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ANALYTICAL REPORT

Eurofins Michigan
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Laboratory Job ID: 190-28204-1
Client Project/Site: City of Cadillac Biosollids PFAS 2022

For:
City of Cadillac Utilities
1121 Plett Road
Cadillac, Michigan 49601

Attn: Cindy Tomaszewski

Sue Schafer

Authorized for release by:
3/23/2022 11:32:22 AM

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Sample Summary

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
190-28204-1	DIGESTER #4	Solid	03/08/22 13:30	03/09/22 13:34
190-28204-2	DIGESTER #4 - duplic	Solid	03/08/22 13:30	03/09/22 13:34
190-28204-3	EQUIP. BLANK	Water	03/08/22 13:20	03/09/22 13:34

Case Narrative

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosollids PFAS 2022

Job ID: 190-28204-1

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Laboratory: Eurofins Michigan

Narrative

Job Narrative
190-28204-1

Comments
No additional comments.

Receipt
The samples were received on 3/9/2022 1:34 PM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 5.6º C.

LCMS
Method 537 (modified): Isotope Dilution Analyte (IDA) recovery are above the method recommended limit for the following samples: DIGESTER #4 (190-28204-1), DIGESTER #4 - duplic (190-28204-2), (190-28204-A-2-B MS) and (190-28204-A-2-C MSD). Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

Method 537 (modified): The Isotope Dilution Analyte (IDA) recovery associated with the following samples are below the method recommended limit: DIGESTER #4 (190-28204-1), DIGESTER #4 - duplic (190-28204-2), (190-28204-A-2-B MS) and (190-28204-A-2-C MSD). 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 samples.

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 3535: Insufficient sample volume was available to perform a matrix spike/matrix spike duplicate (MS/MSD) associated with preparation batch 320-572353.

320-572353
Method: 3535 PFC-W

Method 3535: Elevated reporting limits are provided for the following sample due to insufficient sample provided for preparation: EQUIP. BLANK (190-28204-3).

320-572353
Method: 3535 PFC-W

Method SHAKE: The following samples were yellow after adjusting to the final volume:
DIGESTER #4 (190-28204-1), DIGESTER #4 - duplic (190-28204-2), (190-28204-A-2 MS) and (190-28204-A-2 MSD)

PFC_IDA
Solid
preparation batch 320-572499

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

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Client Sample ID: DIGESTER #4
Lab Sample ID: 190-28204-1
Date Collected: 03/08/22 13:30
Matrix: Solid
Date Received: 03/09/22 13:34
Percent Solids: 3.0

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
F-53B Major	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
F-53B Minor	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
4:2 FTS	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
6:2 FTS	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
8:2 FTS	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
HFPO-DA (GenX)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**9.4**		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorobutanesulfonic acid (PFBS)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorobutanoic acid (PFBA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorodecanesulfonic acid (PFDS)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorodecanoic acid (PFDA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorododecanoic acid (PFDoA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluoroheptanesulfonic Acid (PFHpS)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluoroheptanoic acid (PFHpA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorohexanesulfonic acid (PFHxS)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorohexanoic acid (PFHxA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorononanesulfonic acid (PFNS)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorononanoic acid (PFNA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorooctanesulfonamide (FOSA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorooctanesulfonic acid (PFOS)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorooctanoic acid (PFOA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluoropentanesulfonic acid (PFPeS)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluoropentanoic acid (PFPeA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorotetradecanoic acid (PFTeA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluorotridecanoic acid (PFTriA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1
Perfluoroundecanoic acid (PFUnA)	<6.3		6.3		ug/Kg	☼	03/13/22 20:49	03/15/22 00:39	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*110*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C3 HFPO-DA	*91*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C4 PFBA	*17*	*5-	*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C3 PFBS	*103*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C2 PFDA	*116*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C2 PFDoA	*87*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C4 PFHpA	*104*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C2 PFHxA	*95*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C5 PFNA	*107*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C4 PFOA	*108*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C4 PFOS	*109*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C5 PFPeA	*83*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C2 PFTeDA	*47*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
13C2 PFUnA	*117*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
d5-NEtFOSAA	*128*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
d3-NMeFOSAA	*117*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Client Sample ID: DIGESTER #4
Lab Sample ID: 190-28204-1
Date Collected: 03/08/22 13:30
Matrix: Solid
Date Received: 03/09/22 13:34
Percent Solids: 3.0

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

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*128*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
M2-6:2 FTS	*159*	*5+	*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
M2-8:2 FTS	*170*	*5+	*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*
18O2 PFHxS	*100*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:39*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**97.0**		0.1	%			03/16/22 15:22	1
Percent Solids	**3.0**		0.1	%			03/16/22 15:22	1

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Client Sample ID: DIGESTER #4 - duplic
Lab Sample ID: 190-28204-2
Date Collected: 03/08/22 13:30
Matrix: Solid
Date Received: 03/09/22 13:34
Percent Solids: 3.2

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
F-53B Major	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
F-53B Minor	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
4:2 FTS	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
6:2 FTS	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
8:2 FTS	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
HFPO-DA (GenX)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	**7.1**		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorobutanesulfonic acid (PFBS)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorobutanoic acid (PFBA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorodecanesulfonic acid (PFDS)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorodecanoic acid (PFDA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorododecanoic acid (PFDoA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluoroheptanesulfonic Acid (PFHpS)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluoroheptanoic acid (PFHpA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorohexanesulfonic acid (PFHxS)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorohexanoic acid (PFHxA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorononanesulfonic acid (PFNS)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorononanoic acid (PFNA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorooctanesulfonamide (FOSA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorooctanesulfonic acid (PFOS)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorooctanoic acid (PFOA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluoropentanesulfonic acid (PFPeS)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluoropentanoic acid (PFPeA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorotetradecanoic acid (PFTeA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluorotridecanoic acid (PFTriA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1
Perfluoroundecanoic acid (PFUnA)	<5.8		5.8		ug/Kg	☼	03/13/22 20:49	03/15/22 00:49	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*100*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C3 HFPO-DA	*86*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C4 PFBA	*21*	*5-	*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C3 PFBS	*93*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C2 PFDA	*108*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C2 PFDoA	*83*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C4 PFHpA	*86*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C2 PFHxA	*97*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C5 PFNA	*101*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C4 PFOA	*101*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C4 PFOS	*103*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C5 PFPeA	*76*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C2 PFTeDA	*39*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
13C2 PFUnA	*111*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
d5-NEtFOSAA	*121*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
d3-NMeFOSAA	*108*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Client Sample ID: DIGESTER #4 - duplic
Lab Sample ID: 190-28204-2
Date Collected: 03/08/22 13:30
Matrix: Solid
Date Received: 03/09/22 13:34
Percent Solids: 3.2

