

Your P.O. #: 30202.002.006.010101  
 Your Project #: S28 INV FLD WK  
 Site Location: SWMU 28  
 Your C.O.C. #: STR03046

**Attention: Reporting Group**

TLI Solutions  
 112 North Rubey Drive  
 Golden, CO  
 USA 80401

**Report Date: 2018/02/14**  
 Report #: R4986166  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS**

**MAXXAM JOB #: B823886**

**Received: 2018/02/01, 13:02**

Sample Matrix: Water  
 # Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
PFOS and PFOA in water by SPE/LCMS (1)	3	2018/02/09	2018/02/13	CAM SOP-00894	EPA 537 m

**Remarks:**

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

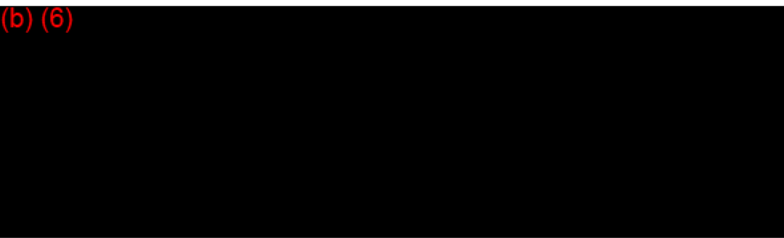
Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding is in the apparent difference.

(1) Per- and polyfluoroalkyl substances (PFAS) identified in the certificate of analysis represent the extracted internal standard.



Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10 2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

### RESULTS OF ANALYSES OF WATER

Maxxam ID		GAC647	GAC649	GAC651				
Sampling Date		2018/01/30 12:15	2018/01/30 10:25	2018/01/30 08:45				
COC Number		STR03046	STR03046	STR03046				
	UNITS	DDPIEZ003B	DDPIEZ003A	300118AB1	DL	LOD	LOQ	QC Batch
<b>Miscellaneous Parameters</b>								
6:2 Fluorotelomer sulfonate	ug/L	0.015 U	0.015 U	0.015 U	0.0066	0.015	0.020	5393111
8:2 Fluorotelomer sulfonate	ug/L	0.015 U	0.015 U	0.015 U	0.0066	0.015	0.020	5393111
Perfluorobutanoic acid	ug/L	0.015 U	0.015 U	0.015 U	0.0055	0.015	0.020	5393111
Perfluorobutane Sulfonate (PFBS)	ug/L	0.015 U	0.015 U	0.015 U	0.0054	0.015	0.020	5393111
Perfluorodecane Sulfonate	ug/L	0.015 U	0.015 U	0.015 U	0.0060	0.015	0.020	5393111
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.015 U	0.015 U	0.015 U	0.0074	0.015	0.020	5393111
Perfluorohexanoic Acid (PFHxA)	ug/L	0.010 U	0.010 U	0.010 U	0.0035	0.010	0.020	5393111
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.015 U	0.015 U	0.015 U	0.0056	0.015	0.020	5393111
Perfluorononanoic Acid (PFNA)	ug/L	0.018 U	0.018 U	0.018 U	0.0087	0.018	0.020	5393111
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.010 U	0.010 U	0.010 U	0.0034	0.010	0.020	5393111
Perfluoropentanoic Acid (PFPeA)	ug/L	0.018 U	0.018 U	0.018 U	0.0075	0.018	0.020	5393111
Perfluorotetradecanoic Acid	ug/L	0.010 U	0.010 U	0.010 U	0.0027	0.010	0.020	5393111
Perfluorotridecanoic Acid	ug/L	0.010 U	0.010 U	0.010 U	0.0038	0.010	0.020	5393111
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.010 U	0.010 U	0.010 U	0.0025	0.010	0.020	5393111
Perfluorodecanoic Acid (PFDA)	ug/L	0.015 U	0.015 U	0.015 U	0.0061	0.015	0.020	5393111
Perfluorododecanoic Acid (PFDoA)	ug/L	0.010 U	0.010 U	0.010 U	0.0050	0.010	0.020	5393111
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.010 U	0.010 U	0.010 U	0.0033	0.010	0.020	5393111
Perfluorooctane Sulfonate (PFOS)	ug/L	0.015 U	0.015 U	0.015 U	0.0060	0.015	0.020	5393111
<b>Surrogate Recovery (%)</b>								
13C2-6:2 Fluorotelomer sulfonate	%	117	81	105				5393111
13C2-8:2 Fluorotelomer sulfonate	%	122	76	94				5393111
13C2-Perfluorodecanoic acid	%	115	86	86				5393111
13C2-Perfluorododecanoic acid	%	110	79	85				5393111
13C2-Perfluorohexanoic acid	%	125	89	93				5393111
13C2-perfluorotetradecanoic acid	%	111	77	78				5393111
13C2-Perfluoroundecanoic acid	%	114	85	90				5393111
13C4-Perfluorobutanoic acid	%	76	63	96				5393111
13C4-Perfluoroheptanoic acid	%	125	83	99				5393111
13C4-Perfluorooctanesulfonate	%	121	91	95				5393111
13C4-Perfluorooctanoic acid	%	125	87	96				5393111
DL = Detection Limit LOD = Limit of Detection LOQ = Limit of Quantitation QC Batch = Quality Control Batch N/A = Not Applicable								

