24-Mar-2022

Brian VanderMeulen
City of Lowell
301 East Main Street
Lowell, MI 49331

Re: **(City of Lowell) Biosolids PFAS** Work Order: **22031274**

Dear Brian,

ALS Environmental received 1 sample on 15-Mar-2022 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 15.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Jodi Blouw

Electronically approved by: Jodi Blouw

Jodi Blouw

Report of Laboratory Analysis

ALS Group, USA

Date: 24-Mar-22

Client: City of Lowell
Project: (City of Lowell) Biosolids PFAS
Work Order: **22031274**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
22031274-01	Biosolids PFAS	Sludge		3/14/2022 09:00	3/15/2022 10:00	☐

Client: City of Lowell
Project: (City of Lowell) Biosolids PFAS
WorkOrder: **22031274**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
% of sample	Percent of Sample
µg/Kg-dry	Micrograms per Kilogram Dry Weight

Client:	City of Lowell
Project:	(City of Lowell) Biosolids PFAS
Work Order:	22031274

Case Narrative

Samples for the above noted Work Order were received on 03/15/2022. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Extractable Organics:
Batch 193320, Method E537 Mod, Sample Biosolids PFAS (22031274-01A): The Continuing Calibration Verification did not meet acceptance criteria with high bias, however, the sample results were non-detect for the following analytes: FTS 10:2

Batch 193320, Method E537 Mod, Sample Biosolids PFAS (22031274-01A): One or more surrogate recoveries were above the upper control limits. The sample was non-detect, therefore, no qualification is needed. 13C2-FtS 8:2
No other deviations or anomalies were noted.

Wet Chemistry:
No deviations or anomalies were noted.

ALS Group, USA

Date: *24-Mar-22*

Client: City of Lowell
Project: (City of Lowell) Biosolids PFAS
Sample ID: Biosolids PFAS
Collection Date: 3/14/2022 09:00 AM

Work Order: 22031274
Lab ID: 22031274-01
Matrix: SLUDGE

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
PFAS BY EPA 537 MODIFIED		Method: **E537 MOD**			Prep: E537 Mod / 3/23/22		Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	U		6.4	22	µg/Kg-dry	1	3/23/2022 16:31
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	U		6.2	22	µg/Kg-dry	1	3/23/2022 16:31
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	U		12	22	µg/Kg-dry	1	3/23/2022 16:31
Fluorotelomer Sulphonic Acid 10:2 (FtS 10:2)	U		7.1	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorobutanesulfonic Acid (PFBS)	U		2.7	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorobutanoic Acid (PFBA)	U		6.0	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorodecanesulfonic Acid (PFDS)	U		12	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorodecanoic Acid (PFDA)	**4.5**	J	**3.6**	**22**	**µg/Kg-dry**	1	3/23/2022 16:31
Perfluorododecanesulfonic Acid (PFDoS)	U		5.6	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorododecanoic Acid (PFDoA)	U		6.9	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluoroheptanesulfonic Acid (PFHpS)	U		12	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluoroheptanoic Acid (PFHpA)	U		5.1	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorohexadecanoic Acid (PFHxDA)	U		3.3	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorohexanesulfonic Acid (PFHxS)	U		4.7	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorohexanoic Acid (PFHxA)	U		3.3	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorononanesulfonic Acid (PFNS)	U		3.7	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorononanoic Acid (PFNA)	U		3.2	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorooctadecanoic Acid (PFODA)	U		4.7	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorooctanesulfonamide (PFOSA)	U		5.3	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorooctanesulfonic Acid (PFOS)	**21**	J	**4.3**	**22**	**µg/Kg-dry**	1	3/23/2022 16:31
Perfluorooctanoic Acid (PFOA)	U		3.7	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluoropentanesulfonic Acid (PFPeS)	U		9.2	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluoropentanoic Acid (PFPeA)	U		2.6	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorotetradecanoic Acid (PFTeA)	U		4.8	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluorotridecanoic Acid (PFTriA)	U		15	22	µg/Kg-dry	1	3/23/2022 16:31
Perfluoroundecanoic Acid (PFUnA)	U		6.7	22	µg/Kg-dry	1	3/23/2022 16:31
N-ethylperfluoro-1-octanesulfonamide	U		21	22	µg/Kg-dry	1	3/23/2022 16:31
N-Ethylperfluorooctanesulfonamidoacetic Acid	U		14	22	µg/Kg-dry	1	3/23/2022 16:31
N-Ethylperfluorooctanesulfonamidoethanol	U		5.3	22	µg/Kg-dry	1	3/23/2022 16:31
N-methylperfluoro-1-octanesulfonamide	U		6.3	22	µg/Kg-dry	1	3/23/2022 16:31

