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ANALYTICAL REPORT

Eurofins Michigan
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Laboratory Job ID: 190-28472-1
Client Project/Site: Jacobs Engineering Group - SHVUA Biosoild PFAS

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:
4/27/2022 9:36:19 PM

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Sample Summary

Client: Jacobs Engineering Group, Inc.
Job ID: 190-28472-1
Project/Site: Jacobs Engineering Group - SHVUA Biosoild PFAS

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
190-28472-1	Biosoild PFAS Grab	Solid	04/14/22 11:14	04/14/22 19:29

Job ID: 190-28472-1

Laboratory: Eurofins Michigan

Narrative

Job Narrative
190-28472-1

Comments
No additional comments.

Receipt
The sample was received on 4/14/2022 7:29 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 3.0º C.

LCMS
Method 537 (modified): The "I" qualifier means the transition mass ratio for the indicated analyte was above the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte: Biosoild PFAS Grab (190-28472-1).

Method 537 (modified): Results for sample Biosoild PFAS Grab (190-28472-1) was reported from the analysis of a diluted extract due to sample matrix of the target analyte in the analysis of the undiluted extract. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

Method 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: Biosoild PFAS Grab (190-28472-1). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample. 13C4 PFBA is significantly below the method recommended limit. The client was contacted and gave permission to report.

Method 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following sample is below the method recommended limit: Biosoild PFAS Grab (190-28472-1). Generally, data quality is not considered affected if the IDA signal-to-noise ratio is greater than 10:1, which is achieved for all IDA in the sample.

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: The following sample was yellow after extraction: Biosoild PFAS Grab (190-28472-1).

preparation batch 320-581145
Method: PFC_IDA/Shake_Bath_14D
Matrix: Solid

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

Client Sample Results

Client: Jacobs Engineering Group, Inc.
Job ID: 190-28472-1
Project/Site: Jacobs Engineering Group - SHVUA Biosoild
PFAS

Client Sample ID: Biosoild PFAS Grab
Lab Sample ID: 190-28472-1
Date Collected: 04/14/22 11:14
Matrix: Solid
Date Received: 04/14/22 19:29
Percent Solids: 14.7

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
F-53B Major	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
F-53B Minor	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
4:2 FTS	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
6:2 FTS	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
8:2 FTS	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
HFPO-DA (GenX)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	**4.1**		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**3.7**		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorobutanesulfonic acid (PFBS)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorodecanesulfonic acid (PFDS)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorodecanoic acid (PFDA)	**1.4**		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorododecanoic acid (PFDoA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluoroheptanoic acid (PFHpA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorohexanesulfonic acid (PFHxS)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorohexanoic acid (PFHxA)	**5.5**	**I**	1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorononanesulfonic acid (PFNS)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorononanoic acid (PFNA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorooctanesulfonamide (FOSA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorooctanesulfonic acid (PFOS)	**11**		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorooctanoic acid (PFOA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluoropentanesulfonic acid (PFPeS)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorotetradecanoic acid (PFTeA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluorotridecanoic acid (PFTriA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1
Perfluoroundecanoic acid (PFUnA)	<1.4		1.4		ug/Kg	☼	04/18/22 19:14	04/21/22 20:17	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*53*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C3 HFPO-DA	*52*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C3 PFBS	*41*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C2 PFDA	*68*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C2 PFDoA	*44*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C4 PFHpA	*71*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C2 PFHxA	*48*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C5 PFNA	*67*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C4 PFOA	*73*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C4 PFOS	*52*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C2 PFTeDA	*19*	**5-*	*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
13C2 PFUnA	*50*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
d5-NEtFOSAA	*29*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
d3-NMeFOSAA	*45*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
M2-4:2 FTS	*45*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
M2-6:2 FTS	*108*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*
M2-8:2 FTS	*82*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*

Client Sample ID: Biosoild PFAS Grab

Lab Sample ID: 190-28472-1
Date Collected: 04/14/22 11:14
Matrix: Solid
Date Received: 04/14/22 19:29
Percent Solids: 14.7

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

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
18O2 PFHxS	*65*		*25 - 150*	*04/18/22 19:14*	*04/21/22 20:17*	*1*

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

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<140		140	ug/Kg	☼	04/18/22 19:14	04/20/22 04:05	100
Perfluoropentanoic acid (PFPeA)	<140		140	ug/Kg	☼	04/18/22 19:14	04/20/22 04:05	100

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*3*	*5-	*25 - 150*	*04/18/22 19:14*	*04/20/22 04:05*	*100*
13C5 PFPeA	*16*	*5-	*25 - 150*	*04/18/22 19:14*	*04/20/22 04:05*	*100*

