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Complex Sites Project Manager – Remediation and Redevelopment Program  
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Date: June 18, 2021  
BRRTS #: 02-38-580694  
Subject: Collected Foam Cause and Significance Evaluation, Tyco Fire  
Technology Center PFAS  
2700 Industrial Parkway South, Marinette, Wisconsin

Dear Ms. Sellwood,

On behalf of Tyco Fire Products LP (Tyco), Arcadis is providing this cause and significance evaluation of foam collected in the study area ditches as part of the sample results notification for waste characterization and disposal activities related to the Tyco Fire Technology Center (FTC) per- or polyfluoroalkyl substances (PFAS) site located at 2700 Industrial Parkway South in Marinette, Wisconsin (Site).

Consistent with the Revised Foam Monitoring Work Plan submitted in April 2021, Tyco monitored area ditches beginning in March to observe the cessation of freezing conditions in the ditches, at which point Tyco installed booms to capture foam on the water surface of ditches. Each boom is monitored for foam collection daily and when foam is observed, it is documented and removed. In 2021, a boom was deployed in Ditch B on March 19 and booms were deployed in the ditches A, C, D, and E on April 1. Tyco will continue maintaining and monitoring booms in ditches daily during the calendar year to capture and remove foam until the ditches begin to freeze in winter at which time the booms will be removed. Booms will be re-deployed in 2022 following the cessation of freezing conditions.

Between March 19, 2021 and May 19, 2021, a total of approximately 57 gallons of uncollapsed foam was skimmed from the surface water using a pool skimmer at the booms located in Ditch B and Ditch C. That foam was stored on Tyco property in a leak proof, 55-gallon drum where it collapsed to approximately 4.5 gallons of liquid. Waste characterization samples were analyzed for PFAS and the liquid from collapsed foam was sent off site for disposal at a permitted facility outside the state of Wisconsin on June 15, 2021. Final documentation of disposal will be provided to the Wisconsin Department of Natural Resources (WDNR) when available.



*Foam observed and collected from Ditch B 5/13/2021*

The cause of some PFAS in the collected foam is attributable to Tyco's historic operations at the FTC and the remainder is due to PFAS that is ubiquitous in the environment<sup>1,2</sup>. Investigation and modeling data demonstrate that PFAS is migrating through groundwater from the FTC to the east where it can upwell to surface water resulting in detectable concentrations within the surface water. Tyco has been monitoring the surface water in area ditches since 2018 as part of the site investigation process. The PFAS concentrations in foam are predictably higher than the concentrations in groundwater or surface water due to the physical properties of PFAS at the molecular level as discussed in more detail below.

#### **PFAS and Foam**

When leaves, twigs, or other organic substances in water begin to decay, they release organic compounds that reduce the surface tension of the water. When that water is agitated by flow patterns, wind, waves, or other influences, air is introduced to the system which allows bubbles to form and congregate as a naturally occurring foam. Naturally occurring foam frequently collects on the surface of ditches, streams, rivers and lakes<sup>3</sup>. The presence and concentration of PFAS in foam is impossible to detect with the naked eye. In

instances where PFAS are present in the water, the foam has been found to accumulate PFAS at higher concentrations than is present in the water. This effect has been demonstrated within the State of Wisconsin at Starkweather Creek and in the City of Peshtigo at a dam within the Peshtigo River where WDNR collected simultaneous samples of foam and surface water for PFAS analyses. The table below demonstrates some of the results posted by WDNR related to those analyses<sup>3,4</sup>:

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<sup>1</sup> <https://www.epa.gov/sciencematters/understanding-pfas-environment>

<sup>2</sup> Rankin, K., Mabury, S.A., Jenkins, T.M. and Washington, J.W., 2016. A North American and global survey of perfluoroalkyl substances in surface soils: Distribution patterns and mode of occurrence. *Chemosphere*, 161, pp.333-341

<sup>3</sup> [DNR Confirms PFAS-Containing Foam Found at the Mouth of Starkweather Creek and Lake Monona News Release - Wisconsin DNR](#)

<sup>4</sup> [DNR Confirms PFAS-Containing Foam Found in Peshtigo Area Waterways News Release - Wisconsin DNR](#)

Location Date	Media	PFOA (parts per trillion)	PFOS (parts per trillion)
Olbrich Boat Launch 10/25/2019	Surface Water	9.5-10	400
Olbrich Boat Launch 10/25/2019	Foam	460-610	80,000-92,000*
Below City of Peshtigo Dam 9/18/2019	Surface Water	2.1	6.2
Below City of Peshtigo Dam 9/18/2019	Foam	230	17,000

\* Approximate values

In all instances, the concentration of PFAS in foam was amplified as compared to the concentrations of PFAS in the underlying surface water. However, the concentration of PFAS in surface water cannot be used to accurately estimate the concentration of PFAS in foam. As an example, PFOS concentrations were amplified by between 200 and 2,700 times in these reported samples compared to the concentrations of PFOS in the underlying surface water. As summarized in the table below, the increase in concentrations has been observed to be even greater in similar studies conducted by the State of Michigan where the observed PFAS concentrations in surface water were compared to PFAS concentrations in foam<sup>5</sup>.

Location Date	Media	PFOA (parts per trillion)	PFOS (parts per trillion)
Rogue River 06 12/3/2019	Surface Water	4.3	29.8
Rogue River 06 12/3/2019	Foam	1,630	97,000
Thornapple River 09 1/3/2020	Surface Water	Not Detected	0.82
Thornapple River 09 1/3/2020	Foam	645	9,590
Huron River 05 11/22/2019	Surface Water	4.54	78.4
Huron River 05 11/22/2019	Foam	439	121,000

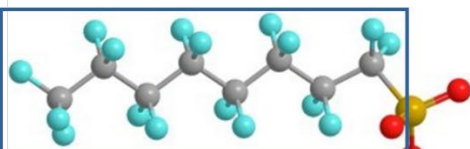
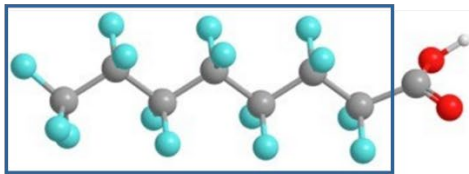
<sup>5</sup> [Surface Water Foam Study Report \(michigan.gov\)](http://www.michigan.gov/surface-water-foam-study-report)

The composition of PFAS varies from surface water to foam. In the WDNR samples listed above, there were approximately 8.3 parts per trillion (ppt) of PFOA and PFOS in the surface water at the Peshtigo River Dam. That represents a composition of approximately 25% PFOA and 75% PFOS. The foam at the same location contained approximately 17,230 ppt of PFOA and PFOS and a composition of 1% PFOA and 99% PFOS. The variance is less significant at the Olbrich Boat Launch location where the amount of PFOA in the surface water is 2% of the total volume of PFOA and PFOS while it drops to less than 1% PFOA and more than 99% PFOS in the foam. Samples collected in the State of Michigan demonstrated similar changes in composition from surface water results to foam results. In the samples collected from surface water at the influent of the Ditch B treatment system on May 4, 2021, PFOA represented 94% of the total of PFOA and PFOS. In the waste characterization sample from collapsed foam collected from Ditches B and C, PFOA represented only 26%. Due to the physical properties of PFAS molecules as described below, the ratio of PFAS compounds within foam varies compared to that of the ratio of PFAS compounds within underlying surface water.