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *24-Mar-22*

Client: City of Lowell
Project: (City of Lowell) Biosolids PFAS
Sample ID: Biosolids PFAS
Collection Date: 3/14/2022 09:00 AM

Work Order: 22031274
Lab ID: 22031274-01
Matrix: SLUDGE

Analyses	Result	Qual	MDL	Report Limit	Units	Dilution Factor	Date Analyzed
N-Methylperfluorooctanesulfonamidoacetic Acid	U		14	22	µg/Kg-dry	1	3/23/2022 16:31
N-Methylperfluorooctanesulfonamidoethanol	U		15	22	µg/Kg-dry	1	3/23/2022 16:31
Hexafluoropropylene oxide dimer acid (HFPO-DA)	U		7.8	22	µg/Kg-dry	1	3/23/2022 16:31
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	U		13	22	µg/Kg-dry	1	3/23/2022 16:31
11Cl-Pf3OUdS	U		5.3	22	µg/Kg-dry	1	3/23/2022 16:31
9Cl-PF3ONS	U		3.2	22	µg/Kg-dry	1	3/23/2022 16:31
Surr: 13C2-FtS 4:2	*122*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C2-FtS 6:2	*136*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C2-FtS 8:2	*170*	S		*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C2-PFDA	*79.8*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C2-PFDoA	*72.8*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C2-PFHxA	*73.6*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C2-PFHxDA	*90.5*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C2-PFTeA	*75.4*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C2-PFUnA	*78.0*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C3-HFPO-DA	*78.3*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C3-PFBS	*60.7*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C4-PFBA	*72.7*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C4-PFHpA	*64.1*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C4-PFOA	*66.9*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C4-PFOS	*64.7*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C5-PFNA	*72.5*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C5-PFPeA	*73.0*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 13C8-FOSA	*67.8*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: 18O2-PFHxS	*55.4*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: d5-N-EtFOSA	*59.5*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: d5-N-EtFOSAA	*95.1*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: d9-N-EtFOSE	*53.5*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: d3-N-MeFOSA	*55.5*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: d3-N-MeFOSAA	*93.5*			*50-150*	*%REC*	1	3/23/2022 16:31
Surr: d7-N-MeFOSE	*62.6*			*50-150*	*%REC*	1	3/23/2022 16:31
MOISTURE		Method: **SW3550C**					Analyst: **ALG**
Moisture	**96**		**0.10**	**0.10**	**% of sample**	1	3/17/2022 11:30

Note: See Qualifiers page for a list of qualifiers and their definitions.

Batch ID: **193320** Instrument ID **LCMS1** Method: **E537 Mod**

MBLK Sample ID: **MBLK-193320-193320** Units: **µg/Kg** Analysis Date: **3/23/2022 01:53 PM**