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

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*119*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
M2-6:2 FTS	*133*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
M2-8:2 FTS	*166*	*5+	*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*
18O2 PFHxS	*91*		*25 - 150*	*03/13/22 20:49*	*03/15/22 00:49*	*1*

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**96.8**		0.1		%			03/16/22 15:22	1
Percent Solids	**3.2**		0.1		%			03/16/22 15:22	1

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Client Sample ID: EQUIP. BLANK
Lab Sample ID: 190-28204-3

Date Collected: 03/08/22 13:20
Matrix: Water
Date Received: 03/09/22 13:34

Method: 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
F-53B Major	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
F-53B Minor	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
4:2 FTS	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
6:2 FTS	<6.0		6.0		ng/L		03/12/22 07:00	03/16/22 02:07	1
8:2 FTS	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
HFPO-DA (GenX)	<4.8		4.8		ng/L		03/12/22 07:00	03/16/22 02:07	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<6.0		6.0		ng/L		03/12/22 07:00	03/16/22 02:07	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<6.0		6.0		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorobutanesulfonic acid (PFBS)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorobutanoic acid (PFBA)	<6.0		6.0		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorodecanesulfonic acid (PFDS)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorodecanoic acid (PFDA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorododecanoic acid (PFDoA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluoroheptanesulfonic Acid (PFHpS)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluoroheptanoic acid (PFHpA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorohexanesulfonic acid (PFHxS)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorohexanoic acid (PFHxA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorononanesulfonic acid (PFNS)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorononanoic acid (PFNA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorooctanesulfonamide (FOSA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorooctanesulfonic acid (PFOS)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorooctanoic acid (PFOA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluoropentanesulfonic acid (PFPeS)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluoropentanoic acid (PFPeA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorotetradecanoic acid (PFTeA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluorotridecanoic acid (PFTriA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1
Perfluoroundecanoic acid (PFUnA)	<2.4		2.4		ng/L		03/12/22 07:00	03/16/22 02:07	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*89*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C3 HFPO-DA	*84*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C4 PFBA	*94*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C3 PFBS	*99*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C2 PFDA	*98*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C2 PFDoA	*89*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C4 PFHpA	*95*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C2 PFHxA	*92*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C5 PFNA	*97*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C4 PFOA	*93*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C4 PFOS	*93*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C5 PFPeA	*90*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C2 PFTeDA	*87*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
13C2 PFUnA	*95*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
d5-NEtFOSAA	*120*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*
d3-NMeFOSAA	*103*		*25 - 150*	*03/12/22 07:00*	*03/16/22 02:07*	*1*

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Client Sample ID: EQUIP. BLANK
Lab Sample ID: 190-28204-3
Date Collected: 03/08/22 13:20
Matrix: Water
Date Received: 03/09/22 13:34

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
M2-4:2 FTS	126		25 - 150	03/12/22 07:00	03/16/22 02:07	1
M2-6:2 FTS	113		25 - 150	03/12/22 07:00	03/16/22 02:07	1
M2-8:2 FTS	122		25 - 150	03/12/22 07:00	03/16/22 02:07	1
18O2 PFHxS	90		25 - 150	03/12/22 07:00	03/16/22 02:07	1

Method: 537 (modified) - Fluorinated Alkyl Substances

Lab Sample ID: MB 320-572353/1-A
Matrix: Water
Analysis Batch: 573161

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 572353

Analyte	MB Result	MB Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
F-53B Major	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
F-53B Minor	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
4:2 FTS	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
6:2 FTS	<5.0		5.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
8:2 FTS	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
HFPO-DA (GenX)	<4.0		4.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<5.0		5.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<5.0		5.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorobutanesulfonic acid (PFBS)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorobutanoic acid (PFBA)	<5.0		5.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorodecanesulfonic acid (PFDS)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorodecanoic acid (PFDA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorododecanoic acid (PFDoA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluoroheptanesulfonic Acid (PFHpS)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluoroheptanoic acid (PFHpA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorohexanesulfonic acid (PFHxS)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorohexanoic acid (PFHxA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorononanesulfonic acid (PFNS)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorononanoic acid (PFNA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorooctanesulfonamide (FOSA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorooctanesulfonic acid (PFOS)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorooctanoic acid (PFOA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluoropentanesulfonic acid (PFPeS)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluoropentanoic acid (PFPeA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorotetradecanoic acid (PFTeA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluorotridecanoic acid (PFTriA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1
Perfluoroundecanoic acid (PFUnA)	<2.0		2.0		ng/L		03/12/22 07:00	03/16/22 01:07	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*96*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C3 HFPO-DA	*89*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C4 PFBA	*90*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C3 PFBS	*100*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C2 PFDA	*103*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C2 PFDoA	*91*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C4 PFHpA	*94*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C2 PFHxA	*96*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C5 PFNA	*103*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C4 PFOA	*102*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C4 PFOS	*101*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C5 PFPeA	*96*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C2 PFTeDA	*96*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
13C2 PFUnA	*103*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*
d5-NEtFOSAA	*113*		*25 - 150*	*03/12/22 07:00*	*03/16/22 01:07*	*1*

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

Lab Sample ID: MB 320-572353/1-A
Matrix: Water
Analysis Batch: 573161

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 572353

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
d3-NMeFOSAA	111		25 - 150	03/12/22 07:00	03/16/22 01:07	1
M2-4:2 FTS	105		25 - 150	03/12/22 07:00	03/16/22 01:07	1
M2-6:2 FTS	99		25 - 150	03/12/22 07:00	03/16/22 01:07	1
M2-8:2 FTS	103		25 - 150	03/12/22 07:00	03/16/22 01:07	1
18O2 PFHxS	99		25 - 150	03/12/22 07:00	03/16/22 01:07	1