The average concentration of PFOA in Ditch B is currently approximately 2,000 parts per trillion (ppt) while the average concentration of PFOS is approximately 130 ppt. The concentrations of PFOA and PFOS in the collapsed foam were 23,000 ppt for PFOA and 64,000 ppt for PFOS (**Table 1** and **Attachment 1**). As WDNR has previously observed in other locations within the state, PFAS concentrations in the foam have been measured to be 2,700 times higher than PFAS concentrations in surface water demonstrating the accumulation of PFAS in foam<sup>3,4</sup>.

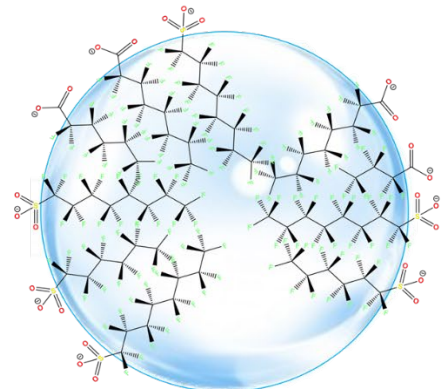
At a molecular level, PFAS collect at the air-water interface of bubbles<sup>3,4</sup> with PFAS suspended partially inside and partially outside the bubble. The figure below illustrates the molecular structure of PFOA and PFOS. PFAS molecules have two portions, one portion is water soluble with carbon atoms saturated with fluorine (the boxed portion in the figure below) while the smaller portion, which can be referred to as the “tail” is considered insoluble. When bubbles are created in water containing PFAS, the PFAS accumulates in the film of the bubble. The soluble portion of PFAS resides in the water portion in the film of the bubble, while the tail remains just outside the film.

**PFOA – 7 carbon atoms are saturated with fluorine**



**PFOS - 8 carbon atoms are saturated with fluorine**

PFOA and PFOS have unique properties which cause them to collect in the surface of bubbles. PFOS has more fluorine and concentrates more than PFOA





Ms. Alyssa Sellwood, P.E.  
Wisconsin Department of Natural Resources  
June 18, 2021

The significance of the results includes:

1. Foam is naturally occurring in the environment
2. Some PFAS in the collected foam comes from historic FTC operations, the remainder is ubiquitous in the environment<sup>1,2</sup>
3. PFAS concentrations amplify in foam
4. Collecting and properly disposing of foams also removes PFAS from the environment because PFAS aggregates in foam

## ADVISORY

### Possible Chemical Exposure Hazard

This water contains PFAS  
(per- and poly-fluoroalkyl substance)

The Wisconsin Department of Health Services recommends that to best protect you, your family, and your pets from potential PFAS exposure:

- Avoid drinking or accidentally swallowing the water or foam.
- Wash your hands after wading or playing in the water or foam.
- Rinse pets after contact with water or foam to avoid swallowing surface water that may be on their fur.

Touching the water or foam is not a health concern.

This surface water is currently being investigated and cleaned up in accordance with Wisconsin laws.

For more information:

- WI Dept of Natural Resources website:  
<http://dnr.wi.gov/topic/contaminants/marinette.html>
- WI Dept of Natural Resources and Dept of Health Services:  
(888) 626-3244

The results reported here and other results referenced demonstrate the science underpinning some emerging PFAS remediation approaches. Specifically, recognizing the strong affinity of PFAS for foam, research groups and private industry are developing techniques to introduce bubbles and foaming agents to PFAS-impacted waters as a means of capturing and removing PFAS. This technology works due to the physical properties of PFAS as explained above, therefore the results presented indicating elevated concentrations of PFAS in foam are expected.

The Groundwater Extraction and Treatment System (GETS) is being constructed and implemented to improve surface water concentrations of PFAS in Ditch B and foam that is collected will continue to be monitored over time.

Tyco posted signs advising the public not to drink, play, or swim in the foam at multiple locations in the City of Marinette. Tyco also offered signs to homeowners with private ponds and select private property owners along area ditches. Tyco will work with WDNR to identify additional locations to augment the existing advisory sign network installed along the ditches as necessary.

*Advisory sign posted in Marinette, WI*

Sincerely,  
Arcadis U.S., Inc.



Scott T. Potter, PhD  
Chief Hydrogeologist

Copies:

Bridget Kelly  
Jeff Danko  
Scott Wahl

Enclosures: Table 1 Foam Sample Results; Attachment 1 Laboratory Reports

Table 1 - Sample Results

		Location	DRUM 1
		Sample ID	DRUM 1 (051921)
		Sample Date	5/19/2021
		Sample Type	N
Lab EDD Chemical Name	Units		
Perfluorobutanoic acid (PFBA)	ng/l	< 5000 U	
Perfluoropentanoic acid (PFPeA)	ng/l	540 J	
Perfluoro-n-hexadecanoic acid (PFHxDA)	ng/l	< 2000 U	
Perfluoroheptanoic acid (PFHpA)	ng/l	1300 J	
Perfluorooctanoic acid (PFOA)	ng/l	23000	
Perfluorononanoic acid (PFNA)	ng/l	15000	
Perfluorodecanoic acid (PFDA)	ng/l	4200	
Perfluoroundecanoic acid (PFUnA)	ng/l	2100	
Perfluorododecanoic acid (PFDoA)	ng/l	< 2000 U	
Perfluorotridecanoic acid (PFTriA)	ng/l	< 2000 U	
Perfluorotetradecanoic acid (PFTeA)	ng/l	< 2000 U	
Perfluorohexanoic acid (PFHxA)	ng/l	3400	
Perfluoro-n-octadecanoic acid (PFODA)	ng/l	< 2000 U	
Perfluorobutanesulfonic acid (PFBS)	ng/l	< 2000 U	
Perfluoropentanesulfonic acid (PFPeS)	ng/l	< 2000 U	
Perfluorohexanesulfonic acid (PFHxS)	ng/l	< 2000 U	
Perfluoroheptanesulfonic Acid (PFHpS)	ng/l	240 J	
Perfluorooctanesulfonic acid (PFOS)	ng/l	64000	
Perfluorononanesulfonic acid (PFNS)	ng/l	< 2000 U	
Perfluorodecanesulfonic acid (PFDS)	ng/l	< 2000 U	
Perfluorododecanesulfonic acid (PFDoS)	ng/l	< 2000 U	
Perfluorooctanesulfonamide (FOSA)	ng/l	7900	
NEtFOSA	ng/l	< 2000 U	
NMeFOSA	ng/l	< 2000 U	
NMeFOSAA	ng/l	< 5000 U	
NEtFOSAA	ng/l	4500 J	
NMeFOSE	ng/l	< 4000 U	
NEtFOSE	ng/l	< 2000 U	
4:2 FTS	ng/l	< 2000 U	
6:2 FTS	ng/l	47000	
8:2 FTS	ng/l	45000 J-	
10:2 FTS	ng/l	< 2000 U	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ng/l	< 2000 U	
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	ng/l	< 4000 U	
F-53B Major	ng/l	< 2000 U	
F-53B Minor	ng/l	< 2000 U	
Arsenic	ug/l	19	
Barium	ug/l	450	
Cadmium	ug/l	< 2.5 U	
Chromium	ug/l	14 J	
Lead	ug/l	3.6	
Selenium	ug/l	< 13 U	
Silver	ug/l	< 2.5 U	
Mercury	ug/l	< 0.20 U	

**Notes:**

< = Compound not detected at reporting detection limit.

-- = No standard

N = Normal sample

ng/l = nanograms per liter

ug/l = micrograms per liter

**Data Qualifier:**

U = The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity. The associated numerical value is expected to have a negative or low bias.