General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**85.3**		0.1	%			04/22/22 16:06	1
Percent Solids	**14.7**		0.1	%			04/22/22 16:06	1

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-581145/1-A
Matrix: Solid
Analysis Batch: 581470

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 581145

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
F-53B Major	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
F-53B Minor	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
4:2 FTS	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
6:2 FTS	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
8:2 FTS	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
HFPO-DA (GenX)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorobutanesulfonic acid (PFBS)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorobutanoic acid (PFBA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorodecanesulfonic acid (PFDS)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorodecanoic acid (PFDA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorododecanoic acid (PFDoA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluoroheptanoic acid (PFHpA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorohexanesulfonic acid (PFHxS)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorohexanoic acid (PFHxA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorononanesulfonic acid (PFNS)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorononanoic acid (PFNA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorooctanesulfonamide (FOSA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorooctanesulfonic acid (PFOS)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorooctanoic acid (PFOA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluoropentanesulfonic acid (PFPeS)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluoropentanoic acid (PFPeA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorotetradecanoic acid (PFTeA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluorotridecanoic acid (PFTriA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1
Perfluoroundecanoic acid (PFUnA)	<0.20		0.20		ug/Kg		04/18/22 19:14	04/19/22 23:52	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*81*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C3 HFPO-DA	*84*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C4 PFBA	*44*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C3 PFBS	*75*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C2 PFDA	*81*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C2 PFDoA	*82*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C4 PFHpA	*94*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C2 PFHxA	*81*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C5 PFNA	*86*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C4 PFOA	*85*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C4 PFOS	*78*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C5 PFPeA	*78*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C2 PFTeDA	*78*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*
13C2 PFUnA	*87*		*25 - 150*	*04/18/22 19:14*	*04/19/22 23:52*	*1*

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

Lab Sample ID: MB 320-581145/1-A
Matrix: Solid
Analysis Batch: 581470

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 581145

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
d5-NEtFOSAA	87		25 - 150	04/18/22 19:14	04/19/22 23:52	1
d3-NMeFOSAA	85		25 - 150	04/18/22 19:14	04/19/22 23:52	1
M2-4:2 FTS	93		25 - 150	04/18/22 19:14	04/19/22 23:52	1
M2-6:2 FTS	87		25 - 150	04/18/22 19:14	04/19/22 23:52	1
M2-8:2 FTS	89		25 - 150	04/18/22 19:14	04/19/22 23:52	1
18O2 PFHxS	75		25 - 150	04/18/22 19:14	04/19/22 23:52	1

Lab Sample ID: LCS 320-581145/2-A
Matrix: Solid
Analysis Batch: 581470

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 581145

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.88	2.25		ug/Kg		119	79 - 139
F-53B Major	1.86	1.98		ug/Kg		106	74 - 134
F-53B Minor	1.88	1.86		ug/Kg		99	66 - 136
4:2 FTS	1.87	1.90		ug/Kg		101	68 - 143
6:2 FTS	1.90	2.07		ug/Kg		109	73 - 139
8:2 FTS	1.92	2.03		ug/Kg		106	75 - 135
HFPO-DA (GenX)	2.00	2.02		ug/Kg		101	53 - 158
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	2.00		ug/Kg		100	72 - 132
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	1.89		ug/Kg		95	72 - 132
Perfluorobutanesulfonic acid (PFBS)	1.77	1.79		ug/Kg		101	69 - 129
Perfluorobutanoic acid (PFBA)	2.00	2.18		ug/Kg		109	76 - 136
Perfluorodecanesulfonic acid (PFDS)	1.93	1.97		ug/Kg		102	71 - 131
Perfluorodecanoic acid (PFDA)	2.00	1.96		ug/Kg		98	72 - 132
Perfluorododecanoic acid (PFDoA)	2.00	2.11		ug/Kg		105	71 - 131
Perfluoroheptanesulfonic acid (PFHpS)	1.90	1.94		ug/Kg		102	76 - 136
Perfluoroheptanoic acid (PFHpA)	2.00	1.96		ug/Kg		98	71 - 131
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.80		ug/Kg		99	62 - 122
Perfluorohexanoic acid (PFHxA)	2.00	2.25		ug/Kg		112	71 - 131
Perfluorononanesulfonic acid (PFNS)	1.92	2.00		ug/Kg		104	72 - 132
Perfluorononanoic acid (PFNA)	2.00	2.14		ug/Kg		107	73 - 133
Perfluorooctanesulfonamide (FOSA)	2.00	2.03		ug/Kg		102	77 - 137
Perfluorooctanesulfonic acid (PFOS)	1.86	2.00		ug/Kg		108	68 - 141
Perfluorooctanoic acid (PFOA)	2.00	2.22		ug/Kg		111	72 - 132
Perfluoropentanesulfonic acid (PFPeS)	1.88	2.02		ug/Kg		108	66 - 126
Perfluoropentanoic acid (PFPeA)	2.00	1.92		ug/Kg		96	69 - 129
Perfluorotetradecanoic acid (PFTeA)	2.00	2.10		ug/Kg		105	67 - 127