Lab Sample ID: LCS 320-572353/2-A
Matrix: Water
Analysis Batch: 573161

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 572353

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	33.2		ng/L		88	79 - 139
F-53B Major	37.3	32.6		ng/L		87	75 - 135
F-53B Minor	37.7	31.0		ng/L		82	54 - 114
4:2 FTS	37.4	30.2		ng/L		81	79 - 139
6:2 FTS	37.9	41.1		ng/L		108	59 - 175
8:2 FTS	38.3	35.2		ng/L		92	75 - 135
HFPO-DA (GenX)	40.0	37.6		ng/L		94	51 - 173
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	41.0		ng/L		102	76 - 136
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	38.0		ng/L		95	76 - 136
Perfluorobutanesulfonic acid (PFBS)	35.4	31.1		ng/L		88	67 - 127
Perfluorobutanoic acid (PFBA)	40.0	37.1		ng/L		93	76 - 136
Perfluorodecanesulfonic acid (PFDS)	38.6	34.2		ng/L		89	71 - 131
Perfluorodecanoic acid (PFDA)	40.0	36.7		ng/L		92	76 - 136
Perfluorododecanoic acid (PFDoA)	40.0	38.0		ng/L		95	71 - 131
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	32.9		ng/L		86	76 - 136
Perfluoroheptanoic acid (PFHpA)	40.0	34.9		ng/L		87	72 - 132
Perfluorohexanesulfonic acid (PFHxS)	36.4	32.0		ng/L		88	59 - 119
Perfluorohexanoic acid (PFHxA)	40.0	32.5		ng/L		81	73 - 133
Perfluorononanesulfonic acid (PFNS)	38.4	32.8		ng/L		85	75 - 135
Perfluorononanoic acid (PFNA)	40.0	32.3		ng/L		81	75 - 135
Perfluorooctanesulfonamide (FOSA)	40.0	38.0		ng/L		95	73 - 133
Perfluorooctanesulfonic acid (PFOS)	37.1	33.4		ng/L		90	70 - 130
Perfluorooctanoic acid (PFOA)	40.0	35.2		ng/L		88	70 - 130
Perfluoropentanesulfonic acid (PFPeS)	37.5	33.3		ng/L		89	66 - 126
Perfluoropentanoic acid (PFPeA)	40.0	35.8		ng/L		89	71 - 131
Perfluorotetradecanoic acid (PFTeA)	40.0	34.9		ng/L		87	70 - 130
Perfluorotridecanoic acid (PFTriA)	40.0	40.4		ng/L		101	71 - 131

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

Lab Sample ID: LCS 320-572353/2-A
Matrix: Water
Analysis Batch: 573161

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 572353

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluoroundecanoic acid (PFUnA)			40.0	39.1		ng/L		98	68 - 128		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C8 FOSA	*93*		*25 - 150*
13C3 HFPO-DA	*83*		*25 - 150*
13C4 PFBA	*89*		*25 - 150*
13C3 PFBS	*95*		*25 - 150*
13C2 PFDA	*92*		*25 - 150*
13C2 PFDoA	*88*		*25 - 150*
13C4 PFHpA	*95*		*25 - 150*
13C2 PFHxA	*96*		*25 - 150*
13C5 PFNA	*102*		*25 - 150*
13C4 PFOA	*95*		*25 - 150*
13C4 PFOS	*100*		*25 - 150*
13C5 PFPeA	*87*		*25 - 150*
13C2 PFTeDA	*92*		*25 - 150*
13C2 PFUnA	*95*		*25 - 150*
d5-NEtFOSAA	*95*		*25 - 150*
d3-NMeFOSAA	*105*		*25 - 150*
M2-4:2 FTS	*110*		*25 - 150*
M2-6:2 FTS	*97*		*25 - 150*
M2-8:2 FTS	*99*		*25 - 150*
18O2 PFHxS	*96*		*25 - 150*

Lab Sample ID: LCSD 320-572353/3-A
Matrix: Water
Analysis Batch: 573161

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 572353

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)			37.7	32.3		ng/L		86	79 - 139	3	30
F-53B Major			37.3	32.7		ng/L		88	75 - 135	1	30
F-53B Minor			37.7	33.3		ng/L		88	54 - 114	7	30
4:2 FTS			37.4	33.7		ng/L		90	79 - 139	11	30
6:2 FTS			37.9	46.8		ng/L		124	59 - 175	13	30
8:2 FTS			38.3	32.5		ng/L		85	75 - 135	8	30
HFPO-DA (GenX)			40.0	39.3		ng/L		98	51 - 173	5	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)			40.0	36.6		ng/L		92	76 - 136	11	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)			40.0	38.8		ng/L		97	76 - 136	2	30
Perfluorobutanesulfonic acid (PFBS)			35.4	31.9		ng/L		90	67 - 127	2	30
Perfluorobutanoic acid (PFBA)			40.0	35.5		ng/L		89	76 - 136	4	30
Perfluorodecanesulfonic acid (PFDS)			38.6	34.8		ng/L		90	71 - 131	2	30
Perfluorodecanoic acid (PFDA)			40.0	37.3		ng/L		93	76 - 136	2	30
Perfluorododecanoic acid (PFDoA)			40.0	38.6		ng/L		97	71 - 131	2	30

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

Lab Sample ID: LCSD 320-572353/3-A
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 573161
Prep Batch: 572353