## ANALYTICAL REPORT

Eurofins TestAmerica, Chicago  
2417 Bond Street  
University Park, IL 60484  
Tel: (708)534-5200

Laboratory Job ID: 500-199411-1

Client Project/Site: Marinette, WI 30015296.00016 Collapsed  
Foam

For:  
ARCADIS U.S., Inc.  
126 North Jefferson Street  
Suite 400  
Milwaukee, Wisconsin 53202

Attn: Lisa Rutkowski



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Authorized for release by:  
5/28/2021 10:56:36 AM

Sandie Fredrick, Project Manager II  
(920)261-1660  
[sandra.fredrick@eurofinset.com](mailto:sandra.fredrick@eurofinset.com)

### LINKS

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*The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

Client: ARCADIS U.S., Inc.  
Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

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## Job ID: 500-199411-1

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Laboratory: Eurofins TestAmerica, Chicago

### Narrative

#### Job Narrative 500-199411-1

#### Comments

No additional comments.

#### Receipt

The sample was received on 5/20/2021 9:20 AM. Unless otherwise noted below, the sample arrived in good condition, and where required, properly preserved and on ice. The temperature of the cooler at receipt was 1.6° C.

#### Metals

Method 6020A: The following sample was diluted due to the nature of the sample matrix: Drum 1 (500-199411-1). Elevated reporting limits (RLs) are provided.

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

#### LCMS

Method 537 (modified): Isotope Dilution Analyte (IDA) recovery is above the method recommended limit for M2-8:2 FTS in the following sample: Drum 1 (500-199411-1). The sample was re-analyzed with concurring results. As a result, the data may be potentially low biased for 8:2 FTS. The client was contacted and gave permission to report.

Method 537 (modified): Results for sample Drum 1 (500-199411-1) was reported from the analysis of a diluted extract due to high concentration of target analytes. The dilution factor was applied to the labeled internal standard area counts and these area counts were within acceptance limits.

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 320-492294. 3535-PFC Aqueous

Method 3535: Due to the matrix, the initial volume used for the following sample deviated from the standard procedure: Drum 1 (500-199411-1). A 10x dilution was made on the sample, then fortified with IDA and extracted. The reporting limits (RLs) have been adjusted proportionately. preparation batch 320-492294 3535\_PFC\_28D Aqueous

Method 3535: Sample is Brown in color and opaque. Sample has a moderate amount of sediment. Drum 1 (500-199411-1) preparation batch 320-492294 3535\_PFC\_28D Aqueous

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

# Detection Summary

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

**Client Sample ID: Drum 1**

**Lab Sample ID: 500-199411-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoropentanoic acid (PFPeA)	540	J	2000	490	ng/L	100		537 (modified)	Total/NA
Perfluorohexanoic acid (PFHxA)	3400		2000	580	ng/L	100		537 (modified)	Total/NA
Perfluoroheptanoic acid (PFHpA)	1300	J	2000	250	ng/L	100		537 (modified)	Total/NA
Perfluorooctanoic acid (PFOA)	23000		2000	850	ng/L	100		537 (modified)	Total/NA
Perfluorononanoic acid (PFNA)	15000		2000	270	ng/L	100		537 (modified)	Total/NA
Perfluorodecanoic acid (PFDA)	4200		2000	310	ng/L	100		537 (modified)	Total/NA
Perfluoroundecanoic acid (PFUnA)	2100		2000	1100	ng/L	100		537 (modified)	Total/NA
Perfluoroheptanesulfonic Acid (PFHpS)	240	J	2000	190	ng/L	100		537 (modified)	Total/NA
Perfluorooctanesulfonic acid (PFOS)	64000		2000	540	ng/L	100		537 (modified)	Total/NA
Perfluorooctanesulfonamide (FOSA)	7900		2000	980	ng/L	100		537 (modified)	Total/NA
NEtFOSAA	4500	J	5000	1300	ng/L	100		537 (modified)	Total/NA
6:2 FTS	47000		5000	2500	ng/L	100		537 (modified)	Total/NA
8:2 FTS	45000		2000	460	ng/L	100		537 (modified)	Total/NA
Arsenic	19		5.0	1.2	ug/L	5		6020A	Total Recoverable
Barium	450		13	3.7	ug/L	5		6020A	Total Recoverable
Chromium	14	J	25	5.7	ug/L	5		6020A	Total Recoverable
Lead	3.6		2.5	0.93	ug/L	5		6020A	Total Recoverable

This Detection Summary does not include radiochemical test results.

Eurofins TestAmerica, Chicago

# Method Summary

Client: ARCADIS U.S., Inc.  
Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

Method	Method Description	Protocol	Laboratory
537 (modified)	Fluorinated Alkyl Substances	EPA	TAL SAC
6020A	Metals (ICP/MS)	SW846	TAL CHI
7470A	Mercury (CVAA)	SW846	TAL CHI
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL CHI
3535	Solid-Phase Extraction (SPE)	SW846	TAL SAC
7470A	Preparation, Mercury	SW846	TAL CHI

#### 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:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

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

# Sample Summary

Client: ARCADIS U.S., Inc.  
Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

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Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-199411-1	Drum 1	Water	05/19/21 13:05	05/20/21 09:20	

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# Client Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

**Client Sample ID: Drum 1**

**Lab Sample ID: 500-199411-1**

**Date Collected: 05/19/21 13:05**

**Matrix: Water**

**Date Received: 05/20/21 09:20**

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<5000		5000	2400	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluoropentanoic acid (PFPeA)</b>	<b>540</b>	<b>J</b>	2000	490	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluorohexanoic acid (PFHxA)</b>	<b>3400</b>		2000	580	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluoroheptanoic acid (PFHpA)</b>	<b>1300</b>	<b>J</b>	2000	250	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluorooctanoic acid (PFOA)</b>	<b>23000</b>		2000	850	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluorononanoic acid (PFNA)</b>	<b>15000</b>		2000	270	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluorodecanoic acid (PFDA)</b>	<b>4200</b>		2000	310	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluoroundecanoic acid (PFUnA)</b>	<b>2100</b>		2000	1100	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluorododecanoic acid (PFDoA)	<2000		2000	550	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluorotridecanoic acid (PFTriA)	<2000		2000	1300	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluorotetradecanoic acid (PFTeA)	<2000		2000	730	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluoro-n-hexadecanoic acid (PFHxDA)	<2000		2000	890	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluoro-n-octadecanoic acid (PFODA)	<2000		2000	940	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluorobutanesulfonic acid (PFBS)	<2000		2000	200	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluoropentanesulfonic acid (PFPeS)	<2000		2000	300	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluorohexanesulfonic acid (PFHxS)	<2000		2000	570	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluoroheptanesulfonic Acid (PFHpS)</b>	<b>240</b>	<b>J</b>	2000	190	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluorooctanesulfonic acid (PFOS)</b>	<b>64000</b>		2000	540	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluorononanesulfonic acid (PFNS)	<2000		2000	370	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluorodecanesulfonic acid (PFDS)	<2000		2000	320	ng/L		05/24/21 21:46	05/25/21 22:32	100
Perfluorododecanesulfonic acid (PFDoS)	<2000		2000	970	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>Perfluorooctanesulfonamide (FOSA)</b>	<b>7900</b>		2000	980	ng/L		05/24/21 21:46	05/25/21 22:32	100
NEtFOSA	<2000		2000	870	ng/L		05/24/21 21:46	05/25/21 22:32	100
NMeFOSA	<2000		2000	430	ng/L		05/24/21 21:46	05/25/21 22:32	100
NMeFOSAA	<5000		5000	1200	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>NEtFOSAA</b>	<b>4500</b>	<b>J</b>	5000	1300	ng/L		05/24/21 21:46	05/25/21 22:32	100
NMeFOSE	<4000		4000	1400	ng/L		05/24/21 21:46	05/25/21 22:32	100
NEtFOSE	<2000		2000	850	ng/L		05/24/21 21:46	05/25/21 22:32	100
4:2 FTS	<2000		2000	240	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>6:2 FTS</b>	<b>47000</b>		5000	2500	ng/L		05/24/21 21:46	05/25/21 22:32	100
<b>8:2 FTS</b>	<b>45000</b>		2000	460	ng/L		05/24/21 21:46	05/25/21 22:32	100
10:2 FTS	<2000		2000	670	ng/L		05/24/21 21:46	05/25/21 22:32	100
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<2000		2000	400	ng/L		05/24/21 21:46	05/25/21 22:32	100
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	<4000		4000	1500	ng/L		05/24/21 21:46	05/25/21 22:32	100
F-53B Major	<2000		2000	240	ng/L		05/24/21 21:46	05/25/21 22:32	100
F-53B Minor	<2000		2000	320	ng/L		05/24/21 21:46	05/25/21 22:32	100
<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	92		25 - 150				05/24/21 21:46	05/25/21 22:32	100
13C5 PFPeA	89		25 - 150				05/24/21 21:46	05/25/21 22:32	100
13C2 PFHxA	91		25 - 150				05/24/21 21:46	05/25/21 22:32	100
13C4 PFHpA	66		25 - 150				05/24/21 21:46	05/25/21 22:32	100
13C4 PFOA	105		25 - 150				05/24/21 21:46	05/25/21 22:32	100