**RESULTS OF ANALYSES OF WATER**

Maxxam ID		GAC647	GAC649	GAC651				
Sampling Date		2018/01/30 12:15	2018/01/30 10:25	2018/01/30 08:45				
COC Number		STR03046	STR03046	STR03046				
	UNITS	DDPIEZ003B	DDPIEZ003A	300118AB1	DL	LOD	LOQ	QC Batch
13C5-Perfluorononanoic acid	%	126	89	98				5393111
13C5-Perfluoropentanoic acid	%	120	82	97				5393111
13C8-Perfluorooctane Sulfonamide	%	128	85	89				5393111
18O2-Perfluorohexanesulfonate	%	135	92	99				5393111
DL = Detection Limit LOD = Limit of Detection LOQ = Limit of Quantitation QC Batch = Quality Control Batch N/A = Not Applicable								

**TEST SUMMARY**

**Maxxam ID:** GAC647  
**Sample ID:** DDPIEZ003B  
**Matrix:** Water

**Collected:** 2018/01/30  
**Shipped:**  
**Received:** 2018/02/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water by SPE/LCMS	LCMS	5393111	2018/02/09	2018/02/13	<b>(b) (6)</b>

**Maxxam ID:** GAC649  
**Sample ID:** DDPIEZ003A  
**Matrix:** Water

**Collected:** 2018/01/30  
**Shipped:**  
**Received:** 2018/02/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water by SPE/LCMS	LCMS	5393111	2018/02/09	2018/02/13	<b>(b) (6)</b>

**Maxxam ID:** GAC651  
**Sample ID:** 300118AB1  
**Matrix:** Water

**Collected:** 2018/01/30  
**Shipped:**  
**Received:** 2018/02/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
PFOS and PFOA in water by SPE/LCMS	LCMS	5393111	2018/02/09	2018/02/13	<b>(b) (6)</b>

**GENERAL COMMENTS**

**Results relate only to the items tested.**

### QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
5393111	KC1	Spiked Blank	13C2-6:2 Fluorotelomer sulfonate	2018/02/13		87	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2018/02/13		83	%	50 - 150
			13C2-Perfluorodecanoic acid	2018/02/13		79	%	50 - 150
			13C2-Perfluorododecanoic acid	2018/02/13		79	%	50 - 150
			13C2-Perfluorohexanoic acid	2018/02/13		89	%	50 - 150
			13C2-perfluorotetradecanoic acid	2018/02/13		78	%	50 - 150
			13C2-Perfluoroundecanoic acid	2018/02/13		81	%	50 - 150
			13C4-Perfluorobutanoic acid	2018/02/13		96	%	50 - 150
			13C4-Perfluoroheptanoic acid	2018/02/13		89	%	50 - 150
			13C4-Perfluorooctanesulfonate	2018/02/13		93	%	50 - 150
			13C4-Perfluorooctanoic acid	2018/02/13		93	%	50 - 150
			13C5-Perfluorononanoic acid	2018/02/13		95	%	50 - 150
			13C5-Perfluoropentanoic acid	2018/02/13		87	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2018/02/13		85	%	50 - 150
			18O2-Perfluorohexanesulfonate	2018/02/13		84	%	50 - 150
			6:2 Fluorotelomer sulfonate	2018/02/13		106	%	68 - 133
			8:2 Fluorotelomer sulfonate	2018/02/13		101	%	70 - 130
			Perfluorobutanoic acid	2018/02/13		97	%	72 - 129
			Perfluorobutane Sulfonate (PFBS)	2018/02/13		107	%	65 - 135
			Perfluorodecane Sulfonate	2018/02/13		105	%	62 - 127
			Perfluoroheptanoic Acid (PFHpA)	2018/02/13		102	%	73 - 129
			Perfluorohexanoic Acid (PFHxA)	2018/02/13		101	%	74 - 129
			Perfluorohexane Sulfonate (PFHxS)	2018/02/13		103	%	67 - 132
			Perfluorononanoic Acid (PFNA)	2018/02/13		95	%	72 - 131
			Perfluorooctane Sulfonamide (PFOSA)	2018/02/13		98	%	71 - 132
			Perfluoropentanoic Acid (PFPeA)	2018/02/13		111	%	73 - 129
			Perfluorotetradecanoic Acid	2018/02/13		102	%	70 - 134
			Perfluorotridecanoic Acid	2018/02/13		100	%	67 - 143
			Perfluoroundecanoic Acid (PFUnA)	2018/02/13		108	%	71 - 133
			Perfluorodecanoic Acid (PFDA)	2018/02/13		115	%	71 - 133
			Perfluorododecanoic Acid (PFDoA)	2018/02/13		96	%	71 - 131
			Perfluoro-n-Octanoic Acid (PFOA)	2018/02/13		98	%	71 - 130
			Perfluorooctane Sulfonate (PFOS)	2018/02/13		98	%	72 - 131
5393111	KC1	Spiked Blank DUP	13C2-6:2 Fluorotelomer sulfonate	2018/02/13		81	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2018/02/13		77	%	50 - 150
			13C2-Perfluorodecanoic acid	2018/02/13		77	%	50 - 150
			13C2-Perfluorododecanoic acid	2018/02/13		80	%	50 - 150
			13C2-Perfluorohexanoic acid	2018/02/13		85	%	50 - 150
			13C2-perfluorotetradecanoic acid	2018/02/13		79	%	50 - 150
			13C2-Perfluoroundecanoic acid	2018/02/13		76	%	50 - 150
			13C4-Perfluorobutanoic acid	2018/02/13		82	%	50 - 150
			13C4-Perfluoroheptanoic acid	2018/02/13		83	%	50 - 150
			13C4-Perfluorooctanesulfonate	2018/02/13		88	%	50 - 150
			13C4-Perfluorooctanoic acid	2018/02/13		84	%	50 - 150
			13C5-Perfluorononanoic acid	2018/02/13		86	%	50 - 150
			13C5-Perfluoropentanoic acid	2018/02/13		84	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2018/02/13		81	%	50 - 150
			18O2-Perfluorohexanesulfonate	2018/02/13		83	%	50 - 150
6:2 Fluorotelomer sulfonate	2018/02/13		107	%	68 - 133			
8:2 Fluorotelomer sulfonate	2018/02/13		104	%	70 - 130			
Perfluorobutanoic acid	2018/02/13		105	%	72 - 129			