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoroheptanesulfonic Acid (PFHpS)			38.1	36.4		ng/L		96	76 - 136	10	30
Perfluoroheptanoic acid (PFHpA)			40.0	37.7		ng/L		94	72 - 132	8	30
Perfluorohexanesulfonic acid (PFHxS)			36.4	34.2		ng/L		94	59 - 119	6	30
Perfluorohexanoic acid (PFHxA)			40.0	34.7		ng/L		87	73 - 133	7	30
Perfluorononanesulfonic acid (PFNS)			38.4	35.2		ng/L		92	75 - 135	7	30
Perfluorononanoic acid (PFNA)			40.0	34.7		ng/L		87	75 - 135	7	30
Perfluorooctanesulfonamide (FOSA)			40.0	41.3		ng/L		103	73 - 133	8	30
Perfluorooctanesulfonic acid (PFOS)			37.1	35.2		ng/L		95	70 - 130	5	30
Perfluorooctanoic acid (PFOA)			40.0	37.9		ng/L		95	70 - 130	7	30
Perfluoropentanesulfonic acid (PFPeS)			37.5	33.8		ng/L		90	66 - 126	1	30
Perfluoropentanoic acid (PFPeA)			40.0	37.4		ng/L		93	71 - 131	4	30
Perfluorotetradecanoic acid (PFTeA)			40.0	37.1		ng/L		93	70 - 130	6	30
Perfluorotridecanoic acid (PFTriA)			40.0	40.1		ng/L		100	71 - 131	1	30
Perfluoroundecanoic acid (PFUnA)			40.0	37.0		ng/L		93	68 - 128	5	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C8 FOSA	*95*		*25 - 150*
13C3 HFPO-DA	*82*		*25 - 150*
13C4 PFBA	*96*		*25 - 150*
13C3 PFBS	*98*		*25 - 150*
13C2 PFDA	*98*		*25 - 150*
13C2 PFDoA	*92*		*25 - 150*
13C4 PFHpA	*94*		*25 - 150*
13C2 PFHxA	*93*		*25 - 150*
13C5 PFNA	*101*		*25 - 150*
13C4 PFOA	*92*		*25 - 150*
13C4 PFOS	*103*		*25 - 150*
13C5 PFPeA	*91*		*25 - 150*
13C2 PFTeDA	*98*		*25 - 150*
13C2 PFUnA	*97*		*25 - 150*
d5-NEtFOSAA	*108*		*25 - 150*
d3-NMeFOSAA	*109*		*25 - 150*
M2-4:2 FTS	*105*		*25 - 150*
M2-6:2 FTS	*102*		*25 - 150*
M2-8:2 FTS	*109*		*25 - 150*
18O2 PFHxS	*95*		*25 - 150*

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

Lab Sample ID: MB 320-572499/1-A
Matrix: Solid
Analysis Batch: 572885

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 572499

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		03/13/22 20:49	03/14/22 23:48	1
F-53B Major	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
F-53B Minor	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
4:2 FTS	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
6:2 FTS	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
8:2 FTS	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
HFPO-DA (GenX)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorobutanesulfonic acid (PFBS)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorobutanoic acid (PFBA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorodecanesulfonic acid (PFDS)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorodecanoic acid (PFDA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorododecanoic acid (PFDoA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluoroheptanesulfonic Acid (PFHpS)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluoroheptanoic acid (PFHpA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorohexanesulfonic acid (PFHxS)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorohexanoic acid (PFHxA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorononanesulfonic acid (PFNS)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorononanoic acid (PFNA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorooctanesulfonamide (FOSA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorooctanesulfonic acid (PFOS)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorooctanoic acid (PFOA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluoropentanesulfonic acid (PFPeS)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluoropentanoic acid (PFPeA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorotetradecanoic acid (PFTeA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluorotridecanoic acid (PFTriA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1
Perfluoroundecanoic acid (PFUnA)	<0.20		0.20		ug/Kg		03/13/22 20:49	03/14/22 23:48	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C8 FOSA	*116*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C3 HFPO-DA	*96*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C4 PFBA	*67*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C3 PFBS	*108*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C2 PFDA	*112*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C2 PFDoA	*113*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C4 PFHpA	*104*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C2 PFHxA	*99*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C5 PFNA	*106*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C4 PFOA	*112*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C4 PFOS	*112*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C5 PFPeA	*98*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C2 PFTeDA	*115*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
13C2 PFUnA	*117*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*
d5-NEtFOSAA	*129*		*25 - 150*	*03/13/22 20:49*	*03/14/22 23:48*	*1*

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosollids PFAS 2022

Job ID: 190-28204-1

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

Lab Sample ID: MB 320-572499/1-A
Matrix: Solid
Analysis Batch: 572885

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 572499

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
d3-NMeFOSAA	120		25 - 150	03/13/22 20:49	03/14/22 23:48	1
M2-4:2 FTS	111		25 - 150	03/13/22 20:49	03/14/22 23:48	1
M2-6:2 FTS	105		25 - 150	03/13/22 20:49	03/14/22 23:48	1
M2-8:2 FTS	128		25 - 150	03/13/22 20:49	03/14/22 23:48	1
18O2 PFHxS	103		25 - 150	03/13/22 20:49	03/14/22 23:48	1

Lab Sample ID: LCS 320-572499/2-A
Matrix: Solid
Analysis Batch: 572885

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 572499

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.88	1.64		ug/Kg		87	79 - 139
F-53B Major	1.86	1.66		ug/Kg		89	74 - 134
F-53B Minor	1.88	1.75		ug/Kg		93	66 - 136
4:2 FTS	1.87	1.87		ug/Kg		100	68 - 143
6:2 FTS	1.90	2.00		ug/Kg		106	73 - 139
8:2 FTS	1.92	1.82		ug/Kg		95	75 - 135
HFPO-DA (GenX)	2.00	2.02		ug/Kg		101	53 - 158
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	1.87		ug/Kg		93	72 - 132
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	2.02		ug/Kg		101	72 - 132
Perfluorobutanesulfonic acid (PFBS)	1.77	1.78		ug/Kg		100	69 - 129
Perfluorobutanoic acid (PFBA)	2.00	1.94		ug/Kg		97	76 - 136
Perfluorodecanesulfonic acid (PFDS)	1.93	1.99		ug/Kg		103	71 - 131
Perfluorodecanoic acid (PFDA)	2.00	1.90		ug/Kg		95	72 - 132
Perfluorododecanoic acid (PFDoA)	2.00	1.98		ug/Kg		99	71 - 131
Perfluoroheptanesulfonic Acid (PFHpS)	1.90	1.77		ug/Kg		93	76 - 136
Perfluoroheptanoic acid (PFHpA)	2.00	2.01		ug/Kg		100	71 - 131
Perfluorohexanesulfonic acid (PFHxS)	1.82	1.69		ug/Kg		93	62 - 122
Perfluorohexanoic acid (PFHxA)	2.00	1.90		ug/Kg		95	71 - 131
Perfluorononanesulfonic acid (PFNS)	1.92	1.89		ug/Kg		98	72 - 132
Perfluorononanoic acid (PFNA)	2.00	1.77		ug/Kg		89	73 - 133
Perfluorooctanesulfonamide (FOSA)	2.00	1.99		ug/Kg		99	77 - 137
Perfluorooctanesulfonic acid (PFOS)	1.86	1.84		ug/Kg		99	68 - 141
Perfluorooctanoic acid (PFOA)	2.00	1.87		ug/Kg		94	72 - 132
Perfluoropentanesulfonic acid (PFPeS)	1.88	1.76		ug/Kg		94	66 - 126
Perfluoropentanoic acid (PFPeA)	2.00	1.84		ug/Kg		92	69 - 129
Perfluorotetradecanoic acid (PFTeA)	2.00	1.86		ug/Kg		93	67 - 127
Perfluorotridecanoic acid (PFTriA)	2.00	2.02		ug/Kg		101	71 - 131

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

Lab Sample ID: LCS 320-572499/2-A
Matrix: Solid
Analysis Batch: 572885

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 572499

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Perfluoroundecanoic acid (PFUnA)			2.00	1.92		ug/Kg		96	66 - 126		

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C8 FOSA	*109*		*25 - 150*
13C3 HFPO-DA	*92*		*25 - 150*
13C4 PFBA	*60*		*25 - 150*
13C3 PFBS	*100*		*25 - 150*
13C2 PFDA	*114*		*25 - 150*
13C2 PFDoA	*113*		*25 - 150*
13C4 PFHpA	*100*		*25 - 150*
13C2 PFHxA	*94*		*25 - 150*
13C5 PFNA	*108*		*25 - 150*
13C4 PFOA	*104*		*25 - 150*
13C4 PFOS	*109*		*25 - 150*
13C5 PFPeA	*98*		*25 - 150*
13C2 PFTeDA	*106*		*25 - 150*
13C2 PFUnA	*117*		*25 - 150*
d5-NEtFOSAA	*128*		*25 - 150*
d3-NMeFOSAA	*112*		*25 - 150*
M2-4:2 FTS	*108*		*25 - 150*
M2-6:2 FTS	*110*		*25 - 150*
M2-8:2 FTS	*127*		*25 - 150*
18O2 PFHxS	*104*		*25 - 150*

Lab Sample ID: 190-28204-2 MS
Matrix: Solid
Analysis Batch: 572885

Client Sample ID: DIGESTER #4 - duplic
Prep Type: Total/NA
Prep Batch: 572499

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<5.8		58.3	51.5		ug/Kg	☼	88	79 - 139		
F-53B Major	<5.8		57.7	51.8		ug/Kg	☼	90	74 - 134		
F-53B Minor	<5.8		58.3	55.7		ug/Kg	☼	96	66 - 136		
4:2 FTS	<5.8		57.8	53.5		ug/Kg	☼	93	68 - 143		
6:2 FTS	<5.8		58.6	56.9		ug/Kg	☼	97	73 - 139		
8:2 FTS	<5.8		59.3	51.9		ug/Kg	☼	88	75 - 135		
HFPO-DA (GenX)	<5.8		61.9	64.0		ug/Kg	☼	103	53 - 158		
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<5.8		61.9	59.4		ug/Kg	☼	92	72 - 132		
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	7.1		61.9	70.9		ug/Kg	☼	103	72 - 132		
Perfluorobutanesulfonic acid (PFBS)	<5.8		54.7	52.3		ug/Kg	☼	96	69 - 129		
Perfluorobutanoic acid (PFBA)	<5.8		61.9	61.5		ug/Kg	☼	99	76 - 136		
Perfluorodecanesulfonic acid (PFDS)	<5.8		59.6	54.2		ug/Kg	☼	91	71 - 131		
Perfluorodecanoic acid (PFDA)	<5.8		61.9	62.7		ug/Kg	☼	101	72 - 132		
Perfluorododecanoic acid (PFDoA)	<5.8		61.9	59.7		ug/Kg	☼	96	71 - 131		

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

Lab Sample ID: 190-28204-2 MS
Client Sample ID: DIGESTER #4 - duplic
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 572885
Prep Batch: 572499

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoroheptanesulfonic Acid (PFHpS)	<5.8		58.9	54.4		ug/Kg	☼	92	76 - 136
Perfluoroheptanoic acid (PFHpA)	<5.8		61.9	58.5		ug/Kg	☼	95	71 - 131
Perfluorohexanesulfonic acid (PFHxS)	<5.8		56.3	55.2		ug/Kg	☼	98	62 - 122
Perfluorohexanoic acid (PFHxA)	<5.8		61.9	63.3		ug/Kg	☼	95	71 - 131
Perfluorononanesulfonic acid (PFNS)	<5.8		59.4	54.7		ug/Kg	☼	92	72 - 132
Perfluorononanoic acid (PFNA)	<5.8		61.9	56.4		ug/Kg	☼	91	73 - 133
Perfluorooctanesulfonamide (FOSA)	<5.8		61.9	64.4		ug/Kg	☼	104	77 - 137
Perfluorooctanesulfonic acid (PFOS)	<5.8		57.4	57.4		ug/Kg	☼	95	68 - 141
Perfluorooctanoic acid (PFOA)	<5.8		61.9	56.7		ug/Kg	☼	92	72 - 132
Perfluoropentanesulfonic acid (PFPeS)	<5.8		58.0	55.1		ug/Kg	☼	95	66 - 126
Perfluoropentanoic acid (PFPeA)	<5.8		61.9	55.3		ug/Kg	☼	89	69 - 129
Perfluorotetradecanoic acid (PFTeA)	<5.8		61.9	60.0		ug/Kg	☼	97	67 - 127
Perfluorotridecanoic acid (PFTriA)	<5.8		61.9	45.0		ug/Kg	☼	73	71 - 131
Perfluoroundecanoic acid (PFUnA)	<5.8		61.9	58.9		ug/Kg	☼	95	66 - 126

Isotope Dilution	*MS %Recovery*	*MS Qualifier*	*Limits*
13C8 FOSA	*114*		*25 - 150*
13C3 HFPO-DA	*89*		*25 - 150*
13C4 PFBA	*18*	*5-	*25 - 150*
13C3 PFBS	*101*		*25 - 150*
13C2 PFDA	*120*		*25 - 150*
13C2 PFDoA	*94*		*25 - 150*
13C4 PFHpA	*102*		*25 - 150*
13C2 PFHxA	*101*		*25 - 150*
13C5 PFNA	*111*		*25 - 150*
13C4 PFOA	*111*		*25 - 150*
13C4 PFOS	*111*		*25 - 150*
13C5 PFPeA	*76*		*25 - 150*
13C2 PFTeDA	*50*		*25 - 150*
13C2 PFUnA	*117*		*25 - 150*
d5-NEtFOSAA	*133*		*25 - 150*
d3-NMeFOSAA	*121*		*25 - 150*
M2-4:2 FTS	*135*		*25 - 150*
M2-6:2 FTS	*159*	*5+	*25 - 150*
M2-8:2 FTS	*197*	*5+	*25 - 150*
18O2 PFHxS	*103*		*25 - 150*

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

Lab Sample ID: 190-28204-2 MSD
Matrix: Solid
Analysis Batch: 572885

Client Sample ID: DIGESTER #4 - duplic
Prep Type: Total/NA
Prep Batch: 572499

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<5.8		57.9	47.7		ug/Kg	☼	82	79 - 139	8	30
F-53B Major	<5.8		57.3	52.8		ug/Kg	☼	92	74 - 134	2	30
F-53B Minor	<5.8		57.9	55.2		ug/Kg	☼	95	66 - 136	1	30
4:2 FTS	<5.8		57.4	53.1		ug/Kg	☼	92	68 - 143	1	30
6:2 FTS	<5.8		58.3	67.6		ug/Kg	☼	116	73 - 139	17	30
8:2 FTS	<5.8		58.9	52.7		ug/Kg	☼	89	75 - 135	1	30
HFPO-DA (GenX)	<5.8		61.5	63.7		ug/Kg	☼	104	53 - 158	0	30
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<5.8		61.5	63.0		ug/Kg	☼	99	72 - 132	6	30
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	7.1		61.5	76.4		ug/Kg	☼	113	72 - 132	7	30
Perfluorobutanesulfonic acid (PFBS)	<5.8		54.4	53.1		ug/Kg	☼	98	69 - 129	2	30
Perfluorobutanoic acid (PFBA)	<5.8		61.5	59.0		ug/Kg	☼	96	76 - 136	4	30
Perfluorodecanesulfonic acid (PFDS)	<5.8		59.3	57.5		ug/Kg	☼	97	71 - 131	6	30
Perfluorodecanoic acid (PFDA)	<5.8		61.5	58.5		ug/Kg	☼	95	72 - 132	7	30
Perfluorododecanoic acid (PFDoA)	<5.8		61.5	61.3		ug/Kg	☼	100	71 - 131	3	30
Perfluoroheptanesulfonic Acid (PFHpS)	<5.8		58.6	55.1		ug/Kg	☼	94	76 - 136	1	30
Perfluoroheptanoic acid (PFHpA)	<5.8		61.5	57.7		ug/Kg	☼	94	71 - 131	1	30
Perfluorohexanesulfonic acid (PFHxS)	<5.8		56.0	57.0		ug/Kg	☼	102	62 - 122	3	30
Perfluorohexanoic acid (PFHxA)	<5.8		61.5	61.0		ug/Kg	☼	92	71 - 131	4	30
Perfluorononanesulfonic acid (PFNS)	<5.8		59.0	55.4		ug/Kg	☼	94	72 - 132	1	30
Perfluorononanoic acid (PFNA)	<5.8		61.5	56.2		ug/Kg	☼	91	73 - 133	0	30
Perfluorooctanesulfonamide (FOSA)	<5.8		61.5	66.2		ug/Kg	☼	108	77 - 137	3	30
Perfluorooctanesulfonic acid (PFOS)	<5.8		57.1	56.4		ug/Kg	☼	94	68 - 141	2	30
Perfluorooctanoic acid (PFOA)	<5.8		61.5	54.6		ug/Kg	☼	89	72 - 132	4	30
Perfluoropentanesulfonic acid (PFPeS)	<5.8		57.7	54.3		ug/Kg	☼	94	66 - 126	1	30
Perfluoropentanoic acid (PFPeA)	<5.8		61.5	62.7		ug/Kg	☼	102	69 - 129	13	30
Perfluorotetradecanoic acid (PFTeA)	<5.8		61.5	60.7		ug/Kg	☼	99	67 - 127	1	30
Perfluorotridecanoic acid (PFTriA)	<5.8		61.5	44.2		ug/Kg	☼	72	71 - 131	2	30
Perfluoroundecanoic acid (PFUnA)	<5.8		61.5	60.5		ug/Kg	☼	98	66 - 126	3	30

Isotope Dilution	*MSD %Recovery*	*MSD Qualifier*	*Limits*
13C8 FOSA	*110*		*25 - 150*
13C3 HFPO-DA	*93*		*25 - 150*
13C4 PFBA	*19*	*5-	*25 - 150*
13C3 PFBS	*105*		*25 - 150*
13C2 PFDA	*120*		*25 - 150*
13C2 PFDoA	*88*		*25 - 150*
13C4 PFHpA	*106*		*25 - 150*

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

Lab Sample ID: 190-28204-2 MSD
Matrix: Solid
Analysis Batch: 572885

Client Sample ID: DIGESTER #4 - duplic
Prep Type: Total/NA
Prep Batch: 572499

Isotope Dilution	MSD %Recovery	MSD Qualifier	Limits
13C2 PFHxA	101		25 - 150
13C5 PFNA	115		25 - 150
13C4 PFOA	115		25 - 150
13C4 PFOS	112		25 - 150
13C5 PFPeA	74		25 - 150
13C2 PFTeDA	43		25 - 150
13C2 PFUnA	118		25 - 150
d5-NEtFOSAA	124		25 - 150
d3-NMeFOSAA	117		25 - 150
M2-4:2 FTS	133		25 - 150
M2-6:2 FTS	156	*5+	25 - 150
M2-8:2 FTS	193	*5+	25 - 150
18O2 PFHxS	104		25 - 150

Isotope Dilution Summary

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFOSA	HFPODA	PFBA	C3PFBS	PFDA	PFDoA	C4PFHA	PFHxA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
190-28204-1	DIGESTER #4	110	91	17 *5-	103	116	87	104	95
190-28204-2	DIGESTER #4 - duplic	100	86	21 *5-	93	108	83	86	97
190-28204-2 MS	DIGESTER #4 - duplic	114	89	18 *5-	101	120	94	102	101
190-28204-2 MSD	DIGESTER #4 - duplic	110	93	19 *5-	105	120	88	106	101
LCS 320-572499/2-A	Lab Control Sample	109	92	60	100	114	113	100	94
MB 320-572499/1-A	Method Blank	116	96	67	108	112	113	104	99

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFNA	PFOA	PFOS	PFPeA	PFTDA	PFUnA	d5NEFOS	d3NMFOS
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
190-28204-1	DIGESTER #4	107	108	109	83	47	117	128	117
190-28204-2	DIGESTER #4 - duplic	101	101	103	76	39	111	121	108
190-28204-2 MS	DIGESTER #4 - duplic	111	111	111	76	50	117	133	121
190-28204-2 MSD	DIGESTER #4 - duplic	115	115	112	74	43	118	124	117
LCS 320-572499/2-A	Lab Control Sample	108	104	109	98	106	117	128	112
MB 320-572499/1-A	Method Blank	106	112	112	98	115	117	129	120

		Percent Isotope Dilution Recovery (Acceptance Limits)			
		M242FTS	M262FTS	M282FTS	PFHxS
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)
190-28204-1	DIGESTER #4	128	159 *5+	170 *5+	100
190-28204-2	DIGESTER #4 - duplic	119	133	166 *5+	91
190-28204-2 MS	DIGESTER #4 - duplic	135	159 *5+	197 *5+	103
190-28204-2 MSD	DIGESTER #4 - duplic	133	156 *5+	193 *5+	104
LCS 320-572499/2-A	Lab Control Sample	108	110	127	104
MB 320-572499/1-A	Method Blank	111	105	128	103

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

Isotope Dilution Summary

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Method: 537 (modified) - Fluorinated Alkyl Substances

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

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFOSA	HFPODA	PFBA	C3PFBS	PFDA	PFDoA	C4PFHA	PFHxA
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
190-28204-3	EQUIP. BLANK	89	84	94	99	98	89	95	92
LCS 320-572353/2-A	Lab Control Sample	93	83	89	95	92	88	95	96
LCSD 320-572353/3-A	Lab Control Sample Dup	95	82	96	98	98	92	94	93
MB 320-572353/1-A	Method Blank	96	89	90	100	103	91	94	96

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		PFNA	PFOA	PFOS	PFPeA	PFTDA	PFUnA	d5NEFOS	d3NMFOS
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)	(25-150)
190-28204-3	EQUIP. BLANK	97	93	93	90	87	95	120	103
LCS 320-572353/2-A	Lab Control Sample	102	95	100	87	92	95	95	105
LCSD 320-572353/3-A	Lab Control Sample Dup	101	92	103	91	98	97	108	109
MB 320-572353/1-A	Method Blank	103	102	101	96	96	103	113	111

		Percent Isotope Dilution Recovery (Acceptance Limits)			
		M242FTS	M262FTS	M282FTS	PFHxS
Lab Sample ID	Client Sample ID	(25-150)	(25-150)	(25-150)	(25-150)
190-28204-3	EQUIP. BLANK	126	113	122	90
LCS 320-572353/2-A	Lab Control Sample	110	97	99	96
LCSD 320-572353/3-A	Lab Control Sample Dup	105	102	109	95
MB 320-572353/1-A	Method Blank	105	99	103	99

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

Definitions/Glossary

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Qualifiers

LCMS

Qualifier	Qualifier Description
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
*5+	Isotope dilution analyte is outside acceptance limits, high biased.

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

QC Association Summary

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

LCMS

Prep Batch: 572353

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
190-28204-3	EQUIP. BLANK	Total/NA	Water	3535	
MB 320-572353/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-572353/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-572353/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

Prep Batch: 572499

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
190-28204-1	DIGESTER #4	Total/NA	Solid	SHAKE	
190-28204-2	DIGESTER #4 - duplic	Total/NA	Solid	SHAKE	
MB 320-572499/1-A	Method Blank	Total/NA	Solid	SHAKE	
LCS 320-572499/2-A	Lab Control Sample	Total/NA	Solid	SHAKE	
190-28204-2 MS	DIGESTER #4 - duplic	Total/NA	Solid	SHAKE	
190-28204-2 MSD	DIGESTER #4 - duplic	Total/NA	Solid	SHAKE	

Analysis Batch: 572885

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
190-28204-1	DIGESTER #4	Total/NA	Solid	537 (modified)	572499
190-28204-2	DIGESTER #4 - duplic	Total/NA	Solid	537 (modified)	572499
MB 320-572499/1-A	Method Blank	Total/NA	Solid	537 (modified)	572499
LCS 320-572499/2-A	Lab Control Sample	Total/NA	Solid	537 (modified)	572499
190-28204-2 MS	DIGESTER #4 - duplic	Total/NA	Solid	537 (modified)	572499
190-28204-2 MSD	DIGESTER #4 - duplic	Total/NA	Solid	537 (modified)	572499