Client ID: Run ID: **LCMS1_220323B** SeqNo: **8264539** Prep Date: **3/23/2022** DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid	U	0.29	1.0								
Fluorotelomer Sulphonic Acid	U	0.28	1.0								
Fluorotelomer Sulphonic Acid	U	0.52	1.0								
Fluorotelomer Sulphonic Acid	U	0.32	1.0								
Perfluorobutanesulfonic Acid (	U	0.12	1.0								
Perfluorobutanoic Acid (PFBA)	U	0.27	1.0								
Perfluorodecanesulfonic Acid	U	0.56	1.0								
Perfluorodecanoic Acid (PFDA	U	0.16	1.0								
Perfluorododecanesulfonic Aci	U	0.25	1.0								
Perfluorododecanoic Acid (PFI	U	0.31	1.0								
Perfluoroheptanesulfonic Acid	U	0.53	1.0								
Perfluoroheptanoic Acid (PFH	U	0.23	1.0								
Perfluorohexadecanoic Acid (F	U	0.15	1.0								
Perfluorohexanesulfonic Acid	U	0.21	1.0								
Perfluorohexanoic Acid (PFHx	U	0.15	1.0								
Perfluorononanesulfonic Acid	U	0.17	1.0								
Perfluorononanoic Acid (PFNA	U	0.15	1.0								
Perfluorooctadecanoic Acid (P	U	0.21	1.0								
Perfluorooctanesulfonamide (F	U	0.24	1.0								
Perfluorooctanesulfonic Acid (I	U	0.19	1.0								
Perfluorooctanoic Acid (PFOA	U	0.17	1.0								
Perfluoropentanesulfonic Acid	U	0.42	1.0								
Perfluoropentanoic Acid (PFPe	U	0.12	1.0								
Perfluorotetradecanoic Acid (F	U	0.22	1.0								
Perfluorotridecanoic Acid (PFT	U	0.66	1.0								
Perfluoroundecanoic Acid (PFI	U	0.3	1.0								
N-ethylperfluoro-1-octanesulfo	U	0.94	1.0								
N-Ethylperfluorooctanesulfona	U	0.64	1.0								
N-Ethylperfluorooctanesulfona	U	0.24	1.0								
N-methylperfluoro-1-octanesul	U	0.28	1.0								
N-Methylperfluorooctanesulfor	U	0.65	1.0								
N-Methylperfluorooctanesulfor	U	0.67	1.0								
Hexafluoropropylene oxide din	U	0.35	1.0								
4,8-Dioxa-3H-perfluorononano	U	0.6	1.0								
11Cl-Pf3OUdS	U	0.24	1.0								
9Cl-PF3ONS	U	0.14	1.0								
Surr: 13C2-FtS 4:2	*12.28*	0	0	*18.68*	0	*65.7*	*50-150*	0			
Surr: 13C2-FtS 6:2	*13.74*	0	0	*19*	0	*72.3*	*50-150*	0			
Surr: 13C2-FtS 8:2	*14.89*	0	0	*19.16*	0	*77.7*	*50-150*	0			
Surr: 13C2-PFDA	*17.91*	0	0	*20*	0	*89.5*	*50-150*	0			
Surr: 13C2-PFDoA	*11.77*	0	0	*20*	0	*58.9*	*50-150*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **193320** Instrument ID **LCMS1** Method: **E537 Mod**

Surr: 13C2-PFHxA	*15.16*	0	0	*20*	0	*75.8*	*50-150*	0
Surr: 13C2-PFHxDA	*16.69*	0	0	*20*	0	*83.5*	*50-150*	0
Surr: 13C2-PFTeA	*15.19*	0	0	*20*	0	*75.9*	*50-150*	0
Surr: 13C2-PFUnA	*17.1*	0	0	*20*	0	*85.5*	*50-150*	0
Surr: 13C3-HFPO-DA	*17.14*	0	0	*20*	0	*85.7*	*50-150*	0
Surr: 13C3-PFBS	*12.88*	0	0	*18.6*	0	*69.3*	*50-150*	0
Surr: 13C4-PFBA	*15.09*	0	0	*20*	0	*75.4*	*50-150*	0
Surr: 13C4-PFHpA	*16.17*	0	0	*20*	0	*80.9*	*50-150*	0
Surr: 13C4-PFOA	*16.52*	0	0	*20*	0	*82.6*	*50-150*	0
Surr: 13C4-PFOS	*15.21*	0	0	*19.1*	0	*79.6*	*50-150*	0
Surr: 13C5-PFNA	*15.7*	0	0	*20*	0	*78.5*	*50-150*	0
Surr: 13C5-PFPeA	*14.64*	0	0	*20*	0	*73.2*	*50-150*	0
Surr: 13C8-FOSA	*13.56*	0	0	*20*	0	*67.8*	*50-150*	0
Surr: 18O2-PFHxS	*15.07*	0	0	*18.9*	0	*79.7*	*50-150*	0
Surr: d5-N-EtFOSA	*14.46*	0	0	*20*	0	*72.3*	*50-150*	0
Surr: d5-N-EtFOSAA	*14.4*	0	0	*20*	0	*72*	*50-150*	0
Surr: d9-N-EtFOSE	*12.91*	0	0	*20*	0	*64.5*	*50-150*	0
Surr: d3-N-MeFOSA	*13.33*	0	0	*20*	0	*66.6*	*50-150*	0
Surr: d3-N-MeFOSAA	*13.46*	0	0	*20*	0	*67.3*	*50-150*	0
Surr: d7-N-MeFOSE	*13.25*	0	0	*20*	0	*66.2*	*50-150*	0

