Memo
Marinette High School Irrigation IRR-02R Installation
July 26, 2023

Alyssa Sellwood
Complex Sites Project Manager, Remediation and Redevelopment Program
State of Wisconsin Department of Natural Resources
101 South Webster Street
Box 7921
Madison, WI 53707-7921

Date: July 26, 2023
Our Ref: 30166809
Subject: Marinette High School Irrigation IRR-02R Installation Technical Memo
Tyco Fire Technology Center, Marinette, WI
BRRTS# 02-38-580694

Dear Ms. Sellwood,

This letter describes work completed by Tyco Fire Products LP (Tyco) from October 2022 to June 2023 evaluating the characteristics of the deep bedrock aquifer system by testing two existing non-drinking, irrigation-only wells located on the grounds of Marinette High School, at 2135 Pierce Avenue in Marinette, Wisconsin. This work is a component of ongoing investigations associated with per- and poly-fluoroalkyl substances (PFAS) related to the Fire Technology Center (FTC) located at 2700 Industrial Parkway South in Marinette, Wisconsin (the Site). The location of the Site and irrigation wells (identified IRR-01 and IRR-02R) are shown on **Figure 1**.

Work Completed

Following the 2022 well profiling conducted at the two irrigation wells, Tyco submitted a technical memo detailing results from work completed to date titled *Marinette High School Irrigation Well Profiling Results* dated October 20, 2022 (Arcadis 2022). In that letter. Tyco recommended that the irrigation well located near the football field, IRR-02, be rehabilitated by installing a well liner. This liner was projected to be installed to approximately 140 feet below ground surface (bgs), a repair consistent with Wisconsin Administrative Code NR 812.21

IRR-02 Packer Installations

A temporary packer was installed August 19, 2022 to prevent downward flow from the shallow aquifer to deep portions of the borehole. The temporary packer, a 3-flanged rubber K-packer, was installed in IRR-02 at 147 feet bgs (Arcadis 2022).

Following installation of the temporary packer, an attempt was made to install a permanent well liner in IRR-02, as outlined in the 2022 technical memo. The temporary packer was removed from IRR-02 on October 18, 2022. From October 18 through October 21, 2022, a drilling subcontractor attempted to install a permanent liner in its place to an approximate depth of 140 feet bgs. This work was halted after the liner became lodged in the well. It was determined that the well had lost plumb over the years since it was installed. The most viable option at this point was to abandon and replace the well.

IRR-02 Abandonment

Following unsuccessful attempts to install a permanent liner in IRR-02, a drilling subcontractor completed abandonment of the now former IRR-02 irrigation well on November 3, 2022.

Well abandonment logs are included in **Attachment 1**.

IRR-02R Installation

Installation of a replacement well, IRR-02R took place May 23 through June 8, 2023. Luisier Drilling, Inc. of Oconto Falls, WI completed the installation of IRR-02R as a high capacity well. Drilling was completed under the oversight of Arcadis U.S., Inc. (Arcadis) to a total depth of 597 feet bgs. The replacement of IRR-02 was completed to ensure there are no leaks in the surface casing identified during the 2022 profiling event. Install activities were conducted according to the design outlined in the *PWSA Drinking Water Upd*ate (Arcadis 2022).

After installation, IRR-02R was temporarily plumbed to the existing irrigation system to provide immediate connection to Marinette High School irrigation operations and to ensure that the replacement high capacity well could provide sufficient water. Marinette High School has since commented on their satisfaction with the well replacement and that the water supply is adequate. Permitting and coordination to connect IRR-02R with an underground pitless adapter are in progress and scheduled for 2023.

The well construction report for IRR-02R (Wisconsin Unique Well Number AAZ056) is included with this memo in **Attachment 2.**

Sampling Results

Arcadis collected total well groundwater samples from both IRR-01 and IRR-02R on June 15, 2023. Laboratory results for these samples are summarized in the attached table (**Table 1)**. The full results from the laboratory are also included in **Attachment 3**, with data validation included in **Attachment 4**.

IRR-01 Results

Sample results from IRR-01 show that PFAS is not present in the deep bedrock aquifer. No PFAS were detected above laboratory reporting limits in the total well sample (**Table 1**).

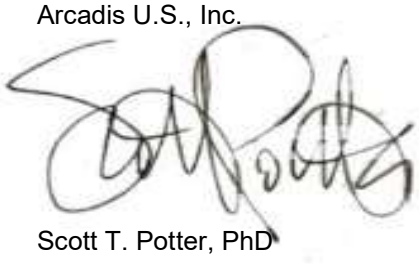
IRR-02R Results

Sample results from IRR-02R show that PFAS is not present in the deep bedrock aquifer at any significant concentrations. No PFAS were detected above laboratory reporting limits in the total well sample (**Table 1**), with the exception of the compound perfluoroctanesulfonamide (FOSA). FOSA was detected at a concentration of 2.1 nanograms per liter (ng/L). The compound is present in a number of consumer and industrial products, and its frequent presence at low concentrations in the irrigation well is likely the results of FOSA-containing components in the well pump.

Next Steps

Tyco will continue to monitor this location on a semi-annual basis as agreed upon with the Marinette School District.

Sincerely,
Arcadis U.S., Inc.



Scott T. Potter, PhD
Chief Hydrogeologist

Email: Scott.Potter@arcadis.com
Direct Line: (267) 685-1800
Mobile: (215) 630-4436

CC. Denice Nelson, JCI
Scott Wahl, JCI

Enclosures:

Table 1. Groundwater Sampling Results
Figure 1. Irrigation Well Locations
Attachment 1: Well Abandonment Form
Attachment 2: Well Construction Report
Attachment 3: Laboratory Analytical Results
Attachment 4: Laboratory Validation Report

Table

Table 1
Groundwater Sampling
Results
Tyco Fire Technology Center

ARCADIS

	June 2019 DHS (Not Adopted by DNR Board) [1]	November 2020 DHS (Not Yet Proposed for Rulemaking by DNR) [2]	Applicable Standards[3]	Location Sample ID Parent Sample ID Sample Date Sample Type	IRR-01 IRR-01 (061523) 06/15/2023 N	IRR-02R IRR-02R (061523) 06/15/2023 N
Analyte				**Units**		
PFOA	20	--	--	ng/L	< 1.7 U	< 1.9 U
PFOS	20	--	--	ng/L	< 1.7 U	< 1.9 U
PFBS	--	450,000	--	ng/L	< 1.7 U	< 1.9 U
PFHpA	--	--	--	ng/L	< 1.7 U	< 1.9 U
PFHxS	--	40	--	ng/L	< 1.7 U	< 1.9 U
PFNA	--	30	--	ng/L	< 1.7 U	< 1.9 U
PFDA	--	300	--	ng/L	< 1.7 U	< 1.9 U
PFDoA	--	500	--	ng/L	< 1.7 U	< 1.9 U
PFHxA	--	150,000	--	ng/L	< 1.7 U	< 1.9 U
PFTeA	--	10,000	--	ng/L	< 1.7 U	< 1.9 U
PFTriA	--	--	--	ng/L	< 1.7 U	< 1.9 U
PFUnA	--	3,000	--	ng/L	< 1.7 U	< 1.9 U
NEtFOSAA	--	20 (2)	--	ng/L	< 4.2 U	< 4.7 U
NMeFOSAA	--	--	--	ng/L	< 4.2 U	< 4.7 U
PFBA	--	10,000	--	ng/L	< 4.2 U	< 4.7 U
PFPeA	--	--	--	ng/L	< 1.7 U	< 1.9 U
PFHxDA	--	--	--	ng/L	< 1.7 U	< 1.9 U
PFODA	--	400,000	--	ng/L	< 1.7 UJ-	< 1.9 UJ-
PFPeS	--	--	--	ng/L	< 1.7 U	< 1.9 U
PFHpS	--	--	--	ng/L	< 1.7 U	< 1.9 U
PFNS	--	--	--	ng/L	< 1.7 U	< 1.9 U
PFDS	--	--	--	ng/L	< 1.7 U	< 1.9 U
PFDoS	--	--	--	ng/L	< 1.7 U	< 1.9 U
FOSA	--	20 (2)	--	ng/L	< 1.7 U	2.1
NEtFOSA	--	20 (2)	--	ng/L	< 1.7 U	< 1.9 U
NMeFOSA	--	--	--	ng/L	< 1.7 U	< 1.9 U
NMeFOSE	--	--	--	ng/L	< 3.4 U	< 3.8 U
NEtFOSE	--	20 (2)	--	ng/L	< 1.7 U	< 1.9 U
4:2 FTS	--	--	--	ng/L	< 1.7 U	< 1.9 U
6:2 FTS	--	--	--	ng/L	< 4.2 U	< 4.7 U
8:2 FTS	--	--	--	ng/L	< 1.7 U	< 1.9 U
10:2 FTS	--	--	--	ng/L	< 1.7 U	< 1.9 U
ADONA	--	3,000	--	ng/L	< 1.7 U	< 1.9 U
HFPO-DA (GenX)	--	300	--	ng/L	< 3.4 U	< 3.8 U
F-53B Major	--	--	--	ng/L	< 1.7 U	< 1.9 U
F-53B Minor	--	--	--	ng/L	< 1.7 U	< 1.9 U

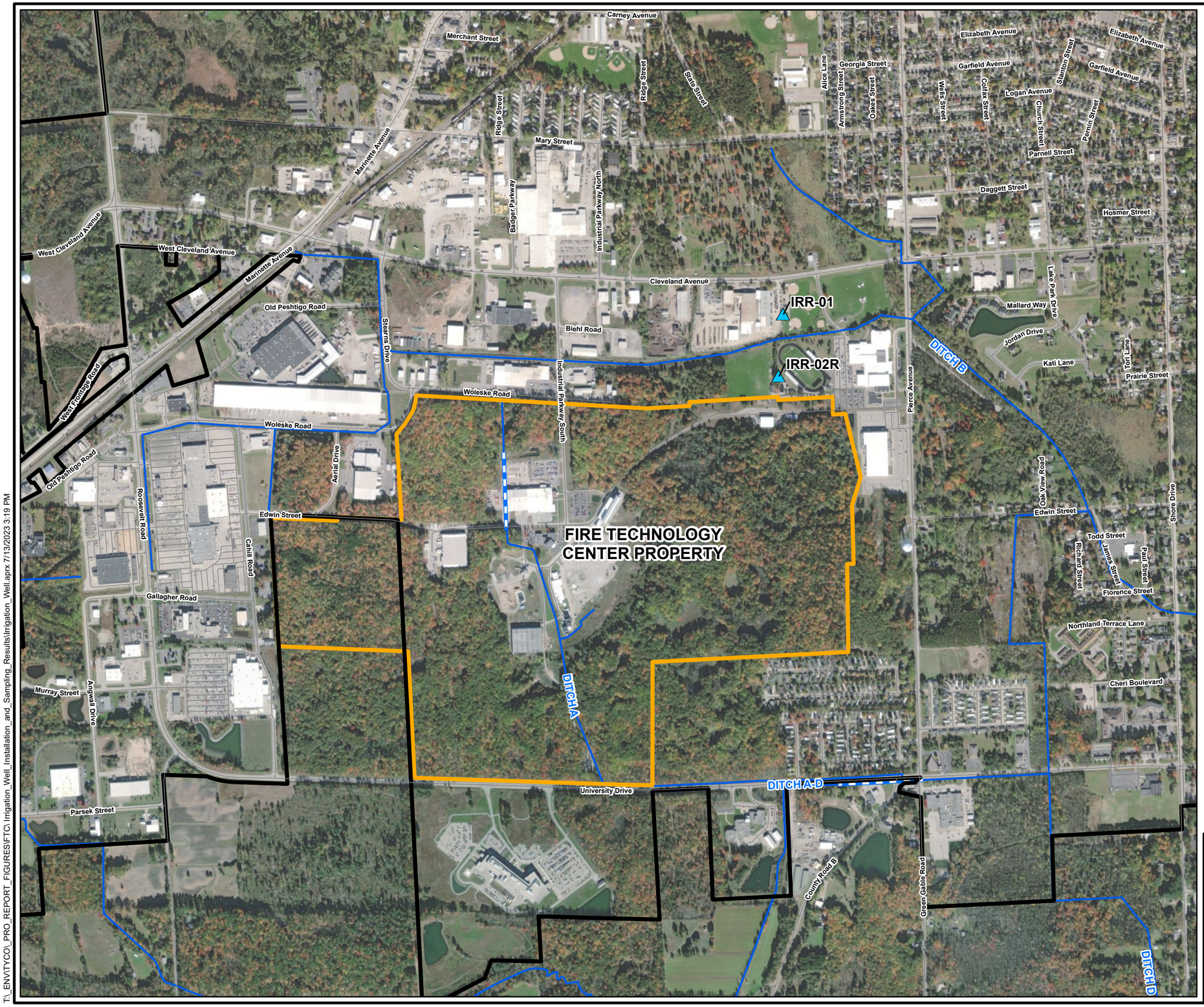
Table 1
Groundwater Sampling Results
Tyco Fire Technology Center

Notes:
< = Compound not detected at reporting detection limit.
(1) = In June 2019, WDHS recommended individual groundwater standards of 20 ng/L for PFOA and PFOS. The WDNR proposed those standards through the state rulemaking process. In February 2022, the Wisconsin Natural Resource Board did not approve the proposed rulemaking for groundwater. In August 2022, WDNR promulgated a drinking water standard of 70 ng/L for PFOA and PFOS, individually and combined, for public water systems. This standard does not apply to private drinking water wells.
(2) = In November 2020 the Wisconsin DHS recommended a combined groundwater standard of 20 ng/L for: FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFOS and PFOA. DHS also recommended individual standards for FOSA, NEtFOSE, NEtFOSA, NEtFOSAA, PFBS, PFHxS, PFNA, PFDA, PFDoA, PFHxA, PFTeA, PFUnA, PFBA, PFODA, DONA, and GenX. In June 2021, the Wisconsin Natural Resources Board approved a Statement of Scope to initiate a rulemaking for this recommendation. The WDNR has not yet proposed rules to initiate the rulemaking process to implement this recommendation; the agency's authority to do so under the Statement of Scope will expire in September 2023. In September 2022, the Governor approved a Statement of Scope to establish groundwater standards for PFOA, PFOS, PFBS and GenX (referred to as the "Four PFAS"). The Statement of Scope was approved by the Natural Resources Board in December 2022. The WDNR has not yet proposed rules to initiate the rulemaking process to implement the Statement of Scope; the agency's authority under the Statement of Scope will expire in March 2025.
(3) = Wis. Admin. Code ch. NR 809 Maximum Contaminant Level in drinking water for Radium-226,228 combined; Hardness as calcium carbonate - very hard defined as > 180 ppm; Iron under Wis. Admin Code ch. NR 140 Enforcement Standard.
-- = No standard
N = Normal sample
ng/L = nanograms per liter
UJ- = The result is an estimated quantity. The associated numerical value is expected to have a negative or low bias.

Chemical Abbreviation:

PFOA = Perfluorooctanoic acid (C8)
PFOS = Perfluorooctanesulfonic acid (C8)
PFBS = Perfluorobutanesulfonic acid (C4)
PFHpA = Perfluoroheptanoic acid (C7)
PFHxS = Perfluorohexanesulfonic acid (C6)
PFNA = Perfluorononanoic acid (C9)
PFDA = Perfluorodecanoic acid (C10)
PFDoA = Perfluorododecanoic acid (C12)
PFHxA = Perfluorohexanoic acid (C6)
PFTeA = Perfluorotetradecanoic acid (C14)
PFTriA = Perfluorotridecanoic acid (C13)
PFUnA = Perfluoroundecanoic acid (C11)
NEtFOSAA = N-ethylperfluorooctanesulfonamidoacetic acid (C12)
NMeFOSAA = N-methylperfluorooctanesulfonamidoacetic acid (C11)
PFBA = Perfluorobutanoic acid (C4)
PFPeA = Perfluoropentanoic acid (C5)
PFHxDA = Perfluoro-n-hexadecanoic acid (C16)
PFODA = Perfluoro-n-octadecanoic acid (C18)
PFPeS = Perfluoropentanesulfonic acid (C5)
PFHpS = Perfluoroheptanesulfonic acid (C7)
PFNS = Perfluorononanesulfonic acid (C9)
PFDS = Perfluorodecanesulfonic acid (C10)
PFDoS = Perfluorododecanesulfonic acid (C12)
FOSA = Perfluorooctanesulfonamide (C8)
NEtFOSA = N-ethylperfluorooctanesulfonamide (C10)
NMeFOSA = N-methylperfluorooctanesulfonamide (C9)
NMeFOSE = N-methylperfluorooctanesulfonamidoethanol (C11)
NEtFOSE = N-ethylperfluorooctanesulfonamidoethanol (C12)
4:2 FTS = 4:2 fluorotelomer sulfonate (C6)
6:2 FTS = 6:2 fluorotelomer sulfonate (C8)
8:2 FTS = 8:2 fluorotelomer sulfonate (C10)
10:2 FTS = 10:2 fluorotelomer sulfonate (C12)
ADONA = 4,8-Dioxa-3H-perfluorononanoic acid (C7)
HFPO-DA (GenX) = Hexafluoropropylene oxide dimer acid (C6)
F-53B Major = 9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (C8)
F-53B Minor = 11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (C10)

Figure



LEGEND:

- IRRIGATION WELL
- APPROXIMATE SITE PROPERTY BOUNDARY
- APPROXIMATE MARINETTE CITY BOUNDARY
- DITCH OR STREAM
- ROAD

0 1,000 2,000

SCALE IN FEET

TYCO FIRE PRODUCTS LP
MARINETTE, WISCONSIN

IRRIGATION WELL SAMPLING LOCATIONS

ARCADIS

FIGURE
1

T:_ENV\TYCO_PRO_REPORT_FIGURES\FTC\ Irrigation_Well_Installation_and_Sampling_Results\Irrigation_Well.aprx 7/13/2023 3:19 PM

Attachments

Attachment 1

Well Abandonment Form

Well / Drillhole / Borehole Filling & Sealing

Form 3300-005 (R 4/08)

Return to Report List | Save Data | Save and Submit Report

Notice: Completion of this report is required by chs. 160, 281, 283, 289, 291-293, 295 and 299, Wis. Stats., and ch. NR 141 Wis. Adm. Code. In accordance with chs. 281, 289, 291-293, 295 and 299, Wis. Stats., failure to file this form may result in a forfeiture of between $10-25,000, or imprisor for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be used for any purpose.

☐ **Verification. Check only if well filling & sealing was done previously and you are just verifying that work.**

Date of Filling & Sealing: 11/3/2022

1. Well Location Information

County: Marinette

WI Unique Well #: (AA###)

DNR Hicap Well #:

Latitude: (DD.DDDDD°) 45.0821 'N

Longitude: (DD.DDDDD°) 87.63471 'W

OR (enter only one format)

Latitude: (DD° MM.MMM') ° 'N

Longitude: (DD° MM.MMM') ° 'W

GPS Method Code: GPS008

Quarter / Quarter:	Quarter:	Section #:	Township #:		Range #:		Gov't Lot #:
NE	SW	7	30	North	24	East	

Well Street Address: 2135 PIERCE AVE

Subdivision Name:

Well City/Village/Town: City of MARINETTE

Well Zip Code: 54143 #####(-####)

Lot #:

Reason for Filling & Sealing: HAD PFAS IN WELL

Does a new well replace this well? No

WI Unique Well # of Replacement Well: (AA###)

2. Facility / Owner Information

Facility Name:

FID #:

License/Permit/Monitoring #:

Original Well Owner: (Last Name Only)

Service Category:

Present Well Owner: MARINETTE HIGH SCHOOL

Mailing Address of Present Owner: 2135 PIERCE AVE

City: MARINETTE

State: WI

Zip Code: 54143 #####(-####)

3. Well / Drillhole / Borehole Information

Well Type: Water Well

Original Construction Date: (mm/dd/yyyy)

Construction Type: Drilled

(specify Other):

Formation Type:

Total Well Depth From Ground Surface (ft.): 582

Casing Diameter (in.): 8

Lower Drillhole Diameter (in.):

Casing Depth (ft.): 60

Was well annular space grouted?

If yes, to what depth (ft.)?

Depth to Water (ft.): 10

4. Pump, Liner, Screen, Casing & Sealing Material

Pump and piping removed?	Yes
Liner(s) removed? If no liner mark as N/A	N/A
If no, was liner perforated?	N/A
Screen removed?	Yes
Well casing (or loop if geothermal) left in place?	Yes
Was casing cut off below surface?	Yes
Did sealing material rise to surface?	Yes
Did material settle after 24 hours?	Yes
If yes, was hole retopped?	Yes
If bentonite chips/pellets were used, were they hydrated from a known water source?	N/A

Method of Placing Sealing Material: (Explain Other):

Conductor Pipe-Pumped

Well Sealing Materials:

Neat Cement Grout

Other Drillholes:

5. Material Used to Fill Well / Drillhole

Material:	From (ft.):	To (ft.):	# and Units of Sealant:	Mix Ratio or Mud Weight:
NEAT CEMENT	Surface	204	76 BAGS	1:1
FINE SAND	210	204	2.5 CU FEET	0
PEA GRAVEL	582	210	7.25 CU YARDS	0

6. Comments

7. Supervision of Work

Name of Person or Firm Doing Filling & Sealing: LUISIER WELL DRILLING INC

License #: 0157

Street Address: 220 HANK MARKS DR

Phone: 920-848-5239 (###-###-####)

City: OCONTO FALLS

State: WI **Zip Code:** 54154-1078 #####(-####)

Email Address: Keithmlwd@gmail.com

Return to Report List | Save Data | Save and Submit Report

Attachment 2

Well Construction Report

Well Construction Report
WISCONSIN UNIQUE WELL NUMBER AAZ056

Drinking Water and Groundwater - DG/5
Department of Natural Resources, Box 7921
Madison WI 53707
Form 3300-077A

Property Owner: MARINETTE SCHOOL DISTRICT			Phone #: (715)735-1406
Mailing Address: 2135 PIERCE AVE			
City: MARINETTE	State: WI	Zip Code: 54143	
County: Marinette	Co. Permit #:	Notification #:	Completed: 06-06-2023

Well Constructor (Business Name): LUISIER WELL DRILLING INC	Lic. #: 157	Facility ID # (Public Wells):
Address: 220 HANK MARKS DR, OCONTO FALLS WI 54154-1078		Well Plan Approval #: 38010012
		Approval Date (mm-dd-yyyy): 7/26/89
Hicap Permanent Well #: 94023	Common Well #:	Specific Capacity: 2.1

3. Well serves 1 # of FOOTBALL FIELD
Private,potable
Heat Exchange____# of drillholes
Hicap Well ? Yes
Hicap Property ? No
Hicap Potable ? No

1. Well Location
Town of PESHTIGO
Fire # (if avail.): 2135
Street Address or Road Name and Number: PIERCE AVE
Subdivision Name | Lot # | Block #

Latitude / Longitude in Decimal Degree (DD): 45.082 °N -87.6346 °W
Method Code: SCR002

NE	SW	Section	Township	Range
or Govt Lot #		7	30 N	24 E

2. Well Type Replacement
of previous unique well # constructed in
Reason for replaced or reconstructed well ?
EXTENSION TO SURFACE CASING INTO BEDROCK
Construction Type Drilled

4. Potential Contamination Sources - ON REVERSE SIDE

5. Drillhole Dimensions and Construction Method

Dia. (in.)	From (ft.)	To (ft.)
12.25	Surface	124
8	124	597

Upper Enlarged Drillhole / Lower Open Bedrock

Yes	Rotary - Mud Circulation	No
No	Rotary - Air	Yes
No	Rotary - Air & Foam	No
No	Drill-Through Casing Hammer	
No	Reverse Rotary	
No	Cable-tool Bit ____in. dia...	No
No	Dual Rotary	No
Yes	Temp. Outer Casing 14in. dia	
Yes	Removed? 8depth ft. (If NO explain on back side)	

8. Geology

Geology Codes				8. Geology Type, Caving/Noncaving, Color, Hardness, etc...	From (ft.)	To (ft.)
		S		S-SAND	Surface	42
		L		L-LIMESTONE/DOLOMITE	42	385
	X	L	N	X-LENSED/STREAKED/LAYERED L-LIMESTONE/DOLOMITE N-W/SANDSTONE	385	597

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
8	8" EW NPS SCH 40 ASTM A53B .322	Surface	124
Dia. (in.)	Screen type, material & slot size	From (ft.)	To (ft.)

7. Grout or Other Sealing Material
Method BRADENHEAD

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
COMMERCIAL CEMENT	Surface	124	50 S

9. Static Water Level
40 ft. below ground surface

10. Pump Test
Pumping level 180 ft. below surface
Pumping at 300 GP M for 1 Hrs.
Pumping Method ? Airlift

11. Well Is
24 in. above grade
Developed ? Yes
Disinfected ? Yes
Capped ? Yes

12. Notified Owner of need to fill & seal ? Yes
Filled & Sealed Well(s) as needed? Yes

13. Constructor / Supervisory Driller	Lic #	Date Signed
LA	7408	06-06-2023
Drill Rig Operator	Lic or Reg #	Date Signed
RV	8926	06-06-2023

Attachment 3

Laboratory Analytical Results

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-01
Lab Sample ID: 500-235454-1
Date Collected: 06/15/23 17:10
Matrix: Water
Date Received: 06/17/23 09:00

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.2		4.2	2.0	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoropentanoic acid (PFPeA)	<1.7		1.7	0.42	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorohexanoic acid (PFHxA)	<1.7		1.7	0.49	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoroheptanoic acid (PFHpA)	<1.7		1.7	0.21	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorooctanoic acid (PFOA)	<1.7		1.7	0.72	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorononanoic acid (PFNA)	<1.7		1.7	0.23	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorodecanoic acid (PFDA)	<1.7		1.7	0.26	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoroundecanoic acid (PFUnA)	<1.7		1.7	0.93	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorododecanoic acid (PFDoA)	<1.7		1.7	0.47	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorotridecanoic acid (PFTrDA)	<1.7		1.7	1.1	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorotetradecanoic acid (PFTeA)	<1.7		1.7	0.62	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.7		1.7	0.75	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.7	*-	1.7	0.80	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorobutanesulfonic acid (PFBS)	<1.7		1.7	0.17	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoropentanesulfonic acid (PFPeS)	<1.7		1.7	0.25	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorohexanesulfonic acid (PFHxS)	<1.7		1.7	0.48	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.7		1.7	0.16	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorooctanesulfonic acid (PFOS)	<1.7		1.7	0.46	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorononanesulfonic acid (PFNS)	<1.7		1.7	0.31	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorodecanesulfonic acid (PFDS)	<1.7		1.7	0.27	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorododecanesulfonic acid (PFDoS)	<1.7		1.7	0.82	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorooctanesulfonamide (FOSA)	<1.7		1.7	0.83	ng/L		07/03/23 19:25	07/06/23 05:23	1
NEtFOSA	<1.7		1.7	0.74	ng/L		07/03/23 19:25	07/06/23 05:23	1
NMeFOSA	<1.7		1.7	0.36	ng/L		07/03/23 19:25	07/06/23 05:23	1
NMeFOSAA	<4.2		4.2	1.0	ng/L		07/03/23 19:25	07/06/23 05:23	1
NEtFOSAA	<4.2		4.2	1.1	ng/L		07/03/23 19:25	07/06/23 05:23	1
NMeFOSE	<3.4		3.4	1.2	ng/L		07/03/23 19:25	07/06/23 05:23	1
NEtFOSE	<1.7		1.7	0.72	ng/L		07/03/23 19:25	07/06/23 05:23	1
4:2 FTS	<1.7		1.7	0.20	ng/L		07/03/23 19:25	07/06/23 05:23	1
6:2 FTS	<4.2		4.2	2.1	ng/L		07/03/23 19:25	07/06/23 05:23	1
8:2 FTS	<1.7		1.7	0.39	ng/L		07/03/23 19:25	07/06/23 05:23	1
10:2 FTS	<1.7		1.7	0.57	ng/L		07/03/23 19:25	07/06/23 05:23	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.7		1.7	0.34	ng/L		07/03/23 19:25	07/06/23 05:23	1
HFPO-DA (GenX)	<3.4		3.4	1.3	ng/L		07/03/23 19:25	07/06/23 05:23	1
9Cl-PF3ONS	<1.7		1.7	0.20	ng/L		07/03/23 19:25	07/06/23 05:23	1
11Cl-PF3OUdS	<1.7		1.7	0.27	ng/L		07/03/23 19:25	07/06/23 05:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*53*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C5 PFPeA	*56*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C2 PFHxA	*55*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C4 PFHpA	*58*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C4 PFOA	*55*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C5 PFNA	*56*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C2 PFDA	*55*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C2 PFUnA	*54*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-01
Lab Sample ID: 500-235454-1
Date Collected: 06/15/23 17:10
Matrix: Water
Date Received: 06/17/23 09:00

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDoA	55		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C2 PFTeDA	59		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C2 PFHxDA	52		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C3 PFBS	53		25 - 150	07/03/23 19:25	07/06/23 05:23	1
18O2 PFHxS	58		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C4 PFOS	56		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C8 FOSA	67		10 - 150	07/03/23 19:25	07/06/23 05:23	1
d3-NMeFOSAA	76		25 - 150	07/03/23 19:25	07/06/23 05:23	1
d5-NEtFOSAA	79		25 - 150	07/03/23 19:25	07/06/23 05:23	1
d-N-MeFOSA-M	51		10 - 150	07/03/23 19:25	07/06/23 05:23	1
d-N-EtFOSA-M	52		10 - 150	07/03/23 19:25	07/06/23 05:23	1
d7-N-MeFOSE-M	53		10 - 150	07/03/23 19:25	07/06/23 05:23	1
d9-N-EtFOSE-M	50		10 - 150	07/03/23 19:25	07/06/23 05:23	1
M2-4:2 FTS	51		25 - 150	07/03/23 19:25	07/06/23 05:23	1
M2-6:2 FTS	43		25 - 150	07/03/23 19:25	07/06/23 05:23	1
M2-8:2 FTS	51		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C3 HFPO-DA	51		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C2 10:2 FTS	55		25 - 150	07/03/23 19:25	07/06/23 05:23	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.2		4.2	2.0	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoropentanoic acid (PFPeA)	<1.7		1.7	0.42	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorohexanoic acid (PFHxA)	<1.7		1.7	0.49	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoroheptanoic acid (PFHpA)	<1.7		1.7	0.21	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorooctanoic acid (PFOA)	<1.7		1.7	0.72	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorononanoic acid (PFNA)	<1.7		1.7	0.23	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorodecanoic acid (PFDA)	<1.7		1.7	0.26	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoroundecanoic acid (PFUnA)	<1.7		1.7	0.93	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorododecanoic acid (PFDoA)	<1.7		1.7	0.47	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorotridecanoic acid (PFTrDA)	<1.7		1.7	1.1	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorotetradecanoic acid (PFTeA)	<1.7		1.7	0.62	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.7		1.7	0.75	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.7	*-	1.7	0.80	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorobutanesulfonic acid (PFBS)	<1.7		1.7	0.17	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoropentanesulfonic acid (PFPeS)	<1.7		1.7	0.25	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorohexanesulfonic acid (PFHxS)	<1.7		1.7	0.48	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.7		1.7	0.16	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorooctanesulfonic acid (PFOS)	<1.7		1.7	0.46	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorononanesulfonic acid (PFNS)	<1.7		1.7	0.31	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorodecanesulfonic acid (PFDS)	<1.7		1.7	0.27	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorododecanesulfonic acid (PFDoS)	<1.7		1.7	0.82	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorooctanesulfonamide (FOSA)	<1.7		1.7	0.83	ng/L		07/03/23 19:25	07/08/23 00:59	1
NEtFOSA	<1.7		1.7	0.74	ng/L		07/03/23 19:25	07/08/23 00:59	1
NMeFOSA	<1.7		1.7	0.36	ng/L		07/03/23 19:25	07/08/23 00:59	1
NMeFOSAA	<4.2		4.2	1.0	ng/L		07/03/23 19:25	07/08/23 00:59	1

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-01
Lab Sample ID: 500-235454-1
Date Collected: 06/15/23 17:10
Matrix: Water
Date Received: 06/17/23 09:00

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NEtFOSAA	<4.2		4.2	1.1	ng/L		07/03/23 19:25	07/08/23 00:59	1
NMeFOSE	<3.4		3.4	1.2	ng/L		07/03/23 19:25	07/08/23 00:59	1
NEtFOSE	<1.7		1.7	0.72	ng/L		07/03/23 19:25	07/08/23 00:59	1
4:2 FTS	<1.7		1.7	0.20	ng/L		07/03/23 19:25	07/08/23 00:59	1
6:2 FTS	<4.2		4.2	2.1	ng/L		07/03/23 19:25	07/08/23 00:59	1
8:2 FTS	<1.7		1.7	0.39	ng/L		07/03/23 19:25	07/08/23 00:59	1
10:2 FTS	<1.7		1.7	0.57	ng/L		07/03/23 19:25	07/08/23 00:59	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.7		1.7	0.34	ng/L		07/03/23 19:25	07/08/23 00:59	1
HFPO-DA (GenX)	<3.4		3.4	1.3	ng/L		07/03/23 19:25	07/08/23 00:59	1
9Cl-PF3ONS	<1.7		1.7	0.20	ng/L		07/03/23 19:25	07/08/23 00:59	1
11Cl-PF3OUdS	<1.7		1.7	0.27	ng/L		07/03/23 19:25	07/08/23 00:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*65*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C5 PFPeA	*58*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFHxA	*58*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C4 PFHpA	*57*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C4 PFOA	*55*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C5 PFNA	*68*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFDA	*66*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFUnA	*54*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFDoA	*52*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFTeDA	*49*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFHxDA	*38*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C3 PFBS	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
18O2 PFHxS	*69*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C4 PFOS	*70*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C8 FOSA	*66*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d3-NMeFOSAA	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d5-NEtFOSAA	*65*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d-N-MeFOSA-M	*57*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d-N-EtFOSA-M	*54*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d7-N-MeFOSE-M	*67*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d9-N-EtFOSE-M	*62*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
M2-4:2 FTS	*49*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
M2-6:2 FTS	*53*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
M2-8:2 FTS	*63*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C3 HFPO-DA	*64*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 10:2 FTS	*57*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.25	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.68	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.83	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	*-	1.9	0.88	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.53	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.91	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanesulfonamide (FOSA)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSA	<1.9		1.9	0.81	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSA	<1.9		1.9	0.40	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSE	<3.7		3.7	1.3	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:46	1
4:2 FTS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/06/23 05:46	1
6:2 FTS	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/06/23 05:46	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/06/23 05:46	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/06/23 05:46	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.37	ng/L		07/03/23 19:25	07/06/23 05:46	1
HFPO-DA (GenX)	<3.7		3.7	1.4	ng/L		07/03/23 19:25	07/06/23 05:46	1
9Cl-PF3ONS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/06/23 05:46	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C5 PFPeA	*67*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFHxA	*67*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C4 PFHpA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C4 PFOA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C5 PFNA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFDA	*70*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFUnA	*69*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDoA	69		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 PFTeDA	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 PFHxDA	66		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C3 PFBS	70		25 - 150	07/03/23 19:25	07/06/23 05:46	1
18O2 PFHxS	74		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C4 PFOS	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C8 FOSA	80		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d3-NMeFOSAA	91		25 - 150	07/03/23 19:25	07/06/23 05:46	1
d5-NEtFOSAA	100		25 - 150	07/03/23 19:25	07/06/23 05:46	1
d-N-MeFOSA-M	58		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d-N-EtFOSA-M	59		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d7-N-MeFOSE-M	60		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d9-N-EtFOSE-M	56		10 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-4:2 FTS	62		25 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-6:2 FTS	57		25 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-8:2 FTS	64		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C3 HFPO-DA	61		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 10:2 FTS	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.25	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.68	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.83	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	*-	1.9	0.88	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.53	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.91	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanesulfonamide (FOSA)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/08/23 01:20	1
NEtFOSA	<1.9		1.9	0.81	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSA	<1.9		1.9	0.40	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/08/23 01:20	1

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSE	<3.7		3.7	1.3	ng/L		07/03/23 19:25	07/08/23 01:20	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:20	1
4:2 FTS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/08/23 01:20	1
6:2 FTS	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/08/23 01:20	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/08/23 01:20	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/08/23 01:20	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.37	ng/L		07/03/23 19:25	07/08/23 01:20	1
HFPO-DA (GenX)	<3.7		3.7	1.4	ng/L		07/03/23 19:25	07/08/23 01:20	1
9Cl-PF3ONS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/08/23 01:20	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*79*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C5 PFPeA	*74*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFHxA	*69*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFHpA	*66*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFOA	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C5 PFNA	*79*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFDA	*77*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFUnA	*63*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFDoA	*63*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFTeDA	*56*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFHxDA	*45*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C3 PFBS	*72*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
18O2 PFHxS	*81*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFOS	*80*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C8 FOSA	*72*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d3-NMeFOSAA	*68*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d5-NEtFOSAA	*73*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d-N-MeFOSA-M	*69*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d-N-EtFOSA-M	*61*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d7-N-MeFOSE-M	*76*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d9-N-EtFOSE-M	*76*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-4:2 FTS	*64*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-6:2 FTS	*61*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-8:2 FTS	*71*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C3 HFPO-DA	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 10:2 FTS	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-02R
Lab Sample ID: 500-235454-2
Date Collected: 06/15/23 17:40
Matrix: Water
Date Received: 06/17/23 09:00

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.55	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.24	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.26	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.52	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.69	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.84	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	*-	1.9	0.89	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorooctanesulfonamide (FOSA)	**2.1**		1.9	0.93	ng/L		07/03/23 19:25	07/06/23 05:34	1
NEtFOSA	<1.9		1.9	0.82	ng/L		07/03/23 19:25	07/06/23 05:34	1
NMeFOSA	<1.9		1.9	0.41	ng/L		07/03/23 19:25	07/06/23 05:34	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/06/23 05:34	1
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/06/23 05:34	1
NMeFOSE	<3.8		3.8	1.3	ng/L		07/03/23 19:25	07/06/23 05:34	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:34	1
4:2 FTS	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/06/23 05:34	1
6:2 FTS	**2.4**	**J**	4.7	2.4	ng/L		07/03/23 19:25	07/06/23 05:34	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/06/23 05:34	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/06/23 05:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.38	ng/L		07/03/23 19:25	07/06/23 05:34	1
HFPO-DA (GenX)	<3.8		3.8	1.4	ng/L		07/03/23 19:25	07/06/23 05:34	1
9Cl-PF3ONS	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/06/23 05:34	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*63*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C5 PFPeA	*64*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C2 PFHxA	*65*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C4 PFHpA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C4 PFOA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C5 PFNA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C2 PFDA	*65*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-02R
Lab Sample ID: 500-235454-2
Date Collected: 06/15/23 17:40
Matrix: Water
Date Received: 06/17/23 09:00

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFUnA	63		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C2 PFDoA	68		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C2 PFTeDA	67		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C2 PFHxDA	52		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C3 PFBS	65		25 - 150	07/03/23 19:25	07/06/23 05:34	1
18O2 PFHxS	67		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C4 PFOS	65		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C8 FOSA	75		10 - 150	07/03/23 19:25	07/06/23 05:34	1
d3-NMeFOSAA	84		25 - 150	07/03/23 19:25	07/06/23 05:34	1
d5-NEtFOSAA	92		25 - 150	07/03/23 19:25	07/06/23 05:34	1
d-N-MeFOSA-M	57		10 - 150	07/03/23 19:25	07/06/23 05:34	1
d-N-EtFOSA-M	54		10 - 150	07/03/23 19:25	07/06/23 05:34	1
d7-N-MeFOSE-M	57		10 - 150	07/03/23 19:25	07/06/23 05:34	1
d9-N-EtFOSE-M	54		10 - 150	07/03/23 19:25	07/06/23 05:34	1
M2-4:2 FTS	57		25 - 150	07/03/23 19:25	07/06/23 05:34	1
M2-6:2 FTS	55		25 - 150	07/03/23 19:25	07/06/23 05:34	1
M2-8:2 FTS	59		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C3 HFPO-DA	54		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C2 10:2 FTS	64		25 - 150	07/03/23 19:25	07/06/23 05:34	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.55	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.24	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.26	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.52	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.69	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.84	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	*-	1.9	0.89	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorooctanesulfonamide (FOSA)	**2.0**		1.9	0.93	ng/L		07/03/23 19:25	07/08/23 01:09	1
NEtFOSA	<1.9		1.9	0.82	ng/L		07/03/23 19:25	07/08/23 01:09	1

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-02R
Lab Sample ID: 500-235454-2
Date Collected: 06/15/23 17:40
Matrix: Water
Date Received: 06/17/23 09:00

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NMeFOSA	<1.9		1.9	0.41	ng/L		07/03/23 19:25	07/08/23 01:09	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/08/23 01:09	1
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/08/23 01:09	1
NMeFOSE	<3.8		3.8	1.3	ng/L		07/03/23 19:25	07/08/23 01:09	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:09	1
4:2 FTS	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/08/23 01:09	1
6:2 FTS	<4.7		4.7	2.4	ng/L		07/03/23 19:25	07/08/23 01:09	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/08/23 01:09	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/08/23 01:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.38	ng/L		07/03/23 19:25	07/08/23 01:09	1
HFPO-DA (GenX)	<3.8		3.8	1.4	ng/L		07/03/23 19:25	07/08/23 01:09	1
9Cl-PF3ONS	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/08/23 01:09	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C5 PFPeA	*71*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFHxA	*62*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C4 PFHpA	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C4 PFOA	*62*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C5 PFNA	*78*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFDA	*69*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFUnA	*62*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFDoA	*61*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFTeDA	*55*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFHxDA	*39*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C3 PFBS	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
18O2 PFHxS	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C4 PFOS	*76*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C8 FOSA	*75*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d3-NMeFOSAA	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d5-NEtFOSAA	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d-N-MeFOSA-M	*66*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d-N-EtFOSA-M	*59*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d7-N-MeFOSE-M	*68*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d9-N-EtFOSE-M	*76*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
M2-4:2 FTS	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
M2-6:2 FTS	*57*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
M2-8:2 FTS	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C3 HFPO-DA	*72*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 10:2 FTS	*59*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.25	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.68	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.83	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	*-	1.9	0.88	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.53	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.91	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanesulfonamide (FOSA)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSA	<1.9		1.9	0.81	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSA	<1.9		1.9	0.40	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSE	<3.7		3.7	1.3	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:46	1
4:2 FTS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/06/23 05:46	1
6:2 FTS	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/06/23 05:46	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/06/23 05:46	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/06/23 05:46	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.37	ng/L		07/03/23 19:25	07/06/23 05:46	1
HFPO-DA (GenX)	<3.7		3.7	1.4	ng/L		07/03/23 19:25	07/06/23 05:46	1
9Cl-PF3ONS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/06/23 05:46	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C5 PFPeA	*67*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFHxA	*67*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C4 PFHpA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C4 PFOA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C5 PFNA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFDA	*70*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFUnA	*69*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDoA	69		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 PFTeDA	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 PFHxDA	66		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C3 PFBS	70		25 - 150	07/03/23 19:25	07/06/23 05:46	1
18O2 PFHxS	74		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C4 PFOS	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C8 FOSA	80		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d3-NMeFOSAA	91		25 - 150	07/03/23 19:25	07/06/23 05:46	1
d5-NEtFOSAA	100		25 - 150	07/03/23 19:25	07/06/23 05:46	1
d-N-MeFOSA-M	58		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d-N-EtFOSA-M	59		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d7-N-MeFOSE-M	60		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d9-N-EtFOSE-M	56		10 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-4:2 FTS	62		25 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-6:2 FTS	57		25 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-8:2 FTS	64		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C3 HFPO-DA	61		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 10:2 FTS	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.25	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.68	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.83	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	*-	1.9	0.88	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.53	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.91	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanesulfonamide (FOSA)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/08/23 01:20	1
NEtFOSA	<1.9		1.9	0.81	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSA	<1.9		1.9	0.40	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/08/23 01:20	1

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSE	<3.7		3.7	1.3	ng/L		07/03/23 19:25	07/08/23 01:20	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:20	1
4:2 FTS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/08/23 01:20	1
6:2 FTS	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/08/23 01:20	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/08/23 01:20	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/08/23 01:20	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.37	ng/L		07/03/23 19:25	07/08/23 01:20	1
HFPO-DA (GenX)	<3.7		3.7	1.4	ng/L		07/03/23 19:25	07/08/23 01:20	1
9Cl-PF3ONS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/08/23 01:20	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*79*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C5 PFPeA	*74*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFHxA	*69*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFHpA	*66*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFOA	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C5 PFNA	*79*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFDA	*77*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFUnA	*63*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFDoA	*63*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFTeDA	*56*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFHxDA	*45*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C3 PFBS	*72*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
18O2 PFHxS	*81*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFOS	*80*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C8 FOSA	*72*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d3-NMeFOSAA	*68*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d5-NEtFOSAA	*73*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d-N-MeFOSA-M	*69*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d-N-EtFOSA-M	*61*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d7-N-MeFOSE-M	*76*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d9-N-EtFOSE-M	*76*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-4:2 FTS	*64*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-6:2 FTS	*61*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-8:2 FTS	*71*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C3 HFPO-DA	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 10:2 FTS	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*

Attachment 4

Laboratory Validation Report

Tyco Fire Products LLC.

Data Review

Marinette, Wisconsin

Perfluorinated Alkyl Substances (PFAS) Analyses

SDG #500-235454-1

Analyses Performed By:
TestAmerica Laboratories, Inc.
West Sacramento, California

Report #50374R
Review Level: Stage 4 Review
Project: 30168809.1.4.1

Summary

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #500-235454-1 for samples collected in association with the for the Tyco Fire Products, LLC., Marinette, Wisconsin Site. The review was conducted as a Stage 4 review evaluation and included review of data package completeness (USEPA Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, EPA 540-R-08-005, January 2009). Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis			
					PFAAS	**Metals**	Rad	Misc.
IRR-01 (061523)	500-235454-1	Water	6/15/2023		X			
IRR-02R (061523)	500-235454-2	Water	6/15/2023		X			
FIELD BLANK-06-15-2023-DW	500-235454-3	Water	6/15/2023		X			

Notes:
Misc. = miscellaneous analysis
Rad = radiological analysis

Analytical Data Package Documentation

The table below evaluates the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limitss		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed chain-of-custody form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data package completeness and compliance		X		X	

Note:
QA = quality assurance

Organic Analysis Introduction

Analyses were performed according to United States Environmental Protection Agency (USEPA) Method 537 Modified and laboratory standard operating procedure (SOP) WS-LC-0025r2-9 PFAS by CLMSMS, 11/22/2017, "Per- and Polyfluorinated Substances (PFAS) in Water, Soils, Sediments and Tissue. [Method 537 (Modified), Method PFAS by LCMSMS Compliant with QSM 5.1 Table B-15]", Data were reviewed in accordance with the following:

- USEPA National Functional Guidelines for Organic Superfund Methods Data Review, EPA 540-R-2017-002, January 2017 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate);
- Department of Defense (DoD) Quality Systems Manual (QSM) 5.1 Table B-15;
- Data Review and Validation Guidelines for Perfluoroalkyl Substances (PFASs) Analyzed Using EPA Method 537, (EPA 910-R-18-001, November 2018); and
- Wisconsin PFAS Aqueous (Non-Potable Water) and Non-Aqueous Matrices Method Expectations, (EA-19-0001, WDNR December 2019).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - UB Compound is considered non-detect at the listed value due to associated blank contamination.
  - 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 positive or high bias.
  - J- The result is an estimated quantity. The associated numerical value is expected to have a negative or low bias.

UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

R The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Perfluorinated Alkyl Acids (PFAA) Analyses

1 Holding Times

The specified holding times for the following methods are presented in the table below.

Method	Matrix	Holding Time	Preservation
EPA 537 Modified	Water	28 days from collection to extraction and 30 days from extraction to analysis	Cool to <6 °C; Extracts must be stored at room temperature until analysis.

Samples were analyzed within the specified holding time criterion.

2 Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the MDL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3 Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

3.1 Initial Calibration

The method specifies the initial calibration standards exhibit a relative standard deviation (%RSD) between 70-130% for each compound and the lowest level of calibration recovery for each compound must be within 50-150% of its true value. In addition, the relative percent difference (RPD) between the low and high internal standard (IS) response for each IS must be ≤ 20%. A technical review of the data applies limits to all compounds with no exceptions.

The initial calibration met criteria and the calibration standards and ICV standard recoveries were acceptable.

3.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit (20%) and RRF value greater than control limit (0.05).

Compounds associated with the calibrations were within the specified control limits, with the exception of the compounds presented in the following table.

Sample Locations	CCV	Compound	%D
IRR-01 (061523) IRR-02R (061523) FIELD BLANK-06-15-2023-DW	CCV %D	6:2 FTS	226.5%
IRR-01 (061523) IRR-02R (061523) FIELD BLANK-06-15-2023-DW	CCV %D	6:2 FTS	AC

The criteria used to evaluate the CCV are presented in the following table. In the case of a calibration deviation, the sample results are qualified.

Continuing	Criteria	Sample Result	Qualification
Continuing Calibration	%D >30% (increase in sensitivity)	Non-detect	UJ
		Detect	J+
	%D >30% (decrease in sensitivity)	Non-detect	UJ
		Detect	J-
	%D >50%	Non-detect	R
		Detect	J

Please note that the original analysis associated with the compound 6:2 FTS was grossly outside the control limit. Therefore, the re-analysis which exhibited an acceptable CCV %D, was used for reporting for 6:2 FTS.

4 Extracted Internal Standard (EIS)/Isotope Labelled Standards

Labeled standards must be added to all field samples and QC samples prior to extraction. For aqueous samples prepared by serial dilution instead of solid phase extraction, they must be added to samples prior to analysis. EIS recoveries must be within the control limits of 25% to150% with exception of compounds FOSA, NMeFOSA, NEtFOSA, NMeFOSE, and NEtFOSE, whereas a control limit of 10-150% is required).

EIS exhibited recoveries within the control limits.

5 Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within 70-130% or within 50-150% at the low-level fortified amount (near the RL). The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within 30%.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD analysis was not performed on a sample location within this SDG.

6 Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the WDNR, December 2019, guidance limits.

Sample locations associated with LCS/LCSD analysis exhibiting recoveries outside of the control limits presented in the following table.

Sample Locations	Compound	LCS Recovery	LCSD Recovery
IRR-01 (061523) IRR-02R (061523) FIELD BLANK-06-15-2023-DW	Perfluoro-n-octadecanoic acid (PFODA)	<LL but >10%	<LL but >10%

The criteria used to evaluate the LCS/LCSD recoveries are presented in the following table. In the case of an LCS/LCSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J

7 Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices.

A field duplicate was not collected within this dataset.

8 Compound Identification

Compounds are identified on the LC/MS by using the analytes relative retention time and ion spectra.

Identified compounds met the specified criteria.

9 System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

Data Validation Checklist for PFAAs

SVOCs: EPA 537 Modified	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Field blanks		X		X	
Laboratory Control Sample (LCS) %R		X	X		
Laboratory Control Sample Duplicate (LCSD) %R		X	X		
LCS/LCSD Precision (RPD)		X		X	
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field/Lab Duplicate (RPD)	X				X
Surrogate/Isotope Dilution Spike Recoveries		X		X	
Dilution Factor		X		X	
Moisture Content	X				X
Tier III Validation					
System performance and column resolution		X		X	
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X	X		
Internal standard		X		X	
Compound identification and quantitation					
A. Reconstructed ion chromatograms		X		X	
B. Quantitation Reports		X		X	
C. RT of sample compounds within the established RT windows		X		X	
D. Quantitation transcriptions/calculations		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:
%RSD = relative standard deviation
%R = percent recovery
RPD = relative percent difference
%D = percent difference

VALIDATION PERFORMED BY: Todd Church

SIGNATURE: 

DATE: July 19, 2023

PEER REVIEW: Joseph C. Houser

DATE: July 26, 2023

Chain of Custody Corrected Sample Analysis Data

Eurofins Sacramento
880 Riverside Parkway
West Sacramento, CA 95605
Phone: 916-373-5600 Fax: 916-372-1059

Chain of Custody Record

eurofins | Environment Testing

Client Information	Sampler:	Lab PM: Fredrick, Sandie	Carrier Tracking No(s):	COC No: 500-111567-46339.1
Client Contact: Lisa Rutkowski	Phone:	E-Mail: Sandra.Fredrick@et.eurofinsus.com	State of Origin: WI	Page: Page 1 of 1
Company: ARCADIS U.S., Inc.	PWSID:	Analysis Requested		Job #:

Address: 126 North Jefferson Street Suite 400	Due Date Requested:	
City: Milwaukee	TAT Requested (days): STD	
State, Zip: WI, 53202	Compliance Project: Δ Yes Δ No	
Phone:	PO #: ~~30135437.02~~ 30168807.1.2.3	
Email: [redacted]	WO #:	
Project Name: Marinette, WI ~~30171095.4.2.1~~ 30168807.1.2.3	Project #: ~~50020340~~ 50020191	
Site: Marinette, WI	SSOW#:	

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFC_IDA_WI - PFAS, Standard List (36 Analytes)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
IRR-01	6/15/23	1710	G	Water	N	N	2	2	
IRR-02R	6/15/23	1740		Water	N	N	2	2	
Field Blank-06-15-23-DW	6/15/23	1750		Water	N	N	1	1	
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					

500-235454 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Jackie Anderson	6/16/23 1230	Arcadis	Pack N Ship	6/16/23 1230	
				6-17-23 09:00	EETSAC

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.: 2159363
Cooler Temperature(s) °C and Other Remarks: 1.0

Ver: 06/08/2021

Definitions/Glossary

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Qualifiers

LCMS

Qualifier	Qualifier Description
*-	LCS and/or LCSD is outside acceptance limits, low biased.
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

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-01
Lab Sample ID: 500-235454-1
Date Collected: 06/15/23 17:10
Matrix: Water
Date Received: 06/17/23 09:00

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.2		4.2	2.0	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoropentanoic acid (PFPeA)	<1.7		1.7	0.42	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorohexanoic acid (PFHxA)	<1.7		1.7	0.49	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoroheptanoic acid (PFHpA)	<1.7		1.7	0.21	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorooctanoic acid (PFOA)	<1.7		1.7	0.72	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorononanoic acid (PFNA)	<1.7		1.7	0.23	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorodecanoic acid (PFDA)	<1.7		1.7	0.26	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoroundecanoic acid (PFUnA)	<1.7		1.7	0.93	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorododecanoic acid (PFDoA)	<1.7		1.7	0.47	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorotridecanoic acid (PFTrDA)	<1.7		1.7	1.1	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorotetradecanoic acid (PFTeA)	<1.7		1.7	0.62	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.7		1.7	0.75	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.7	* UJ -	1.7	0.80	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorobutanesulfonic acid (PFBS)	<1.7		1.7	0.17	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoropentanesulfonic acid (PFPeS)	<1.7		1.7	0.25	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorohexanesulfonic acid (PFHxS)	<1.7		1.7	0.48	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.7		1.7	0.16	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorooctanesulfonic acid (PFOS)	<1.7		1.7	0.46	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorononanesulfonic acid (PFNS)	<1.7		1.7	0.31	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorodecanesulfonic acid (PFDS)	<1.7		1.7	0.27	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorododecanesulfonic acid (PFDoS)	<1.7		1.7	0.82	ng/L		07/03/23 19:25	07/06/23 05:23	1
Perfluorooctanesulfonamide (FOSA)	<1.7		1.7	0.83	ng/L		07/03/23 19:25	07/06/23 05:23	1
NEtFOSA	<1.7		1.7	0.74	ng/L		07/03/23 19:25	07/06/23 05:23	1
NMeFOSA	<1.7		1.7	0.36	ng/L		07/03/23 19:25	07/06/23 05:23	1
NMeFOSAA	<4.2		4.2	1.0	ng/L		07/03/23 19:25	07/06/23 05:23	1
NEtFOSAA	<4.2		4.2	1.1	ng/L		07/03/23 19:25	07/06/23 05:23	1
NMeFOSE	<3.4		3.4	1.2	ng/L		07/03/23 19:25	07/06/23 05:23	1
NEtFOSE	<1.7		1.7	0.72	ng/L		07/03/23 19:25	07/06/23 05:23	1
4:2 FTS	<1.7		1.7	0.20	ng/L		07/03/23 19:25	07/06/23 05:23	1
6:2 FTS	<4.2		4.2	2.1	ng/L		07/03/23 19:25	07/06/23 05:23	1
8:2 FTS	<1.7		1.7	0.39	ng/L		07/03/23 19:25	07/06/23 05:23	1
10:2 FTS	<1.7		1.7	0.57	ng/L		07/03/23 19:25	07/06/23 05:23	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.7		1.7	0.34	ng/L		07/03/23 19:25	07/06/23 05:23	1
HFPO-DA (GenX)	<3.4		3.4	1.3	ng/L		07/03/23 19:25	07/06/23 05:23	1
9Cl-PF3ONS	<1.7		1.7	0.20	ng/L		07/03/23 19:25	07/06/23 05:23	1
11Cl-PF3OUdS	<1.7		1.7	0.27	ng/L		07/03/23 19:25	07/06/23 05:23	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*53*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C5 PFPeA	*56*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C2 PFHxA	*55*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C4 PFHpA	*58*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C4 PFOA	*55*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C5 PFNA	*56*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C2 PFDA	*55*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*
13C2 PFUnA	*54*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:23*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-01
Date Collected: 06/15/23 17:10
Date Received: 06/17/23 09:00

Lab Sample ID: 500-235454-1
Matrix: Water

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDoA	55		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C2 PFTeDA	59		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C2 PFHxDA	52		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C3 PFBS	53		25 - 150	07/03/23 19:25	07/06/23 05:23	1
18O2 PFHxS	58		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C4 PFOS	56		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C8 FOSA	67		10 - 150	07/03/23 19:25	07/06/23 05:23	1
d3-NMeFOSAA	76		25 - 150	07/03/23 19:25	07/06/23 05:23	1
d5-NEtFOSAA	79		25 - 150	07/03/23 19:25	07/06/23 05:23	1
d-N-MeFOSA-M	51		10 - 150	07/03/23 19:25	07/06/23 05:23	1
d-N-EtFOSA-M	52		10 - 150	07/03/23 19:25	07/06/23 05:23	1
d7-N-MeFOSE-M	53		10 - 150	07/03/23 19:25	07/06/23 05:23	1
d9-N-EtFOSE-M	50		10 - 150	07/03/23 19:25	07/06/23 05:23	1
M2-4:2 FTS	51		25 - 150	07/03/23 19:25	07/06/23 05:23	1
M2-6:2 FTS	43		25 - 150	07/03/23 19:25	07/06/23 05:23	1
M2-8:2 FTS	51		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C3 HFPO-DA	51		25 - 150	07/03/23 19:25	07/06/23 05:23	1
13C2 10:2 FTS	55		25 - 150	07/03/23 19:25	07/06/23 05:23	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.2		4.2	2.0	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoropentanoic acid (PFPeA)	<1.7		1.7	0.42	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorohexanoic acid (PFHxA)	<1.7		1.7	0.49	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoroheptanoic acid (PFHpA)	<1.7		1.7	0.21	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorooctanoic acid (PFOA)	<1.7		1.7	0.72	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorononanoic acid (PFNA)	<1.7		1.7	0.23	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorodecanoic acid (PFDA)	<1.7		1.7	0.26	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoroundecanoic acid (PFUnA)	<1.7		1.7	0.93	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorododecanoic acid (PFDoA)	<1.7		1.7	0.47	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorotridecanoic acid (PFTrDA)	<1.7		1.7	1.1	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorotetradecanoic acid (PFTeA)	<1.7		1.7	0.62	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.7		1.7	0.75	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.7	*-	1.7	0.80	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorobutanesulfonic acid (PFBS)	<1.7		1.7	0.17	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoropentanesulfonic acid (PFPeS)	<1.7		1.7	0.25	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorohexanesulfonic acid (PFHxS)	<1.7		1.7	0.48	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.7		1.7	0.16	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorooctanesulfonic acid (PFOS)	<1.7		1.7	0.46	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorononanesulfonic acid (PFNS)	<1.7		1.7	0.31	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorodecanesulfonic acid (PFDS)	<1.7		1.7	0.27	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorododecanesulfonic acid (PFDoS)	<1.7		1.7	0.82	ng/L		07/03/23 19:25	07/08/23 00:59	1
Perfluorooctanesulfonamide (FOSA)	<1.7		1.7	0.83	ng/L		07/03/23 19:25	07/08/23 00:59	1
NEtFOSA	<1.7		1.7	0.74	ng/L		07/03/23 19:25	07/08/23 00:59	1
NMeFOSA	<1.7		1.7	0.36	ng/L		07/03/23 19:25	07/08/23 00:59	1
NMeFOSAA	<4.2		4.2	1.0	ng/L		07/03/23 19:25	07/08/23 00:59	1

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-01
Lab Sample ID: 500-235454-1
Date Collected: 06/15/23 17:10
Matrix: Water
Date Received: 06/17/23 09:00

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NEtFOSAA	<4.2		4.2	1.1	ng/L		07/03/23 19:25	07/08/23 00:59	1
NMeFOSE	<3.4		3.4	1.2	ng/L		07/03/23 19:25	07/08/23 00:59	1
NEtFOSE	<1.7		1.7	0.72	ng/L		07/03/23 19:25	07/08/23 00:59	1
4:2 FTS	<1.7		1.7	0.20	ng/L		07/03/23 19:25	07/08/23 00:59	1
6:2 FTS	<4.2		4.2	2.1	ng/L		07/03/23 19:25	07/08/23 00:59	1
8:2 FTS	<1.7		1.7	0.39	ng/L		07/03/23 19:25	07/08/23 00:59	1
10:2 FTS	<1.7		1.7	0.57	ng/L		07/03/23 19:25	07/08/23 00:59	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.7		1.7	0.34	ng/L		07/03/23 19:25	07/08/23 00:59	1
HFPO-DA (GenX)	<3.4		3.4	1.3	ng/L		07/03/23 19:25	07/08/23 00:59	1
9Cl-PF3ONS	<1.7		1.7	0.20	ng/L		07/03/23 19:25	07/08/23 00:59	1
11Cl-PF3OUdS	<1.7		1.7	0.27	ng/L		07/03/23 19:25	07/08/23 00:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*65*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C5 PFPeA	*58*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFHxA	*58*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C4 PFHpA	*57*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C4 PFOA	*55*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C5 PFNA	*68*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFDA	*66*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFUnA	*54*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFDoA	*52*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFTeDA	*49*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 PFHxDA	*38*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C3 PFBS	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
18O2 PFHxS	*69*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C4 PFOS	*70*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C8 FOSA	*66*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d3-NMeFOSAA	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d5-NEtFOSAA	*65*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d-N-MeFOSA-M	*57*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d-N-EtFOSA-M	*54*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d7-N-MeFOSE-M	*67*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
d9-N-EtFOSE-M	*62*		*10 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
M2-4:2 FTS	*49*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
M2-6:2 FTS	*53*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
M2-8:2 FTS	*63*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C3 HFPO-DA	*64*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*
13C2 10:2 FTS	*57*		*25 - 150*	*07/03/23 19:25*	*07/08/23 00:59*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-02R
Lab Sample ID: 500-235454-2
Date Collected: 06/15/23 17:40
Matrix: Water
Date Received: 06/17/23 09:00

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.55	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.24	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.26	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.52	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.69	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.84	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	* UJ -	1.9	0.89	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/06/23 05:34	1
Perfluorooctanesulfonamide (FOSA)	**2.1**		1.9	0.93	ng/L		07/03/23 19:25	07/06/23 05:34	1
NEtFOSA	<1.9		1.9	0.82	ng/L		07/03/23 19:25	07/06/23 05:34	1
NMeFOSA	<1.9		1.9	0.41	ng/L		07/03/23 19:25	07/06/23 05:34	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/06/23 05:34	1
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/06/23 05:34	1
NMeFOSE	<3.8		3.8	1.3	ng/L		07/03/23 19:25	07/06/23 05:34	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:34	1
4:2 FTS	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/06/23 05:34	1
6:2 FTS <4.7	**2.4**	J	4.7	2.4	ng/L		07/03/23 19:25	07/06/23 05:34	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/06/23 05:34	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/06/23 05:34	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.38	ng/L		07/03/23 19:25	07/06/23 05:34	1
HFPO-DA (GenX)	<3.8		3.8	1.4	ng/L		07/03/23 19:25	07/06/23 05:34	1
9Cl-PF3ONS	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/06/23 05:34	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:34	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*63*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C5 PFPeA	*64*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C2 PFHxA	*65*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C4 PFHpA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C4 PFOA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C5 PFNA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*
13C2 PFDA	*65*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:34*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-02R
Date Collected: 06/15/23 17:40
Date Received: 06/17/23 09:00

Lab Sample ID: 500-235454-2
Matrix: Water

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFUnA	63		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C2 PFDoA	68		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C2 PFTeDA	67		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C2 PFHxDA	52		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C3 PFBS	65		25 - 150	07/03/23 19:25	07/06/23 05:34	1
18O2 PFHxS	67		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C4 PFOS	65		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C8 FOSA	75		10 - 150	07/03/23 19:25	07/06/23 05:34	1
d3-NMeFOSAA	84		25 - 150	07/03/23 19:25	07/06/23 05:34	1
d5-NEtFOSAA	92		25 - 150	07/03/23 19:25	07/06/23 05:34	1
d-N-MeFOSA-M	57		10 - 150	07/03/23 19:25	07/06/23 05:34	1
d-N-EtFOSA-M	54		10 - 150	07/03/23 19:25	07/06/23 05:34	1
d7-N-MeFOSE-M	57		10 - 150	07/03/23 19:25	07/06/23 05:34	1
d9-N-EtFOSE-M	54		10 - 150	07/03/23 19:25	07/06/23 05:34	1
M2-4:2 FTS	57		25 - 150	07/03/23 19:25	07/06/23 05:34	1
M2-6:2 FTS	55		25 - 150	07/03/23 19:25	07/06/23 05:34	1
M2-8:2 FTS	59		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C3 HFPO-DA	54		25 - 150	07/03/23 19:25	07/06/23 05:34	1
13C2 10:2 FTS	64		25 - 150	07/03/23 19:25	07/06/23 05:34	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.55	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.24	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.26	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.52	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.69	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.84	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	*-	1.9	0.89	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/08/23 01:09	1
Perfluorooctanesulfonamide (FOSA)	**2.0**		1.9	0.93	ng/L		07/03/23 19:25	07/08/23 01:09	1
NEtFOSA	<1.9		1.9	0.82	ng/L		07/03/23 19:25	07/08/23 01:09	1

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: IRR-02R
Lab Sample ID: 500-235454-2
Date Collected: 06/15/23 17:40
Matrix: Water
Date Received: 06/17/23 09:00

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NMeFOSA	<1.9		1.9	0.41	ng/L		07/03/23 19:25	07/08/23 01:09	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/08/23 01:09	1
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/08/23 01:09	1
NMeFOSE	<3.8		3.8	1.3	ng/L		07/03/23 19:25	07/08/23 01:09	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:09	1
4:2 FTS	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/08/23 01:09	1
6:2 FTS	<4.7		4.7	2.4	ng/L		07/03/23 19:25	07/08/23 01:09	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/08/23 01:09	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/08/23 01:09	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.38	ng/L		07/03/23 19:25	07/08/23 01:09	1
HFPO-DA (GenX)	<3.8		3.8	1.4	ng/L		07/03/23 19:25	07/08/23 01:09	1
9Cl-PF3ONS	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/08/23 01:09	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:09	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C5 PFPeA	*71*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFHxA	*62*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C4 PFHpA	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C4 PFOA	*62*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C5 PFNA	*78*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFDA	*69*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFUnA	*62*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFDoA	*61*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFTeDA	*55*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 PFHxDA	*39*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C3 PFBS	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
18O2 PFHxS	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C4 PFOS	*76*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C8 FOSA	*75*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d3-NMeFOSAA	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d5-NEtFOSAA	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d-N-MeFOSA-M	*66*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d-N-EtFOSA-M	*59*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d7-N-MeFOSE-M	*68*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
d9-N-EtFOSE-M	*76*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
M2-4:2 FTS	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
M2-6:2 FTS	*57*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
M2-8:2 FTS	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C3 HFPO-DA	*72*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*
13C2 10:2 FTS	*59*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:09*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

Method: EPA 537 (modified) - Fluorinated Alkyl Substances

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.25	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.68	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.83	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	* UJ -	1.9	0.88	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.53	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.91	ng/L		07/03/23 19:25	07/06/23 05:46	1
Perfluorooctanesulfonamide (FOSA)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSA	<1.9		1.9	0.81	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSA	<1.9		1.9	0.40	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/06/23 05:46	1
NMeFOSE	<3.7		3.7	1.3	ng/L		07/03/23 19:25	07/06/23 05:46	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/06/23 05:46	1
4:2 FTS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/06/23 05:46	1
6:2 FTS	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/06/23 05:46	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/06/23 05:46	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/06/23 05:46	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.37	ng/L		07/03/23 19:25	07/06/23 05:46	1
HFPO-DA (GenX)	<3.7		3.7	1.4	ng/L		07/03/23 19:25	07/06/23 05:46	1
9Cl-PF3ONS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/06/23 05:46	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/06/23 05:46	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*66*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C5 PFPeA	*67*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFHxA	*67*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C4 PFHpA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C4 PFOA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C5 PFNA	*71*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFDA	*70*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*
13C2 PFUnA	*69*		*25 - 150*	*07/03/23 19:25*	*07/06/23 05:46*	*1*

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

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

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFDoA	69		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 PFTeDA	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 PFHxDA	66		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C3 PFBS	70		25 - 150	07/03/23 19:25	07/06/23 05:46	1
18O2 PFHxS	74		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C4 PFOS	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C8 FOSA	80		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d3-NMeFOSAA	91		25 - 150	07/03/23 19:25	07/06/23 05:46	1
d5-NEtFOSAA	100		25 - 150	07/03/23 19:25	07/06/23 05:46	1
d-N-MeFOSA-M	58		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d-N-EtFOSA-M	59		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d7-N-MeFOSE-M	60		10 - 150	07/03/23 19:25	07/06/23 05:46	1
d9-N-EtFOSE-M	56		10 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-4:2 FTS	62		25 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-6:2 FTS	57		25 - 150	07/03/23 19:25	07/06/23 05:46	1
M2-8:2 FTS	64		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C3 HFPO-DA	61		25 - 150	07/03/23 19:25	07/06/23 05:46	1
13C2 10:2 FTS	71		25 - 150	07/03/23 19:25	07/06/23 05:46	1

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorobutanoic acid (PFBA)	<4.7		4.7	2.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoropentanoic acid (PFPeA)	<1.9		1.9	0.46	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorohexanoic acid (PFHxA)	<1.9		1.9	0.54	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroheptanoic acid (PFHpA)	<1.9		1.9	0.23	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanoic acid (PFOA)	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorononanoic acid (PFNA)	<1.9		1.9	0.25	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorodecanoic acid (PFDA)	<1.9		1.9	0.29	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroundecanoic acid (PFUnA)	<1.9		1.9	1.0	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorododecanoic acid (PFDoA)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorotridecanoic acid (PFTrDA)	<1.9		1.9	1.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorotetradecanoic acid (PFTeA)	<1.9		1.9	0.68	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoro-n-hexadecanoic acid (PFHxDA)	<1.9		1.9	0.83	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoro-n-octadecanoic acid (PFODA)	<1.9	*-	1.9	0.88	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorobutanesulfonic acid (PFBS)	<1.9		1.9	0.19	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoropentanesulfonic acid (PFPeS)	<1.9		1.9	0.28	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorohexanesulfonic acid (PFHxS)	<1.9		1.9	0.53	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluoroheptanesulfonic acid (PFHpS)	<1.9		1.9	0.18	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanesulfonic acid (PFOS)	<1.9		1.9	0.51	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorononanesulfonic acid (PFNS)	<1.9		1.9	0.35	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorodecanesulfonic acid (PFDS)	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorododecanesulfonic acid (PFDoS)	<1.9		1.9	0.91	ng/L		07/03/23 19:25	07/08/23 01:20	1
Perfluorooctanesulfonamide (FOSA)	<1.9		1.9	0.92	ng/L		07/03/23 19:25	07/08/23 01:20	1
NEtFOSA	<1.9		1.9	0.81	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSA	<1.9		1.9	0.40	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSAA	<4.7		4.7	1.1	ng/L		07/03/23 19:25	07/08/23 01:20	1

Client: ARCADIS US Inc
Job ID: 500-235454-1
Project/Site: Marinette, WI Deep Well 30168809.1.4.1

Client Sample ID: FIELD BLANK-06-15-2023-DW
Lab Sample ID: 500-235454-3
Date Collected: 06/15/23 17:50
Matrix: Water
Date Received: 06/17/23 09:00

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
NEtFOSAA	<4.7		4.7	1.2	ng/L		07/03/23 19:25	07/08/23 01:20	1
NMeFOSE	<3.7		3.7	1.3	ng/L		07/03/23 19:25	07/08/23 01:20	1
NEtFOSE	<1.9		1.9	0.80	ng/L		07/03/23 19:25	07/08/23 01:20	1
4:2 FTS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/08/23 01:20	1
6:2 FTS	<4.7		4.7	2.3	ng/L		07/03/23 19:25	07/08/23 01:20	1
8:2 FTS	<1.9		1.9	0.43	ng/L		07/03/23 19:25	07/08/23 01:20	1
10:2 FTS	<1.9		1.9	0.63	ng/L		07/03/23 19:25	07/08/23 01:20	1
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	<1.9		1.9	0.37	ng/L		07/03/23 19:25	07/08/23 01:20	1
HFPO-DA (GenX)	<3.7		3.7	1.4	ng/L		07/03/23 19:25	07/08/23 01:20	1
9Cl-PF3ONS	<1.9		1.9	0.22	ng/L		07/03/23 19:25	07/08/23 01:20	1
11Cl-PF3OUdS	<1.9		1.9	0.30	ng/L		07/03/23 19:25	07/08/23 01:20	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*79*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C5 PFPeA	*74*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFHxA	*69*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFHpA	*66*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFOA	*67*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C5 PFNA	*79*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFDA	*77*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFUnA	*63*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFDoA	*63*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFTeDA	*56*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 PFHxDA	*45*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C3 PFBS	*72*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
18O2 PFHxS	*81*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C4 PFOS	*80*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C8 FOSA	*72*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d3-NMeFOSAA	*68*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d5-NEtFOSAA	*73*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d-N-MeFOSA-M	*69*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d-N-EtFOSA-M	*61*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d7-N-MeFOSE-M	*76*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
d9-N-EtFOSE-M	*76*		*10 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-4:2 FTS	*64*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-6:2 FTS	*61*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
M2-8:2 FTS	*71*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C3 HFPO-DA	*75*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*
13C2 10:2 FTS	*60*		*25 - 150*	*07/03/23 19:25*	*07/08/23 01:20*	*1*