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

Lab Sample ID: LCS 320-581145/2-A
Matrix: Solid
Analysis Batch: 581470

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 581145

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Perfluorotridecanoic acid (PFTriA)			2.00	1.96		ug/Kg		98	71 - 131		
Perfluoroundecanoic acid (PFUnA)			2.00	2.08		ug/Kg		104	66 - 126		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C8 FOSA	*83*		*25 - 150*
13C3 HFPO-DA	*83*		*25 - 150*
13C4 PFBA	*62*		*25 - 150*
13C3 PFBS	*74*		*25 - 150*
13C2 PFDA	*85*		*25 - 150*
13C2 PFDoA	*81*		*25 - 150*
13C4 PFHpA	*89*		*25 - 150*
13C2 PFHxA	*75*		*25 - 150*
13C5 PFNA	*84*		*25 - 150*
13C4 PFOA	*81*		*25 - 150*
13C4 PFOS	*77*		*25 - 150*
13C5 PFPeA	*82*		*25 - 150*
13C2 PFTeDA	*67*		*25 - 150*
13C2 PFUnA	*82*		*25 - 150*
d5-NEtFOSAA	*83*		*25 - 150*
d3-NMeFOSAA	*86*		*25 - 150*
M2-4:2 FTS	*91*		*25 - 150*
M2-6:2 FTS	*88*		*25 - 150*
M2-8:2 FTS	*85*		*25 - 150*
18O2 PFHxS	*77*		*25 - 150*

Definitions/Glossary

Client: Jacobs Engineering Group, Inc. Job ID: 190-28472-1
Project/Site: Jacobs Engineering Group - SHVUA Biosoild
PFAS

Qualifiers

LCMS

Qualifier	Qualifier Description
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
I	Value is EMPC (estimated maximum possible concentration).

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. Job ID: 190-28472-1
Project/Site: Jacobs Engineering Group - SHVUA Biosoild
PFAS

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Solid **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFBA (25-150)	PFPeA (25-150)						
190-28472-1 - DL	Biosoild PFAS Grab	3 *5-	16 *5-						

Surrogate Legend

PFBA = 13C4 PFBA
PFPeA = 13C5 PFPeA

Method: 537 (modified) - Fluorinated Alkyl Substances

Matrix: Solid **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFOSA (25-150)	HFPODA (25-150)	PFBA (25-150)	C3PFBS (25-150)	PFDA (25-150)	PFDoA (25-150)	C4PFHA (25-150)	PFHxA (25-150)
190-28472-1	Biosoild PFAS Grab	53	52		41	68	44	71	48
LCS 320-581145/2-A	Lab Control Sample	83	83	62	74	85	81	89	75
MB 320-581145/1-A	Method Blank	81	84	44	75	81	82	94	81

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFNA (25-150)	PFOA (25-150)	PFOS (25-150)	PFPeA (25-150)	PFTDA (25-150)	PFUnA (25-150)	d5NEFOS (25-150)	d3NMFOS (25-150)
190-28472-1	Biosoild PFAS Grab	67	73	52		19 *5-	50	29	45
LCS 320-581145/2-A	Lab Control Sample	84	81	77	82	67	82	83	86
MB 320-581145/1-A	Method Blank	86	85	78	78	78	87	87	85

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	M242FTS (25-150)	M262FTS (25-150)	M282FTS (25-150)	PFHxS (25-150)				
190-28472-1	Biosoild PFAS Grab	45	108	82	65				
LCS 320-581145/2-A	Lab Control Sample	91	88	85	77				
MB 320-581145/1-A	Method Blank	93	87	89	75				

Surrogate Legend

PFOSA = 13C8 FOSA
HFPODA = 13C3 HFPO-DA
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

Lab Chronicle

Client: Jacobs Engineering Group, Inc.
Job ID: 190-28472-1
Project/Site: Jacobs Engineering Group - SHVUA Biosoild PFAS

Client Sample ID: Biosoild PFAS Grab
Lab Sample ID: 190-28472-1
Date Collected: 04/14/22 11:14
Matrix: Solid
Date Received: 04/14/22 19:29

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	582342	04/22/22 16:06	KMW	TAL SAC