LCS Sample ID: **LCS-193320-193320** Units: **µg/Kg** Analysis Date: **3/23/2022 02:02 PM**

Client ID: Run ID: **LCMS1_220323B** SeqNo: **8264540** Prep Date: **3/23/2022** DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid	5.204	0.28	1.0	3.792	0	137	64-140	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: City of Lowell
Work Order: 22031274
Project: (City of Lowell) Biosolids PFAS

QC BATCH REPORT

Batch ID: **193320** Instrument ID **LCMS1** Method: **E537 Mod**

LCS	Sample ID: **LCS-193320-193320**				Units: **µg/Kg**			Analysis Date: **3/23/2022 05:05 PM**			
Client ID:		Run ID: **LCMS1_220323B**			SeqNo: **8264559**			Prep Date: **3/23/2022**		DF: **1**	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid	4.291	0.29	1.0	3.736	0	115	62-145	0			
Fluorotelomer Sulphonic Acid	4.736	0.52	1.0	3.832	0	124	65-137	0			
Fluorotelomer Sulphonic Acid	3.916	0.32	1.0	3.856	0	102	40-160	0			
Perfluorobutanesulfonic Acid (	3.814	0.12	1.0	3.536	0	108	72-128	0			
Perfluorobutanoic Acid (PFBA)	4.464	0.27	1.0	4	0	112	71-135	0			
Perfluorodecanesulfonic Acid (	3.475	0.56	1.0	3.856	0	90.1	59-134	0			
Perfluorodecanoic Acid (PFDA	4.553	0.16	1.0	4	0	114	69-133	0			
Perfluorododecanesulfonic Aci	4.08	0.25	1.0	3.872	0	105	69-134	0			
Perfluorododecanoic Acid (PFI	5.034	0.31	1.0	4	0	126	69-135	0			
Perfluoroheptanesulfonic Acid	4.211	0.53	1.0	3.808	0	111	70-132	0			
Perfluoroheptanoic Acid (PFH	3.916	0.23	1.0	4	0	97.9	71-131	0			
Perfluorohexadecanoic Acid (F	3.91	0.15	1.0	4	0	97.7	70-130	0			
Perfluorohexanesulfonic Acid (	4.122	0.21	1.0	3.64	0	113	67-130	0			
Perfluorohexanoic Acid (PFHx	4.26	0.15	1.0	4	0	106	70-132	0			
Perfluorononanesulfonic Acid (	3.358	0.17	1.0	3.84	0	87.5	69-125	0			
Perfluorononanoic Acid (PFNA	4.289	0.15	1.0	4	0	107	72-129	0			
Perfluorooctadecanoic Acid (P	4.172	0.21	1.0	4	0	104	70-130	0			
Perfluorooctanesulfonamide (F	4.464	0.24	1.0	4	0	112	67-137	0			
Perfluorooctanesulfonic Acid (I	4.341	0.19	1.0	3.712	0	117	68-136	0			
Perfluorooctanoic Acid (PFOA	4.469	0.17	1.0	4	0	112	69-133	0			
Perfluoropentanesulfonic Acid	4.148	0.42	1.0	3.752	0	111	73-123	0			
Perfluoropentanoic Acid (PFPe	4.144	0.12	1.0	4	0	104	69-132	0			
Perfluorotetradecanoic Acid (F	4.018	0.22	1.0	4	0	100	69-133	0			
Perfluorotridecanoic Acid (PFT	3.607	0.66	1.0	4	0	90.2	66-139	0			
Perfluoroundecanoic Acid (PFI	4.28	0.3	1.0	4	0	107	64-136	0			
N-ethylperfluoro-1-octanesulfo	4.149	0.94	1.0	4	0	104	70-130	0			
