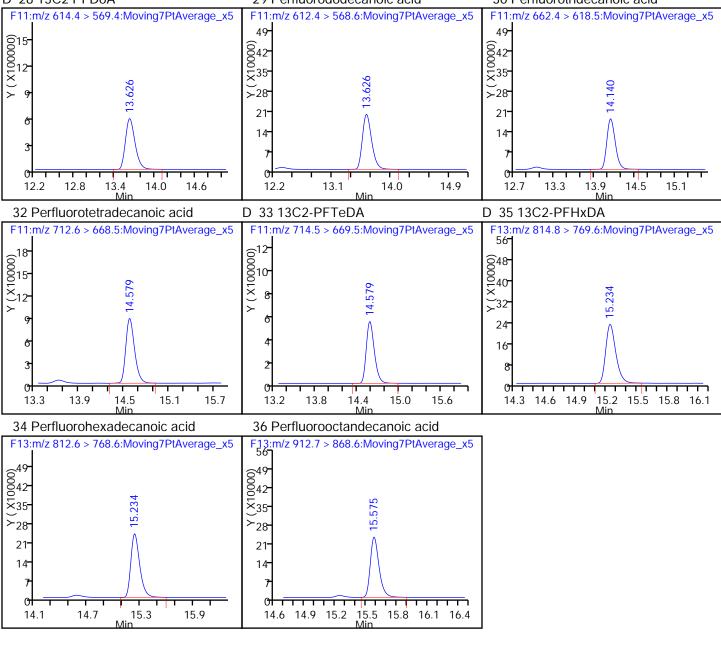
NC - Not Calibrated

Reagents:

LCPFC-L4_00018 Amount Added: 1.00 Units: mL

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Report Date: 31-May-2016 09:50:43 TestAmerica Sacramento Data File: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\27MAY2016B4A_005.d **Injection Date:** 27-May-2016 12:20:32 Instrument ID: A4 Lims ID: Std L4 Client ID: Operator ID: **JRB** ALS Bottle#: 13 Worklist Smp#: 5 15.0 ul Dil. Factor: Injection Vol: 1.0000 PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 (X100000) X ©28 ©24 671 678 ×65 $\stackrel{\smile}{\times}_{20}$ **≻**52 39 12 26 13 5.2 5.8 5.2 7.0 6.4 7.0 5.5 5.8 6.1 5.8 6.4 7.6 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid D F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 881 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 (0000010° ×) × 77- (000015 X) > 9 ×₅₅ 33 22 11-7.2 7.0 6.9 7.8 7.6 8.2 8.8 5.8 6.4 7.6 6.6 7.5 7.0 8 13C4-PFHpA 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid D F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 21-00018-X15-21-00018-X15-X (X100000) 01 7.9 8.2 8.5 8.7 9.3 9.9 10.5 8.7 9.3 9.9 7.6 8.8 8.1 10.5 8.1 D 12 13C4 PFOA 11 1802 PFHxS 58 Perfluorohexanesulfonic acid F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 (X100000) (X100000) 635 630 (000015-X) \succ_{20} 15 10 0 0 0 Page 44% of 523 9.0 9.6 10.2 8.4 10.2 9.2 9.8 10.4 8.4





Report Date: 31-May-2016 09:50:50 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_006.d

Lims ID: Std L5

Client ID:

Sample Type: IC Calib Level: 5

Inject. Date: 27-May-2016 12:41:42 ALS Bottle#: 14 Worklist Smp#: 6

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: STD L5

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:50:49 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

Process Host:	XAWI	RK048								
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA	١									
216.7 > 171.5	5.791	5.790	0.001		4445714	43.0		86.0	12758	
2 Perfluorobut	yric acid									
212.7 > 168.6	5.791	5.792	-0.001	1.000	3040022	52.7		105	8654	
D 3 13C5-PFP6	eΑ									
267.6 > 222.7	6.895	6.892	0.003		3252704	42.9		85.8	5848	
4 Perfluoroper										
		6.895	0.0	1.000	1588028	49.4		98.8	997	
5 Perfluorobut										
298.8 > 79.6	7.010	7.011	-0.001	1.000	751821 512274	NC	1 47(0 00 0 00)		1558	
298.8 > 98.6	7.010	7.011	-0.001	1.000	512374		1.47(0.00-0.00)		1372	
51 Perfluorobu 298.8 > 79.6		onic acid 7.011		1.000	751821	36.7		83.0		
D 6 13C2 PFHx		7.011	-0.001	1.000	731021	30.7		63.0		
314.6 > 269.7	8.138	8.138	0.0		4308005	46.0		92.1	10683	
7 Perfluorohex			0.0		4300003	40.0		72.1	10003	
312.9 > 268.7	8.144		0.004	1.000	2062892	51.4		103	2429	
9 Perfluoroher	otanoic a	cid								
	9.365	9.365	0.0	1.000	2267149	49.8		99.6	5056	
D 8 13C4-PFH _k	Α									
366.6 > 321.6	9.365	9.366	-0.001		4237757	50.5		101	4835	
D 11 1802 PFH	xS									
402.5 > 83.6	9.396	9.399	-0.003		1464878	48.3		102	3478	
58 Perfluorohe	xanesulf	onic acid	d							
398.3 > 79.2	9.404	9.401	0.003	1.000	2370680	48.6		103		
10 Perfluorohe										
398.3 > 79.2	9.404	9.401	0.003	1.000	2370680	NC			3836	
D 12 13C4 PFO										
416.5 > 371.6	10.482	10.483	-0.001		4750565 Page 445 of 9	49.6 523		99.1	7574 05/3	1/2016
					. 232 110 01				30,0	

Report Date: 31-May-2016 09:50:50 Chrom Revision: 2.2 20-Apr-2016 13:59:46

	Report Date: 31- Data File:				:o\Chrom			20-Apr-2016 13:59: \27MAY2016B4A_0			
	Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
	412.8 > 168.7	10.482 10.482	10.485 10.485	-0.003	1.000 1.000	2112373 670755	48.7	3.15(0.00-0.00)	97.3 97.3	2867 2092	
	39 Perfluorohe 448.3 > 79.2	•			1.000	2412173	49.9		105		
	14 Perfluorohe 448.3 > 79.2	ptane Su 10.482		-0.003	1.000	2412173	NC			3934	
	D 16 13C4 PFO 502.4 > 79.7	S 11.440	11.441	-0.001		294545	47.1		98.6	1232	
	15 Perfluorooc 498.3 > 79.2 498.3 > 98.2	tane sulfo 11.440 11.440	11.443	-0.003	1.000 1.000	3568981 2186636	48.0	1.63(0.00-0.00)	100 100	2998 2647	
	18 Perfluorono 462.5 > 418.6	nanoic a 11.469		0.007	1.000	5349285	51.1		102	6345	
	O 17 13C5 PFN 467.5 > 422.6		11.462	-0.003		4126872	50.8		102	5282	
	D 19 13C2 PFD 514.4 > 469.5	A 12.298	12.299	-0.001		4931920	47.9		95.7	5124	
	20 Perfluorode		cid		1.000	5708999	53.8		108	4919	
[D 23 13C8 FOS 505.4 > 77.6					4838600	51.0		102	3850	
	24 Perfluorooc 497.5 > 77.6		onamide)	1.000	5551847	54.4		109	3529	
	25 Perfluorode	cane Sul	fonate						107		
	598.4 > 79.6 49 Perfluorode		fonic aci	d	1.000	1158252	NC			2554	
	598.4 > 79.6 27 Perfluoroun			0.005	1.000	1158252	50.2		104		
	562.4 > 518.5 O 26 13C2 PFU		13.021	-0.001	1.000	6497810	51.0		102	4552	
	564.3 > 519.5	13.020	13.021	-0.001		5491477	50.6		101	5508	
	D 28 13C2 PFD 614.4 > 569.4	13.626		0.0		5641533	50.7		101	3903	
	29 Perfluorodo 612.4 > 568.6			0.0	1.000	5537515	53.5		107	2034	
	30 Perfluorotrio 662.4 > 618.5			0.002	1.000	4159657	52.4		105	1532	
	32 Perfluorotet 712.6 > 668.5	radecano 14.579		0.002	1.000	1901507	44.4		88.8	1148	
[O 33 13C2-PFT 714.5 > 669.5	eDA				3842279	49.4		98.9	3211	
[O 35 13C2-PFH	xDA									
	814.8 > 769.6 34 Perfluorohe	xadecan	oic acid			1419961	47.7		95.5	2830	
	812.6 > 768.6 36 Perfluorooc			-0.001	1.000	4302103	53.4		107	676	
	912.7 > 868.6	15.575	15.575	0.0	1.000	Page 446 of 52	3 ^{54.5}		109	³⁰⁰⁴ /31	/2016

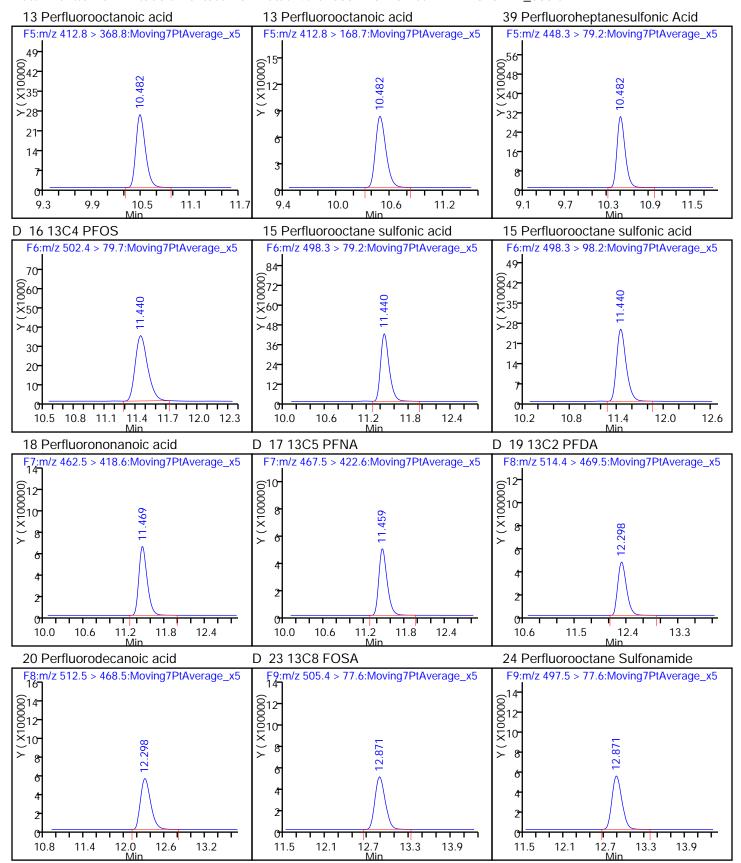
Report Date: 31-May-2016 09:50:50 Chrom Revision: 2.2 20-Apr-2016 13:59:46

OC Flag Legend Processing Flags NC - Not Calibrated

Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Report Date: 31-May-2016 09:50:50 TestAmerica Sacramento Data File: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_006.d **Injection Date:** 27-May-2016 12:41:42 Instrument ID: A4 Lims ID: Std L5 Client ID: Operator ID: **JRB** ALS Bottle#: 14 Worklist Smp#: 15.0 ul Dil. Factor: Injection Vol: 1.0000 PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 63 0054 ©77-0066-63 0054 ×45 ×55 ×45 >36 ≻₃₆-27 33 27 18 18 22 5.8 6.0 5.9 5.2 5.5 6.1 5.4 6.3 6.5 7.1 7.7 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid D $F2:m/z \ 262.9 > 218.7:Moving7PtAverage \ x5$ F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage x5 Y (X100000) 30 0 0 25 (000012 ×) > 9 15 10 7.7 6.5 7.1 7.0 7.9 7.5 8.1 8.7 9.3 5.9 6.4 6.7 7.3 7.6 6.9 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid 8 13C4-PFHpA F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 91 56- (00001X) (00001X) (042 000 35 × >28 0078 0078 ×65 >32 **≻**52 21 24 39 16 26 13 01 7.8 8.4 8.7 8.8 9.4 8.8 9.4 8.1 8.2 10.0 10.0 7.5 8.2 11 1802 PFHxS 58 Perfluorohexanesulfonic acid D 12 13C4 PFOA F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 (X100000) 649 6042 ©28 ©24 ×35 ≻₁₆-≻₂₈-21 12 14 0 0 10.9 05/31/201 9.0 9.6 10.2 8.2 8.8 Page 44% of 523 10.0 10.6 9.1 9.7 10.3 8.4



15.7

16.3

14.7

14.1

15.3

15.9

14.5

15.1

Report Date: 31-May-2016 09:51:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46

> TestAmerica Sacramento **Target Compound Quantitation Report**

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_007.d

Lims ID: Std L6

Client ID:

Sample Type: IC Calib Level: 6

Inject. Date: 27-May-2016 13:02:54 ALS Bottle#: 15 Worklist Smp#: 7

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: STD L6

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm, T=35C

Operator ID: **JRB** Instrument ID: Α4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:51:01 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: **Initial Calibration**

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

EXP DLT	REL						
Signal RT RT RT	RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA							
216.7 > 171.5 5.791 5.790 0.001		4129683	39.9		79.9	10855	
2 Perfluorobutyric acid							
212.7 > 168.6 5.794 5.792 0.002	1.000	11271766	210.3		105	17046	
D 3 13C5-PFPeA							
267.6 > 222.7 6.890 6.892 -0.002		3046275	40.2		80.3	6563	
4 Perfluoropentanoic acid	4 000	5/00/10	10/0		00.4	1001	
262.9 > 218.7	1.000	5608119	186.3		93.1	1894	
5 Perfluorobutane Sulfonate	1 000	2740400	NC			F174	
298.8 > 79.6 7.010 7.011 -0.001 298.8 > 98.6 7.010 7.011 -0.001	1.000 1.000	2740499 1739607	NC	1.58(0.00-0.00)		5174 3444	
51 Perfluorobutanesulfonic acid	1.000	1707007		1.00(0.00 0.00)		0111	
298.8 > 79.6	1.000	2740499	187.8		106		
D 613C2 PFHxA							
314.6 > 269.7 8.138 8.138 0.0		3592360	38.4		76.8	8171	
7 Perfluorohexanoic acid							
312.9 > 268.7 8.138 8.140 -0.002	1.000	6700227	200.8		100	2266	
9 Perfluoroheptanoic acid							
362.8 > 318.7 9.365 9.365 0.0	1.000	6600504	187.1		93.5	7377	
D 8 13C4-PFHpA							
366.6 > 321.6 9.365 9.366 -0.001		3284058	39.1		78.2	7093	
D 11 1802 PFHxS							
402.5 > 83.6 9.396 9.399 -0.003		1044335	34.4		72.8	3013	
58 Perfluorohexanesulfonic acid	1 000	/7174/7	100.0		100		
398.3 > 79.2 9.404 9.401 0.003	1.000	6717467	193.3		102		
10 Perfluorohexane Sulfonate 398.3 > 79.2 9.404 9.401 0.003	1.000	6717467	NC			5359	
D 12 13C4 PFOA	1.000	0/1/40/	INC			JJJ7	
416.5 > 371.6		3335155	34.8		69.6	4602	
1.0.0 2.7.10 10.100 10.100 0.002		Page 451 of 5	523		07.0	05/31	/2016

Report Date: 31- Data File:				to\Chrom			20-Apr-2016 13:59: b\27MAY2016B4A_(
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooc	tanoic ac	cid								
412.8 > 368.8 412.8 > 168.7	10.485 10.485	10.485 10.485		1.000 1.000	6321774 1901540	207.1	3.32(0.00-0.00)	104 104	6033 3439	
39 Perfluorohe 448.3 > 79.2	•	fonic Aci 10.485		1.000	6227195	180.8		95.0		
14 Perfluorohe 448.3 > 79.2	ptane Su 10.485		0.0	1.000	6227195	NC			4735	
D 16 13C4 PFO 502.4 > 79.7		11.441	0 001		209455	33.5		70.1	753	
15 Perfluorooc					207433	33.3		70.1	700	
498.3 > 79.2 498.3 > 98.2		11.443 11.443		1.000 1.000	10153061 6092175	191.8	1.67(0.00-0.00)	100 100	2698 3208	
18 Perfluorono 462.5 > 418.6			0.0	1.000	15179720	194.8		97.4	8936	
D 17 13C5 PFN 467.5 > 422.6	A 11.462	11.462	0.0		3070065	37.8		75.5	3786	
D 19 13C2 PFD 514.4 > 469.5	A 12.302	12.299	0.003		3862828	37.5		75.0	5604	
20 Perfluorode 512.5 > 468.5	canoic a			1.000	17300091	208.3		104	5465	
D 23 13C8 FOS	Α			1.000						
505.4 > 77.6 24 Perfluorooc		12.871 fonamide			3912535	41.2		82.4	2881	
497.5 > 77.6	12.875	12.873		1.000	16700878	202.5		101	3630	
25 Perfluorode 598.4 > 79.6	12.965	12.969		1.000	3032821	NC			3770	
49 Perfluorode 598.4 > 79.6	cane Sul 12.965			1.000	3032821	185.0		96.0		
27 Perfluoroun 562.4 > 518.5	decanoio		0.003	1.000	19242949	200.7		100	4801	
D 26 13C2 PFU	nA									
564.3 > 519.5 D 28 13C2 PFD	13.024 oA	13.021	0.003		4134664	38.1		76.2	3861	
614.4 > 569.4	13.620		-0.006		4448387	40.0		80.0	2888	
29 Perfluorodo 612.4 > 568.6			-0.006	1.000	16837391	206.5		103	3348	
30 Perfluorotrio 662.4 > 618.5			-0.004	1.000	13391959	193.1		96.5	2972	
32 Perfluorotet 712.6 > 668.5			-0 003	1.000	6381395	170.4		85.2	2136	
D 33 13C2-PFT	eDA			1.000						
714.5 > 669.5 D 35 13C2-PFH		14.579	-0.005		3359201	43.2		86.4	2740	
814.8 > 769.6 34 Perfluorohe			0.002		1298274	43.6		87.3	2490	
812.6 > 768.6	15.237	15.235		1.000	14132019	193.9		97.0	1746	
36 Perfluorooc 912.7 > 868.6	tandecar 15.578			1.000	11405069 Page 452 of 5	523 ^{199.9}		99.9	4282 05/3	1/2016

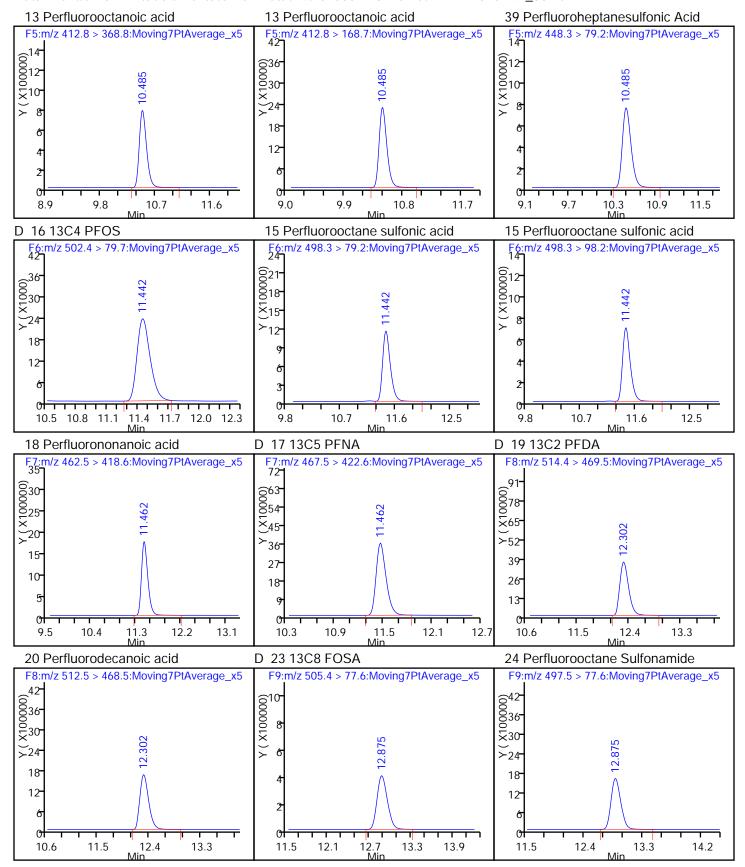
Report Date: 31-May-2016 09:51:02 Chrom Revision: 2.2 20-Apr-2016 13:59:46

OC Flag Legend Processing Flags NC - Not Calibrated

Reagents:

LCPFC-L6_00015 Amount Added: 1.00 Units: mL

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Report Date: 31-May-2016 09:51:02 TestAmerica Sacramento Data File: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\27MAY2016B4A_007.d **Injection Date:** 27-May-2016 13:02:54 Instrument ID: A4 Lims ID: Std L6 Client ID: Operator ID: **JRB** ALS Bottle#: 15 Worklist Smp#: 7 15.0 ul Dil. Factor: Injection Vol: 1.0000 PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 (000015 X)12 656**-**6048**-**0600 X10000 X10000 ×40 -40 ≻32 30 24 20 16 10 5.3 5.9 5.3 5.9 7.0 6.5 4.7 6.5 5.8 6.4 7.6 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 X (X100000) (49⁻ 670 6060 ×35 ×50 ≻₄₀ ≻₂₈-21 30 14 20 10 6.9 7.2 7.5 6.3 7.5 7.5 8.1 8.7 9.3 6.3 6.6 7.8 5.7 8.1 6.9 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid 8 13C4-PFHpA F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 77 (0000012 ×) > 9 000012 X10 0066- ×55-33 22 01 7.8 8.1 8.4 8.7 7.9 8.5 9.1 9.7 8.7 9.3 9.9 7.5 10.3 10.5 8.1 11 1802 PFHxS 58 Perfluorohexanesulfonic acid D 12 13C4 PFOA F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 (X100000) (X100000) 621- 6218-670 660 ∑₁₅-≥50 ≻40 30 20 10 0 0 0 9.9 8.2 8.8 9.4 10.0 8.0 8.6 9.2 9.8 Page 45/4hof 523 10.4 9.3 10.5