Client Sample ID: Biosoild PFAS Grab
Lab Sample ID: 190-28472-1
Date Collected: 04/14/22 11:14
Matrix: Solid
Date Received: 04/14/22 19:29
Percent Solids: 14.7

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE	DL		581145	04/18/22 19:14	PV	TAL SAC
Total/NA	Analysis	537 (modified)	DL	100	581470	04/20/22 04:05	AF	TAL SAC
Total/NA	Prep	SHAKE			581145	04/18/22 19:14	PV	TAL SAC
Total/NA	Analysis	537 (modified)		1	581980	04/21/22 20:17	KSR	TAL SAC

Laboratory References:

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

Analyst References:

Lab: TAL SAC

Batch Type: Prep

PV = Pheng Vue

Batch Type: Analysis

AF = Ashley Farias

KMW = Kelly White

KSR = Kennedy Roy

Accreditation/Certification Summary

Client: Jacobs Engineering Group, Inc. Job ID: 190-28472-1
Project/Site: Jacobs Engineering Group - SHVUA Biosoild
PFAS

Laboratory: Eurofins 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	08-11-22
Arkansas DEQ	State	88-0691	06-17-22
California	State	2897	01-31-23
Colorado	State	CA0004	08-31-22
Florida	NELAP	E87570	06-30-22
Georgia	State	4040	01-30-23
Hawaii	State	<cert No.>	01-29-23
Illinois	NELAP	200060	03-17-23
Kansas	NELAP	E-10375	02-28-22 *
Louisiana	NELAP	01944	06-30-22
Maine	State	CA00004	04-14-24
Michigan	State	9947	01-31-23
Nevada	State	CA00044	08-31-22
New Hampshire	NELAP	2997	04-18-23
New Jersey	NELAP	CA005	06-30-22
New York	NELAP	11666	04-02-23
Ohio	State	41252	01-29-23
Oregon	NELAP	4040	01-29-23
Texas	NELAP	T104704399-19-13	05-31-22
US Fish & Wildlife	US Federal Programs	58448	07-31-22
USDA	US Federal Programs	P330-18-00239	01-23-23
Utah	NELAP	CA000442021-12	03-01-22 *
Virginia	NELAP	460278	03-14-23
Washington	State	C581	05-05-22
West Virginia (DW)	State	9930C	12-31-22
Wisconsin	State	998204680	08-31-22
Wyoming	State Program	8TMS-L	01-28-19 *

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

Method Summary

Client: Jacobs Engineering Group, Inc.
Job ID: 190-28472-1
Project/Site: Jacobs Engineering Group - SHVUA Biosoild
PFAS

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 Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

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
Project Name: SHVUA Biosolid PFAS	Method of Shipment/Carrier: Eurofins TestAmerica Field Services			Job/SDG No:
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	4/11/22	1110				X							2				X	

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

Sample Disposal (A fee may be assessed if samples ar
☐ Return to Client ☑ Disposal By Lab

190-28472 Chain of Custody

Special Instructions/QC Requirements & Comments:

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

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
	EETA	4/12/22 1130		EETA	4-14-22 1929
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

eurofins | Environment Testing TestAmerica

☐ SDS or Known Hazard Information Supplied by Client
☐ Discrepancies
☐ Short Hold
Client ID: Jacobs Eng
Work Oder #: 190-28472
☐ Rush ☐ 24 Hr ☐ 2-Day ☐ 3-Day ☐ 5-Day ☐ Other: _____
Receipt Evaluation Performed by: Initials: TLH Date: 4-14-22 Time: 1929

Cooler / Sample Receipt

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

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	3.0	3.0		X	X 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?	X			
Containers and Labels in good condition? *(unbroken, not leaking, appropriately filled, labels legible & attached)*	X			
Appropriate containers used and adequate volume provided?	X			Preserved bottles checked for pH?* Yes No
Number of sample containers match CoC?	X			pH strip lot # _____
Samples received within hold?	X			
Samples submitted for GRO and Volatiles analysis (8260, 624, 524) received without headspace?			X	
Was a Trip Blank received with VOA samples?			X	
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.)	X			
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?	X			
**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 Jen Hall Date: 4-14-22

WI-MI-010_020720

Eurofins 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: 190-32259.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Sue.Schafer@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: Eurofins Environment Testing Northern Ca		Accreditations Required (See note):		Job #: 190-28472-1
Address: 880 Riverside Parkway, ,	Due Date Requested: 5/4/2022			
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 Biosoild PFAS	Project #: 19001724			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, 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 PFAS 28	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
Biosoild PFAS Grab (190-28472-1)	4/14/22	11:14 Eastern		Solid			X	X	2	

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

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
	Jen Hall	4-15-22 1500			4-16-22 845	EETCA
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021