eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Michigan
10448 Citation Drive
Suite 200
Brighton, MI 48116
Tel: (810)229-2763

Laboratory Job ID: 190-26084-1
Client Project/Site: SHVUA-Biosolids PFAS
Revision: 1

For:
Jacobs Engineering Group, Inc.
c/o SHVUA WWTP
34001 W Jefferson Avenue
Rockwood, Michigan 48173

Attn: Mark Houle

Sue Schafer

Authorized for release by:
6/16/2021 5:24:59 PM

Sue Schafer, Project Manager II
(810)229-2763
Sue.Schafer@Eurofinset.com

Table of Contents

Sample Summary

Client: Jacobs Engineering Group, Inc.
Project/Site: SHVUA-Biosolids PFAS

Job ID: 190-26084-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
190-26084-1	Biosolids PFAS Grab	Solid	06/02/21 10:15	06/02/21 15:00	

Job ID: 190-26084-1

Laboratory: Eurofins TestAmerica, Michigan

Narrative

Job Narrative
190-26084-1

Comments
No additional comments.

Receipt
The sample was received on 6/2/2021 3:00 PM. Unless otherwise noted below, the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.0º C.

LCMS
Method 537 (modified): Due to the high concentration of several, the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 320-495404 and analytical batch 320-495959 could not be evaluated for accuracy and precision.

Method 537 (modified): The concentration of Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) associated with the following samples exceeded the instrument calibration range: (320-74392-F-1-A), (320-74392-F-1-B MS) and (320-74392-F-1-C MSD). These analytes have been qualified; however, the peak(s) did not saturate the instrument detector. Historical data indicate that for the isotope dilution method, dilution and re-analysis will not produce significantly different results from those reported above the calibration range.

Method 537 (modified): The following sample exhibited matrix interferences for Perfluorooctanesulfonic acid (PFOS) causing elevation of the reporting limit (RL): Biosolids PFAS Grab (190-26084-1) . The RL for the affected analyte has been raised to be equal to the level of the matrix interference, and a "G" qualifier applied.

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

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

Organic Prep
Method SHAKE: Due to the matrix, the initial volume used for the following sample deviated from the standard procedure: Biosolids PFAS Grab (190-26084-1). The sample was weighed out at 1.11g and fortified with IDA and extracted. The reporting limits (RLs) have been adjusted proportionately.

preparation batch 320-495404
Shake_Bath_14D
Solid

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

Client: Jacobs Engineering Group, Inc.
Project/Site: SHVUA-Biosolids PFAS

Job ID: 190-26084-1

Client Sample ID: Biosolids PFAS Grab
Date Collected: 06/02/21 10:15
Date Received: 06/02/21 15:00

Lab Sample ID: 190-26084-1
Matrix: Solid
Percent Solids: 2.8

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.593		6.59	0.593	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
F-53B Major	<0.889		6.59	0.889	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
F-53B Minor	<0.725		6.59	0.725	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
4:2 FTS	<12.2		65.9	12.2	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
6:2 FTS	<4.94		65.9	4.94	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
8:2 FTS	<8.24		65.9	8.24	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
HFPO-DA (GenX)	<3.62		8.24	3.62	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<12.2		65.9	12.2	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**17.3**	**J**	65.9	12.8	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorobutanesulfonic acid (PFBS)	**5.19**	**J I**	6.59	0.824	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorobutanoic acid (PFBA)	**38.1**		6.59	0.922	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorodecanesulfonic acid (PFDS)	<1.28		6.59	1.28	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorodecanoic acid (PFDA)	**4.19**	**J**	6.59	0.725	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorododecanoic acid (PFDoA)	<2.21		6.59	2.21	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluoroheptanesulfonic Acid (PFHpS)	<1.15		6.59	1.15	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluoroheptanoic acid (PFHpA)	<0.955		6.59	0.955	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorohexanesulfonic acid (PFHxS)	<1.02		6.59	1.02	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorohexanoic acid (PFHxA)	**5.33**	**J**	6.59	1.38	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorononanesulfonic acid (PFNS)	<0.659		6.59	0.659	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorononanoic acid (PFNA)	<1.19		6.59	1.19	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorooctanesulfonamide (FOSA)	<2.70		6.59	2.70	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorooctanesulfonic acid (PFOS)	<21.1	G	21.1	21.1	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorooctanoic acid (PFOA)	<2.83		6.59	2.83	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluoropentanesulfonic acid (PFPeS)	<0.659		6.59	0.659	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluoropentanoic acid (PFPeA)	<2.54		6.59	2.54	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorotetradecanoic acid (PFTeA)	<1.78		6.59	1.78	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluorotridecanoic acid (PFTriA)	<1.68		6.59	1.68	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1
Perfluoroundecanoic acid (PFUnA)	<1.19		6.59	1.19	ug/Kg	☼	06/04/21 04:59	06/06/21 02:38	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*89*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C4 PFBA	*47*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C3 PFBS	*89*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C2 PFDA	*96*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C2 PFDoA	*46*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C4 PFHpA	*99*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C2 PFHxA	*90*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C5 PFNA	*95*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C4 PFOA	*104*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C4 PFOS	*88*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C5 PFPeA	*88*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C2 PFTeDA	*35*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C2 PFUnA	*66*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
d5-NEtFOSAA	*48*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
d3-NMeFOSAA	*91*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
M2-4:2 FTS	*124*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*