15.5

16.1

16.7

14.9

18-

14.3

12

13.9

14.5

15.1

15.7

16.3

Report Date: 31-May-2016 09:51:10 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Lims ID: Std L7

Client ID:

Sample Type: IC Calib Level: 7

Inject. Date: 27-May-2016 13:24:04 ALS Bottle#: 16 Worklist Smp#: 8

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: STD L7

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:51:09 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

Process Host:	XAWI	RK048								
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA	١									
216.7 > 171.5	5.787	5.790	-0.003		3355560	32.4		64.9	7469	
2 Perfluorobut	yric acid									
212.7 > 168.6	5.791	5.792	-0.001	1.000	18531497	425.4		106	22364	
D 3 13C5-PFP6	eΑ									
267.6 > 222.7	6.890	6.892	-0.002		2484518	32.8		65.5	5553	
4 Perfluoroper										
262.9 > 218.7	6.895	6.895	0.0	1.000	9327831	379.8		95.0	3498	
5 Perfluorobut										
298.8 > 79.6	7.005	7.011	-0.006	1.000	4450007	NC	4 50(0.00.0.00)		4580	
298.8 > 98.6	7.005	7.011	-0.006	1.000	2812494		1.58(0.00-0.00)		4396	
51 Perfluorobu				1 000	4450007	202.2		111		
298.8 > 79.6		7.011	-0.006	1.000	4450007	392.3		111		
D 613C2 PFHx		0.120	0.005		2010442	22.2		442	4200	
314.6 > 269.7	8.133	8.138	-0.005		3010443	32.2		64.3	6380	
7 Perfluorohex 312.9 > 268.7	(anoic ac 8.133		-0.007	1.000	11168800	399.5		99.9	2093	
			-0.007	1.000	11100000	377.3		77.7	2073	
9 Perfluorohep 362.8 > 318.7			0.0	1.000	10926693	386.1		96.5	6916	
D 8 13C4-PFH _R		7.505	0.0	1.000	10720073	300.1		70.5	0710	
366.6 > 321.6		9.366	-0.009		2634013	31.4		62.7	4520	
D 11 1802 PFH		7.000	0.007		200.0.0	•		02.7	.020	
402.5 > 83.6	9.404	9.399	0.005		812066	26.8		56.6	2294	
58 Perfluorohe										
398.3 > 79.2		9.401	0.003	1.000	10489666	388.2		103		
10 Perfluorohe	xane Sul	lfonate								
398.3 > 79.2	9.404	9.401	0.003	1.000	10489666	NC			6098	
D 12 13C4 PFO	Α									
	10.482	10.483	-0.001		2900631 Page 457 of 52	30.3		60.5	4395 05/31	1/2016

Report Date: 31-May-2016 09:51:10 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Data File:				to\Chrom			0\27MAY2016B4A_(
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooc	tanoic ad	cid								
412.8 > 368.8		10.485	-0.003	1.000	10498872	395.5		98.9	6045	
412.8 > 168.7	10.482	10.485	-0.003	1.000	3328897		3.15(0.00-0.00)	98.9	4124	
39 Perfluorohe	eptanesu	Ifonic Ac	id							
448.3 > 79.2		10.485		1.000	10320043	373.3		98.0		
14 Perfluorohe	entane Si	ulfonate								
	10.482		-0.003	1.000	10320043	NC			5191	
D 16 13C4 PFO										
502.4 > 79.7		11.441	-0.001		168111	26.9		56.3	476	
15 Perfluorooc						20.7		00.0		
498.3 > 79.2		11.443		1.000	16274880	383.0		100	2363	
498.3 > 98.2		11.443		1.000	9729875	303.0	1.67(0.00-0.00)	100	2767	
			0.003	1.000	7127013		1.07(0.00 0.00)	100	2707	
18 Perfluorono 462.5 > 418.6	11.459		0.003	1.000	27294533	406.8		102	10033	
		11.402	-0.003	1.000	27294000	400.6		102	10033	
D 17 13C5 PFN		44.440	0.000		0/40/04	00.5		(F 0	4400	
	11.459	11.462	-0.003		2643621	32.5		65.0	4183	
D 19 13C2 PFD										
514.4 > 469.5	12.298	12.299	-0.001		3407629	33.1		66.1	5758	
20 Perfluorode	ecanoic a	icid								
512.5 > 468.5	12.298	12.299	-0.001	1.000	29059913	396.7		99.2	5879	
D 23 13C8 FOS	SA.									
505.4 > 77.6		12.871	0.0		3402041	35.8		71.7	3118	
24 Perfluorooc	tane Sul	fonamide	ے							
497.5 > 77.6		12.873		1.000	29858502	416.3		104	3765	
25 Perfluorode			0.002	1.000	27000002	110.0			0,00	
598.4 > 79.6		12.969	0.005	1.000	4687057	NC			3586	
				1.000	4007037	NC			3300	
49 Perfluorode				1 000	4/07057	25/ 2		00.4		
598.4 > 79.6		12.969	0.005	1.000	4687057	356.2		92.4		
27 Perfluoroun										
562.4 > 518.5	13.020	13.021	-0.001	1.000	32308856	383.5		95.9	5439	
D 26 13C2 PFU	nA									
564.3 > 519.5	13.020	13.021	-0.001		3632488	33.5		67.0	2894	
D 28 13C2 PFD	οΑ									
614.4 > 569.4	13.626	13.626	0.0		3842375	34.5		69.1	2541	
29 Perfluorodo	ndecanoi	r acid								
612.4 > 568.6			0.0	1.000	28935429	410.8		103	2905	
			0.0	1.000	20733427	410.0		100	2700	
30 Perfluorotrio			0.002	1 000	21207040	257.7		00.4	2470	
	14.140		0.002	1.000	21307860	357.7		89.4	2679	
32 Perfluorotet										
712.6 > 668.5	14.570	14.577	-0.007	1.000	10914055	339.4		84.9	2523	
D 33 13C2-PFT	eDA									
714.5 > 669.5	14.579	14.579	0.0		2884794	37.1		74.2	2660	
D 35 13C2-PFH	IxDA									
814.8 > 769.6		15.235	-0.001		1056796	35.5		71.0	1898	
34 Perfluorohe						-		-		
812.6 > 768.6			-0 001	1.000	23508759	397.1		99.3	2028	
				1.000	23300737	J71.1		77.3	2020	
36 Perfluorooc				1 000	100017//	407.0		407	4001	
912.7 > 868.6	15.5/5	15.5/5	U.U	1.000	Page 458 of 5	523 ^{426.3}		107	4001/3	1/2016

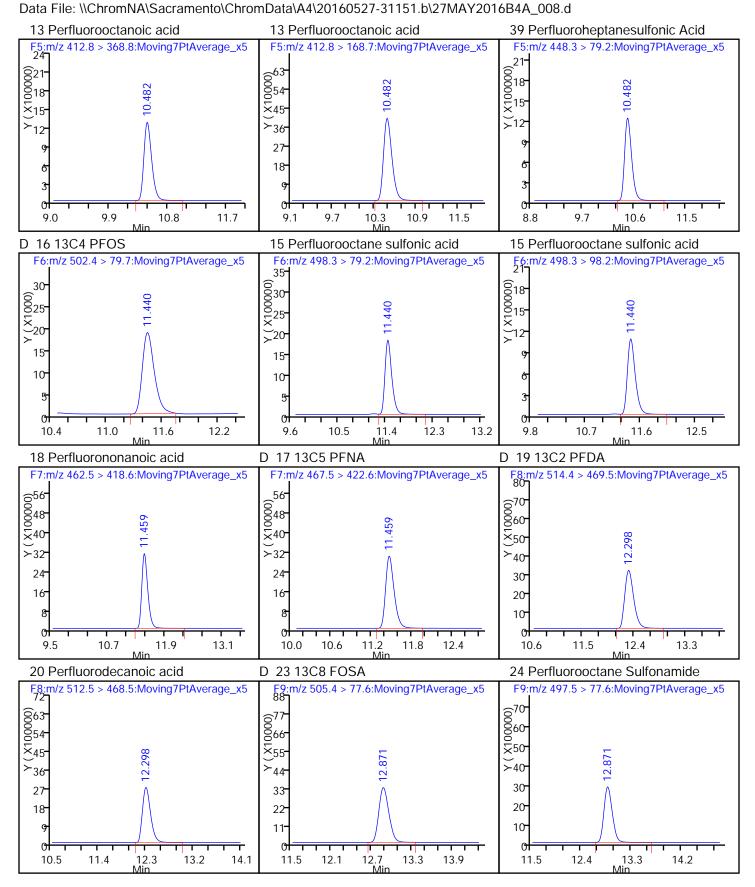
Report Date: 31-May-2016 09:51:10 Chrom Revision: 2.2 20-Apr-2016 13:59:46

OC Flag Legend Processing Flags NC - Not Calibrated

Reagents:

LCPFC-L7_00015 Amount Added: 1.00 Units: mL

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Report Date: 31-May-2016 09:51:10 TestAmerica Sacramento Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d **Injection Date:** 27-May-2016 13:24:04 Instrument ID: A4 Lims ID: Std L7 Client ID: Operator ID: **JRB** ALS Bottle#: 16 Worklist Smp#: 8 15.0 ul Dil. Factor: 1.0000 Injection Vol: PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 6036**-**0048<u>-</u> ×40 \approx 30 ×₂₀ **≻**32 ≻₂₄-15 24 18 10 16 12 5.3 5.9 5.0 6.2 7.0 6.5 5.6 6.8 5.8 6.4 7.6 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid D F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 18-(000001X), 63 (277-(2006) (20 0054 X45 ×55 ≻36 >₄₄-27 33 18 22 11-6.7 7.2 7.3 7.9 6.6 7.8 7.6 8.2 8.8 6.1 6.0 7.0 5.5 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid 8 13C4-PFHpA F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 (00020-0020-(56⁻ (0048⁻ (×40⁻ ©21- ∑₁₆-<u>`</u>≥15• 12 24 16 7.5 8.4 9.3 7.7 8.6 9.5 8.8 9.4 10.0 10.4 8.2 10.6 6.6 11 1802 PFHxS 58 Perfluorohexanesulfonic acid 12 13C4 PFOA F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 (21-(000001X) (000012 ×) > 9 (56⁻ 0048-×40 ₋12 ≻32 24 16 0 0 09.0 9.6 10.2 7.9 8.5 9.1 9.7 Page 46@of 523 10.3 9.2 9.8 10.4 8.4



15.6

16.2

16.8

15.0

24

16-

14.4

27

18

14.0

14.6

15.2

15.8

16.4

FORM VII LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

SDG No.:

Lab Sample ID: ICV 320-111733/10 Calibration Date: 05/27/2016 14:06

Instrument ID: A4 Calib Start Date: 05/27/2016 11:17

GC Column: Acquity ID: 2.10 (mm) Calib End Date: 05/27/2016 13:24

Lab File ID: 27MAY2016B4A_010.d Conc. Units: ng/mL

ANALYTE	CURVE	AVE RRF	RRF	MIN RRF	CALC	SPIKE	%D	MAX
	TYPE				AMOUNT	AMOUNT		%D
Perfluorobutanoic acid	AveID	0.6490	0.6106		47.0	50.0	-5.9	25.0
(PFBA)								
Perfluoropentanoic acid (PFPeA)	AveID	0.4942	0.4467		45.2	50.0	-9.6	25.0
Perfluorobutanesulfonic acid (PFBS)	L2ID		0.5371		35.9	44.3	-18.8	25.0
Perfluorohexanoic acid (PFHxA)	L1ID		0.4056		43.6	50.0	-12.9	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	0.5371	0.4909		45.7	50.0	-8.6	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.574	1.417		42.5	47.3	-10.0	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID		6.445		39.1	47.6	-17.8	25.0
Perfluorooctanoic acid (PFOA)	L1ID		0.4084		44.7	50.0	-10.6	25.0
Perfluorooctanesulfonic acid (PFOS)	L1ID		10.80		42.7	47.8	-10.5	25.0
Perfluorononanoic acid (PFNA)	L2ID		1.163		45.8	50.0	-8.3	25.0
Perfluorodecanoic acid (PFDA)	AveID	1.075	1.076		50.0	50.0	0.0	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	1.054	0.9925		47.1	50.0	-5.8	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	3.741	3.558		45.9	48.3	-4.9	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.160	1.089		47.0	50.0	-6.1	25.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9167	0.8220		44.8	50.0	-10.3	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.032	1.033		50.0	50.0	0.0	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.5573	0.4620		41.4	50.0	-17.1	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		2.732		48.1	50.0	-3.8	25.0
Perfluoro-n-octandecanoic acid (PFODA)	AveID	2.198	2.276		51.8	50.0	3.6	25.0

Report Date: 31-May-2016 09:51:29 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_010.d

Lims ID: ICV

Client ID:

Sample Type: ICV

Inject. Date: 27-May-2016 14:06:25 ALS Bottle#: 9 Worklist Smp#: 10

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: ICV

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Sublist: chrom-PFAC_A4*sub6

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:51:28 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 27-May-2016 14:38:15

First Level Revie	First Level Reviewer: barnettj					27-May-2016 14:38:15				
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 1 13C4 PFBA	1									
216.7 > 171.5	5.787	5.790	-0.003		4762953	46.0		92.1	12836	
2 Perfluorobut	yric acid									
212.7 > 168.6	-	5.792	-0.001	1.000	2908312	47.0			6463	
D 3 13C5-PFPe	eΑ									
267.6 > 222.7	6.890	6.892	-0.002		3768377	49.7		99.4	6733	
4 Perfluoroper		cid								
262.9 > 218.7	6.895	6.895	0.0	1.000	1683388	45.2			721	
5 Perfluorobut										
298.8 > 79.6	7.005	7.011	-0.006	1.000	775730	NC	1 52/2 22 2 22)		1770	
298.8 > 98.6	7.005	7.011	-0.006	1.000	505850		1.53(0.00-0.00)		931	
51 Perfluorobu 298.8 > 79.6		onic acid 7.011		1.000	775730	35.9				
		7.011	-0.006	1.000	775730	33.9				
D 6 13C2 PFHx 314.6 > 269.7		8.138	-0.005		5345566	57.1		114	11504	
7 Perfluorohex			-0.003		3343300	37.1		114	11304	
	8.138		-0.002	1.000	2168211	43.6			2213	
22 PFPeS (Per										
348.7 > 79.5		•	-0.022	0.874	1628045	NC			5207	
9 Perfluorohep	otanoic a	cid								
362.8 > 318.7			0.0	1.000	2193294	45.7			4658	
D 8 13C4-PFHp	Α									
366.6 > 321.6		9.366	-0.001		4467607	53.2		106	4498	
D 11 1802 PFH	xS									
402.5 > 83.6	9.396	9.399	-0.003		1543863	50.9		108	3545	
58 Perfluorohe	xanesulf	onic acid	d							
398.3 > 79.2	9.396	9.401	-0.005	1.000	2185638	42.5				
					Page 464 of	523			05/31	1/2016

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05/31/2016

Data File:	\\Chr	omNA\Sa	acramen	to\Chrom	Data\A4\2016052	7-31151.b)\27MAY2016B4A_0	10.d		
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
10 Perfluorohe	vane Su	lfonate								
398.3 > 79.2		9.401	-0.005	1.000	2185638	NC			3964	
D 12 13C4 PFO										
		10.483	-0.001		5005370	52.2		104	8349	
13 Perfluorooct	tanoic ac	cid								
412.8 > 368.8	10.482	10.485	-0.003	1.000	2044289	44.7			3150	
412.8 > 168.7	10.482	10.485	-0.003	1.000	668559		3.06(0.00-0.00)		2148	
39 Perfluorohe	•									
448.3 > 79.2	10.482	10.485	-0.003	1.000	2061791	39.1				
14 Perfluorohe	•									
448.3 > 79.2	10.482	10.485	-0.003	1.000	2061791	NC			4750	
D 16 13C4 PFO										
		11.441			321274	51.4		108	949	
15 Perfluorooct										
		11.443		1.000	3465080	42.7	1 70/0 00 0 00)		3222	
		11.443	-0.003	1.000	2032381		1.70(0.00-0.00)		2333	
18 Perfluorono			0.002	1 000	E22E010	4E 0			4024	
		11.462	-0.003	1.000	5235010	45.8			4934	
D 17 13C5 PFN		11 440	0.002		4502788	55.4		111	7277	
467.5 > 422.6		11.402	-0.003		4502700	33.4		111	1211	
D 19 13C2 PFD. 514.4 > 469.5		12.299	0.001		5277737	51.2		102	6872	
			-0.001		3211131	31.2		102	0072	
20 Perfluorode 512.5 > 468.5			-0.001	1.000	5676317	50.0			4286	
		12.277	-0.001	1.000	3070317	30.0			4200	
D 23 13C8 FOS		12.871	0.0		5127590	54.0		108	4296	
24 Perfluorooct					3127370	34.0		100	7270	
		12.873		1.000	5089191	47.1			3054	
25 Perfluorode			-0.002	1.000	3007171	77.1			3034	
		12.969	0.005	1.000	1153936	NC			3829	
49 Perfluorode				1.000	1100700	140			0027	
		12.969		1.000	1153936	45.9				
27 Perfluoroun			0.000	1.000	1100700	40.7				
		13.021	-0 001	1.000	6290982	47.0			4186	
D 26 13C2 PFU		.0.02.	0.00.		0270702					
564.3 > 519.5		13 021	-0 001		5776341	53.2		106	4803	
D 28 13C2 PFD		.0.02.	0.00.		0.7.00	00.2			.000	
614.4 > 569.4		13.626	-0.011		6289554	56.5		113	4741	
29 Perfluorodo			0.0		020700.	00.0				
		13.626	0.001	1.000	5169926	44.8			1542	
30 Perfluorotrio			0.00.		0.07,20					
		14.138	0.002	1.000	4217813	50.0			1427	
32 Perfluoroteti			0.002	1.000	1217010	00.0				
		14.577	-0.007	1.000	1885580	41.4			895	
D 33 13C2-PFT		,	0.007						2,0	
		14.579	-0.009		4081543	52.5		105	3965	
D 35 13C2-PFH			0.007		1001010	02.0		.00	0700	
814.8 > 769.6		15.235	-0.001		514377 4.3	48.3		96.7	2542	1/0046
237.707.0	. 5.20 1	. 5.200	3.001		Page 465 of 523	3 .5.5		. 0. 1	²⁵ 42/31	/2016

Report Date: 31-May-2016 09:51:29 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_010.d

2 ata 1 1101	,,,,,,,,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				0= 7 0 1 10 110	<u> </u>			
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
34 Perfluorohe 812.6 > 768.6	xadecan 15.234		-0.001	1.000	3927794	48.1			613	
36 Perfluorood 912.7 > 868.6	tandecar 15.575			1.000	3272932	51.8			2337	

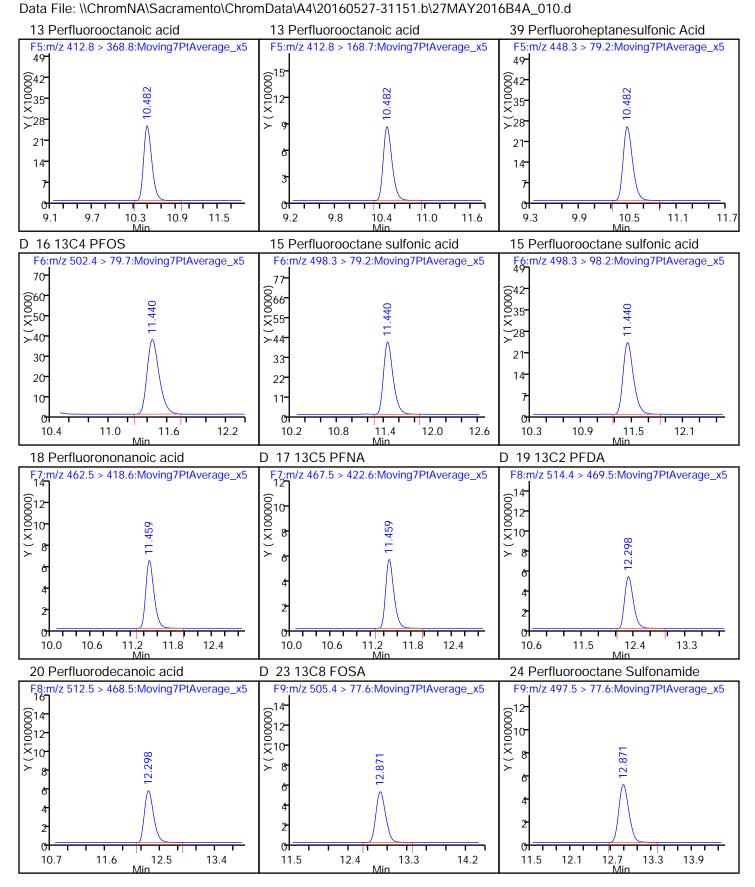
QC Flag Legend Processing Flags

NC - Not Calibrated

Reagents:

LCPFCIC_00016 Amount Added: 1.00 Units: mL

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Report Date: 31-May-2016 09:51:29 TestAmerica Sacramento Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_010.d **Injection Date:** 27-May-2016 14:06:25 Instrument ID: A4 Lims ID: **ICV** Client ID: Operator ID: **JRB** ALS Bottle#: 9 Worklist Smp#: 10 15.0 ul Dil. Factor: 1.0000 Injection Vol: PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 1 13C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 656 648 684 872 (0) 66-55- Σ_{60} ×40 ≻₄₈ ≻₃₂-33 24 36 22 24 16 11 12 6.0 6.9 5.4 6.0 6.6 4.8 5.4 6.6 6.3 6.6 7.2 7.5 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 18-(0012 000010 X) × ©35 ©30 0 0 15 ×12 ×25 **≻**20 15 10 6.9 6.3 7.5 5.9 6.5 7.1 7.7 7.4 8.0 8.6 9.2 8.1 6.8 8 13C4-PFHpA 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 49 49 X (X100000) 0042 X35 0042 ×35 -28 >28 21 21 14 01 7.8 8.1 8.4 8.7 8.8 9.4 10.0 8.9 9.5 8.2 10.6 8.3 10.1 7.5 D 11 1802 PFHxS D 12 13C4 PFOA 58 Perfluorohexanesulfonic acid F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 49 (X100000) (X100000) (X100000) 35 <u>00</u>30 0642 X35 ∑25- _28− -20 21 15 14 10 0 0 08.7 Page 4676 of 523 10.9 05/31/201 9.0 9.6 10.2 8.1 10.5 9.1 9.7 10.3 8.4



14.7 15.0

15.3

15.6

15.9 16.2 16.5

15.9

15.3

14.1

14.7

FORM VII LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

SDG No.:

Lab Sample ID: <u>CCV 320-111733/23</u> Calibration Date: <u>05/27/2016 18:42</u>

Instrument ID: A4 Calib Start Date: 05/27/2016 11:17

GC Column: Acquity ID: 2.10 (mm) Calib End Date: 05/27/2016 13:24

Lab File ID: 27MAY2016B4A_023.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.6490	0.6915		53.3	50.0	6.5	25.0
Perfluoropentanoic acid (PFPeA)	AveID	0.4942	0.4740		48.0	50.0	-4.1	25.0
Perfluorobutanesulfonic acid (PFBS)	L2ID		0.6882		46.0	44.2	4.1	25.0
Perfluorohexanoic acid (PFHxA)	L1ID		0.4513		48.5	50.0	-3.0	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	0.5371	0.5293		49.3	50.0	-1.5	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.574	1.487		44.7	47.3	-5.6	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID		7.252		44.0	47.6	-7.6	25.0
Perfluorooctanoic acid (PFOA)	L1ID		0.4505		49.3	50.0	-1.4	25.0
Perfluorooctanesulfonic acid (PFOS)	L1ID		11.15		44.2	47.8	-7.6	25.0
Perfluorononanoic acid (PFNA)	L2ID		1.224		48.3	50.0	-3.5	25.0
Perfluorodecanoic acid (PFDA)	AveID	1.075	1.202		55.9	50.0	11.8	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	1.054	1.111		52.7	50.0	5.4	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	3.741	3.363		43.3	48.2	-10.1	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.160	1.201		51.8	50.0	3.6	25.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9167	0.9270		50.6	50.0	1.1	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.032	1.091		52.8	50.0	5.7	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.5573	0.4756		42.7	50.0	-14.7	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		3.269		57.7	50.0	15.4	25.0
Perfluoro-n-octandecanoic acid (PFODA)	AveID	2.198	2.375		54.0	50.0	8.0	25.0

Report Date: 31-May-2016 09:52:33 Chrom Revision: 2.2 20-Apr-2016 13:59:46

> TestAmerica Sacramento **Target Compound Quantitation Report**

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_023.d

Lims ID: CCV L5

Client ID:

Sample Type: CCV

Inject. Date: 27-May-2016 18:42:57 ALS Bottle#: 14 Worklist Smp#: 23

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: CCV L5

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm, T=35C

Operator ID: **JRB** Instrument ID: Α4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 09:52:33 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: **Initial Calibration**

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host:	XAWI	RK048								
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA										
216.7 > 171.5	5.794	5.790	0.004		4072019	39.4		78.7	12139	
2 Perfluorobut	yric acid									
212.7 > 168.6	5.794	5.792	0.002	1.000	2815816	53.3		107	7619	
D 3 13C5-PFPe	eΑ									
267.6 > 222.7	6.895	6.892	0.003		3203912	42.2		84.5	6581	
4 Perfluoroper										
262.9 > 218.7		6.895	0.0	1.000	1518596	48.0		95.9	959	
5 Perfluorobut										
298.8 > 79.6 298.8 > 98.6	7.014 7.014	7.011 7.011	0.003	1.000 1.000	802755	NC	1 (2(0 00 0 00)		1808 1282	
				1.000	496028		1.62(0.00-0.00)		1282	
51 Perfluorobu 298.8 > 79.6	tanesuito 7.014	onic acid 7.011	0.003	1.000	802755	46.0		104		
D 6 13C2 PFHx		7.011	0.003	1.000	002733	40.0		104		
314.6 > 269.7	8.138	8.138	0.0		4113361	44.0		87.9	9803	
7 Perfluorohex			0.0		1110001	11.0		07.7	7000	
312.9 > 268.7		8.140	-0.002	1.000	1856391	48.5		97.0	2713	
22 PFPeS (Per	flouro-1-	pentane	sulfonat							
348.7 > 79.5		8.231		0.874	1559642	NC			9304	
9 Perfluorohep	otanoic a	cid								
362.8 > 318.7		9.365	0.0	1.000	1821889	49.3		98.5	5113	
D 8 13C4-PFHp	ρA									
366.6 > 321.6	9.365	9.366	-0.001		3442177	41.0		82.0	4860	
D 11 1802 PFH	xS									
402.5 > 83.6	9.404	9.399	0.005		1248263	41.2		87.0	3831	
58 Perfluorohe										
398.3 > 79.2	9.404	9.401	0.003	1.000	1855698	44.7		94.4		
10 Perfluorohe										
398.3 > 79.2	9.404	9.401	0.003	1.000	1855698 Page 471 of 52	NC 3			3223 05/31	/2016
					. 490 51 02	_			00,01	0.0

Report Date: 31-May-2016 09:52:33 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Data File:				to\Chrom			\27MAY2016B4A_0			
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 12 13C4 PFO 416.5 > 371.6	A 10.482	10.483	-0.001		3881044	40.5		81.0	4588	
13 Perfluorooc 412.8 > 368.8	tanoic ad 10.482		-0.003	1.000	1748581	49.3		98.6	5320	
412.8 > 168.7	10.482	10.485	-0.003	1.000	572400	47.5	3.05(0.00-0.00)	70.0	1661	
39 Perfluorohe 448.3 > 79.2	10.482	10.485		1.000	2037774	44.0		92.4		
	10.482		-0.003	1.000	2037774	NC			4798	
D 16 13C4 PFO 502.4 > 79.7	S 11.440	11.441	-0.001		282170	45.2		94.5	792	
15 Perfluorooc	tane sulf	onic acid	d							
498.3 > 79.2 498.3 > 98.2	11.440 11.440	11.443 11.443		1.000 1.000	3146623 1901433	44.2	1.65(0.00-0.00)	92.4	2909 2771	
18 Perfluorono 462.5 > 418.6	nanoic a 11.469		0.007	1.000	4254039	48.3		96.5	5552	
D 17 13C5 PFN 467.5 > 422.6		11.462	-0.003		3475259	42.7		85.5	4914	
D 19 13C2 PFD 514.4 > 469.5	A 12.298	12.299	-0.001		4116684	40.0		79.9	5197	
20 Perfluorode 512.5 > 468.5			-0.001	1.000	4949296	55.9		112	6267	
D 23 13C8 FOS 505.4 > 77.6		12.871	0.0		4126571	43.5		87.0	4203	
24 Perfluorooc 497.5 > 77.6	tane Sulf		Э	1.000	4583763	52.7		105	2323	
25 Perfluorode	cane Su	lfonate						105		
598.4 > 79.6 49 Perfluorode	cane Su		id	1.000	956792	NC			1657	
598.4 > 79.6 27 Perfluoroun	12.974 Idecanoio		0.005	1.000	956792	43.3		89.9		
562.4 > 518.5 D 26 13C2 PFU		13.021	-0.001	1.000	5665647	51.8		104	4508	
564.3 > 519.5 D 28 13C2 PFD	13.020	13.021	-0.001		4718095	43.5		87.0	5290	
614.4 > 569.4	13.627		0.001		5012463	45.1		90.1	3260	
	13.627	13.626	0.001	1.000	4646597	50.6		101	2036	
30 Perfluorotrio 662.4 > 618.5	decanoic 14.140		0.002	1.000	3598133	52.8		106	1342	
32 Perfluorotet 712.6 > 668.5	tradecano 14.579		0.002	1.000	1568861	42.7		85.3	928	
D 33 13C2-PFT 714.5 > 669.5		14.579	0.0		3298754	42.4		84.9	3425	
D 35 13C2-PFH 814.8 > 769.6		15.235	-0.001		1056305	35.5		71.0	2548	
34 Perfluorohe 812.6 > 768.6	xadecan	oic acid		1.000				115		
012.0 > 700.0	10.204	10.233	-0.001	1.000	Page 472 of 523	31.1		113	603/31	/2016

Report Date: 31-May-2016 09:52:33 Chrom Revision: 2.2 20-Apr-2016 13:59:46 \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_023.d Data File:

EXP **DLT REL** Amount Signal RT RT ng/ml Ratio(Limits) %Rec S/N Flags RT RT Response

36 Perfluorooctandecanoic acid

912.7 > 868.6 15.575 15.575 0.0 108 1.000 2508338 54.0 2662

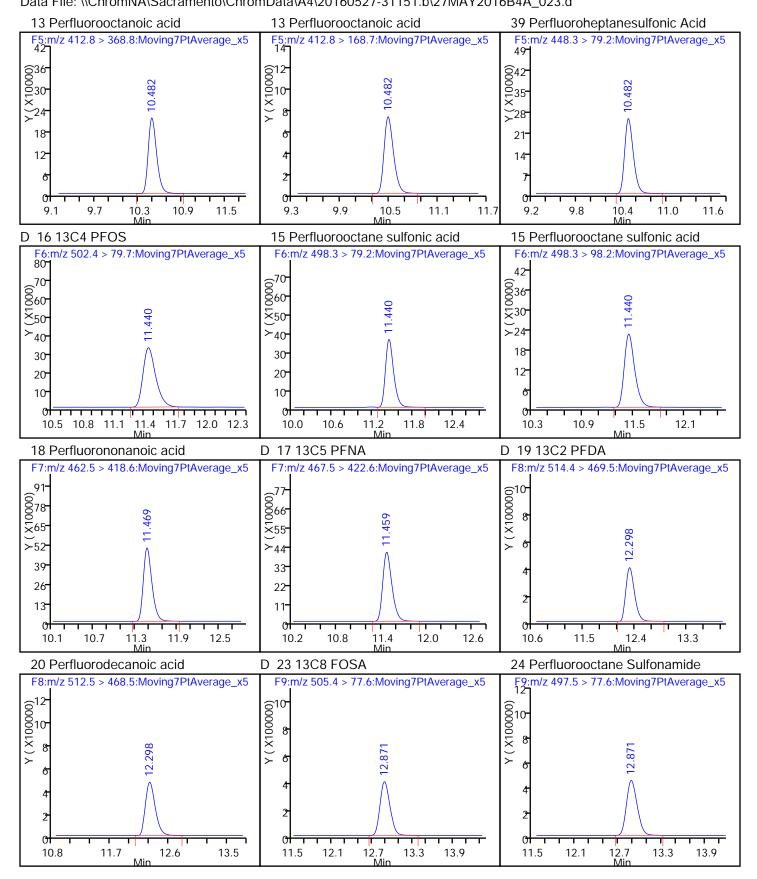
OC Flag Legend Processing Flags

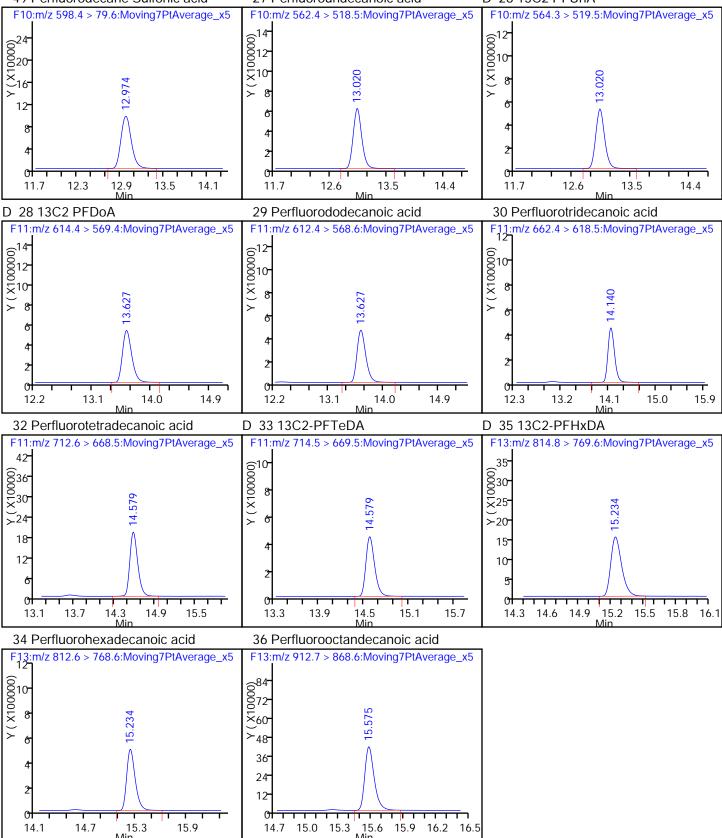
NC - Not Calibrated

Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 09:52:33 Chrom Revision: 2.2 20-Apr-2016 13:59:46 TestAmerica Sacramento Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_023.d **Injection Date:** 27-May-2016 18:42:57 Instrument ID: A4 Lims ID: CCV L5 Client ID: Operator ID: **JRB** ALS Bottle#: 14 Worklist Smp#: 23 15.0 ul Dil. Factor: 1.0000 Injection Vol: PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 649 6042 ©70 960 (00054- ×45- ×35-×50 ≻₂₈-**≻**36 27 21 30 18 14 20 10 5.2 6.9 5.4 6.0 6.6 5.5 5.8 6.1 6.3 6.6 7.2 7.5 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 35 684 672 0030 × (00015 X) > 9 ×60 ≻₄₈-15 36 10 24 12 7.1 7.7 6.5 5.9 6.5 7.1 7.7 7.6 8.2 8.8 7.0 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid 8 13C4-PFHpA F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 42 642 6036 (77- (266-0036-30-× 24-×30 ×55 18 18 33 12 12 22 11 7.9 8.2 8.5 8.7 9.3 9.9 8.9 9.5 10.1 7.6 8.8 10.5 8.1 8.3 D 11 1802 PFHxS D 12 13C4 PFOA 58 Perfluorohexanesulfonic acid F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 28-636 630 684 672 0024 X20 ×₂₄ ×60 ≻48 18 12 36 12 24 12 0 0 0 8.9 9.9 9.5 10.1 8.0 8.6 9.2 9.8 Page 4 Mh of 523 10.4 9.3 10.5 8.3





FORM VII LCMS CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

SDG No.:

Lab Sample ID: <u>CCV 320-111733/37</u> Calibration Date: <u>05/28/2016</u> 02:08

Instrument ID: A4 Calib Start Date: 05/27/2016 11:17

GC Column: Acquity ID: 2.10 (mm) Calib End Date: 05/27/2016 13:24

Lab File ID: 27MAY2016B4A_037.d Conc. Units: ng/mL

ANALYTE	CURVE TYPE	AVE RRF	RRF	MIN RRF	CALC AMOUNT	SPIKE AMOUNT	%D	MAX %D
Perfluorobutanoic acid (PFBA)	AveID	0.6490	0.6799		52.4	50.0	4.8	25.0
Perfluoropentanoic acid (PFPeA)	AveID	0.4942	0.4484		45.4	50.0	-9.3	25.0
Perfluorobutanesulfonic acid (PFBS)	L2ID		0.6895		46.1	44.2	4.3	25.0
Perfluorohexanoic acid (PFHxA)	L1ID		0.4431		47.6	50.0	-4.8	25.0
Perfluoroheptanoic acid (PFHpA)	AveID	0.5371	0.5012		46.7	50.0	-6.7	25.0
Perfluorohexanesulfonic acid (PFHxS)	AveID	1.574	1.675		50.3	47.3	6.4	25.0
Perfluorooctanoic acid (PFOA)	L1ID		0.4168		45.6	50.0	-8.8	25.0
Perfluoroheptanesulfonic Acid (PFHpS)	L2ID		9.309		56.4	47.6	18.6	25.0
Perfluorooctanesulfonic acid (PFOS)	L1ID		14.23		56.4	47.8	17.9	25.0
Perfluorononanoic acid (PFNA)	L2ID		1.266		49.9	50.0	-0.1	25.0
Perfluorodecanoic acid (PFDA)	AveID	1.075	1.184		55.1	50.0	10.2	25.0
Perfluorooctane Sulfonamide (FOSA)	AveID	1.054	1.109		52.6	50.0	5.2	25.0
Perfluorodecanesulfonic acid (PFDS)	AveID	3.741	4.386		56.5	48.2	17.2	25.0
Perfluoroundecanoic acid (PFUnA)	AveID	1.160	1.235		53.2	50.0	6.5	25.0
Perfluorododecanoic acid (PFDoA)	AveID	0.9167	0.9685		52.8	50.0	5.7	25.0
Perfluorotridecanoic Acid (PFTriA)	AveID	1.032	1.163		56.3	50.0	12.6	25.0
Perfluorotetradecanoic acid (PFTeA)	AveID	0.5573	0.5026		45.1	50.0	-9.8	25.0
Perfluoro-n-hexadecanoic acid (PFHxDA)	L2ID		3.051		53.8	50.0	7.6	25.0
Perfluoro-n-octandecanoic acid (PFODA)	AveID	2.198	2.500		56.9	50.0	13.8	25.0

Report Date: 31-May-2016 10:42:26 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_037.d

Lims ID: CCV L5

Client ID:

Sample Type: CCV

Inject. Date: 28-May-2016 02:08:00 ALS Bottle#: 14 Worklist Smp#: 37

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: CCV L5

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Sublist: chrom-PFAC_A4*sub12

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 10:42:25 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

Process Host:	XAWI	RK048								
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA	٨									
216.7 > 171.5	5.791	5.790	0.001		4329340	41.9		83.7	15403	
2 Perfluorobut	•									
212.7 > 168.6	5.794	5.792	0.002	1.000	2943441	52.4		105	7842	
D 3 13C5-PFP6 267.6 > 222.7	eA 6.890	6.892	-0.002		3333257	43.9		87.9	8613	
4 Perfluoroper			-0.002		3333237	43.7		07.7	0013	
262.9 > 218.7	6.895		0.0	1.000	1494601	45.4		90.7	913	
5 Perfluorobut	ane Sulfe	onate								
298.8 > 79.6	7.010	7.011	-0.001	1.000	777338	NC			1727	
298.8 > 98.6	7.005	7.011	-0.006	0.999	496200		1.57(0.00-0.00)		1276	
51 Perfluorobu										
298.8 > 79.6		7.011	-0.001	1.000	777338	46.1		104		
D 6 13C2 PFHx		0.400	0.0		0000074	40.7		05.0	7704	
314.6 > 269.7	8.138	8.138	0.0		3993271	42.7		85.3	7791	
7 Perfluorohex 312.9 > 268.7		8.140	-0.002	1.000	1769525	47.6		95.2	2332	
22 PFPeS (Per				1.000	1707323	47.0		75.2	2002	
348.7 > 79.5	8.215	•	-0.016	0.874	1567832	NC			5321	
9 Perfluoroher	otanoic a	cid								
362.8 > 318.7		9.365	0.0	1.000	1854296	46.7		93.3	5239	
D 8 13C4-PFHp	ρA									
366.6 > 321.6	9.365	9.366	-0.001		3699510	44.1		88.1	7172	
D 11 18O2 PFH										
402.5 > 83.6	9.404	9.399	0.005		1206510	39.8		84.1	4020	
58 Perfluorohe				1 000	2020420	FO 2		10/		
398.3 > 79.2		9.401	0.003	1.000	2020439	50.3		106		
10 Perfluorohe 398.3 > 79.2	xane Sul 9.404	9.401	0.003	1.000	2020439	NC			3605	
J70.J / 17.Z	7.404	7.4U I	0.003	1.000	Page 478 of 52	23			05/31	1/2016