N-Ethylperfluorooctanesulfona	3.387	0.64	1.0	4	0	84.7	61-139	0			
N-Ethylperfluorooctanesulfona	4.115	0.24	1.0	4	0	103	70-130	0			
N-methylperfluoro-1-octanesul	4.522	0.28	1.0	4	0	113	70-130	0			
N-Methylperfluorooctanesulfor	4.855	0.65	1.0	4	0	121	63-144	0			
N-Methylperfluorooctanesulfor	4.248	0.67	1.0	4	0	106	68-141	0			
Hexafluoropropylene oxide din	4.016	0.35	1.0	4	0	100	70-130	0			
4,8-Dioxa-3H-perfluorononano	3.354	0.6	1.0	3.768	0	89	70-130	0			
11Cl-Pf3OUdS	4.315	0.24	1.0	3.768	0	115	70-130	0			
9Cl-PF3ONS	4.028	0.14	1.0	3.728	0	108	70-130	0			
Surr: 13C2-FtS 4:2	*12.34*	0	0	*18.68*	0	*66*	*50-150*	0			
Surr: 13C2-FtS 6:2	*18.1*	0	0	*19*	0	*95.3*	*50-150*	0			
Surr: 13C2-FtS 8:2	*22.78*	0	0	*19.16*	0	*119*	*50-150*	0			
Surr: 13C2-PFDA	*18.72*	0	0	*20*	0	*93.6*	*50-150*	0			
Surr: 13C2-PFDoA	*13.44*	0	0	*20*	0	*67.2*	*50-150*	0			
Surr: 13C2-PFHxA	*15.67*	0	0	*20*	0	*78.4*	*50-150*	0			
Surr: 13C2-PFHxDA	*17.99*	0	0	*20*	0	*90*	*50-150*	0			
Surr: 13C2-PFTeA	*18.42*	0	0	*20*	0	*92.1*	*50-150*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **193320**	Instrument ID **LCMS1**			Method: **E537 Mod**				
Surr: 13C2-PFUnA	*17.91*	0	0	*20*	0	*89.6*	*50-150*	0
Surr: 13C3-HFPO-DA	*18.89*	0	0	*20*	0	*94.4*	*50-150*	0
Surr: 13C3-PFBS	*13.37*	0	0	*18.6*	0	*71.9*	*50-150*	0
Surr: 13C4-PFBA	*15.02*	0	0	*20*	0	*75.1*	*50-150*	0
Surr: 13C4-PFHpA	*18.57*	0	0	*20*	0	*92.8*	*50-150*	0
Surr: 13C4-PFOA	*17.59*	0	0	*20*	0	*88*	*50-150*	0
Surr: 13C4-PFOS	*14.57*	0	0	*19.1*	0	*76.3*	*50-150*	0
Surr: 13C5-PFNA	*17.5*	0	0	*20*	0	*87.5*	*50-150*	0
Surr: 13C5-PFPeA	*15.22*	0	0	*20*	0	*76.1*	*50-150*	0
Surr: 13C8-FOSA	*15.01*	0	0	*20*	0	*75.1*	*50-150*	0
Surr: 18O2-PFHxS	*14.49*	0	0	*18.9*	0	*76.7*	*50-150*	0
Surr: d5-N-EtFOSA	*14.99*	0	0	*20*	0	*75*	*50-150*	0
Surr: d5-N-EtFOSAA	*20.17*	0	0	*20*	0	*101*	*50-150*	0
Surr: d9-N-EtFOSE	*15.13*	0	0	*20*	0	*75.6*	*50-150*	0
Surr: d3-N-MeFOSA	*14.45*	0	0	*20*	0	*72.2*	*50-150*	0
Surr: d3-N-MeFOSAA	*18.33*	0	0	*20*	0	*91.7*	*50-150*	0
Surr: d7-N-MeFOSE	*14.14*	0	0	*20*	0	*70.7*	*50-150*	0

LCSD	Sample ID: **LCSD-193320-193320**				Units: **µg/Kg**			Analysis Date: **3/23/2022 02:10 PM**			
Client ID:		Run ID: **LCMS1_220323B**			SeqNo: **8264541**			Prep Date: **3/23/2022**		DF: **1**	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid	5.132	0.28	1.0	3.792	0	135	64-140	5.204	1.4	30	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: City of Lowell
Work Order: 22031274
Project: (City of Lowell) Biosolids PFAS