Client: Jacobs Engineering Group, Inc.
Project/Site: SHVUA-Biosolids PFAS

Job ID: 190-26084-1

Client Sample ID: Biosolids PFAS Grab
Date Collected: 06/02/21 10:15
Date Received: 06/02/21 15:00

Lab Sample ID: 190-26084-1
Matrix: Solid
Percent Solids: 2.8

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-6:2 FTS	*136*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
M2-8:2 FTS	*136*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
18O2 PFHxS	*93*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*
13C3 HFPO-DA	*95*		*25 - 150*	*06/04/21 04:59*	*06/06/21 02:38*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**97.2**		0.1		%			06/04/21 12:02	1
Percent Solids	**2.8**		0.1		%			06/04/21 12:02	1

Client: Jacobs Engineering Group, Inc.
Project/Site: SHVUA-Biosolids PFAS

Job ID: 190-26084-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-495404/1-A
Matrix: Solid
Analysis Batch: 495959

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 495404

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.0180		0.200	0.0180	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
F-53B Major	<0.0270		0.200	0.0270	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
F-53B Minor	<0.0220		0.200	0.0220	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
4:2 FTS	<0.370		2.00	0.370	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
6:2 FTS	<0.150		2.00	0.150	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
8:2 FTS	<0.250		2.00	0.250	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
HFPO-DA (GenX)	<0.110		0.250	0.110	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<0.370		2.00	0.370	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<0.390		2.00	0.390	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorobutanesulfonic acid (PFBS)	<0.0250		0.200	0.0250	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorobutanoic acid (PFBA)	<0.0280		0.200	0.0280	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorodecanesulfonic acid (PFDS)	<0.0390		0.200	0.0390	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorodecanoic acid (PFDA)	<0.0220		0.200	0.0220	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorododecanoic acid (PFDoA)	<0.0670		0.200	0.0670	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluoroheptanesulfonic Acid (PFHpS)	<0.0350		0.200	0.0350	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluoroheptanoic acid (PFHpA)	<0.0290		0.200	0.0290	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorohexanesulfonic acid (PFHxS)	<0.0310		0.200	0.0310	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorohexanoic acid (PFHxA)	<0.0420		0.200	0.0420	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorononanesulfonic acid (PFNS)	<0.0200		0.200	0.0200	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorononanoic acid (PFNA)	<0.0360		0.200	0.0360	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorooctanesulfonamide (FOSA)	<0.0820		0.200	0.0820	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorooctanesulfonic acid (PFOS)	<0.200		0.500	0.200	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorooctanoic acid (PFOA)	<0.0860		0.200	0.0860	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluoropentanesulfonic acid (PFPeS)	<0.0200		0.200	0.0200	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluoropentanoic acid (PFPeA)	<0.0770		0.200	0.0770	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorotetradecanoic acid (PFTeA)	<0.0540		0.200	0.0540	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluorotridecanoic acid (PFTriA)	<0.0510		0.200	0.0510	ug/Kg		06/04/21 04:59	06/06/21 00:30	1
Perfluoroundecanoic acid (PFUnA)	<0.0360		0.200	0.0360	ug/Kg		06/04/21 04:59	06/06/21 00:30	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*95*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C4 PFBA	*90*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C3 PFBS	*90*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C2 PFDA	*88*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C2 PFDoA	*96*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C4 PFHpA	*98*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C2 PFHxA	*89*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C5 PFNA	*95*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C4 PFOA	*92*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C4 PFOS	*85*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C5 PFPeA	*89*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C2 PFTeDA	*89*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
13C2 PFUnA	*87*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
d5-NEtFOSAA	*95*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*
d3-NMeFOSAA	*92*		*25 - 150*	*06/04/21 04:59*	*06/06/21 00:30*	*1*

