19A2567

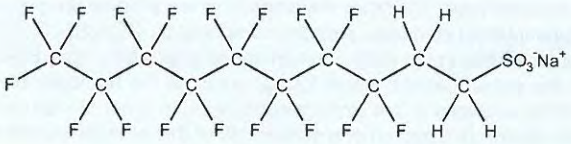
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: 8:2FTS **LOT NUMBER:** 82FTS1118

COMPOUND: Sodium 1H,1H,2H,2H-perfluorodecane sulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$C_{10}H_4F_{17}SO_3Na$		**MOLECULAR WEIGHT:**	550.16
CONCENTRATION:	50.0 ± 2.5 µg/ml	(Na salt)	**SOLVENT(S):**	Methanol
	47.9 ± 2.4 µg/ml	(8:2FTS anion)		
CHEMICAL PURITY:	>98%			
LAST TESTED: (mm/dd/yyyy)	11/28/2018			
EXPIRY DATE: (mm/dd/yyyy)	11/28/2023			
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:** 11/29/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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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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.

HANDLING:

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

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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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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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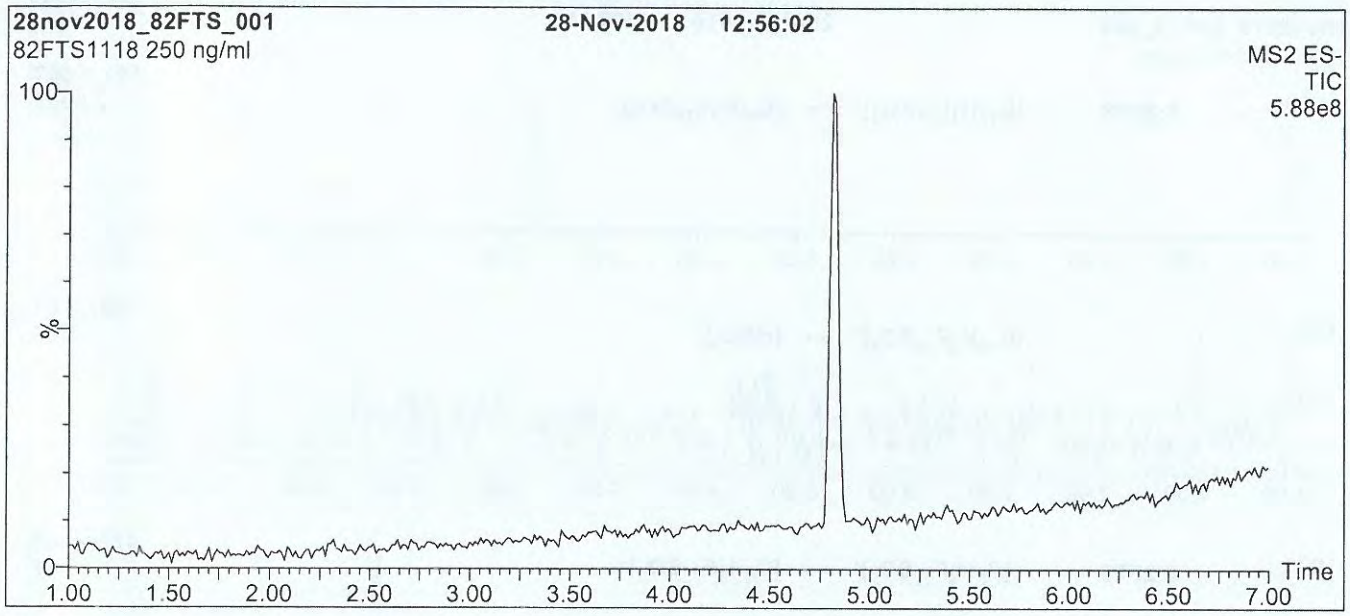
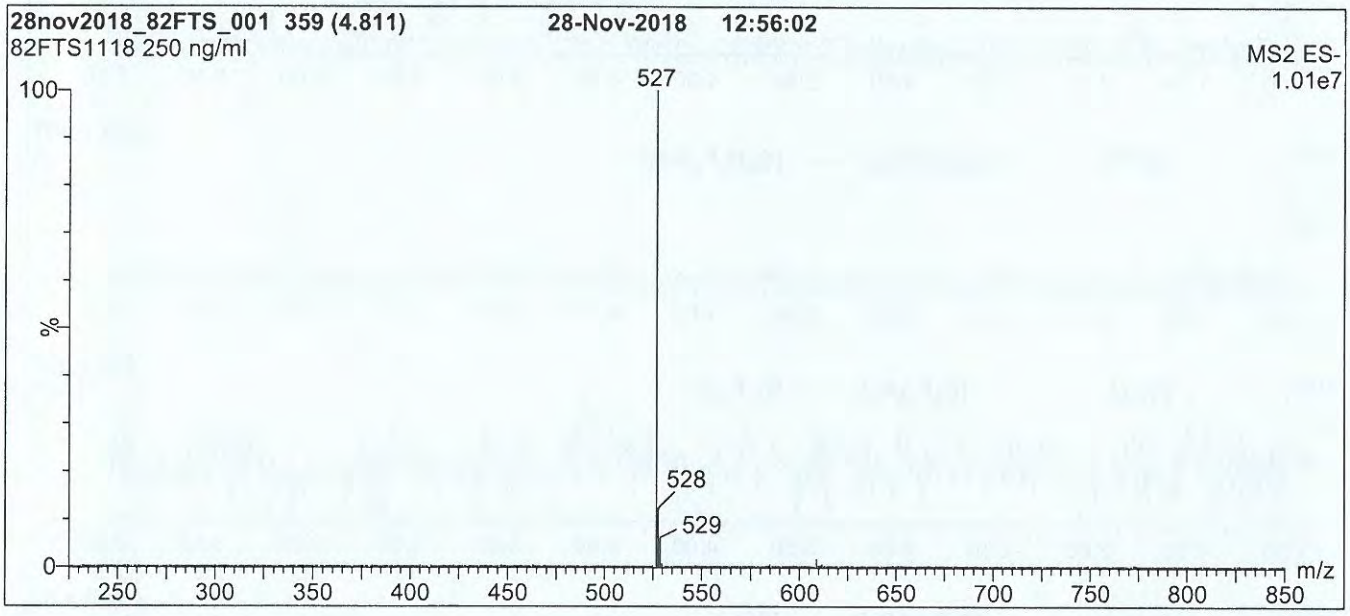
19A2567

Figure 1: **8:2FTS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 2 min
before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

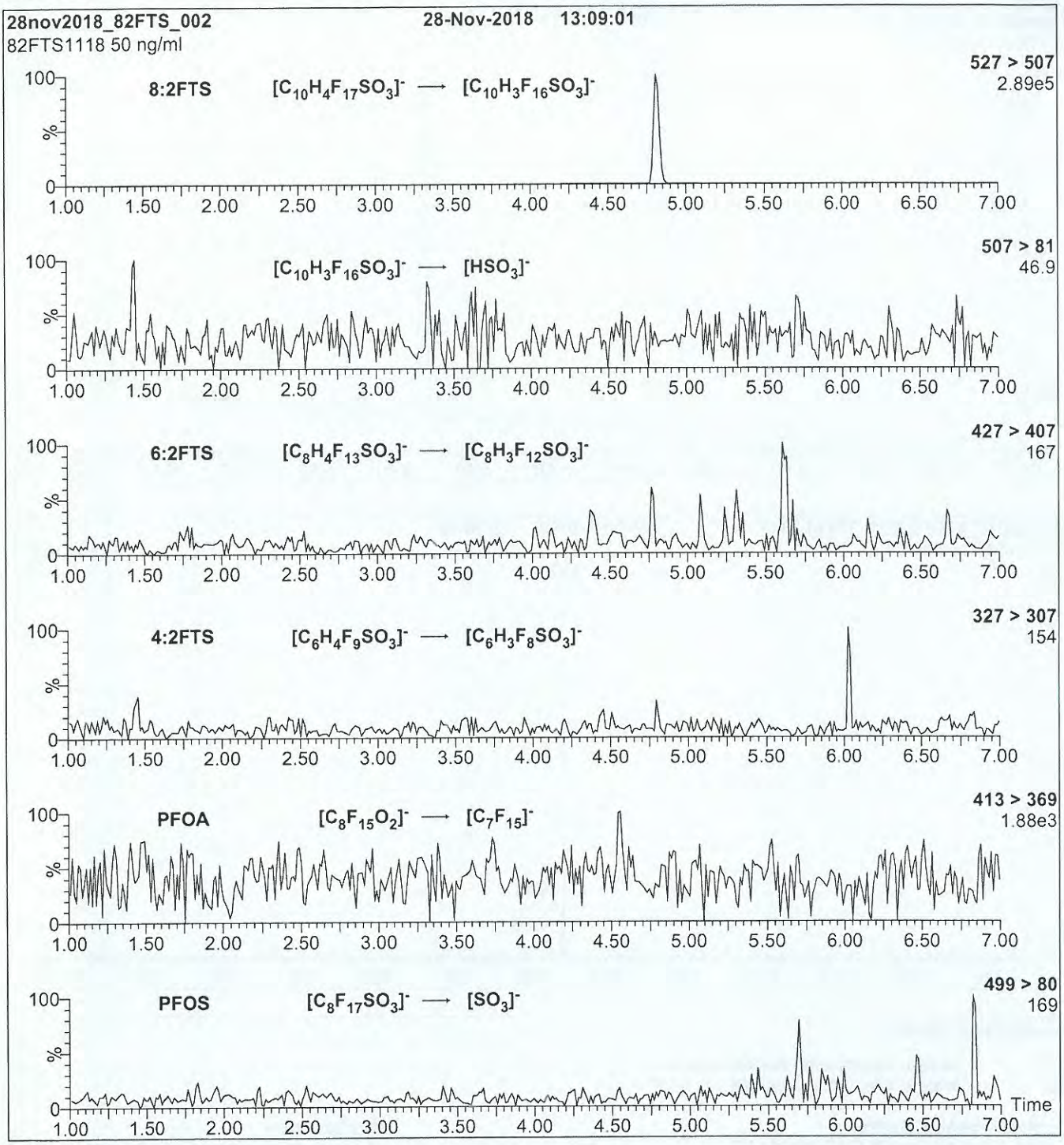
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = 25.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2567

Figure 2: **8:2FTS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (8:2FTS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 2.74e-3
Collision Energy (eV) = 26

19A2568

WELLINGTON LABORATORIES

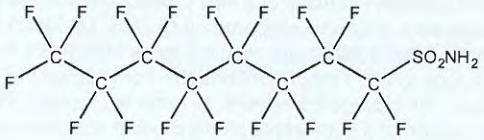
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: FOSA-I
COMPOUND: Perfluoro-1-octanesulfonamide

LOT NUMBER: FOSA0618I

STRUCTURE:

CAS #: 754-91-6



MOLECULAR FORMULA:	$C_8H_2F_{17}NO_2S$	**MOLECULAR WEIGHT:**	499.14
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Isopropanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	06/20/2018		
EXPIRY DATE: (mm/dd/yyyy)	06/20/2023		
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:** 06/25/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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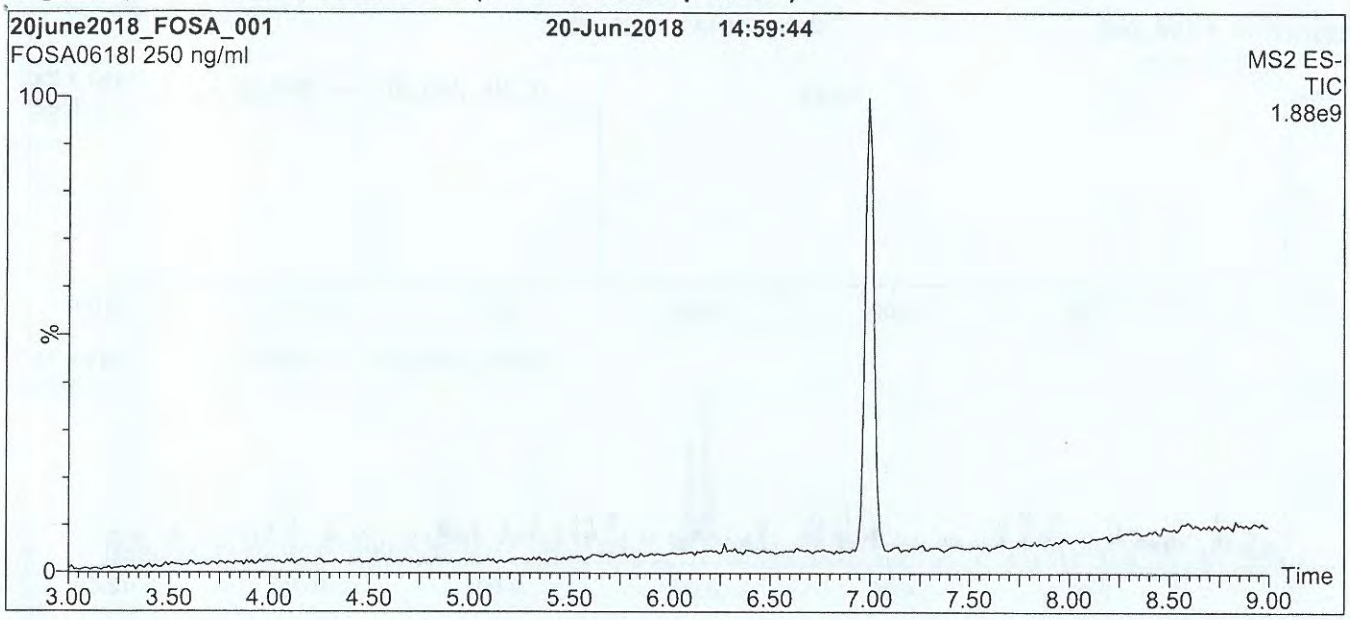
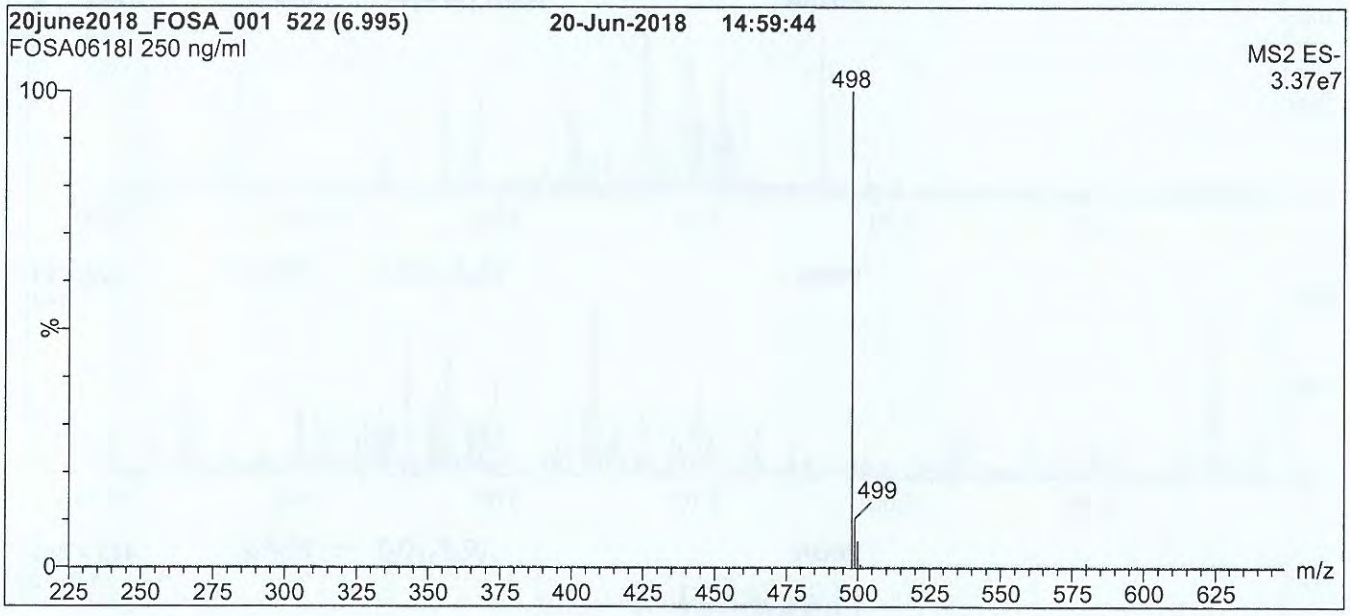
Figure 1: **FOSA-I; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 80% organic over 8 min and hold for 2 min
before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

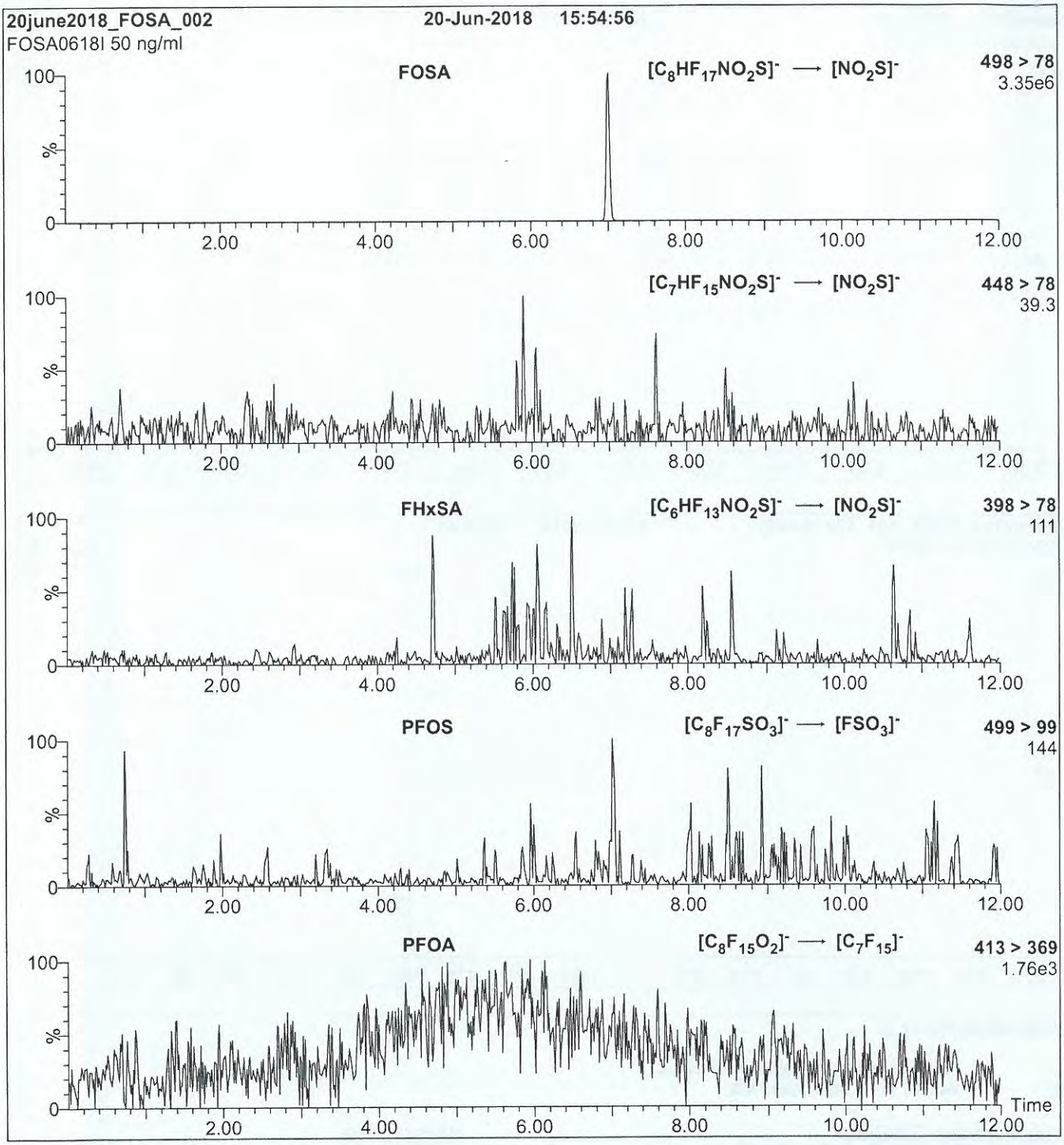
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = 20.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2568

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



Conditions for Figure 2:

Injection: On-column (FOSA-I)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.43e-3

Collision Energy (eV) = 30

19A2569

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

br-NMeFOSAA

N-Methylperfluorooctanesulfonamidoacetic Acid Solution/Mixture of Linear and Branched Isomers

PRODUCT CODE:	br-NMeFOSAA
LOT NUMBER:	brNMeFOSAA0118
CONCENTRATION:	50.0 ± 2.5 µg/ml
SOLVENT(S):	Methanol/Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	01/10/2018
LAST TESTED: (mm/dd/yyyy)	01/17/2018
EXPIRY DATE: (mm/dd/yyyy)	01/17/2023
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

The chemical purity has been determined to be ≥98% N-methylperfluorooctanesulfonamidoacetic acid (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 ^{19}F-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.
- Contains 4 mole eq. of NaOH to prevent conversion of the acetic acid moiety to its respective methyl ester.

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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Table A: **br-NMeFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	N-methylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2N(CH_3)CH_2CO_2H$	76.0
2	N-methylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3CF(CF_3)(CF_2)_2SO_2N(CH_3)CH_2CO_2H$	0.7
3	N-methylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2CF(CF_3)(CF_2)_3SO_2N(CH_3)CH_2CO_2H$	2.0
4	N-methylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2CF(CF_3)(CF_2)_4SO_2N(CH_3)CH_2CO_2H$	6.0
5	N-methylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3CF(CF_3)(CF_2)_5SO_2N(CH_3)CH_2CO_2H$	14.0
6	N-methylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	$CF_3C(CF_3)_2(CF_2)_4SO_2N(CH_3)CH_2CO_2H$	0.2
7	Other Unidentified Isomers		1.1

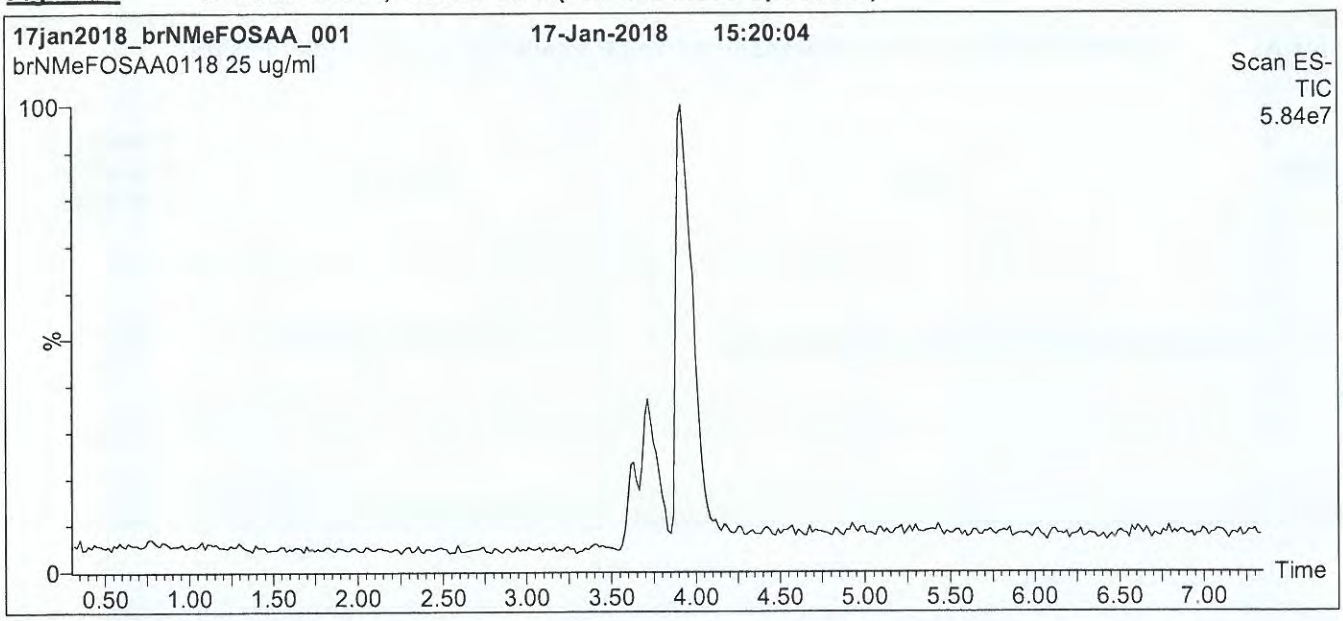
* Percent of total N-methylperfluorooctanesulfonamidoacetic acid isomers only.

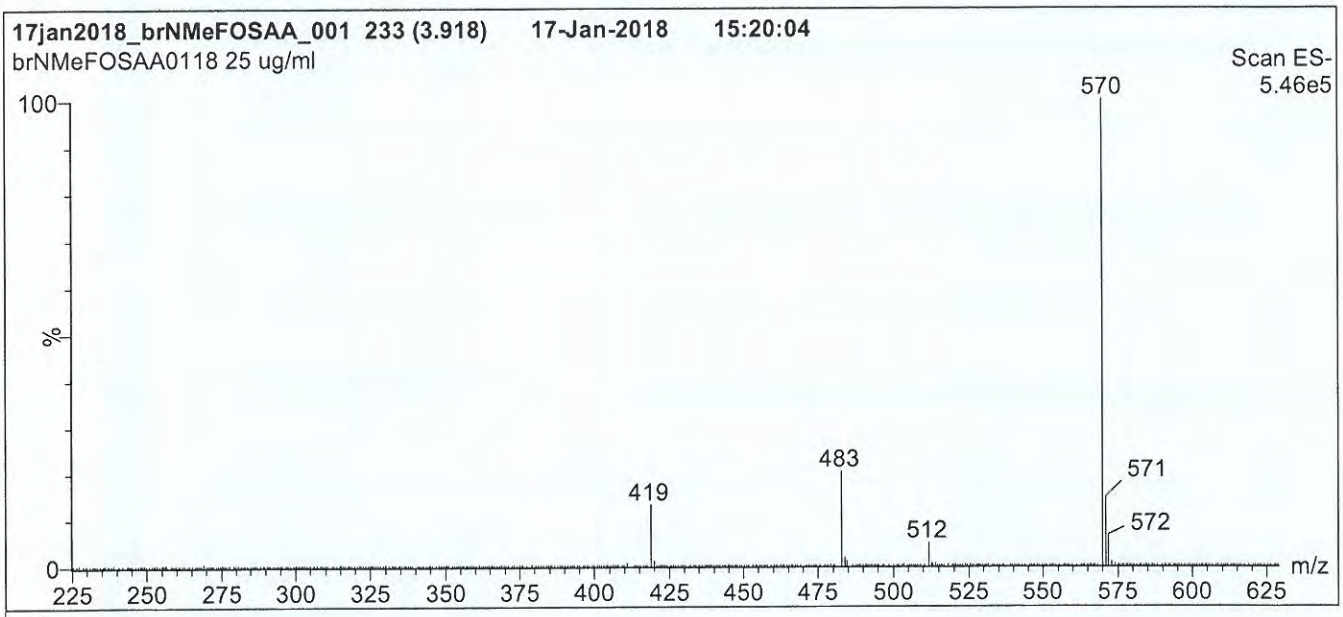
Certified By: _____ **Date:** 03/22/2018 (mm/dd/yyyy)

B.G. Chittim, General Manager

19A2569

Figure 1: **br-NMeFOSAA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc 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

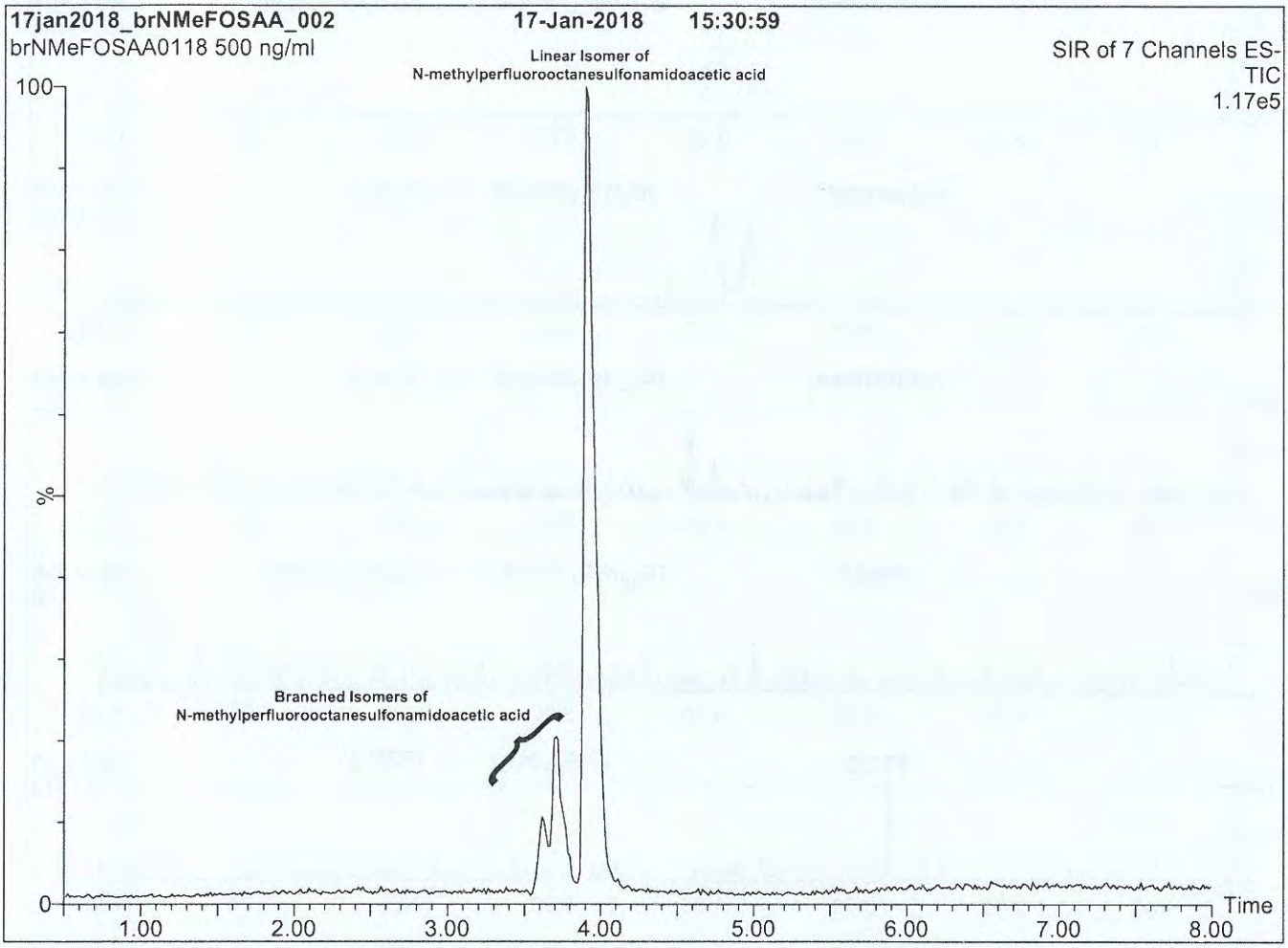
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 35.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

19A2569

Figure 2: **br-NMeFOSAA; LC/MS Data (SIR)**



Conditions for Figure 2:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc 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

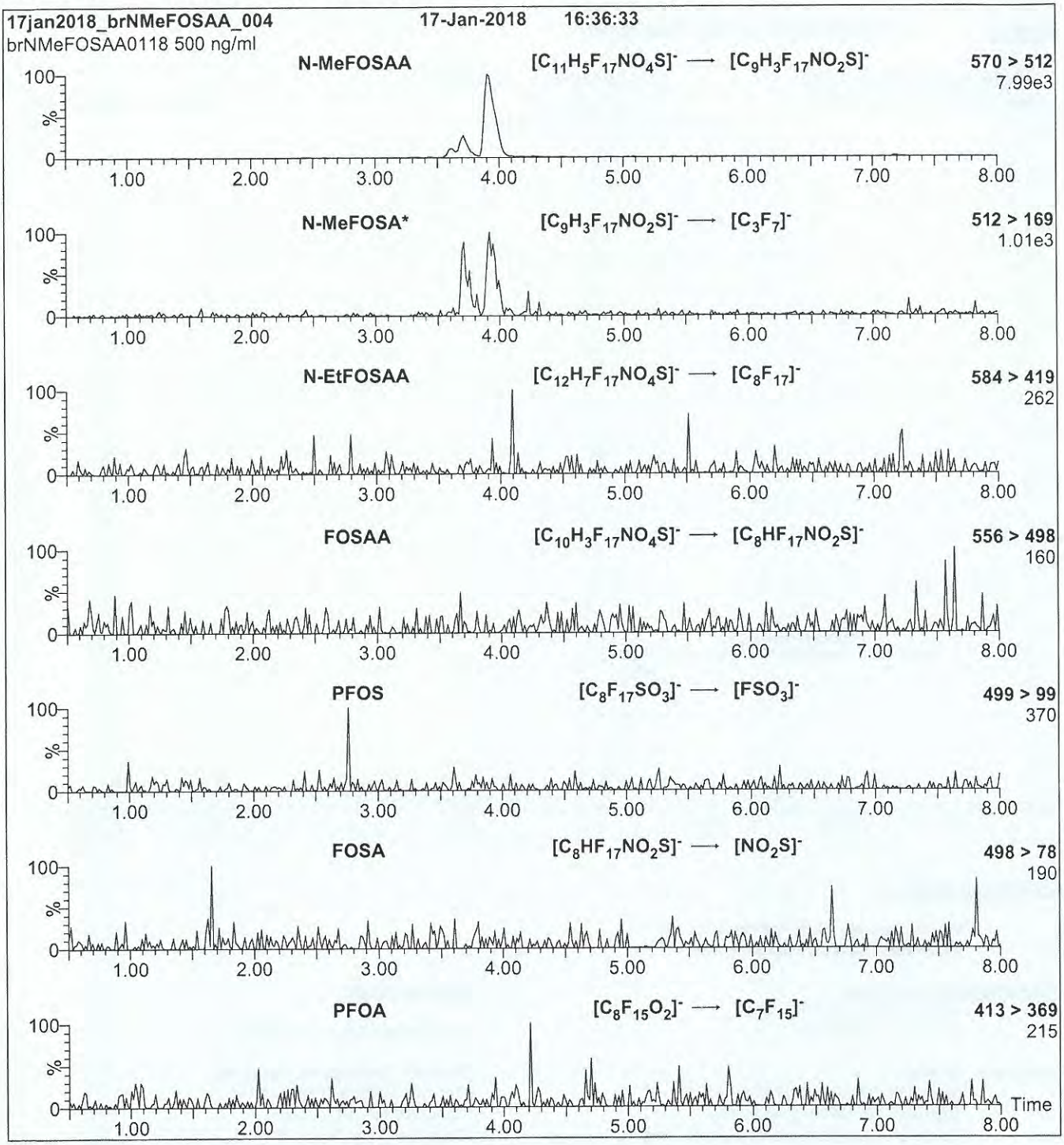
MS Parameters

Experiment: SIR (7 channels)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15-60
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

19A2569

Figure 3: **br-NMeFOSAA; LC/MS/MS Data (Selected MRM Transitions)**



*Note: N-MeFOSA is formed by in-source fragmentation.

Conditions for Figure 3:

Injection: On-column

Mobile phase: Same as Figure 2

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 11-40 (variable)

19A2570

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

br-NEtFOSAA

N-Ethylperfluorooctanesulfonamidoacetic Acid Solution/Mixture of Linear and Branched Isomers

PRODUCT CODE:	br-NEtFOSAA
LOT NUMBER:	brNEtFOSAA0718
CONCENTRATION:	50.0 ± 2.5 µg/ml
SOLVENT(S):	Methanol/Water (<1%)
DATE PREPARED: (mm/dd/yyyy)	07/25/2018
LAST TESTED: (mm/dd/yyyy)	07/26/2018
EXPIRY DATE: (mm/dd/yyyy)	07/26/2023
RECOMMENDED STORAGE:	Refrigerate ampoule

DESCRIPTION:

The chemical purity has been determined to be ≥98% N-ethylperfluorooctanesulfonamidoacetic acid (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 ^{19}F-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.
- Contains 4 mole eq. of NaOH to prevent conversion of the acetic acid moiety to its respective methyl ester.
- Contains ~ 0.6% of perfluoro-n-octanoic acid.

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

19A2570

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 compounds it contains.

HANDLING:

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, as well as mixtures and calibration solutions, are compared to older lots in a similar manner. This further confirms the homogeneity of the crystalline material as well as the stability and homogeneity of the solutions in the storage containers. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

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Table A: **br-NEtFOSAA; Isomeric Components and Percent Composition (by ^{19}F-NMR)***

Isomer	Name	Structure	Percent Composition by ^{19}F-NMR
1	N-ethylperfluoro-1-octanesulfonamidoacetic acid	$CF_3(CF_2)_7SO_2N(C_2H_5)CH_2CO_2H$	77.5
2	N-ethylperfluoro-3-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_3CF(CF_3)(CF_2)_2SO_2N(C_2H_5)CH_2CO_2H$	2.3
3	N-ethylperfluoro-4-methylheptanesulfonamidoacetic acid	$CF_3(CF_2)_2CF(CF_3)(CF_2)_3SO_2N(C_2H_5)CH_2CO_2H$	2.2
4	N-ethylperfluoro-5-methylheptanesulfonamidoacetic acid	$CF_3CF_2CF(CF_3)(CF_2)_4SO_2N(C_2H_5)CH_2CO_2H$	5.4
5	N-ethylperfluoro-6-methylheptanesulfonamidoacetic acid	$CF_3CF(CF_3)(CF_2)_5SO_2N(C_2H_5)CH_2CO_2H$	10.4
6	N-ethylperfluoro-5,5-dimethylhexanesulfonamidoacetic acid	$CF_3C(CF_3)_2(CF_2)_4SO_2N(C_2H_5)CH_2CO_2H$	0.3
7	N-ethylperfluoro-4,5-dimethylhexanesulfonamidoacetic acid	$CF_3CF(CF_3)CF(CF_2)_3SO_2N(C_2H_5)CH_2CO_2H$	0.3
8	N-ethylperfluoro-3,5-dimethylhexanesulfonamidoacetic acid	$CF_3CF(CF_3)CF_2CF(CF_2)_2SO_2N(C_2H_5)CH_2CO_2H$	0.3
9	Other Unidentified Isomers		1.3

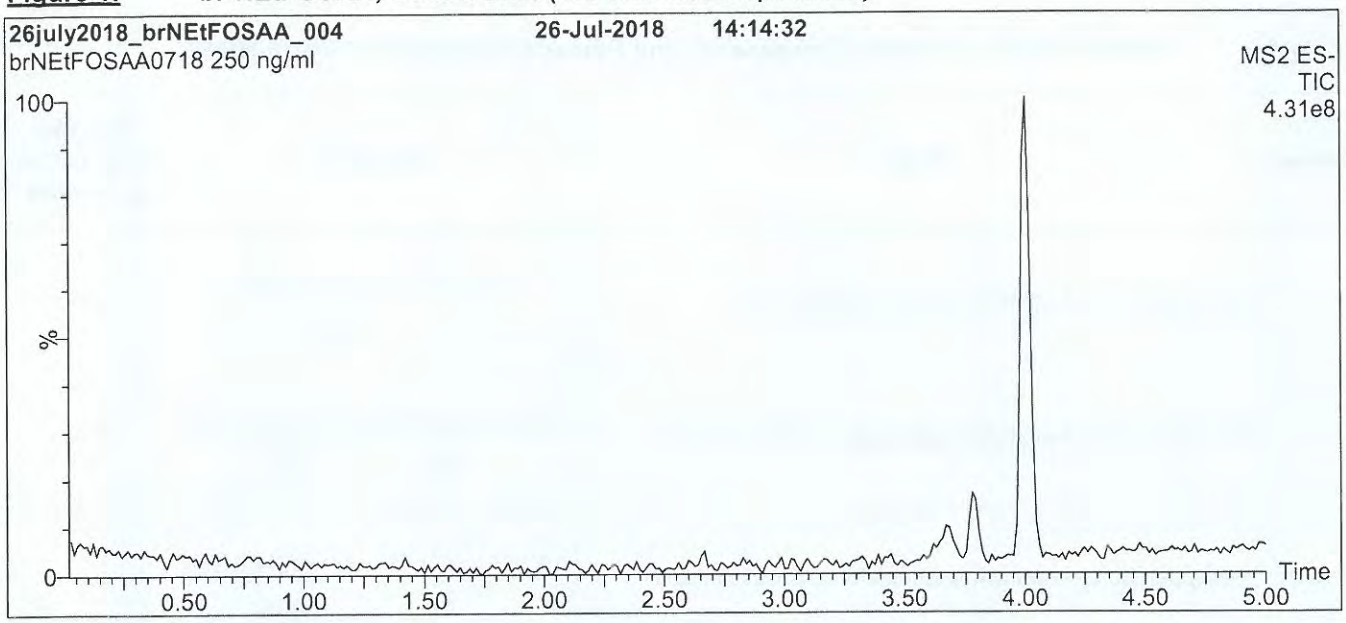
* Percent of total N-ethylperfluorooctanesulfonamidoacetic acid isomers only.

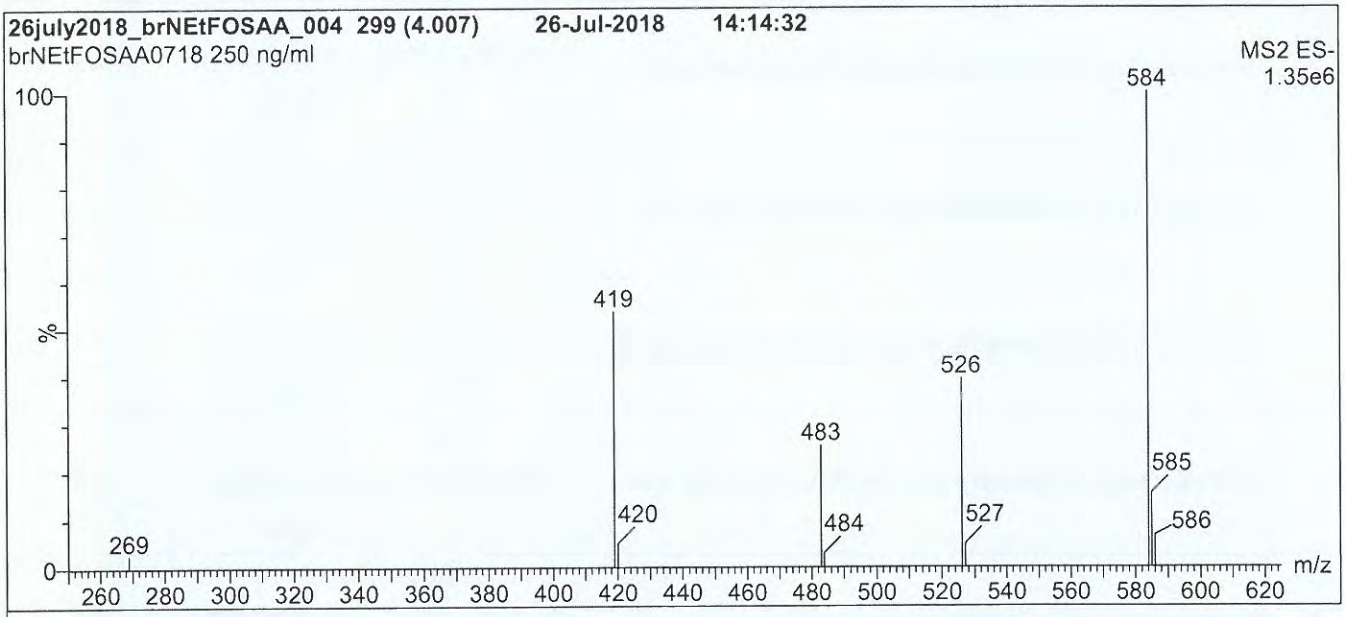
Certified By: _____ **Date:** 07/27/2018 (mm/dd/yyyy)

B.G. Chittim, General Manager

19A2570

Figure 1: **br-NEtFOSAA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = 64
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

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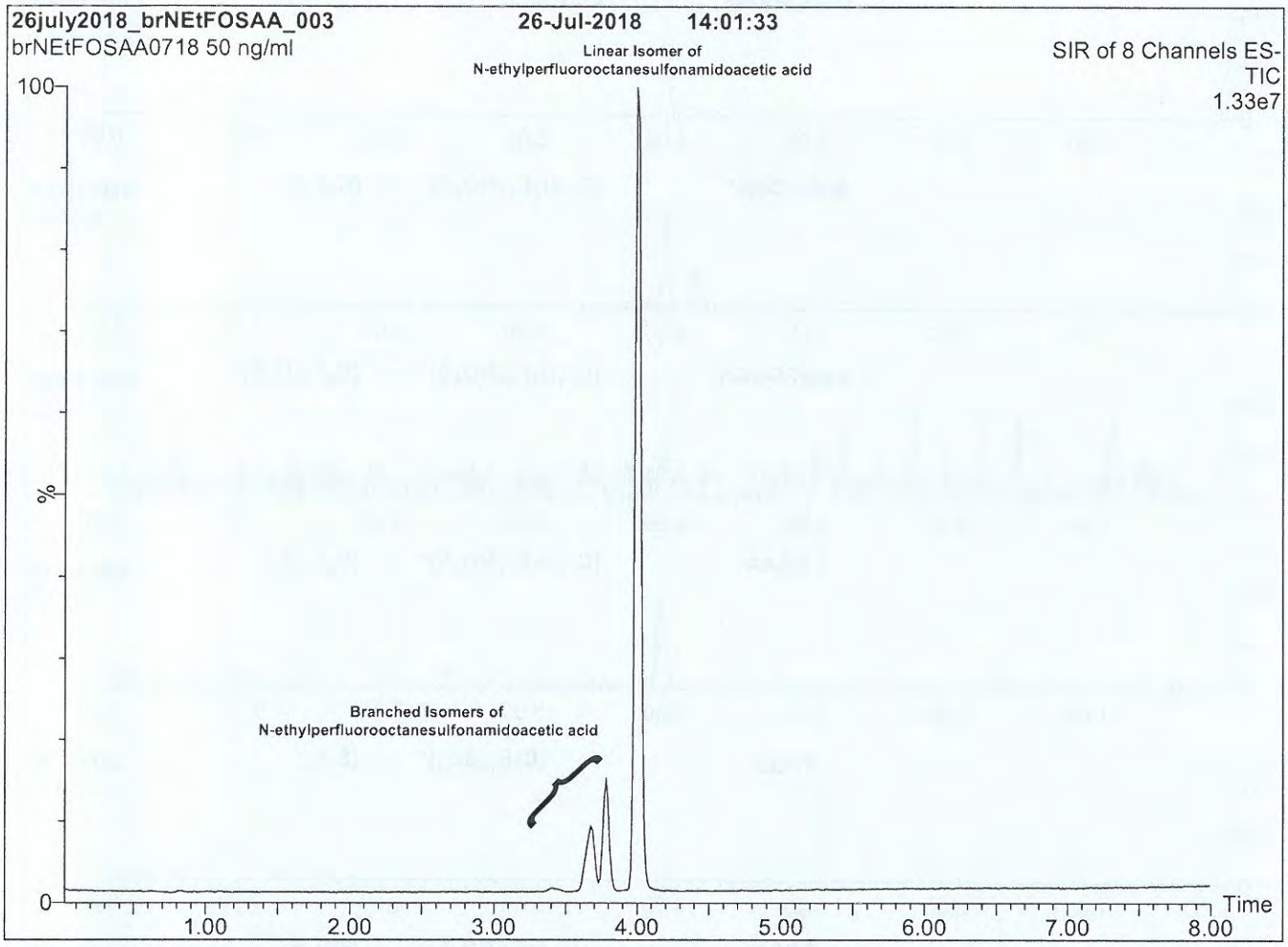
Figure 2: **br-NEtFOSAA; LC/MS Data (SIR)**



Conditions for Figure 2:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

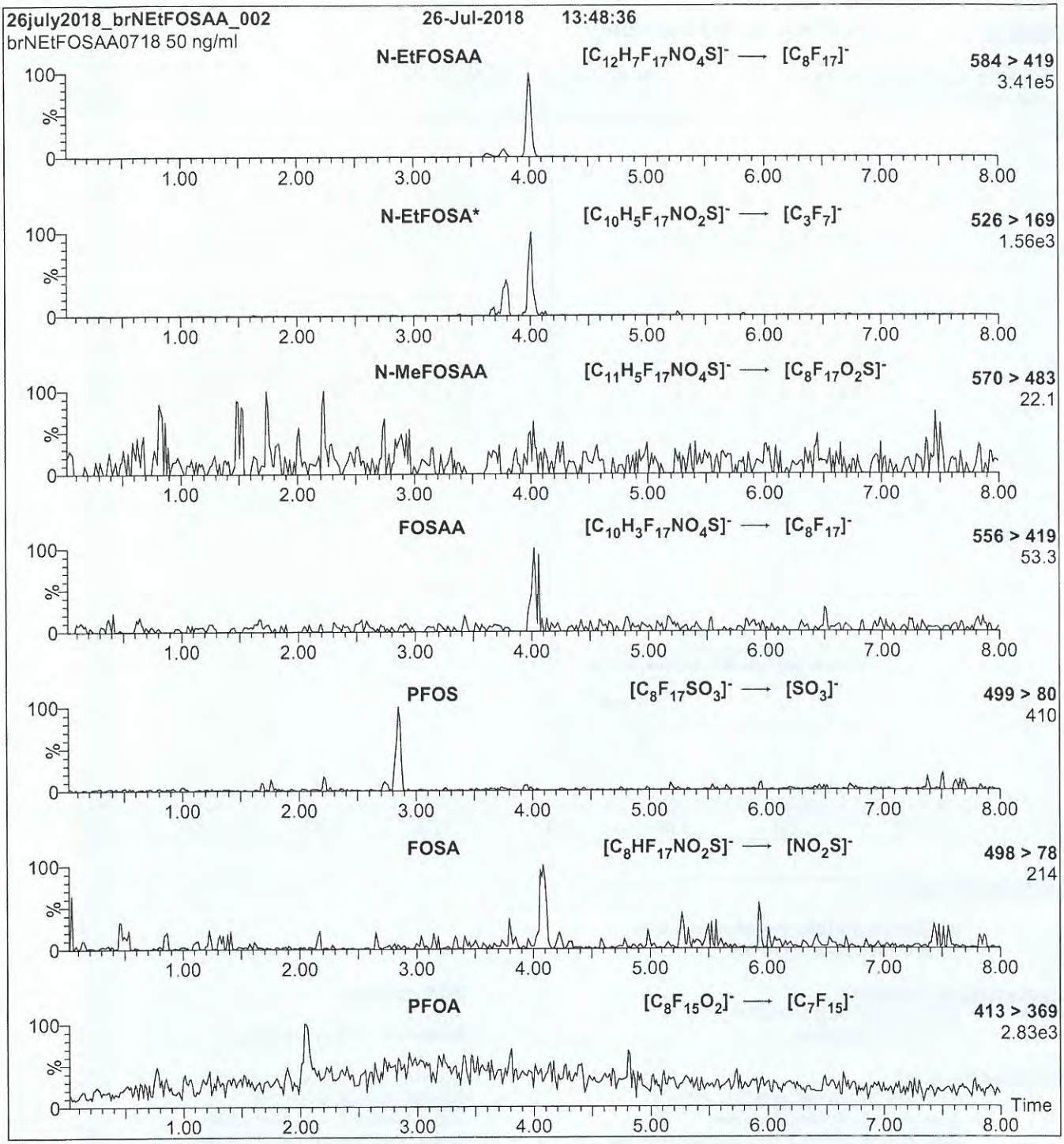
MS Parameters

Experiment: SIR (8 channels)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = variable (2-64)
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2570

Figure 3: **br-NEtFOSAA; LC/MS/MS Data (Selected MRM Transitions)**



*Note: N-EtFOSA is formed by in-source fragmentation.

Conditions for Figure 3:

Injection: On-column (br-NEtFOSAA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.76e-3
Collision Energy (eV) = 18

19A2571

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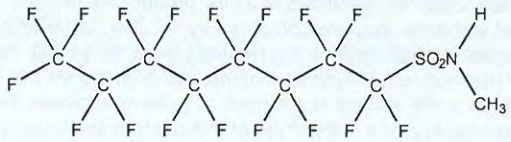
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	N-MeFOSA-M	**LOT NUMBER:**	NMeFOSA0518M
COMPOUND:	N-methylperfluoro-1-octanesulfonamide		
STRUCTURE:		**CAS #:**	31506-32-8



MOLECULAR FORMULA:	$C_9H_4F_{17}NO_2S$	**MOLECULAR WEIGHT:**	513.17
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/31/2018		
EXPIRY DATE: (mm/dd/yyyy)	05/31/2023		
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:** 06/07/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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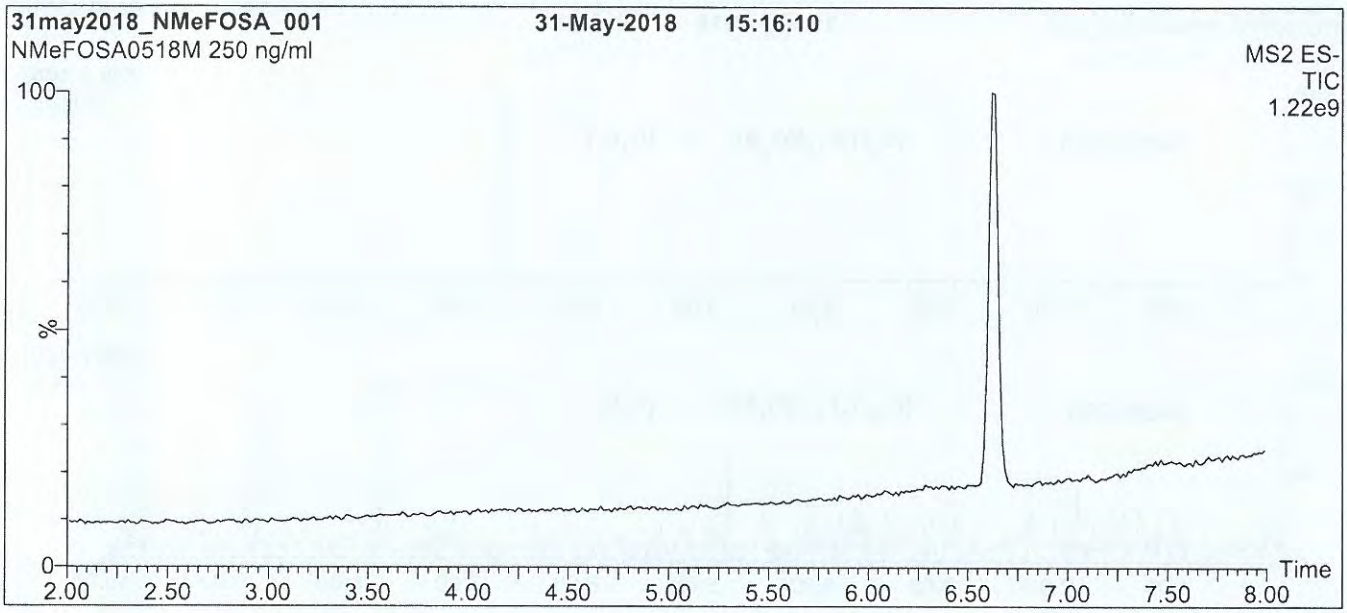
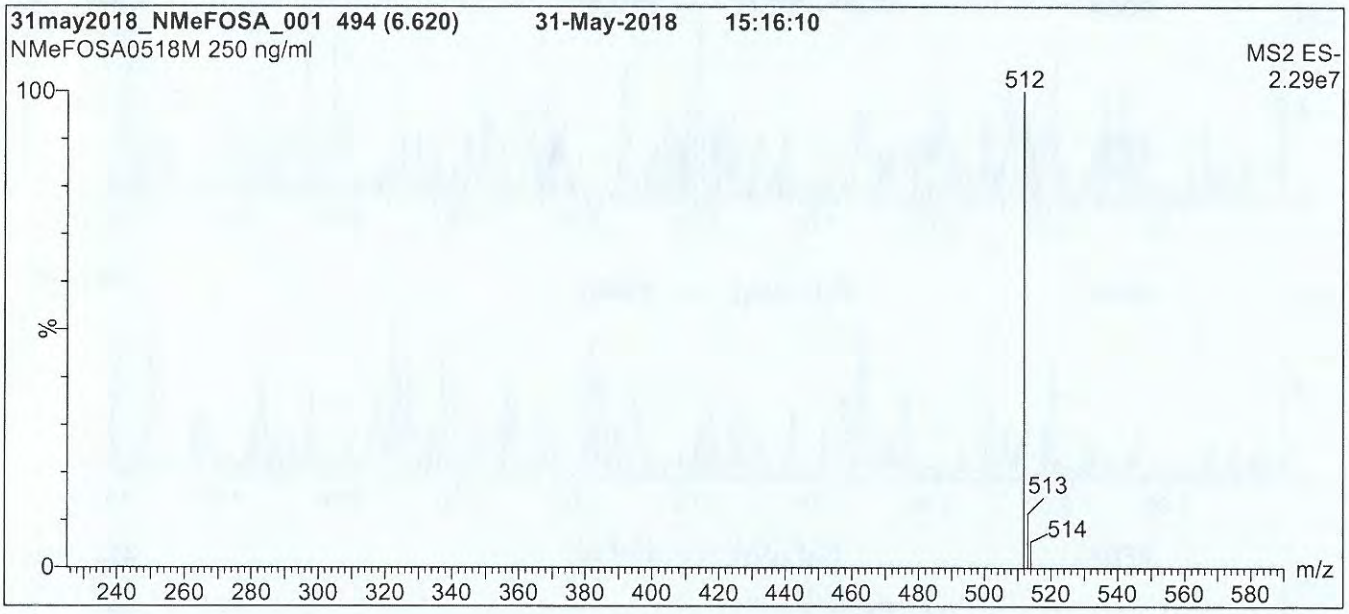
19A2571

Figure 1: **N-MeFOSA-M; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH C_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 85% organic over 7 min and hold for
3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

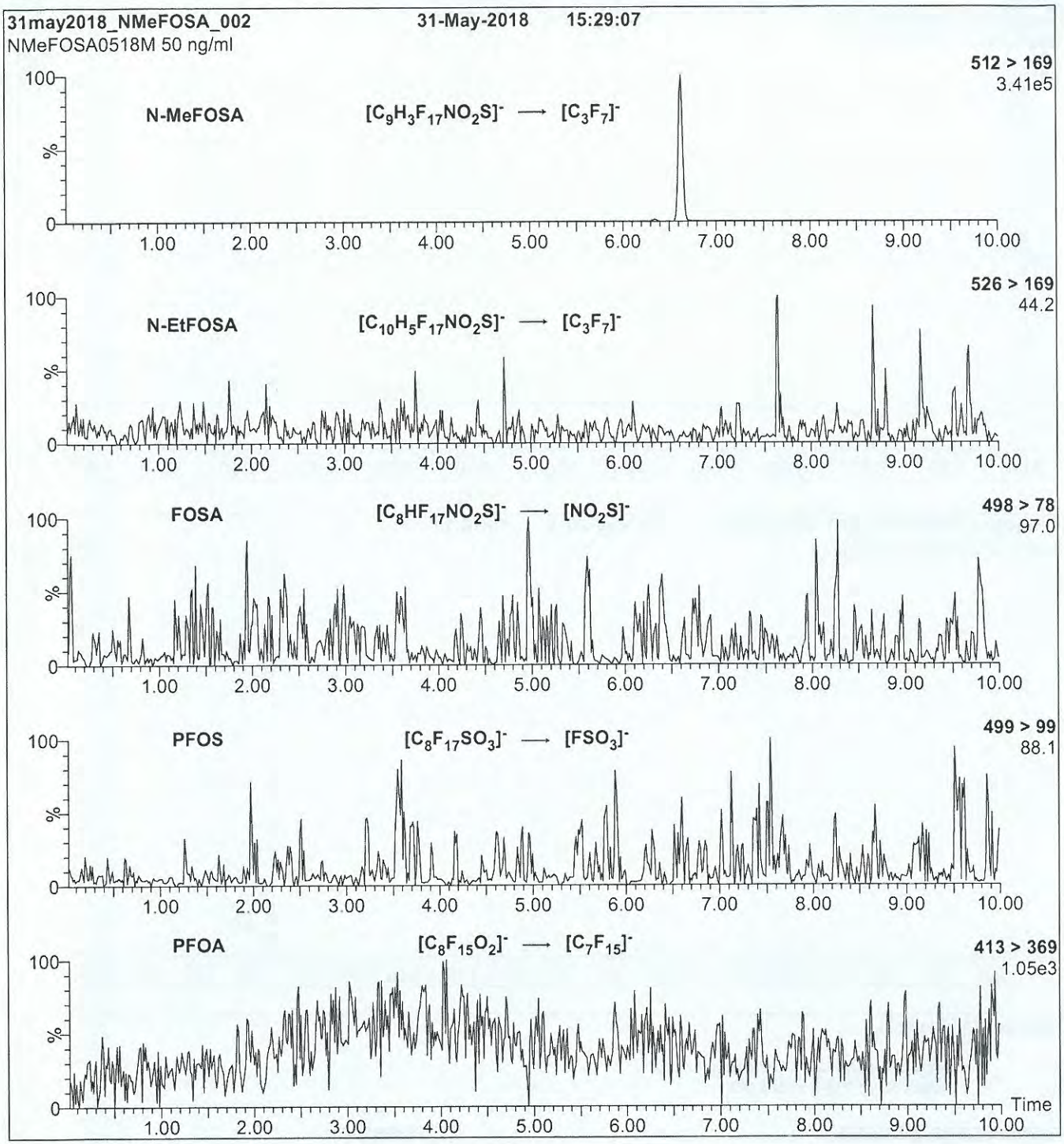
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 1.00
Cone Voltage (V) = 44.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2571

Figure 2: **N-MeFOSA-M; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (N-MeFOSA-M)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

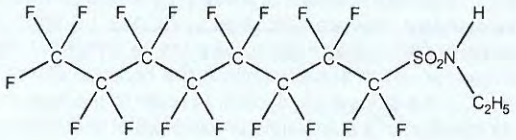
Collision Gas (mbar) = 3.37e-3
Collision Energy (eV) = 24

19A2572

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	N-EtFOSA-M	**LOT NUMBER:**	NEtFOSA0518M
COMPOUND:	N-ethylperfluoro-1-octanesulfonamide		
STRUCTURE:		**CAS #:**	4151-50-2