Eurofins TestAmerica, Chicago



# Client Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

**Client Sample ID: Drum 1**

**Lab Sample ID: 500-199411-1**

**Date Collected: 05/19/21 13:05**

**Matrix: Water**

**Date Received: 05/20/21 09:20**

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C5 PFNA	90		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C2 PFDA	71		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C2 PFUnA	79		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C2 PFDoA	69		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C2 PFTeDA	56		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C2 PFHxDA	50		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C3 PFBS	87		25 - 150	05/24/21 21:46	05/25/21 22:32	100
18O2 PFHxS	76		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C4 PFOS	79		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C8 FOSA	92		10 - 150	05/24/21 21:46	05/25/21 22:32	100
d3-NMeFOSAA	105		25 - 150	05/24/21 21:46	05/25/21 22:32	100
d5-NEtFOSAA	89		25 - 150	05/24/21 21:46	05/25/21 22:32	100
d-N-MeFOSA-M	47		10 - 150	05/24/21 21:46	05/25/21 22:32	100
d-N-EtFOSA-M	60		10 - 150	05/24/21 21:46	05/25/21 22:32	100
d7-N-MeFOSE-M	54		10 - 150	05/24/21 21:46	05/25/21 22:32	100
d9-N-EtFOSE-M	57		10 - 150	05/24/21 21:46	05/25/21 22:32	100
M2-4:2 FTS	97		25 - 150	05/24/21 21:46	05/25/21 22:32	100
M2-6:2 FTS	86		25 - 150	05/24/21 21:46	05/25/21 22:32	100
M2-8:2 FTS	238	*5+	25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C3 HFPO-DA	75		25 - 150	05/24/21 21:46	05/25/21 22:32	100
13C2 10:2 FTS	90		25 - 150	05/24/21 21:46	05/25/21 22:32	100

## Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
<b>Arsenic</b>	<b>19</b>		5.0	1.2	ug/L		05/20/21 18:19	05/26/21 00:23	5
<b>Barium</b>	<b>450</b>		13	3.7	ug/L		05/20/21 18:19	05/25/21 18:43	5
Cadmium	<2.5		2.5	0.84	ug/L		05/20/21 18:19	05/25/21 18:43	5
<b>Chromium</b>	<b>14</b>	<b>J</b>	25	5.7	ug/L		05/20/21 18:19	05/25/21 18:43	5
<b>Lead</b>	<b>3.6</b>		2.5	0.93	ug/L		05/20/21 18:19	05/26/21 00:23	5
Selenium	<13		13	4.9	ug/L		05/20/21 18:19	05/26/21 00:23	5
Silver	<2.5		2.5	0.58	ug/L		05/20/21 18:19	05/25/21 18:43	5

## Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.20		0.20	0.098	ug/L		05/21/21 09:25	05/24/21 08:20	1

# Definitions/Glossary

Client: ARCADIS U.S., Inc.  
Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

## Qualifiers

### LCMS

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

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

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

# QC Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

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

**Lab Sample ID: MB 320-492294/1-A**  
**Matrix: Water**  
**Analysis Batch: 492608**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 492294**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Perfluorobutanoic acid (PFBA)	<5.0		5.0	2.4	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluoropentanoic acid (PFPeA)	<2.0		2.0	0.49	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorohexanoic acid (PFHxA)	<2.0		2.0	0.58	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluoroheptanoic acid (PFHpA)	<2.0		2.0	0.25	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorooctanoic acid (PFOA)	<2.0		2.0	0.85	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorononanoic acid (PFNA)	<2.0		2.0	0.27	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorodecanoic acid (PFDA)	<2.0		2.0	0.31	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluoroundecanoic acid (PFUnA)	<2.0		2.0	1.1	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorododecanoic acid (PFDoA)	<2.0		2.0	0.55	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorotridecanoic acid (PFTriA)	<2.0		2.0	1.3	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorotetradecanoic acid (PFTeA)	<2.0		2.0	0.73	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<2.0		2.0	0.89	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluoro-n-octadecanoic acid (PFODA)	<2.0		2.0	0.94	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorobutanesulfonic acid (PFBS)	<2.0		2.0	0.20	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluoropentanesulfonic acid (PFPeS)	<2.0		2.0	0.30	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorohexanesulfonic acid (PFHxS)	<2.0		2.0	0.57	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluoroheptanesulfonic Acid (PFHpS)	<2.0		2.0	0.19	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorooctanesulfonic acid (PFOS)	<2.0		2.0	0.54	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorononanesulfonic acid (PFNS)	<2.0		2.0	0.37	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorodecanesulfonic acid (PFDS)	<2.0		2.0	0.32	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorododecanesulfonic acid (PFDoS)	<2.0		2.0	0.97	ng/L		05/24/21 21:46	05/25/21 22:04	1
Perfluorooctanesulfonamide (FOSA)	<2.0		2.0	0.98	ng/L		05/24/21 21:46	05/25/21 22:04	1
NEtFOSA	<2.0		2.0	0.87	ng/L		05/24/21 21:46	05/25/21 22:04	1
NMeFOSA	<2.0		2.0	0.43	ng/L		05/24/21 21:46	05/25/21 22:04	1
NMeFOSAA	<5.0		5.0	1.2	ng/L		05/24/21 21:46	05/25/21 22:04	1
NEtFOSAA	<5.0		5.0	1.3	ng/L		05/24/21 21:46	05/25/21 22:04	1
NMeFOSE	<4.0		4.0	1.4	ng/L		05/24/21 21:46	05/25/21 22:04	1
NEtFOSE	<2.0		2.0	0.85	ng/L		05/24/21 21:46	05/25/21 22:04	1
4:2 FTS	<2.0		2.0	0.24	ng/L		05/24/21 21:46	05/25/21 22:04	1
6:2 FTS	<5.0		5.0	2.5	ng/L		05/24/21 21:46	05/25/21 22:04	1
8:2 FTS	<2.0		2.0	0.46	ng/L		05/24/21 21:46	05/25/21 22:04	1
10:2 FTS	<2.0		2.0	0.67	ng/L		05/24/21 21:46	05/25/21 22:04	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<2.0		2.0	0.40	ng/L		05/24/21 21:46	05/25/21 22:04	1
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	<4.0		4.0	1.5	ng/L		05/24/21 21:46	05/25/21 22:04	1
F-53B Major	<2.0		2.0	0.24	ng/L		05/24/21 21:46	05/25/21 22:04	1
F-53B Minor	<2.0		2.0	0.32	ng/L		05/24/21 21:46	05/25/21 22:04	1