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 320-495404/1-A
Matrix: Solid
Analysis Batch: 495959

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 495404

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	99		25 - 150	06/04/21 04:59	06/06/21 00:30	1
M2-6:2 FTS	89		25 - 150	06/04/21 04:59	06/06/21 00:30	1
M2-8:2 FTS	89		25 - 150	06/04/21 04:59	06/06/21 00:30	1
18O2 PFHxS	92		25 - 150	06/04/21 04:59	06/06/21 00:30	1
13C3 HFPO-DA	92		25 - 150	06/04/21 04:59	06/06/21 00:30	1

Lab Sample ID: LCS 320-495404/2-A
Matrix: Solid
Analysis Batch: 495959

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 495404

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.88	2.181		ug/Kg		116	79 - 139
F-53B Major	1.86	2.176		ug/Kg		117	74 - 134
F-53B Minor	1.88	2.037		ug/Kg		108	66 - 136
4:2 FTS	1.87	1.857	J	ug/Kg		99	68 - 143
6:2 FTS	1.90	2.089		ug/Kg		110	73 - 139
8:2 FTS	1.92	2.156		ug/Kg		113	75 - 135
HFPO-DA (GenX)	2.00	2.133		ug/Kg		107	53 - 158
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	1.943	J	ug/Kg		97	72 - 132
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	2.055		ug/Kg		103	72 - 132
Perfluorobutanesulfonic acid (PFBS)	1.77	1.886		ug/Kg		107	69 - 129
Perfluorobutanoic acid (PFBA)	2.00	2.108		ug/Kg		105	76 - 136
Perfluorodecanesulfonic acid (PFDS)	1.93	1.971		ug/Kg		102	71 - 131
Perfluorodecanoic acid (PFDA)	2.00	1.835		ug/Kg		92	72 - 132
Perfluorododecanoic acid (PFDoA)	2.00	2.083		ug/Kg		104	71 - 131
Perfluoroheptanesulfonic Acid (PFHpS)	1.90	2.093		ug/Kg		110	76 - 136
Perfluoroheptanoic acid (PFHpA)	2.00	2.076		ug/Kg		104	71 - 131
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.884		ug/Kg		104	62 - 122
Perfluorohexanoic acid (PFHxA)	2.00	2.069		ug/Kg		103	71 - 131
Perfluorononanesulfonic acid (PFNS)	1.92	1.981		ug/Kg		103	72 - 132
Perfluorononanoic acid (PFNA)	2.00	2.067		ug/Kg		103	73 - 133
Perfluorooctanesulfonamide (FOSA)	2.00	2.156		ug/Kg		108	77 - 137
Perfluorooctanesulfonic acid (PFOS)	1.86	2.044		ug/Kg		110	68 - 141
Perfluorooctanoic acid (PFOA)	2.00	2.169		ug/Kg		108	72 - 132
Perfluoropentanesulfonic acid (PFPeS)	1.88	1.970		ug/Kg		105	66 - 126
Perfluoropentanoic acid (PFPeA)	2.00	2.072		ug/Kg		104	69 - 129
Perfluorotetradecanoic acid (PFTeA)	2.00	2.389		ug/Kg		119	67 - 127
Perfluorotridecanoic acid (PFTriA)	2.00	2.200		ug/Kg		110	71 - 131

Method: 537 (modified) - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 320-495404/2-A
Matrix: Solid
Analysis Batch: 495959