MOLECULAR FORMULA:	$C_{10}H_6F_{17}NO_2S$	**MOLECULAR WEIGHT:**	527.20
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/31/2018		
EXPIRY DATE: (mm/dd/yyyy)	05/31/2023		
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 ~ 0.5% branched isomers of N-ethylperfluorooctanesulfonamide.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 06/12/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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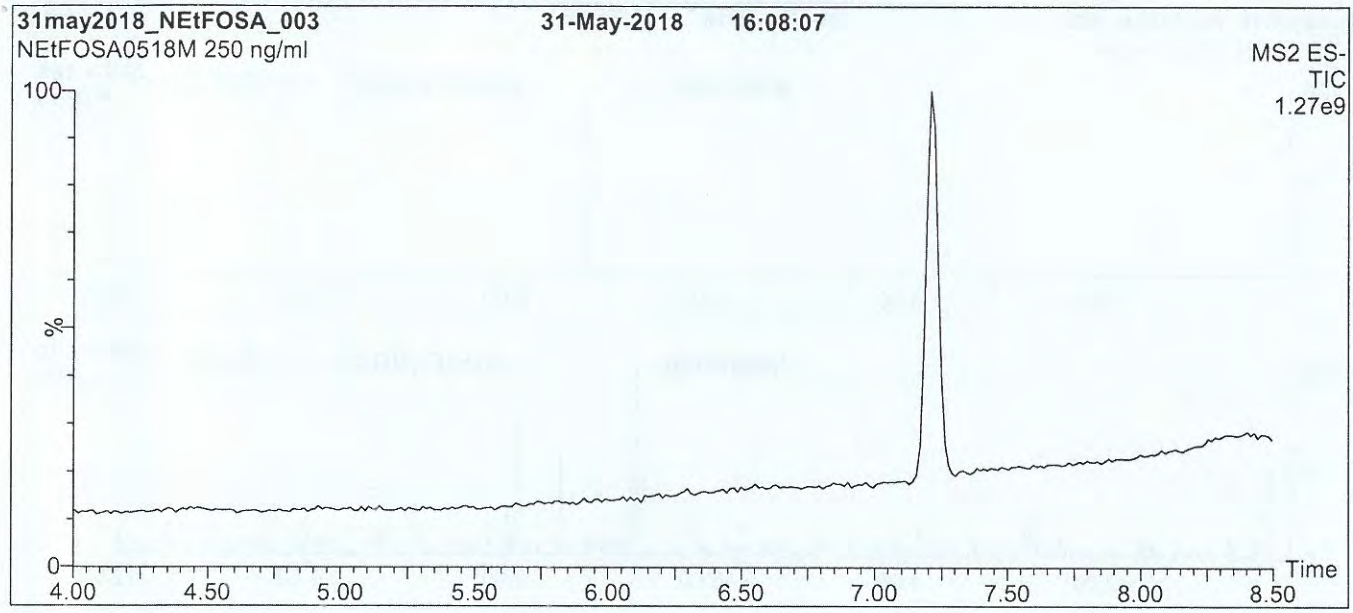
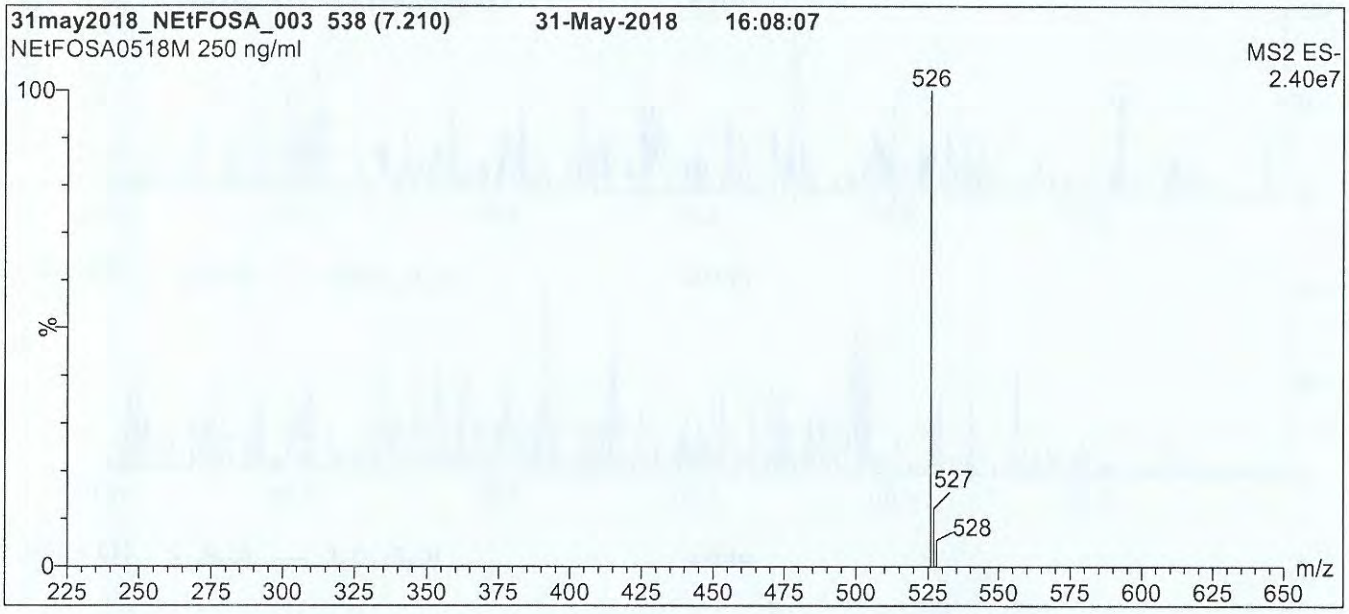
19A2572

Figure 1: **N-EtFOSA-M; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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1.7 µm, 2.1 x 100 mm

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(both with 10 mM NH_4OAc buffer)
Ramp to 85% organic over 7 min and hold for
3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

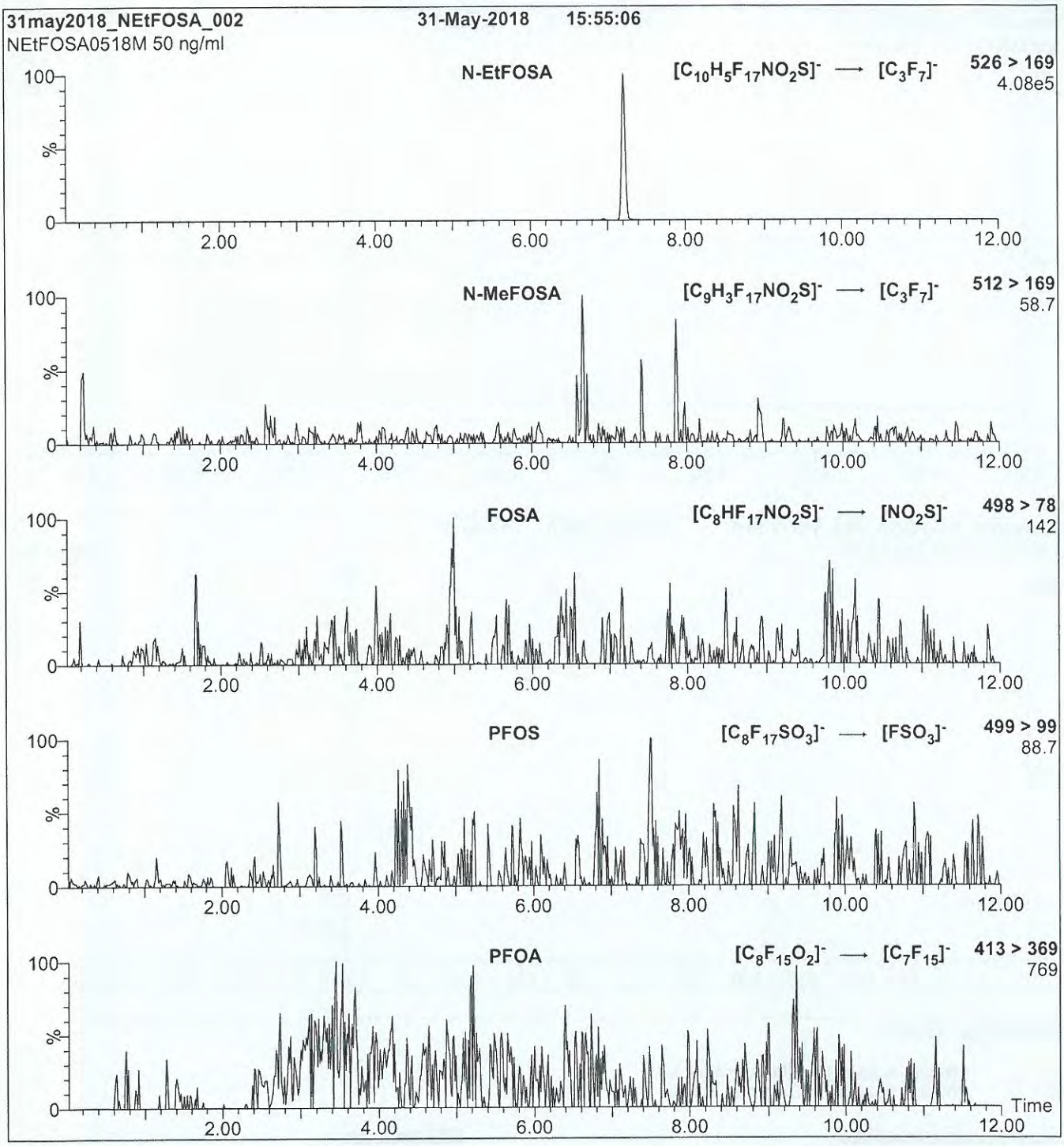
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 1.00
Cone Voltage (V) = 44.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2572

Figure 2: **N-EtFOSA-M; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (N-EtFOSA-M)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.37e-3
Collision Energy (eV) = 24

19A2573

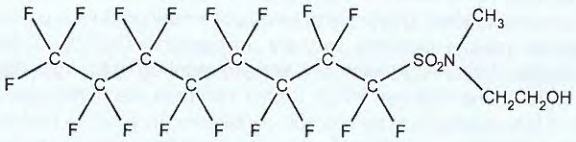
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: N-MeFOSE-M **LOT NUMBER:** NMeFOSE0418M

COMPOUND: 2-(N-methylperfluoro-1-octanesulfonamido)-ethanol

STRUCTURE: **CAS #:** 24448-09-7



MOLECULAR FORMULA:	$C_{11}H_8F_{17}NO_3S$	**MOLECULAR WEIGHT:**	557.22
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	05/17/2018 (HRGC/LRMS) 05/03/2018 (LC/MS)		
EXPIRY DATE: (mm/dd/yyyy)	05/17/2023		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: HRGC/LRMS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data (TIC and Mass Spectrum)
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- In order to see the molecular ion (adduct free), the LC mobile phase should be free of ammonium acetate buffer.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 05/25/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2573

INTENDED USE:

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HANDLING:

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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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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:

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QUALITY MANAGEMENT:

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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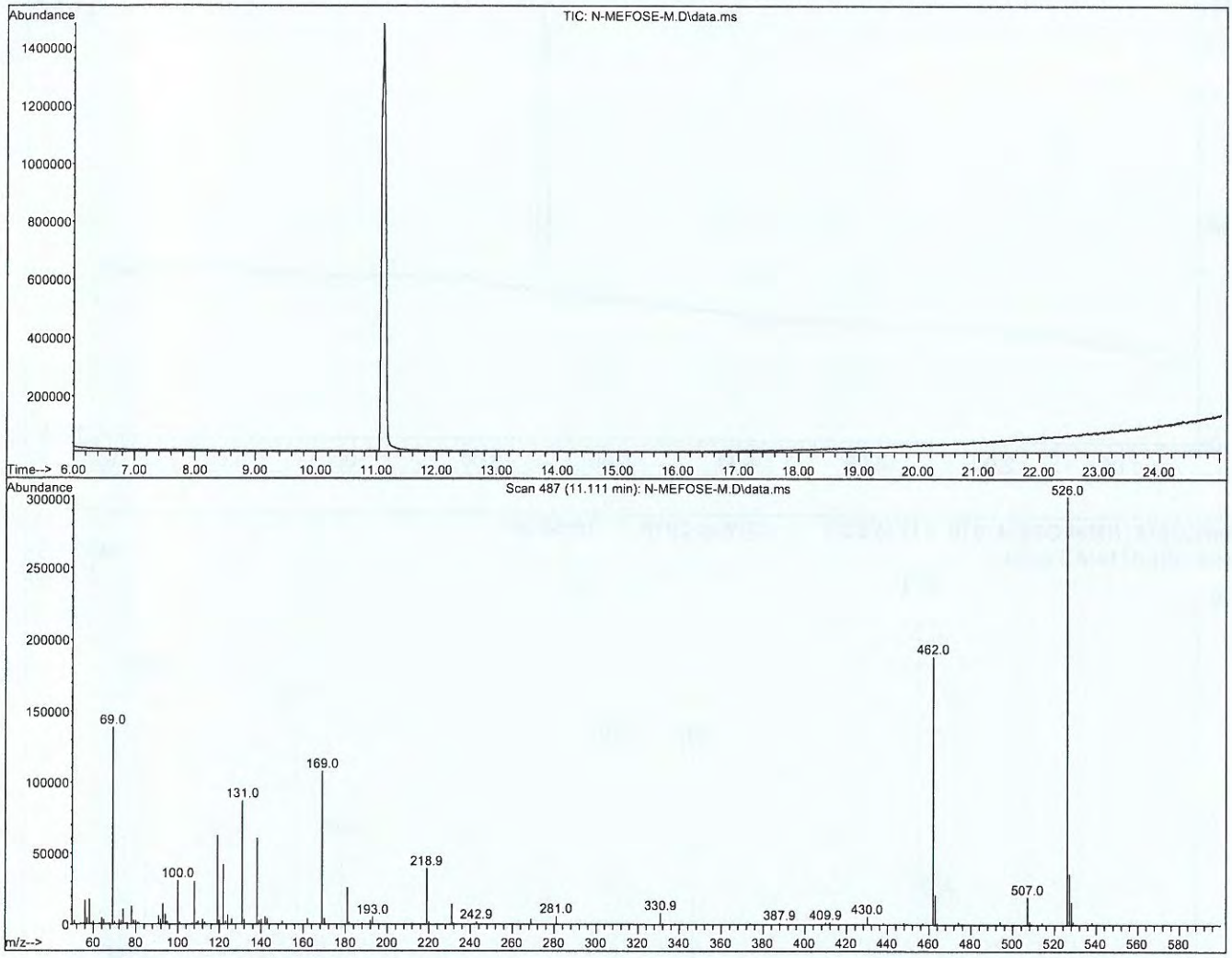
19A2573

Figure 1: **N-MeFOSE-M; HRGC/LRMS Data (TIC and Mass Spectrum)**



HRGC/LRMS:

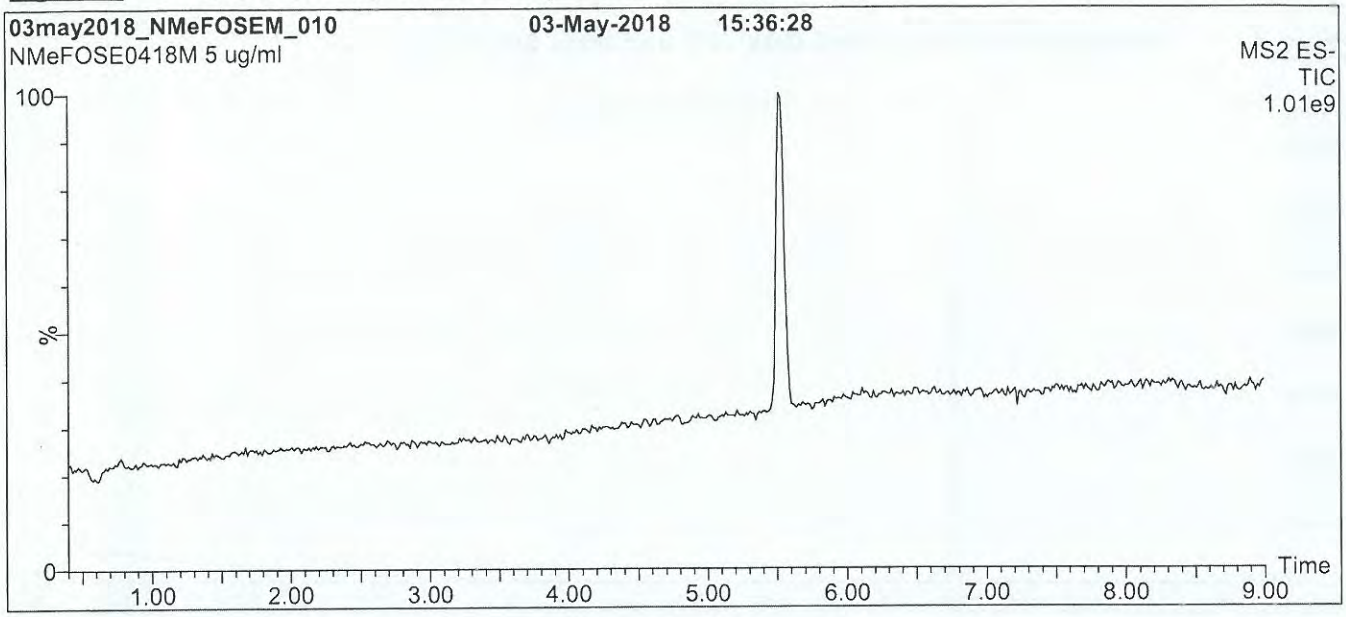
Agilent 7890A (HRGC)
Agilent 5975C (LRMS)

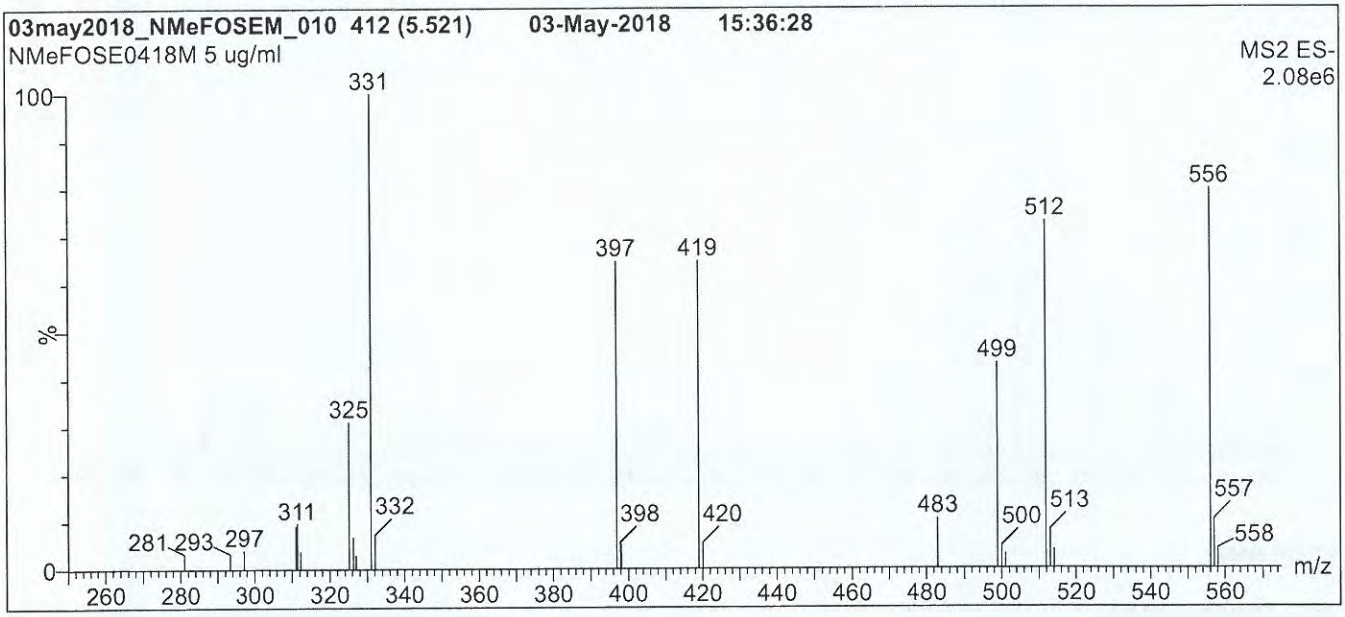
Chromatographic Conditions:

Column:	30 m DB-5 (0.25 mm id, 0.25 µm film thickness) Agilent J&W
Injector:	250 °C (Splitless Injection)
Oven:	100 °C (5 min) 10 °C/min to 325 °C 325 °C (20 min)
Ionization:	EI+
Detector:	250 °C Full Scan (50-1000 amu)

19A2573

Figure 2: **N-MeFOSE-M; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 2:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 65% MeOH / 35% H_2O
Ramp to 85% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

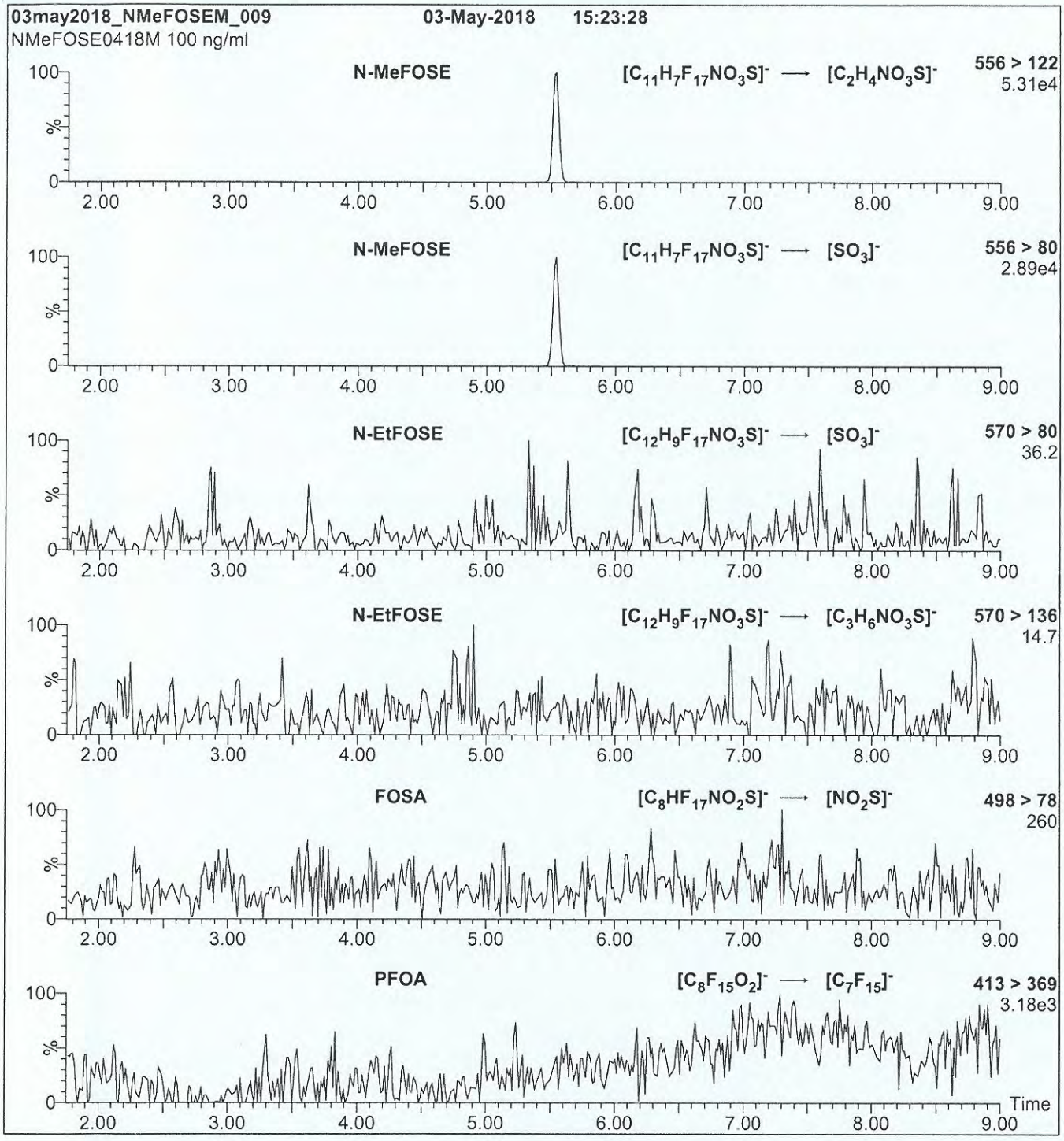
MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 65.00
Desolvation Temperature (°C) = 450
Desolvation Gas Flow (l/hr) = 750

19A2573

Figure 3: **N-MeFOSE-M; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 3:

Injection: On-column (N-MeFOSE-M)

Mobile phase: Same as Figure 2

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.47e-3
Collision Energy (eV) = 36

19A2574

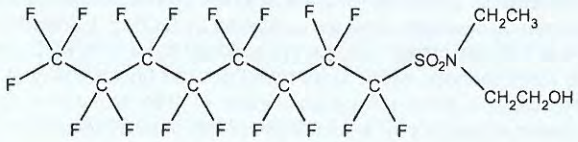
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: N-EtFOSE-M **LOT NUMBER:** NEtFOSE0518M

COMPOUND: 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol

STRUCTURE: **CAS #:** 1691-99-2



MOLECULAR FORMULA:	$C_{12}H_{10}F_{17}NO_3S$	**MOLECULAR WEIGHT:**	571.25
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	06/04/2018 (HRGC/LRMS) 05/30/2018 (LC/MS)		
EXPIRY DATE: (mm/dd/yyyy)	06/04/2023		
RECOMMENDED STORAGE:	Store ampoule in a cool, dark place		

DOCUMENTATION/ DATA ATTACHED:

Figure 1: HRGC/LRMS Data (TIC and Mass Spectrum)
Figure 2: LC/MS Data (TIC and Mass Spectrum)
Figure 3: LC/MS/MS Data (Selected MRM Transitions)

ADDITIONAL INFORMATION:

- See page 2 for further details.
- In order to see the molecular ion (adduct free), the LC mobile phase should be free of ammonium acetate buffer.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 06/04/2018 (mm/dd/yyyy)

B.G. Chittim, General Manager

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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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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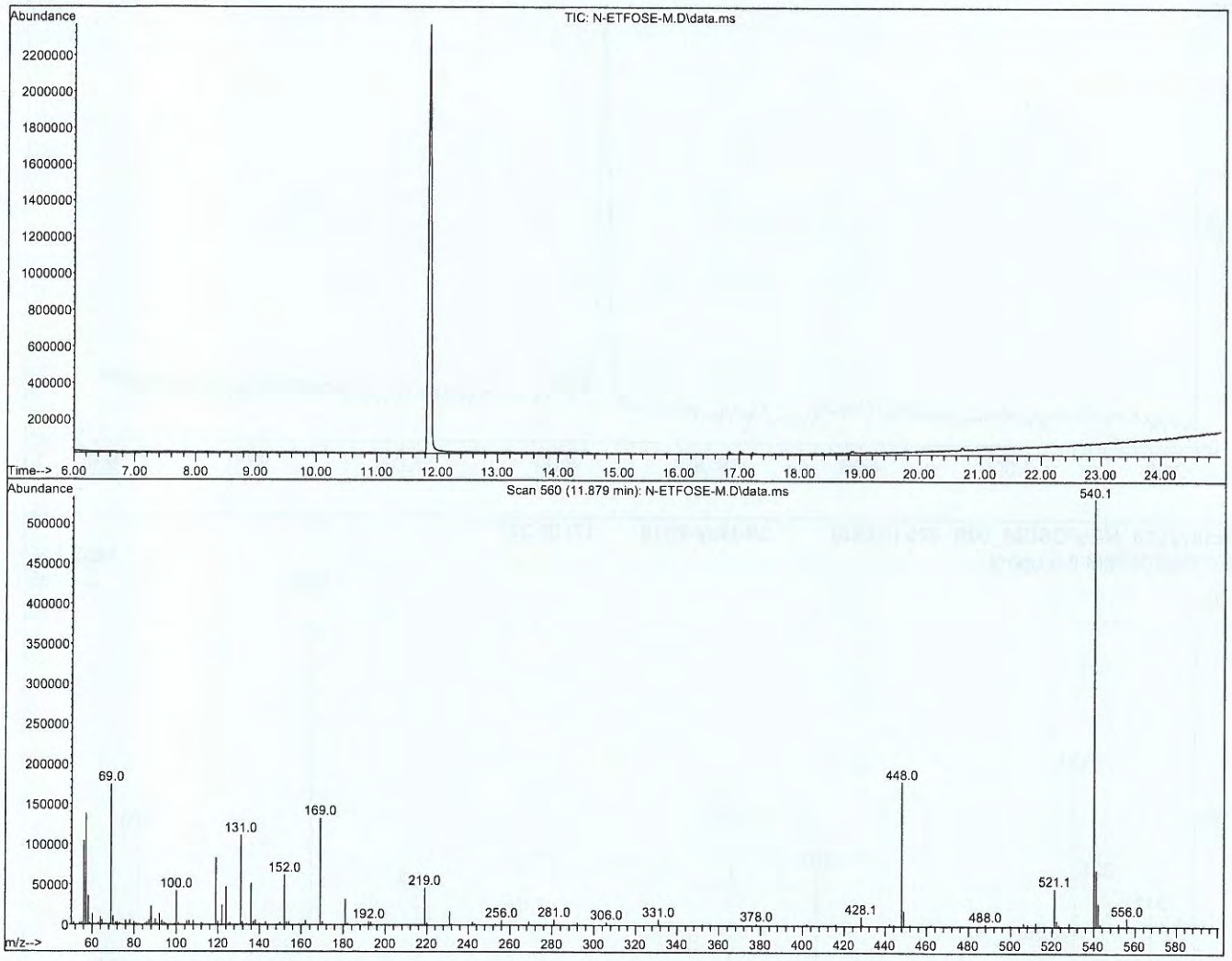
19A2574

Figure 1: **N-EtFOSE-M; HRGC/LRMS Data (TIC and Mass Spectrum)**



HRGC/LRMS:

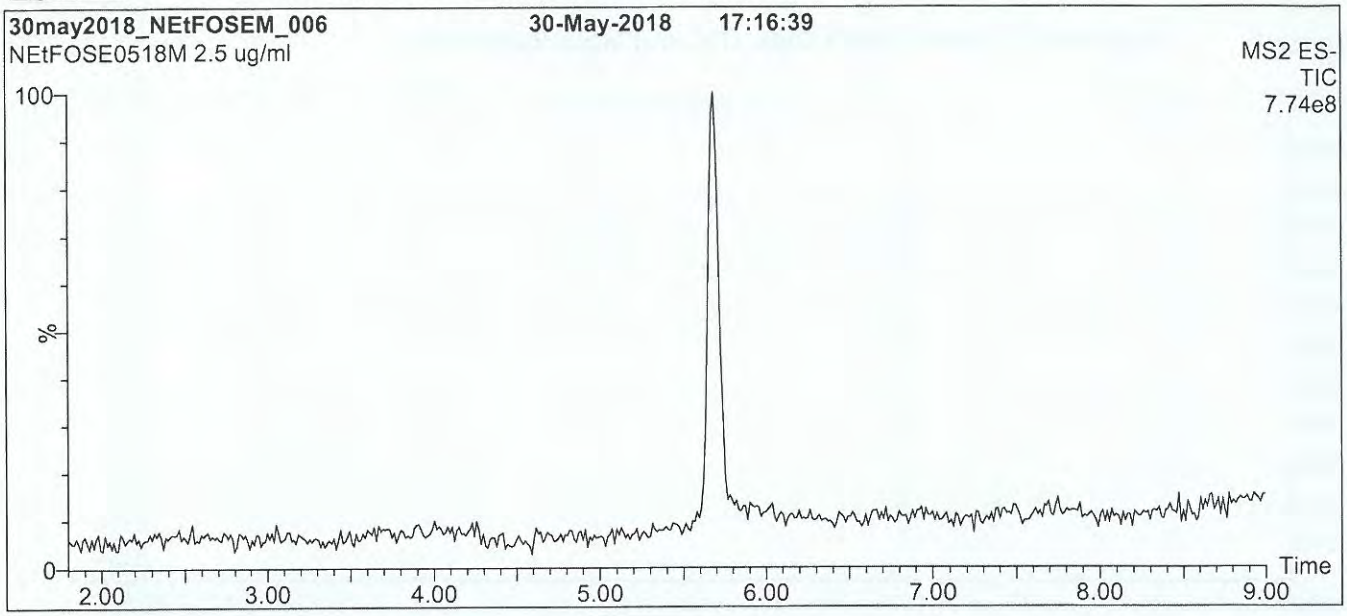
Agilent 7890A (HRGC)
Agilent 5975C (LRMS)

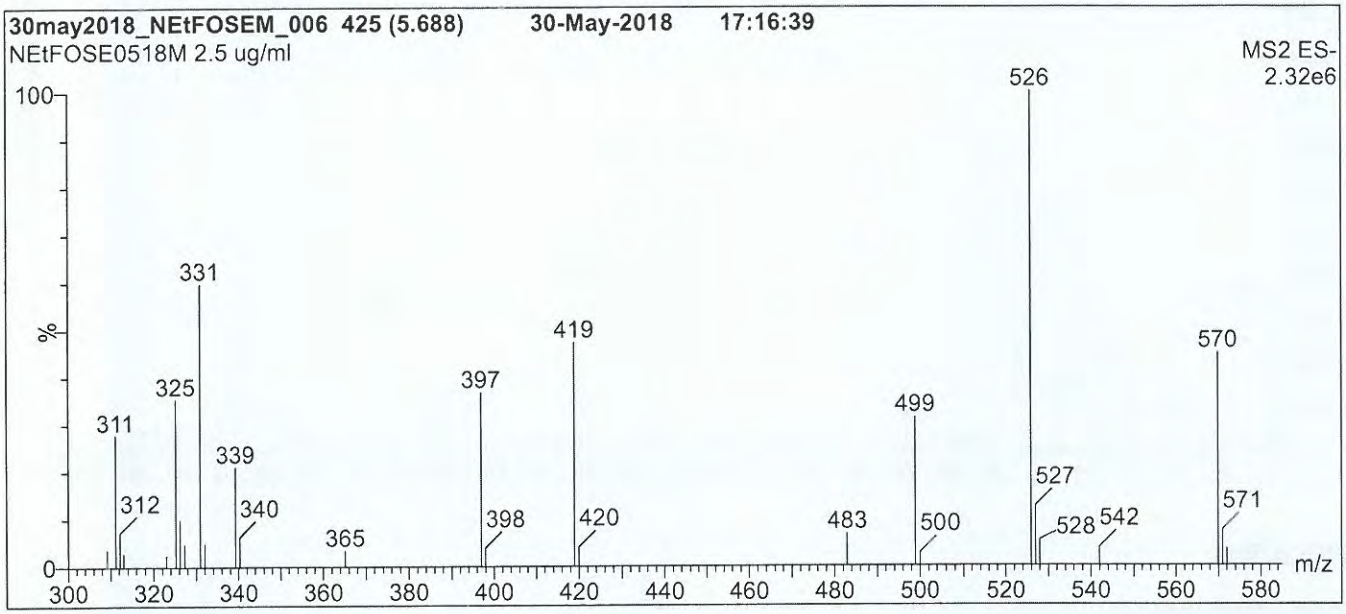
Chromatographic Conditions:

Column:	30 m DB-5 (0.25 mm id, 0.25 µm film thickness) Agilent J&W
Injector:	250 °C (Splitless Injection)
Oven:	100 °C (5 min) 10 °C/min to 325 °C 325 °C (20 min)
Ionization:	EI+
Detector:	250 °C Full Scan (50-1000 amu)

19A2574

Figure 2: **N-EtFOSE-M; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 2:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH C_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 70% MeOH / 30% H_2O
Ramp to 85% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

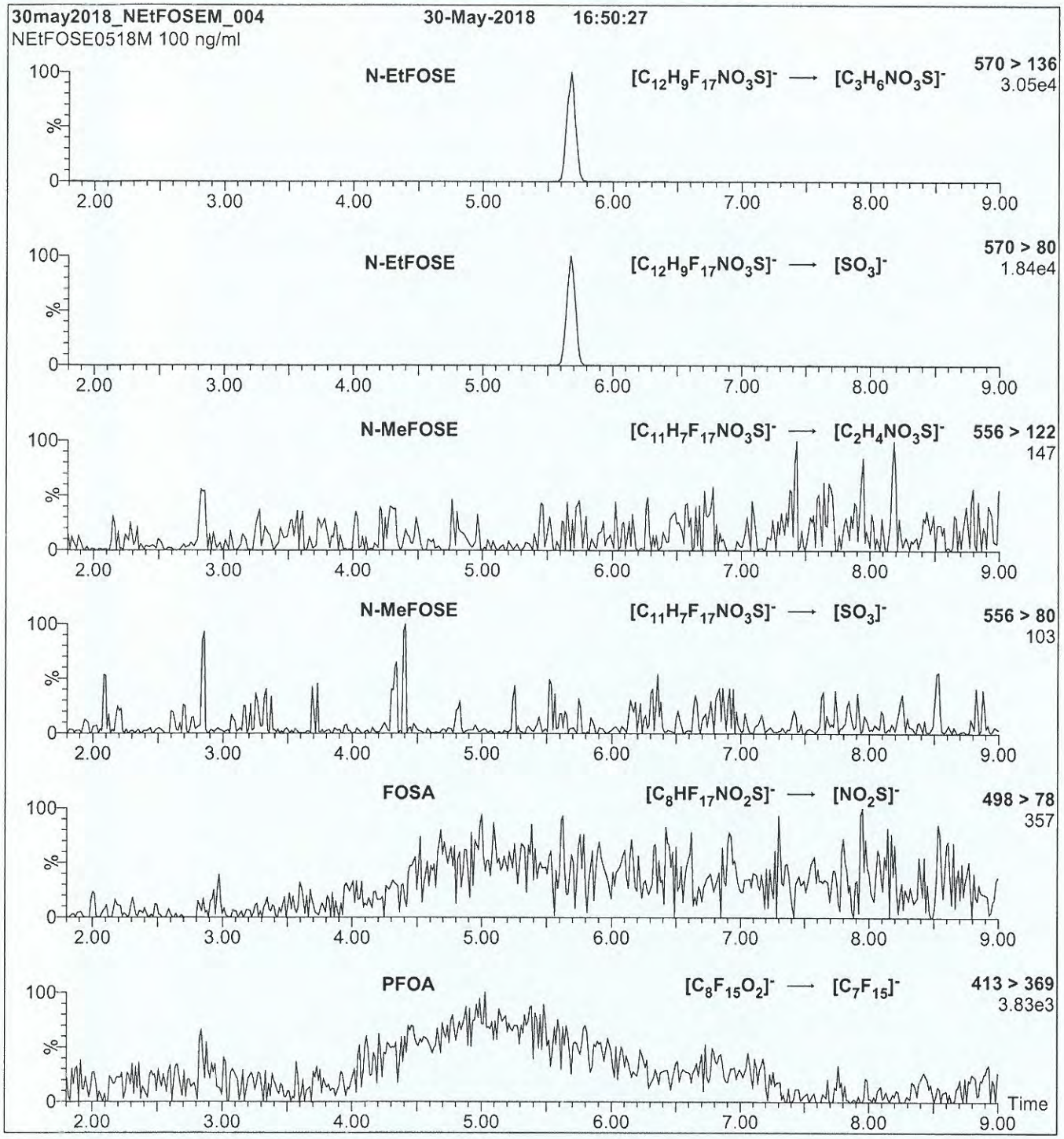
MS Parameters

Experiment: Full Scan (300 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 65.00
Desolvation Temperature (°C) = 450
Desolvation Gas Flow (l/hr) = 750

19A2574

Figure 3: **N-EtFOSE-M; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 3:

Injection: On-column (N-EtFOSE-M)

Mobile phase: Same as Figure 2

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.45e-3
Collision Energy (eV) = 32

19A2575

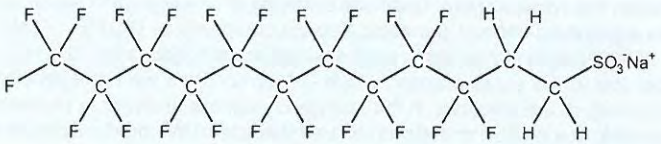
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: 10:2FTS **LOT NUMBER:** 102FTS0718

COMPOUND: Sodium 1H,1H,2H,2H-perfluorododecane sulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$C_{12}H_4F_{21}SO_3Na$		**MOLECULAR WEIGHT:**	650.18
CONCENTRATION:	50.0 ± 2.5 µg/ml	(Na salt)	**SOLVENT(S):**	Methanol
	48.2 ± 2.4 µg/ml	(10:2FTS anion)		
CHEMICAL PURITY:	>98%			
LAST TESTED: (mm/dd/yyyy)	07/13/2018			
EXPIRY DATE: (mm/dd/yyyy)	07/13/2021			
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:** 07/16/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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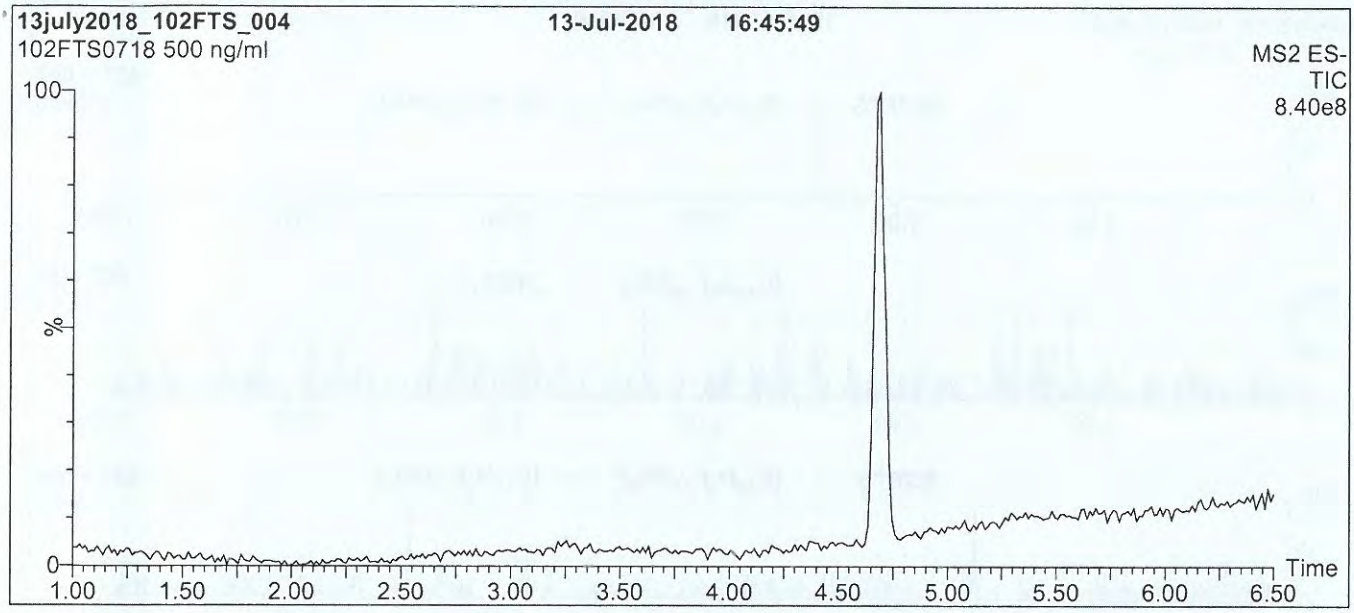
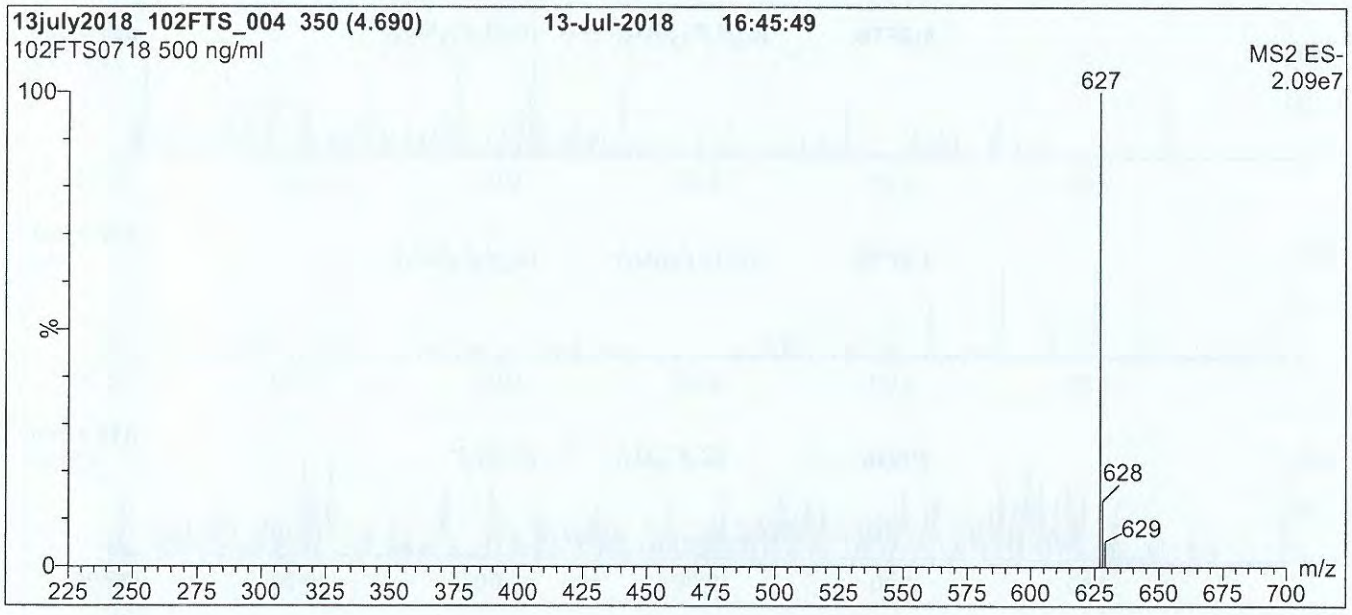
19A2575

Figure 1: **10:2FTS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

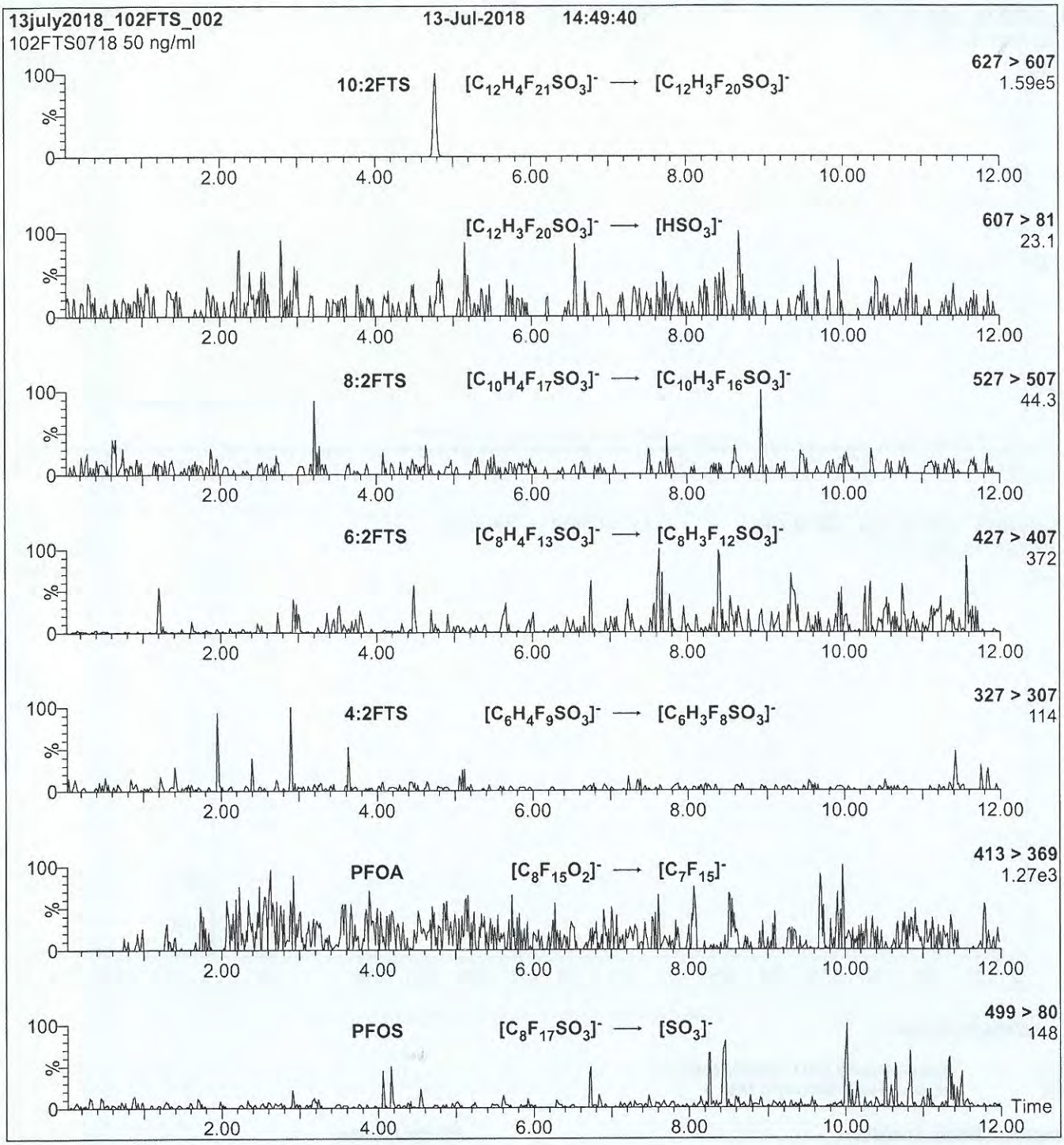
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = 25.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2575

Figure 2: **10:2FTS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (10:2FTS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.47e-3
Collision Energy (eV) = 25

19A2583

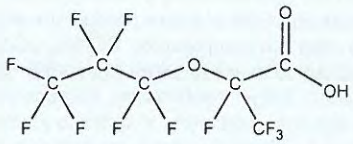
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: HFPO-DA **LOT NUMBER:** HFPODA1018

COMPOUND: 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid

STRUCTURE: **CAS #:** 13252-13-6



MOLECULAR FORMULA:	$C_6HF_{11}O_3$	**MOLECULAR WEIGHT:**	330.05
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	10/24/2018		
EXPIRY DATE: (mm/dd/yyyy)	10/24/2021		
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.
- Product is commercially known as GenX.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 10/29/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2583

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.

HANDLING:

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:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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 calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

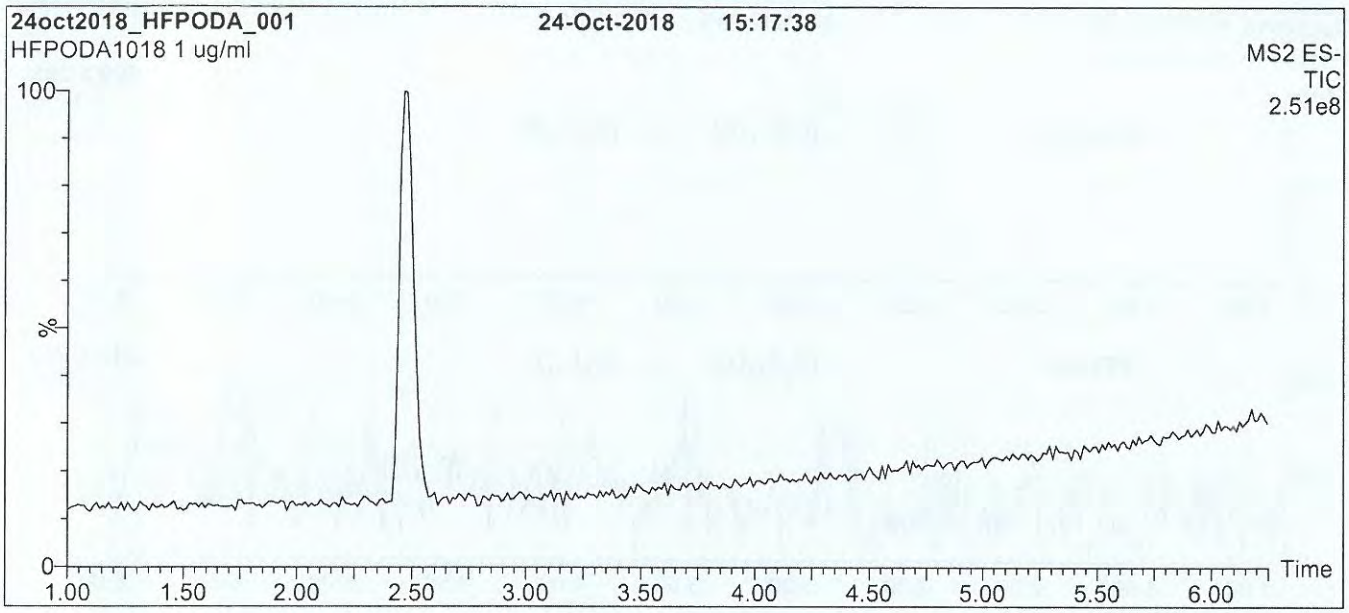
CALA Testing Accreditation No. A1226

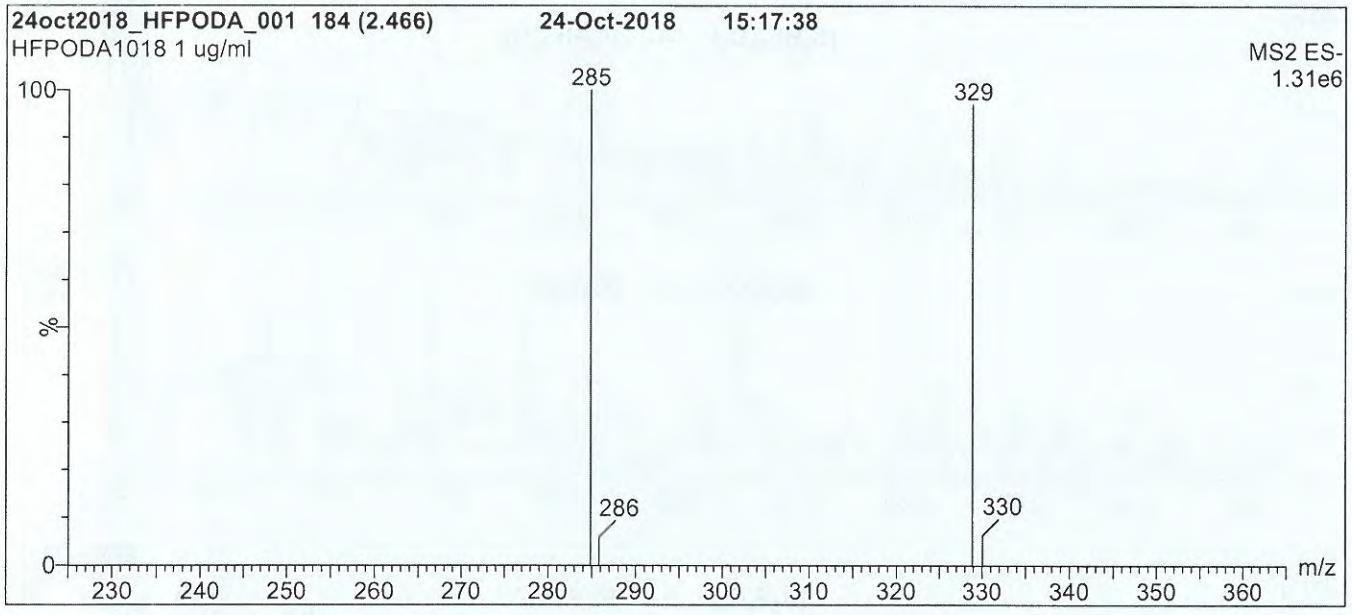
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

19A2583

Figure 1: **HFPO-DA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 45% (80:20 MeOH:ACN) / 55% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

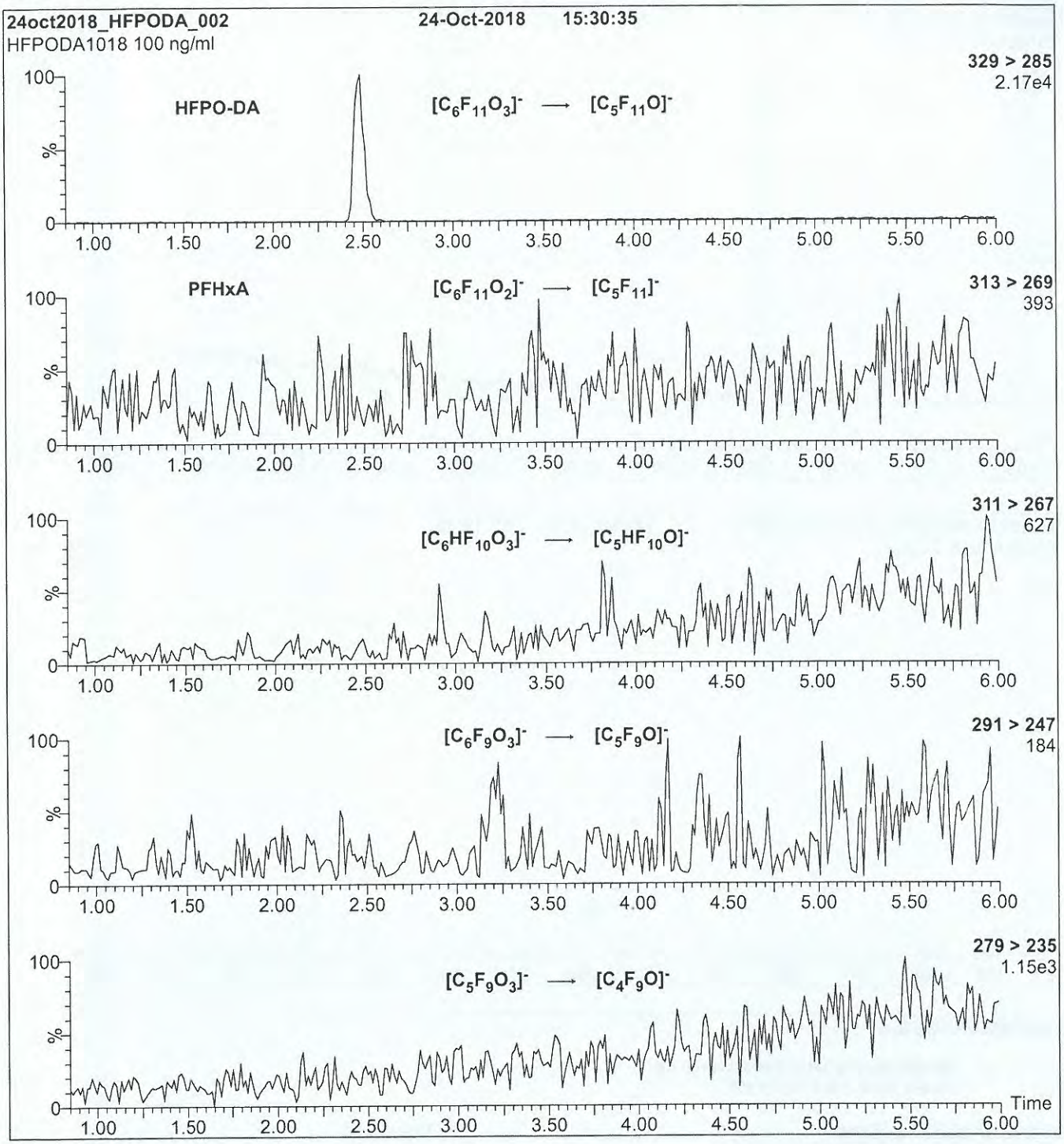
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 15.00
Desolvation Temperature (°C) = 325
Desolvation Gas Flow (l/hr) = 1000

19A2583

Figure 2: **HFPO-DA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (HFPO-DA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.02e-3
Collision Energy (eV) = 6

19A2584

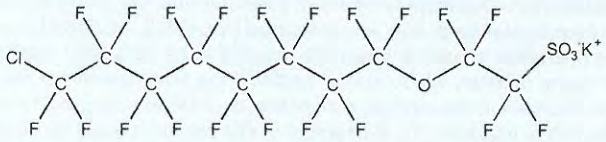
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: 11Cl-PF3OUdS **LOT NUMBER:** 11ClPF3OUdS1118

COMPOUND: Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate

STRUCTURE: **CAS #:** 83329-89-9



MOLECULAR FORMULA:	$C_{10}F_{20}ClSO_4K$	**MOLECULAR WEIGHT:**	670.69
CONCENTRATION:	50.0 ± 2.5 µg/ml (K Salt)	**SOLVENT(S):**	Methanol
	47.1 ± 2.4 µg/ml (11Cl-PF3OUdS anion)		
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	11/23/2018		
EXPIRY DATE: (mm/dd/yyyy)	11/23/2023		
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.
- This compound is a minor component of the commercial formulation known as F-53B.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 11/28/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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19A2584

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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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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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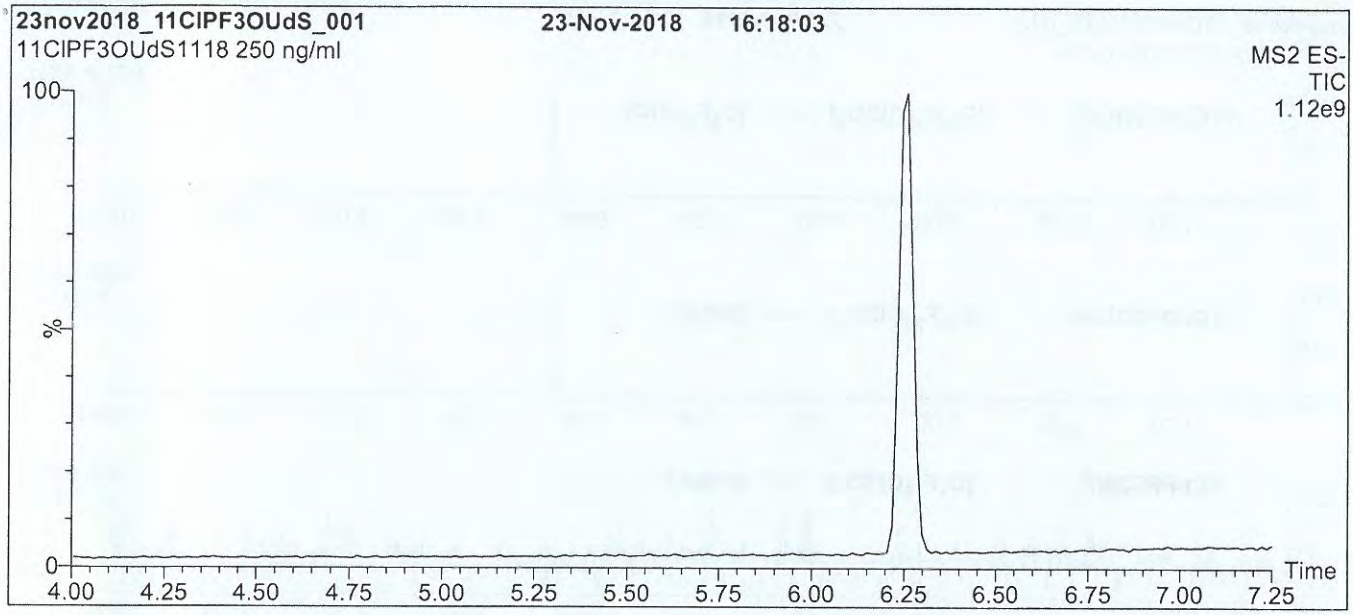
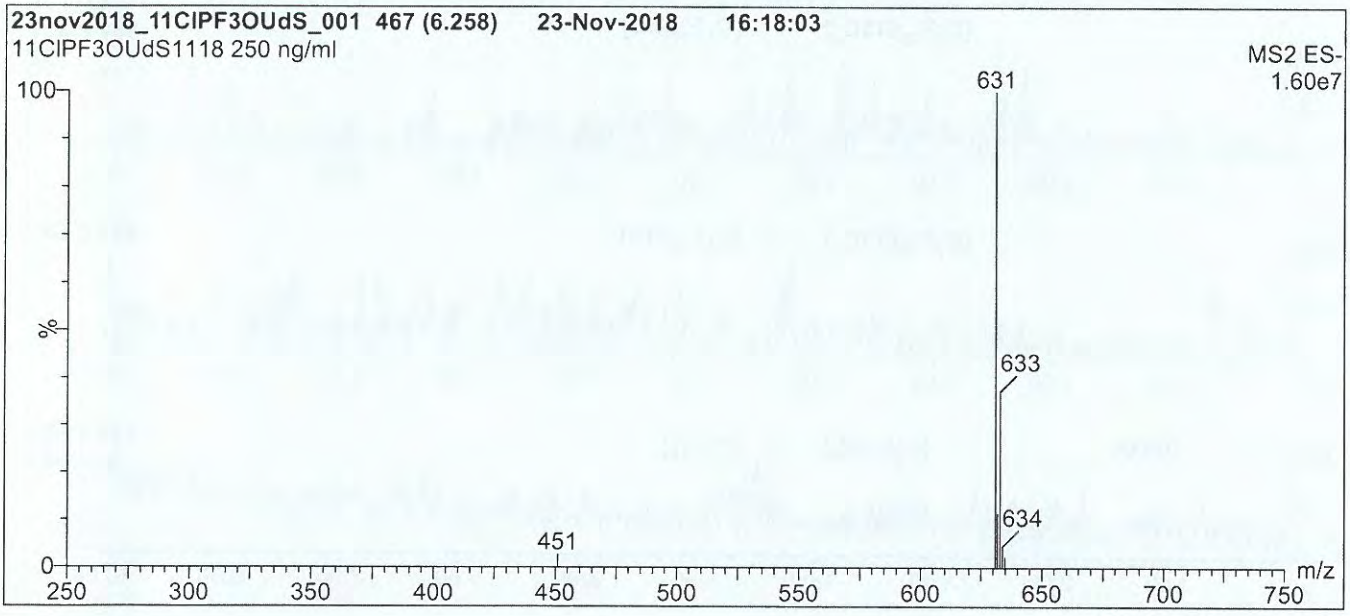
19A2584

