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## Technical Memorandum

**To:** Ms. Demaree Collier – Remedial Project Manager  
USEPA Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604

**From:** Kristopher D. Krause, P.E.                      Meredith Westover, P.G.  
Senior Project Manager                      Senior Hydrogeologist

**Subject:** Evaluation of Per- and Poly-Fluoroalkyl Substances (PFAS) at the Lemberger  
Landfill Sites

**Date:** March 29, 2023

**CC:** B.J. LeRoy – WDNR  
Brian Potts – Perkins Coie, LLP  
Kristin Jones – Newell Rubbermaid  
Troy Adams – Manitowoc Public Utilities  
Scott Karbon – Manitowoc Public Utilities  
James Wallner – Red Arrow Products  
James Cook – Manitowoc Cranes  
Dan Koski – City of Manitowoc  
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Eric Nycz – City of Manitowoc  
Dominique Sorel – SS. Papadopoulos & Associates, Inc.  
John Lang – EHS Support, LLC  
Tom Sullivan – EHS Support, LLC

**Project No.:** 473040.0000 Phase 8

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On behalf of the Lemberger Site Remediation Group (LSRG), and in accordance with the Quality Assurance Project Plan, Revision 0 (“QAPP”; October 2022), TRC Environmental Corporation (TRC) has prepared this technical memorandum to present results of the recent PFAS groundwater sampling event, an evaluation of the significance of PFAS at the site, and recommendations based on the results of the evaluation.

### Introduction

The USEPA completed the fifth Five-Year Review Report for the Lemberger Sites in July 2020 (USEPA, 2020). The report concluded that the USEPA should proceed with a revision to the groundwater cleanup standards (to the Wisconsin NR140 Enforcement Standard [ES]) and to incorporate a Monitored Natural Attenuation (MNA) remedy for volatile organic compounds (VOCs) into an amendment of the 1991 and 1994 Records of Decision (ROD) for the Sites. The Five-Year Review Report also identified that the emerging contaminant group per-and poly-

fluoroalkyl substances (PFAS) had not been evaluated at the Lemberger Sites. Based on the presence of these compounds at other landfill sites with VOC contamination, the USEPA recommended that groundwater samples should be collected and analyzed for PFAS. These recommendations were incorporated into the January 2021 ROD Amendment (USEPA, 2021).

In order to determine if PFAS are constituents of concern (COCs) at the Lemberger Sites, TRC prepared a PFAS Evaluation Work Plan (TRC, 2021a) to collect groundwater samples for PFAS analysis from various site monitoring wells in conjunction with a routine groundwater monitoring event. This initial PFAS evaluation program included four monitoring wells representative of different portions of the chlorinated VOC (CVOC) plume, ranging from upgradient of the site (RM-102D), to the Lemberger Transport and Recycling Landfill (LTR) former source area (RM-007D), to more distal downgradient locations (RM-401XD and RM-204D; Figure 1). The data from these four wells were evaluated to determine if these compounds are present, and if they are present, if the detections are sufficiently significant to make PFAS COCs at the landfills. The evaluation report concluded that PFAS are not constituents of concern at the Lemberger Sites, and that no further action is necessary with respect to PFAS at the site (TRC, 2021b).

In February 2022, the Wisconsin Department of Natural Resources (WDNR) agreed with the conclusion that no further PFAS sampling was required at the Lemberger sites at this time (WDNR, 2022). The USEPA, while in general agreement with the conclusions of the initial evaluation, required confirmation sampling for PFAS coordinated through the USEPA's PFAS team (USEPA, 2022). The addition of PFAS sampling to the overall analytical program for the Lemberger sites required addition of this analytical group to the site QAPP. An updated QAPP was submitted in October 2022, which included a PFAS Sampling Workplan (TRC, 2022). The PFAS Sampling Workplan specified the collection of groundwater samples for PFAS analysis from two of the wells previously sampled for PFAS, RM-007D and RM-401XD. This technical memorandum presents a summary of the work performed and an evaluation of all of the PFAS analytical results.

## Work Performed

On December 15, 2022, TRC and Brooks Services, LLC (Brooks Services) collected groundwater samples from monitoring wells RM-007D (LTR source area) and RM-401XD (immediately downgradient of the Lemberger Landfill [LL] and downgradient of the LTR) for PFAS analysis. In addition, one duplicate sample was collected at RM-007D; a field equipment blank was collected from the portable QED Sample Pro® bladder pump (including pump body, bladder, and HDPE tubing); and one ambient air (poured) blank was collected at the field site. All work was performed in accordance with the Work Plan and QAPP (TRC, 2022). The samples were packed on ice in a cooler and shipped to the Test America Laboratory in Sacramento, California for analysis by modified EPA Method 537 (WI-33 list).

## Analytical Results

The analytical results for PFAS are summarized in Table 1 and shown on Figure 1. Table 1 and Figure 1 also include data from the September 2021 PFAS sampling event for ease of comparison. The data validation report and laboratory data sheets for the December 2022 PFAS samples are included in Attachment 1. The field and laboratory data will be submitted as an electronic data deliverable (EDD) in a subsequent Data Transmittal document once the remainder of the fourth quarter analytical data have been validated.

The December 2022 results are generally consistent with the September 2021 sampling results. Low concentrations of only six PFAS (perfluorobutanoic acid [PFBA], perfluorohexanoic acid [PFHxA], perfluoroheptanoic acid [PFHpA], perfluorooctanoic acid [PFOA], perfluorobutanesulfonic acid [PFBS], and perfluorooctanesulfonamide [FOSA]) have been reported in the groundwater samples, at individual concentrations ranging up to 5.2 ng/L. The maximum total PFAS concentration in any one of the samples was less than 12 ng/L. Only the PFOA results at RM-007D (maximum of 5.1 ng/L) have exceeded the recommended Preventive Action Limit (PAL) of 2 ng/L for that compound. None of the results exceeded a recommended Enforcement Standard (ES). No PFAS have been detected in any field equipment blank or atmospheric (poured) blank from either sampling event.

## Evaluation of Results

Five of the six PFAS that have been detected in the site groundwater are terminal perfluorinated carboxylic acids (PFBA, PFHxA, PFHpA, and PFOA) or perfluorinated sulfonic acids (PFBS). FOSA, detected only at downgradient location RM-204D in September 2021, is a transient intermediate compound. No precursor fluorotelomers (e.g., 6:2 FTS or 8:2 FTS) have been detected in the groundwater samples.

PFBA has only been detected at source area well RM-007D, at concentrations ranging from 4.3 ng/L to 5.2 ng/L. PFOA was detected in groundwater from the source area well RM-007D (4.0 to 5.1 ng/L), as well as both downgradient locations, at concentrations decreasing with distance from the LTR (1.1 to 1.6 ng/L at RM-401XD; and 0.75 ng/L at RM-204D in September 2021). The concentrations present do not pose an ecological or human health risk. PFBA concentrations are two orders of magnitude below the PAL; and PFOA concentrations are an order of magnitude below the ES even within the former source area. Source control measures implemented at the LTR in the mid-1990s, including the removal of potential source materials (drums, jars, gas cylinders), placement of a soil cover, and operation of leachate/groundwater extraction and treatment systems through the 1990s and early 2000s have likely eliminated the LTR as a potential PFAS source. The source control is confirmed through evaluation of historical concentrations of the primary site COCs, CVOCs. CVOc concentrations at the site show site-wide stable to decreasing trends (TRC, 2019).

Two compounds not previously reported at the site, PFHpA and PFHxA, were reported at low concentrations in the primary sample from source area well RM-007D in December 2022. The reported concentrations are just above their respective detection limits, and these compounds were not reported in the duplicate sample collected from RM-007D. The PFHxA concentration (0.62 ng/L) is well below the proposed ES for this compound (30,000 ng/L) and there is no proposed standard for PFHpA.

PFBS was reported at concentrations just above the detection limit in groundwater from three of the four wells sampled in September 2021, including upgradient location RM-102D (0.21 ng/L); PFBS was reported at the detection limit only at RM-401XD in December 2022 (0.18 ng/L). The apparent ubiquitous low-level distribution of this compound in groundwater (but not in the field blanks) suggests its presence is not the result of sample contamination and is also not related to the Landfills. Concentrations of PFBS (maximum of 0.33 ng/L) are well below the recommended PAL (90,000 ng/L).

## Conclusions and Recommendations

Based on our analysis of the PFAS data collected from groundwater at the Lemberger site, TRC concludes the following:

- The analytical results for PFAS compounds have been consistent over two sampling events.
- There were no detections of PFAS compounds at concentrations above the recommended ESs.
- The very low concentrations of PFAS present in the groundwater do not currently pose a risk to human health or the environment.
- Source control measures taken at the LTR in the 1990s and the lack of precursor fluorotelomers in the groundwater indicate that PFAS at the site will not pose a risk to human health or the environment in the future.

These results indicate that PFAS are not constituents of concern at the Lemberger sites. TRC recommends that no further action is necessary with respect to PFAS at the site.

## References

- TRC. 2019. Monitored Natural Attenuation Report, Lemberger Transport and Recycling, Inc. (LTR) and Lemberger Landfill (LL) Superfund Sites, Groundwater Operable Unit OU-1, Town of Franklin, Manitowoc County, Wisconsin. April 2019.
- TRC. 2021a. PFAS Evaluation Work Plan, Lemberger Landfill Sites, Town of Franklin, Wisconsin. Revision 1. September 1, 2021.
- TRC. 2021b. Evaluation of Per- and Poly-Fluoroalkyl Substances (PFAS) at the Lemberger Landfill Sites. November 19, 2021
- TRC. 2022. Quality Assurance Project Plan, Lemberger Landfill and Lemberger Transport and Recycling Site, Town of Franklin, Wisconsin. Revision 0. October 2022.
- USEPA. 2020. Fifth Five-Year Review Report for Lemberger Landfill, Inc. and Lemberger Transport and Recycling Superfund Sites, Manitowoc County, Wisconsin. July 20, 2020.
- USEPA. 2021. Amendment to the 1991 and 1994 Records of Decision for the Lemberger Landfill, Inc. and Lemberger Transport and Recycling Superfund Sites, Town of Franklin, Wisconsin. January 2021.
- USEPA. 2022. Email from USEPA to WDNR, LSRG, and TRC requesting confirmation sampling for PFAS and updates to the QAPP. February 17, 2022.
- WDNR. 2022. Email from WDNR to TRC, LSRG, and USEPA stating that WDNR does not require any further PFAS sampling at this time. February 16, 2022.

Attachments: Table 1 – Water Analytical Data  
Figure 1 – PFAS Sampling Locations and Results  
Attachment 1 – The Data Validation Report and Laboratory Data Sheets