**QUALITY ASSURANCE REPORT(CONT'D)**

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Perfluorobutane Sulfonate (PFBS)	2018/02/13		99	%	65 - 135
			Perfluorodecane Sulfonate	2018/02/13		103	%	62 - 127
			Perfluoroheptanoic Acid (PFHpA)	2018/02/13		105	%	73 - 129
			Perfluorohexanoic Acid (PFHxA)	2018/02/13		94	%	74 - 129
			Perfluorohexane Sulfonate (PFHxS)	2018/02/13		96	%	67 - 132
			Perfluorononanoic Acid (PFNA)	2018/02/13		99	%	72 - 131
			Perfluorooctane Sulfonamide (PFOSA)	2018/02/13		98	%	71 - 132
			Perfluoropentanoic Acid (PFPeA)	2018/02/13		107	%	73 - 129
			Perfluorotetradecanoic Acid	2018/02/13		99	%	70 - 134
			Perfluorotridecanoic Acid	2018/02/13		99	%	67 - 143
			Perfluoroundecanoic Acid (PFUnA)	2018/02/13		108	%	71 - 133
			Perfluorodecanoic Acid (PFDA)	2018/02/13		109	%	71 - 133
			Perfluorododecanoic Acid (PFDoA)	2018/02/13		97	%	71 - 131
			Perfluoro-n-Octanoic Acid (PFOA)	2018/02/13		100	%	71 - 130
			Perfluorooctane Sulfonate (PFOS)	2018/02/13		92	%	72 - 131
5393111	KC1	RPD	6:2 Fluorotelomer sulfonate	2018/02/13	1.0		%	30
			8:2 Fluorotelomer sulfonate	2018/02/13	2.7		%	30
			Perfluorobutanoic acid	2018/02/13	8.1		%	30
			Perfluorobutane Sulfonate (PFBS)	2018/02/13	8.3		%	30
			Perfluorodecane Sulfonate	2018/02/13	1.8		%	30
			Perfluoroheptanoic Acid (PFHpA)	2018/02/13	2.9		%	30
			Perfluorohexanoic Acid (PFHxA)	2018/02/13	7.4		%	30
			Perfluorohexane Sulfonate (PFHxS)	2018/02/13	7.0		%	30
			Perfluorononanoic Acid (PFNA)	2018/02/13	4.1		%	30
			Perfluorooctane Sulfonamide (PFOSA)	2018/02/13	0.21		%	30
			Perfluoropentanoic Acid (PFPeA)	2018/02/13	3.9		%	30
			Perfluorotetradecanoic Acid	2018/02/13	3.0		%	30
			Perfluorotridecanoic Acid	2018/02/13	0.62		%	30
			Perfluoroundecanoic Acid (PFUnA)	2018/02/13	0.0075		%	30
			Perfluorodecanoic Acid (PFDA)	2018/02/13	5.7		%	30
			Perfluorododecanoic Acid (PFDoA)	2018/02/13	1.3		%	30
			Perfluoro-n-Octanoic Acid (PFOA)	2018/02/13	1.7		%	30
			Perfluorooctane Sulfonate (PFOS)	2018/02/13	5.5		%	30
5393111	KC1	Method Blank	13C2-6:2 Fluorotelomer sulfonate	2018/02/13		90	%	50 - 150
			13C2-8:2 Fluorotelomer sulfonate	2018/02/13		86	%	50 - 150
			13C2-Perfluorodecanoic acid	2018/02/13		77	%	50 - 150
			13C2-Perfluorododecanoic acid	2018/02/13		72	%	50 - 150
			13C2-Perfluorohexanoic acid	2018/02/13		82	%	50 - 150
			13C2-perfluorotetradecanoic acid	2018/02/13		73	%	50 - 150
			13C2-Perfluoroundecanoic acid	2018/02/13		72	%	50 - 150
			13C4-Perfluorobutanoic acid	2018/02/13		83	%	50 - 150
			13C4-Perfluoroheptanoic acid	2018/02/13		81	%	50 - 150
			13C4-Perfluorooctanesulfonate	2018/02/13		86	%	50 - 150
			13C4-Perfluorooctanoic acid	2018/02/13		82	%	50 - 150
			13C5-Perfluorononanoic acid	2018/02/13		86	%	50 - 150
			13C5-Perfluoropentanoic acid	2018/02/13		86	%	50 - 150
			13C8-Perfluorooctane Sulfonamide	2018/02/13		76	%	50 - 150
			18O2-Perfluorohexanesulfonate	2018/02/13		86	%	50 - 150
			6:2 Fluorotelomer sulfonate	2018/02/13	0.015 U, LOD=0.015		ug/L	