Isotope Dilution	MB	MB	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C4 PFBA	91		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C5 PFPeA	86		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C2 PFHxA	84		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C4 PFHpA	90		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C4 PFOA	96		25 - 150	05/24/21 21:46	05/25/21 22:04	1

Eurofins TestAmerica, Chicago

# QC Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

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

**Lab Sample ID: MB 320-492294/1-A**  
**Matrix: Water**  
**Analysis Batch: 492608**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 492294**

Isotope Dilution	MB MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
13C5 PFNA	91		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C2 PFDA	92		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C2 PFUnA	84		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C2 PFDoA	91		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C2 PFTeDA	88		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C2 PFHxDA	100		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C3 PFBS	82		25 - 150	05/24/21 21:46	05/25/21 22:04	1
18O2 PFHxS	90		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C4 PFOS	85		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C8 FOSA	95		10 - 150	05/24/21 21:46	05/25/21 22:04	1
d3-NMeFOSAA	90		25 - 150	05/24/21 21:46	05/25/21 22:04	1
d5-NEtFOSAA	90		25 - 150	05/24/21 21:46	05/25/21 22:04	1
d-N-MeFOSA-M	79		10 - 150	05/24/21 21:46	05/25/21 22:04	1
d-N-EtFOSA-M	76		10 - 150	05/24/21 21:46	05/25/21 22:04	1
d7-N-MeFOSE-M	85		10 - 150	05/24/21 21:46	05/25/21 22:04	1
d9-N-EtFOSE-M	75		10 - 150	05/24/21 21:46	05/25/21 22:04	1
M2-4:2 FTS	99		25 - 150	05/24/21 21:46	05/25/21 22:04	1
M2-6:2 FTS	104		25 - 150	05/24/21 21:46	05/25/21 22:04	1
M2-8:2 FTS	99		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C3 HFPO-DA	85		25 - 150	05/24/21 21:46	05/25/21 22:04	1
13C2 10:2 FTS	101		25 - 150	05/24/21 21:46	05/25/21 22:04	1

**Lab Sample ID: LCS 320-492294/2-A**  
**Matrix: Water**  
**Analysis Batch: 492608**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 492294**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoropentanoic acid (PFPeA)	40.0	40.7		ng/L		102	60 - 135
Perfluorohexanoic acid (PFHxA)	40.0	44.6		ng/L		112	60 - 135
Perfluoroheptanoic acid (PFHpA)	40.0	44.6		ng/L		112	60 - 135
Perfluorooctanoic acid (PFOA)	40.0	39.6		ng/L		99	60 - 135
Perfluorononanoic acid (PFNA)	40.0	43.8		ng/L		110	60 - 135
Perfluorodecanoic acid (PFDA)	40.0	41.1		ng/L		103	60 - 135
Perfluoroundecanoic acid (PFUnA)	40.0	43.3		ng/L		108	60 - 135
Perfluorododecanoic acid (PFDoA)	40.0	43.1		ng/L		108	60 - 135
Perfluorotridecanoic acid (PFTriA)	40.0	47.4		ng/L		119	60 - 135
Perfluorotetradecanoic acid (PFTeA)	40.0	43.1		ng/L		108	60 - 135
Perfluoro-n-hexadecanoic acid (PFHxDA)	40.0	42.1		ng/L		105	60 - 135
Perfluoro-n-octadecanoic acid (PFODA)	40.0	43.5		ng/L		109	60 - 135
Perfluorobutanesulfonic acid (PFBS)	35.4	39.3		ng/L		111	60 - 135
Perfluoropentanesulfonic acid (PFPeS)	37.5	47.9		ng/L		128	60 - 135

Eurofins TestAmerica, Chicago

# QC Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

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

**Lab Sample ID: LCS 320-492294/2-A**  
**Matrix: Water**  
**Analysis Batch: 492608**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 492294**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluorohexanesulfonic acid (PFHxS)	36.4	41.2		ng/L		113	60 - 135
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	38.5		ng/L		101	60 - 135
Perfluorooctanesulfonic acid (PFOS)	37.1	38.9		ng/L		105	60 - 135
Perfluorononanesulfonic acid (PFNS)	38.4	43.1		ng/L		112	60 - 135
Perfluorodecanesulfonic acid (PFDS)	38.6	38.3		ng/L		99	60 - 135
Perfluorododecanesulfonic acid (PFDoS)	38.7	41.1		ng/L		106	60 - 135
Perfluorooctanesulfonamide (FOSA)	40.0	39.1		ng/L		98	60 - 135
NEtFOSA	40.0	44.8		ng/L		112	60 - 135
NMeFOSA	40.0	41.2		ng/L		103	60 - 135
NMeFOSAA	40.0	44.5		ng/L		111	60 - 135
NEtFOSAA	40.0	42.9		ng/L		107	60 - 135
NMeFOSE	40.0	40.6		ng/L		102	60 - 135
NEtFOSE	40.0	44.3		ng/L		111	60 - 135
4:2 FTS	37.4	39.3		ng/L		105	60 - 135
6:2 FTS	37.9	37.9		ng/L		100	60 - 135
8:2 FTS	38.3	42.7		ng/L		111	60 - 135
10:2 FTS	38.6	36.0		ng/L		93	60 - 135
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	40.2		ng/L		107	60 - 135
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	47.3		ng/L		118	60 - 135
F-53B Major	37.3	44.7		ng/L		120	60 - 135
F-53B Minor	37.7	38.6		ng/L		103	60 - 135

Isotope Dilution	LCS LCS		Limits
	%Recovery	Qualifier	
13C4 PFBA	90		25 - 150
13C5 PFPeA	88		25 - 150
13C2 PFHxA	89		25 - 150
13C4 PFHpA	90		25 - 150
13C4 PFOA	94		25 - 150
13C5 PFNA	89		25 - 150
13C2 PFDA	93		25 - 150
13C2 PFUnA	85		25 - 150
13C2 PFDoA	87		25 - 150
13C2 PFTeDA	88		25 - 150
13C2 PFHxDA	100		25 - 150
13C3 PFBS	85		25 - 150
18O2 PFHxS	87		25 - 150
13C4 PFOS	90		25 - 150
13C8 FOSA	94		10 - 150
d3-NMeFOSAA	87		25 - 150
d5-NEtFOSAA	86		25 - 150
d-N-MeFOSA-M	79		10 - 150
d-N-EtFOSA-M	76		10 - 150

Eurofins TestAmerica, Chicago



# QC Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

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

**Lab Sample ID: LCS 320-492294/2-A**  
**Matrix: Water**  
**Analysis Batch: 492608**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 492294**

<i>Isotope Dilution</i>	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
d7-N-MeFOSE-M	77		10 - 150
d9-N-EtFOSE-M	75		10 - 150
M2-4:2 FTS	85		25 - 150
M2-6:2 FTS	95		25 - 150
M2-8:2 FTS	86		25 - 150
13C3 HFPO-DA	88		25 - 150
13C2 10:2 FTS	98		25 - 150

**Lab Sample ID: LCSD 320-492294/3-A**  
**Matrix: Water**  
**Analysis Batch: 492608**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**  
**Prep Batch: 492294**

<i>Analyte</i>	<i>Spike Added</i>	<i>LCSD Result</i>	<i>LCSD Qualifier</i>	<i>Unit</i>	<i>D</i>	<i>%Rec</i>	<i>%Rec. Limits</i>	<i>RPD</i>	<i>RPD Limit</i>
Perfluorobutanoic acid (PFBA)	40.0	41.6		ng/L		104	60 - 135	0	30
Perfluoropentanoic acid (PFPeA)	40.0	41.8		ng/L		104	60 - 135	3	30
Perfluorohexanoic acid (PFHxA)	40.0	41.8		ng/L		104	60 - 135	7	30
Perfluoroheptanoic acid (PFHpA)	40.0	42.2		ng/L		105	60 - 135	6	30
Perfluorooctanoic acid (PFOA)	40.0	41.3		ng/L		103	60 - 135	4	30
Perfluorononanoic acid (PFNA)	40.0	41.9		ng/L		105	60 - 135	4	30
Perfluorodecanoic acid (PFDA)	40.0	42.2		ng/L		105	60 - 135	2	30
Perfluoroundecanoic acid (PFUnA)	40.0	47.6		ng/L		119	60 - 135	10	30
Perfluorododecanoic acid (PFDoA)	40.0	44.8		ng/L		112	60 - 135	4	30
Perfluorotridecanoic acid (PFTriA)	40.0	43.9		ng/L		110	60 - 135	8	30
Perfluorotetradecanoic acid (PFTeA)	40.0	45.4		ng/L		114	60 - 135	5	30
Perfluoro-n-hexadecanoic acid (PFHxDA)	40.0	40.0		ng/L		100	60 - 135	5	30
Perfluoro-n-octadecanoic acid (PFODA)	40.0	42.2		ng/L		105	60 - 135	3	30
Perfluorobutanesulfonic acid (PFBS)	35.4	39.5		ng/L		112	60 - 135	1	30
Perfluoropentanesulfonic acid (PFPeS)	37.5	41.2		ng/L		110	60 - 135	15	30
Perfluorohexanesulfonic acid (PFHxS)	36.4	37.6		ng/L		103	60 - 135	9	30
Perfluoroheptanesulfonic Acid (PFHpS)	38.1	43.8		ng/L		115	60 - 135	13	30
Perfluorooctanesulfonic acid (PFOS)	37.1	43.5		ng/L		117	60 - 135	11	30
Perfluorononanesulfonic acid (PFNS)	38.4	44.7		ng/L		116	60 - 135	4	30
Perfluorodecanesulfonic acid (PFDS)	38.6	43.3		ng/L		112	60 - 135	12	30
Perfluorododecanesulfonic acid (PFDoS)	38.7	40.8		ng/L		105	60 - 135	1	30
Perfluorooctanesulfonamide (FOSA)	40.0	37.4		ng/L		94	60 - 135	4	30
NEtFOSA	40.0	44.7		ng/L		112	60 - 135	0	30
NMeFOSA	40.0	41.5		ng/L		104	60 - 135	1	30
NMeFOSAA	40.0	41.9		ng/L		105	60 - 135	6	30

Eurofins TestAmerica, Chicago

# QC Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

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

Lab Sample ID: LCSD 320-492294/3-A  
 Matrix: Water  
 Analysis Batch: 492608

Client Sample ID: Lab Control Sample Dup  
 Prep Type: Total/NA  
 Prep Batch: 492294

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
NEtFOSAA	40.0	47.1		ng/L		118	60 - 135	9	30
NMeFOSE	40.0	38.7		ng/L		97	60 - 135	5	30
NEtFOSE	40.0	46.1		ng/L		115	60 - 135	4	30
4:2 FTS	37.4	38.4		ng/L		103	60 - 135	2	30
6:2 FTS	37.9	35.4		ng/L		93	60 - 135	7	30
8:2 FTS	38.3	43.7		ng/L		114	60 - 135	2	30
10:2 FTS	38.6	40.7		ng/L		106	60 - 135	12	30
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	37.7	44.6		ng/L		118	60 - 135	10	30
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	40.0	38.2		ng/L		96	60 - 135	21	30
F-53B Major	37.3	45.9		ng/L		123	60 - 135	3	30
F-53B Minor	37.7	44.2		ng/L		117	60 - 135	13	30

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	LCSD Limits
13C4 PFBA	96		25 - 150
13C5 PFPeA	96		25 - 150
13C2 PFHxA	98		25 - 150
13C4 PFHpA	90		25 - 150
13C4 PFOA	95		25 - 150
13C5 PFNA	89		25 - 150
13C2 PFDA	91		25 - 150
13C2 PFUnA	81		25 - 150
13C2 PFDoA	86		25 - 150
13C2 PFTeDA	83		25 - 150
13C2 PFHxDA	95		25 - 150
13C3 PFBS	91		25 - 150
18O2 PFHxS	89		25 - 150
13C4 PFOS	84		25 - 150
13C8 FOSA	95		10 - 150
d3-NMeFOSAA	98		25 - 150
d5-NEtFOSAA	87		25 - 150
d-N-MeFOSA-M	82		10 - 150
d-N-EtFOSA-M	71		10 - 150
d7-N-MeFOSE-M	77		10 - 150
d9-N-EtFOSE-M	74		10 - 150
M2-4:2 FTS	92		25 - 150
M2-6:2 FTS	103		25 - 150
M2-8:2 FTS	97		25 - 150
13C3 HFPO-DA	101		25 - 150
13C2 10:2 FTS	91		25 - 150

## Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 500-600086/1-A  
 Matrix: Water  
 Analysis Batch: 600816

Client Sample ID: Method Blank  
 Prep Type: Total Recoverable  
 Prep Batch: 600086

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	<2.5		2.5	0.73	ug/L		05/20/21 18:19	05/25/21 18:36	1

Eurofins TestAmerica, Chicago

# QC Sample Results

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

## Method: 6020A - Metals (ICP/MS) (Continued)

**Lab Sample ID: MB 500-600086/1-A**  
**Matrix: Water**  
**Analysis Batch: 600816**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 600086**

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Cadmium	<0.50		0.50	0.17	ug/L		05/20/21 18:19	05/25/21 18:36	1
Chromium	<5.0		5.0	1.1	ug/L		05/20/21 18:19	05/25/21 18:36	1
Silver	<0.50		0.50	0.12	ug/L		05/20/21 18:19	05/25/21 18:36	1

**Lab Sample ID: MB 500-600086/1-A**  
**Matrix: Water**  
**Analysis Batch: 600933**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 600086**

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Arsenic	<1.0		1.0	0.23	ug/L		05/20/21 18:19	05/26/21 00:16	1
Lead	<0.50		0.50	0.19	ug/L		05/20/21 18:19	05/26/21 00:16	1
Selenium	<2.5		2.5	0.98	ug/L		05/20/21 18:19	05/26/21 00:16	1

**Lab Sample ID: LCS 500-600086/2-A**  
**Matrix: Water**  
**Analysis Batch: 600816**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 600086**

Analyte	Spike Added	LCS LCS		Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Barium	2000	2000		ug/L		100	80 - 120
Cadmium	50.0	49.7		ug/L		99	80 - 120
Chromium	200	204		ug/L		102	80 - 120
Silver	50.0	51.3		ug/L		103	80 - 120

**Lab Sample ID: LCS 500-600086/2-A**  
**Matrix: Water**  
**Analysis Batch: 600933**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 600086**

Analyte	Spike Added	LCS LCS		Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Arsenic	100	94.8		ug/L		95	80 - 120
Lead	100	107		ug/L		107	80 - 120
Selenium	100	96.7		ug/L		97	80 - 120

## Method: 7470A - Mercury (CVAA)

**Lab Sample ID: MB 500-600211/12-A**  
**Matrix: Water**  
**Analysis Batch: 600524**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 600211**

Analyte	MB MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Mercury	<0.20		0.20	0.098	ug/L		05/21/21 09:25	05/24/21 08:16	1

**Lab Sample ID: LCS 500-600211/13-A**  
**Matrix: Water**  
**Analysis Batch: 600524**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 600211**

Analyte	Spike Added	LCS LCS		Unit	D	%Rec	%Rec. Limits
		Result	Qualifier				
Mercury	2.00	2.09		ug/L		105	80 - 120

# Lab Chronicle

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

**Client Sample ID: Drum 1**

**Lab Sample ID: 500-199411-1**

**Date Collected: 05/19/21 13:05**

**Matrix: Water**

**Date Received: 05/20/21 09:20**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			492294	05/24/21 21:46	JER	TAL SAC
Total/NA	Analysis	537 (modified)		100	492608	05/25/21 22:32	RS1	TAL SAC
Total Recoverable	Prep	3005A			600086	05/20/21 18:19	LMN	TAL CHI
Total Recoverable	Analysis	6020A		5	600816	05/25/21 18:43	FXG	TAL CHI
Total Recoverable	Prep	3005A			600086	05/20/21 18:19	LMN	TAL CHI
Total Recoverable	Analysis	6020A		5	600933	05/26/21 00:23	FXG	TAL CHI
Total/NA	Prep	7470A			600211	05/21/21 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	600524	05/24/21 08:20	MJG	TAL CHI

**Laboratory References:**

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

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



# Accreditation/Certification Summary

Client: ARCADIS U.S., Inc.  
Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

## Laboratory: Eurofins TestAmerica, Chicago

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

Authority	Program	Identification Number	Expiration Date
Wisconsin	State	999580010	08-31-21

## Laboratory: Eurofins TestAmerica, Sacramento

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

Authority	Program	Identification Number	Expiration Date
Wisconsin	State	998204680	08-31-21

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# Chain of Custody Record

University Park, IL 60484-3101  
phone 708 534 5200 fax 708 534 5211

Regulatory Program:  DW  NPDES  RCRA  Other:

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

<b>Client Contact</b> Arcadis U S , Inc 126 North Jefferson Street, Suite 400 Milwaukee, WI 53202 Phor 500-199411 COC FAX		<b>Project Manager: Lisa Rutkowski</b> Email: N/A Tel/Fax: N/A		Sampler: <i>Jacob Ramirez</i> Lab Contact: <i>Sandle Fredrick</i> Date: <i>5-19-21</i> Carrier: FedEx		COC No <i>1</i> 1 of 1 COCs																																					
Project Name <i>Marinette, WI</i> Site <i>Marinette, WI</i> P O # <i>30015296 00016 (Collapsed Foam)</i>		<b>Analysis Turnaround Time</b> <input checked="" type="checkbox"/> CALENDAR DAYS <input type="checkbox"/> WORKING DAYS TAT if different from Below _____ <input type="checkbox"/> 2 weeks <input checked="" type="checkbox"/> 1 week <input type="checkbox"/> 2 days <input type="checkbox"/> 1 day		Filtered Sample (Y/N) Perform MS/MSD (Y/N) EPA 537 Modified (36 Compounds) RCRA Metals (6020A, 7470A)		<b>For Lab Use Only:</b> Walk-in Client. _____ Lab Sampling _____ Lab Project Number 50018970 <i>500-199411</i> Sample Specific Notes																																					
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Sample Identification</th> <th>Sample Date</th> <th>Sample Time</th> <th>Sample Type (C=Comp, G=Grab)</th> <th>Matrix</th> <th># of Cont.</th> <th>Filtered Sample (Y/N)</th> <th>Perform MS/MSD (Y/N)</th> <th>EPA 537 Modified (36 Compounds)</th> <th>RCRA Metals (6020A, 7470A)</th> </tr> </thead> <tbody> <tr> <td>Drum 1</td> <td><i>5-19-21</i></td> <td><i>1305</i></td> <td>G</td> <td>W</td> <td>3</td> <td>N</td> <td>N</td> <td>X</td> <td>X</td> </tr> <tr> <td colspan="10" style="text-align:center;"><i>JR</i></td> </tr> <tr> <td colspan="10" style="text-align:center;"><i>JR</i></td> </tr> </tbody> </table>		Sample Identification	Sample Date			Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	EPA 537 Modified (36 Compounds)	RCRA Metals (6020A, 7470A)	Drum 1	<i>5-19-21</i>	<i>1305</i>	G	W	3	N	N	X	X	<i>JR</i>										<i>JR</i>									
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS/MSD (Y/N)	EPA 537 Modified (36 Compounds)	RCRA Metals (6020A, 7470A)																																		
Drum 1	<i>5-19-21</i>	<i>1305</i>	G	W	3	N	N	X	X																																		
<i>JR</i>																																											
<i>JR</i>																																											
<b>Possible Hazard Identification:</b> Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample <input checked="" type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown						<b>Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)</b> <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by Lab <input type="checkbox"/> Archive for _____ Months																																					
<b>Special Instructions/QC Requirements &amp; Comments:</b>																																											
Custody Seals Intact <input type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No _____		Cooler Temp (°C) Obs'd <i>16</i> Corr'd _____		Therm ID No _____																																					
Relinquished by <i>Jacob Ramirez</i>		Company: <i>Barley Excavating</i>		Date/Time <i>5-19-21/1310</i>		Received by: <i>Fed Ex</i>		Company _____ Date/Time _____																																			
Relinquished by _____		Company _____		Date/Time _____		Received by: _____		Company _____ Date/Time _____																																			
Relinquished by: _____		Company _____		Date/Time _____		Received in Laboratory by <i>Shirley Scott</i>		Company <i>ETA-CHE</i> Date/Time <i>5/20/21 0920</i>																																			



ORIGIN ID:PHDA (906) 863-9373  
JOE BARLEY  
BARLEY EXCAVATING  
1824 10TH AVE

SHIP DATE: 11MAR21  
ACTWGT: 10.00 LB MAN  
CAD: 0562071/CAFE3409

MENOMINEE, MI 49858  
UNITED STATES US

TO

**EUROFINS TESTAMERICA CHICAGO**  
**2417 BOND STREET**



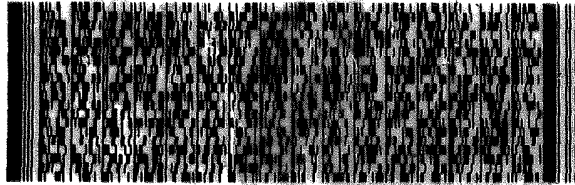
**UNIVERSITY PARK IL 604843101**

(708) 634-5200

REF: 8600-90001

500-199411 Wayb

RMA: 11111111



RETURNS MON-SAT

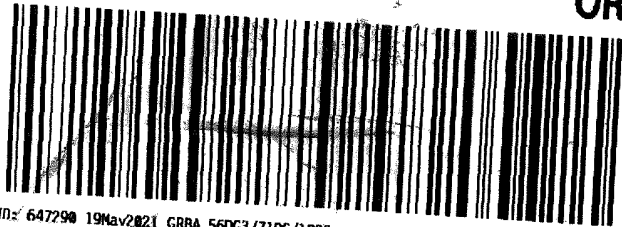
**FedEx**

TRK# 9509 0062 7990  
02221

140 - 20 MAY AA  
PRIORITY OVERNIGHT

**NA JOTA**

60484  
IL-US  
ORD



FTD: 647290 19Mar2021 GRBA 560G3/71DC/1B23

48qt.

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# Chain of Custody Record



<b>Client Information (Sub Contract Lab)</b>		Lab PM: Fredrick, Sandie		Carrier Tracking No(s): 500-148838-1	
Client Contact: Shipping/Receiving		E-Mail: sandra.fredrick@eurofins.com		Page: Page 1 of 1	
Company: TestAmerica Laboratories, Inc.		State of Origin: Wisconsin		Job #: 500-199411-1	
Address: 880 Riverside Parkway, West Sacramento, CA 95605		Due Date Requested: 5/27/2021		Preservation Codes: M - Hexane N - None O - AsNaO2 P - Na2O4S Q - Na2SO3 R - Na2S2O3 S - H2SO4 T - TSP Dodecahydrate U - Acetone V - MCAA W - pH 4-5 L - EDTA L - EDA Other:	
City: West Sacramento		TAT Requested (days):		Analysis Requested:	
State: CA		PO #:		A - HCL B - NaOH C - Zn Acetate D - Nitric Acid E - NaHSO4 F - MeOH G - Amchlor H - Ascorbic Acid I - Ice J - DI Water K - EDTA L - EDA Other:	
Phone: 916-373-5600(Tel) 916-372-1059(Fax)		WG #:		Total Number of containers	
Email:		Project #: 50018970		<input checked="" type="checkbox"/> Field Filtered Sample (Yes or No) <input checked="" type="checkbox"/> Perform MS/MSD (Yes or No) <input checked="" type="checkbox"/> PFC (IDA W/3535_PFC_28D PFAS, Standard List (36 Analytes))	
Site: Marinette, WI 30015296.00016 Collapsed Foam		SSOW#:		Special Instructions/Note:	
<b>Sample Identification - Client ID (Lab ID)</b>		Sample Date		Special Instructions/Note:	
Drum 1 (500-199411-1)		5/19/21		REPORT ALL DILUTIONS	
Sample Time		13:05 Central		<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For Months	
Sample Type (C=Comp, G=grab)		Water		Special Instructions/QC Requirements:	
Matrix (W=water, S=solid, O=waste/oil, B=tissue, A=Air)		Preservation Code:		<input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For Months	
<p>Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte &amp; accreditation compliance upon our subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/test/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to Eurofins TestAmerica.</p>					
<b>Possible Hazard Identification</b>					
<input type="checkbox"/> Unconfirmed <input type="checkbox"/> Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2 <input type="checkbox"/> Empty Kit Relinquished by: Date:					
Relinquished by: <i>[Signature]</i>		Date: 5/20/21 1600		Received by: <i>[Signature]</i>	
Relinquished by:		Date/Time:		Date/Time: 5-21-21 / 0935	
Relinquished by:		Date/Time:		Date/Time:	
Custody Seals Intact: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Custody Seal No.: 1451723		Cooler Temperature(s) °C and Other Remarks: 1.2	



## Login Sample Receipt Checklist

Client: ARCADIS U.S., Inc.

Job Number: 500-199411-1

**Login Number: 199411**

**List Source: Eurofins TestAmerica, Chicago**

**List Number: 1**

**Creator: Scott, Sherri L**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
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	1.6
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.	True	
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").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

## Login Sample Receipt Checklist

Client: ARCADIS U.S., Inc.

Job Number: 500-199411-1

**Login Number: 199411**

**List Number: 2**

**Creator: Cahill, Nicholas P**

**List Source: Eurofins TestAmerica, Sacramento**

**List Creation: 05/21/21 06:05 PM**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	1451723
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	1.2c
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?	False	Received project as a subcontract.
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	





500-199411 Field Sheet

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

Tracking #: 1893 4452 0099

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: 2-07 Corr. Factor: (+/-) N/A °C

Ice  Wet  Gel \_\_\_\_\_ Other \_\_\_\_\_

Cooler Custody Seal: 1451723

Cooler ID: \_\_\_\_\_

Temp Observed: 1.2 °C Corrected: 1.2 °C  
From: Temp Blank  Sample

Opening/Processing The Shipment	Yes	No	NA
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: NC Date: 5-21-21

Unpacking/Labeling The Samples	Yes	No	NA
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"/>
Sample containers have legible labels?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sample custody seal?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Containers are not broken or leaking?	<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"/>
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"/>
Alkalinity has no headspace?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Perchlorate has headspace? (Methods 314, 331, 6850)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Multiphasic samples are not present?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\*Containers requiring zero headspace have no headspace, or bubble < 6 mm (1/4")

Initials: JH Date: 5/21/21

Notes: \_\_\_\_\_

Trizma Lot #(s): \_\_\_\_\_

Login Completion	Yes	No	NA
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"/>

Initials: JH Date: 5/21/21

WR3-17C

# Isotope Dilution Summary

Client: ARCADIS U.S., Inc.  
 Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

## 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)
500-199411-1	Drum 1	92	89	91	66	105	90	71	79
LCS 320-492294/2-A	Lab Control Sample	90	88	89	90	94	89	93	85
LCSD 320-492294/3-A	Lab Control Sample Dup	96	96	98	90	95	89	91	81
MB 320-492294/1-A	Method Blank	91	86	84	90	96	91	92	84

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFDoA (25-150)	PFTDA (25-150)	PFHxDA (25-150)	C3PFBS (25-150)	PFHxS (25-150)	PFOS (25-150)	PFOSA (10-150)	d3NMFOS (25-150)
500-199411-1	Drum 1	69	56	50	87	76	79	92	105
LCS 320-492294/2-A	Lab Control Sample	87	88	100	85	87	90	94	87
LCSD 320-492294/3-A	Lab Control Sample Dup	86	83	95	91	89	84	95	98
MB 320-492294/1-A	Method Blank	91	88	100	82	90	85	95	90

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	d5NEFOS (25-150)	dMeFOSA (10-150)	dEtFOSA (10-150)	NMFM (10-150)	NEFM (10-150)	M242FTS (25-150)	M262FTS (25-150)	M282FTS (25-150)
500-199411-1	Drum 1	89	47	60	54	57	97	86	238 *5+
LCS 320-492294/2-A	Lab Control Sample	86	79	76	77	75	85	95	86
LCSD 320-492294/3-A	Lab Control Sample Dup	87	82	71	77	74	92	103	97
MB 320-492294/1-A	Method Blank	90	79	76	85	75	99	104	99

### Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	HFPODA (25-150)	M102FTS (25-150)
500-199411-1	Drum 1	75	90
LCS 320-492294/2-A	Lab Control Sample	88	98
LCSD 320-492294/3-A	Lab Control Sample Dup	101	91
MB 320-492294/1-A	Method Blank	85	101

#### Surrogate Legend

- PFBA = 13C4 PFBA
- PFPeA = 13C5 PFPeA
- PFHxA = 13C2 PFHxA
- C4PFHA = 13C4 PFHpA
- PFOA = 13C4 PFOA
- PFNA = 13C5 PFNA
- PFDA = 13C2 PFDA
- PFUnA = 13C2 PFUnA
- PFDoA = 13C2 PFDoA
- PFTDA = 13C2 PFTeDA
- PFHxDA = 13C2 PFHxDA
- 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



# Isotope Dilution Summary

Client: ARCADIS U.S., Inc.

Project/Site: Marinette, WI 30015296.00016 Collapsed Foam

Job ID: 500-199411-1

M262FTS = M2-6:2 FTS

M282FTS = M2-8:2 FTS

HFPODA = 13C3 HFPO-DA

M102FTS = 13C2 10:2 FTS

1

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