Report Date: 31-May-2016 10:42:26 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Report Date: 31- Data File:				:o\Chrom			20-Apr-2016 13:59: 0\27MAY2016B4A_0			
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
	10.482		-0.001		4156934	43.4		86.8	6246	
412.8 > 168.7	10.482 10.482	10.485 10.485	-0.003	1.000 1.000	1732402 554413	45.6	3.12(0.00-0.00)	91.2	2685 1833	
	10.491	10.485		1.000	2116387	56.4		119		
14 Perfluorohe 448.3 > 79.2	eptane Su 10.491		0.006	1.000	2116387	NC			4526	
D 16 13C4 PFC 502.4 > 79.7	S 11.440	11.441	-0.001		228301	36.5		76.4	699	
15 Perfluorood 498.3 > 79.2 498.3 > 98.2	11.440 11.440	11.443 11.443	-0.003	1.000 1.000	3249455 1916507	56.4	1.70(0.00-0.00)	118	2907 2760	
18 Perfluorono 462.5 > 418.6			0.007	1.000	4453955	49.9		99.9	5514	
D 17 13C5 PFN 467.5 > 422.6		11.462	0.007		3517112	43.3		86.5	7298	
D 19 13C2 PFD 514.4 > 469.5	A 12.298	12.299	-0.001		4319127	41.9		83.8	5139	
20 Perfluorode 512.5 > 468.5	ecanoic a 12.298		-0.001	1.000	5115777	55.1		110	5540	
D 23 13C8 FOS 505.4 > 77.6	5A 12.884	12.871	0.013		3956764	41.7		83.4	3240	
24 Perfluorood 497.5 > 77.6				1.000	4386790	52.6		105	2976	
25 Perfluorode 598.4 > 79.6	cane Sul	lfonate		1 000	1009679	NC			2533	
49 Perfluorode	cane Sul	lfonic aci	d	1.000	1009679	56.5		117	2000	
27 Perfluorour		acid								
562.4 > 518.5 D 26 13C2 PFU		13.021	-0.001	1.000	5730191	53.2		106	3942	
564.3 > 519.5 D 28 13C2 PFD		13.021	-0.001		4641393	42.8		85.6	6033	
614.4 > 569.4 29 Perfluorodo	13.626		0.0		4654356	41.8		83.7	3644	
612.4 > 568.6	13.626	13.626	0.0	1.000	4507602	52.8		106	2058	
30 Perfluorotrio 662.4 > 618.5	decanoic 14.140		0.002	1.000	3874322	56.3		113	1678	
32 Perfluorote 712.6 > 668.5			0.002	1.000	1675124	45.1		90.2	1013	
D 33 13C2-PFT 714.5 > 669.5		14.579	0.0		3332708	42.9		85.8	3296	
D 35 13C2-PFH 814.8 > 769.6		15.235	-0.001		1211176	40.7		81.4	2712	
34 Perfluorohe 812.6 > 768.6			-0.001	1.000	53695251	53.8		108	627,-	1/0040
5.2.5 7.00.0	. 5.201	. 5.250	0.001		Page 479 of 52	3 55.5		.00	627 05/31	1/2016

Report Date: 31-May-2016 10:42:26 Chrom Revision: 2.2 20-Apr-2016 13:59:46 \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_037.d Data File:

EXP **DLT REL** Amount Signal RT RT ng/ml Ratio(Limits) %Rec S/N Flags RT RT Response

36 Perfluorooctandecanoic acid

912.7 > 868.6 15.575 15.575 0.0 1.000 3028290 56.9 114 2727

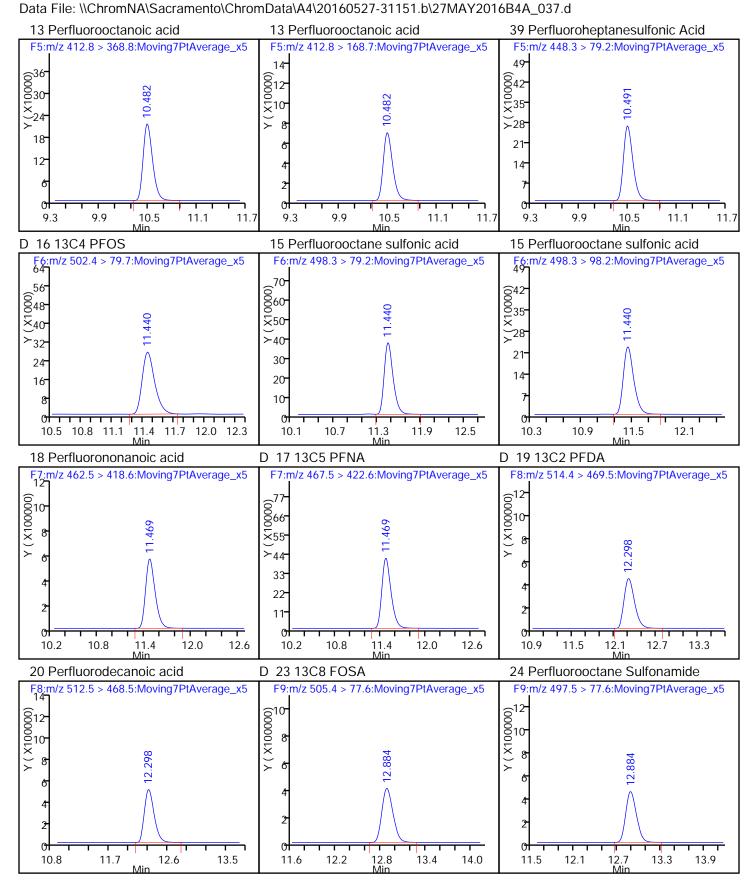
OC Flag Legend Processing Flags

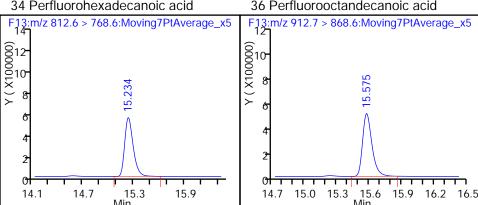
NC - Not Calibrated

Reagents:

LCPFC-L5_00017 Amount Added: 1.00 Units: mL

Report Date: 31-May-2016 10:42:26 Chrom Revision: 2.2 20-Apr-2016 13:59:46 TestAmerica Sacramento Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_037.d **Injection Date:** 28-May-2016 02:08:00 Instrument ID: A4 Lims ID: CCV L5 Client ID: Operator ID: **JRB** ALS Bottle#: 14 Worklist Smp#: 37 15.0 ul Dil. Factor: Injection Vol: 1.0000 PFAC_A4 LC PFC_DOD ICAL Method: Limit Group: D 113C4 PFBA 2 Perfluorobutyric acid D 3 13C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 56- 670 860 0048 0048 ×40 63° 654° \sum_{50} $\stackrel{\sim}{\scriptstyle_{45}}$ -32 ≻₄₀ 36 24 30 27 16 20 18 10 5.9 7.0 5.4 6.0 6.6 4.7 5.3 6.5 5.8 6.4 7.6 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid D F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 91 630 625 (00015 X) > 9 (0078-0078-005-∑₂₀ **≻**52 15 39 10 26 13 6.9 7.2 7.5 7.0 7.9 7.7 8.3 8.9 6.3 6.6 7.8 6.1 6.4 6.7 7.3 7.6 7.1 8 13C4-PFHpA 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 42 49 042 X35 684**-**672-00036-30-× 24- \times 60 ∑28- ≻₄₈ 21 18 36 14 12 24 12 7.9 8.2 8.5 8.7 9.3 9.9 10.5 8.8 9.4 7.6 8.8 8.2 10.0 8.1 D 12 13C4 PFOA D 11 1802 PFHxS 58 Perfluorohexanesulfonic acid F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 91- 30-0025-6⁴² ×65 ×20 **≥**30 ≻52 ≻₂₄· 15 39 18 10 26**-**12 13 0 0 0 8.7 Page 4811nof 523 9.0 9.6 10.2 8.1 10.5 9.3 9.9 10.5 8.4 11.1 05/31/2016





FORM I LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1 SDG No.: Lab Sample ID: MB 320-110721/1-A Client Sample ID: Matrix: Water Lab File ID: 27MAY2016B4A_019.d Analysis Method: WS-LC-0025 Date Collected: Date Extracted: 05/20/2016 11:05 Extraction Method: 3535 Sample wt/vol: 500(mL) Date Analyzed: 05/27/2016 17:18 Con. Extract Vol.: 1.0 (mL) Dilution Factor: 1 Injection Volume: 15(uL) GC Column: Acquity ID: 2.1 (mm) % Moisture: GPC Cleanup:(Y/N) N Analysis Batch No.: 111733 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0020	U	0.0025	0.0020	0.00080
335-67-1	Perfluorooctanoic acid (PFOA)	0.0020	Ū	0.0025	0.0020	0.00075
375-95-1	Perfluorononanoic acid (PFNA)	0.0020	U	0.0025	0.0020	0.00065
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0020	Ū	0.0025	0.0020	0.00092
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0020	U	0.0025	0.0020	0.00087
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0030	U M	0.0040	0.0030	0.0013

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	1802 PFHxS	107		25-150
STL00991	13C4 PFOS	127		25-150
STL00995	13C5 PFNA	97		25-150
STL00990	13C4 PFOA	105		25-150
STL01892	13C4-PFHpA	97		25-150

Report Date: 31-May-2016 10:47:26 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_019.d

Lims ID: MB 320-110721/1-A

Client ID:

Sample Type: MB

Inject. Date: 27-May-2016 17:18:14 ALS Bottle#: 28 Worklist Smp#: 19

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: mb 320-110721/1-a BOX 78

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 10:47:18 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 31-May-2016 10:05:45

First Level Reviewer: Darnettj				Date: 31-May-2016 10:05:4:					.45		
	Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
	D 1 13C4 PFBA										_
	216.7 > 171.5	、 5.791	5.790	0.001		4705233	45.5		91.0	17501	
	2 Perfluorobut										
	212.7 > 168.6	5.778		-0.014	1.000	8296	0.1358			26.1	
	D 3 13C5-PFPe	eΑ									
	267.6 > 222.7		6.892	0.003		3596963	47.4		94.8	8647	
	4 Perfluoroper	ntanoic a	cid								
	262.9 > 218.7	6.886	6.895	-0.009	1.000	5841	0.1643			4.8	
	D 613C2 PFHx	κA									
	314.6 > 269.7	8.138	8.138	0.0		4660266	49.8		99.6	10856	
	7 Perfluorohex										
	312.9 > 268.7	8.138	8.140	-0.002	1.000	14891	0.2070			56.7	
	D 8 13C4-PFHp										
	366.6 > 321.6		9.366	-0.001		4084681	48.6		97.3	8006	
	D 11 18O2 PFH										
		9.396				1539618	50.8		107	5009	
	58 Perfluorohe				1 000	0004	0.4000				
	398.3 > 79.2	7.101		0.003	1.000	9231	0.1802				
	10 Perfluorohe			0.002	1 000	0001	NC			27.0	
		9.404	9.401	0.003	1.000	9231	NC			27.9	
	D 12 13C4 PFO 416.5 > 371.6		10 402	0.001		5023595	E2 4		105	7947	
				-0.001		3023393	52.4		103	1941	
	13 Perfluorooc 412.8 > 368.8			0 003	1 000	2796	0.1394			6.2	
			10.403	-0.003	1.000	2170	U. 1374			0.2	
	D 16 13C4 PFO 502.4 > 79.7	S 11.440	11 441	-0 001		380246	60.9		127	1073	
	JUZ.4 / 17.1	11.440	11.441	-0.001		300240	00.7		141	1073	

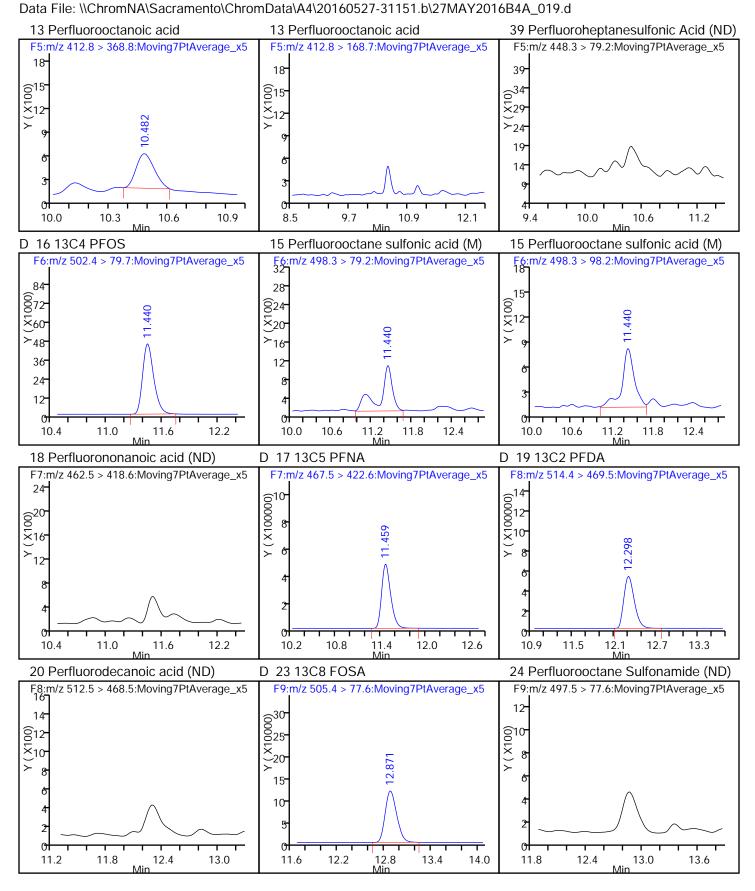
Data File.	WOTH	JIIII VA IOC	acramen	COCHION	150101/14/20100	021 JIIJI.K	7/2 / WIA 1 20 10D4A_0	/		
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
15 Perfluorooc	tane sulf	onic acid	1							М
		11.443		1.000	12482	0.2163			22.5	M
498.3 > 98.2	11.440	11.443	-0.003	1.000	8903		1.40(0.00-0.00)		16.7	M
D 17 13C5 PFN	A									
467.5 > 422.6	11.459	11.462	-0.003		3931403	48.4		96.7	6705	
D 19 13C2 PFD										
514.4 > 469.5		12.299	-0.001		5352114	51.9		104	6836	
D 23 13C8 FOS		10.071			1000110	40.7		05.5	0.400	
		12.871	0.0		1209449	12.7		25.5	2429	
27 Perfluoroun			0.001	1 000	17500	0.1000			20 F	
562.4 > 518.5		13.021	-0.001	1.000	17500	0.1238			28.5	
D 26 13C2 PFU 564.3 > 519.5		12 021	0.001		6094372	56.2		112	5430	
D 28 13C2 PFD		13.021	-0.001		0074372	30.2		112	5450	
614.4 > 569.4		13 626	0.001		5695148	51.2		102	4797	
29 Perfluorodo			0.00.		00701.10	02				
612.4 > 568.6			0.001	1.000	7373	0.0706			4.8	
30 Perfluorotrio										
662.4 > 618.5			0.002	1.000	4152	0.0569			2.5	
32 Perfluorotet	radecan	oic acid								
712.6 > 668.5	14.579	14.577	0.002	1.000	17411	0.4419			8.5	
D 33 13C2-PFT	eDA									
714.5 > 669.5	14.570	14.579	-0.009		3535235	45.5		91.0	3564	
D 35 13C2-PFH	xDA									
814.8 > 769.6	15.234	15.235	-0.001		1061175	35.7		71.3	2636	
34 Perfluorohe										
812.6 > 768.6	15.234	15.235	-0.001	1.000	57867	0.2120			12.3	

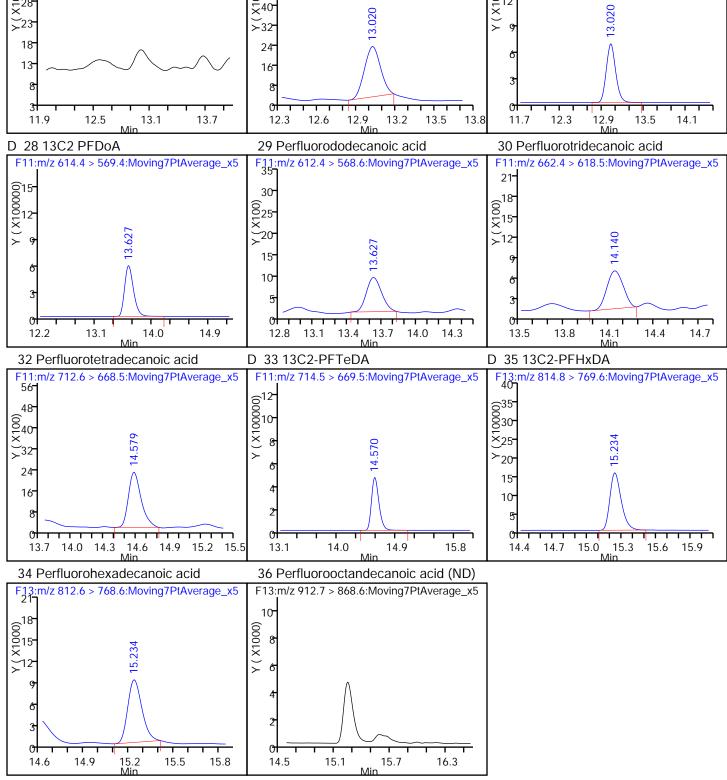
OC Flag Legend Processing Flags

NC - Not Calibrated
Review Flags

M - Manually Integrated

Report Date: 31-May-2016 10:47:27 Chrom Revision: 2.2 20-Apr-2016 13:59:46 TestAmerica Sacramento Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_019.d **Injection Date:** 27-May-2016 17:18:14 Instrument ID: A4 Lims ID: MB 320-110721/1-A Client ID: Operator ID: **JRB** ALS Bottle#: 28 Worklist Smp#: 19 Injection Vol: 15.0 ul Dil. Factor: 1.0000 Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 42 Y (X100000) 77- ×30 ∑55 18 33 12 22 11 5.3 5.9 5.5 5.8 5.9 7.1 4.7 6.5 5.2 6.1 6.5 7.7 D 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid (ND) F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage x5 Y (X100000) 15- 36 (0012-×) × 9 <u>6</u>30-∑₂₄-18 12 7.6 8.2 6.6 6.9 7.2 6.6 7.2 7.8 8.8 6.0 7.0 6.3 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid (ND) 8 13C4-PFHpA F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 Y (X100000) 49 ۲ (X100) 6⁴² ×35 ⁻28⁻ 21 14 01 7.8 8.1 8.4 8.7 8.3 8.9 9.5 8.3 8.9 9.5 10.1 7.5 10.1 D 11 1802 PFHxS 58 Perfluorohexanesulfonic acid 12 13C4 PFOA F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 30 (0012-000010-X) 8 ©36 0 0 0 36 <u> 25</u> ×₂₄ ×20-15 10 12 0 0 0 8.9 9.5 10.1 8.7 9.0 9.3 9.6 Page 487/hof 523 9.9 9.2 9.8 10.4 8.3





Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report Report Date: 31-May-2016 10:47:27

TestAmerica Sacramento

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_019.d

Injection Date: 27-May-2016 17:18:14 Instrument ID: A4

MB 320-110721/1-A Lims ID:

Client ID:

Operator ID: **JRB** ALS Bottle#: 28 Worklist Smp#: 19

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

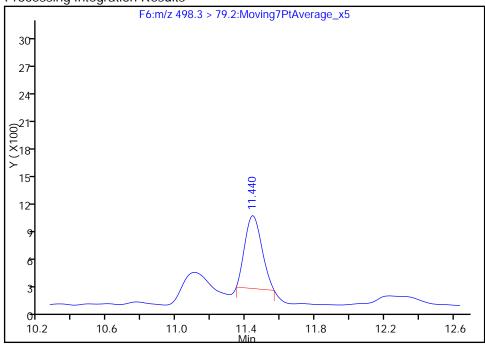
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 1

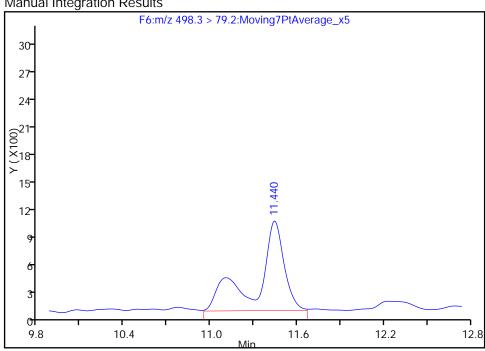
RT: 11.44 Area: 5215 Amount: 0.140703 Amount Units: ng/ml

Processing Integration Results



RT: 11.44 Area: 12482 0.216288 Amount: Amount Units: ng/ml

Manual Integration Results



Reviewer: barnettj, 31-May-2016 10:05:45

Audit Action: Manually Integrated

Audit Reason: Isomers

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Report Date: 31-May-2016 10:47:27 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_019.d Data File:

Injection Date: 27-May-2016 17:18:14 Instrument ID: A4

MB 320-110721/1-A Lims ID:

Client ID:

JRB Operator ID: ALS Bottle#: 28 Worklist Smp#: 19

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC A4 LC PFC_DOD ICAL Limit Group:

Column: Detector F6:MRM

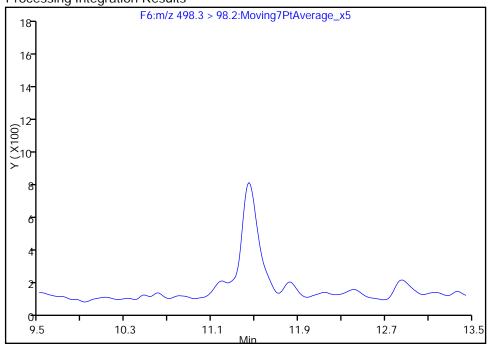
15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