**QUALITY ASSURANCE REPORT(CONT'D)**

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			8:2 Fluorotelomer sulfonate	2018/02/13	0.015 U, LOD=0.015		ug/L	
			Perfluorobutanoic acid	2018/02/13	0.015 U, LOD=0.015		ug/L	
			Perfluorobutane Sulfonate (PFBS)	2018/02/13	0.015 U, LOD=0.015		ug/L	
			Perfluorodecane Sulfonate	2018/02/13	0.015 U, LOD=0.015		ug/L	
			Perfluoroheptanoic Acid (PFHpA)	2018/02/13	0.015 U, LOD=0.015		ug/L	
			Perfluorohexanoic Acid (PFHxA)	2018/02/13	0.010 U, LOD=0.010		ug/L	
			Perfluorohexane Sulfonate (PFHxS)	2018/02/13	0.015 U, LOD=0.015		ug/L	
			Perfluorononanoic Acid (PFNA)	2018/02/13	0.018 U, LOD=0.018		ug/L	
			Perfluorooctane Sulfonamide (PFOSA)	2018/02/13	0.010 U, LOD=0.010		ug/L	
			Perfluoropentanoic Acid (PFPeA)	2018/02/13	0.018 U, LOD=0.018		ug/L	
			Perfluorotetradecanoic Acid	2018/02/13	0.010 U, LOD=0.010		ug/L	
			Perfluorotridecanoic Acid	2018/02/13	0.010 U, LOD=0.010		ug/L	
			Perfluoroundecanoic Acid (PFUnA)	2018/02/13	0.010 U, LOD=0.010		ug/L	
			Perfluorodecanoic Acid (PFDA)	2018/02/13	0.015 U, LOD=0.015		ug/L	
			Perfluorododecanoic Acid (PFDoA)	2018/02/13	0.010 U, LOD=0.010		ug/L	
			Perfluoro-n-Octanoic Acid (PFOA)	2018/02/13	0.010 U, LOD=0.010		ug/L	
			Perfluorooctane Sulfonate (PFOS)	2018/02/13	0.015 U, LOD=0.015		ug/L	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

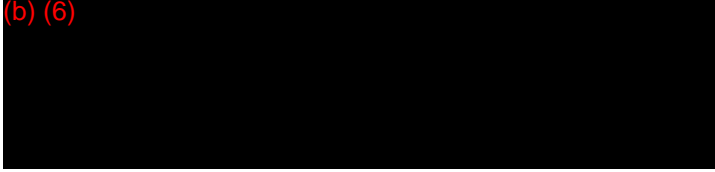
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

### VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

(b) (6)



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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.