QC BATCH REPORT

Batch ID: **193320** Instrument ID **LCMS1** Method: **E537 Mod**

LCSD	Sample ID: **LCSD-193320-193320**				Units: **µg/Kg**			Analysis Date: **3/23/2022 05:13 PM**			
Client ID:		Run ID: **LCMS1_220323B**			SeqNo: **8264560**			Prep Date: **3/23/2022**		DF: **1**	
Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid	4.682	0.29	1.0	3.736	0	125	62-145	4.291	8.71	30	
Fluorotelomer Sulphonic Acid	4.514	0.52	1.0	3.832	0	118	65-137	4.736	4.79	30	
Fluorotelomer Sulphonic Acid	3.857	0.32	1.0	3.856	0	100	40-160	3.916	1.52	30	
Perfluorobutanesulfonic Acid (	4.184	0.12	1.0	3.536	0	118	72-128	3.814	9.24	30	
Perfluorobutanoic Acid (PFBA)	4.398	0.27	1.0	4	0	110	71-135	4.464	1.49	30	
Perfluorodecanesulfonic Acid (	3.912	0.56	1.0	3.856	0	101	59-134	3.475	11.8	30	
Perfluorodecanoic Acid (PFDA	4.298	0.16	1.0	4	0	107	69-133	4.553	5.78	30	
Perfluorododecanesulfonic Aci	4.108	0.25	1.0	3.872	0	106	69-134	4.08	0.694	30	
Perfluorododecanoic Acid (PFI	5.254	0.31	1.0	4	0	131	69-135	5.034	4.28	30	
Perfluoroheptanesulfonic Acid	3.98	0.53	1.0	3.808	0	105	70-132	4.211	5.63	30	
Perfluoroheptanoic Acid (PFH	4.688	0.23	1.0	4	0	117	71-131	3.916	17.9	30	
Perfluorohexadecanoic Acid (F	4.276	0.15	1.0	4	0	107	70-130	3.91	8.95	30	
Perfluorohexanesulfonic Acid (	4.226	0.21	1.0	3.64	0	116	67-130	4.122	2.48	30	
Perfluorohexanoic Acid (PFHx	4.307	0.15	1.0	4	0	108	70-132	4.26	1.11	30	
Perfluorononanesulfonic Acid (	3.338	0.17	1.0	3.84	0	86.9	69-125	3.358	0.621	30	
Perfluorononanoic Acid (PFNA	4.278	0.15	1.0	4	0	107	72-129	4.289	0.261	30	
Perfluorooctadecanoic Acid (P	4.755	0.21	1.0	4	0	119	70-130	4.172	13.1	30	
Perfluorooctanesulfonamide (F	5.021	0.24	1.0	4	0	126	67-137	4.464	11.7	30	
Perfluorooctanesulfonic Acid (I	3.858	0.19	1.0	3.712	0	104	68-136	4.341	11.8	30	
Perfluorooctanoic Acid (PFOA	4.481	0.17	1.0	4	0	112	69-133	4.469	0.268	30	
Perfluoropentanesulfonic Acid	4.098	0.42	1.0	3.752	0	109	73-123	4.148	1.2	30	
Perfluoropentanoic Acid (PFPe	4.358	0.12	1.0	4	0	109	69-132	4.144	5.02	30	
Perfluorotetradecanoic Acid (F	4.66	0.22	1.0	4	0	116	69-133	4.018	14.8	30	
Perfluorotridecanoic Acid (PFT	4.708	0.66	1.0	4	0	118	66-139	3.607	26.5	30	
Perfluoroundecanoic Acid (PFI	4.247	0.3	1.0	4	0	106	64-136	4.28	0.779	30	
N-ethylperfluoro-1-octanesulfo	4.851	0.94	1.0	4	0	121	70-130	4.149	15.6	30	
N-Ethylperfluorooctanesulfona	3.624	0.64	1.0	4	0	90.6	61-139	3.387	6.77	30	
N-Ethylperfluorooctanesulfona	4.249	0.24	1.0	4	0	106	70-130	4.115	3.19	30	
N-methylperfluoro-1-octanesul	4.49	0.28	1.0	4	0	112	70-130	4.522	0.728	30	
N-Methylperfluorooctanesulfor	4.778	0.65	1.0	4	0	119	63-144	4.855	1.6	30	
N-Methylperfluorooctanesulfor	4.499	0.67	1.0	4	0	112	68-141	4.248	5.75	30	
Hexafluoropropylene oxide din	4.314	0.35	1.0	4	0	108	70-130	4.016	7.16	30	
4,8-Dioxa-3H-perfluorononano	3.605	0.6	1.0	3.768	0	95.7	70-130	3.354	7.23	30	
11Cl-Pf3OUdS	3.91	0.24	1.0	3.768	0	104	70-130	4.315	9.84	30	
9Cl-PF3ONS	3.899	0.14	1.0	3.728	0	105	70-130	4.028	3.26	30	
Surr: 13C2-FtS 4:2	*13.81*	0	0	*18.68*	0	*74*	*50-150*	12.34	*11.3*	*30*	
Surr: 13C2-FtS 6:2	*16.41*	0	0	*19*	0	*86.4*	*50-150*	18.1	*9.76*	*30*	
Surr: 13C2-FtS 8:2	*18.64*	0	0	*19.16*	0	*97.3*	*50-150*	22.78	*20*	*30*	
Surr: 13C2-PFDA	*20.54*	0	0	*20*	0	*103*	*50-150*	18.72	*9.29*	*30*	
Surr: 13C2-PFDoA	*17.42*	0	0	*20*	0	*87.1*	*50-150*	13.44	*25.8*	*30*	
Surr: 13C2-PFHxA	*17.03*	0	0	*20*	0	*85.1*	*50-150*	15.67	*8.31*	*30*	
Surr: 13C2-PFHxDA	*20.09*	0	0	*20*	0	*100*	*50-150*	17.99	*11*	*30*	
Surr: 13C2-PFTeA	*17.16*	0	0	*20*	0	*85.8*	*50-150*	18.42	*7.08*	*30*	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: City of Lowell
Work Order: 22031274
Project: (City of Lowell) Biosolids PFAS