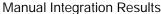
Not Detected

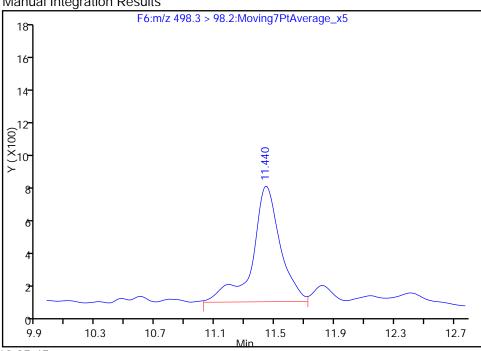
Expected RT: 11.44

Processing Integration Results



RT: 11.44 8903 Area: Amount: 0.216288 Amount Units: ng/ml





Reviewer: barnettj, 31-May-2016 10:05:45

Audit Action: Manually Integrated

Audit Reason: Isomers

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FORM I LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1 SDG No.: Lab Sample ID: LCS 320-110721/2-A Client Sample ID: Matrix: Water Lab File ID: 27MAY2016B4A_020.d Analysis Method: WS-LC-0025 Date Collected: Date Extracted: 05/20/2016 11:05 Extraction Method: 3535 Sample wt/vol: 500(mL) Date Analyzed: 05/27/2016 17:39 Con. Extract Vol.: 1.0 (mL) Dilution Factor: 1 Injection Volume: 15(uL) GC Column: Acquity ID: 2.1 (mm) % Moisture: GPC Cleanup:(Y/N) N Analysis Batch No.: 111733 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0305		0.0025	0.0020	0.00080
335-67-1	Perfluorooctanoic acid (PFOA)	0.0326		0.0025	0.0020	0.00075
375-95-1	Perfluorononanoic acid (PFNA)	0.0340		0.0025	0.0020	0.00065
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0273		0.0025	0.0020	0.00092
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0288	М	0.0025	0.0020	0.00087
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0261	М	0.0040	0.0030	0.0013

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	1802 PFHxS	101		25-150
STL00991	13C4 PFOS	126		25-150
STL00995	13C5 PFNA	91		25-150
STL00990	13C4 PFOA	92		25-150
STL01892	13C4-PFHpA	95		25-150

Report Date: 31-May-2016 10:47:37 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_020.d

Lims ID: LCS 320-110721/2-A

Client ID:

Sample Type: LCS

Inject. Date: 27-May-2016 17:39:25 ALS Bottle#: 29 Worklist Smp#: 20

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: lcs 320-110721/2-a

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 10:47:18 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 29-May-2016 13:39:10

First Level Revie	wer: bar	nettj			Date:	2	9-May-2016 13:39:	10		
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 PFBA										
216.7 > 171.5	5.794	5.790	0.004		4632225	44.8		89.6	12907	
2 Perfluorobut										
212.7 > 168.6	5.794	5.792	0.002	1.000	996998	16.6		82.9	2371	
D 3 13C5-PFPe	eΑ									
267.6 > 222.7	6.895	6.892	0.003		3427630	45.2		90.4	6418	
4 Perfluoroper	ntanoic a	cid								
262.9 > 218.7		6.895	0.0	1.000	530814	15.7		78.3	368	
5 Perfluorobut	ane Sulfo	onate								
298.8 > 79.6	7.010	7.011	-0.001	1.000	277267	NC			707	
298.8 > 98.6	7.010	7.011	-0.001	1.000	180683		1.53(0.00-0.00)		402	
51 Perfluorobu	tanesulfo	onic acid								
298.8 > 79.6	7.010	7.011	-0.001	1.000	277267	13.6		77.1		
D 613C2 PFHx	:A									
314.6 > 269.7	8.138	8.138	0.0		4524036	48.3		96.7	7975	
7 Perfluorohex	anoic ac	id								
312.9 > 268.7	8.144	8.140	0.004	1.000	646520	15.3		76.3	1659	
9 Perfluorohep	otanoic a	cid								
362.8 > 318.7	9.372	9.365	0.007	1.000	657327	15.3		76.3	2308	
D 8 13C4-PFHp	ρA									
366.6 > 321.6	9.365	9.366	-0.001		4007204	47.7		95.4	9509	
D 11 1802 PFH	xS									
402.5 > 83.6	9.404	9.399	0.005		1451660	47.9		101	3743	
58 Perfluorohe	xanesulf	onic acio	b							M
398.3 > 79.2	9.404	9.401	0.003	1.000	694436	14.4		79.0		M
10 Perfluorohe	xane Sul	fonate								
398.3 > 79.2	9.404	9.401	0.003	1.000	549511	NC			935	
D 12 13C4 PFO	A									
416.5 > 371.6	10.485	10.483	0.002		Page84956 of 52	3 46.0		92.0	66 665 ∤31	1/2016

Report Date: 31-May-2016 10:47:37 Chrom Revision: 2.2 20-Apr-2016 13:59:46

Data File:				o\Chrom[\27MAY2016B4A_0			
Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
13 Perfluorooc	tanoic ac	id								
	10.485		0.0	1.000	653971	16.3		81.4	1331	
412.8 > 168.7	10.485	10.485	0.0	1.000	225433		2.90(0.00-0.00)		843	
39 Perfluorohe	ptanesul	fonic Aci	id							
448.3 > 79.2	10.485	10.485	0.0	1.000	734221	12.0		62.9		
14 Perfluorohe	•									
448.3 > 79.2	10.485	10.485	0.0	1.000	734221	NC			2158	
D 16 13C4 PFO										
	11.442				375280	60.1		126	1405	
15 Perfluorooc										M
498.3 > 79.2	11.442			1.000	1230459	13.1	1 77(0 00 0 00)	70.3	2797	M
498.3 > 98.2	11.442		-0.001	1.000	694350		1.77(0.00-0.00)		1300	M
18 Perfluorono			0.0	4 000	4500007	47.0		0.4.0	0404	
	11.462	11.462	0.0	1.000	1593087	17.0		84.9	2181	
D 17 13C5 PFN		44.440	0.0		0700/00	45 (04.4		
	11.462	11.462	0.0		3703629	45.6		91.1	6938	
D 19 13C2 PFD										
	12.302		0.003		5041716	48.9		97.9	5989	
20 Perfluorode										
512.5 > 468.5	12.302	12.299	0.003	1.000	1957728	18.1		90.3	3214	
D 23 13C8 FOS										
505.4 > 77.6	12.875	12.871	0.004		1810440	19.1		38.2	3703	
24 Perfluorooc										
497.5 > 77.6	12.875	12.873	0.002	1.000	642452	16.8		84.2	1190	
25 Perfluorode										
598.4 > 79.6	12.978	12.969	0.009	1.000	356170	NC			1768	
49 Perfluorode	cane Sul	fonic aci	d							
598.4 > 79.6	12.978	12.969	0.009	1.000	356170	12.1		62.9		
27 Perfluoroun	decanoio	acid								
562.4 > 518.5	13.024	13.021	0.003	1.000	1964268	16.6		83.0	2420	
D 26 13C2 PFU	nA									
564.3 > 519.5	13.024	13.021	0.003		5100822	47.0		94.0	5611	
D 28 13C2 PFD	οΑ									
614.4 > 569.4	13.620	13.626	-0.006		5080727	45.7		91.3	4576	
29 Perfluorodo	decanoio	acid								
612.4 > 568.6	13.620	13.626	-0.006	1.000	1505317	16.2		80.8	743	
30 Perfluorotrio	decanoic	acid								
662.4 > 618.5	14.134	14.138	-0.004	1.000	1251863	20.4		102	632	
32 Perfluorotet	radecand	oic acid								
712.6 > 668.5	14.574	14.577	-0.003	1.000	498544	15.1		75.3	242	
D 33 13C2-PFT	eDA									
714.5 > 669.5		14.579	-0.005		2968269	38.2		76.4	3289	
D 35 13C2-PFH	xDA									
	15.237	15.235	0.002		947157	31.8		63.7	2511	
34 Perfluorohe										
812.6 > 768.6			0.002	1.000	964068	17.4		87.2	196	
36 Perfluorooc										
912.7 > 868.6				1.000	Page 494 of 523	21.5		108	1294.	4/0045
			2.000		Page 494 of 523	5			12 <u>94</u> /3	1/2016

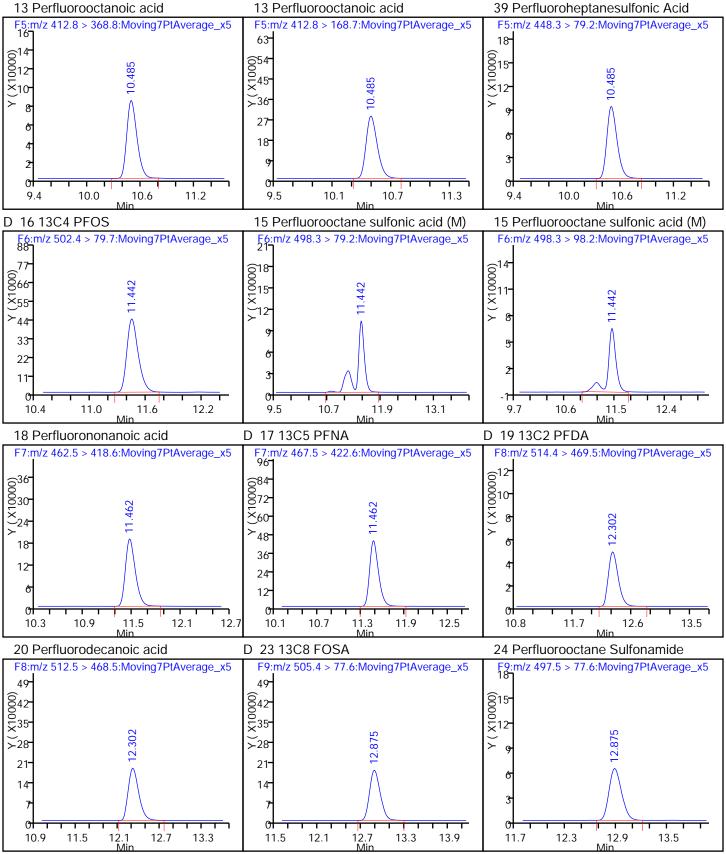
Report Date: 31-May-2016 10:47:37

OC Flag Legend
Processing Flags
NC - Not Calibrated
Review Flags

M - Manually Integrated

Chrom Revision: 2.2 20-Apr-2016 13:59:46

Chrom Revision: 2.2 20-Apr-2016 13:59:46 Report Date: 31-May-2016 10:47:37 TestAmerica Sacramento Data File: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\27MAY2016B4A_020.d **Injection Date:** 27-May-2016 17:39:25 Instrument ID: A4 Lims ID: LCS 320-110721/2-A Client ID: Operator ID: **JRB** ALS Bottle#: 29 Worklist Smp#: 20 15.0 ul Dil. Factor: Injection Vol: 1.0000 PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 21 684 872 0018-15-12-666 ∑50 Σ_{60} ≻40 ≻₄₈ 30 36 20 24 10 5.8 7.2 5.2 5.5 6.1 5.2 5.5 5.8 6.1 6.6 6.9 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage_x5 63 Y (X100000) Y (X10000) (054- 0001 ×45- ∑36- 27 18 6.9 7.7 7.0 7.2 8.9 6.4 6.7 7.3 7.6 6.6 7.5 7.1 8.3 6.3 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid 8 13C4-PFHpA F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 Y (X100000) (000012 X) > 9 (000012 X) > 9 7.9 8.2 8.9 9.5 8.7 9.3 9.9 7.6 8.5 8.8 8.3 10.1 10.5 8.1 D 11 1802 PFHxS 58 Perfluorohexanesulfonic acid (M) D 12 13C4 PFOA F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 (X100000) (14⁻ 00012⁻ 030 025 × 15 10 0 0 9.0 9.6 10.2 7.7 8.6 Page 496 of 523 10.4 9.3 9.9 10.5 8.4



15

10

14.3 14.6 14.9

15.2 15.5 15.8 16.1

Report Date: 31-May-2016 10:47:37 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_020.d

Injection Date: 27-May-2016 17:39:25 Instrument ID: A4

Lims ID: LCS 320-110721/2-A

Client ID:

Operator ID: JRB ALS Bottle#: 29 Worklist Smp#: 20

Injection Vol: 15.0 ul Dil. Factor: 1.0000

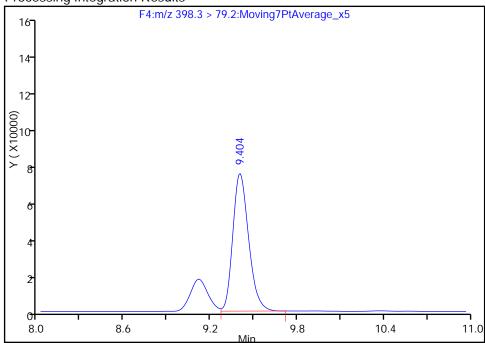
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

Column: Detector F4:MRM

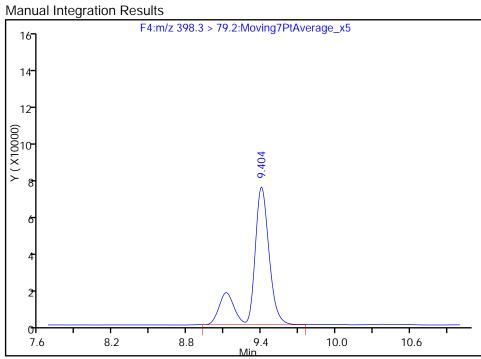
58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

RT: 9.40 Area: 549511 Amount: 11.375117 Amount Units: ng/ml **Processing Integration Results**



RT: 9.40
Area: 694436
Amount: 14.375128
Amount Units: ng/ml



Reviewer: barnettj, 29-May-2016 13:39:10

Audit Action: Manually Integrated

Audit Reason: Isomers

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Report Date: 31-May-2016 10:47:37 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_020.d

Injection Date: 27-May-2016 17:39:25 Instrument ID: A4

Lims ID: LCS 320-110721/2-A

Client ID:

Operator ID: JRB ALS Bottle#: 29 Worklist Smp#: 20

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

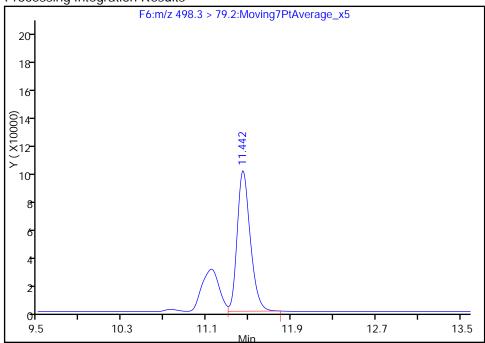
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

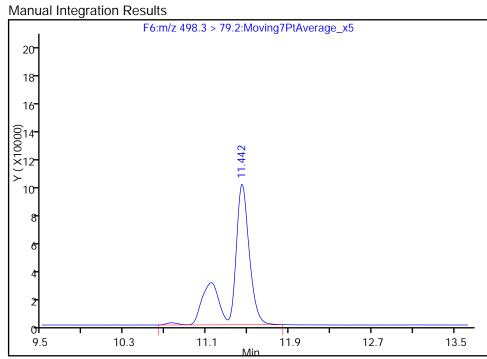
Signal: 1

RT: 11.44
Area: 867819
Amount: 9.232206
Amount Units: ng/ml

Processing Integration Results



RT: 11.44
Area: 1230459
Amount: 13.053986
Amount Units: ng/ml



Reviewer: barnettj, 29-May-2016 13:39:10

Audit Action: Manually Integrated

Audit Reason: Isomers

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Report Date: 31-May-2016 10:47:37 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_020.d

Injection Date: 27-May-2016 17:39:25 Instrument ID: A4

Lims ID: LCS 320-110721/2-A

Client ID:

Operator ID: JRB ALS Bottle#: 29 Worklist Smp#: 20

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

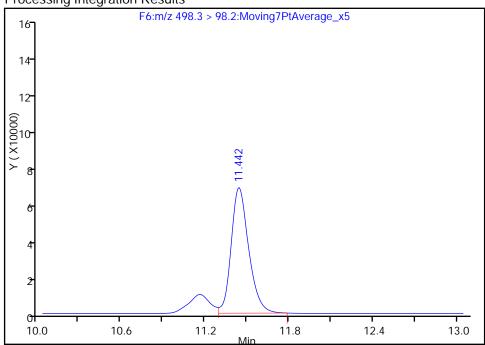
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

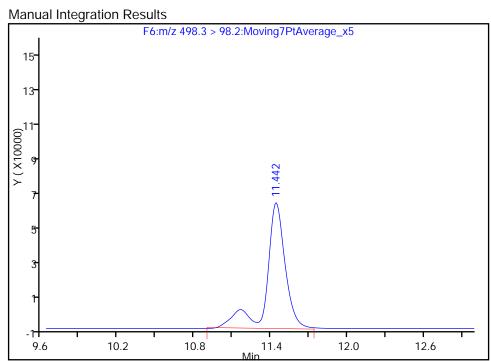
Signal: 2

RT: 11.44
Area: 587770
Amount: 9.232206
Amount Units: ng/ml

Processing Integration Results



RT: 11.44
Area: 694350
Amount: 13.053986
Amount Units: ng/ml



Reviewer: barnettj, 29-May-2016 13:39:10

Audit Action: Manually Integrated

Audit Reason: Isomers

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FORM I LCMS ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1 SDG No.: Lab Sample ID: LCSD 320-110721/3-A Client Sample ID: Matrix: Water Lab File ID: 27MAY2016B4A_021.d Analysis Method: WS-LC-0025 Date Collected: Date Extracted: 05/20/2016 11:05 Extraction Method: 3535 Sample wt/vol: 500(mL) Date Analyzed: 05/27/2016 18:00 Con. Extract Vol.: 1.0 (mL) Dilution Factor: 1 Injection Volume: 15(uL) GC Column: Acquity ID: 2.1 (mm) % Moisture: GPC Cleanup:(Y/N) N Analysis Batch No.: 111733 Units: ug/L

CAS NO.	COMPOUND NAME	RESULT	Q	LOQ	LOD	DL
375-85-9	Perfluoroheptanoic acid (PFHpA)	0.0318		0.0025	0.0020	0.00080
335-67-1	Perfluorooctanoic acid (PFOA)	0.0305		0.0025	0.0020	0.00075
375-95-1	Perfluorononanoic acid (PFNA)	0.0334		0.0025	0.0020	0.00065
375-73-5	Perfluorobutanesulfonic acid (PFBS)	0.0291		0.0025	0.0020	0.00092
355-46-4	Perfluorohexanesulfonic acid (PFHxS)	0.0314	М	0.0025	0.0020	0.00087
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	0.0284	М	0.0040	0.0030	0.0013

CAS NO.	ISOTOPE DILUTION	%REC	Q	LIMITS
STL00994	1802 PFHxS	84		25-150
STL00991	13C4 PFOS	107		25-150
STL00995	13C5 PFNA	82		25-150
STL00990	13C4 PFOA	83		25-150
STL01892	13C4-PFHpA	81		25-150

Report Date: 31-May-2016 10:47:45 Chrom Revision: 2.2 20-Apr-2016 13:59:46

TestAmerica Sacramento
Target Compound Quantitation Report

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_021.d

Lims ID: LCSD 320-110721/3-A

Client ID:

Sample Type: LCSD

Inject. Date: 27-May-2016 18:00:36 ALS Bottle#: 30 Worklist Smp#: 21

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Sample Info: lcsd 320-110721/3-a

Misc. Info.: Acquity BEH C18,1.7u, 3X150mm,T=35C

Operator ID: JRB Instrument ID: A4

Method: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\PFAC_A4.m

Limit Group: LC PFC_DOD ICAL

Last Update: 31-May-2016 10:47:18 Calib Date: 27-May-2016 13:24:04

Integrator: Picker

Quant Method: Isotopic Dilution Quant By: Initial Calibration

Last ICal File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_008.d

Column 1: Det: F1:MRM

Process Host: XAWRK048

First Level Reviewer: barnettj Date: 29-May-2016 13:40:36

First Level Reviewer: barnettj						Date:	2	29-May-2016 13:40:	36		
Signal		RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
D 113C4 F	PFRA										
216.7 > 171		5.800	5.790	0.010		3952701	38.2		76.4	14643	
2 Perfluor	obutvr	ic acid									
212.7 > 168	•	5.800	5.792	0.008	1.000	852517	16.6		83.1	2861	
D 3 13C5-F	PFPeA	\									
267.6 > 222	2.7	6.904	6.892	0.012		3012064	39.7		79.4	7761	
4 Perfluor	openta	anoic a	cid								
262.9 > 218	3.7	6.904	6.895	0.009	1.000	472605	15.9		79.4	304	
5 Perfluor	obutar	ne Sulfo	onate								
298.8 > 79.6		7.014	7.011	0.003	1.000	245542	NC			534	
298.8 > 98.6	6	7.014	7.011	0.003	1.000	165443		1.48(0.00-0.00)		417	
51 Perfluo											
298.8 > 79.6	6	7.014	7.011	0.003	1.000	245542	14.6		82.4		
D 613C2 F											
314.6 > 269	9.7	8.144	8.138	0.006		3969255	42.4		84.8	10521	
7 Perfluor											
312.9 > 268	3.7	8.149	8.140	0.009	1.000	568208	15.3		76.4	1636	
9 Perfluor											
362.8 > 318	3.7 °	9.372	9.365	0.007	1.000	582752	15.9		79.6	2113	
D 8 13C4-F	•										
366.6 > 321	.6	9.372	9.366	0.006		3407847	40.6		81.2	5723	
D 11 18O2											
402.5 > 83.6	6 (9.404	9.399	0.005		1204144	39.7		83.9	3865	
58 Perfluo											M
398.3 > 79.2	2 (9.404	9.401	0.003	1.000	629557	15.7		86.3		M
10 Perfluo											
398.3 > 79.2		9.404	9.401	0.003	1.000	492673	NC			930	
D 12 13C4											
416.5 > 371	.6 1	0.491	10.483	0.008		Page 500 of 52	23 41.4		82.8	59 05 /3	1/2016

Report Date: 31-May-2016 10:47:45 Chrom Revision: 2.2 20-Apr-2016 13:59:46

	Report Date: 31- Data File:				o\Chrom			20-Apr-2016 13:59: <i>4</i> \\27MAY2016B4A_0			
	Signal	RT	EXP RT	DLT RT	REL RT	Response	Amount ng/ml	Ratio(Limits)	%Rec	S/N	Flags
	412.8 > 168.7	10.491 10.491	10.485 10.485	0.006 0.006	1.000 1.000	551315 184233	15.3	2.99(0.00-0.00)	76.3	1087 679	
	39 Perfluorohe 448.3 > 79.2	ptanesul 10.491			1.000	660053	12.7		66.6		
	14 Perfluorohe 448.3 > 79.2	ptane Su 10.491		0.006	1.000	660053	NC			2213	
	D 16 13C4 PFO 502.4 > 79.7	S 11.449	11.441	0.008		318741	51.0		107	887	
	15 Perfluorooc 498.3 > 79.2 498.3 > 98.2	tane sulfo 11.449 11.449	11.443		1.000 1.000	1137170 598957	14.2	1.90(0.00-0.00)	76.5	2048 1396	M M M
	18 Perfluorono 462.5 > 418.6	nanoic a 11.469		0.007	1.000	1401287	16.7		83.5	2514	
	D 17 13C5 PFN. 467.5 > 422.6		11.462	0.007		3313039	40.8		81.5	5384	
	D 19 13C2 PFD. 514.4 > 469.5	A 12.298	12.299	-0.001		4706593	45.7		91.4	5535	
	20 Perfluorode 512.5 > 468.5	canoic ad		-0.001	1.000	1753606	17.3		86.7	2702	
	D 23 13C8 FOS 505.4 > 77.6					922279	9.72		19.4	3290	
	24 Perfluorooc 497.5 > 77.6		onamide	:	1.000	322207	16.6		82.9	1082	
	25 Perfluorode	cane Sul	fonate						02.7		
	598.4 > 79.6 49 Perfluorode	12.974 cane Sul			1.000	351237	NC			991	
	598.4 > 79.6 27 Perfluoroun			0.005	1.000	351237	14.1		73.0		
	562.4 > 518.5 D 26 13C2 PFU		13.021	-0.001	1.000	1802005	17.0		85.1	1616	
	564.3 > 519.5	13.020	13.021	-0.001		4562565	42.0		84.1	5528	
	D 28 13C2 PFD 614.4 > 569.4	13.626		0.0		4437311	39.9		79.8	2911	
	29 Perfluorodo 612.4 > 568.6			0.0	1.000	1383065	17.0		85.0	750	
	30 Perfluorotrio 662.4 > 618.5			0.002	1.000	1170638	24.5		122	674	
	32 Perfluorotet 712.6 > 668.5	radecano 14.579		0.002	1.000	391445	15.2		75.8	246	
ļ	D 33 13C2-PFT0 714.5 > 669.5	eDA				2315589	29.8		59.6	2571	
ı	D 35 13C2-PFH	xDA									
	814.8 > 769.6 34 Perfluorohe			0.007		643685	21.6		43.3	1787	
	812.6 > 768.6 36 Perfluorooc			0.007	1.000	736640	19.7		98.5	147	
	912.7 > 868.6			0.0	1.000	Page 504 of 52	3 5.13		25.7	320 05/3	1/2016

Report Date: 31-May-2016 10:47:45

OC Flag Legend
Processing Flags
NC - Not Calibrated
Review Flags

M - Manually Integrated

Chrom Revision: 2.2 20-Apr-2016 13:59:46

Report Date: 31-May-2016 10:47:45 Chrom Revision: 2.2 20-Apr-2016 13:59:46 TestAmerica Sacramento Data File: \\ChromNA\\Sacramento\ChromData\A4\20160527-31151.b\\27MAY2016B4A_021.d **Injection Date:** 27-May-2016 18:00:36 Instrument ID: A4 Lims ID: LCSD 320-110721/3-A Client ID: Operator ID: **JRB** ALS Bottle#: 30 Worklist Smp#: 21 Injection Vol: 15.0 ul Dil. Factor: 1.0000 PFAC_A4 Limit Group: LC PFC_DOD ICAL Method: D 113C4 PFBA 2 Perfluorobutyric acid D 313C5-PFPeA F1:m/z 216.7 > 171.5:Moving7PtAverage_x5 F1:m/z 212.7 > 168.6:Moving7PtAverage_x5 F2:m/z 267.6 > 222.7:Moving7PtAverage_x5 Y (X100000) 00018 ×15 060-×50-_ ≻40 30 20 10 5.4 5.3 5.9 6.9 4.8 6.0 6.6 5.0 5.6 6.2 6.3 7.2 7.5 6.6 6 13C2 PFHxA 4 Perfluoropentanoic acid 51 Perfluorobutanesulfonic acid F2:m/z 262.9 > 218.7:Moving7PtAverage_x5 F2:m/z 298.8 > 79.6:Moving7PtAverage x5 F3:m/z 314.6 > 269.7:Moving7PtAverage_x5 Y (X10000) 70 Y (X100000) .014 660-50-_ ≻40 30 20 10 6.9 7.7 8.9 6.9 7.2 7.2 8.3 6.3 6.6 7.5 6.6 7.5 7.1 6.3 7 Perfluorohexanoic acid 9 Perfluoroheptanoic acid 8 13C4-PFHpA F3:m/z 312.9 > 268.7:Moving7PtAverage_x5 F4:m/z 362.8 > 318.7:Moving7PtAverage_x5 F4:m/z 366.6 > 321.6:Moving7PtAverage_x5 (000012 X) > 9 684 672 (0014 0012 X10 ×60 ≻48 36 24 12 7.7 8.0 8.3 8.7 9.3 9.9 10.5 8.9 9.5 10.1 8.6 8.1 8.3 D 11 1802 PFHxS 58 Perfluorohexanesulfonic acid (M) D 12 13C4 PFOA F4:m/z 398.3 > 79.2:Moving7PtAverage_x5 F5:m/z 416.5 > 371.6:Moving7PtAverage_x5 F4:m/z 402.5 > 83.6:Moving7PtAverage_x5 28-91-0024 X20 078- ×65 **≻**52 12 39 26 13 0 0 8.9 9.9

9.5

8.3

10.1

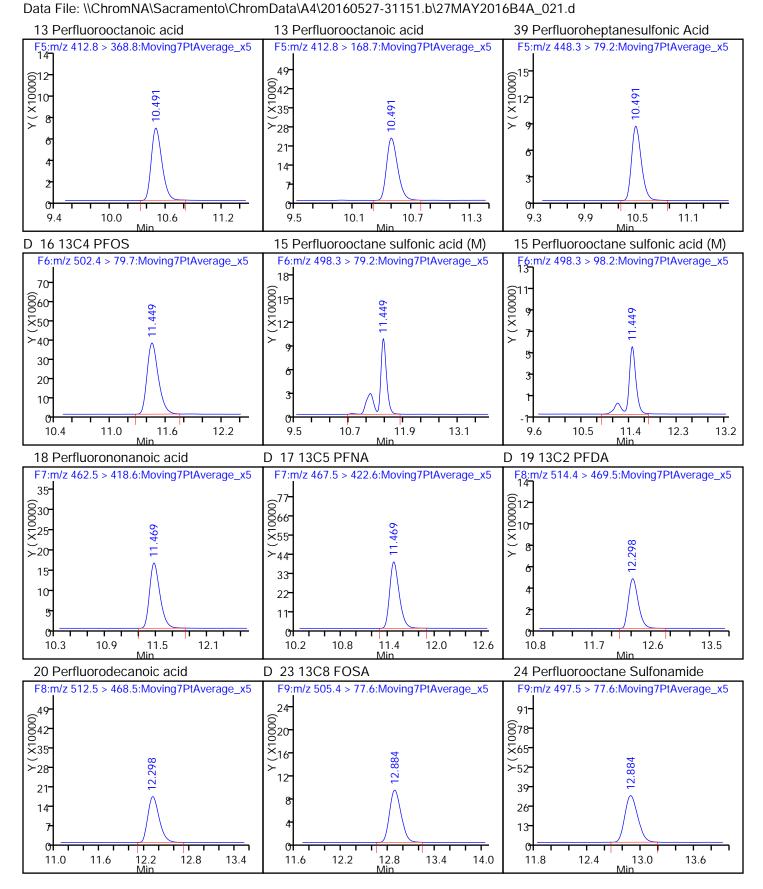
7.6

8.5 Page 506 of 523

10.3

9.3

10.5



15.8

16.1

>32⁻ 24⁻ 16⁻

14.9

15.2

15.2 15.5 15.8 16.1

14.3 14.6 14.9

Report Date: 31-May-2016 10:47:45 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_021.d

Injection Date: 27-May-2016 18:00:36 Instrument ID: A4

Lims ID: LCSD 320-110721/3-A

Client ID:

Operator ID: JRB ALS Bottle#: 30 Worklist Smp#: 21

Injection Vol: 15.0 ul Dil. Factor: 1.0000

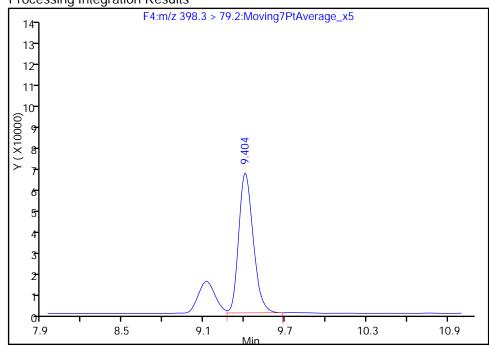
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

Column: Detector F4:MRM

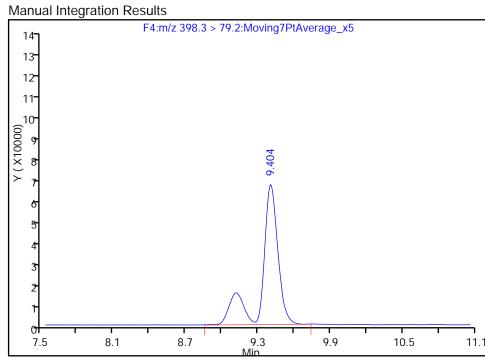
58 Perfluorohexanesulfonic acid, CAS: 355-46-4

Signal: 1

RT: 9.40 Area: 492673 Amount: 12.294892 Amount Units: ng/ml **Processing Integration Results**



RT: 9.40
Area: 629557
Amount: 15.710899
Amount Units: ng/ml



Reviewer: barnettj, 29-May-2016 13:40:36

Audit Action: Manually Integrated

Audit Reason: Isomers

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Report Date: 31-May-2016 10:47:45 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \\ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_021.d

Injection Date: 27-May-2016 18:00:36 Instrument ID: A4

Lims ID: LCSD 320-110721/3-A

Client ID:

Operator ID: JRB ALS Bottle#: 30 Worklist Smp#: 21

Injection Vol: 15.0 ul Dil. Factor: 1.0000

Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

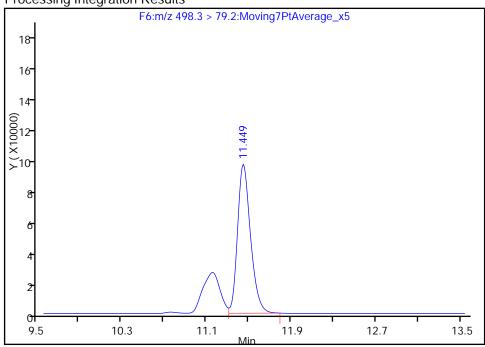
Column: Detector F6:MRM

15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

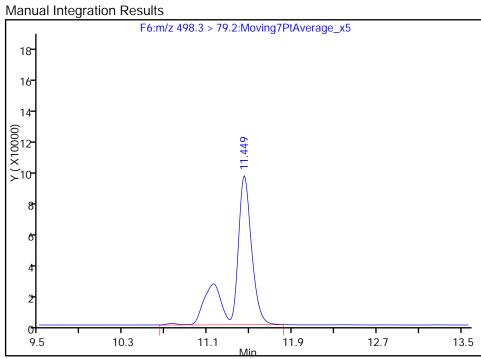
Signal: 1

RT: 11.45
Area: 823047
Amount: 10.298961
Amount Units: ng/ml

Processing Integration Results



RT: 11.45
Area: 1137170
Amount: 14.196650
Amount Units: ng/ml



Reviewer: barnettj, 29-May-2016 13:40:36

Audit Action: Manually Integrated

Audit Reason: Isomers

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Report Date: 31-May-2016 10:47:45 Chrom Revision: 2.2 20-Apr-2016 13:59:46 Manual Integration/User Assign Peak Report

TestAmerica Sacramento

Data File: \ChromNA\Sacramento\ChromData\A4\20160527-31151.b\27MAY2016B4A_021.d

Injection Date: 27-May-2016 18:00:36 Instrument ID: A4

Lims ID: LCSD 320-110721/3-A

Client ID:

Operator ID: JRB ALS Bottle#: 30 Worklist Smp#: 21

Injection Vol: 15.0 ul Dil. Factor: 1.0000

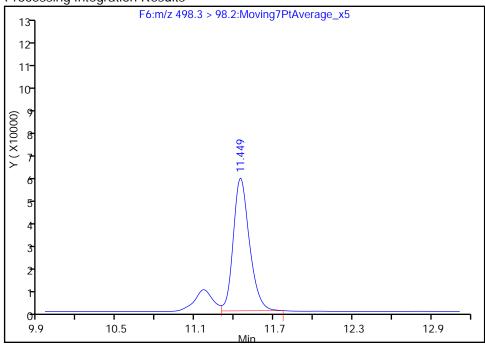
Method: PFAC_A4 Limit Group: LC PFC_DOD ICAL

Column: Detector F6:MRM

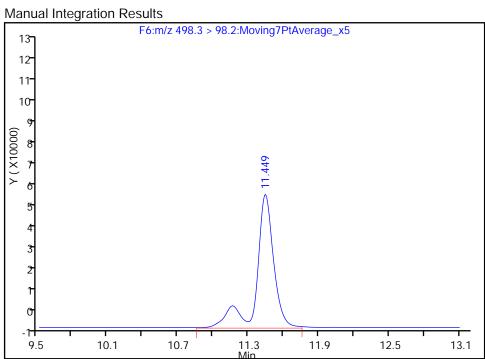
15 Perfluorooctane sulfonic acid, CAS: 1763-23-1

Signal: 2

RT: 11.45 Area: 487609 Amount: 10.298961 Amount Units: ng/ml **Processing Integration Results**



RT: 11.45 Area: 598957 Amount: 14.196650 Amount Units: ng/ml



Reviewer: barnettj, 29-May-2016 13:40:36

Audit Action: Manually Integrated

Audit Reason: Isomers Page 511 of 523

05/31/2016

LCMS ANALYSIS RUN LOG

Lab	Name:	TestAmerica	Sacramento	Job No.:	320-18918-1
SDG	No.:				

Instrument ID: A4 Start Date: 05/27/2016 11:17

Analysis Batch Number: 111733 End Date: 05/28/2016 02:08

LAB SAMPLE ID	CLIENT SAMPLE ID	DATE ANALYZED	DILUTION FACTOR	LAB FILE ID	COLUMN ID
STD 320-111733/2 IC		05/27/2016 11:17	1	27MAY2016B4A_00 2.d	Acquity 2.1(mm)
STD 320-111733/3 IC		05/27/2016 11:38	1	27MAY2016B4A_00 3.d	Acquity 2.1(mm)
STD 320-111733/4 IC		05/27/2016 11:59	1	27MAY2016B4A_00 4.d	Acquity 2.1(mm)
STD 320-111733/5 IC		05/27/2016 12:20	1	27MAY2016B4A_00 5.d	Acquity 2.1 (mm)
STD 320-111733/6 IC		05/27/2016 12:41	1	27MAY2016B4A_00 6.d	Acquity 2.1 (mm)
STD 320-111733/7 IC		05/27/2016 13:02	1	27MAY2016B4A_00 7.d	Acquity 2.1(mm)
STD 320-111733/8 IC		05/27/2016 13:24	1	27MAY2016B4A_00 8.d	Acquity 2.1(mm)
ZZZZZ		05/27/2016 13:45	1		Acquity 2.1(mm)
ICV 320-111733/10		05/27/2016 14:06	1	27MAY2016B4A_01 0.d	Acquity 2.1(mm)
ZZZZZ		05/27/2016 14:27	1		Acquity 2.1 (mm)
ZZZZZ		05/27/2016 14:48	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 15:10	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 15:31	1		Acquity 2.1(mm)
ZZZZZ		05/27/2016 15:54	1		Acquity 2.1 (mm)
ZZZZZ		05/27/2016 16:14	1		Acquity 2.1 (mm)
ZZZZZ		05/27/2016 16:35	1		Acquity 2.1 (mm)
ZZZZZ		05/27/2016 16:57	1		Acquity 2.1 (mm)
MB 320-110721/1-A		05/27/2016 17:18	1	27MAY2016B4A_01 9.d	
LCS 320-110721/2-A		05/27/2016 17:39	1	27MAY2016B4A_02 0.d	Acquity 2.1(mm)
LCSD 320-110721/3-A		05/27/2016 18:00	1	27MAY2016B4A_02 1.d	Acquity 2.1(mm)
ZZZZZ		05/27/2016 18:21	1		Acquity 2.1(mm)
CCV 320-111733/23		05/27/2016 18:42	1	27MAY2016B4A_02 3.d	Acquity 2.1(mm)
320-18918-1		05/27/2016 21:54	1	27MAY2016B4A_02 5.d	Acquity 2.1 (mm)
320-18918-2		05/27/2016 22:15	1	27MAY2016B4A_02 6.d	Acquity 2.1 (mm)
ZZZZZ		05/27/2016 22:36	1		Acquity 2.1 (mm)
ZZZZZ		05/27/2016 22:57	1		Acquity 2.1 (mm)
ZZZZZ		05/27/2016 23:18	1		Acquity 2.1 (mm)
ZZZZZ		05/27/2016 23:39	1		Acquity 2.1 (mm)
ZZZZZ		05/28/2016 00:00	1		Acquity 2.1 (mm)
ZZZZZ		05/28/2016 00:22	1		Acquity 2.1 (mm)
ZZZZZ		05/28/2016 00:43	4		Acquity 2.1 (mm)
ZZZZZ		05/28/2016 01:04	4		Acquity 2.1(mm)
ZZZZZ		05/28/2016 01:25	20		Acquity 2.1(mm)
ZZZZZ		05/28/2016 01:46	1		Acquity 2.1 (mm)
		05/28/2016 02:08		27MAY2016B4A 03	Acquity 2.1 (mm)

LCMS BATCH WORKSHEET

Lab Name: TestAmerica Sacramento Job No.: 320-18918-1

SDG No.:

Batch Number: 110721 Batch Start Date: 05/20/16 11:05 Batch Analyst: Marchenko, Veronika P

Batch Method: 3535 Batch End Date: 05/21/16 14:39

Lab Sample ID	Client Sample ID	Method Chain	Basis	GrossWeight	TareWeight	InitialAmount	FinalAmount	LCMPFCSU 00040	LCPFCSP 00049
MB 320-110721/1		3535, WS-LC-0025				500 mL	1.0 mL	50 uL	
LCS 320-110721/2		3535, WS-LC-0025				500 mL	1.0 mL	50 uL	20 uL
LCSD 320-110721/3		3535, WS-LC-0025				500 mL	1.0 mL	50 uL	20 uL
320-18918-A-1	OF-RW83-0516	3535, WS-LC-0025	Т	564.40 g	45.55 g	518.9 mL	1.0 mL	50 uL	
320-18918-A-2	OF-FB83-0516	3535, WS-LC-0025	Т	558.61 g	43.94 g	514.7 mL	1.0 mL	50 uL	

	Batch Notes	
Balance ID	QA-070	
Batch Comment	0.1N NaOH/H2O: 607459	
H2O ID	5/18/16	
Hexane ID	0000135581	
Manifold ID	5	
Methanol ID	625009	
Pipette ID	EC15219, EC15131	
Analyst ID - Reagent Drop	VPM	
Analyst ID - SU Reagent Drop	VPM	
Analyst ID - SU Reagent Drop Witness	HJA	
Solvent Lot #	626675	
Solvent Name	0.3% NH4OH/MeOH	
SOP Number	WS-LC-0025	
SPE Cartridge Type	WAX 500mg	
Solid Phase Extraction Disk ID	002736075A	

Basis	Basis Description
Т	Total/NA

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

WS-LC-0025

Page 1 of 1



West Sacramento

HPLC/LCMS Data Review Checklist

Job Number(s): 18918, 18987, 18988	Work List ID(s): 3	1151		
Extraction Batch: (1072)	Analysis Batch(es):_	111733		
Delivery Rank 4	Due Date:5	-31-16		
A. Calibration/Instrument Run QC		1 st Level	2 nd Level	N/A
ICAL locked in Chrom and TALS? ICAL Batch#	er felt men egyenge former system og eksteur, e men eksteur et i ver men skille galleg en selled i gelle.			1,35 7,500
2. ICAL, CCV Frequency & Criteria met.			/	
RF _{average} criteria appropriate for the method				-
Linear Regression criteria appropriate if required	(r > 0.995)			
 Quadratic fit criteria appropriate if required (r² ≥ 0 		 		
		+		-V
For Linear Regression and Quadratic fit – Does t 1/ the repeting limit or described in CA O.S. 005			/	
½ the reporting limit as described in CA-Q-S-005	<u>· </u>	V_	N	
All curve points show calculated concentrations.				
Peaks correctly ID'd by data system.		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	/	
5. Tune check frequency & criteria met and Tune check	report attached.	J 🗸 📗	<u> </u>	
B QAQC				ALCOBATE OF
Are all QC samples properly linked in TALS?				
Method blank, LCS/LCSD and MS/SD frequencies me		<u> </u>		
LCS/LCSD and MB data are within control limits. If no		· ·		
 Are MS/MSD recoveries and RPD within control limits 	?		***	
Holding Times were met for prep and analytical.			V ,	
IS/Surrogate recoveries meet criteria or properly noted	. NCM	✓		
C. Sample Analysis				ntoduće,
1. Was correct analysis performed and were project instr	ructions followed?			
2. If required, are compounds within RT windows?				
3. If required, are positive hits confirmed and >40% RPD	flagged?			
Manual Integrations reviewed and appropriate.				
5. All analytes correctly reported. (Primary, secondary, a	cceptable status)			
6. Correct reporting limits used. (based on client reques				
dilutions)	, pp,		✓	
D. Documentation				
1. Are all non-conformances documented/attached? NC	M# 53464 52471	1	$-\sqrt{}$	
2. Do results make sense (e.g. dilutions, etc.)?	· · · · · · · · · · · · · · · · · · ·			
Have all flags been reviewed for appropriateness?		 		
4. For level 3 and 4 reports, have forms and raw data be	en reviewed?			
5. Was QC Checker run for this job?		7	- '	
			/	
*Upon completion of this checklist, the reviewer must sca	n and attach the checkl	ist to the TAL	S job.	
1 st Level (Analyst):	Date: 5	-31-16 312014		
1 st Level (Analyst): JRB 2 nd Level Reviewer: Mway	Date: 5	31/2016		



Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Analyst: Marchenko, Veronika P

Method Code: 320-3535_IVWT-320

Batch Number: 320-110721

Batch Open: 5/20/2016 11:05:40AM Batch End: 52|-|し リー・39

Solid-Phase Extraction (SPE)

Input Sample Lab ID (Analytical Method)	SDG (1ob#)	GrossWt InitAmnt TareWt FinAmnt		PH Rcvd Adj	PHs Adj1 Adj2	Due Date	Analytical TAT	DIv Rank	Comments	Output Sample Lab ID
MB~320-110721/1 N/A	A/N		500 mL			A/N	Ψ/N	N/A		
			1.0 mL							
LCS~320-110721/2 N/A	∀ /Z		500 mL			A/N	A/N	N/A		
			1.0 mL							
_CSD~320-110721/3 N/A	A/N		500 mL			A/A	N/A	A/N		2 2 6 1 1 6 7 2 1 6 3 - A
			1.0 mL					-		·
320-18918-A-1 (PFC_IDA_DOD5)	N/Ä (320-18918-1)	564.40 g	518.9 mL			5/21/16	11_Days	4		
24		45.55 g	1.0 mL							
7-18918-A-2 IDA_DOD5)	N/A (320-18918-1)	558.61 g	514.7 mL			5/21/16	11_Days	4		
47		43.94 g	1.0 mL							
320-18987-A-1 (PFC_IDA_DOD5)	N/A (320-18987-1)	599.67 g	554.8 mL			5/25/16	12_Days	4		
0//0		44.89 g	1.0 mL							
320-18987-A-2 (PFC_IDA_DOD5)	N/A (320-18987-1)	593.46 g	547.9 mL			5/25/16	12_Days	4		
042		45.60 g	1.0 mL							
320-18988-A-1 (PFC_IDA_DOD5)	N/A (320-18988-1)	500.01 g	554.7 mL			5/25/16	12_Days	4		
0//9		45.33 g	1.0 mL							
320-18988-A-2 (PFC_IDA_DOD5)	N/A (320-18988-1)	603.1 g	556.7 mL			5/25/16	12_Days	4		
6/10		46.40 g	1.0 mL							#
320-18988-A-3 (PFC_IDA_DOD5)	N/A (320-18988-1)	598.91 g	552.8 mL			5/25/16	12_Days	4	÷	
6/10		46.14 g	1.0 mL							

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Analyst: Marchenko, Veronika P

Method Code: 320-3535_IVWT-320

Batch Number: 320-110721

Batch Open: 5/20/2016 11:05:40AM

Batch End:

Batch Notes Solvent Name 0.3% NH4OH/MeOH Pipette ID EC15219, EC15131 SPE Cartridge Type WAX 500mg Solid Phase Extraction Disk ID 002736075A Hexane ID 0000135581 Balance ID QA-070 Methanol ID 625009 H20 ID 5/18/16 Sodium Hypochlorite ID NA First Start time NA First End time NA Manifold ID 5 Page 516 of 523

Solvent Lot # 626675

Analyst ID - Reagent Drop VPM

Analyst ID - SU Reagent Drop VPIM

Analyst ID - SU Reagent Drop HJA Witness Acid Name NA

Reagent ID NA Acid ID NA

NaCI ID NA

05/31/2016

Reagent Lot Number NA

Printed: 5/20/2016

Page 3 of 5

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Analyst: Marchenko, Veronika P

Batch Comment 0.1N NaOH/H2O: 607459

SOP Number WS-LC-0025

Method Code: 320-3535_IVWT-320

Batch Number: 320-110721

Batch Open: 5/20/2016 11:05:40AM

Batch End:

Comments

Printed: 5/20/2016

Page 4 of 5

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Analyst: Marchenko, Veronika P

Method Code: 320-3535_IVWT-320

Batch Number: 320-110721

Batch Open: 5/20/2016 11:05:40AM

Batch End:

Reagent Additions Worksheet

Witness	HJA 5120-16											ď
Ву	4PM 5.20-16											>
Final Amount	1.0 mL	1.0 mL	1.0 mL	1.0 mL	1.0 mL	1.0 mL	1.0 mL	1.0 mL	1.0 mL	1.0 mL	1.0 mL	1.0 mL
Amount Added	50 uL	50 uL	30 nF	20 nF	20 nF	20 nF	7n 09	50 uL				
Reagent Code	LCMPFCSU_00040	LCMPFCSU_00040	LCPFCSP_00049	LCMPFCSU_00040	LCPFCSP_00049	LCMPFCSU_00040						
Lab ID	MB 320-110721/1	LCS 320-110721/2	LCS 320-110721/2	LCSD 320-110721/3	LCSD 320-110721/3	320-18918-A-1	320-18918-A-2	320-18987-A-1	320-18987-A-2	320-18988-A-1	320-18988-A-2	320-18988-A-3

Aqueous Extraction Analysis Sheet

(To Accompany Samples to Instruments)

Analyst: Marchenko, Veronika P

Method Code: 320-3535_IVWT-320

Batch Number: 320-110721

Batch Open: 5/20/2016 11:05:40AM

Batch End:

Lot#:			
Other Reagents: Amount/Units			
Reagent			



Sacramento Preparation Data Review Checklist

Preparation Batch Number(s): 110721 Test: PFC_1DA_D0[
Earliest Holding Time: 5-20-10

		
	1 st Level	2 nd Level
Sample List Tab	Reviewer	Reviewer
Samples identified to the correct method	//	V
All necessary NCMs filed (including holding time)		V
Method/sample/login/QAS checked and correct		- V-
Worksheef Tab	1 st Level Reviewer	2 [™] Level Reviewer
All samples properly preserved	INA	1/h
Weights in anticipated range and not targeted		V
All additional test requirements performed, documented, and uploaded to TALS correctly (e.g. final amount, initial amount, turbidity, and Cl Check)	/	/
The pH is transcribed correctly in TALS	NA	NA
All additional information transcribed into TALS is correct and raw data is attached	1	V
Comments are transcribed correctly in TALS	-/-	-
Reagents Tab	1 st Level	2 nd Level
All necessary reagents not expired and entered into TALS	Reviewer	Reviewer
	//	
All spike amounts correct and added to necessary samples and QC		/
Batch Information Date and time accurate and entered into TALS correctly	1 st Level Reviewer	2 nd Level Reviewer
All necessary 'batch information' complete and entered into TALS correctly	/	V

1 st Level Reviewer	VPM	Date:	5-21-16
2 nd Level Reviewer	Mus	Date:	5/21/16
Comments:		· · · · · · · · · · · · · · · · · · ·	

Shipping and Receiving Documents

Temperature on Receipt 3.10 TestAmerica CT0-WEDI

Chain of Custody Record

Drinking Water? Yes X No□

THE LEADER IN ENVIRONMENTAL TESTING

TAL-4124 (1007)				- 1		
Client City Lill	Project Manager			Date 5 - 110- 110	Chain of Custody Number	o sé
44465C	Telephone Mumber (Area Code)/Fax Mumber	deVFax Number			0000	-
570 Christand Greet, Suite 200		מכלוו בע נגמווספו			Page	ot
CAN STATE DO OCHAINA NA	Site Contact	Laura Tursey	Ana more	Analysis (Attach list if more space is needed)		
Project Name and Location (State) Feathers S PFC Salvapling WED!	Carrier/Waybill Number	II (44)	<u></u>		Special Instructions/	tructions/
Contract/Purchase Order/Quote No.	Matrix	Containers & Preservatives	보신 †		Conditions of Receipt	of Receipt
Sample I.D. No. and Description (Containers for each sample may be combined on one line)	IIOS pes snoenby IIV	HOPN JOH LONH JOH SONH SONH SONH) गुरु			
0F-RW83-0516 5/16/16	多好。 X		7			
91 12	X 51.8	×	2			
ge 5						
22 (
off 52						
S			-			
			_ -		, E	
				320-18918 Chain of Custody	>	
					_	
Possible Hazard Identification Non-Hazard Flammable Strin Irritant Poison B	Sample Disposal	Oisoosal By Lab	Archive For	(A fee may be asses: Months Innonth)	(A fee may be assessed if samples are retained former than 1 month)	ımed
9 Required 7 Days 14 Days 21 Da]	OC Requirements (Spo				
18 / Misona Dan		1. Received By	NA NA	1 Sur	Date Time (5)	Time File
	1 -	2. Received By	,		Date Til	ne o
S Relinquished By	Date	3. Received By		!	Date Til	Time
opponments			 - 			,

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Login Sample Receipt Checklist

Client: CH2M Hill Constructors, Inc.