Figure 1: **11Cl-PF3OUdS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

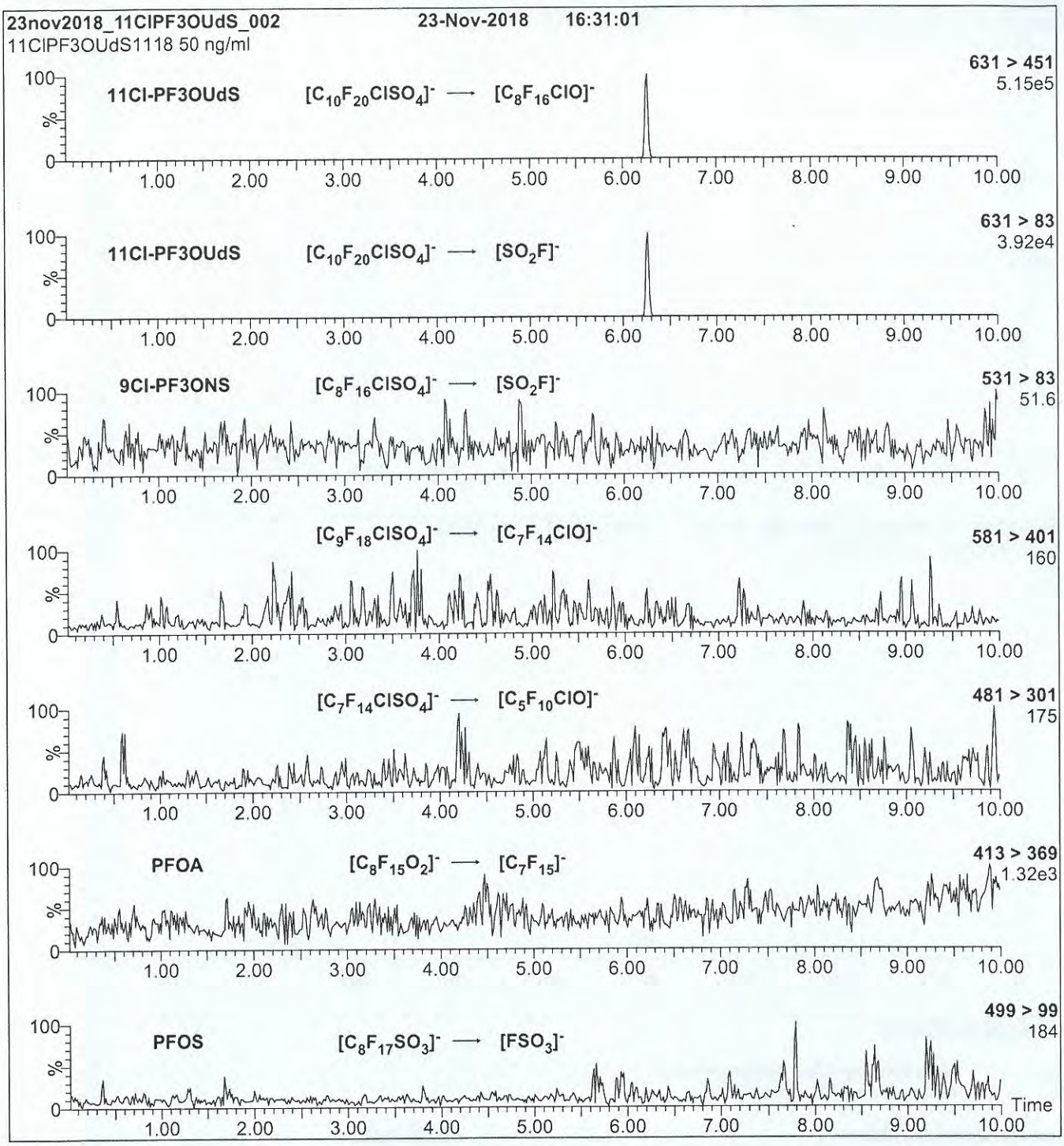
Flow: 300 µl/min

MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 70.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

Figure 2: **11Cl-PF3OUdS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (11Cl-PF3OUdS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

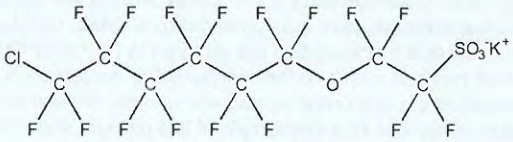
Collision Gas (mbar) = 2.84e-3
Collision Energy (eV) = 24

19A2585

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	9Cl-PF3ONS	**LOT NUMBER:**	9ClPF3ONS1118
COMPOUND:	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate		
STRUCTURE:		**CAS #:**	73606-19-6



MOLECULAR FORMULA:	$C_8F_{16}ClSO_4K$	**MOLECULAR WEIGHT:**	570.67
CONCENTRATION:	50.0 ± 2.5 µg/ml (K Salt) 46.6 ± 2.3 µg/ml (9Cl-PF3ONS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	11/22/2018		
EXPIRY DATE: (mm/dd/yyyy)	11/22/2023		
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.
- This compound is the major component of the commercial formulation known as F-53B.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 11/23/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2585

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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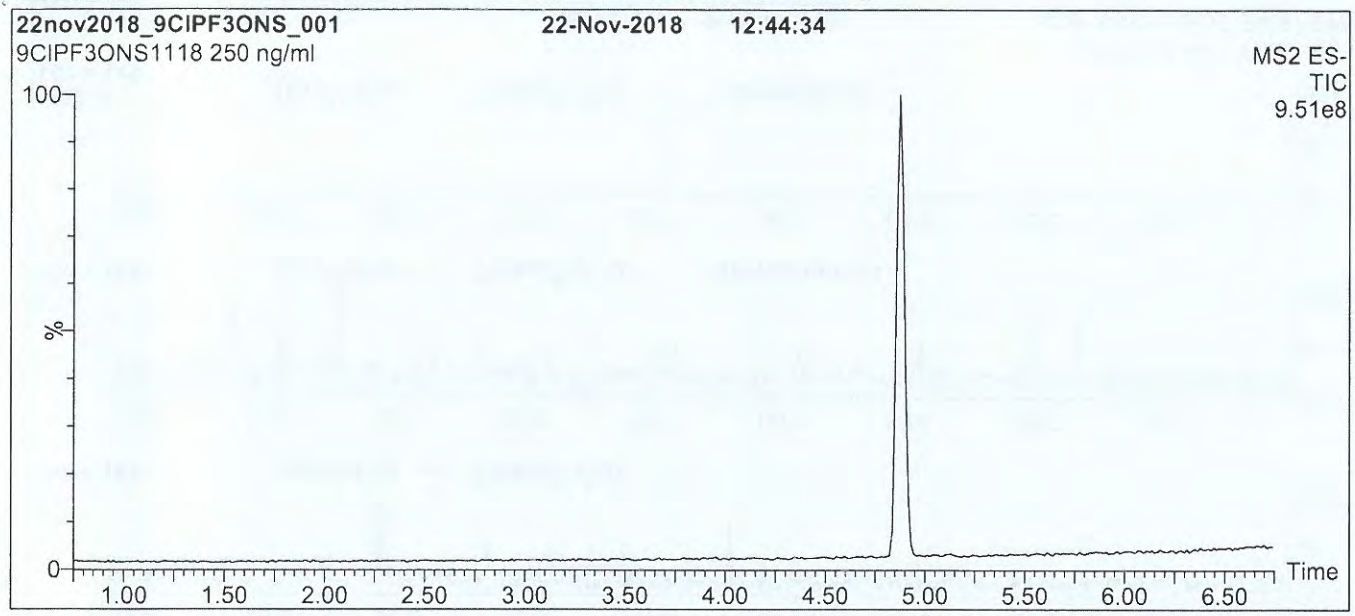
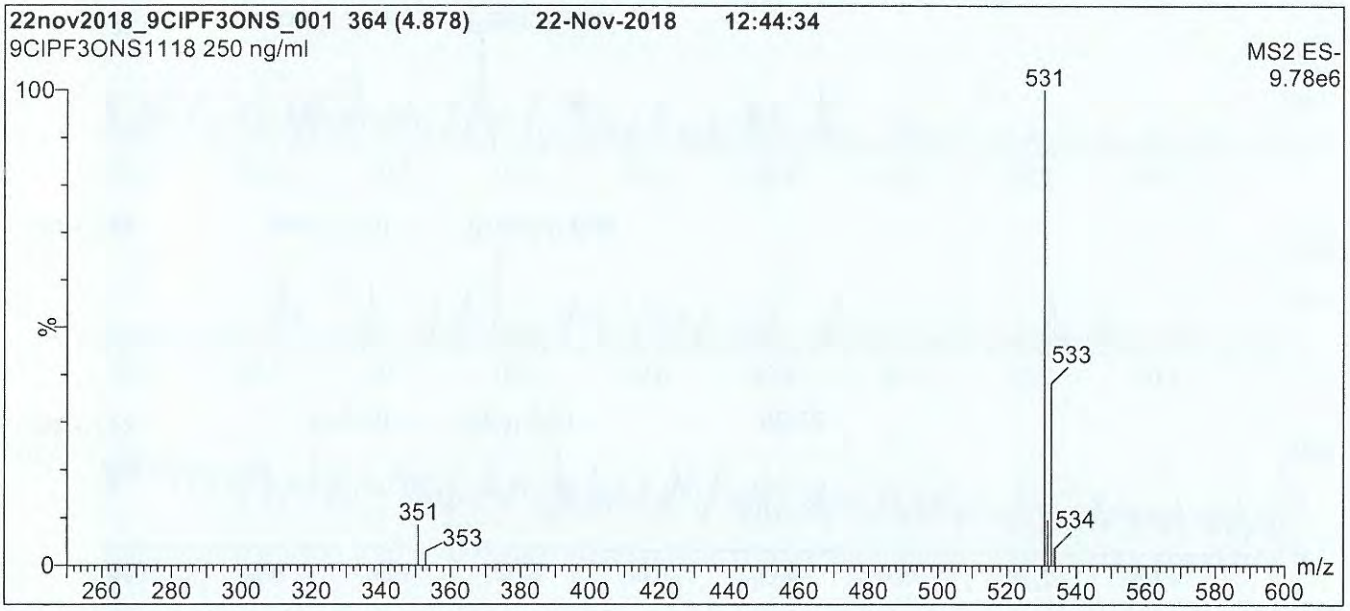
19A2585

Figure 1: **9Cl-PF3ONS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

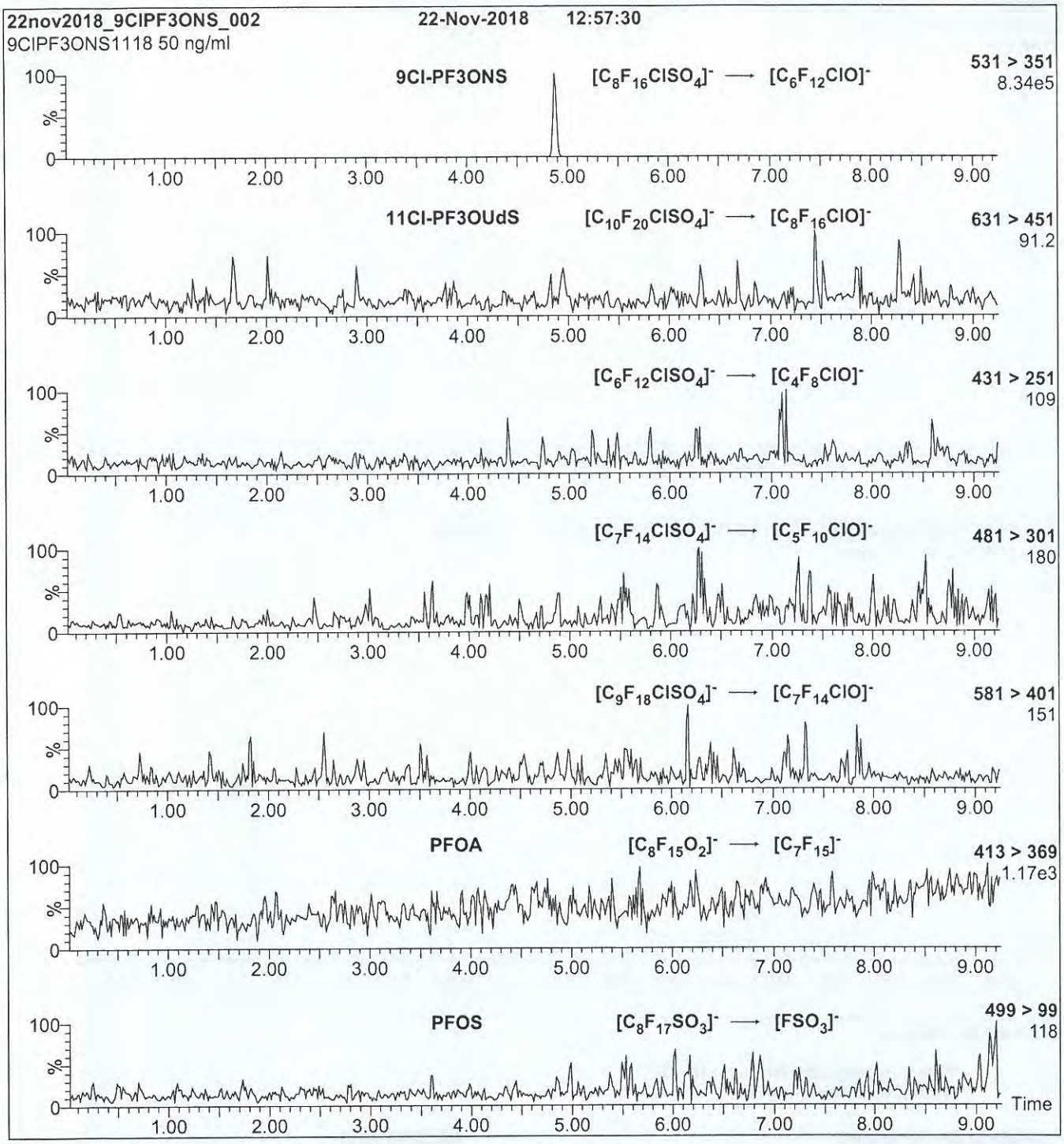
MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 70.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

1902585

Figure 2: **9Cl-PF3ONS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (9Cl-PF3ONS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.16e-3
Collision Energy (eV) = 20

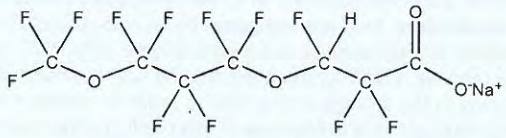
19A2586

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: NaDONA
LOT NUMBER: NaDONA0318
COMPOUND: Sodium dodecafluoro-3H-4,8-dioxanonanoate

STRUCTURE:



CAS #: 958445-44-8 (ammonium salt)

MOLECULAR FORMULA:	$C_7HF_{12}O_4Na$	**MOLECULAR WEIGHT:**	400.05
CONCENTRATION:	50 ± 2.5 µg/ml (Na Salt) 47.1 ± 2.4 µg/ml (NaDONA anion)	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	03/26/2018		
EXPIRY DATE: (mm/dd/yyyy)	03/26/2023		
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.
- Product is commercially known as ADONA.
- 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:** 12/14/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2586

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TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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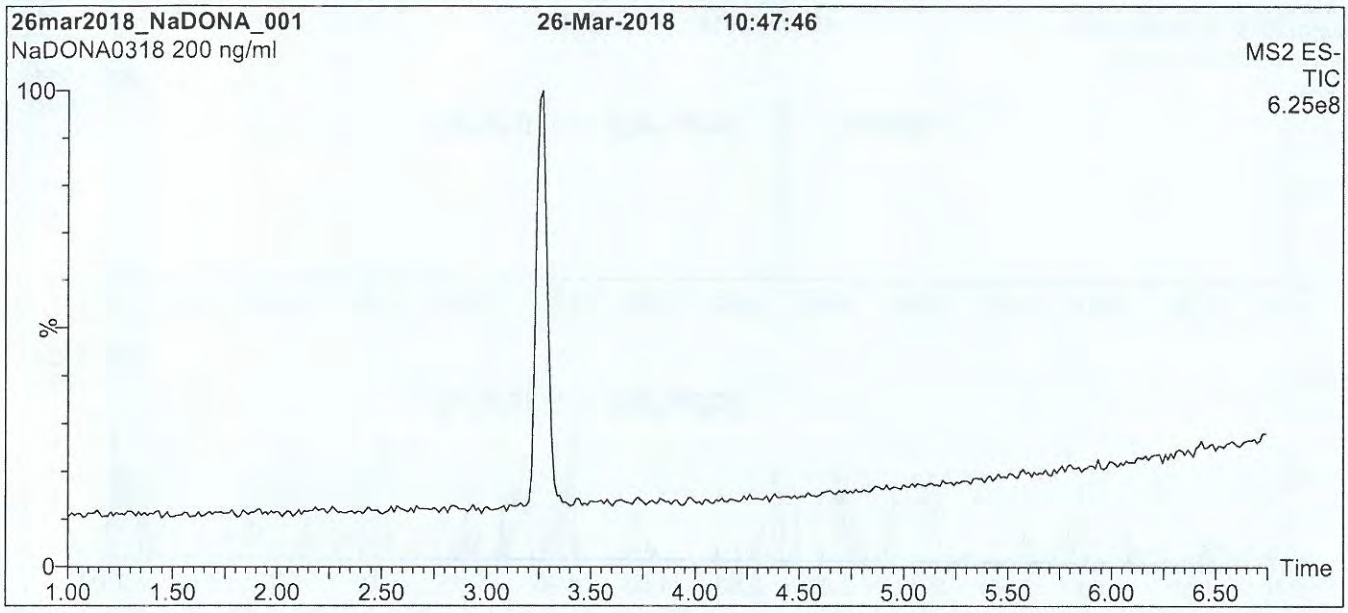
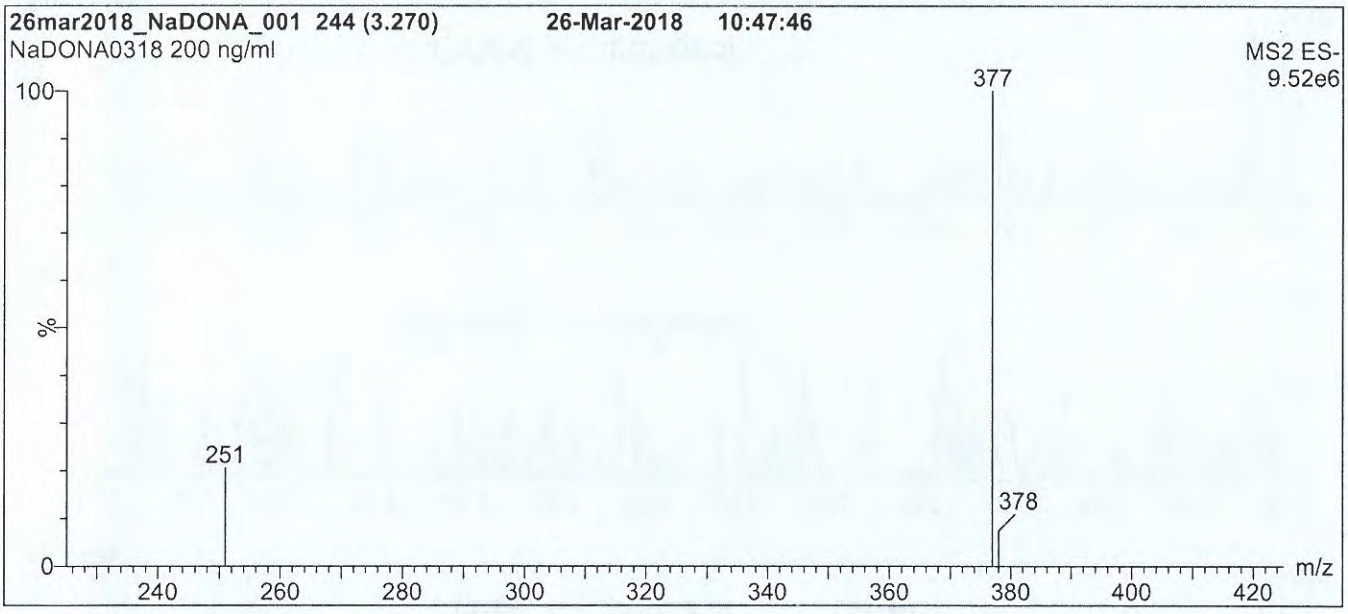
19A2586

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





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 80% organic over 7 min and hold for
3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

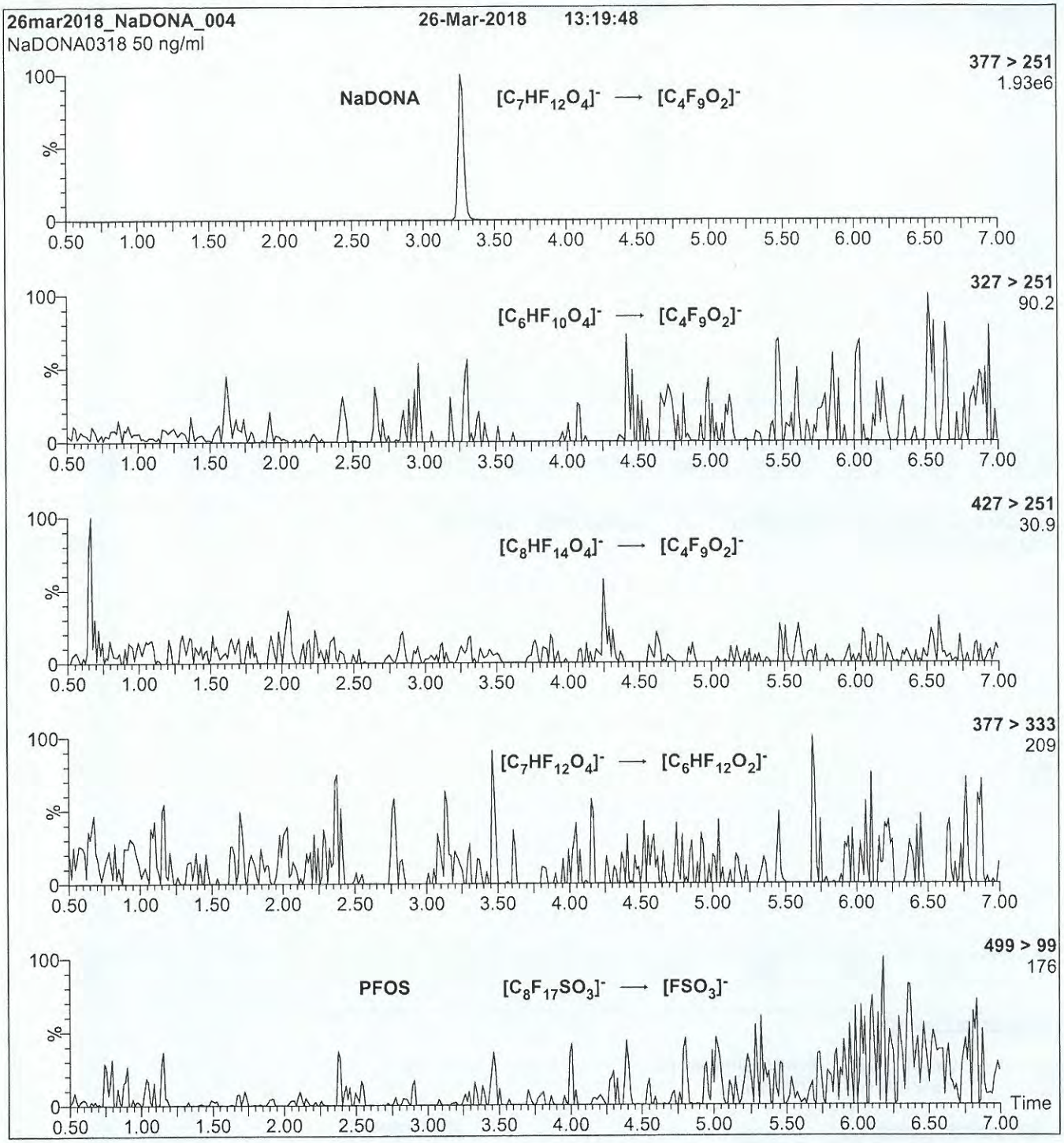
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.70
Cone Voltage (V) = 20.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2586

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



Conditions for Figure 2:

Injection: On-column (NaDONA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.65e-3
Collision Energy (eV) = 10

19A2587

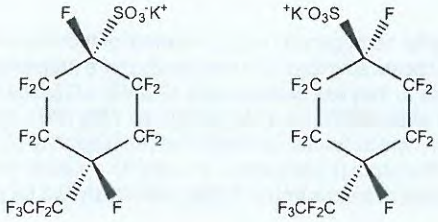
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: PFECHS **LOT NUMBER:** PFECHS0418

COMPOUND: Potassium perfluoro-4-ethylcyclohexanesulfonate (isomeric mixture)

STRUCTURE:



cis-isomer *trans*-isomer

CAS #: 67584-42-3

MOLECULAR FORMULA:	$C_8F_{15}SO_3K$	**MOLECULAR WEIGHT:**	500.22
CONCENTRATION:	50.0 ± 2.5 µg/ml (K salt)	**SOLVENT(S):**	Methanol
	46.1 ± 2.3 µg/ml (PFECHS anion)		
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	04/04/2018		
EXPIRY DATE: (mm/dd/yyyy)	04/04/2023		
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 a mixture of the *cis*/*trans* isomers of PFECHS at a ratio of 2:3 (*cis*:*trans*).
- Contains ~ 1.5% of other isomeric impurities.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 04/09/2018 (mm/dd/yyyy)

B.G. Chittim, General Manager

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

PA2587

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.

HANDLING:

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:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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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LIMITED WARRANTY:

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QUALITY MANAGEMENT:

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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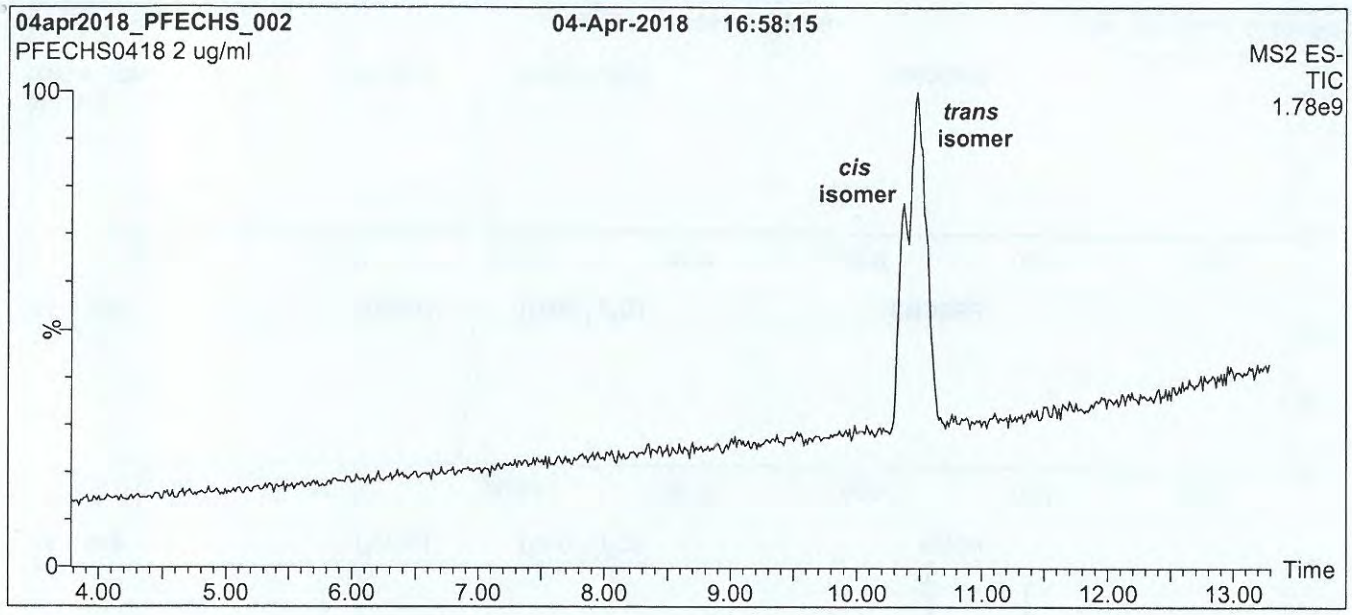
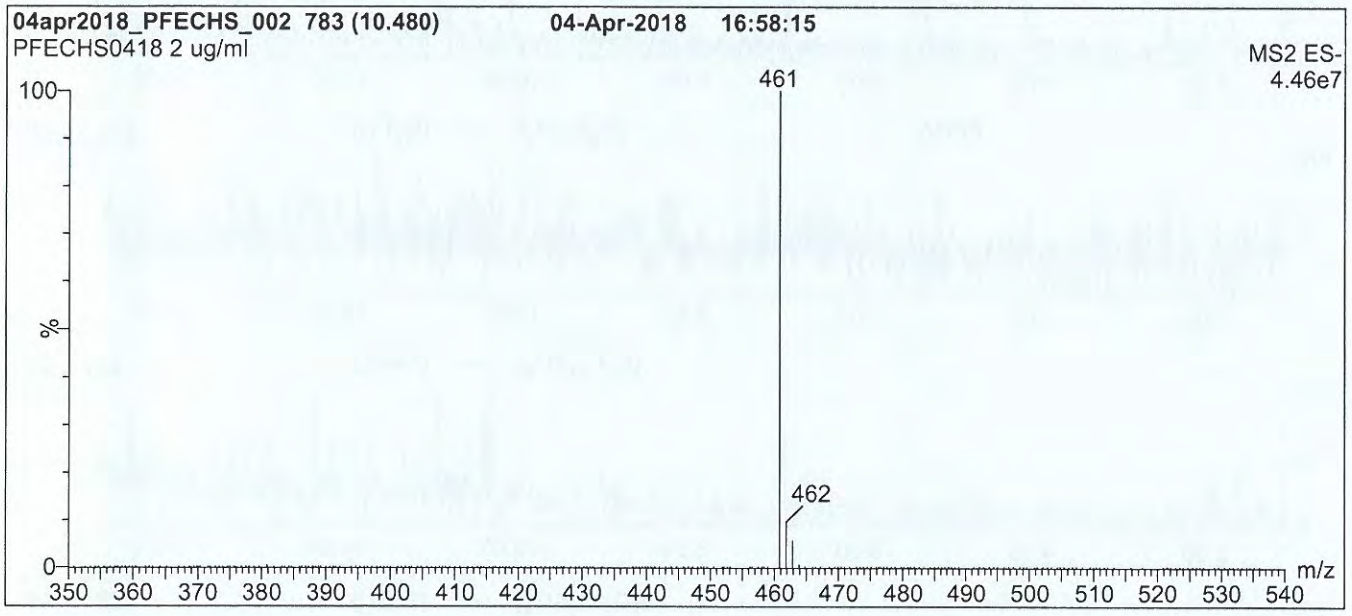
19A2587

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





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity CSH Fluoro-Phenyl
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 25% (80:20 MeOH:ACN) / 75% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 60% organic over 13 min.
Ramp to 80% organic over 2 min and hold for
2 min before returning to initial conditions in 1 min.
Time: 20 min

Flow: 300 µl/min

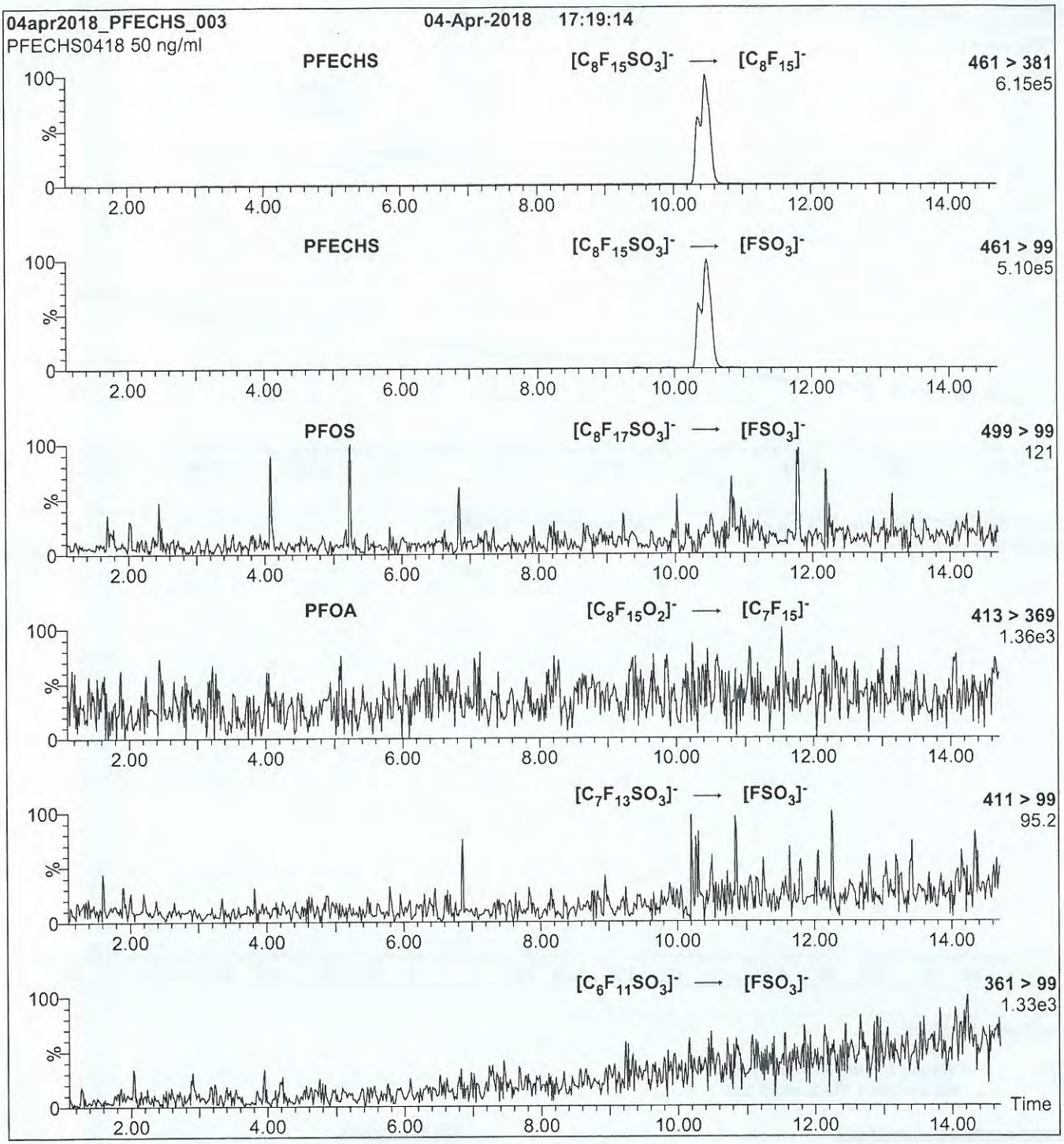
MS Parameters

Experiment: Full Scan (350 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 45.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2587

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



Conditions for Figure 2:

Injection: On-column (PFECHS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.37e-3
Collision Energy (eV) = 24

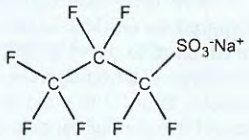
19A2588

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: L-PFPrS
COMPOUND: Sodium perfluoro-1-propanesulfonate
LOT NUMBER: LPFPrS1217

STRUCTURE:
CAS #: Not available



MOLECULAR FORMULA:	$C_3F_7SO_3Na$	**MOLECULAR WEIGHT:**	272.07
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 45.8 ± 2.3 µg/ml (PFPrS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	12/14/2017		
EXPIRY DATE: (mm/dd/yyyy)	12/14/2022		
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:** 12/18/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2588

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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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 calibrated NIST and/or NRC traceable external weights. All volumetric glassware used is calibrated, 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).

CALA Testing Accreditation No. A 1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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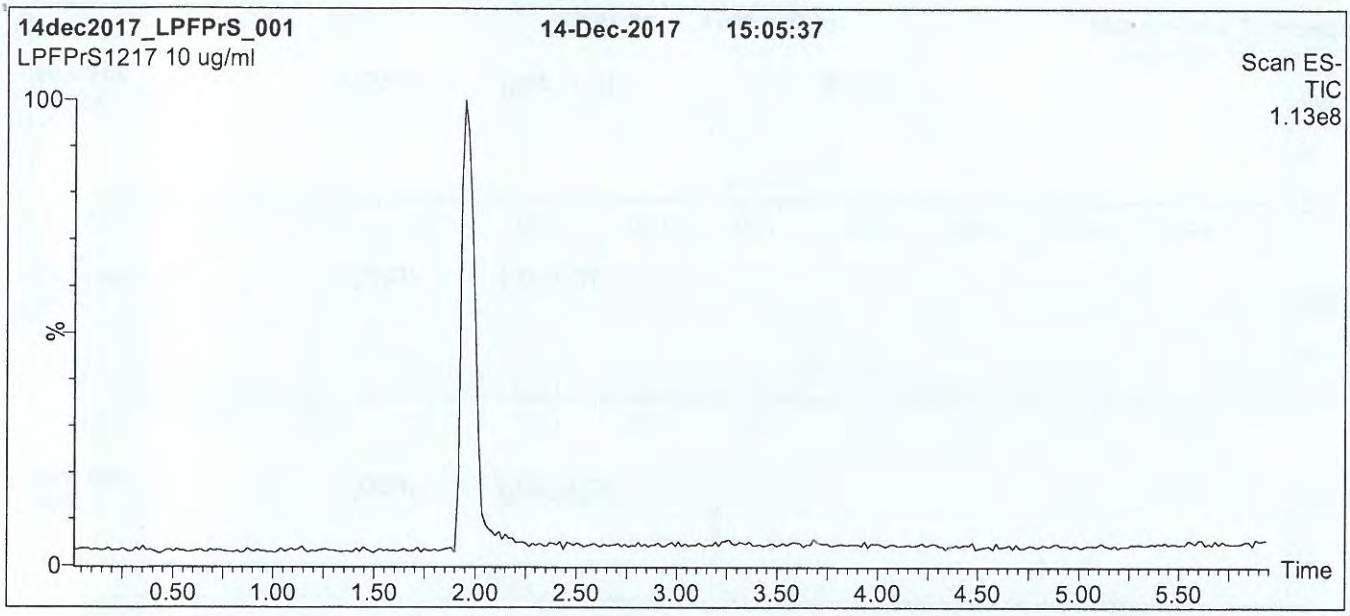
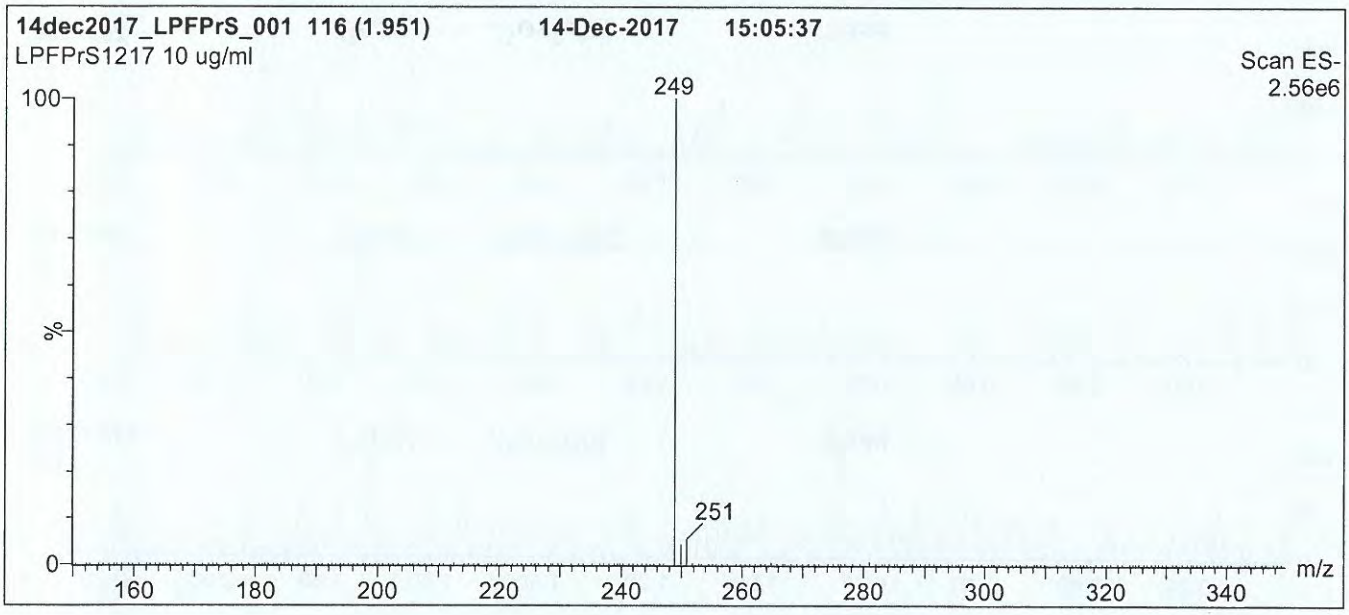
19A2588

Figure 1: **L-PFPrS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions over 0.5 min.
Time: 10 min

Flow: 300 µl/min

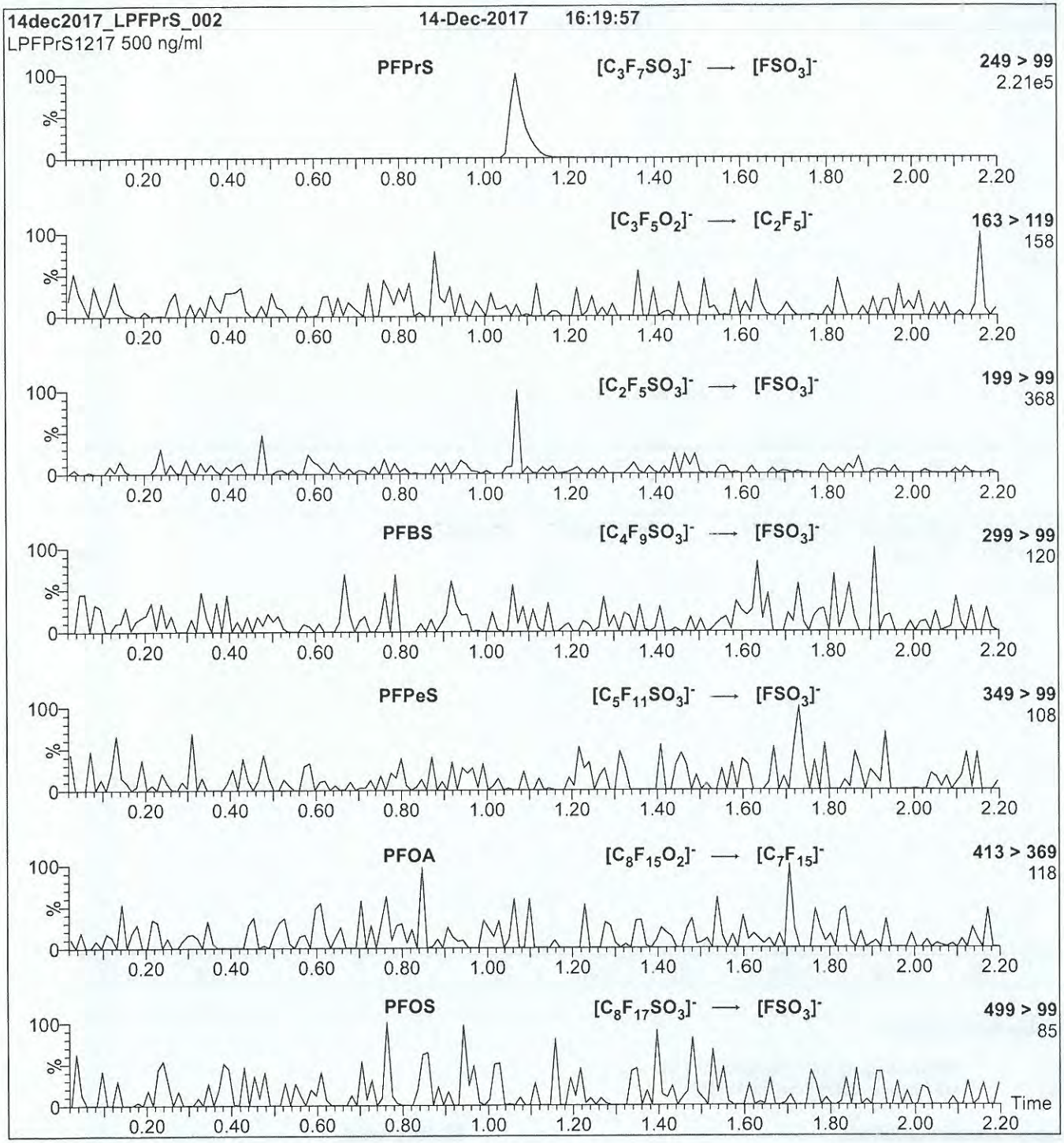
MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 40.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

19A2588

Figure 2: **L-PFPrS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml L-PFPrS)

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

Flow: 300 µl/min

MS Parameters

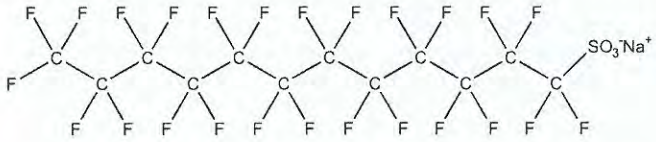
Collision Gas (mbar) = 3.43e-3
Collision Energy (eV) = 25

19E2401

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	L-PFDoS	**LOT NUMBER:**	LPFDoS1218
COMPOUND:	Sodium perfluoro-1-dodecanesulfonate		
STRUCTURE:		**CAS #:**	1260224-54-1



MOLECULAR FORMULA:	$C_{12}F_{25}SO_3Na$	**MOLECULAR WEIGHT:**	722.14
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt)	**SOLVENT(S):**	Methanol
	48.4 ± 2.4 µg/ml (PFDoS anion)		
CHEMICAL PURITY:	>98%		
LAST TESTED: (mm/dd/yyyy)	12/06/2018		
EXPIRY DATE: (mm/dd/yyyy)	12/06/2023		
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 ~ 0.2% of perfluoro-n-dodecanoic acid (PFDoA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 12/20/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19E2401

INTENDED USE:

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HANDLING:

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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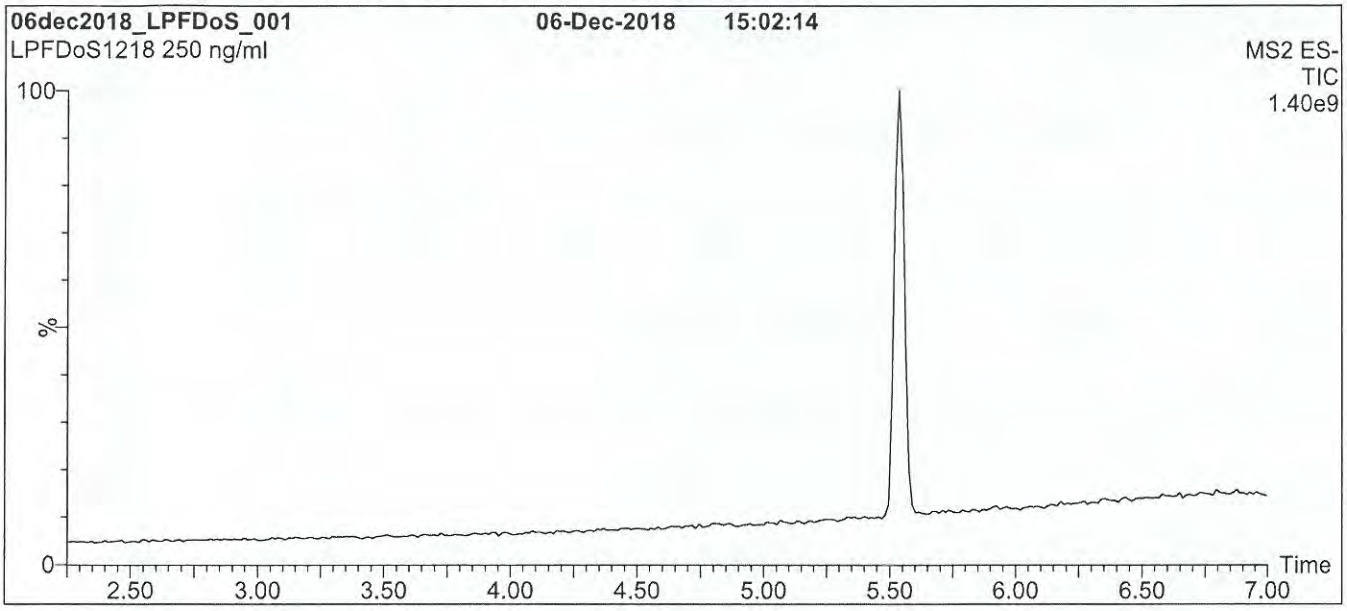
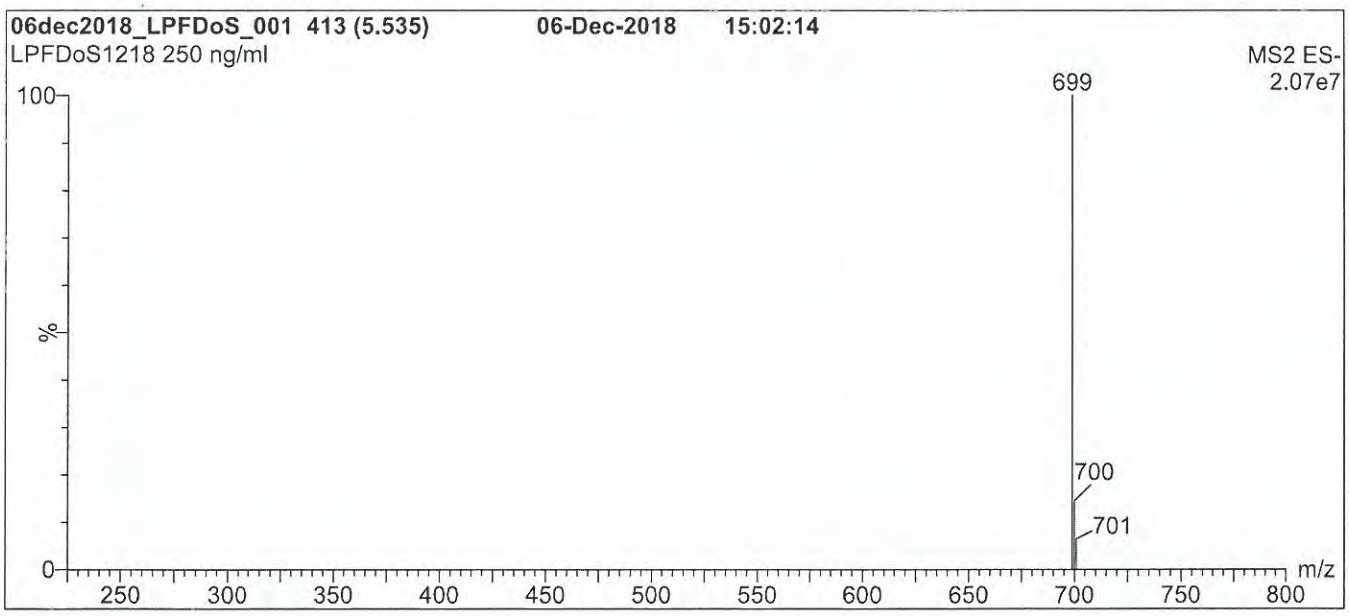
19E2401

Figure 1: **L-PFDoS; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for
3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

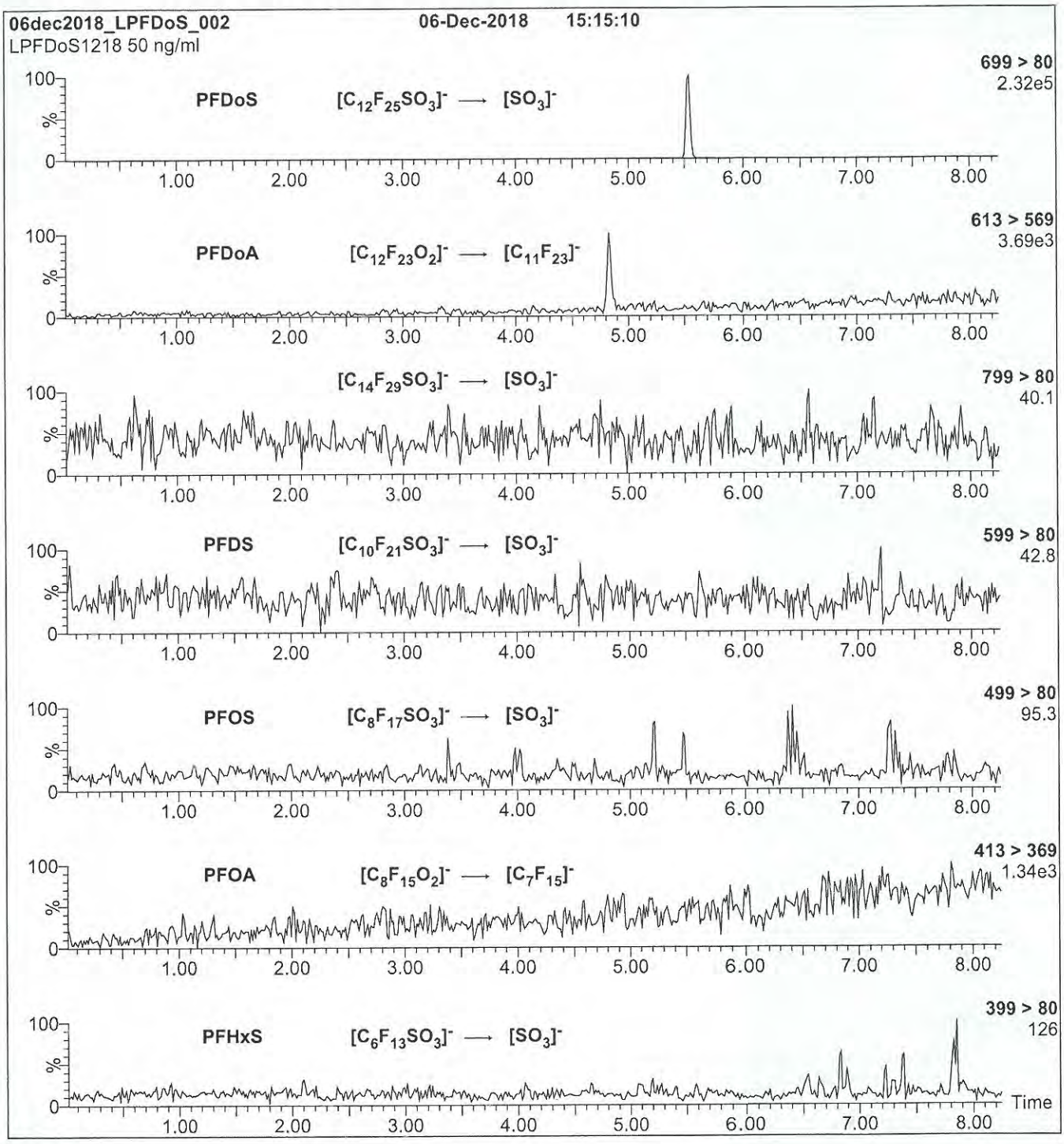
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

19E2401

Figure 2: **L-PFDoS; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (L-PFDoS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.27e-3
Collision Energy (eV) = 60

Analytical Standard Record

Vista Analytical Laboratory

19E2202

Parent Standards used in this standard:

Standard	Description	Prepared	Prepared By	Expires	(mls)
18L2018	18O2-PFHxS	20-Dec-18	** Vendor **	22-Mar-23	1.06
18L2021	13C2-FOUEA	20-Dec-18	** Vendor **	14-Nov-19	1
18L2022	13C4-PFBA	20-Dec-18	** Vendor **	16-Feb-23	1
18L2023	13C6-PFDA	20-Dec-18	** Vendor **	20-Sep-23	1
18L2024	13C9-PFNA	20-Dec-18	** Vendor **	23-May-22	1
18L2025	13C7-PFUdA	20-Dec-18	** Vendor **	20-Sep-23	1
18L2026	13C5-PFHxA	20-Dec-18	** Vendor **	27-Sep-23	1
18L2028	13C4-PFOS	20-Dec-18	** Vendor **	11-Sep-23	1.05
18L2029	13C8-PFOA	20-Dec-18	** Vendor **	29-Jun-23	1.02

Description:	PFC-RS	Expires:	14-Nov-19
Standard Type:	Reagent	Prepared:	23-May-19
Solvent:	MeOH	Prepared By:	Giana R. Bilotta
Final Volume (mls):	40	Department:	LCMS
Vials:	1	Last Edit:	28-May-19 09:02 by GRB

Expiration date set to expiration date of standard being used to create this one. GRB 05/22/19
18L2021 13C2-FOUEA EXP. 11/14/19

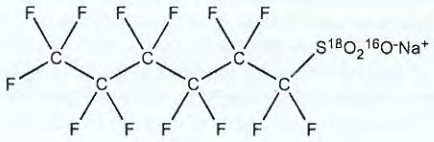
Analyte	CAS Number	Concentration	Units
18O2-PFHxS		1.25	ug/mL
13C9-PFNA		1.25	ug/mL
13C8-PFOA		1.25	ug/mL
13C7-PFUnA		1.25	ug/mL
13C6-PFDA		1.25	ug/mL
13C5-PFHxA		1.25	ug/mL
13C4-PFOS		1.25	ug/mL
13C4-PFBA		1.25	ug/mL
13C2-FOUEA		1.25	ug/mL

18L2018

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFHxS	**LOT NUMBER:**	MPFHxS0318
COMPOUND:	Sodium perfluoro-1-hexane[$^{18}O_2$]sulfonate		
STRUCTURE:		**CAS #:**	1585941-14-5



MOLECULAR FORMULA:	$C_6F_{13}S^{18}O_2{}^{16}ONa$	**MOLECULAR WEIGHT:**	426.10
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.3 ± 2.4 µg/ml (MPFHxS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	>94% ($^{18}O_2$)
LAST TESTED: (mm/dd/yyyy)	03/22/2018		
EXPIRY DATE: (mm/dd/yyyy)	03/22/2023		
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.
- The response factor for MPFHxS ($C_6F_{13}S^{18}O_2{}^{16}O^-$) has been observed to be up to 10% lower than for PFHxS ($C_6F_{13}S^{16}O_3^-$) when both compounds are injected together. This difference may vary between instruments.
- Contains ~ 1.0% of sodium perfluoro-1-octane[$^{18}O_2$]sulfonate ($^{18}O_2$-PFOS) and ~ 0.3% of sodium perfluoro-1-heptane[$^{18}O_2$]sulfonate ($^{18}O_2$-PFHpS).
- Due to the isotopic purity of the starting material ($^{18}O_2$ >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: _____ **Date:** 06/07/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

18L2018

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.