**Table 1: Water Analytical Data  
Summary of Analyzed Constituents  
Lemberger PFAS Sampling**

PFAS Compound (WI-33 List)	CAS Number	Recommended PAL (ng/L)	Recommended ES (ng/L)	RM-007D	RM-007D DUP	RM-007D	RM-007D DUP	RM-102D	RM-204D	RM-401XD	RM-401XD
				09/22/2021	09/22/2021	12/15/2022	12/15/2022	09/22/2021	09/22/2021	09/22/2021	12/15/2022
<b>Results in (ng/L)</b>											
Perfluorobutanoic acid (PFBA)	375-22-4	2000	10000	<b>4.3 J</b>	<b>4.5 J</b>	<b>5.2</b>	<b>4.7</b>	< 2.0	< 2.1	< 2.3	< 2.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	NR	NR	< 0.44	< 0.45	< 0.44	< 0.42	< 0.41	< 0.43	< 0.46	< 0.44
Perfluorohexanoic acid (PFHxA)	307-24-4	30000	150000	< 0.52	< 0.54	<b>0.62 J</b>	< 0.49	< 0.48	< 0.51	< 0.55	< 0.52
Perfluoroheptanoic acid (PFHpA)	375-85-9	NR	NR	< 0.22	< 0.23	<b>0.26 J I</b>	< 0.21	< 0.21	< 0.22	< 0.24	< 0.22
Perfluorooctanoic acid (PFOA)	335-67-1	2	20 (i)(ii)	<b>4.0</b>	<b>4.0</b>	<b>5.1</b>	<b>5.4</b>	< 0.71	<b>0.75 J</b>	<b>1.6 J</b>	<b>1.1 J</b>
Perfluorononanoic acid (PFNA)	375-95-1	3	30	< 0.24	< 0.25	< 0.24	< 0.23	< 0.23	< 0.24	< 0.26	< 0.24
Perfluorodecanoic acid (PFDA)	335-76-2	60	300	< 0.28	< 0.29	< 0.28	< 0.26	< 0.26	< 0.27	< 0.29	< 0.28
Perfluoroundecanoic acid (PFUnA)	2058-94-8	600	3000	< 0.99	< 1.0	< 0.98	< 0.93	< 0.92	< 0.97	< 1.0	< 0.98
Perfluorododecanoic acid (PFDoA)	307-55-1	100	500	< 0.49	< 0.51	< 0.49	< 0.47	< 0.46	< 0.48	< 0.52	< 0.49
Perfluorotridecanoic acid (PFTrIA)	72629-94-8	NR	NR	< 1.2	< 1.2	< 1.2	< 1.1	< 1.1	< 1.1	< 1.2	< 1.2
Perfluorotetradecanoic acid (PFTeA)	376-06-7	2000	10000	< 0.66	< 0.68	< 0.65	< 0.62	< 0.61	< 0.64	< 0.69	< 0.65
Perfluorobutanesulfonic acid (PFBS)	375-73-5	90000	450000	<b>0.28 J</b>	<b>0.33 J</b>	< 0.18	< 0.17	<b>0.21 J</b>	< 0.18	<b>0.19 J</b>	<b>0.18 J</b>
Perfluoropentanesulfonic acid (PFPeS)	2706-91-4	NR	NR	< 0.27	< 0.28	< 0.27	< 0.25	< 0.25	< 0.26	< 0.28	< 0.27
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	4	40	< 0.51	< 0.53	< 0.51	< 0.48	< 0.48	< 0.50	< 0.54	< 0.51
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NR	NR	< 0.17	< 0.18	< 0.17	< 0.16	< 0.16	< 0.17	< 0.18	< 0.17
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	2	20 (i)(ii)	< 0.48	< 0.50	< 0.48	< 0.46	< 0.45	< 0.47	< 0.51	< 0.48
Perfluorononanesulfonic acid (PFNS)	68259-12-1	NR	NR	< 0.33	< 0.34	< 0.33	< 0.31	< 0.31	< 0.33	< 0.35	< 0.33
Perfluorodecanesulfonic acid (PFDS)	335-77-3	NR	NR	< 0.29	< 0.30	< 0.28	< 0.27	< 0.27	< 0.28	< 0.30	< 0.28
Perfluorododecanesulfonic acid (PFDoS)	79780-39-5	NR	NR	< 0.87	< 0.90	< 0.86	< 0.82	< 0.81	< 0.85	< 0.92	< 0.86
Perfluorooctanesulfonamide (FOSA)	754-91-6	2	20 (i)	< 0.88	< 0.91	< 0.87	< 0.83	< 0.82	<b>1.0 J</b>	< 0.93	< 0.87
NEtFOSA	4151-50-2	2	20 (i)	< 0.78	< 0.81	< 0.77	< 0.74	< 0.73	< 0.76	< 0.82	< 0.77
NMeFOSA	31506-32-8	NR	NR	< 0.39	< 0.40	< 0.38	< 0.36	< 0.36	< 0.38	< 0.41	< 0.38
NMeFOSAA	2355-31-9	NR	NR	< 1.1	< 1.1	< 1.1	< 1.0	< 1.0	< 1.1	< 1.1	< 1.1
NEtFOSAA	2991-50-6	2	20 (i)	< 1.2	< 1.2	< 1.2	< 1.1	< 1.1	< 1.1	< 1.2	< 1.2
NMeFOSE	24448-09-7	NR	NR	< 1.3	< 1.3	< 1.2	< 1.2	< 1.2	< 1.2	< 1.3	< 1.2
NEtFOSE	1691-99-2	2	20 (i)	< 0.76	< 0.79	< 0.76	< 0.72	< 0.71	< 0.75	< 0.81	< 0.76
4:2 FTS	757124-72-4	NR	NR	< 0.22	< 0.22	< 0.21	< 0.20	< 0.20	< 0.21	< 0.23	< 0.21
6:2 FTS	27619-97-2	NR	NR	< 2.2	< 2.3	< 2.2	< 2.1	< 2.1	< 2.2	< 2.4	< 2.2
8:2 FTS	39108-34-4	NR	NR	< 0.41	< 0.43	< 0.41	< 0.39	< 0.38	< 0.40	< 0.44	< 0.41
DONA	919005-14-4	600	3000	< 0.36	< 0.37	< 0.36	< 0.34	< 0.33	< 0.35	< 0.38	< 0.36
HFPO-DA (GenX)	13252-13-6	30	300	< 1.3	< 1.4	< 1.3	< 1.3	< 1.3	< 1.3	< 1.4	< 1.3
F-53B Major	756426-58-1	NR	NR	< 0.22	< 0.22	< 0.21	< 0.20	< 0.20	< 0.21	< 0.23	< 0.21
F-53B Minor	763051-92-9	NR	NR	< 0.29	< 0.30	< 0.28	< 0.27	< 0.27	< 0.28	< 0.30	< 0.28

Notes:

**Bold text** indicates the compound was reported at a concentration above the method detection limit (MDL).

**[Redacted]** = value exceeds a recommended PAL.

< = Less than the detection limit.

J = Result is less than the reporting limit (RL) but greater than or equal to the method detection limit (MDL) and the concentration is an approximate value.

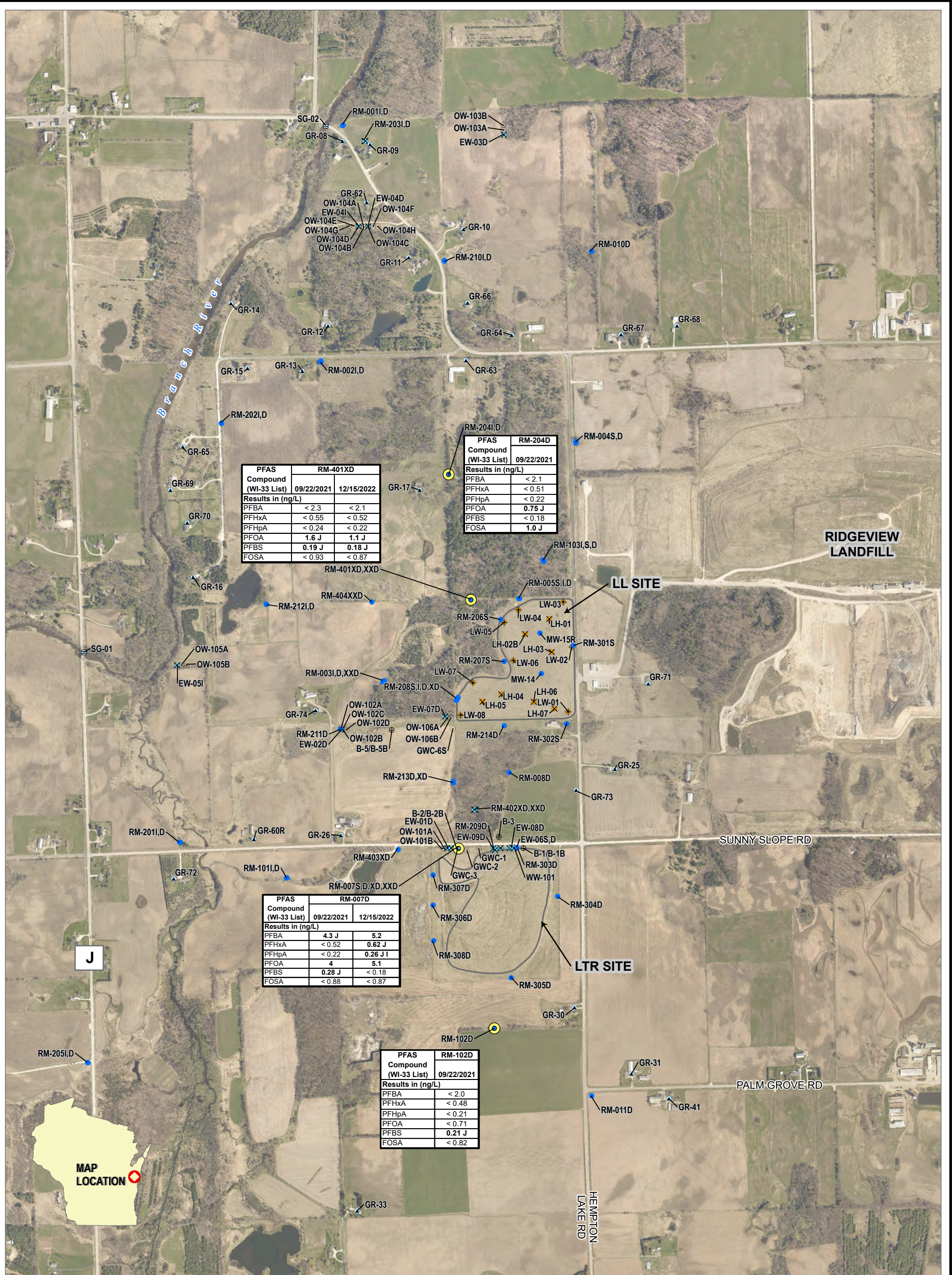
(i) DHS recommends a combined enforcement standard of 20 ng/L for FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFOS, and PFOA.

(ii) USEPA recommended Lifetime Drinking Water Health Advisory (HAS) of 70 parts per trillion (ppt) (0.07 ng/L) for PFOA and PFOS combined or individually.

PAL = Wisconsin Administrative Code (WAC) Chapter NR140 Preventive Action Limit.

ES = WAC Chapter NR140 Enforcement Standard.

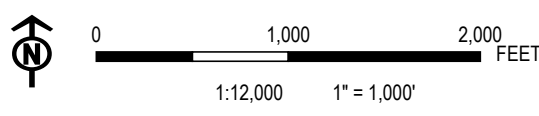
NR = No recommended standard yet from Cycles 10 or 11.



- LEGEND**
- SAMPLE AND MONITORING LOCATIONS
- ⊕ BEDROCK BORING (B)
  - GW COLLECTION SUMP (GWC)
  - ✕ GW EXTRACTION WELL (EW)
  - GW OBSERVATION WELL (OW)
  - ✕ LEACHATE HEAD WELL (LH)
  - ✕ LEACHATE WITHDRAWAL WELL (LW)
  - MONITORING WELL (RM)
  - ▲ RESIDENTIAL WELL (GR)
  - ≡ STAFF GAUGE (SG)
  - ⊙ WELLS SAMPLED FOR PFAS EVALUATION
  - 🗑️ LANDFILL AREA

**NOTES:**

- 1: AERIAL IMAGERY FROM MANITOWOC COUNTY, 2017.
- 2: MAP COORDINATES ARE IN WISCONSIN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT.
- 3: DATA ARE IN NG/L. SEE TABLE 1 FOR DATA QUALIFIER DEFINITIONS.



PROJECT: **LEMBERGER SITES**  
 TOWN OF FRANKLIN, WISCONSIN

TITLE: **PFAS SAMPLING LOCATIONS AND RESULTS**

DRAWN BY: A. HORRIE      PROJ. NO.: 473040

CHECKED BY: R. JORDAN

APPROVED BY: M. WESTOVER

DATE: MARCH 2023

**FIGURE 1**

**TRC**      999 FOURIER DRIVE  
 SUITE 101  
 MADISON, WI 53717  
 PHONE: 608.826.3663

FILE: LEMBERGERLANDFILL\_REPORTING\_473040

## **Attachment 1**

### **The Data Validation Report and Laboratory Data Sheets**



## Memorandum

**To:** Meredith Westover

**From:** Kristen Morin (Data Reviewer)  
Liz Denly (Peer Reviewer)

**Date:** February 10, 2023

**Subject:** Data Validation Report  
PFAS Groundwater Samples: 4<sup>th</sup> Quarter 2022  
Lemberger Landfill and Lemberger Transport and Recycling/Franklin, Wisconsin  
Laboratory Job Number 500-227062-1 (Revision 1)

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### SUMMARY

Full validation (stage 4) was performed on the data for two groundwater samples, one field duplicate, one field blank, and one equipment blank collected at the Lemberger Landfill and Lemberger Transport and Recycling Site in Franklin, Wisconsin. The samples were collected on December 15, 2022. Samples were submitted to Eurofins-Test America in West Sacramento, California for analysis. The samples were analyzed for per- and polyfluoroalkyl substances (PFAS) based on EPA Method 537.1 (modified). The laboratory reported the results under laboratory job number 500-227062-1 (Revision 1).

The sample results were assessed using the following guidance, modified for the methodology used:

- USEPA National Functional Guidelines for Organic Superfund Methods Data Review (EPA-540-R-20-005), November 2020
- USEPA National Functional Guidelines for High Resolution Superfund Methods Data Review (EPA-542-R-20-007), November 2020
- USEPA Data Review and Validation Guidelines for PFAS Analyzed Using EPA Method 537 (EPA 910-R-18-001), November 2018
- The project-specific quality assurance project plan (QAPP), dated October 2022, Revision 0

In general, the data are valid as reported and may be used for decision-making purposes. The following issues were noted which have a minor impact on the data usability:

- Select results were reported which were below the lowest calibration standard and quantitation limit (QL); these results were qualified as estimated (J).
- The positive result for PFHpA in sample RM-007D was qualified as estimated (J) due to the ratio between the two precursor/product ion transitions being outside the acceptance limits and detection below the QL.