QC BATCH REPORT

Batch ID: **193320**	Instrument ID **LCMS1**			Method: **E537 Mod**						
Surr: 13C2-PFUnA	*17.96*	0	0	*20*	0	*89.8*	*50-150*	17.91	*0.285*	*30*
Surr: 13C3-HFPO-DA	*19.51*	0	0	*20*	0	*97.6*	*50-150*	18.89	*3.25*	*30*
Surr: 13C3-PFBS	*14.74*	0	0	*18.6*	0	*79.2*	*50-150*	13.37	*9.7*	*30*
Surr: 13C4-PFBA	*17.71*	0	0	*20*	0	*88.5*	*50-150*	15.02	*16.4*	*30*
Surr: 13C4-PFHpA	*18.51*	0	0	*20*	0	*92.6*	*50-150*	18.57	*0.296*	*30*
Surr: 13C4-PFOA	*19.15*	0	0	*20*	0	*95.8*	*50-150*	17.59	*8.49*	*30*
Surr: 13C4-PFOS	*17.82*	0	0	*19.1*	0	*93.3*	*50-150*	14.57	*20.1*	*30*
Surr: 13C5-PFNA	*18.59*	0	0	*20*	0	*92.9*	*50-150*	17.5	*6*	*30*
Surr: 13C5-PFPeA	*17.22*	0	0	*20*	0	*86.1*	*50-150*	15.22	*12.3*	*30*
Surr: 13C8-FOSA	*17.27*	0	0	*20*	0	*86.3*	*50-150*	15.01	*14*	*30*
Surr: 18O2-PFHxS	*16.64*	0	0	*18.9*	0	*88.1*	*50-150*	14.49	*13.8*	*30*
Surr: d5-N-EtFOSA	*16.28*	0	0	*20*	0	*81.4*	*50-150*	14.99	*8.23*	*30*
Surr: d5-N-EtFOSAA	*16.54*	0	0	*20*	0	*82.7*	*50-150*	20.17	*19.8*	*30*
Surr: d9-N-EtFOSE	*18.32*	0	0	*20*	0	*91.6*	*50-150*	15.13	*19.1*	*30*
Surr: d3-N-MeFOSA	*17.78*	0	0	*20*	0	*88.9*	*50-150*	14.45	*20.7*	*30*
Surr: d3-N-MeFOSAA	*17.08*	0	0	*20*	0	*85.4*	*50-150*	18.33	*7.07*	*30*
Surr: d7-N-MeFOSE	*18.23*	0	0	*20*	0	*91.2*	*50-150*	14.14	*25.2*	*30*