HANDLING:

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:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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:

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

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 calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

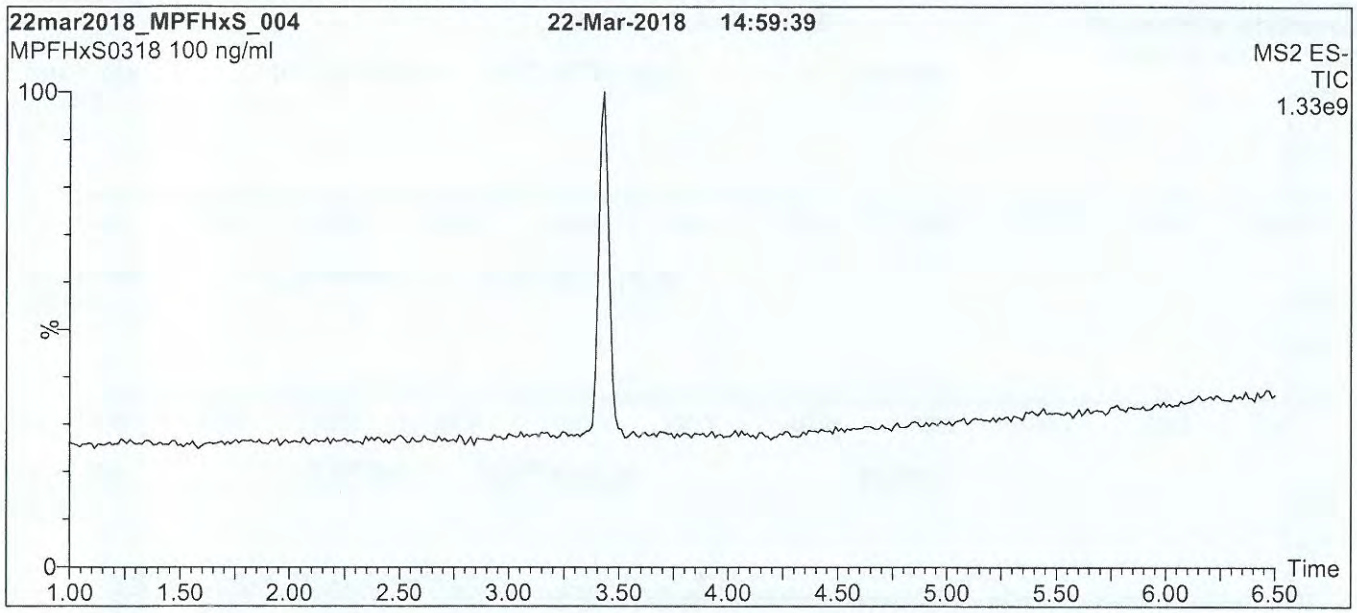
CALA Testing Accreditation No. A-1226

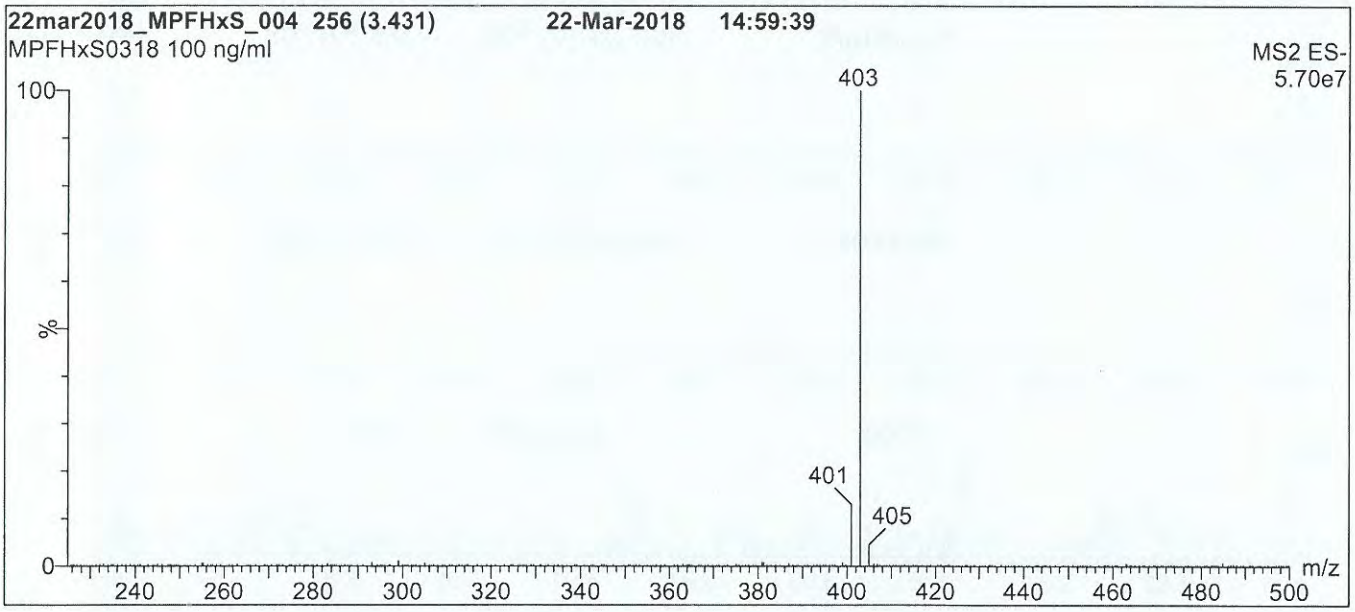
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

18L2018

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





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 80% organic over 7 min and hold for 3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

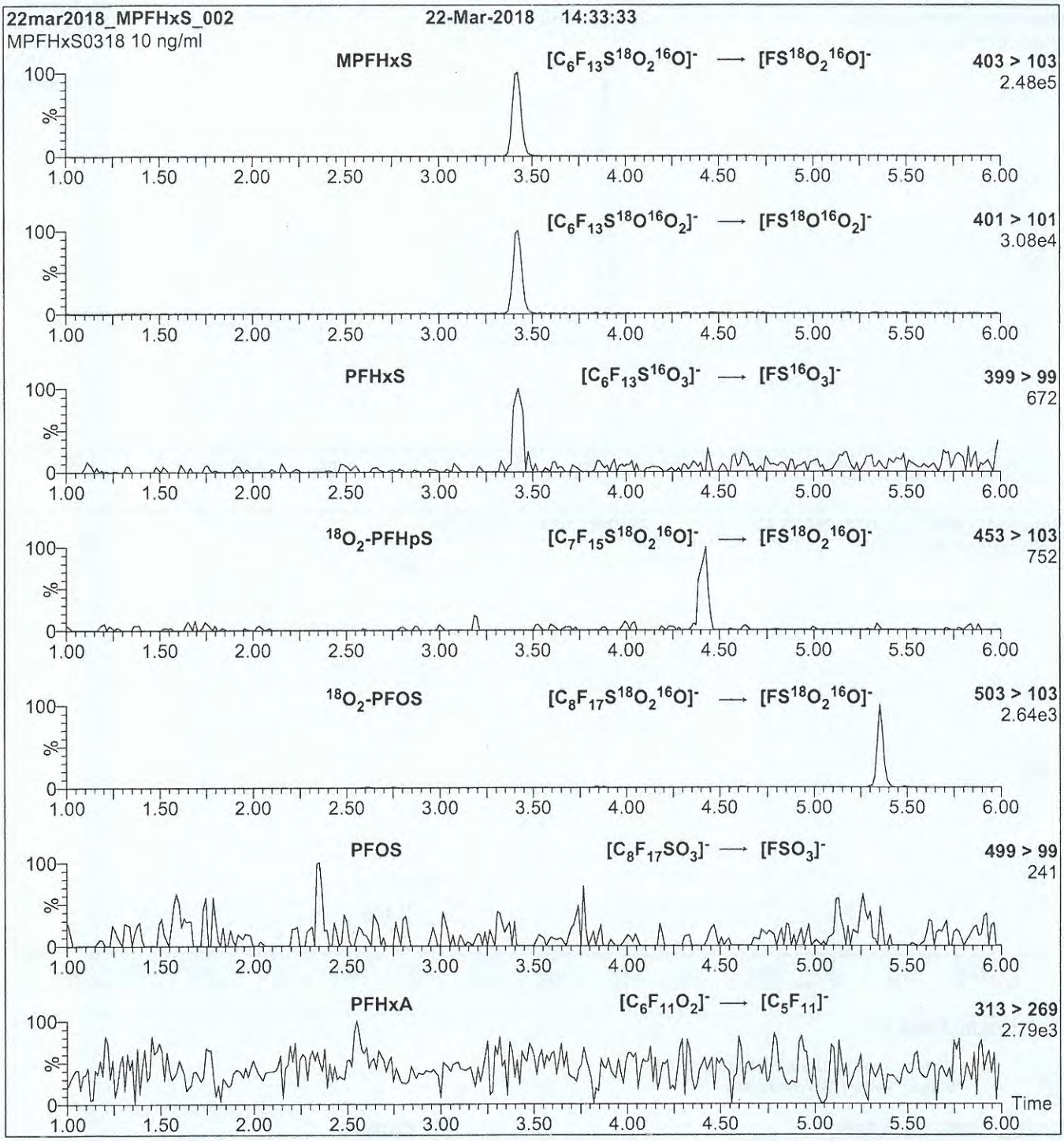
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = 5.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

18L2018

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



Conditions for Figure 2:

Injection: On-column (MPFHxS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.64e-3

Collision Energy (eV) = 32

18L2021

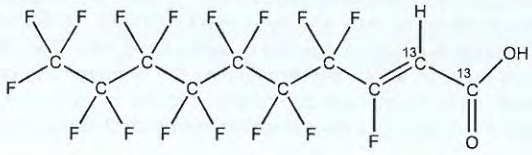
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MFOUEA
LOT NUMBER: MFOUEA1117
COMPOUND: 2H-Perfluoro-[1,2-$^{13}C_2$]-2-decenoic acid

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_8H_2F_{16}O_2$	**MOLECULAR WEIGHT:**	460.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Anhydrous Isopropanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2\text{-}^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	11/14/2017		
EXPIRY DATE: (mm/dd/yyyy)	11/14/2019		
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.
- Dilution of this standard in methanol may lead to the formation of 2H-3-methoxy-perfluoro-[1,2-$^{13}C_2$]-2-decenoic acid. This reaction can be catalyzed by the presence of acid or base. All dilutions should be routinely checked for degradation.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 11/15/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

1812021

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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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:

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

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 calibrated NIST and/or NRC traceable external weights. All volumetric glassware used is calibrated, 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).

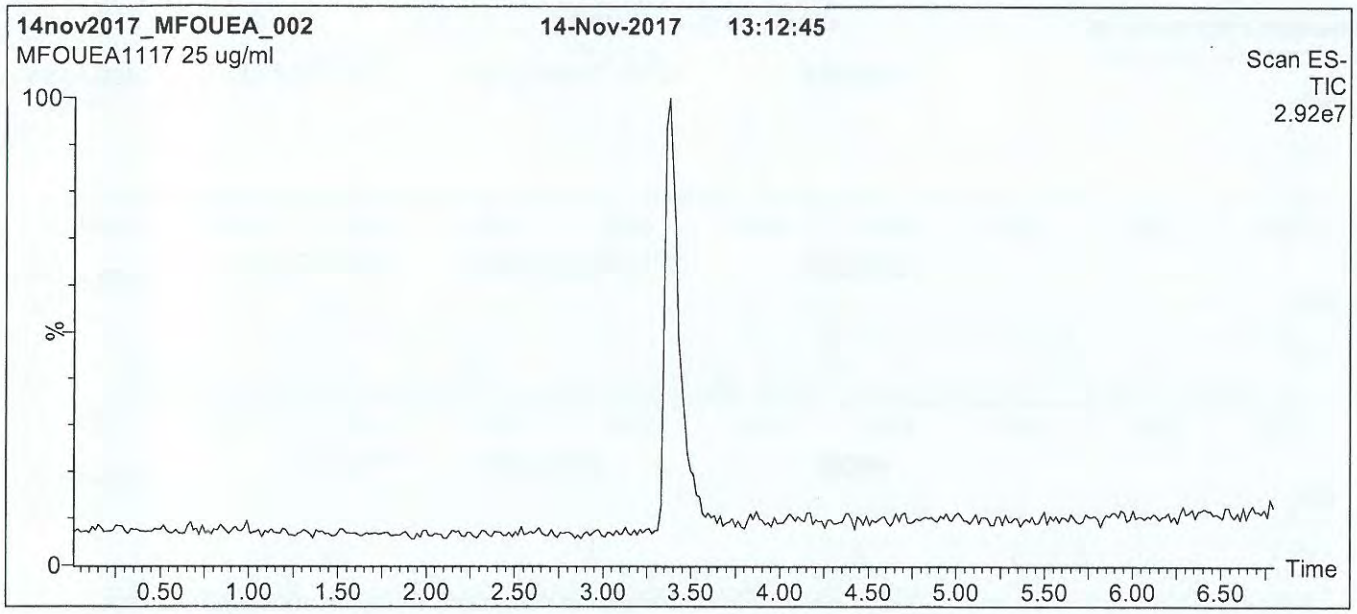
CALA Testing Accreditation No. A 1226

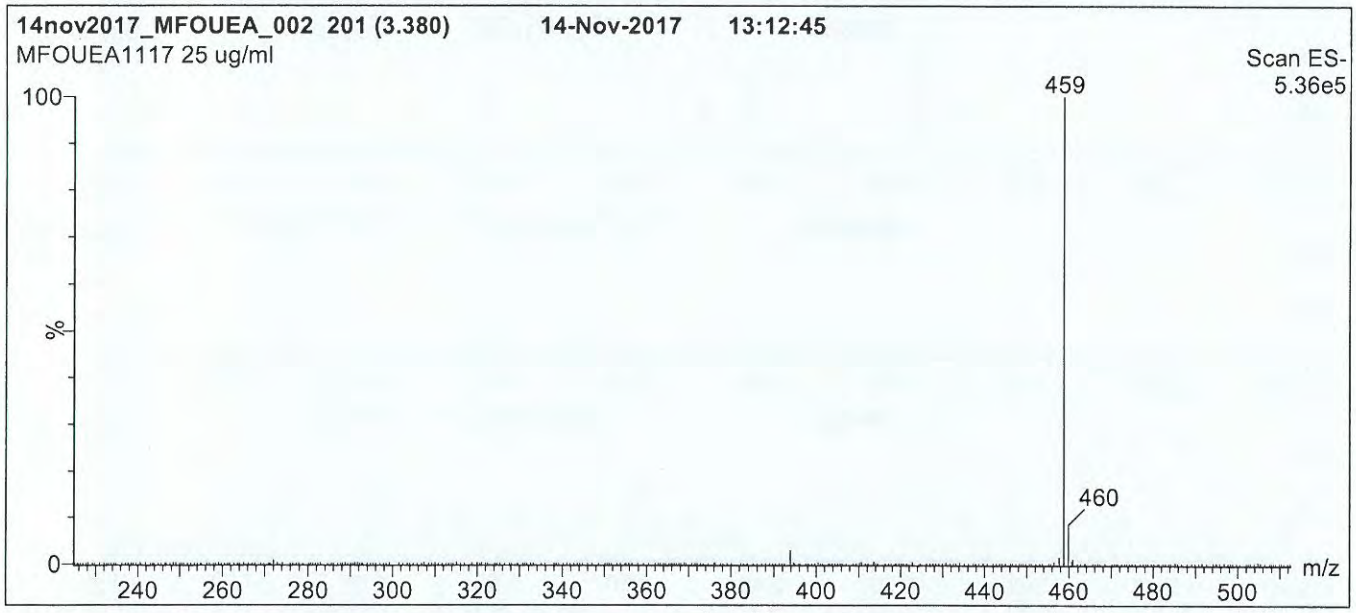
ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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

18L2021

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





Conditions for Figure 1:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold
for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

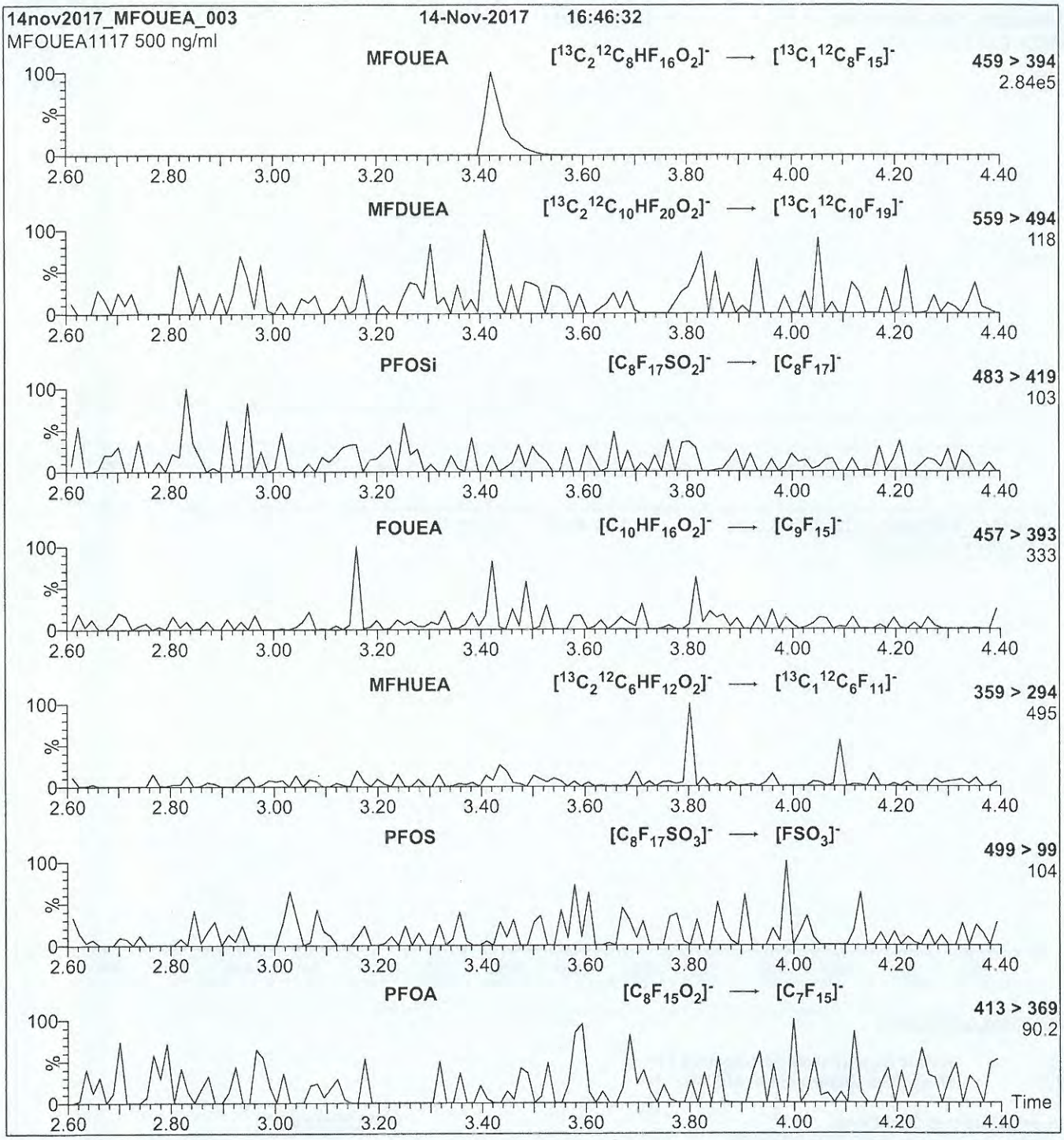
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 14.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

1/8/2021

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



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MFOUEA)

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

Flow: 300 µl/min

MS Parameters

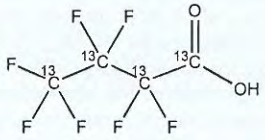
Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 21

1812022

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	MPFBA	**LOT NUMBER:**	MPFBA0218
COMPOUND:	Perfluoro-n-[1,2,3,4-$^{13}C_4$]butanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_4HF_7O_2$	**MOLECULAR WEIGHT:**	218.01
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2,3,4-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	02/16/2018		
EXPIRY DATE: (mm/dd/yyyy)	02/16/2023		
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:** 02/22/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

18L2022

INTENDED USE:

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HANDLING:

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UNCERTAINTY:

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TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

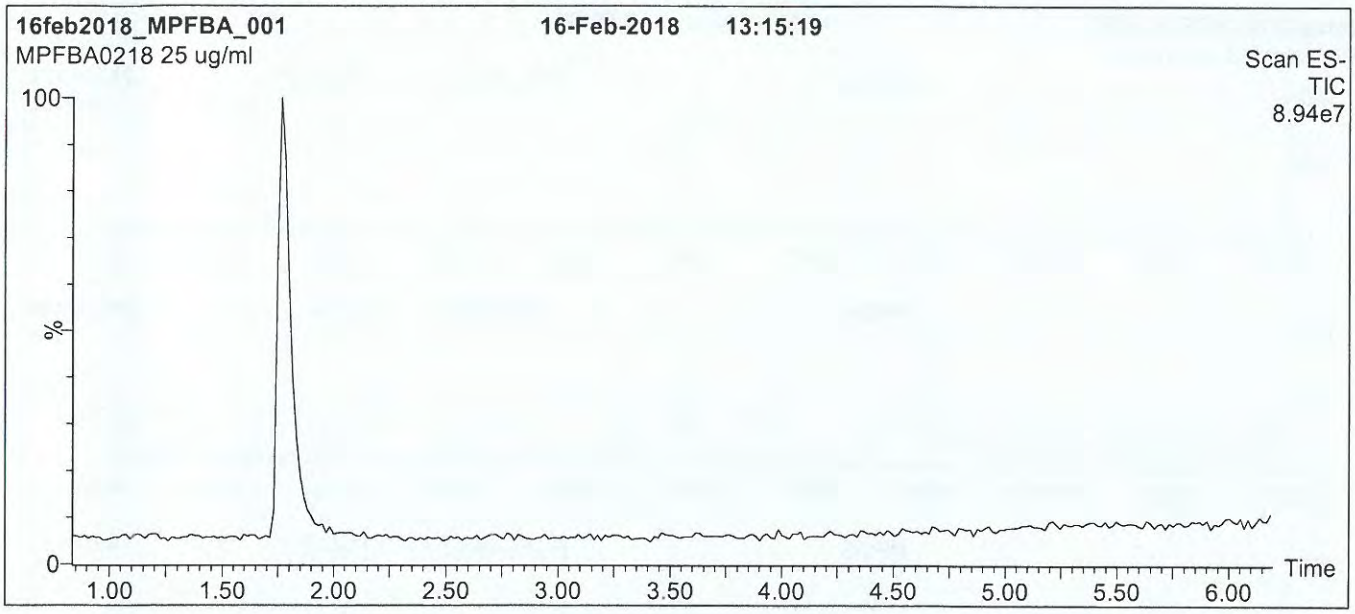
CALA Testing Accreditation No. A 1226

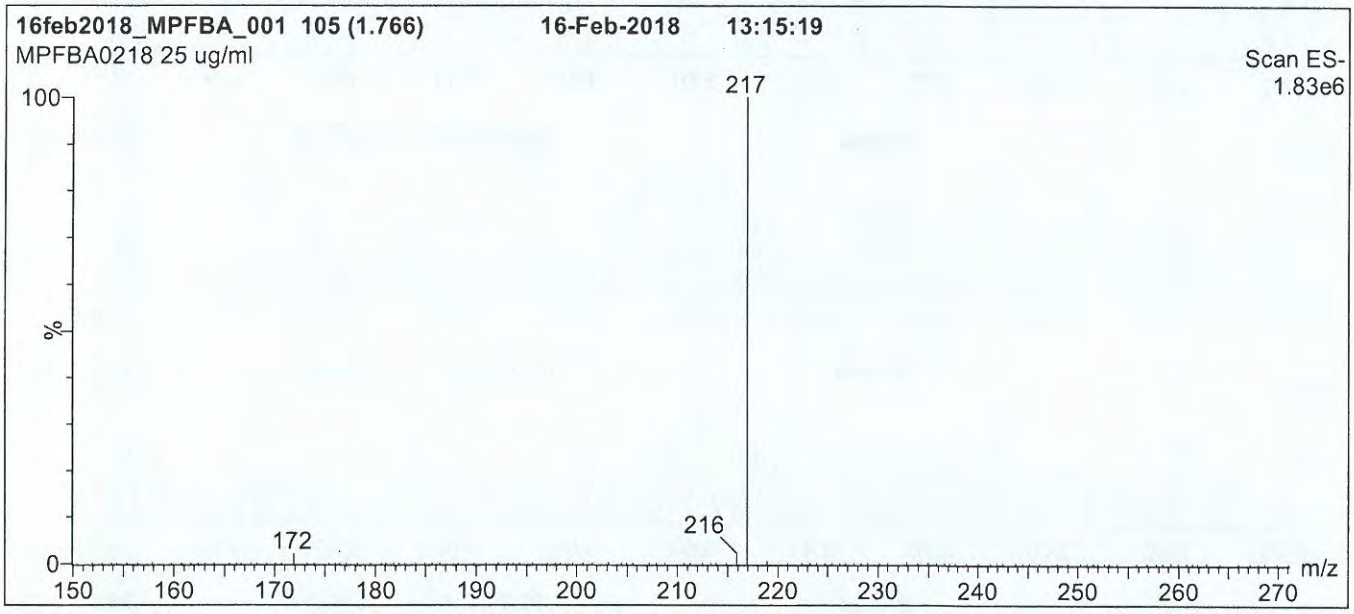
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

18L2022

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





Conditions for Figure 1:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

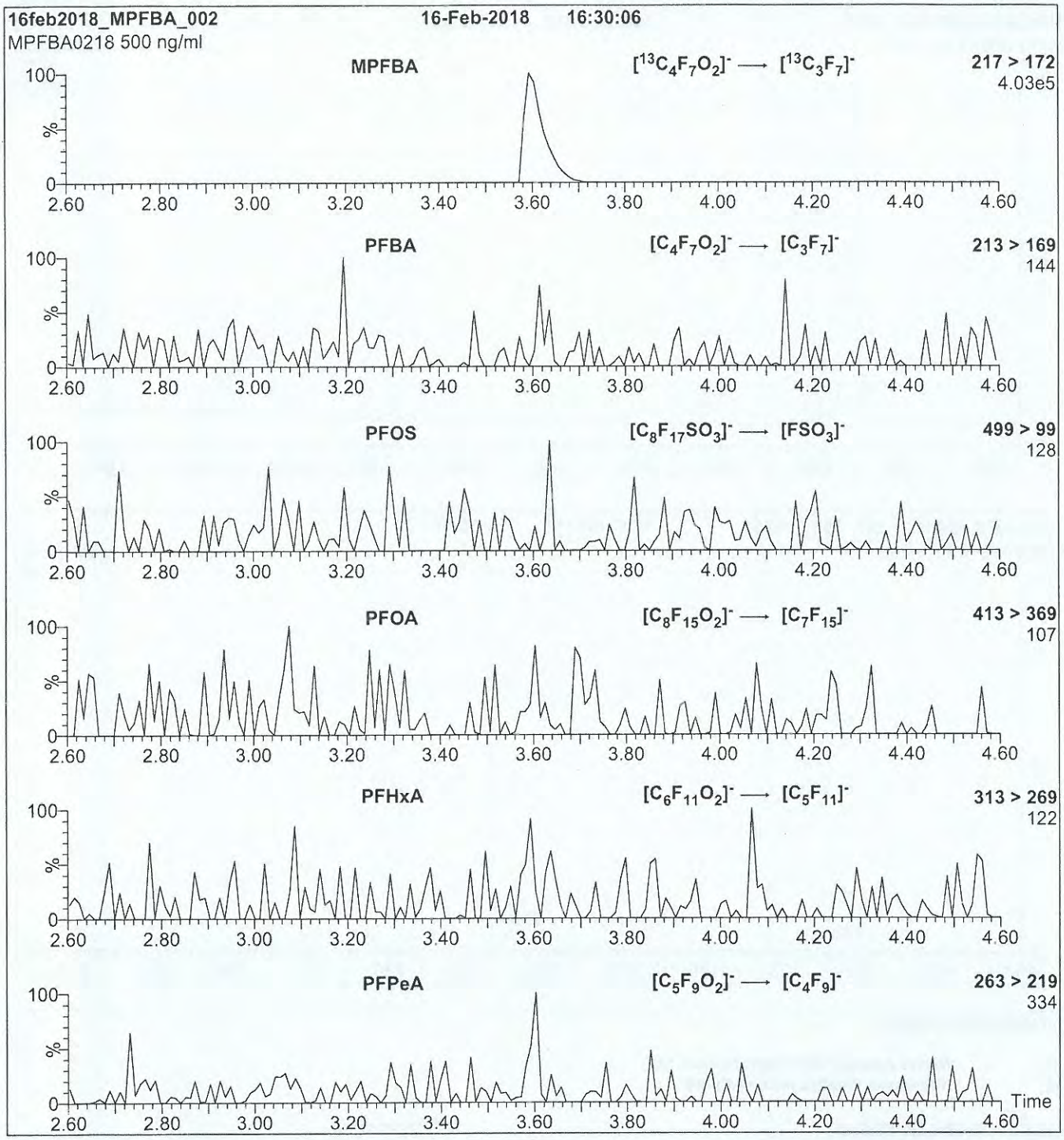
MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 10.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

1812022

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



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFBA)

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

Flow: 300 µl/min

MS Parameters

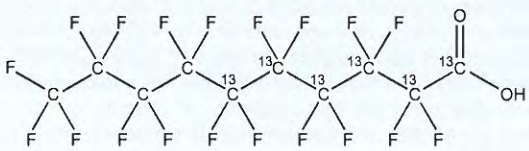
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 10

18L2023

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M6PFDA	**LOT NUMBER:**	M6PFDA0918
COMPOUND:	Perfluoro-n-[1,2,3,4,5,6-$^{13}C_6$]decanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_6{}^{12}C_4HF_{19}O_2$	**MOLECULAR WEIGHT:**	520.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C
LAST TESTED: (mm/dd/yyyy)	09/20/2018		(1,2,3,4,5,6-$^{13}C_6$)
EXPIRY DATE: (mm/dd/yyyy)	09/20/2023		
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:** 10/03/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

18L2023

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.

HANDLING:

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:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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:

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

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 calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

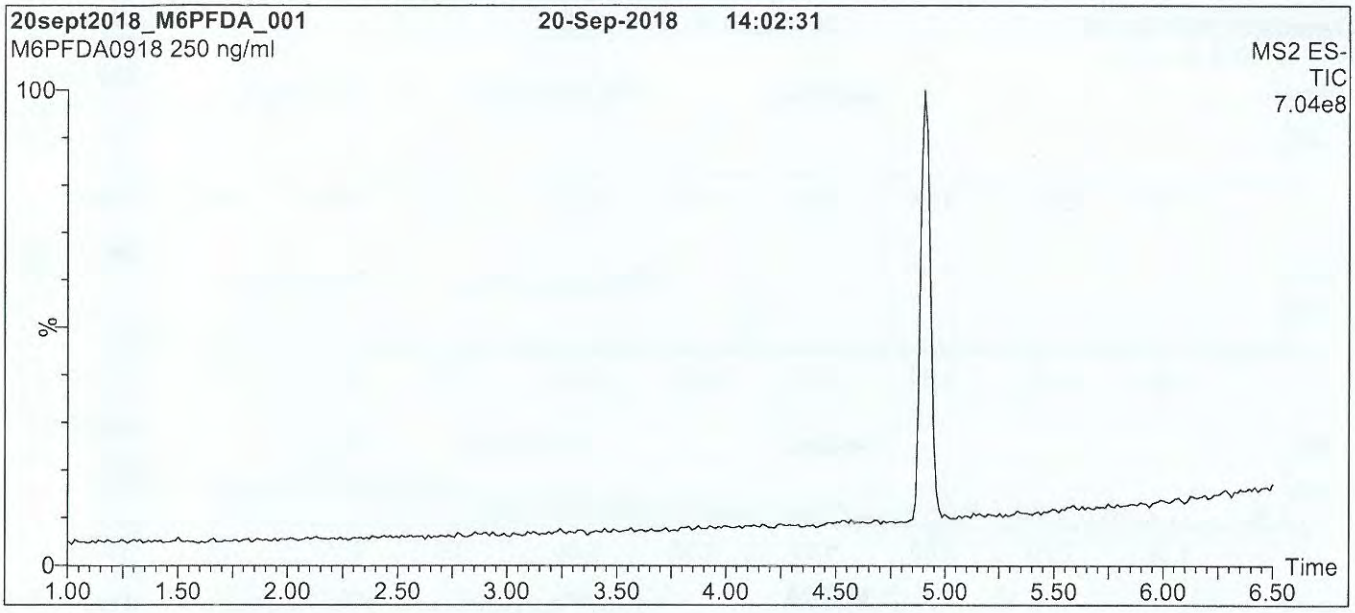
CALA Testing Accreditation No. A1226

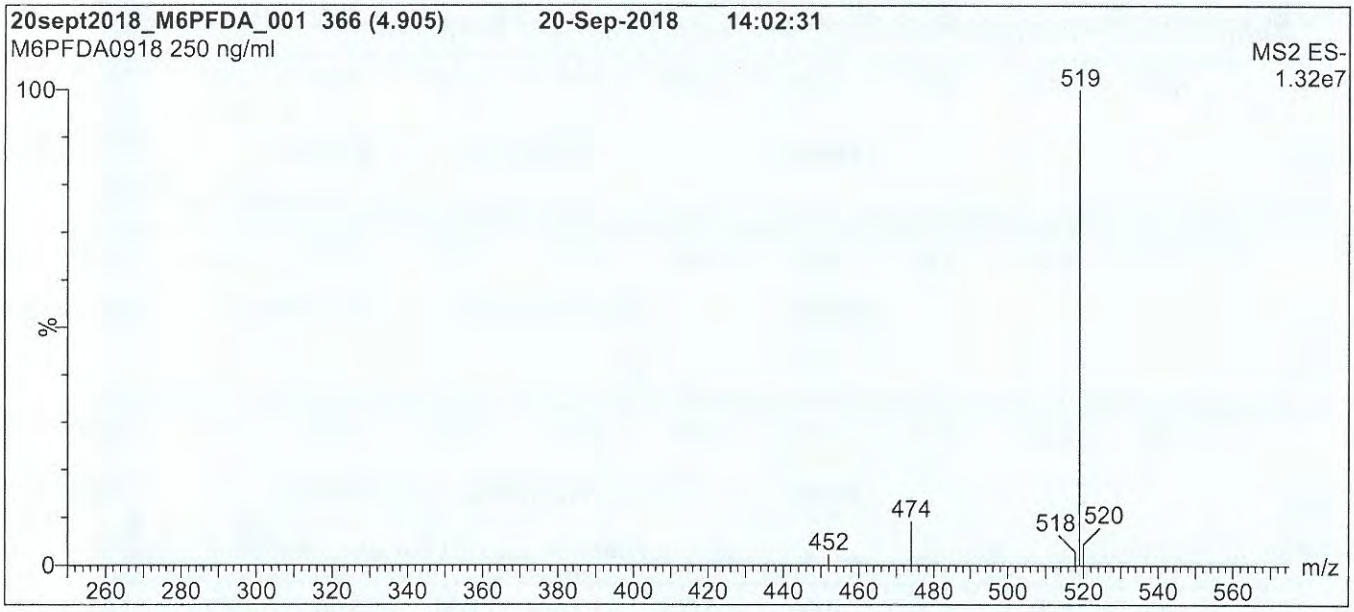
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

18L2023

Figure 1: **M6PFDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

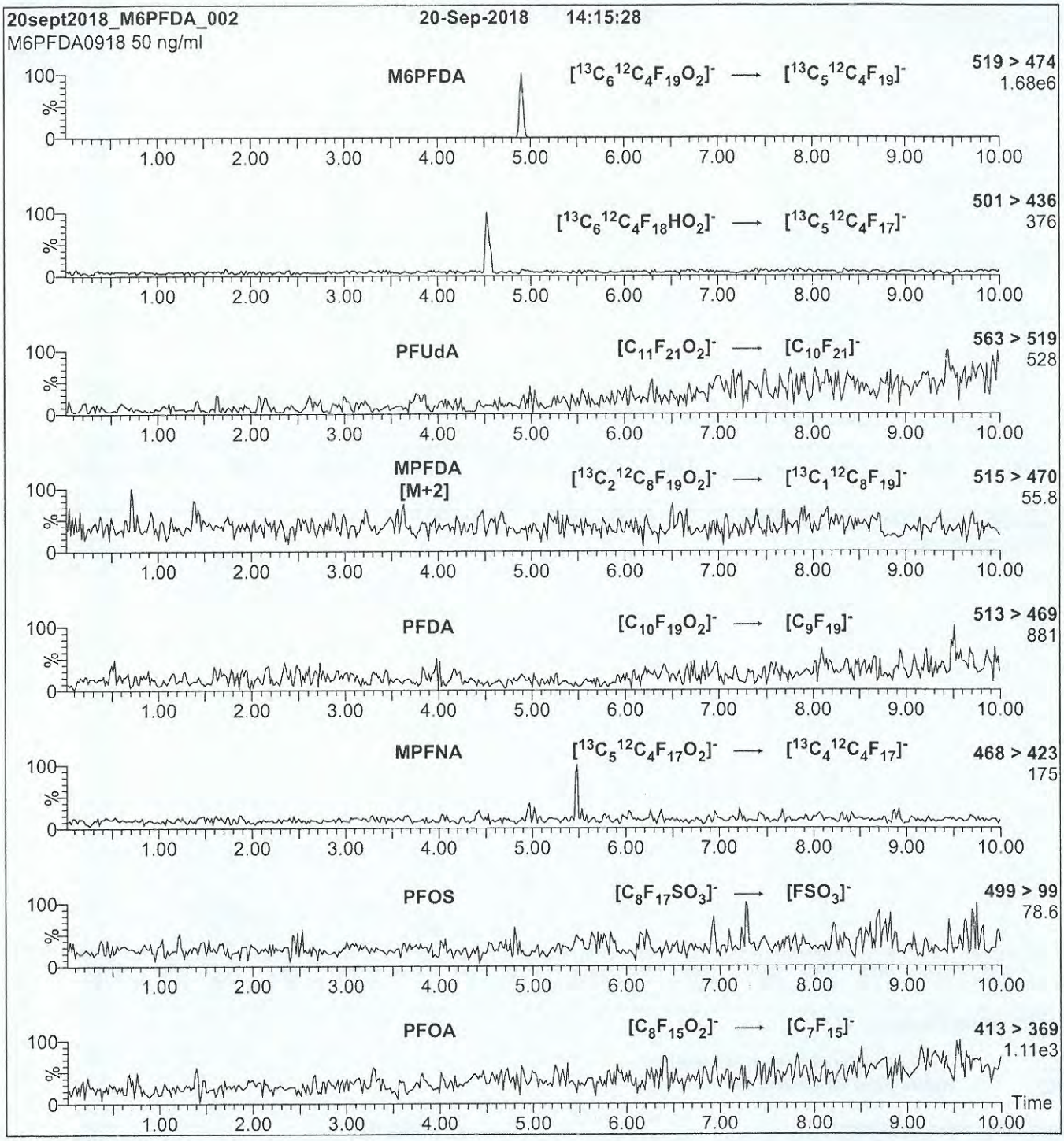
MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

1862023

Figure 2: **M6PFDA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M6PFDA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 2.97e-3
Collision Energy (eV) = 10

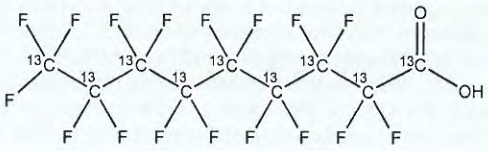
18L2024

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: M9PFNA
COMPOUND: Perfluoro-n-[$^{13}C_9$]nonanoic acid
LOT NUMBER: M9PFNA0517

STRUCTURE:
CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_9HF_{17}O_2$	**MOLECULAR WEIGHT:**	473.01
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($^{13}C_9$)
LAST TESTED: (mm/dd/yyyy)	05/23/2017		
EXPIRY DATE: (mm/dd/yyyy)	05/23/2022		
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 ~ 0.9% of $^{13}C_5{}^{12}C_4HF_{17}O_2$ (MPFNA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 05/25/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

1812024

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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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:

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

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 calibrated NIST and/or NRC traceable external weights. All volumetric glassware used is calibrated, 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:

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER

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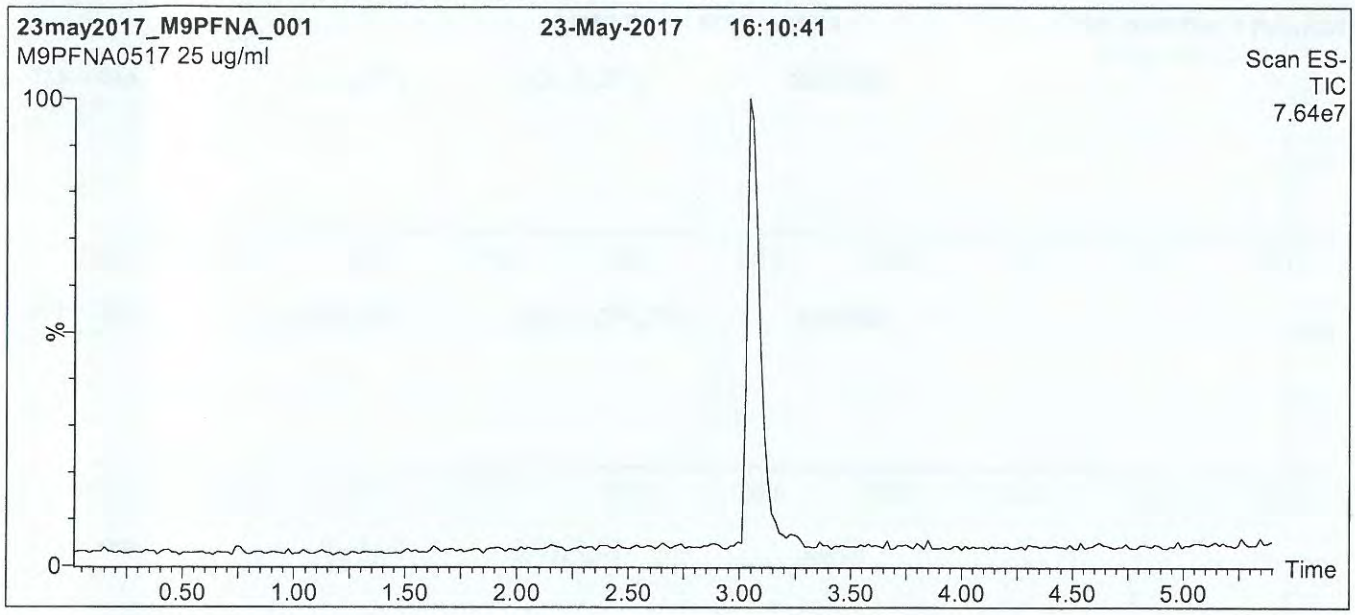
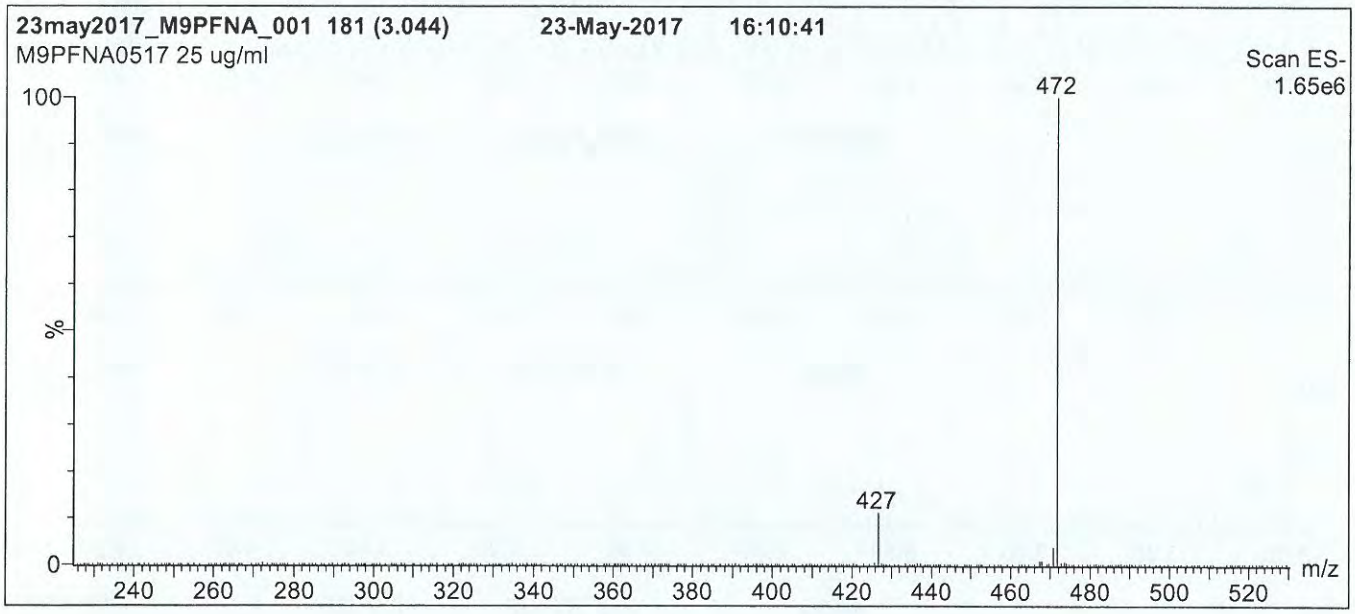
1812024

Figure 1: **M9PFNA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 60% (80:20 MeOH:ACN) / 40% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

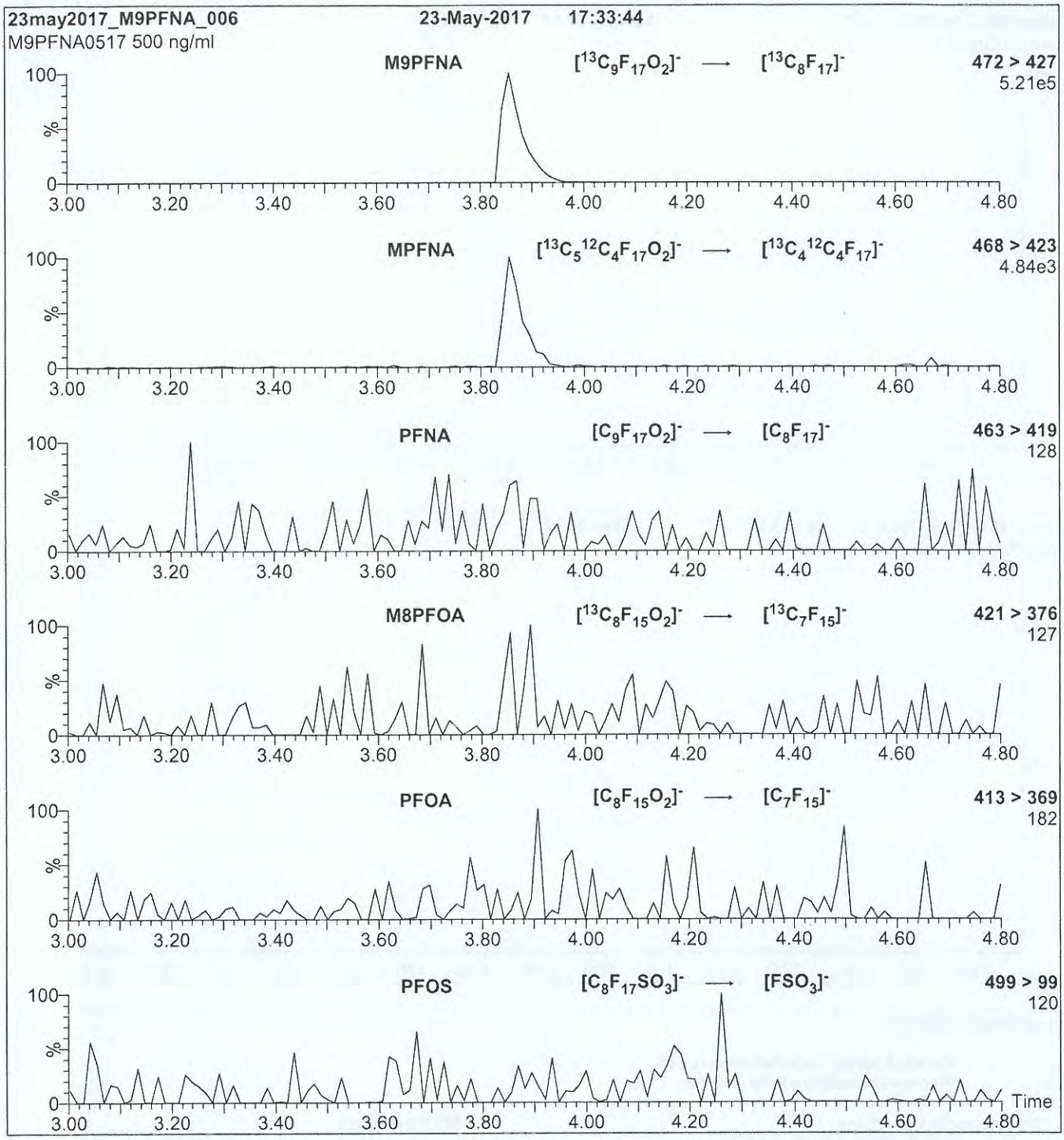
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 15.00
Cone Gas Flow (l/hr) = 50
Desolvation Gas Flow (l/hr) = 750

18L2024

Figure 2: **M9PFNA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection:	Direct loop injection 10 µl (500 ng/ml M9PFNA)
Mobile phase:	Isocratic 80% (80:20 MeOH:ACN) / 20% H_2O (both with 10 mM NH_4OAc buffer)
Flow:	300 µl/min

MS Parameters

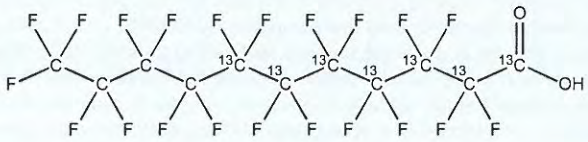
Collision Gas (mbar) = 3.20e-3
Collision Energy (eV) = 11

18L2025

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M7PFUdA	**LOT NUMBER:**	M7PFUdA0918
COMPOUND:	Perfluoro-n-[1,2,3,4,5,6,7-$^{13}C_7$]undecanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_7{}^{12}C_4HF_{21}O_2$	**MOLECULAR WEIGHT:**	571.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2,3,4,5,6,7-$^{13}C_7$)
LAST TESTED: (mm/dd/yyyy)	09/20/2018		
EXPIRY DATE: (mm/dd/yyyy)	09/20/2023		
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:** 09/27/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

18L2025

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

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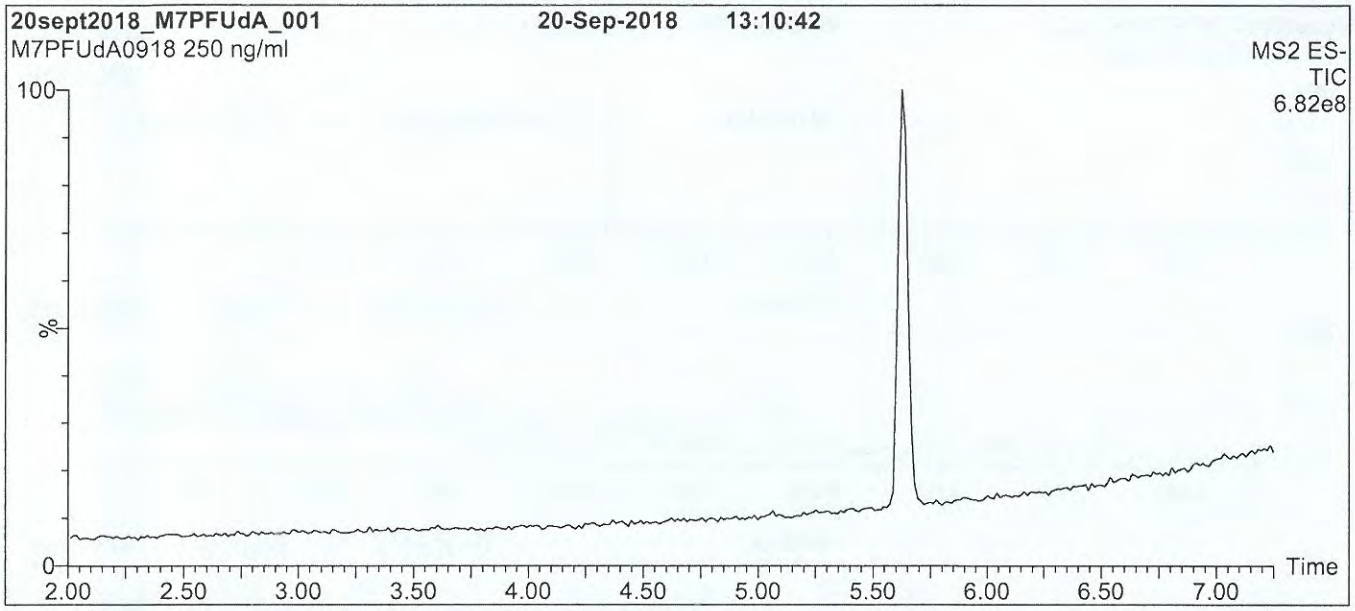
CALA Testing Accreditation No. A 1226

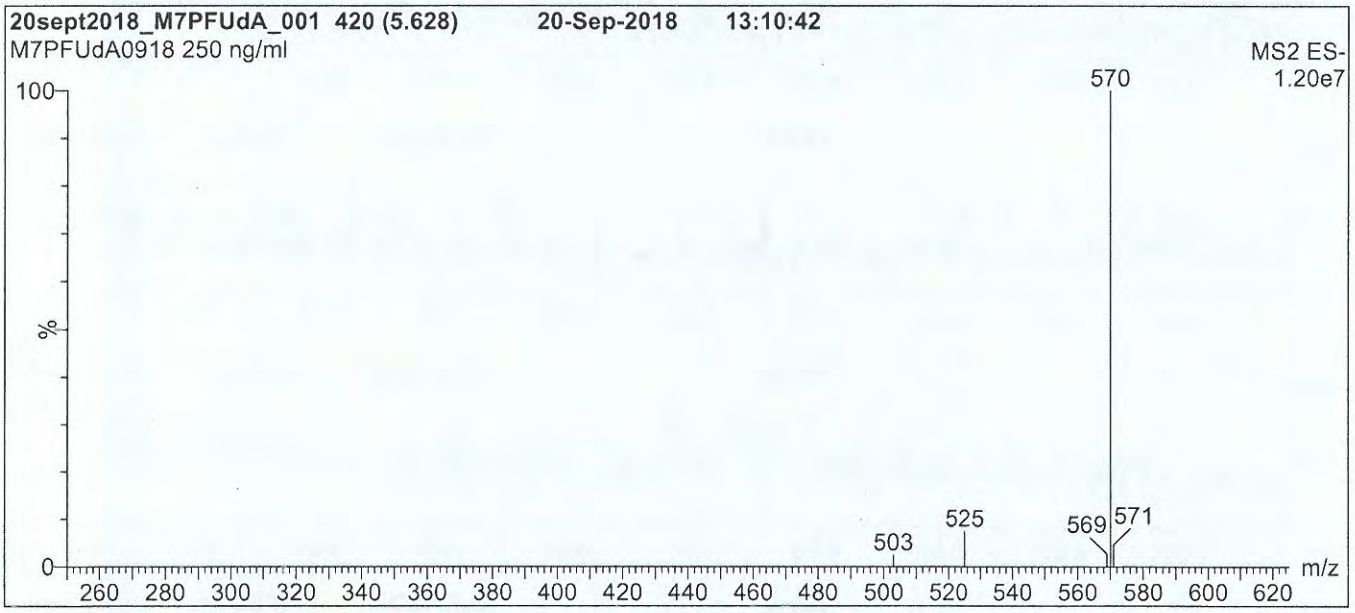
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

18L2025

Figure 1: **M7PFUdA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

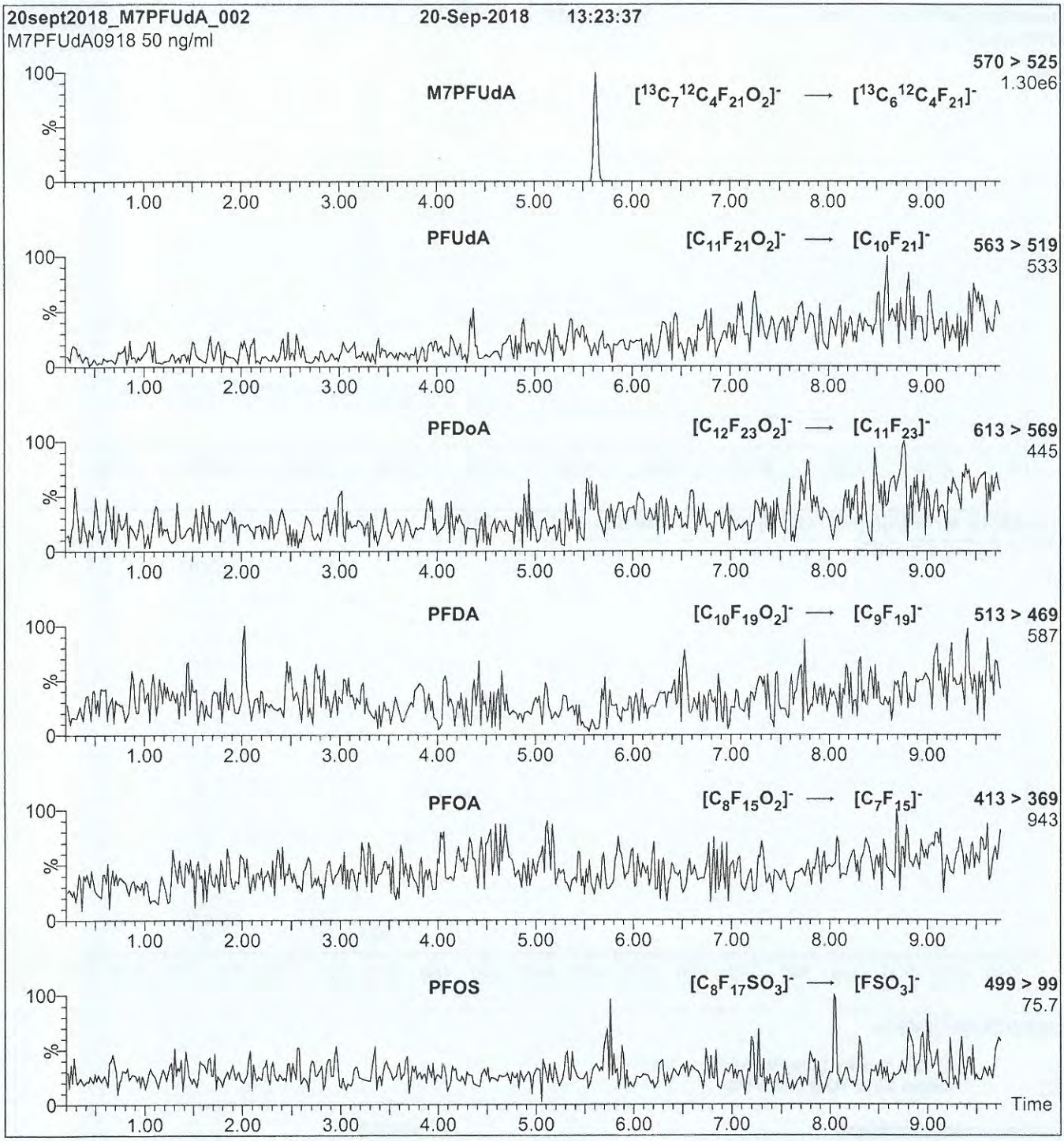
MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

18L2025

Figure 2: **M7PFUdA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M7PFUdA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

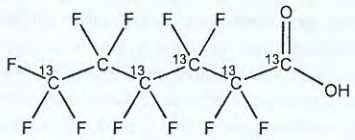
Collision Gas (mbar) = 2.97e-3
Collision Energy (eV) = 12

18L2026

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M5PFHxA	**LOT NUMBER:**	M5PFHxA0918
COMPOUND:	Perfluoro-n-[1,2,3,4,6-$^{13}C_5$]hexanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_5{}^{12}C_1HF_{11}O_2$	**MOLECULAR WEIGHT:**	319.02
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4,6\text{-}^{13}C_5$)
LAST TESTED: (mm/dd/yyyy)	09/27/2018		
EXPIRY DATE: (mm/dd/yyyy)	09/27/2023		
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:** 10/01/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

18L2026

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.

HANDLING:

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:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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 calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

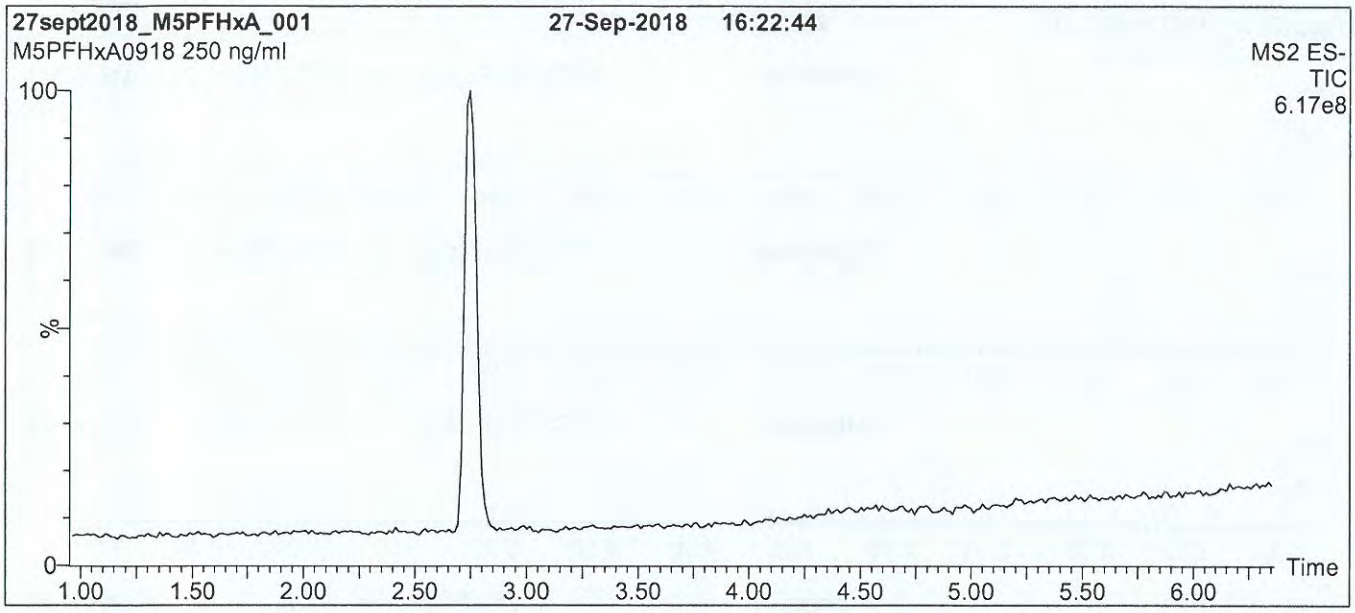
CALA Testing Accreditation No. A 1226

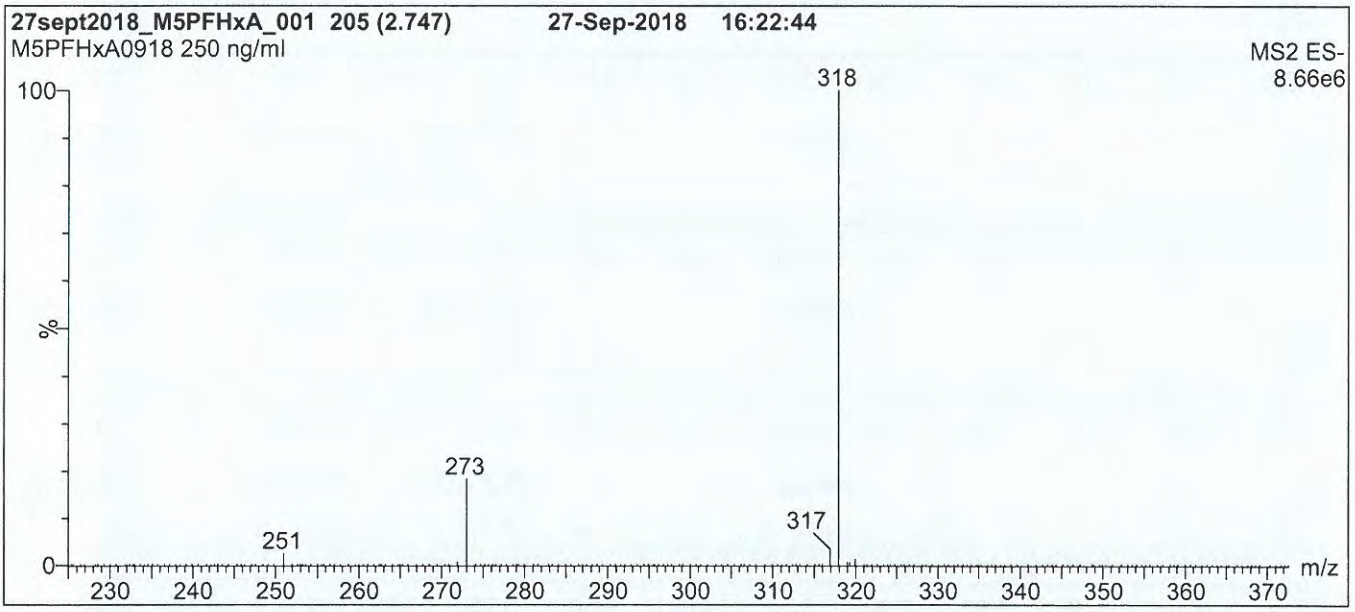
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

18L2026

Figure 1: **M5PFHxA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

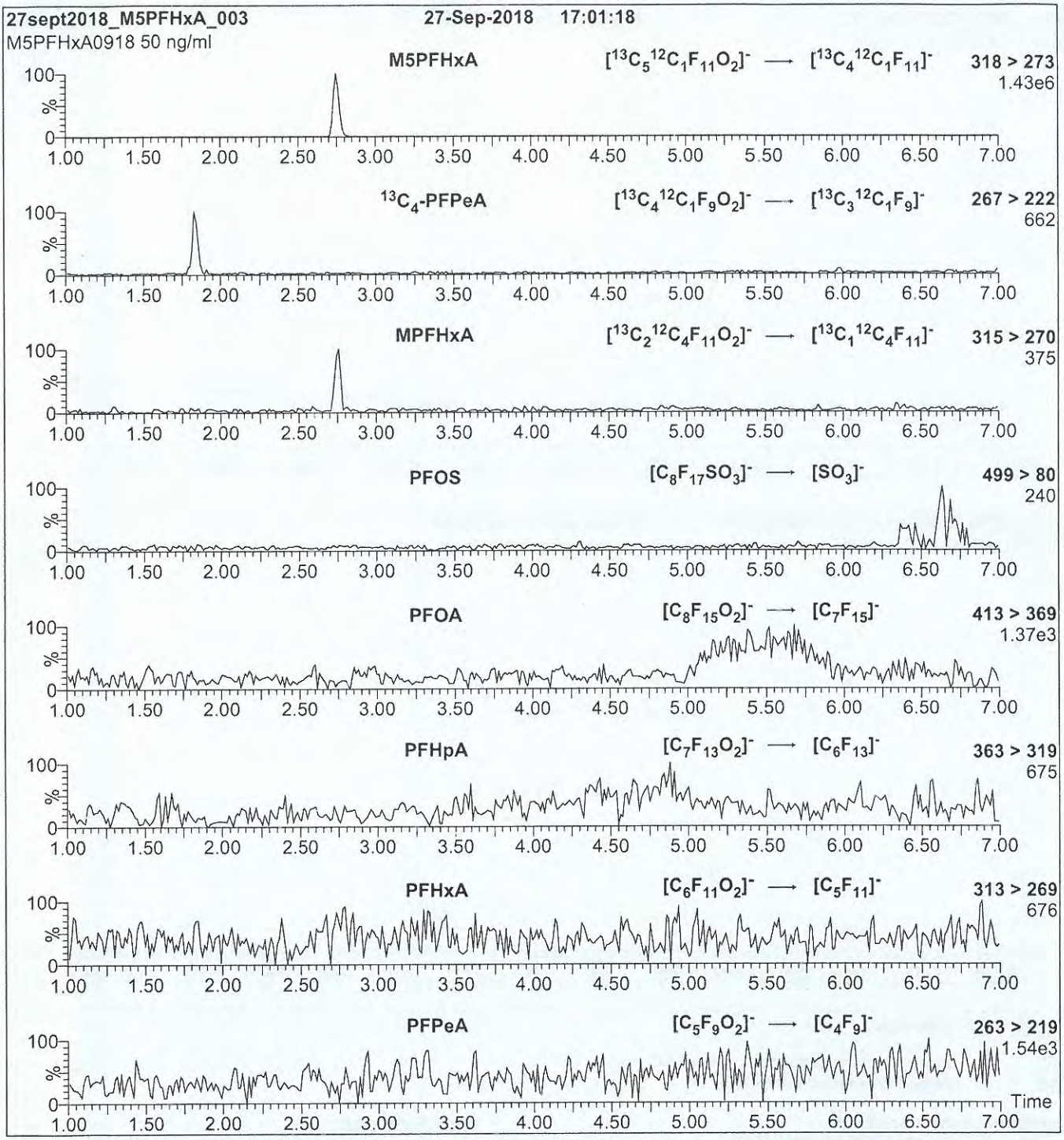
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

1812026

Figure 2: **M5PFHxA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M5PFHxA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 2.97e-3
Collision Energy (eV) = 8

18L2028

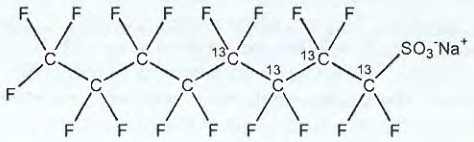
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFOS **LOT NUMBER:** MPFOS0918

COMPOUND: Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_4F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	526.08
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.8 ± 2.4 µg/ml (MPFOS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4$-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	09/11/2018		
EXPIRY DATE: (mm/dd/yyyy)	09/11/2023		
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 ~ 0.3% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 09/14/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

18L2028

INTENDED USE:

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HANDLING:

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SYNTHESIS / CHARACTERIZATION:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

UNCERTAINTY:

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

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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 of our products.

TRACEABILITY:

All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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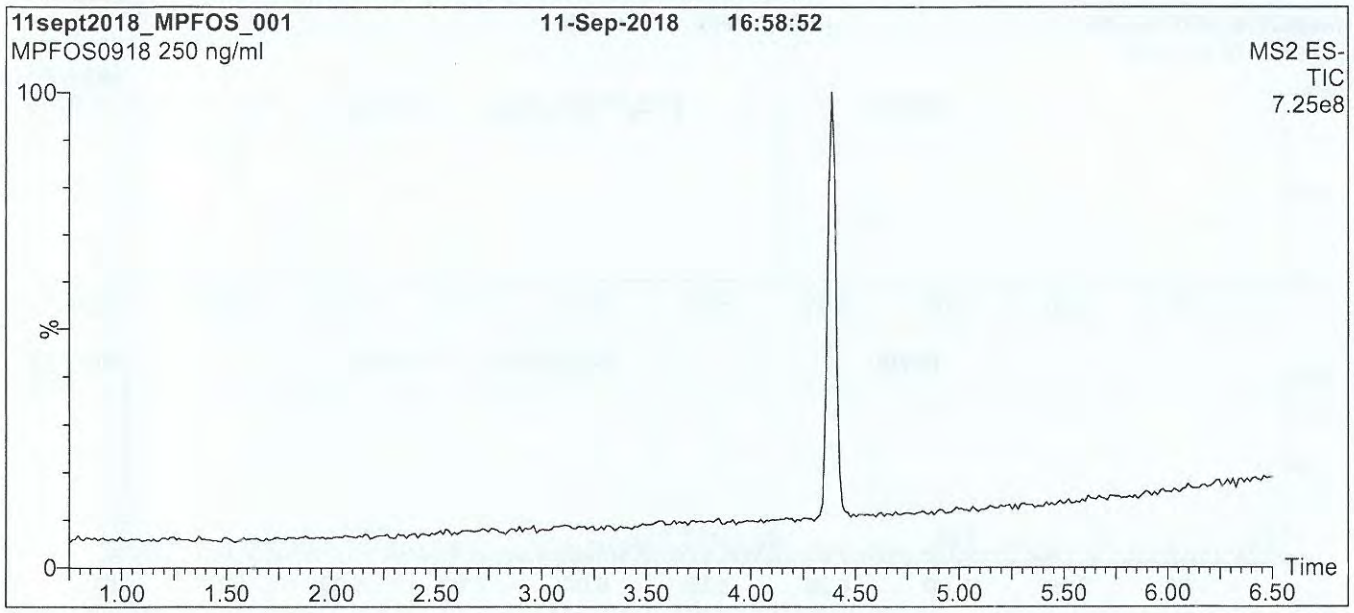
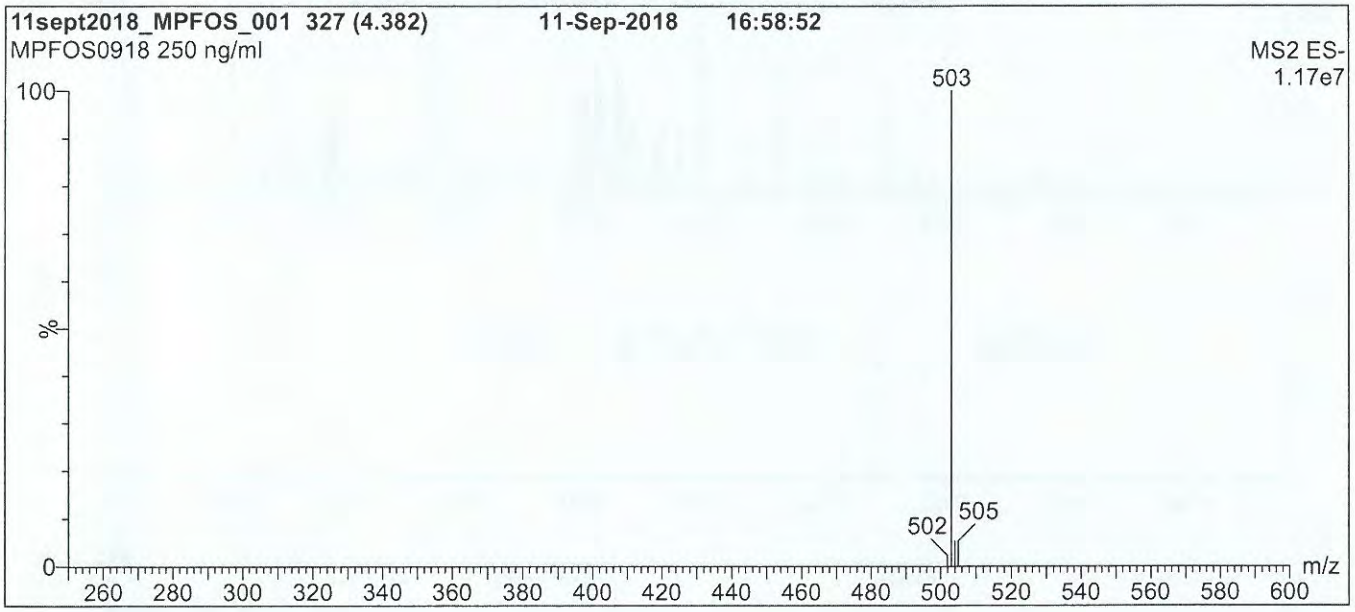
18L2028

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





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

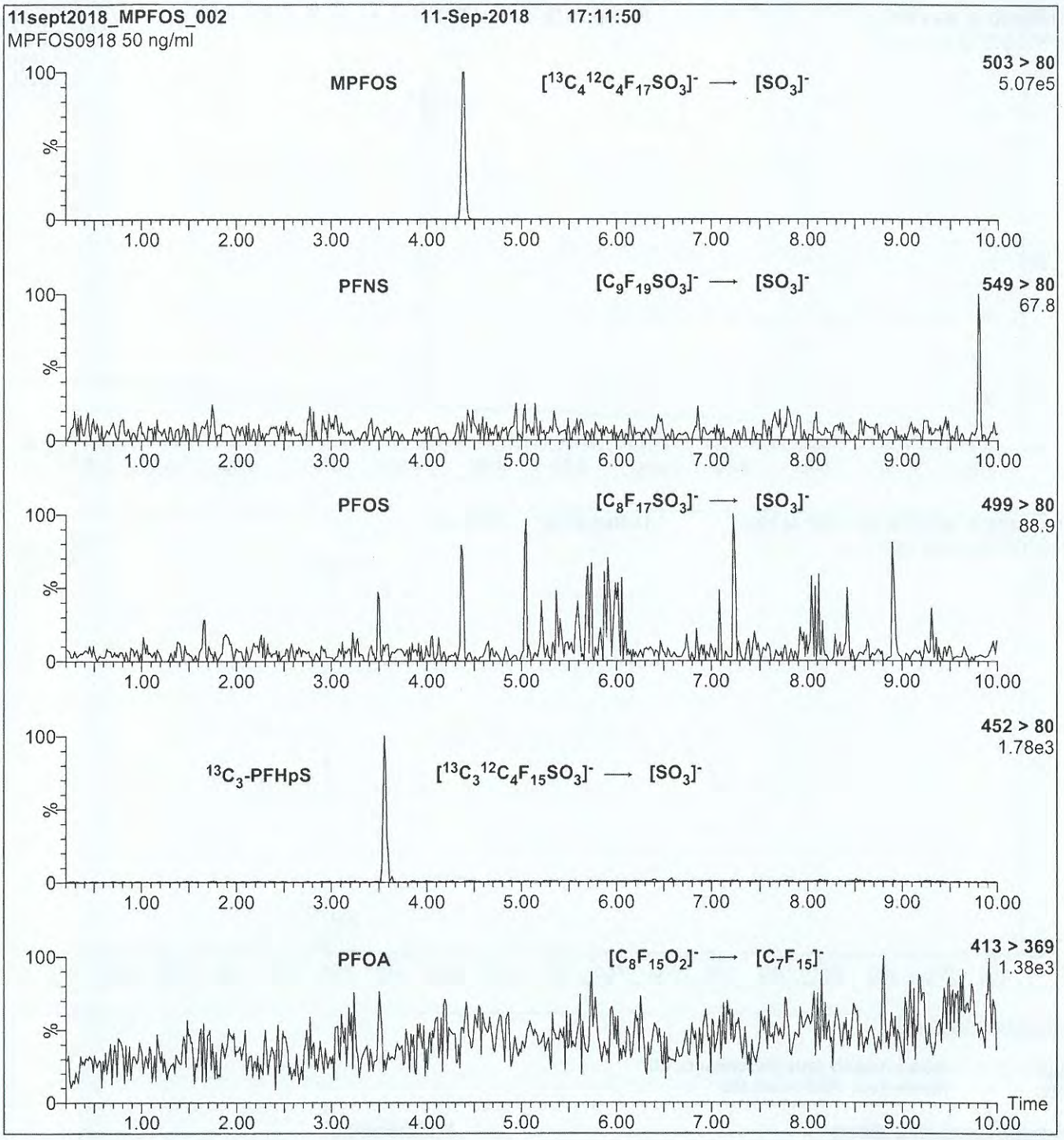
MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

1812028

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



Conditions for Figure 2:

Injection: On-column (MPFOS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 2.99e-3
Collision Energy (eV) = 42

1812029

WELLINGTON LABORATORIES

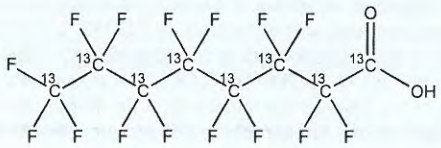
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: M8PFOA
COMPOUND: Perfluoro-n-[$^{13}C_8$]octanoic acid

LOT NUMBER: M8PFOA0618

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_8HF_{15}O_2$	**MOLECULAR WEIGHT:**	422.01
CONCENTRATION:	49 ± 2.45 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	97.9% (M8PFOA) 2.1% (MPFOA [M+4])	**ISOTOPIC PURITY:**	≥99% ^{13}C ($^{13}C_8$)
LAST TESTED: (mm/dd/yyyy)	06/29/2018		
EXPIRY DATE: (mm/dd/yyyy)	06/29/2023		
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) and ~ 1.9% of [M+4] perfluoro-n-octanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 07/03/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

1812029

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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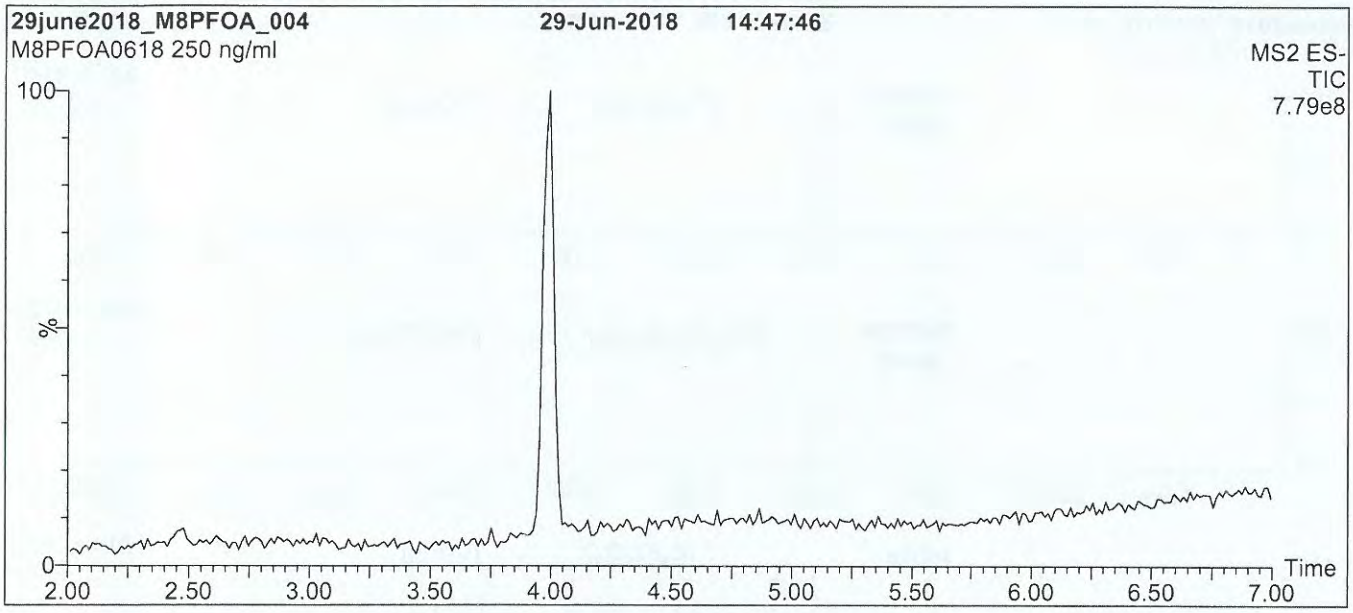
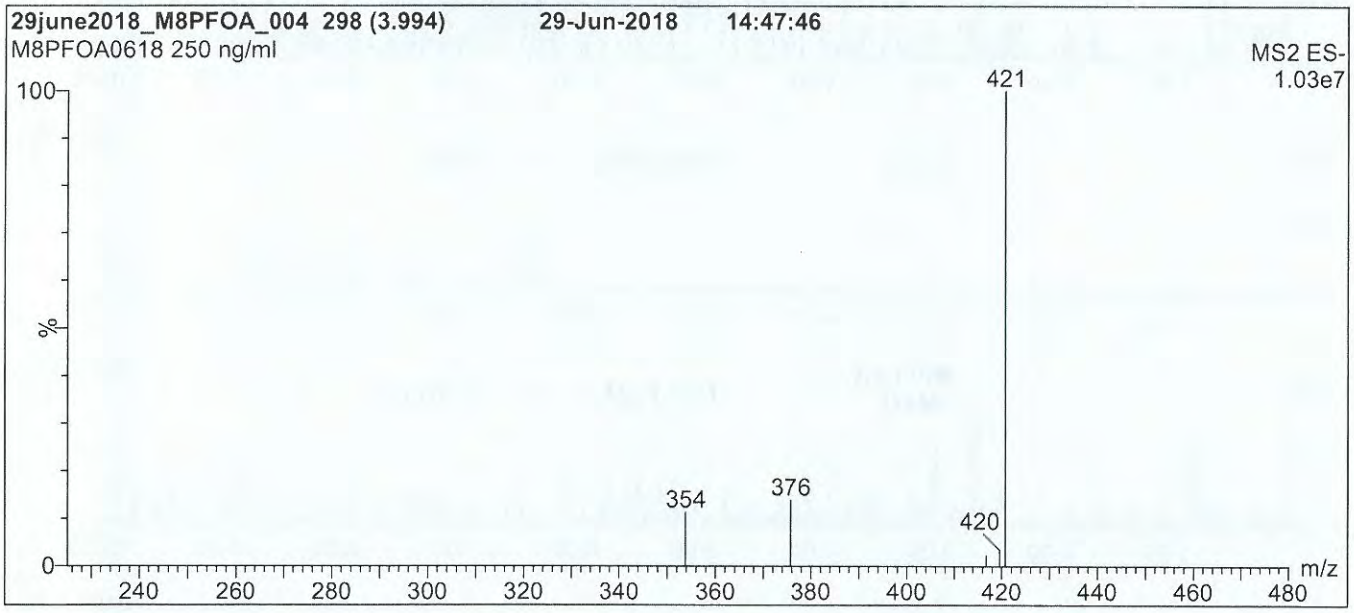
1812029

Figure 1: **M8PFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 80% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

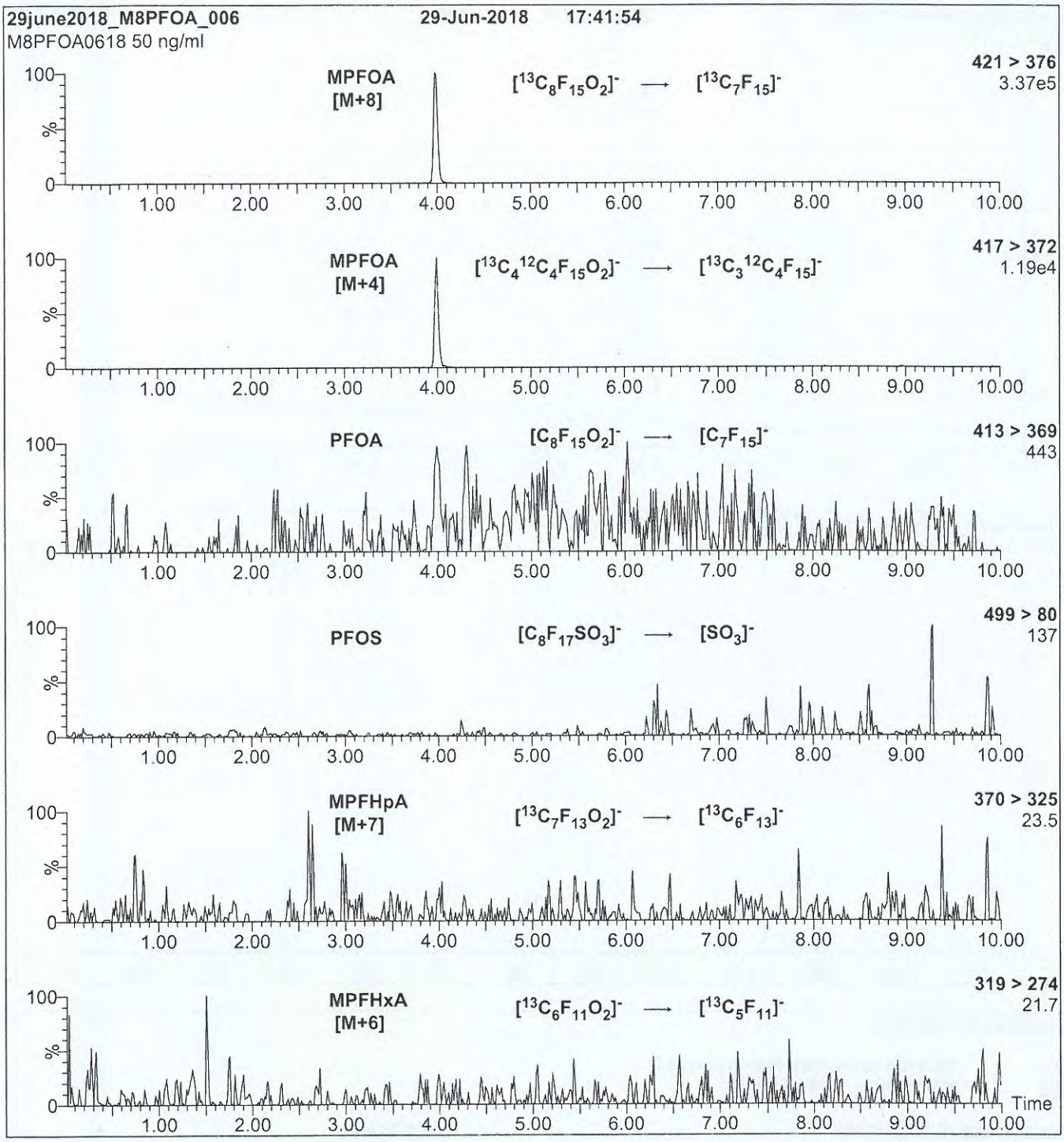
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = 14.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

1812029

Figure 2: **M8PFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M8PFOA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 8

Analytical Standard Record

Vista Analytical Laboratory

19G1702

Parent Standards used in this standard:

Standard	Description	Prepared	Prepared By	Expires	(mls)
19A2532	13C2-FOUEA	25-Jan-19	** Vendor **	14-Nov-19	1
19A2533	13C4-PFBA	25-Jan-19	** Vendor **	16-Feb-23	1
19A2534	13C6-PFDA	25-Jan-19	** Vendor **	20-Sep-23	1
19A2535	13C9-PFNA	25-Jan-19	** Vendor **	08-Sep-23	1
19A2536	13C7-PFUdA	25-Jan-19	** Vendor **	20-Sep-23	1
19A2537	13C5-PFHxA	25-Jan-19	** Vendor **	27-Sep-23	1
19A2538	18O2-PFHxS	25-Jan-19	** Vendor **	22-Mar-23	1.06
19A2539	13C4-PFOS	25-Jan-19	** Vendor **	11-Sep-23	1.05
19A2540	13C8-PFOA	25-Jan-19	** Vendor **	29-Jun-23	1.02

Description:	PFC-RS	Expires:	16-Jul-21
Standard Type:	Reagent	Prepared:	17-Jul-19
Solvent:	MeOH	Prepared By:	Brittany M. Lamb
Final Volume (mls):	40	Department:	LCMS
Vials:	1	Last Edit:	17-Jul-19 08:49 by BML

Analyte	CAS Number	Concentration	Units
18O2-PFHxS		1.25	ug/mL
13C9-PFNA		1.25	ug/mL
13C8-PFOA		1.25	ug/mL
13C7-PFUnA		1.25	ug/mL
13C6-PFDA		1.25	ug/mL
13C5-PFHxA		1.25	ug/mL
13C4-PFOS		1.25	ug/mL
13C4-PFBA		1.25	ug/mL
13C2-FOUEA		1.25	ug/mL

19A2532

WELLINGTON LABORATORIES

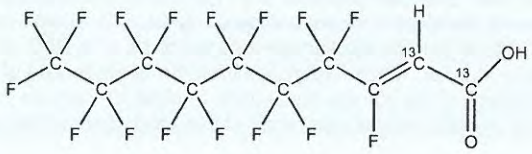
CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE: MFOUEA
COMPOUND: 2H-Perfluoro-[1,2-$^{13}C_2$]-2-decenoic acid

LOT NUMBER: MFOUEA1117

STRUCTURE:

CAS #: Not available



MOLECULAR FORMULA:	$^{13}C_2{}^{12}C_8H_2F_{16}O_2$	**MOLECULAR WEIGHT:**	460.08
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Anhydrous Isopropanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2\text{-}^{13}C_2$)
LAST TESTED: (mm/dd/yyyy)	11/14/2017		
EXPIRY DATE: (mm/dd/yyyy)	11/14/2019		
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.
- Dilution of this standard in methanol may lead to the formation of 2H-3-methoxy-perfluoro-[1,2-$^{13}C_2$]-2-decenoic acid. This reaction can be catalyzed by the presence of acid or base. All dilutions should be routinely checked for degradation.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 11/15/2017 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2532

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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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 calibrated NIST and/or NRC traceable external weights. All volumetric glassware used is calibrated, 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).

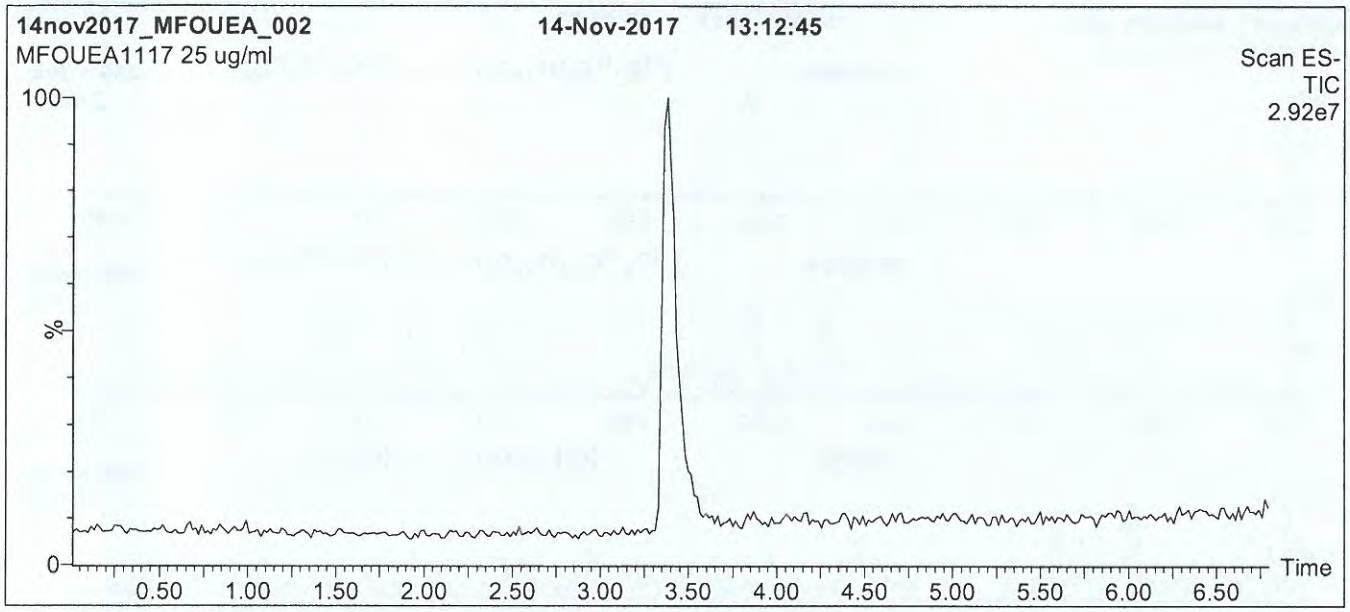
CALA Testing Accreditation No. A 1226

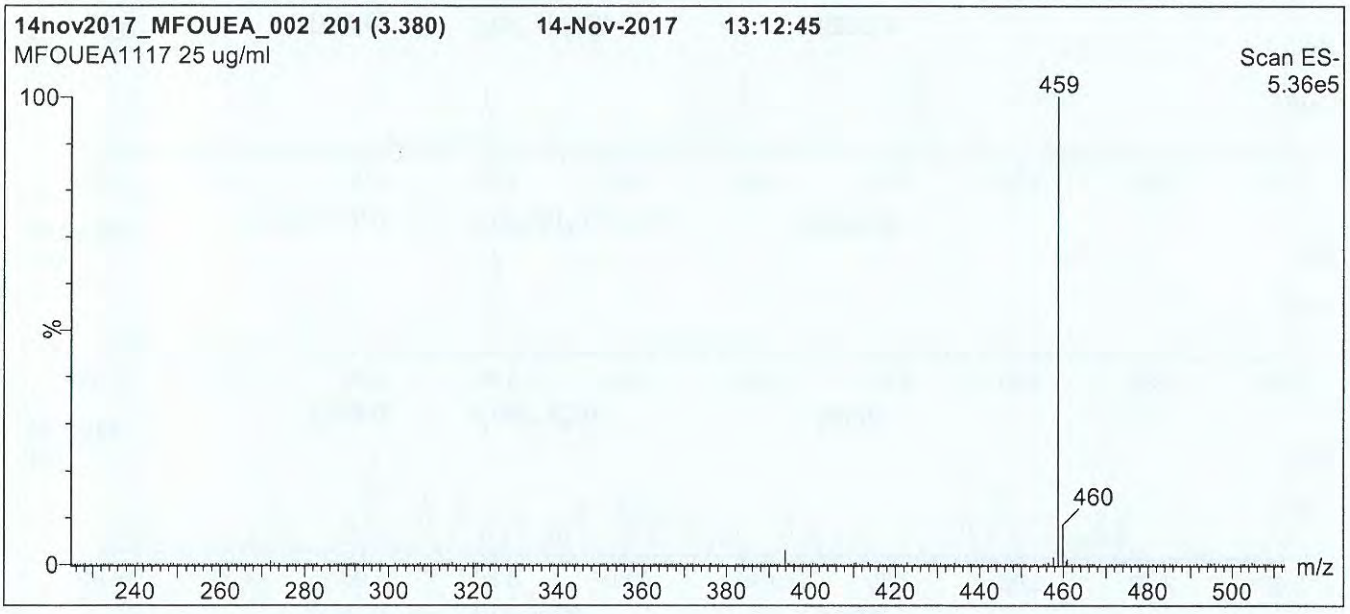
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

19A2532

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





Conditions for Figure 1:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 55% (80:20 MeOH:ACN) / 45% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7.5 min and hold
for 1.5 min before returning to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

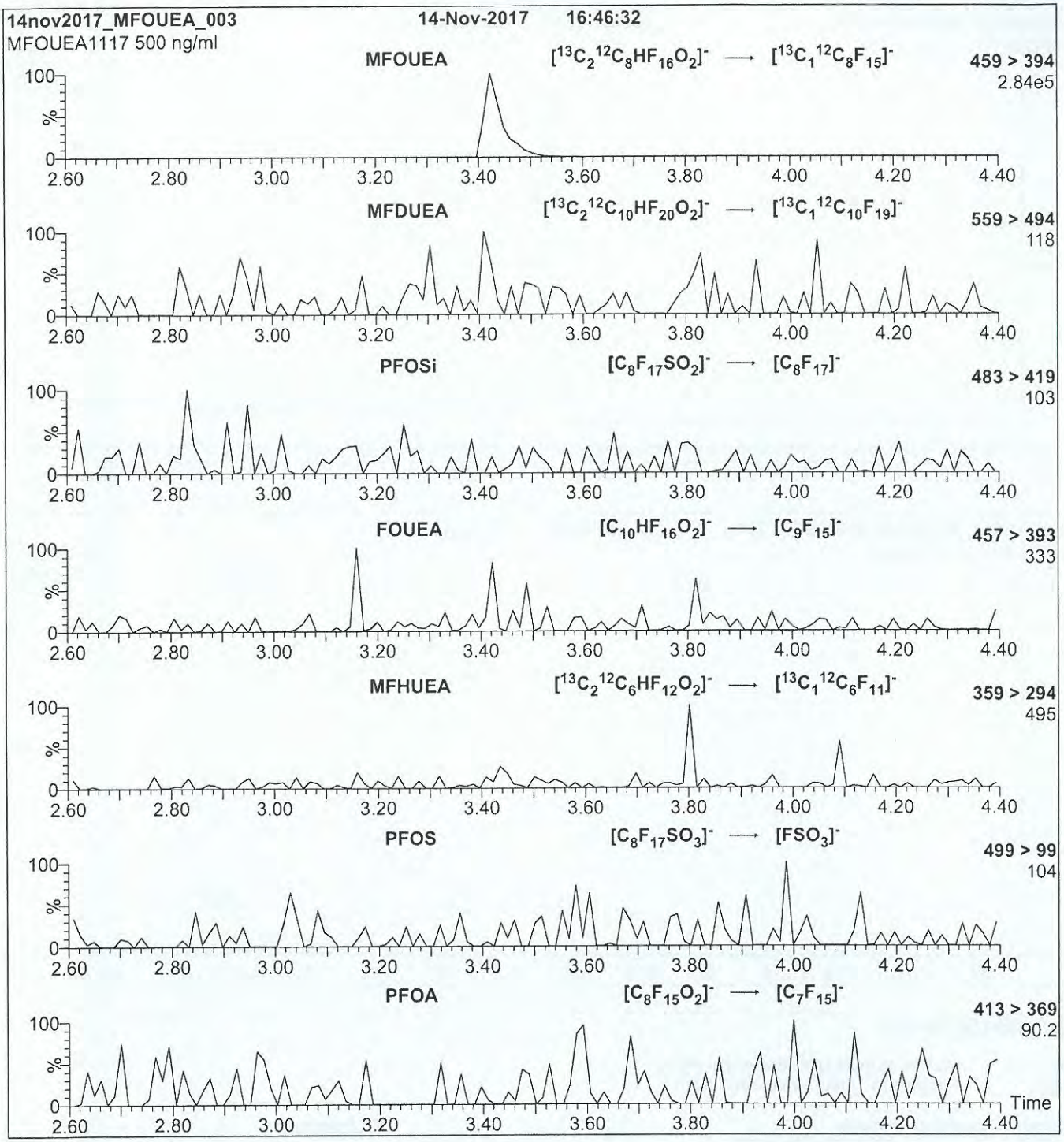
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 14.00
Cone Gas Flow (l/hr) = 60
Desolvation Gas Flow (l/hr) = 750

19A2532

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



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MFOUEA)

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

Flow: 300 µl/min

MS Parameters

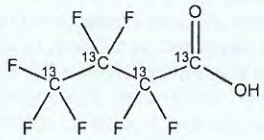
Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 21

19A2533

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	MPFBA	**LOT NUMBER:**	MPFBA0218
COMPOUND:	Perfluoro-n-[1,2,3,4-$^{13}C_4$]butanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_4HF_7O_2$	**MOLECULAR WEIGHT:**	218.01
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4$-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	02/16/2018		
EXPIRY DATE: (mm/dd/yyyy)	02/16/2023		
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:** 02/22/2018 (mm/dd/yyyy)

B.G. Chittim, General Manager

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

19A2533

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.

HANDLING:

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:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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 calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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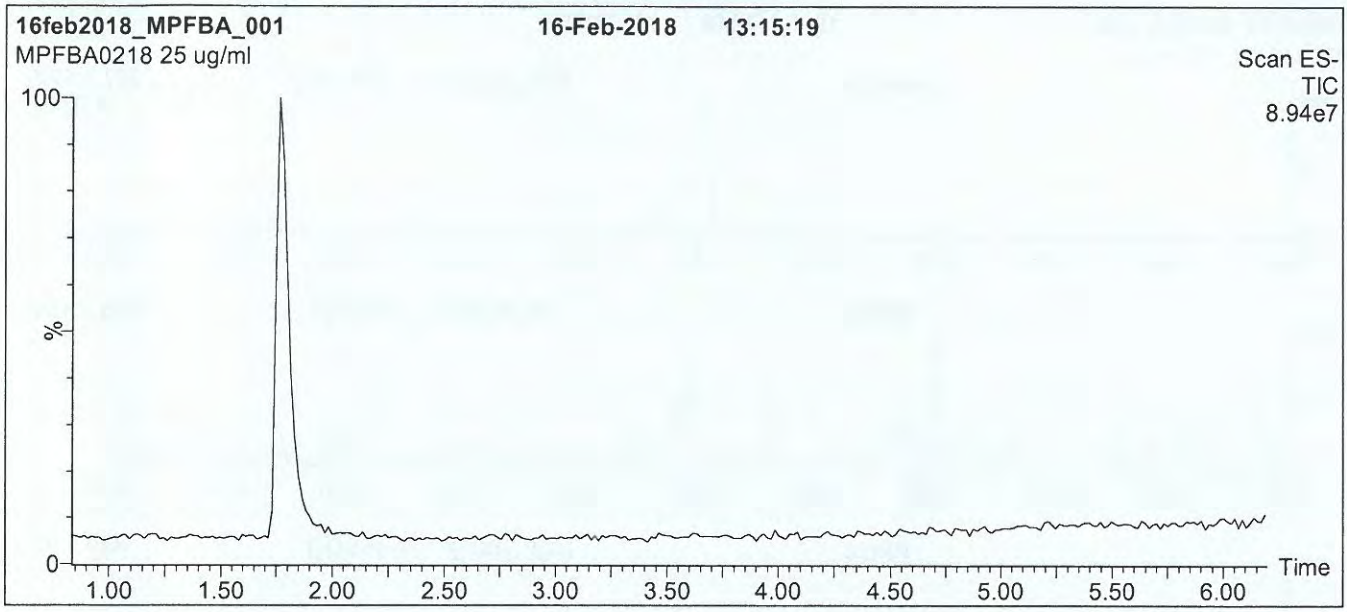
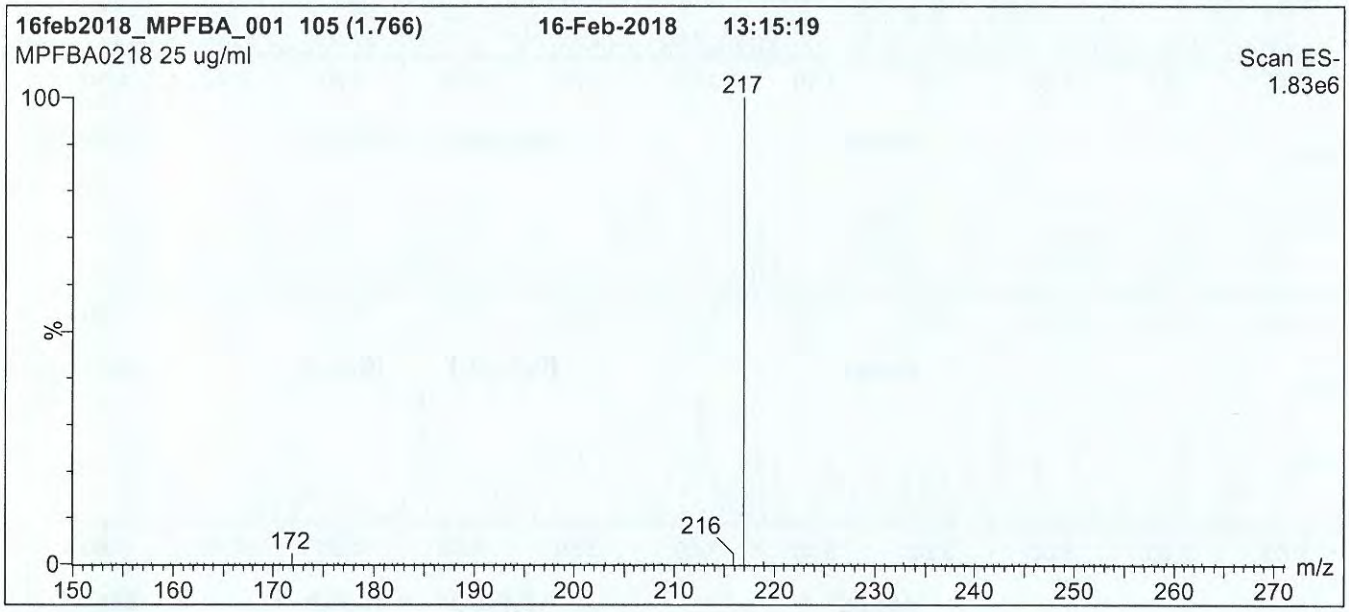
19A2533

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





Conditions for Figure 1:

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

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 30% (80:20 MeOH:ACN) / 70% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 7 min and hold for 1.5 min
before returning to initial conditions in 0.5 min.
Time: 10 min

Flow: 300 µl/min

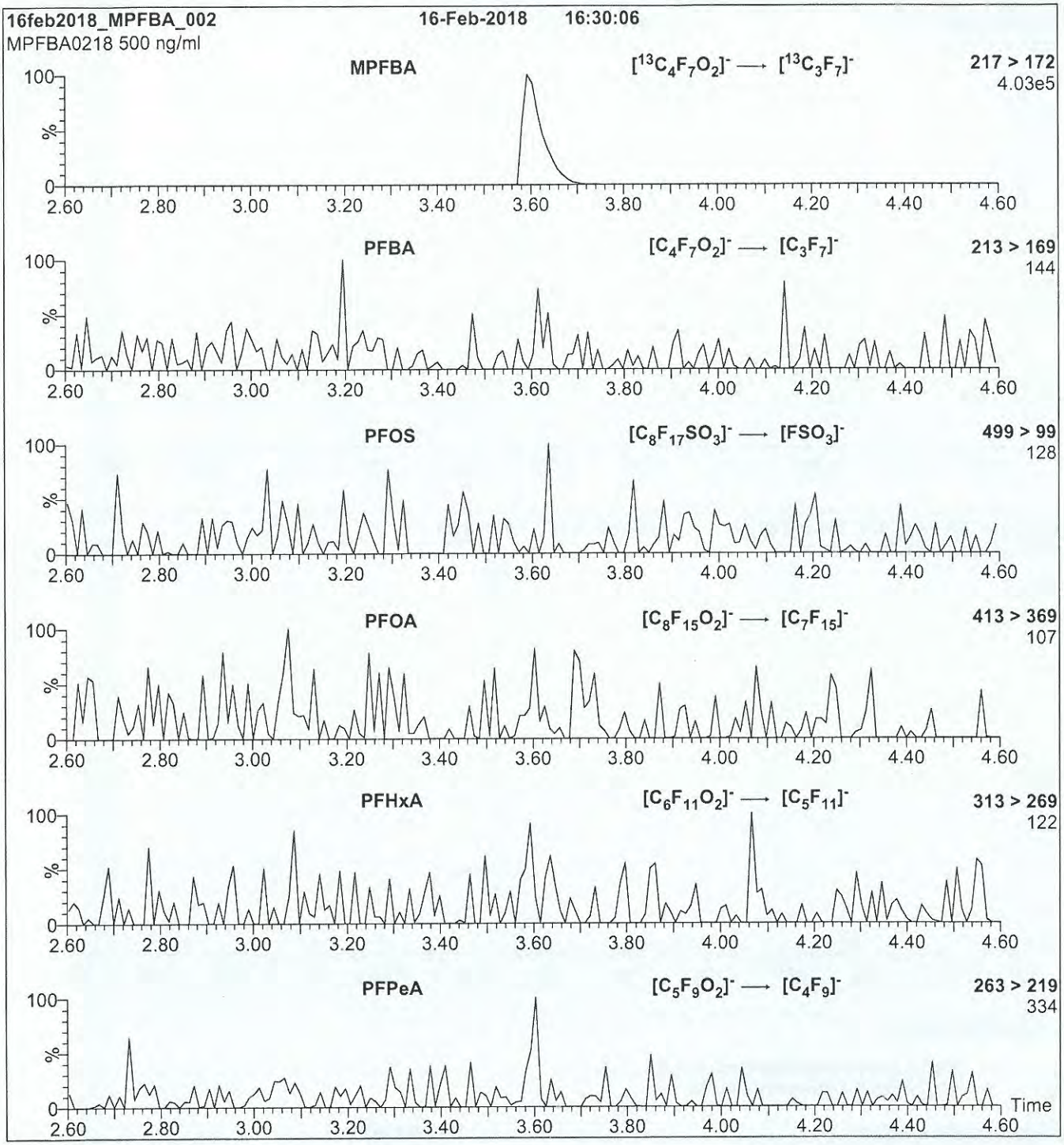
MS Parameters

Experiment: Full Scan (150 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 3.00
Cone Voltage (V) = 10.00
Cone Gas Flow (l/hr) = 100
Desolvation Gas Flow (l/hr) = 750

19A2533

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



Conditions for Figure 2:

Injection: Direct loop injection
10 µl (500 ng/ml MPFBA)

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

Flow: 300 µl/min

MS Parameters

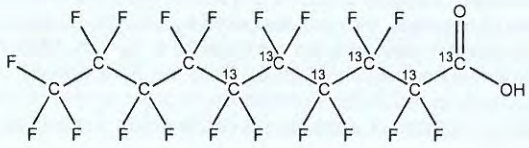
Collision Gas (mbar) = 3.31e-3
Collision Energy (eV) = 10

19A2534

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	M6PFDA	**LOT NUMBER:**	M6PFDA0918
COMPOUND:	Perfluoro-n-[1,2,3,4,5,6-$^{13}C_6$]decanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_6{}^{12}C_4HF_{19}O_2$	**MOLECULAR WEIGHT:**	520.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C (1,2,3,4,5,6-$^{13}C_6$)
LAST TESTED: (mm/dd/yyyy)	09/20/2018		
EXPIRY DATE: (mm/dd/yyyy)	09/20/2023		
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:** 10/03/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2534

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.

HANDLING:

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:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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

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 calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

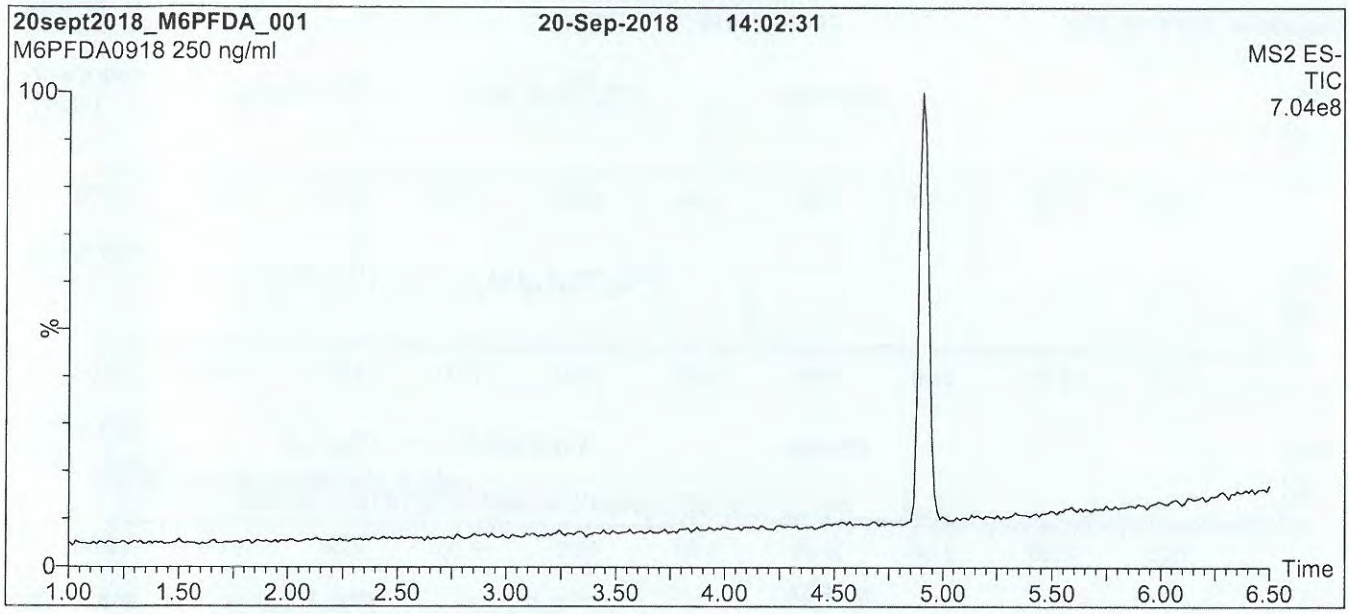
CALA Testing Accreditation No. A1226

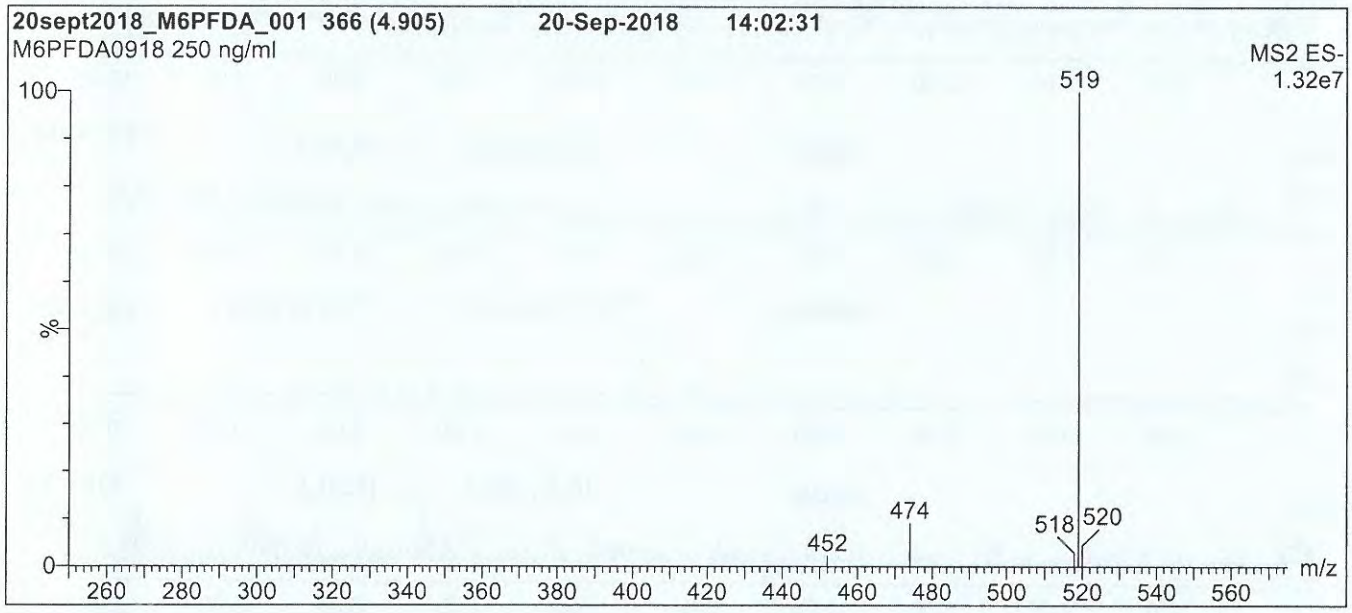
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

19A2534

Figure 1: **M6PFDA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

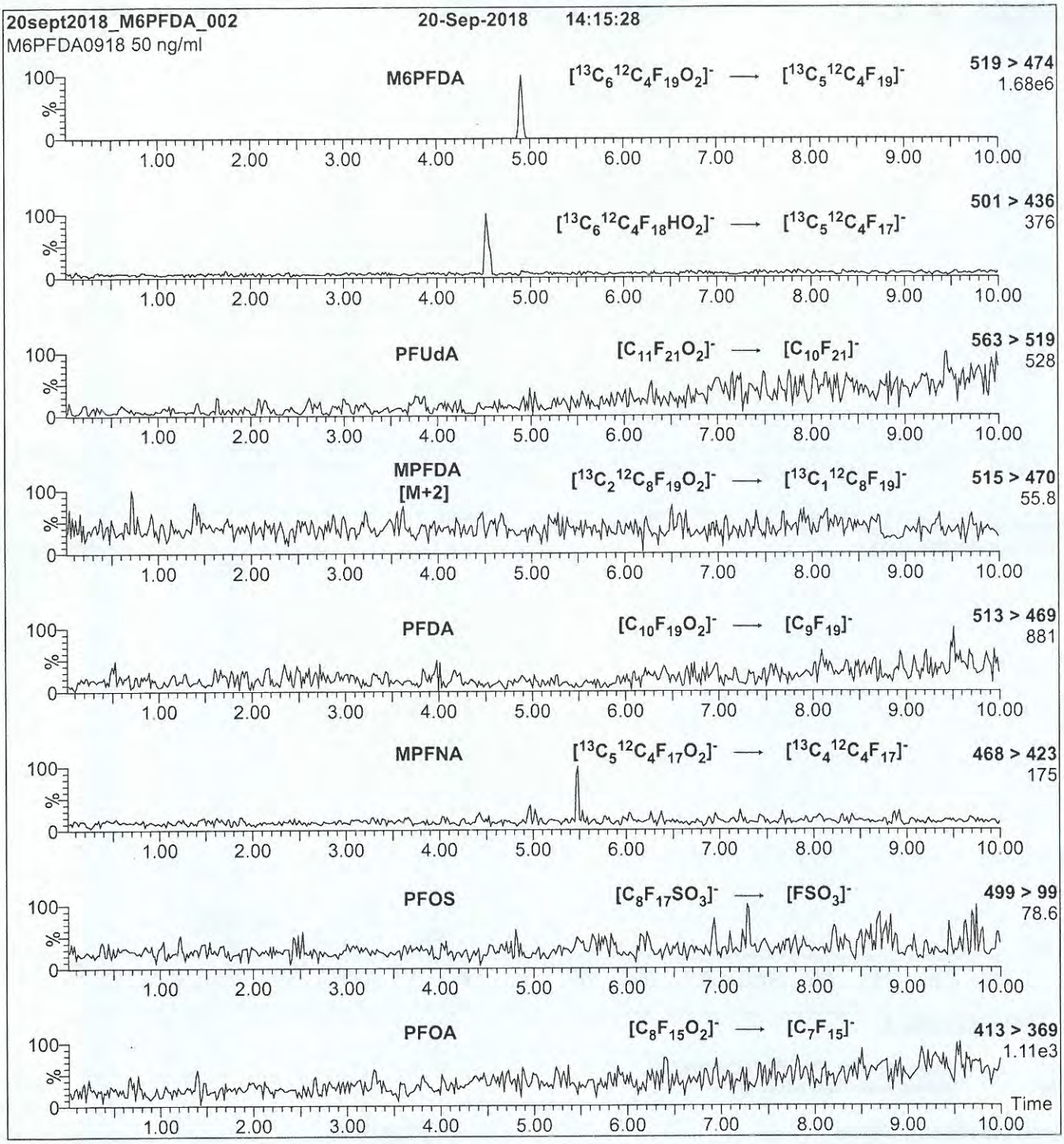
MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

19A2534

Figure 2: **M6PFDA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M6PFDA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

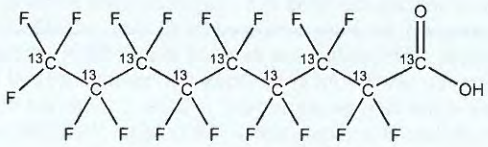
Collision Gas (mbar) = 2.97e-3
Collision Energy (eV) = 10

19A2535

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M9PFNA	**LOT NUMBER:**	M9PFNA0918
COMPOUND:	Perfluoro-n-[$^{13}C_9$]nonanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_9HF_{17}O_2$	**MOLECULAR WEIGHT:**	473.01
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($^{13}C_9$)
LAST TESTED: (mm/dd/yyyy)	09/08/2018		
EXPIRY DATE: (mm/dd/yyyy)	09/08/2023		
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 ~ 1.0% of $^{13}C_5{}^{12}C_4HF_{17}O_2$ (MPFNA).

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 09/19/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2535

INTENDED USE:

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HANDLING:

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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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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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 calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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:

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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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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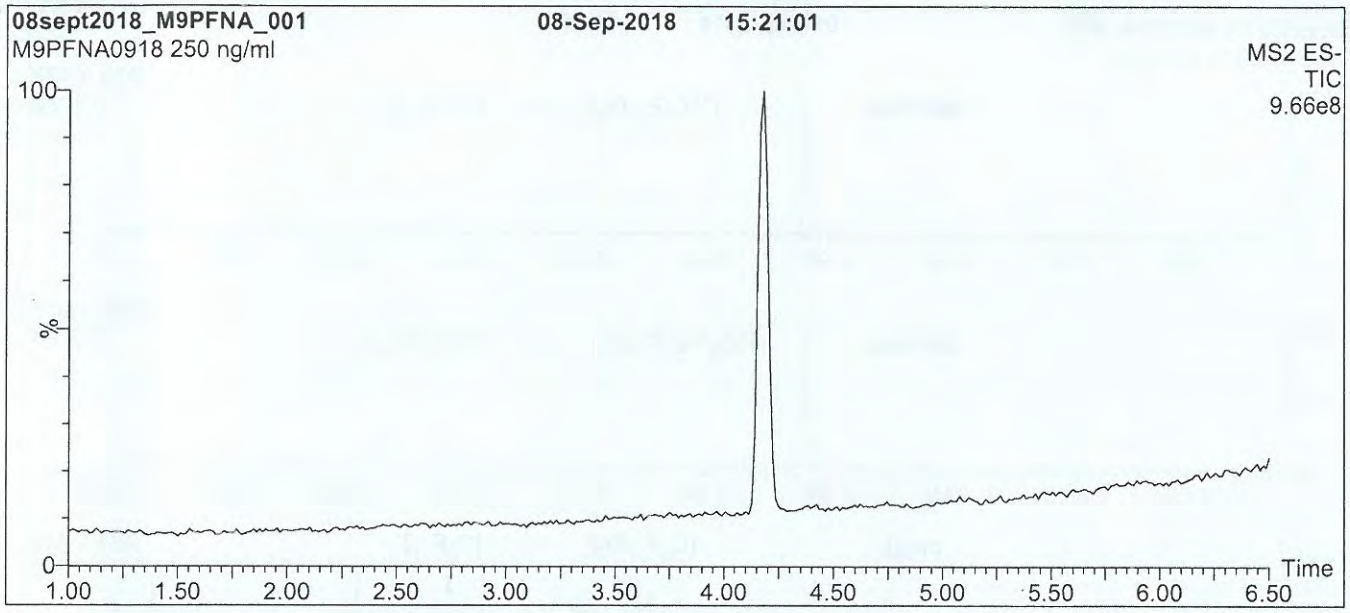
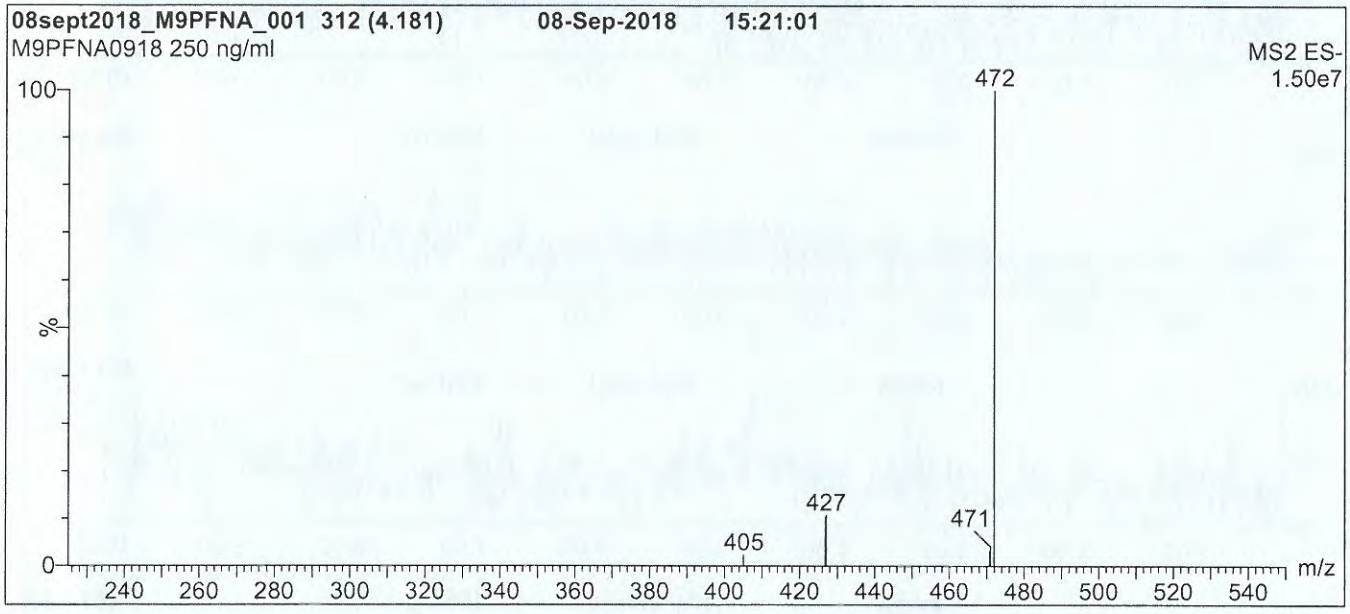
19A2535

Figure 1: **M9PFNA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

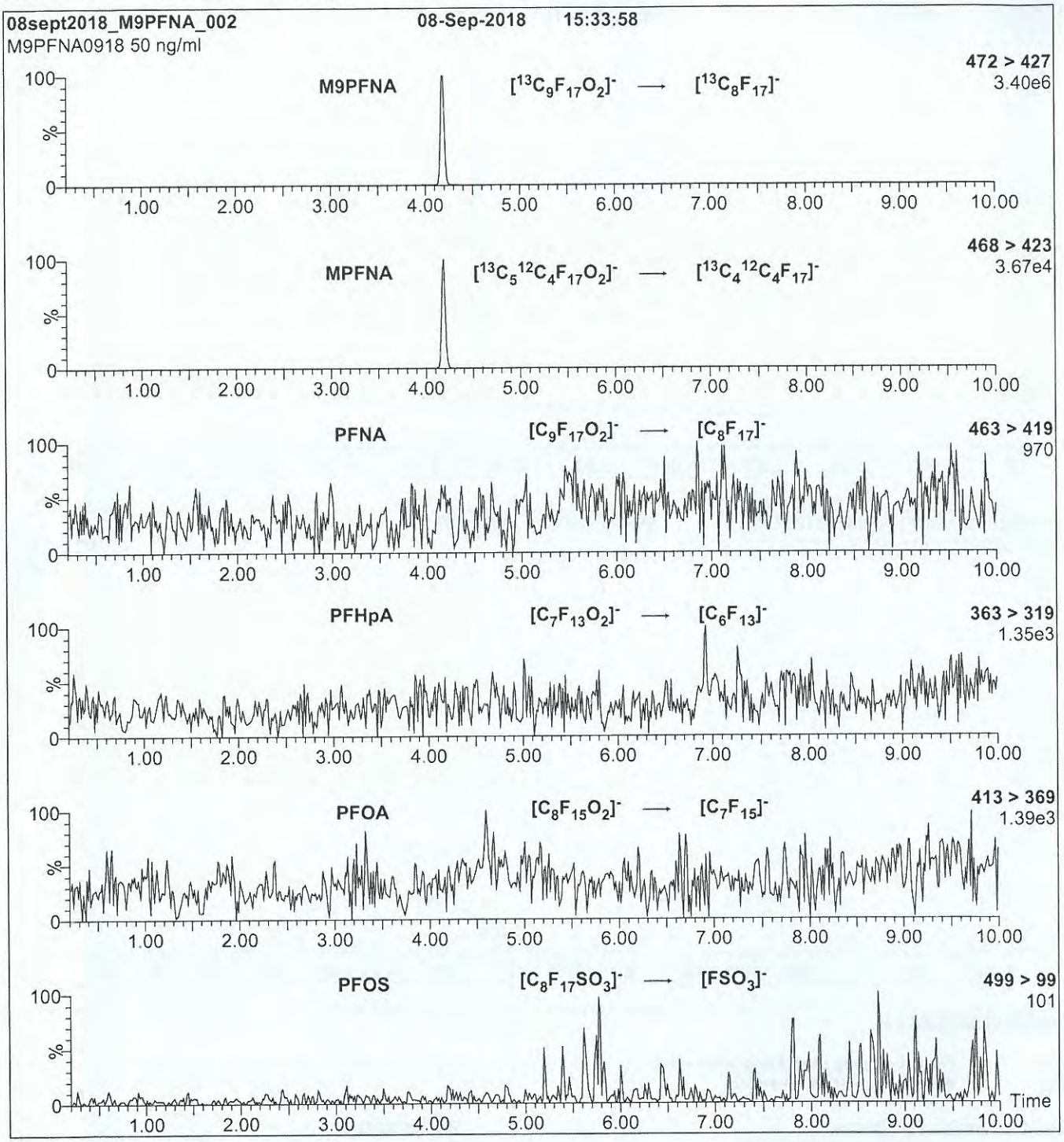
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

19A2535

Figure 2: **M9PFNA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M9PFNA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

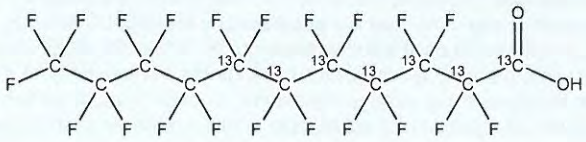
Collision Gas (mbar) = 2.95e-3
Collision Energy (eV) = 10

19A2536

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	M7PFUdA	**LOT NUMBER:**	M7PFUdA0918
COMPOUND:	Perfluoro-n-[1,2,3,4,5,6,7-$^{13}C_7$]undecanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_7{}^{12}C_4HF_{21}O_2$	**MOLECULAR WEIGHT:**	571.04
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C
LAST TESTED: (mm/dd/yyyy)	09/20/2018		(1,2,3,4,5,6,7-$^{13}C_7$)
EXPIRY DATE: (mm/dd/yyyy)	09/20/2023		
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:** 09/27/2018 (mm/dd/yyyy)

B.G. Chittim, General Manager

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

19A2536

INTENDED USE:

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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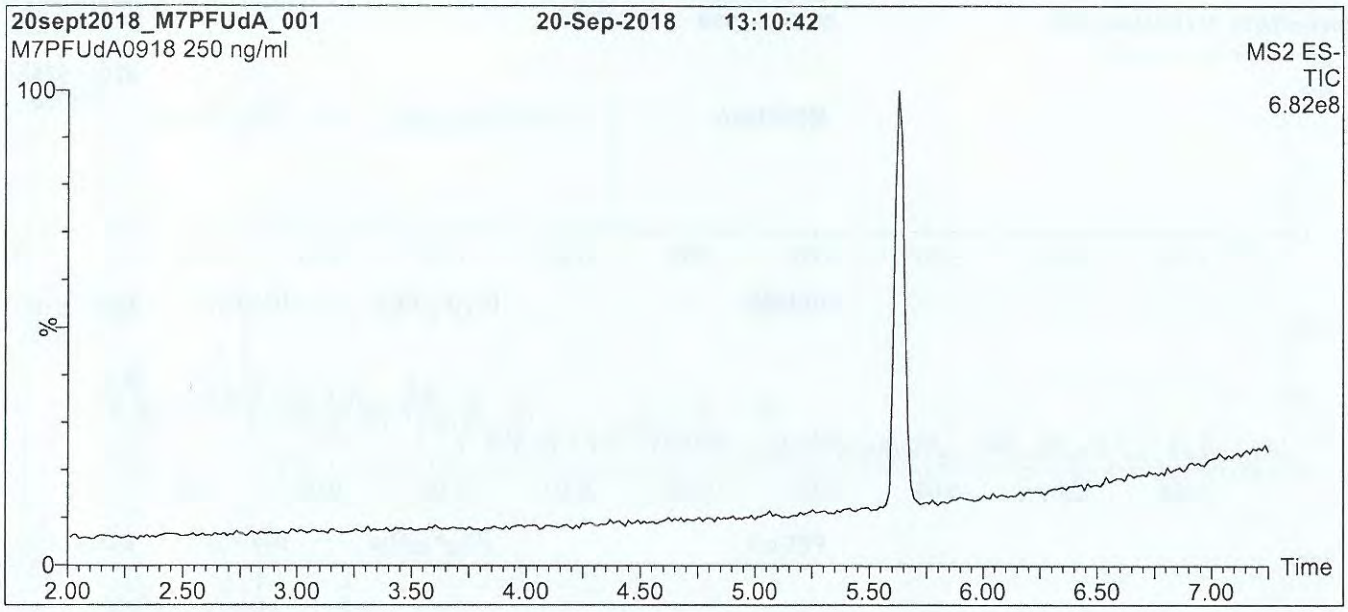
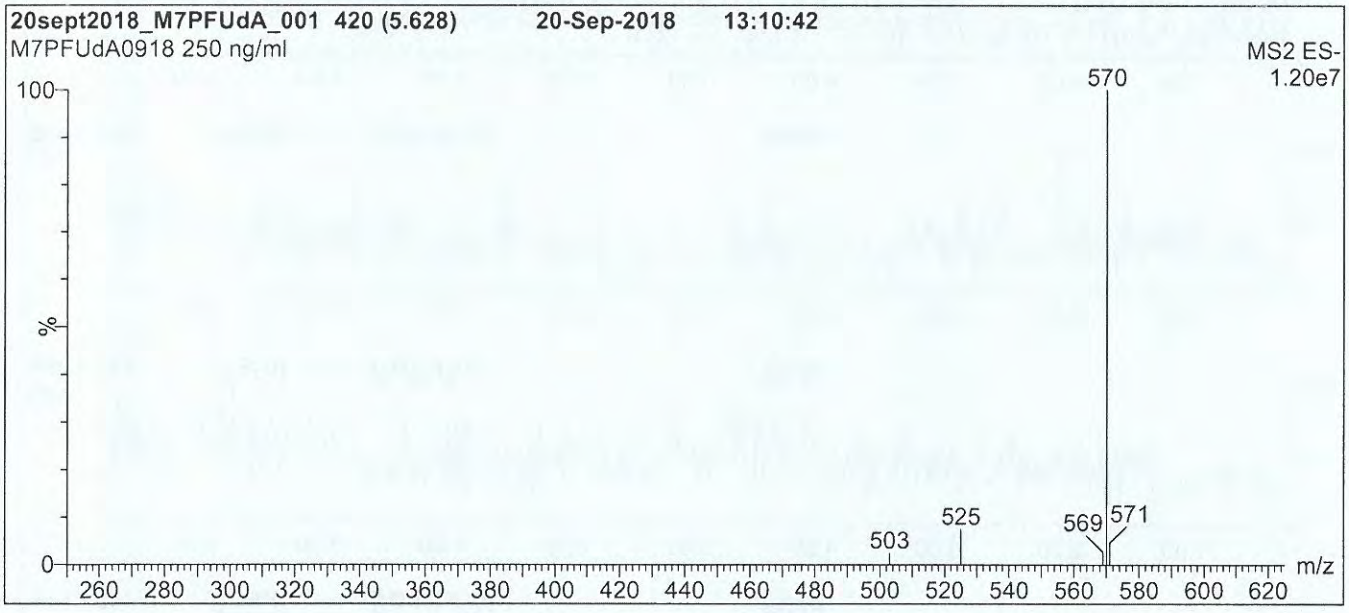
19A2536

Figure 1: **M7PFUdA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

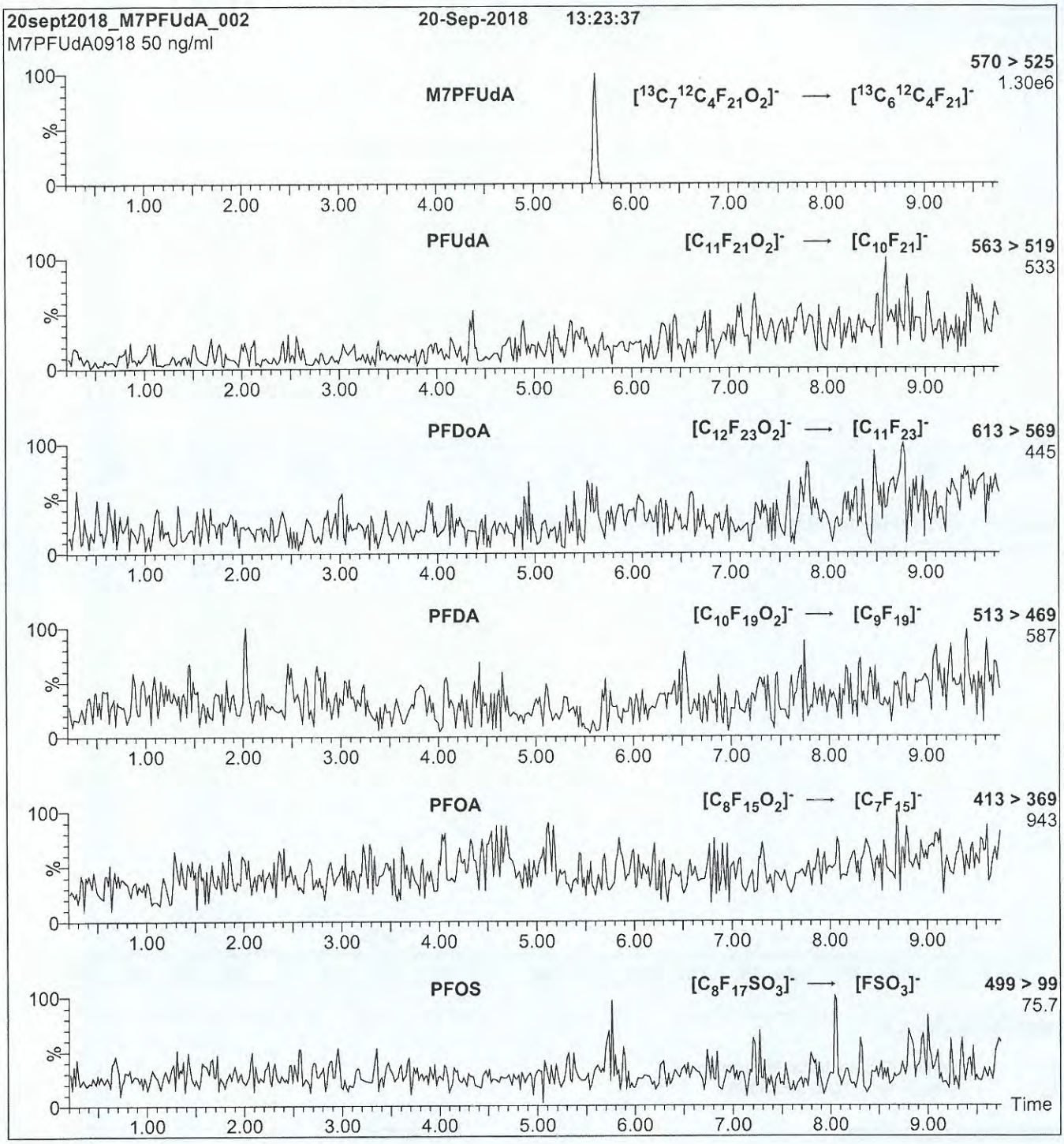
MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

19A2536

Figure 2: **M7PFUdA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M7PFUdA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

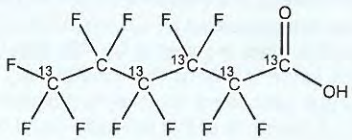
Collision Gas (mbar) = 2.97e-3
Collision Energy (eV) = 12

19A2537

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	M5PFHxA	**LOT NUMBER:**	M5PFHxA0918
COMPOUND:	Perfluoro-n-[1,2,3,4,6-$^{13}C_5$]hexanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_5{}^{12}C_1HF_{11}O_2$	**MOLECULAR WEIGHT:**	319.02
CONCENTRATION:	50 ± 2.5 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4,6\text{-}^{13}C_5$)
LAST TESTED: (mm/dd/yyyy)	09/27/2018		
EXPIRY DATE: (mm/dd/yyyy)	09/27/2023		
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:** 10/01/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2537

INTENDED USE:

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HANDLING:

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CALA Testing Accreditation No. A1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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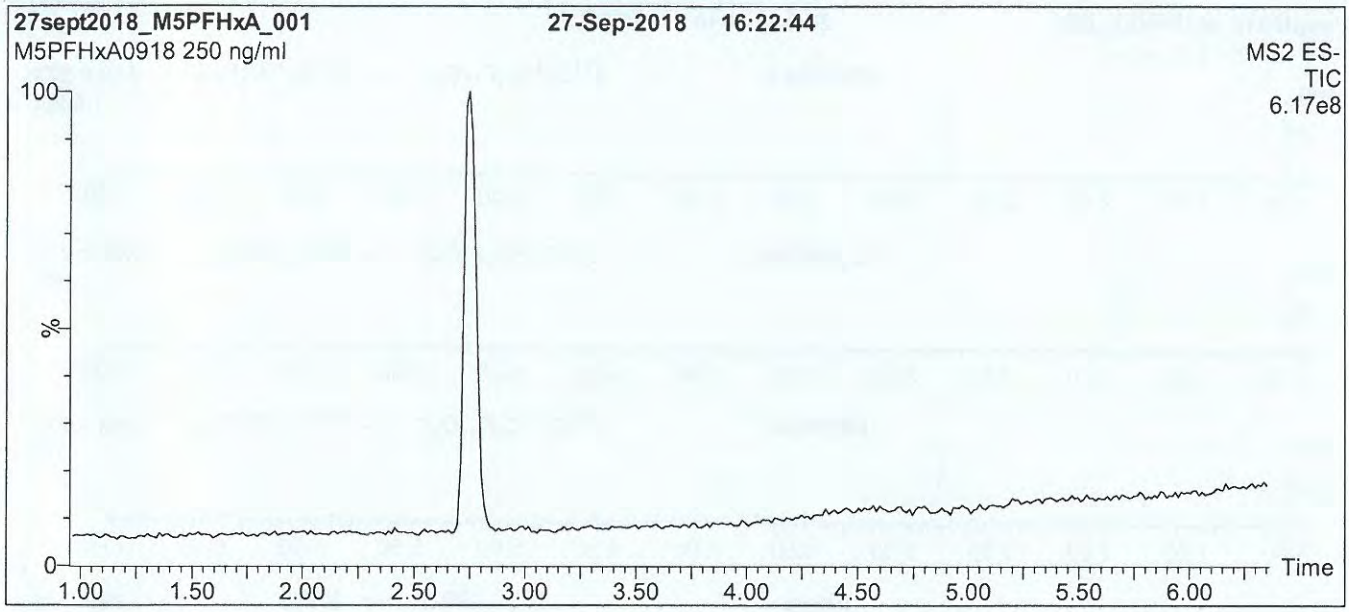
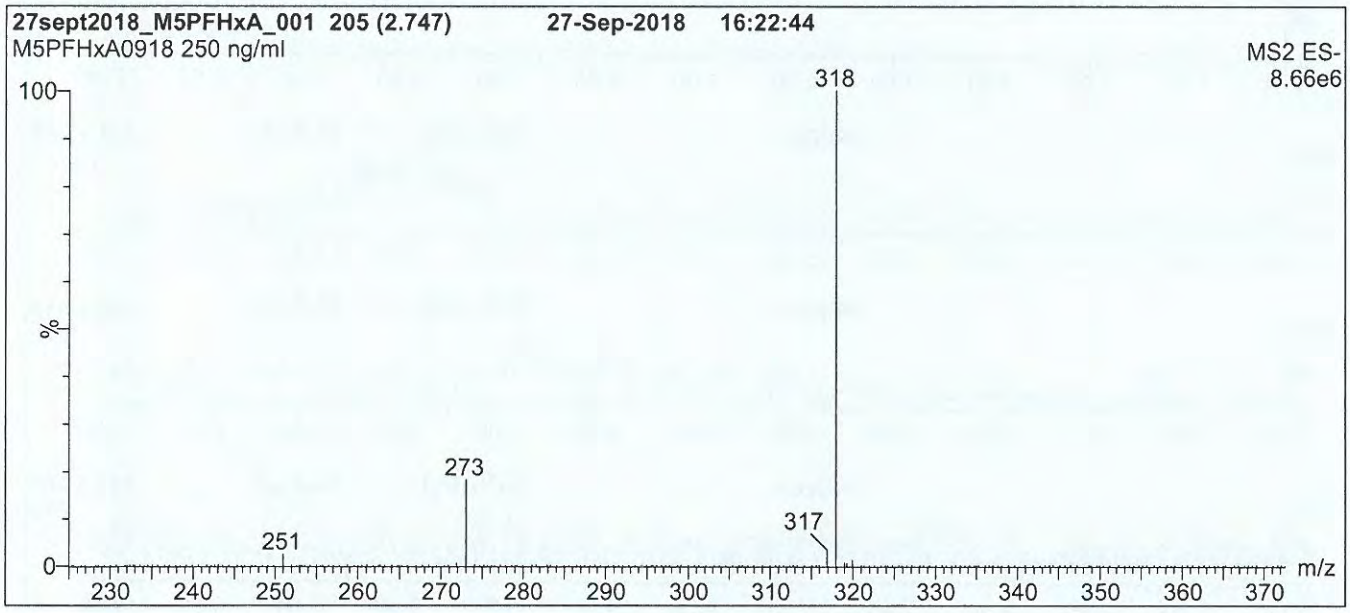
19A2537

Figure 1: **M5PFHxA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 40% (80:20 MeOH:ACN) / 60% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for 2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

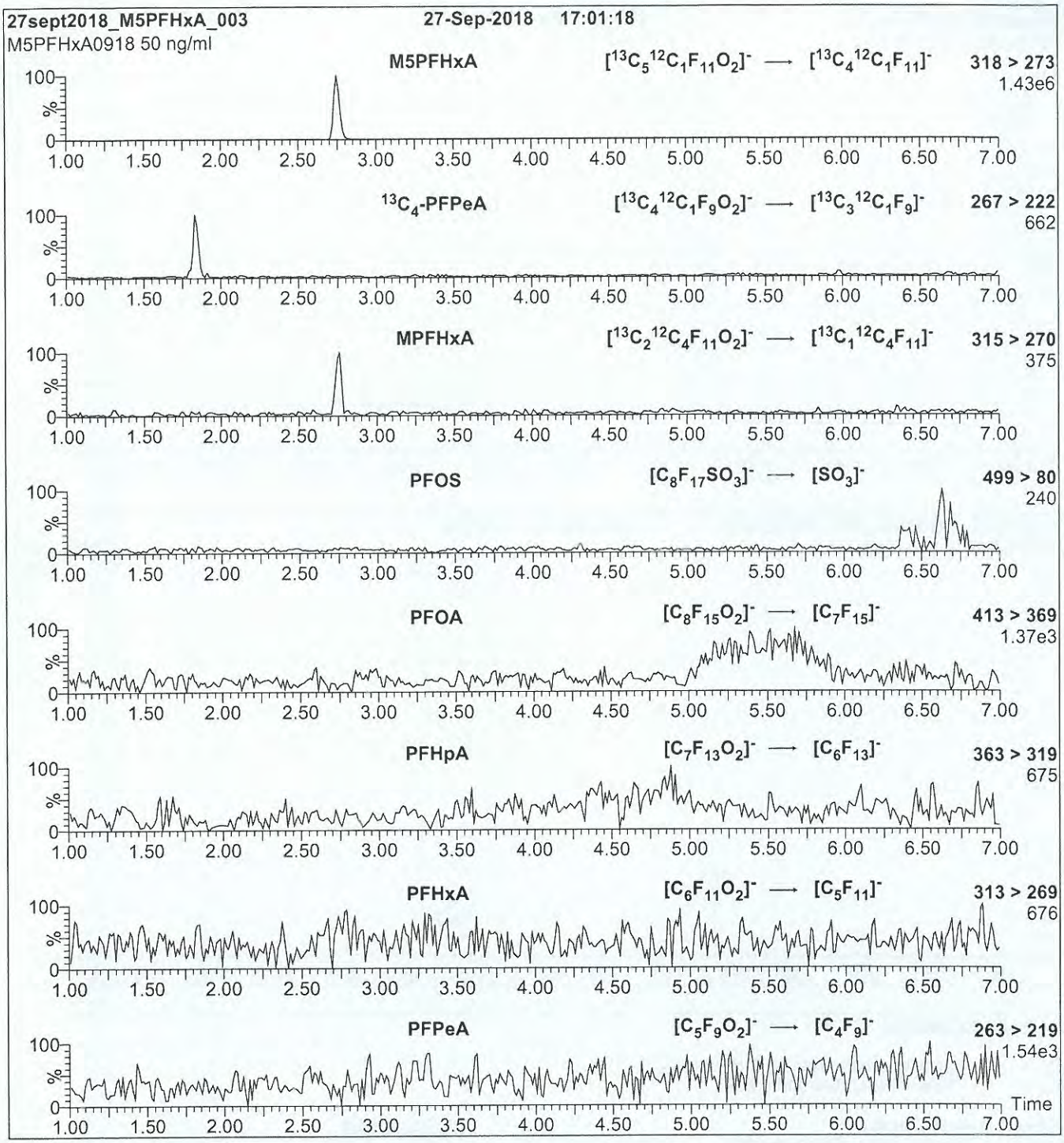
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

19A2537

Figure 2: **M5PFHxA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M5PFHxA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

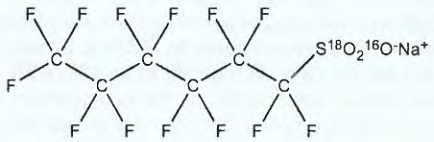
Collision Gas (mbar) = 2.97e-3
Collision Energy (eV) = 8

19A2538

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS DOCUMENTATION

PRODUCT CODE:	MPFHxS	**LOT NUMBER:**	MPFHxS0318
COMPOUND:	Sodium perfluoro-1-hexane[$^{18}O_2$]sulfonate		
STRUCTURE:		**CAS #:**	1585941-14-5



MOLECULAR FORMULA:	$C_6F_{13}S^{18}O_2{}^{16}ONa$	**MOLECULAR WEIGHT:**	426.10
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.3 ± 2.4 µg/ml (MPFHxS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	>94% ($^{18}O_2$)
LAST TESTED: (mm/dd/yyyy)	03/22/2018		
EXPIRY DATE: (mm/dd/yyyy)	03/22/2023		
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.
- The response factor for MPFHxS ($C_6F_{13}S^{18}O_2{}^{16}O^-$) has been observed to be up to 10% lower than for PFHxS ($C_6F_{13}S^{16}O_3^-$) when both compounds are injected together. This difference may vary between instruments.
- Contains ~ 1.0% of sodium perfluoro-1-octane[$^{18}O_2$]sulfonate ($^{18}O_2$-PFOS) and ~ 0.3% of sodium perfluoro-1-heptane[$^{18}O_2$]sulfonate ($^{18}O_2$-PFHpS).
- Due to the isotopic purity of the starting material ($^{18}O_2$ >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: _____ **Date:** 06/07/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

Wellington Laboratories Inc., 345 Southgate Dr. Guelph ON N1G 3M5 CANADA
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19A2538

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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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All reference standard solutions are traceable to specific crystalline lots. The microbalances used for solution preparation are regularly calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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 17034 by ANSI-ASQ National Accreditation Board (ANAB; AR-1523).

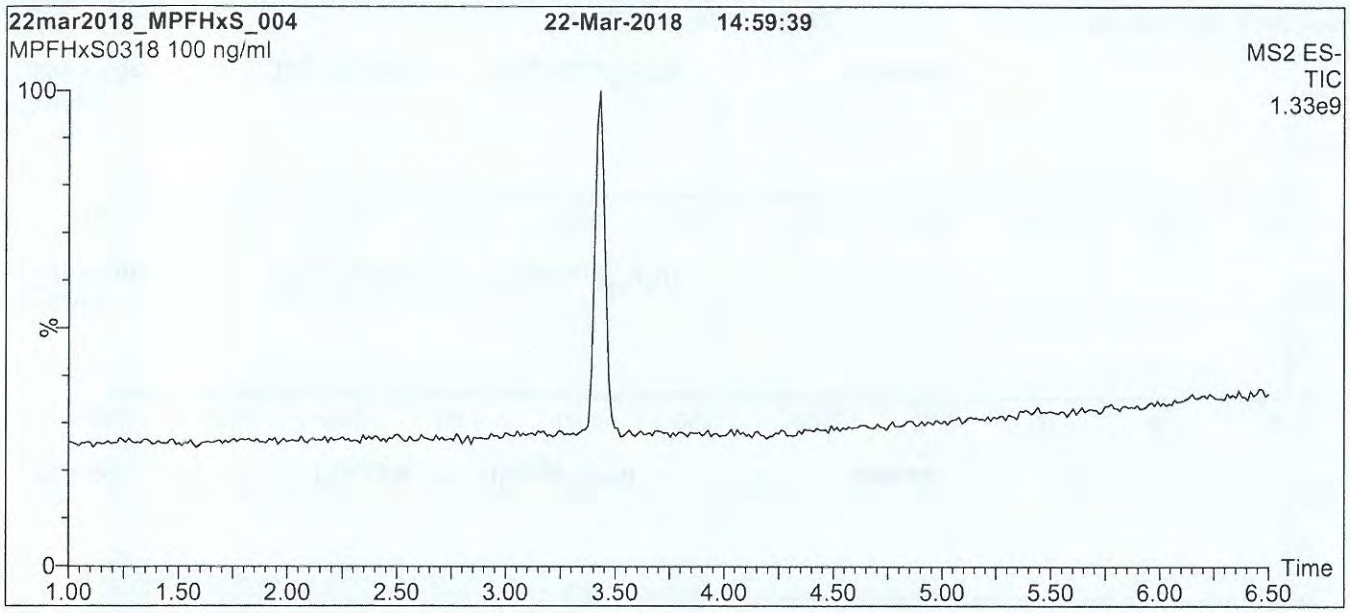
CALA Testing Accreditation No. A1226

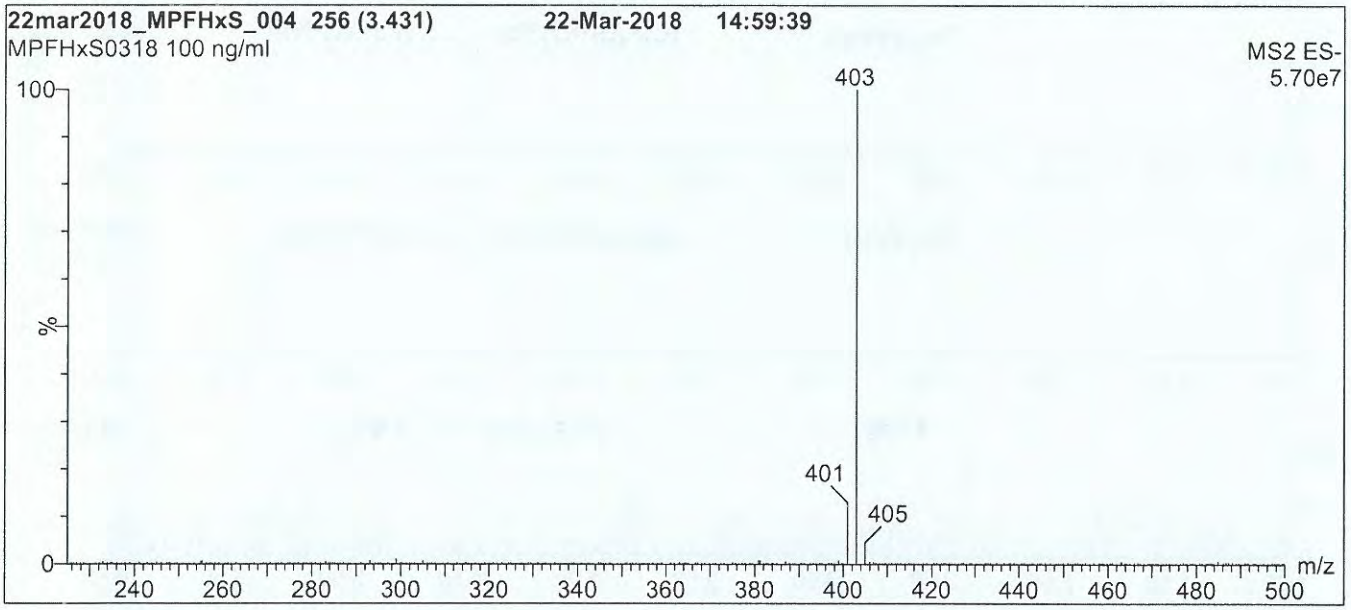
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

19A2538

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





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 80% organic over 7 min and hold for 3 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

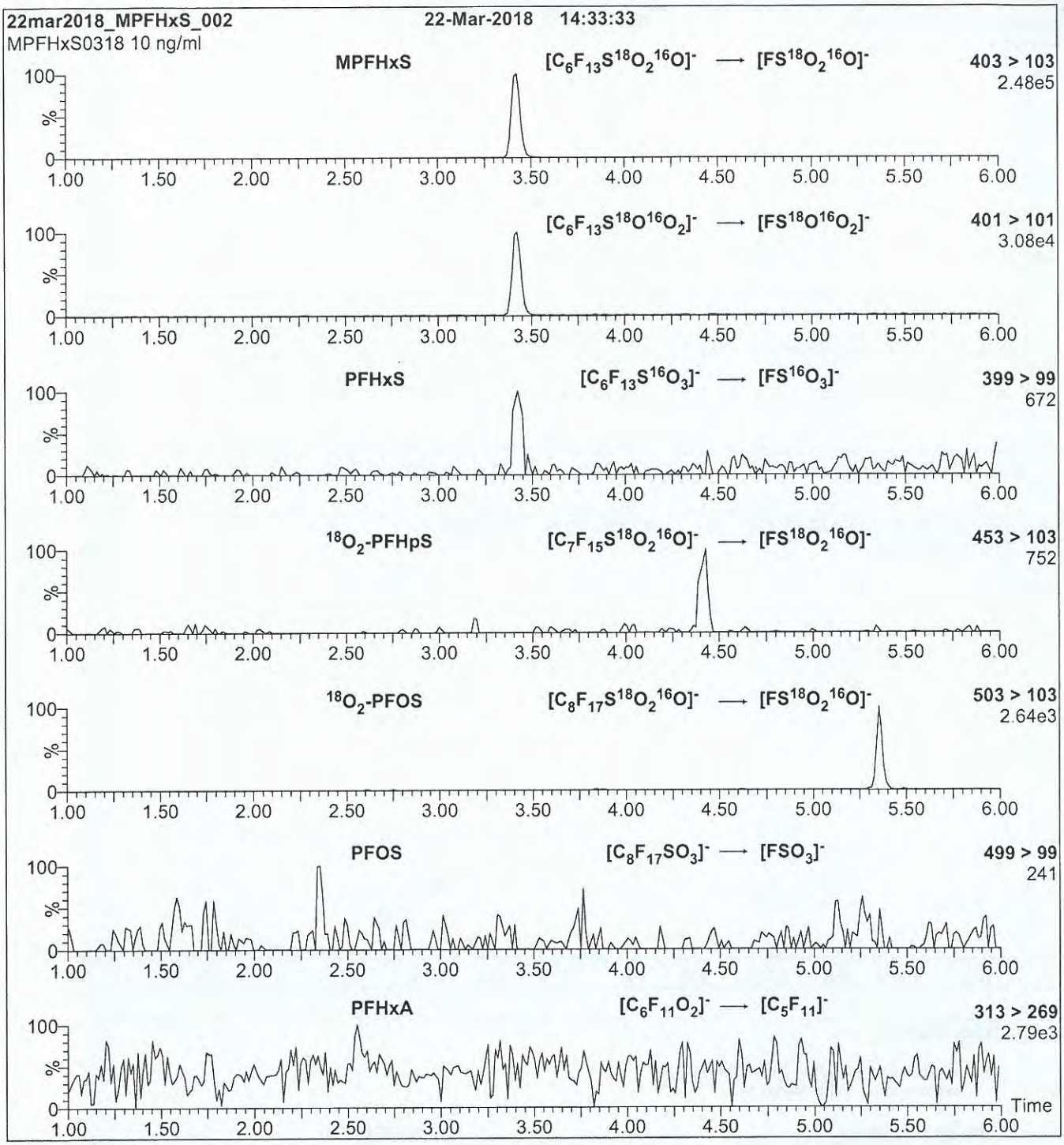
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = 5.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2538

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



Conditions for Figure 2:

Injection: On-column (MPFHxS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.64e-3

Collision Energy (eV) = 32

19A2539

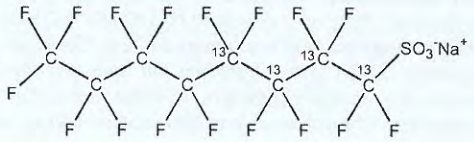
WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE: MPFOS **LOT NUMBER:** MPFOS0918

COMPOUND: Sodium perfluoro-1-[1,2,3,4-$^{13}C_4$]octanesulfonate

STRUCTURE: **CAS #:** Not available



MOLECULAR FORMULA:	$^{13}C_4{}^{12}C_4F_{17}SO_3Na$	**MOLECULAR WEIGHT:**	526.08
CONCENTRATION:	50.0 ± 2.5 µg/ml (Na salt) 47.8 ± 2.4 µg/ml (MPFOS anion)	**SOLVENT(S):**	Methanol
CHEMICAL PURITY:	>98%	**ISOTOPIC PURITY:**	≥99% ^{13}C ($1,2,3,4$-$^{13}C_4$)
LAST TESTED: (mm/dd/yyyy)	09/11/2018		
EXPIRY DATE: (mm/dd/yyyy)	09/11/2023		
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 ~ 0.3% Sodium perfluoro-1-[1,2,3-$^{13}C_3$]heptanesulfonate.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 09/14/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2539

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.

HANDLING:

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:

Our products are synthesized using single-product unambiguous routes whenever possible. 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. In order to maintain the integrity of the assigned value(s), and associated uncertainty, the dilution or injection of a subsample of this product should be performed using calibrated measuring equipment.

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 $x_1, x_2, \ldots x_n$ on which it depends is:

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

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 calibrated by an external ISO/IEC 17025 accredited laboratory. In addition, their calibration is verified prior to each weighing using calibrated external weights traceable to an ISO/IEC 17025 accredited laboratory. All volumetric glassware used is calibrated, of Class A tolerance, and traceable to an ISO/IEC 17025 accredited laboratory. 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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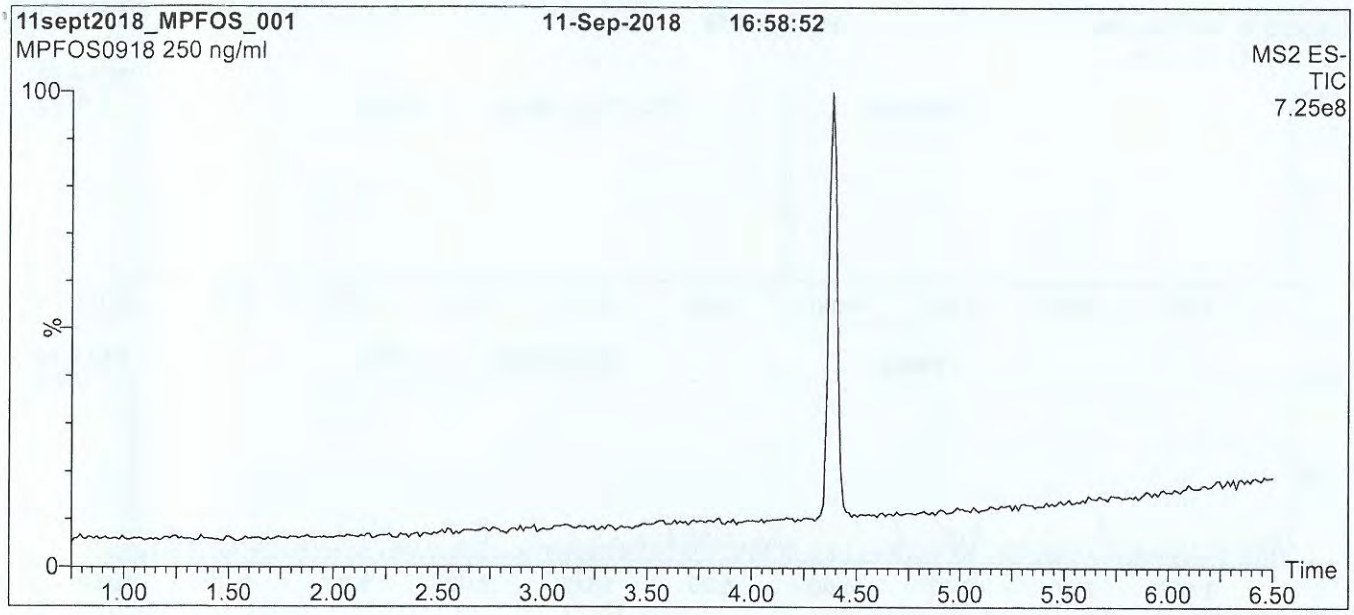
CALA Testing Accreditation No. A 1226

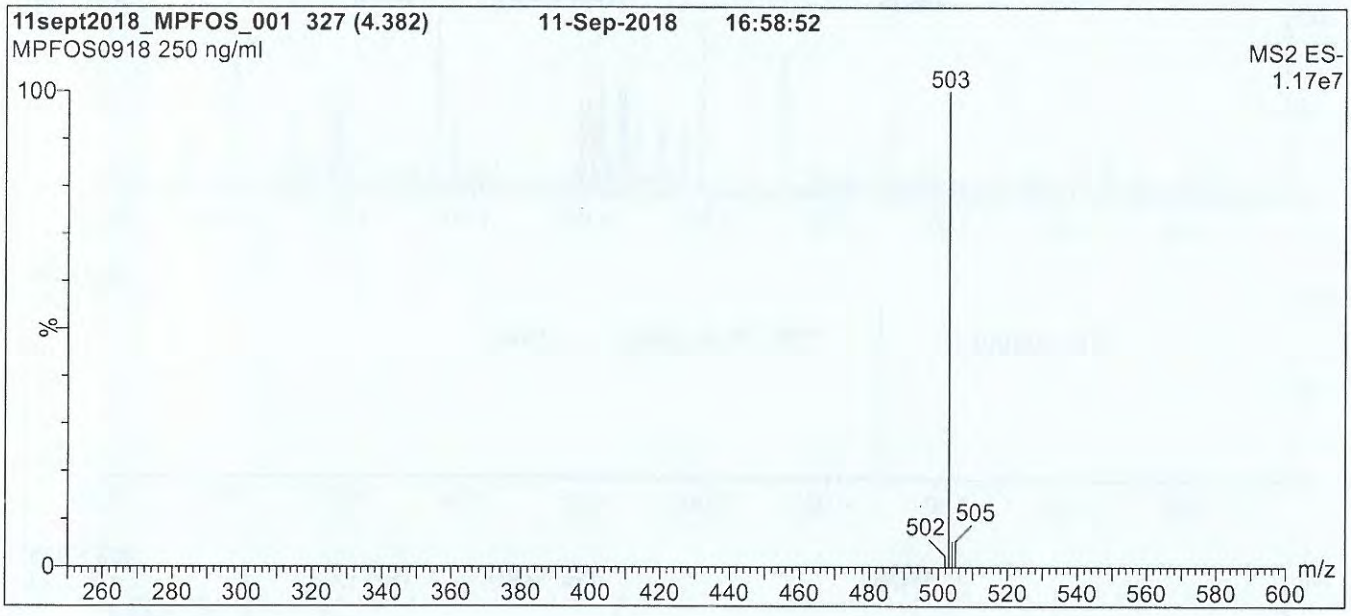
ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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

19A2539

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





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 90% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

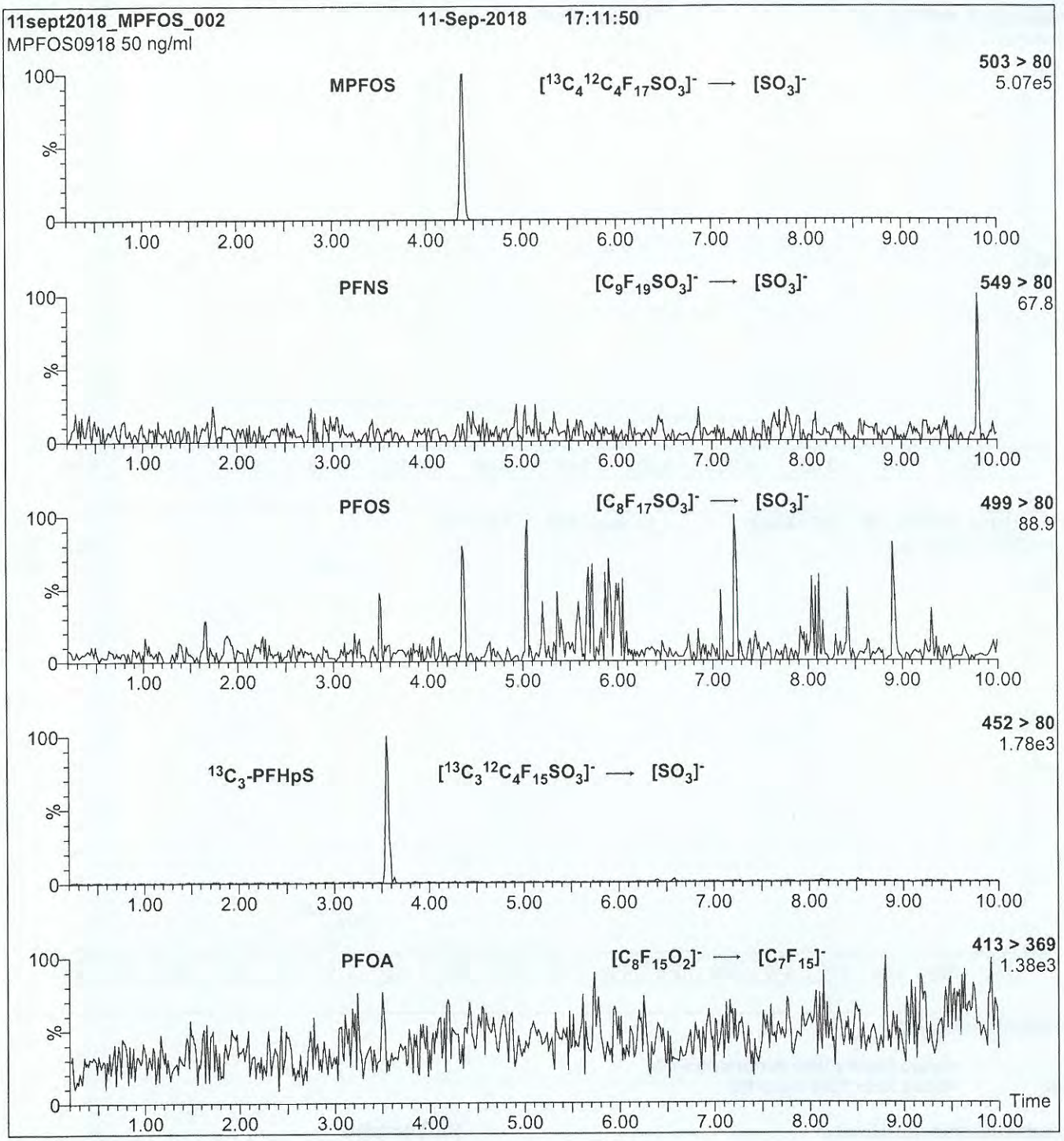
MS Parameters

Experiment: Full Scan (250 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 2.00
Cone Voltage (V) = 10.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 1000

19A2539

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



Conditions for Figure 2:

Injection: On-column (MPFOS)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

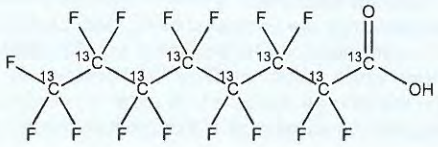
Collision Gas (mbar) = 2.99e-3
Collision Energy (eV) = 42

19A2540

WELLINGTON LABORATORIES

CERTIFICATE OF ANALYSIS
DOCUMENTATION

PRODUCT CODE:	M8PFOA	**LOT NUMBER:**	M8PFOA0618
COMPOUND:	Perfluoro-n-[$^{13}C_8$]octanoic acid		
STRUCTURE:		**CAS #:**	Not available



MOLECULAR FORMULA:	$^{13}C_8HF_{15}O_2$	**MOLECULAR WEIGHT:**	422.01
CONCENTRATION:	49 ± 2.45 µg/ml	**SOLVENT(S):**	Methanol Water (<1%)
CHEMICAL PURITY:	97.9% (M8PFOA) 2.1% (MPFOA [M+4])	**ISOTOPIC PURITY:**	≥99% ^{13}C ($^{13}C_8$)
LAST TESTED: (mm/dd/yyyy)	06/29/2018		
EXPIRY DATE: (mm/dd/yyyy)	06/29/2023		
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) and ~ 1.9% of [M+4] perfluoro-n-octanoic acid.

FOR LABORATORY USE ONLY: NOT FOR HUMAN OR DRUG USE

Certified By: _____ **Date:** 07/03/2018 (mm/dd/yyyy)
B.G. Chittim, General Manager

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

19A2540

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

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

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CALA Testing Accreditation No. A 1226

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

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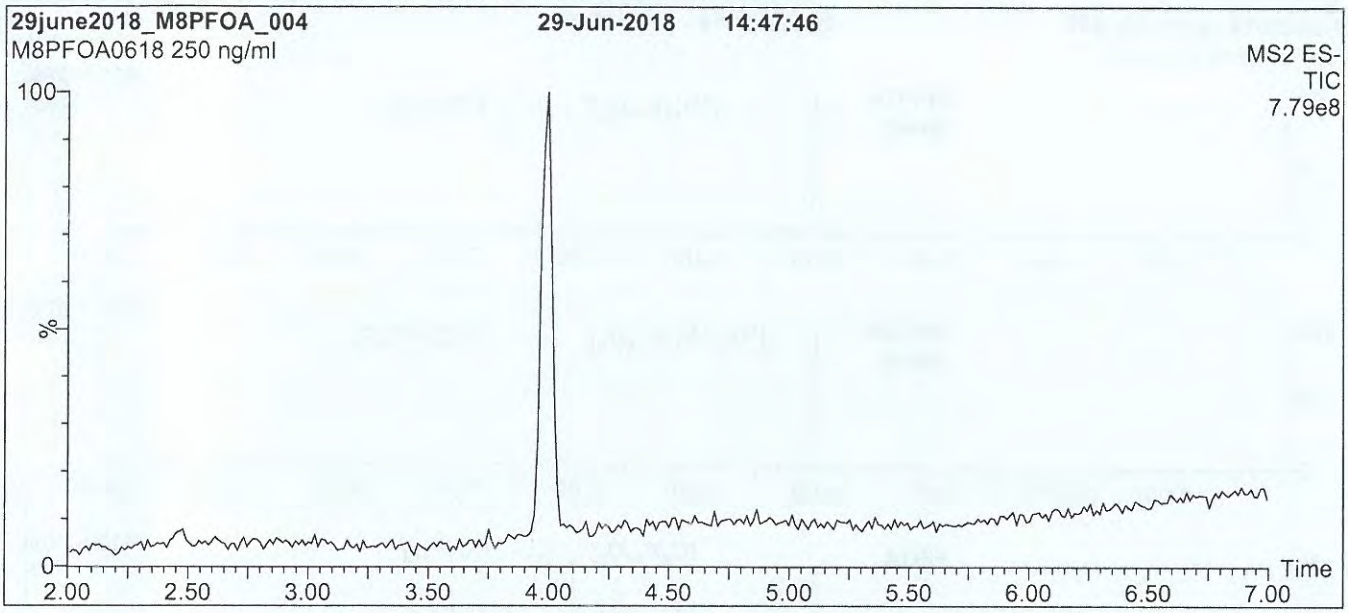
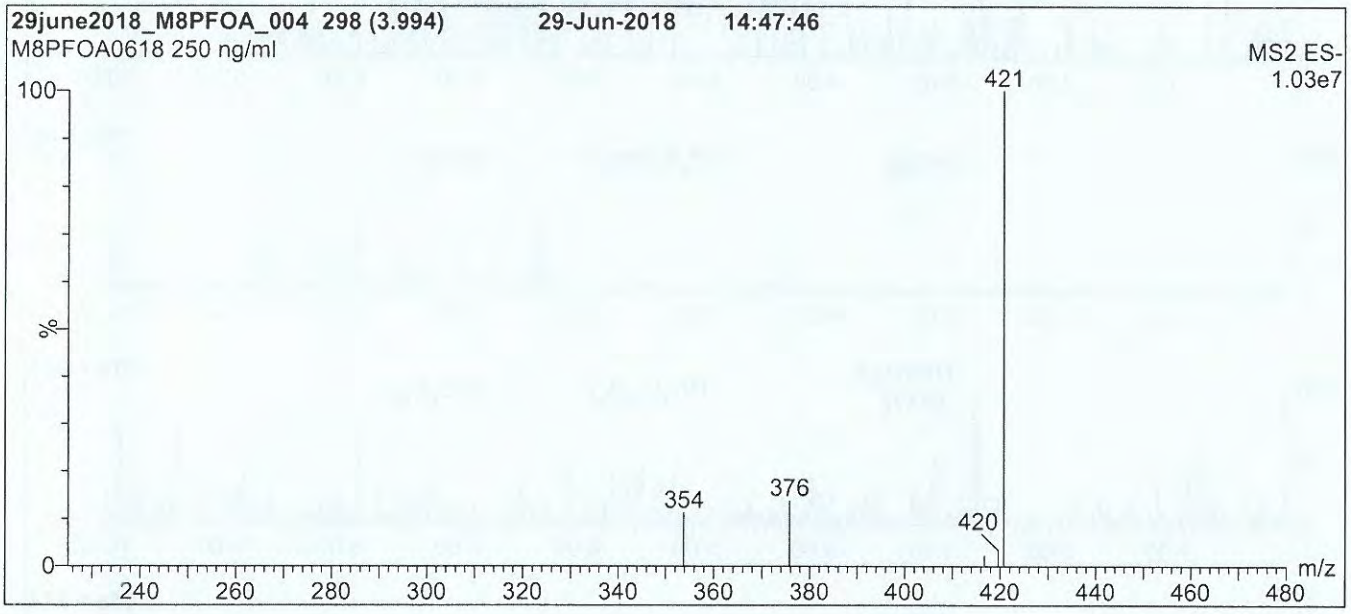
19A2540

Figure 1: **M8PFOA; LC/MS Data (TIC and Mass Spectrum)**





Conditions for Figure 1:

LC: **Waters Acquity Ultra Performance LC**
MS: **Waters Xevo TQ-S micro MS**

Chromatographic Conditions

Column: Acquity UPLC BEH Shield RP_{18}
1.7 µm, 2.1 x 100 mm

Mobile phase: Gradient
Start: 50% (80:20 MeOH:ACN) / 50% H_2O
(both with 10 mM NH_4OAc buffer)
Ramp to 80% organic over 8 min and hold for
2 min before returning to initial conditions in 0.75 min.
Time: 12 min

Flow: 300 µl/min

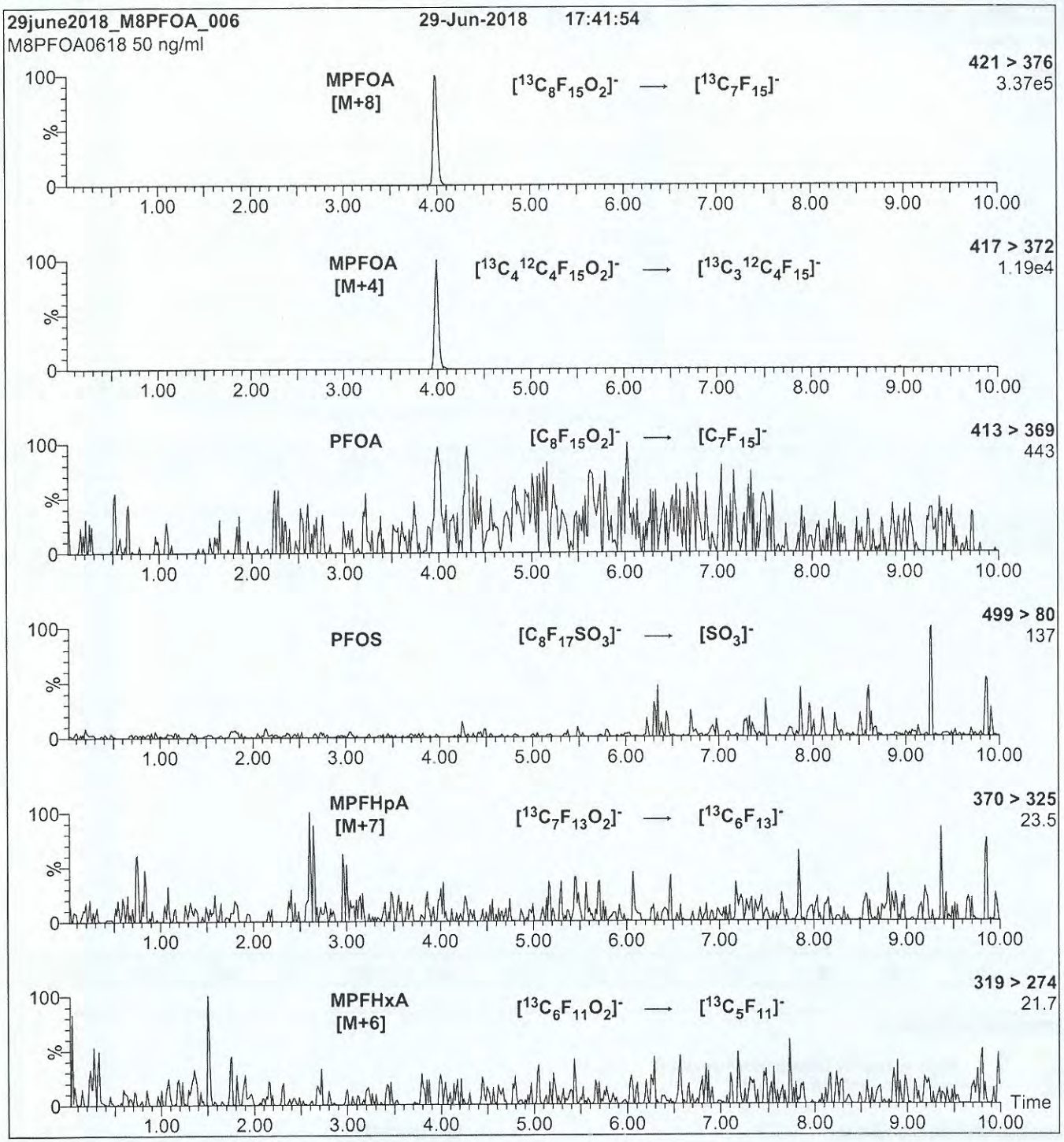
MS Parameters

Experiment: Full Scan (225 - 850 amu)

Source: Electrospray (negative)
Capillary Voltage (kV) = 0.50
Cone Voltage (V) = 14.00
Desolvation Temperature (°C) = 500
Desolvation Gas Flow (l/hr) = 750

19A2540

Figure 2: **M8PFOA; LC/MS/MS Data (Selected MRM Transitions)**



Conditions for Figure 2:

Injection: On-column (M8PFOA)

Mobile phase: Same as Figure 1

Flow: 300 µl/min

MS Parameters

Collision Gas (mbar) = 3.39e-3
Collision Energy (eV) = 8

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5","PFBS","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
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4","PFHxA","8.09","ug/kg","","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
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9","PFHpA","0.842","ug/kg","J","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","355-46-
4","PFHxS","10.7","ug/kg","","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
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1","PFOA","19.9","ug/kg","","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","375-95-
1","PFNA","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
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1","PFOS","15.8","ug/kg","","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","335-76-
2","PFDA","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","2355-31-
9","NMeFOSAA","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","2991-50-
6","NEtFOSAA","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
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8","PFUnA","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","307-55-
1","PFDoA","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
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8","PFTrDA","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
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7","PFTeDA","0.981","ug/kg","U","0.981","CRDL","","TRG","","","1.96","CRDL","YES","0.829"
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PFNA","73.3","%R","","","CRDL","","IS","73.3","","","CRDL","",""
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EtFOSAA","60.0","%R","","","CRDL","","IS","60.0","","","CRDL","",""
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","13C2-PFUnA","13C2-
PFUnA","58.2","%R","","","CRDL","","IS","58.2","","","CRDL","",""
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","13C2-PFDoA","13C2-
PFDoA","50.3","%R","","","CRDL","","IS","50.3","","","CRDL","",""
"SAOA-B03-SO-5-5.5","537 MOD","RES","1902189-01","Vista","13C2-PFTeDA","13C2-

PFTeDA","65.7","%R","","","CRDL","","IS","65.7","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","375-73-
5","PFBS","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","307-24-
4","PFHxA","4.71","ug/kg","","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","375-85-
9","PFHpA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","355-46-
4","PFHxS","1.98","ug/kg","","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","335-67-
1","PFOA","3.74","ug/kg","","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","375-95-
1","PFNA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","1763-23-
1","PFOS","1.73","ug/kg","J","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","335-76-
2","PFDA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","2355-31-
9","NMeFOSAA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","2991-50-
6","NEtFOSAA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","2058-94-
8","PFUnA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","307-55-
1","PFDoA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","72629-94-
8","PFTrDA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","376-06-
7","PFTeDA","0.986","ug/kg","U","0.986","CRDL","","TRG","","","1.97","CRDL","YES","0.833"
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C3-PFBS","13C3-
PFBS","74.5","%R","","","CRDL","","IS","74.5","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C2-PFHxA","13C2-
PFHxA","87.5","%R","","","CRDL","","IS","87.5","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C4-PFHpA","13C4-
PFHpA","99.9","%R","","","CRDL","","IS","99.9","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C3-PFHxS","13C3-
PFHxS","87.7","%R","","","CRDL","","IS","87.7","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C2-PFOA","13C2-
PFOA","88.6","%R","","","CRDL","","IS","88.6","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C5-PFNA","13C5-
PFNA","78.4","%R","","","CRDL","","IS","78.4","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C8-PFOS","13C8-
PFOS","84.6","%R","","","CRDL","","IS","84.6","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C2-PFDA","13C2-
PFDA","55.9","%R","","","CRDL","","IS","55.9","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","d3-MeFOSAA","d3-
MeFOSAA","50.6","%R","","","CRDL","","IS","50.6","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","d5-EtFOSAA","d5-
EtFOSAA","60.5","%R","","","CRDL","","IS","60.5","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C2-PFUnA","13C2-
PFUnA","59.0","%R","","","CRDL","","IS","59.0","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C2-PFDoA","13C2-
PFDoA","47.7","%R","H","","CRDL","","IS","47.7","","","CRDL","",""
"SAOA-B03-SO-20-20.5","537 MOD","RES","1902189-02","Vista","13C2-PFTeDA","13C2-

PFTeDA","70.1","%R","","","CRDL","","IS","70.1","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","375-73-
5","PFBS","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","307-24-
4","PFHxA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","375-85-
9","PFHpA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","355-46-
4","PFHxS","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","335-67-
1","PFOA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","375-95-
1","PFNA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","1763-23-
1","PFOS","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","335-76-
2","PFDA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","2355-31-
9","NMeFOSAA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","2991-50-
6","NEtFOSAA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","2058-94-
8","PFUnA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","307-55-
1","PFDoA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","72629-94-
8","PFTrDA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","376-06-
7","PFTeDA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C3-PFBS","13C3-
PFBS","67.4","%R","","","CRDL","","IS","67.4","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C2-PFHxA","13C2-
PFHxA","84.7","%R","","","CRDL","","IS","84.7","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C4-PFHpA","13C4-
PFHpA","90.1","%R","","","CRDL","","IS","90.1","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C3-PFHxS","13C3-
PFHxS","83.7","%R","","","CRDL","","IS","83.7","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C2-PFOA","13C2-
PFOA","93.9","%R","","","CRDL","","IS","93.9","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C5-PFNA","13C5-
PFNA","73.9","%R","","","CRDL","","IS","73.9","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C8-PFOS","13C8-
PFOS","93.8","%R","","","CRDL","","IS","93.8","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C2-PFDA","13C2-
PFDA","54.2","%R","","","CRDL","","IS","54.2","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","d3-MeFOSAA","d3-
MeFOSAA","49.7","%R","H","","CRDL","","IS","49.7","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","d5-EtFOSAA","d5-
EtFOSAA","50.6","%R","","","CRDL","","IS","50.6","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C2-PFUnA","13C2-
PFUnA","65.4","%R","","","CRDL","","IS","65.4","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C2-PFDoA","13C2-
PFDoA","46.9","%R","H","","CRDL","","IS","46.9","","","CRDL","",""
"SAOA-B03-SO-56-56.5","537 MOD","RES","1902189-03","Vista","13C2-PFTeDA","13C2-

PFTeDA","69.0","%R","","","CRDL","","IS","69.0","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","375-73-
5","PFBS","0.0769","ug/L","","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","307-24-
4","PFHxA","1.23","ug/L","","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","375-85-
9","PFHpA","0.0681","ug/L","","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","355-46-
4","PFHxS","0.134","ug/L","","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","335-67-
1","PFOA","0.0548","ug/L","","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","375-95-
1","PFNA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","1763-23-
1","PFOS","0.117","ug/L","","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","335-76-
2","PFDA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","2355-31-
9","NMeFOSAA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","2991-50-
6","NEtFOSAA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","2058-94-
8","PFUnA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","307-55-
1","PFDoA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","72629-94-
8","PFTrDA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","376-06-
7","PFTeDA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00856","CRDL","YES","0.00293"
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C3-PFBS","13C3-
PFBS","111","%R","","","CRDL","","IS","111","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C2-PFHxA","13C2-
PFHxA","96.0","%R","","","CRDL","","IS","96.0","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C4-PFHpA","13C4-
PFHpA","104","%R","","","CRDL","","IS","104","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C3-PFHxS","13C3-
PFHxS","104","%R","","","CRDL","","IS","104","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C2-PFOA","13C2-
PFOA","89.8","%R","","","CRDL","","IS","89.8","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C5-PFNA","13C5-
PFNA","95.2","%R","","","CRDL","","IS","95.2","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C8-PFOS","13C8-
PFOS","105","%R","","","CRDL","","IS","105","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C2-PFDA","13C2-
PFDA","79.3","%R","","","CRDL","","IS","79.3","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","d3-MeFOSAA","d3-
MeFOSAA","75.7","%R","","","CRDL","","IS","75.7","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","d5-EtFOSAA","d5-
EtFOSAA","75.7","%R","","","CRDL","","IS","75.7","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C2-PFUnA","13C2-
PFUnA","70.5","%R","","","CRDL","","IS","70.5","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C2-PFDoA","13C2-
PFDoA","71.4","%R","","","CRDL","","IS","71.4","","","CRDL","",""
"SAOA-B03-GW","537 MOD","RES","1902189-04","Vista","13C2-PFTeDA","13C2-

PFTeDA","65.4","%R","","","CRDL","","IS","65.4","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","375-73-
5","PFBS","0.0227","ug/L","","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","307-24-
4","PFHxA","0.222","ug/L","","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","375-85-
9","PFHpA","0.0369","ug/L","","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","355-46-
4","PFHxS","0.218","ug/L","","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","335-67-
1","PFOA","0.0554","ug/L","","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","375-95-
1","PFNA","0.00450","ug/L","J","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","1763-23-
1","PFOS","0.337","ug/L","","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","335-76-
2","PFDA","0.00673","ug/L","J","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","2355-31-
9","NMeFOSAA","0.00509","ug/L","U","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","2991-50-
6","NEtFOSAA","0.00509","ug/L","U","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","2058-94-
8","PFUnA","0.00509","ug/L","U","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","307-55-
1","PFDoA","0.00509","ug/L","U","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","72629-94-
8","PFTrDA","0.00509","ug/L","U","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","376-06-
7","PFTeDA","0.00509","ug/L","U","0.00509","CRDL","","TRG","","","0.0102","CRDL","YES","0.00349"
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C3-PFBS","13C3-
PFBS","89.1","%R","","","CRDL","","IS","89.1","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C2-PFHxA","13C2-
PFHxA","88.1","%R","","","CRDL","","IS","88.1","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C4-PFHpA","13C4-
PFHpA","92.3","%R","","","CRDL","","IS","92.3","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C3-PFHxS","13C3-
PFHxS","90.6","%R","","","CRDL","","IS","90.6","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C2-PFOA","13C2-
PFOA","89.8","%R","","","CRDL","","IS","89.8","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C5-PFNA","13C5-
PFNA","86.6","%R","","","CRDL","","IS","86.6","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C8-PFOS","13C8-
PFOS","94.4","%R","","","CRDL","","IS","94.4","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C2-PFDA","13C2-
PFDA","72.5","%R","","","CRDL","","IS","72.5","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","d3-MeFOSAA","d3-
MeFOSAA","62.3","%R","","","CRDL","","IS","62.3","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","d5-EtFOSAA","d5-
EtFOSAA","68.3","%R","","","CRDL","","IS","68.3","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C2-PFUnA","13C2-
PFUnA","69.1","%R","","","CRDL","","IS","69.1","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C2-PFDoA","13C2-
PFDoA","60.5","%R","","","CRDL","","IS","60.5","","","CRDL","",""
"NAOA-B03-GW","537 MOD","RES","1902189-05","Vista","13C2-PFTeDA","13C2-

PFTeDA","57.0","%R","","","CRDL","","IS","57.0","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","375-73-
5","PFBS","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","307-24-
4","PFHxA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","375-85-
9","PFHpA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","355-46-
4","PFHxS","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","335-67-
1","PFOA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","375-95-
1","PFNA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","1763-23-
1","PFOS","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","335-76-
2","PFDA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","2355-31-
9","NMeFOSAA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","2991-50-
6","NEtFOSAA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","2058-94-
8","PFUnA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","307-55-
1","PFDoA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","72629-94-
8","PFTrDA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","376-06-
7","PFTeDA","0.00424","ug/L","U","0.00424","CRDL","","TRG","","","0.00851","CRDL","YES","0.00291"
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C3-PFBS","13C3-
PFBS","92.2","%R","","","CRDL","","IS","92.2","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C2-PFHxA","13C2-
PFHxA","95.7","%R","","","CRDL","","IS","95.7","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C4-PFHpA","13C4-
PFHpA","93.8","%R","","","CRDL","","IS","93.8","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C3-PFHxS","13C3-
PFHxS","104","%R","","","CRDL","","IS","104","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C2-PFOA","13C2-
PFOA","92.0","%R","","","CRDL","","IS","92.0","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C5-PFNA","13C5-
PFNA","88.1","%R","","","CRDL","","IS","88.1","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C8-PFOS","13C8-
PFOS","84.7","%R","","","CRDL","","IS","84.7","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C2-PFDA","13C2-
PFDA","80.5","%R","","","CRDL","","IS","80.5","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","d3-MeFOSAA","d3-
MeFOSAA","77.1","%R","","","CRDL","","IS","77.1","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","d5-EtFOSAA","d5-
EtFOSAA","77.2","%R","","","CRDL","","IS","77.2","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C2-PFUnA","13C2-
PFUnA","73.2","%R","","","CRDL","","IS","73.2","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C2-PFDoA","13C2-
PFDoA","73.0","%R","","","CRDL","","IS","73.0","","","CRDL","",""
"EB-07152019-GW","537 MOD","RES","1902189-06","Vista","13C2-PFTeDA","13C2-

PFTeDA","77.5","%R","","","CRDL","","IS","77.5","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","375-73-
5","PFBS","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","307-24-
4","PFHxA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","375-85-
9","PFHpA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","355-46-
4","PFHxS","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","335-67-
1","PFOA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","375-95-
1","PFNA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","1763-23-
1","PFOS","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","335-76-
2","PFDA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","2355-31-
9","NMeFOSAA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","2991-50-
6","NEtFOSAA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","2058-94-
8","PFUnA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","307-55-
1","PFDoA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","72629-94-
8","PFTrDA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","376-06-
7","PFTeDA","0.00431","ug/L","U","0.00431","CRDL","","TRG","","","0.00863","CRDL","YES","0.00295"
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C3-PFBS","13C3-
PFBS","101","%R","","","CRDL","","IS","101","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C2-PFHxA","13C2-
PFHxA","92.0","%R","","","CRDL","","IS","92.0","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C4-PFHpA","13C4-
PFHpA","93.3","%R","","","CRDL","","IS","93.3","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C3-PFHxS","13C3-
PFHxS","95.2","%R","","","CRDL","","IS","95.2","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C2-PFOA","13C2-
PFOA","88.8","%R","","","CRDL","","IS","88.8","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C5-PFNA","13C5-
PFNA","86.9","%R","","","CRDL","","IS","86.9","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C8-PFOS","13C8-
PFOS","84.4","%R","","","CRDL","","IS","84.4","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C2-PFDA","13C2-
PFDA","77.0","%R","","","CRDL","","IS","77.0","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","d3-MeFOSAA","d3-
MeFOSAA","62.8","%R","","","CRDL","","IS","62.8","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","d5-EtFOSAA","d5-
EtFOSAA","67.0","%R","","","CRDL","","IS","67.0","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C2-PFUnA","13C2-
PFUnA","73.2","%R","","","CRDL","","IS","73.2","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C2-PFDoA","13C2-
PFDoA","68.7","%R","","","CRDL","","IS","68.7","","","CRDL","",""
"FRB-07152019","537 MOD","RES","1902189-07","Vista","13C2-PFTeDA","13C2-

PFTeDA","74.0","%R","","","CRDL","","IS","74.0","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","375-73-
5","PFBS","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","307-24-
4","PFHxA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","375-85-
9","PFHpA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","355-46-
4","PFHxS","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","335-67-
1","PFOA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","375-95-
1","PFNA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","1763-23-
1","PFOS","1.27","ug/kg","J","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","335-76-
2","PFDA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","2355-31-
9","NMeFOSAA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","2991-50-
6","NEtFOSAA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","2058-94-
8","PFUnA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","307-55-
1","PFDoA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","72629-94-
8","PFTrDA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","376-06-
7","PFTeDA","0.979","ug/kg","U","0.979","CRDL","","TRG","","","1.96","CRDL","YES","0.827"
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C3-PFBS","13C3-
PFBS","75.1","%R","","","CRDL","","IS","75.1","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C2-PFHxA","13C2-
PFHxA","80.8","%R","","","CRDL","","IS","80.8","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C4-PFHpA","13C4-
PFHpA","93.0","%R","","","CRDL","","IS","93.0","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C3-PFHxS","13C3-
PFHxS","103","%R","","","CRDL","","IS","103","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C2-PFOA","13C2-
PFOA","92.4","%R","","","CRDL","","IS","92.4","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C5-PFNA","13C5-
PFNA","76.8","%R","","","CRDL","","IS","76.8","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C8-PFOS","13C8-
PFOS","102","%R","","","CRDL","","IS","102","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C2-PFDA","13C2-
PFDA","53.4","%R","","","CRDL","","IS","53.4","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","d3-MeFOSAA","d3-
MeFOSAA","52.4","%R","","","CRDL","","IS","52.4","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","d5-EtFOSAA","d5-
EtFOSAA","56.8","%R","","","CRDL","","IS","56.8","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C2-PFUnA","13C2-
PFUnA","70.3","%R","","","CRDL","","IS","70.3","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C2-PFDoA","13C2-
PFDoA","56.2","%R","","","CRDL","","IS","56.2","","","CRDL","",""
"NON-B03-SO-1-1.5","537 MOD","RES","1902189-08","Vista","13C2-PFTeDA","13C2-

PFTeDA","75.3","%R","","","CRDL","","IS","75.3","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","375-73-
5","PFBS","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","307-24-
4","PFHxA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","375-85-
9","PFHpA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","355-46-
4","PFHxS","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","335-67-
1","PFOA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","375-95-
1","PFNA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","1763-23-
1","PFOS","1.81","ug/kg","J","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","335-76-
2","PFDA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","2355-31-
9","NMeFOSAA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","2991-50-
6","NEtFOSAA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","2058-94-
8","PFUnA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","307-55-
1","PFDoA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","72629-94-
8","PFTrDA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","376-06-
7","PFTeDA","0.971","ug/kg","U","0.971","CRDL","","TRG","","","1.94","CRDL","YES","0.821"
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C3-PFBS","13C3-
PFBS","76.6","%R","","","CRDL","","IS","76.6","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C2-PFHxA","13C2-
PFHxA","89.8","%R","","","CRDL","","IS","89.8","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C4-PFHpA","13C4-
PFHpA","85.9","%R","","","CRDL","","IS","85.9","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C3-PFHxS","13C3-
PFHxS","104","%R","","","CRDL","","IS","104","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C2-PFOA","13C2-
PFOA","94.1","%R","","","CRDL","","IS","94.1","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C5-PFNA","13C5-
PFNA","71.8","%R","","","CRDL","","IS","71.8","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C8-PFOS","13C8-
PFOS","96.6","%R","","","CRDL","","IS","96.6","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C2-PFDA","13C2-
PFDA","54.3","%R","","","CRDL","","IS","54.3","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","d3-MeFOSAA","d3-
MeFOSAA","56.6","%R","","","CRDL","","IS","56.6","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","d5-EtFOSAA","d5-
EtFOSAA","59.0","%R","","","CRDL","","IS","59.0","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C2-PFUnA","13C2-
PFUnA","70.3","%R","","","CRDL","","IS","70.3","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C2-PFDoA","13C2-
PFDoA","57.8","%R","","","CRDL","","IS","57.8","","","CRDL","",""
"NON-B03-SO-15-15.5","537 MOD","RES","1902189-09","Vista","13C2-PFTeDA","13C2-

PFTeDA","77.8","%R","","","CRDL","","IS","77.8","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","375-73-
5","PFBS","0.00486","ug/L","J","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","307-24-
4","PFHxA","0.0998","ug/L","","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","375-85-
9","PFHpA","0.0821","ug/L","","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","355-46-
4","PFHxS","0.147","ug/L","","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","335-67-
1","PFOA","0.0932","ug/L","","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","375-95-
1","PFNA","0.0914","ug/L","","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","1763-23-
1","PFOS","0.982","ug/L","","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","335-76-
2","PFDA","0.00277","ug/L","J","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","2355-31-
9","NMeFOSAA","0.00394","ug/L","U","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","2991-50-
6","NEtFOSAA","0.00394","ug/L","U","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","2058-94-
8","PFUnA","0.00394","ug/L","U","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","307-55-
1","PFDoA","0.00394","ug/L","U","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","72629-94-
8","PFTrDA","0.00394","ug/L","U","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","376-06-
7","PFTeDA","0.00394","ug/L","U","0.00394","CRDL","","TRG","","","0.00790","CRDL","YES","0.00271"
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C3-PFBS","13C3-
PFBS","96.2","%R","","","CRDL","","IS","96.2","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C2-PFHxA","13C2-
PFHxA","89.0","%R","","","CRDL","","IS","89.0","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C4-PFHpA","13C4-
PFHpA","87.9","%R","","","CRDL","","IS","87.9","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C3-PFHxS","13C3-
PFHxS","102","%R","","","CRDL","","IS","102","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C2-PFOA","13C2-
PFOA","79.0","%R","","","CRDL","","IS","79.0","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C5-PFNA","13C5-
PFNA","75.6","%R","","","CRDL","","IS","75.6","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C8-PFOS","13C8-
PFOS","87.6","%R","","","CRDL","","IS","87.6","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C2-PFDA","13C2-
PFDA","65.7","%R","","","CRDL","","IS","65.7","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","d3-MeFOSAA","d3-
MeFOSAA","56.0","%R","","","CRDL","","IS","56.0","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","d5-EtFOSAA","d5-
EtFOSAA","53.6","%R","","","CRDL","","IS","53.6","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C2-PFUnA","13C2-
PFUnA","57.9","%R","","","CRDL","","IS","57.9","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C2-PFDoA","13C2-
PFDoA","41.6","%R","H","","CRDL","","IS","41.6","","","CRDL","",""
"NON-B03-GW","537 MOD","RES","1902189-10","Vista","13C2-PFTeDA","13C2-

PFTeDA","27.2","%R","H","","CRDL","","IS","27.2","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","375-73-
5","PFBS","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","307-24-
4","PFHxA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","375-85-
9","PFHpA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","355-46-
4","PFHxS","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","335-67-
1","PFOA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","375-95-
1","PFNA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","1763-23-
1","PFOS","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","335-76-
2","PFDA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","2355-31-
9","NMeFOSAA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","2991-50-
6","NEtFOSAA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","2058-94-
8","PFUnA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","307-55-
1","PFDoA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","72629-94-
8","PFTrDA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","376-06-
7","PFTeDA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00842","CRDL","YES","0.00288"
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C3-PFBS","13C3-
PFBS","94.8","%R","","","CRDL","","IS","94.8","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C2-PFHxA","13C2-
PFHxA","92.3","%R","","","CRDL","","IS","92.3","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C4-PFHpA","13C4-
PFHpA","94.7","%R","","","CRDL","","IS","94.7","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C3-PFHxS","13C3-
PFHxS","99.0","%R","","","CRDL","","IS","99.0","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C2-PFOA","13C2-
PFOA","88.8","%R","","","CRDL","","IS","88.8","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C5-PFNA","13C5-
PFNA","84.2","%R","","","CRDL","","IS","84.2","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C8-PFOS","13C8-
PFOS","92.0","%R","","","CRDL","","IS","92.0","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C2-PFDA","13C2-
PFDA","74.2","%R","","","CRDL","","IS","74.2","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","d3-MeFOSAA","d3-
MeFOSAA","62.0","%R","","","CRDL","","IS","62.0","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","d5-EtFOSAA","d5-
EtFOSAA","68.7","%R","","","CRDL","","IS","68.7","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C2-PFUnA","13C2-
PFUnA","72.0","%R","","","CRDL","","IS","72.0","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C2-PFDoA","13C2-
PFDoA","70.4","%R","","","CRDL","","IS","70.4","","","CRDL","",""
"EB-07162019-GW","537 MOD","RES","1902189-11","Vista","13C2-PFTeDA","13C2-

PFTeDA","79.7","%R","","","CRDL","","IS","79.7","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","375-73-
5","PFBS","0.166","ug/L","","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","307-24-
4","PFHxA","0.932","ug/L","","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","375-85-
9","PFHpA","0.615","ug/L","","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","DL","1902189-12","Vista","355-46-
4","PFHxS","4.77","ug/L","D","0.0200","CRDL","","TRG","","","0.0401","CRDL","YES","0.0137"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","335-67-
1","PFOA","0.571","ug/L","","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","375-95-
1","PFNA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","1763-23-
1","PFOS","0.0433","ug/L","","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","335-76-
2","PFDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","2355-31-
9","NMeFOSAA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","2991-50-
6","NEtFOSAA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","2058-94-
8","PFUnA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","307-55-
1","PFDoA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","72629-94-
8","PFTrDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","376-06-
7","PFTeDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00802","CRDL","YES","0.00275"
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C3-PFBS","13C3-
PFBS","122","%R","","","CRDL","","IS","122","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C2-PFHxA","13C2-
PFHxA","96.8","%R","","","CRDL","","IS","96.8","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C4-PFHpA","13C4-
PFHpA","99.0","%R","","","CRDL","","IS","99.0","","","CRDL","",""
"NAOA-B06-GW","537 MOD","DL","1902189-12","Vista","13C3-PFHxS","13C3-
PFHxS","116","%R","D","","CRDL","","IS","116","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C2-PFOA","13C2-
PFOA","96.2","%R","","","CRDL","","IS","96.2","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C5-PFNA","13C5-
PFNA","95.7","%R","","","CRDL","","IS","95.7","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C8-PFOS","13C8-
PFOS","106","%R","","","CRDL","","IS","106","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C2-PFDA","13C2-
PFDA","89.5","%R","","","CRDL","","IS","89.5","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","d3-MeFOSAA","d3-
MeFOSAA","64.7","%R","","","CRDL","","IS","64.7","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","d5-EtFOSAA","d5-
EtFOSAA","62.8","%R","","","CRDL","","IS","62.8","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C2-PFUnA","13C2-
PFUnA","73.9","%R","","","CRDL","","IS","73.9","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C2-PFDoA","13C2-
PFDoA","59.6","%R","","","CRDL","","IS","59.6","","","CRDL","",""
"NAOA-B06-GW","537 MOD","RES","1902189-12","Vista","13C2-PFTeDA","13C2-

PFTeDA","31.0","%R","H","","CRDL","","IS","31.0","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","375-73-
5","PFBS","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","307-24-
4","PFHxA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","375-85-
9","PFHpA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","355-46-
4","PFHxS","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","335-67-
1","PFOA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","375-95-
1","PFNA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","1763-23-
1","PFOS","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","335-76-
2","PFDA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","2355-31-
9","NMeFOSAA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","2991-50-
6","NEtFOSAA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","2058-94-
8","PFUnA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","307-55-
1","PFDoA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","72629-94-
8","PFTrDA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","376-06-
7","PFTeDA","0.00427","ug/L","U","0.00427","CRDL","","TRG","","","0.00855","CRDL","YES","0.00293"
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C3-PFBS","13C3-
PFBS","88.9","%R","","","CRDL","","IS","88.9","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C2-PFHxA","13C2-
PFHxA","91.7","%R","","","CRDL","","IS","91.7","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C4-PFHpA","13C4-
PFHpA","92.8","%R","","","CRDL","","IS","92.8","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C3-PFHxS","13C3-
PFHxS","91.0","%R","","","CRDL","","IS","91.0","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C2-PFOA","13C2-
PFOA","90.0","%R","","","CRDL","","IS","90.0","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C5-PFNA","13C5-
PFNA","83.7","%R","","","CRDL","","IS","83.7","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C8-PFOS","13C8-
PFOS","91.5","%R","","","CRDL","","IS","91.5","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C2-PFDA","13C2-
PFDA","76.2","%R","","","CRDL","","IS","76.2","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","d3-MeFOSAA","d3-
MeFOSAA","64.0","%R","","","CRDL","","IS","64.0","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","d5-EtFOSAA","d5-
EtFOSAA","69.5","%R","","","CRDL","","IS","69.5","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C2-PFUnA","13C2-
PFUnA","75.0","%R","","","CRDL","","IS","75.0","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C2-PFDoA","13C2-
PFDoA","72.2","%R","","","CRDL","","IS","72.2","","","CRDL","",""
"FRB-07162019","537 MOD","RES","1902189-13","Vista","13C2-PFTeDA","13C2-

PFTeDA","80.1","%R","","","CRDL","","IS","80.1","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","375-73-
5","PFBS","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","307-24-
4","PFHxA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","375-85-
9","PFHpA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","355-46-
4","PFHxS","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","335-67-
1","PFOA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","375-95-
1","PFNA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","1763-23-
1","PFOS","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","335-76-
2","PFDA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","2355-31-
9","NMeFOSAA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","2991-50-
6","NEtFOSAA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","2058-94-
8","PFUnA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","307-55-
1","PFDoA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","72629-94-
8","PFTrDA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","376-06-
7","PFTeDA","0.00420","ug/L","U","0.00420","CRDL","","TRG","","","0.00843","CRDL","YES","0.00289"
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C3-PFBS","13C3-
PFBS","94.4","%R","","","CRDL","","IS","94.4","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C2-PFHxA","13C2-
PFHxA","94.9","%R","","","CRDL","","IS","94.9","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C4-PFHpA","13C4-
PFHpA","99.0","%R","","","CRDL","","IS","99.0","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C3-PFHxS","13C3-
PFHxS","96.0","%R","","","CRDL","","IS","96.0","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C2-PFOA","13C2-
PFOA","92.0","%R","","","CRDL","","IS","92.0","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C5-PFNA","13C5-
PFNA","90.9","%R","","","CRDL","","IS","90.9","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C8-PFOS","13C8-
PFOS","91.6","%R","","","CRDL","","IS","91.6","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C2-PFDA","13C2-
PFDA","84.7","%R","","","CRDL","","IS","84.7","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","d3-MeFOSAA","d3-
MeFOSAA","71.4","%R","","","CRDL","","IS","71.4","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","d5-EtFOSAA","d5-
EtFOSAA","72.5","%R","","","CRDL","","IS","72.5","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C2-PFUnA","13C2-
PFUnA","76.5","%R","","","CRDL","","IS","76.5","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C2-PFDoA","13C2-
PFDoA","77.3","%R","","","CRDL","","IS","77.3","","","CRDL","",""
"EB-07162019","537 MOD","RES","1902189-14","Vista","13C2-PFTeDA","13C2-

PFTeDA","82.1","%R","","","CRDL","","IS","82.1","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","375-73-
5","PFBS","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","307-24-
4","PFHxA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","375-85-
9","PFHpA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","355-46-
4","PFHxS","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","335-67-
1","PFOA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","375-95-
1","PFNA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","1763-23-
1","PFOS","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","335-76-
2","PFDA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","2355-31-
9","NMeFOSAA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","2991-50-
6","NEtFOSAA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","2058-94-
8","PFUnA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","307-55-
1","PFDoA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","72629-94-
8","PFTrDA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","376-06-
7","PFTeDA","0.994","ug/kg","U","0.994","CRDL","","TRG","","","1.99","CRDL","YES","0.840"
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C3-PFBS","13C3-
PFBS","66.3","%R","","","CRDL","","IS","66.3","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C2-PFHxA","13C2-
PFHxA","85.8","%R","","","CRDL","","IS","85.8","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C4-PFHpA","13C4-
PFHpA","93.1","%R","","","CRDL","","IS","93.1","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C3-PFHxS","13C3-
PFHxS","77.6","%R","","","CRDL","","IS","77.6","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C2-PFOA","13C2-
PFOA","83.5","%R","","","CRDL","","IS","83.5","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C5-PFNA","13C5-
PFNA","76.6","%R","","","CRDL","","IS","76.6","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C8-PFOS","13C8-
PFOS","92.7","%R","","","CRDL","","IS","92.7","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C2-PFDA","13C2-
PFDA","57.6","%R","","","CRDL","","IS","57.6","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","d3-MeFOSAA","d3-
MeFOSAA","47.8","%R","H","","CRDL","","IS","47.8","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","d5-EtFOSAA","d5-
EtFOSAA","58.7","%R","","","CRDL","","IS","58.7","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C2-PFUnA","13C2-
PFUnA","59.8","%R","","","CRDL","","IS","59.8","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C2-PFDoA","13C2-
PFDoA","47.4","%R","H","","CRDL","","IS","47.4","","","CRDL","",""
"NAOA-B04-SO-69-69.5","537 MOD","RES","1902189-15","Vista","13C2-PFTeDA","13C2-

PFTeDA","61.1","%R","","","CRDL","","IS","61.1","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","375-73-
5","PFBS","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","307-24-
4","PFHxA","1.35","ug/kg","J","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","375-85-
9","PFHpA","1.22","ug/kg","J","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","355-46-
4","PFHxS","16.7","ug/kg","","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","335-67-
1","PFOA","13.2","ug/kg","","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","375-95-
1","PFNA","1.36","ug/kg","J","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","1763-23-
1","PFOS","129","ug/kg","","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","335-76-
2","PFDA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","2355-31-
9","NMeFOSAA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","2991-50-
6","NEtFOSAA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","2058-94-
8","PFUnA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","307-55-
1","PFDoA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","72629-94-
8","PFTrDA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","376-06-
7","PFTeDA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C3-PFBS","13C3-
PFBS","84.1","%R","","","CRDL","","IS","84.1","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C2-PFHxA","13C2-
PFHxA","87.2","%R","","","CRDL","","IS","87.2","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C4-PFHpA","13C4-
PFHpA","90.6","%R","","","CRDL","","IS","90.6","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C3-PFHxS","13C3-
PFHxS","111","%R","","","CRDL","","IS","111","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C2-PFOA","13C2-
PFOA","88.2","%R","","","CRDL","","IS","88.2","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C5-PFNA","13C5-
PFNA","76.7","%R","","","CRDL","","IS","76.7","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C8-PFOS","13C8-
PFOS","101","%R","","","CRDL","","IS","101","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C2-PFDA","13C2-
PFDA","49.8","%R","H","","CRDL","","IS","49.8","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","d3-MeFOSAA","d3-
MeFOSAA","54.2","%R","","","CRDL","","IS","54.2","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","d5-EtFOSAA","d5-
EtFOSAA","50.1","%R","","","CRDL","","IS","50.1","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C2-PFUnA","13C2-
PFUnA","67.1","%R","","","CRDL","","IS","67.1","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C2-PFDoA","13C2-
PFDoA","49.1","%R","H","","CRDL","","IS","49.1","","","CRDL","",""
"SAOA-B02-SO-5-5.5","537 MOD","RES","1902189-16","Vista","13C2-PFTeDA","13C2-

PFTeDA","68.6","%R","","","CRDL","","IS","68.6","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","375-73-
5","PFBS","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","307-24-
4","PFHxA","2.85","ug/kg","","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","375-85-
9","PFHpA","1.53","ug/kg","J","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","355-46-
4","PFHxS","18.1","ug/kg","","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","335-67-
1","PFOA","21.5","ug/kg","","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","375-95-
1","PFNA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","1763-23-
1","PFOS","181","ug/kg","","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","335-76-
2","PFDA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","2355-31-
9","NMeFOSAA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","2991-50-
6","NEtFOSAA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","2058-94-
8","PFUnA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","307-55-
1","PFDoA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","72629-94-
8","PFTrDA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","376-06-
7","PFTeDA","0.998","ug/kg","U","0.998","CRDL","","TRG","","","2.00","CRDL","YES","0.843"
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C3-PFBS","13C3-
PFBS","81.7","%R","","","CRDL","","IS","81.7","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C2-PFHxA","13C2-
PFHxA","85.0","%R","","","CRDL","","IS","85.0","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C4-PFHpA","13C4-
PFHpA","90.9","%R","","","CRDL","","IS","90.9","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C3-PFHxS","13C3-
PFHxS","98.2","%R","","","CRDL","","IS","98.2","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C2-PFOA","13C2-
PFOA","95.8","%R","","","CRDL","","IS","95.8","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C5-PFNA","13C5-
PFNA","73.5","%R","","","CRDL","","IS","73.5","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C8-PFOS","13C8-
PFOS","94.3","%R","","","CRDL","","IS","94.3","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C2-PFDA","13C2-
PFDA","56.2","%R","","","CRDL","","IS","56.2","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","d3-MeFOSAA","d3-
MeFOSAA","51.4","%R","","","CRDL","","IS","51.4","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","d5-EtFOSAA","d5-
EtFOSAA","55.9","%R","","","CRDL","","IS","55.9","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C2-PFUnA","13C2-
PFUnA","71.9","%R","","","CRDL","","IS","71.9","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C2-PFDoA","13C2-
PFDoA","52.2","%R","","","CRDL","","IS","52.2","","","CRDL","",""
"SAOA-B02-SO-20-20.5","537 MOD","RES","1902189-17","Vista","13C2-PFTeDA","13C2-

PFTeDA","79.7","%R","","","CRDL","","IS","79.7","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","375-73-
5","PFBS","0.911","ug/kg","J","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","307-24-
4","PFHxA","2.83","ug/kg","","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","375-85-
9","PFHpA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","355-46-
4","PFHxS","1.71","ug/kg","J","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","335-67-
1","PFOA","1.05","ug/kg","J","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","375-95-
1","PFNA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","1763-23-
1","PFOS","7.11","ug/kg","","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","335-76-
2","PFDA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","2355-31-
9","NMeFOSAA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","2991-50-
6","NEtFOSAA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","2058-94-
8","PFUnA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","307-55-
1","PFDoA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","72629-94-
8","PFTrDA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","376-06-
7","PFTeDA","0.999","ug/kg","U","0.999","CRDL","","TRG","","","2.00","CRDL","YES","0.844"
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C3-PFBS","13C3-
PFBS","72.2","%R","","","CRDL","","IS","72.2","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C2-PFHxA","13C2-
PFHxA","82.0","%R","","","CRDL","","IS","82.0","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C4-PFHpA","13C4-
PFHpA","88.0","%R","","","CRDL","","IS","88.0","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C3-PFHxS","13C3-
PFHxS","82.3","%R","","","CRDL","","IS","82.3","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C2-PFOA","13C2-
PFOA","86.9","%R","","","CRDL","","IS","86.9","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C5-PFNA","13C5-
PFNA","77.8","%R","","","CRDL","","IS","77.8","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C8-PFOS","13C8-
PFOS","92.2","%R","","","CRDL","","IS","92.2","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C2-PFDA","13C2-
PFDA","58.6","%R","","","CRDL","","IS","58.6","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","d3-MeFOSAA","d3-
MeFOSAA","51.7","%R","","","CRDL","","IS","51.7","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","d5-EtFOSAA","d5-
EtFOSAA","54.9","%R","","","CRDL","","IS","54.9","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C2-PFUnA","13C2-
PFUnA","60.7","%R","","","CRDL","","IS","60.7","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C2-PFDoA","13C2-
PFDoA","45.8","%R","H","","CRDL","","IS","45.8","","","CRDL","",""
"SAOA-B02-SO-56-56.5","537 MOD","RES","1902189-18","Vista","13C2-PFTeDA","13C2-

PFTeDA","65.0","%R","","","CRDL","","IS","65.0","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","375-73-
5","PFBS","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","307-24-
4","PFHxA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","375-85-
9","PFHpA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","355-46-
4","PFHxS","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","335-67-
1","PFOA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","375-95-
1","PFNA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","1763-23-
1","PFOS","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","335-76-
2","PFDA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","2355-31-
9","NMeFOSAA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","2991-50-
6","NEtFOSAA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","2058-94-
8","PFUnA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","307-55-
1","PFDoA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","72629-94-
8","PFTrDA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","376-06-
7","PFTeDA","0.00410","ug/L","U","0.00410","CRDL","","TRG","","","0.00819","CRDL","YES","0.00281"
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C3-PFBS","13C3-
PFBS","89.2","%R","","","CRDL","","IS","89.2","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C2-PFHxA","13C2-
PFHxA","91.9","%R","","","CRDL","","IS","91.9","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C4-PFHpA","13C4-
PFHpA","91.9","%R","","","CRDL","","IS","91.9","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C3-PFHxS","13C3-
PFHxS","90.8","%R","","","CRDL","","IS","90.8","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C2-PFOA","13C2-
PFOA","90.1","%R","","","CRDL","","IS","90.1","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C5-PFNA","13C5-
PFNA","78.9","%R","","","CRDL","","IS","78.9","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C8-PFOS","13C8-
PFOS","91.0","%R","","","CRDL","","IS","91.0","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C2-PFDA","13C2-
PFDA","72.8","%R","","","CRDL","","IS","72.8","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","d3-MeFOSAA","d3-
MeFOSAA","65.2","%R","","","CRDL","","IS","65.2","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","d5-EtFOSAA","d5-
EtFOSAA","68.3","%R","","","CRDL","","IS","68.3","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C2-PFUnA","13C2-
PFUnA","72.5","%R","","","CRDL","","IS","72.5","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C2-PFDoA","13C2-
PFDoA","72.8","%R","","","CRDL","","IS","72.8","","","CRDL","",""
"FRB-07172019","537 MOD","RES","1902189-19","Vista","13C2-PFTeDA","13C2-

PFTeDA","75.8","%R","","","CRDL","","IS","75.8","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","375-73-
5","PFBS","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","307-24-
4","PFHxA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","375-85-
9","PFHpA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","355-46-
4","PFHxS","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","335-67-
1","PFOA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","375-95-
1","PFNA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","1763-23-
1","PFOS","0.0123","ug/L","","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","335-76-
2","PFDA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","2355-31-
9","NMeFOSAA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","2991-50-
6","NEtFOSAA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","2058-94-
8","PFUnA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","307-55-
1","PFDoA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","72629-94-
8","PFTrDA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","376-06-
7","PFTeDA","0.00417","ug/L","U","0.00417","CRDL","","TRG","","","0.00834","CRDL","YES","0.00286"
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C3-PFBS","13C3-
PFBS","99.2","%R","","","CRDL","","IS","99.2","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C2-PFHxA","13C2-
PFHxA","95.7","%R","","","CRDL","","IS","95.7","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C4-PFHpA","13C4-
PFHpA","97.9","%R","","","CRDL","","IS","97.9","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C3-PFHxS","13C3-
PFHxS","101","%R","","","CRDL","","IS","101","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C2-PFOA","13C2-
PFOA","92.2","%R","","","CRDL","","IS","92.2","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C5-PFNA","13C5-
PFNA","84.3","%R","","","CRDL","","IS","84.3","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C8-PFOS","13C8-
PFOS","101","%R","","","CRDL","","IS","101","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C2-PFDA","13C2-
PFDA","74.4","%R","","","CRDL","","IS","74.4","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","d3-MeFOSAA","d3-
MeFOSAA","65.5","%R","","","CRDL","","IS","65.5","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","d5-EtFOSAA","d5-
EtFOSAA","65.4","%R","","","CRDL","","IS","65.4","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C2-PFUnA","13C2-
PFUnA","72.7","%R","","","CRDL","","IS","72.7","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C2-PFDoA","13C2-
PFDoA","60.1","%R","","","CRDL","","IS","60.1","","","CRDL","",""
"EB-07172019","537 MOD","RES","1902189-20","Vista","13C2-PFTeDA","13C2-

PFTeDA","73.9","%R","","","CRDL","","IS","73.9","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","375-73-
5","PFBS","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","307-24-
4","PFHxA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","375-85-
9","PFHpA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","355-46-
4","PFHxS","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","335-67-
1","PFOA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","375-95-
1","PFNA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","1763-23-
1","PFOS","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","335-76-
2","PFDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","2355-31-
9","NMeFOSAA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","2991-50-
6","NEtFOSAA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","2058-94-
8","PFUnA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","307-55-
1","PFDoA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","72629-94-
8","PFTrDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","376-06-
7","PFTeDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C3-PFBS","13C3-
PFBS","91.7","%R","","","CRDL","","IS","91.7","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C2-PFHxA","13C2-
PFHxA","91.7","%R","","","CRDL","","IS","91.7","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C4-PFHpA","13C4-
PFHpA","97.6","%R","","","CRDL","","IS","97.6","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C3-PFHxS","13C3-
PFHxS","95.6","%R","","","CRDL","","IS","95.6","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C2-PFOA","13C2-
PFOA","86.7","%R","","","CRDL","","IS","86.7","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C5-PFNA","13C5-
PFNA","84.8","%R","","","CRDL","","IS","84.8","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C8-PFOS","13C8-
PFOS","85.2","%R","","","CRDL","","IS","85.2","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C2-PFDA","13C2-
PFDA","73.1","%R","","","CRDL","","IS","73.1","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","d3-MeFOSAA","d3-
MeFOSAA","72.7","%R","","","CRDL","","IS","72.7","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","d5-EtFOSAA","d5-
EtFOSAA","76.2","%R","","","CRDL","","IS","76.2","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C2-PFUnA","13C2-
PFUnA","79.3","%R","","","CRDL","","IS","79.3","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C2-PFDoA","13C2-
PFDoA","72.7","%R","","","CRDL","","IS","72.7","","","CRDL","",""
"B9G0224-BLK1","537 MOD","RES","B9G0224-BLK1","Vista","13C2-PFTeDA","13C2-

PFTeDA","61.3","%R","","","CRDL","","IS","61.3","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","375-73-
5","PFBS","0.0755","ug/L","","0.00400","CRDL","","SPK","94.3","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","307-24-
4","PFHxA","0.0779","ug/L","","0.00400","CRDL","","SPK","97.4","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","375-85-
9","PFHpA","0.0760","ug/L","","0.00400","CRDL","","SPK","95.0","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","355-46-
4","PFHxS","0.0858","ug/L","","0.00400","CRDL","","SPK","107","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","335-67-
1","PFOA","0.0778","ug/L","","0.00400","CRDL","","SPK","97.2","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","375-95-
1","PFNA","0.0801","ug/L","","0.00400","CRDL","","SPK","100","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","1763-23-
1","PFOS","0.0755","ug/L","","0.00400","CRDL","","SPK","94.4","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","335-76-
2","PFDA","0.0817","ug/L","","0.00400","CRDL","","SPK","102","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","2355-31-
9","NMeFOSAA","0.0827","ug/L","","0.00400","CRDL","","SPK","103","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","2991-50-
6","NEtFOSAA","0.0859","ug/L","","0.00400","CRDL","","SPK","107","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","2058-94-
8","PFUnA","0.0791","ug/L","","0.00400","CRDL","","SPK","98.8","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","307-55-
1","PFDoA","0.0793","ug/L","","0.00400","CRDL","","SPK","99.1","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","72629-94-
8","PFTrDA","0.0674","ug/L","","0.00400","CRDL","","SPK","84.2","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","376-06-
7","PFTeDA","0.0776","ug/L","","0.00400","CRDL","","SPK","96.9","","0.00800","CRDL","YES","0.00274"
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C3-PFBS","13C3-
PFBS","101","%R","","","CRDL","","IS","101","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C2-PFHxA","13C2-
PFHxA","93.8","%R","","","CRDL","","IS","93.8","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C4-PFHpA","13C4-
PFHpA","91.7","%R","","","CRDL","","IS","91.7","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C3-PFHxS","13C3-
PFHxS","103","%R","","","CRDL","","IS","103","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C2-PFOA","13C2-
PFOA","83.8","%R","","","CRDL","","IS","83.8","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C5-PFNA","13C5-
PFNA","78.4","%R","","","CRDL","","IS","78.4","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C8-PFOS","13C8-
PFOS","83.8","%R","","","CRDL","","IS","83.8","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C2-PFDA","13C2-
PFDA","72.5","%R","","","CRDL","","IS","72.5","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","d3-MeFOSAA","d3-
MeFOSAA","62.0","%R","","","CRDL","","IS","62.0","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","d5-EtFOSAA","d5-
EtFOSAA","64.4","%R","","","CRDL","","IS","64.4","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C2-PFUnA","13C2-
PFUnA","76.2","%R","","","CRDL","","IS","76.2","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C2-PFDoA","13C2-
PFDoA","69.1","%R","","","CRDL","","IS","69.1","","","CRDL","",""
"B9G0224-BS1","537 MOD","RES","B9G0224-BS1","Vista","13C2-PFTeDA","13C2-

PFTeDA","52.3","%R","","","CRDL","","IS","52.3","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","375-73-
5","PFBS","0.0801","ug/L","","0.00400","CRDL","","SPK","100","6.01","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","307-24-
4","PFHxA","0.0811","ug/L","","0.00400","CRDL","","SPK","101","4.01","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","375-85-
9","PFHpA","0.0739","ug/L","","0.00400","CRDL","","SPK","92.4","2.79","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","355-46-
4","PFHxS","0.0820","ug/L","","0.00400","CRDL","","SPK","102","4.58","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","335-67-
1","PFOA","0.0763","ug/L","","0.00400","CRDL","","SPK","95.4","1.93","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","375-95-
1","PFNA","0.0785","ug/L","","0.00400","CRDL","","SPK","98.2","1.91","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","1763-23-
1","PFOS","0.0831","ug/L","","0.00400","CRDL","","SPK","104","9.52","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","335-76-
2","PFDA","0.0815","ug/L","","0.00400","CRDL","","SPK","102","0.322","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","2355-31-
9","NMeFOSAA","0.0815","ug/L","","0.00400","CRDL","","SPK","102","1.46","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","2991-50-
6","NEtFOSAA","0.0840","ug/L","","0.00400","CRDL","","SPK","105","2.33","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","2058-94-
8","PFUnA","0.0800","ug/L","","0.00400","CRDL","","SPK","100","1.13","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","307-55-
1","PFDoA","0.0773","ug/L","","0.00400","CRDL","","SPK","96.6","2.60","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","72629-94-
8","PFTrDA","0.0616","ug/L","","0.00400","CRDL","","SPK","77.1","8.90","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","376-06-
7","PFTeDA","0.0799","ug/L","","0.00400","CRDL","","SPK","99.9","2.98","0.00800","CRDL","YES","0.00274"
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C3-PFBS","13C3-
PFBS","95.6","%R","","","CRDL","","IS","95.6","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C2-PFHxA","13C2-
PFHxA","98.6","%R","","","CRDL","","IS","98.6","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C4-PFHpA","13C4-
PFHpA","99.2","%R","","","CRDL","","IS","99.2","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C3-PFHxS","13C3-
PFHxS","96.5","%R","","","CRDL","","IS","96.5","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C2-PFOA","13C2-
PFOA","85.4","%R","","","CRDL","","IS","85.4","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C5-PFNA","13C5-
PFNA","82.8","%R","","","CRDL","","IS","82.8","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C8-PFOS","13C8-
PFOS","85.8","%R","","","CRDL","","IS","85.8","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C2-PFDA","13C2-
PFDA","75.3","%R","","","CRDL","","IS","75.3","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","d3-MeFOSAA","d3-
MeFOSAA","60.5","%R","","","CRDL","","IS","60.5","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","d5-EtFOSAA","d5-
EtFOSAA","63.2","%R","","","CRDL","","IS","63.2","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C2-PFUnA","13C2-
PFUnA","78.9","%R","","","CRDL","","IS","78.9","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C2-PFDoA","13C2-
PFDoA","72.9","%R","","","CRDL","","IS","72.9","","","CRDL","",""
"B9G0224-BSD1","537 MOD","RES","B9G0224-BSD1","Vista","13C2-PFTeDA","13C2-

PFTeDA","53.0","%R","","","CRDL","","IS","53.0","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","375-73-
5","PFBS","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","307-24-
4","PFHxA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","375-85-
9","PFHpA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","355-46-
4","PFHxS","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","335-67-
1","PFOA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","375-95-
1","PFNA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","1763-23-
1","PFOS","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","335-76-
2","PFDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","2355-31-
9","NMeFOSAA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","2991-50-
6","NEtFOSAA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","2058-94-
8","PFUnA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","307-55-
1","PFDoA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","72629-94-
8","PFTrDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","376-06-
7","PFTeDA","0.00400","ug/L","U","0.00400","CRDL","","TRG","","","0.00800","CRDL","YES","0.00274"
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C3-PFBS","13C3-
PFBS","93.6","%R","","","CRDL","","IS","93.6","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C2-PFHxA","13C2-
PFHxA","92.9","%R","","","CRDL","","IS","92.9","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C4-PFHpA","13C4-
PFHpA","107","%R","","","CRDL","","IS","107","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C3-PFHxS","13C3-
PFHxS","92.3","%R","","","CRDL","","IS","92.3","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C2-PFOA","13C2-
PFOA","89.0","%R","","","CRDL","","IS","89.0","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C5-PFNA","13C5-
PFNA","78.1","%R","","","CRDL","","IS","78.1","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C8-PFOS","13C8-
PFOS","99.0","%R","","","CRDL","","IS","99.0","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C2-PFDA","13C2-
PFDA","67.5","%R","","","CRDL","","IS","67.5","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","d3-MeFOSAA","d3-
MeFOSAA","77.2","%R","","","CRDL","","IS","77.2","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","d5-EtFOSAA","d5-
EtFOSAA","74.3","%R","","","CRDL","","IS","74.3","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C2-PFUnA","13C2-
PFUnA","67.8","%R","","","CRDL","","IS","67.8","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C2-PFDoA","13C2-
PFDoA","77.2","%R","","","CRDL","","IS","77.2","","","CRDL","",""
"B9G0251-BLK1","537 MOD","RES","B9G0251-BLK1","Vista","13C2-PFTeDA","13C2-

PFTeDA","66.2","%R","","","CRDL","","IS","66.2","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","375-73-
5","PFBS","0.0830","ug/L","","0.00400","CRDL","","SPK","104","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","307-24-
4","PFHxA","0.0894","ug/L","","0.00400","CRDL","","SPK","112","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","375-85-
9","PFHpA","0.0883","ug/L","","0.00400","CRDL","","SPK","110","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","355-46-
4","PFHxS","0.0907","ug/L","","0.00400","CRDL","","SPK","113","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","335-67-
1","PFOA","0.0878","ug/L","","0.00400","CRDL","","SPK","110","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","375-95-
1","PFNA","0.0867","ug/L","","0.00400","CRDL","","SPK","108","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","1763-23-
1","PFOS","0.0830","ug/L","","0.00400","CRDL","","SPK","104","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","335-76-
2","PFDA","0.0859","ug/L","","0.00400","CRDL","","SPK","107","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","2355-31-
9","NMeFOSAA","0.0907","ug/L","","0.00400","CRDL","","SPK","113","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","2991-50-
6","NEtFOSAA","0.0893","ug/L","","0.00400","CRDL","","SPK","112","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","2058-94-
8","PFUnA","0.0874","ug/L","","0.00400","CRDL","","SPK","109","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","307-55-
1","PFDoA","0.0849","ug/L","","0.00400","CRDL","","SPK","106","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","72629-94-
8","PFTrDA","0.0743","ug/L","","0.00400","CRDL","","SPK","92.9","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","376-06-
7","PFTeDA","0.0868","ug/L","","0.00400","CRDL","","SPK","109","","0.00800","CRDL","YES","0.00274"
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C3-PFBS","13C3-
PFBS","96.9","%R","","","CRDL","","IS","96.9","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C2-PFHxA","13C2-
PFHxA","94.6","%R","","","CRDL","","IS","94.6","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C4-PFHpA","13C4-
PFHpA","94.1","%R","","","CRDL","","IS","94.1","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C3-PFHxS","13C3-
PFHxS","93.5","%R","","","CRDL","","IS","93.5","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C2-PFOA","13C2-
PFOA","89.9","%R","","","CRDL","","IS","89.9","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C5-PFNA","13C5-
PFNA","86.2","%R","","","CRDL","","IS","86.2","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C8-PFOS","13C8-
PFOS","89.4","%R","","","CRDL","","IS","89.4","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C2-PFDA","13C2-
PFDA","73.3","%R","","","CRDL","","IS","73.3","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","d3-MeFOSAA","d3-
MeFOSAA","75.0","%R","","","CRDL","","IS","75.0","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","d5-EtFOSAA","d5-
EtFOSAA","81.9","%R","","","CRDL","","IS","81.9","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C2-PFUnA","13C2-
PFUnA","79.1","%R","","","CRDL","","IS","79.1","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C2-PFDoA","13C2-
PFDoA","76.4","%R","","","CRDL","","IS","76.4","","","CRDL","",""
"B9G0251-BS1","537 MOD","RES","B9G0251-BS1","Vista","13C2-PFTeDA","13C2-

PFTeDA","61.1","%R","","","CRDL","","IS","61.1","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","375-73-
5","PFBS","0.0814","ug/L","","0.00400","CRDL","","SPK","102","1.93","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","307-24-
4","PFHxA","0.0887","ug/L","","0.00400","CRDL","","SPK","111","0.846","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","375-85-
9","PFHpA","0.0872","ug/L","","0.00400","CRDL","","SPK","109","1.22","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","355-46-
4","PFHxS","0.0918","ug/L","","0.00400","CRDL","","SPK","115","1.17","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","335-67-
1","PFOA","0.0903","ug/L","","0.00400","CRDL","","SPK","113","2.81","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","375-95-
1","PFNA","0.0865","ug/L","","0.00400","CRDL","","SPK","108","0.295","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","1763-23-
1","PFOS","0.0820","ug/L","","0.00400","CRDL","","SPK","102","1.19","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","335-76-
2","PFDA","0.0928","ug/L","","0.00400","CRDL","","SPK","116","7.75","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","2355-31-
9","NMeFOSAA","0.0883","ug/L","","0.00400","CRDL","","SPK","110","2.61","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","2991-50-
6","NEtFOSAA","0.0939","ug/L","","0.00400","CRDL","","SPK","117","4.92","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","2058-94-
8","PFUnA","0.0879","ug/L","","0.00400","CRDL","","SPK","110","0.607","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","307-55-
1","PFDoA","0.0846","ug/L","","0.00400","CRDL","","SPK","106","0.374","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","72629-94-
8","PFTrDA","0.0683","ug/L","","0.00400","CRDL","","SPK","85.4","8.46","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","376-06-
7","PFTeDA","0.0903","ug/L","","0.00400","CRDL","","SPK","113","3.97","0.00800","CRDL","YES","0.00274"
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C3-PFBS","13C3-
PFBS","90.8","%R","","","CRDL","","IS","90.8","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C2-PFHxA","13C2-
PFHxA","91.6","%R","","","CRDL","","IS","91.6","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C4-PFHpA","13C4-
PFHpA","88.8","%R","","","CRDL","","IS","88.8","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C3-PFHxS","13C3-
PFHxS","82.7","%R","","","CRDL","","IS","82.7","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C2-PFOA","13C2-
PFOA","83.1","%R","","","CRDL","","IS","83.1","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C5-PFNA","13C5-
PFNA","70.0","%R","","","CRDL","","IS","70.0","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C8-PFOS","13C8-
PFOS","86.2","%R","","","CRDL","","IS","86.2","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C2-PFDA","13C2-
PFDA","62.1","%R","","","CRDL","","IS","62.1","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","d3-MeFOSAA","d3-
MeFOSAA","66.9","%R","","","CRDL","","IS","66.9","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","d5-EtFOSAA","d5-
EtFOSAA","67.7","%R","","","CRDL","","IS","67.7","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C2-PFUnA","13C2-
PFUnA","69.6","%R","","","CRDL","","IS","69.6","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C2-PFDoA","13C2-
PFDoA","68.5","%R","","","CRDL","","IS","68.5","","","CRDL","",""
"B9G0251-BSD1","537 MOD","RES","B9G0251-BSD1","Vista","13C2-PFTeDA","13C2-

PFTeDA","46.4","%R","H","","CRDL","","IS","46.4","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","375-73-
5","PFBS","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","307-24-
4","PFHxA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","375-85-
9","PFHpA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","355-46-
4","PFHxS","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","335-67-
1","PFOA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","375-95-
1","PFNA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","1763-23-
1","PFOS","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","335-76-
2","PFDA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","2355-31-
9","NMeFOSAA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","2991-50-
6","NEtFOSAA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","2058-94-
8","PFUnA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","307-55-
1","PFDoA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","72629-94-
8","PFTrDA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","376-06-
7","PFTeDA","1.00","ug/kg","U","1.00","CRDL","","TRG","","","2.00","CRDL","YES","0.845"
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C3-PFBS","13C3-
PFBS","77.5","%R","","","CRDL","","IS","77.5","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C2-PFHxA","13C2-
PFHxA","90.9","%R","","","CRDL","","IS","90.9","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C4-PFHpA","13C4-
PFHpA","102","%R","","","CRDL","","IS","102","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C3-PFHxS","13C3-
PFHxS","92.4","%R","","","CRDL","","IS","92.4","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C2-PFOA","13C2-
PFOA","91.5","%R","","","CRDL","","IS","91.5","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C5-PFNA","13C5-
PFNA","79.4","%R","","","CRDL","","IS","79.4","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C8-PFOS","13C8-
PFOS","102","%R","","","CRDL","","IS","102","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C2-PFDA","13C2-
PFDA","56.7","%R","","","CRDL","","IS","56.7","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","d3-MeFOSAA","d3-
MeFOSAA","52.9","%R","","","CRDL","","IS","52.9","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","d5-EtFOSAA","d5-
EtFOSAA","57.5","%R","","","CRDL","","IS","57.5","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C2-PFUnA","13C2-
PFUnA","61.7","%R","","","CRDL","","IS","61.7","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C2-PFDoA","13C2-
PFDoA","49.6","%R","H","","CRDL","","IS","49.6","","","CRDL","",""
"B9G0264-BLK1","537 MOD","RES","B9G0264-BLK1","Vista","13C2-PFTeDA","13C2-

PFTeDA","69.1","%R","","","CRDL","","IS","69.1","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","375-73-
5","PFBS","12.6","ug/kg","","1.00","CRDL","","SPK","126","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","307-24-
4","PFHxA","13.0","ug/kg","","1.00","CRDL","","SPK","130","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","375-85-
9","PFHpA","9.29","ug/kg","","1.00","CRDL","","SPK","92.9","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","355-46-
4","PFHxS","10.3","ug/kg","","1.00","CRDL","","SPK","103","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","335-67-
1","PFOA","11.2","ug/kg","","1.00","CRDL","","SPK","112","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","375-95-
1","PFNA","10.5","ug/kg","","1.00","CRDL","","SPK","105","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","1763-23-
1","PFOS","9.24","ug/kg","","1.00","CRDL","","SPK","92.4","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","335-76-
2","PFDA","11.9","ug/kg","","1.00","CRDL","","SPK","119","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","2355-31-
9","NMeFOSAA","10.5","ug/kg","","1.00","CRDL","","SPK","105","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","2991-50-
6","NEtFOSAA","11.0","ug/kg","","1.00","CRDL","","SPK","110","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","2058-94-
8","PFUnA","10.2","ug/kg","","1.00","CRDL","","SPK","102","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","307-55-
1","PFDoA","9.10","ug/kg","","1.00","CRDL","","SPK","91.0","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","72629-94-
8","PFTrDA","9.75","ug/kg","","1.00","CRDL","","SPK","97.5","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","376-06-
7","PFTeDA","11.1","ug/kg","","1.00","CRDL","","SPK","111","","2.00","CRDL","YES","0.845"
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C3-PFBS","13C3-
PFBS","69.1","%R","","","CRDL","","IS","69.1","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C2-PFHxA","13C2-
PFHxA","69.3","%R","","","CRDL","","IS","69.3","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C4-PFHpA","13C4-
PFHpA","87.0","%R","","","CRDL","","IS","87.0","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C3-PFHxS","13C3-
PFHxS","84.2","%R","","","CRDL","","IS","84.2","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C2-PFOA","13C2-
PFOA","81.7","%R","","","CRDL","","IS","81.7","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C5-PFNA","13C5-
PFNA","75.9","%R","","","CRDL","","IS","75.9","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C8-PFOS","13C8-
PFOS","94.6","%R","","","CRDL","","IS","94.6","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C2-PFDA","13C2-
PFDA","50.7","%R","","","CRDL","","IS","50.7","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","d3-MeFOSAA","d3-
MeFOSAA","62.5","%R","","","CRDL","","IS","62.5","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","d5-EtFOSAA","d5-
EtFOSAA","66.9","%R","","","CRDL","","IS","66.9","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C2-PFUnA","13C2-
PFUnA","56.9","%R","","","CRDL","","IS","56.9","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C2-PFDoA","13C2-
PFDoA","58.4","%R","","","CRDL","","IS","58.4","","","CRDL","",""
"B9G0264-BS1","537 MOD","RES","B9G0264-BS1","Vista","13C2-PFTeDA","13C2-

PFTeDA","70.6","%R","","","CRDL","","IS","70.6","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","375-73-
5","PFBS","12.1","ug/kg","","0.998","CRDL","","SPK","121","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","307-24-
4","PFHxA","11.4","ug/kg","","0.998","CRDL","","SPK","114","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","375-85-
9","PFHpA","9.58","ug/kg","","0.998","CRDL","","SPK","96.0","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","355-46-
4","PFHxS","8.49","ug/kg","","0.998","CRDL","","SPK","83.3","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","335-67-
1","PFOA","10.0","ug/kg","","0.998","CRDL","","SPK","99.2","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","375-95-
1","PFNA","9.84","ug/kg","","0.998","CRDL","","SPK","98.3","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","1763-23-
1","PFOS","10.2","ug/kg","","0.998","CRDL","","SPK","89.8","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","335-76-
2","PFDA","10.6","ug/kg","","0.998","CRDL","","SPK","105","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","2355-31-
9","NMeFOSAA","12.6","ug/kg","","0.998","CRDL","","SPK","126","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","2991-50-
6","NEtFOSAA","12.8","ug/kg","","0.998","CRDL","","SPK","128","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","2058-94-
8","PFUnA","9.79","ug/kg","","0.998","CRDL","","SPK","98.1","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","307-55-
1","PFDoA","9.00","ug/kg","","0.998","CRDL","","SPK","90.2","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","72629-94-
8","PFTrDA","9.05","ug/kg","","0.998","CRDL","","SPK","90.7","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","376-06-
7","PFTeDA","9.19","ug/kg","","0.998","CRDL","","SPK","92.1","","2.00","CRDL","YES","0.843"
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C3-PFBS","13C3-
PFBS","69.1","%R","","","CRDL","","IS","69.1","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C2-PFHxA","13C2-
PFHxA","81.2","%R","","","CRDL","","IS","81.2","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C4-PFHpA","13C4-
PFHpA","90.4","%R","","","CRDL","","IS","90.4","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C3-PFHxS","13C3-
PFHxS","95.1","%R","","","CRDL","","IS","95.1","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C2-PFOA","13C2-
PFOA","91.3","%R","","","CRDL","","IS","91.3","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C5-PFNA","13C5-
PFNA","76.7","%R","","","CRDL","","IS","76.7","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C8-PFOS","13C8-
PFOS","88.5","%R","","","CRDL","","IS","88.5","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C2-PFDA","13C2-
PFDA","54.9","%R","","","CRDL","","IS","54.9","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","d3-MeFOSAA","d3-
MeFOSAA","57.0","%R","","","CRDL","","IS","57.0","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","d5-EtFOSAA","d5-
EtFOSAA","58.5","%R","","","CRDL","","IS","58.5","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C2-PFUnA","13C2-
PFUnA","73.6","%R","","","CRDL","","IS","73.6","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C2-PFDoA","13C2-
PFDoA","61.1","%R","","","CRDL","","IS","61.1","","","CRDL","",""
"NON-B03-SO-1-1.5MS","537 MOD","RES","B9G0264-MS1","Vista","13C2-PFTeDA","13C2-

PFTeDA","78.3","%R","","","CRDL","","IS","78.3","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","375-73-
5","PFBS","12.1","ug/kg","","0.988","CRDL","","SPK","122","0.823","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","307-24-
4","PFHxA","12.0","ug/kg","","0.988","CRDL","","SPK","121","5.96","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","375-85-
9","PFHpA","10.2","ug/kg","","0.988","CRDL","","SPK","103","7.04","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","355-46-
4","PFHxS","9.95","ug/kg","","0.988","CRDL","","SPK","98.9","17.1","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","335-67-
1","PFOA","10.2","ug/kg","","0.988","CRDL","","SPK","102","2.78","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","375-95-
1","PFNA","10.9","ug/kg","","0.988","CRDL","","SPK","110","11.2","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","1763-23-
1","PFOS","10.3","ug/kg","","0.988","CRDL","","SPK","91.3","1.66","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","335-76-
2","PFDA","10.8","ug/kg","","0.988","CRDL","","SPK","109","3.74","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","2355-31-
9","NMeFOSAA","12.5","ug/kg","","0.988","CRDL","","SPK","126","0","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","2991-50-
6","NEtFOSAA","12.4","ug/kg","","0.988","CRDL","","SPK","126","1.57","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","2058-94-
8","PFUnA","10.6","ug/kg","","0.988","CRDL","","SPK","107","8.68","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","307-55-
1","PFDoA","9.50","ug/kg","","0.988","CRDL","","SPK","96.1","6.33","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","72629-94-
8","PFTrDA","10.6","ug/kg","","0.988","CRDL","","SPK","108","17.4","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","376-06-
7","PFTeDA","9.08","ug/kg","","0.988","CRDL","","SPK","91.9","0.217","1.98","CRDL","YES","0.835"
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C3-PFBS","13C3-
PFBS","71.9","%R","","","CRDL","","IS","71.9","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C2-PFHxA","13C2-
PFHxA","81.1","%R","","","CRDL","","IS","81.1","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C4-PFHpA","13C4-
PFHpA","90.0","%R","","","CRDL","","IS","90.0","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C3-PFHxS","13C3-
PFHxS","90.3","%R","","","CRDL","","IS","90.3","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C2-PFOA","13C2-
PFOA","89.3","%R","","","CRDL","","IS","89.3","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C5-PFNA","13C5-
PFNA","76.9","%R","","","CRDL","","IS","76.9","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C8-PFOS","13C8-
PFOS","87.5","%R","","","CRDL","","IS","87.5","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C2-PFDA","13C2-
PFDA","50.6","%R","","","CRDL","","IS","50.6","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","d3-MeFOSAA","d3-
MeFOSAA","54.5","%R","","","CRDL","","IS","54.5","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","d5-EtFOSAA","d5-
EtFOSAA","57.5","%R","","","CRDL","","IS","57.5","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C2-PFUnA","13C2-
PFUnA","68.3","%R","","","CRDL","","IS","68.3","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C2-PFDoA","13C2-
PFDoA","59.2","%R","","","CRDL","","IS","59.2","","","CRDL","",""
"NON-B03-SO-1-1.5MSD","537 MOD","RES","B9G0264-MSD1","Vista","13C2-PFTeDA","13C2-

PFTeDA","85.8","%R","","","CRDL","","IS","85.8","","","CRDL","",""
"4663.3803","CTO 17F3803 Yuma","SAOA-B03-SO-5-5.5","07/11/2019 16:00","SO","1902189-01","","","","537
MOD","Gen Prep","RES","08/01/2019 12:42","08/06/2019
14:23","Vista","COA","DRY","","1","","","","5.66","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/19/
2019 09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","SAOA-B03-SO-20-20.5","07/11/2019 16:30","SO","1902189-02","","","","537
MOD","Gen Prep","RES","08/01/2019 12:42","08/06/2019
14:34","Vista","COA","DRY","","1","","","","16.20","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/1
9/2019 09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","SAOA-B03-SO-56-56.5","07/11/2019 17:50","SO","1902189-03","","","","537
MOD","Gen Prep","RES","08/01/2019 12:42","08/05/2019
15:36","Vista","COA","DRY","","1","","","","15.20","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/1
9/2019 09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","SAOA-B03-GW","07/11/2019 18:20","AQ","1902189-04","","","","537
MOD","Gen Prep","RES","07/25/2019 07:49","07/28/2019
23:35","Vista","COA","","","1","","","","","B9G0251","B9G0251","S9G0074","S9G0074","1902189","07/19/2019
09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","NAOA-B03-GW","07/15/2019 15:55","AQ","1902189-05","","","","537
MOD","Gen Prep","RES","07/25/2019 07:49","07/29/2019
00:18","Vista","COA","","","1","","","","","B9G0251","B9G0251","S9G0074","S9G0074","1902189","07/19/2019
09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","EB-07152019-GW","07/15/2019 17:10","AQ","1902189-06","","","","537
MOD","Gen Prep","RES","07/24/2019 06:20","07/26/2019
11:27","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","07/19/2019
09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","FRB-07152019","07/15/2019 17:15","AQ","1902189-07","","","","537
MOD","Gen Prep","RES","07/24/2019 06:20","07/26/2019
11:38","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","07/19/2019
09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","NON-B03-SO-1-1.5","07/16/2019 07:50","SO","1902189-08","","","","537
MOD","Gen Prep","RES","08/01/2019 12:42","08/05/2019
15:47","Vista","COA","DRY","","1","","","","0.79","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/19/
2019 09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","NON-B03-SO-15-15.5","07/16/2019 08:20","SO","1902189-09","","","","537
MOD","Gen Prep","RES","08/01/2019 12:42","08/05/2019
15:57","Vista","COA","DRY","","1","","","","3.77","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/19/
2019 09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","NON-B03-GW","07/16/2019 10:30","AQ","1902189-10","","","","537
MOD","Gen Prep","RES","07/25/2019 07:49","07/29/2019
00:28","Vista","COA","","","1","","","","","B9G0251","B9G0251","S9G0074","S9G0074","1902189","07/19/2019
09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","EB-07162019-GW","07/16/2019 10:40","AQ","1902189-11","","","","537
MOD","Gen Prep","RES","07/24/2019 06:20","07/26/2019
11:48","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","07/19/2019
09:23","08/09/2019 00:00"
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MOD","Gen Prep","DL","07/25/2019 07:49","07/29/2019
19:24","Vista","COA","","","5","","","","","B9G0251","B9G0251","S9G0074","S9G0074","1902189","07/19/2019
09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","NAOA-B06-GW","07/16/2019 16:00","AQ","1902189-12","","","","537
MOD","Gen Prep","RES","07/25/2019 07:49","07/29/2019
00:39","Vista","COA","","","1","","","","","B9G0251","B9G0251","S9G0074","S9G0074","1902189","07/19/2019
09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","FRB-07162019","07/16/2019 17:30","AQ","1902189-13","","","","537

MOD","Gen Prep","RES","07/24/2019 06:20","07/26/2019
11:59","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","07/19/2019
09:23","08/09/2019 00:00"
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MOD","Gen Prep","RES","07/24/2019 06:20","07/26/2019
12:10","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","07/19/2019
09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","NAOA-B04-SO-69-69.5","07/17/2019 09:45","SO","1902189-15","","","","537
MOD","Gen Prep","RES","08/01/2019 12:42","08/06/2019
14:44","Vista","COA","DRY","","1","","","","14.00","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/1
9/2019 09:23","08/09/2019 00:00"
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MOD","Gen Prep","RES","08/01/2019 12:42","08/05/2019
16:18","Vista","COA","DRY","","1","","","","15.10","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/1
9/2019 09:23","08/09/2019 00:00"
"4663.3803","CTO 17F3803 Yuma","SAOA-B02-SO-20-20.5","07/17/2019 14:45","SO","1902189-17","","","","537
MOD","Gen Prep","RES","08/01/2019 12:42","08/05/2019
16:29","Vista","COA","DRY","","1","","","","11.30","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/1
9/2019 09:23","08/09/2019 00:00"
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MOD","Gen Prep","RES","08/01/2019 12:42","08/06/2019
14:55","Vista","COA","DRY","","1","","","","21.80","B9G0264","B9G0264","S9H0009","S9H0009","1902189","07/1
9/2019 09:23","08/09/2019 00:00"
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MOD","Gen Prep","RES","07/24/2019 06:20","07/26/2019
12:20","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","07/19/2019
09:23","08/09/2019 00:00"
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MOD","Gen Prep","RES","07/24/2019 06:20","07/26/2019
12:31","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","07/19/2019
09:23","08/09/2019 00:00"
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Prep","RES","07/24/2019 06:20","07/26/2019
11:06","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","","08/09/2019
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Prep","RES","07/24/2019 06:20","07/26/2019
10:45","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","","08/09/2019
00:00"
"4663.3803","CTO 17F3803 Yuma","B9G0224-BSD1","","AQ","B9G0224-BSD1","LCSD","","","537 MOD","Gen
Prep","RES","07/24/2019 06:20","07/26/2019
10:55","Vista","COA","","","1","","","","","B9G0224","B9G0224","S9G0067","S9G0067","1902189","","08/09/2019
00:00"
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Prep","RES","07/25/2019 07:49","07/28/2019
23:25","Vista","COA","","","1","","","","","B9G0251","B9G0251","S9G0074","S9G0074","1902189","","08/09/2019
00:00"
"4663.3803","CTO 17F3803 Yuma","B9G0251-BS1","","AQ","B9G0251-BS1","LCS","","","537 MOD","Gen
Prep","RES","07/25/2019 07:49","07/28/2019
23:04","Vista","COA","","","1","","","","","B9G0251","B9G0251","S9G0074","S9G0074","1902189","","08/09/2019
00:00"
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Prep","RES","07/25/2019 07:49","07/28/2019
23:14","Vista","COA","","","1","","","","","B9G0251","B9G0251","S9G0074","S9G0074","1902189","","08/09/2019

00:00"
"4663.3803","CTO 17F3803 Yuma","B9G0264-BLK1","","SO","B9G0264-BLK1","MB","","","537 MOD","Gen Prep","RES","08/01/2019 12:42","08/06/2019 14:13","Vista","COA","DRY","","1","","","","100.00","B9G0264","B9G0264","S9H0009","S9H0009","1902189","","08/09/2019 00:00"
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"4663.3803","CTO 17F3803 Yuma","NON-B03-SO-1-1.5MS","08/01/2019 12:42","SO","B9G0264-MS1","MS","","","537 MOD","Gen Prep","RES","08/01/2019 12:42","08/05/2019 14:43","Vista","COA","DRY","","1","","","","100.00","B9G0264","B9G0264","S9H0009","S9H0009","1902189","","08/09/2019 00:00"
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LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Tetra Tech EC, Inc.
17885 Von Karman Avenue, Suite 500
Irvine, CA 92614
ATTN: Ms. Lisa Bienkowski
Lisa.Bienkowski@tetratech.com

August 26, 2019

SUBJECT: Revised MCAS Yuma, CTO 17F3803, Data Validation

Dear Ms. Bienkowski,

Enclosed is the revised validation report for the fraction listed below. Please replace the previously submitted report with the enclosed revised report.

- Corrected the sample ID

LDC Project #45706RV1:

SDG #	Fraction
1902014	Perfluoroalkyl & Polyfluoroalkyl Substances

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

- Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, Site Inspection for Per- and Polyfluoroalkyl Substances, Marine Corps Air Station Yuma, Arizona; May 2019
- U.S. Department of Defense Quality Systems Manual for Environmental Laboratories, Version 5.1; 2017
- USEPA National Functional Guidelines for Superfund Organic Methods Data Review; January 2017

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

Sincerely,

Christina Rink

Christina Rink
crink@lab-data.com
Project Manager/Senior Chemist

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

Tetra Tech EC, Inc.
17885 Von Karman Avenue, Suite 500
Irvine, CA 92614
ATTN: Ms. Lisa Bienkowski
Lisa.Bienkowski@tetratech.com

August 23, 2019

SUBJECT: MCAS Yuma, CTO 17F3803, Data Validation

Dear Ms. Bienkowski,

Enclosed are the final validation reports for the fraction listed below. These SDGs were received on August 12, 2019. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #45706:

SDG #	Fraction
1902014, 1902097 1902189	Perfluoroalkyl & Polyfluoroalkyl Substances

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

- Final Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, Site Inspection for Per- and Polyfluoroalkyl Substances, Marine Corps Air Station Yuma, Arizona; May 2019
- U.S. Department of Defense Quality Systems Manual for Environmental Laboratories, Version 5.1; 2017
- USEPA National Functional Guidelines for Superfund Organic Methods Data Review; January 2017

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

Sincerely,

Christina Rink

Christina Rink
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Project Manager/Senior Chemist

4,149 pages-ADV 2 WEEK TAT Attachment 1

Stage 4 **LDC #45706 (Tetra Tech-EC, Inc.-Irvine, CA / MCAS Yuma, CTO 3803)** **PO# 1164819**

LDC	SDG#	DATE REC'D	(3) DATE DUE	PFAs (537)																																	
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	1902014	08/12/19	08/26/19	5	5																																
B	1902097	08/12/19	08/26/19	8	12																																
C	1902189	08/12/19	08/26/19	11	9																																
Total	T/CR			24	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation).

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Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: MCAS Yuma, CTO 17F3803

LDC Report Date: August 26, 2019

Parameters: Perfluoroalkyl & Polyfluoroalkyl Substances

Validation Level: Stage 4

Laboratory: Vista Analytical Laboratory

Sample Delivery Group (SDG): 1902014

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
CAOA-B03-SO-4-4.5	1902014-01	Soil	07/03/19
CAOA-B03-SO-20-20.5	1902014-02	Soil	07/03/19
FRB-07032019	1902014-03	Water	07/03/19
EB-07032019	1902014-04	Water	07/03/19
CAOA-B01-SO-0-0.5	1902014-05	Soil	07/08/19
CAOA-B04-SO-0-0.5	1902014-06	Soil	07/08/19
CAOA-B01-SO-20-20.5	1902014-07	Soil	07/08/19
FRB-07082019	1902014-08	Water	07/08/19
CAOA-B01-GW	1902014-09	Water	07/08/19
EB-07082019	1902014-10	Water	07/08/19
CAOA-B01-SO-0-0.5MS	1902014-05MS	Soil	07/08/19
CAOA-B01-SO-0-0.5MSD	1902014-05MSD	Soil	07/08/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan), Site Inspection for Per- and Polyfluoroalkyl Substances, Marine Corps Air Station Yuma, Arizona (May 2019), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017), and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) by Environmental Protection Agency (EPA) Method 537 Modified

All sample results were subjected to Stage 4 data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

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

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

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

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance was checked and the requirements were met.

III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

For each calibration standard, all compounds were within 70-130% of their true value.

The signal to noise (S/N) ratio was within validation criteria for all compounds.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all compounds.

The signal to noise (S/N) ratio was within validation criteria for all compounds.

V. Laboratory Blanks

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

VI. Field Blanks

Samples EB-07032019 and EB-07082019 were identified as equipment blanks. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Compound	Concentration	Associated Samples in this SDG
EB-07032019	07/03/19	PFHxA PFOS	0.00623 ug/L 0.0852 ug/L	CAOA-B03-SO-4-4.5
EB-07082019	07/08/19	PFHxA PFOS	0.0164 ug/L 0.0217 ug/L	CAOA-B01-SO-0-0.5 CAOA-B04-SO-0-0.5

Samples FRB-07032019 and FRB-07082019 were identified as field reagent blanks. No contaminants were found.

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X for contaminants) than the concentrations found in the associated field blanks.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples/Ongoing Precision Recovery

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

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target compounds were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Compound	Flag	A or P
CAOA-B03-SO-4-4.5	d3-MeFOSAA d5-EtFOSAA 13C2-PFDoA	42.2 (50-150) 46.3 (50-150) 49.5 (50-150)	PFDoA PFTrDA MeFOSAA EtFOSAA	J (all detects) UJ (all non-detects)	P

Sample	Labeled Compound	%R (Limits)	Affected Compound	Flag	A or P
CAOA-B03-SO-20-20.5	13C2-PFDoA 13C2-PFTeDA	43.2 (50-150) 30.5 (50-150)	PFDoA PFTrDA PFTeDA	J (all detects) UJ (all non-detects)	P
CAOA-B01-SO-0-0.5	13C2-PFDoA	43.6 (50-150)	PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects)	P
CAOA-B04-SO-0-0.5	d3-MeFOSAA	48.3 (50-150)	MeFOSAA	UJ (all non-detects)	P
CAOA-B01-SO-20-20.5	13C3-PFBS d3-MeFOSAA d5-EtFOSAA 13C2-PFDoA	48.9 (50-150) 36.1 (50-150) 37.5 (50-150) 42.8 (50-150)	PFBS PFDoA PFTrDA MeFOSAA EtFOSAA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P
CAOA-B01-GW	13C2-PFTeDA	32.4 (50-150)	PFTeDA	UJ (all non-detects)	P

XI. Compound Quantitation

All compound quantitations met validation criteria.

All compounds reported below the limit of quantitation (LOQ) were qualified as follows:

Sample	Finding	Flag	A or P
CAOA-B03-SO-4-4.5 CAOA-B03-SO-20-20.5 EB-07032019 CAOA-B01-SO-0-0.5 CAOA-B04-SO-0-0.5 CAOA-B01-SO-20-20.5 CAOA-B01-GW	All compounds reported below the LOQ.	J (all detects)	A

XII. Target Compound Identifications

All target compound identifications met validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

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

Due to labeled compound %R and results below the LOQ, data were qualified as estimated in seven samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Data Qualification Summary - SDG 1902014

Sample	Compound	Flag	A or P	Reason
CAOA-B03-SO-4-4.5	PFDoA PFTrDA MeFOSAA EtFOSAA	J (all detects) UJ (all non-detects)	P	Labeled compounds (%R)
CAOA-B03-SO-20-20.5	PFDoA PFTrDA PFTeDA	J (all detects) UJ (all non-detects)	P	Labeled compounds (%R)
CAOA-B01-SO-0-0.5	PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects)	P	Labeled compounds (%R)
CAOA-B04-SO-0-0.5	MeFOSAA	UJ (all non-detects)	P	Labeled compounds (%R)
CAOA-B01-SO-20-20.5	PFBS PFDoA PFTrDA MeFOSAA EtFOSAA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P	Labeled compounds (%R)
CAOA-B01-GW	PFTeDA	UJ (all non-detects)	P	Labeled compounds (%R)
CAOA-B03-SO-4-4.5 CAOA-B03-SO-20-20.5 EB-07032019 CAOA-B01-SO-0-0.5 CAOA-B04-SO-0-0.5 CAOA-B01-SO-20-20.5 CAOA-B01-GW	All compounds reported below the LOQ.	J (all detects)	A	Compound quantitation

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Laboratory Blank Data Qualification Summary - SDG 1902014

No Sample Data Qualified in this SDG

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Field Blank Data Qualification Summary - SDG 1902014

No Sample Data Qualified in this SDG

LDC #: 45706A96 **VALIDATION COMPLETENESS WORKSHEET** Date: 08/20/19
SDG #: 1902014 Stage 4 Page: 1 of 1
Laboratory: Vista Analytical Laboratory Reviewer: VIe
2nd Reviewer:

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537(M))

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	LC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	r² Individual ≤ 30% IAV ≤ 30%
IV.	Continuing calibration/ISC	A	CCV ≤ 30%
V.	Laboratory Blanks	A	
VI.	Field blanks	SW	FRB = 3, 8 EB = 4, 10
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D, OPR
IX.	Field duplicates	N	
X.	Labeled Compounds	SW	
XI.	Compound quantitation RL/LOQ/LODs	A	
XII.	Target compound identification	A	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	CAOA-B03-SO-4-4.5	1902014-01	Soil	07/03/19
2	CAOA-B03-SO-20-20.5	1902014-02	Soil	07/03/19
3	FRB-07032019	1902014-03	Water	07/03/19
4	EB-07032019	1902014-04	Water	07/03/19
5	CAOA-B01-SO-0-0.5	1902014-05	Soil	07/08/19
6	CAOA-B04-SO-0-0.5	1902014-06	Soil	07/08/19
7	CAOA-B04-SO-20-20.5	1902014-07	Soil	07/08/19
8	FRB-07082019	1902014-08	Water	07/08/19
9	CAOA-B01-GW	1902014-09	Water	07/08/19
10	EB-07082019	1902014-10	Water	07/08/19
11	CAOA-B01-SO-0-0.5MS	1902014-05MS	Soil	07/08/19
12	CAOA-B01-SO-0-0.5MSD	1902014-05MSD	Soil	07/08/19
13				
14				
15	B9G0189-BLK1			
	B9G0134-			

LDC #: 45706 A96

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer:

Method: LCMS (EPA Method 537 Modified)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	✓			
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of ≥ 0.990?	✓			
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target compounds detected in the field blanks?	✓			
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			

LDC #: 45706 A96

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?			✓	
Were target compounds detected in the field duplicates?			✓	
XI. Labeled compounds				
Were labeled compound percent recoveries (%R) within the QC limits?		✓		
XII. Compound quantitation				
Did the laboratory reporting limits (RL) meet the QAPP RLs?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

VALIDATION FINDINGS WORKSHEET

METHOD: Perfluorinated Alkyl Acids (EPA Method 537)

A. PFBA	375-22-4
B. PFPeA	2706-90-3
C. PFBS	375-73-5
D. PFHxA	307-24-4
E. PFHpA	375-85-9
F. PFHxS	355-46-4
G. PFOA	335-67-1
H. PFHpS	375-92-8
I. PFNA	375-95-1
J. PFOSA	754-91-6
K. PFOS	1763-23-1
L. PFDA	335-76-2
M. PFUnA	2058-94-8
N. PFDS	335-77-3
O. PFDoA	307-55-1
P. MeFOSA	31506-32-8
Q. PFTrDA	72629-94-8
R. PFTeDA	376-06-7
S. EtFOSA	4151-50-2
T. MeFOSE	24448-09-7
U. EtFOSE	1691-99-2
V. MeFOSAA	2355-31-9
W. EtFOSAA	2991-50-6

Notes:_____

LDC #: 45706 A96

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537)

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 07/03/19

Field blank type: (circle one) Trip Blank/Field Blank / Rinsate / Other: EB Associated Samples: 1 (75%)

	Compound	Blank ID	Sample Identification								
		4									
C	D	0.00623									
7	K	0.0852									

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 07/08/19

Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 5, 6 (75%)

	Compound	Blank ID	Sample Identification								
		10	(5%)								
7	D	0.0164	0.082								
7	K	0.0217	0.1085								

LDC #: 45706A96

VALIDATION FINDINGS WORKSHEET
Labeled Compound

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537M)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y (N) N/A Were all labeled compounds within -50 to +150% of the associated calibration standard?

#	Date	Sample ID	Labeled Compound	%R	Limits (%)	Qualifications
		1 (ND)	d3-V	42.2	50-150	J (NJ P (qual V)
		↓	d5-W	46.3		W
		(ND, Det)	13C2-O	49.5		O, Q
		2 (ND Det)	13C2-O	43.2		O, Q
		(ND)	13C2-R	30.5		R
		5 (ND)	13C2-O	43.6		O, Q
		6 (ND)	d3-V	48.3		V
		7 (ND)	13C3-C	48.9		C
		↓	d3-V	36.1		V
			d5-W	37.5		W
		↓	13C2-O	42.8		O, Q
		9 (ND)	13C2-R	32.4		R
		BG60189-BLK1	d3-V	35.4		V
			d5-W	41.5		W
			13C2-O	42.6		O, Q
		11	d3-V	38.8		NQ (QC)
			d5-W	38.8		
		12	d3-V	41.4		
			d5-W	45.9		
			13C2-O	46.3		

LDC#: 45706A96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/16/2019	SCN945	PFOA	0.25	0.04382	3.125
			0.5	0.08680	6.250
	190716M2-CRV		1	0.17268	12.500
		13C2-PFOA	2	0.30178	25.000
			5	0.77418	62.500
			10	1.61096	125.000
			50	8.04664	625.000
			100	15.41406	1250.000
			250	38.92819	3125.000
			500	81.23690	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.164148	0.041757
Std Err of Y Est		
R Squared	0.999672	0.999501
Degrees of Freedom		
X Coefficient(s)	0.01290950	1.994320
Std Err of Coef.		
Correlation Coefficient	0.999836	
Coefficient of Determination (r^2)	0.999672	0.999501

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/16/2019	SCN945	PFOS	0.25	0.00849	3.125
			0.5	0.03458	6.250
			1	0.08285	12.500
	190716M2-CRV	13C8-PFOS	2	0.19007	25.000
			5	0.47672	62.500
			10	1.01888	125.000
			50	5.18689	625.000
			100	10.13946	1250.000
			250	24.80748	3125.000
			500	52.54048	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.122693	-0.149993
Std Err of Y Est		
R Squared	0.999493	0.999286
Degrees of Freedom		
X Coefficient(s)	0.00833418	1.287160
Std Err of Coef.		
Correlation Coefficient	0.999747	
Coefficient of Determination (r^2)	0.999493	0.999286

LDC#: 45706A96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/22/2019	SCN945	PFOA	0.25	0.03165	3.125
			0.5	0.06647	6.250
	190722M1-CRV		1	0.11573	12.500
		13C2-PFOA	2	0.23840	25.000
			5	0.63338	62.500
			10	1.21526	125.000
			50	6.28315	625.000
			100	11.97011	1250.000
			250	28.74840	3125.000
			500	61.12986	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.075937	0.037722
Std Err of Y Est		
R Squared	0.999429	0.999184
Degrees of Freedom		
X Coefficient(s)	0.00968201	1.502070
Std Err of Coef.		
Correlation Coefficient	0.999714	
Coefficient of Determination (r^2)	0.999429	0.999184

LDC#: 45706A96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/22/2019	SCN945	PFOS	0.25	0.01898	3.125
			0.5	0.05101	6.250
	190722M1-CRV		1	0.07006	12.500
		13C8-PFOS	2	0.15729	25.000
			5	0.40492	62.500
			10	0.84884	125.000
			50	4.45203	625.000
			100	8.49765	1250.000
			250	20.93435	3125.000
			500	43.12088	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.029639	-0.019750
Std Err of Y Est		
R Squared	0.999855	0.999659
Degrees of Freedom		
X Coefficient(s)	0.00686606	1.069000
Std Err of Coef.		
Correlation Coefficient	0.999927	
Coefficient of Determination (r^2)	0.999855	0.999659

LDC # 45706A96

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

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

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Conc	Reported	Recalculated	Reported % R	Recalculated % R
1	190719M1-39	7/19/2019	PFOA	(13C2-PFOA)	1.000	1.007	1.007	100.7	100.7
	ISC		PFOS	(13C8-PFOS)	1.000	0.910	0.910	91.0	91.0
2	190719M1-57	7/19/2019	PFOA	(13C2-PFOA)	10.000	9.758	9.758	97.6	97.6
	CS3		PFOS	(13C8-PFOS)	10.000	8.996	8.996	90.0	90.0
3	090721M2-6	7/21/2019	PFOA	(13C2-PFOA)	1.000	0.771	0.771	77.1	77.1
	ISC		PFOS	(13C8-PFOS)	1.000	0.866	0.866	86.6	86.6
4	090722M1-58	7/22/2019	PFOA	(13C2-PFOA)	10.000	9.867	9.867	98.7	98.7
	CS3		PFOS	(13C8-PFOS)	10.000	10.110	10.110	101.1	101.1

LDC #: 45706 A96

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537Mod)

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

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = | MSC - MSC | * 2/(MSC + MSDC) MSC = Matrix spike concentration MSDC = Matrix spike duplicate concentration

MS/MSD samples: 11/12

Compound	Spike Added (ug/kg)		Sample Conc (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	-----	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalc
PFOA	9.936	9.89	0	10.93	10.8	103	105	108	110	4.74	4.74
PFOS	↓	↓	1.154	11.003	10.76	98.9	99.2	97.3	97.6	1.63	1.63

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

NOTE 1. RPD based on %R
2. Rounding off issues

LDC #: 45706 A96

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537M)

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

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: BQG0189-BS1 (OPR)

Compound	Spike Added (ng/kg)		Spike Concentration (ng/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	10.0	NA	10.4	NA	104	104				
PFOS	↓	↓	8.91	↓	89.1	89.1				

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

LDC #: 45706A96

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: LC/MS PFAS (EPA Method 537M)

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

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

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 5, PFOS:

Conc. = $\frac{\left[\left(\frac{322}{2990} \times 12.5\right) - (-0.14993)\right]}{(1.28716)} = 1.1624$

final conc. = $\frac{(1.1624)(1\ mL)}{(1.07\ g)(0.941)}$

= 1.154 ng/kg

#	Sample ID	Compound	Reported Concentration (ng/kg)	Calculated Concentration ( )	Qualification
			1.15		

LDC Report# 45706B96

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: MCAS Yuma, CTO 17F3803

LDC Report Date: August 23, 2019

Parameters: Perfluoroalkyl & Polyfluoroalkyl Substances

Validation Level: Stage 4

Laboratory: Vista Analytical Laboratory

Sample Delivery Group (SDG): 1902097

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SAOA-B10-SO-1-1.5	1902097-01	Soil	07/09/19
SAOA-B10-SO-20-20.5	1902097-02	Soil	07/09/19
SAOA-B10-GW	1902097-03	Water	07/09/19
SAOA-B10-GW-D	1902097-04	Water	07/09/19
EB-07092019	1902097-05	Water	07/09/19
NON-B02-SO-1-1.5	1902097-06	Soil	07/09/19
FRB-07092019	1902097-07	Water	07/09/19
NON-B02-SO-15-15.5	1902097-08	Soil	07/09/19
SAOA-B01-SO-5-5.5	1902097-09	Soil	07/10/19
SAOA-B01-SO-20-20.5	1902097-10	Soil	07/10/19
SAOA-B01-SO-36-36.5	1902097-11	Soil	07/10/19
NON-B01-SO-1-1.5	1902097-12	Soil	07/10/19
NON-B01-SO-15-15.5	1902097-13	Soil	07/10/19
EB-07102019	1902097-14	Water	07/10/19
FRB-07102019	1902097-15	Water	07/10/19
NON-B01-SO-73-73.5	1902097-16	Soil	07/11/19
NON-B04-SO-0.5-1	1902097-17	Soil	07/11/19
NON-B04-SO-4.5-5	1902097-18	Soil	07/11/19
EB-07112019	1902097-19	Water	07/11/19
FRB-07112019	1902097-20	Water	07/11/19
NON-B02-SO-1-1.5MS	1902097-06MS	Soil	07/09/19
NON-B02-SO-1-1.5MSD	1902097-06MSD	Soil	07/09/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan), Site Inspection for Per- and Polyfluoroalkyl Substances, Marine Corps Air Station Yuma, Arizona (May 2019), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017), and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) by Environmental Protection Agency (EPA) Method 537 Modified

All sample results were subjected to Stage 4 data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

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

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

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

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance was checked and the requirements were met.

III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

For each calibration standard, all compounds were within 70-130% of their true value.

The signal to noise (S/N) ratio was within validation criteria for all compounds.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all compounds.

The signal to noise (S/N) ratio was within validation criteria for all compounds.

V. Laboratory Blanks

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

VI. Field Blanks

Samples EB-07092019, EB-07102019, and EB-07112019 were identified as equipment blanks. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Compound	Concentration	Associated Samples in this SDG
EB-07102019	07/10/19	PFHxA PFHpA PFHxS PFOA PFOS	0.0594 ug/L 0.0185 ug/L 0.0122 ug/L 0.00671 ug/L 0.0706 ug/L	SAOA-B01-SO-5-5.5 NON-B01-SO-1-1.5
EB-07112019	07/11/19	PFOS	0.0201 ug/L	NON-B04-SO-0.5-1 NON-B04-SO-4.5-5

Samples FRB-07092019, FRB-07102019, and FRB-07112019 were identified as field reagent blanks. No contaminants were found.

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X for contaminants) than the concentrations found in the associated field blanks.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples/Ongoing Precision Recovery

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

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples SAOA-B10-GW and SAOA-B10-GW-D were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Flag	A or P
	SAOA-B10-GW	SAOA-B10-GW-D			
PFHxA	0.0401	0.0275	Not calculable	-	-
PFHpA	0.00352	0.00817U	Not calculable	-	-
PFHxS	0.0422	0.0365	Not calculable	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Flag	A or P
	SAOA-B10-GW	SAOA-B10-GW-D			
PFOA	0.00776	0.00604	Not calculable	-	-
PFOS	0.180	0.144	22 (≤30)	-	-

Not calculable = One or both results were less than 5x the limit of quantitation.

X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target compounds were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Compound	Flag	A or P
SAOA-B10-GW	13C2-PFTeDA	20.1 (50-150)	PFTeDA	UJ (all non-detects)	P
SAOA-B10-GW-D	13C2-PFTeDA	28.0 (50-150)	PFTeDA	UJ (all non-detects)	P
NON-B01-SO-15-15.5	d3-MeFOSAA 13C2-PFDoA	44.0 (50-150) 46.2 (50-150)	MeFOSAA PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P

XI. Compound Quantitation

All compound quantitations met validation criteria.

All compounds reported below the limit of quantitation (LOQ) were qualified as follows:

Sample	Finding	Flag	A or P
SAOA-B10-SO-1-1.5 SAOA-B10-SO-20-20.5 SAOA-B10-GW SAOA-B10-GW-D NON-B02-SO-15-15.5 SAOA-B01-SO-5-5.5 SAOA-B01-SO-20-20.5 NON-B01-SO-15-15.5 EB-07102019 NON-B01-SO-73-73.5 NON-B04-SO-0.5-1 NON-B04-SO-4.5-5	All compounds reported below the LOQ.	J (all detects)	A

XII. Target Compound Identifications

All target compound identifications met validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

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

Due to labeled compound %R and results below the LOQ, data were qualified as estimated in twelve samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Data Qualification Summary - SDG 1902097

Sample	Compound	Flag	A or P	Reason
SAOA-B10-GW SAOA-B10-GW-D	PFTeDA	UJ (all non-detects)	P	Labeled compounds (%R)
NON-B01-SO-15-15.5	MeFOSAA PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P	Labeled compounds (%R)
SAOA-B10-SO-1-1.5 SAOA-B10-SO-20-20.5 SAOA-B10-GW SAOA-B10-GW-D NON-B02-SO-15-15.5 SAOA-B01-SO-5-5.5 SAOA-B01-SO-20-20.5 NON-B01-SO-15-15.5 EB-07102019 NON-B01-SO-73-73.5 NON-B04-SO-0.5-1 NON-B04-SO-4.5-5	All compounds reported below the LOQ.	J (all detects)	A	Compound quantitation

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Laboratory Blank Data Qualification Summary - SDG 1902097

No Sample Data Qualified in this SDG

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Field Blank Data Qualification Summary - SDG 1902097

No Sample Data Qualified in this SDG

LDC #: 45706B96 **VALIDATION COMPLETENESS WORKSHEET** Date: 08/19/19

SDG #: 1902097 Stage 4 Page: 1 of 2

Laboratory: Vista Analytical Laboratory Reviewer: JV6

2nd Reviewer:

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537)

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	LC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	r² Individual ≤30% ICV ≤30%
IV.	Continuing calibration/ISC	A	CCV ≤30%
V.	Laboratory Blanks	A	
VI.	Field blanks	SW	EB = 5*, 14, 19 FRB = 7, 15, 20
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS(D), OPR
IX.	Field duplicates	SW	D = 3/4
X.	Labeled Compounds	SW	
XI.	Compound quantitation RL/LOQ/LODs	A	
XII.	Target compound identification	A	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

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

	Client ID		Lab ID	Matrix	Date
1	SAOA-B10-SO-1-1.5		1902097-01	Soil	07/09/19
2	SAOA-B10-SO-20-20.5		1902097-02	Soil	07/09/19
3	SAOA-B10-GW	D	1902097-03	Water	07/09/19
4	SAOA-B10-GW-D	D	1902097-04	Water	07/09/19
5	EB-07092019		1902097-05	Water	07/09/19
6	NON-B02-SO-1-1.5		1902097-06	Soil	07/09/19
7	FRB-07092019		1902097-07	Water	07/09/19
8	NON-B02-SO-15-15.5		1902097-08	Soil	07/09/19
9	SAOA-B01-SO-5-5.5		1902097-09	Soil	07/10/19
10	SAOA-B01-SO-20-20.5		1902097-10	Soil	07/10/19
11	SAOA-B01-SO-36-36.5		1902097-11	Soil	07/10/19
12	NON-~~N1~~B01-SO-1-1.5		1902097-12	Soil	07/10/19
13	NON-B01-SO-15-15.5		1902097-13	Soil	07/10/19
14	EB-07102019		1902097-14	Water	07/10/19
15	FRB-07102019		1902097-15	Water	07/10/19

x/6X IX/6X

LDC #: 45706B96 **VALIDATION COMPLETENESS WORKSHEET** Date: 08/19/19
SDG #: 1902097 Stage 4 Page: 2 of 2
Laboratory: Vista Analytical Laboratory Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537)

	Client ID	Lab ID	Matrix	Date
16 1	NON-B01-SO-73-73.5	1902097-16	Soil	07/11/19
17 1	NON-B04-SO-0.5-1	1902097-17	Soil	07/11/19
18 1	NON-B04-SO-4.5-5	1902097-18	Soil	07/11/19
19	EB-07112019	1902097-19	Water	07/11/19
20	FRB-07112019	1902097-20	Water	07/11/19
21	NON-B02-SO-1-1.5MS	1902097-06MS	Soil	07/09/19
22	NON-B02-SO-1-1.5MSD	1902097-06MSD	Soil	07/09/19
23				
24				
25				
26				
27				

Notes:

-1	B9 G0190-BLK1						
-2	B9 G0185- 1						

LDC #: 45706 #96

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer:

Method: LCMS (EPA Method 537 Modified)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?	W		✓	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of ≥ 0.990?	✓			
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target compounds detected in the field blanks?	✓			
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?	✓			
Were target compounds detected in the field duplicates?	✓			
XI. Labeled compounds				
Were labeled compound percent recoveries (%R) within the QC limits?		✓		
XII. Compound quantitation				
Did the laboratory reporting limits (RL) meet the QAPP RLs?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

VALIDATION FINDINGS WORKSHEET

METHOD: Perfluorinated Alkyl Acids (EPA Method 537)

A. PFBA	375-22-4
B. PFPeA	2706-90-3
C. PFBS	375-73-5
D. PFHxA	307-24-4
E. PFHpA	375-85-9
F. PFHxS	355-46-4
G. PFOA	335-67-1
H. PFHpS	375-92-8
I. PFNA	375-95-1
J. PFOSA	754-91-6
K. PFOS	1763-23-1
L. PFDA	335-76-2
M. PFUnA	2058-94-8
N. PFDS	335-77-3
O. PFDoA	307-55-1
P. MeFOSA	31506-32-8
Q. PFTrDA	72629-94-8
R. PFTeDA	376-06-7
S. EtFOSA	4151-50-2
T. MeFOSE	24448-09-7
U. EtFOSE	1691-99-2
V. MeFOSAA	2355-31-9
W. EtFOSAA	2991-50-6

Notes:_____

LDC #: 45706 B96

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 07/10/19
Field blank type: (circle one) Trip Blank/Field Blank / Rinsate / Other: EB Associated Samples: 9, 12 (>5x)

Compound	Blank ID	Sample Identification								
	14	(5x)								
D	0.0594	0.297								
E	0.0185	0.0925								
F	0.0122	0.061 ~~0.0244~~								
G	0.00671	0.03355								
K	0.0706	0.0141								

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 07/11/19
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 17, 18 (>5x)

Compound	Blank ID	Sample Identification								
	19	(5x)								
K	0.0201	0.1005								

LDC#: 45706B96

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVG
2nd Reviewer:

METHOD: LCMS PFAS (EPA Method 537M)
Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/L)		RPD (≤30%)	Qualifications (Parent only)
	3	4		
D	0.0401	0.0275	NC	
E	0.00352	0.00817U	NC	
F	0.0422	0.0365	NC	
G	0.00776	0.00604	NC	
K	0.180	0.144	22	

NC (<5XLOQ)

V:\Josephine\FIELD DUPLICATES\45706B96 ttech yuma1.wpd

LDC #: 45706B96

VALIDATION FINDINGS WORKSHEET
Labeled Compound

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537M)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y (N) N/A Were all labeled compounds within -50 to +150% of the associated calibration standard?

#	Date	Sample ID	Labeled Compound	%R	Limits (%)	Qualifications
		3 (MB)	13C2-R	20.1	50-150	J/UJ/R (qual R)
		4		28.0		R
		13	d3-V	44.0		V
			13C2-O	46.2		O,Q
		B9G0185_BLK1	13C2-R	41.5		R
		B9G0190-BLK1	d3-~~R~~V	47.8		V
			d5- W	48.4		W
			13C2-M	48.3		M
			13C2-O	46.4		O,Q

LDC#: 45706B96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/22/2019	SCN945	PFOA	0.25	0.03165	3.125
			0.5	0.06647	6.250
	190722M1-CRV		1	0.11573	12.500
		13C2-PFOA	2	0.23840	25.000
			5	0.63338	62.500
			10	1.21526	125.000
			50	6.28315	625.000
			100	11.97011	1250.000
			250	28.74840	3125.000
			500	61.12986	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.075937	0.037722
Std Err of Y Est		
R Squared	0.999429	0.999184
Degrees of Freedom		
X Coefficient(s)	0.00968201	1.502070
Std Err of Coef.		
Correlation Coefficient	0.999714	
Coefficient of Determination (r^2)	0.999429	0.999184

LDC#: 45706B96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/22/2019	SCN945	PFOS	0.25	0.01898	3.125
			0.5	0.05101	6.250
	190722M1-CRV		1	0.07006	12.500
		13C8-PFOS	2	0.15729	25.000
			5	0.40492	62.500
			10	0.84884	125.000
			50	4.45203	625.000
			100	8.49765	1250.000
			250	20.93435	3125.000
			500	43.12088	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.029639	-0.019750
Std Err of Y Est		
R Squared	0.999855	0.999659
Degrees of Freedom		
X Coefficient(s)	0.00686606	1.069000
Std Err of Coef.		
Correlation Coefficient	0.999927	
Coefficient of Determination (r^2)	0.999855	0.999659

LDC # _45706A96_

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

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

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Conc	Reported	Recalculated	Reported % R	Recalculated % R
1	190722M1-15 ICV	7/22/2019	PFOA	(13C2-PFOA)	10.000	7.479	7.479	74.8	74.8
			PFOS	(13C8-PFOS)	9.240	7.500	7.559	81.1	81.8
2	190723M2-26 CS3	7/23/2019	PFOA	(13C2-PFOA)	10.000	10.038	10.038	100.4	100.4
			PFOS	(13C8-PFOS)	10.000	9.871	9.871	98.7	98.7
3	190724M1-6 ISC	7/24/2019	PFOA	(13C2-PFOA)	10.000	10.073	10.073	100.7	100.7
			PFOS	(13C8-PFOS)	10.000	9.968	9.968	99.7	99.7

LDC #: 45706B96

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537Mod)

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

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = I MSC - MSC I * 2/(MSC + MSDC) MSC = Matrix spike concentration MSDC = Matrix spike duplicate concentration

MS/MSD samples: 21/22

Compound	Spike Added (ug/kg)		Sample Conc (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalc
PFOA	10.0	10.0	3.02	12.8	13.5	97.8	97.8	105	105	7.10	7.10
PFOS	↓	↓	2.57	12.7	13.9	101	101	114	113	12.1	12.1

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

RPD based on %R

LDC #: 45706B96

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537M)

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

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: B9G0155-BS1/BSD1

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	0.08	0.08	0.0791	0.0855	98.9	98.9	107	107	7.67	7.87
PFOS	↓	↓	0.0776	0.0899	96.9	96.9	112	112	14.7	14.5

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

LDC #: 45706B96

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: JVG
2nd reviewer:

METHOD: LC/MS PFAS (EPA Method 537M)

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

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

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 12, PFOS:

Conc. = $\frac{\left[\left(\frac{45200}{5720} \times 12.5\right) - (-0.01975)\right]}{(1.069)} = 924.02$

final conc. = $\frac{(924.02)(1\,ml)}{(1.19g)(0.847)} = 916.7\ ug/kg$

#	Sample ID	Compound	Reported Concentration (ug/kg)	Calculated Concentration ( )	Qualification
			916		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: MCAS Yuma, CTO 17F3803

LDC Report Date: August 23, 2019

Parameters: Perfluoroalkyl & Polyfluoroalkyl Substances

Validation Level: Stage 4

Laboratory: Vista Analytical Laboratory

Sample Delivery Group (SDG): 1902189

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
SAOA-B03-SO-5-5.5	1902189-01	Soil	07/11/19
SAOA-B03-SO-20-20.5	1902189-02	Soil	07/11/19
SAOA-B03-SO-56-56.5	1902189-03	Soil	07/11/19
SAOA-B03-GW	1902189-04	Water	07/11/19
NAOA-B03-GW	1902189-05	Water	07/15/19
EB-07152019-GW	1902189-06	Water	07/15/19
FRB-07152019	1902189-07	Water	07/15/19
NON-B03-SO-1-1.5	1902189-08	Soil	07/16/19
NON-B03-SO-15-15.5	1902189-09	Soil	07/16/19
NON-B03-GW	1902189-10	Water	07/16/19
EB-07162019-GW	1902189-11	Water	07/16/19
NAOA-B06-GW	1902189-12	Water	07/16/19
FRB-07162019	1902189-13	Water	07/16/19
EB-07162019	1902189-14	Water	07/16/19
NAOA-B04-SO-69-69.5	1902189-15	Soil	07/17/19
SAOA-B02-SO-5-5.5	1902189-16	Soil	07/17/19
SAOA-B02-SO-20-20.5	1902189-17	Soil	07/17/19
SAOA-B02-SO-56-56.5	1902189-18	Soil	07/17/19
FRB-07172019	1902189-19	Water	07/17/19
EB-07172019	1902189-20	Water	07/17/19
NON-B03-SO-1-1.5MS	1902189-08MS	Soil	07/16/19
NON-B03-SO-1-1.5MSD	1902189-08MSD	Soil	07/16/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan), Site Inspection for Per- and Polyfluoroalkyl Substances, Marine Corps Air Station Yuma, Arizona (May 2019), the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.1 (2017), and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) by Environmental Protection Agency (EPA) Method 537 Modified

All sample results were subjected to Stage 4 data validation, which is comprised of the quality control (QC) summary forms as well as the raw data, to confirm sample quantitation and identification.

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

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

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

I. Sample Receipt and Technical Holding Times

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

All technical holding time requirements were met.

II. LC/MS Instrument Performance Check

Instrument performance was checked and the requirements were met.

III. Initial Calibration and Initial Calibration Verification

Initial calibration was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990.

For each calibration standard, all compounds were within 70-130% of their true value.

The signal to noise (S/N) ratio was within validation criteria for all compounds.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 30.0% for all compounds.

The signal to noise (S/N) ratio was within validation criteria for all compounds.

V. Laboratory Blanks

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

VI. Field Blanks

Samples EB-07152019-GW, EB-07162019-GW, EB-07162019, EB-07172019, and EB-07112019 (from SDG 1902097) were identified as equipment blanks. No contaminants were found with the following exceptions:

Blank ID	Collection Date	Compound	Concentration	Associated Samples in this SDG
EB-07172019	07/17/19	PFOS	0.0123 ug/L	SAOA-B02-SO-5-5.5
EB-07112019	07/11/19	PFOS	0.0201 ug/L	SAOA-B03-SO-5-5.5

Samples FRB-07152019, FRB-07162019, and FRB-07172019 were identified as field reagent blanks. No contaminants were found.

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X for contaminants) than the concentrations found in the associated field blanks.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples/Ongoing Precision Recovery

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

Ongoing precision recovery (OPR) samples were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target compounds were within QC limits with the following exceptions:

Sample	Labeled Compound	%R (Limits)	Affected Compound	Flag	A or P
SAOA-B03-SO-20-20.5	13C2-PFDoA	47.7 (50-150)	PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects)	P
SAOA-B03-SO-56-56.5	d3-MeFOSAA 13C2-PFDoA	49.7 (50-150) 46.9 (50-150)	MeFOSAA PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P

Sample	Labeled Compound	%R (Limits)	Affected Compound	Flag	A or P
NON-B03-GW	13C2-PFDoA 13C2-PFTeDA	41.6 (50-150) 27.2 (50-150)	PFDoA PFTrDA PFTeDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P
NAOA-B06-GW	13C2-PFTeDA	31.0 (50-150)	PFTeDA	UJ (all non-detects)	P
NAOA-B04-SO-69-69.5	d3-MeFOSAA 13C2-PFDoA	47.8 (50-150) 47.4 (50-150)	MeFOSAA PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P
SAOA-B02-SO-5-5.5	13C2-PFDA 13C2-PFDoA	49.8 (50-150) 49.1 (50-150)	PFDA PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P
SAOA-B02-SO-56-56.5	13C2-PFDoA	45.8 (50-150)	PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects)	P

XI. Compound Quantitation

All compound quantitations met validation criteria.

All compounds reported below the limit of quantitation (LOQ) were qualified as follows:

Sample	Finding	Flag	A or P
SAOA-B03-SO-5-5.5 SAOA-B03-SO-20-20.5 NAOA-B03-GW NON-B03-SO-1-1.5 NON-B03-SO-15-15.5 NON-B03-GW SAOA-B02-SO-5-5.5 SAOA-B02-SO-20-20.5 SAOA-B02-SO-56-56.5	All compounds reported below the LOQ.	J (all detects)	A

XII. Target Compound Identifications

All target compound identifications met validation criteria.

XIII. System Performance

The system performance was acceptable.

XIV. Overall Assessment of Data

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

Due to labeled compound %R and results below the LOQ, data were qualified as estimated in twelve samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Data Qualification Summary - SDG 1902189

Sample	Compound	Flag	A or P	Reason
SAOA-B03-SO-20-20.5 SAOA-B02-SO-56-56.5	PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects)	P	Labeled compounds (%R)
SAOA-B03-SO-56-56.5 NAOA-B04-SO-69-69.5	MeFOSAA PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P	Labeled compounds (%R)
NON-B03-GW	PFDoA PFTrDA PFTeDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P	Labeled compounds (%R)
NAOA-B06-GW	PFTeDA	UJ (all non-detects)	P	Labeled compounds (%R)
SAOA-B02-SO-5-5.5	PFDA PFDoA PFTrDA	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	P	Labeled compounds (%R)
SAOA-B03-SO-5-5.5 SAOA-B03-SO-20-20.5 NAOA-B03-GW NON-B03-SO-1-1.5 NON-B03-SO-15-15.5 NON-B03-GW SAOA-B02-SO-5-5.5 SAOA-B02-SO-20-20.5 SAOA-B02-SO-56-56.5	All compounds reported below the LOQ.	J (all detects)	A	Compound quantitation

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Laboratory Blank Data Qualification Summary - SDG 1902189

No Sample Data Qualified in this SDG

MCAS Yuma, CTO 17F3803
Perfluoroalkyl & Polyfluoroalkyl Substances - Field Blank Data Qualification Summary - SDG 1902189

No Sample Data Qualified in this SDG

LDC #: 45706C96 **VALIDATION COMPLETENESS WORKSHEET** Date: 08/30/19
SDG #: 1902189 Stage 4 Page: 1 of 2
Laboratory: Vista Analytical Laboratory Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537(M))

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

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / SW	
II.	LC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A / A	r Individual ≤ 30% IA ≤ 30%
IV.	Continuing calibration/ISC	A	CA ≤ 30%
V.	Laboratory Blanks	A	
VI.	Field blanks	SW	EB = 6, 11, 14, 20 FRB = 7, 13, 19 EB 07112019 (1902097)
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D, OPR
IX.	Field duplicates	N	
X.	Labeled Compounds	SW	
XI.	Compound quantitation RL/LOQ/LODs	A	
XII.	Target compound identification	A	
XIII.	System performance	A	
XIV.	Overall assessment of data	A	

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

	Client ID	Lab ID	Matrix	Date
1	SAOA-B03-SO-5-5.5	1902189-01	Soil	07/11/19
2	SAOA-B03-SO-20-20.5	1902189-02	Soil	07/11/19
3	SAOA-B03-SO-56-56.5	1902189-03	Soil	07/11/19
4	SAOA-B03-GW	1902189-04	Water	07/11/19
5	NAOA-B03-GW	1902189-05	Water	07/15/19
6	EB-07152019-GW ✓	1902189-06	Water	07/15/19
7	FRB-07152019	1902189-07	Water	07/15/19
8	NON-B03-SO-1-1.5	1902189-08	Soil	07/16/19
9	NON-B03-SO-15-15.5	1902189-09	Soil	07/16/19
10	NON-B03-GW	1902189-10	Water	07/16/19
11	EB-07162019-GW	1902189-11	Water	07/16/19
12	NAOA-B06-GW	1902189-12	Water	07/16/19
13	FRB-07162019	1902189-13	Water	07/16/19
14	EB-07162019	1902189-14	Water	07/16/19
15	NAOA-B04-SO-69-69.5	1902189-15	Soil	07/17/19

1X/5X

LDC #: 45706C96 **VALIDATION COMPLETENESS WORKSHEET** Date: 08/20/19
SDG #: 1902189 Stage 4 Page: 2 of 2
Laboratory: Vista Analytical Laboratory Reviewer: SVG
2nd Reviewer:

METHOD: LC/MS Perfluoroalkyl & Polyfluoroalkyl Substances (EPA Method 537)

	Client ID	Lab ID	Matrix	Date
+ 16	SAOA-B02-SO-5-5.5	1902189-16	Soil	07/17/19
+ 17	SAOA-B02-SO-20-20.5	1902189-17	Soil	07/17/19
+ 18	SAOA-B02-SO-56-56.5	1902189-18	Soil	07/17/19
- 19	FRB-07172019	1902189-19	Water	07/17/19
+ 20	EB-07172019	1902189-20	Water	07/17/19
21	NON-B03-SO-1-1.5MS	1902189-08MS	Soil	07/16/19
22	NON-B03-SO-1-1.5MSD	1902189-08MSD	Soil	07/16/19
23				
24				
25				
26				
27				

Notes:

-1	B9G0264- BLK1						
-2	B9G0224-						
-3	B9G0251-						

(extracted w/in 14 days)

LDC #: 45706C96

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer:

Method: LCMS (EPA Method 537 Modified)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
Were all technical holding times met?	✓			
Was cooler temperature criteria met?	✓			
II. LC/MS Instrument performance check				
Were the instrument performance reviewed and found to be within the validation criteria?	✓			
IIIa. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	✓			
Were all percent relative standard deviations (%RSD) ≤ 20%?			✓	
Was a curve fit used for evaluation? If yes, did the initial calibration meet the curve fit criteria of ≥ 0.990?	✓			
Were all analytes within 70-130% or percent differences (%D) ≤30% of their true value for each calibration standard?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
IIIb. Initial Calibration Verification				
Was an initial calibration verification standard analyzed after each initial calibration for each instrument?	✓			
Were all percent differences (%D) ≤ 30%?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed prior to sample analysis, after every 10 samples and at the end of the analytical sequence?	✓			
Were all percent differences (%D) of the continuing calibration ≤ 30%?	✓			
Was the signal to noise (S/N) ratio for all compounds within the validation criteria?	✓			
Were all percent differences (%D) of the Instrument Sensitivity Check ≤ 30%?	✓			
V. Laboratory Blanks				
Was a laboratory blank associated with every sample in this SDG?	✓			
Was a laboratory blank analyzed for each matrix and concentration?	✓			
Was there contamination in the laboratory blanks?		✓		
VI. Field blanks				
Were field blanks identified in this SDG?	✓			
Were target compounds detected in the field blanks?	✓			
VIII. Matrix spike/Matrix spike duplicates				
Were matrix spike (MS) and matrix spike duplicate (MSD) analyzed in this SDG?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			

Validation Area	Yes	No	NA	Findings/Comments
IX. Laboratory control samples				
Was an LCS analyzed per extraction batch for this SDG?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	✓			
X. Field duplicates				
Were field duplicate pairs identified in this SDG?		✓		
Were target compounds detected in the field duplicates?			✓	
XI. Labeled compounds				
Were labeled compound percent recoveries (%R) within the QC limits?		✓		
XII. Compound quantitation				
Did the laboratory reporting limits (RL) meet the QAPP RLs?	✓			
Did reported results include both branched and linear isomers?	✓			
Were the correct ion transition, labeled compound and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Target compound identification				
Were two transitions and the ion transition ratio per analyte monitored and documented with the exception of PFBA and PFPeA?	✓			
XIV. System performance				
System performance was found to be acceptable.	✓			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			

VALIDATION FINDINGS WORKSHEET

METHOD: Perfluorinated Alkyl Acids (EPA Method 537)

A. PFBA	375-22-4
B. PFPeA	2706-90-3
C. PFBS	375-73-5
D. PFHxA	307-24-4
E. PFHpA	375-85-9
F. PFHxS	355-46-4
G. PFOA	335-67-1
H. PFHpS	375-92-8
I. PFNA	375-95-1
J. PFOSA	754-91-6
K. PFOS	1763-23-1
L. PFDA	335-76-2
M. PFUnA	2058-94-8
N. PFDS	335-77-3
O. PFDoA	307-55-1
P. MeFOSA	31506-32-8
Q. PFTrDA	72629-94-8
R. PFTeDA	376-06-7
S. EtFOSA	4151-50-2
T. MeFOSE	24448-09-7
U. EtFOSE	1691-99-2
V. MeFOSAA	2355-31-9
W. EtFOSAA	2991-50-6

Notes:_____

LDC #: 45706 CQ6

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 07/17/19
Field blank type: (circle one) Trip Blank/Field Blank / Rinsate / Other: EB Associated Samples: ~~15-18~~ 16 (ND or >5x)

Compound	Blank ID	Sample Identification								
	20									
K	0.0123									

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 7/11/19
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 1 (75x)

Compound	Blank ID	Sample Identification								
	EB-07112019									
K	0.0201									

LDC #: 45706 C96

VALIDATION FINDINGS WORKSHEET
Labeled Compound

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: ✓

METHOD: LC/MS PFAS (EPA Method 537M)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y (N) N/A Were all labeled compounds within -50 to +150% of the associated calibration standard?

#	Date	Sample ID	Labeled Compound	%R	Limits (%)	Qualifications
		2 (MD)	13C2-O	47.7	50-150	J (UJ/P (qual Q,O)
		3	d3-V	49.7		V
			13C2-O	46.9		O,Q
		10	13C2-O	41.6		O,Q
			13C2-R	27.2		R
		12	13C2-R	31.0		R
		15	d3-V	47.8		V
			13C2-O	47.4		O,Q
		16	13C2-L	49.8		L
			13C2-O	49.1		O,Q
		18	13C2-O	45.8		O,Q
		BQG0264-BLK1	13C2-O	49.6		O,Q

LDC#: 45706C96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/22/2019	SCN945	PFOA	0.25	0.03165	3.125
			0.5	0.06647	6.250
	190722M1-CRV		1	0.11573	12.500
		13C2-PFOA	2	0.23840	25.000
			5	0.63338	62.500
			10	1.21526	125.000
			50	6.28315	625.000
			100	11.97011	1250.000
			250	28.74840	3125.000
			500	61.12986	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.075937	0.037722
Std Err of Y Est		
R Squared	0.999429	0.999184
Degrees of Freedom		
X Coefficient(s)	0.00968201	1.502070
Std Err of Coef.		
Correlation Coefficient	0.999714	
Coefficient of Determination (r^2)	0.999429	0.999184

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/22/2019	SCN945	PFOS	0.25	0.01898	3.125
			0.5	0.05101	6.250
	190722M1-CRV		1	0.07006	12.500
		13C8-PFOS	2	0.15729	25.000
			5	0.40492	62.500
			10	0.84884	125.000
			50	4.45203	625.000
			100	8.49765	1250.000
			250	20.93435	3125.000
			500	43.12088	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.029639	-0.019750
Std Err of Y Est		
R Squared	0.999855	0.999659
Degrees of Freedom		
X Coefficient(s)	0.00686606	1.069000
Std Err of Coef.		
Correlation Coefficient	0.999927	
Coefficient of Determination (r^2)	0.999855	0.999659

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/28/2019	SCN945	PFOA	0.25	0.03296	3.125
			0.5	0.06066	6.250
	190728M1-CRV		1	0.12264	12.500
		13C2-PFOA	2	0.24413	25.000
			5	0.59743	62.500
			10	1.26346	125.000
			50	5.75055	625.000
			100	12.09280	1250.000
			250	27.48101	3125.000
			500	57.22712	6250.000

Regression Output	Calculated	Reported WLR
Constant	0.044209	0.101179
Std Err of Y Est		
R Squared	0.999626	0.999104
Degrees of Freedom		
X Coefficient(s)	0.00909328	1.425740
Std Err of Coef.		
Correlation Coefficient	0.999813	
Coefficient of Determination (r^2)	0.999626	0.999104

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
7/28/2019	SCN945	PFOS	0.25	0.01731	3.125
			0.5	0.03195	6.250
	190728M1-CRV		1	0.08040	12.500
		13C8-PFOS	2	0.17206	25.000
			5	0.39523	62.500
			10	0.86270	125.000
			50	4.40816	625.000
			100	9.07360	1250.000
			250	21.45917	3125.000
			500	43.77193	6250.000

Regression Output	Calculated	Reported WLR
Constant	0.006692	-0.0602577
Std Err of Y Est		
R Squared	0.999891	0.999675
Degrees of Freedom		
X Coefficient(s)	0.00698389	1.092800
Std Err of Coef.		
Correlation Coefficient	0.999945	
Coefficient of Determination (r^2)	0.999891	0.999675

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
8/2/2019	SCN945	PFOA	0.25	0.04358	3.125
			0.5	0.07776	6.250
	190802M1-CRV		1	0.13222	12.500
		13C2-PFOA	2	0.29802	25.000
			5	0.75591	62.500
			10	1.51881	125.000
			50	7.32513	625.000
			100	14.71139	1250.000
			250	37.14547	3125.000
			500	74.48904	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.032022	0.031716
Std Err of Y Est		
R Squared	0.999993	0.999947
Degrees of Freedom		
X Coefficient(s)	0.01191336	1.856760
Std Err of Coef.		
Correlation Coefficient	0.999996	
Coefficient of Determination (r^2)	0.999993	0.999947

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
8/2/2019	SCN945	PFOS	0.25	0.03165	3.125
			0.5	0.02844	6.250
	190802M1-CRV		1	0.08730	12.500
		13C8-PFOS	2	0.19110	25.000
			5	0.47341	62.500
			10	0.93333	125.000
			50	4.90193	625.000
			100	9.82558	1250.000
			250	23.44797	3125.000
			500	55.35387	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.405593	-0.2277060
Std Err of Y Est		
R Squared	0.995896	0.994423
Degrees of Freedom		
X Coefficient(s)	0.00864919	1.298410
Std Err of Coef.		
Correlation Coefficient	0.997946	
Coefficient of Determination (r^2)	0.995896	0.994423

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
8/6/2019	SCN945	PFOA	0.25	0.03014	3.125
			0.5	0.05590	6.250
	190806M1-CRV		1	0.11413	12.500
		13C2-PFOA	2	0.22835	25.000
			5	0.56072	62.500
			10	1.12453	125.000
			50	5.30908	625.000
			100	11.15698	1250.000
			250	27.54228	3125.000
			500	54.94986	6250.000

Regression Output	Calculated	Reported WLR
Constant	0.004342	0.037145
Std Err of Y Est		
R Squared	0.999983	0.999901
Degrees of Freedom		
X Coefficient(s)	0.00879704	1.374720
Std Err of Coef.		
Correlation Coefficient	0.999992	
Coefficient of Determination (r^2)	0.999983	0.999901

LDC#: 45706C96

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

Calibration Date	System	Compound	Standard	(Y) Area ratio	(X) Conc ratio
8/6/2019	SCN945	PFOS	0.25	0.01937	3.125
			0.5	0.04171	6.250
	190806M1-CRV		1	0.06852	12.500
		13C8-PFOS	2	0.17654	25.000
			5	0.42663	62.500
			10	0.77173	125.000
			50	3.98623	625.000
			100	8.45885	1250.000
			250	21.61890	3125.000
			500	44.36255	6250.000

Regression Output	Calculated	Reported WLR
Constant	-0.135582	-0.0536139
Std Err of Y Est		
R Squared	0.999773	0.999142
Degrees of Freedom		
X Coefficient(s)	0.00707804	1.088080
Std Err of Coef.		
Correlation Coefficient	0.999886	
Coefficient of Determination (r^2)	0.999773	0.999142

LDC # 45706C96

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

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

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound,
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound	(IS)	Conc	Reported	Recalculated	Reported % R	Recalculated % R
1	190726M1-4 ISC	7/26/2019	PFOA	(13C2-PFOA)	1.000	0.950	0.950	95.0	95.0
			PFOS	(13C8-PFOS)	1.000	0.991	0.991	99.1	99.1
2	190728M1-33 CS3	7/28/2019	PFOA	(13C2-PFOA)	10.000	10.906	10.906	109.1	109.1
			PFOS	(13C8-PFOS)	10.000	9.673	9.673	96.7	96.7
3	190805M1-22 CS3	8/5/2019	PFOA	(13C2-PFOA)	10.000	10.868	10.868	108.7	108.7
			PFOS	(13C8-PFOS)	10.000	8.845	8.845	88.5	88.5
4	090806M1-19 CS3	8/6/2019	PFOA	(13C2-PFOA)	10.000	8.000	8.000	80.0	80.0
			PFOS	(13C8-PFOS)	9.240	7.036	7.036	76.2	76.2

LDC #: 45706 C96

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537Mod)

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

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = I MSC - MSC I * 2/(MSC + MSDC) MSC = Matrix spike concentration MSDC = Matrix spike duplicate concentration

MS/MSD samples: 21/22

Compound	Spike Added (ug/kg)		Sample Conc (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalc
PFOA	9.98	9.88	0	9.996	10.237	99.2	100	107	107	2.78	78
PFOS	↓	↓	1.27	10.2167	10.293	89.8	89.6	91.3	91.3	1.66	1.66

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

- RPDs based on %R
- Rounding off issues

LDC #: 45706 CQ6

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: JVG
2nd Reviewer:

METHOD: LC/MS PFAS (EPA Method 537M)

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

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = | LCSC - LCSDC | * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: BQG0264-BS1

Compound	Spike Added (ng/kg)		Spike Concentration (ng/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
PFOA	10.0	NA	11.2	NA	112	112				
PFOS	↓	↓	9.24	↓	92.4	92.4				

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

LDC #: 45706 C96

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: JVG
2nd reviewer:

METHOD: LC/MS PFCs (EPA Method 537Mod)

(Y) N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

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

A_x	=	Area of the characteristic ion (EICP) for the compound to be measured
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
I_s	=	Amount of internal standard added in nanograms (ng)
V_o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).
V_i	=	Volume of extract injected in microliters (ul)
V_t	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.
2.0	=	Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 1 , PFOS :

Conc. = $\frac{\left[\left(\frac{(4480)(12.5)}{(3210)}\right) - (-0.0536)\right]}{(1.08808)} = 16.0825$

final conc. = $\frac{(16.0825)(1\,000\ mL)}{(1.08\ g)(0.943)(1000)} = 15.79$

≈ 15.8 ug/kg

#	Sample ID	Compound	Reported Concentration (ug/kg)	Calculated Concentration ( )	Qualification
			15.8		

LOCATION-NAME	SITE_NAME	INSTALLATION_ID	LOCATION_TYPE	LOCATION_TYPE_DESC	SDG	COORD_X	COORD_Y	ANALYTICAL_METHOD_GRP_DESC	SAMPLE_NAME	SAMPLE_MATRIX	SAMPLE_MATRIC_DESC
NAOA-B03	SITE 00019	YUMA_MCAS	BH	BOREHOLE	1902189	440165.383	607326.920	Perfluoroalkyl Compounds	NAOA-B03-GW	WG	GROUNDWATER
NAOA-B06	SITE 00019	YUMA_MCAS	BH	BOREHOLE	1902189	442533.349	604929.086	Perfluoroalkyl Compounds	NAOA-B06-GW	WG	GROUNDWATER
NON-B03	SITE 00019	YUMA_MCAS	BH	BOREHOLE	1902189	443302.528	597912.609	Perfluoroalkyl Compounds	NON-B03-GW	WG	GROUNDWATER
SAOA-B03	SITE 00019	YUMA_MCAS	BH	BOREHOLE	1902189	440232.279	601352.774	Perfluoroalkyl Compounds	SAOA-B03-GW	WG	GROUNDWATER

COLLECT_DATE
7/15/2019
7/16/2019
7/16/2019
7/11/2019