## **SAMPLES**

Samples included in this review are listed below:

- RM-007D
- RM-401XD
- FDUP-002 (Field duplicate of RM-007)
- FB-002
- AMB-001

## **REVIEW ELEMENTS**

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Data completeness
- Holding times and sample preservation
- Initial and continuing calibrations
- Blanks
- Isotopically labeled surrogate results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Internal standard performance
- Field duplicate results
- QLs and sample results
- Target compound identification

## **DISCUSSION**

### **Agreement of Analyses Conducted with Chain-of-Custody Requests**

Sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No issues were noted.

### **Data Completeness**

The data package was found to be complete as received from the laboratory with one exception. The initial calibration percent error values were incomplete for ADONA on Form VI. The laboratory was contacted during validation and provided a revised report to correct this issue.

### **Holding Times and Sample Preservation**

All samples were analyzed within the method-specified holding time. All samples were received by the laboratory on ice and were properly preserved.

### **Initial and Continuing Calibrations**

The percent relative standard deviations and percent error values were within the laboratory acceptance criteria in the initial calibration. The percent differences met the laboratory acceptance criteria in the continuing calibration standards associated with the samples in this data set.

## Blanks

Target compounds were not detected in the associated method blank, field blank (AMB-001), and equipment blank (FB-002).

## Isotopically Labeled Surrogate Results

Twenty-five (25) isotopically labeled surrogates were spiked into the samples prior to extraction for isotope dilution quantitation. The following table summarizes the percent recoveries (%Rs) that were not within the laboratory acceptance criteria, the affected samples, and the validation actions.

Sample ID	Isotopically Labeled Surrogate	%R	%R Limits	Validation Actions
FDUP-002	M2-4:2 FTS	163	25-150	No validation actions were required on this basis since 4:2 FTS was not detected in samples FDUP-002, FB-002, and AMB-001.
FB-002		156		
AMB-001		159		

## MS/MSD Results

MS/MSD analyses were not performed on a sample in this data set.

## LCS/LCSD Results

An LCS and LCSD were performed with each extraction batch. The %Rs and relative percent differences (RPDs) were within the laboratory acceptance criteria.

## Internal Standard Performance

The isotopically labeled internal standard 13C2-PFOA was added to each sample prior to injection to monitor for ion suppression/enhancement at the instrument level. The %Rs met the laboratory limits of 50-150% in the PFAS analyses.

## Field Duplicate Results

Samples RM-007D and FDUP-002 were submitted as the field duplicate pair with this data set. The following table summarizes the absolute differences (AbsDs) of the detected PFAS results in the field duplicate pair and the validation actions.

Criteria:

- When both results are  $\geq 5x$  the QL, RPDs must be  $\leq 30\%$ .
- When one or both results are  $< 5x$  the QL, AbsD must be  $<$  the QL.

Analyte	QLs (ng/L)	RM-007D (ng/L)	FDUP-002 (ng/L)	AbsD (ng/L)	Validation Actions
PFBA	4.4/4.2	5.2	4.7	0.5	None; all criteria were met.
PFHxA	1.8/1.7	0.62 J	1.7 U	1.08	
PFHpA	1.8/1.7	0.26 J	1.7 U	1.44	
PFOA	1.8/1.7	5.1	5.4	0.3	

### Quantitation Limits and Sample Results

Select results were reported which were below the lowest calibration standard level and QL. These results were qualified as estimated (J) by the laboratory.

There were no dilutions performed on the samples in this data set.

The laboratory's method detection limits for all PFAS were below both of the project action limits specified in the PFAS Evaluation Work Plan (proposed Wisconsin Department of National Resources Cycle 10 and 11 standards: Wisconsin Administrative Code [WAC] Chapter NR 140 Preventive Action Limit and WAC Chapter NR 140 Enforcement Standard).

### Target Compound Identification

Extracted ion chromatograms were reviewed to verify the target compound identifications. The laboratory manually integrated several peaks to ensure the inclusion of linear and branched isomers for PFOA, PFOS, NEtFOSAA, NMeFOSAA, and/or PFHxS; and/or to ensure proper integration of all PFAS.

Two precursor/product ion transitions were used for identification for all compounds except for PFBA, PFPeA, PFOSA, N-MeFOSE, N-EtFOSE, F-53B Major, and F-53B Minor which only used one precursor/product ion transition for identification.

The following table summarizes the ratios between the two precursor/product ion transitions for positive results that did not meet the laboratory acceptance criteria and the validation actions.

Sample ID	Compound	Ratio	Ratio QC Limits	Validation Actions
RM-007D	PFHpA	6.29	1.85-5.56	The positive result for PFHpA in sample RM-007D was already qualified as estimated (J) by the laboratory due to detection below the lowest calibration standard; thus no further qualification was required.

# **QUALIFIED FORM 1s**

# Client Sample Results

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: RM-007D**

**Lab Sample ID: 500-227062-1**

Date Collected: 12/15/22 12:08

Matrix: Water

Date Received: 12/16/22 09:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	5.2		4.4	2.1	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoropentanoic acid (PFPeA)	<0.44		1.8	0.44	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorohexanoic acid (PFHxA)	0.62	J	1.8	0.52	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoroheptanoic acid (PFHpA)	0.26	JJ J	1.8	0.22	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorooctanoic acid (PFOA)	5.1		1.8	0.76	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorononanoic acid (PFNA)	<0.24		1.8	0.24	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorodecanoic acid (PFDA)	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoroundecanoic acid (PFUnA)	<0.98		1.8	0.98	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorododecanoic acid (PFDoA)	<0.49		1.8	0.49	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorotridecanoic acid (PFTriA)	<1.2		1.8	1.2	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorotetradecanoic acid (PFTeA)	<0.65		1.8	0.65	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorobutanesulfonic acid (PFBS)	<0.18		1.8	0.18	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoropentanesulfonic acid (PFPeS)	<0.27		1.8	0.27	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorohexanesulfonic acid (PFHxS)	<0.51		1.8	0.51	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.17		1.8	0.17	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorooctanesulfonic acid (PFOS)	<0.48		1.8	0.48	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorononanesulfonic acid (PFNS)	<0.33		1.8	0.33	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorodecanesulfonic acid (PFDS)	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorododecanesulfonic acid (PFDoS)	<0.86		1.8	0.86	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorooctanesulfonamide (FOSA)	<0.87		1.8	0.87	ng/L		12/22/22 05:32	12/29/22 02:34	1
NEtFOSA	<0.77		1.8	0.77	ng/L		12/22/22 05:32	12/29/22 02:34	1
NMeFOSA	<0.38		1.8	0.38	ng/L		12/22/22 05:32	12/29/22 02:34	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.1		4.4	1.1	ng/L		12/22/22 05:32	12/29/22 02:34	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.2		4.4	1.2	ng/L		12/22/22 05:32	12/29/22 02:34	1
NMeFOSE	<1.2		3.6	1.2	ng/L		12/22/22 05:32	12/29/22 02:34	1
NEtFOSE	<0.76		1.8	0.76	ng/L		12/22/22 05:32	12/29/22 02:34	1
4:2 FTS	<0.21		1.8	0.21	ng/L		12/22/22 05:32	12/29/22 02:34	1
6:2 FTS	<2.2		4.4	2.2	ng/L		12/22/22 05:32	12/29/22 02:34	1
8:2 FTS	<0.41		1.8	0.41	ng/L		12/22/22 05:32	12/29/22 02:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.36		1.8	0.36	ng/L		12/22/22 05:32	12/29/22 02:34	1
HFPO-DA (GenX)	<1.3		3.6	1.3	ng/L		12/22/22 05:32	12/29/22 02:34	1
F-53B Major	<0.21		1.8	0.21	ng/L		12/22/22 05:32	12/29/22 02:34	1
F-53B Minor	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:34	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	64		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C5 PFPeA	81		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C2 PFHxA	87		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C4 PFHpA	89		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C4 PFOA	90		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C5 PFNA	89		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C2 PFDA	88		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C2 PFUnA	89		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C2 PFDoA	79		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C2 PFTeDA	81		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C3 PFBS	73		25 - 150	12/22/22 05:32	12/29/22 02:34	1

# Client Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: RM-401XD**

**Lab Sample ID: 500-227062-2**

**Date Collected: 12/15/22 13:57**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<2.1		4.5	2.1	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoropentanoic acid (PFPeA)	<0.44		1.8	0.44	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorohexanoic acid (PFHxA)	<0.52		1.8	0.52	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoroheptanoic acid (PFHpA)	<0.22		1.8	0.22	ng/L		12/22/22 05:32	12/29/22 02:45	1
<b>Perfluorooctanoic acid (PFOA)</b>	<b>1.1</b>	<b>J</b>	1.8	0.76	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorononanoic acid (PFNA)	<0.24		1.8	0.24	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorodecanoic acid (PFDA)	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoroundecanoic acid (PFUnA)	<0.98		1.8	0.98	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorododecanoic acid (PFDoA)	<0.49		1.8	0.49	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorotridecanoic acid (PFTriA)	<1.2		1.8	1.2	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorotetradecanoic acid (PFTeA)	<0.65		1.8	0.65	ng/L		12/22/22 05:32	12/29/22 02:45	1
<b>Perfluorobutanesulfonic acid (PFBS)</b>	<b>0.18</b>	<b>J</b>	1.8	0.18	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoropentanesulfonic acid (PFPeS)	<0.27		1.8	0.27	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorohexanesulfonic acid (PFHxS)	<0.51		1.8	0.51	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.17		1.8	0.17	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorooctanesulfonic acid (PFOS)	<0.48		1.8	0.48	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorononanesulfonic acid (PFNS)	<0.33		1.8	0.33	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorodecanesulfonic acid (PFDS)	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorododecanesulfonic acid (PFDoS)	<0.86		1.8	0.86	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorooctanesulfonamide (FOSA)	<0.87		1.8	0.87	ng/L		12/22/22 05:32	12/29/22 02:45	1
NEtFOSA	<0.77		1.8	0.77	ng/L		12/22/22 05:32	12/29/22 02:45	1
NMeFOSA	<0.38		1.8	0.38	ng/L		12/22/22 05:32	12/29/22 02:45	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.1		4.5	1.1	ng/L		12/22/22 05:32	12/29/22 02:45	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.2		4.5	1.2	ng/L		12/22/22 05:32	12/29/22 02:45	1
NMeFOSE	<1.2		3.6	1.2	ng/L		12/22/22 05:32	12/29/22 02:45	1
NEtFOSE	<0.76		1.8	0.76	ng/L		12/22/22 05:32	12/29/22 02:45	1
4:2 FTS	<0.21		1.8	0.21	ng/L		12/22/22 05:32	12/29/22 02:45	1
6:2 FTS	<2.2		4.5	2.2	ng/L		12/22/22 05:32	12/29/22 02:45	1
8:2 FTS	<0.41		1.8	0.41	ng/L		12/22/22 05:32	12/29/22 02:45	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.36		1.8	0.36	ng/L		12/22/22 05:32	12/29/22 02:45	1
HFPO-DA (GenX)	<1.3		3.6	1.3	ng/L		12/22/22 05:32	12/29/22 02:45	1
F-53B Major	<0.21		1.8	0.21	ng/L		12/22/22 05:32	12/29/22 02:45	1
F-53B Minor	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:45	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	79		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C5 PFPeA	88		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFHxA	90		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C4 PFHpA	98		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C4 PFOA	94		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C5 PFNA	96		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFDA	93		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFUnA	96		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFDoA	89		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFTeDA	88		25 - 150	12/22/22 05:32	12/29/22 02:45	1

# Client Sample Results

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: FDUP-002**

**Lab Sample ID: 500-227062-3**

Date Collected: 12/15/22 00:00

Matrix: Water

Date Received: 12/16/22 09:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Perfluorobutanoic acid (PFBA)</b>	<b>4.7</b>		4.2	2.0	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoropentanoic acid (PFPeA)	<0.42		1.7	0.42	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorohexanoic acid (PFHxA)	<0.49		1.7	0.49	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoroheptanoic acid (PFHpA)	<0.21		1.7	0.21	ng/L		12/22/22 05:32	12/29/22 02:55	1
<b>Perfluorooctanoic acid (PFOA)</b>	<b>5.4</b>		1.7	0.72	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorononanoic acid (PFNA)	<0.23		1.7	0.23	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorodecanoic acid (PFDA)	<0.26		1.7	0.26	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoroundecanoic acid (PFUnA)	<0.93		1.7	0.93	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorododecanoic acid (PFDoA)	<0.47		1.7	0.47	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorotridecanoic acid (PFTriA)	<1.1		1.7	1.1	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorotetradecanoic acid (PFTeA)	<0.62		1.7	0.62	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorobutanesulfonic acid (PFBS)	<0.17		1.7	0.17	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoropentanesulfonic acid (PFPeS)	<0.25		1.7	0.25	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorohexanesulfonic acid (PFHxS)	<0.48		1.7	0.48	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.16		1.7	0.16	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorooctanesulfonic acid (PFOS)	<0.46		1.7	0.46	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorononanesulfonic acid (PFNS)	<0.31		1.7	0.31	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorodecanesulfonic acid (PFDS)	<0.27		1.7	0.27	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorododecanesulfonic acid (PFDoS)	<0.82		1.7	0.82	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorooctanesulfonamide (FOSA)	<0.83		1.7	0.83	ng/L		12/22/22 05:32	12/29/22 02:55	1
NEtFOSA	<0.74		1.7	0.74	ng/L		12/22/22 05:32	12/29/22 02:55	1
NMeFOSA	<0.36		1.7	0.36	ng/L		12/22/22 05:32	12/29/22 02:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.0		4.2	1.0	ng/L		12/22/22 05:32	12/29/22 02:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.1		4.2	1.1	ng/L		12/22/22 05:32	12/29/22 02:55	1
NMeFOSE	<1.2		3.4	1.2	ng/L		12/22/22 05:32	12/29/22 02:55	1
NEtFOSE	<0.72		1.7	0.72	ng/L		12/22/22 05:32	12/29/22 02:55	1
4:2 FTS	<0.20		1.7	0.20	ng/L		12/22/22 05:32	12/29/22 02:55	1
6:2 FTS	<2.1		4.2	2.1	ng/L		12/22/22 05:32	12/29/22 02:55	1
8:2 FTS	<0.39		1.7	0.39	ng/L		12/22/22 05:32	12/29/22 02:55	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.34		1.7	0.34	ng/L		12/22/22 05:32	12/29/22 02:55	1
HFPO-DA (GenX)	<1.3		3.4	1.3	ng/L		12/22/22 05:32	12/29/22 02:55	1
F-53B Major	<0.20		1.7	0.20	ng/L		12/22/22 05:32	12/29/22 02:55	1
F-53B Minor	<0.27		1.7	0.27	ng/L		12/22/22 05:32	12/29/22 02:55	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	67		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C5 PFPeA	86		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C2 PFHxA	89		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C4 PFHpA	90		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C4 PFOA	93		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C5 PFNA	97		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C2 PFDA	92		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C2 PFUnA	92		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C2 PFDoA	87		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C2 PFTeDA	86		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C3 PFBS	78		25 - 150	12/22/22 05:32	12/29/22 02:55	1

Eurofins Chicago

# Client Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: FB-002**

**Lab Sample ID: 500-227062-4**

**Date Collected: 12/15/22 11:05**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<2.5		5.3	2.5	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoropentanoic acid (PFPeA)	<0.52		2.1	0.52	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorohexanoic acid (PFHxA)	<0.61		2.1	0.61	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoroheptanoic acid (PFHpA)	<0.26		2.1	0.26	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorooctanoic acid (PFOA)	<0.90		2.1	0.90	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorononanoic acid (PFNA)	<0.29		2.1	0.29	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorodecanoic acid (PFDA)	<0.33		2.1	0.33	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoroundecanoic acid (PFUnA)	<1.2		2.1	1.2	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorododecanoic acid (PFDoA)	<0.58		2.1	0.58	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorotridecanoic acid (PFTriA)	<1.4		2.1	1.4	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorotetradecanoic acid (PFTeA)	<0.77		2.1	0.77	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorobutanesulfonic acid (PFBS)	<0.21		2.1	0.21	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoropentanesulfonic acid (PFPeS)	<0.32		2.1	0.32	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorohexanesulfonic acid (PFHxS)	<0.60		2.1	0.60	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.20		2.1	0.20	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorooctanesulfonic acid (PFOS)	<0.57		2.1	0.57	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorononanesulfonic acid (PFNS)	<0.39		2.1	0.39	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorodecanesulfonic acid (PFDS)	<0.34		2.1	0.34	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorododecanesulfonic acid (PFDoS)	<1.0		2.1	1.0	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorooctanesulfonamide (FOSA)	<1.0		2.1	1.0	ng/L		12/22/22 05:32	12/29/22 03:05	1
NEtFOSA	<0.92		2.1	0.92	ng/L		12/22/22 05:32	12/29/22 03:05	1
NMeFOSA	<0.45		2.1	0.45	ng/L		12/22/22 05:32	12/29/22 03:05	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.3		5.3	1.3	ng/L		12/22/22 05:32	12/29/22 03:05	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.4		5.3	1.4	ng/L		12/22/22 05:32	12/29/22 03:05	1
NMeFOSE	<1.5		4.2	1.5	ng/L		12/22/22 05:32	12/29/22 03:05	1
NEtFOSE	<0.90		2.1	0.90	ng/L		12/22/22 05:32	12/29/22 03:05	1
4:2 FTS	<0.25		2.1	0.25	ng/L		12/22/22 05:32	12/29/22 03:05	1
6:2 FTS	<2.6		5.3	2.6	ng/L		12/22/22 05:32	12/29/22 03:05	1
8:2 FTS	<0.49		2.1	0.49	ng/L		12/22/22 05:32	12/29/22 03:05	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.42		2.1	0.42	ng/L		12/22/22 05:32	12/29/22 03:05	1
HFPO-DA (GenX)	<1.6		4.2	1.6	ng/L		12/22/22 05:32	12/29/22 03:05	1
F-53B Major	<0.25		2.1	0.25	ng/L		12/22/22 05:32	12/29/22 03:05	1
F-53B Minor	<0.34		2.1	0.34	ng/L		12/22/22 05:32	12/29/22 03:05	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	84		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C5 PFPeA	91		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C2 PFHxA	95		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C4 PFHpA	95		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C4 PFOA	93		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C5 PFNA	97		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C2 PFDA	98		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C2 PFUnA	102		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C2 PFDoA	92		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C2 PFTeDA	87		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C3 PFBS	85		25 - 150	12/22/22 05:32	12/29/22 03:05	1

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# Client Sample Results

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: AMB-001**

**Lab Sample ID: 500-227062-5**

**Date Collected: 12/15/22 11:40**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<2.2		4.6	2.2	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoropentanoic acid (PFPeA)	<0.45		1.9	0.45	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorohexanoic acid (PFHxA)	<0.54		1.9	0.54	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoroheptanoic acid (PFHpA)	<0.23		1.9	0.23	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorooctanoic acid (PFOA)	<0.79		1.9	0.79	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorononanoic acid (PFNA)	<0.25		1.9	0.25	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorodecanoic acid (PFDA)	<0.29		1.9	0.29	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoroundecanoic acid (PFUnA)	<1.0		1.9	1.0	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorododecanoic acid (PFDoA)	<0.51		1.9	0.51	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorotridecanoic acid (PFTrIA)	<1.2		1.9	1.2	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorotetradecanoic acid (PFTeA)	<0.68		1.9	0.68	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorobutanesulfonic acid (PFBS)	<0.19		1.9	0.19	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoropentanesulfonic acid (PFPeS)	<0.28		1.9	0.28	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorohexanesulfonic acid (PFHxS)	<0.53		1.9	0.53	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.18		1.9	0.18	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorooctanesulfonic acid (PFOS)	<0.50		1.9	0.50	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorononanesulfonic acid (PFNS)	<0.34		1.9	0.34	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorodecanesulfonic acid (PFDS)	<0.30		1.9	0.30	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorododecanesulfonic acid (PFDoS)	<0.90		1.9	0.90	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorooctanesulfonamide (FOSA)	<0.91		1.9	0.91	ng/L		12/22/22 05:32	12/29/22 03:15	1
NEtFOSA	<0.81		1.9	0.81	ng/L		12/22/22 05:32	12/29/22 03:15	1
NMeFOSA	<0.40		1.9	0.40	ng/L		12/22/22 05:32	12/29/22 03:15	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.1		4.6	1.1	ng/L		12/22/22 05:32	12/29/22 03:15	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.2		4.6	1.2	ng/L		12/22/22 05:32	12/29/22 03:15	1
NMeFOSE	<1.3		3.7	1.3	ng/L		12/22/22 05:32	12/29/22 03:15	1
NEtFOSE	<0.79		1.9	0.79	ng/L		12/22/22 05:32	12/29/22 03:15	1
4:2 FTS	<0.22		1.9	0.22	ng/L		12/22/22 05:32	12/29/22 03:15	1
6:2 FTS	<2.3		4.6	2.3	ng/L		12/22/22 05:32	12/29/22 03:15	1
8:2 FTS	<0.43		1.9	0.43	ng/L		12/22/22 05:32	12/29/22 03:15	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.37		1.9	0.37	ng/L		12/22/22 05:32	12/29/22 03:15	1
HFPO-DA (GenX)	<1.4		3.7	1.4	ng/L		12/22/22 05:32	12/29/22 03:15	1
F-53B Major	<0.22		1.9	0.22	ng/L		12/22/22 05:32	12/29/22 03:15	1
F-53B Minor	<0.30		1.9	0.30	ng/L		12/22/22 05:32	12/29/22 03:15	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFBA	89		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C5 PFPeA	97		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFHxA	93		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C4 PFHpA	101		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C4 PFOA	99		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C5 PFNA	103		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFDA	102		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFUnA	101		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFDoA	96		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFTeDA	95		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C3 PFBS	95		25 - 150				12/22/22 05:32	12/29/22 03:15	1



# ANALYTICAL REPORT

## PREPARED FOR

Attn: Meredith Westover  
TRC Environmental Corporation  
999 Fourier Drive, Suite 101  
Madison, Wisconsin 53717

Generated 1/9/2023 12:53:07 PM

## JOB DESCRIPTION

Lemberger Landfill

## JOB NUMBER

500-227062-1

# Eurofins Chicago

## Job Notes

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of Eurofins Environment Testing North Central, LLC and its client. All questions regarding this report should be directed to the Eurofins Environment Testing North Central, LLC Project Manager who has signed this report.

Results relate only to the items tested and the sample(s) as received by the laboratory. The results, detection limits (LOD) and Quantitation Limits (LOQ) have been adjusted for sample dilutions and/or solids content.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Chicago Project Manager.

## Authorization



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Authorized for release by  
Sandie Fredrick, Project Manager II  
[Sandra.Fredrick@et.eurofinsus.com](mailto:Sandra.Fredrick@et.eurofinsus.com)  
(920)261-1660



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# Case Narrative

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

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**Job ID: 500-227062-1**

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**Laboratory: Eurofins Chicago**

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**Narrative**

**Job Narrative  
500-227062-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 12/16/2022 9:25 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 2.5° C.

**LCMS**

Method 537 (modified): The "I" qualifier means the transition mass ratio for the indicated analyte was above the established ratio limits. The qualitative identification of the analyte has some degree of uncertainty, and the reported value may have some high bias. However, analyst judgment was used to positively identify the analyte. RM-007D (500-227062-1)

Method 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for the following samples: FDUP-002 (500-227062-3), FB-002 (500-227062-4) and AMB-001 (500-227062-5). These samples were reanalyzed with concurring IDA recoveries. Quantitation by isotope dilution generally precludes any adverse effect on data quality due to elevated IDA recoveries.

No additional analytical or quality issues were noted, other than those described above or 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 320-641965.

Method: 3535\_PFC

Matrix: Aqueous

320-641965

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

# Detection Summary

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

## Client Sample ID: RM-007D

Lab Sample ID: 500-227062-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	5.2		4.4	2.1	ng/L	1		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	0.62	J	1.8	0.52	ng/L	1		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	0.26	J I	1.8	0.22	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	5.1		1.8	0.76	ng/L	1		537 (modified)	Total/NA

## Client Sample ID: RM-401XD

Lab Sample ID: 500-227062-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanoic acid (PFOA)	1.1	J	1.8	0.76	ng/L	1		537 (modified)	Total/NA
Perfluorobutanesulfonic acid (PFBS)	0.18	J	1.8	0.18	ng/L	1		537 (modified)	Total/NA

## Client Sample ID: FDUP-002

Lab Sample ID: 500-227062-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorobutanoic acid (PFBA)	4.7		4.2	2.0	ng/L	1		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	5.4		1.7	0.72	ng/L	1		537 (modified)	Total/NA

## Client Sample ID: FB-002

Lab Sample ID: 500-227062-4

No Detections.

## Client Sample ID: AMB-001

Lab Sample ID: 500-227062-5

No Detections.

This Detection Summary does not include radiochemical test results.

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# Method Summary

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	EET SAC
3535	Solid-Phase Extraction (SPE)	SW846	EET SAC

**Protocol References:**

EPA = US Environmental Protection Agency

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

**Laboratory References:**

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

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# Sample Summary

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
500-227062-1	RM-007D	Water	12/15/22 12:08	12/16/22 09:25
500-227062-2	RM-401XD	Water	12/15/22 13:57	12/16/22 09:25
500-227062-3	FDUP-002	Water	12/15/22 00:00	12/16/22 09:25
500-227062-4	FB-002	Water	12/15/22 11:05	12/16/22 09:25
500-227062-5	AMB-001	Water	12/15/22 11:40	12/16/22 09:25

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# Client Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: RM-007D**

**Lab Sample ID: 500-227062-1**

Date Collected: 12/15/22 12:08

Matrix: Water

Date Received: 12/16/22 09:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	5.2		4.4	2.1	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoropentanoic acid (PFPeA)	<0.44		1.8	0.44	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorohexanoic acid (PFHxA)	0.62	J	1.8	0.52	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoroheptanoic acid (PFHpA)	0.26	J I	1.8	0.22	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorooctanoic acid (PFOA)	5.1		1.8	0.76	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorononanoic acid (PFNA)	<0.24		1.8	0.24	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorodecanoic acid (PFDA)	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoroundecanoic acid (PFUnA)	<0.98		1.8	0.98	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorododecanoic acid (PFDoA)	<0.49		1.8	0.49	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorotridecanoic acid (PFTriA)	<1.2		1.8	1.2	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorotetradecanoic acid (PFTeA)	<0.65		1.8	0.65	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorobutanesulfonic acid (PFBS)	<0.18		1.8	0.18	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoropentanesulfonic acid (PFPeS)	<0.27		1.8	0.27	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorohexanesulfonic acid (PFHxS)	<0.51		1.8	0.51	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.17		1.8	0.17	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorooctanesulfonic acid (PFOS)	<0.48		1.8	0.48	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorononanesulfonic acid (PFNS)	<0.33		1.8	0.33	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorodecanesulfonic acid (PFDS)	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorododecanesulfonic acid (PFDoS)	<0.86		1.8	0.86	ng/L		12/22/22 05:32	12/29/22 02:34	1
Perfluorooctanesulfonamide (FOSA)	<0.87		1.8	0.87	ng/L		12/22/22 05:32	12/29/22 02:34	1
NEtFOSA	<0.77		1.8	0.77	ng/L		12/22/22 05:32	12/29/22 02:34	1
NMeFOSA	<0.38		1.8	0.38	ng/L		12/22/22 05:32	12/29/22 02:34	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.1		4.4	1.1	ng/L		12/22/22 05:32	12/29/22 02:34	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.2		4.4	1.2	ng/L		12/22/22 05:32	12/29/22 02:34	1
NMeFOSE	<1.2		3.6	1.2	ng/L		12/22/22 05:32	12/29/22 02:34	1
NEtFOSE	<0.76		1.8	0.76	ng/L		12/22/22 05:32	12/29/22 02:34	1
4:2 FTS	<0.21		1.8	0.21	ng/L		12/22/22 05:32	12/29/22 02:34	1
6:2 FTS	<2.2		4.4	2.2	ng/L		12/22/22 05:32	12/29/22 02:34	1
8:2 FTS	<0.41		1.8	0.41	ng/L		12/22/22 05:32	12/29/22 02:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.36		1.8	0.36	ng/L		12/22/22 05:32	12/29/22 02:34	1
HFPO-DA (GenX)	<1.3		3.6	1.3	ng/L		12/22/22 05:32	12/29/22 02:34	1
F-53B Major	<0.21		1.8	0.21	ng/L		12/22/22 05:32	12/29/22 02:34	1
F-53B Minor	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:34	1
<b>Isotope Dilution</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
13C4 PFBA	64		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C5 PFPeA	81		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C2 PFHxA	87		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C4 PFHpA	89		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C4 PFOA	90		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C5 PFNA	89		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C2 PFDA	88		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C2 PFUnA	89		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C2 PFDoA	79		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C2 PFTeDA	81		25 - 150				12/22/22 05:32	12/29/22 02:34	1
13C3 PFBS	73		25 - 150				12/22/22 05:32	12/29/22 02:34	1

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# Client Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: RM-007D**

**Lab Sample ID: 500-227062-1**

**Date Collected: 12/15/22 12:08**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	81		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C4 PFOS	75		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C8 FOSA	79		10 - 150	12/22/22 05:32	12/29/22 02:34	1
d3-NMeFOSAA	90		25 - 150	12/22/22 05:32	12/29/22 02:34	1
d5-NEtFOSAA	90		25 - 150	12/22/22 05:32	12/29/22 02:34	1
d-N-MeFOSA-M	69		10 - 150	12/22/22 05:32	12/29/22 02:34	1
d-N-EtFOSA-M	69		10 - 150	12/22/22 05:32	12/29/22 02:34	1
d7-N-MeFOSE-M	78		10 - 150	12/22/22 05:32	12/29/22 02:34	1
d9-N-EtFOSE-M	72		10 - 150	12/22/22 05:32	12/29/22 02:34	1
M2-4:2 FTS	139		25 - 150	12/22/22 05:32	12/29/22 02:34	1
M2-6:2 FTS	121		25 - 150	12/22/22 05:32	12/29/22 02:34	1
M2-8:2 FTS	115		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C3 HFPO-DA	83		25 - 150	12/22/22 05:32	12/29/22 02:34	1
13C2 10:2 FTS	113		25 - 150	12/22/22 05:32	12/29/22 02:34	1

# Client Sample Results

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: RM-401XD**

**Lab Sample ID: 500-227062-2**

Date Collected: 12/15/22 13:57

Matrix: Water

Date Received: 12/16/22 09:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<2.1		4.5	2.1	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoropentanoic acid (PFPeA)	<0.44		1.8	0.44	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorohexanoic acid (PFHxA)	<0.52		1.8	0.52	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoroheptanoic acid (PFHpA)	<0.22		1.8	0.22	ng/L		12/22/22 05:32	12/29/22 02:45	1
<b>Perfluorooctanoic acid (PFOA)</b>	<b>1.1</b>	<b>J</b>	1.8	0.76	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorononanoic acid (PFNA)	<0.24		1.8	0.24	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorodecanoic acid (PFDA)	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoroundecanoic acid (PFUnA)	<0.98		1.8	0.98	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorododecanoic acid (PFDoA)	<0.49		1.8	0.49	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorotridecanoic acid (PFTriA)	<1.2		1.8	1.2	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorotetradecanoic acid (PFTeA)	<0.65		1.8	0.65	ng/L		12/22/22 05:32	12/29/22 02:45	1
<b>Perfluorobutanesulfonic acid (PFBS)</b>	<b>0.18</b>	<b>J</b>	1.8	0.18	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoropentanesulfonic acid (PFPeS)	<0.27		1.8	0.27	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorohexanesulfonic acid (PFHxS)	<0.51		1.8	0.51	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.17		1.8	0.17	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorooctanesulfonic acid (PFOS)	<0.48		1.8	0.48	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorononanesulfonic acid (PFNS)	<0.33		1.8	0.33	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorodecanesulfonic acid (PFDS)	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorododecanesulfonic acid (PFDoS)	<0.86		1.8	0.86	ng/L		12/22/22 05:32	12/29/22 02:45	1
Perfluorooctanesulfonamide (FOSA)	<0.87		1.8	0.87	ng/L		12/22/22 05:32	12/29/22 02:45	1
NEtFOSA	<0.77		1.8	0.77	ng/L		12/22/22 05:32	12/29/22 02:45	1
NMeFOSA	<0.38		1.8	0.38	ng/L		12/22/22 05:32	12/29/22 02:45	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.1		4.5	1.1	ng/L		12/22/22 05:32	12/29/22 02:45	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.2		4.5	1.2	ng/L		12/22/22 05:32	12/29/22 02:45	1
NMeFOSE	<1.2		3.6	1.2	ng/L		12/22/22 05:32	12/29/22 02:45	1
NEtFOSE	<0.76		1.8	0.76	ng/L		12/22/22 05:32	12/29/22 02:45	1
4:2 FTS	<0.21		1.8	0.21	ng/L		12/22/22 05:32	12/29/22 02:45	1
6:2 FTS	<2.2		4.5	2.2	ng/L		12/22/22 05:32	12/29/22 02:45	1
8:2 FTS	<0.41		1.8	0.41	ng/L		12/22/22 05:32	12/29/22 02:45	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.36		1.8	0.36	ng/L		12/22/22 05:32	12/29/22 02:45	1
HFPO-DA (GenX)	<1.3		3.6	1.3	ng/L		12/22/22 05:32	12/29/22 02:45	1
F-53B Major	<0.21		1.8	0.21	ng/L		12/22/22 05:32	12/29/22 02:45	1
F-53B Minor	<0.28		1.8	0.28	ng/L		12/22/22 05:32	12/29/22 02:45	1

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFBA	79		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C5 PFPeA	88		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFHxA	90		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C4 PFHpA	98		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C4 PFOA	94		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C5 PFNA	96		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFDA	93		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFUnA	96		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFDoA	89		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 PFTeDA	88		25 - 150	12/22/22 05:32	12/29/22 02:45	1

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# Client Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: RM-401XD**

**Lab Sample ID: 500-227062-2**

**Date Collected: 12/15/22 13:57**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
13C3 PFBS	83		25 - 150	12/22/22 05:32	12/29/22 02:45	1
18O2 PFHxS	86		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C4 PFOS	83		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C8 FOSA	90		10 - 150	12/22/22 05:32	12/29/22 02:45	1
d3-NMeFOSAA	94		25 - 150	12/22/22 05:32	12/29/22 02:45	1
d5-NEtFOSAA	98		25 - 150	12/22/22 05:32	12/29/22 02:45	1
d-N-MeFOSA-M	81		10 - 150	12/22/22 05:32	12/29/22 02:45	1
d-N-EtFOSA-M	80		10 - 150	12/22/22 05:32	12/29/22 02:45	1
d7-N-MeFOSE-M	79		10 - 150	12/22/22 05:32	12/29/22 02:45	1
d9-N-EtFOSE-M	81		10 - 150	12/22/22 05:32	12/29/22 02:45	1
M2-4:2 FTS	133		25 - 150	12/22/22 05:32	12/29/22 02:45	1
M2-6:2 FTS	126		25 - 150	12/22/22 05:32	12/29/22 02:45	1
M2-8:2 FTS	126		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C3 HFPO-DA	95		25 - 150	12/22/22 05:32	12/29/22 02:45	1
13C2 10:2 FTS	117		25 - 150	12/22/22 05:32	12/29/22 02:45	1

# Client Sample Results

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: FDUP-002**

**Lab Sample ID: 500-227062-3**

Date Collected: 12/15/22 00:00

Matrix: Water

Date Received: 12/16/22 09:25

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Perfluorobutanoic acid (PFBA)</b>	<b>4.7</b>		4.2	2.0	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoropentanoic acid (PFPeA)	<0.42		1.7	0.42	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorohexanoic acid (PFHxA)	<0.49		1.7	0.49	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoroheptanoic acid (PFHpA)	<0.21		1.7	0.21	ng/L		12/22/22 05:32	12/29/22 02:55	1
<b>Perfluorooctanoic acid (PFOA)</b>	<b>5.4</b>		1.7	0.72	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorononanoic acid (PFNA)	<0.23		1.7	0.23	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorodecanoic acid (PFDA)	<0.26		1.7	0.26	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoroundecanoic acid (PFUnA)	<0.93		1.7	0.93	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorododecanoic acid (PFDoA)	<0.47		1.7	0.47	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorotridecanoic acid (PFTriA)	<1.1		1.7	1.1	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorotetradecanoic acid (PFTeA)	<0.62		1.7	0.62	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorobutanesulfonic acid (PFBS)	<0.17		1.7	0.17	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoropentanesulfonic acid (PFPeS)	<0.25		1.7	0.25	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorohexanesulfonic acid (PFHxS)	<0.48		1.7	0.48	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.16		1.7	0.16	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorooctanesulfonic acid (PFOS)	<0.46		1.7	0.46	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorononanesulfonic acid (PFNS)	<0.31		1.7	0.31	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorodecanesulfonic acid (PFDS)	<0.27		1.7	0.27	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorododecanesulfonic acid (PFDoS)	<0.82		1.7	0.82	ng/L		12/22/22 05:32	12/29/22 02:55	1
Perfluorooctanesulfonamide (FOSA)	<0.83		1.7	0.83	ng/L		12/22/22 05:32	12/29/22 02:55	1
NEtFOSA	<0.74		1.7	0.74	ng/L		12/22/22 05:32	12/29/22 02:55	1
NMeFOSA	<0.36		1.7	0.36	ng/L		12/22/22 05:32	12/29/22 02:55	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.0		4.2	1.0	ng/L		12/22/22 05:32	12/29/22 02:55	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.1		4.2	1.1	ng/L		12/22/22 05:32	12/29/22 02:55	1
NMeFOSE	<1.2		3.4	1.2	ng/L		12/22/22 05:32	12/29/22 02:55	1
NEtFOSE	<0.72		1.7	0.72	ng/L		12/22/22 05:32	12/29/22 02:55	1
4:2 FTS	<0.20		1.7	0.20	ng/L		12/22/22 05:32	12/29/22 02:55	1
6:2 FTS	<2.1		4.2	2.1	ng/L		12/22/22 05:32	12/29/22 02:55	1
8:2 FTS	<0.39		1.7	0.39	ng/L		12/22/22 05:32	12/29/22 02:55	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.34		1.7	0.34	ng/L		12/22/22 05:32	12/29/22 02:55	1
HFPO-DA (GenX)	<1.3		3.4	1.3	ng/L		12/22/22 05:32	12/29/22 02:55	1
F-53B Major	<0.20		1.7	0.20	ng/L		12/22/22 05:32	12/29/22 02:55	1
F-53B Minor	<0.27		1.7	0.27	ng/L		12/22/22 05:32	12/29/22 02:55	1
<b>Isotope Dilution</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
13C4 PFBA	67		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C5 PFPeA	86		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C2 PFHxA	89		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C4 PFHpA	90		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C4 PFOA	93		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C5 PFNA	97		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C2 PFDA	92		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C2 PFUnA	92		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C2 PFDoA	87		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C2 PFTeDA	86		25 - 150				12/22/22 05:32	12/29/22 02:55	1
13C3 PFBS	78		25 - 150				12/22/22 05:32	12/29/22 02:55	1

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# Client Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: FDUP-002**

**Lab Sample ID: 500-227062-3**

**Date Collected: 12/15/22 00:00**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	87		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C4 PFOS	82		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C8 FOSA	85		10 - 150	12/22/22 05:32	12/29/22 02:55	1
d3-NMeFOSAA	97		25 - 150	12/22/22 05:32	12/29/22 02:55	1
d5-NEtFOSAA	98		25 - 150	12/22/22 05:32	12/29/22 02:55	1
d-N-MeFOSA-M	74		10 - 150	12/22/22 05:32	12/29/22 02:55	1
d-N-EtFOSA-M	74		10 - 150	12/22/22 05:32	12/29/22 02:55	1
d7-N-MeFOSE-M	80		10 - 150	12/22/22 05:32	12/29/22 02:55	1
d9-N-EtFOSE-M	78		10 - 150	12/22/22 05:32	12/29/22 02:55	1
M2-4:2 FTS	163	*5+	25 - 150	12/22/22 05:32	12/29/22 02:55	1
M2-6:2 FTS	128		25 - 150	12/22/22 05:32	12/29/22 02:55	1
M2-8:2 FTS	127		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C3 HFPO-DA	91		25 - 150	12/22/22 05:32	12/29/22 02:55	1
13C2 10:2 FTS	130		25 - 150	12/22/22 05:32	12/29/22 02:55	1

# Client Sample Results

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: FB-002**

**Lab Sample ID: 500-227062-4**

**Date Collected: 12/15/22 11:05**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<2.5		5.3	2.5	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoropentanoic acid (PFPeA)	<0.52		2.1	0.52	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorohexanoic acid (PFHxA)	<0.61		2.1	0.61	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoroheptanoic acid (PFHpA)	<0.26		2.1	0.26	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorooctanoic acid (PFOA)	<0.90		2.1	0.90	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorononanoic acid (PFNA)	<0.29		2.1	0.29	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorodecanoic acid (PFDA)	<0.33		2.1	0.33	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoroundecanoic acid (PFUnA)	<1.2		2.1	1.2	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorododecanoic acid (PFDoA)	<0.58		2.1	0.58	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorotridecanoic acid (PFTriA)	<1.4		2.1	1.4	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorotetradecanoic acid (PFTeA)	<0.77		2.1	0.77	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorobutanesulfonic acid (PFBS)	<0.21		2.1	0.21	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoropentanesulfonic acid (PFPeS)	<0.32		2.1	0.32	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorohexanesulfonic acid (PFHxS)	<0.60		2.1	0.60	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.20		2.1	0.20	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorooctanesulfonic acid (PFOS)	<0.57		2.1	0.57	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorononanesulfonic acid (PFNS)	<0.39		2.1	0.39	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorodecanesulfonic acid (PFDS)	<0.34		2.1	0.34	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorododecanesulfonic acid (PFDoS)	<1.0		2.1	1.0	ng/L		12/22/22 05:32	12/29/22 03:05	1
Perfluorooctanesulfonamide (FOSA)	<1.0		2.1	1.0	ng/L		12/22/22 05:32	12/29/22 03:05	1
NEtFOSA	<0.92		2.1	0.92	ng/L		12/22/22 05:32	12/29/22 03:05	1
NMeFOSA	<0.45		2.1	0.45	ng/L		12/22/22 05:32	12/29/22 03:05	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.3		5.3	1.3	ng/L		12/22/22 05:32	12/29/22 03:05	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.4		5.3	1.4	ng/L		12/22/22 05:32	12/29/22 03:05	1
NMeFOSE	<1.5		4.2	1.5	ng/L		12/22/22 05:32	12/29/22 03:05	1
NEtFOSE	<0.90		2.1	0.90	ng/L		12/22/22 05:32	12/29/22 03:05	1
4:2 FTS	<0.25		2.1	0.25	ng/L		12/22/22 05:32	12/29/22 03:05	1
6:2 FTS	<2.6		5.3	2.6	ng/L		12/22/22 05:32	12/29/22 03:05	1
8:2 FTS	<0.49		2.1	0.49	ng/L		12/22/22 05:32	12/29/22 03:05	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.42		2.1	0.42	ng/L		12/22/22 05:32	12/29/22 03:05	1
HFPO-DA (GenX)	<1.6		4.2	1.6	ng/L		12/22/22 05:32	12/29/22 03:05	1
F-53B Major	<0.25		2.1	0.25	ng/L		12/22/22 05:32	12/29/22 03:05	1
F-53B Minor	<0.34		2.1	0.34	ng/L		12/22/22 05:32	12/29/22 03:05	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFBA	84		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C5 PFPeA	91		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C2 PFHxA	95		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C4 PFHpA	95		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C4 PFOA	93		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C5 PFNA	97		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C2 PFDA	98		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C2 PFUnA	102		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C2 PFDoA	92		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C2 PFTeDA	87		25 - 150				12/22/22 05:32	12/29/22 03:05	1
13C3 PFBS	85		25 - 150				12/22/22 05:32	12/29/22 03:05	1

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# Client Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: FB-002**  
**Date Collected: 12/15/22 11:05**  
**Date Received: 12/16/22 09:25**

**Lab Sample ID: 500-227062-4**  
**Matrix: Water**

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

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	90		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C4 PFOS	84		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C8 FOSA	87		10 - 150	12/22/22 05:32	12/29/22 03:05	1
d3-NMeFOSAA	105		25 - 150	12/22/22 05:32	12/29/22 03:05	1
d5-NEtFOSAA	102		25 - 150	12/22/22 05:32	12/29/22 03:05	1
d-N-MeFOSA-M	75		10 - 150	12/22/22 05:32	12/29/22 03:05	1
d-N-EtFOSA-M	76		10 - 150	12/22/22 05:32	12/29/22 03:05	1
d7-N-MeFOSE-M	81		10 - 150	12/22/22 05:32	12/29/22 03:05	1
d9-N-EtFOSE-M	82		10 - 150	12/22/22 05:32	12/29/22 03:05	1
M2-4:2 FTS	156	*5+	25 - 150	12/22/22 05:32	12/29/22 03:05	1
M2-6:2 FTS	127		25 - 150	12/22/22 05:32	12/29/22 03:05	1
M2-8:2 FTS	133		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C3 HFPO-DA	93		25 - 150	12/22/22 05:32	12/29/22 03:05	1
13C2 10:2 FTS	139		25 - 150	12/22/22 05:32	12/29/22 03:05	1



# Client Sample Results

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: AMB-001**

**Lab Sample ID: 500-227062-5**

**Date Collected: 12/15/22 11:40**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<2.2		4.6	2.2	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoropentanoic acid (PFPeA)	<0.45		1.9	0.45	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorohexanoic acid (PFHxA)	<0.54		1.9	0.54	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoroheptanoic acid (PFHpA)	<0.23		1.9	0.23	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorooctanoic acid (PFOA)	<0.79		1.9	0.79	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorononanoic acid (PFNA)	<0.25		1.9	0.25	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorodecanoic acid (PFDA)	<0.29		1.9	0.29	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoroundecanoic acid (PFUnA)	<1.0		1.9	1.0	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorododecanoic acid (PFDoA)	<0.51		1.9	0.51	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorotridecanoic acid (PFTriA)	<1.2		1.9	1.2	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorotetradecanoic acid (PFTeA)	<0.68		1.9	0.68	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorobutanesulfonic acid (PFBS)	<0.19		1.9	0.19	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoropentanesulfonic acid (PFPeS)	<0.28		1.9	0.28	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorohexanesulfonic acid (PFHxS)	<0.53		1.9	0.53	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.18		1.9	0.18	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorooctanesulfonic acid (PFOS)	<0.50		1.9	0.50	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorononanesulfonic acid (PFNS)	<0.34		1.9	0.34	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorodecanesulfonic acid (PFDS)	<0.30		1.9	0.30	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorododecanesulfonic acid (PFDoS)	<0.90		1.9	0.90	ng/L		12/22/22 05:32	12/29/22 03:15	1
Perfluorooctanesulfonamide (FOSA)	<0.91		1.9	0.91	ng/L		12/22/22 05:32	12/29/22 03:15	1
NEtFOSA	<0.81		1.9	0.81	ng/L		12/22/22 05:32	12/29/22 03:15	1
NMeFOSA	<0.40		1.9	0.40	ng/L		12/22/22 05:32	12/29/22 03:15	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.1		4.6	1.1	ng/L		12/22/22 05:32	12/29/22 03:15	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.2		4.6	1.2	ng/L		12/22/22 05:32	12/29/22 03:15	1
NMeFOSE	<1.3		3.7	1.3	ng/L		12/22/22 05:32	12/29/22 03:15	1
NEtFOSE	<0.79		1.9	0.79	ng/L		12/22/22 05:32	12/29/22 03:15	1
4:2 FTS	<0.22		1.9	0.22	ng/L		12/22/22 05:32	12/29/22 03:15	1
6:2 FTS	<2.3		4.6	2.3	ng/L		12/22/22 05:32	12/29/22 03:15	1
8:2 FTS	<0.43		1.9	0.43	ng/L		12/22/22 05:32	12/29/22 03:15	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.37		1.9	0.37	ng/L		12/22/22 05:32	12/29/22 03:15	1
HFPO-DA (GenX)	<1.4		3.7	1.4	ng/L		12/22/22 05:32	12/29/22 03:15	1
F-53B Major	<0.22		1.9	0.22	ng/L		12/22/22 05:32	12/29/22 03:15	1
F-53B Minor	<0.30		1.9	0.30	ng/L		12/22/22 05:32	12/29/22 03:15	1
Isotope Dilution	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
13C4 PFBA	89		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C5 PFPeA	97		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFHxA	93		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C4 PFHpA	101		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C4 PFOA	99		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C5 PFNA	103		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFDA	102		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFUnA	101		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFDoA	96		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C2 PFTeDA	95		25 - 150				12/22/22 05:32	12/29/22 03:15	1
13C3 PFBS	95		25 - 150				12/22/22 05:32	12/29/22 03:15	1

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# Client Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: AMB-001**

**Lab Sample ID: 500-227062-5**

**Date Collected: 12/15/22 11:40**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

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

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
18O2 PFHxS	95		25 - 150	12/22/22 05:32	12/29/22 03:15	1
13C4 PFOS	89		25 - 150	12/22/22 05:32	12/29/22 03:15	1
13C8 FOSA	94		10 - 150	12/22/22 05:32	12/29/22 03:15	1
d3-NMeFOSAA	103		25 - 150	12/22/22 05:32	12/29/22 03:15	1
d5-NEtFOSAA	113		25 - 150	12/22/22 05:32	12/29/22 03:15	1
d-N-MeFOSA-M	76		10 - 150	12/22/22 05:32	12/29/22 03:15	1
d-N-EtFOSA-M	75		10 - 150	12/22/22 05:32	12/29/22 03:15	1
d7-N-MeFOSE-M	88		10 - 150	12/22/22 05:32	12/29/22 03:15	1
d9-N-EtFOSE-M	87		10 - 150	12/22/22 05:32	12/29/22 03:15	1
M2-4:2 FTS	159	*5+	25 - 150	12/22/22 05:32	12/29/22 03:15	1
M2-6:2 FTS	139		25 - 150	12/22/22 05:32	12/29/22 03:15	1
M2-8:2 FTS	141		25 - 150	12/22/22 05:32	12/29/22 03:15	1
13C3 HFPO-DA	100		25 - 150	12/22/22 05:32	12/29/22 03:15	1
13C2 10:2 FTS	138		25 - 150	12/22/22 05:32	12/29/22 03:15	1

# Definitions/Glossary

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

## Qualifiers

### LCMS

Qualifier	Qualifier Description
*5+	Isotope dilution analyte is outside acceptance limits, high biased.
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	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: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

## LCMS

### Prep Batch: 641965

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-227062-1	RM-007D	Total/NA	Water	3535	
500-227062-2	RM-401XD	Total/NA	Water	3535	
500-227062-3	FDUP-002	Total/NA	Water	3535	
500-227062-4	FB-002	Total/NA	Water	3535	
500-227062-5	AMB-001	Total/NA	Water	3535	
MB 320-641965/1-A	Method Blank	Total/NA	Water	3535	
LCS 320-641965/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 320-641965/3-A	Lab Control Sample Dup	Total/NA	Water	3535	

### Analysis Batch: 643111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-227062-1	RM-007D	Total/NA	Water	537 (modified)	641965
500-227062-2	RM-401XD	Total/NA	Water	537 (modified)	641965
500-227062-3	FDUP-002	Total/NA	Water	537 (modified)	641965
500-227062-4	FB-002	Total/NA	Water	537 (modified)	641965
500-227062-5	AMB-001	Total/NA	Water	537 (modified)	641965
MB 320-641965/1-A	Method Blank	Total/NA	Water	537 (modified)	641965
LCS 320-641965/2-A	Lab Control Sample	Total/NA	Water	537 (modified)	641965
LCSD 320-641965/3-A	Lab Control Sample Dup	Total/NA	Water	537 (modified)	641965

# QC Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

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

**Lab Sample ID: MB 320-641965/1-A**  
**Matrix: Water**  
**Analysis Batch: 643111**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 641965**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanoic acid (PFBA)	<2.4		5.0	2.4	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluoropentanoic acid (PFPeA)	<0.49		2.0	0.49	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorohexanoic acid (PFHxA)	<0.58		2.0	0.58	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluoroheptanoic acid (PFHpA)	<0.25		2.0	0.25	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorooctanoic acid (PFOA)	<0.85		2.0	0.85	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorononanoic acid (PFNA)	<0.27		2.0	0.27	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorodecanoic acid (PFDA)	<0.31		2.0	0.31	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluoroundecanoic acid (PFUnA)	<1.1		2.0	1.1	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorododecanoic acid (PFDoA)	<0.55		2.0	0.55	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorotridecanoic acid (PFTriA)	<1.3		2.0	1.3	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorotetradecanoic acid (PFTeA)	<0.73		2.0	0.73	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorobutanesulfonic acid (PFBS)	<0.20		2.0	0.20	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluoropentanesulfonic acid (PFPeS)	<0.30		2.0	0.30	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorohexanesulfonic acid (PFHxS)	<0.57		2.0	0.57	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluoroheptanesulfonic acid (PFHpS)	<0.19		2.0	0.19	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorooctanesulfonic acid (PFOS)	<0.54		2.0	0.54	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorononanesulfonic acid (PFNS)	<0.37		2.0	0.37	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorodecanesulfonic acid (PFDS)	<0.32		2.0	0.32	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorododecanesulfonic acid (PFDoS)	<0.97		2.0	0.97	ng/L		12/22/22 05:32	12/28/22 23:52	1
Perfluorooctanesulfonamide (FOSA)	<0.98		2.0	0.98	ng/L		12/22/22 05:32	12/28/22 23:52	1
NEtFOSA	<0.87		2.0	0.87	ng/L		12/22/22 05:32	12/28/22 23:52	1
NMeFOSA	<0.43		2.0	0.43	ng/L		12/22/22 05:32	12/28/22 23:52	1
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	<1.2		5.0	1.2	ng/L		12/22/22 05:32	12/28/22 23:52	1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	<1.3		5.0	1.3	ng/L		12/22/22 05:32	12/28/22 23:52	1
NMeFOSE	<1.4		4.0	1.4	ng/L		12/22/22 05:32	12/28/22 23:52	1
NEtFOSE	<0.85		2.0	0.85	ng/L		12/22/22 05:32	12/28/22 23:52	1
4:2 FTS	<0.24		2.0	0.24	ng/L		12/22/22 05:32	12/28/22 23:52	1
6:2 FTS	<2.5		5.0	2.5	ng/L		12/22/22 05:32	12/28/22 23:52	1
8:2 FTS	<0.46		2.0	0.46	ng/L		12/22/22 05:32	12/28/22 23:52	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<0.40		2.0	0.40	ng/L		12/22/22 05:32	12/28/22 23:52	1
HFPO-DA (GenX)	<1.5		4.0	1.5	ng/L		12/22/22 05:32	12/28/22 23:52	1
F-53B Major	<0.24		2.0	0.24	ng/L		12/22/22 05:32	12/28/22 23:52	1
F-53B Minor	<0.32		2.0	0.32	ng/L		12/22/22 05:32	12/28/22 23:52	1

Isotope Dilution	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C4 PFBA	89		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C5 PFPeA	95		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C2 PFHxA	95		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C4 PFHpA	97		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C4 PFOA	95		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C5 PFNA	94		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C2 PFDA	94		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C2 PFUnA	97		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C2 PFDoA	93		25 - 150	12/22/22 05:32	12/28/22 23:52	1

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# QC Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

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

**Lab Sample ID: MB 320-641965/1-A**  
**Matrix: Water**  
**Analysis Batch: 643111**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 641965**

Isotope Dilution	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C2 PFTeDA	85		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C3 PFBS	87		25 - 150	12/22/22 05:32	12/28/22 23:52	1
18O2 PFHxS	92		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C4 PFOS	84		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C8 FOSA	85		10 - 150	12/22/22 05:32	12/28/22 23:52	1
d3-NMeFOSAA	94		25 - 150	12/22/22 05:32	12/28/22 23:52	1
d5-NEtFOSAA	105		25 - 150	12/22/22 05:32	12/28/22 23:52	1
d-N-MeFOSA-M	78		10 - 150	12/22/22 05:32	12/28/22 23:52	1
d-N-EtFOSA-M	79		10 - 150	12/22/22 05:32	12/28/22 23:52	1
d7-N-MeFOSE-M	84		10 - 150	12/22/22 05:32	12/28/22 23:52	1
d9-N-EtFOSE-M	81		10 - 150	12/22/22 05:32	12/28/22 23:52	1
M2-4:2 FTS	142		25 - 150	12/22/22 05:32	12/28/22 23:52	1
M2-6:2 FTS	114		25 - 150	12/22/22 05:32	12/28/22 23:52	1
M2-8:2 FTS	126		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C3 HFPO-DA	93		25 - 150	12/22/22 05:32	12/28/22 23:52	1
13C2 10:2 FTS	123		25 - 150	12/22/22 05:32	12/28/22 23:52	1

**Lab Sample ID: LCS 320-641965/2-A**  
**Matrix: Water**  
**Analysis Batch: 643111**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 641965**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec
							Limits
Perfluorobutanoic acid (PFBA)	40.0	41.1		ng/L		103	60 - 135
Perfluoropentanoic acid (PFPeA)	40.0	41.2		ng/L		103	60 - 135
Perfluorohexanoic acid (PFHxA)	40.0	40.5		ng/L		101	60 - 135
Perfluoroheptanoic acid (PFHpA)	40.0	40.3		ng/L		101	60 - 135
Perfluorooctanoic acid (PFOA)	40.0	39.8		ng/L		99	60 - 135
Perfluorononanoic acid (PFNA)	40.0	40.8		ng/L		102	60 - 135
Perfluorodecanoic acid (PFDA)	40.0	41.5		ng/L		104	60 - 135
Perfluoroundecanoic acid (PFUnA)	40.0	38.6		ng/L		96	60 - 135
Perfluorododecanoic acid (PFDoA)	40.0	45.1		ng/L		113	60 - 135
Perfluorotridecanoic acid (PFTriA)	40.0	43.1		ng/L		108	60 - 135
Perfluorotetradecanoic acid (PFTeA)	40.0	39.4		ng/L		99	60 - 135
Perfluorobutanesulfonic acid (PFBS)	35.5	33.4		ng/L		94	60 - 135
Perfluoropentanesulfonic acid (PFPeS)	37.6	36.6		ng/L		97	60 - 135
Perfluorohexanesulfonic acid (PFHxS)	36.5	34.3		ng/L		94	60 - 135
Perfluoroheptanesulfonic acid (PFHpS)	38.2	42.2		ng/L		111	60 - 135
Perfluorooctanesulfonic acid (PFOS)	37.2	38.0		ng/L		102	60 - 135
Perfluorononanesulfonic acid (PFNS)	38.5	39.9		ng/L		104	60 - 135
Perfluorodecanesulfonic acid (PFDS)	38.6	39.6		ng/L		103	60 - 135

Eurofins Chicago

# QC Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

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

**Lab Sample ID: LCS 320-641965/2-A**  
**Matrix: Water**  
**Analysis Batch: 643111**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 641965**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorododecanesulfonic acid (PFDoS)	38.8	39.1		ng/L		101	60 - 135
Perfluorooctanesulfonamide (FOSA)	40.0	41.5		ng/L		104	60 - 135
NEtFOSA	40.0	38.5		ng/L		96	60 - 135
NMeFOSA	40.0	42.1		ng/L		105	60 - 135
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	39.2		ng/L		98	60 - 135
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	39.6		ng/L		99	60 - 135
NMeFOSE	40.0	42.5		ng/L		106	60 - 135
NEtFOSE	40.0	39.8		ng/L		100	60 - 135
4:2 FTS	37.5	38.0		ng/L		101	60 - 135
6:2 FTS	38.1	39.7		ng/L		104	60 - 135
8:2 FTS	38.4	37.1		ng/L		97	60 - 135
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	47.2		ng/L		125	60 - 135
HFPO-DA (GenX)	40.0	40.1		ng/L		100	60 - 135
F-53B Major	37.4	39.3		ng/L		105	60 - 135
F-53B Minor	37.8	40.7		ng/L		108	60 - 135

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C4 PFBA	82		25 - 150
13C5 PFPeA	86		25 - 150
13C2 PFHxA	92		25 - 150
13C4 PFHpA	91		25 - 150
13C4 PFOA	94		25 - 150
13C5 PFNA	90		25 - 150
13C2 PFDA	90		25 - 150
13C2 PFUnA	93		25 - 150
13C2 PFDoA	84		25 - 150
13C2 PFTeDA	82		25 - 150
13C3 PFBS	87		25 - 150
18O2 PFHxS	87		25 - 150
13C4 PFOS	79		25 - 150
13C8 FOSA	81		10 - 150
d3-NMeFOSAA	95		25 - 150
d5-NEtFOSAA	100		25 - 150
d-N-MeFOSA-M	62		10 - 150
d-N-EtFOSA-M	65		10 - 150
d7-N-MeFOSE-M	75		10 - 150
d9-N-EtFOSE-M	72		10 - 150
M2-4:2 FTS	121		25 - 150
M2-6:2 FTS	115		25 - 150
M2-8:2 FTS	114		25 - 150
13C3 HFPO-DA	90		25 - 150
13C2 10:2 FTS	119		25 - 150