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 495404

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluoroundecanoic acid (PFUnA)			2.00	2.078		ug/Kg		104	66 - 126		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C8 FOSA	*92*		*25 - 150*
13C4 PFBA	*91*		*25 - 150*
13C3 PFBS	*87*		*25 - 150*
13C2 PFDA	*94*		*25 - 150*
13C2 PFDoA	*94*		*25 - 150*
13C4 PFHpA	*98*		*25 - 150*
13C2 PFHxA	*89*		*25 - 150*
13C5 PFNA	*97*		*25 - 150*
13C4 PFOA	*91*		*25 - 150*
13C4 PFOS	*86*		*25 - 150*
13C5 PFPeA	*88*		*25 - 150*
13C2 PFTeDA	*83*		*25 - 150*
13C2 PFUnA	*83*		*25 - 150*
d5-NEtFOSAA	*92*		*25 - 150*
d3-NMeFOSAA	*86*		*25 - 150*
M2-4:2 FTS	*98*		*25 - 150*
M2-6:2 FTS	*84*		*25 - 150*
M2-8:2 FTS	*80*		*25 - 150*
18O2 PFHxS	*89*		*25 - 150*
13C3 HFPO-DA	*91*		*25 - 150*

Definitions/Glossary

Client: Jacobs Engineering Group, Inc.
Project/Site: SHVUA-Biosolids PFAS

Job ID: 190-26084-1

Qualifiers

LCMS

Qualifier	Qualifier Description
G	The reported quantitation limit has been raised due to an exhibited elevated noise or matrix interference
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Isotope Dilution Summary

Client: Jacobs Engineering Group, Inc.
Project/Site: SHVUA-Biosolids PFAS

Job ID: 190-26084-1

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFOSA	PFBA	C3PFBS	PFDA	PFDoA	C4PFHA	PFHxA	PFNA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
190-26084-1	Biosolids PFAS Grab	89	47	89	96	46	99	90	95
LCS 320-495404/2-A	Lab Control Sample	92	91	87	94	94	98	89	97
MB 320-495404/1-A	Method Blank	95	90	90	88	96	98	89	95

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFOA	PFOS	PFPeA	PFTDA	PFUnA	d5NEFOS	d3NMFOS	M242FTS
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
190-26084-1	Biosolids PFAS Grab	104	88	88	35	66	48	91	124
LCS 320-495404/2-A	Lab Control Sample	91	86	88	83	83	92	86	98
MB 320-495404/1-A	Method Blank	92	85	89	89	87	95	92	99

		Percent Isotope Dilution Recovery (Acceptance Limits)			
		M262FTS	M282FTS	PFHxS	HFPODA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)
190-26084-1	Biosolids PFAS Grab	136	136	93	95
LCS 320-495404/2-A	Lab Control Sample	84	80	89	91
MB 320-495404/1-A	Method Blank	89	89	92	92

Surrogate Legend

PFOSA = 13C8 FOSA
PFBA = 13C4 PFBA
C3PFBS = 13C3 PFBS
PFDA = 13C2 PFDA
PFDoA = 13C2 PFDoA
C4PFHA = 13C4 PFHpA
PFHxA = 13C2 PFHxA
PFNA = 13C5 PFNA
PFOA = 13C4 PFOA
PFOS = 13C4 PFOS
PFPeA = 13C5 PFPeA
PFTDA = 13C2 PFTeDA
PFUnA = 13C2 PFUnA
d5NEFOS = d5-NEtFOSAA
d3NMFOS = d3-NMeFOSAA
M242FTS = M2-4:2 FTS
M262FTS = M2-6:2 FTS
M282FTS = M2-8:2 FTS
PFHxS = 18O2 PFHxS
HFPODA = 13C3 HFPO-DA

Lab Chronicle

Client: Jacobs Engineering Group, Inc.
Project/Site: SHVUA-Biosolids PFAS

Job ID: 190-26084-1

Client Sample ID: Biosolids PFAS Grab

Lab Sample ID: 190-26084-1
Date Collected: 06/02/21 10:15
Matrix: Solid
Date Received: 06/02/21 15:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	495560	06/04/21 12:02	KDB	TAL SAC

Client Sample ID: Biosolids PFAS Grab

Lab Sample ID: 190-26084-1
Date Collected: 06/02/21 10:15
Matrix: Solid
Date Received: 06/02/21 15:00
Percent Solids: 2.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			495404	06/04/21 04:59	HK	TAL SAC
Total/NA	Analysis	537 (modified)		1	495959	06/06/21 02:38	RS1	TAL SAC

Laboratory References:

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

Analyst References:

Lab: TAL SAC

Batch Type: Prep

HK = Harmandeep Kaur

Batch Type: Analysis

KDB = Kristen Burrick

RS1 = Rungtip Sanjumnai

Accreditation/Certification Summary

Client: Jacobs Engineering Group, Inc.
Job ID: 190-26084-1
Project/Site: SHVUA-Biosolids PFAS

Laboratory: Eurofins TestAmerica, Sacramento

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	17-020	02-20-24
ANAB	Dept. of Defense ELAP	L2468	01-20-24
ANAB	Dept. of Energy	L2468.01	01-20-24
ANAB	ISO/IEC 17025	L2468	01-20-24
Arizona	State	AZ0708	08-11-21
Arkansas DEQ	State	88-0691	06-17-21
California	State	2897	01-31-22
Colorado	State	CA0004	08-31-21
Connecticut	State	PH-0691	06-30-21
Florida	NELAP	E87570	06-30-21
Georgia	State	4040	01-29-22
Hawaii	State	<cert No.>	01-29-22
Illinois	NELAP	200060	03-18-22
Kansas	NELAP	E-10375	10-31-21
Louisiana	NELAP	01944	06-30-21
Maine	State	CA00004	04-14-22
Michigan	State	9947	01-29-22
Nevada	State	CA000442021-2	07-31-21
New Hampshire	NELAP	2997	04-18-22
New Jersey	NELAP	CA005	06-30-21
New York	NELAP	11666	04-01-22
Ohio	State	41252	01-29-22
Oregon	NELAP	4040	01-30-23
Texas	NELAP	T104704399-19-13	05-31-22
US Fish & Wildlife	US Federal Programs	58448	07-31-21
USDA	US Federal Programs	P330-18-00239	07-31-21
Utah	NELAP	CA000442021-12	03-01-22
Virginia	NELAP	460278	03-14-22
Washington	State	C581	05-05-22
West Virginia (DW)	State	9930C	12-31-21
Wisconsin	State	998204680	08-31-21
Wyoming	State Program	8TMS-L	01-28-19 *

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Jacobs Engineering Group, Inc.
Project/Site: SHVUA-Biosolids PFAS

Job ID: 190-26084-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
D 2216	Percent Moisture	ASTM	TAL SAC
SHAKE	Shake Extraction with Ultrasonic Bath Extraction	SW846	TAL SAC

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

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

MICHIGAN
190

Chain of Custody Record

Eurofins TestAmerica - Brighton --- 10448 Citation Drive, Suite 200 / Brighton, MI 48116 / 810-229-2763

eurofins | Environment Testing TestAmerica

Regulatory program: ☐ DW ☐ NPDES ☐ RCRA ☑ Other wastewater permit

Client Contact	Client Project Manager:	Site Contact:	Lab Contact:	COC No:
Company Name: Jacobs Engineering Group	Mark Houle	Mark Houle	Sue Schafer	
Address: 34001 W. Jefferson Ave.	Telephone: 734-642-6160	Telephone: 734-642-6160	Telephone: 810-229-2763 ext 1	1 of 1 COCs
City/State/Zip: Brownstown, MI 48137	Email: mark.houle@jacobs.com	Analysis Turnaround Time	Analyses	For lab use only
Phone: 734-379-3855		TAT if different from below 10 bus ☐ 3 weeks ☐ 2 weeks ☐ 1 week ☐ 2 days ☐ 1 day		Walk-in client Lab sampling Job/SDG No:
Project Name: SHVUA Biosolid PFAS	Method of Shipment/Carrier: Eurofins TestAmerica Field Services			
PO #	Shipping/Tracking No:			

Sample Identification	Sample Date	Sample Time	Matrix: Air	Aqueous	Sediment	Solid	Other:	Containers & Preservatives: H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	Unpres	Other:	Filtered Sample (Y / N)	Composite=C / Grab=G	Solid - PFAS 28 (SAC)	Sample Specific Notes / Special Instructions:
Biosolid PFAS Grab	6/2/21	1015				X							2				X	

190-26084 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal By Lab ☐ Archive For ____ Months

Special Instructions/QC Requirements & Comments:

(Print Name) Eurofins TestAmerica Field Technician - J. Bertram

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
J. Bertram	ETA	6/2/21 1025	Jeri Hare	ETA	6/2/21 1500
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

6/16/2021 (Rev. 1)

eurofins Environment Testing TestAmerica

☐ SDS or Known Hazard Information Supplied by Client
☐ Discrepancies
☐ Short Hold
☐ Rush ☐ 24 Hr ☐ 2-Day ☐ 3-Day ☐ 5-Day ☐ Other: _____

Client ID: Jacobs Eng
Work Oder #: 190-26084

Cooler / Sample Receipt

After hours receipt: complete gray areas. Place cooler in walk-in, place form in Receiving box. Date: _____ Time: _____

Receipt Evaluation Performed by: Initials: TEH Date: 6-2-21 Time: 1500

Method of Shipment:
Walk-In Client ☐ Eurofins TA Field Courier
Other Client / 3rd Party Courier: _____
Fed Ex Tracking #: _____
UPS Tracking #: _____
Other: _____

Shipping Container Type:
☑ Cooler ☐ Box
☐ None ☐ Other: _____

Custody Seals Intact:
☐ Yes ☐ No
☑ NA (not used or required)

Packing Materials:
☑ Plastic Bags ☐ Foam
☐ Bubble Wrap ☐ Paper
☐ Packing Peanuts ☐ None
☐ Other: _____

Cooling Materials:
☑ Ice (Solid) ☐ Ice (Melted)
☐ Blue Ice ☐ None
☐ Other: _____

Bacteriological Samples	Temp Corrected (°C)	Frozen? Yes	Frozen? No	Rec'd Within 2 Hrs? Yes	Rec'd Within 2 Hrs? No	Sample Flagged? Yes	Sample Flagged? No

Received on same day sampled? (Yes) No Additional Sheets Required? Yes No

Receipt Temperatures

Thermometer ID	Observed (°C)	Corrected (°C)	Temp Blank	Sample Temp	Acceptable	Cooler ID	Affected Samples
CP313207	5.0	5.0		✓	✓ Y N		
					Y N		
					Y N		

Receipt Questions**	Y	N	NA	"No" answers require additional comment
CoC present and ETA receipt signature, date, and time properly documented?	✓			
Containers and Labels in good condition? *(unbroken, not leaking, appropriately filled, labels legible & attached)*	✓			
Appropriate containers used and adequate volume provided?	✓			Preserved bottles checked for pH?* Yes No
Number of sample containers match CoC?	✓			pH strip lot # _____
Samples received within hold?	✓			
Samples submitted for GRO and Volatiles analysis (8260, 624, 524) received without headspace?			✓	
Was a Trip Blank received with VOA samples?			✓	
Were the samples free of any questionable physical conformities? (i.e.; field duplicates or multiple bottles of the same sample do not significantly vary in appearance – color, solid proportions, etc.)	✓			
Were the CoC bottle labels and all other items free of all other discrepancies or issues that would need to be addressed with the Project Manager and/or Client?	✓			
**May not be applicable if samples are not for compliance testing				*Excludes FOG, VOAs, TOC Vials, HEM

Client Contact Record

Contact Via: ☐ Phone ☐ Email ☐ Other: _____ Person Contacted: _____ Date/Time: _____
☐ Discrepancy allowance agreement is on record in the client project file

Discussion / Resolution

Any additional documentation and clarification from the client must be noted in the narrative and/or scanned into the CoC directory.

Reviewed by _____ Date: 6/2/21

WI-MI-010_020720

Eurofins TestAmerica, Michigan
10448 Citation Drive Suite 200
Brighton, MI 48116
Phone: 810-229-2763 Fax: 810-229-0000

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Schafer, Sue	Carrier Tracking No(s):	COC No: 190-29510.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Sue.Schafer@Eurofinset.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 190-26084-1
Address: 880 Riverside Parkway, ,	Due Date Requested: 6/22/2021			
City: West Sacramento	TAT Requested (days):			
State, Zip: CA, 95605				
Phone: 916-373-5600(Tel) 916-372-1059(Fax)	PO #:			
Email:	WO #:			
Project Name: Jacobs Engineering Group - SHVUA-Biosolids	Project #: 19001724			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	Moisture	PFC_IDA/Shake_Bath_14D (MOD) PFAS 28	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
Biosolids PFAS Grab (190-26084-1)	6/2/21	10:15 Eastern		Solid			X	X	2	

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins TestAmerica.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	Jeri Hall	6/2/21 1600			6-3-21 / 10:15	ETASA
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.: 1429 185	Cooler Temperature(s) °C and Other Remarks: 3.3

Ver: 11/01/2020