The following samples were analyzed in this batch: 22031274-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: City of Lowell
Work Order: 22031274
Project: (City of Lowell) Biosolids PFAS

QC BATCH REPORT

Batch ID: **R340218** Instrument ID **MOIST** Method: **SW3550C**

MBLK Sample ID: **WBLKS-R340218** Units: **% of sample** Analysis Date: **3/17/2022 11:30 AM**
Client ID: Run ID: **MOIST_220317A** SeqNo: **8250695** Prep Date: DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	U	0.1	0.10								

LCS Sample ID: **LCS-R340218** Units: **% of sample** Analysis Date: **3/17/2022 11:30 AM**
Client ID: Run ID: **MOIST_220317A** SeqNo: **8250694** Prep Date: DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	100	0.1	0.10	100	0	100	98-102	0			

DUP Sample ID: **22031277-01B DUP** Units: **% of sample** Analysis Date: **3/17/2022 11:30 AM**
Client ID: Run ID: **MOIST_220317A** SeqNo: **8250684** Prep Date: DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	15.51	0.1	0.10	0	0	0	0-0	14.73	5.16	10	

DUP Sample ID: **22031303-01B DUP** Units: **% of sample** Analysis Date: **3/17/2022 11:30 AM**
Client ID: Run ID: **MOIST_220317A** SeqNo: **8250690** Prep Date: DF: **1**

Analyte	Result	MDL	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Moisture	13.54	0.1	0.10	0	0	0	0-0	13.67	0.956	10	

The following samples were analyzed in this batch: 22031274-01A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

8741586

Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070
Houston, TX +1 281 530 5656
Middletown, PA +1 717 944 5541
Spring City, PA +1 610 948 4903
Salt Lake City, UT +1 801 266 7700
South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

Chain of Custody Form

Page _____ of _____

COC ID: 260130

ALS Project Manager: | ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	Biosolids PFAS	A	PFAS - Method 537 (28 compounds)
Work Order		Project Number		B	
Company Name	City of Lowell	Bill To Company	City of Lowell	C	
Send Report To	Brian VanderMeulen	Invoice Attn	Brian VanderMeulen	D	
Address	301 East Main Street	Address	301 East Main Street	E	
				F	
City/State/Zip	Lowell, MI 49331	City/State/Zip	Lowell, MI 49331	G	
Phone	(616) 897-8135	Phone	(616) 897-8135	H	
Fax	(616) 897-4086	Fax	(616) 897-4086	I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	Biosolids PFAS	3/14/22	9:00a	Sludge	—	2	X										
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

22031274
LOWELL - CITY OF, City of Lowell
Project: (City of Lowell) Biosolids PFAS

Sampler(s) Please Print & Sign	Shipment Method	Required Turnaround Time: (Check Box)	Results Due Date:
Brian VanderMeulen	UPS	☐ 10 BD ☐ 5 BD ☐ 3 BD ☐ Other ☐ 2 BD ☐ 1 BD	

Relinquished by:	Date:	Time:	Received by:
	3/14/22	10:00	UPS
Relinquished by: UPS	Date: 3/15/22	Time: 1000	Received by (Laboratory):
Logged by (Laboratory): DFS	Date: 3/15/22	Time: 1530	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.
IR1	3.8°C

QC Package: (Check One Box Below)
- ☑ Level II Std QC
- ☐ Level III Std QC/Raw Data
- ☐ Level IV SW846/CLP
- ☐ Other
- ☐ TRRP CheckList
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Group, USA

Sample Receipt Checklist

Client Name: **LOWELL - CITY OF** Date/Time Received: **15-Mar-22 10:00**

Work Order: **22031274** Received by: **DS**

Checklist completed by Diane Shaw (eSignature) 15-Mar-22 (Date) Reviewed by: Jodi Blouw (eSignature) 16-Mar-22 (Date)

Matrices: Sludge
Carrier name: UPS

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.8/3.8 c	IR1	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	3/15/2022 3:40:58 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction: