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# ANALYTICAL REPORT

Eurofins TestAmerica, Michigan
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Laboratory Job ID: 190-26422-1
Client Project/Site: City of Cadillac Biosolids PFAS

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

Attn: Cindy Tomaszewski

Sue Schafer

*Authorized for release by:*
*8/6/2021 9:28:31 AM*

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# Sample Summary

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 190-26422-1 | Biosolids | Solid | 07/20/21 13:30 | 07/21/21 10:46 |
| 190-26422-2 | Biosolids-Duplicate | Solid | 07/20/21 13:30 | 07/21/21 10:46 |
| 190-26422-3 | Equipment Blank | Water | 07/20/21 13:15 | 07/21/21 10:46 |

# Case Narrative

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

## Job ID: 190-26422-1

### Laboratory: Eurofins TestAmerica, Michigan

**Narrative**

**Job Narrative**
**190-26422-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 7/21/2021 10:46 AM. 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 4.7º C.

**LCMS**
Method 537 (modified): The continuing calibration verification (CCVIS) associated with batch 320-510361 recovered above the upper control limit for Perfluorodecanoic acid (PFDA). The samples associated with this CCV were non-detects for the affected analyte; therefore, the data have been reported.

Method 537 (modified): The matrix spike (MS) recoveries for several analytes in preparation batch 320-509488 and analytical batch 320-510044 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method 537 (modified): The “I” qualifier means the transition mass ratio for the indicated analyte was outside of 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 judgement was used to positively identify the analyte.
Biosolids (190-26422-1) and Biosolids-Duplicate (190-26422-2)

Method 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for the following samples: Biosolids (190-26422-1), Biosolids-Duplicate (190-26422-2), (190-26422-A-1-C MS) and (190-26422-A-1-D 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 is below the method recommended limit: Biosolids (190-26422-1), Biosolids-Duplicate (190-26422-2) and (190-26422-A-1-C MS). 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 320-510162.

Method: 3535_PFC
Matrix: Water

Method SHAKE: The following samples were yellow after extraction: Biosolids (190-26422-1), Biosolids-Duplicate (190-26422-2), (190-26422-A-1 MS) and (190-26422-A-1 MSD).

preparation batch 320-509488
PFC_IDA
Solid

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

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

**Client Sample ID: Biosolids**
**Date Collected: 07/20/21 13:30**
**Date Received: 07/21/21 10:46**

**Lab Sample ID: 190-26422-1**
**Matrix: Solid**
**Percent Solids: 3.5**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| F-53B Major | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| F-53B Minor | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| 4:2 FTS | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| 6:2 FTS | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| 8:2 FTS | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| HFPO-DA (GenX) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| **N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)** | **8.8** | **F1** | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| **N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)** | **21** | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorobutanesulfonic acid (PFBS) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorobutanoic acid (PFBA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorodecanesulfonic acid (PFDS) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorodecanoic acid (PFDA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorododecanoic acid (PFDoA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluoroheptanoic acid (PFHpA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorohexanesulfonic acid (PFHxS) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| **Perfluorohexanoic acid (PFHxA)** | **8.3** | **I** | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorononanesulfonic acid (PFNS) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorononanoic acid (PFNA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorooctanesulfonamide (FOSA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorooctanesulfonic acid (PFOS) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorooctanoic acid (PFOA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluoropentanesulfonic acid (PFPeS) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluoropentanoic acid (PFPeA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorotetradecanoic acid (PFTeA) | <5.3 | F1 | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluorotridecanoic acid (PFTriA) | <5.3 | F1 | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |
| Perfluoroundecanoic acid (PFUnA) | <5.3 | | 5.3 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:01 | 1 |

| *Isotope Dilution* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C8 FOSA* | *84* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C3 HFPO-DA* | *76* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C4 PFBA* | *67* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C3 PFBS* | *76* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C2 PFDA* | *83* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C2 PFDoA* | *37* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C4 PFHpA* | *85* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C2 PFHxA* | *76* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C5 PFNA* | *87* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C4 PFOA* | *87* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C4 PFOS* | *83* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C5 PFPeA* | *77* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C2 PFTeDA* | *24* | **5-* | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *13C2 PFUnA* | *73* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *d5-NEtFOSAA* | *47* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *d3-NMeFOSAA* | *68* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |

Client: City of Cadillac Utilities
Job ID: 190-26422-1
Project/Site: City of Cadillac Biosolids PFAS

**Client Sample ID: Biosolids**
**Lab Sample ID: 190-26422-1**
**Date Collected: 07/20/21 13:30**
**Matrix: Solid**
**Date Received: 07/21/21 10:46**
**Percent Solids: 3.5**

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

| *Isotope Dilution* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *M2-4:2 FTS* | *155* | *5+ | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *M2-6:2 FTS* | *196* | *5+ | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *M2-8:2 FTS* | *205* | *5+ | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |
| *18O2 PFHxS* | *90* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:01* | *1* |

### General Chemistry

| Analyte | Result | Qualifier | RL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|
| **Percent Moisture** | **96.5** | | 0.1 | % | | | 07/23/21 10:03 | 1 |
| **Percent Solids** | **3.5** | | 0.1 | % | | | 07/23/21 10:03 | 1 |

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

**Client Sample ID: Biosolids-Duplicate**
**Date Collected: 07/20/21 13:30**
**Date Received: 07/21/21 10:46**

**Lab Sample ID: 190-26422-2**
**Matrix: Solid**
**Percent Solids: 3.6**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| F-53B Major | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| F-53B Minor | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| 4:2 FTS | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| 6:2 FTS | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| 8:2 FTS | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| HFPO-DA (GenX) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| **N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)** | **7.3** | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| **N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)** | **21** | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorobutanesulfonic acid (PFBS) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorobutanoic acid (PFBA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorodecanesulfonic acid (PFDS) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorodecanoic acid (PFDA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorododecanoic acid (PFDoA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluoroheptanoic acid (PFHpA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorohexanesulfonic acid (PFHxS) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| **Perfluorohexanoic acid (PFHxA)** | **6.9** | I | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorononanesulfonic acid (PFNS) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorononanoic acid (PFNA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorooctanesulfonamide (FOSA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorooctanesulfonic acid (PFOS) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorooctanoic acid (PFOA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluoropentanesulfonic acid (PFPeS) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluoropentanoic acid (PFPeA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorotetradecanoic acid (PFTeA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluorotridecanoic acid (PFTriA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |
| Perfluoroundecanoic acid (PFUnA) | <5.5 | | 5.5 | | ug/Kg | ☼ | 07/23/21 04:42 | 07/24/21 19:29 | 1 |

| *Isotope Dilution* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C8 FOSA* | *75* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C3 HFPO-DA* | *69* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C4 PFBA* | *65* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C3 PFBS* | *69* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C2 PFDA* | *71* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C2 PFDoA* | *39* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C4 PFHpA* | *73* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C2 PFHxA* | *66* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C5 PFNA* | *87* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C4 PFOA* | *86* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C4 PFOS* | *70* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C5 PFPeA* | *67* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C2 PFTeDA* | *23* | *5- | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *13C2 PFUnA* | *66* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *d5-NEtFOSAA* | *42* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *d3-NMeFOSAA* | *65* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

## Client Sample ID: Biosolids-Duplicate

**Date Collected: 07/20/21 13:30**
**Date Received: 07/21/21 10:46**

## Lab Sample ID: 190-26422-2

**Matrix: Solid**
**Percent Solids: 3.6**

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

| *Isotope Dilution* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *M2-4:2 FTS* | *150* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *M2-6:2 FTS* | *187* | *5+ | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *M2-8:2 FTS* | *156* | *5+ | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |
| *18O2 PFHxS* | *71* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 19:29* | *1* |

### General Chemistry

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| **Percent Moisture** | **96.4** | | 0.1 | | % | | | 07/23/21 10:03 | 1 |
| **Percent Solids** | **3.6** | | 0.1 | | % | | | 07/23/21 10:03 | 1 |

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

## Client Sample ID: Equipment Blank

**Date Collected: 07/20/21 13:15**
**Date Received: 07/21/21 10:46**

## Lab Sample ID: 190-26422-3

**Matrix: Water**

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

| Analyte | Result | Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| F-53B Major | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| F-53B Minor | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| 4:2 FTS | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| 6:2 FTS | <4.7 | | 4.7 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| 8:2 FTS | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| HFPO-DA (GenX) | <3.7 | | 3.7 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | <4.7 | | 4.7 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | <4.7 | | 4.7 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorobutanesulfonic acid (PFBS) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorobutanoic acid (PFBA) | <4.7 | | 4.7 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorodecanesulfonic acid (PFDS) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorodecanoic acid (PFDA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorododecanoic acid (PFDoA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluoroheptanoic acid (PFHpA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorohexanesulfonic acid (PFHxS) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorohexanoic acid (PFHxA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorononanesulfonic acid (PFNS) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorononanoic acid (PFNA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| **Perfluorooctanesulfonamide (FOSA)** | **2.1** | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorooctanesulfonic acid (PFOS) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorooctanoic acid (PFOA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluoropentanesulfonic acid (PFPeS) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluoropentanoic acid (PFPeA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorotetradecanoic acid (PFTeA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluorotridecanoic acid (PFTriA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| Perfluoroundecanoic acid (PFUnA) | <1.9 | | 1.9 | | ng/L | | 07/25/21 19:29 | 07/26/21 20:47 | 1 |

| *Isotope Dilution* | *%Recovery* | *Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C8 FOSA* | *87* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C3 HFPO-DA* | *90* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C4 PFBA* | *93* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C3 PFBS* | *89* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C2 PFDA* | *88* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C2 PFDoA* | *82* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C4 PFHpA* | *94* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C2 PFHxA* | *94* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C5 PFNA* | *101* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C4 PFOA* | *94* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C4 PFOS* | *95* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C5 PFPeA* | *92* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C2 PFTeDA* | *74* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *13C2 PFUnA* | *91* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *d5-NEtFOSAA* | *89* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |
| *d3-NMeFOSAA* | *87* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 20:47* | *1* |

Client: City of Cadillac Utilities
Job ID: 190-26422-1
Project/Site: City of Cadillac Biosolids PFAS

**Client Sample ID: Equipment Blank**
**Lab Sample ID: 190-26422-3**
**Date Collected: 07/20/21 13:15**
**Matrix: Water**
**Date Received: 07/21/21 10:46**

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

| Isotope Dilution | %Recovery | Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| M2-4:2 FTS | 127 | | 25 - 150 | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| M2-6:2 FTS | 140 | | 25 - 150 | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| M2-8:2 FTS | 131 | | 25 - 150 | 07/25/21 19:29 | 07/26/21 20:47 | 1 |
| 18O2 PFHxS | 97 | | 25 - 150 | 07/25/21 19:29 | 07/26/21 20:47 | 1 |

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

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

**Lab Sample ID: MB 320-509488/1-A**
**Matrix: Solid**
**Analysis Batch: 510044**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 509488**

| 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 | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| F-53B Major | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| F-53B Minor | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| 4:2 FTS | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| 6:2 FTS | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| 8:2 FTS | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| HFPO-DA (GenX) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorobutanesulfonic acid (PFBS) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorobutanoic acid (PFBA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorodecanesulfonic acid (PFDS) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorodecanoic acid (PFDA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorododecanoic acid (PFDoA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluoroheptanoic acid (PFHpA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorohexanesulfonic acid (PFHxS) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorohexanoic acid (PFHxA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorononanesulfonic acid (PFNS) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorononanoic acid (PFNA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorooctanesulfonamide (FOSA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorooctanesulfonic acid (PFOS) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorooctanoic acid (PFOA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluoropentanesulfonic acid (PFPeS) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluoropentanoic acid (PFPeA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorotetradecanoic acid (PFTeA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluorotridecanoic acid (PFTriA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| Perfluoroundecanoic acid (PFUnA) | <0.20 | | 0.20 | | ug/Kg | | 07/23/21 04:42 | 07/24/21 18:34 | 1 |

| *Isotope Dilution* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C8 FOSA* | *89* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C3 HFPO-DA* | *87* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C4 PFBA* | *85* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C3 PFBS* | *81* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C2 PFDA* | *84* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C2 PFDoA* | *83* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C4 PFHpA* | *100* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C2 PFHxA* | *83* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C5 PFNA* | *93* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C4 PFOA* | *88* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C4 PFOS* | *98* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C5 PFPeA* | *88* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C2 PFTeDA* | *81* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *13C2 PFUnA* | *89* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |
| *d5-NEtFOSAA* | *88* | | *25 - 150* | *07/23/21 04:42* | *07/24/21 18:34* | *1* |

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

**Lab Sample ID: MB 320-509488/1-A**
**Matrix: Solid**
**Analysis Batch: 510044**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 509488**

| Isotope Dilution | MB %Recovery | MB Qualifier | Limits | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|
| d3-NMeFOSAA | 81 | | 25 - 150 | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| M2-4:2 FTS | 72 | | 25 - 150 | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| M2-6:2 FTS | 77 | | 25 - 150 | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| M2-8:2 FTS | 84 | | 25 - 150 | 07/23/21 04:42 | 07/24/21 18:34 | 1 |
| 18O2 PFHxS | 95 | | 25 - 150 | 07/23/21 04:42 | 07/24/21 18:34 | 1 |

**Lab Sample ID: LCS 320-509488/2-A**
**Matrix: Solid**
**Analysis Batch: 510044**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 509488**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 1.88 | 2.03 | | ug/Kg | | 108 | 79 - 139 |
| F-53B Major | 1.86 | 1.91 | | ug/Kg | | 103 | 74 - 134 |
| F-53B Minor | 1.88 | 1.70 | | ug/Kg | | 90 | 66 - 136 |
| 4:2 FTS | 1.87 | 1.99 | | ug/Kg | | 106 | 68 - 143 |
| 6:2 FTS | 1.90 | 2.20 | | ug/Kg | | 116 | 73 - 139 |
| 8:2 FTS | 1.92 | 2.17 | | ug/Kg | | 113 | 75 - 135 |
| HFPO-DA (GenX) | 2.00 | 2.36 | | ug/Kg | | 118 | 53 - 158 |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | 2.00 | 2.09 | | ug/Kg | | 105 | 72 - 132 |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | 2.00 | 2.27 | | ug/Kg | | 113 | 72 - 132 |
| Perfluorobutanesulfonic acid (PFBS) | 1.77 | 2.04 | | ug/Kg | | 116 | 69 - 129 |
| Perfluorobutanoic acid (PFBA) | 2.00 | 2.23 | | ug/Kg | | 112 | 76 - 136 |
| Perfluorodecanesulfonic acid (PFDS) | 1.93 | 2.01 | | ug/Kg | | 104 | 71 - 131 |
| Perfluorodecanoic acid (PFDA) | 2.00 | 2.21 | | ug/Kg | | 110 | 72 - 132 |
| Perfluorododecanoic acid (PFDoA) | 2.00 | 2.23 | | ug/Kg | | 112 | 71 - 131 |
| Perfluoroheptanesulfonic Acid (PFHpS) | 1.90 | 2.18 | | ug/Kg | | 114 | 76 - 136 |
| Perfluoroheptanoic acid (PFHpA) | 2.00 | 2.23 | | ug/Kg | | 111 | 71 - 131 |
| Perfluorohexanesulfonic acid (PFHxS) | 1.82 | 2.02 | | ug/Kg | | 111 | 62 - 122 |
| Perfluorohexanoic acid (PFHxA) | 2.00 | 2.24 | | ug/Kg | | 112 | 71 - 131 |
| Perfluorononanesulfonic acid (PFNS) | 1.92 | 1.87 | | ug/Kg | | 98 | 72 - 132 |
| Perfluorononanoic acid (PFNA) | 2.00 | 2.26 | | ug/Kg | | 113 | 73 - 133 |
| Perfluorooctanesulfonamide (FOSA) | 2.00 | 2.12 | | ug/Kg | | 106 | 77 - 137 |
| Perfluorooctanesulfonic acid (PFOS) | 1.86 | 2.06 | | ug/Kg | | 111 | 68 - 141 |
| Perfluorooctanoic acid (PFOA) | 2.00 | 2.23 | | ug/Kg | | 111 | 72 - 132 |
| Perfluoropentanesulfonic acid (PFPeS) | 1.88 | 2.18 | | ug/Kg | | 116 | 66 - 126 |
| Perfluoropentanoic acid (PFPeA) | 2.00 | 2.30 | | ug/Kg | | 115 | 69 - 129 |
| Perfluorotetradecanoic acid (PFTeA) | 2.00 | 2.19 | | ug/Kg | | 110 | 67 - 127 |
| Perfluorotridecanoic acid (PFTriA) | 2.00 | 2.48 | | ug/Kg | | 124 | 71 - 131 |

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

**Lab Sample ID: LCS 320-509488/2-A**
**Matrix: Solid**
**Analysis Batch: 510044**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 509488**

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Perfluoroundecanoic acid (PFUnA) | | | 2.00 | 2.25 | | ug/Kg | | 113 | 66 - 126 | | |

| *Isotope Dilution* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *13C8 FOSA* | *98* | | *25 - 150* |
| *13C3 HFPO-DA* | *79* | | *25 - 150* |
| *13C4 PFBA* | *90* | | *25 - 150* |
| *13C3 PFBS* | *83* | | *25 - 150* |
| *13C2 PFDA* | *83* | | *25 - 150* |
| *13C2 PFDoA* | *77* | | *25 - 150* |
| *13C4 PFHpA* | *100* | | *25 - 150* |
| *13C2 PFHxA* | *84* | | *25 - 150* |
| *13C5 PFNA* | *88* | | *25 - 150* |
| *13C4 PFOA* | *85* | | *25 - 150* |
| *13C4 PFOS* | *92* | | *25 - 150* |
| *13C5 PFPeA* | *89* | | *25 - 150* |
| *13C2 PFTeDA* | *79* | | *25 - 150* |
| *13C2 PFUnA* | *81* | | *25 - 150* |
| *d5-NEtFOSAA* | *80* | | *25 - 150* |
| *d3-NMeFOSAA* | *78* | | *25 - 150* |
| *M2-4:2 FTS* | *63* | | *25 - 150* |
| *M2-6:2 FTS* | *66* | | *25 - 150* |
| *M2-8:2 FTS* | *76* | | *25 - 150* |
| *18O2 PFHxS* | *92* | | *25 - 150* |

**Lab Sample ID: 190-26422-1 MS**
**Matrix: Solid**
**Analysis Batch: 510044**

**Client Sample ID: Biosolids**
**Prep Type: Total/NA**
**Prep Batch: 509488**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | <5.3 | | 49.2 | 62.4 | | ug/Kg | ☼ | 127 | 79 - 139 | | |
| F-53B Major | <5.3 | | 48.7 | 58.7 | | ug/Kg | ☼ | 120 | 74 - 134 | | |
| F-53B Minor | <5.3 | | 49.2 | 41.3 | | ug/Kg | ☼ | 84 | 66 - 136 | | |
| 4:2 FTS | <5.3 | | 48.8 | 49.3 | | ug/Kg | ☼ | 101 | 68 - 143 | | |
| 6:2 FTS | <5.3 | | 49.5 | 58.9 | | ug/Kg | ☼ | 119 | 73 - 139 | | |
| 8:2 FTS | <5.3 | | 50.1 | 49.9 | | ug/Kg | ☼ | 100 | 75 - 135 | | |
| HFPO-DA (GenX) | <5.3 | | 52.3 | 57.9 | | ug/Kg | ☼ | 111 | 53 - 158 | | |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | 8.8 | F1 | 52.3 | 80.5 | F1 | ug/Kg | ☼ | 137 | 72 - 132 | | |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | 21 | | 52.3 | 78.8 | | ug/Kg | ☼ | 110 | 72 - 132 | | |
| Perfluorobutanesulfonic acid (PFBS) | <5.3 | | 46.2 | 59.8 | | ug/Kg | ☼ | 127 | 69 - 129 | | |
| Perfluorobutanoic acid (PFBA) | <5.3 | | 52.3 | 58.7 | | ug/Kg | ☼ | 112 | 76 - 136 | | |
| Perfluorodecanesulfonic acid (PFDS) | <5.3 | | 50.4 | 50.8 | | ug/Kg | ☼ | 101 | 71 - 131 | | |
| Perfluorodecanoic acid (PFDA) | <5.3 | | 52.3 | 56.4 | | ug/Kg | ☼ | 105 | 72 - 132 | | |
| Perfluorododecanoic acid (PFDoA) | <5.3 | | 52.3 | 54.2 | | ug/Kg | ☼ | 104 | 71 - 131 | | |

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

**Lab Sample ID: 190-26422-1 MS**
**Matrix: Solid**
**Analysis Batch: 510044**

**Client Sample ID: Biosolids**
**Prep Type: Total/NA**
**Prep Batch: 509488**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Perfluoroheptanesulfonic Acid (PFHpS) | <5.3 | | 49.8 | 64.9 | | ug/Kg | ☼ | 130 | 76 - 136 |
| Perfluoroheptanoic acid (PFHpA) | <5.3 | | 52.3 | 54.2 | | ug/Kg | ☼ | 104 | 71 - 131 |
| Perfluorohexanesulfonic acid (PFHxS) | <5.3 | | 47.6 | 56.6 | | ug/Kg | ☼ | 119 | 62 - 122 |
| Perfluorohexanoic acid (PFHxA) | 8.3 | I | 52.3 | 68.2 | | ug/Kg | ☼ | 115 | 71 - 131 |
| Perfluorononanesulfonic acid (PFNS) | <5.3 | | 50.2 | 60.7 | | ug/Kg | ☼ | 121 | 72 - 132 |
| Perfluorononanoic acid (PFNA) | <5.3 | | 52.3 | 54.7 | | ug/Kg | ☼ | 105 | 73 - 133 |
| Perfluorooctanesulfonamide (FOSA) | <5.3 | | 52.3 | 57.3 | | ug/Kg | ☼ | 107 | 77 - 137 |
| Perfluorooctanesulfonic acid (PFOS) | <5.3 | | 48.5 | 59.1 | | ug/Kg | ☼ | 114 | 68 - 141 |
| Perfluorooctanoic acid (PFOA) | <5.3 | | 52.3 | 61.4 | | ug/Kg | ☼ | 117 | 72 - 132 |
| Perfluoropentanesulfonic acid (PFPeS) | <5.3 | | 49.0 | 58.4 | | ug/Kg | ☼ | 119 | 66 - 126 |
| Perfluoropentanoic acid (PFPeA) | <5.3 | | 52.3 | 64.2 | | ug/Kg | ☼ | 123 | 69 - 129 |
| Perfluorotetradecanoic acid (PFTeA) | <5.3 | F1 | 52.3 | 70.7 | F1 | ug/Kg | ☼ | 135 | 67 - 127 |
| Perfluorotridecanoic acid (PFTriA) | <5.3 | F1 | 52.3 | 30.1 | F1 | ug/Kg | ☼ | 58 | 71 - 131 |
| Perfluoroundecanoic acid (PFUnA) | <5.3 | | 52.3 | 57.5 | | ug/Kg | ☼ | 110 | 66 - 126 |

| *Isotope Dilution* | *MS %Recovery* | *MS Qualifier* | *Limits* |
|---|---|---|---|
| *13C8 FOSA* | *80* | | *25 - 150* |
| *13C3 HFPO-DA* | *74* | | *25 - 150* |
| *13C4 PFBA* | *61* | | *25 - 150* |
| *13C3 PFBS* | *71* | | *25 - 150* |
| *13C2 PFDA* | *72* | | *25 - 150* |
| *13C2 PFDoA* | *39* | | *25 - 150* |
| *13C4 PFHpA* | *87* | | *25 - 150* |
| *13C2 PFHxA* | *72* | | *25 - 150* |
| *13C5 PFNA* | *85* | | *25 - 150* |
| *13C4 PFOA* | *87* | | *25 - 150* |
| *13C4 PFOS* | *70* | | *25 - 150* |
| *13C5 PFPeA* | *68* | | *25 - 150* |
| *13C2 PFTeDA* | *23* | *5- | *25 - 150* |
| *13C2 PFUnA* | *66* | | *25 - 150* |
| *d5-NEtFOSAA* | *41* | | *25 - 150* |
| *d3-NMeFOSAA* | *72* | | *25 - 150* |
| *M2-4:2 FTS* | *150* | | *25 - 150* |
| *M2-6:2 FTS* | *179* | *5+ | *25 - 150* |
| *M2-8:2 FTS* | *191* | *5+ | *25 - 150* |
| *18O2 PFHxS* | *81* | | *25 - 150* |

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

**Lab Sample ID: 190-26422-1 MSD**
**Matrix: Solid**
**Analysis Batch: 510044**

**Client Sample ID: Biosolids**
**Prep Type: Total/NA**
**Prep Batch: 509488**

| 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) | <5.3 | | 51.7 | 68.3 | | ug/Kg | ☼ | 132 | 79 - 139 | 9 | 30 |
| F-53B Major | <5.3 | | 51.1 | 61.6 | | ug/Kg | ☼ | 121 | 74 - 134 | 5 | 30 |
| F-53B Minor | <5.3 | | 51.7 | 47.4 | | ug/Kg | ☼ | 92 | 66 - 136 | 14 | 30 |
| 4:2 FTS | <5.3 | | 51.2 | 55.1 | | ug/Kg | ☼ | 108 | 68 - 143 | 11 | 30 |
| 6:2 FTS | <5.3 | | 52.0 | 57.8 | | ug/Kg | ☼ | 111 | 73 - 139 | 2 | 30 |
| 8:2 FTS | <5.3 | | 52.5 | 58.4 | | ug/Kg | ☼ | 111 | 75 - 135 | 16 | 30 |
| HFPO-DA (GenX) | <5.3 | | 54.8 | 60.5 | | ug/Kg | ☼ | 110 | 53 - 158 | 4 | 30 |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | 8.8 | F1 | 54.8 | 74.4 | | ug/Kg | ☼ | 120 | 72 - 132 | 8 | 30 |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | 21 | | 54.8 | 87.0 | | ug/Kg | ☼ | 120 | 72 - 132 | 10 | 30 |
| Perfluorobutanesulfonic acid (PFBS) | <5.3 | | 48.5 | 57.7 | | ug/Kg | ☼ | 117 | 69 - 129 | 3 | 30 |
| Perfluorobutanoic acid (PFBA) | <5.3 | | 54.8 | 61.4 | | ug/Kg | ☼ | 112 | 76 - 136 | 4 | 30 |
| Perfluorodecanesulfonic acid (PFDS) | <5.3 | | 52.9 | 55.8 | | ug/Kg | ☼ | 106 | 71 - 131 | 9 | 30 |
| Perfluorodecanoic acid (PFDA) | <5.3 | | 54.8 | 61.1 | | ug/Kg | ☼ | 109 | 72 - 132 | 8 | 30 |
| Perfluorododecanoic acid (PFDoA) | <5.3 | | 54.8 | 69.4 | | ug/Kg | ☼ | 127 | 71 - 131 | 25 | 30 |
| Perfluoroheptanesulfonic Acid (PFHpS) | <5.3 | | 52.2 | 68.3 | | ug/Kg | ☼ | 131 | 76 - 136 | 5 | 30 |
| Perfluoroheptanoic acid (PFHpA) | <5.3 | | 54.8 | 58.4 | | ug/Kg | ☼ | 106 | 71 - 131 | 7 | 30 |
| Perfluorohexanesulfonic acid (PFHxS) | <5.3 | | 49.9 | 55.0 | | ug/Kg | ☼ | 110 | 62 - 122 | 3 | 30 |
| Perfluorohexanoic acid (PFHxA) | 8.3 | I | 54.8 | 67.8 | | ug/Kg | ☼ | 108 | 71 - 131 | 1 | 30 |
| Perfluorononanesulfonic acid (PFNS) | <5.3 | | 52.7 | 56.9 | | ug/Kg | ☼ | 108 | 72 - 132 | 6 | 30 |
| Perfluorononanoic acid (PFNA) | <5.3 | | 54.8 | 58.4 | | ug/Kg | ☼ | 107 | 73 - 133 | 7 | 30 |
| Perfluorooctanesulfonamide (FOSA) | <5.3 | | 54.8 | 55.4 | | ug/Kg | ☼ | 99 | 77 - 137 | 3 | 30 |
| Perfluorooctanesulfonic acid (PFOS) | <5.3 | | 50.9 | 59.8 | | ug/Kg | ☼ | 110 | 68 - 141 | 1 | 30 |
| Perfluorooctanoic acid (PFOA) | <5.3 | | 54.8 | 68.3 | | ug/Kg | ☼ | 125 | 72 - 132 | 11 | 30 |
| Perfluoropentanesulfonic acid (PFPeS) | <5.3 | | 51.4 | 61.4 | | ug/Kg | ☼ | 119 | 66 - 126 | 5 | 30 |
| Perfluoropentanoic acid (PFPeA) | <5.3 | | 54.8 | 68.7 | | ug/Kg | ☼ | 125 | 69 - 129 | 7 | 30 |
| Perfluorotetradecanoic acid (PFTeA) | <5.3 | F1 | 54.8 | 69.1 | | ug/Kg | ☼ | 126 | 67 - 127 | 2 | 30 |
| Perfluorotridecanoic acid (PFTriA) | <5.3 | F1 | 54.8 | 38.8 | | ug/Kg | ☼ | 71 | 71 - 131 | 25 | 30 |
| Perfluoroundecanoic acid (PFUnA) | <5.3 | | 54.8 | 62.2 | | ug/Kg | ☼ | 113 | 66 - 126 | 8 | 30 |

| *Isotope Dilution* | *MSD %Recovery* | *MSD Qualifier* | *Limits* |
|---|---|---|---|
| *13C8 FOSA* | *80* | | *25 - 150* |
| *13C3 HFPO-DA* | *73* | | *25 - 150* |
| *13C4 PFBA* | *71* | | *25 - 150* |
| *13C3 PFBS* | *78* | | *25 - 150* |
| *13C2 PFDA* | *79* | | *25 - 150* |
| *13C2 PFDoA* | *34* | | *25 - 150* |
| *13C4 PFHpA* | *82* | | *25 - 150* |

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

**Lab Sample ID: 190-26422-1 MSD**
**Matrix: Solid**
**Analysis Batch: 510044**

**Client Sample ID: Biosolids**
**Prep Type: Total/NA**
**Prep Batch: 509488**

| Isotope Dilution | MSD %Recovery | MSD Qualifier | Limits |
|---|---|---|---|
| 13C2 PFHxA | 74 | | 25 - 150 |
| 13C5 PFNA | 86 | | 25 - 150 |
| 13C4 PFOA | 82 | | 25 - 150 |
| 13C4 PFOS | 72 | | 25 - 150 |
| 13C5 PFPeA | 73 | | 25 - 150 |
| 13C2 PFTeDA | 26 | | 25 - 150 |
| 13C2 PFUnA | 68 | | 25 - 150 |
| d5-NEtFOSAA | 46 | | 25 - 150 |
| d3-NMeFOSAA | 73 | | 25 - 150 |
| M2-4:2 FTS | 133 | | 25 - 150 |
| M2-6:2 FTS | 186 | *5+ | 25 - 150 |
| M2-8:2 FTS | 186 | *5+ | 25 - 150 |
| 18O2 PFHxS | 84 | | 25 - 150 |

**Lab Sample ID: MB 320-510162/1-A**
**Matrix: Water**
**Analysis Batch: 510387**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 510162**

| 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 | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| F-53B Major | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| F-53B Minor | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| 4:2 FTS | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| 6:2 FTS | <5.0 | | 5.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| 8:2 FTS | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| HFPO-DA (GenX) | <4.0 | | 4.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | <5.0 | | 5.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | <5.0 | | 5.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorobutanesulfonic acid (PFBS) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorobutanoic acid (PFBA) | <5.0 | | 5.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorodecanesulfonic acid (PFDS) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorodecanoic acid (PFDA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorododecanoic acid (PFDoA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluoroheptanoic acid (PFHpA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorohexanesulfonic acid (PFHxS) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorohexanoic acid (PFHxA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorononanesulfonic acid (PFNS) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorononanoic acid (PFNA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorooctanesulfonamide (FOSA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorooctanesulfonic acid (PFOS) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorooctanoic acid (PFOA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluoropentanesulfonic acid (PFPeS) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluoropentanoic acid (PFPeA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluorotetradecanoic acid (PFTeA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |

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

**Lab Sample ID: MB 320-510162/1-A**
**Matrix: Water**
**Analysis Batch: 510387**

**Client Sample ID: Method Blank**
**Prep Type: Total/NA**
**Prep Batch: 510162**

| Analyte | MB Result | MB Qualifier | RL | | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Perfluorotridecanoic acid (PFTriA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |
| Perfluoroundecanoic acid (PFUnA) | <2.0 | | 2.0 | | ng/L | | 07/25/21 19:29 | 07/26/21 19:52 | 1 |

| *Isotope Dilution* | *MB %Recovery* | *MB Qualifier* | *Limits* | *Prepared* | *Analyzed* | *Dil Fac* |
|---|---|---|---|---|---|---|
| *13C8 FOSA* | *90* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C3 HFPO-DA* | *83* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C4 PFBA* | *87* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C3 PFBS* | *80* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C2 PFDA* | *84* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C2 PFDoA* | *79* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C4 PFHpA* | *87* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C2 PFHxA* | *86* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C5 PFNA* | *86* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C4 PFOA* | *91* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C4 PFOS* | *89* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C5 PFPeA* | *86* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C2 PFTeDA* | *77* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *13C2 PFUnA* | *94* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *d5-NEtFOSAA* | *86* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *d3-NMeFOSAA* | *85* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *M2-4:2 FTS* | *112* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *M2-6:2 FTS* | *117* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *M2-8:2 FTS* | *108* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |
| *18O2 PFHxS* | *86* | | *25 - 150* | *07/25/21 19:29* | *07/26/21 19:52* | *1* |

**Lab Sample ID: LCS 320-510162/2-A**
**Matrix: Water**
**Analysis Batch: 510387**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 510162**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 37.7 | 37.1 | | ng/L | | 99 | 79 - 139 |
| F-53B Major | 37.3 | 35.1 | | ng/L | | 94 | 75 - 135 |
| F-53B Minor | 37.7 | 35.1 | | ng/L | | 93 | 54 - 114 |
| 4:2 FTS | 37.4 | 38.4 | | ng/L | | 103 | 79 - 139 |
| 6:2 FTS | 37.9 | 37.1 | | ng/L | | 98 | 59 - 175 |
| 8:2 FTS | 38.3 | 40.7 | | ng/L | | 106 | 75 - 135 |
| HFPO-DA (GenX) | 40.0 | 41.4 | | ng/L | | 104 | 51 - 173 |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | 40.0 | 37.7 | | ng/L | | 94 | 76 - 136 |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | 40.0 | 37.9 | | ng/L | | 95 | 76 - 136 |
| Perfluorobutanesulfonic acid (PFBS) | 35.4 | 36.2 | | ng/L | | 102 | 67 - 127 |
| Perfluorobutanoic acid (PFBA) | 40.0 | 41.0 | | ng/L | | 103 | 76 - 136 |
| Perfluorodecanesulfonic acid (PFDS) | 38.6 | 35.2 | | ng/L | | 91 | 71 - 131 |
| Perfluorodecanoic acid (PFDA) | 40.0 | 41.8 | | ng/L | | 104 | 76 - 136 |
| Perfluorododecanoic acid (PFDoA) | 40.0 | 42.2 | | ng/L | | 105 | 71 - 131 |

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

**Lab Sample ID: LCS 320-510162/2-A**
**Matrix: Water**
**Analysis Batch: 510387**

**Client Sample ID: Lab Control Sample**
**Prep Type: Total/NA**
**Prep Batch: 510162**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Perfluoroheptanesulfonic Acid (PFHpS) | 38.1 | 37.9 | | ng/L | | 99 | 76 - 136 |
| Perfluoroheptanoic acid (PFHpA) | 40.0 | 39.1 | | ng/L | | 98 | 72 - 132 |
| Perfluorohexanesulfonic acid (PFHxS) | 36.4 | 33.7 | | ng/L | | 92 | 59 - 119 |
| Perfluorohexanoic acid (PFHxA) | 40.0 | 38.5 | | ng/L | | 96 | 73 - 133 |
| Perfluorononanesulfonic acid (PFNS) | 38.4 | 35.9 | | ng/L | | 93 | 75 - 135 |
| Perfluorononanoic acid (PFNA) | 40.0 | 41.5 | | ng/L | | 104 | 75 - 135 |
| Perfluorooctanesulfonamide (FOSA) | 40.0 | 38.0 | | ng/L | | 95 | 73 - 133 |
| Perfluorooctanesulfonic acid (PFOS) | 37.1 | 37.9 | | ng/L | | 102 | 70 - 130 |
| Perfluorooctanoic acid (PFOA) | 40.0 | 42.4 | | ng/L | | 106 | 70 - 130 |
| Perfluoropentanesulfonic acid (PFPeS) | 37.5 | 37.7 | | ng/L | | 100 | 66 - 126 |
| Perfluoropentanoic acid (PFPeA) | 40.0 | 38.6 | | ng/L | | 96 | 71 - 131 |
| Perfluorotetradecanoic acid (PFTeA) | 40.0 | 45.7 | | ng/L | | 114 | 70 - 130 |
| Perfluorotridecanoic acid (PFTriA) | 40.0 | 36.6 | | ng/L | | 92 | 71 - 131 |
| Perfluoroundecanoic acid (PFUnA) | 40.0 | 43.6 | | ng/L | | 109 | 68 - 128 |

| *Isotope Dilution* | *LCS %Recovery* | *LCS Qualifier* | *Limits* |
|---|---|---|---|
| *13C8 FOSA* | *88* | | *25 - 150* |
| *13C3 HFPO-DA* | *86* | | *25 - 150* |
| *13C4 PFBA* | *88* | | *25 - 150* |
| *13C3 PFBS* | *82* | | *25 - 150* |
| *13C2 PFDA* | *85* | | *25 - 150* |
| *13C2 PFDoA* | *82* | | *25 - 150* |
| *13C4 PFHpA* | *92* | | *25 - 150* |
| *13C2 PFHxA* | *88* | | *25 - 150* |
| *13C5 PFNA* | *91* | | *25 - 150* |
| *13C4 PFOA* | *89* | | *25 - 150* |
| *13C4 PFOS* | *92* | | *25 - 150* |
| *13C5 PFPeA* | *86* | | *25 - 150* |
| *13C2 PFTeDA* | *80* | | *25 - 150* |
| *13C2 PFUnA* | *86* | | *25 - 150* |
| *d5-NEtFOSAA* | *85* | | *25 - 150* |
| *d3-NMeFOSAA* | *83* | | *25 - 150* |
| *M2-4:2 FTS* | *106* | | *25 - 150* |
| *M2-6:2 FTS* | *116* | | *25 - 150* |
| *M2-8:2 FTS* | *120* | | *25 - 150* |
| *18O2 PFHxS* | *93* | | *25 - 150* |

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

**Lab Sample ID: LCSD 320-510162/3-A**
**Matrix: Water**
**Analysis Batch: 510387**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**
**Prep Batch: 510162**

| Analyte | | | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | | | 37.7 | 37.1 | | ng/L | | 98 | 79 - 139 | 0 | 30 |
| F-53B Major | | | 37.3 | 37.9 | | ng/L | | 102 | 75 - 135 | 8 | 30 |
| F-53B Minor | | | 37.7 | 37.4 | | ng/L | | 99 | 54 - 114 | 6 | 30 |
| 4:2 FTS | | | 37.4 | 38.0 | | ng/L | | 102 | 79 - 139 | 1 | 30 |
| 6:2 FTS | | | 37.9 | 38.0 | | ng/L | | 100 | 59 - 175 | 2 | 30 |
| 8:2 FTS | | | 38.3 | 45.6 | | ng/L | | 119 | 75 - 135 | 11 | 30 |
| HFPO-DA (GenX) | | | 40.0 | 41.6 | | ng/L | | 104 | 51 - 173 | 0 | 30 |
| N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA) | | | 40.0 | 40.7 | | ng/L | | 102 | 76 - 136 | 8 | 30 |
| N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA) | | | 40.0 | 37.2 | | ng/L | | 93 | 76 - 136 | 2 | 30 |
| Perfluorobutanesulfonic acid (PFBS) | | | 35.4 | 39.8 | | ng/L | | 112 | 67 - 127 | 9 | 30 |
| Perfluorobutanoic acid (PFBA) | | | 40.0 | 40.9 | | ng/L | | 102 | 76 - 136 | 0 | 30 |
| Perfluorodecanesulfonic acid (PFDS) | | | 38.6 | 37.5 | | ng/L | | 97 | 71 - 131 | 6 | 30 |
| Perfluorodecanoic acid (PFDA) | | | 40.0 | 47.0 | | ng/L | | 117 | 76 - 136 | 12 | 30 |
| Perfluorododecanoic acid (PFDoA) | | | 40.0 | 41.8 | | ng/L | | 105 | 71 - 131 | 1 | 30 |
| Perfluoroheptanesulfonic Acid (PFHpS) | | | 38.1 | 39.2 | | ng/L | | 103 | 76 - 136 | 4 | 30 |
| Perfluoroheptanoic acid (PFHpA) | | | 40.0 | 40.9 | | ng/L | | 102 | 72 - 132 | 4 | 30 |
| Perfluorohexanesulfonic acid (PFHxS) | | | 36.4 | 36.3 | | ng/L | | 100 | 59 - 119 | 7 | 30 |
| Perfluorohexanoic acid (PFHxA) | | | 40.0 | 40.6 | | ng/L | | 101 | 73 - 133 | 5 | 30 |
| Perfluorononanesulfonic acid (PFNS) | | | 38.4 | 38.2 | | ng/L | | 100 | 75 - 135 | 6 | 30 |
| Perfluorononanoic acid (PFNA) | | | 40.0 | 45.0 | | ng/L | | 112 | 75 - 135 | 8 | 30 |
| Perfluorooctanesulfonamide (FOSA) | | | 40.0 | 40.0 | | ng/L | | 100 | 73 - 133 | 5 | 30 |
| Perfluorooctanesulfonic acid (PFOS) | | | 37.1 | 39.2 | | ng/L | | 106 | 70 - 130 | 3 | 30 |
| Perfluorooctanoic acid (PFOA) | | | 40.0 | 42.8 | | ng/L | | 107 | 70 - 130 | 1 | 30 |
| Perfluoropentanesulfonic acid (PFPeS) | | | 37.5 | 41.5 | | ng/L | | 111 | 66 - 126 | 10 | 30 |
| Perfluoropentanoic acid (PFPeA) | | | 40.0 | 38.6 | | ng/L | | 97 | 71 - 131 | 0 | 30 |
| Perfluorotetradecanoic acid (PFTeA) | | | 40.0 | 46.5 | | ng/L | | 116 | 70 - 130 | 2 | 30 |
| Perfluorotridecanoic acid (PFTriA) | | | 40.0 | 40.1 | | ng/L | | 100 | 71 - 131 | 9 | 30 |
| Perfluoroundecanoic acid (PFUnA) | | | 40.0 | 40.8 | | ng/L | | 102 | 68 - 128 | 7 | 30 |

| *Isotope Dilution* | *LCSD %Recovery* | *LCSD Qualifier* | *Limits* |
|---|---|---|---|
| *13C8 FOSA* | *89* | | *25 - 150* |
| *13C3 HFPO-DA* | *85* | | *25 - 150* |
| *13C4 PFBA* | *87* | | *25 - 150* |
| *13C3 PFBS* | *79* | | *25 - 150* |
| *13C2 PFDA* | *80* | | *25 - 150* |
| *13C2 PFDoA* | *87* | | *25 - 150* |
| *13C4 PFHpA* | *90* | | *25 - 150* |

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

**Lab Sample ID: LCSD 320-510162/3-A**
**Matrix: Water**
**Analysis Batch: 510387**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: Total/NA**
**Prep Batch: 510162**

| Isotope Dilution | LCSD %Recovery | LCSD Qualifier | Limits |
|---|---|---|---|
| 13C2 PFHxA | 85 | | 25 - 150 |
| 13C5 PFNA | 88 | | 25 - 150 |
| 13C4 PFOA | 91 | | 25 - 150 |
| 13C4 PFOS | 91 | | 25 - 150 |
| 13C5 PFPeA | 88 | | 25 - 150 |
| 13C2 PFTeDA | 78 | | 25 - 150 |
| 13C2 PFUnA | 92 | | 25 - 150 |
| d5-NEtFOSAA | 83 | | 25 - 150 |
| d3-NMeFOSAA | 87 | | 25 - 150 |
| M2-4:2 FTS | 111 | | 25 - 150 |
| M2-6:2 FTS | 111 | | 25 - 150 |
| M2-8:2 FTS | 102 | | 25 - 150 |
| 18O2 PFHxS | 91 | | 25 - 150 |

# Isotope Dilution Summary

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

## 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) |
| 190-26422-1 | Biosolids | 84 | 76 | 67 | 76 | 83 | 37 | 85 | 76 |
| 190-26422-1 MS | Biosolids | 80 | 74 | 61 | 71 | 72 | 39 | 87 | 72 |
| 190-26422-1 MSD | Biosolids | 80 | 73 | 71 | 78 | 79 | 34 | 82 | 74 |
| 190-26422-2 | Biosolids-Duplicate | 75 | 69 | 65 | 69 | 71 | 39 | 73 | 66 |
| LCS 320-509488/2-A | Lab Control Sample | 98 | 79 | 90 | 83 | 83 | 77 | 100 | 84 |
| MB 320-509488/1-A | Method Blank | 89 | 87 | 85 | 81 | 84 | 83 | 100 | 83 |

| | | 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) |
| 190-26422-1 | Biosolids | 87 | 87 | 83 | 77 | 24 *5- | 73 | 47 | 68 |
| 190-26422-1 MS | Biosolids | 85 | 87 | 70 | 68 | 23 *5- | 66 | 41 | 72 |
| 190-26422-1 MSD | Biosolids | 86 | 82 | 72 | 73 | 26 | 68 | 46 | 73 |
| 190-26422-2 | Biosolids-Duplicate | 87 | 86 | 70 | 67 | 23 *5- | 66 | 42 | 65 |
| LCS 320-509488/2-A | Lab Control Sample | 88 | 85 | 92 | 89 | 79 | 81 | 80 | 78 |
| MB 320-509488/1-A | Method Blank | 93 | 88 | 98 | 88 | 81 | 89 | 88 | 81 |

| | | Percent Isotope Dilution Recovery (Acceptance Limits) | | | |
|---|---|---|---|---|---|
| | | M242FTS | M262FTS | M282FTS | PFHxS |
| Lab Sample ID | Client Sample ID | (25-150) | (25-150) | (25-150) | (25-150) |
| 190-26422-1 | Biosolids | 155 *5+ | 196 *5+ | 205 *5+ | 90 |
| 190-26422-1 MS | Biosolids | 150 | 179 *5+ | 191 *5+ | 81 |
| 190-26422-1 MSD | Biosolids | 133 | 186 *5+ | 186 *5+ | 84 |
| 190-26422-2 | Biosolids-Duplicate | 150 | 187 *5+ | 156 *5+ | 71 |
| LCS 320-509488/2-A | Lab Control Sample | 63 | 66 | 76 | 92 |
| MB 320-509488/1-A | Method Blank | 72 | 77 | 84 | 95 |

**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: 190-26422-1
Project/Site: City of Cadillac Biosolids PFAS

## 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) |
| 190-26422-3 | Equipment Blank | 87 | 90 | 93 | 89 | 88 | 82 | 94 | 94 |
| LCS 320-510162/2-A | Lab Control Sample | 88 | 86 | 88 | 82 | 85 | 82 | 92 | 88 |
| LCSD 320-510162/3-A | Lab Control Sample Dup | 89 | 85 | 87 | 79 | 80 | 87 | 90 | 85 |
| MB 320-510162/1-A | Method Blank | 90 | 83 | 87 | 80 | 84 | 79 | 87 | 86 |

| | | 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) |
| 190-26422-3 | Equipment Blank | 101 | 94 | 95 | 92 | 74 | 91 | 89 | 87 |
| LCS 320-510162/2-A | Lab Control Sample | 91 | 89 | 92 | 86 | 80 | 86 | 85 | 83 |
| LCSD 320-510162/3-A | Lab Control Sample Dup | 88 | 91 | 91 | 88 | 78 | 92 | 83 | 87 |
| MB 320-510162/1-A | Method Blank | 86 | 91 | 89 | 86 | 77 | 94 | 86 | 85 |

| | | Percent Isotope Dilution Recovery (Acceptance Limits) | | | |
|---|---|---|---|---|---|
| | | M242FTS | M262FTS | M282FTS | PFHxS |
| Lab Sample ID | Client Sample ID | (25-150) | (25-150) | (25-150) | (25-150) |
| 190-26422-3 | Equipment Blank | 127 | 140 | 131 | 97 |
| LCS 320-510162/2-A | Lab Control Sample | 106 | 116 | 120 | 93 |
| LCSD 320-510162/3-A | Lab Control Sample Dup | 111 | 111 | 102 | 91 |
| MB 320-510162/1-A | Method Blank | 112 | 117 | 108 | 86 |

**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: 190-26422-1
Project/Site: City of Cadillac Biosolids PFAS

## 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. |
| F1 | MS and/or MSD recovery exceeds control limits. |
| 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 |

# QC Association Summary

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

## LCMS

### Prep Batch: 509488

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 190-26422-1 | Biosolids | Total/NA | Solid | SHAKE | |
| 190-26422-2 | Biosolids-Duplicate | Total/NA | Solid | SHAKE | |
| MB 320-509488/1-A | Method Blank | Total/NA | Solid | SHAKE | |
| LCS 320-509488/2-A | Lab Control Sample | Total/NA | Solid | SHAKE | |
| 190-26422-1 MS | Biosolids | Total/NA | Solid | SHAKE | |
| 190-26422-1 MSD | Biosolids | Total/NA | Solid | SHAKE | |