Analysis Batch: 573161

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
190-28204-3	EQUIP. BLANK	Total/NA	Water	537 (modified)	572353
MB 320-572353/1-A	Method Blank	Total/NA	Water	537 (modified)	572353
LCS 320-572353/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	572353
LCSD 320-572353/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	572353

General Chemistry

Analysis Batch: 573462

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
190-28204-1	DIGESTER #4	Total/NA	Solid	D 2216	
190-28204-2	DIGESTER #4 - duplic	Total/NA	Solid	D 2216	

Lab Chronicle

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

Client Sample ID: DIGESTER #4
Lab Sample ID: 190-28204-1
Date Collected: 03/08/22 13:30
Matrix: Solid
Date Received: 03/09/22 13:34

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	573462	03/16/22 15:22	KMW	TAL SAC

Client Sample ID: DIGESTER #4
Lab Sample ID: 190-28204-1
Date Collected: 03/08/22 13:30
Matrix: Solid
Date Received: 03/09/22 13:34
Percent Solids: 3.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			572499	03/13/22 20:49	AM	TAL SAC
Total/NA	Analysis	537 (modified)		1	572885	03/15/22 00:39	VPM	TAL SAC

Client Sample ID: DIGESTER #4 - duplic
Lab Sample ID: 190-28204-2
Date Collected: 03/08/22 13:30
Matrix: Solid
Date Received: 03/09/22 13:34

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	573462	03/16/22 15:22	KMW	TAL SAC

Client Sample ID: DIGESTER #4 - duplic
Lab Sample ID: 190-28204-2
Date Collected: 03/08/22 13:30
Matrix: Solid
Date Received: 03/09/22 13:34
Percent Solids: 3.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SHAKE			572499	03/13/22 20:49	AM	TAL SAC
Total/NA	Analysis	537 (modified)		1	572885	03/15/22 00:49	VPM	TAL SAC

Client Sample ID: EQUIP. BLANK
Lab Sample ID: 190-28204-3
Date Collected: 03/08/22 13:20
Matrix: Water
Date Received: 03/09/22 13:34

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			572353	03/12/22 07:00	EG	TAL SAC
Total/NA	Analysis	537 (modified)		1	573161	03/16/22 02:07	K1S	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

AM = Andrew Martin

EG = Eric Gomez

Batch Type: Analysis

K1S = Kotechakon Sorndee

KMW = Kelly White

VPM = Veronika Melnik

Accreditation/Certification Summary

Client: City of Cadillac Utilities
Job ID: 190-28204-1
Project/Site: City of Cadillac Biosollids PFAS 2022

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	03-18-22
Louisiana	NELAP	01944	06-30-22
Maine	State	CA00004	04-14-22
Michigan	State	9947	01-29-22 *
Nevada	State	CA00044	08-31-22
New Hampshire	NELAP	2997	04-18-22
New Jersey	NELAP	CA005	06-30-22
New York	NELAP	11666	04-01-22
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.

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

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing America

Client Information	Sampler: TL & DS	Lab PM: Schafer, Sue	Carrier Tracking No(s):	COC No: 190-33620-2329.1
Client Contact: Cindy Tomaszewski	Phone: 231-775-2368	E-Mail: Sue.Schafer@Eurofinset.com	State of Origin:	Page: Page 1 of 1
Company: City of Cadillac Utilities	PWSID:	Analysis Requested		Job #:
Address: 1121 Plett Road	Due Date 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:
City: Cadillac	TAT Requested (days): STANDARD			
State, Zip: MI, 49601	Compliance Project: Δ Yes Δ No			
Phone:	PO #: ~~2019-018~~ CAT 220308 ERF			
Email: lab@cadillac-mi.net	WO #: 19001884			
Project Name: City of Cadillac Biosolids PFAS 2022	Project #: 19001884			
Site:	SSOW#:			

Sample Identification	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)	PFC_IDA - (MOD) PFAS 28	Moisture - Local Method	PFC_IDA - PFAS 28	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N		
DIGESTER #4	3-8-22	1330	G	Solid	N	N	X	X	X ~~CAT~~	2	
DIGESTER #4-duplic	3-8-22	1330	G	Solid	N	N	X	X	X ~~CAT~~	2	
EQUIP. BLANK	3-8-22	1320	G	Water	N	N	~~X~~	~~X~~	X	2	

190-28204 Chain of Custody

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown ☐ Radiological — WASTEWATER	☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Need EDD for MI-WATERS	Special Instructions/QC Requirements:
Empty Kit Relinquished by:	Date: Time: Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Cindy Tomaszewski / City of Cadillac	3-8-2022/1415		Ship UPS Next Day		
Relinquished by:	Date/Time:	Company	Received by: Jeri Hall	3/9/22 1334	EETA
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

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

Client ID: City of Cadillac-
Work Oder #: 190-26204

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: TRH Date: 3/9/22 Time: 1334

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

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

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

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

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
CP3B2079	5.6	5.6		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 Tri Hall Date: 3/9/22

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: 190-31844.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Sue.Schafer@Eurofinset.com	State of Origin: Michigan	Page: Page 1 of 1
Company: Eurofins Environment Testing Northern Ca		Accreditations Required (See note):		Job #: 190-28204-1
Address: 880 Riverside Parkway, ,	Due Date Requested: 3/29/2022			
City: West Sacramento	TAT Requested (days):			
State, Zip: CA, 95605				
Phone: 916-373-5600(Tel) 916-372-1059(Fax)	PO #:			
Email:	WO #:			
Project Name: City of Cadillac Biosollids PFAS 2022	Project #: 19001884			
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	PFC_IDA/3535_PFC PFAS 28	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
DIGESTER #4 (190-28204-1)	3/8/22	13:30 Eastern		Solid			X	X		2	
DIGESTER #4 - duplic (190-28204-2)	3/8/22	13:30 Eastern		Solid			X	X		2	
EQUIP. BLANK (190-28204-3)	3/8/22	13:20 Eastern		Water					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
1	Jen Hall	3/9/22 1700			3/10/22 9:40	
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.: 185755 | Cooler Temperature(s) °C and Other Remarks: 2.2

Ver: 06/08/2021