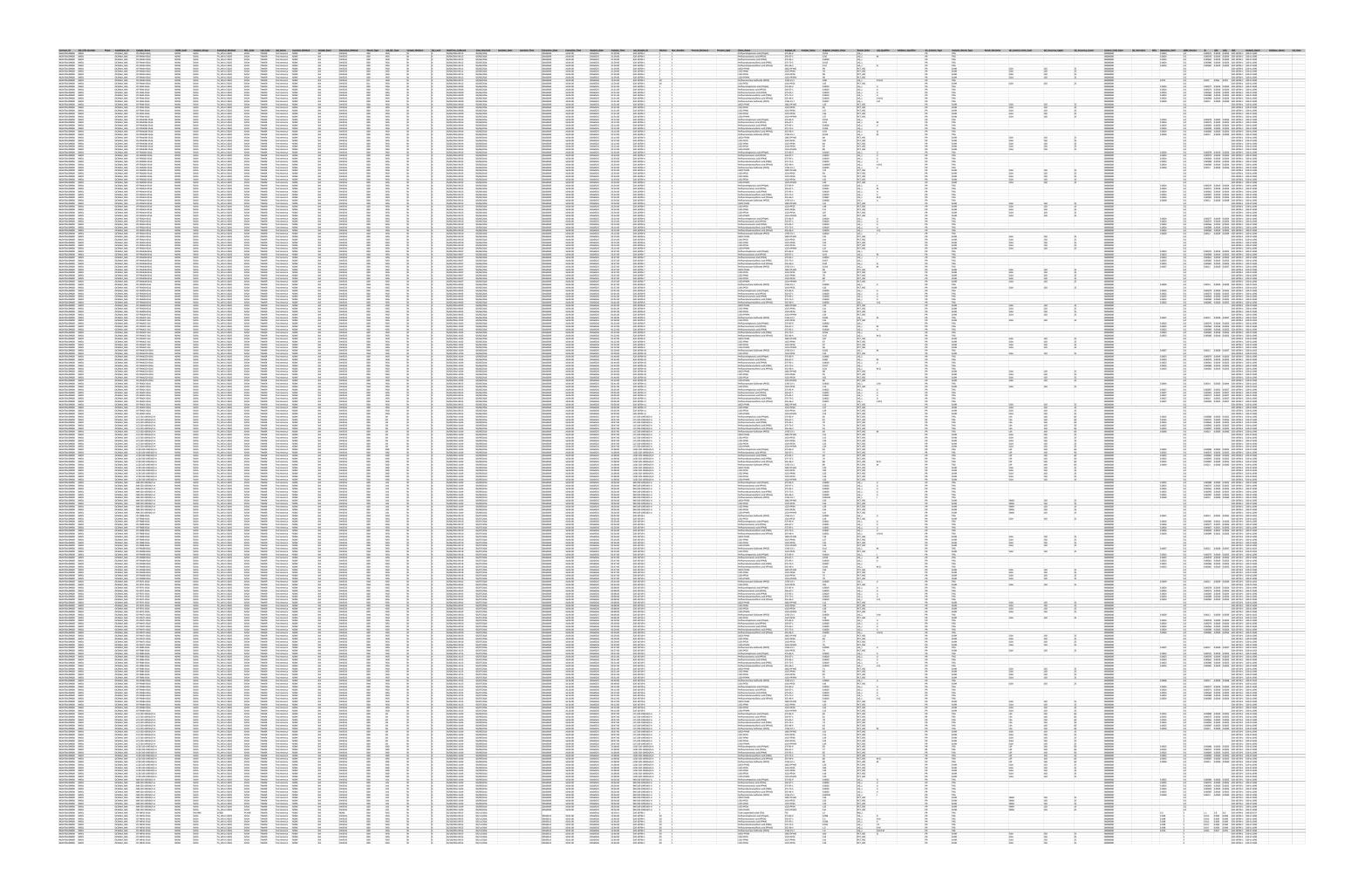
Job Number: 320-18918-1

Login Number: 18918 List Source: TestAmerica Sacramento

List Number: 1

Creator: Nelson, Kym D

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



Uniber Phase Installation_ID Sample_Name OCEANA_NAS	CHIM Code Analysis Group NOSS SUCA NOSS MATAL	### ##################################	Code Lab Code Lab Name Enachase Method A TAMER Test America ACNS TAMER Test America MCNS		m OC Lines boartime cafected base Sectived Labolate Date Colonia Time Extraction D 8 (SCNC)0316-0455 SCN11/2066 Discolate Date(ScN11/2066) 8 (SCNC)0316-0455 SCN11/2066 Discolate Date(ScN11/2066)	List Schrödiger, Time Assistypic, Clarke Assistypic, Time List, Sampler District District 5 0001150 200060026 12.546-00 20004004-1 30 1 40001000 200060018 12.520-00 20004004-1 1 1 1	Fescinit Molitaire Percent Lipid Chem Name Analysi (D Analysis Vision Libid-991-90) (Libid-991-90) (Libid-991-9	Original Asia/yes_Volume Recust_limits Lob_qualifier Validation_Qualifier DC_Column_Type Asia/yes_Lob 1-64 PCT_SEC PR PR TSG 3C600 DGL_L PR TSG	alt_Type Realt_Narrative QC_Cartrid_Linkt_Code QC_Assuraty_Lipper QC_Assuraty_Lineer Control_ SCA 150 35 35 00000000	Not Date OC Navative MDL Detection Limit CON 1 100 5	M_Version DE 100 100 506 Analysic_Exch 1 120-1679-1 20-11180 22 85 100 120-1679-1 20-12600
OCEANA, NAS OF-RAFOS OSSIS OCEANA, NAS OF-SFFOS OSSIS		6010C MIT TA_W5-LC-0025 SHO TA_W5-LC-0025 SHO	A TAMER Sen Annoica ACMV [FAMER Sen Annoica SCHV TAMER THE Annoica SCHV A TAMER SEN ANNOICA S	FF	8 (March 2014) (Ma	56/65/00 20060520 22:46/52 220-18786-1 1 1 9001/00 20060526 11877/00 220-18786-2 20 1 9001/00 20060526 12877/00 220-18786-2 20 1	Tops 7429-69-6 Perfluorotheptanoic acid (PFspA) 275-65-9 Perfluorococtanoic acid (PFspA) 285-67-5	170 US_1 PR TRG 0.064 US_1 D PR TRG 1.27 US_1 D PR TRG	000000 000000	. 100 5 0.068 5 0.068 5	22 85 100 100-1009-1 100-10100 22 85 100 100-1009-1 100-10100 22 85 100 100-1009-1 100-10100 0.015 0.008 0.008 100-1010-1 100-10100 0.014 0.008 0.008 100-1009-1 100-10100 0.014 0.008 0.008 100-1009-1 100-10100 0.015 0.008 0.008 100-1009-1 100-1000
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CCGAN, MIC LC 280-24050(7)	HET FASTAL WORS WCHSM NOWS WCHSM	9050 PCH 9060 PCH	AR TAMER Test America ACONE AR TAMER Test America ACONE AR TAMER Test America ACONE	INA NONE 000 RS W	4 (05/19/2015 1546) 05/19/2005 (05/19/2005) 4 (05/19/2015 1564) 05/19/2005 (05/19/2005) 5 (05/19/2015 1564) (05/19/2005)	58.65.00 2000020 32.36.58 (CS.386-325700)2 1 1 2000038 18.67.52 (CS.386-32606)2 1 1 2000038 (S.67.52 (CS.386-32606)9 1 1			1	100 S 10 S 10 C	22 6 5 00 10-01994 26-01900 21-1 11-1 11-1 11-1 11-1 11-1 11-1 11
OCEANA, NAS LCS 280-326666/3 OCEANA, NAS LCS 280-326666/3 OCEANA, NAS	NONE WCHEM NONE WCHEM	9060 PCH 9060 PCH 9060	AR TAMER Test America NONE AR TAMER Test America NONE AR TAMER Test America	NA 9006 000 95 W NA 9006 000 85 W NA 9006 000 85	4 05/18/2015 15/42 05/18/2015 4 05/18/2015 15/42 05/18/2016 4 05/18/2015 15/42 05/18/2016 4 05/18/2015 15/42	20060518 16/8752 LCS 280-340066/3 1 1 20060518 16/8752 LCS 280-34066/3 1 1 20060518 LC-97-0 LCS 280-34066/3 1 1	Test organic carbon (TOC) TGC Test organic carbon (TOC) TGC	100	1564 112 98 0000000 1564 112 58 0000000 1564 112 58 0000000		0.16 0.50 1.0 320-18796-1 380-324866 0.16 0.50 1.0 320-18796-1 380-324866 0.16 0.00 1.0 320-18796-1 380-324866
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OCSANA_NAS LCS 220-009640/2-A OCSANA_NAS LCS 220-009640/2-A OCSANA_NAS LCS 220-009640/2-A	NONE SVOA NONE SVOA	TA_WS-LC-0025 SHO TA_WS-LC-0025 SHO TA_WS-LC-0025 SHO	A TAMER Test America ACONE A TAMER Test America ACONE A TAMER Test America ACONE	NA SWISSE 000 85 W NA SWISSE 000 85 W NA SWISSE 000 85 W	4 (0/12/2016 1000 (6/12/2016)1666512 4 (0/12/2016 1000 (0/12/2016)1666512 4 (6/12/2016 1000 (6/12/2016)1666512	1001120	Perfluoroccanoic acid (PEOA) 225-47-1	\$6 PCT-\$65 96 196 86 86 86 86 86 86 86 86 86 86 86 86 86	15A 140 50 000000	0 0.0025 5	0.0000 0.0000 0.0005 220-18790-1 220-111290 0.00075 0.0000 0.0005 220-18790-1 220-111290 0.00065 0.0000 0.0005 220-18790-1 220-111290
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OCEANA, NAS 105 320 00640/0 A OCEANA, NAS 1050 320 10640/0 A OCEANA, NAS 1050 320 10640/0 A	NONS SUDA NONS SUDA NONS SUPA	1A_W9-12-0025 5900	A TAMER Test America ACINE A TAMER Test America ACINE A TAMER Test America ACINE A TAMER Test America	NA SWISSES RAD BSD W	4 06/12/2016 92:01 06/12/2016 20:06/612 4 06/12/2016 92:01 06/12/2016 30:01 06/12/2016 31:06/612 4 06/12/2016 90:01 06/12/2016 31:06/612	10:01:00	12C PF49A 12C PF49BA PAPLATOCENE SARSONE (PGS) 1	122 PCT_6EC P48 SLIBS 60 PCT_6EC 54 P48 T96 1119 PCT_6EC 54	\$25A \$26 \$3 \$0000000 \$26 \$160 \$160 \$0000000 \$25A \$25B \$15	0 0.0000 S	0.0018 0.0000 0.0000 120-1879-1 120-11120 120-1879-1 120-11122 120-1879-1 120-11122
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OCEANA, NAS LCSD 220-129640/3-A OCEANA, NAS LCSD 220-129640/3-A OCEANA, NAS LCSD 220-129640/3-A	NONS SUCA NONS SUCA NONS SUCA	TA_WS-LC-0025 SV0 TA_WS-LC-0025 SV0 TA_WS-LC-0025 SV0	A TAMÉR Test America ACINS	NA SWESS 000 RSD W NA SWESS 000 RSD W NA SWESS 000 RSD W	6 05/32/2016 0001 05/32/2016 3366613 4 05/32/2016 0001 05/32/2016 3266613 6 05/32/2016 0001 05/32/2016 3266613	\$0.001.00 \$0.000.00 \$0.000 \$1.000 \$1.000 \$200.00 \$1.000 \$2.00 \$1.000 \$2.00 \$1.0	Personancia ad presi Personancia ad presi Personanc	97 PCT_982 PR TRG 88 PCT_982 PR TRG 82 PCT_982 PR TRG	160 160 160 0000000 150 150 150 000000 150 165 165 0000000	0 0,0005 5 0 0,0005 5 0 0,0005 5	0.00065 0.0020 0.0025 320-1879-1 320-111280 0.00082 0.0020 0.0025 320-1879-1 320-111280 0.00087 0.0026 0.0025 320-1879-1 320-111280
OCEANA_NAS 1050 329-109640/5-A OCEANA_NAS 1050 329-109640/5-A OCEANA_NAS 1050 329-109640/5-A	NONS SUDA NONS SUDA	TA_W5-LC-0025 SV0 TA_W5-LC-0025 SV0	A TAMER Test America ACNE A TAMER Test America ACNE A TAMER Test America ACNE	NA (MISCH DO SED W NA (MISCH DO SED W		5001.00 2056026 06.19.00 (CSC 220 1086402-A 1 2 5001.00 2056026 06.19.00 (CSC 220 1086402-A 1 2	1803 PRINS 1803 PRINS 1805 PRINS 1805 PRINS 1805 PRINS 1805 PRINS 1805 PRINS 1806 PRINS 180	114 PCT-982 P4 5048 139 PCT-982 P4 5048	315A 155 35 000000 315A 155 35 000000		220-1979e-1 220-111390 220-1979e-1 220-111390
OCEANA, NAS LCSD 320-129680/3-A OCEANA, NAS MR 280-325380/1-A	NONS SHOA NONE METAL	TA_W5-LC-0025 SV0 6010C MET	A TAMER Test America NONE TAMER Test America NONE	NA SW2525 000 RSD W NA SW200A 000 LES W	6 05/12/2016-0031 05/12/2016 2016012 4 05/12/2016-005 05/12/2016 2016012	1993 1994 1995		135 PCT NGC PR SURR 85 UG_L U PR TRG	SLSA 150 25 000000	, 100 S	220 18796-1 220-11210 22 85 900 220-18796-1 280-226000
OCEANA, NAS MR 280-325527/2 OCEANA, NAS MR 280-325708/5 C OCEANA, NAS MR 280-326062/4	NOTIFIC SOUTH SO	TA, WK-C-0005 SUD TA, WK-C-0005	AR TAMER Test America NONE TAMER Test America NONE AR TAMER Test America NONE	Next	\$ \$\\ \text{\$\\ \text{\$\\ \text{\$\\ \ell}\\ \text{\$\\ \text{\$\\ \ell}\\ \text{\$\\ \text{\$\\ \ell}\\ \text{\$\\ \text{\$\\ \ell}\\ \\ \ell_{\ell}\\ \text{\$\\ \ell}\\ \text{\$\\ \ell}\\ \$\\ \		Total suppended solids (TSS)	2.8 MG_L U PR TRG 65 UG_L U PR TRG 0.251 MG_L U PR TRG	1	6.0 5 100 5	12
OCSANA, NAS ANI 280-226066/4 OCSANA, NAS ANI 280-226066/4	NONE WOHEM NONE WOHEM	9060 PCH 9060 PCH	AR TAMER Test America ACINE AR TAMER Test America ACINE	NA 1000 100 W NA 1000 100 W	4 00/10/2016 16/10 00/10/2016 4 00/10/2016 16/10 00/10/2016	2006018 163627 66856-23006/6 1 1 2006018 163627 66556-23006/6 1 1	Test organic carbon (TOC) 150C Test organic carbon (TOC) 150C	5.555 MG 1 PA 196 5.565 MG 1 PA 196	000000	1.0 S	016 030 10 201676-1 38032666 016 030 10 201676-1 38032666
OCEANA, NAS MIR 280-220064/4 OCEANA, NAS MIR 280-220064/4 OCEANA, NAS MIR 220-200640/1-A	NONE WCHEM NONE WCHEM NONE SUCA	9060 PCH 9060 PCH TA_WS-LC-0025 SVD	AR TAMER Test America NONE AR TAMER Test America NONE A TAMER Test America NONE	NA 900% 000 185 W NA 900% 000 185 W NA 500555 8AO 185 W	4 05/18/2016 16:58 05/18/2016 4 05/18/2016 16:58	DESCRIPTION TABLE 27 Mat 200-12000-0-0 1	ISEA organic carbon (TICL)	0.255 MG_1 I PR TRG 0.253 MG_1 I PR TRG 0.0016 UG_1 IM PR TRG	00000000000000000000000000000000000000	1.0 S 1.0 S 0.0000 S	0.16 0.50 1.0 120.1879e-1 390.18066 0.16 0.50 1.0 120.1879e-1 390.18066 0.0013 0.0000 0.0000 120.1879e-1 120.11112
OCEANA, NAS ANS 220-00660/1-A OCEANA, NAS ANS 220-00660/1-A	NONS SUDA NONS SUDA	TA_W5-LC-0025 SV0 TA_W5-LC-0025 SV0	A TAMÉR Test America NONE A TAMÉR Test America NONE	NA 500535 PAO 181 W NA 500535 000 185 W	4 06/12/2016-0001 06/12/2016 2016-0612 6 06/12/2016-0001 06/12/2016 2016-0612	00:01:00 20:06026 06:36:00 Mel 220-10640/1-A 1 1 00:01:00 20:06026 06:27:00 Mel 220-10640/1-A 1 2	Information (Inform (INC) 10% 3 3 4 1 12.4 10% 3 4 1 12.4 10% 3 4 1 12.4 10% 3 4 10.4 10% 3 4 10.4 10% 3 4 10.4 10% 3 4 10.4 10% 3 4 10.4	130 PCT_66C PR SURR 0.0003 U.S.,1 U PR TRG	SMA 150 35 000000	0 0.0025 5 0 0.0025 5 0 0.0025 5	220-18796-1 220-111182 0.00080 0.0000 0.0005 220-18796-1 220-111380
OCEANA, NAS ANI 220-00640/5-A OCEANA, NAS ANI 220-00640/5-A	NONS SHOA NONS SHOA	TA_W5+LC-0025 SVD TA_W5+LC-0025 SVD	A TAMER Test America ACINE A TAMER Test America NONE	NA SWEETS 200 125 W NA SWEETS 200 125 W	6 00(12)/2016-0001 00(12)/2016 2016-001 00(12)/2016 2016-0010 2016-001 2016-001 2016-001 2016-001 2016-001 2016-001 2016-0010 2016-001 2016-001 2016-001 2016-001 2016-001 2016-001 2016-0010 2016-001 2016-001 2016-001 2016-001 2016-001 2016-001 2016-0010 2016-001 2016-001 2016-001 2016-001 2016-001 2016-001 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-0010 2016-00	2001.00 20060036 05:27:00 688.20-1066031-4 1 2 2001.00 20060036 05:27:00 688.20-1066031-4 1 2 2001.00 20060036 05:27:00 688.20-1066031-4 1 2	Perhansananic and (PRA) 27-36-1 Perhansananintoic and (PRA) 27-7-5	0.0000 U.C. U. PR 1965 0.0000 U.C. U. PA 1962			0.00065 0.0005 0.0005 120-18784-1 120-11180 0.00062 0.0005 0.0005 120-18784-1 120-11180
OCEANA, NAS MB 220-00640/5-A OCEANA, NAS MB 220-00640/5-A OCEANA, NAS MB 220-00640/5-A	NONS SUCA NONS SUCA NONS SUCA	TA, WS-LC-0005 SUD TA, WS-LC-0005 SUD	A TAMÉR Test America NONE A TAMÉR Test America NONE A TAMÉR Test America NONE	NA SWESS 000 181 W NA SWESS 000 182 W NA SWESS 000 182 W	6 05/12/2016 0001 05/12/2016 3260612 4 05/12/2016 0001 05/12/2016 3260612 6 05/12/2016 0201 05/12/2016 3260612	5001.00 20060526 66.37.00 488.305-3066074 4 3 2001.00 20060526 66.37.00 488.305-3066077 4 3 2 2 2 2 2 2 2 2 2	Perfusion and Confession (1994aC) 555-664	0.0000 UG_1 U PR 19G 115 PCT_MSC PR 5URR 129 PCT_MSC PR 5URR	DASA 150 25 250000000000000000000000000000	0.005 5	0.00087 0.0000 0.0005 120-1879e-1 120-111390 120-1879e-1 120-111390 120-1879e-1 120-111390
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OCEANA, NAS OF STORLAG-0516 OCEANA, NAS OF STORLAG-0516 OCEANA, NAS OF STORLAG-0516	NONS SIGNA NONS SIGNA	1a_ws-c-ooss sec 1a_ws-c-ooss sec	A TAMER THE AMERICA NOVE A TAMER THE AMERICA NOVE	MA SINISSI 000 REG W NA SINISSI 000 REG W		1901.00 1004000 1912.00 10040041 10 1 1901.00 1004000 1912.00 10040041 10 1		8.65 UCL 5 M PS 196 0.00 UCL 0 P4 196			0.0000 2.0000 2.0000 100-100-1 100-1100-1 0.0007 2.0000 2.0000 2.0000 100-100-1 100-100-1000 2.00000 2.000000 2.000000 2.00000 2.00000 2.00000 2.00000 2.000000 2.00000 2.00000 2.00000 2.00000000
OCEANA_NAS OF STORLAG-0516 OCEANA_NAS OF STORLAG-0516 OCEANA_NAS OF STORLAG-0516	NONS SUDA NONS SUDA NONS SUDA	18., 86 ± 0.00012 0000000000000000000000000000000		Section Sect			Perhandeutenicacid (PHG) 27-72-5 Perhandeutenicacid (PHG) 25-64-6	UL_1 U	100 00 00 00 00 00 00 00 00 00 00 00 00	0.00 S 0.00 S 0.005 S	0.017 0.027 0.047 120-1276-1 120-111200 0.016 0.027 0.047 120-1276-1 120-111200 0.024 0.056 0.075 120-1276-1 120-111200
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OCEANA, NAS OF STORLAG-0616 OCEANA, NAS OF STORLAG-0616 OCEANA, NAS OF TRATILAG-0616	PILT PARETAL NONE METAL NONE SYDA	6010C MET 6010C MET TA WELC-0005 990	TAMER Test America NONE TAMER Test America NONE A TAMER Test America NONE	55 09/200A 000 REG W NA SW200A 000 REG W NA SW20E 000 REG W	6 06/10/2016 22:00 06/11/2016 20160617 6 06/10/2016 22:00 06/11/2016 20160617 6 06/10/2016 12:00 06/11/2016 20160617	86.05.00 20040617 173033 120-1496-1 1 1 6605.00 860505 142527 120-1496-1 1 901300 2004065 181100 120-1896-2 10 1	Burkurahartanir arid (Klana) 275,95,9	1400 UG_1 PR TRG 1400 UG_1 PR TRG 0.071 UG_1 D PR TRG	90000	100 5 100 5	12 15 15 15 15 15 15 15
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OCEANA, NAS CCSC 220-1096/0/3-A OCEANA, NAS AMB 280-22-280/3-A OCEANA, NAS AMB 280-22-282-N-A	Yeoles Yeolo Yeo	1A_W9-EC-0025 990 6010C MET 6010C MET	TAMER Test America NONE TAMER Test America NONE TAMER Test America NONE	000 000	* (SA/12/2016 SIZEE OF/CA/2016 DECENT) 4 (SA/17/2016 OE/CA/2016 DECENT) 4 (SA/17/2016 OE/CA/2016 DECENT) 5 (SA/17/2016 OE/CA/2016 DECENT)	0000000 20000000 000000 1.000 200 200 200 200 200 200 200 200 200	1200-9999A 1200-9999A 1000 7229-99-6 1000 7229-99-6		943A 550 05 000000	100 S	220 18796-1 320-111290 22 85 100 220-18796-1 280-324000 22 85 100 220-18796-1 280-325799
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MEMORANDUM CH2MHILL

Data Validation Summary

Oceana CTO-WE44, NALF Fentress

To: Tiffany Hill/CVO

Anita Dodson/VBO

FROM: Tiffany McGlynn/GNV

CC: Herb Kelly/GNV

DATE: June 14, 2016

Introduction

The following data validation report discusses the data validation process and findings for TestAmerica Laboratories in the Sample Delivery Groups (SDGs) listed in the table below.

Samples were analyzed using the following analytical methods:

- WS-LC-0025 Perfluorinated Hydrocarbons
- SW6010C Iron, total & dissolved

The samples included in these SDGs are listed in the table below.

SDG	Sample_Name	Matrix
320-18704-1	OF-RW44-0516	Water
320-18704-1	OF-FB44-0516	Water
320-18704-1	OF-RW42B2-0516	Water
320-18704-1	OF-FB42B2-0516	Water
320-18704-1	OF-RW42A-0516	Water
320-18704-1	OF-FB42A-0516	Water
320-18704-1	OF-RW42B-0516	Water
320-18704-1	OF-FB42B-0516	Water
320-18704-1	OF-RW42C-516	Water
320-18704-1	OF-RW42CD-0516	Water

SDG	Sample_Name	Matrix
320-18704-1	OF-FB42C-0516	Water
320-18719-1	OF-FB08-0516	Water
320-18719-1	OF-RW08-0516	Water
320-18719-1	OF-FB71-0516	Water
320-18719-1	OF-RW71-0516	Water
320-18719-1	OF-FB84-0516	Water
320-18719-1	OF-RW84-0516	Water
320-18794-1	OF-INF01-0516	Water
320-18794-1	OF-EFF01-0516	Water
320-18794-1	OF-FB78-0516	Water
320-18794-1	OF-RW78-0516	Water
320-18794-1	OF-RW78D-0516	Water
320-18794-1	OF-FB77-0516	Water
320-18794-1	OF-RW77-0516	Water
320-18796-1	OF-STORLAG-0516	Water
320-18796-1	OF-TRMTLAG-0516	Water
320-18796-1	OF-POLLLAG-0516	Water
320-18796-1	OF-CLTANK-0516	Water
320-18796-1	OF-BACKWASH-0516	Water
320-18796-1	OF-FILTER-0516	Water
320-18918-1	OF-RW83-0516	Water
320-18918-1	OF-FB83-0516	Water
320-18849-1	OF-FB74-0516	Water
320-18849-1	OF-RW74-0516	Water
320-18849-1	OF-FB59-0516	Water
320-18849-1	OF-RW59-0516	Water
320-19022-1	OF-STORLAG-PT-0516	Water
320-19022-1	OF-TRMLAG-PT-0516	Water
320-19022-1	OF-POLLAG-PT-0516	Water
320-19022-1	OF-CLTANK-PT-0516	Water
320-19022-1	OF-BACKWASH-PT-0516	Water
320-19022-1	OF-FILTER-PT-0516	Water
320-19022-1	OF-INF01-PT-0615	Water
320-19022-1	OF-PROCESS BLANK-PT-0516	Water

Data Evaluation

Data was evaluated in accordance with the analytical methods and with the criteria found in the following guidance documents: Sampling and Analysis Plan Perfluorinated Compound Investigation, Naval Auxiliary Landing Field Fentress, Chesapeake, Virginia Contract Task Order WE44 (December 2015), National Functional Guidelines for Organic Data Review

(August 2014), and National Functional Guidelines for Inorganic Data Review (August 2014), with Region 3 Modification (Use of 'B' qualifier) as applicable. The samples were evaluated based on the following criteria:

- Data Completeness
- Technical Holding Times
- Tuning Instrument
- Initial/Continuing Calibrations
- Blanks
- Internal Standards
- Laboratory Control Samples
- Matrix Spike/Spike Duplicate
- Serial Dilution
- Isotope Dilution Analyte
- Field Duplicates
- Identification/Quantitation
- Reporting Limits
- Total vs. Dissolved

Overall Evaluation of Data/Potential Usability Issues

Specific details regarding qualification of the data are addressed in the sections below. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte, the validator has chosen the qualifier that best indicates possible bias in the results and qualified these data accordingly.

Data Completeness

The SDGs were received complete and intact.

Technical Holding Times

According to the chain of custody records, sampling was performed on 5/4/16 through 5/19/16. Samples were received at the laboratory 5/6/16 through 5/20/16. All sample preparation and analyses were performed within holding time requirements.

Blanks

Several compounds were detected in the field blanks and method blanks as listed below. Affected data are summarized in **Attachment 1**.

Blank ID	Compound	Conc.	Units
OF-FB42C-0516	Perfluorohexanesulfonic acid (PFHxS)	0.0011	UG_L
OF-FB44-0516	Perfluorooctane Sulfonate (PFOS)	0.0037	UG_L
OF-FB42B2-0516	Perfluorohexanesulfonic acid (PFHxS)	0.00097	UG_L
OF-FB42A-0516	Perfluorooctane Sulfonate (PFOS)	0.0029	UG_L
OF-FB78-0516	Perfluorooctane Sulfonate (PFOS)	0.011	UG_L
OF-FB78-0516	Perfluorooctanoic acid (PFOA)	0.0040	UG_L
OF-FB78-0516	Perfluorohexanesulfonic acid (PFHxS)	0.0016	UG_L
MB 280-325382/1-A	Iron	23.7	UG_L
MB 320-109334/1-A	Perfluorooctane Sulfonate (PFOS)	0.00149	UG_L
MB 320-109334/1-A	Perfluorooctane Sulfonate (PFOS)	0.00149	UG_L
MB 320-109640/1-A	Perfluorooctane Sulfonate (PFOS)	0.00136	UG_L
MB 320-109640/1-A	Perfluorooctane Sulfonate (PFOS)	0.00136	UG_L

Lab Control Sample/Sample Duplicate

Perfluorohexanesulfonic acid (PFHxS) did not meet RPD criteria between the LCS and LCSD in SDGs 320-18719-1 and 320-18704-1. Affected data are summarized in **Attachment 1**.

Isotope Dilution Analyte

Internal standards exhibited low or high recoveries for the samples listed below. Affected data are summarized in **Attachment 1**.

SDG	Sample_Name
320-18794-1	OF-INF01-0516
320-18794-1	OF-EFF01-0516
320-18794-1	OF-RW78-0516
320-18796-1	OF-STORLAG-0516
320-18796-1	OF-POLLLAG-0516
320-18796-1	OF-CLTANK-0516
320-18796-1	OF-BACKWASH-0516

SDG	Sample_Name
320-18918-1	OF-RW83-0516
320-18918-1	OF-FB83-0516
320-19022-1	OF-INF01-PT-0615

Total vs. Dissolved

Iron did not meet criteria for total and dissolved for sample OF-STORLAG-0516. Affected data are summarized in **Attachment 1**.

Conclusion

These data can be used in the project decision-making process as qualified by the data quality evaluation process.

Please do not hesitate to contact us about this validation report.

Sincerely,

Tiffany McGlynn

Tillary Millya

Qualification Flags

Exclude More appropriate data exist for this analyte.

R Data were rejected for use.

Analyte not detected, quantitation limit is potentially biased

UL low.

UJ Analyte not detected, estimated quantitation limit.

U Analyte not detected.

Not detected substantially above the level reported in

B laboratory or field blanks.

L Analyte present, estimated value potentially biased low.
K Analyte present, estimated value potentially biased high.

Analyte identification presumptive; no second column analysis

N performed or GC/MS tentative identification.

J Analyte present, estimated value.

Analysis indicates the presence of an analyte that was

"tentatively identified" and the associated value represents its

NJ approximate concentration.

Placeholder for calculating quality control issues that do not

None require flagging.

Analyte was detected at a concentration greater than the

= quantitation limit.

Qualifier Code Reference

Value	Description
%SOL	High Moisture content
70002	Second Column – Poor Dual Column
2C	Reproducibility
	Second Source – Bad reproducibility
2S	between tandem detectors
	Blank Spike/Blank Spike
BD	Duplicate(LCS/LCSD) Precision
BRL	Below Reporting Limit
	3
BSH	Blank Spike/LCS – High Recovery
BSL	Blank Spike/LCS – Low Recovery
CC	Continuing Calibration
	Continuing Calibration Blank
CCBL	Contamination
	Continuing Calibration Verification – High
CCH	Recovery
0.01	Continuing Calibration Verification – Low
CCL	Recovery
DL	Redundant Result – due to Dilution
EBL	Equipment Blank Contamination
EMPC	Estimated Possible Maximum Concentration
ESH	Extraction Standard - High Recovery
ESL	Extraction Standard - Low Recovery
FBL	Field Blank Contamination
FD	
	Field Duplicate
HT	Holding Time
ICB	Initial Calibration – Bad Linearity or Curve Function
100	Initial Calibration – High Relative
ICH	Response Factors
	Initial Calibration – Low Relative
ICL	Response Factors
IR15	Ion ratio exceeds +/- 15% difference
ISH	Internal Standard – High Recovery
ISL	Internal Standard – Low Recovery
LD	Lab Duplicate Reproducibility
LR	Concentration Exceeds Linear Range
MBL	Method Blank Contamination
IVIDL	
MDP	Matrix Spike/Matrix Spike Duplicate Precision
MI	Matrix interference obscuring the raw data

Value	Description
MSH	Matrix Spike and/or Matrix Spike Duplicate – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate – Low Recovery
OT	Other
PD	Pesticide Degradation
RE	Redundant Result - due to Reanalysis or Re-extraction
SD	Serial Dilution Reproducibility
SSH	Spiked Surrogate – High Recovery
SSL	Spiked Surrogate – Low Recovery
TBL	Trip Blank Contamination
TN	Tune