### Analysis Batch: 510044

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 190-26422-1 | Biosolids | Total/NA | Solid | 537 (modified) | 509488 |
| 190-26422-2 | Biosolids-Duplicate | Total/NA | Solid | 537 (modified) | 509488 |
| MB 320-509488/1-A | Method Blank | Total/NA | Solid | 537 (modified) | 509488 |
| LCS 320-509488/2-A | Lab Control Sample | Total/NA | Solid | 537 (modified) | 509488 |
| 190-26422-1 MS | Biosolids | Total/NA | Solid | 537 (modified) | 509488 |
| 190-26422-1 MSD | Biosolids | Total/NA | Solid | 537 (modified) | 509488 |

### Prep Batch: 510162

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 190-26422-3 | Equipment Blank | Total/NA | Water | 3535 | |
| MB 320-510162/1-A | Method Blank | Total/NA | Water | 3535 | |
| LCS 320-510162/2-A | Lab Control Sample | Total/NA | Water | 3535 | |
| LCSD 320-510162/3-A | Lab Control Sample Dup | Total/NA | Water | 3535 | |

### Analysis Batch: 510387

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 190-26422-3 | Equipment Blank | Total/NA | Water | 537 (modified) | 510162 |
| MB 320-510162/1-A | Method Blank | Total/NA | Water | 537 (modified) | 510162 |
| LCS 320-510162/2-A | Lab Control Sample | Total/NA | Water | 537 (modified) | 510162 |
| LCSD 320-510162/3-A | Lab Control Sample Dup | Total/NA | Water | 537 (modified) | 510162 |

## General Chemistry

### Analysis Batch: 509561

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 190-26422-1 | Biosolids | Total/NA | Solid | D 2216 | |
| 190-26422-2 | Biosolids-Duplicate | Total/NA | Solid | D 2216 | |

# Lab Chronicle

Client: City of Cadillac Utilities
Project/Site: City of Cadillac Biosolids PFAS

Job ID: 190-26422-1

## Client Sample ID: Biosolids
**Lab Sample ID: 190-26422-1**
**Date Collected: 07/20/21 13:30**
**Matrix: Solid**
**Date Received: 07/21/21 10:46**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | D 2216 | | 1 | 509561 | 07/23/21 10:03 | TCS | TAL SAC |

## Client Sample ID: Biosolids
**Lab Sample ID: 190-26422-1**
**Date Collected: 07/20/21 13:30**
**Matrix: Solid**
**Date Received: 07/21/21 10:46**
**Percent Solids: 3.5**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | SHAKE | | | 509488 | 07/23/21 04:42 | HK | TAL SAC |
| Total/NA | Analysis | 537 (modified) | | 1 | 510044 | 07/24/21 19:01 | RS1 | TAL SAC |

## Client Sample ID: Biosolids-Duplicate
**Lab Sample ID: 190-26422-2**
**Date Collected: 07/20/21 13:30**
**Matrix: Solid**
**Date Received: 07/21/21 10:46**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | D 2216 | | 1 | 509561 | 07/23/21 10:03 | TCS | TAL SAC |

## Client Sample ID: Biosolids-Duplicate
**Lab Sample ID: 190-26422-2**
**Date Collected: 07/20/21 13:30**
**Matrix: Solid**
**Date Received: 07/21/21 10:46**
**Percent Solids: 3.6**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | SHAKE | | | 509488 | 07/23/21 04:42 | HK | TAL SAC |
| Total/NA | Analysis | 537 (modified) | | 1 | 510044 | 07/24/21 19:29 | RS1 | TAL SAC |

## Client Sample ID: Equipment Blank
**Lab Sample ID: 190-26422-3**
**Date Collected: 07/20/21 13:15**
**Matrix: Water**
**Date Received: 07/21/21 10:46**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Prep | 3535 | | | 510162 | 07/25/21 19:29 | AP | TAL SAC |
| Total/NA | Analysis | 537 (modified) | | 1 | 510387 | 07/26/21 20:47 | S1M | 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

AP = Austin Phillips

HK = Harmandeep Kaur

Batch Type: Analysis

RS1 = Rungtip Sanjumnai

S1M = Sudarat Mongkol

TCS = Tammy Saechao

# Accreditation/Certification Summary

Client: City of Cadillac Utilities
Job ID: 190-26422-1
Project/Site: City of Cadillac 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 |
| California | State | 2897 | 01-31-22 |
| Colorado | State | CA0004 | 08-31-21 |
| Florida | NELAP | E87570 | 06-30-22 |
| 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 | 06-30-22 |
| 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 | 06-30-22 |
| 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.

**Eurofins TestAmerica, 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 & KM | Lab PM: Schafer, Sue | Carrier Tracking No(s): | COC No: 190-31714-2093.1 |
|---|---|---|---|---|
| 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: | | | Job #: |
| Address: 1121 Plett Road | Due Date Requested: | | | |
| City: Cadillac | TAT Requested (days): STANDARD | | | |
| State, Zip: MI, 49601 | Compliance Project: Δ Yes Δ No | | | |
| Phone: | PO #: ~~2019-010~~ TBD | | | |
| Email: lab@cadillac-mi.net | WO #: 19001884 | | | |
| Project Name: City of Cadillac Biosolids PFAS | Project #: 19001884 | | | |
| 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 | 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 | | |
| ~~E~~ BIOSOLIDS | 07-20-21 | 1330 | G | Solid | N | N | X | X | | 3 | |
| BIOSOLIDS - duplic. | 07-20-21 | 1330 | G | Solid | N | N | X | X | | 3 | |
| EQUIPMENT BLANK | 07-20-21 | 1315 | G | Water | N | N | | | X | 2 | |

190-26422 Chain of Custody

**Possible Hazard Identification**
☐ Non-Hazard ☐ Flammable ☒ Skin Irritant ☐ Poison B ☒ Unknown WASTEWATER ☐ Radiological

**Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)**
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

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

| Relinquished by: | Date/Time: | Company | Received by: | Date/Time: | Company |
|---|---|---|---|---|---|
| CTomaszewski | 07-20-2021 / 1430 | CITY OF CADILLAC | Shipped UPS NEXT DAY | | |
| Relinquished by: | Date/Time: | Company | Received by: Teri Hall | Date/Time: 7-21-21 1046 | Company ETA |
| 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: 11/01/2020

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: City of Cadillac
Work Oder #: _____

## 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: TCH Date: 7/21/21 Time: 1040

**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 |
|---|---|---|---|---|---|---|---|
| CP313207 | 4.7 | 4.7 | | ✓ | ✓ 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 Li Hall Date: 7/21/21

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: 190-29912.1 |
|---|---|---|---|---|
| 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 #: 190-26422-1 |
| Address: 880 Riverside Parkway, , | Due Date Requested: 8/10/2021 | | | |
| City: West Sacramento | TAT Requested (days): | | | |
| State, Zip: CA, 95605 | | | | |
| Phone: 916-373-5600(Tel) 916-372-1059(Fax) | PO #: | | | |
| Email: | WO #: | | | |
| Project Name: City of Cadillac Biosolids PFAS | 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: | | | | | | | | | | | |
| Biosolids (190-26422-1) | 7/20/21 | 13:30 Eastern | | Solid | | | X | X | | 3 | |
| Biosolids-Duplicate (190-26422-2) | 7/20/21 | 13:30 Eastern | | Solid | | | X | X | | 3 | |
| Equipment Blank (190-26422-3) | 7/20/21 | 13:15 Eastern | | Water | | | | | 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 | Jen Hall | 7/21/2021 1201 | | | 7/22/21 9:40 | ETASac |
| 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.: 1429339 | Cooler Temperature(s) °C and Other Remarks: 3.0c |
|---|---|---|