# QC Sample Results

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

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

**Lab Sample ID: LCSD 320-641965/3-A**  
**Matrix: Water**  
**Analysis Batch: 643111**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 641965**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec		RPD	Limit
							Limits	RPD		
Perfluorobutanoic acid (PFBA)	40.0	40.1		ng/L		100	60 - 135	2	30	
Perfluoropentanoic acid (PFPeA)	40.0	39.7		ng/L		99	60 - 135	4	30	
Perfluorohexanoic acid (PFHxA)	40.0	40.2		ng/L		100	60 - 135	1	30	
Perfluoroheptanoic acid (PFHpA)	40.0	41.6		ng/L		104	60 - 135	3	30	
Perfluorooctanoic acid (PFOA)	40.0	41.9		ng/L		105	60 - 135	5	30	
Perfluorononanoic acid (PFNA)	40.0	41.7		ng/L		104	60 - 135	2	30	
Perfluorodecanoic acid (PFDA)	40.0	38.9		ng/L		97	60 - 135	6	30	
Perfluoroundecanoic acid (PFUnA)	40.0	40.4		ng/L		101	60 - 135	5	30	
Perfluorododecanoic acid (PFDoA)	40.0	45.0		ng/L		112	60 - 135	0	30	
Perfluorotridecanoic acid (PFTriA)	40.0	42.4		ng/L		106	60 - 135	2	30	
Perfluorotetradecanoic acid (PFTeA)	40.0	39.4		ng/L		99	60 - 135	0	30	
Perfluorobutanesulfonic acid (PFBS)	35.5	35.6		ng/L		100	60 - 135	6	30	
Perfluoropentanesulfonic acid (PFPeS)	37.6	38.7		ng/L		103	60 - 135	6	30	
Perfluorohexanesulfonic acid (PFHxS)	36.5	35.4		ng/L		97	60 - 135	3	30	
Perfluoroheptanesulfonic acid (PFHpS)	38.2	43.0		ng/L		113	60 - 135	2	30	
Perfluorooctanesulfonic acid (PFOS)	37.2	38.6		ng/L		104	60 - 135	2	30	
Perfluorononanesulfonic acid (PFNS)	38.5	39.3		ng/L		102	60 - 135	2	30	
Perfluorodecanesulfonic acid (PFDS)	38.6	41.9		ng/L		109	60 - 135	6	30	
Perfluorododecanesulfonic acid (PFDoS)	38.8	40.9		ng/L		105	60 - 135	4	30	
Perfluorooctanesulfonamide (FOSA)	40.0	40.6		ng/L		102	60 - 135	2	30	
NEtFOSA	40.0	42.0		ng/L		105	60 - 135	9	30	
NMeFOSA	40.0	40.7		ng/L		102	60 - 135	3	30	
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	40.0	41.6		ng/L		104	60 - 135	6	30	
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	40.0	40.4		ng/L		101	60 - 135	2	30	
NMeFOSE	40.0	44.1		ng/L		110	60 - 135	4	30	
NEtFOSE	40.0	40.2		ng/L		101	60 - 135	1	30	
4:2 FTS	37.5	36.4		ng/L		97	60 - 135	4	30	
6:2 FTS	38.1	39.6		ng/L		104	60 - 135	0	30	
8:2 FTS	38.4	39.5		ng/L		103	60 - 135	6	30	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.8	47.1		ng/L		125	60 - 135	0	30	
HFPO-DA (GenX)	40.0	40.2		ng/L		100	60 - 135	0	30	
F-53B Major	37.4	40.1		ng/L		107	60 - 135	2	30	
F-53B Minor	37.8	42.2		ng/L		112	60 - 135	4	30	

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
<sup>13</sup> C4 PFBA	90		25 - 150



# QC Sample Results

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

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

Lab Sample ID: LCSD 320-641965/3-A  
 Matrix: Water  
 Analysis Batch: 643111

Client Sample ID: Lab Control Sample Dup  
 Prep Type: Total/NA  
 Prep Batch: 641965

Isotope Dilution	LCSD		Limits
	%Recovery	Qualifier	
13C5 PFPeA	96		25 - 150
13C2 PFHxA	96		25 - 150
13C4 PFHpA	95		25 - 150
13C4 PFOA	97		25 - 150
13C5 PFNA	100		25 - 150
13C2 PFDA	98		25 - 150
13C2 PFUnA	95		25 - 150
13C2 PFDoA	91		25 - 150
13C2 PFTeDA	91		25 - 150
13C3 PFBS	91		25 - 150
18O2 PFHxS	91		25 - 150
13C4 PFOS	84		25 - 150
13C8 FOSA	90		10 - 150
d3-NMeFOSAA	98		25 - 150
d5-NEtFOSAA	106		25 - 150
d-N-MeFOSA-M	82		10 - 150
d-N-EtFOSA-M	80		10 - 150
d7-N-MeFOSE-M	80		10 - 150
d9-N-EtFOSE-M	81		10 - 150
M2-4:2 FTS	141		25 - 150
M2-6:2 FTS	116		25 - 150
M2-8:2 FTS	114		25 - 150
13C3 HFPO-DA	93		25 - 150
13C2 10:2 FTS	118		25 - 150

# Lab Chronicle

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

**Client Sample ID: RM-007D**

**Lab Sample ID: 500-227062-1**

**Date Collected: 12/15/22 12:08**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3535			641965	HJA	EET SAC	12/22/22 05:32
Total/NA	Analysis	537 (modified)		1	643111	KCO	EET SAC	12/29/22 02:34

**Client Sample ID: RM-401XD**

**Lab Sample ID: 500-227062-2**

**Date Collected: 12/15/22 13:57**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3535			641965	HJA	EET SAC	12/22/22 05:32
Total/NA	Analysis	537 (modified)		1	643111	KCO	EET SAC	12/29/22 02:45

**Client Sample ID: FDUP-002**

**Lab Sample ID: 500-227062-3**

**Date Collected: 12/15/22 00:00**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3535			641965	HJA	EET SAC	12/22/22 05:32
Total/NA	Analysis	537 (modified)		1	643111	KCO	EET SAC	12/29/22 02:55

**Client Sample ID: FB-002**

**Lab Sample ID: 500-227062-4**

**Date Collected: 12/15/22 11:05**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3535			641965	HJA	EET SAC	12/22/22 05:32
Total/NA	Analysis	537 (modified)		1	643111	KCO	EET SAC	12/29/22 03:05

**Client Sample ID: AMB-001**

**Lab Sample ID: 500-227062-5**

**Date Collected: 12/15/22 11:40**

**Matrix: Water**

**Date Received: 12/16/22 09:25**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	3535			641965	HJA	EET SAC	12/22/22 05:32
Total/NA	Analysis	537 (modified)		1	643111	KCO	EET SAC	12/29/22 03:15

**Laboratory References:**

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

# Accreditation/Certification Summary

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

## Laboratory: Eurofins Sacramento

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Wisconsin	State	998204680	08-31-23

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16



# Login Sample Receipt Checklist

Client: TRC Environmental Corporation

Job Number: 500-227062-1

**Login Number: 227062**

**List Number: 2**

**Creator: Her, David A**

**List Source: Eurofins Sacramento**

**List Creation: 12/19/22 09:40 AM**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	2110710
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	2.5 c
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



500-227062 Field Sheet

Tracking #: 6155 6317 2992

Job: \_\_\_\_\_

SO / PO / FO / SAT / 2-Day / Ground / UPS / CDO / Courier  
GSO / OnTrac / Goldstreak / USPS / Other \_\_\_\_\_

Use this form to record Sample Custody Seal, Cooler Custody Seal, Temperature & corrected Temperature & other observations.  
File in the job folder with the COC.

Therm. ID: <u>L-02</u> Corr. Factor: (+/-) _____ °C	Notes: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
Ice <input checked="" type="checkbox"/> Wet <input checked="" type="checkbox"/> Gel _____    Other _____	
Cooler Custody Seal: <u>2110710</u>	
Cooler ID: _____	
Temp Observed: <u>25</u> °C    Corrected: <u>2.5</u> °C	
From: Temp Blank <input type="checkbox"/> Sample <input checked="" type="checkbox"/>	
<b>Opening/Processing The Shipment</b> <b>Yes</b> <b>No</b> <b>NA</b>	
Cooler compromised/tampered with? <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
Cooler Temperature is acceptable? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Frozen samples show signs of thaw? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	
Initials: <u>DL</u> Date: <u>12/16/22</u>	
<b>Unpacking/Labeling The Samples</b> <b>Yes</b> <b>No</b> <b>NA</b>	Trizma Lot #(s): _____ _____ _____
COC is complete w/o discrepancies? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Samples compromised/tampered with? <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
Containers are not broken or leaking? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Sample custody seal? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	
Sample containers have legible labels? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Sample date/times are provided? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Appropriate containers are used? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Sample bottles are completely filled? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Sample preservatives verified? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	
Is the Field Sampler's name on COC? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Samples require splitting/compositing? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	
Samples w/o discrepancies? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Zero headspace?* <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	<b>Login Completion</b> <b>Yes</b> <b>No</b> <b>NA</b> Receipt Temperature on COC? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Samples received within hold time? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> NCM Filed? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> Log Release checked in TALS? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Alkalinity has no headspace? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	
Perchlorate has headspace? <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (Methods 314, 331, 6850)	
Multiphasic samples are not present? <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Initials: <u>DL</u> Date: <u>12/16/22</u>	Initials: <u>DL</u> Date: <u>12/16/22</u>



# Isotope Dilution Summary

Client: TRC Environmental Corporation  
 Project/Site: Lemberger Landfill

Job ID: 500-227062-1

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

Matrix: Water

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFBA (25-150)	PFPeA (25-150)	PFHxA (25-150)	C4PFHA (25-150)	PFOA (25-150)	PFNA (25-150)	PFDA (25-150)	PFUnA (25-150)
500-227062-1	RM-007D	64	81	87	89	90	89	88	89
500-227062-2	RM-401XD	79	88	90	98	94	96	93	96
500-227062-3	FDUP-002	67	86	89	90	93	97	92	92
500-227062-4	FB-002	84	91	95	95	93	97	98	102
500-227062-5	AMB-001	89	97	93	101	99	103	102	101
LCS 320-641965/2-A	Lab Control Sample	82	86	92	91	94	90	90	93
LCSD 320-641965/3-A	Lab Control Sample Dup	90	96	96	95	97	100	98	95
MB 320-641965/1-A	Method Blank	89	95	95	97	95	94	94	97

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	PFDaA (25-150)	PFTDA (25-150)	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	PFOSA (10-150)	d3NMFOS (25-150)	d5NEFOS (25-150)
500-227062-1	RM-007D	79	81	73	81	75	79	90	90
500-227062-2	RM-401XD	89	88	83	86	83	90	94	98
500-227062-3	FDUP-002	87	86	78	87	82	85	97	98
500-227062-4	FB-002	92	87	85	90	84	87	105	102
500-227062-5	AMB-001	96	95	95	95	89	94	103	113
LCS 320-641965/2-A	Lab Control Sample	84	82	87	87	79	81	95	100
LCSD 320-641965/3-A	Lab Control Sample Dup	91	91	91	91	84	90	98	106
MB 320-641965/1-A	Method Blank	93	85	87	92	84	85	94	105

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	dMeFOSA (10-150)	dEtFOSA (10-150)	NMFM (10-150)	NEFM (10-150)	M242FTS (25-150)	M262FTS (25-150)	M282FTS (25-150)	HFPODA (25-150)
500-227062-1	RM-007D	69	69	78	72	139	121	115	83
500-227062-2	RM-401XD	81	80	79	81	133	126	126	95
500-227062-3	FDUP-002	74	74	80	78	163 *5+	128	127	91
500-227062-4	FB-002	75	76	81	82	156 *5+	127	133	93
500-227062-5	AMB-001	76	75	88	87	159 *5+	139	141	100
LCS 320-641965/2-A	Lab Control Sample	62	65	75	72	121	115	114	90
LCSD 320-641965/3-A	Lab Control Sample Dup	82	80	80	81	141	116	114	93
MB 320-641965/1-A	Method Blank	78	79	84	81	142	114	126	93

		Percent Isotope Dilution Recovery (Acceptance Limits)							
Lab Sample ID	Client Sample ID	M102FTS (25-150)							
500-227062-1	RM-007D	113							
500-227062-2	RM-401XD	117							
500-227062-3	FDUP-002	130							
500-227062-4	FB-002	139							
500-227062-5	AMB-001	138							
LCS 320-641965/2-A	Lab Control Sample	119							
LCSD 320-641965/3-A	Lab Control Sample Dup	118							
MB 320-641965/1-A	Method Blank	123							

### Surrogate Legend

- PFBA = 13C4 PFBA
- PFPeA = 13C5 PFPeA
- PFHxA = 13C2 PFHxA
- C4PFHA = 13C4 PFHpA
- PFOA = 13C4 PFOA
- PFNA = 13C5 PFNA

# Isotope Dilution Summary

Client: TRC Environmental Corporation  
Project/Site: Lemberger Landfill

Job ID: 500-227062-1

PFDA = 13C2 PFDA  
PFUnA = 13C2 PFUnA  
PFDoA = 13C2 PFDoA  
PFTDA = 13C2 PFTeDA  
C3PFBS = 13C3 PFBS  
PFHxS = 18O2 PFHxS  
PFOS = 13C4 PFOS  
PFOSA = 13C8 FOSA  
d3NMFOS = d3-NMeFOSAA  
d5NEFOS = d5-NEtFOSAA  
dMeFOSA = d-N-MeFOSA-M  
dEtFOSA = d-N-EtFOSA-M  
NMFm = d7-N-MeFOSE-M  
NEFM = d9-N-EtFOSE-M  
M242FTS = M2-4:2 FTS  
M262FTS = M2-6:2 FTS  
M282FTS = M2-8:2 FTS  
HFPODA = 13C3 HFPO-DA  
M102FTS = 13C2 10:2 FTS

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